



12500 TI Boulevard, MS 8640, Dallas, Texas 75243

PCN# 20240202004.2

**Qualification of RFAB using qualified Process Technology, Die Revision, and additional Assembly Sites/Test site options
Change Notification / Sample Request**

Date: February 02, 2024

To: MOUSER PCN

Dear Customer:

This is an announcement of a change to a device that is currently offered by Texas Instruments (TI). The details of this change are on the following pages, and are in alignment with our standard product change notification (PCN) [process](#).

TI requires acknowledgement of receipt of this notification within 30 days of the date of this notice. Lack of acknowledgement of this notice within 30 days constitutes acceptance and approval of this change. If samples or additional data are required, requests must be received within 30 days of this notification, given that samples are not built ahead of the change.

The Proposed First Ship date in this PCN letter is the earliest possible date that customers could receive the changed material. It is our commitment that the changed device will not ship before that date. If samples are requested within the 30 day sample request window, customers will still have 30-days to complete their evaluation regardless of the proposed 1st ship date.

This particular PCN is related to TI's multiyear transition plan for our two remaining factories with 150-millimeter production (DFAB in Dallas, Texas, and SFAB in Sherman, Texas). DFAB will remain open, but will focus on 200-mm production, with a smaller set of technologies. SFAB will close no earlier than 2024 and no later than 2025. As referenced in the "reason for change" below, these changes are part of our multiyear plan to transition these products to newer, more efficient manufacturing processes and technologies, underscoring our commitment to product longevity and supply continuity.

For questions regarding this notice or to provide acknowledgement of this PCN, you may contact your local Field Sales Representative or the Change Management team. For sample requests or sample related questions, contact your local Field Sales Representative. As always, we thank you for your continued business.

Change Management Team
SC Business Services

20240202004.2
Attachment: 1

Products Affected:


The devices listed on this page are a subset of the complete list of affected devices. According to our records, you have recently purchased these devices. The corresponding customer part number is also listed, if available.

DEVICE	CUSTOMER PART NUMBER
LM4040QAIM3-2.5/NOPB	NULL
LM4040QBIM3X2.5/NOPB	NULL
LM4040QCEM3-2.5/NOPB	NULL
LM4040QCEM3-3.0/NOPB	NULL
LM4040QCIM3-2.5/NOPB	NULL
LM4040QCIM3X2.5/NOPB	NULL
LM4040QDEM3-2.5/NOPB	NULL
LM4040QDIM3-2.5/NOPB	NULL
LM4040QDIM3X2.5/NOPB	NULL
LM4040QEEM3-3.0/NOPB	NULL
LM4041QAIM3-1.2/NO	NULL
LM4041QCEM3-1.2NO	NULL
LM4041QCEM3X-1.2NO	NULL
LM4041QCIM3-1.2/NO	NULL
LM4041QDEM3-1.2/NO	NULL
LM4041QEEM3-1.2/NO	NULL
LM4041QEEM3X-1.2NO	NULL

Technical details of this Product Change follow on the next page(s).

