Product Change Notification / GBNG-25AASD236

Date:

27-Aug-2021

Product Category:

8-bit Microcontrollers, Clock and Timing - Clock and Data Distribution, Clock and Timing - Clock Generation

PCN Type:

Manufacturing Change

Notification Subject:

CCB 4801 Final Notice: Implement Edge Protection Technology (EPT) for selected products available in 32L (7x7x1mm), (7x7x0.9mm) and 44L (7x7x0.9mm) VQFN packages at ANAP assembly site.

Affected CPNs:

GBNG-25AASD236_Affected_CPN_08272021.pdf
GBNG-25AASD236_Affected_CPN_08272021.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 32L (7x7x1mm), (7x7x0.9mm) and 44L (7x7x0.9mm) VQFN packages at ANAP assembly site.

Pre and Post Change Summary:

	Pre Change			Post Change		
Assembly Site	Amkor Technology Philippine (P1/P2), INC. (ANAP)			Amkor Technology Philippine (P1/P2), INC. (ANAP)		
Wire material	Au	AuPd	PdCu	Au	AuPd	PdCu
Die attach material	8290	CRM-1085A		8290	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:
December 20, 2021 (date code: 2152)

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

Time Table Summary:

	August 2021					→	December 2021				
Workweek	32	33	34	35	36		49	50	51	52	53
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:

August 27, 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-25AASD236_Qual_Report.pdf
PCN_GBNG-25AASD236_Pre and Post Change_Summary.pdf

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

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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.

Affected Catalog Part Numbers (CPN)

SY89113UMY
SY89113UMY-TR
SY89112UMY
SY89464UMY
SY89465UMY
SY89540UMY
SY89112UMY-TR
SY89464UMY-TR
SY89465UMY-TR
SY89540UMY-TR
SY58037UMY
SY58038UMY
SY58040UMY
SY56040ARMY
SY58037UMY-TR
SY58038UMY-TR
SY58040UMY-TR
SY56040ARMY-TR
SY89859UMY
SY89859UMY-TR
SY89537LMY
SY89537LMY-TR
AT90PWM3-16MQT
AT90PWM3-16MQ
AT90PWM1-16MU
AT90PWM3B-16MU
AT90PWM1-16MUR
AT90PWM3BOS-16MUR
AT90PWM3B-16MUR
AT90PWM1EP-16MUR
AT90PWM316-16MU
AT90PWM316EBR-16MUR
AT90PWM316-16MUR
AT89C5130A-PUTUM
AT89C5131A-PUTUM
AT8375102-ZZ12T

CCB 4801
Pre and Post Change Summary
PCN #: GBNG-25AASD236

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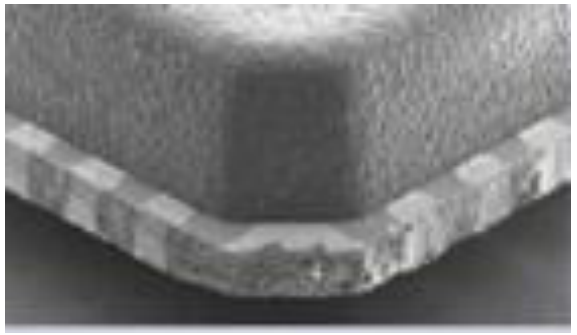
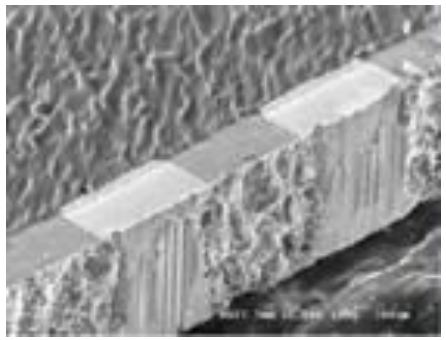
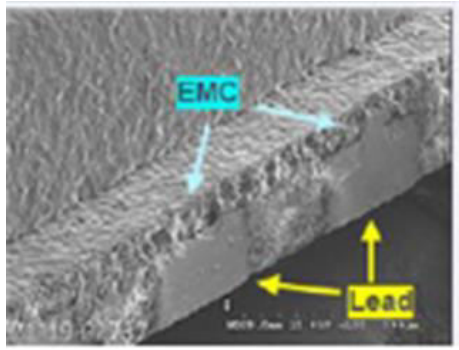
Pre and Post Change

