PCN Number: 20		2023	20231219000.1			PCN Date:		:	December 21, 2023	
Title:         Qualification of additional Fab site (RFAB) using qualified Process Technology an additional Assembly Site/BOM options for select devices							hnology and			
Custome	Contact:		Cha	nge Management t	eam	Dep	pt:		Qu	ality Services
Proposed 1 <sup>st</sup> Ship Date:			Jun 17, 2024 Samp		ple Requests cepted until:		uests until:	Jan 20, 2024*		
*Sample requests received after Jan 20, 2024 will not be supported.										
Change T	ype:									
🛛 Assem	oly Site		🛛 Design				Wafer Bump Material		mp Material	
Assembly Process			Data Sheet				Wafer Bump Process			
Assembly Materials		Part number change			🛛 🖾 🛛 Wafer		Fa	b Site		
Mechanical Specification		$\square$	⊠ Test Site			$\boxtimes$	Wafer	Fa	b Materials	
Packing	g/Shipping/Lab	eling		Test Process			$\boxtimes$	Wafer	Fa	b Process

# **PCN Details**

**Description of Change:** Qualification of additional Fab site (RFAB) using qualified Process Technology and additional Assembly site/BOM options for the list of devices in the product affected section below.

C	urrent Fab Site	e	Additional Fab site			
Current Fab Process Site		Wafer Diameter	Additional Fab site	Process	Wafer Diameter	
SFAB	HCMOS	150mm	RFAB	LBC9	300mm	

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

Construction differences are noted below:

# Group 1 BOM Table (RFAB/Process migration, Die Change & Qualify CDAT as an additional Assembly site):

	UTL2	HNA	CDAT
Mount Compound	SID#PZ0001	SID#400180	4207123
Bond wire composition, diameter	Au, 1.0 mil	Cu, 1.0 mil	Cu, 0.8 mil
Mold Compound	SID#CZ0096	SID#450413	4222198
Lead finish	NiPdAu	NiPdAu	Matte Sn
Probe site	Sherman	Sherman	CD-PR
Final Test site	UTAC	HNA	CDAT
Pin one Mark	stipe	stripe	dot

# Group 2 BOM Table (RFAB/Process migration, Die Change & BOM update):

	Current	Additional
Bond wire composition, diameter	Cu, 0.96 mil	Au, 0.8 mil
Probe site	Sherman	None **
Final Test site	TI Mexico	TI Malaysia

\*\* - SN74AHCT08QDRG4Q1 & SN74AHCT08QDRQ1 will be probed in CD-PR

Upon expiry of this PCN TI will combine lead free solutions in a single <u>standard part number</u>, for the device in group 2. For example; <u>CAHCT1G32QDBVRQ1</u> – can ship with both Matte Sn and NiPdAu.

Example:

- Customer order for 7500 units of CAHCT1G32QDBVRQ1 with 2500 units SPQ (Standard Pack Quantity per Reel).
- TI can satisfy the above order in one of the following ways.
  - I. 3 Reels of NiPdAu finish.
  - II. 3 Reels of Matte Sn finish
  - III. 2 Reels of Matte Sn and 1 reel of NiPdAu finish.
  - IV. 2 Reels of NiPdAu and 1 reel of Matte Sn finish.

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

Qual details are provided in the Qual Data Section.

# **Reason for Change:**

These changes are part of our multiyear plan to transition products from our 150-milimeter factories to newer, more efficient manufacturing processes and technologies, underscoring our commitment to product longevity and supply continuity.

Anticipated impact on Form, Fit, Function, Quality or Reliability (positive / negative):

None

# Impact on Environmental Ratings

Checked boxes indicate the status of environmental ratings following implementation of this change. If below boxes are checked, there are no changes to the associated environmental ratings.

RoHS	REACH	Green Status	IEC 62474
🛛 No Change	🛛 No Change	🛛 No Change	🛛 No Change

Changes to product identification resulting from this PCN:

# Fab Site Information:

Chip Site	Chip Site Origin Code (20L)	Chip Site Country Code (21L)	Chip Site City
SH-BIP-1	SHE	USA	Sherman
RFAB	RFB	USA	Richa rdso n

Die Rev:	
Current	New
Die Rev [2P]	Die Rev [2P]
A, B, C, H, J, -	Α

# **Assembly Site Information:**

Assembly Site	Assembly Site Origin (22L)	Assembly Country Code (23L)	Assembly City
UTAC	NS2	THA	Bangpakong, Chachoengsao
HNA	HNT	THA	Ayutthaya
CDAT	CDA	CHN	Chengdu

