PCN Number:	20210326002.2	PCN Date:	Mar 31, 2021
Title:	Qualification of MIHO8 as an additional Fab site option for select LBC8 devices		
Customer Contact:	PCN Manager	Dept:	Quality Services
Proposed 1st Ship Date:	Sep 30, 2021	Estimated Sample Availability:	Date provided at sample request.

Change Type:

☐	Assembly Site	☐	Assembly Process	☐	Assembly Materials
☐	Design	☐	Electrical Specification	☐	Mechanical Specification
☐	Test Site	☐	Packing/Shipping/Labeling	☐	Test Process
☐	Wafer Bump Site	☐	Wafer Bump Material	☐	Wafer Bump Process
☒	Wafer Fab Site	☐	Wafer Fab Materials	☐	Wafer Fab Process
		☐	Part number change		

Notification Details

Description of Change:

Texas Instruments is pleased to announce the qualification of its MIHO8 fabrication facility as an additional Wafer Fab source for the selected devices listed in the "Product Affected" section.

Current Fab Site			Additional Fab Site		
Current Fab Site	Process	Wafer Diameter	New Fab Site	Process	Wafer Diameter
DP1DM5	LBC8	200mm	MIHO8	LBC8	200mm

Qual details are provided in the Qual Data Section.

Reason for Change:

Continuity of supply.

Anticipated impact on Fit, Form, 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
DP1DM5	DM5	USA	Dallas
MIHO8	**MH8**	**JPN**	**Ibaraki**

Sample product shipping label (not actual product label)

Product Affected:

LMR23610AQDDAQ1	LMR23625CFPQDRRRQ1	LMR23630AFQDDAQ1	LMR23630FQDRRRQ1
LMR23610AQDDARQ1	LMR23625CFPQDRRTQ1	LMR23630AFQDDARQ1	LMR23630FQDRRTQ1
LMR23612QDRRRQ1	LMR23625CFQDDAQ1	LMR23630APQDRRRQ1	LMR23630QDRRRQ1
LMR23612QDRRTQ1	LMR23625CFQDDARQ1	LMR23630APQDRRTQ1	LMR23630QDRRTQ1
LMR23615QDRRRQ1	LMR23625CQDDAQ1	LMR23630AQDDAQ1	

LMR23615QDRRTQ1	LMR23625CQDDARQ1	LMR23630AQDDARQ1

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

Approved 11-20-2019

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 LMR23630xQDRRQ1	QBS Process Reference: LM46002AQPWPRQ1
Test Group A – Accelerated Environment Stress Tests									
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	All units for A2 to A5	MSL2/260C	-	3/693/0 for A2 to A4 1/45/0 for A5	-
	HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 hours	3/231/0	-
	AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 hours	3/231/0	-
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 cycles	3/231/0	-
	TC	A4	JEDEC JESD22-A104 and Appendix 3	1	5 units	Temperature Cycle, -65/150C	Post 500 cycles	5 units/ 30 wires pass.	-
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle, -40/125C	1000 cycles	1/45/0	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 hours	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	-
	ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 150C	24 hours	QBS	3/2400/0
	EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, 150C	1000 hours	QBS	3/231/0
Test Group C – Package Assembly Integrity Tests									
	WBS	C1	AEC Q100-001	1	30	Wire Bond Shear (Cpk>1.67)	-	1/30/0	-
	WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull (Cpk>1.67)	-	1/30/0	-
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	-	1/15/0	-
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	-	3/30/0	-
Test Group D – Die Fabrication Reliability Tests									
EM	D1	JESD61	-	-	Electro migration			Completed Per Process Technology Requirements	
TDDB	D2	JESD35	-	-	Time Dependent Dielectric Breakdown			Completed Per Process Technology Requirements	
HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier			Completed Per Process Technology Requirements	
NBTI	D4	-	-	-	Negative Bias Temperature Instability			Completed Per Process Technology Requirements	
SM	D5	-	-	-	Stress Migration			Completed Per Process Technology Requirements	

