Product Change Notification / CENO-12GMEV224

Date:

21-Apr-2022

Product Category:

AIS Ethernet Switches, Ethernet Controllers, Ethernet PHYs, Ethernet Products, INIC, INIC_Companion, USB Products, USB Transceiver

PCN Type:

Manufacturing Change

Notification Subject:

CCB 4869.001 Final Notice: Implement Edge Protection Technology (EPT) for selected products available in 32L (5x5x0.9mm) 36L (6x6x0.9mm), 40L (6x6x0.9mm), 48L(7x7x0.9mm), 56L (8x8x0.9mm), 72L (10x10x0.9mm) and 88L (12x12x0.9mm) VQFN packages at ANAP assembly site.

Affected CPNs:

CENO-12GMEV224_Affected_CPN_04212022.pdf
CENO-12GMEV224_Affected_CPN_04212022.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 (5x5x0.9mm) 36L (6x6x0.9mm), 40L (6x6x0.9mm), 48L(7x7x0.9mm), 56L (8x8x0.9mm), 72L (10x10x0.9mm) and 88L (12x12x0.9mm) VQFN packages at ANAP assembly site.

Pre and Post Change Summary:

	Pre Change		Post Change	
Assembly Site	Amkor Technology Philippines (P1/P2), INC. (ANAP)		Amkor Technology Philippines (P1/P2), INC. (ANAP)	
Wire material	Au		Au	
Die attach material	8290	CRM-1085A	8290	CRM-1085A
Molding compound material	G700	G631BQ	G700	G631BQ
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: September 22, 2022 (date code: 2239)

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

Time Table Summary:

	April 2022					->	September 2022				
Workweek	14	15	16	17	18		36	37	38	39	40
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: April 21, 2022: 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_CENO-12GMEV224_Pre and Post Change_Summary.pdf
PCN_CENO-12GMEV224_Qual_Report.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.

QUALIFICATION REPORT SUMMARY

RELIABILITY LABORATORY

PCN #: CENO-12GMEV224

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. Implement Edge Protection Technology (EPT) for selected products available in 32L (5x5x0.9mm), 36L (6x6x0.9mm), 40L (6x6x0.9mm), 48L (7x7x0.9mm), 56L (8x8x0.9mm), 72L (10x10x0.9mm) and 88L (12x12x0.9mm) VQFN packages at ANAP assembly site will qualify by similarity (QBS).

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. Implement Edge Protection Technology (EPT) for selected products available in 32L (5x5x0.9mm), 36L (6x6x0.9mm), 40L (6x6x0.9mm), 48L (7x7x0.9mm), 56L (8x8x0.9mm), 72L (10x10x0.9mm) and 88L (12x12x0.9mm) VQFN packages at ANAP assembly site will qualify by similarity (QBS).

CCB No.: 4869 and 4869.001

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.

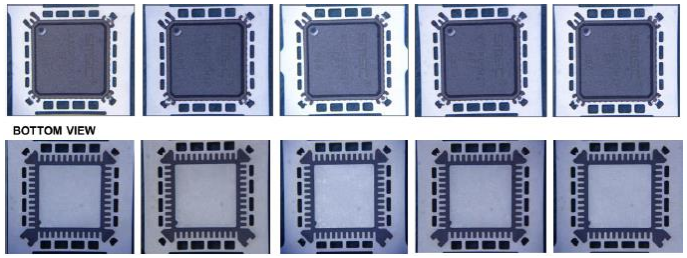
Process	Control Item	Sample Size	Evaluation Result	Remarks
Mold	Visual Inspection	480	0/480	Passed
	SAT	240	0/240	Passed
Singulation	PKG Crack/Gap	360	0/360	Passed
	PKG Chipping	360	0/360	Passed
	Tip Burr	360	0/360	Passed
	Package Dimension	30	0/30	Passed
Reliability Test	MSL 3 @ 260°C Visual, SAT, O/S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

