

**PCN# 20210318001.1**

**Qualification of new Fab site (CFAB) using qualified Process Technology, Die Revision, updated BOMs, and additional Assembly options for select devices  
Change Notification / Sample Request**

**Date:** March 29, 2021

**To:** Flextronics PCN

Dear Customer:

This is an announcement of a change to a device that is currently offered by Texas Instruments (TI). The details of this change are on the following pages, and are in alignment with our standard product change notification (PCN) [process](#).

TI requires acknowledgement of receipt of this notification within 30 days of the date of this notice. Lack of acknowledgement of this notice within 30 days constitutes acceptance of the change. If samples or additional data are required, requests must be received within 30 days of acknowledgement, given that samples are not built ahead of the change.

The Proposed First Ship date in this PCN letter is the earliest possible date that customers could receive the changed material. It is our commitment that the changed device will not ship before that date. If samples are requested within the 30 day sample request window, customers will still have 30-days to complete their evaluation regardless of the proposed 1st ship date.

This particular PCN is related to TI's previous announcement to close our two remaining factories with 150-millimeter production (DFAB in Dallas, Texas, and SFAB in Sherman, Texas). As referenced in the "reason for change" below, these changes are part of our multiyear plan to transition these products to newer, more efficient manufacturing processes and technologies, underscoring our commitment to product longevity and supply continuity.

For questions regarding this notice or to provide acknowledgement of this PCN, you may contact your local Field Sales Representative or the PCN Team ([PCN\\_ww\\_admin\\_team@list.ti.com](mailto:PCN_ww_admin_team@list.ti.com)). For sample requests or sample related questions, contact your local Field Sales Representative. As always, we thank you for your continued business.

PCN Team  
SC Business Services

**20210318001.1**  
**Attachment: 1**

**Products Affected:**

The devices listed on this page are a subset of the complete list of affected devices. According to our records, these are the devices that you have purchased within the past twenty-four (24) months. The corresponding customer part number is also listed, if available.

<b>DEVICE</b>	<b>CUSTOMER PART NUMBER</b>
LM2903DR	SCHF1NTC001572
LM2903DR	GEC2H-405251521
LM2903DR	CIS1-15-6907-02
LM393DRG4	IBMH-78P0381
LM293DR	SIA-S02376
LM393DR	ALCH-1AB004100002
LM393DR	ALE-1AB004100002
LM393DR	LEX-1020197
LM393DR	TDN-732-031-01
LM393DR	TEKH-K-156501901
LM393DR	AGIH-1827-4976
LM393DR	CISU-15-1278-02
SN393DR	TPK4H-832447-0310
SN393DR	TPK-832447-0310
LM393PWR	PNSH-286100393033
LM2903DRE4	CIE-N0048855
LM393ADR	KODH-122A10027S
LM393ADR	HPMH-PCA-1836-0177
LM393APWR	TEKH-K-IC-2095
LM393ADR	KSIH-53560-0393-200
LM293ADR	SEAH-SZ1ST1501
LM393DRG4	LGHG-78P0381
LM393DRG4	HLK-353S2066
LM2903DR	RHLH-886159-002
LM2903DR	TYC-1359453
LM2903DR	HNW1-120-03127-0011
LM2903DR	HID-ICC-00100
LM2903DR	GEC1H-VLAPSU-061
LM2903DR	ALC7-1AB018720001
LM393DR	XXRH-833W63001
LM393DR	TEK2G-IC-775
LM393DR	KSI-720222
LM393DR	CCIH-ICC0374001-10
LM393DR	AGI-1826-1572
LM2903DR	SFT-113-0001
TL331KDBVRG4	XXRGCH-833W63021
TL331IDBVT	NSWH-4333260
TL331KDBVR	NTKH-NTE00100114
TL331IDBVRG4	HPMHQ-1836-0457
TL331IDBVR	FLKH-3407716
TL331IDBVR	CISU-15-9327-01
TL331IDBVR	CIS-15-9327-01-00
TL331IDBVR	100100059433
TL331IDBVR	CTI1H-14-002385-01
TL331KDBVR	CCP-FCS-TL331KDBVR
TL331IDBVRG4	JNTG-310-026346-MX
TL331IDBVRG4	HPMHQ-1836-0068
TL331IDBVR	NTK-NTE00100032
TL331IDBVR	CTI-FCS-TL331IDBVR
TL331IDBVR	15-9327-01
TL331IDBVR	WPL-W10436874
LM393APWRE4	TEKH-K-IC-2095
LM2903PWR	TYC-1396411
LM393PWR	RUIH-V-35040007-000
LM393PWR	DYGG-12955-01/01
LM293DR	FSA-9400LM293
LM2903PWR	SEA2H-FPN935335P003
LM393PWR	FFV2H-MP-00012366-000
LM393PWR	AGIH-1826-4278
LM393ADR	KSI-53560-0393-200
LM2903DR	TTUH-PTT0078
LM2903DR	LUCF405251521

