Keysight M9217A
PXIe Single-Slot 2-Channel Isolated Digitizer

Data Sheet

KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

Introduction

The Keysight Technologies, Inc. M9217A is a PXI Express based, single-slot 2-channel, isolated digitizer that supports up to ±256 V input voltage at 20 MSa/s sampling rate with 16-bit resolution. With its built-in peak voltage protection of up to 400 V, the M9217A is ideal for analyzing high-voltage and transient signals as seen in automotive, mechatronics and aerospace defense applications.

Key Features

- ±256 V input voltage
- 2-channel isolated, with ADCs per channel, simultaneously sampled channels
- 20 MSa/s sampling rate at 16-bit resolution
- Built-in 400 V peak voltage protection
- Single PXI express slot
- PXI trigger types supported: PXI TTL / trigger and PXI Star trigger
- IVI-COM, IVI-C, LabVIEW G drivers

±256 V input voltage

Input channels with the ability to measure waveforms up to 256 V are ideal for analyzing high-voltage and transient signals as seen in automotive and aerospace defense applications. Most oscilloscopes and PXI digitizers have a maximum input range less than 40 Vpk. This also reduces the need to add expensive input signal attenuation and signal conditioning circuitry, saving test development time and money.

2-channel isolated, with ADCs per channel

In addition, since the ±256 V input voltage range is combined with 16-bit analog-to-digital converters (ADCs), the isolated front-end and low input offset allows voltages from as low as 250 mV to as high as 256 V to be measured simultaneously.

The M9217A's individually isolated 2-channel inputs have been designed for high performance with an A/D converter per channel to ensure the signals you measure are accurately digitized without distortion or additional noise. Channel input range is configurable from ±250 mV up to ±256 V, with a floating voltage up to ±40 V to accommodate differential waveform acquisition.

20 MSa/s sampling rate at 16-Bit resolution

The M9217A's ability to support up to 20 MSa/s sampling rate at 16-bit resolution enables sampling of transient waveforms like injector waveforms (Figure 1).

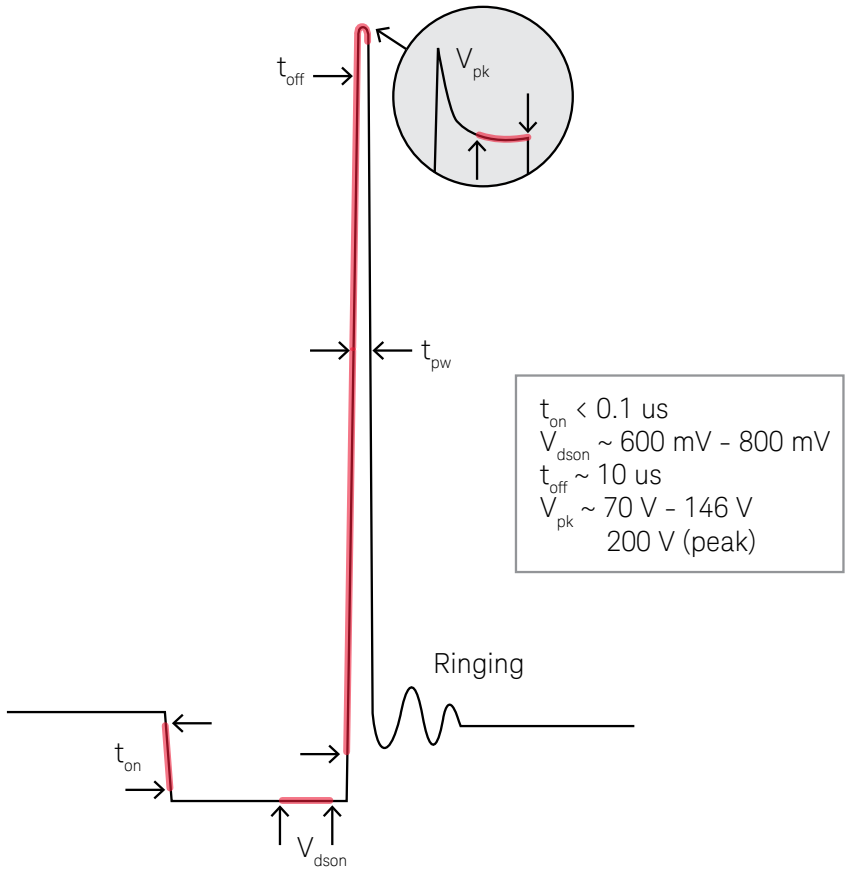

Figure 1. Sample injector waveform

Built-in 400 V peak voltage protection

To support high voltage and transient signals in automotive, mechatronics and aerospace and defense applications, the M9217A has a built-in peak voltage protection against overvoltage spikes of up to 400 V.

