ACQ465ELF

32 Channel Simultaneous Analog Input Module

Product Description

- 32 Channels of Simultaneous Analog input
- 24 bit resolution up to 374 kSPS
- 16 bit resolution from 374 kSPS to 1 MSPS
- High SNR typical > 95 dB

Module Key Features

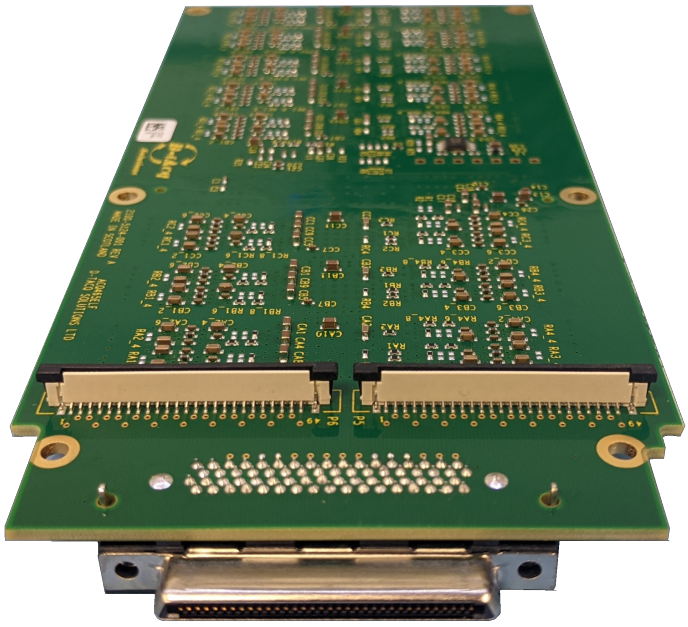
- Ideal for Instrumentation applications, control and monitoring
- Compatible with all D-TACQ Carriers offering up to 192 channels in a 1U 19” system
- Wide range of triggering and capture modes
- Compatible with a range of D-TACQ Breakout Panels and Termination Modules
- Internal FFC connectors for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



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1 Product Description

1. ACQ465ELF is a 32 channel, 24-bit simultaneous, analog input module, implemented with the AD4134 ADC with extremely good SNR
2. Standard configuration, 32 channels :
   - Sample rate up to 374 kSPS per channel, 24-bit
   - Sample rate up to 1 MSPS per channel, 16-bit
3. Device includes many features including programmable filters
4. Extended module with FMC connector and FMC front panel
5. 2-wire differential voltage inputs. High quality differential amplifier front end
6. Front panel connector: VHDCI or FFC (for local interconnect)
   - VHDCI compatible with D-TACQ range of termination panels
   - FFC compatible with 2xD37 front panel and facilitates custom transitions
7. -HR version, best possible SNR from the AD4134 ADC

1.1 Product Variants

- HR optimised for highest resolution
  - ACQ465ELF-32-HR-8V : 24-bit resolution, 32 channels, ± 8V inputs
  - ACQ465ELF-32-HR-4V : 24-bit resolution, 32 channels, ± 4V inputs

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
- Quantum Detector PandABox, ZYNQ 7030 with single ELF site. Please contact info@d-tacq.com for details

