Strumenti di Misura Nuovi e Ricondizionati

TEST EQUIPMENT FOR MEASUREMENT

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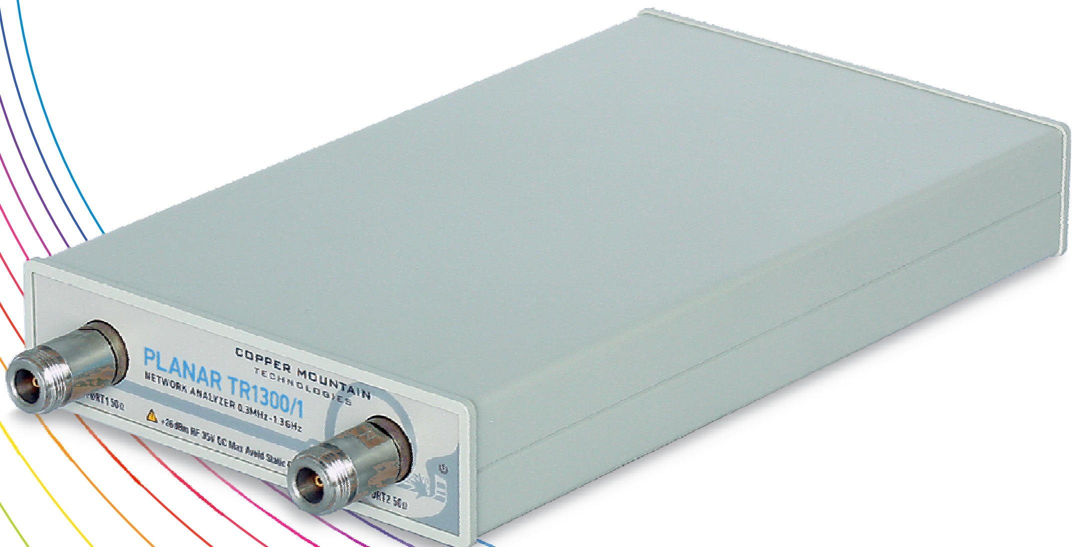
VECTOR NETWORK ANALYZER

PLANAR TR1300/1

DATA SHEET

COPPER MOUNTAIN TECHNOLOGIES

- Frequency range: 300 kHz to 1.3 GHz
- Measured parameters: S_{11}, S_{21}
- Dynamic range of transmission measurement magnitude: 130 dB
- Measurement time per point: 150 µs
- Output power adjustment range: -55 dBm to +3 dBm



PLANAR TR1300/1 Network Analyzer is designed for use in the process of development, adjustment and testing of various electronic devices in industrial and laboratory facilities, including operation as a component of an automated measurement system. PLANAR TR1300/1 is designed for operation with external PC, which is not supplied with the Analyzer.

To learn more about the software functions, please download the demo software from our website and install it on your PC.

MEASUREMENT RANGE

Impedance	50 Ω (75 Ω connectors via adapters)
Test port connector	N-type, female
Number of test ports	2
Frequency range	300 kHz to 1.3 GHz
Full CW frequency accuracy	$\pm 5x10^{-6}$
Frequency setting resolution	1 Hz
Number of measurement points	2 to 10,001
Measurement bandwidths	10 Hz to 30 kHz (with 1/3 step)
Dynamic range (IF bandwidth 10 Hz)	130 dB

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MEASUREMENT ACCURACY

Accuracy of transmission measurements (magnitude / phase)[1]	
+10 dB to +13 dB	0.2 dB / 2°
-50 dB to +10 dB	0.1 dB / 1°
-70 dB to -50 dB	0.2 dB / 2°
-90 dB to -70 dB	1.0 dB / 6°
Accuracy of reflection measurements (magnitude / phase)[1]	
-15 dB to 0 dB	0.4 dB / 4°
-25 dB to -15 dB	1.5 dB / 7°
-35 dB to -25 dB	4.0 dB / 22°
Trace stability	
Trace noise magnitude (IF bandwidth 3 kHz)	0.002 dB rms
Temperature dependence (per one degree of temperature variation)	0.02 dB

EFFECTIVE SYSTEM DATA[1]

Effective directivity	45 dB
Effective source match	40 dB

[1] Applies over the temperature range of 23°C ± 5°C after 40 minutes of warming-up, with less than 1°C deviation from the one-path two-port calibration temperature, at -10 dBm output power and 10 Hz IF bandwidth.

