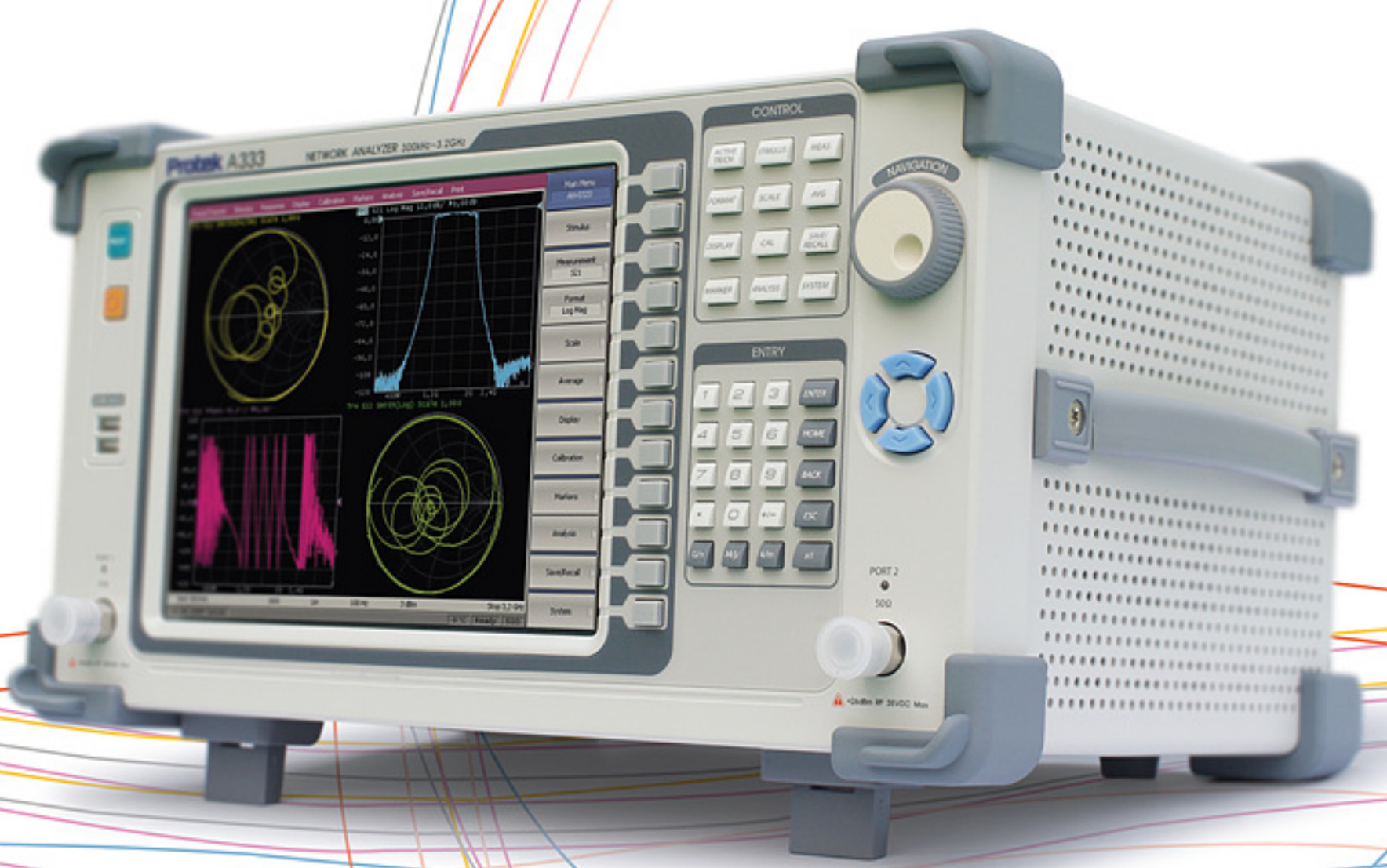
Protek A333

Network Analyzer 3.2GHz

Frequency range 300kHz to 3.2GHz **Frequency resolution** 1mHz **IF bandwidth settings** 1Hz to 30kHz
Power range -45dBm to +10dBm **Power accuracy** ±1.0 dB **Display** 10.4 inch TFT Color LCD(800x600) Touch Screen
User Interface USB 2.0, Ethernet, Key Board, Mouse, Printer, Video



"All new Network Analyzer" Protek A333.

