

PCN Number:	20240202006.2		PCN Date:	February 02, 2024	
Title:	Qualification of RFAB using qualified Process Technology, Die Revision, and additional Assembly/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:					
☒	Assembly Site	☒	Design	☒	Wafer Bump Material
☒	Assembly Process	☐	Data Sheet	☒	Wafer Bump Process
☒	Assembly Materials	☐	Part number change	☒	Wafer Fab Site
☐	Mechanical Specification	☒	Test Site	☒	Wafer Fab Materials
☒	Packing/Shipping/Labeling	☐	Test Process	☒	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/Test site (CDAT, TIPI) 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/JI2	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:					
	UTL2	TIEM	CDAT	TIPI	
Bond wire diam/type	1.0mil Au	1.0mil Au	0.8mil Cu	0.8mil Cu	
Mount compound	PZ0001	4213245	4207123	4207123	
Mold compound	CZ0096	8097131	4222198	4222198	
Lead finish	NiPdAu	Matte Sn	Matte Sn	NiPdAu	
Pin 1 Marking	Notch	Stripe	Dot	Dot	
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		
☒ No Change	☒ No Change	☒ No Change	☒ 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]
C, -	A

Assembly/Test Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
TIEM	CU6	MYS	Melaka
UTL2	NS2	THA	Bangpakong, Chachoengsao
CDAT	CDA	CHN	Chengdu
TIPI	PHI	PHL	Baguio City

Sample product shipping label (not actual product label)


TEXAS INSTRUMENTS
 MADE IN: Malaysia
 2DC: 20:
 MSL '2 / 260C/1 YEAR SEAL DT
 MSL 1 / 235C/UNLIM 03/29/04
 OPT:
 ITEM:
 LBL: 5A (L)T0:1750



(1P) SN74LS07NSR
 (Q) 2000 (D) 0336
 (31T) LOT: 3959047MLA
 (4W) TKY (1T) 7523483SI2
 (P)
 (2P) REV: (V) 8833317
 (20L) CS0: SHE (21L) CC0:USA
 (22L) AS0: MLA (23L) AC0: MYS

Product Affected:

LM4050QAEM3-2.0/NOPB	LM4050QAIM3X4.1/NOPB	LM4050QBIM3-4.1/NOPB	LM4050QCIM3-4.1/NOPB
LM4050QAEM3-2.5/NOPB	LM4050QBEM3-2.0/NOPB	LM4050QBIM3-5.0/NOPB	LM4050QCIM3-5.0/NOPB
LM4050QAEM3-4.1/NOPB	LM4050QBEM3-2.5/NOPB	LM4050QCEM3-2.0/NOPB	TL4050A50QDBZRQ1
LM4050QAEM3-5.0/NOPB	LM4050QBEM3-4.1/NOPB	LM4050QCEM3-2.5/NOPB	TL4050B25QDBZRQ1
LM4050QAEM3X2.0/NOPB	LM4050QBEM3-5.0/NOPB	LM4050QCEM3-4.1/NOPB	TL4050B41QDBZRQ1
LM4050QAEM3X2.5/NOPB	LM4050QBEM3X2.0/NOPB	LM4050QCEM3-5.0/NOPB	TL4050B41SDBZRCT
LM4050QAEM3X4.1/NOPB	LM4050QBEM3X2.5/NOPB	LM4050QCEM3X2.0/NOPB	TL4050B50QDBZRQ1
LM4050QAEM3X5.0/NOPB	LM4050QBEM3X4.1/NOPB	LM4050QCEM3X2.5/NOPB	TL4050C20QDBZRQ1
LM4050QAIM3-2.0/NOPB	LM4050QBEM3X5.0/NOPB	LM4050QCEM3X4.1/NOPB	TL4050C50QDBZRQ1
LM4050QAIM3-2.5/NOPB	LM4050QBIM3-2.0/NOPB	LM4050QCEM3X5.0/NOPB	
LM4050QAIM3-4.1/NOPB	LM4050QBIM3-2.5/NOPB	LM4050QCIM3-2.0/NOPB	

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

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

Product Attributes

Attributes	Qual Device: <u>PLM405X25DBZRQ1</u>	QBS Process Reference: <u>BQ79616HPAPRQ1</u>	QBS Package Reference: <u>TL431BQDBZRQ1</u>	QBS Package, Product Reference: <u>PLM40XX25DBZRQ1</u>
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125
Product Function	Power Management	Power Management	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB	RFAB	RFAB
Assembly Site	CDAT	PHI	CDAT	CDAT
Package Group	SOT	QFP	SOT	SOT
Package Designator	DBZ	PAP	DBZ	DBZ
Pin Count	3	64	3	3

