



Cypress Semiconductor Corporation, 198 Champion Court, San Jose, CA 95134. Tel: (408) 943-2600

PRODUCT CHANGE NOTIFICATION

PCN: PCN181006

Date: March 15, 2018

Subject: Qualification of Fab 25 as an Additional Wafer Fab Site, Test 25 as an Additional Sort Site and ASE-Kaohsiung Taiwan as an Additional Assembly, Test and Finish Site for the PSoC® 4xx7 BLE and PSoC® 4xx8 BLE Product Family

To: FUTURE ELECTRONICS
FUTURE ELE
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Change Type: Major

Description of Change:

Cypress announces the qualification of Fab 25 in Austin, Texas as an additional wafer fab site, Test 25 as an additional sort site in Austin, Texas and qualification of ASE-Kaohsiung Taiwan (ASE-KH) as an additional assembly, test and finish site for 56-Pin QFN (7x7x0.6mm) for the PSoC® 4xx7 BLE and PSoC® 4xx8 BLE product family.

ASE-KH is a world-class manufacturing facility, qualified to build standard grade as well as automotive grade products in consistent with AEC-Q100. ASE-KH is certified to several international quality standards, including ISO/TS16949, OHSAS18001 and ANSI/ESD S20.20. The qualification of this facility will enable Cypress to tailor manufacturing operations to meet our customers' stringent quality and reliability requirements in our effort to continually provide world-class service. 56-pin QFN (7x7x0.6mm) packages assembled at ASE-KH will use the following Bill of Materials (BOM).

Assembly Site	Cypress Philippines	ASE-Kaohsiung Taiwan
Mold Compound	Sumitomo G700Y	Sumitomo EME-G700LA
Die Attach	Ablestik QMI519	Hitachi EN4900F
Bond Wire	0.8 mil CuPd	0.8 mil CuPd
Lead Finish	NiPdAu	Pure Sn

These qualifications are part of the flexible manufacturing initiatives which allow Cypress to meet its delivery commitments in dynamic and changing market conditions.

Benefit of Change:

Qualification of alternate manufacturing sites is part of the ongoing flexible manufacturing initiative announced by Cypress. The goal of the flexible manufacturing initiative is to provide

the means for Cypress to continue to meet delivery commitments through dynamic, changing market conditions.

Part Numbers Affected: 82

See the attached 'Affected Parts List' file for a list of all part numbers affected by this change. Note that any new parts that are introduced after the publication of this PCN will include all changes outlined in this PCN.

Qualification Status:

These products have been qualified through a series of tests documented in the Qualification Test Plans summarized in the table below. These qualification reports can be found as attachments to this PCN or by visiting www.cypress.com and typing the QTP number in the keyword search window.

Qualification	QTP Report Number
PSoC® 4xx7 BLE Device Family Fab 25	151603
PSoC® 4xx8 BLE Device Family Fab 25	162013
Cypress Test 25 as Additional Sort Site	171610
ASE-KH as Additional Assembly Site	144405
ASE-KH as Additional Test Site	153801
ASE-KH as Additional Finish Site	113901

Sample Status:

Qualification samples may not be built ahead of time for all part numbers affected by this change. Please review the attached 'Affected Parts List' file for a list of affected part numbers with their associated sample ordering part numbers. Samples are available now unless there is an indication that the sample ordering part numbers are subject to lead times. If you require qualification samples, please contact your local Cypress sales representative as soon as possible, preferably within 30 days of the date of this PCN, to place any sample orders.

Approximate Implementation Date:

Effective 90 days from the date of this notification or upon customer approval, whichever comes first, all shipments of the affected part numbers in the attached file will be supplied from any of the qualified manufacturing sites. This change will be effective upon customer approval.

Anticipated Impact:

Products manufactured at Fab 25, Sorted at Test 25 and manufactured at ASE are completely compatible with existing products from form, fit, functional, parametric, and quality performance perspectives.

Cypress also recommends that customers take this opportunity to review these changes against current application notes, system design considerations and customer environment conditions to assess impact (if any) to their application.

Method of Identification:

Cypress maintains traceability of product to wafer level, including wafer fabrication location, through the lot number marked on the package.

Response Required:

No response is required.

For additional information regarding this change, contact your local sales representative or contact the PCN Administrator at pcn_adm@cypress.com.

Sincerely,

Cypress PCN Administration

Item	Marketing Part Number	Package	Sample Order Part Number
1	CY8C4127FNI-BL483T	68-WLCSP	CY8C4127FNI2-BL483 Subject to lead time
2	CY8C4127FNI-BL493T	68-WLCSP	CY8C4127FNI2-BL493 Subject to lead time
3	CY8C4127LQI-BL453	56-QFN	CY8C4127LQI2-BL453
4	CY8C4127LQI-BL453T	56-QFN	CY8C4127LQI2-BL453
5	CY8C4127LQI-BL473	56-QFN	CY8C4127LQ2I-BL473 Subject to lead time
6	CY8C4127LQI-BL473T	56-QFN	CY8C4127LQI2-BL473 Subject to lead time
7	CY8C4127LQI-BL483	56-QFN	CY8C4127LQI2-BL483 Subject to lead time
8	CY8C4127LQI-BL483T	56-QFN	CY8C4127LQI2-BL483 Subject to lead time
9	CY8C4127LQI-BL493	56-QFN	CY8C4127LQI2-BL493 Subject to lead time
10	CY8C4127LQI-BL493T	56-QFN	CY8C4127LQI2-BL493 Subject to lead time
11	CY8C4128FNI-BL543T	76-WLCSP	CY8C4128FNI2-BL543 Subject to lead time
12	CY8C4128FNI-BL553T	76-WLCSP	CY8C4128FNI2-BL553 Subject to lead time
13	CY8C4128FNI-BL563T	76-WLCSP	CY8C4128FNI2-BL563 Subject to lead time
14	CY8C4128FNI-BL573T	76-WLCSP	CY8C4128FNI2-BL573 Subject to lead time
15	CY8C4128FNI-BL583T	76-WLCSP	CY8C4128FNI2-BL583 Subject to lead time
16	CY8C4128FNI-BL593T	76-WLCSP	CY8C4128FNI2-BL593 Subject to lead time
17	CY8C4128LQI-BL473	56-QFN	CY8C4128LQI2-BL473 Subject to lead time
18	CY8C4128LQI-BL473T	56-QFN	CY8C4128LQI2-BL473 Subject to lead time
19	CY8C4128LQI-BL483	56-QFN	CY8C4128LQI2-BL483 Subject to lead time
20	CY8C4128LQI-BL483T	56-QFN	CY8C4128LQI2-BL483 Subject to lead time
21	CY8C4128LQI-BL543	56-QFN	CY8C4128LQI2-BL543 Subject to lead time
22	CY8C4128LQI-BL543T	56-QFN	CY8C4128LQI2-BL543 Subject to lead time
23	CY8C4128LQI-BL553	56-QFN	CY8C4128LQI2-BL553 Subject to lead time
24	CY8C4128LQI-BL553T	56-QFN	CY8C4128LQI2-BL553 Subject to lead time
25	CY8C4128LQI-BL563	56-QFN	CY8C4128LQI2-BL563 Subject to lead time
26	CY8C4128LQI-BL563T	56-QFN	CY8C4128LQI2-BL563 Subject to lead time
27	CY8C4128LQI-BL573	56-QFN	CY8C4128LQI2-BL573 Subject to lead time
28	CY8C4128LQI-BL573T	56-QFN	CY8C4128LQI2-BL573 Subject to lead time
29	CY8C4128LQI-BL583	56-QFN	CY8C4128LQI2-BL583
30	CY8C4128LQI-BL583T	56-QFN	CY8C4128LQI2-BL583
31	CY8C4128LQI-BL593	56-QFN	CY8C4128LQI2-BL593 Subject to lead time
32	CY8C4128LQI-BL593T	56-QFN	CY8C4128LQI2-BL593 Subject to lead time
33	CY8C4247FLI-BL493T	68-Thin WLCSP	CY8C4247FLI2-BL493 Subject to lead time
34	CY8C4247FNI-BL473T	68-WLCSP	CY8C4247FNI2-BL473 Subject to lead time
35	CY8C4247FNI-BL483T	68-WLCSP	CY8C4247FNI2-BL483 Subject to lead time
36	CY8C4247FNI-BL493T	68-WLCSP	CY8C4247FNI2-BL493 Subject to lead time
37	CY8C4247FNQ-BL483T	68-WLCSP	CY8C4247FNQ2-BL483 Subject to lead time
38	CY8C4247LQI-BL453	56-QFN	CY8C4247LQI2-BL453 Subject to lead time
39	CY8C4247LQI-BL453T	56-QFN	CY8C4247LQI2-BL453 Subject to lead time
40	CY8C4247LQI-BL463	56-QFN	CY8C4247LQ2I-BL463 Subject to lead time
41	CY8C4247LQI-BL463T	56-QFN	CY8C4247LQI2-BL463 Subject to lead time
42	CY8C4247LQI-BL473	56-QFN	CY8C4247LQI2-BL473
43	CY8C4247LQI-BL473T	56-QFN	CY8C4247LQI2-BL473
44	CY8C4247LQI-BL483	56-QFN	CY8C4247LQI2-BL483
45	CY8C4247LQI-BL483T	56-QFN	CY8C4247LQI2-BL483
46	CY8C4247LQI-BL493	56-QFN	CY8C4247LQI2-BL493 Subject to lead time
47	CY8C4247LQI-BL493T	56-QFN	CY8C4247LQI2-BL493 Subject to lead time
48	CY8C4247LQQ-BL483	56-QFN	CY8C4247LQQ2-BL483 Subject to lead time
49	CY8C4247LQQ-BL483T	56-QFN	CY8C4247LQQ2-BL483 Subject to lead time
50	CY8C4248FLI-BL483T	76-Thin WLCSP	CY8C4248FLI2-BL483 Subject to lead time
51	CY8C4248FLI-BL583T	76-Thin WLCSP	CY8C4248FLI2-BL583 Subject to lead time
52	CY8C4248FNI-BL483T	76-WLCSP	CY8C4248FNI2-BL483 Subject to lead time
53	CY8C4248FNI-BL543T	76-WLCSP	CY8C4248FNI2-BL543 Subject to lead time
54	CY8C4248FNI-BL553T	76-WLCSP	CY8C4248FNI2-BL553 Subject to lead time

55	CY8C4248FNI-BL563T	76-WLCSP	CY8C4248FNI2-BL563 Subject to lead time
56	CY8C4248FNI-BL573T	76-WLCSP	CY8C4248FNI2-BL573 Subject to lead time
57	CY8C4248FNI-BL583T	76-WLCSP	CY8C4248FNI2-BL583 Subject to lead time
58	CY8C4248FNI-BL593T	76-WLCSP	CY8C4248FNI2-BL593 Subject to lead time
59	CY8C4248FNQ-BL583T	76-WLCSP	CY8C4248FNQ2-BL583 Subject to lead time
60	CY8C4248LQI-BL453	56-QFN	CY8C4248LQI2-BL453 Subject to lead time
61	CY8C4248LQI-BL453T	56-QFN	CY8C4248LQI2-BL453 Subject to lead time
62	CY8C4248LQI-BL473	56-QFN	CY8C4248LQI2-BL473 Subject to lead time
63	CY8C4248LQI-BL473T	56-QFN	CY8C4248LQI2-BL473 Subject to lead time
64	CY8C4248LQI-BL483	56-QFN	CY8C4248LQI2-BL483 Subject to lead time
65	CY8C4248LQI-BL483T	56-QFN	CY8C4248LQI2-BL483 Subject to lead time
66	CY8C4248LQI-BL543	56-QFN	CY8C4248LQI2-BL543 Subject to lead time
67	CY8C4248LQI-BL543T	56-QFN	CY8C4248LQI2-BL543 Subject to lead time
68	CY8C4248LQI-BL553	56-QFN	CY8C4248LQI2-BL553 Subject to lead time
69	CY8C4248LQI-BL553T	56-QFN	CY8C4248LQI2-BL553 Subject to lead time
70	CY8C4248LQI-BL563	56-QFN	CY8C4248LQI2-BL563 Subject to lead time
71	CY8C4248LQI-BL563T	56-QFN	CY8C4248LQI2-BL563 Subject to lead time
72	CY8C4248LQI-BL573	56-QFN	CY8C4248LQI2-BL573 Subject to lead time
73	CY8C4248LQI-BL573T	56-QFN	CY8C4248LQI2-BL573 Subject to lead time
74	CY8C4248LQI-BL583	56-QFN	CY8C4248LQI2-BL583
75	CY8C4248LQI-BL583T	56-QFN	CY8C4248LQI2-BL583
76	CY8C4248LQI-BL593	56-QFN	CY8C4248LQI2-BL593 Subject to lead time
77	CY8C4248LQI-BL593T	56-QFN	CY8C4248LQI2-BL593 Subject to lead time
78	CY8C4248LQQ-BL583	56-QFN	CY8C4248LQQ2-BL583 Subject to lead time
79	CY8C4248LQQ-BL583T	56-QFN	CY8C4248LQQ2-BL583 Subject to lead time
80	CG8370AM	56-QFN	CG8370BM
81	CS8808AM	56-QFN	CS8808BM Subject to lead time
82	CS8808AMT	56-QFN	CS8808BM Subject to lead time

Cypress Semiconductor Product Qualification Report

QTP# 162013 VERSION*A
February 2018

PSoC® 4xx8 BLE 4.1 and PSoC 4xx8 BLE 4.2 Device Family S8PIRS Technology, Fab 25	
CY8C4128LQI-BLxxx	Programmable System-on-Chip With Bluetooth Low Energy (PSoC 4 BLE)
CY8C4128FNI-BLxxx	
CY8C4248LQx-BLxxx	
CY8C4248FNx-BLxxx	
CY8C4248FLI-BLxxx	

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
151008	Qualification of S8* Technology in Fab 25 Using TrueTouch® Gen6M Touchscreen Controller Device	Dec. 2015
151303	Qualification of CapSense® MBR3 Device, S8PF-10R Technology in Fab 25	Dec. 2015
160401	Qualification of TrueTouch® Fingerprint Device, S8PFHD-10R Technology in Fab 25	May 2016
160301	Qualification of TrueTouch® Gen6XL Touchscreen Controller Device, S8SPF-10P Technology in Fab 25	June 2016
160803	Qualification of PSoC® 4000S Device, S8PFHD-10R Technology in Fab 25	June 2016
160207	Qualification of PSoC® 3 Device, S8P12-10P Technology in Fab 25	July 2016
161003	Qualification of EZ-PD™ CCG1 USB Type-C PD Controller Device, S8PF-10R Technology in Fab 25	March 2016
160809	Qualification of EZ-PD™ CCG2 USB Type-C PD Controller Device, S8PR2-10R Technology in Fab 25	Aug. 2016
164802	Qualification of EZ-PD™ CCG2 USB Type-C PD Controller Device, S8PR1-10/S8PHR-10R Technology in Fab 25	Sept. 2017
163301	Qualification of EZ-PD™ CCG3 USB Type-C PD Controller Device, S8SPF-20/S8SPF20-NP Technology in Fab 25 (Al BEOL Interconnect)	June 2017
164302	Qualification of EZ-PD™ CCG3 USB Type-C PD Controller Device, S8SPF-20/S8SPF20-NP Technology in Fab 25 (Cu BEOL Interconnect)	Nov. 2017
162113	Qualification of EZ-PD™ CCG4 USB Two-Port Type-C PD Controller Device, S8SPR1P Technology in Fab 25	March 2017
170802	Qualification of EZ-PD™ CCG5 USB Type-C PD Controller Device, S8SPFN-20R Technology in Fab 25	Oct. 2017
151603	Qualification of PSoC® 4xx7 BLE Device Family, S8PIR-10R Technology in Fab 25	Feb. 2018
162013	Qualification of PSoC® 4xx8 BLE 4.1 and PSoC 4xx8 BLE 4.2 Device Family, S8PIRS Technology in Fab 25	Feb. 2018

PRODUCT DESCRIPTION

Qualification Purpose: To qualify PSoC 4xx8 BLE 4.1 and PSoC 4xx8 BLE 4.2 device, S8PIRS technology in Fab 25	
Marketing Part #:	CY8C4128LQI-BLxxx/ CY8C4128FNI-BLxxx/ CY8C4248LQx-BLxxx/ CY8C4248FNx-BLxxx/ CY8C4248FLI-BLxxx
Device Description:	Programmable System-on-Chip with Bluetooth Low Energy (PSoC 4 BLE)
Cypress Division:	Cypress Semiconductor – MCU and Connectivity Division (MCD)

TECHNOLOGY/FAB PROCESS DESCRIPTION

Number of Metal Layers:	Proprietary	Metal Composition:	Proprietary
Passivation Type and Thickness:	Proprietary		
Generic Process Technology/Design Rule (μ -drawn):	Proprietary		
Gate Oxide Material/Thickness (MOS):	Proprietary		
Name/Location of Die Fab (prime) Facility:	Fab 25		
Die Fab Line ID/Wafer Process ID:	S8PIRS		

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION

Package Designation:	LQ56A
Package Outline, Type, or Name:	56-Pin Quad Flat No Lead , 7x7x0.6mm
Mold Compound Name/Manufacturer:	G700Y/Sumitomo
Mold Compound Flammability Rating:	V-0 UL94
Oxygen Rating Index: >28%	54%
Lead Frame Designation:	FMP
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Saw Process
Die Attach Supplier:	Henkel
Die Attach Material:	QMI 519
Bond Diagram Designation	001-96712
Wire Bond Method:	Thermosonic
Wire Material/Size:	CuPd/0.9 mil (23um)
Thermal Resistance Theta JA °C/W:	17 °C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	11-21099
Name/Location of Assembly (prime) facility:	CML-RA
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION

Test Location:	CML-RA
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RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Data Retention	150°C/175°C, No Bias JESD22-A117 and JESD22-A103	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V/750V/1,000V/1,250V/1,500V/1,750V/2,000V JESD22-C101	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1,100V/2,200V /3,300V/4,000V/5,000V/6,000V/7,000V JESD22, Method A114	P
Endurance Test	MIL-STD-883, Method 883-1033/ JESD22-A117	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 110°C /130°C, 85% RH, 5.0V/5.5V/6.6V Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
High Accelerated Saturation Test (HAST) - Unbiased	JEDEC STD 22-A110: 130°C, 85% RH Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max=2.07V/2.27V, 125°C /150°C JESD22-A-108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=2.07V/2.27V, 125°C /150°C JESD22-A-108	P
Low Temperature Operating Life	Dynamic Operating Condition, -40°C JESD22-A108	P
Pressure Cooker	JESD22-A102:121°C /100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Pre/Post LFR AC/DC Char	AC/DC Critical Parameter Char at 0 hour/500hrs; 0 hour/1000hrs	P
SEM Analysis	MIL-STD-883, Method 2018	P
Static Latch-up	85°C, +/- 140mA, +/- 200mA, +/-300mA 125°C, +/-100mA, +/-140mA JESD 78	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition B, -55°C to 125°C MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF ³	Failure Rate
High Temperature Operating Life Early Failure Rate	1,527 Devices	0	N/A	N/A	0 PPM ⁽¹⁾
High Temperature Operating Life Long Term Failure Rate	616,140 DHRs	0	0.7	170	7 FIT ⁽²⁾
	397, 504 DHRs	0	0.7	55	

1. Early Failure Rate was computed from QTP# 162013.
2. Long Term Failure Rate was computed from QTP#151008, QTP#151303, QTP#160301, QTP#160207, QTP# 161003, QTP# 164802, QTP# 163301, QTP# 164302, QTP# 170802, QTP# 151603 and QTP# 162013 LFR data.

¹ Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

² Chi-squared 60% estimations used to calculate the failure rate.

³ Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp \left[\frac{E_A}{k} \left[\frac{1}{T_2} - \frac{1}{T_1} \right] \right]$$

where:

E_A = The Activation Energy of the defect mechanism.

K = Boltzmann's constant = 8.62×10^{-5} eV/Kelvin.

T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 151008

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	15	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	15	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	80	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1000	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1000	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	76	80	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	152	79	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	76	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	152	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	76	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150, 2.07V, Vcc Max)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	48	1490	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	48	1510	0	
CYTT214032 (8CP206101)	4545249	611537364	CML-RA	48	1547	0	
STRESS: ENDURANCE							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	168	78	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	78	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	168	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	168	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	9	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	750	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1000	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1250	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1500	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1750	3	0	

Reliability Test Data

QTP #: 151008

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ESD-CHARGE DEVICE MODEL							
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	9	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	750	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1000	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1250	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1500	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1750	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	9	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	750	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1000	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1250	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1500	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1750	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1100	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	2200	8	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	3300	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	4000	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	5000	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1100	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	2200	8	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	3300	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	4000	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1100	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	2200	8	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	3300	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	4000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	96	30	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	96	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	80	116	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	116	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	80	120	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	120	0	

Reliability Test Data

QTP #: 151008

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: LOW TEMPERATURE OPERATING LIFE, -40C							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	160	40	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	380	40	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	168	75	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	168	78	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	168	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	288	80	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	10+2	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	10+2	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	10+2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	6	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	6	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	3	0	
STRESS: SEM CROSS SECTION							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	1	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	80	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1000	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	79	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1000	79	0	
STRESS: THERMAL JUNCTION MEASUREMENT							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	1	0	

Reliability Test Data

QTP #: 151303

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	500	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	76	80	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8CMBR31552 (8CP44303CB)	4542914	611534693	ASE-G	48	1469	0	
STRESS: ENDURANCE							
CY8CMBR31552 (8CP44303CB)	4542914	611534693	ASE-G	168	80	0	
CY8CMBR31552 (8CP44303CB)	4542914	611534693	ASE-G	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	500	9	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	750	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1250	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1500	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1750	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1100	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	2200	8	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	3300	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	4000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	5000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	6000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	7000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8CMBR31552(8CP44303CB)	4542914	611534693	ASE-G	80	120	0	
CY8CMBR31552(8CP44303CB)	4542914	611534693	ASE-G	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	168	80	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	288	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CY8CMBR31552(8CP44303CB)	4542914	611534693	ASE-G	COMP	10+2	0	

Reliability Test Data

QTP #: 151303

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 140mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	500	80	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1000	80	0	

Reliability Test Data

QTP #: 160401

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	500	80	0	
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	1000	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	48	1550	0	
STRESS: ENDURANCE							
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	168	80	0	
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	1000	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	500	9	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	750	3	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	1000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	1100	3	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	2200	3	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	3300	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	168	80	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	168	76	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	500	78	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	1000	76	0	

Reliability Test Data

QTP #: 160301

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	76	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	48	2609	1	No Visual Defect found
CYAT816882 (8C206802BB)	3617006	611617664	CML-R	48	1013	0	
STRESS: ENDURANCE							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	9	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	750	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	3	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	500	9	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1000	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1250	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1500	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1750	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1100	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	2200	8	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	3300	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	4000	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	5000	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	6000	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	7000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	99	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	10	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	

Reliability Test Data

QTP #: 160301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	80	0	

Reliability Test Data

QTP #: 160803

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	48	1596	0	
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STRESS: ESD-CHARGE DEVICE MODEL

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	500	9	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	750	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1250	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1500	3	0	

STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1100	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	2200	8	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	3300	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	4000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	5000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	6000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	7000	3	0	

STRESS: STATIC LATCH-UP (125C, 100mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (125C, 140mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (85C, 140mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (85C, 200mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (85C, 300mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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Reliability Test Data

QTP #: 160207

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	90	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	1000	90	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	76	90	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	152	90	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	48	2303	0	
STRESS: ENDURANCE							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	168	90	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	90	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	9	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	1100	3	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	2200	8	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	96	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	125	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	168	78	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	80	0	

Reliability Test Data

QTP #: 161003

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CYPD1103 (8F44100)	4537464	611531543	CML-R	76	80	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	48	1510	0	
STRESS: ENDURANCE							
CYPD1103 (8F44100)	4537464	611531543	CML-R	168	80	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	9	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	750	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1000	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1250	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1500	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1750	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD1103 (8F44100)	4537464	611531543	CML-R	1100	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	2200	8	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	3300	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	4000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	80	120	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	168	80	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	288	80	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	10+2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	6	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	3	0	

Reliability Test Data

QTP #: 161003

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
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STRESS: STATIC LATCH-UP (85C, 300mA)

CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	3	0	
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STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)

CYPD1103 (8F44100)	4537464	611531543	CML-R	500	79	0	
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CYPD1103 (8F44100)	4537464	611531543	CML-R	1000	79	0	
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Reliability Test Data

QTP #: 160809

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	500	9	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	750	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1000	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1250	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1500	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1750	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1100	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	2200	8	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	3300	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	4000	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	5000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150, 2.07V, Vcc Max)							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	48	1032	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	48	537	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
YIELD: BACKEND							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	COMP	EQUIVALENT		
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	EQUIVALENT		
YIELD: E-TEST							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	COMP	EQUIVALENT		
YIELD: SORT							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	COMP	EQUIVALENT		

Reliability Test Data

QTP #: 164802

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	15	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	9	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	750	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1000	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1250	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1500	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1750	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1100	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	2200	8	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	3300	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	4000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 6.6V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	96	28	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	48	1550	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	80	84	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	81	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	96	80	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	168	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	0	10+2	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	10+2	0	

Reliability Test Data

QTP #: 164802

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	80	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1000	80	0	

Reliability Test Data

QTP #: 163301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8C4248AZI2 (8CP42003CB)	3621015	611619413	G-Taiwan	76	80	0	
CY8C4248AZI2 (8CP42003CB)	3621015	611619413	G-Taiwan	152	80	0	
STRESS: ENDURANCE							
CY8C4248AZI2 (8CP42003CB)	3621015	611619413	G-Taiwan	168	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	9	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1000	3	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1250	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1000	3	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	2200	8	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	3300	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	96	25	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	192	25	0	
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	96	26	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	48	1103	0	
CYPD3135 (7CP64301DB)	3641022	611637237	CML-RA	48	413	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	48	1570	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	117	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	80	130	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	500	130	0	
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	45	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1000	45	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	500	45	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	1000	45	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	0	10+2	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	10+2	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	0	10+2	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	500	10+2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	2	0	

Reliability Test Data

QTP #: 163301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	2	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	6	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	6	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	2	0	
STRESS: THERMAL JUNCTION MEASUREMENT							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	COMP	1	0	

Reliability Test Data

QTP #: 164302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	22	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	500	9	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	750	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1000	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1250	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1500	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1750	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1100	9	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	2200	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	3300	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	4000	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	5000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	96	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	48	1040	1	Functional (NGDO_Vbus)
CYPD31357 (7CP64301JB)	3715132	611716236	CML-RA	48	1043	0	
CYPD31357 (7CP64301JB)	3719028	611719500	CML-RA	48	985	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	500	79	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	168	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	0	10+2	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	500	10+2	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	

Reliability Test Data

QTP #: 164302

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
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STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)

CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	500	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	1000	0	

Reliability Test Data

QTP #: 170802

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	COMP	22	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	500	9	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1000	3	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1250	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	CML-RA	500	9	0	
CYPD5125 (7CP645002B)	3736092	611735126	CML-RA	1000	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	CML-RA	1250	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1100	3	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	2200	8	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	3300	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	SB-Thailand	1100	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	SB-Thailand	2200	8	0	
CYPD5125 (7CP645002B)	3736092	611735126	SB-Thailand	3300	3	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	2200	12	0	(CC Pins-EAG)
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1100	56	0	(SBU Pins-CML)
STRESS: HI-ACCEL SATURATION TEST (110C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	264	30	0	
STRESS: HI-ACCEL SATURATION TEST- UNBIASED (130C, 85%RH), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	96	80	0	
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	192	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	48	1538	0	
CYPD5225 (7CP645001B)	3731039	611729762	SB-Thailand	48	1594	0	
CYPD5225 (7CP645001B)	3734103	611733486	SB-Thailand	48	1653	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD5225 (7CP645001B)	3731039	611729762	SB-Thailand	80	129	0	
CYPD5225 (7CP645001B)	3731039	611729762	SB-Thailand	500	124	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	

Reliability Test Data

QTP #: 170802

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: TC COND. B -55C TO 125C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	500	80	0	
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	1000	80	0	

Reliability Test Data

QTP #: 151603

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	76	80	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	152	79	0	
STRESS: ENDURANCE							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	168	80	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	500	9	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	750	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1000	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1250	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1500	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1750	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	1100	3	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	2200	8	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	3300	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.07V, Vcc Max)							
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	48	921	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	96	918	0	
CY8C4127LQI (8CP41275D)	3709056	611735728	CML-RA	48	600	0	
CY8C4127LQI (8CP41275D)	3709056	611735728	CML-RA	96	600	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 2.07V, Vcc Max)							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	168	200	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1000	197	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	168	80	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	288	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	0	10+2	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1000	10+2	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	COMP	3	0	



Reliability Test Data

QTP #: 151603

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8C4127LQI (8CP41275D)	3645064	611708314	CML-RA	500	80	0	
CY8C4127LQI (8CP41275D)	3645064	611708314	CML-RA	1000	80	0	

Reliability Test Data

QTP #: 162013

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	500	80	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1000	76	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1500	74	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	500	80	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	1000	80	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	1500	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	500	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	1000	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	1500	80	0	
STRESS: ENDURANCE							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	168	80	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	500	76	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	168	80	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	500	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	168	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	500	9	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	750	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1000	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1250	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1500	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1750	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1100	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	2200	8	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	3300	3	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	4000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.0V), PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	96	26	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	128	26	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	96	30	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	128	30	0	

Reliability Test Data

QTP #: 162013

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.07V, Vcc Max)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	96	763	0	
CY8C4248LQI (8CP47600B)	4633568	611638967	CML-RA	96	762	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 2.07V, Vcc Max)							
CY8C4128LQI (8CP47600B)	3645065	611707325	CML-RA	168	200	0	
CY8C4128LQI (8CP47600B)	3645065	611707325	CML-RA	1000	200	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C4248LQI (8CP47600B)	3725113	611733522	CML-RA	168	80	0	
CY8C4248LQI (8CP47600B)	3725113	611733522	CML-RA	288	80	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CY8C4128LQI (8CP47600B)	3645065	611707325	CML-RA	0	10+2	0	
CY8C4128LQI (8CP47600B)	3645065	611707325	CML-RA	1000	10+2	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	500	78	0	
CY8C4248LQI (8CP47600B)	4633568	611638968	CML-RA	1000	78	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	500	80	0	
CY8C4248LQI (8CP47600B)	3645064	611708314	CML-RA	1000	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	500	80	0	
CY8C4248LQI (8CP47600B)	3645065	611707324	CML-RA	1000	75	0	

Document History Page

Document Title: QTP# 162013: PSoC 4xx8 BLE 4.1 and PSoC 4xx8 BLE 4.2 Device Family, S8PIRS Technology
Fab 25
Document Number: 002-22707

Rev.	ECN No.	Orig. of Change	Description of Change
**	6015810	JYF	Initial spec release.
*A	6075573	JYF	MPN Update.

