

<b>PCN Number:</b>	20181217000B.2		<b>PCN Date:</b>	March 15, 2019 Aug 9, 2019 Oct. 30, 2019	
<b>Title:</b>	Qualify New Assembly Material set for Selected Devices				
<b>Customer Contact:</b>	<a href="#">PCN Manager</a>		<b>Dept:</b>	Quality Services	
<b>Proposed 1<sup>st</sup> Ship Date:</b>	Sept. 6, 2019 Feb. 9, 2020	<b>Estimated Sample Availability:</b>	Date provided at sample request		
<b>Change Type:</b>					
<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
<b>PCN Details</b>					
<b>Description of Change:</b>					
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:					
<b>The purpose of Addendum B is to remove p/n's highlighted in light blue with strikethrough on page 5.</b>					
<b>P/N's added in Addendum A are highlighted in yellow and first proposed ship date remains Feb 9 2020.</b>					
<b>Group 1 Devices:</b>					
	<b>Material</b>	<b>Current</b>	<b>New Material</b>		
	Leadframe	non-Roughened	Roughened		
	Wire	Au	No change		
	Mount compound	4147858	No change		
	Mold compound	4205694	4211880		
<b>Group 2 Devices:</b>					
	<b>Material</b>	<b>Current</b>	<b>New Material</b>		
	Leadframe	non-Roughened	Roughened		
	Wire	Au	No change		
	Mount compound	4042500	4147858		
	Mold compound	4205694	4211880		
<b>Reason for Change:</b>					
Better delamination performance and align with universal BOM (UBOM) material strategy.					
<b>Anticipated impact on Fit, Form, Function, Quality or Reliability (positive / negative):</b>					
None.					
<b>Changes to product identification resulting from this PCN:</b>					
None.					
<b>Product Affected:</b>					

<b>Group 1 Devices (Qual data on page 12)</b>	<b>Group 2 Devices (Qual data on page 15)</b>	<b>Group 2 Devices (Qual data on page 18)</b>
AM26C31QDRG4	ADS7841EIDBQRQ1	AM26C31QD
CD4010BQDRQ1	ADS7841ESQDBQRQ1	AM26C31QDG4
CD4021BQDRQ1	ADS7843IDBQRHB	AM26C31QDR
CD4053BQM96G4Q1	ADS7843IDBQRQ1	AM26C31QDRG4
CD4053BQM96Q1	ADS931E/1KVS	AM26C32QD
CD4066BQDRQ1	AMC6821SQDBQRQ1	AM26C32QDG4
CD4093BQM96G4Q1	CAHCT244QDWRG4Q1	AM26C32QDR
CD4093BQM96Q1	CAHCT573QDWRG4Q1	CD74HCT4067QM96Q1
CD74ACT74QM96G4Q1	CD40109BQNSRQ1	CDCVF2505IDRQ1
CD74HC08QM96Q1	CD4093BQNSRG4HT	CLV4051ATDWRG4Q1
CD74HC125QM96G4Q1	CD74HCT574QM96G4Q1	D24067IM96G4Q1
CD74HC138QM96Q1	CDC2351QDB	INA270AQDRQ1
CD74HC366QDRQ1	CDC2351QDBG4	INA271AQDRQ1
CD74HC4051QM96G4Q1	CDC2351QDBR	LM124D
CD74HC4051QM96Q1	CDC2351QDBRG4	LM124DG4
CD74HC4538QM96G4Q1	CLVC244AQDWRG4Q1	LM124DR
CD74HCT4051QM96Q1	CLVC373AQDWRG4Q1	LM139AD
CD74HCT4066QM96Q1	CLVC374AQDWRG4Q1	LM139ADG4
D24051QM96G4Q1	CLVC540AQDWRG4Q1	LM139ADR
D24066QM96G4Q1	CLVC541AQDWRG4Q1	LM139ADRG4
LMV393QDRQ1	CLVC573AQDWRG4Q1	LM139D
LP2951-50QDRQ1	CLVC574AQDWRG4Q1	LM139DG4
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SN65HVD230QD	HVDA553QDRQ1	LM139DRG4
SN65HVD230QDG4	INA282AQDRDN	LM193DR
SN65HVD230QDG4Q1	INA282AQDRQ1	LM193DRG4
SN65HVD230QDR	INA283AQDRQ1	LM2903QD
SN65HVD230QDRG4	INA284AQDRQ1	LM2903QDG4
SN65HVD230QDRG4Q1	INA285AQDRQ1	LM2903QDRG4
SN65HVD231QD	INA286AQDRQ1	LM2904QDR
SN65HVD231QDG4	MAX3238IDBG4Q1	LM2904QDRG4
SN65HVD231QDR	MAX3238IDBRG4Q1	LT1013DMD
SN65HVD231QDRG4	MLA00348DRG4	LT1013DMDG4
SN65HVD231QDRG4Q1	OPA2333AQDRQ1	LT1014DMDW
SN65HVD231QDRQ1	OPA2348AQDRQ1	LT1014DMDWG4
SN65HVD232QD	OPA2364AQDRKN	SE555D
SN65HVD232QDG4	OPA2365AQDRQ1	SE555DG4
SN65HVD232QDR	OPA4364AQDRKN	SE555DR
SN65HVD232QDRG4	OPA4364AQDRQ1	SE555DRG4
SN65HVD232QDRG4Q1	PCM1753TDBQRME	SN65HVDA195QDRQ1
SN65HVD232QDRQ1	PCM1753TDBQRQ1	SN65HVDA540QDR
SN65HVD251QDRQ1	PCM1754TDBQRQ1	SN65LBC031D
SN65LBC176AQDR	PCM1794AQDBRQ1	SN65LBC031DG4

