Supplement

Tektronix

TDS5032 and TDS5034
Digital Phosphor Oscilloscopes

071-1316-00

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Product Description

This manual is a supplement to the existing TDS5000 Series User and Service manuals and product software CD. Refer to the TDS5000 Series documents for all other manuals information.

Models

- The TDS5032 Digital Phosphor Oscilloscope has 2 channels with 350 MHz bandwidth and 5 GS/s real time sampling rate.
- The TDS5034 Digital Phosphor Oscilloscope has 4 channels with 350 MHz bandwidth and 5 GS/s real time sampling rate.

Specification Tables

Table 1: Channel input and vertical specifications

Characteristic	Description	
Input impedance, DC coupled	1 MΩ ± 1.0% in parallel with 18 pF ±2 pF 50 Ω ±2.5% VSWR: TDS5032 and TDS5034: ≤1.6:1 typical from DC to 350 MHz	
TDS5032/TDS5034	*SCALE range*	*Bandwidth*
	1 mV/div to 1.99 mV/div	DC to 150 MHz
	2 mV/div to 4.98 mV/div	DC to 250 MHz
	5 mV/div to 1 V/div	DC to 350 MHz
TDS5032/TDS5034	*SCALE range*	*Rise time*
	1 mV/div to 1.99 mV/div	2.67 ns
	2 mV/div to 4.98 mV/div	1.6 ns
	5 mV/div to 1 V/div	1.15 ns

Table 1: Channel input and vertical specifications (Cont.)

Characteristic	Description	
TDS5032/TDS5034	50 Ω coupling	
	SCALE range	*Offset range*
	1 mV/div to 99.5 mV/div	±1 V
	100 mV/div to 1 V/div	±10 V
TDS5032/TDS5034	*Signal and input conditions*	*Effective bits*
	1 MHz, 9.2 div, 5 GS/s sample rate, Sample acquisition mode	6.8 bits
	1 MHz, 9.2 div, 10 MS/s sample rate, HiRes acquisition mode	9.1 bits
	350 MHz, 6.5 div, 5 GS/s sample rate, Sample acquisition mode	6.5 bits

Table 2: Trigger specifications

Characteristic	Description	
TDS5032/TDS5034	Any channel, DC coupled	0.35 div from DC to 50 MHz, increasing to 1 div at 350 MHz
TDS5032/TDS5034	Auxiliary input	400 mV from DC to 50 MHz, increasing to 750 mV at 100 MHz

The following *Check Analog Bandwidth* performance verification procedure is a TDS5032 and TDS5034 supplement. This is a supplement to the existing performance verification located in the TDS5000 Series Service manual and product software CD. Refer to the TDS5000 Series manuals for all other *Performance Verification* procedures and *Equipment Required* tables.

Check Analog Bandwidth

Equipment required	One sine wave generator (Item 14)
	One level meter and power sensor (Item 15)
	One power divider (Item 16)
	One female N to male BNC adapter (Item 22)
	Four male N to female BNC adapters (Item 21)
	Two 50 Ω precision cables (Item 5)
	Attenuators (Items 1 and 2)
	Optional: One high-frequency leveled sine wave generator and its leveling head – replaces items 14, 15, 16, 21, and 22

1. *Install the test hookup and preset the instrument controls:*

   a. *Initialize the oscilloscope:*

      - Press **DEFAULT SETUP**.

   b. *Modify the default settings:*

      - Turn the horizontal **SCALE** knob to 40 ns.
      - From the tool bar, click **Horiz** and select the Acquisition tab.
      - Click **Average** and set the number of averages to 16.
      - From the tool bar, click **MEAS**. Click Setup **Ref Levs**; then click the Determine Base, Top From **Min-Max** button.

***NOTE**. The sine wave generator output amplitude must be leveled to within 0.35 db of the reference frequency (10 MHz) through the bandwidth frequency listed in Table 3 on page 8. The 0.35 db requirement is necessary to ensure a bandwidth that meets Tektronix specifications.*

You can perform bandwidth Performance Verification using an unleveled sine wave generator (with amplitude error < 0.35 db). Under these conditions, the bandwidth PV is subject to the flatness errors associated with the generator used.

Refer to the Sine Wave Generator Leveling Procedure *if your sine wave generator does not have automatic output amplitude leveling.*

c. *Hook up the test-signal source:* Connect the sine wave output of a leveled sine wave generator to **CH 1**. Set the output of the generator to a reference frequency of 10 MHz or less. See Figure 1.
For the optional setup using a leveled sine wave generator with a leveling head, see Figure 2 and, if using this optional setup with the Tektronix SG504, set the generator output to 6 MHz.

