PCN Number:	20210720001.1	**PCN Date:**	July 22, 2021
Title:	Qualification of new Fab site (CFAB) using qualified Process Technology, Die Revision, Probe site, and additional Assembly site/BOM options for select devices		
Customer Contact:	PCN Manager	**Dept:**	Quality Services
Proposed 1st Ship Date:	Oct 22 2021	**Estimated Sample Availability:**	Date provided at sample request

Change Type:

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

PCN Details

Description of Change:

Texas Instruments is pleased to announce the qualification of a new fab & process technology, (CFAB, JI3), die revisions, probe site, and AT (FMX) site/BOM options for selected devices as listed below in the product affected section. Construction differences are noted below:

Current Fab Site			Additional Fab Site		
Current Fab Site	**Process**	**Wafer Diameter**	**Additional 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:

Group 1 CFAB/Process migration & additional BOM option in FMX for PDIP Devices:

	Current	Additional
Bond wire diameter	Cu, 0.96 mils	Cu, 0.80 mils

Group 2 CFAB/Process migration & HFTF as additional Assembly site for SOP Devices:

	ASESH	HNA	UTL2	HFTF*
Mount Compound	SID#EY1000063	SID#400180	SID#PZ0013	SID#A-18
Mold Compound	SID#EN2000763	SID#450179	SID#CZ0094	SID#R-30
Lead finish	NiPdAu	NiPdAu	NiPdAu	Matte Sn
Bond wire diameter	Cu, 1.0 mils	Au, 1.0 mils	Au, 1.0 mils	Cu, 0.8 mils

Note(*): In this group, only the LM358DGKR-JF, LM2904DGKR-JF, and LM2904DGKR-ND are new to HFTF.

Marking differences:

Current	Proposed
Topside Symbol YM TI M5P O Backside Symbol YMS LLLL TI = TI LETTERS YM = YEAR MONTH DATE CODE LLLL = ASSEMBLY LOT CODE **S** = ASSEMBLY SITE CODE O = PIN 1 INDICATOR	Topside Symbol YMLL M5P O YM = YEAR MONTH DATE CODE LL = LAST 2 DIGIT IN ASSEMBLY LOT CODE O = PIN 1 INDICATOR

Group 3 CFAB/Process migration & Additional BOM Option qualification:

	Current	Additional
Bond wire diameter	Cu, 0.96 mils	Cu, 0.80 mils
Pin one designator	Stripe	dot

Group 4 Matte Sn lead finish option added:

	Current	Additional
Lead finish	NiPdAu	Matte Sn

Other versions of this device family are included in EOL notice PDN#20210720003.3.

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-BIP-1	SHE	USA	Sherman
CFAB	**CU3**	**CHN**	**Chengdu**

Die Rev:

Current	New
Die Rev [2P]	**Die Rev [2P]**
E, F, H, C	**B**

Assembly Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
ASESH	ASH	CNN	Shanghai
HNA	HNT	THA	Ayutthaya
UTL2	NS2	UT3	Bangpakong, Chachoengsao
HFTF	**HFT**	**CHN**	**Hefei**

Sample product shipping label (not actual product label)

Product Affected:

Group 1 Device list: CFAB/Process migration & additional BOM option in FMX for PDIP Devices:

LM258P	LM358AP	LM258APE4	LM358P-P2
LM358P	MC1458P	LM2904PE4	MC1458PE4
LM258AP	LM258PE4	LM358APE4	LM2904P-JF
LM2904P	LM358PE4	LM358P-JF	

Group 2 Device list: CFAB/Process migration & HFTF as additional Assembly site for SOP Devices:

LM258DGKR	LM258ADGKR	LM358ADGKR	LM2904DGKR-JF
LM358DGKR	LM2904DGKR	LM358DGKR-JF	LM2904DGKR-ND

Group 3 Device list: CFAB/Process migration & Additional BOM Option qualification

MC1458DR	MC1458DRE4	MC1458DRG4

Group 4 Device list: Matte Sn Lead finish option added

LM358BIDGKR	LM2904BIDGKR	LM358BAIDGKR	LM2904BAIDGKR

Group 1 Qual Memos:

