Product Change Notification / GBNG-07QSVE687

Date:

12-Oct-2021

Product Category:

8-bit Microcontrollers, Crypto Authentication, Crypto RF, Trusted Platform Module, USB Port Power Controller

PCN Type:

Manufacturing Change

Notification Subject:

CCB 4869 Final Notice: Implement Edge Protection Technology (EPT) for selected products available in 28L (5x5x0.9mm), 36L (6x6x1mm), 40L (6x6x1mm) and 64L (9X9X1.0mm) VQFN packages at ANAP and ATP7 assembly sites.

Affected CPNs:

GBNG-07QSVE687_Affected_CPN_10122021.pdf
GBNG-07QSVE687_Affected_CPN_10122021.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:

Implement Edge Protection Technology (EPT) for selected products available in 28L (5x5x0.9mm), 36L (6x6x1mm), 40L (6x6x1mm) and 64L (9X9X1.0mm) VQFN packages at ANAP and ATP7 assembly sites.

Pre and Post Change Summary:

	Pre Change				Post Change			
Assembly Site	Amkor Technology Philippine (P1/P2), INC. (ANAP)			Amkor Technology Philippines (P3/P4), INC. (ATP7)	Amkor Technology Philippine (P1/P2), INC. (ANAP)			Amkor Technology Philippines (P3/P4), INC. (ATP7)
Wire material	Au			Au	Au			Au
Die attach material	8290	8900NC	CRM-1085A	CRM-1085A	8290	8900NC	CRM-1085A	CRM-1085A
Molding compound material	G700				G700			
Package Outline/Appearance	Non-Edge Protection Technology				With Edge Protection Technology			
	See Pre and Post Change summary							

Impacts to Data Sheet:

Yes. POD drawing.

Change Impact:

None

Reason for Change:

To improve manufacturability by implementing Edge Protection Technology (EPT).

Change Implementation Status:

In Progress

Estimated First Ship Date:

February 28, 2022 (date code: 2210)

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

Time Table Summary:

	October 2021					→	February 2022				
Workweek	41	42	43	44	45		06	06	08	09	10
Qual Report Availability		X									
Final PCN Issue Date		X									
Estimated Implementation 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:
October 12, 2021: Issued final notification.

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

Attachments:

PCN_GBNG-07QSVE687_Qual_Report.pdf
PCN_GBNG-07QSVE687_Pre and Post Change_Summary.pdf

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

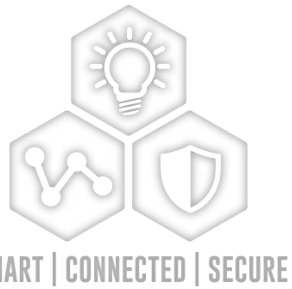
Terms and Conditions:

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 4869
Pre and Post Change Summary
PCN #: GBNG-07QSVE687

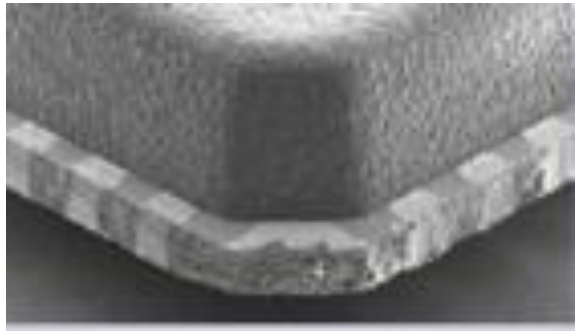
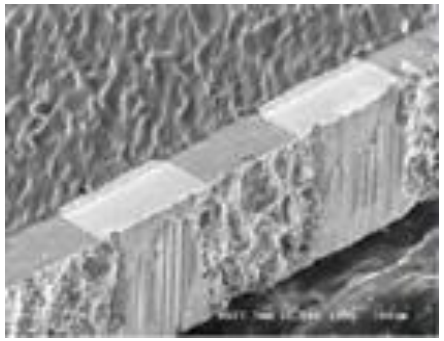
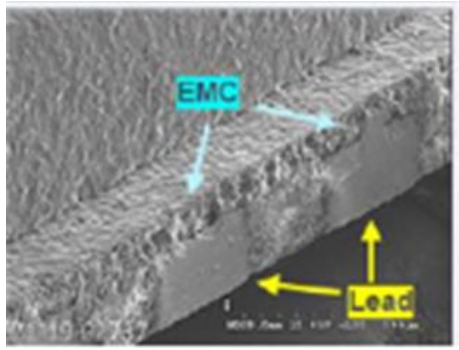
A Leading Provider of Smart, Connected and Secure Embedded Control Solutions



