



May 8, 2017

**Subject: PCN# 04A-17 Notification of Changes to the ECP5™ and ECP5-5G™ Family Data Sheet**

Dear Lattice Customer,

Lattice Semiconductor is providing this notification of changes to the ECP5™ and ECP5-5G™ Family Data Sheet.

**Change Description**

The new ECP5™ and ECP5-5G™ Family Data Sheet (FPGA-DS-02012 dated April 2017) includes the following key changes:

1. Updated Table 3.2 Recommended Operating conditions:
  - Changed the ECP5-5G VCC from 1.1V +/- 5% to 1.2V +/- 5%
  - Changed the ECP5-5G VCCA from 1.2V +/- 5% to 1.2V +/- 3%
2. Updated Table 3.8 ECP5/ECP5-5G Supply Current (Standby)
  - Changed “Core Power Supply Current” for ICC on LFE5UM5G devices
  - Changed “SERDES Power Supply Current (Per Dual)” for ICCA on LFE5UM5G devices
3. Updated Table 3.19 Register to Register Performance
  - Removed “(DDR/SDR)” from DSP Function
  - Changed DSP functions to 225 MHz

See the data sheet revision history for other clarifications.

**Effects to Customer Design**

**Changes to ECP5-5G VCC and VCCA Supply Voltages:**

Customers designing with the ECP5-5G devices should note the change in the supply voltages for VCC and VCCA. VCC supply voltage on ECP5-5G needs to be 1.2V +/- 5%, compared to the ECP5 devices which require 1.1V +/- 5%.

Supply voltage on VCCA for ECP5-5G requires 1.2V +/- 3%, compared to ECP5 devices which require 1.1V +/- 5%.

Customers designing a board with ECP5UM device and planning to migrate to ECP5-5G for the 5G SERDES performance need to design VCCA with +/- 3% from the beginning, and have a regulator that can be adjusted to either 1.1V or 1.2V +/- 3%. The VCC needs to be designed

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with a regulator that can be adjusted to either 1.1V or 1.2V +/- 5%, in order to allow either ECP5UM or ECP5-5G device on the board.

Customers who have created an ECP5-5G design previously in Diamond software will need to re-run the design flow (specifically Map, Place & Route, and Bitstream File creation steps) in Diamond 3.9 SP1, or later. This will re-generate the bitstream file that includes all the updated internal timing with VCC = 1.2V.

#### Changes in the ECP5-5G Supply Current

On the ECP5-5G device, VCC voltage increased from 1.1V to 1.2V. Therefore power consumption will increase as well. The new power requirements can be calculated using the Diamond software Power Calculator. Customers need to ensure that the power supply can provide this additional current, as specified in the Data Sheet tables.

Customers designing the board with the ECP5UM device and planning to migrate to ECP5-5G for the 5G SERDES performance need to ensure that the power supply meets the current requirements for both devices, in addition to designing the voltages as described above.

#### Changes in the DSP Function

On all ECP5 devices (ECP5U, ECP5UM, and ECP5-5G), the DSP block no longer supports the DDR (Double Data Rate) mode. DDR mode in the DSP block performs operations to the data input on both rising and falling edges of the clock. It was found to be more efficient for user designs to perform operations in SDR (Single Data Rate) mode, where user data is updated on a per cycle basis.

This change should have no effect to customers, since the DDR mode has not been deployed in the Diamond software. No action is required from the customer.

The clock rate for DSP block has been increased to 225 MHz. This increased performance means any existing design meeting the previous 185 MHz will function without any modification.

### **Affected Products**

The Ordering Part Numbers (OPNs) affected by this PCN are as follows:

LFE5U-12

LFE5U-25

LFE5U-45

LFE5U-85

LFE5UM-25

LFE5UM-45

LFE5UM-85

LFE5UM5G-25

LFE5UM5G-45

LFE5UM5G-85

Note: This PCN affects all package, speed grade, temperature grade, and other options (see Appendix A for list) and any custom devices (i.e. factory programmed, tape & reel, special test, etc.) which are derived from any of the devices listed above.

