November 22, **PCN Number:** 20241121000.2 **PCN Date:** 2024 Title: Qualification of LFAB as an additional Wafer Fab site for select devices **Customer Contact:** Change Management team | **Dept: Quality Services Proposed 1st Ship** Sample requests December 22, May 21, 2025 Date: 2024* accepted until:

*Sample requests received after December 22, 2024 will not be supported.

C	hange Type:			
	Assembly Site	Design		Wafer Bump Material
	Assembly Process	Data Sheet		Wafer Bump Process
	Assembly Materials	Part number change	\boxtimes	Wafer Fab Site
	Mechanical Specification	Test Site		Wafer Fab Materials
\geq	Packing/Shipping/Labeling	Test Process		Wafer Fab Process

PCN Details

Description of Change:

Texas Instruments is pleased to announce the qualification of its LFAB fabrication facility as an additional Wafer Fab option for the devices listed below.

Cı	urrent Fab Sit	e	Additional Fab Site				
Current Fab Site	Process	Wafer Diameter	Additional Fab Site	Process	Wafer Diameter		
UMC12i	F65	300mm	LFAB	F65	300mm		

Qual details are provided in the Qual Data Section.

Reason for Change:

Continuity of Supply.

Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):

None

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
UMC12i	UMI	SGP	Singapore
LFAB	LHI	USA	Lehi

Sample product shipping label (not actual product label)



M0G3105QDGS20RQ1	M0G3107QDGS32RQ1	M0G3506QRHBRQ1	M0L1305QDYYRQ1
M0G3105QDGS28RQ1	M0G3107QPMRQ1	M0G3507QDGS28RQ1	M0L1305QRGERQ1
M0G3105QDGS32RQ1	M0G3107QPTRQ1	M0G3507QDGS32RQ1	M0L1305QRHBRQ1
M0G3105QPMRQ1	M0G3107QRGZRQ1	M0G3507QPMRQ1	M0L1306QDGS20RQ1
M0G3105QPTRQ1	M0G3107QRHBRQ1	M0G3507QPTRQ1	M0L1306QDGS28RQ1
M0G3105QRGZRQ1	M0G3505QDGS28RQ1	M0G3507QRGZRQ1	M0L1306QDGS32RQ1
M0G3105QRHBRQ1	M0G3505QDGS32RQ1	M0G3507QRHBRQ1	M0L1306QDYYRQ1
M0G3106QDGS20RQ1	M0G3505QPMRQ1	M0L1304QDGS20RQ1	M0L1306QRGERQ1
M0G3106QDGS28RQ1	M0G3505QPTRQ1	M0L1304QDGS28RQ1	M0L1306QRHBRQ1
M0G3106QDGS32RQ1	M0G3505QRGZRQ1	M0L1304QDGS32RQ1	XM0L1304QDGS20RQ1
M0G3106QPMRQ1	M0G3505QRHBRQ1	M0L1304QDYYRQ1	XM0L1305QRHBRQ1
M0G3106QPTRQ1	M0G3506QDGS28RQ1	M0L1304QRGERQ1	XM0L1306QDGS20RQ1
M0G3106QRGZRQ1	M0G3506QDGS32RQ1	M0L1304QRHBRQ1	XM0L1306QDGS28RQ1
M0G3106QRHBRQ1	M0G3506QPMRQ1	M0L1305QDGS20RQ1	XM0L1306QRGERQ1
M0G3107QDGS20RQ1	M0G3506QPTRQ1	M0L1305QDGS28RQ1	XM0L1306QRHBRQ1
M0G3107QDGS28RQ1	M0G3506QRGZRQ1	M0L1305QDGS32RQ1	

TI Information Selective Disclosure

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

MSP M0G* Qualification for addition of LFAB with QFP Packages Approve Date 23-SEPTEMBER-2024

Product Attributes

Attributes	Qual Device:	Qual Device:	QBS Reference:	QBS Reference:
Attributes	MSPM0G3507SPMR	MSPM0G3507SPTR	TMS320F28379SPTPQ	MSPM0G3507SPMR
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	Microcontroller	Microcontroller	Microcontroller	Microcontroller
Wafer Fab Supplier	LFAB	LFAB	LFAB, UMCI	UMCI
Assembly Site	PHI	PHI	PHI	PHI
Package Group	LQFP	LQFP	HLQFP	LQFP
Package Designator	РМ	PT	PTP	PM
Pin Count	64	48	176	64

- QBS: Qual By Similarity, also known as Generic Data
- Qualification Devices MSPM0G3507SPMR and MSPM0G3507SPTR are listed in the table above and are qualified at MSL2 260C.
- Reference Device TMS320F28379SPTPQ is listed in the table above and is qualified at MSL3 260C.
- QBS uses generic data as in the table below. The mold compound is the same material for all devices, except the EME-G700S-LB ULA (Ultra Low Alpha) includes an extra step to remove
 alpha emitter radioisotopes. Temperature cycling tests at MSL2 confirm capability for the M0G3507Q* QFP packages.

