Shenzhen Vkinging Electronic Co. Ltd

VK702H-Pro USB data acquisition card

VK702H-Pro USB 24-bit data acquisition card

——Precision Accurate Speed Reliable

Description

VK702H-Pro is a USB high speed data acquisition card, featuring USB port photoelectric isolation, 8-channel true differential input, 24-bit resolution, maximum sampling rate of each channel 100KSPS, 8-channel 800KSPS, and precision pre-gain amplification.The product adopts a number of high-precision 24-bit ADC units and the pre-differential amplifier module developed by the company over the years, so that the product has the advantages of high speed, high resolution, high precision, ultra-low noise, high suppression ratio, wide measuring range and low temperature bleaching. It is suitable for various occasions of precise and high-speed acquisition.

The acquisition card is extended to series version, BNC connector version VK702H-Pro-pro, and the corresponding Ethernet types are vk702nh and vk702nh-pro.

VK702H-Pro acquisition card adopts all-metal shield, which can be used in industrial occasions with strong interference, and has the advantages of moisture-proof, shockproof and anti-interference.

Features:

- **High precision and resolution** : 24Bit
- **Ultra low noise** : **1uV**
- **High speed** : **single channel up to 100ksps**
- **8 channels 800ksps in total**
- **IEPE / ICP** : **2 / 4mA ICP / IEPE standard sensor**
- **Input range** : **0** ~ ± 10V Eight gear switching
- **Counting / frequency measurement**
- **Integrated 2CH PWM output: 16 bit adjustable PWM**
- **1 channel DAC output (optional): 0 ~ +/- 10V analog**

Application

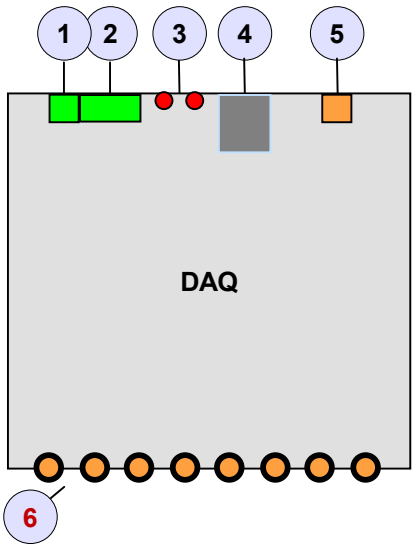
- USB data acquisition
- High resolution signal measurement
- High resolution signal measurement

Acquisition card port diagram:

1. **Power***
2. **Digital IO port**

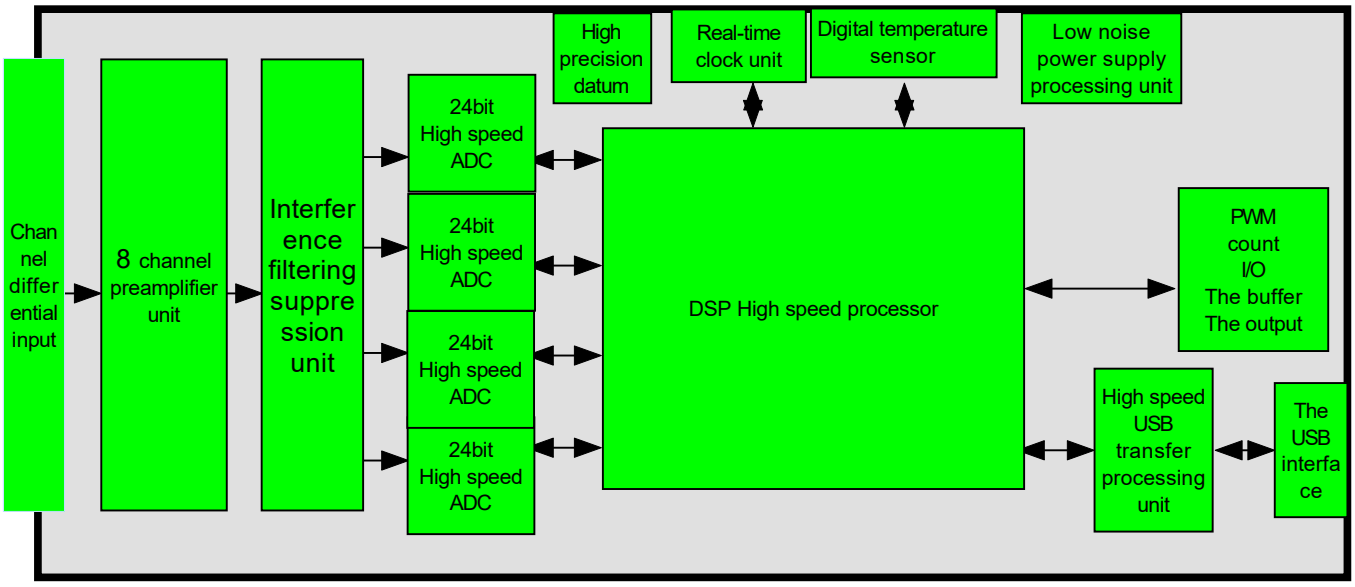
DGND	DIO4 /CNT	DIO3 /PWM2	DIO2 /PWM1	DIO1	VCC /Aout

