ACQ435ELF

32 Channel Simultaneous Analog Input Module

Product Description

- 32 Channels of Simultaneous Analog input
- 24-bit resolution with Digital Filter
- Up to 125 kSPS/channel in Hi-Speed Mode
- Voltage Mode or Current Mode[1] inputs
- High SNR up to 108dB in Hi-Resolution Mode

Module Key Features

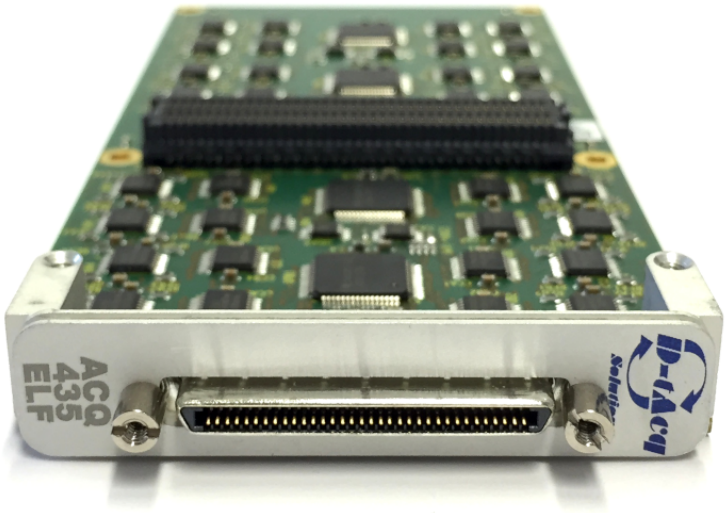
- Ideal for Instrumentation applications, control and monitoring
- Compatible with all D-TACQ Carriers offering up to 192 channels in a 1U 19” system
- Wide range of triggering and capture modes
- Compatible with a range of D-TACQ Breakout Panels and Termination Modules
- Internal FFC connectors for possible OEM Termination or Signal Conditioning

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.



[1] Special Build contact info@d-tacq.com for details.

Rev 10 February 2025

sales@d-tacq.com
www.d-tacq.com

Contents

1 Product Description

1. ACQ435ELF is an 32 Channel, 24 bit simultaneous analog input module.
2. Standard configuration : 32 Channels, 125 kSPS/channel Hi-Speed and 52 kSPS Hi-Resolution.
3. Inbuilt Digital Filter in the ADC device, see Section 4 for details .
4. 2-wire Differential inputs, high quality differential amplifier front end.
5. Front end can be configured for Voltage Input (Follower FF) or Current Input (Transimpedance TF).

1.1 Product Variants

1.1.1 Standard ACQ435ELF Module

Channels connected via a 68 Way VHDCI on the Carrier Front Panel.

- ACQ435ELF-32FF : 24 bit resolution, 32 channels Voltage Mode inputs, ±10 V Range.
- ACQ435ELF-32FF-5V : 24 bit resolution, 32 channels Voltage Mode inputs, ±5 V Range.
- ACQ435ELF-24FF[2] : 24 bit resolution, 24 channels Voltage Mode inputs, ±10 V Range.
- ACQ435ELF-16FF[2] : 24 bit resolution, 16 channels Voltage Mode inputs, ±10 V Range.
- ACQ435ELF-16FF-5V[2] : 24 bit resolution, 16 channels Voltage Mode inputs, ±5 V Range.
- ACQ435ELF-24TF-8FF[2] : 24 bit resolution, 24 channels Current Mode inputs; 8 channels Voltage Mode inputs.

1.1.2 ACQ435ELF-FFC Module - ACQ2X06 Only

Channels connected via 2 FFC connectors to a Transition module on the front panel. Current Transition module support is for 2 x DSUB 37 way connectors per ADC module. Note: Restrictions apply on D37 Front panel see Section 2.3.

- ACQ435ELF-32FF-FFC : 24 bit resolution, 32 channels Voltage Mode inputs, ±5V Range.

1.2 Applications

- Instrumentation applications, control and monitoring.
- Acoustic and seismic applications.
- LF Radar.

