

PCN Number:	20230210000.2A		PCN Date:	July 27, 2023																									
Title:	Qualification of CDAT as an alternate Assembly and test site for select devices																												
Customer Contact:	Change Management team		Dept:	Quality Services																									
Proposed 1st Ship Date:	May 13, 2023		Sample Requests accepted until:	Aug 27, 2023*																									
*Sample requests received after Aug 27, 2023 will not be supported, Rev A devices only																													
Change Type:																													
<input checked="" type="checkbox"/>	Assembly Site	<input type="checkbox"/>	Design	<input type="checkbox"/>	Wafer Bump Material																								
<input checked="" type="checkbox"/>	Assembly Process	<input type="checkbox"/>	Data Sheet	<input type="checkbox"/>	Wafer Bump Process																								
<input checked="" type="checkbox"/>	Assembly Materials	<input type="checkbox"/>	Part number change	<input type="checkbox"/>	Wafer Fab Site																								
<input checked="" type="checkbox"/>	Mechanical Specification	<input checked="" type="checkbox"/>	Test Site	<input type="checkbox"/>	Wafer Fab Material																								
<input type="checkbox"/>	Packing/Shipping/Labeling	<input type="checkbox"/>	Test Process	<input type="checkbox"/>	Wafer Fab Process																								
PCN Details																													
Description of Change:																													
<p>Revision A is to announce the <u>addition</u> of new devices that were not included on the original PCN notification. These new devices and some minor content changes are highlighted and bolded in the device list below. The expected first shipment date for these new devices will be 90 days from this notice for these newly added devices only.</p> <p>Texas Instruments Incorporated is announcing the qualification of CDAT as an additional Assembly and test site for set of devices listed below. Construction differences are as follows:</p> <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th>What</th> <th>UTL1</th> <th>CDAT</th> </tr> </thead> <tbody> <tr> <td>Mount Compound</td> <td>SID#PZ0035</td> <td>4207123</td> </tr> <tr> <td>Lead Finish</td> <td>Matte Sn</td> <td>NiPdAu</td> </tr> <tr> <td>Bond wire composition, diameter***</td> <td>Cu, 1.3 mil</td> <td>Cu, 1.0 mil</td> </tr> <tr> <td>MSL **</td> <td>Level 1</td> <td>Level 2</td> </tr> <tr> <td>Bond wire composition, diameter****</td> <td>Au, 1.3 mil</td> <td>Cu, 0.96 mil</td> </tr> </tbody> </table> <p>** - DRB Devices only</p> <p>*** - NGU devices only</p> <p>**** - TUSB217xRGYx devices only</p> <p>Marking Differences:</p> <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th></th> <th>UTAC</th> <th>TI Chengdu</th> </tr> </thead> <tbody> <tr> <td>RHB Package</td> <td> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">UTAC</div> <div style="font-family: monospace; font-size: 0.8em;"> +-----+ ! O ! ! LP8770Q ! ! 2D RHB ! ! TI YMS ! ! LLLL G3 ! +-----+ TI = TI LETTERS YM = YEAR MONTH CODE S = ASSEMBLY SITE CODE PER QSS 005- LLLL = ASSY LOT CODE O - PIN 1 (MARKED) ECAT : G3 </div> </div> </td> <td> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <div style="font-family: monospace; font-size: 0.8em;"> +-----+ ! O ! ! LP8770Q ! ! 2D RHB ! ! TI YMS ! ! LLLL G4 ! +-----+ TI = TI LETTERS YM = YEAR MONTH CODE S = ASSEMBLY SITE CODE PER QSS 005-120 LLLL = ASSY LOT CODE O - PIN 1 (MARKED) ECAT : G4 </div> </div> </td> </tr> </tbody> </table>						What	UTL1	CDAT	Mount Compound	SID#PZ0035	4207123	Lead Finish	Matte Sn	NiPdAu	Bond wire composition, diameter***	Cu, 1.3 mil	Cu, 1.0 mil	MSL **	Level 1	Level 2	Bond wire composition, diameter****	Au, 1.3 mil	Cu, 0.96 mil		UTAC	TI Chengdu	RHB Package	<div style="border: 1px solid black; padding: 5px; margin: 5px;"> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">UTAC</div> <div style="font-family: monospace; font-size: 0.8em;"> +-----+ ! O ! ! LP8770Q ! ! 2D RHB ! ! TI YMS ! ! LLLL G3 ! +-----+ TI = TI LETTERS YM = YEAR MONTH CODE S = ASSEMBLY SITE CODE PER QSS 005- LLLL = ASSY LOT CODE O - PIN 1 (MARKED) ECAT : G3 </div> </div>	<div style="border: 1px solid black; padding: 5px; margin: 5px;"> <div style="font-family: monospace; font-size: 0.8em;"> +-----+ ! O ! ! LP8770Q ! ! 2D RHB ! ! TI YMS ! ! LLLL G4 ! +-----+ TI = TI LETTERS YM = YEAR MONTH CODE S = ASSEMBLY SITE CODE PER QSS 005-120 LLLL = ASSY LOT CODE O - PIN 1 (MARKED) ECAT : G4 </div> </div>
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ECAT

