QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN #: CENO-14FNGT847

Date:
November 12, 2020

Qualification of MMT as an additional assembly site for selected Atmel ATA5702xx and ATA5700xx device families available in 38L VQFN (5x7x1mm) package using palladium coated copper with gold flash (CuPdAu) bond wire.
The qualification of palladium coated copper with gold flash (CuPdAu) as a new bond wire material for AT86RF233-ZU, AT86RF233-ZF, AT86RF233-ZUR and AT86RF233-ZFR catalog part numbers (CPN) available in 32L VQFN (5x5x0.9mm) at MMT assembly site will qualify by similarity (QBS).
This is an AEC-Q006 Grade 3 qualification.

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Package Qualification Report

Purpose: Qualification of MMT as an additional assembly site for selected Atmel ATA5702xx and ATA5700xx device families available in 38L VQFN (5x7x1mm) package using palladium coated copper with gold flash (CuPdAu) bond wire. The qualification of palladium coated copper with gold flash (CuPdAu) as a new bond wire material for AT86RF233-ZU, AT86RF233-ZF, AT86RF233-ZUR and AT86RF233-ZFR catalog part numbers (CPN) available in 32L VQFN (5x5x0.9mm) at MMT assembly site will qualify by similarity (QBS). This is an AEC-Q006 Grade 3 qualification.

CCB No.: 3944 and 8013.001

Misc.	Assembly site	MMT
	BD Number	BDM-002203
	MP Code (MPC)	58975TSJBC02
	Part Number (CPN)	ATA5700F1000M-WDQW
	MSL information	1
	Assembly Shipping Media (T/R, Tube/Tray)	T/R
	Base Quantity Multiple (BQM)	4000
Lead-Frame	Paddle size	3.9 x 5.9mm
	Material	A194
	DAP Surface Prep	Ag-special photomask
	Treatment	rough
	Process	etch
	Lead-lock	yes
	Lead Plating	Ag
	Strip Size	70 x 250mm
Bond Wire	Material	CuPdAu
Die Attach	Part Number	3280
	Conductive	yes
MC	Part Number	G700LTD
PKG	PKG Type	VQFN-WFS
	Pin/Ball Count	38
	PKG width/size	5x7mm

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Package Qualification Report

Manufacturing Information

Assembly Lot No.
MMT-204301685.000
MMT-204301686.000
MMT-204301687.000

Result ☑ Pass ☐ Fail ☐ _____

AEC-Q006 grade 3 qualification of 58975 (ATA5700) UMC in VQFN-WFS 5x7 using 0.8mil CuPdAu wire at MMT (MSL 1), pass reliability test per AEC-Q006 which was conducted at MPHL reliability lab. This package is qualified Moisture/Reflow Sensitivity Classification Level 1 at 260°C reflow temperature per IPC/JEDEC J-STD-020E standard.

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS	Result	Remarks
Moisture/Reflow Sensitivity Classification Test (At MSL Level 1)	**Electrical Test:** +25°C, +85°C System: LTX/RASCO Bake 150°C, 24 hrs System: HERAEUS 85°C/85%RH Moisture Soak 168 hrs. System: Climats Excal 5423-HE 3x Convection-Reflow 265°C max System: Mancorp CR.5000F (IPC/JEDEC J-STD-020E)	IPC/JEDEC	45 units per lot	Lot 1 0/45 Lot 2 0/45 Lot 3 0/45	Pass Pass Pass	
Precondition Prior Perform Reliability Tests (At MSL Level 1)	**Electrical Test:** +25°C, +85°C System: LTX/RASCO Bake 150°C, 24 hrs System: HERAEUS 85°C/85%RH Moisture Soak 168hrs. System: Climats Excal 5423-HE 3x Convection-Reflow 260°C max System: Mancorp CR.5000F **Electrical Test:** +25°C, +85°C System: LTX/RASCO All units before HAST, UHAST, TCT were submitted to this MSL1 preconditioning	JESD22-A113	231 units per lot	Lot 1 0/279 Lot 2 0/258 Lot 3 0/258	Pass Pass Pass	
Temperature Cycle	**Stress Condition:** (Standard) -55°C to +125°C, 500 cycles System: Votsch VTS^{2}7012 **Electrical Test:** +85°C System: LTX/RASCO	JESD22-A104	77 units per lot	Lot 1 0/90 Lot 2 0/89 Lot 3 0/90	Pass Pass Pass	
	Bond Strength: 0.8 mils Wire Pull (>4.0g) Bond *Shear* (>10.0g) Stitch Pull (>3g) System: Dage		5 same units for WP, BS, and SP per test	Lot 1 0/5 Lot 2 0/5 Lot 3 0/5	Pass Pass Pass	For each lot (Lot1, Lot2, Lot3): WP:30 wires from 5 units BS:30 wires from 5 units SP:30 wires from 5 units