Qualification Data

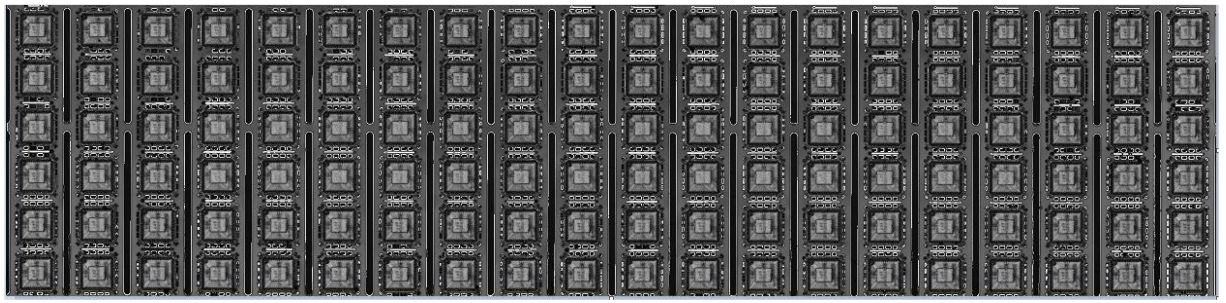
Subcon Pre-Qual Data for 7x7 (TA203TRSXV01) Package after Molding

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

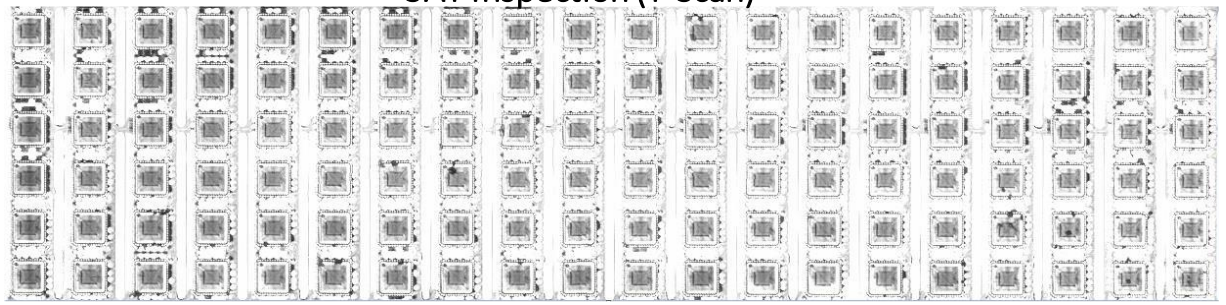
Visual Inspection Result



SAT Inspection (C-Scan)



SAT Inspection (T-Scan)

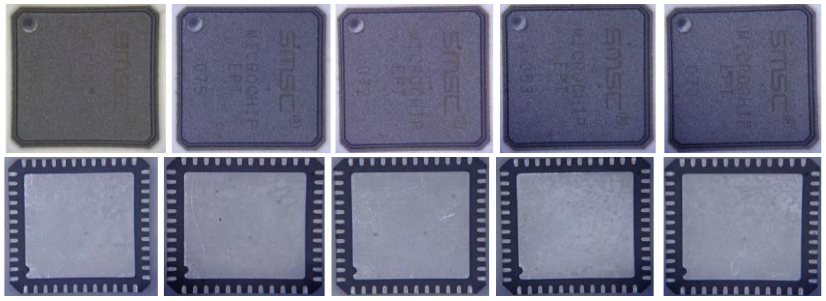


Qualification Data

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

Leg	Info IDs	Info ID Val	Test Type	Test Item	Test Condition	Reflow/R Point	E/L	O/S	SAT	SS
1	Others1	ANAP203500065.00	MRT	L3	30/60-192	260C 3X		V	V	22

6.0 TEST RESULTS

6.1 SAT Test

Leg	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

Leg	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:

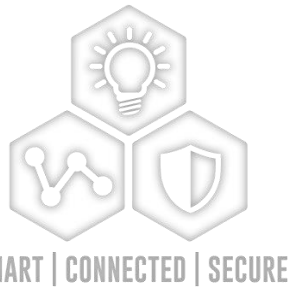
- No major change on Package outline dimension. Minor change on D1/E1.

- 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.