G3

G4

With the advent of CDAT Assembly, there will be minor package outline dimension differences as follows:

Package Outline Drawing Differences:

	UTAC	TI Chengdu
DRB Package Drawing		
NGU Package Drawing		
RHB Package Drawing		

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
<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change	<input checked="" type="checkbox"/> No Change
Changes to product identification resulting from this PCN:			
Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
UTL1	NSE	THA	Bangkok
CDAT	CDA	CHN	Chengdu
<p>Sample product shipping label (not actual product label)</p> <div> <p>G3 = Matte Sn G4 = NiPdAu</p> </div>			
Product Affected:			
LM25180QNGURQ1	LP87702TRHBRQ1	TCAN1042HGVRBQT1	TCAN1051HVRBQT1
LM5180QNGURQ1	LP87702TRHBTQ1	TCAN1042HVDRBRQ1	TCAN1051HGDRBRQ1
LM5180QNGUTQ1	TCAN1042DRBRQ1	TCAN1042HVDRBTQ1	TCAN1051HGDRBTQ1
LM5181QNGURQ1	TCAN1042DRBTQ1	TCAN1042VDRBRQ1	TCAN1051HGVRDRBRQ1
LP877020RHBRQ1	TCAN1042GDRBRQ1	TCAN1042VDRBTQ1	TCAN1051HGVRDRBTQ1
LP87702DRHBRQ1	TCAN1042GDRBTQ1	TCAN1051DRBRQ1	TCAN1051HVDRBRQ1
LP87702DRHBTQ1	TCAN1042GVDRBRQ1	TCAN1051DRBTQ1	TCAN1051HVDRBTQ1
LP87702KRHBRQ1	TCAN1042GVDRBTQ1	TCAN1051GDRBRQ1	TCAN1051VDRBRQ1
LP87702KRHBTQ1	TCAN1042HVRBRQ1	TCAN1051GDRBTQ1	TCAN1051VDRBTQ1
LP87702PRHBRQ1	TCAN1042HVRBTQ1	TCAN1051GVDRBRQ1	TCAN4550RGYRQ1
LP87702PRHBTQ1	TCAN1042HGDRBRQ1	TCAN1051GVDRBTQ1	TCAN4550RGYTQ1
LP87702RRHBRQ1	TCAN1042HGDRBTQ1	TCAN1051HVRBRQ1	TCAN4551RGYRQ1
LP87702RRHBTQ1	TCAN1042HGVRDRBRQ1	TUSB217RGYRQ1	TUSB217RGYTQ1

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

Approve Date 18-JANUARY -2023

Product Attributes

Attributes	Qual Device: TCAN4550RGYRQ1	QBS Reference: TLC6C5816QPWPRQ1	QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1	QBS Reference: TLIN2024RGYRQ1	QBS Reference: TCAN11625DMTRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125
Product Function	Interface	Power Management	Interface	Interface	Interface	Interface
Wafer Fab Supplier	RFAB	RFAB	RFAB	RFAB	RFAB, RFAB	RFAB
Assembly Site	CDAT	TAI	CDAT	CDAT	CDAT	CDAT
Package Group	QFN	TSSOP	QFN	QFN	QFN	QFN
Package Designator	RGY	PWP	DRB	DRB	RGY	DMT
Pin Count	20	28	8	8	24	14

