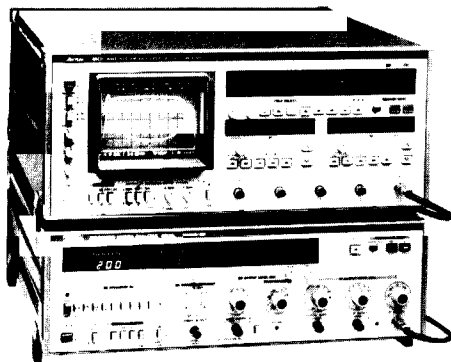


MICROWAVE MEASURING EQUIPMENT

MICROWAVE SYSTEM ANALYZER

ME453K/L/M, ME538K/L/M

70/140 MHz



Custom-made product

《GP-IB》
OPTION

Measurement items

- Group delay characteristics
- Linearity and sensitivity in modulators and demodulators
- Differential gain characteristics
- Differential phase characteristics
- IF and BB band amplitude response
- IF and BB band return loss
- Frequency deviation (or spectrum)
- AM/PM conversion coefficient
- DC characteristics
- IF/BB band power, gain, loss
- IF band frequency

Multiplexed telephone, TV, PCM and data communications signals are mostly transmitted through microwave radio relay systems. However, when linear distortion (amplitude distortion, phase distortion) or non-linear distortion (which causes problems, particularly with analog signal transmission) is present in the transmission line, distortion noise is generated in the telephone transmission, clarity and color uniformity are lost with TV transmission and intersymbol interference between codes originating in the waveform distortion results in digital transmission. It is therefore necessary to measure the distortion in these transmission lines and to equalize it sufficiently.

The ME453 and ME538 Microwave System Analyzer series are used to measure the transmission line characteristics in the BB and IF bands in terrestrial microwave radio relay systems and in satellite communication systems. The above types of transmission distortion can be measured and analyzed with them.

They have been designed with special emphasis on measurement items, performance, functions, precision and size so that they can be used for all types of microwave radio relay systems, such as FDM-FM relay systems, high efficiency large-capacity digital microwave radio relay systems, and INTELSAT and other satellite communications systems. Unique special innovations contribute greatly to improving handling ease. To improve operational ease, a number of internal controls are used and some measurements are automatic.

Furthermore, the measuring parameters and measured values are displayed digitally, so even when one of these analyzers is used for the first time, results can be obtained quickly and accurately.

The IF and BB frequencies must coincide for remote testing with other models or instruments of other manufacturers. This condition can be met quite easily by selecting the appropriate model from this particular series.

Applications

The ME453 and ME538 can be used in the construction, maintenance, or research and development of digital microwave systems and of satellite and terrestrial radio relay systems with BB and IF capability. The measurements item relating to the various circuit parts are listed below.

- Modulators and demodulators:
Linearity, sensitivity, group delay characteristics, differential gain, differential phase, IF and BB band amplitude characteristics
- Repeater IF sections and overall links:
Group delay characteristics, differential gain, differential phase, IF and BB band amplitude characteristics
- Others:
IF/BB impedance, power, gain, AM/PM conversion coefficient. The transmitter and receiver are designed to operate independently so that end-to-end measurement can be conducted with a single analyzer.
RF band measurements can be conducted by connecting an up/down converter model to this analyzer.

MICROWAVE MEASURING EQUIPMENT

Features and functions

• LED readout of transmitter settings

For IF and BB measurements, the transmitter settings are shown with unmistakable clarity by the front-panel LED display, so you can read deviation, sweep width and center frequency at a glance.

• Automatic receiver settings and display

Deviation, IF level, BB frequency and level—all are automatically selected and displayed by the microwave system analyzer receiver section. Calibration and attenuation are also automatic.

• Automatic display of units

Both scale sensitivity and units are displayed automatically for all measurements, so readings are fast and unmistakably accurate.

• All measurements shown on the CRT and large LED displays

Measurement parameters and results are displayed on the CRT in alphanumeric form together with the signal trace.

They are also displayed simultaneously on the large, easy-to-read LED display.

• Automatic CRT calibration and ranging

No need to adjust vertical gain and position.

Just press the AUTO pushbutton, and the CRT traces are calibrated and centered automatically.