Cypress Semiconductor Product Qualification Report

QTP# 151603 VERSION*A
February 2018

PSoC® 4xx7 BLE Device Family S8PIR-10R Technology, Fab 25	
CY8C4127LQI-BLxxx	Programmable System-on-Chip With Bluetooth Low Energy (PSoC 4 BLE)
CY8C4127FNI-BLxxx	
CY8C4247LQx-BLxxx	
CY8C4247FNx-BLxxx	
CY8C4247FLI-BLxxx	

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
151008	Qualification of S8* Technology in Fab 25 Using TrueTouch® Gen6M Touchscreen Controller Device	Dec. 2015
151303	Qualification of CapSense® MBR3 Device, S8PF-10R Technology in Fab 25	Dec. 2015
160401	Qualification of TrueTouch® Fingerprint Device, S8PFHD-10R Technology in Fab 25	May 2016
160301	Qualification of TrueTouch® Gen6XL Touchscreen Controller Device, S8SPF-10P Technology in Fab 25	June 2016
160803	Qualification of PSoC® 4000S Device, S8PFHD-10R Technology in Fab 25	June 2016
160207	Qualification of PSoC® 3 Device, S8P12-10P Technology in Fab 25	July 2016
161003	Qualification of EZ-PD™ CCG1 USB Type-C PD Controller Device, S8PF-10R Technology in Fab 25	March 2016
160809	Qualification of EZ-PD™ CCG2 USB Type-C PD Controller Device, S8PR2-10R Technology in Fab 25	Aug. 2016
164802	Qualification of EZ-PD™ CCG2 USB Type-C PD Controller Device, S8PR1-10/S8PHR-10R Technology in Fab 25	Sept. 2017
163301	Qualification of EZ-PD™ CCG3 USB Type-C PD Controller Device, S8SPF-20/S8SPF20-NP Technology in Fab 25 (Al BEOL Interconnect)	June 2017
164302	Qualification of EZ-PD™ CCG3 USB Type-C PD Controller Device, S8SPF-20/S8SPF20-NP Technology in Fab 25 (Cu BEOL Interconnect)	Nov. 2017
162113	Qualification of EZ-PD™ CCG4 USB Two-Port Type-C PD Controller Device, S8SPR1P Technology in Fab 25	March 2017
170802	Qualification of EZ-PD™ CCG5 USB Type-C PD Controller Device, S8SPFN-20R Technology in Fab 25	Oct. 2017
151603	Qualification of PSoC® 4xx7 BLE Device Family, S8PIR-10R Technology in Fab 25	Feb. 2018

PRODUCT DESCRIPTION

Qualification Purpose: To qualify PSoC 4xx7 BLE Device Family, S8PIR-10R Technology in Fab 25	
Marketing Part #:	CY8C4127LQI-BLxxx/ CY8C4127FNI-BLxxx/ CY8C4247LQx-BLxxx CY8C4247FNx-BLxxx/ CY8C4247FLI-BLxxx
Device Description:	Programmable System-on-Chip with Bluetooth Low Energy (PSoC 4 BLE)
Cypress Division:	Cypress Semiconductor – MCU and Connectivity Division (MCD)

TECHNOLOGY/FAB PROCESS DESCRIPTION

Number of Metal Layers:	Proprietary	Metal Composition:	Proprietary
Passivation Type and Thickness:	Proprietary		
Generic Process Technology/Design Rule (μ -drawn):	Proprietary		
Gate Oxide Material/Thickness (MOS):	Proprietary		
Name/Location of Die Fab (prime) Facility:	Fab 25		
Die Fab Line ID/Wafer Process ID:	S8PIR-10		

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION

Package Designation:	LQ56A
Package Outline, Type, or Name:	56-Pin Quad Flat No Lead , 7x7x0.6mm
Mold Compound Name/Manufacturer:	G700Y/Sumitomo
Mold Compound Flammability Rating:	V-0 UL94
Oxygen Rating Index: >28%	54%
Lead Frame Designation:	FMP
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Saw Process
Die Attach Supplier:	Henkel
Die Attach Material:	QMI 519
Bond Diagram Designation	001-92431
Wire Bond Method:	Thermosonic
Wire Material/Size:	CuPd/ 0.8 mil (20um) ; 0.9 mil (23um)
Thermal Resistance Theta JA °C/W:	17 °C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	11-21099
Name/Location of Assembly (prime) facility:	CML-RA
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION

Test Location:	CML-RA
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RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Data Retention	150°C/175°C, No Bias JESD22-A117 and JESD22-A103	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V/750V/1,000V/1,250V/1,500V/1,750V/2,000V JESD22-C101	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1,100V/2,200V /3,300V/4,000V/5,000V/6,000V/7,000V JESD22, Method A114	P
Endurance Test	MIL-STD-883, Method 883-1033/ JESD22-A117	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 110°C /130°C, 85% RH, 5.0V/5.5V/6.6V Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
High Accelerated Saturation Test (HAST) - Unbiased	JEDEC STD 22-A110: 130°C, 85% RH Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max=2.07V/2.27V, 125°C /150°C JESD22-A-108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=2.07V/2.27V, 125°C /150°C JESD22-A-108	P
Low Temperature Operating Life	Dynamic Operating Condition, -40°C JESD22-A108	P
Pressure Cooker	JESD22-A102:121°C /100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Pre/Post LFR AC/DC Char	AC/DC Critical Parameter Char at 0 hour/500hrs; 0 hour/1000hrs	P
SEM Analysis	MIL-STD-883, Method 2018	P
Static Latch-up	85°C, +/- 140mA, +/- 200mA, +/-300mA 125°C, +/-100mA, +/-140mA JESD 78	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition B, -55°C to 125°C MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF ³	Failure Rate
High Temperature Operating Life Early Failure Rate	1,518 Devices	0	N/A	N/A	0 PPM ⁽¹⁾
High Temperature Operating Life Long Term Failure Rate	616,140 DHRs	0	0.7	170	8 FIT ⁽²⁾
	197, 504 DHRs	0	0.7	55	

1. Early Failure Rate was computed from QTP# 151603.
2. Long Term Failure Rate was computed from QTP#151008, QTP#151303, QTP#160301, QTP#160207, QTP# 161003, QTP# 164802, QTP# 163301, QTP# 164302, QTP# 170802, QTP# 151603 LFR data.

¹ Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

² Chi-squared 60% estimations used to calculate the failure rate.

³ Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp \left[\frac{E_A}{k} \left[\frac{1}{T_2} - \frac{1}{T_1} \right] \right]$$

where:

E_A = The Activation Energy of the defect mechanism.

K = Boltzmann's constant = 8.62x10⁻⁵ eV/Kelvin.

T₁ is the junction temperature of the device under stress and T₂ is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 151008

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	15	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	15	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	80	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1000	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1000	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	76	80	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	152	79	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	76	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	152	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	76	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150, 2.07V, Vcc Max)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	48	1490	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	48	1510	0	
CYTT214032 (8CP206101)	4545249	611537364	CML-RA	48	1547	0	
STRESS: ENDURANCE							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	168	78	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	78	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	168	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	168	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	9	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	750	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1000	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1250	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1500	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1750	3	0	

Reliability Test Data

QTP #: 151008

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ESD-CHARGE DEVICE MODEL							
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	9	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	750	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1000	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1250	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1500	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1750	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	9	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	750	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1000	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1250	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1500	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1750	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1100	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	2200	8	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	3300	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	4000	3	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	5000	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	1100	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	2200	8	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	3300	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	4000	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1100	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	2200	8	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	3300	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	4000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	96	30	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	96	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	80	116	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	116	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	80	120	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	120	0	

Reliability Test Data

QTP #: 151008

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: LOW TEMPERATURE OPERATING LIFE, -40C							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	160	40	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	380	40	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	168	75	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	168	78	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	168	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	288	80	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	10+2	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	10+2	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	10+2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	6	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	6	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	3	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	COMP	3	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	COMP	3	0	
STRESS: SEM CROSS SECTION							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	1	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	500	80	0	
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	1000	80	0	
CYTT214032 (8CP206101)	4540145	611534709	CML-RA	500	80	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	500	79	0	
CY8C42452 (8CP44200)	4537464	611531543	CML-RA	1000	79	0	
STRESS: THERMAL JUNCTION MEASUREMENT							
CYTT214032 (8CP206101)	4539372	611534008	CML-RA	COMP	1	0	

Reliability Test Data

QTP #: 151303

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	500	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	76	80	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8CMBR31552 (8CP44303CB)	4542914	611534693	ASE-G	48	1469	0	
STRESS: ENDURANCE							
CY8CMBR31552 (8CP44303CB)	4542914	611534693	ASE-G	168	80	0	
CY8CMBR31552 (8CP44303CB)	4542914	611534693	ASE-G	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	500	9	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	750	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1250	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1500	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1750	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1100	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	2200	8	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	3300	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	4000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	5000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	6000	3	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	7000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8CMBR31552(8CP44303CB)	4542914	611534693	ASE-G	80	120	0	
CY8CMBR31552(8CP44303CB)	4542914	611534693	ASE-G	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	168	80	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	288	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CY8CMBR31552(8CP44303CB)	4542914	611534693	ASE-G	COMP	10+2	0	

Reliability Test Data

QTP #: 151303

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 140mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	500	80	0	
CY8CMBR3106S2(8CP44304)	4542914	611534639	CML-RA	1000	80	0	

Reliability Test Data

QTP #: 160401

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	500	80	0	
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	1000	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	48	1550	0	
STRESS: ENDURANCE							
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	168	80	0	
CY8C42452(8CP44200DB)	4537464	611531543	CML-RA	1000	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	500	9	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	750	3	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	1000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	1100	3	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	2200	3	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	3300	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	168	80	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	168	76	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	500	78	0	
CYFPA1 (8CP2F1001BB)	3609025	611610290	CML-R	1000	76	0	

Reliability Test Data

QTP #: 160301

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	76	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	48	2609	1	No Visual Defect found
CYAT816882 (8C206802BB)	3617006	611617664	CML-R	48	1013	0	
STRESS: ENDURANCE							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	9	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	750	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	3	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	500	9	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1000	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1250	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1500	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	1750	3	0	
CYTT417012 (8CP206801BB)	3613017	611614958	CML-R	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1100	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	2200	8	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	3300	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	4000	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	5000	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	6000	3	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	7000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	99	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	10	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	

Reliability Test Data

QTP #: 160301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	500	80	0	
CYAT816882 (8C206802BB)	3613017	611611087	CML-R	1000	80	0	

Reliability Test Data

QTP #: 160803

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	48	1596	0	
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STRESS: ESD-CHARGE DEVICE MODEL

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	500	9	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	750	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1250	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1500	3	0	

STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	1100	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	2200	8	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	3300	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	4000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	5000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	6000	3	0	
CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	7000	3	0	

STRESS: STATIC LATCH-UP (125C, 100mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (125C, 140mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (85C, 140mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (85C, 200mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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STRESS: STATIC LATCH-UP (85C, 300mA)

CY8C4045 (8CP40003BB)	3615013	611612344	OSE-T	COMP	3	0	
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Reliability Test Data

QTP #: 160207

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	90	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	1000	90	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	76	90	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	152	90	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	48	2303	0	
STRESS: ENDURANCE							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	168	90	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	90	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	9	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	1100	3	0	
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	2200	8	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	96	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	125	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	168	78	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8C3866A (8CP38661HB)	3617013	611615839	CML-R	500	80	0	

Reliability Test Data

QTP #: 161003

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	15	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	80	0	
STRESS: DATA RETENTION, PLASTIC, 175C							
CYPD1103 (8F44100)	4537464	611531543	CML-R	76	80	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	152	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.07V, Vcc Max)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	48	1510	0	
STRESS: ENDURANCE							
CYPD1103 (8F44100)	4537464	611531543	CML-R	168	80	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	9	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	750	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1000	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1250	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1500	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1750	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD1103 (8F44100)	4537464	611531543	CML-R	1100	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	2200	8	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	3300	3	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	4000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.07V, Vcc Max)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	80	120	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	168	80	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	288	80	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	10+2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	6	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	3	0	

Reliability Test Data

QTP #: 161003

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYPD1103 (8F44100)	4537464	611531543	CML-R	500	79	0	
CYPD1103 (8F44100)	4537464	611531543	CML-R	1000	79	0	

Reliability Test Data

QTP #: 160809

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	500	9	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	750	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1000	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1250	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1500	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1750	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	1100	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	2200	8	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	3300	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	4000	3	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	5000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150, 2.07V, Vcc Max)							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	48	1032	0	
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	48	537	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	3	0	
YIELD: BACKEND							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	COMP	EQUIVALENT		
CYPD21342 (7CP64111C)	3612012	611612814	CML-RA	COMP	EQUIVALENT		
YIELD: E-TEST							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	COMP	EQUIVALENT		
YIELD: SORT							
CYPD21342 (7CP64111C)	3612012	611612816	CML-RA	COMP	EQUIVALENT		

Reliability Test Data

QTP #: 164802

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	15	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	9	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	750	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1000	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1250	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1500	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1750	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1100	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	2200	8	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	3300	3	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	4000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 6.6V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	96	28	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	48	1550	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	80	84	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	81	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	96	80	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	168	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	0	10+2	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	10+2	0	

Reliability Test Data

QTP #: 164802

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	500	80	0	
CYPD21227 (7CP64102E)	3705058	611711793	CML-RA	1000	80	0	

Reliability Test Data

QTP #: 163301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8C4248AZI2 (8CP42003CB)	3621015	611619413	G-Taiwan	76	80	0	
CY8C4248AZI2 (8CP42003CB)	3621015	611619413	G-Taiwan	152	80	0	
STRESS: ENDURANCE							
CY8C4248AZI2 (8CP42003CB)	3621015	611619413	G-Taiwan	168	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	9	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1000	3	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1250	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1000	3	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	2200	8	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	3300	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	96	25	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	192	25	0	
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	96	26	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	48	1103	0	
CYPD3135 (7CP64301DB)	3641022	611637237	CML-RA	48	413	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	48	1570	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	117	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	80	130	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	500	130	0	
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	45	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	1000	45	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	500	45	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	1000	45	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	0	10+2	0	
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	500	10+2	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	0	10+2	0	
CYPD3135 (7CP64301DB)	3643014	611639672	CML-RA	500	10+2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	2	0	

Reliability Test Data

QTP #: 163301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	2	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	6	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	6	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD3135 (7CP64301DB)	3652003	611700857	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3652003	611700858	CML-RA	COMP	3	0	
CYPD3135 (7CP64301DB)	3706023	611706634	CML-RA	COMP	2	0	
STRESS: THERMAL JUNCTION MEASUREMENT							
CYPD3135 (7CP64301DB)	3641047	611637169	CML-RA	COMP	1	0	

Reliability Test Data

QTP #: 164302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	22	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	500	9	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	750	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1000	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1250	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1500	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1750	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	1100	9	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	2200	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	3300	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	4000	3	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	5000	3	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	96	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	48	1040	1	Functional (NGDO_Vbus)
CYPD31357 (7CP64301JB)	3715132	611716236	CML-RA	48	1043	0	
CYPD31357 (7CP64301JB)	3719028	611719500	CML-RA	48	985	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	500	79	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	168	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	0	10+2	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	500	10+2	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	3	0	



Reliability Test Data

QTP #: 164302

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	500	0	
CYPD31357 (7CP64301JB)	3714062	611714862	CML-RA	COMP	1000	0	

Reliability Test Data

QTP #: 170802

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	COMP	22	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	500	9	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1000	3	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1250	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	CML-RA	500	9	0	
CYPD5125 (7CP645002B)	3736092	611735126	CML-RA	1000	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	CML-RA	1250	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1100	3	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	2200	8	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	3300	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	SB-Thailand	1100	3	0	
CYPD5125 (7CP645002B)	3736092	611735126	SB-Thailand	2200	8	0	
CYPD5125 (7CP645002B)	3736092	611735126	SB-Thailand	3300	3	0	
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	2200	12	0	(CC Pins-EAG)
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	1100	56	0	(SBU Pins-CML)
STRESS: HI-ACCEL SATURATION TEST (110C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	264	30	0	
STRESS: HI-ACCEL SATURATION TEST- UNBIASED (130C, 85%RH), PRE COND 192 HR 30C/60%RH (MSL3)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	96	80	0	
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	192	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	48	1538	0	
CYPD5225 (7CP645001B)	3731039	611729762	SB-Thailand	48	1594	0	
CYPD5225 (7CP645001B)	3734103	611733486	SB-Thailand	48	1653	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.27V, Vcc Max)							
CYPD5225 (7CP645001B)	3731039	611729762	SB-Thailand	80	129	0	
CYPD5225 (7CP645001B)	3731039	611729762	SB-Thailand	500	124	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	

Reliability Test Data

QTP #: 170802

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: STATIC LATCH-UP (85C, 140mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (85C, 300mA)							
CYPD5225 (7CP645001B)	3736092	611735125	SB-Thailand	COMP	3	0	
STRESS: TC COND. B -55C TO 125C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	500	80	0	
CYPD5225 (7CP645001A)	3718035	611718382	SB-Thailand	1000	80	0	

Reliability Test Data

QTP #: 151603

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 175C							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	76	80	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	152	79	0	
STRESS: ENDURANCE							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	168	80	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	500	80	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	500	9	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	750	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1000	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1250	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1500	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1750	3	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	2000	3	0	
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	1100	3	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	2200	8	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	3300	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 2.07V, Vcc Max)							
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	48	921	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	96	918	0	
CY8C4127LQI (8CP41275D)	3709056	611735728	CML-RA	48	600	0	
CY8C4127LQI (8CP41275D)	3709056	611735728	CML-RA	96	600	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 2.07V, Vcc Max)							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	168	200	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1000	197	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	168	80	0	
CY8C4127LQI (8CP41275D)	3709056	611733261	CML-RA	288	79	0	
STRESS: PRE/POST LFR PARAMETER ASSESSMENT							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	0	10+2	0	
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	1000	10+2	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CY8C4127LQI (8CP41275D)	3615000	611621075	CML-RA	COMP	3	0	



Reliability Test Data

QTP #: 151603

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8C4127LQI (8CP41275D)	3645064	611708314	CML-RA	500	80	0	
CY8C4127LQI (8CP41275D)	3645064	611708314	CML-RA	1000	80	0	

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Document Number: 002-23044

Rev.	ECN No.	Orig. of Change	Description of Change
**	6064955	JYF	Initial spec release.
*A	6075573	JYF	MPN Update.

Cypress Semiconductor Corporation

PSoC® 4xx8 BLE 4.1 and PSoC® 4xx8 BLE 4.2

Characterization Report for Fab25

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2.0 Introduction

2.1 General Description

PSoC® 4 BLE is a 32-bit, 48-MHz ARM® Cortex®-M0 Bluetooth® Low Energy (BLE) solution with CapSense®, 12-bit ADC, four timers, counter, pulse-width modulators (TCPWM), 36 GPIOs, two serial communication blocks (SCBs), LCD, and I2S. PSoC 4 BLE includes a royalty-free BLE stack compatible with Bluetooth 4.2 and provides a complete, programmable, and flexible solution for embedded applications such as remote controls, toys, beacons, and wireless chargers. In addition to these applications, PSoC 4 BLE provides a simple, low-cost way to add BLE connectivity to any system.

Key Features

- Bluetooth 4.2 single-mode device
- 2.4-GHz BLE radio and baseband with integrated balun
- Received signal strength indicator (RSSI) with 1-dB resolution
- BLE protocol stack supporting generic access profile (GAP) Central, Peripheral, Observer, or Broadcaster roles
- CapSense touch-sensing with Two-Finger Gestures

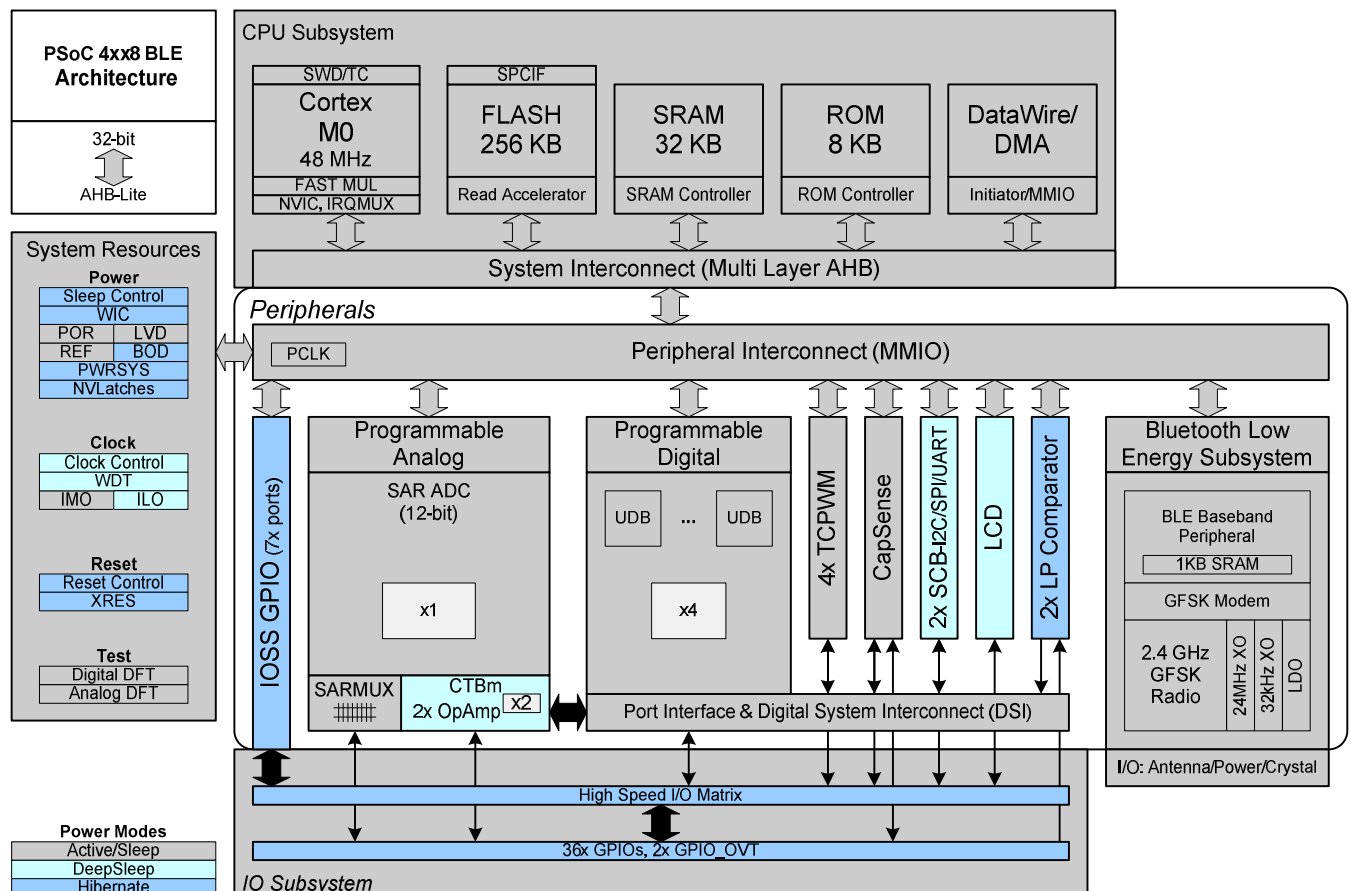


Figure 1. PSoC 4 BLE Block Diagram

2.2 Datasheet

The *PSoC 4xx8 BLE 4.1* and *PSoC 4xx8 BLE 4.2*, which are referred as *PSoC 4xx8 BLE* in this document, meet all datasheet specifications. The datasheet is available from the Cypress Website at: <http://www.cypress.com/products/psoc-4-ble-bluetooth-smart>.

2.3 Qualification Report

The *PSoC 4xx8 BLE* have completed qualification report under QTP 151603. The qualification report is available from the Cypress Website at: <http://www.cypress.com>.

3.0 Characterization Hardware and Setup

DC Characterization Board

Two different boards were used for DC measurements. The DC parameters were measured on an engineering 56 QFN package. Nextest and Agilent HP93K ATE Boards were used to measure DC parameters for GPIOs, trip levels, and SCB currents.

DC Measurement System and Hardware

Temperature Forcing System

Thermionics TPO4310A Precision Temperature Forcing System was used to force operating temperatures of -45°C, 25°C, 105°C and 125°C.

ATE Tester

The Nextest and the Agilent HP93K Testers were used to test the DC parameters for SCB currents, I2C Master and Slave, ADC, GPIO, SPI, SWD, Trip levels (IPOR, PPOR) and Chip level currents.

Oscilloscope

Tektronix DPO 7254 Digital Phosphor Oscilloscope was used to verify IMO oscillator frequency on bench.

Power Supply

Agilent E3631A (Triple Output DC Power supply) and Keithley 2400 series source meter were used to power the device.

LCR Meter

The 4275A Multi-Frequency LCR Meter was used to measure input pin capacitance.

BLE parameters were measured with the following equipment:

1. CBT (ROHDE&SCHWARZ)
2. Spectrum Analyzer(Agilent-E4405B)
3. Signal Generator(Agilent-E4438C)
4. Agilent Power Supply(E3649A)

AC Characterization Board

AC measurements board with Socket was used to characterize all AC parameters, these included all AC parameters related to IMO, ILO oscillators, GPIO rise/fall times.

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DC Characterization Board

DC measurements board with Socket was used to characterize all DC parameters, these included all DC parameters related to OPAMP, Comparator, LCD and Temperature Sensor.

