

DATASHEET

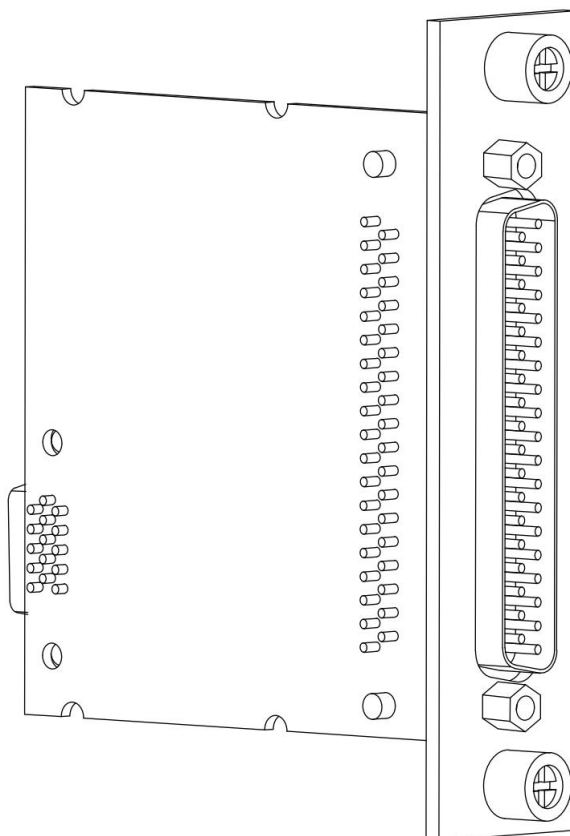
MT E749

4 AI, ± 25 mV/V, 24 Bit, 50 kS/s/ch Simultaneous, Bridge Completion

This document contains the specifications for MT-E749. Specifications are typical at 25°C unless otherwise noted.



Caution Using the MT-E749 in a manner not described in this document may impair the protection the MT-E749 provides.



MT E Series Overview



MT provides more than 20 E Series modules for measurement, control, and communication applications. E Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals
- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground
- -40 °C to 70 °C temperature range to meet a variety of application and environmental needs
- Hot-swappable

The majority of E Series modules are supported in both RobustRIO and FlexDAQ platforms and you can move modules from one platform to the other with no modification.

RobustRIO



RobustRIO combines an open-embedded architecture with small size, extreme ruggedness, and E Series modules in a platform powered by the Redefinable I/O (RIO) architecture. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of available modular I/O to meet any embedded application requirement.

FlexDAQ

FlexDAQ is a portable, rugged data acquisition platform that integrates connectivity, data acquisition, and signal conditioning into modular I/O for directly interfacing to any sensor or signal. Using FlexDAQ with LabVIEW, you can easily customize how you acquire, analyze, visualize, and manage your measurement data.



Software

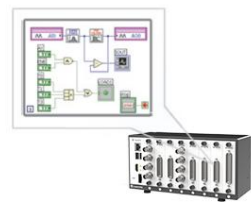
LabVIEW Professional Development System for Windows

- Use advanced software tools for large project development
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers



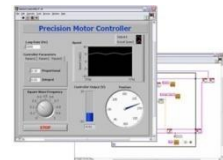
LabVIEW FPGA Module

- Design FPGA applications for MT RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx IP generator functions



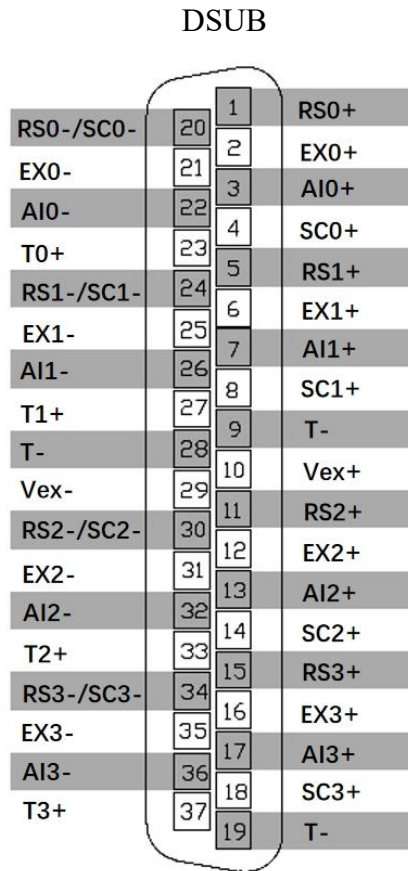
LabVIEW Real-Time Module

- Design deterministic real-time applications with LabVIEW graphical programming
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Take advantage of real-time OS, development and debugging support, and board support

