ACQ425ELF

16 Channel Simultaneous Analog Input Module

Product Description

- 16 Channels of Simultaneous Analog input
- Up to 2 MSPS/channel sample rate
- 16 bit resolution with 18 bit option
- Programmable Input Voltage Range
- High SNR up to 94 dB

Module Key Features

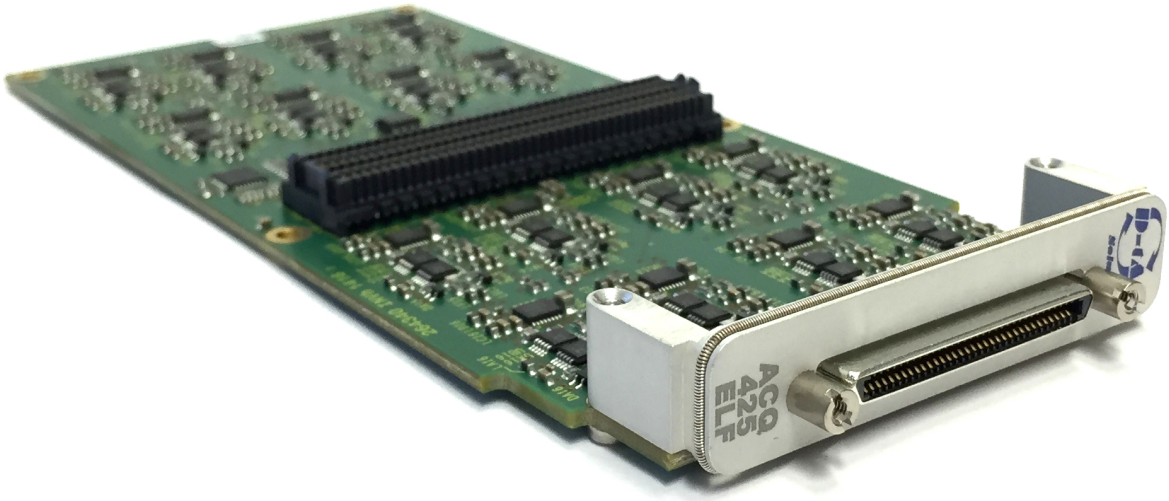
- Ideal for Instrumentation applications, control and monitoring
- Compatible with all D-TACQ Carriers offering up to 96 channels in a 1U 19” system
- Wide range of triggering and capture modes
- Compatible with a range of D-TACQ Breakout Panels and Termination Modules

Platform Key Features

D-TACQ supplies a complete working Intelligent DAQ Appliance providing :

- FPGA based system with a range of flexible and customisable features
- Microprocessor system running open source Linux
- Comprehensive API provided in Python
- Onboard EPICS IOC for rapid integration

Please contact info@d-tacq.com for details on the above system integration options.



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1 Product Description

1. ACQ425ELF is a 16 Channel, 16/18 bit simultaneous analog input module.
2. Standard configuration : 16 Channels, 1 MSPS/channel 16 bit resolution.
3. 2-wire Differential inputs, high quality Instrumentation PGA, see Section 3 for details.
4. Front end tolerates significant continuous over voltage. Transient suppression is provided for VHDCI via transition panel eg BNC PANEL, see Termination Panels on the D-TACQ website.

1.1 Product Variants

- ACQ425ELF-16-1000 : 16 channels, 16 bit resolution, 1 MSPS/channel.
- ACQ425ELF-16-1000-16-HG : 16 channels, 16 bit resolution, 1 MSPS/channel, High Gain Range see Section 3.
- ACQ425ELF-16-1000-18[1] : 16 channels, 18 bit resolution, 1 MSPS/channel.
- ACQ425ELF-16-2000 : 16 channels, 16 bit resolution, 2 MSPS/channel.
- ACQ425ELF-16-2000-16-HG : 16 channels, 16 bit resolution, 2 MSPS/channel High Gain Range see Section 3.

The ACQ425BLF is a variant of the module with the channels connected to 4 RJ45 Connectors via a special front panel connection on the ACQ2106 and ACQ2206 Carriers. The RJ45 connection allows for 4 channels, 4 shielded twisted pairs per connector carrying 4 differential channels using standard Ethernet Cat6 cabling, it has the following variants:

- ACQ425BLF-16-500 : 16 channels, 16 bit resolution, 500 kSPS/channel.
- ACQ425BLF-16-2000 : 16 channels, 16 bit resolution, 2 MSPS/channel.

Note: The BLF module is fitted with additional transient voltage protection see Section 3

1.2 Applications

- Instrumentation applications, control and monitoring.

