Tektronix®

4 Series MSO (MSO44, MSO46)
Specifications and Performance Verification

Technical Reference

Register now!
Click the following link to protect your product.
www.tek.com/register

077-1546-01

Contacting Tektronix

Tektronix, Inc.

14150 SW Karl Braun Drive

P.O. Box 500

Beaverton, OR 97077

USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit *www.tek.com* to find contacts in your area.

Table of Contents

List of Figures

List of Tables

Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, see the *Service safety summary* that follows the *General safety summary*.

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

This product shall be used in accordance with local and national codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To avoid fire or personal injury

Use proper power cord	Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.
Ground the product	This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. Do not disable the power cord grounding connection.
Power disconnect	The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.
Connect and disconnect properly	Do not connect or disconnect probes or test leads while they are connected to a voltage source. Use only insulated voltage probes, test leads, and adapters supplied with the product, or indicated by Tektronix to be suitable for the product.
Observe all terminal ratings	To avoid fire or shock hazard, observe all rating and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not exceed the Measurement Category (CAT) rating and voltage or current rating of the lowest rated individual component of a product, probe, or accessory. Use caution when using 1:1 test leads because the probe tip voltage is directly transmitted to the product. Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal. Do not float the common terminal above the rated voltage for that terminal. The measurement terminals on this product are not rated for connection to Category III or IV circuits.

Do not operate without covers

Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry

Do not touch exposed connections and components when power is present.

Do not operate with suspected failures

If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

Do not operate in wet/damp conditions

Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere

Keep product surfaces clean and dry

Remove the input signals before you clean the product.

Provide proper ventilation

Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment

Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product. This product is provided with a handle or handles for lifting and carrying.

⚠ **Warning:** The product is heavy. To reduce the risk of personal injury or damage to the device get help when lifting or carrying the product.

⚠ **Warning:** The product is heavy. Use a two-person lift or a mechanical aid.

Use only the Tektronix rackmount hardware specified for this product.

Probes and test leads

Before connecting probes or test leads, connect the power cord from the power connector to a properly grounded power outlet.

Keep fingers behind the protective barrier, protective finger guard, or tactile indicator on the probes.

Remove all probes, test leads and accessories that are not in use.

Use only correct Measurement Category (CAT), voltage, temperature, altitude, and amperage rated probes, test leads, and adapters for any measurement.

Beware of high voltages	Understand the voltage ratings for the probe you are using and do not exceed those ratings. Two ratings are important to know and understand: • The maximum measurement voltage from the probe tip to the probe reference lead • The maximum floating voltage from the probe reference lead to earth ground These two voltage ratings depend on the probe and your application. Refer to the Specifications section of the manual for more information. ⚠ **Warning:** To prevent electrical shock, do not exceed the maximum measurement or maximum floating voltage for the oscilloscope input BNC connector, probe tip, or probe reference lead.
Connect and disconnect properly	Connect the probe output to the measurement product before connecting the probe to the circuit under test. Connect the probe reference lead to the circuit under test before connecting the probe input. Disconnect the probe input and the probe reference lead from the circuit under test before disconnecting the probe from the measurement product.
Connect and disconnect properly	De-energize the circuit under test before connecting or disconnecting the current probe. Connect the probe reference lead to earth ground only. Do not connect a current probe to any wire that carries voltages or frequencies above the current probe voltage rating.
Inspect the probe and accessories	Before each use, inspect probe and accessories for damage (cuts, tears, or defects in the probe body, accessories, or cable jacket). Do not use if damaged.
Ground-referenced oscilloscope use	Do not float the reference lead of this probe when using with ground-referenced oscilloscopes. The reference lead must be connected to earth potential (0 V).
Floating measurement use	Do not float the reference lead of this probe above the rated float voltage.

Risk assessment warnings and information

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock	Do not touch exposed connections.
Do not service alone	Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.
Disconnect power	To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.
Use care when servicing with power on	Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.
Verify safety after repair	Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in the manual

These terms may appear in this manual:

⚠ **Warning:** Warning statements identify conditions or practices that could result in injury or loss of life.

⚠ **CAUTION:** Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the product

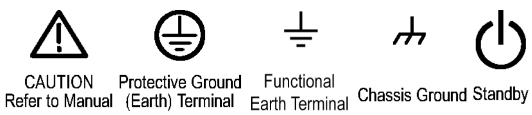
These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

Symbols on the product

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbols may appear on the product:



Specifications

This chapter contains specifications for the instrument. All specifications are guaranteed unless noted as "typical." Typical specifications are provided for your convenience but are not guaranteed. Specifications that are marked with the ✓ symbol are checked in Performance Verification.

All specifications apply to all models unless noted otherwise. To meet specifications, two conditions must first be met:

- The instrument must have been operating continuously for twenty minutes within the specified operating temperature range.
- You must perform the Signal Path Compensation (SPC) operation described in ... If the operating temperature changes by more than 10 °C (18 °F), you must perform the SPC operation again.

Analog channel input and vertical specification

Number of input channels	MSO4 4: 4 BNC MSO4 6: 6 BNC
Input coupling	DC, AC
Input resistance selection	1 MΩ or 50 Ω
✓Input impedance 1 MΩ DC coupled	1 MΩ ±1%
Input capacitance 1 MΩ DC coupled, typical	13 pF ±1.5 pF
✓Input impedance 50 Ω, DC coupled	50 Ω ±1% (VSWR ≤1.5:1, typical)
Maximum input voltage, 1 MΩ	300 V_{RMS} at the BNC Derate at 20 dB/decade between 4.5 MHz and 45 MHz; derate 14 dB/decade between 45 MHz and 450 MHz. Above 450 MHz, 5.5 V_{RMS} Maximum peak input voltage at the BNC: ±425 V
Maximum input voltage, 50 Ohm	5 V_{RMS}, with peaks ≤ ±20 V (DF ≤6.25%)
Number of digitized bits	8 bits at 6.25 GS/s 12 bits at 3.125 GS/s 13 bits at 1.25 GS/s 14 bits at 625 MS/s 15 bits at 312.5 MS/s 16 bits at 125 MS/s Displayed vertically with 25 digitization levels (DL [1]) per division, (8-bits only) 10.24 divisions dynamic range.

[1] DL is the abbreviation for digitization level. A DL is the smallest voltage level change that can be resolved by an 8-bit A-D Converter. This value is also known as an LSB (least significant bit).

Sensitivity range, coarse

1 MΩ	500 µV/div to 10 V/div in a 1-2-5 sequence
50 Ω	500 µV/div to 1 V/div in a 1-2-5 sequence Note: 500 µV/div is a 2X digital zoom of 1 mV/div or a 4x digital zoom of 2 mV/div, depending on the instrument bandwidth configuration

Sensitivity range, fine

Allows continuous adjustment from 1 mV/div to 10 V/div, 1 MΩ and from 1 mV/div to 1 V/div, 50 Ω

1 MΩ	500 µV/div to 10 V/div
50 Ω	500 µV/div to 1 V/div

Sensitivity resolution, fine ≤1% of current setting

✓ DC gain accuracy

Step Gain, 50 Ω	±1.0%, (±2.5% at 1 mV/div and 500 µV/div settings), de-rated at 0.100%/ °C above 30 °C
Step Gain, 1 MΩ	±1.0%, (±2.0% at 1 mV/div and 500 µV/div settings), de-rated at 0.100%/ °C above 30 °C
Variable gain	±1.5%, derated at 0.100%/ °C above 30 °C.

⚠ **Note:** 500 µV/div is a 2X digital zoom of 1 mV/div or a 4x digital zoom of 2 mV/div, depending on the instrument bandwidth configuration. As such, it is guaranteed by testing the nonzoomed setting.

Offset ranges, maximum

Input signal cannot exceed maximum input voltage for the 50 Ω input path.

Volts/div Setting	Maximum offset range, 50 Ω Input
500 µV/div - 99 mV/div	±1 V
100 mV/div - 1 V/div	±10 V

Volts/div Setting	Maximum offset range, 1 MΩ Input
500 µV/div - 63 mV/div	±1 V
64 mV/div - 999 mV/div	±10 V
1 V/div - 10 V/div	±100 V

⚠ **Note:** 500 µV/div is a 2X digital zoom of 1 mV/div or a 4x digital zoom of 2 mV/div, depending on the instrument bandwidth configuration. As such, it is guaranteed by testing the nonzoomed setting.

Position range ±5 divisions

✓ Offset accuracy

Number of waveforms for average acquisition mode 2 to 10,240 Waveforms, default 16 waveforms

DC voltage measurement accuracy, Average acquisition mode

Measurement Type	DC Accuracy (In Volts)
Average of ≥ 16 waveforms	±((DC Gain Accuracy) * |reading - (offset - position)| + Offset Accuracy + 0.1 * V/div setting)
Delta volts between any two averages of ≥ 16 waveforms acquired with the same oscilloscope setup and ambient conditions	±(DC Gain Accuracy * |reading| + 0.05 div)

DC voltage measurement accuracy, sample acquisition mode, typical

Measurement Type	DC Accuracy (In Volts)
Any Sample	±(DC Gain Accuracy * |reading - (offset - position)| + Offset Accuracy + 0.15 div + 0.6 mV)
Delta Volts between any two samples acquired with the same scope setup and ambient conditions	±(DC Gain Accuracy * |reading| + 0.15 div + 1.2 mV)

Bandwidth selections

50 Ω: 20 MHz, 250 MHz, and the full bandwidth value of your model

1 MΩ: 20 MHz, 250 MHz, 500 MHz

✓Analog bandwidth 50 Ω DC coupled

1.5 GHz models

Volts/Div Setting	Bandwidth
1 mV/div - 1 V/div	DC - 1.50 GHz
500 µV/div - 995 µV/div	DC - 250 MHz

1 GHz models

Volts/Div Setting	Bandwidth
1 mV/div - 1 V/div	DC - 1.00 GHz
500 µV/div - 995 µV/div	DC - 250 MHz

500 MHz models

Volts/Div Setting	Bandwidth
1 mV/div - 1 V/div	DC - 500 MHz
500 µV/div - 995 µV/div	DC - 250 MHz

350 MHz models

Volts/Div Setting	Bandwidth
1 mV/div - 1 V/div	DC - 350 MHz
500 µV/div - 995 µV/div	DC - 250 MHz

200 MHz models

Volts/Div Setting	Bandwidth
1 mV/div - 1 V/div	DC - 200 MHz
500 µV/div - 995 µV/div	DC - 200 MHz

Analog bandwidth, 1 MΩ, typical

All model bandwidths except 350 MHz, 200 MHz

The limits stated above are for ambient temperature of ≤30 °C and the bandwidth selection set to FULL. Reduce the upper bandwidth frequency by 1% for each °C above 30 °C.

Volts/Div Setting	Bandwidth
1 mV/div - 10 V/div	DC - 500 MHz
500 µV/div - 995 µV/div	DC - 250 MHz

350 MHz models

Volts/Div Setting	Bandwidth
1 mV/div - 10 V/div	DC - 350 MHz
500 µV/div - 995 µV/div	DC - 250 MHz

200 MHz models

Volts/Div Setting	Bandwidth
1 mV/div - 10 V/div	DC - 200 MHz
500 µV/div - 995 µV/div	DC - 200 MHz

Analog bandwidth with TPP0500, TPP1000 and TPP0250 probes, typical

The limits are for ambient temperature of ≤30 °C and the bandwidth selection set to FULL. Reduce the upper bandwidth frequency by 1% for each °C above 30 °C.

Instrument	Volts/Div Setting	Bandwidth
1.5 GHz, 1 GHz	5 mV/div - 100 V/div	DC - 1 GHz (TPP1000 Probe)
500 MHz	5 mV/div - 100 V/div	DC - 500 MHz (TPP0500 Probe)
350 MHz	5 mV/div - 100 V/div	DC - 350 MHz (TPP0500 Probe)
200 MHz	5 mV/div - 100 V/div	DC - 200 MHz (TPP0250 Probe)

Lower frequency limit, AC coupled, typical

<10 Hz when AC 1 MΩ coupled. The AC coupled lower frequency limits are reduced by a factor of 10 (<1 Hz) when 10X passive probes are used.

Upper frequency limit, 250 MHz bandwidth limited, typical

250 MHz, ± 25%

Upper frequency limit, 20 MHz bandwidth limited, typical

20 MHz, ± 25 %

Calculated rise time, typical

Model	50 Ω	TP1000 Probe	TPP0500 Probe	TPP0250 Probe
	500 µV-1 V	5 mV-10 V	5 mV-10 V	5 mV-10 V
1.5 GHz	333ps	450ps	900ps	1.8ns
1 GHz	450ps	450ps	900ps	1.8ns
500 MHz	900ps	900ps	900ps	1.8ns
350 MHz	1.3ns	1.3ns	1.3ns	1.8ns
200 MHz	2.3ns	2.3ns	2.3ns	2.3ns

Peak Detect or Envelope mode pulse response, typical

Minimum pulse width is >640 ps (6.25 GS/s)

Effective bits (ENOB), typical

Typical effective bits for a 9-division p-p sine-wave input, 50 mV/div, 50-ohm

Sample mode, 50 Ω, 50 mV/div

Bandwidth	Input frequency	ENOB at 6.25 GS/s
1.5 GHz	10 MHz	6.80
1.5 GHz	300 MHz	6.80
1 GHz	10 MHz	7.10
1 GHz	300 MHz	7.10
500 MHz	10 MHz	7.40
500 MHz	150 MHz	7.40
350 MHz	10 MHz	7.60
350 MHz	100 MHz	7.60
250 MHz	10 MHz	7.60
250 MHz	100 MHz	7.60
200 MHz	10 MHz	7.60
200 MHz	100 MHz	7.60
20 MHz	10 MHz	7.70

High Res mode, 50 Ω, 50 mV/div

Bandwidth	Input frequency	ENOB at 6.25 GS/s
1.5 GHz	10 MHz	7.10
1.5 GHz	300 MHz	7.10
1 GHz	10 MHz	7.60
1 GHz	300 MHz	7.60
500 MHz	10 MHz	7.90
500 MHz	150 MHz	7.90
350 MHz	10 MHz	8.20
350 MHz	100 MHz	8.20
250 MHz	10 MHz	8.20
250 MHz	100 MHz	8.20
200 MHz	10 MHz	8.20
200 MHz	100 MHz	8.20
20 MHz	10 MHz	8.90

Random noise, Sample and High Res Acquisition modes, 50 Ω and 1 MΩ, 6.25 Gs/s

✓1.5 GHz models, Sample mode (RMS), 50 Ω

V/div	1.5 GHz
1 mV/div	635 µV
2 mV/div	635 µV
5 mV/div	817 µV

Table continued…

V/div	1.5 GHz
10 mV/div	843 μV
20 mV/div	920 μV
50 mV/div	1.582 mV
100 mV/div	3.686 mV
1 V/div	23.753 mV

All models, Sample mode (RMS), 50 Ω, typical

V/div	1.5 GHz	1 GHz	500 MHz	350 MHz	250/200 MHz	20 MHz
1 mV/div	490 μV	300 μV	220 μV	145 μV	120 μV	80 μV
2 mV/div	490 μV	350 μV	220 μV	150 μV	130 μV	80 μV
5 mV/div	630 μV	380 μV	230 μV	175 μV	160 μV	110 μV
10 mV/div	650 μV	400 μV	280 μV	220 μV	215 μV	155 μV
20 mV/div	710 μV	510 μV	410 μV	340 μV	340 μV	260 μV
50 mV/div	1.220 mV	980 μV	890 μV	760 μV	760 μV	630 μV
100 mV/div	2.84 mV	2.23 mV	1.93 mV	1.61 mV	1.61 mV	1.25 mV
1 V/div	18.3 mV	19.0 mV	17.3 mV	15.0 mV	15.0 mV	12.5 mV

✓All models except 1.5 GHz, High Res mode (RMS), 50 Ω

V/div	1 GHz	500 MHz	350 MHz	250/200 MHz	20 MHz
1 mV/div	336 μV	259 μV	194 μV	161 μV	96 μV
2 mV/div	363 μV	259 μV	194 μV	161 μV	96 μV
5 mV/div	394 μV	304 μV	239 μV	174 μV	96 μV
10 mV/div	434 μV	356 μV	284 μV	206 μV	103 μV
20 mV/div	551 μV	466 μV	349 μV	298 μV	141 μV
50 mV/div	1.038 mV	1.038 mV	739 μV	596 μV	259 μV
100 mV/div	2.102 mV	1.596 mV	1.349 mV	1.349 mV	609 μV
1 V/div	16.874 mV	12.850mV	11.617 mV	11.617 mV	4.906 mV

All models except 1.5 GHz, High Res mode (RMS), 50 Ω, typical

V/div	1 GHz	500 MHz	350 MHz	250/200 MHz	20 MHz
1 mV/div	260 μV	200 μV	150 μV	125 μV	75 μV
2 mV/div	280 μV	200 μV	150 μV	125 μV	75 μV
5 mV/div	305 μV	235 μV	185 μV	135 μV	75 μV
10 mV/div	335 μV	275 μV	220 μV	160 μV	80 μV
20 mV/div	425 μV	360 μV	270 μV	230 μV	110 μV

Table continued…

V/div	1 GHz	500 MHz	350 MHz	250/200 MHz	20 MHz
50 mV/div	800 µV	800 µV	570 µV	460 µV	200 µV
100 mV/div	1.62 mV	1.23 mV	1.04 mV	1.04 mV	470 µV
1 V/div	13.00 mV	9.90 mV	8.95 mV	8.95 mV	3.78 mV

All models, Sample mode (RMS), 1 MΩ, typical

V/div	500 MHz	350 MHz	250/200 MHz	20 MHz
1 mV/div	210 µV	140 µV	120 µV	78 µV
2 mV/div	210 µV	140 µV	120 µV	78 µV
5 mV/div	230 µV	160 µV	135 µV	96 µV
10 mV/div	270 µV	200 µV	190 µV	135 µV
20 mV/div	370 µV	300 µV	300 µV	240 µV
50 mV/div	760 µV	600 µV	650 µV	750 µV
100 mV/div	1.75 mV	1.350 mV	1.45 mV	1.22 mV
1 V/div	19.00 mV	15.25 mV	15.70 mV	11.20 mV