Edge Protection Technology (EPT):

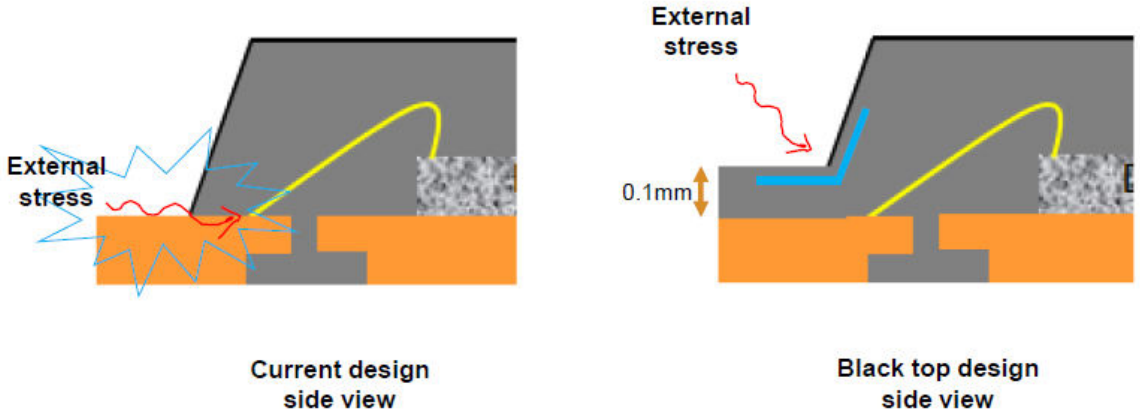
- It extends the mold cap to cover the top exposed lead area of the package which provides more robustness on the flange area.
- PKG Gap/Crack prevention
- Top lead solder bridging prevention

	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)

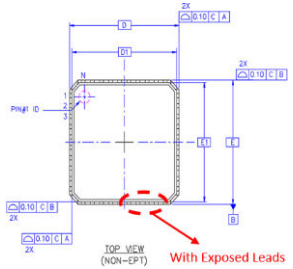
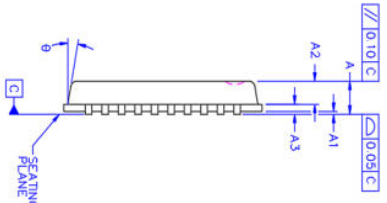
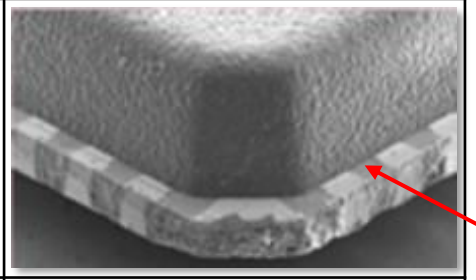
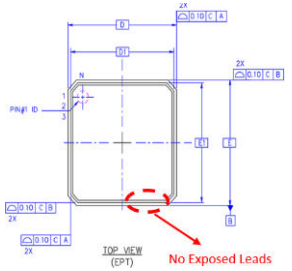
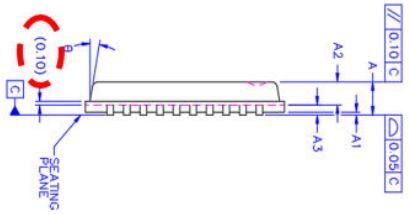
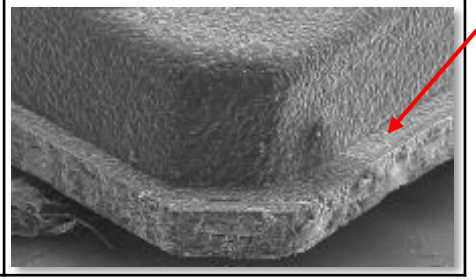
- **Change on Mold and Singulation tooling only. No change on BOM and parameters.**
- **Package appearance is slightly changed but no change on overall package outline.**

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

MICROCHIP

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.
- Added A3 + EPT to illustrate additional mold covering the top leads.

