

PCN Number:	20180412000.2A	PCN Date:	July 19, 2018
Title:	Qualification of a new Die Attach Film for selected Devices		
Customer Contact:	PCN Manager	Dept:	Quality Services
Proposed 1st Ship Date:	Jan 19, 2019	Estimated Sample Availability:	Provided upon Request
Change Type:			
<input type="checkbox"/>	Assembly Site	<input type="checkbox"/>	Assembly Process
<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	Assembly Materials
<input type="checkbox"/>	Design	<input type="checkbox"/>	Electrical Specification
<input type="checkbox"/>		<input type="checkbox"/>	Mechanical Specification
<input type="checkbox"/>	Test Site	<input type="checkbox"/>	Packing/Shipping/Labeling
<input type="checkbox"/>		<input type="checkbox"/>	Test Process
<input type="checkbox"/>	Wafer Bump Site	<input type="checkbox"/>	Wafer Bump Material
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Bump Process
<input type="checkbox"/>	Wafer Fab Site	<input type="checkbox"/>	Wafer Fab Materials
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Fab Process
	<input type="checkbox"/>		Part number change
PCN Details			
Description of Change:			
Revision A is to announce the <u>addition</u> of new devices that were not included on the original PCN notification. These new devices are under Group 2 in the product affected section below.			
Texas Instruments is pleased to announce the qualification of a new die attached film for the devices list below as follows:			
		Current	New
	Die Attach Film	8097221	4223179
Reason for Change:			
Current die attach film is being discontinued			
Anticipated impact on Fit, Form, 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:			
Not Applicable			
Group 1: Product Affected			
DS90UB304TRHSRQ1	DS90UB928QSQE/NOPB	DS90UH928QSQ/S4	LMR16006YQ3DDCTQ1
DS90UB304TRHSTQ1	DS90UB928QSQ/NOPB	DS90UH928QSQ/NOPB	LMR16006YQ5DDCRQ1
DS90UB924TRHSRQ1	DS90UH928QSQE/NOPB	LMP8640QMKE-T/NOPB	LMR16006YQ5DDCTQ1
DS90UB924TRHSTQ1	DS90UH928QSQX/NOPB	LMP8640QMKX-T/NOPB	LMR16006YQDDCRQ1
DS90UB928QSQX/E7002980	DS90UB928QSQX/NOPB	LMR16006YQ3DDCRQ1	LMR16006YQDDCTQ1
DS90UH928QSQ/E7002398			
Group 2: Product Affected			

LM20123QMH/NOPB	LM20133QMHE/NOPB	LM20143QMHX/NOPB	LM20154QMH/NOPB
LM20123QMHE/NOPB	LM20133QMHE/NOPB	LM20144QMH/NOPB	LM20154QMHE/NOPB
LM20123QMHX/NOPB	LM20134QMH/NOPB	LM20144QMHE/NOPB	LM20154QMHX/NOPB
LM20124QMH/NOPB	LM20134QMHE/NOPB	LM20144QMHX/NOPB	TPL5010QDDCRQ1
LM20124QMHE/NOPB	LM20134QMHE/NOPB	LM20145QMH/NOPB	TPL5010QDDCTQ1
LM20124QMHX/NOPB	LM20136QMH/NOPB	LM20145QMHE/NOPB	TPL5110QDDCRQ1
LM20125QMH/NOPB	LM20136QMHE/NOPB	LM20145QMHX/NOPB	TPL5110QDDCTQ1
LM20125QMHE/NOPB	LM20136QMHE/NOPB	LM20146QMH/NOPB	
LM20125QMHX/NOPB	LM20143QMH/NOPB	LM20146QMHE/NOPB	
LM20133QMH/NOPB	LM20143QMHE/NOPB	LM20146QMHX/NOPB	

Group 1 Qualification Report

Qualify 4223179 to replace 8097221DAF material

Date: 03/29/2018

Product Attributes

Attributes	Qual Device: <u>DS90UB928QC8YM</u>	Qual Device: <u>LMR16006YQ3DDR</u>	Qual Device: <u>LP3971SQ78GNMY</u>
Operating Temp Range	-40 to +105 C	-40 to +125 C	-40 to +125 C
Automotive Grade Level	Grade 2	Grade 1	-
Product Function	Signal Chain	Power Management	Power Management
Wafer Fab Supplier	MAINEFAB	DMO5S	MAINEFAB
Die Revision	B	B	-
Assembly Site	TIEM-MALACCA	TIEM-MALACCA	TIEM-MALACCA
Package Type	WQFN	SOT-23-THIN	WQFN
Package Designator	RHS	DDC	RSB
Ball/Lead Count	48	6	40

- Qual Device qualified at LEVEL1-260CG: LMR16006YQ3DDR, LP3971SQ78GNMY

- Qual Device DS90UB928QC8YM is qualified at LEVEL3-260CG.