• Direct deviation measurements

The P-P pushbutton gives you an LED readout of the peak-to-peak deviation value of the signal displayed on the CRT.

• Signal averaging for noisy traces

Internal normalizing circuitry allows you to average traces for removing the noise component—as in the measurement of a satellite system, for example.

• Signal subtraction

You can also subtract one trace from another for eliminating the effects of measuring system components.

The Y-STO and AVG-STO pushbuttons are used for subtracting the residual effects of measuring instruments, cables, pads, etc..

• BB to BB amplitude measurement (optional function)

An extremely flat baseband sweep generator and detector give you the end-to-end, BB to BB amplitude response measurements so necessary for maintenance of telephone and TV links. The CRT X-axis is a logarithmic frequency scale. Markers are at 60, 100 and 300 kHz, and 1, 3, 10 and 15 MHz.

• Recorder output (optional function)

An optional X-Y recorder can be attached to the ME453 or ME538 and controlled by front-panel adjustments on the analyzer itself.

• Pushbutton baseband frequency selection

The ME453 comes complete with eight BB frequencies which are selectable by pushbuttons, while the ME538 has nine BB frequencies available. The three low frequencies are determined by the model designation: K, L or M.

• One-button AM-PM conversion

For measurement of the AM to PM conversion coefficient, a single pushbutton gives you both the calibrated trace on the CRT and the measured value on the LED display.

• IF band frequency counter

The CW signal frequency of the IF band and the center frequency of the sinewave swept IF signal are counted and displayed on both the CRT and the large, easy-to-read LED display.

• IF band sweep width measurements

The sweep width of the swept IF signal is measured and numerically displayed on the CRT permitting easy verification of the measured band.

• Automatic sweep reduction control

The Auto Sweep Reduction pushbutton allows you to limit maximum sweep width, including modulated sideband signals, to some specified nominal value.

• Threshold extension function

A special threshold extension function enables group delay measurement of low C/N INTELSAT equipment and systems.

• Scale intensity switch

For photographing the CRT screen, the scale can be made to appear clearly with the SCALE INTEN switch.

• Receiver GP-IB and direct plotting functions (Option)

The receiver section of the MSA is computer controllable via the GP-IB interface which is usable with either plotters or personal computers. This function enables MSA measured data to be sent to a personal computer for data processing. The MSA direct plotter function allows CRT displayed data (measured parameters and displayed signal) to be directly printed out on either a plotter or a dot matrix printer.

• Printers and plotters that can be directly connected

Type	Model	
Plotter	9872C	(Hewlett-Packard)
	7470A	(Hewlett-Packard)
	7475A	(Hewlett-Packard)
	VP-6801A	(Matsushita Communication Industrial Co., Ltd.)
Printer (graphic)	DPR7713A	(Anritsu)

