TECHNICAL DATA SHEET

VXI Instruments
the test solutions provider

# PXM(e)7810
# Advanced Multi-Measurement Device




PXI
VXI
LAN
cPCI
PXIe
GPIB
USB
RS232 485
external PCIe

## Features

- High voltage range with up to 500 $V_{pp}$
- 16 Bit Waveform Digitizer 64 MS, 10 MS/s
- High precision Digital Multimeter with 16 Bit resolution
- Fully isolated design
- >1 GΩ || <20 pF input impedance up to 8 V range
- 10 MΩ || <20 pF for all other ranges
- Extremely low switching time of <1 ms for ranges and functions
- 2- and 4-wire resistance measurement
- Highly configurable trigger matrix
- Trigger engine for instrument synchronization
- Built-in timer/counter engine
- Electronic protection against overcurrent and overvoltage
- Memory segmenting
- Available with PXI or PXI Express interface

# Product Information

## General

The PXM(e)7810 High Speed Multi-Measurement Device combines a 16 Bit DMM, a 10 MS/s Digitizer with a resolution of 16 Bit, a timer/counter and a trigger card. One special feature of the PXM(e)7810 is a very high input impedance of 10 MΩ || <20 pF also in all AC ranges. Therefore the influence on DC and AC signals is reduced to a minimum.
A trigger input and output is provided as well as electronic protection against overvoltage and overcurrent.

## High voltage, high resolution Waveform Digitizer

The PXM(e)7810 High Speed Multi-Measurement Device features waveform sampling with 10 MS/s, 16 Bit resolution, input voltages up to ±250 Vp and a bandwidth up to 5 MHz. This allows the measurement of high voltage signals without additional signal conditioning. Data can be acquired before and after the trigger event with a programmable sample counter that controls a number of up to 64 million data points. The memory segmenting function allows to save different digitizing events in the memory.
A great amount of trigger capabilities results in multiple instrument and channel synchronization possibilities.

## High precision Digital Multimeter

The PXM(e)7810 High Speed Multi-Measurement Device features a high precision Digital Multimeter (DMM) for high performance measurements with 16 Bit resolution.
It provides measurement of DC voltage up to 250 V, AC voltage up to 250 VP, DC current up to 1 A and AC current up to 2 AP.

## High resolution timer/counter

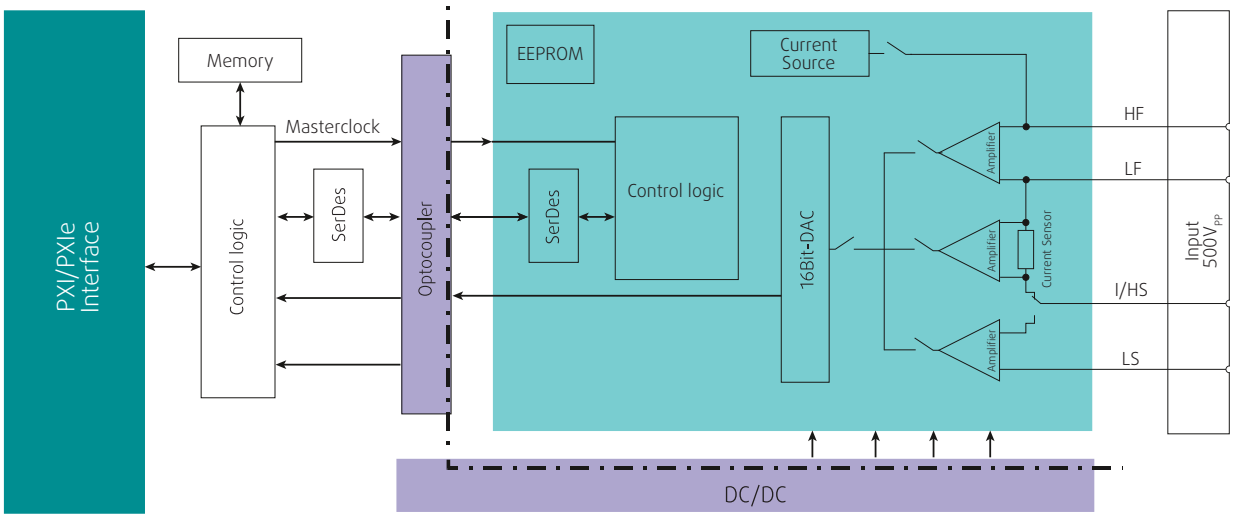
The PXM(e)7810 High Speed Multi-Measurement Device features a high precision timer/counter for high performance measurements of frequency, period time, interval and pulse width and rise and fall times with a resolution of up to 100 ns.

