



October 1, 2013  
PPCN #130020

## **PROCESS/ PRODUCT CHANGE NOTIFICATION**

This is to inform you that Micrel Inc. has qualified QSOP-16L and SOIC-14L/16L packages at Unisem Batam, Indonesia as an assembly site due to Micrel current subcontractors Unisem Ipoh, Malaysia notifying Micrel that they plan to exit the QSOP-16L and SOIC-14L/16L package manufacturing. If you have any questions concerning this change, please contact:

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## **TYPE OF CHANGE**

We have qualified Unisem Batam as QSOP-16L and SOIC-14L/16L assembly source to replace the current Unisem Ipoh. The package type, material, form, fit and function will not be affected. These products will be shipped with the same packing and shipment format.

## **EFFECTIVITY**

Starting Jan 1st, 2014, Micrel will begin to deliver the listed devices from Batam. After Jan 1st, 2014, the products shipped to customers could be either assembled from Ipoh or Batam. 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 Ipoh in the future.

## **PRODUCT ID (DESCRIPTION)**

Please refer to the part numbers listed in the attached spread sheet "PPCN 130020 part list for QSOP-16L SOIC-14L 16L assembly at Batam" for Micrel's products that would be assembled at Batam site.

## **DESCRIPTION OF CHANGE**

Micrel has qualified Unisem Batam, Indonesia for assembly of the listed Micrel products. This is due to Micrel current subcontractors Unisem Ipoh, Malaysia notifying Micrel that they plan to exit the QSOP-16L and SOIC-14L/16L package manufacturing.



## **EFFECT OF CHANGE**

There is no change in form, fit or function of the product. The land pattern, lead finish, lead layout, naming, and lead count are the same. There is no change in the die or testing. There is no change in moisture sensitivity rating.

## **QUALIFICATION**

Batam is Micrel's qualified assembly subcontractor. Batam is already qualified and manufacturing PDIP, PLCC, SSOP, and SOICW 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 Batam will have an "IN" country of origin mark. We attach representative reliability reports for qualifying products assembled at Batam, Indonesia.



## RELIABILITY REPORT

DATE : 09/20/2013

<b>QUALITY ENG :</b>	<b>PURPOSE:</b>
H.GRIMM	NEW ASSEMBLY SITE FOR QSOP PACKAGE EME-G600 M/C MATTE TIN L/F 84-1LMRS4 D/A

PART NUMBER	PACKAGE TYPE	ASSEMBLY LOCATION	FAB LOCATION	PROCESS NAME
MIC2010-1PZQS	QSOP_16L	UNISEM BATAM	Micrel, USA	BCD2
MICRF219 AYQS	QSOP_16L	UNISEM BATAM	AMS, Austria	CMOS 0.35

### DIE QUALIFICATION RESULTS

TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	168 HR Rej/ss	500 HR Rej/ss	1000 HR Rej/ss	
<b>HTOL</b> <b>High Temperature Operating Life Test</b>	JESD22, Method 108	1301	134054.01MQA	0/77	0/77	0/77	
	TA= + 125°C	1250	PC13561.1MQB	SKIP	0/77	0/77	
		1249	PC13561.1MQA	SKIP	0/77	0/77	

### ELECTROSTATIC DISCHARGE

TEST DESCRIPTION	METHOD/CONDITIONS		DEVICE ID.	STRESS	RESULT Rej/ss	COMMENTS
<b>ESD-HBM</b>  Human Body Model ATE Test @ Room +25C	R= 1500 Ohms		MIC2010-1PZQS	+/-500V +/-1000V +/-1500V +/-2000V	0/3 0/3 0/3 0/3	
	C= 100 pF  1X +/- Voltage		MICRF219AYQS	+/-500V +/-1000V +/-1500V +/-2000V	0/3 0/3 0/3 0/3	
<b>ESD-CDM</b>  Charged Device Model ATE Test @ Room +25C	JESD22-C101		MIC2010-1PZQS	+/-500V +/-1000V +/-1500V +/-2000V	0/3 0/3 0/3 0/3	
	1X +/- Voltage		MICRF219AYQS	+/-500V +/-1000V +/-1500V +/-2000V	0/3 0/3 0/3 0/3	