- QBS: Qual By Similarity
- Qual Device TCAN4550RGYRQ1 is qualified at MSL2 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: TCAN4550RGYRQ1	QBS Reference: TLC6C5816QPWPRQ1	QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1	QBS Reference: TLIN2024RGYRQ1	QBS Reference: TCAN11625DMTRQ1
Test Group A - Accelerated Environment Stress Tests													
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	QBS (1)	-	Pass	Pass	Pass	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS (1)	-	1/77/0	2/154/0	3/231/0	-
ACUHA	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	QBS (1)	-	1/77/0	2/154/0	3/231/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: TCAN4550RGYRQ1	QBS Reference: TLC6C5816QPWPRQ1	QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1	QBS Reference: TLIN2024RGYRQ1	QBS Reference: TCAN11625DMTRQ1
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-55C/150C	1000 Cycles	QBS (1)	-	-	1/77/0	-	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	QBS (1)	-	1/77/0	1/77/0	3/231/0	-
TC-8P	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	QBS (1)	-	-	-	1/5/0	-
PTC	A5	JEDEC JESD22-A105	1	45	PTC	-40/125C	1000 Cycles	N/A	-	-	1/45/0	1/45/0	-
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	1000 Hours	QBS (1)	-	1/77/0	2/154/0	2/90/0	-
Test Group B - Accelerated Lifetime Simulation Tests													
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	QBS (2)	3/231/0	-	-	-	3/231/0
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	1000 Hours	QBS (2)	-	1/77/0	2/154/0	-	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	QBS (2)	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	2/60/0	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	-	1/30/0	2/60/0	3/90/0	-
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	-	-	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	-
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	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

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: TCAN4550RGYRQ1	QBS Reference: TLC6C5816QPWPRQ1	QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1	QBS Reference: TLIN2024RGYRQ1	QBS Reference: TCAN11625DMTRQ1
TDOB	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													
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	-	-	-	-	-

- 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

EI (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/HAST

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

TI Qualification ID: R-CHG-2209-076

QBS (1) - Package QBS to TLIN2024RGYRQ1, TLIN10285DRBRQ1, TLIN10283DRBRQ1 with same package attributes. TLIN10285DRBRQ1 / TLIN10283DRBRQ1 has been Q006 tested.

QBS (2) - Process QBS to TLC6C5816QPWPRQ1 and TCAN11625DMTRQ1 with same silicon attributes

Rev A Device qual Memos:

TI Information
Selective Disclosure

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

Approve Date 02-June-2023

Product Attributes

Attributes	Qual Device: TCAN1042HGVDRBRQ1	Qual Device: TCAN1042HGVDRBRQ1	Process QBS Reference: TCAN1042HVDRO1	Process QBS Reference: TCAN1051VDRO1	Process QBS Reference: TCAN1042HVDRO1	Package QBS Reference: CAXC8T245QRHLRQ1	Package QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125
Product Function	Interface	Interface	Interface	Interface	Interface	Logic	Interface	Interface
Wafer Fab Supplier	MH8	MAINEFAB	MH8	MH8	MAINEFAB	MH8	RFAB	RFAB
Assembly Site	CDAT	CDAT	FMX	FMX	FMX	CDAT	CDAT	CDAT
Package Group	QFN	QFN	SOIC	SOIC	SOIC	QFN	QFN	QFN
Package Designator	DRB	DRB	D	D	D	RHL	DRB	DRB
Pin Count	8	8	8	8	8	24	8	8

- QBS: Qual By Similarity
- Qual Device TCAN1042HGVDRBRQ1 is qualified at MSL2 260C

Qualification Results

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

Type	#	Test Spec	Min Lot Qty	SB / Lot	Test Name	Condition	Duration	Qual Device: TCAN1042HGVDRBRQ1	Qual Device: TCAN1042HGVDRBRQ1	Process QBS Reference: TCAN1042HVDRO1	Process QBS Reference: TCAN1051VDRO1	Process QBS Reference: TCAN1042HVDRO1	Package QBS Reference: CAXC8T245QRHLRQ1	Package QBS Reference: TLIN10283DRBRQ1	Package QBS Reference: TLIN10285DRBRQ1
Test Group A - Accelerated Environment Stress Tests															
PC	A1	JEDEC 1-STD-020 JESD02- A113	3	77	Preconditioning	MSL1 260C	1 Step	-	-	-	-	-	3/Pass	-	-
PC	A1	JEDEC 1-STD-020 JESD02- A113	3	77	Preconditioning	MSL2 260C	1 Step	QBS (1)	QBS (1)	-	-	-	-	1/Pass	2/Pass
HAST	A2	JEDEC JESD02- A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS (1)	QBS (1)	-	-	-	3/231/0	1/77/0	2/154/0
AOUHAST	A3	JEDEC JESD02- A100/JEDEC JESD02- A118	3	77	Autoclave	121C/15psig	96 Hours	QBS (1)	QBS (1)	-	-	-	3/231/0	1/77/0	2/154/0

