



FMD5000

PROGRAMMABLE CMOS

SWITCHED - CAPACITOR ARRAY

DESCRIPTION

The FMD5000 is a mask programmable CMOS array optimized for switched- capacitor and mixed-signal applications.

Biquadratic or ladder filters of up to the twelfth order are attainable. Other applications include tone detection and generation.

The core of the array consists of two sets of six Flexible Analog Building Blocks (FABBs), capacitors, and switches that surround an area optimized for digital applications.

Predefined TILES (Templates for Interconnecting Loose Elements) allow the FABBs to be configured as high-performance opamps, comparators, OTA's and other functional blocks for signal processing applications.

Six peripheral FABBs provide added flexibility. They are ideal for internal voltage reference generation and low impedance output drive. In addition dedicated cells are provided for clock generation and interfacing digital signals to the array.

The FMD5000 architecture makes it an extremely versatile mixed-signal array.

FEATURES

- Wide operating voltage range (3-10 Volts)
- Two micron double poly, double metal, P-well CMOS process.
- Architecture allows over 80% component utilization
- Low development cost and quick turnaround
- Forty bonding pads
- Over three hundred equivalent gates for logic and timing
- Line driver ability on board
- Excellent component matching for tight filter specifications
- Low-Noise
- FILTRO software simplifies filter design

APPLICATIONS

- Switched Capacitor Filters
- Tone detectors
- Tone generators
- Telecommunications
- Sonar

COMPONENTS

CORE

- **FLEXIBLE ANALOG BUILDING BLOCKS (FABBs)**

12 FABBs are available. Each FABB contains 25 multigate transistor structures. A maximum of 42 N-Channel and 15 P-Channel matched transistors can be obtained depending on connection scheme.

- **DIGITAL SECTION**

300 two-input NAND equivalent gates in a gate array configuration are available. 4 Non-Overlapping Clock Generator (NOCG) dedicated cells are provided.

- **CAPACITORS AND SWITCHES**

Over 900 unit, and 54 fractional capacitors add flexibility without sacrificing accuracy. More than 200 switches, (full transmission gates, and P-Channel), are available.

PERIPHERY

- **FLEXIBLE ANALOG BUILDING BLOCKS (FABBs)**

2 FABBs, (type 2), with similar structure as core FABB but with a maximum of 60 P-Channel and 94 N-Channel matched transistors. Components optimized for medium (2KOhms) drive.

2 FABBs, (type 3), with maximum of 44 P-Channel and 47 N-Channel matched transistors. Components optimized for high (200 Ohms) drive.

- **REFERENCE VOLTAGE GENERATOR**

2 FABBs, (type 4), similar to core FABB and with additional bipolar structures. The components on these FABBs are optimized for the generation of bandgap and internal voltage references.

- **BIPOLAR CELLS**

Over 20 lateral NPN bipolar transistors for modulators, variable gain amplifiers, voltage reference and other applications.

- **RESISTOR CELLS**

P-Well resistors and poly-silicon resistors located around the periphery for gain and threshold setting, voltage dividers, etc.

- **TRANSMISSION GATES**

9 complementary transmission gates strategically located around the periphery.

- **DIGITAL SUPPORT CELLS**

Crystal oscillator.

4 I/O cells for TTL-to-CMOS input conversion or as 4mA digital output drivers.

Power on reset cell to support digital circuitry in mixed signal applications.

MACROTILE LIBRARY

The following is a partial list of MacroTiles designed for the FMD5000 Mixed-Signal Array

- BIS100 Cascode Bias Network
- BIS103 PTAT Bias Network
- OPA106 Folded Cascode Opamp (High Output Impedance)
- OPA108 Folded Cascode Opamp (RL=20K Ohm)
- OPA109 Folded Cascode Opamp (RL=2K Ohm)
- OPA110 Folded Cascode Opamp (RL=200 Ohm)
- REF100 Bandgap Reference
- OTA100 Operational Transconductance Amplifier

Additional MacroTiles are in development. For a complete listing contact your local representative or FMD.

NOTE

- MacroTiles available for the FMD4000 High-Performance Analog Array can be combined with FMD5000 MacroTiles for increased design flexibility.
- FMD will design custom MacroTiles to meet your particular specification.

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