

<b>PCN Number:</b>	20180614000.1A	<b>PCN Date:</b>	Sept 12, 2018
<b>Title:</b>	Add Cu as Alternative Wire Base Metal for Selected Device(s)		
<b>Customer Contact:</b>	<a href="#">PCN Manager</a>	<b>Dept:</b>	Quality Services
<b>Proposed 1<sup>st</sup> Ship Date:</b>	Sept 15, 2018	<b>Estimated Sample Availability:</b>	Date provided at sample request
<b>Change Type:</b>			
<input type="checkbox"/>	Assembly Site	<input type="checkbox"/>	Design
<input checked="" type="checkbox"/>	Assembly Process	<input type="checkbox"/>	Data Sheet
<input checked="" type="checkbox"/>	Assembly Materials	<input type="checkbox"/>	Part number change
<input type="checkbox"/>	Mechanical Specification	<input type="checkbox"/>	Test Site
<input type="checkbox"/>	Packing/Shipping/Labeling	<input type="checkbox"/>	Test Process
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Bump Site
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Bump Material
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Bump Process
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Fab Site
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Fab Materials
<input type="checkbox"/>		<input type="checkbox"/>	Wafer Fab Process

### PCN Details

#### Description of Change:

Revision A is to announce the addition of new devices that were not included on the original PCN notification. These new devices are under **Group 2 & 3** in the Product affected section below. The expected first shipment date for these new devices will be 90 days from this notice (**Dec 13, 2018**) for these newly added devices only. The proposed 1<sup>st</sup> ship date of Sept 15, 2018 still applies for the original set of devices.

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 Differences:

##### Group 1 Device:

Material	Current	Proposed
Wire	Au	Cu

##### Group 2 Device:

Material	Current	Proposed
Wire	Au	Cu
Lead finish	NiPdAu	NiPdAu (Roughened Single Side)

##### Group 3 Device:

Material	Current	Proposed
Lead frame thickness/finish	10 mils, NiPdAu	6mils NiPdAu (Roughened Single Side)
Wire	Au	Cu
Mount compound	4042500	4147858
Mold compound	4205694	4211880

#### 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 Material Declaration

<input type="checkbox"/>	No Impact to the Material Declaration	<input checked="" type="checkbox"/>	Material Declarations or Product Content reports are driven from production data and will be available following the production release. Upon production release the revised reports can be obtained from the <a href="#">TI Eco-Info website</a> . There is no impact to the material meeting current regulatory compliance requirements with this PCN change.
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**Anticipated impact on Fit, Form, Function, Quality or Reliability (positive / negative):**

None.

**Changes to product identification resulting from this PCN:**

None.

**Product Affected: Group 1**

RF430FRL152HCRGER	TLC0838CDW	TLC1543CDWG4	TLC1543IDWR
RF430FRL152HCRGET	TLC0838CDWG4	TLC1543CDWR	TLC1543IDWRG4
RF430FRL153HCRGER	TLC0838CDWR	TLC1543CDWRG4	
RF430FRL154HCRGER	TLC0838CDWRG4	TLC1543IDW	
RF430TAL152HSRGER	TLC1543CDW	TLC1543IDWG4	

**Product Affected: Group 2**

DRV8803DW	MSP430F2101IDWR	MSP430F2121IDWR	MSP430F2121TDW
DRV8803DWR	MSP430F2101TDW	MSP430F1121IDW	MSP430F2121TDWR
DRV8804DW	MSP430F2101TDWR	MSP430F1121IDWR	MSP430F2131IDW
DRV8804DWR	MSP430F2111IDW	MSP430F1122IDW	MSP430F2131IDWR
DRV8805DW	MSP430F2111IDWR	MSP430F1122IDWR	MSP430F2131TDW
DRV8805DWR	MSP430F2111TDW	MSP430F112IDWR	MSP430F2131TDWR
MSP430F1101IDWR	MSP430F2111TDWR	MSP430F1132IDW	TLC0838IDW
MSP430F2101IDW	MSP430F2121IDW	MSP430F1132IDWR	TLC0838IDWR

