

FEATURES/BENEFITS

- 100 Hz to 325 GHz Frequency Coverage
- Continuous-Resolution Frequency Tuning Combines "Synthesized" Settability and Accuracy with Analog Feel
- Up to 30 dB Viewable Dynamic Range
- Built-in Frequency Counters Provide Frequency Determination to within 0.0000001% (1x10⁻⁹/day rel.)
- Sensitivities to -134 dBm
- Built-in Intelligence for Signal Processing/Marker Functions
- Push Button Occupied-Bandwidth and Noise-Normalization Functions
- Macro Capability with Nonvolatile Memory to Simplify and Speed Up Commonly-Used Routines
- Optional Switch-Selectable 50/75-ohm Impedances
- Nonvolatile Memory for up to Nine Waveforms and Ten Front Panel Settings
- GPIB Programmability with Tek Codes and Formats for Standardized Bus Operation

PORTABLE LABORATORY PERFORMANCE WITH AFFORDABLE PRICES

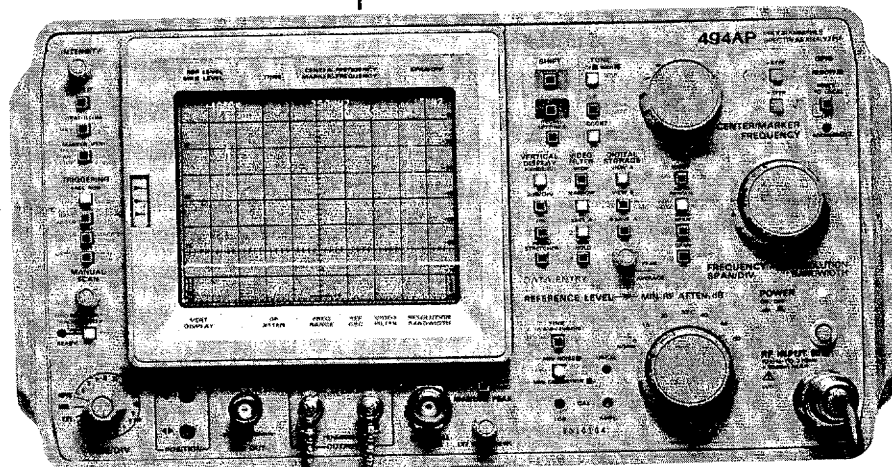
Tektronix 490 Series Spectrum Analyzers offer a broad selection of features and benefits to meet wide-ranging needs for laboratory-level frequency domain spectrum analysis. All units provide full IEEE-488 (GPIB) programmability, which means you can change front panel settings, read data from the crt display, and send waveforms from internal digital source memory to other GPIB devices. Frequency range of the instruments is as follows:

- 10 kHz to 325 GHz: 494AP and 492BP
- 10 kHz to 21 GHz: 492PGM
- 100 Hz to 7.1 GHz: 497P
- 100 Hz to 1.8 GHz: 495P

Built to rugged MIL-T-28800C environmental specifications, these units can withstand transportation shock and vibration to a remote site. Or they can simply be moved from the engineering lab to the production floor with complete confidence in measurement accuracy.

A wide array of price/performance alternatives are available. If you need 10 Hz resolution for an exacting close-in spectral purity measurement, consider the 494AP. For more routine uses, such as a microwave transmitter occupied-bandwidth measurement, the 492PGM may be the most cost-effective solution.

A WIDE ARRAY OF INTELLIGENT FEATURES



- Optional MATS/CML Compatibility for Military Applications
- Logarithmic-Designed Front Panel Controls
- Direct Set on Units from 100 MHz to 325 GHz
- Long Calibration Periods
- High-Speed for Bandwidth and Accuracy

Downloadable programming (macro) capability lets you execute your frequently-used measurement routines from the Spectrum Analyzer's nonvolatile memory. In addition, these Spectrum Analyzers can store up to 10 complete front-panel measurement parameter setups in nonvolatile memory to save you measurement time. You can also save up to 9 waveform displays, a real benefit when data analysis must be delayed.

