

PCN Number:	20181217000.2	PCN Date:	March 15, 2019															
Title:	Qualify New Assembly Material set for Selected Devices																	
Customer Contact:	PCN Manager	Dept:	Quality Services															
Proposed 1st Ship Date:	August 6, 2019	Estimated Sample Availability:	Date provided at sample request															
Change Type:																		
<input type="checkbox"/> Assembly Site	<input type="checkbox"/> Design	<input type="checkbox"/> Wafer Bump Site																
<input type="checkbox"/> Assembly Process	<input type="checkbox"/> Data Sheet	<input type="checkbox"/> Wafer Bump Material																
<input checked="" type="checkbox"/> Assembly Materials	<input type="checkbox"/> Part number change	<input type="checkbox"/> Wafer Bump Process																
<input type="checkbox"/> Mechanical Specification	<input type="checkbox"/> Test Site	<input type="checkbox"/> Wafer Fab Site																
<input type="checkbox"/> Packing/Shipping/Labeling	<input type="checkbox"/> Test Process	<input type="checkbox"/> Wafer Fab Materials																
		<input type="checkbox"/> Wafer Fab Process																
PCN Details																		
Description of Change:																		
Texas Instruments is pleased to announce the qualification of new assembly material set for devices listed in "Product affected" section below. Devices will remain in current assembly facility and piece part changes as follows:																		
Group 1 Devices:																		
	<table border="1"> <thead> <tr> <th>Material</th> <th>Current</th> <th>New Material</th> </tr> </thead> <tbody> <tr> <td>Leadframe</td> <td>non-Roughened</td> <td>Roughened</td> </tr> <tr> <td>Wire</td> <td>Au</td> <td>No change</td> </tr> <tr> <td>Mount compound</td> <td>4147858</td> <td>No change</td> </tr> <tr> <td>Mold compound</td> <td>4205694</td> <td>4211880</td> </tr> </tbody> </table>			Material	Current	New Material	Leadframe	non-Roughened	Roughened	Wire	Au	No change	Mount compound	4147858	No change	Mold compound	4205694	4211880
Material	Current	New Material																
Leadframe	non-Roughened	Roughened																
Wire	Au	No change																
Mount compound	4147858	No change																
Mold compound	4205694	4211880																
Group 2 Devices:																		
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Leadframe	non-Roughened	Roughened																
Wire	Au	No change																
Mount compound	4042500	4147858																
Mold compound	4205694	4211880																
Reason for Change:																		
Better delamination performance and align with universal BOM (UBOM) material strategy.																		
Anticipated impact on Fit, Form, Function, Quality or Reliability (positive / negative):																		
None.																		
Changes to product identification resulting from this PCN:																		
None.																		
Product Affected:																		
Group 1 Devices (Qual data on page 12)	Group 2 Devices (Qual data on page 15)	Group 2 Devices (Qual data on page 18)																
AM26C31QDRG4	ADS7841EIDBQRQ1	AM26C31QD																
CD4010BQDRQ1	ADS7841ESQDBQRQ1	AM26C31QDG4																
CD4021BQDRQ1	ADS7843IDBQRQ1	AM26C31QDR																
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CD4053BQM96Q1	CAHCT244QDWRG4Q1	AM26C32QD																

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CD4093BQM96G4Q1	CD40109BQNSRQ1	AM26C32QDR
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CD74HC08QM96Q1	CDC2351QDBG4	CLV4051ATDWRG4Q1
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CD74HCT4066QM96Q1	CLVC573AQDWRG4Q1	LM139ADG4
D24051QM96G4Q1	CLVC574AQDWRG4Q1	LM139ADR
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SN65HVD230QDRG4Q1	LM139DR	LM2903QDRG4
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SN65HVD231QDG4	LM193DR	LM2904QDRG4
SN65HVD231QDR	LM193DRG4	LT1013DMD
SN65HVD231QDRG4	LM2903QD	LT1013DMDG4
SN65HVD231QDRG4Q1	LM2903QDG4	LT1014DMDW
SN65HVD231QDRQ1	LM2903QDRG4	LT1014DMDWG4
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SN74ACT00TDRQ1	SN74AHC244QDWRG4	SN65LBC176QD
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		TPIC2810DRG4	
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TI Confidential
NDA Restrictions