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## **Data Sheet Specifications**

The updated ECP5™ and ECP5-5G™ Family Data Sheet (FPGA-DS-02012 dated April 2017) described above is available on the Lattice website.

## **Recommended Actions for Existing Designs**

Customers should check their designs with the key changes described above, and take appropriate actions with the recommendations provided below:

### **1. For designs with ECP5-5G devices:**

1. VCC supply voltage needs to be 1.2V +/- 5%. If the board is designed to allow either ECP5UM or ECP5-5G devices for future migration into higher SERDES performance, the VCC supply voltage needs to be adjustable to be either 1.1V (ECP5UM), or 1.2V (ECP5-5G) with voltage regulator.
2. VCCA supply voltage will be the same at 1.2V, but customer needs to ensure the supply source is within +/- 3% variation.
3. The VCC and VCCA supply source needs to meet the current requirements due to higher voltage, as specified in the Data Sheet.
4. Customer needs to re-check power via the Power Calculator in Diamond 3.9 SP1, or later, to ensure proper thermal management.
5. Customer needs to re-run the design flow (specifically Map, Place & Route, and Bitstream File creation steps) with the current design in Diamond 3.9 SP1, or later, to ensure proper timing closure with higher VCC voltage.

### **2. For designs with all other ECP5 devices:**

No change is required.

Customers who have further questions regarding this specification change are encouraged to contact local field support or [sales@latticesemi.com](mailto:sales@latticesemi.com).

## **PCN Timing**

The data sheet changes are effective immediately and retroactively. There are no changes to the silicon and therefore samples are not applicable to these data sheet changes.

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.

Sincerely,

Lattice PCN Administrator

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## Appendix A OPNs Affected

### Commercial Temp.

Part number	Grade	Package	Pins	Temp.	LUTs (K)	SERDES
LFE5U-12F-6MG285C	-6	Lead free csfBGA	285	Commercial	12	No
LFE5U-12F-7MG285C	-7	Lead free csfBGA	285	Commercial	12	No
LFE5U-12F-8MG285C	-8	Lead free csfBGA	285	Commercial	12	No
LFE5U-12F-6BG381C	-6	Lead free caBGA	381	Commercial	12	No
LFE5U-12F-7BG381C	-7	Lead free caBGA	381	Commercial	12	No
LFE5U-12F-8BG381C	-8	Lead free caBGA	381	Commercial	12	No
LFE5U-25F-6MG285C	-6	Lead free csfBGA	285	Commercial	24	No
LFE5U-25F-7MG285C	-7	Lead free csfBGA	285	Commercial	24	No
LFE5U-25F-8MG285C	-8	Lead free csfBGA	285	Commercial	24	No
LFE5U-25F-6BG381C	-6	Lead free caBGA	381	Commercial	24	No
LFE5U-25F-7BG381C	-7	Lead free caBGA	381	Commercial	24	No
LFE5U-25F-8BG381C	-8	Lead free caBGA	381	Commercial	24	No
LFE5U-45F-6MG285C	-6	Lead free csfBGA	285	Commercial	44	No
LFE5U-45F-7MG285C	-7	Lead free csfBGA	285	Commercial	44	No
LFE5U-45F-8MG285C	-8	Lead free csfBGA	285	Commercial	44	No
LFE5U-45F-6BG381C	-6	Lead free caBGA	381	Commercial	44	No
LFE5U-45F-7BG381C	-7	Lead free caBGA	381	Commercial	44	No
LFE5U-45F-8BG381C	-8	Lead free caBGA	381	Commercial	44	No
LFE5U-45F-6BG554C	-6	Lead free caBGA	554	Commercial	44	No
LFE5U-45F-7BG554C	-7	Lead free caBGA	554	Commercial	44	No
LFE5U-45F-8BG554C	-8	Lead free caBGA	554	Commercial	44	No
LFE5U-85F-6MG285C	-6	Lead free csfBGA	285	Commercial	84	No
LFE5U-85F-7MG285C	-7	Lead free csfBGA	285	Commercial	84	No
LFE5U-85F-8MG285C	-8	Lead free csfBGA	285	Commercial	84	No
LFE5U-85F-6BG381C	-6	Lead free caBGA	381	Commercial	84	No
LFE5U-85F-7BG381C	-7	Lead free caBGA	381	Commercial	84	No
LFE5U-85F-8BG381C	-8	Lead free caBGA	381	Commercial	84	No
LFE5U-85F-6BG554C	-6	Lead free caBGA	554	Commercial	84	No
LFE5U-85F-7BG554C	-7	Lead free caBGA	554	Commercial	84	No
LFE5U-85F-8BG554C	-8	Lead free caBGA	554	Commercial	84	No
LFE5U-85F-6BG756C	-6	Lead free caBGA	756	Commercial	84	No
LFE5U-85F-7BG756C	-7	Lead free caBGA	756	Commercial	84	No
LFE5U-85F-8BG756C	-8	Lead free caBGA	756	Commercial	84	No
LFE5UM-25F-6MG285C	-6	Lead free csfBGA	285	Commercial	24	Yes
LFE5UM-25F-7MG285C	-7	Lead free csfBGA	285	Commercial	24	Yes
LFE5UM-25F-8MG285C	-8	Lead free csfBGA	285	Commercial	24	Yes
LFE5UM-25F-6BG381C	-6	Lead free caBGA	381	Commercial	24	Yes
LFE5UM-25F-7BG381C	-7	Lead free caBGA	381	Commercial	24	Yes
LFE5UM-25F-8BG381C	-8	Lead free caBGA	381	Commercial	24	Yes
LFE5UM-45F-6MG285C	-6	Lead free csfBGA	285	Commercial	44	Yes
LFE5UM-45F-7MG285C	-7	Lead free csfBGA	285	Commercial	44	Yes