Qualification Results

Туре	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: MSPM0G3507SPMR	Qual Device: MSPM0G3507SPTR	QBS Reference: TMS320F28379SPTPQ	QBS Reference: MSPM0G3507SPMR
Test Gro	oup A - A	ccelerated Env	/ironme	nt Stress	s Tests						
PC	А	JEDED J- STD-020, JESD22- A113	3	77	Preconditioning	MSL2 260C	-	QBS MSPM0G3507SPRMR & TMS320F28379SPTPQ	QBS MSPM0G3507SPRMR & TMS320F28379SPTPQ	-	3/462/0
PC	A1	JEDED J- STD-020, JESD22- A113	3	77	Preconditioning	MSL3 260C	-	QBS TMS320F28379SPTPQ	QBS TMS320F28379SPTPQ	6/1125/0	-
HAST	A2	Biased HAST	3	77	Biased HAST	110C/85%RH	264 Hours	QBS TMS320F28379SPTPQ	QBS TMS320F28379SPTPQ	6/462/0	-
UHAST	А3	Unbiased HAST	3	77	Unbiased HAST	130C/85%RH	96 Hours	QBS TMS320F28379SPTPQ	QBS TMS320F28379SPTPQ	4/308/0	-
TC	A4	Temperature Cycle	3	77	Temperature Cycle	-65C/150C	500 Cycles	QBS Reference Devices	QBS Reference Devices	6/462/0	3/231/0
TC- BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle bond Pull	-	-	QBS Reference Devices	QBS Reference Devices	2/10/0	1/5/0
HTSL	A6	High Temperature Storage Life ¹	3	77	High Temperature Storage Life ¹	150C	1000 Hours	1/77/0 + QBS Reference Devices	QBS Reference Devices	6/270/0	-
Test Gro	oup B - A	ccelerated Life	etime Sir	nulation	Tests						
HTOL	B1	Life Test	3	77	Life Test	125C	1000 Hours	1/77/0 + QBS Reference Devices	QBS Reference Devices	6/462/0	3/231/0
ELFR	B2	Early Life Failure Rate	3	800	Early Life Failure Rate	125C	48 Hours	1/800/0 + QBS TMS320F28379SPTPQ	← QBS	6/4800/0	2/1600/0
EDR	В3	AEC-Q100- 105	3	77	Data Retention	150C	1000 Hours	1/77/0 + QBS Reference Devices	- QBS	6/462/0	3/231/0
EDR	B3	AEC-Q100- 105	3	77	Endurance Cycling	-40, 25C, 125C	≥ 10K cycles	3/231/0 (1/77/0 for each temperature)	- QBS	6/432/0 (2/154/0 for each temperature)	3/231/0 (1/77/0 for each temperature)
Test Gro	up C - P	ackage Assem	ibly Inte	grity Tes	ts						
WBS	C1	AEC Q100- 001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	3/90/0	2/60/0	3/90/0	3/90/0
Туре	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: MSPM0G3507SPMR	Qual Device: <u>MSPM0G3507SPTR</u>	QBS Reference: TMS320F28379SPTPQ	QBS Reference: MSPM0G3507SPMR
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	3/90/0	2/60/0	3/90/0	3/90/0
PD	C4	JEDEC JESD22- B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	3/30/0	2/20/0	3/30/0	3/30/0
Test Gro	up D - D	ie Fabrication f	Reliabilit	y 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 Gro	up E - El	ectrical Verific	ation Te	sts							
ESD	E2	AEC Q100- 002	1	3	ESD HBM	-	2000 Volts	1/3/0	← QBS	1/3/0	1/3/0
ESD	E3	AEC Q100- 011	1	3	ESD CDM	-	500 Volts (750 corner pins)	1/3/0	- QBS	1/3/0	1/3/0
LU	E4	AEC Q100- 004	1	6	Latch-Up	Per AEC Q100-004	-	1/3/0	← QBS	1/6/0	1/3/0
ED	E5	AEC Q100- 009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	- QBS	3/90/0	3/90/0

Qualification Devices MSPM0G3507SPMR and MSPM0G3507SPTR are listed in the table above and are qualified at MSL2 260C.

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- . Test B1, HTOL Life Test and test B3, the Data Retention Test, were preceded by endurance cycling
- 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

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

TI Qualification ID: R-CHG-2409-029, R-CHG-2408-080, R-NPD-2306-083

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

Lego A3 Automotive QFN LFAB Approve Date 23-SEPTEMBER-2024

Product Attributes

Attributes	Qual Device:	Qual Device:	QBS Reference: QBS Reference:		Qual Device: QBS Reference:		Qual Device:	QBS Reference:	QBS Reference:
Attributes	M0G3507QRGZRQ1	M01306QRHBRQ1	M0G3507QPMRQ1	M0G3507QPMRQ1	M01306QRHBRQ1	TMS320F2837X*PTPQ	M0G3507QRGZRQ1	F2800157QRHBRQ1	CC2642R1FTWRGZRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 2
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 105
Product Function	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller
Wafer Fab Supplier	LFAB	LFAB	LFAB	UMCI	LFAB	UMCI, LFAB	UMCI	UMCI	LFAB, UMCI
Assembly Site	CDAT	CDAT	PHI	PHI	CDAT	PHI	CDAT	CDAT	CDAT / CLARK-AT
Package Group	QFN	QFN	QFP	QFP	QFN	QFP	QFN	QFN	QFN
Package Designator	RGZ	RHB	PM	PM	RHB	PTP	RGZ	RHB	RGZ
Pin Count	48	32	64	64	32	176	48	32	48

- QBS: Qual By Similarity, also known as Generic Data
 Qual Devices MOG* and MOL* in RGZ and RHB packages are qualified at MSL2 260C

