AO424ELF

32 Channel Simultaneous Analog Output Module

Product Description

- 16/32 Channels of Simultaneous Analog output
- Update rate of 500 kSPS/channel for 32 channel option and 1 MSPS/channel for 16 channel option
- 16 bit resolution
- -LLC with higher frequency reconstruction filter to optimise step response in control applications

Module Key Features

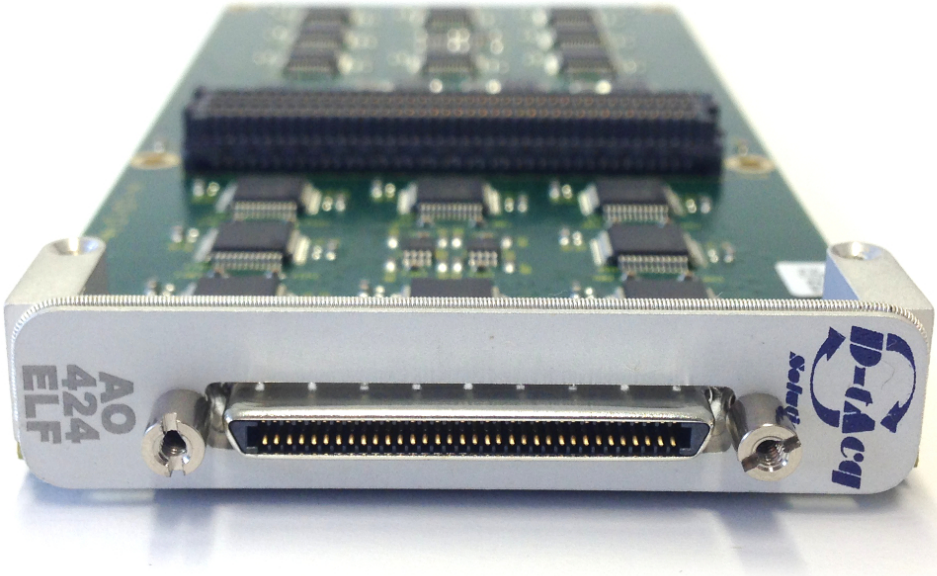
- Instrumentation applications, control and monitoring
- Compatible with all D-TACQ Carriers
- Range of output modes. DC levels, AWG

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. AO424ELF is a 32 channel simultaneous analog Output module.
2. Standard configuration : 32 channels, 500kSPS/channel.
3. 16 channels, 1 MSPS/channel version.
4. Extended module with FMC connector and VHDCI front panel connector.
5. ±10V per channel 20mA drive; with ±5V and ±2.5V soft-selectable options.
6. Standard reconstruction filter at 50 kHz. Also available in a Low-Latency Control configuration at 250 kHz. Please contact info@d-tacq.com for custom options.
7. DC and AWG modes.

1.1 Product Variants

- AO424ELF : 32 channels, 16 bit resolution, 500 kSPS/channel, 50 kHz Butterworth Reconstruction Filter.
- AO424ELF-LLC : 32 channels, 16 bit resolution, 500 kSPS/channel„ 250 kHz Bessel Reconstruction Filter.
- AO424ELF-16 : 16 channels, 16 bit resolution, 1 MSPS/channel, 50 kHz Butterworth Reconstruction Filter.
- AO424ELF-16-LLC : 16 channels, 16 bit resolution, 1 MSPS/channel„ 250 kHz Bessel Reconstruction Filter.

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 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 Physical

