ON Semiconductor

UPDATE CHANGE NOTIFICATION # 16796B

Apple Corporation

Issue Date: 05-Jun-2012

TITLE: Request for approval to use an alternate production site for EFC4618R-TR (APN: 376S0976) (Update Notification to FPCN16796)

PROPOSED FIRST SHIP DATE: WW24 in 2012

AFFECTED CHANGE CATEGORY(S): Transfer of Product to Alternate Site (BGA process)

SAMPLES: Contact your local ON Semiconductor Sanyo Division Sales Office

FOR ANY QUESTIONS CONCERNING THIS NOTIFICATION:
Please contact <Mitsutoshi.Yoshimura@onsemi.com>

NOTIFICATION TYPE:

Final Product Change Notification

ON Semiconductor will start the shipment of the units after approval of PCN by Apple.

DESCRIPTION AND PURPOSE:

FPCN 16796 announced ON Semiconductor-Sanyo Division intention to transfer products from the Sanyo wafer fabrication sites located in SANYO Semiconductor Manufacturing Co., Ltd.-SSMC Gifu Japan to the United Microelectronics Corporation Japan-UMCJ wafer fab.

This update notification is to notify our customers that due to the financial failure of Minami Co., Ltd., we are adding an alternate BGA production site to minimize the impact on your production. We apologize for any inconvenience this has caused.

Please review the change information below, we need your approval of the alternate site so we can begin production.

No design changes will be made and Sanyo Semiconductor CSP-line manufacturing processes and procedures will be the same as MINAMI's. There will be no changes in device functionality, specification and electrical characteristics. Reliability will continue to meet or exceed ON Semiconductor's highest standards.

Alternate production site

Alternate production site of BGA process
Production: Sanyo Semiconductor CSP-line
Location: 1-1-1,Sakata Oizumi Machi Oura Gun Gunma,Japan

Schedule
(1) Sample shipment: WW19 in 2012
(2) Mass production start: WW24 2012

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Qualification Data:

Quality evaluation of Bump, (Ball height, Ball shear strength)

1) Ball adhesion information(10pcs per lot for 3 lots)on parts from CSP

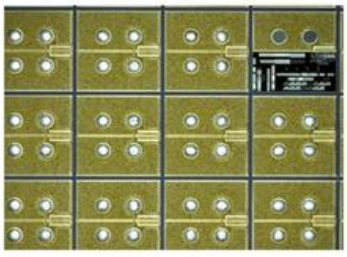
BGA Evaluation 1

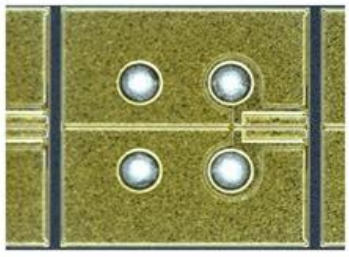
Sample : EFC4618R Lot : JCH9911 ,JCH9913 ,JCH9914

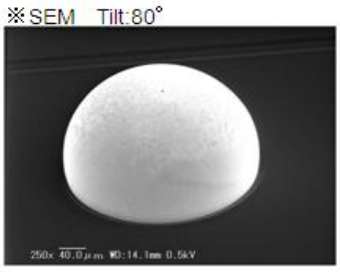
contents	standard	CSP	MINAMI
Ball Shape	No change		
Bump height	150±30um	Ave. 154.6 MAX 167.0 MIN. 142.5	Ave. 151.4 MAX 161.7 MIN. 143.4
Bump strength	2.5mg/um2	Ave. 6.140 MAX 6.775 MIN. 5.691	Ave. 5.602 MAX 6.327 MIN. 4.653

