Product Change Notification / RMES-27BPWG940

Date:

10-Jun-2022

Product Category:

USB Hubs

PCN Type:

Manufacturing Change

Notification Subject:

CCB 4186 Final Notice: Qualification of MTAI as an additional assembly site for USB58xx and USB59xx device families available in 100L VQFN (12X12X0.9mm) package.

Affected CPNs:

RMES-27BPWG940_Affected_CPN_06102022.pdf
RMES-27BPWG940_Affected_CPN_06102022.csv

Notification Text:

PCN Status: Final notification

PCN Type: Manufacturing Change

Microchip Parts Affected: Please open one of the files found in the Affected CPNs section.

NOTE: For your convenience Microchip includes identical files in two formats (.pdf and .xls).

Description of Change: Qualification of MTAI as an additional assembly site for USB58xx and USB59xx device families available in 100L VQFN (12X12X0.9mm) package.

Pre and Post Change Summary:

	Pre Change	Post Change

Assembly Site	ASE Inc. (ASE)	ASE Group Chung-Li (ASCL)	ASE Inc. (ASE)	ASE Group Chung-Li (ASCL)	Microchip Technology Thailand (HQ) (MTAI)
Wire material	CuPdAu	CuPdAu	CuPdAu	CuPdAu	CuPdAu
Die attach material	EN-4900F	EN-4900G	EN-4900F	EN-4900G	3280
Molding compound material	G631H	G700LA	G631H	G700LA	G700LTD
Lead frame material	C194	C7025	C194	C7025	EFTEC64
Lead frame comparison	See attachment for pre and post change comparison				

Impacts to Data Sheet:

Yes. Refer to Package Outline Drawing (POD) comparison.

		ASE / ASCL			MTAI		
Feature	**Dimension**	**MIN**	**NOM**	**MAX**	**MIN**	**NOM**	**MAX**
Number of Pins	n		100			100	
Pitch	e		0.40 BSC			0.40 BSC	
Overall Height	A	0.80	0.85	0.90	0.80	0.90	1.00
Standoff	A1	0.00	0.020	0.05	0.00		0.05
Terminal Thickness	A3		0.203 REF		0.195	0.203	0.211
Overall Width	D		12.00 BSC		11.90	12.00	12.10
Exposed Pad Width	D2	7.90	8.00	8.10	7.90	8.00	8.10
Overall Length	E		12.00 BSC		11.90	12.00	12.10
Exposed Pad Length	E2	7.90	8.00	8.10	7.90	8.00	8.10
Terminal Width	b	0.15	0.20	0.25	0.15	0.20	0.25
Terminal Length	L	0.50	0.60	0.70	0.50	0.60	0.70
Terminal-to-Exposed Pad	K	1.30	-	'-		1.40 REF	

Change Impact: None

Reason for Change: To improve on-time delivery performance by qualifying MTAI as an additional assembly site.

Change Implementation Status: In Progress

Estimated First Ship Date: September 14, 2021 (date code: 2138)

NOTE: Please be advised that after the estimated first ship date customers may receive pre and post change parts.

Time Table Summary:

	July 2021					**August 2021**				**September 2021**				
Workweek	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Initial PCN Issue Date					X									

Qual Report Availability							X							
Final PCN Issue Date							X							
Estimated first ship date												X		

Method to Identify Change: Traceability code

Qualification Report: Please open the attachments included with this PCN labeled as PCN_#_Qual_Report.

Revision History:July 28, 2021: Issued initial notification.**August 12, 2021:** Issued final notification. Attached the qualification report and added estimated first ship date by September 14, 2021**September 22, 2021.** Re-issued final notification due to updated scope. Excluded the following CPNs in affected CPN list USB5807T-I/KD, USB5816CT/KDH02, USB5807CT/KDH01, USB5816CT/KD, USB5816CT/KDH02, USB5816CT/KD, USB5807CT/KDH01, USB5807CT/KD, USB5807C-I/KD, USB5807CT-I/KD, USB5906CT/KD, USB5906C/KD, USB5906CT/KD, USB7002-I/KDXVAC**June 10, 2022:** Re-issued final notification due to updated scope. Excluded CPNs of device family USB70xx on the affected CPN list. Updated notification subject and description.

The change described in this PCN does not alter Microchip's current regulatory compliance regarding the material content of the applicable products.

Attachments:

PCN_RMES-27BPWG940_Qual_Report.pdf
PCN_RMES-27BPWG940_Pre and Post Change_Summary.pdf

Please contact your local Microchip sales office with questions or concerns regarding this notification.

Terms and Conditions:

If you wish to receive Microchip PCNs via email please register for our PCN email service at our PCN home page select register then fill in the required fields. You will find instructions about registering for Microchips PCN email service in the PCN FAQ section.

If you wish to change your PCN profile, including opt out, please go to the PCN home page select login and sign into your myMicrochip account. Select a profile option from the left navigation bar and make the applicable selections.

CCB 4186
Pre and Post Change Summary
PCN#: RMES-27BPWG940

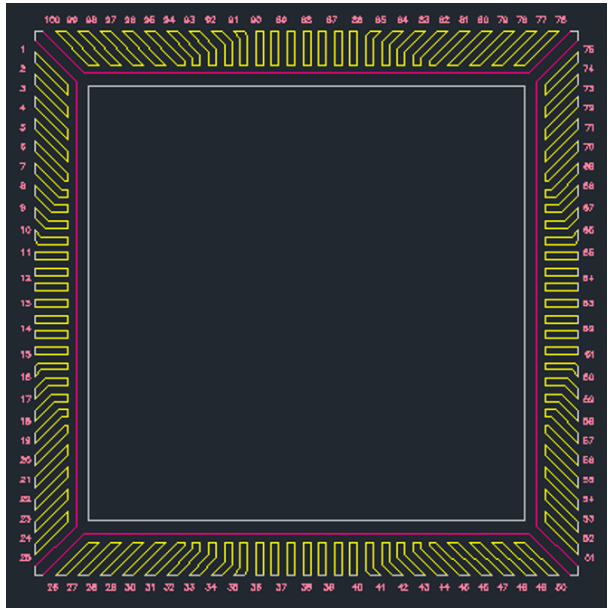
A Leading Provider of Smart, Connected and Secure Embedded Control Solutions

SMART | CONNECTED | SECURE

Qualification of MTAI as an additional assembly site for USB58xx, USB59xx and USB70xx device families available in 100L VQFN (12X12X0.9mm) package.

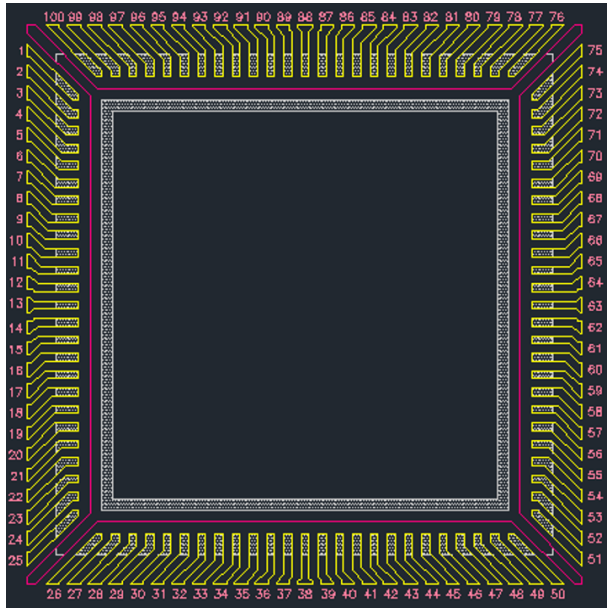
LeadFrame Comparison

ASE



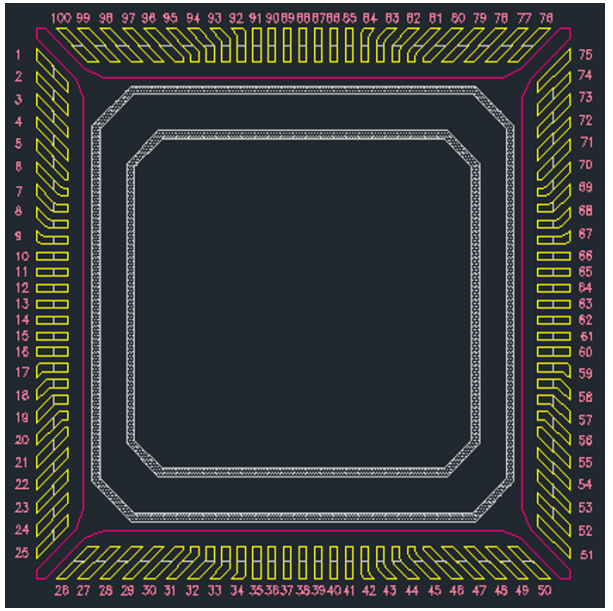
Leadframe material	C194
Lead-lock	No

ASCL



Leadframe material	C7025
Lead-lock	No

MTAI



Leadframe material	EFTEC64
Lead-lock	No

QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN#: RMES-27BPWG940

Date:
July 21, 2021

Qualification of MTAI as an additional assembly site for USB58xx, USB59xx and USB70xx device families available in 100L VQFN (12X12X0.9mm) package. This is Q006 Grade 3 qualification.