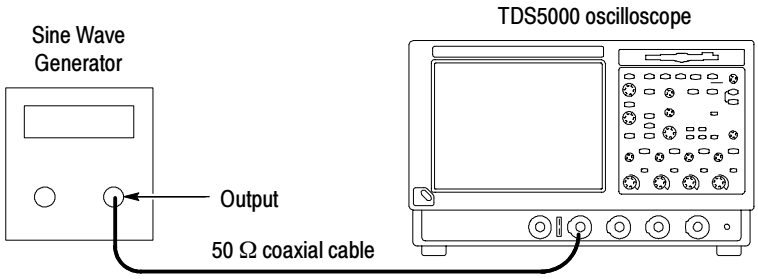

Figure 1: Initial test hookup

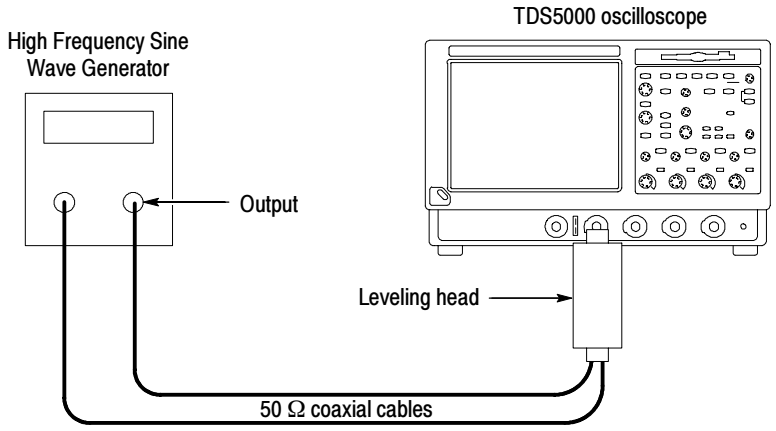

Figure 2: Optional initial test hookup

2. *Confirm that the input channels are within limits for analog bandwidth:* Do the following substeps — test CH 1 first, *skipping substeps* **a** *and* ***b*** *since CH 1 is already set up for testing from step 1.*

a. *Select an unchecked channel:*

- From the tool bar, click **MEAS** and then **Clear** to remove the previous measurement.
- Press the **Vertical** button of the channel just confirmed to remove the channel from the display.
- Press the front-panel **Vertical** button that corresponds to the channel that you are to confirm.
- Move the leveling output of the sine wave generator to the channel you selected.

b. *Match the trigger source to the channel selected:*

- Press the Trigger **SOURCE** button until the source that corresponds to the channel you are to confirm is on.

c. *Set its input impedance:*

- From the button bar, click the **VERT** button and select the tab for the channel you are to confirm. Click the Termination **50 Ω** button.

d. *Set the vertical scale:* Set the vertical **SCALE** that corresponds to the channel you are to confirm to one of the settings listed in Table 3 not yet checked. (Start with the 100 mV setting.)

e. *Set the triggering coupling:*

- Click the Coupling **DC** button.

Table 3: Analog bandwidth

Vertical scale	Reference amplitude (6 divisions)	Horizontal scale	Test frequency	
			TDS5032 and TDS5034	-3 db Limits
1 mV	6 mV	1 ns	150 MHz	≥4.24 mV
2 mV	12 mV	1 ns	250 MHz	≥8.48 mV
5 mV	30 mV	1 ns	350 MHz	≥21.2 mV
10 mV	60 mV	1 ns	350 MHz	≥42.4 mV
20 mV	120 mV	1 ns	350 MHz	≥84.8 mV
50 mV	300 mV	1 ns	350 MHz	≥212 mV
100 mV	600 mV	1 ns	350 MHz	≥424 mV
200 mV	1.2 V	1 ns	350 MHz	≥848 mV
500 mV	3 V[1]	1 ns	350 MHz	≥2.12 V[1]
1 V	6 V[1]	1 ns	350 MHz	≥4.24 V[1]

[1] **If your generator cannot output 6 divisions of amplitude, determine its maximum output at the Test frequency, and use this for the reference amplitude. The -3 db limit can be calculated as: 0.707 × reference amplitude.**

f. *Display the test signal:* Do the following subparts to first display the reference signal and then the test signal.

