EMX 2.0
Data Acquisition Redefined

ANALOG & THERMOCOUPLE MODULES

SUPPORTS USER DEFINED **CAN MESSAGING**

IP67 RATED

AEROSPACE GRADE QUALITY

ETHERNET CONNECTIVITY

The EMX data acquisition product family is based on a modular chassis design offering combinations of internal measurement module types to support different applications. This provides cost-effective flexibility and efficiency for various channel count needs.

- Analog, thermocouple, and cost-effective mixed I/O types available
- Accuracy and precision typical of larger, more costly laboratory style equipment
- Advanced anti-aliasing and DSP filters with selectable filter characteristic/cutoff
- Multiple thermocouple types: B, E, J, K, N, R, S, T, selectable per channel
- Advanced quick response thermocouple cold-junction compensation
- Competitive cost-per channel especially for high channel count applications
- Flexible communication interface options
    - CAN and CAN-FD for easy daisy-chaining
    - Ethernet with hardware IEEE-1588 PTP time sync for maximum performance
    - Generic message-based open protocol available
- Aerospace grade connectors and hard anodized billet aluminum enclosure design
- IP67 rated for installation in vehicles or other rugged environments
- Wide operating temperature range for hot and cold weather testing
- Variety of I/O breakout cable and breakout box options available

IP67 Rated Connectors

Internal Vibration Damping

Fully Sealed Waterproof Enclosure

DATA ACQUISITION

ECU CALIBRATION

ECU RAPID PROTOTYPING

TEST CELL MEASUREMENT

Measurement inputs typically provide a number of software configurable options per channel including advanced DSP filtering algorithms with selectable filter response characteristics and stop band frequencies to ensure repeatable and accurate measurements of the performance level that typically requires laboratory style equipment. Each channel also allows independent selection of its output data rate.

Flexible communication options are available including CAN/CAN-FD and Ethernet. When used with ATI software products like VISION, the EMX operates as a plug and play device and benefits from enhanced features including dynamic acquisition rates and automatic filter compensation.

Quickly integrate high quality EMX data with any generic CAN/CAN-FD based acquisition system using the EMX's open Message Based Protocol (MBP). MBP allows for the highly flexible freeform configuration of free running CAN message formats and rates – a feature not commonly found in traditional CAN based DAQ hardware.

The aerospace-grade IP67 connectors and sealed hard-anodized billet aluminum enclosure survive harsh testing environments where failure is not an option. A new chromium plated connector option provides improved salt spray resistance.
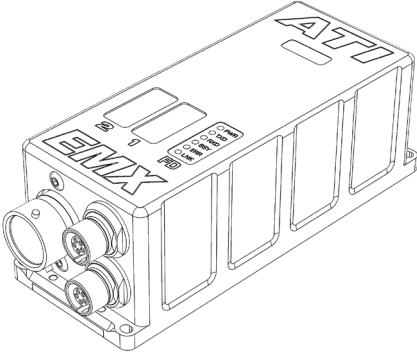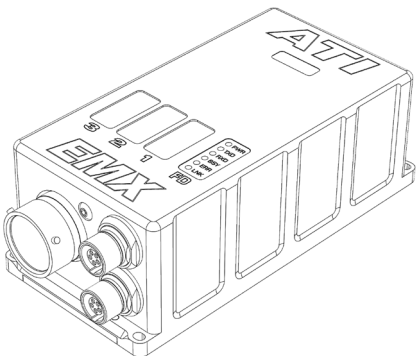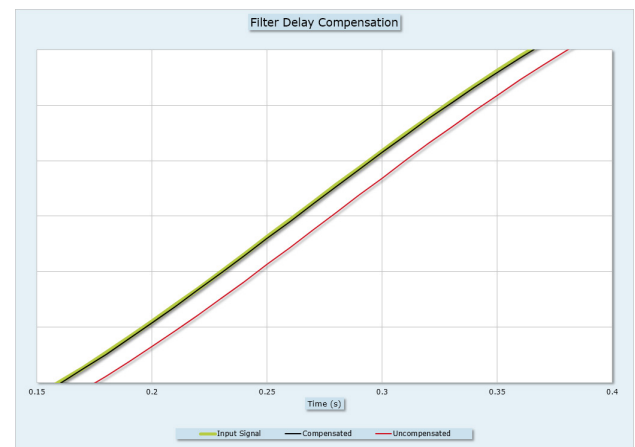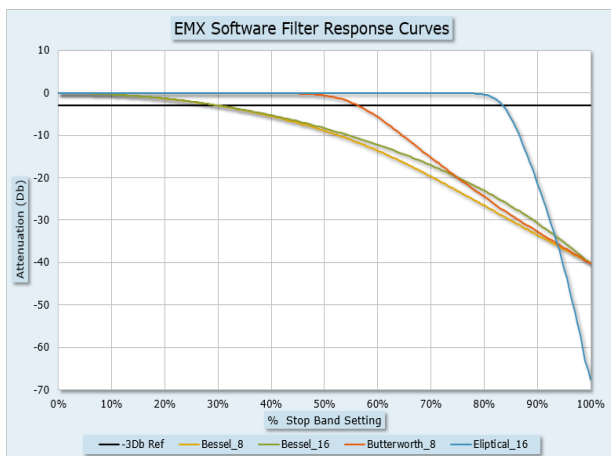