Ball Shape

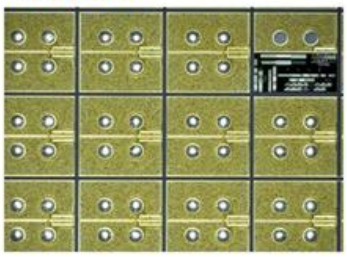
CSP

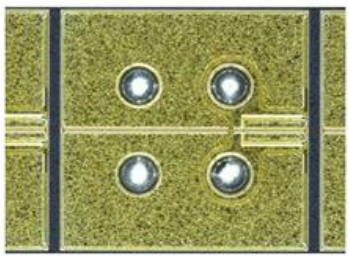


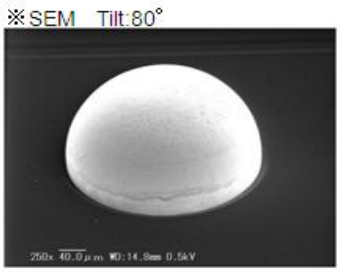




MINAMI







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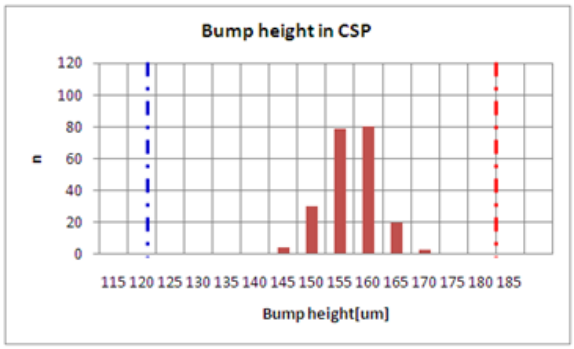
Bump height

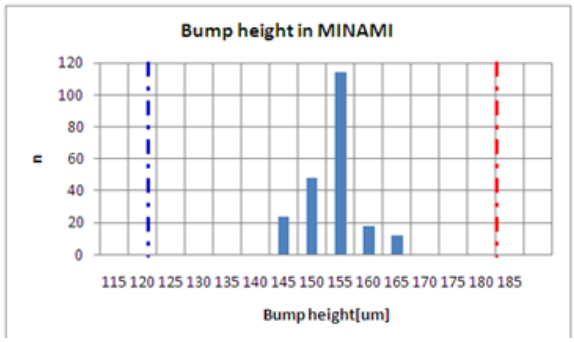
CSP

	Height [um]
Ave.	154.6
MAX	167.0
MIN.	142.5



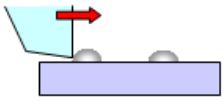
MINAMI

	Height [um]
Ave.	151.4
MAX	161.7
MIN.	143.4

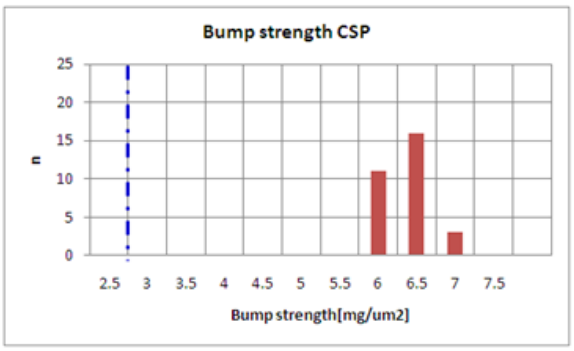


Bump strength

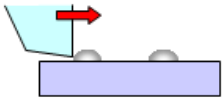
CSP



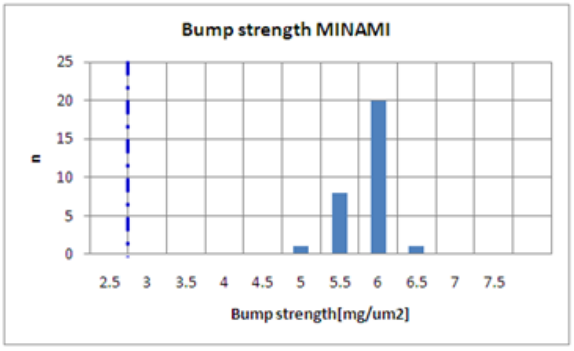
	strength [mg/um2]
Ave.	6.140
MAX	6.775
MIN.	5.691



MINAMI



	strength [mg/um2]
Ave.	5.602
MAX	6.327
MIN.	4.653



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2）<u>Comparison of an electrical characteristic 50parts from 3 lots. Data .</u>

Lot： JCH9911、JCH9913、JCH9914

Gifu+Minami vs UMCJ+CSP Comparison data

		ISSS	IGSS(+)	VSSS	VGS(off)	RSS(on)1	RSS(on)2	RSS(on)3	RSS(on)4	RSS(on)4	Vf
		(21V)	(8V)	(1mA)	(10V/1mA)	(4.5V/3A)	(4V/3A)	(3.7V/3A)	(3.1V/3A)	(2.5V/3A)	(3A)
Ratings	max	1000	10000		1.3	23	24	25.5	30	35	1200
	Typ					19.8	20.5	21	23	27	
	min			24	0.5	13.5	14	14.5	14.9	18.5	
		[nA]	[nA]	[V]	[V]	[mΩ]	[mΩ]	[mΩ]	[mΩ]	[mΩ]	[mV]
UMCJ + CSP product	max	8.1	269.0	27.8	0.68	18.7	19.7	20.5	22.9	27.9	762.6
	Ave	6.8	235.3	27.6	0.66	18.4	19.4	20.2	22.4	27.1	753.6
	min	5.7	215.0	27.4	0.65	18.0	18.9	19.7	21.8	26.4	750.4
Gifu + Minami product	max	10.1	280.0	27.5	0.72	20.0	21.0	21.8	24.0	28.6	758.9
	Ave	7.3	242.3	26.5	0.71	19.7	20.7	21.4	23.6	27.9	756.3
	min	6.1	228.0	26.1	0.67	19.4	20.4	21.1	23.3	27.3	752.5

