12500 TI Boulevard, MS 8640, Dallas, Texas 75243

PCN#20230306002.2
Qualification of CFAB & DFAB8 as additional Fab sites, Additional AT options, and Cu bond wire
Change Notification / Sample Request

Date: March 07, 2023
To: TOKYO ELECTRON DEVICE (DSTR) 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 this notification, 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 multiyear transition plan for our two remaining factories with 150-millimeter production (DFAB in Dallas, Texas, and SFAB in Sherman, Texas). DFAB will remain open, but will focus on 200-mm production, with a smaller set of technologies. SFAB will close no earlier than 2024 and no later than 2025. 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). 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

20230306002.2
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 sixty (60) months. The corresponding customer part number is also listed, if available.

DEVICE	CUSTOMER PART NUMBER
MAX3232EIPWRQ1	null
TRS3232EQPWRQ1	null
TLV2371QDBVRQ1	null
TLV2374QPWRG4Q1	null
TLV2374QPWRQ1	null
TLC2272AQPWRQ1	null
TLV271QDBVRQ1	null
TLV2371QDRG4Q1	null
TLC2264AQPWRQ1	null
TLC2272AQDRG4	null

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

PCN Number:	20230306002.2	PCN Date:	March 07, 2023
Title:	Qualification of CFAB & DFAB8 as additional Fab sites, Additional AT options, and Cu bond wire		
Customer Contact:	PCN Manager	Dept:	Quality Services
Proposed 1st Ship Date:	Sept 3, 2023	Sample requests accepted until:	April 7, 2023*

***Sample requests received after April 7, 2023 will not be supported.**

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		

PCN Details

Description of Change:

Qualification of additional Fab sites (CFAB & DL-LIN) using qualified Process Technology and additional Assembly sites options for the list of devices in the product affected section below.

Current Fab Site			Additional Fab Site		
Current Fab Site	Process	Wafer Diameter	Additional Fab Site	Process	Wafer Diameter
DL-LIN	LBC3S	150mm	CFAB DL-LIN	LBC3S	200mm

Construction differences (No construction differences for Group 1) are as follows:

Group 2: CFAB & DFAB as an additional Fab sites and Cu as additional bond wire

	Current	Additional
Bond wire composition, diameter	Au, 0.96 mil	Cu, 0.96 mil

Group 3: CFAB & DFAB8 as additional fab sites and additional AT sites

	LEN	TAI	UTL1	CDAT	FMX	MLA
Mold Compound	SID #0011G60007	4205443 or 4211880	SID #CZ0135	4222198	4211880	4211649
Bond wire composition, diameter	Au, 1.0 mil	Au, 0.96 mil	Cu, 1.0 mil	Cu, 0.8 or 1.0 mil	Cu, 0.96	Cu, 0.96 mil
Mount Compound	SID #0003C10332	4208458 or 4147858	SID #PZ0037	4226215, or 4207123	4147858	4208458
Lead finish	NiPdAu	NiPdAu	NiPdAu	NiPdAu or Matte Sn	NiPdAu	NiPdAu
Final Test site	LEN	TAI	UTL2	CDAT	FMX	MLA

Group 4: CFAB as an additional Fab site and Cu as additional bond wire

	Current	Additional
Bond wire composition, diameter	Au, 0.96 mil	Cu, 0.96 mil

Group 5: CFAB as an additional Fab site and additional AT sites

	LEN	TAI	UTL1	CDAT	FMX	MLA

Mold Compound	SID #0011G60007	4205443 or 4211880	SID #CZ0135	4222198	4211880	4211649
Bond wire composition, diameter	Au, 1.0 mil	Au, 0.96 mil	Cu, 1.0 mil	Cu, 0.8 or 1.0 mil	Cu, 0.96	Cu, 0.96 mil
Mount Compound	SID #0003C10332	4208458 or 4147858	SID #PZ0037	4226215 or 4207123	4147858	4208458
Lead finish	NiPdAu	NiPdAu	NiPdAu	NiPdAu or Matte Sn	NiPdAu	NiPdAu
Final Test site	LEN	TAI	UTL2	CDAT	FMX	MLA

Probe site change: All devices listed in this notification will also be qualified at CD-PR as an additional probe site with the following exceptions: MAX3232EIPWRQ1 & TRS3232EQPWRQ1 (these devices have no probe step)

Upon expiry of this PCN TI will combine lead free solutions in a single ***standard part number***, for the devices in groups 3 & 5. For example; ***TLV2374QDRQ1*** – can ship with both Matte Sn and NiPdAu/Ag.