	_			_												
Туре		Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device:	Qual Device:	Qual Device	Qual Device	Qual Device:	QBS Reference:	Qual Device	QBS Reference:	QBS Reference:
'71~	"	l Karopio	Qty	Lot	I Car Hunc	Condition		M0G3507QRGZRQ1	M01306QRHBRQ1	MOG3507QPMRQ1	MOG3507QPMRQ1	M01306QRHBRQ1	IMS320F2837X*PTPQ	M0G3507QRGZRQ1	F2800157QRHBRQ1	CC2642R1TWRGZRQ1
Test Group	A - Acce	lerated Enviror	ment Si	ress Te	sts											
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL2 260C	-	1/77/0 + QBS F2800157QRHBRQ1	QBS M0G*RGZ + MOL*RHB F2800157QRHBRQ1	-		3/231/0	-	1/77/0 + QBS F2800157QRHBRQ1	3/900/0	
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL3 260C	-	-	-	-	-	-	6/1125/0	-	-	6/1656/0
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	110C/85%RH	264 Hours	QBS F2800157QRHBRQ1	QBS F2800157QRHBRQ1			QBS F2800157QRHBRQ1	6/462/0	QBS F2800157QRHBRQ1	3/231/0	6/462/0
AC/UHAST	А3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Autoclave	121C/15psig	96 Hours	QBS F2800157QRHBRQ1	QBS F2800157QRHBRQ1		-	QBS F2800157QRHBRQ1	-	QBS F2800157QRHBRQ1	2/154/0	-
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Temperature Humidity	85C/85%RH	1000 Hours	QBS F2800157QRHBRQ1	QBS F2800157QRHBRQ1	-	-	QBS F2800157QRHBRQ1	-	QBS F2800157QRHBRQ1	1/77/0	-
ACIUHAST	А3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	110C/85%RH	264 Hours	-	-	-	-	-	6/462/01	-	-	6/462/0

Туре		Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: M0G3S07QRGZRQ1	Qual Device: M01306QRHBRQ1	Qual Device MOG3S07QPMRQ1	Qual Device M0G3507QPMRQ1	Qual Device: M01306QRHBRQ1	QBS Reference: IMSS20F28S7X*PTPQ	Qual Device	QBS Reference: F2800157QRHBRQ1	QBS Reference: CC2642R1TWRGZRQ1
тс	Δ4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-55C/125C	1000 Cycles	-	-	-	-	-	-	-	-	6/462/0
тс	Δ4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0 + QBS F2800157QRHBRQ1	QBS M0G*RGZ + M0L*RHB F2800157QRHBRQ1	-	-	3/231/0	6/462/0	1/77/0 + QBS F2800157QRHBRQ1	3/231/0	-
TC-8P	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull		-	1/5/0	QBS M0G*RGZ + MOL*RHB F2800157QRHBRQ1	-		1/5/0	2/10/0	1/5/0	1/5/0	2/10/0
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours	QBS F2800157QRHBRQ1	QBS F2800157QRHBRQ1		-	QBS F2800157QRHBRQ1	6/270/0	QBS F2800157QRHBRQ1	3/135/0	6/270/0
Test Group I	5 - Acce		e Simula	tion lest	5											
HTOL	B1	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours	QBS M0G3507QPMRQ1 + Reference Devices	QBS M0G3507QPMRQ1 + Reference Devices	1/77/0 + QBS Reference Devices	3/231/0	3/231/0	6/462/0	QBS M0G3507QPMRQ1	-	6/462/02
ELFR	B2	AEC Q100- 008	3	800	Early Life Failure Rate	125C	48 Hours	QBS M0G3507QPMRQ1 + Reference Devices	QBS M0G3507QPMRQ1 + Reference Devices	1/800/0 + QBS TMS320F28379SPTPQ	2/1600/0	QBS TMS320F28379SPTPQ	6/4800/0	QBS M0G3507QPMRQ1	-	6/4800/0 ³
EDR	B3	AEC Q100- 105	3	77	Data Retention	150C	1000 Hours	QBS M0G3507QPMRQ1 + Reference Devices	QBS M0G3507QPMRQ1 + Reference Devices	1/77/0 + QBS Reference Devices	3/231/0	3/231/0	6/462/0	QBS M0G3507QPMRQ1	-	6/462/0
EDR	B3	AEC Q100- 105	3	77	Endurance Cycling	-40C, 25C, 125C	±10K cycles	QBS M0G3507QPMRQ1 + Reference Devices	QBS M0G3507QPMRQ1 + Reference Devices	3/231/0 (1/77/0 for each temperature)	3/231/0 (1/77/0 for each temperature)	3/231/0 (1/77/0 for each temperature)	6/462/0 (2/154/0 for each temperature)	QBS M0G3507QPMRQ1	-	6/462/04
Test Group (C - Pack	age Assembly	Integrity	Tests												
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	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	Minimum of 5 devices, 30 wires Cpl>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
PD	C4	JEDEC JESD22- B100 and B108	3	10	Physical Dimensions	Cpi<>1.67		3/30/0	3/30/0	3/30/0	3/30/0	3/30/0	3/30/0	3/30/0	3/30/0	3/30/0
Test Group I	D - Die E	abrication Relia	bility Te	ete												
ЕМ	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	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	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 Carrier Injection		-	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	Completed Per Process Technology Requirements
вті	D4				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	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	Completed Per Process Technology Requirements
Test Group I	E - Elect	rical Verificatio	n Tests													
ESD	E2	AEC Q100- 002	1	3	ESD HBM		2000 Volts	QBS M0G3507QPMRQ1	1/3/0	1/3/0	1/3/0	1/3/0	2/6/0	QBS M0G3507QPMRQ1	1/3/0	2/6/0
ESD	E3	AEC Q100- 011	1	3	ESD CDM		500 Volts	1/3/0	1/3/0	1/3/0	1/3/0	1/3/0	2/6/0	1/3/0	1/3/0	2/6/0
													QBS Reference:			
Туре	#	Test Spec	Min Lat Qty	SS/ Lot	Test Name	Condition	Duration	Qual Devise: M0G3507QRGZRQ1	Qual Devise: M01306QRHBRQ1	Qual Device MOG3507QPMRQ1	Qual Device M0G3507QPMRQ1	Qual Device: M01306QRHBRQ1	QBS Reference: IMSS20F28S7X*PTPQ	Qual Device ¹ M0G3507QRGZRQ1	QBS Reference: F2800157QRHBRQ1	QBS Reference: CC2642R1TWRGZRQ1
Type LU	# E4	Test Spec AEC Q100- 004	Min Lot Qty	SS/ Lot	Test Name	Condition Per AEC Q100-004 Colo 1.67	Duration	'	'			'			`	