EMX measurement modules provide precision DSP software filters with user-configurable response characteristics to ensure high quality unaliased measurements.

The ATI VISION software has integrated Filter Delay Compensation which automatically time aligns EMX measurements with data from other sources such as ECU modules.
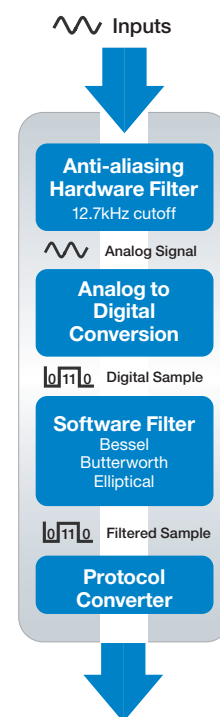
EMX Enclosure Specifications

A-Chassis Specifications

Common Specifications	
I/O Modules	Support for up to (2) EMX I/O modules
Construction	Sealed hard-anodized billet aluminum enclosure
Rating	IP67
LEDs	(6) power and status indicators
Power	5 to 32VDC, automotive surge tolerant
Operating Temperature	-40°C to +105°C / -40°F to +221°F
Dimensions	51mm x 45.75mm x 140mm / 2.01in x 1.80in x 5.51in (overall includes connectors)
Weight	12.7oz / 360g (typical)

Options	CAN Only	Ethernet and CAN
Connectors	(2) Lemo 1F Series 5-pin for power and CAN (1) Deutsch ASDD series 41-pin for I/O	(1) Lemo 1F Series 5-pin for power and CAN (1) Lemo 1F Series 8-pin for Ethernet (1) Deutsch ASDD series 41-pin for I/O
Communications	CAN 2.0B up to 1Mbps CAN-FD up to 8Mbps	Ethernet at 100Mbps with hardware IEEE-1588 PTP time sync CAN 2.0B up to 1Mbps CAN-FD up to 8Mbps

B-Chassis Specifications

Common Specifications	
I/O Modules	Support for up to (3) EMX I/O modules
Construction	Sealed hard-anodized billet aluminum enclosure
Rating	IP67
LEDs	(6) power and status indicators
Power	5 to 32VDC, automotive surge tolerant
Operating Temperature	-40°C to +105°C / -40°F to +221°F
Dimensions	63mm x 45.75mm x 140mm / 2.48in x 1.80in x 5.51in (overall includes connectors)
Weight	15.9oz / 450g (typical)

Options	CAN Only	Ethernet and CAN
Connectors	(2) Lemo 1F Series 5-pin for power and CAN (1) Deutsch ASDD series 64-pin for I/O	(1) Lemo 1F Series 5-pin for power and CAN (1) Lemo 1F Series 8-pin for Ethernet (1) Deutsch ASDD series 64-pin for I/O
Communications	CAN 2.0B up to 1Mbps CAN-FD up to 8Mbps	Ethernet at 100Mbps with hardware IEEE-1588 PTP time sync CAN 2.0B up to 1Mbps CAN-FD up to 8Mbps

ATI **ACCURATE TECHNOLOGIES**

EMX I/O Module Specifications

HSA8D High Speed Analog Input Module (EMX 2.0 spec)

IOM.HSA8D HIGH-SPEED ANALOG INPUTS	The HSA8D module offers uncompromising high-end measurement performance in a compact size, typically only found on much larger and more expensive instrumentation equipment. It is ideal for a variety of wide bandwidth precision measurements.