Example:

- Customer order for 7500 units of TLV2374QDRQ1with 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.

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-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	IEC 62474
☒ No Change	☒ No Change	☒ No Change	☒ No Change

Changes to product identification resulting from this PCN:

Fab Site Information:

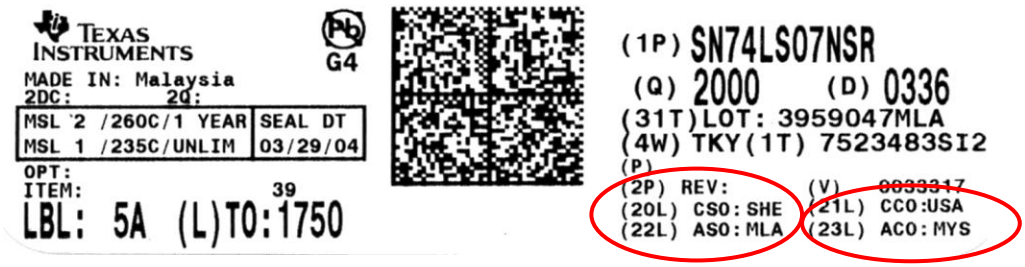
Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
DL-LIN	DLN	USA	Dallas
CFAB	**CU3**	**CHN**	**Chengdu**

Assembly Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
TAI	TAI	TWN	Chung Ho, New Taipei City
LEN	LIN	TWN	Taichung

UTL1	NSE	THA	Bangkok
CDAT	**CDA**	**CHN**	**Chengdu**
TI Malaysia	**MLA**	**MYS**	**Kuala Lumpur**
FMX	**MEX**	**MEX**	**Aguascalientes**

Sample product shipping label (not actual product label)



Product Affected:

Group 1 (CFAB & DFAB8 as additional Fab sites)Device list:

TLV2462QDGKRQ1

Group 2 (CFAB & DFAB as an additional Fab sites and Cu as additional bond wire)Device list:

TLC2264AIDRCT	TLV2374QDRG4Q1	TLV2462QDRG4Q1	TLV2474QDRG4Q1
TLC2264AQPWRG4Q1	TLV2374QDRQ1	TLV2462QDRQ1	TLV2474QDRQ1
TLC2264AQPWRQ1	TLV2374QPWRG4Q1	TLV2462QPWRG4Q1	TLV272QDRQ1
TLV2264AQPWRQ1	TLV2374QPWRQ1	TLV2463AQPWRG4Q1	TLV274QDRQ1
TLV2371QDRG4Q1	TLV2374QPWRRB	TLV2474AQDRG4Q1	TLV274QPWRG4Q1
TLV2372QDRQ1	TLV2462AQDRQ1		

Group 3 (CFAB & DFAB8 as additional fab sites and additional AT sites) Device list:

TLC072QDRQ1	TLV2371QDBVRQ1	TLV271QDBVRQ1	TPS3838E18QDBVRCT
TLC084QPWPRQ1	TLV2474APWPRQ1	TLV271QDBVRVS	TPS3838K33QDBVRQ1
TLV2264AQD	TLV2474QPWPRQ1		

Group 4 (CFAB as an additional Fab site and Cu as additional bond wire)Device list:

MAX3232EIPWRQ1	MLA00464PWR	TLC2272MDRCT	TLC2272SDRG4SV
MLA00059DR	TLC2272AQDR	TLC2272QDRG4Q1	TLC2274AQDRG4Q1
MLA00060DR	TLC2272AQDRG4	TLC2272QDRQ1	TLC2274AQDRQ1
MLA00172DR	TLC2272AQDRG4Q1	TLC2272QDRSV	TLC2274AQPWRG4Q1
MLA00349PWR	TLC2272AQDRQ1	TLC2272QPWRG4	TLC2274AQPWRQ1
MLA00351PWR	TLC2272AQPWRG4Q1	TLC2272QPWRG4Q1	TLC2274ASDRDL
MLA00354DR	TLC2272AQPWRQ1	TLC2272QPWRQ1	TLC2274QPWRQ1
MLA00361PWR	TLC2272ASPWRCT	TLC2272QPWRSV	TRS3232EQPWRQ1
MLA00402PWR			

