Video Measurement Set


1780R Video Measurement Set.

1780R Series

CHARACTERISTICS

Input/Output

Vertical Range, Full Scale -
Fixed: 1.0 V ±.007 V.
Variable: Approximately 0.67 to 2.00 V.

Vertical Magnification - Fixed, Variable, X5.

Maximum Input Signal -
AC Coupled: 2.0 V_{p-p}, 10% -90% AP.
DC Coupled: ±1.5 V (DC + peak AD).

Return Loss -
Inputs A, B, B2 or B3: <40 dB DC to 5 MHz.
Aux Video in, Aux Video out, Pix Mon out
<34 dB DC to 5 MHz.
External Sync Input: <46 dB DC to 5 MHz.

Waveform Monitor Vertical System

Frequency Response (Flat X1) -
50 kHz - 5 MHz:

Input CH A, B, B2 and B3: 1%.

5 MHz - 10 MHz:

Input CH A: 1%.
CH B1, B2 and B3: 2%.

10 MHz - 15 MHz:

Input CH A, B1, B2 and B3: +2%, -5%.

15 MHz 20 MHz:

Input CH A, B1, B2 and B3: +2%, -15%.

Voltage Cursor -
Accuracy ±0.2%.
Resolution: 1 mV.

Cal Amplitude-
Accuracy: 1.00 V ±0.2%.
Resolution: 1 mV at 1.00 V.

DC Restorer -
Mains Hum Attenuation:
Slow Clamp: ≤0.9 dB.
Fast Clamp: ≥26 dB.

Lum/Chroma Gain Ratio - 1:1 ±1%.

Vertical Overscan -
1 V_{p-p} Modulated Sin^2 Composite Signal, X5 Gain: <7 mV variation in baseline of chroma when positioned anywhere between sync tip and 100% white.

DC Channel Matching -
Typically Within: 10 mV.

Common Mode Rejection (A-B1) -
60 Hz: A-B ≥46 dB.
15 kHz: A-B ≥46 dB.
1 MHz: A-B ≥40 dB.
F_{SC}: A-B ≥34 dB.

Filters -
Luminance: <3 dB down at 1 MHz, ≥40 dB down at F_{SC}.
Low Pass: ≥14 dB down at 500 kHz.
Chrominance: Typically ±1% of flat at F_{SC}, 3 dB points ±.75 MHz F_{SC}, within ±.15 MHz.
Diff'd Steps: <40 dB at F_{SC}.

Linear Waveform Distortion -
Pulse Overshoot and Ringing: ≤1% of applied pulse amplitude.
25 µs Bar Tilt: ≤1% of applied square wave amplitude.
2T Sin^2 Pulse to Bar Ratio: 1:1 ±1%.

Non-linear Waveform Distortion -
Aux Video and Pix Mon out:

Differential Gain: ≤0.25%, 10-90% APL.
Differential Phase: ≤0.25°, 10-90% APL.

Probe Input

Input Resistance - Nominally 1.0 megaohm.

Input RC Product - Nominally 20 µs (20 pF).

Gain Full Scale - 0.1 V, 1.0 V ±3%.

Frequency Response - 25 Hz to 10 MHz: ±3%.

Probe Calibrator - 1.0 V ±0.5%.

Waveform Monitor Horizontal Deflection System

Sweep Rates and Timing Accuracy -
1H (5 µs/div): ±2%. 2H (10 µs/div): ±2%.
3H (15 µs/div): ±2%.
1F displays 1 full field including field rate sync. 2F displays 2 full fields, first field selectable even or odd. 3F displays 3 full fields, first field selectable even or odd.

Sweep Linearity -
1H, 2H or 3H: ±1%.
1F, 2F or 3F: ±0.5 div.
Slow Sweep: ±5% full screen over sweep length.

Magnified Sweep Accuracy -
X5 (1 µs/div): ±1%. X10 (0.5 µs/div): ±2%.
X20 (0.25 µs/div): ±3%. X25 (0.2 µs/div): ±3%.
X50 (0.1 µs/div): ±3%. X100 (50 ns/div): ±5%.

Magnified Sweep Linearity - ±1 minor division ($\leq$2%).

Variable Sweep Range - < ±20%.

Slow Sweep Duration - 4 - 12 sec.

Timing Cursors - Accuracy: 5 ns any delay within one line.

Line Select -
Range: Full field, waveform and vector monitors may select different lines.
Field Selection: 1 of 4 for NTSC (1780R) or 1 of 8 for PAL (1781R), even, odd or all fields.

RGB/YRGB -
Staircase Input: 10 V_{p-p} for 9 division wide display ±1.4 major divisions.
Staircase Operating Signal: DC signal levels plus peak AC, not to exceed -12 V to +12 V.
Maximum AC Signal: 12 V_{p-p}.
Field or Line Rate: Front panel selectable.

External Horizontal Input - 0 to +5 V. 5 V is nominally a 10 div H sweep.

Waveform Monitor Differential Gain and Differential Phase Display

Differential Gain (DG) -
Deflection Factor: 5% DG deflects the trace 50 IRE (1780R) or 500 mV (1781R) ±5%.
Residual DG (10-90% APL): $\leq$0.2% last 90% of track.

Calibrated DG (CRT Readout) -
Resolution: 0.1%.
Accuracy: 0.1% ±10% of reading.
Range: ±5%.

