

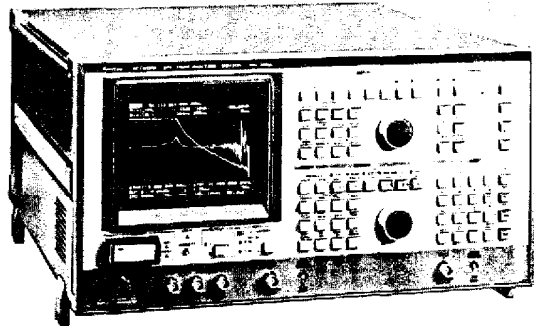
NETWORK ANALYZERS

NETWORK/SPECTRUM ANALYZER

MS420B/K

10Hz to 30MHz

B: 75Ω
K: 50Ω



《GP-IB》

The MS420B/K Network/Spectrum Analyzer is suitable for total evaluation of electronic devices, circuits, and elements. It can analyze magnitude, phase, delay time, levels and spectrum, and frequencies of signals. The MS420B/K also has a built-in test-signal source and CRT display.

A high-performance synthesizer is employed in the test-signal source and the local signal source of the receiver, giving highly stable measurements and high resolution.

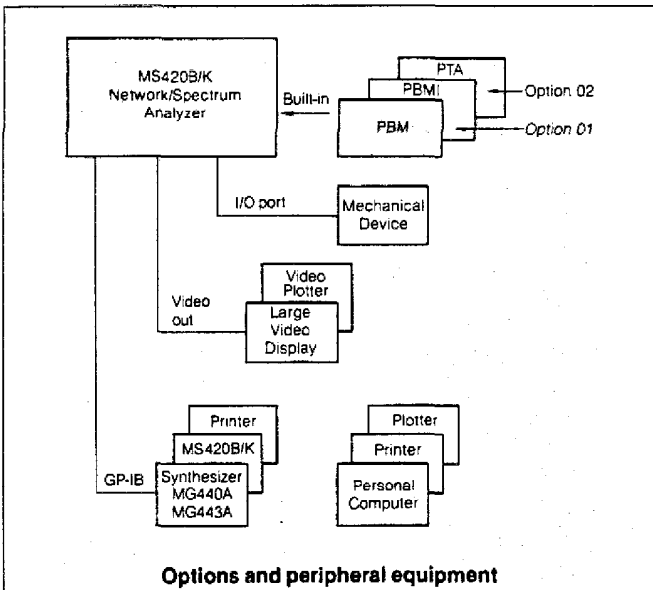
The following options are available on the MS420B/K

PTA (Personal Test Automation)

Controller used to construct a high-speed measuring system. Its programs are written in high-level language PTL (Personal Test Language) that is similar to BASIC.

PBMI (Plug-In Bubble Memory Interface)

8k-byte PBM interface. PBM can be plugged into the MS420B/K front panel, and can memorize up to 6 functions or can file application programs written in PTL.



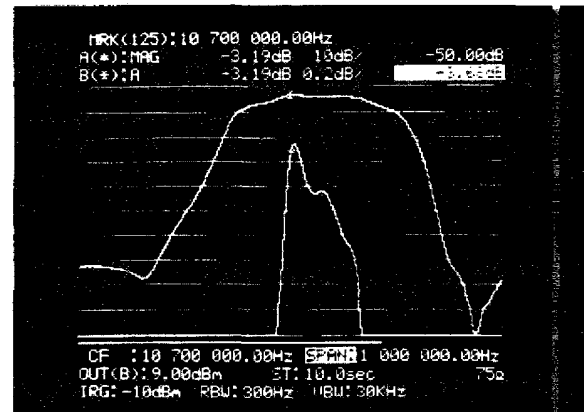
Features

- Wide measurable level range of over 150dB, allowing the measured device to be checked at actual operational levels.
- High-performance synthesizer to enable high resolution measurements.
- High-speed measurement of 2ms/point
This is useful for speedier mass production of parts.
- High-precision group delay measurements
- Logarithmic frequency sweep
- Level sweep for non-linearity tests; variable input levels make the instrument suitable for characteristics tests
- Built-in GP-IB interface for remote control of front panel functions
- Video output (rear panel) allows connection of a large-scale video display or video plotter (copy speed: about 13 sec)
- Level calibration by using the output of the test-signal source
- External MG440A Synthesizer or MG443B SLG can be connected to check frequency response of conversion loss at different input/output frequencies

Applications

● Filter adjustment

The MS420B/K can simultaneously display both the overall characteristics and passband ripple of a filter on the CRT. Therefore, passband ripple adjustment of a filter can be done while the overall frequency response is being observed.



