August 1, 2011

Revision History

PCN#	Issue Date	Description
07A-11	May 2, 2011	Initial release.
07B-11	May 2, 2011	Exhibit B “Affected Device List” has been updated to include the LFX125EB products.
07C-11	August 1, 2011	Withdrawal of all previous versions of this PCN

Subject: Withdrawal of PCN# 07B-11

Dear Lattice Customers:

Lattice is withdrawing this Notification effective immediately. The original intent of this Notice was to establish alternate Bills of Materials to expand our manufacturing capacity in light of the material shortages that were feared as a result of the Japan earthquake of March 2011.

Material shortages have been resolved and steps have been taken to assure supply going forward. As a result, Lattice is no longer planning to go forward with the Alternate Qualified Material Sets identified in this Notice.

Sincerely,
Lattice Semiconductor PCN Administration

PCN#07B-11, #06B-11 and ACN#03C-11 also issued on May 2, 2011 will supersede ACN#03B-11, issued on April 5, 2011.

May 2, 2011

Revision History

PCN#	Issue Date	Description
07A-11	May 2, 2011	Initial release.
07B-11	May 2, 2011	Exhibit B "Affected Device List" has been updated to include the LFX125EB products.

Subject: **PCN# 07B-11, Notification of Intent to Utilize an Alternate Qualified Material Set for Select Chip Scale BGA, Ultra Chip Scale BGA, Chip Array BGA, Fine Pitch Thin BGA, Fine Pitch BGA and Plastic BGA Packages**

Dear Lattice Customers:

Lattice is providing this Notification of our intent to utilize an alternate qualified material set for select devices in Chip Scale Ball Grid Array (csBGA), Ultra Chip Scale Ball Grid Array (ucBGA), Chip Array Ball Grid Array (caBGA), Fine Pitch Thin Ball Grid Array (ftBGA), Fine Pitch Ball Grid Array (fpBGA) and Plastic Ball Grid Array (BGA) packages.

In an effort to diversify our source of supply, and reduce risk of supply interruption, Lattice will now maintain alternate qualified Bills of Material (BOMs) for select csBGA / usBGA / caBGA / ftBGA / fpBGA / BGA packages. Alternate BOMs will be qualified at ASE Malaysia* and at UTAC Singapore*. Both ASE Malaysia and UTAC Singapore utilize industry standard raw materials, assembly and test processes. These material sets meet all external package dimensions and package footprints remain the same and are published on the Lattice web site (www.latticesemi.com).

Lattice is taking this action in response to the major Japan earthquake of March 11, 2011. This urgent response to the risk of supply interruption creates a need for immediate qualification of these alternate BOMs. Lattice will provide a limited set of package samples using the alternate BOMs for select die / package combinations to assist customer conversions. Sample availability plans are shown in Exhibit A.

*Note: At this time, no changes are planned to BGA Package BOMs used at Amkor Philippines, Amkor Korea, ASE Taiwan, or Unisem Indonesia.

AFFECTED DEVICES AND APPLICABLE CHANGES

The affected devices and applicable changes are summarized in Exhibit B. This PCN also affects any custom devices (i.e. factory programmed, customer specific Pb-free packages, special test, tape & reel, etc.), which are derived from any of the devices listed.

ALTERNATE QUALIFIED MATERIAL SET

The complete material set used for each package type is described in Exhibit C.

DEVICE MARKING AND IDENTIFICATION

Lattice does not plan to change the device marking or identification for the alternate materials. Our assembly subcontractors will use the existing and alternate BOMs as required to meet production demand. The current topside Date Code Mark provides complete traceability to the assembly vendor and BOM used for all material.

Due to the critical nature of this situation, Lattice is not able to accommodate specific BOM requests. The existing and alternate BOMs will be qualified and available for use interchangeably.

QUALIFICATION AND CHARACTERIZATION DATA

Reliability testing for the qualification of these ASE Malaysia and UTAC Singapore manufactured csBGA / usBGA / caBGA / ftBGA / fpBGA / BGA packages is in progress. The Qualification Plan and Timing are shown in Exhibit D. An updated PCN will be posted to the Lattice web site when qualification milestones are completed.

In accordance with Lattice PCN Policy, changes to BGA laminate substrate core material are not typically reported. Qualification of these materials is completed by the assembly subcontractor, and reported to Lattice prior to use. To support recent customer requests for additional information, a qualification summary for the qualified BGA laminate core materials is shown in Exhibit F. Shipment of products with qualified BGA laminate cores will not be restricted to the timing for this PCN.

