Marconi
Instruments

The Microwave Test Revolution

6200 series

6200 SERIES
MICROWAVE TEST SET

The MTS – Microwave Test Set – revolutionizes microwave bench and field measurements.
A complete set of instrumentation covering 10 MHz to 26.5 GHz is integrated into one compact and portable package.

The main elements of the MTS are a synthesized sweep generator, a scalar analyzer, a power meter, a frequency counter and voltage/current source.

A clear color display gives high definition readout of swept responses and digital readings of power and frequency.

A major additional facility is real-time Fault Location. It gives the precise position of faults and discontinuities in coaxial and waveguide antenna feeders.

The MTS is the ideal solution for development, production, installation, commissioning and maintenance tasks. Just one instrument replaces all the individual instruments currently required.

But the MTS is much more than a collection of discrete instruments – it is a fully integrated test system designed to simplify numerous microwave measurement problems.

THE INTEGRATED MICROWAVE TEST REVOLUTION

The MTS is the economical test solution that is faster and easier to use than the multitude of individual instruments usually associated with microwave measurements.

Its high accuracy ensures that the MTS is equally applicable for design, manufacture and maintenance tasks. Field applications include commissioning and repair of microwave radio links, radar and electronic warfare systems.

Using the programmable voltage/current source, swept or static analysis of components and sub-systems is available. This opens up a wide variety of new applications.

Intelligent markers, automatic pass/fail analysis, a memory card for saving settings and traces and a Macro function to store and replay key-press sequences further extend the measurement capabilities.

An intuitive user-interface ensures quick learning, fast operation and ease of use. Hard keys access a range of soft key functions. The user is prompted to make the required selections and help messages are used to guide and assist.

Two versions of the MTS are available, both covering a continuous wide frequency range. 6200 covers 10 MHz to 20 GHz, 6203 covers 10 MHz to 26.5 GHz.

Fully Synthesized Sweep Generator

The fast synthesized generator with 1 Hz resolution combines the speed of an analog sweeper with the precision of a synthesizer. Fast step times coupled with high stability ensures that even narrow filters can be measured with speed, accuracy and confidence. A 400 point sweep can be made in less than 200 ms allowing interactive tuning without compromising accuracy.

Both start/stop and center/span sweep modes may be used as well as a CW mode for spot frequency measurements.

With the step attenuator option, amplitudes can be set from +20 dBm down to −90 dBm. Fundamental frequency generation gives low level harmonics (<−40 dBc) and spurious signals (<−60 dBc).

The levelled accuracy of typically <±0.5 dB and superior source match means that a second detector to give a live reference may be omitted to simplify measurements.

Versatile Scalar Analyzer

The four input scalar analyzer has a 90 dB dynamic range with excellent linearity. Both AC and DC detection are provided.

Two auto-scaling display channels, each capable of displaying up to two measurements are available. Up to four live or stored traces can be displayed.

Simultaneous measurement of pass-band and stop-band characteristics is available in un-coupled mode since each display channel can be set to sweep different frequency ranges.

Integrated Voltage/ Current Source

The programmable voltage/current source increases the range of applications so that devices such as VCOs, PIN modulators and amplifiers can be characterized at fixed or swept voltages and currents.

Rapid Fault Location

Fault location displays return loss against distance. It is especially important for field analysis of antenna feeders since faults and discontinuities in coaxial cables and waveguides can be accurately located and diagnosed. Short range discontinuities and faults spaced only a few millimetres apart can also be resolved.

Accurate Power Meter

Accurate power measurements are made using the Marconi Instruments range of nine Power Sensors. Power can be measured from −70 dBm to +35 dBm at frequencies up to 26.5 GHz.

High accuracy is assured since a calibrator is included and Calibration Factor and Linearity Factor are corrected.

An analog meter is also provided to assist when tuning and peaking. Maximum and minimum hold and limit-checking provides comprehensive analysis.

Multi-Function Frequency Counter

The counter covers the full frequency range of the MTS. Limit checking is provided for fault monitoring. Maximum/minimum hold display assists frequency drift analysis.