Group 5 (CFAB as an additional Fab site and additional AT sites)Device list:

TLC2272AMD	TLC2272AMDRG4	TLC2274AMD	TLC2274AQDRG4

TLC2272AMDR	TLC2272MDR	TLC2274AMDG4

TI Informational
Selective Disclosure

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Approved 2-March-2023

Product Attributes

Attributes	Qual Device: TLC2264AQPWRQ1	QBS Process Reference: TPS3838E18QDBVRCT	QBS Package Reference: SN3257QPWRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range	-40C to 125C	-40C to 125C	-40C to 125C
Product Function	Signal Chain	Interface	Interface
Wafer Fab Supplier	CFAB	CFAB	RFAB
Assembly Site	MLA	CDAT	MLA
Package Type	TSSOP	SOT-23	TSSOP
Package Designator	D	DBV	PW
Ball/Lead Count	14	5	16

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: TLC2264AQPWRQ1	QBS Process Reference: TPS3838E18QDBVRCT	
Test Group A – Accelerated Environment Stress Tests										
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	231	Automotive Preconditioning	Level 1-260C	-	Pass	Pass
	bHAST	A2	JEDEC JESD22-A101	3	77	Biased HAST, 130C/85%RH	192 Hours	-	3/231/0	3/210/0
	AC	A3	JEDEC JESD22-A102	3	77	Autoclave, 121C	192 Hours	-	3/231/0	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	-	3/231/0	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	2000 Cycles	-	-	3/210
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Life, 175C	500 Hours	-	1/45/0	3/135/0
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Life, 175C	1000 Hours	-	-	3/132/0
Test Group B – Accelerated Lifetime Simulation Tests										
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 125C	1000 Hours	1/77/0	3/231/0	-
	ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 125C	48 Hours	-	3/2400/0	-
Test Group C – Package Assembly Integrity Tests										
	WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	1/30/0	3/90/0	3/90/0
	WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	1/30/0	3/90/0	3/90/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	15	-	1/15/0	-
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	10 units	1/10/0	3/30/0	-
Test Group D – Die Fabrication Reliability Tests										
	EM	D1	JESD61	-	-	Electromigration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	-
	TDDB	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
	HCI	D3	JESD60 & 28	-	-	Hot Injection Carrier	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
	NBTI	D4	-	-	-	Negative Bias Temperature Instability	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
	SM	D5	-	-	-	Stress Migration	--	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	1/3/0	-
	CDM	E3	AEC Q100-011	1	3	ESD - CDM	1000 V	1/3/0	1/3/0	-
	LU	E4	AEC Q100-004	1	6	Latch-up	+/100mA, 125C	1/6/0	1/6/0	-
	ED	E5	AEC Q100-005	3	30	Electrical Distribution	Cpk > 1.67	1/30/0	3/90/0	-

- QBS: Qual By Similarity
- Qual Device TLC2264AQPWRQ1 is qualified at LEVEL1-260C

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

TI Qualification ID: 20200903-135990

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Approved 2-March-2023

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: SN65HVDA195QDRQ1
Test Group A – Accelerated Environment Stress Tests								
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	231	Automotive Preconditioning	Level 1-260C	Pass
	bHAST	A2	JEDEC JESD22-A101	3	77	Biased HAST, 130C/85%RH	192 Hours	3/231/0
	AC	A3	JEDEC JESD22-A102	3	77	Autoclave, 121C	192 Hours	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Life, 175C	500 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, 125C	48 Hours	3/2400/0
Test Group C – Package Assembly Integrity Tests								
	WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	3/90/0
	WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	3/90/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability >95% Lead Coverage	15	1/15/0
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	10 units	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 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	1000 V	1/3/0
	LU	E4	AEC Q100-004	1	6	Latch-up	+/100mA, 125C	1/6/0
	ED	E5	AEC Q100-005	3	30	Electrical Distribution	Cpk > 1.67	3/30/0