CCB 4869.001
Pre and Post Change Summary
PCN #: CENO-12GMEV224

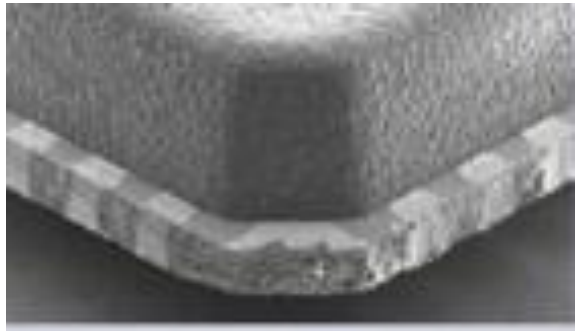
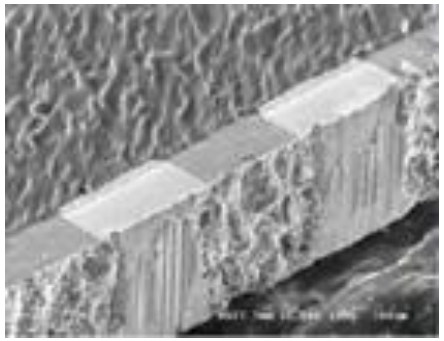
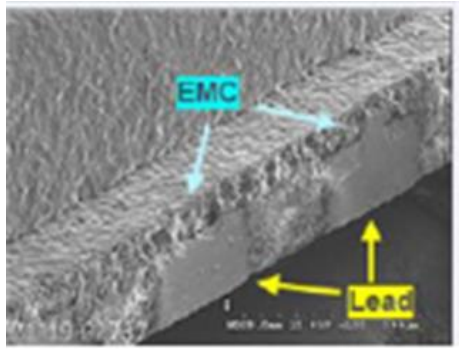
A Leading Provider of Smart, Connected and Secure Embedded Control Solutions



Pre and Post Change

Edge Protection Technology (EPT):

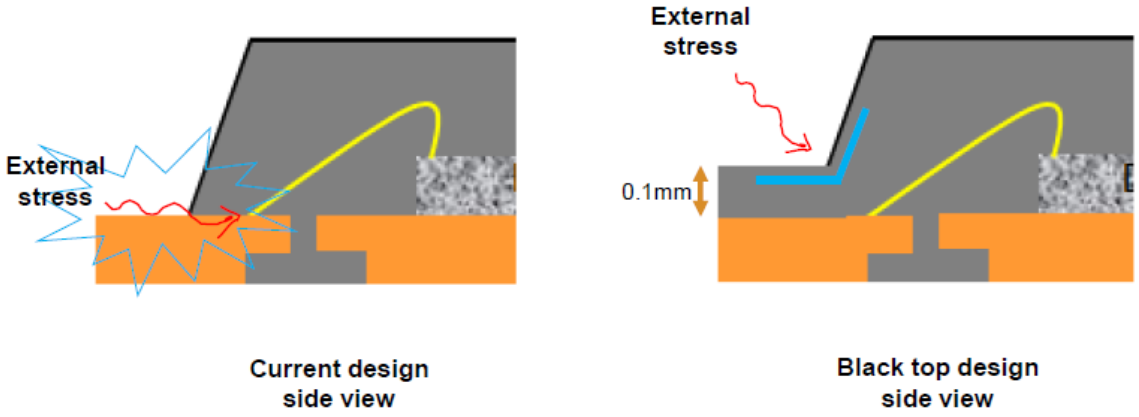
- It extends the mold cap to cover the top exposed lead area of the package which provides more robustness on the flange area.
- PKG Gap/Crack prevention
- Top lead solder bridging prevention

