



# BumbleBee®

High Voltage Differential Probe

Order-No: 880-102-501

## Features:

- 1000 V CAT III
- 400 MHz Bandwidth
- < 1 % Deviation within Specified Operating Temperatures (0 °C to +50 °C)
- High CMRR
- 4 Mode Attenuation
- Useable with any 50 Ω Measuring Instrument



BumbleBee® is a 400 MHz, 1 kV CAT III high-voltage, differential probe that can be used with any oscilloscope or device providing 50 Ω termination. The probe is very effective in power device evaluation such as measurements in IGBT circuits used in design of motor drives, switching power supplies and frequency converters. BumbleBee® is also very effective in fast transient measurements with bandwidths up to 400 MHz.

It provides a 4 Mode Attenuation which allows higher resolution measurements. The probe provides overload indicators for each input channel as well as for the output. That makes it easy to observe, that the differential probe is working in the specified range. The probe also provides an active offset correction in a range of  $\pm 4$  V, related to the output voltage, with a resolution of 15 Bit. The newly designed input leads are less sensitive to changes of position or twisting.

Utilizing lowest ppm components available, the probe offers exceptional stability.

Especially long term measurements profit from such low drifts at varying temperatures. Another feature is the probe channel identifier, providing a channel indicator LED.

This datasheet supersedes all previously published material. Specifications that are not marked as guaranteed are published as general information to the user. The specifications stated are achieved with a PMK Power Supply and can vary, if BumbleBee® is powered by another source.

The instrument should have warmed up for at least 20 minutes and the environmental conditions must not exceed the specified limits of the probe. We recommend a calibration period of 1 year or less. Note that specifications are subject to change without notice.

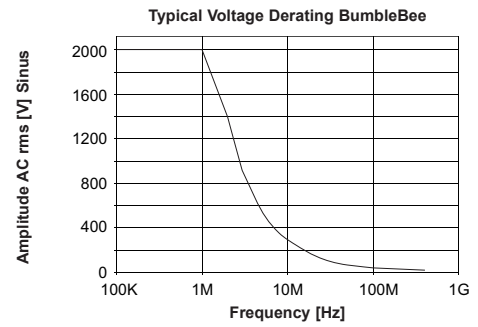
## Electrical Specifications <sup>(1)</sup>

<i>Attenuation Ratio (switchable)</i>	<b>50:1</b>	<b>100:1</b>	<b>250:1</b>	<b>500:1</b>
<b>Bandwidth (-3dB)</b>				
<i>Input Voltage 50 V</i>	300 MHz	300 MHz	400 MHz	400 MHz
<i>Input Voltage 500 V</i>	n.a	n.a	300 MHz	300 MHz
<i>Input Voltage 1000 V</i>	n.a	n.a	n.a	300 MHz
<b>Risetime (10 %- 90%)</b>				
<i>Input Voltage 50 V</i>	1.2 ns	1.2 ns	875 ps	875 ps
<i>Input Voltage 500 V</i>	n.a	n.a	1.2 ns	1.2 ns
<i>Input Voltage 1000 V</i>	n.a	n.a	n.a	1.2 ns
<i>Typical Noise (rms) <sup>(2)</sup> (referred to input)</i>	55 mV	55 mV	75 mV	75 mV
<i>Typical Propagation Delay</i>	10 ns			
<i>Max. Input Voltage</i>				
<i>Measurement Category I</i>	2000 V rms 6000 V transiente Overvoltage			
<i>Measurement Category III</i>	1000 V CAT III			
<i>Pollution Degree</i>	2			
<i>Max. Differential Input Voltage (incl. AC peak)</i>	±200 V DC	± 400 V DC	± 1000 V DC	±2000 V DC
<i>Common Mode Voltage</i>	± 2000 V pk (± 1400 V rms)			
<i>DC Gain Accuracy</i>	± 0.7 %	± 0.7 %	± 0.35 %	± 0.35 %
<i>Offset Range <sup>(3)</sup></i>	± 4 V			
<i>Offset Resolution <sup>(3)</sup></i>	15 Bit / minimum Step < 125 µV			
<i>Offset Drift <sup>(3)</sup></i>	150 µV / °C	150 µV / °C	40 µV / °C	40 µV / °C
<b>Input Impedance</b>				
<i>Each Input to Ground</i>	5 MΩ    4 pF			
<i>Differential Input Impedance</i>	10 MΩ    2 pF			
<i>Input Coupling of the Measuring Instrument <sup>(4)</sup></i>	50 Ω			
<i>Typical CMRR</i>	DC	> 80 dB		
	100 kHz	> 70 dB		
	1 MHz	> 62 dB		
	3.2 MHz	> 50 dB		

## Voltage Derating



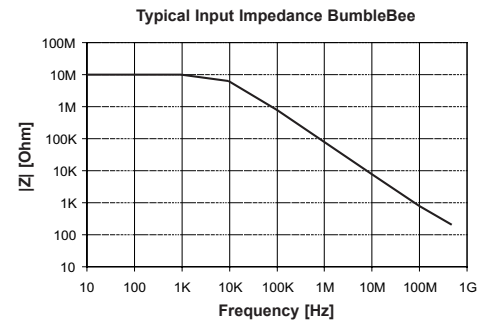
*Note that the max. input voltage rating of the probe decreases as the frequency of the applied signal increases.*



## Input Impedance



*Note that the input impedance of the probe decreases as the frequency of the applied signal increases.*



### Power Supply

Model	Description	Order Number
PS-02	2 Channel Power Supply	889-09V-PS2
PS-03	4 Channel Power Supply	889-09V-PS3

### Mechanical Specifications

Weight (Probe only)	370 g
Cable Length	2 m
Input Leads Length	25 cm
Input Connectors	2 x 4 mm (male)
Output Connector	BNC (male)

### Environmental Specifications

	operating	non- operating
Altitude	up to 2000 m	up to 15000 m
Temperature Range		
Probe Assembly	0 °C to +50 °C	-20 °C to +70 °C
Input Leads only	-40 °C to +85 °C	
Maximum Relative Humidity	80 % RH for temperatures of up to +31 °C, decreasing linearly to 40 % at +50 °C.	



Keyboard Layout - BumbleBee®

- (1) Measured at + 23 °C environment connected to PS-02 Power Supply
- (2) Broadband Noise, Bandwidth 30 MHz
- (3) Referred to Output
- (4) Must be met to achieve best Performance and avoid Damage to the Probe

## WEEE/ RoHS Directives

PMK electronic products are classified within the WEEE/ RoHS\* category list as monitoring and control equipment (category 9). Category 9 products are exempt from the restrictions under the scope of the RoHS directive.

Your help and efforts are required to protect and keep clean our environment. Therefore return this electronic product at the end of its life either to the Service Department of PMK Mess- und Kommunikationstechnik GmbH or take care of separate WEEE collection and professional WEEE treatment yourself. Do not dispose as unsorted municipal waste.

\* EC Directives:

WEEE Directive 2002/96/EC	–	Waste Electrical and Electronic Equipment
RoHS Directive 2002/95/EC	–	Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment

## Safety Information

To avoid personal injury and to prevent fire or damage to this product or products connected to it, review and comply with the safety informations stated in the manual before using this product.

Be aware that if you use this probe assembly in a manner not specified the protection this product provides may be impaired.

**Only Qualified Personnel should use this Probe Assembly.**

## Manufacturer

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