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

2 Physical

2.1 Board Outline

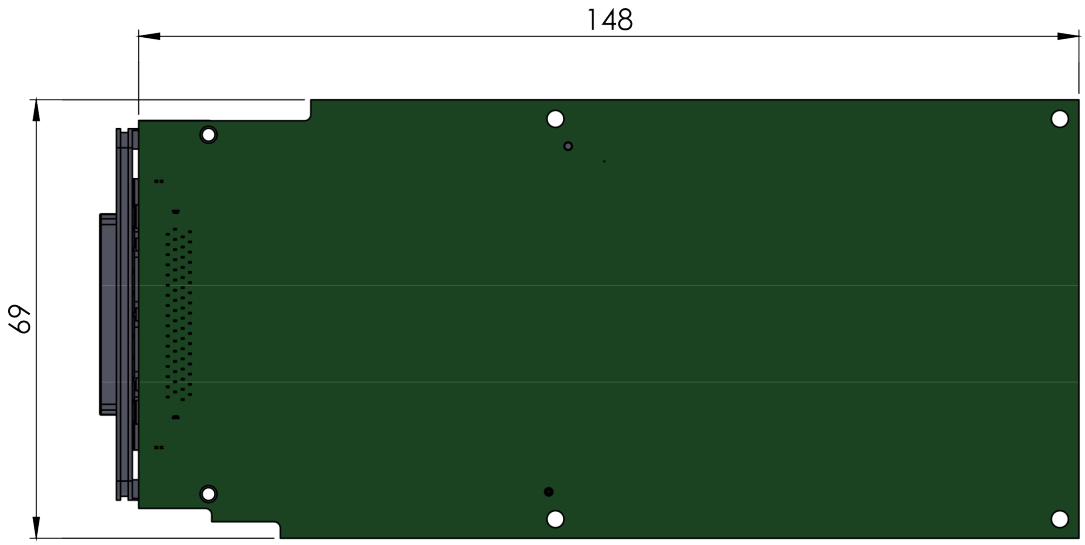

Figure 1: Board Outline

2.2 Appearance

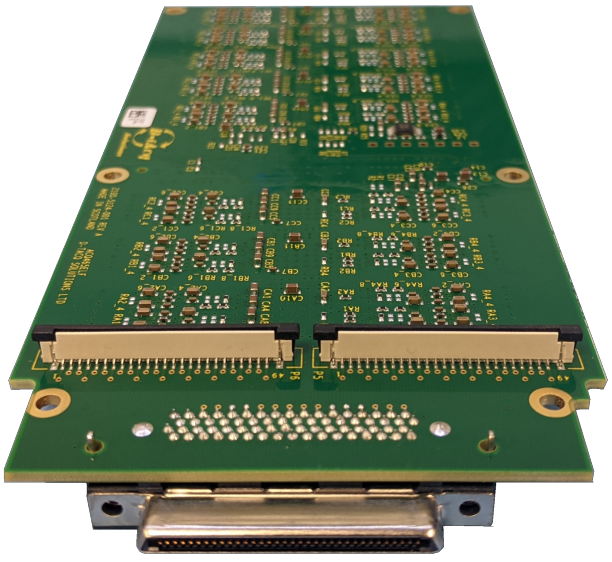

Figure 2: Board Photo

2.3 Front Panel Connectors

Figure 2 shows the duplicate front panel connector options

2.3.1 VHDCI

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

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: Front Panel VHDCI Connector Pinout

2.3.2 VHDCI 16CH (32CH Depopulated)

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	AI09+	61	AI09-
28	AI10+	62	AI10-
29	AI11+	63	AI11-
30	AI12+	64	AI12-
31	AI13+	65	AI13-
32	AI14+	66	AI14-
33	AI15+	67	AI15-
34	AI16+	68	AI16-

Table 2: Front Panel VHDCI 16CH Connector Pinout

2.3.3 Flexible Flat Cable - FFC

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

3 Digital Filters

Filter Name	-3 dB BW (Hz)	Sample Rate Range	Description
Sinc3	0.2617 x Fsample	0.01 to 1200 kSPS	Fast settling
Sinc6	0.1861 x Fsample	0.01 to 1200 kSPS	Balancing settling with rejection
Wideband 0.433	0.433 x Fsample	2.5 to 374 kSPS	Wideband low ripple filter
Wideband 0.108	0.433 x Fsample	2.5 to 374 kSPS	Wideband low ripple filter with lower bandwidth

Table 3: Digital Filters

Full filter definitions can be found in the ADC datasheet for the AD4134.

4 Electrical Specification

4.1 24-bit Mode

#	Parameter	Value
1	Number of Channels	32
2	Sample Rate (Max)	374 kHz, per channel simultaneous
3	Resolution	24-bit
4	Coupling	DC, Differential Input
5	Input Impedance	1 MΩ
6	Input Voltage Range	See Section 1.1
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	±2 ppm of FS
11	Analog Input BW	See Digital Filters
12	CMRR	> 60 dB FS @ 1 kHz
13	Crosstalk	< 90 dB @ 1 kHz FS Input
14	THD	-100 dB
15	SFDR	115 dBc
16	SNR[1] ACQ465ELF-32-HR Filter: Wideband 374 kHz Sample Rate	100 dB

[1] With a full-scale 8 kHz signal

Table 4: ACQ465ELF 24-bit Electrical Performance

4.2 16-bit Mode

#	Parameter	Value
1	Number of Channels	32
2	Sample Rate (Max)	1 MHz, per channel simultaneous
3	Resolution	16-bit
4	Coupling	DC, Differential Input
5	Input Impedance	1 MΩ
6	Input Voltage Range	See Section 1.1
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	±2 ppm of FS
11	Analog Input BW	400 kHz front-end, constrained by Digital Filters
12	CMRR [1]	> 60 dB FS @ 1 kHz
13	Crosstalk	< 90 dB @ 1 kHz FS Input
14	THD	-98 dB
15	SFDR	115 dBc
16	SNR[1] ACQ465ELF-32-HR Filter: Sinc3 (0.2617) 1 MHz Sample Rate	94 dB

[1] With a full-scale 8 kHz signal

Table 5: ACQ465ELF 16-bit Electrical Performance

5 Mechanical & Environmental Specification

#	Parameter	Value
1	Form Factor	Long ELF
2	Power Consumption	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	ELF (ULPC)

Table 6: Mechanical & Environmental Specification

Revision History

Revision	Date	Author(s)	Description
1.0	21/04/2021	SR	Created
2.0	10/09/2023	SR	Formatting updates
3.0	03/06/2025	SR	Update for board Rev A06, update images