QUALIFICATION REPORT SUMMARY
RELIABILITY LABORATORY

PCN#: LIAL-07ZRUR500

Date
September 19,2018

Qualification of MTAI as an additional assembly site for selected Atmel ATTINYXX automotive products in 35.5K wafer technology available in 8L SOIJ package.

Package Qualification Report

Purpose: Qualification of MTAI as an additional assembly site for selected Atmel ATTINYXX automotive products in 35.5K wafer technology available in 8L SOIJ package.

Miscellaneous	**Assembly site**	MTAI
	BD Number	BDM-001676 rev. A
	MP Code (MPC)	355C4YC3XC01
	Part Number (CPN)	ATTiny45-15SZ
	CCB No.	3257.001
	Qual id	QTP3390
	Quad id revision	A
Lead-Frame	**Paddle size**	140x160 mils
	Material	CDA194
	Surface	Bare Cu paddle
	Treatment	Roughening
	Process	Stamped
	Lead-lock	No
	Part Number	10100840
	Lead Plating	Matte Tin
Bond Wire	**Material**	Au
Die Attach	**Part Number**	8390A
	Conductive	Yes
Mold Compound	**Part Number**	G600V
PKG	**PKG Type**	SOIJ
	Pin/Ball Count	8
	PKG width/size	208 mils
Die	**Die Thickness**	15 mils
	Die Size	90.0 x 88.0 mils
MSL		MSL1/260

MICROCHIP

Package Qualification Report

Manufacturing Information

Lot No.	WF lot No.	Date Code
MTAI184804030.000	MCSO518466665.110	1808A68
MTAI184802538.000	MCSO518466665.110	180827Y
MTAI184804035.000	MCSO518466665.110	1808BC6

Result [X] Pass [ ] Fail [ ] ____________________

Atmel 355C4 using 0.9 mil Au wire for 8L SOIJ at MTAI is qualified at Moisture/Reflow Sensitivity Classification Level 1 per IPC/JEDEC J-STD-020E standard. Red Spot observed on 1 unit at die attach paddle and inner lead but unit is electrically Passing.

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 , +130°C	JESD22-A113	810(0)	0/810		Good Devices
	0hr CSAM			0/135	Passed	
	Bake 150°C, 24 hrs System: HERAEUS		810			
	85°C/85%RH Moisture Soak 168 hrs. System: Climats Excal 5423-HE	IPC/JEDEC J-STD-020D	810			
	3x Convection-Reflow 260°C max System: Mancorp CR.5000F		810			
	Post CSAM			0/135	Passed	
	Electrical Test: +25°C, +130°C			0/810	Passed	

Temp Cycle	**Stress Condition:** (Standard) 65°C to +150°C, 500 Cycles System: VOTSCH VT 7012 S2	JESD22-A104	252			Parts had been pre-conditioned at 260°C
	Electrical Test: +25°C, + 130°C		252(0)	0/252	Passed	
	Bond Strength: Wire Pull (> 6.00 grams) Bond Shear (>22.00 grams)		15(0)	0/15	Passed	See attachment 1 Wire pull & bond shear after Temp Cycle

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, + 130°C	JESD22-A118	255 255(0)	0/255	Passed	Parts had been pre-conditioned at 260°C
HAST	**Stress Condition:** (Standard) +130°C/85%RH, 96 hrs. **Bias Volt:** 5.5 Volts System: HIRAYAMA HASTEST PC-422R8 **Electrical Test:** +25°C, + 130°C	JESD22-A110	255 255(0)	0/255	Passed	Parts had been pre-conditioned at 260°C

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, 504 hrs System: HERAEUS **Electrical Test :**+25°C ,+130°C	JESD22-A103	60 60(0)	0/60	Pass	60 units
Solderability Temp 245°C	**Bake:** Temp 155°C,4Hrs System:Oven Solder Bath: Temp.245°C Solder material: SnPb Visual Inspection: External Visual Inspection	J-STD-002	15 (0)	0/15	Pass	Performed at MPHIL
Physical Dimensions	Physical Dimension, 10 units from 3 lot	JESD22-B100/B108	32(0) Units	0/32	Pass	Attachment 3
Bond Strength Data Assembly	Wire Pull (> 6.00 grams)	M2011.8 MIL-STD-883	30(0) Wires Ppk>1.67	4.94	Pass	Attachment 2
Bond Strength Data Assembly	Bond Shear (>22.00 grams)	M2011.8 MIL-STD-883	30(0) bonds Ppk>1.67	2.04	Pass	Attachment 2