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 ACQ1002 : D-TACQ dual 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

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

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

2 Physical

2.1 Module Outline

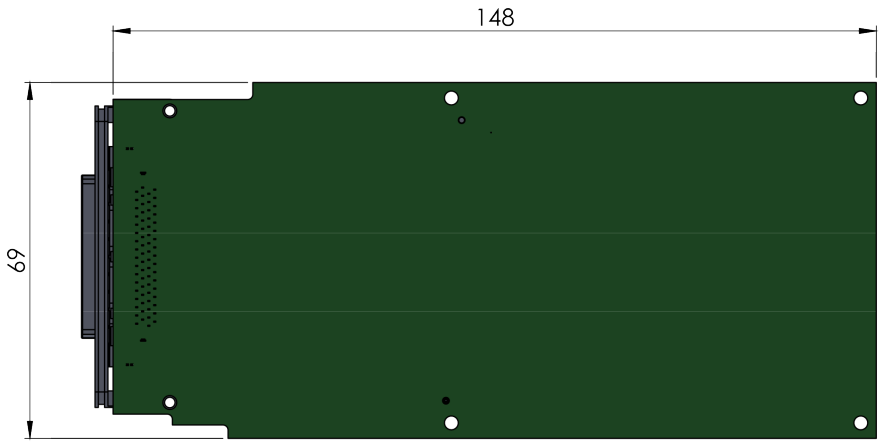


Figure 1: Module Outline

2.2 Appearance

The picture below shows the ACQ435ELF module with the 68 Way VHDCI Connector:

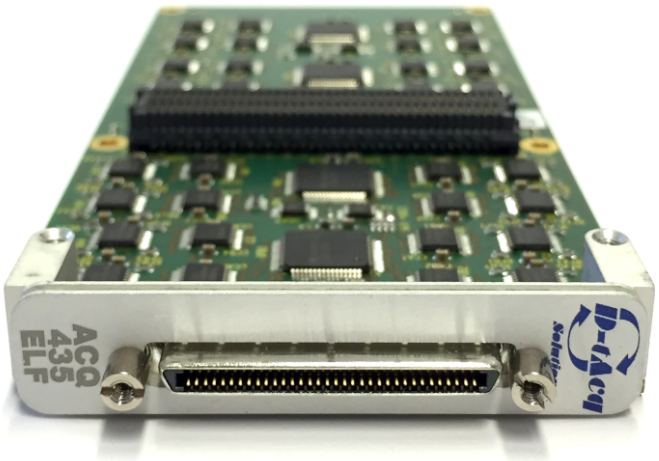


Figure 2: ACQ435ELF module Appearance

2.3 Example: D37 Front Panel connection

The picture below shows the front panel for the ACQ435ELF-32FF-FFC module connected to the D37 transition module in the 1U Single Height Configuration:

Figure 3: ACQ435ELF FFC D37 Front Panel

FFC version allows for a custom front panel. Please contact info@d-tacq.com for details.

3 Front Panel Connector & Pinout

3.1 ACQ435ELF Front Panel Connector

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

Note:

- -32 variant uses entire BNCPANEL as expected.
- -24 variant uses BNCPANEL CH01..CH12, CH21..CH32.
- -16 variant uses BNCPANEL CH01..CH08, CH25..CH32.

3.2 ACQ435ELF-FFC Front Panel – ACQ2X06 Only

D37 Front Panel is available in two configurations:

- 1U Single Height D37 up to 96 channels with ADC boards in Sites 1,3,5.
- 2U Double Height D7 up to 192 channels with ADC boards in Sites,1,2,3,4,5,6.

Each 32 channel ADC module has 2x D37 Way connectors

3.3 32 Channel Voltage Input VHDCI Pinout

Pin	Function	Pin	Function
1	0V	35	0V
2	0V	36	0V
3	AI01+	37	AI01-
4	AI02+	38	AI02-
5	AI03+	39	AI03-
6	AI04+	40	AI04-
7	AI05+	41	AI05-
8	AI06+	42	AI06-
9	AI07+	43	AI07-
10	AI08+	44	AI08-
11	AI09+	45	AI09-
12	AI10+	46	AI10-
13	AI11+	47	AI11-
14	AI12+	48	AI12-
15	AI13+	49	AI13-
16	AI14+	50	AI14-
17	AI15+	51	AI15-
18	AI16+	52	AI16-
19	AI17+	53	AI17-
20	AI18+	54	AI18-
21	AI19+	55	AI19-
22	AI20+	56	AI20-
23	AI21+	57	AI21-
24	AI22+	58	AI22-
25	AI23+	59	AI23-
26	AI24+	60	AI24-
27	AI25+	61	AI25-
28	AI26+	62	AI26-
29	AI27+	63	AI27-
30	AI28+	64	AI28-
31	AI29+	65	AI29-
32	AI30+	66	AI30-
33	AI31+	67	AI31-
34	AI32+	68	AI32-