All models, High Res mode (RMS), 1 MΩ, typical

V/div	500 MHz	350 MHz	250/200 MHz	20 MHz
1 mV/div	200 µV	140 µV	120 µV	75 µV
2 mV/div	200 µV	140 µV	120 µV	75 µV
5 mV/div	210 µV	150 µV	130 µV	75 µV
10 mV/div	230 µV	160 µV	150 µV	80 µV
20 mV/div	280 µV	200 µV	200 µV	100 µV
50 mV/div	520 µV	370 µV	410 µV	180 µV
100 mV/div	1.24 mV	880 µV	930 µV	460 µV
1 V/div	14.30 mV	10.20 mV	10.30 mV	5.45 mV

✓All models, High Res mode (RMS), 1 MΩ

V/div	500 MHz	350 MHz	250/200 MHz	20 MHz
1 mV/div	259 µV	181 µV	155 µV	96 µV
2 mV/div	259 µV	181 µV	155 µV	96 µV
5 mV/div	271 µV	194 µV	168 µV	96 µV
10 mV/div	298 µV	206 µV	194 µV	103 µV
20 mV/div	363 µV	259 µV	259 µV	129 µV
50 mV/div	674 µV	479 µV	531 µV	233 µV
100 mV/div	1.609 mV	1.141 mV	1.206 mV	596 µV

Table continued…

V/div	500 MHz	350 MHz	250/200 MHz	20 MHz
1 V/div	18.561 mV	13.239 mV	13.369 mV	7.074 mV

Delay between analog channels, full bandwidth, typical

≤ 100 ps for any two channels with input impedance set to 50 Ω, DC coupling with equal Volts/div or above 10 mV/div

Deskew range

-125 ns to +125 ns with a resolution of 40 ps

Crosstalk (channel isolation), typical

≥ 200:1 up to the rated bandwidth for any two channels having equal Volts/div settings

Total probe power

TekVPI+ Compliant probe interfaces: (4 per MSO44, 6 per MSO46) and 1 TekVPI interface for Aux In

MSO46: 80 W maximum (40 W maximum for channels 1-3, 40 W maximum for channels 4-6 and Aux In)

MSO44: 80 W maximum (40 W maximum for channels 1-3, 40 W maximum for channel 4 and Aux In)

Probe power per channel

Voltage	Max Amperage	Voltage Tolerance
5 V	60 mA	±10%
12 V	1.67 A (20 W maximum software limit)	±10%

TekVPI interconnect

All analog channel inputs on the front panel conform to the TEKVPI specification.

Timebase system

Sample rate

Max HW Capability	Number of Channels
6.25 GS/s	1-6

Interpolated waveform rate range

500 GS/sec, 250 GS/sec, 125 GS/sec, 62.5 GS/sec, 25 GS/sec, and 12.5 GS/sec

Record length range

- **Standard**: 1 kpoints to 31.25 Mpoints in single sample increments
- **Optional**: 62.5 Mpoints

Seconds/Division range

Model	1 K	10 K	100 K	1 M	10 M	31.25 M	62.5 M
MSO4X Standard 31.25 M	200 ps - 64 s	200 ps - 640 s	200 ps - 1000 s				N/A
MSO4X Option 62.5 M	200 ps - 64 s	200 ps - 640 s	200 ps - 1000 s				

Maximum triggered acquisition rate, typical

Analog or digital channels: single channel [Analog or Digital 8-bit channel] on screen, measurements and math turned off. >20 wfm/sec

FastAcq Update Rate (analog only): >500 K/second with one channel active and >100 K/second with all channels active.

Digital channel: >20/second with one channel (8-bits) active. There is no FastAcq for digital channels, but they do not slow down FastAcq for active analog channels.

Aperture uncertainty

≤ 0.450 ps + (10^{-11} * Measurement Duration)$_{RMS}$, for measurements having duration ≤`100`ms

✓Timebase accuracy

±2.5 x 10^{-6} over any ≥1 ms time interval

Description	Specification
Factory Tolerance	±5.0 x10^{-7} At calibration, 25 °C ambient, over any ≥1 ms interval
Temperature stability, typical	±5.0 x10^{-7} Tested at operating temperatures
Crystal aging	±1.5 x 10^{-6} . Frequency tolerance change at 25 °C over a period of 1 year

Delta-time measurement accuracy, nominal

The formulas to calculate the peak-to-peak or rms nominal delta-time measurement accuracy (DTA) for a given instrument setting and input signal is as follows (assumes insignificant signal content above Nyquist frequency):

$$DTA_{pp}(typical) = 10 \times \sqrt{\left(\frac{N}{SR_1}\right)^2 + \left(\frac{N}{SR_2}\right)^2 + \left(0.450\text{ ps} + \left(1 \times 10^{-11} \times t_p\right)\right)^2} + TBA \times t_p$$

$$DTA_{RMS} = \sqrt{\left(\frac{N}{SR_1}\right)^2 + \left(\frac{N}{SR_2}\right)^2 + \left(0.450\text{ps} + \left(1 \times 10^{-11} \times t_p\right)\right)^2} + TBA \times t_p$$

Where:

N = input-referred guaranteed noise limit (V_{RMS})

SR $_1$ = Slew Rate (1^{st} Edge) around 1^{st} point in measurement

SR $_2$ = Slew Rate (2^{nd} Edge) around 2^{nd} point in measurement

t $_p$ = delta-time measurement duration (sec)

TBA = timebase accuracy or Reference Frequency Error ±0.5 ppm

(Assumes insignificant error due to aliasing or over-drive.)

The term under the square root sign is the stability and is due to TIE (Time Interval Error). The errors due to this term occur throughout a single-shot measurement. The second term is due to both the absolute center-frequency accuracy and the center-frequency stability of the timebase and varies between multiple single-shot measurements over the observation interval (the amount of time from the first single-shot measurement to the final single-shot measurement).

Note: The formulas assume negligible errors due to measurement interpolation, and apply only when the interpolated sample rate is 25 GS/s or higher.

Trigger system

Trigger bandwidth (edge, pulse and logic), typical

1.5 GHz models, Edge	1.5 GHz
1.5 GHz models, Pulse and Logic	1 GHz
1 GHz models	1 GHz
500 MHz models	500 MHz
350 MHz models	350 MHz
200 MHz models	200 MHz

Edge-type trigger sensitivity, DC coupled, typical

Path	Range	Specification
1 MΩ path (all models)	0.5 mV/div to 0.99 mV/div	4.5 div from DC to instrument bandwidth
	≥ 1 mV/div	The greater of 5 mV or 0.7 div
50 Ω path, all models		The greater of 5.6 mV or 0.7 div from DC to the lesser of 500 MHz or instrument BW, & 7 mV or 0.8 div from > 500 MHz to instrument bandwidth
Line		Fixed

Trigger jitter, typical

≤ 7 ps_{RMS}

Edge-type trigger sensitivity, not DC coupled, typical

Trigger Coupling	Typical Sensitivity
NOISE REJ	2.5 times the DC Coupled limits
HF REJ	1.0 times the DC Coupled limits from DC to 50 kHz. Attenuates signals above 50 kHz.
LF REJ	1.5 times the DC Coupled limits for frequencies above 50 kHz. Attenuates signals below 50 kHz.

Logic-type triggering, minimum logic or rearm time, typical

Triggering type	Pulse width	Rearm time	Time skew needed for 100% and no triggering [2]
Logic	160 ps + t_{rise}	160 ps + t_{rise}	>360 ps / <150 ps

Table continued…

[2] For Logic, time between channels refers to the length of time a logic state derived from more than one channel must exist to be recognized. For Events, the time is the minimum time between a main and delayed event that will be recognized if more than one channel is used.

Triggering type	Pulse width	Rearm time	Time skew needed for 100% and no triggering [2]
Time qualified logic	320 ps + t_{rise}	320 ps + t_{rise}	>360 ps / <150 ps

t_{rise} is rise time of the instrument.

Minimum clock pulse widths for setup/hold time violation trigger, typical

Minimum pulsewidth, clock active [3]	Minimum pulsewidth, clock inactive [4]
320 ps + t_{rise}	320 ps +t_{rise}

t_{rise} is rise time of the instrument.

Setup/hold violation trigger, setup and hold time ranges, typical

Feature	Min	Max
Setup Time	0 ns	20 s
Hold Time	0 ns	20 s
Setup + Hold Time	320 ps	22 s

Input coupling on clock and data channels must be the same.

For Setup Time, positive numbers mean a data transition before the clock.

For Hold Time, positive numbers mean a data transition after the clock edge.

Setup + Hold Time is the algebraic sum of the Setup Time and the Hold Time programmed by the user.

Pulse type trigger, minimum pulse, rearm time, transition time

Pulse class	Minimum pulse width	Minimum rearm time
Runt	160 ps + t_{rise}	160 ps + t_{rise}
Time-Qualified Runt	160 ps + t_{rise}	160 ps + t_{rise}
Width	160 ps + t_{rise}	160 ps + t_{rise}
Slew Rate (minimum transition time)	160 ps + t_{rise}	160 ps + t_{rise}

For trigger class width, pulse width refers to the width of the pulse being measured. Rearm time refers to the time between pulses.

For trigger class runt, pulse width refers to the width of the pulse being measured. Rearm time refers to the time between pulses.

For trigger class slew rate, pulse width refers to the delta time being measured. Rearm time refers to the time it takes the signal to cross the two trigger thresholds again.

t_{rise} is rise time of the instrument.

Active pulsewidth is the width of the clock pulse from its active edge (as defined in the Clock Edge menu item) to its inactive edge

Inactive pulsewidth is the width of the pulse from its inactive edge to its active edge.

2 For Logic, time between channels refers to the length of time a logic state derived from more than one channel must exist to be recognized. For Events, the time is the minimum time between a main and delayed event that will be recognized if more than one channel is used.

3 Active pulsewidth is the width of the clock pulse from its active edge (as defined in the Clock Edge menu item) to its inactive edge.

4 Inactive pulsewidth is the width of the pulse from its inactive edge to its active edge.

Transition time trigger, delta time range

160 ps to 20 s.

Time range for glitch, pulse width, timeout, time-qualified runt, or time-qualified window triggering

160 ps to 20 s.

Time accuracy for pulse, glitch, timeout, or width triggering

Time Range	Accuracy
1 ns to 500 ns	±(160 ps +Time Base Error * Setting).
520 ns to 1 s	±(160 ps +Time Base Error * Setting).

B trigger after events, minimum pulse width and maximum event frequency, typical

Minimum pulse width: 160 ps + t_{rise}

Maximum event frequency: Instrument bandwidth.

t_{rise} is rise time of the instrument.

B trigger, minimum time between arm and trigger, typical

320 ps

For trigger after time, this is the time between the end of the time period and the B trigger event.

For trigger after events, this is the time between the last A trigger event and the first B trigger event.

B trigger after time, time range

160 ps to 20 seconds

B trigger after events, event range

1 to 65,471

Trigger level ranges

Source	Range
Any Channel	±5 divs from center of screen
Aux In Trigger, typical	±8 V
Line	Fixed at about 50% of line voltage

This specification applies to logic and pulse thresholds.

Trigger holdoff range

0 ns to 20 seconds

Serial Trigger specifications

Maximum serial trigger bits

128 bits

Optional serial bus interface triggering

Please refer to the *Serial Triggering and Analysis 3 Series MDO, 4/5/6 Series MSO Applications Datasheet* (part number 61W-61101-x), located on the Tektronix Web site, for information on available serial triggering options and their triggering capabilities.

Digital acquisition system

Digital channel maximum sample rate

6.25 GS/s

Transition detect (digital peak detect)	Displayed data at sample rates less than 6.25 GS/s (decimated data), that contains multiple transitions between sample points will be displayed with a bright white colored edge.
Digital-To-Analog trigger skew	3 ns
Digital to digital skew	3 ns from bit 0 of any TekVPI channel to bit 0 of any TekVPI channel.
Digital skew within a FlexChannel	160 ps within any TekVPI channel

Digital volt meter (DVM)

Measurement types DC, AC_{RMS}+DC, AC_{RMS}

Voltage resolution 4 digits

✓Voltage accuracy

DC:

±((1.5% * |reading - offset - position|) + (0.5% * |(offset - position)|) + (0.1 * Volts/div))

De-rated at 0.100%/°C of |reading - offset - position| above 30 °C

Signal ± 5 divisions from screen center

AC:

± 2% (40 Hz to 1 kHz) with no harmonic content outside 40`Hz to 1`kHz

AC, typical: ± 2% (20 Hz to 10 kHz)

For AC measurements, the input channel vertical settings must allow the V_{PP} input signal to cover between 4 and 10 divisions and must be fully visible on the screen

Trigger frequency counter

✓Accuracy

±(1 count + time base accuracy * input frequency)

The signal must be at least 8 mV_{pp} or 2 div, whichever is greater.

✓ Maximum input frequency

10 Hz to maximum bandwidth of the analog channel

The signal must be at least 8 mV_{pp} or 2 div, whichever is greater.

Resolution 8-digits

Arbitrary Function Generator system

Function types Arbitrary, sine, square, pulse, ramp, triangle, DC level, Gaussian, Lorentz, exponential rise/fall, sin(x)/x, random noise, Haversine, Cardiac

Amplitude range Values are peak-to-peak voltages

Waveform	50 Ω	1 MΩ
Arbitrary	10 mV to 2.5 V	20 mV to 5 V
Sine	10 mV to 2.5 V	20 mV to 5 V
Square	10 mV to 2.5 V	20 mV to 5 V

Table continued…

Waveform	50 Ω	1 MΩ
Pulse	10 mV to 2.5 V	20 mV to 5 V
Ramp	10 mV to 2.5 V	20 mV to 5 V
Triangle	10 mV to 2.5 V	20 mV to 5 V
Gaussian	10 mV to 1.25 V	20 mV to 2.5 V
Lorentz	10 mV to 1.2 V	20 mV to 2.4 V
Exponential Rise	10 mV to 1.25 V	20 mV to 2.5 V
Exponential Fall	10 mV to 1.25 V	20 mV to 2.5 V
Sine(x)/x	10 mV to 1.5 V	20 mV to 3.0 V
Random Noise	10 mV to 2.5 V	20 mV to 5 V
Haversine	10 mV to 1.25 V	20 mV to 2.5 V
Cardiac	10 mV to 2.5 V	20 mV to 5 V

Maximum sample rate 250 MS/s

Arbitrary function record length 128 K Samples

Sine waveform

Frequency range 0.1 Hz to 50 MHz

Frequency setting resolution 0.1 Hz

Frequency accuracy 130 ppm (frequency ≤ 10 kHz), 50 ppm (frequency > 10 kHz)

This is for Sine, Ramp, Square and Pulse waveforms only.

Amplitude range 20 mV_{pp} to 5 V_{pp} into Hi-Z; 10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Amplitude flatness, typical ±0.5 dB at 1 kHz

±1.5 dB at 1 kHz for < 20 mV_{pp} amplitudes

Total harmonic distortion, typical 1% for amplitude ≥ 200 mV_{pp} into 50 Ω load

2.5% for amplitude > 50 mV AND < 200 mV_{pp} into 50 Ω load

This is for Sine wave only.

Spurious free dynamic range, typical 40 dB (V_{pp} ≥ 0.1 V); 30 dB (V_{pp} ≥ 0.02 V), 50 Ω load

Square and pulse waveform

Frequency range 0.1 Hz to 25 MHz

Frequency setting resolution 0.1 Hz

Duty cycle range 10% - 90% or 10 ns minimum pulse, whichever is larger

Minimum pulse time applies to both on and off time, so maximum duty cycle will reduce at higher frequencies to maintain 10 ns off time

Duty cycle resolution	0.1%
Minimum pulse width, typical	10 ns. This is the minimum time for either on or off duration.
Rise/Fall time, typical	5.5 ns, 10% - 90%
Pulse width resolution	100 ps
Overshoot, typical	< 4 % for signal steps greater than 100 mV_{pp} This applies to overshoot of the positive-going transition (+overshoot) and of the negative-going (-overshoot) transition
Asymmetry, typical	±1% ±5 ns, at 50% duty cycle
Jitter, typical	< 60 ps TIE_{RMS}, ≥ 100 mV_{pp} amplitude, 40%-60% duty cycle

Ramp and triangle waveform

Frequency range	0.1 Hz to 500 kHz
Frequency setting resolution	0.1 Hz
Variable symmetry	0% - 100%
Symmetry resolution	0.1%

DC level range	±2.5 V into Hi-Z ±1.25 V into 50 Ω

Gaussian pulse, Haversine, and Lorentz pulse

Maximum frequency	5 MHz

Exponential rise fall maximum frequency	5 MHz

Sin(x)/x

Maximum frequency	2 MHz

Random noise amplitude range	20 mV_{pp} to 5 V_{pp} into Hi-Z 10 mV_{pp} to 2.5 V_{pp} into 50 Ω For both isolated noise signal and additive noise signal.
✓Sine and ramp frequency accuracy	1.3 x 10^{-4} (frequency ≤10 kHz) 5.0 x 10^{-5} (frequency >10 kHz)
✓Square and pulse frequency accuracy	1.3 x 10^{-4} (frequency ≤10 KHz); 5.0 x 10^{-5} (frequency >10 KHz)
Signal amplitude resolution	1 mV (Hi-Z) 500 µV (50 Ω)

✓Signal amplitude accuracy	±[(1.5% of peak-to-peak amplitude setting) + (1.5% of absolute DC offset setting) + 1 mV] (frequency = 1 kHz)
DC offset range	±2.5 V into Hi-Z ±1.25 V into 50 Ω
DC offset resolution	1 mV (Hi-Z) 500 µV (50 Ω)
✓DC offset accuracy	±[(1.5% of absolute offset voltage setting) + 1 mV] Add 3 mV of uncertainty per 10 °C change from 25 °C ambient

Display system

Display type	Display area - 11.38 inches (289 mm) (H) x 6.5 inches (165 mm) (V), 13.3 inches (338 mm) diagonal, 6-bit RGB color, (1920 X 1080) TFT liquid crystal display (LCD) with capacitive touch
Resolution	1,920 horizontal × 1,080 vertical pixels
Luminance, typical	400 cd/m^2, (Minimum: 320 cd/m^2) Display luminance is specified for a new display set at full brightness.