TEST PORT

Directivity (without system error correction)	18 dB

TEST PORT OUTPUT

Match (without system error correction)	18 dB
Power range	-55 dBm to +3 dBm
Power accuracy	±1.5 dB
Power resolution	0.05 dB

TEST PORT INPUT

Match	28 dB
Damage level	+26 dBm
Damage DC voltage	35 V
Noise level (defined as the rms value of the specified noise floor, IF bandwidth 10 Hz)	-127 dBm

MEASUREMENT SPEED

Measurement time per point	150 µs

Typical cycle time versus number of measurement points

Number of points	51	201	401	1601
Start 0.3 MHz, stop 1.3 GHz, IF bandwidth 30 kHz				
One-path two-port calibration	9 ms	31 ms	60 ms	235 ms

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GENERAL DATA

Output reference signal level at 50 Ω impedance	3 dBm ± 2 dB
«OUT 10 MHz» connector type	BNC female
Operating temperature range	+5°C to +40°C
Storage temperature range	-45°C to +55°C
Humidity	90% at 25°C
Atmospheric pressure	84 to 106.7 kPa
Calibration interval	3 years
External PC system requirements:	
- Operating system	WINDOWS XP / VISTA / 7
- CPU frequency	1 GHz
- RAM	512 MB
Power supply:	
- AC circuit	110 - 240 V, 50/60 Hz
- external DC power supply	9-15 V
Power consumption	8 W
Dimensions (L x W x H)	11.2 x 5.6 x 1.6 in
Weight	3.3 lb

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MEASUREMENT CAPABILITIES

Measured parameters	S_{11}, S_{21}
Number of measurement channels	Up to 4 independent logical channels. Each logical channel is represented on the screen as an individual channel window. A logical channel is defined by such stimulus signal settings as frequency range, number of test points, power level, etc.
Data traces	Up to 8 data traces can be displayed in each channel window. A data trace represents one of such parameters of the DUT as S-parameters, response in time domain, input power response.
Memory traces	Each of the 8 data traces can be saved into memory for further comparison with the current values.
Data display formats	Logarithmic magnitude, linear magnitude, phase, expanded phase, group delay, SWR, real part, imaginary part, Smith chart diagram and polar diagram.

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SWEEP FEATURES

Sweep type	Fixed stimulus power value: linear frequency sweep, logarithmic frequency sweep, segment frequency sweep. Fixed frequency value: linear power sweep.
Measured points per sweep	Set by the user from 2 to 10,001.
Segment sweep features	A frequency sweep within several independent user-defined segments. Frequency range, number of sweep points, source power, and IF bandwidth should be set for each segment.
Power	Source power from –55 dBm to +3 dBm with resolution of 0.05 dB. In frequency sweep mode the power slope can be set to up to 2 dB/GHz for compensation of high frequency attenuation in connection wires.
Sweep trigger	Trigger modes: continuous, single, hold.

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TRACE FUNCTIONS

Trace display	Data trace, memory trace, or simultaneous display of data and memory traces.
Trace math	Data trace modification by math operations: addition, subtraction, multiplication or division of measured complex values and memory data.
Autoscaling	Automatic selection of scale division and reference level value for the most effective display of the trace.
Electrical delay	Moving of the calibration plane to compensate for the delay in the test setup. Compensation for electrical delay in a DUT during measurements of phase deviation from linearity.
Phase offset	Phase offset defined in degrees.

