DATE: 3 March, 2023

PCN #: 2618

PCN Title: Qualification of Additional Wafer Source, and Lead Frame Structure and Mold Compound Type Changes for Select Discrete Automotive Products

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 within 30 days of the date of this PCN. If you require samples for evaluation purposes, please make a request immediately. 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.

The changes announced in this PCN will not be implemented earlier than 90 days from the notification date stated in the attached PCN form.

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 PCN-2618 REV 1

Notification Date:	Implementation Date:	Product Family:	Change Type:	PCN #:
3 March, 2023	3 June, 2023	Discrete - Automotive	Wafer Fab Material, Assembly Material	**2618**

TITLE

Qualification of Additional Wafer Source, Lead Frame Structure, and Mold Compound Type Changes for Select Discrete Automotive Products

DESCRIPTION OF CHANGE

This PCN is being issued to notify customers that in order to assure continuity of supply, Diodes Incorporated has qualified Diodes internal BCD (Shanghai) Micro-Electronics Limited (SFAB2) in Shanghai, China as an additional wafer source for select automotive products listed below, and an enhanced lead frame structure and mold compound type for PowerDI-5 packaged products as listed below.

Full electrical characterization and high reliability testing has been completed on representative part numbers to ensure no change to device functionality or electrical specifications in the datasheet. Refer to the attached qualification report embedded in this file (to view, download this PCN file then open it with a PDF viewer to see the attached qual report).

There will be no change to the Form, Fit, or Function of affected products.

IMPACT

No change in datasheet parameters and product performance

PRODUCTS AFFECTED

Table 1 – Affected part list to add SFAB2 as additional wafer source

Table 2 – Affected part list to add SFAB2 as additional wafer source, and change lead frame and mold compound for PowerDI-5 package

WEB LINKS

Manufacturer's Notice:	https://www.diodes.com/quality/product-change-notices/diodes-product-change-notices/
For More Information Contact:	https://www.diodes.com/about/contact-us/contact-sales/
Data Sheet:	https://www.diodes.com/catalog/

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: Affected part list to add SFAB2 as additional wafer source					
SBR02U100LPQ-7	SBR1045CTLQ-13	SBR15U100CTLQ-13	SBR3045CTBQ-13	SBR3U40P1Q-7	SBR6100CTLQ-13
SBR02U100LPQ-7B	SBR1045D1Q-13	SBR20M45D1Q-13	SBR30A45CTBQ-13	SBR3U60P1Q-7	SBR660CTLQ-13
SBR0560S1Q-7	SBR10U45D1Q-13	SBR2A40P1Q-7	SBR30A60CTBQ-13		

Table 2: Affected part list to add SFAB2 as additional wafer source, and change lead frame and mold compound for PowerDI-5 package					
SBR1045SP5Q-13	SBR10U200P5Q-13	SBR10U45SP5Q-13	SBR12U100P5Q-13	SBR8U60P5Q-13	SBR8U60P5Q-13D
SBR10A45SP5Q-13	SBR10U200P5Q-13D	SBR10U45SP5Q-13D	SBR12U100P5Q-13D		