LM2903DR	CIS-15-6907-02
LM393DR	KSI-53560-0393-400
LM393DR	ITL3G-Q2126011
LM393DR	ALC15-1AB004100002
LM393DR	100100039526
LM2903DRG4	TYC-230133-0
LM293ADR	SCHFSZ1ST1501
TL331IDBVR	TDN-731-048-01
TL331IDBVR	RUL-9400TL331
TL331IDBVR	OCVH-OC-032447-0101
TL331IDBVR	ITO-A5007044-AA_T2P2
TL331IDBVR	HNW-51506337-121
TL331IDBVR	GEC2H-CC408576508
TL331IDBVR	HNWG-51506337-121
TL331IDBVT	MRNH-W10436874
LM2903DR	TL331IDBVT
LM2903DR	LM2903DR
LM293ADR	EC-ON318920
LM393DR	JPTF0106
LM393DR	CISH-15-1278-01
LM393DR	JTMH-R40499730014
LM393DR	TEKH-K-IC-775
LM393DR	CISH-15-100183-01
LM393DR	15-1278-01
LM393PWR	XRT3G-00012366-00A
LM393PWR	XRT2G-63539-01
LM2903DRG4	NRN1H-302-0027-01
LM393ADR	GEHF2187008-2
LM393ADR	QSC-IC-000505-30
LM2903PWR	SEAH-HUA16522
LM393ADRE4	null
LM393ADRG4	null
LM293DR	EC-ON70089
LM393DR	CIS1-15-1278-02
LM393DR	TDN-732-031-01-00
LM393DR	OCEH-1301509-01
LM393DR	CISV-15-1278-02
LM393DR	XRXH-856007500
LM393DR	CIS-15-1278-02
TL331KDBVR	GEC1H-2102551-001
TL331IDBVR	NTKH-NTE00100032
TL331IDBVR	PBEH-18269219
TL331IDBVR	CISH-15-9327-01
TL331IDBVR	CIS1-15-9327-01
TL331IDBVR	AXI-38875
TL331KDBVR	CCP1H-1QF126-TL331KDBVR
TL331IDBVT	AUC1H-SICN00087
TL331IDBVR	MWTH-57010691
TL331IDBVR	ITO-A5007044-AA_PP
TL331IDBVR	GTBH-IC-0016
TL331IDBVR	FSA-9400TL331
LM2903PWR	SLD-ECS-AM-2903P
LM2903PWR	ALC13-1AB004100110
LM293DR	SEA1H-65580007
LM2903PWR	SH JID-RYT1012048/2C
LM393PWRG4	DYGG-12955-01/01
LM393ADR	TEKH-156501901
LM393ADR	GEC-2187008-2
LM393ADR	FPS-213-D0000109-101
LM393DR	HPMHQ-1836-0040
LM393DR	SEA-01-2133-008/RF
LM393DR	CISH-15-1278-02
TL331IDBVR	HNW-FCS-TL331IDBVR
TL331IDBVR	TTUH-PU01555-00
LM393DR	SCH01-2133-008/RF
LM393ADR	GEC1H-2187008-2
LM393ADR	HPMHV-1836-0177
LM2903PWR	ABBH-3HAC064591-153
LM2903PWR	SEA1H-HUA16522
LM2903PWR	SEAH-060454B
LM2903PWR	UPR-WHK015-G-AA1
LM393ADR	AGIH-VR-1827-4902
LM2903DR	CISH-15-6907-02
LM2903DR	ALC2H-1AB018720001
LM393DR	KSIH-53560-0393-400

