PCN Number: 2023			0230215002.2				N Date:	February 16, 2023		
Title	e:			ew Fab site (RFAB) using qualified Pro onal Assembly & Test site options for						
Cus	tomer	Contact:	l	PCN M	<u>lanager</u>	Dept:		Qu	ality Services	
				Aug 1	5, 2023	Sample requests accepted until:			ar 18, 2023*	
*Sa	mple ı	requests rece	ived	l afte	r March 18, 2023	will not be	supported.			
Cha	nge Ty	/pe:								
$\boxtimes$	Assen	nbly Site		Assembly Process				Assembly Materials		
$\boxtimes$	Desigi	n		$\square$	Electrical Specifica	tion 🗌 Med		Mechan	echanical Specification	
$\boxtimes$	Test S	Site		$\square$	Packing/Shipping/L	abeling		Test Process		
Wafer Bump Site				Wafer Bump Material			Wafer Bump Process			
Wafer Fab Site			$\square$	☑ Wafer Fab Materials			Wafer F	ab Process		
					Part number chang	je				
					PCN Detai	ls				

# 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.

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

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,		
SNAJEDCI/OA	52255700	3LL3370L	SN65LBC176QDRG4		
SN65LBC179QDR	SLLS173F	SLLS173G	SN65LBC179QDR		

TEXAS INSTRUMENTS

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

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/SN65LBC176-01

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:	
	Chin Site Ori

Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
DL-LIN	DLN	USA	Dallas
RFAB	RFB	USA	Richa rdso n

Die Rev:	
Current	New
Die Rev [2P]	Die Rev [2P]
Α	-

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
TEXAS INSTRUMENTS	04 PLA 228 1644 ;	P) SN74LS07NSR	
INSTRUMENTS ADE IN: Malaysia DC: 2Q: SL'2 /260C/1 YEAR SEA SL 1 /235C/UNLIM 03/ PT: TEM: 39 BL: 5A (L)TO:1	L DT 29/04 (11 - 11 - 11 - 11 - 11 - 11 - 11 - 11	P) SN74LS07NSR 2) 2000 (D) 0336 1T)LOT: 3959047MLA W) TKY(1T) 7523483512	)
INSTRUMENTS MADE IN: Malaysia MDC: 20: ISL '2 /260C/1 YEAR SEA ISL 1 /235C/UNLIM 03/ PT: TEM: 39 BL: 5A (L)T0:1 oduct Affected:	L DT 29/04 750	P) SN74LS07NSR A) 2000 (D) 0336 1T)LOT: 3959047MLA W) TKY (1T) 7523483S12 ) REV: (V) 0033317 L) CSO: SHE (21L) CCO:USA L) ASO: MLA (23L) ACO: MYS	
	L DT 29/04 (11 - 11 - 11 - 11 - 11 - 11 - 11 - 11	P) SN74LS07NSR A) 2000 (D) 0336 1T) LOT: 3959047MLA W) TKY (1T) 7523483S12 ) REV: (V) 0000017 (V) 00000017 (V) 0000017 (V) 00000017 (V) 00000017 (V) 00000017 (V) 000000000000000000000000000000000000	SN65LBC179QDR

For alternate parts with similar or improved performance, please visit the product page on  $\underline{\text{TI.com}}$ 

# 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												
Туре	pe # Test Spec Min SS / Lot Qty Lot Test Name Condition Duration Qual Device: Qual Device: QBS Reference: QBS Reference: TCAN1044VDRQ1 CAN1044VDRQ1 SN65LBC176QDRQ1												QBS Reference: SN65LBC176AQDR
Test Group	A - Acce	lerated Enviror	ment St	ress Tes	sts								
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

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
Test Group	D - Die F	abrication Relia	ıbility Te	sts									
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
SD	СЗ	JEDEC J- STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	-	-	-	1/15/0	-
SD	СЗ	JEDEC J- STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	-		-	1/15/0	-
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
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
Test Group	C - Pack	age Assembly	Integrity	Tests	Failure Rate		nours						
ELFR	B2	AEC Q100- 008	1	77	Early Life Failure Rate	125C	48 Hours	-		3/2400/0			
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
Test Group	B - Acce	elerated Lifetime	e Simula	tion Tes	-								
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	175C	500 Hours	-		-	1/45/0	2/90/0	-
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull			-	-	1/5/0	-	-	-
тс	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
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
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	-	-	1/77/0	2/154/0	-
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL2 260C	1 Step	-	-	3/0/0	-	-	-

