



**QUALIFICATION REPORT SUMMARY
RELIABILITY LABORATORY**

PCN#: KSRA-20BGKY389

**Date
January 14, 2020**

Qualification of MTAI as a new assembly site for selected Atmel products available in 48L TQFP (7x7x1.0mm) package using gold (Au) wire. The selected products available in 32L (7x7x1.0mm) TQFP package will qualify by similarity (QBS). This is a Q100 Grade 1 & 3 qualification.



MICROCHIP PACKAGE QUALIFICATION REPORT

Purpose: Qualification of MTAI as a new assembly site for selected Atmel products available in 48L TQFP (7x7x1.0mm) package using gold (Au) wire. The selected products available in 32L (7x7x1.0mm) TQFP package will qualify by similarity (QBS). This is a Q100 Grade 1 & 3 qualification.

<u>Misc.</u>	Assembly site	MTAI
	BD Number	BDE-005935-01
	MP Code (MPC)	59B20YY8XVA1
	Part Number (CPN)	ATMEGA4809-AFR-VAO
	MSL information	1
	Assembly Shipping Media (T/R, Tube/Tray)	T/R
	Base Quantity Multiple (BQM)	2500
	Qual ID	QTP3956 Rev. A
	CCB No.	4023, 4023.001, 4023.002
	<u>Lead-Frame</u>	Paddle size
Material		C7025
DAP Surface Prep		Cu
Treatment		BOT with Bare Cu on Paddle
Process		Stamping
Lead-lock		No
Part Number		10104805
Lead Plating		Matte Tin
Strip Size		70x x250
Strip Density		440
<u>Bond Wire</u>	Material	Au
	Wire Diameter	0.8
<u>Die Attach</u>	Part Number	3280
	Conductive	Yes
<u>MC</u>	Part Number	G700HA
<u>PKG</u>	PKG Type	TQFP
	Pin/Ball Count	48
	PKG width/size	7 x 7 mm
<u>Die</u>	Die Thickness	11 mils
	Die Size	2.614x2.794 mm
	Fab Process (site)	59.91K / UMC 8D



MICROCHIP PACKAGE QUALIFICATION REPORT

Manufacturing Information

Assembly Lot No.	QTY In	QTY Out	Assembly Yield
MTAI203002582.000	979	979	100.00%
MTAI203002653.000	980	980	100.00%
MTAI203002654.000	976	975	99.89%
Average Yield			99.96%

Result



Pass



Fail



59B20 ATMEGA4809 Family UMC using Au wire assembled in **MTAI** is qualified the Moisture/ Reflow Sensitivity Classification Level 1 at 260°C reflow temperature per IPC/JEDEC J-STD-020D standard. No delamination were observed on all the units.

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard / Method	Qty. (Acc.)	Def/SS	Result	Remarks
<u>Precondition</u> <u>Prior Perform</u> <u>Reliability</u> <u>Tests(At MSL</u> <u>Level 1)</u>	Electrical Test :+25°C System:	JESD22- A113 231 units of 3 Lots	693(0)	0/693	Pass	
	0hr CSAM	45 units of 3 Lots	135(0)	0/135	Pass	
	Bake 150°C, 24 hrs System:		693(0)			
	85°C/85%RH Moisture Soak 168 hrs. System: Climats Excal 5423-HE	IPC/JED EC J- STD- 020E	693(0)			
	3x Convection-Reflow 265°C max System: Mancorp CR.5000F		693(0)	0/693	Pass	
	Post CSAM	45 units of 3 Lots	135(0)	0/135	Pass	
	Electrical Test :+25°C System: Magnum PV		693(0)	0/693	Pass	

High Temperature Storage Life	Stress Condition: (Standard) Bake 175°C, 500 hrs System : VOTSCH VT 7012 S2	JESD22- A104 45 units of 3 Lots	135(0)			
	Electrical Test : +25°C , +85°C, +125°C System: Magnum PV		135(0)	0/135	Pass	

