

DataSheet

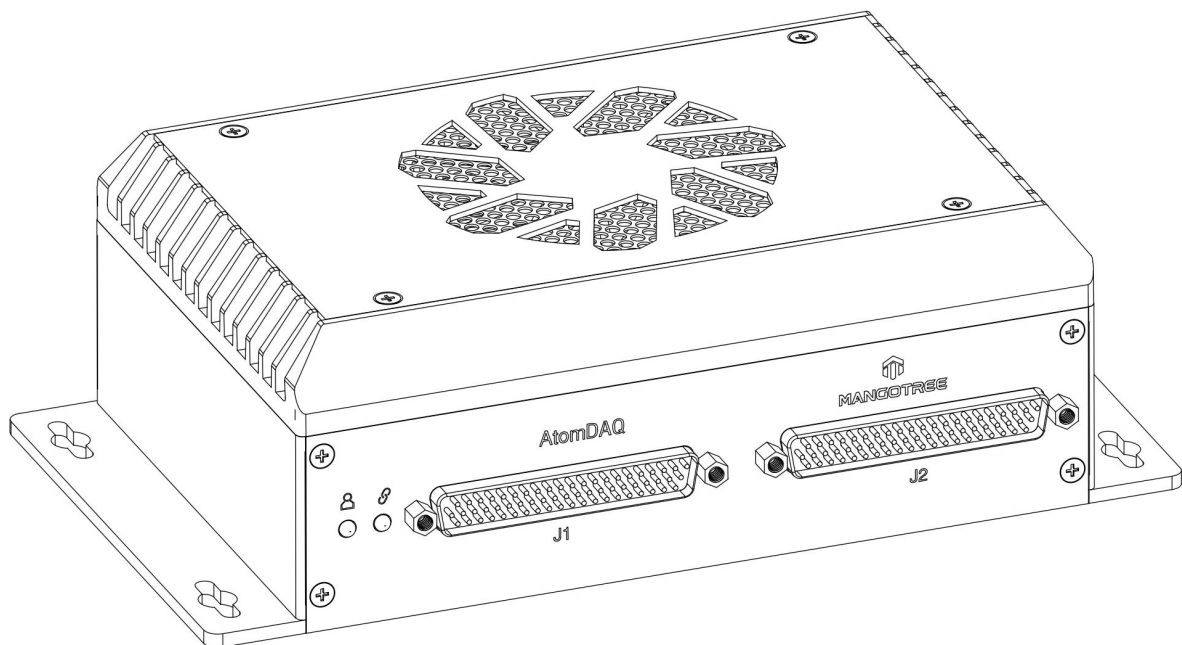
MT-D814

16 AI(16 Bit,200 kS/s/ch),4 AO(16 Bit,125 kS/s/ch),2 Counter,2 PWM,2 Encoder,1 Trigger,16 Digital Input,16 Digital Output,4 Digital Waveform Input,4 Digital Waveform Output

This document contains the specifications for MT-D814.Specifications are typical at 25°C unless otherwise noted.



Caution Using the MT-D814 in a manner not described in this document may impair the protection the MT-D814 provides.



Analog Input

Number of channels	16 single ended
ADC resolution	16 bits
Type of ADC	Successive approximation register (SAR)
Input range	$\pm 10\text{V}$
Conversion time	5 μs minimum
Sample rate	200 kS/s maximum per channel

Table 1. Accuracy

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

Stability

Gain drift	4.5 ppm/°C
Offset drift	10 $\mu\text{V}/^\circ\text{C}$
CMRR	120 dB minimum
-3 dB bandwidth	>10 kHz
Input impedance	>1 G Ω
Crosstalk	-90 dB
Total Harmonic Distortion(THD)	-107dB
No missing codes	16 bits
DNL	$\pm 0.5\text{LSB}$
INL	$\pm 0.5\text{LSB}$

Analog Output

Number of channels	4
DAC resolution	16 bits
Type of DAC	String

Output voltage range	±10V
Current drive	±10 mA per channel maximum
Output impedance	1 Ω
Sample rate	125 kS/s maximum per channel

Table 2. Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	0.214%	0.075%
	Typical (25 °C, ±5 °C)	0.010%	0.007%

Output voltage drift	5 ppm/°C
Zero-code error drift	±4μV /°C
Noise	
Output noise density	170 uV/ √ Hz
Output noise	50 uVpp
Slew rate	1.8V/us
Crosstalk	76dB
DNL	±1 LSB maximum
INL (endpoint)	±12 LSB maximum

