SCMHVAS

High Voltage Attenuator System

DESCRIPTION

The SCMHVAS (Signal Conditioning Modular High Voltage Attenuator System) is an analog signal conditioning system designed to safely monitor and accurately measure voltage potentials up to 1414VAC (4000V peak-to-peak). These high potential voltages are typically found in industrial applications such as induction heaters, electric-motor drive controllers, and measurement of battery stacks. The system reduces the input signal to a level suitable for interface to data acquisition systems, while at the same time providing filtering characteristics and 1500Vrms isolation (Figure 1).

For each channel of analog input, an attenuator module, SCMHVAS-Mxxxx, pre-conditions the signal which is then filtered, isolated, and converted to a high-level voltage output using an SCM5B30-07 or SCM5B40-07 module. The SCM5B40-07 module with a 10kHz bandwidth is recommended for common 50/60Hz signals low in harmonics where the user is interested in measuring only AC voltage. The SCM5B30-07 module is used for low frequency AC signals below 4Hz. The attenuator and signal conditioning modules have excellent stability over time and do not require recalibration. Overall system accuracy is ±0.06%.

Input signal connections to the SCMHVAS-Mxxxx attenuator module are made using integrated terminal blocks for robust system assembly. For safety purposes, the terminal blocks are inside the shell and can only be accessed from the top. There are no exposed high-voltage points on the SCMHVAS-Mxxxx series modules, SCM5B30-07 or SCM5B40-07 module, or the mounting backpanel.

The SCMHVAS system has two specially designed backpanels for mounting the attenuator and signal conditioning modules. The SCMVAS-PB8 high density, 8-channel backpanel (Figures 2, 3 can be panel mounted or DIN rail mounted and provides the conditioned output signal on screw terminal blocks. Jumpers are provided on each channel to optionally connect or isolate each module's I/O Common from other channel's I/O Common and/or Power Common. The SCMVAS-PB16 (Figures 4, 5) has 16 channels of analog I/O simultaneously available to high speed data acquisition (ADC) boards through a 26-conductor ribbon cable. Refer to the SCMPB01 Data Sheet and Application Note AN502 for recommended ground connections and host system interfaces. Both the SCMVAS-PB8 and SCMVAS-PB16 backpanels can be mounted on the SCMXRK-002 19-inch metal rack. The SCMVAS-PB8 and SCMVAS-PB16 backpanels are forward compatible and can accommodate both, the original SCMVAS-Mxxx modules and the SCMHVAS-Mxxxx modules.

FEATURES

- Accepts High Voltage Signals up to 1414VAC (4000V Peak-to-Peak)
- 5 or 10 Volt Output for A/D Systems
- 1500Vrms Transformer Isolation
- True 3-Way Isolation
- Up to 160dB CMR
- ±0.06% Accuracy
- Panel or DIN Rail Mounting Options
- CSA Certification pending
- CE Compliant
- ATEX Compliance Pending (-M0100, -M0200, -M0300)

BENEFITS

- Safe Attenuation of High Voltage Signals
- Protects User Equipment from Lightning and Heavy Equipment Power-Line Voltage
- Reduces EMC Concerns and Electrical Noise in Measured Signals
- Convenient System Expansion and Repair
- Signal Filtering in Noisy Environments
- Simplifies Sensor Interface and Signal Conditioning Design
- Provides Isolation of External Sensors
- Breaks Ground Loops

APPLICATIONS

- Analog Signal Conditioning
- Analog Signal Isolation
- Analog Signal Filtering
- High Voltage AC/DC Measurement
- Industrial Process Control
- Test & Measurement