	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

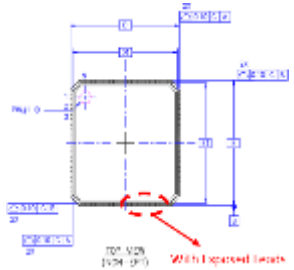
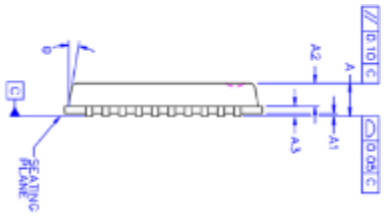
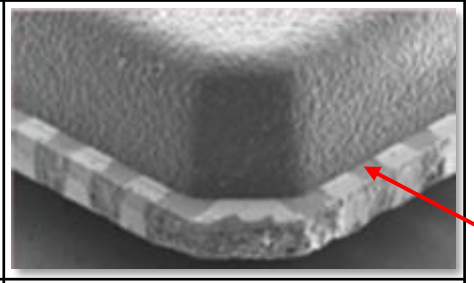
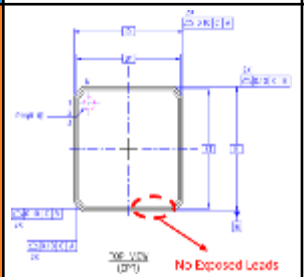
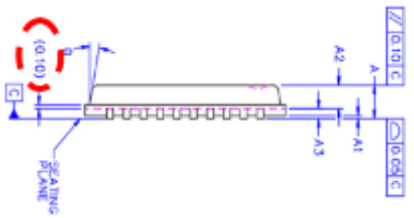
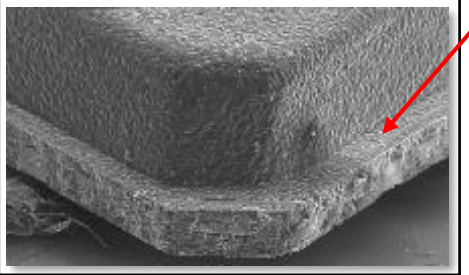
Assembly BOM/Parameter Comparison (Punch QFN Non EPT vs EPT)

- **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	AS-IS (Non-EPT)	TO-BE (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	Per Device	Per Device	Same, No change
Packing Media	Tray/Reel	Per Device	Per Device	Same, No change

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				

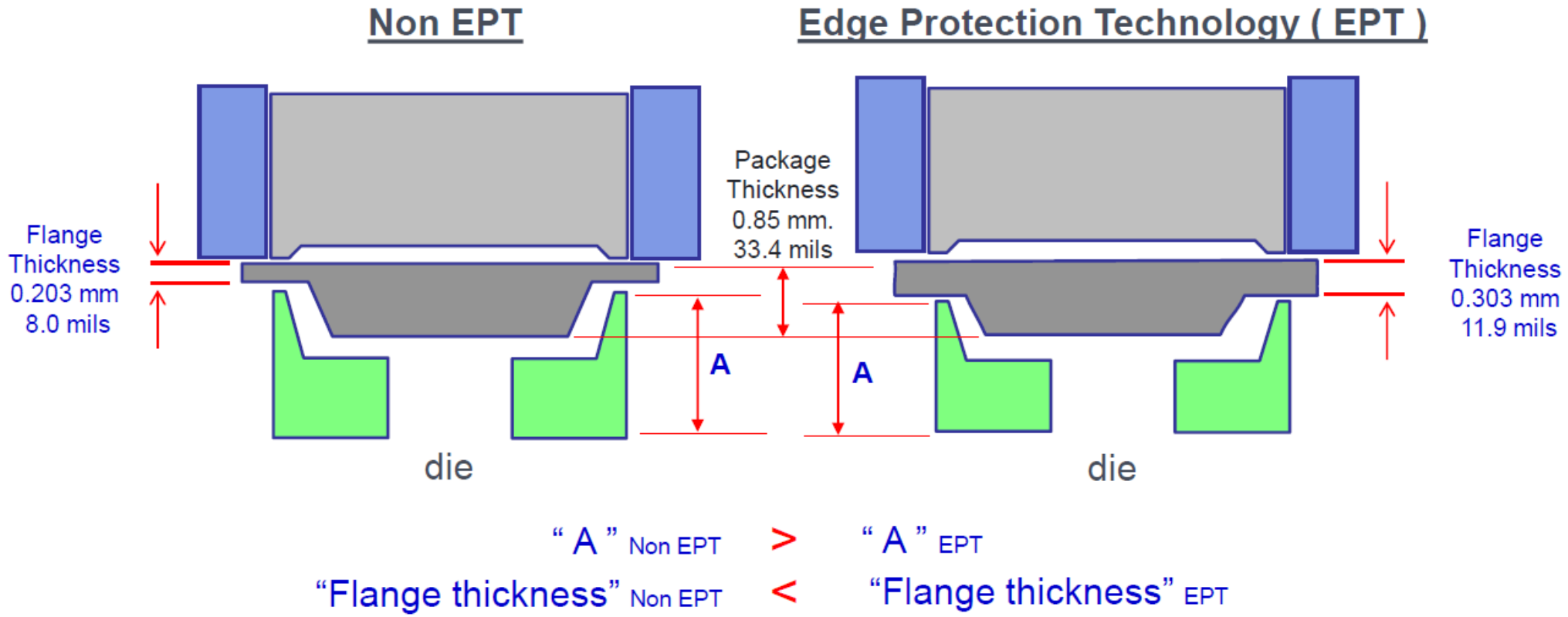
The top external leads will be covered by Mold Compound for the EPT package.

