CHARACTERISTICS

Introduction

The P6015 High-Voltage Probe is a dc-to-75 MHz, 1000X attenuator probe that adds high-voltage capabilities to oscilloscopes with input resistances of 1 MΩ paralleled by 12 pF to 60 pF. The P6015 body is made of a high-impact thermoplastic material that provides mechanical protection for its internal components and electrical protection for the user. The probe's dielectric properties can be improved by filling it with flourocarbon gas.

The standard probe includes a 10-foot interconnecting cable with a resistive center conductor, and the compensating box. Option 25 provides for a 25-foot overall length with reduced high-frequency performance characteristics.

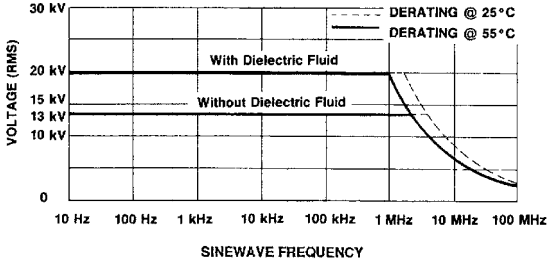

Fig. 1-2. Maximum input voltage derating versus frequency.

Performance Conditions

The electrical characteristics listed in Table 1-1 are valid under the following conditions:

- The probe and instrument with which it is used must have been calibrated at an ambient temperature of between +20°C and +30°C.
- The instrument and probe must be in an environment whose limits are described in Table 1-3.

Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

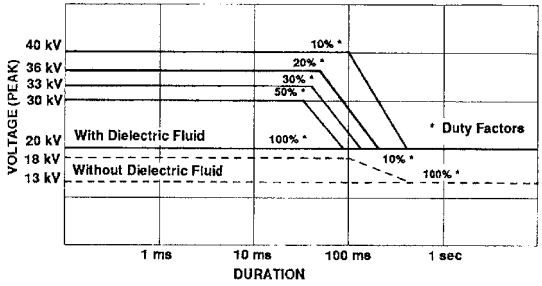

Fig. 1-3. Maximum peak pulse derating versus duration.

Table 1-1
Electrical Characteristics

Characteristic	Performance Requirement	Supplemental Information
Attenuation	1000:1, variable by ±5%.	Oscilloscope input: 1 MΩ ±2%.
Voltage/Temperature Coefficients	(0 V to 20 kV, +10°C to +55°C.) Total change typically < ±1%.	Temperature coefficient is typically < ±0.006%/°C.
	(0 V to 40 kV, +10°C to +55°C.) Total change typically < ±1.5%.	Voltage coefficient is typically < ±0.018%/kV.
Input Resistance	100 megohms.	Typically within ±2%.
Input Capacitance		
10-foot probe	Approximately 3 pF.	Typically within ±0.3 pF.
25-foot probe	Approximately 4 pF.	Typically within ±0.4 pF.
Compensation Range	12 pF to 60 pF.	
Bandwidth (−3 db)		Test oscilloscope must be ⩾ 100 MHz.
10-foot probe	75 MHz.	
25-foot probe	8 MHz.	
Delay Time		
10-foot probe	Approximately 10 ns.	
25-foot probe	Approximately 25 ns.	

Table 1-1 (cont.)
Electrical Characteristics

Characteristic	Performance Requirement	Supplemental Information
Risetime		
10-foot probe	≤ 4.5 ns.	Z_{Source} = 25 ohms.
25-foot probe	≤ 50 ns.	
Aberrations		
10-foot probe	After 1st 5 ns, +4%, −4%, in addition to system aberrations.	
25-foot probe	After 1st 5 ns, +5%, −5%, in addition to system aberrations.	
Input Volts		
With flourocarbon dielectric fluid		
Arc-over Test		Leakage currents < 10 μA at 27.5 kV dc.
Corona Test		Corona current < 1 μA at 40 kV (10 kHz to 1 MHz).

