



Diodes Incorporated Discrete and Analog Semiconductors

Qualification Report – PCN-2236

Manufacturer No.: Die Attach Material and Back Metal Composition changes to improve product performance

Revision: 0

Date: June 27, 2016

Qualified By: Diodes Incorporated

Also Applicable To: The part numbers listed in the associated PCN are Qualified by Similarity (QBS) to the devices included in this report.

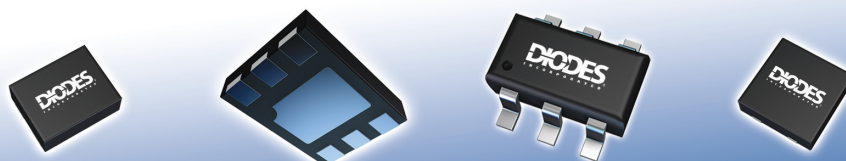
Please go to www.diodes.com for current data sheets on associated devices

Prepared By:	<u>Diodes US Document Control</u>	Date	<u>June 27, 2016</u>
Approved By:	<u>Diodes US QRA Department</u>	Date	<u>June 27, 2016</u>



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DIODES INCORPORATED 4949 Hedgcoxe Road, Suite # 200, Plano, TX 75024 USA www.diodes.com



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DIODES INCORPORATED
4949 Hedgcoxe Road, Suite # 200
Plano, TX 75024 USA
(972) 987-3900
www.diodes.com



DATE: 27th June, 2016

PCN #: 2236

PCN Title: Die Attach Material and Back Metal Composition changes to improve product performance

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 within 30 days as well. Otherwise, samples may not be built prior to this change. 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-2236 REV 00

Notification Date:	Implementation Date:	Product Family:	Change Type:	PCN #:
27th June, 2016	26th September, 2016	Discrete Products	Die Attach Materials / Back Metal Composition	2236
TITLE				
Die Attach Material and Back Metal Composition changes to improve product performance				
DESCRIPTION OF CHANGE				
<p>This PCN is being issued to notify customers that in order to improve product performance, Diodes Incorporated has qualified an enhanced die attach material and back metal composition for the part number(s) listed in this PCN.</p> <p>Full electrical characterization and reliability testing have been completed to ensure that no changes in product reliability, device functionality or data sheet electrical specifications exist.</p> <p>There will be no change to the Form, Fit, or Function of affected products.</p>				
IMPACT				
No change in datasheet parameters				
PRODUCTS AFFECTED				
AL5802-7, AL5802-13, ASMCC0164-7				
WEB LINKS				
Manufacturer's Notice:	http://www.diodes.com/quality/pcns			
For More Information Contact:	http://www.diodes.com/contacts			
Data Sheet:	http://www.diodes.com/products			
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.				



Certificate of Design, Construction & Qualification

Description: Qualification of ASMCC0164 and AL5802

Category	Part Number	QBS Source Device 1	Qual Device 1
Product	ASMCC0164-7	ASMCC0164-7	AL5802-7
Assembly	SOT-26	SOT-26	SOT-26
Assembly	3.0*2.8*1.15 mm	3.0*2.8*1.15 mm	3.0*2.8*1.15 mm
Wafer	C3904EG + DB-ICT036N140S15	C3904EG + DB-ICT036N140S15	C3904EG + DB-ICT036N140S15
Wafer	Die Size (W/L/Thickness) - After Saw	C3904EG: 0.4*0.31*0.216 mm DB-ICT036N140S15: 0.36*0.36*0.15 mm	C3904EG: 0.4*0.31*0.216 mm DB-ICT036N140S15: 0.36*0.36*0.15 mm
Wafer	Die Process / Technology	Bipolar	Bipolar
Wafer	Wafer FAB/ Location	KFAB/USA & Phenitec/Japan	KFAB/USA & Phenitec/Japan
Wafer	Wafer Diameter	6" for C3904EG and 5" for DB-ICT036N140S15	6" for C3904EG and 5" for DB-ICT036N140S15
Wafer	Front Metal Type	Al	Al
Wafer	Front Metal Layer Number/ Thickness	C3904EG: 3.5 um DB-ICT036N140S15: 2.0 um	C3904EG: 3.5 um DB-ICT036N140S15: 2.0 um
Wafer	Back Metal Type (All Layers)	C3904EG: Ti/Ni/Au DB-ICT036N140S15: AuAs-Au	C3904EG: Ti/Ni/Au DB-ICT036N140S15: AuAs-Au
Wafer	Back Metal Thickness (All Layers)	C3904EG: 1500A Ti + 3300A NiV + 600A Au DB-ICT036N140S15: 0.9 um	C3904EG: 1500A Ti + 3300A NiV + 600A Au DB-ICT036N140S15: 0.9 um
Wafer	Die Conforming Coating (Passivation)	C3904EG: Oxide + Nitride DB-ICT036N140S15: N/A	C3904EG: Oxide + Nitride DB-ICT036N140S15: N/A
Wafer	Die passivation thickness range	C3904EG: 6kA+/-600A Oxide and 1.5kA+/-200A Nitride DB-ICT036N140S15: N/A	C3904EG: 6kA+/-600A Oxide and 1.5kA+/-200A Nitride DB-ICT036N140S15: N/A
Wafer	No of masks Steps	C3904EG: 5 DB036N140D15CH: N/A	C3904EG: 5 DB036N140D15CH: N/A
Assembly	Die quantity per package (e.g. single or dual dies)	Dual	Dual
Assembly	Die Attach Method (DB Epoxy/Solder Type)	Epoxy	Epoxy
Assembly	Die Attach Material/ Supplier	84-1LMSR4	84-1LMSR4
Assembly	Bond Wire/Clip Bond Material/ Supplier	Au	Au
Assembly	Bond Type (at Die)	Thermo-Ultrasonic	Thermo-Ultrasonic
Assembly	Bond Type (at LF)	Thermo-Ultrasonic	Thermo-Ultrasonic
Assembly	No. of bond over active area	5	5
Assembly	Glass Transition Temp	130°C	130°C
Assembly	Terminal Finish (Plating) Material	100% Matte Tin	100% Matte Tin
Assembly	Header plating (Die Land Area)	Silver Spot Plating	Silver Spot Plating
Assembly	Wire Diameter	1.0 mil	1.0 mil
Assembly	Leadframe Type	SOT-26Z	SOT-26Z
Assembly	Leadframe Material	EFTEC-64T	EFTEC-64T
Assembly	Lead Frame Manufacturer	MHT	MHT
Assembly	Molding Compound Type	CEL1700HF40SK-D3	CEL1700HF40SK-D3
Assembly	Mold Compound Material Manufacturer	Hitachi	Hitachi
Assembly	Green Compound (Yes/No)	Yes	Yes
Assembly	Lead-Free (Yes/No)	Yes	Yes
Assembly	Assembly Site/ Location	SAT/Shanghai	SAT/Shanghai
Assembly	Test Site/ Location	SAT/Shanghai	SAT/Shanghai
Product	Max Junction Temp	150°C	150°C
Product	Max Thermal resistance Junc (case)	70 °C/W	70 °C/W
Product	Max Thermal resistance Junc (ambient)	200 °C/W	200 °C/W
Product	DataSheet	DS31781 Rev. 3 - 5	DS3516 Rev. 9 - 2