Туре	#	Test Spec	Min Lot Oty	SS / Lot	Test Name	Condition	Duration	Qual Device	Qual Device	QBS Reference	QBS Reference	QBS Reference	QBS Reference
Additional	Tests												
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
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
ESD	E3	AEC Q100- 011	1	3	ESD CDM		500 Volts	1/3/0	1/3/0	1/3/0	-		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	E2	AEC Q100- 002	1	3	ESD HBM (Custom Bus Pin)	-	12000 Volts		1/3/0	-	-	-	-
Test Group	E - Elect	rical Verificatio	n Tests			1							
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
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
нсі	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
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

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, 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):

- Ream/Hat/Cold : HTOL, ED
   Ream/Het : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
   Ream : 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

Туре	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>SN65LBC176QDRQ1</u>	Qual Device: <u>SN65LBC179QDR</u>	QBS Reference: TPS51604QDSGRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: <u>SN65LBC176AQDR</u>
Test G	roup A - A	Accelerated	·	l Iment St	ress Tests								
РС	A1	JEDEC J-STD- 020 JESD22-	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	A113	3	22	SAM Precon	Review for	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
					Pre SAM Precon	delamination Review for							
PC	A1.1		3	22	Pre SAM Precon	delamination, T0 SAM Review for	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
PC	A1.2		3	22	Post	delamination Review for	1 Step	-	-	-	1/22/0	2/44/0	1/22/0
PC	A1.2	-	3	22	SAM Precon Post	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		з	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	
тс	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
тс	A4.1.1	-	з	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
тс	A4.1.2		3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	-	-	-	64/64/0	128/128/0	1/1/0
тс	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
тс	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
тс	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
тс	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
тс	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
тс	A4.2.2		3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	-	-	-	8/8/0	432/432/0	27/27/0
тс	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
тс	A4.2.4	-	з	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
тс	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
тс	A4.2.5	-	3	30	Ball, post TC,	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	-	-	-	1/44/11	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 Gr	oup B - A	Accelerated	Lifetime	e Simula	tion 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 Gr	oup C - F	Package As	sembly I	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	СЗ	JEDEC J-STD- 002	1	15	PB Solderability	>95% Lead Coverage	-	-		-	-	1/15/0	-
SD	СЗ	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 Gr		in Fabrica											
	oup D - L	Jie Fabricati	ion Relia	ubility Te	sts								
EM	D1	JESD61	-	-	sts 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
				-		-	-	Process Technology	Process Technology	Process Technology	Process Technology	Process Technology	Process Technology
ЕМ	D1	JESD61		- -	Electromigration Time Dependent Dielectric	-	-	Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology
EM TDDB	D1 D2	JESD61 JESD35 JESD60		- -	Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias Temperature	-	- -	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology
EM TDDB HCI	D1 D2 D3	JESD61 JESD35 JESD60			Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias	-	· ·	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Process	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Completed Per Process	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Completed Per Process	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology
EM TDDB HCI NBTI SM	D1 D2 D3 D4 D5	JESD61 JESD35 JESD60 & 28	-	-	Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias Temperature Instability	-	-	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 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 Completed Per	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per
EM TDDB HCI NBTI SM	D1 D2 D3 D4 D5	JESD61 JESD35 JESD60	-	-	Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias Temperature Instability	-	- - -	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology
EM TDDB HCI NBTI SM	D1 D2 D3 D4 D5	JESD61 JESD35 JESD60 & 28 - - - - - - - - - - - - - - - - - - -	-	-	Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias Temperature Instability	-		Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology
EM TDDB HCI NBTI SM Test Gr	D1 D2 D3 D4 D5 roup E - E	JESD61 JESD35 JESD60 & 28		- -	Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias Temperature Instability Stress Migration ESD HBM (Custom Bus	- - - - -		Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology	Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology
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#### 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 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