TL331KDBVRG4	XRXRSH-833W63021
TL331KDBVR	ALC5H-24-1117-01
TL331IDBVR	HNW-A4-3A34809H57
TL331IDBVR	FPS-RYT101484
TL331IDBVR	ELXH-CDPB1200T040
TL331KDBVT	null
TL331IDBVR	ALC2H-1AB150510003
LM393PWR	FPS-RYT101483
LM393ADR	AGIH-1827-4902
LM2903DR	TSA3H-P000053530
LM393DR	TEKH-156501901
LM293ADR	XPTH-0106
TL331IDBVR	LUCFCC408576508
TL331IDBVR	MRNH-W10436874
TL331IDBVR	CCP1H-1QF126-331IDBVR
LM2903DR	15-6907-02
LM393DR	TER732-031-01
LM393DR	15-1278-02
LM293DR	RUL-9400LM293
LM393DR	XRT1G-22861-01
LM2903DR	INV-0001200142395
LM393DR	TSTH-156501901
LM393DR	WNIH-2574204430
LM2903DR	DVS-106-000112-00
TL331IDBVR	AXI-38875
TL331IDBVR	TTUH-PPU01555-00
TL331IDBVR	SH JID-RYT101484
TL331IDBVR	GWF-006-085
TL331IDBVR	HNW-1002665
LM2903PWR	SEA3H-HUA16522
TL331IDBVR	SUN3H-7047460
LM393ADR	GEU-2187008-2
LM393DR	HPM3H-1836-0040
LM2903DR	CISU-15-6907-02
TL331IDBVT	CISH-15-9327-01
LM393APWR	CAI-AJ-6200-1498-01
TL331IDBVR	TEKH-K-IC-2370
TL331IDBVR	RYT101484
LM393PWR	XRT3G-00012366-000
TL331IDBVT	GEC1H-5476145
TL331KDBVR	NTK-NTE00100114
LM2903PWR	ALC2H-1AB004100110
LM393PWR	RYT101483
TL331IDBVTG4	AGIH-VR-1827-2458
LM393DRE4	null

Technical details of this Product Change follow on the next page(s).

<b>PCN Number:</b>	20210318001.1	<b>PCN Date:</b>	Mar 29, 2021
<b>Title:</b>	Qualification of new Fab site (CFAB) using qualified Process Technology, Die Revision, updated BOMs, and additional Assembly options for select devices		
<b>Customer Contact:</b>	<a href="#">PCN Manager</a>	<b>Dept:</b>	Quality Services
<b>Proposed 1<sup>st</sup> Ship Date:</b>	Jun 29, 2021	<b>Estimated Sample Availability:</b>	Date provided at sample request.
<b>Change Type:</b>			
<input checked="" type="checkbox"/>	Assembly Site	<input type="checkbox"/>	Assembly Process
<input checked="" type="checkbox"/>	Design	<input type="checkbox"/>	Electrical Specification
<input type="checkbox"/>	Test Site	<input checked="" type="checkbox"/>	Packing/Shipping/Labeling
<input type="checkbox"/>	Wafer Bump Site	<input type="checkbox"/>	Wafer Bump Material
<input checked="" type="checkbox"/>	Wafer Fab Site	<input checked="" type="checkbox"/>	Wafer Fab Materials
		<input type="checkbox"/>	Part number change

### PCN Details

#### Description of Change:

Texas Instruments is pleased to announce the qualification of a new fab using a qualified process technology (CFAB, JI3), updated BOMs, and assembly (FMX, MLA, TIPI) site options for selected devices as listed below in the product affected section.

Current Fab Site			New Fab Site		
Current Fab Site	Process	Wafer Diameter	New Fab Site	Process	Wafer Diameter
SFAB	JI1	150 mm	CFAB	JI3	200 mm

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

#### Construction differences are noted below:

#### SOIC Package:

	FMX	MLA	TAI	ASESH	FMX, MLA New
Mount Compound	4147858	4147858	4042500	EY1000063	4147858
Mold Compound	4211880	4211880	4205694	EN2000509	4211880
Lead finish, Prep	NiPdAu	NiPdAu	NiPdAu	Matte Sn	NiPdAu
Bond wire, diameter	0.96 mil Cu	0.96 mil Cu	0.96mil Au	1.0mil Cu	0.8 mils Cu
MSL	G4	G4	G4	G3	G4

Upon expiry of this PCN TI will combine lead free solutions in a single **standard part number**, for the devices in groups 1 & 2. For example; **SN393DR** – can ship with both Matte Sn and NiPdAu. Example:

- Customer order for 7500 units of SN358DR with 2500 units SPQ (Standard Pack Quantity per Reel).
- TI can satisfy the above order in one of the following ways.
  - I. 3 Reels of NiPdAu finish.
  - II. 3 Reels of Matte Sn finish
  - III. 2 Reels of Matte Sn and 1 reel of NiPdAu finish.
  - IV. 2 Reels of NiPdAu and 1 reel of Matte Sn finish.