Analog Voltage Inputs

Number of Inputs	(8) unipolar/bipolar differential inputs, configurable per channel
Measurement Ranges	(26) ranges from ±25mV to ±70V, configurable per channel
ADC Resolution	16-bits
ADC Sampling Type	Simultaneous time-aligned sampling of all channels
Input Impedance	Ranges ≤ ±5V = >100MΩ Ranges > ±5V = >400kΩ When powered down = >100MΩ all ranges
Overvoltage Protection	>100V
Output Data Rate	Up to 10KHz per channel, configurable per channel (limited to 2KHz on CAN 2.0B)
Anti-Aliasing Filter	10th order precision Butterworth, cutoff 12.7KHz (can be disabled via software configuration)
Configurable DSP Filter Characteristics	8th order Bessel low-pass 16th order Bessel low-pass 8th order Butterworth low-pass 16th order Elliptical low-pass
Filter Stop Band Settings (Hz)	0.5, 1.0, 2.5, 5.0, 10, 25, 50, 100, 250, 500, 1K, 2.5K, 5K, 10K, 20K, or disabled via software configuration

Sensor Power Outputs

Number of Outputs	(2) sensor power outputs (may be shared by multiple sensors)
Output Voltage	3 to 15VDC, software configurable per output
Output Current	250mA maximum per output
Output Protection	Short circuit protection with fault monitoring

∿∿ Inputs

Anti-aliasing Hardware Filter
12.7kHz cutoff

∿∿ Analog Signal

Analog to Digital Conversion

0 11 0 Digital Sample

Software Filter
Bessel
Butterworth
Elliptical

0 11 0 Filtered Sample

Protocol Converter

LSA8D Low Speed Analog Input Module (EMX 2.0 spec)
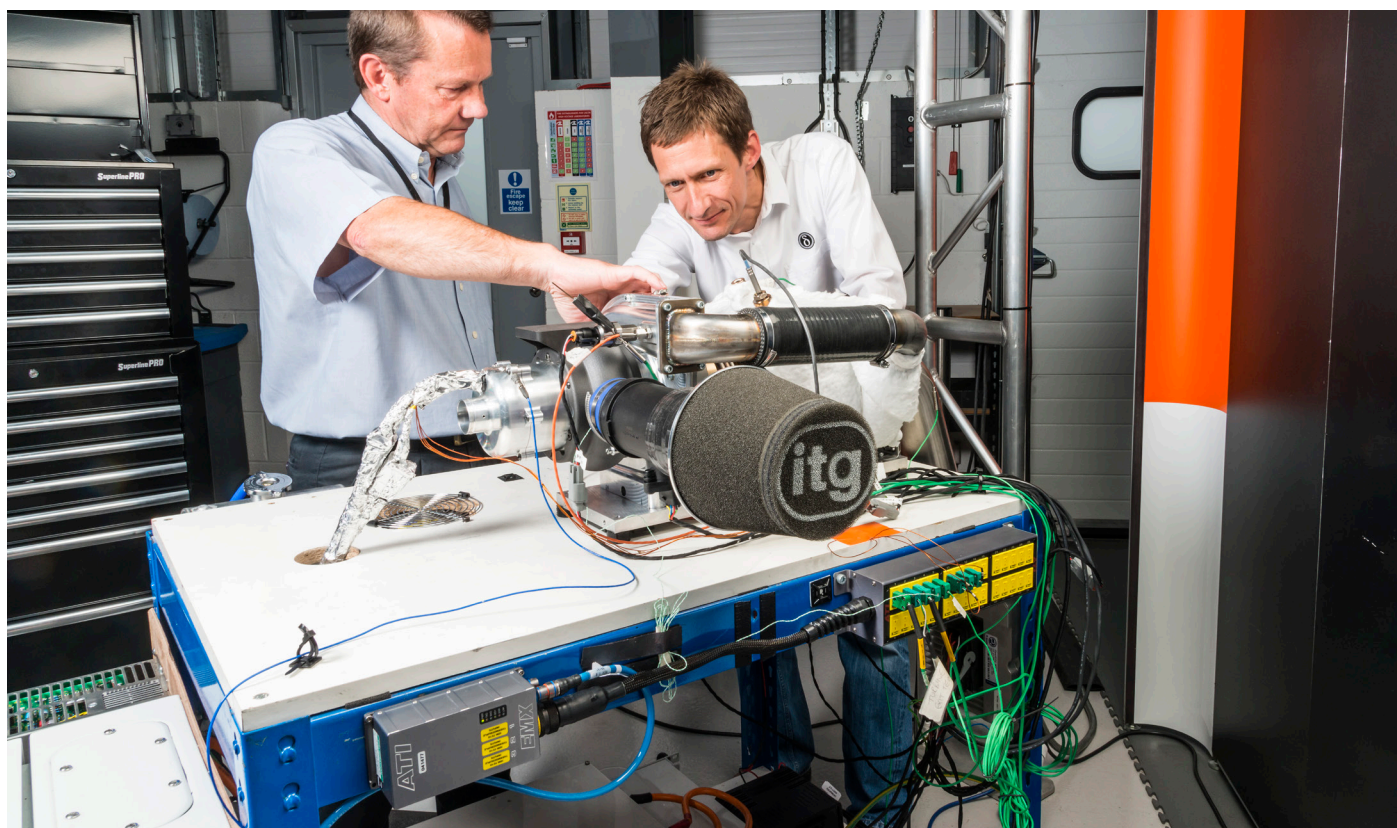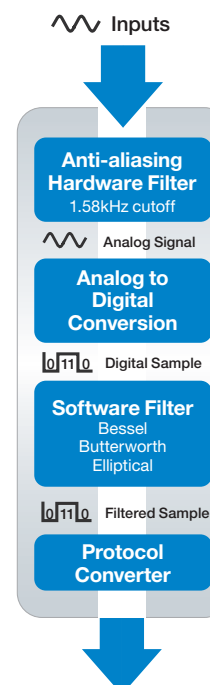
IOM.LSA8D LOW-SPEED ANALOG INPUTS