Processor system

Host processor	Texas Instruments AM5728
Operating system	Closed Linux

Input_Output port specifications

Ethernet interface	An 8-pin RJ-45 connector that supports 10/100/1000 Mb/s
Video signal output	A 29-pin HDMI connector Recommended resolution: 1920 x 1080 @ 60 Hz. Note that video out may not be hot pluggable. HDMI cable may need to be attached before power up for dual display functions to work depending upon the instrument firmware revision
USB interface (Host, Device ports)	Front panel USB Host ports: Three USB 2.0 Hi-Speed ports Rear panel USB Host ports: Two USB 2.0 Hi-Speed ports Rear panel USB Device port: One USB 2.0 Hi-Speed Device port providing USBTMC support

Probe compensator signal output voltage and frequency, typical

Characteristic	Value
Output Voltage	Default: 0-2.5 V amplitude
Impedance	1 kΩ
Frequency	1 kHz

Auxiliary output, AUX OUT, Trigger Out, Event, or Reference Clock Out

Selectable output	Acquisition Trigger Out Reference Clock Out AFG Trigger Out
Acquisition Trigger Out	User selectable transition from HIGH to LOW, or LOW to HIGH, indicates the trigger occurred. The signal returns to its previous state after approximately 100 ns
Acquisition trigger jitter	380 ps (peak-to-peak)
Reference Clock Out	Reference clock output tracks the acquisition system and can be referenced from either the internal clock reference or the external clock reference
AFG Trigger Out	The output frequency is dependent on the frequency of the AFG signal as shown in the following table:

AFG signal frequency	AFT trigger frequency
≤ 4.9 MHz	Signal frequency
> 4.9 MHz to 14.7 MHz	Signal frequency / 3
> 14.7 MHz to 24.5 MHz	Signal frequency / 5
> 24.5 MHz to 34.3 MHz	Signal frequency / 7
> 34.3 MHz to 44.1 MHz	Signal frequency / 9
> 44.1 MHz to 50 MHz	Signal frequency / 11

AUX OUT Output Voltage

Characteristic	Limits
Vout (HI)	≥ 2.5 V open circuit; ≥ 1.0 V into a 50 Ω load to ground
Vout (LO)	≤ 0.7 V into a load of ≤ 4 mA; ≤0.25 V into a 50 Ω load to ground

External reference input

Nominal input frequency	10 MHz
Frequency Variation Tolerance	9.99996 MHz to 10.00004 MHz (±4.0 x 10^{-6})
Sensitivity, typical	V_{in} 1.5 V_{p-p} using a 50 Ω termination
Maximum input signal	7 V_{pp}
Impedance	1.2 K Ohms ±20% in parallel with 18 pf ±5 pf at 10 MHz

Data storage specifications

Nonvolatile memory retention time, typical	No time limit for front panel settings, saved waveforms, setups, product licensing, and calibration constants.
Real-time clock	A programmable clock providing time in years, months, days, hours, minutes, and seconds.

Nonvolatile memory capacity

32 GB Primary MMC	Stores the operating system, application software and factory data. No user data
32 GB Secondary MMC	Stores saved setups and waveforms, Ethernet settings, log files, user data and user settings
2 Kbit EEPROM	Memory on the main board that stores the instrument serial number, instrument start up count, total uptime factory data, security option passwords, and user-settable security option passwords
1 Kbit EEPROM	Memory on the main board that stores power management controller factory data

1 KB Flash Memory	Memory on the main board that stores the SODIMM memory configuration data (SPD). Two to four pieces depending on model
32 KB Flash Memory	Memory on the main board that stores microcontroller firmware. Two pieces
64 KB Flash Memory	Memory on the main board that stores microcontroller firmware. Two pieces

Power supply system

Power

Power consumption	400 Watts maximum
Source voltage	100 - 240 V ±10% (50 Hz to 60 Hz)
Source frequency	50 Hz to 60 Hz ±10%, at 100 - 240 V ±10% 400 Hz at 115 V ±10%
Fuse Rating	12.5 A, 250 V_{ac}

Safety characteristics

Safety certification	US NRTL Listed - UL61010-1. Canadian Certification - CAN/CSA-C22.2 No. 61010.1. EU Compliance - Low Voltage Directive 2014-35-EU and EN61010-1. International Compliance - IEC 61010-1.
Pollution degree	Pollution degree 2, indoor, dry location use only

Environmental specifications

Temperature

Operating	+0 °C to +50 °C (32 °F to 122 °F)
Non-operating	-30 °C to +70 °C (-22 °F to 158 °F)

Humidity

Operating	5% to 90% relative humidity (% RH) at up to +40 °C 5% to 50% RH above +40 °C up to +50 °C, noncondensing, and as limited by a maximum wet-bulb temperature of +39 °C
Non-operating	5% to 90% relative humidity (% RH) at up to +40 °C 5% to 50% RH above +40 °C up to +50 °C, noncondensing, and as limited by a maximum wet-bulb temperature of +39 °C

Altitude

Operating	Up to 3,000 meters (9,843 feet)
Non-operating	Up to 12,000 meters (39,370 feet)

Mechanical specifications

Dimensions	Height: 9.8 in (249 mm), feet folded in, handle to back Height: 13.8 in (351 mm) feet folded in, handle up Width: 15.9 in (405 mm) from handle hub to handle hub Depth: 6.1 in (155 mm) from back of feet to front of knobs, handle up Depth: 10.4 in (265 mm) feet folded in, handle to the back
Weight	< 16.8 lbs (7.6 kg)
Cooling	The clearance requirement for adequate cooling is 2.0 in (50.8 mm) on the right side of the instrument (when viewed from the front) and on the rear of the instrument

Performance verification procedures

This chapter contains performance verification procedures for the specifications marked with the ✓ symbol. The following equipment, or a suitable equivalent, is required to complete these procedures.

The performance verification procedures verify the performance of your instrument. They do not adjust your instrument. If your instrument fails any of the performance verification tests, repeat the failing test, verifying that the test equipment and settings are correct. If the instrument continues to fail a test, contact Tektronix Customer Support for assistance.

These procedures cover all 4 Series MSO instruments (MSO44, MSO46) .

Print the test records on the following pages and use them to record the performance test results for your oscilloscope. Disregard checks and test records that do not apply to the specific model you are testing.

⚠ **Note:** Completion of the performance verification procedure does not update the instrument time and date.

Required equipment:

Required equipment	Minimum requirements	Examples
DC voltage source	3 mV to 4 V, ±0.1% accuracy	Fluke 9500B Oscilloscope Calibrator with a 9530 Output Module
Leveled sine wave generator	50 kHz to 2 GHz, ±4% amplitude accuracy	
Time mark generator	80 ms period, $\pm 1.0 \times 10^{-6}$ accuracy, rise time <50 ns	
Logic probe	Low capacitance digital probe, 8 channels.	TLP058 probe
BNC-to-0.1 inch pin adapter to connect the logic probe to the signal source.	BNC-to-0.1 inch pin adapter; female BNC to 2x16 .01 inch pin headers.	Tektronix adapter part number 878-1429-00; to connect the Fluke 9500B to the TLP058 probe.
Digital multimeter (DMM)	0.1% accuracy or better	Tektronix DMM4020
One 50 Ω terminator	Impedance 50 Ω; connectors: female BNC input, male BNC output	Tektronix part number 011-0049-02
One 50 Ω BNC cable	Male-to-male connectors	Tektronix part number 012-0057-01
Optical mouse	USB, PS2	Tektronix part number 119-7054-00
RF vector signal generator	Maximum bandwidth of instrument	Tektronix TSG4100A

You might need additional cables and adapters, depending on the actual test equipment you use.

Test records

Instrument information, self test record

Model	Serial #	Procedure performed by	Date

Test	Passed	Failed
Self Test		

Input Impedance test record

Input Impedance				
Performance checks	Vertical scale	Low limit	Test result	High limit
All models				
Channel 1 Input Impedance, 1 MΩ	100 mV/div	990 kΩ		1.01 MΩ
Channel 1 Input Impedance, 50 Ω	10 mV/div	49.5 Ω		50.5 Ω
	100 mV/div	49.5 Ω		50.5 Ω
Channel 2 Input Impedance, 1 MΩ	100 mV/div	990 kΩ		1.01 MΩ
Channel 2 Input Impedance, 50 Ω	10 mV/div	49.5 Ω		50.5 Ω
	100 mV/div	49.5 Ω		50.5 Ω
Channel 3 Input Impedance, 1 MΩ	100 mV/div	990 kΩ		1.01 MΩ
Channel 3 Input Impedance, 50 Ω	10 mV/div	49.5 Ω		50.5 Ω
	100 mV/div	49.5 Ω		50.5 Ω
Channel 4 Input Impedance, 1 MΩ	100 mV/div	990 kΩ		1.01 MΩ
Channel 4, Input Impedance, 50 Ω	10 mV/div	49.5 Ω		50.5 Ω
	100 mV/div	49.5 Ω		50.5 Ω

MSO46				
Channel 5 Input Impedance, 1 MΩ	100 mV/div	990 kΩ		1.01 MΩ
Channel 5 Input Impedance, 50 Ω	10 mV/div	49.5 Ω		50.5 Ω
	100 mV/div	49.5 Ω		50.5 Ω
Channel 6 Input Impedance, 1 MΩ	100 mV/div	990 kΩ		1.01 MΩ
Channel 6 Input Impedance, 50 Ω	10 mV/div	49.5 Ω		50.5 Ω
	100 mV/div	49.5 Ω		50.5 Ω

DC Gain Accuracy test record

DC Gain Accuracy					
Performance checks	**Bandwidth**	**Vertical scale**	**Low limit**	**Test result**	**High limit**
Channel 1 DC Gain Accuracy, 0 V offset, 0 V vertical position, 50 Ω	20 MHz	1 mV/div	-2.5%		2.5%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%
Channel 1 DC Gain Accuracy, 0 V offset, 0 V vertical position, 1 MΩ	20 MHz	1 mV/div	-2%		2%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%

Table continued…

DC Gain Accuracy					
Channel 2 DC Gain Accuracy, 0 V offset, 0 V vertical position,50 Ω	20 MHz	1 mV/div	-2.5%		2.5%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%
Channel 2 DC Gain Accuracy, 0 V offset, 0 V vertical position,1 MΩ	20 MHz	1 mV/div	-2%		2%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%
Channel 3 DC Gain Accuracy, 0 V offset, 0 V vertical position,50 Ω	20 MHz	1 mV/div	-2.5%		2.5%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%

Table continued…

DC Gain Accuracy					
Channel 3 DC Gain Accuracy, 0 V offset, 0 V vertical position,1 MΩ	20 MHz	1 mV/div	-2%		2%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%
Channel 4 DC Gain Accuracy, 0 V offset, 0 V vertical position,50 Ω	20 MHz	1 mV/div	-2.5%		2.5%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%
Channel 4 DC Gain Accuracy, 0 V offset, 0 V vertical position,1 MΩ	20 MHz	1 mV/div	-2%		2%
		2 mV/div	-1%		1%
		5 mV/div	-1%		1%
		10 mV/div	-1%		1%
		20 mV/div	-1%		1%
		50 mV/div	-1%		1%
		100 mV/div	-1%		1%
		200 mV/div	-1%		1%
		500 mV/div	-1%		1%
		1 V/div	-1%		1%
	250 MHz	20 mV/div	-1%		1%
	FULL	20 mV/div	-1%		1%

DC Offset Accuracy test record

Offset Accuracy					
Performance checks	**Vertical scale**	**Vertical offset** [5]	**Low limit**	**Test result**	**High limit**
All models					
Channel 1 DC Offset Accuracy, 20 MHzBW, 50 Ω	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2 mV		0.2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	5.0 V	4.965 V		5.035 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-5.0 V	-5.035 V		-4.965 V
Channel 1 DC Offset Accuracy, 20 MHz BW, 1 MΩ	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2mV		0. 2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	1.0 V	0.935 V		1.065 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-1.0 V	-1.065 V		-0.935 V
	500 mV/div	9.0 V	8.855 V		9.145 V
	500 mV/div	0 V	-50 mV		50mV
	500 mV/div	-9.0 V	-9.145 V		-8.855 V
	1.01 mV/div	10 V	9.3 V		10.7 V
	1.01 mV/div	0 V	-200 mV		200 mV
	1.01 mV/div	-10 V	-10.7 V		-9.3 V
	5 mV/div	10 V	8.5 V		11.5 V
	5 mV/div	0 V	-500 mV		500 mV
	5 mV/div	-10 V	-11.5 V		-8.5 V
Channel 2 DC Offset Accuracy, 20 MHz BW, 50 Ω	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2 mV		0.2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	5.0 V	4.965 V		5.035 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-5.0 V	-5.035 V		-4.965 V

Table continued…

5 Use this value for both the calibrator output and the oscilloscope offset setting.

Offset Accuracy					
Channel 2 DC Offset Accuracy, 20 MHz BW, 1 MΩ	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2mV		0. 2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	1.0 V	0.935 V		1.065 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-1.0 V	-1.065 V		-0.935 V
	500 mV/div	9.0 V	8.855 V		9.145 V
	500 mV/div	0 V	-50 mV		50mV
	500 mV/div	-9.0 V	-9.145 V		-8.855 V
	1.01 mV/div	10 V	9.3 V		10.7 V
	1.01 mV/div	0 V	-200 mV		200 mV
	1.01 mV/div	-10 V	-10.7 V		-9.3 V
	5 mV/div	10.0 V	8.5 V		11.5 V
	5 mV/div	0 V	-500 mV		500 mV
	5 mV/div	-10.0 V	-11.5 V		-8.5 V
Channel 3 DC Offset Accuracy, 20 MHz BW, 50 Ω	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2 mV		0.2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	5.0 V	4.965 V		5.035 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-5.0 V	-5.035 V		-4.965 V
Channel 3 DC Offset Accuracy, 20 MHz BW, 1 MΩ	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2mV		0. 2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	1.0 V	0.935 V		1.065 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-1.0 V	-1.065 V		-0.935 V
	500 mV/div	9.0 V	8.855 V		9.145 V
	500 mV/div	0 V	-50 mV		50mV
	500 mV/div	-9.0 V	-9.145 V		-8.855 V
	1.01 mV/div	10.0 V	9.3 V		10.7 V
	1.01 mV/div	0 V	-200 mV		200 mV
	1.01 mV/div	-10.0 V	-10.7 V		-9.3 V
	5 mV/div	10 V	8.5 V		11.5 V
	5 mV/div	0 V	-500 mV		500 mV
	5 mV/div	-10 V	-11.5 V		-8.5 V

Table continued…

Offset Accuracy					
Channel 4 DC Offset Accuracy, 20 MHz BW, 50 Ω	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2 mV		0.2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	5.0 V	4.965 V		5.035 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-5.0 V	-5.035 V		-4.965 V
Channel 4 DC OffsetAccuracy, 20 MHz BW, 1 MΩ	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2mV		0. 2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	1.0 V	0.935 V		1.065 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-1.0 V	-1.065 V		-0.935 V
	500 mV/div	9.0 V	8.855 V		9.145 V
	500 mV/div	0 V	-50 mV		50mV
	500 mV/div	-9.0 V	-9.145 V		-8.855 V
	1.01 mV/div	10.0 V	9.3 V		10.7 V
	1.01 mV/div	0 V	-200 mV		200 mV
	1.01 mV/div	-10.0 V	-10.7 V		-9.3 V
	5 mV/div	10 V	8.5 V		11.5 V
	5 mV/div	0 V	-500 mV		500 mV
	5 mV/div	-10 V	-11.5 V		-8.5 V
MSO46					
Channel 5 DC Offset Accuracy, 20 MHz BW, 50 Ω	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2 mV		0.2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	5.0 V	4.965 V		5.035 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-5.0 V	-5.035 V		-4.965 V

Table continued…

Offset Accuracy					
Channel 5 DC Offset Accuracy, 20 MHz BW, 1 MΩ	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2mV		0. 2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	1.0 V	0.935 V		1.065 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-1.0 V	-1.065 V		-0.935 V
	500 mV/div	9.0 V	8.855 V		9.145 V
	500 mV/div	0 V	-50 mV		50mV
	500 mV/div	-9.0 V	-9.145 V		-8.855 V
	1.01 mV/div	10.0 V	9.3 V		10.7 V
	1.01 mV/div	0 V	-200 mV		200 mV
	1.01 mV/div	-10.0 V	-10.7 V		-9.3 V
	5 mV/div	10.0 V	8.5 V		11.5 V
	5 mV/div	0 V	-500 mV		500 mV
	5 mV/div	-10.0 V	-11.5 V		-8.5 V
Channel 6 DC Offset Accuracy, 20 MHz BW, 50 Ω	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2 mV		0.2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	5.0 V	4.965 V		5.035 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-5.0 V	-5.035 V		-4.965 V
Channel 6 DC Offset Accuracy, 20 MHz BW, 1 MΩ	1 mV/div	900 mV	895.3 mV		904.7 mV
	1 mV/div	0 V	-0.2mV		0. 2 mV
	1 mV/div	-900 mV	-904.7 mV		-895.3 mV
	100 mV/div	1.0 V	0.935 V		1.065 V
	100 mV/div	0 V	-20 mV		20 mV
	100 mV/div	-1.0 V	-1.065 V		-0.935 V
	500 mV/div	9.0 V	8.855 V		9.145 V
	500 mV/div	0 V	-50 mV		50mV
	500 mV/div	-9.0 V	-9.145 V		-8.855 V
	1.01 mV/div	10.0 V	9.3 V		10.7 V
	1.01 mV/div	0 V	-200 mV		200 mV
	1.01 mV/div	-10.0 V	-10.7 V		-9.3 V
	5 mV/div	10.0 V	8.5 V		11.5 V
	5 mV/div	0 V	-500 mV		500 mV
	5 mV/div	-10.0 V	-11.5 V		-8.5 V