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard / Method	Qty. (Acc.)	Def/SS	Result	Remarks
<u>Temp Cycle</u> <u>Parts had been pre-conditioned at 260°C</u>	Stress Condition: (Standard) -65°C to +150°C, 500 Cycles System :	JESD22-A104 77 units of 3 Lots	231(0)			
	Electrical Test :+85°C, +125°C System: Magnum PV		231(0)	0/231	Pass	
	Bond Strength: Wire /Stitch Pull (Cpk ≥ 1.67) Bond Shear (Cpk≥1.67)			15(0)	0/15	Pass

<u>Biased HAST</u> <u>Parts had been pre-conditioned at 260°C</u>	Stress Condition: (Standard) +130°C/85%RH, 96hrs. Bias Volt: 5.5 Volts System :	JESD22-A104 77 units of 3 Lots	231(0)			
	Electrical Test : +25°C , +85°C, +125°C System: Magnum PV		231(0)	0/231	Pass	

<u>UnBiased HAST</u> <u>Parts had been pre-conditioned at 260°C</u>	Stress Condition: (Standard) +130°C/85%RH, 96hrs System :	JESD22-A104 77 units of 3 Lots	231(0)			
	Electrical Test :+25°C System: Magnum PV		231(0)	0/213	Pass	

Bond Strength Data Assembly	Wire /Stitch Pull (Cpk ≥1.67) :	M2011.8 MIL-STD-883 30 bonds from 5 units min	30(0)	0/30	Pass	Attachment 1
	Bond Shear (Cpk ≥1.67) :		30(0)	0/30	Pass	Attachment 1

Attachment 1: Bond Strength WBP/WSP/WBS (Assembly Data)

