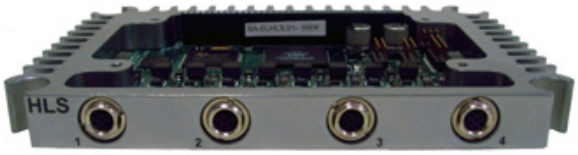


SOMAT

ELHLS

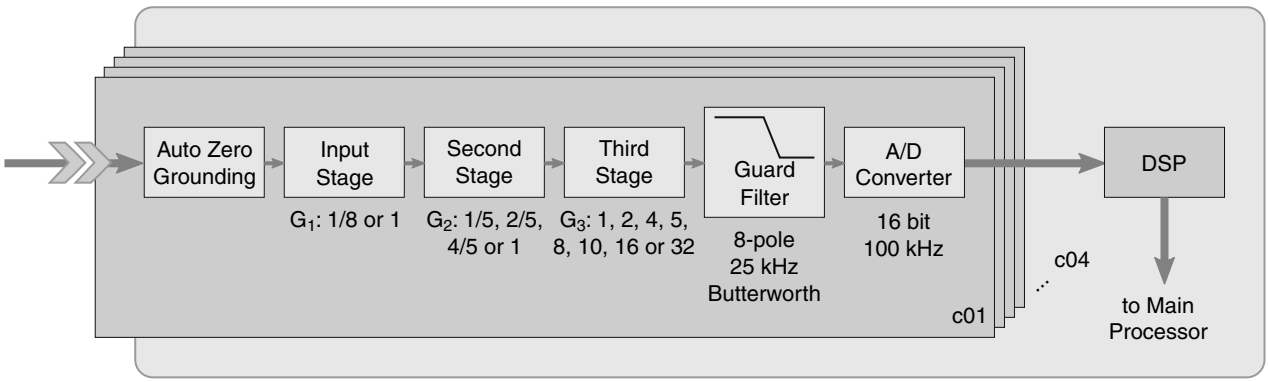
eDAQ*lite* High Level Analog Layer

Data Sheet

Special Features

- **4 simultaneously-sampled, high-level differential analog inputs from ±0.0625 to ±74.9 V**
- **64 automatic gain states ensuring use of the fullest possible A/D converter range**
- **Sampling rates up to 100 kHz**
- **16-bit A/D converter per channel across full-scale range**
- **25 kHz, 8-pole analog Butterworth low-pass filter**
- **Software selectable sample rates, transducer power and digital filtering**

Block Diagram



HBM

Detailed Description

The SoMat ELHLS eDAQ*lite* High Level Analog Layer (1-ELHLS-B-2) offers four simultaneously sampled high-level differential analog inputs through independent connectors. The ELHLS can inherently handle any analog input from ±74.9 volts and, together with the SoMat SMART conditioning modules, constitutes a real multi-purpose layer. The ELHLS is compatible with practically any input including thermocouples, strain gages, accelerometers, microphones and amplified and un-amplified transducers. Software selectable sample rates, transducer power and digital filtering simplify the set-up of any channel. There are also several calibration options including defined value, external value and multipoint calibrations.

Includes four (4) 1-SAC-TRAN-MP-2-2 Transducer Cables with a male SoMat M8 connector and tinned pigtail wires for transducer wiring.

Accessories (Order Separately)

Order No.	Description
1-EICP-B-2	ICP-Type Conditioning Module - BNC Connector In-line signal conditioning module for ELHLS Inputs: IEPE (Integrated Electronics Piezoelectric) Transducers Requires (1) Extension Cable
1-EICP-M-2	ICP-Type Conditioning Module - Microdot Connector In-line signal conditioning module for ELHLS Inputs: IEPE (Integrated Electronics Piezoelectric) Transducers Requires (1) Extension Cable
1-SMSTRB4-120-2	Strain SMART Module - 120-Ohm Completion In-line signal conditioning module for ELHLS Integrated 120-Ohm, 1/4-bridge completion resistor Requires (1) Extension Cable
1-SMSTRB4-350-2	Strain SMART Module - 350-Ohm Completion In-line signal conditioning module for ELHLS Integrated 350-Ohm, 1/4-bridge completion resistor Requires (1) Extension Cable
1-SMITC-2	Thermocouple SMART Module In-line signal conditioning module for ELHLS Inputs: Isolated Thermocouple, 500-V Isolation, Software selectable J, K, T and E Thermocouples

