

**Table 1-1
Electrical Characteristics**

Characteristics	Performance Requirements
VERTICAL DEFLECTION SYSTEM	
Deflection Factor Range	2 mV per division to 5 V per division in a 1-2-5 sequence.
DC Accuracy (NON-STORE)	
+ 15 °C to + 35 °C	± 2%.
0 °C TO + 50 °C	± 3%. ^a For 5 mV per division to 5 V per division VOLTS/DIV switch settings, the gain is set at a VOLTS/DIV switch setting of 10 mV per division. 2 mV per division gain is set with the VOLTS/DIV switch set to 2 mV per division.
On Screen DC Accuracy (STORE)	
+ 15 °C to + 35 °C	± 2%.
0 °C TO + 50 °C	± 3%. ^a Gain set with the VOLTS/DIV switch set to 5 mV per division.
Storage Acquisition Vertical Resolution	8-bits, 25 levels per division. 10.24 divisions dynamic range. ^a
Range of VOLTS/DIV Variable control	Continuously variable between settings. Increases deflection factor by at least 2.5 to 1.
Step Response (NON-STORE Mode)	
Rise Time	
0 °C TO + 35 °C	
5 mV per division to 5 V per division	3.5 ns or less. ^a
2 mV per division	4.4 ns or less. ^a
+ 35 °C to + 50 °C	
5 mV per division to 5 V per division	3.9 ns or less. ^a
2 mV per division	4.4 ns or less. ^a Rise time is calculated from: $\text{Rise Time} = \frac{0.35}{\text{Bandwidth } (-3 \text{ dB})}$

^a Performance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements				
Step Response (STORE Mode) Useful Storage Rise Time SAMPLE	<table border="1"> <thead> <tr> <th>Single Trace</th> <th>CHOP/ALT</th> </tr> </thead> <tbody> <tr> <td>$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{100} \text{ s}$</td> <td>$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{50} \text{ s}$</td> </tr> </tbody> </table>	Single Trace	CHOP/ALT	$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{100} \text{ s}$	$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{50} \text{ s}$
Single Trace	CHOP/ALT				
$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{100} \text{ s}$	$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{50} \text{ s}$				
PEAKDET or ACCPEAK with SMOOTH	<table border="1"> <tbody> <tr> <td>$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{50} \text{ s}$</td> <td>$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{25} \text{ s}$</td> </tr> </tbody> </table> <p>Rise time is limited to 3.5 ns minimum with derating over temperature (see NON-STORE Rise Time).</p>	$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{50} \text{ s}$	$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{25} \text{ s}$		
$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{50} \text{ s}$	$\frac{\text{SEC/DIV} \times 1.6^{\text{a}}}{25} \text{ s}$				
Aberrations (NON-STORE and STORE in Default Modes)					
2 mV per division to 50 mV per division	+ 4%, -4%, 4% p-p.				
0.1 V per division to 0.2 V per division	+ 6%, -6%, 6% p-p.				
0.5 V per division	+ 6%, -6%, 6% p-p. ^a				
1 V per division to 5 V per division	+ 12%, -12%, 12% p-p. ^a				
	Measured with a five-division positive-going reference signal, from a 50-Ω coaxial cable terminated in 50 Ω at the input connector with the VOLTS/DIV Variable control in the CAL detent. Vertically center the top of the reference signal. Set A Trigger SLOPE switch to positive.				
NON-STORE Bandwidth (-3 dB)					
0°C to +35°C					
5 mV per division to 5V per division	DC to at least 100 MHz.				
2 mV per division	DC to at least 80 MHz.				
+35°C to +50°C					
2 mV per division to 5V per division	DC to at least 80 MHz. ^a				
	Measured with a vertically centered six-division reference signal, from a 50-Ω source driving a 50-Ω coaxial cable terminated in 50 Ω at the input connector; with the VOLTS/DIV Variable control in the CAL detent.				
BW LIMIT (-3dB)	20 MHz ±10%.				
AC Coupled Lower Cutoff Frequency	10 Hz or less at -3 dB. ^a				

^aPerformance Requirement not checked in manual.