Symbol	5x5			6x6			7x7			8x8			9x9			10x10			12x12		
	Non-EPT	EPT	MCHP	Non-EPT	EPT	MCHP	Non-EPT	EPT	MCHP	Non-EPT	EPT	MCHP	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	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	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	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	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	-	0.65 +/- 0.05	0.65 +/- 0.05	-	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	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	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**	-	n/a	**0.30 ref**	-	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	7.0 +/- 0.1	7.0 +/- 0.1	7.00 BSC	8.0 +/- 0.1	8.0 +/- 0.1	8.00 BSC	9.0 +/- 0.1	9.0 +/- 0.1	9.00 BSC	10.0 +/- 0.1	10.0 +/- 0.1	10.00 BSC	12.0 +/- 0.1	12.0 +/- 0.1	12.00 BSC
D1	4.75 +/- 0.1	**4.71 +/- 0.1**	**4.75 BSC**	5.75 +/- 0.1	**5.71 +/- 0.1**	**5.75 BSC**	6.75 +/- 0.1	**6.71 +/- 0.1**	**6.75 BSC**	7.75 +/- 0.1	**7.71 +/- 0.1**	**7.75 BSC**	8.75 +/- 0.1	**8.71 +/- 0.1**	**8.75 BSC**	9.75 +/- 0.1	**9.71 +/- 0.1**	**9.75 BSC**	11.75 +/- 0.1	**11.71 +/- 0.1**	**11.75 BSC**
E	5.0 +/- 0.1	5.0 +/- 0.1	5.00 BSC	6.0 +/- 0.1	6.0 +/- 0.1	6.00 BSC	7.0 +/- 0.1	7.0 +/- 0.1	7.00 BSC	8.0 +/- 0.1	8.0 +/- 0.1	8.00 BSC	9.0 +/- 0.1	9.0 +/- 0.1	9.00 BSC	10.0 +/- 0.1	10.0 +/- 0.1	10.00 BSC	12.0 +/- 0.1	12.0 +/- 0.1	12.00 BSC
E1	4.75 +/- 0.1	**4.71 +/- 0.1**	**4.75 BSC**	5.75 +/- 0.1	**5.71 +/- 0.1**	**5.75 BSC**	6.75 +/- 0.1	**6.71 +/- 0.1**	**6.75 BSC**	7.75 +/- 0.1	**7.71 +/- 0.1**	**7.75 BSC**	8.75 +/- 0.1	**8.71 +/- 0.1**	**8.75 BSC**	9.75 +/- 0.1	**9.71 +/- 0.1**	**9.75 BSC**	11.75 +/- 0.1	**11.71 +/- 0.1**	**11.75 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.

Affected Catalog Part Numbers (CPN)

OS81118BFR-D2A-020300-VAD
OS81118BFR-D2A-020400S2-VAE
OS81118BFR-D2A-020500-VAF
OS81118BFR-D2A-020400-VAH
OS81118AFR-D2A-020300-VAK
OS81119AFR-D2A-010200-V03
OS81119AFR-D2A-010300-V04
OS81119AFR-D2A-010300-VAA
OS81119AFR-D2A-010200-VAO
LAN88730AM-C-V01
LAN88730BM-C-V01
LAN88730BMR-C-V01
LAN88730AMR-C-V01
OS81118AF-D2A-020400-V11
OS81118BF-D2A-020400-V12
OS81118AF-D2A-020400S2-V15
OS81118BF-D2A-020400S2-V16
OS81118AF-D2A-020500-V17
OS81118BF-D2A-020500-V18
OS81118AF-D2A-020400S2-VA1
OS81118AF-D2A-020400-VA2
OS81118AF-D2A-020501-VAO
OS81118BF-D2A-020501-VAO
OS81118AF-D2A-020500-VAC
OS81118BF-D2A-020300-VAD
OS81118BF-D2A-020400S2-VAE
OS81118BF-D2A-020500-VAF
OS81118BF-D2A-020400-VAH
OS81118AF-D2A-020300-VAK
OS81119AF-D2A-010200-V03
OS81119AF-D2A-010300-V04
OS81119AF-D2A-010300-VAA
OS81119AF-D2A-010200-VAO
OS81118AFR-D2A-020300-V07
OS81118BFR-D2A-020300-V08
OS81118AFR-D2A-020400-V11
OS81118BFR-D2A-020400-V12
OS81118AFR-D2A-020400S2-V15
OS81118BFR-D2A-020400S2-V16
OS81118AFR-D2A-020500-V17
OS81118BFR-D2A-020500-V18
LAN89530AM-A-V01
LAN89730AM-A-V03
LAN89530AMR-A-V01
LAN89730AMR-A-V03
LAN89303AM-A-V01

