

# Ethernet Disturber Calibration – Solution Note

## Background

The testing of Ethernet-based devices – supporting the 10Base-T, 100Base-TX, and 1000Base-T standards – is defined in the IEEE 802.3-2005 and ANSI X3.263-1995 standards.

Support for four test modes is required in the physical layer of the device-under-test (DUT). A *disturbing sine wave* is required for modes 1 and 4. The frequency and amplitude of the sine wave specified for each mode are listed in the following table:

Test	Test mode	Fixture location		Disturbing Sine Wave	
		w/Dist	wo/Dist	Frequency	Amplitude
Peak differential output voltage	1	D	G	31.25 MHz	2.8 V <sub>p-p</sub>
Maximum output droop	1	D	G	31.25 MHz	2.8 V <sub>p-p</sub>
Differential output templates	1	D	G	31.25 MHz	2.8 V <sub>p-p</sub>
Transmitter distortion	4	D	G	20.833 MHz	5.4 V <sub>p-p</sub>
Jitter in master mode	2	G		N/A	N/A
Jitter in slave mode	3	G		N/A	N/A
Common Mode Output Voltage	4	C		N/A	N/A

Figure 1: Gigabit Ethernet Tests and Modes

An important prerequisite for testing is **disturber calibration**, in which we measure the amplitude of a disturbing sine wave being applied to the DUT. The calibration is required to adjust the amplitude of the disturbing sine wave, which is generated by a dual-channel arbitrary waveform generator (AWG).

## Requirement

The testing modes requiring use of a disturbing signal are detailed below. Note that the two output signals generated by the AWG must have the same amplitude, but are generated with a 180-degree phase shift.

### Mode 1 Disturbing Signal

Channel	Waveform Type	Frequency	Phase (degrees)
CH1	Sine	31.25 MHz	0
CH2	Sine	31.25 MHz	180

**Mode 4 Disturbing Signal**

Channel	Waveform Type	Frequency	Phase (degrees)
CH1	Sine	20.833 MHz	0
CH2	Sine	20.833 MHz	180

## Solution

Tabor Electronics' *Wave Standard* family of Arbitrary Function Generators (AFGs) serves as an excellent platform for Ethernet Disturber Calibration, with dual-channel waveform generation capability, and a sampling rate of 250 MS/second.

Wave Standard incorporates both a built in waveform gallery and modulation schemes for easy and fast generation of standard waveforms, as well as a memory-based true AWG architecture that allows you to quickly create and edit complex waveforms.

Wave Standard is supplied with *ArbConnection* – Tabor's comprehensive software tool that controls AWG operation, and supports the creation of unique, arbitrary waveforms using its powerful *Waveform Composer*.

## For More Information

To learn more about Tabor's solutions or to schedule a demo, please contact your local Tabor representative or email your request to [info@tabor.co.il](mailto:info@tabor.co.il). More information can be found at our website at [www.taborelec.com](http://www.taborelec.com).

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