

# Counters & Power Meters

## CPM 20, 46 Counter Power Meter

**AEROFLEX**  
A passion for performance.



A ruggedized solution for microwave power and frequency measurements in the field

- Combined Frequency Counter and Power Meter in one unit
- Two models available:
  - 10 MHz to 20 GHz
  - 10 MHz to 46 GHz
- Large, easy to read screen allows simultaneous display of both power and frequency measurements
- Built-in DVM for AGC voltage measurements
- Designed for use in the field, weighing only 4.9 kg (10.8 lb) and battery operated
- Supported by the full range of Aeroflex power sensors

*Aeroflex's Counter Power Meter (CPM) is a portable combination of three instruments: a Microwave Frequency Counter, true Power Meter and Digital Voltmeter. A compact instrument with internal rechargeable battery, ruggedized case and carrying strap, it can be used up a tower, on a roof top or at a field site. Digital microwave radios are commonly installed for network access to mobile radio cell sites and quick installation of business communications. The CPM is the ideal instrument for installation and maintenance engineers working on these systems.*

### Designed for Field Use

The CPM weighs 4.9 kg (10.8 lb), including battery, which makes it ideal for taking up radio towers or carrying on to exposed roof top sites. A supplied accessory pouch contains and protects all the required accessories. The rechargeable battery gives three hours of continuous operation. Batteries can be charged from either the supplied AC adapter or a vehicle supply. Battery life is continuously monitored and the display shows the percentage life remaining. As accessories a spare battery and desktop charger are available.

The display uses transfective LCD technology which has an integral backlight. This means that it can easily be read both outdoors in direct sunlight and indoors in low light. The user interface makes operation fast, simple and reliable. Measurements are swiftly configured, connections are clearly marked and results are easy to read.

### Accuracy

Despite being lightweight and portable, there is no compromise in accuracy. The standard reference oscillator is a DTCXO, digitally controlled temperature compensated crystal oscillator. A DTCXO has no warm up time and is ready to make accurate measurements immediately after switch on, saving both time and battery life. Power measurement accuracy is guaranteed through the use of the standard Aeroflex 6900 series of power sensors. These sensors have excellent return loss specifications which minimize mismatch errors in power measurements. Calibration and linearity factors, unique to each sensor, can also be entered into the CPM to ensure the best accuracy at all times. An integral 0 dBm, 50 MHz power reference is used for sensor calibration, ensuring measurement accuracy and traceability to national standards.

## Fully Featured

Two versions of the CPM are available, CPM 20 measures frequencies from 10 MHz to 20 GHz and CPM 46 from 10 MHz to 46 GHz, through a single input. Power sensors cover the frequency range 30 kHz to 46 GHz, and when used with a CPM measure -60 dBm to +44 dBm (25 W).

The frequency counter has relative frequency and frequency offset modes for frequency drift and frequency conversion measurements. A limits function enables frequency to be measured against a specification, with pass/fail annunciator in the display. Resolution is user settable from 1 Hz to 1 MHz.

The power meter features pass/fail limits, dB rel, power offset and duty cycle modes. An analog peaking meter is displayed for tuning and adjusting power levels.

A built-in DVM complements the frequency counter and power meter. Radio links are often aligned by monitoring the receiver AGC voltage. The DVM, with its clear 10 mV resolution readout and analog peaking meter, is ideally suited to this task.

## SPECIFICATION

### FREQUENCY MEASUREMENT

#### Frequency Range

10 MHz to 20 GHz	CPM 20
10 MHz to 46 GHz	CPM 46

#### Sensitivity

10 MHz to 20 GHz	-20 dBm (typ, below 20 MHz)
20 GHz to 26.5 GHz	-20 dBm
26.5 GHz to 40 GHz	-15 dBm
40 GHz to 46 GHz	-10 dBm