3. **LED indicator**
4. **USB**
5. **GPS receiving antenna port (optional function)**
6. **Analog input interface**



CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1
AIN8	AIN7	AIN6	AIN5	AIN4	AIN3	AIN2	AIN1

The system block diagram



Port functions

port number	name	function	note
6	**CH1, CH2, CH3, CH4, CH5, CH6, CH7, CH8**	Analog input interface. The interface type is BNC+/-10V input range	ADC/IEPE Software switching
2	**VCC /Aout**	■ Digital power supply 5V, for digital power supply, can provide load current up to 100mA. ■ When an analog output module is selected, this port is an analog voltage output	
	DIO1	● DIO1—— Configured as a digital input/output port	
	DIO2/ PWM1	● DIO2——Configured as a digital input/output port ● PWM1——Configured as A PWM output port	Function 2 choose 1
	DIO3/ PWM2	● DIO3——Configured as a digital input/output port ● PWM2——Configured as A PWM output port	Function 2 choose 1
	DIO4/ CNT	● DIO4——Configured as a digital input/output port ● CNT——Configured as a counter/frequency meter input port ● Ext Trig——Configure external trigger acquisition	Function 3 choose 1
	DGND	Digital earth	

VK702H-Pro USB data acquisition card

Electrical parameters

Item	Unit	Typical	Note
USB supply voltage：	V	5	4.5~5.5
USB supply current：	mA	250mA @ADC mode 430mA @IEPE mode	
6-30V Supply port voltage	V	6-30	5~40
6-30V Supply port current	mA	188mA@12V 96mA@24V	ADC mode
ADC analog port input voltage	V		-10V ~ +10V
ADC analog port signal bandwidth	Hz	30k(-3db) 15k(-0.5db) 10k(-0.1db)	
ADC anti aliasing filter frequency response		0.2 * fs @ -3db 0.5 * fs @ -10db	(fs = sample rate)
Anti aliasing filter type		Sinc3	
IEPE drive voltage	V	24	22~26
IEPE drive current	mA	4	3.6~4.4
Digital port input VL Low level	V	0	-0.3~1
Digital port input VH high level	V	3.3	2~5.5
Digital port output voltage	V	3.3	3.2~3.4
Digital port output drive current (output VH)	mA	10	
Digital port input current (@5V input voltage)	uA	170	
ADC Maximum sampling rate	ksps		100KSPS (8-channel synchronization)
Minimum resolution voltage	uV		0.1
DAC Analog output resolution (optional function)		16bit	
Aout Output voltage (optional function)	V		-10V ~ +10V
PWM frequency(DIO2/PWM1、DIO3/PWM2 port)	Hz		1~1M
PWM duty(DIO2/PWM1、DIO3/PWM2 port)	%		0~100
Counter input maximum frequency(DIO4/CNT port)	Hz		100K
Counter enter maximum count value		2^64	
working temperature	centigrade		-40~ 85
Storage temperature	centigrade		-40~ 105
Physical dimensions (length, width and height)	mm	190*150*50	Excluding connector

Use absolute maximum values safely

Project	Unit		
USB supply voltage:	V	-1~+6	*Exceeding the absolute maximum may damage the device and cause irreparable damage.
ADC analog port	V	+-200(protective circuits inside)	
Digital ports	V	+-200(protective circuits inside)	
DAC output port	V	-1~+6	
All Port Electrostatic Input (ESD)	V	2000	

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ADC detailed electrical parameters

Item	Unit	Typical	Note
Differential input common mode rejection ratio(CMRR)	dB	130	
Input bias current	nA	1	
Input bias voltage	uv	10	
Input equivalent voltage noise	nVp-p	200	
Input equivalent current noise	pAp-p	1	The maximum value is 2
Equivalent input capacitance	pF	400	
Input resistance	GΩ	1	
Maximum temperature drift of amplification unit	ppm/°C	6	

