PCN Number:	20230215002.2	**PCN Date:**	February 16, 2023
Title:	Qualification of new Fab site (RFAB) using qualified Process Technology, Die Revision, Datasheet, additional Assembly & Test site options for select devices		
Customer Contact:	PCN Manager	**Dept:**	Quality Services
Proposed 1st Ship Date:	Aug 15, 2023	**Sample requests accepted until:**	Mar 18, 2023*

***Sample requests received after March 18, 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:

Texas Instruments is pleased to announce the qualification of a new fab & process technology (RFAB, LBC7) and TI Malaysia as additional Assembly & Test site for selected devices listed below in the product affected section.

Current Fab Site			Additional Fab Site		
Current Fab Site	**Process**	**Wafer Diameter**	**Additional Fab Site**	**Process**	**Wafer Diameter**
DL-LIN	LBC2	150 mm	RFAB	LBC7	300 mm
DL-LIN	LBC3S	150 mm			
DL-LIN	LBC3S	200 mm			

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

Construction Differences:

	TI Taiwan	TI Mexico	TI Malaysia
Wire type	0.96mil Au	0.96mil Au	0.96mil Cu

The datasheet will be changing as a result of the above mentioned changes. The datasheet change details can be reviewed in the datasheet revision history. The links to the revised datasheets are available in the table below.

SN65LBC176A, SN75LBC176A
SLLS376F – MAY 2000 – REVISED JANUARY 2023

Changes from Revision E (January 2023) to Revision F (January 2023) **Page**

- Changed the SN65LBC176AQ values in the *Thermal Information* table.......................................5

Note: Not all devices are affected by the thermal changes in the datasheet. The devices not included in this PCN already reflect the changes to those devices in a prior datasheet update. The non-affected devices were updated in a previous datasheet revision as seen in the table below.

Product Folder	Current Datasheet Number	New Datasheet Number	Thermal changes for the devices in this PCN shown below were reflected in a prior datasheet release
SNx5LBC176A	SLLS376D	SLLS376E	SN65LBC176QDR, SN65LBC176QDRVS, SN65LBC176QDRG4
SN65LBC179QDR	SLLS173F	SLLS173G	SN65LBC179QDR

SN65LBC176-Q1
SGLS211B – OCTOBER 2003 – REVISED JANUARY 2023

Changes from Revision A (October 2003) to Revision B (January 2023) **Page**

- Added the *Package Information* table, *Pin Configuration and Implementation*, *Thermal Information* table, *Device Functional Modes*, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section........ 1
- Deleted the *Ordering Information* table........ 1

Product Folder	Current Datasheet Number	New Datasheet Number	Thermal changes for the remaining devices in this PCN shown below are reflected in these datasheet releases
SNx5LBC176A	SLLS376E	SLLS376G	SN65LBC176AQDR
SN65LBC176-Q1	SGLS211A	SGLS211B	SN65LBC176QDRG4Q1, SN65LBC176QDRQ1

These changes may be reviewed at the datasheet links provided.
https://www.ti.com/product/SN65LBC176A
https://www.ti.com/product/SN65LBC176-Q1

Tube and some G4 variants of the devices are included in EOL notice PDN# 20230215005.3.

Test coverage, insertions, conditions will remain consistent with current testing.

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
RFAB	**RFB**	**USA**	**Richardson**

Die Rev:

Current	New
Die Rev [2P]	**Die Rev [2P]**
A	**-**

Assembly Site Information:

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
TI Mexico	MEX	MEX	Aguascalientes
TI Taiwan	TAI	TWN	Chung Ho, New Taipei City
TI Malaysia	**MLA**	**MYS**	**KUALA LUMPUR**

Sample product shipping label (not actual product label)

TEXAS INSTRUMENTS
MADE IN: Malaysia
2DC: 2Q:
MSL 2 /260C/1 YEAR SEAL DT
MSL 1 /235C/UNLIM 03/29/04
OPT:
ITEM: 39
LBL: 5A (L)T0:1750
G4
(1P) SN74LS07NSR
(Q) 2000 (D) 0336
(31T)LOT: 3959047MLA
(4W) TKY(1T) 7523483SI2
(P)
(2P) REV: (V)
(20L) CSO: SHE (21L) CCO:USA
(22L) ASO: MLA (23L) ACO: MYS

