



# PROCESS CHANGE NOTIFICATION

## PCN0712

### MOLD COMPOUND CHANGES FOR BGA, UBGA, MBGA AND FBGA PACKAGES

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#### Change Description:

Altera is implementing mold compound material changes to the wire bonded Plastic Ball-Grid Array (BGA), Ultra FineLine Ball-Grid Array (UBGA), Micro FineLine Ball-Grid Array (MBGA), and FineLine Ball-Grid Array (FBGA) packages assembled in both Amkor and ASE manufacturing sites. The changes are summarized in Table 1.

**Table 1: Summary of Mold Compound Changes**

Current Mold Material	New Mold Material	Site
Sumitomo G770 series	Hitachi CEL-9750ZHF10AKL(LSA) series	ASE Malaysia ASE Taiwan
	Nitto GE-100LFCS series	Amkor Korea Amkor Philippines

These changes do not affect the overall package dimensions or the current moisture sensitivity rating levels (*per JEDEC J-STD-020C*).

#### Reason for Change

Sumitomo has announced the discontinuance of the supply of the G770 series mold compound materials.

#### Products Affected

Appendix 1 lists the products affected by these changes. Specific lists of ordering part numbers are available upon request.

## Product Traceability and Transition Dates

Customers may receive products with this change beginning with a date code marking of 0801 on the top of the package.

Altera Date Code Marking Format
A X $\beta$ Z $\alpha\alpha$ <b>0801</b> T

## Qualification Data

The new mold compound materials have been fully qualified by Altera. Appendix 2 through Appendix 5 contain the qualification data and the material properties of the mold compounds listed in Table 1.

## Contact

For more information on this PCN, please contact Altera Customer Quality support at [customer-quality@altera.com](mailto:customer-quality@altera.com).

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*In accordance with JESD46-C, this change is deemed acceptable to the customer if no acknowledgement is received within 30 days from this notification.*

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## Revision History:

Date	Rev	Description
10/03/2007	1.0.0	Initial Release
	1.0.1	Amend Qual Test label to "Temperature Humidity Bias"

**Appendix 1**  
**Products Affected by PCN0712 (1 of 3)**

<b>Package</b>	<b>Pin Count</b>	<b>Product Line</b>
BGA	225	EPF8820A
	256	EPF6016
		EPF6024A
	672	EP1S10
		EP1S20
		EP1S25
UBGA	49	EPM7032B
	169	EPM7256B
		EPM7512B
	484	EP2C35
		EP2C50
	MBGA	100
EPM240G		
EPM570		
EPM570G		
256		EPM1270
		EPM1270G
		EPM570
		EPM570G
FBGA	100	EPF6016A
		EPM240
		EPM240G
		EPM570
		EPM570G
		EPM7064AE
		EPM7064B
		EPM7128AE
		EPM7128B
		EPM7256AE
	144	EP20K100E
		EP20K30E
		EP20K60E

**Appendix 1**  
**Products Affected by PCN0712 (2 of 3)**

Package	Pin Count	Product Line
FBGA	256	EP1C12
		EP1C6
		EP1K10
		EP1K100
		EP1K30
		EP1K50
		EP2C15A
		EP2C20
		EP2C5
		EP2C8
		EP2C8A
		EPF10K100E
		EPF10K30A
		EPF10K30E
		EPF10K50E
		EPF10K50S
		EPF6016A
		EPM1270
		EPM1270G
		EPM2210
		EPM2210G
		EPM3128A
		EPM3256A
		EPM3512A
		EPM570
		EPM570G
		EPM7128AE
	EPM7128B	
	EPM7256AE	
	EPM7256B	
	EPM7512AE	
	EPM7512B	
	324	EP1C12
EP1C20		
EP1C4		
EP20K100E		
EP20K100F		
EP20K60E		
EPM2210		
EPM2210G		

**Appendix 1**  
**Products Affected by PCN0712 (3 of 3)**

<b>Package</b>	<b>Pin Count</b>	<b>Product Line</b>
FBGA	400	EP1C20
		EP1C4
	484	EP1K100
		EP1K50
		EP20K160E
		EP20K200
		EP20K200C
		EP20K200E
		EP2C15A
		EP2C20
		EP2C20A
		EP2C35
		EP2C50
		EPF10K100
		EPF10K100A
		EPF10K100E
		EPF10K130
		EPF10K130E
		EPF10K200S
		EPF10K30A
		EPF10K30E
		EPF10K50E
		EPF10K50V
		EPXA1
		672
	EP1S20	
	EP1S25	
	EP20K200E	
	EP20K300E	
	EP2C35	
	EP2C50	
	EP2C70	
EPF10K200S		
HC1S25		
896	EP2C70	

