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Product Brief

Switch Modularity and Interface Platform (SMIP)/ SM1000 Series

- Modular Building Blocks Allow Flexibility and Density
- Up to Two Switch Modules per Single VXIbus C-size Card Slot
- Up to Six Switch Modules per Double VXIbus C-size Card Slot for High-density Applications
- All Switch Modules are Designed for Low Noise Applications
- Register-based Access for High System Throughput
- VXIplug&play Drivers

Overview

The SMIP is designed with modularity, density and cost in mind. As opposed to "traditional" VXIbus switching solutions, the SMIP family consists of switch modules that can be mixed and combined to form flexible and high-density switch configurations. The goal of the SMIP series is to reduce the size of switching solutions by at least one-third compared to solutions from other manufacturers.

The SM1000 series consists of the SM1000A single-slot base unit and the SM1000B double-slot base unit.The SM1000A can house up to two high-density switch modules, and the SM1000B can house up to six high-density switch modules. Switching modules can be mixed and matched for flexibility and density. For example, a 1 x 384 two-wire multiplexer can be accommodated in a double-slot VXIbus card (SM1000B) - 128 channels greater than competing products.

Each SM1000 base module includes a switch control interface board, which has one of the most advanced switch control designs on the market. Each SMIP switch module is register mapped into the VXIbus, allowing for a seamlessly integrated switching system. This approach allows new modules to be easily added to the product family without the need to reprogram EEPROMs or exchange control modules, as is common with other switching systems. The SM1000 interface supports direct register control of all relays, downloaded scan lists with backplane trigger advance, and hardware implemented break-before-make and make-before-break switching. By using direct register access, switching speeds are maximized while keeping VXIbus backplane traffic to a minimum. The supplied VXIplug&play drivers provide support for higher level commands, a unified switch interface, and path level routing.

Signal Integrity

All SMIP switch modules have been designed with over a decade of experience in signal switch design and are optimized to preserve signal integrity. For example, all switch modules employ multi-layer PCB designs with extensive ground planes and shielding where appropriate, and relays are selected to maximize signal integrity. All signal ground planes are also isolated from

the control circuit grounds, and signal paths are designed to minimize crosstalk between channels.

In order to further minimize digital noise, the control circuitry goes into a quiescent state when not processing commands, allowing for the switching of low level signals. Mating shrouds are also available to allow cable harnesses to be crimped, soldered or connected via terminal blocks, allowing the user to select the best method of cabling for the application.

Programming

The SMIP family of switch modules is programmed using direct register access for fast data throughput and boasts the following features that allow the SMIP series to be easily programmed and integrated:

- *Automatic Scanning:* A predefined sequence of channels can be programmed into an extensive scan list and can be incremented by any of the trigger sources.This approach relieves the host controller from having to tie up the VXIbus backplane when scanning.
- *Programmable Timing Delays:* A delay can be programmed between relay closures to allow for settling times of other system resources.When used with triggers a controlled synchronous switching system can easily be configured.
- *Confidence Checking:* Internal feedback provides confidence of relay closures.
- *Extensive Triggering:* Triggers can be generated when a relay closes and settles, and programmed relays can be actuated upon receipt of a trigger to allow for synchronization between other devices.
- *Make-Before-Break and Break-Before-Make:* Relay control implemented in hardware eases software burden.
- *Safety Interrupt:* This is a programmable fail-safe feature that allows all relays to open based upon external or TTL backplane triggers.This allows signals to be removed from the unit under test if a system fail-safe occurs, such as inadvertent removal of a test adapter.

The SMIP platform has been designed as a base system to allow signal switching from DC to light. Switching modules will be added to the SMIP family at a very fast rate. Please consult your local sales representative or factory with your requirements.

SM2001 / 20 SPST 10 Amp Power Switch or 10 DPST 10 Amp Power Switch

- 250V max. switching voltage
- 10A max. switching current
- 300 WDC, 2500 VA max. switching power
- >10e7 Ω isolation
- < 0.10 Ω at 5A path resistance (30m Ω typical)
- >20 MHz bandwidth (-3dB)

- Separate Fail-safe Interrupt

The SM2001 10A SPST switch module finally breaks the 8A switching barrier found on other VXI power switching cards. Up to 120 10A SPST relays can be accommodated in two VXIbus card slots for maximum density, or mixed and matched with other SMIP cards for flexibility. Some applications include: AC line power switching, switching of DC or AC power supplies, control or driving relays for industrial machines (robotics, numerical control machines, etc.), automotive engine control, solenoid switching.

All relays are also driven from the VXIbus +5V supply line, since VXIbus mainframes always have ample current capability on this supply line, as opposed to the +24 or +12V supply lines.

Since these SPSTs switch power to the UUT or interface, a fail-safe interrupt input line is provided on the front panel that can open all relays automatically if a safety condition occurs.This approach instantly removes all power to the UUT or interface, protecting operators or the UUT.