Certificate of Design, Construction & Qualification

Description: SFAB2 8 inch wafer qual for SBR auto produc

Category		Qual Device 1-1st lot	Qual Device 1-2nd lot	Qual Device 1-3rd lot	QBS Source Device 1	QBS Source Device 2	QBS Source Device 3	QBS Source Device 4	QBS Source Device 5	QBS Source Device 6	QBS Source Device 7
Product	Part Number	SBR10U200P5Q-13	SBR10U200P5Q-13	SBR10U200P5Q-13	SBR10U45SP5-13	SBR3U40P1-7	SBR8M100P5Q-13	SBR02U100LP-7	SBR0560S1Q-7	SBR20M45D1Q-13	SBR30A45CTBQ-13
Assembly	Package Type	PowerDI5	PowerDI5	PowerDI5	PowerDi-5	PDI123	PowerDI5	DFN1006-2	SOD-123	TO252-3L	TO-263AB
Assembly	Package Size	6.5*3.97*1.10mm	6.5*3.97*1.10mm	6.5*3.97*1.10mm	6.5*3.97*1.10mm	3.7*1.775*0.98mm	6.5*3.97*1.10mm	1.0*0.6*0.5mm	1.55*3.7*1.06mm	9.91*6.58*2.29mm	15.24*10.16*4.44
Wafer	Die Name(s)	SS102A200PHAQ-8A-HGN	SS102A200PHAQ-8A-HGN	SS102A200PHAQ-8A-HGN	SS112A045PEA2-8-4C	SS048A040PEF2-8-4C	SS082A100PGC2-8-4C	SS014A100AGB7-8-BGN	SS030A060AEA2-8-HGN	SS124A045AED2-8-HGN	SS112A045AEA2-8-HGN
Wafer	Die Size (W/L/Thickness) - After Saw	2.592 x 2.592 x 0.25 mm	2.592 x 2.592 x 0.25 mm	2.592 x 2.592 x 0.25 mm	2.84mm * 2.84 mm	1.24*1.24*0.25mm	2086x 2086*254 um	0.40*0.35*0.14mm	0.78*0.78*0.25mm	3.97*2.56*0.25mm	2.84*2.84*0.25mm
Wafer	Die Process / Technology	SBR	SBR	SBR	Standard SBR	SBR	SBR	SBR	SBR	SBR	SBR
Wafer	Wafer FAB/ Location	SFAB2	SFAB2	SFAB2	SFAB	SFAB2	SFAB2	SFAB2	SFAB	SFAB	SFAB
Wafer	Wafer Diameter	8 inch	8 inch	8 inch	8 inch	8 inch	8 inch	8inch	8inch	8inch	8inch
Wafer	Front Metal Type	AlCu +NiAu	AlCu +NiAu	AlCu +NiAu	AlCu +NiAu	AlCu +NiAu	AlCu +NiAu	AlSiCu	Al-Si-Cu	AlSiCu	AlSiCu
Wafer	Front Metal Layer Number/ Thickness	AlCu 2.5um + NiAu 1.5um / 500A	AlCu 2.5um + NiAu 1.5um / 500A	AlCu 2.5um + NiAu 1.5um / 500A	AlCu 2.5um + NiAu 1.5um / 500A	AlCu 2.5um + NiAu 1.5um / 500A	AlCu 2.5um + NiAu 1.5um / 500A	AlSiCu/40kA	Al-Si-Cu/30kA	Al-Si-Cu/30kA	Al-Si-Cu/30kA
Wafer	Front Solderable or Plated Metal Type / Thicknes	Plated NiAu 1.5um / 500A	Plated NiAu 1.5um / 500A	Plated NiAu 1.5um / 500A	Plated NiAu 1.5um / 500A	Plated NiAu 1.5um / 500A	Plated NiAu 1.5um / 500A	NA	NA	NA	NA
Wafer	Front Solderable or Plated Metal Supplie	CAT	CAT	CAT	CAT	CAT	CAT	NA	NA	NA	NA
Wafer	Number of Poly Layers	1	1	1	1 Poly	1 Poly	1 Poly	1 Poly	1 Poly	1 Poly	1 Poly
Wafer	Back Metal Type (All Layers	1 Poly	1 Poly	1 Poly	TiNiAg	TiNiAg	TiNiAg	TiNiAg	TiNiAg	TiNiAg	TiNiAg
Wafer	Back Metal Thickness (All Layers	TiNiAg	TiNiAg	TiNiAg	1000A / 3000A / 10000A	1000A / 3000A / 10000A	1000A / 3000A / 10000A	1000A / 3000A / 10000A	1000A / 3000A / 10000A	1000A / 3000A / 10000A	1000A / 3000A / 10000A
Wafer	Back Metal Supplier	1000A / 3000A / 10000A	1000A / 3000A / 10000A	1000A / 3000A / 10000A	CAT	CAT	CAT	CAT	CAT	CAT	CAT
Wafer	Die Conforming Coating (Passivation)/Supplie	PETEOS (SiO2)	PETEOS (SiO2)	PETEOS (SiO2)	NA	NA	SiON	NA	NA	NA	NA
