12500 TI Boulevard, MS 8640, Dallas, Texas 75243

PCN#20230728000.2
Qualification of additional Fab site (DL-LIN) using qualified Process Technology and additional Assembly/Test sites options for select devices
Change Notification / Sample Request

Date: July 31, 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 Change Management team. For sample requests or sample related questions, contact your local Field Sales Representative. As always, we thank you for your continued business.

Change Management Team
SC Business Services

20230728000.2
Attachment: 1

Products Affected:

The devices listed on this page are a subset of the complete list of affected devices. According to our records, you have recently purchased these devices. The corresponding customer part number is also listed, if available.

DEVICE	CUSTOMER PART NUMBER
TPS76801QPWPRG4Q1	null
TPS76801QPWPRQ1	null
SN65HVD234QDRQ1	null
TLV2372QDRG4Q1	null
TRS3223QPWRQ1	null
TLC082QDGNRQ1	null
TPS76750QPWPRQ1	null
SN65C3221IPWRQ1	null
SN65HVD232QDRQ1	null
SN65HVD251QDRQ1	null

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

PCN Number:	20230728000.2	PCN Date:	July 31, 2023
Title:	Qualification of additional Fab site (DL-LIN) using qualified Process Technology and additional Assembly/Test sites options for select devices		
Customer Contact:	Change Management team	Dept:	Quality Services
Proposed 1st Ship Date:	Jan 31, 2024	Sample Requests accepted until:	Aug 31, 2023*

***Sample requests received after Aug 31, 2023 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:

Qualification of additional Fab site (DL-LIN) using qualified Process Technology and additional Assembly/Test 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	DL-LIN	LBC3S	200mm

Construction differences are noted below (There are no construction differences for Group 1)
.

Group 1A (DFAB8 qualification plus Probe site) BOM Table

	Current	Additional
Probe Site	DFAB	CDPR

Group 2 (DFAB8 qualification plus Cu) BOM Table

	Current	Additional
Bond wire composition, diameter	Au, 0.96 mil	Cu, 1.0 mil

Group 3 (DFAB8 qualification plus BOM changes) BOM Table

	Current	Additional
Mold Compound	4206193	4211471
Bond wire composition, diameter	Au, 0.96 mil	Cu, 1.0 mil
Mount Compound	4042500	4147858

Group 4 (DFAB8 qualification plus PHI as additional site) BOM Table

	LEN	PHI
Mold Compound	SID#0011G60007	4222198
Bond wire composition, diameter	Au, 1.0 mil	Cu, 1.0 mil
Mount Compound	SID#0003C10332	8095733

Lead finish	NiPdAu	Matte Sn
Final Test site	LEN	PHI

Group 5 (DFAB8 qualification plus CDAT as additional Assembly site)BOM Table

	LEN	CDAT
Mold Compound	SID#0011G60007	4222198
Bond wire composition, diameter	Au, 1.0 mil	Cu, 1.0 mil
Mount Compound	SID#0003C10332	4207123
Lead finish	NiPdAu	Matte Sn
Probe Site	DFAB	CDPR
Final Test Site	LEN	CDAT

Upon expiry of this PCN, there will be a transition period where TI will combine lead free solutions in a single ***standard part number*** For example; ***TLV2381IDBVT*** – can ship with both Matte Sn and NiPdAu.
Example:

- Customer order for 7500 units of TLV2381IDBVT 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.

