

PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.	ADG/17/10495	
1.3 Title of PCN	SO-20 Products (U447, U448, US48): Migration to SO20 IDF (Inter Digit Frame) line with new BOM and matte Tin plating process	
1.4 Product Category	See list	
1.5 Issue date	2017-10-27	

2. PCN Team

2.1 Contact supplier	
2.1.1 Name	ROBERTSON HEATHER
2.1.2 Phone	+1 8475853058
2.1.3 Email	heather.robertson@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Elena Maria PERNIGOTTI
2.1.2 Marketing Manager	Alberto DA DALT
2.1.3 Quality Manager	Marcello Donato MENCHISE

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Materials	New direct material part number (same supplier, different supplier or new supplier), lead frame, resin, wire, ...)	ST Muar (Malaysia)

4. Description of change

	Old	New
4.1 Description	Current Bill Of Materials (See details in the included validation report)	New Bill Of Materials (See details in the included validation report)
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No Impact	

5. Reason / motivation for change

5.1 Motivation	Company Road Map
5.2 Customer Benefit	SERVICE CONTINUITY

6. Marking of parts / traceability of change

6.1 Description	Dedicated Finished Good Codes
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7. Timing / schedule

7.1 Date of qualification results	2017-10-09
7.2 Intended start of delivery	2018-01-09
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	10495 Validation.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2017-10-27

9. Attachments (additional documentations)

10495 Public product.pdf
10495 Validation.pdf
10495 5W and Details.pdf

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
	E-L9826TR	
	L9903	
	L9904TR	

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SO20 IDF Project

- Migration to IDF line and new BOM introduction
- From Pre-Plated Frame (PPF) to Matte Tin Plating Process

October, 2017

Change description

Migration from SO20 Matrix to High Density Line IDF (Inter Digit Frame)

New Bill of Material (BOM)

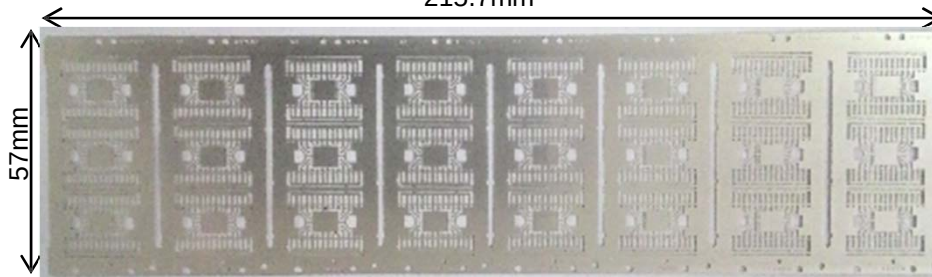
- Copper frame (SpAg/RgAg/SelAg) with ME2 treatment for rough surface
- Copper wire bonding
- Resin Sumitomo EME-G633CA
- Glue Loctite Ablestik ABP8302

