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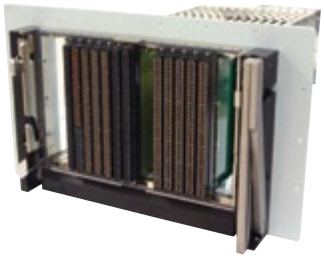
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EX1200 series

HIGH-DENSITY SWITCHING AND DATA ACQUISITION SYSTEMS

SCALABLE

HIGH-DENSITY

PERFORMANCE GRADE

COST-EFFECTIVE

SET UP AND RUN

VTI Instruments

RELIABLE DATA FIRST TIME EVERY TIME

20+ YEARS OF INDUSTRY LEADERSHIP

VTI IS AT THE CORE OF VIRTUALLY EVERY MAJOR ATE TESTER

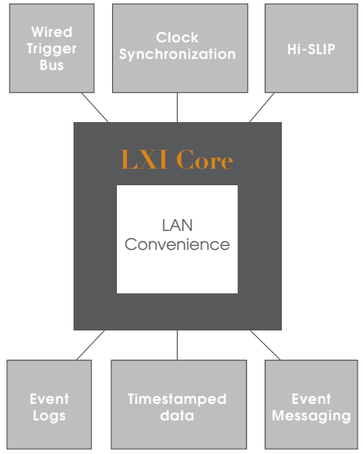
VTI's signal switch/measure and control components are employed worldwide in a broad spectrum of applications for aerospace, defense, telecommunications, test and measurement, contract manufacturing, automotive, medical, and commercial functional test.

VTI presides over the VXIbus consortium, co-founded the LXI standard, and is an active member of many other consortiums that drive test and measurement industry standards. Our commitment to long-term open-platform standards has enabled system integrators to develop common ATE systems that are not impacted by the effects of obsolescence using standard products that are designed to maintain active production status in excess of 15 years.

The EX1200 is our next generation family that leverages our reputation for delivering innovative, modular high-density designs with common hardware and software architectures that can be leveraged throughout the life cycle of a product.

Leading Supplier of Data Acquisition Hardware and Software	INDUSTRY LEADING DATA ACQUISITION AND PRECISION INSTRUMENTATION PROVIDER GLOBALLY RANKED 6TH BY FROST & SULLIVAN WORLDWIDE SALES, SERVICE & SUPPORT
Design and Deliver Precision Modular Instrumentation and Data Acquisition Systems	ELECTRONIC TEST EMBEDDED ELECTRONIC APPLICATIONS MECHANICAL / ENVIRONMENTAL MONITORING & TEST
Serve High Reliability Markets Where Measurement Performance is Critical	MILITARY / AEROSPACE ENERGY / POWER GENERATION HIGH-END CONSUMER GOODS AND MEDICAL DEVICES
Industry Recognition from Peers and Customers	

LXI – The T&M Standard for Ethernet



LXI EXTENDED FUNCTIONS

In 2005, VTI cofounded LXI*, an industry standard for Ethernet-based test instrumentation, and is also the industry leader in open platform switching solutions. LXI stands for LAN eXtension for Instrumentation. It extends on traditional LAN, adding instrument interoperability requirements, timing and synchronization options, and enhanced performance, that makes it ideal as an instrumentation platform.

The EX1200 family incorporates LXI core technology as well as optional extended function capabilities, to take full advantage of the benefits the specification offers. The EX1200 family's powerful synchronization and triggering capabilities provide the confidence that it can be integrated within any LXI, GPIB, PXI or VXI hybrid system

- Distributed switching and measurement systems over LAN
- Synchronized measurement data to IEEE 1588 precision
- Highly deterministic hardware-based triggering using the LXI Wired Trigger Bus
- Protection against PC bus obsolescence
- Assurance of multi-vendor instrument interoperability
- Scalable solutions that optimize rack space
- LAN eXtensions for Instrumentation

OVERVIEW

The EX1200 product family is a modular and scalable series of multifunction switch/measure units that can be configured to address a variety of applications in the mechanical data acquisition and electronic test environments.

THIS FAMILY CONTAINS THE FOLLOWING CORE COMPONENTS:

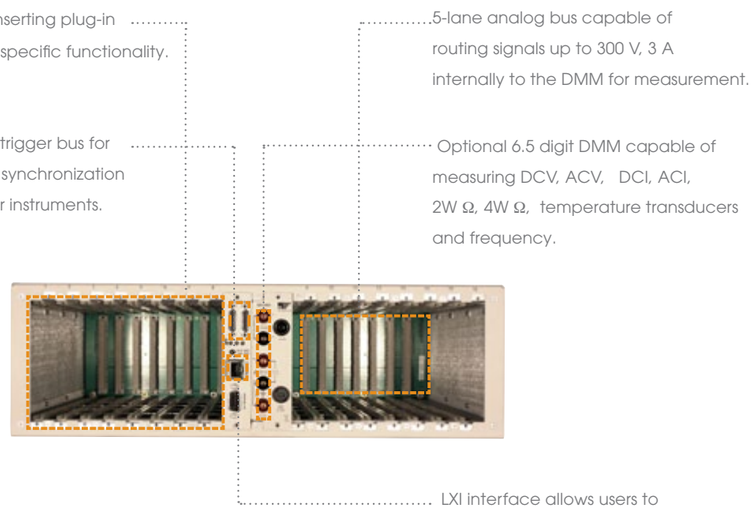
MAINFRAMES

PLUG-IN CARDS

ACCESSORIES AND CONNECTIVITY

Mainframes

- PROVIDING POWER TO THE PLUGIN CARDS
- ANALOG BUS FOR ROUTING MEASUREMENTS FROM PLUGIN CARDS TO DMM
- A SHARED COMMUNICATION BUS AND SYSTEM CLOCK
- SYNCHRONIZATION



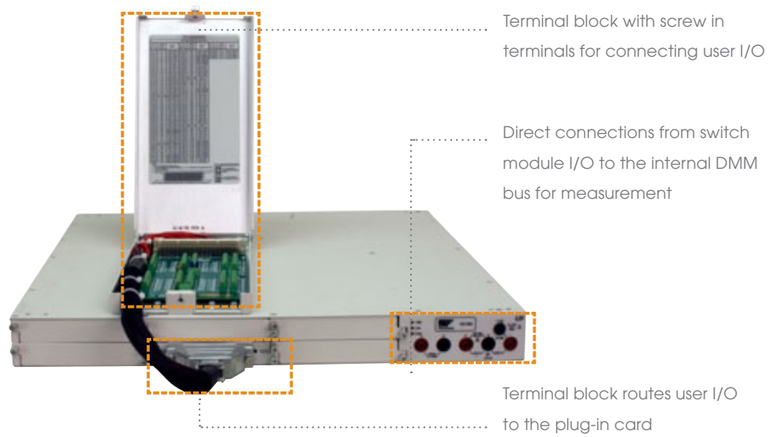
Plug-in Cards

- GENERAL PURPOSE AND MULTIPLEXER SWITCHING 300 V, 3 A
- POWER SWITCHING UP TO 16 A
- HIGH VOLTAGE SWITCHING UP TO 1000 V
- RTD SIMULATOR
- COMPARATOR/THRESHOLD DETECTOR
- RF/MICROWAVE SWITCHING
- SOURCES / TACHOMETER / COUNTERS
- DIGITAL I/O



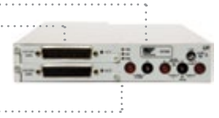
Robust I/O Interface

- CONNECTIVITY OPTIONS GIVE USERS CONVENIENT AND EASY METHODS TO CONNECT THE I/O TO THE INSTRUMENT



A Single, Modular, Scalable Solution

Internal 5-wire bus routes directly to DMM
1/2 rack, 1U with 2 slots
Robust connectors provide durable interface



EX1262-Front View

Full-featured 6.5 digit DMM
Full rack, 1U with 6 slots
Modules plug in from the front – minimizes system wiring



EX1206A with optional DMM

Internal bus extension
Digital alarm outputs
LAN/LXI status LEDs
Standard LAN connectivity
8-line LXI Wired Trigger Bus – precision hardware handshakin



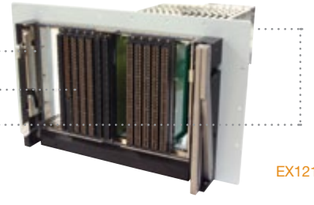
EX1206A-Rear View

Full rack, 3U with 16 slots



EX1208A with optional DMM

Full rack 8U with 14 slots
Integrated mass interconnect receiver on plug-in cards
Access points in rear to interface with I/O



EX1214-ICA

High-Density Switching and Data Acquisition Systems

APPLICATIONS

- High-performance switching for ATE, DC to 26.5 GHz
- Power supply switching
- Temperature monitoring (RTD, thermocouple, thermistor)
- Automotive ECM testing
- High voltage monitor
- Data logging applications
- Cable/harness testing
- Battery test
- RTD/sensor simulation
- White Goods Testing

HIGHLIGHTS

- Modular, scalable architecture in half and full rack 1U, 3U and 8U versions provides low cost-per-channel across a wide range of channel count
- Small footprint for switching/scanning applications with up to 576 2-wire channels in 1U
- Optional EXLab "Set Up and Run" software simplifies data acquisition and analysis
- Measurement support for all thermocouple types, RTDs, and thermistors with built-in cold junction compensation
- Scan list architecture, tightly synchronized with internal 6.5 digit DMM, increases test throughput
- Analog and digital plug-in modules provide control capability of external devices
- Multiple calibration sets yield more accurate data across temperature range (up to eight per module)
- LXI communication interface eliminates platform obsolescence and support cost concerns
- Tightly synchronized measurements in a distributed architecture using IEEE 1588
- Highly deterministic handshaking using the LXI Wired Trigger Bus
- Web-based access for monitoring and control of devices, from anywhere in the world, using any web-enabled device