Sample product shipping label (not actual product label):



### Product Affected: Group 1 Device list (RFAB/Process migration, Die Change & Qualify CDAT as an additional Assembly site):

CAHCT1G32QDBVRQ1	SN74AHC1G08QDBVRQ1	SN74AHC1G32TDBVRQ1	SN74AHC1G86QDBVRQ1
SN74AHC1G04QDBVRQ1			

# Group 2 Device list (RFAB/Process migration, Die Change & BOM update):

SN74AHC14QDRQ1	SN74AHC74QDRQ1	SN74AHCT08QDRG4Q1	SN74AHCT126QDRQ1
SN74AHC32QDRQ1	SN74AHCT00QDRQ1	SN74AHCT08QDRQ1	SN74AHCT32QDRQ1

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

# R-CHG-2208-037

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

#### BD9 Redbull Q323- (RFAB) in MLA using 14-pin D Automotive Approve Date 06-NOVEMBER -2023

#### **Qualification Results**

Туре	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>SN74AHCT00QDRQ1</u>	QBS Reference: <u>SN74HCS74QDRQ1</u>
Test G	roup A - /	Accelerated Environment	Stress 1	Tests			······································		
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	-	3/0/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	-	-	3/66/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	-	-	3/66/0
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours		3/231/0
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	3/3/0
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.2	JEDEC JESD22-A110	3	70	Biased HAST	130C/85%RH	192 Hours	-	3/231/0
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	-	3/66/0
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	-	3/3/0
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	3/9/0
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	-	3/9/0
HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	-	3/9/0
тс	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	-	3/231/0
тс	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	-	3/66/0
тс	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	-	3/3/0
тс	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	-	3/9/0
тс	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	-	3/9/0
тс	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	-	3/9/0
тс	A4.2	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle	-65C/150C	1000 Cycles	-	3/231/0
тс	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	-	3/66/0
тс	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	-	3/3/0
тс	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	-	3/9/0

тс	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	-	3/9/0
тс	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	-	3/9/0
HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	1000 Hours	-	3/135/0
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	3/3/0
HTSL	A6.2	JEDEC JESD22-A103	3	44	High Temperature Storage Life	150C	2000 Hours	-	3/135/0
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	3/3/0
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
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

QBS: Qual By Similarity

Qual Device SN74AHCT00QDRQ1 is qualified at MSL1 260C

· Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable

The following are equivalent HTOL options based on an activation energy of 0.7eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours

The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours

The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

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

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

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

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

TI Qualification ID: R-CHG-2208-037

#### R-CHG-2208-037 Q006

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

# BD9 Redbull Q323- (RFAB) in MLA using 14-pin D Automotive Approve Date 06-NOVEMBER -2023

#### **Qualification Results**

Туре	#	Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: <u>SN74AHCT00QDRQ1</u>	QBS Reference: <u>SN74HCS74QDRQ1</u>
Test G	roup A - A	Accelerated Environment	Stress 1	Tests					
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL1 260C	-	-	3/0/0
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	-	-	3/66/0
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	-	-	3/66/0
HAST	A2.1	JEDEC JESD22-A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	3/231/0
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	3/3/0
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.1.4	-	3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	3/9/0
								1	
HAST	A2.1.5	-	3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	3/9/0
HAST	A2.2	JEDEC JESD22-A110	3	70	Biased HAST	130C/85%RH	192 Hours	-	3/231/0
HAST	A2.2.1	-	3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed	-	3/66/0
HAST	A2.2.2	-	3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed	-	3/3/0
HAST	A2.2.3	-	3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	3/9/0
HAST	A2.2.4	-	3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress Wires		-	3/9/0
HAST	A2.2.5	-	3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires	-	3/9/0
тс	A4.1	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	-	3/231/0
тс	A4.1.1	-	3	22	SAM Analysis, post TC 1X	Review for delamination	Completed	-	3/66/0
тс	A4.1.2	-	3	1	Cross Section, post TC, 1X	Post stress cross section	Completed	-	3/3/0
тс	A4.1.3	-	3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires	-	3/9/0
тс	A4.1.4	-	3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	-	3/9/0
тс	A4.1.5	-	3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires	-	3/9/0
тс	A4.2	JEDEC JESD22-A104 and Appendix 3	3	70	Temperature Cycle	-65C/150C	1000 Cycles	-	3/231/0
тс	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	-	3/66/0
тс	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	-	3/3/0
тс	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	-	3/9/0

