



Training 1
Signal Board Definitions

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061424400

Training 1 Signal Board: Signal Definitions

Pins 1, 7, 8, and 14	GND
Description	These pins provide the ground reference for the Training 1 signal board.
Pin 2	CLK 20 MHz
Specification	20 MHz digital signal, 4 V peak-to-peak
Description	This signal is the control clock for all of the digital signals on the Training 1 signal board.
Pin 3	D_10 MHz
Specification	10 MHz digital signal, 4 V peak-to-peak
Description	This signal is a 10 MHz digital data signal.
Pin 4	BURST (also found on the 2x8 pin connector)
Specification	Digital signal, 4 V peak-to-peak
Description	This signal is a repetitive pulse stream consisting of four groups of eight 16 to 24 ns pulses separated by 1.3 ms of inactivity. Verification of this signal requires two measurements at two different time scales.

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Pin 5	PSEUDO RANDOM
Specification	20 MHz digital clock signal, 3 V peak-to-peak
Description	This NRZ/OC1 pseudo random signal can be used to show how to trigger on a complex yet repeating signal sequence, such as a communication signal or computer control signal, with the use of trigger holdoff on a TDS200 or a TDS3000 oscilloscope.
Pin 6	METASTABLE
Specification	Digital signal, 3 V peak-to-peak
Description	This signal is a 10 MHz square wave that contains an occasional glitch caused by a metastable state in the flip-flop. A logic analyzer or an advanced oscilloscope set to trigger on narrow pulse widths will find these glitches.

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Pin 9	AM SIGNAL
Specification	Analog signal Frequency: 5 kHz sine wave with 1 MHz carrier Amplitude: 3 V peak-to-peak
Description	This amplitude modulated signal uses a 5 kHz sine wave signal source and a 1 MHz carrier frequency. The output should look like a sine wave with a positive DC component and an inverted sine wave with a negative DC component with shading between. This signal can be used to show the varying characteristics of one signal being amplitude modulated onto another signal, such as in radio frequency applications. These characteristics can be shown on a TDS200 or a TDS3000 oscilloscope by using trigger holdoff and variable persistence.
Pins 10 and 11	5 kHz SINE and PHASE SHIFTED SINE WAVE
Specification	Analog signal Positive phase shift: 0–135 degrees Frequency: About 5 kHz Amplitude: 1 V

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Description The phase difference between these two 5 kHz sine waves is varied using a potentiometer. The maximum phase shift between the two sine waves is determined by turning the potentiometer to both extremes. This set of signals can be used to demonstrate the phase relationship of two time related signals, such as voltage and current in a power supply, by using the **X/Y** display mode on a TDS200 or a TDS3000 oscilloscope.

Pins 12 and 13 DIFF + and DIFF –

Specification Analog signals

Frequency: 7 Hz, with 1 Hz background

Amplitude: 2 V common with 250 mV differential

Description The differential signal from pins 12 and 13 is a 1 Hz heartbeat signal with a 250 mV amplitude. It is combined with a 2 Volt common mode 7 Hz sine wave. This signal can be used to demonstrate how to separate differential signals from common mode signals. Subtracting one channel from another on a TDS200 or a TDS3000 oscilloscope can reject common mode signals.

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Pin 15 VARIABLE AMPL WITH GLITCH

Specification Analog signal

Frequency: 10 Hz

Amplitude: Variable between 1 V and 4 V,
following sine wave at 0.1 Hz rate

20 ns asynchronous glitch, 5 V amplitude, at
1 Hz rate

Description This signal is a 10 Hz square wave with an amplitude that follows a 0.1 Hz sine wave. In addition, a +5 VDC 20 ns pulse combines with the signal at an asynchronous 1 Hz rate. The glitch is visible on an oscilloscope if the sweep speed is increased and set to trigger on a narrow pulse. This signal can be used to demonstrate how to capture and analyze infrequent high-speed glitches with the use of the **Peak Detect** acquisition mode on a TDS200 or a TDS3000 oscilloscope.

Pin 16 FAST RISE TIME

Specification Analog signal

Amplitude: About 0.6 V

1 ns to 2 ns rise time

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Description This signal is a 100 ns wide 0.6 Volt pulse with a rise time of <2 ns. The signal is generated each time the **PRESS FOR SINGLE SHOT** button is pressed on the Training 1 signal board. This signal can be used to demonstrate the unwanted effects of the ground lead when probing high speed circuits.

2x8 Pin Connector D_10MHz: Duplicate of the 10 MHz data signal from pin 3.

Q_META: Duplicate of the METASTABLE signal from pin 6.

PSEUDO: Duplicate of the PSEUDO RANDOM signal from pin 5.

CNT0, CNT1, CNT2, and CNT3: This signal is a 10 MHz count pattern that is run continuously