Matte Tin plating process introduction

SO20 IDF Line

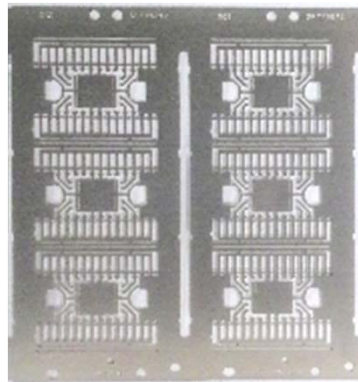
SO20 Matrix

215.7mm



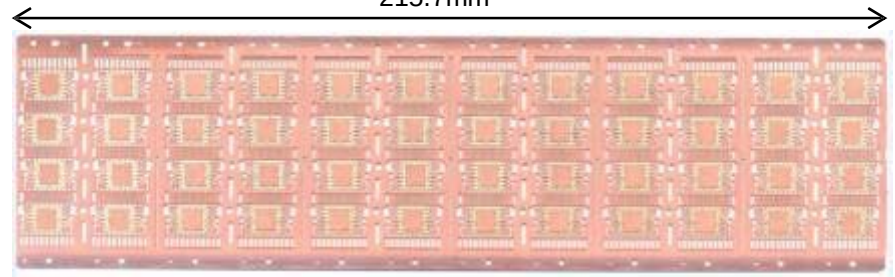
57mm

Matrix Leadframe
3row x 8columns
24units

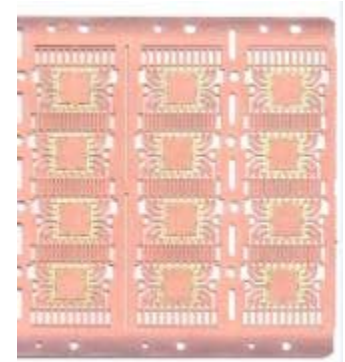


SO20 Inter Digit Frame (IDF)

215.7mm



IDF Leadframe
4row x 12columns
48units



BOM comparison

Product Line: U447

Current Bill of Material	
ITEM	MATERIAL
WIRE	GOLD D1.5 MIL
RESIN	SUMITOMO EME7026
GLUE	HITACHI EN4900
FRAME	SO 20L 195x250 Btw16+2+2OpCuAdvPPF



New Bill of Material	
ITEM	MATERIAL
WIRE	COPPER D2.0 MIL
RESIN	SUMITOMO EME-G633CA
GLUE	LOCTITE ABLESTIK ABP8302
FRAME	SO 20L 200x230 Btw OpG V2 SelAgME2

Product Lines: U448, US48

Current Bill of Material	
ITEM	MATERIAL
WIRE	GOLD D1.2 MIL
RESIN	SUMITOMO EME7026
GLUE	HITACHI EN4900
FRAME	SO 20L 150x200 MtxW FloOpD uAdvPPF



New Bill of Material	
ITEM	MATERIAL
WIRE	COPPER D1.2 MIL
RESIN	SUMITOMO EME-G633CA
GLUE	LOCTITE ABLESTIK ABP8302
FRAME	SO 20L 140x165 Flo OpC V2 RgAg+ME2

Leadframe Comparison

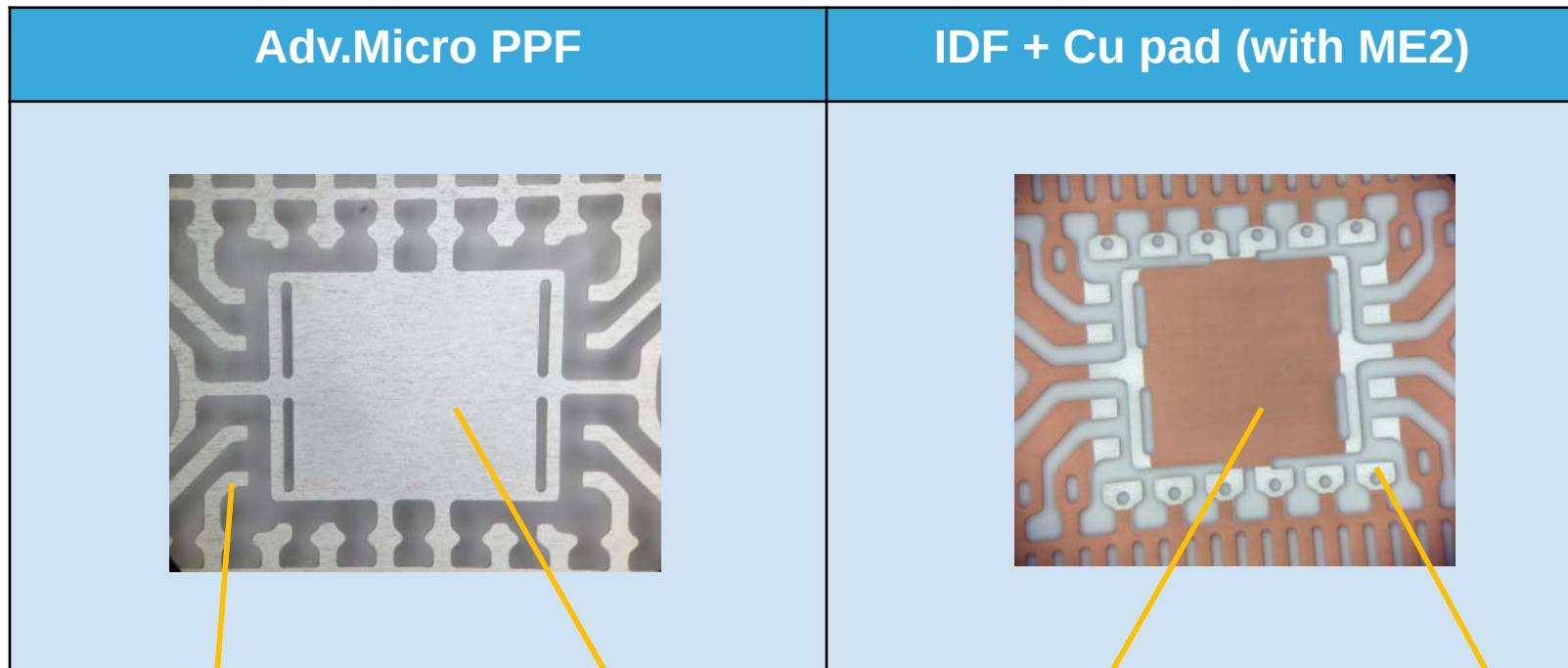
ITEM	EXISTING	NEW
Frame size	(215.7 x 57 mm)	(215.7 x 57 mm)
Units/Strip	24	48
Pad size	(195 x 250) ^a (150 x 200) ^b	(200 x 230) ^a (140 x 165) ^b
Surface treatment	No	ME2
Inner Lead Plating	Adv _μ PPF (NiPdAuAg)	Selective Ag ^a Ring Ag ^b
Frame base material	C194	C194
Frame process	Etched	Stamped
Plating	Adv _μ PPF (NiPdAuAg)	Sn
Leadframe Supplier	DCI	ASM