- Qualification Devices MOO* and MOL* in (QRI) PIGZ and RHB packages are qualified at MSI.2 260C.
 Qualification devices listed below include (QRI) RIGE packages that are qualified to MSI.2 260C.
 Preconditioning was performed for Autoclane, Unbiased HAST, THOBisaed HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
 Fars B1, HTGL LIFE stand sites B3, De Bata Retention Fact were preceded by ondurance cycling
 The fallowing are equivalent HTGL options based on an activation energy of 0.719.1 125CUI: Notus, 140CH40 Hours, 150CH300 Hours, and 155C/240 Hours
 The fallowing are equivalent HTGL options based on an activation energy of 0.719.1 150CUI: Notus, 140CH40 Hours
 The fallowing are equivalent Time Cycle options based on an activation energy of 0.719.1 150CUI: Notus, 140CH40 Hours
 The following are equivalent Time Cycle options based on an activation energy of 0.719.1 150CUI: Notus, 140CH40 Hours
 The following are equivalent Time Cycle options based on an activation energy of 0.719.1 150CUI: Notus, 140CH40 Hours
 The following are equivalent Time Cycle options based on an activation energy of 0.719.1 150CUI: Notus, 140CH40 Hours, 140CH40 Hours
 The following are equivalent Time Cycle options based on an activation energy of 0.719.1 150CUI: Notus, 140CH40 Hours, 140CH40 H

- 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-2409-030, R-CHG-2409-029, R-CHG-2206-036, R-CHG-2403-093, R-CHG-2112-003, R-NPD-2306-083, R-NPD-2306-082, R-NPD-2304-106, R-BKF-2205-007, R-NPD-2205-009

^{1.} For this UHAST test, product MS32072837X°PTPQ was stessed at an equivalent condition, 130C, 85H RH for 96 hrs.
2. While CC2642R1TMCG2PQ1 was stressed in the HTOL test at 125 Ct to 1000 hrs in LF88, fix was ran at 105 Ct to 1000 hrs in UMCI.
3. Fur CC2642R1TMCG2PQ1, the LTM was nat 61Gade 5, conditions, including at 1950 Ct broad 2 Hrs and 45 Hrs; and 125 Ct br 24 hrs. These tests included here as a reference.
4. Fur CC2642R1TMCG2PQ1, the LTM test was conducted at only high temperature condition.
5. See Erram MSPMC1DQ, 15 MCDCC000FG1 (Itemature 2 SLAZF1), which outlines best practices to avoid excessive current injection.

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

Lego A3 Automotive VSSOP LFAB Approve Date 23-SEPTEMBER-2024

Product Attributes

Attributes	Qual Device:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:
Attributes	M0G3507QDGS32RQ1	M0G3507QPMRQ1	M0G3507QPMRQ1	M0L1306QRHBRQ1	TMS320F2837X*PTPQ	CC2642R1TWRGZRQ1	M0L1306QDGS28RQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 2	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 105	-40 to 125
Product Function	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller
Wafer Fab Supplier	LFAB	LFAB	UMCI	LFAB	UMCI, LFAB	LFAB	UMCI
Assembly Site	MLA	PHI	PHI	CDAT	PHI	CDAT / CLARK-AT	MLA
Package Group	VSSOP	QFP	QFP	QFN	QFP	QFN	VSSOP
Package Designator	DGS	PM	PM	RHB	PTP	RGZ	DGS
Pin Count	32	64	64	32	176	48	28

- QBS: Qual By Similarity, also known as Generic Data
 Qual Device M0G3507QDG532RQ1 is qualified at MSL2 260C
 Qual Device M0G3507QDGS28RQ1 is qualified at MSL2 260C
 Qual Device M0G3107QDG520RQ1 is qualified at MSL2 280C