Measurement of a 10.7 MHz IF filter

APPENDIX 1-(a) MS420[] SPECIFICATIONS

Items		Specifications	Network Analysis	Spectrum Analysis														
Measuring items		Magnitude, Phase, Delay, Magnitude and Phase, Magnitude and Delay	○															
		Level (R), Level (T), Spectrum (R), Spectrum (T) R: Reference input, T: Test input Level: Measures the level at only frequency points displayed on the CRT Spectrum: Display the maximum value of the signal by making a measurement with frequency steps fine enough to acquire all frequencies in full sweep bandwidth		○														
Frequency	Range	10Hz to 30 MHz, Resolution: 10 mHz	○	○														
	Reference crystal Oscillator	Frequency: 10 MHz Stability: $\leq 5 \times 10^{-8}$ after 10 minutes warm-up, based on the frequency after one hour warm-up $\pm 1 \times 10^{-7}$ (0 to 45°C)	○	○														
Input	Channel	2 channels (R and T)	○	○														
	Impedance	1 MΩ: 1 MΩ $\pm 10\%$ shunted by ≤ 70 pF (50 pF typical) 75Ω/50Ω: Return loss: ≥ 30 dB	○	○														
	Range (IRG)	-40 to +20 dBm, 10 dB steps	○	○														
	Connector	BNC	○	○														
Dynamic range	Image rejection	≥ 70 dB	○	○														
	IF rejection	≥ 70 dB	○	○														
	Internal distortion	≤ -60 dB at 100 Hz to 200 kHz (Resolution Bandwidth: ≤ 300 Hz) ≤ -70 dB at 200 kHz to 15 MHz		○														
	Average noise level	At level measurement when the input channel and impedance are T and 75 Ω/50 Ω. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Resolution bandwidth</th> <th>Frequency</th> <th>Values relative to input range</th> </tr> </thead> <tbody> <tr> <td>10 Hz</td> <td>100 Hz to 30 MHz</td> <td>-50 dB</td> </tr> <tr> <td>10 Hz</td> <td>10 kHz to 30 MHz</td> <td>-90 dB</td> </tr> <tr> <td>30 Hz</td> <td>300 Hz to 30 MHz</td> <td>-70 dB</td> </tr> <tr> <td>30 Hz</td> <td>10 kHz to 30 MHz</td> <td>-55 dB</td> </tr> </tbody> </table>	Resolution bandwidth	Frequency	Values relative to input range	10 Hz	100 Hz to 30 MHz	-50 dB	10 Hz	10 kHz to 30 MHz	-90 dB	30 Hz	300 Hz to 30 MHz	-70 dB	30 Hz	10 kHz to 30 MHz	-55 dB	
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		The best data for the network analysis is 10 dB or more improvement over above values.	○																						
Crosstalk	Between input R and T	≧100 dB	○																						
	Between synthesizer output and input T	≧120 dB	○	○																					
Resolution bandwidth	3 dB bandwidth	3 Hz to 30 kHz in 1.3 sequence Accuracy: ±20% at ≧30 Hz	○	○																					
	Selectivity	<20:1, shape factor 60 dB/3dB	○	○																					
Video bandwidth		1 Hz to 30 kHz in 1.3 sequence	○	○																					
Magnitude measurement	Range	100 dB, Resolution: 0.01 dB	○																						
	Offset error	Frequency response and input range/resolution bandwidth switching errors can automatically be corrected by memorizing the calibration data (usually based on the through connection).																							
	Linearity	0 to -50 dB : ±0.15 dB -50 to -60 dB: ±0.5 dB -60 to -70 dB: ±1 dB -70 to -80 dB: ±2 dB ±1 dB (0 to -10 dB) for resolution bandwidth 3 Hz																							
Level/spectrum measurement	Range	-130 to +20 dBm. Resolution: 0.01 dB		○																					
	Offset error	Frequency response and input range errors can automatically be corrected by memorizing the standard data calibrated with the reference signal (synthesizer output)																							