PACKAGE QUALIFICATION REPORT

Purpose	**Qualification of MTAI as an additional assembly site for USB58xx, USB59xx and USB70xx device families available in 100L VQFN (12X12X0.9mm) package. This is Q006 Grade 3 qualification.**
CN	ES355189
QUAL ID	R2100462 Rev. A
MP CODE	STB07SKDXCH3
Part No.	USB5807CT/KDH01
Bonding No.	BDM-002868 Rev. A
CCB No.	4186
Package	
Type	100L VQFN
Package size	12x12x0.9 mm
Die thickness	11 mils
Die size	143.5 x 156.5 mils
Lead Frame	
Paddle size	323 x 323 mils
Material	EFTEC 64T
Surface	Roughening
Process	Etched
Lead Lock	No
Part Number	10110011
Material	
Epoxy	3280
Wire	CuPdAu wire 0.7 mil
Mold Compound	G700LTD
Plating Composition	Matte Sn

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PACKAGE QUALIFICATION REPORT

Manufacturing Information:

Assembly Lot No.	Wafer No.	Date Code	QTY In	QTY Out	Assembly Yield
MTAI215204532.000	TC14921371923.100	2113CSV	699	699	100.00%
MTAI215204616.000	TC14921371923.100	2114Q48	701	700	99.86%
MTAI215204617.000	TC14921371923.100	2114Q7E	696	695	99.86%
			Average Yield		99.90%

Result [X] Pass [ ] Fail [ ] _____

100L VQFN (12x12x0.9 mm) assembled by MTAI pass reliability test per QCI-39000. This package was qualified the Moisture/Reflow Sensitivity Classification Level 3 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 3)	30°C/ 60%RH Moisture Soak 192 hrs. System: TABAI ESPEC Model PR-3SPH 3x Convection-Reflow 265°C max System: Vitronics Soltec MR1243 (IPC/JEDEC J-STD-020E)	IPC/JEDEC J-STD-020E	135	0/135	Pass	

<u>Precondition Prior Perform Reliability Tests</u> (At MSL Level 3)	**Electrical Test:** +25°C and 85°C System: LTX_D1X	JESD22-A113	693(0)	693		Good Devices
	Bake 150°C, 24 hrs System: CHINEE			693		
	30°C/60%RH Moisture Soak 192 hrs. System: TABAI ESPEC Model PR-3SPH			693		
	3x Convection-Reflow 265°C max			693		
	System: Vitronics Soltec MR1243					
	Electrical Test: +25°C and 85°C System: LTX_D1X			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 +125°C, 1000 Cycles System: TABAI ESPEC TSA-70H	JESD22-A104		231		Parts had been pre-conditioned at 260°C
	Electrical Test: +85°C System: LTX_D1X		231(0)	0/231	Pass	
	C-SAM Inspection Focus on die surface, Lead finger, and paddle System: HITACHI (FS200)		66 (0)	0 /66	Pass	22 units / lot attachment 11
	Decap Inspection (Information Only)		15 (0)	0/15	Pass	See attachment 1
	Bond Strength: Wire Pull (>2.5 grams) Bond Shear (>10.00 grams)		45 (0)	0/45	Pass	Wire pull & bond shear after Temp Cycle
	Cross section		3(0) Wires	0/3	Pass	1 Wire/ lot attachment 5
	Stress Condition: -55°C to +125°C, 2000 Cycles System: TABAI ESPEC TSA-70H			231		
	Electrical Test: +85°C System: LTX_D1X		231(0)	0/231	Pass	
	C-SAM Inspection Focus on die surface, Lead finger, and paddle System: HITACHI (FS200)		66 (0)	0 /66	Pass	22 units / lot attachment 12
	Decap Inspection (Information Only)		15 (0)	0/15	Pass	See attachment 2
	Bond Strength: Wire Pull (>2.5 grams) Bond Shear (>10.00 grams)		45 (0)	0/45	Pass	Wire pull & bond shear after Temp Cycle
	Cross section		3(0) Wires	0/3	Pass	1 Wire/ lot attachment 6

PACKAGE QUALIFICATION REPORT=

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
HAST	**Stress Condition:** +130°C/85%RH, 96 hrs. **Bias Volt:** 3.3 Volts, 1.2 Volts System: HAST 6000X	JESD22-A110		231		Parts had been pre-conditioned at 260°C
	Electrical Test: +25°C and 85°C System: LTX_D1X		231(0)	0/231	Pass	77 units / lot
	C-SAM Inspection Focus on die surface, Lead finger, and paddle System: HITACHI (FS200)		66 (0)	0 /66	Pass	22 units / lot attachment 13
	Decap Inspection (Information Only)		15 (0)	0/15	Pass	See attachment 3
	Bond Strength: Wire Pull (>2.5 grams) Bond Shear (>10.00 grams)		45 (0)	0/45	Pass	Wire pull & bond shear after HAST
	Cross section		3(0) Wires	0/3	Pass	1Wire/ lot attachment 7
	Stress Condition: +130°C/85%RH, 192 hrs. **Bias Volt:** 3.3 Volts, 1.2 Volts System: HAST 6000X			231		
	Electrical Test: +25°C and 85°C System: LTX_D1X		231(0)	0/231	Pass	
	C-SAM Inspection Focus on die surface, Lead finger, and paddle System: HITACHI (FS200)		66 (0)	0 /66	Pass	22 units / lot attachment 14
	Decap Inspection (Information Only)		15 (0)	0/15	Pass	See attachment 4
	Bond Strength: Wire Pull (>2.5 grams) Bond Shear (>10.00 grams)		45 (0)	0/45	Pass	Wire pull & bond shear after HAST
	Cross section		3(0) Wires	0/3	Pass	1 Wire/ lot attachment 8

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
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: LTX_D1X		231(0)	0/231	Pass	77 units / lot
	Decap Inspection (Information Only)		15(0) Units	0/15	Pass	5 units / lot
High Temperature Storage Life	**Stress Condition:** Bake 150°C, 500 hrs System: SHEL LAB	JESD22-A103		135		45 units / lot
	Electrical Test: +25°C and 85°C System: LTX_D1X		135(0)	0/135	Pass	
	Cross section		3(0) Wires	0/3	Pass	1 Wire/ lot attachment 9
	Stress Condition: Bake 150°C, 1000 hrs System: SHEL LAB			135		
	Electrical Test: +25°C and 85°C System: LTX_D1X		135(0)	0/135	Pass	
	Cross section		3(0) Wires	0/3	Pass	1 Wire/ lot attachment 10
Solderability **Temp 215°C**	**Steam Aging:** Temp 93°C,8Hrs System: SAS-3000 Solder Dipping: Solder Temp.215°C Solder material: SnPb Sn63, Pb37 System: ERSA RA 2200D Visual Inspection: External Visual Inspection	J-STD-002	22 (0)	22 22 0/22	Pass	
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	

PACKAGE QUALIFICATION REPORT

Test Number (Reference)	Test Condition	Standard/ Method	Qty. (Acc.)	Def/SS.	Result	Remarks
Physical Dimensions	Physical Dimension, 10 units from 1 lot	JESD22-B100/B108	30(0) Units	0/30	Pass	See attachment 17 Physical Dimension
Bond Strength Data Assembly	Wire Pull (> 2.5 grams)	Mil. Std. 883-2011	30 (0) Wires Cpk>1.67	0/30 Cpk=5.00	Pass	See attachment 15 Wire pull & bond shear data assembly
	Bond Shear (> 10.00 grams)	CDF-AEC-Q100-001	30 (0) bonds Cpk>1.67	0/30 Cpk=3.48	Pass	

Attachment 1

Wire Pull & Ball Shear After TC1000 Cycles (R2100462)

