

PROCESS CHANGE NOTIFICATION

PCN0904

Cyclone[®] III Family Process Shrink from 65-nm to 60-nm and Package Bill of Material Change

Change Description

This is an update to PCN0904, please see revision history table for information specific to this update.

Altera is transitioning Cyclone[®] III products from a 65-nm to a 60-nm process at TSMC Fab 14. In addition to the change in technology node, BGA packages out of Amkor will transition from a 4-layer to 2-layer or from a 6-layer to 4-layer substrate design. Packages with leadframe designs will remain unchanged. All package types will transition from gold (Au) to copper (Cu) wire. There is no change to the package-outline drawings. The new packages are halogen free, EU-RoHS compliant, and do not contain published REACH SvHC. Altera will continue to support packages assembled with tin lead (SnPb) solder balls and leadframe plating.

Recommended Action

There is no change to form, fit, or function as defined in Altera's datasheet. Altera recommends that customers review the electrical characterization report to determine if any action is required for their application.

Reason for Change

Altera is implementing this process change to improve manufacturing efficiency and to enable Altera to better support long-term demand for the affected products. TSMC and Amkor are existing, fully qualified strategic manufacturing partners for Altera products. The substrate designs are being migrated to current substrate-routing technologies. Conversion to copper wire is aligned with the current industry trend. Copper wire is used in high-volume production by our assembly vendors and has demonstrated better electrical and mechanical properties than gold.

Altera is committed to conducting its business operations in a manner that sustains the environment. This includes maintaining the compliance of Altera products to applicable environmental regulations. The conversion to halogen-free packages is in alignment with known regulatory trends for the semiconductor industry.

TSMC's 60-nm fabrication process is fully qualified and meets Altera's quality and reliability requirements. The change to 60-nm process, reduced substrate layers for BGA packages, and copper wire has been validated through successful completion of full qualification per JEDEC requirements. Supporting reliability data are included in this notification.

Products Affected

The initial product lines affected by this change are listed in Table 1. A list of ordering part numbers is included in Appendix 1.

Table 1: Affected Product Lines

Product Line	Pin Count	Package Type	Sample Availability	Earliest Shipment
EP3C120	484	FBGA	Dec 2009	Feb 2010
EP3C120	780	FBGA	Dec 2009	Feb 2010
EP3C80	484	FBGA	Jan 2010	Apr 2010
EP3C80	780	FBGA	Jan 2010	Apr 2010
EP3C80	484	UBGA	Jan 2010	Apr 2010
EP3C55	484	FBGA	Jan 2010	Apr 2010
EP3C55	780	FBGA	Jan 2010	Apr 2010
EP3C55	484	UBGA	Jan 2010	Apr 2010

Additional Cyclone III devices will transition as indicated in Table 2. Refer to Appendix 2 for the associated ordering part numbers.

Table 2: Summary of Cyclone III Device Transition Dates

Product Line	Pin Count	Package Type	Sample Availability	Earliest Shipment
EP3C40	240	PQFP ⁽¹⁾	June	October
EP3C40	324	FBGA	May	
EP3C40	484	FBGA	April	
EP3C40	484	UBGA ⁽²⁾	June	
EP3C40	780	FBGA ⁽²⁾	April	
EP3C25	144	EQFP ⁽¹⁾	May	October
EP3C25	240	PQFP ⁽¹⁾	June	
EP3C25	256	FBGA	May	
EP3C25	256	UBGA	June	
EP3C25	324	FBGA	July	October
EP3C16	144	EQFP ⁽¹⁾	May	
EP3C16	164	MBGA	June	
EP3C16	240	PQFP ⁽¹⁾	June	
EP3C16	256	FBGA	May	
EP3C16	256	UBGA	June	
EP3C16	484	FBGA	May	
EP3C16	484	UBGA ⁽²⁾	June	October
EP3C10	144	EQFP ⁽¹⁾	April	
EP3C10	164	MBGA	June	
EP3C10	256	FBGA	April	
EP3C10	256	UBGA	July	October
EP3C5	144	EQFP ⁽¹⁾	April	
EP3C5	164	MBGA	June	
EP3C5	256	FBGA	April	
EP3C5	256	UBGA	July	

Notes: (1) Lead-frame-based packages are not affected by the substrate design change.

(2) These packages will transition from a 6-layer to a 4-layer substrate design

Please visit Altera's sample request page for availability.

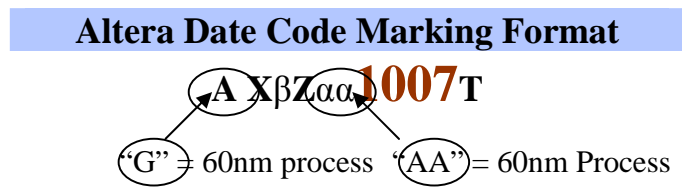
For device samples please visit <http://www.samplecomponents.com/scripts/SampleCenter.dll?Altera>

Product Traceability

This change will be implemented in Feb 2010. The product will transition to the new material as the current inventory is consumed. Customers may receive products with this change beginning with a date-code marking of 1007 or later on the top of the package. See Figure 1.