a) U447
b) U448, US48



ME2: Micro Etching Version 2

Existing frame vs ME2

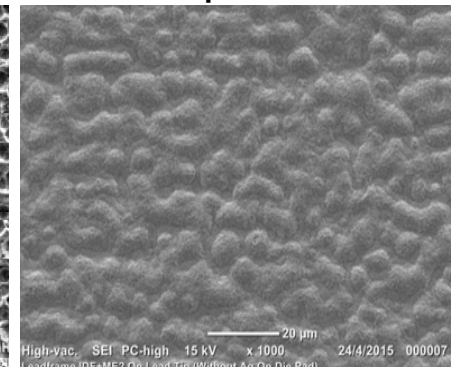
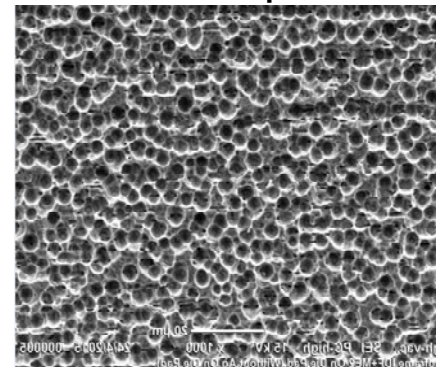
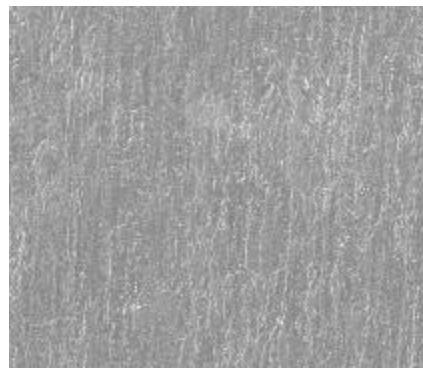


Lead tip

On die pad

On die pad

Lead tip



SEM images

[Note: SEM Mag 1000X]

