PCN Number:	20221207001.2A	PCN Date:	January 11, 2023

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

Customer Contact:	PCN Manager	Dept:	Quality Services
Proposed 1st Ship Date:	June 09, 2023	Sample requests accepted until:	Jan 09, 2023

*Sample requests received after (Jan 09, 2023) will not be supported.

Change Type:

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

PCN Details

Description of Change:

Revision A is to include Q006 Qual data for reference.

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:

Material	Current	Proposed
Wire type	0.96mil Au	0.96mil 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 Fit, Form, 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.

Product Affected:

6PAIC3104IRHBRQ1

Qualification Report

Automotive New Product Qualification Summary
(As per AEC-Q100 and JEDEC Guidelines)
Approve Date 09-Nov-2022

Product Attributes

Attributes	Qual Device: 6PAIC3104IRHBRQ1	QBS Reference: 6PAIC3104IRHBRQ1	QBS Reference: 6PAIC3104TRHBRQ1	QBS Reference: PCM5100AQPWRQ1
Automotive Grade Level	Grade 3	Grade 3	Grade 2	Grade 1
Operating Temp Range (C)	-40 to 85	-40 to 85	-40 to 105	-40 to 125
Product Function	Signal Chain	Signal Chain	Signal Chain	Signal Chain
Wafer Fab Supplier	DP1DM5, RFAB	DP1DM5	RFAB	RFAB
Assembly Site	CDAT	CDAT	CDAT	TAI
Package Group	QFN	QFN	QFN	TSSOP
Package Designator	RHB	RHB	RHB	PW
Pin Count	32	32	32	20
Lead Finish	NIPDAU	NIPDAU	NIPDAU	NIPDAU

QBS: Qual By Similarity
Qual Device 6PAIC3104IRHBRQ1 is qualified at MSL3 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: 6PAIC3104IRHBRQ1	QBS Reference: 6PAIC3104IRHBRQ1	QBS Reference: 6PAIC3104TRHBRQ1	QBS Reference: PCM5100AQPWRQ1
Test Group A - Accelerated Environment Stress Tests											
PC	A1	JEDEC J-STD-020 JESD22A113	3	77	Preconditioning	MSL1 260C	1 Step	-	-	-	3/0/0
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL2 260C	1 Step	-	3/0/0	-	-

PC	A1	JEDEC J-STD-020 JESD22A113	3	77	Preconditioning	MSL3 260C	1 Step	-	-	3/0/0	-
HAST	A2	JEDEC JESD22A110	3	77	Biased HAST	130C/85% RH	96 Hours	-	3/231/0	3/231/0	3/231/0
AC/U HAST	A3	JEDEC JESD22A102/JEDEC JESD22A118	3	77	Autoclave	121C/15psig	96 Hours	-	3/231/0	-	3/231/0
AC/U HAST	A3	JEDEC JESD22A102/JEDEC JESD22-A118	3	77	Unbiased HAST	130C/85% RH	96 Hours	-	-	3/231/0	-
TC	A4	JEDEC JESD22A104 and Appendix 3	3	77	Temperature Cycle	-55C/125C	1000 Cycles	-	-	3/231/0	-
TC	A4	JEDEC JESD22A104 and Appendix 3	3	77	Temperature Cycle	-65C/150C	500 Cycles	-	3/231/0	-	3/231/0
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	-	1/45/0	-	1/45/0
HTSL	A6	JEDEC JESD22-A103	1	45	High Temperature Storage Life	150C	500 Hours	-	-	3/135/0	-
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	85C	1000 Hours	-	3/231/0	-	-

ELFR	B2	AEC Q100008	1	77	Early Life Failure Rate	125C	48 Hours	-	-	-	3/2400/0
ELFR	B2	AEC Q100008	1	77	Early Life Failure Rate	85C	24 Hours	-	3/2400/0	-	-
Test Group C - Package Assembly Integrity Tests											
WBS	C1	AEC Q100001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	-	3/90/0	1/30/0	3/90/0
WBP	C2	MIL-STD883 Method 2011	1	30	Wire Bond Pull	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	-	3/90/0	1/30/0	3/90/0
SD	C3	JEDEC JESD22B102	1	15	PB-Free Solderability	>95% Lead Coverage	-	-	1/15/0	1/15/0	-
PD	C4	JEDEC JESD22B100 and B108	1	10	Physical Dimensions	Cpk>1.67	-	-	3/30/0	1/10/0	3/30/0
Test Group D - Die Fabrication Reliability Tests											
EM	D1	JESD61	-	-	Electromigration	-	-	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements	Completed Per Process Technology Requirements
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
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
NBTI	D4	-	-	-	Negative Bias Temperature	-	-	Completed Per Process Technology	Completed Per Process Technolo	Completed Per Process Technology	Completed Per Process Technology