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

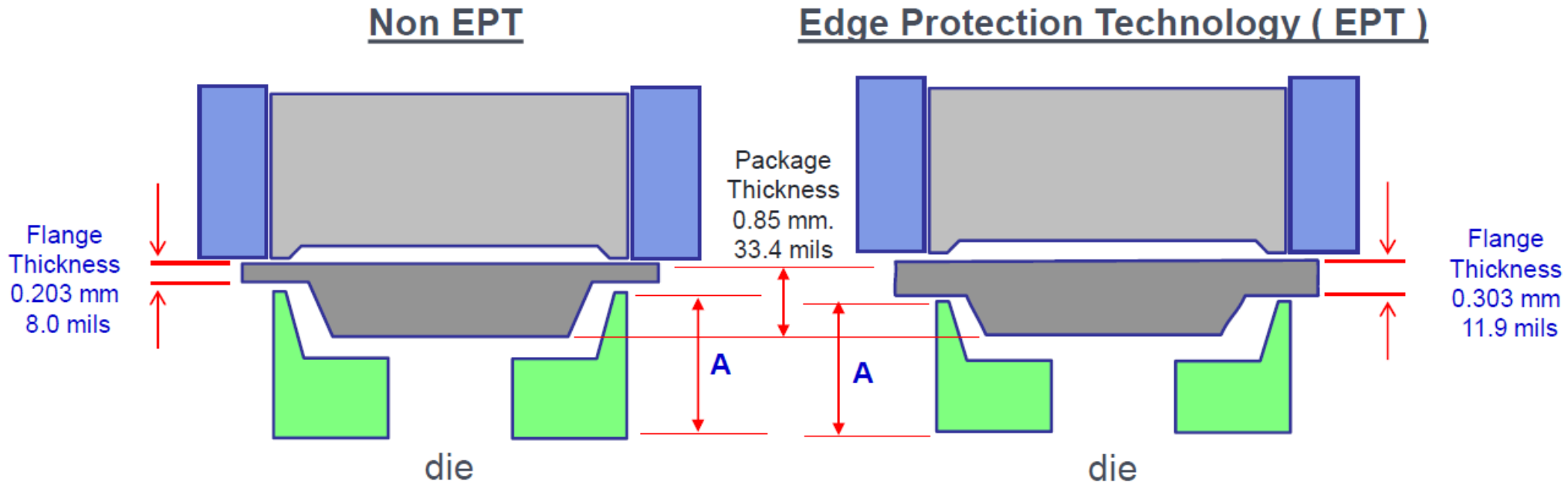
The top external leads will be covered by Mold Compound for the EPT package.

Symbol	7x7		
	Non-EPT	EPT	MCHP
A	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
A2	0.65 +/- 0.05	0.65 +/- 0.05	-
A3	0.20 ref	0.20 ref	0.20 ref
A3+EPT	n/a	**0.30 ref**	-
D	7.0 +/- 0.1	7.0 +/- 0.1	7.00 BSC
D1	6.75 +/- 0.1	**6.71 +/- 0.1**	**6.75 BSC**
E	7.0 +/- 0.1	7.0 +/- 0.1	7.00 BSC
E1	6.75 +/- 0.1	**6.71 +/- 0.1**	**6.75 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-25AASD236

Date
August 10, 2021

Implement Edge Protection Technology (EPT) for selected products available in 32L (7x7x1mm), (7x7x0.9mm) and 44L (7x7x0.9mm) VQFN packages at ANAP assembly site.

