

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 2 ms/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

/inritsu



• High precision delay time measurement

Delay time and frequency response of VTR 1H delay lines must be measured precisely. The delay time expansion function of the MS420B/K can test samples that have very feeble frequency response in comparison with the absolute delay time. At 400kHz aperture, samples of 1 μ s delay time can be tested easily at a resolution of 1 ns. For VTR 1H delay lines, 63- μ s delay time can be tested at 10-ns resolution.



• High-resolution spectrum analysis

A high-performance synthesizer is built in, so that stable analysis can be performed at a resolution bandwidth of 3 Hz. This permits accurate analysis of even a spurious signal from a power line.



• Connection to personal computer

Through the built-in GP-IB interface, the MS420B/K can be connected to a data processor, such as personal computer, so that all the functions except the POWER switch and the INTENSITY control can be controlled externally. The interface is especially useful when mass of data is to be processed, and when the MS420B/K is to be combined with other measuring instruments. External memory, an XY plotter, and a serial printer can also be connected for recording and listing of data.



• Frequency shift measurement by MAX HOLD

The MAX HOLD function can measure frequency shift of F signals and the degree of such shifts. For a spectrum havir a large level change, the maximum value can be held easily



Frequency deviation measurement of FM signal

MS420 specifications

	Functions	Specifications	Network	Spectrum
Measuring items		Magnitude Phase Delay Magnitude and Phase Magnitude and Dalay	analysis	analysis
		Level (R), Level (T), Spectrum (R), Spectrum (T) R: Reference input, T: Test input, Level: Measures the level only at frequency points displayed on the CRT, Spectrum: Displays the maximum value of the signal by making a measurement with frequency steps fine enough to acquire all frequencies in full sweep bandwidth	•	•
	Range	10Hz to 30MHz. Resolution: 0.01Hz		
Frequency	Reference crystal oscillator	Frequency: 10MHz Stability: ≤5 x 10 ⁻⁸ after 10 minutes warm-up, based on the frequency after one hour warm-up ±1 x 10 ⁻⁷ (0 to 45°C)	•	•
Input	Channel	2 channels (R and T)		
	Impedance	$1M\Omega$: $1M\Omega \pm 10\%$ shunted by $\leq 70pF$ (50pF typical) 75 Ω : (MS420B); 50 Ω : (MS420K); Return loss. $\geq 30dB$	•	•
	Range (IRG)	-40 to +20dBm, 10dB steps	•	•
	Connector	BNC	•	•
	Image rejection	≥ 70dB	•	•
	IF rejection	≥ 70dB	•	•
	Internal distortion	≤ -60 dB at 100 Hz to 200 kHz (Resolution bandwidth: ≤ 300 Hz) ≤ -70 dB at 200 kHz to 15 MHz	•	•
Dynamic range	Average noise level	Resolution bandwidth Frequency Values relative to input range 10 Hz 100 Hz to 30MHz -60dB 10 Hz 100 Hz to 30MHz -90dB 30 Hz 300 Hz to 30MHz -70dB 30 Hz 10kHz to 30MHz -80dB 30 Hz 10kHz to 30MHz -80dB 300 Hz 10kHz to 30MHz -75dB 30kHz 10kHz to 30MHz -75dB 3kHz 30kHz to 30MHz -65dB 30kHz 100kHz to 30MHz -66dB 30kHz 300kHz to 30MHz -66dB 30kHz 300kHz to 30MHz -60dB The best data for the network analysis is 10dB or more improvement over above values. -60dB	•	•
Crosstalk	Between input R and T	≥ 100dB	•	
	Between synthesizer output and input T	≩120dB	•	•
Resolution	3dB bandwidth	3Hz to 30kHz in 1,3 sequence. Accuracy: ±20% at ≥30Hz		
	Selectivity	< 20:1, shape factor 60dB/3dB	•	•
Video bandwidth		3 Hz to 30 kHz in 1,3 sequence	•	•
Magnitude measure- ment	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 -50dB : ±0.15dB -50 to -60dB: ±0.5dB -60 to -70dB: ±1dB -70 to -80dB: ±2dB ±1dB (0 to -10dB) for resolution bandwidth 3Hz	•	
Level/ spectrum measure- ment	Range	-130 to +20dBm. Resolution: 0.01dB		
	Offset error	Frequency response and input range errors can automatically be corrected by memorizing the standard data calibrated with the reference signal (synthesizer output)		•
	Linearity	0 to -50dB : ±0.15dB -50 to -60dB: ±1dB -60 to -70dB: ±3dB ±1dB (0 to -10dB) for resolution bandwidth 3Hz		•
Phase measure- ment	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).	•	
Delay measure ment	Bange	Use to 400 ms is 1.5 deg50 to -70dB: ±3 deg. at resolution bandwidth 3kHz.		
	Besolution	Normal: 1/1000 at	•	
	Offset error	Frequency response can automatically be corrected by memorizing the calibration		
	Level characteristic	(0.5% of full scale +0.5% of reading) at 0 to $-50 dBand resolution bandwidth > 10 Hz for 1 us range (1 to 20 MHz)$		