Туре	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: M0G3507QDGS32RQ1	QBS Reference:	QBS Reference: M0G3507QPMRQ1	QBS Reference:	QBS Reference: IMS320F2837X*PTPQ	QBS Reference: CC2642R1TWRGZRQ1	QBS ⁶ Reference: M0L1306QDGS28RQ1
Test Group	A - Acce	elerated Enviro	nment S	tress Te	sts									
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL2 260C	-	1/77/0 + QBS MOL1306QDGS28RQ1 + Reference Devices	QBS M0G3507QPMRQ1+ TMS320F2837x4PTPQ	3/462/0 + QBS TMS320F2837x*PTPQ	-	6/1125/0 ¹	3/828/0	3/1710/0
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS MOL1306QDGS28RQ1 + Reference Devices	QBS TMS320F2837x*PTPQ	QBS TMS320F2837x*PTPQ	-	6/462/01	3/231/0	6/462/0
AC/UHAST	А3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	QBS MOL1306QDGS28RQ1 + Reference Devices	QBS TMS320F2837x*PTPQ	QBS TMS320F2837x*PTPQ	-	6/462/0	3/231/0	4/308/0
тс	A4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0 + QBS MOL1306QDGS28RQ1 + Reference Devices	QBS TMS320F2837x*PTPQ	3/231/0	-	6/462/0		6/462/0
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	1/5/0	QBS TMS320F2837x*PTPQ	1/5/0	-	2/10/0	1/5/0	2/10/0
			Min					Qual Device:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:	QBS ⁶ Reference:
Туре	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	M0G3507QDGS32RQ1	M0G3507QPMRQ1	M0G3507QPMRQ1	M0L1306QRHBRQ1	TMS320F2837X*PTPQ	CC2642R1TWRGZRQ1	M0L1306QDGS28RQ1
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours	QBS MOL1306QDGS28RQ1 + References Devices	QBS TMS320F2837x*PTPQ	QBS TMS320F2837x*PTPQ	-	6/270/0	3/135/0	4/180/0
Test Group I	B - Acce	lerated Lifetim	e Simula	tion Test	ts									
HTOL	B1	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours	QBS M0G3507QPMRQ1 + Reference Devices	1/77/0 + QBS Reference Devices	3/231/0	3/231/0	6/462/0	6/462/0²	QBS M0G3507QPMRQ1 + Reference Devices
ELFR	B2	AEC Q100- 008	3	800	Early Life Failure Rate	125C	48 Hours	QBS M0G3507QPMRQ1 + Reference Devices	1/800/0 + QBS TMS320F28379SPTPQ	2/1600/0	QBS TMS320F28379SPTPQ	6/4800/0	6/4800/03	QBS TMS320F28379SPTPQ
EDR	В3	AEC Q100- 105	3	77	Data Retention	150C	1000 Hours	QBS M0G3507QPMRQ1 + Reference Devices	1/77/0 + QBS Reference Devices	3/231/0	3/231/0	6/462/0	6/462/0	QBS M0G3507QPMRQ1 + Reference Devices
EDR	В3	AEC Q100- 105	3	77	Endurance Cycling	-40C, 25C, 125C	≥10K cycles	QBS M0G3507QPMRQ1 + Reference Devices	3/231/0 (1/77/0 for each temperature)	3/231/0 (1/77/0 for each temperature)	3/231/0 (1/77/0 for each temperature)	6/462/0 (2/154/0 for each temperature)	6/462/04	QBS M0G3507QPMRQ1 + Reference Devices
Test Group (C - Pack	age Assembly	integrity	Tests										
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	3/90/0	3/90/0	3/90/0	1/30/0	3/180/0
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	3/90/0	3/90/0	3/90/0	1/30/0	3/180/0
PD	C4	JEDEC JESD22- B100 and B108	3	10	Wire Bond Pull Physical Dimensions	devices 30	Wires	3/90/0	3/90/0	3/90/0	3/90/0	3/90/0	1/30/0	3/180/0
	C4	Method 2011 JEDEC JESD22- B100 and	3	10	Physical	devices, 30 wires Cpk>1.67								
Test Group I	C4	JEDEC JESD22- B100 and B108	3	10	Physical	devices, 30 wires Cpk>1.67								
	C4 D - Die F	Method 2011 JEDEC JESD22- B100 and B108 abrication Relia	3	10	Physical Dimensions	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology	3/30/0 Completed Per Process Technology	3/30/0 Completed Per Process Technology	3/30/0 Completed Per Process Technology	3/30/0 Completed Per Process Technology	1/10/0 Completed Per Process Technology	3/60/0 Completed Per Process Technology
Test Group I	C4 D - Die F	Method 2011 JEDEC JESD22- B100 and B108 abrication Relia JESD61	3	10	Physical Dimensions Electromigration Time Dependent Dielectric	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology	1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology	3/60/0 Completed Per Process Technology Requirements Completed Per Process Technology
Test Group I EM TDDB	C4 D - Die F D1 D2	Method 2011 JEDEC JESD22- B100 and B108 abrication Relia JESD61 JESD35	3	10	Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Technology Technology	3/60/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology
Test Group I EM TDDB HCI BTI	D - Die F D1 D2 D3	Method 2011 JEDEC JESD22- B100 and B108 abrication Relia JESD61 JESD35	3	10	Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Blas Temperature	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	1/10/10 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Technology Technology Technology Technology	3/60/0 Completed Per Process Technology Requirements
Test Group I EM TDDB HCI BTI SM	C4 D - Die F D1 D2 D3 D4	Method 2011 JEDEC JESD22- B100 and B108 abrication Relia JESD61 JESD35	3 sbility Te	10	Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Bias Temperature Instability	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Technology Technology Technology Technology Technology	3/60/0 Completed Per Process Technology Requirements
TEST Group I EM TDDB HCI BTI SM	C4 D - Die F D1 D2 D3 D4	Method 2011 JEDEC JESD22 B100 and B108 Striction RCE JESD61 JESD60 JESD60 & Z8	3 sbility Te	10	Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Bias Temperature Instability	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Technology Technology Technology Technology Technology	3/60/0 Completed Per Process Technology Requirements
Test Group I EM TDDB HCI BTI SM Test Group I	D1 D2 D3 D4 D5 E-Elect	Method 2011 JEDEC JESDEZ JESDEZ JESDEZ JESDEZ JESDES Abrication Relia JESDES JE	3 ability Te	10 10	Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Bilas Temperature Instability Stress Migration	devices, 30 wires Cpk>1.67		3/30/0 Completed Per Process Technology Requirements Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Echnology Requirements Completed Per Process Echnology Requirements Completed Per Process Technology Requirements	1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/60/0 Completed Per Process Technology Requirements Requirements
Test Group I EM TDDB HCI BTI SM Test Group I	D - Die F D1 D2 D3 D4 D5 E - Elect E2	Method 2011 JEDEC JESD22 B100 and B108 Abrication Relia JESD25 JESD61 JESD60 & JESD60 & AEC Q100-002	3 ability Te	10 10 3	Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Bias Temperature Instability Stress Migration	devices, 30 wires Cpi-1.67 Cpi-1.67		3/30/0 Completed Per Process Technology Requirements QBS M0G3507QPMRQ1	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/30/0 Completed Per Process Technology Requirements	1/10/0 Completed Per Process Technology Requirements 1/3/0	3/60/0 Completed Per Process Technology Requirements MOLISOF MARCHARD COMPLETED COMPLICATION COMPLETED COMPLICATION COMPLETED COMPLICATION COMPLETED