**Product Affected: Group 3**

MSP430F1101AIDW	MSP430F1111AIDW	MSP430F1121AIDW
MSP430F1101AIDWR	MSP430F1111AIDWR	MSP430F1121AIDWR

## Group 1 Qualification Report

### SUHD Leadframe 20pin DW

#### Au to Cu wire Conversion

Approve Date 07-Aug-2017

#### Product Attributes

Attributes	Qual Device: <u>SN74HCT573DWR</u>	Qual Device: <u>SN74LVC244ADWR</u>	QBS Package Reference: <u>SN65LBC170DW</u>	QBS Package Reference: <u>SN74LVC541ADW</u>
Assembly Site	MLA	MLA	MLA	MLA
Package Family	SOIC	SOIC	SOIC	SOIC
Flammability Rating	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V-0
Wafer Fab Supplier	SH-BIP-1	FR-BIP-1	DFAB	FFAB
Wafer Fab Process	74HC	ASLC10	LBC3S	ASLC10

Attributes	QBS Package Reference: <u>TL494IDR</u>	QBS Package Reference: <u>ULQ2003AQDRQ1</u>
Assembly Site	FMX	FMX
Package Family	SOIC	SOIC
Flammability Rating	UL 94 V0	UL 94 V-0
Wafer Fab Supplier	SFAB	SFAB
Wafer Fab Process	J11	J11-SLM

- QBS: Qual By Similarity

- Qual Device qualified at LEVEL1-260C: SN74HCT573DWR, SN74LVC244ADWR

### Qualification Results

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

Type	Test Name / Condition	Duration	Qual Device: <u>SN74HCT573DWR</u>	Qual Device: <u>SN74LVC244ADWR</u>	QBS Package Reference: <u>SN65LBC170DW</u>	QBS Package Reference: <u>SN74LVC541ADW</u>
AC	Autoclave 121C	96 Hours	-	-	3/231/0	3/231/0
ED	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	-	-	-	-
ED	Electrical Characterization, side by side	Per datasheet parameters	-	-	Pass	Pass
HAST	Biased HAST, 130C/85%RH	192 Hours (for info)	-	-	-	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	-	-
HTOL	Life Test, 150C	408 Hours	-	-	-	-
HTSL	High Temp Storage Bake 150C	1000 Hours	-	-	-	-
HTSL	High Temp Storage Bake 170C	420 Hours	-	-	3/231/0	3/231/0
LI	Lead Fatigue	Leads	3/66/0	3/66/0	-	-
LI	Lead Pull	Leads	3/66/0	3/66/0	-	-
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	Pass	Pass	Pass	Pass
MQ	Manufacturability (Auto Assembly)	(per automotive requirements)	-	-	-	-
PD	Physical Dimensions	(per mechanical drawing)	3/15/0	3/15/0	-	-
SD	Solderability	Pb Free	-	-	-	-
SD	Solderability	Steam age, 8	3/66/0	3/66/0	-	-

Type	Test Name / Condition	Duration	Qual Device: <u>SN74HCT573DWR</u>	Qual Device: <u>SN74LVC244ADWR</u>	QBS Package Reference: <u>SN65LBC170DW</u>	QBS Package Reference: <u>SN74LVC541ADW</u>
		hours				
SD	Surface Mount Solderability	Pb	-	-	-	-
TC	Temperature Cycle, -65/150C	500 Cycles	3/231/0	3/231/0	3/231/0	3/231/0
WBP	Bond Pull	Wires	3/228/0	3/228/0	3/228/0	3/228/0
WBS	Ball Bond Shear	Wires	3/228/0	3/228/0	3/228/0	3/228/0

Type	Test Name / Condition	Duration	QBS Package Reference: <u>TL494IDR</u>	QBS Package Reference: <u>ULQ2003AQDRQ1</u>
AC	Autoclave 121C	96 Hours	-	3/231/0
ED	Auto Electrical Distributions	Cpk>1.67 Room, hot, and cold test	-	3/90/0
ED	Electrical Characterization, side by side	Per datasheet parameters	-	-
HAST	Biased HAST, 130C/85%RH	192 Hours (for info)	3/231/0	3/217/0
HAST	Biased HAST, 130C/85%RH	96 Hours	3/231/0	3/231/0
HTOL	Life Test, 150C	408 Hours	-	3/231/0
HTSL	High Temp Storage Bake 150C	1000 Hours	-	1/45/0
HTSL	High Temp Storage Bake 170C	420 Hours	-	-
LI	Lead Fatigue	Leads	-	-
LI	Lead Pull	Leads	-	-
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	-	-
MQ	Manufacturability (Auto Assembly)	(per automotive requirements)	-	Pass
PD	Physical Dimensions	(per mechanical drawing)	-	-
SD	Solderability	Pb Free	-	1/15/0
SD	Solderability	Steam age, 8 hours	-	-
SD	Surface Mount Solderability	Pb	-	1/15/0
TC	Temperature Cycle, -65/150C	500 Cycles	-	3/231/0
WBP	Bond Pull	Wires	3/228/0	3/228/0
WBS	Ball Bond Shear	Wires	3/228/0	3/228/0

