

Part 4

Specification

Performance Conditions

The specifications that follow apply when the instrument is in the condition of Enhanced Accuracy. Enhanced Accuracy is initiated by pushing the ENHANCED ACCURACY button on the specific host mainframe after the system has reached thermal equilibrium, which requires 20 minutes warmup. Enhanced Accuracy is indicated on the crt display and remains in effect as long as the mainframe internal temperature change is less than 5° C from the temperature at which the calibration was performed. When the 5° C change does occur the accuracy condition becomes Not-Enhanced. In the Not-Enhanced condition those Characteristics that are temperature sensitive may not remain within the limits of these specifications. The instruments specifications are valid at an ambient temperature of 0° to +50° C, unless otherwise stated.

TABLE 4-1
Electrical Characteristics

Characteristic	Performance Requirement		
DISPLAY			
DEFLECTION FACTOR (Sensitivity)			
Calibrated Range	1 mV to 10 V/div.		
Enhanced DC Accuracy ¹ , either polarity, any HF Limit of 11A52 in 11301/11302 Mainframes, with on-screen cursors.			
Without Probes			
Volts/Div	ΔV DC Acc.	DC Balance	DC Offset Acc.
1 mV to 99.5 mV	$\pm(1.0\% + 0.04\text{div})$	$\pm(0.20\text{mV} + 0.13\text{div})$	$\pm(0.15\% + 0.4\text{mV})$
100 mV to 995 mV	$\pm(1.0\% + 0.04\text{div})$	$\pm(2\text{mV} + 0.13\text{div})$	$\pm(0.20\% + 4\text{mV})$
1 V to 10 V	$\pm(1.0\% + 0.04\text{div})$	$\pm(20\text{mV} + 0.13\text{div})$	$\pm(0.20\% + 40\text{mV})$
With P6231 Probe calibrated from 11301/11302 Calibrator output			
Volts/Div	ΔV DC Acc.	DC Balance	DC Offset Acc.
10 mV to 995 mV	$\pm(1.1\% + 0.04\text{div})$	$\pm(2\text{mV} + 0.13\text{div})$	$\pm(0.15\% + 2\text{mV})$
≥ 1 V	$\pm(1.2\% + 0.04\text{div})$	$\pm(20\text{mV} + 0.13\text{div})$	$\pm(0.15\% + 2\text{mV})$
Probe Tip TC term	100 ppm/°C		

¹ For absolute dc accuracy of single-point measurements using Offset, add the DC Offset Accuracy, DC Balance and ΔV DC Accuracy terms. Apply the ΔV DC Accuracy only to the difference between the Vertical Position setting and the measurement point.

TABLE 4-1 (cont)
Electrical Characteristics

Characteristic	Performance Requirement
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DISPLAY (cont)

DEFLECTION FACTOR (Sensitivity), cont.

Enhanced DC Accuracy¹, either polarity, any BW Limit, of 11A52 in 11401/11402 Mainframes.

Without Probes

Volts/Div	ΔV DC Acc.	DC Balance	DC Offset Acc.
1 mV to 99.5 mV	$\pm(0.8\% + 0.01\text{div})$	$\pm(0.2\text{mV} + 0.10\text{div})$	$\pm(0.15\% + 0.4\text{mV})$
100 mV to 995 mV	$\pm(0.8\% + 0.01\text{div})$	$\pm(2\text{mV} + 0.10\text{div})$	$\pm(0.20\% + 4\text{mV})$
1 V to 10 V	$\pm(0.8\% + 0.01\text{div})$	$\pm(20\text{mV} + 0.10\text{div})$	$\pm(0.20\% + 40\text{mV})$

With P6231 Probe calibrated from 11401/11402 Calibrator output

Volts/Div	ΔV WC Acc.	DC Balance	WC Offset Acc.
10 mV to 995 mV	$\pm(0.9\% + 0.01\text{div})$	$\pm(2\text{mV} + 0.10\text{div})$	$\pm(0.15\% + 2\text{mV})$
≥ 1 V	$\pm(1.0\% + 0.01\text{div})$	$\pm(20\text{mV} + 0.10\text{div})$	$\pm(0.15\% + 2\text{mV})$
Probe Tip TC term	100 ppm/ $^{\circ}$ C		

¹For absolute dc accuracy of single-point measurements using Offset, add the DC Offset Accuracy, DC Balance, and ΔV DC Accuracy terms. Apply the ΔV DC Accuracy only to the difference between the Vertical Position setting and the measurement point.