Table 1: 32 Channel Voltage Input VHDCI Pinout

3.4 24 Channel Voltage Input VHDCI Pinout

Pin	Function	Pin	Function
1	0V	35	0V
2	0V	36	0V
3	AI01+	37	AI01-
4	AI02+	38	AI02-
5	AI03+	39	AI03-
6	AI04+	40	AI04-
7	AI05+	41	AI05-
8	AI06+	42	AI06-
9	AI07+	43	AI07-
10	AI08+	44	AI08-
11	AI09+	45	AI09-
12	AI10+	46	AI10-
13	AI11+	47	AI11-
14	AI12+	48	AI12-
15	nc	49	nc
16	nc	50	nc
17	nc	51	nc
18	nc	52	nc
19	nc	53	nc
20	nc	54	nc
21	nc	55	nc
22	nc	56	nc
23	AI21+	57	AI21-
24	AI22+	58	AI22-
25	AI23+	59	AI23-
26	AI24+	60	AI24-
27	AI25+	61	AI25-
28	AI26+	62	AI26-
29	AI27+	63	AI27-
30	AI28+	64	AI28-
31	AI29+	65	AI29-
32	AI30+	66	AI30-
33	AI31+	67	AI31-
34	AI32+	68	AI32-

Table 2: 24 Channel Voltage Input VHDCI Pinout

3.5 16 Channel Voltage Input VHDCI Pinout

Pin	Function	Pin	Function
1	0V	35	0V
2	0V	36	0V
3	AI01+	37	AI01-
4	AI02+	38	AI02-
5	AI03+	39	AI03-
6	AI04+	40	AI04-
7	AI05+	41	AI05-
8	AI06+	42	AI06-
9	AI07+	43	AI07-
10	AI08+	44	AI08-
11	nc	45	nc
12	nc	46	nc
13	nc	47	nc
14	nc	48	nc
15	nc	49	nc
16	nc	50	nc
17	nc	51	nc
18	nc	52	nc
19	nc	53	nc
20	nc	54	nc
21	nc	55	nc
22	nc	56	nc
23	nc	57	nc
24	nc	58	nc
25	nc	59	nc
26	nc	60	nc
27	AI25+	61	AI25-
28	AI26+	62	AI26-
29	AI27+	63	AI27-
30	AI28+	64	AI28-
31	AI29+	65	AI29-
32	AI30+	66	AI30-
33	AI31+	67	AI31-
34	AI32+	68	AI32-

Table 3: 16 Channel Voltage Input VHDCI Pinout

3.6 24 Channel Current Input, 8 Channel Voltage Input VHDCI Pinout

Pin	Function	Pin	Function
1	0V	35	0V
2	0V	36	0V
3	AI01 I	37	AI01 I RTN (0V)
4	AI02 I	38	AI02 I RTN (0V)
5	AI03 I	39	AI03 I RTN (0V)
6	AI04 I	40	AI04 I RTN (0V)
7	AI05 I	41	AI05 I RTN (0V)
8	AI06 I	42	AI06 I RTN (0V)
9	AI07 I	43	AI07 I RTN (0V)
10	AI08 I	44	AI08 I RTN (0V)
11	AI09 I	45	AI09 I RTN (0V)
12	AI10 I	46	AI10 I RTN (0V)
13	AI11 I	47	AI11 I RTN (0V)
14	AI12 I	48	AI12 I RTN (0V)
15	AI13+	49	AI13-
16	AI14+	50	AI14-
17	AI15+	51	AI15-
18	AI16+	52	AI16-
19	AI17+	53	AI17-
20	AI18+	54	AI18-
21	AI19+	55	AI19-
22	AI20+	56	AI20-
23	AI21 I	57	AI21 I RTN (0V)
24	AI22 I	58	AI22 I RTN (0V)
25	AI23 I	59	AI23 I RTN (0V)
26	AI24 I	60	AI24 I RTN (0V)
27	AI25 I	61	AI25 I RTN (0V)
28	AI26 I	62	AI26 I RTN (0V)
29	AI27 I	63	AI27 I RTN (0V)
30	AI28 I	64	AI28 I RTN (0V)
31	AI29 I	65	AI29 I RTN (0V)
32	AI30 I	66	AI30 I RTN (0V)
33	AI31 I	67	AI31 I RTN (0V)
34	AI32 I	68	AI32 I RTN (0V)