MEASUREMENT RANGE

Impedance	50Ω (75 Ω)
Test port connector	N-type, female
Number of test ports	2
Frequency range	300 kHz to 3.2 GHz
Full CW frequency accuracy	± 5×10^{-6}
Frequency resolution	1mHz
Number of measurement points	2 to 10001
Measurement bandwidths	1 Hz to 30 kHz (with 1/1.5/2/3/5/7 steps)
Dynamic range (IF bandwidth 10 Hz)	130 dB, typ. 135 dB

MEASUREMENT SPEED

Measurement time per point				125 µs
Source to receiver port switchover time				10 ms
Typical sweep times versus number of measurement points				
Number of points	51	201	401	1601
Start 300 kHz, stop 10 MHz, IF bandwidth 30 kHz				
Uncorrected	13 ms	52 ms	104 ms	413 ms
Full two-port calibration	46 ms	123 ms	226 ms	844 ms
Start 10 MHz, stop 3.2 GHz, IF bandwidth 30 kHz				
Uncorrected	7 ms	27 ms	53 ms	207 ms
Full two-port calibration	34 ms	73 ms	125 ms	434 ms

MEASUREMENT ACCURACY

Accuracy of transmission measurements (magnitude / phase)	
+15 dB to +5 dB	0.2 dB / 2°
+5 dB to −50 dB	0.1 dB / 1°
−50 dB to −70 dB	0.2 dB / 2°
−70 dB to −90 dB	1.0 dB / 6°

Accuracy of reflection measurements (magnitude / phase)	
0 dB to −15 dB	0.4 dB / 4°
−15 dB to −25 dB	1.5 dB / 7°
−25 dB to −35 dB	4.0 dB / 22°

Trace stability	
Trace noise magnitude (IF bandwidth 3 kHz)	1 mdB rms
Temperature dependence (per one degree of temperature variation)	0.02 dB

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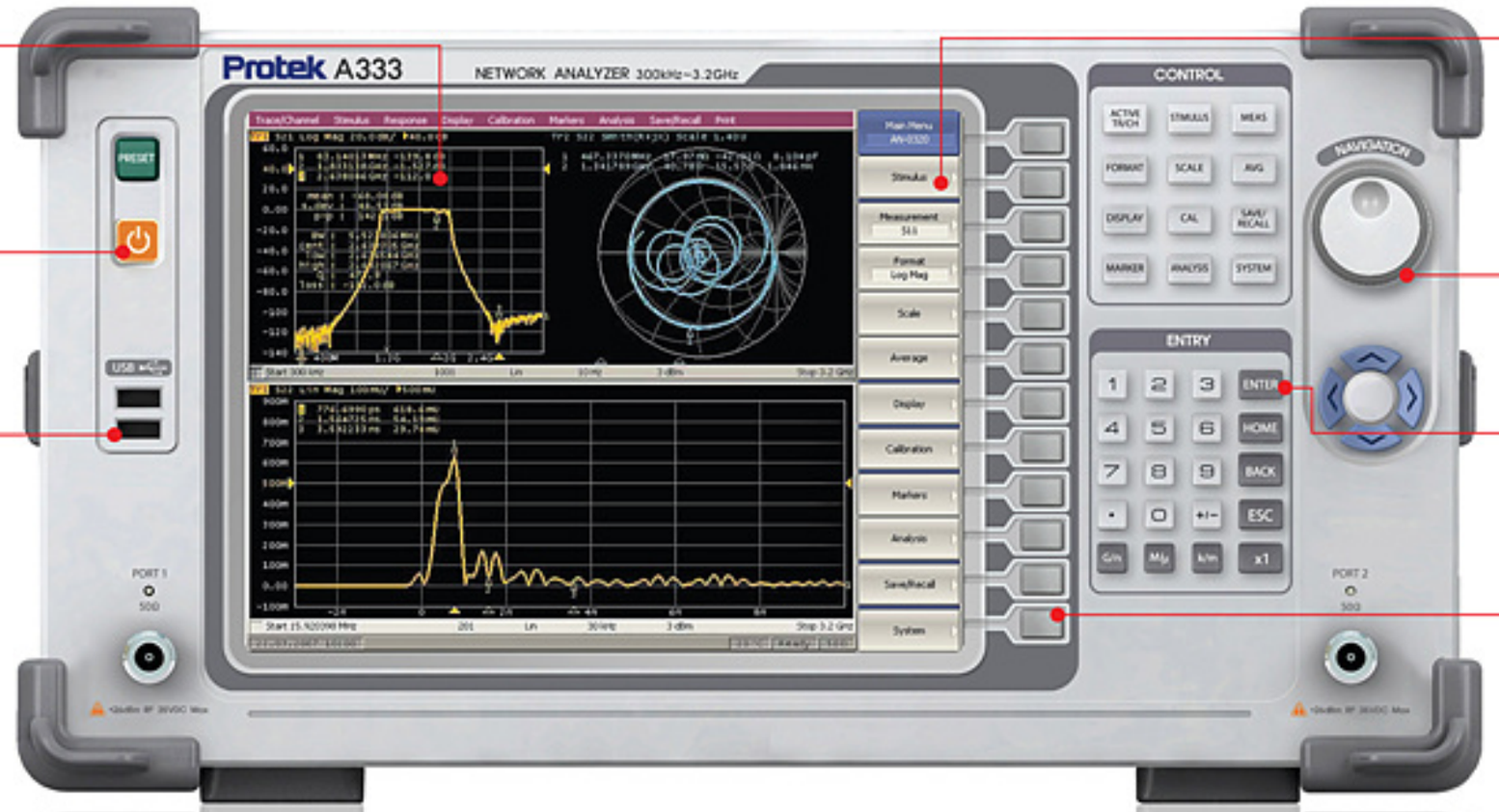