Tedious, time-consuming, and often incorrect carrier-to-noise ratio calculations are eliminated; the instrument

handles it all with a single keystroke, with automatic noise normalization to 1Hz and automatic conversion for reference units such as dBm, dBmV, dBV, dBμV, and dB/Hz.

An internal high-stability reference provides marker or center frequency accuracy approaching 10⁻⁹/day in the 494AP. For added confidence in measurements, a built-in microwave signal counter in the 494AP with 144 dB dynamic range means you can determine the exact frequency of marked signals only 10 Hz apart – or count the exact delta-frequency between two marked signals – even with greatly differing amplitudes. You also have the flexibility of tying in with a system clock, using the external reference lock capacity.

A permanent record of crt displays can be obtained at the push of a button, without a controller, using the direct plot capability and a GPIB plotter such as the Tektronix HC100.

Menu-selected dynamic markers automatically update frequency and amplitude data with every sweep. Unprecedented signal processing power results when you use these markers in conjunction with the built-in intelligence. With PULSE Mode, you can mark the peak of a main lobe and peaks of side lobes at the push of a button. The CW Mode locates signals that exhibit CW characteristics and ignores all other signals. The SPUR Mode marks all signals that meet user-defined or automatic threshold criteria. User-definable threshold criteria are available for all signal processing modes.

These instruments also offer operator convenience for measuring the bandwidth of filters, amplifiers, and other networks. Just enter the desired bandwidth point and select BANDWIDTH Mode, and the markers automatically update to display the new value.

Dedicated direct keypad data entry of major measurement parameters enables fast, accurate instrument setup. Screen messages prompt you for proper keypad inputs – all "valid" keys to push are illuminated to steer you to the proper selections. The unique marker keypad allows Peak Find, Right and Left Next, Next Higher and Lower, Left and Right X dB, and Peak Find and Center operations to be executed directly from the front panel. This makes signal searches much easier.

Optional switch-selectable 50-ohm and 75-ohm impedances add versatility. For applications such as baseband and CATV, 75-ohm/dBmV greatly simplifies spectrum analysis.

The performance leader is the 494AP, which offers frequency coverage from 10 kHz to 21 GHz with its internal mixer, and to 325 GHz with external mixers such as Tek's WM490 Series, or the new WM780 Series (each WM780 Series mixer is individually calibrated). Signal sensitivity is an impressive -134 dBm. The 494AP is optimized for use in baseband through millimeter-wave measurements, where the ability to identify and process signal frequencies and amplitudes over wide dynamic ranges with high accuracy is critical.

The 492BP covers the same frequency range as the 494AP, and provides nearly the same set of outstanding features and state-of-the-art specifications. It is designed as a cost-effective and productive solution to engineering needs.

The 497P provides the same cost-effective performance as the 492BP, but over a frequency range of 100 Hz to 7.1 GHz.

The 492PGM's frequency range of 10 kHz to 21 GHz is ideal for cost-sensitive applications that still require most of the powerful features of the product family, but can get by with slightly-reduced performance specifications.

The 495P features the same functionality and high level of performance as the 494AP, but over a frequency range of 100 Hz to 1.8 GHz. It is optimized for stand-alone or automated operation in baseband through UHF measurements, where the ability to identify and process weak signals is critical.

Remote Operation and Complete Spectrum Analysis Packages

Full GPIB-programmability lets you automate your spectrum analysis system needs. Programming is simplified and measurement repeatability ensured. Under program control you can operate the instrument, change front panel settings, read data from the crt display, and send waveforms from internal memory to other GPIB devices. Tek's Standard Codes and Formats keeps commands clear, consistent, and universally understood.

You can increase programming flexibility and power with the optional MATE/CIL language extension. It provides direct memory access (DMA) for high-speed data transmission, a requirement for MATE/CIL compliance.

TekSPANS software lets you use the 490 Series Spectrum Analyzers as system components, controlling them with popular instrument controllers such as the Tektronix PEP-Series, Compaq models, and other PC compatibles. Coupling the computer to the Spectrum Analyzer via the IEEE 488 bus lets you take advantage of the PC's capability, as well as the power and versatility of the Spectrum Analyzer.

