

# Chapter 5 Specifications

## DC Characteristics

Accuracy Specifications:  $\pm$  (% of reading + % of range) <sup>[1]</sup>

Function	Range <sup>[2]</sup>	Test Current or Load Voltage	24 Hour <sup>[3]</sup> T <sub>CAL</sub> °C $\pm$ 1°C	90 Day T <sub>CAL</sub> °C $\pm$ 5°C	1 Year T <sub>CAL</sub> °C $\pm$ 5°C	Temperature Coefficient 0°C to (T <sub>CAL</sub> °C - 5°C) (T <sub>CAL</sub> °C + 5°C) to 50°C
DC Voltage	200.0000mV	-	0.0020 + 0.0020	0.0030 + 0.0025	0.0040 + 0.0025	0.0005 + 0.0005
	2.000000V	-	0.0015 + 0.0005	0.0020 + 0.0006	0.0035 + 0.0006	0.0005 + 0.0001
	20.00000V	-	0.0020 + 0.0004	0.0030 + 0.0005	0.0040 + 0.0005	0.0005 + 0.0001
	200.0000V	-	0.0020 + 0.0006	0.0040 + 0.0006	0.0050 + 0.0006	0.0005 + 0.0001
	300.000V	-	0.0020 + 0.0006	0.0040 + 0.0010	0.0055 + 0.0010	0.0005 + 0.0001
DC Current	200.0000μA	<0.03V	0.010 + 0.012	0.040 + 0.015	0.050 + 0.015	0.0020 + 0.0030
	2.000000mA	<0.25V	0.007 + 0.003	0.030 + 0.003	0.050 + 0.003	0.0020 + 0.0005
	20.00000mA	<0.07V	0.007 + 0.012	0.030 + 0.015	0.050 + 0.015	0.0020 + 0.0020
	200.0000mA	<0.7V	0.010 + 0.002	0.030 + 0.003	0.050 + 0.003	0.0020 + 0.0005
	1.000000A	<0.12V	0.050 + 0.020	0.080 + 0.020	0.100 + 0.020	0.0050 + 0.0010
Resistance <sup>[4]</sup>	200.0000Ω	1mA	0.0030 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.0006 + 0.0005
	2.000000kΩ	1mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	20.00000kΩ	100μA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	200.0000kΩ	10μA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	1.000000MΩ	2μA	0.002 + 0.001	0.010 + 0.001	0.012 + 0.001	0.0010 + 0.0002
	10.00000MΩ	200nA	0.015 + 0.001	0.030 + 0.001	0.040 + 0.001	0.0030 + 0.0004
	100.0000MΩ	200nA    10MΩ	0.300 + 0.010	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002

[1] Specifications are for 90-minute warm-up and 100 PLC integration time.

[2] 10% overrange on all ranges.

[3] Relative to calibration standards.

[4] Specifications are for 4-wire resistance measurement. Add 0.2 Ω additional error in 2-wire resistance measurement.

**Measuring Characteristics**

<b>DC Voltage</b>	
<b>Input Impedance</b>	200mV, 2V, 20V ranges: 10M $\Omega$ or >10G $\Omega$ (For these ranges, input beyond $\pm 26$ V are clamped through 106 k $\Omega$ ) 200V and 300V ranges: 10M $\Omega$ $\pm$ 1%
<b>Input Protection</b>	300V
<b>Input Offset Current</b>	50pA, at 25 $^{\circ}$ C, typical
<b>CMRR (common mode rejection ratio)</b>	140 dB for 1 k $\Omega$ unbalanced resistance in LO lead, $\pm$ 300 VDC peak maximum.
<b>Resistance</b>	
<b>Measurement Method</b>	4-wire or 2-wire resistance Current source referenced to LO input
<b>Open-circuit Voltage</b>	Limited to <10 V
<b>Max. Lead Resistance (4-wire)</b>	10% of range per lead for 200 $\Omega$ and 2 k $\Omega$ ranges, 1 k $\Omega$ per lead on all other ranges
<b>Input Protection</b>	300V on all ranges
<b>Offset Compensation</b>	Available on 200 $\Omega$ , 2 k $\Omega$ and 20 k $\Omega$ ranges.
<b>DC Current</b>	
<b>Shunt Resistor</b>	100 $\Omega$ for 200 $\mu$ A, 2 mA 1 $\Omega$ for 20 mA, 200 mA 0.01 $\Omega$ for 2 A, 10 A
<b>Auto Zero OFF Operation (typical value)</b>	
Following instrument warm-up at the environment temperature $\pm$ 1 $^{\circ}$ C and <5 minutes, add 0.0001 % range + 2 $\mu$ V error for DCV and 2 m $\Omega$ error for resistance.	
<b>Settling Considerations</b>	
Reading settling times are affected by source impedance, cable dielectric characteristics and input signal changes. The default measurement delay can ensure the correctness of the first reading for most measurements.	
<b>Measurement Considerations</b>	
Teflon or other high-impedance, low-dielectric absorption wire insulation is recommended for these measurements.	