Test Group E – Electrical Verification Tests									
	HBM	E2	AEC Q100-002	1	3	ESD - HBM - Q100	2000 Volts	1/3/0	-
	CDM	E3	AEC Q100-011	1	3	ESD - CDM - Q100	750 volts	1/3/0	-
	LU	E4	AEC Q100-004	1	6	Latch-up	125C	1/3/0	-
	ED	E5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	3/90/0	-

- QBS: Qual By Similarity

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

AEC-Q006 Table 3a: Integrated Circuit Qualification Test Requirements: Qualification Results

Data Displayed as: Number of lots / Total sample size / Total failed

Qualification Device **LMR236xxQDRRQ1 family of devices**

Technology attributes covered by this Q006 qualification

- **Silicon attributes** : NDA required
- **Package family** : Small VSON (3x3 mm) from UTAC Thailand
- **Wire type** : NDA required to read wire type and thickness
- **Critical Package materials**: NDA required to read Mold compound and die attach

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: LMR23630xQDDAQ1
Test Group A - Accelerated Environment Stress Test							
					SAM Analysis, Pre Stress	-	Passed
PC	A1	JESD22-113	-	-	**Preconditioning**	**Level 3-260C**	**Passed**
			-	-	SAM Analysis, Post-Precon on 11 marked units per lot before THB, TC, PTC and HTSL		Passed : No delamination
HAST	A2	JESD22-A101	3	77	**BHAST, Vmax/130C/85% RH**	**96 Hours**	**3/231/0**
			3	1	Cross Section, Post bHAST 96 Hours	-	3/3/0
			3	11	SAM Analysis, Post bHAST, 96 Hours	-	3/33/0
			3	30	Wire Bond Shear, Post bHAST, 96 Hours	Wires	3/90/0
			3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	3/90/0
			3	30	Bond Pull over Ball, Post bHAST, 96 Hours	Wires	3/90/0
HAST	A2	JESD22-A101	3	70	**BHAST, Vmax/130C/85% RH**	**192 Hours**	**3/210/0**
			3	1	Cross Section, Post bHAST 192 Hours	-	3/3/0
			3	11	SAM Analysis, Post bHAST, 192 Hours	-	3/33/0
			3	30	Wire Bond Shear, Post bHAST, 192 Hours	Wires	3/90/0
			3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	3/90/0
			3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	3/90/0
TC	A4	JESD22-A104	3	77	**Temperature Cycle, -65/150C**	**500 Cycles**	**3/231/0**
			3	1	Cross Section, Post T/C 500 Cycles	-	3/3/0
			3	11	SAM Analysis, Post T/C, 500 Cycles	-	3/33/0
			3	30	Wire Bond Shear, Post T/C 500 Cycles	Wires	3/30/0
			3	30	Bond Pull over Stitch Post T/C 500 Cycles	Wires	3/30/0

			3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	3/30/0
TC	A4	JESD22-A104	3	70	**Temperature Cycle, -65/150C**	**1000 Cycles**	**3/210/0**
			3	1	Cross Section, Post T/C 1000 Cycles	-	3/3/0
			3	11	SAM Analysis, Post T/C, 1000 Cycles	-	3/33/0
			3	30	Wire Bond Shear, Post T/C 1000 Cycles	Wires	3/90/0
			3	30	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	3/90/0
			3	30	Bond Pull over Ball, Post T/C, 1000 Cycles	Wires	3/90/0
PTC	A5	JESD22-A105	1	45	**Power Temperature Cycle**	**1000 Cycles**	**1/45/0**
PTC	A5	JESD22-A105	1	45	**Power Temperature Cycle**	**2000 Cycles**	**1/45/0**
HTSL	A6	JESD22-A103	3	45	**High Temp Storage Bake 150C**	**500 Hours**	**3/135/0**
			3	1	Cross Section, Post HTSL 1000 Hours	-	3/3/0
HTSL	A6	JESD22-A103	3	45	**High Temp Storage Bake 150C**	**1000 Hours**	**3/132/0**
			3	1	Cross Section, Post HTSL 2000 Hours	-	3/3/0