- QBS: Qual By Similarity
- Qual Device TPS3838E18QDBVRCT is qualified at LEVEL1-260C

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

TI Qualification ID: R-CHG-2211-005

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

Approve Date 11-Feb-2020

Updated 02/11/2020-Added QBS Data

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: TLV2401QDBVRQ1	QBS Process Reference: MAX3243IPWG4DL
Test Group A – Accelerated Environment Stress Tests									
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning Level 1	Level 1-260C	3/1199/0	-
	HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	3/231/0	3/231/0
	AC	A3	JEDEC JESD22-A102	3	77	Autoclave 121C	96 Hours	3/231/0	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0	3/231/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 150C	1000 Hours	-	3/231/0
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 175C	500 Hours	3/135/0	-
Test Group B – Accelerated Lifetime Simulation Tests									
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 150C	408 Hours	3/231/0	3/231/0
	ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 125C	48 Hours	-	3/2400/0
	EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	-	N/A	-
Test Group C – Package Assembly Integrity Tests									
	WBP	C1	AEC Q100-001	1	30	Bond Pull, over ball	Minimum of 5 devices, 30 wires Cpk>1.67	3/90/0	1/30/0
	WBP	C1	AEC Q100-001	1	30	Bond Pull, over stitch	Minimum of 5 devices, 30 wires Cpk>1.67	3/90/0	1/30/0
	WBS	C1	AEC Q100-001	1	30	Auto Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	3/90/0	-

	Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: TLV2401QDBVRQ1	QBS Process Reference: MAX3243IPWG4DL
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb	1/15/0	-
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb Free	1/15/0	1/15/0
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Auto Physical Dimensions	Cpk>1.67	3/30/0	3/30/0
	LI	C6	JEDEC JESD22-B105	1	22	Lead Pull to Destruction	Leads	1/22/0	-
Test Group D – Die Fabrication Reliability Tests									
	EM	D1	JESD61	-	-	Electromigration	-	Completed Per Process Technology Requirements	-
	TDDB	D2	JESD35	-	-	Time Dependant 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	500 V (1)	1/3/0	-
	CDM	E3	AEC Q100-011	1	3	ESD - CDM - Q100	1500 V	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	Auto Electrical Distributions	Cpk>1.67	3/90/0	-

- QBS: Qual By Similarity
- Qual Device TLV2401QDBVRQ1 is qualified at LEVEL1-260C

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
Note (1): See ESD waiver attached to eQDB.
Change Number: NA
TI Qualification ID: 20190124-128331

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

Q006 Qual Summary for LBC3 BOAC with PCC wire in FMX with 150mm wafers (ALSiCu metalization) Q100H (Grade 1, -40/125C)
Approved 07-Sep-2016

Product Attributes

Attributes	Qual Device: SN65HVD233QDRQ1	Qual Device: SN65HVD234QDRQ1	Qual Device: SN65HVD235QDRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range	-40 to +125 C	-40 to +125 C	-40 to +125 C
Product Function	Interface	Interface	Interface
Wafer Fab Supplier	DFAB	DFAB	DFAB
Die Revision	A	A	A
Assembly Site	FMX	FMX	FMX
Package Type	SOIC	SOIC	SOIC
Package Designator	D	D	D
Ball/Lead Count	8	8	8

- QBS: Qual By Similarity
- Qual Device SN65HVD233QDRQ1, Qual Device SN65HVD235QDRQ1, - Qual Device SN65HVD234QDRQ1 is qualified at LEVEL1-260C

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: SN65HVD233QDRQ1	Qual Device: SN65HVD234QDRQ1	Qual Device: SN65HVD235QDRQ1
Test Group A – Accelerated Environment Stress Tests										
	-	-	-	-	-	SAM Analysis Post Precon	Completed	1/22/0	1/22/0	1/22/0
	PC	A1	JEDEC J-STD-020 JESD22-A113	-	-	Preconditioning	Level 1-260C	No Fails	No Fails	No Fails
	-	-	-	-	-	SAM Analysis Post Precon	Completed	1/22/0	1/22/0	1/22/0
	HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST 130C/85%RH	96 Hours	1/77/0	1/77/0	1/77/0
	-	-	-	3	1	Cross Section Post bHAST 96 Hours	Completed	1/1/0	1/1/0	1/1/0

