



# FMD6000

## PROGRAMMABLE CMOS

## MIXED-SIGNAL ARRAY

### DESCRIPTION

The FMD6000 is a mask programmable CMOS array optimized for analog and mixed-signal applications.

The core of the array consists of 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 analog cells opamps, comparators, OTA's and other functional blocks for signal processing applications.

Other peripheral FABBs provide added flexibility. They are ideal for internal voltage reference generation and analog / mixed-signal conditioning. In addition dedicated cells are provided for clock generation and interfacing digital signals to the array.

Continuous time, as well as switched-capacitor filters can be implemented. Control systems, sensors, audio, and telecommunications are among other applications for which the FMD6000 is ideally suited.

The FMD6000 mask programmable CMOS array architecture makes it an extremely versatile mixed-signal ASIC. The die size is ideal for Small Outline (SOIC narrow) packages.

### FEATURES

- Operating voltage range (6 Volts max)
- 1.2 micron double poly, double metal, N-well CMOS process.
- Architecture allows over 80% component utilization
- Low development cost and quick turnaround
- Ideal for small outline SOIC package
- Over one thousand equivalent gates for glue logic and timing
- Voltage regulator and Oscillator on board
- Excellent component matching for tight specifications
- Low-Noise, Low-power, High-performance
- Extensive MacroTile library simplifies circuit design

### APPLICATIONS

- Sensors/Transducers
- Controls
- Telecommunications
- Interface circuits
- Signal conditioning
- Filters

# COMPONENTS

## CORE

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

10 FABBs in two configurations contain multi-gate transistor structures optimized for flexibility & interconnect. Matching N-Channel and P-Channel transistors can be configured to obtain single ended or differential circuits depending on the connection scheme.

- ◆ **DIGITAL SECTION**

Over one thousand equivalent gates in a gate-array configuration are available for clock dividers, counters and other logic functions.

- ◆ **CAPACITORS AND SWITCHES**

Over 500 unit, and 60 fractional capacitors add flexibility without sacrificing accuracy. 240 switches for SC and sample and hold applications are available.

## PERIPHERY

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

Type 3 FABBs, similar structure as core FABB but with more P-Channel and N-Channel matched transistors. Components optimized to drive external medium loads.

Type 5 FABBs, structure with matched P-Channel and N-Channel transistors optimized for low power applications.

- ◆ **REFERENCE VOLTAGE GENERATOR**

Type 4 FABBs, 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**

14 lateral PNP bipolar transistors for voltage reference and other applications.

- ◆ **RESISTOR CELLS**

P-Plus and polysilicon resistors are located around the periphery. Matching resistor blocks are ideal for gain and threshold setting, voltage dividers, etc.

- ◆ **INPUT / OUTPUT and POWER PADS**

27 I/O Pads with standard CMOS protection are strategically located around the periphery. Power pads are located in the corners allowing separate runs for analog and digital power.

- ◆ **DIGITAL SUPPORT CELLS**

Crystal oscillator, VCO and PLL cells.  
I/O cells and digital output drivers.  
Power on reset (POR) cell to support digital and mixed-signal applications.

## MACROTILE LIBRARY

The following is a partial list of MacroTiles designed for the FMD6000 Mixed-Signal Array

- BIS100            Cascode Bias Network
- BIS103            PTAT Bias Network
- OPA106            Folded Cascode Opamp
- OPA108            Folded Cascode Opamp
- OPA109            Folded Cascode Opamp
- CMP101            Folded Cascode Comaprator
- REF100            Bandgap Reference
- OTA100            Operational Transconductance Amplifier
- FMD6000-001    Signal conditioning for sensor application
- FMD6000-002    PLL
- FMD6000-003    12-bit Cyclic DAC with SPI interface

For an updated list of MacroTiles available or for more information contact your local representative or FMD.

### NOTE

- Existing MacroTiles for the FMD6000 Analog Mixed-Signal Array can be modified and re-simulated for new applications.
- FMD will design custom MacroTiles to meet your particular specification.

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