- From the button bar, click **MEAS**; then select the Time tab.
- Click the **Freq** button to measure the frequency of the current channel.
- Select the Ampl tab. Click the **Pk-Pk** button.
- Click **Close** button.
- Set the generator output so that the CHx Pk-Pk readout equals the reference amplitude in Table 3 that corresponds to the vertical scale set in substep **d**.
- Press the front-panel **PUSH TO SET 50%** as necessary to trigger a stable display. At full bandwidth, you may also want to make small, manual adjustments to the trigger level. You can use the **Trigger LEVEL** knob to do this. (Full bandwidth varies with TDS model as is shown in Table 3.)

g. *Measure the test signal:*

- Set the frequency of the generator, as shown on the screen, to the test frequency in Table 3 that corresponds to the vertical scale set in substep **d**. See Figure 3.
- Set the horizontal **SCALE** to the horizontal scale setting in Table 3 that corresponds to the vertical scale set in substep **d**. Press **PUSH TO SET 50%** as necessary to trigger the signal.
- Read the results at the CHx Pk-Pk readout, which will automatically measure the amplitude of the test signal. See Figure 3.

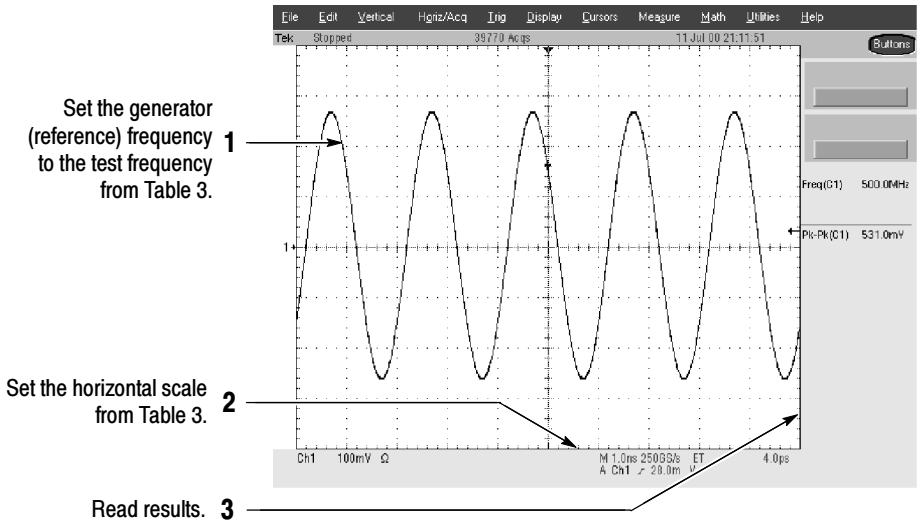

Figure 3: Measurement of analog bandwidth

h. *Check against limits:*

- CHECK that the **Pk-Pk** readout on the screen is within the limits listed in Table 3 for the current vertical scale setting.
- Enter voltage on the test record.
- When finished checking, set the horizontal **SCALE** back to the 50 ns setting.

STOP*. Checking the bandwidth of each channel at all vertical scale settings is time consuming and unnecessary. You can skip checking the remaining vertical scale settings in Table 3 (that is, skip the following substep, i) if this oscilloscope has performed as follows:*
Passing the signal path compensation confirms the signal path for all vertical scale settings for all channels. Passing the internal diagnostics ensures that the factory-set adjustment constants that control the bandwidth for each vertical scale setting have not changed.

- Passed the 100 mV vertical scale setting just checked in this procedure.
- Passed the *Verify Internal Adjustment, Self Compensation, and Diagnostics* procedure found under *Self Tests*.

i. *Check remaining vertical scale settings against limits (optional):*

- If desired, finish checking the remaining vertical scale settings for the channel under test by repeating substeps **d** through **h** for each of the remaining scale settings listed in Table 3 for the channel under test.
- Before doing substep **f**, click the **Clear** button to remove the previous channel measurements.
- When doing substep **f**, skip the subparts that turn on the CHx Pk-Pk measurement until you check a new channel.
- Install/remove attenuators between the generator leveling head and the channel input as needed to obtain the six division reference signals listed in the table.

j. *Test all channels:* Repeat substeps **a** through **h** for all channels.

3. *Disconnect the hookup:* Disconnect the test hook up from the input connector of the channel last tested.

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