The LSA8D module is the leader in cost-effective precision analog voltage measurement, offering wide measurement ranges that cover most applications, as well as configurable precision DSP filtering to ensure accurate anti-aliased data.

Analog Voltage Inputs

Number of Inputs	(8) bipolar differential inputs
Measurement Ranges	(5) ranges from ±100mV to ±50V, configurable per channel
ADC Resolution	16-bits
ADC Sampling Type	Simultaneous time-aligned sampling of all channels
Input Impedance	Ranges ≤ ±5V = >100MΩ Ranges > ±5V = >200kΩ
Overvoltage Protection	>100V
Output Data Rate	Up to 2KHz per channel, configurable per channel
Anti-Aliasing Filter	4th order precision Butterworth, cutoff 1.58KHz
Configurable DSP Filter Characteristics	8th order Bessel low-pass 16th order Bessel low-pass 8th order Butterworth low-pass 16th order Elliptical low-pass
Filter Stop Band Settings (Hz)	0.1, 0.25, 0.5, 1.0, 2.5, 5.0, 10, 25, 50, 100, 250, 500, 1K, 2.5K, 5K

Sensor Power Outputs

Number of Outputs	(2) sensor power outputs (may be shared by multiple sensors)
Output Voltage	3 to 15VDC, software configurable per output
Output Current	250mA maximum per output
Output Protec-tion	Short circuit protection with fault monitoring

∿∿ Inputs

Anti-aliasing Hardware Filter
1.58kHz cutoff

∿∿ Analog Signal

Analog to Digital Conversion

0 11 0 Digital Sample

Software Filter
Bessel
Butterworth
Elliptical

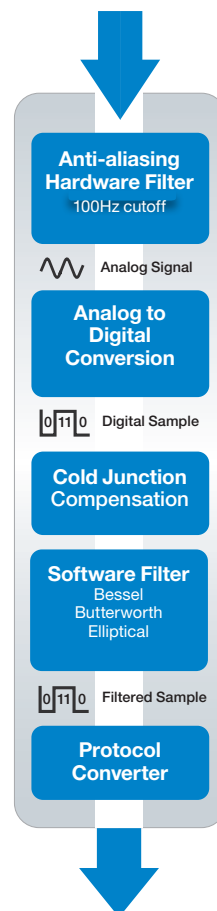0 11 0 Filtered Sample

Protocol Converter

TC10 Thermocouple Input Module

IOM.TC10 THERMOCOUPLE INPUTS

The TC10 module is the cost per channel leader in precision thermocouple measurement, offering multiple thermocouple type support and precision fast-response cold-junction compensation for accurate measurements under extreme conditions.