	Type	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name / Condition	Duration	Qual Device: SN65HVD233QDRQ1	Qual Device: SN65HVD234QDRQ1	Qual Device: SN65HVD235QDRQ1
	-	-	-	3	22	SAM Analysis Post bHAST 96 Hours	Completed	1/22/0	1/22/0	1/22/0
	-	-	-	3	30	Wire Bond Shear Post bHAST 96 Hours	Wires	1/30/0	1/30/0	--
	-	-	-	3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	1/30/0	1/30/0	-
	-	-	-	3	30	Bond Pull over Ball, Post bHAST, 96 Hours	Wires	1/30/0	1/30/0	-
	HAST	**A2**	**JEDEC JESD22-A110**	**3**	**70**	**Biased HAST 130C/85%RH**	**192 Hours**	**1/70/0**	**1/70/0**	**1/70/0**
	-	-	-	3	1	Cross Section Post bHAST 192 Hours	Completed	1/1/0	1/1/0	1/1/0
	-	-	-	3	22	SAM Analysis Post bHAST 192 Hours	Completed	1/22/0	1/22/0	1/22/0
	-	-	-	3	30	Wire Bond Shear Post bHAST 192 Hours	Wires	1/20/0 (1)	1/30/0	1/30/0
	-	-	-	3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	1/30/0	1/30/0	1/30/0
	-	-	-	3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	1/20/0 (1)	1/30/0	1/30/0
	TC	**A4**	**JEDEC JESD22-A104 and Appendix 3**	**3**	**77**	**Temperature Cycle -65/150C**	**500 Cycles**	**1/77/0**	**1/77/0**	**1/77/0**
	-	-	-	3	1	Cross Section Post T/C 500 Cycles	Completed	1/1/0	1/1/0	1/1/0
	-	-	-	3	22	SAM Analysis Post T/C 500 Cycles	Completed	1/22/0	1/22/0	1/22/0
	TC-WBS	-	-	3	30	Wire Bond Shear Post T/C 500 Cycles	Wires	1/30/0	1/30/0	1/30/0
	TC-WBP	A4	MIL-STD883 Method 2011	3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	1/30/0	1/30/0	1/30/0
	TC-WBP	A4	MIL-STD883 Method 2011	3	30	Bond Pull over Stitch Post T/C 500 Cycles	Wires	1/30/0	1/30/0	1/30/0
	TC	**A4**	**JEDEC JESD22-A104 and Appendix 3**	**3**	**70**	**Temperature Cycle -65/150C**	**1000 Cycles**	**1/70/0**	**1/70/0**	**1/70/0**
		-	-	3	1	Cross Section Post T/C 1000 Cycles	Completed	1/1/0	1/1/0	1/1/0
		-	-	3	22	SAM Analysis Post T/C 1000 Cycles	Completed	1/22/0	1/22/0	1/22/0
	TC-WBS	-	-	3	30	Wire Bond Shear Post T/C 1000 Cycles	Wires	1/30/0	1/30/0	1/30/0
	TC-WBP	A4	MIL-STD883 Method 2011	3	30	Bond Pull over Ball Post T/C 1000 Cycles	Wires	1/30/0	1/30/0	1/30/0
	TC-WBP	A4	MIL-STD883 Method 2011	3	30	Bond Pull over Stitch Post T/C 1000 Cycles	Wires	1/30/0	1/30/0	1/30/0