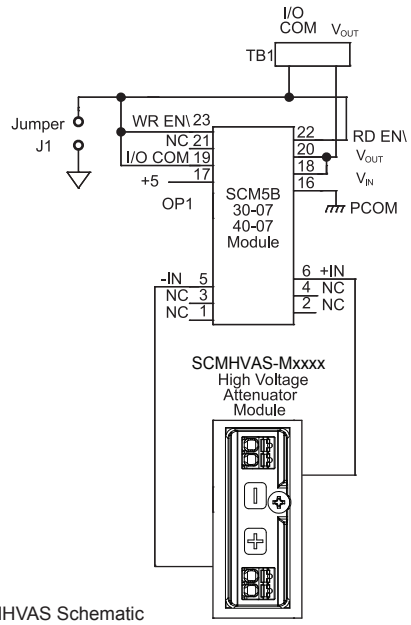


Figure 1: SCMHVAS Schematic

SCM5B30, SCM5B40-07

Isolated Analog Voltage Input Modules

Specifications

Typical* at T_A = +25°C and +5VDC power

Module	SCM5B30-07	SCM5B40-07
Input Range	–1.0V to +1.0V	–1.0V to +1.0V
Input Bias Current	±0.5nA	±0.5nA
Input Resistance		
Normal	50MΩ	200MΩ
Power Off	40kΩ	40kΩ
Overload	40kΩ	40kΩ
Input Protection		
Continuous	240Vrms max	240Vrms max
Transient	ANSI/IEEE C37.90.1	ANSI/IEEE C37.90.1
CMV, Input to Output		
Continuous	1500Vrms max	1500Vrms max
Transient	ANSI/IEEE C37.90.1	ANSI/IEEE C37.90.1
CMR (50 or 60Hz)	160dB	100dB
NMR	95dB at 50Hz, 90dB at 60Hz	120dB per Decade above 10kHz
Accuracy(1)	±0.03% Span	±0.03% Span
Linearity	±0.005% Span	±0.01% Span
Stability		
Input Offset	±20µV/°C	±20µV/°C
Output Offset	±20µV/°C	±20µV/°C
Gain	±50ppm/°C	±50ppm/°C
Noise		
Input, DC to 10Hz	2µVrms	2µVrms
Output, 100kHz	200µVrms	2mVp-p
Bandwidth, -3dB	4Hz	10kHz
Response Time (to 90% final value)	0.2s	35µ s
Output Range	–5V to +5V (–10V to +10V, D model versions)	–5V to +5V (–10V to +10V, D model versions)
Output Resistance	50Ω	50Ω
Output Protection	Continuous Short to Ground	Continuous Short to Ground
Output Selection Time (to ±1mV of V_{OUT})	6.0µS at C_{load} = 0 to 2000pF	6.0µS at C_{load} = 0 to 2000pF
Output Current Limit	±8mA	±8mA
Output Enable Control		
Max Logic "0"	+0.8V	+0.8V
Min Logic "1"	+2.4V	+2.4V
Max Logic "1"	+36V	+36V
Input Current "0,1"	0.5µA	0.5µA
Power Supply Voltage	+5VDC ±5%	+5VDC ±5%
Power Supply Current	30mA	30mA
Power Supply Sensitivity	±200µ V/% RTI(2)	±200µ V/% RTI(2)
Mechanical Dimensions (h)(w)(d)	2.28"x 2.26"x 0.60" (58mm x 57mm x 15mm)	2.28"x 2.26"x 0.60" (58mm x 57mm x 15mm)
Environmental		
Operating Temp. Range	–40°C to +85°C	–40°C to +85°C
Storage Temp. Range	–40°C to +85°C	–40°C to +85°C
Relative Humidity	0 to 95% Noncondensing	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1	ISM, Group 1
Radiated, Conducted	Class A	Class A
Immunity EN61000-6-2	ISM, Group 1	ISM, Group 1
RF	Performance A ±0.5% Span Error	Performance A ±0.5% Span Error
ESD,EFT	Performance B	Performance B

Ordering Information

Model	Description
SCM5B30-07	V Isolation Module, ±5V Output, 4Hz Bandwidth
SCM5B40-07	V Isolation Module, ±5V Output, 10kHz Bandwidth
SCM5B30-07D	V Isolation Module, ±10V Output, 4Hz Bandwidth
SCM5B40-07D	V Isolation Module, ±10V Output, 10kHz Bandwidth

NOTES:
*Contact factory or your local Dataforth sales office for maximum values.
(1) Includes linearity, hysteresis and repeatability.
(2) RTI = Referenced to input.