1.3 Carrier Compatibility

The ELF module standard, based on the same front panel and connector footprint as FMC, adds user IO to carrier modules fitted with FPGA resource. D-TACQ recommends carriers based on the Xilinx ZYNQ system on chip, combining FPGA resource with a dual-core ARM Cortex A9 and gigabit Ethernet see Module Carriers on the D-TACQ website.
The ELF module standard is a D-TACQ standard and is compatible only with D-TACQ Carriers.

Compatible carriers include:

- D-TACQ ACQ1001 : D-TACQ single site FMC/ELF carrier, ZYNQ Z7020
- D-TACQ ACQ2106 : D-TACQ 6 site ELF carrier, ZYNQ Z7030
- D-TACQ ACQ2206 : D-TACQ 6 site ELF carrier, ZYNQ Z7030
- D-TACQ ACQ1102 : D-TACQ 2 site FMC/ELF carrier, Z7030
- DAMC-FMC1Z7IO + D-TACQ ACQ400-MTCA-RTM-2 : 2 site ELF + 1 site FMC carrier, ZYNQ Z7030/7035

Note: ACQ425BLF is only compatible with ACQ2106 and ACQ2206

D-TACQ supplies a complete working Intelligent DAQ Appliance including programmable logic and microprocessor system running Linux.

[1] Special Build : MOQ and/or longer lead time may apply.

2 Physical

2.1 ELF Module Outline

The picture below shows the ACQ425ELF module outline with the 68 Way VHDCI Connector:

Figure 1: ELF Module Outline

2.2 ELF Appearance

The picture below shows the ACQ425ELF module with the 68 Way VHDCI Connector:

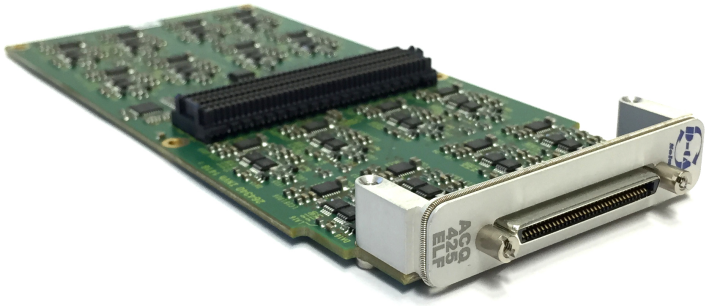

Figure 2: ACQ425ELF Module Appearance

2.3 BLF Module Outline

The picture below shows the ACQ425BLF module outline with the 4xRJ45 Connectors:

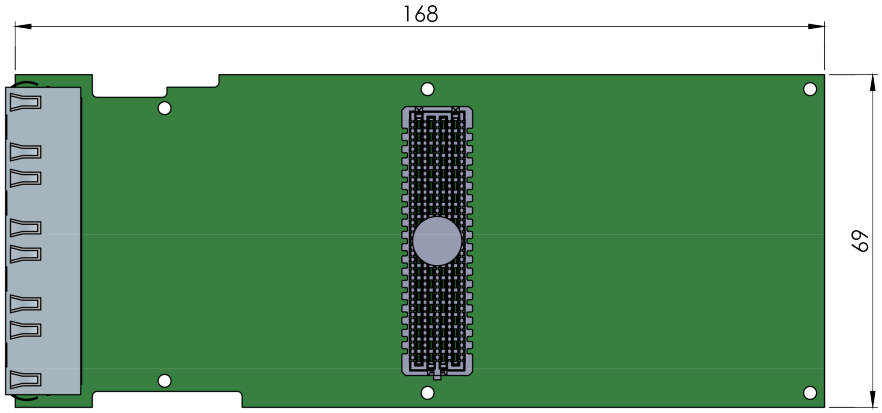

Figure 3: BLF Module Outline

2.4 ELF Appearance

The picture below shows the ACQ425BLF module with the 4xRJ45 Connectors:

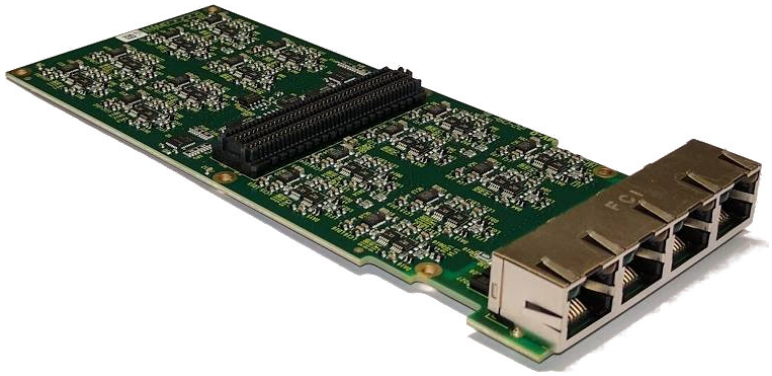

Figure 4: ACQ425BLF Module Appearance

2.5 ELF Front Panel VHDCI Connector

- 68 Pin VHDCI. Pinout compatible with D-TACQ BNCPANEL-S2, SMAPANEL-S2, BNCPANEL-16.
- For direct external cable to front panel.