Sub group	Wire Pull Strength (Grams)						Sub group	Ball Shear Strength (Grams)					
	R2100462-01		R2100462-02		R2100462-03			R2100462-01		R2100462-02		R2100462-03	
	wire	mode	wire	mode	wire	mode		Ball	mode	Ball	mode	Ball	mode
1	5.58	5	5.33	5	5.73	5	**1**	15.53	2	16.03	2	16.39	2
2	5.83	5	5.32	5	5.37	5	**2**	15.77	2	17.11	2	15.70	2
3	6.22	5	5.86	5	5.96	5	**3**	18.34	2	17.57	2	15.52	2
4	5.65	5	6.13	5	5.71	5	**4**	16.97	2	13.06	2	18.00	2
5	6.37	5	6.25	5	5.91	5	**5**	17.19	2	17.53	2	16.75	2
6	5.38	5	5.91	5	6.19	5	**6**	15.97	2	16.70	2	16.97	2
7	5.71	5	5.67	5	6.82	5	**7**	15.73	2	14.60	2	15.43	2
8	5.95	5	5.98	5	6.22	5	**8**	15.24	2	17.29	2	17.46	2
9	5.72	5	6.04	5	5.54	5	**9**	16.88	2	17.03	2	15.07	2
10	5.63	5	5.38	5	5.83	5	**10**	15.20	2	17.95	2	17.80	2
11	5.52	5	5.79	5	5.14	5	**11**	14.75	2	15.55	2	15.52	2
12	5.83	5	5.63	5	5.20	5	**12**	18.03	2	17.02	2	18.50	2
13	5.77	5	6.36	5	4.50	5	**13**	17.19	2	15.74	2	16.20	2
14	5.76	5	6.83	5	5.66	5	**14**	17.11	2	16.99	2	16.81	2
15	6.09	5	6.19	5	6.61	5	**15**	15.17	2	17.19	2	17.23	2
MIN.	4.50						**MIN.**	13.06					
MAX	6.83						**MAX**	18.50					
AVG.	5.82						**AVG.**	16.48					
STD.	0.44						**STD.**	1.14					
SPEC	2.50						**SPEC**	10.00					

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 2

Wire Pull & Ball Shear After TC 2000 Cycles (R2100462)

Sub group	Wire Pull Strength (Grams)						Sub group	Ball Shear Strength (Grams)					
	R2100462-01		R2100462-02		R2100462-03			R2100462-01		R2100462-02		R2100462-03	
	wire	mode	wire	mode	wire	mode		Ball	mode	Ball	mode	Ball	mode
1	5.16	5	4.47	5	4.68	5	**1**	15.99	2	16.24	2	15.45	2
2	4.50	5	4.88	5	4.40	5	**2**	16.26	2	16.77	2	14.08	2
3	4.65	5	4.68	5	5.09	5	**3**	16.77	2	16.86	2	16.21	2
4	4.93	5	4.55	5	4.87	5	**4**	16.35	2	16.54	2	16.73	2
5	5.46	5	4.53	5	4.71	5	**5**	15.61	2	16.56	2	15.97	2
6	4.56	5	5.01	5	5.00	5	**6**	18.61	2	16.60	2	16.10	2
7	4.74	5	4.41	5	5.18	5	**7**	16.78	2	17.49	2	16.19	2
8	5.00	5	4.46	5	5.09	5	**8**	15.86	2	17.21	2	14.49	2
9	5.02	5	4.49	5	5.01	5	**9**	16.32	2	15.09	2	15.72	2
10	5.01	5	4.55	5	5.71	5	**10**	16.60	2	15.39	2	16.30	2
11	5.37	5	4.53	5	4.62	5	**11**	16.81	2	16.37	2	14.77	2
12	4.53	5	4.55	5	5.03	5	**12**	16.02	2	18.01	2	15.39	2
13	5.01	5	4.92	5	4.62	5	**13**	15.11	2	17.16	2	14.99	2
14	4.96	5	5.26	5	4.60	5	**14**	16.71	2	15.01	2	15.82	2
15	5.11	5	4.66	5	4.61	5	**15**	18.41	2	16.10	2	14.85	2
MIN.	4.40						**MIN.**	14.08					
MAX	5.71						**MAX**	18.61					
AVG.	4.83						**AVG.**	16.19					
STD.	0.31						**STD.**	0.95					
SPEC	2.50						**SPEC**	10.00					

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

Wire Pull & Ball Shear After HAST 96 hrs (R2100462)

Sub group	Wire Pull Strength (Grams)						Sub group	Ball Shear Strength (Grams)					
	R2100462-01		R2100462-02		R2100462-03			R2100462-01		R2100462-02		R2100462-03	
	wire	mode	wire	mode	wire	mode		Ball	mode	Ball	mode	Ball	mode
1	5.61	5	5.99	5	4.86	5	**1**	17.10	2	18.04	2	14.40	2
2	4.82	5	5.20	5	4.50	5	**2**	16.20	2	18.69	2	11.80	2
3	5.38	5	5.50	5	4.53	5	**3**	16.84	2	18.99	2	13.40	2
4	5.79	5	5.85	5	4.76	5	**4**	18.19	2	19.57	2	12.20	2
5	5.39	5	6.07	5	4.87	5	**5**	17.64	2	17.87	2	14.60	2
6	5.24	5	5.46	5	5.21	5	**6**	15.75	2	16.36	2	16.20	2
7	5.79	5	6.21	5	4.44	5	**7**	15.52	2	18.22	2	15.00	2
8	6.42	5	5.92	5	4.04	5	**8**	17.64	2	18.41	2	15.20	2
9	5.88	5	6.48	5	4..889	5	**9**	16.21	2	17.69	2	13.40	2
10	5.52	5	6.00	5	4.88	5	**10**	17.41	2	19.80	2	22.00	2
11	5.95	5	6.49	5	7.74	5	**11**	17.87	2	18.61	2	11.60	2
12	5.83	5	6.05	5	5.22	5	**12**	17.71	2	19.70	2	17.80	2
13	5.79	5	6.24	5	4.74	5	**13**	16.20	2	18.17	2	19.20	2
14	6.27	5	6.12	5	4.39	5	**14**	17.61	2	17.03	2	14.60	2
15	5.41	5	5.27	5	5.26	5	**15**	18.21	2	18.32	2	15.60	2
MIN.	4.04						**MIN.**	11.60					
MAX	7.74						**MAX**	22.00					
AVG.	5.53						**AVG.**	16.86					
STD.	0.71						**STD.**	2.21					
SPEC	2.50						**SPEC**	10.00					

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 4

Wire Pull & Ball Shear After HAST 192 hrs (R2100462)

Sub group	Wire Pull Strength (Grams)						Sub group	Ball Shear Strength (Grams)					
	R2100462-01		R2100462-02		R2100462-03			R2100462-01		R2100462-02		R2100462-03	
	wire	mode	wire	mode	wire	mode		Ball	mode	Ball	mode	Ball	mode
1	3.65	5	5.21	5	5.55	5	**1**	22.74	2	16.88	2	23.80	2
2	3.25	5	5.27	5	5.00	5	**2**	21.25	2	15.27	2	23.00	2
3	4.00	5	5.47	5	5.50	5	**3**	19.22	2	15.03	2	22.00	2
4	4.30	5	5.80	5	5.10	5	**4**	18.98	2	14.97	2	25.00	2
5	3.25	5	5.73	5	5.15	5	**5**	18.57	2	15.97	2	24.20	2
6	3.00	5	5.21	5	4.75	5	**6**	19.05	2	16.23	2	20.60	2
7	3.85	5	4.94	5	4.35	5	**7**	18.94	2	16.78	2	19.00	2
8	3.55	5	5.29	5	5.00	5	**8**	18.23	2	15.50	2	23.40	2
9	3.55	5	5.38	5	5.20	5	**9**	20.39	2	17.04	2	21.00	2
10	4.00	5	4.91	5	4.40	5	**10**	18.73	2	15.88	2	21.00	2
11	4.20	5	5.35	5	5.20	5	**11**	18.27	2	16.30	2	19.40	2
12	3.05	5	3.46	5	5.10	5	**12**	18.38	2	15.66	2	19.80	2
13	3.00	5	4.09	5	5.45	5	**13**	19.91	2	15.50	2	20.20	2
14	3.75	5	3.60	5	5.35	5	**14**	19.33	2	13.96	2	24.40	2
15	3.45	5	4.34	5	5.50	5	**15**	19.60	2	17.33	2	24.00	2
MIN.	3.00						**MIN.**	13.96					
MAX	5.80						**MAX**	25.00					
AVG.	4.54						**AVG.**	19.13					
STD.	0.86						**STD.**	2.93					
SPEC	2.50						**SPEC**	10.00					

