

PCN Number:	20170228002B	PCN Date:	March 28, 2017								
Title:	Qualification of a new Die Attach Material for Select Devices										
Customer Contact:	PCN Manager	Dept:	Quality Services								
Proposed 1st Ship Date:	June 1, 2017	Estimated Sample Availability:	Date provided at sample request								
Change Type:											
<input type="checkbox"/>	Assembly Site	<input type="checkbox"/>	Design								
<input type="checkbox"/>	Assembly Process	<input type="checkbox"/>	Data Sheet								
<input checked="" type="checkbox"/>	Assembly Materials	<input type="checkbox"/>	Part number change								
<input type="checkbox"/>	Mechanical Specification	<input type="checkbox"/>	Test Site								
<input type="checkbox"/>	Packing/Shipping/Labeling	<input type="checkbox"/>	Test Process								
		<input type="checkbox"/>	Wafer Bump Site								
		<input type="checkbox"/>	Wafer Bump Material								
		<input type="checkbox"/>	Wafer Bump Process								
		<input type="checkbox"/>	Wafer Fab Site								
		<input type="checkbox"/>	Wafer Fab Materials								
		<input type="checkbox"/>	Wafer Fab Process								
PCN Details											
Description of Change:											
<p>Revision B is to announce additional devices not included in the original publication. This additional devices included below are in bold highlight font. The expected first shipment date for these new devices will be 90 days from this notice for these newly added devices only.</p> <p>This notification is to announce the qualification of a new die attach material for the devices in the product affected section below as follows:</p> <p>Group 1 Devices:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Current</th> <th>Proposed</th> </tr> </thead> <tbody> <tr> <td>SID#142010015</td> <td>SID#14201002</td> </tr> </tbody> </table> <p>Group 2 Devices:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Current</th> <th>Proposed</th> </tr> </thead> <tbody> <tr> <td>8087417</td> <td>4222215</td> </tr> </tbody> </table>				Current	Proposed	SID#142010015	SID#14201002	Current	Proposed	8087417	4222215
Current	Proposed										
SID#142010015	SID#14201002										
Current	Proposed										
8087417	4222215										
Reason for Change:											
Die Attach Supplier change no longer producing current material. No current material available after PCN expiration.											
Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):											
None											
Anticipated impact on Material Declaration											
<input type="checkbox"/>	No Impact to the Material Declaration	<input checked="" type="checkbox"/>	Material Declarations or Product Content reports are driven from production data and will be available following the production release. Upon production release the revised reports can be obtained from the TI ECO website .								
Changes to product identification resulting from this PCN:											
None											
Product Affected:											
Group 1 Devices:											
OPA2541AM	OPA2541SM	OPA541AM	OPA541SM								
OPA2541BM	OPA2541SMQ	OPA541BM									

Group 2 Devices:

