SMT-FMC116 Digitizer FMC Module

1. Introduction
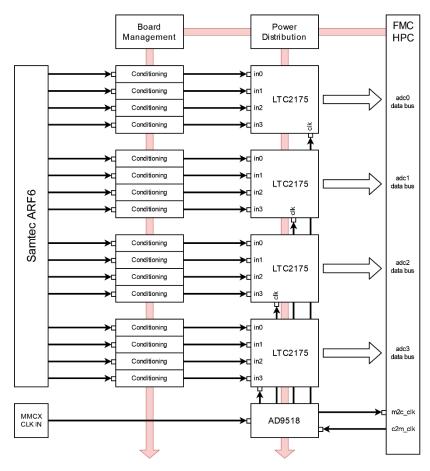

Figure 1 General Block Diagram of SMT-FMC116

The SMT-FMC116 is an FMC digitiser module equipped with one, two, three or four [LTC217x](LTC217x) ADCs with speeds up to 125Msps @ 14-bit resolution. It uses an HPC FMC connector and complies with ANSI/VITA 57.1. The simplified block diagram is presented in Figure 1.

In addition to ADCs, it is equipped with a clock distribution unit, which allows the selection of sampling clocks based on several clock sources (front panel input, FMC input or internal clock reference) and additional functional elements such as board management/monitoring and power distribution.

2. ADC and Analog Input Path

The LTC2175-14/LTC2174-14/LTC2173-14 are 4-channel, simultaneous sampling 14-bit A/D converters designed for digitising high frequency, wide dynamic range signals. The digital outputs are serial LVDS (with optional internal termination) to minimise the number of data lines. Each channel outputs two bits at a time (2-lane mode), resulting in data rates of up to 1 Gbps on a single data lane. The receiver used on the carrier must be able to accommodate such a data stream.

Analog Input path consists of a true differential operational amplifier for DC-coupled version or transformer for AC-coupled one. In both cases, the accepted input signal levels are 2 Vpp. The analogue input bandwidth on board is limited to 100 MHz (> Nyquist frequency).

3. Input Connectors

The board is equipped with several input connectors to provide interfaces for the user. This includes:

a. Clock

SMA connector dedicated for single-ended external input clock. The signal can be routed (via clock distribution unit) to ADCs (as main clock) and to user application level via dedicated pins of the HPC FMC connector.

b. Trigger

SMA connector for external trigger input – the signal is buffered and connected to the FMC connector for use on the user application level.

c. Analog Input

Samtec's ACCELERATE® ARF6-RA Right Angle connector connects analogue signals to the board. The connector and the mating cable provide sufficient analogue performance. The selection of break-out boards offered by Sundance allows easy integration with any user application/system.

4. Power Distribution

All internal power supplies are derived from 12V and 3.3V FMC, using high-performance, low-noise DC/DC converters and LDOs. The board does not limit VADJ supply voltage to fit a wide range of carrier boards on the market.

5. Board Management

Board management consists of standard elements required by FMC specification (ID EPROM and Power management interface) extended by additional temperature sensors on the management I2C bus for constant monitoring with over-temperature protection.

6. FMC Interface

The board uses HPC FMC with the fastest lines running at 1 Gbps (ADC data lines). 4-channels and 8-channels version is also compatible with the LPC interface, however, *Power Good Monitoring* and *c2m_clk lines* are unavailable for user application.

7. Parameters

Electrical	Unit	Min	Typ	Max
12PV0	Volt	11.4	12	12.6
3P3V	Volt	3.135	3.3	3.465
VADJ	Volt	0	1.5-3.3	3.465
3P3VAUX	Volt	3.135	3.3	3.465
Analog Input	**Unit**	**Min**	**Typ**	**Max**
Level	Volt Peak-Peak	-	2	-
Bandwidth	MHz	-	100	-
Digital IO	**Unit**	**Min**	**Typ**	**Max**
LVDS				
differential	mV	247	350	454
common mode	Volt	1.125	1.250	1.375
Single-Ended				
high level	V	0.7x VADJ	VADJ	VADJ
low level	V	0	-	0.6
Clock Input	**Unit**	**Min**	**Typ**	**Max**
Input Voltage				
high level	V	-	-	3
low level	V	0.35	-	-
Fmax	MHz	-	-	3000
Trigger Input	**Unit**	**Min**	**Typ**	**Max**
Input Swing	V	0.1	-	1
Input Frequency	MHz	-	-	1000

8. Ordering Information & EUP Price in £, excl. ARF6 cables

SMT-FMC116-8-65-14-AC-I   **£2295**
Two LTC2172 @ 65MHz and 14-bit resolution, AC coupling and Industrial Grade