PACKAGE QUALIFICATION REPORT

Temperature Cycle	**Stress Condition:** (Standard) -55°C to +125°C, 1000 Cycles System: Votsch VTS²7012 **Electrical Test:** +85°C System: LTX/RASCO	JESD22-A104	70 units per lot	Lot 1 0/79 Lot 2 0/70 Lot 3 0/78	Pass Pass Pass	
	Bond Strength: 0.8 mils Wire Pull (>4.0g) Bond *Shear* (>10.0g) Stitch Pull (>3g) System: Dage		5 same units for WP, BS, and SP per test	Lot 1 0/5 Lot 2 0/5 Lot 3 0/5	Pass Pass Pass	For each lot (Lot1, Lot2, Lot3): WP:30 wires from 5 units BS:30 wires from 5 units SP:30 wires from 5 units
HAST	**Stress Condition:** (Standard) + 130°C, 85%RH, 96hrs. **BIAS** System: HIRAYAMA HASTEST PC-422R8 **Electrical Test:** +25°C, +85°C System: LTX/RASCO	JESD22-A110	77 units per lot	Lot 1 0/90 Lot 2 0/79 Lot 3 0/78	Pass Pass Pass	

PACKAGE QUALIFICATION REPORT

HAST	**Bond Strength:** 0.8 mils Wire Pull (>4.0g) Bond *Shear* (>10.0g) Stitch Pull (>3g) System: Dage		5 same units for WP, BS, and SP per test	Lot 1 0/5 Lot 2 0/5 Lot 3 0/5	Pass Pass Pass	For each lot (Lot1, Lot2, Lot3): WP:30 wires from 5 units BS:30 wires from 5 units SP:30 wires from 5 units
	Stress Condition: (Standard) + 130°C, 85%RH, 192hrs. **BIAS** System: HIRAYAMA HASTEST PC-422R8 **Electrical Test:** +25°C, +85°C System: LTX/RASCO	JESD22-A110	70 units per lot	Lot 1 0/73 Lot 2 0/71 Lot 3 0/71	Pass Pass Pass	
	Bond Strength: 0.8 mils Wire Pull (>4.0g) Bond *Shear* (>10.0g) Stitch Pull (>3g) System: Dage		5 same units for WP, BS, and SP per test	Lot 1 0/5 Lot 2 0/5 Lot 3 0/5	Pass Pass Pass	For each lot (Lot1, Lot2, Lot3): WP:30 wires from 5 units BS:30 wires from 5 units SP:30 wires from 5 units
UHAST	**Stress Condition:** (Standard) + 130°C, 85%RH, 96hrs. **NO BIAS** System: HIRAYAMA HASTEST PC-422R8 **Electrical Test:** +25°C System: LTX/RASCO	JESD22-A110	77 units per lot	Lot 1 0/99 Lot 2 0/90 Lot 3 0/90	Pass Pass Pass	

