GX5960 SERIES

HIGH PERFORMANCE DYNAMIC DIGITAL I/O PXI SUBSYSTEM

- Cycle based, 50 MHz dynamic digital subsystem with high performance timing generator
- High voltage pin electronics with per channel programmability
- Per channel parametric measurement unit (PMU)
- Analog bus access for each I/O channel
- Dual level drive / sense, and programmable load on a per channel basis
- Supports sngle-ended or differential channel configurations
- 256 timing sets with 4 phases and 4 windows
- 0 - 64 us phase and window programming range
- Supports up to 528 bi-directional I/O channels
- 256K of vector memory
- Comprehensive software tool set supports CASS legacy programs and importing of IEEE - 1445 compliant vector files
- 6U PXI Instrument

DESCRIPTION

The GX5960 digital subsystem represents the highest level of performance available for PXI-based digital instrumentation. Based on the proven architecture of the GX5055 and the EADS T964, the GX5960 offers high performance pin electronics and a timing generator / sequencer in a compact, 6U PXI form factor. The GX5960 series consists of one GX5961 Clock generator board with 16 driver / sensor channels and the GX5964 driver / sensor board which supports 32 bi-directional I/O channels. Up to 528 digital I/O channels can be supported by the GX5960 digital subsystem. Each digital channel features a wide drive / sense voltage range of -15 V to +25 V (maximum swing of 26 volts) which can be individually programmed for a drive hi, drive lo, sense hi, sense lo, and a load value (with commutation voltage level) – offering the user complete flexibility when creating test programs and fixtures for multiple UUTs. In addition, each channel offers a parametric measurement unit (PMU) for DC measurements.

FEATURES

The GX5960 offers real-time digital stimulus, record, or expect data modes on all I/O channels. Pattern memory depth is 256K words. Each channel can be configured as an input or output on a per cycle basis. Six drive data formats are supported: NR, R1, R0, RZ, RC, and Complement Surround – providing flexibility to create a variety of bus cycles and waveforms to test board and box level products.

The GX5961 provides timing, input / output synchronization signals, and sequencing as well as 16 I/O channels. Additional channels can be added to the system by installing one or more, GX5964 boards which are interconnected via the PXI local and trigger busses. The GX5961 offers a flexible clock system which allows the module to operate as a timing master to the UUT or be slaved to the UUT's time base or some other external clock.

All pin electronic resources are independent on a per channel basis – offering the user complete flexibility when programming drive / sense levels, source / sink currents, slew rate, skew, or PMU functions. The PMU can operate in the force voltage / measure current or force current / measure voltage mode and is useful for measuring a UUT's DC characteristics. In addition, each I/O channel includes an analog bus relay, which allows each channel to support hybrid channel (digital or analog) measurement capabilities. For analog stimulus / response measurements, the analog bus can be connected to external resources via a dedicated analog bus connector located on the front panel of the module.

DATA SEQUENCER

The GX5961's sequencer supports sequences up to 4096 steps and has 16 loop counters that may be nested. The sequencer supports a variety of sequencing functions including jumps, subroutines, looping, and test inputs. All of the sequencer commands may be programmed using a Graphical Vector Editor, Windows® API commands, or via a script language. The sequencer allows the user to generate test vectors indefinitely at maximum test rates. Internal and external trigger and pause commands are available in several modes.

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TIMING GENERATOR

The GX5961's timing generator supports 256 timing sets which can consist of up to 4 drive phases and 4 sense windows for 4K of sequence steps. Alternative timing set configurations include 1K of timing sets with 4 phases and 4 sense windows or 4K of timing sets with 1 phase and 1 window. The T0 cycle or sequencer period range is programmable from 20 ns to 64 us with the phase and window values programmable from 0 ns to 64 us. This flexibility offers the user the ability to address a wide range of applications including the emulation of complex bus cycles and proprietary digital interfaces.

COMPATIBILITY

The GX5960 subsystem can operate in any 6U PXI chassis that supports an air flow rate of 20 cfm/slot. Power for the pin electronics requires the use of external power supplies or the GX5960 can be used with a Geotest GX7005A / GX7015A PXI chassis which is designed specifically for high performance / high power digital applications and includes the necessary pin electronics power supplies.