Туре	#	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 Gr	oup A - A	Accelerated	Environ	ment St	ress 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	-	-	-	-
тс	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
тс	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

National regional r																1
No.     No. </td <td>тс</td> <td>A4.1.3</td> <td></td> <td>3</td> <td>30</td> <td>Wire Bond Shear, post TC, 1X</td> <td>Post stress</td> <td>Wires</td> <td>1/3/0</td> <td>-</td> <td>8/24/0</td> <td>16/48/0</td> <td>-</td> <td>2/6/0</td> <td>-</td> <td>16/48/0</td>	тс	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
No.     No. </td <td>тс</td> <td>A4.1.4</td> <td></td> <td>3</td> <td>30</td> <td>Stitch, post TC,</td> <td>Post stress</td> <td>Wires</td> <td>1/3/0</td> <td>-</td> <td>8/24/0</td> <td>16/48/0</td> <td>-</td> <td>2/6/0</td> <td>-</td> <td>16/48/0</td>	тс	A4.1.4		3	30	Stitch, post TC,	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	2/6/0	-	16/48/0
N         No.	тс	A4.1.5		3	30	Ball, post TC,	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	2/6/0	-	16/48/0
n         n	тс	A4.2	JESD22- A104 and	3	77	Temperature Cycle	-65C/150C	1000 Cycles	1/77/0	-	1/70/0	2/154/0	-	3/210/0	-	2/140/0
m     m </td <td>тс</td> <td>A4.2</td> <td>JESD22- A104 and</td> <td>3</td> <td>77</td> <td></td> <td>-65C/150C</td> <td>500 Cycles</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>	тс	A4.2	JESD22- A104 and	3	77		-65C/150C	500 Cycles	-	-	-	-	-	-	-	-
Note   Note <td>тс</td> <td>A4.2.1</td> <td></td> <td>3</td> <td>22</td> <td>post TC, 2X</td> <td>delamination</td> <td>Completed</td> <td>1/22/0</td> <td>-</td> <td>8/176/0</td> <td>16/352/0</td> <td>-</td> <td>3/66/0</td> <td>-</td> <td>16/352/0</td>	тс	A4.2.1		3	22	post TC, 2X	delamination	Completed	1/22/0	-	8/176/0	16/352/0	-	3/66/0	-	16/352/0
No	тс	A4.2.2		3	1	post TC, 2X	Post stress cross section	Completed	1/1/0	-	8/8/0	16/16/0	-	3/3/0	-	16/16/0
Net         Net <td>тс</td> <td>A4.2.3</td> <td></td> <td>3</td> <td>30</td> <td>Shear, post TC,</td> <td>Poststress</td> <td>Wires</td> <td>1/3/0</td> <td>-</td> <td>8/24/0</td> <td>16/48/0</td> <td>-</td> <td>3/9/0</td> <td>-</td> <td>16/48/0</td>	тс	A4.2.3		3	30	Shear, post TC,	Poststress	Wires	1/3/0	-	8/24/0	16/48/0	-	3/9/0	-	16/48/0
N         N	тс	A4.2.4		3	30	Stitch, post TC,	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	3/9/0	-	16/48/0
i         i	тс	A4.2.5		3	30	Ball, post TC,	Post stress	Wires	1/3/0	-	8/24/0	16/48/0	-	3/9/0	-	16/48/0
image         image <th< td=""><td>PTC</td><td>A5.1</td><td>JESD22-</td><td>1</td><td>45</td><td>PTC</td><td>-40/125C</td><td></td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1/45/0</td></th<>	PTC	A5.1	JESD22-	1	45	PTC	-40/125C		-	-	-	-	-	-	-	1/45/0
int         int <td>PTC</td> <td>A5.2</td> <td>JESD22-</td> <td>1</td> <td>45</td> <td>PTC</td> <td>-40/125C</td> <td></td> <td>-</td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td>-</td> <td>1/45/0</td>	PTC	A5.2	JESD22-	1	45	PTC	-40/125C		-	-			-		-	1/45/0