тс	A4 2 4	-	3	30	Bond Pull over Stitch,	Doct stress	Wires	-	3/9/0		
10	A4.2.4	-	3	30	post TC, 2X	103130033	VIICS	-	51510		
тс	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	-	3/9/0		
HTSL	A6.1	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	1000 Hours	-	3/135/0		
HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed	-	3/3/0		
HTSL	A6.2	JEDEC JESD22-A103	3	44	High Temperature Storage Life	150C	2000 Hours	-	3/135/0		
HTSL	A6.2.1	-	3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	3/3/0		
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		
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		

QBS: Qual By Similarity

Qual Device SN74AHCT00QDRQ1 is qualified at MSL1 260C

Preconditioning was performed for Autoclave, Unbiased HAST, THB/Biased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable

The following are equivalent HTOL options based on an activation energy of 0.7eV : 125C/1k Hours, 140C/480 Hours, 150C/300 Hours, and 155C/240 Hours

The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours

The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

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

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

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

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

TI Qualification ID: R-CHG-2208-037

#### R-CHG-2310-059

# Automotive New Product Qualification Summary (As per AEC-Q100 Rev. H and JEDEC Guidelines)

# Gatorade BD13 DBV-5 Q-100 PCN CDAT Group 1 Approve Date 08-NOVEMBER -2023

Product Attributes

Attributer	Qual Device:	Qual Device:	QBS Process Reference:	QBS Package Reference:	QBS Package Reference:	QBS Product Reference:	QBS Product Reference:
Attributes	CAHCT1G32QDBVRQ1	SN74AHC1G08QDBVRQ1	SN74HCS74QPWRQ1	SN74HCS595QBQBRQ1	TPS3840PH30DBVRQ1	CAHCT1G125QDBVRQ1	CAHCT1G00QDBVRQ1
Automotive Grade Level	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
Product Function	Logic	Logic	Logic	Logic	Power Management	Logic	Logic
Wafer Fab Supplier	RFAB	RFAB	RFAB	RFAB	RFAB	RFAB	RFAB
Assembly Site	CDAT	CDAT	MLA	CDAT	CDAT	CDAT	CDAT
Package Group	SOT	SOT	TSSOP	QFN	SOT	SOT	SOT
Package Designator	DBV	DBV	PW	BQB	DBV	DBV	DBV
Pin Count	5	5	14	16	5	5	5

QBS: Qual By Similarity
 Qual Device CAHCT1G32QDBVRQ1 is qualified at MSL1 260C
 Qual Device SN74AHC1G08QDBVRQ1 is qualified at MSL1 260C

#### Qualification Results

Туре	=	Test Spec	Min Lot Qty	SS/ Lot	TestName	Condition	Duration	Qual Device: CAHCT1G32QDBVRQ1	Qual Device: SN74AHC1G08QDBVRQ1	QBS Process Reference: SN74HCS74QPWRQ1	QBS Package Reference: SN74HC S595QBQBRQ1	QBS Package Reference: TPS3840PH30DBVRQ1	QBS Product Reference: CAHCT1G125QDBVRQ1	QBS Product Reference: CAHCT1G00QDBVRQ1
Test Group	A - Acce	lerated Environ	ment St	ress Tes	sts									
PC	Al	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL1 260C				3/0/0	3/0/0	3/0/0	1/0/0	
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours			3/231/0	3/231/0	3/231/0	1/77/0	
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Autoclave	121C/15psig	96 Hours			3/231/0	3/231/0	3/231/0		
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	130C/85%RH	96 Hours						1/77/0	
Туре	=	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: CAHCT1G32QDBVRQ1	Qual Device: SN74AHC1G08QDBVRQ1	QBS Process Reference: SN74HCS74QPWRQ1	QBS Package Reference: SN74HCS595QBQBRQ1	QBS Package Reference: TP53840PH30DBVRQ1	QBS Product Reference: CAHCT1G125QDBVRQ1	QBS Product Reference: CAHCT1G00QDBVRQ1
тс	A4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles			3/231/0	3/231/0	3/231/0	1/77/0	-
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull							1/5/0	1/5/0	
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours			3/135/0	3/135/0	3/135/0	-	
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	175C	500 Hours						1/45/0	
Test Group	B - Acce	lerated Lifetime	e Simula	tion Tes	ts									
HTOL	81	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours	-	-	3/231/0	3/231/0	3/231/0		
HTOL	81	JEDEC JESD22- A108	3	77	Life Test	150C	300 Hours	-					1/77/0	
ELFR	B2	AEC Q100- 008	3	800	Early Life Failure Rate	125C	48 Hours			3/2400/0		-	-	
Test Group	C - Pack	age Assembly I	Integrity	Tests	_									
WBS	<b>C1</b>	AEC Q100- 001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires			3/90/0	3/90/0	3/90/0	1/30/0	-
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires		-	3/90/0	3/90/0	3/90/0	1/30/0	
SD	СЗ	JEDEC J- STD-002	1	15	PB Solderability	>95% Lead Coverage				1/15/0		1/15/0		•
SD	СЗ	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	з	10	Physical Dimensions	Cpk>1.67	-	-	-	3/30/0	3/30/0	3/30/0	1/10/0	
Test Group	D - Die Fi	abrication Relia	bility Te	sts	·				·			·	·	·
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
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
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	Completed Per Process Technology Requirements
вті	D4		-		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
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
Test Group	E - Electr	rical Verification	n Te <u>sts</u>						i					
ESD	E2	AEC Q100- 002	1	з	ESD HBM		2000 Volts	1/3/0	1/3/0	1/3/0			1/3/0	1/3/0