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: TCAN1042HVDQRQ1	Qual Device: TCAN1042HVDQRQ1	Process QBS Reference: TCAN1042HVDQRQ1	Process QBS Reference: TCAN1051VDRQ1	Process QBS Reference: TCAN1042HVDQRQ1	Package QBS Reference: CAXC8T245QRHLRQ1	Package QBS Reference: TLIN10283DRBRQ1	Package QBS Reference: TLIN10283DRBRQ1
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-55C/150C	1000 Cycles	QBS (1)	QBS (1)	-	-	-	-	-	1/77/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-55C/150C	500 Cycles	QBS (1)	QBS (1)	-	-	-	3/231/0	1/77/0	1/77/0
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	QBS (1)	QBS (1)	-	-	-	3/135/0	1/77/0	2/154/0
Test Group B - Accelerated Lifetime Simulation Tests															
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	-	-	-	-	-	3/231/0	-	-
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	1000 Hours	QBS (1)	QBS (1)	-	-	-	-	1/77/0	2/154/0
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	300 Hours	QBS (2)	QBS (2)	2/154/1	1/77/0	3/231/0	-	-	-
ELFR	B2	AEC Q100-005	1	77	Early Life Failure Rate	125C	48 Hours	QBS (2)	QBS (2)	2/1500/0	1/800/0	3/2400/0	-	-	-
EDR	B3	AEC Q100-005	1	77	MM Endurance, Data Retention, and Op Life	Per QSS-009-018	1 Step	-	-	-	-	-	-	1/77/0	2/154/0
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	-	-	-	3/90/0	-	-
WBP	C2	MIL-STD-883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	1/30/0	-	-	-	3/90/0	-	-
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	QBS (1)	QBS (1)	-	-	-	-	-	1/15/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	QBS (1)	QBS (1)	-	-	-	-	-	1/15/0
PD	C4	JEDEC JESD22-B100 and B109	1	10	Physical Dimensions	Cpk>1.67	-	1/10/0	1/10/0	-	-	-	-	1/10/0	2/20/0
Test Group D - Die Fabrication Reliability Tests															
EM	D1	JESD61	-	-	Electronigration	-	-	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
TDOB	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
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: TCAN1042HVDQRQ1	Qual Device: TCAN1042HVDQRQ1	Process QBS Reference: TCAN1042HVDQRQ1	Process QBS Reference: TCAN1051VDRQ1	Process QBS Reference: TCAN1042HVDQRQ1	Package QBS Reference: CAXC8T245QRHLRQ1	Package QBS Reference: TLIN10283DRBRQ1	Package QBS Reference: TLIN10283DRBRQ1
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															
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	-	-	-	-	-	-	-

- 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 -85C/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

EI (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/HAST

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

TI Qualification ID: R-CHG-2209-031

QBS (1) - Package QBS to TLIN10283DRBRQ1/TLIN10285DRBRQ1 with same package attributes. Q006 QBS to CAXC8T245QRHLRQ1.

QBS (2) - MH8MFAB ABCD05HV Process QBS to TCAN1042VDRQ1/TCAN1051VDRQ1/TCAN1042HVDQRQ1 with same silicon attributes

[1]- 1 EOS fail Discounted. QEM-EVAL-1801-00348 8D reports EOS damage to be caused by mishandling of units during the cold temperature electrical test insertion.

