



February 17, 2014
PPCN #130027

PROCESS/ PRODUCT CHANGE NOTIFICATION

This is to inform you that Micrel Inc has qualified Exposed Pad (E-Pad) SOIC packages at STARS Microelectronics, Thailand as an alternative assembly site and test site. This manufacturing subcontractor is in addition to the current Unisem, Malaysia as qualified assembly and test locations for these products. This change adds more capacity and provides for the flexibility of assembly processing locations. This will enable Micrel to continue to make on-time deliveries to our growing end customers. E-Pad SOIC is an extension of the already qualified SOIC at STARS. It is the addition of the E-Pad leadframes to the already released SOIC process.

If you have any questions concerning this change, please contact:

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TYPE OF CHANGE

We are adding SOIC Epad leadframes to our already qualified SOIC products assembled and tested at STARS. There is no change in package type. Form, fit and function will not be affected. These products will be shipped with the same packing and shipment format.

EFFECTIVITY

Starting May 20, 2014, Micrel will begin to deliver the listed devices from STARS. After May 20, 2014, the products shipped to customers could be either assembled from UNISEM or STARS. In order to make on-time deliveries to our growing list of end customers, we will reserve the flexibility to deliver certain part numbers at an earlier date if un-expected material or capacity shortage occurs at UNISEM in the future. We consider this an extension of the already qualified SOIC products at STARS (see Micrel PPCN100001)

PRODUCT ID (DESCRIPTION)

See the product list in the attached Excel file "PPCN 130027 part list add STARS additional assembly site for EPAD SOIC" for Micrel's products that would be assembled and tested at UNISEM or STARS site.



DESCRIPTION OF CHANGE

Micrel has qualified STARS, Thailand for assembly and test of the listed Micrel products. This will provide additional capacity for these products.

EFFECT OF CHANGE

There is no change in form, fit or function of the product. There is no change in the die or testing. The following material changes are being made. The die attach epoxy is changed from Ablestik (UNISEM) to Ablestik ABLEBOND 84-1LMISR4 (STARS). 84-1LMISR4 has higher thermal conductivity than ABLEBOND 8290. The lead finish will change from matte tin (Sn) to Nickel-Palladium-Gold (NiPdAu). The land pattern, lead layout, naming, and lead count are the same. There is no change in moisture sensitivity rating.

QUALIFICATION

STARS is Micrel's qualified assembly and test subcontractor. STARS is already qualified and manufacturing SOIC, SC70, SOT143, SOT-23, and TSOT packages in high volume production. Traceability is maintained by date code and lot number, and country of origin (CO) for all products. The parts made at Unisem Ipoh will have a "MY" country of origin mark, and the parts made at STARS will have a "TH" country of origin mark. We attach a representative reliability report for qualifying products assembled at STARS, Thailand.



RELIABILITY REPORT

DATE: 10/16/2013

QUALITY ENG:	PURPOSE:						
H. Grimm	TO QUALIFY STARS MICROELECTRONICS, THAILAND TO ASSEMBLE ePad_SOIC-8L PACKAGE						
ASSEMBLY	PACKAGE TYPE :	MSL	MOLD COMP.	DIE ATTACH	LOT #	DATE CODE	FAB PROCESS
STARS ELECTRONICS, THAILAND	Epad_SOIC-8L RoHS NiPdAu Plating PPF-ASM	LEVEL 2	SUMITOMO EME-G600 HALOGEN FREE	ABLESTICK 84-1LMISR4	6A41380MQF 0A19251MSA 0A36685MSC	1309 1310 1310	BCD3 BCDM BCDM

QUALIFICATION RESULTS :