- QBS: Qual By Similarity
- Qual Device PLM405X25DBZRQ1 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: <u>PLM405X25DBZRQ1</u>	QBS Process Reference: <u>BQ79616HPAPRQ1</u>	QBS Package Reference: <u>TL431BQDBZRQ1</u>	QBS Package, Product Reference: <u>PLM40XX25DBZRQ1</u>
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	1/All/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL3 260C	-	-	3/All/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	-	-	3/231/0	1/77/0
TC	A4	JEDEC JESD22-A104/JEDEC JESD22-A118	3	77	Temperature Cycle	-65/150C	500 Cycles	1/77/0	3/231/0	3/231/0	1/77/0
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	-	3/231/0	-	1/77/0
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	-	-
Test Group C - Package Assembly Integrity Tests											
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30	3/90/0	3/90/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>PLM405X25DBZRQ1</u>	QBS Process Reference: <u>BQ79616HPAPRQ1</u>	QBS Package Reference: <u>TL431BQDBZRQ1</u>	QBS Package, Product Reference: <u>PLM40XX25DBZRQ1</u>
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30	3/90/0	3/90/0	-
PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	1/10	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	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	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	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	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
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
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>PLM405X25DBZRQ1</u>	QBS Process Reference: <u>BQ79616HPAPRQ1</u>	QBS Package Reference: <u>TL431BQDBZRQ1</u>	QBS Package, Product Reference: <u>PLM40XX25DBZRQ1</u>
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30	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/UnHAST

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

TI Qualification ID: R-CHG-2307-076

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

Product Attributes

Attributes	Qual Device: PLM405X25DBZRQ1	QBS Device: PLM40XX25DBZRQ1	QBS Device: TL431BQDBZRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range	-40 to +125 C	-40 to +125 C	-40 to +125 C
Product Function	Power Management	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB	RFAB
Assembly Site	CDAT	CDAT	CDAT
Package Type	SOT-23	SOT-23	SOT-23
Package Designator	DBZ	DBZ	DBZ
Ball/Lead Count	3	3	3

- QBS: Qual By Similarity

- Qual Device PLM405X25DBZRQ1 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: PLM405X25DBZRQ1	QBS Device: PLM40XX25DBZRQ1	QBS Device: TL431BQDBZRQ1
Test Group A – Accelerated Environment Stress Tests									
			3	12	SAM Analysis, T0	Completed	1/22/0	1/22/0	3/66/0
PC	A1	JEDEC J-STD-020; JESD22-A113	3	77	Preconditioning	Level 1-260C	1/All/0	1/All/0	3/All/0
			3	12	SAM Analysis, Post Preconditioning	Completed	1/22/0	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

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: PLM405X25DBZR Q1	QBS Device: PLM40XX25DBZR Q1	QBS Device: TL431BQDBZR Q1
			3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	—	1/30/0	3/90/0
			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	1/77/0	3/231/0
			3	1	Cross Section, Post T/C 500 Cycles	Completed	1/1/0	1/1/0	3/3/0
			3	22	SAM Analysis, Post T/C 500 Cycles	Completed	1/22/0	1/22/0	3/66/0
			3	30	Wire Bond Shear, Post T/C 500 Cycles	Wires	1/30/0	1/30/0	3/90/0
			3	30	Bond Pull over Stitch, Post T/C 500 Cycles	Wires	1/30/0	1/30/0	3/90/0
			3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	1/30/0	1/30/0	3/90/0
TC	A4	JEDEC JESD22-A104	3	70	Temperature Cycle, -65/150C	1000 Cycles	1/77/0	1/77/0	3/231/0
			3	1	Cross Section, Post T/C 1000 Cycles	Completed	1/1/0	1/1/0	3/3/0
			3	22	SAM Analysis, Post T/C 1000 Cycles	Completed	1/22/0	1/22/0	3/66/0
			3	30	Wire Bond Shear,	Wires	1/30/0	1/30/0	3/90/0