2.1 Module Outline

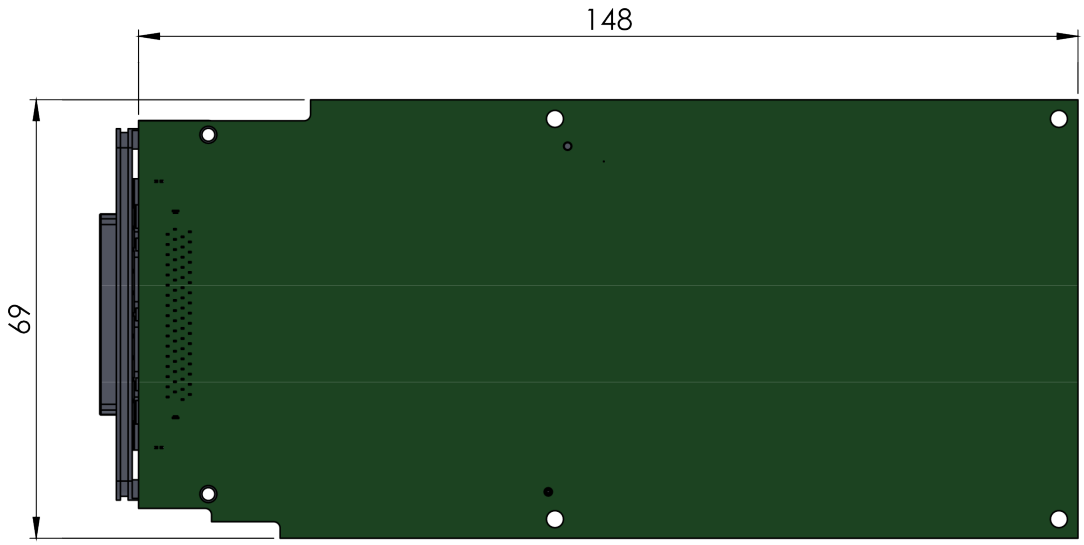

Figure 1: Module Outline

2.2 Appearance

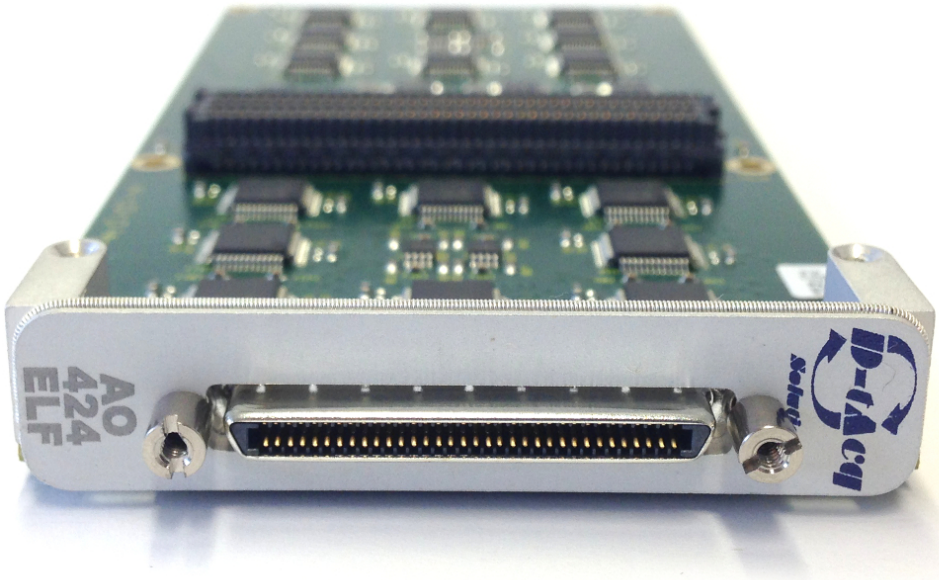

Figure 2: Module Photo

2.3 Front Panel VHDCI Connector

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

2.3.1 Pinout 32 Channel

Pin	Function	Pin	Function
1	0V	35	0V
2	0V	36	0V
3	AO01+	37	0V
4	AO02+	38	0V
5	AO03+	39	0V
6	AO04+	40	0V
7	AO05+	41	0V
8	AO06+	42	0V
9	AO07+	43	0V
10	AO08+	44	0V
11	AO09+	45	0V
12	AO10+	46	0V
13	AO11+	47	0V
14	AO12+	48	0V
15	AO13+	49	0V
16	AO14+	50	0V
17	AO15+	51	0V
18	AO16+	52	0V
19	AO17+	53	0V
20	AO18+	54	0V
21	AO19+	55	0V
22	AO20+	56	0V
23	AO21+	57	0V
24	AO22+	58	0V
25	AO23+	59	0V
26	AO24+	60	0V
27	AO25+	61	0V
28	AO26+	62	0V
29	AO27+	63	0V
30	AO28+	64	0V
31	AO29+	65	0V
32	AO30+	66	0V
33	AO31+	67	0V
34	AO32+	68	0V

Table 1: 32 Channel VHDCI Connector Pinout

2.3.2 Pinout 16 Channel

- 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	AO1+	37	0V
4	0V	38	0V
5	AO2+	39	0V
6	0V	40	0V
7	AO3+	41	0V
8	0V	42	0V
9	AO4+	43	0V
10	0V	44	0V
11	AO5+	45	0V
12	0V	46	0V
13	AO6+	47	0V
14	0V	48	0V
15	AO7+	49	0V
16	0V	50	0V
17	AO8+	51	0V
18	0V	52	0V
19	AO9+	53	0V
20	0V	54	0V
21	AO10+	55	0V
22	0V	56	0V
23	AO11+	57	0V
24	0V	58	0V
25	AO12+	59	0V
26	0V	60	0V
27	AO13+	61	0V
28	0V	62	0V
29	AO14+	63	0V
30	0V	64	0V
31	AO15+	65	0V
32	0V	66	0V
33	AO16+	67	0V
34	0V	68	0V

Table 2: 16 Channel VHDCI Connector Pinout

3 Electrical Specification

#	Parameter	Value
1	Number of Channels	16/32
2	Sample Rate	32: 500 kSPS 16: 1 MSPS
3	Resolution	16 bit
4	Coupling	DC, Single-ended Output
5	Maximum output current	20 mA per channel 200 mA total
6	Output Voltage Range	±10 V ±5 V ±2.5 V
7	Output Impedance	50 Ω
8	Offset Error	0.01% FS with numerical calibration
9	Gain Error	0.01% FS with numerical calibration
10	INL	±2 LSB
11	DNL	±1 LSB
12	THD	-92 dB
13	SINAD	87 dB
14	SFDR	93 dBc
15	SNR	88 dB
16	Reconstruction Filter BW (-3dB)	50 kHz Standard [250 kHz -LLC Option]
17	Amplifier Slew Rate	2.5 V/us
18	Crosstalk	<90 dB @ 1 kHz FS Output
19	Temperature Stability	<25ppm/°C

Table 3: AO424ELF Electrical Performance

4 Mechanical & Environmental Specification

#	Parameter	Value
1	Form Factor	D-TACQ Standard 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	D-TACQ ELF Ultra Low Pin Count ULPC

Table 4: Mechanical & Environmental Specification

Revision History

Revision	Date	Author(s)	Description
5	March 2020	JMcL	Last Release of Previous Format
6	February 2025	JMcL	Updated Format