3.1 AC Characterization Board

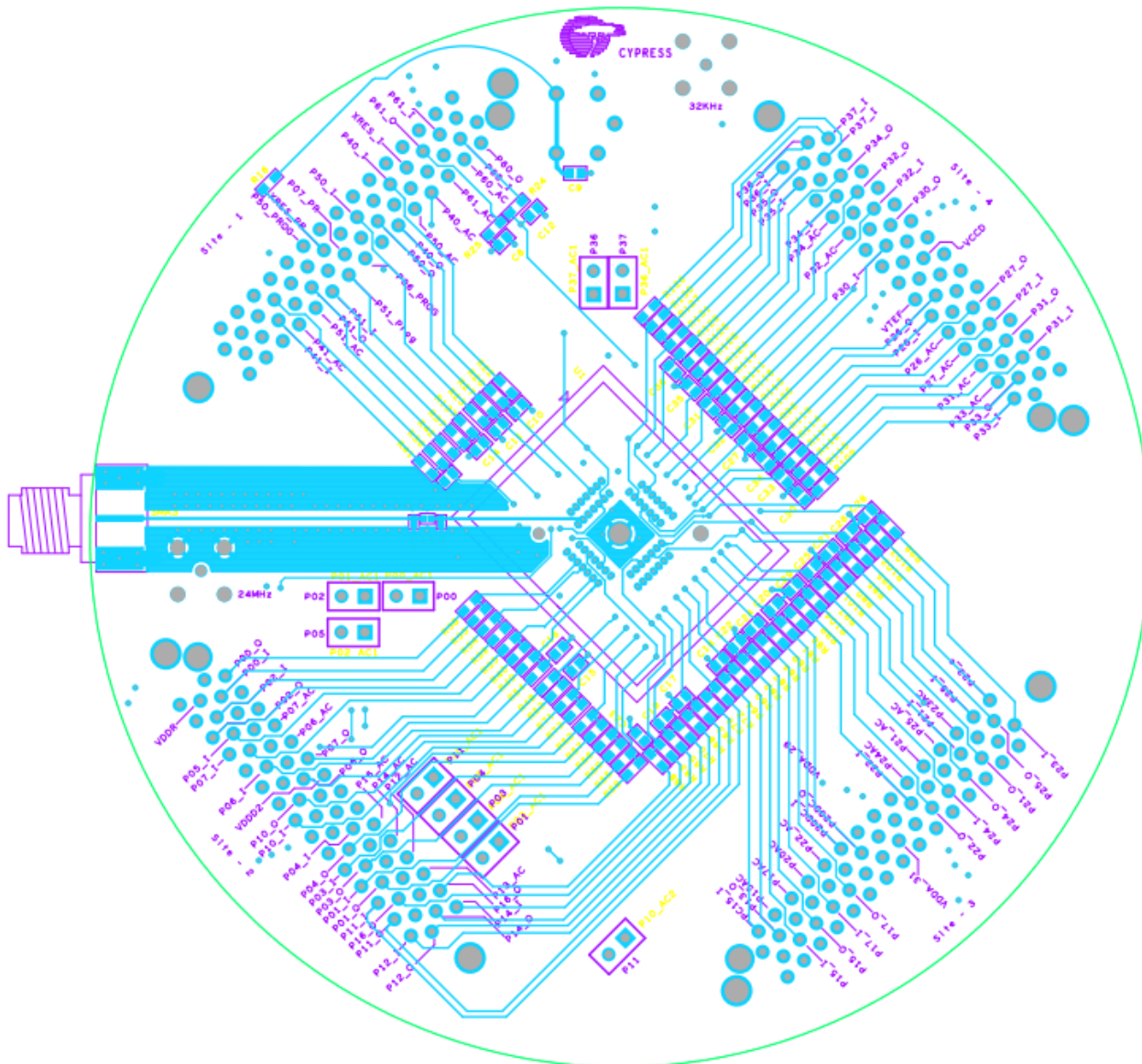


Figure 1. PSoC 4xx8 BLE AC Characterization Board Top View

3.2 DC Characterization Board

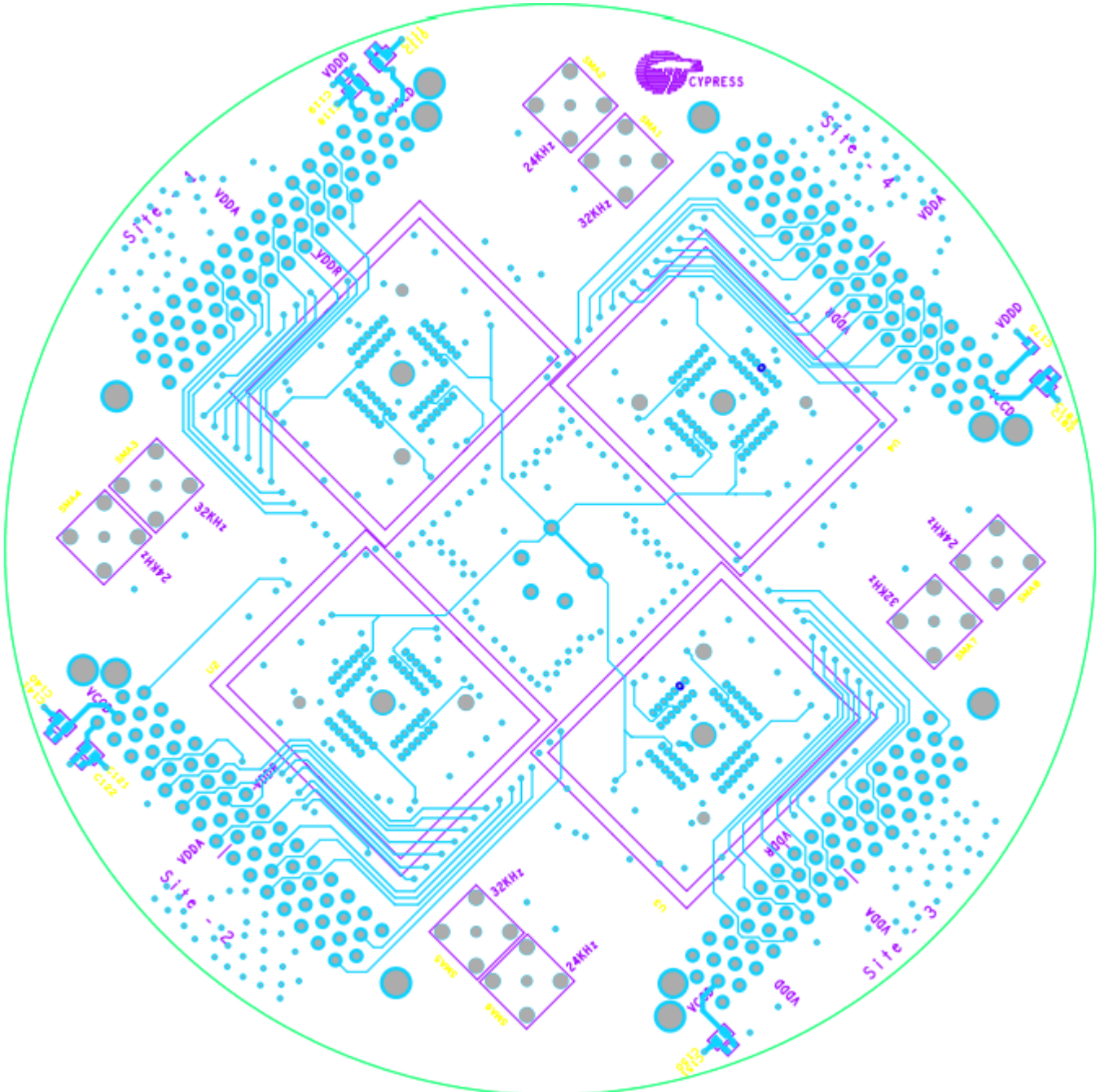


Figure 2. PSoC 4xx8 DC Characterization Board Top View

3.3 ADC Characterization Board

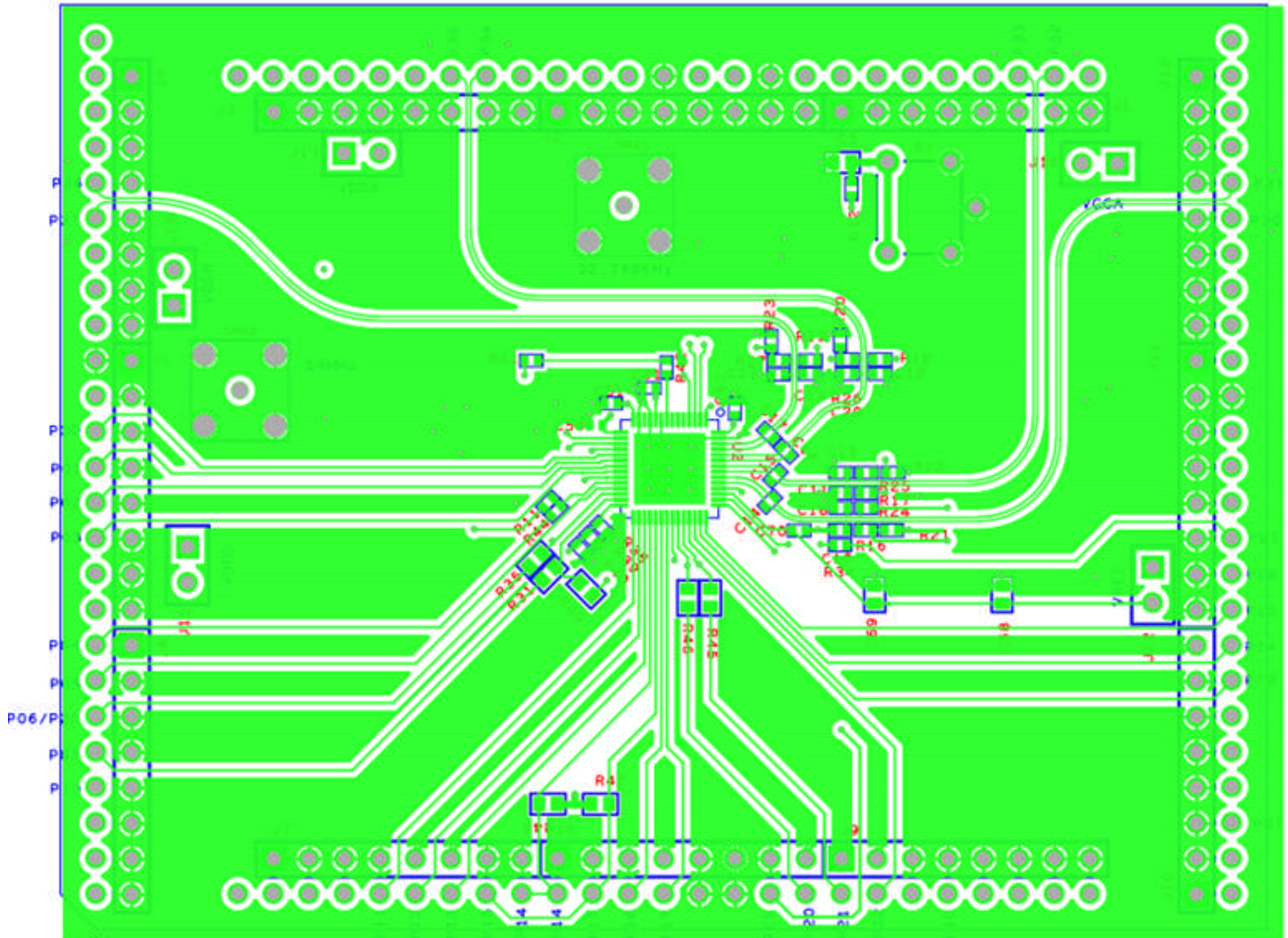


Figure 3. PSoC 4xx8 BLE ADC Characterization Board Top View

3.4 ATE 93K Characterization Board

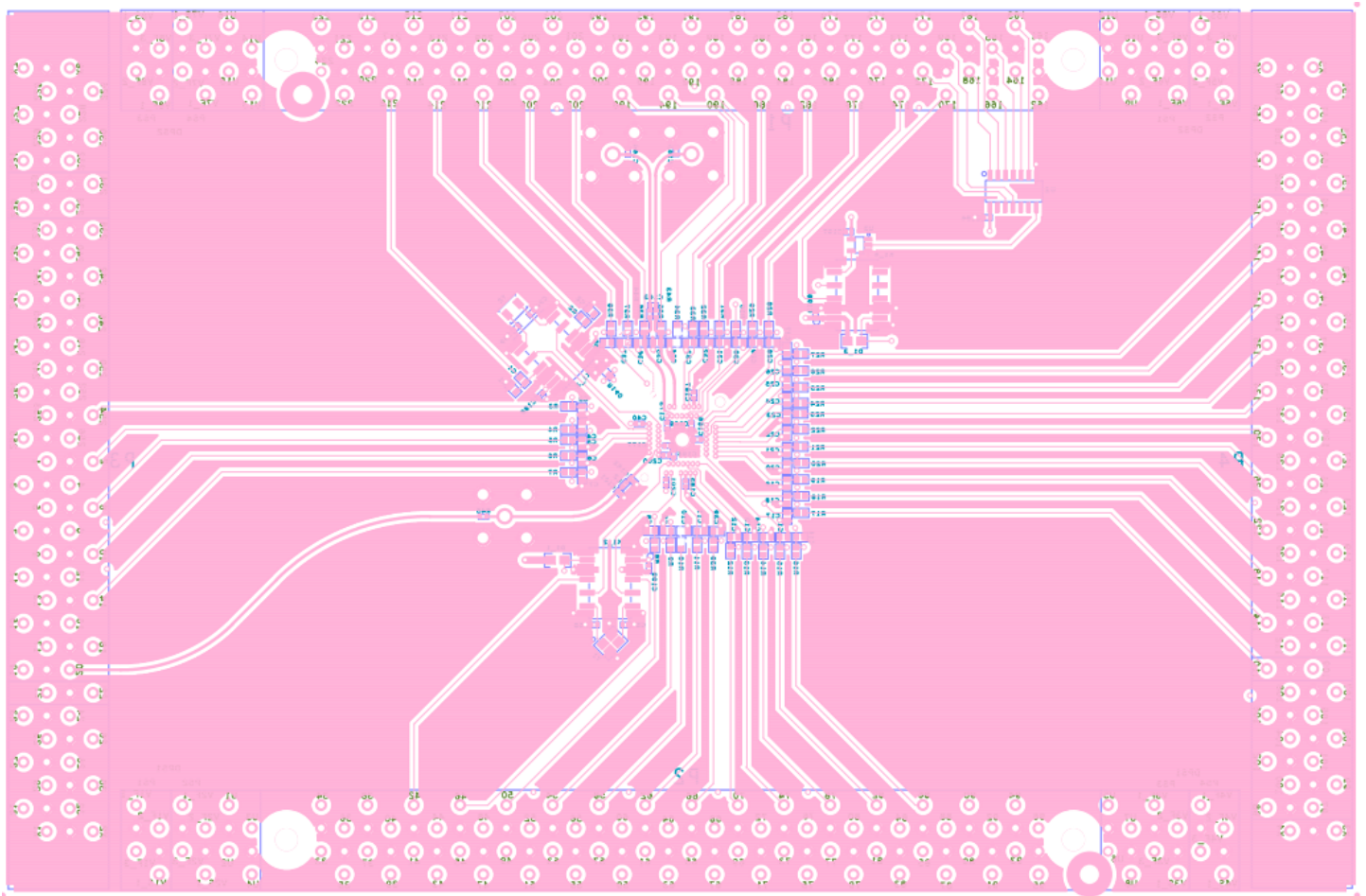


Figure 4. PSoC 4xx8 BLE ATE 93K Characterization Board Top View

3.5 Measurement System and Hardware

ATE Tester

- Verigy 93K ATE tester was used to test all AC parameters of serial communication blocks (I2C, SPI and UART).
- IMO frequencies were measured using the production Nextest tester. These frequencies were correlated against ATE data by measuring them on bench setup as well.

Temperature Forcing System

Same as DC Measurement System and Hardware.

Power Supply

Same as DC Measurement System and Hardware.

Signal Generator

Agilent 81110A was used on bench setups.

Oscilloscope

Tektronix DPO 7254 Oscilloscope was used to measure AC parameters.

Probes

All AC signals were measured through SMA connectors and TAP1500 active probes.

3.6 Characterization Conditions and Parameters

Characterization was done on the following parts and conditions as listed in Table below. Units were built using standard production manufacturing and chosen randomly unless specified.

Table 1. Characterization Conditions and Parameters

Parameter	Device	Fab Lot	Assy Lot	# of Devices	Voltage Variation (V)	Temperature Variation (°C)
DC	CY8C4248LQI-BL583	4633568	611638967	6-30	VDDD, VDDA, VDDR = 1.71, 1.8, 3.3, 5.5, 6.0	-45, 25, 105, 125
AC	CY8C4248LQI-BL583	4633568	611638967	6-30	VDDD, VDDA, VDDR = 1.71, 1.8, 3.3, 5.5, 6.0	-45, 25, 105, 125
RF (BLE)	CY8C4248LQI-BL583	4633568	611638967	30	VDDD = 5, 3.3, 1.9, VDDA = 5, 3.3, 3.3, VDDR = 5, 3.3, 5.5	-45, 25, 105, 125

Note: Minimum sample size was 6 for bench and 30 for ATE.

4.0 Device Level Specifications Characterization Summary across Voltage and Temperature

Table 1. Absolute Maximum Ratings

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Absolute Maximum Ratings													
SID1	Vdd_abs	Analog or Digital Supply relative to Vss (Vssd=Vssa)	-0.5	-	6	V	Absolute Maximum	Input condition			Input condition		
SID2	Vccd_abs	Direct digital core voltage input relative to Vssd	-0.5	-	1.95	V	Absolute Maximum	Input condition			Input condition		
SID3	Vgpio_abs	GPIO voltage	-0.5	-	Vdd+0.5	V	Absolute Maximum	Input condition			Input condition		
SID4	Igpio_abs	Current per GPIO	-25	-	25	mA	Absolute Maximum	Input condition			Input condition		
SID5	Igpio_injection	GPIO injection current, Max for VIH > VDDD,	-0.5	-	0.5	mA	Absolute Maximum Current injected per pin	Input condition			Input condition		
		and Min for VIL < VSS											
DC Specifications													
SID6	Vdd	Power Supply Input Voltage (Vdda=Vddd=Vdd)	1.8		5.5	V	With regulator enabled	Input condition			Input condition		
SID7	Vdd	Power Supply Input Voltage unregulated (Vdda=Vddd=Vdd)	1.71	1.8	1.89	V	Internally unregulated Supply	Input condition			Input condition		
SID8	Vddr	Radio Supply Voltage (RadioON)	1.9		5.5	V		Input condition			Input condition		
SID8A	Vddr	Radio Supply Voltage (Radio OFF)	1.71		5.5	V		Input condition			Input condition		
SID9	Vccd	Digital Regulator Output Voltage (for core Logic)		1.8		V		1.87	1.9	2	1.85	1.85	1.86
SID10	CVCCD	Digital Regulator Output Bypass Capacitor	1	1.3	1.6	μF	X5R ceramic or better	Input condition			Input condition		

4.1 DC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Active Mode, VDD = 1.71V to 5.5V													
SID13	idd3	Execute from Flash; CPU at 3 MHz	-	2.1		mA	T = 25 C, VDD = 3.3V	2.03	2.04	2.06	1.99	2.04	2.06
SID14	idd4	Execute from Flash; CPU at 3 MHz	-	-		mA	T = -40 C to 85 C	1.61	1.71	2.02	1.89	2.04	2.46
SID15	idd5	Execute from Flash; CPU at 6 MHz	-	2.5		mA	T = 25 C, VDD = 3.3V	2.42	2.47	2.51	2.55	2.58	2.62
SID16	idd6	Execute from Flash; CPU at 6 MHz	-	-		mA	T = -40 C to 85 C	2.33	2.44	3.05	2.42	2.58	3.08
SID17	idd7	Execute from Flash; CPU at 12 MHz	-	4		mA	T = 25 C, VDD = 3.3V	3.89	3.93	3.99	4.09	4.15	4.23
SID18	idd8	Execute from Flash; CPU at 12 MHz	-	-		mA	T = -40 C to 85 C	3.65	3.89	4.16	3.89	4.13	4.32
SID19	idd9	Execute from Flash; CPU at 24 MHz	-	7.1		mA	T = 25 C, VDD = 3.3V	6.37	6.42	6.50	6.74	6.88	6.97
SID20	idd10	Execute from Flash; CPU at 24 MHz	-	-		mA	T = -40 C to 85 C	5.89	6.33	6.69	6.41	6.84	7.12
SID21	idd11	Execute from Flash; CPU at 48 MHz	-	13.4		mA	T = 25 C, VDD = 3.3V	10.42	10.54	10.70	11.26	11.51	11.61
SID22	idd12	Execute from Flash; CPU at 48 MHz	-	-		mA	T = -40 C to 85 C	9.74	10.39	10.90	10.71	11.42	11.80
Sleep Mode, VDD = 3.3V													
SID23	idd13	IMO on	-	-	-	mA	T = 25 C, VDD = 3.3V, SYCLK=3MHz	1.07	1.097	1.085	1.13	1.15	1.18
Sleep Mode, VDD and VDDR = 3.3V													
SID24	idd14	ECO on	-	-	-	mA	T = 25 C, VDD = 3.3V, SYCLK=3MHz	1.07	1.08	1.096	2.80	2.83	2.85
Deep Sleep Mode, VDD = 1.8 to 3.6V													
SID25	idd15	WDT with WCO on	-	1.5	-	µA	T = 25 C, VDD = 3.3V	1.313	1.34	1.397	1.55	1.58	1.64
SID26	idd16	WDT with WCO on	-	-	-	µA	T = -40 C to 85 C	1.13	9.18	54.71	1.36	1.58	57.75
Deep Sleep Mode, VDD = 3.6 to 5.5V													
SID27	idd17	WDT with WCO on	-	-	-	µA	T = 25 C, VDD = 5V	1.382	1.409	1.465	1.57	1.60	1.66
SID28	idd18	WDT with WCO on	-	-	-	µA	T = -40 C to 85 C	1.16	6.77	23.51	1.44	1.60	30.31
Deep Sleep Mode, VDD = 1.71 to 1.89V (Regulator bypassed)													
SID29	idd19	WDT with WCO on	-	-	-	µA	T = 25 C	1.275	1.36	1.46	1.39	1.49	1.62
SID30	idd20	WDT with WCO on	-	-	-	µA	T = -40 C to 85 C	1.096	14.24	57.31	1.31	1.49	63.53
Deep Sleep Mode, VDD = 2.5 to 3.6V													
SID31	idd21	Op Amp on	-	-	-	µA	T = 25 C, VDD = 3.3V	10.14	13.06	15.16	9.20	11.97	14.51
SID32	idd22	Op Amp on	-	-	-	µA	T = -40 C to 85 C	7.4	18.95	39.26	6.18	11.97	47.88
Deep Sleep Mode, VDD = 3.6 to 5.5V													
SID33	idd23	Op Amp on	-	-	-	µA	T = 25 C, VDD = 5V	11.19	14.15	16.77	9.66	12.57	15.02
SID34	idd24	Op Amp on	-	-	-	µA	T = -40 C to 85 C	7.86	21.11	45.1	6.58	12.57	50.85
Hibernate Mode, VDD = 1.8 to 3.6V													
SID37	idd27	GPIO & Reset active	-	150	-	nA	T = 25 C, VDD = 3.3V	103.2	110.96	125.14	95.68	109.29	125.09
SID38	idd28	GPIO & Reset active	-	-	-	nA	T = -40 C to 85 C	75.71	1354.38	6064.9	57.64	109.29	11692.22
Hibernate Mode, VDD = 3.6 to 5.5V													
SID39	idd29	GPIO & Reset active	-	-	-	nA	T = 25 C, VDD = 5V	160.31	174.42	191.68	111.65	125.66	141.08
SID40	idd30	GPIO & Reset active	-	-	-	nA	T = -40 C to 85 C	89.7	2360.6	9163	62.25	125.66	13761.12
Hibernate Mode, VDD = 1.71 to 1.89V (Regulator bypassed)													
SID41	idd31	GPIO & Reset active	-	-	-	nA	T = 25 C	92.82	116	190.83	73.72	103.46	133.99
SID42	idd32	GPIO & Reset active	-	-	-	nA	T = -40 C to 85 C	77.48	1833	6899	52.25	103.46	13208.64
Stop Mode, VDD = 1.8 to 3.6V													
SID43	idd33	Stop mode current (VDD)	-	20	-	nA	T = 25 C, VDD = 3.3V	0.44	1.93	4.37	0.03	0.38	1.23
SID44	idd34	Stop mode current (VDDR)	-	40	-	nA	T = 25 C, VDDR = 3.3V	2.44	2.7	2.96	0.44	0.58	0.85
SID45	idd35	Stop mode current (VDD)	-	-	-	nA	T = -40 C to 85 C	0.11	1292	5422	0.02	0.38	7001.96
SID46	idd36	Stop mode current (VDDR)	-	-	-	nA	T = -40 C to 85 C, VDDR = 1.9V to 3.6V	0.32	241	1107	0.01	0.58	1313.68
Stop Mode, VDD = 3.6 to 5.5V													
SID47	idd37	Stop mode current (VDD)	-	-	-	nA	T = 25 C, VDD = 5V	38.03	45.13	59.21	9.31	10.64	11.20
SID48	idd38	Stop mode current (VDDR)	-	-	-	nA	T = 25 C, VDDR = 5V	19.84	20.94	23.28	5.33	5.94	8.89
SID49	idd39	Stop mode current (VDD)	-	-	-	nA	T = -40 C to 85 C	0.26	1823	7520	0.04	10.64	8590.34
SID50	idd40	Stop mode current (VDDR)	-	-	-	nA	T = -40 C to 85 C	0.42	586	2639	0.01	5.94	2180.28
Stop Mode, VDD = 1.71 to 1.89V (Regulator bypassed)													
SID51	idd41	Stop mode current (VDD)	-	-	-	nA	T = 25 C	0.03	1.9	6.71	11.39	20.68	30.92
SID52	idd42	Stop mode current (VDD)	-	-	-	nA	T = -40 C to 85 C	0.03	240	860	0.23	20.68	11522.66

4.2 AC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
AC Specifications													
SID53	Fcpu	CPU frequency	DC	-	48	MHz	1.71 <= Vdd<= 5.5	DC	-	48.00	DC	-	48.00
SID54	Tsleep	Wakeup from Sleep Mode	-	0		μs		0.08	0.10	0.13	0.09	0.10	0.13
SID55	Tdeepsleep	Wakeup from Deep Sleep Mode	-	-	25	μs		17.01	19.01	21.00	19.86	20.21	20.32
SID56	Thibernate	Wakeup from Hibernate Mode	-	-	0.7	ms		0.05	0.05	0.05	0.17	0.18	0.20
SID57	Tstop	Wakeup from Stop Mode			2.2	ms		1.55	1.60	1.65	1.54	1.61	1.67

4.3 GPIO DC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
GPIO DC Specifications (Including OVT GPIO pins P5_0 and P5_1)													
SID58	Vih	Input Voltage high threshold	0.7*Vdd	-	-	V	CMOS Input at 2.7V, 3.3V and 5.5V	0.53*Vdd	0.59*Vdd	0.70*Vdd	0.47*Vdd	0.57*Vdd	0.64*Vdd
SID59	Vil	Input Voltage low threshold	-	-	0.3*Vdd	V	CMOS Input at 2.7V, 3.3V and 5.5V	0.37*Vdd	0.42*Vdd	0.47*Vdd	0.35*Vdd	0.41*Vdd	0.48*Vdd
SID60	Vih	LVTTL input, Vdd< 2.7V	0.7*Vdd	-	-	V	VDD = 2.4V	0.52*Vdd	0.56*Vdd	0.63*Vdd	0.62*Vdd	0.63*Vdd	0.69*Vdd
SID61	Vil	LVTTL input, Vdd< 2.7V	-	-	0.3*Vdd	V	VDD = 2.4V	0.43*Vdd	0.44*Vdd	0.45*Vdd	0.42*Vdd	0.45*Vdd	0.46*Vdd
SID62	Vih	LVTTL input, Vdd>= 2.7V	2	-	-	V	VDD=2.7V, 3.3V and 5.5V	1.33	1.69	1.93	1.32	1.39	1.99
SID63	Vil	LVTTL input, Vdd>= 2.7V	-	-	0.8	V	VDD=2.7V, 3.3V and 5.5V	1.17	1.54	1.79	1.16	1.22	1.82
SID64	Voh	Output Voltage high level	Vdd-0.6	-	-	V	Ioh = 4mA at 3.3V Vdd	Vdd-0.23	Vdd-0.19	Vdd-0.14	Vdd-0.22	Vdd-0.17	Vdd-0.13
SID65	Voh	Output Voltage high level	Vdd-0.5	-	-	V	Ioh = 1mA at 1.8V Vdd	Vdd-0.1	Vdd-0.07	Vdd-0.09	Vdd-0.07	Vdd-0.08	Vdd-0.10
SID66	Vol	Output Voltage low level	-	-	0.6	V	Iol = 8mA at 3.3V Vdd	0.09	0.12	0.17	0.08	0.11	0.16
SID67	Vol	Output Voltage low level	-	-	0.6	V	Iol = 4mA at 1.8V Vdd	0.08	0.10	0.14	0.08	0.10	0.14
SID68	VOL	Output Voltage low level	-	-	0.4	V	Iol = 3mA at 3V VDD	0.03	0.05	0.06	0.03	0.04	0.06
SID69	Rpullup	Pull-up resistor	3.5	5.6	8.5	kΩ		4.86	5.22	5.71	4.68	4.98	5.48
SID70	Rpulldown	Pull-down resistor	3.5	5.6	8.5	kΩ		4.66	5.05	5.40	4.70	5.06	5.65
SID71	Iil	Input leakage current(absolute value)	-	-	2	nA	25° C, Vdd = 3.0V	Guaranteed by design			Guaranteed by design		
SID72	Iil_ctbm	Input leakage on CTBm input pins	-	-	4	nA		Guaranteed by design			Guaranteed by design		
SID73	Cin	Input Capacitance	-	-	7	pF		1.80	2.67	4.42	1.99	2.85	5.02
SID74	Vhysttl	Input hysteresis LVTTL	25	40	-	mV	VDD > 2.7V	54.00	153.44	188.10	71.50	167.66	188.10
SID75	Vhyscmos	Input hysteresis CMOS	0.05*VDD	-	-	mV		500.50	765.23	876.00	0.09*Vdd	0.16*Vdd	0.18*Vdd
SID76	Iodiode	Current through protection diode to Vdd/Vss	-	-	100	μA		Input condition			Input condition		
SID77	Itot_GPIO	Maximum Total Source or Sink Chip Current			200	mA		Guaranteed by design			Guaranteed by design		
OVT GPIO DC Specifications (P5_0 and P5_1 only)													
SID71A	Iil	Input Leakage (absolute value), VIH>VDD	-		10	uA	25°C, Vdd = 0V, VIH = 3.0V	Guaranteed by design			Guaranteed by design		
SID66A	Vol	Output Voltage low level	-	-	0.4	V	Iol = 20mA, Vdd> 2.9 V	0.03	0.04	0.06	0.12	0.18	0.22

4.4 GPIO AC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
GPIO AC Specifications (Including OVT GPIO pins P5_0 and P5_1)													
SID78	TriseF	Rise time in Fast Strong Mode	2	-	12	ns	3.3V Vdd, Clod = 25 pF	2.32	2.97	5.00	3.42	4.84	7.80
SID79	TfallF	Fall time in Fast Strong Mode	2	-	12	ns	3.3V Vdd, Clod = 25 pF	4.16	4.98	6.22	3.78	4.49	6.06
SID80	TriseS	Rise time in Slow Strong Mode	10	-	60	ns	3.3V Vdd, Clod = 25 pF	30.99	37.11	45.09	31.55	36.83	43.83
SID81	TfallS	Fall time in Slow Strong Mode	10	-	60	ns	3.3V Vdd, Clod = 25 pF	34.98	44.13	53.05	35.79	43.20	50.43
SID84	Fgpiout3	GPIO Fout;3.3V<=Vdd<=5.5V. Slow Strong mode.			7	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 7.7MHz			Verified till 7.7MHz		
SID85	Fgpiout4	GPIO Fout;1.71V<=Vdd<=3.3V. Slow Strong mode.			3.5	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 3.85MHz			Verified till 3.85MHz		
SID86	Fgpiin	GPIO input operating frequency;1.71V<=Vdd<=5.5V			48	MHz	90/10% Vio	Verified till 52.8MHz			Verified till 52.8MHz		
GPIO AC Specifications													
SID82	Fgpiout1	GPIO Fout;3.3V<=Vdd<=5.5V. Fast Strong mode.			33	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 36.3MHz			Verified till 36.3MHz		
SID83	Fgpiout2	GPIO Fout;1.71V<=Vdd<=3.3V. Fast Strong mode.			16.7	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 18.4MHz			Verified till 18.4MHz		
OVT GPIO AC Specifications (P5_0 and P5_1 only)													
SID78A	TRISE_OVFS	Output rise time in Fast-Strong Mode	1.5		12	ns	25 pF load, 10%~90%, Vdd = 3.3V	3.26	4.29	6.07	3.01	3.96	6.28
SID79A	TFALL_OVFS	Output fall time in Fast-Strong Mode	1.5		12	ns	25 pF load, 10%~90%, Vdd = 3.3V	2.1	2.68	3.47	2.17	2.77	3.99
SID80A	TriseSS	Output rise time in Slow-Strong mode	10		60	ns	25 pF load, 10%~90%, Vdd = 3.3V	22.12	26.05	30.48	22.99	27.12	32.33
SID81A	TfallSS	Output fall time in Slow-Strong mode	10		60	ns	25 pF load, 10%~90%, Vdd = 3.3V	28.17	32.61	37.83	29.38	34.53	40.13
SID82A	Fgpiout1	GPIO Fout;3.3V<=Vdd<=5.5V. Fast Strong mode.			24	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 26.4MHz			Verified till 26.4MHz		
SID83A	Fgpiout2	GPIO Fout;1.71V<=Vdd<=3.3V. Fast Strong mode.			16	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 17.6MHz			Verified till 17.6MHz		

4.5 XRES Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
XRES DC Specifications													
SID87	Vih	Input Voltage high threshold	0.7*Vdd	-	-	V	CMOS Input	0.53*Vdd	0.56*Vdd	0.63*Vdd	0.53*Vdd	0.56*Vdd	0.63*Vdd
SID88	Vil	Input Voltage low threshold	-	-	0.3*Vdd	V	CMOS Input	0.42*Vdd	0.48*Vdd	0.51*Vdd	0.42*Vdd	0.48*Vdd	0.51*Vdd
SID89	Rpullup	Pull-up resistor	3.5	5.6	8.5	kΩ		4.83	5.27	5.71	4.95	5.25	5.91
SID90	Cin	Input Capacitance	-	3	-	pF		-	1.28	-	-	1.17	-
SID91	Vhysxres	Input voltage hysteresis	-	100	-	mV		275.00	308.00	360.00	208.62	256.76	366.00
SID92	Idiode	Current through protection diode to Vdd/Vss			100	μA		Input condition			Input Condition		
XRES AC Specifications													
SID93	Tresetw idth	Reset pulse w idth	1	-	-	μs		0.13	0.15	0.18	0.13	0.14	0.16

4.6 OPAMP Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Analog Peripherals													
Op Amp Specifications													
Idd Op Amp Block current. Vdd = 1.8V. No load.													
SID94	Idd_hi	power=hi		1000	1300	uA		889.00	1074.00	1264.00	844.29	959.26	1069.89
SID95	Idd_med	power=med		500		uA		502.60	591.36	783.90	472.64	543.45	619.39
SID96	Idd_low	power=lo		250	350	uA		122.00	150.90	188.00	117.39	141.67	195.53
GBW Load = 20pF, 0.1mA. VDDA = 2.7V													
SID97	GBW_hi	power=hi	6			MHz		17.89	25.68	31.98	17.39	22.94	28.64
SID98	GBW_med	power=med	4			MHz		11.14	14.74	19.81	9.50	12.72	16.09
SID99	GBW_lo	power=lo	-	1		MHz		1.38	3.13	4.56	2.18	3.30	4.71
	Iout_max	VDDA=>2.7V, 500 mV from rail											
SID100	Iout_max_hi	power=hi	10			mA		12.60	17.40	21.70	11.07	17.30	22.34
SID101	Iout_max_mid	power=mid	10			mA		12.63	17.40	21.70	11.07	17.31	22.33
SID102	Iout_max_lo	power=lo		5		mA		12.60	17.40	21.60	11.06	17.30	22.33
Iout VDDA=1.71V, 500 mV from rail													
SID103	Iout_max_hi	power=hi	4			mA		6.40	7.90	10.20	6.35	7.71	9.23
SID104	Iout_max_mid	power=mid	4			mA		6.40	7.90	10.20	6.36	7.71	9.24
SID105	Iout_max_lo	power=lo		2		mA		6.40	7.90	10.20	6.34	7.71	9.24
SID106	Vin	Charge-pump on, VDDA => 2.7V	-0.05		VDDA-0.2	V		Char Condition			Input Condition		
SID107	Vcm	Charge-pump on, VDDA => 2.7V	-0.05		VDDA-0.2	V		Char Condition			Input Condition		
Vout VDDA=> 2.7V													
SID108	Vout_1	power=hi, Iload=10mA	0.5		VDDA -0.5	V		0.32		VDDA-0.41	0.44		VDDA-0.38
SID109	Vout_2	power=hi, Iload=1mA	0.2		VDDA -0.2	V		0.02		VDDA-0.03	0.04		VDDA-0.04
SID110	Vout_3	power=med, Iload=1mA	0.2		VDDA -0.2	V		0.02		VDDA-0.03	0.04		VDDA-0.04
SID111	Vout_4	power=lo, Iload=0.1mA	0.2		VDDA -0.2	V		0.00		VDDA-0.01	0.00		VDDA-0.02
SID112	Vos_tr	Offset voltage, trimmed	-1	+/-0.5	1	mV	High mode	-0.89	-0.08	0.91	-0.67	-0.07	0.83
SID113	Vos_tr	Offset voltage, trimmed	-	+/-1	-	mV	Medium mode	-1.71	-0.10	1.25	-1.07	-0.08	0.78
SID114	Vos_tr	Offset voltage, trimmed	-	+/-2	-	mV	Low mode	-3.33	-0.60	3.62	-3.27	-0.53	2.96
SID115	Vos_dr_tr	Offset voltage drift, trimmed	-10	+/-3		uV/C	High mode	-0.97	0.15	3.99	-8.61	0.33	9.74
SID116	VOS_DR_TR	Offset voltage drift, trimmed	-	+/-10	-	uV/C	Medium mode	-7.49	-0.49	4.27	-10.70	0.12	8.40
SID117	VOS_DR_TR	Offset voltage drift, trimmed	-	+/-10	-	uV/C	Low mode	-16.01	-0.32	13.16	-19.73	-0.03	14.48
SID118	CMRR	DC	65	70	-	dB	VDDD = 3.6V, High power Mode	67.39	78.40	88.61	67.32	75.58	90.28
SID119	PSRR	at 1 kHz, 10mV ripple	70	85	-	dB	VDDD = 3.6V	70.30	74.54	78.60	73.57	77.91	81.82
SID124	Cload	Stable up to max. load. Performance specs at 50 pF.			125	pF		Input condition			Input condition		
SID125	Slew_rate	Cload = 50pF, Power = High, VDDA => 2.7V	6			V/us		7.23	9.09	10.94	8.83	10.38	12.33
SID126	T_op_wake	From disable to enable, no external RC dominating		300		us		0.46	0.49	0.68	0.18	0.22	0.26
Comp_mode Comparator mode; 50mV drive, Trise=TFall (approx.)													
SID127	Tpd1	Response time; power=hi		150		ns		66.35	134.93	287.00	103.70	145.89	222.90
SID128	Tpd2	Response time; power=med		400		ns		119.80	131.80	146.80	143.10	166.03	199.90
SID129	Tpd3	Response time; power=lo		2000		ns		415.30	444.20	495.60	470.25	629.71	937.80
SID130	Vhyst_op	Hysteresis		10		mV		9.90	15.90	22.90	13.31	21.52	24.44
Deep Sleep Deep-Sleep mode operation is only guaranteed for VDDA > 2.5 V													
SID131	GBW_DS	Gain Bandwidth Product	-	50	-	kHz		137.46	326.63	339.32	64.45	302.53	496.34
SID132	IDD_DS	Current	-	15	-	uA		5.81	12.97	23.03	4.55	10.07	18.78
SID133	Vos_DS	Offset voltage	-	5	-	mV		0.18	0.50	7.85	0.26	3.05	7.86
SID134	Vos_dr_DS	Offset voltage drift	-	20	-	uV/C		10.50	30.20	44.19	0.13	19.29	64.69
SID136	Vcm_DS	Common mode voltage	0.2	-	Vdd-1.8	V		Input Condition			Input Condition		

4.7 Comparator Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Comparator DC Specifications													
SID140	Voffset1	Input offset voltage, Factory trim	-	-	±10	mV		-3.20	0.89	4.45	-8.05	-0.70	4.95
SID141	Voffset2	Input offset voltage, Custom trim	-	-	±6	mV		-2.66	0.22	2.88	-4.58	0.13	4.01
SID141A	Voffset3	Input offset voltage, Ultra low power mode		±12		mV	VDDD ≥ 2.6V for Temp < 0C	-6.56	1.06	4.94	-11.30	0.35	14.95
SID142	Vhyst	Hysteresis when enabled	-	10	35	mV		0.22	16.00	22.95	5.32	22.14	34.47
SID143	Vicm1	Input common mode voltage in normal mode	0	-	Vddd-0.1	V	Modes 1 and 2	Input condition			Input condition		
SID144	Vicm2	Input common mode voltage in low power mode	0	-	Vddd	V		Input condition			Input condition		
SID145	Vicm3	Input common mode voltage in ultra low power mode	0		Vddd-1.15	V	VDDD ≥ 2.6V for Temp < 0C	Input condition			Input condition		
							VDDD ≥ 1.8V for Temp ≥ 0C						
SID146	CMRR	Common mode rejection ratio	50	-	-	dB	VDDD ≥ 2.7V	58.35	64.20	87.40	55.85	70.41	96.26
SID147	CMRR	Common mode rejection ratio	42	-	-	dB	VDDD ≤ 2.7V	51.70	61.90	81.90	49.34	65.30	85.79
SID148	Icmp1	Block Current, normal mode	-	-	400	µA		148.00	218.00	285.40	134.14	227.33	285.66
SID149	Icmp2	Block Current, low power mode	-	-	100	µA		19.90	42.00	53.30	23.62	38.04	59.86
SID150	Icmp3	Block Current in ultra low-power mode	-	6	-	µA	VDDD ≥ 2.6V for Temp < 0C	5.85	6.14	6.76	5.92	6.85	7.66
							VDDD ≥ 1.8V for Temp ≥ 0C						
SID151	Zcmp	DC Input impedance of comparator	35	-	-	MΩ		5280.00	6644.00	8080.00	3734.44	4729.96	5532.79
Comparator AC Specifications													
SID152	Tresp1	Response time, normal mode, 50 mV overdrive	-	38	-	ns	50 mV overdrive	47.10	48.25	52.26	25.79	36.81	50.03
SID153	Tresp2	Response time, low power mode, 50 mV overdrive	-	70	-	ns	50 mV overdrive	66.40	81.78	93.27	45.35	83.61	130.28
SID154	Tresp3	Response time, ultra-low power mode, 50 mV overdrive	-	2.3	-	µs	200 mV overdrive	1.02	1.28	1.35	0.92	1.73	2.56
							VDDD ≥ 2.6V for Temp < 0C						
							VDDD ≥ 1.8V for Temp ≥ 0C						

