



October 23, 2017

**Subject: PCN#06A-17 –MachXO3™ Family Data Sheet and Selected MachXO3 BGA Packages Material Set**

Dear Lattice Customers,

Lattice is providing this 90-day Notification of changes to the MachXO3 product family data sheet and a planned conversion of select MachXO3L/LF-9400C BGA products to an enhanced material set.

The data sheet change is a continuous improvement and is effective immediately. The material change will be effective at the end of the 90-day PCN notification period.

**Change Description**

The new MachXO3 Family Data Sheet (DS1047 Version 1.8 released dated October 2017) is updated.

The key changes include the following:

1. The Introduction and Ordering Information sections have been updated to include the new MachXO3L/LF-9400E packages
2. A footnote referencing the updated TN1289, Power Estimation and Management for MachXO3 Devices, has been added to the Family Selection Guide table (in the Introduction section) and the Absolute Maximum Ratings (in the DC and Switching Characteristics section).

In response to consumer demand for optimized system level performance, Lattice is making the following changes to the XO3L/LF 9400C caBGA package material sets:

1. **Die Attach material converting from Ablebond 2300 to QMI529HT-LV.** This change in die attach material will provide improved thermal performance at the die interface. This improved thermal performance will be captured in a future release of our Diamond Software Power Calculator. There is no risk to using the new die attach material parts with existing designs compiled using current versions of Diamond Software. Performing power calculations using the current Diamond Software while using the new die attach material will only serve to provide additional thermal margin in the customer's system.
2. **Solder Ball Material converting from SAC125Ni to SAC305.** This change provides optimized board level performance for larger scale applications in the communications and computer industries. SAC305 is the widely accepted standard Bill of Materials (BOM) for boards which are subjected to more extensive temperature cycling. Lattice is aligning the Solder Ball material on this device with the rest of the caBGA products in the XO3L/LF families.

**Please Note: This change only affects the XO3L/LF-9400C caBGA packages. The XO3L/LF-9400E 256csfBGA Material Set is not being changed.**

**Affected Products**

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

#	OPN	PACKAGE
1	LCMXO3L-9400C-5BG256C	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
2	LCMXO3L-9400C-5BG256I	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
3	LCMXO3L-9400C-5BG400C	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
4	LCMXO3L-9400C-5BG400I	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
5	LCMXO3L-9400C-5BG484C	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
6	LCMXO3L-9400C-5BG484I	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
7	LCMXO3L-9400C-6BG256C	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
8	LCMXO3L-9400C-6BG256I	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
9	LCMXO3L-9400C-6BG400C	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
10	LCMXO3L-9400C-6BG400I	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
11	LCMXO3L-9400C-6BG484C	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
12	LCMXO3L-9400C-6BG484I	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
13	LCMXO3LF-9400C-5BG256C	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
14	LCMXO3LF-9400C-5BG256I	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
15	LCMXO3LF-9400C-5BG400C	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
16	LCMXO3LF-9400C-5BG400I	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
17	LCMXO3LF-9400C-5BG484C	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
18	LCMXO3LF-9400C-5BG484I	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
19	LCMXO3LF-9400C-6BG256C	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
20	LCMXO3LF-9400C-6BG256I	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
21	LCMXO3LF-9400C-6BG400C	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
22	LCMXO3LF-9400C-6BG400I	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
23	LCMXO3LF-9400C-6BG484C	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
24	LCMXO3LF-9400C-6BG484I	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
25	LCMXO3L-9400C-5BG256CALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
26	LCMXO3L-9400C-5BG256IALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
27	LCMXO3L-9400C-5BG400CALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
28	LCMXO3L-9400C-5BG400IALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
29	LCMXO3L-9400C-5BG484CALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
30	LCMXO3L-9400C-5BG484IALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
31	LCMXO3L-9400C-6BG256CALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
32	LCMXO3L-9400C-6BG256IALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
33	LCMXO3L-9400C-6BG400CALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
34	LCMXO3L-9400C-6BG400IALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
35	LCMXO3L-9400C-6BG484CALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
36	LCMXO3L-9400C-6BG484IALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
37	LCMXO3LF-9400C-5BG256CALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
38	LCMXO3LF-9400C-5BG256IALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
39	LCMXO3LF-9400C-5BG400CALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
40	LCMXO3LF-9400C-5BG400IALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
41	LCMXO3LF-9400C-5BG484CALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
42	LCMXO3LF-9400C-5BG484IALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)

43	LCMXO3LF-9400C-6BG256CALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
44	LCMXO3LF-9400C-6BG256IALV	BG256 = 256-Ball Halogen-Free caBGA (0.8 mm Pitch)
45	LCMXO3LF-9400C-6BG400CALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
46	LCMXO3LF-9400C-6BG400IALV	BG400 = 400-Ball Halogen-Free caBGA (0.8 mm Pitch)
47	LCMXO3LF-9400C-6BG484CALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)
48	LCMXO3LF-9400C-6BG484IALV	BG484 = 484-Ball Halogen-Free caBGA (0.8 mm Pitch)

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

Material set identification can be accomplished by referencing the Lattice top mark lot / date code for any given production lot. If required by the customer, Lattice can confirm Material Set for a specific lot.

### 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 Solder Ball Shear (SBS) reliability testing with no failures.

The qualification reliability summary is shown below.

Device	Category	Pkg/Size (mm)	Lot	MSL3 + TC	MSL3 + uHAST	SBS (post- MSL3 + 700cyc TC)
				700Cycles	264hrs	25balls/5u
LCMXO3L-9400C BCG484	Largest molded ball grid array package	caBGA484 19x19	1	0/77	0/77	> 230gF Cpk = 2.901
			2	0/77	0/77	> 230gF Cpk = 2.378
			3	0/77	0/77	> 230gF Cpk = 2.640
LCMXO3L-9400C BCG256	Largest die-to-pkg ratio molded ball grid array package	caBGA256 14x14	1	0/77	QBS	QBS
			2	0/77		
			3	0/77		

QBS = Qualified by Similarity

### Characterization Data

Lattice Semiconductor Home Page: <http://www.latticesemi.com>

Applications & Literature Hotline: 1-800-LATTICE

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No electrical performance difference has been measured or is expected.

### **Recommended Action**

Customers should review the compatibility of the new materials with their system level manufacturing requirements to insure a successful conversion.

### **Sample Support**

Although, Lattice considers this change as extremely low risk, samples with the new material set are available on request. Conversion to these new materials will start 90 days from the date of this notice. Any order using the affected OPNs will begin transitioning to the new material set after the 90 day notice period expires. No additional action is required to convert (meaning no changes to Ordering Part Numbers, customer's System Bill of Material, Existing backlog or Existing Orders).

### **Conversion Timing Summary**

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

### **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](mailto:pcn@latticesemi.com).

Sincerely,

Lattice Semiconductor PCN Administration

## Appendix A: Material set comparison

Item	Old Material	New Material
Die Attach	Ablebond 2300	QMI529HT-LV
Solder ball composition	SAC125Ni	SAC305