**TSSOP Package:**

	<b>MLA</b>	<b>ASESH</b>	<b>MLA New</b>
Mount Compound	4147858	EY1000063	4147858
Mold Compound	4211471	EN2000507	4211471
Lead finish, Prep	NiPdAu	Matte Sn	NiPdAu
Bond wire, diam	1mil, 0.96mil Cu	1.0mil Cu	Cu, 0.8 mils
MSL	G4	G3	G4

Upon expiry of this PCN TI will combine lead free solutions in a single **standard part number**, for the devices in groups 1 & 2. For example; **SN2903PWR** – can ship with both Matte Sn and NiPdAu.

Example:

- Customer order for 7500 units of SN358DR with 2500 units SPQ (Standard Pack Quantity per Reel).
- TI can satisfy the above order in one of the following ways.
  - I. 3 Reels of NiPdAu finish.
  - II. 3 Reels of Matte Sn finish
  - III. 2 Reels of Matte Sn and 1 reel of NiPdAu finish.
  - IV. 2 Reels of NiPdAu and 1 reel of Matte Sn finish.

**SOT- 23 Package:**

	<b>NFME</b>	<b>HNA</b>	<b>HFTF</b>	<b>TIPI</b>
Mount Compound	A-03	400180	A-03	8095733
Mold Compound	R-04	450207	R-27	4222198
Lead finish, Prep	NiPdAu	NiPdAu	Matte Sn	NiPdAu
Bond wire, diam	1.0 mil Au	1.0 mil Au	1.0 mil Cu	Cu, 0.8 mils
MSL	G4	G4	G3	G4

Upon expiry of this PCN TI will combine lead free solutions in a single **standard part number**, for the devices in groups 1 & 2. For example; **TL331KDBVR/T**– can ship with both Matte Sn and NiPdAu.

Example:

- Customer order for 7500 units of SN358DR with 2500 units SPQ (Standard Pack Quantity per Reel).
- TI can satisfy the above order in one of the following ways.
  - I. 3 Reels of NiPdAu finish.
  - II. 3 Reels of Matte Sn finish
  - III. 2 Reels of Matte Sn and 1 reel of NiPdAu finish.
  - IV. 2 Reels of NiPdAu and 1 reel of Matte Sn finish.

**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

**Anticipated impact on Material Declaration**

<input type="checkbox"/>	No Impact to the Material Declaration	<input checked="" type="checkbox"/>	Material Declarations or Product Content reports are driven from production data and will be available following the production release. Upon production release the revised reports can be obtained from the <a href="#">TI ECO website</a> .
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**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
<b>CFAB</b>	<b>CU3</b>	<b>CHN</b>	<b>Chengdu</b>

**Die Rev:**

Product Family	Current Die Rev [2P]	New Die Rev [2P]
LM293/393/LM2903	A, B	<b>A</b>
TL331x	A	<b>A</b>

**Assembly Site Information:**

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
TAI	TAI	TWN	Chung Ho, New Taipei City
ASESH	ASH	CHN	Shanghai
NFME	NFM	CHN	Nantong
HNA	HNT	THA	Ayutthaya
HFTF	HFT	CHN	Hefei
<b>FMX</b>	<b>MEX</b>	<b>MEX</b>	<b>Aguascalientes</b>
<b>MLA</b>	<b>MLA</b>	<b>MYS</b>	<b>Kuala Lumpur</b>
<b>TIPI</b>	<b>PHI</b>	<b>PHL</b>	<b>Baguio City</b>

Sample product shipping label (not actual product label)

