

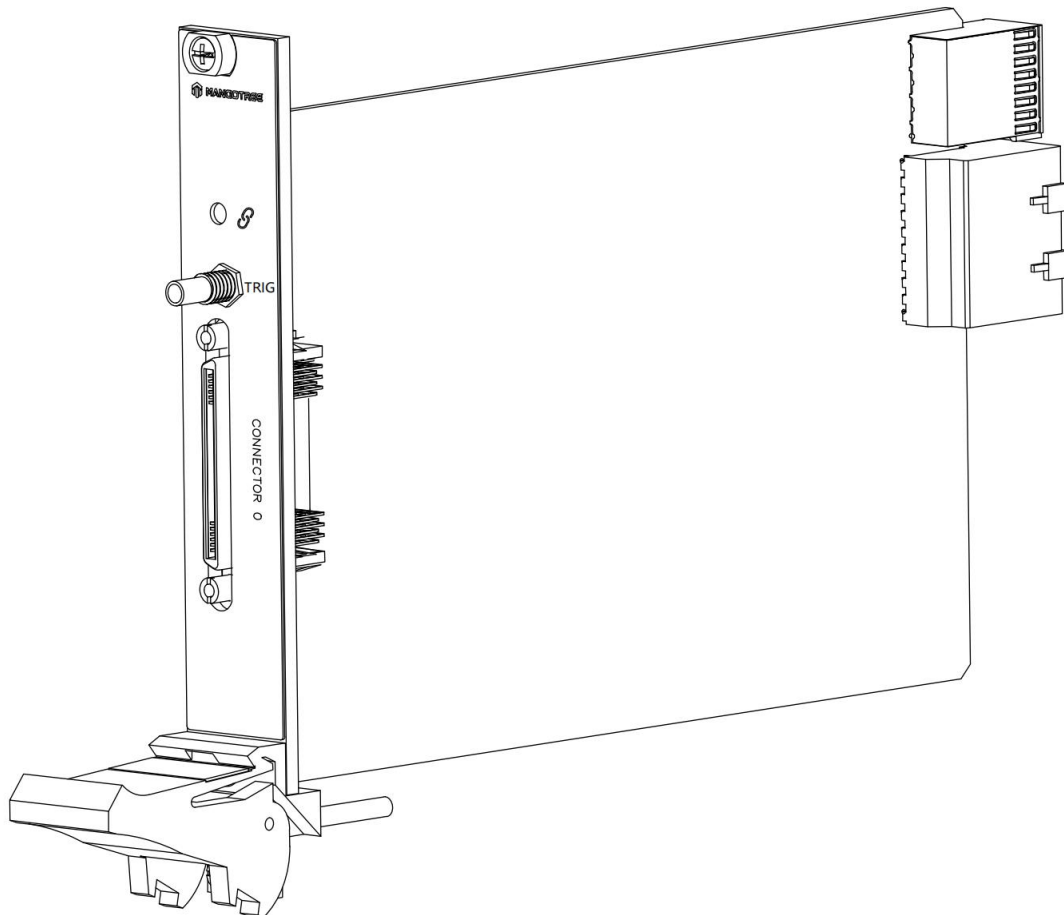
## DataSheet

# MT-X413

This document contains the specifications for MT-X413. Specifications are typical at 25°C unless otherwise noted.



**Caution** Using the MT-X413 in a manner not described in this document may impair the protection the MT-X413 provides.



# Analog Input

Number of channels	16 differential
ADC resolution	16 bits
Type of ADC	Successive approximation register (SAR)
Input range	±10V
Input Voltage Ranges	
Measurement Voltage (AI+ to AI-)	
Minimum(V)	±10.2V
Typical(V)	±10.4V
Maximum	±10.6V
Overvoltage protection	±30 V
Conversion time	1.25 µs minimum
Sample rate	600 kS/s maximum

**Table 1.** Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	0.142%	±0.070%
	Typical (23 °C ±5 °C)	0.010%	±0.007%

CMRR	120 dB minimum
-3 dB bandwidth	>10 kHz
Input impedance	>1 GΩ
Crosstalk	-90 dB
Total Harmonic Distortion(THD)	-107dB
No missing codes	16 bits
DNL	±0.5LSB
INL	±0.5LSB
SNR	90 dB
SFDR	109 dB

# Counter

Voltage Level	5V
Number of Channels	2
Counter measurements	Edge counting,pulse,pulse width,frequency
Maximum input frequency	2MHz

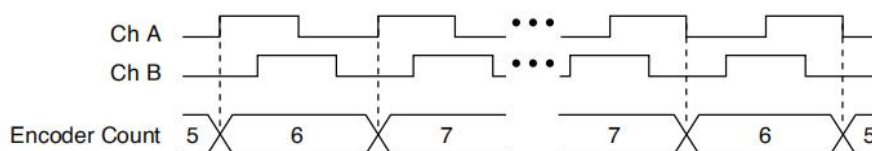
# PWM

Voltage Level	5V
Number of Channels	2
Maximum output frequency	500kHz

# Encoder

Voltage Level	5V
Number of Channels	1 (each with A,B,Z)
Position measurements	Quadrature encoding

**Figure 1.** Quadrature encoding



# Digital Trigger

Voltage Level	5V
Number of Channels	1

# Digital Waveform Input/Output

Voltage Level	5V
Number of Channel	1 Digital Waveform In, 1 Digital Waveform Out

Maximum update rate	5MHz
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## Digital Input/Output

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Voltage Level	5V
Number of Channel	3 Digital Input, 3 Digital Output
Maximum update rate	500Hz

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## External Digital Triggers

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Number of triggers	11
Source	Digital Trigger, TRIG, PXI_TRIG<0..7>, PXI_STAR

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## Maximum Power Requirements

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Power requirements are dependent on the digital output loads and configuration of the LabVIEW FPGA VI used in your application.