- 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 JEDEC47 : -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/>

Green/Pb-free Status:

Qualified Pb-Free (SMT) and Green\

THIS INFORMATION RELATING TO QUALITY AND RELIABILITY IS PROVIDED "AS IS." Product information detailed in this report may not accurately reflect TI's current product materials, processes and testing used in the construction of the TI products. Customers are solely responsible to conduct sufficient engineering and additional qualification testing to determine whether a device is suitable for use in their applications. Using TI products outside limits stated in TI's datasheet may void TI's warranty. See TI's Terms of Sale at "<http://www.ti.com/lscs/ti/legal/termsofsale.page>"

# Qualification Report

## Apollo device RF430TAL152HSRGER in TI-Clark with Cu wire

Approve Date 30-Apr-2018

### Product Attributes

Attributes	Qual Device: <u>DM5 + CU WIRE QUAL MSP430FR5739IRHA40</u>	Qual Device: <u>RF430TAL152HSRGER</u>
<b>Assembly Site</b>	CLARK-AT	CLARK-AT
<b>Package Family</b>	QFN	QFN
<b>Flammability Rating</b>	UL 94 V-0	UL 94 V-0
<b>Wafer Fab Supplier</b>	DM5	DM5
<b>Wafer Process</b>	E035	E035

- QBS: Qual By Similarity
- Qual Device RF430TAL152HSRGER is qualified at LEVEL2-260C

### Qualification Results

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

Type	Test Name / Condition	Duration	Qual Device: <u>DM5 + CU WIRE QUAL MSP430FR5739IRHA40</u>	Qual Device: <u>RF430TAL152HSRGER</u>
AC	Autoclave 121C	96 Hours	3/231/0	3/231/0
HAST	Biased HAST, 130C/85%RH	96 Hours	1/78/0	-
HTSL	High Temp. Storage Bake, 125C	500 Hours	-	3/231/0
HTSL	High Temp, Storage Bake, 150C	1000 Hours	1/77/0	-
TC	Temperature Cycle, -65/150C	500 Cycles	3/231/0	-
TC	Temperature Cycle, -40C/ 85C	850 Cycles	-	3/231/0
THB	Biased Temperature and Humidity, 85C/85%RH	500 Hours	-	3/231/0

- 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

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

**Green/Pb-free Status:**

Qualified Pb-Free(SMT) and Green

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**Group 2 and 3 Qualification Report**  
**SOIC DW Au to Cu wire Qualification in MLA**  
 Approve Date 30-Apr-2018

**Product Attributes**

Attributes	Qual Device: <u>M430F1101AIDWR</u>	Qual Device: <u>SN65LBC170DW</u>	Qual Device: <u>SN74LVC245ADWR</u>
Assembly Site	MLA	MLA	MLA
Package Family	NIPDAU	NIPDAU	SOIC
Flammability Rating	UL 94 V-0	UL 94 V-0	UL 94 V-0
Wafer Fab Supplier	TSMC-WFT	DFAB	FFAB
Wafer Fab Process	0.35UM-TSMC	LBC3S	ASLC10

- Qual Devices qualified at LEVEL1-260CG: SN65LBC170DW, SN74LVC245ADWR, M430F1101AIDWR

**Qualification Results**

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

Type	Test Name / Condition	Duration	Qual Device: <u>M430F1101AIDWR</u>	Qual Device: <u>SN65LBC170DW</u>	Qual Device: <u>SN74LVC245ADWR</u>
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	Pass	Pass	Pass
SD	Solderability	8 Hours Steam age	-	3/66/0	-
TC	Temperature Cycle, -65/150C	500 Cycles	3/231/0	-	3/231/0
WBP	Bond Pull	Wires	3/228/0	3/228/0	3/228/0
WBP	Bond Strength	Wires	3/228/0	3/228/0	3/228/0

