PCN Number:
 20240605000.1
 PCN Date:
 June 05, 2024

**Title:** Add Cu as Alternative Wire Base Metal for Selected Device(s)

**Customer Contact:** Change Management team **Dept:** Quality Services

Proposed 1<sup>st</sup> Ship Date: September 03, 2024 Sample requests accepted until:

\*Sample requests received after July 05, 2024 will not be supported.

Change Type:

Assembly Site	Design	Wafer Bump Material
Assembly Process	Data Sheet	Wafer Bump Process
Assembly Materials	Part number change	Wafer Fab Site
Mechanical Specification	Test Site	Wafer Fab Material
Packing/Shipping/Labeling	Test Process	Wafer Fab Process

#### **PCN Details**

#### **Description of Change:**

Texas Instruments is pleased to announce the qualification of new assembly material set to add Cu as an additional bond wire option for devices listed in "Product affected" section below. Devices will remain in current assembly facility and piece part changes as follows:

**Group 1 device:** 

Material	Current*	Proposed
Wire type	0.96mil Au, 1.0mil Cu	0.8mil Cu

Note: \* - Au wire: Die to die bonding, Cu wire: Die to leadframe

**Group 2 device:** 

Material	Current	Proposed
Wire type	0.96mil Au	0.8mil Cu

#### **Reason for Change:**

Continuity of supply.

- 1) To align with world technology trends and use wiring with enhanced mechanical and electrical properties
- 2) Maximize flexibility within our Assembly/Test production sites.
- 3) Cu is easier to obtain and stock

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:

None

#### **Group 1 Product Affected:**

UCC5310MCDR	ISO7810FDWR	ISO7830FDWR	ISO6720FBDR
UCC5350MCDR	ISO7820DW	ISO1540DR	ISO6721BDR
UCC5350SBDR	ISO7820LLDW	ISO1541DR	ISO6721FBDR

ISO1432DW	ISO7821LLSDW	ISO1640BDR		
ISO7810DWR	ISO7830DW	ISO6720BDR		
<b>Group 2 Product Affe</b>	ected:			
SN3138064RGCR	UCD3138064RGCT	UCD3138ARMHR	UCD3138RHAT	
SN3138RGCR	UCD3138064RMHR	UCD3138ARMHT	UCD3138RMHR	
UCD3138064ARGCR	UCD3138064RMHT	UCD3138RGCR	UCD3138RMHT	
UCD3138064ARGCT	UCD3138ARGCR	UCD3138RGCT		
UCD3138064RGCR	UCD3138ARGCT	UCD3138RHAR		

# Group 1 Qualification Report

Automotive Qualification Summary (As per AEC-Q100 Rev. J and JEDEC Guidelines) Approve Date 01-May-2024

#### **Product Attributes**

Attributes	Qual Device:	QBS Package Reference:	QBS Package Reference:	QBS Process Reference:	QBS Product Reference:
Attributes	ISO6721RBQDRQ1	<u>ISO6721BQDRQ1</u>	TLV9022QDRQ1	<u>UCC23513QDWYQ1</u>	ISO1640QDWRQ1
Automotive Grade Level	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
Product Function	Interface	Interface	Signal Chain	Power Management	Interface
Wafer Fab Supplier	RFAB, RFAB	MH8, MH8	RFAB	RFAB, RFAB	RFAB, RFAB
Assembly Site	MLA	MLA	MLA	TAI	MLA
Package Group	SOIC	SOIC	-	SOIC	SOIC
Package Designator	D	D	D	DWY	DW
Pin Count	8	8	8	6	16

QBS: Qual By Similarity

Qual Device ISO6721RBQDRQ1 is qualified at MSL2 260C

#### **Qualification Results**

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

Туре	#	Test Spec	Min Lot	SSI	Test Name	Condition	Duration	Qual Device:	QBS Package Reference:	QBS Package Reference:	QBS Process Reference:	QBS Product Reference:
.,,,,		1000 ороо	Qty	Lot	lostriamo	Condition	Jaranon	ISO6721RBQDRQ1	ISO6721BQDRQ1	TLV9022QDRQ1	UCC23513QDWYQ1	ISO1640QDWRQ1
Test Group	A - Acc	elerated Environ	ment Si	tress Tes	sts							
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL1 260C		-	No Fails	No Fails	-	
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	-	3/231/0	3/231/0	-	-
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Autoclave	121C/15psig	96 Hours	-	3/231/0			
AC/UHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	-	-	3/231/0		-
TC-SAM	A4		3	3	Post TC SAM	<50% delamination	-	-	1/12/0		-	
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours		-	3/135/0	-	
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	175C	500 Hours		3/135/0	-	-	