Figure 1 also shows the traceability scheme for 60-nm process. Devices produced with this process change can be distinguished by the first (A) and sixth ($\alpha\alpha$) characters of the Altera date code, which is marked on the top side of the device and the bar code labels on the packing boxes.

Figure 1. Date-Code Marking and Traceability



Qualification Data

Qualification data is summarized in Table 3.

Table 3. Summary of Cyclone III Product Qualification Data

Product Line	Package	Qualification Test	Read Out	Results
Cu Bondwire Validation	F672	High Temp Bake @ 150°C	1000 hrs	0 / 25
		Temp Humidity Bias (85°C /85%RH)	1000 hrs	0 / 19
		Temperature Cycle "B" (-55°C to 125°C)	1000 cyc	0 / 25
		Unbiased HAST (130°C / 85%RH)	96 hrs	0 / 25
60mn Process Validation	F780	Life Test @ 125°C	1000 hrs	0 / 75
		High Temp Bake @ 150°C	1000 hrs	0 / 94
EP3CLS200 (60nm)	F780	Life Test @ 125°C	1000 hrs	0 / 71
		High Temp Bake @ 150°C	1000 hrs	0 / 74
EP3C120 (60nm+2L+Cu)	F780	Life Test @ 125°C	1000 hrs	0 / 88
		High Temp Bake @ 150°C	1000 hrs	0 / 120
		Unbiased HAST (130°C / 85%RH)	96 hrs	0 / 635
		Temp Humidity Bias (85°C /85%RH)	1000 hrs	0 / 80
		Temperature Cycle "B" (-55°C to 125°C)	1000 cyc	0 / 256
		High Temp Bake @ 150°C	1000 hrs	0 / 25
EP1C12 (Cu Bondwire)	F324	Unbiased HAST (130°C / 85%RH)	96 hrs	0 / 50
		Biased HAST (130°C / 85%RH)	96 hrs	0 / 49
		Temperature Cycle "B" (-55°C to 125°C)	1000 cyc	0 / 50
		High Temp Bake @ 150°C	1000 hrs	0 / 77
EP1C6 (Cu Bondwire)	T144	Biased HAST (130°C / 85%RH)	96 hrs	0 / 77
		Autoclave (121°C / 15 psi)	96 hrs	0 / 77
		Temperature Cycle "B" (-55°C to 125°C)	1000 cyc	0 / 77
		High Temp Bake @ 150°C	1000 hrs	0 / 77

Contact

For more information, please contact Altera Customer Quality Engineering at customer-quality@altera.com.

Customer Notifications Subscription

Customers that have subscribed to Altera's customer notification mailing list will receive updates automatically via email.

If you would like to receive customer notifications by e-mail, please subscribe to our customer notification mailing list at <https://www.altera.com/subscriptions/email/signup/eml-index.jsp>

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

Revision History

Date	Rev	Description
11/25/2009	1.0.0	Initial Release
03/11/2010	1.1.0	Updated Table 2 to include estimated sample availability schedules and Table 3 qualification data

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Appendix 1. Affected Ordering Part Numbers



EP3C120F484C7	EP3C80F484C6	EP3C80U484C6	EP3C55F780C6N
EP3C120F484C7N	EP3C80F484C6N	EP3C80U484C6N	EP3C55F780C7
EP3C120F484C8	EP3C80F484C6NAB	EP3C80U484C7	EP3C55F780C7N
EP3C120F484C8N	EP3C80F484C7	EP3C80U484C7N	EP3C55F780C8
EP3C120F484I7	EP3C80F484C7N	EP3C80U484C8	EP3C55F780C8N
EP3C120F484I7N	EP3C80F484C8	EP3C80U484C8N	EP3C55F780I7
EP3C120F484I7NGA	EP3C80F484C8N	EP3C80U484I7	EP3C55F780I7N
EP3C120F780C7	EP3C80F484I7	EP3C80U484I7N	EP3C55U484C6
EP3C120F780C7AA	EP3C80F484I7N		EP3C55U484C6N
EP3C120F780C7N	EP3C80F780C6	EP3C55F484C6	EP3C55U484C7
EP3C120F780C7NGA	EP3C80F780C6N	EP3C55F484C6N	EP3C55U484C7N
EP3C120F780C8	EP3C80F780C7	EP3C55F484C7	EP3C55U484C8
EP3C120F780C8AA	EP3C80F780C7N	EP3C55F484C7N	EP3C55U484C8N
EP3C120F780C8N	EP3C80F780C7NAA	EP3C55F484C8	EP3C55U484I7
EP3C120F780I7	EP3C80F780C8	EP3C55F484C8N	EP3C55U484I7N
EP3C120F780I7N	EP3C80F780C8N	EP3C55F484I7	
	EP3C80F780I7	EP3C55F484I7N	
	EP3C80F780I7N	EP3C55F780C6	