Available Tektronix automated spectrum analyzer packages provide ordering convenience. They are configured around a DOS-based PC, one of the 490 Series of programmable Spectrum Analyzers, and Tek's General RF Applications Software Package (GRASP). The GRASP software offers many different applications and utility routines, which are selected through easy menu-driven operation. Also, EMI software is available for FCC, VDE, CISPR, and MIL-STD testing.

490 Series Spectrum Analyzer characteristics are given in the following tables.

- TYPICAL MEASUREMENTS**
- Baseband Measurements
 - Carrier Level Monitoring
 - Carrier ON/OFF Ratios
 - Carrier/Noise Measurements
 - EMI/RFI Compliance
 - EW Gathering and Analysis
 - Frequency Counting
 - Harmonic Distortion
 - IF Amplifier Adjustments
 - Modulation Adjustments
 - Pulse Analysis
 - Spectral Monitoring
 - Typical Spur Searches

- TYPICAL APPLICATIONS**
- Manufacturing ATE
 - Avionics
 - Broadcasting
 - CATV
 - Cellular Radio
 - Design and Engineering
 - Nuclear Physics
 - Radio Astronomy
 - Satellite Communications
 - Terrestrial Microwave
 - Two-Way Radio

490 SERIES CHARACTERISTICS

	494AP	492BP	492PGM	497P	495P
FREQUENCY-RELATED					
Frequency Range with Internal Mixers	10 kHz to 21 GHz	10 kHz to 21 GHz	10 kHz to 21 GHz	100 Hz to 7.1 GHz	100 Hz to 1.8 GHz
Frequency Range with External Mixers	10 kHz to 325 GHz	10 kHz to 325 GHz	N/A	N/A	N/A
Frequency Readout Accuracy (center or marker) ±(2% span + (CF x Ref) + (2N + 25) Hz)	±20 kHz @ 1 GHz with 100 kHz/div span	±21 kHz @ 1 GHz with 100 kHz/div span	±30 kHz @ 1 GHz with 100 kHz/div span	±21 kHz @ 1 GHz with 100 kHz/div span	±20 kHz @ 1 GHz with 100 kHz/div span
Frequency Counter Accuracy, ± [(CF x Ref) + (5 + N) Hz + 1 LSD]	±100 Hz @ 1 GHz	±1 kHz @ 1 GHz	N/A	±1 kHz @ 1 GHz	±100 Hz @ 1 GHz
Delta Count Accuracy, ± [(D-F x Ref) + (10 + 2N) + 1 LSD]	±13 Hz for 1 MHz ΔF	±14 Hz for 1 MHz ΔF	N/A	±14 Hz for 1 MHz ΔF	±13 Hz for 1 MHz ΔF
Frequency Reference Accuracy	≤ 1x10 ⁻⁷ /yr (aging)	≤ 1x10 ⁻⁹ /yr (aging)	≤ 1x10 ⁻⁹ /yr (aging)	≤ 1x10 ⁻⁶ /yr (aging)	≤ 1x10 ⁻⁷ /yr (aging)
Frequency Stability (residual FM)	≤ 5 Hz @ 1 GHz	≤ 12 Hz @ 1 GHz	≤ 12 Hz @ 1 GHz	≤ 5 Hz @ 1 GHz	≤ 5 Hz @ 1 GHz
Frequency Stability (drift)	< 50 Hz/minute	< 50 Hz/minute	< 50 Hz/minute	< 50 Hz/minute	< 50 Hz/minute
Single Sideband Phase Noise (30 kHz offset and N=1)	-105 dBc/Hz @ 1 GHz	-105 dBc/Hz @ 1 GHz	-103 dBc/Hz @ 1 GHz	-105 dBc/Hz @ 1 GHz	-105 dBc/Hz @ 1 GHz
Frequency Span Range (per div)	0 Hz, 10 Hz-10 GHz	0 Hz, 100 Hz-10 GHz	0 Hz, 200 Hz-1 GHz	0 Hz, 100 Hz-500 MHz	0 Hz, 10 Hz-100 MHz
Frequency Span Accuracy	±5%	±5%	±5%	±5%	±5%
Delta Frequency Accuracy Marker Mode	1% of span	1% of span	1% of span	1% of span	1% of span
Resolution Bandwidth (6 dB) Range	10 Hz to 3 MHz	100 Hz to 3 MHz	1 kHz to 3 MHz	10 Hz to 3 MHz	10 Hz to 3 MHz
Resolution Bandwidth Selectivity (-60 dB/-6 dB)	≤ 7.5:1 except 15:1 @ 10 Hz	≤ 7.5:1	≤ 7.5:1	≤ 7.5:1 except 15:1 @ 10 Hz	≤ 7.5:1 except 15:1 @ 10 Hz
Video Bandwidth Range	0.3 Hz to 30 kHz	0.3 Hz to 30 kHz	3 Hz to 30 kHz	0.3 Hz to 30 kHz	0.3 Hz to 30 kHz
AMPLITUDE-RELATED					
Reference Level Range	-117 to +30 dBm	-117 to +30 dBm	-117 to +30 dBm	-117 to +30 dBm	-117 to +30 dBm
Maximum Safe Input Power, CW	1 Watt (+30 dBm)	1 Watt (+30 dBm)	1 Watt (+30 dBm)	1 Watt (+30 dBm)	1 Watt (+30 dBm)
Maximum Safe Input Power, Pulse 0.1% duty factor	75 W Pk (1 μS pulse, 0.1% duty factor)	75 W Pk (1 μS pulse, 0.1% duty factor)	75 W Pk (1 μS pulse, 0.1% duty factor)	75 W Pk (1 μS pulse, 0.1% duty factor)	75 W Pk (1 μS pulse)
CRT Display Range, Log	1 to 15 dB/div	1 to 15 dB/div	1 to 15 dB/div	1 to 15 dB/div	1 to 15 dB/div