Attachment 1:
Thermal Cycles 500c BPT and BST

WBP/WBS Criteria:

WBP / WSP	
0	no reading
1	neck break
2	span break
3	ball bond fail
4	wedge bond fail/heel break
5	ball metal lift
6	wedge metal lift
7	die fracture
8	substrate fracture

WBS	
0	no reading
1	ball lift
2	ball shear
3	pad lift
4	cratering
5	wire shear
6	intermetallic
7	reweld
8	other

Lot: 184804030_BPT

Reading Comment:		WBP Wire Bond Pull break force post TC_-65-150C_500x					
Min	6.60	Break Code Summary					
Max	9.90	# of Break Code 1		28	# of Break Code 4		0
Average	8.40	# of Break Code 2		2	# of Break Code 5		0
Stdev	0.940	# of Break Code 3		0	# of Break Code 6		0
cpk_{L_Side}	2.36	Min > μ-3σ		YES		# outliers	0
Bond diameter	1	20.0	2	20.0	3	20.0	
Avg	[um]	20	[mil]	0.8	TC_-65-150C_500x		

Lot: 184804030_BST

Reading Comment:		WBS Wire Ball Shear break force post TC_-65-150C_500x					
Min	35.6	Break Code Summary					
Max	47.1	# of Break Code 1		0	# of Break Code 4		0
Average	39.7	# of Break Code 2		30	# of Break Code 5		0
Stdev	2.780	# of Break Code 3		0	# of Break Code 6		0
cpk_{L_Side}	3.25	Min > μ-3σ		YES		# outliers	0
Ball diameter	1	42.7	2	43.8	3	44.0	
Avg	[um]	43.5	[mil]	1.7	TC_-65-150C_500x		

Lot: 184802538_BPT

Reading Comment:		WBP Wire Bond Pull break force post TC_-65-150C_500x					
Min	6.30	Break Code Summary					
Max	10.00	# of Break Code 1		28	# of Break Code 4		0
Average	8.40	# of Break Code 2		2	# of Break Code 5		0
Stdev	0.890	# of Break Code 3		0	# of Break Code 6		0
cpk_{L_Side}	2.49	Min > μ-3σ		YES		# outliers	0
Bond diameter	1	20.0	2	20.0	3	20.0	
Avg	[um]	20	[mil]	0.8	TC_-65-150C_500x		

Lot: 184802538_BST

Reading Comment:		WBS Wire Ball Shear break force post TC_-65-150C_500x					
Min	34.4	Break Code Summary					
Max	48.2	# of Break Code 1		0	# of Break Code 4		0
Average	40.0	# of Break Code 2		30	# of Break Code 5		0
Stdev	4.140	# of Break Code 3		0	# of Break Code 6		0
cpk_{L_Side}	2.2	Min > μ-3σ		YES		# outliers	0
Ball diameter	1	42.7	2	43.8	3	44.0	
Avg	[um]	43.5	[mil]	1.7	TC_-65-150C_500x		

Lot: 184804035_BPT

Reading Comment:		WBP Wire Bond Pull break force post TC_-65-150C_500x					
Min	7.20	Break Code Summary					
Max	9.80	# of Break Code 1		30	# of Break Code 4		0
Average	8.50	# of Break Code 2		0	# of Break Code 5		0
Stdev	0.710	# of Break Code 3		0	# of Break Code 6		0
cpk_{L_Side}	3.17	Min > μ-3σ		YES		# outliers	0
Bond diameter	1	20.0	2	20.0	3	20.0	
Avg	[um]	20	[mil]	0.8	TC_-65-150C_500x		