Qualification Report

Approve Date 18-May-2021

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

Type	Test Name / Condition	Duration	Qual Device: LM358P	QBS Product Reference: LM358BIPWR	QBS Process / Package Reference: LM358BIDR	QBS Package Reference: NE5532P	QBS Package Reference: TLC339IN
PC	Preconditioning, L1	Level 1-260C	1/77/0	-	-	-	-
PC	Preconditioning, L2	Level 2-260C	-	-	3/1499/10 (1)	-	-
ED	Electrical Characterization	Per Datasheet Parameters	-	1/30/0	3/90/0	-	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	2/231/0	3/231/0	-
AC	Autoclave 121C	96 Hours	-	-	-	-	3/231/0
UHAST	Unbiased HAST 130C/85%RH	96 Hours	-	-	2/231/0	-	-
TC	Temperature Cycle, -65/150C	500 Cycles	1/77/0	-	2/231/0	-	3/231/0
HTSL	High Temp Storage Bake 170C	420 Hours	-	-	-	-	3/231/0
HTSL	High Temp Storage Bake 175C	500 Hours	-	-	2/231/0	-	-
HTOL	Life Test, 150C	300 Hours	-	-	3/231/0	3/231/0	-
HBM	ESD - HBM - Q100	2000 V	-	1/3/0	-	-	-
HBM	ESD - HBM - Q100	2500 V	-	-	1/3/0	-	-
CDM	ESD - CDM - Q100	1500 V	-	1/3/0	3/9/0	-	-
HTOL	Life Test, 150C	300 Hours	-	-	3/231/0	3/231/0	-
LU	Latch-up	Per JESD78	-	1/6/0	3/18/0	-	-
WBP	Wire Bond Pull (Cpk>1.67)	Wires	-	1/76/0	3/228/0	3/228/0	3/228/0
WBP	Wire Bond Shear (Cpk>1.67)	Wires	-	1/76/0	3/228/0	3/228/0	3/228/0
SD	Solderability	8 Hours Steam Age	-	-	-	3/66/0	3/66/0

- QBS: Qual By Similarity
- Qual Device LM358P 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: -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/

Green/Pb-free Status:
Qualified Pb-Free(SMT) and Green
Note (1): Fails due to crystallographic defects.

Group 2 & 3 Qual Memo:

Qualification Report

Approve Date 18-Jun-2021

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

Type	Test Name / Condition	Duration	Qual Device: LM358BIDGKR	QBS Product Reference: LM358BIDGKR	QBS Process Reference: LM2904BQDRQ1	QBS Package Reference: LM2904BQDGKRQ1	QBS Package Reference: TCA9803DGK
PC	Preconditioning Level 1	Level 1-260C	-	-	-	3/1305/0	-
PC	Preconditioning Level 2	Level 2-260C	-	-	3/1499/10 (1)	-	-
ED	Electrical Characterization	Per Datasheet Parameters	-	1/30/0	3/90/0	3/90/0	-
HAST	Biased HAST, 110C/85%RH	264 Hours	-	-	-	3/231/0	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	3/231/0	-	-
TC	Temperature Cycle, -65/150C	500 Cycles	-	-	3/231/0	3/231/0	3/231/0
UHAST	Unbiased HAST 130C/85%RH	96 Hours	-	-	3/231/0	-	-
AC	Autoclave 121C	96 Hours	-	-	-	3/231/0	3/231/0
HTSL	High Temp Storage Bake 150C	1000 Hours	-	-	-	3/135/0	-
HTSL	High Temp Storage Bake 170C	420 Hours	-	-	-	-	3/231/0
HTSL	High Temp Storage Bake 175C	500 Hours	-	-	3/135/0	-	-
HTOL	Life Test, 150C	408 Hours	-	-	3/231/0	3/231/0	-
ELFR	Early Life Failure Rate, 125C	48 Hours	-	-	3/2400/4 (1)	-	-
HBM	ESD - HBM	2000 V	-	1/3/0	3/9/0	1/3/0	-
CDM	ESD - CDM	1500 V	-	1/3/0	3/9/0	1/3/0	3/9/0
LU	Latch-up	Per JESD78	-	1/6/0	3/18/0	1/6/0	-
MSL	Moisture Sensitivity, JEDEC	Level 1-260C	1/12/0	-	-	-	1/12/0
WBP	Bond Pull	Wires	1/76/0	1/76/0	3/90/0	3/90/0	3/228/0
WBS	Ball Bond Shear	Wires	1/76/0	1/76/0	3/90/0	3/90/0	3/228/0