Synthesizer E output 110 to 4968m, Resolution: 0.01dB (power spiriter output) Both outputs terminated • Soutput 1368 at 4958m • • Connector: BNC • • Frequency measurement Resolution: 114 Accuracy. Reference frequency 1142 • Sweep Frequency LIN START/STOP, CENTER/SPAN LOG: START/STOP • Sweep points 251 • • • Sweep time (ST) * • • • Sweep points 251 • • • Sweep control RESET: STOP, REPEAT full range • • • Sweep control RESET: STOP, REPEAT STAT, STOP, REPEAT STAT, STOP, REPEAT • • • Sweep control RESET: STOP, REPEAT STAT, ST	Synthesizer output	A output	-110 to +15dBm, Resolution: 0.01dB		
Syntheszer iewel accuracy. i:0.308 ai +568m Outbut Timosdance 750, Retrum Toss.:>3008 (MS4208) 500, Retrum Toss.:>3008 (MS420K) Frequency measurement Resolution 112, Accuracy. Reference frequency. 1142 • Sweep Frequency LIN START/STOP. CENTER/SPAN LOG START/STOP • Sweep points 251 • • • Sweep points 251 • • • Sweep points 251 • • • Sweep control RESET, STOP. REPEAT START, SINGLE START • • Sweep control RESET, STOP. REPEAT START, SINGLE START • • Sweep control RESET, STOP. REPEAT START, SINGLE START • • Automatic setting SIGNAL TRACK Automatically aging to maximum received signal • • Resolution badwidth wideo bandwidth and sweep time are automatically set to the optimum values by ganging with span width • • Calibration INT Non-Insertity error correction • • X – S Offset error correction • • • X – S Offset error correction </td <td>Boutput</td> <td>-110 to +9dBm, Resolution: 0.01 dB (power splitter output). Both outputs terminated.</td> <td>•</td> <td>•</td>		Boutput	-110 to +9dBm, Resolution: 0.01 dB (power splitter output). Both outputs terminated.	•	•
00/00/1 Timoedance 75,0, Return loss: >30/08 (MS4208) 500, Return loss: >30/08 (MS420K) Frequency measurement Resolution 1Hz, Accuracy: Reterence frequency ± 1Hz • Sweep Frequency LIN: START/STOP/STEP • • Sweep Frequency LIN: START/STOP/STEP • • Sweep Frequency LIN: START/STOP/STEP • • Sweep Automatics weep own resurement item and measurement conditions • • Sweep Automatics weep own resurement item and measurement conditions • • Sweep control RESET: STOP, REPEAT START, SINCE START • • Sweep control RESET: STOP, REPEAT START, SINCE START • • Automatic setting Not incestry ganged to maximum received signal • • BW, ST: COUPLED TO SPAN BW, ST: COUPLED TO SPAN • • Calibration INT Non-linearity error correction • • X - S Offset error correction • • • X - S Offset error correction • <td>Level accuracy</td> <td>±0.3dB at +5dBm</td> <td></td> <td></td>		Level accuracy	±0.3dB at +5dBm		
Connector BNC Frequency measurement Resolution 1Hz. Accuracy. Reference (requency 11Hz Sweep mode Level START/STOP. CENTER/SPAN LOG. START/STOP Sweep points Z51 • • Sweep points Z51 • • Sweep time (ST) 500ms* to 24 hours/ SPAN • • Sweep AUTO Automatic sweep over the full range • • range MARKER Measures only marker point or sweeps only the range between two markers • Sweep control RESET. STOP, REPEAT START, SINCLE START • • Automatic setting SIGNAL TRACK Automatically aganged to maximum received signal • • Automatic setting Non-incarging anged to maximum received signal • • Calibration INT Non-incarging with span width • • Calibration INT Non-incarging with span width • • Calibration INT Non-incarging with frequency • • Calibration INT Non-incarging with frequency		Impedance	75Ω, Return loss: >30dB (MS420B), 50Ω, Return loss: >30dB (MS420K)		
Frequency mesolution Hit. Accuracy: Reference frequency 1142 Sweep Frequency LIN START/STOP/STEP • • Sweep points 251 • • • • Sweep points 251 • • • • • Sweep points 251 • • • • • • Sweep points 251 • <td></td> <td>Connector</td> <td>BNC</td> <td></td> <td></td>		Connector	BNC		