Thermocouple Inputs

Number of Inputs	(10) differential thermocouple inputs
Thermocouple Types	B, E, J, K, N, R, S, and T, selectable per channel
ADC Resolution	24-bits
ADC Sampling Type	Simultaneous time-aligned sampling of all channels
Measurement Resolution	0.1°C
Cold Junction Compensation	Integrated in the custom I/O connector for excellent stability during module temperature swings
Grounded Thermocouples	Supported
Overvoltage Protection	>100V
Output Data Rate	Up to 200Hz per channel, configurable per channel
Anti-Aliasing Filter	4th order precision Butterworth, cutoff 100Hz
Configurable DSP Filter Characteristics	8th order Bessel low-pass 16th order Bessel low-pass 8th order Butterworth low-pass 16th order Elliptical low-pass
Filter Stop Band Settings (Hz)	0.1, 0.25, 0.5, 1.0, 2.5, 5.0, 10, 25, 50, 100

Inputs

Anti-aliasing
Hardware Filter
100Hz cutoff

Analog Signal

Analog to Digital Conversion

Digital Sample

Cold Junction Compensation

Software Filter
Bessel
Butterworth
Elliptical

Filtered Sample

Protocol Converter

SPS16 Sensor Power Supply Module

IOM.SPS16 PROG. SENSOR POWER SUPPLIES

The SPS16 module can provide power to a wide range of sensors to reduce wiring complexity and eliminate the cost and space consumed by additional external power supplies. This module is typically used in combination with an EMX Analog Input module.

Sensor Power Outputs

Number of Outputs	(16) precision sensor power outputs
Output Voltage	3 to 15VDC, software configurable per output
Output Current	50mA maximum per output
Output Protection	Short circuit protection with fault monitoring

Voltage   Enable=1   Status

SPS Channel

Power Output
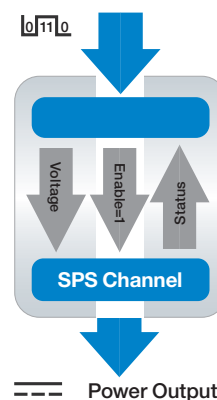
EMX Device Variants

Ordering Information

Part Number	Enclosure	I/O Modules Installed			CAN	Ethernet
160-0005	B	HSA8D	HSA8D	SPS16	✓	
160-0006	A	LSA8D	LSA8D		✓	
160-0007	B	TC10	TC10	TC10	✓	
160-0008	B	HSA8D	HSA8D	---	✓	
160-0009	B	TC10	TC10	---	✓	
160-0010	B	HSA8D	---	---	✓	
160-0011	B	HSA8D	---	SPS16	✓	
160-0012	A	TC10	TC10		✓	
160-0013	A	LSA8D	TC10		✓	
160-0014	A	LSA8D	---		✓	
160-0015	A	TC10	---		✓	
160-0016	B	LSA8D	LSA8D	LSA8D	✓	
160-0017	B	LSA8D	LSA8D	TC10	✓	
160-0018	B	LSA8D	TC10	TC10	✓	
160-0030	B	HSA8D	HSA8D	SPS16	✓	✓
160-0031	A	HSA8D	---		✓	✓
160-0032	A	HSA8D	TC10		✓	✓
160-0033	A	HSA8D	HSA8D		✓	✓
160-0034	A	LSA8D	LSA8D		✓	✓
160-0035	B	HSA8D	---	---	✓	✓
160-0036	B	HSA8D	TC10	TC10	✓	✓
160-0037	B	HSA8D	HSA8D	---	✓	✓
160-0038	B	HSA8D	HSA8D	TC10	✓	✓
160-0040	B	LSA8D	LSA8D	LSA8D	✓	✓
160-0041	B	TC10	TC10	TC10	✓	✓
160-0042	B	HSA8D	LSA8D	TC10	✓	✓

- All EMX Devices have a **3-year warranty period**
- Append "-CR" to the part numbers above to order with the chromium plated Lemo connector option
- Other variants may be available, please contact ATI for details

Configuration Software

Use the free Hardware Configuration Utility to configure EMX devices for open protocol MBP operation on CAN and CAN-FD. This provides a quick and easy method to integrate EMX devices into any application that can monitor traditional CAN messages. The utility software is available for download from the ATI support site at www.accuratetechnologies.com.

