PRODUCT / PROCESS CHANGE NOTIFICATION
PCN-000710
Date: 12-16-2021

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012

Change Details

Part Number(s) Affected:	Customer Part Number(s) Affected: ☒ N/A
TS30011-M033QFNR; **TS30011-M050QFNR;** **TS30011-M000QFNR;**	

Description, Purpose and Effect of Change:

Additional Source to Support Production Assembly and Final Test from Carsem Suzhou to Carsem Malaysia

Change Classification	☒ **Major** ☐ **Minor**	**Impact to Form, Fit, Function**	☐ **Yes** ☒ **No**
Impact to Data Sheet	☐ **Yes** ☒ **No**	**New Revision or Date**	☒ **N/A**

Impact to Performance, Characteristics or Reliability:

No Impact to performance , Characteristics or Reliability

Implementation Date	**12/16/2021**	**Work Week**	**WW51**
Last Time Ship (LTS) **Of unchanged product**	**N/A**	**Affecting Lot No. / Serial No. (SN)**	**N/A**
Sample Availability	**-**	**Qualification Report Availability**	**Yes**

Supporting Documents for Change Validation/Attachments:

- **TS30011-M0XXQFNR SZ to Ipoh test qual data Transfer**
- **TS30011-M0XXQFNR SZ to Ipoh assembly qual data Transfer**

Issuing Authority

Semtech Business Unit:	Power Management	
Semtech Contact Info:	***Carlos Sierra*** *Quality Assurance* *Semtech Corporation* 200 Flynn Road Camarillo, CA, 93012 *csierra@semtech.com*	Carlos Sierra

FOR FURTHER INFORMATION & WORLDWIDE SALES COVERAGE: http://www.semtech.com/contact/index.html#support

Site Transfer

P/N TS3001X-M0XXQFNR

From: Carsem Suzhou

To: Carsem Ipoh

SEMTECH

COMPARISON BETWEEN CARSEM SUZHOU & CARSEM IPOH

ITEM	CARSEM SUZHOU	CARSEM IPOH
ATE Tester	ETS364	ETS364
Handler	Manufatcurer : SRM Model : XD248 Type : Turret/Rotary # Sites : Quad	Manufatcurer : SRM Model : XD248 Type : Turret/Rotary # Sites : Quad
Load Board	TS3001X/3004X	TS3001X/3004X
Test Program	ef3001100_BC_10 ef3001115_BC_10 ef3001118_BC_10 ef3001125_BC_10 ef3001133_BC_10 ef3001150_BC_10 ef30011_BC_11	ef3001100_BC_10 ef3001115_BC_10 ef3001118_BC_10 ef3001125_BC_10 ef3001133_BC_10 ef3001150_BC_10 ef30011_BC_11

SZ vs IPOH Handler Comparison

SEMTECH

	Carsem Ipoh	Carsem SZ
Model	S248	XD248
Manufacturer	SRM Integration (Malaysia) Sdn Bhd	SRM Integration (Malaysia) Sdn Bhd
No of Site	Quad	Quad
Top Marking & Orientation Vision	Yes	Yes
Coplanarity & Pad Smear Vision	Yes	Yes
Integrated Tape and Reel	Yes	Yes
In Pocket Vision	Yes	Yes
Socket Cleaning Frequency	1x/Shift	1x/Shift
Impact to Part Lifetime	None	None

	IPOH - S248	SZ - XD248
Handler Photo		
GUI		

Remarks: Both Carsem SZ and Carsem IPOH handlers are compatible with similar capabilities

TS3001X Series – Qual Data

SEMTECH

Description	Acceptance Criteria	Remarks	Data
Test Repeatability: - 3~5 Devices loop run 30 times;	Pass or Fail 100% match	**PASS** Done. 10 Units 33X – PASS Consistently. Data as in attached file.	CORR_UNIT_LOOP33.csv

Description	Acceptance Criteria	Remarks	Data
Bin-to-Bin Correlation: - Good and rejects bins are sorted according to the Bin assignment	100% Bin-to-Bin correlation for all good and reject units - Pass/fail correlation;	**PASS** Done. Attached is the data and summary. All samplings are matching for Bin to Bin Summary vs Physical	Bin to Bin Corelation

