



PROCESS CHANGE NOTIFICATION

PCN1801

Capillary Underfill for Thermal Composite Flip Chip Ball Grid Array (BGA) Packages on Selected Arria®II GX and Arria®V Devices

Change Description:

Intel Programmable Solutions Group ("Intel PSG", formerly Altera) is announcing a conversion from Molded Underfill to Capillary Underfill in Thermal Composite Flip Chip Ball Grid Array (BGA) on Arria®II GX and Arria®V devices with the "G" OPN suffix.

This change is aligned with Intel PSG's efforts towards Bill of Materials (BOM) standardization for devices assembled at Advanced Semiconductor Engineering Inc., Taiwan (ASEK) and Amkor Technology Korea (ATK).

The capillary underfill material introduced in the package is already qualified and has been used in Arria®10 products for >4 years.

Table 1: Changes to BOM

| Product Family | OPN Suffix | Package-Pin | Affected Material | Change From | Change To |
|----------------|------------|--------------------------------|-------------------|------------------|---------------------|
| Arria II GX | G | FBGA F572 F780 F1152 | Underfill | Molded Underfill | Capillary Underfill |
| Arria V | G | FBGA F672 F896 F1152 F1517 | Underfill | Molded Underfill | Capillary Underfill |

Note: The rest of the BOM including the mold compound remains the same.

Products Affected:

Table 2

| Product Family | OPN Suffix | Package – Pin Count |
|----------------|------------|--------------------------|
| Arria II GX | G | FBGA – 572/780/1152 |
| Arria V | G | FBGA – 672/896/1152/1517 |

The list of affected OPNs can be downloaded in Excel form:

https://www.altera.com/content/dam/altera-www/global/en_US/pdfs/literature/pcn/pcn1801-opn-list.xlsx

Recommended Action

Customers are requested to:

1. Acknowledge receipt of this notification.
2. Review and provide approval of this change at the earliest convenience.

Please refer to the “Product Transition Dates” for the key milestones.

Upon implementation, Intel PSG may continue to ship pre-change material until inventory is depleted.

Product Transition Dates:

Customers are requested to take note of the key dates shown in the table below.

Table 3

| Milestone | Date |
|--|----------------|
| Last date to acknowledge receipt of this notification ¹ | March 12, 2018 |
| Estimated earliest shipment date of changed products ² | July 1, 2018 |

Note 1: J-STD-046, section 3.2.3.1b, stipulates that lack of acknowledgement of the PCN within 30 days constitutes acceptance of the change.

Note 2: Effective the earliest ship date listed above, Intel PSG may begin the shipment of changed products.

Intel PSG reserves the right to continue shipment of pre-change product after the change implementation date, and customers will receive shipments of either pre-change or post-change product.

Reason for Change:

The change to the capillary underfill package type supports BOM standardization for Arria II GX and Arria V devices in ball grid array packages assembled at ASE Taiwan and Amkor Technology Korea.

Impact and Benefit of Change:

The change will not impact the form, fit, and function of the product. Product datasheet and package specifications remain the same. See Figure 1 below for a top-view example image of the Thermal Composite Flip Chip Ball Grid Array (BGA) package; the package appearance remains unchanged post-change.



Fig 1: Arria V F896 Package

Additional qualification has been performed to further evaluate the quality and reliability performance of the capillary underfill BGA package for the products specific to this PCN. (See Qualification Data Section, Table 4)

Method to Identify Change Product:

An earliest datecode of implementation can be identified and shared upon request as reference information related to this change. This earliest datecode of implementation may vary per product and depends on the depletion of existing inventory.

Upon implementation, Intel PSG may continue to ship pre-change material until inventory is depleted.

Qualification Data:

Qualification testing was performed to further evaluate the quality and reliability performance of the capillary underfill BGA package for the products specific to this PCN. (See Table 4)

Table 4: Qualification Data

| Test | Time point | Conditions | # of Lots | SS/lot | Results (Fail/Total SS) |
|---|------------|-------------------------|-----------|--------|-------------------------|
| Temperature Cycle Test (TCB) | 500X | -55°C /125°C | 7 | 44-50 | 0/318 |
| | 1000X | -55°C /125°C | 7 | 44-50 | 0/318 |
| Biased Humidity (THB) | 500hrs | 85°C / 85% RH with bias | 7 | 44-50 | 0/317 |
| | 1000hrs | 85°C / 85% RH with bias | 7 | 44-50 | 0/317 |
| Unbiased Highly Accelerated Stress Test (uHAST) | 96hrs | 130°C / 85%RH | 7 | 45-50 | 0/320 |
| | 196hrs | 130°C / 85%RH | 7 | 45-50 | 0/320 |

Note: Preconditioning (J-STD-020, MSL3 @ 260C) performed on all samples prior to each reliability test.

Table 4a: Vehicle Devices

| Product Family | Package | Base Die |
|----------------|-------------|----------|
| Arria II GX | FBGA - 1152 | 2AGX260 |
| Arria V | FBGA - 1152 | 5AGTD3 |

Note: Qualification vehicles were selected to represent various die and package combinations, to identify the largest die or package, or largest die-to-package ratio.

Contact

For more information, please contact Sales or Customer Quality Engineering (CQE) in your region, or submit a Service Request at Intel PSG's [mySupport](#) website.

Customer Notifications Subscription

Customers that have subscribed to Intel PSG's customer notification mailing list will receive the PCN document automatically via email.

If you would like to receive customer notifications by email, please subscribe to our customer notification mailing list at:

<https://www.altera.com/subscriptions/email/signup/eml-index.jsp>

Intel PSG references J-STD-046 guidelines for PCN.

In accordance with J-STD-046, this change is deemed acceptable to the customer if no acknowledgement is received within 30 days from date of notification.

Revision History

| Date | Rev | Description |
|------------|-------|-----------------|
| 01/26/2018 | 1.0.0 | Initial Release |

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