Revision: 1.2.0

PROCESS CHANGE NOTIFICATION
PCN0702 UPDATE

MOLD COMPOUND CHANGE FOR PQFP, PDIP, AND RQFP PACKAGES

Change Description:

This is an update to PCN0702, published March, 2007. Altera is implementing mold compound material changes on the Plastic Quad Flat Pack (PQFP), Plastic Dual In-Line Package (PDIP), and Power Quad Flat Pack (RQFP) packages assembled in Amkor Philippines and Korea. The changes are summarized in Table 1.

Table 1: Summary of PQFP, PDIP, and RQFP Package Mold Compound Changes

Package	Current Mold Material	New Mold Material	Site	Transition date
Plastic Quad Flat Pack Package (PQFP)	Sumitomo EME 6300HJ	Sumitomo G700M	Amkor Philippines	0725 (June 2007)
Plastic Dual In-Line Package (PDIP) Non Pb-free	Sumitomo EME 6300H	Sumitomo G600	Amkor Philippines	0737 (Sept 2007)
Plastic Dual In-Line Package (PDIP) Pb-free	DongJin DMC 2000HG	Sumitomo G600	Amkor Philippines	0737 (Sept 2007)
Power Quad Flat Pack Package (RQFP)	Sumitomo EME-6300H Nitto MP8000CH4	Sumitomo G700M	Amkor Korea	0737 (Sept 2007)

The Sumitomo G600 and G700 mold material has been fully qualified by Altera. The qualification data and the material properties of the above mold compounds are listed in Appendix 1 through Appendix 7.

This change will not affect the current moisture-sensitivity-rating level of these packages.

Reason for Change

Sumitomo has announced discontinuance of the supply of EME 6300H and EME 6300HJ mold compound materials. We are standardizing the mold compound material for all PDIP and RQFP packages assembled in Amkor to Sumitomo G600 and G700, respectively.

Product Traceability and Transition Dates

This change will be implemented in June 2007 for the PQFP products and Sept 2007 for the PDIP and RQFP products. Customers may receive products with this change beginning with a date code marking of 0725 and 0737, respectively on top of the package. See Figure 1.

Figure 1: Altera Date Code Marking Format

Altera Date Code Marking Format
A XβZαα**07XX**T

Products Affected

Table 2 lists the product lines affected by this change. Specific ordering part numbers are available upon request.

Table 2: Product Lines Affected by PCN0702 (Part 1 of 2)

Package	Pin Count	Product Line
PQFP	44	EPM7032
	100	EPM7128E
		EPM7128S
		MPM7128
		MPM7128S
PDIP	8	EPC1
		EPC1064
		EPC1064V
		EPC1213
		EPC1441
	24	EP600I
		EP610
		EP610I
	40	EP900I
		EP910
		EP910I

Table 2: Product Lines Affected by PCN0702 (Part 2 of 2)

Package	Pin Count	Product Line
RQFP	208	EP20K200
		EPF10K20
		EPF10K30
		EPF10K40
		EPF8636A
		EPF8820A
		EPM7256E
		EPM7256S
		EPM9320
		EPM9320A
		EPM9400
		EPM9480
		EPM9560
		EPM9560A
	240	EP20K200
		EPF10K100A
		EPF10K200S
		EPF10K20
		EPF10K30
		EPF10K40
		EPF10K50
		EPF10K50V
		EPF10K70
		EPF81188A
		EPF81500A
		EPM9400
		EPM9560
		EPM9560A
	304	EPF81500A
		EPM9560

Contact

For more information on this PCN, please contact Altera Customer Quality support at **customer-quality@altera.com**.

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

Revision History:

Date	Rev	Description
03/20/2007	1.0.0	Initial Release
06/22/2007	1.1.0	Update to include RQFP packages and their transition date.
07/02/2007	1.1.1	Appendix 6: Amend column heading to "Nitto MP8000CH4"
09/17/2007	1.2.0	Update to include Qualification data for G600 (Appendix 2) Re-number the Appendixes

Appendix 1

Qualification Data for the Sumitomo G700 Series Mold Compound

Representative Package	Qualification Test	Read Out	Results
PQFP 100	PCL 3 and Temperature Cycle Condition B	1000 cycle	0/45
	Autoclave	168 hrs	0/45
PQFP 208	PCL 3 and Unbiased HAST	192 hrs	0/25
RQFP 240	PCL 3 and Temperature Cycle Condition B	1000 cycle	0/25
	Autoclave	168 hrs	0/45
	PCL 3 and Unbiased HAST	192 hrs	0/25

Appendix 2

Qualification Data for the Sumitomo G600 Series Mold Compound

Representative Package	Qualification Test	Read Out	Results
PDIP 8	Temperature Cycle Condition B	1000 cycle	0/45
	Autoclave	96 hrs	0/45
	High Temp Bake @ 150 °C	1000 hrs	0/45
	Temperature Humidity Bias	1000 hrs	0/45