SN65LBC176QDRG4Q1	PCM1804S1IDBRME	SN65LBC031DR
SN65LBC179QD	PCM1804S1IDBRQ1	SN65LBC031DRG4
SN65LBC179QDG4	PLL1707IDBQRQ1	SN65LBC031QD
SN65LBC179QDR	SN104217NSR	SN65LBC031QDG4
SN65LBC179QDRG4	SN65HVD1040QDRQ1	SN65LBC031QDR
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SN74ABT125QDRG4Q1	SN65HVD1050QDRQ1	SN65LBC176AQD
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SN74AC08QDRG4Q1	SN65HVDA100QDRQ1	SN65LBC176AQDR
SN74AC11IDRG4Q1	SN65HVDA1040AQDRQ1	SN65LBC176AQDRG4
SN74ACT00TDRQ1	SN65HVDA1050AQDRQ1	SN65LBC176QD
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SN74AHC08QDRQ1	SN74AHCT244QDWRG4	SN65LBC180IDRQ1
SN74AHC125QDRG4Q1	SN74AHCT244QDWRQ1	SN65LVDM050QDG4Q1
SN74AHC14QDRQ1	SN74HC244QDWRG4Q1	SN65LVDM050QDQ1
SN74AHC32QDRG4Q1	SN74HC244QDWRQ1	SN65LVDM050QDRG4Q1
SN74AHC32QDRQ1	SN74HC273QDWRG4Q1	SN65LVDM050QDRQ1
SN74AHC74QDRG4Q1	SN74HC4060QDRQ1	SN65LVDM051QDQ1
SN74AHC74QDRQ1	SN74HC573AQDWRQ1	SN65LVDM051QDRG4Q1
SN74AHCT00QDRG4Q1	SN74LVC541AQDWRQ1	SN65LVDM051QDRQ1
SN74AHCT00QDRQ1	SN74LVC573AQDWRQ1	SN74LV4051ATDWRQ1
SN74AHCT08QDRG4Q1	SN74LVC574AQDWRQ1	SN75LBC031D
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SN74AHCT125QDRQ1	TLC1543QDBG4	THS4041IDRQ1
SN74AHCT126QDRG4Q1	TLC1543QDBR	TL084QD
SN74AHCT126QDRQ1	TLC1543QDBG4	TL084QDG4
SN74AHCT138QDRQ1	TLC2543IDBRG4Q1	TL084QDR
SN74AHCT14QDRG4Q1	TLC2543IDBRQ1	TL084QDRG4
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SN74AHCT32QDRQ1	TLV1548QDBRG4Q1	TL1431QDRG4
SN74AHCT74QDRG4Q1	TLV1548QDBRQ1	TL1451AQD
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SN74HC86IDRG4Q1	TPIC6C596DG4	TLC1543QDWRG4
SN74HC86QDRG4Q1	TPIC6C596DR	TLC2201AMD
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TLC2272AQDR	ULQ2003ATDG4Q1	TLC339MDG4
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TLC2274AQDRQ1		TLC372MDG4
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TLC2274QDRQ1		TLC372MDRG4
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TLC3702QDRQ1		TLC372QDG4
TLC3704QDRG4Q1		TLC372QDR
TLC3704QDRQ1		TLC372QDRG4
TLC372QDRG4		TLC374MD
TLC393QDRG4Q1		TLC374MDG4
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TLC4502QD		TLC393QDRG4
TLC4502QDG4		TLC4502AMD
TLC555QDRQ1		TLC4502MDG4
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TLC556MDRG4		TLC555QDRG4
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TLC5917QDRQ1		TLC556MDG4
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TLE2021AQDRQ1		TLC5618AQDG4