SCMHVAS-Mxxxx

High Voltage Attenuator Modules

Specifications

Typical* at T_A = +25°C

Module	SCMHVAS-Mxxxx
Input Range Input Voltage Maximum Input Resistance	±100Vpeak to ±2,000Vpeak (70VAC to 1414VAC) ±2,000Vpeak >10MΩ
Accuracy Stability	±0.03% ±50ppm/°C
Output Range Output Resistance	±1V <100kΩ
Mechanical Dimensions (h)(w)(d)	2.13" x 1.705" x 0.605" max (54.1mm x 43.3mm x 15.4mm max)
Environmental Operating Temp. Range Storage Temp. Range Relative Humidity	 –40°C to +85°C –40°C to +85°C 0 to 95% Noncondensing

*Contact factory or your local Dataforth sales office for maximum values.

Ordering Information

Model	Description	Input Range with V Isolation Module
SCMHVAS-M0100	Attenuator Module	±100V Input (70VAC)
SCMHVAS-M0200	Attenuator Module	±200V Input (141VAC)
SCMHVAS-M0300	Attenuator Module	±300V Input (212VAC)
SCMHVAS-M0400	Attenuator Module	±400V Input (282VAC)
SCMHVAS-M0500	Attenuator Module	±500V Input (353VAC)
SCMHVAS-M0600	Attenuator Module	±600V Input (424VAC)
SCMHVAS-M0700	Attenuator Module	±700V Input (495VAC)
SCMHVAS-M1000	Attenuator Module	±1000V Input (707VAC)
SCMHVAS-M1500	Attenuator Module	±1500V Input (1060VAC)
SCMHVAS-M2000	Attenuator Module	±2000V Input (1414VAC)
SCMHVAS-MPT	Attenuator Module, Pass-Thru 1-to-1	

Accessories

Model	Description
SCMVAS-PB8	Backpanel, 8-Channel
SCMVAS-PB8D	Backpanel, 8-Channel, DIN Rail Mount
SCMVAS-PB16	Backpanel, 16-Channel
SCMVAS-PB16D	Backpanel, 16-Channel, DIN Rail Mount