PCN Number:	20240202004.2		PCN Date:	February 02, 2024	
Title:	Qualification of RFAB using qualified Process Technology, Die Revision, and additional Assembly Sites/Test site options				
Customer Contact:	Change Management team		Dept:	Quality Services	
Proposed 1st Ship Date:	Aug 2, 2024		Estimated Sample Availability:	Mar 2, 2024*	
*Sample requests received after March 2, 2024 will not be supported.					
Change Type:					
<input checked="" type="checkbox"/>	Assembly Site	<input checked="" type="checkbox"/>	Design	<input type="checkbox"/>	Wafer Bump Material
<input checked="" type="checkbox"/>	Assembly Process	<input type="checkbox"/>	Data Sheet	<input type="checkbox"/>	Wafer Bump Process
<input checked="" type="checkbox"/>	Assembly Materials	<input type="checkbox"/>	Part number change	<input checked="" type="checkbox"/>	Wafer Fab Site
<input type="checkbox"/>	Mechanical Specification	<input checked="" type="checkbox"/>	Test Site	<input checked="" type="checkbox"/>	Wafer Fab Materials
<input checked="" type="checkbox"/>	Packing/Shipping/Labeling	<input type="checkbox"/>	Test Process	<input checked="" type="checkbox"/>	Wafer Fab Process
PCN Details					
Description of Change:					
Texas Instruments is pleased to announce the addition of RFAB using the LBC9 qualified process technology and additional Assembly sites/Test site options for the device listed below.					
Current Fab Site			Additional Fab Site		
Current Fab Site	Process	Wafer Diameter	Additional Fab Site	Process	Wafer Diameter
SFAB	LFAST	150/200 mm	RFAB	LBC9	300 mm
GFAB6/8	LFAST	150/200 mm			
The die was also changed as a result of the process change.					
Additionally, there will be a BOM options introduced for these devices:					
What	TI Melaka	PHI	CDAT		
Bond Wire composition, diameter	Au 1.0 mil	Cu, 0.8 mil	Cu, 0.8 mil		
Mold Compound	8097131	4222198	4222198		
Mount Compound	4213245	4207123	4207123		
Lead Finish	Matte Sn	NiPdAu	Matte Sn		
ECAT	G3	G4	G3		
Pin one designator	notch	dot	dot		
Upon expiry of this PCN, there will be a transition period where TI will combine lead free solutions in a single <u>standard part number</u> . For example; <u>LM4040QAIM3X2.5/NOPB</u> – can ship with both Matte Sn and NiPdAu.					
Example:					
<ul style="list-style-type: none"> Customer order for 7500 units of LM4040QAIM3X2.5/NOPB with 2500 units SPQ (Standard Pack Quantity per Reel). TI can satisfy the above order in one of the following ways. <ul style="list-style-type: none"> I. 3 Reels of NiPdAu finish. II. 3 Reels of Matte Sn finish III. 2 Reels of Matte Sn and 1 reel of NiPdAu finish. IV. 2 Reels of NiPdAu and 1 reel of Matte Sn finish. 					
Test coverage, insertions, conditions will remain consistent with current testing.					

Qual details are provided in the Qual Data Section.

Reason for Change:			
These changes are part of our multiyear plan to transition products from our 150-millimeter factories to newer, more efficient manufacturing processes and technologies, underscoring our commitment to product longevity and supply continuity.			
Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):			
None			
Impact on Environmental Ratings:			
Checked boxes indicate the status of environmental ratings following implementation of this change. If below boxes are checked, there are no changes to the associated environmental ratings.			
RoHS	REACH	Green Status	IEC 62474
<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change
Changes to product identification resulting from this PCN:			
Fab Site Information:			
Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
GFAB6	GF6	GBR	Greenock
GFAB8	GF8	GBR	Greenock
SH-BIP-1	SHE	USA	Sherman
RFAB	RFB	USA	Richardson
Die Rev:			
Current	New		
Die Rev [2P]	Die Rev [2P]		
D	A		
Assembly/Test Site Information:			
Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
TIEM	CU6	MYS	Melaka
CDAT	CDA	CHN	Chengdu
TIPI	PHI	PHL	Baguio City
Sample product shipping label (not actual product label)			
			
Product Affected:			
LM4040QAIM3-2.5/NOPB	LM4040QDEM3-2.5/NOPB	LM4040QEIM3X2.5/NOPB	LM4041QDIM3-1.2/NO
LM4040QAIM3X2.5/NOPB	LM4040QDEM3-3.0/NOPB	LM4041QAIM3-1.2/NO	LM4041QEEM3-1.2/NO
LM4040QBIM3X2.5/NOPB	LM4040QDIM3-2.5/NOPB	LM4041QBIM3-1.2/NO	LM4041QEEM3X-1.2NO
LM4040QCEM3-2.5/NOPB	LM4040QDIM3X2.5/NOPB	LM4041QCEM3-1.2NO	LM4041QEIM3-1.2/NO
LM4040QCEM3-3.0/NOPB	LM4040QEEM3-2.5/NOPB	LM4041QCEM3X-1.2NO	
LM4040QCIM3-2.5/NOPB	LM4040QEEM3-3.0/NOPB	LM4041QCIM3-1.2/NO	
LM4040QCIM3X2.5/NOPB	LM4040QEIM3-2.5/NOPB	LM4041QDEM3-1.2/NO	

For alternate parts with similar or improved performance, please visit the product page on [TI.com](https://www.ti.com)

Automotive Qualification Summary
(As per AEC-Q100 Rev. J and JEDEC Guidelines)