905X5433200	REG1117	TPS72516DCQRG4	TPS78633DCQ
HPA00295DDAR	REG1117/2K5	TPS72518DCQ	TPS78633DCQG4
LM22670QTJ-5.0/NOPB	REG1117/2K5G4	TPS72518DCQG4	TPS78633DCQR
LM22670QTJ-ADJ/NOPB	REG1117-2.85	TPS72518DCQR	TPS78633DCQRG4
LM22670QTJE-5.0/NOPB	REG1117-2.85/2K5	TPS72518DCQRG4	TPS79401DCQ
LM22670QTJE-ADJ/NOPB	REG1117-2.85G4	TPS72525DCQ	TPS79401DCQR
LM22673QTJ-5.0/NOPB	REG1117-3.3	TPS72525DCQG4	TPS79401DCQRG4
LM22673QTJ-ADJ/NOPB	REG1117-3.3/2K5	TPS72525DCQR	TPS79418DCQ
LM22673QTJE-5.0/NOPB	REG1117-3.3/2K5G4	TPS72525DCQRG4	TPS79418DCQR
LM22673QTJE-ADJ/NOPB	REG1117-3.3G4	TPS726126DCQ	TPS79425DCQ
LM22676QTJ-5.0/NOPB	REG1117-5	TPS726126DCQG4	TPS79425DCQG4
LM22676QTJ-ADJ/NOPB	REG1117-5/2K5	TPS726126DCQR	TPS79425DCQR
LM22676QTJE-5.0/NOPB	REG1117-5G4	TPS726126DCQRG4	TPS79428DCQ
LM22676QTJE-ADJ/NOPB	REG1117A	TPS72615DCQ	TPS79428DCQG4
LM22677QTJ-ADJ/NOPB	REG1117A/2K5	TPS72615DCQG4	TPS79428DCQR
LM22677QTJE-5.0/NOPB	REG1117A/2K5G4	TPS72615DCQR	TPS79430DCQ
LM22677QTJE-ADJ/NOPB	REG1117A-1.8	TPS72616DCQ	TPS79430DCQG4
LM22678QTJ-5.0/NOPB	REG1117A-1.8/2K5	TPS72616DCQR	TPS79430DCQR
LM22678QTJ-ADJ/NOPB	REG1117A-1.8G4	TPS72618DCQ	TPS79433DCQ
LM22678QTJE-5.0/NOPB	REG1117A-2.5	TPS72618DCQR	TPS79433DCQR
LM22678QTJE-ADJ/NOPB	REG1117A-2.5/2K5	TPS72618DCQRG4	TPS79501DCQG4
LM22679QTJ-5.0/NOPB	REG1117A-2.5G4	TPS72625DCQ	TPS79501DCQR
LM22679QTJ-ADJ/NOPB	REG1117AG4	TPS72625DCQG4	TPS79516DCQ
LM22679QTJE-5.0/NOPB	REG1117G4	TPS72625DCQR	TPS79516DCQG4
LM22679QTJE-ADJ/NOPB	REG1118-2.85	TPS73201DCQ	TPS79516DCQR
OPA2211AIDDA	REG1118-2.85/2K5	TPS73201DCQR	TPS79516DCQRG4
OPA2211AIDDAR	REG1118-2.85/2K5G4	TPS73215DCQ	TPS79518DCQ
OPA2677IDDA	SN0804036DCQR	TPS73215DCQR	TPS79518DCQG4
OPA2677IDDAG4	TL1963A-15DCQR	TPS73218DCQ	TPS79518DCQR
OPA2677IDDAR	TL1963A-15DCQT	TPS73218DCQR	TPS79518DCQRG4
OPA2677IDDARG4	TL1963A-18DCQR	TPS73225DCQ	TPS79525DCQ
OPA454AIDDA	TL1963A-18DCQT	TPS73225DCQG4	TPS79525DCQG4
OPA454AIDDAG4	TL1963A-25DCQR	TPS73225DCQR	TPS79525DCQR
OPA454AIDDAR	TL1963A-25DCQT	TPS73230DCQR	TPS79525DCQRG4
OPA454AIDDARG4	TL1963A-33DCQR	TPS73233DCQ	TPS79530DCQ
REG102GA-2.5	TL1963A-33DCQT	TPS73233DCQR	TPS79530DCQG4
REG102GA-2.5G4	TL1963ADCQR	TPS73250DCQ	TPS79530DCQR
REG102GA-2.85	TL1963ADCQT	TPS73250DCQG4	TPS79533DCQG4
REG102GA-2.85G4	TPS2376DDA-H	TPS73250DCQR	TPS79533DCQRG4
REG102GA-3	TPS2376DDA-HG4	TPS73601DCQG4	TPS79601DCQG4
REG102GA-3.3	TPS2376DDAR-H	TPS73601DCQR	TPS79601DCQR
REG102GA-3.3/2K5	TPS2376DDAR-HG4	TPS73601DCQRG4	TPS79601DCQRG4
REG102GA-3.3G4	TPS2421-1DDA	TPS73615DCQ	TPS79618DCQ

