

## Tektronix 2213 and 2215 Oscilloscopes Specifications

VERTICAL DEFLECTION (2 identical channels)		
	0 ° C to +40° C	+40° C to +50° C
<b>Bandwidth*<sup>1</sup> and Risetime*<sup>2</sup></b>	Dc to 60 MHz, 20 mV/div to 10 V/div, 5.8 ns reduced Dc to 50 MHz, 2 mV to 10 mV/div, 7 ns	Dc to 50 MHz, 2 mV to 10 mV/div 7 ns
* <sup>1</sup> Measured at -3 dB. * <sup>2</sup> At all deflection factors from 50Ω terminated source.		
<b>Deflection Factor</b>	2 mV/div to 10 V/div ± 3% (+20° C to +30° C) or ± 4% (0° C to +50° C). 1-2-5 sequence. Uncalibrated, continuously variable between steps to at least 25 V/div.	
<b>Display Modes</b>	CH 1, CH 2, CH 2 Add (normal and inverted), Alternate, Chopped: approx. 250 kHz rate, electronically switched.	
<b>Common-Mode Rejection Ratio</b>	At least 10:1 at 10 MHz for common-mode signals of 6 divisions or less.	
<b>Input R and C</b>	1 MΩ ± 2% paralleled by approx. 30 pF.	
<b>Maximum Input Voltage</b>	Dc Coupled	400 V (dc + peak ac) 800 V (p-p ac at 1 kHz or less)
	Ac Coupled	400 V (dc + peak ac) 800 V (p-p ac at 1 kHz or less)
<b>Delay Line</b>	Permits viewing leading edge of displayed waveform	
HORIZONTAL DEFLECTION		
<b>Time Base A (2213 and 2215)</b>	0.05 μs/div to 0.5 s/div (1-2-5 sequence). 10X magnifier extends max sweep rate to 5 ns/div.	
<b>Time Base B (2215 only)</b>	0.05 μs/div to 50 ms/div (1-2-5 sequence). 10X magnifier extends max sweep rate to 5 ns/div.	
<b>Variable Time Control (2213 and 2215)</b>	Time Base A provides continuously variable uncalibrated sweep rates between steps to at least 1.25 s/div.	
Time Base A (2213 and 2215) and B (2215 only) Accuracy* <sup>1</sup>		
	+20° C to +30° C	0° C to + 50° C
Unmagnified	± 3%	± 4%
Magnified	± 5%	± 6%
* <sup>1</sup> Center 8 divisions.		
<b>Horizontal Display Modes (2213)</b>	A, A intensified after delay, delayed.	
<b>Horizontal Display Modes (2215)</b>	A, alternate (A intensified by B and B), B. Electronic switching between intensified and delayed sweep.	
2213 SWEEP DELAY		
<b>Delay Times</b>	< 0.5 μs, 10 μs, and 0.2 ms.	
<b>Multiplier</b>	Increases delay time by 20 to 1 or more.	
<b>Jitter</b>	5000 to 1 (0.02%) of maximum available delay time.	
2215 SWEEP DELAY		
<b>Delay Times</b>	Continuously variable by means of a 10 to 1 vernier control. Delayed (B) portion is intensified on the main (A) trace.	
<b>Delay Position Range</b>	< 0.5 div + 300 ns to more than 10 div.	
<b>Delay Dial Accuracy</b>	± 1.5% of reading past 1 div.	
<b>A/B Sweep Separation</b>	Control permits main and delayed sweep to be separated by at least 3.5 div.	
<b>Jitter</b>	10,000 to 1 (0.01%) of maximum available delay time.	