<b>LATCH-UP</b>	JESD-78  TA = +25°C		MIC2010-1PZQS  MICRF219AYQS	I/O LU O/V LU  I/O LU O/V LU	0/6 0/6  0/6 0/6	
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>96 HR</b> Rej/ss	<b>COMMENTS</b>	
<b>PRESSURE POT</b>  <i>With Level 1 Pre-conditioning</i> Tpeak + 260°C 3X Reflow	JESD22-A102  Ta = +121°C/100%RH  15 PSIG	1301  1250  1249	134054.01MQA  PC13561.1MQB  PC13561.1MQA	0/77  0/77  0/45		
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>1000 cy</b> Rej/ss	<b>COMMENTS</b>	
<b>TEMP CYCLE</b>  <i>With Level 1 Pre-conditioning</i> Tpeak + 260°C 3X Reflow	JESD22-A104  Ta = -65°C/+150°C	1301  1250  1249	134054.01MQA  PC13561.1MQB  PC13561.1MQA	0/77  0/45  0/77		
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>1000 HR</b> Rej/ss	<b>2000 HR</b> Rej/ss	<b>COMMENTS</b>
<b>HTSL</b>  <i>High Temperature Storage Life</i>  <i>With Level 1 Pre-conditioning</i> Tpeak + 260°C 3X Reflow	JESD22-A103  Ta = +150°C	1301  1250  1249	134054.01MQA  PC13561.1MQB  PC13561.1MQA	0/76  0/76  0/76	0/76  0/76  0/76	
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>500 HR</b> Rej/ss	<b>1000 HR</b> Rej/ss	<b>COMMENTS</b>
<b>BIAS HUMIDITY</b>  <i>With Level 1 Pre-conditioning</i> Tpeak + 260°C 3X Reflow	JESD22-A101  Ta = +85°C/85%RH	1250  1249	PC13561.1MQB  PC13561.1MQA	0/45  0/77	0/45  0/77	
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>96 HR</b> Rej/ss	<b>COMMENTS</b>	



<b>HAST</b>  <i>With Level 1 Pre-conditioning</i>  Tpeak + 260°C 3X Reflow	JESD22-A110  Ta= +131°C/85%RH	1301	134054.01MQA	0/50			
<b>FLAMMABILITY</b>	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.					
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>P / F</b>	<b>COMMENTS</b>		
<b>CSAM INSPECTION</b>	IPC/JEDEC JSTD-020	1301	134054.01MQA	PASS			
		1249	PC13561.1MQA	PASS			
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>P / F</b>	<b>COMMENTS</b>		
<b>PHYSICAL DIMENSIONS</b>	MIL STD 883	1249	PC13561.1MQA	PASS	PT#4420848.1		
		1250	PC13561.1MQB	PASS	PT#4424595.1		
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>P / F</b>	<b>COMMENTS</b>		
<b>RADIOGRAPHIC X-RAY</b>	MIL STD 883 TM2010	1301	134054.01MQA	PASS			
		1249	PC13561.1MQA	PASS			
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>MIN</b>	<b>MAX</b>	<b>AVE</b>	<b>PPK</b>
<b>WIRE PULL</b>	MIL STD 883 TM2011	1250	PC13561.1MQB	7.7	9.7	8.6	3.08
	ASTM F-1269-89	1249	PC13561.1MQA	7.7	9.4	8.53	2.91
	MIC-100-1010						
<b>BALL SHEAR</b>	MIL STD 883 TM2011	1250	PC13561.1MQB	29.2	49.1	35.85	2.91
	ASTM F-1269-89	1249	PC13561.1MQA	32.3	39.6	36.31	2.04
	MIC-100-1010						



<b>DIE SHEAR</b>	MIL STD 883 TM2011	1250	PC13561.1MQB	10.98	12.05	11.4	N/A
	ASTM F-1269-89	1249	PC13561.1MQA	9.8	12.62	11.8	N/A
	MIC-100-1010						
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>SAC</b>	<b>Sn +215</b>	<b>Sn +245</b>	
<b>SOLDERABILITY</b>  <i>Matte tin plating</i>	JESD22-B102	1301	134054.01MQA	PASS	PASS	PASS	
NOTES:  Passes Reliability Qualification and Released to Production.							