PACKAGE QUALIFICATION REPORT

HTSL	**Stress Condition:** Bake 150°C, 500 hrs. System: HERAEUS **Electrical Test:** +25°C, +85°C System: LTX/RASCO	JESD22-A103	45 units per lot	Lot 1 0/85 Lot 2 0/86 Lot 3 0/88	Pass Pass Pass	
	Stress Condition: Bake 150°C, 1000 hrs. System: HERAEUS **Electrical Test:** +25°C, +85°C System: V93k/RASCO	JESD22-A103	44 units per lot	Lot 1 0/73 Lot 2 0/74 Lot 3 0/77	Pass Pass Pass	
Bond Strength: 0h data	0.8 mils Wire Pull (>4.0g) Bond Shear (>10.0g) Stitch Pull (>3g) System: Dage		5 same units for WP, BS, and SP per test	Lot 1 0/5 Lot 2 0/5 Lot 3 0/5	Pass Pass Pass	For each lot (Lot1, Lot2, Lot3): WP: 30 wires from 5 units BS: 30 wires from 5 units SP: 30 wires from 5 units
Solderability	Condition: Aging: 155C Bake, 4h Pot temperature: Pb free / 245C Dipping time: 5+/- 0.5 sec	J-STDF-002D	22 units, 1 lot	Lot 1 0/22	Pass	>95% lead coverage
Physical Dimension		JESD22-B100 and B108		3 Lots	Pass	

QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN #: CENO-14FNGT847

Date:
February 3, 2021

Qualification of palladium coated copper with gold flash (CuPdAu) as a new bond wire material for AT86RF233-ZU, AT86RF233-ZF, AT86RF233-ZUR and AT86RF233-ZFR catalog part numbers (CPN) available in 32L VQFN (5x5x0.9mm) at MMT assembly site.
This is a qualification by similarity (QBS) and an AECQ100 Grade 3 qualification.

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Package Qualification Report

Purpose: Qualification of palladium coated copper with gold flash (CuPdAu) as a new bond wire material for AT86RF233-ZU, AT86RF233-ZF, AT86RF233-ZUR and AT86RF233-ZFR catalog part numbers (CPN) available in 32L VQFN (5x5x0.9mm) at MMT assembly site. This is a qualification by similarity (QBS) and an AECQ100 Grade 3 qualification.

CCB No.: 4011 and 8013.001

Misc.	Assembly site	MMT
	BD Number	BDE-005892-01
	MP Code (MPC)	3611A75LXBX1
	Part Number (CPN)	PIC32CM5164LS60064-I/5LX
Lead-Frame	Paddle size	264x264
	Material	C194
	DAP Surface Prep	Bare Cu
	Treatment	BOT
	Process	Etched
	Lead-lock	No
	Part Number	10106409
	Lead Plating	Matte Tin
	Strip Size	250x70mm
	Strip Density	120
Bond Wire	Material	Au
Die Attach Bottom	Part Number	3280
	Conductive	Yes
Die Attach Top	Part Number	8006NS
	Conductive	No
MC	Part Number	G700LTD
PKG	PKG Type	QFN
	Pin/Ball Count	64L
	PKG width/size	9x9x0.9mm

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Package Qualification Report

Manufacturing Information

Wafer Lot No.	Assembly Lot No.
U8CD921090052.100 U08D920411264.121	MMT-211301998.000
U8CD921090052.100 U08D920411264.121	MMT-211400407.000
U8CD921090052.100 U08D920411264.121	MMT-211801393.000

Result ☑ Pass ☐ Fail ☐ _____

66102 / 58962 Stacked in VQFN 64 9x9 WF (5LX) package for AECQ100 grade 3 MSL1 assembled in MMT pass reliability test per QCI-39000 which was conducted at MPHL rel lab. This package is qualified Moisture/Reflow Sensitivity Classification Level 1 at 260°C reflow temperature per IPC/JEDEC J-STD-020E standard.