					Instability			Requirements	gy Requirements	Requirements	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
Test Group E - Electrical Verification Tests											
ESD	E2	AEC Q100002	1	3	ESD HBM	-	2000 Volts	-	1/3/0	1/3/0	1/3/0
ESD	E3	AEC Q100011	1	3	ESD CDM	-	1500 Volts	-	-	-	1/3/0
ESD	E3	AEC Q100011	1	3	ESD CDM	-	500 Volts	-	1/3/0	1/3/0	-
LU	E4	AEC Q100004	1	6	Latch-Up	Per AEC Q100-004	-	-	1/6/0	1/6/0	1/6/0
ED	E5	AEC Q100009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	-	3/90/0	3/90/0	3/90/0

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

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

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

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

Ambient Operating Temperature by Automotive Grade Level:

Grade 0 (or E): -40C to +150C

Grade 1 (or Q): -40C to +125C

Grade 2 (or T): -40C to +105C Grade 3 (or I) : -40C to +85C

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

Room/Hot/Cold : HTOL, ED

Room/Hot : THB / HAST, TC / PTC, HTSL, ELFR, ESD & LU

Room : AC/uHAST

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

Qualification Report

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

Approve Date 07-Nov-2022

Product Attributes

Attributes	Qual Device: 6PAIC3104TRHBRQ1	QBS Reference: 6PAIC3104IRHBRQ1	QBS Reference: PCM5100AQPWRQ1
Die Attributes			
Wafer Fab Supplier	RFAB	DP1DM5	RFAB
Package Attributes			
Assembly Site	CDAT	CDAT	TAI
Package Group	QFN	QFN	TSSOP
Package Designator	RHB	RHB	PW
Pin Count	32	32	20
Lead Finish	NIPDAU	NIPDAU	NIPDAU
Bond Wire Composition	CU	AU	AU

QBS: Qual By Similarity
Qual Device 6PAIC3104TRHBRQ1 is qualified at MSL3 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: 6PAIC3104TRHBRQ1	QBS Reference: 6PAIC3104IRHBRQ1	QBS Reference: PCM5100AQPWRQ1
Test Group A - Accelerated Environment Stress Tests										
PC	A1	JEDEC J-STD-020 JESD22-A113	3	77	Preconditioning	MSL3 260C	1 Step	3/0/0	-	-
HAST	A2.2	JEDEC JESD22-A110	3	77	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	-	-
TC	A4.2	JEDEC JESD22-A104 and Appendix 3	3	77	Temperature Cycle	-55C/125C	2000 Cycles	3/231/0	-	-
TC	A4.2.1	-	3	22	SAM Analysis, post TC, 2X	Review for delamination	Completed	3/66/0	-	-
TC	A4.2.2	-	3	1	Cross Section, post TC, 2X	Post stress cross section	Completed	3/3/0	-	-
TC	A4.2.3	-	3	30	Wire Bond Shear, post TC, 2X	Post stress	Wires	3/9/0	-	-
TC	A4.2.4	-	3	30	Bond Pull over Stitch, post TC, 2X	Post stress	Wires	3/9/0	-	-
TC	A4.2.5	-	3	30	Bond Pull over Ball, post TC, 2X	Post stress	Wires	3/9/0	-	-
HTSL	A6.2	JEDEC JESD22-A103	3	45	High Temperature Storage Life	150C	1000 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 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	85C	1000 Hours	-	3/231/0	-
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	125C	48 Hours	-	-	3/2400/0
ELFR	B2	AEC Q100-008	1	77	Early Life Failure Rate	85C	24 Hours	-	3/2400/0	-
Test Group C - Package Assembly Integrity Tests										
WBS	C1	AEC Q100-001	1	30	Wire Bond Shear	Minimum of 5 devices, 30 wires Cpk>1.67	Wires	1/30/0	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	1/30/0	3/90/0	3/90/0
SD	C3	JEDEC JESD22-B102	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	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										
ESD	E2	AEC Q100-002	1	3	ESD HBM	-	2000 Volts	1/3/0	1/3/0	1/3/0
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	1500 Volts	-	-	1/3/0
ESD	E3	AEC Q100-011	1	3	ESD CDM	-	500 Volts	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
ED	E5	AEC Q100-009	3	30	Electrical Distributions	Cpk>1.67 Room, hot, and cold	-	3/90/0	3/90/0	3/90/0

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

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Location	E-Mail
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