Product Attributes

Attributes	Qual Device: PLM40XX25DBZRQ1	QBS Process Reference: BQ79616HPAPRQ1	QBS Package, Product Reference: TL431BQDBZRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125
Product Function	Power Management	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB	RFAB
Assembly Site	CDAT	PHI	CDAT
Package Group	SOT	QFP	SOT
Package Designator	DBZ	PAP	DBZ
Pin Count	3	64	3

- QBS: Qual By Similarity
- Qual Device PLM40XX25DBZRQ1 is qualified at MSL1 260C

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: PLM40XX25DBZRQ1	QBS Process Reference: BQ79616HPAPRQ1	QBS Package, Product Reference: TL431BQDBZRQ1
Test Group A - Accelerated Environment Stress Tests										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	1/All/0	-	3/All/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL3 260C	-	-	3/All/0	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	3/231/0	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	-	3/231/0	-
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	1/45/0	3/135/0	3/231/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	-	3/135/0	-
Test Group B - Accelerated Lifetime Simulation Tests										
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	125C	1000 Hours	1/77/0	3/231/0	-
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	-
Test Group C - Package Assembly Integrity Tests										

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>PLM40XX25DBZRQ1</u>	QBS Process Reference: <u>BQ79616HPAPRQ1</u>	QBS Package, Product Reference: <u>TL431BQDBZRQ1</u>
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	-	3/90/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	-	3/90/0	3/90/0
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	-	3/30/0	3/30/0
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 Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
BTI	D4	-	-	-	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
Test Group E - Electrical Verification Tests										
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>PLM40XX25DBZRQ1</u>	QBS Process Reference: <u>BQ79616HPAPRQ1</u>	QBS Package, Product Reference: <u>TL431BQDBZRQ1</u>
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	1/3/0	-
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	1/6/0	-
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	3/90/0	3/90/0	3/90/0
Additional Tests										

- 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 JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I) : -40C to +85C

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

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

TI Qualification ID: R-CHG-2205-041

Automotive New Product Qualification Summary (As per AEC-Q100, Q006 and JEDEC Guidelines)

Product Attributes

Attributes	Qual Device: PLM40XX25DBZRQ1	QBS Device: TL431BQDBZRQ1
Automotive Grade Level	Grade 1	Grade 1
Operating Temp Range	-40 to +125 C	-40 to +125 C
Product Function	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB
Assembly Site	CDAT	CDAT
Package Type	SOT-23	SOT-23
Package Designator	DBZ	DBZ
Ball/Lead Count	3	3

- QBS: Qual By Similarity

- Qual Device PLM40XX25DBZRQ1 is qualified at MSL1 260C

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: PLM40XX25DBZRQ1	QBS Device: TL431BQDBZRQ1
Test Group A – Accelerated Environment Stress Tests								
			3	12	SAM Analysis, T0	Completed	1/22/0	3/66/0
PC	A1	JEDEC J-STD-020; JESD22-A113	3	77	Preconditioning	Level 1-260C	1/All/0	3/All/0
			3	12	SAM Analysis, Post Preconditioning	Completed	1/22/0	3/66/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	1/77/0	3/231/0
			3	1	Cross Section, Post bHAST 96 Hours	Completed	1/1/0	3/3/0
			3	30	Wire Bond Shear, Post bHast, 96 Hours	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	1/30/0	3/90/0

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: PLM40XX25DBZRQ1	QBS Device: TL431BQDBZRQ1
			3	30	Bond Pull over Ball, Post bHAST, 96 Hours	Wires	1/30/0	3/90/0
HAST	A2	JEDEC JESD22-A110	3	70	Biased HAST, 130C/85%RH	192 Hours	1/77/0	3/231/0
			3	1	Cross Section, Post bHAST 192 Hours	Completed	1/1/0	3/3/0
			3	22	SAM Analysis, Post bHAST, 192 Hours	Completed	1/22/0	3/66/0
			3	30	Wire Bond Shear, Post bHast 192 Hours	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Stitch, post bHAST 192 Hours	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Ball, Post bHAST 192 Hours	Wires	1/30/0	3/90/0
TC	A4	JEDEC JESD22-A104	3	77	Temperature Cycle, -65/150C	500 Cycles	1/77/0	3/231/0
			3	1	Cross Section, Post T/C 500 Cycles	Completed	1/1/0	3/3/0
			3	22	SAM Analysis, Post T/C 500 Cycles	Completed	1/22/0	3/66/0
			3	30	Wire Bond Shear, Post T/C 500 Cycles	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Stitch, Post T/C 500 Cycles	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	1/30/0	3/90/0
TC	A4	JEDEC JESD22-A104	3	70	Temperature Cycle, -65/150C	1000 Cycles	1/77/0	3/231/0
			3	1	Cross Section, Post T/C 1000 Cycles	Completed	1/1/0	3/3/0
			3	22	SAM Analysis, Post T/C 1000 Cycles	Completed	1/22/0	3/66/0
			3	30	Wire Bond Shear, Post T/C 1000 Cycles	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Stitch, Post T/C 1000 Cycles	Wires	1/30/0	3/90/0
			3	30	Bond Pull over Ball,	Wires	1/30/0	3/90/0