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Group 1 Devices

Product Attributes

Attributes	Qual Device: <u>CHC4851QDR</u> <u>Q1</u>	Qual Device: <u>LMV393QDR</u> <u>Q1</u>	Qual Device: <u>MC33063AOD</u> <u>RO1</u>	Qual Device: <u>SN65HVD232</u> <u>QDR</u>	Qual Device: <u>TLC5917QDR</u> <u>CT</u>	Qual Device: <u>TPS5410QDR</u> <u>Q1</u>	Qual Device: <u>TPS54331QDR</u> <u>Q1</u>	Qual Device: <u>UCC28220QD</u> <u>RO1</u>	QBS Product Reference: <u>ULO2003AOD</u> <u>RO1</u>
Operating Temp Range	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1
Product Function	Logic	Signal Chain	Power Management	Interface	Power Management	Signal Chain	Signal Chain	Power Management	Interface
Wafer Fab Supplier	SFAB	FFAB	SFAB	DFAB	MIHO8	DFAB	DMOS5	DFAB	SFAB
Die Revision	-	-	A	B	-	A	A	A	C
Assembly Site	FMX	FMX	FMX	FMX	FMX	FMX	FMX	FMX	FMX
Package Type	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC
Package Designator	D	D	D	D	D	D	D	D	D
Ball/Lead Count	16	8	8	8	16	8	8	16	16

- QBS: Qual By Similarity

- Qual Devices qualified at LEVEL1-260CG: CHC4851QDRQ1, SN65HVD232QDR, UCC28220QDRQ1, TPS5410QDRQ1, TPS54331QDRQ1, TLC5917QDRCT, LMV393QDRQ1, MC33063AQDRQ1

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>CHC4851QDR</u> <u>Q1</u>	Qual Device: <u>LMV393QDR</u> <u>Q1</u>	Qual Device: <u>MC33063AODR</u> <u>Q1</u>	Qual Device: <u>SN65HVD232QDR</u> <u>R</u>	Qual Device: <u>TLC5917QDRCT</u> <u>Q1</u>	Qual Device: <u>TPS5410QDR</u> <u>Q1</u>	Qual Device: <u>TPS54331QDR</u> <u>Q1</u>	Qual Device: <u>UCC28220QDR</u> <u>Q1</u>	QBS Product Reference: <u>ULO2003AQDR</u> <u>Q1</u>
Test Group A – Accelerated Environment Stress Tests															
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 1-260C	No Fails	No Fails	No Fails	No Fails	No Fails	No Fails	No Fails	No Fails	No Fails
HAS T	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	-	-	3/231/0	-	-	-	-	-	3/231/0
HAS T	A2	JEDEC JESD22-A110	3	12	Post Biased HAST, CSAM/TSAM	96 Hours	-	-	-	-	-	-	-	-	1/12/0
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	3/231/0	2/154/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0
AC	A3	JEDEC JESD22-A102	3	77	Post Autoclave 121C, CSAM/TSAM	96 Hours	-	-	-	-	-	-	-	-	3/36/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0	2/154/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	12	Post Temp. Cycle, CSAM/TSAM	500 Cycles	-	-	-	-	-	-	-	-	3/36/0
TC-BP	A4	MIL-STD883	1	30	Post Temp. Cycle, Bond	Wires	3/90/0	2/60/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	2/60/0

		Method 2011			Pull										
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours									1/45/0
HTSL	A6	JEDEC JESD22-A103	1	22	High Temp Storage Bake 150C	Post CSAM/TSAM									1/22/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 175C	500 Hours	3/135/0	2/90/0	3/135/0	3/135/0	3/135/0	3/135/0	3/135/0	3/135/0	-
Test Group B – Accelerated Lifetime Simulation Tests															
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 150C	408 Hours	-	-	-	-	-	-	-	-	3/231/0
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	--	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	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	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb Free	-	-	-	3/45/0	-	-	-	3/45/0	1/15/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb	-	-	-	3/45/0	-	-	-	3/45/0	1/15/0
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	-	1/30/0	1/30/0	-	-	-	-	-	-	3/30/0
SBS	C5	AEC Q100-010	3	50	Solder Ball Shear (Cpk>1.67)	Solder Balls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	Leads	-	-	-	-	-	-	-	-	-
Test Group D – Die Fabrication Reliability Tests															
EM	D1	JESD61	-	-	Electromigration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
TDD B	D2	JESD35	-	-	Time Dependant Dielectric Breakdown	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
NBT I	D4	-	-	-	Negative Bias Temperature Instability	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
SM	D5	-	-	-	Stress	--	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	-

					Migration		d Per Process Technology Requirements	d Per Process Technology Requirements	d Per Process Technology Requirements	d Per Process Technology Requirements	d Per Process Technology Requirements	d Per Process Technology Requirements	d Per Process Technology Requirements	d Per Process Technology Requirements	
Test Group E – Electrical Verification Tests															
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, Hot, & Cold	-	-	-	-	-	-	-	-	3/90/0