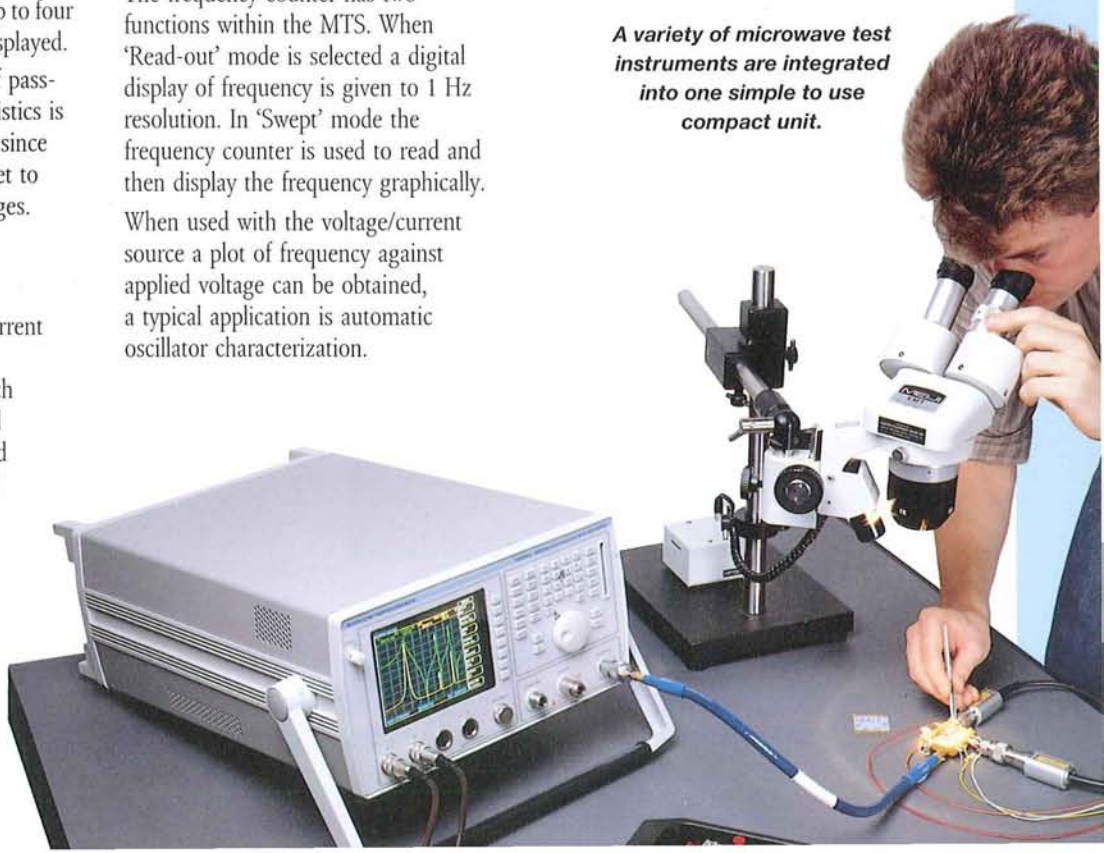
The frequency counter has two functions within the MTS. When 'Read-out' mode is selected a digital display of frequency is given to 1 Hz resolution. In 'Swept' mode the frequency counter is used to read and then display the frequency graphically.

When used with the voltage/current source a plot of frequency against applied voltage can be obtained, a typical application is automatic oscillator characterization.

The MTS integrates many measurement functions in one portable package.

Separate power meters and frequency counters can now be omitted from ATE saving cost and space.

A variety of microwave test instruments are integrated into one simple to use compact unit.



WIDE RANGE OF MEASUREMENT APPLICATIONS

A wide range of measurement functions are incorporated into the MTS to make numerous sophisticated measurements rapidly and simply.

Integrating all the functions into a single instrument eliminates the need for system interconnections, avoids set-up errors and provides faster measurements.

The memory card extends the on-board memory to store instrument settings with limit lines, measurement traces and calibration data.

Convenient Memory Card

Both plot and print hard copy facilities are available. Any HPGL compatible plotter can be driven from the GPIB port and any Epson FX series compatible printer can be connected to the parallel port.

Both outputs are buffered so that measurements can continue while plotting.

Versatile Hard Copy

A sequence of key strokes and command strings, including pauses, can be entered and automatically executed using the Macro facility. Macro programs can be stored internally or on a memory card.

User Defined Macro

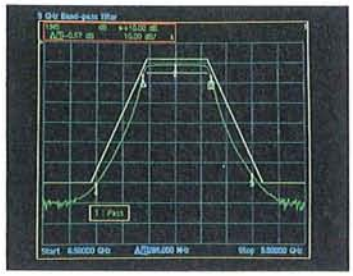
Unique PIN Diode Characterization

The programmable voltage/current port allows automatic analysis of PIN switches and attenuators. The applied voltage can be changed so that a plot of attenuation versus voltage is obtained. Insertion loss can be simply displayed for a range of bias voltages.

Multi-Port Device Analysis

Four scalar analyzer detector inputs simplify the adjustment and tuning of multi-port devices such as circulators, directional couplers and diplexers.

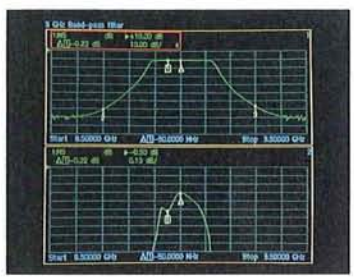
The MTS – built-in power to meet the demands of future applications



Comprehensive Analysis

Eight markers plus a 'delta marker' assist analysis and reduce reading errors. Automatic search such as minimum and maximum find, are provided as well as 'N–dB bandwidth' and peak-to-peak response.

Limit lines give rapid automatic 'go/no-go' testing.



Dual Channel Mode

Dual channel mode enables two different displays of the response of a filter to be shown simultaneously. Overall response and pass-band ripple can be clearly seen.

Digital Read Out

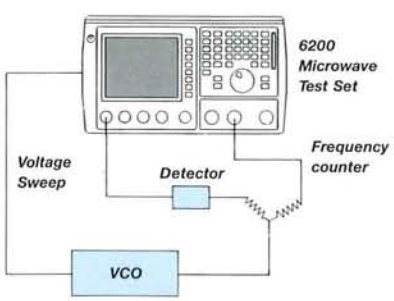
Digital read out of power and frequency increase the range of applications of the MTS. Frequency is measured to 1 Hz resolution.

Automatic limit checking against user-set limits and Maximum/Minimum Hold aid drift analysis.

Fast VCO Characterization

A swept voltage from the MTS is applied to the Voltage Controlled Oscillator. Frequency and level are simultaneously displayed on two axes to characterize the device quickly and simply.