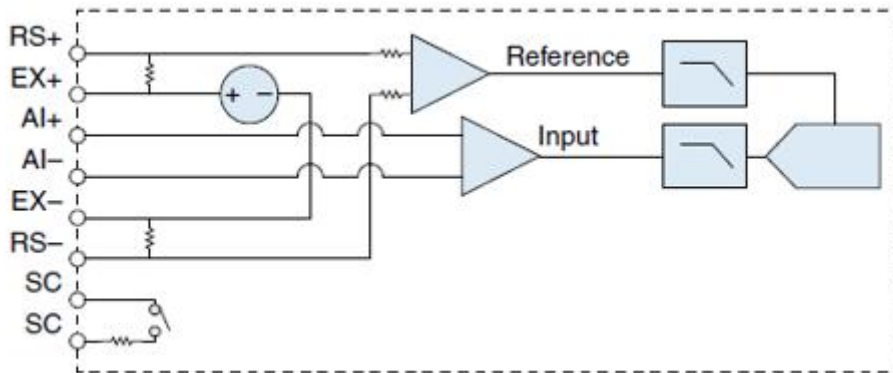


MT-E749 Connectivity

Pin definition of DSUB connector.



MT E749 Circuitry



Each channel on the MT E749 has an independent 24-bit ADC and an input amplifier that enable you to sample signals from all four channels simultaneously

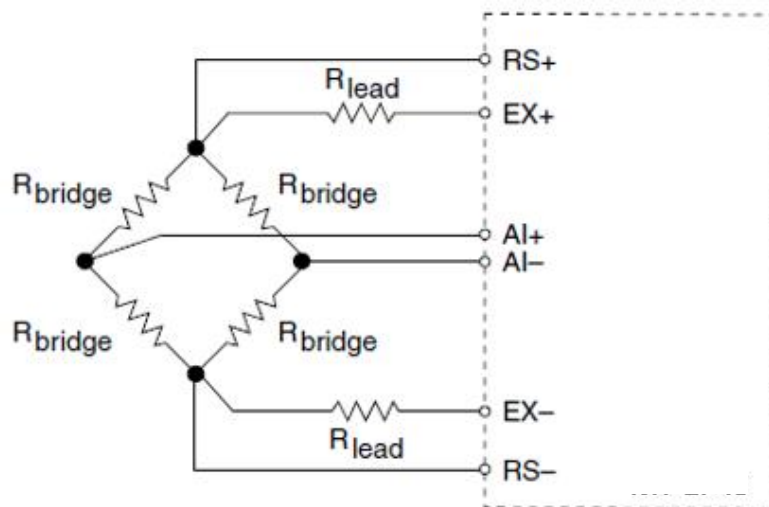
Connection Options to Correct for Resistance Errors

Wiring resistance can create errors in bridge circuits. The MT E749 provides two mechanisms to correct for these errors: remote sensing and shunt calibration.

Remote Sensing

Remote sensing continuously and automatically corrects for errors in excitation leads, and generally is most appropriate for half-and full-bridge sensors.

Long wire and small gauge wire have greater resistance, which can result in gain errors. The resistance in the wires that connect the excitation voltage to the bridge cause a voltage drop, which is a source of gain error. The MT E749 includes remote sensing to compensate for this gain error. Connect remote sense wires to the points where the excitation voltage wires connect to the bridge circuit. Refer to the following figure for an illustration of how to connect remote sense wires to the MT E749.



Shunt Calibration

Shunt calibration can correct for errors from the resistance of both the excitation wiring and wiring in the individual resistors of the bridge. Remote sensing corrects for resistances from the EX pins on the MT E749 to the sensor, and shunt calibration corrects for these errors and for errors caused by wire resistance within an arm of the bridge. Shunt calibration is most useful with quarter-bridge sensors because there may be significant resistance in the wiring to the active resistor in the bridge.