## AC Characteristics

Accuracy Specifications:  $\pm$  (% of reading + % of range) <sup>[1]</sup>

Function	Range <sup>[2]</sup>	Frequency Range	24 Hour <sup>[3]</sup> $T_{CAL} \text{ } ^\circ\text{C} \pm 1^\circ\text{C}$	90 Day $T_{CAL} \text{ } ^\circ\text{C} \pm 5^\circ\text{C}$	1 Year $T_{CAL} \text{ } ^\circ\text{C} \pm 5^\circ\text{C}$	Temperature Coefficient 0°C to ( $T_{CAL} \text{ } ^\circ\text{C} - 5^\circ\text{C}$ ) ( $T_{CAL} \text{ } ^\circ\text{C} + 5^\circ\text{C}$ ) to 50°C
True RMS AC Voltage <sup>[4]</sup>	200.0000mV	3Hz- 5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5Hz-10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10Hz-20kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
		20kHz-50kHz	0.10 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz- 300kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
	2.000000V	3Hz-5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
		5Hz-10Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
		10Hz-20kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
		20kHz-50kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz-300kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
	20.00000V	3Hz-5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5Hz-10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10Hz-20kHz	0.04 + 0.04	0.07 + 0.04	0.08 + 0.04	0.008 + 0.004
		20kHz- 50kHz	0.10 + 0.05	0.12 + 0.05	0.15 + 0.05	0.012 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz-300kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02
	200.0000V	3Hz-5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
		5Hz-10Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
		10Hz-20kHz	0.04 + 0.02	0.07 + 0.03	0.08 + 0.03	0.008 + 0.003
		20kHz-50kHz	0.10 + 0.04	0.12 + 0.05	0.15 + 0.05	0.012 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz-300kHz	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.20 + 0.02

	300.000V	3Hz-5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
		5Hz-10Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
		10Hz-20kHz	0.04 + 0.02	0.07 + 0.03	0.08 + 0.03	0.008 + 0.003
		20kHz-50kHz	0.10 + 0.04	0.12 + 0.05	0.15 + 0.05	0.012 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz-300kHz	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.20 + 0.02
<b>True RMS AC Current</b> [8]	200.0000μA	3Hz-5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.200 + 0.006
		5Hz-10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.100 + 0.006
		10Hz-5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
		5kHz-10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006
	2.000000mA	3Hz-5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		5Hz-10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
		10Hz-5kHz	0.12 + 0.04	0.12 + 0.04	0.12 + 0.04	0.015 + 0.006
		5kHz-10kHz	0.20 + 0.25	0.20 + 0.25	0.20 + 0.25	0.030 + 0.006
	20.00000mA	3Hz-5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.200 + 0.006
		5Hz-10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.100 + 0.006
		10Hz-5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
		5kHz-10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006
	200.0000mA	3Hz-5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		5Hz-10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
		10Hz-5kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
		5kHz-10kHz	0.20 + 0.25	0.20 + 0.25	0.20 + 0.25	0.030 + 0.006
	1.000000A	3Hz-5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.100 + 0.006
		5Hz-10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
		10Hz-5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
		5kHz-10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006
5Hz-10Hz		0.35 + 0.08	0.35 + 0.10	0.35 + 0.10	0.035 + 0.008	
10Hz-5kHz		0.15 + 0.08	0.15 + 0.10	0.15 + 0.10	0.015 + 0.008	

[1] Specifications are for 90-minute warm-up, slow ac filter and sine wave input.

