PI-41401 Four Channel Clock Driver Card

Features:
- Four Independent Channels
- Output Levels -5 V to +8 V
- Output Amplitude 0 V to 9 V
- Variable Rise & Fall Times
- Tri-State Operation

Applications:
- Device Characterization
- FPA Testing
- CMOS Testing
- CCD Testing
- Test Instrumentation
- Test Systems

Instrument Description:

The PI-41401 is a Four Channel Clock Driver for the CompactPCI® modular instrumentation platform. Four independently-programmable driver channels are capable of operating up to 90 MHz at 5 V_{PP} into a 1 MΩ load. Maximum toggle rate is a function of programmed amplitude and output loading, and the card can toggle up to 140 MHz at 1.5 V_{PP} into a 50 Ω load. Into high impedance the output voltage range is from a -5 V to +8 V with the pulse amplitude ranging from 0 V to 9 V. When driving a 50 Ω load the voltage range is -2.5 V to 4.0 V with the pulse amplitude ranging from 0 V to 4.5 V.

Each channel has a common edgespeed control to vary the rising and falling edges of the output waveform. The adjustable slew rate range, for any amplitude, is the minimum edgespeed of that amplitude times 4.5, typical. The output pulse amplitude and the load being driven determine the range of variability.

Unlike most other drivers, the PI-41401 can have the Hi and Low levels programmed for the same value. This is useful when measuring the input current to a DUT pin. Each of the driver channels can be also be set for tri-state operation. To minimize waveform distortion caused by reflections from impedance mismatches, each channel output is back-matched with an equivalent 50 Ω termination resistor.

Four TTL signals are used to drive the inputs of the PI-41401 Clock Driver. The terminating resistor for each input can be selected in software to be either 50 Ω or 1 KΩ.

For added noise immunity, the PI-41401 has a separate connector that allows the use of external laboratory-type power supplies to power the critical circuitry on the board.

Using external power supplies requires moving a jumper on the board.

The PI-41401 also has voltage and current sense for remote measurement of the voltage and current levels. This sense circuitry is accessed via banana jacks on the front card flange, for measurement on an external DVM.

The voltage and current can also be sensed with an on-board 8-bit A/D converter and sent over the CPCI bus. This A/D sense circuitry is meant for measurements not requiring high precision. For precision measurements use of the banana jacks and an external DVM is recommended.

For device protection the PI-41401 has a "Disconnect" mode that tristates the outputs when connecting or disconnecting a DUT from the test system. There is also a voltage-sequencing feature to control the order in which bias and clock signals are applied to or removed from the DUT.

All channels on a single PI-41401 card must be in one of two operating ranges:
- High Range: -3 to +8 V
- Low Range: -5 to +6 V

Channels on different PI-41401 cards may be in different ranges. All other parameters are independently programmable for each clock driver channel.

The TTL input and clock driver output connectors are SMA. The external power supply connector is a 9-pin D-Sub.

Instrument Control:

The PI-41401 is programmed by Pulse Instruments' PI-Controller or PI-DATS software running under Windows 10/64. The card can also be programmed by 3rd-party software over GPIB or via an included Win32 DLL using the fully-documented command set. The command set is highly backward-compatible with applications written for Pulse Instruments' 4000 Series clock drivers.
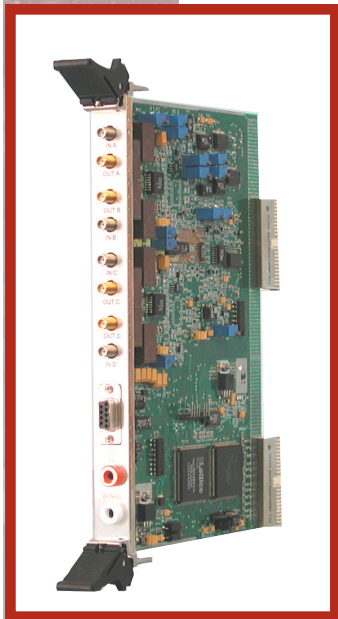
Pulse Instruments

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Specifications:

DC Characteristics

Output:	1 MΩ Load	50 Ω Load
Hi-Level:	-4.0 V to +8.0 V	-2.0 V to +4.0 V (80 mA)
Low-Level:	-5.0 V to +7.0 V	-2.5 V to +3.5 V
Amplitude:	0 V min. to 9 V max.	0 V min. to 4.5 V max.
Resolution:	64 mV	32 mV effective

Accuracy: (Transition times set to minimum. Constant value may increase with increased transition times.)

HL-LL > 1 V

-3 V to +8 V High Range:	1% of prog. value ±150 mV	1.5% of prog. value ±75 mV
-5 V to +6 V Low Range:	2.5% of prog. value ±200 mV	2.5% of prog. value ±100 mV

HL-LL ≤ 1 V:

-3 V to +8 V High Range:	3% of prog. value ±200 mV
-5 V to +6 V Low Range:	6% of prog. value ±300 mV

Hi and Low level can be programmed to same value, but zero delta is not guaranteed. Low-level cannot be programmed more positive than Hi-level, and Hi-level cannot be more negative than Low-level.

AC Characteristics

Output:	5 V_{PP} into 1 MΩ Load	1.5 V_{PP} into 50 Ω Load	2.5 V_{PP} into 50 Ω Load
Minimum Pulse Width:		3.4 ns typ.	5.0 ns typ.
Rise/Fall Time:	≤ 4 ns	≤ 2 ns	≤ 3 ns
Max. Rep. Rate:	90 MHz	140 MHz	100 MHz
Propagation Time:	7 ns maximum	7 ns maximum	7 ns maximum

Resistance:	50 Ω ±10% (Backmatch Value)
Leakage:	7 µA (Tri-state operation)
V/I Sense (DC to 1 kHz):	
Voltage:	0.5% of reading ±20 mV
Current:	
1 mA Range:	1% of reading ±20 µA
10 mA Range:	1% of reading ±200 µA
21.1 mA Range:	1% of reading ±300 µA
Internal A/D:	
Range:	±1 V to ±8 V
Accuracy:	3% of reading ±100 mV
Inputs:	
Low Level:	< 0.7 V
High Level:	> 2.2 V
Termination:	Selectable 50 Ω or 1 KΩ, ±10%

Signal Connectors: SMA for all inputs and outputs.

Power Consumption:

Pwr. Supply	Min	Typical	Max.
5.0 V ±5%		0.70 A	
3.3 V ±5%		0.70 A	
12 V ±5%		0.70 A	
-12 V ±5%		0.70 A	

Mechanical:
- Size 6U Eurocard
- Dimensions 6.30" x 9.18" (160.00 mm x 233.35 mm)
- One card slot

Ordering Information:
Contact Pulse Instruments Sales at (310) 515-5330 or sales@pulseinstruments.com

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