TABLE 4-1 (cont)
Electrical Characteristics

Characteristic	Performance Requirement
DISPLAY (cont)	
DEFLECTION FACTOR (Sensitivity), cont.	
Coarse Resolution	1, 2, 5 sequence.
Fine Resolution depends on Deflection Factor, as follows:	
<p>Rotating the Fine control one increment will change the Deflection Factor by 1% of the next more-sensitive Coarse setting.</p> <p>For example, with deflection factor set to 198 mV, rotating the Fine control counterclockwise will cause this sequence of sensitivities: 199 mV, 200 mV, 202 mV, etc. Rotating the Fine control clockwise from 204 mV/div will cause the reverse sequence (202 mV, 200 mV, 199 mV, etc.).</p>	
OFFSET	
Accuracy	See Deflection Factor Accuracy, which precedes this characteristic.
Range, Resolution depend on Deflection Factor, as follows:	
between 1 mV and 99.5 mV/div.	±1 V. Coarse and fine resolution are 0.25 div. (250 μV) and 0.025 div. (25 μV), respectively.
between 0.1 v and 0.995 V/div.	±10 V. Coarse and fine resolution are 0.25 div. (2.5 mV) and 0.025 div. (250 μV), respectively.
between 1 V and 10.0 V/div.	±100 v. Coarse and fine resolution are 0.25 div (25 mV) and 0.025 div (2.5 mV) respectively.

TABLE 4-1 (cont)
Electrical Characteristics

Characteristic	Performance Requirement
DISPLAY (cont)	
FREQUENCY RESPONSE (0° to + 35° C)	
High Frequency Limit, (-3 dB point) and Calculated Rise Time of Display, Auxiliary, & Trig signals	Type of Mainframe
Volts/Division	11301 11302 11401 11402
≥10 mV	350 MHz 1.0 ns 400 MHz 0.9 ns 500 MHz 0.7 ns 600 MHz 0.6 ns
5 mV-9.95 mV	300 MHz 1.2 ns 350 MHz 1.0 ns 350 MHz 1.0 ns 400 MHz 0.9 ns
2 mV-4.98 mV	250 MHz 1.4 ns 250 MHz 1.4 ns 250 MHz 1.4 ns 250 MHz 1.4 ns
1 mV-1.99 mV	200 MHz 1.8 ns 200 MHz 1.8 ns 200 MHz 1.8 ns 200 MHz 1.8 ns
High Frequency-3 dB point	
100 MHz Limit	100 MHz ±30%.
20 MHz Limit	20 MHz ±30%.
Low Frequency-3 dB point, ac coupled Display, Trig, and Auxiliary signals	1 kΩ maximum from 50 Ω source (Vdc <20 V).
STEP RESPONSE (0° to 35° C)	
Overdrive Recovery Time ¹	
1 mV to 99.5 mV/div. (for signals up to ±2 V peak)	<20 ns to within (0.1% of signal +0.2 division).
100 mV to 995 mV/div. (for signals up to ±20 V peak)	<20 ns to within (0.1% of signal +0.2 division).
1 V to 10 V/div. (for signals up to ±25 V peak)	<20 ns to within (0.1% of signal +0.2 division).

¹Cable losses greatly increase the overdrive recovery time as cables are lengthened. See the discussion on pages 2-5 and 3-5.

TABLE 4-1 (cont)
Electrical Characteristics

Characteristic	Performance Requirement
INPUT CHARACTERISTICS	
Maximum Input Voltage, AC or DC Coupled ,	5 Vrms (0.5 W) or 0.25 watt-second pulses not exceeding 25 V peak.
Maximum DC Input Voltage, AC Coupled	≤100 V (dc+peak ac). CAUTION <i>Signals of more than 25 V peak amplitude must be connected with the input coupling set to OFF so that the input coupling capacitor is precharged.</i>
Input Disconnect Threshold	4 Vrms minimum to 6 Vrms maximum.
Power-Down Condition	50 Ω terminations disconnect when 11A52 is powered down
Impedance (dc coupled)	50 Ω within 0.5%, VSWR < 1.25:1 from dc to 500 MHz.
Impedance (ac coupled)	50 Ω ±1% in series with nominally 2.2 μF, with 500 kΩ to ground. VSWR < 1.25:1 from 100 kHz to 500 MHz.
Input Bias Current	4.0 μA maximum.

