



FmcAdc100M14b4ch_a

Shortened Spec

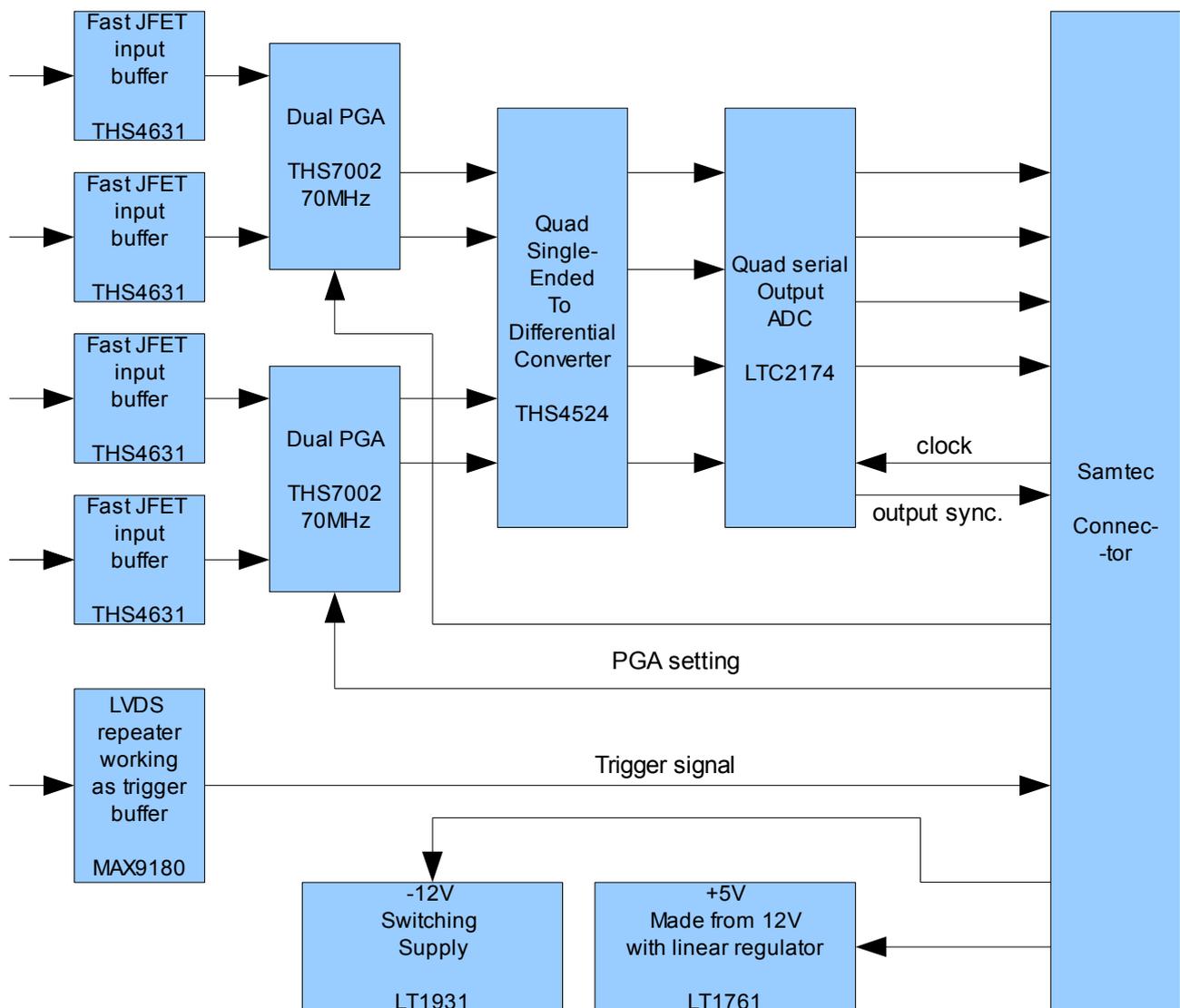
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Abstract

FmcAdc100M14b4ch_a is a 4 channel 14 bit 100MS/s ADC board with internal/external triggering
in FMC (FPGA Mezzanine Card) standard

1. Block diagram



2. Description

- Input sockets

SMA type sockets are used here. They are chosen because of the price and the popularity. JOHNSON/EMERSON – 142-0701-301¹ type is used because of its dimensions (especially height) which fits to the standard.

¹ <http://ch.farnell.com/johnson-emerson/142-0701-301/rf-coaxial-connector/dp/1164408?Ntt=142-0701-301>

- Fast JFET input opamp

It is possible to use opamp existing in shown below PGA structure. It was decided to skip this amplifier and replace it with the external opamp because of:

- it's slew rate parameter which is not large enough. GBW of the amplifier is wide, but not great slew rate ($85\text{V}/\mu\text{s}$) will cause problems if large signal appears at the input,
- internal opamp has large polarisation current, therefore input impedance and input offset will be worsen.

JFET-based opamp is harder to break down by static electricity than opamp based on the CMOS technology. THS4631² type is fast enough, it is unity gain stable and can be powered from $\pm 12\text{V}$, so no attenuator at the input is needed.

- PGA

As a PGA, THS7002³ is used. It's bandwidth is independent on the gain, and the gain can be easily set in the range of 1 to 128 (from -22dB to 20dB). In fact there is no alternative choice in the market. One part includes two PGAs, so taken amount of place in the board is reduced. PGA is used in the inverting configuration to get the proper gain range. Preceding buffer is needed because PGA's low input impedance (in this configuration) and because impedance will vary while changing gain.

- Single-ended to differential converter

This part is needed here because of ADC's differential input. The THS4524 is chosen because all needed converters are put into one package, it is fast enough, it's noise level is small. It is used in the inverting configuration (therefore whole amplifier will not invert signal).

² <http://www.ti.com/lit/gpn/th4631>

³ <http://www.ti.com/lit/gpn/th7002>

- ADC

Reasons of choosing LTC2174⁴:

- proper sampling speed (up to 105MSPS)
- including four ADCs in one package
- serial output interface – do not needs many pins to communicate with carrier board, low-pin-count connector can be used.

- Trigger receiver

The MAX9180⁵ is used here. This component is a LVDS repeater, but it can be used as single-ended to differential converter. It is fast enough (400Mbps) and it's added jitter is low.

- Power supply

Power supply regulators needs to be stable, efficient, easy to use and have ot deliver proper current to the loading. Switching supply should work with high chopping frequency, therefore proper filtration is easier. LT1931⁶ and LT1761⁷ is used here.

4 <http://cds.linear.com/docs/Datasheet/21754312f.pdf>

5 <http://datasheets.maxim-ic.com/en/ds/MAX9180.pdf>

6 <http://cds.linear.com/docs/Datasheet/1931fa.pdf>

7 <http://cds.linear.com/docs/Datasheet/1761sfe.pdf>