Table 1-1 (cont)

Characteristics	Performance Requirements	
<p>Useful Storage Performance</p> <p>RECORD, SCAN and ROLL Store Modes</p> <p>SAMPLE Acquisition, no AVERAGE</p> <p>1 μs per division to 5 s per division</p> <p>EXT CLOCK (up to 100 kHz)</p>	<p>Single Trace</p> <p>$\frac{10}{\text{SEC/DIV}}$ Hz^a</p> <p>$\frac{\text{EXT}}{10}$ Hz^a</p>	<p>CHOP/ALT</p> <p>$\frac{5}{\text{SEC/DIV}}$ Hz^a</p> <p>$\frac{\text{EXT}}{20}$ Hz^a</p> <p>Useful storage performance is limited to the frequency where there are 10 samples per sine wave signal period at the maximum sampling rate. (Maximum sampling rate is 100 MHz.) This yields a maximum amplitude uncertainty of 5%. Accuracy at the useful storage bandwidth limit is measured with respect to a six-division 50 kHz reference sine wave.</p>
<p>PEAK DETECT</p> <p>Sine-Wave Amplitude Capture (5% p-p maximum amplitude uncertainty)</p>	<p>10 MHz.^a</p>	
<p>Pulse Width Amplitude Capture (50% p-p maximum amplitude uncertainty)</p>	<p>10 ns.</p>	
<p>REPETITIVE Store Mode</p> <p>SAMPLE and AVERAGE</p> <p>0.05 μs per division</p> <p>0.1 μs per division</p> <p>0.2 μs per division to 2 μs per division (5% maximum amplitude uncertainty)</p>	<p>Single Trace</p> <p>100 MHz (-3 dB)^b</p> <p>100 MHz (-3 dB)^{a,b}</p> <p>$\frac{10}{\text{SEC/DIV}}$ Hz^a</p>	<p>CHOP/ALT</p> <p>100 MHz (-3 dB)^b</p> <p>50 MHz (-3 dB)^a</p> <p>$\frac{5}{\text{SEC/DIV}}$ Hz^a</p>
<p>ACCPEAK</p> <p>0.05 μs per division to 5 s per division</p>	<p>Same as NON-STORE Bandwidth.^a</p>	

^a Performance Requirement not checked in manual.


^b One hundred MHz bandwidth derated for temperatures outside 0°C to +35°C and at 2 mV per division VOLTS/DIV setting as for NON-STORE.

Table 1-1 (cont)

Characteristics	Performance Requirements
AVERAGE Mode Sweep Limit	Adjustable from 1 to 998,000 or NO LIMIT. Resolution is 1 from 1 to 200; 2 from 202 to 1000; 10 from 1010 to 2000; 20 from 2020 to 10,000; 100 from 10,100 to 20,000; 200 from 20,200 to 100,000; 1,000 from 101,000 to 200,000; 2,000 from 202,000 to 998,000. ^a
Weight of Last Acquisition	1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, or 1/256 (MENU selections). AVERAGE mode default weight is 1/4.
Resolution	Assuming uncorrelated triggers and greater than 1 LSB of the 8-bit acquisition of vertical signal noise, the averaging weight for the first acquisition is 1, the averaging weight for the second acquisition is 1/2 and for n acquisitions is $1/2^{n-1}$. The MENU selects the least weight used. Maximum signal-to-noise improvement is achieved after (2 X weight factor) X (expected acquisitions to fill).
NON-STORE CHOP Mode Switching Rate	500 kHz \pm 30%. ^a
A/D Converter Linearity	Monotonic with no missing codes. ^a
Analog CH1/CH2 Delay Match	\pm 1.0 ns. ^a
NON-STORE Common-Mode Rejection Ratio (CMRR)	At least 10 to 1 at 50 MHz. Checked at 10 mV per division for common-mode signals of six divisions or less with the VOLTS/DIV Variable control adjusted for the best CMRR at 50 kHz.
Input Current	1 nA or less (0.5 division or less trace shift when switching between DC and GND input coupling with the VOLTS/DIV switch set to 2 mV per division). ^a
Input Characteristics	
Resistance	1 M Ω \pm 2%. ^a
Capacitance	20 pF \pm 2 pF. ^a
Maximum Safe Input Voltage (CH 1 and CH 2) DC and AC Coupled 	See Figure 1-1 for maximum input voltage vs frequency derating curve. 400 V (dc + peak ac) or 800 V ac p-p at 10 kHz or less. ^a
Channel Isolation STORE and NON-STORE	Greater than 100 to 1 at 50 MHz.
POSITION Control Range	At least \pm 11 divisions from graticule center.
A/B SWP SEP Control Range (NON-STORE Mode Only)	\pm 3.5 divisions or greater.
Trace Shift with VOLTS/DIV Switch Rotation	0.75 division or less; VOLTS/DIV Variable control in the CAL detent. ^a
Trace Shift as the VOLTS/DIV Variable Control is Rotated	1 division or less. ^a
Trace Shift with INVERT	1.5 divisions or less. ^a