A VCO can therefore be easily and accurately characterized in seconds without additional test equipment.

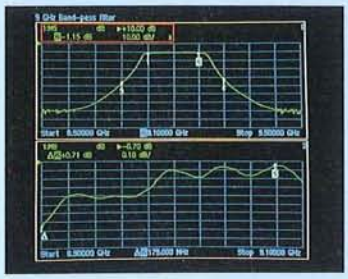


Simple Mixer Measurements

The GPIB port can control a second MTS synthesized sweep generator for synchronous mixer evaluation. The two synthesizers sweep together with a fixed offset to enable the frequency response of a mixer and its IF filter to be rapidly and simply measured.

Automatic Two Port Measurement

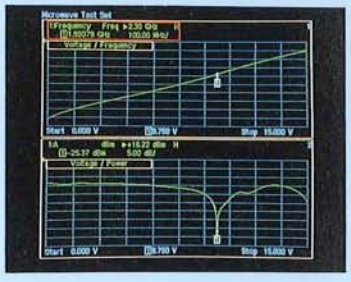
An output signal generated at the end of each sweep is used to activate a changeover switch to alternate the swept signal between the two ports of devices such as isolators. The dual channel display can simultaneously show the full characteristics of non-reciprocal devices.



Dual Frequency Scales

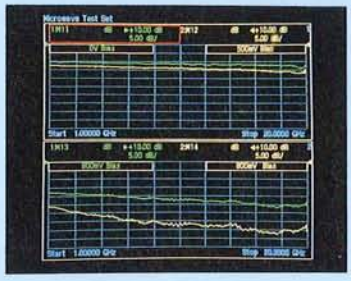
In dual channel mode the channels can be uncoupled so that different frequency ranges can be sequentially swept to display pass-band and stop-band on one screen.

This powerful technique simplifies the design and alignment of even the most complex filters.



Automatic VCO Measurement

Using the frequency counter and programmable voltage source the frequency/voltage relationship can be simply displayed. A detector is used to show the variation in level with frequency.



PIN Attenuator Characterization

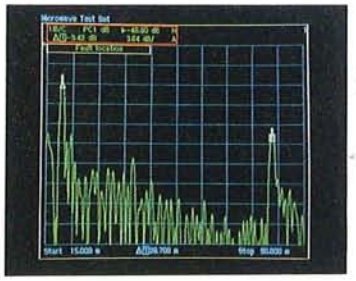
Four measurements are made, each with a different bias voltage automatically applied from the programmable source.

Many components and devices can be simply characterized in this way.

REAL TIME FAULT LOCATION DISPLAY

The optional real time Fault Location capability of the MTS now makes field repair of both coaxial and waveguide antenna feeders both quick and economical.

Fault Location operates by analyzing the interference patterns generated when the reference signal is incident on discontinuities.
The pattern is processed to give a rapid and clear display of return loss against distance.
Accuracy is 0.1% of range up to 1 km.



Waveguides are analyzed using a non-linear sweep to totally eliminate the effects of dispersion so that waveguide measurements are as fast and clear as coaxial cable measurements.

Closely spaced faults can be determined so that even loose or corroded contacts within a bulkhead connection can be pin-pointed.

The MTS fault location option has a simple user-interface to allow measurements to be made with little training. It is ideal for microwave and cellular radio operators for antenna feeder measurements. Military applications include fault location on aircraft EW systems and on board ship.

The accuracy and resolution makes Fault Location also applicable to laboratory applications.

Revolutionize your Microwave Testing . . .

TECHNICAL SPECIFICATION

SYNTHESIZED SWEEP GENERATOR

Frequency

Range
6200: 10 MHz to 20 GHz.
6203: 10 MHz to 26.5 GHz.

Resolution
1 Hz.

CW Accuracy
Frequency standard accuracy ±0.5 Hz.

Typical Swept Accuracy

	Frequency	
Step time	Up to 2 GHz	> 2 GHz
250 µs	< 5 kHz	< 100 kHz
1 ms	< 500 Hz	< 1.5 kHz
10 ms	< 50 Hz	< 50 Hz

Power

6200/6203 standard.

	Power-levelled (dBm)	
Frequency range (GHz)	Guaranteed	Maximum typical
0.01 to 2	−10 to +7	+11
2 to 8	−10 to +6	+10
8 to 18	−10 to +5	+10
18 to 20	−10 to +5	+8
20 to 26.5	−10 to +4	+8

6200 + opt 001 (step attenuator)

	Power-levelled (dBm)	
Frequency range (GHz)	Guaranteed	Maximum typical
0.01 to 2	−80 to +5	+9
2 to 8	−80 to +4	+8
8 to 18	−80 to +3	+7
18 to 20	−80 to +2	+5

For option 002 (Field replaceable RF connector) guaranteed output is reduced by 0.5 dB.

Settable power ranges
Standard: −20 dBm to +20 dBm.
With Option 001: −90 dBm to +20 dBm.

Resolution
0.01 dB.

Power Sweep range
From maximum levelled power
Standard: >25 dB
With Option 001:>95 dB

Internal Levelling

Accuracy (including flatness at 0 dBm).

Standard and Option 002
±1 dB, ±0.5 dB typical.
Linearity: <0.5 dB over guaranteed power range.