Pin	Function	Pin	Function
1	0V	35	0V
2	0V	36	0V
3	AI01+	37	AI01-
4	0V	38	0V
5	AI02+	39	AI02-
6	0V	40	0V
7	AI03+	41	AI03-
8	0V	42	0V
9	AI04+	43	AI04-
10	0V	44	0V
11	AI05+	45	AI05-
12	0V	46	0V
13	AI06+	47	AI06-
14	0V	48	0V
15	AI07+	49	AI07-
16	0V	50	0V
17	AI08+	51	AI08-
18	0V	52	0V
19	AI09+	53	AI09-
20	0V	54	0V
21	AI10+	55	AI10-
22	0V	56	0V-
23	AI11+	57	AI11-
24	0V	58	0V
25	AI12+	59	AI12-
26	0V	60	0V
27	AI13+	61	AI13-
28	0V	62	0V
29	AI14+	63	AI14-
30	0V	64	0V
31	AI15+	65	AI15-
32	0V	66	0V
33	AI16+	67	AI16-
34	0V	68	0V

Table 1: 16 Channel Voltage Input VHDCI Pinout

2.6 BLF 4xRJ45 Pinout

Pin	Function	Pin	Function
A.1	AI01+	A.2	AI01-
A.3	AI02+	A.6	AI02-
A.4	AI03+	A.5	AI03-
A.7	AI04+	A.8	AI04-
B.1	AI05+	B.2	AI05-
B.3	AI06+	B.6	AI06-
B.4	AI07+	B.5	AI07-
B.7	AI08+	B.8	AI08-
C.1	AI09+	C.2	AI09-
C.3	AI10+	C.6	AI10-
C.4	AI11+	C.5	AI11-
C.7	AI12+	C.8	AI12-
D.1	AI13+	D.2	AI13-
D.3	AI14+	D.6	AI14-
D.4	AI15+	D.5	AI15-
D.7	AI16+	D.8	AI16-

Table 2: 16 Channel Voltage Input RJ45 Pinout

Note: this pinout is compatible with Standard Ethernet RJ45 Cables

3 Electrical Specification

The table below is for the 32 Voltage Input signals:

#	Parameter	Value
1	Number of Channels	8
2	Sample Rate	-1000: 1 MHz -2000: 2 MHz Per channel simultaneous
3	Resolution	-16: 16 bits -18: 18 bits
4	Coupling	DC, Differential Input
5	Input Impedance	1 MΩ
6	Input Voltage Range Standard Gain (1,2,4,8) High Gain (1,10,100,1000)	Software selectable ranges ±10 V, ±5 V, ±2.5 V, ±1.25 V ±10 V, ±1 V, ±100 mV, ±10 mV
7	Input Voltage Withstand[1]	ELF ±30 V BLF[2] ±100 V
8	Offset Error	0.01% FS with numerical calibration
9	Gain Error	0.01% FS with numerical calibration
10	INL	16 bit ±0.2 LSB 18 bit ±0.5 LSB
11	DNL	16 bit ±0.1 LSB 18 bit ±0.1 LSB
12	CMRR	> 80 dB FS @ 1 kHz
13	THD[3]	-98 dB
14	SINAD[3]	-93 dB
15	SNR Gain 1[3] SNR Gain 2[3] SNR Gain 4[3] SNR Gain 8[3]	94dB 94 dB 92 dB 90 dB
16	SFDR[3]	100 dBc
17	Power BW (-3dB)[4]	450 kHz
18	Small Signal BW[4]	-1000: 500 kHz -2000: 800 kHz
19	Crosstalk	< 90 dB @ 1 kHz FS Input
20	Temperature Stability	<25ppm/°C

[1] Withstand voltage for damage protection however functional behavior may be impacted above input range.
[2] Not Continuous. Transient Voltage Suppression using 400W type Suppressors
[3] Typical values measured at full scale with an 8kHz input.
[4] Bandwidth is reduced in High Gain configuration. Contact info@d-tacq.com for details.

Table 3: ACQ425ELF Electrical Performance

4 Mechanical & Environmental Specification

#	Parameter	Value
1	Form Factor	D-TACQ Standard ELF
2	Power Source	D-TACQ ELF Module Please contact info@d-tacq.com for details.
3	Environmental	0 °C - 50 °C Operational −10 °C - 85 °C Non-Operational
4	Mezzanine Socket	D-TACQ ELF Ultra Low Pin Count ULPC

Table 4: Mechanical & Environmental Specification

Revision History

Revision	Date	Author(s)	Description
9	August 2018	JMcL	Last Release of Previous Format
10	February 2025	JMcL	Updated Carrier Details and Updated Format