490 SERIES CHARACTERISTICS (cont.)

	494AP	492BP	492PGM	497P	495P
AMPLITUDE-RELATED (cont.)					
CRT Display Range, Linear	39.6 nV/div to 2.8 V/div	39.6 nV/div to 2.8 V/div	39.6 nV/div to 2.8 V/div	39.6 nV/div to 2.8 V/div	39.6 nV/div to 2.8 V/div
Input Attenuator Range	0 to 60 dB in 10 dB steps	0 to 60 dB in 10 dB steps	0 to 60 dB in 10 dB steps	0 to 60 dB in 10 dB steps	0 to 60 dB in 10 dB steps
Viewable Dynamic Range	90 dB (12 dB/div)	90 dB (12 dB/div)	80 dB (10 dB/div)	90 dB (12 dB/div)	90 dB (12 dB/div)
Residual Response (no signal and zero RF attenuation)	-100 dBm (input terminated)	-100 dBm (input terminated)	-95 dBm (input terminated)	-100 dBm (input terminated)	-100 dBm (input terminated)
Second Harmonic Distortion, RF Frequency Range	-60 dBc (mixer level -40 dBm)	-60 dBc (mixer level -40 dBm)	-60 dBc (mixer level -40 dBm)	-60 dBc (mixer level -40 dBm)	-60 dBc (mixer level -40 dBm)
Second Harmonic Distortion, Microwave Frequency Range	-100 dBc (mixer level -20 dBm)	-100 dBc (mixer level -20 dBm)	-100 dBc (mixer level -20 dBm)	-100 dBc (mixer level -20 dBm)	N/A
Third Order Intermodulation Distortion	-70 dBc (mixer level -27 dBm)	-70 dBc (mixer level -27 dBm)	-70 dBc (mixer level -27 dBm)	-70 dBc (mixer level -27 dBm)	-70 dBc (mixer level -27 dBm)
Calibrator Accuracy	±0.3 dB	±0.3 dB	±0.3 dB	±0.3 dB	±0.3 dB
Gain Compression (1 dB)	-13 dBm	-13 dBm	-13 dBm	-13 dBm	-13 dBm
Frequency Response (10 dB RF attenuation referred to cal signal)					
Band 1 (10 kHz to 1.8 MHz)	±2.5 dB	±2.5 dB	±3.0 dB	±2.5 dB	±1.5 dB (100 Hz to 1.8 GHz)
Band 2 (1.7 GHz to 5.5 GHz)	±3.5 dB	±3.5 dB	±4.0 dB	±3.5 dB	N/A
Band 3 (3.0 GHz to 7.1 GHz)	±3.5 dB	±3.5 dB	±4.0 dB	±3.5 dB	N/A
Band 4 (5.4 GHz to 18 GHz)	±4.5 dB	±4.5 dB	±5.0 dB	N/A	N/A
Band 5 (15 GHz to 21 GHz)	±6.5 dB	±6.5 dB	±7.0 dB	N/A	N/A
In-band Flatness (with 10 dB RF attenuation) Band 1 (10 kHz to 1.8 MHz)	±1.5 dB	±1.5 dB	±2.0 dB	±1.5 dB (100 Hz to 1.8 GHz)	±1.0 dB (100 Hz to 1.8 GHz)
Band 2 (1.7 GHz to 5.5 GHz)	±2.5 dB	±2.5 dB	±3.0 dB	±2.5 dB	N/A