Туре	=	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: CAHCT1G32QDBVRQ1	Qual Device: SN74AHC1G08QDBVRQ1	QBS Process Reference: SN74HCS74QPWRQ1	QBS Package Reference: SN74HCS595QBQBRQ1	QBS Package Reference: TPS3840PH30DBVRQ1	QBS Product Reference: CAHCT1G125QDBVRQ1	QBS Product Reference: CAHCT1G00QDBVRQ1
ESD	E2	AEC Q100- 002	1	3	ESD HBM		7000 Volts				1/3/0	-		-
ESD	E3	AEC Q100- 011	1	3	ESD CDM		2000 Volts			•	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	1/6/0
ED	E5	AEC Q100- 009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold		1/30/0	1/30/0	3/90/0	3/90/0	3/90/0	1/30/0	1/30/0

Preconditioning was performed for Autoclave, Unbiased HAST, THBBiased HAST, Temperature Cycle, Thermal Shock, and HTSL, as applicable
 The following are equivalent HTCL options based on an activation energy of 0.7eV : 125C/LkHours, 140C/480 Hours, 150C/200 Hours, and 155C/240 Hours
 The following are equivalent HTCL options based on an activation energy of 0.7eV : 125C/LkHours, 140C/480 Hours, 155C/200 Hours, and 155C/240 Hours
 The following are equivalent TEmp Cycle options per JacSD47 : 55C/L25C/700 Cycles and -65C/L50C/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/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-2310-059

# R-CHG-2310-059 Q006

TI Information Selective Disclosure

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

#### Gatorade BD13 DBV-5 Q-100 PCN CDAT Group 1 Approve Date 08-NOVEMBER -2023

#### Qualification Results

Туре	#	Test Spec	Min Lot Qty	SS/ Lot	Test Name	Condition	Duration	Qual Device: <u>CAHCT1G32QDBVRQ1</u>	Qual Device: <u>SN74AHC1G08QDBVRQ1</u>	QBS Reference: <u>SN74HCS595QBQBRQ1</u>	QBS Reference: TPS3840PH30DBVRQ1			
Test G	Test Group A - Accelerated Environment Stress Tests													
PC	A1	JEDEC J-STD- 020 JESD22- A113	3	77	Preconditioning	MSL1 260C	-	-	-	3/0/0	3/0/0			
PC	A1.1	-	3	22	SAM Precon Pre	Review for delamination	-	-	-	3/66/0	3/66/0			
PC	A1.2	-	3	22	SAM Precon Post	Review for delamination	-	-	-	3/66/0	3/66/0			
HAST	A2.1	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	-	3/231/0	3/231/0			
HAST	A2.1.2	-	3	1	Cross Section, post bHAST, 1X	Post stress cross section	Completed	-	-	-	3/3/0			
HAST	A2.1.3	-	3	30	Wire Bond Shear, post bHAST, 1X	Post stress	Wires	-	-	-	3/9/0			