Summary post-reliability construction analysis.
1. CSAM shows no delamination after BHAST and Temperature cycling
2. Cross sections showed no evidence of cracking or oxidation within the bonds.
3. Bond pulls, shears and stitch pulls show no degradation – distribution showing similar performance to unaged devices

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

Approved 26-Dec-2019

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: LMR236xxQDDA	QBS Wafer fab Process Reference: LM4360xxQPWPRQ1	QBS Package Reference: LMR236xxQDDAQ1
	Test Group A – Accelerated Environment Stress Tests									
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning Level 2	260C	QBS	3/693/0	3/693/0
	THB	A2	JEDEC JESD22-A101	3	77	Biased Temperature and Humidity, 85C/85%RH	1000 hours	QBS	3/231/0	3/231/0
	AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 hours	QBS	3/231/0	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 cycles	QBS	3/231/0	3/231/0
	TC	A4	Post Temp cycle bond pulls	1	5 units	Post-500 cycles	-	QBS	1/5/0	1/5/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle, -40/125C	1000 cycles	QBS	1/45/0	1/45/0
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 hours	QBS	3/231/0	3/231/0
	Test Group B – Accelerated Lifetime Simulation Tests							Note 2		
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 150C	408 hours	QBS	3/231/0	-
	ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 150C	24 hours	QBS	3/2400/0	-
	EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	1000 hours	QBS	3/231/0	-
	Test Group C – Package Assembly Integrity Tests									
	WBS	C1	AEC Q100-001	1	30	Wire Bond Shear (Cpk>1.67)	-	QBS	-	1/30/0

	Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: LMR236xxQDDA	QBS Wafer fab Process Reference: LM4360xxQPWPRQ1	QBS Package Reference: LMR236xxQDDAQ1
	WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull (Cpk>1.67)	-	QBS	-	1/30/0
	SD	C3	JEDEC JESD22-B102	1	15	Auto Solderability (Pb and Pb-Free)	>95% Lead Coverage	QBS	-	1/15/0
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Auto Physical Dimensions	Cpk>1.33 Ppk>1.67	QBS	-	3/30/0
Test Group D – Die Fabrication Reliability Tests										
	EM	D1	JESD61	-	-	Electro-migration	-	Completed Per Process Technology Requirements		-
	TDDB	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	Completed Per Process Technology Requirements		-
	HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier	-	Completed Per Process Technology Requirements		-
	NBTI	D4	-	-	-	Negative Bias Temperature Instability	-	Completed Per Process Technology Requirements		-
	SM	D5	-	-	-	Stress Migration	-	Completed Per Process Technology Requirements		-
Test Group E – Electrical Verification Tests										
	HBM	E2	AEC Q100-002	1	3	ESD - HBM	2000 V	1/3/0	-	
	CDM	E3	AEC Q100-011	1	3	ESD - CDM	750 V	1/3/0	-	
	LU	E4	AEC Q100-004	1	6	Latch-up	125C	1/6/0	-	
	ED	E5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	3/30/0	-	

- QBS: Qual By Similarity
- Qual Device LMR236xxQDDARQ1 is qualified at LEVEL2-260CG

Note 1: Top metallization of the silicon die is the same process and same factory location for both primary and second sourced fab products – supports QBS for group A and group C tests.

Note 2: Silicon IP components of the LMR232xxQDDA are used in LM4360xxQPWPRQ1

A1 (PC): Preconditioning:
Performed for THB, Biased HAST, AC, uHAST, TC & PTC samples, as applicable.

