March 3, 2014
PPCN #140003

PROCESS/ PRODUCT CHANGE NOTIFICATION

This is to inform you that Micrel Inc has qualified MSOP-8L and MSOP-10L packages at STARS Microelectronics, Thailand as an alternative assembly site. This manufacturing subcontractor is in addition to the current Unisem, Malaysia as qualified assembly 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.
If you have any questions concerning this change, please contact:

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TYPE OF CHANGE

We are adding STARS as an assembly source in addition to the current Unisem. The package type, form, fit and function will not be affected. These products will be shipped with the same packing and shipment format.

EFFECTIVITY

Starting June 1st, 2014, Micrel will begin to deliver the listed devices from STARS. After June 1st, 2014, the products shipped to customers could be either assembled from UNISEM or STARS. In order to make on-time deliveries to our growing end customers, we will reserve the flexibility to deliver certain part numbers at earlier date if un-expected material or capacity shortage occurs at UNISEM in the future.

PRODUCT ID (DESCRIPTION)

See the product list in the attached Excel file “PPCN 140003 part list add STARS additional assembly site for MSOP” for Micrel’s products that would be assembled at UNISEM or STARS site.

DESCRIPTION OF CHANGE

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

EFFECT OF CHANGE

There is no change in form, fit or function of the product. There is no change in the die, testing, or assembly materials, except the die attach epoxy material. The Epoxy is changed from Ablestik ABLEBOND 8290 (UNISEM) to Ablestik ABLEBOND 84-1LMISR4 (STARS). 84-1LMISR4 has higher thermal conductivity than ABLEBOND 8290. The land pattern, lead finish, lead layout, naming, and lead count are the same. There is no change in moisture sensitivity rating.

QUALIFICATION

STARS is Micrel's qualified assembly 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: 1/07/2014

QUALITY ENG:	**PURPOSE:** SY88903ALKG_MICRF112YMM_MIC2124YMM						
H. Grimm	TO QUALIFY STARS MICROELECTRONICS, THAILAND TO ASSEMBLE MSOP PACKAGE						
ASSEMBLY	**PACKAGE TYPE :**	**MSL**	**MOLD COMP.**	**DIE ATTACH**	**LOT #**	**DATE CODE**	**FAB PROCESS**
STARS ELECTRONICS, THAILAND	MSOP-10L RoHS NiPdAu Plating PPF-ASM	LEVEL 1	SUMITOMO EME-G600 HALOGEN FREE	ABLESTICK 84-1LMISR4	PC38075.1MQA BA42508MQB BA41353MQB	1319 1320 1324	CMOS 0.35 BCD 0.5 ASSET 1.2

QUALIFICATION RESULTS :

TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**168 HR** Rej/pass	***1000 HR*** Rej/pass	**COMMENTS**
HTOL ***High Temperature Operating Life Test*** **With Level 1 Pre-conditioning Tpeak + 260°C 3X Reflow**	JESD-22, Method A108 TA= + 125°C VCC = OPERATING MAX	PC38075.1MQA BA42508MQB BA41353MQB	1319 1320 1324	0/77 0/77 0/77	0/77 0/77 0/77	VCC = +3.6V VCC = +5.5V VCC = +5.5V
TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**96 HR** Rej/pass	**COMMENTS**	
PRESSURE POT **With Level 1 Pre-conditioning** Tpeak + 260°C 3X Reflow	JESD22-A102 Ta = +121°C/100%RH 15 PSIG	PC38075.1MQA BA42508MQB BA41353MQB	1319 1320 1324	0/45 0/45 0/45		
TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**1000cyc** Rej/pass	**COMMENTS**	
TEMP CYCLE **With Level 1 Pre-conditioning** Tpeak + 260°C 3X Reflow	JESD22-A104 Ta = -65°C/+150°C	PC38075.1MQA BA42508MQB BA41353MQB	1319 1320 1324	0/45 0/45 0/45		
TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**1000 HR** Rej/pass	**COMMENTS**	

HTSL **High Temperature Storage Life** With Level 1 Pre-conditioning **Tpeak + 260°C 3X Reflow**	JESD22-A103	PC38075.1MQA	1319	0/76	
	Ta = +150°C	BA42508MQB	1320	0/76	
		BA41353MQB	1324	0/76	

TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**96HR** Rej/pass	**COMMENTS**
HAST With Level 1 Pre-conditioning Tpeak + 260°C 3X Reflow	Ta= +131°C/85%RH JESD22-A110 Vcc = 3.6v	PC38075.1MQA	1319	0/45	
HAST With Level 1 Pre-conditioning Tpeak + 260°C 3X Reflow	Ta= +131°C/85%RH	PC38075.1MQA	1319	0/45	
	JESD22-A118	BA42508MQB	1320	0/45	
		BA41353MQB	1324	0/45	

TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**P / F**	**COMMENTS**
CSAM INSPECTION	IPC/JEDEC JSTD-020	PC38075.1MQA	1319	PASS	
Pre/Post L1		BA42508MQB	1320	PASS	
		BA41353MQB	1324	PASS	

TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**P / F**	**COMMENTS**
PHYSICAL DIMENSIONS	MIL STD 883	PC38075.1MQA	1319	30 / 0	
	SS= 30/LOT	BA42508MQB	1320	30 / 0	
	Cpk >1.66	BA41353MQB	1324	30 / 0	

TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**P / F**	**COMMENTS**
RADIOGRAPHIC X-RAY	MIL STD 883 TM2010	PC38075.1MQA	1319	5 / 0	PASS
		BA42508MQB	1320	5 / 0	PASS
		BA41353MQB	1324	5 / 0	PASS

TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**	**MIN**	**MAX**	**AVE**	**CpK**
WIRE PULL 1.0 mil	MIL STD 883 TM2011	PC38075.1MQA	1319	9.11	11.02	9.96	4.45
1.0 mil	ASTM F-1269-89	BA42508MQB	1320	8.25	10.69	9.55	4.25
1.3 mil	MIC-100-1010	BA41353MQB	1324	14.65	19.04	17.23	3.33

BALL SHEAR 1.0 mil	MIL STD 883 TM2011	PC38075.1MQA	1319	31.94	44.44	37.59	2.03
1.0 mil	ASTM F-1269-89	BA42508MQB	1320	34.22	43.55	38.80	2.01
1.3 mil	MIC-100-1010	BA41353MQB	1324	39.01	49.72	43.45	2.20
TEST DESCRIPTION	**METHOD/CONDITIONS**	**LOT #**	**DATE CODE**		SAC+245C	Sn+245C	Sn+215C
SOLDERABILITY	JESD22-B102	PC38075.1MQA	1319	PASS	0/5	0/5	0/5
PPF - NiPdAu		BA42508MQB	1320	PASS	0/5	0/5	0/5
		BA41353MQB	1324	PASS	0/5	0/5	0/5
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.