## Configurable trigger matrix

The PXM(e)7810 High Speed Multi-Measurement Device features a complex trigger matrix. The trigger connector on the front panel, internal trigger events and all trigger lines on the backplane can be connected individually.

## High throughput design for many applications

The PXM(e)7810 High Speed Multi-Measurement Device is designed for high throughput production testing. One key feature is the extremely low switching time of <1 ms for the changing of ranges and functions like switching from AC to DC.



# General Specification

| General | Specification |
|---|---|
| **Module size** | 1 slot, 3U |
| **Module weight** | <0.4 kg |
| **Front connector type** | FM5W5P |
| **Storage temperature range** | -25 ... 70°C |
| **Operating temperature** | 0 ... 40°C |
| **Operating altitude** | <2 000 m |
| **Relative humidity** | Up to 85% at 35°C |
| **Electrical safety** | According EN61010-1 |
| **Isolation input to PE** | 250 V CAT I, Pollution Degree 2 |

# Waveform Digitizer

| Acquisition | Specification | Comment |
|---|---|---|
| **Maximum sample rate** | 10 MS/s | |
| **Bandwidth** | | |
| Range 250 $mV_p$, 500 $mV_p$ | >2 MHz | 0.5 $V_{pp}$ input signal; no filter |
| Range 1 $V_p$, 2 $V_p$, 4 $V_p$, 8 $V_p$ | >5 MHz | 2 $V_{pp}$ input signal; no filter |
| All other ranges | >1 MHz | 20 $V_{pp}$ input signal; no filter |
| **Vertical resolution** | 16 Bit | |
| **Sampling interval** | 100 ns ... 1 s | Software selectable |
| **Input impedance** | 10 MΩ // <20 pF | |
| **Input coupling** | DC or AC | Software selectable |
| **Maximum input voltage** | f < 40 kHz: 250 $V_p$<br>40 kHz < f < 1 MHz: $10^7 V_p$ / f<br>1 MHz < f < 5 MHz: 10 $V_p$ | Input voltage may not exceed selected input voltage range |
| **Input ranges** | 250 $mV_p$, 500 $mV_p$, 1 $V_p$, 2 $V_p$, 4 $V_p$, 8 $V_p$,<br>16 $V_p$, 32 $V_p$, 64 $V_p$, 128 $V_p$, 250 $V_p$ | 5% overrange<br>5% overrange |
| **DC accuracy**[1] | | |
| Range 250 $mV_p$ | 0.2 + 0.2 | ±(% of input + % of full scale) |
| Range 500 $mV_p$ | 0.15 + 0.15 | ±(% of input + % of full scale) |
| All other ranges | 0.1 + 0.1 | ±(% of input + % of full scale) |
| **Filter** | 1 kHz, 10 kHz, 100 kHz, 1 MHz | Software selectable |
| **Waveform memory** | 64 MS | |

# Time Base

| Time Base | Specification | Comment |
|---|---|---|
| **Accuracy** | 1 ppm | In operating temperature range |
| **Aging per year** | 1 ppm | In operating temperature range |

[1] DC accuracy specified for an average value of 100 samples with a sample rate of 5 kS/s and active 10 kHz filter performed within 24 hours after an offset correction.

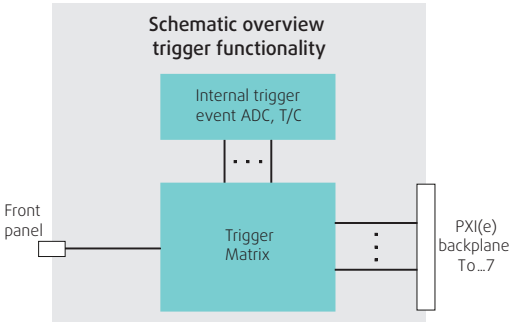
**Notes:** All product data are specified for 1 year at an ambient temperature of 23°C ±5°C (after 1 hour warm-up time). Product specification and description in this document are subject to change without notice.

