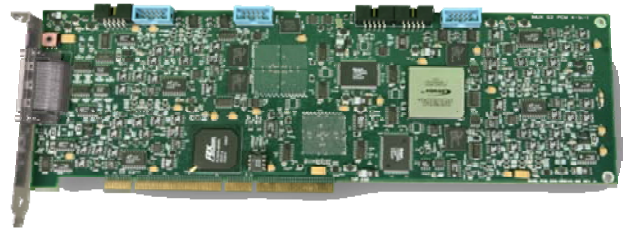


### PCM Input/Output, 4-Channel, 30 Mbps, w/Bit Sync and Time Board G2-PCM-411-30/50-xx

#### Features

- 4-Channel Bit Sync, Decom, Channel Reproduce, Time Reader and Reproducer
- Occupies Single PCI Card Slot
- Operation to 50 Mbps
- Supports Packed, Unpacked, and Throughput
- Accepts All IRIG PCM Codes
- Accepts IRIG A, B, and G Time Codes
- 1 dB Bit Sync Performance
- Optional Convolutional Decoder/Encoder
- Optional QPSK or UQPSK Support



#### Introduction

The G2 PCM Input/Output board combines the advanced capabilities of bit synchronization, PCM input, and PCM output/reconstruction along with an embedded IRIG Time module into a single PCI slot.

#### Bit Synchronizer Function

A multifeatured, digital process controller provides state-of-the-art BER performance. The bit sync input excels in harsh noise conditions with superior signal-to-noise capabilities. The patented phase-lock loop and tracking features enable the bit sync to attain the performance levels of box-level bit synchronizers with equal performance.

Programmability includes selection of source and impedance, input code type, derandomization, polarity, bit rate, loop and tracking bandwidths, and output code and clock phase. An optional on-board convolutional decoder provides programmable symbol inversion and symbol order, differential conversion, and descrambling.

#### Time Code Input/Output Functions

IRIG time code inputs are translated to digital time setups with a nanosecond resolution every 100 nanoseconds. Time stamps are provided for each data transfer in Packed, Unpacked, or Throughput modes via direct memory addressing (DMA) block transfers over the PCI bus.

#### Data Reproduction

A variable rate, on-board numerically controlled oscillator (NCO) resides on the PCM card. It is slaved to the data reproduction and can faithfully reproduce PCM data to within 1 microsecond inter-channel time skew, relative to other recorded channels.

By occupying a single PCI bus card slot, the PCI Quad Record/Reproduce board provides remarkable flexibility for the systems integrator while not compromising performance.

<b>Bit Sync Input</b>	Number Channels	Four independent data synchronization and clock generation channels
	Programmability	Each PCM input channel programmed independently
	Sources & Type	One single-ended and one differential input per channel, programmable.
	Level	300 mV to 10 VP-P
	Impedance	50 ohms, 75 ohms, or 10 Kohms (single-ended), programmable; 110 ohms (differential)
	Operating Range	3 kbps to 30 Mbps, NRZ codes
		3 kbps to 15 Mbps, all non-NRZ codes with optional support to 50 Mbps and 25 Mbps respectively
	Codes	NRZ-L/M/S, BIØ-L/M/S; additionally, plus and minus randomized codes for NRZ-L
	Derandomizer	Forward & reverse, 5 lengths: 9, 11, 15, 20, 23, programmable
	Polarity	Normal or inverted, programmable
	Tracking Range/Deviation	Programmable up to 20% of data rate
	DC Offset	DC offset plus peak signal plus noise $\leq 10V$
	Loop Bandwidth	Continuously programmable with 0.02% resolution from 0.02% to 5.00%.
	<b>Bit Sync Performance</b>	Bit Error Rate
Jitter		Jitter not to exceed 0.1% of a bit interval
Acquisition Range		Up to $\pm 5\%$ of programmed data rate
Acquisition Time		Within 50 bits, average, random data within 0.5% deviation from the programmed data rate, $E_b/N_o = 15$ dB
Sync Maintenance		Retains sync at $E_b/N_o = 3$ dB for NRZ at 50% transition density
Bit Slippage		Maintains phase with BIØ codes at $E_b/N_o = 12$ dB with over 2,000 continuous ones or zeroes and at $E_b/N_o = 0$ dB for random data
Baseline Variation		No degradation beyond 1 dB from theoretical performance curve with a superimposed wave form equal to 100% of the peak-to-peak signal input at 0.1% of the bit rate, BIØ codes
<b>Bit Sync Output</b>	Level	+3.3V @50 mA, short circuit protected
	Codes	Programmable PCM output codes, (R)NRZ-L/M/S, BIØ-L/M/S
	Clock	0° or 180°, programmable
<b>PCM Input</b>	Number Channels	Four independent PCM record channels
	Programmability	Each PCM input channel programmed independently
	Sources & Type	One bit sync, one single-ended and one RS422 differential input per channel, programmable.
	Level	+3.3V @ 50 mA, short circuit protected; single-ended RS422; differential