Analog Bandwidth test record

Analog Bandwidth performance checks							
Bandwidth at Channel	**Impedance**	**Vertical scale**	**Horizontal scale**	V_{in-pp}	V_{bw-pp}	**Limit**	**Test result Gain = V_{bw-pp}/V_{in-pp}**
1.5 GHz models							
Channel 1	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 1	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 2	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 2	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 3	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 3	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 4		1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 4	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
1.5 GHz MSO46							

Table continued…

Analog Bandwidth performance checks							
Channel 5	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 5	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 6	50 Ω	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 6	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
1 GHz models							
Channel 1	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 1	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 2	50 Ω	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 2	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 3	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 3	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 4	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 4	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
1 GHz MSO46							

Table continued…

Analog Bandwidth performance checks							
Channel 5	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 5	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 6	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 6	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
500 MHz models							
Channel 1	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 1	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 2	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 2	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 3	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 3	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 4		1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 4	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
500 MHz models (MSO46)							

Table continued…

Analog Bandwidth performance checks							
Channel 5	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 5	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 6	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 6	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
350 MHz models							
Channel 1	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 1	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 2	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 2	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 3	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 3	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 4	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 4	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Six channel models (MSO46)							

Table continued…

Analog Bandwidth performance checks							
Channel 5	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 5	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 6	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 6	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
200 MHz							
Channel 1	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 1	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 2	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 2	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 3	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 3	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 4	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 4	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Six channel models (MSO46)							

Table continued…

Analog Bandwidth performance checks							
Channel 5	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	
Channel 5	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	
Channel 6	50 Ω	1 mV/div	5 ns/div (Full BW)			≥ 0.707	
		2 mV/div	2.5 ns/div (Full BW)			≥ 0.707	
		5 mV/div	1 ns/div (Full BW)			≥ 0.707	
		10 mV/div	1 ns/div (Full BW)			≥ 0.707	
		50 mV/div	1 ns/div (Full BW)			≥ 0.707	
		100 mV/div	1 ns/div (Full BW)			≥ 0.707	
		1 V/div	1 ns/div (Full BW)			≥ 0.707	

Table continued…

Analog Bandwidth performance checks							
Channel 6	1 MΩ, typical	1 mV/div	5 ns/div (500 MHz)			≥ 0.707	
		2 mV/div	2.5 ns/div (500 MHz)			≥ 0.707	
		5 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		10 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		50 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		100 mV/div	1 ns/div (500 MHz)			≥ 0.707	
		1 V/div	1 ns/div (500 MHz)			≥ 0.707	

Random Noise High Res acquisition mode test record

Random Noise, High Res acquisition mode unless otherwise noted: 1.5 GHz models				
Performance checks			**50 Ω**	
	V/div	**Bandwidth (Sample acq.mode)**	**Test result (mV)**	**High limit (mV)**
Channel 1	1 mV/div	1.5 GHz		0.635
	2 mV/div	1.5 GHz		0.635
	5 mV/div	1.5 GHz		0.817
	10 mV/div	1.5 GHz		0.843
	20 mV/div	1.5 GHz		0.920
	50 mV/div	1.5 GHz		1.582
	100 mV/div	1.5 GHz		3.686
	1 V/div	1.5 GHz		23.753
Channel 2	1 mV/div	1.5 GHz		0.635
	2 mV/div	1.5 GHz		0.635
	5 mV/div	1.5 GHz		0.817
	10 mV/div	1.5 GHz		0.843
	20 mV/div	1.5 GHz		0.920
	50 mV/div	1.5 GHz		1.582
	100 mV/div	1.5 GHz		3.686
	1 V/div	1.5 GHz		23.753

Table continued…

Random Noise, High Res acquisition mode unless otherwise noted: 1.5 GHz models				
Channel 3	1 mV/div	1.5 GHz		0.635
	2 mV/div	1.5 GHz		0.635
	5 mV/div	1.5 GHz		0.817
	10 mV/div	1.5 GHz		0.843
	20 mV/div	1.5 GHz		0.920
	50 mV/div	1.5 GHz		1.582
	100 mV/div	1.5 GHz		3.686
	1 V/div	1.5 GHz		23.753
Channel 4	1 mV/div	1.5 GHz		0.635
	2 mV/div	1.5 GHz		0.635
	5 mV/div	1.5 GHz		0.817
	10 mV/div	1.5 GHz		0.843
	20 mV/div	1.5 GHz		0.920
	50 mV/div	1.5 GHz		1.582
	100 mV/div	1.5 GHz		3.686
	1 V/div	1.5 GHz		23.753
Six channel models (MSO46)				
Channel 5	1 mV/div	1.5 GHz		0.635
	2 mV/div	1.5 GHz		0.635
	5 mV/div	1.5 GHz		0.817
	10 mV/div	1.5 GHz		0.843
	20 mV/div	1.5 GHz		0.920
	50 mV/div	1.5 GHz		1.582
	100 mV/div	1.5 GHz		3.686
	1 V/div	1.5 GHz		23.753
Channel 6	1 mV/div	1.5 GHz		0.635
	2 mV/div	1.5 GHz		0.635
	5 mV/div	1.5 GHz		0.817
	10 mV/div	1.5 GHz		0.843
	20 mV/div	1.5 GHz		0.920
	50 mV/div	1.5 GHz		1.582
	100 mV/div	1.5 GHz		3.686
	1 V/div	1.5 GHz		23.753

Random Noise, High Res acquisition mode: 1 GHz models				
Performance checks			**50 Ω**	
	V/div	**Bandwidth (Sample acq.mode)**	**Test result (mV)**	**High limit (mV)**

Table continued…

Random Noise, High Res acquisition mode: 1 GHz models				
Channel 1	1 mV/div	1 GHz		0.336
	2 mV/div	1 GHz		0.363
	5 mV/div	1 GHz		0.394
	10 mV/div	1 GHz		0.434
	20 mV/div	1 GHz		0.551
	50 mV/div	1 GHz		1.038
	100 mV/div	1 GHz		2.102
	1 V/div	1 GHz		16.847
Channel 2	1 mV/div	1 GHz		0.336
	2 mV/div	1 GHz		0.363
	5 mV/div	1 GHz		0.394
	10 mV/div	1 GHz		0.434
	20 mV/div	1 GHz		0.551
	50 mV/div	1 GHz		1.038
	100 mV/div	1 GHz		2.102
	1 V/div	1 GHz		16.847
Channel 3	1 mV/div	1 GHz		0.336
	2 mV/div	1 GHz		0.363
	5 mV/div	1 GHz		0.394
	10 mV/div	1 GHz		0.434
	20 mV/div	1 GHz		0.551
	50 mV/div	1 GHz		1.038
	100 mV/div	1 GHz		2.102
	1 V/div	1 GHz		16.847
Channel 4	1 mV/div	1 GHz		0.336
	2 mV/div	1 GHz		0.363
	5 mV/div	1 GHz		0.394
	10 mV/div	1 GHz		0.434
	20 mV/div	1 GHz		0.551
	50 mV/div	1 GHz		1.038
	100 mV/div	1 GHz		2.102
	1 V/div	1 GHz		16.847
Six channel models (MSO46)				

Table continued…

Random Noise, High Res acquisition mode: 1 GHz models				
Channel 5	1 mV/div	1 GHz		0.336
	2 mV/div	1 GHz		0.363
	5 mV/div	1 GHz		0.394
	10 mV/div	1 GHz		0.434
	20 mV/div	1 GHz		0.551
	50 mV/div	1 GHz		1.038
	100 mV/div	1 GHz		2.102
	1 V/div	1 GHz		16.847
Channel 6	1 mV/div	1 GHz		0.336
	2 mV/div	1 GHz		0.363
	5 mV/div	1 GHz		0.394
	10 mV/div	1 GHz		0.434
	20 mV/div	1 GHz		0.551
	50 mV/div	1 GHz		1.038
	100 mV/div	1 GHz		2.102
	1 V/div	1 GHz		16.847

Random Noise, High Res acquisition mode: 500 MHz models						
Performance checks			**1 MΩ**		**50 Ω**	
	V/div	**Bandwidth**	**Test result (mV)**	**High limit (mV)**	**Test result (mV)**	**High limit (mV)**
Channel 1	1 mV/div	500 MHz		0.259		0.259
	2 mV/div	500 MHz		0.259		0.259
	5 mV/div	500 MHz		0.271		0.304
	10 mV/div	500 MHz		0.298		0.356
	20 mV/div	500 MHz		0.363		0.466
	50 mV/div	500 MHz		0.674		1.038
	100 mV/div	500 MHz		1.609		1.596
	1 V/div	500 MHz		18.561		12.85
Channel 2	1 mV/div	500 MHz		0.259		0.259
	2 mV/div	500 MHz		0.259		0.259
	5 mV/div	500 MHz		0.271		0.304
	10 mV/div	500 MHz		0.298		0.356
	20 mV/div	500 MHz		0.363		0.466
	50 mV/div	500 MHz		0.674		1.038
	100 mV/div	500 MHz		1.609		1.596
	1 V/div	500 MHz		18.561		12.85

Table continued…

Random Noise, High Res acquisition mode: 500 MHz models						
Channel 3	1 mV/div	500 MHz		0.259		0.259
	2 mV/div	500 MHz		0.259		0.259
	5 mV/div	500 MHz		0.271		0.304
	10 mV/div	500 MHz		0.298		0.356
	20 mV/div	500 MHz		0.363		0.466
	50 mV/div	500 MHz		0.674		1.038
	100 mV/div	500 MHz		1.609		1.596
	1 V/div	500 MHz		18.561		12.85
Channel 4	1 mV/div	500 MHz		0.259		0.259
	2 mV/div	500 MHz		0.259		0.259
	5 mV/div	500 MHz		0.271		0.304
	10 mV/div	500 MHz		0.298		0.356
	20 mV/div	500 MHz		0.363		0.466
	50 mV/div	500 MHz		0.674		1.038
	100 mV/div	500 MHz		1.609		1.596
	1 V/div	500 MHz		18.561		12.85
Six channel models (MSO46)						
Channel 5	1 mV/div	500 MHz		0.259		0.259
	2 mV/div	500 MHz		0.259		0.259
	5 mV/div	500 MHz		0.271		0.304
	10 mV/div	500 MHz		0.298		0.356
	20 mV/div	500 MHz		0.363		0.466
	50 mV/div	500 MHz		0.674		1.038
	100 mV/div	500 MHz		1.609		1.596
	1 V/div	500 MHz		18.561		12.85
Channel 6	1 mV/div	500 MHz		0.259		0.259
	2 mV/div	500 MHz		0.259		0.259
	5 mV/div	500 MHz		0.271		0.304
	10 mV/div	500 MHz		0.298		0.356
	20 mV/div	500 MHz		0.363		0.466
	50 mV/div	500 MHz		0.674		1.038
	100 mV/div	500 MHz		1.609		1.596
	1 V/div	500 MHz		18.561		12.85

Random Noise, High Res acquisition mode: 350 MHz models						
Performance checks			**1 MΩ**		**50 Ω**	
	V/div	**Bandwidth**	**Test result (mV)**	**High limit (mV)**	**Test result (mV)**	**High limit (mV)**

Table continued…

Random Noise, High Res acquisition mode: 350 MHz models						
Channel 1	1 mV/div	350 MHz		0.181		0.194
	2 mV/div	350 MHz		.0181		0.194
	5 mV/div	350 MHz		0.194		0.239
	10 mV/div	350 MHz		0.206		0.284
	20 mV/div	350 MHz		0.259		0.349
	50 mV/div	350 MHz		0.479		0.739
	100 mV/div	350 MHz		1.141		1.349
	1 V/div	350 MHz		13.239		11.617
Channel 2	1 mV/div	350 MHz		0.181		0.194
	2 mV/div	350 MHz		.0181		0.194
	5 mV/div	350 MHz		0.194		0.239
	10 mV/div	350 MHz		0.206		0.284
	20 mV/div	350 MHz		0.259		0.349
	50 mV/div	350 MHz		0.479		0.739
	100 mV/div	350 MHz		1.141		1.349
	1 V/div	350 MHz		13.239		11.617
Channel 3	1 mV/div	350 MHz		0.181		0.194
	2 mV/div	350 MHz		.0181		0.194
	5 mV/div	350 MHz		0.194		0.239
	10 mV/div	350 MHz		0.206		0.284
	20 mV/div	350 MHz		0.259		0.349
	50 mV/div	350 MHz		0.479		0.739
	100 mV/div	350 MHz		1.141		1.349
	1 V/div	350 MHz		13.239		11.617
Channel 4	1 mV/div	350 MHz		0.181		0.194
	2 mV/div	350 MHz		.0181		0.194
	5 mV/div	350 MHz		0.194		0.239
	10 mV/div	350 MHz		0.206		0.284
	20 mV/div	350 MHz		0.259		0.349
	50 mV/div	350 MHz		0.479		0.739
	100 mV/div	350 MHz		1.141		1.349
	1 V/div	350 MHz		13.239		11.617
Six channel models (MSO46)						

Table continued…

Random Noise, High Res acquisition mode: 350 MHz models						
Channel 5	1 mV/div	350 MHz		0.181		0.194
	2 mV/div	350 MHz		.0181		0.194
	5 mV/div	350 MHz		0.194		0.239
	10 mV/div	350 MHz		0.206		0.284
	20 mV/div	350 MHz		0.259		0.349
	50 mV/div	350 MHz		0.479		0.739
	100 mV/div	350 MHz		1.141		1.349
	1 V/div	350 MHz		13.239		11.617
Channel 6	1 mV/div	350 MHz		0.181		0.194
	2 mV/div	350 MHz		.0181		0.194
	5 mV/div	350 MHz		0.194		0.239
	10 mV/div	350 MHz		0.206		0.284
	20 mV/div	350 MHz		0.259		0.349
	50 mV/div	350 MHz		0.479		0.739
	100 mV/div	350 MHz		1.141		1.349
	1 V/div	350 MHz		13.239		11.617

Random Noise, High Res acquisition mode: 200 MHz models						
Performance checks			**1 MΩ**		**50 Ω**	
	V/div	**Bandwidth**	**Test result (mV)**	**High limit (mV)**	**Test result (mV)**	**High limit (mV)**
Channel 1	1 mV/div	200 MHz		0.181		0.194
	2 mV/div	200 MHz		0.181		0.194
	5 mV/div	200 MHz		0.194		0.239
	10 mV/div	200 MHz		0.206		0.284
	20 mV/div	200 MHz		0.259		0.349
	50 mV/div	200 MHz		0.479		0.739
	100 mV/div	200 MHz		1.141		1.349
	1 V/div	200 MHz		13.239		11.617
Channel 2	1 mV/div	200 MHz		0.181		0.194
	2 mV/div	200 MHz		0.181		0.194
	5 mV/div	200 MHz		0.194		0.239
	10 mV/div	200 MHz		0.206		0.284
	20 mV/div	200 MHz		0.259		0.349
	50 mV/div	200 MHz		0.479		0.739
	100 mV/div	200 MHz		1.141		1.349
	1 V/div	200 MHz		13.239		11.617

Table continued…

Random Noise, High Res acquisition mode: 200 MHz models						
Channel 3	1 mV/div			0.181		0.194
	2 mV/div			0.181		0.194
	5 mV/div			0.194		0.239
	10 mV/div			0.206		0.284
	20 mV/div			0.259		0.349
	50 mV/div			0.479		0.739
	100 mV/div			1.141		1.349
	1 V/div			13.239		11.617
Channel 4	1 mV/div			0.181		0.194
	2 mV/div			0.181		0.194
	5 mV/div			0.194		0.239
	10 mV/div			0.206		0.284
	20 mV/div			0.259		0.349
	50 mV/div			0.479		0.739
	100 mV/div			1.141		1.349
	1 V/div			13.239		11.617
Six channel models (MSO46)						
Channel 5	1 mV/div			0.181		0.194
	2 mV/div			0.181		0.194
	5 mV/div			0.194		0.239
	10 mV/div			0.206		0.284
	20 mV/div			0.259		0.349
	50 mV/div			0.479		0.739
	100 mV/div			1.141		1.349
	1 V/div			13.239		11.617
Channel 6	1 mV/div			0.181		0.194
	2 mV/div			0.181		0.194
	5 mV/div			0.194		0.239
	10 mV/div			0.206		0.284
	20 mV/div			0.259		0.349
	50 mV/div			0.479		0.739
	100 mV/div			1.141		1.349
	1 V/div			13.239		11.617

Long term sample rate through AFG DC offset accuracy test records

Long Term Sample Rate			
Performance checks	**Low limit**	**Test result**	**High limit**
Long Term Sample Rate	-2 divisions		+2 divisions