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: <u>DS90UB928QC8YM</u>	Qual Device: <u>LMR16006YQ3DDR</u>
Test Group A – Accelerated Environment Stress Tests								
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 1-260C	-	3/480/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 3-260C	3/480/1 (1)	-
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST, 130C/85%RH	96 Hours	-	-
UHAST	A2	JEDEC JESD22- A110	3	77	Unbiased 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	3/231/0
TC-BP	A4	MIL-STD883 Method 2011	1	60	Bond Pull Post T/C 500 Cycles	Wires	3/90/84 (2)	3/90/0
PTC	A5	JEDEC JESD22- A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	N/A
Test Group B – Accelerated Lifetime Simulation Tests								
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	--	N/A	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	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	3/90/0	3/90/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hours Steam Age	-	-
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	-	-
SBS	C5	AEC Q100-010	3	50	Solder Ball Shear (Cpk>1.67)	Post HTSL/Bump	NA for this package	NA for this package
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	Leads	NA for this package	NA for this package
Test Group D – Die Fabrication Reliability Tests								
EM	D1	JESD61	-	-	Electromigration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
TDDDB	D2	JESD35	-	-	Time Dependant Dielectric Breakdown	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
NBTI	D4	-	-	-	Negative Bias Temperature Instability	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: <u>LP3971SQ78GNMY</u>
Test Group A – Accelerated Environment Stress Tests							
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 1-260C	3/231/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 3-260C	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	3/231/0
UHAST	A2	JEDEC JESD22-A110	3	77	Unbiased HAST 130C/85%RH	96 Hours	-
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	-
TC-BP	A4	MIL-STD883 Method 2011	1	60	Bond Pull Post T/C 500 Cycles	Wires	-
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A
Test Group B – Accelerated Lifetime Simulation Tests							
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	3/228/0
WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	3/228/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	8 Hours Steam Age	-
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	-
SBS	C5	AEC Q100-010	3	50	Solder Ball Shear (Cpk>1.67)	Post HTSL/Bump	NA for this package
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	Leads	NA for this package
Test Group D – Die Fabrication Reliability Tests							
EM	D1	JESD61	-	-	Electromigration	--	Completed Per Process

							Technology Requirements
TDDDB	D2	JESD35	-	-	Time Dependant 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 & PTC 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

Note (1): 1 Bin25 failure had same IJT functional tests which is related to the die level screening test per Test Engr. Discounted.

Note (2): Lifted ball fails were in qual and control lots resulted from using incorrect 4N wire first bond parameter setting instead of 2N wire first bond parameter setting. See 4 corner MRB lifted bond 2N wire issue attached to eQDB for corrective action.

THIS INFORMATION RELATING TO QUALITY AND RELIABILITY IS PROVIDED "AS IS." Product information detailed in this report may not accurately reflect TI's current product materials, processes and testing used in the construction of the TI products. Customers are solely responsible to conduct sufficient engineering and additional qualification testing to determine whether a device is suitable for use in their applications. Using TI products outside limits stated in TI's datasheet may void TI's warranty. See TI's Terms of Sale at "<http://www.ti.com/lscs/ti/legal/termsofsale.page>"

Group 2 Qualification Report

Qualify 4223179 to replace 8097221DAF material

Date: 03/29/2018

Product Attributes

Attributes	Qual Device: <u>ADC16V130CK830</u>	Qual Device: <u>DS90UB928QC8YM</u>	Qual Device: <u>LMP8646MKENOPB</u>	Qual Device: <u>LMR16006YQ3DDR</u>	Qual Device: <u>LP3971SQ78GNMY</u>
Assembly Site	TIEM-MALACCA	TIEM-MALACCA	TIEM-MALACCA	TIEM-MALACCA	TIEM-MALACCA
Package Family	WQFN	WQFN	SOT-23-THIN	SOT-23-THIN	WQFN
Flammability Rating	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V-0
Wafer Fab Supplier	MAINEFAB	MAINEFAB	GFAB	DMO5S	MAINEFAB
Wafer Process	CMOS9	BICMOS13	ABCD150XV1	LBC5M	CMOS 7

- Qual Devices qualified at LEVEL1-260CG: LMR16006YQ3DDR, LMP8646MKENOPB, LP3971SQ78GNMY

- Qual Devices qualified at LEVEL3-260CG: ADC16V130CK830, DS90UB928QC8YM

Qualification Results

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

Type	Test Name / Condition	Duration	Qual Device: <u>ADC16V130CK830</u>	Qual Device: <u>DS90UB928QC8YM</u>	Qual Device: <u>LMP8646MKENOPB</u>
TC-BP	Post Temp. Cycle, Bond Pull	500 Cycles	-	3/90/84	-

MSL	Moisture Sensitivity Level	Level 1-260C	-	-	3/66/0
AC	Autoclave 121C	96 Hours	-	-	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	-
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	Pass	-	Pass
MQ	Manufacturability (Auto Assembly)	(per automotive requirements)	-	Pass	-
PC	Preconditioning	Level 1-260C	-	-	-
PC	Preconditioning	Level 3-260C	3/480/0	3/480/1	-
TC	Temperature Cycle, -65/150C	500 Cycles	3/231/0	3/231/0	-
UHA	Unbiased HAST, 130C/85%RH	96 Hours	3/231/0	3/231/0	-
WBP	Bond Pull (Cpk>1.67)	Wires	3/228/0	3/90/0	3/228/0
WBS	Bond Shear (Cpk>1.67)	Wires	3/228/0	3/90/0	3/228/0

Type	Test Name / Condition	Duration	Qual Device: LMR16006YQ3DDR	Qual Device: LP3971SQ78GNMY
TC-BP	Post Temp. Cycle, Bond Pull	500 Cycles	3/90/0	-
MSL	Moisture Sensitivity Level	Level 1-260C	-	-
AC	Autoclave 121C	96 Hours	3/231/0	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	3/231/0
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	-	Pass
MQ	Manufacturability (Auto Assembly)	(per automotive requirements)	Pass	-
PC	Preconditioning	Level 1-260C	3/480/0	3/231/0
PC	Preconditioning	Level 3-260C	-	-
TC	Temperature Cycle, -65/150C	500 Cycles	3/231/0	-
UHA	Unbiased HAST, 130C/85%RH	96 Hours	-	-
WBP	Bond Pull (Cpk>1.67)	Wires	3/90/0	3/228/0
WBS	Bond Shear (Cpk>1.67)	Wires	3/90/0	3/228/0

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
 - 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 HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours
 - The following are equivalent Temp Cycle options per JEDEC47 : -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

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