Lot No: MTAI203002582.000
Wire Size/Type: 0.8 mil/Au

Lot No: MTAI203002653.000
Wire Size/Type: 0.8 mil/Au

Lot No: MTAI203002654.000
Wire Size/Type: 0.8 mil/Au

Samples	Bond ability test			Ball size	BTK	BAR	Samples	Bond ability test			Ball size	BTK	BAR	Samples	Bond ability test			Ball size	BTK	BAR
	BST	WPT	SPT					BST	WPT	SPT					BST	WPT	SPT			
1	30.65	10.45	4.85	2.30	0.53	4.36	1	28.85	13.05	4.95	2.13	0.54	3.95	1	27.75	10.35	5.80	2.39	0.62	3.84
2	33.25	10.85	5.15	2.21	0.56	3.95	2	28.85	11.45	4.95	2.04	0.54	3.74	2	33.75	10.15	5.45	2.48	0.64	3.88
3	31.45	10.85	4.95	2.26	0.55	4.15	3	27.35	12.25	4.95	2.07	0.55	3.78	3	26.95	10.55	5.25	2.55	0.63	4.08
4	31.75	11.15	4.85	2.23	0.56	3.97	4	31.35	11.65	4.15	2.10	0.54	3.86	4	29.35	9.95	4.75	2.49	0.60	4.16
5	31.45	10.45	4.85	2.32	0.51	4.56	5	28.65	11.35	4.65	2.13	0.55	3.87	5	29.35	10.25	5.25	2.51	0.64	3.94
6	31.15	10.55	5.15	2.26	0.51	4.44	6	25.15	11.25	4.35	2.13	0.52	4.08	6	29.15	9.25	5.30	2.56	0.64	4.01
7	27.65	10.25	5.05	2.31	0.53	4.37	7	25.75	10.85	4.35	2.16	0.53	4.10	7	29.75	9.55	5.70	2.37	0.64	3.68
8	29.15	10.15	5.05	2.32	0.54	4.28	8	29.15	11.65	4.65	2.06	0.55	3.78	8	31.75	10.15	5.05	2.48	0.64	3.88
9	28.35	10.15	5.05	2.22	0.51	4.36	9	30.95	11.75	4.65	2.08	0.52	4.00	9	33.75	9.45	5.15	2.55	0.65	3.95
10	28.95	10.75	5.15	2.29	0.53	4.32	10	27.35	10.45	4.85	2.10	0.52	4.06	10	30.55	9.95	5.30	2.39	0.61	3.90
11	27.45	11.05	5.25	2.41	0.52	4.59	11	27.35	11.05	4.75	2.07	0.54	3.80	11	28.95	10.65	5.80	2.48	0.62	4.01
12	29.75	10.75	5.45	2.27	0.51	4.41	12	29.85	11.25	4.75	2.14	0.54	3.96	12	28.55	10.65	5.35	2.55	0.64	3.99
13	27.75	10.65	4.75	2.30	0.55	4.17	13	27.35	11.25	4.85	2.21	0.52	4.24	13	28.35	10.35	4.35	2.37	0.64	3.71
14	30.05	10.05	4.55	2.40	0.56	4.30	14	28.85	10.95	5.15	2.05	0.51	4.01	14	26.95	10.25	4.65	2.47	0.63	3.94
15	26.55	10.55	4.55	2.35	0.53	4.43	15	31.25	11.45	4.95	2.13	0.54	3.97	15	29.15	9.45	4.70	2.36	0.60	3.93
16	29.35	10.35	4.65	2.21	0.53	4.15	16	29.75	10.65	5.05	2.04	0.53	3.85	16	30.95	10.05	5.65	2.40	0.64	3.76
17	28.95	10.55	5.35	2.26	0.55	4.10	17	29.75	11.95	4.75	2.07	0.54	3.83	17	30.35	9.75	5.45	2.43	0.64	3.81
18	27.95	10.85	4.35	2.23	0.53	4.24	18	28.55	11.45	4.75	2.10	0.55	3.85	18	29.35	10.25	5.50	2.46	0.64	3.83
19	27.05	10.35	4.55	2.32	0.52	4.44	19	30.25	11.45	4.95	2.13	0.53	4.05	19	29.75	10.95	5.00	2.46	0.64	3.85
20	28.05	10.45	4.75	2.26	0.55	4.10	20	30.55	10.75	4.35	2.13	0.56	3.82	20	28.15	9.85	5.50	2.49	0.65	3.86
21	28.85	11.15	4.75	2.31	0.55	4.21	21	29.45	10.85	4.25	2.16	0.55	3.94	21	28.15	10.55	5.40	2.49	0.61	4.07
22	28.85	11.15	4.75	2.32	0.53	4.40	22	29.25	12.45	4.25	2.06	0.53	3.91	22	29.55	10.35	5.60	2.51	0.62	4.07
23	27.45	11.15	5.15	2.22	0.52	4.29	23	29.05	11.55	4.95	2.08	0.52	4.01	23	30.15	10.55	5.95	2.56	0.64	4.00
24	28.75	10.85	4.65	2.29	0.51	4.47	24	28.75	9.85	4.55	2.10	0.54	3.86	24	32.55	10.35	5.85	2.37	0.61	3.88
25	27.65	9.95	5.15	2.41	0.53	4.55	25	28.05	11.55	4.65	2.07	0.52	3.96	25	31.95	9.75	5.00	2.48	0.61	4.09
26	30.05	10.75	5.35	2.23	0.52	4.28	26	27.35	9.55	4.95	2.18	0.52	4.23	26	29.95	9.45	4.95	2.55	0.64	3.99
27	32.15	10.65	5.35	2.34	0.56	4.19	27	28.75	10.95	4.15	2.14	0.53	4.04	27	28.95	9.85	5.00	2.54	0.63	4.00
28	28.85	10.75	4.75	2.41	0.52	4.59	28	30.95	10.95	4.75	2.24	0.54	4.15	28	28.75	10.45	5.40	2.45	0.63	3.86
29	30.85	10.75	4.35	2.27	0.51	4.42	29	29.05	11.45	5.05	2.04	0.51	4.00	29	29.25	10.25	5.35	2.37	0.60	3.95
30	31.35	10.55	5.15	2.29	0.51	4.50	30	27.35	11.35	4.95	2.14	0.55	3.89	30	29.95	10.35	5.75	2.49	0.65	3.86
min	26.55	9.95	4.35	2.21	0.51	3.95	min	25.15	9.55	4.15	2.04	0.51	3.74	min	26.95	9.25	4.35	2.36	0.60	3.68
max	33.25	11.15	5.45	2.41	0.56	4.59	max	31.35	13.05	5.15	2.24	0.56	4.24	max	33.75	10.95	5.95	2.56	0.65	4.16
stdev	1.71	0.33	0.30	0.06	0.02	0.17	stdev	1.52	0.69	0.29	0.05	0.01	0.13	stdev	1.69	0.42	0.39	0.07	0.02	0.11
ave	29.38	10.63	4.92	2.29	0.53	4.32	ave	28.83	11.28	4.71	2.11	0.53	3.95	ave	29.73	10.12	5.31	2.47	0.63	3.93
Ppk	2.22	5.14	2.66	-	-	-	Ppk	2.38	2.79	2.55	-	-	-	Ppk	2.31	3.65	2.40	-	-	-