^aPerformance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements		
TRIGGERING SYSTEM			
A Trigger Sensitivity			
P-P AUTO and NORM	10 MHz	60 MHz	100 MHz
Internal	0.35 div	1.0 div	1.5 div
External	40 mV	120 mV	150 mV
	External trigger signal from a 50-Ω source driving a 50-Ω coaxial cable terminated in 50 Ω at the input connector.		
HF REJ Coupling	Reduces trigger signal amplitude at high frequencies by about 20 dB with rolloff beginning at 40 kHz ±25%. Should not trigger with a one-division peak-to-peak 250 kHz signal when HF REJ is ON.		
LF REJ Coupling	Attenuates signals below 40 kHz (-3 dB point at 40 kHz ±25%). Should not trigger with a 0.35 peak-to-peak 25 kHz signal when LF REJ is on.		
P-P AUTO Lowest Usable Frequency	20 Hz with 1 division internal or 100 mV external. ^a		
TV LINE			
Internal	0.35 div. ^a		
External	35 mV p-p. ^a		
TV FIELD	≥1 division of composite sync. ^a		
B Trigger Sensitivity (Internal Only)	10 MHz	60 MHz	100 MHz
	0.35 div	1.0 div	1.5 div
EXT INPUT			
Maximum Input Voltage 	400 V (dc + peak ac) or 800 V ac p-p at 10 kHz or less. ^a See Figure 1-1 for maximum input voltage vs frequency derating curve.		
Input Resistance	1 MΩ ±2%. ^a		
Input Capacitance	20 pF ±2.5 pF. ^a		
AC Coupled Lower Cutoff Frequency	10 Hz or less at -3 dB. ^a		
LEVEL Control Range			
A Trigger (NORM)			
INT	May be set at any voltage level of the trace that can be displayed. ^a		
EXT, DC	At least ±1.6 V, 3.2 V p-p.		
EXT, DC ÷ 10	At least ±1.6 V, 3.2 V p-p. ^a		
B Trigger (Internal)	May be set at any point of the trace that can be displayed. ^a		

^aPerformance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
VAR HOLDOFF Control (NON-STORE Holdoff)	Increases A Sweep holdoff time by at least a factor of 10. STORE holdoff is a function of microprocessor activity and the pretrigger acquisition. The VAR HOLDOFF control maintains some control over the STORE holdoff by preventing a new trigger from being accepted by the storage circuitry until the next (or current, if one is in progress) NON-STORE holdoff has completed.
Trigger Level Readout Accuracy	±(0.3% of 10 times the VOLTS/DIV switch setting). Applies to ±10 divisions from zero volts.
Acquisition Window Trigger Points	
Pretrigger	Seven-eighths of the waveform acquisition window is prior to the trigger (other trigger points are selectable via the MENU).
Midtrigger	One-half of the waveform acquisition window is prior to the trigger (other trigger points are selectable via the MENU).
Post Trigger	One-eighth of the waveform acquisition window is prior to the trigger (other trigger points are selectable via the MENU).
Point-Selectable Triggering	<u>PRETRIG^a</u> <u>MIDTRIG^a</u> <u>POST TRIG^a</u>
1K Record Length	128 512 896
4K Record Length	512 2048 3584
HORIZONTAL DEFLECTION SYSTEM	
NON-STORE Sweep Rates	
Calibrated Range	
A Sweep	0.5 sec per division to 0.05 μs per division in a 1-2-5 sequence of 22 steps. ^c
B Sweep	50 ms per division to 0.05 μs per division in a 1-2-5 sequence of 19 steps. ^c
STORE Mode Ranges	
REPETITIVE	0.05 μs per division to 0.5 s per division. ^{a,d}
RECORD	1 μs per division to 50 ms per division. ^{a,d}
ROLL/SCAN	0.1 s per division to 5 s per division. (A Sweep only). ^{a,d}

^aPerformance Requirement not checked in manual.