SM2003 8 SPDT 20 Amp Power Switch Module

- 270V max. switching voltage
- 20A max. switching current
- >1500V breakdown voltage
- >10e5 Ohm Isolation
- < 30 mohm at 18.75A path resistance
- >20 MHz bandwidth (-3dB)
- Separate Fail-safe Interrupt
- <20mS switching time

The SM2003 20A SPDT switch module is designed for heavy-duty power switching requirements. This switch module allows the switching of signals such as motor, ballast, tungsten or simple high power AC or DC signals. Since large power relays are used, these modules can only be configured within a SM1000A, but they may be mixed and matched with other modules.

Since these SPDTs switch power to the UUT or interface, a fail-safe interrupt input line is provided on the front panel that can open all relays automatically if a safety condition occurs. This approach instantly removes all power to the UUT or interface protecting operators or the UUT.

SM3001 / 64 x 1 Two-wire Multiplexer 2A per Channel

4 (1 x 8) 4 wire; 8 (1 x 8) 2 wire; 8 (1 x 16) 1 wire

2 (1 x 16) 4 wire; 4 (1 x 16) 2 wire; 4 (1 x 32) 1 wire

1 (1 x 32) 4 wire; 2 (1 x 32) 2 wire; 2 (1x 64) 1 wire

1 (1 x 64) 2 wire; 1 (1 x 128) 1 wire

- 220VDC, 250V AC rms max. switching voltage
- 60 WDC, 125 VA max. switching power
- 2A max. switching current
- >10e8 Ω isolation
  < 0.5 Ω path resistance
- >50 MHz bandwidth (-3dB)
- Capacitive discharge relays keep high voltages from disturbing sensitive measurement points.

The SM3001 high-density multiplexer module is designed for scanning of multiple points to a common bus, in either 1- 2-or 4-wire configurations, either synchronously with an instrument (i.e., using triggers), or asynchronously with individual relay control. Up to 384 two-wire channels can be accommodated in a double-slot VXIbus card (SM1000B) for maximum density, or mixed and matched with other SMIPcards for flexibility. Some applications include: cable harness testing, semiconductor and PCB testing, or essentially any application where multiple points need to be switched to a common bus. All relays also have individual relay control, and each path allows for 2A switching.

All relays are also driven from the VXIbus +5V supply line, since VXIbus mainframes always have ample current capability on this supply line, as opposed to the +24 or+12V supply lines. Residual voltage discharge relays can be enabled to momentarily short out the measurement path when changing from one input channel to the next. This dissipates any voltage held by the wiring and instrument input capacitance. This protects sensitive devices, such as CMOS circuits, from residual voltages caused by previous high-voltage measurements. This feature can also be disabled in low-voltage applications where maximum throughput speed is important.

SM4001 / 4 x 32 Matrix 2A per Channel

4 (4 x 8) 2 wire 2 (4 x 8) 4 wire

2 (4 x 16) 2 wire 1 (4 x 16) 4 wire

2 (8 x 8) 2 wire 1 (8 x 8) 4 wire

1(4 x 32) 2 wire 2 (8 x 16) 2 wire

or any Combination of a 4 x 8 Building Block.

- 220VDC, 250V AC rms max. switching voltage
- 60 WDC, 125 VA max. switching power
- 2A max. switching current
- >10e8 Ω isolation
- < 0.5 Ω path resistance
- >25 MHz bandwidth (-3dB)

The SM4001 high-density matrix module is designed for applications that require a true non-blocking matrix, where the user has the ability to connect any row to any column. The smallest building block is a 4 x 8 2-wire matrix, and rows and columns can easily be expanded to form larger matrices. A 4 x 192 two-wire matrix can be accommodated in a double-slot VXIbus card (SM1000B) for maximum density or mixed and matched with other SMIP cards for flexibility. All relays also have individual relay control allowing multiple inputs to be connected to multiple outputs, and each path allows for 2A switching.

SM5001 / 80 SPST Relays 2A per Channel

- 220VDC, 250V AC rms max. switching voltage
- 60 WDC, 125 VA max. switching power
- 2A max. switching current
- >10e9 Ω isolation
- < 0.5 Ω path resistance

- >50 MHz bandwidth (-3dB)

The SM5001 high-density basic switch module is designed for general purpose switching where individual relays can be used to route signals to/from the UUT, or combined externally to form user-defined configurations. The latter approach allows the same switch module to be used for testing multiple UUTs by simply changing the configuration within a UUT-specific external adapter. Up to 480 individual SPST relays can be accommodated in a double-slot VXIbus card (SM1000B) for maximum density, or mixed and matched with other SMIP cards for flexibility.

All relays are also driven from the VXIbus +5V supply line, since VXIbus mainframes always have ample current capability on this supply line, as opposed to the +24 or +12V supply lines.

SM5002 / 50 SPDT Relays 2A per Channel

- 220VDC, 250V AC rms max. switching voltage
- 60 WDC, 125 VA max. switching power
- 2A max. switching current
- >10e9 Ω isolation
- < 0.5 Ω path resistance
- >50 MHz bandwidth (-3dB)

The SM5002 high-density basic switch module is designed for general purpose switching where individual relays can be used to route a signal to one of two points. Up to 300 individual SPDT relays can be accommodated in a double-slot VXIbus card (SM1000B) for maximum density, or mixed and matched with other SMIP cards for flexibility. All relays are also driven from the VXIbus +5V supply line, since VXIbus mainframes always have ample current capability on this supply line, as opposed to the +24 or +12V supply lines.

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