Band 3 (3.0 GHz to 7.1 GHz)	±2.5 dB	±2.5 dB	±3.0 dB	±2.5 dB (5.4 GHz to 7.1 GHz)	N/A
Band 4 (5.4 GHz to 18 GHz)	±3.5 dB	±3.5 dB	±4.0 dB	N/A	N/A
Band 5 (15 GHz to 21 GHz)	±5.0 dB	±5.0 dB	±6.0 dB	N/A	N/A
Displayed Average Noise Level (input terminated, narrowest resolution bandwidth and video filter)					
Band 1 (100 Hz)	-80 dBm (typical)	-30 dBm (typical)	N/A	-80 dBm (typical)	-100 dBm (typical)
Band 1 (1 kHz to 10 kHz)	-90 dBm (typical)	-85 dBm (typical)	-35 dBm (typical)	-90 dBm	-105 dBm
Band 1 (10 kHz to 100 kHz)	-95 dBm	-85 dBm	-80 dBm	-100 dBm	-110 dBm
Band 1 (100 kHz to 1 MHz)	-115 dBm	-105 dBm	-100 dBm	-120 dBm	-120 dBm
Band 1 (1 MHz to 1.8 GHz)	-134 dBm	-120 dBm	-110 dBm	-130 dBm	-131 dBm
Band 2 (1.7 GHz to 5.5 GHz)	-125 dBm	-120 dBm	-108 dBm	-127 dBm	N/A
Band 3 (3.0 GHz to 7.1 GHz)	-125 dBm	-119 dBm	-108 dBm	-126 dBm	N/A
Band 4 (5.4 to 12 GHz/12 to 18 GHz)	-111 / -107 dBm	-105 / -100 dBm	-94 / -89 dBm	N/A	N/A
Band 5 (15 GHz to 21 GHz)	-105 dBm	-99 dBm	-88 dBm	N/A	N/A
IF Gain Uncertainty	±2 dB max over 107 dB range	±2 dB max over 107 dB range	±2 dB max over 107 dB range	±2 dB max over 107 dB range	±2 dB max over 107 dB range
Scale Fidelity, Log (80 dB range/90 dB range)	±2 dB max/ ±4 dB max	±2 dB max/ ±4 dB max	±2 dB max	±2 dB max/ ±4 dB max	±2 dB max/ ±4 dB max
Scale Fidelity, Linear	±5% of full scale	±5% of full scale	±5% of full scale	±5% of full scale	±5% of full scale
Input Attenuator Switching Accuracy (20 dB to 60 dB settings) 0 to 1.8 GHz	±0.5 dB/10 dB; ±1.0 dB max ±1.5 dB/10 dB; ±3.0 dB max	±0.5 dB/10 dB; ±1.0 dB max ±1.5 dB/10 dB; ±3.0 dB max	±0.5 dB/10 dB; ±1.0 dB max ±1.5 dB/10 dB; ±3.0 dB max	±0.5 dB/10 dB; ±1.0 dB max ±1.5 dB/10 dB; ±3.0 dB max (1.8 to 7.1 GHz)	±0.5 dB/10 dB; ±1.0 dB max N/A
1.8 to 18 GHz					
18 to 21 GHz	±3.0 dB/10 dB; ±6.0 dB max	±3.0 dB/10 dB; ±6.0 dB max	±3.0 dB/10 dB; ±6.0 dB max	N/A	N/A
Resolution Bandwidth Switching Uncertainty (reference BW = 3 MHz)	±0.4 dB	±0.4 dB	±0.4 dB	±0.4 dB	±0.4 dB