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

Approve Date 05-June-2023

Product Attributes

Attributes	Qual Device: LM5180QNGURQ1	QBS Reference: UCC27282QDRCRQ1	QBS Reference: PDRV8889QWRGERQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125
Product Function	Power Management	Power Management	Power Management
Wafer Fab Supplier	MAINEFAB	MAINEFAB	RFAB
Assembly Site	CDAT	CDAT	CDAT
Package Group	QFN	QFN	QFN
Package Designator	NGU	DRC	RGE
Pin Count	8	10	24

- QBS: Qual By Similarity
- Qual Device LM5180QNGURQ1 is qualified at MSL2 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: LM5180QNGURQ1	QBS Reference: UCC27282QDRCRQ1	QBS Reference: PDRV8889QWRGERQ1
Test Group A - Accelerated Environment Stress Tests										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	1/PASS	3/PASS	3/PASS
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS (1)	3/231/0	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	QBS (1)	-	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	QBS (1)	3/231/0	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	3/231/0	3/231/0
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	QBS (1)	3/135/0	3/231/0
Test Group B - Accelerated Lifetime Simulation Tests										
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	QBS (2)	3/231/0	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	QBS (2)	3/2400/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM5180QNGURQ1	QBS Reference: UCC27282QDRCRQ1	QBS Reference: PDRV8889QWRGERQ1
Test Group A - Accelerated Environment Stress Tests										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	1/PASS	3/PASS	3/PASS
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS (1)	3/231/0	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	QBS (1)	-	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	QBS (1)	3/231/0	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	3/231/0	3/231/0
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	QBS (1)	3/135/0	3/231/0
Test Group B - Accelerated Lifetime Simulation Tests										
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	QBS (2)	3/231/0	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	QBS (2)	3/2400/0	-

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM5180QNGURQ1	QBS Reference: UCC27282QDRCRQ1	QBS Reference: PDRV8889QWRGERQ1
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	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	3/90/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	QBS (1)	3/90/0	-
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	1/10/0	3/30/0	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
TDDb	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
NBTI	D4	-	-	-	Negative Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LM5180QNGURQ1	QBS Reference: UCC27282QDRCRQ1	QBS Reference: PDRV8889QWRGERQ1
Test Group E - Electrical Verification Tests										
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	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/>

TI Qualification ID: R-CHG-2209-084

QBS (1) - Package QBS to UCC27282QDRCRQ1, PDRV8889QWRGERQ1 with same package attributes. PDRV8889QWRGERQ1 has been Q006 tested.

QBS (2) - Process QBS to UCC27282QDRCRQ1 with same silicon attributes

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

**DRV8889WRGEQ1 - RFAB/CD-PR/CDAT - Grade 1 Q100 Rev H Q006
Approved 06-Dec-2019**

Product Attributes

Attributes	Qual Device: DRV8889WRGEQ1	Qual Device: DRV8889WRGEQ1-1P1	Qual Device: DRV8889WRGEQ1-1P2
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	Power Management	Power Management	Power Management
Wafer Fab Supplier	RFAB	RFAB	RFAB
Assembly Site	CDAT	CDAT	CDAT
Package Type	VQFN	VQFN	VQFN
Package Designator	RGE (4 X 4 QFN)	RGE (4 X 4 QFN)	RGE (4 X 4 QFN)
Ball/Lead Count	24	24	24

- QBS: Qual By Similarity

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: DRV8889WRGEQ1	Qual Device: DRV8889WRGEQ1-1P1	Qual Device: DRV8889WRGEQ1-1P2
Test Group A – Accelerated Environment Stress Tests									
PC	A1	-	3	22	SAM Analysis, Pre Stress	Completed	2/44/0	1/22/0	-
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	Level 3- 260C	No fails	No fails	-
PC	A1	-	3	22	SAM Analysis, Post Stress	Completed	2/44/0	1/22/0	-
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST, 130C/85%RH	96 Hours	2/154/0	1/77/0	-