Digital Threshold Accuracy, typical						
Performance checks:						
Digital channel	**Threshold**	V_{s-}	V_{s+}	**Low limit**	**Test result**	**High limit**
All models						
Channel 1						
D0	0 V			-0.1 V		0.1 V
D1	0 V			-0.1 V		0.1 V
D2	0 V			-0.1 V		0.1 V
D3	0 V			-0.1 V		0.1 V
D4	0 V			-0.1 V		0.1 V
D5	0 V			-0.1 V		0.1 V
D6	0 V			-0.1 V		0.1 V
D7	0 V			-0.1 V		0.1 V
Channel 2						
D0	0 V			-0.1 V		0.1 V
D1	0 V			-0.1 V		0.1 V
D2	0 V			-0.1 V		0.1 V
D3	0 V			-0.1 V		0.1 V
D4	0 V			-0.1 V		0.1 V
D5	0 V			-0.1 V		0.1 V
D6	0 V			-0.1 V		0.1 V
D7	0 V			-0.1 V		0.1 V
Channel 3						
D0	0 V			-0.1 V		0.1 V
D1	0 V			-0.1 V		0.1 V
D2	0 V			-0.1 V		0.1 V
D3	0 V			-0.1 V		0.1 V
D4	0 V			-0.1 V		0.1 V
D5	0 V			-0.1 V		0.1 V
D6	0 V			-0.1 V		0.1 V
D7	0 V			-0.1 V		0.1 V
Channel 4						
D0	0 V			-0.1 V		0.1 V
D1	0 V			-0.1 V		0.1 V
D2	0 V			-0.1 V		0.1 V
D3	0 V			-0.1 V		0.1 V
D4	0 V			-0.1 V		0.1 V

Table continued…

Digital Threshold Accuracy, typical						
D5	0 V			-0.1 V		0.1 V
D6	0 V			-0.1 V		0.1 V
D7	0 V			-0.1 V		0.1 V
MSO46 models						
Channel 5						
D0	0 V			-0.1 V		0.1 V
D1	0 V			-0.1 V		0.1 V
D2	0 V			-0.1 V		0.1 V
D3	0 V			-0.1 V		0.1 V
D4	0 V			-0.1 V		0.1 V
D5	0 V			-0.1 V		0.1 V
D6	0 V			-0.1 V		0.1 V
D7	0 V			-0.1 V		0.1 V
Channel 6						
D0	0 V			-0.1 V		0.1 V
D1	0 V			-0.1 V		0.1 V
D2	0 V			-0.1 V		0.1 V
D3	0 V			-0.1 V		0.1 V
D4	0 V			-0.1 V		0.1 V
D5	0 V			-0.1 V		0.1 V
D6	0 V			-0.1 V		0.1 V
D7	0 V			-0.1 V		0.1 V

AUX Out output voltage levels				
Performance checks	**Vout**	**Low limit**	**Test result**	**High limit**
Output levels, 1 MΩ input impedance	Max	≥ 2.5 V		n/a
	Min	n/a		≤ 700 mV
Output levels, 50 Ω Input Impedance,	Max	≥ 2.5 V		n/a
	Min	n/a		≤ 250 mV

DVM voltage accuracy (DC)					
Channel 1					
Vertical Scale	Input Voltage	Offset Voltage	Low limit	Test result	High limit
1	–5	–5	-5.125		-4.875
0.5	–2	–2	-2.06		-1.94
0.5	–1	–0.5	-1.06		-0.94

Table continued…

DVM voltage accuracy (DC)					
0.2	–0.5	–0.5	-0.5225		-0.4775
0.01	0.002	0	0.00097		0.00303
0.2	0.5	0.5	0.4775		0.5225
0.5	1	0.5	0.94		1.06
0.5	2	2	1.94		2.06
1	5	5	4.875		5.125
Channel 2					
Vertical Scale	Input Voltage	Offset Voltage	Low limit	Test result	High limit
1	–5	–5	-5.125		-4.875
0.5	–2	–2	-2.06		-1.94
0.5	–1	–0.5	-1.06		-0.94
0.2	–0.5	–0.5	-0.5225		-0.4775
0.01	0.002	0	0.00097		0.00303
0.2	0.5	0.5	0.4775		0.5225
0.5	1	0.5	0.94		1.06
0.5	2	2	1.94		2.06
1	5	5	4.875		5.125
Channel 3					
Vertical Scale	Input Voltage	Offset Voltage	Low limit	Test result	High limit
1	-5	-5	-5.125		-4.875
0.5	-2	-2	-2.06		-1.94
0.5	-1	-0.5	-1.06		-0.94
0.2	-0.5	-0.5	-0.5225		-0.4775
0.01	0.002	0	0.00097		0.00303
0.2	0.5	0.5	0.4775		0.5225
0.5	1	0.5	0.94		1.06
0.5	2	2	1.94		2.06
1	5	5	4.875		5.125
Channel 4					
Vertical Scale	Input Voltage	Offset Voltage	Low limit	Test result	High limit
1	-5	-5	-5.125		-4.875
0.5	-2	-2	-2.06		-1.94
0.5	–1	-0.5	-1.06		-0.94
0.2	-0.5	-0.5	-0.5225		-0.4775
0.01	0.002	0	0.00097		0.00303
0.2	0.5	0.5	0.4775		0.5225
0.5	1	0.5	0.94		1.06
0.5	2	2	1.94		2.06

Table continued…

DVM voltage accuracy (DC)					
1	5	5	4.875		5.125

DVM voltage accuracy (DC)					
MSO46 models					
Channel 5					
Vertical Scale	Input Voltage	Offset Voltage	Low limit	Test result	High limit
1	-5	-5	-5.125		-4.875
0.5	-2	-2	-2.06		-1.94
0.5	-1	-0.5	-1.06		-0.94
0.2	-0.5	-0.5	-0.5225		-0.4775
0.01	0.002	0	0.00097		0.00303
0.2	0.5	0.5	0.4775		0.5225
0.5	1	0.5	0.94		1.06
0.5	2	2	1.94		2.06
1	5	5	4.875		5.125
Channel 6					
Vertical Scale	Input Voltage	Offset Voltage	Low limit	Test result	High limit
1	-5	-5	-5.125		-4.875
0.5	-2	-2	-2.06		-1.94
0.5	-1	-0.5	-1.06		-0.94
0.2	-0.5	-0.5	-0.5225		-0.4775
0.01	0.002	0	0.00097		0.00303
0.2	0.5	0.5	0.4775		0.5225
0.5	1	0.5	0.94		1.06
0.5	2	2	1.94		2.06
1	5	5	4.875		5.125

DVM voltage accuracy (AC)				
All models				
Channel 1				
Vertical Scale	Input Signal	Low limit	Test result	High limit
5 mV	20 mV_{pp} at 1 kHz	9.800 mV		10.200 mV
10 mV	50 mV_{pp} at 1 kHz	24.5 mV		25.500 mV
100 mV	0.5 V_{pp} at 1 kHz	245.000 mV		255.000 mV
200 mV	1 V_{pp} at 1 kHz	490.000 mV		510.000 mV
1 V	5 V_{pp} at 1 kHz	2.450 mV		2.550 mV
Channel 2				

Table continued…

DVM voltage accuracy (AC)				
Vertical Scale	Input Signal	Low limit	Test result	High limit
5 mV	20 mV_{pp} at 1 kHz	9.800 mV		10.200 mV
10 mV	50 mV_{pp} at 1 kHz	24.5 mV		25.500 mV
100 mV	0.5 V_{pp} at 1 kHz	245.000 mV		255.000 mV
200 mV	1 V_{pp} at 1 kHz	490.000 mV		510.000 mV
1 V	5 V_{pp} at 1 kHz	2.450 mV		2.550 mV
Channel 3				
Vertical Scale	Input Signal	Low limit	Test result	High limit
5 mV	20 mV_{pp} at 1 kHz	9.800 mV		10.200 mV
10 mV	50 mV_{pp} at 1 kHz	24.5 mV		25.500 mV
100 mV	0.5 V_{pp} at 1 kHz	245.000 mV		255.000 mV
200 mV	1 V_{pp} at 1 kHz	490.000 mV		510.000 mV
1 V	5 V_{pp} at 1 kHz	2.450 mV		2.550 mV
Channel 4				
Vertical Scale	Input Signal	Low limit	Test result	High limit
5 mV	20 mV_{pp} at 1 kHz	9.800 mV		10.200 mV
10 mV	50 mV_{pp} at 1 kHz	24.5 mV		25.500 mV
100 mV	0.5 V_{pp} at 1 kHz	245.000 mV		255.000 mV
200 mV	1 V_{pp} at 1 kHz	490.000 mV		510.000 mV
1 V	5 V_{pp} at 1 kHz	2.450 mV		2.550 mV
MSO46 models				
Channel 5				
Vertical Scale	Input Signal	Low limit	Test result	High limit
5 mV	20 mV_{pp} at 1 kHz	9.800 mV		10.200 mV
10 mV	50 mV_{pp} at 1 kHz	24.5 mV		25.500 mV
100 mV	0.5 V_{pp} at 1 kHz	245.000 mV		255.000 mV
200 mV	1 V_{pp} at 1 kHz	490.000 mV		510.000 mV
1 V	5 V_{pp} at 1 kHz	2.450 mV		2.550 mV
Channel 6				
Vertical Scale	Input Signal	Low limit	Test result	High limit
5 mV	20 mV_{pp} at 1 kHz	9.800 mV		10.200 mV
10 mV	50 mV_{pp} at 1 kHz	24.5 mV		25.500 mV
100 mV	0.5 V_{pp} at 1 kHz	245.000 mV		255.000 mV
200 mV	1 V_{pp} at 1 kHz	490.000 mV		510.000 mV
1 V	5 V_{pp} at 1 kHz	2.450 mV		2.550 mV

Trigger frequency accuracy and trigger frequency counter maximum input frequency				
All models				
Channel 1	Hz	Low limit	Test result	High limit
	100 Hz	99.99974 Hz		100.00026 Hz
	1 kHz	999.9974 Hz		1.0000026 KHz
	10 kHz	9.999974 KHz		10.000026 kHz
	100 kHz	99.99974 kHz		100.00026 kHz
	1 MHz	999.9974 kHz		1.0000026 MHz
	10 MHz	9.999974 kHz		10.000026 MHz
	100 MHz	99.99974 MHz		100.00026 MHz
	1 GHz [6]	999.9974 MHz		1.0000026 GHz
	1.5 GHz [7]	1.499994 GHz		1.5000051 GHz
Channel 2	Hz	Low limit	Test result	High limit
	100 Hz	99.99974 Hz		100.00026 Hz
	1 kHz	999.9974 Hz		1.0000026 KHz
	10 kHz	9.999974 KHz		10.000026 kHz
	100 kHz	99.99974 kHz		100.00026 kHz
	1 MHz	999.9974 kHz		1.0000026 MHz
	10 MHz	9.999974 kHz		10.000026 MHz
	100 MHz	99.99974 MHz		100.00026 MHz
	1 GHz[6]	999.9974 MHz		1.0000026 GHz
	1.5 GHz[7]	1.499994 GHz		1.5000051 GHz
Channel 3	Hz	Low limit	Test result	High limit
	100 Hz	99.99974 Hz		100.00026 Hz
	1 kHz	999.9974 Hz		1.0000026 KHz
	10 kHz	9.999974 KHz		10.000026 kHz
	100 kHz	99.99974 kHz		100.00026 kHz
	1 MHz	999.9974 kHz		1.0000026 MHz
	10 MHz	9.999974 kHz		10.000026 MHz
	100 MHz	99.99974 MHz		100.00026 MHz
	1 GHz[6]	999.9974 MHz		1.0000026 GHz
	1.5 GHz[7]	1.499994 GHz		1.5000051 GHz

Table continued…

6 1 GHz models only.
7 1.5 GHz models only.

Trigger frequency accuracy and trigger frequency counter maximum input frequency				
Channel 4	Hz	Low limit	Test result	High limit
	100 Hz	99.99974 Hz		100.00026 Hz
	1 kHz	999.9974 Hz		1.0000026 KHz
	10 kHz	9.999974 KHz		10.000026 kHz
	100 kHz	99.99974 kHz		100.00026 kHz
	1 MHz	999.9974 kHz		1.0000026 MHz
	10 MHz	9.999974 kHz		10.000026 MHz
	100 MHz	99.99974 MHz		100.00026 MHz
	1 GHz[6]	999.9974 MHz		1.0000026 GHz
	1.5 GHz[7]	1.499994 GHz		1.5000051 GHz

Trigger frequency accuracy and trigger frequency counter maximum input frequency				
MSO46 models				
Channel 5	Hz	Low limit	Test result	High limit
	100 Hz	99.99974 Hz		100.00026 Hz
	1 kHz	999.9974 Hz		1.0000026 KHz
	10 kHz	9.999974 KHz		10.000026 kHz
	100 kHz	99.99974 kHz		100.00026 kHz
	1 MHz	999.9974 kHz		1.0000026 MHz
	10 MHz	9.999974 kHz		10.000026 MHz
	100 MHz	99.99974 MHz		100.00026 MHz
	1 GHz[6]	999.9974 MHz		1.0000026 GHz
	1.5 GHz[7]	1.499994 GHz		1.5000051 GHz
Channel 6	Hz	Low limit	Test result	High limit
	100 Hz	99.99974 Hz		100.00026 Hz
	1 kHz	999.9974 Hz		1.0000026 KHz
	10 kHz	9.999974 KHz		10.000026 kHz
	100 kHz	99.99974 kHz		100.00026 kHz
	1 MHz	999.9974 kHz		1.0000026 MHz
	10 MHz	9.999974 kHz		10.000026 MHz
	100 MHz	99.99974 MHz		100.00026 MHz
	1 GHz[6]	999.9974 MHz		1.0000026 GHz
	1.5 GHz[7]	1.499994 GHz		1.5000051 GHz

AFG sine and ramp frequency accuracy
Performance checks

Table continued…

AFG sine and ramp frequency accuracy				
	Waveform type	**Minimum**	**Test result**	**Maximum**
	Sine	0.999950 MHz		1.000050 MHz
	Ramp	499.975 kHz		500.025 kHz

AFG square and pulse frequency accuracy				
Performance checks				
	Waveform type	**Minimum**	**Test result**	**Maximum**
	Sine	0.999950 MHz		1.000050 MHz
	Pulse	0.999950 MHz		500.025 kHz

AFG signal amplitude accuracy				
Performance checks				
	Amplitude	**Minimum**	**Test result**	**Maximum**
	30.0 mV$_{PP}$	28.55 mV$_{PP}$		31.45 mV$_{PP}$
	300.0 mV$_{PP}$	294.5 mV$_{PP}$		305.5 mV$_{PP}$
	800.0 mV$_{PP}$	787.0 mV$_{PP}$		813.0 mV$_{PP}$
	1.500 V$_{PP}$	1.4765 V$_{PP}$		1.5235 V$_{PP}$
	2.000 V$_{PP}$	1.9690 V$_{PP}$		2.0310 V$_{PP}$
	2.500 V$_{PP}$	2.4615 V$_{PP}$		2.5385 V$_{PP}$

AFG DC offset accuracy				
Performance checks				
	Offset	**Minimum**	**Test result**	**Maximum**
	1.25 V	1.23025 Vdc		1.26975 Vdc
	0 V	-0.001 Vdc		+0.001 Vdc
	-1.25 V	-1.26975		-1.23025 Vdc

Performance tests

This section contains a collection of manual procedures for checking that the instrument performs as warranted. They check all the characteristics that are designated as checked in *Specifications.* (The characteristics that are checked appear with a ✓ in *Specifications*).

Prerequisites

The tests in this section comprise an extensive, valid confirmation of performance and functionality when the following requirements are met:

- The instrument must be in its normal operating configuration (no covers removed).
- You must have performed and passed the procedures under *Self Test*. (See *Self test* on page 77.)
- A signal-path compensation must have been done within the recommended calibration interval and at a temperature within ±5 ºC (±9 ºF) of the present operating temperature. (If the temperature was within the limits just stated at the time you did the prerequisite *Self Test,* consider this prerequisite met). A signal-path compensation must have been done at an ambient humidity within 25% of the current ambient humidity and after having been at that humidity for at least 4 hours.

- The instrument must have been last adjusted at an ambient temperature between +18 ºC and +28 ºC (+64 ºF and +82 ºF), must have been operating for a warm-up period of at least 20 minutes, and must be operating at an ambient temperature as listed in the specifications. The warm-up requirement is usually met in the course of meeting the Self Test prerequisites listed above.
- The instrument must be powered from a source maintaining voltage and frequency within the limits described in the *Specifications* section.
- The instrument must be in an environment with temperature, altitude, humidity, and vibration within the operating limits described in the *Specifications* section.

Self test

This procedure verifies that the instrument passes the internal diagnostics and performs signal path compensation. No test equipment or hookups are required.

Equipment required	Prerequisites
None	Power on the instrument and allow a 20 minute warm-up period before performing this procedure.

1. *Run the System Diagnostics (may take a few minutes):*
   a. Disconnect all probes and/or cables from the oscilloscope inputs.
   b. Tap **Utility > Self Test**. This displays the **Self Test** configuration menu.
   c. Tap the **Run Self Test** button.
   d. The internal diagnostics perform an exhaustive verification of proper instrument function. This verification may take several minutes. When the verification is finished, the status of each self test is shown in the menu.
   e. Verify that the status of all tests is **Pass**.
   f. Tap anywhere outside the menu to exit the menu.
2. *Run the signal-path compensation routine (may take 5 to 15 minutes per channel):*
   a. Tap **Utility > Calibration**. This displays the **Calibration** configuration menu.
   b. Tap the **Run SPC** button to start the routine.
   c. Signal-path compensation may take 5 to 15 minutes to run per channel.
   d. Verify that the **SPC Status** is **Passed**.
3. *Return to regular service:* Tap anywhere outside the menu to exit the **Calibration** menu.

The self test procedures are completed. If any of the above tests failed, run the tests again. If there are still failures, contact Tektronix Customer Support.

⚠ **Note:** You cannot run the remaining performance tests until the self tests pass and the SPC has successfully run.