[2] 10% overrange on all ranges.

[3] Relative to calibration standards.

- [4] Specifications are for sine wave input >5% of range. For inputs from 1% to 5% of range and <50 kHz, add 0.1% of range additional error. For 50 kHz to 100 kHz, add 0.13% of range.
- [5] When the frequency is lower than 100 Hz, the specification of slow filter is only for sine wave input.
- [6] Specifications are for sine wave input >5% of range. For inputs from 1% to 5% of range, add 0.1% of range additional error. Specifications are typical values for 200  $\mu$ A, 2 mA, 2 A and 10 A ranges when frequency is >1 kHz.

### Measuring Characteristics

True RMS AC Voltage	
<b>Measurement Method</b>	AC-coupled True-RMS -- measure the ac component of input with up to 300 V DC bias on any range.
<b>Crest Factor</b>	$\leq 5$ at full range
<b>Input Impedance</b>	1 M $\Omega$ $\pm$ 2%, in parallel with <150 pF capacitance on any range
<b>Input Protection</b>	300 V rms on all ranges
<b>AC Filter Bandwidth</b>	Slow: 3 Hz – 300 kHz
	Medium: 20 Hz – 300 kHz
	Fast: 200 Hz – 300 kHz
<b>CMRR (common mode rejection ratio)</b>	70 dB, for the 1 k $\Omega$ unbalance in LO lead, <60 Hz common mode signal frequency, $\pm$ 500 VDC peak maximum.
True RMS AC Current	
<b>Measurement Method</b>	Direct coupled to the fuse and shunt; AC-coupled True RMS measurement (measure the AC component).
<b>Crest Factor</b>	$\leq 3$ at full range
<b>Max. Input</b>	DC + AC current peak value <300% of range. Current with DC current component <10 A rms.
<b>Shunt Resistor</b>	100 $\Omega$ for 200 $\mu$ A, 2 mA
	1 $\Omega$ for 20 mA, 200 mA
	0.01 $\Omega$ for 1 A
Settling Time Considerations	
The default measurement delay of the multimeter can ensure the correctness of the first readings of most of the measurements. Make sure the RC circuit of input terminal has been fully settled (about 1 s) before accurate measurement.	

## Frequency and Period Characteristics

Accuracy Specifications:  $\pm$  (% of reading) <sup>[1] [2]</sup>

Function	Range	Frequency Range	24 Hour <sup>[3]</sup> $T_{CAL} \text{ } ^\circ\text{C} \pm 1^\circ\text{C}$	90 Day $T_{CAL} \text{ } ^\circ\text{C} \pm 5^\circ\text{C}$	1 Year $T_{CAL} \text{ } ^\circ\text{C} \pm 5^\circ\text{C}$	Temperature Coefficient 0°C to ( $T_{CAL} \text{ } ^\circ\text{C} - 5^\circ\text{C}$ ) ( $T_{CAL} \text{ } ^\circ\text{C} + 5^\circ\text{C}$ ) to 50°C
Frequency, Period	200mV to 300V	3 Hz-5 Hz	0.07	0.07	0.07	0.005
		5 Hz-10 Hz	0.04	0.04	0.04	0.005
		10 Hz-40 Hz	0.02	0.02	0.02	0.001
		40 Hz-300 kHz	0.005	0.006	0.007	0.001
		300 kHz-1 MHz	0.005	0.006	0.007	0.001

Additional Low Frequency Errors: (% of reading)

Frequency	Gate Time (Resolution)			
	1 s (0.1 ppm)	0.1 s (1 ppm)	0.01 s (10 ppm)	0.001 s (100 ppm)
3 Hz-5Hz	0	0.12	0.12	0.12
5 Hz-10Hz	0	0.17	0.17	0.17
10 Hz-40Hz	0	0.20	0.20	0.20
40 Hz-100Hz	0	0.06	0.21	0.21
100 Hz-300Hz	0	0.03	0.21	0.21
300 Hz-1 kHz	0	0.01	0.07	0.07
>1kHz	0	0	0.02	0.02

[1] Specifications are for 90 minutes warm-up and 1 s gate time.