Product Performance Characterization of the qualification vehicle devices for these ASE Malaysia and UTAC Singapore manufactured BGA packages is in progress. The characterization plan is shown in Exhibit E. Characterization data will be reported with the qualification milestone updates.

DATA SHEET SPECIFICATIONS

This PCN has no impact on any data sheet specifications.

CONVERSION TIMING

Use of the Alternate BOMs will begin no sooner than October 3, 2011 (Note: this schedule may change in the event of further supply chain interruption). Any significant changes to the Qualification and Characterization schedule, or changes in material availability, will be reported in an updated PCN. Lattice recommends expedited approval of this PCN to ensure continued supply of product.

CONVERSION TIMING – Summary

- **ACN Issue Date: April 5, 2011**
- **PCN Issue Date: May 2, 2011**
- **Early Qualification and Characterization Date: Late June, 2011**
- **Final Qualification and Characterization Date: Late July, 2011**
- **PCN Expiration Date: October 3, 2011**

RESPONSE

In accordance with JESD46-C, this change is deemed accepted by the customer if no acknowledgement is received within 30 days from this Notice.

Lattice PCNs are available on the Lattice website. Please sign up to receive e-mail PCN alerts by registering here. If you already have a Lattice web account and wish to receive PCN alerts, you can do so by logging into your account and making edits to your subscription options.

CONTACT

If you have any questions or require additional information, please contact pcn@latticesemi.com.

Sincerely,
Lattice Semiconductor PCN Administration

EXHIBIT "A" – PCN Evaluation Sample Availability[1]

Product	Package Type	Package Designator	Vendor	Die Attach	Mold Compound
LCMXO640C	Pb-Free 256-ftBGA	FTN256	ASE Malaysia	No	Yes
LCMXO1200C	Pb-Free 256-ftBGA	FTN256	UTAC Singapore	Yes	Yes
LCMXO2280C	Pb-Free 324-ftBGA	FTN324	ASE Malaysia	No	Yes
LC4512V	Pb-Free 256-ftBGA	FTN256	UTAC Singapore	No	Yes
LFXP2-30E	Pb-Free 256-ftBGA	FTN256	ASE Malaysia	No	Yes
LFE3-70EA	Pb-Free 672-fpBGA	FN672	ASE Malaysia	No	Yes
LFE3-150EA	Pb-Free 1156-fpBGA	FN1156	ASE Malaysia	No	Yes
LFE2M20E	Pb-Free 484-fpBGA	FN484	ASE Malaysia	No	Yes
LFE2M100E	Pb-Free 900-fpBGA	FN900	ASE Malaysia	No	Yes
LC5256MV	Pb-Free 256-fpBGA	FN256	ASE Malaysia	No	Yes

1. Sample availability targeted for end of July

EXHIBIT "B" – PCN Device Listing and Applicable Changes

Product Family	Product Line	Package Type	Package Code			ASE Malaysia	UTAC Singapore
			Pb	Pb-Free	Halogen-Free		
ispGDX®	ispGDX160V	208-fpBGA	B208			✓	
	ispGDX160VA	208-fpBGA	B208	BN208		✓	
	ispGDX240VA	388-fpBGA	B388	BN388		✓	
ispGDX2™	LX128V/EV	208-fpBGA	F208	FN208		✓	
ispLSI 5000VA	ispLSI 5256VA	208-fpBGA	B208			✓	
		272-BGA	B272			✓	
	ispLSI 5384VA	208-fpBGA	B208			✓	
		272-BGA	B272			✓	
		388-BGA	B388			✓	
	ispLSI 5512VA	272-BGA	B272			✓	
		388-BGA	B388			✓	
ispLSI 5000VE	ispLSI 5256VE	256-fpBGA	F256			✓	
		272-BGA	B272			✓	
	ispLSI 5384VE	256-fpBGA	F256			✓	
		272-BGA	B272			✓	
	ispLSI 5512VE	256-fpBGA	F256			✓	
		272-BGA	B272			✓	
		388-BGA	B388			✓	
		388-fpBGA	F388			✓	
ispLSI® 2000VE	ispLSI 2128VE	208-fpBGA	B208	BN208		✓	
ispMACH® 4000	LC4256V/B/C	256-ftBGA	FT256	FTN256		✓	✓
	LC4384V/B/C	256-ftBGA	FT256	FTN256		✓	✓
	LC4512V/B/C	256-ftBGA	FT256	FTN256		✓	✓
ispMACH 4000ZC	LC4032ZC	56-csBGA	M56	MN56		✓	
	LC4064ZC	132-csBGA	M132	MN132		✓	
		56-csBGA	M56	MN56		✓	
	LC4128ZC	132-csBGA	M132	MN132		✓	
	LC4256ZC	132-csBGA	M132	MN132		✓	
ispMACH 4000ZE	LC4032ZE	64-csBGA		MN64		✓	
	LC4064ZE	144-csBGA		MN144		✓	
		64-csBGA		MN64		✓	
		64-ucBGA		UMN64		✓	
	LC4128ZE	132-ucBGA		UMN132		✓	
		144-csBGA		MN144		✓	
	LC4256ZE	144-csBGA		MN144		✓	