TFT Color LED (10.4-inch)
Daylight viewable high resolution LCD display

POWER & LED
Power On/ Off
Green LED:
Power On Status
Red LED:
External power

USB
Instrument states, calibration data, and trace data can be stored on an external USB drive

SCREEN MENU
Display selectable menuin connection with function keys or soft keys

KNOB / ARROW
Move marker positions or items on the table list

ENTER
Input numeric values

SOFT KEY
Select menu displayed on the screen

TEST PORT OUTPUT

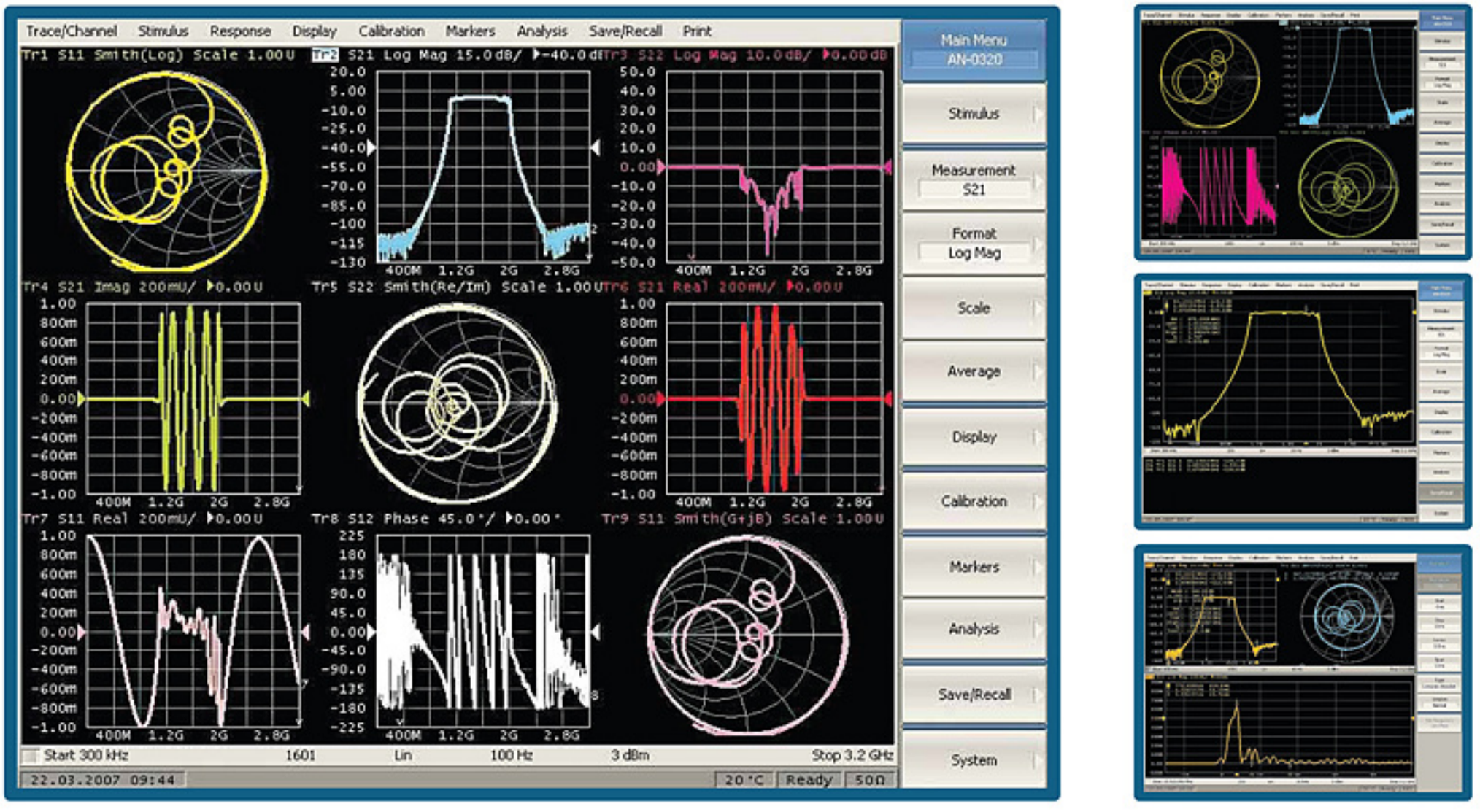
Match (without system error correction)	15 dB
Power range	−45 dBm to +10 dBm
Power accuracy	±1.0 dB
Power resolution	0.05 dB
Harmonics distortion	−30 dBc