Test Grou	рВ - Ассе	elerated Lifetime	e Simula	tion Tes	ts				(c) ).			
HTOL	B1	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours		3/231/0	3/231/0	3/231/0	-
ELFR	B2	AEC Q100- 008	3	800	Early Life Failure Rate	125C	48 Hours		-	-	3/2400/0	-
Test Group	p C - Pack	age 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	3/228/0	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	1/30/0	3/228/0	3/90/0	-	1/30/0
Туре		Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device:	QBS Package Reference: ISO6721BQDRQ1	QBS Package Reference: TLV9022QDRQ1	QBS Process Reference: UCC23513QDWYQ1	QBS Product Reference:
SD	С3	JEDEC J- STD-002	1	15	PB Solderability	>95% Lead Coverage	-	-	1/15/0	-	-	-
SD	С3	JEDEC J- STD-002	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	1/15/0	-	-	-
PD	C4	JEDEC JESD22- B100 and B108	3	10	Physical Dimensions	Cpk>1.67	-	1/10/0	3/30/0	3/30/0	-	-
Test Group	D - Die F	abrication Relia	ıbility Te	sts					·			·
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
BTI	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
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 - Elect	rical Verification	n Tests									
ESD	E2	AEC Q100- 002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	1/3/0	1/3/0	1/3/0
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	-	1/3/0	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	3/90/0	3/90/0	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

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

Room/Hot/Cold: HTOL, ED

 ${\sf Room/Hot: THB\ /\ HAST, TC\ /\ PTC,\ HTSL,\ ELFR,\ ESD\ \&\ LU}$ 

Room: AC/uHAST

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

### **Qualification Report**

**Automotive Qualification Summary** (As per AEC-Q100 Rev. J and JEDEC Guidelines) Approve Date 05-April-2024

#### **Product Attributes**

Attributes	Qual Device:	Qual Device:	QBS Package Reference:	QBS Process Reference:	QBS Package Reference:	QBS Product Reference:	QBS Product Reference:	QBS Package Reference:	QBS Package Reference:	QBS Package, Process, Product Reference:	QBS Package Reference:
	UCC5350MCQDRQ1	UCC5350MCQDRQ1	IS06721BQDRQ1	UCC23513QDWYQ1	AMC22C12QDRQ1	UCC5390ECQDWVQ1	UCC5350MCQDRQ1	UCC21520QDWRQ1	ISO5452DWR	UCC5350SBQDRQ1	UCC21540QDWKRQ1
Automotive Grade Level	Grade 1	Grade 1	Grade 1	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	-40 to 125	-40 to 125	-40 to 125
Product Function	Signal Chain	Signal Chain	Interface	Power Management	Signal Chain	Interface	Interface	Power Management	Power Management	Signal Chain	Power Management
Wafer Fab Supplier	RFAB, RFAB	RFAB, RFAB	MH8, MH8	RFAB, RFAB	MH8, DMOS6	DP1DM5, DP1DM5	DP1DM5, DP1DM5	DP1DM5, DP1DM5, DP1DM5	DP1DM5, DP1DM5, MH8	RFAB, RFAB	MH8, MH8, MH8
Assembly Site	TAI	MLA	MLA	TAI	MLA	TAI	TAI	TAI	MLA	MLA	TAI
Package Group	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC	SOIC
Package Designator	D	D	D	DWY	D	DWV	D	DW	DW	D	DWK
Pin Count	8	8	8	6	8	8	8	16	16	8	14

QBS: Qual By Similarity
Qual Device UCC5350MCQDRQ1 is qualified at MSL2 260C
Qual Device UCC5350MCQDRQ1 is qualified at MSL2 260C

