
Operating Characteristics

Operating Characteristics are specified with the Measurement/Storage Module installed on an Agilent 54600-Series Oscilloscope.

Measurements

Voltage	Vamp, Vavg, Vrms, Vpp, Vpre, Vovr, Vtop, Vbase, Vmin & Vmax
Time	Delay, Duty Cycle, Frequency, Period, Phase Angle, Rise Time, Fall Time, +Width, & -Width
Thresholds	User-selectable among, 10%/90%, 20%/80% or voltage levels
Cursor Readout	Voltage, time, percentage, and phase angle.
Waveform Math Functions	Addition, subtraction, multiplication, differentiation, integration, and FFT.

Fast Fourier Transforms

Test Region	Each pixel is selectable to be tested or not.
Inputs	On either ch1, ch2, or F1
Freq Cursor Resolution	From 1.22 mHz (milliHz) to 9.766 MHz (1.22 mHz to 48.828 MHz for 54615/54616)
Points	Fixed at 1024 for all models except 54615/54616 Fixed at 1024 for 54615/54616 with vectors off Fixed at 512 for 54615/54616 with vectors on
Peak Find:	Find Peak automatically snaps cursor to the two largest peaks located anywhere in the displayed frequency span. Measurement information is automatically displayed at the bottom of the screen together with the difference in frequency between the two selected peaks.
Variable Sensitivity and Offset	Sensitivity and vertical offset (position) are controlled from the front panel to display an optimum view of the spectrum. Sensitivity is calibrated in dB per divisions; vertical offset is calibrated in dBV.
Time Record Length	10x main sweep speed.
Horizontal Magnification and Center Frequency Control	As the frequency span is changed, the display is magnified about center frequency so that you get a closer view.

Reference Information
Operating Characteristics

Selectable Windows Four windows are selectable: Hanning, for best frequency resolution and general purpose use; flattop, for best amplitude accuracy; rectangular, for single-shot signals such as transients and signals where there are an integral number of cycles in the time record, and exponential for best transient analysis.

Window Characteristics

Window	Highest Side Lobe (dB)	3dB Bandwidth(b ins)	6dB Bandwidth(b ins)	Scallop Loss (dB)
Rectangular	-13	0.89	1.21	3.92
Hanning	-32	1.44	2.00	1.42
Flattop	-70	3.38	4.17	0.005

FFT Freq Range dc to 100 MHz (54600/54601/54645)
dc to 150 MHz (54602)
dc to 60 MHz (54603)
dc to 500 MHz (54610/54615/54616)

Freq Span Control This control allows you to specify the frequency span of the FFT display. When the Span is adjusted the display will expand or contract about the center frequency as set by the Center Frequency control. Refer to Figure 3-1 for the limits of the Frequency Span control.

Center Freq Control This control allows you to specify the frequency at the center of the FFT display. When the Frequency Span is changed, the FFT display will expand or contract about the frequency at the center of the display. Refer to Figure 3-1 for the limits of this control.

Move 0 Hz to Left Pressing this soft key will move the FFT display so that the left hand edge of the display will be 0Hz.

FFT Vector display When the time domain display is turned off the FFT display will be displayed in vector drawing mode. The time domain display can be turned off by pressing the Channel # key twice

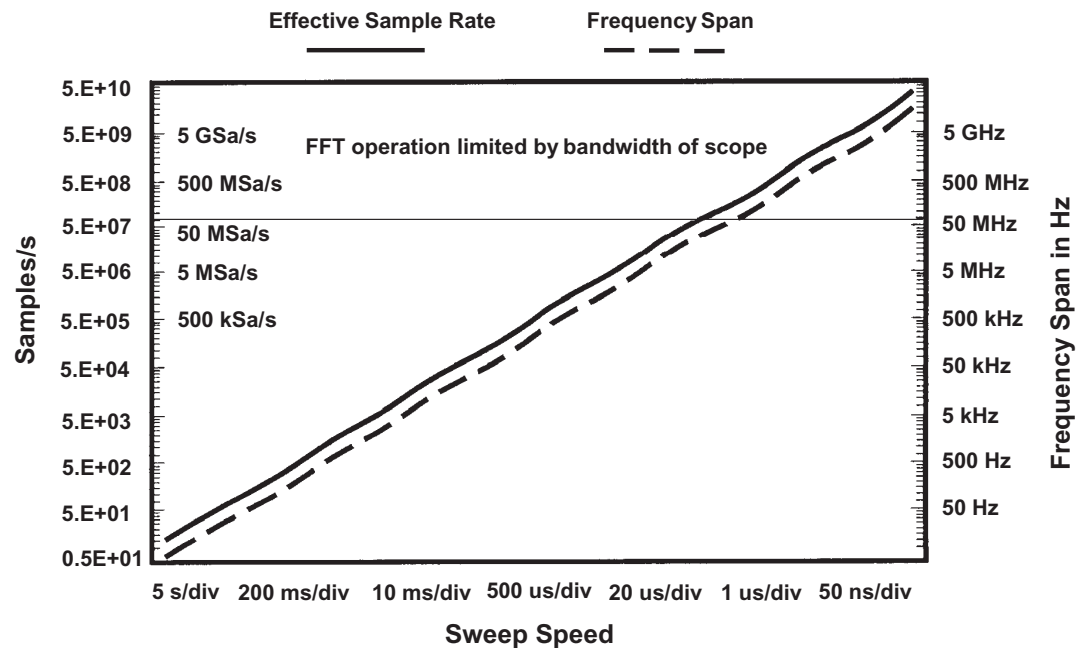
Display FFT vertical units in dB.