Option 001 (including Option 002 if fitted)

10 MHz to 8 GHz:	±1 dB ±0.3 dB ±2% of attenuator setting in dB
8 GHz to 20 GHz:	±1 dB (±1 dB or ±4% of attenuator setting in dB, whichever is greater).

External Levelling

Via rear panel BNC input socket. Accepts signals from a detector (positive or negative) or from the analog output of a power meter (0 to ±1 V). Accuracy depends on levelling technique.

Power Stability with Temperature

Typical values following power calibration at operating temperature. Self-calibration with a Power Sensor removes temperature effects.

6200

0 to 20°C	<0.02 dB/°C
20 to 40°C	<0.04 dB/°C
40 to 50°C	<0.08 dB/°C

6203

0 to 20°C	<0.1 dB/°C
20 to 30°C	<0.08 dB/°C
30 to 50°C	<0.06 dB/°C

Signal Purity

Harmonics

0.01 GHz to 2 GHz	<−27 dBc, −35 dBc typical.
2 GHz to 8 GHz	<−35 dBc, −40 dBc typical.
8 GHz to 26.5 GHz	<−40 dBc, −50 dBc typical.

Sub-harmonics and spurious signals <−60 dBc.

There are no sub-harmonics for frequencies above 2 GHz.

Phase noise
Typical values measured in 1 Hz bandwidth at 20 kHz offset from the carrier in CW mode.

0.01 to 2 GHz	<−90 dBc/Hz
2 to 8 GHz	<−78 dBc/Hz
8 to 12 GHz	<−74 dBc/Hz
12 to 20 GHz	<−70 dBc/Hz
20 to 26.5 GHz	<−67 dBc/Hz

Residual FM
In 100 kHz bandwidth in CW mode:

0.01 to 2 GHz	< 1 kHz peak
2 to 26.5 GHz	< (500F) Hz peak

where F is the frequency in GHz.

Output Connector

Type
6200: Precision N (female), 50 Ω.
6203: MPC (Marconi Precision Connector) 3.5 mm (female), 50 Ω.
Option 002: Field replaceable, 50 Ω precision 3.5 mm (female) and N-type (female).

Reverse input power
100 mW maximum.

Source Match (internally levelled)

Frequency range		Return Loss (dB)	
(GHz)	VSWR	Typical	Minimum
0.01 to 0.05	<1.45:1	>17	>15
0.05 to 2	<1.11:1	>33	>26
2 to 8	<1.2:1	>30	>21
8 to 12	<1.35:1	>25	>16.5
12 to 26.5	<1.45:1	>20	>15

With option 001 minimum return loss specification degrades by up to 5 dB.

With option 002 minimum return loss specification degrades by up to 3 dB.

Volts/GHz

Voltage proportional to frequency available from rear panel BNC Voltage/Current output.

Range: 1 V or 0.5 V/GHz selectable (20 V maximum in 1 V/GHz mode).
Linearity: ±15 mV.

PROGRAMMABLE VOLTAGE/CURRENT SOURCE

Voltage Output

Range: −15 V to +15 V
Resolution: 1 mV
Accuracy: ±15 mV

Total power supplied not to exceed 2.5 W.

Current Output

Range: −150 mA to +150 mA
Resolution: 10 µA
Accuracy: ±300 µA

Total power supplied not to exceed 1.25 W.

Output Connector

Rear panel BNC.

SCALAR ANALYZER

Number of Inputs

Four (A, B, C and D).

Detection Modes

AC and DC.

Dynamic Range

AC detection: 85 dB (−65 to +20 dBm), 90 dB typical (−70 to +20 dBm)
DC detection: 80 dB (−60 to +20 dBm)

Number of Measurement Points

User selectable from 2 to 1601.

Number of Channels

Two, two measurements may be made per channel allowing a total of four simultaneous measurements.

Sweep Time

Settable range
40 ms to 500 s, automatically selected or manually entered.

Measurement times

401 points:	<200 ms.
1601 points:	<800 ms.

Direct Voltage Input Range

Input A, B and C	0 to −4.5 volts
Input D	0 to −9 volts

Noise Reduction

Averaging
1 to 1000 (applied per measurement).

Smoothing
Aperture settable from 0.01 to 20% of span, resolution 0.01%

Calibration

Path calibration (Normalization) types Through, short/open, short.

Instrumentation Accuracy
±0.05%

System Accuracy
Refer to individual specifications for detectors and Return Loss Bridges.

FAULT LOCATION (optional)

Distance
Units
Metres or feet.

Accuracy
0.1% of range or 3 mm, whichever is the larger (for a single fault up to 1 km range).

Full scale
Up to 25 km depending on cable or waveguide loss.

Minimum resolution
For two equal amplitude discontinuities using maximum sweep width.
6200: 1.82 cm.
6203: 1.37 cm.

These resolution values are for a relative velocity (V_r) of 1. For other velocities the minimum distance resolution is:-
6200: 1.82 × V_r cm.
6203: 1.37 × V_r cm.

Dynamic Range
AC detection: 80 dB.
DC detection: 70 dB.

Measurement Time (401 Points)
Normal mode: <250 ms.
Enhanced mode: <500 ms.

Number of Measurement Points
User selectable from 51 to 512.

POWER METER

Frequency Range
30 kHz to 26.5 GHz, dependent upon sensor used.

Power Range
−70 dBm (100 pW) to +35 dBm (3 W), dependent upon sensor used.

Instrumentation Accuracy
0.05%

Correction
Calibration Factor
Range: 0.01 to 200%.
Resolution: 0.01.