TRIGGERING	
<b>2213 and 2215 A Time Base Trigger Modes</b>	Normal (sweep runs when triggered), automatic (sweep runs in the absence of a triggering signal and triggers automatically for signals down to 20 Hz), and TV field (with slope set for negative going transitions, and trigger level adjusted close to blanking level, sweep starts at first line of video; use Normal for TV line display). LED indicates when sweep is triggered.
<b>A Trigger Holdoff</b>	Adjustable control permits a stable presentation of repetitive complex waveforms.
<b>Sensitivity</b>	<b>Auto and Normal Internal:</b> Below 2 MHz, signal must be at least 0.4 div amplitude; requirements increase above 2 MHz; at 60 MHz, signal must be at least 1.5 div amplitude.
<b>Auto and Normal External</b>	Up to 2 MHz, trigger signal must be at least 50 mV p-p; requirements increase up to 60 MHz, where signal must be at least 250 mV p-p.
<b>TV Field</b>	Composite video must be at least 2 div amplitude.
<b>Level and Slope (Norm Mode)</b>	<b>Internal:</b> Trigger level can be adjusted over the range of amplitudes displayed on the CRT. <b>External, Dc Coupled:</b> Level can be adjusted over a range of at least $\pm 2$ V, or 4 V p-p. <b>External; Dc Coupled and Attenuated (divided by 10):</b> Level can be adjusted over a range of at least $\pm 20$ V, or 40 V p-p.
<b>External Inputs</b>	R and C approx. $1\text{ M}\Omega$ paralleled by approx. 30 pF.
2215 Delayed (B) Timebase	
<b>Level and Slope</b>	Separate slope and level controls for triggering B sweep.
<b>Sensitivity</b>	Up to 2 MHz, signal must be at least 0.4 div in vertical amplitude; requirements increase up to 60 MHz, where signal must be at least 2 div in amplitude.
X-Y OPERATION	
<b>Full Sensitivity X-Y (CH1 Horizontal, CH 2 Vertical)</b>	2 mV/div to 10 V/div accurate $\pm 5\%$ . Bandwidth is dc to at least 2 MHz. Phase difference between amplifiers is $3^\circ$ or less from dc to 50 kHz.
DISPLAY	
<b>CRT</b>	8 X 10 cm display. Horizontal and vertical center lines further marked in 0.2 cm increments. GH (P31) Phosphor standard. 10 kV accelerating potential, mesh grid, halo suppressed.
<b>Graticule</b>	Internal, non-parallax, not illuminated; markings for measurement of risetime.
<b>Beam Finder</b>	Compresses trace to within graticule area for ease in locating an off-screen signal. A preset intensity level provides a constant brightness.
<b>Z-Axis Input</b>	Dc coupled, positive-going signal decreases intensity; 5 V p-p signal causes noticeable modulation at normal intensity; dc to 5 MHz.
ENVIRONMENTAL CHARACTERISTICS	
<b>Ambient Temperature</b>	<b>Operating:</b> $0^\circ\text{C}$ to $+50^\circ\text{C}$ . <b>Nonoperating:</b> $-55^\circ\text{C}$ to $+75^\circ\text{C}$ .
<b>Altitude</b>	<b>Operating:</b> To 4600 m (15,000 ft); maximum allowable ambient temperature decreased by $1^\circ\text{C}/1000$ ft from 5000 to 15,000 ft. <b>Nonoperating:</b> 15,000 m (50,000 ft).
<b>Vibration</b>	Operating test samples were subjected to sinusoidal vibration in the X, Y and Z axis with the frequency varied from 10 Hz to 55 Hz to 10 Hz in 1 minute sweeps for a duration of 15 minutes per axis and a dwell of 10 minutes at 55 Hz. Total displacement was 0.015 in p-p (2.4 g's at 55 Hz).
<b>Humidity</b>	Operating and Nonoperating: Test samples were subjected to 5 cycles (120 hours) of humidity testing.
<b>Shock</b>	Operating and Nonoperating: Test samples were subjected to 3 shocks, both directions along each axis for a total of 18 shocks. Peak accelerations of each 1/2-sine shock were 30 g's.

<b>OTHER CHARACTERISTICS</b>		
<b>Probe Adjust Signal</b>	Squarewave, 0.5 V ± 20%, 1 kHz ± 20%.	
<b>Power Requirements</b>	90 to 250 V, 48 to 440 Hz without range switching, 50 Ω maximum at 115 V and 60 Hz.	
<b>PHYSICAL CHARACTERISTICS</b>		
<b>Cabinet Dimensions</b>	<b>mm</b>	<b>in</b>
Width (with handle)		
Width (without handle)	360	14.2
Height (with feet and handle)	237	12.9
Depth (with front cover)	137	5.4
Depth (without front cover)	445	17.5
Depth (with handle extended)	440	17.3
	511	20.1
<b>Weights approx.</b>	<b>kg</b>	<b>lb</b>
Net (with cover accessories and pouch)	7.6	16.8
Net (without cover accessories and pouch)	6.1	13.5
Shipping (domestic)	8.2	18.0
<b>INCLUDED ACCESSORIES</b>	Two P6122 10X voltage probes (010-6122-01); operator's manual, service manual	