Impacted Products List & Selected TVs

➤ Products List

Product Line	Package	Technical Code	Finished Good	Commercial Product
U447	SO 20	J6Z7*U447CA6	L9826-JLF1/	E-L9826
U447	SO 20	J6Z7*U447CA6	L9826TR-JLF1/	E-L9826TR
U447	SO 20	J9Z7*U447CA6	ATM39LTR/	E-ATM39LTR
U448	SO 20	J6Z7*U448DB6	L9903-JLF/	L9903
U448	SO 20	J6Z7*U448DB6	L9903TR-JLF/	L9903TR
US48	SO 20	J6Z7*US48AA6	L9904-JLF/	L9904
US48	SO 20	J6Z7*US48AA6	L9904TR-JLF/	L9904TR
US48	SO 20	J8Z7*US48AA6	6A919TR-JLF/	6A919TR

U447, U448 and US48 share the same Front End Process Technology

➤ Selected TVs

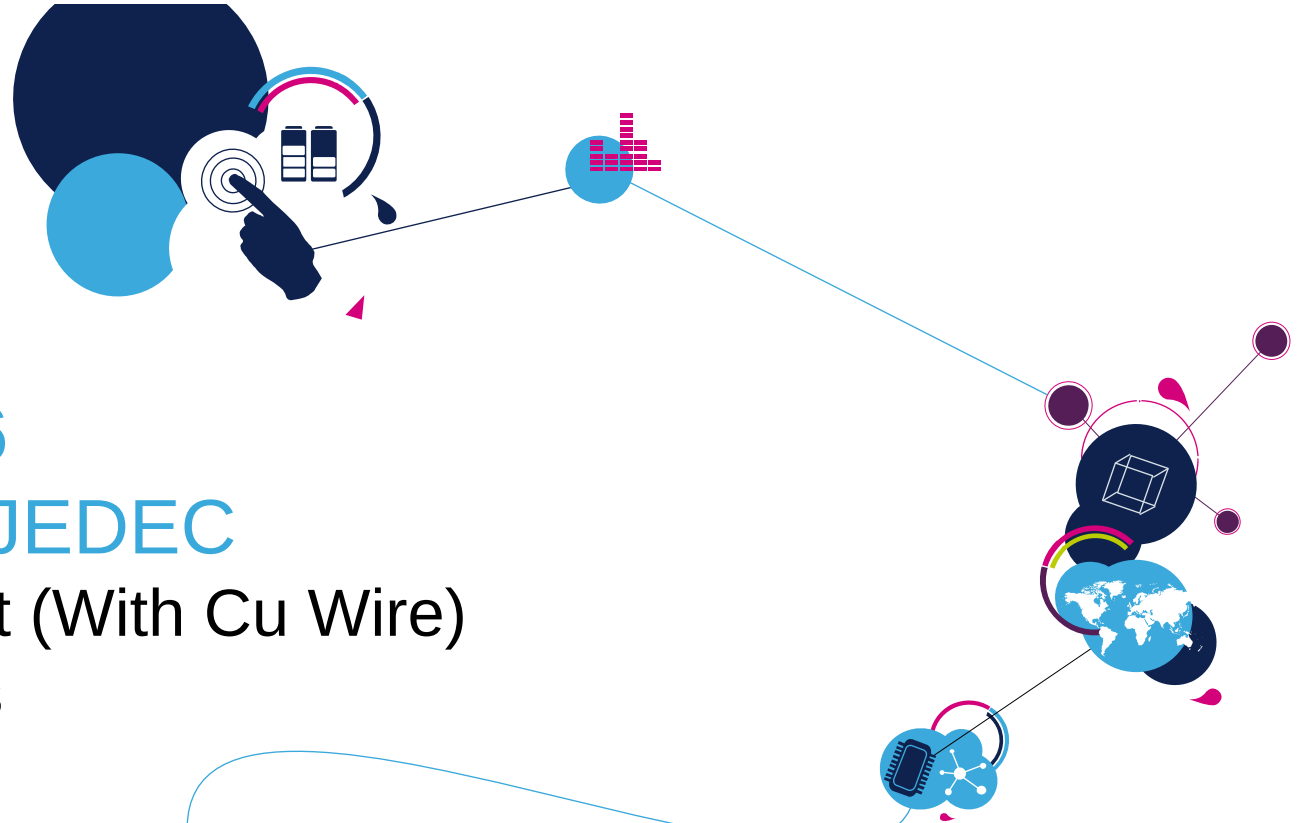
- TV1: U447, 2.0mil copper wire bonding diameter. 3 Qualification lots (LL, NN, HH)
- TV2: US48, 1.2mil copper wire bonding diameter. 3 Qualification lots (LL, NN, HH)