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Part number	Grade	Package	Pins	Temp.	LUTs (K)	SERDES
LFE5UM-45F-8MG285C	-8	Lead free csfBGA	285	Commercial	44	Yes
LFE5UM-45F-6BG381C	-6	Lead free caBGA	381	Commercial	44	Yes
LFE5UM-45F-7BG381C	-7	Lead free caBGA	381	Commercial	44	Yes
LFE5UM-45F-8BG381C	-8	Lead free caBGA	381	Commercial	44	Yes
LFE5UM-45F-6BG554C	-6	Lead free caBGA	554	Commercial	44	Yes
LFE5UM-45F-7BG554C	-7	Lead free caBGA	554	Commercial	44	Yes
LFE5UM-45F-8BG554C	-8	Lead free caBGA	554	Commercial	44	Yes
LFE5UM-85F-6MG285C	-6	Lead free csfBGA	285	Commercial	84	Yes
LFE5UM-85F-7MG285C	-7	Lead free csfBGA	285	Commercial	84	Yes
LFE5UM-85F-8MG285C	-8	Lead free csfBGA	285	Commercial	84	Yes
LFE5UM-85F-6BG381C	-6	Lead free caBGA	381	Commercial	84	Yes
LFE5UM-85F-7BG381C	-7	Lead free caBGA	381	Commercial	84	Yes
LFE5UM-85F-8BG381C	-8	Lead free caBGA	381	Commercial	84	Yes
LFE5UM-85F-6BG554C	-6	Lead free caBGA	554	Commercial	84	Yes
LFE5UM-85F-7BG554C	-7	Lead free caBGA	554	Commercial	84	Yes
LFE5UM-85F-8BG554C	-8	Lead free caBGA	554	Commercial	84	Yes
LFE5UM-85F-6BG756C	-6	Lead free caBGA	756	Commercial	84	Yes
LFE5UM-85F-7BG756C	-7	Lead free caBGA	756	Commercial	84	Yes
LFE5UM-85F-8BG756C	-8	Lead free caBGA	756	Commercial	84	Yes
LFE5UM5G-25F-8MG285C	-8	Lead free csfBGA	285	Commercial	24	Yes
LFE5UM5G-25F-8BG381C	-8	Lead free caBGA	381	Commercial	24	Yes
LFE5UM5G-45F-8MG285C	-8	Lead free csfBGA	285	Commercial	44	Yes
LFE5UM5G-45F-8BG381C	-8	Lead free caBGA	381	Commercial	44	Yes
LFE5UM5G-45F-8BG554C	-8	Lead free caBGA	554	Commercial	44	Yes
LFE5UM5G-85F-8MG285C	-8	Lead free csfBGA	285	Commercial	84	Yes
LFE5UM5G-85F-8BG381C	-8	Lead free caBGA	381	Commercial	84	Yes
LFE5UM5G-85F-8BG554C	-8	Lead free caBGA	554	Commercial	84	Yes
LFE5UM5G-85F-8BG756C	-8	Lead free caBGA	756	Commercial	84	Yes