Appendix 3

Material Properties for the Sumitomo EME6300 Series Mold Compound

Material Properties	Unit	Sumitomo EME-6300 series
Spiral Flow	cm	80
Thermal Conductivity	cal/cm.sec.° C	16×10^{-4}
Thermal Expansion	1/° C	1.7×10^{-5}
Tg	° C	165
Gel Time (at 175° C)	sec	24-41
Volume Resistivity (at 150° C)	Ohm-cm	$1 - 4 \times 10^{13}$
Water Adsorption (boiling, 24hrs)	% weight gain	0.3
Flexural Strength (at 25° C)	kgf/mm^2	12
Flexural Modulus (at 25° C)	kgf/mm^2	1200
Specific Gravity	-	1.82
UL Flame Class	UL-94	V-0
Extracted Na^+	ppm	<1
Extracted Cl^-	ppm	2-5

Appendix 4

Material Properties for the Sumitomo G700 Series Mold Compound

Material Properties	Unit	Sumitomo G700 series
Spiral Flow	cm	100
Gel Time (at 175°C)	sec	30
Thermal Expansion ∝ 1	$X10^{-5}$ 1/° C	1.0
Thermal Expansion ∝ 2	$X10^{-5}$ 1/° C	4.7
Tg	° C	130
Thermal Conductivity	W/m. ° C	80×10^{-2}
Flexural Strength (at 25° C)	N/mm2	180
Flexural Strength (at 240° C)	N/mm2	22
Flexural Modulus (at 25° C)	$x\ 10^2 N / mm^2$	200
Flexural Modulus (at 240° C)	$x\ 10^2 N / mm^2$	6.0
Specific Gravity	-	1.97
Volume Resistivity (at 150° C)	Ω-cm	1×10^{12}
UL Flame Class	UL-94	V-0
Water Absorption (boiling, 24hrs)	% weight gain	0.14
Extracted Na^+	ppm	1
Extracted Cl^-	ppm	5

Appendix 5
Material Properties for the DMC 2000HG Mold Compound

Material Properties	Unit	Dongjin DMC-2000HG
Spiral Flow	inch	30
Gel Time (at 175° C)	sec	26
Molded density	g/cm^3	1.93
Flexural Modulus (at 25° C)	kgf/mm^2	1800
Flexural Strength (at 25° C)	kgf/mm^2	17
Tg	°C	140
C.T.E 1	E-5/° C	1.18
C.T.E 2	E-5/° C	4.30
Water Adsorption (boiling, 24hrs)	% weight gain	0.15
Viscosity	poise	300
Flame retardant	-	Zinc borate + n-PN

Appendix 6
Material Properties for the Sumitomo G600 Mold Compound

Material Properties	Unit	Sumitomo G600 series
Spiral Flow	cm	80
Gel Time	sec	27
Thermal Expansion ∝ 1	$X10^{-5}$ 1/° C	1.0
Thermal Expansion ∝ 2	$X10^{-5}$ 1/° C	3.9
Tg	° C	135
Thermal Conductivity	W/m . ° C	87×10^{-2}
Flexural Strength (at 25° C)	N/mm2	185
Flexural Strength (at 240° C)	N/mm2	21
Flexural Modulus (at 25° C)	$x\ 10^2 N / mm^2$	240
Flexural Modulus (at 240° C)	$x\ 10^2 N / mm^2$	7.2
Specific Gravity	-	1.98
Volume Resistivity (at 150° C)	Ω-cm	1×10^{12}
UL Flame Class	UL-94	V-0
Water Absorption (boiling, 24hrs)	% weight gain	0.13
Extracted Na^+	ppm	1
Extracted Cl^-	ppm	5

Appendix 7

Material Properties for the Nitto MP8000CH4 Mold Compound

Material Properties	Unit	Nitto MP8000CH4
Spiral Flow	cm	115
Gel Time (at 175°C)	sec	23
Thermal Expansion ∝ 1	$X10^{-5}$ 1/° C	1.3
Thermal Expansion ∝ 2	$X10^{-5}$ 1/° C	4.9
Tg	° C	150
Thermal Conductivity	cal/cm.sec.° C	20×10^{-4}
Flexural Strength (at 25° C)	kg/mm^2	17
Flexural Modulus (at 25° C)	kg/mm^2	1900
Specific Gravity	-	1.94
Volume Resistivity (at 150° C)	Ω-cm	55×10^{12}
UL Flame Class	UL-94	V-0
Water Absorption (boiling, 48hrs)	% weight gain	0.3
Extracted Na^+	ppm	2
Extracted Cl^-	ppm	18