**Product Affected: SOIC Package**

**Group 1 Device list (CFAB/Process migration & BOM Update at FMX/MLA):**

LM2903AVQDR	LM2903DR-S	LM293DR	LM393ADRG4
LM2903AVQDRG4	LM2903VQDR	LM293DRE4	LM393DR
LM2903DR	LM2903VQDRG4	LM293DRG4	LM393DRE4
LM2903DRE4	LM293ADR	LM393ADR	LM393DRG4
LM2903DRG4	LM293ADRG4	LM393ADRE4	SN293DR

**Group 2 Device list (CFAB/Process migration & AT Site TAI to FMX/MLA):**

LM2903QDRG4

**Group 3 Device list (CFAB/Process migration & AT Site ASESH to FMX/MLA):**

SN393DR

**Product Affected: TSSOP Package****Group 1 Device list (CFAB/Process migration & BOM Update at MLA):**

LM2903AVQPWR	LM2903PWRG4	LM393APWRE4	LM393PWRG4
LM2903AVQPWRG4	LM2903VQPWR	LM393APWRG4	
LM2903PWR	LM393APWR	LM393PWR	

**Group 2 Device list (CFAB/Process migration & AT Site ASESH to MLA):**

SN2903PWR
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**Product Affected: SOT-23 Package****Group 1 Device list (CFAB/Process migration & AT Site NFME/HNA to TIPI):**

TL331IDBVR	TL331IDBVRG4	TL331IDBVT	TL331IDBVTG4
TL331IDBVRE4			

**Group 2 Device list (CFAB/Process migration & AT Site HFTF to TIPI):**

TL331KDBVR	TL331KDBVRG4	TL331KDBVT
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**SOIC Qual Memo:****Qualification Report**

**LM393 / LM2903 SOIC**  
**Approve Date 20-Oct-2020**

**Qualification Results**

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

Type	Test Name / Condition	Duration	Qual Device: <u>LM2903AVQDR</u>	QBS Product Reference: <u>LM2903BIDR(MSL1)</u>	QBS Product Reference: <u>LM2903BIDR(MSL2)</u>	QBS Package Reference: <u>LM358BIDR</u>
MSL1	Moisture Sensitivity	Level 1, 260C	-	3/45/0	-	-
PC	Preconditioning Level 2	Level 2, 260C	-	-	Pass	Pass
HTOL	Life Test, 150C	300 Hours	-	-	3/231/0	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	1/77/0	3/231/0
UHAST	Unbiased HAST 130C/85%RH	96 Hours	-	-	1/77/0	3/231/0
TC	Temperature Cycle, -65/150C	500 Cycles	-	-	1/77/0	3/231/0
HTSL	High Temp Storage Bake 175C	500 Hours	-	-	1/77/0	3/231/0
CDM	ESD - CDM	1500 V	-	-	3/9/0	-
HBM	ESD - HBM	2000 V	-	-	3/9/0	-
LU	Latch-up	(per JESD78)	-	-	3/18/0	-
ED	Electrical Characterization	Per Datasheet Parameters	-	-	3/90/0	-
WBP	Bond Pull	Wires	-	-	1/240/0	3/228/0
WBS	Ball Shear	Wires	-	-	1/240/0	3/228/0

- QBS: Qual By Similarity

- Qual Device LM2903AVQDR is qualified at LEVEL1-260C

- 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: -65C/125C/700 Cycles and -65C/150C/500 Cycles

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

**Green/Pb-free Status:**

Qualified Pb-Free (SMT) and Green



## Qualification Report

**LM2903DR & LM393DR**  
**Approve Date 05-Feb-2021**

### Qualification Results

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

Type	Test Name / Condition	Duration	Qual Device: LM2903DR	QBS Product Reference: LM393BIDR	QBS Product Reference: LM2903BQDRQ1	QBS Package Reference: TMP1075D
PC	Preconditioning	level 1 @ 260C		1/308/0	-	3/924/0
HTOL	High Temp Operating Life , 150C	300 Hours		-	3/231/0	-
HAST	**Biased HAST, 130C/85%RH	96 Hours		1/77/0	-	3/231/0
UHAST	**Unbiased HAST, 130C/85%RH	96 Hours		1/77/0	-	3/231/0
TC	**Temperature Cycles, -65C/150C	500 Cycles		1/77/0	-	3/231/0
HTSL	**High Temp. Storage Bake , 150C	1000 Hours		1/77/0	-	-
HTSL	**High Temp. Storage Bake , 170C	420 Hours		-	-	3/231/0
HBM	ESD HBM	2000V		-	3/9/0	-
CDM	ESD CDM	1500V		1/3/0	3/9/0	-
LU	Latch-up	JESD78		-	3/18/0	-
ED	Electrical Characterization	Per Datasheet Parameters		1/30/0	3/90/0	-
MQ	Manufacturability (Assembly)	(per mfg. Site specification)		Pass	-	-
MQ	Manufacturability (Test)	(per mfg. Site specification)		Pass	-	-
MQ	Manufacturability (Wafer Fab)	(per mfg. Site specification)		Pass	-	-