- 1. TMS320F2837X*PTPQ supports MSL3 and was preconditioned to this MSL level for the Group A tests in this column. Additionally, for the Group A uHAST test, product TMS320F2837X*PTPQ was stressed at an equivalent condition, 130C, 85% RH for 96 hrs.
 2. While CC2642R1TWRGZRQ1, was stressed in the HTOL test at 12SC for 1000 hrs in LFAB, this was ran at 10SC for 1000 hrs in UMCl.
 3. For CC2642R1TWRGZRQ1, his ELFR was ran at Grade 2 conditions, including at 105C for both 24 hrs and 48 hrs; and 125C for 24 hrs. These tests included here as a reference.
 4. For CC2642R1TWRGZRQ1, the EDR test was conducted at only the high temperature condition.
 5. See Errata MSPMDL110x, MSPMDL13xx Microcontrollers (literature # SLAZ741), which outlines best practices to avoid excessive current injection.
 6. Data in the Group A tests in this column includes data from both M0G3507QDGS28RQ1 and M0L1306QDGS28RQ1; these devices differ by die size and 2 die sizes were included in these Group A tests.

- Qualification Devices MOG* and MOL* in (VSSOP) DGS packages are qualified at MSL2 260C.
 Preconditioning was performed for Autoclave, Unbiased HAST, THB/Blased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
 Test B1, HTOL Life Test and test 83, the Data Retention Test, were preceded by endurance cycling
 The following are equivalent HTDL options based on an activation energy of 0.7 eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours
 The following are equivalent Temp Cycle options per JESD47: -55C/125C/700 Cycles and -65C/150C/500 Cycles

- 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-2409-031, R-CHG-2409-029, R-NPD-2306-083, R-NPD-2304-106, R-BKF-2205-007, R-CHG-2112-003, R-CHG-2206-036, R-NPD-2306-084, R-NPD-2304-108

TI Information Selective Disclosure

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

Qualification Report for MOL* Products in SOT Packages in LFAB Approve Date 23-SEPTEMBER-2024

Product Attributes

Attributes	Qual Device:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference:	QBS Reference::
Attributes	M0L1306QDYYRQ1	M0G3507QPMRQ1	M0G3507QPMRQ1	M01306QRHBRQ1	TMS320F2837X*PTPQ	CC2642R1TWRGZRQ1	M0L1306QDYYRQ1
Automotive Grade Level	Grade 1	Grade 2	Grade 1				
Operating Temp Range (C)	-40 to 125	-40 to 105	-40 to 125				
Product Function	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller	Microcontroller
Wafer Fab Supplier	LFAB	LFAB	UMCI	LFAB	UMCI, LFAB	LFAB	UMCI
Assembly Site	PHI	PHI	PHI	CDAT	PHI	CDAT/CLARK-AT	PHI
Package Group	SOT	QFP	QFP	QFN	QFP	QFN	SOT
Package Designator	DYY	PM	PM	RHB	PTP	RGZ	DYY
Pin Count	16	64	64	32	176	48	16

- QBS: Qual By Similarity, also known as Generic Data
 Qual Device XM0L1306QDYYRQ1 is qualified at MSL1 260C

Oualification Results

Туре	#	Test Spec	Min Lot	SS/ Lot	Test Name	Condition	Qual Device: QBS PRODUCT QBS PRODUCT QBS PRODUCT Reference: Reference: Reference:			QBS PRODUCT Reference:	QBS PRODUCT Reference:	QBS PRODUCT Reference:		
			Qty	1.00				M0L1306QDYYRQ1	M0G3507QPMRQ1	M0G3507QPMRQ1	M01306QRHBRQ1	TMS320F2837X*PTPQ	CC2642R1TWRGZRQ1	M0L1306QDYYRQ1
Test Group	Test Group A - Accelerated Environment Stress Tests													
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL2 260C	-	1/77/0 + QBS QBS MOL1306QDYYRQ1 + Reference Devices	QBS M0G3507QPMRQ1+ TMS320F2837x*PTPQ	3/462/0 + QBS TMS320F2837x*PTPQ	-	6/1125/0 ¹		3/692/0 ³
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL1 260C		QBS MOL1306QDYYRQ1 + Reference Devices	-	-	-	-	3/828/0²	3/231/0
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS MOL1306QDYYRQ1 + Reference Devices	QBS TMS320F2837x*PTPQ	QBS TMS320F2837x*PTPQ	-	6/462/0	3/231/0	3/231/0