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 5

Cross section Ball and Stitch After TC 1000 Cycles			
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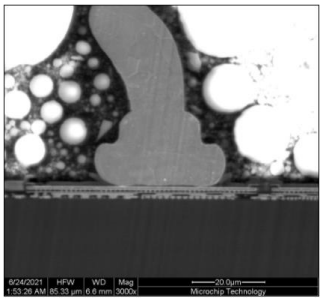
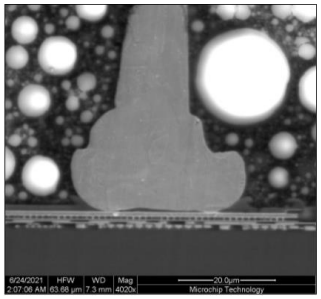
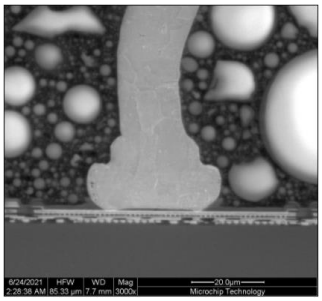
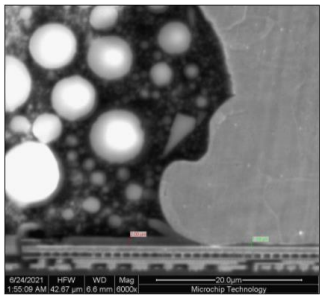
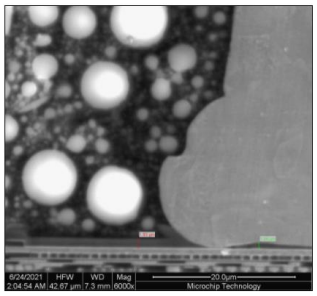
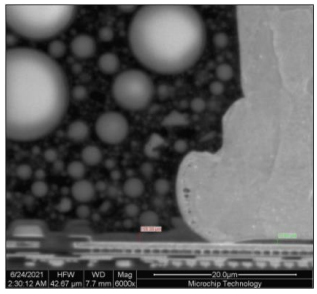
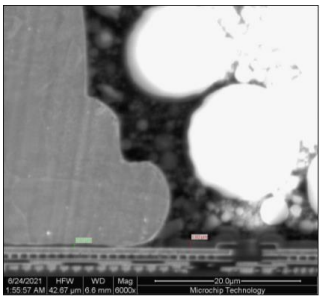
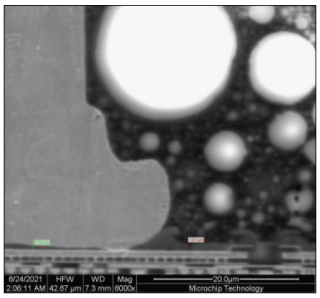
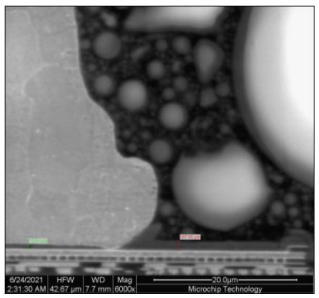
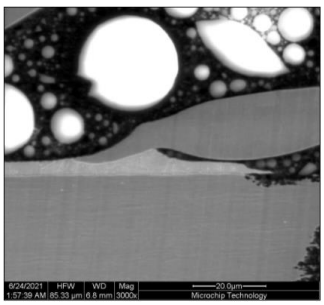
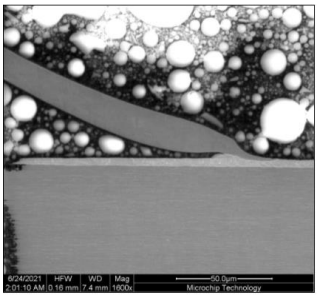
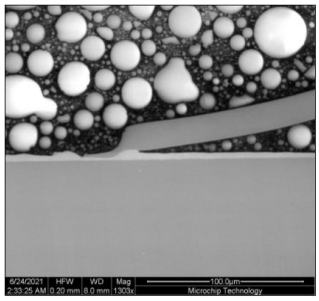
1			
2			
3			
4			
Result	Accepted	Accepted	Accepted

Attachment 6

Cross section Ball and Stitch After TC 2000 Cycles			
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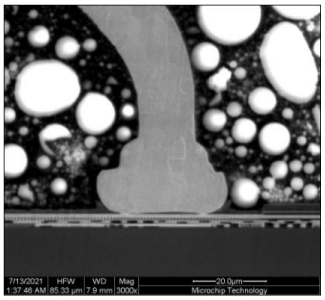
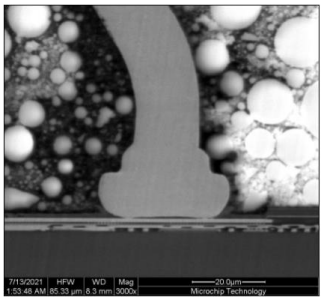
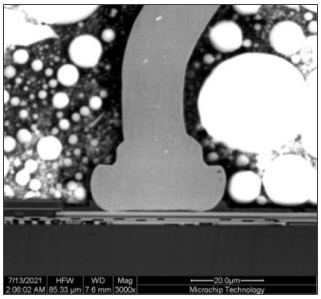
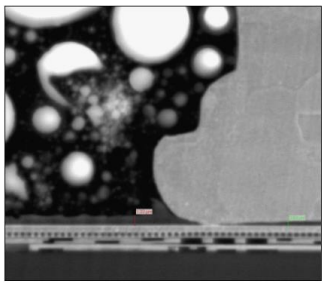
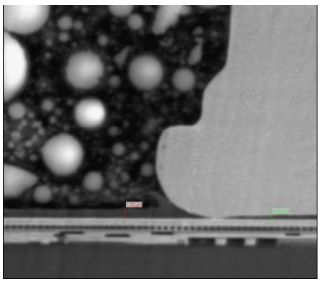
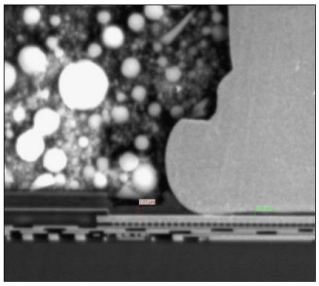
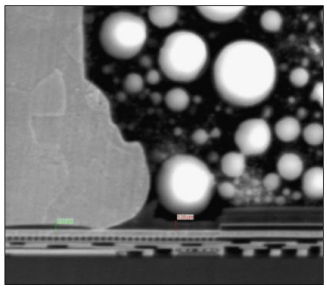
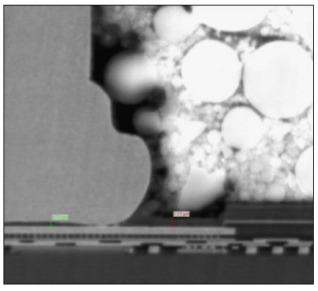
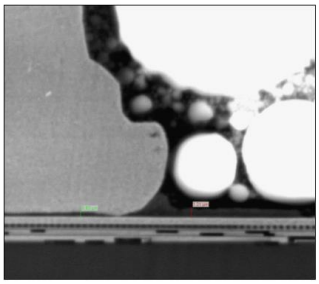
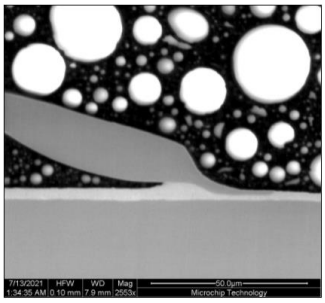
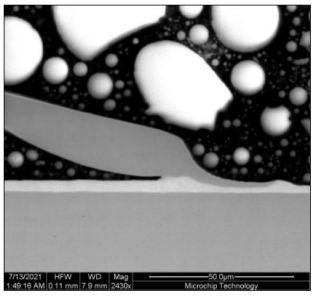
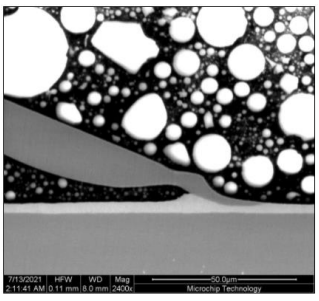
1			
2			
3			
4			
Result	Accepted	Accepted	Accepted