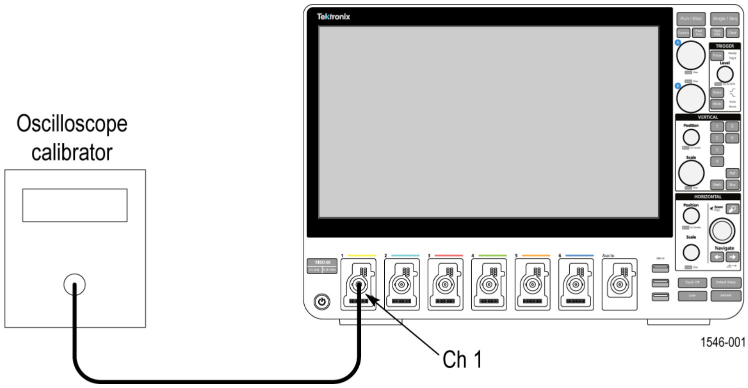
Check input impedance

This test checks the input impedance on all channels.

1. Connect the output of the oscilloscope calibrator (for example, Fluke 9500) to the oscilloscope channel 1 input, as shown in the following illustration.

   ⚠ **Warning:** Be sure to set the generator to Off or 0 volts before connecting, disconnecting, and/or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

   ⚠ **Note:** Impedance measuring equipment that produces a voltage across the channel that exceeds the measurement range of the instrument may report erroneous impedance results. A measurement voltage exceeds the measurement range of the instrument when the resulting trace is not visible on the graticule.

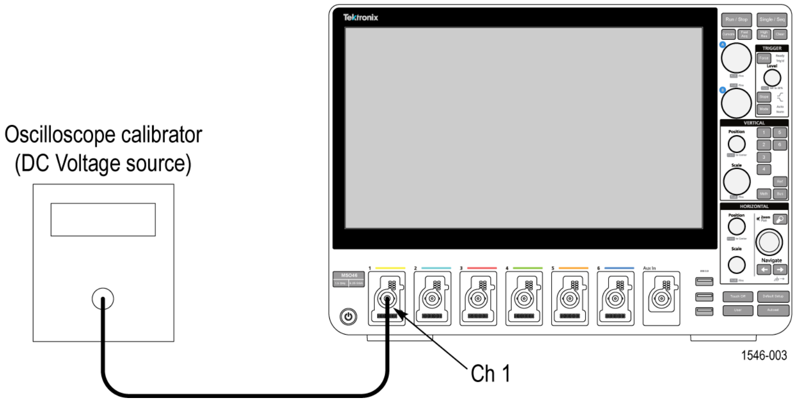


2. Set the calibrator to measure 1 MΩ impedance.
3. Tap **File** > **Default Setup**.
4. *Test 1 MΩ input impedance as follows:*
   a. Tap the channel **1** button on the Settings bar.
   b. Double tap the **Ch 1** badge to open its menu.
   c. Set **Termination** to **1 MΩ**.
   d. Set the **Vertical Scale** to the value to test in the test record (first value is **10 mV/div**).
5. Use the calibrator to measure the input impedance of the oscilloscope and enter the value in the test record.
6. Repeat steps *4.d* on page 78 and *5* on page 78 for all vertical scale settings in the test record for the channel.
7. *Test 50 Ω input impedance as follows:*
   a. Set the calibrator impedance to measure 50 Ω impedance.
   b. Double-tap the **Ch 1** badge and set **Termination** to **50 Ω**.
   c. Repeat steps *4.d* on page 78 through *6* on page 78 for all vertical scale settings in the test record for the channel.
8. *Repeat the procedures for all remaining channels as follows:*
   a. Turn the calibrator output Off.
   b. Move the calibrator connection to the next channel to test.
   c. Double-tap the channel badge of the channel that you have finished testing and set **Display** to **Off**.
   d. Tap the channel button on the Settings bar of the next channel to test.
   e. Starting from step *2* on page 78, repeat the procedures until all channels have been tested.

Check DC gain accuracy

This test checks the DC gain accuracy.

1. Connect the oscilloscope to a calibrated DC voltage source. If you are using the Fluke 9500 calibrator, connect the calibrator head to the oscilloscope channel to test.



Warning: Set the generator output to Off or 0 volts before connecting, disconnecting, and/or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

2. Tap **File** > **Default Setup**.
3. Double-tap the **Acquisition** badge and set **Acquisition Mode** to **Average**.
4. Set the **Number of Waveforms** to **16**.
5. Tap outside the menu to close the menu.
6. Double-tap the **Trigger** badge and set the trigger **Source** to **AC line**.
7. Tap outside the menu to close it.
8. Add the **Mean** measurement to the Results bar:
   a. Tap the **Add New... Measure** button to open the **Add Measurements** menu.
   b. Set the **Source** to **Ch 1**.
   c. In the **Amplitude Measurements** panel, double-tap the **Mean** button to add the Mean measurement badge to the Results bar.
9. Tap outside the menu to close it.
10. Double-tap the **Mean** results badge.
11. Tap **Show Statistics in Badge**.
12. Tap **FILTER/LIMIT RESULTS** to open the panel.
13. Tap **Limit Measurement Population** to toggle it to **On.**
14. Tap outside the menu to close it.
15. Tap the channel button of the channel to test, to add the channel badge to the Settings bar.
16. Double tap the channel to test badge to open its menu and set the channel settings:
   a. Set **Vertical Scale** to **1 mV/div**.
   b. Set **Termination** to **50 Ω**.
   c. Tap **Bandwidth Limit** and set to **20 MHz**.
   d. Tap outside the menu to close it.
17. Record the negative-measured and positive-measured mean readings in the *Expected gain worksheet* as follows:
   a. On the calibrator, set the DC Voltage Source to the $V_{negative}$ value as listed in the 1 mV row of the worksheet.
   b. Double-tap the **Acquisition** badge and tap **Clear** to reset the measurement statistics.
   c. Enter the **Mean** reading in the worksheet as $V_{negative-measured}$.
   d. On the calibrator, set the DC Voltage Source to $V_{positive}$ value as listed in the 1 mV row of the worksheet.
   e. Double-tap the **Acquisition** badge (if not open) and tap **Clear**.
   f. Enter the **Mean** reading in the worksheet as $V_{positive-measured}$.

Table 1: Expected gain worksheet

Oscilloscope vertical scale setting	$V_{diffExpected}$	$V_{negative}$	$V_{positive}$	$V_{negative-measured}$	$V_{positive-measured}$	V_{diff}	Test result (Gain accuracy)
1 mV/div	7 mV	-3.5 mV	+3.5 mV				
2 mV/div	14 mV	-7 mV	+7 mV				
5 mV/div	35 mV	-17.5 mV	+17.5 mV				
10 mV/div	70 mV	-35 mV	+35 mV				
20 mV/div	140 mV	-70 mV	+70 mV				
50 mV/div	350 mV	-175 mV	+175 mV				
100 mV/div	700 mV	-350 mV	+350 mV				

Table continued…

Oscilloscope vertical scale setting	$V_{diffExpected}$	$V_{negative}$	$V_{positive}$	$V_{negative\text{-}measured}$	$V_{positive\text{-}measured}$	V_{diff}	Test result (Gain accuracy)
200 mV/div	1400 mV	-700 mV	+700 mV				
500 mV/div	3500 mV	-1750 mV	+1750 mV				
1.0 V/div	7000 mV	-3500 mV	+3500 mV				
20 mV/div at 250 MHz	140 mV	-70 mV	+70 mV				
20 mV/div at Full BW	140 mV	-70 mV	+ 70 mV				

18. Calculate Gain Accuracy as follows:

a. Calculate V_{diff} as follows:

$V_{diff} = | V_{negative\text{-}measured} - V_{positive\text{-}measured} |$

b. Enter V_{diff} in the worksheet.

c. Calculate *Gain Accuracy* as follows:

Gain Accuracy $= ((V_{diff} - V_{diffExpected})/V_{diffExpected}) \times 100\%$

d. Enter the *Gain Accuracy* value in the worksheet and in the test record.

19. Repeat steps *16* on page 79 through *18* on page 80 for all vertical scale settings in the work sheet and the test record.

20. *Repeat tests at 1 MΩ impedance as follows:*

a. Set the calibrator to **0** volts and **1 MΩ** output impedance.

b. Double-tap the badge of the channel being tested.

c. Set the **Termination** to **1 MΩ**

d. Repeat steps *16* on page 79 through *19* on page 80 for all vertical scale settings in the test record.

21. *Repeat the procedure for all remaining channels:*

a. Set the calibrator to **0** volts and **50 Ω** output impedance.

b. Move the calibrator output to the next channel input to be tested.

c. Double-tap the channel badge of the channel that you have finished testing and set **Display** to **Off**.

d. Double-tap the **Mean** measurement badge.

e. Tap the **Configure** panel.

f. Tap the **Source 1** field and select the next channel to test.

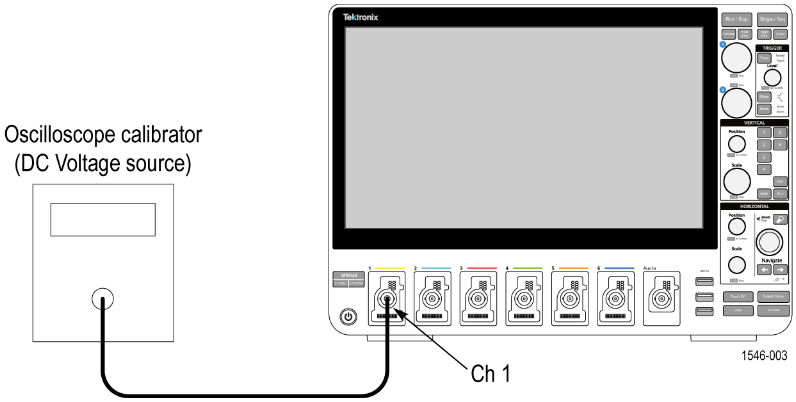
g. Starting from step*16* on page 79, set the values from the test record for the channel under test, and repeat the above steps until all channels have been tested.

22. Touch outside a menu to close the menu.

Check DC offset accuracy

This test checks the offset accuracy at 50 Ω and 1 MΩ input impedances.

1. Connect the oscilloscope to a calibrated DC voltage source. If you are using the Fluke 9500B calibrator as the DC voltage source, connect the calibrator head to the oscilloscope channel 1.



Warning: Set the generator output to Off or 0 volts before connecting, disconnecting, or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

2. Tap **File** > **Default Setup**.
3. Double-tap the **Acquisition** badge and set **Acquisition Mode** to **Average**.
4. Set the **Number of Waveforms** to **16**.
5. Tap outside the menu to close the menu.
6. Double-tap the **Trigger** badge and set the trigger **Source** to **AC line**.
7. Add the **Mean** measurement to the Results bar:
   a. Tap the **Add New... Measure** button to open the **Add Measurements** menu.
   b. Set the **Source** to **Ch 1**.
   c. In the **Amplitude Measurements** panel, double-tap the **Mean** button to add the Mean measurement badge to the Results bar.
8. Tap outside the menu to close it.
9. Double-tap the **Mean** results badge.
10. Tap **Show Statistics in Badge**.
11. Tap **FILTER/LIMIT RESULTS** to open the panel.
12. Tap **Limit Measurement Population** to toggle it to **On.**
13. Tap outside the menu to close it.
14. Tap the channel button on the Settings bar to add the channel under test to the Settings bar.
15. Double-tap the channel under test badge to open its configuration menu and change the vertical settings:
   a. Set **Vertical Scale** to **1 mV/div**.
   b. Set **Offset** to **900 mV**.
   c. Set **Position** to 0 by tapping **Set to 0**.
   d. Set **Termination** to **50 Ω**.
   e. Tap **Bandwidth Limit** and set to **20 MHz**.
   f. Tap outside the menu to close it.
16. Set the calibrator output to **+900 mV**, as shown in the test record, and turn the calibrator output On.
17. Enter the Mean measurement value in the test record.
18. Double-tap the channel under test badge to open its configuration menu and change the **Offset** to **-900 mV**.
19. Set the calibrator output to **-900 mV**, as shown in the test record.
20. Enter the Mean measurement value in the test record.
21. Repeat step *15* on page 81 through *20* on page 81, changing the channel vertical settings and the calibrator output as listed in the test record for the channel under test.
22. *Repeat the channel tests at 1 MΩ impedance as follows:*
   a. Set the calibrator output to Off or 0 volts.

- **b.** Change the calibrator impedance to **1 MΩ** and voltage to **+900 mV**.
- **c.** Turn the calibrator output On.
- **d.** Repeat steps *15* on page 81 through *20* on page 81, changing the channel **Termination** to **1 MΩ** and the vertical Offset value and the calibrator output as listed in the 1`MΩ test record for the channel under test.

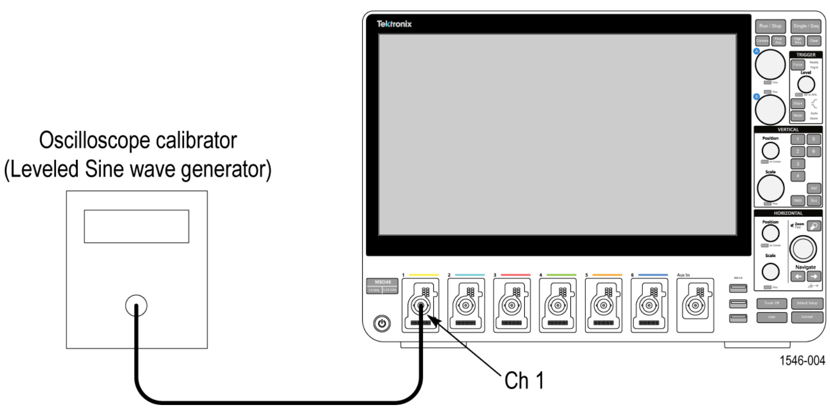
23. *Repeat the procedure for all remaining channels as follows:*

- **a.** Double-tap the **Mean** measurement badge.
- **b.** Tap the **Configure** panel.
- **c.** Tap the **Source 1** field and select the next channel to test.
- **d.** Set the calibrator to **0** volts and **50 Ω** output impedance.
- **e.** Move the calibrator output to the next channel input to test.
- **f.** Double-tap the channel badge of the channel that you have finished testing and set **Display** to **Off**.
- **g.** Tap the channel button on the oscilloscope Settings bar of the next channel to test.
- **h.** Starting from step , repeat the procedure until all channels have been tested.

Check analog bandwidth

This test checks the bandwidth at 50 Ω and 1 MΩ terminations for each channel. The typical bandwidth at 1 M Ω termination is checked on the products as a functional check.

1. Connect the output of the calibrated leveled sine wave generator to the oscilloscope channel 1 input as shown in the following illustration.



Warning: Set the generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

2. Tap **File** > **Default Setup** to reset the instrument and add the channel 1 badge and signal to the display.

3. *Add the peak-to-peak measurement as follows:*

- **a.** Tap the **Add New. Measure** button.
- **b.** Set the **Source** to the channel under test.
- **c.** In the **Amplitude Measurements** panel, double-tap the **Peak-to-Peak** measurement button to add the measurement badge to the Results bar.
- **d.** Tap outside the menu to close it.
- **e.** Double-tap the **Peak-to-Peak** results badge.
- **f.** Tap **Show Statistics in Badge**.
- **g.** Tap **FILTER/LIMIT RESULTS** to open the panel.
- **h.** Tap **Limit Measurement Population** to toggle it to **On.**
- **i.** Tap outside the menu to close it.

4. Set the channel under test settings:

   a. Double-tap the badge of the channel under test to open its configuration menu.
   b. Set **Vertical Scale** to **1 mV/div**.
   c. Set **Termination** to **50 Ω**.
   d. Tap outside the menu to close it.

5. Adjust the leveled sine wave signal source to display a waveform of 8 vertical divisions at the selected vertical scale with a set frequency of **10 MHz**. For example, at 5 mV/div, use a ≥40 mV$_{p\text{-}p}$ signal; at 2 mV/div, use a ≥16 mV$_{p\text{-}p}$ signal.

   Note: At some V/div settings, the generator may not provide 8 vertical divisions of signal. Set the generator output to obtain as many vertical divisions of signal as possible.

6. Double-tap the **Horizontal** badge in the Settings bar.
7. Set the **Horizontal Scale** to **1 ms/division**.
8. Tap outside the menu to close it.
9. Record the **Peak-to-Peak** measurement in the **V** $_{in\text{-}pp}$ entry of the test record.
10. Double-tap the **Horizontal** badge in the Settings bar.
11. Set the **Horizontal Scale** to **4 ns/division** .
12. Adjust the signal source to the maximum bandwidth frequency for the bandwidth and model being tested.
13. *Record the peak-to-peak measurement as follows:*

    a. Record the **Peak-to-Peak** measurement at the new frequency in the **V** $_{bw\text{-}pp}$ entry of the test record.

14. Use the values of *V bw-pp* and *V in-pp* recorded in the test record, and the following equation, to calculate the Gain at bandwidth:

    Gain = Vbw-pp / Vin-pp.

    To pass the performance measurement test, Gain should be ≥ 0.707. Enter *Gain* in the test record.

15. Repeat steps *4* on page 82 through *14* on page 83 for all combinations of Vertical Scale settings listed in the test record.
16. *Repeat the tests at 1 MΩ impedance as follows:*

    a. Set the calibrator output to Off or 0 volts.
    b. Change the calibrator impedance to **1 MΩ**.
    c. Double-tap the badge of the channel under test to open its menu.
    d. Set the **Termination** to **1 MΩ**.
    e. Repeat steps *4* on page 82 through *16* on page 83 , but leave the termination set to **1 MΩ** .

17. *Repeat the test for all remaining channels as follows:*

    a. Set the calibrator to **0** volts and **50 Ω** output impedance.
    b. Move the calibrator output to the next channel input to be tested.
    c. Double-tap the channel badge of the channel that you have finished testing and set **Display** to **Off**.
    d. Tap the channel button on the oscilloscope Settings bar of the next channel to test.
    e. Double-tap the **Peak-to-Peak** measurement badge.
    f. Tap the **Configure** panel.
    g. Tap the **Source 1** field and select the next channel to test.
    h. Starting from step *4* on page 82, repeat the procedure until all channels have been tested.