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ACCURACY ENHANCEMENT

Calibration	Calibration of a test setup (which includes the Analyzer, cables, and adapters) significantly increases the accuracy of measurements. Calibration allows for correction of the errors caused by imperfections in the measurement system: system directivity, source and load match, tracking and isolation.
Calibration methods	The following calibration methods of various sophistication and accuracy enhancement level are available: - reflection and transmission normalization; - full one-port calibration; - one-path two-port calibration.
Reflection and transmission normalization	The simplest calibration method. It provides low accuracy.
Factory calibration	The factory calibration of the Analyzer allows for reduction of measurement error in reflection and transmission normalization.
Full one-port calibration	Method of calibration performed for one-port reflection measurements. It ensures high accuracy.
One-path two-port calibration	Method of calibration performed for reflection and one-way transmission measurements. It ensures high accuracy for reflection measurements and average accuracy for transmission measurements.
Mechanical Calibration Kits	The user can select one of the predefined calibration kits from various manufacturers or define own calibration kits.
Electronic Calibration Modules	Electronic calibration modules offered by Copper Mountain Technologies make the Analyzer calibration faster and easier than traditional mechanical calibration.
Defining of calibration standards	Different methods of calibration standard defining are available: - standard defining by polynomial model; - standard defining by data (S-parameters).
Error correction interpolation	When the user changes such settings as start/stop frequencies and number of sweep points, compared to the settings at the moment of calibration, interpolation or extrapolation of the calibration coefficients will be applied.

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SUPPLEMENTAL CALIBRATION METHODS

Power calibration	Method of calibration, which allows more stable maintenance of the power level setting at the DUT input. An external power meter should be connected directly, or via a USB/GPIB adapter, to a USB port of the computer running the Analyzer software.

MARKER FUNCTIONS

Data markers	Up to 16 markers for each trace. Reference marker is available for delta marker operation. Smith chart diagram supports 5 marker formats: linear magnitude/phase, log magnitude/phase, real/imaginary, R + jX and G + jB. Polar diagram supports 3 marker formats: linear magnitude/phase, log magnitude/phase, and real/imaginary.
Reference marker	Enables display of any marker values relative to the reference marker.
Marker search	Search for max, min, peak, or target values on a trace.
Marker search additional features	User-definable search range. Switching between one-time search or tracking modes.
Setting parameters by markers	Setting of start, stop and center frequencies by the stimulus value of the marker and setting of reference level by the response value of the marker.
Marker math functions	Statistics, bandwidth, flatness, RF filter.
Statistics	Calculation and display of mean, standard deviation and peak-to-peak in a frequency range limited by two markers on a trace.
Bandwidth	Determines bandwidth between cutoff frequency points for an active marker or absolute maximum. The bandwidth value, center frequency, lower frequency, higher frequency, Q value, and insertion loss are displayed.
Flatness	Displays gain, slope, and flatness between two markers on a trace.
RF filter	Displays insertion loss and peak-to-peak ripple of the passband and the maximum signal magnitude in the stopband. The passband and stopband are defined by two pairs of markers.

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DATA ANALYSIS

Port impedance conversion	The function of conversion of the S-parameters measured at 50 Ω port into the values, which could be determined if measured at a test port with arbitrary impedance.
De-embedding	The function allows to mathematically exclude the effect of the fixture circuit, connected between the calibration plane and the DUT, from the measurement result. This circuit should be described by an S-parameter matrix in a Touchstone file.
Embedding	The function allows to mathematically simulate the DUT parameters after virtual integration of a fixture circuit between the calibration plane and the DUT. This circuit should be described by an S-parameter matrix in a Touchstone file.
S-parameter conversion	The function allows conversion of the measured S-parameters to the following parameters: - reflection impedance and admittance; - transmission impedance and admittance; - inverse S-parameters.
Time domain transformation	The function performs data transformation from frequency domain into response of the DUT to various stimulus types in time domain. Modeled stimulus types: bandpass, lowpass impulse, and lowpass step. Time domain span is set by the user arbitrarily from zero to maximum, which is determined by the frequency step. Windows of various forms are used for better tradeoff between resolution and level of spurious sidelobes.
Time domain gating	The function mathematically removes unwanted responses in time domain, which allows to obtain frequency response without influence from the fixture elements. The function applies reverse transformation back to frequency domain after cutting out the user-defined span in time domain. Gating filter types: bandpass or notch. For better tradeoff between gate resolution and level of spurious sidelobes the following filter shapes are available: maximum, wide, normal, and minimum.