✓ U448 is qualified by full similarity with US48

❖	LL = Lower Corner Wire Bonding Parameters
❖	NN = Nominal Wire Bonding Parameters
❖	HH = Higher Corner Wire Bonding Parameters



Process Change Qualification according to AEC-Q100 & Q006 guidelines



I9Z7*U447CA6

SO 20 .30 TO JEDEC

SO20 IDF Project (With Cu Wire)

Wire Size 2.0mils

Automotive Division (ADG) – BCD3 Technology

05th JULY 2017

Muar BE QA Reliability Laboratory

Prepared by : Nur Fithriah Md Jani (Reliability Technician)



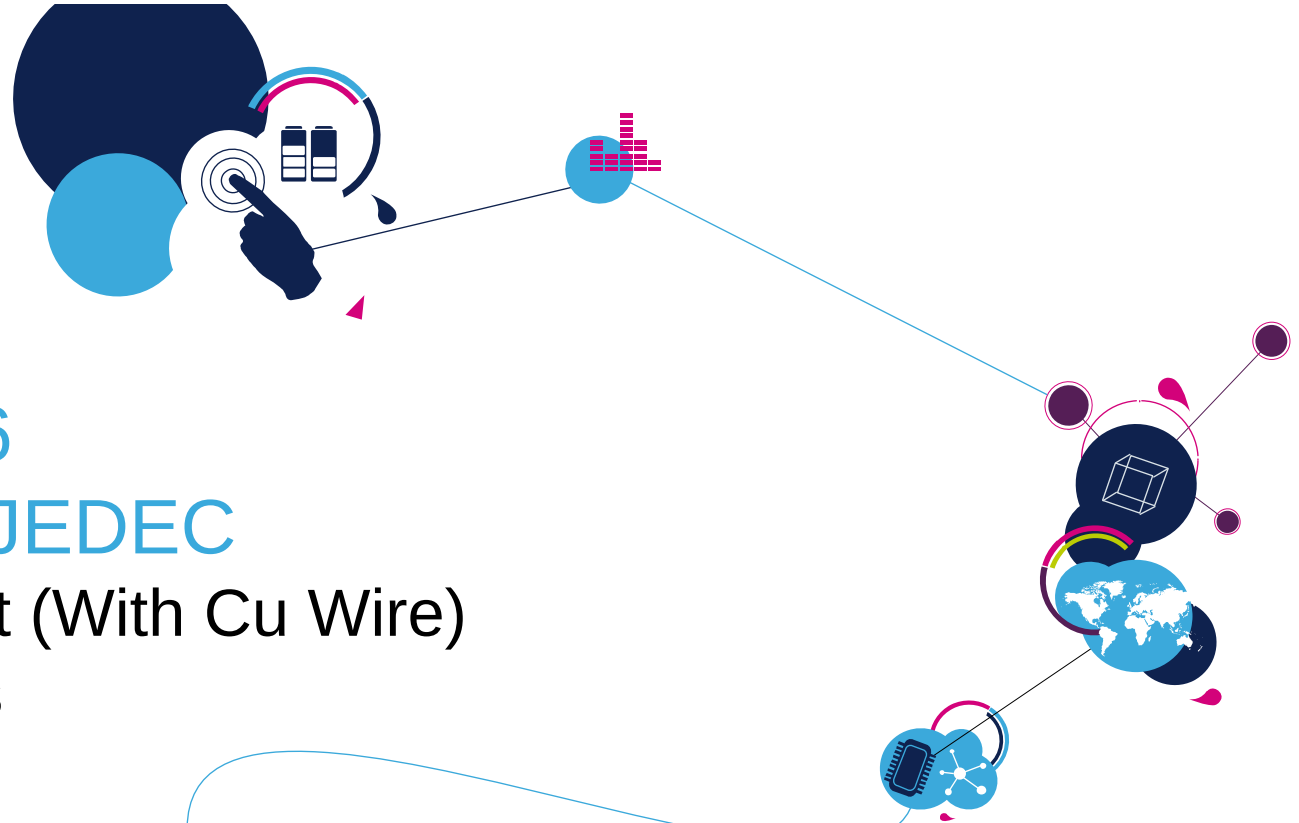
U447 SO20 IDF Project (With 2.0mils Cu Wire)