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: PLM405X25DBZR Q1	QBS Device: PLM40XX25DBZR Q1	QBS Device: TL431BQDBZR Q1
					Post T/C 1000 Cycles				
			3	30	Bond Pull over Stitch, Post T/C 1000 Cycles	Wires	1/30/0	1/30/0	3/90/0
			3	30	Bond Pull over Ball, Post T/C 1000 Cycles	Wires	1/30/0	1/30/0	3/90/0
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-2307-076

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

Product Attributes

Attributes	Qual Device: PLM405X25DBZRQ1	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR	QBS Package, Process, Product Reference: LM4040QAIM3-5.0/NO
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125
Product Function	Power Management	Power Management	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB	RFAB	RFAB
Assembly Site	PHI	MLA	PHI	PHI
Package Group	SOT	TSSOP	SOT	SOT
Package Designator	DBZ	PW	DBV	DBZ
Pin Count	3	16	5	3

- QBS: Qual By Similarity
- Qual Device PLM405X25DBZRQ1 is qualified at MSL1

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: PLM405X25DBZRQ1	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR	QBS Package, Process, Product Reference: LM4040QAIM3-5.0/NO
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	1/All/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	-	3/0/0	-	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	3/231/0	3/231/0	1/77/0
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	-	-	3/231/0	1/77/0
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	1/77/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	3/135/0	3/135/0	1/45/0
Test Group B - Accelerated Lifetime Simulation Tests											
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	125C	1000 Hours	-	3/231/0	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: PLM405X25DBZRQ1	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR	QBS Package, Process, Product Reference: LM4040QAIM3-5.0/NO
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	1/30/0
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	1/30/0
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	1/10/0
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	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	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	Completed Per Process Technology Requirements
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: PLM405X25DBZRQ1	QBS Process Reference: BQ79600PWRQ1	QBS Package, Product Reference: PTPS3840PHXXDBVR	QBS Package, Process, Product Reference: LM4040QAIM3-5.0/NO
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
SM	D5	-	-	-	Stress Migration	-	-	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											
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	-	1/30/0	2/60/0	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-2210-062

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

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: PLM405X25DBZRQ1	QBS Reference: PTPS3840PHXXDBVR	QBS Reference: LM4040QAIM3-5.0/NO
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	1/All/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	-	1/22/0	3/66/0	1/22/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	-	1/22/0	3/66/0	1/22/0
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	3/231/0	1/77/0
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	3/3/0	1/1/0
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	3/9/0	1/3/0
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	3/9/0	1/3/0
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	3/9/0	1/3/0
HAST	A2.2	JEDEC JESD22-A110	3	70	Biased HAST	130C/85%RH	192 Hours	-	3/210/0	1/70/0
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	-	3/66/0	1/22/0
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	-	3/3/0	1/1/0
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	3/9/0	1/3/0
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	-	3/9/0	1/3/0
HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	-	3/9/0	1/3/0
TC	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	3/231/0	1/77/0
TC	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	1/22/0	3/66/0	1/22/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	1/1/0	3/3/0	1/1/0
TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	1/3/0	3/9/0	1/3/0
TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	1/3/0	3/9/0	1/3/0

TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	1/3/0	3/9/0	1/3/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle	-65C/150C	1000 Cycles	1/70/0	3/210/0	1/70/0
TC	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	1/22/0	3/66/0	1/22/0
TC	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	1/1/0	3/3/0	1/1/0
TC	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	1/3/0	3/9/0	1/3/0
TC	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	1/3/0	3/9/0	1/3/0
TC	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	1/3/0	3/9/0	1/3/0
HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	1000 Hours	-	3/135/0	1/45/0
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	3/3/0	1/1/0
HTSL	A6.2	JEDEC JESD22-A103	3	44	High Temperature Storage Life	150C	2000 Hours	-	3/132/0	1/44/0
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	3/3/0	1/1/0
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	1/30/0
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	1/30/0

- QBS: Qual By Similarity
- Qual Device PLM405X25DBZRQ1 is qualified at MSL1
- 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-2210-062

ZVEI ID: SEM-PA-18, SEM-PA-05, SEM-PA-10, SEM-PA-07, SEM-PA-13, SEM-PA-08, SEM-PA-11, SEM-BD-01, SEM-PA-19, SEM-PW-13, SEM-PW-02, SEM-PW-09, SEM-DE-03, SEM-DE-01, SEM-DE-02, SEM-TF-01, SEM-PW-03

For questions regarding this notice, e-mails can be sent to the Change Management team or your local Field Sales Representative.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY

INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.