+3.3V	1.23 A
+12 V	0.57 A

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## Physical Characteristics

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Weight	200g
Dimensions	See end of this document

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## Safety Voltages

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1

# 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.

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### Operating vibration

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Random (IEC 60068-2-64)	5 g <sub>rms</sub> , 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

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## Environmental

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

Operating temperature	-40 °C to 70 °C (IEC 60068-2-1, IEC 60068-2-2)
Storage temperature	-40 °C to 85 °C (IEC 60068-2-1, IEC 60068-2-2)
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	4,000 m

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Indoor use only.

# DAQMode Support

通用模式 (DAQMode=0) 包括: AI、AO、Counter、PWM、Encoder、Digital Input、Digital Output、Digital Waveform Input、Digital Waveform Output、Temperature。

通用模式适用所有的MT-DAQ设备, 该模式下用户可以开发使用设备数据手册中说明的全部功能, 不同设备支持的功能不同。本设备通用模式支持的功能如下表所示, 对应功能为绿色则支持, 红色则不支持。

本设备通用模式 (DAQMode=0) 支持的功能:

● AI	● AO
● Counter	● PWM
● Encoder	● Temperature
● Digital Input	● Digital Output
● Digital Waveform Input	● Digital Waveform Output

特殊模式包括: AI/AO同步 (AIO Sync)、编码器触发AI (Encoder Trigger AI)、AI触发编码器 (AI Trigger Encoder)、DI触发AI/AO同步 (DI Trigger AIO)、DI触发AI (DI Trigger AI)、DI触发AO (DI Trigger AO)。

如果需要使用特殊模式下的模式, 用户需要确认购买设备是否支持该模式, 本设备支持的特殊模式如下表所示, 对应模式为绿色则支持, 红色则不支持; Customer是定制DAQ模式, 正常用户无法使用。如果模式配置错误, 会导致设备无法正常运行。

本设备支持的特殊模式:

● AO-Sync-AI (DAQMode=1)	● AI-Trigger-Encoder (DAQMode=2)
● Encoder-Trigger-AI (DAQMode=3)	● DI-Trigger-AI-Sync-AO (DAQMode=4)
● DI-Trigger-AI (DAQMode=5)	● DI-Trigger-AO (DAQMode=6)

# Config文本

MT-DAQ设备的开发和使用依赖于Config配置文本，只有正确配置该文本，才能保证设备的正常运行。不同型号的设备或板卡对应的配置参数是不同的。Python、LabVIEW和C#三种编程语言的Config配置文本完全相同。

通用Config配置文本通过MT-Master软件主页导出获得，用户可以根据实际设备或板卡的参数对配置文本进行修改配置，或者按照文本默认参数配置运行。

Config配置文本中的各项参数含义及其具体配置可以参考MT-DAQ上手指南，指南链接附于下文Support板块。

使用MT产品过程中如有任何疑问，可以通过访问官网：<http://www.mangotree.cn>联系专业客服咨询。



MangoTree官网

# Support

MT-Master上手指南:

<https://server.mangotree.cn:9900/WebFile/Downloads/上手指南/MT-Master/>



Master上手指南

MT-Master视频教程:

<https://server.mangotree.cn:9900/WebFile/Downloads/视频教程/MT-Master/>



Master视频教程

MT-DAQ上手指南:

<https://server.mangotree.cn:9900/WebFile/Downloads/上手指南/MT-DAQ/>



DAQ上手指南

MT-DAQ视频教程:

<https://server.mangotree.cn:9900/WebFile/Downloads/视频教程/MT-DAQ/>



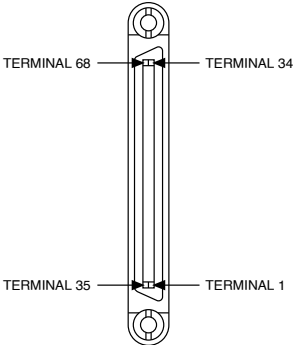
DAQ视频教程



# MT-X413 Pinout

## CONNECTOR 0

AI 0+	68	34	AI 0-
A GND	67	33	A GND
AI 1+	66	32	AI 1-
AI 2+	65	31	AI 2-
A GND	64	30	A GND
AI 3+	63	29	AI 3-
AI 4+	62	28	AI 4-
A GND	61	27	A GND
AI 5+	60	26	AI 5-
AI 6+	59	25	AI 6-
A GND	58	24	A GND
AI 7+	57	23	AI 7-
NC	56	22	NC
AI 8+	55	21	AI 8-
AI 9+	54	20	AI 9-
AI 10+	53	19	AI 10-
AI 11+	52	18	AI 11-
AI 12+	51	17	AI 12-
AI 13+	50	16	AI 13-
AI 14+	49	15	AI 14-
AI 15+	48	14	AI 15-
Digital Trigger	47	13	Digital Waveform Out 0
Digital Waveform In 0	46	12	Digital Output 2
Digital Output 1	45	11	Digital Output 0
Digital Input 2	44	10	Digital Input 1
Digital Input 0	43	9	D GND
Counter 1	42	8	D GND
Counter 0	41	7	D GND
PWM 1	40	6	D GND
PWM 0	39	5	D GND
Encoder0.Z	38	4	D GND
Encoder0.B	37	3	D GND
Encoder0.A	36	2	D GND
+5 V	35	1	+5 V



# Dimensions:(mm)