MICROWAVE MEASURING EQUIPMENT

Specifications

Measurements	Models	ME453K/L/M		ME538K/L/M		
		70 MHz Band		70 MHz Band	140 MHz Band	
Amplitude (IF INPUT terminal)	Inherent slope	± 0.05 dB/ ± 25 MHz		± 0.05 dB/ ± 25 MHz	± 0.05 dB/ ± 25 MHz, ± 0.1 dB/ ± 40 MHz, ± 0.2 dB/ ± 50 MHz	
	Measuring range	0 to 16 dB				
	Max. sensitivity	0.01 dB/div (Y2 display)				
	IF INPUT level	+ 10 to - 20 dBm				
Amplitude (RET. LOSS INPUT terminal)	Inherent slope	± 1 dB				
	Measuring range	0 to 40 dB				
	Sensitivity	1 dB/div, 5 dB/div				
	INPUT level	- 60 to - 20 dBm				
Group delay	Inherent slope	0.3 ns/ ± 15 MHz, 0.5 ns/ ± 25 MHz	0.3 ns/ ± 15 MHz, 0.5 ns/ ± 25 MHz	0.3 ns/ ± 20 MHz, 0.5 ns/ ± 30 MHz, 1 ns/ ± 50 MHz		
	Measuring range	0 to 400 ns				
	Max. sensitivity	0.1 ns/div (Y2 display)				
	Noise	0.05 ns/condition: fM—200 to 278 kHz, deviation: 200 kHz rms, using average function				
Linearity	Inherent slope	0.2%/ ± 25 MHz	0.2%/ ± 25 MHz	0.2%/ ± 50 MHz		
	Measuring range	0% to 80%				
	Max. sensitivity	0.05% div				
	Noise	0.01%/condition: fM < 1 MHz, deviation: 200 kHz rms, using average function				
Differential phase	Inherent slope*1	0.3°/ ± 15 MHz, 0.5°/ ± 25 MHz	0.3°/ ± 15 MHz, 0.5°/ ± 25 MHz	0.3°/ ± 20 MHz, 0.5°/ ± 30 MHz, 0.8°/ ± 50 MHz		
	Measuring range	0° to 40°				
	Max. sensitivity	0.2°/div				
	Noise	0.02°/condition: fM = 5.6 MHz, deviation: 500 kHz rms, using average function *1 Specified frequency range = Carrier sweep width + 2 fM				
Differential gain	Inherent slope*2	0.2%/ ± 15 MHz, 0.4%/ ± 25 MHz	0.2%/ ± 15 MHz, 0.4%/ ± 25 MHz	0.3%/ ± 20 MHz, 0.4%/ ± 30 MHz, 0.6%/ ± 50 MHz		
	Measuring range	0% to 80%				
	Max. sensitivity	0.05%/div				
	Noise	0.01%/condition: fM = 5.6 MHz, deviation: 500 kHz rms, using average function *2 Specified frequency range = Carrier sweep width + 2 fM				
IF return loss	Frequency range	70 \pm 25 MHz	70 \pm 25 MHz	140 \pm 50 MHz		
	Measuring range	10 to 50 dB: Accuracy depends on the bridge used.				
	Sensitivity	1 dB/div, 5 dB/div				
AM to PM conversion	Residual PM	0.3°/dB/ ± 25 MHz	0.3°/dB/ ± 25 MHz	0.3°/dB/ ± 35 MHz		
	Measuring range	0.3°/dB to 16°/dB				
Spectrum	Center frequency	70 \pm 20 MHz Auto tuning	70 \pm 20 MHz Auto tuning	140 \pm 30 MHz Auto tuning		
	Sweep width	Approx. ± 700 kHz				
	Max. sensitivity	Detects 0.1 dB change of modulating signal at carrier zero point.				
	Deviation	K type: 340 kHz rms at 200 kHz, L type: 472 kHz rms at 277.778 kHz, M type: 425 kHz rms at 250 kHz				
Deviation	Measuring range	20 kHz to 999 kHz rms at the built-in BB frequencies ≤ 8.2 MHz				
	Accuracy	10% at the built-in BB frequencies ≤ 8.2 MHz				
	Calibration	Deviation is calibrated by easy pushbutton operation. Accuracy reaches 1% theoretically at the specified modulation frequency and deviation (as measured by the Bessel zero method) shown below.				
		Model	MOD frequency	Key in factor		
K type		200 kHz	340 kHz rms			
L type		277.778 kHz	472 kHz rms			
M type	250 kHz	425 kHz rms				
Modulator sensitivity	Mod signal level	- 50 to + 10 dBm				
	Deviation	Use the DEVIATION meter function or use the carrier zero deviation with the SPECTRUM function				
Demodulator sensitivity	IF signal	Calibrate the deviation with DEVIATION meter function or SPECTRUM function				
	Demo BB level	- 50 to + 10 dBm				
Inherent noise (IF to IF) (for all models)	Group delay	66 to 93 kHz: 0.3 ns rms 200 to 278 kHz: 0.1 ns rms 400 to 556 kHz: 0.05 ns rms		Linearity	0.02% rms	
	Differential phase	0.05° rms		Differential gain	0.1% rms	
	Deviation: 200 kHz rms, fM < 1 MHz		Deviation: 500 kHz rms, fM = 5.6 MHz		Detection band: 3 kHz	

