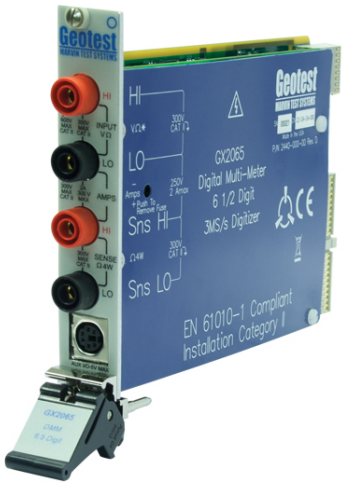
# GX2065

## 6½ DIGIT DMM / DIGITIZER PXI CARD

- Full featured 6.5 digit DMM
- 3 MHz isolated digitizer with memory
- AC True RMS measurements, 10 Hz to 300 KHz
- Measure 1 uV to 300 V
- 7 resistance ranges, 100 to 100 M
- SMX2040 & SMX2060 compatible drivers
- Extended temperature range option




## DESCRIPTION

The GX2065 offers a unique combination of features, resolution, accuracy and speed in a compact, single slot 3U PXI format. Featuring 6-½ digit resolution, 0.005% basic DCV reading accuracy and up to 3,500 reading per second (rps) assures you of measurements that are accurate, fast and repeatable. All measurement functions including digitizing functions are isolated from the PXI bus - providing the ability to make true differential, floating measurements. An on-board controller performs all necessary DMM and digitizer calculations, minimizing PXI control bus overhead.

## FEATURES

The GX2065 is designed as a universal, multifunction DMM and provides all of the features associated with standard bench top DMMs including $V_{DC}$, $V_{AC}$, 2 and 4 - wire resistance measurements, and current measurements. Additionally, the GX2065 features a 3 MHz, 16 bit, isolated input digitizer which allows users to acquire and analyze waveforms. Built in analysis and waveform functions include RMS, average, peak to peak, and peak to average measurements. Up to 8192 samples can be stored in the digitizer's memory. Frequency and period measurements to 500 kHz are also supported. An external TTL trigger via the PXI bus or front panel is available for triggering DMM measurements.

## SOFTWARE

The GX2065 is supplied with the GXDMM software package which includes a virtual instrument panel, a Windows 32/64-bit DLL driver libraries and documentation. The virtual panel can be used to interactively program and control the instrument from a window that displays the instrument's current settings and status. In addition, interface files are provided to support access to programming tools and languages such as ATEasy, LabView, LabView/Real-Time, C/C++, Microsoft Visual Basic®, Delphi, and Pascal. An On-Line help file and PDF User's Guide provides documentation that includes instructions for installing, using and programming the board. SMX2040 & SMX2060 compatible drivers are also supplied, allowing customers to easily upgrade existing applications to the GX2065.
A separate software package - GtLinux - provides support for Linux 32/64 operating systems.

## APPLICATIONS

- Automated production testing
- Laboratory automation
- Portable/field test
- Semiconductor and component test