4.8 Temperature Sensor Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Temperature Sensor Specifications													
SID155	Tsensacc	Temperature sensor accuracy	-5	±1	5	°C	-40 to +85 C	-4.00	-0.04	4.00	0.92	2.20	4.96

4.9 SAR ADC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
SAR ADC DC Specifications													
SID156	A_res	Resolution	-	-	12	bits		-	-	12	-	-	12
SID157	A_chnls_s	Number of channels - single ended	-	-	8		8 full speed.	-	-	8	-	-	8
SID158	A-chnks_d	Number of channels - differential	-	-	4		Diff inputs use neighbouring I/O	-	-	4	-	-	4
SID159	A-mono	Monotonicity	-	-	-		Yes.	Guaranteed by Char			Guaranteed by Char		
SID160	A_gainerr	Gain error	-	-	±0.1	%	With external reference.	-0.08	0.01	0.07	-0.03	-0.01	0.06
SID161	A_offset	Input offset voltage	-	-	2	mV	Measured with 1V reference	0.02	0.40	1.27	0.00	0.28	0.51
SID162	A_isar	Current consumption	-	-	1	mA		0.47	0.53	0.68	0.59	0.55	0.67
SID163	A_vins	Input voltage range - single ended	Vss	-	Vdda	V		Input Condition			Input Condition		
SID164	A_vind	Input voltage range - differential[	Vss	-	Vdda	V		Input Condition			Input Condition		
SID165	A_inres	Input resistance	-	-	2.2	KΩ		Calculated specification			Calculated specification		
SID166	A_incap	Input capacitance			10	pF		2.17	2.30	2.52	2.20	2.34	2.49
SAR ADC AC Specifications													
SID167	A_psr	Power supply rejection ratio	70	-	-	dB	Measured at 1V	82.36	98.20	117.80	81.26	94.72	117.78
SID168	A_cmrr	Common mode rejection ratio	66	-	-	dB		72.50	86.00	121.00	69.98	78.19	115.01
SID169	A_samp	Sample rate	-	-	1	MSPS		-	-	1	-	-	1
SID170	A_snr	Signal-to-noise ratio (SNR)	65	-	-	dB	Fin = 10 kHz	69.19	71.80	78.04	68.50	70.97	74.62
SID171	A_bw	Input bandwidth w without aliasing	-	-	A_samp/2	KHz		-	-	A_samp/2	-	-	A_samp/2
SID172	A_inl	Integral Non Linearity. VDD = 1.71 to 5.5, 1 MSPS	-1.7	-	2	LSB	Vref = 1 to VDD	-1.27	0.77	1.29	-1.39	0.86	1.38
SID173	A_INL	Integral Non Linearity. VDDD = 1.71 to 3.6, 1 MSPS	-1.5	-	1.7	LSB	Vref = 1.71 to VDD	-1.25	0.73	0.96	-1.13	0.84	1.01
SID174	A_INL	Integral Non Linearity. VDD = 1.71 to 5.5, 500 KSPS	-1.5	-	1.7	LSB	Vref = 1 to VDD	-1.10	0.71	1.04	-1.17	0.86	1.13
SID175	A_dnl	Differential Non Linearity. VDD = 1.71 to 5.5, 1 MSPS	-1	-	2.2	LSB	Vref = 1 to VDD	-0.87	0.77	1.40	-0.71	0.91	1.36
SID176	A_DNL	Differential Non Linearity. VDD = 1.71 to 3.6, 1 MSPS	-1	-	2	LSB	Vref = 1.71 to VDD	-0.86	0.74	1.28	-0.43	0.88	1.11
SID177	A_DNL	Differential Non Linearity. VDD = 1.71 to 5.5, 500 KSPS	-1	-	2.2	LSB	Vref = 1 to VDD	-0.83	0.73	1.36	-0.48	0.88	1.19
SID178	A_thd	Total harmonic distortion	-	-	-65	dB	Fin = 10 kHz	-81.30	-74.60	-70.94	-86.29	-74.64	-66.94

4.10 CSD Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
CSD Specifications													
SID179	Vcsd	Voltage range of operation	1.71		5.5	V		Input condition			Input condition		
SID180	ldac1	DNL for 8-bit resolution	-1		1	LSB		-0.74	-0.09	0.57	-0.33	-0.02	0.36
SID181	ldac1	INL for 8-bit resolution	-3		3	LSB		-2.03	-0.68	1.53	-1.93	0.09	2.65
SID182	ldac2	DNL for 7-bit resolution	-1		1	LSB		-0.34	0.10	0.49	-0.73	0.05	0.43
SID183	ldac2	INL for 7-bit resolution	-3		3	LSB		-0.64	0.24	1.14	-2.48	0.12	2.00
SID184	SNR	Ratio of counts of finger to noise	5			Ratio	9 to 35pF Capacitance range, 0.1 pF sensitivity	Verified at System Level			Verified at System Level		
							Radio is not operating during the scan						
SID185	ldac1_crt1	Output current of ldac1 (8-bits) in High range		612		uA		597.00	615.00	632.50	588.25	609.96	626.63
SID186	ldac1_crt2	Output current of ldac1 (8-bits) in Low range		306		uA		298.90	305.00	314.70	290.19	305.22	313.75
SID187	ldac2_crt1	Output current of ldac2 (7-bits) in High range		305		uA		297.89	305.00	312.80	288.75	302.47	310.44
SID188	ldac2_crt2	Output current of ldac2 (7-bits) in Low range		153		uA		149.84	154.00	158.90	141.56	151.92	155.19

4.11 Timer and Counter Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Digital Peripherals													
Timer DC Specifications													
SID189	Itim1	Block current consumption at 3 Mhz	-	-	50	µA	16-bit Timer	30.06	32.85	35.66	36.88	40.74	46.01
SID190	Itim2	Block current consumption at 12 MHz	-	-	175	µA	16-bit Timer	113.29	121.47	134.05	139.07	153.90	163.24
SID191	Itim3	Block current consumption at 48 Mhz	-	-	712	µA	16-bit Timer	468.99	518.31	544.88	597.25	652.13	683.06
Timer AC Specifications													
SID192	Timfreq	Operating frequency	Fclk	-	48	MHz		Fclk		48	Fclk		48
SID193	Tcapwint	Capture pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID194	Tcapwext	Capture pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID195	Ttimres	Timer Resolution	Tclk	-	-	ns		Tclk	-	-	Tclk	-	-
SID196	Ttenwidint	Enable pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID197	Ttenwidext	Enable pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID198	Ttimreswint	Reset pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID199	Ttimresext	Reset pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
Counter DC Specifications													
SID200	lctr1	Block current consumption at 3 Mhz	-	-	50	µA	16-bit Counter	30.49	32.88	36.11	36.71	40.81	46.00
SID201	lctr2	Block current consumption at 12 MHz	-	-	175	µA	16-bit Counter	113.26	125.12	134.42	140.44	153.87	163.08
SID202	lctr3	Block current consumption at 48 Mhz	-	-	712	µA	16-bit Counter	463.34	515.42	546.37	600.17	651.64	681.13
Counter AC Specifications													
SID203	Tctrfreq	Operating frequency	Fclk	-	48	MHz		Fclk		47.00	Fclk		48.00
SID204	Tctrpwint	Capture pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID205	Tctrpwext	Capture pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID206	Tctrres	Counter Resolution	Tclk	-	-	ns		Tclk	-	-	Tclk	-	-
SID207	Tcenwidint	Enable pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID208	Tcenwidext	Enable pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID209	Tctrreswint	Reset pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID210	Tctrreswext	Reset pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		

4.12 PWM Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
PWM DC Specifications													
SID211	lpw m1	Block current consumption at 3 Mhz	-	-	50	µA	16-bit PWM	30.27	32.80	36.11	37.06	40.82	44.99
SID212	lpw m2	Block current consumption at 12 Mhz	-	-	175	µA	16-bit PWM	112.74	124.81	135.09	139.72	153.81	162.88
SID213	lpw m3	Block current consumption at 48 Mhz	-	-	741	µA	16-bit PWM	454.68	503.57	532.75	632.49	682.28	708.59
PWM AC Specifications													
SID214	tpw mfreq	Operating frequency	Fclk	-	48	MHz		Fclk		47.00	Fclk		48.00
SID215	tpw mpw int	Pulse w idth (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID216	tpw mext	Pulse w idth (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID217	tpw mkillint	Kill pulse w idth (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID218	tpw mkillext	Kill pulse w idth (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID219	tpw menint	Enable pulse w idth (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID220	tpw menext	Enable pulse w idth (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID221	tpw mresw int	Reset pulse w idth (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID222	tpw mresw ext	Reset pulse w idth (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		

4.13 I2C Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Fixed I2C DC Specifications													
SID223	I2c1	Block current consumption at 100 KHz	-	-	50	µA		30.00	32.00	36.00	1.00	10.20	25.00
SID224	I2c2	Block current consumption at 400 KHz	-	-	155	µA		100.00	105.30	110.00	15.00	40.20	88.00
SID225	I2c3	Block current consumption at 1 Mbps	-	-	390	µA		236.00	256.40	274.00	80.00	141.40	273.00
SID226	I2c4	I2C enabled in Deep Sleep mode	-	-	1.4	µA		Guaranteed by design simulations			Guaranteed by design simulations		
Fixed I2C AC Specifications													
SID227	F2c1	Bit Rate	1	-	-	Mbps		1.11	1.55	1.98	1.05	1.12	1.17

4.14 LCD Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
LCD Direct Drive DC Specifications													
SID228	Ilcdlow	Operating current in low power mode	-	17.5	-	μA	16 X 4 small segment disp. @ 50 Hz	4.00	4.33	5.00	6.00	9.37	15.00
SID229	Cldcap	LCD capacitance per segment/common driver	-	500	5000	pF		Input Condition			Input Condition		
SID230	Lcdoffset	Long-term segment offset	-	20	-	mV		1.06	1.07	1.08	4.48	6.38	8.28
SID231	Ildcop1	LCD system operating current. Vbias = 5V.	-	2	-	mA	32 X 4 segments. 50 Hz. 25 C	0.21	0.24	0.27	0.41	0.43	0.46
SID232	Ildcop2	LCD system operating current Vbias = 3.3V	-	2	-	mA	32 X 4 segments. 50 Hz. 25 C	0.20	0.24	0.29	0.28	0.30	0.33
LCD Direct Drive AC Specifications													
SID233	Flcd	LCD Frame rate	10	50	150	Hz		Verified at 150Hz			Verified at 150Hz		

4.15 UART Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Fixed UART DC Specifications													
SID234	Iuart1	Block current consumption at 100 Kbits/sec	-	-	55	μA		24.00	27.60	30.00	36.00	40.56	45.00
SID235	Iuart2	Block current consumption at 1000 Kbits/sec	-	-	360	μA		146.00	153.10	176.00	245.00	274.80	304.00
Fixed UART AC Specifications													
SID236	Fuart	Bit Rate			1	Mbps		-	-	1.00	-	-	1.00

4.16 SPI Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Fixed SPI DC Specifications													
SID237	Ispi1	Block current consumption at 1Mbits/sec	-	-	360	μA		46.00	48.67	52.00	15.00	31.90	50.00
SID238	Ispi2	Block current consumption at 4 Mbits/sec	-	-	560	μA		184.00	158.73	222.00	68.00	135.70	370.00
SID239	Ispi3	Block current consumption at 8 Mbits/sec	-	-	600	μA		402.00	424.70	448.00	143.00	279.20	411.00
Fixed SPI AC Specifications													
SID240	Fspi	SPI Operating frequency (Master; 6X Oversampling)	8		-	MHz		10.07	12.88	14.27	8.39	8.94	9.40
Fixed SPI Master mode AC Specifications													
SID241	Tdmo	MOSI Valid after SClck driving edge	-	-	18	ns		3.28	2.06	16.57	-4.25	2.40	6.62
SID242	Tdsi	MISO Valid before SClck capturing edge	20	-	-	ns	Full clock, late MISO sampling	-51.30	-35.45	-14.87	-50.47	-43.81	-11.59
SID243	Thmo	Previous MOSI data hold time	0	-	-	ns	Referred to Slave capturing edge	49.44	55.66	58.61	50.35	58.06	66.23
Fixed SPI Slave mode AC Specifications													
SID244	Tdmi	MOSI Valid before SClck Capturing edge	40	-	-	ns		0.24	0.62	1.04	-1.16	1.21	3.27
SID245	Tdso	MISO Valid after SClck driving edge	-	-	42 + 3*Tscb	ns		78.85	91.67	111.41	79.46	85.52	111.72
SID246	Tdso_ext	MISO Valid after SClck driving edge in Ext. Clk. Mode			55	ns	Vdd< 3V	12.40	27.68	48.13	11.71	16.50	43.33
SID247	Thso	Previous MISO data hold time	0	-	-	ns		13.13	33.59	48.86	14.83	44.30	49.53
SID248	Tsselsck	SSEL Valid to first SCK Valid edge			100	ns		8.10	16.85	61.57	10.11	15.56	45.92

4.17 FLASH Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Memory													
Flash DC Specifications													
SID249	Vpe	Erase and program voltage	1.71	-	5.5	V		1.71	-	5.5	1.71	-	5.5
SID309	Tw s48	# of wait states at 32-48 MHz	2				CPU execution from flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID310	Tw s32	# of wait states at 16-48 MHz	1	-	-		CPU execution from flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID311	Tw s16	# of wait states at 0-16 MHz	0	-	-		CPU execution from flash	Guaranteed by design simulations			Guaranteed by design simulations		
Flash AC Specifications													
SID250	Trow write	Row (Block) write time (erase & program)	-	-	20	ms	Row (Block) = 256 Bytes	Guaranteed by design simulations			Guaranteed by design simulations		
SID251	Trow erase	Row erase time	-	-	13	ms		Guaranteed by design simulations			Guaranteed by design simulations		
SID252	Trow program	Row program time after erase	-	-	7	ms		Guaranteed by design simulations			Guaranteed by design simulations		
SID254	Tdevprog	Total Device Program time	-	-	50	seconds		Guaranteed by design simulations			Guaranteed by design simulations		
SID255	Fend	Flash Endurance	100K	-	-	cycles		Guaranteed by design simulations			Guaranteed by design simulations		
SID256	Fret1	Flash Retention. Ta<= 55 C, 100K P/E cycles	20	-	-	years		Guaranteed by design simulations			Guaranteed by design simulations		
SID257	Fret2	Flash Retention. Ta<= 85 C, 10K P/E cycles	10	-	-	years		Guaranteed by design simulations			Guaranteed by design simulations		

4.18 POR Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
System Resources													
Power-On-Reset with Brown-outDC Specifications													
Imprecise POR (IPOR)													
SID258	Vriseipor	Rising trip voltage	0.8	-	1.45	V		Guaranteed by design			Guaranteed by design		
SID259	Vfallipor	Falling trip voltage	0.75	-	1.4	V		Guaranteed by design			Guaranteed by design		
SID260	Viporhyst	Hysteresis	15	-	200	mV		Guaranteed by design			Guaranteed by design		
Precise POR(PPOR)													
SID261	Vfallppor	BOD trip voltage in Active and Sleep modes	1.64	-	-	V		1.65	1.66	1.67	1.65	1.66	1.68
SID262	Vfalldpslp	BOD trip voltage in Deep Sleep	1.4	-	-	V		1.42	1.52	1.6	1.47	1.57	1.67
Hibernate Reset													
SID263	Vhbrtrip	BOD trip voltage in Hibernate	1.1	-	-	V		1.32	1.35	1.38	1.27	1.33	1.39
POR with Brown-out AC Specification													
SID264	Tppor_tr	PPOR Response time in Active and Sleep modes	-	-	1	µs		Verified at 500ns			Verified at 500ns		

4.19 Voltage Monitor Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Voltage Monitors DC Specifications													
SID265	Vlv1	LVI_A/D_SEL[3:0] = 0000b	1.71	1.75	1.79	V		1.73	1.75	1.77	1.74	1.75	1.76
SID266	Vlv2	LVI_A/D_SEL[3:0] = 0001b	1.76	1.8	1.85	V		1.78	1.80	1.82	1.79	1.80	1.81
SID267	Vlv3	LVI_A/D_SEL[3:0] = 0010b	1.85	1.9	1.95	V		1.88	1.90	1.92	1.88	1.89	1.91
SID268	Vlv4	LVI_A/D_SEL[3:0] = 0011b	1.95	2	2.05	V		1.98	2.00	2.03	1.98	2.00	2.02
SID269	Vlv5	LVI_A/D_SEL[3:0] = 0100b	2.05	2.1	2.15	V		2.07	2.10	2.13	2.08	2.10	2.12
SID270	Vlv6	LVI_A/D_SEL[3:0] = 0101b	2.15	2.2	2.26	V		2.17	2.20	2.23	2.18	2.20	2.22
SID271	Vlv7	LVI_A/D_SEL[3:0] = 0110b	2.24	2.3	2.36	V		2.27	2.30	2.33	2.29	2.31	2.32
SID272	Vlv8	LVI_A/D_SEL[3:0] = 0111b	2.34	2.4	2.46	V		2.37	2.40	2.43	2.38	2.40	2.42
SID273	Vlv9	LVI_A/D_SEL[3:0] = 1000b	2.44	2.5	2.56	V		2.47	2.50	2.53	2.49	2.51	2.52
SID274	Vlv10	LVI_A/D_SEL[3:0] = 1001b	2.54	2.6	2.67	V		2.57	2.61	2.63	2.59	2.61	2.62
SID275	Vlv11	LVI_A/D_SEL[3:0] = 1010b	2.63	2.7	2.77	V		2.68	2.71	2.74	2.69	2.71	2.73
SID276	Vlv12	LVI_A/D_SEL[3:0] = 1011b	2.73	2.8	2.87	V		2.78	2.81	2.84	2.79	2.81	2.83
SID277	Vlv13	LVI_A/D_SEL[3:0] = 1100b	2.83	2.9	2.97	V		2.88	2.91	2.94	2.89	2.91	2.93
SID278	Vlv14	LVI_A/D_SEL[3:0] = 1101b	2.93	3	3.08	V		2.98	3.01	3.04	2.96	2.98	3.00
SID279	Vlv15	LVI_A/D_SEL[3:0] = 1110b	3.12	3.2	3.28	V		3.18	3.21	3.25	3.14	3.17	3.19
SID280	Vlv16	LVI_A/D_SEL[3:0] = 1111b	4.39	4.5	4.61	V		4.47	4.52	4.57	4.41	4.44	4.48
SID281	LVI_ddd	Block current	-	-	100	uA		Guaranteed by design simulations			Guaranteed by design simulations		

4.20 SWD Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
SWD Interface													
SID283	F_sw dclk1	3.3V <= Vdd<= 5.5V	14	-	-	MHz	SWDCLK <= 1/3 CPU clock frequency	29.87	33.40	31.72	18.46	19.64	20.65
SID284	F_sw dclk2	1.71V <= Vdd<= 3.3V	7	-	-	MHz	SWDCLK <= 1/3 CPU clock frequency	28.79	25.33	28.79	18.46	19.63	20.64
SID285	T_sw di_setup	T = 1/f SWDCLK	0.25*T	-	-	ns		0.13	0.57	0.90	0.006*T	0.015*T	0.029*T
SID286	T_sw di_hold	T = 1/f SWDCLK	0.25*T	-	-	ns		0.01	0.21	0.36	-0.005*T	-0.003*T	0.002*T
SID287	T_sw do_valid	T = 1/f SWDCLK		-	0.5*T	ns		13.03	17.61	24.10	0.179*T	0.232*T	0.296*T
SID288	T_sw do_hold	T = 1/f SWDCLK	1	-	-	ns		10.80	13.18	16.74	9.27	13.73	36.19

4.21 IMO Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Internal Oscillator Clock Specifications													
IMO DC Specifications													
SID289	lmo1	IMO Operating current at 48 MHz	-	-	1000	µA		Guaranteed by design			Guaranteed by design		
SID290	lmo2	IMO Operating current at 24 MHz	-	-	325	µA		Guaranteed by design			Guaranteed by design		
SID291	lmo3	IMO Operating current at 12 MHz	-	-	225	µA		Guaranteed by design			Guaranteed by design		
SID292	lmo4	IMO Operating current at 6 MHz	-	-	180	µA		Guaranteed by design			Guaranteed by design		
SID293	lmo5	IMO Operating current at 3 MHz	-	-	150	µA		Guaranteed by design			Guaranteed by design		
IMO AC Specifications													
SID296	Fimotol3	Frequency variation from 3 to 48 MHz	-	-	±2	%	With API-called calibration	0.10	0.00	0.21	0.00	0.31	1.48
SID297	Tstartimo	IMO Startup time	-	-	12	µs		0.53	1.58	2.98	1.70	1.97	2.37
ILO DC Specifications													
SID298	ilo2	ILO Operating current at 32 KHz	-	0.3	1.05	µA		0.24	0.32	0.52	0.17	0.30	0.67
ILO AC Specifications													
SID299	Tstartilo1	ILO Start-up time	-	-	2	ms		2.45	2.89	3.76	2.00	2.40	3.00
SID300	Fiotrim1	32 KHz trimmed frequency	15	32	50	KHz		21.48	33.39	45.97	18.65	31.95	44.54

4.22 External Clock Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Internal Oscillator Clock Specifications													
External Clock Specifications													
SID301	ExtClkFreq	External Clock input Frequency	0		48	MHz	CMOS input level only. TTL input is not supported	0		48	0		48
SID302	ExtClkDuty	Duty cycle; Measured at VDD/2	45		55	%		45		55	45		55

4.23 Block Specifications

Spec ID#	Parameter	Description	Datasheet			Units	Details / Conditions	Measured FAB25			Measured SkyWater		
			Min	Typ	Max			Min	Typ	Max	Min	Typ	Max
UDB AC Specifications													
Datapath performance													
SID303	Fmax-timer	Max. frequency of 16-bit timer in a UDB pair	-	-	48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
SID304	Fmax-adder	Max. frequency of 16-bit adder in a UDB pair	-	-	48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
SID305	Fmax_CRC	Max. frequency of 16-bit CRC/PRS in a UDB pair	-	-	48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
PLD Performance in UDB													
SID306	Fmax_PLD	Max. freq. of 2-pass PLD function in a UDB pair			48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
Clock to Output Performance													
SID307	Tclk_out_udb1	Prop. Delay for clock in to data out @ 25 C, Typ.	-	15	-	ns		Guaranteed by design simulations			Guaranteed by design simulations		
SID308	Tclk_out_udb2	Prop. Delay for clock in to data out, Worst case.	-	25	-	ns							
Block Specs													
SID309	Tw s48	Number of Wait states at 32-48 MHz	2	-	-		CPU execution from Flash	Guaranteed by Design			Guaranteed by Design		
SID310	Tw s32	Number of Wait states at 16-32 MHz	1	-	-		CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID311	Tw s16	Number of Wait states for 0-16 MHz	0				CPU execution from Flash						
SID312	Vrefsar	Trimmed internal reference to SAR	-1	-	1	%	Percentage of Vbg (1.024V)	Guaranteed by Design			Guaranteed by Design		
SID313	Fsarintref	SAR Operating speed without external ref. bypass	-	-	100	KSPS	12-bit resolution	Verified upto 800Ksps			Verified upto 800Ksps		

4.24 BLE Subsystem Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater						
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX				
BLE Subsystem Specification																	
RF Receiver Specification																	
SID340	RXS,IDLE	RX Sensitivity with Ideal Transmitter		-89		dBm		-89.70	-88.02	-86.90	-90.55	-88.87	-83.85				
SID340A	RXS,IDLE	RX Sensitivity with Ideal Transmitter excluding Balun loss		-91		dBm	Guaranteed by design simulation	Guaranteed by design simulation			Guaranteed by design simulation						
SID341	RXS,DIRTY	RX Sensitivity with Dirty Transmitter		-87	-70	dBm	RF-PHY Specification (RCV-LE/CA/01/C)	-88.50	-86.92	-82.10	-89.55	-87.67	-83.45				
SID342	RXS,HIGHGAIN	RX Sensitivity in High Gain mode with Ideal Transmitter		-91		dBm		-91.70	-90.18	-88.70	-93.55	-91.7	-86.55				
SID343	PRXMAX	Maximum Input Power	-10	-1		dBm	RF-PHY Specification (RCV-LE/CA/06/C)	0.00	0.00	0.00	0.00	0.00	0.00				
SID344	C1	Co-channel interference, Wanted Signal at -67dBm and Interferer at FRX		9	21	dB	RF-PHY Specification (RCV-LE/CA/03/C)	10	11.27	14	7	8.27	18				
		Adjacent channel interference		3	15	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-11	-8.33	-4	-6	-2.75	3				
SID345	C2	Adjacent channel interference															
		Wanted Signal at -67dBm and Interferer at FRX ± 1 MHz		3	15	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-11	-8.33	-4	-6	-2.75	3				
SID346	C3	Adjacent channel interference															
		Wanted Signal at -67dBm and Interferer at FRX ± 2 MHz		-29	-17	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-39	-36.50	-32	-42	-39.33	-23				
SID347	C4	Adjacent channel interference															
		Wanted Signal at -67dBm and Interferer at ≥ FRX ± 3 MHz		-39	-27	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-46	-44.00	-40	-48	-41.32	-27				
SID348	C5	Adjacent channel interference															
		Wanted Signal at -67dBm and Interferer at Image frequency (FIMAGE)		-20	-9	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-24	-21.16	-18	-32	-27.3	-12				
SID349	C6	Adjacent channel interference															
		Wanted Signal at -67dBm and Interferer at Image frequency (FIMAGE ± 1MHz)		-30	-15	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-34	-31.00	-27	-44	-38	-27				
SID350	OBB1	Out of Band Blocking															
		Wanted Signal at -67dBm and Interferer at F = 30 -2000 MHz	-30	-27		dBm	RF-PHY Specification (RCV-LE/CA/04/C)	Verified with Interferer at MinSpec			Verified with Interferer at MinSpec						
SID351	OBB2	Out of Band Blocking															
		Wanted Signal at -67dBm and Interferer at F = 2003 -2399 MHz	-35	-27		dBm	RF-PHY Specification (RCV-LE/CA/04/C)										
SID352	OBB3	Out of Band Blocking,															
		Wanted Signal at -67dBm and Interferer at F= 2484-2997MHz	-35	-27		dBm	RF-PHY Specification (RCV-LE/CA/04/C)										
SID353	OBB4	Out of Band Blocking															
		Wanted Signal at -67dBm and Interferer at F= 3000-12750 MHz	-30	-27		dBm	RF-PHY Specification (RCV-LE/CA/04/C)										
SID354	IMD	Intermodulation Performance															
		Wanted Signal at -64dBm and 1 Mbps BLE, 3rd, 4th and 5th offset channel	-50			dBm	RF-PHY Specification (RCV-LE/CA/05/C)	Covered as part of validation			Covered as part of validation						
SID355	RXSE1	Receiver Spurious emission			-57	dBm	100 kHz measurement bandwidth	-81.24	-78.90	-73.46	-88.37	-79.27	-75.16				
		30 MHz to 1.0 GHz					ETSI EN300 328 V1.8.1										
SID356	RXSE2	Receiver Spurious emission			-47	dBm	1 MHz measurement bandwidth	-85.15	-80.76	-77.98	-76.77	-75.82	-64.47				
		1.0 GHz to 12.75 GHz					ETSI EN300 328 V1.8.1										

BLE Subsystem Specifications (Continued)

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
BLE Subsystem Specification													
RF Transmitter Specifications													
SID357	TXP,ACC	RF Power Accuracy		±1		dB		-2.65	0.10	2.40	-3.10	-0.14	3.80
SID358	TXP,RANGE	RF PowerControlRange		20		dB		19.87	20.09	21.20	19.97	21.02	21.95
SID359	TXP,0dBm	Output Power, 0 dB Gain setting (PA7)		0		dBm		-2.40	-0.10	2.65	-3.80	0.14	3.10
SID360	TXP,MAX	Output Power, Maximum Power Setting (PA10)		3		dBm		0.72	2.17	3.98	-0.64	2.94	5.32
SID361	TXP,MIN	Output Power, Minimum Power Setting (PA1)		-18		dBm		-20.99	-18.79	-15.47	-21.76	-18.08	-15.26
SID362	F2AVG	Average Frequency deviation for 10101010 pattern	185			kHz	RF-PHY Specification (TRM-LE/CA/05/C)	229.49	247.56	253.83	244.73	253.68	262.75
SID363	F1AVG	Average Frequency deviation for 11110000 pattern	225	250	275	kHz	RF-PHY Specification (TRM-LE/CA/05/C)	245.05	252.24	257.08	245.12	250.28	259.31
SID364	EO	Eye opening = ΔF2AVG/ΔF1AVG	0.8				RF-PHY Specification (TRM-LE/CA/05/C)	0.92	0.98	0.99	0.98	1.01	1.03
SID365	FTX,ACC	Frequency Accuracy	-150		150	kHz	RF-PHY Specification (TRM-LE/CA/06/C)	-50.87	-8.70	40.32	-76.34	-23.78	91.25
SID366	FTX,MAXDR	Maximum Frequency Drift	-50		50	kHz	RF-PHY Specification (TRM-LE/CA/06/C)	-15.65	-6.39	5.55	-11.95	-6.23	36.08
SID367	FTX,INITDR	Initial Frequency drift	-20		20	kHz	RF-PHY Specification (TRM-LE/CA/06/C)	-7.17	-0.49	4.75	-2.16	0.78	5.81
SID368	FTX,DR	Maximum Drift Rate	-20		20	kHz/50µs	RF-PHY Specification (TRM-LE/CA/06/C)	-7.96	-0.90	7.20	-4.21	0.27	6.43
SID369	IBSE1	In Band Spurious Emission at 2 MHz offset			-20	dBm	RF-PHY Specification (TRM-LE/CA/03/C)	-41.70	-39.00	-36.00	-56.79	-51.77	-46.77
SID370	IBSE2	In Band Spurious Emission at ≥ 3 MHz offset			-30	dBm	RF-PHY Specification (TRM-LE/CA/03/C)	-46.00	-43.05	-40.20	-66.47	-58.26	-51.25
SID371	TXSE1	Transmitter Spurious Emissions (Averaging), <1.0 GHz			-55.5	dBm	FCC-15.247	-87.65	-80.90	-76.90	-85.74	-83.28	-75.11
SID372	TXSE2	Transmitter Spurious Emissions (Averaging), >1.0 GHz			-41.5	dBm	FCC-15.247	-69.09	-59.07	-49.87	-67.00	-58.04	-52.42
RF Current Specification													
SID373	IRX	Receive Current in Normal Mode		18.7		mA		Same as IRX_RF			Same as IRX_RF		
SID373A	IRX_RF	Radio Receive Current in Normal Mode		16.4		mA	Measured at VDDR	16.56	17.88	18.75	15.82	17.17	18.51
SID374	IRX, HIGHGAIN	Receive Current in High Gain mode		21.5		mA		18.34	19.70	20.68	17.44	19.00	20.78
SID375	ITX,3dBm	TX Current at 3 dBm setting (PA10)		20		mA		17.00	17.90	18.80	16.89	18.59	19.18
SID376	ITX,0dBm	TX Current at 0 dBm setting (PA7)		16.5		mA		Same as ITX_RF,0dBm			Same as ITX_RF,0dBm		
SID376A	ITX_RF,0dBm	Radio TX Current at 0 dBm setting (PA7)		15.6		mA	Measured at VDDR	14.90	15.80	16.50	14.25	15.71	16.55
SID376B	ITX_RF,0dBm	Radio TX Current at 0 dBm excluding Balun loss		14.2		mA	Guaranteed by design simulation	Guaranteed by design			Guaranteed by design		
SID377	ITX,-3dBm	TX Current at -3 dBm setting (PA4)		15.5		mA		13.10	14.00	14.50	12.79	13.88	14.43
SID378	ITX,-6dBm	TX Current at -6 dBm setting (PA3)		14.5		mA		12.00	13.00	13.50	12.04	12.96	13.44
SID379	ITX,-12dBm	TX Current at -12 dBm setting (PA2)		13.2		mA		10.80	11.79	12.30	10.99	11.71	12.18
SID380	ITX,-18dBm	TX Current at -18 dBm setting (PA1)		12.5		mA		10.20	11.10	11.80	10.42	11.07	11.55
General RF Specification													
SID381	FREQ	RF operating frequency	2400		2482	MHz		2400		2482	2400		2482
SID382	CHBW	Channel spacing		2		MHz			2			2	
RSSI Specification													
SID386	RSSI,ACC	RSSI Accuracy		±5		dB		-7.20	0.39	5.80	-8.00	6.49	7.00
SID387	RSSI,RES	RSSI Resolution		1		dB		Tested for 1 dB resolution			Tested for 1 dB resolution		
SID388	RSSI,PER	RSSI Sample Period		6		µs		Guaranteed by RSSI ACC and RSSI RES char			Guaranteed by RSSI ACC and RSSI RES char		

4.25 ECO Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
ECO Specifications													
SID389	FECO	Crystal Frequency		24		MHz		24.00	24.00	24.00	24.00	24.00	24.00
SID390	FTOL	Frequency tolerance	-50		50	ppm		-28.60	-18.70	-1.30	-28.60	-14.30	11.00
SID391	ESR	Equivalent series resistance			60	Ω		Input condition			Input condition		
SID393	TSTART1	Startup time (Fast Charge on)			850	μs		221.75	264.00	319.10	220.20	274.10	335.30
SID394	TSTART2	Startup time (Fast Charge off)			3	ms		0.55	0.61	0.79	0.66	0.75	1.03
SID395	CL	Load Capacitance		8		pF		Input Condition			Input condition		
SID396	C0	Shunt Capacitance		1.1		pF		Input Condition			Input condition		

4.26 WCO Subsystem Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
WCO Specifications													
SID398	FWCO	Crystal Frequency		32.768		kHz		32.76	32.77	32.77	32.76	32.77	32.77
SID399	FTOL	Frequency tolerance		50		ppm	T = 25 C with 20ppm Crystal	-28.6	-18.7	-1.3	3	16	24.00
SID400	ESR	Equivalent series resistance		50		kΩ		Input Condition			Input Condition		
SID402	TSTART	Startup time			500	ms		135.00	196.00	255.00	126.00	205.00	345.00
SID403	CL	Crystal Load Capacitance	6		12.5	pF		Input Condition			Input condition		
SID404	C0	Crystal Shunt Capacitance		1.35		pF		Input Condition			Input condition		
SID405	IWCO1	Operating Current (high power mode)			8	uA		1.12	4.01	4.68	1.65	3.16	4.08

Document History Page

Rev.	ECN No.	Orig. of Change	Description of Change
**	6073002	RADK	New Characterization Report.

