



DATE: July 23, 2019

PCN #: 2424 Rev 3 (Final)

PCN Title: OSE BGA Assembly and Test site transfer and addition of ASE Chungli Assembly and Test site for BGA packages plus Marking Change

Dear Customer:

This is an announcement of change(s) to products that are currently being offered by Diodes Incorporated.

We request that you acknowledge receipt of this notification. Please refer to the implementation date of this change as it is stated in the attached PCN form. Please contact your local Diodes sales representative to acknowledge receipt of this PCN and for any sample requests.

Previously agreed upon customer specific change process requirements or device specific requirements will be addressed separately.

For questions or clarification regarding this PCN, please contact your local Diodes sales representative.

Sincerely,

Diodes Incorporated PCN Team



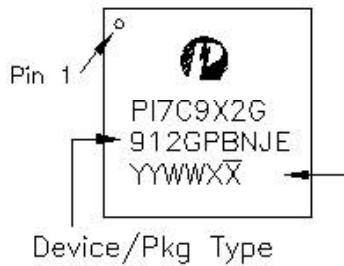
**PRODUCT CHANGE NOTICE (FINAL)**

**PCN-2424 REV 3**

Notification Date:	Implementation Date:	Product Family:	Change Type:	PCN #:
July 23, 2019	<b>May 6, 2020</b> (Change # 1) <b>May 6, 2020</b> (Change # 2)	Analog	AT Site Transfer AT Site Addition Product Marking	<b>2424</b>
TITLE				
OSE BGA Assembly and Test site transfer and addition of ASE Chungli Assembly and Test site for BGA packages plus Marking Change				
DESCRIPTION OF CHANGE				
<b>1. OSE Assembly and Test Site Change</b>  This PCN is being issued to notify customers that Diodes' subcontractor OSE has transferred the assembly site to a new assembly site within the same industrial zone in Kaohsiung, Taiwan.  Full electrical characterization and high reliability testing has been completed on representative part numbers. There is no change to device functionality or electrical specifications in the datasheet. Refer to the attached qualification / reliability report (embedded in this file).				
<b>2. Addition of Assembly and Test Site ASE Chungli</b>  In order to assure continuity of supply, Diodes is in the process of qualifying ASE Chungli as additional assembly and test site.  Full electrical characterization and high reliability testing has been completed on representative part numbers. There is no change to device functionality or electrical specifications in the datasheet. Refer to the attached qualification / reliability report (embedded in this file).				
Rev 3: 1) Qualification / reliability testing for both changes have been completed and results have been attached within this file. 2) Implementation dates have been extended.				

As part of the changes above, we will also have a new top marking. New parts from OSE and ASE Chungli will have a different logo and an added MO # (Manufacturing Order) for added traceability. Part number and date code marking will remain the same.

**Old Marking**



YY: Year  
 WW: Workweek  
 1st X: Assembly Code  
 2nd X: Fab Code  
 Bar above fab code means Cu wire

**New Marking**



YY: Year  
 WW: Workweek  
 1st X: Assembly Code  
 2nd X: Fab Code  
 Bar above fab code means Cu wire  
 Bar above assy code means ULA BOM



IMPACT	
Continuity of Supply. There will be no change to the Fit or Function of products affected. No change in datasheet parameters and product performance.	
PRODUCTS AFFECTED	
See Table 1	
WEB LINKS	
<b>Manufacturer's Notice:</b>	<a href="https://www.diodes.com/quality/product-change-notices/diodes-product-change-notices/">https://www.diodes.com/quality/product-change-notices/diodes-product-change-notices/</a>
<b>For More Information Contact:</b>	<a href="http://www.diodes.com/contacts.html">http://www.diodes.com/contacts.html</a>
<b>Data Sheet:</b>	<a href="http://www.diodes.com/catalog">http://www.diodes.com/catalog</a>
DISCLAIMER	
Unless a Diodes Incorporated Sales representative is contacted in writing within 30 days of the posting of this notice, all changes described in this announcement are considered approved.	

Table 1- OSE assembly and test site change & Adding ASE Chungli assembly and test site	
PI7C9X2G308GPANJE	PI7C9X2G608GPBNJE
PI7C9X2G308GPANJEX	PI7C9X2G608GPBNJEX
PI7C9X2G312GPBNJE	PI7C9X2G606PRDNJAE
PI7C9X2G312GPBNJEX	PI7C9X2G606PRDNJAEX
PI7C9X2G612GPCNJE	PI7C9X2G808PRCNJAEX
PI7C9X2G612GPCNJEX	PI7C9X2G912GPBNJEX

Description: OSE (New site, 80 Jing 3rd Rd. N. E. P. Z) NJ196 / NJA196 (PdCu + non-ULA mold compound)\_Qualification