Attachment 2: Post TC 500cycles WBS and WBP

MTAI203002582.000

Reading Comment:		WBP Wire Bond Pull break force post TC_-65C-150C_500x			
Min	4.70	Break Code Summary			
Max	7.00	# of Break Code 1	29	# of Break Code 4	0
Average	5.60	# of Break Code 2	1	# of Break Code 5	0
Stdev	0.580	# of Break Code 3	0	# of Break Code 6	0
cpk _{L_Side}	2.21	Min > $\mu-3\sigma$	YES	# outliers	0
Reading Comment:		WBS Wire Ball Shear break force post TC_-65C-150C_500x			
Min	28.1	Break Code Summary			
Max	38.0	# of Break Code 1	0	# of Break Code 4	0
Average	34.1	# of Break Code 2	30	# of Break Code 5	0
Stdev	2.180	# of Break Code 3	0	# of Break Code 6	0
cpk _{L_Side}	3.29	Min > $\mu-3\sigma$	YES	# outliers	0

MTAI203002654.000

Reading Comment:		WBP Wire Bond Pull break force post TC_-65C-150C_500x			
Min	4.30	Break Code Summary			
Max	7.50	# of Break Code 1	28	# of Break Code 4	0
Average	5.50	# of Break Code 2	2	# of Break Code 5	0
Stdev	0.680	# of Break Code 3	0	# of Break Code 6	0
cpk _{L_Side}	1.84	Min > $\mu-3\sigma$	YES	# outliers	0
Reading Comment:		WBS Wire Ball Shear break force post TC_-65C-150C_500x			
Min	30.9	Break Code Summary			
Max	41.0	# of Break Code 1	0	# of Break Code 4	0
Average	35.2	# of Break Code 2	30	# of Break Code 5	0
Stdev	2.180	# of Break Code 3	0	# of Break Code 6	0
cpk _{L_Side}	3.45	Min > $\mu-3\sigma$	YES	# outliers	0

MTAI203002653.000

Reading Comment:		WBP Wire Bond Pull break force post TC_-65C-150C_500x			
Min	4.10	Break Code Summary			
Max	6.50	# of Break Code 1	29	# of Break Code 4	0
Average	5.50	# of Break Code 2	1	# of Break Code 5	0
Stdev	0.540	# of Break Code 3	0	# of Break Code 6	0
cpk _{L_Side}	2.31	Min > $\mu-3\sigma$	YES	# outliers	0
Reading Comment:		WBS Wire Ball Shear break force post TC_-65C-150C_500x			
Min	26.1	Break Code Summary			
Max	36.3	# of Break Code 1	0	# of Break Code 4	0
Average	32.5	# of Break Code 2	30	# of Break Code 5	0
Stdev	2.170	# of Break Code 3	0	# of Break Code 6	0
cpk _{L_Side}	3.05	Min > $\mu-3\sigma$	YES	# outliers	0