[2] For frequency  $\leq 300$  kHz, the specification is for AC input voltage of 10% to 110% of range. For frequency  $> 300$  kHz, the specification is for AC input voltage of 20% to 110% of range. The maximum input is limited to 750 Vrms or  $8 \times 10^7$  Volts-Hz (whichever is less). 200 mV range is full range input or input that is larger than the full range. For 20 mV to 200 mV inputs, multiply % of reading error by 10.

[3] Relative to calibration standards.

**Measuring Characteristics****Frequency and Period**

Measurement Method	Reciprocal-counting technique, AC-coupled input using the AC voltage function.
Input Impedance	1 M $\Omega$ $\pm$ 2%, in parallel with <150 pF capacitance on any range
Input Protection	300 Vrms on all ranges

**Measurement Considerations**

All frequency counters are susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs from external noise pickup is critical for minimizing measurement errors.

**Settling Considerations**

Errors will occur when attempting to measure the frequency or period of an input following a dc offset voltage change. The input blocking RC time constant must be allowed to fully settle (about 1 s) before the most accurate measurements are possible.

## Temperature Characteristics

Function	Probe Type	Type	Optimum Range	Accuracy Specifications <sup>[1]</sup>	
				1 Year $T_{CAL}^{\circ}C \pm 5^{\circ}C$	Temperature Coefficient 0°C to ( $T_{CAL}^{\circ}C - 5^{\circ}C$ ) ( $T_{CAL}^{\circ}C + 5^{\circ}C$ ) to 50°C
Temperature	RTD <sup>[2]</sup> ( $R_0$ is within 49 $\Omega$ and 2.1 k $\Omega$ )	$\alpha=0.00385$	-200°C to 660°C	0.16°C	0.01°C
		$\alpha=0.00389$	-200°C to 660°C	0.17°C	0.01°C
		$\alpha=0.00391$	-200°C to 660°C	0.14°C	0.01°C
		$\alpha=0.00392$	-200°C to 60°C	0.15°C	0.01°C
	Thermal Resistance	2.2 k $\Omega$	-40°C to 150°C	0.08°C	0.002°C
		3 k $\Omega$	-40°C to 150°C	0.08°C	0.002°C
		5 k $\Omega$	-40°C to 150°C	0.08°C	0.002°C
		10 k $\Omega$	-40°C to 150°C	0.08°C	0.002°C
		30 k $\Omega$	-40°C to 150°C	0.08°C	0.002°C
	Thermocouple <sup>[3]</sup>	B	0°C to 1820°C	0.76°C	0.14°C
		E	-270°C to 1000°C	0.5°C	0.02°C
		J	-210°C to 1200°C	0.5°C	0.02°C
		K	-270°C to 1372°C	0.5°C	0.03°C
		N	-270°C to 1300°C	0.5°C	0.04°C
		R	-50°C to 1768.1°C	0.5°C	0.09°C
		S	-50°C to 1768.1°C	0.6°C	0.11°C
	T	-270°C to 400°C	0.5°C	0.03°C	

[1] Specifications are for 90 minutes warm-up. Probe error excluded.

[2] Specification is for 4WR resistance measurement.

[3] Relative to cold junction temperature, accuracy is based on ITS-90. Built-in cold junction temperature refers to the temperature inside the banana jack and its accuracy is  $\pm 2.5^{\circ}C$ .

**Measuring Characteristics**

<b>Thermocouple</b>	
<b>Conversion</b>	ITS-90 software compensation
<b>Reference Junction Type</b>	Internal, Fixed, or External
<b>T/C Check</b>	Selectable per channel. When the channel resistance is $>5k\Omega$ , it is considered as Open.
<b>RTD</b>	
<b>Alpha</b>	= 0.00385 (DIN/IEC 751): using ITS-90 software compensation; = 0.00389, 0.00391 or 0.00392: using IPTS-68 software compensation
<b>Thermistor</b>	
	44004, 44007, 44006 series
<b>Measurement Considerations</b>	
The built-in cold junction temperature tracks the temperature inside the terminal block. The change of temperature in the terminal block might cause additional error. When using the built-in cold junction compensation, connect the sensor terminal of the thermocouple to the terminal block and warm it up for more than 3 minutes to minimize the error.	