Wafer	Die passivation thickness range	1+/-0.1um	1+/-0.1um	1+/-0.1um	NA	NA	1+/-0.1um	NA	NA	NA	NA
Wafer	No of masks Steps	6	6	6	4	4	6	4	4	4	4
Assembly	Die quantity per package (e.g. single or dual dies	Single	Single	Single	Single	Single	Single	Single	Single	Single	Dual dies
Assembly	Die Attach Method (DB Epoxy/Solder Type	Solder	Solder	Solder	Solder	Solder	Solder	Epoxy	Epoxy	SOFT-SOLDER	SOFT-SOLDER
Assembly	Die Attach Material/ Supplie	ES-500-SPA/EARLY SUN	ES-500-SPA/EARLY SUN	ES-500-SPA/EARLY SUN	NC-SMQ51SC/INDIUM	ES-500-SPA / Early Sun	NC-SMQ51SC / Indium	QMI519/HENKEL	84-1LMISR4	Pb92.5Sn5Ag2.5/HERAEUS	Pb92.5Sn5Ag2.5/HERAEUS
Assembly	Bond Wire/Clip Bond Material/ Supplier	Clip/PDE	Clip/PDE	Clip/PDE	Clip/SSHP	Clip / PBE	Clip/HITACHI CABLE	Au/HERAEUS&NBKQ	Au/MULTIPLE	Al/HERAEUS&Nichetech	Al/HERAEUS/Nichetech
Assembly	Bond Type (at Die)	Solder	Solder	Solder	Solder	Solder	Solder	Thermo sonic	ultrasonic	ultrasonic	ultrasonic
Assembly	Bond Type (at LF)	Solder	Solder	Solder	Solder	Solder	Solder	Thermo sonic	ultrasonic	ultrasonic	ultrasonic
Assembly	No. of bond over active are	1	1	1	1	1	1	2	2	2	4
Assembly	Glass Transistion Temp	130C	130C	130C	130*C	135C	130C	135℃	135℃	135C	135C
Assembly	Terminal Finish (Plating) Materia	Pbfree	Pbfree	Pbfree	Pbfree	100% matte Tin	Pbfree	NiPdAu	Pbfree	Pbfree	100% Matte Tin
Assembly	Header plating (Die Land Area	Spot Ag	Spot Ag	Spot Ag	Spot Ag	Bare copper	Spot Ag	NiPdAu	Spot Ag	Bare copper	Bare copper
Assembly	Wire Diameter	Clip	Clip	Clip	Clip	Clip	Clip	1.0mil	2mil	15mil	15mil
Assembly	Leadframe Type	PowerDi-5 F type	PowerDi-5 F type	PowerDi-5 F type	PowerDi-5 F type	KLF00281	PowerDi-5 F type	SLP1006P2	SOD-123A	DPAK-3L F	TO263-3L bare
Assembly	Leadframe Materia	CDA194HH	CDA194HH	CDA194HH	CDA194FH	CDA194HH	CDA194HH	C7025HH	Alloy 42	12SnOFC-H	KFC
Assembly	Molding Compound Type	EME-G700LA-LA	EME-G700LA-LA	EME-G700LA-LA	EME-G700LA-LA	EME-G600	EME-G700LA-LA	EME-G770HCD	GR640HV-L1	EME-G630AY	KTMC1050G
Assembly	Mold Compound Material Manufacture	SUMITOMO	SUMITOMO	SUMITOMO	SUMITOMO	SUMITOMO	Sumitomo	SUMITOMO	HENKEL	SUMITOMO	KCC
Assembly	Green Compound (Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assembly	Plating Material / Source	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac	Sn/Yuan Hac
Assembly	Lead-Free (Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assembly	Assembly Site/ Location	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China
Assembly	Test Site/ Location	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China	SAT / China
Product	Max Junction Temp	175C	175C	175C	150C	150C	175C	150℃	150C	150C	150C
Product	DataSheet	DS39274	DS39274	DS39274	DS31371	DS36535	DS37626	DS31134	DS31525	DS38241	DS36348
Product	Qual Plan Number	22112403	22112403	22112403	19112604	21083104	22020903	20080601	20080601	20080601	20080601