Product Affected:

SN65LBC176AQDR	SN65LBC176QDRG4	SN65LBC176QDRQ1	SN65LBC179QDR
SN65LBC176QDR	SN65LBC176QDRG4Q1	SN65LBC176QDRVS	

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)
Approve Date 24-January-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: SN65LBC176QDRQ1	Qual Device: SN65LBC179QDR	QBS Reference: TPS51604QDSGRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: SN65LBC176AQDR
Test Group A - Accelerated Environment Stress Tests													
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	1 Step	1/0/0	1/0/0	-	1/0/0	2/0/0	1/0/0

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device	Qual Device	QBS Reference	QBS Reference	QBS Reference	QBS Reference
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	1 Step	-	-	3/0/0	-	-	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	-	-	1/77/0	2/154/0	-
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	1/77/0	1/77/0	3/231/0	1/77/0	2/154/0	1/77/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	1/77/0	3/231/0	1/77/0	2/154/0	1/77/0
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	-	-	1/5/0	-	-	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	-	-	-	1/45/0	2/90/0	-
Test Group B - Accelerated Lifetime Simulation Tests													
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	1/77/0	1/77/0	3/231/0	1/77/0	2/154/0	1/77/0
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	-	-	3/2400/0	-	-	-
Test Group C - Package Assembly Integrity Tests													
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	1/30/0	3/15/0	1/30/0	2/60/0	1/30/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	1/30/0	3/15/0	1/30/0	2/60/0	1/30/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	-	-	-	1/15/0	-
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	-	-	-	1/15/0	-
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	1/10/0	1/10/0	3/30/0	1/10/0	2/20/0	1/10/0
Test Group D - Die Fabrication Reliability Tests													
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests													
ESD	E2	AEC Q100-002	1	3	ESD HBM (Custom Bus Pin)	-	12000 Volts		1/3/0	-	-	-	-
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	1/3/0	-	-	1/3/0
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	1/3/0	1/3/0	-	-	1/3/0
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	1/6/0	1/6/0	-	-	1/6/0
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	1/30/0	3/90/0	2/60/0	-	1/30/0
Additional Tests													

- Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
- The following are equivalent HTOL options based on an activation energy of 0.7eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours
- The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours
- The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I) : -40C to +85C

E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):

- Room/Hot/Cold : HTOL, ED
- Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
- Room : AC/uHAST

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

- QBS: Qual By Similarity
- Qual Device SN65LBC176QDRQ1 is qualified at MSL1 260C
- Qual Device SN65LBC179QDR is qualified at MSL1 260C

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

Approve Date 24-JANUARY -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: SN65LBC176QDRQ1	Qual Device: SN65LBC179QDR	QBS Reference: TPS51604QDSGRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: SN65LBC176AQDR
Test Group A - Accelerated Environment Stress Tests													
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	1 Step	1/0/0	1/0/0	-	1/0/0	2/0/0	1/0/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination, T0 SAM	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination, Post precon	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	-	-	1/77/0	2/154/0	-
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	-	-	64/64/0	128/128/0	-
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	-	-	8/24/0	16/48/0	-
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	-	-	8/24/0	128/384/0	-
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	-	-	64/192/0	16/48/0	-
HAST	A2.2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	192 Hours	-	-	-	1/70/0	2/154/0	-
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	-	-	-	64/1408/0	128/2816/0	-
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	-	-	-	64/64/0	16/16/0	-
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	-	-	8/24/0	128/384/0	-
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	-	-	-	64/192/0	128/384/0	-
HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	-	-	-	64/192/0	128/384/0	-
TC	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	1/77/0	-	1/77/0	2/154/0	1/77/0
TC	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	1/22/0	1/22/0	-	8/176/0	16/352/0	1/22/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	-	-	-	64/64/0	128/128/0	1/1/0
TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	1/3/0	1/3/0	-	216/648/0	432/1296/0	27/81/0
TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	1/3/0	1/3/0	-	8/24/0	432/1296/0	27/81/0
TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	1/3/0	1/3/0	-	8/24/0	432/1296/0	27/81/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	1000 Cycles	1/77/0	1/77/0	-	1/70/0	2/154/0	1/77/0
TC	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	1/22/0	1/22/0	-	216/4752/0	432/9504/0	27/594/0
TC	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	-	-	-	8/8/0	432/432/0	27/27/0
TC	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	1/3/0	1/3/0	-	8/24/0	432/1296/0	27/81/0
TC	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	1/3/0	1/3/0	-	8/24/0	432/1296/0	27/81/0
TC	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	1/3/0	1/3/0	-	8/24/0	432/1296/0	27/81/0

HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	175C	500 Hours	-	-	-	1/45/0	2/90/0	-
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	-	-	8/8/0	16/16/0	-
HTSL	A6.2	JEDEC JESD22-A103	3	45	High Temperature Storage Life	175C	1000 Hours	-	-	-	1/44/1[1]	2/90/0	-
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	-	-	64/64/0	128/128/0	-
Test Group B - Accelerated Lifetime Simulation Tests													
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	1/77/0	1/77/0	3/231/0	1/77/0	2/154/0	1/77/0
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	-	-	3/2400/0	-	-	-
Test Group C - Package Assembly Integrity Tests													
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	1/30/0	3/15/0	1/30/0	2/60/0	1/30/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	1/30/0	3/15/0	1/30/0	2/60/0	1/30/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	-	-	-	1/15/0	-
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	-	-	-	1/15/0	-
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	1/10/0	1/10/0	3/30/0	1/10/0	2/20/0	1/10/0
Test Group D - Die Fabrication Reliability Tests													
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests													
ESD	E2	AEC Q100-002	1	3	ESD HBM (Custom Bus Pin)	-	12000 Volts	1/3/0	-	-	-	-	-
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	1/3/0	-	-	1/3/0
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	1/3/0	1/3/0	-	-	1/3/0
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	1/6/0	1/6/0	-	-	1/6/0
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	1/30/0	3/90/0	2/60/0	-	1/30/0

- QBS: Qual By Similarity

- Qual Device SN65LBC176QDRQ1 is qualified at MSL1 260C
- Qual Device SN65LBC179QDR is qualified at MSL1 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

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I) : -40C to +85C

E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):

- Room/Hot/Cold : HTOL, ED
- Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
- Room : AC/uHAST

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

[1]-EIPD. Discounted. Not Cu wire related

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

Approve Date 09-JANUARY -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: SN65LBC176AQDR	QBS Reference: TPS51604QDSGRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1146DRQ1	QBS Reference: TCAN1146DRQ1	QBS Reference: TLIN10285SDRQ1
Test Group A - Accelerated Environment Stress Tests															
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	1 Step	1/0/0	-	1/0/0	2/0/0	-	-	-	2/0/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	1 Step	1/22/0	-	1/22/0	2/44/0	-	3/66/0	-	2/44/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination, T0 SAM	1 Step	1/22/0	-	1/22/0	2/44/0	-	-	-	2/44/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	1 Step	1/22/0	-	1/22/0	2/44/0	-	3/66/0	-	2/44/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination, Post precon	1 Step	1/22/0	-	1/22/0	2/44/0	-	-	-	2/44/0
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	-	1/77/0	2/154/0	-	-	-	-
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	-	8/8/0	16/16/0	-	-	-	-
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	-	8/24/0	16/48/0	-	-	-	-
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	-	8/24/0	16/48/0	-	-	-	-
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	-	8/24/0	16/48/0	-	-	-	-
HAST	A2.2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	192 Hours	-	-	1/70/0	2/154/0	-	-	-	-
HAST	A2.2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	-	-	-	-	-	-	-
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	-	-	8/176/0	16/352/0	-	-	-	-
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	-	-	8/8/0	16/16/0	-	-	-	-
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	-	8/24/0	16/48/0	-	-	-	-
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	-	-	8/24/0	16/48/0	-	-	-	-
HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	-	-	8/24/0	16/48/0	-	-	-	-
TC	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	1/22/0	-	8/176/0	16/352/0	-	3/66/0	-	16/352/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	1/1/0	-	8/8/0	16/16/0	-	-	-	16/16/0

TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	2/6/0	-	16/48/0
TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	2/6/0	-	16/48/0
TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	2/6/0	-	16/48/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	1000 Cycles	1/77/0	-	1/70/0	2/154/0	-	3/210/0	-	2/140/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	-	-	-	-	-	-	-	-
TC	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	1/22/0	-	8/176/0	16/352/0	-	3/66/0	-	16/352/0
TC	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	1/1/0	-	8/8/0	16/16/0	-	3/3/0	-	16/16/0
TC	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	3/9/0	-	16/48/0
TC	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	3/9/0	-	16/48/0
TC	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	3/9/0	-	16/48/0
PTC	A5.1	JEDEC JESD22-A105	1	45	PTC	-40/125C	1000 Cycles	-	-	-	-	-	-	-	1/45/0
PTC	A5.2	JEDEC JESD22-A105	1	45	PTC	-40/125C	2000 Cycles	-	-	-	-	-	-	-	1/45/0
HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	175C	500 Hours	-	-	1/45/0	2/90/0	-	-	-	-
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	-	8/8/0	16/16/0	-	-	-	-
HTSL	A6.2	JEDEC JESD22-A103	3	45	High Temperature Storage Life	175C	1000 Hours	-	-	1/44/1[1]	2/90/0	-	-	-	-
HTSL	A6.2	JEDEC JESD22-A103	3	45	High Temperature Storage Life	175C	500 Hours	-	-	-	-	-	-	-	-
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	-	8/8/0	16/16/0	-	-	-	-
Test Group B - Accelerated Lifetime Simulation Tests															
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	1/77/0	3/231/0	1/77/0	2/154/0	-	-	-	1/77/0
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	1000 Hours	-	-	-	-	-	2/154/0	1/77/0	1/77/0
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	408 Hours	-	-	-	-	-	-	-	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	-	-	-	-	-	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	150C	24 Hours	-	-	-	-	-	-	-	-
EDR	B3	AEC Q100-005	1	77	NVM Endurance, Data Retention, and Op Life	Per QSS-009-018	1 Step	-	-	-	-	-	2/154/0	1/77/0	1/77/0
Test Group C - Package Assembly Integrity Tests															
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/15/0	1/30/0	2/60/0	-	1/30/0	2/60/0	2/60/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/15/0	1/30/0	2/60/0	-	1/30/0	2/60/0	2/60/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	-	-	1/15/0	-	-	1/15/0	1/15/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	-	-	1/15/0	-	-	1/15/0	1/15/0
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	1/10/0	3/30/0	1/10/0	2/20/0	-	1/10/0	2/20/0	2/20/0
Test Group D - Die Fabrication Reliability Tests															
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests															

ESD	E2	AEC Q100-002	1	3	ESD HBM (Bus Pins)	-	12000 Volts	1/3/0	-	-	-	-	-	1/3/0	2/6/0
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	-	-	-	-	-	-
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	1/3/0	-	-	1/3/0	-	1/3/0	1/3/0
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	1/6/0	-	-	1/6/0	-	1/6/0	1/6/0
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	3/90/0	2/60/0	-	1/30/0	1/30/0	2/60/0	3/90/0

- 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

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
- Grade 2 (or T): -40C to +105C
- Grade 3 (or I) : -40C to +85C

E1 (TEST): Electrical test temperatures of Qual samples (High temperature according to Grade level):

- Room/Hot/Cold : HTOL, ED
- Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
- Room : AC/uHAST