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



Automotive New Product Qualification Summary (As per AEC-Q100 and JEDEC Guidelines)

Group 2 Devices

Product Attributes

Attributes	Qual Device: <u>CAHCT244ODWRQ1</u>	Qual Device: <u>INA282AQDRQ1</u>	Qual Device: <u>K3A1040AQDRQ1</u>	Qual Device: <u>OPA2365AQDRQ1</u>	Qual Device: <u>P11804S1IDBRME</u>	Qual Device: <u>TLC6C598CODRQ1</u>	QBS Package Reference: <u>MC33063AQDRQ1</u>	QBS Package Reference: <u>ULQ2003AQDRQ1</u>
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 3	Grade 1	Grade 1	Grade 1
Operating Temp Range	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +125 C	-40 to +85 C	-40 to +125 C	-40 to +125 C	-40 to +125 C
Product Function	Logic	Signal Chain	Interface	Signal Chain	Signal Chain	Power Management	Power Management	-
Wafer Fab Supplier	SFAB	DFAB	DFAB	DMOS5	TSMC-FAB3	DMOS5	SFAB	SFAB
Die Revision	B	G	B	C	C	B	A	C
Assembly Site	MLA	MLA	MLA	MLA	MLA	MLA	FMX	FMX
Package Type	SOIC	SOIC	SOIC	SOIC	SSOP	SOIC	SOIC	SOIC
Package Designator	DW	D	D	D	DB	D	D	D
Ball/Lead Count	20	8	8	8	28	16	8	16

- QBS: Qual By Similarity
- Qual Devices qualified at LEVEL1-260CG: CAHCT244QDWRQ1, K3A1040AQDRQ1
- Qual Devices qualified at LEVEL2-260CG: INA282AQDRQ1
- Qual Devices qualified at LEVEL3-260CG: OPA2365AQDRQ1, P11804S1IDBRME, TLC6C598CQDRQ1

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>CAHCT244ODWRQ1</u>	Qual Device: <u>INA282AQDRQ1</u>	Qual Device: <u>K3A1040AQDRQ1</u>	Qual Device: <u>OPA2365AQDRQ1</u>	Qual Device: <u>P11804S1IDBRME</u>	Qual Device: <u>TLC6C598CODRQ1</u>	QBS Package Reference: <u>MC33063AQDRQ1</u>	QBS Package Reference: <u>ULQ2003AQDRQ1</u>
Test Group A – Accelerated Environment Stress Tests														
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 1-260C	No Fails	-	No Fails	-	-	-	No Fails	No Fails
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 2-260C	-	No Fails	-	-	-	-	-	-
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 3-260C	-	-	-	No Fails	No Fails	No Fails	-	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	-	-	-	-	-	-	3/231/0	3/231/0
HAST	A2	JEDEC JESD22-A110	3	12	Post Biased HAST, CSAM/TSAM	96 Hours	-	-	-	-	-	-	-	1/12/0
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0	3/231/0
AC	A	JEDEC	3	77	Autoclave	Post 96-	-	-	-	-	-	-	-	3/36/0

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: CAHCT24 4QDWRQ1	Qual Device: INA282AQ DRQ1	Qual Device: K3A1040A QDRQ1	Qual Device: OPA2365A QDRQ1	Qual Device: P11804S1I DBRME	Qual Device: TLC6C598 CODRQ1	QBS Package Reference: MC33063A QDRQ1	QBS Package Reference: ULQ2003A QDRQ1
	3	JESD22-A102			e 121C	hour CSAM/TSAM								
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0	-	3/231/0	3/231/0	3/231/0	-	3/231/0	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	10	Temperature Cycle, -65/150C	Post 500-cycle CSAM/TSAM	-	-	-	-	-	-	-	3/36/0
TC-BP	A4	MIL-STD883 Method 2011	1	30	Post TC Bond Pull	Wires	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	1/30/0
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle, -40/125C	1000 Cycles	N/A	N/A	N/A	N/A	N/A	3/231/0	N/A	N/A
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours	-	-	-	-	3/135/0	3/135/0	-	1/45/0
HTSL	A6	JEDEC JESD22-A103	1	22	High Temp Storage Bake 150C	Post CSAM/TSAM	-	-	-	-	-	-	-	1/22/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 175C	500 Hours	3/135/0	3/135/0	3/135/0	3/135/0	-	-	3/135/0	-
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	N/A	N/A	N/A	N/A	N/A	N/A
Test Group C – Package Assembly Integrity Tests														
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear (Cpk>1.67)	Wires	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull (Cpk>1.67)	Wires	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	Pb Free	3/45/0	3/45/0	3/45/0	3/45/0	3/45/0	3/45/0	-	1/15/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	Pb	2/30/0	3/45/0	-	-	3/45/0	3/45/0	-	1/15/0
PD	C4	JEDEC JESD22-B100 and	3	10	Physical Dimensions	-	3/30/0	3/30/0	3/30/0	3/30/0	3/30/0	3/30/0	-	3/30/0

