

PCN Number:	20230927002.2		PCN Date:	September 28, 2023																			
Title:	Qualification of RFAB as an additional Fab site option and BOM Options for select devices																						
Customer Contact:	Change Management Team		Dept:	Quality Services																			
Proposed 1st Ship Date:	Mar 26, 2024		Sample requests accepted until:	Oct 28, 2023*																			
*Sample requests received after Oct 28, 2023 will not be supported.																							
Change Type:																							
<input type="checkbox"/>	Assembly Site	<input checked="" type="checkbox"/>	Design	<input type="checkbox"/>	Wafer Bump Material																		
<input type="checkbox"/>	Assembly Process	<input type="checkbox"/>	Data Sheet	<input type="checkbox"/>	Wafer Bump Process																		
<input checked="" type="checkbox"/>	Assembly Materials	<input type="checkbox"/>	Part number change	<input checked="" type="checkbox"/>	Wafer Fab Site																		
<input type="checkbox"/>	Mechanical Specification	<input type="checkbox"/>	Test Site	<input checked="" type="checkbox"/>	Wafer Fab Material																		
<input type="checkbox"/>	Packing/Shipping/Labeling	<input type="checkbox"/>	Test Process	<input checked="" type="checkbox"/>	Wafer Fab Process																		
PCN Details																							
Description of Change:																							
Texas Instruments is pleased to announce the qualification of its RFAB fabrication facility as an additional Wafer Fab option in addition to BOM options for the devices listed below.																							
<table border="1"> <thead> <tr> <th colspan="3">Current Fab Site</th> <th colspan="3">Additional Fab site</th> </tr> <tr> <th>Current Fab Site</th> <th>Process</th> <th>Wafer Diameter</th> <th>Additional Fab site</th> <th>Process</th> <th>Wafer Diameter</th> </tr> </thead> <tbody> <tr> <td>SH-BIP-1</td> <td>J11</td> <td>150mm</td> <td>RFAB</td> <td>TIB</td> <td>300mm</td> </tr> </tbody> </table>			Current Fab Site			Additional Fab site			Current Fab Site	Process	Wafer Diameter	Additional Fab site	Process	Wafer Diameter	SH-BIP-1	J11	150mm	RFAB	TIB	300mm			
Current Fab Site			Additional Fab site																				
Current Fab Site	Process	Wafer Diameter	Additional Fab site	Process	Wafer Diameter																		
SH-BIP-1	J11	150mm	RFAB	TIB	300mm																		
The die was also changed as a result of the process change.																							
Additional BOM items are as follows:																							
<table border="1"> <thead> <tr> <th></th> <th>Current</th> <th>New</th> </tr> </thead> <tbody> <tr> <td>Bond wire composition, diameter</td> <td>Cu, 1.0 mil</td> <td>Cu, 0.8 mil</td> </tr> <tr> <td>Wafer Thickness</td> <td>10.5 mils</td> <td>7.5 mils</td> </tr> </tbody> </table>				Current	New	Bond wire composition, diameter	Cu, 1.0 mil	Cu, 0.8 mil	Wafer Thickness	10.5 mils	7.5 mils												
	Current	New																					
Bond wire composition, diameter	Cu, 1.0 mil	Cu, 0.8 mil																					
Wafer Thickness	10.5 mils	7.5 mils																					
In conjunction with this notice, the probe test step will be removed from the process flow.																							
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																			
<input checked="" type="checkbox"/> No Change		<input checked="" type="checkbox"/> No Change		<input checked="" type="checkbox"/> No Change																			
				IEC 62474																			
				<input checked="" type="checkbox"/> No Change																			


Changes to product identification resulting from this PCN:**Fab Site Information:**



Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
SH-BIP-1	SHE	USA	Sherman
RFAB	RFB	USA	Richardson

Die Rev:**Current****New**

Die Rev [2P]	Die Rev [2P]
-	A

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: 39
LBL: 5A (L)T0:1750



(1P) **SN74LS07NSR**
(Q) **2000** (D) **0336**
(31T) LOT: 3959047MLA
(4W) TKY (1T) 7523483SI2
(P)
(2P) REV: (V) **0033317**
(20L) CS0: SHE (21L) CCO:USA
(22L) AS0: MLA (23L) ACO: MYS

Product Affected:

LM2901PWRCT	LM2901QPWRQ1	LM2901QPWRRBG4	LM2901VQPWRG4Q1
LM2901QPWRG4Q1	LM2901QPWRRB	LM2901VQPWRCT	LM2901VQPWRQ1

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

LM2901-Q1 TSSOP Red Bull Refresh
Approve Date 06-SEPTEMBER-2023

Product Attributes

Attributes	Qual Device: <u>LM2901VQPWRQ1</u>	QBS Reference: <u>LM2902BQPWRQ1</u>
Automotive Grade Level	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125
Product Function	Signal Chain	Signal Chain
Wafer Fab Supplier	RFAB	RFAB
Assembly Site	MLA	MLA
Package Group	TSSOP	TSSOP
Package Designator	PW	PW
Pin Count	14	14

- QBS: Qual By Similarity
- Qual Device LM2901VQPWRQ1 is qualified at MSL1 250C

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>LM2901VQPWRQ1</u>	QBS Reference: <u>LM2902BQPWRQ1</u>
Test Group A - Accelerated Environment Stress Tests									
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	3/308/0	3/924/0
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	1/77/0	-
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	110C/85%RH	264 Hours	-	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	3/231/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	1/77/0	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	3/231/0
Test Group B - Accelerated Lifetime Simulation Tests									
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	300 Hours	1/77/0	-
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	408 Hours	-	3/231/0
ELFR	B2	AEC Q100-008	1	77	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	1/30/0	3/90/0

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM2901VQPWRQ1	QBS Reference: LM2902BQPWRQ1
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
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	1/30/0	3/30/0
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	-
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									
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	-
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 /750 Volts	1/3/0 (750V corner pins)	-
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	-	1/3/0	-
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

Orderable Part Numbers

The following table contains a list of all TI Orderable Part Numbers (OPNs) released by this qualification per Product Qualification Family definition (AEC Q100 Appendix 1). Group E results shown above cover all part numbers listed here.

LM2901PWRCT	LM2901QPWRG4Q1
LM2901QPWRQ1	LM2901QPWRRB
LM2901QPWRRBG4	LM2901VQPWRCT
LM2901VQPWRG4Q1	LM2901VQPWRQ1

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-2308-080

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

**Q006 Grade-1 Report for 0.8 diameter CU in MLA
Approve Date 16-FEBRUARY -2023**

Product Attributes

Attributes	Qual Device: <u>LM2902BQPWRQ1</u>	QBS Reference: <u>SN74HCS74QPWRQ1</u>
Operating Temp Range	-40 to +125 C	-40 to +125 C
Automotive Grade Level	Grade 1	Grade 1
Wafer Fab Supplier	RFAB	RFAB
Assembly Site	MLA	MLA
Package Group	TSSOP	TSSOP
Package Designator	PW	PW
Pin Count	14	14

- QBS: Qual By Similarity
- Qual Device LM2902BQPWRQ1 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>LM2902BQPWRQ1</u>	QBS Reference: <u>SN74HCS74QPWRQ1</u>
Test Group A - Accelerated Environment Stress Tests									
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	1 Step	3/0/0	3/0/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	1 Step	-	3/66/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	1 Step	-	3/66/0
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	110C/85%RH	264 Hours	-	-
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	3/231/0
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	3/3/0
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.2	JEDEC JESD22-A110	3	77	Biased HAST	110C/85%RH	528 Hours	-	-
HAST	A2.2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	192 Hours	-	3/231/0
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	-	3/66/0
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	-	3/3/0
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	3/9/0
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	-	3/9/0

HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	-	3/9/0
TC	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	3/231/0	3/231/0
TC	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	3/66/0	3/66/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	3/3/0	3/3/0
TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	3/9/0	3/9/0
TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	3/9/0	3/9/0
TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	3/9/0	3/9/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	1000 Cycles	3/231/0	3/231/0
TC	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	3/66/0	3/66/0
TC	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	3/3/0	3/3/0
TC	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	3/9/0	3/9/0
TC	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	3/9/0	3/9/0
TC	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	3/9/0	3/9/0
HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	1000 Hours	-	3/135/0
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	3/3/0
HTSL	A6.2	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	2000 Hours	-	3/135/0
HTSL	A6.2	JEDEC JESD22-A103	3	45	High Temperature Storage Life	175C	500 Hours	-	-
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	3/3/0
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	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

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
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Quality and Environmental data is available at TI's external Web site: <http://www.ti.com/>

TI Qualification ID: R-NPD-2110-020

ZVEI Ids: SEM-DE-01, SEM-DE-02, SEM-DE-03, SEM-PW-09, SEM-PW-13, SEM-BD-01, SEM-PA-08

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

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