

ACQ435ELF Product Specification



High Performance Simultaneous Data Acquisition

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1 Product Description

1. **ACQ435ELF** is a 32 channel, 24 bit simultaneous analog input module.
2. Standard configuration : 32 channels, 128kSPS/channel.
3. Extended module with *FMC* connector and *FMC* front panel.
4. 2-wire Differential inputs, high quality differential amplifier front end.
5. Factory set input function: Follower (voltage input) or Transimpedance (current input). Since the input is differential, there are 4 possible configurations, however only two are used:
 - FF : Both buffers in Follower configuration.
 - TF : Positive side buffer in Transimpedance configuration.
 - FF is the default and is implied.

1.1 Product Variants

1.1.1 Standard ACQ435ELF Board

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

- **ACQ435ELF-32FF** : 24 bit resolution, 128kSPS/channel, 32 channels + follower, - follower inputs.
- **ACQ435ELF-32FF-5V** : 24 bit resolution, 128kSPS/channel, 32 channels + follower, - follower inputs, +/-5V Input Range.
- **ACQ435ELF-24TF-8FF §** : 24 bit resolution, 128kSPS/channel, 24 channels + transimpedance, - follower inputs; 8 channels + follower, - follower inputs.
- **ACQ435ELF-24FF §** : 24 bit resolution, 128kSPS/channel, 24 channels + follower, - follower inputs.
- **ACQ435ELF-16FF §** : 24 bit resolution, 128kSPS/channel, 16 channels + follower, - follower inputs.
- **ACQ435ELF-16FF-5V §** : 24 bit resolution, 128kSPS/channel, 16 channels + follower, - follower inputs, +/-5V Input Range.
- § Special build, MOQ and/or longer lead time may apply.

1.1.2 ACQ435ELF-FFC Board - ACQ2X06 Only

Channels connected via 2 FFC connectors to a Transition board on the front panel.

Current Transition board support is for 2 x DSUB 37 way connectors per ADC Board.

Note: Restrictions apply on D37 Front panel see Section 3.2

- **ACQ435ELF-32FF-FFC** : 24 bit resolution, 128kSPS/channel, 32 channels + follower, - follower inputs. +/-5V Input Range

For 8 channel applications, consider **ACQ430FMC**.

1.2 Applications

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

1.3 Overview

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.

Compatible carriers include:

- D-TACQ **ACQ1001** : D-TACQ single slot FMC carrier, Z7020
- D-TACQ **ACQ1002** : D-TACQ dual slot FMC carrier, Z7020
- D-TACQ **ACQ2106** : D-TACQ 6 slot FMC carrier, Z7030
- **DAMC-Z7IO + ACQ400RTM2** : 2 slot ELF carrier, Z7030
 - Up to 64 channels, 2x VHDCI connectors.
- Diamond Light Source **PandABox**, ZYNQ 7030 with single ELF site
 - Up to 32 channels, 1x VHDCI connector.

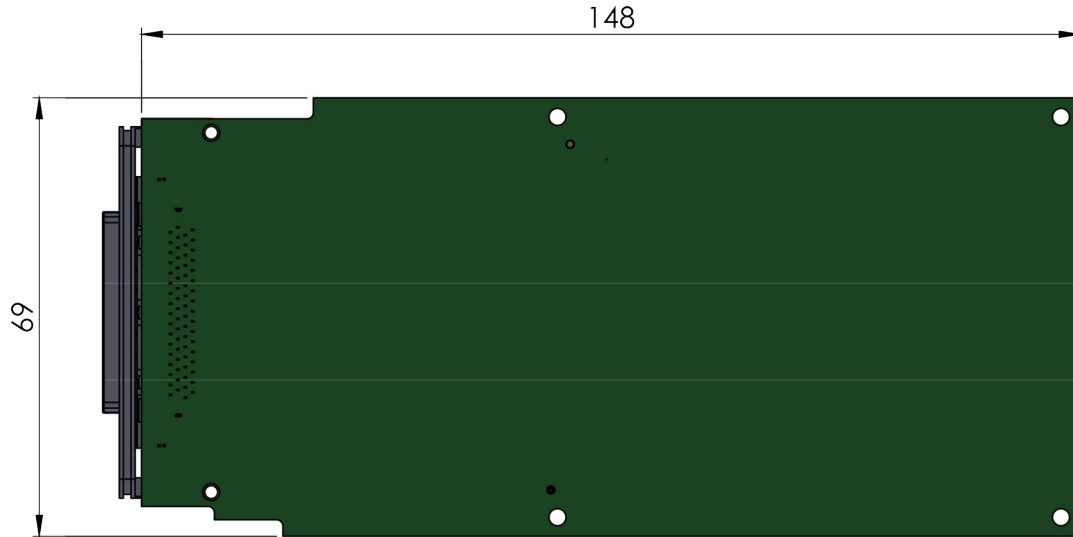
D-TACQ supplies a complete working Intelligent Digitizer appliance including programmable logic and microprocessor system running Linux.

