

Accessories for DLM series  
PBDH0400 Differential probe

702921 (1000 V<sub>peak</sub>, 400 MHz)

702922 (2000 V<sub>peak</sub>, 400 MHz)

# High-Speed, High-Voltage Differential Probe

For Power Conversion Applications Using Next-Generation Power Semiconductors

This high-voltage differential probe offers a wide frequency range from DC to 400 MHz, excellent frequency response flatness, and superior Common Mode Rejection Ratio (CMRR) characteristics.



Standard accessory

## Features

- The PBDH0400 differential probe is ideal for measuring non-grounded (floating) signals in power electronics applications such as inverters, motors, and power supplies, particularly for high-speed, high-voltage switching operations of IGBTs and SiC devices.
- Attenuation ratio can be selected using the switch on the probe head, and the attenuation ratio is automatically recognized and set along with the input impedance. This eliminates the need for cumbersome settings and prevents setting errors. No separate power supply is required for the probe, allowing for immediate measurement after connection.
- In addition to the included pincher tip, users can choose the appropriate accessories according to the measurement target from the expanded lineup of optional accessories.
- Combining the PBDH0400 with the high-definition oscilloscopes DLM3000HD/DLM5000HD enables more accurate waveform measurements.

## Specifications

	702921	702922
Frequency Bandwidth (–3 dB)	DC to 400 MHz	DC to 400 MHz
Attenuation ratio	50:1/500:1	100:1/1000:1
DC gain accuracy	±0.7%	
Allowable differential voltage (DC + AC <sub>peak</sub> )	±100 V/±1000 V	±200 V/±2000 V
Maximum input voltage (DC + AC <sub>peak</sub> )	±1000 V	±2000 V
Maximum non-destructive input voltage (DC + AC <sub>peak</sub> )	±1500 V (Within 5 seconds)	±3000 V (Within 5 seconds)
CMRR (typical)	–80 dB (60 Hz), –50 dB (10 MHz), –30 dB (100 MHz), –20 dB (400 MHz)	
Input conversion noise (typical)	250 mVrms	500 mVrms
Measurement category	CATIII 1000 V, CATIII 600 V	
Connector type	Yokogawa probe interface (Compatible with DLM3000, DLM3000HD, DLM5000 and DLM5000HD)	
Standard accessory	758928 Pincher tip set (Red and Black)	



Application

### Power semiconductor switching measurement with high-resolution oscilloscopes

Issue

The switching loss (Power in the right figure) is calculated by multiplying the output voltage ( $V_{DS}$ ) and current ( $I_D$ ) during the switching period (turn ON/turn OFF). The ON voltage is only a few volts for an output voltage of several hundred volts. However, with a typical 8-bit oscilloscope, this corresponds to only 1-2 bits of AD resolution, making it difficult to achieve high-precision measurements.

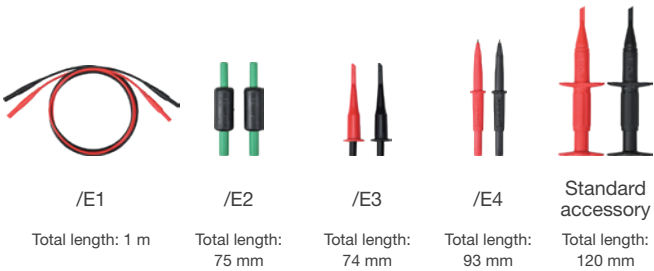
Solution

Using the high-resolution oscilloscope DLM5000HD with a 12-bit ADC, along with the 702921/702922 probes, which feature a wide bandwidth and excellent CMRR characteristics, enables more accurate measurements. Next-generation devices such as SiC/ GaN have a fast rise time of switching voltage, which can cause high-voltage ringing. Suppressing this ringing is a crucial aspect of inverter design. The high-definition oscilloscope and 702921/702922 differential probes are effective for observing such ringing and noise.

Model and Suffix Code

Model	Suffix Code	Description
702921		PBDH0400 High-voltage type (1 kV) Differential probe with YOKOGAWA probe interface
702922		PBDH0400 High-voltage type (2 kV) Differential probe with YOKOGAWA probe interface
	-02	Cable length: 2 m
	/NA	No standard accessories
	/E1	Extension leads, cable length: 1 m, a set of red and black
	/E2	150 $\Omega$ resistance adapter $\times$ 2 pieces
	/E3	Pincher tips, a set of red and black
	/E4	Test probes, a set of red and black

Standard and Optional Accessories (Appearance)



Related products

Combining the PBDH0400 with an oscilloscope with high vertical resolution provides an environment for more accurate waveform measurement.

#### Lightweight, Multi-Channel

##### DLM5000HD High-Definition Oscilloscope

- 8 Channels/500 MHz
- 12-bit/2.5 G Sample Rate
- 1 G Points, Supports Dual Synchronized Operation "DLMSync"

#### Compact, Lightweight, Portrait style

##### DLM3000HD High-Definition Oscilloscope

- 4 Channels/500 MHz
- 12-bit/2.5 G Sample Rate
- 1 G Points, Supports Dual Synchronized Operation "DLMSync"

NOTICE

● Before operating the product, read the user's manual thoroughly for proper and safe operation.



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