SMT-FMC116-8-80-14-AC-I   **£2325**
Two LTC2173 @ 80MHz and 14-bit resolution, AC coupling and Industrial Grade

SMT-FMC116-8-125-12-AC-C   **£2315**
Two LTC2175 @ 125MHz and 12-bit resolution, AC coupling and Commercial Grade

SMT-FMC116-8-125-14-AC-I   **£2670**
Two LTC2175 @ 125MHz and 14-bit resolution, AC coupling and Industrial Grade

SMT-FMC116-16-65-14-AC-I   **£3055**
Four LTC2172 @ 65MHz and 14-bit resolution, AC coupling and Industrial Grade

SMT-FMC116-16-80-14-AC-I   **£3120**
Four LTC2173 @ 80MHz and 14-bit resolution, AC coupling and Industrial Grade

SMT-FMC116-16-125-12-AC-C   **£3100**
Four LTC2175 @ 125MHz and 12-bit resolution, AC coupling and Commercial Grade

SMT-FMC116-16-125-14-AC-I   **£3815**
Four LTC2175 @ 125MHz and 14-bit resolution, AC coupling and Industrial Grade

Matrix:
Generic Part Number
Channels [count]: 4, 8 or 16
Sampling Frequency [MHz]: 65,80,105 or 125
Resolution [bits]: 12,14
Coupling [type]: AC, DC
Temperature Range [Celsius]: I = -40°C to 85°C & C = 0°C to 70°C
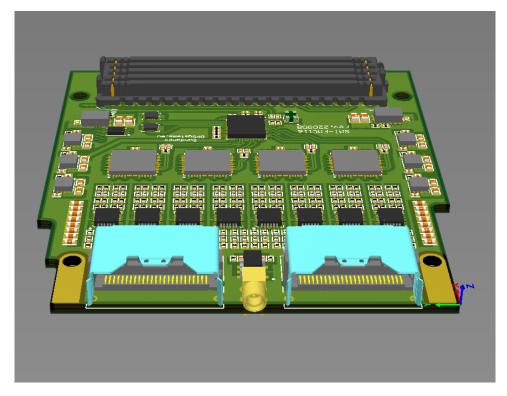
9. Images

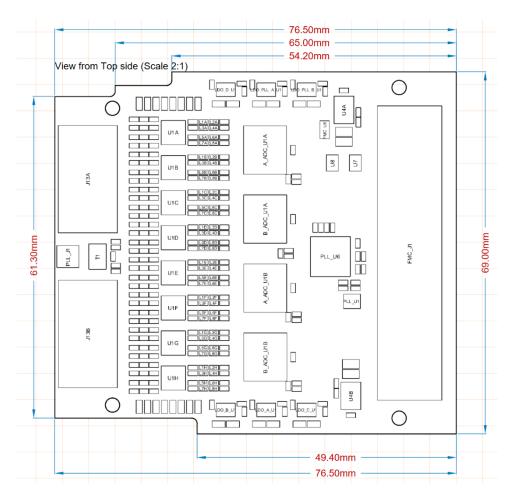*Figure 2 - SMT-FMC116 – Outline for illustration - Prototype*

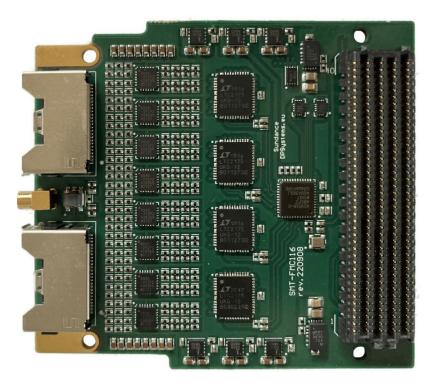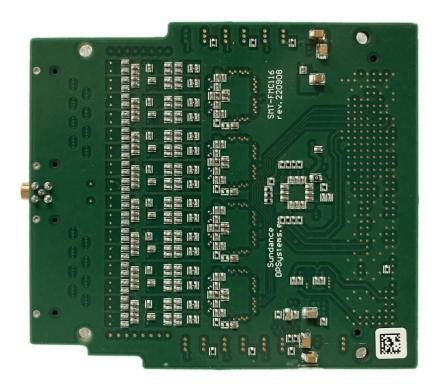*Figure 3 - SMT-FMC116 Components Placement – Prototype*

Figure 4 - SMT-FMC116 Top View Photo

Figure 5 - SMT-FMC116 Bottom View Photo