Ambient Operating Temperature by Automotive Grade Level: Grade 1 (or Q): -40°C to +125°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

ADDENDUM A : AEC-Q006 Table 3a: Integrated Circuit Qualification Test Requirements: Qualification Results
Data Displayed as: Number of lots / Total sample size / Total failed

Qualification Device **LMR236xxQDDA family of devices**

Technology attributes covered by this Q006 qualification

- **Silicon attributes** : Same silicon technology and top side metallization
- **Package family** : HSOIC (PSOP) from ASE – Shanghai, China
- **Wire type** : NDA information
- **Critical Package materials**: NDA information

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: LMR23630AQDDAQ1
Test Group A - Accelerated Environment Stress Test							
					SAM Analysis, Pre Stress	-	Passed
PC	A1	JESD22-113	-	-	**Preconditioning**	**Level 2-260C**	**3/738/0**
			-	-	SAM Analysis, Post-Precon	-	Passed
HAST	A2	JESD22-A110	3	77	**Biased HAST, 130C/85%RH**	**96 Hours**	**3/231/0**
			3	1	Cross Section, Post bHAST 96 Hours	-	3/3/0
			3	11	SAM Analysis, Post bHAST, 96 Hours	-	3/33/0
			3	30	Wire Bond Shear, Post bHAST, 96 Hours	Wires	3/90/0
			3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	3/90/0
			3	30	Bond Pull over Ball, Post bHAST, 96 Hours	Wires	3/90/0
HAST	A2	JESD22-A110	3	70	**Biased HAST, 130C/85%RH**	**192 Hours**	**3/210/0**
			3	1	Cross Section, Post bHAST 192 Hours	-	3/3/0
			3	11	SAM Analysis, Post bHAST, 192 Hours	-	3/33/0
			3	30	Wire Bond Shear, Post bHAST, 192 Hours	Wires	3/90/0
			3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	3/90/0
			3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	3/90/0
TC	A4	JESD22-A104	3	77	**Temperature Cycle, -65/150C**	**500 Cycles**	**3/231/0**
			3	1	Cross Section, Post T/C 500 Cycles	-	3/3/0
			3	11	SAM Analysis, Post T/C, 500 Cycles	-	3/33/0
			3	30	Wire Bond Shear, Post T/C 500 Cycles	Wires	3/90/0
			3	30	Bond Pull over Stitch Post T/C 500 Cycles	Wires	3/90/0
			3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	3/90/0
TC	A4	JESD22-A104	3	70	**Temperature Cycle, -65/150C**	**1000 Cycles**	**3/210/0**
			3	1	Cross Section, Post T/C 1000 Cycles	-	3/3/0
			3	11	SAM Analysis, Post T/C, 1000 Cycles	-	3/33/0
			3	30	Wire Bond Shear, Post T/C 1000 Cycles	Wires	3/90/0
			3	30	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	3/90/0
			3	30	Bond Pull over Ball, Post T/C, 1000 Cycles	Wires	3/90/0
PTC	A5	JESD22-A105	1	45	**Power Temperature Cycle**	**1000 Cycles**	**1/45/0**
PTC	A5	JESD22-A105	1	45	**Power Temperature Cycle**	**2000 Cycles**	**1/45/0**
HTSL	A6	JESD22-A103	3	45	**High Temp Storage Bake 150C**	**1000 Hours**	**3/135/0**
			3	1	Cross Section, Post HTSL 1000 Hours	-	3/3/0
HTSL	A6	JESD22-A103	3	45	**High Temp Storage Bake 150C**	**2000 Hours**	**3/132/0**
			3	1	Cross Section, Post HTSL 2000 Hours	-	3/3/0

A1 (PC): Preconditioning:
Performed for THB, Biased HAST, AC, uHAST, PTC & TC samples, as applicable.

For questions regarding this notice, e-mails can be sent to the contacts shown below or your local Field Sales Representative.

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