Sweep mode Frequency Level LIN START/STOP, CENTER/SPAN LOG. START/STOP Sweep points 251 Sweep points 251 Sweep time (ST) 500ms* to 24 hours/ SPAN Sweep bart Automatic sweep over the full range range MARKER MARKER Measurement item and measurement conditions Sweep control RESET.STOP, REPEAT START, SINGLE START Sweep control RESET.STOP, REPEAT START, SINGLE START Automatic setting SIGNAL TRACK Automatically ganged to maximum received signal Automatic setting SIGNAL Complexity ganged to maximum received signal Automatic setting SIGNAL TRACK Automatically ganged to maximum received signal Automatic setting BW. ST COUPLED TO SPAN Resolution bandwidth, video bandwidth and sweep time are automatically set • to the optimum value by ganging with span width • Secource Arithmetic processing between A and B memories Calculation A - B Automatic correction of offset error • ZERO Deviation between MAIN marker and Amarker ZERO Deviation between Vage condinates)	Frequer	ncy measurement	Resolution: 1 Hz. Accuracy: Reference frequency ±1 Hz		•
mode Level START/STOP/STEP Sweep Doints 251 Sweep Doints 251 Sweep Time (ST) Depends on measurement item and measurement conditions Sweep Control 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 Sweep Control SIGNAL TRACK Automatically ganged to maximum received signal Automatic setting BW.ST COUPLED TO FRED Automatic setting BW.ST. COUPLED TO SPAN Besolution bandwidth, wideo bandwidth and sweep time are automatically set to the optimum value by ganging with span width BW.ST. COUPLED TO SPAN Resolution bandwidth, wideo bandwidth and sweep time are automatically set to the optimum value by ganging with frequency Calibration A - B A - S Automatic correction of offset error A - B A - B A - Deviation between MAIN marker and Δ marker ZERO Deviation trom reference value Calibration CAT Markers 2 (MAIN marker and Δ marker) Sub-trace Same as the measuring items (rectangular coordinat	Sween	Frequency	LIN: START/STOP, CENTER/SPAN LOG: START/STOP		
Sweep points 251 • • Sweep time (ST) • Depends on messurement item and measurement conditions • Sweep AUTO Automatic sweep over the full range • range MARKER Measurement item and measurement conditions • Sweep control RESET, STOP, REPEAT START, SINGLE START • • Sweep control RESET, STOP, REPEAT START, SINGLE START • • Automatic setting SiGNAL TRACK Automatically ganged to maximum received signal • • Automatic setting BW, ST COUPLED TO FRED BW, ST COUPLED TO SPAN • • Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values by ganging with span width • • Calibration INT Non-Inearity error correction • • X ~ S Offset error correction • • • Z = RO Deviation between MAIN marker • • • Z = RO Deviation tirrom reference value • • • • Calculation A - B Arithmetic processing tense error • • • <td>mode</td> <td>Level</td> <td>START/STOP/STEP</td> <td>•</td> <td>•</td>	mode	Level	START/STOP/STEP	•	•
Sweep Source 500 ms² to 24 hours/ SPAN Sweep AUTO Automatic sweep over the full range • Sweep MARKER Measures only marker point or sweeps only the range between two markers • Sweep control RESSET. STOP, REPEAT START, SINGLE START • • Automatic setting SiGNAL TRACK Automatically ganged to maximum received signal • • Automatic setting BW.ST COUPLED TO FREG Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values by ganging with fraguency • • Calibration INT Non-linearity error correction • • Calibration X → S Automatic correction of offset error • • Calculation X → S Automatic correction of offset error • • Calculation X → S Automatic processing between A and B memories • • Calculation A → B Arithmetic processing between A and B memories • • Calculation ERT 6.5 in the electromagnetic deflection • • • Display<	Sv	veep points	251	٠	•