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Cypress Semiconductor Sort Site Qualification Report

**QTP# 171610 VERSION *A
September 2017**

Cypress Test 25, Austin, Texas

Sort Site for S8 Technology

MPD / MCD Devices

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PACKAGE/PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
151907	Cypress Test 25, Austin, Texas Sort Site Qualification for S4 Technology	June 2015
171610	Cypress Test 25, Austin, Texas Sort Site Qualification for S8 Technology	April 2017

QUALIFICATION COVERAGE RANGE

MARKETING PART NUMBER	DEVICE DESCRIPTION
CY8C4013 / CY8C4014 / CY8CMBR3002 / CY8CMBR3102 / CY8CMBR3110	CapSense® MBR3
CY8CMBR31 / CY8C4013 / CY8C4014	PSoC® 4000
CY8C4014	Automotive PSoC® 4000
CY8C4124 / CY8C4125 / CY8C4244 / CY8C4245	PSoC® 4100 & PSoC® 4200
CY8C4124 / CY8C4125 / CY8C4244 / CY8C4245	Automotive PSoC® 4100 & PSoC® 4200
CY8CEBIKE	PSoC® 4100 & PSoC® 4200
CY8C4125 / CY8C4126 / CY8C4127	PSoC® 4100M & PSoC® 4200M M Series
CY8C4245 / CY8C4246 / CY8C4247	PSoC® 4100M & PSoC® 4200M M Series
CY8C4246 / CY8C4247 / CY8C4248	PSoC® 4200L L-Series
CY8C4127 / CY8C4247	PSoC® 4 BLE 128K
CYBL1016 / CYBL10162 / CYBL10163	PRoCTM-BLE 128K
CYBL10461 / CYBL10462 / CYBL10463	PRoCTM-BLE 128K
CYBL10561 / CYBL10562 / CYBL10563	PRoCTM-BLE 128K
CYBL10999	PRoCTM-BLE 128K
CY8C4128 / CY8C4248	PSoC® 4 BLE 256K
CYBL10573	PRoCTM-BLE 256K
CY8C3244 / CY8C3245 / CY8C3246 / CY8C3444	Automotive PSoC® 3
CY8C3445 / CY8C3446 / CY8C3645 / CY8C3646 CY8C3665 / CY8C3666 / CY8C3846 / CY8C3866 /	Automotive PSoC® 3
CY8C3244 / CY8C3245 / CY8C3246 / CY8C3444	PSoC® 3
CY8C3445 / CY8C3446 / CY8C3665 / CY8C3666 / CY8C3846 / CY8C3865 / CY8C3866 / CY8C3MFIDOCK / CY8C3USBAUDIO	PSoC® 3
CY8C5267 / CY8C5268 / CY8C5287 / CY8C5288/ CY8C5467 / CY8C5468 / CY8C5488 / CY8C5666 CY8C5667 / CY8C5668 / CY8C5688 / CY8C5866 / CY8C5867 / CY8C5868 / CY8C5888	PSoC® 5LP
CY8CTMA1036 / CY8CTMA460 / CY8CTMA461/ CY8CTMA768	Automotive True Touch® Gen4 Touchscreen Controller

QUALIFICATION COVERAGE RANGE

MARKETING PART NUMBER	DEVICE DESCRIPTION
CYTMA445A / CYTMA525A / CYTT21100 CYTT21401 / CYTT21402 / CYTT21403	True Touch® Gen6M Touchscreen Controller
CYTT21100 / CYTT21401 / CYTT21402 CYTT21403 / CYTT31401 / CYTT31702 CYTT31802 / CYTT32302	True Touch® Gen6L Touchscreen Controller
CYAT81682 / CYAT81685 / CYAT81688	Automotive True Touch® Gen6XL Touchscreen Controller
CYFPA1I	True Touch® Fingerprint
CYPD1103 / CYPD1104 / CYPD1105 CYPD1120 / CYPD1121 / CYPD1122 CYPD1134	EZ-PDTM CCG1 USB Type-C PD Controller
CYPD2103 / CYPD2104 / CYPD2105 CYPD2119 / CYPD2120 / CYPD2134	EZ-PDTM CCG2 USB Type-C PD Controller
CY7C65210 / CY7C65211 / CY7C65213 CY7C65215 / CY7C65217 / CY7C65221	USB-Serial Bridge Controller
CY14B064 / CY14E064 / CY14MB064 / CY14ME064	64Kb Serial nvSRAM
CY14B256 / CY14E256	256Kb Serial nvSRAM
CY14B512	512Kb Serial nvSRAM
CY14B101 / CY14E101	1Mb Serial nvSRAM
CY14V101	1Mb Quad SPI nvSRAM
CY14B256 / CY14E256 / CY14U256 / CY14V256	256Kb Parallel nvSRAM
CY14101V / CY14B101 / CY14V101	1Mb Parallel nvSRAM
CY14B102NS	2Mb Parallel nvSRAM
CY14104V / CY14B104 / CY14V104	4Mb Parallel nvSRAM
CY14B108 / CYATB108	8Mb Parallel nvSRAM
CY14B116 / CY14V116 / CY14E116	16Mb Parallel nvSRAM
CY27410F / CY27410L	4-PLL Spread-Spectrum Clock Generator

Reliability Test Data

QTP #: 151907

<i>Device</i>	<i>Fab Lot #</i>	<i>Assembly Lot#</i>	<i>Test Loc</i>	<i>Yield</i>
<i>SORT TEST: CORRELATION</i>				
Sort Yield:				
8C24094AC	4446219 w2, w4, w5	N/A	CMI-FAB25	Correlated
8A24094AC	4510997 w5, w6, w7	N/A	CMI-FAB25	Correlated
8A24094AC	4506339 w6, w7, w8	N/A	CMI-FAB25	Correlated
Bin Movement:				
8C24094AC	4446219 w2	N/A	CMI-FAB25	Correlated
8A24094AC	4510997 w5	N/A	CMI-FAB25	Correlated
8A24094AC	4506339 w6	N/A	CMI-FAB25	Correlated
Fishers Exact:				
8C24094AC	4446219 w2, w4, w5	N/A	CMI-FAB25	>0.05
8A24094AC	4510997 w5, w6, w7	N/A	CMI-FAB25	>0.05
8A24094AC	4506339 w6, w7, w8	N/A	CMI-FAB25	>0.05



Reliability Test Data

QTP #: 171610

Device	Fab Lot #	Assembly Lot#	Test Loc	Yield
---------------	------------------	----------------------	-----------------	--------------

SORT TEST: CORRELATION

Sort Yield:

8A20680BB	3639013 w21	N/A	FAB25	Correlated
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Bin Movement:

8A20680BB	3639013 w21	N/A	FAB25	<2%
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Document History Page

Document Title: QTP#171610: Cypress Test 25, Austin, Texas Sort Site for S8 Technology
Document Number: 002-19700

Rev.	ECN No.	Orig. of Change	Description of Change
**	5747717	HSTO	Initial Spec Release
*A	5874099	GKUS	1. Rearranged the nvSRAM parts as per the density & interface. 2. Included CY14B101 in the 1Mb Serial nvSRAM row which was missed in the last revision.

Cypress Semiconductor Corporation

PSoC® 4xx7 BLE Characterization Report for Fab25

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2.0 Introduction

2.1 General Description

PSoC® 4 BLE is a 32-bit, 48-MHz ARM® Cortex®-M0 Bluetooth® Low Energy (BLE) solution with CapSense®, 12-bit ADC, four timers, counter, pulse-width modulators (TCPWM), 36 GPIOs, two serial communication blocks (SCBs), LCD, and I2S. PSoC 4 BLE includes a royalty-free BLE stack compatible with Bluetooth 4.1 and provides a complete, programmable, and flexible solution for embedded applications such as remote controls, toys, beacons, and wireless chargers. In addition to these applications, PSoC 4 BLE provides a simple, low-cost way to add BLE connectivity to any system.

Key Features

- Bluetooth 4.1 single-mode device
- 2.4-GHz BLE radio and baseband with integrated balun
- Received signal strength indicator (RSSI) with 1-dB resolution
- Bluetooth Low Energy protocol stack supporting generic access profile (GAP) Central, Peripheral, Observer, or Broadcaster roles
- CapSense Touch Sensing with Two-Finger Gestures

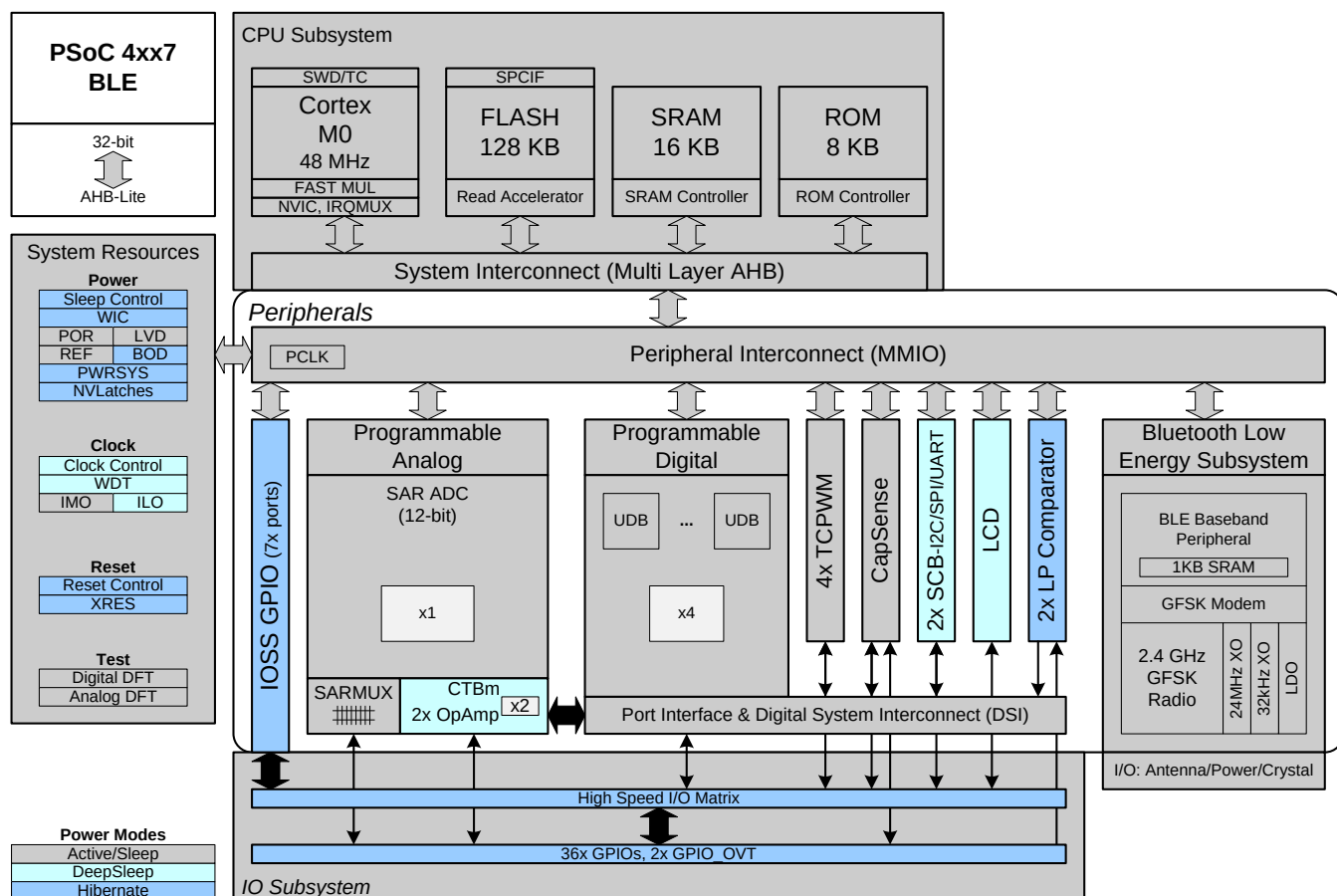


Figure 1. PSoC 4 BLE Logic Block Diagram

2.2 Datasheet

The PSoC 4xx7 BLE meets all datasheet specifications. The datasheet is available from the Cypress Website at: <http://www.cypress.com/products/psoc-4-ble-bluetooth-smart>.

2.3 Qualification Report

The PSoC 4xx7 BLE have completed qualification report under QTP 151603. The qualification report is available from the Cypress Website at: <http://www.cypress.com>.

3.0 Characterization Hardware and Setup

DC Characterization Board

Two different boards were used for DC measurements. The DC parameters were measured on an engineering 56 QFN package. Nextest and Agilent HP93K ATE Boards were used to measure DC parameters for GPIOs, trip levels, and SCB currents.

DC Measurement System and Hardware

Temperature Forcing System

Thermonics TPO4310A Precision Temperature Forcing System was used to force operating temperatures of -45°C, 25°C, 105°C and 125°C.

ATE Tester

The Nextest and the Agilent HP93K Testers were used to test the DC parameters for SCB currents, I2C Master and Slave, ADC, GPIO, SPI, SWD, Trip levels (IPOR, PPOR) and Chip level currents.

Oscilloscope

Tektronix DPO 7254 Digital Phosphor Oscilloscope was used to verify IMO oscillator frequency on bench.

Power Supply

Agilent E3631A (Triple Output DC Power supply) and Keithley 2400 series source meter were used to power the device.

LCR Meter

The 4275A Multi-Frequency LCR Meter was used to measure input pin capacitance.

BLE parameters were measured with the following equipment:

1. CBT (ROHDE&SCHWARZ)
2. Spectrum Analyzer(Agilent-E4405B)
3. Signal Generator(Agilent-E4438C)
4. Agilent Power Supply(E3649A)

AC Characterization Board

AC measurements board with Socket was used to characterize all AC parameters, these included all AC parameters related to IMO, ILO oscillators, GPIO rise/fall times.

DC Characterization Board

DC measurements board with Socket was used to characterize all DC parameters, these included all DC parameters related to OPAMP, Comparator, LCD and Temperature Sensor.

3.1 AC Characterization Board

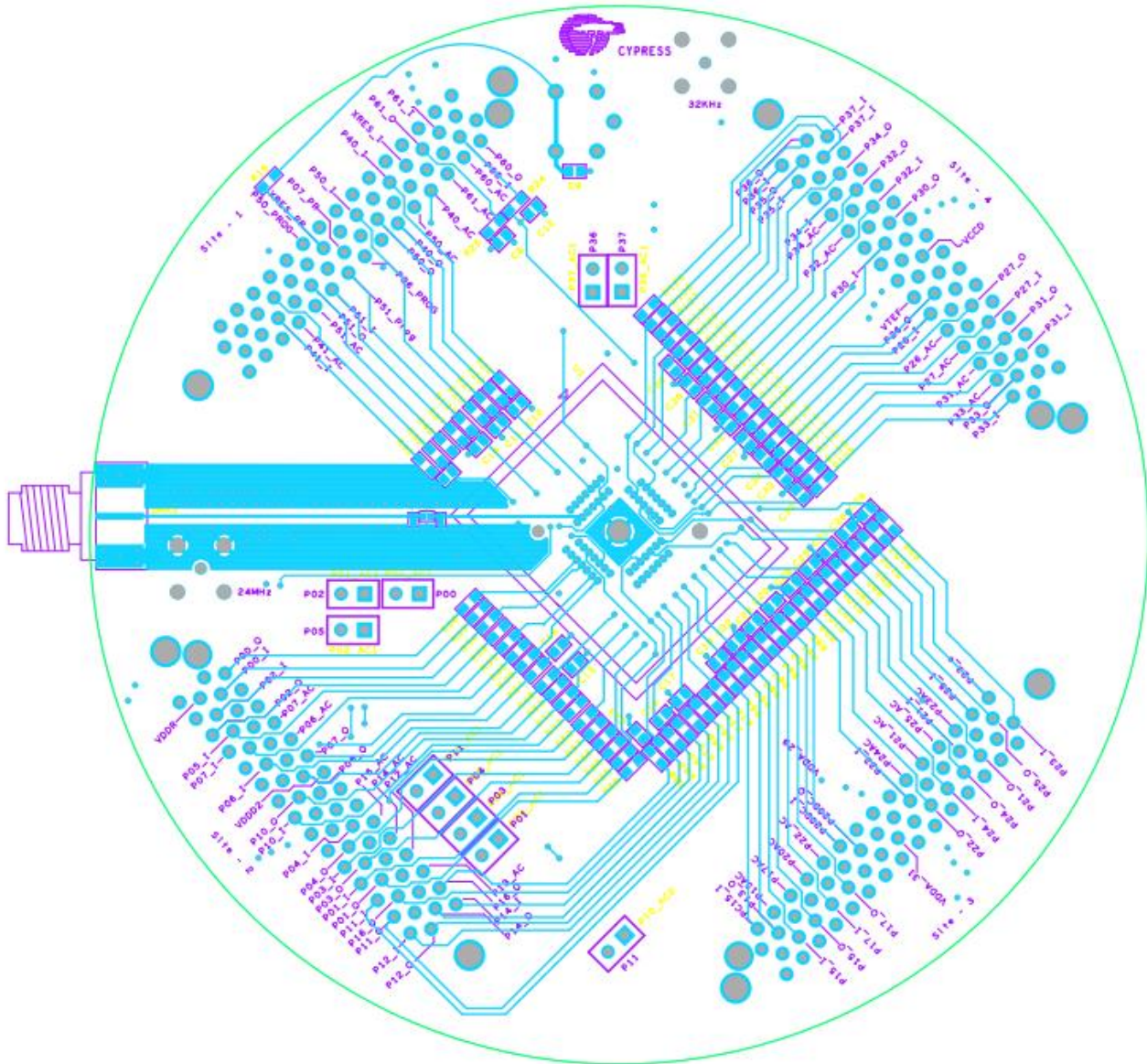


Figure 1. PSoC 4xx7 BLE AC Characterization Board Top View

3.2 DC Characterization Board

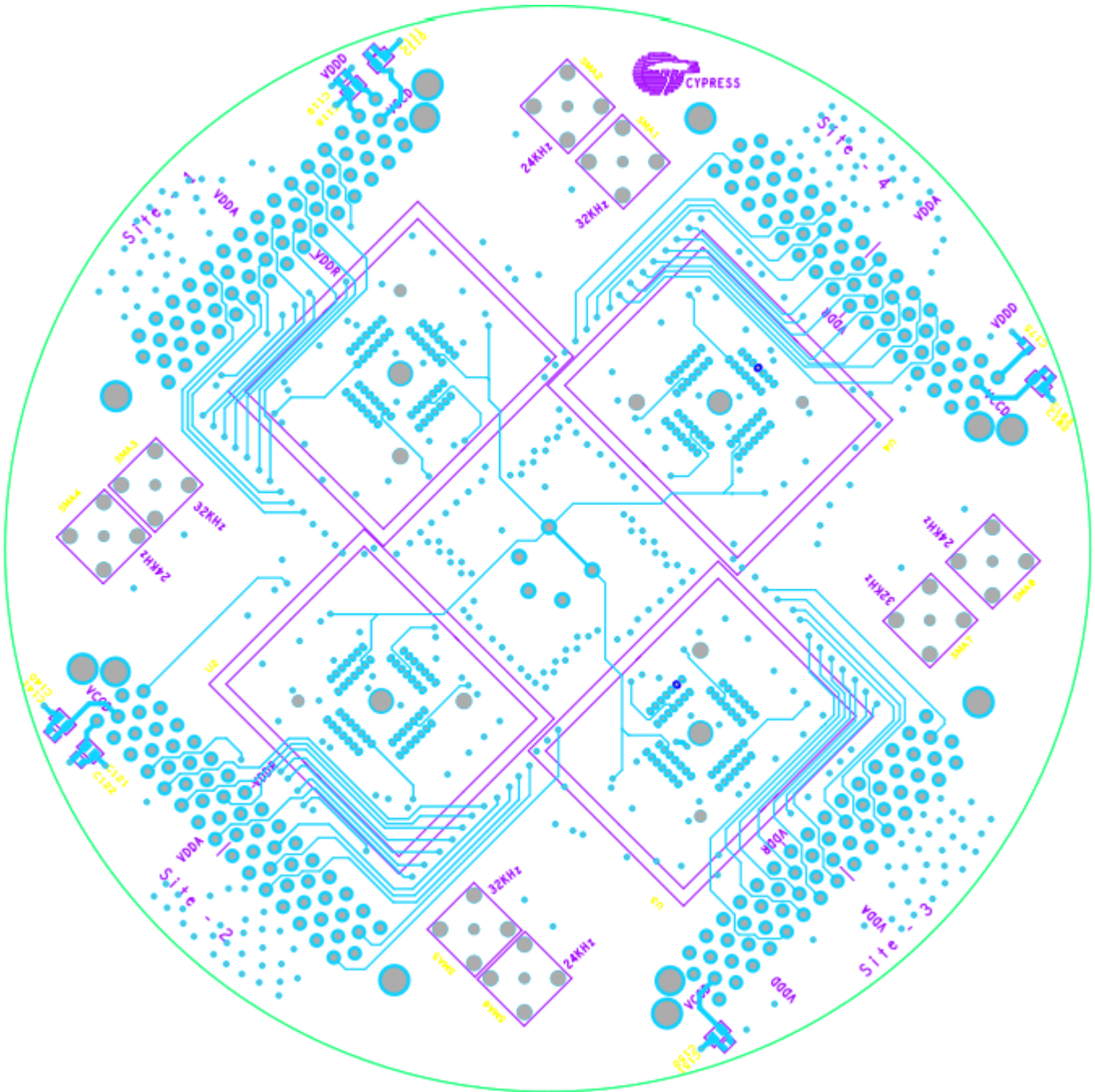


Figure 2. PSoC 4xx7 BLE DC Characterization Board Top View

3.3 ADC Characterization Board

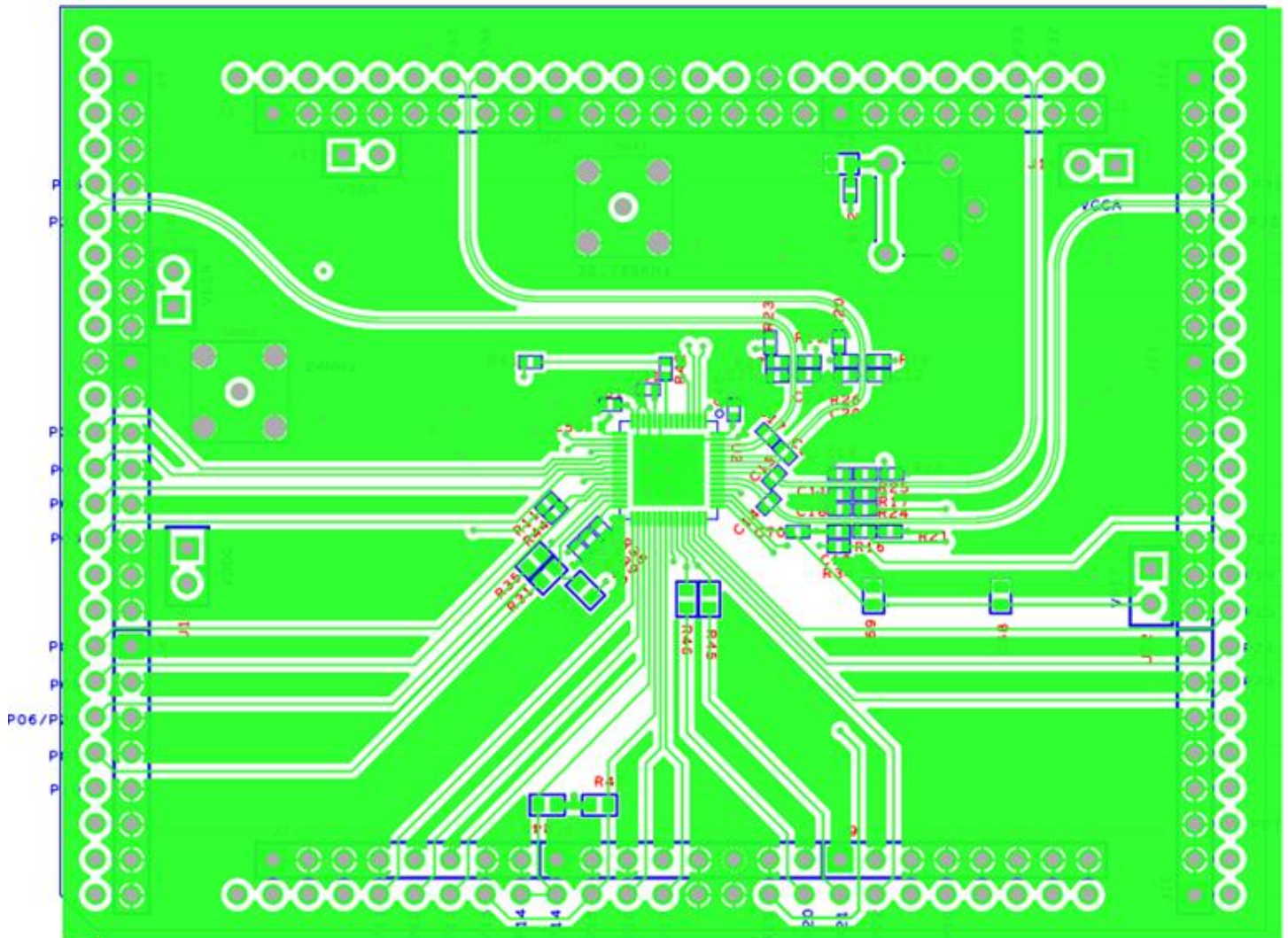


Figure 3. PSoC 4xx7 BLE ADC Characterization Board Top View

3.4 ATE 93K Characterization Board

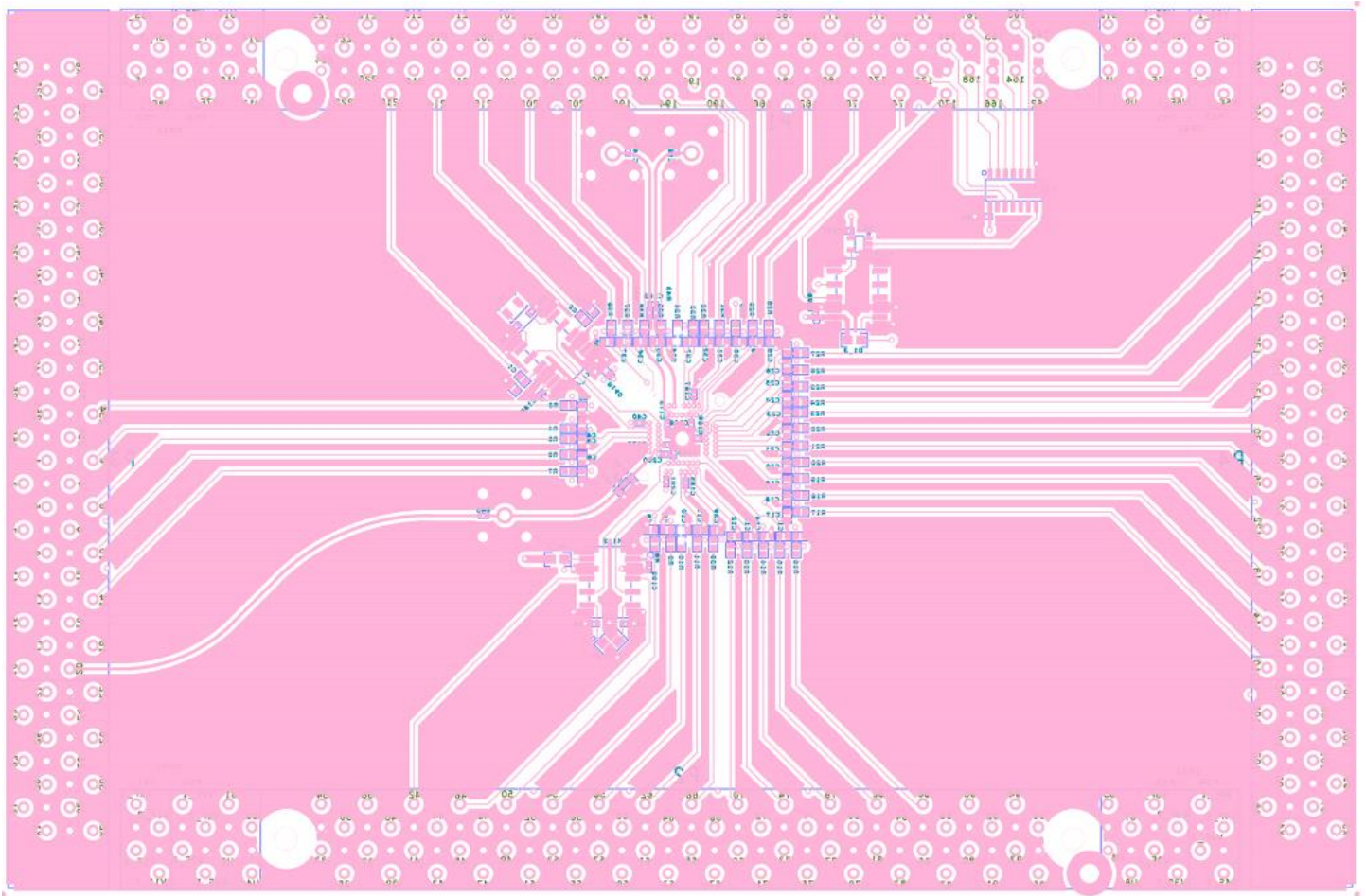


Figure 4. PSoC 4xx7 ATE 93K Characterization Board Top View

3.5 Measurement System and Hardware

ATE Tester

- Verigy 93K ATE tester was used to test all AC parameters of serial communication blocks (I2C, SPI and UART).
- IMO frequencies were measured using the production Nextest tester. These frequencies were correlated against ATE data by measuring them on bench setup as well.

Temperature Forcing System

Same as DC Measurement System and Hardware.

Power Supply

Same as DC Measurement System and Hardware.

Signal Generator

Agilent 81110A was used on bench setups.

Oscilloscope

Tektronix DPO 7254 Oscilloscope was used to measure AC parameters.

Probes

All AC signals were measured through SMA connectors and TAP1500 active probes.

3.6 Characterization Conditions and Parameters

Characterization was done on the following parts and conditions as listed in Table below. Units were built using standard production manufacturing and chosen randomly unless specified.

Table 1. Characterization Conditions and Parameters

Parameter	Device	Fab Lot	Assembly Lot	# of Devices	Voltage Variation (V)	Temperature Variation (°C)
DC	CY8C4247LQI-BL483	4551396	611621020	6-30	VDDD, VDDA, VDDR = 1.71, 1.8, 3.3, 5.5, 6.0	-45, 25, 105, 125
AC	CY8C4247LQI-BL483	4551396	611621020	6-30	VDDD, VDDA, VDDR = 1.71, 1.8, 3.3, 5.5, 6.0	-45, 25, 105, 125
RF (BLE)	CY8C4247LQI-BL483	4425547	611608178	30	VDDD = 5, 3.3, 1.9, VDDA = 5, 3.3, 3.3, VDDR = 5, 3.3, 5.5	-45, 25, 105, 125

Note: Minimum sample size was 6 for bench and 30 for ATE.