MAR         No.         No.         No.         Norme         Mase         I columbra	_												
HARNo.No.No.No.NormeNo.		HAST	A2.1.4		3	30	Bond Pull over Stitch, post bHAST, 1X	Post stress	Wires	-	-	-	3/9/0
NA         Singer Name         Si		HAST	A2.1.5		3	30	Bond Pull over Ball, post bHAST, 1X	Post stress	Wires	-	-		3/9/0
HAM         AJ21         Solution Markets         Reference Markets         Completed		HAST	A2.2	JEDEC JESD22- A110	3	70	Biased HAST	130C/85%RH	192 Hours		-	3/231/0	3/231/0
HATE         ALZ         I.         Core Series         Core Series         Core Series         Core Series         Core Series         Core Series         Sole		HAST	A2.2.1		3	22	SAM Analysis, post bHAST 2X	Review for delamination	Completed		-	3/66/0	3/66/0
HAT         A 23         S 20         S 20         S 20         S 200         S 200 <ths 200<="" th=""> <ths 200<="" th=""> <ths 200<="" t<="" td=""><td></td><td>HAST</td><td>A2.2.2</td><td></td><td>3</td><td>1</td><td>Cross Section, post bHAST, 2X</td><td>Post stress cross section</td><td>Completed</td><td></td><td>-</td><td>3/3/0</td><td>3/3/0</td></ths></ths></ths>		HAST	A2.2.2		3	1	Cross Section, post bHAST, 2X	Post stress cross section	Completed		-	3/3/0	3/3/0
HAST         AZA         I         B         Book Planer         Planer         Wins         I company         I company         Book Planer         Book Planer <td></td> <td>HAST</td> <td>A2.2.3</td> <td></td> <td>3</td> <td>30</td> <td>Wire Bond Shear, post bHAST, 2X</td> <td>Post stress</td> <td>Wires</td> <td>-</td> <td>-</td> <td>3/9/0</td> <td>3/9/0</td>		HAST	A2.2.3		3	30	Wire Bond Shear, post bHAST, 2X	Post stress	Wires	-	-	3/9/0	3/9/0
Norm         A2.5		HAST	A2.2.4		3	30	Bond Pull over Stitch, post bHAST, 2X	Post stress	Wires	-	-	3/9/0	3/9/0
TC         A4.1         MCC         Solution         Solution </td <td></td> <td>HAST</td> <td>A2.2.5</td> <td></td> <td>3</td> <td>30</td> <td>Bond Pull over Ball, post bHAST, 2X</td> <td>Post stress</td> <td>Wires</td> <td></td> <td>-</td> <td>3/9/0</td> <td>3/9/0</td>		HAST	A2.2.5		3	30	Bond Pull over Ball, post bHAST, 2X	Post stress	Wires		-	3/9/0	3/9/0
TC         A1.1         -         3         22         5M Analysis point T : 15 point T : 15		тс	A4.1	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles		•	3/231/0	3/231/0
TC         Al.2         I.2         S.0         J.2         S.00		тс	A4.1.1		3	22	SAM Analysis, post TC 1X	Review for delamination	Completed		-	3/66/0	3/66/0
TC       A1.3        3       30       Sine point       Pois stress       Wires         380       380       380         TC       A1.4        3       30       Bond Pull over LX       Pois stress       Wires         380       380       380         TC       A1.5        3       30       Bond Pull over Ball, positive       Pois stress       Wires         380       380       380         TC       A1.5        3       30       Bond Pull over Ball, positive       Wires         380       380       380         TC       A1.5       .       3       70       Bond Pull over Create       Mires         32310       32310       32310         TC       A2.4       .       3       3       70       Temperature       450120C       Coop Create       Coop Stress       Coop St		тс	A4.1.2		3	1	Cross Section, post TC, 1X	Post stress cross section	Completed		-	3/3/0	3/3/0
TC         A4.14          3         30         Sole Pull over State, post TC. XX         Wres           990         380           TC         A4.15          3         30         Sole Pull over State, post TC. XX         Wres           990         380           TC         A4.2         Jone And And And And Spectric         3         70         Temperature Cycle            32310         32310         32310           TC         A4.2         Jone And And Spectric         3         70         Temperature Cycle            3600         3600           TC         A4.2         I-         3         2         SAM Analytis Post TC., 2X         Post seess         Completed           3600         3660           TC         A4.2         I-         3         1         Cross seedo Post seedo Seedo         Completed           300         380           TC         A4.2         I-         3         30         Seedor TC., 2X         Post stress         Wres         I.         I.         300         390           TC         A4		тс	A4.1.3		3	30	Wire Bond Shear, post TC, 1X	Post stress	Wires		-	3/9/0	3/9/0