Sweep range AUTO MARKER Automatic sweep over the full range •••• Sweep control RESET. STOP. REPEAT START, SINGLE START ••• Automatic setting SiGNAL TRACK Automatically ganged to maximum received signal •• Automatic setting SiGNAL TRACK Automatically ganged to maximum received signal •• Automatic setting SiGNAL TRACK Automatically ganged to maximum received signal •• Automatic setting To be optimum values by ganging with span width •• BW, ST: COUPLED TO SPRIO Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values by ganging with span width •• Galibration INT Non-linearity error correction •• X - S Automatic correction of offset error •• •• Calculation A - B Arithmetic processing between A and B memories •• ZERO Deviation form reference value •• • • Offset error Sub-trace Same as the measuring items (rectangular coordinates) •• • Display Sub-trace Same as the measuring items (rectangular coordinates) •• •	Sweep time (ST)		500ms* to 24 hours/ SPAN *: Depends on measurement item and measurement conditions	•	•
range MARKER Measures only marker point or sweep only the range between two markers • Sweep control RESET, STOP, REPEAT, START, SINGLE START • Automatic setting SIGNAL TRACK Automatically ganged to maximum received signal • Automatic setting BW, ST COUPLED TO FREO Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values 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 frequency • Calibration INT Non-linearity error correction • X - S Offset error correction of offset error • X - S Deviation between MAIN marker and Δ marker • ZERO Deviation trom reference value • Calculation CRT 6.5 inch electromagnetic deflection • Trace Same as the measuring items (rectangular coordinates) • • Display Sub-trace Marker ad Δmarker • • Video output 75G load, approx. 1 Vp-p (BNC) • • • INPUT/ OUTPUT	Sweep	AUTO	Automatic sweep over the full range		
Sweep control RESET. STOP. REPEAT START, SINGLE START ● SiGNAL TRACK. Automatically ganged to maximum received signal ● Automatic setting BW, ST. COUPLED TO FRED ● Automatic setting To the optimum values 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 A - B Arithmetic processing between A and B memories ● Calculation A - B Arithmetic processing between A and B memories ● ZERO Deviation trom reference value ● ● Video output CBT € 5 inch electromagnetic deflection ● Trace Same as the measuring items (rectangular coordinates) B, A, A - B ● Sub-trace Same as the measuring items (rectangular coordinates) B, A, A - B ● Markers 2 (IMAIN marker and △ marker) ● ● Character Marker point data, trace condition, measurem	range	MARKER	Measures only marker point or sweeps only the range between two markers.	•	•
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Automatic setting BW. ST. COUPLED TO FRED Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values 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 frequency • Calibration INT X - S Offset error correction • A - B Automatic correction of offset error • Calculation A - B Automatic correction of offset error • Calculation CRT 6.5 inch electromagnetic deflection • Calculation Sub-trace Same as the measuring items (rectangular coordinates) • Display Sub-trace Marker and Amarker) • • Character Marker point data, trace condition, measurement condition • • Fear banet Video output 75Ω load, approx. 1 Vp-p (BNC) • • 10MHz TTL level (BNC) • • • • Point data, sprate prove and Mithersity structures Set and approx. 1 Vp-p (BNC) • • • Display Video output 75Ω load, approx. 1 Vp-p (BNC) • • • •			SIGNAL TRACK: Automatically ganged to maximum received signal		•
