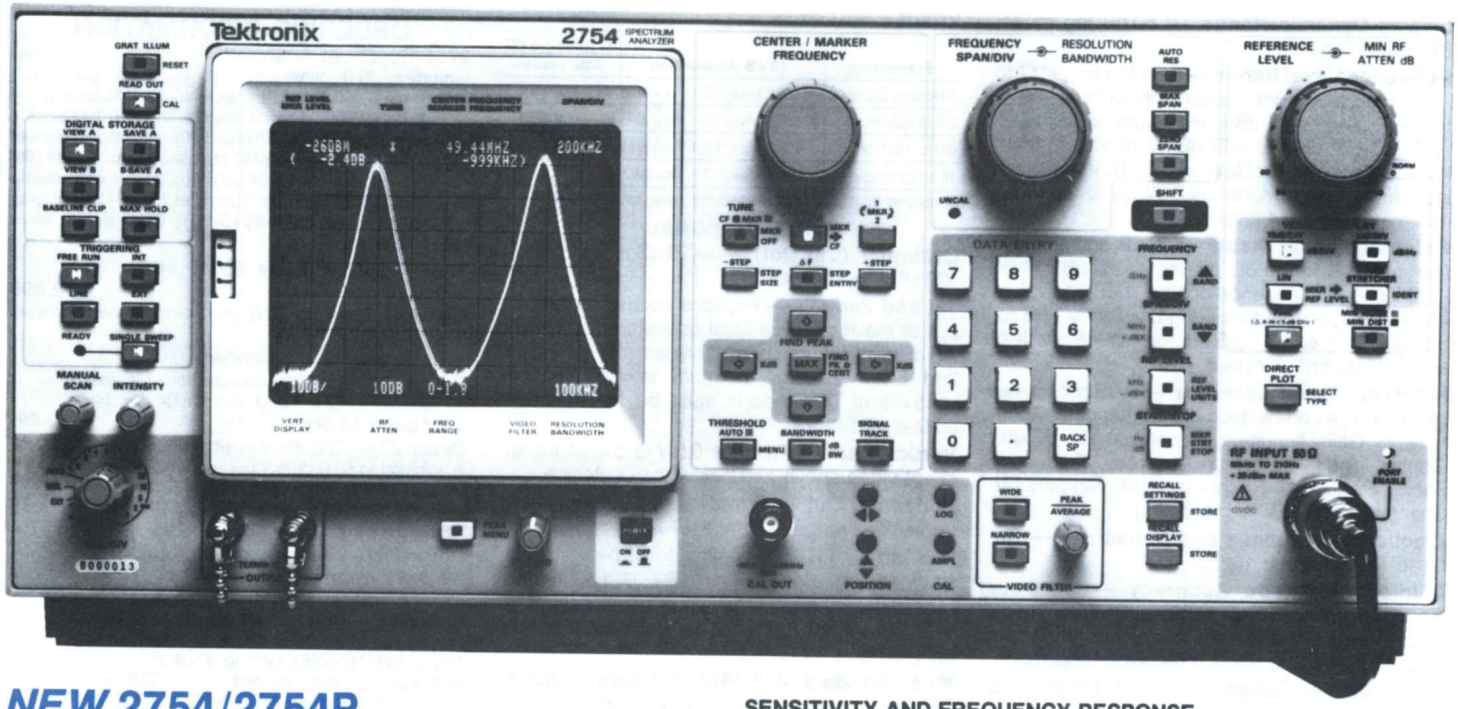
TEK 50 kHz to 21 GHz SPECTRUM ANALYZERS



NEW 2754/2754P

GPIB IEEE-488

The 2754P complies with IEEE Standard 488-1978, and with Tektronix *Standard Codes and Formats.*