Attachment 7

Cross section Ball and Stitch After HAST 96 hrs.			
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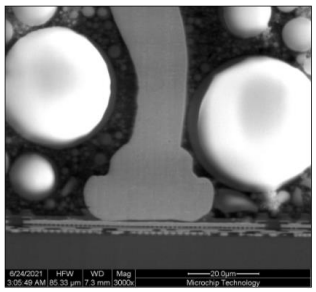
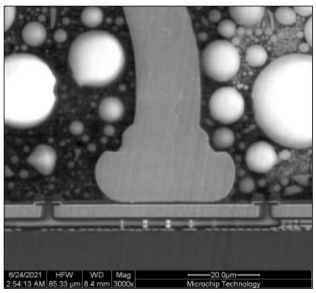
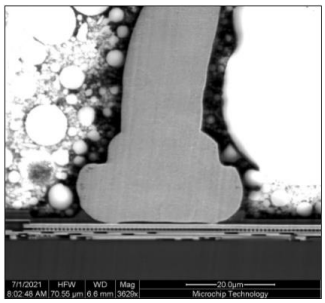
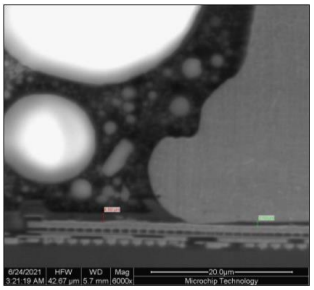
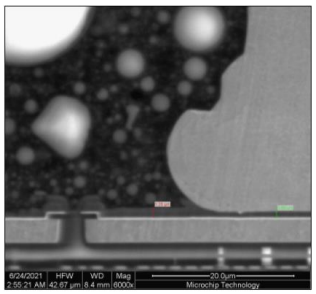
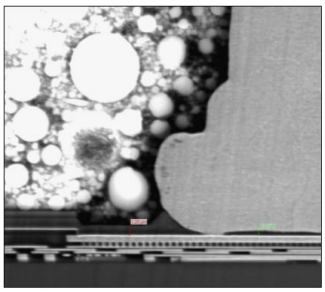
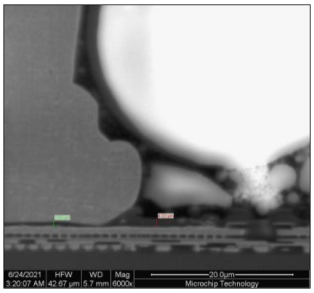
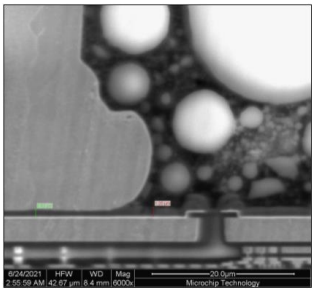
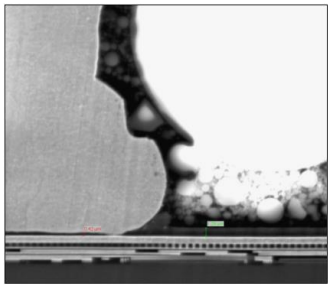
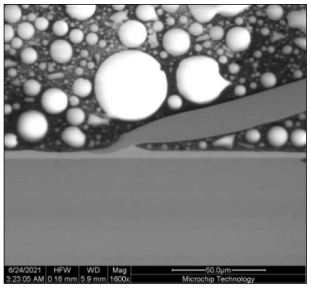
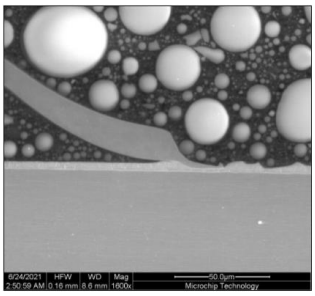
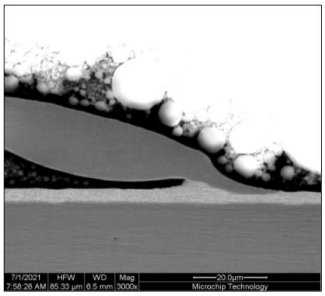
1			
2			
3			
4			
Result	Accepted	Accepted	Accepted

Attachment 8

Cross section Ball and Stitch After HAST 192 hrs.			
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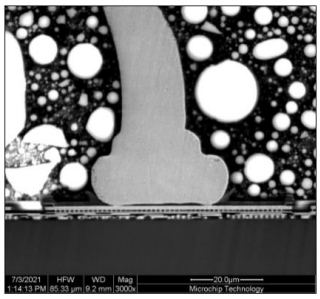
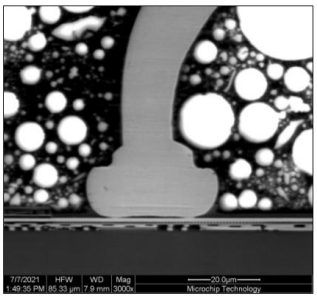
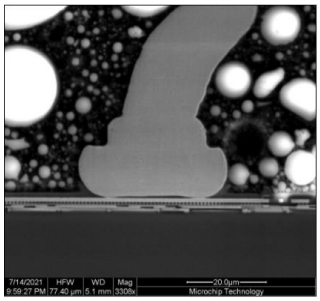
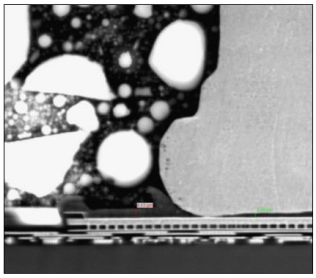
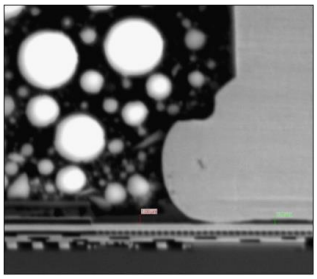
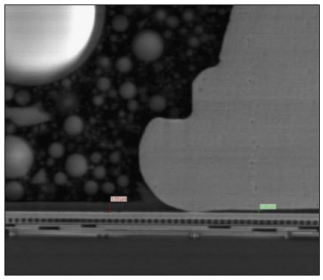
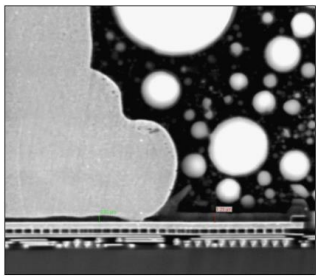
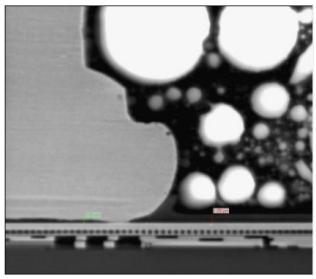
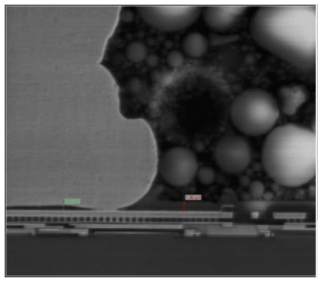
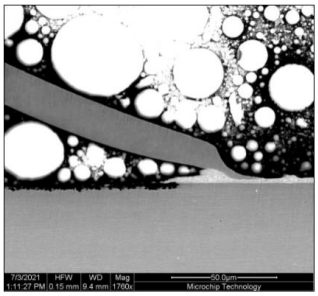
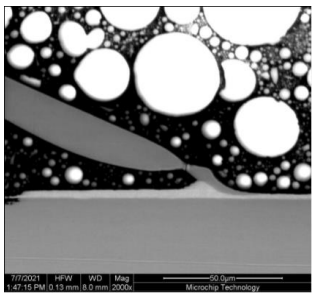
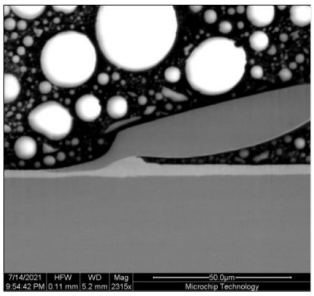
1			
2			
3			
4			
Result	Accepted	Accepted	Accepted