	Type	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name / Condition	Duration	Qual Device: SN65HVD233QDRQ1	Qual Device: SN65HVD234QDRQ1	Qual Device: SN65HVD235QDRQ1
	PTC	**A5**	**JEDEC JESD22-A105**	**1**	**45**	**Power Temperature Cycle - 40/125C**	**1000 Cycles**	**N/A**	**N/A**	**N/A**
	PTC	**A5**	**JEDEC JESD22-A105**	**1**	**45**	**Power Temperature Cycle - 40/125C**	**2000 Cycles**	**N/A**	**N/A**	**N/A**
	HTSL	**A6**	**JEDEC JESD22-A103**	**3**	**45**	**High Temp Storage Bake 150C**	**1000 Hours**	**1/45/0**	**1/45/0**	**1/45/0**
	-	-	-	3	1	Cross Section Post Bake 1000 Hours	Completed	1/1/0	1/1/0	1/1/0
	HTSL	**A6**	**JEDEC JESD22-A103**	**3**	**44**	**High Temp Storage Bake 150C**	**2000 Hours**	**1/44/0**	**1/44/0**	**1/44/0**
	-	-	-	3	1	Cross Section Post Bake 2000 Hours	Completed	1/1/0	1/1/0	1/1/0
Test Group C – Package Assembly Integrity Tests										
	WBS	C1	AEC Q100-001	3	30	Wire Bond Shear Cpk>1.67	Wires	1/30/0	1/30/0	1/30/0
	WBP	C2	MIL-STD883 Method 2011	3	30	Bond Pull Cpk>1.67	Wires	1/30/0	1/30/0	1/30/0

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

Junction 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

TI Qualification ID: 20160217-116814

Notes/ Comments:
(1) Performed on only 2 devices

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

SN3257QPWRQ1 (Grade 1, Q100H, -40/125C)
Approved 13-Feb-2020

Product Attributes

Attributes	Qual Device: SN3257QPWRQ1	QBS Process Reference: SN3257QDYYRQ1
Automotive Grade Level	Grade 1	Grade 1
Operating Temp Range	-40 to +125 C	-40 to +125 C
Product Function	Interface	Interface
Wafer Fab Supplier	RFAB	RFAB
Die Revision	A	A
Assembly Site	MLA	PHI
Package Type	TSSOP	SOT-23
Package Designator	PW	DYY
Ball/Lead Count	16	16

- QBS: Qual By Similarity
- Qual Device SN3257QPWRQ1 is qualified at LEVEL1-260C

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: SN3257QPWRQ1	QBS Process Reference: SN3257QDYYRQ1
Test Group A – Accelerated Environment Stress Tests									
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 1-260C	No Fails	-
	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, -55/150C	1000 Cycles	3/231/0	-
	TC-WBP	A4	MIL-STD883 Method 2011	1	60	Bond Pull Post Temp Cycle	Wires	1/60/0	-
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle	1000 Cycles	N/A	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp Storage Bake 175C	500 Hours	3/135/0	-
Test Group B – Accelerated Lifetime Simulation Tests									
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 150C	300 Hours	3/231/0	3/231/0
	ELFR	B2	AEC Q100-008	3	800	Early Life Failure Rate, 150C	24 Hours	-	3/2400/0
	EDR	B3	AEC Q100-005	3	77	NVM Endurance, Data Retention, and Operational Life	-	N/A	-
Test Group C – Package Assembly Integrity Tests									
	WBS	C1	AEC Q100-001	1	30	Wire Bond Shear, Cpk >1.67	Wires	3/90/0	-
	WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull, Cpk >1.67	Wires	3/90/0	-
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	PB Solder	1/15/0	-
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb Free Solder	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	-	-	Electromigration	-	Completed Per Process Technology Requirements	-
	TDDB	D2	JESD35	-	-	Time Dependant 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	5000 V	1/3/0	-
	CDM	E3	AEC Q100-011	1	3	ESD - CDM	2000 V	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	3/90/0	-

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

TI Qualification ID: 20190311-128972

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Q100H Grade-1 qual for TLV27L2QDRQ1 (DFAB/LBC3S) in FMX using 8-pin SOIC pkg