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS	Result	Remarks
Precondition Prior Perform Reliability Tests (At MSL Level 1)	**Electrical Test :25°C** Magnum	JESD22-A113, JIP/ IPC/JEDEC J-STD-020E	231 per lot	Lot 1 0/231 Lot 2 0/231 Lot 3 0/231	Pass Pass Pass	Good Devices
	Bake 150°C, 24 hrs System: HERAEUS		231 per lot			
	Moisture Soak 168h(85°C/85%RH) System: Climats Excal 5423-HE		231 per lot			
	Reflow 3x Convection-Reflow 265°C max System: Mancorp CR.5000F		231 per lot	Lot 1 0/231 Lot 2 0/231 Lot 3 0/231	Pass Pass Pass	
	Electrical Test :25°C Magnum SV 1024		231 per lot	Lot 1 0/231 Lot 2 0/231 Lot 3 0/231	Pass Pass Pass	

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
UNBIASED HAST	**Stress Condition:** (Standard) + 130°C, 85%RH, 96 hrs. System: HIRAYAMA HASTEST PC-422R8 **Electrical Test:** 25°C System: Magnum	JESD22-A118	77 units per lot	Lot 1 0/77 Lot 2 0/77 Lot 3 0/77	Pass Pass Pass	Parts had been pre-conditioned at 260°C
HAST	**Stress Condition:** (Standard) 130°C, 85%RH, 96 hrs. VOLTS=5.5V System: HIRAYAMA HASTEST PC-422R8 **Electrical Test:** 25°C /85°C System: Magnum	JESD22-A110	77 units per lot	Lot 1 0/77 Lot 2 0/77 Lot 3 0/77	Pass Pass Pass	

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS	Result	Remarks
Temp Cycle	**Stress Condition:** (Standard) -55°C to +125°C, 500 Cycles System : Votsch VTS²7012 **Electrical Test:** 85°C System: Magnum	JESD22-A104	77 units per lot	Lot 1 0/77 Lot 2 0/77 Lot 3 0/77	Pass Pass Pass	Parts had been pre-conditioned at 260°C
	Bond Strength: Wire Pull (> 1.75 grams) Bond *Shear (>12.6 grams)* System: Dage		5 units, 30 bonds per lot	Lot 1, 0/30 Lot 2, 0/30 Lot 3, 0/30	Pass Pass Pass	
High Temperature Storage Life	**Stress Condition:** Bake 150°C, 500 hrs System: HERAEUS **Electrical Test:** 25°C /85°C System: Magnum	JESD22-A103	45 units per lot	Lot 1 0/45 Lot 2 1/45 Lot 3 0/45	Pass Pass Pass	

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
Bond Strength, 0 Hour	**System:** Dage Wire Pull (> 1.75 grams) Bond *Shear (>12.6 grams)*		5 units, 30 bonds per lot	Lot 1 0/30 Lot 2 0/30 Lot 3 0/30	Pass Pass Pass	
Solderability	**Bake:** Temp 155°C,4Hrs System: Oven Solder Bath: Temp.245°C Solder material: SAC305 Visual Inspection: External Visual Inspection	J-STD-002D	22 units from 1 lot	0/22	Pass	

QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN #: CENO-14FNGT847

Date:
July 15, 2025

Qualification of palladium coated copper with gold flash (CuPdAu) as a new bond wire material for AT86RF233-ZU, AT86RF233-ZF, AT86RF233-ZUR and AT86RF233-ZFR catalog part numbers (CPN) available in 32L VQFN (5x5x0.9mm) at MMT assembly site.
This is a qualification by similarity (QBS) and an AEC-Q100 Grade 1 qualification.

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PACKAGE QUALIFICATION REPORT

Purpose	Qualification of palladium coated copper with gold flash (CuPdAu) as a new bond wire material for AT86RF233-ZU, AT86RF233-ZF, AT86RF233-ZUR and AT86RF233-ZFR catalog part numbers (CPN) available in 32L VQFN (5x5x0.9mm) at MMT assembly site. This is a qualification by similarity (QBS) and an AEC-Q100 Grade 1 qualification.
CCB No.	7263 and 8013.001
CN	E000257222
QUAL ID	R2500310 Rev. A
MP CODE	SG80445LXBXB
Part No.	PIC32CM5112GC00064-E/5LX
Bonding No.	BD-001666 Rev.03