int     int <td>HTSL</td> <td>A6.1</td> <td>JESD22-</td> <td>3</td> <td>45</td> <td>Temperature</td> <td>175C</td> <td>500 Hours</td> <td>-</td> <td>-</td> <td>1/45/0</td> <td>2/90/0</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>	HTSL	A6.1	JESD22-	3	45	Temperature	175C	500 Hours	-	-	1/45/0	2/90/0	-	-	-	-
Math Math<	HTSL	A6.1.1		3	1	Cross Section, post HTSL, 1X		Completed	-	-	8/8/0	16/16/0	-	-	-	-
Math	HTSL	A6.2	JESD22-	3	45	Temperature	175C		-	-	1/44/11	2/90/0	-	-	-	-
Number       NUM     Number     <	HTSL	A6.2	JESD22-	3	45	Temperature	175C	500 Hours		-	-	-	-	-	-	-
Hat         Resc Apple         I <t< td=""><td>HTSL</td><td>A6.2.1</td><td></td><td>3</td><td>1</td><td>Cross Section, post HTSL, 2X</td><td>Post stress cross section</td><td>Completed</td><td>-</td><td>-</td><td>8/8/0</td><td>16/16/0</td><td>-</td><td>-</td><td>-</td><td>-</td></t<>	HTSL	A6.2.1		3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	-	8/8/0	16/16/0	-	-	-	-
NIME	Test Gr	roup B - /		Lifetime	Simulat	tion Tests										
Min     Ni     Single Vis     Vis <th<< td=""><td>HTOL</td><td>B1</td><td>JESD22-</td><td>1</td><td>77</td><td>Life Test</td><td>125C</td><td></td><td>1/77/0</td><td>3/231/0</td><td>1/77/0</td><td>2/154/0</td><td>-</td><td></td><td>-</td><td>1/77/0</td></th<<>	HTOL	B1	JESD22-	1	77	Life Test	125C		1/77/0	3/231/0	1/77/0	2/154/0	-		-	1/77/0
Min     Rin     Rin     Rin     Rin     Rin     Sine     S	HTOL	B1	JESD22-	1	77	Life Test	150C	1000 Hours	-	-	-	-	-	2/154/0	1/77/0	1/77/0
Lef R     2     Quot     1     7     Parking Raw     12C     44 Hour     -     324000     -     -     -     -     -     -     -       LER R     2     ACC     1     7     Parking Raw     100C     24 Hour     -	HTOL	B1	JESD22-	1	77	Life Test	150C	408 Hours	-	-			-		-	
Line     El     B2     OLD     A     T     Party Register     Solo     24 Hours	ELFR	B2	Q100-	1	77	Early Life Failure Rate	125C	48 Hours	-	3/2400/0					-	
EARB3B30B101T7Endingeneral band Gueteneral band Gueteneral band Gueteneral band Gueteneral11217.00177.00177.00177.00TEAT Fragmeneral trad Fragmeneral band Gueteneral band Gueteneral177Endingeneral band Gueteneral band Gueteneral11<	ELFR	B2	AEC 0100-			Farly Life		24 Hours		-			-			-
NetSr. 1Sr. 2NoNove BoodMoney or 2Nove BoodMoney or 2Nove BoodNove Bood<	EDR		008	1	77	Failure Rate	150C									
Weise       C1       Ödi       Ja       Jas       Weise of the strength of the str	Lon	B3	AEC Q100-			Failure Rate NVM Endurance, Data Retention,	Per QSS-009-			-			-	2/154/0	1/77/0	1/77/0
WePC2ML bit Method130Wire Bond Pul dressMinimum of S dressWires1300315013002600.13002600260050C3350°115PB Solerabily2651 Lead Coverage1150115011501150<			AEC Q100- 005	1	77	Failure Rate NVM Endurance, Data Retention, and Op Life	Per QSS-009-		-	-			-	2/154/0	1/77/0	1/77/0
SD       G3       J-STD- (000)       1       15       PE Solderability Coverage       -       -       -       1150       -       1150       -       1150       1150         SD       G3       JSDC (000)       1       15       PE-Free Solderability       -////Coverage       -////Coverage       -       -       1150       -       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150       -       1150	Test G	roup C - I	AEC Q100- 005 Package Ass AEC Q100-	1 sembly i	77 ntegrity	Failure Rate NVM Endurance, Data Retention, and Op Life Tests Wire Bond	Per QSS-009- 018 Minimum of 5 devices, 30 wires	1 Step	1/30/0	3/15/0	-	- 2/60/0	- -			