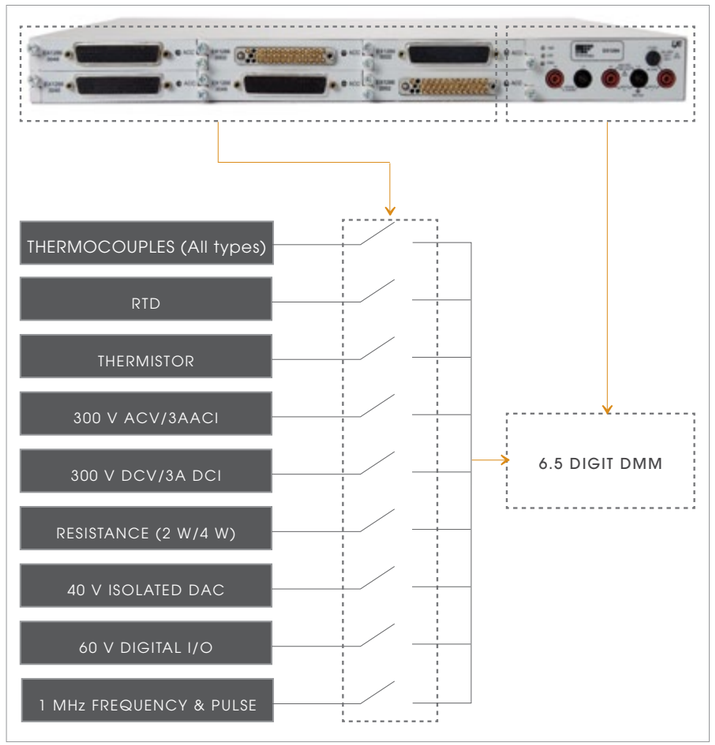


Data Acquisition

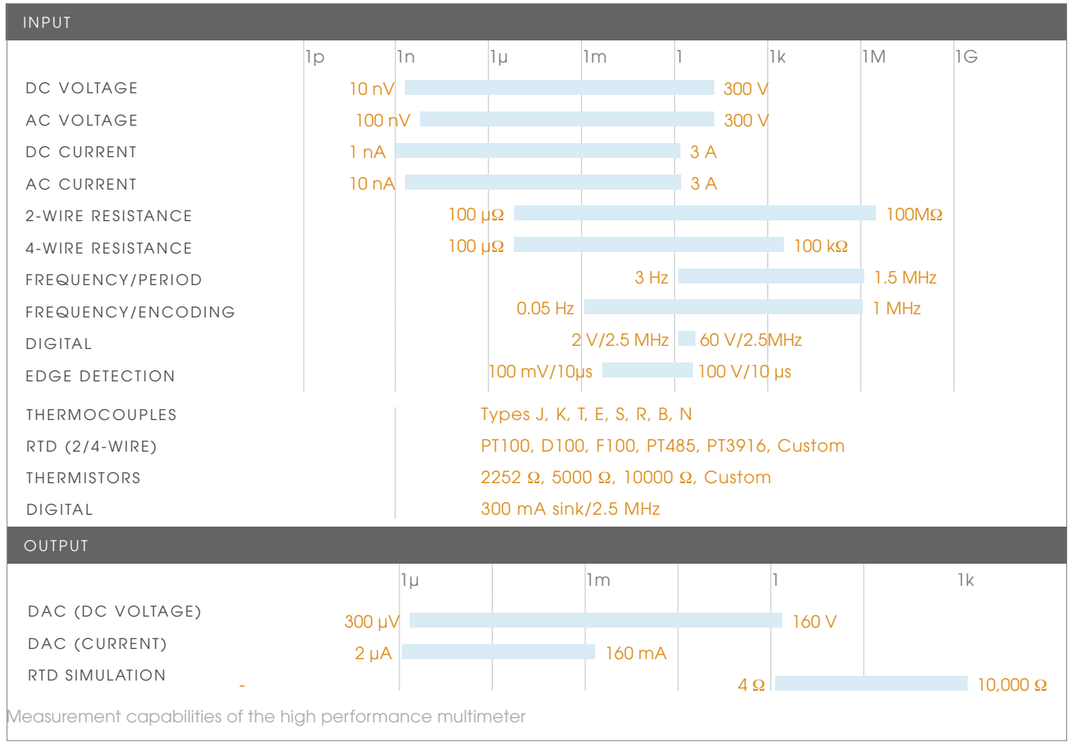
SWITCH/MEASURE AND CONTROL FOR DATA ACQUISITION

When installed with the optional 6.5 digit DMM, the EX1200 family can be configured as a cost-effective, high-density, scanning measurement and control instrument capable of acquiring data from thermocouples, RTDs, thermistors, and voltage/current sensors at rates up to 1000 samples per second.

Plug-in switch/multiplexer modules are used to expand the number of channels that can be scanned in a single system. Additional plug-in modules extend the capabilities of this instrument for data acquisition by adding precision analog and digital outputs for controlling external devices, as well source/tach for measurements on rotating machinery.



MEASUREMENT CAPABILITY

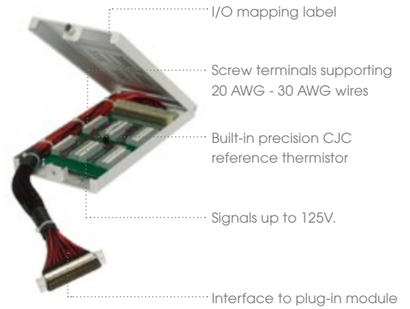


Measurement capabilities of the high performance multimeter

TERMINAL BLOCKS

Terminal blocks provide wired cable assemblies with screw terminal breakout points that allow users to probe connections between instruments.

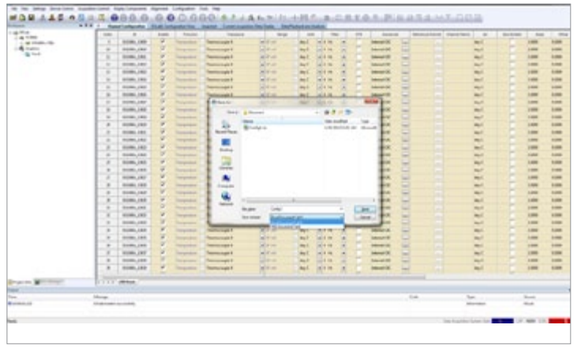
EX1200-TB44

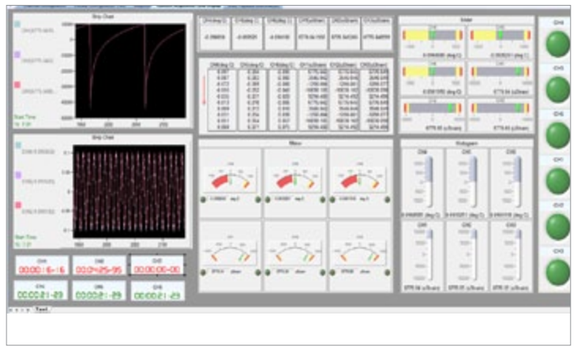


EX1200-TBR



Powerful Easy to Use Turn-key Software





EXLab

SET UP AND RUN

The EX1200 series is supported by the popular EXLab turn-key software package. The EXLab's intuitive GUI significantly shortens time-consuming test setup and configuration. Test engineers can begin monitoring, recording, and analyzing data within minutes.

With EXLab and the EX1200 family, engineers can design a mixed-signal distributed measurement system that includes voltage, thermocouple, RTD, and digital inputs.

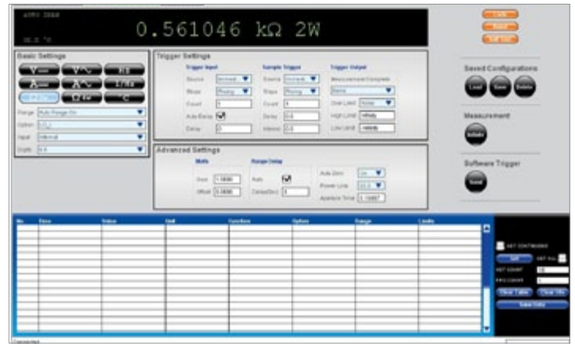
- Wide range of graphical displays to generate customized views of multiple channels
- Simultaneously Record and store time-stamped data in open data formats
- Easy instrument discovery and connectivity on startup
- Save and import configurations for repeat tests
- Easily configure alarms and triggers
- Simplified options for timing and synchronization
- Self-calibration routines accessible in software
- Calculated and virtual channels supported

Powerful Easy to Use Turn-key Software

EASY-TO-USE GRAPHICAL CONTROL

The EX1200 series is delivered with an embedded web interface that provides virtual monitoring and control of all switches and instruments without the need for any third-party software.

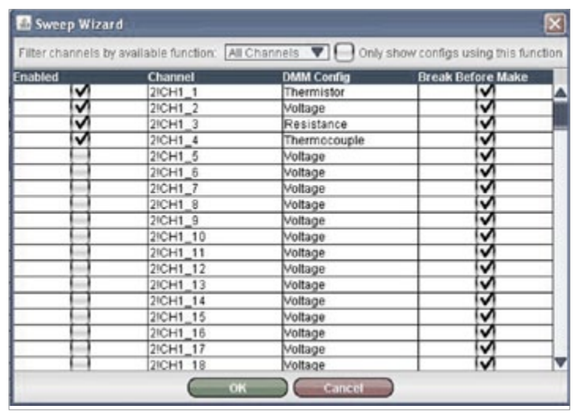
The web interface is accessible from any web-enabled device, including smart phones and tablets, and provides easy to use tools for test sequencing and scanning. Power on your instrument and start taking data in less than a minute.



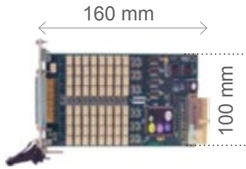
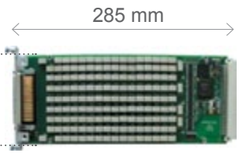
BUILT-IN TEST SEQUENCING

A powerful embedded application dedicated to scanning measurement and control is provided. Each measurement channel can be configured independently with pass/fail limits that can be evaluated on the fly.

Stimulus and switch settings can be modified as part of the test sequence and input channels can be measured to verify how they respond to these changes. This robust utility minimizes processor overhead and test execution time.



ATE Solutions

TYPICAL PC-BASED 2 A MATRIX	LXI-BASED EX1200-4003 2 A MATRIX
	
Dual 4 x 8; 64 two-wire crosspoints 25 MHz bandwidth	Dual 4 x 16; 128 two-wire crosspoints 45 MHz bandwidth

HIGH DENSITY SWITCHING, INSTRUMENTATION AND I/O

The EX1200 family is the highest density switch and I/O instrument on the market with the ability to mix low-level, power, and RF switch modules in a single mainframe.

This scalable family of products is designed to leverage capital investments in one common hardware and software platform that can be used in development, manufacturing, and field service.

Mix and match a variety of modules to build a comprehensive signal switching subsystem that can be supplemented with precision analog and digital I/O modules.

DON'T COMPROMISE DENSITY FOR PERFORMANCE

Typical switch cards that conform to the 3U Eurocard footprint (e.g. PXI) have a limited amount of available working space and manufacturers are often forced to make design tradeoffs between density and performance.

To achieve higher channel counts on a PXI card, smaller relays are tightly packed on a switch module. This puts signal carrying traces closer to one another and limits the channel-to-channel crosstalk immunity as well as current carrying capacity.

EX1200 series switching modules offer nearly double the available working space and increased channel count capacity to ensure the highest degree of signal integrity in the same vertical footprint as PXI. For lower density switching applications. VTI also offers a comprehensive family of performance PXI Express switch modules.

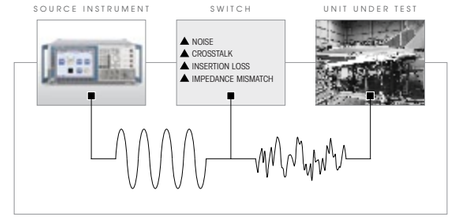
ATE Solution

TREATING THE SIGNAL SWITCH IN ATE AS AN INSTRUMENT

A key factor that differentiates VTI Instruments from competitors is that we view signal switching subsystems as precision instruments and not just a collection of relays on a card. The quality of a switch is not determined by what it does, rather by what it doesn't do; the ideal switch instruments transmit signals exactly as they come in, without attenuating, adding noise, or reducing signal integrity in any way.

With years of experience in designing precision switch instruments and a widespread install-base in virtually every major ATE system world-wide, VTI Instruments has proven that, when it comes to signal transparency, the performance offered by our switch cards is unmatched.

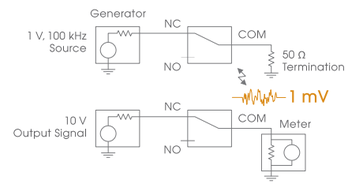
SWITCH SYSTEMS THAT LACK SIGNAL TRANSPARENCY DESTROY SIGNAL INTEGRITY



WHY INVEST IN A 6.5 DIGIT DMM WHEN 1.5 DIGITS CAN BE LOST IN SWITCH NOISE?

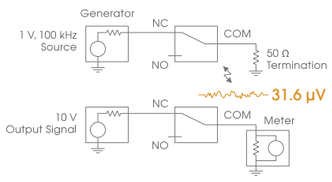
TYPICAL PC-SWITCH CARD

- -60 dB crosstalk @ 100 kHz
- 1 V aggressor adds 1 mV of noise to 10 V signal
- >30x error when compared to higher integrity switch card
- 1.5 digits are lost off a measurement instrument due to the crosstalk

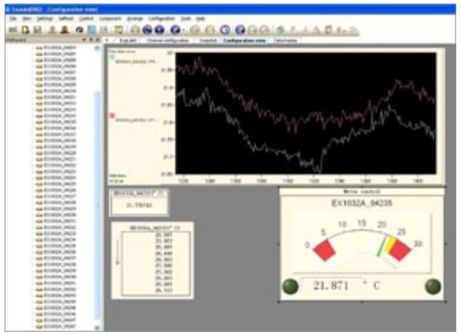


TYPICAL VTI SWITCH CARD

- -90 dB crosstalk @ 100 kHz
- 1 V aggressor adds only 31.6 µV noise to 10 V signal
- Maximize full range of measurement instrument capability



Open Software – Expedite System Readiness



THE MOST SIGNIFICANT INVESTMENT OF ANY AUTOMATED TEST PROJECT RESIDES IN THE SYSTEM SOFTWARE. VTI'S COMMITMENT TO DELIVERING OPEN ARCHITECTURE SOLUTIONS EXTENDS TO SOFTWARE UTILITIES AND TOOLS THAT REDUCE DEVELOPMENT TIME WHILE MAXIMIZING THE FLEXIBILITY TO CHOOSE THE APPLICATION DEVELOPMENT ENVIRONMENT.

FLEXIBLE APPLICATION PROGRAMMING OPTIONS

Every EX1200 series module is delivered with an application programming interface (API) that conforms to industry standard IVI specifications.