TABLE 4-1 (cont)
Electrical Characteristics

Characteristic	Performance Requirement
MISCELLANEOUS	
Typical Noise 1.0 mV to 1.99 mV/div 2.0 mV to 4.98 mV/div 5.0 mV to 9.95 mV/div 10.0 mV to 995 mV/div 100 mV to 995 mV/div 1.0 V to 10.0 V/div	0.087 div, rms. 0.04 div, rms. 0.02 div, rms. 0.015 div, rms. 0.015 div, rms. 0.015 div, rms.
DC Drift with Temperature	20 μ V/ $^{\circ}$ C, or less, at any sensitivity. ¹
Channel Isolation	At least 50:1 display ratio*, any Coarse Volts/div setting, dc-600 MHz.
Common Mode Rejection Ratio	At least 20:1, dc to 50 MHz, 10-div. reference signal on each input.
Probe Compatibility	The 11A52 is compatible with Level 1 and 2 TEKPROBES. ³

¹Dc drift can be calibrated out by invoking a calibration (Enhanced Accuracy) at any specific operating temperature.

$$^2\text{Display ratio} = \frac{\text{Amplitude (div)} \times \text{V/div (driven channel)}}{\text{Error amplitude (div)} \times \text{V/div (undriven channel)}}$$

³TEKPROBE is Tektronix' name for the interface used with probes designed for the 11000-Series of oscilloscopes and plug-in units. TEKPROBES have output connectors with one or more spring loaded coding pins. Two categories of TEKPROBES are:

Level 1

A level 1 probe uses analog encoding to indicate the probe's scale factor to the plug-in unit.

Level 2

A level 2 probe uses an EEPROM to store data about the the probe's transfer units, scale factor, and output voltage scale factor. Such data are serially encoded, then stored in the EEPROM. The probe data is intended to be read once at instrument power-up or when the probe is first connected to a plug-in unit (that is, at probe power-up).

TABLE 42
Environmental Characteristics

characteristic	Information
Ambient temperature (External to main frame)	
Operating within specs.	0° to +50° C., mainframe ambient.
Nonoperating	-40° to +75° c.
Humidity, Operating and Nonoperating	Five days, per MIL-T-28800C , Type III, class 5 as described in 3.9.22 and 455.1.2.2.
Altitude	
operating	To 4,570 m (15,000 ft.).
Nonoperating	To 15,200 m (50,000 ft.).
Vibration	
Operating, installed on Flexible Extender	MIL-T-28800C , Sec. 4.5.5.3.1 , type III, class 5.
Shock, Nonoperating (not installed in mainframe)	MIL-T-28800C , Sec. 4.5.5.4.1 , type III, class 5.
Bench Handling (operating and nonoperating)	MIL-T-28800C , Sec. 4.5.5.4.3 , type III, class 5.
Packaged Product Vibration and Shock	
Vibration and Bounce of Packaged Product	Meets ASTM D999-75 , Method A (NSA Project 1A-B-1).
Drop of Packaged Product	Meets ASTM D775-61 , Paragraph 5 (NSA Project 1A-B-2).
Electromagnetic Compatibility	MIL . STD. 461B. FCC Part 15, Subpart J , Class A . VDE 0871/6.78 , class B.

Physical Characteristics

TABLE 43
Physical Characteristics

Characteristic	Information
Weight (max)	1 lb. 14 oz. (851 grams).
Weight of Packaged Product (max)	4 lb. 12 oz. (2.2 kg).
Dimensions (max)	Refer to Figure 4-7.

