MicroLAB Systems

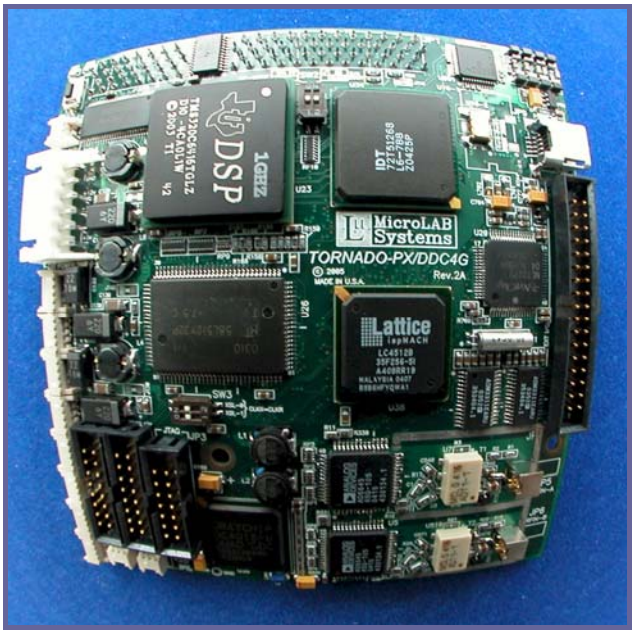
Ultimate DSP Development Solutions

TORNADO-PX/DDC4G rev.2x

Quad Channel Multi-Standard 105 MSPS Digital Radio Receiver Coprocessor/Controller for TORNADO DSP Boards and Stand-alone Applications

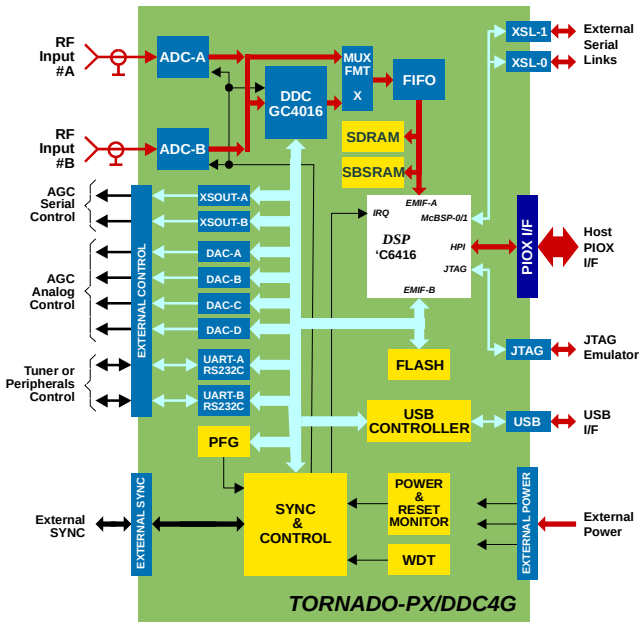
general features

- digital radio coprocessor for all *TORNADO* DSP boards plugs into the 32-/16-bit PIOX daughter-card module (DCM) site
- stand-alone operation with external power for embedded DRR applications
- complete quad channel multi-standard digital radio receiver solution with on-board ultra-high performance DSP requires only external RF tuners and I/F amplifiers
- a variety of on-board I/O peripherals offers easy interfacing to external peripherals and/or external host PC
- multi-board expansion for multi-channel data acquisition and multi-DSP signal processing



details

- *two 105 MSPS 14-bit ADC* [1] with 250 MHz bandwidth and undersampling feature, overflow and peak-level detectors
- TI/Graychip GC4016 quad-channel multi-standard DDC with input cross-bar switch
- quad-channel FIFO with input data multiplexer/formatter acquires and unpacks either ADC or DDC output data streams
- programmable MASTER/SLAVE data acquisition controller with external synchronization allows to synchronize data acquisition processes and DDC operation at multiple boards
- *low phase noise programmable sampling frequency generator with high frequency stability and ultra-high frequency resolution* [1]
- quad 16-bit DACs for analog AGC of external I/F amplifiers, headpones control and general purpose analog output
- two software configured serial output ports for digital AGC of external I/F amplifiers
- four general purpose I/O pins
- ultra-high performance *1 GHz TMS320C6416 32-bit fixed-point DSP* [1] with on-chip 1Mbyte RAM and Viterbi/Turbo decoders
- up to 1Mx32 SBSRAM and up to 32Mx32 SDRAM external DSP memory for local data
- *up to 8Mx8 FLASH* [1] for DSP boot code and/or non-volatile data
- DSP can start with either no boot or boot from FLASH or HPI
- communication between host *TORNADO* on-board DSP and *TORNADO-PX/DDC4G* on-board DSP via HPI port
- two 384 kBaud UARTs with RS232C interface for external tuner control and/or connection to external peripherals
- *USB 2.0 480 Mbit/s device interface* [1] for communication with external host PC in stand-alone operation
- two external serial links for external communication and connection to external SIOX rev.B DCM
- multi-board DSP-to-DSP communication via external serial links with *TORNADO-PX/DDC4G* and *TORNADO-PX64xxQ* quad-DSP coprocessors for multi-channel data processing
- external power/reset monitor and watchdog timer
- stand-alone operation