Check random noise

This test checks random noise at 1 M Ω and 50 Ω for each channel, in HiRes acquisition mode. You do not need to connect any test equipment to the oscilloscope for this test.

1. Disconnect everything from the oscilloscope inputs.
2. Tap **File** > **Default Setup**.
3. Turn on **HiRes** Mode except for 1.5`GHz instruments. 1.5`GHz instruments must be tested in **Sample** mode.
4. Add the **AC RMS** measurement:

   a. Tap the **Add New... Measure** button.
   b. Set the **Source** to the channel being tested.
   c. In the **Amplitude Measurements** panel, double-tap the **AC RMS** measurement button to add the measurement badge to the Results bar.
   d. Tap outside the menu to close it.
   e. Double-tap the **AC RMS** measurement badge and tap **Show Statistics in Badge** to display statistics in the measurement badge.
   f. Tap the **Filter / Limit Results** panel.
   g. Turn on **Limit Measurement Population**.
   h. Set the limit to **100**.
   i. Tap outside the menu to close it.
5. Set up the Horizontal mode:
   a. Double-tap the **Horizontal** setting badge.
   b. Set **Horizontal Mode** to **Manual**.
   c. Set the **Record Length** to **2 Mpts**.
   d. Tap outside the menu to close it.
6. Double-tap the Channel badge of the channel being tested.
7. Set the **Vertical Scale** value to **1 mV**.
8. *Check **1 M Ω** termination as follows:*
   a. In the Channel badge menu, tap **1 M Ω** termination.
   b. Tap the **Bandwidth Limit** field and select the highest frequency listed.
   c. Set the channel **Position** value to **340 mdivs**.
   d. Once the measurement count (N) in the AC RMS measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   e. Set the channel vertical **Position** value to **360 mdivs**.
   f. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   g. Average the two values and record the result in the **1 mV/div > Full** row of the **1 MΩ** column of the Test Result record.
   h. In the channel badge menu, tap the **Bandwidth Limit** field and select **250 MHz**.
   i. Set the channel vertical **Position** value to **340 mdivs**.
   j. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   k. Set the channel vertical Position value to **360 mdivs**.
   l. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   m. Average the two values and record the result in the **1 mV/div > 250MHz limit** row of the **1 MΩ** column of the Test Result record.
   n. Tap the **Bandwidth Limit** field and select **20 MHz**.
   o. Set the channel vertical **Position** value to **340 mdivs**.
   p. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   q. Set the channel vertical **Position** value to **360 mdivs**.
   r. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   s. Average the two values and record the result in the **1 mV/div > 20MHz limit** row of the **1 MΩ** column of the Test Result record.
9. *Check **50 Ω** termination as follows:*
   a. In the Channel badge, set **Termination** to **50 Ω**.
   b. Tap the **Bandwidth Limit** field and select the highest frequency listed.
   c. Set the channel vertical Position value to **340 mdivs**.
   d. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   e. Set the channel vertical Position value to **360 mdivs**.
   f. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **μ** readout).
   g. Average the two values and record the result in the **1 mV/div > Full** row of the **50 Ω** column of the Test Result record.
   h. Tap the **Bandwidth Limit** field and select **250 MHz**.

i. Set the channel vertical **Position** value to **340 mdivs**.
j. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **µ** readout).
k. Set the channel vertical **Position** value to **360 mdivs**.
l. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **µ** readout).
m. Average the two values and record the result in the **1 mV/div > 250MHz limit** row of the **50 Ω** column of the Test Result record.
n. Tap the **Bandwidth Limit** field and select **20 MHz**.
o. Set the channel vertical **Position** value to **340 mdivs**.
p. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **µ** readout).
q. Set the channel vertical **Position** value to **360 mdivs**.
r. Once the measurement count (N) in the measurement badge reaches 100, record the AC RMS Mean value (the **µ** readout).
s. Average the two values and record the result in the **1 mV/div > 20MHz limit** row of the **50 Ω** column of the Test Result record.

10. *Repeat 1 MΩ and 50 Ω tests at all V/div settings for the current channel:*

    a. In the Channel badge, set the **Vertical Scale** setting to the next value in the test record (2`mV, 5`mV, and so on, up to 1`V/div).
    b. Repeat steps *8* on page 84 through *9* on page 84.

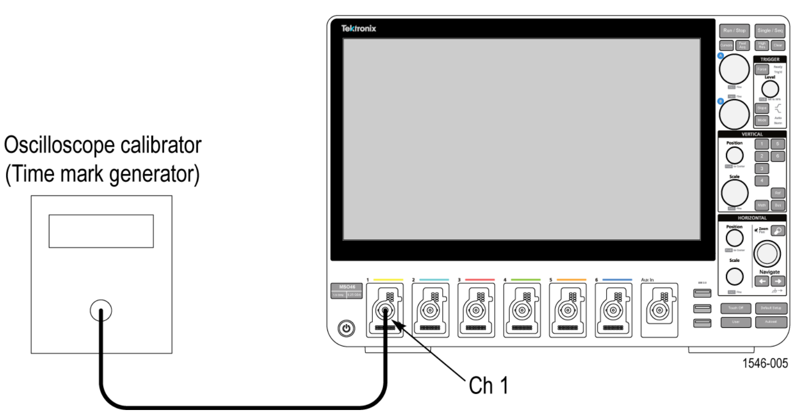
11. *Repeat all tests for the remaining input channels:*

    a. Double-tap the **AC RMS** measurement badge.
    b. Tap the **Configure** panel.
    c. Tap the **Source 1** field and select the next channel to test.
    d. Double-tap the channel badge of the channel that you have finished testing and set **Display** to **Off**.
    e. Tap the channel button on the oscilloscope Settings bar of the next channel to test.
    f. Double-tap the channel badge for the channel being tested.
    g. Starting at step *7* on page 84, repeat these procedures for each input channel.

Check long term sample rate

This test checks the sample rate and delay time accuracy (time base).

1. Connect the output of a time mark generator to the oscilloscope channel 1 input using a 50 Ω cable, as shown in the following illustration.



Warning: Set the generator output to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

2. Set the time mark generator period to **80 ms**. Use a time mark waveform with a fast rising edge.
3. If it is adjustable, set the time mark amplitude to approximately **2 V** $_{\mathbf{P\text{-}P}}$.
4. Tap **File** > **Default Setup**.

5. Tap the channel **1** button on the Settings bar.
6. Double-tap the Channel 1 badge to open its Configuration menu.
7. Set **Termination** to **50 Ω**.
8. Set **Vertical Scale** to **500 mV**.
9. Set the **Position** value to center the time mark signal on the screen.
10. Tap outside the menu area to close it.
11. Double-tap the **Horizontal** settings badge.
12. Set the **Horizontal Scale** to **100 ns/div**.
13. Tap outside the menu area to close it.
14. Double-tap the **Trigger** settings badge.
15. Set **Source** to the channel being tested.
16. Set the **Level** as necessary for a triggered display.
17. Tap outside the menu area to close it.
18. Double-tap the **Horizontal** settings badge.
19. Adjust the **Position** value to move the trigger point to the center of the screen.
20. Turn **Delay** to **On** and set **Position** to **80 ms**.
21. Set the **Horizontal Scale** to **100 ns/div**.
22. Observe where the rising edge of the marker crosses the center horizontal graticule line. The rising edge should cross within ±2 divisions of the vertical center graticule. Enter the deviation in the test record.

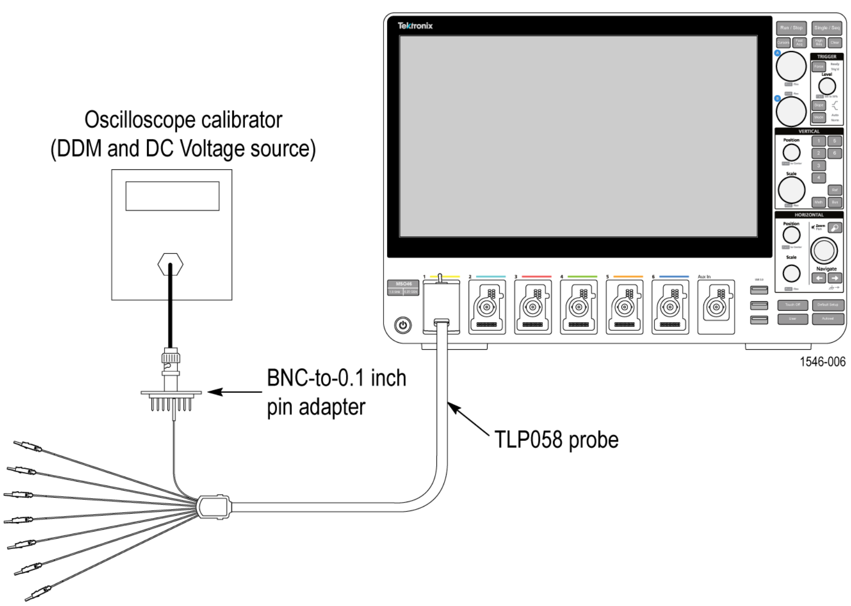
   Note: A 2.5 x 10^{-6} time base error is 2 divisions of displacement.

Check digital threshold accuracy

This test checks the threshold accuracy of the TLP058 logic probe digital channels D0-D7 at 0 V and 25 °C, for all oscilloscope input channels.

Note: Threshold Accuracy is a function of the logic probe only. It is a typical specification. The Threshold Accuracy test checks the typical logic probe performance, and may be considered a functional check of the oscilloscope digital input.

1. Connect a TLP058 digital probe to channel 1.



2. Connect the DC voltage source to digital channel **D0**.

⚠ **Warning:** Set the generator output to Off or 0 volts before connecting, disconnecting, or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

If you are using the Fluke 9500 calibrator as the DC voltage source, connect the calibrator head to the digital channel D0, using the BNC-to-0.1 inch pin adapter listed in the table. Be sure to connect channel D0 to both the corresponding signal pin and to a ground pin on the adapter.

3. Tap **File** > **Default Setup**. This resets the instrument and adds the channel 1 badge and signal to the display.
4. *Display the digital channels and set the thresholds as follows:*
   a. Double-tap the badge of the channel under test on the Settings bar.
   b. Double-tap the **Threshold** field at the bottom of the menu and set the value to **0 V**.
   c. Tap **Set All Thresholds**. All thresholds are now set for the 0 V threshold check.
   d. Tap outside the menu to close it.
5. Double-tap the **Horizontal** badge in the Settings bar.
6. Set the **Horizontal Scale** to **10 ns/div**.
7. Tap outside the menu to close it.
8. Set the calibrator DC voltage output (Vs) to **-400 mV**.
9. Wait 1 second. Verify that the logic level is low on **D0**.
10. Increment Vs by **+10 mV**. Wait 1 second and check the logic level of the channel D0 signal display.

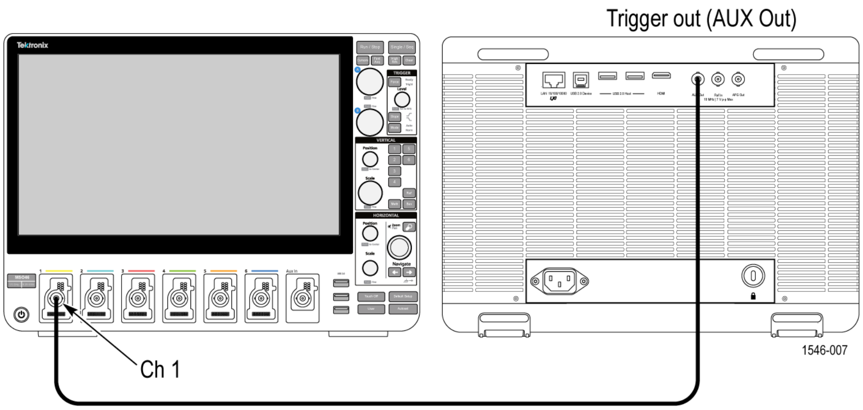
    If the signal level is a logic low or is alternating between high and low, continue to increment Vs by +10 mV, wait 1 second, and check the logic level until the logic state is a steady high.
11. Record this Vs value as **Vs-** for D0 of the test record.
12. Double-tap the **Trigger** badge and set the **Slope** to **Falling** edge.
13. Set the DC voltage source (Vs) to **+400 mV**.
14. Wait 1 second. Verify that the logic level is high.
15. Decrement Vs by **-10 mV**. Wait 1 second and check the logic level of the channel D0 signal display.

    If the signal level is a logic high or is alternating between high and low, continue to decrement Vs by -10 mV, wait 1 second, and check the logic level until the logic state is a steady low.
16. Record this Vs value as **Vs+** for D0 of the test record.
17. Find the average using this formula: $V_{sAvg} = (V_{s-} + V_{s+})/2$.
18. Record the average as the test result for D0 in the test record. The test result should be between the low and high limits.
19. *Repeat the procedure for all remaining digital channels as follows:*
    a. Connect the next digital channel to be tested (D1, D2, and so on) to the DC voltage source.
    b. Repeat steps *8* on page 87 through *19* on page 87, until all digital channels have been tested for this input channel.
20. *Repeat the procedure for all remaining input channels as follows:*
    a. Move the TLP058 digital probe from channel 1 to channel 2.
    b. Set the generator output to 0 volts and Off.
    c. Repeat steps starting at *2* on page 86 for the channel being tested (channel 2, channel 3, and so on).

Check AUX Out output voltage levels

This test checks the output voltage levels from the AUX Out connector.

1. Use a 50 Ω cable to connect the AUX Out signal from the rear of the instrument to the channel 1 input of the same instrument, as shown in the following illustration.



2. Tap **File** > **Default Setup**. This resets the instrument and adds the channel 1 badge and signal to the display.
3. Double-tap the badge of the channel 1 badge to open its configuration menu.
4. Set the **Vertical Scale** to **1 V/div**.
5. Tap outside the menu to close it.
6. Double-tap the **Horizontal** badge in the Settings bar.
7. Set the **Horizontal Scale** to **400 ns/div**.
8. Tap outside the menu to close it.
9. *Record the Maximum and Minimum measurements at 1 MΩ termination as follows:*

   a. Tap the **Add New... Measure** button.
   b. In the Amplitude Measurements panel, set the **Source** to **Ch 1**.
   c. Double-tap the **Maximum** button to add the measurement badge to the Results bar.
   d. Double-tap the **Minimum** button to add the measurement badge to the Results bar.
   e. Tap outside the menu to close it.
   f. Double-tap the **Maximum** results badge.
   g. Tap **Show Statistics in Badge**.
   h. Tap **FILTER/LIMIT RESULTS** to open the panel.
   i. Tap **Limit Measurement Population** to toggle it to **On**.
   j. Tap outside the menu to close it.
   k. Double-tap the **Minimum** results badge.
   l. Tap **Show Statistics in Badge**.
   m. Tap **FILTER/LIMIT RESULTS** to open the panel.
   n. Tap **Limit Measurement Population** to toggle it to **On**.
   o. Tap outside the menu to close it.
   p. Enter the Maximum and Minimum measurement readings in the 1 MΩ row of the test record.
10. *Record the Maximum and Minimum measurements at 50 Ω termination as follows:*

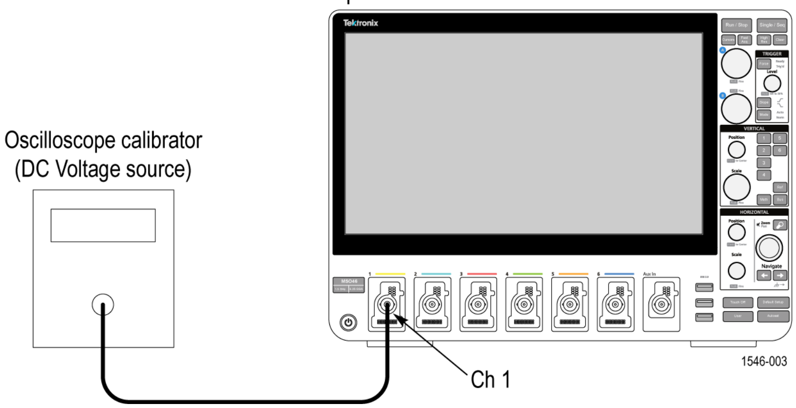
   a. Double-tap the **Ch 1** badge to open its configuration menu.
   b. Set **Termination** to **50 Ω**.
   c. Tap outside the menu to close it.
   d. Enter the Maximum and Minimum measurement readings in the 50 Ω row of the test record.

Check DVM voltage accuracy (DC)

This test checks the DC voltage accuracy of the Digital Volt Meter (DVM) option. The DVM option is available for free when you register the instrument at tek.com.

Procedure

1. Connect the oscilloscope to a DC voltage source to run this test. If using the Fluke 9500 calibrator as the DC voltage source, connect the calibrator head to the oscilloscope channel to test.



Warning: Set the generator output to Off or 0 volts before connecting, disconnecting, or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.

2. Set the calibrator impedance to **1 MΩ**.
3. Tap **File** > **Default Setup**. This resets the instrument and adds the channel 1 badge and signal to the display.
4. *Set the channel settings:*
   a) Double tap the badge of the channel under test to open its menu.
   b) Check that **Position** is set to **0 divs**. If not, set the position to 0 divisions.
   c) Confirm that **Termination** is set to **1 MΩ**.
   d) Set the **Bandwidth Limit** to **20 MHz**.
5. Set the calibrator impedance to **1 MΩ**.
6. Double-tap the **Horizontal** badge and set **Horizontal Scale** to **1 ms/div**.
7. Tap outside the menu to close it.
8. Double-tap the **Acquisition** badge and set the **Acquisition Mode** to **Average**.
9. Verify or set the **Number of Waveforms** to **16**.
10. Tap outside the menu to close it.
11. Double-tap the **Trigger** badge and set the **Source** to **AC Line**.
12. Tap outside the menu to close it.
13. Tap the **DVM** button to add the DVM badge to the Results bar.
14. In the **DVM** menu, set **Source** to the channel to be tested.
15. Set **Mode** to **DC**.
16. Tap outside the menu to close it.
17. Set the calibrator to the input voltage shown in the test record (for example, –5 V for a 1V/div setting).
18. In the channel under test menu, set the **Offset** value to that shown in the test record (for example, –5 V for –5 V input and 1`V/div setting).
19. Set the **Vertical Scale** field to match the value in the test record (for example, 1 V/div).
20. Enter the measured value on the DVM badge into the DVM Voltage Accuracy Tests record.