TC         Al.15         -         3         30         Bad Pull over Str. Post stress         Wines         -         -         300         300         300           TC         Al.2         JESC22 ALA4 Appendix         3         70         Temperature (SCISSO2)         -         -         -         3221.0         3223.0         3231.0           TC         Al.21         -         3         2         SAM Analysis, Appendix         Completed         -         -         366.0         366.0           TC         Al.22         -         3         2         SAM Analysis, Post Section         Completed         -         -         366.0         366.0           TC         Al.22         -         3         1         Cross Section, Post stress         Completed         -         -         360.0         360.0         360.0           TC         Al.23         -         3         30         Wine Bond Pull over Str. Post stress         Wines         -         -         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0         390.0		тс	A4.1.4		3	30	Bond Pull over Stitch, post TC, 1X	Post stress	Wires	-	-	3/9/0	3/9/0
TC         A.2         JEDCC JESO2C A104 and Appendix Spend         3         70         Temperature Cycle         45C/150C         1000 Cycles         -         1         22310         22310         22310           TC         A.2.1         -         3         2.2         SAM Analysis, Operating         Review for detarination         Completed         -         -         3660         3660           TC         A.2.2         -         3         1         Coss Section, Dist TC, 2X         Post stress         Completed         -         -         3860         3600         3600           TC         A.2.2         -         3         1         Coss Section, Dist TC, 2X         Post stress         Wires         -         -         3900         3900         3900           TC         A.2.4         -         3         30         Stress, post TC, Stress         Wires         -         -         3900         3900         3900           TC         A.2.4         -         3         30         Bod of UII over Stress, post TC, ZX         Post stress         Wires         -         -         3900         3900           HTSL         A.1         1         3         1         Cross Section, Cross secti		тс	A4.1.5		3	30	Bond Pull over Ball, post TC, 1X	Post stress	Wires		-	3/9/0	3/9/0
TCA.2.JEDECA.3.7.0.Temperature consistenceosc/1soc1000 cycles323103231032310TCA.4.21-32SAM AnalysicReview of cyclescompleted36603660TCA.4.22-31Cross Section const r.c.xxPost stresscompleted36003600TCA.4.23-3330Streat, post r.c.Post stressWiles36003900TCA.4.24-3330Streat, post r.c.Post stressWiles36003600TCA.4.25-330Streat, post r.c.Post stressWiles36003600TCA.4.25-330Streat, post r.c.Post stressWiles36003600TCA.4.25-3330Streat, post r.c.Post stressWiles36003600TCA.4.25-3330Streat, post r.c.Post stressWiles36003900TCA.4.25-331Cross Section100030003300HTSLA.6.11-31Cross SectionCompleted30003300 <td></td>													
TC         A4.2.1         -         3         2.2         SAM Analysis post TC_2.X         Review for delamination         completed         -         -         3660         3660         3660           TC         A4.2.2         -         3         1         Cross Section Section         Post stress post section         Completed         -         -         37.0         37.0         37.0           TC         A4.2.3         -         3         30         Wire Bond Section         Post stress         Wires         -         -         39.0         39.0         39.0           TC         A4.2.4         -         3         30         Bond Pull over ZX         Post stress         Wires         -         -         39.0         39.0         39.0           TC         A4.2.4         -         3         30         Bond Pull over ZX         Post stress         Wires         -         -         39.0         39.0         39.0           TC         A4.2.5         -         3         4         Bond Pull over ZX         Post stress         Wires         -         -         39.0         313.50           TTS         A6.1         -         3         1         Cross Section post HTSL, ZX<		тс	A4.2	JEDEC JESD22- A104 and Appendix 3	3	70	Temperature Cycle	-65C/150C	1000 Cycles	-	-	3/231/0	3/231/0