Input range vs noise

Program set	Corresponding measurement range	Background noise	NOTE
0	-10V~+10V	0.3mV	ADC background noise is white noise, which will be superimposed on the measurement results (*note 2)
1	-5V~+5V	0.1mV	
2	-2.5V~+2.5V	60uV	
3	-1V~+1V	25uV	
4	-500mV~+500mV	15uV	
5	-100mV~+100mV	6.5uV	
6	-20mV~+20mV	6uV	
7	-1mV~+1mV	5uV	

Sample rate vs effective resolution

sampling rate	Effective resolution (*note 1)	Note
1 ~ 4Ksps	21bit	When the sampling rate is high, the greater the noise of ADC and surrounding internal devices, so as to reduce the effective resolution(*note2)
4K~15Ksps	20bit	
15k~35Ksps	19bit	
35k~64Ksps	17bit	
64k~100Ksps	16bit	

note 1: The effective resolution is all ADC characteristics

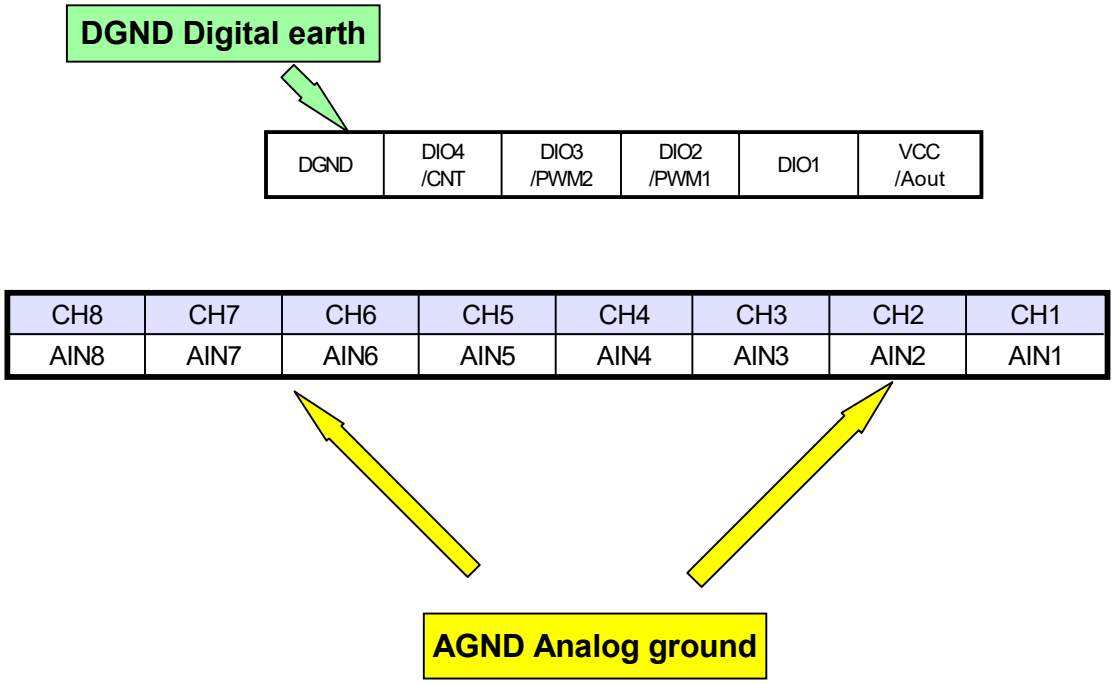
note 2: For signal acquisition, the background noise of ADC and the effective resolution corresponding to the sampling rate shall be considered at the same time

Precautions for Use

The ground wire is divided into digital ground and analog ground.

The port on the USB power side is the digital terminal (including Aout output).On the other side is the analog input port.

When in use, digital input and AOUT output should be used in conjunction with digital ground (DGND), while ADC acquisition terminal should be used in conjunction with analog ground (AGND), so as to avoid digital interference of digital input to analog input.