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: DRV8889WRGEQ1	Qual Device: DRV8889WRGEQ1-1P1	Qual Device: DRV8889WRGEQ1-1P2
HAST	A2	-	3	1	Cross Section, Post bHAST 96 Hours	Completed	2/2/0	1/1/0	-
HAST	A2	-	3	30	Wire Bond Shear, Post bHAST, 96 Hours	Wires	2/60/0	1/30/0	-
HAST	A2	-	3	30	Bond Pull over Stitch, post bHAST, 96 Hours	Wires	2/60/0	1/30/0	-
HAST	A2	-	3	30	Bond Pull over Ball, Post bHAST, 96 Hours	Wires	2/60/0	1/30/0	-
HAST	A2	JEDEC JESD22-A110	3	70	Biased HAST, 130C/85%RH	192 Hours	3/210/0	3/210/0	-
HAST	A2	-	3	1	Cross Section, Post bHAST 192 Hours	Completed	2/2/0	1/1/0	-
HAST	A2	-	3	22	SAM Analysis, Post bHAST, 192 Hours	Completed	2/44/0	1/22/0	-
HAST	A2	-	3	30	Wire Bond Shear, Post bHAST, 192 Hours	Wires	2/60/0	1/30/0	-
HAST	A2	-	3	30	Bond Pull over Stitch, post bHAST, 192 Hours	Wires	2/60/0	1/30/0	-
HAST	A2	-	3	30	Bond Pull over Ball, Post bHAST, 192 Hours	Wires	2/60/0	1/30/0	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle, -65/150C	500 Cycles	2/154/0	1/77/0	-
TC	A4	-	3	1	Cross Section, Post T/C 500 Cycles	Completed	2/2/0	1/1/0	-
TC	A4	-	3	22	SAM Analysis, Post T/C, 500 Cycles	Completed	2/44/0	1/22/0	-
TC	A4	-	3	30	Wire Bond Shear, Post T/C 500 Cycles	Wires	2/60/0	1/30/0	-
TC	A4	-	3	30	Bond Pull over Stitch Post T/C 500 Cycles	Wires	2/60/0	1/30/0	-
TC	A4	-	3	30	Bond Pull over Ball Post T/C 500 Cycles	Wires	2/60/0	1/30/0	-
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle, -65/150C	1000 Cycles	2/140/0	1/70/0	-
TC	A4	-	3	1	Cross Section, Post T/C 1000 Cycles	Completed	2/2/0	1/1/0	-
TC	A4	-	3	22	SAM Analysis, Post T/C, 1000 Cycles	Completed	2/44/0	1/22/0	-
TC	A4	-	3	30	Wire Bond Shear, Post T/C 1000 Cycles	Wires	2/60/0	1/30/0	-
TC	A4	-	3	30	Bond Pull over Stitch, Post T/C, 1000 Cycles	Wires	2/60/0	1/30/0	-

Type	#	Test Spec	Min Lot Qty	SS/Lot	Test Name / Condition	Duration	Qual Device: DRV8889WRGEQ1	Qual Device: DRV8889WRGEQ1-1P1	Qual Device: DRV8889WRGEQ1-1P2
TC	A4	-	3	30	Bond Pull over Ball, Post T/C, 1000 Cycles	Wires	2/60/0	1/30/0	-
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle - 40/125C	1000 Cycles	-	-	-
PTC	A5	JEDEC JESD22-A105	1	45	Power Temperature Cycle - 40/125C	2000 Cycles	-	-	-
HTSL	A6	JEDEC JESD22-A103	3	45	High Temp Storage Bake 150C	1000 Hours	2/90/0	1/45/0	-
HTSL	A6	-	3	1	Cross Section, Post HTSL 1000 Hours	Completed	2/2/0	1/1/0	-
HTSL	A6	JEDEC JESD22-A103	3	44	High Temp Storage Bake 150C	2000 Hours	2/88/0	1/44/0	-
HTSL	A6	-	3	1	Cross Section, Post HTSL 2000 Hours	Completed	2/2/0	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 over Ball, 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.

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: 20180731-126552

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

Approve Date 09-June-2023
Product Attributes

Attributes	Qual Device: LP87702DRHBRQ1	Process, Package QBS Reference: LM2775QDSGRQ1	Package Reference: TPS92682QRHBRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 125	-40 to 125	-40 to 125
Product Function	Power Management	Power Management	Power Management
Wafer Fab Supplier	DMOS6	RFAB	RFAB
Assembly Site	CDAT	CDAT	CDAT
Package Group	QFN	QFN	QFN
Package Designator	RHB	DSG	RHB
Pin Count	32	8	32