REG102GA-3G4	TPS2421-1DDAR	TPS73615DCQRG4	TPS79618DCQRG4
REG102GA-5	TPS2421-2DDA	TPS73618DCQ	TPS79625DCQ
REG102GA-5G4	TPS2421-2DDAR	TPS73618DCQRG4	TPS79625DCQRG4
REG102GA-A	TPS5430DDA	TPS73625DCQ	TPS79628DCQ
REG102GA-A/2K5	TPS5430DDAG4	TPS73625DCQR	TPS79628DCQR
REG102GA-A/2K5G4	TPS5430DDA-P	TPS73630DCQ	TPS79630DCQ
REG102GA-AG4	TPS5430DDAR	TPS73630DCQG4	TPS79630DCQG4
REG103GA-2.5	TPS5430DDARG4	TPS73630DCQR	TPS79630DCQR
REG103GA-2.5G4	TPS5430DDAR-P	TPS73633DCQ	TPS79633DCQG4
REG103GA-3	TPS5431DDA	TPS73633DCQR	TPS79633DCQRG4
REG103GA-3.3	TPS5431DDAG4	TPS73701DCQG4	TPS79650DCQ
REG103GA-3.3/2K5	TPS5431DDAR	TPS73701DCQRG4	TPS79650DCQG4
REG103GA-3.3/2K5G4	TPS5431DDARG4	TPS73718DCQG4	TPS79650DCQR
REG103GA-3.3G4	TPS54331DDA	TPS73718DCQRG4	TPS7A4501DCQR
REG103GA-5	TPS54331DDAR	TPS73725DCQ	TPS7A4501DCQT
REG103GA-5/2K5	TPS54332DDA	TPS73725DCQRG4	TPS7A4515DCQR
REG103GA-5/2K5G4	TPS54332DDAR	TPS73733DCQG4	TPS7A4515DCQT
REG103GA-5G4	TPS5450DDA	TPS73733DCQRG4	TPS7A4518DCQR
REG103GA-A	TPS5450DDAG4	TPS73734DCQ	TPS7A4518DCQT
REG103GA-A/2K5	TPS5450DDA-P	TPS73734DCQR	TPS7A4525DCQR
REG103GA-A/2K5G4	TPS5450DDAR	TPS73801DCQR	TPS7A4525DCQT
REG103GA-AG4	TPS5450DDARG4	TPS78601DCQ	TPS7A4533DCQR
REG104GA-2.5	TPS5450DDAR-P	TPS78601DCQRG4	TPS7A4533DCQT
REG104GA-2.5/2K5	TPS72501DCQ	TPS78618DCQ	UCC27200ADDA
REG104GA-2.5G4	TPS72501DCQG4	TPS78618DCQR	UCC27200ADDAR
REG104GA-3.3	TPS72501DCQR	TPS78618DCQRG4	UCC27200DDA
REG104GA-3.3/2K5	TPS72501DCQRG4	TPS78625DCQ	UCC27200DDAG4
REG104GA-3.3G4	TPS72515DCQ	TPS78625DCQG4	UCC27200DDAR
REG104GA-5/2K5G4	TPS72515DCQG4	TPS78625DCQR	UCC27201ADDA
REG104GA-5G4	TPS72515DCQR	TPS78625DCQRG4	UCC27201ADDAR
REG104GA-A/2K5	TPS72515DCQRG4	TPS78628DCQR	UCC27201DDA
REG104GA-A/2K5G4	TPS72516DCQ	TPS78630DCQ	UCC27201DDAG4
REG104GA-AG4	TPS72516DCQR	TPS78630DCQR	UCC27201DDAR

Group 1 Device Qual Results:

Qualification Report

MMT/ALP Qualification of New Die Attach Epoxy SID#142010022 as Replacement for SID#142010015

Product Attributes

Attributes	Qual Device: OPA2541SMQ
Assembly Site	ALP
Package Family	LMF
Wafer Fab Supplier	SFAB
Wafer Process	BIPOLAR

- Device OPA2541SMQ contains multiple dies.

Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed

Type	Test Name / Condition	Duration	Qual Device: OPA2541SMQ
-	D4 Constant Acceleration	Condition D, 20 kg, Y1 axis, 1 minute duration	3/32/0
-	D4 Electrical Test	Room temperature	3/32/0
-	D4 Fine and Gross Leak	-	3/32/0
-	D4 Mechanical Shock	Condition B, 1500 g, 0.5 ms Y1 6 pulses	3/32/0
-	D4 Vibration	Condition A, 20 g 20-2000 Hz, All 3 planes (x, y, z)	3/32/0
DS	Die Shear	MIL-STD-883, Method 2019	3/10/0
ED	Electrical Characterization	Per Datasheet Parameters	1/30/0
HTOL	High Temp Operating Life, 125C	1000 Hours	2/77/0
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	PASS
TC	Temperature Cycle, -65C/150C	500 Cycles	3/77/0
XRAY	X-ray	Inspect for attach voids, wire bonds	3/5/0
XRAY	X-ray	Post TC (500 Cycles). Inspect for attach voids	3/5/0
YLD	FTY and Bin Summary	-	PASS

- The following are equivalent HTOL options based on an activation energy of 0.7eV: 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours

- The following are equivalent Temp Cycle options per JE5D47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>

Green/Pb-free Status:

Qualified Pb-Free(SMT) and Green

Group 2 Device Qual Results:



TI Information
Selective Disclosure

Automotive New Die Attach Material Qualification Summary
(As per AEC-Q100 and JEDEC Guidelines)

8087417 Die Attach Epoxy (TJ263) Replacement BCP
Approved 14-Mar-2017

Product Attributes

Attributes	Qual Device: LM22678QJ5K1W
Operating Temp Range	-40 to +125 C
Automotive Grade Level	Grade 1
Product Function	Power Management
Wafer Fab Supplier	MAINEFAB
Die Revision	A
Assembly Site	TIEM-AT
Package Type	TO-263
Package Designator	NDR
Ball/Lead Count	7

- QBS: Qual By Similarity
- Qual Device LM22678QJ5K1W is qualified at LEVEL1-260CG

Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: LM22678QJ5K1W
Test Group A – Accelerated Environment Stress Tests							
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 1-260C	3/720/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	3/231/0
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0
TC-BF	A4	MIL-STD883 Method 2011	1	30	Post Temp Cycle Bond Pull	500 Cycles	3/15/0
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake, 150C	1000 Hours	3/231/0
Test Group B – Accelerated Lifetime Simulation Tests							
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 125C	1000 Hours	3/231/0
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	-	N/A
Test Group C – Package Assembly Integrity Tests							
WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	3/90/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hour Steam Age	N/A
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	N/A
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	Leads	N/A
Test Group D – Die Fabrication Reliability Tests							
EM	D1	JESD61	-	-	Electromigration	--	Completed Per Process Technology Requirements
TDDB	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	--	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier	--	Completed Per Process Technology Requirements
NBTI	D4	-	-	-	Negative Bias Temperature Instability	--	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	--	Completed Per Process Technology Requirements

A1 (PC): Preconditioning:

Performed for THB, Biased HAST, AC, uHAST & TC samples, as applicable.