Reliability and Characterization Testing

# in AEC-Q101 (D)	Test	Test Conditions	Duration / Limits	Accept on # Failed/ Sample Size per Lot	# of Lots	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail
2	MSL1 Pre-conditioning	Bake 125C	24 Hrs	SMD only, for Test #7, 8, 9 &	3 Assembly lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
		Soak 85C, 85% RH	168Hrs			X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
		IR reflow 260C	3 cycles			X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
3	EXTERNAL VISUAL (EV)	MIL-STD-750 METHOD 2071	PER SPEC	All qualification parts submitted for testing		X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
4	PARAMETRIC VERIFICATION (PV)	Test all parameters per Data Sheet inlcuding AC & DC accross data sheet temperature rang	Operating Range, Per Data Sheet (AC, DC)	0/25	3 wafer lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
	FORWARD SURGE	MIL-750D, METHOD 4066	PER DATA SHEET	0/50	3 wafer lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
5	HTRB	Ta=150℃ or Max Tj, *Max DC Reverse Voltage, PER MIL STD-750-1	168 Hrs	0/77	3 wafer lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
			500 Hrs	0/77		X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
			1000 Hrs	0/77		X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
7	TC	Ta=-55C to 150C or Max Tj, PER JESD22A-104	168 Cycles	0/77	3 Assembly lots							X = Test Needed	PASS	X = Test Needed	PASS			X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
			500 Cycles	0/77								X = Test Needed	PASS	X = Test Needed	PASS			X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
			1000 Cycles	0/77								X = Test Needed	PASS	X = Test Needed	PASS			X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
7	TC	Ta=-55C to 175C Per Datasheet Max Tj , PER JESD22A-104	200 Cycles	0/77	3 Assembly lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS					X = Test Needed	PASS								
			400 Cycles	0/77		X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS					X = Test Needed	PASS								
8 (alt)	PCT/AC	Ta=121℃ 15PSIG 100%RH; PER JESD22-A102	96 Hrs	0/77	3 Assembly lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
9	HAST	Ta=130C, 85%RH, 33.3 psia, 80% Bias or up to a voltage above which arcing in the chamber will likely occur (typically 42V).; PER JESD22-A110	96 Hrs	0/77	3 wafer lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS														
9 alt	H3TRB	Ta=85ºC, 85% RH, with 80% Maximum Reverse Bias o up to a maximum of 100V or limit of chamber. JESD22A-101	168 Hrs	0/77	3 wafer lots							X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS			X = Test Needed	PASS
			500 Hrs	0/77								X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS			X = Test Needed	PASS
			1000 Hrs	0/77								X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS			X = Test Needed	PASS
10	IOL	MIL-STD-750 Method 1037 (Not required for TVS)	2520 Cycles	0/77	3 wafer lots	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
			7560 Cycles	0/77		X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
			15000 Cycles	0/77		X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
11	ESD	HBM (AEC-Q101-001)	PER DATA SHEET	0/30	1 wafer lot	X = Test Needed	PASS 6KV	X = Test Needed	PASS 6KV	X = Test Needed	PASS 6KV	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
		CDM (AEC-Q101-005)	PER DATA SHEET	0/30	1 wafer lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
12	DPA	AEC Q101-004 SEC. 4		0/2	1 Assembly lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
13	Package Physical Dimemsions (PD)	JESD22-B100	Package Outline	0/30	1 Assembly lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
20	RESISTANCE TO SOLDER HEAT (RSH)	JESD22 A-111 (SMD), B-106 (PTH) (260C @10S)	PER SPEC	0/30	1 Assembly lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
21	Solderability	J-STD-002; JESD22B102 (245C +0/5S)	5 Seconds	0/10	1 Assembly lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
22	THERMAL RESISTANCE (TR)	JESD 24-3, 24-4, 24-6 AS APPROPRIATE	PER SPEC	0/10	1 Assembly lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
23	Wire Bond Strength	MIL-STD-750 METHOD 2037 (JESD22-B116B)	Cpk≥1.67	0/ min of 5	1 Assembly lot													X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
24	BOND SHEAR	AEC-Q101-003	Cpk≥1.67	0/ min of 5	1 Assembly lot													X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS
25	Die Shear	MIL-STD-750 (2017) (Not required for soft solder die attach)	Cpk≥1.67	0/5	1 Assembly lot	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS	X = Test Needed	PASS