### **Qualification Results**

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

				2							200.000				100000000000000000000000000000000000000	QBS	ORS Package.	
Туре		Test Spec	Min Lot Qty	SS / Lot	Test Name	Condition	Duration	Qual Device: UCC5350MCQDRQ1	Qual Device: UCC5350MCQDRQ1	QBS Package Reference: ISO6721BQDRQ1	QBS Process Reference: UCC23513QDWYQ1	QBS Package Reference: AMC22C12QDRQ1	QBS Product Reference: UCC5390ECQDWVQ1	QBS Product Reference: UCC5350MC0DR01	QBS Package Reference: UCC21520QOWRQ1	Package Reference:	Process, Product Reference:	QBS Package Reference: UCC21540QDWKRQ1
Test Group	Accel	lerated Environ	mont Str	ress Tes												ISO5452DWR	UCC5350SBQORQ1	
rest Group	4 - Acce	JEDEC J-	iment Su	ress les	İ													
PC	A1	STD-020 JESD22- A113	3	77	Preconditioning	MSL1 260C				3/0/0	0	5	•	ē.	5	0		
PC	A1	JEDEC J- STD-020 JESD22- A113	3	77	Preconditioning	MSL2 260C	-		1/0/0	-	-	3/0/0	-		3/0/0	1/0/0	-	1/0/0
HAST	A2	JEDEC JESD22- A110	3	77	Biased HAST	130C/85%RH	96 Hours	-					- 1	-		1/77/0		2/154/0
ACIUHAST	A3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Autoclave	121C/15psig	96 Hours	ar .	-	3/231/0				-0		1/77/0		3/231/0
ACIUHAST	А3	JEDEC JESD22- A102/JEDEC JESD22- A118	3	77	Unbiased HAST	130C/85%RH	96 Hours	-1	-			3/231/0	-	- 8				
тс	A4	JEDEC JESD22- A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	-	-	-	-	-		-	1/77/0			2/154/0
TC-BP	A4	MIL-STD883 Method 2011	1	5	Post Temp Cycle Bond Pull			-	-		2			-	1/5/0	2	-	T.
TC-SAM	A4	-	3	3	Post TC SAM	<50% delamination		-	-	1/12/0	-	-	-		-	-	-	-
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	150C	1000 Hours	-	-	-	-	3/135/0	-	-	-	1/45/0	-	1/45/0
HTSL	A6	JEDEC JESD22- A103	1	45	High Temperature Storage Life	175C	500 Hours	-	-	3/135/0	-	-	-	-	-	-	-	-
Test Group	B - Acce	lerated Lifetime	e Simulat	tion Tes	ts													
HTOL	B1	JEDEC JESD22- A108	3	77	Life Test	125C	1000 Hours	-	1/77/0	-	3/231/0		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	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	3/228/0		3/90/0				-	1/30/0	3/90/0
WBS	C1	AEC Q100- 001 MIL-STD883 Method 2011	1	30		devices, 30 wires	Wires	1/30/0	1/30/0	3/228/0		3/90/0	-			-	1/30/0	3/90/0
		MIL-STD883			Shear	devices, 30 wires Cpk>1.67 Minimum of 5 devices, 30					-					-		
WBP	C2	MIL-STD883 Method 2011	1	30	Shear Wire Bond Pull	devices, 30 wires Cpk>1.67 Minimum of 5 devices, 30 wires Cpk>1.67 >95% Lead				3/228/0		3/90/0						
WBP	C2	MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J-	1	30	Wire Bond Pull PB Solderability PB-Free	devices, 30 wires Cpk>1.67 Minimum of 5 devices, 30 wires Cpk>1.67 >95% Lead Coverage >95% Lead				3/228/0		3/90/0						
WBP SD SD	C2 C3 C3	MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC JESD22- B100 and	1 1 1 3	30 15 15	Wire Bond Pull  PB Solderability  PB-Free Solderability  Physical	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/30/0	1/30/0	3/228/0 1/15/0 1/15/0		3/90/0 1/15/0 1/15/0					1/30/0	
WBP SD SD	C2 C3 C3	MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC J- SD22- B100 and B108	1 1 1 3	30 15 15	Wire Bond Pull  PB Solderability  PB-Free Solderability  Physical	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/30/0	1/30/0	3/228/0 1/15/0 1/15/0	Completed Per Process Technology	3/90/0 1/15/0 1/15/0	Completed Per Process Technology Requirement	Completed Per Process Technology	Completed Per Process Technology	Completed Per Process Technology Requirements	1/30/0	
WBP SD SD PD Test Group	C2 C3 C3 C4 D - Die Fi	MIL-STD883 Method 2011  JEDEC J- STD-002  JEDEC J- STD-002  JEDEC JESD22- B100 and B108  abrication Relia	1 1 1 3	30 15 15	Wire Bond Pull  PB Solderability  PB-Free Solderability  Physical Dimensions	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/300  1/100  Completed Per Process Technology	1/30/0	3/228/0 1/15/0 1/15/0 3/30/0  Completed Per Process Technology	Process Technology	390/0 1/15/0 1/15/0 3/30/0 Completed Per Process	Process Technology	Process Technology	Process Technology	Per Process	1/30/0	3/90/0  - Completed Per Process Technology
SD SD PD Test Group I	C2 C3 C3 C4 D - Die F	MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC J- SSD22- B100 and B108 JESD61	1 1 1 3	30 15 15	Wire Bond Pull  PB Solderability  PB-Free Solderability  Physical Dimensions  Electromigration  Time Dependent Dielectric	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/300	1/30/0	3/28/0 1/15/0 1/15/0 1/15/0 3/30/0  Completed Per Process Processory Requirements Completed Per Technology Requirements Completed Per Technology	Process Technology Requirements  Completed Per Process Technology	3/90/0 1/15/0 1/15/0 3/30/0 Completed Per Process Technology Requirements Completed Per Process Requirements Completed Per Process	Process Technology Requirements  Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology	Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	1/30/0	