FULL RELIABILITY SUMMARY RESULTS								
No	Test Name	Prec.	Condition/ Method	Steps	Steps	Fails/SS		
						I9Z7*U447CA6 996451F5RP (Lot LL) SO 20 .30 TO JEDEC	I9Z7*U447CA6 996451F5RQ (Lot NN) SO 20 .30 TO JEDEC	I9Z7*U447CA6 996451F5RR (Lot HH) SO 20 .30 TO JEDEC
1	PC (MSL3 STD)		Bake 24hrs @ 125°C Soak 192hrs @ 30°C / 60%RH Reflow Profile = 260°C	Final	TSAM (0hrs)	0 delam / 60pcs	0 delam / 60pcs	0 delam / 60pcs
					CSAM (0hrs)	0 delam / 60pcs	0 delam / 60pcs	0 delam / 60pcs
					ATE (3IR)	0 defect / 169pcs	0 defect / 169pcs	0 defect / 169pcs
					TSAM (3IR)	0 delam / 40pcs	0 delam / 40pcs	0 delam / 40pcs
					CSAM Top (3IR)	0 delam / 40pcs	0 delam / 40pcs	0 delam / 40pcs
2	TC Thermal Cycle	Yes	Test Conditions = -55°C/150°C	500 cycle	ATE	0 defect / 91pcs (note 1)	0 defect / 92pcs	0 defect / 92pcs
					TSAM	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					CSAM Top	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
				1000 cycle	ATE	0 defect / 86pcs	0 defect / 87pcs	0 defect / 87pcs
					TSAM	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					CSAM Top	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
				2000 Cycle	ATE	0 defect / 81pcs	0 defect / 82pcs	0 defect / 82pcs
					TSAM	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					CSAM Top	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
3	PPT Pressure Pot Test	Yes	Test Conditions = 121°C / 2 ATM	96 hours	ATE	0 defect / 77pcs	0 defect / 77pcs	0 defect / 77pcs
					TSAM	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					CSAM Top	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit

Note 1: 1pc missing due to jamming issue.

U447 SO20 IDF Project (With 2.0mils Cu Wire)

FULL RELIABILITY SUMMARY RESULTS								
No	Test Name	Prec.	Condition/ Method	Steps	Steps	Fails/SS		
						I9Z7*U447CA6 996451F5RP (Lot LL) SO 20 .30 TO JEDEC	I9Z7*U447CA6 996451F5RQ (Lot NN) SO 20 .30 TO JEDEC	I9Z7*U447CA6 996451F5RR (Lot HH) SO 20 .30 TO JEDEC
4	HTS High Temperature Storage Life	No	Test Conditions = 150°C	500 hours	ATE	0 defect / 60pcs	0 defect / 60pcs	0 defect / 60pcs
					TSAM	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					CSAM Top	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
				1000 hours	ATE	0 defect / 55pcs	0 defect / 55pcs	0 defect / 55pcs
					TSAM	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					CSAM Top	0 delam / 20pcs	0 delam / 20pcs	0 delam / 20pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
				2000 hours	ATE	0 defect / 50pcs	0 defect / 50pcs	0 defect / 50pcs
					TSAM	0 delam / 20pcs	0 defect / 50pcs	0 defect / 50pcs
					CSAM Top	0 delam / 20pcs	0 defect / 50pcs	0 defect / 50pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
5	THB Temperature Humidity Bias	Yes	Test Conditions = 85°C / 85%RH	1000 hours	ATE	0 defect / 77pcs	0 defect / 77pcs	0 defect / 77pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
				2000 hours	ATE	0 defect / 72pcs	0 defect / 72pcs	0 defect / 72pcs
					WP/BS	PASS All readings within spec limit	PASS All readings within spec limit	PASS All readings within spec limit
6	HTOL High Temp. Operating Life	No	Test Conditions = 125°C	500 hours	ATE	0 defect / 26pcs	0 defect / 26pcs	0 defect / 26pcs
				1000 hours	ATE	0 defect / 26pcs	0 defect / 26pcs	0 defect / 26pcs