Note: This PCN affects all speed and temperature grades for the device families listed above. Please refer to the device family data sheets on the Lattice web site at http://www.latticesemi.com for the complete list of OPNs. This PCN also affects any custom devices (i.e. factory programmed, customer specific Pb-free packages, special test, tape and reel, non-standard speed grade, etc.), which are derived from any of the devices listed above.

EXHIBIT "B" – PCN Device Listing and Applicable Changes (Cont'd)

Product Family	Product Line	Package Type	Package Code			ASE Malaysia	UTAC Singapore
			Pb	Pb-Free	Halogen-Free		
ispMACH 4A3	M4A3-256/128	256-fpBGA	FA	FAN		✓	
	M4A3-256/192	256-fpBGA	FA	FAN		✓	
	M4A3-384/192	256-fpBGA	FA	FAN		✓	
	M4A3-512/192	256-fpBGA	FA	FAN		✓	
ispMACH® 5000VG	LC5768VG	484-fpBGA	F484			✓	
	LC51024VG	484-fpBGA	F484			✓	
ispXPGA®	LFX125EB	256-fpBGA	F256	FN256		✓	
	LFX200B/EB	256-fpBGA	F256	FN256		✓	
ispXPLD®	LC5256MB/V	256-fpBGA	F256	FN256		✓	
	LC5512MB/V	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LC5768MV	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LC51024MV	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
LatticeEC™	LFEC3E	256-fpBGA	F256	FN256		✓	
	LFEC6E	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFEC10E	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFEC15E	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFEC20E	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFEC33E	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
LatticeECP™	LFECP6E	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFECP10E	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFECP15E	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFECP20E	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFECP33E	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	

Note: This PCN affects all speed and temperature grades for the device families listed above. Please refer to the device family data sheets on the Lattice web site at http://www.latticesemi.com for the complete list of OPNs. This PCN also affects any custom devices (i.e. factory programmed, customer specific Pb-free packages, special test, tape and reel, non-standard speed grade, etc.), which are derived from any of the devices listed above.

EXHIBIT "B" – PCN Device Listing and Applicable Changes (Cont'd)

Product Family	Product Line	Package Type	Package Code			ASE Malaysia	UTAC Singapore
			Pb	Pb-Free	Halogen-Free		
LatticeECP2™	LFE2-6E/SE	256-fpBGA	F256	FN256		✓	
	LFE2-12E/SE	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFE2-20E/SE	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFE2-35E/SE	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFE2-50E/SE	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFE2-70E/SE	672-fpBGA	F672	FN672		✓	
		900-fpBGA	F900	FN900		✓	
LatticeECP2M™	LFE2M20E/SE	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
	LFE2M35E/SE	256-fpBGA	F256	FN256		✓	
		484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFE2M50E/SE	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
		900-fpBGA	F900	FN900		✓	
	LFE2M70E/SE	1152-fpBGA	F1152	FN1152		✓	
		900-fpBGA	F900	FN900		✓	
	LFE2M100E/SE	1152-fpBGA	F1152	FN1152		✓	
		900-fpBGA	F900	FN900		✓	
LatticeECP3™	LFE3-17EA	256-ftBGA		FTN256		✓	
		484-fpBGA		FN484		✓	
	LFE3-35EA	256-ftBGA		FTN256		✓	
		484-fpBGA		FN484		✓	
		672-fpBGA		FN672		✓	
	LFE3-70EA	1156-fpBGA		FN1156		✓	
		484-fpBGA		FN484		✓	
		672-fpBGA		FN672		✓	
	LFE3-95EA	1156-fpBGA		FN1156		✓	
		484-fpBGA		FN484		✓	
		672-fpBGA		FN672		✓	
	LFE3-150EA	1156-fpBGA		FN1156		✓	
		672-fpBGA		FN672		✓	

Note: This PCN affects all speed and temperature grades for the device families listed above. Please refer to the device family data sheets on the Lattice web site at http://www.latticesemi.com for the complete list of OPNs. This PCN also affects any custom devices (i.e. factory programmed, customer specific Pb-free packages, special test, tape and reel, non-standard speed grade, etc.), which are derived from any of the devices listed above.