Туре	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: MOL1306QDYYRQ1	QBS PRODUCT Reference: M0G3507QPMRQ1	QBS PRODUCT Reference: M0G3507QPMRQ1	QBS PRODUCT Reference: M01306QRHBRQ1	QBS PRODUCT Reference: TMS320F2837X*PTPQ	QBS PRODUCT Reference: CC2642R1TWRGZRQ1	QBS PRODUCT Reference: MOL1306QDYYRQ1
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0 + QBS MOL1306QDYYRQ1 + Reference Devices	QBS TMS320F2837x*PTPQ	QBS TMS320F2837x*PTPQ	-	6/462/0	3/231/0	3/231/0
тс	A4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/5/0	QBS TMS320F2837x*PTPQ	3/231/0	-	6/462/0	3/231/0²	3/231/04
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-		QBS QBS MOL1306QDYYRQ1 + References Devices	QBS TMS320F2837x*PTPQ	1/5/0	-	2/10/0	1/5/0	1/5/0
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours	1/77/0 + QBS QBS MOL1306QDYYRQ1 + Reference Devices	QBS TMS320F2837x*PTPQ	QBS TMS320F2837x*PTPQ	-	6/270/0	3/135/0	3/135/0
Test Group	B - Acc	elerated Lifetim	e Simula	ution Tes	its									
HTOL	B1	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours	QBS M0G3507QPMRQ1 + Reference Devices	1/77/0 + QBS Reference Devices	3/231/0	3/231/0	6/462/0	6/462/0 ⁵	QBS M0G3507QPMRQ1 + Reference Devices
ELFR	B2	AEC Q100- 008	3	800	Early Life Failure Rate	125C	48 Hours	QBS M0G3507QPMRQ1 + Reference Devices	1/800/0 + QBS TMS320F28379SPTPQ	2/1600/0	QBS TMS320F28379SPTPQ	6/4800/0	6/4800/0 ⁶	QBS TMS320F28379SPTPQ
EDR	B3	AEC Q100- 105	3	77	Data Retention	150C	1000 Hours	QBS M0G3507QPMRQ1 + Reference Devices	1/77/0 + QBS Reference Devices	3/231/0	3/231/0	6/462/0	6/462/0	QBS M0G3507QPMRQ1 + Reference Devices
EDR	B3	AEC Q100- 105	3	77	Endurance Cycling	-40C, 25C, 125C	≥10K cycles	QBS M0G3507QPMRQ1 + Reference Devices	3/231/0 (1/77/0 for each temperature)	3/231/0 (1/77/0 for each temperature)	3/231/0 (1/77/0 for each temperature)	6/462/0 (2/154/0 for each temperature)	6/462/07	QBS M0G3507QPMRQ1 + Reference Devices
Test Group	C - Paci	kage Assembly	Integrity	Tests										
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	3/90/0	3/90/0	3/90/0	1/30/0	6/180/0
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	3/90/0	3/90/0	3/90/0	1/30/0	6/180/0
PD	C4	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	1/10/0	6/60/0
Test Group	D - Die F	Fabrication Reli	ability Te	sts										
ЕМ	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
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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
нсі	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
вп	D4	-	-	-	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
									QBS PRODUCT	OBS PRODUCT				
Туре		Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: MOL1306QDYYRQ1	Reference: M0G3507QPMRQ1	Reference: M0G3507QPMRQ1	Reference: M01306QRHBRQ1	Reference: TMS320F2837X*PTPQ	Reference: CC2642R1TWRGZRQ1	Reference: MOL1306QDYYRQ1
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
Test Group	E - Elect	rical Verification	n Tests											
ESD	E2	AEC Q100- 002	1	3	ESD HBM	-	2000 Volts	QBS M0G3507QPMRQ1	1/3/0	1/3/0	1/3/0	2/6/0	1/3/0	QBS M0L1306QRHBRQ1
ESD	E3	AEC Q100- 011	1	3	ESD CDM	-	500 Volts	1/3/0	1/3/0	1/3/0	1/3/0	2/6/0	1/3/0	1/3/0
LU	E4	AEC Q100- 004	1	6	Latch-Up	Per AEC Q100-004		QBS M0G3507QPMRQ1	1/3/0	1/3/0	1/3/08	2/6/0	1/6/0	QBS M0L1306QRHBRQ18
ED	E5	AEC Q100- 009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold		3/90/0	1/30/0	3/90/0	3/90/0	6/180/0	3/90/0	3/90/0

- 1. TMS320F2837X/PTPQ supports MSL3 and was preconditioned to this MSL level for the Group A tests in this column. Additionally, for the Group A UHAST test, product TMS320F2837X/PTPQ was stressed at an equivalent condition, 130C, 85% RH for 96 hrs.
 2. CC2842R1TWRGZRQ1 supports MSL3 and was preconditioned to this MSL level for the Group A tests in this column. Additionally, for the Group A TC test, product CC2642R1TWRGZRQ1 was stressed at an equivalent condition, -55C/125C, for 1000 cycles.
 3. One unit also showed electrical overstress, which effects handling and lessing in a laboratory environment. This unit was discounted from the qualification population.
 but it reported, consistent with AEC-Q100.
 4. This test completed at both MSL1 and MSL2 conditions, including SAM review post 1000 cycles. All units passed, confirming support for MSL1, standard for SOT packages.
 5. While CC2642R1TWRGZRQ1 was stressed in the HT0L testat 125C for 1000 hrs in LFAB, this was ran at 105C for 1000 hrs in UMCl.
 6. For CC2642R1TWRGZRQ1, this ELFR was ran at Grade 2 conditions, including at 105C for both 24 hrs and 48 hrs; and 125C for 24 hrs. These tests included here as a reference.
 7. For CC2642R1TWRGZRQ1 the EDR testwas conducted at only the high temperature condition.
 8. See Errata MSPM0L110x, MSPM0L130x Microcontrollers (literature # SLAZ741), which outlines best practices to avoid excessive current injection.