- QBS: Qual By Similarity
- Qual Device LM358BIDGKR 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: -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/

Green/Pb-free Status:

Qualified Pb-Free(SMT) and Green

Note (1): Precon and ELFR fails due to a defect screenable at production test.

Group 4 Qual Memos:

Qualification Report

Approve Date 14-Jan-2021

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

Type	Test Name / Condition	Duration	Qual Device: MC1458DR	QBS Product Reference: LM358BIDR	QBS Process Reference: LM2904BQDRQ1	QBS Package Reference: LM393BIDR	QBS Package Reference: SN65HVDA1040AQDRQ1
PC	Preconditioning, L2	Level 2-260C	-	3/1499/10 (1)	3/1499/10 (1)	-	-
PC	Preconditioning, L1	Level 1-260C	-	-	-	4/420/0	8/1597/0
ED	Electrical Characterization	Per Datasheet Parameters	-	3/90/0	3/90/0	-	3/90/0
HAST	Biased HAST, 130C/85%RH	96 Hours	-	2/231/0	3/231/0	1/77/0	3/231/0
AC	Autoclave 121C	96 Hours	-	-	-	-	3/231/0
UHAST	Unbiased HAST 130C/85%RH	96 Hours	-	2/231/0	3/231/0	1/76/0	-
TC	Temperature Cycle, -65/150C	500 Cycles	-	2/231/0	3/231/0	1/77/0	3/231/0
HTSL	High Temp Storage Bake 150C	1000 Hours	-	-	-	1/77/0	3/135/0
HTSL	High Temp Storage Bake 175C	500 Hours	-	3/231/0	3/135/0	-	-
HTOL	Life Test, 125C	1000 Hours	-	-	-	-	3/231/0
HTOL	Life Test, 150C	300 Hours	-	3/231/0	-	-	-
HTOL	Life Test, 150C	408 Hours	-	-	3/231/0	-	-
ELFR	Early Life Failure Rate, 125C	48 Hours	-	-	4/2400/4 (1)	-	3/2400/0
HBM	ESD - HBM - Q100	2000 V	-	2/6/0	3/9/0	-	-
HBM	ESD - HBM - Q100	2500 V	-	1/3/0	-	-	-
CDM	ESD – CDM – Q100	1500 V	-	3/9/0	3/9/0	1/3/0	-
LU	Latch-up	Per JESD78	-	3/18/0	3/18/0	-	-
MSL	Automotive Moist Sens. L2	Level 2-260C	-	-	3/36/0	-	-
PD	Physical Dimensions	Cpk>1.67	-	-	3/30/0	-	3/30/0
SD	Surface Mount Solderability	Pb Free	-	-	1/15/0	-	1/15/0

Type	Test Name / Condition	Duration	Qual Device: MC1458DR	QBS Product Reference: LM358BIDR	QBS Process Reference: LM2904BQDRQ1	QBS Package Reference: LM393BIDR	QBS Package Reference: SN65HVDA1040AQDRQ1
SD	Surface Mount Solderability	Pb	-	-	1/15/0	-	1/15/0
DS	Die Shear	QSS 009-009	1/10/0	1/10/0	1/10/0	-	1/10/0
WBP	Bond Pull Cpk>1.67	Wires	1/76/0	3/228/0	3/90/0	-	3/90/0
WBS	Wire Bond Shear Cpk>1.67	Wires	1/76/0	3/228/0	3/90/0	-	3/90/0

- QBS: Qual By Similarity
- Qual Device MC1458DR 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: -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/

Green/Pb-free Status:

Qualified Pb-Free(SMT) and Green

Note (1): Precon and ELFR fails due to a defect screenable at production test.