Automatic setting Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values 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 frequency • • Calibration INT Non-linearity error correction • • X → S Offset error correction of offset error • • • Calculation A → B Arithmetic processing between A and B memories • • ZERO Deviation between MAIN marker and Δ marker • • • ZERO Deviation between MAIN marker and Δ marker • • • Display Sub-trace Same as the measuring items (rectangular coordinates) • • • Markers 2 (MAIN marker and Δ marker) • • • • • Character Marker point data, trace condition, measurement condition • • • • • NUTH Yideo output 75Ω load, approx.1 Vp.p (BNC) 10MHz • • •			BW, ST COUPLED TO FREQ		
BW, ST: COUPLED TO SPAN Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum value by ganging with frequency • Calibration INT Non-Inearity error correction • Calculation X → S Offset error correction of offset error • Calculation A - B Arithmetic processing between A and B memories • Calculation A - B Arithmetic processing between A and B memories • Calculation A - B Arithmetic processing between A and B memories • ZERO Deviation between MAIN marker and A marker • • ZERO Deviation from reference value • • Character Same as the measuring items (rectangular coordinates) Sub-trace • Markers 2 (MAIN marker and A marker) • • Character Marker and A marker) • • Character Marker and A marker) • • Video output 75Ω load, approx.1 Vp-p (BNC) • • 10MHz TTL level (BNC) • • • 10MHz TTL level (BNC) • • • 10MHz TTL level (BNC) • • • 10MHz Felerence input Open collector (36 pins) <td colspan="2" rowspan="2">Automatic setting</td> <td>Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values by ganging with span width</td> <td>٠</td> <td>•</td>	Automatic setting		Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum values by ganging with span width	٠	•
Calibration INT Non-linearity error correction X - S Offset error correction of offset error Calculation A - B Automatic correction of offset error Calculation A - B Arithmetic processing between A and B memories Calculation A - B Arithmetic processing between A and B memories CBT 6.5 inch electromagnetic deflection Trace Same as the measuring items (rectangular coordinates) B, A, A - B Display Sub-trace Same as the measuring items (rectangular coordinates) B, A, A - B Markers 2 (MAIN marker and Δ marker) Character Marker point data, trace condition, measurement condition Function memory 3 (Trace condition, measurement condition) Video output 75Ω load, approx. 1 Vp-p (BNC) 10MHz TTL level (BNC) reference output TTL level (BNC) reference input TTL level (BNC) Video output 75Ω load, approx. 1 Vp-p (D, CO, DTO, C28 Switching signal Open collector (36 pins) GP-18 Compatible with IEEE-488 (24 pins) GP-18 Compatible with IEEE-488 (24 pins) Remote control SH1, AH1, T6, L4, SR1, R1, PP			BW, ST: COUPLED TO SPAN Resolution bandwidth, video bandwidth and sweep time are automatically set to the optimum value by ganging with frequency		•
Calibration X → S Offset error correction X → S Automatic correction of offset error Calculation A - B Arithmetic processing between A and B memories A - B Arithmetic processing between A and B memories ZERO Deviation between MAIN marker and A marker ZERO Deviation from reference value CAT 6.5 inch electromagnetic deflection Trace Same as the measuring items (rectangular coordinates) Sub-trace It is not performed for Magnitude/ Phase and Magnitude/ Delay Markers 2 (MAIN marker and △ marker) Character Marker point data, trace condition, measurement condition Function memory 3 (Trace condition, measurement condition) Video output 75Ω load, approx. 1 Vp-p (BNC) 10MHz TTL level (BNC) reference input TTL level (BNC) 10MHz GP-1B Compatible with IEEE-488 (24 pins) GP-1B Compatible with IEEE-488 (24 pins) Fill functions (except power and INTENSITY) of front panel are remotely controllable Power AC100V ± 10%, 50/60Hz, < 30VA		INT	Non-linearity error correction	-	