32 MSa/channel with up to 1024 segmented memory

Coupled with the memory segmentation feature of up to 1024 records, the M9217A's 32M sample memory size enables multiple bursts of data to be digitized without the need for re-initialization between bursts. The record size is configured by selecting the total number of samples, including pre-trigger samples.

Support for multiple trigger types

The M9217A supports different trigger types like PXI trigger bus, PXI Star, external input/output, channel and software trigger. Configurable trigger delay and trigger hold-off allow you to better define where record data is collected relative to the trigger event. The configurable trigger delay feature allows precise positioning of acquisition relative to the trigger event, while the trigger hold-off feature helps avoid false triggers.

The PXI TTL trigger output enables the M9217A digitizer to synchronize to other devices. Multiple M9217A digitizers can be synchronized for higher channel count.

IO Libraries

Keysight input/output or IO Libraries Suite offers fast and easy connection to instruments. The latest suite version extends that capability to include modular instruments. New support for PXI such as the Keysight IO Libraries Suite helps you display all of the modules in your system. From here, you can view information about the installed software or start the soft front panel of the module. Launch the soft front panel of the module directly from Keysight Connection Expert. Figure 2 shows the M9217A soft front panel.

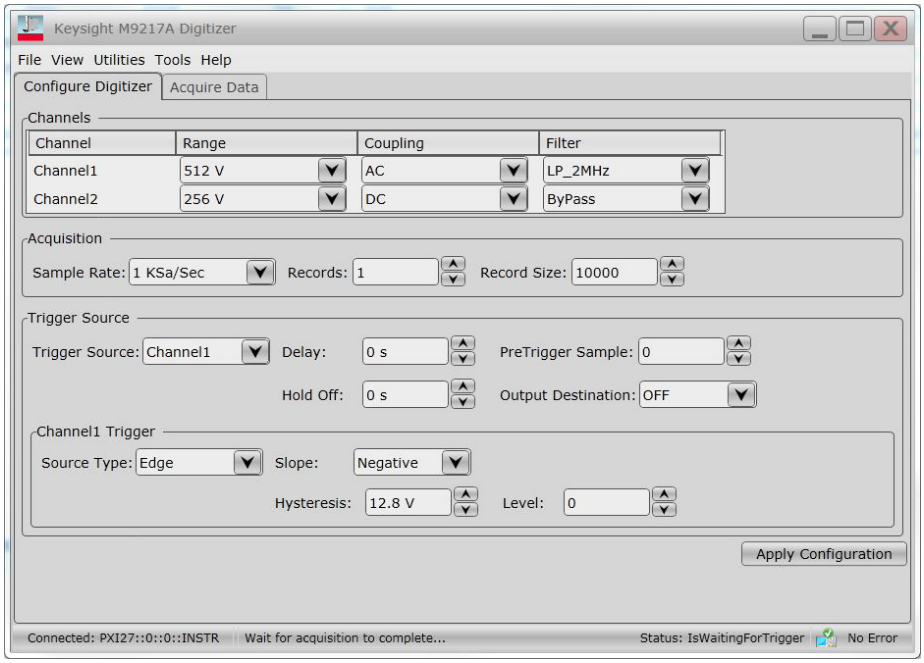

Figure 2. M9217A soft front panel

Drivers

The M9217A digitizer is supplied with a comprehensive portfolio of module drivers, documentation, examples, and software tools to help you quickly develop test systems with your software platform of choice. The module comes with IVICOM, IVI-C, and LabVIEW G software drivers that work in the most popular test and measurement development environments, including LabVIEW and LabWindows/CVI from National Instruments, Microsoft C/C++, C#, and VB.NET.

Easy software integration

The module software support provides context-sensitive help, complete documentation and code examples that allow a quick module set up and basic acquisition functionalities. These code examples can be easily modified, so that the card can be quickly integrated into a test system. Included are application code examples for LabVIEW, LabWindows/CVI, Visual Studio C, C++, and C# and Visual Basic.

Calibration Intervals

The M9217A is factory-calibrated and shipped with a calibration certificate. Calibration is recommended every year in order to verify product performance.

M9217A specifications

2-channel isolated digitizer with ADCs per channel and utilizing one PXI express slot.