<b>PCM Input (Cont'd)</b>	Impedance	75-ohm; single-ended (factory adjustment for 50 ohm or 10 Kohm) 110 ohm; differential
	Rate	3 kbps to 30 Mbps with option to 50 Mbps
	Code	NRZ-L and R-NRZ-L
	Data Polarity	Normal and inverse, programmable
	Clock Phase	0° or 180° , programmable
	Clock Duty Cycle	50% +/- 10%
	Mode	Throughput or packed, programmable
<b>PCM Performance</b>	Time Data Resolution	+/- 100 ns
<b>PCM Output</b>	Level	+3.3V @ 50 mA, short circuit protected
	Rate	3 kbps to 30 Mbps with option to 50 Mbps
	Data	(R)NRZ-L/M/S, BIØ-L/M/S
	Inter Channel Skew	Less than 1 µs
	Mode	Loop-through of input signal (record time only) or Playback from file; programmable
<b>Time Input</b>	Number Channels	1 independent Time channel
	Programmability	Time input channel programmed independently
	Time Input Source	External or internal, programmable
	Level	Signal level 0.5 to 10 VP-P from mark; 3-1 nominal (mark to space relationship); external
	Impedance	10 Kohm
	Code	IRIG A, B, G modulated carrier input.
	Internal Time	On-board timer seeded from any source internal to computer; e.g., computer clock, GPS receiver, etc.
<b>Time Output</b>	Time Code Rate	IRIG A, B, G modulated carrier
	Level	7V, typical P-P into 10-Kohm load
	Mode	Loop-through of input signal (record time only) or playback from file; programmable.
<b>Reference Clock Input</b>	Frequency	10 MHz
	Source	Internal or External; programmable
	Duty cycle	50% +/- 5%
	Signal type	Single-ended sine wave
	Levels	1 to 8 VP-P
	DC offset	<10% of VP-P level centered around ground
	Input impedance	50-ohm or 75-ohm (programmable).
	SNR	≥ 50 dB
	Internal Clock Accuracy	Factory tuned to <1 ppm Drift over lifetime of 3.5 ppm

<b>Interboard Time Bus</b>	Level	+3.3V @ 50 mA, short circuit protected
	Max Daisy Chain Delay	20 ns
	Control	Each board capable of operating as Master or Slave
	Max Record Throughput	240 Mbps
	Max Playback Throughput	240 Mbps
	Max Aggregate Throughput	2 Gbps
<b>Electrical and Environmental</b>	Form Factor	Full-length, PCI-66 MHz, 64bit, based module
	Temperature	0° to 50 °C (operating), -20° to 80 °C (storage)
	Humidity	20 to 95% noncondensing
	Power	12 W typical; +3.3V @ 3.4A
	Status	Sync, input, amplitude, rate deviation via PCI bus
	Connectors	High Density D-Sub
	Programming	Programming via PCI bus, 32-bit
<b>Ordering Codes</b>	G2-PCM-411-30-01	PCM Input/Output, 4-Channel, 30 Mbps, w/Bit Sync and Time
	G2-PCM-411-50-01	PCM Input/Output, 4-Channel, 50 Mbps, w/Bit Sync and Time
	G2-PCM-412-30-02	PCM Input/Output, 4-Channel, 30 Mbps, w/Time
	G2-PCM-412-50-02	PCM Input/Output, 4-Channel, 50 Mbps, w/Time
	G2-PCM-413-30-01	PCM Bit Sync, 30 Mbps
	G2-PCM-413-50-01	PCM Bit Sync, 50 Mbps
	G2-PCM-411-30-01	PCM Input/Output, 4-Channel, 30 Mbps, w/Bit Sync & Time
	G2-PCM-411-50-01	PCM Input/Output, 4-Channel, 50 Mbps, w/Bit Sync & Time
	G2-PCM-412-30-02	PCM Input/Output, 4-Channel, 30 Mbps, w/Time
	G2-PCM-412-50-02	PCM Input/Output, 4-Channel, 50 Mbps, w/Time
	G2-PCM-413-30-01	PCM Bit Sync, 30 Mbps
	G2-PCM-413-50-01	PCM Bit Sync, 50 Mbps

*Specifications change w/o notice. Contact the factory for current information.*