21. Repeat the procedure (steps *17* on page 89, *18* on page 89, *19* on page 89 and *20* on page 89) for each volts/division setting shown in the test record.
22. Repeat all steps, starting with step *4* on page 89, for each oscilloscope channel to check. To set the next channel to test:
    a) Double tap the badge of the channel under test to open its menu.
    b) Set **Display** to **Off.**
    c) Tap the channel button in the Settings bar of the next channel to test to add that channel badge and signal to the display.

Check DVM voltage accuracy (AC)

This test checks the AC voltage accuracy of the Digital Volt Meter (DVM) option. The DVM option is available for free when you register the instrument at tek.com.

Procedure

1. Connect the output of the leveled square wave generator (for example, Fluke 9500) to the oscilloscope channel 1 input.

   Warning: Set the generator output to Off or 0 volts before connecting, disconnecting, or moving the test hookup during the performance of this procedure. The generator is capable of providing dangerous voltages.
2. Set the generator to **50 Ω** output impedance (50`Ω source impedance).
3. Set the generator to produce a square wave of the amplitude and frequency listed in the test record (for example, 20 mV_{pp} at 1`kHz).
4. Tap **File** > **Default Setup** to reset the instrument and add the channel 1 badge and signal to the display.
5. Tap the **DVM** button to add the DVM badge to the Results bar.
6. Set the DVM **Mode** to **AC RMS**.
7. In the DVM menu, set **Source** to the channel to be tested.
8. Double-tap the channel badge of the channel being tested to open its configuration menu.
9. Set **Termination** to **50 Ω**.
10. Use the **Vertical Scale** controls to set the signal height so that the signal covers between 4 and 8 vertical divisions on the screen.
11. Enter the DVM measured value in the test record.
12. Repeat steps *10* on page 90 and *11* on page 90 for each voltage and frequency combination shown in the record.
13. Repeat all steps to test all remaining oscilloscope channels. To set the next channel to test:
    a) Double tap the badge of the channel under test to open its menu.
    b) Set **Display** to **Off.**
    c) Tap the channel button in the Settings bar of the next channel to test to add that channel badge and signal to the display.

Check trigger frequency accuracy and maximum input frequency

This test checks trigger frequency counter accuracy. The trigger frequency counter is part of the free DVM and trigger frequency option that is available when you register the instrument at tek.com.

Procedure

1. Tap **File** > **Default Setup** to reset the instrument and add the channel 1 badge and signal to the display.
2. Connect the **10 MHz Reference out** from the time mark generator to the **Ref In** connector on the back of the oscilloscope.
3. Connect the output of the time mark generator to the oscilloscope channel input being tested using a 50 Ω cable.
   Set the time mark generator to a 50 Ω source and a fast rising edge waveform (≥ 3 mV/ns).
4. Set the time mark generator frequency to the first value shown in the test record, starting at **100 Hz**.
5. Set the mark amplitude to **1 V** $_{pp}$, which makes a 2 divisions high waveform.
6. Double-tap the channel badge being tested (starting with channel 1) and set **Termination** to **50 Ω**.
7. Set the channel **Vertical Scale** to **500 mV/div**.

8. Tap outside the menu to close it.

9. Double-tap the **Acquisition** badge and set the **Timebase Reference Source** to .

10. Tap outside the menu to close it.

11. Double-tap the **Horizontal** badge and use the **Horizontal Scale** controls to display at least 2 cycles of the waveform.

12. Tap outside the menu to close it.

13. Double-tap the **Trigger** badge to open its menu.

a) Set the **Source** field to the input channel being tested.

b) Tap the **Set to 50%** button to obtain a stable display.

c) Tap the **Mode & Holdoff** panel to open the **Mode & Holdoff** configuration menu.

d) In the **Mode & Hold Off** menu, set the **Trigger Frequency Counter** to **On**. The trigger frequency readout is at the bottom of the Trigger badge.

e) Tap outside the menu to close it.

14. Double-tap the channel badge being tested (starting with channel 1) and use the **Position** controls to vertically center the time mark in the waveform graticule.

15. Enter the value of the trigger frequency (**F** readout in the **Trigger** badge) in the test record for that frequency.

16. Repeat this procedure for each frequency setting shown in the record. Make sure to adjust the Horizontal scale after each calibrator frequency change to show at least two cycles of the waveform on the screen.

17. Repeat all these steps to test each oscilloscope channel.

Arbitrary function generator

Check AFG sine and ramp frequency accuracy

This test verifies the frequency accuracy of the arbitrary function generator. All output frequencies are derived from a single internally generated frequency. Only one frequency point of channel 1 is required to be checked.

1. Connect a 50 Ω cable from the **AFG Out** connector to the frequency counter input as shown in the following figure.

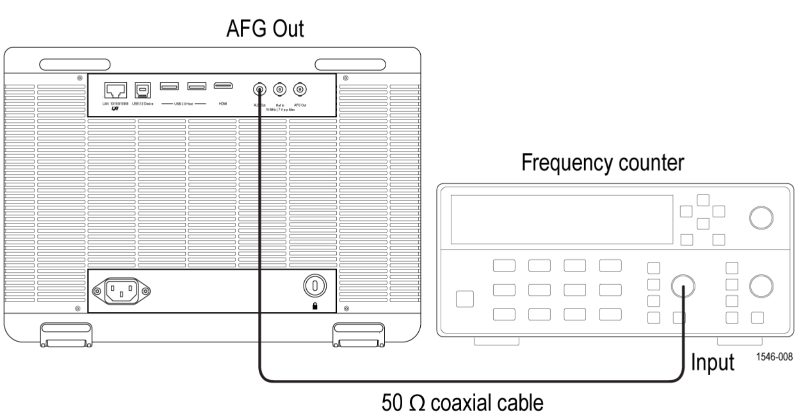


Figure 1: Frequency/period test

2. Tap **File** > **Default Setup** to set the instrument to the factory default settings.

3. Tap the **AFG** button to open the **AFG** menu.

4. Set the arbitrary function generator output as follows:

Select menu	Setting
Output	On
Waveform Type	Sine
Frequency	1.000000 MHz

Table continued…

Select menu	Setting
Amplitude	1.00 V_{PP}

5. Turn on the frequency counter:

   a. Double-tap the **Trigger** badge to open its menu.
   b. Set the **Source** field to the input channel being tested.
   c. Tap the **Set to 50%** button to obtain a stable display.
   d. Tap the **Mode & Holdoff** panel to open the Mode & Holdoff configuration menu
   e. In the Mode & Hold Off menu, set the **Trigger Frequency Counter** to **On**. The trigger frequency readout is at the bottom of the Trigger badge.
   f. Tap outside the menu to close it.

6. Check that the reading of the frequency counter is between **0.999950 MHz** and **1.000050 MHz**. Enter the value in the Test record.

7. Set the arbitrary function generator output as follows:

Select menu	Setting
Waveform Type	Ramp
Frequency	500 kHz

8. Check that reading of the frequency counter is between **499.975 kHz** and **500.025 kHz**. Enter the value in the Test record.

Check AFG square and pulse frequency accuracy

This test verifies the frequency accuracy of the arbitrary function generator. All output frequencies are derived from a single internally generated frequency. Only one frequency point of channel 1 is required to be checked.

1. Connect the arbitrary function generator to the frequency counter as shown in the following figure.

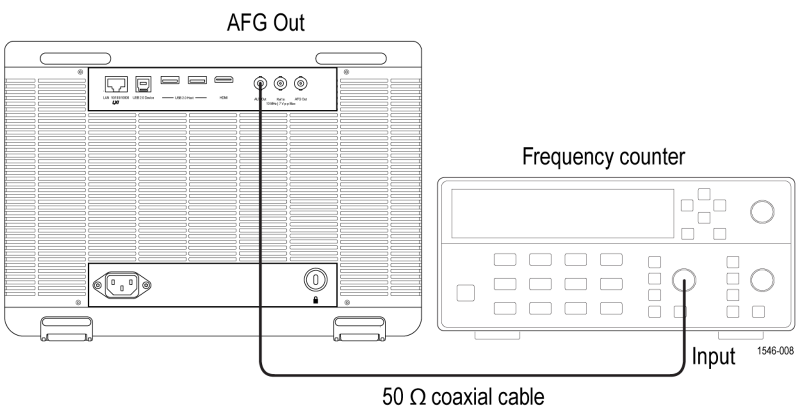


Figure 2: Frequency/period test

2. Tap **File** > **Default Setup** to set the instrument to the factory default settings.

3. Tap the **AFG** button to open the AFG menu.

4. Set the arbitrary function generator as follows:

Select menu	Setting
Waveform Type	Square
Frequency	1.000000 MHz
Amplitude	1.00 V_{PP}
Output	On

5. Turn on the frequency counter:

a. Double-tap the **Trigger** badge to open its menu.
b. Set the **Source** field to the input channel being tested.
c. Tap the **Set to 50%** button to obtain a stable display.
d. Tap the **Mode & Holdoff** panel to open the Mode & Holdoff configuration menu
e. In the Mode & Hold Off menu, set the **Trigger Frequency Counter** to **On**. The trigger frequency readout is at the bottom of the Trigger badge.
f. Tap outside the menu to close it.

6. Check that the frequency counter readout is between **0.999950 MHz** and **1.00005 MHz**. Enter the value in the Test record.
7. Set up the arbitrary function generator as follows:

Select menu	Setting
Waveform Type	Pulse

8. Check that reading of the frequency counter is between **0.999950 MHz** and **1.000050 MHz**. Enter the value in the Test record.

Check AFG signal amplitude accuracy

This test verifies the amplitude accuracy of the arbitrary function generator. All output amplitudes are derived from a combination of attenuators and 3 dB variable gain. Some amplitude points are checked. This test uses a 50 Ω terminator. It is necessary to know the accuracy of the 50 Ω terminator in advance of this amplitude test. This accuracy is used as a calibration factor.

1. Connect the 50 Ω terminator to the DMM as shown in the following figure and measure the resistance value.

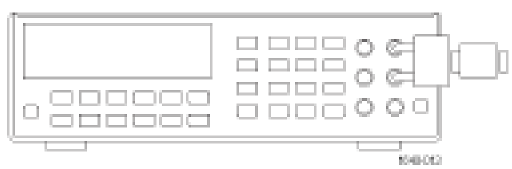


Figure 3: 50 Ω terminator accuracy

2. Calculate the 50 Ω calibration factor (CF) from the reading value and record as follows:

Table 2: CF (Calibration Factor) = 1.414 × ((50 / Measurement Ω) + 1)

Measurement (reading of the DMM)	Calculated CF

Examples:

For a measurement of 50.50 Ω, CF = 1.414 (50 / 50.50 + 1) = **2.814**.

For a measurement of 49.62 Ω, CF = 1.414 (50 / 49.62 + 1) = **2.839**.

3. Connect the arbitrary function generator output to the DMM as shown in the following figure. Be sure to connect the 50 Ω terminator to the **AFG Out** connector.

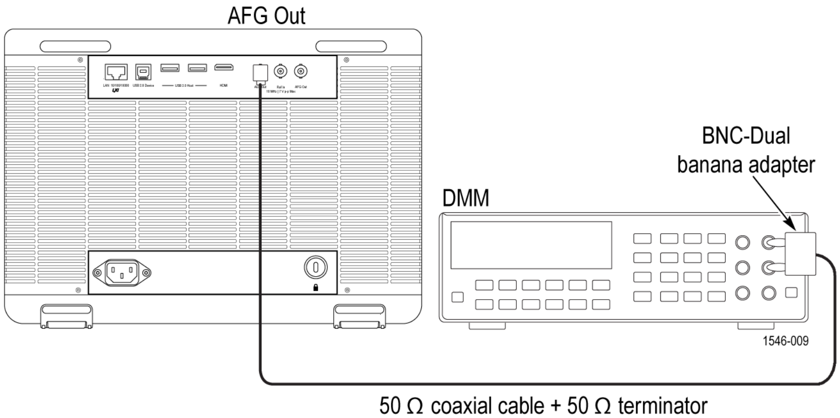


Figure 4: Amplitude test

4. Tap the **AFG** button and set up the arbitrary function generator output as follows:

Select menu	Setting
Waveform Type	Sine
Frequency	1.000000 kHz
Amplitude	30 mV_{PP}
Load Impedance	50 Ω
Output	On

5. Measure the **AC RMS** voltage readout on the DMM.
6. Multiply the DMM voltage by the calculated CF to get the corrected peak to peak voltage. Enter the resulting value in the Measurement field in the following table.
7. Change the AFG output amplitude to the next value in the table.
8. Repeat steps *5* on page 94 through *7* on page 94 for each amplitude value. Check that the peak to peak voltages are within the limits in the table below. Enter the values in the test record.

Waveform Type	Frequency	Amplitude	Measurement	Range
Sine	1.000 kHz	30.0 mV_{PP}		28.55 mV_{PP} - 31.45`mV_{PP}
Sine	1.000 kHz	300.0 mV_{PP}		294.5 mV_{PP} - 305.5`mV_{PP}
Sine	1.000 kHz	800.0 mV_{PP}		787.0 mV_{PP} - 813.0`mV_{PP}
Sine	1.000 kHz	1.500 V_{PP}		1.4765 V_{PP} - 1.5235`V_{PP}
Sine	1.000 kHz	2.000 V_{PP}		1.969 V_{PP} - 2.031`V_{PP}
Sine	1.000 kHz	2.500 V_{PP}		2.4615 V_{PP} - 2.5385`V_{PP}

Check AFG DC offset accuracy

This test verifies the DC offset accuracy of the arbitrary function generator. This test uses a 50 Ω terminator. It is necessary to know the accuracy of the 50 Ω terminator in advance of this test. This accuracy is used as a calibration factor.

1. Connect the 50 Ω terminator to the DMM as shown in the following figure and measure the resistance value.

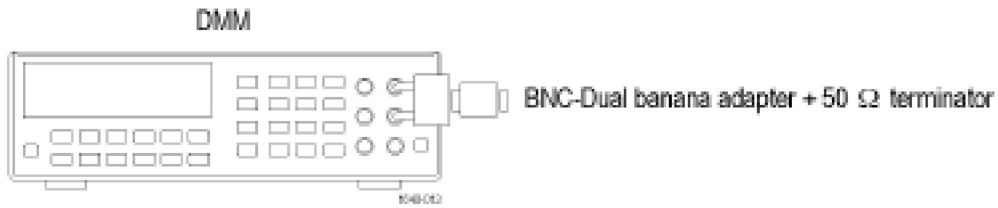


Figure 5: 50 Ω terminator accuracy

2. Calculate the 50 Ω calibration factor (CF) from the reading value and record as follows:

Table 3: CF (Calibration Factor) = 0.5 × ((50 / Measurement Ω) + 1)

Measurement (reading of the DMM)	Calculated CF

Examples:

For a measurement of 50.50 Ω, CF = 0.5 (50 / 50.50 + 1) = **0.9951**.

For a measurement of 49.62 Ω, CF = 0.5 (50 / 49.62 + 1) = **1.0038**.

3. Connect the arbitrary function generator output to the DMM as shown in the following figure. Be sure to connect the 50 Ω terminator to the arbitrary function generator **AFG Output** connector.

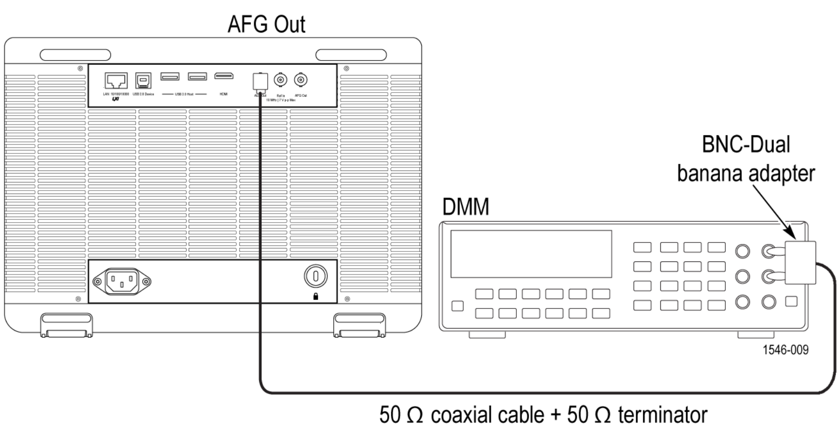


Figure 6: DC offset tests

4. Tap the **AFG** button and set up the arbitrary function generator as follows:

Select menu	Setting
Waveform Type	DC
Offset	+ 1.25 V
Output	On

5. Measure the voltage readout on the DMM.
6. Multiply the DMM voltage by the calculated CF to get the corrected offset voltage. Enter the resulting value in the Measurement field in the following table.

Function	Offset	Measurement	Range
DC	+ 1.25 Vdc	Vdc	1.23025 Vdc to 1.26975 Vdc

Table continued…

Function	Offset	Measurement	Range
DC	0.000 Vdc	Vdc	- 0.001 Vdc to + 0.001 Vdc
DC	- 1.25 Vdc	Vdc	-1.26975 Vdc to -1.23025 Vdc

7. Change the AFG output amplitude to the next value in the table, measure the voltage readout on the DMM, multiply the DMM readout by the calculated CF to get the corrected offset voltage, and enter the resulting value in the Measurement field in the table.
8. Verify that the corrected offset measurements are within the range.