Test coverage, insertions, conditions will remain consistent with current testing and verified with test MQ

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
DL-LIN	DLN	USA	Dallas
DL-LIN	**DLN**	**USA**	**Dallas**

Assembly Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City

LEN	LIN	TWN	Taichung
CDAT	**CDA**	**CHN**	**Chengdu**
TIPI	**PHI**	**PHL**	**Baguio City**

Sample product shipping label (not actual product label)

Product Affected:

Group 1 Device list (DFAB8 qualification only)

MLA00300DR	TLV2402QDGKRQ1	TPS3307-18QDRG4Q1	TPS76833QPWPRQ1
MLA00346PWPR	TLV2472QDRG4Q1	TPS3307-18QDRQ1	TPS76850QPWPRQ1
SN65HVD230QDR	TLV2472QDRQ1	TPS76733QPWPRQ1	TPS77501QPWPRQ1
SN65HVD231QD	TPS3306-15QDRG4Q1	TPS76750QPWPRQ1	TPS77533QPWPRCT
SN65HVD231QDG4	TPS3306-15QDRQ1	TPS76801QPWPRG4CT	TPS77533QPWPRQ1
SN65HVD231QDR	TPS3306-18QDRG4Q1	TPS76801QPWPRG4Q1	TPS77601QPWPRG4CT
SN65HVD232QD	TPS3306-18QDRQ1	TPS76801QPWPRMO	TPS77601QPWPRG4Q1
SN65HVD232QDG4	TPS3306-25QDRG4Q1	TPS76801QPWPRQ1	TPS77601QPWPRQ1
SN65HVD232QDR	TPS3306-33QDRG4Q1	TPS76818QPWPRQ1	TPS77633QPWPRQ1
SN65HVD233QDRQ1	TPS3306-33QDRQ1	TPS76825QPWPRQ1	TPS77733QDRVS
SN65HVD234QDRQ1			

Group 1A Device list (DFAB8 qualification plus Probe site)

TLC082QDGNRQ1	TLV2372QDRG4Q1	TLV272QDRG4Q1

Group 2 Device list (DFAB8 qualification plus Cu)

SN65HVD230QDG4Q1	SN65HVD232QDRG4Q1	TLV2472AQDRG4Q1	TPS767D301QPWPRQ1
SN65HVD230QDRG4Q1	SN65HVD232QDRQ1	MLA00127PWPR	TPS767D318QPWPRQ1
SN65HVD231QDRG4Q1	SN65HVD251QDRMO	MLA00128PWPR	SN65C3221IPWRQ1
SN65HVD231QDRQ1	SN65HVD251QDRQ1	MLA00340PWPR	SN65C3221IPWRSV
SN65HVD232QDRG4	SN65HVD251QDRSV	MLA00341PWPR	

Group 3 Device list (DFAB8 qualification plus BOM changes)

TLV2460AQPWRG4Q1	TLV2464AQPWRG4Q1	TLV2464AQPWRVS	TRS3223QPWRQ1
TLV2461AQPWRG4Q1	TLV2464AQPWRQ1		

Group 4 Device list (DFAB8 qualification plus PHI as additional site)

TLV2471QDBVRQ1

Group 5 Device list (DFAB8 qualification plus CDAT as additional Assembly site)

TPS3836J25QDBVRQ1	TPS3836K33QDBVRQ1	TPS3836L30QDBVRQ1

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

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Approved 25-Aug-2016

Product Attributes

Attributes	Qual Device: ALM2402QPWPRQ1	QBS Process Reference: TPS51604QDSGQ1
Operating Temp Range	-40 to +125 C	-40 to +125 C
Automotive Grade Level	Grade 1	Grade 1
Product Function	Signal Chain	Power Management
Wafer Fab Supplier	RFAB	RFAB
Die Revision	A0	A
Assembly Site	TAI	CLARK-AT
Package Type	HTSSOP	WSON
Package Designator	PWP	DSG
Ball/Lead Count	14	8

- QBS: Qual By Similarity
- Qual Device ALM2402QPWPRQ1 is qualified at LEVEL3-260C