- 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

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**Green/Pb-free Status:**

Qualified Pb-Free(SMT) and Green

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## Qualification Report

### Qualification of Mold 4211880 and Die Attach 4147858 for SOIC DW Packages in TITL and MLA

Approve Date 12-May-2016

#### Product Attributes

Attributes	Qual Device: ADS1213U	Qual Device: ADS820U	Qual Device: ADS8504IBDW	Qual Device: MSP430F123IDWR	Qual Device: SN65LBC170DW
Assembly Site	TAI	TAI	TAI	TAI	MLA
Package Family	SOIC	SOIC	SOIC	SOIC	SOIC
Flammability Rating	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V-0
Wafer Fab Supplier	OKI	TSMC WF2	DMOS5	TSMC	DFAB
Wafer Fab Process	OKIDALSATFAB_BICMOS	0.60UM-TSMC	50HPA07	0.35UM-TSMC	LBC3S
Attributes	Qual Device: SN65LBC170DW_SSTN	Qual Device: SN74LVC541ADW	Qual Device: SN74LVC541ADW_SSTN	QBS Package Reference: TL494IDR	QBS Package Reference: ULQ2003AQDRQ1
Assembly Site	MLA	MLA	MLA	FMX	FMX
Package Family	SOIC	SOIC	SOIC	SOIC	SOIC
Flammability Rating	UL 94 V-0	UL 94 V-0	UL 94 V-0	UL 94 V0	UL 94 V-0
Wafer Fab Supplier	DFAB	FFAB	FFAB	SFAB	SFAB
Wafer Fab Process	LBC3S	ASLC10	ASLC10	JI1	JI1-SLM

- QBS: Qual By Similarity

- Qual Devices qualified at LEVEL1-260C: SN65LBC170DW, SN74LVC541ADW, MSP430F123IDWR

- Qual Devices qualified at LEVEL2-260C: ADS1213U, ADS8504IBDW, ADS820U

#### Qualification Results

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

Type	Test Name / Condition	Duration	Qual Device: ADS1213U	Qual Device: ADS820U	Qual Device: ADS8504IBD W	Qual Device: MSP430F123I DWR	Qual Device: SN65LBC170 DW
AC	Autoclave 121C	96 Hours	1/77/0	-	1/77/0	1/77/0	1/77/0
ED	Electrical Characterization, side by side	Per datasheet parameters	Pass	Pass	Pass	-	Pass
HAST	Biased HAST, 130C/85%RH	192 Hours	-	-	-	-	-
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	-	-	-
HTSL	High Temp Storage Bake 170C	420 Hours	1/77/0	-	1/77/0	1/77/0	1/77/0
MQ	Manufacturability (Assembly)	(per mfg. Site specification)	Pass	Pass	Pass	Pass	Pass
TC	Temperature Cycle, - 65/150C	500 Cycles	1/77/0	3/231/0	1/77/0	1/77/0	1/77/0

Type	Test Name / Condition	Duration	Qual Device: SN65LBC17 0DW_ SSTN	Qual Device: SN74LVC541 ADW	Qual Device: SN74LVC541 ADW_SSTN	QBS Package Reference: TL494IDR	QBS Package Reference: ULQ2003AQ DRQ1_STDL F
AC	Autoclave 121C	96 Hours	3/231/0	3/231/0	3/231/0	-	3/231/0
ED	Electrical Characterization, side by side	Per datasheet parameters	Pass	Pass	Pass	-	-
HAST	Biased HAST, 130C/85%RH	192 Hours	-	-	-	3/231/0	3/217/0
HAST	Biased HAST, 130C/85%RH	96 Hours	-	-	-	3/231/0	3/231/0
HTSL	High Temp Storage Bake 170C	420 Hours	3/231/0	3/231/0	3/231/0	-	-
MQ	Manufacturability (Assembly)	(per mfg. Site specificatio n)	Pass	Pass	Pass	-	-
TC	Temperature Cycle, - 65/150C	500 Cycles	3/231/0	3/231/0	3/231/0	-	3/231/0

- 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

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**Green/Pb-free Status:**

Qualified Pb-Free(SMT) and Green

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