I9Z7*US48AA6

SO 20 .30 TO JEDEC

SO20 IDF Project (With Cu Wire)

Wire Size 1.2mils

Automotive Division (ADG) – BCD3 Technology

23th NOVEMBER 2016

Muar BE QA Reliability Laboratory

Prepared by : Mohd Nazri Bin Bakar



US48 SO20 IDF Project (With 1.2mils Cu Wire)

FULL RELIABILITY SUMMARY RESULTS								
No	Test Name	Prec	Condition/ Method	Steps	Steps	Fails/SS		
						I927*US48AA6 996160UA01 (Lot LL) SO 20 .30 TO JEDEC	I927*US48AA6 996160UARQ (Lot NN) SO 20 .30 TO JEDEC	I927*US48AA6 996160UARR (Lot HH) SO 20 .30 TO JEDEC
1	PC (JL3 STD)		Bake 24 hrs @ 125°C Soak 192 hrs @ 30°C / 60% RH Reflow Profile = J-STD-020D (Tmax = 260°C)	Final	TSAM (0hr)	0 delam / 60 pcs	0 delam / 60 pcs	0 delam / 60 pcs
					CSAM TOP (0hr)	0 delam / 60 pcs	0 delam / 60 pcs	0 delam / 60 pcs
					ATE	0 def / 169 pcs	0 def / 169 pcs	0 def / 169 pcs
					TSAM	0 delam / 40 pcs	0 delam / 40 pcs	0 delam / 40 pcs
					CSAM TOP	0 delam / 40 pcs	0 delam / 40 pcs	0 delam / 40 pcs
2	TC	Yes	TA = -55°C / +150°C	500 Cycle	ATE	0 def / 92 pcs	0 def / 92 pcs	0 def / 92 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
				1000 cycle	ATE	0 def / 87 pcs	0 def / 87 pcs	0 def / 87 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
				1500 cycle	ATE	0 def / 82 pcs	0 def / 82 pcs	0 def / 82 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
				2000 cycle	ATE	0 def / 77 pcs	0 def / 77 pcs	0 def / 77 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass

US48 SO20 IDF Project (With 1.2mils Cu Wire)

FULL RELIABILITY SUMMARY RESULTS								
No	Test Name	Prec	Condition/ Method	Steps	Steps	Fails/SS		
						I927*US48AA6 996160UA01 (Lot LL) SO 20 .30 TO JEDEC	I927*US48AA6 996160UARQ (Lot NN) SO 20 .30 TO JEDEC	I927*US48AA6 996160UARR (Lot HH) SO 20 .30 TO JEDEC
3	HTS	No	TA = 150°C	500 hrs	ATE	0 def / 60 pcs	0 def / 60 pcs	0 def / 60 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
				1000 hrs	ATE	0 def / 55 pcs	0 def / 55 pcs	0 def / 55 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
				1500 hrs	ATE	0 def / 50 pcs	0 def / 50 pcs	0 def / 50 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
				2000 hrs	ATE	0 def / 45 pcs	0 def / 45 pcs	0 def / 45 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass
4	PPT	Yes	PPT 121°C / 2 ATM	96 hrs	ATE	0 def / 77 pcs	0 def / 77 pcs	0 def / 77 pcs
					TSAM	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					CSAM TOP	0 delam / 20 pcs	0 delam / 20 pcs	0 delam / 20 pcs
					DPA	Pass	Pass	Pass