SOFTWARE

The board is supplied with GtDio6x, a software package that includes vector editing, a virtual instrument panel, and 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, C/C++, Microsoft Visual Basic®, Delphi, and Pascal. On-Line help file and PDF User's Guide provides documentation that includes instructions for installing, using and programming the board.

Other optional software packages are available to support the importing of CASS digital TPS' or IEEE-1445 .tap files.

APPLICATIONS

- Automatic Test Equipment (ATE)
- High-speed functional digital test
- Vector capture
- Hybrid and digital device test
- Memory testing
- LRU and SRU test

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SPECIFICATIONS

TIMING	
Internal Test Clock or System Clock (T0_Clk)	15.625 KHz to 50 MHz (using the 500 MHz master clock)
Test Clock Timebase	External reference clock: 1 MHz to 80 MHz Internal reference clock: 20 MHz
T0_CLK Timing Resolution	2 ns (using the 500 MHz master clock)
Master Clock (Phase and Window Timing Source)	500 MHz (internal oscillator), ±50 ppm 40 KHz to 500 MHz (PLL), ±50 ppm
Master Clock Reference	Internal: 20 MHz PXI CLCK10 Front panel: 5 MHz to 80 MHz
Timing Set Options	• 256 Timing Sets with 4 Phases, 4 Windows, and 4 K sequence steps • 1 K Timing Sets with 4 Phases, 4 Windows, and 1 K sequence steps (one timing set for each sequence step) • 4 K Timing Sets with 1 Phase, 1 Window, and 4 K sequence steps (one timing set for each sequence step)
Phase Programming Range (Assert / Return)	0 ns to 64 us (using the 500 MHz master clock)
Window Programming Range (Open / Close)	0 ns to 64 us (using the 500 MHz master clock)
Phase and Window Timing Resolution	1 ns, using the 500 MHz master clock
DRIVE / SENSE MODES & CHANNEL I/O SPECIFICATIONS	
(All specifications based on pin electronic voltage rails (V_{CC} & V_{EE}) of +18 V and -14 V)	
Number of I/O Channels (Single-Ended)	16 per card (GX5961) 32 per card (GX5964)
Channel Configuration	Single-ended or differential, programmable per channel
Test Modes	Dynamic or Static

Data Output Formats (Per Channel)	Drive Hi, Drive Lo, Hi-Z Formatted Data: No return, Return to 1, Return to 0, Return to Hi-Z, Return to complement, Surround by complement; selectable on a per channel basis
Drive Data Timing (Per Channel)	Data assert / de-assert based on Phases 1 - 4
Capture Modes (Per Channel)	Mask Opening edge of Window Closing edge of Window Window - data is valid for entire window duration
Drive / Expect Mode	Output: Drive Hi, Drive Lo, Hi-Z Expect: 1, 0, OK, between states, or mask Keep last Toggle last Accumulate CRC-16
Number of Drive and Sense Voltage References	GX5961: • 16 Drive Hi / Drive Lo • 16 Sense Hi / Sense Lo GX5964: • 32 Drive Hi / Drive Lo • 32 Sense Hi / Sense Lo
Drive Voltage Level	Drive Hi: -9 V to +15 V Drive Lo: -10 V to +11 V
Drive Voltage Level Range	0.5 V_{PP} (min) 25 V_{PP} (max)
Drive Voltage Accuracy	±25 mV, < 26 V_{PP} driver voltage
Drive Voltage Resolution	16 bits
Output Impedance	50 (typ)
Drive Current	200 mA per channel 1.6 A per board, max (GX5964) 0.8 A per board, max (GX5961)
Short Circuit Protection	Programmable current level with automatic disable, per channel basis
Slew Rate	0.1 V/ns to 1 V/ns, adjustable
Channel Skew	160 ps, typical 320 ps max, after calibration for all channels (single board) (Drive and Sense)
Channel De-Skew	Range: ± 5 ns Resolution: 312.5 ps • Programmable on a per channel basis • Separate deskew control for drive and sense
Sense Voltage Range	Sense Hi: -10 V to +11 V Sense Lo: -10 V to +11 V
Sense Voltage Threshold Accuracy	±25 mV, < 25 Vp-p sense voltage