Rackmountable for Engineering and Manufacturing System Productivity

Marker and Center Frequency Accuracy of One Part in 10^5

Built-In Signal Processing Intelligence
—Search, Sort and Mark CW, Pulse or Spurious Signals
—Exclusive Occupied Bandwidth Mode
—Signal Tracking
—Noise Normalization to 1 Hz

Nonvolatile Memory for Storage of Up to Nine Waveforms and Nine Front Panel Displays

Direct Keypad Entry of Control Parameters

Large, Easy-to-Use Controls

Direct Plot Capability (All Versions)

1 kHz Resolution Bandwidth

Optional Preselector

Now There is a Tek Spectrum Analyzer Especially for the Engineering Labs and Manufacturing Systems

The Tektronix 2754 Spectrum Analyzer combines cost-effective lab performance and ease of use with a new dimension in Spectrum Analyzer signal processing intelligence. Packaged for enhanced productivity, it reduces operator interface requirements and risk of human error. You'll make measurements faster and more accurately than ever before. All with the high standard of Tektronix quality and reliability.

Decision-Making Power at the Touch of a Button

Tek exclusives include marker signal processing intelligence that can discriminate and sort among continuous wave (CW), pulse and spurious signals. Hands-off convenience for measuring the bandwidth of filters, amplifiers and channelized spectrum occupancy is provided by Tek's new BANDWIDTH mode. For a summary of signal processing functions, see page 160.

Tedious, time-consuming calculations are eliminated with automatic noise normalization to 1 Hz and alternate reference units such as dBm, dBmV, dBμV and dBV.

Value Packed

Feature for feature, the 2754 is optimized for straightforward operation and outstanding ease of use—from the ergonomically designed front panel and larger controls to direct keypad entry of important control factors.

Use as a Systems Component

The 2754P is the GPIB-programmable version of the 2754 and features Tek *Standard Codes and Formats*, making programming easy to implement with English-like commands. With TekSPANS® software you can use the 2754P with popular controllers including the IBM PC and PC compatibles.

As an option, you can quickly and easily rackmount the 2754 for use in the manufacturing or test environment not requiring instrument mobility.

SENSITIVITY AND FREQUENCY RESPONSE

Band and Frequency Range	Harmonic Number	Sensitivity at (dBm) Minimum Resolution	Frequency Response (dB)*2
1 (50 kHz–4.2 GHz)*1	1	−115	±1.5
2 (1.7–5.5 GHz)*1	1	−115	±1.5
3 (3.0–7.1 GHz)*1	1	−115	±1.5
4 (5.4–18 GHz)*1	3	−100	±2.5
(12–18 GHz)	3	−95	±2.5
5 (15–21 GHz)*1	3	−95	±3.5

*1 Band 1 is limited to 50 kHz to 1.8 GHz for preselected (Option 01) units. The preselector degrades minimum sensitivity by 5 dB (6 dB in BAND 3) and degrades frequency response by ±1.0 dB to 18 GHz; ±1.5 dB to 21 GHz.
*2 Measured with 10 dB RF Attenuation and peaking optimized (when applicable). Frequency response within ±3.5 dB from 50 kHz to 18 GHz referenced to 100 MHz (±4.5 dB for Option 01).

CHARACTERISTICS

The following characteristics apply after a 30 minute warm-up period unless otherwise noted.

FREQUENCY RELATED

Frequency Range — 50 kHz to 21 GHz coaxial input.

Center and Marker Frequency Accuracy*1 — Phase Locked: ±[20%D + (Fx10^{-5})] Hz; Bands 1 and 5 with span/div; ≤200 kHz, and Bands 2–4 with span/div ≤100 kHz. Unlocked: ±[20%D + (Fx10^{-5}) + 15 NkHz].
Where: D = Span/div or Res BW, whichever is greater.
F = Center or Marker Frequency
N = Harmonic Mixing Number

Delta Marker Frequency Accuracy — 1% of total span.