WBP SD SD FD Test Group EM TDDB	C2 C3 C3 C4 D-Die Fi	MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC J- BLD8 JEDEC J- BLD8 JEDEC J- BLD8 JEDEC J- BLD8 JEDEC J- JEDEC J- JEDEC J- JEDEC J- JEDEC J- JEDEC J- JEDEC J- BLD8 JEDEC J- JEDEC J- BLD8 JEDEC J- JEDEC	1 1 1 3	30 15 15	Wire Bond Pull  PB Solderability  PB-Free Solderability  Physical Dimensions  Electronigration  Time Dependent Delectric Breaddown  Hot Carrier	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/300  Completed Per Process Technology Requirements  Completed Per Process Technology Requirements  Completed Per Process Technology Requirements	1/30/0  Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	3/2280  1/15/0  1/15/0  1/15/0  3/3/00	Process Technology Requirements  Completed Per Process Technology Requirements  Completed Per Process Technology	1950 1150 1150 1150 1150 3000 3000 3000 Completed Per Technology Requirements Completed Per Process Process Technology Requirements Completed Per Process Technology Technology Technology Technology Technology Technology Completed Per Process Completed Per Process Completed Per Process	Process Technology Requirements  Completed Per Process Technology Requirements  Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology Requirements  Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology Requirements  Completed Per Process Technology	Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology	1/30/0  Completed Per Process Technology Requirement Completed Per Process Technology	Completed Per Process Technology Requirements Technology Reposes Technology
WBP SD SD PD Test Group EM TDDB	C2 C3 C3 C4 D-Die Fi	MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC J- BLD8 JEDEC J- BLD8 JEDEC J- BLD8 JEDEC J- BLD8 JEDEC J- JEDEC J- JEDEC J- JEDEC J- JEDEC J- JEDEC J- JEDEC J- BLD8 JEDEC J- JEDEC J- BLD8 JEDEC J- JEDEC	1 1 1 3	30 15 15	Wire Bond Pull PB Solderability PB Solderability PB Solderability PB-Free Solderability Physical Dimensions Electromigration Time Dependent Dependent Breadown Hot Carrier Injection	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/30/0  Completed Per Process Technology Requirements	1/30/0	3/2280  1/150  1/150  1/150  3/300  3/300  Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Requirements Completed Per Process Requirements Completed Per Process Completed Per P	Process Technology Requirements  Completed Per Process Technology Requirements	1050 1155 1155 1155 1155 1155 1155 1155	Process Technology Requirements Completed Per Process Technology Requirements	Process Technology Requirements  Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements	Per Process Technology Requirements Completed Per Process	1/30/0  Completed Per Process Technology Requirements	390/0  Completed Per Process Technology Requirements
WBP SD SD PD Test Group EM TDDB HCI BTI SM	C2 C3 C3 C4 D-Die R D1 D2 D3 D4	MIL-STD883 Method 2011 MIL-STD883 Method 2011 JEDEC J- STD-002 JEDEC J- STD-002 JEDEC L- STD-002 JEDEC J- ST	1 1 1 1 1 3 3	30 15 15	Wire Bond Pull  PB Solderability  PB Siderability  PB Siderability  PB Siderability  Physical  Dimensions  Electronigration  Electronigration  Line Delectric  Breakfown  Hot Carrier  Bijection  Bias   devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage		1/10/0  L/10/0  Completed Per Process Technology Requirements   1/30/0	3/2280  1/15/0  1/15/0  1/15/0  3/3/00	Process Technology Requirements  Completed Per Process Technology Requirements	1950  1159  1159  3000  3000  3000  3000  Completed Per Fechnology Requirements Completed Per Process Process Technology Requirements Completed Per Process Technology Requirements Completed Per Nocess Technology Requirements Completed Per Nocess Technology Requirements	Process Technology Requirements  Completed Per Process Technology Requirements	Process Technology Requirements  Completed Per Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements	Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements	1/30/0  Completed Per Process Technology Requirements	290/00  Completed Per Process Richrology Requirements  Completed Per Process Technology Requirements		
