PCN Number:	20240327002.2	**PCN Date:**	March 28, 2024
Title:	Qualification of RFAB using qualified Process Technology, Die Revision, and additional Assembly site options		
Customer Contact:	Change Management team	**Dept:**	Quality Services
Proposed 1st Ship Date:	September 24, 2024	**Estimated Sample Availability:**	April 27, 2024*

***Sample requests received after April 27, 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 (MLA) 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 CFAB	JI1 JI3	150 mm 200 mm	RFAB	TIB	300 mm

The die was also changed as a result of the process change.

BOM Table (RFAB/Process migration, Die Change + BOM options qualification):

	FMX	**MLA**
Bond Wire Composition/Thickness	Cu, 0.8 or 1.0 mil, Au, 0.96 **	**Cu, 0.8 mil**
Mount Compound	4147858 or 4208458 **	**4147858**
Mold Compound	4211880 or 4209640 **	**4211880**
Die Thickness	10.5 mils **	**7.5 mils**
MSL	1 or 3 **	**1**

** - Device Dependent
Note: The LBT-2903DR is already being assembled in MLA

The probe step will be eliminated as a result of this PCN.

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-milimeter 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
SH-BIP1	SHE	USA	Sherman
CFAB	CU3	CHN	CHENGDU
RFAB	**RFB**	**USA**	**Richardson**

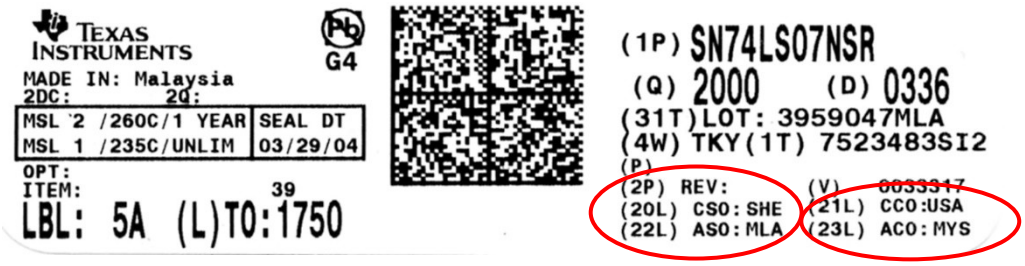
Die Rev:

Current	New
Die Rev [2P]	**Die Rev [2P]**
A	**A**

Assembly Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
TI Mexico	MEX	MEX	Aguascalientes
TI Malaysia	**MLA**	**MYS**	**Kuala Kumpur**

Sample product shipping label (not actual product label)



Product Affected:

LBT-LM2903DR	LM2903DRCT	LM2903QDRQ1	LM2903ZQDRQ1
LM2903AVQDRG4Q1	LM2903IDRDL	LM2903VQDRQ1	SN104611DR
LM2903AVQDRQ1	LM2903QDRG4Q1		

For alternate parts with similar or improved performance, please visit the product page on TI.com

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

LM2903-Q Legacy Devices in SOIC - Redesigned Die of TIB Process. MLA as New A/T site. - ROLEX
Approve Date 23-FEBRUARY -2024

Product Attributes

Attributes	Qual Device: LM2903AVQDRQ1	QBS Process Reference: LM2902BQPWRQ1	QBS Package, Product Reference: LM2903BQDRQ1	QBS Product Reference: LM2901BQDRQ1
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	Signal Chain	Signal Chain	Signal Chain	Signal Chain
Wafer Fab Supplier	RFAB	RFAB	CFAB	RFAB
Assembly Site	MLA	MLA	MLA	MLA
Package Group	SOIC	TSSOP	SOIC	SOIC
Package Designator	D	PW	D	D
Pin Count	8	14	8	14

- QBS: Qual By Similarity
- Qual Device LM2903AVQDRQ1 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: LM2903AVQDRQ1	QBS Process Reference: LM2902BQPWRQ1	QBS Package, Product Reference: LM2903BQDRQ1	QBS Product Reference: LM2901BQDRQ1
Test Group A - Accelerated Environment Stress Tests											
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	1/231/0	-	3/924/0	1/308/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0	1/77/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-	3/231/0	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	1/77/0
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	1/5/0	-	-	1/5/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	-	3/135/0	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	1/45/0	-	-	1/77/0
Test Group B - Accelerated Lifetime Simulation Tests											
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	300 Hours	1/77/0	-	3/231/0	1/77/0
HTOL	B1	JEDEC JESD22-A108	3	77	Life Test	150C	408 Hours	-	3/231/0	-	-
ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	3/2400/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM2903AVQDRQ1	QBS Process Reference: LM2902BQPWRQ1	QBS Package, Product Reference: LM2903BQDRQ1	QBS Product Reference: LM2901BQDRQ1
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
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	1/10/0
Test Group D - Die Fabrication Reliability Tests											
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	-	-	-
TDDB	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	-	-	-
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	-	-	-
BTI	D4	-	-	-	Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	-	-	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM2903AVQDRQ1	QBS Process Reference: LM2902BQPWRQ1	QBS Package, Product Reference: LM2903BQDRQ1	QBS Product Reference: LM2901BQDRQ1
SM	D5	-	-	-	Stress Migration	-	-	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	-	-	-
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	1000 Volts	1/3/0	-	-	-
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	-	-	-
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30	-	-	-
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-2402-047