X - S Automatic correction of offset error Calculation A - B Arithmetic processing between A and B memories Deviation between MAIN marker and ∆ marker Deviation between MAIN marker and ∆ marker ZERO Deviation from reference value CRT CRT 6.5 inch electromagnetic deflection Trace Trace Same as the measuring items (rectangular coordinates) Same as the measuring items (rectangular coordinates) Display Sub-trace It is not performed for Magnitude/ Phase and Magnitude/ Delay • Markers 2 (MAIN marker and ∆ marker) Character Marker point data, trace condition, measurement condition Fear panel 10MHz TTL level (BNC) • Video output 75Ω load, approx. 1 Vp-p (BNC) • 10MHz TTL level (BNC) • Video output TTL level (BNC) • X → S Open collector (36 pins) • GP-IB Compatible with IEEE-488 (24 pins) • GP-IB Compatible with IEEE-488 (24 pins) • GP-IB Compatible with IEEE-488 (24 pins) • GP-IB Compatible with IEEE-488, IEC625 1, 24 pins) • <td>Calibration</td> <td>X → S</td> <td>Offset error correction</td> <td>•</td> <td>•</td>	Calibration	X → S	Offset error correction	•	•
Calculation A - B Arithmetic processing between A and B memories • Δ Deviation between MAIN marker and Δ marker • ZERO Deviation from reference value • CRT 6.5 inch electromagnetic deflection • Trace Same as the measuring items (rectangular coordinates) B. A. A - B Bub-trace It is not performed for Magnitude/ Phase and Magnitude/ Delay • Markers 2 (MAIN marker and Δ marker) • Character Marker point data, trace condition, measurement condition • Fear panel 10MHz TTL level (BNC) • TOBHZ 10MHz TTL level (BNC) • To PiB Compatible with IEEE-488 (24 pins) • • GP-1B Compatible with IEEE-488 (24 pins) • • Remote control GP-1B (IEEE-488, IEC625-1, 24 pins) • • Remote control GP-1B (IEEE-488, IEC625-1, 24 pins) • • Power AC100V ± 10%, 50/60Hz, <330VA		X – S	Automatic correction of offset error		
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$\begin{array}{ c c c c c c } \hline Trace & Same as the measuring items (rectangular coordinates) \\ \hline Sub-trace & Same as the measuring items (rectangular coordinates) B, A, A - B. \\ It is not performed for Magnitude/ Phase and Magnitude/ Delay \\ \hline Markers & 2 (MAIN marker and \triangle marker) \\ \hline Character & Marker point data, trace condition, measurement condition \\ \hline Function memory & 3 (Trace condition, measurement condition) \\ \hline Video output & 75\Omega load, approx. 1 Vp-p (BNC) \\ \hline 10MHz & TTL level (BNC) \\ \hline 10MHz & TTL level (BNC) \\ \hline VIDUT/ OUTPUT & TTL level (BNC) \\ \hline Video control & Open collector (36 pins) \\ \hline Switching signal & Open collector (36 pins) \\ \hline Switching signal & GP-IB & Compatible with IEEE-488 (24 pins) \\ \hline Remote control & SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 \\ \hline All functions (except power and INTENSITY) of front panel are remotely controllable \\ \hline Power & AC100V \pm 10\%, 50/60Hz, < 330VA \\ \hline Ambient temperature, rated range of use \\ \hline Dimensions and weight & 221.5H, 426W, 451D mm, \leq 35 kg \\ \hline \end{array}$		CRT	6.5 inch electromagnetic deflection		•
Display Sub-trace Same as the measuring items (rectangular coordinates) B, A, A – B. It is not performed for Magnitude/ Phase and Magnitude/ Delay Markers 2 (MAIN marker and △ marker) Character Marker point data, trace condition, measurement condition Function memory 3 (Trace condition, measurement condition) Video output 75Ω load, approx, 1 Vp-p (BNC) 10MHz TTL level (BNC) reference output TTL level (BNC) VOUTPUT TTL level (BNC) GP-1B Compatible with IEEE-488 (24 pins) GP-1B Compatible with IEEE-488 (24 pins) GP-1B Compatible with IEEE-488 (24 pins) Power AC100V ± 10%, 50/60Hz, < 330VA		Trace	Same as the measuring items (rectangular coordinates)		