Summary: William Lai 2/1, 2023
Submitted By: William Lai 2/1, 2023
Approved By Frank Chen, 2/15/2023

Certificate of Design, Construction & Qualification

Description: SBR 8inch porting 20~120V qualification

Category		Qual Device 1	Qual Device 2	Qual Device 3	Qual Device 4	Qual Device 5	Qual Device 6	Qual Device 7	QBS Source Device 1
Product	Part Number	SBR02E20LP-7	SBR60A20CT	SBR02U100LP-7	SBR40U120CT	SBR0560S1Q-7	SBR20M45D1-13	SBR30A45CTB-13-G	SBR10E45P5-13
Assembly	Package Type	DFN1006-2	TO220-3L	DFN1006-2	TO220-3L	SOD-123	TO252-3L	TO-263AB	PowerDi-5
Assembly	Package Size	1.0*0.6*0.5mm	28.6*10.11*4.57mm	1.0*0.6*0.5mm	28.6*10.11*4.57mm	1.55*3.7*1.06mm	9.91*6.58*2.29mm	15.24*10.16*4.44	6.5*3.97*1.10mm
Wafer	Die Name(s)	SS014A020AEB2-8-BGN	SS146A020AEC2-8-HGN	SS014A100AGB7-8-BGN	SS143A120AJD2-8-4I	SS030A060AEA2-8-HGN	SS124A045AED2-8-HGN	SS112A045AEA2-8-HGN	SS112A045PEA2-8-4C
Wafer	Die Size (W/L/Thickness) - After Saw	0.40*0.35*0.14mm	3.504*3.922*0.25mm	0.40*0.35*0.14mm	3.494*3.912*0.25mm	0.78*0.78*0.25mm	3.97*2.56*0.25mm	2.84*2.84*0.25mm	2.84mm * 2.84 mm
Wafer	Die Process / Technology	SBR	SBR	SBR	SBR	SBR	SBR	SBR	Standard SBR
Wafer	Wafer FAB/ Location	SFAB	SFAB	SFAB	SFAB	SFAB	SFAB	SFAB	SFAB
Wafer	Wafer Diameter	8inch	8inch	8inch	8inch	8inch	8inch	8inch	8 inch
Wafer	Front Metal Type	Al-Si-Cu	Al-Si-Cu	Al-Si-Cu	Al-Si-Cu	Al-Si-Cu	AlSiCu	AlSiCu	NiAu
Wafer	Front Metal Layer Number/ Thickness	Al-Si-Cu/30kA	Al-Si-Cu/30kA	Al-Si-Cu/40kA	Al-Si-Cu/30kA	Al-Si-Cu/30kA	Al-Si-Cu/30kA	Al-Si-Cu/30kA	1.5 / 0.05 um
Wafer	Number of Poly Layers	1 poly	1 poly	1 poly	1 poly	1 poly	1 poly	1 poly	1
Wafer	Back Metal Type (All Layers)	Ti-Ni-Ag	Ti-Ni-Ag	Ti-Ni-Ag	Ti-Ni-Ag	Ti-Ni-Ag	Ti/Ni/Ag	Ti/Ni/Ag	TiNiAg
Wafer	Back Metal Thickness (All Layers)	1kA/ 3kA/ 10kA	1kA/ 3kA/ 10kA	1kA/ 2kA/ 8kA	1kA/ 3kA/ 10kA	1kA/ 3kA/ 10kA	1kA/ 3kA/ 10kA	1kA/ 3kA/ 10kA	1k/ 3k/ 10k A
Wafer	Die Conforming Coating (Passivation)	None	None	None	None	None	None	None	None
Wafer	Die passivation thickness range	None	None	None	None	None	None	None	None
Wafer	No of masks Steps	4	4	4	4	4	4	4	4
Assembly	Die quantity per package (e.g. single or dual dies)	Single	Dual dies	Single	Dual dies	Single	Single	Dual dies	Single