# Trigger System

| Trigger System | Specification | Comment |
|---|---|---|
| **Input from** | | |
| Internal function module | Module can trigger itself | |
| Software | Via software command | |
| Front connector | Front trigger input (TTL level) | |
| PXI trigger | Trigger 0 ... 7 and star trigger | From the PXI backplane |
| **Output to** | | |
| Internal function module | Module can trigger itself | |
| Front connector | Front trigger output (TTL level) | |
| PXI trigger | Trigger 0 ... 7 | To the PXI backplane |
| **Level resolution** | 16 Bit | |
| **Level accuracy** | 0.6 + 0.3 | ±(% of programmed value + % of full range) |
| **Trigger delay** | 0 ... 200 s | Programmable delay, 100 ns resolution |
| **Trigger slope** | Positive or negative | |
| **Trigger hysteresis** | 0 ... 100% of signal range | Programmable via software |
| **Pre-Trigger** | 0 ... 100% of full record length | Trigger is armed after all pre-samples are captured; post-samples are captured after trigger |
| **Post-Trigger** | 0 ... 100% of full record length | Number of samples captured after trigger event |
| **Trigger Mode** | Asynchronous, synchronous level, synchronous slope | |

# Timer/Counter

| T/C Measurement Modes | Specification |
|---|---|
| **Frequency** | |
| Counter width | 32 Bit |
| Range | 0.1 Hz ... 2.5 MHz |
| Minimum pulse width | 200 ns |
| Gate time | 1 µs ... 10 s |
| **Period** | |
| Resolution | 100 ns |
| Accuracy[1,2] | ±100 ns |
| Range | 1 µs ... 10 s |
| **Time interval and pulse width** | |
| Resolution | 100 ns |
| Accuracy[2] | ±100 ns |
| Range | 1 µs ... 10 s |
| **Rise and fall time** | |
| Resolution | 100 ns |
| Accuracy[2] | ±100 ns |
| Range | 1 µs ... 10 s |
| **Totalize** | |
| Minimum pulse width | 1 µs |
| Range | 0 ... $2^{32}$-1 |




1 Square wave signal with $T_{Rise}$<1 ns and $T_{Fall}$<1 ns.
2 Trigger comparator error not included.

# Digital Multimeter (DMM)

| DC Voltage Measurement | Specification | Comment |
|---|---|---|
| **Resolution** | 16 Bit | |
| **Maximum input voltage** | ±250 V | |
| **Overrange** | 5% of range | |
| **Filter frequencies** | 100 Hz, 1 kHz, 10 kHz, 100 kHz | Software selectable |
| **DC accuracy**[1,2,5,7] | | |
| Range 250 mV | 0.08 + 0.02 | Input resistance >1 GΩ |
| Range 500 mV | 0.08 + 0.015 | Input resistance >1 GΩ |
| Range 1 V | 0.08 + 0.01 | Input resistance >1 GΩ |
| Range 2 V | 0.08 + 0.01 | Input resistance >1 GΩ |
| Range 4 V | 0.08 + 0.01 | Input resistance >1 GΩ |
| Range 8 V | 0.08 + 0.01 | Input resistance >1 GΩ |
| Range 16 V | 0.08 + 0.01 | Input resistance 10 MΩ |
| Range 32 V | 0.08 + 0.01 | Input resistance 10 MΩ |
| Range 64 V | 0.08 + 0.01 | Input resistance 10 MΩ |
| Range 128 V | 0.08 + 0.01 | Input resistance 10 MΩ |
| Range 250 V | 0.08 + 0.01 | Input resistance 10 MΩ |

| AC Voltage Measurement | Specification | Comment |
|---|---|---|
| **Resolution** | 16 Bit | |
| **Input impedance** | 10 MΩ // <20 pF | |
| **Maximum input voltage** | f < 40 kHz: 250 $V_p$<br>40 kHz < f < 1 MHz: $10^7 V_p$ / f<br>1 MHz < f < 5 MHz: 10 $V_p$ | Input voltage may not exceed selected input voltage range |
| **Overrange** | 5% of range | |

| AC Voltage Accuracy[1,2,3,4,5,8] | 1 ... 40 Hz[6] | 40 Hz ... 20 kHz | 20 ... 50 kHz | 50 ... 100 kHz |
|---|---|---|---|---|
| **Range 250 $mV_{RMS}$** | 0.4 + 0.1 | 0.4 + 0.1 | 0.3 + 0.15 | 0.8 + 0.1 |
| **Range 500 $mV_{RMS}$** | 0.3 + 0.1 | 0.2 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 1 $V_{RMS}$** | 0.15 + 0.1 | 0.15 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 2 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 4 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 8 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 16 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 32 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 64 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1 |
| **Range 128 $V_{RMS}$** | 0.15 + 0.1 | 0.1 + 0.1 | 0.2 + 0.1 | 0.8 + 0.1[9] |

1 For measurements >10% of range.
2 ±(% of reading + % of full scale).
3 For sine wave signals >5% of range.
4 Maximum peak input voltage = 2x full scale (e.g. maximum input voltage for 128 $V_{RMS}$ range = ±256 $V_p$).
5 With auto offset correction.
6 With DC coupling.
7 5 PLC.
8 Measurement aperture greater than $5/f_{Low}$, where $f_{Low}$ is the lowest frequency component of the signal being measured.
9 Maximum input voltage must be satisfied.