Pre and Post Change

Edge Protection Technology (EPT):

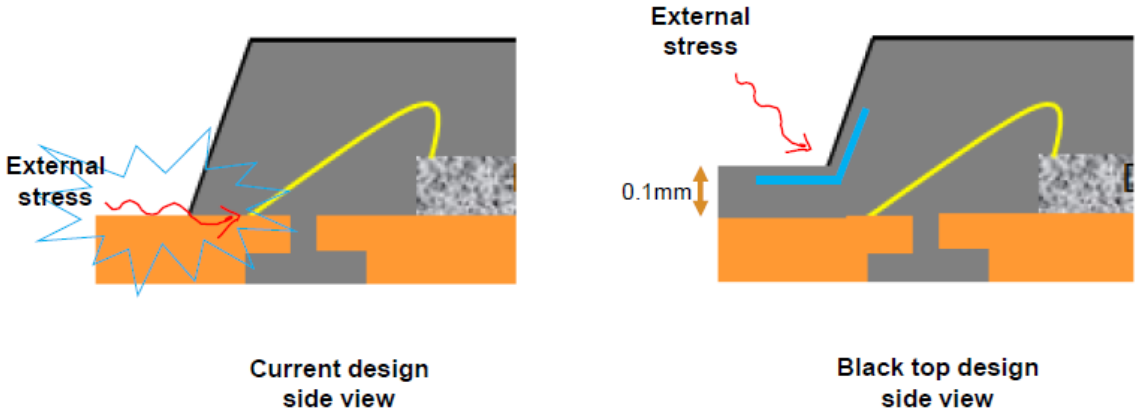
- It extends the mold cap to cover the top exposed lead area of the package which provides more robustness on the flange area.
- PKG Gap/Crack prevention
- Top lead solder bridging prevention

	Pre Change (Without Edge Protection	Post Change (With Edge Protection
Top corner view		
Top edge view		

Background

Edge Protection Technology (EPT) mechanism

- **With current standard design of Punch QFN, external stress which exceeds pkg flange strength between lead frame and molding compound will penetrate toward stitch bond resulting in stitch broken.**
- **Edge protection design has additional mold cap with 100um on flange area. Additional mold cap will increase pkg strength against fracture which can protect stitch bond from external stress from Assy to board mounting process**



Current design
side view

Black top design
side view

Background

Assembly BOM/Parameter Comparison (Punch QFN Non EPT vs EPT)

- **Change on Mold and Singulation tooling only. No change on BOM and parameters.**
- **Package appearance is slightly changed but no change on overall package outline.**

Item	Sub Item	Pre Change (Non-EPT)	Post Change (EPT)	Remarks
BOM	Leadframe/Substrate	Per Device	Per Device	Same, No change
	Die Attach	Per Device	Per Device	Same, No change
	Wire Type & Size	Per Device	Per Device	Same, No change
	Mold Compound	Per Device	Per Device	Same, No change
Parameter / Tooling	Mold Tooling	Standard	**EPT Cavity Bars**	**Change, Low risk**
	Mold/Post-Mold Parameter	Per Device	Per Device	Same, No change
	Singulation Tooling	Standard	**EPT Bottom die set**	**Change, Low risk**
POD	Package Outline/Appearance	See next slide	See next Slide	**Change in visual appearance but no change in critical dimensions. POD dwg update needed**
Package Code	MCHP Pkg Code	See next slide	See next Slide	**Some package will change Package Code due to update on POD**
Packing Media	Tray/Reel	Per Device	Per Device	Same, No change