- Qualification Devices MOL* in (SOT) DYY apackages are qualified at MSL1 260C.
 Preconditioning was performed for Autoclave, Unbiased HAST, THBBlased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
 Test BL, HTOL Life Test and test B3, the Data Retention Test, were preceded by endurance cycling
 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: 115C/1k Hours, and 170C/420 Hours
 The following are equivalent Temp Cycle options per JESD47: -55C/125C/700 Cycles and -65C/150C/500 Cycles

- Grade 0 (or E): -40C to +150C
- 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

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

TI Qualification ID: R-CHG-2403-094, R-CHG-2409-031, R-CHG-2409-029, R-NPD-2306-083, R-NPD-2304-106, R-BKF-2205-007, R-CHG-2112-003, R-CHG-2206-036, R-NPD-2304-107

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

Lego A2 Auto SOT Approve Date 18-Sept-2024

Product Attributes

Attributes	Qual Device:	QBS Reference:	QBS Reference:		
, italibatoo	M0L1306QDYYRQ1	TMS320F28377DPTPQ	M0L1306QRHBRQ1		
Automotive Grade Level	Grade 1	Grade 1	Grade 1		
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125		
Product Function	Microcontroller	Microcontroller	Microcontroller		
Wafer Fab Supplier	UMCI	UMCI	UMCI		
Assembly Site	PHI	PHI	CDAT		
Package Group	SOT	QFP	QFN		
Package Designator	DYY	PTP	RHB		
Pin Count	16	176	32		

- QBS: Qual By Similarity, based on generic data for the technology, product, and/or package. Additional supporting data are provided for as general reference data.
 Qual Device M0L1306QDYYRQ1 is qualified at MSL1 260C

Qualification Results

Туре	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: M0L1306QDYYRQ1	QBS Reference:	QBS Reference:	
Test Group A - Accelerated Environment Stress Tests											
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL2 260C	-	3/692/0 ¹	-	-	
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL1 260C	-	3/231/0			
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	3/231/0	-	-	
AC/UHAST	А3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	3/231/0	-	-	
тс	A4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	3/231/0 ²	-	-	
TC	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-65C/150C	500 Cycles	1/5/0	-	-	
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours	3/135/0	-	-	
Test Group	Test Group B - Accelerated Lifetime Simulation Tests										
HTOL	B1	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours	QBS M0L1306QRHBRQ1	6/462/0	3/231/0	
ELFR	B2	AEC Q100- 008	3	800	Early Life Failure Rate	125C	48 Hours	QBS TMS320F28377DPTPQ	3/2400/0	-	

Туре	#	Test Spec	Min Lot	SS/	Test Name	Condition	Duration	Qual Device:	QBS Reference:	QBS Reference:
1,400		Тозгорос	Qty	Lot				M0L1306QDYYRQ1	TMS320F28377DPTPQ	M0L1306QRHBRQ1
EDR	В3	AEC Q100- 008	3	77	Data Retention	150C	1000 Hours	QBS M0L1306QRHBRQ1	-	3/231/0
EDR	В3	AEC Q100- 005	3	77	Endurance Cycling	-40C, 25C, 125C	10K cycles, full bank; 100K cycles, single sector	QBS MOL1306QRHBRQ1	-	1/77/0 (at each temperature)
Test Group	C - Pack	age Assembly	Integrity	Tests						
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	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	3/90/0
SD	C3	JEDEC J- STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	1/15/0	-	1/15/0
PD	C4	JEDEC JESD22- B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	3/30/0	3/30/0	3/30/0
Test Group	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
Туре	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: <u>M0L1306QDYYRQ1</u>	QBS Reference:	QBS Reference: M0L1306QRHBRQ1
ВТІ	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 - Elect	rical Verificatio	n Tests							
ESD	E2	AEC Q100- 002	1	3	ESD HBM	-	2000 Volts	QBS M0L1306QRHBRQ1	-	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	-	QBS M0L1306QRHBRQ1	-	1/6/0 ³
ED	E5	AEC Q100- 009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	3/90/0	-	3/90/0
Additional T	ests									

- One unit also showed electrical overstress, which reflects handling and testing in a laboratory environment. This unit was discounted from the qualification population, but is reported, consistent with AEC-Q100.
- This test completed at both MSL1 and MSL2 conditions, including SAM review post 1000 cycles. All units passed, confirming support for MSL1, standard for SOT packages.
- 3. See Errata MSPM0L110x, MSPM0L13xx Microcontrollers (literature # SLAZ741), which outlines best practices to avoid excessive current injection.
- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- Test B1, HTOL Life Test, was preceded by endurance cycling
- Test B3, Data Retention Test, was preceded by endurance cycling
- 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

- 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

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TI Qualification ID: R-NPD-2304-107

ZVEI ID's: SEM-PW-13

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