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	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	Pass	QBS	Pass
		Soak 85C, 85% RH	168Hrs			X	Pass	QBS	Pass
		IR reflow 260C	3 cycles			X	Pass	QBS	Pass
3	EXTERNAL VISUAL (EV)	MIL-STD-750 METHOD 2071	PER SPEC	All qualification parts submitted for testing		X	Pass	QBS	Pass
4	PARAMETRIC VERIFICATION (PV)	-55C, 25C, 85C, 125C, 150C	Operating Range, Per Data Sheet	0/25	3 wafer lots	X	Pass	QBS	Pass
5	HTRB	Ta=150°C or Max Tj, Vd=100%, PER MIL-STD-750-1	168 Hrs	0/77	3 wafer lots	X	Pass	QBS	Pass
			500 Hrs	0/77		X	Pass	QBS	Pass
			1000 Hrs	0/77		X	Pass	QBS	Pass
7	TC	Ta=-65C to 150C or Max Tj, PER JESD22A-104	168 Cycles	0/77	3 Assembly lots	X	Pass	QBS	Pass
			500 Cycles	0/77		X	Pass	QBS	Pass
			1000 Cycles	0/77		X	Pass	QBS	Pass
8	PCT/AC	Ta=121°C 15PSIG 100%RH; PER JESD22-A102	96 Hrs	0/77	3 Assembly lots	X	Pass	QBS	Pass
9 alt	H3TRB	Ta=85°C, 85% RH, with 80% Maximum Reverse Bias. JESD22A-101	168 Hrs	0/77	3 wafer lots	X	Pass	X	Pass
			500 Hrs	0/77		X	Pass	X	Pass
			1000 Hrs	0/77		X	Pass	X	Pass
10	IOL	MIL-STD-750 Method 1037 (N/A for TVS)	2520 Cycles	0/77	3 wafer lots	X	Pass	QBS	Pass
			7560 Cycles	0/77		X	Pass	QBS	Pass
			15000 Cycles	0/77		X	Pass	QBS	Pass
11	ESD	HBM (AEC-Q101-001)	PER DATA SHEET	0/30	1 wafer lot	X	Pass	QBS	Pass
		CDM (AEC-Q100-005)	PER DATA SHEET	0/30	1 wafer lot	X	Pass	QBS	Pass
12	DPA	AEC Q101-004 SEC. 4		0/2	1 Assembly lot	X	Pass	QBS	Pass
13	Package Physical Dimemions (PD)	JESD22-B100	Package Outline	0/30	1 Assembly lot	X	Pass	QBS	Pass
20	RESISTANCE TO SOLDER HEAT (RSH)	JESD22 A-111 (SMD), B-106 (PTH) (260C @30S)	PER SPEC	0/30	1 Assembly lot	X	Pass	QBS	Pass
21	Solderability	J-STD-002; JESD22B102 (245C +0/5S)	5 Seconds	0/10	1 Assembly lot	X	Pass	QBS	Pass
22	THERMAL RESISTANCE (TR)	JESD 24-3, 24-4, 24-6 AS APPROPRIATE	PER SPEC	0/10	1 Assembly lot	X	Pass	QBS	Pass
23	Wire Bond Strength	MIL-STD-750 METHOD 2037 (JESD22-B116B)	Cpk>1.66	0/ min of 5	1 Assembly lot	X	Pass	QBS	Pass
24	BOND SHEAR	AEC-Q101-003	Cpk>1.66	0/ min of 5	1 Assembly lot	X	Pass	QBS	Pass
25	Die Shear	MIL-STD-750 (2017)	Cpk>1.66	0/5	1 Assembly lot	X	Pass	QBS	Pass

Summary:
Submitted By: Yuan Dai, 02/02/2016
Approved By: Frank Chen, 4/21/2016