- QBS: Qual By Similarity
- Qual Device LP87702DRHBRQ1 is qualified at MSL2 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: LP87702DRHBRQ1	Process, Package QBS Reference: LM2775QDSGRQ1	Package QBS Reference: TPS92682QRHBRQ1
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Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LP87702DRHBRQ1	Process, Package QBS Reference: LM2775QDSGRQ1	Package QBS Reference: TPS92682QRHBRQ1
Test Group A - Accelerated Environment Stress Tests										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	QBS(1)	3/PASS	-
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL3 260C	-	-	-	3/PASS
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS(1)	3/231/0	3/231/0
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	QBS(1)	3/231/0	3/231/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	QBS(1)	3/231/0	3/231/0
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	QBS(1)	-	3/135/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	175C	500 Hours	QBS(1)	3/135/0	-
Test Group B - Accelerated Lifetime Simulation Tests										
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	QBS(2)	3/231/0	-
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	324 Hours	-	-	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	3/90/0	3/90/0

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LP87702DRHBRQ1	Process, Package QBS Reference: LM2775QDSGRQ1	Package QBS Reference: TPS92682QRHBRQ1
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	3/90/0	3/90/0
SD	C3	JEDEC J-STD-002	1	15	PB Solderability	>95% Lead Coverage	-	QBS(1)	1/15/0	3/44/0
SD	C3	JEDEC J-STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	QBS(1)	1/15/0	3/44/0
PD	C4	JEDEC JESD22-B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	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
Tddb	D2	JESD35	-	-	Time Dependent Dielectric Breakdown	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
HCI	D3	JESD60 & 28	-	-	Hot Carrier Injection	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
NBTI	D4	-	-	-	Negative Bias Temperature Instability	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
SM	D5	-	-	-	Stress Migration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
Test Group E - Electrical Verification Tests										
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	1/30/0	-	-
Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: LP87702DRHBRQ1	Process, Package QBS Reference: LM2775QDSGRQ1	Package QBS Reference: TPS92682QRHBRQ1
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/>

TI Qualification ID: R-CHG-2209-077

QBS (1) - Package QBS to LM2775QDSGRQ1 and TPS92682QRHB with same package attributes. LM2775QDSGRQ1 and TPS92682QRHB have been Q006 tested.

QBS (2) - Process QBS to LM2775QDSGRQ1 with same silicon attributes

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

Approve Date 14-July-2023

Product Attributes

Attributes	Qual Device: TUSB217RGYRQ1	QBS Reference: TLC6C5816QPWPRQ1	QBS Reference: TS3A5017QRGYRQ1	QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1
Automotive Grade Level	Grade 2	Grade 1	Grade 1	Grade 1	Grade 1
Operating Temp Range (C)	-40 to 105	-40 to 125	-40 to 125	-40 to 125	-40 to 125
Product Function	Signal Chain	Power Management	Signal Chain	Interface	Interface
Wafer Fab Supplier	RFAB	RFAB	FR-BIP-1	RFAB	RFAB
Assembly Site	CDAT	TAI	CDAT	CDAT	CDAT
Package Group	QFN	TSSOP	QFN	QFN	QFN
Package Designator	RGY	PWP	RGY	DRB	DRB
Pin Count	14	28	16	8	8

- QBS: Qual By Similarity
- Qual Device TUSB217RGYRQ1 is qualified at MSL2 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: TUSB217RGYRQ1	Process QBS Reference: TLC6C5816QPWPRQ1	QBS Reference: TS3A5017QRGYRQ1	QBS Reference: TLIN10283DRBRQ1	QBS Reference: TLIN10285DRBRQ1
Test Group A - Accelerated Environment Stress Tests												
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	QBS(1)	-	3/Pass	1/Pass	2/Pass
HAST	A2	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	QBS(1)	-	3/231/0	1/77/0	2/154/0