4.0 Device Level Specifications Characterization Summary across Voltage and Temperature

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Absolute Maximum Ratings													
SID1	Vdd_abs	Analog or Digital Supply relative to Vss (Vssd=Vssa)	-0.5	-	6	V	Absolute Maximum	Input condition			Input condition		
SID2	Vccd_abs	Direct digital core voltage input relative to Vssd	-0.5	-	1.95	V	Absolute Maximum	Input condition			Input condition		
SID3	Vgpio_abs	GPIO voltage	-0.5	-	Vdd+0.5	V	Absolute Maximum	Input condition			Input condition		
SID4	Igpio_abs	Current per GPIO	-25	-	25	mA	Absolute Maximum	Input condition			Input condition		
SID5	Igpio_injection	GPIO injection current, Max for VIH > VDDD,	-0.5	-	0.5	mA	Absolute Maximum Current injected per pin	Input condition			Input condition		
		and Min for VIL < VSS											

4.1 DC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
DC Specifications													
SID6	Vdd	Power Supply Input Voltage (Vdda=Vddd=Vdd)	1.8		5.5	V	With regulator enabled	Input condition			Input condition		
SID7	Vdd	Power Supply Input Voltage unregulated (Vdda=Vddd=Vdd)	1.71	1.8	1.89	V	Internally unregulated Supply	Input condition			Input condition		
SID8	Vddr	Radio Supply Voltage (RadioON)	1.9		5.5	V		Input condition			Input condition		
SID8A	Vddr	Radio Supply Voltage (Radio OFF)	1.71		5.5	V		Input condition			Input condition		
SID9	Vccd	Digital Regulator Output Voltage (for core Logic)		1.8		V		2	1.85	1.87	1.78	1.81	1.83
SID10	CVCCD	Digital Regulator Output Bypass Capacitor	1	1.3	1.6	µF	X5R ceramic or better	Input condition			Input condition		
Active Mode, VDD = 1.71V to 5.5V													
SID13	Idd3	Execute from Flash; CPU at 3 MHz	-	2.1		mA	T = 25 C, VDD = 3.3V	1.71	1.76	1.81	1.55	1.74	2.60
SID14	Idd4	Execute from Flash; CPU at 3 MHz	-	-		mA	T = -40 C to 85 C	1.64	1.76	1.89	1.40	1.74	2.98
SID15	Idd5	Execute from Flash; CPU at 6 MHz	-	2.5		mA	T = 25 C, VDD = 3.3V	2.2	2.26	2.32	2.17	2.45	3.25
SID16	Idd6	Execute from Flash; CPU at 6 MHz	-	-		mA	T = -40 C to 85 C	2.09	2.26	2.41	1.22	2.45	3.70
SID17	Idd7	Execute from Flash; CPU at 12 MHz	-	4		mA	T = 25 C, VDD = 3.3V	3.49	3.54	3.62	3.39	3.80	4.60
SID18	Idd8	Execute from Flash; CPU at 12 MHz	-	-		mA	T = -40 C to 85 C	3.33	3.53	3.71	2.97	3.80	4.88
SID19	Idd9	Execute from Flash; CPU at 24 MHz	-	7.1		mA	T = 25 C, VDD = 3.3V	5.56	5.64	5.76	5.39	6.10	7.38
SID20	Idd10	Execute from Flash; CPU at 24 MHz	-	-		mA	T = -40 C to 85 C	5.33	5.6	5.86	4.51	6.10	7.38
SID21	Idd11	Execute from Flash; CPU at 48 MHz	-	13.4		mA	T = 25 C, VDD = 3.3V	8.98	9.14	9.33	5.22	8.68	10.85
SID22	Idd12	Execute from Flash; CPU at 48 MHz	-	-		mA	T = -40 C to 85 C	8.55	9.05	9.48	5.09	8.68	11.84
Sleep Mode, VDD = 3.3V													
SID23	Idd13	IMO on	-	-	-	mA	T = 25 C, VDD = 3.3V, SYSCCLK=3MHz	1.07	1.10	1.09	1.07	1.08	1.1
Sleep Mode, VDD and VDDR = 3.3V													
SID24	Idd14	ECO on	-	-	-	mA	T = 25 C, VDD = 3.3V, SYSCCLK=3MHz	1.07	1.08	1.10	2.8	2.83	2.85
Deep Sleep Mode, VDD = 1.8 to 3.6V													
SID25	Idd15	WDT with WCO on	-	1.5	-	µA	T = 25 C, VDD = 3.3V	1.31	1.34	1.40	1.13	1.17	1.22
SID26	Idd16	WDT with WCO on	-	-	-	µA	T = -40 C to 85 C	1.13	9.18	54.71	1.36	1.58	57.75
Deep Sleep Mode, VDD = 3.6 to 5.5V													
SID27	Idd17	WDT with WCO on	-	-	-	µA	T = 25 C, VDD = 5V	1.38	1.41	1.47	1.15	1.18	1.21
SID28	Idd18	WDT with WCO on	-	-	-	µA	T = -40 C to 85 C	1.16	6.77	23.51	1.44	1.60	30.31

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Deep Sleep Mode, VDD = 1.71 to 1.89V (Regulator bypassed)													
SID29	idd19	WDT with WCO on	-	-	-	µA	T = 25 C	1.275	1.36	1.46	1.04	1.13	1.24
SID30	idd20	WDT with WCO on	-	-	-	µA	T = -40 C to 85 C	1.10	14.24	57.31	1.31	1.49	63.53
Deep Sleep Mode, VDD = 2.5 to 3.6V													
SID31	idd21	Op Amp on	-	-	-	µA	T = 25 C, VDD = 3.3V	10.14	13.06	15.16	11.32	12.85	14.29
SID32	idd22	Op Amp on	-	-	-	µA	T = -40 C to 85 C	7.4	18.95	39.26	2.54	12.85	48.04
Deep Sleep Mode, VDD = 3.6 to 5.5V													
SID33	idd23	Op Amp on	-	-	-	µA	T = 25 C, VDD = 5V	11.19	14.15	16.77	12.3	13.39	14.36
SID34	idd24	Op Amp on	-	-	-	µA	T = -40 C to 85 C	7.86	21.11	45.1	8.42	13.39	33.56
Hibernate Mode, VDD = 1.8 to 3.6V													
SID37	idd27	GPIO & Reset active	-	150	-	nA	T = 25 C, VDD = 3.3V	103.2	110.96	125.14	93.9	99.08	109
SID38	idd28	GPIO & Reset active	-	-	-	nA	T = -40 C to 85 C	75.71	1354.38	6064.9	76.5	99.08	3120
Hibernate Mode, VDD = 3.6 to 5.5V													
SID39	idd29	GPIO & Reset active	-	-	-	nA	T = 25 C, VDD = 5V	160.31	174.42	191.68	115	120.2	126
SID40	idd30	GPIO & Reset active	-	-	-	nA	T = -40 C to 85 C	89.7	2360.6	9163	89.2	120.2	3570
Hibernate Mode, VDD = 1.71 to 1.89V (Regulator bypassed)													
SID41	idd31	GPIO & Reset active	-	-	-	nA	T = 25 C	92.82	116	190.83	87.5	104.458	128
SID42	idd32	GPIO & Reset active	-	-	-	nA	T = -40 C to 85 C	77.48	1833	6899	81.3	113.33	4440
Stop Mode, VDD = 1.8 to 3.6V													
SID43	idd33	Stop mode current (VDD)	-	20	-	nA	T = 25 C, VDD = 3.3V	0.44	1.93	4.37	7.6	12.73	17.1
SID44	idd34	Stop mode current (VDDR)	-	40	-	nA	T = 25 C, VDDR = 3.3V	2.44	2.7	2.96	0.3	0.33	0.4
SID45	idd35	Stop mode current (VDD)	-	-	-	nA	T = -40 C to 85 C	0.11	1292	5422	0.1	12.73	1780
SID46	idd36	Stop mode current (VDDR)	-	-	-	nA	T = -40 C to 85 C, VDDR = 1.9V to 3.6V	0.32	241	1107	0.1	0.33	202
Stop Mode, VDD = 3.6 to 5.5V													
SID47	idd37	Stop mode current (VDD)	-	-	-	nA	T = 25 C, VDD = 5V	38.03	45.13	59.21	23	29.7	37.4
SID48	idd38	Stop mode current (VDDR)	-	-	-	nA	T = 25 C, VDDR = 5V	19.84	20.94	23.28	6.8	7.93	8.7
SID49	idd39	Stop mode current (VDD)	-	-	-	nA	T = -40 C to 85 C	0.26	1823	7520	0.1	29.7	2380
SID50	idd40	Stop mode current (VDDR)	-	-	-	nA	T = -40 C to 85 C	0.42	586	2639	0.1	7.93	410
Stop Mode, VDD = 1.71 to 1.89V (Regulator bypassed)													
SID51	idd41	Stop mode current (VDD)	-	-	-	nA	T = 25 C	0.03	1.9	6.71	11.4	21.94	32
SID52	idd42	Stop mode current (VDD)	-	-	-	nA	T = -40 C to 85 C	0.03	240	860	0.4	26.88	3470

4.2 AC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
AC Specifications													
SID53	Fcpu	CPU frequency	DC	-	48	MHz	1.71 <= Vdd<= 5.5	DC	-	48.00	DC	-	48.00
SID54	Tsleep	Wakeup from Sleep Mode	-	0		µs		0.08	0.10	0.13	0.09	0.09	0.10
SID55	Tdeepsleep	Wakeup from Deep Sleep Mode	-	-	25	µs		17.01	19.01	21.00	19.86	20.21	20.32
SID56	Thibernate	Wakeup from Hibernate Mode	-	-	0.7	ms		0.05	0.05	0.05	0.17	0.18	0.20
SID57	Tstop	Wakeup from Stop Mode			2.2	ms		1.551	1.60	1.648	1.54	1.61	1.67

4.3 GPIO DC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
GPIO DC Specifications (Including OVT GPIO pins P5_0 and P5_1)													
SID58	Vih	Input Voltage high threshold	0.7*Vdd	-	-	V	CMOS Input	0.45*Vdd	0.55*Vdd	0.67*Vdd	0.50*Vdd	0.57*Vdd	0.62*Vdd
SID59	Vil	Input Voltage low threshold	-	-	0.3*Vdd	V	CMOS Input	0.34*Vdd	0.40*Vdd	0.47*Vdd	0.35*Vdd	0.40*Vdd	0.45*Vdd
SID60	Vih	LVTTL input, Vdd< 2.7V	0.7*Vdd	-	-	V		0.50*Vdd	0.53*Vdd	0.58*Vdd	0.49*Vdd	0.54*Vdd	0.57*Vdd
SID61	Vil	LVTTL input, Vdd< 2.7V	-	-	0.3*Vdd	V		0.41*Vdd	0.44*Vdd	0.46*Vdd	0.40*Vdd	0.43*Vdd	0.44*Vdd
SID62	Vih	LVTTL input, Vdd>= 2.7V	2	-	-	V		1.30	1.68	1.95	1.31	1.38	1.87
SID63	Vil	LVTTL input, Vdd>= 2.7V	-	-	0.8	V		1.14	1.53	1.83	1.15	1.21	1.70
SID64	Voh	Output Voltage high level	Vdd-0.6	-	-	V	Ioh = 4mA at 3.3V Vdd	Vdd-0.23	Vdd-0.19	Vdd-0.13	Vdd-0.16	Vdd-0.20	Vdd-0.24
SID65	Voh	Output Voltage high level	Vdd-0.5	-	-	V	Ioh = 1mA at 1.8V Vdd	Vdd-0.11	Vdd-0.09	Vdd-0.07	Vdd-0.08	Vdd-0.10	Vdd-0.11
SID66	Vol	Output Voltage low level	-	-	0.6	V	Iol = 8mA at 3.3V Vdd	0.08	0.11	0.15	0.12	0.15	0.20
SID67	Vol	Output Voltage low level	-	-	0.6	V	Iol = 4mA at 1.8V Vdd	0.07	0.10	0.13	0.10	0.12	0.14
SID68	VOL	Output Voltage low level	-	-	0.4	V	Iol = 3mA at 3V VDD	0.03	0.04	0.06	0.05	0.06	0.08
SID69	Rpullup	Pull-up resistor	3.5	5.6	8.5	kΩ		4.56	4.91	5.22	4.32	5.03	5.57
SID70	Rpulldown	Pull-down resistor	3.5	5.6	8.5	kΩ		4.53	4.96	5.38	3.71	5.08	5.70
SID71	Iil	Input leakage current(absolute value)	-	-	2	nA	25° C, Vdd = 3.0V	Guaranteed by design			Guaranteed by design		
SID72	Iil_ctbm	Input leakage on CTBm input pins	-	-	4	nA		Guaranteed by design			Guaranteed by design		
SID73	Cin	Input Capacitance	-	-	7	pF		1.80	2.61	4.42	2.00	2.75	5.05
SID74	Vhysttl	Input hysteresis LVTTL	25	40	-	mV	VDD > 2.7V	71.50	158.85	210.33	152.00	170.00	178.00
SID75	Vhyscmos	Input hysteresis CMOS	0.05*VDD	-	-	mV		0.10*Vdd	0.16*Vdd	0.21*Vdd	0.13*Vdd	0.17*Vdd	0.18*Vdd
SID76	Idiode	Current through protection diode to Vdd/Vss	-	-	100	μA		Input condition			Input condition		
SID77	Itot_GPIO	Maximum Total Source or Sink Chip Current			200	mA		Guaranteed by design			Guaranteed by design		
OVT GPIO DC Specifications (P5_0 and P5_1 only)													
SID71A	Iil	Input Leakage (absolute value), VIH>VDD	-		10	uA	25°C, Vdd = 0V, VIH = 3.0V	Guaranteed by design			Guaranteed by design		
SID66A	Vol	Output Voltage low level	-	-	0.4	V	Iol = 20mA, Vdd> 2.9 V	0.03	0.04	0.06	0.13	0.19	0.28

4.4 GPIO AC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNIT S	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
GPIO AC Specifications (Including OVT GPIO pins P5_0 and P5_1)													
SID78	TriseF	Rise time in Fast Strong Mode	2	-	12	ns	3.3V Vdd, Cload = 25 pF	2.32	2.97	5.00	3.65	5.07	6.96
SID79	TfallF	Fall time in Fast Strong Mode	2	-	12	ns	3.3V Vdd, Cload = 25 pF	4.16	4.98	6.22	3.95	4.68	5.57
SID80	TriseS	Rise time in Slow Strong Mode	10	-	60	ns	3.3V Vdd, Cload = 25 pF	30.99	37.11	45.09	30.40	35.78	41.09
SID81	TfallS	Fall time in Slow Strong Mode	10	-	60	ns	3.3V Vdd, Cload = 25 pF	34.98	44.13	53.05	35.17	41.99	47.25
SID84	Fgpiout3	GPIO Fout;3.3V<=Vdd<=5.5V. Slow Strong mode.			7	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 7.7MHz			Verified till 7.7MHz		
SID85	Fgpiout4	GPIO Fout;1.71V<=Vdd<=3.3V. Slow Strong mode.			3.5	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 3.85MHz			Verified till 3.85MHz		
SID86	Fgpiin	GPIO input operating frequency;1.71V<=Vdd<=5.5V			48	MHz	90/10% Vio	Verified till 52.8MHz			Verified till 52.8MHz		
GPIO AC Specifications													
SID82	Fgpiout1	GPIO Fout;3.3V<=Vdd<=5.5V. Fast Strong mode.			33	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 36.3MHz			Verified till 36.3MHz		
SID83	Fgpiout2	GPIO Fout;1.71V<=Vdd<=3.3V. Fast Strong mode.			16.7	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 18.4MHz			Verified till 18.4MHz		

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
OVT GPIO AC Specifications (P5_0 and P5_1 only)													
SID78A	TRISE_OVFS	Output rise time in Fast-Strong Mode	1.5		12	ns	25 pF load, 10%–90%, Vdd = 3.3V	3.26	4.29	6.07	3.22	4.36	5.89
SID79A	TFALL_OVFS	Output fall time in Fast-Strong Mode	1.5		12	ns	25 pF load, 10%–90%, Vdd = 3.3V	2.1	2.68	3.47	2.23	2.87	3.57
SID80A	TriseSS	Output rise time in Slow-Strong mode	10		60	ns	25 pF load, 10%–90%, Vdd = 3.3V	22.12	26.05	30.48	24.35	28.14	31.77
SID81A	TfallSS	Output fall time in Slow-Strong mode	10		60	ns	25 pF load, 10%–90%, Vdd = 3.3V	28.17	32.61	37.83	30.02	34.85	39.43
SID82A	Fgpiout1	GPIO Fout; 3.3V<=Vdd<=5.5V. Fast Strong mode.			24	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 28MHz			Verified till 28MHz		
SID83A	Fgpiout2	GPIO Fout; 1.71V<=Vdd<=3.3V. Fast Strong mode.			16	MHz	90/10%, 25 pF load, 60/40 duty cycle	Verified till 17.6MHz			Verified till 17.6MHz		

4.5 XRES Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
XRES DC Specifications													
SID87	Vih	Input Voltage high threshold	0.7*Vdd	-	-	V	CMOS Input	0.52*Vdd	0.56*Vdd	0.61*Vdd	0.41*Vdd	0.48*Vdd	0.51*Vdd
SID88	Vil	Input Voltage low threshold	-	-	0.3*Vdd	V	CMOS Input	0.39*Vdd	0.47*Vdd	0.49*Vdd	0.53*Vdd	0.57*Vdd	0.61*Vdd
SID89	Rpullup	Pull-up resistor	3.5	5.6	8.5	kΩ		4.70	5.12	5.49	4.88	5.26	5.66
SID90	Cin	Input Capacitance	-	3	-	pF		-	1.28	-	-	1.30	-
SID91	Vhysxres	Input voltage hysteresis	-	100	-	mV		71.00	121.00	207.00	186.00	252.40	344.00
SID92	Idiode	Current through protection diode to Vdd/Vss			100	μA		Input condition			Input Condition		
XRES AC Specifications													
SID93	Tresetwidth	Reset pulse width	1	-	-	μs		0.13	0.15	0.18	0.13	0.14	0.16

4.6 OPAMP Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Op Amp Specifications													
Idd Op Amp Block current. Vdd = 1.8V. No load.													
SID94	idd_hi	power=hi		1000	1300	uA		889.00	1074.00	1264.00	635.26	1015.81	1140.89
SID95	idd_med	power=med		500		uA		502.60	591.36	803.90	379.63	518.31	616.60
SID96	idd_low	power=lo		250	350	uA		122.00	150.90	188.00	106.63	133.69	158.29
GBW Load = 20pF, 0.1mA. VDDA = 2.7V													
SID97	GBW_hi	power=hi	6			MHz		17.89	25.68	31.98	13.71	20.44	30.95
SID98	GBW_med	power=med	4			MHz		11.14	14.74	19.81	8.65	12.06	19.57
SID99	GBW_lo	power=lo	-	1		MHz		1.38	3.13	4.56	1.35	3.10	5.61
	Iout_max	VDDA=>2.7V, 500 mV from rail											
SID100	Iout_max_hi	power=hi	10			mA		12.60	17.40	21.70	12.48	17.50	23.36
SID101	Iout_max_mid	power=mid	10			mA		12.63	17.40	21.70	12.48	17.50	23.36
SID102	Iout_max_lo	power=lo		5		mA		12.60	17.40	21.60	12.49	17.05	23.35
Iout VDDA=1.71V, 500 mV from rail													
SID103	Iout_max_hi	power=hi	4			mA		6.40	7.90	10.20	6.77	7.87	10.16
SID104	Iout_max_mid	power=mid	4			mA		6.40	7.90	10.20	6.77	7.87	10.17
SID105	Iout_max_lo	power=lo		2		mA		6.40	7.90	10.20	6.78	7.87	10.17
SID106	Vin	Charge-pump on, VDDA => 2.7V	-0.05		VDDA-0.2	V		Input Condition			Input Condition		
SID107	Vcm	Charge-pump on, VDDA => 2.7V	-0.05		VDDA-0.2	V		Input Condition			Input Condition		
Vout VDDA=> 2.7V													
SID108	Vout_1	power=hi, Iload=10mA	0.5		VDDA -0.5	V		0.32		VDDA-0.41	0.14		VDDA-0.35
SID109	Vout_2	power=hi, Iload=1mA	0.2		VDDA -0.2	V		0.02		VDDA-0.03	0.01		VDDA-0.04
SID110	Vout_3	power=med, Iload=1mA	0.2		VDDA -0.2	V		0.02		VDDA-0.029	0.01		VDDA-0.03
SID111	Vout_4	power=lo, Iload=0.1mA	0.2		VDDA -0.2	V		0.00		VDDA-0.01	0.00		VDDA-0.02

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
SID112	Vos_tr	Offset voltage, trimmed	-1	+/-0.5	1	mV	High mode	-0.89	-0.08	0.91	-0.71	0.00	0.72
SID113	Vos_tr	Offset voltage, trimmed	-	+/-1	-	mV	Medium mode	-1.71	-0.10	1.25	-1.34	-0.01	1.33
SID114	Vos_tr	Offset voltage, trimmed	-	+/-2	-	mV	Low mode	-3.33	-0.60	3.62	-3.32	0.06	3.18
SID115	Vos_dr_tr	Offset voltage drift, trimmed	-10	+/-3		uV/C	High mode	-0.97	0.15	3.99	-5.80	-0.47	5.61
SID116	VOS_DR_TR	Offset voltage drift, trimmed	-	+/-10	-	uV/C	Medium mode	-7.49	-0.49	4.27	-5.97	-0.34	6.09
SID117	VOS_DR_TR	Offset voltage drift, trimmed	-	+/-10	-	uV/C	Low mode	-16.01	-0.32	13.16	-12.97	-0.49	12.94
SID118	CMRR	DC	65	70	-	dB	VDDD = 3.6V, High power Mode	67.39	78.40	88.61	67.32	75.58	90.28
SID119	PSRR	at 1 kHz, 10mV ripple	70	85	-	dB	VDDD = 3.6V	70.30	74.54	78.60	73.24	81.55	89.84
SID124	Cload	Stable up to max. load. Performance specs at 50 pF.			125	pF		Input Condition			Input Condition		
SID125	Slew_rate	Cload = 50pF, Power = High, VDDA => 2.7V	6			V/us		7.23	9.09	10.94	8.86	10.43	12.89
SID126	T_op_wake	From disable to enable, no external RC dominating		300		us		0.46	0.49	0.68	0.34	0.40	0.52
Comp_mode Comparator mode; 50mV drive, Trise=Tfall (approx.)													
SID127	Tpd1	Response time; power=hi		150		ns		66.35	134.93	287.00	90.88	107.99	146.13
SID128	Tpd2	Response time; power=med		400		ns		119.80	131.80	146.80	144.24	172.03	243.74
SID129	Tpd3	Response time; power=lo		2000		ns		415.30	444.20	495.60	412.69	863.20	1362.47
SID130	Vhyst_op	Hysteresis		10		mV		9.90	15.90	22.90	3.02	8.71	12.88
Deep Sleep Deep-Sleep mode operation is only guaranteed for VDDA > 2.5 V													
SID131	GBW_DS	Gain Bandwidth Product	-	50	-	kHz		137.46	326.63	339.32	156.89	380.94	558.50
SID132	IDD_DS	Current	-	15	-	uA		5.81	12.97	23.03	2.54	12.85	48.04
SID133	Vos_DS	Offset voltage	-	5	-	mV		-7.22	0.25	8.78	-5.60	0.53	6.42
SID134	Vos_dr_DS	Offset voltage drift	-	20	-	uV/C		-38.35	-4.11	44.19	-35.6	-3.9	30.2
SID136	Vcm_DS	Common mode voltage	0.2	-	Vdd-1.8	V		Input Condition			Input Condition		

4.7 Comparator Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Comparator DC Specifications													
SID140	Voffset1	Input offset voltage, Factory trim	-	-	±10	mV		-0.03	0.25	6.00	-5.06	-0.30	3.81
SID141	Voffset2	Input offset voltage, Custom trim	-	-	±6	mV		-0.10	0.00	6.00	-3.50	0.18	3.94
SID141A	Voffset3	Input offset voltage, Ultra low power mode		±12		mV	VDDD ≥ 2.6V for Temp < 0C	-0.02	0.25	6.00	-8.74	0.05	7.63
SID142	Vhyst	Hysteresis when enabled	-	10	35	mV		0.22	16.00	22.95	0.11	15.90	29.46
SID143	Vicm1	Input common mode voltage in normal mode	0	-	Vddd-0.1	V	Modes 1 and 2	Input condition			Input condition		
SID144	Vicm2	Input common mode voltage in low power mode	0	-	Vddd	V		Input condition			Input condition		
SID145	Vicm3	Input common mode voltage in ultra low power mode	0		Vddd-1.15	V	VDDD ≥ 2.6V for Temp < 0C	Input condition			Input condition		
							VDDD ≥ 1.8V for Temp ≥ 0C						
SID146	CMRR	Common mode rejection ratio	50	-	-	dB	VDDD ≥ 2.7V	58.35	64.20	87.40	58.77	71.58	94.12
SID147	CMRR	Common mode rejection ratio	42	-	-	dB	VDDD ≤ 2.7V	51.70	61.90	81.90	54.78	44.56	76.78
SID148	Icmp1	Block Current, normal mode	-	-	400	μA		148.00	218.00	285.40	91.01	232.52	292.15
SID149	Icmp2	Block Current, low power mode	-	-	100	μA		19.90	42.00	53.30	16.55	38.70	50.30
SID150	Icmp3	Block Current in ultra low-power mode	-	6	-	μA	VDDD ≥ 2.6V for Temp < 0C	5.85	6.14	6.76	1.31	3.72	10.10
							VDDD ≥ 1.8V for Temp ≥ 0C						
SID151	Zcmp	DC Input impedance of comparator	35	-	-	MΩ		5280.00	6644.00	8080.00	3731.86	4730.27	5538.46

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Comparator AC Specifications													
SID152	Tresp1	Response time, normal mode, 50 mV overdrive	-	38	-	ns	50 mV overdrive	28.20	30.77	36.60	26.10	26.86	27.50
SID153	Tresp2	Response time, low power mode, 50 mV overdrive	-	70	-	ns	50 mV overdrive	66.40	81.78	93.27	45.70	49.23	53.10
SID154	Tresp3	Response time, ultra-low power mode, 50 mV overdrive	-	2.3	-	μ s	200 mV overdrive	1.02	1.28	1.35	0.94	1.04	1.22
							VDDD $\geq$ 2.6V for Temp < 0C						
							VDDD $\geq$ 1.8V for Temp $\geq$ 0C						

4.8 Temperature Sensor Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Temperature Sensor Specifications													
SID155	Tsensacc	Temperature sensor accuracy	-5	±1	5	°C	-40 to +85 C	-4.00	-0.04	4.00	-2.08	0.70	4.43

4.9 SAR ADC Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
SAR ADC DC Specifications													
SID156	A_res	Resolution	-	-	12	bits		-	-	12.00	-	-	12.00
SID157	A_chnls_s	Number of channels - single ended	-	-	8		8 full speed.	-	-	8.00	-	-	8.00
SID158	A-chnks_d	Number of channels - differential	-	-	4		Diff inputs use neighbouring I/O	-	-	4.00	-	-	4.00
SID159	A-mono	Monotonicity	-	-	-		Yes.	Guaranteed by Char			Guaranteed by Char		
SID160	A_gainerr	Gain error	-	-	±0.1	%	With external reference.	-0.08	0.01	0.07	-0.04	0.01	0.03
SID161	A_offset	Input offset voltage	-	-	2	mV	Measured with 1V reference	0.02	0.40	1.27	0.01	0.44	0.98
SID162	A_isar	Current consumption	-	-	1	mA		0.47	0.53	0.68	0.10	0.48	0.70
SID163	A_vins	Input voltage range - single ended	Vss	-	Vdda	V		Input Condition			Input Condition		
SID164	A_vind	Input voltage range - differential[	Vss	-	Vdda	V		Input Condition			Input Condition		
SID165	A_inres	Input resistance	-	-	2.2	KΩ		Calculated specification			Calculated specification		
SID166	A_incap	Input capacitance			10	pF		2.17	2.30	2.52	2.20	2.40	2.60
SAR ADC AC Specifications													
SID167	A_psr	Power supply rejection ratio	70	-	-	dB	Measured at 1V	85.11	99.08	117.78	79.93	92.22	117.78
SID168	A_cmrr	Common mode rejection ratio	66	-	-	dB		70.14	82.50	98.75	70.80	75.40	115.00
SID169	A_samp	Sample rate	-	-	1	MSPS		-	-	1	-	-	1
SID170	A_snr	Signal-to-noise ratio (SNR)	65	-	-	dB	Fin = 10 kHz	68.37	71.02	73.18	68.04	72.12	76.24
SID171	A_bw	Input bandwidth without aliasing	-	-	A_samp/2	KHz		-	-	A_samp/2	-	-	A_samp/2
SID172	A_inl	Integral Non Linearity. VDD = 1.71 to 5.5, 1 MSPS	-1.7	-	2	LSB	Vref = 1 to VDD	-1.65	1.07	1.83	-1.19	0.92	1.57
SID173	A_INL	Integral Non Linearity. VDDD = 1.71 to 3.6, 1 MSPS	-1.5	-	1.7	LSB	Vref = 1.71 to VDD	-1.26	0.98	1.66	-1.13	0.92	1.53
SID174	A_INL	Integral Non Linearity. VDD = 1.71 to 5.5, 500 KSPS	-1.5		1.7	LSB	Vref = 1 to VDD	-1.27	-1.04	1.64	-1.44	-0.86	1.10
SID175	A_dnl	Differential Non Linearity. VDD = 1.71 to 5.5, 1 MSPS	-1	-	2.2	LSB	Vref = 1 to VDD	-0.89	0.32	1.92	-0.65	-0.34	1.36
SID176	A_DNL	Differential Non Linearity. VDD = 1.71 to 3.6, 1 MSPS	-1	-	2	LSB	Vref = 1.71 to VDD	-0.84	-0.38	1.77	-0.65	-0.34	1.32
SID177	A_DNL	Differential Non Linearity. VDD = 1.71 to 5.5, 500 KSPS	-1	-	2.2	LSB	Vref = 1 to VDD	-0.85	0.24	1.89	-0.60	-0.31	1.74
SID178	A_thd	Total harmonic distortion	-	-	-65	dB	Fin = 10 kHz	-78.47	-74.00	-66.96	-82.63	-76.31	-65.07

4.10 CSD Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
CSD Specifications													
SID179	Vcsd	Voltage range of operation	1.71		5.5	V		Input Condition			Input Condition		
SID180	Idac1	DNL for 8-bit resolution	-1		1	LSB		-0.48	0.00	0.50	-0.48	0.01	0.56
SID181	Idac1	INL for 8-bit resolution	-3		3	LSB		-2.15	-0.55	2.09	-1.20	0.23	1.92
SID182	Idac2	DNL for 7-bit resolution	-1		1	LSB		-0.31	0.10	0.51	-0.33	0.06	0.49
SID183	Idac2	INL for 7-bit resolution	-3		3	LSB		-0.56	0.34	1.19	-1.10	0.12	1.36
SID184	SNR	Ratio of counts of finger to noise	5			Ratio	9 to 35pF Capacitance range, 0.1 pF sensitivity	Verified at System Level			Verified at System Level		
							Radio is not operating during the scan						
SID185	Idac1_crt1	Output current of Idac1 (8-bits) in High range		612		uA		599	606.50	611.00	485.44	610.96	623.81
SID186	Idac1_crt2	Output current of Idac1 (8-bits) in Low range		306		uA		301.31	304.03	308.40	242.50	305.30	310.81
SID187	Idac2_crt1	Output current of Idac2 (7-bits) in High range		305		uA		298.44	302.84	308.90	240.81	303.63	310.06
SID188	Idac2_crt2	Output current of Idac2 (7-bits) in Low range		153		uA		150.14	152.54	155.40	120.06	152.09	155.19

4.11 Timer and Counter Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNIT S	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Timer DC Specifications													
SID189	Ilim1	Block current consumption at 3 Mhz	-	-	50	µA	16-bit Timer	30.06	32.85	35.66	29.94	31.88	36.05
SID190	Ilim2	Block current consumption at 12 MHz	-	-	175	µA	16-bit Timer	113.29	121.47	134.05	115.28	120.03	124.10
SID191	Ilim3	Block current consumption at 48 Mhz	-	-	712	µA	16-bit Timer	468.99	518.31	544.88	486.42	508.17	518.70
Timer AC Specifications													
SID192	Tlimfreq	Operating frequency	Fclk	-	48	MHz		Fclk		47.00	Fclk		48.00
SID193	Tcapwint	Capture pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID194	Tcapwext	Capture pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID195	Ttimres	Timer Resolution	Tclk	-	-	ns		Tclk	-	-	Tclk	-	-
SID196	Ttenwidint	Enable pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID197	Ttenwidext	Enable pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID198	Ttimreswint	Reset pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID199	Ttimresext	Reset pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
Counter DC Specifications													
SID200	Ictr1	Block current consumption at 3 Mhz	-	-	50	µA	16-bit Counter	30.49	32.88	36.11	29.54	32.09	35.04
SID201	Ictr2	Block current consumption at 12 MHz	-	-	175	µA	16-bit Counter	113.26	125.12	134.42	115.22	121.11	124.67
SID202	Ictr3	Block current consumption at 48 Mhz	-	-	712	µA	16-bit Counter	463.34	515.42	546.37	479.80	506.37	518.31
Counter AC Specifications													
SID203	Tctrfreq	Operating frequency	Fclk	-	48	MHz		Fclk		47.00	Fclk		48.00
SID204	Tctrpwint	Capture pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID205	Tctrpwext	Capture pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID206	Tctrres	Counter Resolution	Tclk	-	-	ns		Tclk	-	-	Tclk	-	-
SID207	Tcenwidint	Enable pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID208	Tcenwidext	Enable pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID209	Tctrreswint	Reset pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID210	Tctrreswext	Reset pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		