490 SERIES CHARACTERISTICS (cont.)

494AP

492BP

492PGM

497P

495P

TIME-RELATED

	494AP	492BP	492PGM	497P	495P
Sweep Time Range, Digitized Display	10 msec/div to 10 sec/div	10 msec/div to 10 sec/div	10 msec/div to 10 sec/div	10 msec/div to 10 sec/div	10 msec/div to 10 sec/div
Sweep Time Range, Real-Time Display	20 μ sec/div to 10 sec/div	20 μ sec/div to 10 sec/div	20 μ sec/div to 10 sec/div	20 μ sec/div to 10 sec/div	20 μ sec/div to 10 sec/div
Sweep Time Accuracy	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$
Marker Time Measurement Accuracy	$\pm 10\%$	$\pm 10\%$	$\pm 10\%$	$\pm 10\%$	$\pm 10\%$
Delta Marker Time Measurement Accuracy	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$
Sweep Trigger	Free Run, Line, Video, Single, Ext	Free Run, Line, Video, Single, Ext	Free Run, Line, Video, Single, Ext	Free Run, Line, Video, Single, Ext	Free Run, Line, Video, Single, Ext

EXTERNAL INPUT

	494AP	492BP	492PGM	497P	495P
RF Input Impedance	50 ohms nominal	50 ohms nominal	50 ohms nominal	50 ohms nominal	50 ohms nominal
VSWR (10 dB input attenuation)					
< 2.5 GHz	1.3:1 max	1.3:1 max	1.3:1 max	1.3:1 max	1.3:1 max
2.5 GHz to 6.0 GHz	1.7:1 max	1.7:1 max	1.7:1 max	1.7:1 max	N/A
6.0 GHz to 18 GHz	2.3:1 max	2.3:1 max	2.3:1 max	N/A	N/A
18 GHz to 21 GHz	3.5:1 max	3.5:1 max	3.5:1 max	N/A	N/A
Local Oscillator Emission Level (10 dB input attenuation)	≤ -80 dBm	≤ -80 dBm	≤ -80 dBm	≤ -80 dBm	≤ -80 dBm
External Mixer Input	Approx 2 GHz IF	Approx 2 GHz IF	N/A	N/A	N/A
External Reference Input	1, 2, 5, or 10 MHz	1, 2, 5, or 10 MHz	N/A	1, 2, 5, or 10 MHz	1, 2, 5, or 10 MHz
Horizontal Input/Trigger Input	0 to +10 V/1 to 50 V	0 to +10 V/1 to 50 V	0 to +10 V/1 to 50 V	0 to +10 V/1 to 50 V	0 to +10 V/1 to 50 V
Video Input/Marker Input	0 to +4 V/0 to -10 V	0 to +4 V/0 to -10 V	0 to +4 V/0 to -10 V	0 to +4 V/0 to -10 V	0 to +4 V/0 to -10 V