## Industrial Temp.

Part number	Grade	Package	Pins	Temp.	LUTs (K)	SERDES
LFE5U-12F-6MG285I	-6	Lead free csfBGA	285	Industrial	12	No
LFE5U-12F-7MG285I	-7	Lead free csfBGA	285	Industrial	12	No
LFE5U-12F-8MG285I	-8	Lead free csfBGA	285	Industrial	12	No
LFE5U-12F-6BG381I	-6	Lead free caBGA	381	Industrial	12	No
LFE5U-12F-7BG381I	-7	Lead free caBGA	381	Industrial	12	No
LFE5U-12F-8BG381I	-8	Lead free caBGA	381	Industrial	12	No
LFE5U-25F-6MG285I	-6	Lead free csfBGA	285	Industrial	24	No
LFE5U-25F-7MG285I	-7	Lead free csfBGA	285	Industrial	24	No
LFE5U-25F-8MG285I	-8	Lead free csfBGA	285	Industrial	24	No
LFE5U-25F-6BG381I	-6	Lead free caBGA	381	Industrial	24	No
LFE5U-25F-7BG381I	-7	Lead free caBGA	381	Industrial	24	No
LFE5U-25F-8BG381I	-8	Lead free caBGA	381	Industrial	24	No

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Part number	Grade	Package	Pins	Temp.	LUTs (K)	SERDES
LFE5U-45F-6MG285I	-6	Lead free csfBGA	285	Industrial	44	No
LFE5U-45F-7MG285I	-7	Lead free csfBGA	285	Industrial	44	No
LFE5U-45F-8MG285I	-8	Lead free csfBGA	285	Industrial	44	No
LFE5U-45F-6BG381I	-6	Lead free caBGA	381	Industrial	44	No
LFE5U-45F-7BG381I	-7	Lead free caBGA	381	Industrial	44	No
LFE5U-45F-8BG381I	-8	Lead free caBGA	381	Industrial	44	No
LFE5U-45F-6BG554I	-6	Lead free caBGA	554	Industrial	44	No
LFE5U-45F-7BG554I	-7	Lead free caBGA	554	Industrial	44	No
LFE5U-45F-8BG554I	-8	Lead free caBGA	554	Industrial	44	No
LFE5U-85F-6MG285I	-6	Lead free csfBGA	285	Industrial	84	No
LFE5U-85F-7MG285I	-7	Lead free csfBGA	285	Industrial	84	No
LFE5U-85F-8MG285I	-8	Lead free csfBGA	285	Industrial	84	No
LFE5U-85F-6BG381I	-6	Lead free caBGA	381	Industrial	84	No
LFE5U-85F-7BG381I	-7	Lead free caBGA	381	Industrial	84	No
LFE5U-85F-8BG381I	-8	Lead free caBGA	381	Industrial	84	No
LFE5U-85F-6BG554I	-6	Lead free caBGA	554	Industrial	84	No
LFE5U-85F-7BG554I	-7	Lead free caBGA	554	Industrial	84	No
LFE5U-85F-8BG554I	-8	Lead free caBGA	554	Industrial	84	No
LFE5U-85F-6BG756I	-6	Lead free caBGA	756	Industrial	84	No
LFE5U-85F-7BG756I	-7	Lead free caBGA	756	Industrial	84	No
LFE5U-85F-8BG756I	-8	Lead free caBGA	756	Industrial	84	No
LFE5UM-25F-6MG285I	-6	Lead free csfBGA	285	Industrial	24	Yes
LFE5UM-25F-7MG285I	-7	Lead free csfBGA	285	Industrial	24	Yes