- QBS: Qual By Similarity

- Qual Device LM2903DR/L393DR are qualified at LEVEL1-260C

- 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/700Cycles and -65C/150C/500 Cycles

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

**Green/Pb-free Status:**

Qualified Pb-Free (SMT) and Green

## TSSOP Qual Memo:

## Qualification Report

**LM393/LM2903 TSSOP**  
**Approve Date 30-Sep-2020**

### Qualification Results

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

Type	Test Name / Condition	Duration	Qual Device: LM2903AVQPWR	QBS Product Reference: LM2903BIPWR	QBS Product Reference: LM393BIDR
PC	Preconditioning Level 1	Level 1, 260C	-	Pass	-
HTOL	Life Test, 150C	300 Hours	-	3/231/0	3/231/0
HAST	Biased HAST, 130C/85%RH	96 Hours	-	3/231/0	-
UHAST	Unbiased HAST 130C/85%RH	96 Hours	-	3/231/0	-
TC	Temperature Cycle, -65/150C	500 Cycles	-	3/231/0	-
HTSL	High Temp Storage Bake 175C	500 Hours	-	3/231/0	-
CDM	ESD - CDM	1500 V	-	1/3/0	-
HBM	ESD - HBM	2000 V	-	1/3/0	-
LU	Latch-up	(per JESD78)	-	-	3/18/0
ED	Electrical Characterization	Per Datasheet Parameters	-	3/90/0	-
WBP	Bond Pull	Wires	-	1/100/0	-
WBS	Ball Shear	Wires	-	1/100/0	-

- QBS: Qual By Similarity

- Qual Device LM2903AVQPWR is qualified at LEVEL1-260C

- Preconditioning was performed for Auto-clave, 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/700Cycles and -65C/150C/500 Cycles

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

**Green/Pb-free Status:**

Qualified Pb-Free (SMT) and Green

**SOT-23 Qual Memo:**

**Qualification Report**

**TL331KDBVR/TL331IDBVR/TL331IDBVRG4  
Approve Date 26-Oct-2020**

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

Type	Test Name / Condition	Duration	Qual Device: TL331KDBVR	QBS Product Reference: TL331BIDBVR	QBS Product Reference: TL391BIDBVR	QBS Product Reference: LM393BIDR	QBS Package Reference: TLV9001DBVR
PC	Preconditioning	(level 1 @ 260C peak +/-0C)	-	-	1/308/0	-	Pass
HTOL	High Temp Operating Life, 150C	300 Hours	-	-	1/77/0	3/231/0	-
HAST	**Biased HAST, 130C/85%RH	96 Hours	-	-	1/77/0	-	3/231/0
HTSL	**High Temp. Storage Bake, 150C	1000 Hours	-	-	1/77/0	-	-
HTSL	**High Temp. Storage Bake, 170C	420 Hours	-	-	-	-	3/231/0
TC	**T/C -65C/150C	500 Cycles	-	-	1/77/0	-	3/231/0
UHAST	**Unbiased HAST, 130C/85%RH	96 Hours	-	-	1/77/0	-	3/231/0
HBM	ESD HBM	2500V	-	-	1/3/0	-	-
HBM	ESD HBM	2000V	-	-	-	3/9/0	-
CDM	ESD CDM	1500V	-	-	1/3/0	3/9/0	-
LU	Latch-up 25C and 125C	(per JESD78)	-	-	1/6/0	3/18/0	-
ED	Electrical Characterization	Per Datasheet Parameters	-	1/30/0	1/30/0	-	-
ED	Bench Characterization	Per Datasheet Parameters	Pass	-	-	-	-
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	-	Pass	Pass	-	-

- QBS: Qual By Similarity

- Qual Device TL331KDBVR is qualified at LEVEL 1-260C

- 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

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

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