Linearity Factor
Range: 0.1 to 15.
Resolution: 0.1.

Power Reference
Used for Power Sensor correction.

Output Connector
N (female), 50 Ω. Adapters are supplied with 75 Ω and MPC (Marconi Precision Connector) 3.5 mm Power Sensors.

Frequency
50 MHz ±0.01 MHz.

Level
1 mW.

Uncertainty
±0.7% traceable to National Standards.

Accuracy
±1.2% worst case for one year.

Auto-Zero
Set
Removes DC offset from signal input.
6910 Series: ±100 nW.
6920 Series: ±50 pW.
6930 Series: ±3 µW.

Drift
6910 Series: ±10 nW.
6920 Series: ±50 pW.
6930 Series: ±300 nW.

Noise
6910 Series: ±100 nW.
6920 Series: ±50 pW.
6930 Series: ±3 µW.

Response Time
<100 ms.

Averaging
1 to 1000 selected automatically or manually entered.

Chart Recorder
Rear panel voltage/current BNC output gives a voltage proportional to measured power.

Sensitivity
0 to 5 V: 0 V level dependent upon type of detector or sensor used.

Log mode: 1 V per decade.

Linear mode: Scaling dependent on detector or sensor.

FREQUENCY COUNTER

FREQUENCY RANGE
6200: 10 MHz to 20 GHz.
6203: 10 MHz to 26.5 GHz.

Resolution
1 Hz

Accuracy
Readout mode
±1 Hz ± frequency standard error.

Swept mode
±100 Hz ± frequency standard error.

Sensitivity
10 MHz to 10 GHz <−20 dBm typical.
10 GHz to 20 GHz <−15 dBm typical.
20 GHz to 26.5 GHz <−10 dBm typical.

Maximum Input Level
+5 dBm.

Damage Level
+27 dBm peak.

Input Connector
Type
6200: Precision N Type (female).
6203: MPC (Marconi Precision Connector) 3.5 mm (female).

Input impedance
50 Ω.

FM Tolerance
Readout mode
20 MHz peak to peak at 45 Hz to 10 MHz rate.

Swept mode
1.5 MHz peak to peak at 75 Hz to 10 MHz rate.

AM Tolerance
Up to 40% modulation depth for signals within the range of sensitivity and maximum input level.

Acquisition Time
Readout mode
Typically 2 s for frequencies greater than 300 MHz.

Swept mode
Typically 50 ms per point.

Selectivity
Typically 25 dB.

DISPLAY

Type
Color display with 15 cm (6 inch) visible diagonal. External color monitor output available on rear panel.

Number of Channels
Two. A channel may be configured either as a swept channel for displaying traces or a readout channel for displaying read-outs of values such as power and frequency.

Number of Traces/Read-Outs
Four. Maximum of two per channel.

Titles
Screen title plus individual measurement titles.

Swept Channel Characteristics
The horizontal and vertical axes can be configured to display a variety of different measurements. The horizontal axes, referred to as 'Domain', may be defined to display the stimulus such as frequency, power, voltage, current and distance. The vertical axis, referred to as 'response', may display frequency, power and voltage.

Domain (Horizontal axis)
Frequency Modes:
CW, start/stop, center/span, alternate sweep.

Frequency Resolution:
Settable to 1 Hz, displayed as six digits.

Frequency Offset:
Frequency offset between source and display can be entered to characterize frequency changing devices such as mixers.

Frequency Scaling:
Multiplication factor between source and display can be entered to characterize frequency multipliers and dividers.

Power Sweep Range
Range depends on option – refer to Synthesized Sweep Generator section.

Power Offset
Power offset between source and display can be entered for use when measuring amplifiers and attenuators.

Response (Vertical axis)
Units
dBm, dB, pW to kW, nV to V, VSWR, Hz to GHz.

Scaling
Manual auto-scale (single shot), continuous auto-scale (every sweep) or user selectable.

Reference level position
Reference level may be set to any graticule line.

Reference level value
−199.99 to +199.99 all units except VSWR.
1 to 100 VSWR.

Measurement Manipulation

Scalar detector and counter inputs
Display live measurement.
Display trace memory.
Display live measurement relative to trace memory.

Measurement hold may be applied for each trace.

Scalar detector inputs only
Any input or ratio of inputs may be assigned to any one or more than one of the traces. A trace may display absolute power, power relative to a path calibration or power minus a trace memory.

Complex limit lines
Four stores of 12 segments each. Each segment defines an upper and a lower limit line or point. Any store can be applied to any trace.

Markers
Eight per channel plus a separate delta marker.

Marker Resolution

Domain (Horizontal)
Frequency: Six digits with over-ride to give 1 Hz resolution.

Power: 0.01 dB.

Voltage: 1 mV.

Current: 10 μA.

Response (Vertical)
Power: 0.01 dB.

Frequency: Six digits.

Voltage: 1 nV.

Marker functions
Marker, delta marker, minimum, maximum, search left, search right, N-dB bandwidth (with centre frequency). Peak to peak response value and optional test against limit.

Input Offsets:
An offset in the range −99.99 to +99.99 dB in 0.01 dB steps may be applied per detector input.

Readout Channel Characteristics

Resolution

Power: Four digits.

Frequency: 1 Hz.

Units

Power: dBm, dB, pW to kW.

Frequency: Hz to GHz.