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>TUSB217RGYRQ1</u>	Process QBS Reference: <u>TLC6C5816QPWPRQ1</u>	QBS Reference: <u>TS3A5017QRGYRQ1</u>	QBS Reference: <u>TLIN10283DRBRQ1</u>	QBS Reference: <u>TLIN10285DRBRQ1</u>
AC/UHAST	A3	JEDEC JESD22-A102/JEDEC JESD22-A118	3	77	Autoclave	121C/15psig	96 Hours	QBS(1)	-	3/231/0	1/77/0	2/154/0
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	QBS(1)	-	3/231/0	2/154/0	
TC	A4	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-55C/150C	1000 Cycles	QBS(1)	-	-	-	1/77/0
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull	-	-	QBS(1)	-	1/5/0	1/5/0	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	QBS(1)	-	3/135/0	1/77/0	2/154/0
Test Group B - Accelerated Lifetime Simulation Tests												
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	125C	1000 Hours	QBS(2)	3/231/0	3/231/0	-	-
HTOL	B1	JEDEC JESD22-A108	1	77	Life Test	150C	1000 Hours	QBS(2)	-	-	1/77/0	2/154/0
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	QBS(2)	3/2400/0	-	-	-
EDR	B3	AEC Q100-005	1	77	NVM Endurance, Data Retention, and Op Life	Per QSS-009-018	1 Step	-	-	-	1/77/0	2/154/0
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	3/90/0	3/90/0	1/30/0	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	3/90/0	3/90/0	1/30/0	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

Type	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>TUSB217RGYRQ1</u>	Process QBS Reference: <u>TLC6C5816QPWPRQ1</u>	QBS Reference: <u>TS3A5017QRGYRQ1</u>	QBS Reference: <u>TLIN10283DRBRQ1</u>	QBS Reference: <u>TLIN10285DRBRQ1</u>
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	3/30/0	1/10/0	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
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
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
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
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
Test Group E - Electrical Verification Tests												
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	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/HAST

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

TI Qualification ID: R-CHG-2209-079

QBS (1) - Package QBS to TS3A5017QRGYRQ1, TLIN10285DRBRQ1, TLIN10283DRBRQ1 with same package attributes. TLIN10285DRBRQ1 / TLIN10283DRBRQ1 has been Q006 tested.

QBS (2) - Process QBS to TLC6C5816QPWPRQ1 with same silicon attributes

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

**Approve Date 18-JANUARY -2023
Product Attributes**

TLIN10283DRBRQ1	TLIN10285DRBRQ1
Die Attributes	
RFAB	RFAB
LBC9M	LBC9M
1650 x 1830	1650 x 1830
Package Attributes	
CDAT	CDAT
QFN	QFN
DRB	DRB

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	TLIN10283DRBRQ1	TLIN10285DRBRQ1
Test Group A - Accelerated Environment Stress Tests									
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	-	1/Pass	2/Pass
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	-	1/22/0	2/44/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	-	1/22/0	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	-	-
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	1/30/0	2/60/0
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	1/30/0	2/60/0
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	1/30/0	2/60/0
HAST	A2.2	JEDEC JESD22-A110	3	70	Biased HAST	130C/85%RH	192 Hours	1/70/0	2/140/0
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	1/22/0	2/44/0
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	1/1/0	2/1/0
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	1/30/0	2/60/0
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	1/30/0	2/60/0

HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	1/30/0	2/60/0
TC	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-55C/150C	1000 Cycles	-	1/77/0
TC	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	-	1/22/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	-	-
TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	-	1/30/0
TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires		1/30/0
TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires		1/30/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle	-55C/150C	2000 Cycles	-	1/70/0
TC	A4.1.1	-	3	22	SAM Analysis, post TC 2X	Review for delamination	Completed	-	1/22/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	-	-
TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	-	1/30/0
TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires		1/30/0
TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires		1/30/0
TC	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	1/77/0	1/77/0
TC	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	1/22/0	1/22/0
TC	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	-	-
TC	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	1/30/0	1/30/0

TC	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	1/30/0	1/30/0
TC	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	1/30/0	1/30/0
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle	-65C/150C	1000 Cycles	1/70/0	1/70/0
TC	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	1/22/0	1/22/0
TC	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	1/1/0	1/1/0
TC	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	1/30/0	1/30/0
TC	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	1/30/0	1/30/0
TC	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	1/30/0	1/30/0
HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	1000 Hours	1/45/0	2/90/0
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	-
HTSL	A6.2	JEDEC JESD22-A103	3	44	High Temperature Storage Life	150C	2000 Hours	1/44/0	2/88/0
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	1/1/0	2/2/0

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TI Qualification ID: 20200329-133554

Affected ZVEI IDs: SEM-PA-05, SEM-PA-07, SEM-PA-18, SEM-TF-01, SEM-PA-01, SEM-PA-08, SEM-PA-13, SEM-PS-02

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