^cThe X10 MAG control extends the maximum sweep speed to 5 ns per division.


^dThe X10 MAG control extends the maximum sweep speed to 5 ns per division. The 4k COMPRESS control multiplies the SEC/DIV by 4.

Table 1-1 (cont)

Characteristics	Performance Requirements	
	Unmagnified	Magnified
NON-STORE Accuracy		
+ 15°C to + 35°C		
0.5 s per division to 0.1 μs per division	±2%	±3%
0.05 μs per division	±2%	±4%
0°C to + 50°C		
0.5 s per division to 0.1 μs per division	±3% ^a	±4% ^a
0.05 μs per division	±3% ^a	±6% ^a
	Sweep accuracy applies over the center eight divisions. Exclude the first 40 ns of the sweep for magnified sweeps and anything beyond the 100th magnified division.	
STORE Accuracy	See Horizontal Differential Accuracy and Cursor Time Difference Accuracy. ^a	
NON-STORE Sweep Linearity		
0.5 s per division to 10 ns per division	±0.1 division.	
5 ns per division	±0.15 division.	
	Linearity measured over any two of the center eight divisions. Exclude the first 40 ns and anything past the 100th division of the X10 magnified sweeps.	
Digital Sample Rate	Single Trace	CHOP/ALT
SAMPLE (1 μs per division to 5 s per division)	$\frac{100}{\text{SEC/DIV}}$ Hz ^a	$\frac{50}{\text{SEC/DIV}}$ Hz ^a
PEAKDET or ACCPEAK (1 μs per division to 5 s per division)	100 MHz ^a	100 MHz ^a
REPETITIVE Store (0.05 μs per division to 0.5 μs per division)	100 MHz ^a	100 MHz ^a
External Clock		
Input Frequency		
Slow	Dc to 1 kHz.	
Fast	Dc to 100 kHz.	
Digital Sample Rate	100 MHz in ACCPEAK and PEAKDET, otherwise it is equal to the input frequency. ^a	
Screen Update Rate		
Slow	One data pair for every second falling clock edge. ^a	
Fast	Varies with record length and sweep speed. ^a	

^a Performance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
External Clock (cont)	
Duty Cycle	10% or greater (1 μ s minimum hold time). ^a
Ext Clock Logic Thresholds	Logic Thresholds are TTL compatible. ^a
Maximum Safe Input Voltage 	25 V (dc + peak ac) or 25 V p-p ac at 1 kHz or less. ^a
Input Resistance	Greater than 20 k Ω (LSTTL compatible).
STORE Mode Resolution	
Acquisition Record Length	1024 or 4096 data points. ^a
Single Waveform Acquisition Display	1024 data points (100 data points per division across the graticule area). ^a
CHOP or ALT Acquisition Display	512 data points (50 data points per division across the graticule area). ^a
Horizontal POSITION Control Range	Start of the 10th division will position past the center vertical graticule line in X1; 100th division in X10 magnified and NON-STORE.
Horizontal Variable Sweep Control Range	
NON-STORE	Continuously variable between calibrated settings of the SEC/DIV switch. Extends the A and the B Sweep speeds by at least a factor of 2.5 times over the calibrated SEC/DIV settings.
STORE	Horizontal Variable Sweep has no affect on the STORE Mode time base. Rotating the Variable SEC/DIV control out of the CAL detent position horizontally compresses a 4K point acquisition record to 1K points in length, so that the whole record length can be viewed on screen. Screen readout is altered accordingly.
Displayed Trace Length	
NON-STORE	Greater than 10 divisions.
STORE	10.24 divisions. ^a
Delay Time	
0.5 μ s per division to 0.5 s per division (A Sweep)	
Delay POSITION Range	Less than (0.5 div + 300 ns) to greater than 10 divisions. Delay Time is functional, but not calibrated, at A Sweep speeds faster than 0.5 μ s per division.
NON-STORE Delay Jitter	One part or less in 5,000 (0.02%) of the maximum available delay time.