The IVI drivers can be used directly in the most common application development environments such as LabVIEW™, LabWindows/CVI™, C++ and Visual Basic. The EX1200 drivers allow a programmer to :

- Achieve faster development time through system wide path-level programming
- Plan routine maintenance by automatically tracking relay closures
- Precisely synchronize distributed measurements through IEEE 1588
- Use the LXI Wired Trigger Bus for highly deterministic hardware handshaking
- Auto-instrument discovery using NI-MAX™ and Agilent Connection Expert™

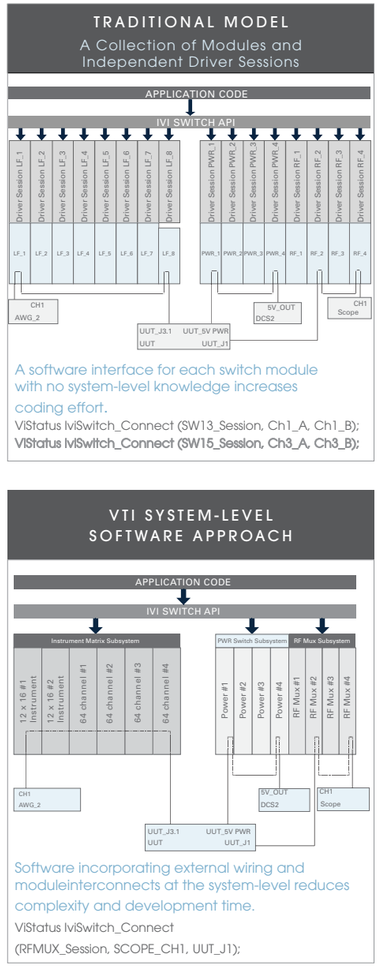
OPERATING SYSTEM INDEPENDENCE

VTI's innovative approach to driver development provides system developers with true OS independence without sacrificing the convenience that instrument drivers deliver.

An IVI-like API can be imported into Linux® and other operating systems. The intuitive APIs simplify programming, making low-level coding unnecessary to access the full capability of the instrument.

BUILT-IN PATH-LEVEL SWITCH CONFIGURATOR

System-level (not just card level) I/O can be logically named such that an entire path consisting of multiple relays can be connected with a single function call. On-board intelligence ensures that there are no conflicts with shared resources. With the EX1200 family there is now no need for expensive switch configurator utilities.



CONFIDENCE CHECKING

Internal feedback provides assurance of relay closure

EXTENSIVE TRIGGERING

Extensive hardware and LAN-based handshaking with other system devices increases test throughput by limiting communication with a host PC.

AUTOMATIC SCANNING

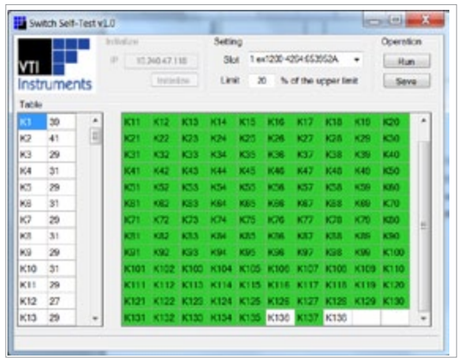
Predefined channel lists can be stored on-board to simplify programming setup and reduce test execution time.

SAFETY INTERRUPT

This failsafe feature forces all relays to a default state in the event of a fault condition. This allows hazardous voltages to be automatically removed from the interface panels.

PROGRAMMABLE TIMING DELAY

Delays can be programmed into the modules to account for the settling of other system devices. When used with triggers and scan lists, a highly deterministic measurement system can be easily configured.



RELAY HEALTH MONITORING

A relay odometer keeps track of the number of times a relay has been actuated and can be used to predict routine maintenance. Switch self-test is supported on select switch instruments and tracks path resistance across relays to monitor relay health.

Connectors and Cabling

PROTECTING SIGNAL INTEGRITY END-TO-END

The performance of a switch system goes beyond just the relays and the switch card PCB. Everything in the signal path, including the cabling and connectors from the DUT and to the measurement instruments, can add noise and degrade the signal.

VTI optimizes the system-level performance by providing easy to use connectivity options that minimize signal loss.

TYPICAL VTI HIGH-DENSITY CONNECTOR



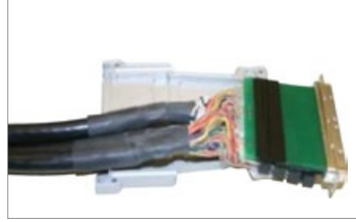
CRIMP/POKE SIMPLIFIES CABLE CONSTRUCTION INCREASES DURABILITY

WIRES TERMINATE DIRECTLY INTO CONNECTOR, MAXIMIZING PERFORMANCE

22 AWG WIRE ALLOWS FOR 2 A CARRY

INCREASED PIN SEPARATION EXTENDS VOLTAGE RATING TO 300 V

TYPICAL PC HIGH-DENSITY CONNECTOR



PC BOARD REQUIRED FOR SUCCESSFUL TERMINATION

NOT RECOMMENDED TO BE BUILT BY END USER

ADDITIONAL CONNECTION POINT INCREASES INSERTION LOSS AND ADDS ANOTHER POINT OF FAILURE

MAXIMUM 28 AWG WIRE RESTRICTS CURRENT CARRYING CAPABILITY TO 1 A CARRY

MINIMAL PIN SEPARATION LIMITS SWITCHED VOLTAGE TO 100 V

EX1200 SERIES

ACCESSORIES

Connectors and Cabling

CONNECTORS AND ACCESSORIES

For each product in the EX1200 series, VTI Instruments offers a range of connectivity options that give users different options to interface to the instruments. There are four basic types of connectivity options:



DISCRETE ACCESSORIES

PRE-ASSEMBLED CABLES

TERMINAL BLOCKS

INTERFACE TEST ADAPTERS

DISCRETE ACCESSORIES

VTI Instruments offers discrete components for all its connectors that allow users to build their own cable assemblies. This includes:



MATING CONNECTORS

STRAIN RELIEF ACCESSORIES

CRIMP TOOLS

CRIMP PINS

TEFLON/PVC COATED WIRES

INSERTION AND EXTRACTION TOOLS

HOODS/COVERS

NYLON SHROUDS

Connectors and Cabling

PRE-ASSEMBLED CABLES

VTI Instruments offers fully assembled cables that have mating connectors on one end and loose wires on the other end. Different options for cable length are available for many of the connectors.

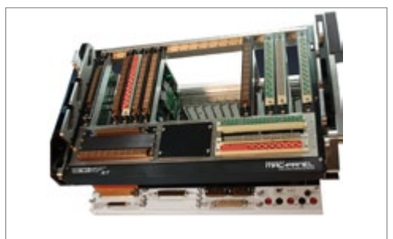


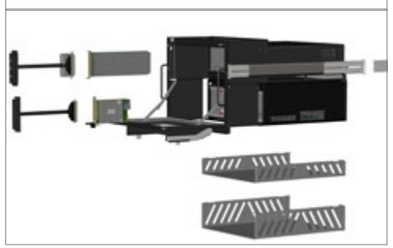
70-0363-506	41-pin, Unterminated Cable Assembly, 3 ft
70-0363-502	44-pin, Unterminated Cable Assembly, 3 ft
70-0363-501	104-pin, Unterminated Cable Assembly, 3 ft
70-0363-505	160-pin, Unterminated Cable Assembly, 3 ft

* To match plugin card to connector type, see table on page 20

INTERFACE TEST ADAPTERS

Interface test adapters are used in automated test stations to interface between test instruments in the test rack and the device under test. VTI offers pre-configured mainframes with interface receivers and all associated cabling and wiring. Please refer to VTI's creatEX series data sheets.





CMX24-XT	Integrated 18-slot PXI Express/EX1206A mainframe with pull-through receiver
CMX34-G18	Integrated 18 slot PXI Express/EX1208A mainframe, with cabled receiver

PXIe Switching

PXI EXPRESS SWITCHING

For applications where the channel counts for signal switching are not large, VTI offers the SMX series - a broad range of "precision instrumentation grade" switch modules on the PXIe platform.

The SMX series is an extension to the EX1200 series, and can be controlled using the same instrument drivers. This allows smaller systems within PXI to be upgraded, or larger systems to be downsized very easily.



Unlike traditional PXI switch modules available in the market that pack relays onto cards to maximize density while ignoring performance, SMX series is designed with VTI's core philosophy of high-density without compromising on performance.

- Best-in-class signal switching performance on PXI/PXIe form factor
- PXIe as opposed to PXI - mitigates obsolescence and is based on faster, newer, and forward looking instrumentation platform
- Relay health monitoring and self-test within matrix cards
- Software benefits – path level switching, confidence checking, and safety interrupts

PXI EXPRESS SWITCH MODULES

SMX-3276	76 channel, dual (1x38) 2-wire, 300V/2A multiplexer
SMX-4410	160 crosspoint, four (4x10), 2-wire, 300V/2A matrix
SMX-2002	12-channel, 16A, Form C (SPDT) switch
SMX-5001	80-channel, 2A, Form A (SPST) switch
SMX-6301	Four SP4T multiplexer tree, 3 GHz
SMX-7X00	DC to 26.5 GHz, microwave switch carrier and relay driver

EX1200 Series Quick Reference

MAINFRAMES

Model	Slots	Note	Size	LAN Specificaion	Backplane Extension Lines
EX1202	2		Half Rack, 1U	LXI 10/100T	5
EX1262	2	With 6.5 digit DMM	Half Rack, 1U	LXI 10/100T	5
EX1206A	6		Full Rack, 1U	LXI 10/100T	5
EX1208A	16		Full Rack, 3U	LXI 10/100T	5
EX1214-ICA	14	6U slots with integrated mass interconnect receiver	Full Rack, 8U	LXI 10/100T	6

SWITCHES

Model	Channels	Configuration	Switched V/A	Switched Power (max)	Bandwidth (-3 dB)
DISCRETE					
EX1200-2001	20	SPST	250 VAC/300 VDC, 16 A	480 W, 4000 VA	40 MHz
EX1200-2002	12	SPDT	250 VAC/300 VDC, 16 A	480 W, 4000 VA	40 MHz
EX1200-5001	80	SPST	300 V, 2 A	60 W, 125 VA	80 MHz
EX1200-5002	32	SPDT	300 V, 2 A	60 W, 125 VA	40 MHz
EX1200-5004	32	SPDT	250 VAC/110 VDC, 5 A	150 W, 1250 VA	40 MHz
EX1200-5006	40	SPST	300 V, 2 A	60 W, 125 VA	80 MHz
EX1200-5007	12	SPDT	300 V, 2 A	60 W, 125 VA	80 MHz
MULTIPLEXER					
EX1200-2007A	48	2x (1x24) 1-wire, 2x (1x12) 2-wire	1000 VDC/700 VAC, 2 A	25 W, 25 VA	60 MHz
EX1200-2008H	30	3x (1x10) 1-wire	1000 VDC/700 VAC, 2 A	25 W, 25 VA	60 MHz
EX1200-2087	8	Mux; 2 x (1 x 2) 2-wire	1000 V/1 A	25 W/25 VA	400 kHz
EX1200-3001	128	8x (1x16) 1-wire, 8x (1x8) 2-wire, 4x (1x8) 4-wire	300 V, 2 A	60 W, 125 VA	50 MHz
EX1200-3048	48	2x (1x24) 2-wire, (1x24) 4-wire plus 2x 3A channels	300 V, 2 A	60 W, 125 VA	35 MHz
EX1200-3048S	48	2x (1x24) 2-wire, (1x24) 4-wire FET mux	250 V, 0.2 A	6 W, 4.2 VA	10 MHz
EX1200-3072	72	2x (1x36) 2-wire, (1x36) 4-wire	300 V, 2 A	60 W, 125 VA	40 MHz
EX1200-3096	96	2x (1x48) 2-wire, (1x48) 4-wire	240 VAC/120 VDC, 1 A	30 W, 37.5 VA	20 MHz
EX1200-3164	64	16x (1x4) 2-wire, 8x (1x4) 4-wire	300 V, 2 A	60 W, 125 VA	45 MHz
MATRIX					
EX1200-4003	128	2x (4x16) 2-wire	300 VAC/300 VDC, 2 A	60 W, 62.5 VA	45 MHz
EX1200-4128	512	(4x128) 1-wire	250 VAC/220 VDC, 1 A	60 W	10 MHz
EX1200-4264	128	2x (2x32) 2-wire	300 VAC/300 VDC, 2 A	60 W, 62.5 VA	45 MHz