Recommended Probes

Tektronix recommends the P6231 Probe for use with the 11A52. It has the following characteristics:

P6231 Low Impedance Subminiature 10X Active Probe. The P6231 has a bandwidth of 1.5 GHz, input impedance of 450 Ω , and dc offset of ± 5 V controlled by the 11A52. The P6231 is a Level 2 probe.

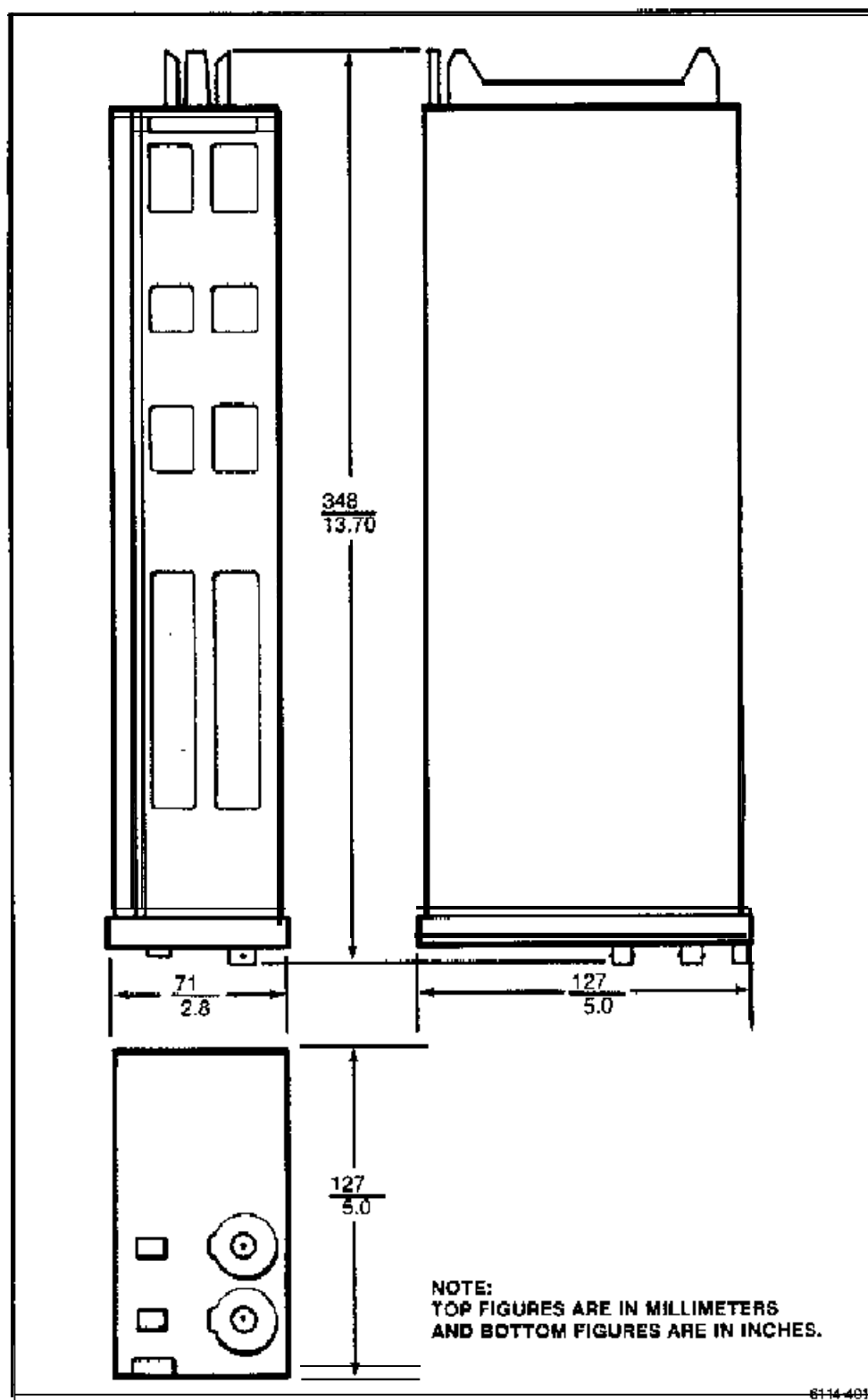


Figure 41. Dimensions of 11A52.