# GX5295

## DYNAMIC DIGITAL I/O WITH PER CHANNEL PROGRAMMABLE LOGIC LEVELS AND PMU PXI CARD

- 32 input / output channels, dynamically configurable on a per channel basis
- 4 control / timing channels with programmable levels
- 256 MB of on-board vector memory
- Per channel Drive / sense voltage range of -2 V to +7 V with PMU per pin
- 100 MHz vector rate
- Stimulus / Response & Real-time Compare modes
- Ideal for use in PXI-based semiconductor test

## DESCRIPTION

The GX5295 offers outstanding digital test capabilities and channel density in a compact 3U PXI form factor. Offering both performance digital and analog test capabilities, the GX5295 provides a cost-effective, tester per pin architecture - making this card the ideal choice for high throughput, mixed-signal component test applications. Each digital channel can be individually programmed for a drive hi, drive lo, sense hi, sense lo, and load value (with commutation voltage level). In addition, each channel offers a parametric measurement unit (PMU) providing users with the capability to perform parallel DC measurements on the DUT (device under test).

The GX5295 supports deep pattern memory by offering 256 MB of on-board vector memory with dynamic per pin direction control and with test rates up to 100 MHz. The board supports both Stimulus / Response and Real-time Compare modes of operation, allowing the user to maximize test throughput for go / no-go testing of components and UUTs that require deep memory test patterns. The single board design supports both master and slave functionality without the use of add-on modules.

## FEATURES

The GX5295's pin electronic resources are independent on a per channel basis and include a full-featured PMU for DC characterization of DUTs. The PMU can operate in the force voltage / measure current or force current / measure voltage mode. In addition, the driver and receiver can be configured to support differential input and output signals from / to the UUT. A windowing method is utilized for memory accesses, which limits the required PCI memory space for each board to only 16 MB, thus preserving test system resources. A direct mode, for continuous data transfer between the test system controller and the I/O pins of the GX5295 is also supported.

The GX5295 offers 256 MB of vector memory, with 64 Mb per channel. Programmable I/O width allows trading vector width for vector depth. Under software control, the GX5295's vector memory can be configured to support channel widths of 32, 16, 8, 4, 2 and 1 with corresponding vector depths of 64 Mb, 128 Mb, 256 Mb, 512 Mb, 1024 Mb, and 2048 Mb.

The GX5295 provides programmable LVTTL output clocks and strobes, and supports external clock and strobe. A programmable PLL (phase locked loop) provides configurable clock frequencies and delays. Additionally, 4 additional pin electronics resources are available for use as timing and/or control resources - providing programmable drive and sense levels from -2 to +7 V.

The GX5295's sequencer can halt or pause on a defined address or loop through the entire memory as well as loop on a defined address range or through a defined block of memory. Two modes of digital test are also supported - a Stimulus / Response and a real-time compare mode. The Stimulus / Response mode is used for driving and capturing data. Alternatively, for digital tests requiring long test vectors, the real-time compare mode can be used to significantly shorten overall test times by comparing in real-time, expected test results and logging only failed vectors and resultant test results (pass or fail).



MARVIN TEST SOLUTIONS

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## SOFTWARE

The GX5295 is supplied with DIOEasy, which provides powerful graphical vector development / waveform display tools as well as a virtual instrument panel, 32-bit DLL driver libraries, and documentation. The virtual panel can be used to interactively control and monitor the instrument from a window that displays the instrument's current settings and status. In addition, various interface files provide access to the instrument's function library for programming tools and languages such as ATEasy, C/C++, Microsoft Visual Basic®, Delphi, and LabVIEW.

Optionally, DtifEasy is available for use the GX5295. DtifEasy offers a complete LASAR post-processor and test execution environment for post-processing and executing of LASAR generated .tap files.