TCA4.22-31Cross Section, post Stress, cross sectionCompleted33/3/03/3/03/3/0TCA4.23-3330Streat, post TC, 2Post stress, cross sectionVires3/3/03/3/03/3/0TCA4.24-330Stort, post TC, 2Post stress, viresWires3/3/03/3/03/3/0TCA4.24-330Stort, post TC, 2Post stressWires3/3/03/3/03/3/0TCA4.25-330Stort, post TC, 2Post stressWires3/3/03/3/03/3/0TCA4.25-330Stort, post TC, 2Post stressWires3/3/03/3/03/3/0TCA4.25-330Stort, post TC, 2Post stressWires3/3/03/3/03/3/0TSLA6.1JEDEC, 3/40334High Temperature Storage Life150C1000 Post stresscomplete3/3/03/3/0HTSLA6.2JEDEC, 3L0334High Temperature Temperature150C2000 Pours3/3/03/3/03/3/0HTSLA6.2 $A6.2$		тс	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed		-	3/66/0	3/66/0
TCA4.23330Wire Bond Shear, post Cr. Shear, post Cr.Post stressWires39003900TCA4.24330Bond Pull over Stich, post Cr.Post stressWires390039003900TCA4.25330Bond Pull over Stich, post Cr.Post stressWires390039003900TCA4.25330Bond Pull over Stich, post TC.Post stressWires39003900TCA4.25330Bond Pull over Stich, post TSL, 17Post stressWires39003900TSLA6.1JEDEC JESD22345High Temperature Storage Life150C1000 HoursHTSLA6.1JEDEC JESD22344High Temperature Storage Life150C2000 Hours <td></td> <td>тс</td> <td>A4.2.2</td> <td></td> <td>3</td> <td>1</td> <td>Cross Section, post TC, 2X</td> <td>Post stress cross section</td> <td>Completed</td> <td></td> <td>-</td> <td>3/3/0</td> <td>3/3/0</td>		тс	A4.2.2		3	1	Cross Section, post TC, 2X	Post stress cross section	Completed		-	3/3/0	3/3/0
TCA4.24-330Bond Pull over String, post TC, ZXPost stressWires390390TCA4.25-330Bond Pull over Ball, post TC, ZXPost stressWires390390390TCA4.25-330Bond Pull over Ball, post TC, ZXPost stressWires390390390HTSA6.1JEDEC Ald3345High Temperature Storage Life150C1000 Hours313503135031350HTSLA6.11-31Cross Section, Post HTSL, 1XCompleted313503135031350HTSLA6.2JEDEC JEDEC Ald331Cross Section, Post HTSL, 2XCompleted3135031350HTSLA6.2JEDEC JEDEC Ald331Cross Section, Post HTSL, 2XCompleted3135031350HTSLA6.2JEDEC JEDEC Ald331Cross Section, Post HTSL, 2XCompleted3135031350HTSLA6.2JEDEC JEDEC Ald331Cross Section, Post HTSL, 2XCompleted3135031360HTSLA6.2JEDEC Ald331Brost Mining Mining Mining Mining Mining Mining Mining Minin		тс	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	-	-	3/9/0	3/9/0
TCA4.2.5A4.2.5aaa <th< td=""><td></td><td>тс</td><td>A4.2.4</td><td>-</td><td>3</td><td>30</td><td>Bond Pull over Stitch, post TC, 2X</td><td>Post stress</td><td>Wires</td><td>-</td><td>-</td><td>3/9/0</td><td>3/9/0</td></th<>		тс	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	-	-	3/9/0	3/9/0
HTSLA6.1JEDEC AL03345High Temperature Storage Life150C $1000$ Hours $\cdot$ $\cdot$ $\cdot$ $3/135/0$ $3/135/0$ HTSLA6.1.1 $\cdot$ $3$ $1$ $Cross Section,cross sectionCompleted\cdot\cdot3/303/30HTSLA6.2JEDEC,AL0331Cross Section,cross sectionCompleted\cdot\cdot3/303/30HTSLA6.2JEDEC,AL0334HighTemperatureStorage Life150C2000,Hours\cdot\cdot3/303/30HTSLA6.2JEDEC,AL0334HighTemperatureStorage Life150C2000,Hours\cdot\cdot3/303/30HTSLA6.2JEDEC,AL0334HighTemperatureStorage Life150C2000,Hours\cdot\cdot3/303/30HTSLA6.2JEDEC,AL0331Cross Section,Cross SectionCompleted \cdot3/303/30HTSLA6.2II31Cross Section,Cross SectionCompleted I3/303/30HTSLA6.2IIIIIIIIIIIIIIIIIIIIIIIII<$		тс	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	-	-	3/9/0	3/9/0