MEASUREMENT

# GX2065

## SPECIFICATIONS

| GENERAL SPECIFICATIONS | |
|---|---|
| **Inputs** | Hi, Lo, Hi Sense, Lo Sense; floating and isolated from ground<br>External trigger |
| **Input Connectors** | (4) Banana, 7-pin DIN |
| **Format** | PXI, 3U single slot, hybrid slot compatible |
| **DMM AND DIGITIZER MEASUREMENT SYSTEM FEATURES** | |
| **Resolution** | 22 bits (DMM),<br>16 bits (digitizer / DAQ) |
| **DMM Sampling Rate ($V_{DC}$, $I_{DC}$ & R Measurements)** | Selectable PLC rate, 0.01 to 10;<br>PLC can be set to 50 or 60 Hz |
| **DMM Reading Rate ($V_{DC}$, $I_{DC}$ & 2WR (< 10 M ohm))** | 50 readings/sec @ 6.5 digits, 60 Hz, (1 PLC)<br>500 readings/sec @ 5.5 digits, 60 Hz, (0.1 PLC)<br>2500 readings/sec @ 4.5 digits, 60 Hz, (0.01 PLC)<br>3500 readings/sec @ 3.5 digits, 60 Hz, (0.002 PLC) |
| **Digitizer (DAQ) Clock Rate** | Programmable to 3 MHz<br>Range: (3 MS/s) / N, N=1 to $2^{16}$<br>Accuracy: 100 ppm |
| **DAQ Measurement Functions** | AC / DC voltage and current measurements, frequency |
| **Digitizer Memory** | 8192 samples |
| **DMM Memory** | 1 K samples |
| **DMM MEASUREMENT CHARACTERISTICS** | |
| **Input Range** | 100 nV to 300 V |
| **$V_{AC}$ Input Range** | 3 $\mu$V to 425 V (peak), 300 $V_{RMS}$ 10 Hz to 100 kHz, AC coupled |
| **Crest Factor ($V_{AC}$)** | No limitation as long as maximum input signal is below the maximum range value. |
| **$V_{DC}$ / $V_{AC}$ Input Impedance** | > 10 GΩ (0.1, 1, and 0 $V_{DC}$ ranges)<br>400 pF shunt capacitance<br>10 MΩ for other AC / DC ranges,<br>400 pF shunt capacitance |
| **Maximum Input (Volt - Hertz)** | 8 x 10e7 V x Hz Common Mode Input<br>8 x 10e7 V x Hz (across Hi or Lo input relative to earth ground) |
| **Input Isolation** | CATII 300 V |
| **Input Overvoltage Protection** | 250 V for current input,<br>300 V CATII for all other inputs |
| **Noise Rejection** | $V_{DC}$: 90 dB, NMRR; 140 dB CMRR 15 readings/s, 1 PLC, 6.5 digit, 10 V range<br>$V_{AC}$: 70dB, CMRR |
| **$I_{DC}$ Input Range** | 10 nA to 2 A |
| **$I_{AC}$ Input Range** | 3 $\mu$A to 2 A RMS, AC coupled<br>10 Hz to 5 kHz |
| **Crest Factor (AC Current)** | No limitation as long as maximum input signal is below the peak range value |
| **AC / DC Input Current Protection** | 2 A, 250 V, fast blow, sand filled, 1.5 kA breaking |
| **Resistance Range** | 100Ω to 100 MΩ |
| **Resistance Measurement Configuration** | Selectable, 2-wire or 4-wire |

MEASUREMENT

MARVIN TEST SOLUTIONS

# GX2065

| Burden Voltage (Maximum) | Current Range<br>20 mA<br>100 mA<br>1 A<br>2 A | Voltage<br><0.2 V<br><0.1 V<br><0.5 V<br><1.0 V |
|---|---|---|

## TRIGGERING

| | |
|---|---|
| Trigger Source | Function: Start measurement<br>Source: PXIbus, software, continuous, external input (DIN connector), timer |
| Trigger Output Modes | Functions: Start of measurement, end of measurement<br>Trigger can be routed to the PXIbus or the DIN connector |
| Trigger Input Voltage Range | 3.3 V CMOS, 5 V Tolerant |
| Minimum Trigger Input Pulse Width | 50 ns for PXI bus, 250 $\mu$s for external DIN input |
| Trigger Input Impedance | 4.75 kΩ |
| Trigger Input Edge | Selectable, positive or negative |

## AC MEASUREMENT PERFORMANCE

| Digits | Reading Rate | Signal Bandwidth |
|---|---|---|
| 6½ | 1 S/s | 4 Hz to 4 kHz |
| 6½ | 5 S/s | 30 Hz to 20 kHz (default) |
| 6½ | 375 S/s | 300 Hz to 300 kHz |

## DC VOLTAGE MEASUREMENT

| Range | Resolution | Accuracy 24 Hours 23°C ±5° (% of Reading)+ (% of FS) | Accuracy 90 Days 23°C ±5° (% of Reading)+ (% of FS) | Accuracy 1 Year 23°C ±5° (% of Reading)+ (% of FS) |
|---|---|---|---|---|
| 100 mV | 100nV | 0.0030 + 0.0040 | 0.0040 + 0.0045 | 0.0045 + 0.0045 |
| 1 V | 1 $\mu$V | 0.0030 + 0.0007 | 0.0040 + 0.0008 | 0.0045 + 0.0008 |
| 10 V | 10 $\mu$V | 0.0010 + 0.0004 | 0.0025 + 0.0005 | 0.0030 + 0.0005 |
| 100 V | 100 $\mu$V | 0.0030 + 0.0006 | 0.0050 + 0.0009 | 0.0060 + 0.0009 |
| 300 V | 1 mV | 0.0030 + 0.0020 | 0.0045 + 0.0030 | 0.0060 + 0.0030 |