Assembly	Die Attach Method (DB Epoxy/Solder Type)	Epoxy	Soft solder	Epoxy	SOFT-SOLDER	Epoxy	SOFT-SOLDER	SOFT-SOLDER	Solder
Assembly	Die Attach Material/ Supplier	QMI519/HENKEL	Pb92.5Sn5Ag2.5/HERAEUS	QMI519/HENKEL	Pb92.5Sn5Ag2.5/HERAEUS	84-1LMISR4	Pb92.5Sn5Ag2.5/HERAEUS	Pb92.5Sn5Ag2.5/HERAEUS	NC-SMQ51SC/Indium
Assembly	Bond Wire/Clip Bond Material/ Supplier	Au/HERAEUS&NBKQ	Al/HERAEUS&Nichetech	Au/HERAEUS&NBKQ	Al/HERAEUS&Nichetech	Au/MULTIPLE	Al/HERAEUS&Nichetech	Al/HERAEUS/Nichetech	Clip/SSHP
Assembly	Bond Type (at Die)	Thermo sonic	ultrasonic	Thermo sonic	ultrasonic	ultrasonic	ultrasonic	ultrasonic	Solder
Assembly	Bond Type (at LF)	Thermo sonic	ultrasonic	Thermo sonic	ultrasonic	ultrasonic	ultrasonic	ultrasonic	Solder
Assembly	No. of bond over active area	2	4	2	6	2	2	4	1
Assembly	Glass Transistion Temp	135℃	135℃	135℃	135℃	135℃	135C	135C	130*C
Assembly	Terminal Finish (Plating) Material	NiPdAu	100% Matte Tin	NiPdAu	Pbfree	Pbfree	Pbfree	100% Matte Tin	Pbfree
Assembly	Header plating (Die Land Area)	Ag Plating	Bare copper	NiPdAu	Bare copper	Spot Ag	Bare copper	Bare copper	Spot Ag
Assembly	Wire Diameter	1.0mil	15mil	1.0mil	15mil	2mil	15mil	15mil	KLP00014
Assembly	Leadframe Type	SLP1006P2-U	TO220-3L C	SLP1006P2	TO220-3L C	SOD-123A	DPAK-3L F	TO263-3L bare	PowerDi-5 F type
Assembly	Leadframe Material	ALLOY42	KFC	C7025HH	KFC	Alloy 42	12SnOFC-H	KFC	CDA194FH
Assembly	Lead Frame Manufacturer	SHEC/ASM	XMYM/ NBKQ	ASM&PBE&MHT	XMYM/ NBKQ	XMYH/JYKQ/MHT	HITACHI	XMYM/ NBKQ	NBKQ
Assembly	Molding Compound Type	EME-G770HCD	KTMC1050G	EME-G770HCD	EME-G630AY	GR640HV-L1	EME-G630AY	KTMC1050G	EME-G700LA-LA
Assembly	Mold Compound Material Manufacturer	SUMITOMO	KCC	SUMITOMO	SUMITOMO	HENKEL	SUMITOMO	KCC	Sumitomo
Assembly	Green Compound (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assembly	Lead-Free (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assembly	Assembly Site/ Location	DSH	DSH	DSH	DSH	DSH	SAT	SAT	SAT / Shanghai
Assembly	Test Site/ Location	DSH	DSH	DSH	DSH	DSH	SAT	SAT	SAT / Shanghai
Product	Max Junction Temp	150C	150C	150℃	150C	150C	150C	150C	150C
Product	DataSheet	DS31062	DS31421	DS31134	DS31584	DS31525	DS38241	DS36348	37867
Product	Qual Plan Number	20080601	20080601	20080601	20080601	20080601	20080601	20080601	19112604