| DC Current Measurement | Specification | Comment |
|---|---|---|
| **Resolution** | 16 Bit | |
| **Maximum input voltage** | ±1 A | |
| **Overrange** | 5% of range | |
| **Filter frequencies** | 100 Hz, 1 kHz, 10 kHz, 100 kHz | Software selectable |
| **DC accuracy**[1,3,4] | | |
| Range 10 mA | 0.2 + 0.05 | |
| Range 100 mA | 0.2 + 0.05 | |
| Range 1 A | 0.2 + 0.05 | |

| AC Current Measurement | Specification | Comment |
|---|---|---|
| **Resolution** | 16 Bit | |
| **Maximum input voltage** | ±2 $A_p$ | |
| **Overrange** | 5% of range | |

| AC Current Accuracy[2,3,4,5,6] | 40Hz ... 5 kHz | 5 kHz ... 20 kHz |
|---|---|---|
| **Resolution** | 0.3 + 0.1 | 0.5 + 0.3 |
| **Maximum input voltage** | 0.1 + 0.02 | 0.2 + 0.04 |
| **Overrange** | 0.1 + 0.02 | 0.3 + 0.04 |

1 For measurements >8% of range.
2 For sine wave signals >8% of range.
3 With auto offset correction.
4 ±(% of reading + % of full scale).
5 Maximum peak input current = 2x full scale (e.g. maximum input current for 1 $A_{RMS}$ range = ±2 $A_p$).
6 With DC coupling.

# Resistance

| Resistance Measurement | Specification | Comment |
|---|---|---|
| **Resolution** | 16 Bit | |
| **Overrange** | 5% of range | |
| **Resistance accuracy**[1,2,3,4] | | |
| Range 100 Ω | 0.1 + 0.01 | Test current 8 mA |
| Range 1 kΩ | 0.1 + 0.01 | Test current 8 mA |
| Range 10 kΩ | 0.1 + 0.01 | Test current 800 µA |
| Range 100 kΩ | 0.1 + 0.01 | Test current 80 µA |
| Range 1 MΩ | 0.1 + 0.01 | Test current 8 µA |
| Range 10 MΩ | 0.1 + 0.01 | Test current 800 nA |

# PXI(e) Trigger

| PXI Capabilities | Specification | Comment |
|---|---|---|
| **PXI(e) TTL/trigger usage** | Possible | PXI(e) trigger 0...7; input and output |
| **PXI(e) star trigger usage** | Possible | Input only |

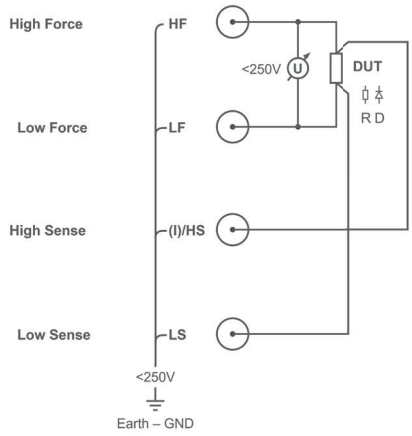
# Operating Times

| Time Base | Specification | Comment |
|---|---|---|
| **Ranges** | <1ms | |
| **Functions**[5] | <1ms | For all U–, I–, R–Ranges[5] |

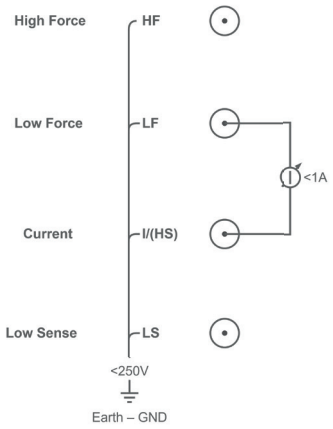
1 For measurements >8% of range.
2 Only 4 wire measurement.
3 With auto offset correction.
4 ±(% of reading + % of full scale).
5 For AC modes with DC coupling.

# Pin Assignment

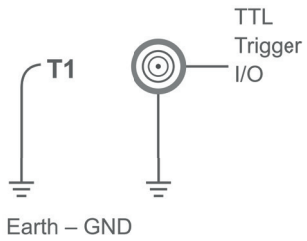
## U/R-Measurement




## I-Measurement




## Trigger Line




# Ordering Information

| Ordering Information | Comment |
|---|---|
| **PXM7810** | Device with PXI interface |
| **PXMe7810** | Device with PXI Express interface |

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