Cables (Order Separately)

Order No.	Description
1-SAC-TRAN-MP-2-2	Transducer Cable - Male/Pigtail - 2 Meters Length
1-SAC-TRAN-MP-10-2	Transducer Cable - Male/Pigtail - 10 Meters Length
1-SAC-EXT-MF-0.4-2	Extension Cable - Male/Female Connectors - 0.4 Meters Length
1-SAC-EXT-MF-2-2	Extension Cable - Male/Female Connectors - 2 Meters Length
1-SAC-EXT-MF-5-2	Extension Cable - Male/Female Connectors - 5 Meters Length
1-SAC-EXT-MF-10-2	Extension Cable - Male/Female Connectors - 10 Meters Length
1-SAC-EXT-MF-15-2	Extension Cable - Male/Female Connectors - 15 Meters Length

Specifications

Parameter	Units	Value
Layer dimensions		
width	mm	175
length	mm	143
height	mm	1.76
Layer weight	kg	0.42
Temperature range	°C	-20 ... 65
Relative humidity range, non-condensing	%	0 ... 90
Initial accuracy	% of full scale	0.1
Common mode range plus signal		
G_1 = 1/8	V	±74.9
G_1 = 1	V	±10
Analog inputs surviving over voltage	V	±125
Transducer power supply voltage range		
no adapter	V	4 ... 15 in 1 V steps
with IEPE adapter	V	24
Transducer power supply output power	mW	400
Transducer power supply voltage change over temperature	%	±1
Voltage regulation		
4 V out, 2 mA to 150 mA	mV	10
10 V out, 2 mA to 60 mA	mV	5
15 V out, 2 mA to 40 mA	mV	5
24 V out, 2 mA to 25 mA	mV	10
Voltage regulation efficiency		
4 V out, 2 mA to 150 mA	%	67
10 V out, 2 mA to 60 mA	%	78
15 V out, 2 mA to 40 mA	%	80
24 V out, 2 mA to 25 mA	%	82
Ripple (4 V out)		
1.4 MHz at 2 mA	mV	5
1.4 MHz at 150 mA	mV	18.5
Ripple (10 V out)		
1.4 MHz at 2 mA	mV	5
1.4 MHz at 60 mA	mV	14
Ripple (15 V out)		
1.4 MHz at 2 mA	mV	2
1.4 MHz at 40 mA	mV	12
3.4 kHz at 2 mA	mV	7
Ripple (24 V out)		
1.4 MHz at 2 mA	mV	2
1.4 MHz at 25 mA	mV	10
10.5 kHz at 2 mA	mV	9

Specifications (continued)

Parameter	Units	Value
Power consumption [1]		
no load	W	3.3
SBSTRB4-120, quarter bridge or half bridge (5 V out)	W	4.26
SBSTRB4-120, full bridge (5 V out)	W	5.14
SMSTRB4-350, quarter bridge or half bridge (5 V out)		3.52
SBSTRB4-350, full bridge (5 V out)	W	3.62
SMSTRB4-350, quarter bridge or half bridge (10 V out)	W	5.36
SMSTRB4-350, full bridge (10 V out)	W	5.74
SMITC	W	3.96
IEPE plus accelerometer	W	4.5
40 mA load (12 V out)	W	5.6
Minimum input resistance		
$G_1 = 1$	GΩ	2
$G_1 = 1/8$	kΩ	108

[1] Power consumption measurements are taken with the stated load on all four channels and include the efficiency of the power supply.