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TLE2021QDRQ1		TLE2021MD	
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TLE2022AQDRG4Q1		TLE2022AMD	
TLE2022QDRG4Q1		TLE2022AMDG4	
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TLV2422QDRG4Q1		TLE2062AMD	
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TLV2432AQDG4		TLE2062AMDR	
TLV2432AQDRG4		TLE2062MD	
TLV2432AQDRG4Q1		TLE2062MDG4	
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UCC27425QDRQ1		TPIC1021DRG4	
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UCC28600TDRQ1		TPIC2603DWRG4	
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		TPIC2810DG4	
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		TPIC2810DRG4	
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		TPIC6273DWR	
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TPS3306-20QDRG4Q1
TPS3306-25QDRG4Q1
TPS3306-33QDRG4Q1
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UC2856QDWR
UC2856QDWRQ1
UCC2305TDWRQ1
UCC2895QDWRQ1

## 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>MC33063AQD</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>ULO2003AQD</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>MC33063AQDR</u> <u>Q1</u>	Qual Device: <u>SN65HVD232QDR</u> <u>R</u>	Qual Device: <u>TLC5917QDRCT</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>
<b>Test Group A – Accelerated Environment Stress Tests</b>															
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 Method 2011	1	30	Post Temp. Cycle, Bond Pull	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
PTC	A5	JEDEC	1	45	Power	1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

		JESD22-A105			Temperature Cycle	Cycles									
HTS L	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours									1/45/0
HTS L	A6	JEDEC JESD22-A103	1	22	High Temp Storage Bake 150C	Post CSAM/TSAM									1/22/0
HTS L	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	-
<b>Test Group B – Accelerated Lifetime Simulation Tests</b>															
HTO L	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
<b>Test Group C – Package Assembly Integrity Tests</b>															
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	-	-	-	-	-	-	-	-	-
<b>Test Group D – Die Fabrication Reliability Tests</b>															
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 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	-