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Item		Specifications	Network Analysis	Spectrum Analysis
Level/spectrum measurement	Linearity	0 to -50 dB : ±0.15 dB -50 to -60 dB: ±1 dB -60 to -70 dB: ±3 dB ±1 dB (0 to -10dB) for resolution bandwidth 3Hz		○
Phase measurement	Range	±180 degrees, Resolution: 0.1 deg.		
	Offset error	Frequency response and input range/resolution bandwidth switching errors can automatically be corrected by memorizing the calibration data (usually based on the through connection).	○	
	Level characteristic	0 to -50dB : ±1.5 deg. -50 to -70 dB: ±3 deg. at resolution bandwidth 3 kHz.		
Delay measurement	Range	1 μs to 400 ms in 1,2,4 sequence		
	Resolution	Normal: 1/1000 of measurement range Expand: 1/10000 of measurement range		
	Offset error	Frequency response can automatically be corrected by memorizing the calibration data (usually based on the through connection).	○	
	Level characteristic	(0.5% of full scale +0.5% of reading) at 0 to -50dB and resolution bandwidth ≥10 Hz for 1 μs range (1 - 30 MHz)		
Synthesizer output	A output	-110 to +15 dBm, Resolution: 0.01 dB		
	B output	-110 to +9 dBm, Resolution: 0.01 dB (power splitter output) Both output terminated		
	Level accuracy	±0.3 dB at +5 dBm	○	○
	Impedance	75 Ω/50 Ω, Return loss: >30 dB		
	Connector	BNC		
Frequency measurement		Resolution: 1 Hz, Accuracy : Reference frequency ±1 Hz		○
Sweep mode	Frequency	LN : START/STOP, CENTER/SPAN LOG: START/STOP	○	○
	Level	START/STOP/STEP		

APPENDIX I-(a) MS420[] SPECIFICATIONS

Item		Specifications	Network Analysis	Spectrum Analysis
Sweep point		251	○	○
Sweep time (ST)		500 ms* to 24 hours/SPAN *: Depends on measurement item and measurement conditions	○	○
Sweep range	AUTO	Automatic sweep over the full range	○	○
	MARKER	Measures only marker point or sweeps only the range between two markers.		
Sweep control		RESET, STOP, REPEAT START, SINGLE START	○	○
Automatic setting		SIGNAL TRACK: Ganged to maximum received signal automatically	—	○
		BW, ST: COUPLED TO FREQ Resolution bandwidth, Video bandwidth and Sweep time are automatically set to the optimum value by ganging with span width	○	○
		BW, ST: COUPLED TO SPAN Resolution bandwidth, Video bandwidth and Sweep time are automatically set to the optimum value by ganging with span width		○
Calibration	INT	Non-linearity error correction	○	○
	X → S	Offset error correction		
Calculation	X - S	Automatic correction of offset error	○	○
	A - B	Arithmetic processing between A and B memories		
	Δ	Deviation between MAIN marker and Δ marker		
	ZERO	Deviation from reference value		
Display	CRT	6.5 - inch electromagnetic deflection	○	○
	Trace	Same as the measuring items (rectangular coordinates)		
	Sub-trace	Same as the measuring items (rectangular coordinates) B, A, A - B. It is not performed for Magnitude/Phase and Magnitude/Delay		
	Marker	2 (MAIN marker and Δ marker)		
	Character	Marker point data, Trace condition, Measurement condition		

Item	Specifications	Network Spectrum Analysis	Analysis
Function memory	3 (Trace condition, Measurement condition)	○	○
Rear panel INPUT/ OUTPUT	Video output	75Ω load, Approx. 1 Vp-p (BNC)	
	10 MHz reference output	TTL level (BNC)	
	10 MHz reference input	○	○
	X → S switching signal	Open collector (36 pins)	
	GP-IB	Compatible with IEEE488 (24 pins)	
Remote control	GP-IB (IEEE488, IEC 625-1; 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 All functions (without power and intensity) of front panel are remotely controllable	○	○
Power	** Vac ±10%, 50/60 Hz, <330 VA	○	○
Ambient temperature rated range of use	0°C to +45°C	○	○
Dimensions and weight	221.5H, 426W, 451D mm, ≤35 kg	○	○