Standards

Category	Standard	Description
Shock	MIL-STD-810F	Method 516.5, Section 2.2.2 Functional Shock - ground vehicle
Vibration	MIL-STD-202G	Method 204D, Test condition C (10 *g* swept sine tested from 5 Hz to 2000 Hz)

Selected Gain Settings

Desired Input Range [1] (V_{pp})	Input Stage Gain, G_1 (1/8 or 1)	Second Stage Gain, G_2 (1/5, 2/5, 4/5 or 1)	Third Stage Gain, G_3 (1, 2, 4, 5, 8, 10,16 or 32)	Overall Gain
149.8	1/8	1/5	1	0.025
80	1/8	2/5	1	0.05
40	1/8	4/5	1	0.1
32	1/8	1	1	0.125
20	1	4/5	2	0.2
10	1/8	4/5	4	0.4
5	1/8	4/5	8	0.8
4	1/8	1	8	1
2	1/8	1	16	2
1	1/8	1	32	4
0.5	1	1	8	8
0.25	1	1	16	16
0.125	1	1	32	32

[1] The maximum A/D converter input, which is the product of the input range and the overall gain, is 4.096 V_{pp}.

Note: This table is a representative list only and does not show all available gain settings. To check the gain settings for a defined channel, click the Ampl button in the TCE transducer setup window. “Gain 1” is the input stage gain, “Atten2” is the second stage gain and “Gain2” is the third stage gain.

Channel Noise Characteristics

The input-referred noise and the signal to noise ratio (SNR) are defined by the following two equations:

$$\mathrm{InputReferredNoise} = \frac{N}{G_o}$$

$$\mathrm{SNR} = 20\log\left(\frac{4.096}{N}\right)$$

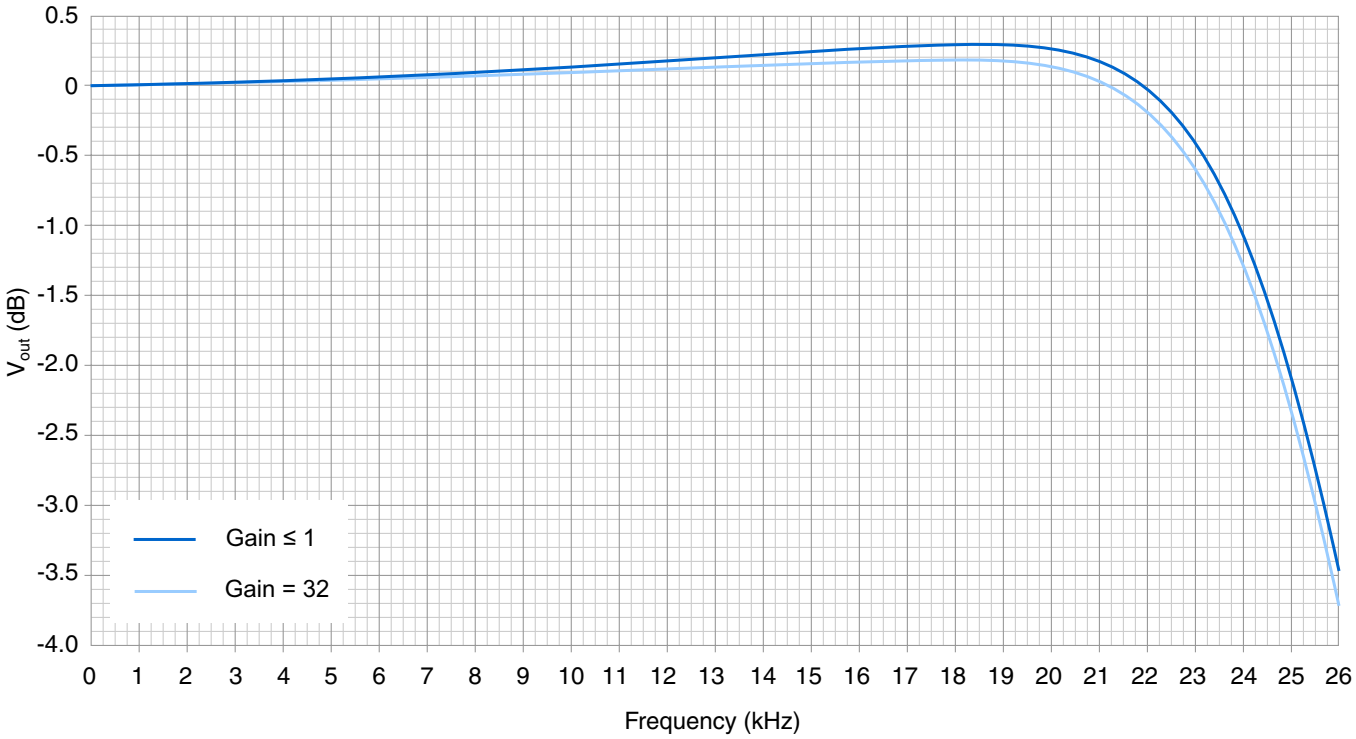
where G_o is the overall gain setting and N is defined by the following equation:

$$N = \sqrt{\left(17.6[\mu V]G_2G_3\sqrt{\frac{x_1}{24[kHz]}}\right)^2 + \left(37[\mu V]G_3\sqrt{\frac{x_1}{24[kHz]}}\right)^2 + \left(45[\mu V]G_3\sqrt{\frac{x_2}{13[kHz]}}\right)^2 + \left(4.5[\mu V]G_3\sqrt{\ln\left(\frac{x_1}{0.1[kHz]}\right)}\right)^2 + 83[\mu V^2]}$$

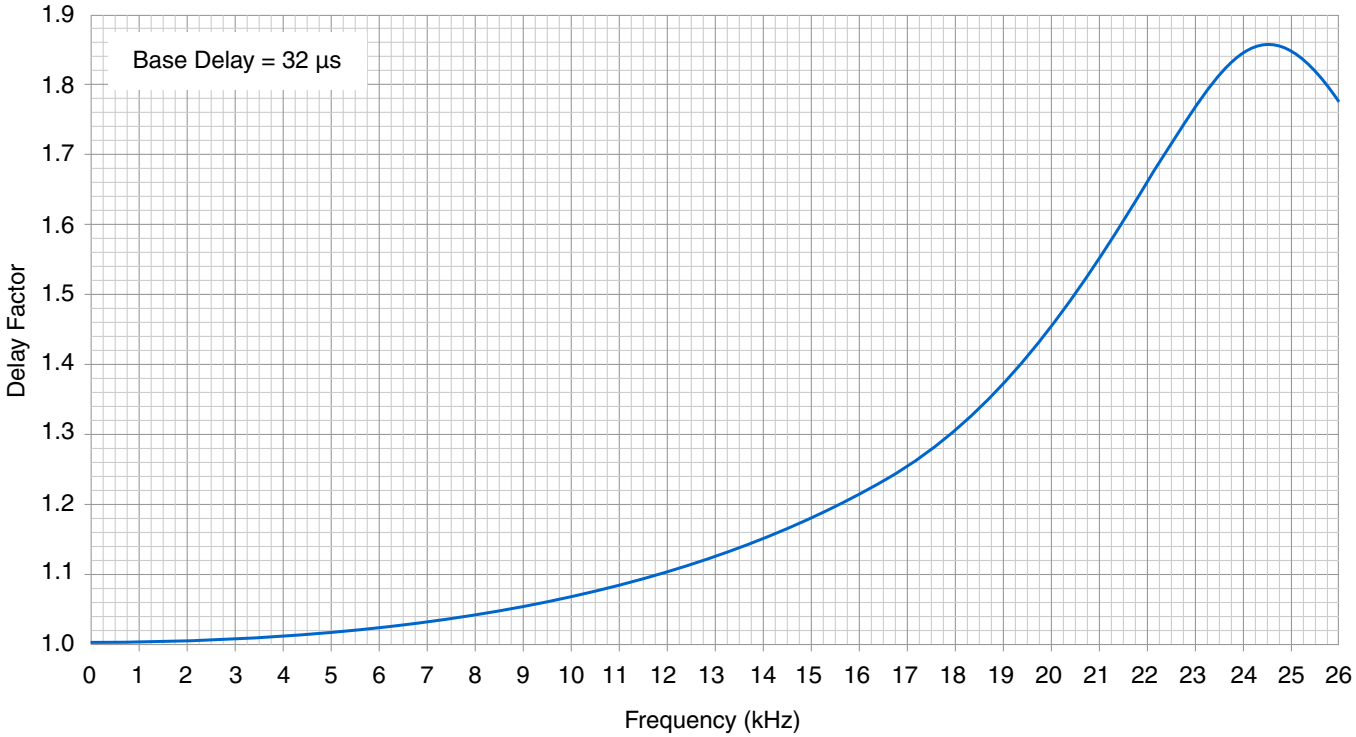
and where x_n is the cutoff frequency of the digital or analog filter to a specified maximum.