Differential Phase (Dø) -
Deflection Factor: 5° Dø deflects the trace 50 IRE (1780R) or 500 mV (1781R) ±5%.
Residual Dø: (10-90% APL) $\leq$0.1° last 90% of trace.
Calibrated Dø (CRT readout):

Resolution: 0.05°.
Accuracy: Burst lock ±0.1° over any 10° increment; ±0.2° over full 360° range; Ext ref ±0.1° over full 360° range.

Digital Recursive Vertical Filter -
Displayed Error Signal White Noise Reduction: Approx. 15 dB.
Cross Luminance Rejection: Approx. 30 dB.
Unit Sample Response: Settles to within 1 dB in 50 samples.
Chrominance Bandwidth: 500 kHz ±100 kHz baseband.

Synchronization

Sync Input - Internal:

Reference Sync Separator: 0.2 to 2.0 V_{p-p} composite video.
Internal Sync Separator: 0.5 to 2.0 V_{p-p} composite video.

External:

Black Burst: 286 mV (1780R), 300 mV (1781R) sync and burst amplitude, +6/-14dB
Composite Sync: 0.2 to 8.0 V_{p-p}.
SCH Modes: 286 mV (1780R), 300 mV (1781R) sync burst ±3 dB.

Direct Sync -
Horizontal Frequency Range: 15.734 kHz ±100 Hz.

AFC Sync -
Horizontal Frequency Range: 15.734 kHz ±200 Hz.
Lock-in Time: <1 second.

Slow Sweep Triggering -
Signal APL change from $\leq$10% to 90%.
Sensitivity: 0.4 to 2.0 V_{p-p} composite video with APL change.
Rate: $\geq$0.2 Hz.

Remote Sync -
Amplitude: 2.0 to 5.0 V squarewave or 4.0 V composite sync.

Vectorscope Vector Display

Digital Phase Shifter Phase Accuracy - 0.1°.

Chrominance Bandwidth -
Upper -3 dB Point: F_{sc} +500 kHz, ±100 kHz.
Lower -3 dB Point: F_{sc} -500 kHz, ±100 kHz.

Display - Vector Phase Accuracy: ±1.25°.

Quadrature Phasing - ±0.5°.

Subcarrier Regenerator -
Pull-in Range: ±50 Hz of F_{sc} (1780R), ±10 Hz of F_{sc} (1781R, typically ±50 Hz).
Phase Shift with Burst Amplitude Change:
Phase Shift with Input Channel Change: $\leq$2°.

Clamp Stability - Better than 0.4 mm.

Variable Gain Range - +14 dB to -6 dB of 75% colorbar preset gain.

Variable Gain Phase Shift - $\leq$1° as gain is varied +3 dB to -6 dB.

Vectorscope XY Display

DC Coupled Differential Inputs Through Rear Panel Connector -
Input Amplitude: 2 to 9 V_{p-p}, adjustable internally for full scale deflection 0 dBm to +12 dBm for 600 Ohm system. Factory set to 0 dBm.
Maximum Input Voltage: ±15 V combined peak signal and DC.
Frequency Response: DC to <500 kHz.
X and Y Input Phase Matching: < one trace width of separation to 20 kHz.

Vectorscope SCH Phase Display

Accuracy -
Absolute: ±5° phase at 25°C.
Relative: Typically ±2°.
Acquisition Time: $\leq$1 second.

Display Range -
Absolute (Internal Reference): ±70°.
Relative (External Reference): 360° Indicates correct color framing.

CRTs and High Voltage Supplies

Waveform Monitor -
Viewing Area: 80 mm x 100 mm.
Accelerating Potential: Nominally 20 kV.
Orthogonality: ±1°.

Vectorscope -
Viewing Area: 80 mm x 100 mm.
Accelerating Potential: Nominally 13.75 kV.
Orthogonality: ±1°.

Power Requirements

Mains Voltage Ranges -
110 V AC: 90-132 V.
220 V AC: 200-250 V.

Mains Frequency Range - 48-66 Hz.

Power Consumption - 110 W max.

Environmental

Temperature Range -
Operating: 0°C to +50°C.
Nonoperating: -55°C to +75°C.

Altitude -
Operating: To 15,000 ft. (4.5 km) max.
Nonoperating: To 50,000 ft. (15 km) max.

Humidity - 90-95% noncondensing.

Vibration -
Operating: 0.015 in (0.38 mm) p-p, 10-55 Hz, 75 minutes.

Shock -
Nonoperating: 30 g acceleration, 3 times each major axis, 11 ms, halfsine.

Bench Handling - 4 in. drop to table top on each of four bottom corners.

Transportation -
Vibration: Qualified under National Safe Transit Association (NSTA) Test Procedure 1A-B-1.
Drop Test: Qualified under NSTA Test Procedure IA-B-2.

Certifications

EMC - Certified to the EMC Directive 89/336/EEC.

Safety -
UL1244, CSA231, EN61010-1, IEC61010-1.
Complies with: HD401 S IEC 348.

Physical Characteristics

Dimensions	**mm**	**in.**
Height	133.4	5.25
Width	483	19
Length	460	18
Weight (approximate)	**kg**	**lbs.**
Net	12.75	28
Shipping	20.1	45

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