Package

Type	64L VQFN WFS
Package size	9 x 9 mm

Lead Frame

Paddle size	264x264 mils
Material	C194
Surface	Bare Cu Paddle
Process	ETC
Lead Lock	No
Part Number	10106409
Treatment	BOT

Material

Epoxy	QMI519
Wire	Au
Mold Compound	G700LTD
Plating Composition	Matte Sn

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PACKAGE QUALIFICATION REPORT

Manufacturing Information

Assembly Lot No.	Wafer Lot No.	Date Code
MMT-254500745.000	GF07924355279.210	25060S0
MMT-254500746.000	GF07924355279.220	25060RV
MMT-254500747.000	GF07924355279.200	25060RS

Result [X] Pass [ ] Fail [ ] _____

64L VQFN WFS (9x9mm) assembled by MMT pass reliability test per QCI-39000. This package was qualified the Moisture/Reflow Sensitivity Classification Level 1 at 260°C reflow temperature per IPC/JEDEC J-STD-020E standard.

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS	Result	Remarks
<u>Precondition Prior Perform Reliability Tests</u> (At MSL Level 1)	**Electrical Test:** +25°C, 85°C, 125°C and -40°C System: D1X_GX1_UC	JESD22-A113	693(0)	0/693	Pass	Good Devices
	Bake 150°C, 24 hrs. System: CHINEE	JIP/ IPC/JEDEC J-STD-020E		693		
	85°C/85%RH Moisture Soak 168 hrs. System: TABAI ESPEC Model PR-3SPH			693		
	3x Convection-Reflow 265°C max System: Vitronics Soltec MR1243			693		
	Electrical Test: +25°C, 85°C and 125°C System: D1X_GX1_UC		693(0)	0/693	Pass	

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
Temp Cycle	**Stress Condition:** -55°C to +150°C, 1000 Cycles System: TABAI ESPEC TSA-70H	JESD22-A104		231		Parts had been pre-conditioned at 260°C
	Electrical Test: +25°C, 85°C and 125°C System: D1X_GX1_UC		231(0)	231/0	Pass	77 units / lot
	Bond Strength: Wire Pull (>3.00 grams)		15(0)	0/15	Pass	
UNBIASED-HAST	**Stress Condition:** +130°C/85%RH, 96 hrs. System: HAST 6000X	JESD22-A118		231		Parts had been pre-conditioned at 260°C
	Electrical Test: +25°C System: D1X_GX1_UC		231(0)	0/231	Pass	77 units / lot
HAST	**Stress Condition:** +130°C/85%RH, 96 hrs. **Bias Volt:** 3.6 Volts System: HAST 6000X	JESD22-A110		231		Parts had been pre-conditioned at 260°C
	Electrical Test: +25°C, 85°C and 125°C System: D1X_GX1_UC		231(0)	0/231	Pass	77 units / lot

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
High Temperature Storage Life	**Stress Condition:** Bake 175°C, 500 hrs. System: TPS Bake Oven **Electrical Test:** +25°C, 85°C and 125°C System: D1X_GX1_UC	JESD22-A103	 45(0)	45 0/45	 Pass	45 units
Solderability **Temp 245°C**	**Steam Aging:** Temp 93°C,8Hrs System: SAS-3000 **Solder Dipping:** Solder Temp.245°C **Solder material:** Pb Free Sn 95.5Ag3.9 Cu0.6 System: ERSA RA 2200D **Visual Inspection**: External Visual Inspection	J-STD-002	 22(0)	22 22 0/22	 Pass	
Physical **Dimensions**	Physical Dimension 10 units / 1 lot	JESD22-B100/B108	30(0) Units	0/30	Pass	
Bond Strength **Data Assembly**	Wire Pull (>3.00 grams) Bond Shear (>12.60 grams)	Mil. Std. 883-2011 CDF-AEC-Q100-001	30(0) Wires 30(0) Bonds	0/30 0/30	Pass Pass	