SD       C3       J-STD- (24)       1       15       SD/GetaAbility Coverage       -       -       -       1/150       -       -       1/150       1/150       -       1/150       1/15	Test Gr WBS	roup C - F C1	AEC Q100- 005 Package Ass AEC Q100- 001 MIL- STD883 Method	1 sembly I	77 ntegrity 30	Failure Rate NVM Endurance, Data Retention, and Op Life Tests Wire Bond Shear	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpk>1.67 Minimum of 5 devices, 30 wires	1 Step Wires					-	1/30/0	2/60/0	2/60/0
PDC4 $\frac{3E5022}{3R_{out}}$ 110Physical DrimensionsCpl>1.671.0033001.002200-1.00220022002200Text rowspan="14">Text rowspan="14">Text rowspan="14">Text rowspan="14">Text rowspan="14">Text rowspan="14"Physical DrimensionsCpl>1.671.0033001.002200-1.00220022002200Text rowspan="14">Text rowspan="14">Text rowspan="14"Physical DrimensionsCpl>1.671.0033001.002200-1.00220022002200Text rowspan="14">Text rowspan="14"JESD61-Text rowspan="14"Completed Per Text rology RequirementsCompleted Per Text rology Requi	Test Gr WBS WBP	roup C - F C1 C2	AEC Q100- 005 Cots AEC Q100- 001 MIL- STD883 Method Z011 JEDEC J-STD-	1 sembly I	77 ntegrity 30 30	Failure Rate NVM Endurance, Data Retention, and Op Life Tests Wire Bond Shear Wire Bond Pull	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpk>1.67 Minimum of 5 devices, 30 wires Cpk>1.67	1 Step Wires				2/60/0	•	1/30/0	2/60/0	2/60/0
EMJ1JESD61Electromigration-Completed Per Process RequirementsCompleted Per Process Technology RequirementsCompleted Per Process Technolog	Test Gr WBS WBP SD	C1 C2 C3	AEC Q100- 005 AEC Q100- 001 AEC Q100- 001 MIL- STD883 Method Z011 JEDEC J-STD- 002 JEDEC J-STD-	1 sembly l 1 1	77 ntegrity 30 30 15	Failure Rate Failure Rate Endurance, Data Retention, and OL life Tests Wire Bond Shear Wire Bond Pull PB Solderability PB-Free	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpk>1.67 Minimum of 5 devices, 30 wires Cpk>1.67 >95% Lead Coverage	1 Step Wires				2/60/0	•	1/30/0	2/60/0 2/60/0 1/15/0	2/60/0 2/60/0 1/15/0
EMD1JESD61ElectomigrationDiagrate Print Process RequirementsProcess Process RequirementsProcess Technology RequirementsProcess<	Test Gr WBS WBP SD SD	C1 C2 C3 C3	AEC Q100- 005 AECege Ass AEC Q100- 001 MIL- STD883 Method 2011 JEDEC J-STD- 002 JEDEC J-STD- 002 JEDEC2- BL00 And	1 sembly I 1 1 1	77 ntegrity 30 30 15 15	Failure Rate NVM Endurance, Data Retention, and Op Life Wire Bond Shear Wire Bond Pull PB Solderability PB-Free Solderability Physical	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/30/0 - -	3/15/0	1/30/0 - -	2/60/0 1/15/0 1/15/0	•	1/30/0 1/30/0 -	2/60/0 2/60/0 1/15/0 1/15/0	2/60/0 2/60/0 1/15/0 1/15/0