Measurement Manipulation

The following facilities are available:
Marker readout: Spot readings may be made at the domain value specified by the active marker.

Limit checking: Upper and lower test limits may be entered.

Relative measurement: To display the measured offset from a previously entered measured reading.

Max/Min hold: To display maximum and minimum values over a period of time for drift measurements.

Duty Cycle: To display peak power given by average power measured/duty cycle. Range: 0.001 to 100%.

Peaking Meter Display: Analog display to assist when adjusting power levels.

Input Offsets: An offset in the range −99.99 to +99.99 dB in 0.01 dB steps may be applied per detector or sensor input.

AUXILIARY INPUTS AND OUTPUTS

GPIB Interface

GPIB is IEEE 488.1 and 488.2 compatible. The interface has three applications:-

- Instrument control with full talk and listen.
- Control of a plotter using HPGL. Plotter output is buffered to permit measurements to proceed whilst plotting.
- Control of a second MTS for mixer measurements. The instruments may be set to sweep with a fixed frequency offset between them.

Memory Card Interface

For external storage of data and installation of software options.

Parallel Printer Output

Compatible with any Epson FX series printer. Output is buffered to allow further measurements whilst printing.

Frequency Standard In/Out BNC

1 or 10 MHz input or 10 MHz output selectable from front panel.

External Levelling Input BNC

For connection of remote detector or power meter for source levelling.

Voltage/Current Output BNC

User definable to be:
Volts/GHz: Voltage proportional to frequency output from source.

Fixed: Fixed voltage or current output for bias measurements.

Swept V/I: Swept voltage or current for voltage/current domain measurements.

Chart recorder: Voltage proportional to power level of scalar detector or power meter sensor input.

External Monitor

Output to a variable scan rate color monitor such as NEC Multisync™ (rear panel 15 way 'high density' D type female).

Horizontal sync frequency: 24.77 kHz nominal.
Vertical sync frequency: 54.9 Hz nominal.

Horizontal sync width: 3.5 μs nominal.
Vertical sync width: 204 μs nominal.

GENERAL SPECIFICATION

Frequency Standard

For synthesized sweep generator and frequency counter.

Internal
30 MHz VCXO.

Temperature stability: Better than ±0.15 ppm/°C.

Ageing: Better than ±2 in 10^7 per year.

External
1 or 10 MHz standard rear panel BNC input socket.

Memories

Standard
Trace memories: Four.

Settings stores: 10.

Power sensor cal stores
Stores for 10 sets of Power Sensor calibration and linearity factor data.

Memory card
Extra stores available on memory card.

Real Time Clock

Date and time.
Used to date-stamp hard copies and to determine instrument operating hours.

Radio Frequency Interference

Conforms with the requirement of EEC Directive 76/889 as to limits of RF interference.

Safety

Complies with IEC 348.

Rated Range of Use

(over which full specification is met)
Temperature: 0 to 50°C.

Conditions of Storage and Transport

Temperature: −40 to +70°C.

Humidity
93% RH at 40°C.

Power Requirements

Switchable voltage ranges
115 V set: 90 to 132 V
230 V set: 188 to 265 V

AC Supply
45 to 440 Hz. 500 VA maximum.

Dimensions and Weight

Height	Width	Depth
197 mm	389 mm	546 mm
7.75 in	15.3 in	21.5 in

Weight

6200	19 kg 41.7 lb
6203	19.5 kg 42.8 lb

Notes:

Guaranteed Power Range Power Accuracy and VSWR are calibrated for the temperature range 0 to 50°C and are subject to the availability of National Standards.

Typical performance figures are non-warranted.

6230 SERIES SCALAR DETECTORS

	6230	6233
Frequency range (GHz)	0.01 to 20	0.01 to 26.5
Dynamic range (dBm)	−70 to +20	−70 to +20
Maximum RF input (dBm)	+26 CW +30 peak	+26 CW +30 peak
VSWR		
10 MHz to 40 MHz	1.4:1	1.4:1
40 MHz to 100 MHz	1.15:1	1.15:1
100 MHz to 2 GHz	1.12:1	1.12:1
2 GHz to 5 GHz	1.17:1	1.17:1
5 GHz to 18 GHz	1.29:1	1.29:1
18 GHz to 20 GHz	1.5:1	1.5:1
20 GHz to 26.5 GHz	–	1.5:1
Frequency Response (dB)		
10 MHz to 8 GHz	±0.5	±0.5
8 GHz to 18 GHz	±0.65	±0.65
18 GHz to 20 GHz	±1.25	±1.25
20 GHz to 26.5 GHz	–	±1.25
Connector	Precision Type N male	Precision MPC 3.5 mm male
Length (mm)	79	79
Width (mm)	27	27
Weight (g)	250	250

	6230/6233	
Power Accuracy (dB)	AC	DC
−60 dBm	1.2	–
−50 dBm	0.7	0.9
−40 dBm	0.4	0.45
−30 dBm	0.4	0.4
−20 dBm	0.35	0.35
−10 dBm	0.3	0.3
0 dBm	0.2	0.2
+10 dBm	0.3	0.3
+16 dBm	0.4	0.4
+16 to +20 dBm	1.0 (typical)	1.0 (typical)

Note: Specification applies at 50 MHz at a temperature of 22°C ± 5°C and does not include errors due to mismatch, harmonics and temperature. Performance above +16 dBm is typical non-warranted. Different specifications are given for detectors when using AC or DC detection.