EMX Cables and Accessories
Ordering Information

Part Numbers		Description
Breakout Boxes		
151-0035		Accessory for 161-0013; Phoenix Screw Terminal (qty 16)
151-0036		Accessory for 161-0013; Phoenix Spring Cage (qty 16)
151-0037		Accessory for 161-0013; Phoenix Spring Cage with flange (qty 16)
151-0038		Accessory for 161-0013; Phoenix Screw Terminal with flange (qty 16)
161-0011		Breakout box for EMX30T; B-chassis compatible; 30 K-type thermocouple connectors; AutoSport 64-pin connector
161-0013		Breakout box for EMX16AI.SPS; B-chassis compatible; 16 analog connections for input, XVS, and SPS; Auto-Sport 64-pin connector
161-0014		Two AI8 breakout boxes (16 analog connections total); to an AutoSport 41-pin connector
161-0015		Two AI8 breakout boxes (16 analog connections total); to an AutoSport 64-pin connector
161-0016		Three AI8 breakout boxes (24 analog connections total); to an AutoSport 64-pin connector
161-0017		One AI8 breakout box; 8 analog connections; to an AutoSport 41-pin connector
161-0018		One TC10 breakout box (10 K-type thermocouple connectors); AutoSport 41- pin connector
161-0019		One TC10 (10 K-type thermocouple connectors) breakout box and one AI8 (8 analog connections) breakout box to an AutoSport 41-pin connector
161-0020		Two TC10 breakout boxes (total 20 K-type thermocouple connectors total); AutoSport 41-pin connector
161-0021		One A8I breakout box; B-chassis compatible; 8 analog connections; AutoSport 64-pin connector
161-0023		One TC10 (10 K-type thermocouple connectors), 2 AI8 boxes (16 analog total), to an AutoSport 64-pin connector
161-0024		Two TC10 (total 20 K-type thermocouple connectors), to an AutoSport 64-pin connector
161-0025		Three TC10 (total 30 K-type thermocouple connectors), to an AutoSport 64-pin connector
Hardware		
151-0034		Bracket; B-chassis, mounting bracket
I/O Cables / Connectors		
150-0164-6FT 150-0164-10FT	1.83m/6ft 3.05m/10ft	Cable; octopus; B-chassis compatible; 16 unterminated cables for sensor connection (input+, input-, sensor power, ground, and shield)
150-0185-2FT	0.61m/2ft	Cable; octopus; B-chassis compatible; 30 K-type thermocouple connectors
150-0189-2FT	0.61m/2ft	Cable; octopus; B-chassis compatible; 10 R-type and 20 K-type thermocouple connectors

Part Numbers		Description
Communication and Power Cables		
150-0175-12FT 150-0175-12IN 150-0175-6FT 150-0175-6IN	3.66m/12ft 0.301m/12in 1.83m/6ft 0.15m/6in	Cable; EMX-to-EMX; LEMO 1F 5-pin plug, 180°/180°
151-0033		CAN termination; EMX; LEMO 1F 5-pin plug
150-0209-26FT 150-0209-20FT 150-0209-15FT 150-0209-12FT 150-0209-6FT 150-0209-12IN 150-0209-6IN	7.92m/26ft 6.10m/20ft 4.57m/15ft 3.66m/12ft 1.83m/6ft 0.30m/1ft 0.15m/6in	Cable; VISION Network Hub to VID or EMX; LEMO 1B 5-pin plug to LEMO 1F 5-pin plug (replaces 150-0128)
150-0227-10FT 150-0227-15FT 150-0227-25FT 150-0227-50FT 150-0227-HT-10FT 150-0227-HT-15FT 150-0227-HT-20FT 150-0227-HT-50FT	3.05m/10ft 4.57m/15ft 7.62m/25ft 15.24m/50ft 3.05m/10ft 4.57m/15ft 7.62m/25ft 15.24m/50ft	Cable; EMX to PC; Ethernet cable with RJ45 and LEMO 1F 8-pin plug; Standard Temperature range -30 to 75C; High Temperature -55 to 150C

- Most cables and accessories have a **30-day warranty period**
- Custom cabling and breakout box solutions are available—please contact ATI for details

A-Chassis

.13in [3.20mm]

2.01in [51.00mm]
1.74in [44.20mm]

4.96in [126.00mm]

B-Chassis

.13in [3.20mm]

2.48in [63.00mm]
2.21in [56.20mm]

4.96in [126.00mm]

1.80in [45.75mm]

5.20in [132.00mm]

ATI *ACCURATE TECHNOLOGIES*

sales@accuratetechnologies.com
www.accuratetechnologies.com

V18 - EMX Data Acquisition Series

DATA ACQUISITION

ECU CALIBRATION

ECU RAPID PROTOTYPING

TEST CELL MEASUREMENT