Lot: 184804035_BST

Reading Comment:		WBS Wire Ball Shear break force post TC_-65-150C_500x					
Min	32.6	Break Code Summary					
Max	47.7	# of Break Code 1		0	# of Break Code 4		0
Average	39.7	# of Break Code 2		30	# of Break Code 5		0
Stdev	3.930	# of Break Code 3		0	# of Break Code 6		0
cpk_{L_Side}	2.3	Min > μ-3σ		YES		# outliers	0
Ball diameter	1	42.7	2	43.8	3	44.0	
Avg	[um]	43.5	[mil]	1.7	TC_-65-150C_500x		

Attachment 2

Wire Pull & Ball Shear Strength Assembly Data (8L SOIJ)

REL # QTP3390 CN# ES172326-24752

MPC: 355C4YC3XC01 WF# MCSO518466665.110

Sub group	Wire Pull Strength (Grams)						Sub group	Ball Shear Strength (Grams)					
	wire1	mode	wire2	mode	wire3	mode		Ball 1	mode	Ball 2	mode	Ball 3	mode
1	9.10	5	8.55	5	9.05	5	1	29.25	2	32.50	2	32.85	2
2	8.90	5	9.30	5	8.20	5	2	29.65	2	36.60	2	36.95	2
3	9.05	5	9.00	5	8.60	5	3	28.15	2	37.40	2	37.75	2
4	9.35	5	8.50	5	9.15	5	4	32.25	2	37.10	2	37.45	2
5	9.00	5	9.30	5	9.00	5	5	33.05	2	36.40	2	36.75	2
6	8.85	5	8.40	5	8.45	5	6	32.75	2	36.40	2	36.75	2
7	8.30	5	9.65	5	8.10	5	7	32.05	2	31.60	2	31.95	2
8	8.50	5	8.80	5	8.60	5	8	32.05	2	32.80	2	33.15	2
9	8.00	5	8.55	5	8.70	5	9	27.25	2	34.70	2	35.05	2
10	8.25	5	9.30	5	8.30	5	10	28.45	2	32.90	2	33.25	2
MIN.	8.00						**MIN.**	27.25					
MAX	9.65						**MAX**	37.75					
AVG.	8.76						**AVG.**	33.51					
STD.	0.42						**STD.**	3.03					
Ppk.	4.94						**Ppk.**	2.04					
SPEC	2.50						**SPEC**	15.00					