Qualification Report

Approve Date 12-Nov-2020

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

Type	Test Name / Condition	Duration	Qual Device: MC1458DR	QBS Product Reference: LM358BIDR	QBS Process Reference: LM2904BQDRQ1	QBS Package Reference: LM358DR	QBS Package Reference: TL494IDR
PC	PreCon Level 1	Level 1-260C	1/170/0	-	-	-	-
PC	PreCon Level 2	Level 2-260C	-	-	3/1499/10 (1)	-	-
ED	Electrical Characterization	Per Datasheet Parameters	-	Pass	Pass	Pass	Pass
HAST	Biased HAST, 130C/85%RH	96 Hours	-	2/231/0	3/231/0	1/77/0	3/229/0
TS	Thermal Shock -65/150C	500 Cycles	-	-	-	3/231/0	3/231/0
AC	Autoclave 121C	96 Hours	1/77/0	-	-	1/77/0	3/231/0
UHAST	Unbiased HAST 130C/85%RH	96 Hours	-	2/231/0	3/231/0	-	-
TC	Temperature Cycle, -65/150C	500 Cycles	1/77/0	2/231/0	3/231/0	3/231/0	3/231/0
HTSL	High Temp Storage Bake 170C	420 Hours	-	-	-	1/77/0	3/231/0
HTSL	High Temp Storage Bake 175C	500 Hours	-	2/231/0	3/135/0	-	-
HTOL	Life Test, 150C	300 Hours	-	3/231/0	-	1/77/0	3/231/0
HTOL	Life Test, Grade-1, 150C	408 Hours	-	-	3/231/0	-	-
ELFR	Early Life Failure Rate, 125C	48 Hours	-	-	8/3600/4 (1)	-	-
HBM	ESD - HBM - Q100	2000 V	-	2/6/0	3/9/0	-	-
HBM	ESD - HBM - Q100	2500 V	-	1/3/0	-	-	-
CDM	ESD - CDM - Q100	1500 V	-	3/9/0	3/9/0	-	-
LU	Latch-up	Per AEC-Q100-004	-	-	3/18/0	-	-
LU	Latch-up	Per JESD78	-	3/18/0	-	-	-
PD	Auto Physical Dimensions	Cpk>1.67	-	-	3/30/0	-	-
SD	Surface Mount Solderability	Pb	-	-	1/30/0	-	-
SD	Surface Mount Solderability	Pb Free	-	-	1/30/0	-	-
FLAM	Flammability (IEC 695-2-2)	--	-	-	-	-	3/15/0

Type	Test Name / Condition	Duration	Qual Device: MC1458DR	QBS Product Reference: LM358BIDR	QBS Process Reference: LM2904BQDRQ1	QBS Package Reference: LM358DR	QBS Package Reference: TL494IDR
FLAM	Flammability (UL 94V-0)	--	-	-	-	-	3/15/0
FLAM	Flammability (UL-1694)	--	-	-	-	-	3/15/0
MSL	Moisture Sensitivity, JEDEC	Level 1-260C	1/12/0	-	-	3/36/0	3/36/0
MSL	Automotive Moist Sens. L2	Level 2-260C	-	-	3/36/0	-	-
WBP	Bond Strength	Wires	-	3/228/0	3/90/0	1/76/0	3/228/0
WBS	Ball Bond Shear	Wires	-	3/228/0	3/90/0	-	-

- QBS: Qual By Similarity
- Qual Device MC1458DR 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: -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/

Green/Pb-free Status:

Qualified Pb-Free(SMT) and Green

Note (1): Precon and ELFR fails due to a defect screenable at production test.

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

Location	E-Mail
USA	PCNAmericasContact@list.ti.com
Europe	PCNEuropeContact@list.ti.com
Asia Pacific	PCNAsiaContact@list.ti.com
WW PCN Team	PCN_ww_admin_team@list.ti.com

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.