



## Features

Use with VT1413C/VT1415A/  
VT1419A/VT1422A

Four Channels of 4-wire  $\Omega$   
Measurement

Programmable Current Level on  
Each Source Channel

x16 Gain and 10 Hz Filter on Each  
Input Channel

## 4-wire Resistance Measurement SCP

### Overview

The VT1518A 4-wire Resistance Measurement SCP provides four programmable current source channels (with input over-voltage protection) for excitation. Each current source can be programmed to provide either 30 mA or 433 mA. The VT1518A also has four channels of analog input with x16 gain and 10 Hz, 2-pole, low-pass filters for measuring the voltage across the resistor.

The engineering conversion to ohms or temperature is done automatically at the full scanning rate in the base VXI module. Use the VT1518A with the following VXI modules:

Model	Description
VT1413C	64-channel Scanning A/D Converter
VT1415A	Algorithmic Closed Loop Controller
VT1419A	Multifunction Measurement and Control Module
VT1422A	Remote Channel Multifunction DAC

Refer to the VXI Technology Website for recent product updates, if applicable.

### Product Specifications

These specifications for the VT1518A reflect the combined performance of the scanning A/D and the VT1518A SCP.

#### Measurement Ranges

**dc Volts:**  $\pm 3.9$  mV to  $\pm 1$  V Full-scale

#### Temperature:

Thermocouples: - 200 °C to + 1700 °C  
Thermistors: - 80 °C to + 160 °C  
RTD's: - 200 °C to + 850 °C

**Resistance full-scale ranges ( $\Omega$ ):** 8  $\Omega$  to 32 k $\Omega$

#### Input Characteristics

##### Maximum input voltage (normal mode plus common mode):

Operating:  $< \pm 16$  V peak  
Damage level:  $> \pm 42$  V peak

##### Maximum common mode voltage:

Operating:  $< \pm 16$  V peak  
Damage level:  $> \pm 42$  V peak

**Common mode rejection:** -100 dB  
(0 Hz to 60 Hz)

**Input impedance:**  $> 100$  M $\Omega$  differential

## 4-wire Resistance Measurement SCP

### Maximum Tare Cal Offset

Maximum tare cal offset depends on A/D range and SCP gain.

A/D Range $\pm V$ FS	Maximum Offset
16	0.20009
4	0.05007
1	0.01317
0.25	0.00349
0.0625	0.00112

### Current Source

Minimum: 30.5  $\mu A \pm 9$  nA  
 Maximum: 488.3  $\mu A \pm 60$  nA

### Resistance Measurements

Range FS	Current Amplitude	A/D Range	Maximum Resolution
32.77 k $\Omega$ :	30.518 $\mu A$	16 Vdc	1 $\Omega$
8.192 k $\Omega$ :	30.518 $\mu A$	4 Vdc	0.25 $\Omega$
2.048 k $\Omega$ :	30.518 $\mu A$	1 Vdc	0.0625 $\Omega$
2.048 k $\Omega$ :	488.28 $\mu A$	16 Vdc	0.0625 $\Omega$
512 $\Omega$ :	488.28 $\mu A$	4 Vdc	0.0156 $\Omega$
128 $\Omega$ :	488.28 $\mu A$	1 Vdc	0.0039 $\Omega$
32 $\Omega$ :	488.28 $\mu A$	0.25 Vdc	0.0009 $\Omega$

### Resistance Accuracy

Any input SCP/Most sensitive range. Four-wire connections.

MIN Current Source:  $\pm[0.035\%$  of rdg]  
 MAX Current Source:  $\pm[0.02\%$  of rdg]

### Measurement Accuracy dc Volts

For autorange, add 0.02% of reading for input voltages  $> \pm 4$  V.

### Accuracy – Gain x16

Range $\pm FS$	Linearity % of Reading:	Offset Error:	Noise 3 $\sigma$ :
0.0039	0.01	3.8 $\mu V$	3.4 $\mu V$
0.0156	0.01	4.2 $\mu V$	4.4 $\mu V$
0.0625	0.01	4.9 $\mu V$	7.5 $\mu V$
0.25	0.01	8 $\mu V$	28 $\mu V$
1	0.01	31 $\mu V$	113 $\mu V$

\* A/D filter ON (min sample period  $\geq 145$   $\mu s$ :  $\leq 100$  Hz scan rate 64 ch).

**Temperature coefficients:** add tempco error to above table

Gain: 15 ppm/ $^{\circ}C$  (after \*CAL)  
 Offset: 0-30  $^{\circ}C$ : 0.16  $\mu V/^{\circ}C$   
 30-40  $^{\circ}C$ : 0.18  $\mu V/^{\circ}C$   
 40-55  $^{\circ}C$ : 0.39  $\mu V/^{\circ}C$

### Temperature Measurement Accuracy

The following temperature accuracy specifications include instrument and firmware linearization errors. The linearization algorithm used is based on the ITS-90 transducer curves. Add your transducer accuracy to determine total measurement error.

#### Thermistors\*

**2252  $\Omega$**   
 0  $^{\circ}C$  to 30  $^{\circ}C$ : 0.006  $^{\circ}C$     30  $^{\circ}C$  to 70  $^{\circ}C$ : 0.013  $^{\circ}C$     70  $^{\circ}C$  to 80  $^{\circ}C$ : 0.010  $^{\circ}C$     80  $^{\circ}C$  to 100  $^{\circ}C$ : 0.014  $^{\circ}C$

**5 k $\Omega$**   
 0  $^{\circ}C$  to 30  $^{\circ}C$ : 0.012  $^{\circ}C$     30  $^{\circ}C$  to 70  $^{\circ}C$ : 0.014  $^{\circ}C$     70  $^{\circ}C$  to 85  $^{\circ}C$ : 0.019  $^{\circ}C$

**5 k $\Omega$  Reference**  
 -10  $^{\circ}C$  to 65  $^{\circ}C$ : 0.012  $^{\circ}C$     65  $^{\circ}C$  to 85  $^{\circ}C$ : 0.013  $^{\circ}C$

**10 k $\Omega$**   
 0  $^{\circ}C$  to 30  $^{\circ}C$ : 0.015  $^{\circ}C$     30  $^{\circ}C$  to 60  $^{\circ}C$ : 0.016  $^{\circ}C$     60  $^{\circ}C$  to 90  $^{\circ}C$ : 0.018  $^{\circ}C$     90  $^{\circ}C$  to 115  $^{\circ}C$ : 0.022  $^{\circ}C$

#### RTDs \*

**100  $\Omega$**   
 -200  $^{\circ}C$  to 75  $^{\circ}C$ : 0.08  $^{\circ}C$     75  $^{\circ}C$  to 300  $^{\circ}C$ : 0.21  $^{\circ}C$     300  $^{\circ}C$  to 600  $^{\circ}C$ : 0.27  $^{\circ}C$     600  $^{\circ}C$  to 970  $^{\circ}C$ : 0.37  $^{\circ}C$

**100  $\Omega$  Reference**  
 -125  $^{\circ}C$  to 70  $^{\circ}C$ : 0.145  $^{\circ}C$

\* A/D Filter Off

**Current Requirements (Amps)**  
 5 V max: 0.01    24 V max: 0.033    -24 V max: 0.039

## Ordering Information

**VT1518A** 4-wire Resistance Measurement SCP

VT1518A