General	Part Number
Diode Package ID #	
PTC Package Code/Wire Finish	
Construct Type - WireBond, Cu Pillar, CSP	
MSL Level	
Package Size in mm	
Die Count by leg (one per package)	
Die Name(s)	
Die Size (W/L) Thickness	
Wafer Fab/ Die Process/ Technology	
Top Metal Type/Bond Pad Composition	
Wire Bond Material (Au, PdCu, Cu, Al)	
Wire Diameter	
Wafer Fab	
Wafer Diameter	
Wafer Thickness	
Top Metal Thickness	
Back Metal Type (All Layers)	
No. of bond over active area	
Glass Transition Temp	
Max Junction Temp	
No. of metal steps	
Metal Layers	
Number of SSBAM/DRAM and/or Flipchips	
Package	
Backgrnd Thickness	
Backgrnd Location	
Bond Type (at Die)	
Bond Temp (at LF)	
Die Attach Material	
Min Bond Pad Pitch	
# of pad ball/pin Pitch	
Leadframe Type	
Leadframe Material / Lead Finish	
Molding Compound Type	
Green Compound (Yes/No)	
Lead-Free (Yes/No)	
Solder Ball Diameter	
Assembly Site	
Reliability Test Site	
Qual Plan #	
Reliability Testing	

Qual Device 1	Qual Device 2	QBS Device 3
P17C9X2G606PRDIAE	P17C9X2G308BPANIE(X) P17C9X2G312GPBIE(X) P17C9X2G606GPBIE(X) P17C9X2G624GRNIE(X)	P17C9X2G1234GPAHSBE
NJA196	NJ196	HSB34
NJA196 (PdCu)BGA	NJ196 (PdCu)BGA	BGA
Wire Bond	Wire Bond	Wire Bond
MSL-3	MSL-3	3
15x15mmx1.6mm (base active component)	15x15mmx1.5mm	15x15mm
1	1	1
9X2G606B3	9X2G606B1/2	9X2G1616-A4 9X2G1616-A6
4350x4590um	4350x4590um	7.06x7.06mm
0.05um 1.0n/3.3u 1PSM	0.05um 1.0n/3.3u 1PSM	0.05um 1.0n/3.3u 1PSM
Au/Cu, 3um Al Alloy	Au/Cu, 3um Al Alloy	Au/Cu
PdCu	PdCu	PdCu
0.8mil	0.8mil	0.8mil
TSMC12	TSMC12	TSMC
300mm	300mm	300mm
725um	30mil	30mil
1.5um	Au/Cu	Au/Cu
3um Al Alloy	3um Al Alloy	3um Al Alloy
zero	zero	Nitride (1um)
130C	130 degree C	145
125C	125C	125C
25	25	25
1PSM	1PSM	1P
344,064//116,539	N6T186.00	48000000
8mil	8mil	~10-15mil (BGA)
OSE	OSE	OSE
Ball	Ball	Ball
Wedge	Wedge	Wedge
Epoxy	Epoxy	Epoxy
AblestK 2300	AblestK 2300	AblestK 2100A
60um	60um	58.5um
196/1.0mm	196/1.0mm	427
NA	NA	ASEM-6ES324023401
BT substrate - 4 Layer Sumitomo E770 (non-ULA) (non-ULA mold compound)	BT substrate - 4 Layer Sumitomo E770 (non-ULA) (non-ULA mold compound)	BT substrate - 4 Layer
Yes	Yes	EMC-G70SE (ULA)
Yes	Yes	Yes
Size 0.6mm / Pitch 1.0mm	Size 0.5mm / Pitch 1.0mm	Yes
OSE (new site)	OSE (new site)	Assy Report
ASEM	ASEM	ASEM
OSE /IST	OSE /IST	ASEM
19062401	19062401	18011102