Center Frequency Drift (After 1 Hour Warm-Up) — ≤50 Hz per minute of sweep time corrected at least every 30 seconds. Phase Locked: Bands 1 and 5 with span/div ≤200 kHz, and band 2–4 with span/div ≤100 kHz. Locked: ≤(5 kHz) N per minute of sweep time.

Frequency Readout Resolution — ≤10% span/div to 1 kHz minimum. (100 Hz in Delta Marker Mode).

Residual FM — Phase Locked: ≤(10 +2N) Hz peak-to-peak in 20 ms, Bands 1 and 5 with span/div ≤200 kHz, and Bands 2–4 with span/div ≤100 kHz. Unlocked: ≤(7 kHz) N peak-to-peak in 20 ms.

*1 Over the operating temperature extremes of 0°C to +50°C, 1.5 x 10^{-5}

Noise Sidebands

dBc/Hz	Offset From Carrier
≤ −105	30 kHz
≤ −115	300 kHz

Resolution Filters — 1 kHz to 1 MHz (6 dB bandwidth ±20%) in decade steps. Shape factor ≤7.5: 1 (60 dB/6 dB).

Video Filter Range — 3 Hz to 30 kHz (coupled to resolution filter by front panel pushbuttons).

Frequency Span/Division — 0 Hz (zero span pushbutton or data entry keypad); 200 Hz to 1 GHz (in a 1-2-5 sequence) via span/div knob; 200 Hz to 1.2 GHz (to two significant digits) via keypad or start/stop data entry, or marker start/stop; full band via MAX SPAN pushbutton (5 bands). Accuracy ±5% of selected span/div.

AMPLITUDE RELATED

Vertical Display Modes — 10 dB, 2 dB and linear via pushbutton; any integer from 1 to 15 dB/div via Data Entry keypad.

Display Dynamic Range — 80 dB log mode; 8 divisions linear.

Reference Level Range — Log Mode: −117 to +40 dBm, +30 dBm maximum input level; −130 to +27 dBV, +17 dBV maximum input level; −70 to +87 dBmV, +77 dBmV maximum input level; −10 to +147 dBμV, +137 dBμV maximum input level. Linear Mode: 39.6 nV/div to 2.8 V/div, 1 W maximum input level.

Reference Level Steps — 10 dB coarse, 1 dB fine in 10 dB log; 1 dB coarse, 0.25 dB fine in 2 dB log. 1-2-5 sequence coarse, 1 dB equivalent fine in linear; coarse step=log/div, fine is 1 dB for 5 dB/div or greater, 0.25 dB for 4 dB/div or less set via Data Entry keypad.

Reference Level Accuracy — Accuracy is dependent on a combination of RF Attenuator Accuracy, IF Gain Accuracy, Resolution Bandwidth, Display Mode, Calibrator Accuracy, Frequency Band, Frequency Response and Temperature Change (±0.15 dB/°C maximum).

Display Amplitude Accuracy — ±1.0 dB/10 dB to a maximum of ±2 dB over 80 dB (10 dB Log); ±0.4 dB/2 dB to a maximum of ±1.0 dB over 16 dB (2 dB Log); ±5% of full scale in linear mode.

RF Attenuator Range — 0 to 60 dB in 10 dB steps.

Attenuator Level Accuracy — Dc to 1.8 GHz: 0.5 dB/10 dB, 1 dB maximum cumulative error over 60 dB. 1.8 to 18 GHz: 1.5 dB/10 dB, 3 dB maximum cumulative error over 60 dB. 18 to 21 GHz: 3 dB/10 dB, 6 dB maximum cumulative error over 60 dB.

Resolution Bandwidth Gain Variation — ±0.4 dB (after CAL with respect to 1 MHz filter).

IF Gain Range — 87 dB increase; 10 dB decrease in MIN NOISE; 10 dB and 1 dB steps.