WBP SD SD PD Test Group EM TDOB HCI STI SM Test Group	C2 C3 C3 C4 D-Die R D1 D2 D3 D4 D5 = - Electron	MIL-STD883 Method 2011 Method 2011 STD002 ST	1 1 1 3 ability Te	30 15 15 10 10	Wire Bond Pull  Wire Bond Pull  PB Solderability  PB Solderability  PB-free Solderability  Physical  Dimensions  Time Dependent Dependent Biss Temperature Inspecton  Stress Migration  Stress Migration	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage	Wires	1/30/0  Completed Per Process Technology Requirements	1/30/0	3/2280  1/15/0  1/15/0  1/15/0  3/3/0/0  Completed Per Process Per Process Process Process Process Process Process Technology Requirements Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology Requirements	1050  1050	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 Requirements Completed Per Process Technology Requirements	Process Technology Requirements Completed Per Process Technology Requirements	Per Process Technology Requirements Completed Per Process Technology	1/30/0	390/0  Completed Per Process Technology Requirements
WBP SD SD FD Test Group EM TDOB HCI STI SM Test Group ESD	C2 C3 C3 C4 D-Die F D1 D2 D3 D4 D5 E-Electr E2	MIL-STD883 Method 2013 Method 2013 STD-002 SEDEC 3 STD-002 STD	1 1 3 ability Te	30 15 15	Wire Bond Pull  PB Solderability  PB Siderability  PB Siderability  PB Siderability  Physical  Dimensions  Electronigration  Electronigration  Line Delectric  Breakfown  Hot Carrier  Bijection  Bias   devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage	Wires	1/30/0  Completed Per Process Technology Requirements	1/30/0	3/2280  1/15/0  1/15/0  1/15/0  3/3/0/0  Completed Per Process Per Process Process Process Process Process Process Technology Requirements Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology Requirements	1050  1050	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 Requirements	Process Technology Requirements Completed Per Process Technology Requirements	Per Process Technology Requirements Completed Per Process Technology	1/30/0  Completed Per Process Technology Requirements  1/3/0	390/0  Completed Per Process Technology Requirements	
WBP SD SD SD Test Group! EM TDD8 HCI SM Test Group ESD ESD	C2 C3 C3 C4 D - Die Fi D1 D2 D3 D4 D5 E - Electri E2 E3	ME_STD883 ME_STD883 Meflod 2011 JEDEC J- STD-002 JEDEC JESD2- JESD20 JESD61 JESD61 JESD60 & Z6	1 1 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	30 15 15 10 10	Wire Bond Pull  Wire Bond Pull  PB Solderability  PB Solderability  PB-free Solderability  Physical  Dimensions  Time Dependent Dependent Biss Temperature Inspecton  Stress Migration  Stress Migration	devices, 30 device		1/30/0  Completed Per Process Technology Requirements	1/30/0	3/2280  1/15/0  1/15/0  1/15/0  3/3/0/0  Completed Per Process Per Process Process Process Process Process Process Technology Requirements Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology Requirements	1050  1050	Process Technology Recquirements 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 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	Per Process Technology Requirements Completed Per Process Technology	1/30/0	Completed Per Process Technology Requirements
WBP SD SD FD Test Group EM TDOB HCI STI SM Test Group ESD	C2 C3 C3 C4 D - Die Fi D1 D2 D3 D4 D5 E - Electri	ME_STD883 ME_STD883 MEPOd 2013 JEDEC 13-STD-002 JEDEC 13-STD-002 JEDEC 13-STD-002 JESD100 and B100 JESD61 JESD61 JESD60 & 28	1 1 1 3 3 3 4 5 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7	30 15 15 10 10 3	Wire Bond Pull  Wire Bond Pull  PB Solderability  PB Solderability  PB-Free Solderability  Physical  Directioning and Direction  Time Dependent  Dependent  Time Dependent  Time Dependent  Time Leston  Hot Carrier Injecton  Sites  Sites Site	devices, 30 wires Cplx-1.67 Minimum of 5 devices, 30 wires Cplx-1.67 >95% Lead Coverage >95% Lead Coverage	Wires	1/30/0  Completed Per Process Technology Requirements	1/30/0	3/2280  1/15/0  1/15/0  1/15/0  3/3/0/0  Completed Per Process Per Process Process Process Process Process Process Technology Requirements Completed Per Process Technology	Process Technology Requirements  Completed Per Process Technology Requirements	1050  1050	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 Requirements	Process Technology Requirements Completed Per Process Technology Requirements	Per Process Technology Requirements Completed Per Process Technology	1/30/0  Completed Per Process Technology Requirements  1/3/0	Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Requirements Completed Per Process Technology Tequirements Completed Per Process Technology Tequirements Completed Per Process Technology Tequirements