HTSLA6.1.1·31Cross Section, post HTSL, 1XPost stress cross sectionCompleted··3/3/03/3/0HTSLA6.2JEDEC< A103344High Temperature150C2000 Hours··3/135/03/135/03/135/0HTSLA6.2.1·31Cross Section, Storage LifePost stress cross sectionCompleted··3/3/03/135/0HTSLA6.2.1·31Cross Section, cross sectionPost stress cross sectionCompleted··3/3/03/3/0HTSLA6.2.1·31Cross Section, cross sectionPost stress cross sectionCompleted···3/3/03/3/0HTSLA6.2.1·S1Socs Section, cross sectionPost stress cross sectionCompleted···3/3/03/3/0HTSLA6.2.1·S1Socs Section, cross sectionPost stress cross sectionCompleted···3/3/03/3/0HTSLVICSVICS···········WBSC1AEC O01130Wire Bond PullWires devices, 30 wires Cpk>-1.67········WBPC2Stress Contract StressMinimum of 5 devices, 30 wires Cpk>-1.67· <td< td=""><td></td><td>HTSL</td><td>A6.1</td><td>JEDEC JESD22- A103</td><td>3</td><td>45</td><td>High Temperature Storage Life</td><td>150C</td><td>1000 Hours</td><td>-</td><td>-</td><td>3/135/0</td><td>3/135/0</td></td<>		HTSL	A6.1	JEDEC JESD22- A103	3	45	High Temperature Storage Life	150C	1000 Hours	-	-	3/135/0	3/135/0
HrSL         A6.2         JEDEC AL03         a         44         High Temperature Storage Life         150C         2000 Hours         a         a         a         a         a           HTSL         A6.2.1         -         3         1         Cross Section, post HTSL, 2X         Post stress cross section         Complete         -         a         3/135/0         3/30/0           HTSL         A6.2.1         -         3         1         Cross Section, post HTSL, 2X         Complete         -         a         3/30/0         3/30/0           Test Group C - Package Assembly Integrity         Test         Feature Cross section         Complete         -         a         a         a/30/0         a/30/0           WBS         C1         AEC Q100- Q01         1         30         Wire Bond Shear         Minimu of 5 devices, 30 wires Cpk>-1.67         Wires         -         a         a/90/0         a		HTSL	A6.1.1	-	3	1	Cross Section, post HTSL, 1X	Post stress cross section	Completed			3/3/0	3/3/0
HTSL         A6.2.1         -         3         1         Cross Section, loss Arress, cross section         Completed         -         -         3/3/0         3/3/0           Test Group C - Package Assembly Integrity Tests           WBS         C.1         AEC Ologo         1         30         Wire Bond Shear         Minimum of 5 devices, 30 wires Cpk-1.67         Vires         -         -         3/90/0 </td <td></td> <td>HTSL</td> <td>A6.2</td> <td>JEDEC JESD22- A103</td> <td>3</td> <td>44</td> <td>High Temperature Storage Life</td> <td>150C</td> <td>2000 Hours</td> <td>-</td> <td>•</td> <td>3/135/0</td> <td>3/135/0</td>		HTSL	A6.2	JEDEC JESD22- A103	3	44	High Temperature Storage Life	150C	2000 Hours	-	•	3/135/0	3/135/0
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         •         •         •         3/90/0		HTSL	A6.2.1		3	1	Cross Section, post HTSL, 2X	Post stress cross section	Completed	-	-	3/3/0	3/3/0
WBS         C1         AEC Q100- 001         1         30         Wire Bond Shear         Minimum of 5 devices, 30 wires Cpk>1.67         wires         -         -         3/90/0 <td></td> <td>Test G</td> <td>roup C -</td> <td>Package As</td> <td>sembly</td> <td>Integrity</td> <td>/ Tests</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Test G	roup C -	Package As	sembly	Integrity	/ Tests						
WBP         C2         ML- STD883 Method 2011         1         30         Wire Bond Pull         Minimum of 5 devices, 30 wires Cpk>1.67         Wires         -         3/90/0         3/90/0         3/90/0		WBS	C1	AEC Q100- 001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	-		3/90/0	3/90/0
		WBP	C2	MIL- STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires		-	3/90/0	3/90/0

QBS: Qual By Similarity
 Qual Device CAHCT1G32QDBVRQ1 is qualified at MSL1 260C
 Qual Device SN74AHC1G08QDBVRQ1 is qualified at MSL1 260C

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

- The following are equivalent HTSL options based on an activation energy of 0.7eV : 150C/1k Hours, and 170C/420 Hours
- The following are equivalent Temp Cycle options per JESD47 : -55C/125C/700 Cycles and -65C/150C/500 Cycles

Ambient Operating Temperature by Automotive Grade Level:

- Grade 0 (or E): -40C to +150C
- Grade 1 (or Q): -40C to +125C
   Grade 2 (or T): -40C to +105C
- Grade 2 (or 1): -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-2310-059

ZVEI ID's: SEM-DE-01, SEM-DE-02, SEM-DE-03, SEM-PW-02, SEM-PW-09, SEM-PW-13, SEM-PA-05, SEM-PA-07, SEM-PA-08, SEM-PA-11, SEM-PA-18, SEM-PS-04, SEM-TF-01, SEM-PA-13

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