Description	Acceptance Criteria	Remarks	Data
QA gate validation: -Good units to be tested 100% at QA gate after these lots have been processed through final production test flow.	No QA Gate failures.	**PASS** Done. Attached is the data and summary. All 100% Inline QA sampling test is PASS	QA Summary

TS3001X Series – Qual Data

SEMTECH

Description	Acceptance Criteria	Remarks	Data
Tester-to-tester variation: GR&R - Perform tester to tester variation analysis for selected parameters; - Tester 1, Tester 2; - DIB1, DIB2; - Test site 1 to test site n;	Tester-to-Tester variation (GR&R) for selected parameters: - GRR<=10% Acceptable; - GRR<=33% Waiver required; - GRR >33% reject;	**PASS** Done. All within spec. Using Site1 and Site 2 from same tester.	TS3001X GRNR

Test#	Test Name	Unit	Samples	Min Spec	Max Spec	Average Min	Average Max	Average Mean	Ra (AveMax-AveMin)	Meas. <= Mean	Meas. > Mean	Repeatability	Reproduceability	R&R	%R&R	Remarks
190000101	limit_meas_val	AMPS	30	1.50	2.000	1.801	1.887	1.884	0.086	1	1	0.242	0.000	0.242	48.4%	Leakage Test. Baseline issue. Test is capable with cpk > 1.33
190020101	osc_meas_val	KHERTZ	30	960.00	1050.000	997.984	998.020	998.002	0.036	1	1	43.059	0.000	43.059	47.8%	High frequency, baseline issue. Test is capable with cpk > 1.33
101050411	int_rail	VOLTS	30	3.90	4.700	4.452	4.454	4.453	0.002	1	1	0.303	0.000	0.303	37.9%	Vout Measurement, baseline issue. Test is capable with cpk > 1.33
190070101	ovuv_meas_val	%%	30	98.00	102.000	100.972	100.984	100.978	0.012	1	1	1.175	0.000	1.175	29.4%	Several factors affecting %R&R > 10% that can be attributed to ATE capability, some minor differences on loadboards, cables, sockets, interface boards, etc. These tests have historically high %R&R > 10% since day 1 in Carsem SZ. These tests do not impact FT yield since the tests are capable with cpk > 1.33. Test distribution between Carsem SZ and Carsem IPOH are comparable
201050414	en_leak_5v_delta	uAMPS	30	-3.00	3.000	-1.068	-1.058	-1.063	0.010	1	1	1.665	0.000	1.665	27.8%	
101050410	en_leak_5v	uAMPS	30	-3.00	3.600	-1.608	-1.546	-1.577	0.062	1	1	1.906	0.000	1.906	26.5%	
201050408	en_leak_5v_post	uAMPS	30	-3.00	3.600	-0.458	-0.428	-0.443	0.030	1	1	1.870	0.000	1.870	24.6%	
201050413	en_leak_0v_delta	uAMPS	30	-0.10	0.100	-0.017	-0.011	-0.014	0.007	1	1	0.043	0.000	0.043	21.6%	
190140103	vout_meas	VOLTS	30	3.25	3.346	3.299	3.300	3.300	0.001	1	1	0.018	0.000	0.018	19.6%	
190010121	bg_tc_diff	mVOLTS	30	-10.00	10.000	0.334	0.708	0.521	0.374	1	1	3.757	0.000	3.757	18.8%	
201050416	PG_unpowered_leak_delta	nAMPS	30	-30.00	30.000	0.575	2.822	1.699	2.247	1	1	10.293	3.196	10.778	18.0%	
101050412	en_resist1	uAMPS	30	85.00	245.000	169.348	169.517	169.433	0.170	1	1	28.085	0.000	28.085	17.6%	
101050409	en_leak_0v	uAMPS	30	-1.00	0.000	-1.424	-1.407	-1.415	0.018	1	1	0.313	0.000	0.313	12.0%	
201050407	en_leak_0v_post	uAMPS	30	-2.00	1.000	-1.414	-1.389	-1.402	0.024	1	1	0.316	0.000	0.316	10.5%	
101040400	pg_off_lk_hi	nAMPS	30	-25.00	200.000	17.253	24.561	20.907	7.307	1	1	19.384	11.526	22.552	10.0%	