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

[1]-EIPD. Discounted. Not Cu wire related

- QBS: Qual By Similarity
- Qual Device SN65LBC176AQDR is qualified at MSL1 260C

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

Approve Date 09-JANUARY -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: SN65LBC176AQDR	QBS Reference: TPS51604QDSGRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1146DRQ1	QBS Reference: TCAN1146DRQ1	QBS Reference: TLIN10285SDRQ1	QBS Reference: TLIN10283SDRQ1	QBS Reference: TPD3S714QDBQRQ1
Test Group A - Accelerated Environment Stress Tests																	
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	1 Step	1/0/0	-	1/0/0	2/0/0	-	-	1/0/0	2/0/0	1/0/0	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	1/77/0	3/231/0	1/77/0	2/154/0	-	3/231/1[1]	-	2/154/0	1/77/0	-
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	1/77/0	3/231/0	1/77/0	2/154/0	-	3/231/0	-	2/154/0	1/77/0	3/231/0

TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	-	3/231/0	-	-	-	-	1/77/0	-	-	-
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	-	1/5/0	-	-	-	-	-	-	-	-
PTC	A5	JEDEC JESD22-A105	1	45	PTC	-40/125C	1000 Cycles	-	-	-	-	-	-	-	1/45/0	-	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	1/45/0	3/135/0	-	-	-	3/231/0	-	2/154/0	1/77/0	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	-	-	1/45/0	2/90/0	-	-	-	-	-	-
Test Group B - Accelerated Lifetime Simulation Tests															
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	1/77/0	3/231/0	1/77/0	2/154/0	-	-	-	1/77/0	-	-
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	1000 Hours	-	-	-	-	-	2/154/0	1/77/0	1/77/0	1/77/0	-
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	408 Hours	-	-	-	-	-	-	-	-	-	3/231/0
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	-	3/2400/0	-	-	-	-	-	-	-	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	150C	24 Hours	-	-	-	-	-	-	-	-	-	3/2400/0
EDR	B3	AEC Q100-005	1	77	NVM Endurance, Data Retention, and Op Life	Per QSS-009-018	1 Step	-	-	-	-	-	2/154/0	1/77/0	1/77/0	1/77/0	-
Test Group C - Package Assembly Integrity Tests															
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/15/0	1/30/0	2/60/0	-	1/30/0	2/60/0	2/60/0	1/30/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/15/0	1/30/0	2/60/0	-	1/30/0	2/60/0	2/60/0	1/30/0	-
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	-	-	1/15/0	-	-	1/15/0	1/15/0	-	3/45/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	-	-	1/15/0	-	-	1/15/0	1/15/0	-	3/45/0
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	1/10/0	3/30/0	1/10/0	2/20/0	-	1/10/0	2/20/0	2/20/0	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	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	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests															
ESD	E2	AEC Q100-002	1	3	ESD HBM (Bus Pins)	-	12000 Volts	1/3/0	-	-	-	-	-	1/3/0	2/6/0	2/6/0	-
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	-	-	1/3/0	-	1/3/0	1/3/0	1/3/0	3/9/0
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	1/3/0	1/3/0	-	-	1/3/0	-	1/3/0	1/3/0	1/3/0	3/9/0
LU	E4	AEC Q100-004	1	6	Latch-Up	Per AEC Q100-004	-	1/6/0	1/6/0	-	-	1/6/0	-	1/6/0	1/6/0	1/6/0	3/18/0
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	3/90/0	2/60/0	-	1/30/0	1/30/0	2/60/0	3/90/0	3/90/0	3/90/0

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- Qual Device SN65LBC176AQDR is qualified at MSL1 260C

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- Room : AC/uHAST

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

[1]-EOS. Discounted. QEM-EVAL-2004-00176

Affected ZVEI IDs: SEM-PW-13, SEM-PW-09, SEM-PW-02, SEM-PA-13, SEM-DE-01, SEM-DE-02, SEM-DE-03, SEM-PA-18, SEM-PA-13, SEM-DS-01,SEM-PA-08, SEM-TF-01

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