x_n	Maximum Value	Cause
x_1	24 kHz	analog filter cutoff
x_2	13 kHz	secondary filter cutoff

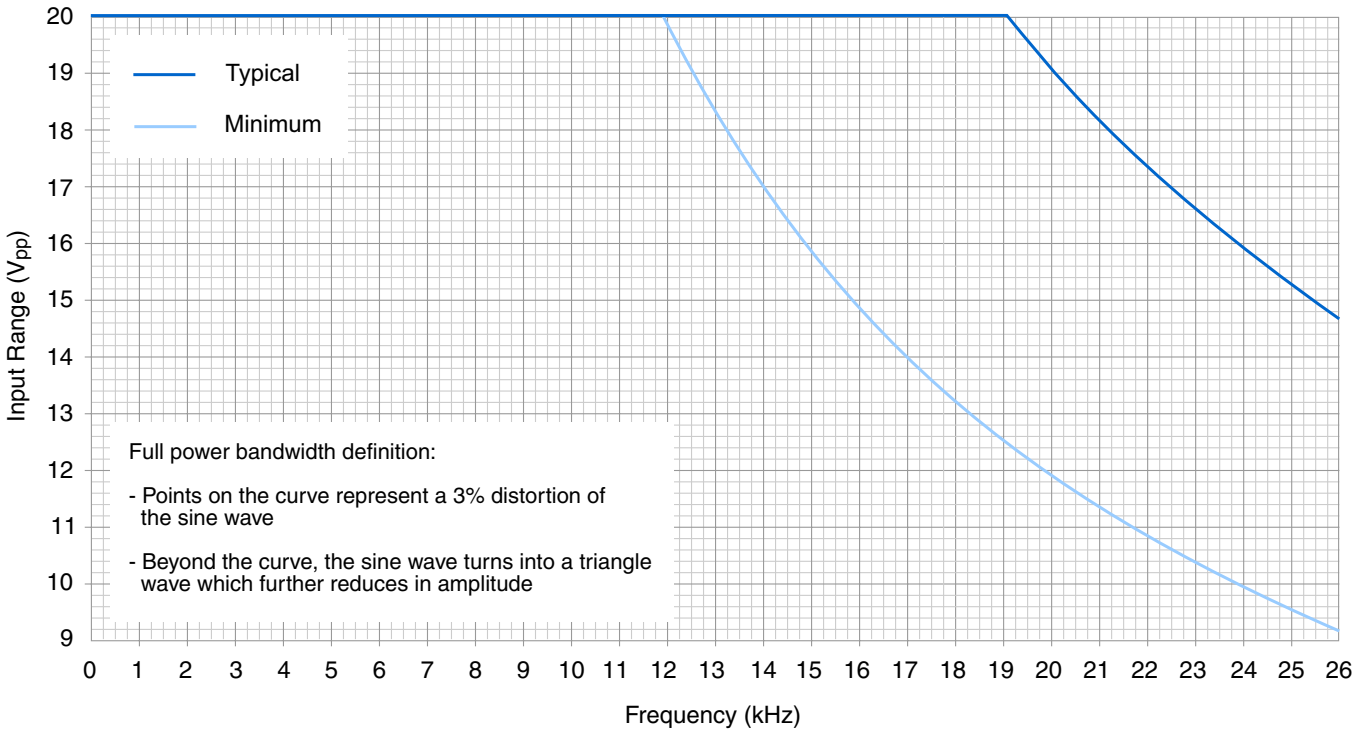
Input Filter Pass Band Frequency Response