^aPerformance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
Delay Time Differential Measurement Accuracy (Runs After Delay only)	
+ 15°C to + 35°C	±1% of reading, ±0.5% of full scale (10 divisions).
0°C to + 50°C	± 2% of reading, ±0.5% of full scale (10 divisions) ^a Exclude delayed operation when the A and B SEC/DIV knobs are locked together at any sweep speed or when the A SEC/DIV switch is faster than 0.5 μs per division. Accuracy applies over the B DELAY TIME POSITION control range.
DIGITAL STORAGE DISPLAY	
Vertical	
Resolution	10 bits (1 part in 1024). ^a Display waveforms are calibrated for 100 data points per division.
Position Registration	
NON-STORE to STORE	± 0.5 division at graticule center at VOLTS/DIV switch settings from 2 mV per division to 5 V per division.
CONTINUE to SAVE	± 0.5 division at VOLTS/DIV switch settings from 2 mV per division to 5 V per division.
SAVE Mode Expansion or Compression Range	Up to 10 times as determined by the remaining VOLTS/DIV switch positions up or down. 2 mV per division acquisitions cannot be expanded, and 5 V per division acquisitions cannot be compressed. Any portion of a stored waveform vertically magnified or compressed up to 10 times can be positioned to the top and to the bottom of the graticule area.
Storage Display Expansion Algorithm Error	± 0.1% of full scale. ^a
Storage Display Compression Algorithm Error	+ 0.16% of reading ± 0.4% of full scale. ^a
Horizontal	
Resolution	10 bits (1 part in 1024). ^a Calibrated for 100 data points per division.
Differential Accuracy	Graticule indication of time cursor difference is ± 2% of the readout value, measured over the center eight divisions.
SAVE Mode Expansion Range	10 times as determined by the X10 MAG switch.
Expansion Accuracy	Same as the Vertical. ^a



^a Performance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
DIGITAL READOUT DISPLAY	
CURSOR Accuracy Voltage Difference	$\pm 3\%$ of the ΔV readout value, $\pm 0.4\%$ of full scale (10 divisions). Applies within center 6 divisions.
Time Difference RECORD or ROLL/SCAN	
SAMPLE or AVERAGE	± 1 display interval.
PEAKDET or ACCPEAK	± 2 display interval. ^a
REPETITIVE	
SAMPLE or AVERAGE	$\pm (2 \text{ display interval} + 0.5 \text{ ns})$. ^a
ACCPEAK	$\pm (4 \text{ display interval} + 0.5 \text{ ns})$. ^a A display interval is the time between two adjacent display points on a waveform.
X-Y OPERATION (X1 MAGNIFICATION ONLY)	
Deflection Factors	Same as vertical deflection system with the VOLTS/DIV Variable controls in the CAL detent position.
NON-STORE Accuracy	Measured with a dc-coupled, five-division reference signal.
X-Axis	
+ 15°C to + 35°C	$\pm 3\%$.
0°C to + 50°C	$\pm 4\%$. ^a
Y-Axis	Same as vertical deflection system. ^a
NON-STORE Bandwidth (-3 dB)	Measured with a five-division reference signal.
X-Axis	DC to at least 2.5 MHz.
Y-Axis	Same as vertical deflection system. ^a
NON-STORE Phase Difference Between X-Axis and Y-Axis Amplifiers	± 3 degrees from dc to 150 kHz. ^a Vertical Input Coupling set to DC.
STORE Accuracy	
X-Axis and Y-Axis	Same as digital storage vertical deflection system. ^a
Useful Storage Bandwidth	
RECORD and REPETITIVE Store Modes	$\frac{5}{\text{SEC/DIV}}$ Hz ^a

^aPerformance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
STORE Mode Time Difference Between Y-Axis and X-Axis Signals RECORD, SCAN, and ROLL Modes	$\pm 1.0 \text{ ns.}^a$
REPETITIVE Store	$\frac{\text{SEC/DIV}}{100} \times 4^a$
PROBE ADJUST	
Output Voltage on PRB ADJ Jack	0.5 V $\pm 5\%$.
Probe Adjust Signal Repetition Rate	1 kHz $\pm 20\%$. ^a
Z-AXIS	
Sensitivity (NON-STORE Only)	5 V causes noticeable modulation. Positive-going input decreases intensity. Usable frequency range is dc to 20 MHz.
Maximum Input Voltage 	30 V (dc + peak ac) or 30 V p-p at 1 kHz or less. ^a
Input Resistance	Greater than 10 k Ω . ^a
POWER SUPPLY	
Line Voltage Range	90 Vac to 250 Vac. ^a
Line Frequency	48 Hz to 440 Hz. ^a
Maximum Power Consumption	85 watts (150 VA). ^a
Line Fuse	2 A, 250 V, slow blow. ^a
Primary Circuit Dielectric Requirement	Routine test to 1500 V rms, 60 Hz, for 10 seconds without breakdown. ^a
CRT DISPLAY	
Display Area	8 cm X 10 cm. ^a
Standard Phosphor	P31. ^a
Nominal Accelerating Voltage	14 kV. ^a
X-Y PLOTTER OUTPUT	
Maximum Safe Applied Voltage, Any Connector Pin 	25 V (dc + peak ac) or 25 V p-p ac at 1 kHz or less. ^a
X and Y Plotter Outputs	
Pen Lift/Down	Fused relay contacts, 100 mA maximum. ^a
Output Voltage Levels	500 mV per division $\pm 10\%$. Center screen is 0 V ± 1 division. Measured with a dc-coupled, five-division reference signal.
Series Resistance	2 k Ω $\pm 10\%$. ^a
4.2 V Output	$\pm 10\%$ through 2 k Ω . ^a