4.12 PWM Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNIT S	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
PWM DC Specifications													
SID211	lpwm1	Block current consumption at 3 Mhz	-	-	50	µA	16-bit PWM	30.27	32.80	36.11	29.99	32.01	34.77
SID212	lpwm2	Block current consumption at 12 Mhz	-	-	175	µA	16-bit PWM	112.74	124.81	135.09	114.63	120.24	125.71
SID213	lpwm3	Block current consumption at 48 Mhz	-	-	741	µA	16-bit PWM	454.68	503.57	532.75	483.54	505.60	518.27
PWM AC Specifications													
SID214	Tpwmfreq	Operating frequency	Fclk	-	48	MHz		Fclk		47.00	Fclk		48.00
SID215	Tpwmppwint	Pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID216	Tpwmext	Pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID217	Tpwmkillint	Kill pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID218	Tpwmkillext	Kill pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID219	Tpwmnenint	Enable pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID220	Tpwmnenext	Enable pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID221	Tpwmreswint	Reset pulse width (internal)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		
SID222	Tpwmreswext	Reset pulse width (external)	2*Tclk	-	-	ns		Guaranteed by design simulation			Guaranteed by design simulation		

4.13 I2C Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNIT S	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Fixed I2C DC Specifications													
SID223	I2c1	Block current consumption at 100 KHz	-	-	50	µA		14.00	17.00	24.00	33.65	36.29	38.14
SID224	I2c2	Block current consumption at 400 KHz	-	-	155	µA		46.00	49.50	52.00	105.57	112.55	118.05
SID225	I2c3	Block current consumption at 1 Mbps	-	-	390	µA		108.00	119.50	130.00	243.66	262.24	270.90
SID226	I2c4	I2C enabled in Deep Sleep mode	-	-	1.4	µA		Guaranteed by design simulations			Guaranteed by design simulations		
Fixed I2C AC Specifications													
SID227	F2c1	Bit Rate	1	-	-	Mbps		1.11	1.55	1.98	1.35	1.54	1.59

4.14 LCD Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
LCD Direct Drive DC Specifications													
SID228	Ilcdlow	Operating current in low power mode	-	17.5	-	µA	16 X 4 small segment disp. @ 50 Hz	4.00	4.33	5.00	16.40	17.68	20.90
SID229	Clcdcap	LCD capacitance per segment/common driver	-	500	5000	pF		Input Condition			Input Condition		
SID230	Lcdoffset	Long-term segment offset	-	20	-	mV		1.06	1.07	1.08	1.33	1.66	2.30
SID231	Ilcdop1	LCD system operating current. Vbias = 5V.	-	2	-	mA	32 X 4 segments. 50 Hz. 25 C	0.21	0.24	0.27	0.24	0.26	0.28
SID232	Ilcdop2	LCD system operating current Vbias = 3.3V	-	2	-	mA	32 X 4 segments. 50 Hz. 25 C	0.20	0.24	0.29	0.23	0.25	0.27
LCD Direct Drive AC Specifications													
SID233	Flcd	LCD Frame rate	10	50	150	Hz		Verified at 150Hz			Verified at 150Hz		

4.15 UART Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Fixed UART DC Specifications													
SID234	luart1	Block current consumption at 100 Kbits/sec	-	-	55	µA		22.00	25.17	28.00	37.28	40.48	42.82
SID235	luart2	Block current consumption at 1000 Kbits/sec	-	-	360	µA		124.00	138.50	178.00	194.49	205.52	209.81
Fixed UART AC Specifications													
SID236	Fuart	Bit Rate			1	Mbps		-	-	1	-	-	1

4.16 SPI Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Fixed SPI DC Specifications													
SID237	Ispi1	Block current consumption at 1Mbps/sec	-	-	360	µA		40.00	44.67	54.00	41.29	54.57	60.13
SID238	Ispi2	Block current consumption at 4 Mbps/sec	-	-	560	µA		172.00	181.80	190.00	213.33	230.58	237.32
SID239	Ispi3	Block current consumption at 8 Mbps/sec	-	-	600	µA		338.00	358.70	374.00	425.02	450.30	464.51
Fixed SPI AC Specifications													
SID240	Fspi	SPI Operating frequency (Master; 6X Oversampling)	8		-	MHz		9.39	17.67	23.93	10.15	13.41	14.97
Fixed SPI Master mode AC Specifications													
SID241	Tdmo	MOSI Valid after SClck driving edge	-	-	18	ns		3.05	5.39	8.55	1.22	4.38	6.96
SID242	Tdsi	MISO Valid before SClck capturing edge	20	-	-	ns	Full clock, late MISO sampling	-52.29	-36.50	-13.49	-53.48	-47.33	-19.25
SID243	Thmo	Previous MOSI data hold time	0	-	-	ns	Referred to Slave capturing edge	47.91	57.96	67.78	50.34	58.45	66.62
Fixed SPI Slave mode AC Specifications													
SID244	Tdmi	MOSI Valid before SClck Capturing edge	40	-	-	ns		0.66	1.14	1.93	-0.17	0.76	1.87
SID245	Tdso	MISO Valid after SClck driving edge	-	-	42 + 3*Tscb	ns		75.87	88.26	109.37	74.37	79.94	106.60
SID246	Tdso_ext	MISO Valid after SClck driving edge in Ext. Clk. Mode			55	ns	Vdd< 3V	11.06	26.19	45.48	9.84	15.02	42.76
SID247	Thso	Previous MISO data hold time	0	-	-	ns		14.19	35.05	50.21	18.52	46.26	51.44
SID248	Tsselsck	SSEL Valid to first SCK Valid edge			100	ns		9.21	24.36	46.46	8.36	13.48	39.99

4.17 FLASH Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Memory													
Flash DC Specifications													
SID249	Vpe	Erase and program voltage	1.71	-	5.5	V		1.71	-	5.5	1.71	-	5.5
SID309	Tws48	Number of Wait states at 32-48 MHz	2	-	-		CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID310	Tws32	Number of Wait states at 16-32 MHz	1	-	-		CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID311	Tws16	Number of Wait states for 0-16 MHz	0				CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
Flash AC Specifications													
SID250	Trow write	Row(Block) write time (erase & program)	-	-	20	ms	Row (Block) = 256 Bytes	Guaranteed by design simulations			Guaranteed by design simulations		
SID251	Trow erase	Row erase time	-	-	13	ms		Guaranteed by design simulations			Guaranteed by design simulations		
SID252	Trow program	Row program time after erase	-	-	7	ms		Guaranteed by design simulations			Guaranteed by design simulations		
SID254	Tdev prog	Total Device Program time	-	-	50	seconds		Guaranteed by design simulations			Guaranteed by design simulations		
SID255	Fend	Flash Endurance	100K	-	-	cycles		Guaranteed by design simulations			Guaranteed by design simulations		
SID256	Fret1	Flash Retention. Ta<= 55 C, 100K P/E cycles	20	-	-	years		Guaranteed by design simulations			Guaranteed by design simulations		
SID257	Fret2	Flash Retention. Ta<= 85 C, 10K P/E cycles	10	-	-	years		Guaranteed by design simulations			Guaranteed by design simulations		

4.18 POR Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
System Resources													
Power-On-Reset with Brown-outDC Specifications													
Imprecise POR (IPOR)													
SID258	Vriseipor	Rising trip voltage	0.8	-	1.45	V		Guaranteed by design			Guaranteed by design		
SID259	Vfallipor	Falling trip voltage	0.75	-	1.4	V		Guaranteed by design			Guaranteed by design		
SID260	Viporhyst	Hysteresis	15	-	200	mV		Guaranteed by design			Guaranteed by design		
Precise POR(PPOR)													
SID261	Vfallppor	BOD trip voltage in Active and Sleep modes	1.64	-	-	V		2.00	1.66	1.68	1.65	1.67	1.70
SID262	Vfalddpslp	BOD trip voltage in Deep Sleep	1.4	-	-	V		1.42	1.46	1.69	1.43	1.52	1.64
Hibernate Reset													
SID263	Vhbrtrip	BOD trip voltage in Hibernate	1.1	-	-	V		1.3	1.33	1.36	1.26	1.31	1.35
POR with Brown-out AC Specification													
SID264	Tppor_tr	PPOR Response time in Active and Sleep modes	-	-	1	µs		Verified at 500ns; 50% margin			Verified at 500ns; 50% margin		

4.19 Voltage Monitor Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Voltage Monitors DC Specifications													
SID265	Vlv1	LVI_A/D_SEL[3:0] = 0000b	1.71	1.75	1.79	V		1.73	1.75	1.76	1.74	1.75	1.77
SID266	Vlv2	LVI_A/D_SEL[3:0] = 0001b	1.76	1.8	1.85	V		1.78	1.8	1.81	1.79	1.80	1.82
SID267	Vlv3	LVI_A/D_SEL[3:0] = 0010b	1.85	1.9	1.95	V		1.88	1.89	1.91	1.88	1.90	1.92
SID268	Vlv4	LVI_A/D_SEL[3:0] = 0011b	1.95	2	2.05	V		1.98	1.99	2.01	1.99	2.00	2.02
SID269	Vlv5	LVI_A/D_SEL[3:0] = 0100b	2.05	2.1	2.15	V		2.08	2.1	2.12	2.09	2.10	2.12
SID270	Vlv6	LVI_A/D_SEL[3:0] = 0101b	2.15	2.2	2.26	V		2.18	2.2	2.22	2.19	2.21	2.23
SID271	Vlv7	LVI_A/D_SEL[3:0] = 0110b	2.24	2.3	2.36	V		2.28	2.3	2.32	2.29	2.31	2.33
SID272	Vlv8	LVI_A/D_SEL[3:0] = 0111b	2.34	2.4	2.46	V		2.38	2.4	2.42	2.39	2.41	2.43
SID273	Vlv9	LVI_A/D_SEL[3:0] = 1000b	2.44	2.5	2.56	V		2.48	2.5	2.52	2.49	2.51	2.53
SID274	Vlv10	LVI_A/D_SEL[3:0] = 1001b	2.54	2.6	2.67	V		2.58	2.6	2.62	2.59	2.61	2.64
SID275	Vlv11	LVI_A/D_SEL[3:0] = 1010b	2.63	2.7	2.77	V		2.68	2.7	2.72	2.69	2.71	2.74
SID276	Vlv12	LVI_A/D_SEL[3:0] = 1011b	2.73	2.8	2.87	V		2.78	2.81	2.82	2.80	2.81	2.84
SID277	Vlv13	LVI_A/D_SEL[3:0] = 1100b	2.83	2.9	2.97	V		2.87	2.9	2.92	2.89	2.91	2.94
SID278	Vlv14	LVI_A/D_SEL[3:0] = 1101b	2.93	3	3.08	V		2.99	3.01	3.03	2.96	2.98	3.01
SID279	Vlv15	LVI_A/D_SEL[3:0] = 1110b	3.12	3.2	3.28	V		3.19	3.21	3.23	3.16	3.17	3.21
SID280	Vlv16	LVI_A/D_SEL[3:0] = 1111b	4.39	4.5	4.61	V		4.48	4.51	4.55	4.43	4.45	4.51
SID281	LVI_1dd	Block current	-	-	100	uA		Guaranteed by design simulations			Guaranteed by design simulations		

4.20 SWD Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
SWD Interface													
SID283	F_swdclk1	3.3V <= Vdd<= 5.5V	14	-	-	MHz	SWDCLK <= 1/3 CPU clock frequency	29.69	31.51	33.48	16.93	17.72	18.48
SID284	F_swdclk2	1.71V <= Vdd<= 3.3V	7	-	-	MHz	SWDCLK <= 1/3 CPU clock frequency	22.44	26.05	30.70	11.96	17.72	18.48
SID285	T_swdi_setup	T = 1/f SWDCLK	0.25*T	-	-	ns		0.55	1.01	1.46	-0.002*T	0.007*T	0.013*T
SID286	T_swdi_hold	T = 1/f SWDCLK	0.25*T	-	-	ns		-0.84	-0.62	-0.46	-0.005*T	0.00	0.006*T
SID287	T_swdo_valid	T = 1/f SWDCLK		-	0.5*T	ns		11.29	24.70	32.94	0.181*T	0.385*T	0.414*T
SID288	T_swdo_hold	T = 1/f SWDCLK	1	-	-	ns		9.50	12.92	15.26	7.64	9.01	10.39

4.21 IMO Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
Internal Oscillator Clock Specifications													
IMO DC Specifications													
SID289	lmo1	IMO Operating current at 48 MHz	-	-	1000	µA		Guaranteed by design			Guaranteed by design		
SID290	lmo2	IMO Operating current at 24 MHz	-	-	325	µA		Guaranteed by design			Guaranteed by design		
SID291	lmo3	IMO Operating current at 12 MHz	-	-	225	µA		Guaranteed by design			Guaranteed by design		
SID292	lmo4	IMO Operating current at 6 MHz	-	-	180	µA		Guaranteed by design			Guaranteed by design		
SID293	lmo5	IMO Operating current at 3 MHz	-	-	150	µA		Guaranteed by design			Guaranteed by design		
IMO AC Specifications													
SID296	Fimotol3	Frequency variation from 3 to 48 MHz	-	-	±2	%	With API-called calibration	0.10	0.00	0.21	-1.56	0.36	1.72
SID297	Tstartimo	IMO Startup time	-	-	12	µs		0.53	1.58	2.98	1.80	2.03	2.27
ILO DC Specifications													
SID298	llo2	ILO Operating current at 32 KHz	-	0.3	1.05	µA		0.24	0.32	0.52	0.15	0.28	0.62
ILO AC Specifications													
SID299	Tstartilo1	ILO Start-up time	-	-	2	ms		0.25	0.29	0.38	0.51	0.53	0.55
SID300	Filotrim1	32 KHz trimmed frequency	15	32	50	KHz		21.48	33.39	45.97	22.31	31.63	40.52

4.22 External Clock Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
External Clock Specifications													
SID301	ExtClkFreq	External Clock input Frequency	0		48	MHz	CMOS input level only. TTL input is not supported	0		48	0		48
SID302	ExtClkDuty	Duty cycle; Measured at VDD/2	45		55	%		45		55	45		55

4.23 Block Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
UDB AC Specifications													
Datapath performance													
SID303	Fmax-timer	Max. frequency of 16-bit timer in a UDB pair	-	-	48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
SID304	Fmax-adder	Max. frequency of 16-bit adder in a UDB pair	-	-	48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
SID305	Fmax_CRC	Max. frequency of 16-bit CRC/PRS in a UDB pair	-	-	48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
PLD Performance in UDB													
SID306	Fmax_PLD	Max. freq. of 2-pass PLD function in a UDB pair			48	MHz		Guaranteed by design simulations			Guaranteed by design simulations		
Clock to Output Performance													
SID307	Tclk_out_udb1	Prop. Delay for clock in to data out @ 25 C, Typ.	-	15	-	ns		Guaranteed by design simulations			Guaranteed by design simulations		
SID308	Tclk_out_udb2	Prop. Delay for clock in to data out, Worst case.	-	25	-	ns		Guaranteed by design simulations			Guaranteed by design simulations		
Block Specs													
SID309	Tws48	Number of Wait states at 32-48 MHz	2	-	-		CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID310	Tws32	Number of Wait states at 16-32 MHz	1	-	-		CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID311	Tws16	Number of Wait states for 0-16 MHz	0				CPU execution from Flash	Guaranteed by design simulations			Guaranteed by design simulations		
SID312	Vrefsar	Trimmed internal reference to SAR	-1	-	1	%	Percentage of Vbg (1.024V)	Guaranteed by design simulations			Guaranteed by design simulations		
SID313	Fsarintref	SAR Operating speed without external ref. bypass	-	-	100	KSPS	12-bit resolution	Guaranteed by design simulations			Guaranteed by design simulations		

4.24 BLE Subsystem Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
BLE Subsystem Specification													
RF Receiver Specification													
SID340	RXS,IDLE	RX Sensitivity with Ideal Transmitter		-89		dBm		-91.55	-89.40	-85.15	-91.01	-88.75	-84.65
SID340A	RXS,IDLE	RX Sensitivity with Ideal Transmitter excluding Balun loss		-91		dBm	Guaranteed by design simulation	Guaranteed by design			Guaranteed by design		
SID341	RXS,DIRTY	RX Sensitivity with Dirty Transmitter		-87	-70	dBm	RF-PHY Specification (RCV-LE/CA/01/C)	-90.15	-88.20	-83.95	-89.81	-87.55	-83.55
SID342	RXS,HIGHGAIN	RX Sensitivity in High Gain mode with Ideal Transmitter		-91		dBm		-93.90	-91.90	-85.85	-93.57	-91.48	-88.95
SID343	PRXMAX	Maximum Input Power	-10	-1		dBm	RF-PHY Specification (RCV-LE/CA/06/C)	0	0	0	0	0	0
SID344	CI1	Co-channel interference, Wanted Signal at -67dBm and Interferer at FRX		9	21	dB	RF-PHY Specification (RCV-LE/CA/03/C)	8	9.72	12	4	5.83	7
SID345		CI2	Adjacent channel interference, Wanted Signal at -67dBm and Interferer at FRX ± 1 MHz		3	15	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-7	-5.06	2	-19	-16.58
SID346	CI3	Adjacent channel interference, Wanted Signal at -67dBm and Interferer at FRX ± 2 MHz		-29	-17	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-38	-36.37	-34	-42	-33.67	-25
SID347		CI4	Adjacent channel interference, Wanted Signal at -67dBm and Interferer at ± FRX ± 3 MHz		-39	-27	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-45	-43.17	-41	-50	-47.17
SID348	CI5	Adjacent channel interference, Wanted Signal at -67dBm and Interferer at Image frequency (FIMAGE)		-20	-9	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-27	-24.77	-22	-33	-27.08	-25
SID349		CI6	Adjacent channel interference, Wanted Signal at -67dBm and Interferer at Image frequency (FIMAGE ± 1MHz)		-30	-15	dB	RF-PHY Specification (RCV-LE/CA/03/C)	-33	-32.55	-29	-48	-30.98
SID350	OBB1	Out of Band Blocking, Wanted Signal at -67dBm and Interferer at F = 30 -2000 MHz	-30	-27		dBm	RF-PHY Specification (RCV-LE/CA/04/C)	Verified with Interferer at MinSpec			Verified with Interferer at MinSpec		
SID351		OBB2	Out of Band Blocking, Wanted Signal at -67dBm and Interferer at F = 2003 -2399 MHz	-35	-27		dBm						
SID352	OBB3	Out of Band Blocking, Wanted Signal at -67dBm and Interferer at F= 2484-2997MHz	-35	-27		dBm	RF-PHY Specification (RCV-LE/CA/04/C)						
SID353		OBB4	Out of Band Blocking, Wanted Signal at -67dBm and Interferer at F= 3000-12750 MHz	-30	-27		dBm						
SID354	IMD	Intermodulation Performance, Wanted Signal at -64dBm amd 1 Mbps BLE, 3rd, 4th and 5th offset channel	-50			dBm	RF-PHY Specification (RCV-LE/CA/05/C)	Covered as part of validation			Covered as part of validation		
SID355	RXSE1	Receiver Spurious emission, 30 MHz to 1.0 GHz			-57	dBm	100 kHz measurement bandwidth ETSI EN300 328 V1.8.1	-83.92	-76.68	-75.99	-88.37	-79.27	-75.16
		Receiver Spurious emission, 1.0 GHz to 12.75 GHz			-47	dBm	1 MHz measurement bandwidth ETSI EN300 328 V1.8.1	-83.01	-78.94	-72.60	-76.77	-75.82	-64.47
RF Transmitter Specifications													
SID357	TXP,ACC	RF Power Accuracy		±1		dB		-2.28	0.17	2.57	-3.21	0.10	2.76
SID358	TXP,RANGE	RF PowerControlRange		20		dB		17.41	21.18	24.36	19.69	21.05	21.77
SID359	TXP,0dBm	Output Power, 0 dB Gain setting (PA7)		0		dBm		-2.57	-0.17	2.28	-2.60	-0.10	2.93
SID360	TXP,MAX	Output Power, Maximum Power Setting (PA10)		3		dBm		0.37	2.68	4.47	0.31	2.68	5.20
SID361	TXP,MIN	Output Power, Minimum Power Setting (PA1)		-18		dBm		-20.95	-18.13	-16.08	-20.82	-18.37	-15.11
SID362	F2AVG	Average Frequency deviation for 10101010 pattern	185			kHz	RF-PHY Specification (TRM-LE/CA/05/C)	242.03	254.61	262.58	237.43	256.79	265.57
SID363	F1AVG	Average Frequency deviation for 11110000 pattern	225	250	275	kHz	RF-PHY Specification (TRM-I F/CA/05/C)	243.02	251.08	261.66	245.86	251.81	258.60

BLE Subsystem Specifications (Continued)

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
SID365	FTX,ACC	Frequency Accuracy	-150		150	kHz	RF-PHY Specification (TRM-LE/CA/06/C)	-5.25	40.80	96.80	3.23	52.83	89.27
SID366	FTX,MAXDR	Maximum Frequency Drift	-50		50	kHz	RF-PHY Specification (TRM-LE/CA/06/C)	-11.68	-0.72	9.75	2.00	7.68	47.80
SID367	FTX,INITDR	Initial Frequency drift	-20		20	kHz	RF-PHY Specification (TRM-LE/CA/06/C)	-7.16	-0.02	9.43	0.74	3.61	19.89
SID368	FTX,DR	Maximum Drift Rate	-20		20	kHz/50µs	RF-PHY Specification (TRM-LE/CA/06/C)	-4.78	-0.43	9.44	1.76	4.48	19.82
SID369	IBSE1	In Band Spurious Emission at 2 MHz offset			-20	dBm	RF-PHY Specification (TRM-LE/CA/03/C)	-55.82	-52.94	-50.85	-55.15	-42.04	-46.53
SID370	IBSE2	In Band Spurious Emission at ≥ 3 MHz offset			-30	dBm	RF-PHY Specification (TRM-LE/CA/03/C)	-61.25	-58.37	-57.71	-64.55	-46.23	-53.19
SID371	TXSE1	Transmitter Spurious Emissions (Averaging), <1.0 GHz			-55.5	dBm	FCC-15.247	-65.50	-63.59	-60.03	-78.07	-72.23	-64.24
SID372	TXSE2	Transmitter Spurious Emissions (Averaging), >1.0 GHz			-41.5	dBm	FCC-15.247	-60.63	-59.16	-53.46	-75.45	-64.03	-46.48
RF Current Specification													
SID373	IRX	Receive Current in Normal Mode		18.7		mA		Same as IRX_RF			Same as IRX_RF		
SID373A	IRX_RF	Radio Receive Current in Normal Mode		16.4		mA	Measured at VDDR	16.04	17.65	20.35	15.92	18.87	19.62
SID374	IRX, HIGHGAIN	Receive Current in High Gain mode		21.5		mA		17.32	19.11	20.27	17.92	20.51	22.52
SID375	ITX,3dBm	TX Current at 3 dBm setting (PA10)		20		mA		17.52	19.04	19.66	18.05	19.40	21.72
SID376	ITX,0dBm	TX Current at 0 dBm setting (PA7)		16.5		mA		Same as ITX_RF,0dBm			Same as ITX_RF,0dBm		
SID376A	ITX_RF,0dBm	Radio TX Current at 0 dBm setting (PA7)		15.6		mA	Measured at VDDR	14.92	16.38	17.09	14.96	15.82	17.77
SID376B	ITX_RF,0dBm	Radio TX Current at 0 dBm excluding Balun loss		14.2		mA	Guaranteed by design simulation	Guaranteed by design			Guaranteed by design		
SID377	ITX,-3dBm	TX Current at -3 dBm setting (PA4)		15.5		mA		13.55	14.45	14.95	13.98	14.80	16.91
SID378	ITX,-6dBm	TX Current at -6 dBm setting (PA3)		14.5		mA		12.76	13.46	13.86	13.09	13.86	15.77
SID379	ITX,-12dBm	TX Current at -12 dBm setting (PA2)		13.2		mA		11.51	12.12	12.13	11.85	12.58	14.22
SID380	ITX,-18dBm	TX Current at -18 dBm setting (PA1)		12.5		mA		10.82	11.41	11.47	11.23	11.94	13.46
General RF Specification													
SID381	FREQ	RF operating frequency	2400		2482	MHz		2400		2482	2400		2482
SID382	CHBW	Channel spacing		2		MHz			2			2	
RSSI Specification													
SID386	RSSI,ACC	RSSI Accuracy		±5		dB		-6.00	0.40	5.00	-5.06	-0.15	4.43
SID387	RSSI,RES	RSSI Resolution		1		dB		Tested for 1 dB resolution			Tested for 1 dB resolution		
SID388	RSSI,PER	RSSI Sample Period		6		µs		Guaranteed by RSSI ACC and RSSI RES char			Guaranteed by RSSI ACC and RSSI RES char		

4.25 ECO Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
ECO Specifications													
SID389	FECO	Crystal Frequency		24		MHz		24.00	24.00	24.00	24.00	24.00	24.00
SID390	FTOL	Frequency tolerance	-50		50	ppm		-28.60	-18.70	-1.30	-13.96	0.14	18.08
SID391	ESR	Equivalent series resistance			60	Ω		Crystal Condition			Input condition		
SID393	TSTART1	Startup time (Fast Charge on)			850	μs		221.75	264.00	319.10	232.21	274.62	319.55
SID394	TSTART2	Startup time (Fast Charge off)			3	ms		0.55	0.61	0.79	0.67	0.73	0.86
SID395	CL	Load Capacitance		8		pF		Input Condition			Input Condition		
SID396	C0	Shunt Capacitance		1.1		pF		Input Condition			Input Condition		

4.26 WCO Subsystem Specifications

SPEC ID#	PARAMETER	DESCRIPTION	DATASHEET			UNITS	DETAILS / CONDITIONS	MEASURED FAB25			MEASURED SkyWater		
			MIN	TYP	MAX			MIN	TYP	MAX	MIN	TYP	MAX
WCO Specifications													
SID398	FWCO	Crystal Frequency		32.768		kHz	T = 25 C with 20ppm Crystal	32.7617	32.76875	32.7688891	32.763	32.767	32.768
SID399	FTOL	Frequency tolerance		50		ppm		-28.6	-18.7	-1.3	-13	-15	-167.84
SID400	ESR	Equivalent series resistance		50		kΩ		Input Condition			Input Condition		
SID402	TSTART	Startup time			500	ms		135	196	255	97	138	265
SID403	CL	Crystal Load Capacitance	6		12.5	pF		Input Condition			Input Condition		
SID404	C0	Crystal Shunt Capacitance		1.35		pF		Input Condition			Input Condition		
SID405	IWCO1	Operating Current (high power mode)			8	uA		1.12	4.01	4.68	2.51	3.17	4.38

Document History Page

Rev.	ECN No.	Orig. of Change	Description of Change
**	6073038	RADK	New Characterization Report.

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**56 Pin – QFN 7x7x0.6 mm
(Saw Version)
Pb-Free Package**

PACKAGE MATERIAL DECLARATION DATASHEET

Cypress Package Code	LQ	Body Size (mil/mm)	7x7x0.6mm
Package Weight – Site 1	91.3252 mg	Package Weight – Site 2	B1: 95.0102 mg B2: 94.9965 mg B3: 94.9965 mg B4: 93.8950 mg
Package Weight – Site 3	B1: 97.5725 mg B2: 97.5725 mg	Package Weight – Site 4	N/A

SUMMARY

The 56 Pin – QFN Pb-Free package is compliant to RoHS. Cypress Ordering Part Numbers containing an “X” (e.g. CY7C1328G-133AXI, CY2308SXC-1HT) meet the Directive 2002/95/EC (RoHS) requirement.

**ASSEMBLY Site 1: Amkor Technology Philippines (P3/P4)
Package Qualification Report # 110707 (See Note 1)**

I. DECLARATION OF PACKAGED UNITS

A. BANNED SUBSTANCES

Materials from Level A of the EIA/JIG/JGPSSI/EICTA Material Composition Declaration Guide and EU RoHS. Listed in the table below are materials that are neither contained nor intentionally added to this product.

Substances / Compounds	Weight by mg	PPM	Analysis Report (Note 2)
Cadmium and Cadmium Compounds	0	< 5.0	CoA-LQ56- Amkor Philippines (P3/P4)
Hexavalent Chromium and its Compounds	0	< 5.0	
Lead and Lead Compounds	0	< 5.0	
Mercury and Mercury Compounds	0	< 5.0	
Polybrominated Biphenyls (PBB)	0	< 5.0	
Polybrominated Diphenylethers (PBDE)	0	< 5.0	
Asbestos	0	0	As per MSDS
Azo colorants	0	0	As per MSDS
Ozone Depleting Substances	0	0	As per MSDS
Polychlorinated Biphenyls (PCBs)	0	0	As per MSDS
Polychlorinated Naphthalenes	0	0	As per MSDS
Radioactive Substances	0	0	As per MSDS
Shortchain Chlorinated Paraffins	0	0	As per MSDS
Tributyl Tin (TBT) and Triphenyl Tin (TPT)	0	0	As per MSDS
Tributyl Tin Oxide (TBTO)	0	0	As per MSDS
Formaldehyde	0	0	As per MSDS

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD's are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

B. MATERIAL COMPOSITION (Note 3)

Material	Purpose of Use	Substance Composition	CAS Number	Weight by mg	% weight of substance per Homogenous material	PPM	% weight of Substance per package
Lead frame	Base Material	Cu	7440-50-8	42.7870	97.4400%	468,513	46.8513%
		Fe	7439-89-6	1.0320	2.3500%	11,300	1.1300%
		Zn	7440-66-6	0.0550	0.1300%	602	0.0602%
		P	7723-14-0	0.0360	0.0800%	394	0.0394%
Lead finish	External Plating	Ni	7440-02-0	0.1263	88.2621%	1,383	0.1383%
		Pd	7440-05-3	0.0075	5.2362%	82	0.0082%
		Au-Ag	7440-57-5 7440-22-4	0.0093	6.5016%	102	0.0102%
Frame Plating	Frame Plating	Ni	7440-02-0	1.1077	97.5431%	12,129	1.2129%
		Pd	7440-05-3	0.0235	2.0712%	257	0.0257%
		Au-Ag	7440-57-5 7440-22-4	0.0044	0.3858%	48	0.0048%
Die Attach	Adhesive	Proprietary Acrylates	Trade Secret	0.1502	13.0000%	1,645	0.1645%
		Ag	7440-22-4	0.9241	80.0000%	10,119	1.0119%
		Proprietary Bismaleimide	Trade Secret	0.0347	3.0000%	380	0.0380%
		Methacrylate Ester	Trade Secret	0.0347	3.0000%	380	0.0380%
		Proprietary polymer	Trade Secret	0.0116	1.0000%	127	0.0127%
Die	Circuit	Si	7440-21-3	4.9896	100.0000%	54,636	5.4636%
Wire	Interconnect	Au	7440-57-5	0.8480	98.9900%	9,285	0.9285%
		Pd	7440-05-3	0.0090	1.0035%	99	0.0099%
Mold Compound	Encapsulation	Epoxy Resin	Trade Secret	3.4047	8.7000%	37,281	3.7281%
		Phenol Resin	Trade Secret	1.9567	5.0000%	21,426	2.1426%
		Carbon Black	1333-86-4	0.1174	0.3000%	1,286	0.1286%
		SiO2	60676-86-0	33.6558	86.0000%	368,527	36.8527%

Package Weight (mg): **91.3252**

% Total: **100.0000**

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD's are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

II. DECLARATION OF PACKAGING / INDIRECT MATERIALS

Type	Material	Lead PPM	Cadmium PPM	Cr VI PPM	Mercury PPM	PBB PPM	PBDE PPM	Analysis Report (Note2)
Tape & Reel	Cover tape	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-COVT-R
	Carrier tape	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-CART-R
	Plastic Reel	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-PLRL-R
Tray	Tray	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-TRAY-R
Others	Moisture Barrier bag	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-MBBG-R
	Shielding bag	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-SBAG-R
	Protective Band	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-PROB-R
	Shipping and inner/ pizza box	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-ABOX-R
	Desiccant	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-DESS-R
	Bubble Pack	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-BUBP-R

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

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Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

ASSEMBLY Site 2: Advanced Semiconductor Engineering Taiwan (ASET) Package Qualification Report # 112105, 114404, 120607, 144405, 152901 (See Note 1)

I. DECLARATION OF PACKAGED UNITS

A. BANNED SUBSTANCES

Materials from Level A of the EIA/JIG/JGPSSI/EICTA Material Composition Declaration Guide and EU RoHS. Listed in the table below are materials that are neither contained nor intentionally added to this product.

Substances / Compounds	Weight by mg	PPM	Analysis Report (Note 2)
Cadmium and Cadmium Compounds	0	< 5.0	CoA-LQ56-ASET
Hexavalent Chromium and its Compounds	0	< 5.0	
Lead and Lead Compounds	0	< 5.0	
Mercury and Mercury Compounds	0	< 5.0	
Polybrominated Biphenyls (PBB)	0	< 5.0	
Polybrominated Diphenylethers (PBDE)	0	< 5.0	
Asbestos	0	0	As per MSDS
Azo colorants	0	0	As per MSDS
Ozone Depleting Substances	0	0	As per MSDS
Polychlorinated Biphenyls (PCBs)	0	0	As per MSDS
Polychlorinated Napthalenes	0	0	As per MSDS
Radioactive Substances	0	0	As per MSDS
Shortchain Chlorinated Paraffins	0	0	As per MSDS
Tributyl Tin (TBT) and Triphenyl Tin (TPT)	0	0	As per MSDS
Tributyl Tin Oxide (TBTO)	0	0	As per MSDS
Formaldehyde	0	0	As per MSDS

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

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Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD's are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.



