

ACQ423ELF Product Specification



High Performance Simultaneous Data Acquisition

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Subject to change

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Revision History

Revision	Date	Author(s)	Description
1	17/08/2018	JMcL	Initial Version
2	03/10/2019	JMcL	minor updates
3	07/10/2020	JMcL	Update to Single Ended Input Range
4	26/10/2023	JMcL	Updated to current template, updated carrier support

Glossary

- FMC : VITA57.1 FPGA Mezzanine Card
- ELF : Electrically Extended FMC, implies ULPC or DULPC (only compatible with D-TACQ carriers)
- LPC : FMC Low Pin Count standard as per VITA57.1
- ULPC : Subset by D-TACQ, Ultra Low Pin Count
- DULPC : Subset by D-TACQ, Differential Ultra Low Pin Count (ULPC with extra differential signalling)
- Xilinx ZYNQ System on Chip (SoC)
- FPGA : Field Programmable Gate Array

1 Product Description

1. ACQ423ELF is a minimum cost 32 channel simultaneous analog input module, intended to replace obsolete high channel count digitizers operating in the range 10..200kHz.
2. Standard configuration : 32 channels, 200kSPS/channel, 16 bit, differential, fixed bandwidth 100kHz.
3. Software channel masking for higher sample rate, options:
 - 32 Channels Enabled, Fs = 200ksps.
 - 16 Channels Enabled, Fs = 350ksps.
4. Front end tolerates significant continuous overvoltage. Transient suppression is provided for VHDCI via transition panel eg BNCPANEL
5. 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. please contact info@d-tacq.com for details

1.1 Product Variants

- ACQ423ELF-32-200-16 32 channels, 200kSPS/ch 16 bit resolution with VHDCI Front Panel Connector
- ACQ423ELF-32-200-16-FFC 32 channels, 200kSPS/ch 16 bit resolution with FFC Connector. This is ordered in conjunction with custom front panel i.e D37

1.2 Applications

- Instrumentation applications, control and monitoring

1.3 Carrier Compatibility

The FMC module standard adds user IO to carrier modules fitted with FPGA resource. D-TACQ recommends modules based on the Xilinx ZYNQ system on chip, combining FPGA resource with ARM CPU and Gigabit Ethernet.

The ELF module standard is a D-TACQ standard and is compatible with only D-TACQ Carriers.

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
- D-TACQ ACQ2206 : D-TACQ 6 slot FMC carrier, Z7030
- D-TACQ ACQ1102 : D-TACQ 2 slot FMC carrier, Z7030
- DAMC-FMC1Z7IO + D-TACQ ACQ400-MTCA-RTM-2
- Quantum Detectors PandABox, ZYNQ 7030 with single ELF site. Please contact info@d-tacq.com for details