Ambient Operating Temperature by Automotive Grade Level:

Grade 0 (or E): -40°C to +150°C

Grade 1 (or Q): -40°C to +125°C

Grade 2 (or T): -40°C to +105°C

Grade 3 (or I): -40°C to +85°C

E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):

Room/Hot/Cold: HTOL, ED

Room/Hot: THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU

Room: AC/uHAST

Green/Pb-free Status:

Qualified Pb-Free(SMT) and Green

Qualification Report

Qualification of 4222215 Die Attach Epoxy as Replacement of End of Life 8087417 Epoxy for Commercial Devices

Product Attributes

Attributes	Qual Device: OPA2211AIDDAR	Qual Device: OPA454AIDDAR	Qual Device: REG1117A/2K5	Qual Device: TPS72xxxQDCQR
Assembly Site	HNT	HNT	HNT	HNT
Package Family	SOIC (SO PowerPAD)	HSOIC (PowerPAD)	SOT223	SOT223
Flammability Rating	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V-0
Wafer Fab Supplier	FR-BIP-1	DL LIN	SH-BIP-1	TSMC-WF2
Wafer Process	BICOM3-HV	LBC-SOI	BIPOLAR	0.60UM-TSMC

- QBS: Qual By Similarity
- Qual Device REG1117A/2K5 is qualified at LEVEL1-260C
- Qual Device OPA2211AIDDAR is qualified at LEVEL1-260C
- Qual Device OPA454AIDDAR is qualified at LEVEL2-260C
- Qual Device TPS7xxxQDCQR is qualified at LEVEL2-260C

Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed



Type	Test Name / Condition	Duration	Qual Device: OPA2211AIDDAR	Qual Device: OPA454AIDDAR	Qual Device: REG1117A/2K5	Qual Device: TPS72xxxQDCQR
PC	Automotive Preconditioning	Level 2-260C	-	-	-	3/308/0
PC	Preconditioning	Level 1-260C	3/154/0	-	3/231/0	-
PC	Preconditioning	Level 2-260C	-	3/308/0	-	-
AC	Autoclave, 121C	96 Hours	3/77/0	3/77/0	3/77/0	3/77/0
DS	Die Shear	QSS 009-009	3/10/0	3/10/0	3/10/0	3/10/0
ED	Electrical Distributions	Cpk>1.67	-	-	-	3/30/0
ED	Electrical Characterization	-	3/15/0	3/15/0	-	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	-	3/77/0
HTOL	Life Test, 125C	1000 Hours	-	-	-	3/77/0
HTSL	High Temp. Storage Bake, 150C	1000 Hours	-	3/77/0	3/77/0	3/77/0
MQ	Manufacturability	(per mfg. Site specification)	3/0/0	3/0/0	3/0/0	-
MQ	Manufacturability (Auto Assembly)	(per automotive requirements)	-	-	-	3/0/0
MSL	Moisture Sensitivity	Level 1-260C	-	-	3/12/0	-
MSL	Thermal Integrity Sequence	Level 1-260C	3/12/0	-	-	-
MSL	Thermal Integrity Sequence	Level 2-260C	-	3/12/0	-	3/12/0
TC	Temperature Cycle, -65C/150C	500 Cycles	3/77/0	3/77/0	3/77/0	3/77/0
TC-WBP	Post Temp Cycle Bond Pull	30 ball bonds, min. 5 units	-	-	-	3/5/0
TS	Thermal Shock, -65C/+150C	500 Cycles	-	3/77/0	-	-
XRAY	X-ray	(top side only)	3/5/0	3/5/0	3/5/0	3/5/0
YLD	FTY and Bin Summary	-	3/0/0	3/0/0	3/0/0	3/0/0

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable.

- The following are equivalent HTSL options based on an activation energy of 0.7eV: 150C/1k Hours and 170C/420 Hours.

- The following are equivalent Temperature Cycle options per JESD47: -55C/125C/700 Cycles and -65C/150C/500 Cycles.

Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>

Green/Pb-free Status:

Qualified Pb-Free (SMT) and Green

For questions regarding this notice, e-mails can be sent to the regional contacts shown below or your local Field Sales Representative.

Location	E-Mail
USA	PCNAmericasContact@list.ti.com
Europe	PCNEuropeContact@list.ti.com
Asia Pacific	PCNAsiaContact@list.ti.com
Japan	PCNJapanContact@list.ti.com