Table 4: 24 Channel Current Input, 8 Channel Voltage Input VHDCI Pinout

3.7 FFC to D37 Front Panel

Figure 4: Example Fitted to ACQ2106 Carrier, 96 channels in 1U

Figure 5: Front View of ACQ2106 Carrier, 96 channels in 1U

The pinout of the connectors on the D37 panel is given in the tables below:

Pin	Function	Pin	Function
1	AI01+	20	AI01-
2	AI02+	21	AI02-
3	AI03+	22	AI03-
4	AI04+	23	AI04-
5	AI05+	24	AI05-
6	AI06+	25	AI06-
7	AI07+	26	AI07-
8	AI08+	27	AI08-
9	AI09+	28	AI09-
10	AI10+	29	AI10-
11	AI11+	30	AI11-
12	AI12+	31	AI12-
13	AI13+	32	AI13-
14	AI14+	33	AI14-
15	AI15+	34	AI15-
16	AI16+	35	AI16-
17	nc	36	nc
18	nc	37	0V
19	0V		

Table 5: D37 Front Panel 1-16 Connector Pinout

Pin	Function	Pin	Function
1	AI17+	20	AI17-
2	AI18+	21	AI18-
3	AI19+	22	AI19-
4	AI20+	23	AI20-
5	AI21+	24	AI21-
6	AI22+	25	AI22-
7	AI23+	26	AI23-
8	AI24+	27	AI24-
9	AI25+	28	AI25-
10	AI26+	29	AI26-
11	AI27+	30	AI27-
12	AI28+	31	AI28-
13	AI29+	32	AI29-
14	AI30+	33	AI30-
15	AI31+	34	AI31-
16	AI32+	35	AI32-
17	nc	36	nc
18	nc	37	0V
19	0V		

Table 6: D37 Front Panel 17-32 Connector Pinout

For custom front panel. Please contact info@d-tacq.com for details.

4 Electrical Specification

The table below is for the 32 Voltage Input signals:

#	Parameter	Value
1	Number of Channels	8
2	Sample Rate Hi-Speed Mode Hi-Resolution Mode	Per channel simultaneous 125 kHz 52 kHz
3	Resolution	24 bits
4	Coupling	DC, Differential Input
5	Input Impedance	1 MΩ
6	Input Voltage Range	±10 V Standard ±5 V FF-5V Version
7	Input Voltage Withstand	±30 V
8	Offset Error	0.01% FS with numerical calibration
9	Gain Error	0.01% FS with numerical calibration
10	INL	±0.002% FS
11	Analog Input BW	80 kHz
12	CMRR	> 60 dB FS @ 1 kHz
13	Crosstalk	< 90 dB @ 1 kHz FS Input
14	THD[1]	-106 dB
15	SFDR[1]	107 dBc
16	SNR Hi-Speed Mode[1] Hi-Resolution Mode[1]	 104 dB 108 dB
17	Digital Filter:Pass Band Digital Filter:3dB Digital Filter:Stop Band Digital Filter:Attenuate	0.453 Fsample 0.490 Fsample 0.547 Fsample 95 dB

[1] Typical values measured at full scale with a 8kHz input

Table 7: ACQ435ELF Electrical Performance

Please contact info@d-tacq.com for details of Current Mode Inputs.

5 Mechanical,Power & 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	Standard ELF D-TACQ Ultra Low Pin Count ULPC

Table 8: Mechanical & Environmental Specification

Revision History

Revision	Date	Author(s)	Description
6	January 2015	PJ	First Full Release
7	June 2021	JMcL	Added ±5 V version detail
8	March 2023	JMcL	Added FFC version and D37 Pinout
9	July 2024	JMcL	Hi-Speed sample rate reduced to 125 kSPS
10	February 2025	JMcL	Updated Format