IF Gain Accuracy — ≤0.2 dB/dB to maximum of 0.5 dB/9 dB except at the decade transitions: −19 to −20 dBm, −29 to −30 dBm; −39 to −40 dBm, −49 to −50 dBm, −59 to −60 dBm. An additional ≤0.5 dB for a maximum cumulative error of 1 dB over 10 dB; ±2 dB maximum deviation over the 97 dB range.

Marker/s Accuracy — Equal to Reference Level Accuracy plus Display Amplitude Accuracy.

Third Order Intermodulation Distortion — (Option 01 only) ≤−70 dBc for CW signal (MIN Distortion Mode) Any two on-screen signals within any frequency span (50 kHz to 21 GHz); ≤−100 dBc for signals spaced ≥100 MHz for preselector bands.

Harmonic Distortion — (Option 01 only) ≤−60 dBc for a −40 dBm input 50 kHz to 21 GHz in MIN Distortion mode. Not discernible above the noise (typically −100 dBc) for preselected bands.

LO Emissions — ≤−10 dBm. Option 01: ≤−70 dBm.

Spurious Responses (Residual) — ≤−100 dBm.

INPUT SIGNAL

RF Input — Type "N" female 50 Ω nominal impedance.

Maximum Safe Input — +30 dBm CW with ≥20 dB attenuation; +13 dBm CW with 0 dB attenuation; 0 V dc.

Option 01: +30 dBm (1 W) CW; 75 W peak, 1μs pulse width, 0.001 duty; 0 dB attenuation. Do not apply dc.

1 dB Gain Compression — −10 dBm with 0 dB RF Attenuation in MIN NOISE; −20 dBm with 0 dB RF Attenuation in MIN DISTORTION (No gain compression can be observed on screen).

VSWR

Frequency	10 dB Attenuation	(Typical) 0 dB Attenuation
50 kHz to 2.5 GHz	1.3:1 Max; 1.2:1 Typical	1.9:1
2.5 to 6.0 GHz	1.7:1 Max; 1.5:1 Typical	1.9:1
6.0 to 18 GHz	2.3:1 Max; 1.9:1 Typical	2.3:1
18 to 21 GHz	3.5:1 Max; 2.7:1 Typical	3.0:1

Measured at ±3 MHz of preselector peak for Option 01.

CHARACTERISTICS (OPTION 07) 50 Ω/75 Ω INPUT RELATED

Same as 495. See page 160.

OUTPUT SIGNAL

Calibrator (Cal Out) — −20 dBm ±0.3 dB at 100 MHz ±1.0 kHz

1st and 2nd LO — Provides access to the output of the respective local oscillators (1st LO + 7.5 dBm minimum to a maximum of +15 dBm, 2nd LO −22 dBm minimum to maximum of +15 dBm). These ports must be terminated in 50 Ω at all times.

Vertical Out — Provides 0.5 V ±5% of signal per division of video above and below the centerline.

Horizontal Out — Provides 0.5 V either side of center. Full range −2.5 V to +2.5 V ±10%.

Pen Lift — TTL, 5 V nominal to lift pen.

IF Out — Output of the 10 MHz IF. Level is approximately −5 dBm for a full screen signal at −30 dBm input reference level. Nominal impedance 50 Ω.

IEEE Standard 488-1978 Interface Function Subsets Implemented — **2754P:** SH1, AH1, T5, L3, SR1, RL1, PP1, DC1, DT1 and CØ. **2754 (Direct Plot only):** SH1, AHØ, T3, LØ, SRØ, RLØ, PPØ, DTØ and CØ.

GENERAL CHARACTERISTICS

Sweep Time — 20 μs to 5 s/div (10 s/div in auto) in 1-2-5 sequence.

CRT Readout — Displays: Reference level, center frequency, frequency range, vertical display mode, frequency span/div, resolution bandwidth, RF attenuation and video filter.

CRT — 8 x 10 cm, (GH) P31 Phosphor.

Power — 210 W max with all options, at 115 V and 60 Hz.

Input Voltage — 90 to 132 V ac or 180 to 250 V ac, 48 to 440 Hz.