RETURN LOSS BRIDGES – AUTOTESTERS

A range of Return Loss Bridges are available for the precise determination of Return Loss over a wide frequency range.

Model/ Characteristic	59999-151W	59999-158R	59999-159B	59999-152D	59999-166H
Frequency range (GHz)	0.01–18	0.01–18	0.01–18	0.01–26.5	0.01–26.5
Directivity (dB)					
0.01–18 GHz	40	38	38	38	38
18–26.5 GHz	N/A	N/A	N/A	35	35
Frequency sensitivity (dB)	±1.2	±1.5	±1.5	±2.0	±2.0
Accuracy[1]					
0.01–8 GHz	$0.010 \pm 0.06\rho^2$	$0.013 \pm 0.08\rho^2$	$0.013 \pm 0.08\rho^2$	$0.013 \pm 0.10\rho^2$	$0.013 \pm 0.10\rho^2$
8–18 GHz	$0.010 \pm 0.10\rho^2$	$0.013 \pm 0.12\rho^2$	$0.013 \pm 0.12\rho^2$	$0.013 \pm 0.10\rho^2$	$0.013 \pm 0.10\rho^2$
18–26.5 GHz	N/A	N/A	N/A	$0.018 \pm 0.12\rho^2$	$0.018 \pm 0.12\rho^2$
Insertion loss[2] (dB)	6.5	6.5	6.5	6.5	6.5
Max. input power (dBm)	+27	+27	+27	+27	+27
Test port connector	GPC-7	N(m)	N(f)	WSMA(m)	WSMA(f)
Input connector	N(f)	N(f)	N(f)	Ruggedized k(f)	Ruggedized k(f)
Length[3] (mm)	76	76	76	54	54
Width[3] (mm)	50	50	50	38	38
Depth[3] (mm)	28	28	28	19	19
Weight (g)	340	340	340	198	198

[1] Where ρ = measured reflection coefficient – includes directivity and test port reflection effects over the specified frequency range.
[2] Nominal value from input port to test port.
[3] Excluding connectors and cable.

Test Heads for Fault Location

6581 and 6583 series of Test Heads interface the MTS to the device under test when Fault Location is used. The '−001' version Transmission Line Test Heads incorporate a Return Loss Bridge. The economy 'E' or '−002' version Fault Location Test Heads omit the Bridge.

Test Head 6581 & 6581E

Frequency Range
10 MHz to 20 GHz, limited to 18 GHz for return loss measurement.

Input port connector
Precision Type N female.

Fault location test port
Connector.
Precision Type N female.

Return loss
>20 dB, 10 MHz to 10 GHz.
>15 dB, 10 to 18 GHz.

Return loss port*
Connector.
Precision Type N female.

Directivity*
38 dB, 10 MHz to 18 GHz.

Size (excluding connectors)
178 × 117 × 45 mm.

Detector cable length
1.5 metres.

Test Head 6583 & 6583E

Frequency range
10 MHz to 26.5 GHz.

Input port connector
Precision 3.5 mm female.

Fault location test port
Connector.
Precision 3.5 mm female.

Return loss
>20 dB, 10 MHz to 10 GHz.
>15 dB, 10 to 18 GHz.
>12 dB, 18 to 26.5 GHz.

Return loss port*
Connector.
WSMA female.

Directivity*
38 dB, 10 MHz to 18 GHz.
35 dB, 18 to 26.5 GHz.

Size (excluding connectors)
160 × 110 × 45 mm.

Detector cable length
1.5 metres.

*Not applicable to 'E' versions.

VERSIONS

Ordering numbers	
6200	10 MHz to 20 GHz Microwave Test Set
6203	10 MHz to 26.5 GHz Microwave Test Set
Option 001	70 dB step attenuator (available for 6200 only)
Option 002	Field Replaceable RF output connector (3.5 mm and N-type)
	For Fault Location order 59000 – 180F
	Fault Location Software Card

SUPPLIED ACCESSORIES

AC Supply Lead 43123-076
2 m Power Sensor Cable 06950-081W
Operating Manual
Input socket cap 6950-069