Counter

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

PWM

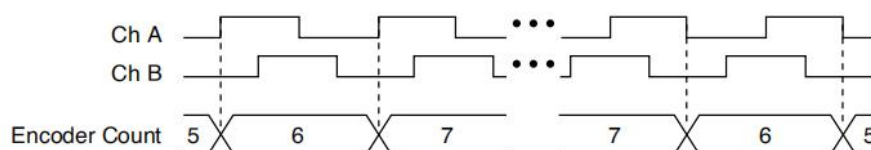
Voltage Level	5V
Number of Channels	2

Maximum output frequency	500kHz
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Encoder

Voltage Level	5V
Number of Channels	2 (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	3.3V
Number of Channel	4 Digital Waveform In, 4 Digital Waveform Out
Maximum update rate	5MHz

Digital Input/Output

Voltage Level	3.3V
Number of Channel	16 Digital Input, 16 Digital Output
Maximum update rate	500Hz

Processor

CPU	I5-1155G7
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Number of cores	4 Cores,8 Threads
CPU frequency	4.5 GHz max
Cache	8 MB

Operating System

Supported operating system	Windows or Linux RT
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Ethernet Port

Numbers of ports	2
Network interface	1000Base-T Ethernet

USB Ports

Number of USB 3.0	6
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Display Port

Supported Port	HDMI
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Memory

Processor memory	4 GB DDR4
Solid-state drive	256 GB

Minimum Power Requirements

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

+24V	3 A
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Physical Characteristics

Weight	1.2 kg
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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.

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)	-20 °C to 60 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Ingress protection	IP20
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

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。如果模式选择错误，也会导致配置文件无法生成。

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。



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-D814 Pinout

Connector J1					
Pin	Definition	Pin	Definition	Pin	Definition
1	5V	22	AGND	43	AI 15
2	5V	23	AO 0	44	NC
3	DGND	24	AO 1	45	Encoder0.A
4	DGND	25	AGND	46	Encoder0.B
5	AI 0	26	AGND	47	Encoder0.Z
6	NC	27	AO 2	48	Encoder1.A
7	AI 1	28	AO 3	49	Encoder1.B
8	NC	29	AI 8	50	Encoder1.Z
9	AI 2	30	NC	51	PWM 0
10	NC	31	AI 9	52	PWM 1
11	AI 3	32	NC	53	Counter 0
12	NC	33	AI 10	54	Counter 1
13	AI 4	34	NC	55	Digital trigger
14	NC	35	AI 11	56	NC
15	AI 5	36	NC	57	NC
16	NC	37	AI 12	58	NC
17	AI 6	38	NC	59	NC
18	NC	39	AI 13	60	NC
19	AI 7	40	NC	61	DGND
20	NC	41	AI 14	62	DGND
21	AGND	42	NC		

Note: The voltage level of digital signals is 5V in connector J1.

Connector J2					
Pin	Definition	Pin	Definition	Pin	Definition
1	5V	22	Digital Output 9	43	Digital Input 12
2	5V	23	Digital Output 10	44	Digital Input 13
3	DGND	24	Digital Output 11	45	Digital Input 14
4	DGND	25	DGND	46	Digital Input 15
5	Digital Waveform Out 0	26	DGND	47	DGND
6	Digital Waveform Out 1	27	Digital Output 12	48	DGND
7	Digital Waveform Out 2	28	Digital Output 13	49	3.3V
8	Digital Waveform Out 3	29	Digital Output 14	50	3.3V
9	Digital Waveform In 0	30	Digital Output 15	51	DGND
10	Digital Waveform In 1	31	Digital Input 0	52	DGND
11	Digital Waveform In 2	32	Digital Input 1	53	DGND
12	Digital Waveform In 3	33	Digital Input 2	54	DGND
13	Digital Output 0	34	Digital Input 3	55	DGND
14	Digital Output 1	35	Digital Input 4	56	DGND
15	Digital Output 2	36	Digital Input 5	57	DGND
16	Digital Output 3	37	Digital Input 6	58	DGND
17	Digital Output 4	38	Digital Input 7	59	DGND
18	Digital Output 5	39	Digital Input 8	60	DGND
19	Digital Output 6	40	Digital Input 9	61	DGND
20	Digital Output 7	41	Digital Input 10	62	DGND
21	Digital Output 8	42	Digital Input 11		

Note: The voltage level of digital signals is 3.3V in connector J2.

Dimensions:(mm)