Approved 03-Sep-2015

Updated 08/03/2015-Added QBS Data

Product Attributes

Attributes	Qual Device: TLV2372QDRG4Q1	Qual Device: TLV2372QDRQ1	Qual Device: TLV27L2QDRQ1	QBS Process Reference: MAX3243IPWG4DL	QBS Package Reference: SN65HVD230D	QBS Package Reference: TPS28225TDRQ1
Operating Temp Range	-40°C to +125°C	-40°C to +125°C	-40°C to +125°C	-40°C to +125°C	-40°C to +125°C	-40°C to +105°C
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 2
Product Function	Signal Chain	Signal Chain	Signal Chain	-	-	-
Wafer Fab Supplier	DFAB	DFAB	DFAB	DFAB	DFAB	DMOS5
Die Revision	A	A	A	A	B	D
Assembly Site	FMX	FMX	FMX	MLA	FMX	FMX
Package Type	SOIC	SOIC	SOIC	TSSOP	SOIC	SOIC
Package Designator	D	D	D	PW	D	D
Ball/Lead Count	8	8	8	28	8	8

- QBS: Qual By Similarity
- Qual Devices qualified at LEVEL1-260C: TLV2372QDRG4Q1, TLV2372QDRQ1, TLV27L2QDRQ1

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: TLV2372QDRG4Q1	Qual Device: TLV2372QDRQ1	Qual Device: TLV27L2QDRQ1	QBS Process Reference: MAX3243IPWG4DL	QBS Package Reference: SN65HVD230D	QBS Package Reference: TPS28225TDRQ1
Test Group A – Accelerated Environment Stress Tests													
	PC	A1	JEDEC J-STD-020 JESD22-A113	1	0	Automotive Preconditioning	Level 3-260C	1/243/0	1/240/0	1/300/0	-	-	-
	THB	A2	JEDEC JESD22-A101	3		Biased Temperature and Humidity, 85C/85%RH	1000 Hours	1/77/1 (Note 1)	1/77/0	-	-	-	-
	HAST	A2	JEDEC JESD22-A110	1	77	Biased HAST, 130C/85%RH	96 Hours	-	-	1/77/0	3/231/0	-	-
	AC	A3	JEDEC JESD22-A102	1	77	Autoclave 121C	96 Hours	1/77/0	1/77/0	1/77/0	3/231/0	-	-
	TC	A4	JEDEC JESD22-A104 and Appendix 3	1	77	Temperature Cycle, -65/150C	500 Cycles	1/77/0	1/77/0	1/77/0	3/231/0	-	-
	TC-BP		MIL-STD883 Method 2011	1	30	Post Temp Cycle Bond Pull	Wires	-	-	1/30/0	-	-	-
	PTC	A5	JEDEC JESD22-A105	1		Power Temperature Cycle, -40/105C	1000 Cycles	N/A	N/A	N/A	-	-	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 150C	1000 Hours	-	-	-	1/45/0	-	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 175C	500 Hours	-	-	1/45/0	-	-	-
Test Group B – Accelerated Lifetime Simulation Tests													
	HTOL	B1	JEDEC JESD22-A108	1	77	Life Test, 150C	408 Hours	1/77/0	1/77/0	1/77/0	3/231/0	-	-
	ELFR	B2	AEC Q100-008	3		Early Life Failure Rate, 125C	48 Hours	-	-	-	1/800/0	-	-
	ELFR	B2	AEC Q100-008	3		Early Life Failure Rate, 150C	48 Hours	-	-	-	2/1600/0	-	-
	EDR	B3	AEC Q100-005	3		NVM Endurance, Data Retention, and Operational Life	-	N/A	N/A	N/A	-	-	-

Test Group C – Package Assembly Integrity Tests													
	WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	-	-	1/30/0	-	-	-
	WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	-	-	1/30/0	-	-	-
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb	-	-	-	-	-	1/15/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb-Free	-	-	-	-	-	1/15/0
	PD	C4	JEDEC JESD22-B100 and B108	3		Physical Dimensions (Cpk>1.67)	--	-	-	-	3/30/0	3/30/0	-
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	1000 V	-	-	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	-	-	3/90/0	-	-	-

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

Junction 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

Note (1): Die EOS, 1 unit – capacitor pinhole, discounted (QTS 439122-1)

TI Qualification ID: 20150513-113887

Affected ZVEI IDs: SEM-PW-02, SEM-PW-13, SEM-PA-05, SEM-PA-07, SEM-PA-08, SEM-PA-11, SEM-TF-01

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

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

Location	E-Mail
WW Change Management Team	PCN_ww_admin_team@list.ti.com