EXHIBIT "B" – PCN Device Listing and Applicable Changes (Cont'd)

Product Family	Product Line	Package Type	Package Code			ASE Malaysia	UTAC Singapore
			Pb	Pb-Free	Halogen-Free		
LatticeSC™	LFSC3GA15E	256-fpBGA	F256	FN256		✓	
		900-fpBGA	F900	FN900		✓	
	LFSC3GA25E	900-fpBGA	F900	FN900		✓	
LatticeSCM™	LFSCM3GA15EP1	256-fpBGA	F256	FN256		✓	
		900-fpBGA	F900	FN900		✓	
	LFSCM3GA25EP1	900-fpBGA	F900	FN900		✓	
LatticeXP™	LFXP6C/E	256-fpBGA	F256	FN256		✓	
	LFXP10C/E	256-fpBGA	F256	FN256		✓	
		388-fpBGA	F388	FN388		✓	
	LFXP15C/E	256-fpBGA	F256	FN256		✓	
		388-fpBGA	F388	FN388		✓	
		484-fpBGA	F484	FN484		✓	
	LFXP20C/E	256-fpBGA	F256	FN256		✓	
		388-fpBGA	F388	FN388		✓	
		484-fpBGA	F484	FN484		✓	
LatticeXP2™	LFXP2-5E	132-csBGA	M132	MN132		✓	✓
		256-ftBGA	FT256	FTN256		✓	✓
	LFXP2-8E	132-csBGA	M132	MN132		✓	✓
		256-ftBGA	FT256	FTN256		✓	✓
	LFXP2-17E	256-ftBGA	FT256	FTN256		✓	✓
		484-fpBGA	F484	FN484		✓	
	LFXP2-30E	256-ftBGA	FT256	FTN256		✓	✓
		484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
	LFXP2-40E	484-fpBGA	F484	FN484		✓	
		672-fpBGA	F672	FN672		✓	
MachXO™	LCMXO256C/E	100-csBGA	M100	MN100		✓	
	LCMXO640C/E	100-csBGA	M100	MN100		✓	
		132-csBGA	M132	MN132		✓	
		256-caBGA	B256	BN256		✓	
		256-ftBGA	FT256	FTN256		✓	
	LCMXO1200C/E	132-csBGA	M132	MN132		✓	
		256-caBGA	B256	BN256		✓	
		256-ftBGA	FT256	FTN256		✓	
	LCMXO2280C/E	132-csBGA	M132	MN132		✓	
		256-caBGA	B256	BN256		✓	
		256-ftBGA	FT256	FTN256		✓	
		324-ftBGA	FT324	FTN324		✓	

Note: This PCN affects all speed and temperature grades for the device families listed above. Please refer to the device family data sheets on the Lattice web site at http://www.latticesemi.com for the complete list of OPNs. This PCN also affects any custom devices (i.e. factory programmed, customer specific Pb-free packages, special test, tape and reel, non-standard speed grade, etc.), which are derived from any of the devices listed above.

EXHIBIT "B" – PCN Device Listing and Applicable Changes (Cont'd)

Product Family	Product Line	Package Type	Package Code			ASE Malaysia	UTAC Singapore
			Pb	Pb-Free	Halogen-Free		
MachXO2™	LCMXO2-1200HC	132-csBGA			MG132	✓	
	LCMXO2-1200ZE	132-csBGA			MG132	✓	
ORCA™ 2 Series	OR2T15A	256-BGA	BA256			✓	
ORCA 3 Series	OR3T30	256-BGA	BA256			✓	
	OR3T55	256-BGA	BA256			✓	
ORCA 4 Series FPSC	ORSO42G5	484-fpBGA	BM484	BMN484		✓	
	ORSO82G5	680-fpBGA	F680	FN680		✓	
	ORT42G5	484-fpBGA	BM484	BMN484		✓	
	ORT82G5	680-fpBGA	F680	FN680		✓	
	ORT8850H	680-fpBGA	BM680	BMN680		✓	
	ORT8850L	680-fpBGA	BM680	BMN680		✓	

Note: This PCN affects all speed and temperature grades for the device families listed above. Please refer to the device family data sheets on the Lattice web site at http://www.latticesemi.com for the complete list of OPNs. This PCN also affects any custom devices (i.e. factory programmed, customer specific Pb-free packages, special test, tape and reel, non-standard speed grade, etc.), which are derived from any of the devices listed above.