^a Performance Requirement not checked in manual.

Table 1-1 (cont)

Characteristics	Performance Requirements
MEMORY	
Non-Volatile Memory	26 Kbytes.
Power-Down	
Battery Voltage	Memory retained for battery voltages greater than 2.3 V. ^a
Data Retention	Memory maintained at least 6 months without instrument power. ^a
Battery Life	Power-down data retention specification shall be maintained for 3 years without battery change. ^a
Power-down Detection	
Threshold	Fail asserted for supply drop to less than 4.5 V. ^a Reset held until supply is greater than 4.75 V. ^a
Reset Delay	Power-down interrupt to reset delay ≥ 1 ms. ^a
GPIB OPTION	
GPIB Requirements	Complies with ANSI/IEEE Standard 488-1978. ^a
RS-232-C OPTION	
RS-232-C Requirements	Complies with EIA Standard RS-232-C. ^a
Baud Rates	
Available Rates	110, 300, 600, 1200, and 2400 baud. ^a
Accuracy	< 1% error. ^a

^aPerformance Requirement not checked in manual.

**Table 1-2
Environmental Characteristics**

Characteristics	Performance Requirements
Environmental Requirements	The instrument meets the following MIL-T-28800D requirements for Type III, Class 5, Style D equipment, except where noted otherwise.
Temperature	
Operating	0°C to +50°C (+32°F to +122°F). ^a
Nonoperating	-40°C to +71°C (-40°F to +160°F). ^a Tested to MIL-T-28800D, para 4.5.5.1.3 and 4.5.5.1.4, except that in para 4.5.5.1.3 steps 4 and 5 (-10°C operating test) are performed before step 2 (-40°C nonoperating test). Equipment shall remain off upon return to room ambient temperature during step 6. Excessive condensation shall be removed before operating during step 7.
Altitude	
Operating	To 4,500 meters (13,716 feet). ^a Maximum operating temperature decreases 1°C per 1,000 feet above 5,000 feet.
Nonoperating	To 15,240 meters (50,000 feet). ^a Exceeds requirements of MIL-T-2880D, para 4.5.5.2.
Humidity	
Operating and Nonoperating	5 cycles (120 hours) referenced to MIL-T-28800D para 4.5.5.1.2.2 for Type III, Class 5 instruments. Operating and nonoperating at 95%, -5% to +0%, relative humidity. Operating, +30° C to +50°C; nonoperating, +30°C to +60°C. ^a
EMI (electromagnetic interference)	Meets radiated and conducted emission requirements per VDE 0871, Class B. ^a To meet EMI regulations and specifications, use the specified shielded cable and metal connector housing with the housing grounded to the cable shield on the AUXILIARY CONNECTOR.
Vibration	
Operating	15 minutes along each of three major axes at a total displacement of 0.015 inch p-p (2.3 g at 55 Hz) with frequency varied from 10 Hz to 55 Hz to 10 Hz in one-minute sweeps. Hold for 10 minutes at 55 Hz in each of the three major axes. All major resonances are above 55 Hz. Meets requirements of MIL-T-22800D, para 4.5.5.3.1. ^a

^a Performance Requirement not checked in manual.