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: ALM2402QPWPRQ1	QBS Process Reference: TPS51604QDSGQ1
Test Group A – Accelerated Environment Stress Tests									
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 3-260C	3/1000/1 (Note 1)	-
	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
	TC-BP	A4	MIL-STD883 Method 2011	1	60	Post Temp Cycle Bond Pull	per MIL-STD 883 Method 2011	1/30/0	1/30/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle, -40/125C	1000 Cycles	1/45/0	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 150C	1000 Hours	-	3/135/0
	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	3	77	Life Test, 125C	1000 Hours	-	3/231/0
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 150C	300 Hours	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									
	WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	3/90/0	1/30/0
	WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	3/90/0	1/30/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb-Free	3/45/0	1/30/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb	3/45/0	-
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	3/30/0	3/30/0
Test Group D – Die Fabrication Reliability Tests									
	EM	D1	JESD61	-	-	Electromigration	-	Completed Per Process Technology Requirements	-
	TDDB	D2	JESD35	-	-	Time 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	2000 V	1/3/0	1/3/0
	CDM	E3	AEC Q100-011	1	3	ESD - CDM	250 V	1/3/0	1/3/0
	LU	E4	AEC Q100-004	1	6	Latch-up	(Per AEC Q100-004)	1/6/0	1/12/0
	ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67	3/90/0	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): One continuity failure due to mishandling – discounted.

TI Qualification ID: 20150211-111605

Automotive New Product Qualification Summary

(As per AEC-Q100 and JEDEC Guidelines)

Q100 Grade-1 qual for ALM2402QPWPRQ1 (RFAB/LBC7/D-Cu) in TAI using 14-pin TSSOP pkg (PWP) , per AEC Q100 Rev H
Approved 25-Aug-2016

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: ALM2402QPWPRQ1	QBS Process Reference: TPS51604QDSGQ1
	Test Group A – Accelerated Environment Stress Tests								
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Automotive Preconditioning	Level 3-260C	3/1000/1 (Note 1)	-
	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
	TC-BP	A4	MIL-STD883 Method 2011	1	60	Post Temp Cycle Bond Pull	per MIL-STD 883 Method 2011	1/30/0	1/30/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle, -40/125C	1000 Cycles	1/45/0	-
	HTSL	A6	JEDEC JESD22-A103	1	45	High Temp. Storage Bake, 150C	1000 Hours	-	3/135/0
	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	3	77	Life Test, 125C	1000 Hours	-	3/231/0
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 150C	300 Hours	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								
	WBS	C1	AEC Q100-001	1	30	Bond Shear (Cpk>1.67)	Wires	3/90/0	1/30/0
	WBP	C2	MIL-STD883 Method 2011	1	30	Bond Pull (Cpk>1.67)	Wires	3/90/0	1/30/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb-Free	3/45/0	1/30/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb	3/45/0	-
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions (Cpk>1.67)	--	3/30/0	3/30/0
	Test Group D – Die Fabrication Reliability Tests								
	EM	D1	JESD61	-	-	Electromigration	-	Completed Per Process Technology Requirements	-
	TDDB	D2	JESD35	-	-	Time 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	2000 V	1/3/0	1/3/0
	CDM	E3	AEC Q100-011	1	3	ESD - CDM	250 V	1/3/0	1/3/0
	LU	E4	AEC Q100-004	1	6	Latch-up	(Per AEC Q100-004)	1/6/0	1/12/0
	ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67	3/90/0	3/90/0

- QBS: Qual by Similarity
- Qual Device ALM2402QPWPRQ1 is qualified at LEVEL3-260C

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): One continuity failure due to mishandling – discounted.