EX1200 Series Quick Reference

SWITCHES

Model	Channels	Configuration	Switched V/A	Switched Power (max)	Bandwidth (-3 dB)
RF					
EX1200-6101	40	10x SP4T	250 VAC/220 VDC, 2 A	50 W 62.5 VA	1.3 GHz
EX1200-6111	20	5x SP4T	250 VAC/220 VDC, 2 A	50 W 62.5 VA	1.3 GHz
EX1200-6102	17	SPDT	250 VAC/220 VDC, 2 A	50 W 62.5 VA	1.3 GHz
EX1200-6216	32	2x (1x16)	250 VAC/220 VDC, 2 A	50 W 62.5 VA	1 GHz
EX1200-6216HV	32	2x (1x16)	500 V, 2A	10 W	250 MHz
EX1200-6301	16	4x SP4T	250 VDC/220 VAC, 2 A	60 W, 62.5 VA	3 GHz
EX1200-6301T	16	4xSP4T terminated	250 VDC/220 VAC, 2 A	60 W 62.5 VA	3 GHz
EX1200-7100	3 banks	DC-26.5 GHz switch carrier	30V/0.5 A	40 W	26.5 GHz

EX1200-ICA SWITCHES

Model	Channels	Configuration	Switched V/A	Switched Power (max)	Bandwidth (-3 dB)
EX1200-2011ICA	20	12 SPDT 5 SP4T, 2 Dual Ganged SPDT, 1 SPDT	115 VAC/28 VDC, 12 A 115 VAC/28 VDC, 25A	300 W 700 W	1 kHz
EX1200-6100ICA	14	11 SP4T, 3 SPDT	30 V, 0.5 A	10 W	1 GHz
EX1200-5111ICA	56	21 SP4T, 35 SPDT	220 VDC/250 VAC, 2 A	60 W, 125 VA	20 MHz
EX1200-4464ICA	64	64 channel 4-pole hybrid star matrix	30 V, 0.5 A	10 W	500 MHz

DIGITAL I/O

Model	Channels	Sample Rate	Memory	Iout max (Sink)	Vout max
EX1200-7500	8x 8-bit ports	2 MHz	2 MB	< 300 mA	60 V

COUNTER/MULTIFUNCTION

Model	Channels	Sample Rate	Memory	Output	Min Pulse Width
EX1200-1538	8 counter	1 MHz	256 k reading	NA	50 ns
	16 DIO	Static	NA	TTL	NA
	2 bipolar DAC	Static	NA	±10 V	NA

DMMs

Model	Mainframe	Digits (Min/Max)	Functions	Max V/I	Max Frequency (ACV)	Max Reading Rate
EX1200-2165	EX1206A	3.5/6.5	ACV, DCV, DCI, ACI, 2/4 wire RES, FREQ, TEMP	300 V/3 A	1.5 MHz	2,000/s
EX1200-2365	EX1208A	3.5/6.5	ACV, DCV, DCI, ACI, 2/4 wire RES, FREQ, TEMP	300 V/3 A	1.5 MHz	2,000/s

EX1200 Series Quick Reference

ANALOG OUTPUT/CONTROL

Model	Channels	Voltage/Current Range	Sample Rate	Max Isolation	Memory
EX1200-3604	4 V/I, 16 bit	±1/2/5/10/20 V, ±20 mA	500 kSa/s	200 VDC/200 VAC peak	1 Msample
EX1200-3608	8 V/I, 16 bit	±1/2/5/10/20 V, ±20 mA	500 kSa/s	200 VDC/200 VAC peak	1 Msample

COMPARATOR/EDGE DETECTOR

Model	Channels	Modes	Voltage Range	Min Pulse Width	Memory
EX1200-7416	16 DE/SE	Edge detect, Window, Pulse	±10 V/100 V	1 µs	128k events

PROGRAMMABLE LOAD

Model	Channels	Range	Switched V/A	Switched Power
EX1200-7600	1	0.5 - 1,499,999 Ω at 0.1 Ω increments	200 V/ 0.5 A	5 W

RTD SIMULATOR

Model	Channels	Accuracy	Range	RTD Types
EX1200-7008	8	±0.1 °C	4 Ω - 6.5 kΩ	Pt-100, Pt-200, Pt-500, Pt-1000, Cu-100, Ni-100, Ni-120

BREADBOARD

Model	Type	Connectors
EX1200-7000	Prototyping	44p, 104p, 160p

TERMINAL BLOCKS*

Model	Connector compatibility
EX1200-TB44	44-pin HD D-sub
EX1200-TB104	104-pin HD D-sub
EX1200-TB160	160-pin DIN
EX1200-TB200	200-pin HD SCSI
EX1200-TBR	6-slot terminal block receiver

* EX1200 Data Sheet for more info

EX1200 Mainframe Specifications

1U MAINFRAMES

Model	Description	Dimensions	Weight
EX1202	Two standard plug-in module slots	Half rack 1U mainframe (20.25” D, 8.61” W, 1.75” H)	4.9 lbs (2.3 kg)
EX1262	Two standard plug-in module slots plus 6.5 digit DMM	Half rack 1U mainframe (20.25” D, 8.61” W 1.75” H)	5.3 lbs (2.4 kg)
EX1206A	Six standard plug-in module slots (optional 6.5 digit DMM)	Full rack 1U mainframe (17.17” D, 17.27” W, 1.75” H)	7.1 lbs (3.2 kg)

3U MAINFRAMES

Model	Description	Dimensions	Weight
EX1208A	Sixteen standard plug-in module slots (optional 6.5 digit DMM)	Full rack 3U mainframe (17.65” D, 16.72” W, 1.75” H)	16.2 lbs (7.4 kg)

8U MAINFRAMES

Model	Description	Dimensions	Weight
EX1214-ICA	Fourteen 6U high-density slots	Full rack 8u mainframe (23.5” D, 23.9” W, 14” H)	57.5 lbs (26.1 kg

General Specifications

ENVIRONMENTAL SPECIFICATIONS

OPERATING TEMPERATURE	0 °C – 55 °C
OPERATING ALTITUDE	10,000 ft (3,000 m) maximum
OPERATING HUMIDITY	5% - 95% non-condensing @ 0 °C - 30 °C, 5% - 75% non-condensing @ 30 °C – 40 °C, 5% - 45% non-condensing @ 40 °C – 50 °C (per 3.8.2 of MIL-PRF-28800F Class 3)
STORAGE TEMPERATURE	-40 °C – 70 °C
STORAGE ALTITUDE	15,000 ft (4,500 m) maximum
STORAGE HUMIDITY	5% – 95%, non-condensing

CLOCK SPECIFICATIONS

CLOCK OSCILLATOR ACCURACY	±50 ppm
SYNCHRONIZATION ACCURACY	Reports “synchronized” when < ±200 µs of the 1588 master clock
TIMESTAMP	
ACCURACY	As good as time synchronization down to 50 ns
RESOLUTION	25 ns

LXI SUPPORTED EXTENSIONS

LXI WTB, LXI Event Log, LXI Event Messaging, LXI IEEE 1588 Clock Synchronization, LXI Timestamped Data

EX1200-2165 | 2365 DMMs

6.5 Digit DMM





EX1200-2165
(for use with EX1206A)



EX1200-2365
(or use with EX1208A)

OVERVIEW

- Modular 6.5 digit DMMs for the EX1200 mainframes
- Tightly integrated into mainframes, allowing high-speed, synchronized scanning measurements without the need for external cabling.
- Input can be routed directly to the DMM or through an internal analog bus on the backplane.
- Super fast scanning with no processor intervention required
- Scanning configuration can be saved in the DMM's non-volatile memory allowing quick recall of saved states
- Integrating ADC for with adjustable integration time depending on the level of accuracy required.
- "True RMS" AC readings
- Frequency and temperature measurements

General Specifications

MEASUREMENT FUNCTIONS	DC voltage, AC voltage DC current, AC current 2-wire Ω, 4-wire Ω Temperature and Frequency
MAX NON-DESTRUCTIVE INPUTS	450 V
Using external probe	1.5 kV
Current input protection	3A, 250 V fuse, externally accessible



DMM Specifications

6.5 Digit DMM

General Specifications

SYSTEM SPEED

FUNCTION CHANGE	
DCV/DCI	9/s
4-W resistance (100 Ω, 1 kΩ)	9/s
2-W resistance (<1 MΩ)	1/s
ACV	0.4/s high filter
ACI (0.01 A and 0.1 A)	0.25/s, high filter
RANGE CHANGE	
DCV/DCI	300/s
4-W resistance (100 Ω, 1 kΩ)	300/s
2-W resistance (<1 MΩ)	2/s
ACV (0.01 V to 100 V)	< 1.25/s, high filter
ACI (0.01 A and 0.1 A)	< 0.2/s, high filter
AUTO-RANGE TIME	
DCV/DCI	< 30 ms
4-W resistance (100 Ω, 100 kΩ)	< 60 ms
2-W resistance (100 Ω, 100 kΩ)	< 3.0 s
ACV (0.01 V to 100 V)	< 2.0 s, high filter
ACI (0.01 A and 0.1 A)	< 4.0 s, high filter
MAX READING RATE	2,000/s
MAX INTERNAL TRIGGER RATE	2,000/s
MAX. EXTERNAL TRIGGER RATE TO MEMORY	2,000/s

DC VOLTAGE

Range	Input Resistance	Resolution			Accuracy
		6.5 digit	5.5 digit	4.5 digit	
100 mV	10 GΩ / 10 MΩ	0.01 µV	1 µV	10 µV	0.0150%
1 V	10 GΩ / 10 MΩ	1 µV	10 µV	100 µV	0.0060%
10 V	10 GΩ / 10 MΩ	10 µV	100 µV	1 mV	0.0035%
100 V	10 MΩ	100 µV	1 mV	10 mV	0.0050%
300 V	10 MΩ	100 µV	1 mV	10 mV	0.0055%

DMM Specifications

6.5 Digit DMM



General Specifications

DC CURRENT

Range	Input Resistance	Resolution			Accuracy
		6.5 digit	5.5 digit	4.5 digit	
1 mA	<0.1 V	1 nA	10 nA	100 nA	0.0500%
10 mA	<0.1 V	10 nA	100 nA	1 µA	0.0500%
100 mA	<0.6 V	100 nA	1 µA	10 µA	0.0500%
1 A	<0.4 V	1 µA	10 µA	100 µA	0.0700%
3 A	<0.9 V	1 µA	10 µA	100 µA	0.1000%

AC VOLTAGE

Range	Resolution			Accuracy
	6.5 digit	5.5 digit	4.5 digit	
100 mV	100 nV	1 µV	10 µV	Frequency dependant. See manual.
1 V	1 µV	10 µV	100 µV	
10 V	10 µV	100 µV	1 mV	
100 V	100 µV	1 mV	10 mV	
300 V	100 µV	1 mV	10 mV	

AC CURRENT

Range	Resolution			Accuracy
	6.5 digit	5.5 digit	4.5 digit	
10 mA	10 nA	100 nA	1 µA	Frequency dependant. See manual.
100 mA	100 nA	1 µV	10 µA	
1 A	1 µA	10 µA	100 µA	
3 A	1 µA	10 µA	100 µA	

2-WIRE RESISTANCE

Range	Resolution			Accuracy		
	6.5 digit	5.5 digit	4.5 digit	6.5 digit	5.5 digit	4.5 digit
100 Ω	100 µΩ	1 mΩ	10 mΩ	0.1000%	0.1500%	0.1500%
1 kΩ	1 mΩ	10 mΩ	100 mΩ	0.0500%	0.0550%	0.1000%
3 kΩ	10 mΩ	100 mΩ	1 Ω	0.0200%	0.0250%	0.0400%
10 kΩ	10 mΩ	100 mΩ	1 Ω	0.0100%	0.0110%	0.0250%
100 kΩ	100 mΩ	1 Ω	10 Ω	0.0100%	0.0100%	0.0180%
1 MΩ	1 Ω	10 Ω	100 Ω	0.0250%	0.0260%	0.0270%
10 MΩ	100 Ω	100 Ω	1000 Ω	0.0550%	0.1000%	0.1200%
100 MΩ	100 Ω	1000 Ω	10000 Ω	0.1200%	0.1250%	0.1300%