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Table 1-2 (cont)

Characteristics	Performance Requirements
Shock Operating and Nonoperating	30 g half-sine, 11 ms duration, three shocks per axis each direction, for a total of 18 shocks. ^a Meets requirements of MIL-T-22800D, para 4.5.5.4.1, except limited to 30 g.
Bench Handling Test	Each edge lifted four inches and allowed to free fall onto a solid wooden bench surface. ^a Meets requirements of MIL-T-22800D, para 4.5.5.4.3.

^a Performance Requirement not checked in manual.

**Table 1-3
Physical Characteristics**

Characteristics	Performance Requirements
Weight	See Figure 1-2 for dimensional drawing.
With Power Cord, Cover, Probes, and Pouch	9.4 kg (20.7 lb).
With Power Cord Only	8.2 kg (18 lb).
Domestic Shipping Weight	12.2 kg (26.9 lb).
Height	137 mm (5.4 in).
Width	
With Handle	360 mm (14.2 in).
Without Handle	328 mm (12.9 in).
Depth	
With Front Cover	445 mm (17.5 in).
Without Front Cover	440 mm (17.3 in).
With Handle Extended	511 mm (20.1 in).

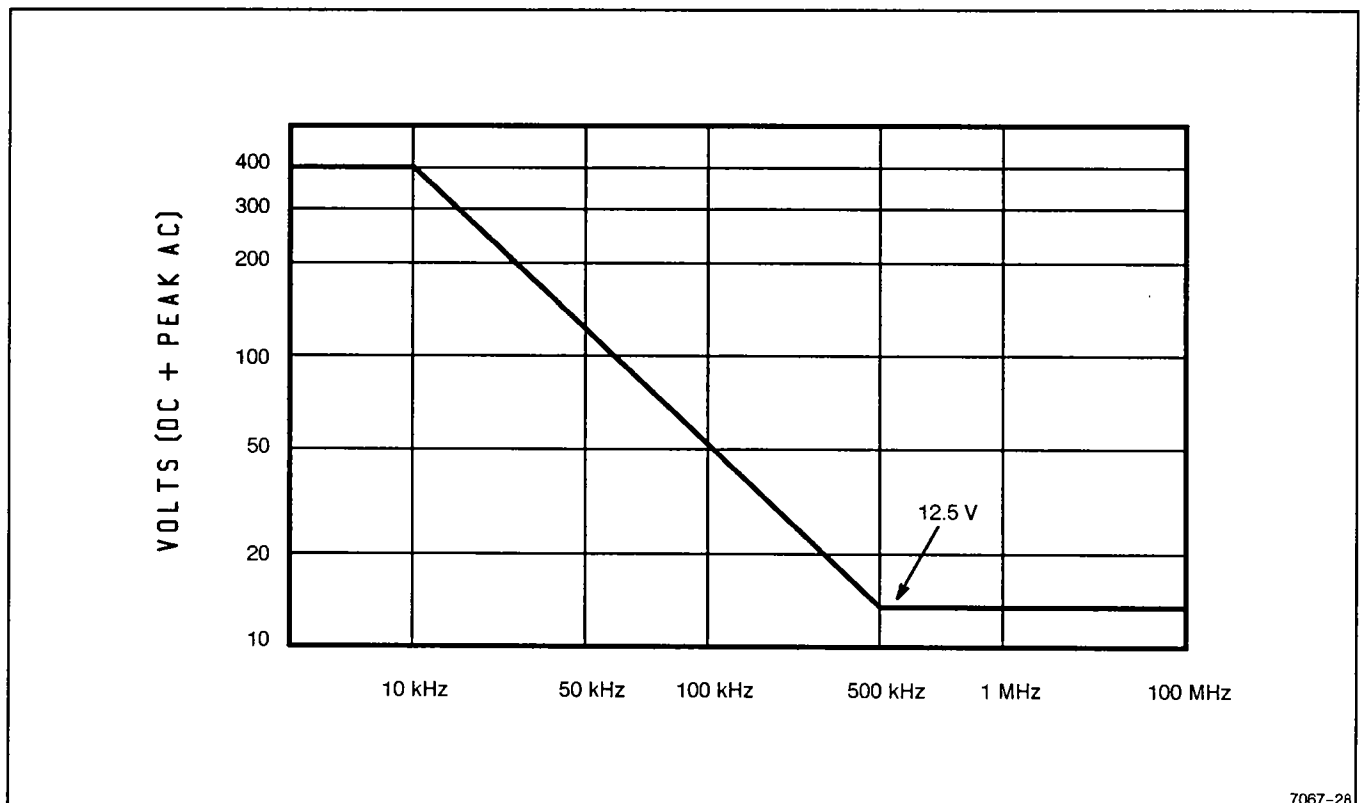


Figure 1-1. Maximum input voltage versus frequency derating curve for the CH 1 OR X, CH 2 OR Y, and EXT INPUT connectors.