MICROWAVE MEASURING EQUIPMENT

BB (baseband) measurement

	Item	Inherent slope	Measuring range	Max. sensitivity	Noise
BB to BB measurements (for all models)	Group delay	0.1 ns	0 to 400 ns	0.1 ns/div (at Y2)	0.2 ns
	Linearity	0.1%	0% to 80%	0.05%/div	0.05%
	Differential phase	0.1%	0° to 40°	0.2°/div	0.05°
	Differential gain	0.1%	0% to 80%	0.05%/div	0.05%
	Measuring condition	BB level: -30 dBm			
BB return loss	Frequency	Built-in BB frequency or BB amplitude option			
	Range	10 to 40 dB, 1 dB/div (BB amplitude option)			
BB amplitude (Option)	Frequency range: 60 kHz to 15 MHz, level: +10 to -50 dBm, inherent slope: ±0.5 dB/100 kHz to 13 MHz Measuring range: 0 to 8 dB, max. sensitivity: 0.1 dB/div				
DC input	Measuring range: 0 to ±400 mV, max. sensitivity: 1 mV/div				

Receiver

IF input	Frequency range	70 MHz band: 45 to 95 MHz 140 MHz band: 90 to 190 MHz When BB frequency is 55.6 kHz (or 27.8 kHz). *1 70 MHz band: 60 to 80 MHz 140 MHz band: 130 to 150 MHz	Phase detector	Input frequency	The BB frequency (66.7 kHz to 12.39 MHz) is selected automatically.																																												
	Level range	+10 to -20 dBm		f1 f2 f3 f4 f5 f6 f7 f8 f9 f10	<table border="1"> <thead> <tr> <th></th> <th>K type</th> <th>L type</th> <th>M type</th> </tr> </thead> <tbody> <tr> <td>f1</td> <td>66.667 kHz</td> <td>92.593 kHz</td> <td>83.333 kHz</td> </tr> <tr> <td>f2</td> <td>200 kHz</td> <td>277.778 kHz</td> <td>250 kHz</td> </tr> <tr> <td>f3</td> <td>400 kHz</td> <td>555.556 kHz</td> <td>500 kHz</td> </tr> <tr> <td>f4</td> <td colspan="2">2 MHz</td> <td>2.4 MHz</td> </tr> <tr> <td>f5</td> <td colspan="3">3.58 MHz</td> </tr> <tr> <td>f6</td> <td colspan="3">4.43 MHz</td> </tr> <tr> <td>f7</td> <td colspan="3">5.6 MHz</td> </tr> <tr> <td>f8</td> <td colspan="3">8.2 MHz</td> </tr> <tr> <td>f9</td> <td colspan="3">12.39 MHz (ME538K/L/M)</td> </tr> <tr> <td>f10</td> <td colspan="3">55.5556 kHz *1 (option)</td> </tr> </tbody> </table>				K type	L type	M type	f1	66.667 kHz	92.593 kHz	83.333 kHz	f2	200 kHz	277.778 kHz	250 kHz	f3	400 kHz	555.556 kHz	500 kHz	f4	2 MHz		2.4 MHz	f5	3.58 MHz			f6	4.43 MHz			f7	5.6 MHz			f8	8.2 MHz			f9	12.39 MHz (ME538K/L/M)			f10	55.5556 kHz *1 (option)
	K type	L type	M type																																														
f1	66.667 kHz	92.593 kHz	83.333 kHz																																														
f2	200 kHz	277.778 kHz	250 kHz																																														
f3	400 kHz	555.556 kHz	500 kHz																																														
f4	2 MHz		2.4 MHz																																														
f5	3.58 MHz																																																
f6	4.43 MHz																																																
f7	5.6 MHz																																																
f8	8.2 MHz																																																
f9	12.39 MHz (ME538K/L/M)																																																
f10	55.5556 kHz *1 (option)																																																
Level display	3-digit LED display Resolution: 0.1 dB	+10 to -20 dBm	*127.8 kHz can be supplied if specified.																																														