Table 1-1 (cont.)
Electrical Characteristics

Characteristic	Performance Requirement	Supplemental Information
Maximum Input Volts (DC or RMS)	20 kV, dc to 1 MHz. [a]	Refer to Figure 1-2 for frequencies above 1 MHz.
Maximum Input Volts (Peak)	40 kV peak pulse. [a] Maximum duration: 100 ms. Maximum duty factor: 10%.	
Without dielectric fluid		
Maximum Input Volts (DC or RMS)	13 kV, dc to 2 MHz. [a]	Refer to Figure 1-2 for frequencies above 2 MHz.
Maximum Input Volts (Peak)	18 kV peak pulse. [a] Maximum duration: 100 ms. Maximum duty factor: 10%.	

[a]**This Performance Requirement is not checked in the manual.**

Table 1-2
Physical Characteristics

Characteristic	Description
Diameter	3.5 in. (8.8 cm.) max.
Length (Probe Body)	13.5 in. (34.3 cm) max.
Length (Cable)	10 ft. ± 2 in. (305 cm. ± 5.1 cm.) 25 ft. ± 3 in. (762 cm. ± 7.6 cm.)
Dimensions (Compbox)	1.8 × 1.6 × 3.6 in. (46 × 41.3 × 905 cm.)
Saturation Pressure of Inert Gas	Approximately 2 atmospheres at 25°C (internal). Approximately 6 atmospheres at 75°C (internal).
Net Weight (Probe Assembly)	10 ft.: 1.8 lbs (0.82 kg.) 25 ft.: 2.1 lbs (0.96 kg.)
Shipping Weight (Including Accessories)	10 ft.: 3.7 lbs (1.573 kg.) maximum. 25 ft.: 4.0 lbs (1.713 kg.) maximum.

Table 1-3
Environmental Characteristics

Characteristic	Description
Temperature	Non Operating: −55°C to +55°C (−67°F to +131°F). Operating: −10°C to +55°C (+14°F to +131°F). Per Tek Standard 062-2847-00, Class 3. Exception from Class 3 (+55°C to +75°C).
Humidity	Operating and Non Operating: Five cycles (120 hr. total) at 95% to 97% relative humidity. Per Tek Standard 062-2847-00, Class 3.
Altitude	Non Operating: To 15,000 meters (50,000 feet). Operating: To 4,500 meters (15,000 feet). Tek Standard 062-2847-00.
Vibration	Operating: 0.64 mm (0.025 in.) p-p displacement, swept 10 Hz to 55 Hz in three axes, 75 minute total. Tek Standard 062-2858-00. Exception 400 g's.
Shock	Non Operating: 400 g's, half-sine, 0.5 ms duration, 18 shocks total in 3 axes. Tek Standard 062-2858-00. Exception 400 g's.
Packaged Product Vibration and Shock	The packaged product qualifies under the National Safe Transit Association's Pre-shipment Test Procedures, Project 1A-B-1, 48-inch drop. Tek Standard 062-2858-00.

Low-Frequency Compensation

Due to variations in oscilloscope input capacitance, the low-frequency compensation of the P6015 should be checked, and adjusted if necessary, each time it is used with a different oscilloscope or oscilloscope input channel.

To do this, connect the P6015 to a 1 kHz square wave signal of enough amplitude to display 4 or 5 divisions on the oscilloscope (40 V or 50 V at 10 mV/div.). Some oscilloscopes have a Calibrator output suitable for this purpose, or else a Tektronix PG506 High Amplitude Square Wave Generator[a] may be used. When using an oscilloscope calibrator, connect the P6015 probe-body ground-lead clip to the oscilloscope ground, and connect the P6015 tip to the calibrator. When using a PG506, connect a BNC male-to-GR adapter (Tektronix Part No. 017-0064-00) to the PG506 High Amplitude output connector and clip the P6015 ground lead to the outer fin of the GR connector. Insert the P6015 probe tip into the center conductor of the GR adapter.

WARNING

The PG506 High Amplitude Square Wave Generator will produce up to 108 V from a 600 Ω source. To avoid personal injury, do not touch the GR center conductor or the P6015 tip while they are connected to the generator, or else electrical shock could result.

Adjust the signal source and oscilloscope volts/div for 4 or 5 divisions. Using a low-capacitance screwdriver, adjust C3 through the proper hole in the compensating box for the best square wave display.

High-Frequency Compensation

The high-frequency compensation of the P6015 seldom requires adjustment. However, if the probe has excessive high-frequency aberrations, insufficient bandwidth, or can-

[a]Requires a TM500- or TM5000-Series Power Module Mainframe.