## Module Specifications

### MC3132/MC3164/MC3232/MC3264/MC3324/MC3416/MC3648

General	Multiplexer					Actuator	Matrix
	MC3132	MC3164	MC3232	MC3264	MC3324	MC3416	MC3648
Number of Channels	32	64	32	64	20 Voltage+4 Current	16	4×8
	2/4 wire	2 wire	2/4 wire	2 wire	2/4 wire	SPDT	2 wire
Connect to DMM Module?	Yes	Yes	Yes	Yes	Yes	No	No
Scanning Speed <sup>[1]</sup>	60Ch/s	60Ch/s	250Ch/s	250Ch/s	60Ch/s	---	---
Open/Close Speed	200Ch/s	200Ch/s	1000Ch/s	1000Ch/s	200Ch/s	200Ch/s	200Ch/s
Maximum Input							
Voltage (DC, AC rms)	300Vrms	300Vrms	150Vrms	150Vrms	300Vrms	300Vrms	300Vrms
Current (DC, AC rms)	1Arms	1Arms	100mArms	100mArms	1Arms	2Arms	1Arms
Power (W, VA)	50VA	50VA	5VA	5VA	50VA	60VA	50VA
Isolation (ch-ch, ch-earth) (DC, AC rms)	300Vrms	300Vrms	150Vrms	150Vrms	300Vrms	300Vrms	300Vrms
DC Characteristics							
Offset Voltage	5uV	5uV	<40uV	<40uV	5uV	<3uV	5uV
Initial Closed Channel Resistance	<1Ω	<1Ω	<1.5Ω	<1.5Ω	<1Ω	<0.1Ω	<1Ω
Isolation (ch-ch, ch-earth)	>10GΩ	>10GΩ	>10GΩ	>10GΩ	>10GΩ	>10GΩ	>10GΩ
AC Characteristics							
Bandwidth	1MHz	1MHz	1MHz	1MHz	1MHz	1MHz	1MHz
Ch-Ch Cross Talk (dB) <sup>[2]</sup> 1MHz	-45	-18 <sup>[3]</sup>	-40	-33	-45	-15	-18
Capacitance HI-LO	100pF	100pF	<80pF	<80pF	100pF	<500pF	100pF
Capacitance LO-Earth	200pF	200pF	<200pF	<200pF	200pF	<200pF	200pF

Volt-Hertz Limit	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>
<b>Other</b>							
T/C Cold Junction Accuracy (Typical)	0.8°C	0.8°C <sup>[4]</sup>	0.8°C	0.8°C	0.8°C	—	—
Switch Life (No Load) (Typical)	100M	100M	100M	100M	100M	100M	100M
Switch Life (Rated Load) (Typical) <sup>[5]</sup>	100K	100K	100K	100K	100K	100K	100K
Operating Temperature	0°C - 55°C	0°C - 55°C	0°C - 55°C	0°C - 55°C	0°C - 55°C	0°C - 55°C	0°C - 55°C
Storage Temperature	-20°C - 70°C	-20°C - 70°C	-20°C - 70°C	-20°C - 70°C	-20°C - 70°C	-20°C - 70°C	-20°C - 70°C
Humidity (non-condensing)	40°C / 80% RH	40°C / 80% RH	40°C / 80% RH	40°C / 80% RH	40°C / 80% RH	40°C / 80% RH	40°C / 80% RH

[1] Integration time: 0.02PLC, channel delay: 0, auto zero: off, alarm: off, scaling: off, display: off, data to internal memory.