EXHIBIT "C" – Current and Future Qualified Assembly Sites and Material Sets

	Current				Alternate Qualified			
Package Type	Assembly Site	Material Set			Assembly Site	Material Set		
		Die Attach	Mold Compound	Wire		Die Attach	Mold Compound	Wire
csBGA ucBGA caBGA ftBGA fpBGA PBGA	ASE Malaysia	Ablebond 2100A	Sumitomo G770HJ[1] Kyocera KEG1250[2] Hitachi CEL9750HF[3]	Au	ASE Malaysia	Ablebond 2100A	Kyocera KEG2250	Au
	UTAC Singapore	Ablebond 2100A	Hitachi CEL9750[4]	Au	UTAC Singapore	Ablebond 2300	Nitto G100BC	Au
		Ablebond 2300	Nitto G100BC[5]					

Note:

- Any of the qualified material sets above may be used with Mitsubishi, Doosan or Hitachi BGA Laminate core.
- Above table summarizes the current qualified material set and alternate qualified material set at ASE Malaysia and UTAC Singapore. The highlighted cells in the "Alternate Qualified" section identify the changes associated with this PCN.

1. Currently used for LC4000, MachXO families
2. Currently used for ispLSI 2000VE, ispLSI 5000VA/VE, ispMACH 5000VG, ispXPLD, LatticeEC/ECP, ispGDX/V, ispGDX2, LatticeXP, ispMACH 4A, ispXPGA and ORCA 2/3/4 families
3. Currently used for MachXO2, LatticeECP2/M, LatticeECP3, LatticeSC/SCM and LatticeXP2 families
4. Currently used for LatticeECP2/M, MachXO, LatticeXP, LatticeXP2 families
5. Currently used for LC4000 and MachXO families. Mold compound formulation changes to low alpha

EXHIBIT "D" – Alternate Materials Qualification Plan

ASEM Alternate Mold Compounds by Product & Package Type	Now	Alternate	Peak Reflow Temp
csBGA / usBGA / caBGA / ftBGA	Sumitomo G770HJ	Kyocera KEG2250	260C
fpBGA / BGA	CEL9750HF Series / Kyocera KEG1250	Kyocera KEG2250	250C

Reliability Stress at	Stress	# Lots	Units / Lot	Jedec Standard	Condition	Vcc (V)	Early Release Point	Early Release Target Date	Qual Pass	Qual Complete Target Date
ASEM	SMPC	3	135	J-STD-020D.1 & JESD-A113F	MSL3 30C/60% RH & 250C or 260C peak reflow temp	N/A	N/A	Late June	After 3x reflow	Late July
ASEM	TC	3	45	JESD22-A104C	Cond B (-55C/+125C)	N/A	200 Cycles		1000 Cycles	
ASEM	HTSL	3	45	JESD22-A103D	150C dry bake	N/A	168 Hrs		1000 Hours	
ASEM	UHAST	3	45	JESD22-A118	Cond B (110C/85%RH)	N/A	N/A		264 Hours	
Lattice Semi	BHAST	3	45	JESD22-A110B	Cond B (110C/85%RH)	1.2 / 3.3	N/A		264 Hours	

UTAC Alternate Mold Compounds by Product & Package Type	Now	Alternate	Peak Reflow Temp
csBGA / usBGA / caBGA / ftBGA	CEL9750HF Series	Nitto G100 BC CFC-S	260C
LC4000 256-ftBGA Only	Nitto G100BC-U	Nitto G100 BC CFC-S	260C

Reliability Stress at	Stress	# Lots	Units / Lot	Jedec Standard	Condition	Vcc (V)	Early Release Point	Early Release Target Date	Qual Pass	Qual Complete Target Date
UTAC	SMPC	3	135	J-STD-020D.1 & JESD-A113F	MSL3a 60C/60% RH & 260C peak reflow temp	N/A	N/A	Late June	After 3x reflow	Late July
UTAC	TC	3	45	JESD22-A104C	Cond B (-55C/+125C)	N/A	200 Cycles		1000 Cycles	
UTAC	HTSL	3	45	JESD22-A103D	150C dry bake	N/A	168 Hrs		1000 Hours	
UTAC	UHAST	3	45	JESD22-A118	Cond B (110C/85%RH)	N/A	N/A		264 Hours	
Lattice Semi	BHAST	3	45	JESD22-A110B	Cond B (110C/85%RH)	1.2 / 3.3	N/A		264 Hours	