Appendix 2. Additional Affected Ordering Part Numbers



EP3C40F324A7N	EP3C25F256C6	EP3C16F256I7N	EP3C10F256C8
EP3C40F324C6	EP3C25F256C6N	EP3C16F484A7N	EP3C10F256C8N
EP3C40F324C6N	EP3C25F256C7	EP3C16F484C6	EP3C10F256I7
EP3C40F324C7	EP3C25F256C7N	EP3C16F484C6N	EP3C10F256I7N
EP3C40F324C7N	EP3C25F256C8	EP3C16F484C7	EP3C10M164C7N
EP3C40F324C8	EP3C25F256C8N	EP3C16F484C7N	EP3C10M164C8N
EP3C40F324C8N	EP3C25F256C8NAA	EP3C16F484C8	EP3C10M164I7N
EP3C40F324I7	EP3C25F256I7	EP3C16F484C8N	EP3C10U256A7N
EP3C40F324I7N	EP3C25F256I7N	EP3C16F484I7	EP3C10U256C6
EP3C40F484A7N	EP3C25F324A7N	EP3C16F484I7N	EP3C10U256C6N
EP3C40F484C6	EP3C25F324C6	EP3C16M164C7N	EP3C10U256C7
EP3C40F484C6N	EP3C25F324C6N	EP3C16M164C8N	EP3C10U256C7N
EP3C40F484C7	EP3C25F324C7	EP3C16M164I7N	EP3C10U256C8
EP3C40F484C7N	EP3C25F324C7N	EP3C16M164INAA	EP3C10U256C8N
EP3C40F484C8	EP3C25F324C8	EP3C16Q240C8	EP3C10U256I7
EP3C40F484C8N	EP3C25F324C8N	EP3C16Q240C8N	EP3C10U256I7N
EP3C40F484I7	EP3C25F324I7	EP3C16U256A7N	
EP3C40F484I7N	EP3C25F324I7N	EP3C16U256C6	EP3C5E144A7N
EP3C40F780C6	EP3C25Q240C8	EP3C16U256C6N	EP3C5E144C7
EP3C40F780C6N	EP3C25Q240C8N	EP3C16U256C7	EP3C5E144C7N
EP3C40F780C7	EP3C25U256A7N	EP3C16U256C7N	EP3C5E144C8
EP3C40F780C7N	EP3C25U256C6	EP3C16U256C8	EP3C5E144C8N
EP3C40F780C8	EP3C25U256C6N	EP3C16U256C8N	EP3C5E144I7
EP3C40F780C8N	EP3C25U256C7	EP3C16U256I7	EP3C5E144I7N
EP3C40F780I7	EP3C25U256C7N	EP3C16U256I7N	EP3C5F256A7N
EP3C40F780I7N	EP3C25U256C7NAD	EP3C16U484A7N	EP3C5F256C6
EP3C40Q240C8	EP3C25U256C7NAE	EP3C16U484C6	EP3C5F256C6N
EP3C40U240C8N	EP3C25U256C8	EP3C16U484C6N	EP3C5F256C7
EP3C40U484A7N	EP3C25U256C8N	EP3C16U484C7	EP3C5F256C7N
EP3C40U484C6	EP3C25U256I7	EP3C16U484C7N	EP3C5F256C8
EP3C40U484C6N	EP3C25U256I7N	EP3C16U484C8	EP3C5F256C8N
EP3C40U484C7		EP3C16U484C8N	EP3C5F256I7
EP3C40U484C7N	EP3C16E144A7N	EP3C16U484I7	EP3C5F256I7N
EP3C40U484C8	EP3C16E144C7	EP3C16U484I7N	EP3C5M164C7N
EP3C40U484C8N	EP3C16E144C7N		EP3C5M164C8N
EP3C40U484I7	EP3C16E144C8	EP3C10E144A7N	EP3C5M164I7N
EP3C40U484I7N	EP3C16E144C8N	EP3C10E144C7	EP3C5U256A7N
	EP3C16E144I7	EP3C10E144C7N	EP3C5U256C6
EP3C25E144A7N	EP3C16E144I7N	EP3C10E144C8	EP3C5U256C6N
EP3C25E144C7	EP3C16F256A7N	EP3C10E144C8N	EP3C5U256C7
EP3C25E144C7N	EP3C16F256C6	EP3C10E144I7	EP3C5U256C7N
EP3C25E144C8	EP3C16F256C6N	EP3C10E144I7N	EP3C5U256C8
EP3C25E144C8N	EP3C16F256C7	EP3C10F256A7N	EP3C5U256C8N
EP3C25E144C8NAA	EP3C16F256C7N	EP3C10F256C6	EP3C5U256I7
EP3C25E144I7	EP3C16F256C8	EP3C10F256C6N	EP3C5U256I7N
EP3C25E144I7N	EP3C16F256C8N	EP3C10F256C7	
EP3C25F256A7N	EP3C16F256I7	EP3C10F256C7N	