[2] 50Ω load

[3] Isolation within banks is -40dB

[4] Specifications are for the LO setting and not the temperature of the cold terminal

[5] Applies to resistive loads only

## MC3534

Digital Input/Output (DIO)					
Port 1,2,3,4	8-bit, input or output, non-isolated				
Type	Vin(L)	Vin(H)	Vout(L)	Vout(H)	Vin(H) Max
TTL	<0.8V	>2.0V	<0.2V@I <sub>out</sub> =-500mA	>4.8V@I <sub>out</sub> =1mA	<42V with external open drain pull-up
5V CMOS	<1.5V	>3.5V	<0.2V@I <sub>out</sub> =-500mA	>4.8V@I <sub>out</sub> =1mA	
3.3V CMOS	<1.0V	>2.3V	<0.2V@I <sub>out</sub> =-500mA	>3.15V@I <sub>out</sub> =1mA	
2.5V CMOS	<0.75V	>1.75V	<0.2V@I <sub>out</sub> =-500mA	>2.35V@I <sub>out</sub> =1mA	
User defined	Threshold-0.3V	Threshold+0.3V	<0.2V@I <sub>out</sub> =-500mA	>(Level-0.2V)@I <sub>out</sub> =1mA	
Alarming	Match or mismatch, maskable				Match or mismatch, maskable
Speed	4ms (Max) alarm sampling				4ms (Max) alarm sampling

<b>Latency</b>	5ms	5ms
<b>Read/Write Speed</b>	100/s	100/s
<b>Totalizer Input (TOT)</b>		
	<b>High Speed (TOT1,TOT2)</b>	<b>Normal Speed (TOT3,TOT4)</b>
<b>Maximum Count</b>	$2^{32}-1$	$2^{32}-1$
<b>Totalizer Input</b>	10MHz (max), rising or falling edge, programmable	100kHz (max), rising or falling edge, programmable
<b>Signal Level</b>	CMOS 3.3V, 5V tolerable	1Vp-p(min), 42Vpk(max), $V_{cm}=-12V\sim+12V$
<b>Threshold</b>	Fixed at CMOS 3.3V	-12V~+12V, programmable
<b>Gated Input</b>	CMOS 3.3V-Hi, CMOS 3.3V-Lo or none, 5V tolerance	CMOS 3.3V-Hi, CMOS 3.3V-Lo or none, 5V tolerance
<b>Count Reset</b>	Manual or Read + Reset	Manual or Read + Reset
<b>Read Speed</b>	100/s	100/s
<b>Analog Voltage Output (DAC)</b>		
<b>DAC 1,2,3,4</b>	$\pm 12V$ , non-isolated (earth referenced)	
<b>Resolution</b>	1mV	
<b>I<sub>out</sub></b>	10mA max <sup>[1]</sup>	
<b>Setting Time</b>	1ms to 0.01% of output	
<b>Accuracy 1 year <math>\pm 5^{\circ}C</math></b>	$\pm(\% \text{ output} + mV)$ 0.25%+20mV	
<b>Temp Coefficient</b>	$\pm(0.015\%+1mV)/^{\circ}C$	

[1] No limit for 5 slots (20 DAC channels)

## General Specifications

<b>Display</b>	4.3 inches
<b>Power Supply</b>	AC 100V - 120V, 45Hz - 440Hz AC 200V - 240V, 45Hz - 66Hz Detect the power frequency automatically at power-on, 400 Hz defaults to 50 Hz
<b>Power Consumption</b>	25 VA Max
<b>Working Environment</b>	Full accuracy for 0°C to 50°C Full accuracy to 80% R.H. at 40°C Non-coagulation
<b>Storage Temperature</b>	-40°C to 70°C
<b>Operation Altitude</b>	Up to 2000m
<b>Safety</b>	IEC 61010-1; EN 61010-1; UL 61010-1; CAN/CSA-C22.2 No. 61010-1 Measurement CAT I 1000V/CAT II 300V Pollution Degree 2
<b>EMC</b>	EN 61326-1
<b>Weight</b>	About 5.7 kg (without package)
<b>Dimension</b>	(height × width × length): 159.0mm × 239.0mm × 373.4mm
<b>Remote Interface</b>	GPIO, 10/100Mbit LAN, USB 2.0 Full Speed Device & Host (support USB storage device), RS-232
<b>Programming Language</b>	SCPI
<b>LXI Compatibility</b>	LXI Core Device 2011, Version 1.4
<b>Warm-up Time</b>	90 minutes