## APPLICATIONS

- Automatic Test Equipment (ATE)
- Semiconductor test
- Displays, printers, and disk drive testing
- ASICs testing
- A/D and D/A testing
- Video acquisition / playback applications
- High speed, bi-directional bus testing / emulation

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## SPECIFICATIONS

| CHANNEL I/O SPECIFICATIONS | |
|---|---|
| Number of Data I/O Channels | 32 per card |
| Auxilary I/O Channels | 4, can be used for timing / control functions. Auxiliary channels offer all features supported by the data channels including a PMU per channel without vector memory. |
| Channel Direction Control | Input or Output per step, per channel |
| Number of Drive and Sense Voltage References | 32 Drive Hi / Drive Lo<br>32 Sense Hi / Sense Lo |
| Drive Voltage Level | Drive Hi: -2 V to +7 V<br>Drive Lo: -2 V to +7 V<br>Maximum swing: 8 V |
| Drive Voltage Accuracy | ±20 mV (max) |
| Drive Voltage Resolution | 16 bits, 250 uV |
| Driver Leakage Current | ±15 nA (max) |
| Output Impedance | 50 Ω (typ) |
| Drive Current | ±35 mA (min) |
| Rise / Fall Times | 0.5 ns typical for a 2 V pulse |
| Channel Skew | 160 ps, typical between the same card 320 ps max, after calibration, for all channels (Drive and sense) |
| Drive Data Timing | Data valid relative to the rising edge of Clk0: 4 ns. Clock & strobe delays set to 0 ns.<br>Data valid relative to the rising edge of EXCLK: 31 ns. Clock and strobe delays set to 0 ns. |
| Programmable Channel Skew | Each channel can be programmed with a skew of 2.5 ns, relative to the test clock; 200 ps of resolution (Drive and sense can be programmed independently) |
| Sense Voltage Range | Sense Hi: -2 V to +7 V<br>Sense Lo: -2 V to +7 V |
| Sense Voltage Threshold Accuracy | ±15 mV |
| Sense Voltage Resolution | 16 bits, 250 uV |
| Input Leakage Current | ±15 nA (max) |
| Minimum Data Sense Pulse Width | 1.0 ns (typ) |
| Data Sense Timing | Acquire data relative to internal strobe:<br>Setup time: 18 ns (Ostb to input data)<br>Acquire data relative to external strobe:<br>Setup time: -9 ns<br>Clock and strobe delays set to 0 ns. |
| Pull-Up / Pull-Down Current Source / Sink | ±24 mA, programmable on a per channel basis<br>V commutate: -2 V to +7 V, programmable on a per channel basis |
| Pull-Up / Pull-Down Current Source / Sink Accuracy | ±64 uV |
| Pull-Up / Pull-Down Current Source / Sink Resolution | 16 bits |
| Voltage Commutation Accuracy | ±15 mV |
| Voltage Commutation Resolution | 16 bits |
| Memory | 64 Mb to 2 Gb per channel |
| **TEST MODES** | |
| Stimulus / Response | Drive / compare data against expected data pattern<br>Expect & mask data on a per cycle basis |
| Real-Time Compare | Drive / Capture data, up to 64 Mb per channel |
| Real-Time Compare Record Memory | 1024 of record memory<br>Record compared data and program steps |
| Real-Time Compare Stop Modes | Stop on defined error count (max is 1024), record failed vectors & address locations<br>Stop on defined error count, record up to 1 K of data prior to stopping on error count<br>Stop on defined comparison data value<br>Stop on defined program counter value |