Level accuracy	±0.3 dB at +4 dBm		Capture range	±5 Hz (≤555.556 kHz) ±5 × 10 ⁻⁶ Hz (≤12.39 MHz) ±1 Hz (≤55.5556 kHz)																																													
Impedance	75 Ω	Return loss: >30 dB at +4 dBm	Frequency markers	Slide marker	Variable side markers: 70 ±25 MHz, 140 ±50 MHz																																												
Input frequency sweep width	±25 MHz/center frequency 70 MHz ±50 MHz/center frequency 140 MHz	The minimum sweep width is required for reproducing the HOR signal on the CRT, ±0.2 MHz		Frequency display	4-digit LED display Resolution: 10 kHz																																												
Maximum sweep width	±10 MHz/center frequency 70/140 MHz		Demodulation	Accuracy	±1 × 10 ⁻⁴ ±1 digit																																												
Minimum sweep width	70/140 MHz	66.7, 80 kHz to 8.2 MHz BB frequency 55.6 kHz (or 27.8 kHz) is demodulated when sweep frequency is only 18 Hz. *1		2 MHz comb + slide	2 MHz Comb markers + Variable side markers																																												
IF return loss input	The return loss input is used with the same frequency applied to IF INPUT to lock the AFC loop.		Input level range	Center frequency counter	Counts the center frequency of the swept IF signal and CW-IF signal and displays it on the 5-digit LED display. The display to the LED display is made by selecting either the slide marker frequency or center frequency with a key.																																												
Flatness	±1 dB/45 to 95 MHz ±1 dB/90 to 190 MHz	Frequency range			70 MHz band: 45 to 90 MHz 140 MHz band: 90 to 190 MHz																																												
Impedance	75 Ω	Return loss: >28 dB	Frequency display	4-digit LED display (ME453□) 5-digit LED display (ME538□) Resolution: 10 kHz																																													
BB input (BB + sweep)	BB frequency range	66 kHz to 15 MHz and 55.6 kHz *1 (or 27.8 kHz)	IF sweep width measurement	Accuracy	±1 × 10 ⁻³ ±1 digit																																												
	BB level range	+10 to -50 dBm		Measuring range	70 MHz band: ±0.2 to ±25 MHz 140 MHz band: ±0.2 to ±50 MHz																																												
	BB level display	3-digit LED display Resolution: 0.1 dB	Resolution	0.2 to 9.99 MHz: 10 kHz 10 to 50 MHz: 100 kHz																																													
	BB level accuracy	±0.3 dB at 0 dBm	Accuracy	±5 × 10 ⁻² ±1 digit																																													
	Impedance	75 Ω	BB output (rear panel)	Level	-7 dBm, typical																																												
	Sweep frequency range	18 to 100 Hz		Impedance	75 Ω, nominal																																												
Sweep voltage range	±50 mV to ±5 V	X phase setting range	Ext. sweep input (rear panel)	Frequency	18 to 100 Hz																																												
X phase setting range	0° to 360°		Level	1 Vp-p																																													
			Impedance	>5 kΩ																																													
			X-Y recorder output (option)	Output	X: 0 to 4 V Y: 0 to 4 V Pen lift: Open Pen down: Ground																																												
				Sweep speed	20 s, 40 s, nominal																																												