TEST DESCRIPTION	METHOD/CONDITIONS	LOT #	DATE CODE	168 HR Rej/pass	1000 HR Rej/pass	2000 HR Rej/pass	COMMENTS
HTOL <i>High Temperature Operating Life Test</i> With Level 2 Pre-conditioning Tpeak + 260°C 3X Reflow	JESD-22, Method A108 TA= + 125°C VCC = +20V	6A41380MQF	1309	0/77	0/77	0/77	PASS
TEST DESCRIPTION	METHOD/CONDITIONS	LOT #	DATE CODE	96HR Rej/pass	COMMENTS		
PRESSURE POT With Level 2 Pre-conditioning Tpeak + 260°C 3X Reflow	JESD22-A102 Ta = +121°C/100%RH 15 PSIG	6A41380MQF 0A19251MSA 0A36685MSC	1309 1310 1310	0/77 0/77 0/77			
TEST DESCRIPTION	METHOD/CONDITIONS	LOT #	DATE CODE	1000cyc Rej/pass	COMMENTS		
TEMP CYCLE With Level 2 Pre-conditioning Tpeak + 260°C 3X Reflow	JESD22-A104 Ta = -65°C/+150°C	6A41380MQF 0A19251MSA 0A36685MSC	1309 1310 1310	0/77 0/77 0/77			
TEST DESCRIPTION	METHOD/CONDITIONS	LOT #	DATE CODE	1000 HR Rej/pass	2000 HR Rej/pass	COMMENTS	



HTSL High Temperature Storage Life With Level 2 Pre-conditioning Tpeak + 260°C 3X Reflow	JESD22-A103 Ta = +150°C	6A41380MQF 0A19251MSA 0A36685MSC	1309 1310 1310	0/76 0/76 0/76	0/76	Extended time points for information only	
TEST DESCRIPTION	METHOD/CONDITIONS	LOT #	DATE CODE	96HR Rej/pass	COMMENTS		
HAST With Level 2 Pre-conditioning Tpeak + 260°C 3X Reflow	Ta= +131°C/85%RH JESD22-A118	6A41380MQF 0A19251MSA 0A36685MSC	1309 1310 1310	0/77 0/77 0/77			
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	P / F	COMMENTS		
CSAM INSPECTION Pre-Post L2	IPC/JEDEC JSTD-020	1309 1310	6A41380MQF 0A36685MSC	PASS PASS	PT# MIC4127YME PT# MIC37301-2.5YME		
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	P / F	COMMENTS		
PHYSICAL DIMENSIONS	MIL STD 883 SS= 30/LOT Cpk >1.66	1309 1310 1310	6A41380MQF 0A19251MSA 0A36685MSC	PASS PASS PASS	PT# MIC4127 PT# MIC37153YME PT# MIC37301-2.5YME		
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	P / F	COMMENTS		
RADIOGRAPHIC X-RAY	MIL STD 883 TM2010	1309 1310 1310	6A41380MQF 0A19251MSA 0A36685MSC	PASS PASS PASS	PT# MIC4127 PT# MIC37153YME PT# MIC37301-2.5YME		
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	MIN	MAX	AVE	CpK
WIRE PULL 1.3 mil	MIL STD 883 TM2011 ASTM F-1269-89 MIC-100-1010	1309 1310 1310	6A41380MQF 0A19251MSA 0A36685MSC	14.55 17.82 15.6	17.3 21.0 18.36	15.9 19.52 17.48	6.59 8.10 7.69
BALL SHEAR	MIL STD 883 TM2011 ASTM F-1269-89 MIC-100-1010	1309 1310 1310	6A41380MQF 0A19251MSA 0A36685MSC	51.9 49.16 48.18	61.26 58.69 57.08	56.35 54.74 52.70	4.21 4.60 4.58
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.				



SOLDERABILITY PPF - NiPdAu	JESD22-B102	1309	6A41380MQF	PASS	0/2	PT# MIC4127YME
		1310	0A19251MSA	PASS	0/2	PT# MIC37153YME
		1310	0A36685MSC	PASS	0/2	PT# MIC37301-2.5YME
FLAMMABILITY	UL-94V-0 Certified	All mold compounds used by Micrel meet this standard. See the UL website on-line list of material flammability certifications. Micrel requires a Certificate of Compliance from the assembly house and we verify the certifications on the web.				

Conclusion: STARS has passed the Package Reliability Tests required for production release.