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: PLM40XX25DBZRQ1	QBS Device: TL431BQDBZRQ1
					Post T/C 1000 Cycles			
HTSL	A6	JEDEC JESD22-A103	3	45	High Temp Storage Bake 175C	500 Hours	1/45/0	3/135/0
			3	1	Cross Section, Post HTSL 500 Hours	Completed	1/1/0	3/3/0
HTSL	A6	JEDEC JESD22-A103	3	44	High Temp Storage Bake 175C	1000 Hours	1/45/0	3/135/0
			3	1	Cross Section, Post HTSL 1000 Hours	Completed	1/1/0	3/3/0
Test Group C – Package Assembly Integrity Tests								
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear, Cpk>1.67	Wires	1/30/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull, Cpk>1.67	Wires	1/30/0	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

TI Qualification ID: R-CHG-2205-041

**Automotive Qualification Summary
(As per AEC-Q100 Rev. J and JEDEC Guidelines)**

Product Attributes

Attributes	Qual Device: <u>LM4040QAIM3-5.0/NO</u>	QBS Process Reference: <u>BQ79600PWRQ1</u>	QBS Package, Product Reference: <u>PTPS3840PHXXDBVR</u>
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125
Product Function	Power Management	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB	RFAB
Assembly Site	PHI	MLA	PHI
Package Group	SOT	TSSOP	SOT
Package Designator	DBZ	PW	DBV
Pin Count	3	16	5

- QBS: Qual By Similarity
- Qual Device LM4040QAIM3-5.0/NO is qualified at MSL1 260C

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: LM4040QAIM3-5.0NO	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR
Test Group A - Accelerated Environment Stress Tests										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	1/All/0	-	3/All/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	-	3/All/0	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	3/231/0	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	-	3/231/0	-
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	3/231/0	3/231/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	1/45/0	3/135/0	3/135/0
Test Group B - Accelerated Lifetime Simulation Tests										
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	125C	1000 Hours	3/231/0 ¹	3/231/0	3/231/0
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	-
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM4040QAIM3-5.0NO	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR
EDR	B3	AEC Q100-005	1	77	NVM Endurance, Data Retention, and Op Life	Per QSS-009-018	1 Step	-	3/231/0	-
Test Group C - Package Assembly Integrity Tests										
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/90/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/90/0	3/90/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	1/15/0	1/15/0	1/15/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	1/15/0	1/15/0	1/15/0
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	1/10/0	3/30/0	3/30/0
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 Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
BTI	D4	-	-	-	Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM4040QAIM3-5.0/NO	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR
SM	D5	-	-	-	Stress Migration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests										
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	-	1/3/0
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	-	1/3/0
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	-	1/6/0
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	3/90/0	2/60/0	3/90/0
Additional Tests										

- 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 JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I): -40C to +85C

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

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

TI Qualification ID: R-CHG-2205-010

[1]-Failures due to bent/broken leads



**TI Information
Selective Disclosure**

Automotive New Product Qualification Summary (As per AEC-Q006 and JEDEC Guidelines)

Product Attributes

Attributes	Qual Device: LM40XX50DBZRQ1	QBS Device: TPS3840DBVRQ1
Automotive Grade Level	Grade 1	Grade 1
Operating Temp Range	-40 to +125 C	-40 to +125 C
Product Function	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB
Assembly Site	TIPI	TIPI
Package Type	SOT23	SOT23
Package Designator	DBZ	DBV
Ball/Lead Count	3	5

- QBS: Qual By Similarity
- Qual Device LM40XX50DBZRQ1 is qualified at LEVEL1-260C

