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Model 4271

4-Ch. 4-Input Narrowband Digital Receiver MIX Module



Features

- Sampling rates to 70 MHz
- One to four channels
- 70 dB dynamic range
- 0.26 Hz tuning resolution
- Compatible A/D's available, Series 64xx

Ordering Information

Model	Description
4271	4-Channel 4-Input Digital Receiver MIX module
Options:	
-010	TTL diff. inputs, RS-422
-012	ECL diff. inputs (full-depth module, see p. 118)
-013	4261 TTL inputs
-020	8 ksample FIFO
-021	16 ksample FIFO

General Information

Model 4271 is a general purpose digital receiver/tunable bandpass filter MIX module for VMEbus workstations and embedded systems. It accepts 12-bit data at sampling rates up to 70 MHz on 1 to 4 channels. Narrowband data is extracted from the wideband input by digital down conversion to a lowpass band. The low pass signal is then filtered and decimated.

Operating Principle

Each data channel of the module uses a highly integrated digital receiver chip, containing a tunable local oscillator, a mixer and a tunable low pass filter. The local oscillator frequency and the filter cutoff frequency are independently programmable for each channel over the MIX interface. As a result, each channel can be separately configured for its own input data with the appropriate sampling rate. The same digital data may be fed into all four channels, in order to simultaneously extract up to four different frequency bands.

Applications

These MIX modules provide an effective way to create powerful digital signal processing and analysis systems for selected frequency bands. For example, a 4-channel 150 MFLOP signal processing receiver can be assembled to perform band-selectable FFT analysis, by utilizing a Model 4271, a Model 6472 70 MHz A/D Converter, a Model 4284 'C40 Processor Baseboard, and a Model 4257 Dual 'C40 Coprocessor.

Specifications

Digital input format: 12-bit words, 2's complement (Graychip GC1011A); one sample clock line

Input level: TTL single-ended; optionally TTL differential RS-422, ECL differential

Sampling rate: DC to 70 MHz max

Local oscillator: direct digital synthesizer; frequency = $F*f_S/2^{28}$, where F is a 28-bit binary integer and f_S is the input sample rate

Tuning range: DC to $f_S/2$ (35 MHz for f_S = 70 MHz)

Tuning resolution: $f_S/2^{28}$ (~0.26 Hz for f_S = 70 MHz)

Low pass filter: decimating FIR programmed by 14-bit integer D, from 16 to 16,384; nominal output Nyquist bandwidth $f_N = f_S/4D$; output sampling rate is $f_S/4D$ for complex outputs and $f_S/2D$ for real outputs

Filter response: programmable 70 dB or 50 dB stopband attenuation at $1.2f_N$ where f_N is Nyquist frequency

	70 dB	50 dB
–3 dB bandwidth	$0.8f_N$	$0.9f_N$
±0.2 dB ripple BW	$0.7f_N$	–
±0.4 dB ripple BW	–	$0.8f_N$

Real mode: 16-bit real output samples at sampling rate $f_S/2D$

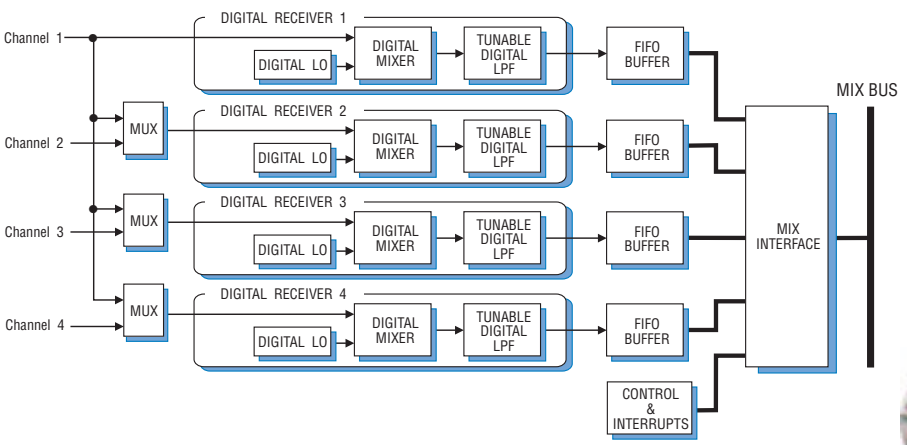
Complex mode: 16-bit complex (I and Q) output samples at sampling rate $f_S/4D$

Control registers: 16, 8 bits/register; memory-mapped over the MIX bus - Frequency (4 registers, 28 bits), Sync Mode, Output Mode, Filter Mode, Gain, Output Status, Decimation Frequency D (2 registers, 16 bits)

FIFO: 1k x 16 expandable to 16k x 16 bits per channel; interrupts at full, half-empty and empty

Power: 3.0 A at +5 V from the MIX bus

Block Diagram, Model 4271



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