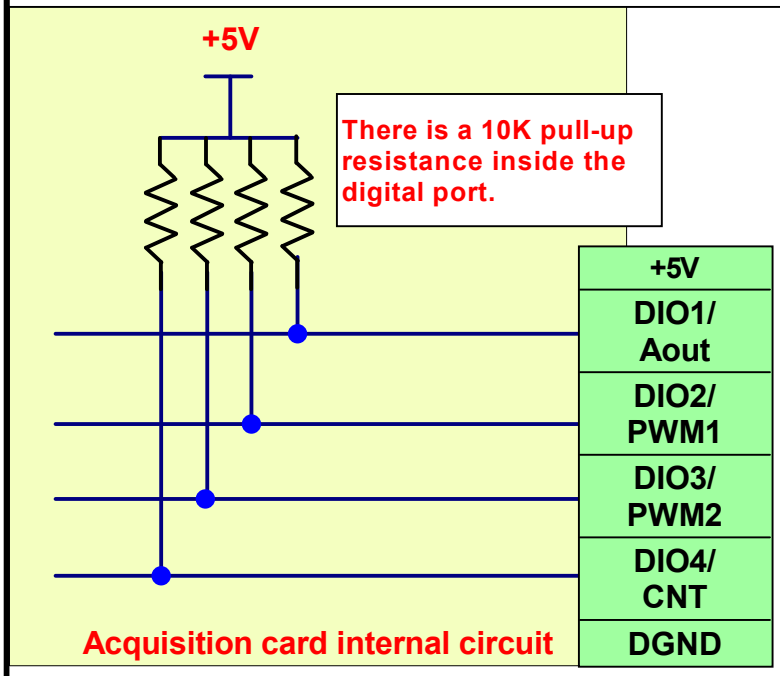


IEPE mode description

- This acquisition card integrates IEPE / ICP hardware function support.
- 24V power supply unit, constant current drive and receiving unit are integrated in the truck, and each channel can be switched to common "analog input mode" or "IEPE mode" through software settings.
- In IEPE mode, the output is 24V 4mA (compatible with 2mA), and the relative ADC input is AC coupled input
- 8 channels can be switched and controlled independently

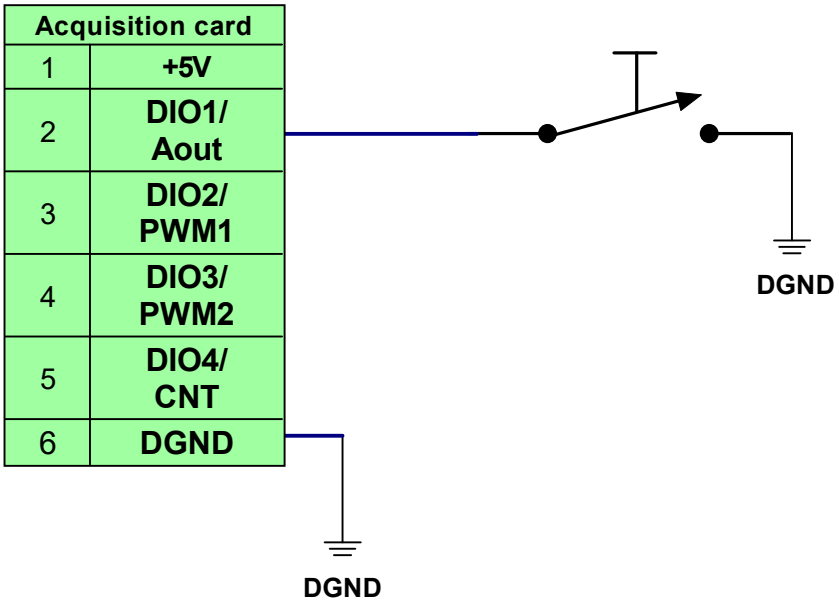
Digital port as input application

When the acquisition card is used as input, its internal pull-up resistance can be more convenient to use.