EXHIBIT "E" – Alternate Materials Characterization Plan

Subcon	Product	Pkg	Split	Mold Compound	# Lots	Units/ Lot	Temperature
UTAC	LC4512V	256-ftBGA	Current	Nitto G100BC	1	300	90C
	LC4512V	256-ftBGA	Alternate	Nitto G100BC	3	300	90C
UTAC	LMXO-1200C	256-ftBGA	Current	9750HF Series	1	300	90C
	LMXO-1200C	256-ftBGA	Alternate	Nitto G100BC	3	300	90C

Subcon	Product	Pkg	Split	Mold Compound	# Lots	Units/ Lot	Temperature
ASEM	LFE3-150EA	1156-fpBGA	Current	9750HF Series	1	300	90C
	LFE3-150EA	1156-fpBGA	Alternate	Kyocera KEG2250	3	300	90C
ASEM	LFXP2-30E	256-ftBGA	Current	9750HF Series	1	300	90C
	LFXP2-30E	256-ftBGA	Alternate	Kyocera KEG2250	3	300	90C

EXHIBIT "F" – Qualified BGA Laminate Core Material

Hitachi E-679FGB BGA Laminate Core Material Qualification Data Report

Test Conditions					Test Results		
Stress Test	Stress Conditions	Duration	Lot Number	Read Point	Visual Inspection	O/S Test	SAT
Pre-condition	JEDEC 22-A113-D Level 3	N/A	Lot 1	Pre-stress	0/50	0/50	0/50
				Post-stress	0/50	0/50	0/50
			Lot 2	Pre-stress	0/156	0/156	0/156
				Post-stress	0/156	0/156	0/156
Temperature Cycle Test	JEDEC 22-A104-B 150°C --> -65°C	1000 Cycles	Lot 1	Post-stress	0/25	0/25	0/25
			Lot 2	Post-stress	0/77	0/77	0/77
HAST Test (no bias)	JEDEC 22-A118 130°C/85%RH 33.5PSIA	100 Hrs	Lot 1	Post-stress	0/25	0/25	0/25
			Lot 2	Post-stress	0/77	0/77	0/77
High Temperature Storage	JEDEC 22-A103-C 150°C	1000 Hrs	Lot 1	Post-stress	0/25	0/25	0/25
			Lot 2	Post-stress	0/77	0/77	0/77

EXHIBIT "F" – Qualified BGA Laminate Core Material (Cont'd)

Doosan DS-7409HGB BGA Laminate Core Material Qualification Data Report

Test Conditions					Test Results		
Stress Test	Stress Conditions	Duration	Lot Number	Read Point	Visual Inspection	O/S Test	SAT
Pre-condition	JEDEC 22-A113-D Level 3	N/A	7B218	Pre-stress	0/180	0/180	0/180
				Post-stress	0/180	0/180	0/180
			7B219	Pre-stress	0/180	0/180	0/180
				Post-stress	0/180	0/180	0/180
			7B220	Pre-stress	0/180	0/180	0/180
				Post-stress	0/180	0/180	0/180
Pressure Cooker Stress	JEDEC 22-A102-C 121°C/100%RH 29.7PSIA	168 Hrs	7B218	Post-stress	0/45	0/45	0/45
			7B219	Post-stress	0/45	0/45	0/45
			7B220	Post-stress	0/45	0/45	0/45
Temperature Cycle Test	JEDEC 22-A104-B 150°C --> -65°C	1000 Cycles	7B218	Post-stress	0/45	0/45	0/45
			7B219	Post-stress	0/45	0/45	0/45
			7B220	Post-stress	0/45	0/45	0/45
HAST Test (no bias)	JEDEC 22-A118 130°C/85%RH 33.5PSIA	100 Hrs	7B218	Post-stress	0/45	0/45	0/45
			7B219	Post-stress	0/45	0/45	0/45
			7B220	Post-stress	0/45	0/45	0/45
High Temperature Storage	JEDEC 22-A103-C 150°C	1000 Hrs	7B218	Post-stress	0/45	0/45	0/45
			7B219	Post-stress	0/45	0/45	0/45
			7B220	Post-stress	0/45	0/45	0/45