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

OPA2991QDRQ1 Q006 Qual Summary for 8 pin SOIC (D) Package / 0.8 mil PCC Wire LBC9/TIB Al Bond Pad in MLA (Grade 1, -40°C to 125°C)
Approved 23-Sep-2021

Product Attributes

Attributes	Qual Device: OPA2991QDRQ1
Operating Temp Range	-40 to +125 C
Automotive Grade Level	Grade 1
Product Function	Signal Chain
Wafer Fab Supplier	RFAB
Assembly Site	MLA
Package Type	SOIC
Package Designator	D
Ball/Lead Count	8

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: OPA2991QDRQ1
Test Group A – Accelerated Environment Stress Tests								
	PC	A1	-	3	22	SAM Analysis, Pre Stress	Completed	3/66/0
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	276	Preconditioning	Level 1-260C	3/828/0
	PC	A1	-	3	22	SAM Analysis, Post Stress	Completed	3/66/0
	HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	3/231/1 (1)
	HAST	A2	JEDEC JESD22-A110	3	70, 70, 69	Biased HAST, 130C/85%RH	192 Hours	3/209/0
	HAST	A2	-	3	1	Cross Section, Post bHAST 192 Hours	Completed	3/3/0
	HAST	A2	-	3	22	SAM Analysis, Post bHAST, 192 Hours	Completed	3/66/0
	HAST	A2	-	3	30	Wire Bond Shear, Post bHast, 192 Hours	Wires	3/90/0
	HAST	A2	-	3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	3/90/0
	HAST	A2	-	3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	3/90/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0
	TC	A4	-	3	22	SAM Analysis, Post T/C, 500 Cycles	Completed	3/66/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	1000 Cycles	3/210/0
	TC	A4	-	3	1	Cross Section, Post T/C 1000 Cycles	Completed	3/3/0
	TC	A4	-	3	22	SAM Analysis, Post T/C, 1000 Cycles	Completed	3/66/0
	TC	A4	-	3	30	Wire Bond Shear, Post T/C 1000 Cycles	Wires (3)	3/90/0
	TC	A4	-	3	30	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	3/90/0
	TC	A4	-	3	30	Bond Pull over Ball, Post T/C, 1000 Cycle	Wires	3/90/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle - 40/125C	1000 Cycles	N/A
	PTC	A5	JEDEC JESD22-A105	1	44	Power Temperature Cycle - 40/125C	2000 Cycles	N/A
	HTSL	A6	JEDEC JESD22-A103	3	45	High Temp Storage Bake 150C	1000 Hours	3/135/0
	HTSL	A6	-	3	1	Cross Section, Post HTSL 1000 Hours	Completed	3/3/0
	HTSL	A6	JEDEC JESD22-A103	3	44	High Temp Storage Bake 150C	2000 Hours	3/132/0
	HTSL	A6	-	3	1	Cross Section, Post HTSL 2000 Hours	Completed	3/3/0
Test Group C – Package Assembly Integrity Tests								
	WBS	C1	AEC Q100-001	3	30	Wire Bond Shear, Cpk>1.67	Wires	3/90/0
	WBP	C2	MIL-STD883 Method 2011	3	30	Bond Pull over Ball, Cpk >1.67	Wires	3/90/0

- A1 (PC): Preconditioning: Performed for THB, Biased HAST, AC, uHAST & TC samples, as applicable.
- For BHAST, TC, and HTSL post 1X activities such as wire bond pull, wire bond shear, and cross section were not performed unless there were failures at the 2x read point.

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
Note (1): HAST fail due to corrosion from foreign material. Corrective action was installation of Contamination Removal System (CRS) at auto wire bonder and update of Point-of-Use filter change schedule.

Green/Pb-free Status:
Qualified Pb-Free(SMT) and Green

TI Qualification ID: 20201209-137461

ZVEI ids: SEM-DE-01, SEM-DE-02, SEM-DE-03, SEM-PW-02, SEM-PW-03, SEM-PW-13, SEM-PA-07, SEM-PA-11, SEM-PS-01, SEM-PS-02, SEM-PS-04, SEM-TF-01

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