Units/Div This control allows you to adjust the vertical scaling of the FFT display in a 1-2-5 sequence from 1 dB/div to 50 dB/div.

Reference Level This control allows adjustment of the reference level of the FFT display across a range of 400 dBV. The minimum setting is -196 dB at 1 dBV/div decreasing to 0 dBV at 50 dBV/div. The maximum setting is 400 dBV at 50 dB/div, decreasing to 204 dB at 1 dBV/div.

Programmability All front-panel controls are fully programmable over GPIB (54657A) or RS-232 (54658A and 54659B)

Figure 3-1



Sweep Speed	Effective Sample Rate	Maximum Frequency Span	Sweep Speed	Effective Sample Rate	Maximum Frequency Span
5 s/div	20 Hz	9.75 Hz	50 μ s/div	2 MHz	975k kHz
2 s/div	50 Hz	24.4 Hz	20 μ s/div	5 MHz	2.44 MHz
1 s/div	100 Hz	48.85 Hz	10 μ s/div	10 MHz	4.885 MHz
500 ms/div	200 Hz	97.5 Hz	5 μ s/div	20 MHz	9.75 MHz
200 ms/div	500 Hz	244 Hz	2 μ s/div	50 MHz	24.4 MHz
100 ms/div	1 kHz	488.5 Hz	1 μ s/div	100 MHz	48.85 MHz
50 ms/div	2 kHz	975 Hz	500 ns/div	200 MHz	97.5 MHz
20 ms/div	5 kHz	2.44 kHz	200 ns/div	500 MHz	244 MHz
10 ms/div	10 kHz	4.885 kHz	100 ns/div	1 GHz	488.5 MHz
5 ms/div	20 kHz	9.75k Hz	50 ns/div	2 GHz	975 MHz
2 ms/div	50 kHz	24.4 kHz	20 ns/div	5 GHz	2.44 GHz
1 ms/div	100 kHz	48.85 kHz	10 ns/div	10 GHz	4.885 GHz
500 μ s/div	200 kHz	97.5 kHz	5 ns/div	20 GHz	9.75 GHz
200 μ s/div	500 kHz	244 kHz	2 ns/div*	50 GHz	24.41 GHz
100 μ s/div	1 MHz	488.5 kHz			

* 2 ns/div FFT valid only on 54615/54616

FFT Operation
Frequency Span and Effective Sampling Rate vs Sweep Speed

Mask Template Testing

Number of mask templates	2, nonvolatile
Mask template generation	Automask generates a mask from waveform data with variable tolerances. Mask editor allows pixel-by-pixel editing and line drawing editing. Smooth mask function performs a running average of 3 pixels.
Test Region	Each pixel is selectable to be tested or not
Fail Region	Inside-signal fails if it falls inside the region bounded by the maximum and minimum limit lines. Outside-signal fails if it falls outside the region bounded by the maximum and minimum limit lines.
Failure indication	Failure zone indicator shows where the signal fails the mask template.
Failure mode	Failure modes are stop or continue on failure. Failure(s) can be saved to trace memory or printed

Trace Memory (all nonvolatile)

1 through 3	High-speed storage without compression.
4 through 100	Storage with compression, number of traces is a function of complexity. Storage time is less than 10 seconds.

Real Time Clock

Can be set from front panel.	24-hour format with battery back-up.
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Hardcopy Output

Printer/Plotter Supported	HP ThinkJet, HP QuietJet, HP PaintJet, HP DeskJet, and HP LaserJet printer. HP-GL compatible plotters.
54658A and 54659B only	Epson FX-80 or compatible printer.

RS-232 Configurations

Connector Type	With the adapter cable connected, at the end of the cable is a 9 pin/25 pin DTE port; a printer cable is required to connect it to hardcopy devices or a computer.
Protocols	XON/XOFF, hardware.
Data Bits	8
Stop Bits	1
Parity:	none.
Baud Rates	1200, 2400, 9600, 19200.

Programmability

All instrument settings and operating modes may be remotely programmed via RS-232 and GPIB (IEEE-488).