Attachment 9

Cross section Ball and Stitch After High Temperature Storage Life 500 hrs.			
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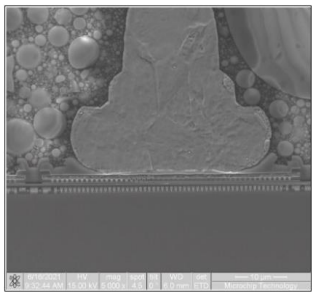
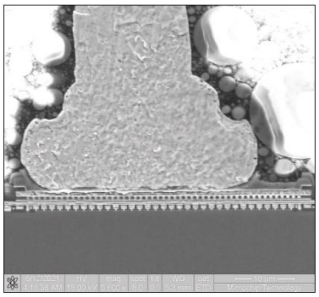
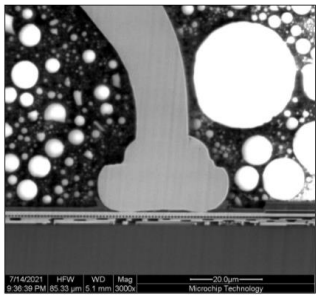
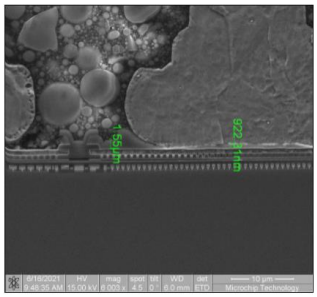
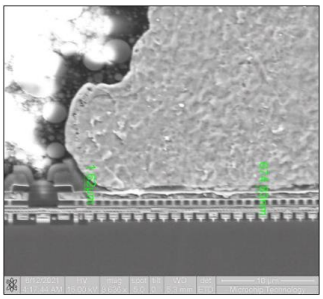
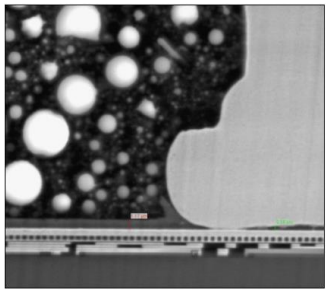
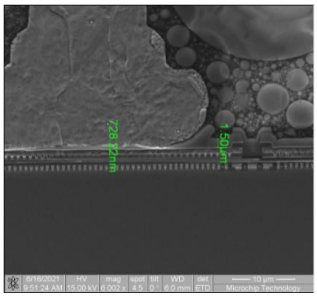
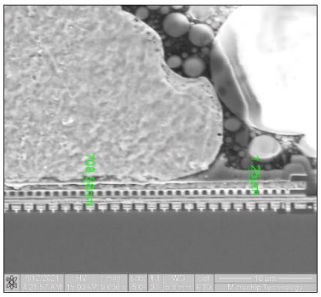
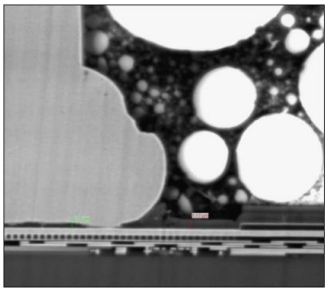
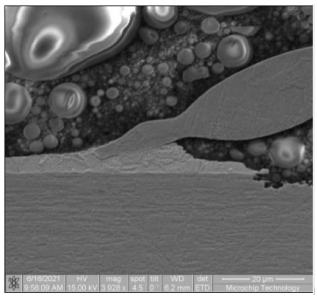
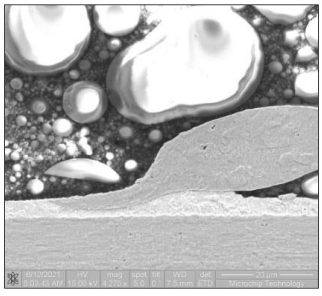
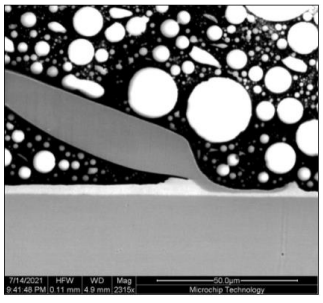
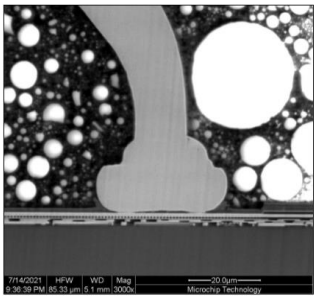
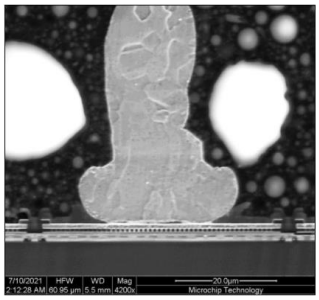
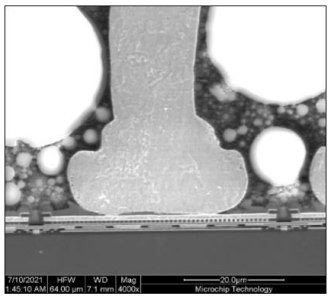
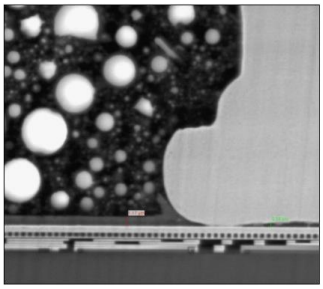
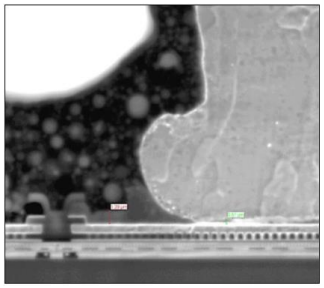
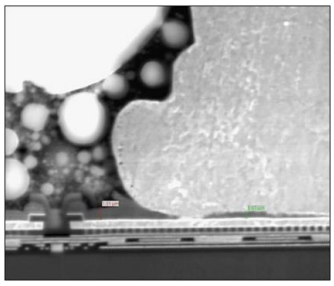
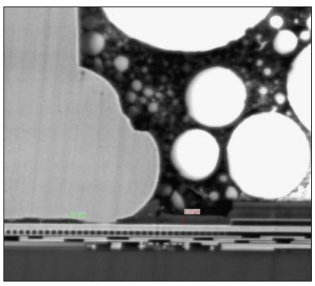
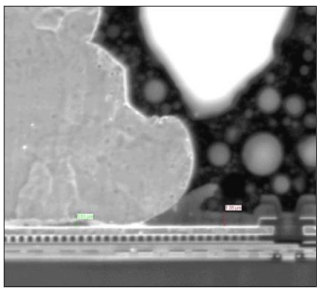
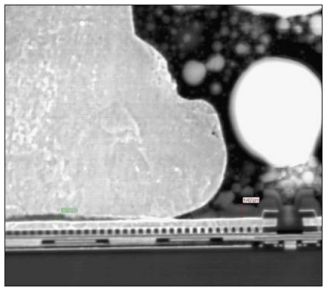
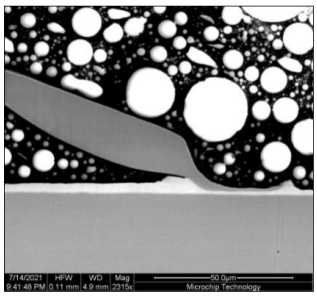
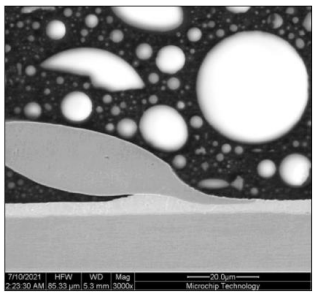
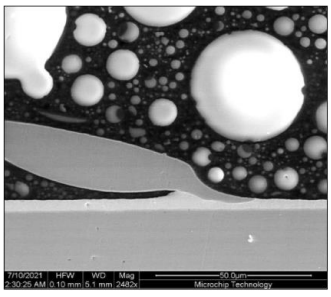
1			
2			
3			
4			
Result	Accepted	Accepted	Accepted

Attachment 10

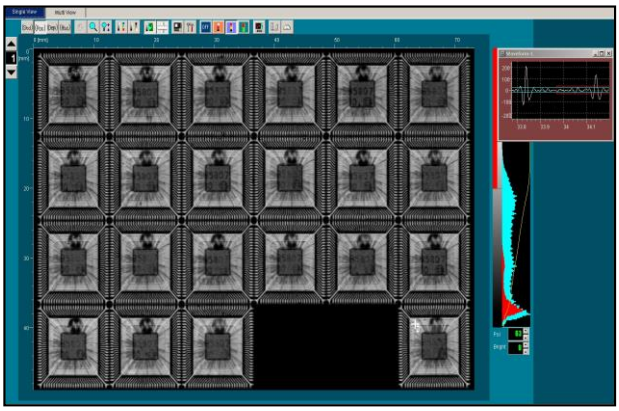
Cross section Ball and Stitch After High Temperature Storage Life 1000 hrs.			
Lot No.	R2100462-01 MTAI215204532.000	R2100462-02 MTAI215204616.000	R21100462-03 MTAI215204617.000
1			
2			
3			
4			
Result	Accepted	Accepted	Accepted