EX1200 SERIES

DMMs



DMM Specifications

6.5 Digit DMM

General Specifications

4-WIRE RESISTANCE

Range	Resolution			Accuracy		
	6.5 digit	5.5 digit	4.5 digit	6.5 digit	5.5 digit	4.5 digit
100 Ω	100 µΩ	1 mΩ	10 mΩ	0.1040%	0.0150%	0.0160%
1 kΩ	1 mΩ	10 mΩ	100 mΩ	0.0100%	0.0100%	0.0150%
3 kΩ	10 mΩ	100 mΩ	1 Ω	0.0100%	0.0110%	0.0150%
10 kΩ	10 mΩ	100 mΩ	1 Ω	0.0100%	0.0110%	0.0150%
100 kΩ	100 mΩ	1 Ω	10 Ω	0.0100%	0.0100%	0.0150%

FREQUENCY

Range	Frequency Range	Accuracy	Offset PPM		
			6.5 digit	5.5 digit	4.5 digit
100 mV to 300 mV	3 Hz to 1.5 MHz	60 PPM	0.3	3.0	30.0

TEMPERATURE

Type	Min	Max	-100° C	0° C	100° C	300° C	500° C	700° C	900° C	1100° C	1400° C
J	-200 °C	1200 °C	± 0.25 °C	± 0.20 °C	± 0.20 °C	± 0.25 °C	± 0.30 °C	± 0.30 °C	± 0.35 °C	± 0.45 °C	-
K	-200 °C	1372 °C	± 0.25 °C	± 0.20 °C	± 0.20 °C	± 0.20 °C	± 0.35 °C	± 0.35 °C	± 0.45 °C	± 0.55 °C	± 0.50 °C
T	-200 °C	400 °C	± 0.25 °C	± 0.20 °C	± 0.20 °C	± 0.20 °C	± 0.25 °C	± 0.35 °C	-	-	-
E	-200 °C	900 °C	± 0.25 °C	± 0.20 °C	± 0.20 °C	± 0.20 °C	± 0.25 °C	± 0.30 °C	-	-	-
S	-50 °C	1768 °C	-	± 1.00 °C	± 0.75 °C	± 0.65 °C	± 0.65 °C	± 0.65 °C	± 0.70 °C	± 0.70 °C	± 0.75 °C
R	-50 °C	1768 °C	-	± 1.00 °C	± 0.75 °C	± 0.60 °C	± 0.60 °C	± 0.60 °C	± 0.60 °C	± 0.65 °C	± 0.70 °C
B	-250 °C	1820 °C	-	-	-	± 1.65 °C	± 1.10 °C	± 0.80 °C	± 0.70 °C	± 0.65 °C	± 0.65 °C
N	-200 °C	1300 °CC	± 0.40 °C	± 0.25 °C	± 0.25 °C	± 0.25 °C	± 0.30 °C	± 0.35 °C	± 0.40 °C	± 0.40 °C	-

RELIABLE DATA FIRST TIME EVERY TIME

EX1200-1538

Multifunction Counter, DAQ, and DIO



APPLICATIONS

Single frequency measurement range from 0.05 Hz to 1 MHz

Tooth wheel RPM measurement

Measure position and speed from quadrature encoder signal

Wide range of measurement functions makes this ideal for both electronic functional test and data acquisition

FEATURES

- 8 frequency counter channels, 16 isolated digital I/O, 2 isolated DAC channels per card
- Highly stable 50 MHz, TCXO base clock along with 32-bit counter for frequency measurement
- Counter channel accepts both analog and digital inputs with ±48 V differential input range eliminates need for signal conditioning in most applications
- Programmable hysteresis and threshold levels
- Isolated digital
- Precision isolated 16-bit current or voltage source

General Specifications

FREQUENCY/COUNTER INPUTS	
NUMBER OF CHANNELS	8 (analog/digital)
DIGITAL INPUT SIGNAL RANGE	TTL
ANALOG INPUT SIGNAL RANGE	±48 V
COMMON MODE INPUT	250 V peak
SENSITIVITY	±500 mV
THRESHOLD AND HYSTERESIS	Programmable, 1 mV step
SIGNAL FREQUENCY RANGE	0.05 Hz - 1 MHz in DC coupling mode
3 Hz - 1 MHz in AC coupling mode	
MAIN TIME BASE CLOCK	50 MHz
TIME BASE CLOCK STABILITY	±1 ppm
COUNTER TYPE	32-bit, reciprocal counting type
50 ns on digital channel	
MINIMUM DETECTABLE PULSE	600 ns on analog channel
RPM MEASUREMENT RANE	3 RPM to 90,000 RPM
SAMPLE DATA CORRELATION	IEEE 1588 timestamp
ON-BOARD MEMORY	256,000 reading
AVERAGING METHODS	Moving average and simple average
APERTURE TIME WINDOW	1 ms to 30 s (1 ms programming steps)

EX1200 SERIES

MULTIFUNTION

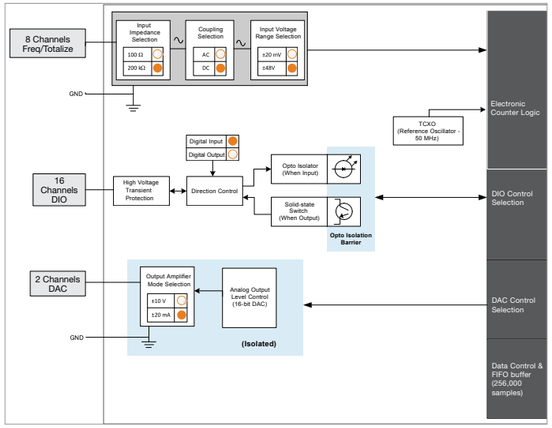


EX1200-1538

Multifunction Counter, DAQ, and DIO

General Specifications

FREQUENCY/COUNTER INPUTS	
MAXIMUM DATA	
SAMPLING SPEED	1,000,000 samples/s (into on-board buffer)
TRIGGERING	Software, immediate, EX1200-based LXI triggers
QUADRATURE MEASUREMENT	Two channels to be paired for each encoder input
DIGITAL INPUT/OUTPUT	
NUMBER OF CHANNELS	16
DIO INPUT SIGNAL LEVEL	
LOGICAL HIGH	2.5 V to 60 V
LOGICAL LOW	< 2.5 V
DIO ISOLATION	Channel-to-channel
DIO OUTPUT SIGNALS	Optically isolated solid state switch
OUTPUT SIGNAL COMPATIBILITY	50 mA sink/source, up to 60 V (AC/DC)
UPDATE CONTROL	Software paced
DAC OUTPUTS	
NUMBER OF CHANNELS	2
OUTPUT TYPE	Constant voltage or constant current
OUTPUT MODE	Static mode or dynamic mode (frequency to voltage/current conversion)
VOLTAGE MODE RANGE	±10 V, up to 20 mA per channel
CURRENT MODE RANGE	±20 mA, drive up to 250 Ω load
OUTPUT RESOLUTION	16-bit
ISOLATION	Channel-to-channel, galvanic
PROTECTION	Open and short circuit for short duration
CONNECTOR TYPE	104-pin HD D-sub



RELIABLE DATA FIRST TIME EVERY TIME

POWER

EX1200-2001 | 2002

High Power Switch Modules

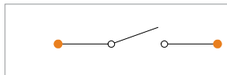


APPLICATIONS

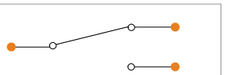
High current/high power switching
AC line power switching
Switching AC or DC power supplies
Driving relays for industrial machines
Solenoid switching
Automotive engine control

FEATURES

- Switch up to 16 A current – highest in its class
- Large switching capacity in a small footprint
- High breakdown voltage (1,000 V rms between open contacts)
- Failsafe interrupt detects fault conditions and opens relays to their default state. This protects the test object from damage if a fault occurs.



EX1200-2001 – 1 OF 20 SPST



EX1200-2002 – 1 OF 12 SPDT

General Specifications

CONFIGURATION	
EX1200-2001	(20) x SPST
EX1200-2002	(12) x SPDT
MAXIMUM SWITCHING VOLTAGE	250 VAC, 300 VDC
MAXIMUM SWITCHING CURRENT	16A
MAXIMUM SWITCHING POWER	480 W, 4000 VA per channel
RATED SWITCH OPERATIONS	
MECHANICAL	1×10^7
ELECTRICAL	1×10^5 at full load
SWITCHING TIME	< 10 ms
PATH RESISTANCE	< 100 mΩ
INSULATION RESISTANCE	> 1×10^9 Ω
BANDWIDTH	40 MHz
CONNECTOR TYPE	41-pin

HIGH VOLTAGE



EX1200-2007A | 2008H | 2087A

High Voltage Multiplexers

APPLICATIONS

High voltage multiplexing and scanning

Hi-pot tests

Switching source measure unit

Cable breakdown test

Power supply switching

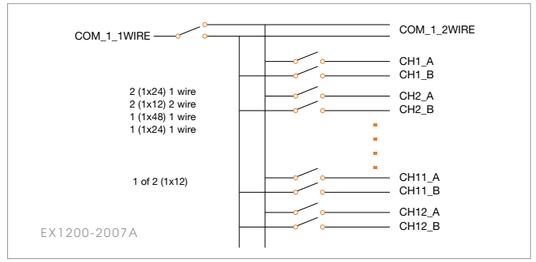
Power generator testing

FEATURES

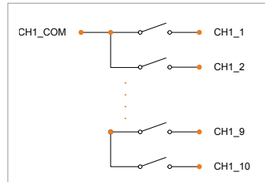
- Switch signals up to 1000 V
- Large shield planes used to reduce crosstalk and voltage spikes to adjacent channels
- Failsafe interrupt detects fault conditions and opens relays to their default state. This protects the test object from damage if a fault occurs.
- EX1200-2087A features Continuous Relay Self-Monitoring that continuously checks for welded relay contacts and generates an interrupt if detected. This protects the test object by preventing unintentional routing of power.

General Specifications

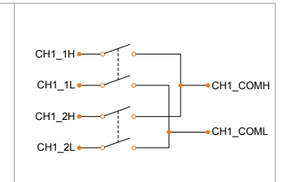
CONFIGURATION	
EX1200-2007A	Dual 1 x 12 (2-wire)
EX1200-2008H	(3) x 1 x 10 (1 wire)
EX1200-2087	(8) SPDT with BIT
MAXIMUM SWITCHING VOLTAGE	1000 VDC/700 VAC RMS
MAXIMUM SWITCHING CURRENT	1 A
MAXIMUM CARRYING CURRENT	2A
MAXIMUM SWITCHING POWER	25 W (resistive load)
RATED SWITCH OPERATIONS	
MECHANICAL	5×10^8
ELECTRICAL	1×10^6 at full load
SWITCHING TIME	< 1 ms
PATH RESISTANCE	< 1 Ω
INSULATION RESISTANCE	> 1×10^7 Ω
BANDWIDTH	
2007A, 2009H	60 MHz
2087A	400 kHz
CONNECTOR TYPE	160-pin DIN
RELAY TYPE	Reed



EX1200-2007A



EX1200-2008H – 1 OF 3 (1X10) 1-WIRE MUXES



EX1200-2087A –2OF 8 (1X2) 2-WIRE MUXES

EX1200-3001 | 3001DS | 3048 3072 | 3164 300 V/2 A Multiplexers



APPLICATIONS

Applications where multiple points need to be switched to a common resource

Thermal chamber testing

Battery test

Cable harness testing

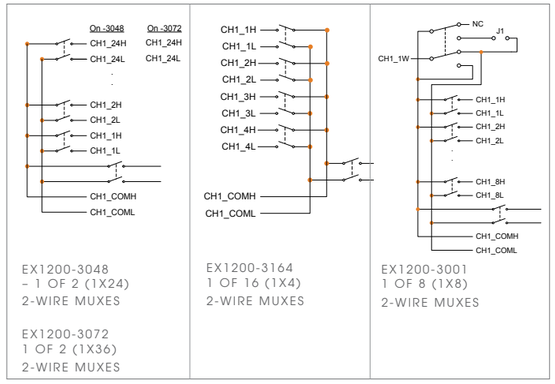
Semiconductor and PCB testing

FEATURES

- High density, 300 V/2 A multiplexers/scanner
- Direct routing to EX1200 series DMM through internal analog measurement bus simplifies field wiring
- Support thermocouple, RTD, and thermistor measurements with optional terminal block with built in CJC reference
- On-board scanning greatly reduces overall test execution time
- Configure as 1- (-3001 only), 2- or 4- wire under program control
- Discharge relays to bleed out stray charge for sensitive measurements

General Specifications

CONFIGURATION	
EX1200-3001/3001DS	(8) 1 x 8 (2-wire)
EX1200-3048	Dual 1 x 24 (2-wire)
EX1200-3072	Dual 1 x 36 (2-wire)
EX1200-3164	(16) 1 x 4 (2-wire)
MAXIMUM SWITCHING VOLTAGE	300 VDC/300 VAC
MAXIMUM SWITCHING CURRENT	2A
MAXIMUM SWITCHING POWER	60 W, 125 VA
RATED SWITCH OPERATIONS	
MECHANICAL	1×10^7
ELECTRICAL	1×10^5 at full load
SWITCHING TIME	< 3 ms
PATH RESISTANCE	< 500 mΩ
INSULATION RESISTANCE	> 1×10^9 Ω



EX1200-3048 – 1 OF 2 (1X24) 2-WIRE MUXES

EX1200-3072 1 OF 2 (1X36) 2-WIRE MUXES

EX1200-3164 1 OF 16 (1X4) 2-WIRE MUXES

EX1200-3001 1 OF 8 (1X8) 2-WIRE MUXES

	EX1200-3001/ 3001DS	EX1200-3048	EX1200-3072	EX1200-3164
Bandwidth	50 MHz	35 MHz	40 MHz	45 MHz
Crosstalk @ 1 MHz	< -70 dB	< -45 dB	< -70 dB	< -70 dB
Connector type	160-pin DIN	104-pin D-sub	104-pin D-sub	160-pin DIN



EX1200-3048S

Solid State Multiplexer

APPLICATIONS

High-speed scanning

Applications requiring long periods of continuous scanning where mechanical relays will wear.

