GF 22FDX® EFLX®4K *In Design*

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 21 Kbit RAM, an improved XFLX™ interconnect network, multiple clocks & scan: fully reconfigurable in-field at any time.

The EFLX 4K 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 >500K 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.

| Name	EFLX®4K Core Gen 2	
Technology	GlobalFoundries 22FDX	
Metal Stack	9M_2Mx_3Cx_2Bx_1Ix_1Ox_LB__eMRAM	
Nominal Supply Voltages (Vj)	0.8	
Junction Temperature (°C)	−40 to 125	
TARGET Leakage Power	~1.1 mW (NN, 0.8Vj, 25C Tj) (est.)	
Body Bias Support	Forward body bias	
Area (mm²)	~2.8 (*estimate*)	
Clock inputs	1 to 8	
Input and Output Pins	632 input & 632 output, each with an optional flip flop	
Look-up Tables (6-input LUT with two independent outputs)	Logic/Mem Core	DSP Core
	2,520 (~4.0K LUT4)	1,880 (~3.0K LUT4)
Total Flip Flops (ex DSP)	6,304	5,024
Distributed Memory (Kb)	21 Kbits	1K bits
22-bit DSP MACs	0	40
EFLX Array Sizes Possible	1×1 to >8x8	
Design-for-Test Support	Yes, 98% fault coverage	
LUT Utilization	Typically ~90%	

EFLX features full connectivity inside the core, and provides ArrayLinx™ interconnects at the boundary to concatenate multiple cores: array sizes are possible from 4,000 LUT4s to >500K LUT4s, with a roadmap to >1M 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.
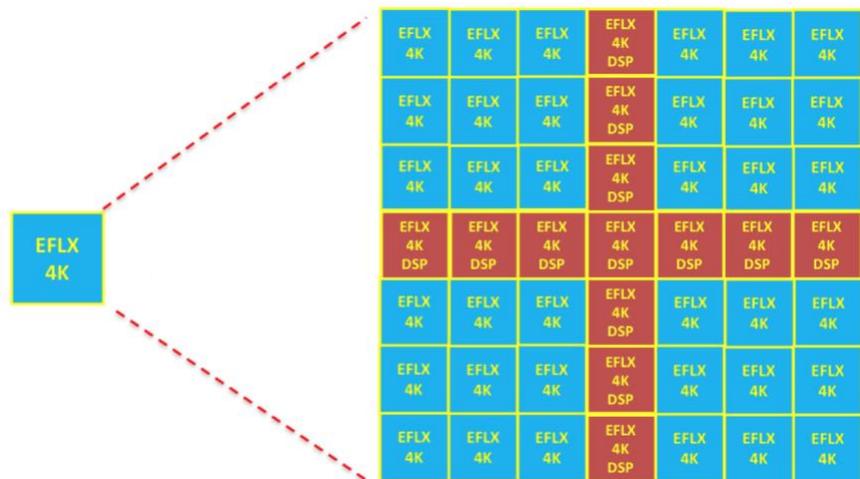
MIX LOGIC AND DSP CORES

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The EFLX 4K 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).
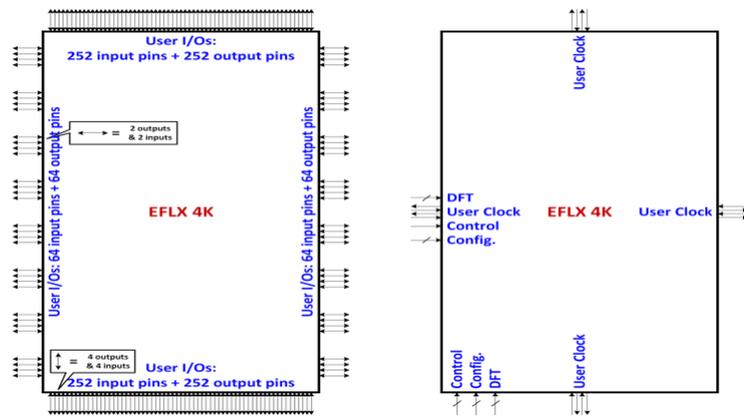
GF12 EFLX4K dimensions: 0.95mm wide x 1.35mm tall

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 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 available	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 available on other process nodes. The validation chips were tested over the full temperature and voltage range to confirm all specs were met. An evaluation board is available now for users to test their RTL on the chip over temperature and voltage.

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