*1 Option 05: 55.6 kHz additional BB frequency

MICROWAVE MEASURING EQUIPMENT

Transmitter

IF output	Frequency range Center frequency Display Frequency display Accuracy Stability	70 MHz band: 45 to 95 MHz 140 MHz band: 90 to 190 MHz 4-digit LED display (ME453□) 5-digit LED display (ME538□) Resolution: 10 kHz $\pm 1 \times 10^{-4} \pm 1$ digit/CW ± 100 kHz at 70 MHz ± 200 kHz at 140 MHz 5 h after 1/2 h warm-up																																											
	Level range Level accuracy Harmonics Impedance	+10 to -70 dBm (1 dB step attenuator) Continuously variable range: > ± 1 dB ± 0.3 dB at +4 dBm < -30 dB 75 Ω Return loss: >30 dB at +4 dBm																																											
IF sweep width	Sweep width range Sweep width display Auto sweep reduction	70 MHz band: 0 to ± 25 MHz 140 MHz band: 0 to ± 50 MHz 3-digit LED display Resolution: 0.1 MHz The sweep width is reduced by 2 x BB frequency $\pm 10\%$ when BB frequency > 1 MHz. This function can be reset with a switch.																																											
FM deviation	Mod frequency Deviation range Deviation display	Same as BB frequency (item 6) 5 to 1000 kHz rms 4-digit LED display Resolution: 1 kHz rms																																											
AUX IF output	Frequency range Output level Level accuracy Impedance	Same as IF OUTPUT specification (item 1). -10 dBm < ± 1 dB 75 Ω , nominal																																											
Crystal output	Frequency Output level Level accuracy Impedance	70 MHz band: 70 MHz 140 MHz band: 140 MHz +5 dBm < ± 1 dB 75 Ω , nominal																																											
BB + sweep output	BB frequency																																												
		<table border="1"> <thead> <tr> <th></th> <th>K type</th> <th>L type</th> <th>M type</th> </tr> </thead> <tbody> <tr> <td>f1</td> <td>66.667 kHz</td> <td>92.593 kHz</td> <td>83.333 kHz</td> </tr> <tr> <td>f2</td> <td>200 kHz</td> <td>277.778 kHz</td> <td>250 kHz</td> </tr> <tr> <td>f3</td> <td>400 kHz</td> <td>555.556 kHz</td> <td>500 kHz</td> </tr> <tr> <td>f4</td> <td>2 MHz</td> <td colspan="2">2.4 MHz</td> </tr> <tr> <td>f5</td> <td colspan="3">3.58 MHz</td> </tr> <tr> <td>f6</td> <td colspan="3">4.43 MHz</td> </tr> <tr> <td>f7</td> <td colspan="3">5.6 MHz</td> </tr> <tr> <td>f8</td> <td colspan="3">8.2 MHz</td> </tr> <tr> <td>f9</td> <td colspan="3">12.39 MHz (ME538K/L/M)</td> </tr> <tr> <td>f10</td> <td colspan="3">55.5556 kHz *1 (option)</td> </tr> </tbody> </table>		K type	L type	M type	f1	66.667 kHz	92.593 kHz	83.333 kHz	f2	200 kHz	277.778 kHz	250 kHz	f3	400 kHz	555.556 kHz	500 kHz	f4	2 MHz	2.4 MHz		f5	3.58 MHz			f6	4.43 MHz			f7	5.6 MHz			f8	8.2 MHz			f9	12.39 MHz (ME538K/L/M)			f10	55.5556 kHz *1 (option)	
	K type	L type	M type																																										
f1	66.667 kHz	92.593 kHz	83.333 kHz																																										
f2	200 kHz	277.778 kHz	250 kHz																																										
f3	400 kHz	555.556 kHz	500 kHz																																										
f4	2 MHz	2.4 MHz																																											
f5	3.58 MHz																																												
f6	4.43 MHz																																												
f7	5.6 MHz																																												
f8	8.2 MHz																																												
f9	12.39 MHz (ME538K/L/M)																																												
f10	55.5556 kHz *1 (option)																																												
		<p>*1 Can be changed to 27.778 kHz if so specified. Sweep frequency is automatically set to 18 Hz when f₁ is selected.</p> <p>BB frequency ± 5 Hz (≤ 555.556 kHz) Accuracy $\pm 5 \times 10^{-6}$ (≤ 12.39 MHz) ± 1 Hz (≤ 55.5556 kHz)</p> <p>BB level +10 to -50 dBm A 10 dB step attenuator and 0 to -10 dB continuously variable dial are provided for setting the level.</p> <p>BB level display 3-digit LED display Resolution: 0.1 dB</p>																																											

(Contd.)	BB level accuracy BB harmonics BB impedance Sweep frequency Sweep level Sweep level display Sweep level accuracy Sweep harmonics	± 0.3 dB at 0 dBm < -38 dB 75 Ω Return loss: >28 dB at -10 dBm Line (50/60 Hz), 70 Hz Option (select one frequency from 18 to 100 Hz) Ext. (18 to 100 Hz) 0 to 6.5 Vp-p/75 Ω 3-digit LED display Resolution: 0.01 V $\pm 10\%$ at 6 Vp-p < -35 dB
BB + sweep output	Sweep output	0 to 25 Vp-p/10 k Ω 3-digit LED display Resolution: 0.01 x 4 V $\pm 10\%$ at 24 Vp-p
Ext. sweep input (rear panel)	Frequency Level Impedance	18 to 100 Hz 2 Vp-p 10 k Ω , nominal
Ext. BB input (rear panel)	Frequency Level Impedance	80 kHz to 15 MHz -7 dBm 75 Ω , nominal
BB sweeper (option)	Frequency range BB output level BB level display Inherent slope Impedance	60 kHz to 15 MHz +10 dBm to -50 dBm (10 dB step attenuator) Continuously variable range: 0 to -10 dB 3-digit LED display Resolution: 0.1 dB ± 0.5 dB/100 kHz to 13 MHz The value of the sum of the receiver and transmitter. 75 Ω Return loss: >28 dB at -10 dBm

*1 Option 05: 55.6 kHz additional BB frequency.

