

# 144x144 4.25 Gbps Crosspoint Switch with Amplif-Eye™ Signal Conditioning

## M21161G4

### 4.25 Gbps Performance as a Drop-in- Replacement for the M21151, 3.2 Gbps 144x144 Crosspoint Switch

The M21161G4, designed for today's demanding SAN, enterprise, datacom, and telecom applications, is a low-power CMOS, high-speed 144x144 crosspoint switch with signal conditioning and built-in system test features.

The device consumes as low as 13 W of power (typical) with all channels operational. In addition, the PowerScaler™ features offer dynamically scalable switch settings to further reduce power consumption. Unused portions of the core can be automatically (SmartPower™) or manually turned off, without effecting the operation of the remaining channels.

To improve signal quality, each input buffer is preceded by a programmable input equalizer (IE) and each output includes output pre-emphasis (PE). The IE removes ISI jitter, which is usually caused by PCB skin effect losses. The IE circuit opens the input data eye in applications where long PCB traces and cables are used. There are four settings available for the input equalizer, allowing flexibility in adjusting the equalization level on a per-channel basis.

The PE provides a boost of the high frequency content of the output signal, such that the data eye remains open after passing through a long interconnect of PCB traces and cables. There are two amplitude settings and two duration settings that can be selected on a global basis. Pre-emphasis can be enabled on a per-channel basis.

### KEY FEATURES

- Low-power consumption of 13 W
- Pin-and software-compatible with M21151
- Programmable Input Equalizer to reduce deterministic jitter (ISI)
- Input signal activity monitoring
- Programmable output pre-emphasis for driving long board traces and cables
- Supports any data rate from 0 to 4.25 Gbps
- Built-in system test features such as JitterMeter™ and PRBS Tx/Rx
- PowerScaler™ for further power reduction based on system needs

The device supports data rates from 0 to 4.25 Gbps on each channel, allowing any combination of Fibre Channel (1x, 2x, 4x, and 10x), SONET, InfiniBand, Gigabit Ethernet and 10 Gbps Ethernet traffic.

Built-in system test features simplify design, verification, and production testing of the system. These features include a fourth generation, fully independent PRBS transmitter/receiver and the JitterMeter.

The switch includes a pair of on-board  $2^{23}-1$  pseudo-random bit sequence transmitters (PRBS TX) and receivers (PRBS RX). In addition, the JitterMeter feature allows the host controller to measure jitter of an incoming signal. *Note:* PRBS Tx/Rx and JitterMeter operate up to data rates of 3.2 Gbps maximum.



Three-stage switch fabrics with up to 10,368 x 10,368 ports, carrying up to 44 terabits per second of traffic, can be designed using the non-blocking switch, with multi-cast and broadcast abilities.

All inputs and outputs are differential PCML (positive current mode logic) with supply voltages ranging from 1.2 V to 2.5 V. The output levels are programmable at 500 mV, 900 mV, and 1200 mV. The M21161G4 is available in a 1156-terminal, 35 mm, ceramic ball grid array (CBGA) package, with a case temperatures range of 0° C to 95° C.

Figure 1: Jitter Removal at 4.25 Gbps through Input Equalization

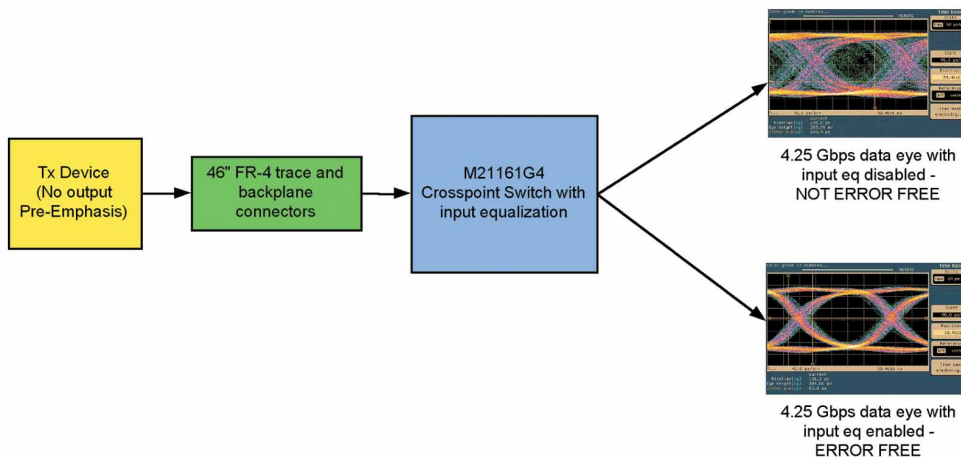
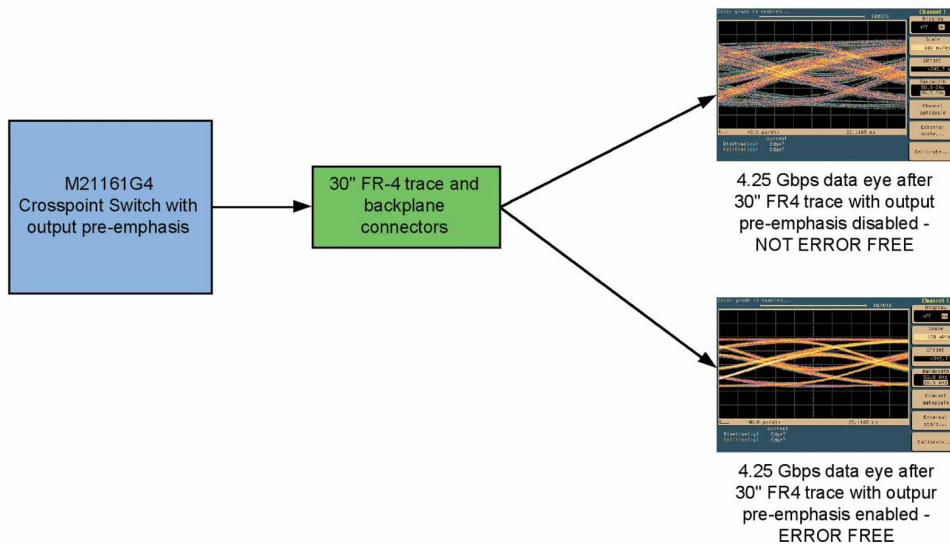


Figure 2: Jitter Removal at 4.25 Gbps through Output Pre-Emphasis



## Applications

- Storage area network (SAN) switches (1x, 2x, 4x, and 10x Fibre Channel)
- High-speed patch panels
- 10 GbE parallel, GbE, and Infiniband networks
- High-speed automated test equipment
- Telecom & datacom switches
- Packet switching
- Fiber-optic telecom systems (OC-48/OC-48 FEC).
- DWDM Switches

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