comment

A difference is not in the characteristic of Gifu+Minami products and UMCJ + CSPproducts.

3) <u>Temperature cycling data (1000cycle)</u>

Lot:JCH9911、JCH9913、JCH9914

<Test cycles>	<Test condition>	<Sample Size/Lot>	<Lot>	<Failure>
1000 cycles	**Ta=-40degc to125degC**	**77**	**3**	**0**

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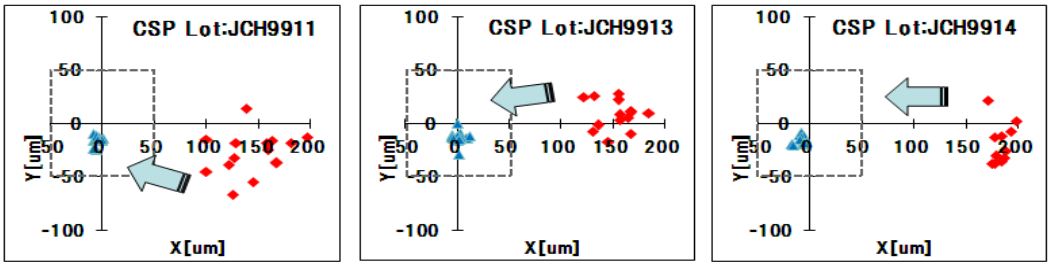
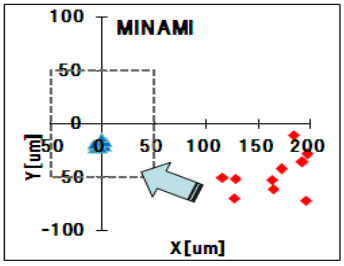
4) Solder test information (10pcs per lot for 3 lots) on parts from CSP.

Provide Solder test (Self alignment evaluation)

CSP



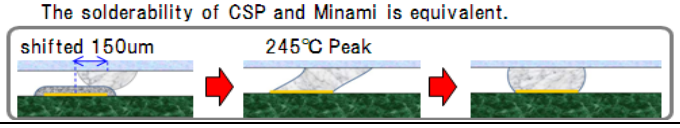
MINAMI



■ Valuation method
Pre-treatment condition : PCT(105℃/100%/8h)
Mounting position : It is shifted 150um from a land center.
Mounting temperature : 245℃ Peak

■Judgment conditions
It carries out self alignment from a land center to less than 50um.

■Result
The solderability of CSP and Minami is equivalent.



Reliability Evaluation Results (UMC-J with MINAMI)

Test Items		Test Condition	Test Time	Sample Size	Lot	Failure
Steady State Operating Life	*1	Tch=150degC	1000h	77	3	0
High-Temperature Reverse-Bias	*1	Ta=150degC,VDSS=24V	1000h	77	3	0
Temperature Humidity Storage	*1	Ta=85degC,RH=85%	1000h	77	3	0
Temperature Cycle	*1, *2	Ta=-40degC to 125degC	1000cycles	77	3	0
Intermittent Operating Life	*1	ΔTch=90degC	10000cycles	77	3	0
Pressure Cooker	*1	Ta=110degC,1.2×10^{5}Pa,100%	50h	77	3	0
High Temperature Storage	*1	Ta=150degC	1000h	77	3	0
Low Temperature Storage	*1	Ta=-55degC	1000h	77	3	0
Resistance to Soldering heat (Reflow)		Peak260degC/10s abobe220degC/60s	2times	77	3	0

Notice) *1 Pre-treatment: Resistance to Soldering heat (Reflow: 260degC/10s)
*2 1000 temp cycles were done with samples from UMC-J and CSP

List of affected Customer Specific Parts:
EFC4618R-TR (APN: 376S0976)

If no Customer Part Number is on file, the CPN Part Number is marked “CPN Unassigned”.