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

2 Physical

2.1 Board Outline

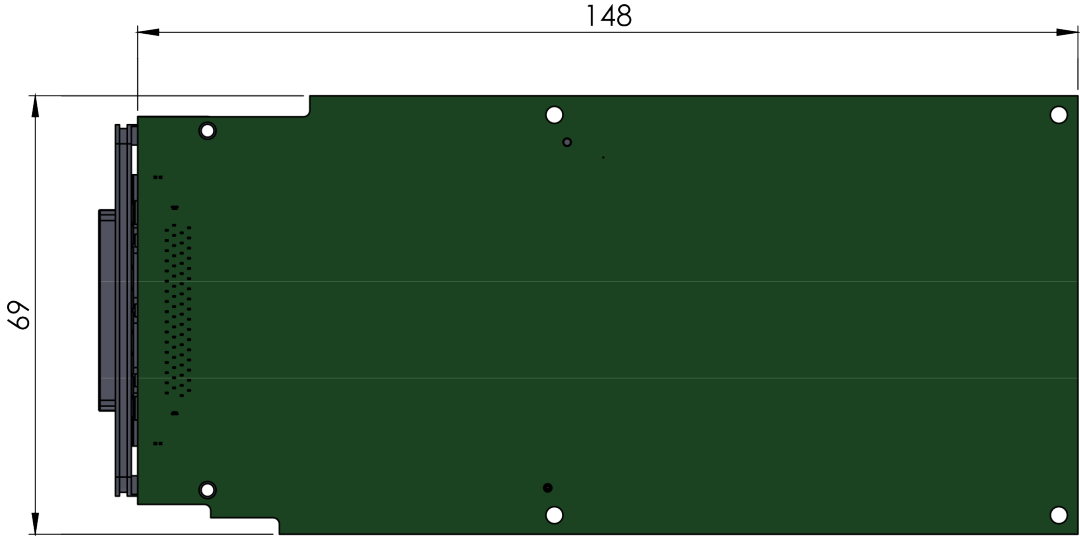


Figure 1: Board Outline

2.2 Appearance with VHDCI Connector

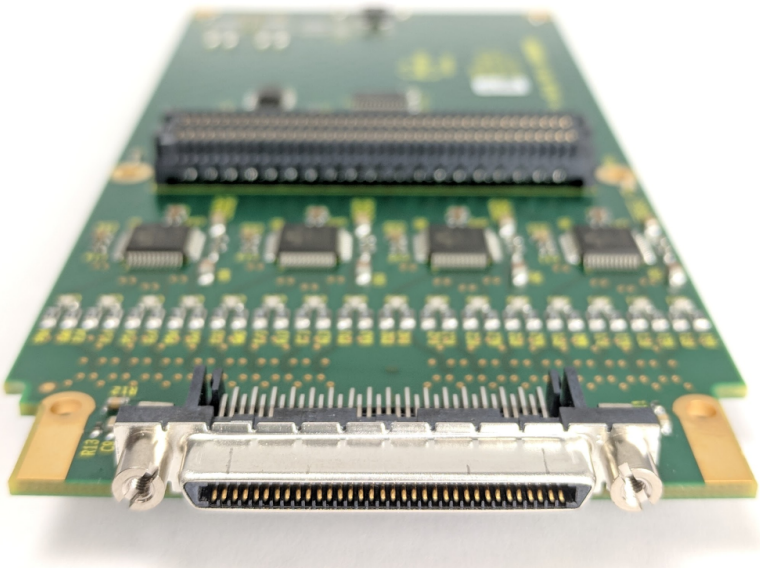


Figure 2: Board Photo

2.3 Front Panel Connectors

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 Flexible Flat Cable - FFC

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

The example below shows the FFC version fitted with a custom D37 Front panel



Figure 3: Example Fitted to ACQ2106 Carrier, 96 channels in 1U



Figure 4: Front View of ACQ2106 Carrier, 96 channels in 1U

3 Electrical Specification

#	Parameter	Value
1	Number of Channels	32
2	Sample Rate (Max)	200 kHz / 32 channels, 350 kHz / 16 channels, per channel simultaneous
3	Resolution	16-bit
4	Coupling	DC, Differential Input
5	Input Impedance	> 1 M Ω
6	Input Voltage Range	$\pm 10V$, $\pm 5V$, 0-10V, 0-5.12V ¹
7	Input Voltage Withstand	$\pm 40V$ ²
8	Offset Error	0.01% FS with numerical calibration
9	Gain Error	0.01% FS with numerical calibration
10	INL	± 1 LSB
10	DNL	± 1 LSB
11	Analog Input BW	130kHz
12	Small Signal BW	200kHz
13	CMRR	> 60 dB FS @ 1 kHz
14	Crosstalk	< 95 dB @ 1 kHz FS Input
15	THD	-90 dB ³
16	SINAD	-84 dB ³
17	SFDR	100 dBc ³
18	SNR ⁴	90 dB ³
19	Temperature Stability	<25ppm/ $^{\circ}C$

¹ Input Full Scale may saturate below the Input Range span by up to 0.1%

² Maximum Continuous, up to $\pm 100V$ transient

³ Typical values measured at full scale with an 8.9 kHz input

⁴ $\pm 10V$ Input Range

Table 2: ACQ423ELF Electrical Performance

4 Mechanical & Environmental Specification

#	Parameter	Value
1	Form Factor	Long ELF
2	Power Consumption	Typical 2.5W, Max 3.5W
3	Environmental	0 $^{\circ}C$ - 50 $^{\circ}C$ Operational -10 $^{\circ}C$ - 85 $^{\circ}C$ Non-Operational
4	Mezzanine Socket	ELF (ULPC)

Table 3: Mechanical & Environmental Specification