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 0.7 eV: 150 C/1 k Hours, and 170 C/420 Hours

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

# Group 2 Qualification Report

Approve Date 18-April-2024

#### **Qualification Results**

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

		Bata Biopia, ca	asi itaiiis	<del>CI                                    </del>	otal sample siz	<u>c, .o.a.</u>	- uncu	
Туре	#	Test Name	Condition	Duration	Qual Device: UCD3138064ARGCR	QBS Process Reference: CC2541S	QBS Package, Process Reference: BQ9000RSMR	QBS Process, Product Reference: UCD3138064RGCR
HAST	A2	Biased HAST	110C/85%RH	264 Hours	-	-	1/77/0	-
UHAST	А3	Autoclave	121C/15psig	96 Hours	-	-	3/231/0	-
UHAST	A3	Unbiased HAST	110C/85%RH	264 Hours	3/231/0	-	-	-
TC	A4	Temperature Cycle	-65C/150C	500 Cycles	3/231/0	-	3/231/0	-
HTSL	A6	High Temperature Storage Life	150C	1000 Hours	3/231/0	-	-	-
HTSL	A6	High Temperature Storage Life	170C	420 Hours	-	-	3/231/0	-
HTOL	B1	Life Test	125C	1000 Hours	-	-	-	1/77/0
HTOL	B1	Life Test	125C	408 Hours	-	3/231/0	-	-
HTOL	B1	Life Test	140C	480 Hours	-	-	3/231/0	-
ELFR	B2	Early Life Failure Rate	125C	24 Hours	-	3/2399/0	-	-
ESD	E2	ESD CDM	-	250 Volts	1/3/0	-	-	-
ESD	E2	ESD HBM	15	1000 Volts	1/3/0	-	-	-
LU	E4	Latch-Up	Per JESD78	-	-	-	-	1/6/0
CHAR	E5	Electrical Characterization	Per Datasheet Parameters	-	1/30/0	-	-	1/30/0

QBS: Qual By Similarity

Qual Device UCD3138064ARGCR is qualified at MSL2 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 0.7 eV: 150 C/1 k Hours, and 170 C/420 Hours

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

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

For questions regarding this notice, e-mails can be sent to Change Management team or your local Field Sales Representative.

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