Battery test

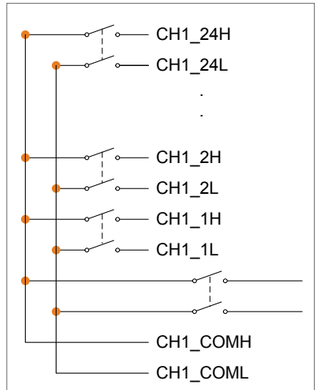
Thermal/environmental chamber test

FEATURES

- High-density dual 1x48 solid state multiplexer
- Switch up to 250 VAC/250 VDC, highest for a solid state switch module in its class.
- Configure as 2- or 4-wire multiplexer
- Optically isolated design
- Very high-speed scanning - up to 1,000 measurements per second using the internal DMM
- Virtually unlimited relay life

General Specifications

CONFIGURATION	Dual 1 x 24 (2-wire)
MAXIMUM SWITCHING VOLTAGE	250 VDC
MAXIMUM SWITCHING CURRENT	1 A
MAXIMUM CARRYING CURRENT	2 A
MAXIMUM SWITCHING VOLTAGE	250 V
MAXIMUM SWITCHING CURRENT	0.2 A
MAXIMUM SWITCHING POWER	6 W/4.2 VA
RATED SWITCH OPERATIONS	Unlimited
SWITCHING TIME	< 500 µs
PATH RESISTANCE	<8 Ω (per contact)
INSULATION RESISTANCE	> 1 x 10^9 Ω
BANDWIDTH	10 MHz
RELAY TYPE	Solid-state
CONNECTOR TYPE	104-pin



EX1200-3048S – 1 OF 2 (1X24) 2-WIRE MUXES

EX1200-3096

High-Density Multiplexer



APPLICATIONS

High-channel count scanning applications

Environmental chamber test

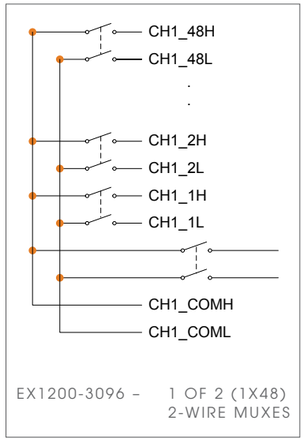
Cable harness test

FEATURES

- Dual 1x48, ultra high density multiplexer
- Low cost per channel
- Configure as 2- or 4- wire
- Capacitive discharge relays prevent high voltages from affecting sensitive measurement points

General Specifications

CONFIGURATION	Dual 1 x 48 (2-wire)
MAXIMUM SWITCHING VOLTAGE	100 V
MAXIMUM SWITCHING CURRENT	0.5 A
MAXIMUM SWITCHING POWER	30 W/37.5 VA
RATED SWITCH OPERATIONS	
MECHANICAL	1×10^7
ELECTRICAL	1×10^5
SWITCHING TIME	< 3 ms
PATH RESISTANCE	< 500 mΩ
INSULATION RESISTANCE	$> 1 \times 10^9$ Ω
MAXIMUM THERMAL OFFSET	< 7 µV
BANDWIDTH	10 MHz
CONNECTOR TYPE	104-pin



EX1200-3096 – 1 OF 2 (1X48) 2-WIRE MUXES



EX1200-3608 | 3604

Analog Output

APPLICATIONS

500 kSa/s arbitary waveformgeneration

±20 V, ±10 V, ±5 V, ±2 V and ±1 V output ranges

±20 mA, ±10 mA, and ±5 mA, output ranges

Sensor simulation

Static output

FEATURES

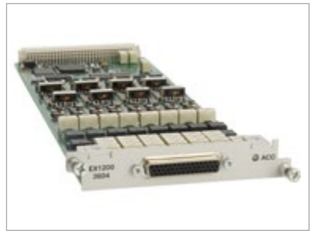
- 4 (-3604) or 8 (-3608) independent, isolated, 16-bit D/A converter
- Isolated outputs can be combined in series to extend range to 160 V or in parallel to achieve 160 mA
- Extensive triggering capability
- Synchronize level changes with input measurements to facilitate test sequencing
- Sense lines for every channel to compensate for cable
- Voltage or current source

General Specifications

RESOLUTION	16-bits monotonic
TIME DOMAIN	
SETTING TIME	5 µs to 0.1% of specified value
RISE TIME	< 800 ns
SLEW RATE	40 V/µs
BANDWIDTH	250 kHz
PHASE MATCHING	< 100 ns when all channels are running synchronized on the internal clock
VOLTAGE MODE	
BIPOLAR	±20 V, ±10 V, ±5 V, ±2 V and ±1 V
UNIPOLAR	40 V
AUTORANGING	Supported
MAXIMUM OUTPUT	±160 V when tied in series
OUTPUT CURRENT	±20 mA
CURRENT PROTECTION	Current limitation at 50 mA and short circuit protection
DCV ACCURACY	±(0.050% of setting ±0.305 mV) @ 1 V range ±(0.050% of setting ±7.324 mV) @ 40V range
ISOLATION	200 V

EX1200-3608 | 3604

Analog Output



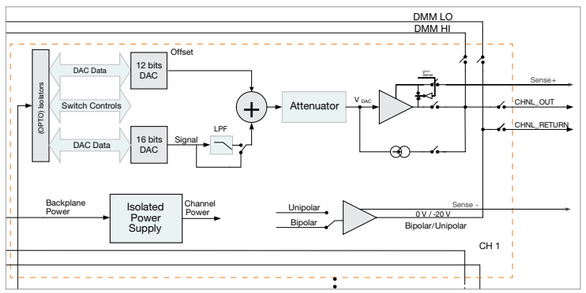
General Specifications

CURRENT MODE

RANGES	±20 mA, ±10 mA, and ±5 mA
MAXIMUM OUTPUT	160 mA
COMPLIANCE VOLTAGE	20 V

AWG SPECIFICATIONS

UPDATE RATE	
PROGRAMMABLE	20 ns steps
MAXIMUM	500 kSa/s
WAVEFORM SIZE	4 Sa to 2,097,100 Sa
MODES	
OUTPUT MODES	Standard, arbitrary waveform, arbitrary source
OPERATION MODES	Continuous, burst Sequenced, single step
STANDARD WAVEFORMS	Sine, ramp, triangle, square with independently configurable, initial phase, burst mode, and duty cycle
CONNECTOR TYPE	44-pin





EX1200-4003 | 4264

300 V/2 A Matrices

APPLICATIONS

Applications where multiple test instrumentsneed to be connected to multiple test points.

Semiconductor and PCB test

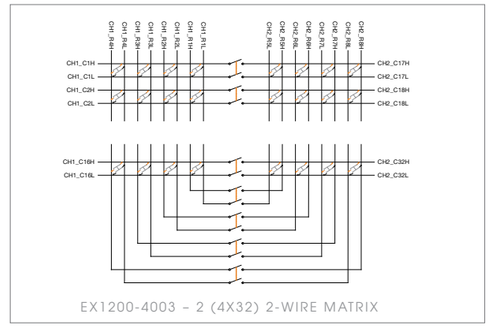
Functional/production test

FEATURES

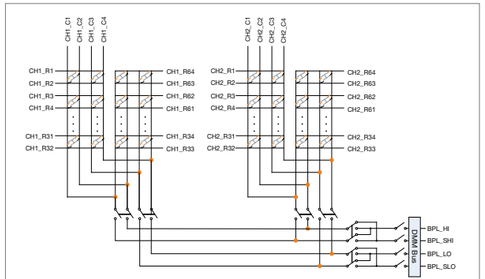
- High density programmatically reconfigurable matrices
- Switch signals up to 300 VAC/300 VDC and 2A.
- Best in class switching performance - 45 MHz bandwidth
- Extensive signal shielding to preserve signal integrity
- Backplane connectivity on EX1200-4264 allows internal scanning measurements

General Specifications

CONFIGURATION	
EX1200-4003	Dual 4 x 16 (2-wire
EX1200-4264	Dual 2 x 32 (2-wire)
MAXIMUM SWITCHING VOLTAGE	300 VAC/300 VDC
MAXIMUM SWITCHING CURRENT	2 A
MAXIMUM SWITCHING POWER	60 W, 62.5 VA per channel
RATED SWITCH OPERATIONS	
MECHANICAL	1 x 10^8
ELECTRICAL	1 x 10^5 at full load
SWITCHING TIME	< 5 ms
PATH RESISTANCE	< 500 mΩ
INSULATION RESISTANCE	> 1 x 10^9 Ω
BANDWIDTH	45 MHz
CROSSTALK @ 1 MHz	
4003	< -55 dB
4264	< -70 dB
CONNECTOR TYPE	104-pin



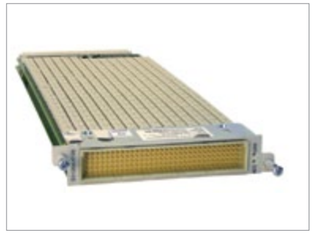
EX1200-4003 – 2 (4X32) 2-WIRE MATRIX



EX1200-4264 – 2 (2X64) 2-WIRE MATRIX

EX1200-4128

High-Density Matrix



APPLICATIONS

Applications where multiple test instruments need to be connected to multiple test points

Semiconductor and PCB test

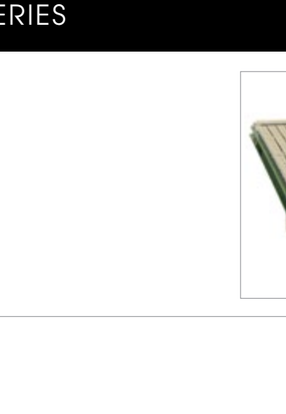
Functional/production test

FEATURES

- Ultra high-density 4x128 1-wire matrix
- Switch up to 250 VAC/220 VDC, highest at its density in its class
- Connect rows to internal analog bus to construct larger matrices without external cabling
- Stub breaking relays reduces antenna effect on long open paths and increases switching performance

General Specifications

CONFIGURATION	4 x 128 (1-wire)
MAXIMUM SWITCHING VOLTAGE	250 VAC, 220 VDC
MAXIMUM SWITCHING CURRENT	1 A
MAXIMUM SWITCHING POWER	60 W/63.5 VA
RATED SWITCH OPERATIONS	
MECHANICAL	1×10^8
ELECTRICAL	1×10^5
SWITCHING TIME	< 5 ms
PATH RESISTANCE	1 Ω
INSULATION RESISTANCE	$> 1 \times 10^9$ Ω
BANDWIDTH	45 MHz
CONNECTOR TYPE	104-pin



EX1200-4128 – (4X128)
1-WIRE MATRIX



EX1200-5001 | 5002 | 5006 | 5007

General Purpose Switch

APPLICATIONS

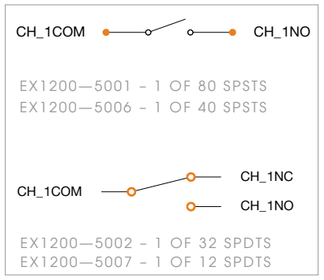
General purpose switching

Can be combined with external wiring to form complex switch configurations

Functional/production test

FEATURES

- General purpose switching up to 300 V / 2 A
- Easy to use end-to-end path level switching for simplified programming
- Best bandwidth and crosstalk performance in its class