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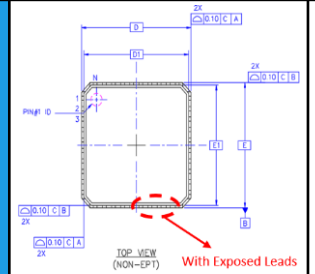
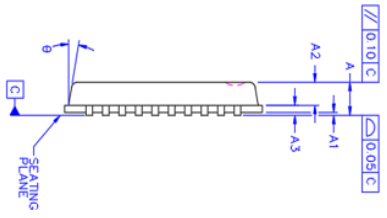
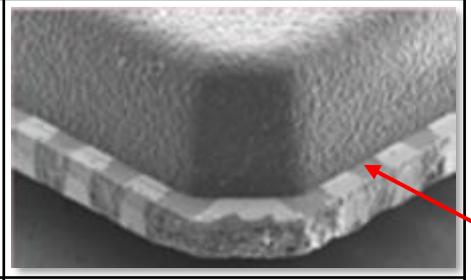
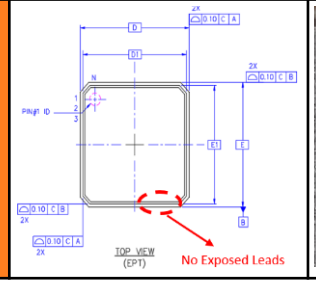
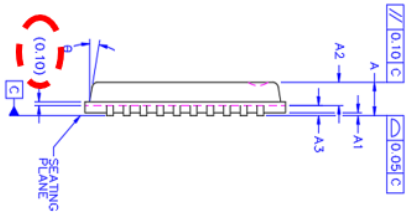
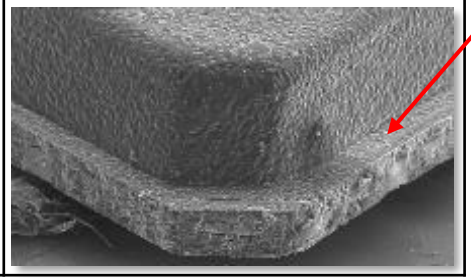
Punch QFN EPT vs Non-EPT POD comparison

- Lead Pitch, Width, E-Pad size – NO CHANGE due to no change in LeadFrame.
- Overall PKG dimension (D/E) – NO CHANGE. D1/E1 nominal dimension reduced by 0.04mm – see below table.
- MCHP POD update/rev-up to include package option for EPT Design.

	Top View POD	Actual	Side View POD	Actual
Non-EPT				
EPT				

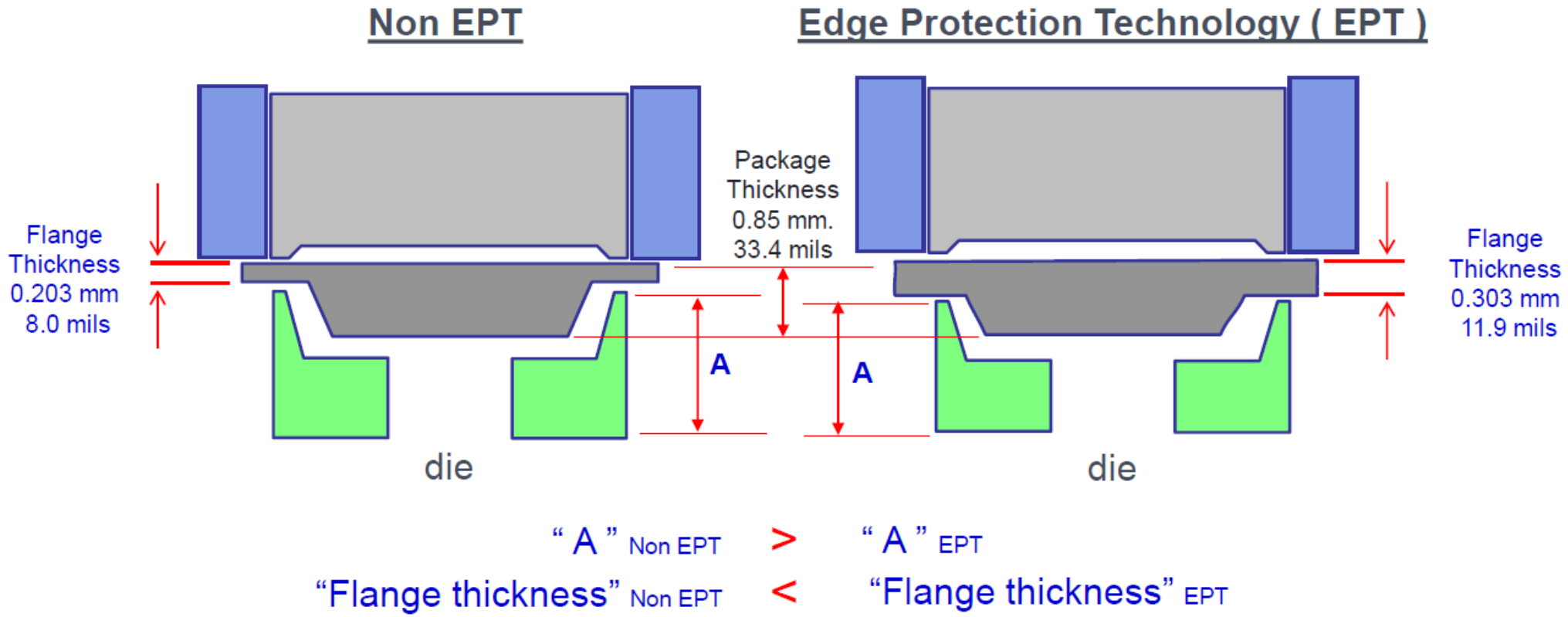
The top external leads will be covered by Mold Compound for the EPT package.