TI Qualification ID: 20150211-111605

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

Approve Date 11-Feb-2020

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

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
	-	-	-	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	--

Type	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name / Condition	Duration	Qual Device: SN65HVD233QDRQ1	Qual Device: SN65HVD234QDRQ1	Qual Device: SN65HVD235QDRQ1
-	-	-	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
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**

Type	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name / Condition	Duration	Qual Device: SN65HVD233QDRQ1	Qual Device: SN65HVD234QDRQ1	Qual Device: SN65HVD235QDRQ1
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)

TPS3840PH30DBVRQ1 (Q100, Grade 1, -40 to 125C)

Approved 02-Jun-2022

Product Attributes

Attributes	Qual Device: TMS3840PH30DBVRQ1
Automotive Grade Level	Grade 1
Operating Temp Range	-40 to +125 C
Product Function	Power Management
Wafer Fab Supplier	RFAB
Die Revision	A
Assembly Site	CDAT
Package Type	SOT-23
Package Designator	DBV
Ball/Lead Count	5

- QBS: Qual By Similarity
- Qual Device 3840PH30DBVRQ1 is qualified at LEVEL1-260CG

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: 3840PH30DBVRQ1
			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
	UHAST	A3	JEDEC JESD22-A102	3	77	Unbiased HAST 130C/85%RH	96 Hours	3/231/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0
	TC-WBP	A4	MIL-STD883 Method 2011	1	60	Post Temp Cycle Bond Pull	Wires	3/108/0
	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
			Test Group B – Accelerated Lifetime Simulation Tests					
	HTOL	B1	JEDEC JESD22-A108	3	77	Life Test, 125C	1000 Hours	3/231/0
	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 Free Solder	3/45/0
	SD	C3	JEDEC JESD22-B102	1	15	Surface Mount Solderability	Pb Solder	3/45/0
	PD	C4	JEDEC JESD22-B100 and B108	3	10	Physical Dimensions	Cpk>1.67	3/30/0
	LI	C6	JEDEC JESD22-B105	1	50	Lead Fatigue	Leads	3/66/0
	LI	C6	JEDEC JESD22-B105	1	50	Lead Pull to Destruction	Leads	3/66/0

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								
	ED	E5	AEC Q100-009	3	30	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	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: 20201126-137339

TEXAS INSTRUMENTS

TI Information
Selective Disclosure

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)

Approved 11-Feb-2020

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
			Test Group A – Accelerated Environment Stress Tests					
	PC	A1	-	3	22	SAM Analysis, Pre-Stress	Completed	2/44/0
	PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 1-260C	No fails
	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	3/231/0
	HAST	A2	-	3	1	Cross Section, Post bHAST 96 Hours	Completed	3/3/0
	HAST	A2	-	3	30	Wire Bond Shear, Post bHast, 96 Hours	Wires	3/90/0
	HAST	A2	-	3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	3/90/0
	HAST	A2	-	3	30	Bond Pull over Ball, Post bHAST, 96 Hours	Wires	3/90/0
	HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	192 Hours	3/210/0
	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	3/60/0
	HAST	A2	-	3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	3/60/0
	HAST	A2	-	3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	3/60/0
	TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	3/231/0

	Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: TLV2401QDBVRQ1
	TC	A4	-	3	1	Cross Section, Post T/C 500 Cycles	Completed	3/3/0
	TC	A4	-	3	22	SAM Analysis, Post T/C, 500 Cycles	Completed	3/66/0
	TC	A4	-	3	30	Wire Bond Shear, Post T/C 500 Cycles	Wires	3/90/0
	TC	A4	-	3	30	Bond Pull over Stitch Post T/C 500 Cycles	Wires	3/90/0
	TC	A4	-	3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	3/90/0
	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	3/60/0
	TC	A4	-	3	30	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	3/60/0
	TC	A4	-	3	30	Bond Pull over Ball, Post T/C, 1000 Cycles	Wires	3/60/0
	PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle -40/125C	1000 Cycles	N/A
	PTC	A5	JEDEC JESD22-A105	1	45	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	3/30/0
	WBP	C2	MIL-STD883 Method 2011	3	30	Bond Pull over Ball, Cpk >1.67	Wires	3/30/0

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

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

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

TI Qualification ID: 20190124-128331

ZVEI ID: SEM-PW-02, SEM-PW-13, SEM-TF-01, SEM-PA-08, SEM-PA-11, SEM-PA-07, SEM-PA-18, SEM-PA-05

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