Test	Test Conditions	Duration / Units	Pa/SS	lots Required	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail
MSL3 Precond	(JESD22A119) Bake 125C	24 Hrs	0/154	3 Assy lots	3 lots x 231 units	Pass	QBS Qual Device 1		N/A	
	Soak 30C, 60% RH	192hrs	0/154	3 Assy lots	3 lots x 231 units	Pass	QBS Qual Device 1		N/A	
	IR reflow 260C	3 cycles	0/154	3 Assy lots	3 lots x 231 units	Pass	QBS Qual Device 1		N/A	
Temp Cycle (PdCu) 1X	(JESD22A104) -65C-150C	500 cycles-ATE 1000 cycles-ATE	500 = 0/77 1000 = 0/72	3 Assy lots	3 lots x 80 units	Pass	QBS Qual Device 1		N/A	
BHAST (PdCu) - 2X	JESD22A101/A110 130C, 85%RH, 33.3 psia, Vcc = OpMax	96 hours, ATE 192 hours, ATE	0/70	3 Assy lots	3 lots x 80 units	Pass	QBS Qual Device 1		N/A	
UHASt (PdCu)	JESD22A118 130C, 85%RH, 33.3 psia, no power	96 hours, ATE 168 hours, ATE	0/77	3 Assy lots	3 lots x 80 (96hr)	Pass	QBS Qual Device 1		N/A	
HTSL (PdCu) - 1X	JESD22A103 T > 150C	500 Hrs 1000 Hrs	0/77 0/77	3 Assy lots 3 Assy lots	3 lots x 80 units 3 lots x 80 units	Pass Pass	QBS Qual Device 1 QBS Qual Device 1		N/A N/A	
HTCL High Temp Operating Life	Ta=125C, Vcc = Oper Max	168 Hrs	0/77	3 WF	Not Required	Not Required	Not Required	3 WF x 80 - Done	Pass	
		500 Hrs	0/77	3 WF	Not Required	Not Required	Not Required	3 WF x 80 - Done	Pass	
		1000 Hrs	0/77	3 WF	Not Required	Not Required	Not Required	3 WF x 80 - Done	Pass	
ELFR Earlier Life Failure Rate	Ta=125C, Vcc = Oper Max	48hrs	0/800	3 WF	Not Required	Not Required	Not Required	3 WF x 500	Pass	
WBS Wire Bond Shear	JESD22-B1166	Cpk > 1.66	0/5	30 Bonds	3 lots x 5	Pass	QBS Qual Device 1		NA	
WBP Wire Bond Pull	MIL-STD883-2011	Cpk > 1.66	0/5	30 Bonds	3 lots x 5	Pass	QBS Qual Device 1		NA	
SD Solderability	Check solderability on 5 units >95% Coverage	5 Seconds	0/5	3 Assy	3 lots x 5	Pass	QBS Qual Device 1		NA	
PD Physical Dimensions	Measure dimensions on 15 units	Package Outline	Ppk > 1.67 Cpk > 1.33	3 Assy	3 lots x 15	Pass	QBS Qual Device 1		NA	
SBS Solder Ball Shear	BGA & CSP Only		Ppk > 1.67 Cpk > 1.33	3 Assy 50 balls	3 lots x 15	Pass	QBS Qual Device 1		NA	

Summary:  
Submitted By: VirgInfa Cheung 11/14/2019  
Approved By: Pam Finer 14-Nov-2019



Certificate of Design, Construction & Qualification

Description: ASECLN196 / NJA196 (PdCu)\_Qual Plan

General	Part Number	Qual Device 1	Qual Device 2	Process QBS 3
	Diodes Package ID#	P17C9X2G60PRDNI/AE	P17C9X2G9124GPAH8E	P17C9X2G9124GPAH8E
	PTC Package Code/Wire Finish	NJA196	NJA196	H88324
	Construct Type: Wirebond, Cu Pad, CSP	NJA196(PdCu)	NJA196(PdCu)	H88324 (PdCu)
	MSL Level	Wire Bond	Wire Bond	Wire Bond
	Package Size in mm	MSL-3	MSL-3	MSL-3
	Die Quantity (eg. Die per package)	15x15mmx1.53mm	15x15mmx1.50mm	19x19mm
	Die Name(s)	1	1	1
	Die Size (WxLxThickness)	9X2G606B-63	9X2G1616A6	9X2G1616-A4
	Wafer Fab/Die Process/Technology	4350x4590um	7.05x7.06 mm	9X2G1616-A6
	Top Metal Type/Bond Pad Composition	0.09um, 1.0x/3.3u, 1PSM	0.09um, 1.0x/3.3u, 1PSM	7.05x7.06 mm
	Wire Bond Material (Au, PdCu, Cu, Al)	Au/Cu, 3um Al Alloy	Au/Cu, 3um Al Alloy	Au/Cu
	Wire Diameter	PdCu	PdCu	PdCu
	Wafer Fab	0.8mil	0.8mil	0.8mil
	Wafer Diameter	TSMC12 30mm	TSMC12 30mm	TSMC12 30mm
	Wafer Thickness	300mm	300mm	300mm
	Top Metal Thickness	725um	32mil	30mil
	Back Metal Type (All, open)	1.5um	Au/Cu	Au/Cu
	No. of bond over active area	3um Al Alloy	3um Al Alloy	3um Al Alloy
	Glass Transition Temp	zero	zero	445
	Max Junction Temp	130C	130 degree C	130 degree C
	No. of metal layers	125C	125C	125C
	Metal Layers	25	25	25
	Background Thickness	1PSM	1PSM	1PSM
	# of pad/ball/pin/patch	8mil	8mil	~10-15mil (BGA)
	Lead frame Type	196/L0mm	196/L0mm	427
	Lead frame Material / Lead finish	n/a	n/a	ASEM-S-E85324023401
	Molding Compound Type	BT substrate -4 Layer	BT substrate -4 Layer	BT substrate -4 Layer
	Green Compound (Yes/No)	KE-62350	(ULAmold compound)	EME-G7505E (ULA)
	Lead Free (Yes/No)	Yes	Yes	Yes
	Solder Ball Diameter	Yes	Yes	Yes
	Assembly Site	Size 0.5mm / Pitch 1.0mm	Size 0.5mm / Pitch 1.0mm	Yes
	Reliability Test Site	ASECL	ASECL	ASEM
	Qual Plan #	ASECL / IST	ASECL / IST	IST-TW (HTOL, BHAST, ZLFR)
		19061103	19061103	18011102