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Sense Voltage Resolution	16 bits
Input Leakage Current	50 nA (max)
Pull-up, Pull-down Current Source / Sink	±24 mA, programmable on a per channel basis V commutate: -10 V to +11 V, programmable on a per channel basis
Pull-up / Pull-down Current Source Source / Sink Accuacy	±250 uA
Pull-up / Pull-down Current Source Source / Sink Resolution	16 bits
Voltage Commutation Accuracy	±25 mV, < 25 V range
Voltage Commutation Resolution	16 bits
Resistive Load	Range: Hi-Z, 250 , 1 K, programmable on a per channel basis
Memory	256 Kb per channel
SEQUENCER	
Commands	Jump, Conditional Jump, Loop, Call Subroutine, Return, Pause, Halt
Loop Counters	16, can be nested Only one can end on a sequence step Loop count range: 1 – 64 K or continuous
Test Inputs	External: PXI triggers, Aux I/O Internal: Data sense, Edge or level
Sequencer Memory	1,024 or 4,096 Steps
GX5961 TIMING GENERATOR BOARD EXTERNAL TIMING, CONTROL AND STATUS SIGNALS	
Sync Outputs	2, Start of Sequence; Start of Sequence Step
General Purpose Aux I/O	12 64 output selections 7 input selections
Input Aux I/O Selections	Synthesizer reference clock, System clock, Break (System Clutch), Halt (Pattern Clutch), Sequence Jump signals
Output Aux I/O Selections	Phase, Window, Waveform, Syncs, Seqflag, Seq Active, Seq Idle, T0_Clk , Pat_Clk, misc test signals
Probe	Ground, Probe Button, Probe LED, Monitor

PARAMETRIC MEASUREMENT UNIT (PMU)	
Number of PMUs	32, one per channel (GX5964) 16, one per channel (GX5961)
Modes	Force voltage, measure current Force current, measure voltage
Force Voltage Range	-10 V to +15 V
Force Current Range	±30 mA FS ±200 mA FS
Measure Voltage Range	-10 V to +15 V
Measure Current Range	±30 mA FS ±200 mA FS
ANALOG MEASUREMENT BUS	
Number of Analog I/O Channels	16 per card (GX5961) 32 per card (GX5964)
Control	Independent connect / disconnect to each I/O channel
ENVIRONMENTAL	
Operating Temperature	0 °C to +50 °C
Storage Temperature	-20 °C to +70 °C
Vibration	5 g @ 500 Hz
Shock	10 g for 6 ms ½ sine
PHYSICAL DIMENSIONS	
Size	6U PXI, single slot
Weight	1.2 lbs (520 g)
CONNECTIONS (GX5961 & GX5964)	
I/O, External Control, Timing	68 position SCSI III Type
Analog Bus (for connections to analog instrumentation)	68 position SCSI III Type
External V_{CC} / V_{EE}	9 position sub-D, male +18 V @ 6 A (GX5964) +18 V @ 3 A (GX5961) -14 V @ 6 A (GX5964) -14 V @ 3 A (GX5961)

Note: Specifications are subject to change without notice

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ORDERING INFORMATION

GX5961	Timing / Sync Board. Includes 16, 50MHz Digital I/O Channels
GX5964	50MHz High Performance Dynamic Digital I/O Card. 32 Channels with 256K of Memory per Channel
GX5961-I	Timing / Sync Board. Includes 16, 50MHz Digital I/O Channels and Digital Subsystem Integration
GX5964-I	50MHz High Performance Dynamic Digital I/O Card. 32 Channels with 256K of Memory per Channel and Digital Subsystem Integration
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)
GT97110	3' cable with female DB-9 connector for GX5055
CALIBRATION	
GX5961-CAL	GX5961 Calibration Service (Includes Pre/Post Data Analysis)
GX5961-CAL-3	GX5961 Calibration Service - 3 Years (Includes Pre/Post Data Analysis)
GX5961-CAL-5	GX5961 Calibration Service - 5 Years (Includes Pre/Post Data Analysis)
GX5964-CAL	GX5964 Calibration Service (Includes Pre/Post Data Analysis)
GX5964-CAL-3	GX5964 Calibration Service - 3 Years (Includes Pre/Post Data Analysis)
GX5964-CAL-5	GX5964 Calibration Service - 5 Years (Includes Pre/Post Data Analysis)
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

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