Key in to make

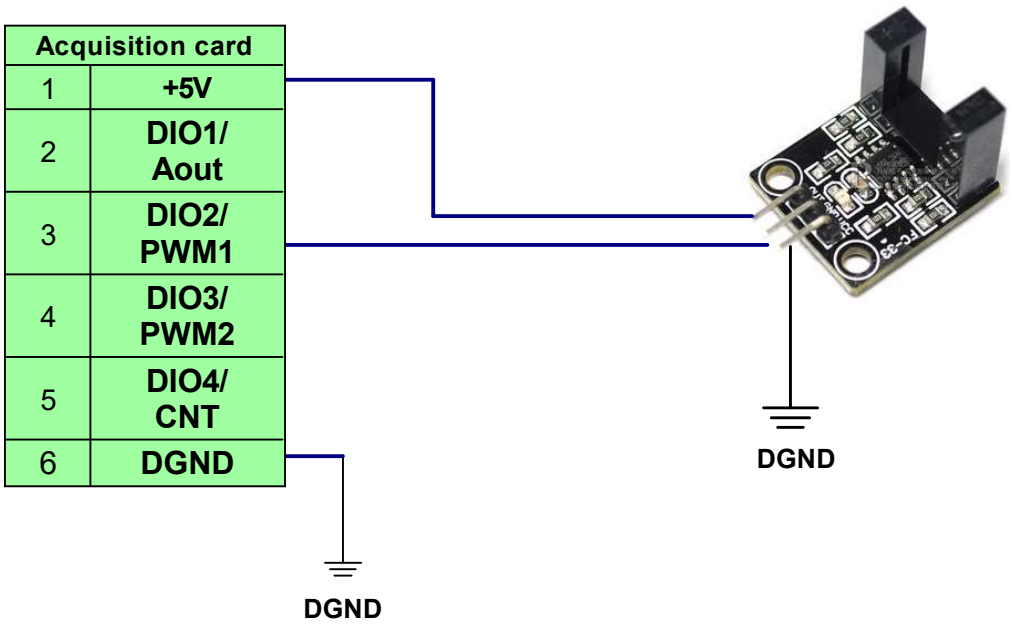
When the acquisition card is used as input, its internal pull-up resistance can be more convenient to use.



*All the ground wires in the diagram must be connected otherwise a loop cannot be formed.

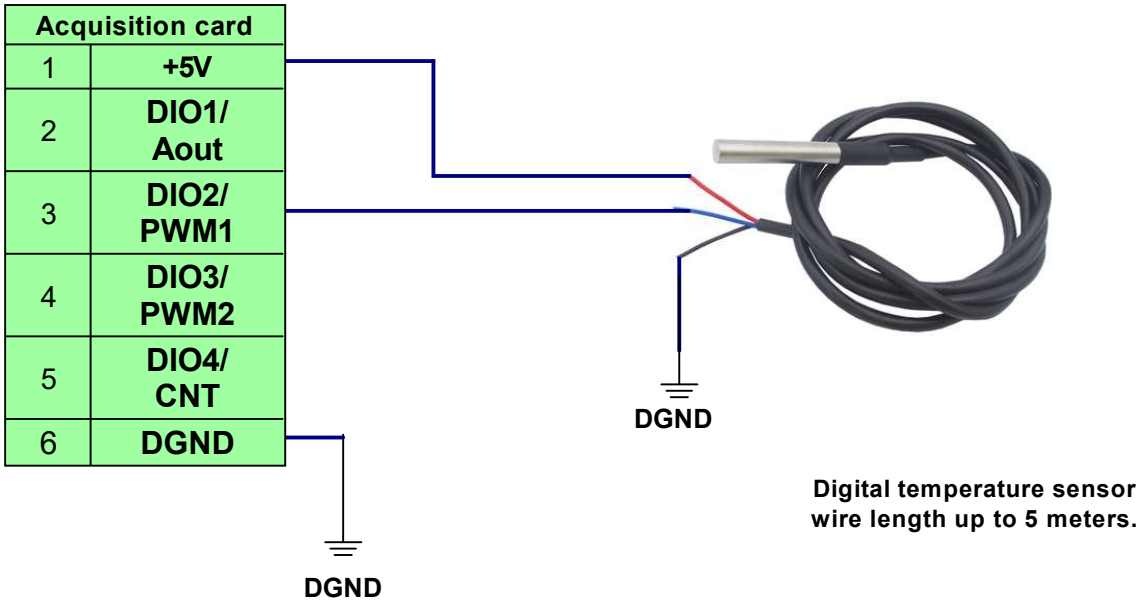
Use an internal 5V power supply to supply the sensor input

When the acquisition card is used as input, its internal pull-up resistance can be more convenient to use.



Any digital port can be connected to digital temperature sensor

Any digital port of the acquisition card can be connected with 18B20 digital temperature sensor to directly read the temperature value.



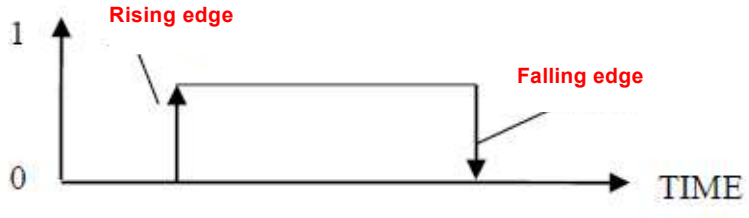
Power status indicator (beside USB interface)

Acquisition status indicator (red and blue two-in-one LED)
1. Red and blue LED lights are out: normal collection is under way
2. Blue light flashing constantly: indicates the stopped state of sampling, waiting for new command to start sampling again, standby state
3. The red light will flicker: if there is data overflow or data error during the collection process
4. The red light is always on: it means the data cannot be sent out, or the USB fails.