TDDB         D2         JESD35	Test Gr WBS WBP SD SD PD	roup C - F C1 C2 C3 C3 C4	AEC Q100- 005 Ackedge Ass AEC Q100- 001 MIL- STD883 Method 2011 JEDEC J-STD- 002 JEDEC J-STD- 002 JEDEC JESD22- BL00 and BL08	1 1 1 1 1 1	77 <b>ntegrity</b> 30 30 15 15 10	Failure Rate NVM Endurance, Data Retention, and Op Life Tests Wire Bond Shear Wire Bond Pull PB Solderability PB-Free Solderability Physical Dimensions	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/30/0 - -	3/15/0	1/30/0 - -	2/60/0 1/15/0 1/15/0	•	1/30/0 1/30/0 -	2/60/0 2/60/0 1/15/0 1/15/0	2/60/0 2/60/0 1/15/0 1/15/0 2/20/0
HCI         D3         JESD60         -         Image: Completed Per Process Technology Requirements         Completed Per Process Technology Requireme	Test Gr WBS SD SD PD	roup C - F C1 C2 C3 C3 C4 roup D - F	AEC Q100- 005 AEC Q100- 001 MIL- STD883 Method 2011 JEDEC J-STD- 002 JEDEC JESD22- B100 and B108 Die Fabrican	1 1 1 1 1 1	77 <b>ntegrity</b> 30 30 15 15 10	Failure Rate NVM Endurance, Data Retention, and Op Life Vire Bond Shear Wire Bond Pull PB Solderability PB-Free Solderability Physical Dimensions sts	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/30/0	3/15/0  3/30/0  Completed Per Process Technology	1/30/0	2/60/0 1/15/0 1/15/0 2/20/0 Completed Per Process Technology	- Completed Per Process Technology	1/30/0 1/30/0 - - 1/10/0 Completed Per Process Technology	2/50/0 2/50/0 1/15/0 1/15/0 2/20/0 Completed Per Process Technology	2/60/0 2/60/0 1/15/0 1/15/0 2/20/0 Completed Per Process Technology
NBT         La         -         Negative Bias Temperature         -         Completed Per Process	Test G WBS SD SD PD EM	roup C - 1 C1 C2 C3 C3 C4 roup D - 1 D1	AEC QUOD- 005 Package Ass AEC QUOD- 001 STD883 Method 2011 JEDEC J-STD- 002 JEDEC JESD22- BL00 and BL08 Die Fabricati	1 1 1 1 1 1	77 <b>ntegrity</b> 30 30 15 15 10	Failure Rate Failure Rate NVM Endurance, Data Retension, and Op Life Wire Bond Shear Wire Bond Pull PB Solderability PB-Free Solderability Physical Dimensions Sts Electromigration Time Dependent Dielectric	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/300	3/15/0	1/30/0	2/60/0 1/15/0 1/15/0 2/20/0 2/20/0 Completed Per Process Requirements Completed Per Process Technology	- Completed Per Process Technology Requirements Completed Per Process Technology	1/30/0 1/30/0	2/60/0 2/60/0 1/15/0 1/15/0 2/20/0 2/20/0 Completed Per Process Technology	2/60/0 2/60/0 1/15/0 1/15/0 2/20/0 Completed Per Process Technology
SM       D5       -       -       Stress Migration       -       Completed Per Process rechnology Requirements       Completed Per Proceses rechnology Requirements       Comp	Test G WBS SD SD PD EM TDDB	roup C - I C1 C2 C3 C3 C4 roup D - I D1 D2	AEC QUOD- 005 AECCQUOD- 001 MIL- STD883 Method 2011 JEDEC J-STD- 002 JEDEC J-STD- 002 JEDEC BL00 JEDEC BL00 JESD61 JESD60	1 1 1 1 1 1	77 <b>ntegrity</b> 30 30 15 15 10	Failure Rate Failure Rate NVM Endurance, Data Retention, and Op Life Varie Bond Shear Varie Bond Pull PB Solderability PB-Free Solderability Physical Dimensions Electromigration Time Dependent Delector Breaddown Hot Carrier	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/30/0	3/15/0	1/30/0	2/60/0 1/1.5/0 1/1.5/0 2/20/0 2/20/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	- Completed Per Process Requirements Completed Per Process Technology Requirements Completed Per Process Technology	1/30/0 1/30/0 1/30/0 1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	2/60/0 2/60/0 1/15/0 1/15/0 2/20/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/2	2/60/0 2/60/0 1/15/0 1/15/0 1/15/0 2/20/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/2
