

## GF14LPP/12LP EFLX®4K Gen 2 IN FAB

The EFLX®4K Logic IP core is an embeddable FPGA IP core containing 2,520 Look-Up-Tables (LUTs: each is 6-input, or dual-5-input, with 2 independent outputs with 2 bypassable flip flops) in Reconfigurable Building Blocks (RBBs) and 21Kbits RAM, an improved XFLX™ interconnect network, multiple clocks & scan: fully reconfigurable in-field at any time.

The EFLX4K DSP core has 40 DSP MACs (22x22 multiplier with 48 bit accumulator). In the Gen2 architecture, MACs cascade up to 10 stages without using the interconnect network.

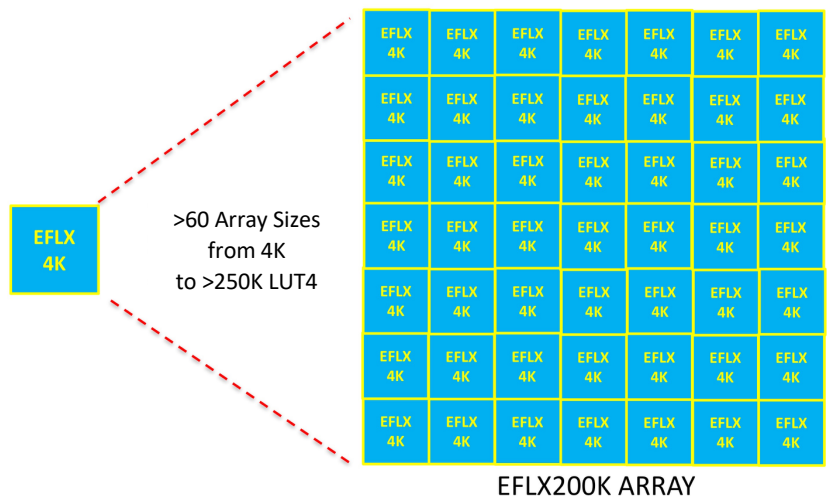
Each EFLX core is a standalone embedded FPGA. Cores can be arrayed up to at least 8x8 to create arrays >250K LUT4s. Logic and DSP cores can be mixed. And RAM can be integrated as well.

Our improved, Gen 2 XFLX programmable interconnect has been optimized for higher performance, especially for large arrays.

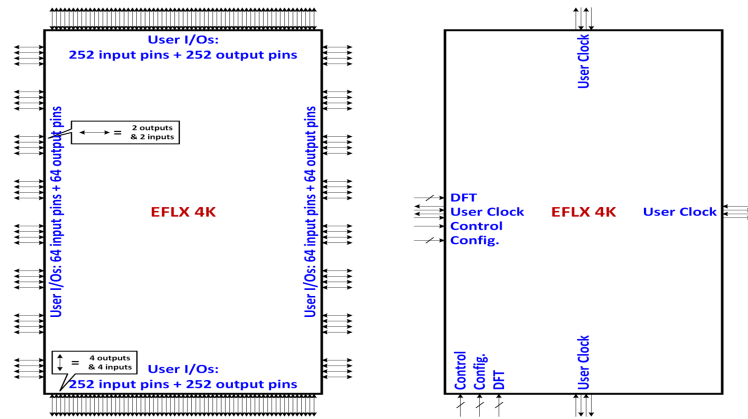
EFLX features full connectivity inside the core, and provides ArrayLinX™ interconnects at the boundary to concatenate multiple cores: >60 array sizes are possible from 4,000 LUT4s to >250K LUT4s.

Gen 2 DFT improvements achieve 99% coverage of all faults & a new configuration load mode for test reduces test times about 100 times faster than Gen 1 to lower test costs.

Name	EFLX®4K Core Gen 2	
Technology	GlobalFoundries 14LPP/12LP	
Metal Stack	Optimized for GF 13 Metal Stack	
Nominal Supply Voltages (Vj)	0.6, 0.7, 0.8, 0.9	
Junction Temperature (°C)	-40 to 125	
Leakage Power	6.0 mW (NN, 0.8Vj, 25C Tj)	
Area (mm <sup>2</sup> )	~1.28	
Clock inputs	Mesh, multiple access points	
Input and Output Pins	632 input & 632 output, each with an optional flip flop	
Look-up Tables (6-input LUT with two independent outputs)	<b>Logic/Mem Core</b>	<b>DSP Core</b>
	2,520 (~4.0K LUT4)	1,880 (~3.0K LUT4)
Total Flip Flops (ex DSP)	6,304	5,024
Distributed Memory (Kb)	21Kbits	1Kbits
22-bit DSP MACs	0	40
EFLX Array Sizes Possible	1x1 to at least 8x8 (256K LUT4)	
Design-for-Test Support	Yes, 99% fault coverage	
LUT Utilization	Typically ~90%	



The EFLX4K Core has 632 input pins and 632 output pins placed as follows: 64 West, 64 East, 252 North, and 252 South. The I/O pins provide user access to the EFLX core. Each pin has a bypassable flip flop. When multiple cores are concatenated into EFLX arrays, the pins along the abutting edges are disabled (or are used for controlling embedded RAM blocks).



GF14 EFLX4K dimensions: 0.95mm wide x 1.35mm tall

Besides input/output pins, there are clock, configuration, and test/DFT pins. Each Core has an internal power grid which can be connected to the customer's digital SoC power grid. The Core has power control pins. The Core also has configuration inputs on the West side and configuration inputs on the South side to load the bitstream. An AXI or JTAG interface is available for configuration. A clock mesh provides multiple connect points. The configuration bits can be read back anytime to enable checking for soft errors to improve reliability for high-reliability applications. A new test mode enables test times about 100x faster for lower test cost.

Deliverables and EDA Design Views	
Front-end Design view (with NDA)	Back-end Design Views (with License)
Encrypted Verilog Netlist	Encrypted Verilog Netlist with Timing Annotation & SDF
LIB	GDS-II
Footprint LEF	CDL/Spice netlist
Detailed datasheet & DSP User's Guide	Integration guidelines & assistance
Silicon validation report, when ready	Test Vectors for DFT fault coverage of 99%
EFLX Compiler evaluation version	EFLX Compiler bitstream generation version

A Validation chip with EFLX Logic and DSP cores with test circuitry to enable full speed operation is in fabrication. The validation chips will be tested over the full temperature and voltage range to confirm all specs are met. An evaluation board will be available which users can use to test their RTL on the chip over temperature and voltage.