EXTERNAL OUTPUT

	494AP	492BP	492PGM	497P	495P
Calibrator	100 MHz ± 10 Hz, -20 dBm ± 0.3 dB	100 MHz ± 100 Hz, -20 dBm ± 0.3 dB	100 MHz ± 1 kHz, -20 dBm ± 0.3 dB	100 MHz ± 100 Hz, -20 dBm ± 0.3 dB	100 MHz ± 10 Hz, -20 dBm ± 0.3 dB
1st Local Oscillator	2 to 6 GHz, +7.5 to +20 dBm	2 to 6 GHz, +7.5 to +20 dBm	2 to 6 GHz, +6 to +20 dBm	2 to 6 GHz, +6 to +20 dBm	2 to 4 GHz, +6 to +20 dBm
2nd Local Oscillator	-7 to -17 dBm	-7 to -17 dBm	-7 to -17 dBm	-7 to -17 dBm	-7 to -17 dBm
Video Output (CRT center reference)	0.5 V of signal per div of video	0.5 V of signal per div of video	0.5 V of signal per div of video	0.5 V of signal per div of video	0.5 V of signal per div of video
Sweep Output (CRT center reference)	0.5 V/div; ± 2.5 V max	0.5 V/div; ± 2.5 V max	0.5 V/div; ± 2.5 V max	0.5 V/div; ± 2.5 V max	0.5 V/div; ± 2.5 V max
Pen Lift	+5 V nominal; TTL-compatible	+5 V nominal; TTL-compatible	+5 V nominal; TTL-compatible	+5 V nominal; TTL-compatible	+5 V nominal; TTL-compatible
2nd IF Output (Opt. 42)	110 MHz, 0 dBm; 3 dB BW is 4.5 MHz	110 MHz, 0 dBm; 3 dB BW is 4.5 MHz	110 MHz, 0 dBm; 3 dB BW is 4.5 MHz	110 MHz, 0 dBm; 3 dB BW is 4.5 MHz	110 MHz, 0 dBm; 3 dB BW is 4.5 MHz
3rd IF Output	10 MHz, -5 dBm	10 MHz, -5 dBm	10 MHz, -5 dBm	10 MHz, -5 dBm	10 MHz, -5 dBm
Probe Power	+5 V, -15 V, +15 V; 100 mA max each	+5 V, -15 V, +15 V; 100 mA max each	+5 V, -15 V, +15 V; 100 mA max each	+5 V, -15 V, +15 V; 100 mA max each	+5 V, -15 V, +15 V; 100 mA max each

GENERAL SPECIFICATIONS

	494AP	492BP	492PGM	497P	495P
Power Requirements					
Voltage	90-132/180-250 Vac	90-132/180-250 Vac	90-132/180-250 Vac	90-132/180-250 Vac	90-132/180-250 Vac
Frequency	48-440 Hz	48-440 Hz	48-440 Hz	48-440 Hz	48-440 Hz
Power	210 W max @ 115 Vac, 60 Hz	210 W max @ 115 Vac, 60 Hz	210 W max @ 115 Vac, 60 Hz	210 W max @ 115 Vac, 60 Hz	210 W max @ 115 Vac, 60 Hz
Weight (carrying), Nominal	22.2 kg (48 lbs)	21.76 kg (47 lbs)	21.3 kg (46 lbs)	20.83 kg (45 lbs)	19.44 kg (42 lbs)
Dimensions (without handle, feet, or cover), mm/inches	175 x 327 x 499/6.9 x 12.87 x 19.65	175 x 327 x 499/6.9 x 12.87 x 19.65	175 x 327 x 499/6.9 x 12.87 x 19.65	175 x 327 x 499/6.9 x 12.87 x 19.65	175 x 327 x 499/6.9 x 12.87 x 19.65
Digital Storage	1000 pts horizontal, 250 pts vertical	1000 pts horizontal, 250 pts vertical	1000 pts horizontal, 250 pts vertical	1000 pts horizontal, 250 pts vertical	1000 pts horizontal, 250 pts vertical
Digitizing Rate	9 μ s	9 μ s	9 μ s	9 μ s	9 μ s
Macro Programming	8K	8K	N/A	8K	8K
Nonvolatile Memory	9 waveforms, 10 control settings	9 waveforms, 10 control settings	9 waveforms, 10 control settings	9 waveforms, 10 control settings	9 waveforms, 10 control settings
HELP Mode	Yes	Yes	Yes	Yes	Yes