Symbol	5x5			6x6			9x9		
	Non-EPT	EPT	MCHP	Non-EPT	EPT	MCHP	Non-EPT	EPT	MCHP
A	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05	0.85 +/- 0.05
A1	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05
A2	0.65 +/- 0.05	0.65 +/- 0.05	-	0.65 +/- 0.05	0.65 +/- 0.05	-	0.65 +/- 0.05	0.65 +/- 0.05	-
A3	0.20 ref	0.20 ref	0.20 ref	0.20 ref	0.20 ref	0.20 ref	0.20 ref	0.20 ref	0.20 ref
A3+EPT	n/a	**0.30 ref**	-	n/a	**0.30 ref**	-	n/a	**0.30 ref**	-
D	5.0 +/- 0.1	5.0 +/- 0.1	5.00 BSC	6.0 +/- 0.1	6.0 +/- 0.1	6.00 BSC	9.0 +/- 0.1	9.0 +/- 0.1	9.00 BSC
D1	4.75 +/- 0.1	**4.71 +/- 0.1**	**4.75 BSC**	5.75 +/- 0.1	**5.71 +/- 0.1**	**5.75 BSC**	8.75 +/- 0.1	**8.71 +/- 0.1**	**8.75 BSC**
E	5.0 +/- 0.1	5.0 +/- 0.1	5.00 BSC	6.0 +/- 0.1	6.0 +/- 0.1	6.00 BSC	9.0 +/- 0.1	9.0 +/- 0.1	9.00 BSC
E1	4.75 +/- 0.1	**4.71 +/- 0.1**	**4.75 BSC**	5.75 +/- 0.1	**5.71 +/- 0.1**	**5.75 BSC**	8.75 +/- 0.1	**8.71 +/- 0.1**	**8.75 BSC**

Background

Punch QFN EPT vs Non-EPT Singulation Tool

- **Change is only on bottom die set flange height to support the EPT thickness.**
- **No impact on the package dimension.**



Notes :
1. Not drawn to scale
2. All other singulation parts dimensions , same.

QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN #: GBNG-07QSVE687

Date
August 10, 2021

Implement Edge Protection Technology (EPT) for selected products available in 28L (5x5x0.9mm), 36L (6x6x1mm), 40L (6x6x1mm) and 64L (9X9X1.0mm) VQFN packages at ANAP and ATP7 assembly sites.

Purpose: Implement Edge Protection Technology (EPT) for selected products available in 28L (5x5x0.9mm), 36L (6x6x1mm), 40L (6x6x1mm) and 64L (9X9X1.0mm) VQFN packages at ANAP and ATP7 assembly sites.

CCB No.: 4869

All packages passed internal qual and other customer qual.

Internal Qual Result

Body Size	MSL3				TCC 500				uHAST 96hrs			
	O/S	CSAM	EVI	Remarks	O/S	CSAM	EVI	Remarks	O/S	CSAM	EVI	Remarks
5 x 5 mm	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
6 x 6 mm	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
7 x 7 mm	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
8 x 8 mm	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
9 x 9 mm	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
10 x 10 mm	0/77	0/77	0/77	Passed	-	-	-	-	-	-	-	-
12 x 12 mm	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	-	-	-	-

Customer Qual Result

Customer	Body Size	MSL				T/C				uHAST 96hrs			
		O/S	CSAM	EVI	Remarks	O/S	CSAM	EVI	Remarks	O/S	CSAM	EVI	Remarks
Customer A	5x5, 8x8SR, 8x8DR, 9x9, 12x12	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
Customer B	5x5, 7x7, 8x8SR, 9x9	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
Customer C	5x5	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
Customer D	5x5	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed
Customer E	6x6, 7x7, 12x12	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed	0/77	0/77	0/77	Passed