	Test Gr WBP SD SD PD Test Gr EM HCI	roup C - I C1 C2 C3 C3 C4 C4 D1 D1 D2 D3	AEC QUOD- 005 AECCQUOD- 001 MIL- STD883 Method 2011 JEDEC J-STD- 002 JEDEC J-STD- 002 JEDEC BL00 JEDEC BL00 JESD61 JESD60	1 1 1 1 1 1	77 <b>ntegrity</b> 30 30 15 15 10	Failure Rate Failure Rate NVM Endurance, Data Retention, and Op Life Vire Bond Shear Vire Bond Pull PB Solderability PB-Free Solderability Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negatve Bias Negatve Bias	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/30/0  1/30/0  Completed Per Process Technology Requirements Completed Per Process Technology Completed P	3/15/0 3/15/0	1/30/0   Completed Per Process Technology Requirements Completed Per Process Technology T	2/60/0 1/1.5/0 1/1.5/0 2/20	Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Completed Per Process Technology	1/30/0 1/30/0 1/30/0 1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Completed Per Process Technology Requirements Completed Per Process Completed Per Process Technology Requirements Completed Per Process Technology Completed Per Process Technology Comp	2/60/0 2/60/0 1/15/0 1/15/0 2/20/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/2	2/60/0 2/60/0 1/15/0 1/15/0 1/15/0 2/20/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/2
	Test Gr WBS SD SD PD Test Gr HCI NBTI	roup C - 1 C1 C2 C3 C3 C4 C4 D1 D1 D2 D3 D4	AEC QUOD- 005 AECCQUOD- 001 MIL- STD883 Method 2011 JEDEC J-STD- 002 JEDEC J-STD- 002 JEDEC BL00 JEDEC BL00 JESD61 JESD60	1 1 1 1 1 1	77 <b>ntegrity</b> 30 30 15 15 10	Failure Rate Failure Rate NVM Endurance, Data Retension, and Op Life Vire Bond Shear Vire Bond Pull PB Solderability PB-Free Solderability Physical Dimensions Electromigration Time Dependent Dielectric Breakdown Hot Carrier Injection Negative Bias Temperature Instance	Per QSS-009- 018 Minimum of 5 devices, 30 wires Cpl>1.67 Minimum of 5 evelces, 30 wires Cpl>1.67 Software Coverage	1 Step Wires	1/30/0      1/30/0      Completed Per Process Technology Requirements      Completed Per Process Technology	3/15/0 3/15/0	1/30/0	2/60/0 1/15/0 1/15/0 1/15/0 2/20/0	Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Completed Per Process Technology	1/30/0 1/30/0 1/30/0 - - - 1/10/0 Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Completed Per Process Technology Requirements Completed Per Process Completed Per Process Completed Per Process Completed Per Process Completed Per Process Completed Per Process Completed Per Process Technology Requirements	2/60/0 2/60/0 2/60/0 1/15/0 1/15/0 2/20/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/2	2/60/0 2/60/0 2/60/0 1/15/0 1/15/0 2/20/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/0 2/20/2