Max sample rate	20 MSa/s
Sample resolution	16 bits
Input configuration	Isolated inputs (each channel independently isolated)
Isolation voltage (low to chassis)	+40 V
Maximum input range (high to low)	+256 Vpk
Input impedance	1 MW // 40 pF
Input coupling	DC or AC
AC cutoff frequency	< 10 Hz
Input ranges	±256 V, ±128 V, ±64 V, ±32 V, ±16 V, ±8 V, ±4V, ±2 V, ±1 V, ±500 mV, ±250 mV
Over voltage protection	Yes
Maximum overvoltage protection	±400 Vppk
Analog bandwidth (-3 dB)	20 MHz typical

Trigger

Each trigger event causes acquisition of data into a single record at the configured sample rate. The number of data records is configurable from 1 to 1024.

Source	Description
Immediate	Trigger at initiation of acquisition,
External	SMD connector, TTL input edge (rising edge)
PXI_Trig[0:7], PXI_STAR	PXI connector XJ4 , TTL input edge (rising edge)
DSTARB	PXIe connector XJ3, TTL input edge (rising edge)
Software	Instrument command
Channel/edge	Selectable level, rising/falling, hysteresis.
Channel/window	Selectable high and low levels, leaving/entering.

Sampling

Programmable sample rates	1 kSa/s, 2 kSa/s, 5 kSa/s, 10 kSa/s, 50 kSa/s, 100 kSa/s, 200 kSa/s, 500 kSa/s, 1 MSa/s, 2 MSa/s, 5 MSa/s, 10 MSa/s, 20 MSa/s
External event output	Trigger
Output signal	TTL (rising edge)
Impedance	25 or 50 Ω
Pulse width	1 μs
Trigger modes	
Record length	2 to 32 million samples
Pre trigger	0 to record length -1
Post trigger	Record length-pre-trigger
Timestamp triggered event	Continuous running timestamp
Timestamp resolution	10 ns
Trigger delay	0 – 3600 s with 50 ns resolution
Trigger hold-off	0 – 10 s with 50 ns resolution
Trigger latency[1]	50 ns

1. Latency between edge trigger detection and first trigger sample.

Accuracy

DC accuracy

Total specification (% of reading + % of range)

	23 °C ±5%	
Range	**±% of reading**	**±% of range**
250 mV	0.1	0.3
500 mV	0.1	0.2
1 V, 2 V	0.1	0.12
4 V, 64 V	0.1	0.3
8 V, 128 V	0.1	0.2
16 V, 32 V, 256 V	0.1	0.12
100,000 reading average @ 1 MSa/s		
Integral nonlinearity	±5 LSB	
Differential nonlinearity	±1 LSB	

Dynamic characteristic (typical)

Source	SFDR dBc	THD dBc
250 mV	71	79
500 mV	77	83
1 V	81	85
2 V	85	82
4 V	70	80

Measured for input of 1 Mhz

Noise power (typical)

Range	Noise voltage[1] V_{rms}	Equivalent[2] S/N dB
250 mV	0.5 mV	51
0.5 mV	0.55 mV	55
1 V	0.6 mV	60
2 V	0.9 mV	63
4 V	4 mV	56
8 V	6.5 mV	58
16 V	8.5 mV	61
32 V	11 mV	65
64 V	60 mV	56
128 V	94 mV	58
256 V	120 mV	62

1. 50 Ω source resistance.
2. For -1 dB of full scale range

AC flatness (DC-4 MHz) typical

250 mV, 500 mV, 1 V, 2 V	< 0.3 dB relative to 20 kHz
4 V, 8 V, 16 V, 32 V	< 0.5 dB relative to 20 kHz
128 V	< 1.2 dB relative to 20 kHz

Utilities

Calibration cycle	1 year

Waveform memory

Data memory standard[1]	32 Msa/ch
Random access to readings in multiple record mode	Capture multiple records from single trigger source

1. Nominal values. Specific sample max is 30,000,000

Waveform measurements

Voltage	Peak-to-peak, Minimum, Maximum, High (Top), Low (Base), Amplitude, RMS, Cycle RMS, Average, Cycle Average, Overshoot, Preshoot
Time	Rise, Fall, Frequency, Period, Positive Width, Negative Width, Positive Duty Cycle, Negative Duty Cycle

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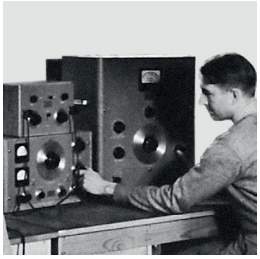

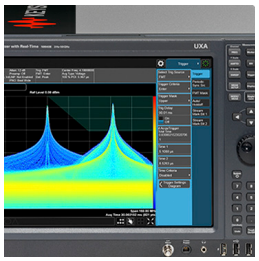

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