TS3001X – Carsem Ipoh Qual Data

SEMTECH

CPK Carsem SZ VS Carsem Ipoh - Summary

[illegible]													
Test Number	Test Name	Mean	Std Dev	Min	Max	N	Spec Low	Spec High	N Bad	N Good	Yield	Pct Def Spec	Cpk
[illegible]	bg_tc_trim_val	7	0.407	0	7	887	0	7	0	887	100	0	[illegible]
[illegible]	ovuv_trim_val	5	3	0	7	887	0	7	0	887	100	0	[illegible]
[illegible]	vout_trim_val	8	13	0	31	887	0	31	0	887	100	0	[illegible]
[illegible]	ovuv_trim	3	3	0	7	887	0	255	0	887	100	0	[illegible]
[illegible]	vout_trim	9	13	0	31	887	0	255	0	887	100	0	[illegible]

[illegible]													
Test Number	Test Name	Mean	Std Dev	Min	Max	N	Spec Low	Spec High	N Bad	N Good	Yield	Pct Def Spec	Cpk
190010100	bg_tc_trim_val	7	0.461	0	7	6149	0	7	0	6149	100	0	[illegible]
190070100	ovuv_trim_val	4	3	0	7	6149	0	7	0	6149	100	0	[illegible]
190140201	vout_trim_val	11	13	0	31	6149	0	31	0	6149	100	0	[illegible]
190950100	ovuv_trim	6	5	0	7	6149	0	255	0	6149	100	0	[illegible]
190950200	vout_trim	11	13	0	31	6149	0	255	0	6149	100	0	[illegible]

Critical Parameter looks good

CPK Analysis Ipoh vs SZ

Conclusion:
From the Cpk data all parameters are comparable for both Suzhou and Carsem

TS3001X Series – Qual Data

SPIKE CHECK

- Spike Check done ETS, while loop testing the device.
- No ripple found and no device damaged during the 1000X loop test.
- All the waveform captured within acceptable range
- Details are in the spike plot check attached.
- Spike check for both Carsem Suzhou and Carsem Ipoh are compatible

TS3001X Series – Qual Data – Other Summary

- No changes done to the Test Program and Limits:

FT Program: *ef30011XX_BC_10 (ECO-053461) – TS30011-M0XXQFNR & ef30011_BC_11 (ef30011_BC_11) – TS30012-M0XXQFNR & TS30013-M0XXQFNR*

QA Program: *ef30011XX_BC_10 (ECO-053461) – TS30011-M0XXQFNR & ef30011_BC_11 (ef30011_BC_11) – TS30012-M0XXQFNR & TS30013-M0XXQFNR*

- Both Carsem Suzhou and Ipoh uses the same Tester Platform (ETS)
- Both Carsem Suzhou and Ipoh uses the same QC flow diagram *100% FT and Sample QA*.
- No Changes required in Control Plan and FMEA.

PCN No. 000710
Qualification of Carsem Ipoh for TS3001X-M0XXQFNR products

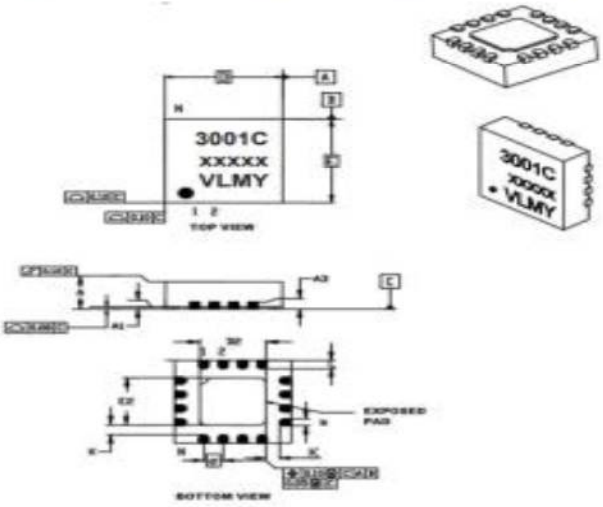
Semtech Confidential

Introduction

SEMTECH

- TS3001X-M0XXQFNR Series have been qualified in Carsem Ipoh, Malaysia as a site for assembly. Current Assembly is performed in Carsem SuZhou, China.
- The change affect applicable to products: TS3001X-M0XXQFNR
- Qualification Vehicles selected are ZSPM4561CI1R
- Schedule for Implementation
  Passing REL qualification MSL 1 under Rel job# 7197.