WIRE PULL FAILURE MODE CRITERIA

MODE 1 = LIFTED WELD <Reject>

MODE 2 = LIFTED BALL <Reject>

MODE 3 = BROKEN AT MID-SPAN

MODE 4 = BROKEN AT WELD

MODE 5 = BROKEN AT BALL-NECK

MODE 6 = CRATERING <Reject>

BALL SHEAR FAILURE MODE CRITERIA

MODE 1 = BALL LIFT <Reject>

MODE 2 = BALL SHEAR

MODE 3 = BALL PAD LIFT

MODE 4 = CRATERING <Reject>

Attachment 3

	Dimension	All Packages					SMD & Through Hole		SMD Only				
		Overall Length	Overall Width	Overall Height	Lead Width	Pitch	Molded Package Width	Molded Package Thickness	§ Standoff	Molded Package Length*	§ Lead Co-planarity	Side Flash/ Mold Flash	Foot Angle
		D	E	A	b	e	E1	A2	A1	D1	QCI-33003	JEDEC	φ
Spec.	USL	5.334	8.255	2.030	0.510	1.27BSC	5.359	1.980	0.250		0.100	0.250	8.000
	LSL	5.131	7.620	1.770	0.360		5.207	1.750	0.050				
MEASUREMENTS	1	5.221	8.002	1.999	0.466	1.268	5.288	1.835	0.164		0.010	0.111	4.570
	2	5.229	8.006	1.967	0.466	1.272	5.288	1.803	0.164		0.004	0.075	6.097
	3	5.231	8.025	1.960	0.467	1.268	5.274	1.805	0.155		0.005	0.061	3.971
	4	5.231	8.026	1.966	0.472	1.268	5.262	1.809	0.157		0.023	0.082	2.071
	5	5.215	8.013	1.993	0.464	1.269	5.268	1.843	0.150		0.003	0.072	3.994
	6	5.233	8.016	1.969	0.464	1.270	5.281	1.820	0.149		0.001	0.071	4.683
	7	5.241	8.011	1.954	0.463	1.268	5.276	1.795	0.159		0.002	0.066	2.207
	8	5.269	8.010	1.989	0.463	1.268	5.273	1.826	0.163		0.022	0.072	3.145
	9	5.223	8.011	1.952	0.464	1.269	5.289	1.798	0.154		0.012	0.063	2.632
	10	5.228	8.017	1.951	0.464	1.268	5.285	1.795	0.156		0.014	0.074	4.872
	11	5.237	8.014	1.958	0.463	1.272	5.287	1.797	0.161		0.012	0.062	3.953
	12	5.247	7.999	1.949	0.465	1.271	5.273	1.788	0.161		0.014	0.066	5.184
	13	5.219	8.012	1.984	0.464	1.271	5.285	1.834	0.150		0.013	0.073	1.431
	14	5.219	8.005	2.012	0.466	1.270	5.283	1.851	0.161		0.014	0.074	4.853
	15	5.237	7.999	1.959	0.466	1.267	5.295	1.796	0.163		0.011	0.069	2.138
	16	5.234	8.005	1.984	0.468	1.272	5.294	1.829	0.156		0.012	0.066	5.002
	17	5.223	8.006	1.989	0.465	1.268	5.284	1.823	0.167		0.015	0.068	4.097
	18	5.227	8.001	1.988	0.466	1.267	5.275	1.824	0.164		0.019	0.078	3.440
	19	5.239	8.022	1.980	0.473	1.271	5.260	1.823	0.157		0.014	0.062	2.734
	20	5.203	8.027	1.978	0.472	1.269	5.285	1.827	0.150		0.007	0.057	3.800
	21	5.223	8.012	1.952	0.464	1.270	5.271	1.802	0.150		0.019	0.066	2.587
	22	5.223	8.014	1.981	0.464	1.268	5.289	1.824	0.157		0.007	0.069	3.427
	23	5.235	8.019	1.951	0.471	1.269	5.276	1.800	0.151		0.015	0.073	2.939
	24	5.235	8.016	1.974	0.464	1.273	5.299	1.816	0.158		0.004	0.070	1.400
	25	5.230	8.021	1.967	0.472	1.272	5.291	1.814	0.154		0.023	0.059	2.797
	26	5.234	7.996	1.976	0.466	1.267	5.270	1.818	0.157		0.018	0.058	6.063
	27	5.235	7.999	2.002	0.466	1.270	5.268	1.847	0.154		0.014	0.067	7.050
	28	5.239	8.016	1.980	0.464	1.270	5.300	1.823	0.157		0.003	0.106	0.144
	29	5.249	8.009	2.015	0.467	1.272	5.271	1.862	0.153		0.007	0.056	3.044
	30	5.236	8.023	1.994	0.467	1.270	5.271	1.839	0.156		0.012	0.066	5.431
	31	5.229	8.023	1.981	0.467	1.269	5.261	1.831	0.150		0.011	0.072	1.503
	32	5.227	8.018	1.956	0.467	1.271	5.303	1.806	0.150		0.014	0.072	1.970
Calc.	MAX	5.27	8.03	2.02	0.47	1.27	5.30	1.86	0.17		0.02	0.11	7.05
	MIN	5.20	8.00	1.95	0.46	1.27	5.26	1.79	0.15		0.00	0.06	0.14
	Average	5.23	8.01	1.98	0.47	1.27	5.28	1.82	0.16		0.01	0.07	3.54
	Std. Dev.	0.01	0.01	0.02	0.00	0.00	0.01	0.02	0.01		0.006	0.01	1.58
	PASS/FAIL	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS		PASS	PASS	PASS

Note:

- * If molded package length is different from overall package length.
- BSC: Basic Dimension. Theoretically exact value shown without tolerances.
- REF: Reference Dimension, usually without tolerance, for information purposes only.