LAN89303AMR-A-V01

USB43340AM-B-V01

USB83340AM-B-V02

USB43340AMR-B-V01

USB83340AMR-B-V02

OS81110AM-D1A-010204-V02

OS81110AM-D1A-010205-V03

OS81060AM-B1C-011010-V01

OS81060AM-B1D-011102-V02

OS81060AF-B1C-011010-V03

OS81060AF-B1D-011102-V04

OS81060AM-B1D-011102-VAA

OS81060AF-B1C-011010-VAB

OS81060AF-B1D-011102-VAC

OS81060AM-B1C-011010-VAO

OS81060AMR-B1C-011010-V01

OS81060AMR-B1D-011102-V02

OS81060AFR-B1C-011010-V03

OS81060AFR-B1D-011102-V04

OS81060AMR-B1D-011102-VAA

OS81060AFR-B1C-011010-VAB

OS81060AFR-B1D-011102-VAC

OS81060AMR-B1C-011010-VAO

OS81092AM-C1C-010604-V01

OS81092AM-C1D-010605-V02

OS81092AM-C1D-010605-VAA

OS81092AM-C1C-010604-VAO

OS81092AMR-C1C-010604-V01

OS81092AMR-C1D-010605-V02

OS81092AMR-C1D-010605-VAA

OS81092AMR-C1C-010604-VAO

USB82512AF-B-V04

USB82513AF-B-V05

USB82514AF-B-V06

USB82512AM-A-V01

USB82513AM-A-V02

USB82514AM-A-V03

USX2004-I/RQ-V04

USB82512AFR-B-V04

USB82513AFR-B-V05

USB82514AFR-B-V06

USB82512AMR-A-V01

USB82513AMR-A-V02

USB82514AMR-A-V03

USX2004T-I/RQ-V04

USB82512AMR-AV18

USB82513AMR-AV19

USB82640AM-D-000527-V01

USB82642AM-A-000528-V02

~~USB82522AM-A-000528-V03~~

USX2730-I/RS-V06

USX2740-I/RS-V08

USB82642AM-H-000728-V09

USB82640AMR-D-000527-V01

USB82642AMR-A-000528-V02

USB82522AMR-A-000528-V03

USX2730T-I/RS-V06

USX2740T-I/RS-V08

USB82642AMR-H-000728-V09

OS85654AM-C1A-V01

OS85656AM-C1A-V02

OS85656AM-C1A-VAA

OS85654AM-C1A-VAO

OS85654AMR-C1A-V01

OS85656AMR-C1A-V02

OS85656AMR-C1A-VAA

OS85654AMR-C1A-VAO

SPYNIC150-D1A-010400-V05

OS81110AM-D1A-010206-V06

OS81110AM-D1A-010207-V07

SPYNIC150-D1A-010401-V08

OS81110AM-D1A-010203-V01

OS81110AMR-D1A-010204-V02

OS81110AMR-D1A-010205-V03

OS81110AMR-D1A-010206-V06

OS81110AMR-D1A-010207-V07

OS81110AMR-D1A-010203-V01

OS81118AF-D2A-020300-V07

OS81118BF-D2A-020300-V08

OS81118AFR-D2A-020400S2-VA1

OS81118AFR-D2A-020400-VA2

OS81118AFR-D2A-020501-VAO

OS81118BFR-D2A-020501-VAO

OS81118AFR-D2A-020500-VAC