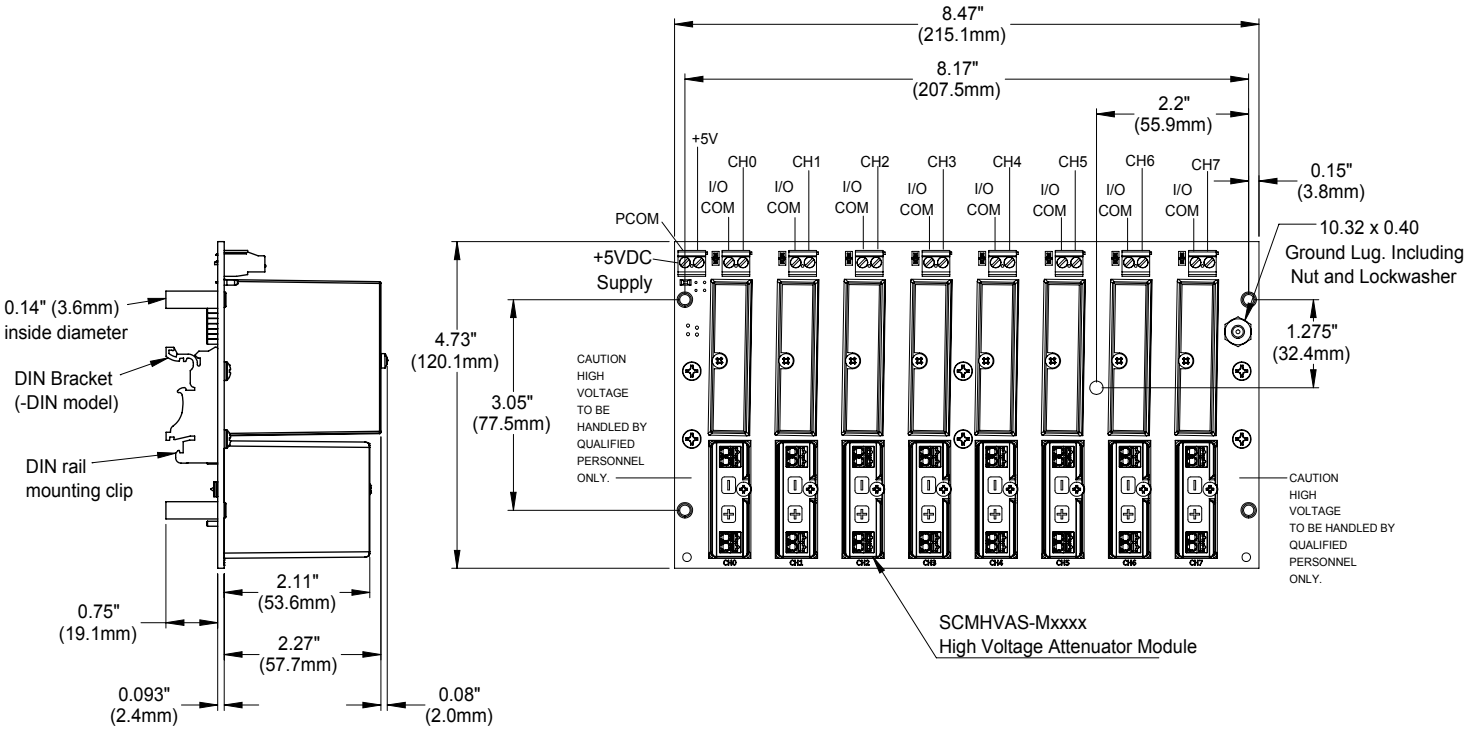


Figure 2: SCMVAS-PB8 and SCMVAS-PB8D Analog I/O Backpanel

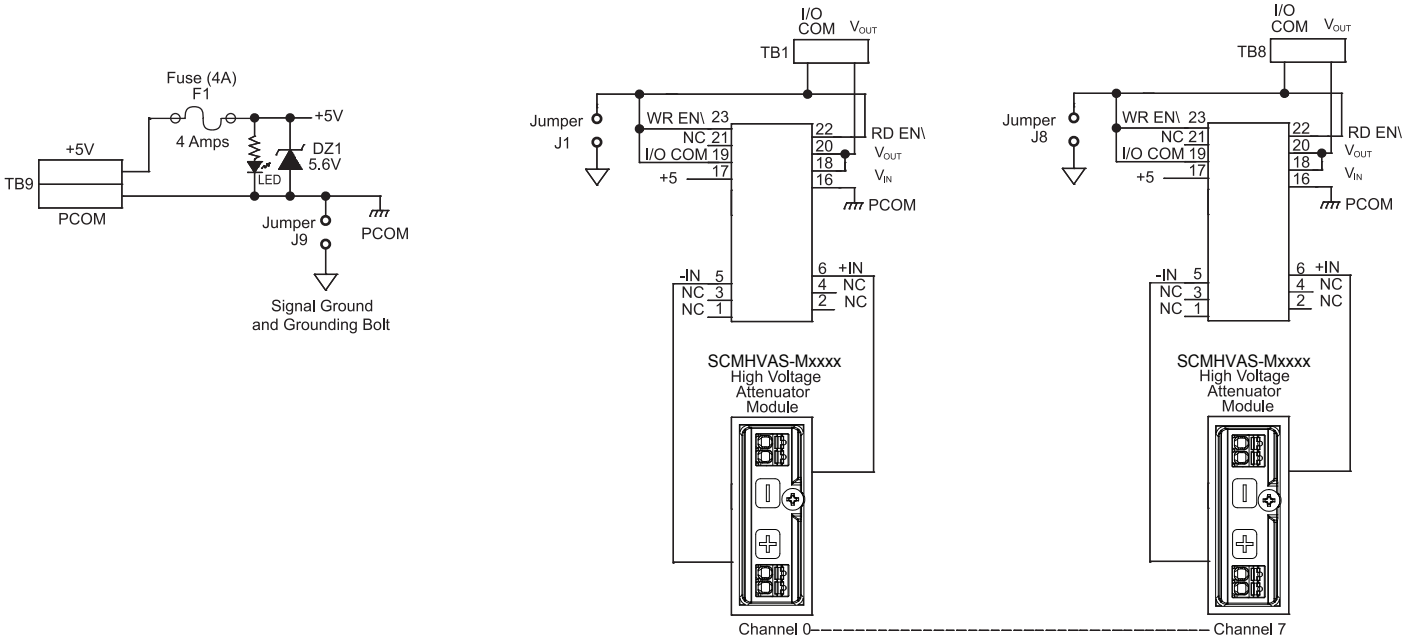
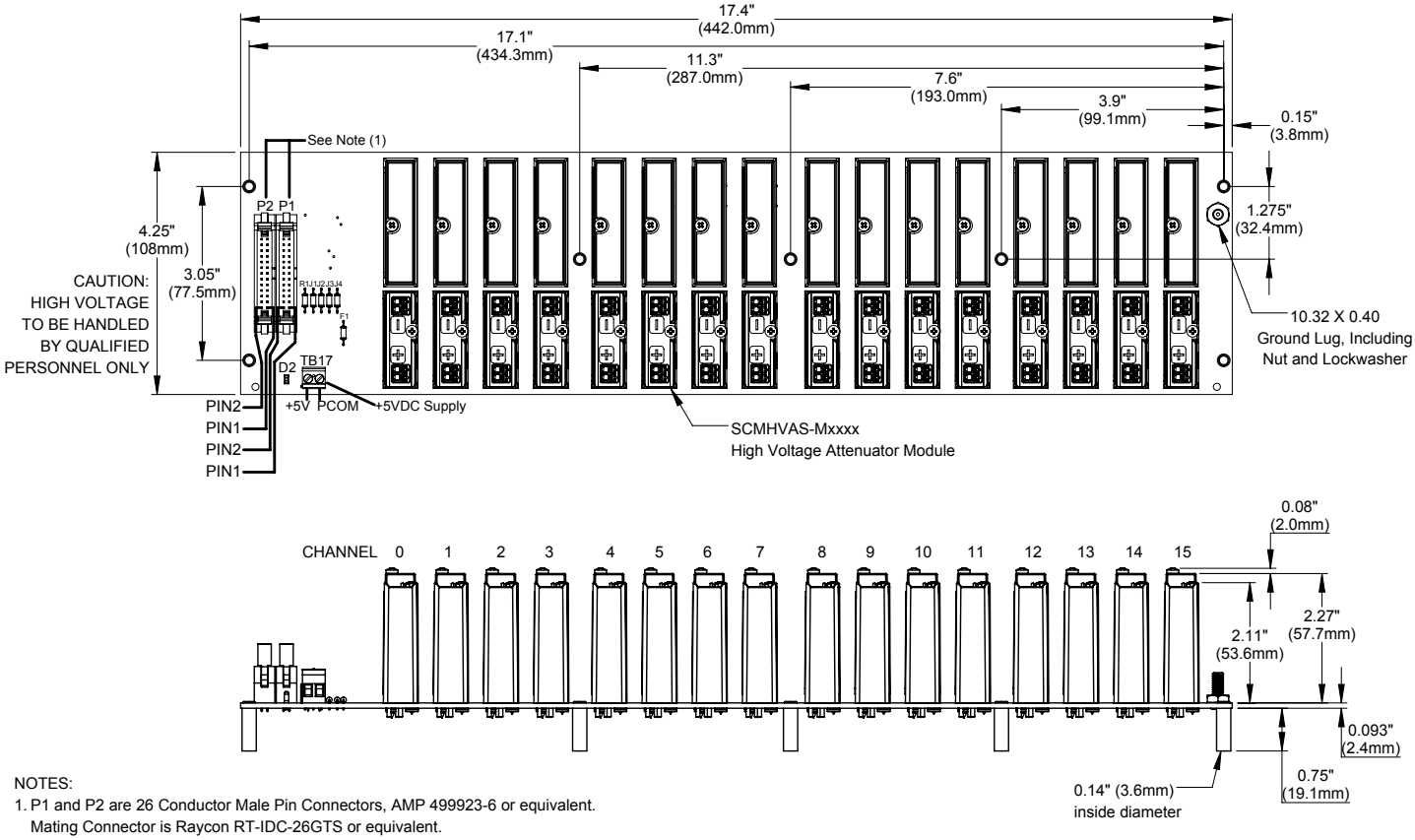