#### Input Connector

Precision Type N (f) CPM 20  
Precision 2.92 mm (f) CPM 46

#### Input Impedance

50  $\Omega$  Nominal

#### Maximum Input

10 MHz to 46 GHz +10 dBm (typ, below 20 MHz)

#### Damage Level

+27 dBm

#### Resolution

User selectable 1 Hz to 1 MHz

#### Measurement Time

1 Hz Resolution <2 s  
>1 Hz Resolution <250 ms

#### FM Tolerance

20 MHz peak to peak, for >1 kHz rate

#### AM Tolerance

Any index as long as minimum level does not fall below sensitivity, at 20 kHz rate

#### Amplitude Discrimination

20 dB for signals >400 MHz

## Accuracy (1 Hz Resolution)

Frequency standard error  $\pm 25$  Hz  
(10 MHz to 20 GHz)

Frequency standard error  $\pm 50$  Hz  
(20 GHz to 46 GHz)

## Features

Limit checking, Relative frequency, Frequency offset, Frequency hold

## 10 MHz FREQUENCY STANDARD

### Temperature Stability

DTCXO (standard)

Better than  $\pm 5$  in  $10^8$ , 0 to 50°C

TCXO (option 001)

Better than  $\pm 1$  in  $10^6$ , 0 to 50°C

### Ageing

DTCXO (standard)  $\pm 0.3$  ppm/year

TCXO (option 001)  $\pm 1$  ppm/year

### External Frequency Standard Input

10 MHz, 0.7 to 5 V p-p sine or square wave into 1 k $\Omega$  nominal.  
AC coupled. BNC female

## POWER MEASUREMENT

### Frequency Range (Sensor Dependent)

30 kHz to 46 GHz

### Power Range (Sensor Dependent)

-65 dBm (0.31 nW) to +44 dBm (25 W)

### Power Sensors Supported

6910 series (-30 dBm to +20 dBm)

6920 series (-65 dBm to -20 dBm)\*

6930 series (-15 dBm to +35 dBm)

6930 series opt 2, (-5 dBm to +44 dBm)

### Power Accuracy

After calibration using 0 dBm, 50 MHz power reference:  $\pm 0.2$  dB  
measuring a 50 MHz signal in the centre of the power sensor dynamic range, from a source with a return better than 14 dB

### Resolution

4 digits

### Units

dBm, dBW, pW, nW,  $\mu$ W, mW, W, kW

### Features

Limit checking, Duty cycle, dB Relative, Power offset,

Analog Meter

### Correction

Linearity Factor

Calibration Factor

### Auto-Calibration

Ability to calibrate against a 0 dBm (1 mW), 50 MHz power reference

### Auto-Zero

Removes DC offset from gain stages and power sensor.

## Noise Floor (after Auto-Zero)

6910 series <-30 dBm  
6920 series <-65 dBm\*  
6930 series <-15 dBm

## POWER REFERENCE

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### Frequency

50 MHz  $\pm$ 0.10 MHz

### Power Level

0 dBm (1 mW)

### Uncertainty

$\pm$ 0.7% traceable to National Standards

### Accuracy

$\pm$ 1.2% worst case for one year

### Output Connector

N (f), 50  $\Omega$ . Adapters are supplied with 75  $\Omega$ , 3.5 mm and 2.92 mm power sensors

## DIGITAL VOLTMETER

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### Voltage Range

0 V to +10 V (DC only) protected to 40 V

### Accuracy

$\pm$ 2.5% of reading

### Resolution

10 mV

### Connector

4 mm banana sockets

### Impedance

6 M $\Omega$  in parallel with 100 pF, -ve terminal connected to chassis via 10 k $\Omega$  resistor

## DISPLAY

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### LCD

1/4 VGA transfective with backlight

## TERMINAL INTERFACE

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### Connector

9 pin D male. RS-232 (DTE) compatible

## POWER REQUIREMENTS

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### DC Input (Vehicle Supply or AC Adapter)

10 V to 28 V, 32 VA (max)

### Rechargeable Battery

3 hours continuous operation minimum

### Recharge Time

<6 hours

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## SIZE & WEIGHT

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285 mm (width), 130 mm (height), 210 mm (depth)

4.9 kg (10.8 lb)

## ENVIRONMENTAL

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### Operating Temperature Range

