# ACQ480FMC

4/8 Channel Simultaneous Analog Input Module

## Product Description

- 4/8 Channels of Simultaneous Analog input
- Up to 80 MSPS/channel sample rate
- 14-bit resolution
- Input Voltage Ranges: ±1V or ±2.5V
- Programmable High Impedance or 50 Ω termination
- High SNR typical 72 dB

## Module Key Features

- Ideal for high speed Instrumentation applications including Radar, Radio Reflectometry, and High Speed Ultrasound
- Compatible with all D-TACQ Carriers
- Fully compliant with VITA-57, FMC-LPC
- Wide range of triggering and capture modes
- Internal UFL 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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sales@d-tacq.com
www.d-tacq.com

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# 1 Product Description

1. ACQ480FMC is a 4 or 8 channel simultaneous analog input module.
2. Standard configuration 8 channels, maximum ADC sample rate of 80 MSPS/channel, 14-bit resolution.
3. Bipolar Single Ended input front end, input voltage ranges of ±1V to ±2.5V.
4. Input bandwidth to 20MHz, higher for reduced voltage input.
5. TTL Sample Clock and Trigger Inputs (FMC Version).

## 1.1 Product Variants

- ACQ480FMC: ±2.5V input voltage range, MMCX inputs.
- ACQ480FMC-1V: ±1V input voltage range, MMCX inputs.
- ACQ480ELF-LFP: ±2.5V input voltage range, 4x Single Pin LEMO inputs + 4x UFL coaxial cable inputs.
- ACQ480ELF-LFP-1V: ±1V input voltage range, 4x Single Pin LEMO inputs + 4x UFL coaxial cable inputs.
- ACQ480ELF-LFP-UFL: ±2.5V input voltage range, 8x UFL coaxial cable inputs.

ACQ480ELF-LFP provides 4 channels of Single Pin LEMO Input on the front panel, 4 channels are available on UFL cables for connection to a “Top Deck” Module, see Section 2.2 for an example Front Panel.

## 1.2 Product Overview

The product is intended to be used as an oversampling digitizer. Single, or 2 cascaded FIR digital filters provide tight control of bandwidth with strong anti-aliasing. Filtering includes both ADC based filters and FPGA based filtering in D-TACQ Carriers and covers many combinations. Please contact info@d-tacq.com for more information on this.

## 1.3 Applications

- Radar, Radio Reflectometry.
- High speed ultrasound and diagnostics.

## 1.4 Carrier Compatibility

The FMC module standard, 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.

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

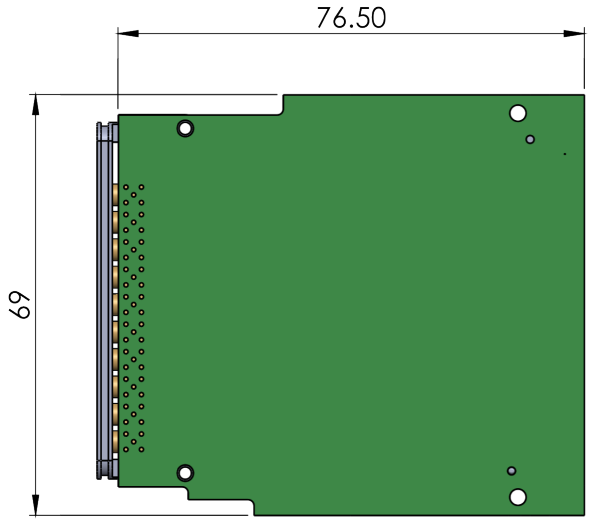


Figure 1: Module Outline

## 2.2 Appearance of LFP Version


Figure 2: LFP Module with front panel fitted in ACQ1001Q

## 2.3 Front Panel Connectors

### 2.3.1 ACQ480FMC MMCX

All inputs both digital and analog are standard MMCX Connectors, connectors fitted are TE 1634010-01 or equivalent.

All Digital Inputs are +5V TTL Compatible inputs.

### 2.3.2 ACQ480FMC-LFP LEMO

All connectors are single-pin LEMO 00 Series Mini Coax connector part EPL.00.250.NTN. Mating plugs should be compatible with this part.

The ACQ480FMC-LFP-UFL version allows the used of custom Front Panels using UFL coaxial connectors to the Front Panel, please contact info@d-tacq.com for details.

# 3 Electrical Specification

| # | Parameter | Value |
|---|---|---|
| 1 | Number of Channels | 4/8 |
| 2 | Sample Rate[1] | Up to 80 MHz, per channel simultaneous |
| 3 | Resolution | 14-bit |
| 4 | Coupling | DC, Single-Ended Input |
| 5 | Input Impedance | 100 kΩ, 50 Ω - Software switchable |
| 6 | Input Voltage Range[2] | ±2.5 V<br>±1 V |
| 7 | Input Voltage Withstand | ±30 V |
| 8 | Offset Error | ±3 mV |
| 9 | Gain Error | ±2 mV |
| 10 | INL | ±2.2 LSB |
| 11 | DNL | ±0.5 LSB |
| 12 | THD | 80 dBc |
| 13 | SINAD | 71 dBc |
| 14 | SFDR | 85 dBc |
| 15 | SNR | 72 dB |
| 16 | Power BW (-3dB) | 15 MHz @ 5 Vpp Standard ±2.5 V variant)<br>40 MHz @ 2 Vpp ±1 V variant |
| 17 | Small Signal BW | 80MHz |
| 18 | Crosstalk | < 100 dB @ 100 kHz FS Input<br><90 dB @ 5 MHz FS Input |
| 19 | Temperature Stability | < 25 ppm/°C |

[1] Max ADC Frequency, decimating FIR filter reduces stored data rate. Please contact info@d-tacq.com for details
[2] See Product Variants Section 1.1

Table 1: ACQ480FMC Electrical Performance

# 4 Mechanical & Environmental Specification

## 4.1 ACQ480FMC Mechanical & Environmental Specification

| # | Parameter | Value |
|---|---|---|
| 1 | Form Factor | Standard FMC |
| 2 | Power Consumption | 12V, 100 mA<br>3.3V, 500 mA |
| 3 | Supported VADJ | Min 1.8V, Max 3.3V |
| 4 | Environmental | 0 °C - 50 °C Operational<br>−10 °C - 85 °C Non-Operational |
| 5 | Mezzanine Socket | Standard FMC, Low Pin Count LPC |

Table 2: Mechanical & Environmental Specification

# Revision History

| Revision | Date | Author(s) | Description |
|---|---|---|---|
| 5 | October 2018 | JMcL | Product Release Version |
| 6 | February 2025 | JMcL | Updates for latest product variants |