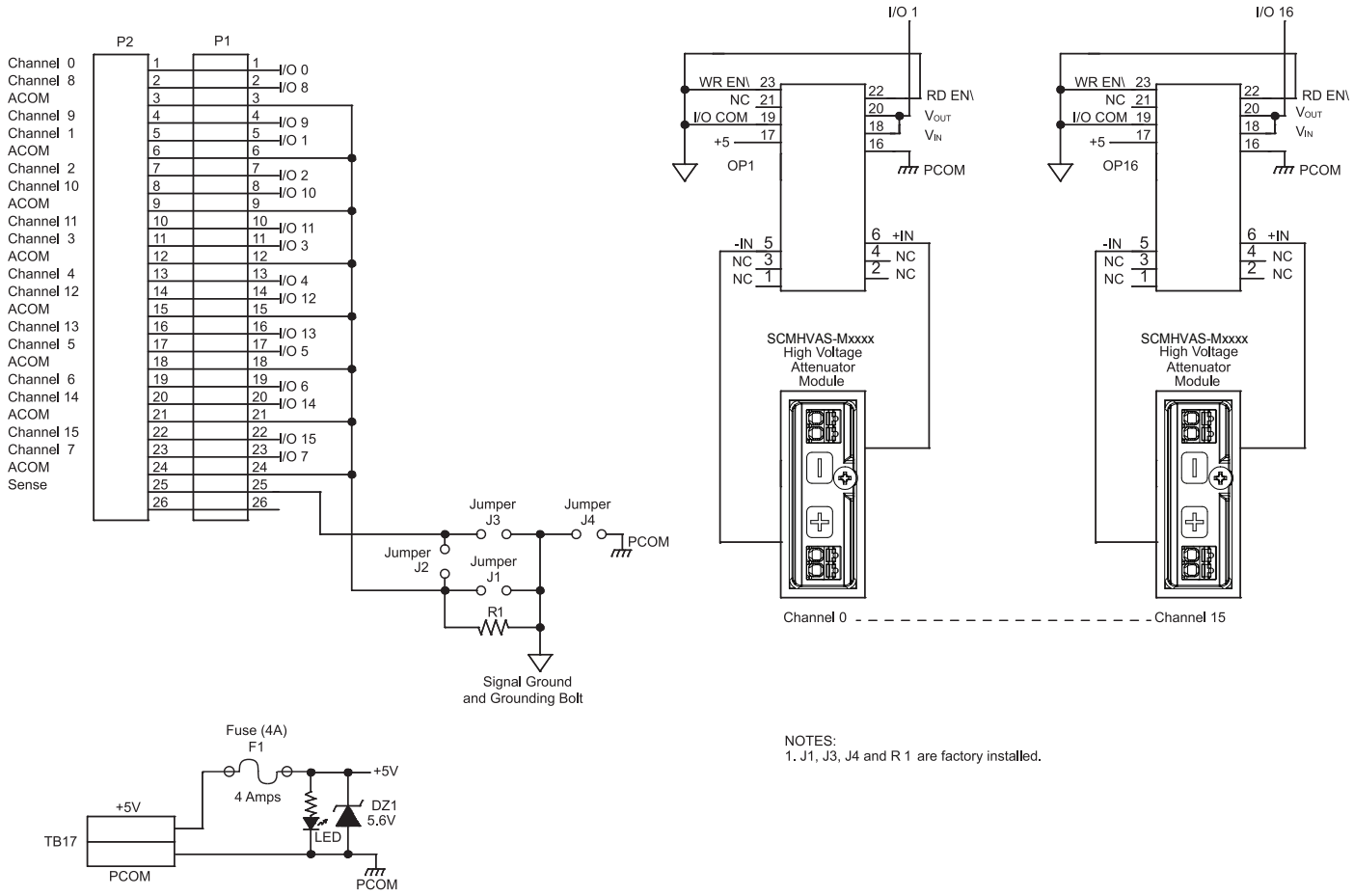


Figure 3: SCMVAS-PB8 Schematic



NOTES:
1. P1 and P2 are 26 Conductor Male Pin Connectors, AMP 499923-6 or equivalent.
   Mating Connector is Raycon RT-IDC-26GTS or equivalent.

Figure 4: SCMVAS-PB16 Analog I/O Backpanel



NOTES:
1. J1, J3, J4 and R 1 are factory installed.

Figure 5: SCMVAS-PB16 Schematic