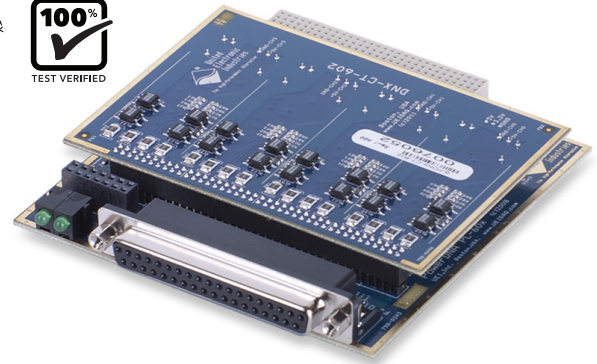# DNA/DNR-CT-602
High Speed Differential Counter/Timer Board

- DNA-CT-602 for use with "Cube" data acquisition & logging chassis
- DNR-CT-602 for use with RACKtangle™ I/O chassis
- 4 independent 32-bit counter/timer units;
- Fully differential inputs/outputs at RS-422/485 logic levels
- 8 Counting modes
- 32-bit prescaler per channel;
- Internal (66 MHz) or external (max 16.5 MHz) timebases
- 256 x 32-bit Input FIFO and 256 x 32-bit Output FIFO on each counter
- Debouncing/glitch removal on external clock and gate inputs

General Description:

The DNA-CT-602 and DNR-CT-602 are differential counter/timer interfaces for UEI's "Cube" and RACKtangle I/O chassis respectively. The DNA/DNR versions are electrically identical and provide four independent 32-bit channels, each one having overvoltage protection and opto-isolation. They perform up/down counting in a number of flexible modes using values from a Load Register and two Compare Registers. They can act as an event counter, perform width/period measurements and run in quadrature-encoder mode where the user sets the direction of the counting. For output modes, the layer offers 1-shot and Universal PWM operation. It also provides edge detection on the ClockIn and Gate pins. The DNx-CT-602 is software compatible with the DNx-CT-601 except for the additional commands which configure and control the Trigger Output pins. The DNx-CT-602 provides the following 8 counting modes which will accommodate most data acquisition and data logging requirements:

Timer
- PWM generator
- Continuously updated PWM generator (buffered)
- Bin counter (number of pulses in specified time interval)

- Pulse width
- Pulse period (232 periods max)
- Quadrature encoder
- Timebase operation

Software is included, providing a comprehensive, yet easy-to-use API that supports all popular operating systems, including Windows, Linux, and most real-time operating systems—such as QNX, Intime, VXworks, and more. Additionally, the UEIDAQ Framework—an even higher level Windows driver—supplies complete support for those creating applications in many popular Windows programming languages, as well as data acquisition software packages such as LabVIEW and MATLAB/Simulink.

Block Diagram:
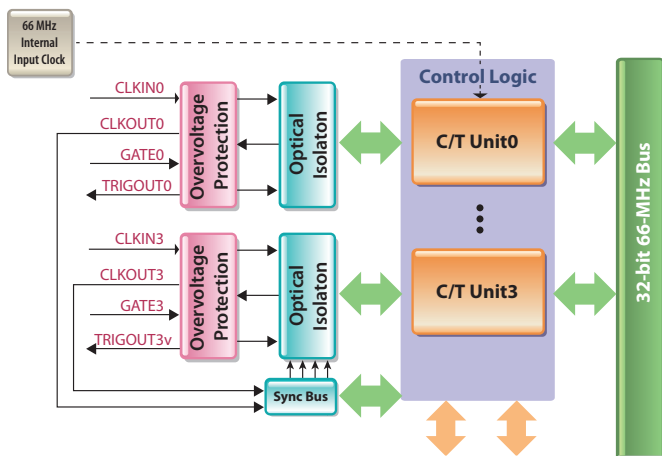
Notes:
1. Any counter input may be internally connected to the 66 MHz internal bus clock.
2. Any counter output may be internally connected to any inter-board synch bus signal.

Technical Specifications:

Number of counter/timer units	4
Resolution	32 bits
Prescaler (per channel)	1 (32 bits)
Maximum frequency	16.5 MHz for external input clock; 66 MHz for internal input clock; 33 MHz for outputs
Minimum frequency	no low limits
On-board FIFOs, per counter	Input: 256 x 32; Output: 256 x 32
Minimum pulse width	15.15 nS
Minimum period	30.30 nS
Measurement resolution	15.15 nS (standard mode) 7.5 nS (2X mode)
Internal 66 MHz time base (from backplane clock signal)	Initial accuracy: ±10 ppm Temp drift: ±15 ppm over full temp range Time drift: ±5 ppm year one, then lower
Debouncer circuit size	16 bits (on GATE and CLKIN)
Compare registers per counter	2
External gates per counter	1, programmable polarity
External triggers per counter	1 (shared with Gate), edge sensitive, programmable polarity
Protection	7 kV ESD, 350V isolation
Input High / Low voltage	RS-422/485 compatible
Electrical Isolation	350 Vrms, chan-chan and chan-chassis
Output High / Low voltage	RS-422/485 compatible
Input/output buffer chip	LTC1686 or equivalent
Power consumption	2W
Operating range	Tested -40 to +85 °C
Humidity range	0 - 95%, noncondensing
Vibration IEC 60068-2-6 IEC 60068-2-64	5 g, 10-500 Hz, sinusoidal 5 g (rms), 10-500 Hz, broad-band random
Shock IEC 60068-2-27 IEC 60068-2-64	100 g, 3 ms half sine, 18 shocks @ 6 orientations 30 g, 11 ms half sine, 18 shocks @ 6 orientations
Altitude	120,000 FT
MTBF	350,000

Connection Options:

Cable	Terminal Panel	Description
DNA-CBL-37	DNA-STP-37	DNA-CBL-37 3 foot ribbon cable connects directly to the DNA-STP-37 Screw Terminal Panel.
DNA-CBL-37S	DNA-STP-37	DNA-CBL-37S 3 foot shielded cable connects directly to the DNA-STP-37 Screw Terminal Panel.

Pinout Diagram:

DB-37 (female) connector

CLKOUT(0)+	1		20	CLKOUT(0)-
GATE(0)+	2		21	GATE(0)-
TRIGOUT(0)+	3		22	TRIGOUT(0)-
CLKIN(0)+	4		23	CLKIN(0)-
GND(0)	5		24	GND(1)
CLKOUT(1)+	6		25	CLKOUT(1)-
GATE(1)+	7		26	GATE(1)-
TRIGOUT(1)+	8		27	TRIGOUT(1)-
CLKIN(1)+	9		28	CLKIN(1)-
CLKOUT(2)+	10		29	CLKOUT(2)-
GATE(2)+	11		30	GATE(2)-
TRIGOUT(2)+	12		31	TRIGOUT(2)-
CLKIN(2)+	13		32	CLKIN(2)-
GND(2)	14		33	GND(3)
CLKOUT(3)+	15		34	CLKOUT(3)-
GATE(3)+	16		35	GATE(3)-
TRIGOUT(3)+	17		36	TRIGOUT(3)-
CLKIN(3)+	18		37	CLKIN(3)-
Rsvd	19			