Input Filter Delay Factor

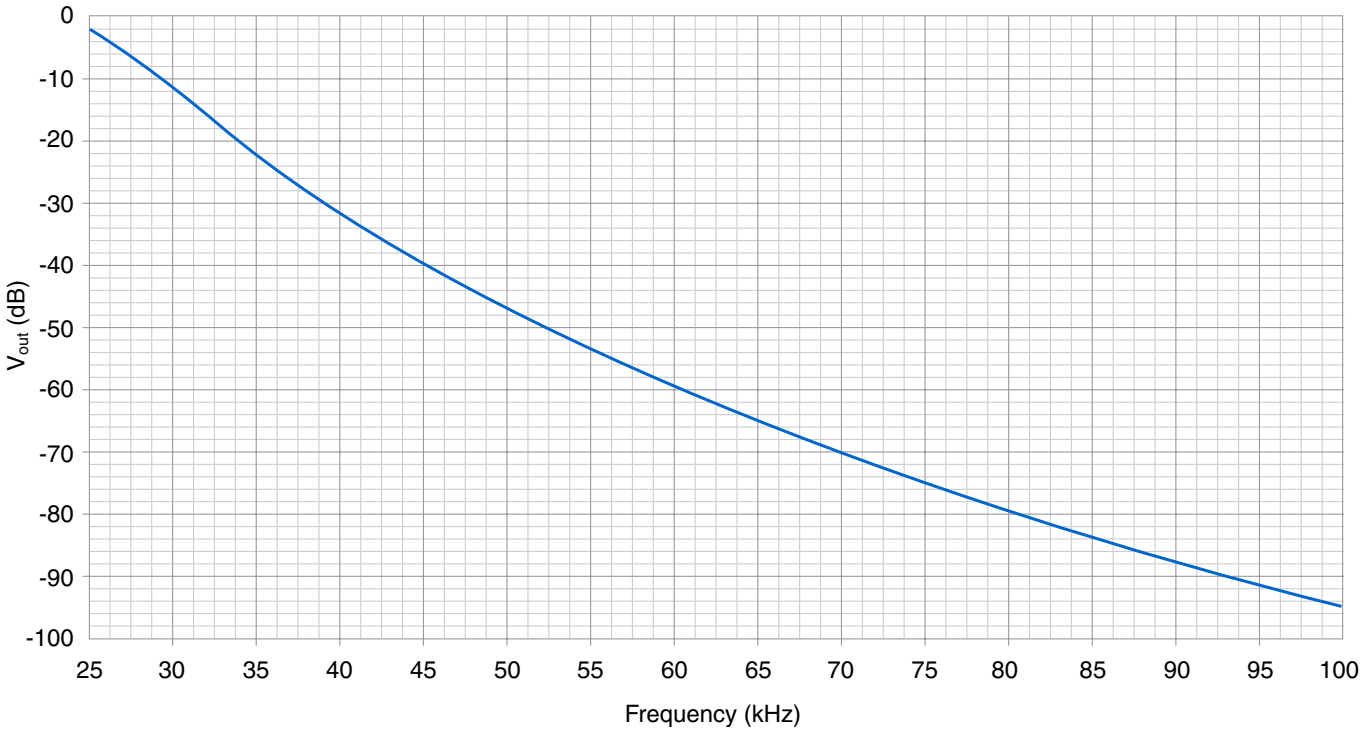


Full Power Bandwidth



Note: Plot shows full power bandwidth for an overall gain of 0.2 or a 20 V_{pp} input range. For other gain settings, scale the input range by the appropriate value. For example, for an overall gain of 0.025, multiply the 20 V_{pp} scale by 4 for a 80 V_{pp} input range.

Input Filter Cut-Off Region



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