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: CAHCT24 4QDWRQ1	Qual Device: INA282AQ DRQ1	Qual Device: K3A1040A QDRQ1	Qual Device: OPA2365A QDRQ1	Qual Device: P11804S1I DBRME	Qual Device: TLC6C598 CODRO1	QBS Package Reference: MC33063A QDRQ1	QBS Package Reference: ULQ2003A QDRQ1
		B108			(Cpk>1.67)									
SBS	C5	AEC Q100-010	3	50	Solder Ball Shear (Cpk>1.67)	Solder Balls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	-	-	-	-	-	-	-	-	-
Test Group D – Die Fabrication Reliability Tests														
EM	D1	JESD61	-	-	Electromigration	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
TDD B	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E – Electrical Verification Tests														
ED	E5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	-	-	-	-	-	-	-	3/90/0
Additional Tests														
FLAM			-	-	Flammability (UL 94V-0)	-	-	-	-	-	-	3/15/0	-	

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 Gre

Automotive New Product Qualification Summary (As per AEC-Q100 and JEDEC Guidelines)

Group 2 Devices

Product Attributes

Attributes	Qual Device: <u>LT1014DMDW</u>	Qual Device: <u>SN0302035DWRG4</u>	Qual Device: <u>TPIC6A595DWR</u>
Automotive Grade Level	-	Grade 1	Grade 1
Operating Temp Range	-55 to +125 C	-40 to +125 C	-40 to +125 C
Product Function	Signal Chain	Signal Chain	Power Management
Wafer Fab Supplier	SFAB	DFAB	DFAB
Die Revision	J	C	C
Assembly Site	TAI	TAI	TAI
Package Type	SOIC	SOIC	SOIC
Package Designator	DW	DW	DW
Ball/Lead Count	16	20	24

- QBS: Qual By Similarity
- Qual Devices qualified at LEVEL1-260CG: LT1014DMDW and TPIC6A595DWR
- Qual Device qualified at LEVEL3-260CG: SN0302035DWRG4
- Device LT1014DMDW contains multiple dies.

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>LT1014DMDW</u>	Qual Device: <u>SN0302035DWRG4</u>	Qual Device: <u>TPIC6A595DWR</u>
Test Group A – Accelerated Environment Stress Tests									
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 1-260C	No Fails	-	No Fails
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 3-260C	-	No Fails	-
AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	2/154/0	3/231/0	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -55/125C	1000 Cycles	2/153/0 (1)	-	-

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: <u>LT1014DMDW</u>	Qual Device: <u>SN0302035DWRG4</u>	Qual Device: <u>TPIC6A595DWR</u>
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -55/150C	1000 Cycles	-	3/228/0 (2)	3/231/0
TC-BP	A4	MIL-STD883 Method 2011	1	30	Post TC Bond Pull	Wires	2/60/0	3/90/0	3/90/0
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	N/A	N/A
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours	2/90/0	-	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 175C	500 Hours	-	3/135/0	3/135/0
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	N/A
Test Group C – Package Assembly Integrity Tests									
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear (Cpk>1.67)	Wires	2/60/0	3/90/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull (Cpk>1.67)	Wires	2/60/0	3/90/0	3/90/0
SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb Free	2/30/0	3/45/0	3/45/0
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	-	2/20/0	3/30/0	3/30/0

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: <u>LT1014DMDW</u>	Qual Device: <u>SN0302035DWRG4</u>	Qual Device: <u>TPIC6A595DWR</u>
SBS	C5	AEC Q100-010	3	50	Solder Ball Shear (Cpk>1.67)	Solder Balls	N/A	N/A	N/A
LI	C6	JEDEC JESD22-B105	1	50	Lead Integrity	-	-	-	-
Test Group D – Die Fabrication Reliability Tests									
EM	D1	JESD61	-	-	Electromigration	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Tddb	D2	JESD35	-	-	Time Dependant Dielectric Breakdown	-	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements
NBTI	D4	-	-	-	Negative Bias Temperature Instability	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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 unit was missing/lost before test.

Note (2): 3 units were missing/lost before test.

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