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: LM40XX50DBZRQ1	QBS Device: TPS3840DBVRQ1
Test Group A – Accelerated Environment Stress Tests								
PC	A1		3	22	SAM Analysis, Pre Stress	Completed	1/22/0	3/66/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level1-260C	1/All/0	3/All/0
PC	A1		3	22	SAM Analysis, Post Stress	Completed	1/22/0	3/66/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	1/77/0	3/231/0
HAST	A2		3	1	Cross Section, Post HAST 96 Hours	Completed	1/1/0	3/3/0
HAST	A2		3	22	SAM Analysis, Post HAST, 96 Hours	-	1/22/0	3/66/0
HAST	A2		3	3	Wire Bond Shear, Post HAST, 96 Hours	Wires	1/3/0	3/9/0
HAST	A2		3	3	Bond Pull over Stitch, post HAST, 96 Hours	Wires	1/3/0	3/9/0
HAST	A2		3	3	Bond Pull over Ball, Post HAST, 96 Hours	Wires	1/3/0	3/9/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	192 Hours	1/70/0	3/210/0
HAST	A2		3	1	Cross Section, Post HAST, 192 Hours	Completed	1/1/0	3/3/0
HAST	A2		3	22	SAM Analysis, Post HAST, 192 Hours	Completed	1/22/0	3/66/0
HAST	A2		3	3	Wire Bond Shear, Post HAST, 192 Hours	Wires	1/3/0	3/9/0
HAST	A2		3	3	Bond Pull over Stitch, Post HAST, 192 Hours	Wires	1/3/0	3/9/0
HAST	A2		3	3	Bond Pull over Ball, Post HAST, 192 Hours	Wires	1/3/0	3/9/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	1/77/0	3/231/0
TC	A4	-	3	1	Cross Section, Post T/C 500 Cycles	Completed	1/1/0	3/3/0
TC	A4	-	3	22	SAM Analysis, Post T/C, 500 Cycles	Completed	1/22/0	3/66/0
TC	A4	-	3	3	Wire Bond Shear, Post T/C 500 Cycles	Wires	1/3/0	3/9/0
TC	A4	-	3	3	Bond Pull over Stitch Post T/C 500 Cycles	Wires	1/3/0	3/9/0
TC	A4	-	3	3	Bond Pull over Ball Post T/C 500 Cycles	Wires	1/3/0	3/9/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	1000 Cycles	1/70/0	3/210/0
TC	A4	-	3	1	Cross Section, Post T/C 1000 Cycles	Completed	1/1/0	3/3/0
TC	A4	-	3	22	SAM Analysis, Post T/C, 1000 Cycles	Completed	1/22/0	3/66/0
TC	A4	-	3	3	Wire Bond Shear, Post T/C 1000 Cycles	Wires	1/3/0	3/9/0
TC	A4	-	3	3	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	1/3/0	3/9/0
TC	A4	-	3	3	Bond Pull over Ball, Post T/C, 1000 Cycles	Wires	1/3/0	3/9/0

HTSL	A6	JEDEC JESD22-A103	3	45	High Temp. Storage Bake, 150C	1000 Hours	1/45/0	3/135/0
HTSL	A6	-	3	1	Cross Section, Post HTSL 1000 Hours	Completed	1/1/0	3/3/0
HTSL	A6	JEDEC JESD22-A103	3	44	High Temp Storage Bake 150C	2000 Hours	1/44/0	3/132/0
HTSL	A6	-	3	1	Cross Section, Post HTSL 2000 Hours	Completed	1/1/0	3/3/0
Test Group C – Package Assembly Integrity Tests								
WBS	C1	AEC Q100-001	3	30	Bond Shear (Cpk>1.67)	Wires	1/30/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	3	30	Bond Pull (Cpk>1.67)	Wires	1/30/0	3/90/0

A1 (PC): Preconditioning:

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

Junction 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

TI Qualification ID: R-CHG-2205-010

ZVEI ID: SEM-PA-18, SEM-PA-05, SEM-PA-08, SEM-PA-07, SEM-PA-13, SEM-PA-11, SEM-BD-01, SEM-PA-19, SEM-TF-01, SEM-PW-13, SEM-PW-02, SEM-PW-03, SEM-PW-09, SEM-DE-03, SEM-DE-01, SEM-DE-02

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