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 1250/Lk Hours, 140C/400 Hours, 150C/300 Hours, and 155C/240 Hours
 The following are equivalent HTSL options based on an activation energy of 0.7eV 1350/Lk Hours, and 170C/420 Hours, and 155C/240 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):

Ream/Hat/Cold : HTOL, ED
 Ream/Hat: THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU
 Ream : 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

Туре	•	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: SN65LBC176AQDR	QBS Reference: TPS51604QDS0RQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1044VDRQ1	QBS Reference: TCAN1146DRQ1	QBS Reference: TCAN1146DRQ1	QBS Reference: TLIN102858DRQ1	QBS Reference: TLIN10283SDRQ1	QBS Reference: TPD38714QDBQRQ1
Test Group	A - Accele	rated Environm	ent Stress	Tests													
PC	Al	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	100	
HAST	A2	JEDEC JESD22- A110	3	77	Blased HAST	130C/85%RH	96 Hours	1/77/0	3/231/0	1/77/0	2/154/0		3/231/11		2/154/0	1/77/0	
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	з	77	Autoclave	121C/15psig	96 Hours	07710	3/231/0	0וללע	2/154/0		3/231/0		2/154/0	1/77/0	3/231/0

тс	44	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles		3/231/0	-	-			1/77/0			
TC-8P	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull				1/5/0								
PTC	AS	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	3 - Acceler	ated Lifetime S	Imulation	Tests													
HTOL	<b>B</b> 1	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	81	JEDEC JESD22- A108	1	77	Life Test	150C	1000 Hours						2/154/0	1/77/0	1/77/0	1/77/0	
HTOL	81	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	83	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	) - Packag	e Assembly Int	egrity Test	5													
WBS	<b>c</b> 1	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	сз	JEDEC J- STD-002	1	15	PB Solderability	>95% Lend Coverage					1/15/0			1/15/0	1/15/0		3/45/0
SD	сз	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	2/2010	2/20/0	1/10/0	3/30/0
Test Group I	01-0-0	rication Reliab	The Tests														
Test Group D	) - Die Pac	ricason Relias	ility rests														
ЕМ	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
нсі	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 Regulaements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
NBTI	D4				Negative Blas 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 Regularements	Completed Per Process Technology Regulaements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
								Completed Per	Completed Per	Completed Per Process	Completed Per Process	Completed Per Process	Completed Per Process	Completed Per Process	Completed Per Process	Completed Per Process	Completed Per Process Technology
SM	DS			-	Stress Migration		•	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Technology Requirements	Technology Requirements	Technology Requirements	Technology Requirements	Technology Requirements	Technology Requirements	Technology Requirements	Requirements
		al Verification 1	Tests	•	Stress Migration		•	Process Technology Requirements	Process Technology Requirements	Technology	Technology Requirements	Technology	Requirements	Technology Requirements	Technology	Technology Requirements	Process Technology Requirements
				•	Migration			Process Technology Requirements	Process Technology Requirements	Technology	Technology Requirements	Technology	Technology Requirements	Technology Requirements	Technology Requirements	Technology Requirements	Process Technology Requirements
Test Group E ESD	E - Electric	AEC Q100- 002	1		Migration ESD HBM (Bus Pins)		- 12000 Voits	Requirements	Requirements	Technology	Technology Requirements	Technology Requirements	Requirements	Technology Requirements	2/6/0	Pechnology Requirements 2/6/0	Requirements
Test Group E ESD ESD	E2 E2	AEC Q100- 002 AEC Q100- 002	1	3	ESD HBM (Bus Pins) ESD HBM	- -	Volts 2000 Volts	Requirements 1/3/0 1/3/0	Requirements - 1/3/0	Technology	Process     P	Technology Requirements	Technology Requirements	Technology       Requirements       1/3/0       1/3/0	Technology Requirements 2/6/0 1/3/0	2/6/0 1/3/0	- Jan Strand
Test Group E ESD ESD ESD	E2 E2 E3	AEC Q100- 002 Q100- 002 Q100- AEC Q100- 011	1 1 1	3	ESD HEM (Bus Pins) ESD HEM ESD CDM	- - - -	Volts 2000	Requirements 1/3/0 1/3/0 1/3/0	Requirements 1/3/0 1/3/0	Technology	Technology     Requirements	Technology Requirements - 1/3/0 1/3/0	Technology Requirements	Technology       Requirements       1/3/0       1/3/0       1/3/0	Technology Requirements 2/6/0 1/3/0 1/3/0	Zi6i0           L/3i0           L/3i0	3/9/0 3/9/0
Test Group E ESD ESD ESD	E2 E2	AEC Q100- 002 AEC Q100- 002	1	3	ESD HBM (Bus Pins) ESD HBM	- - - - - - - - - - - - - - - - - - -	Volts 2000 Volts	Requirements 1/3/0 1/3/0	Requirements - 1/3/0	Technology	Processory     Requirements	Technology Requirements	Technology Requirements	Technology       Requirements       1/3/0       1/3/0	Technology Requirements 2/6/0 1/3/0	2/6/0 1/3/0	- Jan Strand

QBS: Qual By Similarity
Qual Device SN65LBC176AQDR 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, 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, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours
 The following are equivalent HTML options based on an activation energy of 0.7eV : 150C/1k Hours, 140C/480 Hours, 150C/300 Hours, 150C/

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]-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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