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| TIMING | |
|---|---|
| **Internal Test Clock (PLL)** | |
| Frequency Range | 1 Hz (min); 100 MHz (max) |
| Programming Resolution | 5 digits |
| Accuracy | Greater of (±1 Hz or ±0.02% of programmed value) + accuracy of reference clock (PXI 10 MHz or external reference clock) |
| Jitter | ±20 mUI of internal clock frequency, max |
| Programmable Delays for Internal Strobe & Output Clock Signals | 0-3 ns, 4-7 ns, 8-11 ns, 12-15 ns, 16-19 ns, 20-23 ns, 24-27 ns; 250 ps steps within each range (using internal clock source only) |
| Reference | PXI 10 MHz clock or XClk (external clock) input |
| **Internal B Clock Output (LVTTL)** | |
| Frequency Range | 300 KHz (min); 100 MHz (max) |
| Programming Resolution | 5 digits |
| Accuracy | Greater of (±1 Hz or ±0.5% of programmed value) + accuracy of reference clock) |
| **External Test Clock Input** | |
| Frequency Range (Configured as Sample Clock) | 0 Hz (min); 100 MHz (max) |
| Frequency Range (Configured as Input to PLL) | 8 MHz (min); 10.5 MHz (max) |
| Pulse Width | 40% (min); 60% (max) |
| Input Level | LVTTL or programmable level using one of the four Aux pin electronics channels. |
| **External Strobe Clock Input** | |
| Frequency Range | 0 Hz (min); 100 MHz (max) |
| Logic Levels | LVTTL or programmable level using one of the four Aux pin electronics channels. |

| EXTERNAL STATUS AND CONTROL SIGNALS | |
|---|---|
| Logic Levels | LVTTL or programmable level using one of the four Aux pin electronics channels. |
| Trigger Source | Software, PXI trigger bus, External event, External trigger input (overrides Run command) |
| External Test Clock Enable | Internal (software), External input (via J3 connector) |
| External Strobe Clock Enable | Internal (software), External input (via J3 connector) |
| External Event Bus | 8 input lines with mask and logic AND conditioning |
| Pause | External pause input overrides Pause command |
| Pause Latency | 10 clock cycles to acquire data after pause deasserts |
| Run | Run status indicator (J3 connector) |

| PARAMETRIC MEASUREMENT UNIT (PMU) | |
|---|---|
| Number of Parametric Measurement Units | 32, one per DIO channel<br>4, one per auxiliary channel (for timing /control & static I/O functions) |
| Configurations | Force Voltage/Measure Current (FVMI)<br>Force Current/Measure Voltage (FIMV)<br>Force Voltage/Measure Voltage (FVMV)<br>Force Current/Measure Current (FIMI) |
| Force Voltage Range | -1.5 V to +7 V |
| Force Voltage Accuracy | ±20 mV |
| Force Voltage Resolution | 16 bits |
| Force Current Ranges | ±32 mA, ±8 mA, ±2 mA, ±512 uA, ±128 uA, ±32 uA, ±8 uA, ±2 uA FS |
| Force Current Accuracy:<br>Compliance Range:<br>+1.75V to +7V @ 32 mA<br>-1.5V to +7V @ no load | ±120 uA, 32 mA range<br>±40 uA, 8 mA range<br>±5 uA, 2 mA range<br>±1.2 uA, 512 uA range<br>±600 nA, 128 uA range<br>±160 nA, 32 uA range<br>±80 nA, 8 uA range<br>±20 nA, 2 uA range |
| Current Measurement Accuracy (60 Measurements / Sec)<br>Compliance Range:<br>+1.75V to +7V @ 32 mA<br>-1.5V to +7V @ no load | ±120 uA, 32 mA range<br>±40 uA, 8 mA range<br>±5 uA, 2 mA range<br>±1.2 uA, 512 uA range<br>±600 nA, 128 uA range<br>±160 nA, 32 uA range<br>±80 nA, 8 uA range<br>±20 nA, 2 uA range |
| Measure Voltage Range | -2 V to +7 V |
| Measure Voltage Accuracy | ±1 mV (measurement rate < 200 measurements / sec) |
| High and Low Commutation Voltage Range | VCLo: -2 V to +5 V<br>VCHi: 0 V to +7 V |
| Voltage Clamp Accuracy | ±100 mV |