External trigger acquisition mode

Trigger acquisition - mode 1: DIO4 trigger n acquisition

DAQ	
1	**+5V**
2	**DIO1/ Aout**
3	**DIO2/ PWM1**
4	**DIO3/ PWM2**
5	**DIO4/** Ext Trig
6	**DGND**



Operation process:
1,Set n acquisition as 500 data points and sampling rate
2,Put P0 4 set to IO trigger n acquisition mode,,
3,Then, P0.05 Each falling edge of 4 will trigger a continuous acquisition of 500 data points at a time

*Note : For details of software operation, refer to
< VK702H-Pron-sd LAN series (TCP) operation examples pdf>,
Chapter 3 "3. Setting the sampling method and mode"

External acquisition clock mode

Trigger acquisition - mode 2: DIO4 as the acquisition clock input port for acquisition,

DAQ	
1	**+5V**
2	**DIO1/ Aout**
3	**DIO2/ PWM1**
4	**DIO3/ PWM2**
5	**DIO4/** Ext Trig
6	**DGND**

*Note : For details of software operation, refer to
< VK702H-Pron-sd LAN series (TCP) operation examples pdf>,
Chapter 3 "3. Setting the sampling method and mode"

Operation process:
1,Put P0 4 set IO to ADC sampling clock mode,
2,P0. 4 input one data for each pulse collector The maximum input frequency is 100kHz;Input 1K pulses and output 1K groups of collected data

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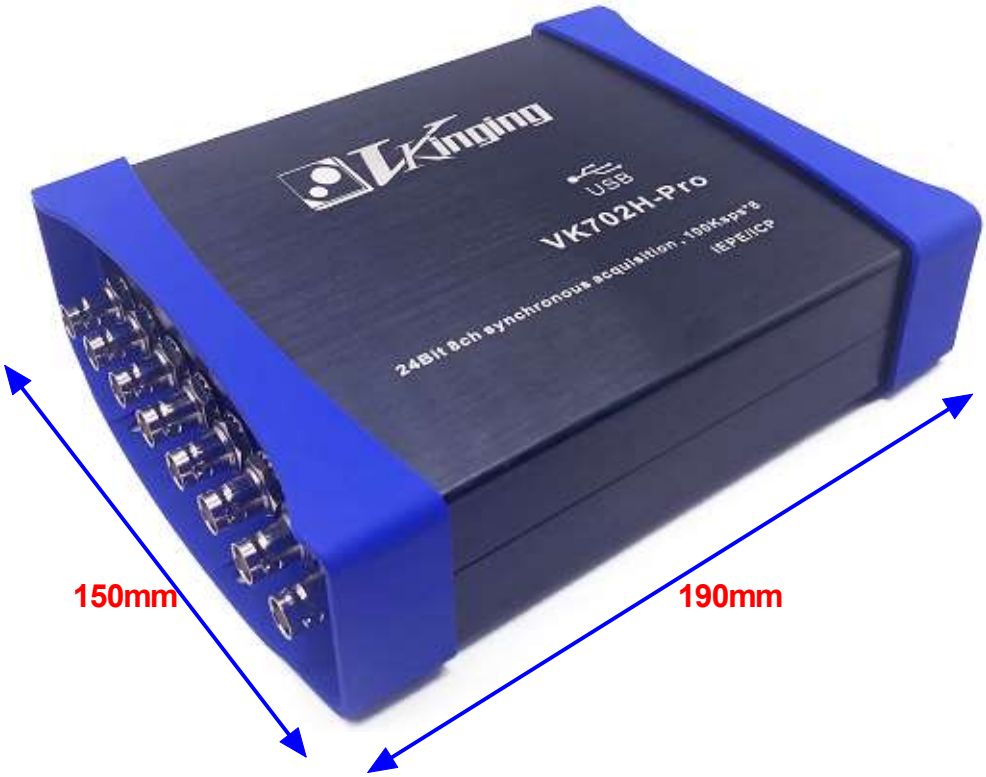
Physical dimension drawing



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