1.4 Glossary

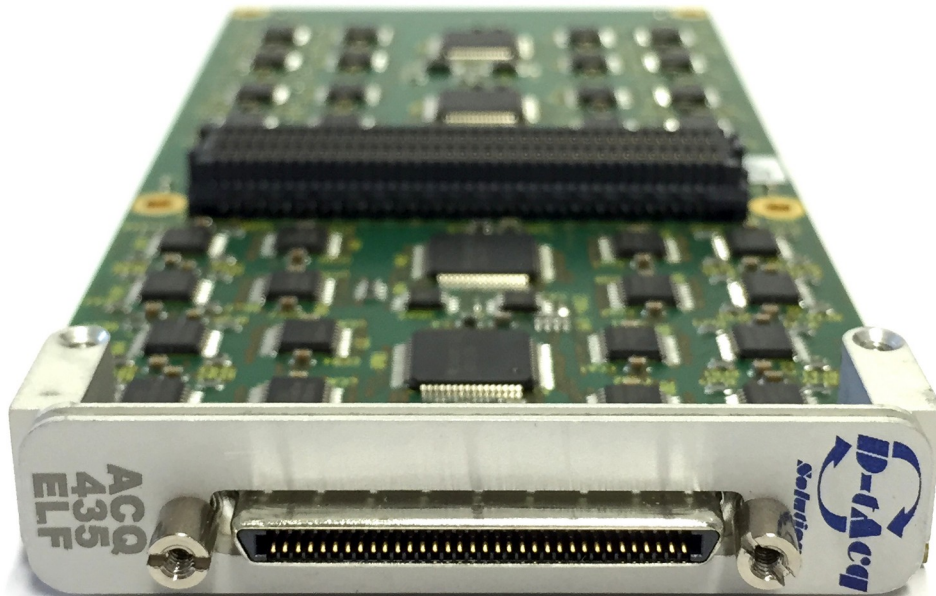
- FMC: [VITA57 FPGA Mezzanine Card](#).
- ELF: D-TACQ extension to FMC, elongated card with provision for dedicated analog power supply rails.
- [Xilinx ZYNQ Soc](#)
- LPC: FMC Low pin count wiring standard.
- ULPC: FMC/ELF Ultra low pin count (D-TACQ).

2 Physical

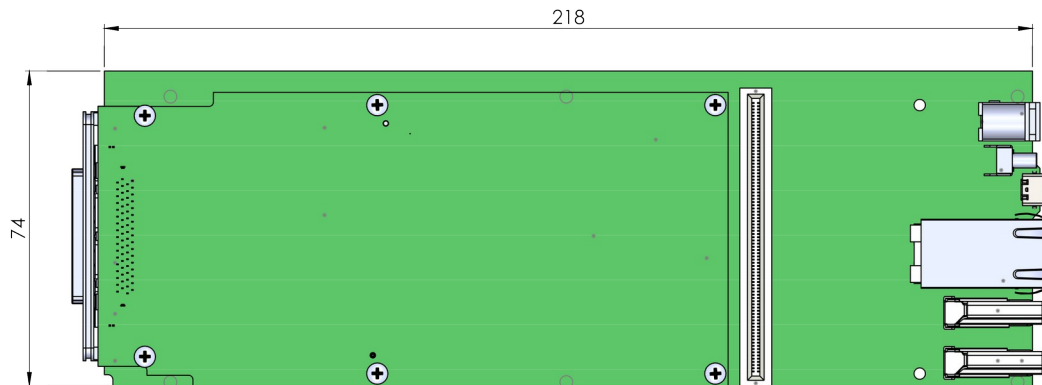
2.1 Extended ELF Module



2.2 Appearance



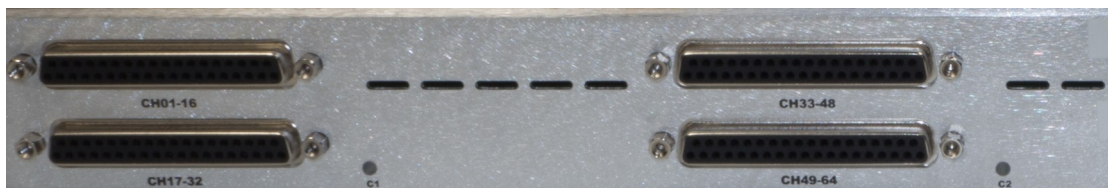
2.3 Example: Fitted to ACQ1001 Carrier



Carrier accommodates 1 x ELF e.g. *ACQ435ELF* or a standard size FMC module such as *ACQ420FMC* or *AO420FMC*.