## DC VOLTAGE MEASUREMENT, DAQ MODE

| Range | Resolution | Accuracy 24 Hours 23°C ±5° (% of Reading)+ (% of FS) | Accuracy 90 Days 23°C ±5° (% of Reading)+ (% of FS) | Accuracy 1 Year 23°C ±5° (% of Reading)+ (% of FS) |
|---|---|---|---|---|
| 100 mV | 4$\mu$V | 0.06 + 0.08 | 0.06 + 0.08 | 0.06 + 0.08 |
| 1 V | 40 $\mu$V | 0.06+ 0.03 | 0.06+ 0.03 | 0.06+ 0.03 |
| 10 V | 400 $\mu$V | 0.06+ 0.03 | 0.06+ 0.03 | 0.06+ 0.03 |
| 100 V | 4 mV | 0.06+ 0.03 | 0.06+ 0.03 | 0.06+ 0.03 |
| 300 V | 40 mV | 0.06 + 0.01 | 0.06 + 0.01 | 0.06 + 0.01 |

# GX2065

| DC CURRENT MEASUREMENT | | | | |
|---|---|---|---|---|
| **Range** | **Resolution** | **Accuracy 24 Hours 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 90 Days 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 1 Year 23°C ±5° (% of Reading)+ (% of FS)** |
| 20 mA | 10nA | 0.0060 + 0.0030 | 0.030 + 0.0080 | 0.0500 + 0.0080 |
| 100 mA | 100 nA | 0.0100 + 0.0300 | 0.0300 + 0.080 | 0.0500 + 0.080 |
| 1 A | 1 µA | 0.0200 + 0.0030 | 0.0500 + 0.0080 | 0.0800 + 0.0080 |
| 2 A | 10 µA | 0.1000 + 0.0035 | 0.1200 + 0.0060 | 0.1200 + 0.0060 |

| DC CURRENT MEASUREMENT, DAQ MODE | | | | |
|---|---|---|---|---|
| **Range** | **Resolution** | **Accuracy 24 Hours 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 90 Days 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 1 Year 23°C ±5° (% of Reading)+ (% of FS)** |
| 20 mA | 4µA | 0.03 + 0.06 | 0.03 + 0.06 | 0.03 + 0.06 |
| 100 mA | 40 µA | 0.0100 + 1.0 | 0.0100 + 1.0 | 0.0100 + 1.0 |
| 1 A | 40 µA | 0.0400 + 0.06 | 0.0400 + 0.06 | 0.0400 + 0.06 |
| 2 A | 80 µA | 0.1000 + 0.04 | 0.1000 + 0.04 | 0.1000 + 0.04 |

Notes:
DC measurements @ 10 PLC or 1 PLC with digital filtering
Accuracy of measurement is % of reading + % of Range

| AC VOLTS (RMS), AC COUPLED, DAQ MODE | | | | | | |
|---|---|---|---|---|---|---|
| **Range (RMS) (Except as noted)** | **Range (Vpk)** | **Resolution** | **Frequency and Accuracy [23°C ±5° (% of Reading) + (% of FS)]** | | | |
| 50 mV | 100 mV | 2 µV | **Frequency** | **Accuracy 24 Hours** | **Accuracy 90 Days** | **Accuracy 1 Year** |
| | | | 3 Hz - 10Hz | 0.5 + 0.28 | 0.5 + 0.28 | 0.5 + 0.28 |
| | | | 10 Hz - 20 KHz | 0.2 + 0.28 | 0.2 + 0.28 | 0.2 + 0.28 |
| | | | 20 KHz - 50 KHz | 0.26 + 0.3 | 0.26 + 0.3 | 0.26 + 0.3 |
| | | | 50 KHz - 100 KHz | 0.75 + 0.33 | 0.75 + 0.33 | 0.75 + 0.33 |
| | | | 100 KHz - 300 KHz | 4.15 + 0.75 | 4.15 + 0.75 | 4.15 + 0.75 |
| 0.5 V | 1 V | 20 µV | 3 Hz - 10Hz | 0.35 + 0.03 | 0.35 + 0.03 | 0.35 + 0.03 |
| 5 V | 10 V | 200 µV | 10 Hz - 20 KHz | 0.05 + 0.03 | 0.05 + 0.03 | 0.06 + 0.03 |
| 50 V | 100 V | 2 mV | 20 KHz - 50 KHz | 0.11 + 0.05 | 0.11 + 0.05 | 0.12 + 0.05 |
| 300 V | 450 V | 30 mV | 50 KHz - 100 KHz | 0.60 + 0.08 | 0.60 + 0.08 | 0.60 + 0.08 |
| | | | 100 KHz - 300 KHz | 4.0 + 0.5 | 4.0 + 0.5 | 4.0 + 0.5 |