0 to +45°C

### Storage Temperature Range (Excluding Battery)

-40 to +70°C

### Storage Humidity Range

Up to 93% RH at +40°C

### Shock and Vibration

MIL-T-28800 for class 3

### Drop Test

EN60068-2-32

### Overall Instrument Protection

IP52 (EN60529)

## EMC AND SAFETY

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Conforms with the limits specified in the following standards:

### ELECTROMAGNETIC COMPATIBILITY

Conforms with the protection requirements of the EEC Council Directive 89/336/EEC. Conforms with the limits specified in the following standards:

IEC/EN61326-1, RF Emission Class B, Immunity Table 1, Performance Criteria B

### SAFETY

Conforms with the safety requirements of EEC Council Directive 73/23/EEC (as amended) and the product safety standard IEC/EN 61010-1 + C1 + C2 for class (3) portable equipment, for use in a Pollution Degree 2 environment. The instrument is designed to be operated from a Installation Category 1 supply.

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## VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

### Ordering

Numbers	Versions		
CPM 20	10 MHz to 20 GHz Counter Power Meter	56914/003	10 MHz to 46 GHz (-30 dBm to +20 dBm) 2.92mm.
CPM 46	10 MHz to 46 GHz Counter Power Meter	56919/900	75 W 30 kHz to 3 GHz (-30 dBm to +20 dBm) Type N
Option 001	Replaces DTCXO with TCXO		
<b>Supplied with</b>			<b>Power Sensors - Low power</b>
41690/616	Accessory pouch	56920/900	10 MHz to 20 GHz (-65 dBm to -20 dBm) Type N.
41700/788	Carrying strap	56923/900	10 MHz to 26.5 GHz (-60 dBm to -20 dBm) MPC 3.5
43113/022	Rechargeable battery	56924/001	10 MHz to 40 GHz (-60 dBm to -20 dBm) 2.92 mm.
28541/213	Universal AC adapter/battery charger	56924/002	10 MHz to 40 GHz (-60 dBm to -20 dBm) 2.92 mm plus waveguide 22 coax transition and calibration table
	Power lead for charger		
43169/039	Vehicle DC supply lead	56924/003	10 MHz to 46 GHz. (-60 dBm to -20 dBm) 2.92 mm.
43138/663	1.5 m power sensor cable		
23443/874	DVM, BNC adapter		
46882/335	Operating Manual		
<b>Accessories</b>			<b>Power Sensors - High power</b>
54311/219	20 GHz standard counter cable 1.5 m, SMA (m) to SMA (m)	56930/900	10 MHz to 18 GHz (-15 dBm to +35 dBm) Type N.
54311/134	Adapter N (m) to SMA (f)	56932/900	30 kHz to 4.2 GHz (-15 dBm to +35 dBm) Type N.
54351/027	40 GHz counter cable 0.5 m, 2.92 mm (m) to 2.92 mm (m)	56934/001	10 MHz to 40 GHz (-15 dBm to +30 dBm) 2.92 mm
43113/022	Spare battery	56934/002	10 MHz to 40 GHz (-15 dBm to +30 dBm) 2.92 mm plus waveguide 22 coax transition and calibration table
54464/001	Desktop battery charger	56934/003	10 MHz to 46 GHz (-15 dBm to +30 dBm) 2.92 mm
46880/084	Service Manual	56930/002	10 MHz to 18 GHz (-5 dBm to +44 dBm) Type N
		56932/002	30 kHz to 4.2 GHz (-5 dBm to +44 dBm) Type N
<b>Power Sensors - Standard</b>			
56910/900	10 MHz to 20 GHz (-30 dBm to +20 dBm) Type N.		
56911/900	10 MHz to 20 GHz (-30 dBm to +20 dBm) APC 7.		
56912/900	30 kHz to 4.2 GHz (-30 dBm to +20 dBm) Type N.		
56913/900	10 MHz to 26.5 GHz (-30 dBm to +20 dBm) MPC 3.5.		
56914/001	10 MHz to 40 GHz (-30 dBm to +20 dBm) 2.92mm.		
56914/002	10 MHz to 40 GHz (-30 dBm to +20 dBm) 2.92 mm plus waveguide 22 coax transition and calibration table.		

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