**Appendix 2**  
**Qualification Data for the new Mold Compounds**

<b>Mold Compound</b>	<b>Representative Package</b>	<b>Qualification Test</b>	<b>Read Out</b>	<b>Results</b>
Hitachi CEL9750ZHF10AKL (LSA) series	FBGA 400	PCL3 + Temperature Cycle “B”	1000 cycs	0/25
		High Temp Bake @ 175° C	450 hrs	0/25
	FBGA 324	PCL3 + HAST	96 hrs	0/25
	FBGA 256	PCL3 + HAST	96 hrs	0/25
		PCL3 + Temperature Cycle “B”	1000 cycs	0/75
		PCL3 + Temperature Humidity Bias	1000 hrs	0/50
		PCL3 + Unbiased HAST	96 hrs	0/50
		Life test	1000 hrs	0/25
		High Temp Bake @ 175° C	450 hrs	0/25
	Nitto GE-100LFCS series	FBGA 256	PCL3 + HAST	96 hrs
PCL3 + Temperature Cycle “B”			1000 cycs	0/50
Life test			1000 hrs	0/25
PCL3 + Unbiased HAST			96 hrs	0/25
High Temp Bake @ 175° C			450 hrs	0/25
FBGA 896		PCL3 + Temperature Cycle “B”	1000 cycs	0/50
		PCL3 + Unbiased HAST	96 hrs	0/25
		High Temp Bake @ 175° C	450 hrs	0/25
FBGA 672		Life test	1000 hrs	0/48

### Appendix 3

#### Material Properties for the Sumitomo EME-G770 series Mold Compound

Material Properties	Unit	Sumitomo EME-G770 series
Epoxy		MAR/Low vis.
Hardener		MAR/Tough
Filler Content (%)	%	88.5
Spherical / Flake	% / %	100/0
Filler Sieving Size	Um	55
Filler Average Size	Um	13
Adhesion System		Modified
Releasing System		Modified
Carbon Type		Type B
Carbon Pre Blending		Milling
Flame Retardant		Br/Sb/P Free
(Typical)		
Spiral Flow	Cm	140
Gel Time	Sec	40
C.T.E. -1	$10^{-5} / ^\circ \text{C}$	0.9
C.T.E. -2	$10^{-5} / ^\circ \text{C}$	3.9
Tg	$^\circ \text{C}$	130
Flexural Strength (RT)	$\text{N/mm}^2$	185
Flexural Modulus (RT)	$\text{N/mm}^2$	26000
Specific Gravity	-	2.00
Water Absorption (boil 24h)	%	0.18

## Appendix 4

### Material Properties for the Hitachi CEL-9750ZHF10AKL(LSA) series Mold Compound

Material Properties		Unit	Hitachi CEL-9750ZHF10AKL(LSA) series
Epoxy Resin		-	Low molecular weight type 2
Hardener		-	Low water absorption type 4 + MF
Flame retardant		-	no FR
Filler	Content	(wt%/vol%)	88 / 80
	Shape	-	All spherical (53cut filler)
Flexibilizer		-	yes
SF		Inch	70.0
GT (175degC)		Sec	55
Flash		Mm	3.5
Hot hardness		-	84
FT Viscosity		Poise	90
Tg		° C	130
CTE	Alpha 1	ppm/° C	8
	Alpha 2	ppm/° C	34
Flexural modulus	at RT	kgf/mm <sup>2</sup>	2400
	at 215° C	kgf/mm <sup>2</sup>	85
Flexural strength	at RT	kgf/mm <sup>2</sup>	14
	at 215° C	kgf/mm <sup>2</sup>	1
Specific gravity		-	2.00
Volume resistivity	at 25° C	ohm.cm	1E+16
	at 150° C	ohm.cm	1E+11
	after PCT20h	ohm.cm	1E+15
Water absorption (PCT20h)		%	0.32
Mold shrinkage		%	0.16
EC	at 121° C / 20h	uS/cm	25
pH		-	5.5
Cl <sup>-</sup>		ppm	25
Na <sup>+</sup>		ppm	1

## Appendix 5

### Material Properties for the Nitto GE-100LFCS series Mold Compound

Material Properties		Unit	Nitto GE-100LFCS series
Epoxy Resin			Bi-phenyl
Hardener Resin			New hydrophobic
Catalyst system			New
Filler Type			Spherical
Filler cutting size		um	54
Filler average size		um	9
Filler content		wt%	88.5
Filler treatment for pitting			Yes
Ion trapping agent			Yes
Flame retardant system			Metal hydroxide
Spiral Flow	175° C	cm	185
Gel Time	175° C	sec	42
Viscosity	175° C	Pa-s	5.0
Tg	-	° C	143
CTE -1	below Tg	ppm/° C	8.0
CTE -2	above Tg	ppm/° C	34.0
Flexural Strength	25° C	N/mm2	170
	260° C	N/mm2	13
Flexural Modulus	25° C	N/mm2	24000
	260° C	N/mm2	320
Volume resistivity	100° C	E + 14 ohm-cm	60
	150° C	E + 12 ohm-cm	0.70
Specific Gravity		-	2.00