							y Requirem ents	y Requirem ents	y Requirem ents	y Requirem ents	y Requirem ents	y Requirem ents	y Requirem ents	
<b>Test Group E – Electrical Verification Tests</b>														
ED	E5	AEC Q100-009	3	30	Electrical Distribution s	Cpk>1.6 7 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>CAHCT244QDW</u> <u>RQ1</u>	Qual Device: <u>INA282AQDRQ1</u>	Qual Device: <u>K3A1040AQDRQ</u> <u>1</u>	Qual Device: <u>OPA2365AQDRQ</u> <u>1</u>	Qual Device: <u>P11804S1IDBRM</u> <u>E</u>	Qual Device: <u>TLC6C598CQDR</u> <u>Q1</u>	QBS Package Reference: <u>MC33063AQDRQ</u> <u>1</u>	QBS Package Reference: <u>ULQ2003AQDRQ</u> <u>1</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: CAHCT244QDW RQ1, 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>CAHCT244QDW</u> <u>RQ1</u>	Qual Device: <u>INA282AQDRQ1</u>	Qual Device: <u>K3A1040AQDRQ1</u>	Qual Device: <u>OPA2365AQDRQ1</u>	Qual Device: <u>P11804S1IDBRME</u>	Qual Device: <u>TLC6C598CQDRQ1</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	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	Post 96-hour CSAM/	-	-	-	-	-	-	-	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
						TSAM								
TC	A 4	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	A 4	JEDEC JESD22-A104 and Appendix 3	3	10	Temperature Cycle, -65/150C	Post 500-cycle CSAM/TSAM	-	-	-	-	-	-	-	3/36/0
TC-BP	A 4	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	A 5	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
HTS L	A 6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours	-	-	-	-	3/135/0	3/135/0	-	1/45/0
HTS L	A 6	JEDEC JESD22-A103	1	22	High Temp Storage Bake 150C	Post CSAM/TSAM	-	-	-	-	-	-	-	1/22/0
HTS L	A 6	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	-
<b>Test Group B – Accelerated Lifetime Simulation Tests</b>														
EDR	B 3	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
<b>Test Group C – Package Assembly Integrity Tests</b>														
WBS	C 1	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	C 2	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	C 3	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	C 3	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	C 4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	-	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: <u>CAHCT244QDWRQ1</u>	Qual Device: <u>INA282AQDRQ1</u>	Qual Device: <u>K3A1040AQDRQ1</u>	Qual Device: <u>OPA2365AQDRQ1</u>	Qual Device: <u>P11804S11DBRME</u>	Qual Device: <u>TLC6C598CODRQ1</u>	QBS Package Reference: <u>MC33063AQDRQ1</u>	QBS Package Reference: <u>ULQ2003AQDRQ1</u>
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	-	-	-	-	-	-	-	-	-
<b>Test Group D – Die Fabrication Reliability Tests</b>														
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
<b>Test Group E – Electrical Verification Tests</b>														
ED	E5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	-	-	-	-	-	-	-	3/90/0
<b>Additional Tests</b>														
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>
<b>Automotive Grade Level</b>	-	Grade 1	Grade 1
<b>Operating Temp Range</b>	-55 to +125 C	-40 to +125 C	-40 to +125 C
<b>Product Function</b>	Signal Chain	Signal Chain	Power Management
<b>Wafer Fab Supplier</b>	SFAB	DFAB	DFAB
<b>Die Revision</b>	J	C	C
<b>Assembly Site</b>	TAI	TAI	TAI
<b>Package Type</b>	SOIC	SOIC	SOIC
<b>Package Designator</b>	DW	DW	DW
<b>Ball/Lead Count</b>	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>
<b>Test Group A – Accelerated Environment Stress Tests</b>									
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
<b>Test Group B – Accelerated Lifetime Simulation Tests</b>									
EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	-	N/A	N/A	N/A
<b>Test Group C – Package Assembly Integrity Tests</b>									
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	-	-	-	-
<b>Test Group D – Die Fabrication Reliability Tests</b>									
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.

<b>Location</b>	<b>E-Mail</b>
USA	<a href="mailto:PCNAmericasContact@list.ti.com">PCNAmericasContact@list.ti.com</a>
Europe	<a href="mailto:PCNEuropeContact@list.ti.com">PCNEuropeContact@list.ti.com</a>
Asia Pacific	<a href="mailto:PCNAsiaContact@list.ti.com">PCNAsiaContact@list.ti.com</a>
Japan	<a href="mailto:PCNJapanContact@list.ti.com">PCNJapanContact@list.ti.com</a>