Attachment 11

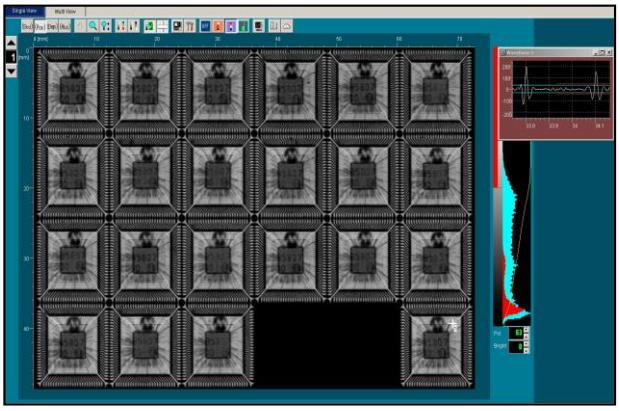
C-SAM INSPECTION AFTER TC 1000 CYCLE

LOT#1: MTAI215204532.000

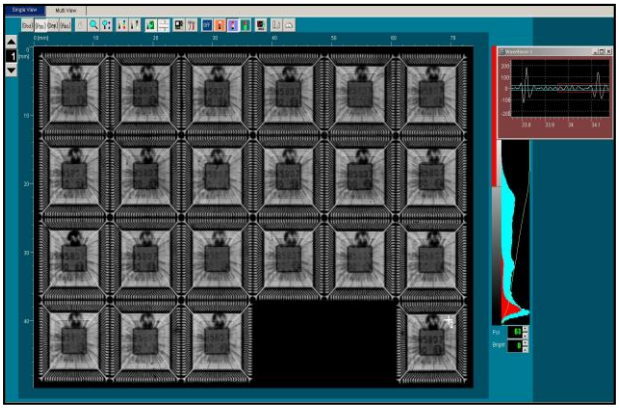
Top side



LOT#2: MTAI215204616.000



LOT#3: MTAI215204617.000

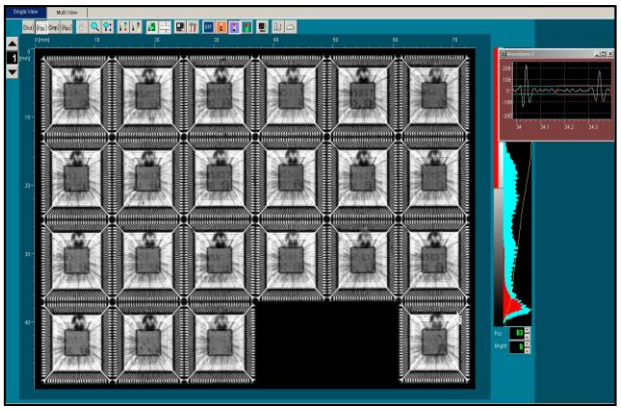


Attachment 12

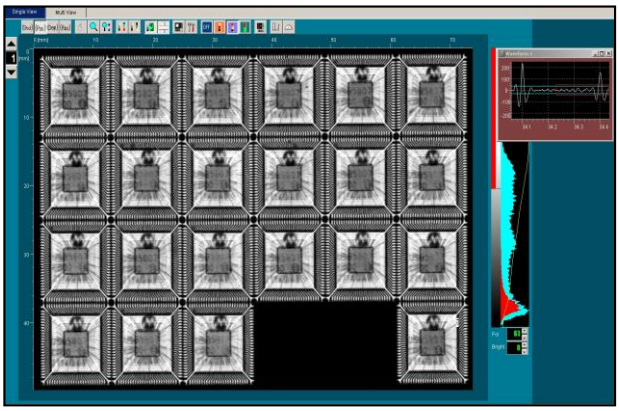
C-SAM INSPECTION AFTER TC 1000 CYCLE

LOT#1: MTAI215204532.000

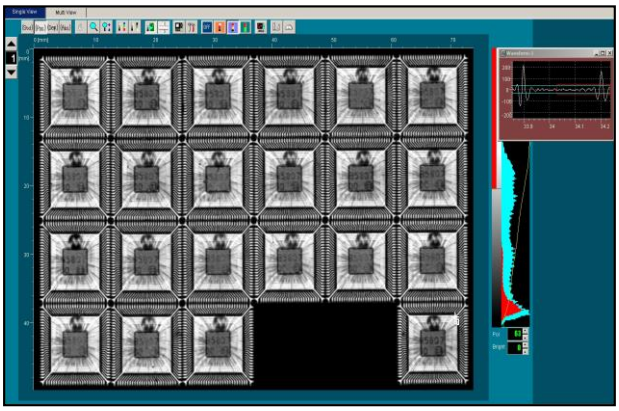
Top side



LOT#2: MTAI215204616.000



LOT#3: MTAI215204617.000

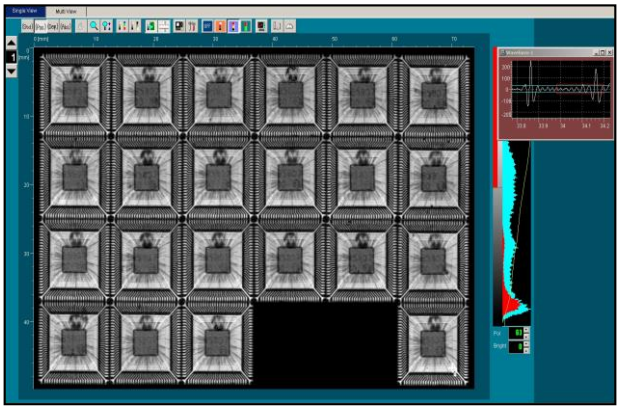


Attachment 13

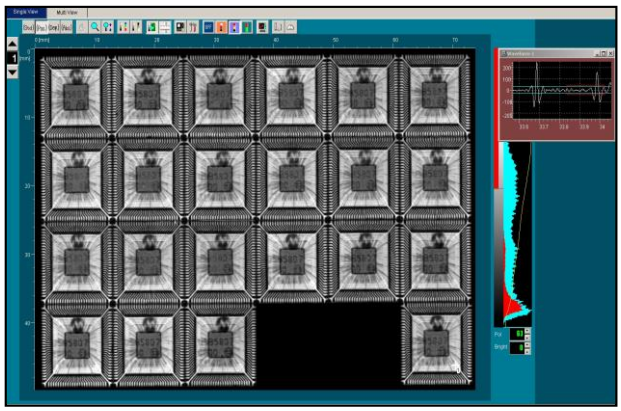
C-SAM INSPECTION AFTER HAST 96 hrs.

LOT#1: MTAI215204532.000

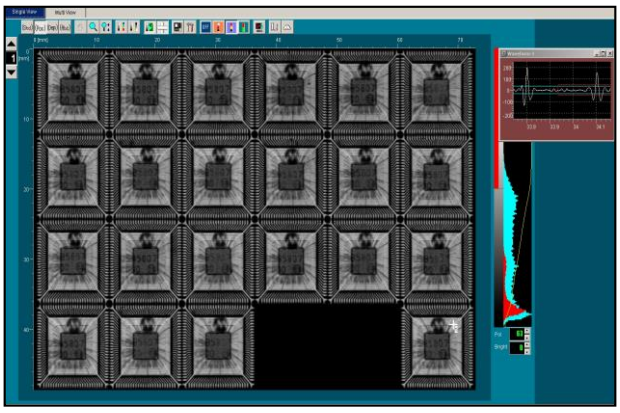
Top side



LOT#2: MTAI215204616.000



LOT#3: MTAI215204617.000

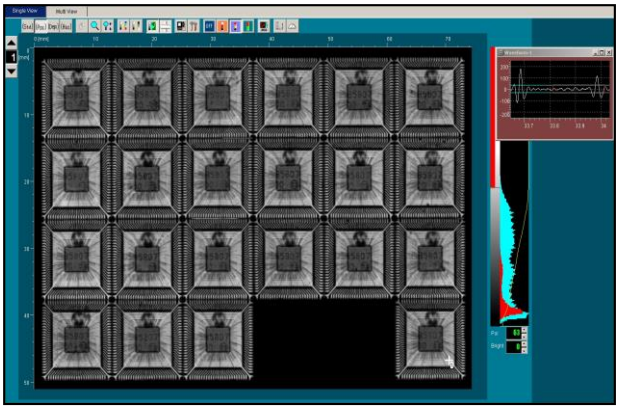


Attachment 14

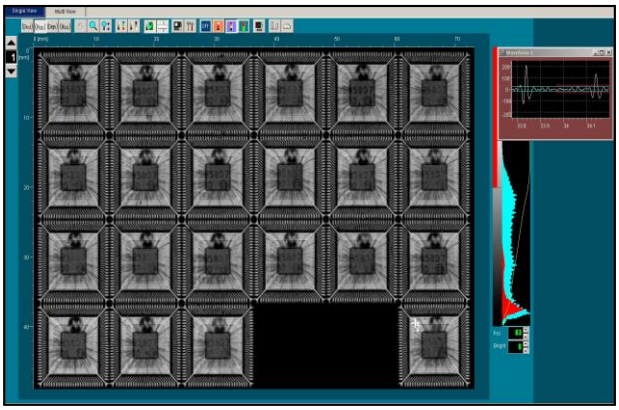
C-SAM INSPECTION AFTER HAST 192 hrs.