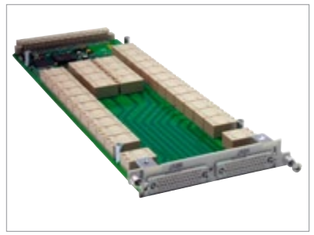
General Specifications

CONFIGURATION	
EX1200-4003	Dual 4 x 16 (2-wire
EX1200-4264	Dual 2 x 32 (2-wire)
MAXIMUM SWITCHING VOLTAGE	300 VDC/300 VAC
MAXIMUM SWITCHING CURRENT	2 A
MAXIMUM SWITCHING POWER	60 W, 125 VA
RATED SWITCH OPERATIONS	
MECHANICAL	1×10^8
ELECTRICAL	1×10^5 at V DC, 0.1 A (resistive)
SWITCHING TIME	< 3 ms
PATH RESISTANCE	< 300 mΩ
INSULATION RESISTANCE	$> 1 \times 10^9$ Ω

	EX1200-5001	EX1200-5002	EX1200-5006	EX1200-5007
Bandwidth	80 MHz	40 MHz	80 MHz	80 MHz
Crosstalk @ 1 MHz	< -55 dB	< -55 dB	< -60 dB	< -60 dB
Connector type	160-pin DIN	160-pin DIN	104-pin DSUB	104-pin DSUB

EX1200-5004

High-Density 5A Switch



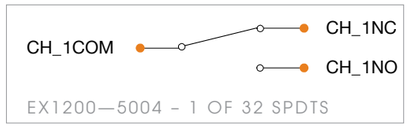
APPLICATIONS

General purpose switching

Switching power supplies

FEATURES

- Switch signals up to 5 A
- Fail-safe interrupt forces relays to open in case of fault condition



EX1200—5004 – 1 OF 32 SPDTS

General Specifications

MAXIMUM SWITCHING VOLTAGE	250 VAC, 110 VDC
MAXIMUM SWITCHING CURRENT	5 A
MAXIMUM SWITCHING POWER	150 W/1250 V
RATED SWITCH OPERATIONS	
MECHANICAL	1×10^7
ELECTRICAL	5×10^5
SWITCHING TIME	< 3 ms
PATH RESISTANCE	< 150 mΩ
INSULATION RESISTANCE	> 1×10^9 Ω
BANDWIDTH	40 MHz
CONNECTOR TYPE	104 pin



EX1200-6101 | 6102 | 6111 6216 | 6301 | 6301T RF Switches

APPLICATIONS

Ideal for applications switching RF signals

Wireless device/chipset testing

Testing with high-frequency oscilloscopes or spectrum analyzers

FEATURES

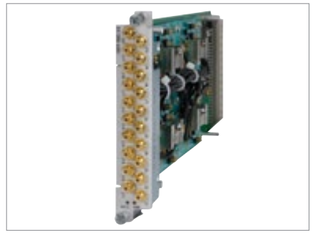
- High-density RF switches and matrices
- 50 W switching power – highest in class
- > 3 GHz bandwidth (6301)
- Stub breaking relays eliminate unterminated stub effect for best switching performance

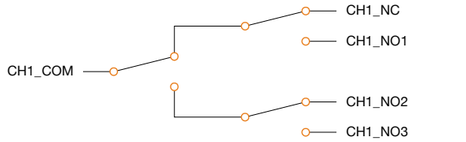
General Specifications

CONFIGURATION	
EX1200-6101	10 x SP4T
EX1200-6102	17 x SPDT
EX1200-6111	5 x SP4T
EX1200-6216	Dual 1 x 16
EX1200-6301	Quad SP4T
EX1200-6301T	Quad SP4T 50 Ω self terminated
MAXIMUM SWITCHING VOLTAGE	220 VDC/250 VAC
MAXIMUM SWITCHING CURRENT	2 A
MAXIMUM SWITCHING POWER	50 W, 62.5 VA
RATED SWITCH OPERATIONS	
Mechanical	5×10^5
Electrical	1×10^5
SWITCHING TIME	< 5 ms
INSULATION RESISTANCE	> 1×10^9 Ω

	EX1200-6101/6111	EX1200-6102	EX1200-6216	EX1200-6301/6301T
Path Resistance	< 250 mΩ	<250 mΩ	<500 mΩ	
Bandwidth	1.3 GHz	1.2 GHz	1 GHz	3 GHz
Crosstalk	< -60 dB @ 1.3 GHz	< -55 dB @1.3 GHz	< -70 dB @ 1.3 GHz	< -60 dB @ 1 GHz
Isolation	< -60 dB @1.3 GHz	< -55 dB @ 1.3 GHz	< -70 dB @ 1.3 GHz	< -65 dB @ 1 GHz
VSWR	< 2.92:1 @ 1.3 GHz	< 2.92:1 @ 1.3 GHz	< 2.5:1 @ 1.3 GHz	< 1.2:1 @ 1 GHz
Connector type	Dual-26-pin	Dual 26-pin	Dual 26-pin	SMB

EX1200-6101 | 6102 | 6111 6216 | 6301 | 6301T RF Switches

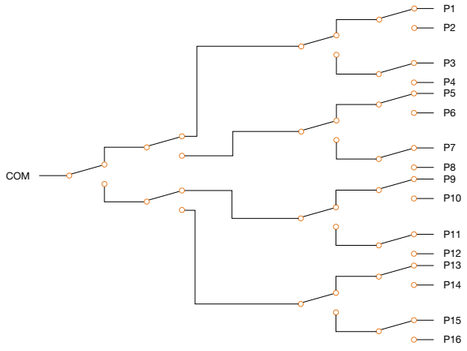




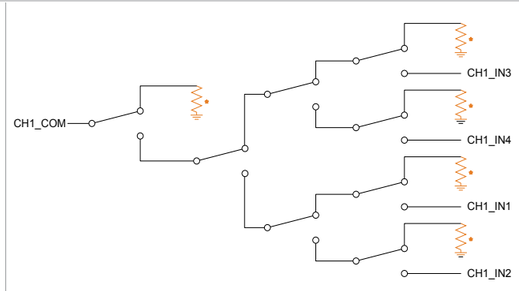
EX1200—6101 – 1 OF 10 ISOLATED (1X4) TREE MUXES
EX1200—6111 – 1 OF 5 ISOLATED (1X4) TREE MUXES



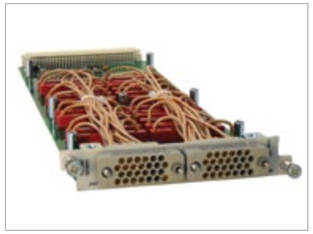
EX1200—6102 – 1 OF 17 SPDTS



EX1200—6216 – 1 OF 10 ISOLATED (1X4) TREE MUXES



EX1200—6301 – 1 OF 4 ISOLATED (1X4) TREE MUXES
* NO TERMINATION RESISTORS
EX1200—6301T – 1 OF 4 ISOLATED (1X4) TREE MUXES WITH TERMINATION RESISTORS



EX1200-6216HV

High-Voltage RF Switches*

APPLICATIONS

Ideal for applications using high voltage probes like transient measurements on power supplies

Differential coaxial switching

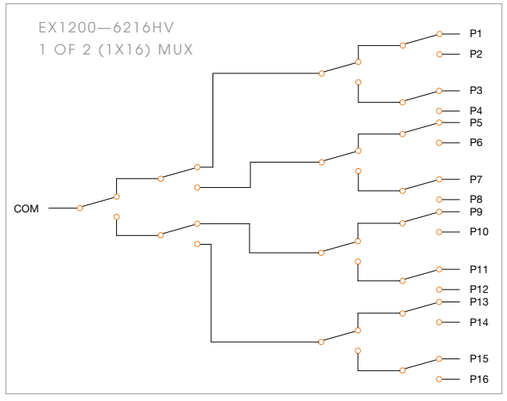
FEATURES

- High-density coax switch
- Switch signals up to 500 V and 250 MHz
- Star configuration allows any channel to be connected to any other channel

General Specifications

CONFIGURATION	Dual 1 x 16
MAXIMUM SWITCHING VOLTAGE	500 VAC
MAXIMUM SWITCHING CURRENT	0.5 A
MAXIMUM SWITCHING POWER	2 A
RATED SWITCH OPERATIONS	1×10^8 @ 1V, 10 mA
SWITCHING TIME	< 1 ms
PATH RESISTANCE	< 500 mΩ
BANDWIDTH	250 MHz
CROSSTALK AT 100 MHz	< -45 dB
ISOLATION AT 100 MHz	< -45 dB
VSWR	< 1.2 : 1
RELAY TYPE	Mercury-wetted Reed
CONNECTOR TYPE	Dual 26-pin

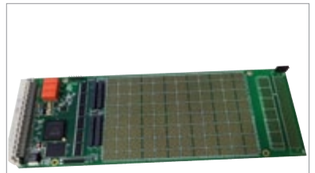
EX1200—6216HV
1 OF 2 (1X16) MUX



* NOTE: This module uses position sensitive mercury wetted reed relays and can only be used in the EX1208A mainframe.

EX1200-7000

Prototyping Card



APPLICATIONS

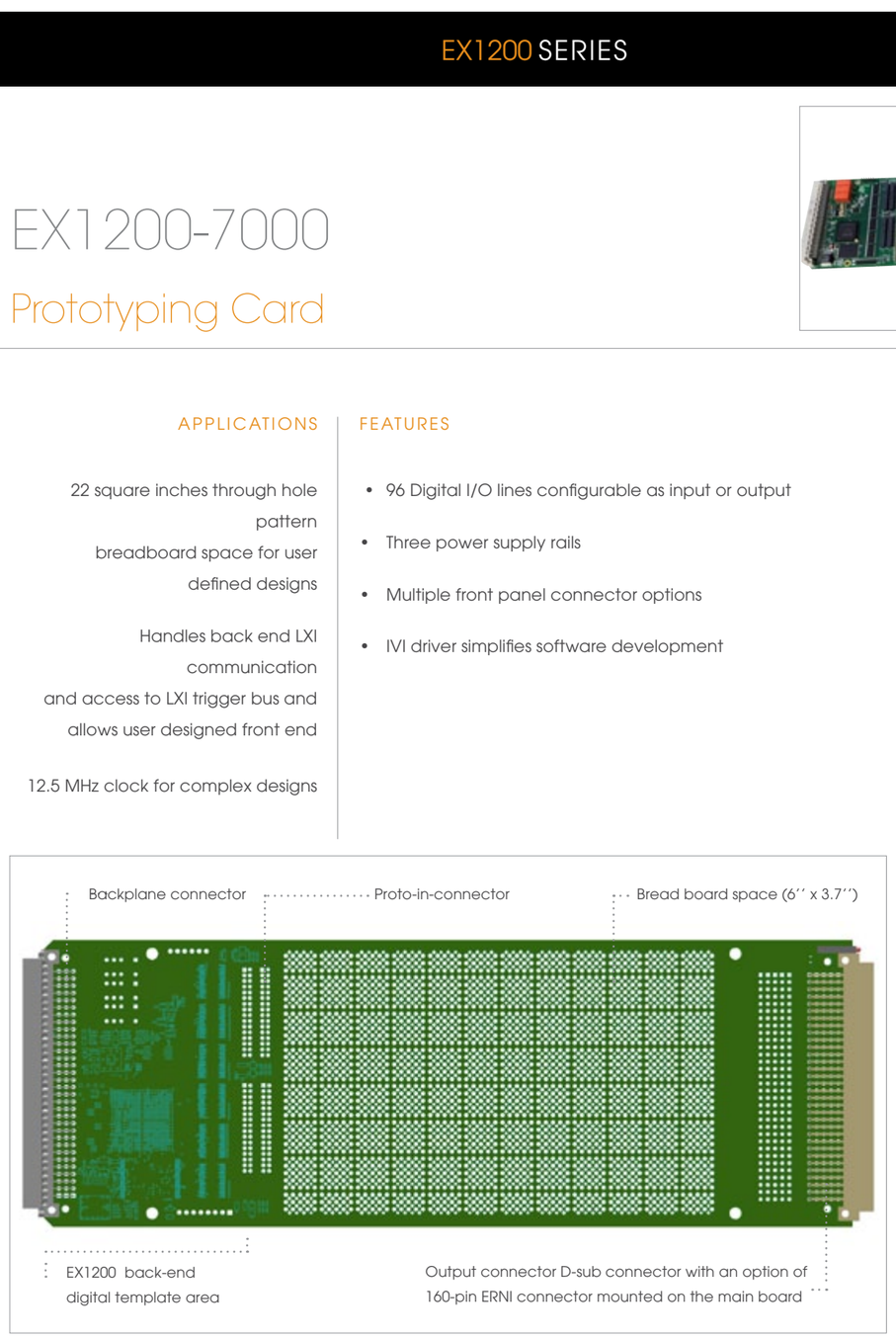
22 square inches through hole pattern
breadboard space for user defined designs

