



## Description

The 5045 is a versatile, high accuracy calibrator capable of calibrating digital and analogue oscilloscopes, timer/counters, and frequency meters. It provides a wide range of outputs for amplitude, frequency, period and bandwidth. Amplitude calibration is achieved by a DC signal or 1 kHz square-wave, ranging from 1 mV to 220 V (2 V max for 50 ohm loads). Deviation up to  $\pm 9.99\%$  allows fine adjustment of amplitude and direct read-out of error. Accurate frequencies are generated from a temperature controlled quartz crystal oscillator. Alternatively a 10 MHz reference input in can be used. Timing accuracy of 0.1 ppm is suitable for most oscilloscopes and timer counters. A precise square-wave output provides a fast rise time of less than 300 ps, which allows bandwidth testing up to 600 MHz.

### Simple Operation

Functions and ranges are easily accessed from the front panel. Increase and decrease keys per digit, are used to quickly set the output value. Deviation control then enables the user to finely adjust the output value as a percentage ( $\pm 9.99\%$ ). All this information is shown on a clear, easy to read LED display.

Additionally the 5045 is supplied with Time Electronics Windows based virtual control interface software. This enables the user to control the instrument via a laptop or PC.

### 2.2 GHz Levelled Sine-Wave Option

For precise bandwidth determination and frequency response analysis the 2.2 GHz option is available. The ability to sweep the frequency output from 50 MHz to 2.2 GHz and adjust the amplitude from 0.5 V to 1.5 V pk-pk ensures accurate analysis of oscilloscope input amplifiers.

### Current Probe Calibration

For calibration of oscilloscope current probes an external adaptor is available. This converts the amplitude of the 5045 output to current and covers the range of 0.1 mA to 100 mA pk-pk, with 0.2% accuracy, DC or 1 kHz.

### Rubidium Frequency Reference

Enhanced timing performance is available by specifying the rubidium high stability frequency reference option (9762). This option achieves timing accuracies required to calibrate high performance timer/counters to 1 part in  $10^{10}$ .

## Features

- 1 mV to 220 V square wave/DC
- Frequency 0.1 to 100 MHz
- Time markers 10 s to 10 ns
- Fast rise < 300 ps
- Front panel or PC virtual control
- External reference input
- 2.2 GHz sweep option
- Rubidium frequency reference option
- Current probe adaptor option
- RS-232, USB, GPIB interface

## EasyCal Calibration Software

The 5045 can be controlled via Time Electronics EasyCal software to automate the calibration process. This provides increased speed of calibration and consistency of results. Produce traceable calibration certificates and test reports for quality standards with additional uncertainty information for ISO 17025 conformance.





## Technical Specifications

Specifications are for 1 year and apply between 23 °C ± 5 °C

### Standard features

Function	Range	Specification (± output + floor)		Resolution
Frequency*	0.1 Hz to 10 MHz 20 MHz to 100 MHz	± 0.1 ppm ± 20 ppm		Fixed Outputs in 1, 2, 5, 10 Sequenced Steps
Period*	10 s to 100 ns 50 ns to 10 ns	± 0.1 ppm + 30 ps ± 20 ppm + 50 ps		
Duty Cycle	100 Hz, 1 kHz, 10 kHz	Settable from 0 to 100 %		
Amplitude DC or 1 kHz Square wave	2 to 200 mV (1 MΩ) 0.2 to 20 V (1 MΩ) 20 to 220 V (1 MΩ) 1 to 200 mV (50 Ω) 0.2 to 2 V (50 Ω)	DC Signal	Square Wave Signal	10 μV 1 mV 10 mV 100 μV 1 mV
		± 0.20 % + 10 μV ± 0.05 % + 10 μV ± 0.05 % + 10 μV ± 0.25 % + 15 μV ± 0.25 % + 15 μV	± 0.25 % + 100 μV	
Fast Rise**	10 MHz	Rise time less than 300 ps (> 400 mV pk-pk into 50 Ω)		

\* Frequency amplitude: 1.5 V pk-pk 0.1 Hz to 100 kHz. 1 V pk-pk 200 kHz to 100 MHz.

### Options

Option	Range	Specification	
2.2 GHz Levelled Sine-Wave** (option 9769)	50 MHz to 199.9 MHz* 200 MHz to 499.9 MHz* 500 MHz to 999.9 MHz 1 GHz to 2.2 GHz	1 % 2 % 4 % 6 %	Settable amplitudes: 0.5 V, 1 V, 1.5 V pk-pk 50 Ω Output
	*From 50 to 499.9 MHz an additional error of 0.5 % of range applies. Frequency accuracy 20 ppm.		
Rubidium reference (option 9762)	Rubidium atomic clock 10 MHz frequency reference. Increases accuracy to 1 part in 10 <sup>10</sup> . (Applies to 10 MHz maximum output on 5045)		
Current probe adaptor (option 9764)	Battery powered external adaptor for checking current probes. 0.1 to 100 mA, 0.2 % accuracy.		

\*\* Accredited calibration is not available for this function.

## General specification

**Warm up** ..... 30 minutes to full accuracy.  
**Settling time** ..... Less than 5 seconds.  
**Standard interfaces** ..... GPIB (IEEE-488), RS-232, USB.  
**Temperature performance** ..... Operating: 10 to 40 °C, Full Spec: 23 °C ± 5 °C, Storage: -10 °C to 50 °C.  
**Operating humidity / Altitude** ..... < 80 % non-condensing / Altitude: 0 to 3 km. Non operating: 3 to 12 km.  
**Line power** ..... 100 to 230 V AC 50/60 Hz. Power Consumption 60 W typical, 80 W maximum.  
**Dimensions** ..... W 450 x D 272 x H 152 mm (18 x 11 x 7 ").  
**Weight** ..... 8.2 kg (18 lbs).  
**Supplied with** ..... Virtual control software, user manual, RS-232 cable, USB adaptor/cable.

## Ordering Information

5045..... Oscilloscope and Timer/Counter Calibrator  
9769..... Scope 2.2 GHz levelled sine generator  
9762..... Rubidium high stability frequency reference  
9764..... Current probe calibration adaptor  
9519..... Test lead and adaptors set  
9728..... 19 " universal rack mount kit  
ECFLA ..... EasyCal Calibration Software (see separate datasheet for details and options)  
C147 ..... Traceable calibration certificate (Factory)  
C128 ..... Accredited calibration certificate (ISO 17025)  
EW03..... Extended warranty: 3 years covering parts and labour

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.