**56 Pin – QFN 7x7x0.6 mm
(Saw Version)
Pb-Free Package**

**B1. MATERIAL COMPOSITION (Note 3)
Using Gold Wire and NiPdAu LF**

Material	Purpose of Use	Substance Composition	CAS Number	Weight by mg	% weight of substance per Homogenous material	PPM	% weight of Substance per package
Lead frame	Base Material	Nickel	7440-02-0	1.0971	3.0000%	11,547	1.1547%
		Silicon	7440-21-3	0.2377	0.6500%	2,502	0.2502%
		Magnesium	7439-95-4	0.0549	0.1500%	577.3603	0.0577%
		Copper	7440-50-8	35.1803	96.2000%	370,280	37.0280%
Frame Plating	Frame Plating	Gold	7440-57-5	0.0098	1.0700%	103.6101	0.0104%
		Palladium	7440-05-3	0.0339	3.6800%	356.3414	0.0356%
		Nickel	7440-02-0	0.8763	95.2500%	9,223	0.9223%
Die Attach	Adhesive	Silver	7440-22-4	1.4070	70.0000%	14,809	1.4809%
		Acrylic Resin	Trade Secret	0.1508	7.5000%	1,587	0.1587%
		Polybutadiene derivative	Trade Secret	0.1859	9.2500%	1,957	0.1957%
		Butadiene copolymer	Trade Secret	0.0704	3.5000%	740.4484	0.0740%
		Acrylate	Trade Secret	0.1508	7.5000%	1,587	0.1587%
		Peroxide	Trade Secret	0.0201	1.0000%	211.5567	0.0212%
		Additive	Trade Secret	0.0251	1.2500%	264.4458	0.0264%
Die	Circuit	Silicon	7440-21-3	3.3000	100.0000%	34,733	3.4733%
Wire	Interconnect	Gold	7440-57-5	0.6999	99.9900%	7,367	0.7367%
		Ion Impurities	Trade Secret	0.0001	0.0100%	0.736765	0.0001%
Mold Compound	Encapsulation	Epoxy Resin A	Trade Secret	2.3180	4.5000%	24,397	2.4397%
		Epoxy Resin B	Trade Secret	1.5453	3.0000%	16,265	1.6265%
		Phenol Resin	Trade Secret	3.3997	6.6000%	35,782	3.5782%
		Carbon Black	1333-86-4	0.2576	0.5000%	2,711	0.2711%
		Silica Fused	60676-86-0	43.9895	85.4000%	462,999	46.2999%

Package Weight (mg): **95.0102**

% Total: **100.0000**

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD’s are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

**B2. MATERIAL COMPOSITION (Note 3)
 Using Copper Wire and NiPdAu LF**

Material	Purpose of Use	Substance Composition	CAS Number	Weight by mg	% weight of substance per Homogenous material	PPM	% weight of Substance per package
Lead frame	Base Material	Nickel	7440-02-0	1.5414	3.0000	16,226	1.6226
		Silicon	7440-21-3	0.3340	0.6500	3,516	0.3516
		Magnesium	7439-95-4	0.0771	0.1500	811	0.0811
		Copper	7440-50-8	49.4276	96.2000	520,311	52.0311
Frame Plating	Frame Plating	Nickel	7440-02-0	0.8823	95.2500	9,287	0.9287
		Palladium	7440-05-3	0.0341	3.6800	359	0.0359
		Gold	7440-57-5	0.0099	1.0700	104	0.0104
Die Attach	Adhesive	Silver	7440-22-4	1.4000	70.0000	14,737	1.4737
		Acrylic Resin	Trade Secret	0.1500	7.5000	1,579	0.1579
		Polybutadiene derivative	Trade Secret	0.1850	9.2500	1,947	0.1947
		Butadiene copolymer	Trade Secret	0.0700	3.5000	737	0.0737
		Acrylate	Trade Secret	0.1500	7.5000	1,579	0.1579
		Peroxide	Trade Secret	0.0200	1.0000	211	0.0211
		Additive	Trade Secret	0.0250	1.2500	263	0.0263
Die	Circuit	Silicon	7440-21-3	3.3000	100.0000	34,738	3.4738
Wire	Interconnect	Copper	7440-50-8	0.7000	100.0000	7,369	0.7369
Mold Compound	Encapsulation	Epoxy Resin A	Trade Secret	1.6511	4.5000	17,380	1.7380
		Epoxy Resin B	Trade Secret	1.1007	3.0000	11,587	1.1587
		Phenol Resin	Trade Secret	2.4215	6.6000	25,491	2.5491
		Carbon Black	1333-86-4	0.1835	0.5000	1,931	0.1931
		Silica Fused	60676-86-0	31.3333	85.4000	329,837	32.9837

Package Weight (mg): 94.9965
% Total: 100.0000

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD's are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.



**56 Pin – QFN 7x7x0.6 mm
(Saw Version)
Pb-Free Package**

**B3. MATERIAL COMPOSITION (Note 3)
Using Copper-Palladium Wire and NiPdAu LF**

Material	Purpose of Use	Substance Composition	CAS Number	Weight by mg	% weight of substance per Homogenous material	PPM	% weight of Substance per package
Lead frame	Base Material	Nickel	7440-02-0	1.5414	3.0000	16,226	1.6226
		Silicon	7440-21-3	0.3340	0.6500	3,516	0.3516
		Magnesium	7439-95-4	0.0771	0.1500	811	0.0811
		Copper	7440-50-8	49.4276	96.2000	520,311	52.0311
Frame Plating	Frame Plating	Nickel	7440-02-0	0.8823	95.2500	9,287	0.9287
		Palladium	7440-05-3	0.0341	3.6800	359	0.0359
		Gold	7440-57-5	0.0099	1.0700	104	0.0104
Die Attach	Adhesive	Silver	7440-22-4	1.4000	70.0000	14,737	1.4737
		Acrylic Resin	Trade Secret	0.1500	7.5000	1,579	0.1579
		Polybutadiene derivative	Trade Secret	0.1850	9.2500	1,947	0.1947
		Butadiene copolymer	Trade Secret	0.0700	3.5000	737	0.0737
		Acrylate	Trade Secret	0.1500	7.5000	1,579	0.1579
		Peroxide	Trade Secret	0.0200	1.0000	211	0.0211
		Additive	Trade Secret	0.0250	1.2500	263	0.0263
Die	Circuit	Silicon	7440-21-3	3.3000	100.0000	34,738	3.4738
Wire	Interconnect	Copper	7440-50-8	0.6811	97.3000	7,170	0.7170
		Palladium	7440-05-3	0.0189	2.7000	199	0.0199
Mold Compound	Encapsulation	Epoxy Resin A	Trade Secret	1.6511	4.5000	17,380	1.7380
		Epoxy Resin B	Trade Secret	1.1007	3.0000	11,587	1.1587
		Phenol Resin	Trade Secret	2.4215	6.6000	25,491	2.5491
		Carbon Black	1333-86-4	0.1835	0.5000	1,931	0.1931
		Silica Fused	60676-86-0	31.3333	85.4000	329,837	32.9837

Package Weight (mg): **94.9965**

% Total: **100.0000**

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD's are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.



**56 Pin – QFN 7x7x0.6 mm
(Saw Version)
Pb-Free Package**

**B4. MATERIAL COMPOSITION (Note 3)
Using Copper-Palladium Wire and Spot Ag LF**

Material	Purpose of Use	Substance Composition	CAS Number	Weight by mg	% weight of substance per Homogenous material	PPM	% weight of Substance per package
Lead frame	Base Material	Nickel	7440-02-0	1.5414	3.0000	16,416	1.6416
		Silicon	7440-21-3	0.3340	0.6500	3,557	0.3557
		Magnesium	7439-95-4	0.0771	0.1500	821	0.0821
		Copper	7440-50-8	49.4276	96.2000	526,422	52.6422
Frame Plating	Frame Plating	Silver	7440-22-4	0.9263	100.0000	9,864	0.9864
Die Attach	Adhesive	Silver	7440-22-4	1.4000	70.0000	14,910	1.4910
		Acrylic Resin	Trade Secret	0.1500	7.5000	1,598	0.1598
		Polybutadiene derivative	Trade Secret	0.1850	9.2500	1,970	0.1970
		Butadiene copolymer	Trade Secret	0.0700	3.5000	746	0.0746
		Acrylate	Trade Secret	0.1500	7.5000	1,598	0.1598
		Peroxide	Trade Secret	0.0200	1.0000	213	0.0213
		Additive	Trade Secret	0.0250	1.2500	266	0.0266
Die	Circuit	Silicon	7440-21-3	3.3000	100.0000	35,145	3.5145
Wire	Interconnect	Copper	7440-50-8	0.6811	97.3000	7,254	0.7254
		Palladium	7440-05-3	0.0189	2.7000	201	0.0201
Mold Compound	Encapsulation	Epoxy Resin A	Trade Secret	2.4912	7.0000	26,531	2.6531
		Phenol Resin	Trade Secret	1.7794	5.0000	18,951	1.8951
		Carbon Black	1333-86-4	0.1424	0.4000	1,517	0.1517
		Silica Fused	60676-86-0	31.1756	87.6000	332,020	33.2020

Package Weight (mg): **93.8950**

% Total: **100.0000**

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD’s are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

II. DECLARATION OF PACKAGING / INDIRECT MATERIALS

Type	Material	Lead PPM	Cadmium PPM	Cr VI PPM	Mercury PPM	PBB PPM	PBDE PPM	Analysis Report (Note2)
Tape & Reel	Cover tape	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-COVT-R
	Carrier tape	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-CART-R
	Plastic Reel	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-PLRL-R
Tray	Tray	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-TRAY-R
Others	Moisture Barrier bag	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-MBBG-R
	Shielding bag	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-SBAG-R
	Protective Band	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-PROB-R
	Shipping and inner/ pizza box	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-ABOX-R
	Desiccant	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-DESS-R
	Bubble Pack	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-BUBP-R

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Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

**ASSEMBLY Site 3: Cypress Manufacturing Limited (CML)
Package Qualification Report # 120205, 143004 (See Note 1)**

I. DECLARATION OF PACKAGED UNITS

A. BANNED SUBSTANCES

Materials from Level A of the EIA/JIG/JGPSSI/EICTA Material Composition Declaration Guide and EU RoHS. Listed in the table below are materials that are neither contained nor intentionally added to this product.

Substances / Compounds	Weight by mg	PPM	Analysis Report (Note 2)
Cadmium and Cadmium Compounds	0	< 5.0	CoA-LQ56-CML
Hexavalent Chromium and its Compounds	0	< 5.0	
Lead and Lead Compounds	0	< 5.0	
Mercury and Mercury Compounds	0	< 5.0	
Polybrominated Biphenyls (PBB)	0	< 5.0	
Polybrominated Diphenylethers (PBDE)	0	< 5.0	
Asbestos	0	0	As per MSDS
Azo colorants	0	0	As per MSDS
Ozone Depleting Substances	0	0	As per MSDS
Polychlorinated Biphenyls (PCBs)	0	0	As per MSDS
Polychlorinated Napthalenes	0	0	As per MSDS
Radioactive Substances	0	0	As per MSDS
Shortchain Chlorinated Paraffins	0	0	As per MSDS
Tributyl Tin (TBT) and Triphenyl Tin (TPT)	0	0	As per MSDS
Tributyl Tin Oxide (TBTO)	0	0	As per MSDS
Formaldehyde	0	0	As per MSDS

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD's are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

**B1. MATERIAL COMPOSITION (Note 3)
USING COPPER WIRE**

Material	Purpose of Use	Substance Composition	CAS Number	Weight by (mg)	% weight of substance per Homogeneous material	PPM	% weight of substance per package
Leadframe	Base Material	Cu	7440-50-8	51.1800	96.6572%	524,533	52.4533%
		Fe	7439-89-6	1.6400	3.0973%	16,808	1.6808%
		P	7723-14-0	0.0500	0.0944%	512	0.0512%
		Zn	7440-66-6	0.0800	0.1511%	820	0.0820%
Lead Finish	External Plating	Ni	7440-02-0	0.9120	96.5200%	9,347	0.9347%
		Pd	7440-05-3	0.0200	1.7400%	205	0.0205%
		Au	7440-57-5	0.0200	1.7400%	205	0.0205%
Die Attach	Adhesive	Silver	7440-22-4	1.1200	73.6842%	11,479	1.1479%
		Carbocyclic Acrylate	Trade Secret	0.1400	9.2106%	1,435	0.1435%
		Bismaleimide resin	Trade Secret	0.1300	8.5526%	1,332	0.1332%
		Acrylate	Trade Secret	0.1100	7.2368%	1,127	0.1127%
		Additive	96-48-0	0.0200	1.3158%	205	0.0205%
Die	Circuit	Si	7440-21-3	3.3000	100.0000%	33,821	3.3821%
Wire	Interconnect	Cu	7440-50-8	0.6945	100.0000%	7,118	0.7118%
Mold Compound	Encapsulation	Silica Fused	60676-86-0	33.8200	88.6361%	346,614	34.6614%
		Crystalline Silica	14808-60-7	0.5100	1.3366%	5,227	0.5227%
		Metal OH	Trade Secret	0.6100	1.5987%	6,252	0.6252%
		Epoxy Resin	Trade secret	1.1210	2.9379%	11,489	1.1489%
		Phenol Resin	Trade secret	1.9100	5.0058%	19,575	1.9575%
		Carbon Black	1333-86-4	0.1850	0.4849%	1,896	0.1896%

Package Weight (mg): **97.5725**

% Total: **100.0000**

Note 1: Qualification reports are available at www.cypress.com. Access them by doing a Search on the Report #.

Note 2: Report available from Cypress Sales Offices or Distributors.

Note 3: Materials/substances not declared in Section I-A and I-B of this document are considered “non-existent in the product” or a natural impurity. In order to report exactly 100% material composition, some numbers were rounded to the nearest 0.01 percent. Cypress Semiconductor PMDD’s are calculated using MSDS, Material Analysis Reports and Cypress Assembly site information.

Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

**B2. MATERIAL COMPOSITION (Note 3)
USING COPPER PALLADIUM WIRE**

Material	Purpose of Use	Substance Composition	CAS Number	Weight by (mg)	% weight of substance per Homogeneous material	PPM	% weight of substance per package
Leadframe	Base Material	Cu	7440-50-8	51.1800	96.6572%	524,533	52.4533%
		Fe	7439-89-6	1.6400	3.0973%	16,808	1.6808%
		P	7723-14-0	0.0500	0.0944%	512	0.0512%
		Zn	7440-66-6	0.0800	0.1511%	820	0.0820%
Lead Finish	External Plating	Ni	7440-02-0	0.9120	96.5200%	9,347	0.9347%
		Pd	7440-05-3	0.0200	1.7400%	205	0.0205%
		Au	7440-57-5	0.0200	1.7400%	205	0.0205%
Die Attach	Adhesive	Silver	7440-22-4	1.1200	73.6842%	11,479	1.1479%
		Carbocyclic Acrylate	Trade Secret	0.1400	9.2106%	1,435	0.1435%
		Bismaleimide resin	Trade Secret	0.1300	8.5526%	1,332	0.1332%
		Acrylate	Trade Secret	0.1100	7.2368%	1,127	0.1127%
		Additive	96-48-0	0.0200	1.3158%	205	0.0205%
Die	Circuit	Si	7440-21-3	3.3000	100.0000%	33,821	3.3821%
Wire	Interconnect	Cu	7440-50-8	0.6944	99.9800%	7,117	0.7117%
		Pd	7440-05-3	0.0001	0.0200%	1	0.0001%
Mold Compound	Encapsulation	SiO2	60676-86-0	33.4819	87.7500%	343,149	34.3149%
		Phenol Resin	Trade secret	1.9078	5.0000%	19,553	1.9553%
		Epoxy Resin	Trade secret	2.6709	7.0000%	27,373	2.7373%
		Carbon Black	1333-86-4	0.0954	0.2500%	978	0.0978%

Package Weight (mg): **97.5725**

% Total: **100.0000**

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Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

II. DECLARATION OF PACKAGING / INDIRECT MATERIALS

Type	Material	Lead PPM	Cadmium PPM	Cr VI PPM	Mercury PPM	PBB PPM	PBDE PPM	Analysis Report (Note2)
Tape & Reel	Cover tape	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-COVT-R
	Carrier tape	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-CART-R
	Plastic Reel	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-PLRL-R
Tray	Tray	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-TRAY-R
Others	Moisture Barrier bag	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-MBBG-R
	Shielding bag	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-SBAG-R
	Protective Band	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-PROB-R
	Shipping and inner/ pizza box	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-ABOX-R
	Desiccant	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-DESS-R
	Bubble Pack	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	CoA-BUBP-R

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Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

Document History Page

Document Title: 56 Pin - QFN 7X7X0.6 MM (SAW VERSION) PB- FREE PACKAGE MATERIAL
 DECLARATION DATASHEET
 Document Number: 001-69614

Rev.	ECN No.	Orig. of Change	Description of Change
**	3256206	JSO VFR	New specification.
*A	3455387	VFR	Added PMDD for Site 3, ASE-G Copper wire qual. Reference QTP # 114404.
*B	3600945	UDR VFR	Added PMDD for Site 4, RA Copper wire qual. Reference QTP # 120205. Added Table B.1 for Site 3 PMDD with reference QTP # 120607 – ASEK Pure Cu Wire qualification.
*C	4058267	YUM	Added assembly site name in the assembly heading in site 1, 2 and 3. Changed assembly code to assembly site name in site 1, 2 and 3. Update material composition to reflect 4 decimal on values in SITE 2: B1. Consolidate material composition in one assembly site (ASET).
*D	4433818	HLR	Corrected the total package weight of Assembly Site 2.B1 Material Composition table from 95.0100 to 95.0102 mg. Changed the CAS Number of Palladium (Pd) on Assembly Site 3.
*E	4586648	MLA	Added table B2 for site 3 to support QTP 143004.
*F	4616946	MLA	Added table B4 for site 2 to support QTP 144405. Add new weight option on page 1.
*G	5361824	HLR DCON	Changed Cypress Logo. Changed the substances with "-----" and Proprietary to "Trade Secret". Removed Distribution and posting information from Document history page.
*H	5755788	JVP	Added Reference QTP# 152901 IN Table B4 for Site 2 : Advanced Semiconductor Engineering Taiwan (ASET)

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Note 4: Actual testing performed on package family basis. Engineering calculations were applied to derive individual package data.

Cypress Semiconductor Test Site: Qualification Report

**QTP# 153801 VERSION **
June 2017**

ASE-Kaohsiung Test Site
PSoC4A-BLE Device

**FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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TEST QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
153801	PSoC4A-BLE Device Qualification at ASE-Kaohsiung Test Location	June 2017

QUALIFICATION COVERAGE

MANUFACTURING PART NUMBER	PACKAGE
CY8C4127LQI-BL453	LQ56A
CY8C4127LQI-BL473	LQ56A
CY8C4127LQI-BL483	LQ56A
CY8C4127LQI-BL493	LQ56A
CY8C4128LQI-BL483	LQ56A
CY8C4128LQI-BL483T	LQ56A
CY8C4128LQI-BL543	LQ56A
CY8C4128LQI-BL553	LQ56A
CY8C4128LQI-BL563	LQ56A
CY8C4128LQI-BL563T	LQ56A
CY8C4128LQI-BL573	LQ56A
CY8C4128LQI-BL583	LQ56A
CY8C4247LQI-BL453	LQ56A
CY8C4247LQI-BL463	LQ56A
CY8C4247LQI-BL473	LQ56A
CY8C4247LQI-BL483	LQ56A
CY8C4247LQI-BL493	LQ56A
CY8C4248LQI-BL483	LQ56A
CY8C4248LQI-BL483T	LQ56A
CY8C4248LQI-BL543	LQ56A
CY8C4248LQI-BL553	LQ56A
CY8C4248LQI-BL563	LQ56A
CY8C4248LQI-BL573	LQ56A
CY8C4248LQI-BL583	LQ56A
CY8C4248LQI-BL583T	LQ56A
CY8C4248LQI-BL593	LQ56A
CYBL10161-56LQXI	LQ56A

MANUFACTURING PART NUMBER	PACKAGE
CYBL10161-56LQXIT	LQ56A
CYBL10162-56LQXI	LQ56A
CYBL10162-56LQXIT	LQ56A
CYBL10163-56LQXI	LQ56A
CYBL10163-56LQXIT	LQ56A
CYBL10461-56LQXI	LQ56A
CYBL10461-56LQXIT	LQ56A
CYBL10462-56LQXI	LQ56A
CYBL10462-56LQXIT	LQ56A
CYBL10463-56LQXI	LQ56A
CYBL10463-56LQXIT	LQ56A
CYBL10561-56LQXI	LQ56A
CYBL10561-56LQXIT	LQ56A
CYBL10562-56LQXI	LQ56A
CYBL10562-56LQXIT	LQ56A
CYBL10563-56LQXI	LQ56A
CYBL10563-56LQXIT	LQ56A
CYBL10573-56LQXI	LQ56A
CYBL10573-56LQXIT	LQ56A
CYBL10999-56LQXI	LQ56A
CYBL10999-56LQXIT	LQ56A
CYBL11171-56LQXI	LQ56A
CYBL11171-56LQXIT	LQ56A
CYBL11172-56LQXI	LQ56A
CYBL11172-56LQXIT	LQ56A
CYBL11473-56LQXI	LQ56A
CYBL11473-56LQXIT	LQ56A

MANUFACTURING PART NUMBER	PACKAGE
CYBL11573-56LQXI	LQ56A
CYBL11573-56LQXIT	LQ56A
CY8C4127LQI-BL453T	LQ56A
CY8C4127LQI-BL473T	LQ56A
CY8C4127LQI-BL483T	LQ56A
CY8C4127LQI-BL493T	LQ56A
CY8C4247LQI-BL453T	LQ56A
CY8C4247LQI-BL463T	LQ56A

Reliability Test Data
QTP #: 153801

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot#</i>	<i>Test Site</i>	<i>Yield</i>	
TEST: CLASS TEST					
CY8C4248LQI (8CP42488A)	4549311	611628687	ASE- Kaohsiung	97.69%	Correlated
CY8C4248LQI (8CP42488A)	4549311	611628687	CML-R	97.69%	Correlated
TEST: CORRELATION					
CY8C4248LQI (8CP42488A)	4549311	611628687	ASE- Kaohsiung	Correlated	
CY8C4248LQI (8CP42488A)	4549311	611628687	CML-R	Correlated	

Document History Page

Document Title: QTP# 153801: PSOC4A-BLE DEVICE QUALIFICATION AT ASE-KAOHSIUNG TEST
LOCATION
Document Number: 002-19957

Rev.	ECN No.	Orig. of Change	Description of Change
**	5766279	JYF	Initial spec release.

Cypress Semiconductor Finish Qualification Report

**QTP# 113901 VERSION **
June 2017**

ASE-Taiwan (G) Finish Site

**36-Pin QFN (LQ36A)/ 48-Pin QFN (LQ48A)/
56-Pin QFN (LQ56A) Packages**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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FINISH QUALIFICATION HISTORY

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QTP Number	Description of Qualification Purpose	Date
113901	Qualification of 36/48/56-Pin QFN Packages at ASE-Taiwan (G) Finish Site	June 2017

PROCESS ENGINEERING QUALIFICATION PERFORMED PER SPECIFICATION REQUIREMENTS

Test	Test Condition (Reference Specifications)	Result P/F
Bend Test	No separation along pocket and ridge area	P
CADFIT Analysis	Pass POD & End flash Criteria	P
Detaping	No cover tape tearing	P
Dimensional Measurement	POD Drawing-JESD22-B100	P
Drop Test	Non-Dry Packed Material: No tears & punctures Boxes: No Complete structural damage, No progressive crumpling/deformed, no tears & punctures.	P
External Visual	MIL-PRF-38535, MIL-STD-883, METHOD 2009	P
Functionality Test	Pass Manufacturability	P
PBFT	Min $\geq$ 30gr Average=50 $\pm$ gr Max $\leq$ 70gr	P
Split PBFT Test	Delta of Sprocket side and its opposite side: 5 gr Range: 20 gr	P
Substance Check	European Union RoHS 2002/95/E REACH XVII	P
Surface Resistivity Measurement	Conductive Packing/shipping material: 10 ⁵ Ω /sq Static dissipative Packing/shipping material: 10 ⁵ -10 ¹² Ω /sq	P

Reliability Test Data

QTP #: 113901

Device	Assy Lot #	Package	Finish Site	Duration	Samp	Rej	Failure Mechanism
STRESS: BEND TEST							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	5 Strips	0	
STRESS: CADFIT ANALYSIS							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	1	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	1	0	
STRESS: DETAPING							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	10 Strips	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	10 Strips	0	
STRESS: DIMENSIONAL MESAUREMENT							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	10	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	10	0	
STRESS: DROP TEST							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	2500	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	2500	0	
STRESS: EXTERNAL VISUAL							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	2500	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	2500	0	
CYBL10161 (CYBL10161)	611628749	LQ56A	ASE-TAIWAN	COMP	500	0	
STRESS: FUNCTIONALITY TEST							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	1	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	1	0	
STRESS: LEAD SCAN							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	2500	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	2500	0	
CYBL10161 (CYBL10161)	611628749	LQ56A	ASE-TAIWAN	COMP	500	0	
STRESS: PEEL BACK FORCE TEST							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	40 Strips	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	40 Strips	0	
CYBL10161 (CYBL10161)	611628749	LQ56A	ASE-TAIWAN	COMP	30 Strips	0	

Reliability Test Data

QTP #: 113901

Device	Assy Lot #	Package	Finish Site	Duration	Samp	Rej	Failure Mechanism
STRESS: QUICK HAND PULL TEST							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	10 Strips	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	10 Strips	0	
STRESS: SPLIT PEEL BACK FORCE TEST							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	10 Strips	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	10 Strips	0	
STRESS: SUBSTANCE CHECK							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	1	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	1	0	
STRESS: SURFACE RESISTIVITY MEASUREMENT							
CY8CTMA375 (8C20312EK)	611133209	LQ36A	ASE-TAIWAN	COMP	5	0	
CY8CTMA375 (8C20313EK)	611147833	LQ48A	ASE-TAIWAN	COMP	5	0	



Document History Page

Document Title: QTP# 113901: QUALIFICATION OF ASE-TAIWAN (G) AS FINISH SITE FOR 36/48/56-PIN QFN PACKAGES
Document Number: 002-19951

Rev.	ECN No.	Orig. of Change	Description of Change
**	5765842	JYF	Initial spec release.

Cypress Semiconductor Package Qualification Report

**QTP# 144405 VERSION*A
June 2017**

**56-Pin QFN (7x7x0.6mm)
Pure Sn Leadfinish, CuPd Wire
MSL3, 260°C Reflow
ASE-Taiwan (G)**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PACKAGE QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
144405	Qualification of 56-Pin QFN (7x7x0.6mm) at ASE-Taiwan (G) using EME-G700LA Mold Compound, EN-4900F Die Attach Epoxy, Pure Sn Leadfinish, 0.8 mil CuPd Wire at MSL 3, 260°C Reflow Temperature	April 2015
152901	Qualification of 56-Pin QFN (7x7x0.6mm) at ASE-Taiwan (G) using EME-G700LA Mold Compound, EN-4900F Die Attach Epoxy, Pure Sn Leadfinish, 0.8 mil CuPd Wire at MSL 3, 260°C Reflow Temperature	June 2017

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LQ56A
Package Outline, Type, or Name:	56 Quad Flat No-Lead (7x7x0.6mm)
Mold Compound Name/Manufacturer:	EME-G700LA/Sumitomo
Mold Compound Flammability Rating:	UL-94 V0
Oxygen Rating Index:	54%
Leadframe Material:	Copper
Lead Finish, Composition / Thickness:	Pure Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Saw
Die Attach Supplier:	Hitachi
Die Attach Material:	EN-4900F
Bond Diagram Designation:	001-94504/001-97062
Wire Bond Method:	Thermosonic
Wire Material/Size:	CuPd, 0.8 mil
Thermal Resistance Theta JA °C/W:	16.9°C/W
Package Cross Section Yes/No:	No
Assembly Process Flow:	49-41999
Name/Location of Assembly (prime) facility:	ASE-Taiwan (G)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST/FINISH DESCRIPTION	
Test Location	CML-RA

Note: Please contact a Cypress Representative for other packages availability.

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30°C, 60% RH, 260°C Reflow)	P
Ball Shear	JESD22-B116	P
Bond Pull	MIL-STD-883 – Method 2011	P
Constructional Analysis	Criteria: Meet external and internal characteristics of Cypress package	P
Cross Section	Meets Cypress requirements	P
Die Shear	MIL-STD-883, Method 2019 Per die size: <3000 sq. mils = 1.2 kgf 30001-5000 sq. mils = 1.2 kgf >5001 sq. mils = 1.2 kgf	P
Dye Penetrant Test	Test to determine the existence and extent of cracks, Criteria: No Package Crack	P
Final Visual	JESD22-B101	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30°C, 60% RH, 260°C Reflow)	P
Internal Visual	MIL-STD-883-2014	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30°C, 60% RH, 260°C Reflow)	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30°C, 60% RH, 260°C Reflow)	P
X-Ray	MIL-STD-883 - 2012	P

Reliability Test Data

QTP #: 144405

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Ass Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	80	0	
CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	COMP	80	0	
CY8C4247LQI (8CP42478A)	4440150	611443938	G-TAIWAN	COMP	78	0	
STRESS: BALL SHEAR							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	10	0	
STRESS: BOND PULL							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	10	0	
STRESS: CROSS SECTION							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	5	0	
CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	COMP	5	0	
CY8C4247LQI (8CP42478A)	4440150	611443938	G-TAIWAN	COMP	5	0	
STRESS: DYE PENETRANT TEST							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	15	0	
CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	COMP	15	0	
CY8C4247LQI (8CP42478A)	4440150	611443938	G-TAIWAN	COMP	15	0	
STRESS: FINAL VISUAL							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	457	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3							
CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	96	28	0	
STRESS: INTERNAL VISUAL							
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	5	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	168	80	0	
CY8C4247LQI (8CP42478A)	4440150	611443938	G-TAIWAN	168	80	0	
CY8C4247LQI (8CP42478A)	4449923	611505289	G-TAIWAN	168	80	0	

Reliability Test Data

QTP #: 144405

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: TEMPERATURE CYCLE COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3

CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	500	80	0	
CY8C4247LQI (8CP42478A)	4440150	611443939	G-TAIWAN	1000	80	0	
CY8C4247LQI (8CP42478A)	4440150	611443938	G-TAIWAN	500	79	0	
CY8C4247LQI (8CP42478A)	4440150	611443938	G-TAIWAN	1000	79	0	
CY8C4247LQI (8CP42478A)	4449923	611505289	G-TAIWAN	500	80	0	
CY8C4247LQI (8CP42478A)	4449923	611505289	G-TAIWAN	1000	80	0	

STRESS: X-RAY

CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	15	0	
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Reliability Test Data

QTP #: 152901

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Ass Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ACOUSTIC, MSL3							
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	15	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	15	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	15	0	
STRESS: BALL SHEAR							
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	10	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	10	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	10	0	
STRESS: BOND PULL							
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	10	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	10	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	10	0	
STRESS: CONSTRUCTIONAL ANALYSIS							
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	5	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	5	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	5	0	
STRESS: DIE SHEAR							
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	5	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	5	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	5	0	
CY8C4247LQI (8CP42478A)	4430358	611441948	G-TAIWAN	COMP	10	0	
CY8C4247LQI (8CP42478A)	4430358	611441950	G-TAIWAN	COMP	10	0	
CY8C4247LQI (8CP42478A)	4430358	611441949	G-TAIWAN	COMP	10	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3							
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	96	28	0	

Reliability Test Data

QTP #: 152901

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: INTERNAL VISUAL

CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	5	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	5	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	5	0	

STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3

CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	168	78	0	
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	288	78	0	

STRESS: TEMPERATURE CYCLE COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3

CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	500	80	0	
CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	1000	80	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	500	78	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	1000	78	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	500	79	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	1000	79	0	

STRESS: X-RAY

CY8C4128LQI (8CP41288A)	4520736	611532303	G-TAIWAN	COMP	15	0	
CY8C4128LQI (8CP41288A)	4520736	611532301	G-TAIWAN	COMP	15	0	
CY8C4128LQI (8CP41288A)	4520736	611532302	G-TAIWAN	COMP	15	0	

Document History Page

Document Title: QTP# 144405: 56L QFN (7X7X0.6MM) PURE SN, CUPD WIRE MSL3, 260C REFLOW, ASE-TAIWAN (G)
Document Number: 001-97305

Rev.	ECN No.	Orig. of Change	Description of Change
**	4733346	JYF	Initial spec release.
*A	5758876	JYF	Changed "56L QFN" to "56-Pin QFN"; Deleted device name in qualification purpose of QTP# 144405 (page 2); Added Qualification data of QTP# 152901; Updated CY logo.
		SLLO	Removed Distribution and Posting from the document history page.