Handles back end LXI communication
and access to LXI trigger bus and allows user designed front end

12.5 MHz clock for complex designs

FEATURES

- 96 Digital I/O lines configurable as input or output
- Three power supply rails
- Multiple front panel connector options
- IVI driver simplifies software development





EX1200-7100

Microwave Switch

APPLICATIONS

RF and microwave component/ equipment testing

Ideal for switching multiple test points to spectrum/network analyzers, high frequency oscilloscopes, or RF sources

Radar and satellite testing

Cell phone and wireless devices testing

Semiconductor chipset testing

FEATURES

- Switch signals DC to 26.5 GHz
- Microwave building blocks are pluggable from the front
- Building blocks range from dual SPDT relays to SP6T relays, transfer switches and relay drivers
- Competitively priced to suit OEM/system integration model

General Specifications

PLUG-IN RELAY MODULES	
EX1200-7102	Dual SPDT, 26.5 GHz, unterminated
EX1200-7104	SP4T, 26.5 GHz, unterminated
EX1200-7106	SP6T, 26.5 GHz, unterminated
EX1200-7122	26.5 GHz, transfer switch
AVERAGE POWER PER CHANNEL	40 W, 26.5 GHz
SWITCHING TIME	< 15 ms
RF IMPEDANCE	50 Ω
CONNECTOR TYPE	SMA

	DC to 3 GHz	3-8 GHz	8-12.4 GHz	12.4-18 GHz	18-26.5 GHz
Isolation (dB min)	80 dB	70 dB	60 dB	60 dB	45 dB
Insertion loss (dB max)	0.2 dB	0.4 dB	0.4 dB	0.5 dB	0.7 dB
VSRW	1.2:1	1.3:1	1.4:1	1.5:1	1.7:1

SIMULATOR

EX1200-7008

Sensor Simulation



APPLICATIONS

Simulate platinum/copper/nickel or custom user defined RTD types

Programmable by temperature or resistance value

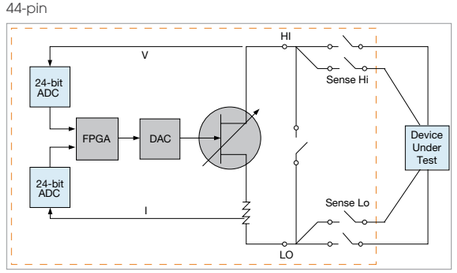
Sensor simulation

FEATURES

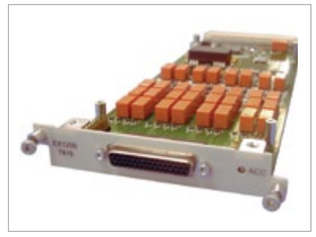
- 8-channel, 2- or 4- wire RTD simulator
- Solid state servo mechanism produces fast, monotonic, glitch free resistance value programming
- Synchronize level changes with input measurements to facilitate test sequencing

General Specifications

NUMBER OF CHANNELS	8
RANGE OF TEMPERATURE SIMULATION	As per standards (programmable per channel)
RESOLUTION OF TEMPERATURE SIMULATION	0.1 °C
ACCURACY OF TEMPERATURE SIMULATION	±0.1 °C
RANGE OF RESISTANCE SIMULATION	4 Ω to 500 Ω, 40 Ω to 5,500 Ω, 100 Ω to 10,000 Ω
RESOLUTION OF RESISTANCE SIMULATION	0.00125 Ω, 0.250 Ω, 0.500 Ω
CONNECTIONS	2- or 4-wire
SUPPORTED RTD SENSOR TYPES	
PLATINUM	(Pt100, Pt200, Pt500, Pt1000)
COPPER	(Cu10, Cu100)
NICKEL	(Ni100, Ni120)
TEMPERATURE SCALES	ITS-90
RESISTANCE SETTLING TIME	10ms
EXCITATION / INPUT CURRENT	±10.5 mA (max) (pulsed/continuous), 10 mA @ 1000Ω, 1 mA max @ 10 kΩ
MAX DIFFERENTIAL VOLTAGE	12 V
MAX POWER DISSIPATION	0.1 W per channel
DC OFFSET ERROR	< 10 µV
ISOLATION	300 V
CONNECTOR TYPE	44-pin



COMPARATOR



EX1200-7416

Comparator/Event Detector/Time Stamp

APPLICATIONS

Constantly monitor input for fault conditions

Detect edges, out-of-bound conditions, and measure pulse widths

Can be used as a timestamp module and as a Digital I/O

"Go/no-go" tests where device needs to perform within a certain window

Control applications where device or test needs to be shut down if a threshold is exceeded

FEATURES

- 16-Channel analog comparator/event detector
- Programmable debounce circuitry prevents erroneous readings
- 10 V and 100 V input ranges
- Onboard memory stores events with 1588 timestamps
- Inputs can be masked, inverted and combined to produce interrupts

General Specifications

NUMBER OF CHANNELS	16
INPUT RANGES	±10 V, ±100 V
INPUT THRESHOLD	±10 V with 82 mV resolution (8-bit) ±100 V with 820 mV resolution (8-bit), Programmable per channel
INPUT EDGE TYPE	Differential
THRESHOLD HYSTERESIS AND ACCURACY	
10 V range	-82 mV to 82 mV
100 V range	-820 mV to 820 mV
INPUT EDGE DETECTION	Normal (rising) or inverted (falling),Programmable per channel
MODES	
Normal	Edge detect
Paired	Upper/lower bounds
Pulsed	Positive/negative polarity
DEBOUNCE TIME	1 µs to 1.6777216 s
MEMORY	43,960 events
TIMESTAMP ACCURACY	
EX1200-7416	500ns
MATH FUNCTIONS	AND / OR
CONNECTOR TYPE	44-pin

EX1200-7600

Programmable Resistor Ladder



APPLICATIONS

Unit under test loading or simulation

Sensor simulation

Process control

ATE calibration

FEATURES

- Simulate resistance from 0.5 Ω to 1.5 MΩ
- 0.1 Ω step size
- Fault sensing over-voltage, over-current and over-temperature circuits protects unit from damage.
- Internal 5W high-precision power resistors switched in and out using mechanical relays

General Specifications

NUMBER OF CHANNELS	1
SWITCHING TIME	<3 ms
RATED SWITCH OPERATIONS	
Mechanical	5 x 10^6
Electrical	1 x 10^5
OVER TEMPERATURE PROTECTION	102 °C (215.6 °F)
MAXIMUM SWITCHING VOLTAGE	200 VAC RMS
MAXIMUM SWITCHING CURRENT	0.5 A
MAXIMUM SWITCHING/CARRY POWER	5 W
VOLTAGE SENSING CIRCUIT	40:1 ±1% full scale accuracy
CURRENT SENSING CIRCUIT	100:1 ±1% full scale accuracy
SETTING ACCURACY	
0.5 to 60 Ω	±0.15Ω
60.1 to 1,499,999 Ω	±0.25% of programmed value
MINIMUM INCREMENT	0.1 Ω
CONNECTOR TYPE	15-pin



EX1200-7500

Digital I/O

APPLICATIONS

Simulate and receive digital data up to 2 MHz sample rate

High-current capability for control of external relays – 300 mA sink

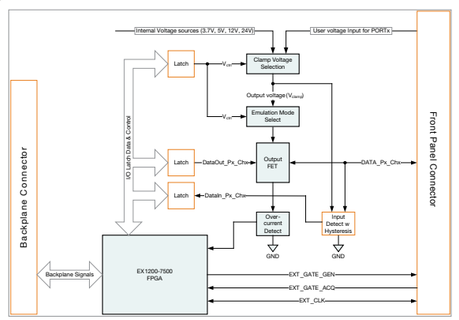
Onboard 1 MB memory can be used for storing and generating patterns

FEATURES

- 64-channel, 2 MHz Digital I/O
- Each channel configurable as input or output
- Selectable output range from 3.3 V to 60 V
- Input data can be timestamped using EX1200 scan engine

General Specifications

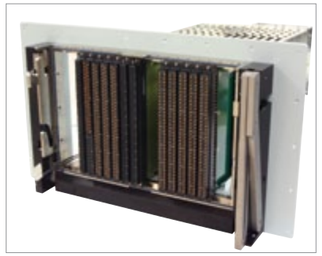
NUMBER OF CHANNELS	64
DATA INPUT CHARACTERISTICS	
Vout (high)	>2 V to 60 V
Vout (low)	<1.5 V @ 300 mV
VOLTAGE RANGE	
Internal voltage source	±3.3 V, ±5.0 V, ±12.0 V, ±24 V
User	>2 V up to 60 V
MODES	
Immediate	Inputs and outputs read and written via software control
Asynchronous	Channels are latched into memory via external clock
Pattern	Buffered pattern generation and acquisition controller by inernal on external clock
Gate (Pattern Mode)	Programmable active low or high
MEMORY DEPTH	
Output or input enabled	2 MB
Output and input enabled	1 MB
MAXIMUM EXTERNAL CLOCK RATE	
Pattern generation disabled	2.5 MHz
Pattern generation enabled	2 MHz
DATA INPUT CLOCK SOURCE	Internal clock, fron panel input
CONNECTOR TYPE	160-pin



EX1200-ICA Solutions

Integrated ICA and Switching Mainframe





FEATURES

- Integrated receiver and switch modules eliminate lossy cabling
- 14 high-density switch and I/O slots
- Integrated analog backplane expands measurement capability
- Matrix switching allows for flexible use of receiver I/O
- 270 V dc power option

The EX1200-ICA is an 8U signal switching mainframe with 6U tall plugin cards with integrated receiver modules. It is used at the core of the US Navy CASS program as the enhanced general purpose interface subsystem.

These receiver modules greatly simplify cabling and maintenance, and also improves performance by eliminating cable losses between switch system and receiver.

The EX1214-ICA has access points in the rear that can be used to interface the I/O to internal test system resources such as spectrum analyzers and RF synthesizers. It also has a removable power supply that supports AC/DC inputs with remote enable/disable.

EX1214-ICA	14-Slot, 8U mainframe
EX1200-2011ICA	12 SPDT 12 A and 5 SP4T 5 A power switch module
EX1200-6100ICA	1 GHz coax switch module, 11 SP4T, 3 SPDT
EX1200-5111ICA	250 V/2 A switch module, 21 SP4T, 35 SPDT
EX1200-4464ICA	64-channel, coax hybrid star/matrix switch module

CUSTOM INTEGRATION SERVICES

VTI employs an innovative, modular approach to our standard product designs that allows us to quickly make customer-requested modifications that address specific application requirements. These 'custom' products are then documented and supported just like our standard products. This relieves our customers of the burden of managing a custom development project and the associated long-term support issues, while helping them optimize their size and overall cost.

SYSTEM-LEVEL EXPERIENCE

Our application engineering team has years of experience in integrating a wide range of instrumentation products into larger test systems. We work with customers during the project definition phase to help architect solutions that best meet the application requirements. Our expert knowledge of industry standards, such as LXI, VXI, IVI, PXI and VME, at the hardware and software level has helped test developers reduce the time to 'system readiness' in the following applications:

- DATA ACQUISITION
- FUNCTIONAL / AUTOMATED TEST
- SIGNAL SWITCHING AND DISTRIBUTION

It is with this experience that we are able to provide our customers with a world-class selection of automated test and data acquisition solutions.





SERVICE AND SUPPORT

VTI Instruments has a worldwide sales, service, and support infrastructure, along with a staff of applications and technical sales people who have years of experience configuring and specifying test requirements. By utilizing state-of-the-art technology in all phases of product development, VTI Instruments is able to provide a level of worldwide support that is unique in the industry.

VTI is committed to preserving our customers' initial capital investment in our products through a dedicated sustaining engineering program that continuously designs out component obsolescence. This approach enables us not only to enhance products, but also to considerably extend their life and support cycles. We strive to maintain hardware and software backward compatibility with our installed base whenever possible so as not to impact our customers' existing test program sets.

VTI INSTRUMENTS

HIGH-DENSITY SWITCHING AND DATA ACQUISITION SYSTEMS

EX1200 series

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