LOT#1: MTAI215204532.000

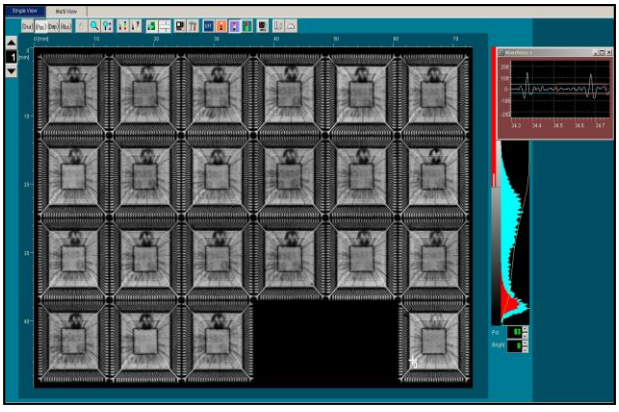
Top side



LOT#2: MTAI215204616.000



LOT#3: MTAI215204617.000



Attachment 15

Wire Pull & Ball Shear Strength Assembly Data (100L VQFN_12X12)

REL # R210462 CN# ES355189

MPC# STB07SKDXCH3 WF# TC14921371923.100

Sub	Wire Pull Strength (Grams)						Sub	Ball Shear Strength (Grams)					
group	wire	mode	wire	mode	wire	mode	group	Ball	mode	Ball	mode	Ball	mode
1	6.11	5	6.27	5	6.77	5	1	13.72	2	12.90	2	13.28	2
2	6.24	5	6.67	5	6.43	5	2	12.92	2	12.75	2	13.58	2
3	6.40	5	6.36	5	7.03	5	3	13.52	2	12.95	2	13.39	2
4	6.59	5	6.80	5	6.83	5	4	13.62	2	13.18	2	13.25	2
5	6.21	5	6.27	5	6.68	5	5	13.44	2	13.27	2	13.34	2
6	6.47	5	7.17	5	6.48	5	6	13.24	2	13.30	2	13.49	2
7	6.32	5	6.59	5	7.04	5	7	13.50	2	12.68	2	13.65	2
8	6.48	5	6.39	5	6.49	5	8	12.97	2	12.58	2	13.15	2
9	6.53	5	6.88	5	6.83	5	9	13.77	2	13.25	2	13.00	2
10	6.45	5	6.71	5	6.91	5	10	13.00	2	13.26	2	13.00	2
MIN.	6.11						**MIN.**	12.58					
MAX	7.17						**MAX**	13.77					
AVG.	6.58						**AVG.**	13.23					
STD.	0.27						**STD.**	0.31					
Ppk.	5.00						**Ppk.**	3.48					
SPEC	2.50						**SPEC**	10.00					

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 16

Ball Diameter			
	R2100462-01	R2100462-02	R2100462-03
Item	MTAI215204532.000	MTAI215204616.000	MTAI215204617.000
	Mils	Mils	Mils
1	1.35	1.34	1.35
2	1.34	1.35	1.35
3	1.35	1.35	1.36
4	1.37	1.35	1.34
5	1.36	1.35	1.35
6	1.36	1.35	1.35
7	1.37	1.36	1.36
8	1.34	1.36	1.35
9	1.35	1.36	1.34
10	1.34	1.36	1.34
		MIN	1.34
		MAX	1.37
		Average	1.35
		STD	0.01

Attachment 17

Physical Dimension of 100L VQFN , MTAI assembly (R2100462)

ITEM	§ Overall Length (Leadless)	§ Overall Width (Leadless)	Overall Height	Exposed Pad Length	Exposed Pad Width	Pitch	§ Standoff (SMD)	Terminal Length	Terminal Width	Terminal-to-Exposed Pad	Terminal Thickness
	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)	(mm.)
Spec LSL.	11.800	11.800	0.800	7.900	7.900	0.400 BSC	0.000	0.500	0.150	1.300	0.203 REF
Spec USL.	12.200	12.200	0.900	8.100	8.100		0.050	0.700	0.250		
1	11.980	11.991	0.890	8.003	8.004	0.400	0.016	0.604	0.235	1.391	0.228
2	11.983	11.990	0.879	8.002	7.999	0.400	0.021	0.605	0.235	1.394	0.236
3	11.980	11.988	0.885	8.006	8.006	0.400	0.015	0.612	0.237	1.386	0.242
4	11.967	11.985	0.885	8.004	8.003	0.400	0.019	0.601	0.231	1.392	0.236
5	11.983	11.987	0.894	8.005	8.000	0.400	0.020	0.605	0.232	1.393	0.225
6	11.978	11.984	0.888	8.006	8.005	0.400	0.015	0.605	0.233	1.389	0.233
7	11.982	11.991	0.893	8.001	8.001	0.400	0.016	0.605	0.234	1.393	0.229
8	11.982	11.986	0.890	8.005	8.009	0.400	0.017	0.609	0.234	1.387	0.234
9	11.980	11.987	0.889	8.004	8.005	0.400	0.017	0.606	0.235	1.390	0.242
10	11.979	11.987	0.875	8.003	8.002	0.400	0.014	0.603	0.232	1.393	0.241
11	11.981	11.993	0.893	8.004	8.001	0.400	0.014	0.605	0.234	1.394	0.238
12	11.984	11.986	0.884	8.007	8.008	0.400	0.014	0.607	0.233	1.389	0.235
13	11.977	11.990	0.876	8.004	8.002	0.400	0.016	0.604	0.235	1.392	0.229
14	11.979	11.981	0.886	8.005	8.003	0.400	0.017	0.601	0.237	1.395	0.239
15	11.977	11.991	0.887	8.001	8.000	0.400	0.017	0.604	0.234	1.393	0.231
16	11.977	11.983	0.890	8.004	8.004	0.400	0.014	0.603	0.232	1.390	0.243
17	11.981	11.987	0.878	8.007	8.009	0.400	0.016	0.605	0.235	1.390	0.236
18	11.981	11.985	0.878	8.005	8.001	0.400	0.012	0.604	0.236	1.391	0.241
19	11.970	11.981	0.882	8.004	8.003	0.400	0.014	0.598	0.233	1.393	0.240
20	11.983	11.991	0.871	8.006	8.001	0.400	0.019	0.607	0.234	1.392	0.235
21	11.977	11.989	0.879	8.005	8.007	0.400	0.015	0.603	0.234	1.394	0.232
22	11.980	11.991	0.880	8.003	8.005	0.400	0.018	0.603	0.233	1.392	0.241
23	11.982	11.990	0.894	7.993	8.002	0.400	0.016	0.603	0.234	1.395	0.233
24	11.980	11.988	0.892	8.003	8.006	0.400	0.016	0.604	0.235	1.392	0.235
25	11.980	11.989	0.887	8.006	8.009	0.400	0.017	0.607	0.238	1.387	0.232
26	11.982	11.984	0.893	8.004	8.004	0.400	0.018	0.604	0.233	1.391	0.240
27	11.976	11.993	0.893	8.003	8.002	0.400	0.015	0.604	0.233	1.392	0.242
28	11.969	11.983	0.891	8.004	8.003	0.400	0.011	0.600	0.235	1.392	0.239
29	11.976	11.983	0.879	8.005	8.003	0.400	0.015	0.601	0.233	1.392	0.230
30	11.980	11.988	0.891	8.003	8.004	0.400	0.017	0.604	0.234	1.392	0.235
MIN	11.967	11.981	0.871	7.993	7.999	0.400	0.011	0.598	0.231	1.386	0.225
MAX	11.984	11.993	0.894	8.007	8.009	0.400	0.021	0.612	0.238	1.395	0.243
Average	11.979	11.987	0.886	8.004	8.004	0.400	0.016	0.604	0.234	1.392	0.236
STD	0.004	0.003	0.007	0.003	0.003	0.000	0.002	0.003	0.002	0.002	0.005

Affected Catalog Part Numbers (CPN)

USB5807/KD
USB5806/KD
USB5816/KD
USB5906/KD
USB5916/KD
USB5926/KD
USB5826/KD
USB5807C/KD
USB5806C/KD
USB5816C/KD
USB5826C/KD
USB5916C/KD
USB5926C/KD
USB5816C/KDH01
USB5816C/KDH02
USB5807C/KDH01
USB5807-I/KD
USB5806-I/KD
USB5816-I/KD
USB5906-I/KD
USB5916-I/KD
USB5926-I/KD
USB5826-I/KD
USB5806C-I/KD
USB5816C-I/KD
USB5826C-I/KD
USB5906C-I/KD
USB5916C-I/KD
USB5926C-I/KD
USB5816C-I/KDH02
USB5807C-I/KDH01
USB5807T/KD
USB5806T/KD
USB5816T/KD
USB5906T/KD
USB5916T/KD
USB5926T/KD
USB5826T/KD
USB5806CT/KD
USB5826CT/KD
USB5916CT/KD
USB5926CT/KD
USB5806CT/KDD01
USB5816CT/KDH01
USB5806T-I/KD
USB5816T-I/KD

USB5906T-I/KD

USB5916T-I/KD

USB5926T-I/KD

USB5826T-I/KD

USB5806CT-I/KD

USB5816CT-I/KD

USB5826CT-I/KD

USB5906CT-I/KD

USB5916CT-I/KD

USB5926CT-I/KD

USB5816CT-I/KDH02

USB5807CT-I/KDH01