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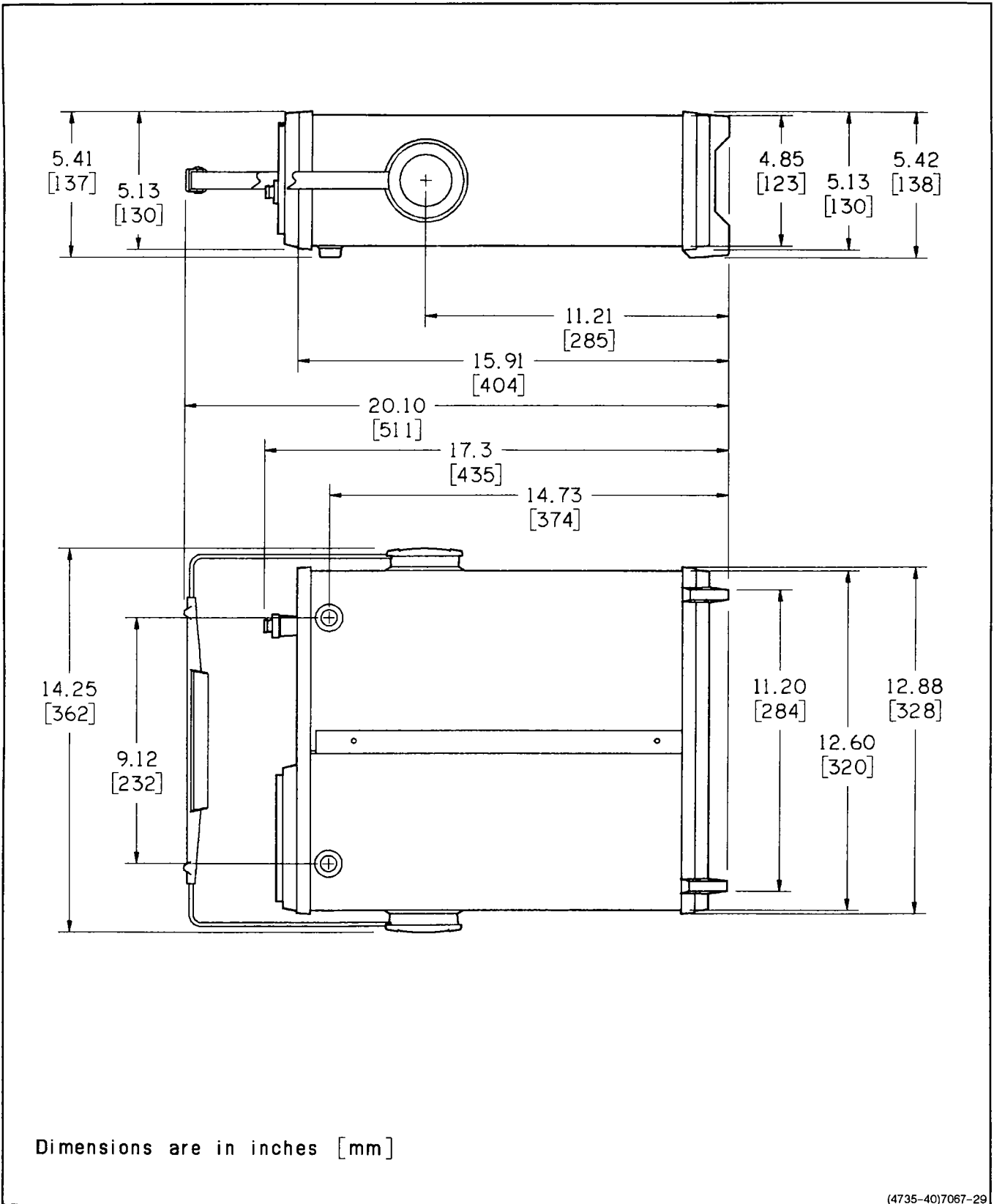


Figure 1-2. Physical dimensions of the 2232 Oscilloscope.