Markers 2 (MAIN marker and Δmarker) Character Marker point data, trace condition, measurement condition Function memory 3 (Trace condition, measurement condition) • Video output 75Ω load, approx. 1 Vp-p (BNC) • IOMHz TTL level (BNC) • reference output TTL level (BNC) • OUTPUT Open collector (36 pins) • GP-1B Compatible with IEEE-488 (24 pins) • Remote control GP-1B (IEEE-488, IEC625-1, 24 pins) • • Remote control SH1, AH1, T6, L4, SR1, RL1, PPO, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllable • Ambient temperature, rated range of use 0° C to +45° C • • Dimensions and weight 221.5H, 426W, 451D mm, ≤ 35 kg • •	Display	Sub-trace	Same as the measuring items (rectangular coordinates) B, A, A – B. It is not performed for Magnitude/ Phase and Magnitude/ Delay	•	
Character Marker point data, trace condition, measurement condition Function memory 3 (Trace condition, measurement condition) Video output 75Ω load, approx. 1 Vp-p (BNC) 10MHz TTL level (BNC) reference output TTL level (BNC) 10MHz TTL level (BNC) reference input TTL level (BNC) 0UTPUT GP-1B GP-1B Compatible with IEEE-488 (24 pins) GP-1B GP-1B (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PPO, DCO, DTO, C28 All functions (except power and INTENSITY) of front panel are remotely controllable Power AC100V ± 10%, 50/60Hz, < 330VA	. ,	Markers	2 (MAIN marker and \land marker)		
Function memory 3 (Trace condition, measurement condition) ● Video output 75Ω load, approx. 1 Vp-p (BNC) ● 10MHz TTL level (BNC) ● INPUT/ OUTPUT 10MHz TTL level (BNC) Rear panel INPUT/ OUTPUT 10MHz TTL level (BNC) Remote control Open collector (36 pins) GP-1B Compatible with IEEE-488 (24 pins) GP-1B Compatible with IEEE-488, IEC625-1, 24 pins) Remote control GP-1B (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PPO, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllable Power AC100V ± 10%, 50/60Hz, < 330VA		Character	Marker point data, trace condition, measurement condition		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Function memory	3 (Trace condition, measurement condition)	•	•
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Rear panel INPUT/ OUTPUT10MHz reference inputTTL level (BNC) $V \rightarrow S$ switching signalOpen collector (36 pins) Open collector (36 pins) $GP-IB$ Compatible with IEEE-488 (24 pins) $Remote control$ GP-IB (IEEE-488, IEC625.1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PPO, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllablePowerAC100V ± 10%, 50/60Hz, < 330VA		10MHz reference output	TTL level (BNC)		•
OUTPUT $X \rightarrow S$ switching signalOpen collector (36 pins)GP-1BCompatible with IEEE-488 (24 pins)Remote controlGP-1B (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllablePowerAC100V ± 10%, 50/60Hz, < 330VA		10MHz reference input	TTL level (BNC)	•	
GP-IB Compatible with IEEE-488 (24 pins) Remote control GP-IB (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 • All functions (except power and INTENSITY) of front panel are remotely controllable • Power AC100V ± 10%, 50/60Hz, < 330VA		X → S switching signal	Open collector (36 pins)		
Remote control GP-IB (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllable Power AC100V ± 10%, 50/60Hz, < 330VA		GP-IB	Compatible with IEEE-488 (24 pins)		
Power AC100V ± 10%, 50/60Hz, < 330VA ● Ambient temperature, rated range of use 0°C to +45°C ● Dimensions and weight 221.5H, 426W, 451D mm, ≤ 35 kg ●	Remote control		GP-IB (IEEE-488, IEC625-1, 24 pins) SH1, AH1, T6, L4, SR1, RL1, PP0, DC0, DT0, C28 All functions (except power and INTENSITY) of front panel are remotely controllable	•	•
Ambient temperature, rated range of use 0°C to +45°C ● Dimensions and weight 221.5H, 426W, 451D mm, ≤35 kg ●	Power		AC100V ± 10%, 50/60Hz, < 330VA	•	•
Dimensions and weight 221.5H, 426W, 451D mm, ≤35 kg • •	Ambient temperature, rated range of use		0°C to +45°C	•	•
	Dimensions and weight		221.5H, 426W, 451D mm, ≤ 35 kg	•	•