Reliability and Characterization Testing

# in AEC-Q101 (D)	Test	Test Conditions	Duration / Limits	Accept on # Failed/ Sample Size per Lot	# of Lots	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	X = Test Needed	Results Pass/Fail	QBS Test Completed	Results Pass/Fail
2	MSL1 Pre-conditioning	Bake 125C	24 Hrs	SMD only, for Test #7, 8, 9 & 10	3 Assembly lots	X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
		Soak 85C, 85% RH	168Hrs			X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
		IR reflow 260C	3 cycles			X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
3	EXTERNAL VISUAL (EV)	MIL-STD-750 METHOD 2071	PER SPEC	All qualification parts submitted for testing		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
4	PARAMETRIC VERIFICATION (PV)	Test all parameters per Data Sheet inlcuding AC & DC accross data sheet temperature range	Operating Range, Per Data Sheet (AC, DC)	0/25	3 wafer lots	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
	FORWARD SURGE	MIL-750D, METHOD 4066	PER DATA SHEET	0/50	3 wafer lots	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
5	HTRB	Ta=150℃ or Max Tj, Vd=100%, PER MIL-STD-750-1	168 Hrs	0/77	3 wafer lots	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
			500 Hrs	0/77		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
			1000 Hrs	0/77		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
7	TC	Ta=-55C to 150C or Max Tj, PER JESD22A-104	168 Cycles	0/77	3 Assembly lots	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
			500 Cycles	0/77		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
			1000 Cycles	0/77		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
8 (alt)	PCT/AC	Ta=121℃ 15PSIG 100%RH; PER JESD22-A102	96 Hrs	0/77	3 Assembly lots	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
8 (alt)	HHT	Ta=85ºC, 85% RH,	168 Hrs	0/77	3 wafer lots			X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass				
			500 Hrs	0/77				X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass				
			1000 Hrs	0/77				X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass				
9	HAST	Ta=130C, 85%RH 33.3 psia 80% Bias; PER JESD22-A110	96 Hrs	0/77	3 wafer lots	X = Test Needed	Pass														
9 alt	H3TRB	Ta=85ºC, 85% RH, with 80% Maximum Reverse Bias. JESD22A-101	168 Hrs	0/77	3 wafer lots					X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass	X	Pass
			500 Hrs	0/77						X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass	X	Pass
			1000 Hrs	0/77						X = Test Needed	Pass			X = Test Needed	Pass			X = Test Needed	Pass	X	Pass
10	IOL	MIL-STD-750 Method 1037 (Not required for TVS)	2520 Cycles	0/77	3 wafer lots	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
			7560 Cycles	0/77		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
			15000 Cycles	0/77		X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
11	ESD	HBM (AEC-Q101-001)	PER DATA SHEET	0/30	1 wafer lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	2KV	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
		CDM (AEC-Q101-005)	PER DATA SHEET	0/30	1 wafer lot	X = Test Needed		X = Test Needed	Pass			X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
		MM (AEC-Q101-002)	PER DATA SHEET	0/30	1 wafer lot					X = Test Needed	200V									X	Pass
12	DPA	AEC Q101-004 SEC. 4		0/2	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
13	Package Physical Dimemsions (PD)	JESD22-B100	Package Outline	0/30	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed		X = Test Needed	Pass	X = Test Needed		X = Test Needed	Pass	X = Test Needed		X	Pass
20	RESISTANCE TO SOLDER HEAT (RSH)	JESD22 A-111 (SMD), B-106 (PTH) (260C @10S)	PER SPEC	0/30	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
21	Solderability	J-STD-002; JESD22B102 (245C +0/5S)	5 Seconds	0/10	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
22	THERMAL RESISTANCE (TR)	JESD 24-3, 24-4, 24-6 AS APPROPRIATE	PER SPEC	0/10	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass
23	Wire Bond Strength	MIL-STD-750 METHOD 2037 (JESD22-B116B)	Cpk>1.66	0/ min of 5	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass		
24	BOND SHEAR	AEC-Q101-003	Cpk>1.66	0/ min of 5	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass		
25	Die Shear	MIL-STD-750 (2017)	Cpk>1.66	0/5	1 Assembly lot	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X = Test Needed	Pass	X	Pass

Summary: ________________________________
Submitted By: CH Hsu 2021/01/28
Approved By: Frank Chen, 3/30/2021