Subcon Pre-Qual Data Collection Summary (Microchip Device)

- **Internal Qual Vehicle**

Target Device	Restriction Auto/Non-Auto	PKG Type	PKG Code	Body Size	Lead Count	Epoxy	Wire	Mold Compound
TA203TRSXV01	QS Auto	VQFN	RSX	7x7x0.9mm	48	1085A	Au_0.8mil	G700

- **Qualification Result Summary**
  - Used existing production process flow and parameters.
  - All inspection data passed, no fail after MSL 3 validation.

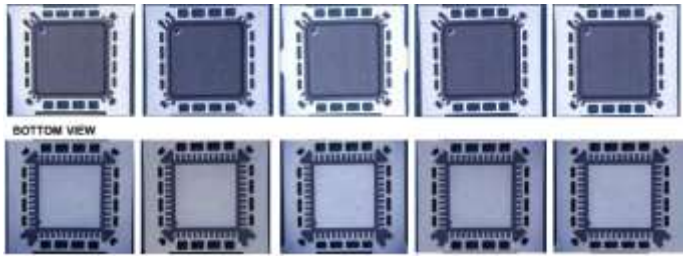
Process	Control Item	Sample Size	Evaluation Result	Remarks
Mold	Visual Inspection	480	0/480	Passed
	SAT	240	0/240	Passed
Singulation	PKG Crack/Gap	360	0/360	Passed
	PKG Chipping	360	0/360	Passed
	Tip Burr	360	0/360	Passed
	Package Dimension	30	0/30	Passed
Reliability Test	MSL 3 @ 260°C Visual, SAT, O/S	22	0/22	Passed
Test	Test Assessment Burn-In ATE Tape & Reel	200	0/200	Passed

Qualification Data

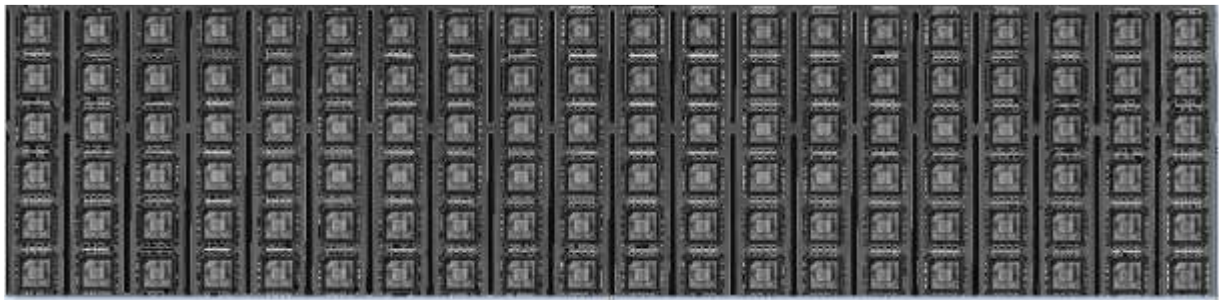
Subcon Pre-Qual Data for 7x7 (TA203TRSXV01) Package after Molding

All samples passed visual inspection and SAT, no delamination observed.

Visual Inspection Result



SAT Inspection (C-Scan)



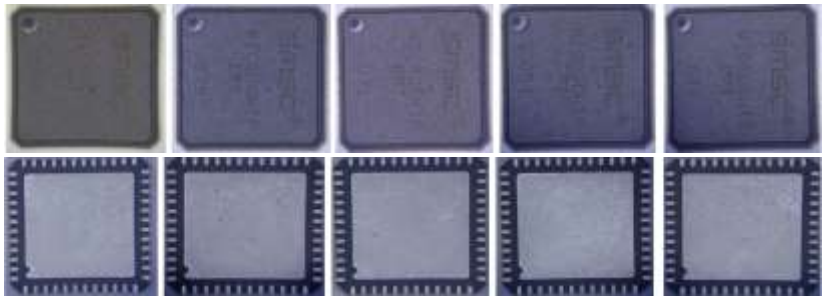
SAT Inspection (T-Scan)

Qualification Data

Subcon Pre-Qual Data for 7x7 (TA203TRSXV01) Package after Singulation

All samples passed visual inspection, no PKG crack/gap/chipping.
Package dimensions meet POD criteria.