# GX2065

| AC CURRENT (RMS), AC COUPLED, DAQ MODE | | | | | |
|---|---|---|---|---|---|
| **Range (RMS) (Except as noted)** | **Resolution** | **Frequency and Accuracy [23°C ±5° (% of Reading) + (% of FS)]** | | | |
| **0.5 A** | 40 µA | **Frequency** | **Accuracy 24 Hours** | **Accuracy 90 Days** | **Accuracy 1 Year** |
| | | 3 Hz - 10 Hz | 0.30 + 0.04 | 0.30 + 0.04 | 0.30 + 0.04 |
| | | 10 Hz - 3 KHz | 0.10 + 0.04 | 0.10 + 0.04 | 0.10 + 0.04 |
| | | 3 KHz - 5 KHz | 0.14 + 0.04 | 0.14 + 0.04 | 0.14 + 0.04 |
| **1.0 A** | 80 µA | 3 Hz - 10 Hz | 0.35 + 0.09 | 0.35 + 0.09 | 0.35 + 0.09 |
| | | 10 Hz - 3 KHz | 0.15 + 0.09 | 0.15 + 0.09 | 0.15 + 0.09 |
| | | 3 KHz - 5 KHz | 0.18 + 0.09 | 0.18 + 0.09 | 0.18 + 0.09 |

| RESISTANCE | | | | | |
|---|---|---|---|---|---|
| **Range (ohms)** | **Open Circuit Voltage & Test Current** | **Resolution** | **Accuracy 24 Hours 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 90 Days 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 1 Year 23°C ±5° (% of Reading)+ (% of FS)** |
| **100** | 6.9 V, 1 mA | 100µΩ | 0.0020 + 0.0060 | 0.0080 + 0.0060 | 0.0100 + 0.0060 |
| **1000** | 6.9 V, 1 mA | 1 mΩ | 0.0025 + 0.0006 | 0.0085 + 0.0020 | 0.0105 + 0.0006 |
| **10 K** | 6.9 V, 100 µA | 10 mΩ | 0.0020 + 0.0006 | 0.0080 + 0.0020 | 0.0100 + 0.0006 |
| **100 K** | 12.8 V, 10 µA | 100 mΩ | 0.0030 + 0.0006 | 0.0090 + 0.0010 | 0.0110 + 0.0010 |
| **1 M** | 12.8 V, 1 µA | 1 Ω | 0.0020 + 0.0006 | 0.0020 + 0.0010 | 0.0100 + 0.0010 |
| **10 M** | 7 V, 0.7 µA / 10 M Ω | 10 Ω | 0.0150 + 0.0006 | 0.0200 + 0.0010 | 0.0400 + 0.0010 |
| **100 M** | 7 V, 0.7 µA / 10 MΩ | 100 Ω | 0.0800 + 0.0030 | 0.2000 + 0.0030 | 0.2000 + 0.0030 |