Test	Test Condition	Duration / Units	Fail/Pass	Jobs Required	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail
MSL3 Precond	(JESD22-A118) Bake 125C	24 Hrs	0/154	3 AssyLots	3 lotx 231 units	Pass	1 lotx 231 units	Pass	N/A	
	Soak 30C, 60% RH	192hrs	0/154	3 AssyLots	3 lotx 231 units	Pass	1 lotx 231 units	Pass	N/A	
	IR reflow 260C	3 cycles	0/154	3 AssyLots	3 lotx 231 units	Pass	1 lotx 231 units	Pass	N/A	
Temp Cycle (PdCu) 1X	(JESD22-A104) -45C-150C	500 cycles -ATE 1000 cycles -ATE	500 = 0/77 1000 = 0/72	3 AssyLots	3 lotx 80 units	Pass	1 lotx 80 units 500 cycle = Pass 1000 cycle = Pass	Pass	N/A	
	BHAST (Au)	JESD22-A101/A110 130C, 85%RH, 33.3 psia, Vcc = Op Max	96 Hrs	0/80	3 AssyLots	1 lotx 80 units (96hr)	Pass	1 lotx 80 units (96hr)	Pass	N/A
BHAST (PdCu) - 2X	JESD22-A101/A110 130C, 85%RH, 33.3 psia, Vcc = Op Max	+96 = 192 hours, ATE	0/70	3 AssyLots	3 lotx 80 units	Pass	QBS Qual Device 1	Pass	N/A	
UHAST (PdCu)	JESD22-A118 130C, 85%RH, 33.3 psia, no power	96 Hrs	0/77	3 AssyLots	3 lotx 80 (96hr)	Pass	QBS Qual Device 1	Pass	N/A	
HTSL (PdCu) - 1X High Temp Storage	JESD22-A103 Ta > 150C	500 Hrs	0/77	3 AssyLots	3 lotx 80 units	Pass	QBS Qual Device 1	Pass	N/A	
		1000 Hrs	0/77	3 AssyLots	3 lotx 80 units	Pass	QBS Qual Device 1	Pass		
HTOL High Temp Operating Life	Ta = 125C, Vcc = Op Max	168 Hrs	0/77	3 WF	N/A for Pkg Qual		Not Required		3 WF x 80 - Done	Pass
		500 Hrs	0/77	3 WF	N/A for Pkg Qual		Not Required		3 WF x 80 - Done	Pass
		1000 Hrs	0/77	3 WF	N/A for Pkg Qual		Not Required		3 WF x 80 - Done	Pass
ELFR Earlier Life Failure Rate	Ta = 125C, Vcc = Op Max	48 Hrs	0/800	3 WF	N/A for Pkg Qual		Not Required		3 WF x 500	Pass
WBS Wire Bond Shear	JESD22-B109	Cpk > 1.66	0/5	30 Bonds	3 lotx 5 units x 64 balls StdDev = 0.784; 0.771; 0.458 Cpk = 4.770; 4.089; 7.278	Pass	1 lotx 5 units x 64 balls StdDev = 21.61 Cpk = 6.1204	Pass	NA	
WBP Wire Bond Pull	MIL-STD-883-2011	Cpk > 1.66	0/5	30 Bonds	3 lotx 5 units x 64 balls StdDev = 0.276; 0.342; 0.393 Cpk = 4.775; 3.811; 4.003	Pass	1 lotx 5 units x 64 balls StdDev = Cpk = 4.6465	Pass	NA	
PD Physical Dimensions	Measure dimensions on 15 units	Package Outline	Ppk > 1.67 Cpk > 1.33	3 Assy	3 lotx 15	Pass	QBS Qual Device 1	Pass	NA	
SBS Solder Ball Shear	BGA & CSP Only		Ppk > 1.67 Cpk > 1.33	3 Assy 50 Balls	3 lotx 1 unit x 10 balls StdDev = 20.390; 33.196; 23.688 Cpk = 6.307; 7.585; 10.289	Pass	QBS Qual Device 1	Pass	NA	

Summary:	
Submitted By:	Vinginta Cheung 2/24/2020
Approved By:	Fam Fimer 2/25/2020