SEMTECH Package Outline on TS3001X-M0XXQFNR CarsemSZ (Old) and CarsemIPH (New)



Units		Millimeters		
Dimensions Limits		MIN	NOM	MAX
Number of Pins	N		16	
Pitch	e		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3		0.20 REF	
Overall Length	D		3.00 BSC	
Exposed Pad Width	E2	1.55	1.70	1.80
Overall Width	E		3.00 BSC	
Exposed Pad Length	D2	1.55	1.70	1.80
Contact Width	b	0.20	0.25	0.30
Contact Length	L	0.20	0.30	0.40
Contact-to-Exposed Pad	K	0.20	-	-

No Change in Package Outline.

Semtech Confidential 3

Assembly Process Flow Comparison for CarsemSZ (Old) vs. CarsemIPH (New)

Assembly Process Flow:

CARSEMSZ (Old)

CARSEMIPH (New)

- No major Change in manufacturing Flow for both Assembly site CarsemSZ versus CarsemIPH except additional process step for plasma cleaning before mold for Carsem Ipoh.

Semtech Confidential 4

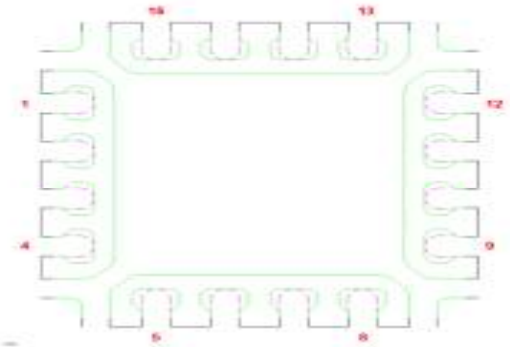
BOM Comparison CarsemSZ (Old) vs CarsemIPH (New)

CarsemSZ (Old)				CarsemIPH (New)			
Epoxy	Leadframe	Wire Type	Mold compound	Epoxy	Leadframe	Wire Type	Mold compound
Henkel QMI-519 Conductive epoxy	DCI AgCu LDF	1.2 mils PdCu wire	Sumitomo G770HCD	Henkel QMI-519 Conductive epoxy	DCI AgCu LDF	1.2 mils PdCu wire	Sumitomo G770HCD

- BOM for both supplier CarsemSZ and CarsemIPH are no difference.

Lead frame outline Comparison CARSEMSZ (OLD) Vs CARSEMIPH(NEW)

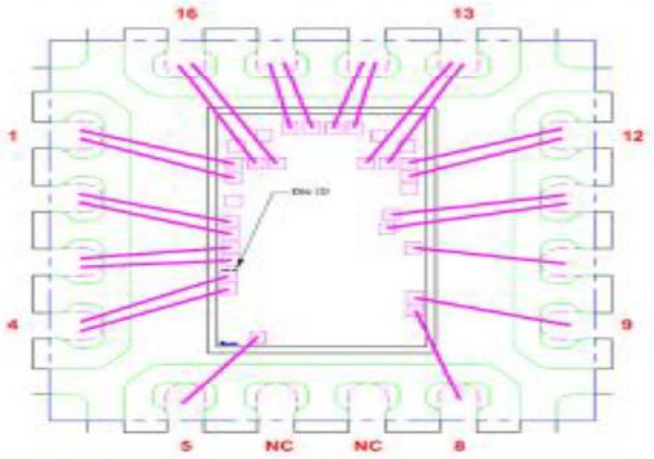
Lead frame Outline



Die Pad :2.1 x 2.1mm
Exposed Pad : 1.7 x 1.7mm

No Difference on lead frame outline for CARSEMSZ and CARSEMIPH as both are using the same lead frame.

Bonding Layout (CarsemSZ vs CarsemIPH)



No Change in Bonding Layout.