MICROWAVE MEASURING EQUIPMENT

Low BB frequency (55.6 kHz or 27.8 kHz) specifications (Option)

Group delay	Inherent slope	70 ± 10 MHz: 5 ns 140 ± 10 MHz: 5 ns
	Measuring range	0 to 400 ns
	Max. sensitivity	2 ns/div
	Noise	1 ns,*
Linearity	Inherent slope	70 ± 10 MHz: 0.5% 140 ± 10 MHz: 0.5%
	Measuring range	0% to 80%
	Max. sensitivity	0.1%/div
	Noise	0.1%*

*With deviation 100 kHz rms using average function.

Accessories supplied

Accessories	Qty.	Remarks
Test cable	3	2 m, coaxial
Power cord	2	One each for transmitter and receiver
Fuse	2	
Instruction manual	1	

General specifications

Input and output connector	BNC or SP connector Other type of connector can be installed if requested by the user: e.g., Siemens Small, WECO560A or equivalent
Power	260 VA Transmitter: 85 VA Receiver: 175 VA From AC 100 V to AC 250 V, at the request of the user. Tolerance ± 10%
Ambient temperature, rated range of use	0° to 50°C
Dimensions and weight	Receiver: 177H × 426W × 450D mm ≤ 18.5 kg Transmitter: 133H × 426W × 450D mm ≤ 13.5 kg

MICROWAVE MEASURING EQUIPMENT

Ordering information

Please specify model/order number, name and quantity when ordering.

Model number/ Order number	Name	Remarks		
		IF bands	BB type	Std I/O connector
ME453K	Microwave System Analyzer (MSA)	70 MHz	200 kHz	SP
ME453L	Microwave System Analyzer (MSA)	70 MHz	278 kHz	BNC
ME453M	Microwave System Analyzer (MSA)	70 MHz	250 kHz	BNC
ME538K	Microwave System Analyzer (MSA)	70/140 MHz	200 kHz	SP
ME538L	Microwave System Analyzer (MSA)	70/140 MHz	278 kHz	BNC
ME538M	Microwave System Analyzer (MSA)	70/140 MHz	200 kHz	BNC
Main frame				
J0082A	Coaxial Cord, 2 m: 3 pcs	SP-3CP•3C-2WS•SP-3CP		
J0092C	Coaxial Cord, 2 m: 3 pcs	For SP connector (Either one is attached) BNC-P620•3C-2W•BNC-P620 For BNC connector		
J0134	Power Cord, 2.5 m: 2 pcs	One each for transmitter and receiver		
B0019	Front Cover: 1 pc	For transmitter		
B0020	Front Cover: 1 pc	For receiver		
	Fuse for MSA, 3.15 A: 2 pcs	MF51NN250V3.15AAC05		
	Fuse for MSA, 2 A: 2 pcs	MF51NN250V2AAC05		
	Fuse for MSA, 2 A: 4 pcs	MF51NN250V2ADC01		
	ME453K/L/M Operation Manual: 1 copy	Specified one is attached		
	ME538K/L/M Operation Manual: 1 copy			
Options				
MSA-01	BB Amplitude Measurement	Processed at factory		
MSA-02	X-Y Recorder Output			
MSA-03	Sweeper Frequency Added	Specify one frequency from 18 to 100 Hz		
MSA-04	Receiver GP-IB, Direct Plotting of CRT Output			
MSA-05	55.6 kHz BB Frequency Added	Change to 27.8 kHz possible (Opt 03 is required)		
Optional accessories				
MR55A1	IF Return Loss Bridge	Connector: SP or BNC		
MR43A	BB Return Loss Bridge	Connector: SP or BNC		
Peripherals				
MB23A	Portable Test Rack	Tilt angle		
MB24A	Portable Test Rack	Horizontally fixed		
G0015	M-085D Camera with #83-23 Hood			