Configuration — (Bench/Rackmount) 24.5 kg (54 lb), 177.8 mm x 431.8 mm x 609.6 mm (7 in x 17 in x 24 in).

ENVIRONMENTAL

Per MIL-T-28800C Type III, Class 5, Style E.

Temperature — Operating: 0°C to +50°C; Nonoperating: −40°C to +75°C.

Humidity — 95% below +30°C, 75% above +30°C, 45% above +40°C.

Altitude — 10,000 feet operating; 40,000 feet nonoperating.

Electromagnetic Compatibility — The 2754 and 2754P Spectrum Analyzers meet the requirements of MIL-STD-461B, operating from 48 Hz to 440 Hz power sources with the exceptions shown below.

Conducted Emissions — CE01: 15 dB relaxation for first 10 harmonics of power line frequency. CE03 (Narrowband): Full limits. CE03 (Broadband): 15 dB relaxation from 15 kHz to 50 kHz.

Conducted Susceptibility — CS01: Full limits. CS02: Full limits. CS06: Full limits.

Radiated Emissions — RE01: 10 dB relaxation for first 10 harmonics of power line frequency, and exceptioned from 30 kHz to 36 kHz, RE02: Full limits.

Radiated Susceptibility — RS01: Full limits. RS02-1: Full limits. RS02-2: To 5 amps only. RS03: Up to 1 GHz only.

ORDERING INFORMATION

2754 Spectrum Analyzer **$22,995**

Includes: 50 Ω coax cable, N to N connector, 6 ft; (012-0114-00); 50 Ω coax cable, BNC to BNC connector, 18 in (012-0076-00); service manual Vol. 1 (070-6097-00); service manual Vol. 2 (070-6098-00); operator's manual (070-6096-00); N male to BNC female adaptor; 2 Fast-Blo, 4A fuses; power cord (161-0104-00); power cord clamp (343-0170-00); amber CRT light filter (378-0115-01); gray CRT light filter (378-0115-02); CRT mesh filter (378-0887-00).

2754P Programmable Spectrum Analyzer **$27,995**

Includes: Same as 2754 plus programmer's manual (070-6099-00).

OPTIONS

Option 01 — Adds preselection for the 1.7 GHz to 21 GHz band and limiter for 1st mixer below 1.8 GHz. **+$3,995**

Option 07 — 75 Ω dBmV input and calibration in addition to normal 50 Ω dBm input and calibration. **+$750**

Includes: BNC male to female adaptor connector (013-0126-00); 42 inch BNC to BNC connector 75 Ω coax cable (012-0074-00).

Option 30 — Rackmount 19 inch rack width. **+$250**

Includes: Rack slides (351-0623-00).

Option 31 — Rackmount 19 inch rack width with rear panel input/output capability (no front panel inputs). **+$450**

Includes: Same as Option 30.

Option 52*1 — North American 220 V configuration with standard power cord. Fuses are replaced with 2A slo-blo.

***WARRANTY-PLUS* SERVICE PLANS**

SEE PAGE 497

M1 — (2754) 2 Calibrations. **+$1,995**

M1 — (2754P) 2 Calibrations. **+$2,025**

M2 — (2754) 2 Years Service. **+$3,380**

M2 — (2754P) 2 Years Service. **+$3,510**

M3 — (2754) 2 Years Service and 4 Calibrations. **+$3,995**

M3 — (2754P) 2 Years Service and 4 Calibrations. **+$4,045**

OPTIONAL ACCESSORIES

Microwave Comb Generator — TM 500 Series compatible. Order 067-0885-00 **$1,800**

1405 TV Sideband Analyzer Adaptor — 525/60 markers (Option 02 required for 275X and 49X). **$5,780**

TR 503 Tracking Generator — 100 kHz to 1.8 GHz. **$6,620**

**1 To order, contact your local Tektronix Sales Office.*