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MIXER / CONVERTER MEASUREMENTS

Scalar mixer / converter measurements	The scalar method allows measurement of the transmission coefficient (magnitude only) of mixers and other frequency translating devices. The scalar method employs port frequency offset when there is a difference between source port frequency and receiver port frequency.
Scalar mixer / converter calibration	The most accurate calibration method applicable to mixer measurements in frequency offset mode. The OPEN, SHORT, and LOAD calibration standards are used. An external power meter should be connected directly, or via a USB/GPIB adapter, to a USB port of the computer running the Analyzer software.
Automatic frequency offset adjustment	The function performs automatic frequency offset adjustment when the scalar mixer / converter measurements are performed to compensate for internal LO setting inaccuracy in the DUT.

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OTHER FEATURES

Analyzer control	Using external personal computer, which runs the Analyzer software.
Familiar graphical user interface	Graphical user interface based on Windows operating system ensures fast and easy Analyzer operation by the user.
Saving trace data	Features saving trace data in *.csv and *.s1p formats; and saving the screen captures in *.png format.
State save/recall	The program allows to save the current state configuration for further recall. A state configuration includes signal source parameters, data traces, memory traces, markers, calibration, etc.
Diagram printout/saving	The diagram and data printout function has preview feature. The preview, saving and printout can be performed using MS Word, Image Viewer for Windows, or Analyzer Print Wizard.

REMOTE CONTROL AND DATA EXCHANGE

COM/DCOM	COM/DCOM automation is used for remote control and data exchange with the user software. The Analyzer program runs as COM/DCOM server. The user program runs as COM/DCOM client. The COM client runs on Analyzer PC. The DCOM client runs on a separate PC connected via LAN.

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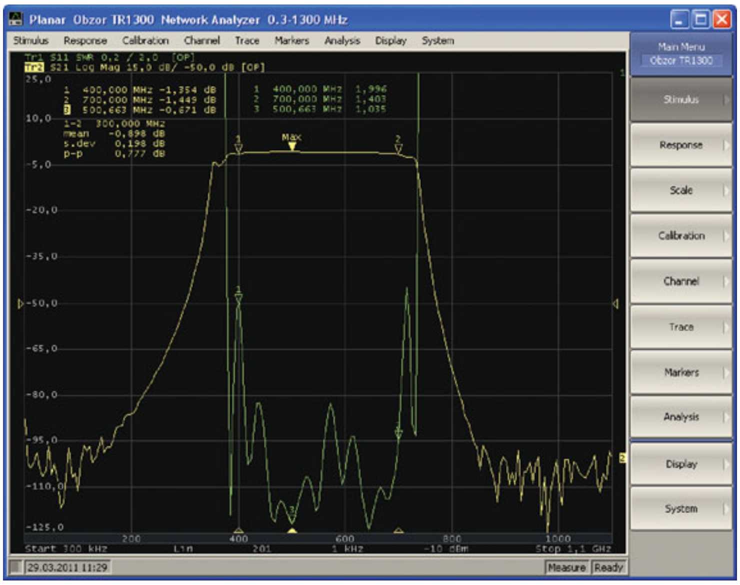
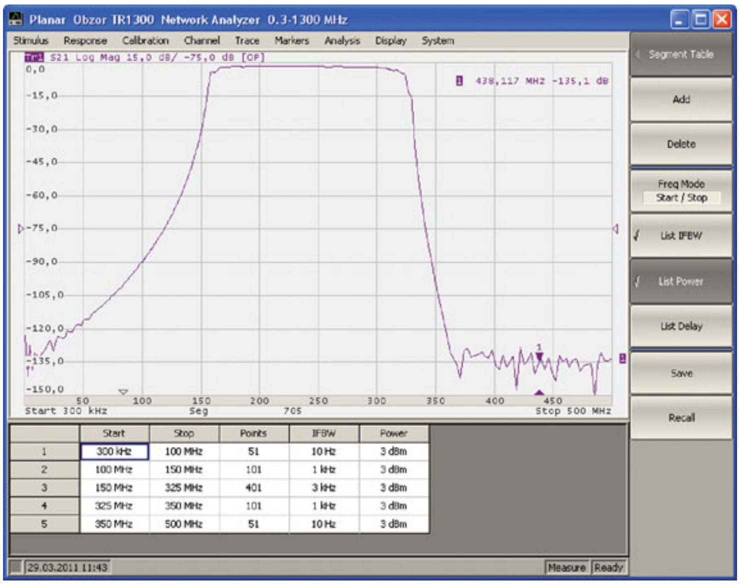
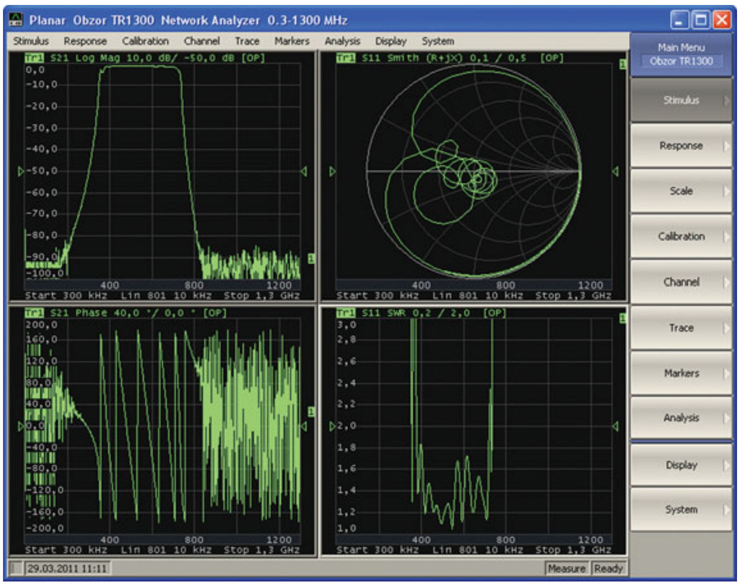