OPTIONAL ACCESSORIES

	6230 Series Scalar Detectors
6230	10 MHz to 20 GHz, N type (m)
6233	10 MHz to 26.5 GHz, MPC (Marconi Precision Connector) 3.5 mm (m)
	Power Meter Sensors
	6910 Series (−30 dBm to +20 dBm)
56910–900L	10 MHz to 20 GHz, N type (m)
56911–900X	10 MHz to 20 GHz, APC 7
56912–900U	30 kHz to 4.2 GHz, N type (m)
56913–900D	10 MHz to 26.5 GHz, MPC (Marconi Precision Connector) 3.5 mm (m)
56919–900Y	30 kHz to 3 GHz, N type 75 Ω
	6920 Series (−70 dBm to −20 dBm)
56920–900J	10 MHz to 20 GHz, N type (m)
56923–900T	10 MHz to 26.5 GHz, MPC (Marconi Precision Connector) 3.5 mm (m)
	6930 Series (−15 dBm to +35 dBm)
56930–900F	10 MHz to 18 GHz, N type (m)
56932–900N	30 kHz to 4.2 GHz, N type (m)
	Transmission Line Test Heads (includes Fault Location Software Card)
56581–001T	20 GHz Transmission Line Test Head, 6581
56583–001S	26.5 GHz Transmission Line Test Head, 6583
	Fault Location Test Heads (includes Fault Location Software Card)
56581–002P	20 GHz Fault Location Test Head, 6581E
56583–002W	26.5 GHz Fault Location Test Head, 6583E
	Sensor/Detector Cables
06950–086M	5 m Power Sensor Cable
06950–087C	15 m Power Sensor Cable
06950–088R	50 m Power Sensor Cable
03964–325P	5 m Detector Extension Cable
54311–111E	15 m Detector Extension Cable
54311–113Y	25 m Detector Extension Cable
54311–112U	Direct Voltage Measurement Cable
54311–118G	1.5 m Extension Cable for Transmission Line Test Head
54311–120F	1.5 m Extension Cable for Fault Location Test Head
	Miscellaneous Electrical Cables
43129–189U	GPIB Cable
43126–012S	50 Ω BNC(m) to BNC(m) 1.5 m
46884–560M	Parallel Printer Interface Cable
	Microwave Cables
54311–109U	Ruggedized Cable N(m) to N(m) 3 m (for Fault Location)
54311–110H	Ruggedized Cable 3.5 mm (m) to 3.5 mm (m) 3 m (for Fault Location)
54311–116J	Ruggedized Cable N(m) to N(m) 1.5 m (for Fault Location)
54311–117F	Ruggedized Cable 3.5 mm (m) to 3.5 mm (m) 1.5 m (for Fault Location)
54351–022X	Cable N(m) to N(m) 0.5 m
54351–025R	Cable 3.5 mm (m) to 3.5 mm (m) 0.5 m
	Autotesters
59999–151W	10 MHz to 18 GHz 7 mm
59999–158R	10 MHz to 18 GHz N(m)
59999–159B	10 MHz to 18 GHz N(f)
59999–152D	10 MHz to 26.5 GHz WSMA (m)
59999–166H	10 MHz to 26.5 GHz WSMA (f)
	Power Splitters
54311–123S	Power splitter DC to 18 GHz Type N
54311–124W	Power splitter DC to 26.5 GHz 3.5 mm
	Miscellaneous
59000–181G	32k Blank Memory Card
59000–182V	128k Blank memory card
54127–309Z	Rack Mount Kit
54124–027S	Front Stowage Cover
59000–180F	Fault Location Software Card
54121–034F	Detector Input Socket Cap
46882–112C	Service Manual

Scalar Analyzer Detectors

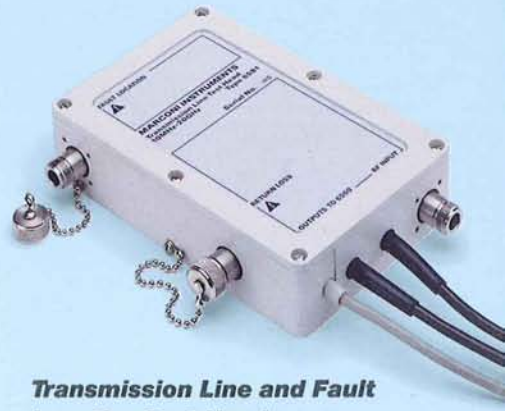
Linearity is automatically corrected with the 6230 series self-identifying detectors. The 6230 is used for measurements to 20 GHz; 6233 covers up to 26.5 GHz.

Power Meter Sensors

A range of nine power sensors cover 30 kHz to 26.5 GHz for the measurement of power from −70 dBm (100 pW) to +35 dBm (3 W) with a range of connector types.

Return Loss Bridges

Return Loss Bridges or 'Autotesters' are available for the swept measurement of return loss.



Transmission Line and Fault Location Test Heads

Transmission line test heads provide a rapid and convenient interface for fault location measurements.

Marconi
Instruments

UK
Marconi Instruments Ltd
Longacres
St Albans
Herts, England AL4 0JN
Tel: (+44) 727 59292
Fax: (+44) 727 57481
Tlx: 23350 MARCON G

USA
Marconi Instruments Inc.
3 Pearl Court
Allendale
New Jersey 07401
Tel: 201 934 9050
Toll Free: 1 800 233 2955
Fax: 201 934 9229

France
Marconi Instruments S.A.
18 rue du Plessis-Briard
le Canal
Courcouronnes
91023 Evry Cedex
Tel: (1) 60 77 90 66
Fax: (1) 60 77 69 22
Tlx: 604 482

Germany
Marconi Messtechnik GmbH
Landsberger Strasse 65
8034 Germering
Tel: 089 84936 0
Fax: 089 8419142
Tlx: 5212642 MMMC D

Netherlands
Marconi Instrumenten
Van Limburg Stirumlaan 4
5037 SK Tilburg
Postbus 645
5000 AP Tilburg
Tel: 013 63 95 40
Fax: 013 63 96 63

Spain
Marconi Instrumentos S.A.
Calle de Gobelas 13
Urbanizacion "La Florida"
28023 Madrid
Tel: 372 98 75
Fax: 307 69 39
Tlx: 57481 MIES E

Hong Kong
Marconi Instruments Ltd
Rm 702-3 CC Wu Building
302-308 Hennessy Road
Wanchai
Tel: 8327988
Fax: 8345364
Tlx: 72369 MINST HX

Australia
Marconi Instruments
(Pty) Limited
P.O. Box 1390
Level 4
15 Orion Road Lane Cove
N.S.W. 2066
Tel: (02) 418 6044
Fax: (02) 418 6383

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