LFE5UM-25F-8MG285I	-8	Lead free csfBGA	285	Industrial	24	Yes
LFE5UM-25F-6BG381I	-6	Lead free caBGA	381	Industrial	24	Yes
LFE5UM-25F-7BG381I	-7	Lead free caBGA	381	Industrial	24	Yes
LFE5UM-25F-8BG381I	-8	Lead free caBGA	381	Industrial	24	Yes
LFE5UM-45F-6MG285I	-6	Lead free csfBGA	285	Industrial	44	Yes
LFE5UM-45F-7MG285I	-7	Lead free csfBGA	285	Industrial	44	Yes
LFE5UM-45F-8MG285I	-8	Lead free csfBGA	285	Industrial	44	Yes
LFE5UM-45F-6BG381I	-6	Lead free caBGA	381	Industrial	44	Yes
LFE5UM-45F-7BG381I	-7	Lead free caBGA	381	Industrial	44	Yes
LFE5UM-45F-8BG381I	-8	Lead free caBGA	381	Industrial	44	Yes
LFE5UM-45F-6BG554I	-6	Lead free caBGA	554	Industrial	44	Yes
LFE5UM-45F-7BG554I	-7	Lead free caBGA	554	Industrial	44	Yes
LFE5UM-45F-8BG554I	-8	Lead free caBGA	554	Industrial	44	Yes
LFE5UM-85F-6MG285I	-6	Lead free csfBGA	285	Industrial	84	Yes
LFE5UM-85F-7MG285I	-7	Lead free csfBGA	285	Industrial	84	Yes
LFE5UM-85F-8MG285I	-8	Lead free csfBGA	285	Industrial	84	Yes
LFE5UM-85F-6BG381I	-6	Lead free caBGA	381	Industrial	84	Yes
LFE5UM-85F-7BG381I	-7	Lead free caBGA	381	Industrial	84	Yes
LFE5UM-85F-8BG381I	-8	Lead free caBGA	381	Industrial	84	Yes
LFE5UM-85F-6BG554I	-6	Lead free caBGA	554	Industrial	84	Yes
LFE5UM-85F-7BG554I	-7	Lead free caBGA	554	Industrial	84	Yes
LFE5UM-85F-8BG554I	-8	Lead free caBGA	554	Industrial	84	Yes

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Part number	Grade	Package	Pins	Temp.	LUTs (K)	SERDES
LFE5UM-85F-6BG756I	-6	Lead free caBGA	756	Industrial	84	Yes
LFE5UM-85F-7BG756I	-7	Lead free caBGA	756	Industrial	84	Yes
LFE5UM-85F-8BG756I	-8	Lead free caBGA	756	Industrial	84	Yes
LFE5UM5G-25F-8MG285I	-8	Lead free csfBGA	285	Industrial	24	Yes
LFE5UM5G-25F-8BG381I	-8	Lead free caBGA	381	Industrial	24	Yes
LFE5UM5G-45F-8MG285I	-8	Lead free csfBGA	285	Industrial	44	Yes
LFE5UM5G-45F-8BG381I	-8	Lead free caBGA	381	Industrial	44	Yes
LFE5UM5G-45F-8BG554I	-8	Lead free caBGA	554	Industrial	44	Yes
LFE5UM5G-85F-8MG285I	-8	Lead free csfBGA	285	Industrial	84	Yes
LFE5UM5G-85F-8BG381I	-8	Lead free caBGA	381	Industrial	84	Yes
LFE5UM5G-85F-8BG554I	-8	Lead free caBGA	554	Industrial	84	Yes
LFE5UM5G-85F-8BG756I	-8	Lead free caBGA	756	Industrial	84	Yes