Planar Obzor TR1300 Network Analyzer 0.3-1300 MHz
Stimulus Response Calibration Channel Trace Markers Analysis Display System
Tr1 S11 SWR 0,2 / 2,0 [OP]
Tr2 S21 Log Mag 15,0 dB/ -50,0 dB [OP]
1 400,000 MHz -1,354 dB
2 700,000 MHz -1,449 dB
3 500,663 MHz -0,871 dB
1 400,000 MHz 1,996
2 700,000 MHz 1,403
3 500,663 MHz 1,035
1-2 300,000 MHz
mean -0,898 dB
s.dev 0,198 dB
p-p 0,777 dB
Max
Start 300 kHz Lin 201 1 kHz -10 dBm Stop 1,1 GHz
Main Menu
Obzor TR1300
Stimulus
Response
Scale
Calibration
Channel
Trace
Markers
Analysis
Display
System
29.03.2011 11:29
Measure
Ready


Planar Obzor TR1300 Network Analyzer 0.3-1300 MHz
Stimulus Response Calibration Channel Trace Markers Analysis Display System
Tr1 S21 Log Mag 15,0 dB/ -75,0 dB [OP]
1 438,117 MHz -135,1 dB
Start 300 kHz Seg 705 Stop 500 MHz
Segment Table
Add
Delete
Freq Mode
Start / Stop
List IFBW
List Power
List Delay
Save
Recall
	Start	Stop	Points	IFBW	Power
1	300 kHz	100 MHz	51	10 Hz	3 dBm
2	100 MHz	150 MHz	101	1 kHz	3 dBm
3	150 MHz	325 MHz	401	3 kHz	3 dBm
4	325 MHz	350 MHz	101	1 kHz	3 dBm
5	350 MHz	500 MHz	51	10 Hz	3 dBm
29.03.2011 11:43
Measure
Ready


Planar Obzor TR1300 Network Analyzer 0.3-1300 MHz
Stimulus Response Calibration Channel Trace Markers Analysis Display System
Tr1 S21 Log Mag 10,0 dB/ -50,0 dB [OP]
Tr1 S11 Smith (R+jX) 0,1 / 0,5 [OP]
Tr1 S21 Phase 40,0 °/ 0,0 ° [OP]
Tr1 S11 SWR 0,2 / 2,0 [OP]
Start 300 kHz Lin 801 10 kHz Stop 1,3 GHz
Main Menu
Obzor TR1300
Stimulus
Response
Scale
Calibration
Channel
Trace
Markers
Analysis
Display
System
29.03.2011 11:11
Measure
Ready

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