CPM 20, 46
Counter Power Meter

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 IFR power sensors

IFR'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 transflective 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 IFR 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.

CPM is designed for radio link testing

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 Ω 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 ±25 Hz
(10 MHz to 20 GHz)
Frequency standard error ±50 Hz
(20 GHz to 46 GHz)

10 MHz Frequency Standard

Features
Limit checking
Relative frequency
Frequency offset
Frequency hold

Temperature Stability
DTCXO (standard)
Better than ±5 in 10^8, 0 to 50°C
TCXO (option 001)
Better than ±1 in 10^6, 0 to 50°C

Ageing
DTCXO (standard) ±0.3 ppm/year
TCXO (option 001) ± 1ppm/year

External Frequency Standard Input
10 MHz, 0.7 to 5 V p-p sine or square wave into 1 kΩ 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 power reference: ±0.2 dB. Measuring a signal in the centre of the power sensor dynamic range, from a source with return loss better than 14 dB

Resolution
4 digits

Units
dBm, dBW, pW, nW, µW, 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

Frequency
50 MHz ±0.10 MHz

Power Level
0 dBm (1 mW)

Uncertainty
±0.7% traceable to National Standards

Accuracy
±1.2% worst case for one year

Output Connector
N (f), 50 Ω. Adapters are supplied with 75 Ω, 3.5 mm and 2.92 mm power sensors

Digital Voltmeter

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

Accuracy
±2.5% of reading

Resolution
10 mV

Connector
4 mm banana sockets

Impedance
6 MΩ in parallel with 100 pF, -ve terminal connected to chassis via 10 kΩ resistor

Display

LCD
1/4 VGA transflective with backlight

Terminal Interface

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

Power Requirements

DC Input (Vehicle Supply or AC Adapter)
10 V to 28 V, 32 VA (max)

Rechargable Battery
3 hours continuous operation minimum

Recharge Time
<4 hours

Size & Weight

285 mm (width), 130 mm (height), 210 mm (depth)
4.9 kg (10.8 lb)

Environmental

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
IEC 68-2-32

Overall Instrument Protection
IEC 529 (rating IP 523)

EMC and Safety

Conforms with the limits specified in the following standards:

Emissions
EN55011:1991
AS/NZS2064.1/2 CISPR11

Immunity
EN50082-1:1992
AS/NZS4252.1 IEC801-2:1991
IEC801-3:1984
IEC801-4:1988

Safety
EN61010-1
UL3111-1 IEC 1010-1
CSA-C22.2 No. 1010.1

Versions and Accessories

When ordering please quote the following ordering number information

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

* - 60dBm for 6923 and 6924