Excitation Voltages

You can program the MT E749 to supply 2.5 V, 3.3 V, 5 V, or 10 V of excitation voltage. The

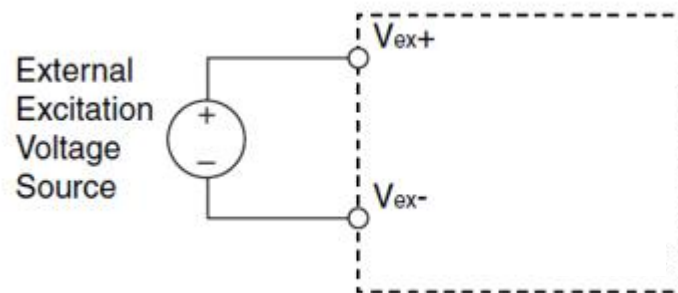
maximum excitation power for internal excitation is 150 mW.

The 150 mW limit allows you to power half and full bridges as follows:

- Four 350 Ω half bridges at 5.0 V
- Four 350 Ω full bridges at 3.3 V
- Four 120 Ω half bridges at 2.5 V

External Excitation

You can connect an external excitation voltage source to the MT E749 if you need an excitation voltage that causes more than 150 mW to dissipate across all the bridges.



MT E749 Specifications

The following specifications are typical for the range -40 °C to 70 °C unless otherwise noted.



Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.



Caution Do not operate the MT E749 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to MT for repair.

Input Characteristics

Number of channels	4 analog input channels
Bridge completion	
Half and Full	Internal
Quarter	External
ADC resolution	24 bits
Type of ADC	Delta-Sigma

Sampling mode	Simultaneous
Internal master timebase(f_M)	
Frequency	12.8 MHz
Accuracy	± 105 ppm maximum
Data rate range (f_s) using internal master timebase	
Minimum	1.613 kS/s
Maximum	50 kS/s
Data rate range (f_s) using external master timebase	
Minimum	391 S/s
Maximum	51.36 kS/s
Data rates (f_s)	$(f_M \div 256)/n$, $n = 1, 2, \dots, 31$
Typical input range	± 25 mV/V
Scaling coefficient	2.9802 nV/V per LSB
Overvoltage protection between any two pins	± 30 V

Table 1. Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	0.25%	$\pm 0.28\%$
	Typical (25 °C ± 5 °C)	0.062%	$\pm 0.054\%$

Gain drift	11ppm/°C maximum
Offset drift	
2.5V excitation	0.7 uV/V per °C
3.3V excitation	0.5 uV/V per °C
5V excitation	0.4 uV/V per °C
10V excitation	0.3 uV/V per °C
Half-bridge completion	
Tolerance	± 1100 uV/V maximum

Drift	1.7 $\mu\text{V}/\text{V}$ per $^{\circ}\text{C}$
Passband	
Frequency	$0.45 * f_s$
Flatness	0.1dB maximum
Stopband	
Frequency	$0.55 * f_s$
Rejection	98 dB
Alias-free bandwidth	$0.45 * f_s$
Oversample rate	$64 * f_s$
SFDR(1kHz, -60 dBFS)	113dB
Total Harmonic Distortion(THD)	
1 kHz, -20 dBFS	-93 dB
8 kHz, -20 dBFS	-93 dB
Excitation	
Internal voltage	2.5V, 3.3 V, 5.0 V, 10.0 V
Internal power	153mW maximum
External voltage	2V to 10 V

Power Requirements

Power consumption from chassis:	760 mW maximum
Thermal dissipation (at 70 $^{\circ}\text{C}$)	760 mW maximum

Safety Voltages

Connect only voltages that are within the following limits:

Between any two pins	± 30 V maximum
Isolation Channel-to-channel	None
Isolation Channel-to-earth ground	
Up to 3000m	

Continuous	60 VDC
Withstand	1,000 Vrms
Up to 5000m	
Continuous	60 VDC
Withstand	860 Vrms

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low- voltage sources, and electronics.

CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

Shock and Vibration

To meet these specifications, you must panel mount the system.

Operating vibration

Random (IEC 60068-2-64)	5 g _{rms} , 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

Environmental

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing Storage
humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing Pollution
Degree	2
Maximum altitude	5000m

Indoors use only.

Support

MT-RIO上手指南:

<http://server.mangotree.cn:9000/WebFile/Downloads/上手指南/MT-RIO/>



RIO上手指南

MT-RIO视频教程:

<http://server.mangotree.cn:9000/WebFile/Downloads/视频教程/MT-RIO/>



RIO视频教程

MT-Master上手指南:

<http://server.mangotree.cn:9000/WebFile/Downloads/上手指南/MT-Master/>



Master上手指南

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Master视频教程

Dimensions:(mm)