'C64xx DSP software development tools

- JTAG port for MicroLAB Systems *MIRAGE* and TI XDS emulators
- TI C6000 Code Composer Studio Compile/Debug tools

applications

- multi-channel digital radio receivers
- multi-channel cellular telephony
- security systems

Notes:

1. Highlighted features in the 'Details' list specifies enhanced product features versus TORNADO-PX/DDC4G rev.1A.

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Technical Specifications

A/D channels	2
A/D resolution	14 bits
input A/D signal range	±1 V @ 50 Ohm, either OPA or RF transformers at RF inputs
input signal bandwidth	10 kHz … 150 MHz (OPA input) 200kHz … 250MHz (RF transformer input)
A/D nonlinearity	±0.25 LSB differential nonlinearity (typ) ±0.5 LSB integral nonlinearity (typ)
A/D SNR	72 dB typ
ADC sampling frequency	234kHz .. 105 MHz
ADC sampling frequency source	- from on-board high-resolution sampling frequency generator (PFG) - from external sampling frequency input (LVDS)
A/D signal level control	4-level peak-level detectors and overflow detector for each A/D channel
DDC	TI/Graychip GC4016 quad-channel multi-standard DDC chip with built-in 4:1 input data stream multiplexer, data formatter, NCO, decimator, and resampler for each channel
DDC output signal bandwidth	2MHz max per channel (four channels involved) 4MHz max per channel (two channels involved) 8MHz max (one channel involved)
FIFO	quad-channel with either 32Kx32, or 64Kx16, or 128Kx8 (rev.2B only) per channel
Data Acquisition Controller	continuous pass-thru or one-pass mode, MASTER/SLAVE operation
DDC inter-channel synchronization and board-to-board synchronization	from DSP software, DDC synchro-output, or external synchro-inputs (LVDS)
PFG frequency resolution	< 0.1 Hz
PFG frequency stability	±2 ppm (standard and super-low phase noise option) ±50 ppm (ultra-low phase noise options)
PFG phase noise	standard: -85dBc/Hz @ 100Hz, -105dBc/Hz @ 1kHz, -115dbc/Hz @ 10kHz, -135dBc @ 1MHz, super- and ultra-low phase noise options are available
RF radiation minimization	optional
XDAC channels	4 (XDAC-A, XDAC-B, XDAC-C, XDAC-D)
XDAC resolution	16 bits
XDAC output signal output range	Unipolar (0..+2.5v) or bipolar (± 2.5v) @ 600 Ohm
XDAC settling time	10 us
AGC serial outputs	2
communication parameters for AGC serial outputs	software configured as 8/16/24/30-bit serial data output, inversed frame synchronization, programmable polarity of serial clock, serial clock framing feature
number of UART channels	2
UART interface and baud rate	RS232C, maximum 384 kBaud (all standard baud rates are available)
USB interface	USB 2.0 480 Mbit/s device interface
DSP type, performance	1GHz (8000 MIPS) 32-bit fixed-point TI TMS320C6416 DSP with on-chip Viterbi and Turbo Decoders
DSP bootmodes	no boot, boot from FLASH, boot from HPI
on-board SBSRAM capacity	128K/512K/1M x32
on-board SDRAM capacity	4M/16M/32M x32
on-board FLASH capacity	512K/1M/4M/8M x8
general purpose I/O (GPIO)	4 bits (3v/5v TTL, 3.2 mA)
host TORNADO PIOX interface	automatically detected and host software selected either 32-bit PIOX-32 or 16-bit PIOX-16
power consumption	5 V @ 1.3A, +12 V @ 70 mA, -12v @ 70 mA

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