Visual Inspection Result



Package Dimension

Unit #	X Dim	Y Dim
1	7.025	7.018
2	7.027	7.021
3	7.031	7.019
4	7.025	7.021
5	7.028	7.022
6	7.030	7.017
7	7.024	7.019
8	7.028	7.015
9	7.027	7.018
10	7.032	7.020
11	7.022	7.019
12	7.025	7.022
13	7.028	7.015
14	7.029	7.017
15	7.027	7.022
Max	7.032	7.022
Min	7.022	7.015
Ave	7.027	7.019

Note: Units in mm

Spec: 7.0mm +0.1 / - 0.1

Qualification Data

Subcon Pre-Qual Data for 7x7 (TA203TRSXV01) Package - MSL3

Lot passed MSL3 @ 260°C having no O/S Test Failure or Package Crack noted

1.0 TEST PURPOSE

MSL3 for new PMLF package design enhancement.

2.0 CONCLUSION

- Lot passed MRT L3@260C having no O/S test failure or package crack noted

4.0 TEST PROCEDURE

4.1 Rel Test Traveller - MRT

No	TEST ITEM	CONDITION / READ POINT
1	O/S	Open/Short
2	SAT	T&C scan
3	Bake	125C 24h
4	T&H soak	30/60-192
5	Reflow	260C 3X
6	O/S	Open/Short
7	SAT	T&C scan

5.0 TEST MATRIX & REL TEST ITEMS

Lag	Info IDs	Info ID Val	Test Type	Test Item	Test Condition	Reflow/R. Point	E/L	O/S	SAT	SS
1	Others1	ANAP203500065.02	MRT	L3	30/60-192	260C 3X		V	V	22

6.0 TEST RESULTS

6.1 SAT Test

Lag	Test Item	Reading Point	SS	Before /After	Delamination						Crack	
						T1	T2	T3	T4	T5	Ext	Int
1	L3	260C 3X	22	Before	Qty	0	0	0	N/A	0	0	0
					Min	0	0	0	N/A	0		
					Max	0	0	0	N/A	0		
				After	Qty	0	0	0	N/A	0	0	0
					Min	0	0	0	N/A	0		
					Max	0	0	0	N/A	0		

- Note
T1 : Delamination at EMC or Encap / Die Top Surface
T2 : Delamination at Die Attach Region
T3 : Delamination at EMC or Encap / pad Top or Laminate Surface surrounding die
T5 : Delamination at Lead finger / EMC

Refer to the specification # 001-2531 for the Pass / Fail Criteria

6.2 Open/Short Test

Lag	Test Item	Test Condition	Reading Point	Result	SS	#Fail.	Fail. Mode
1	L3	30/60-192	260C 3X	Pass	22	0	N/A

- Note
Refer to the specification # 001-2150 for the Pass / Fail Criteria

Qualification Data

Subcon Internal Qual Summary

Conclusion:

- No major change on Package outline dimension. Minor change on D1/E1.

- Minor difference on visual appearance of punch QFN with EPT vs Non-EPT.

- Low/No risk to implement Edge Protection Technology for punch QFN devices. Propose to use subcon internal qual data to approve the implementation.
    - Subcon internal Qualification and Reliability PASSED.

Affected Catalog Part Numbers (CPN)

AT97SC3204-X2M600B
AT97SC3204-X2MA10B
AT97SC3204T-X2MB10B
AT97SC3204S-X2MC10B
AT97SC3204-U2MA10B
AT97SC3204-U2MA20B
AT97SC3204T-U2MB10B
AT97SC3204-X2M6-00
AT97SC3204-X2MA-10
AT97SC3204-X2MA-20
AT97SC3204T-X2MB-10
AT97SC3204S-X2MC-10
AT97SC3204-U2MA-10
AT97SC3204-U2MA-20
AT97SC3204T-U2MB-10
8UA1084AE9-PBTU
AT88RF1354-ZU
AT88RF1354-ZU-T
AT8USDX5AG1-PBRU
AT8358402-UML2T
AT8358402-UML2T-206
UCS81001AM-C1A-V01
UCS81002AM-C1A-V02
UCS81003AM-C1A-V03
UCS81003AB-C1AVAO
UCS81001AMR-C1A-V01
UCS81002AMR-C1A-V02
UCS81003AMR-C1A-V03
UCS81003ABR-C1AVAO