2.4 Example: D37 Front Panel connection

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



3 Interface Specification.

3.1 ACQ435ELF Front Panel Connector

- 68 Pin VHDCI
- Pinout compatible with D-TACQ BNCPANEL, SMAPANEL, LEMOPANEL, PTBPANEL.

NB:

-32 variant uses entire BNCPANEL as expected.

-24 variant uses BNCPANEL CH01..CH12, CH21..CH22

-16 variant uses BNCPANEL CH01..CH08, CH25..CH32

3.2 ACQ435ELF-FFC Front Panel – ACQ2106 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 board has 2x D37 Way connectors

3.3 VHDCI 32 Channel Pinout

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

3.4 VHDCI 24 Channel Pinout

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

3.5 VHDCI 16 Channel Pinout

Input Configuration Key	Follower	Transimpedance
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Pin	Variant	Pin	Variant
	16FF		16FF
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		45	
12		46	
13		47	
14		48	
15		49	
16		50	
17		51	
18		52	
19		53	
20		54	
21		55	
22		56	
23		57	
24		58	
25		59	
26		60	
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-

3.6 D37 16(32) Channel Pinout

The 2 D37 way connectors have the following pinout – the first 16 channels in black the second 16 channels in **blue**

<i>Pin</i>	<i>Function</i>	<i>Pin</i>	<i>Function</i>
1	AI01+ AI17+	20	AI01- AI17-
2	AI02+ AI18+	21	AI02- AI18-
3	AI03+ AI19+	22	AI03- AI19-
4	AI04+ AI20+	23	AI04- AI20-
5	AI05+ AI21+	24	AI05- AI21-
6	AI06+ AI22+	25	AI06- AI22-
7	AI07+ AI23+	26	AI07- AI23-
8	AI08+ AI24+	27	AI08- AI24-
9	AI09+ AI25+	28	AI09- AI25-
10	AI10+ AI26+	29	AI10- AI26-
11	AI11+ AI27+	30	AI11- AI27-
12	AI12+ AI28+	31	AI12- AI28-
13	AI13+ AI29+	32	AI13- AI29-
14	AI14+ AI30+	33	AI14- AI30-
15	AI15+ AI31+	34	AI15- AI31-
16	AI16+ AI32+	35	AI16- AI32-
17	nc nc	36	nc nc
18	nc nc	37	0V 0V
19	0V 0V		

nc = No Connect

4 ACQ435ELF Electrical Specification.

#	Parameter	Value
1	Number of Channels	32
2	Sample Rate High Speed Mode High Resolution Mode	Per channel simultaneous 128 kHz 52 kHz
3	Resolution	24 bits
4	Coupling	DC, Differential Input
5	Input Impedance	1M Ω
6	Input Voltage Range	$\pm 10V$ Standard FF Version $\pm 5V$ FF-5V Version
7	Input Voltage Range including Common Mode Voltage	$\pm 12.5V$ Standard FF Version $\pm 6.5V$ FF-5V Version**
8	Input Voltage Withstand	$\pm 30V$
9	Offset Error	0.01% FS with numerical calibration
10	Gain Error	0.01% FS with numerical calibration
11	INL	$\pm 0.002\%$ FS
12	CMRR	>60dB FS @ 1 kHz
13	THD	-106 dB*
14	SFDR	107 dBc*
15	SNR High Speed Mode High Resolution Mode	104 dB* 108 dB*
16	Analog Input BW	80kHz
17	Crosstalk	<90dB @ 1kHz FS Input
18	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

* Typical values measured at full scale with a 9.76kHz input

** The Input range of the FF-5V version can be extended to +/-8V when the Analog Power Supply is set to +/-13V

5 ACQ435ELF Specification

#	Parameter	Value
1	Form Factor	D-TACQ Standard ELF
2	Power source	D-TACQ ELF Module - Please contact us if details are required.
3	Environmental	0°C-50°C Operational -10°C-85°C Non-Operational
4	FMC Socket	Standard ELF D-TACQ Ultra Low Pin Count ULPC