Purpose: Implement Edge Protection Technology (EPT) for selected products available in 32L (7x7x1mm), (7x7x0.9mm) and 44L (7x7x0.9mm) VQFN packages at ANAP assembly site.

CCB No.: 4801

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.

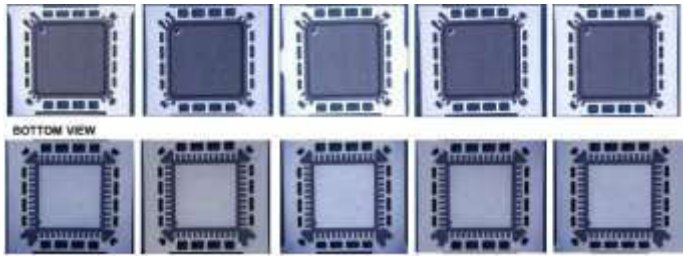
Process	Control Item	Sample Size	Evaluation Result	Remarks
Mold	Visual Inspection	480	0/480	Passed
	SAT	240	0/240	Passed
Singulation	PKG Crack/Gap	360	0/360	Passed
	PKG Chipping	360	0/360	Passed
	Tip Burr	360	0/360	Passed
	Package Dimension	30	0/30	Passed
Reliability Test	MSL 3 @ 260°C Visual, SAT, O/S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

Qualification Data

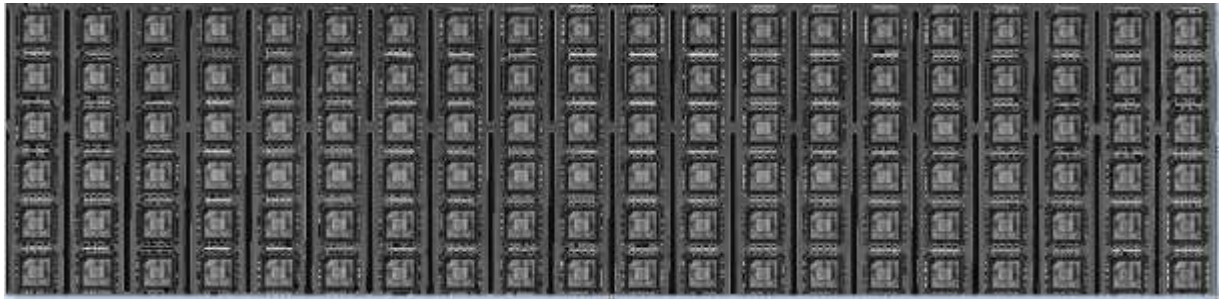
Subcon Pre-Qual Data for 7x7 (TA203TRSXV01) Package after Molding

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

Visual Inspection Result



SAT Inspection (C-Scan)



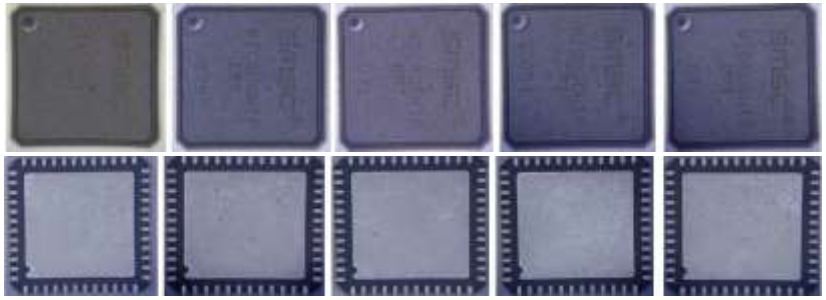
SAT Inspection (T-Scan)

Qualification Data

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

All samples passed visual inspection, no PKG crack/gap/chipping.
Package dimension 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

Lot	Info IDs	Info ID Val	Test Type	Test Item	Test Condition	Reflow/R. Point	B/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

Lot	Test Item	Reading Point	SS	Before /After	Delamination		T1	T2	T3	T4	T5	Crack Ext	Crack 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

Lot	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.