October 23, 2017

Subject: PCN#05A-17 – Upgrade of Selected BGA Substrates to Green Materials

Dear Lattice Customers,

Lattice is delighted to provide this 90-day Notification of our intent to convert select BGA products to a Halogen-free material set. This change affects specific BGA packages from assembly-test supplier, Advanced Semiconductor Engineering, Malaysia (ASEM). This change is a continuous improvement and will be implemented on a rolling basis.

Change Description

In response to consumer demand for non-Halogenated IC's, substrate supplier Mitsubishi Gas Chemical (MGC) has announced the discontinuance of Halogenated materials by the end of 2017. Lattice's assembly/test supplier, ASEM, uses MGC products in select BGA substrates and will also be converting to the new non-Halogenated materials.

The substrate core and prepreg dielectric material will change from CCL-HL832/GHPL-830 to CCL-HL832**NX**/GHPL-830**NX**. All compounds are manufactured by MGC. This change will not impact the device form, fit or function.

Note that the new material set combination is already in-use on other Lattice products at ASEM and at other Lattice suppliers. No electrical performance difference has been measured or is expected.

Affected Products

The Ordering Part Numbers (OPNs) affected by this PCN are listed below:

#	OPN	PACKAGE
1	LFE3-17EA-*sp*FN484*g*	fpBGA484 23X23
2	LFE3-17EA-*sp*FTN256*g*	ftBGA256 17X17
3	LFE3-35EA-*sp*FN484*g*	fpBGA484 23X23
4	LFE3-35EA-*sp*FN672*g*	fpBGA672 27X27
5	LFE3-35EA-*sp*FTN256*g*	ftBGA256 17X17
6	LFE3-70EA-*sp*FN484*g*	fpBGA484 23X23
7	LFE3-70EA-*sp*FN672*g*	fpBGA672 27X27
8	LFE3-70EA-*sp*FN1156*g*	fpBGA1156 35X35
9	LFE3-95EA-*sp*FN484*g*	fpBGA484 23X23
10	LFE3-95EA-*sp*FN672*g*	fpBGA672 27X27
11	LFE3-95EA-*sp*FN1156*g*	fpBGA1156 35X35
12	LFE3-150EA-*sp*FN672*g*	fpBGA672 27X27

13	LFE3-150EA-*sp*FN1156*g*	fpBGA1156 35X35
14	LAE3-17EA-*sp*FN484E	fpBGA484 23X23
15	LAE3-17EA-*sp*FTN256E	ftBGA256 17X17
16	LAE3-35EA-*sp*FN484E	fpBGA484 23X23
17	LAE3-35EA-*sp*FN672E	fpBGA672 27X27
18	LAE3-35EA-*sp*FTN256E	ftBGA256 17X17
19	LFXP2-5E-*s*FTN256*g*	ftBGA256 17X17
20	LFXP2-5E-*s*MN132*g*	csBGA132 8X8
21	LFXP2-8E-*s*FTN256*g*	ftBGA256 17X17
22	LFXP2-8E-*s*MN132*g*	csBGA132 8X8
23	LFXP2-17E-*s*FTN256*g*	ftBGA256 17X17
24	LFXP2-17E-*s*FN484*g*	fpBGA484 23X23
25	LFXP2-30E-*s*FTN256*g*	ftBGA256 17X17
26	LFXP2-30E-*s*FN484*g*	fpBGA484 23X23
27	LFXP2-30E-*s*FN672*g*	fpBGA672 27X27
28	LFXP2-40E-*s*FN484*g*	fpBGA484 23X23
29	LFXP2-40E-*s*FN672*g*	fpBGA672 27X27
30	LAXP2-5E-*s*FTN256E	ftBGA256 17X17
31	LAXP2-5E-*s*MN132E	csBGA132 8X8
32	LAXP2-8E-*s*FTN256E	ftBGA256 17X17
33	LAXP2-8E-*s*MN132E	csBGA132 8X8
34	LAXP2-17E-*s*FTN256E	ftBGA256 17X17
35	LC4032ZC-*s*MN56*g*	csBGA56 6X6
36	LC4064ZC-*s*MN56*g*	csBGA56 6X6
37	LC4064ZE-*s*MN144*g*	csBGA144 7X7
38	LC4128ZE-*s*MN144*g*	csBGA144 7X7
39	LC4128ZE-*s*UMN132*g*	ucBGA132 6X6
40	LC4256ZE-*s*MN144*g*	csBGA144 7X7
41	LC4256V/ZC-*s*FTN256A*g*	ftBGA256 17X17
42	LC4256V-*s*FTN256B*g*	ftBGA256 17X17
43	LC4384V-*s*FTN256*g*	ftBGA256 17X17
44	LC4512V-*s*FTN256*g*	ftBGA256 17X17
45	LCMXO640C/E-*s*BN256*g*	caBGA256 14X14
46	LCMXO640C/E-*s*FTN256*g*	ftBGA256 17X17
47	LCMXO640C/E-*s*MN100*g*	csBGA100 8X8
48	LCMXO1200C/E-*s*BN256*g*	caBGA256 14X14