## RELIABILITY REPORT

DATE : 09/25/2013

<b>QUALITY ENG :</b>	<b>PURPOSE:</b>
H.GRIMM	Unisem Batam SOIC 14-16L Package Qual

PART NUMBER	PACKAGE TYPE	ASSEMBLY LOCATION	FAB LOCATION	PROCESS NAME
MIC2537-2YM	SOIC-16L	UNISEM, BATAM	FORTUNE DR. SAN JOSE CA. USA	2537A-BCD2
MIC5157YM	SOIC-14L	M/C G600, D/A CRM1076NS,		5157B-BCDM
SY100EL34LZG	SOIC-16L	MATTE TIN LEAD FINISH		EL34-ASSET 1.2

### DIE QUALIFICATION RESULTS

TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	168 HR Rej/ss	1000 HR Rej/ss	COMMENTS
<b>HTOL</b> High Temperature Operating Life Test	JESD22, Method 108	1312	4A05377MQA	0/77	0/77	
	TA= + 125°C	1312	2A18063MQA	0/77	0/77	
	VCC =	1317	AA27231MEA	0/77	0/77	

### PACKAGE QUALIFICATION RESULTS

TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	96 HR Rej/ss	COMMENTS
<b>PRESSURE POT</b>  <i>With Level 2 Pre-conditioning</i> Tpeak + 260°C 3X Reflow	JESD22-A102	1312	4A05377MQA	0/45	
	Ta = +121°C/100%RH	1312	2A18063MQA	0/45	
	15 PSIG	1317	AA27231MEA	0/45	
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	96 HR Rej/ss	COMMENTS
<b>HAST</b>  <i>With Level 2 Pre-conditioning</i> Tpeak + 260°C 3X Reflow	JESD22-A110 (BIASED)	1312	4A05377MQA	0/45	Vin = 5.5V
	Ta= +131°C/85%RH	1312	2A18063MQA	0/45	No bias
	JESD22-A118 (UNBIASED)	1317	AA27231MEA	0/45	No bias
TEST DESCRIPTION	METHOD/CONDITIONS	DATE CODE	LOT ID.	1000 CY Rej/ss	COMMENTS



<b>TEMP CYCLE</b>	JESD22-A104	1312	4A05377MQA	0/45			
<i>With Level 2 Pre-conditioning</i>	Ta = -65°C/+150°C	1312	2A18063MQA	0/45			
Tpeak + 260°C 3X Reflow		1317	AA27231MEA	0/45			
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>1000 HR Rej/ss</b>	<b>COMMENTS</b>		
<b>HTSL</b>	JESD22-A103	1312	4A05377MQA	0/76			
<i>High Temperature Storage Life With Level 2 Pre-conditioning</i>	Ta = +150°C	1312	2A18063MQA	0/76			
Tpeak + 260°C 3X Reflow		1317	AA27231MEA	0/76			
<b>FLAMMABILITY</b>	UL-94V-0	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.					
	Certified						
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>P / F</b>	<b>COMMENTS</b>		
<b>CSAM INSPECTION</b>	IPC/JEDEC JSTD-020	1312	4A05377MQA	Pass			
		1312	2A18063MQA	Pass			
		1317	AA27231MEA	Pass			
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>P / F</b>	<b>COMMENTS</b>		
<b>PHYSICAL DIMENSIONS</b>	MIL STD 883	1312	4A05377MQA	Pass			
		1317	AA27231MEA	Pass			
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>LOT ID.</b>	<b>P / F</b>	<b>COMMENTS</b>		
<b>RADIOGRAPHIC X-RAY</b>	MIL STD 883 TM2010	1312	4A05377MQA	Pass	5 samples		
		1312	2A18063MQA	Pass	5 samples		
		1317	AA27231MEA	pass	5 samples		
<b>TEST DESCRIPTION</b>	<b>METHOD/CONDITIONS</b>	<b>DATE CODE</b>	<b>PKG</b>	<b>SAC +245C</b>	<b>Sn +245C</b>	<b>Sn +215C</b>	
<b>SOLDERABILITY</b>	JESD22-B102	1312	14L SOIC	0/5	0/5	0/5	PASS
		1317	16L SOIC	0/5	0/5	0/5	PASS
NOTES: Passes Reliability Qualification and Released to Production.							