| DC VOLTAGE MEASUREMENT, DAQ MODE | | | | |
|---|---|---|---|---|
| **Range** | **Resolution** | **Accuracy 24 Hours 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 90 Days 23°C ±5° (% of Reading)+ (% of FS)** | **Accuracy 1 Year 23°C ±5° (% of Reading)+ (% of FS)** |
| **100 mV** | 4µV | 0.06 + 0.06 | 0.06 + 0.06 | 0.06 + 0.06 |
| **1 V** | 40 µV | 0.06 + 0.03 | 0.06 + 0.03 | 0.06 + 0.03 |
| **10 V** | 400 µV | 0.06 + 0.03 | 0.06 + 0.03 | 0.06 + 0.03 |
| **100 V** | 4 mV | 0.06 + 0.03 | 0.06 + 0.03 | 0.06 + 0.03 |
| **300 V** | 40 mV | 0.06 + 0.10 | 0.06 + 0.10 | 0.06 + 0.10 |

| FREQUENCY MEASUREMENT | |
|---|---|
| **Frequency Range1** | 1 Hz to 500 KHz |
| **Input Voltage*** | 20 mV to 300 V |
| **Resolution (offset ppm)** | 0.33 (1 second gate time)<br>3.33 (100 mSec gate time)<br>33.3 (10 mSec gate time) |
| **Accuracy** | 100 ppm of reading + offset ppm |

* Input amplitude must be at least 20% of FS and input amplitude must not exceed specified volt - hertz product.

# GX2065

| ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS | |
|---|---|
| **Safety** | Complies with IEC 61010-1, CAT II<br>300 V, pollution degree 2 |
| **EMC** | Complies with EN61326-1 |
| **Calibration** | Calibration is performed at the factory using NIST traceable instrumentation.<br>All calibration constants are stored on-board in non-volatile EEROM.<br>Calibration can be performed by any calibration laboratory with the appropriate equipment. |
| **Temperature Range** | Operating: 0 °C to +50 °C<br>Extended operating range: -20 °C to +70 °C<br>Storage: -20 °C to +70 °C storage |
| **Relative Humidity** | Operating: 80% at 40 °C<br>Storage: 95% at 40 °C |
| **Power (max)** | +5 VDC, 2.3 A<br>+3.3 VDC, 255 mA<br>+12 VDC, 16 mA<br>-12 VDC, 25 mA |
| **Connectors** | (4) Banana jacks:<br>Hi: Voltage, 2 W Ω<br>Lo: Voltage, Current, 2 W Ω<br>Sense Hi: Current, 4 W Ω<br>Sense Lo: 4 W Ω<br>7-pin DIN: Trigger in, Trigger out, Trigger Gnd |

Note: Specifications are subject to change without notice

# GX2065

## ORDERING INFORMATION

| | |
|---|---|
| **GX2065** | Performance 6½ Digit DMM / Digitizer |
| **GX2065-M** | Performance 6½ Digit DMM / Digitizer (Ruggedized and Conformally Coated) |
| **ACCESSORY** | |
| **GX93005** | DIN Mating Connector for GTX22xx |
| **GX93006** | 3' Harness for GTX22xx DIN connector (DIN to Header) |
| **CALIBRATION** | |
| **CalEasy** | CalEasy License for all Supported Marvin Test Solutions Products (Single User License) with One Year Support and Subscription |
| **CalEasy-2Y** | CalEasy License for all Supported Marvin Test Solutions Products (Single User License) with Two Year Support and Subscription |
| **CalEasy-3Y** | CalEasy License for all Supported Marvin Test Solutions Products (Single User License) with Three Year Support and Subscription |
| **CalEasy-GX1120** | CalEasy for the GX1120 (Single User License) with One Year Support and Subscription |
| **CalEasy-GX1649** | CalEasy for the GX11649 (Single User License) with One Year Support and Subscription |
| **CalEasy-GX2065** | CalEasy for the GX2065 (Single User License) with One Year Support and Subscription |
| **CalEasy-GX5055** | CalEasy for the GX5055 (Single User License) with One Year Support and Subscription |
| **CalEasy-GX5295** | CalEasy for the GX5295 (Single User License) with One Year Support and Subscription |
| **CalEasy-GX5960** | CalEasy for the GX5960 (Single User License) with One Year Support and Subscription |
| **CalEasy-UG** | Upgrades a Single Instrument CalEasy License to Include All Supported Marvin Test Solutions Instruments |
| **CalEasy-S1Y** | Renew CalEasy Subscription and Support 1 Year |
| **CalEasy-S2Y** | Renew CalEasy Subscription and Support 2 Years |
| **CalEasy-S3Y** | Renew CalEasy Subscription and Support 3 Years |