49	LCMXO1200C/E-*s*FTN256*g*	ftBGA256 17X17
50	LCMXO2280C/E-*s*BN256*g*	caBGA256 14X14
51	LCMXO2280C/E-*s*FTN256*g*	ftBGA256 17X17
52	LCMXO2280C/E-*s*FTN324*g*	ftBGA324 19X19
53	LAMXO640C/E-*s*FTN256E	ftBGA256 17X17
54	LAMXO1200E-*s*FTN256E	ftBGA256 17X17
55	LAMXO2280E-*s*FTN256E	ftBGA256 17X17
56	LAMXO2280E-*s*FTN324E	ftBGA324 19X19
57	LFE2-12E/SE-*s*FN256*g*	fpBGA256 17X17
58	LFE2-12E/SE-*s*FN484*g*	fpBGA484 23X23
59	LFE2-20E/SE-*s*FN256*g*	fpBGA256 17X17
60	LFE2-20E/SE-*s*FN484*g*	fpBGA484 23X23
61	LFE2-35E/SE-*s*FN484*g*	fpBGA484 23X23
62	LFE2-35E/SE-*s*FN672*g*	fpBGA672 27X27
63	LFE2-50E/SE-*s*FN484*g*	fpBGA484 23X23
64	LFE2-50E/SE-*s*FN672*g*	fpBGA672 27X27
65	LFE2-70E/SE-*s*FN672*g*	fpBGA672 27X27
66	LFE2-70E/SE-*s*FN900*g*	fpBGA900 31X31
67	LFE2M20E/SE-*s*FN256*g*	fpBGA256 17X17
68	LFE2M20E/SE-*s*FN484*g*	fpBGA484 23X23
69	LFE2M35E/SE-*s*FN484*g*	fpBGA484 23X23
70	LFE2M35E/SE-*s*FN672*g*	fpBGA672 27X27
71	LFE2M50E/SE-*s*FN484*g*	fpBGA484 23X23
72	LFE2M50E/SE-*s*FN672*g*	fpBGA672 27X27
73	LFE2M50E/SE-*s*FN900*g*	fpBGA900 31X31
74	LFE2M70E/SE-*s*FN900*g*	fpBGA900 31X31
75	LFE2M100E/SE-*s*FN900*g*	fpBGA900 31X31
76	LFE2M100E/SE-*s*FN1152*g*	fpBGA1152 35X35
77	LFSC/M15E-*s*FN256*g*	fpBGA256 17X17
78	LFSC/M15E-*s*FN900*g*	fpBGA900 31X31
79	LFSC/M25E-*s*FN900*g*	fpBGA900 31X31
80	M4A3-256/128-sFANg	fpBGA256 17X17
81	M4A3-256/192-sFANg	fpBGA256 17X17
82	M4A3-384/192-sFANg	fpBGA256 17X17
83	M4A3-512/192-sFANg	fpBGA256 17X17

Where *s*= Speed Grade, *g*=Temp Grade and *p*=Power Grade. For a full part list click *here*

This PCN also affects any custom devices (i.e. factory programmed, special test, tape and reel, non-standard speed grade and package, etc.), which are derived from any of the devices listed in the table.

Device Identification

This PCN only pertains to devices that are packaged at ASEM. Those devices are identified by an "R" or "1" in the 5th character in the Inspection Lot number on the topside of the package.

Inspection Lot identification:

D8WW*x*TNN

Where *x* is either "R" or "1"

Data Sheet Specifications

This PCN has no impact on any data sheet performance specifications.

Qualification Data

A matrix of device size and package combinations using the new material set were subjected to Temp Cycle, uHAST and HTSL reliability testing with no failures.

The qualification summary is shown below.

				MSL3 + TC	MSL3 + uHAST	MSL3 + HTSL
Device	**Category**	**PKG/Size(mm)**	**Lot**	**700Cycles**	**264hrs**	**1Khrs**
LCMXO640	**Smallest saw singulated BGA**	**csBGA100 8x8**	1	0/80	0/80	0/80
			2	0/80	0/80	0/80
			3	0/80	0/80	0/80
LCMXO2280	**Largest saw singulated BGA**	**ftBGA324 19x19**	1	0/80	0/80	0/80
			2	0/80	0/80	0/80
			3	0/80	0/80	0/80
FE2-6E	**Smallest overmolded BGA**	**fpBGA256 17x17**	1	0/80	0/80	0/80
			2	0/80	0/80	0/80
			3	0/80	0/80	0/80
FE3-150	**Largest overmolded BGA**	**fpBGA1156 35x35**	1	0/80	0/80	0/80
			2	0/80	0/80	0/80
			3	0/80	0/80	0/80

Characterization Data

No difference in electrical test yields was measured on any of the above qual lots. Electrical performance parametrics of speed and power also showed no difference as evidenced by the sample data below.

MXO640E-csBGA100

Parameter	Old Substrate	New Substrate	Comment
Yield	Baseline	Within 0.002 sigma of Baseline	Very nominal
Power	Baseline	Baseline – 4mA	Slightly lower power
Speed	Baseline	Baseline+.3sigma	Slightly faster performance

Sample Support

Lattice considers this change an extremely low risk. Samples of the new BOM are not required. Conversion to these new materials will start 90 days from the date of this Notice. Any order of the affected OPNs from ASEM will eventually transistion to the new materials. No action is required (meaning no changes to OPNs, your internal Bills of Material, backlog or orders).

Conversion Timing Summary

- **PCN Notification:** **October 23, 2017**
- **PCN Expiration Date:** **January 23, 2018**

Response

In accordance with J-STD-046, 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 PCN web page. 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

Appendix A: Material set comparison

Item	Old Material	New Material
Core material	CCL-HL832	CCL-HL832**NX**
Core thickness	*No Change for a given OPN*	
Tg (ºC)	205-210	220-230
CTE (ppm / ºC)	X /Y = 15-16 Z = 50-55	X /Y = 13-14 Z = 30-35