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| POWER (IDLE AND INITIALIZED) | |
|---|---|
| +3.3 $V_{DC}$ | 4.8 A |
| +5 $V_{DC}$ | 1.48 A |
| +12 $V_{DC}$ | 0.25 A |
| **ENVIRONMENTAL** | |
| Operating Temperature | 0 °C to +50 °C |
| Storage Temperature | -20 °C to +70 °C |
| Size | 3U PXI |
| Weight | 200 g |
| **FRONT PANEL CONNECTORS** | |
| J1 | Digital I/O Signals, type 68-pin VHD connector |
| J3 | Timing & Control Signals, type 68-pin VHD connector |

Note: Specifications are subject to change without notice

## ORDERING INFORMATION

| | |
|---|---|
| GX5295 | Dynamic Digital I/O (3U), 32 ch., per pin voltage & direction control; 100 MHz w/256 MB memory; per pin PMU |
| **SOFTWARE** | |
| DIOEasy | Digital I/O control software including a vector generator and vector comparison |
| DIOEasy-FIT | DIOEasy file import tool kit converts STIL, WGL, VCD/EVCD files to Marvin Test Solutions digital file formats for the GX529x and GX5055 digital I/O cards |
| DIOEasy-FIT-UG | Upgrade for DIOeasy file import tool kit |
| DIOEasy-DS | 2 days DIOEasy training at Marvin Test Solutions (Irvine, CA) for 1-3 persons. Call for larger groups. |
| DIOEasy-DS2 | On-site, 2-days DIOEasy training seminars for 1-3 persons. Call for larger groups. |
| **ACCESSORY** | |
| GT95014 | Connector Interface for GT5xxx/GX5xxx/GC5xxx, SCSI to 100 Mil Grid, Single Ended |
| GT95021 | 2' shielded cable for 5xxx/35xx products (68 Pin) |
| GT95022 | 3' shielded cable for 5xxx/35xx products (68 Pin) |
| GT95022E | 3' shielded cable for 5xxx/35xx products (68 Pin) not terminated one end |
| GT95025 | Connector Interface, 68-Pin SCSI to TTI Testron 170-Pin Signal Block |
| GT95028 | 10' shielded cable for 5xxx/35xx products (68 Pin) |
| GT95031 | 6' shielded cable for 5xxx/35xx products (68 Pin) |
| GT95032 | 6" Shielded Cable for all 5xxx/35xx (68 Pin) |
| GT95032-8 | 8" Shielded Cable for all 5xxx/35xx (68 Pin) |
| GT95032-12 | 12" Shielded Cable for all 5xxx/35xx (68 Pin) |
| GX95951 | Demonstration/Training Board for GX5295 |
| GX5295-CAL | GX5295 Calibration/Verification Service. Includes pre-verification data (post calibration data provided if applicable) |
| GX5295-CAL-3 | GX5295 Calibration/Verification Service - 3 Years. Includes pre-verification data (post calibration data provided if applicable) |
| GX5295-CAL-5 | GX5295 Calibration/Verification Service - 5 Years. Includes pre-verification data (post calibration data provided if applicable) |
| GX5055-5960-CALKIT | GX5055/GX5960 Calibration Cable Kit |
| **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-GX1110 | CalEasy for the GX1110 (Single User License) with One Year Support and Subscription |
| CalEasy-GX1120 | CalEasy for the GX1120 (Single User License) with One Year Support and Subscription |
| CalEasy-GX1649 | CalEasy for the GX1649 (Single User License) with One Year Support and Subscription |
| CalEasy-GX1838 | CalEasy for the GX1838 (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-GX3348 | CalEasy for the GX3348 (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 Series | CalEasy for the GX5961 / GX5964 (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 |

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|---|---|
| **CalEasy-S2Y** | Renew CalEasy Subscription and Support 2 Years |
| **CalEasy-S3Y** | Renew CalEasy Subscription and Support 3 Years |
| **CalEasy-GX5296** | CalEasy for the GX5296 (Single User License) with One Year Support and Subscription |
| **CalEasy-GX3788** | CalEasy for the GX3788 (Single User License) with One Year Support and Subscription |

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