TEST PORT INPUT

Match (without system error correction)	25 dB
Damage level	+26 dBm
Damage DC voltage	35 V
Noise level (defined as the rms value of the specified noise floor, IF bandwidth 10Hz)	−120 dBm

GENERAL DATA

Operating temperature range	+5℃ to +40℃
Storage temperature range	−45℃ to +55℃
Humidity	90% at 25℃
Atmospheric pressure	84 to 106.7 kPa
Power supply	100 to 240 VAC/47 to 63Hz
Power consumption	30 W
Conformity Mark	CE
Dimensions(L × W × H)	426 x 222 x 270mm
Weight	10.6kg



MEASUREMENT CAPABILITIES

Measured parameters	S11, S21, S12, S22
Number of measurement channels	Up to 16 independent logical channels. A logical channel is defined by such stimulus signal settings as frequency range, number of test points, power level, etc. Each logical channel is represented on the screen as an individual channel window.
Data traces	Up to 16 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 16 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.
Data markers	Up to 16 markers for each trace. Reference marker 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.

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MARKER FUNCTIONS

Marker search	Search for max value, min value, peak, peak left, peak right, target, target left, target right, and bandwidth parameters.
Marker search additional features	Setting of search range; a specific value tracking or single operation search functions.
Parameter setting 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.

SWEEP FEATURES

Measured points per sweep	Set by the user from 2 to 10001
Sweep type	Linear frequency sweep, logarithmic frequency sweep, and segment frequency sweep, when the stimulus power is a fixed value; and linear power sweep when frequency is a fixed value.
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 -45 dBm to +10 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. Trigger sources: internal, manual, external.

TRACE FUNCTIONS

Trace display	Data trace, memory trace, or simultaneous indication 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 to have the trace most effectively displayed.
Electrical delay	Calibration plane moving to compensate for the delay in low-loss test setup. Compensation for electrical delay in a DUT during measurements of deviation from linear phase.
Phase offset	Phase offset defined in degrees.
Statistics	Calculation and display of mean, standard deviation, and peak-to-peak deviation for a data trace.

OTHER FEATURES

Familiar graphical user interface	Graphical user interface based on Windows operating system ensures fast and easy Analyzer operation by the user.
Analyzer control	Using personal computer.
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.
Programming Functions	COM/DCOM automation.

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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	Calibration methods of various sophistication and accuracy enhancement level are available. The most accurate among them are full one-port calibration and full two-port calibration.
Reflection and transmission normalization	Magnitude and phase correction of frequency response errors for reflection or transmission measurements.
Full one-port calibration	Magnitude and phase correction of frequency response, correction of directivity, and source match errors for one-port reflection measurements
One-path two-port calibration	Performed for reflection and one-way transmission measurements. Similar to one-port calibration for reflection measurements. Magnitude and phase correction of frequency response, and correction of source match errors for transmission measurements.
Full two-port calibration	Performed for full S-parameter matrix measurement of a DUT. Magnitude and phase correction of frequency response for reflection and transmission measurements, correction of directivity, source match, load match, and isolation. Isolation calibration can be omitted.
Directivity calibration (optional)	Correction of directivity additionally to reflection normalization.
Isolation calibration (optional)	Correction of isolation additionally to transmission normalization, one-path two-port calibration, or full two-port calibration.
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, interpol-ation or extrapolation of the calibrations will be applied.
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 from the measurement result the effect of the fixture circuit connected between the calibration plane and the DUT 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, and inverse S-parameters.
Time domain transformation	Transformation of measured data from frequency domain into time domain using Chirp Z Transform. Transformation types: bandpass, lowpass impulse, and lowpass step Transformation windows available: minimum, normal, maximum.
Gating	Gating filter types: bandpass and notch. Gating windows available: wide, normal and minimum.

GSI GS Instruments Co., Ltd.
1385-14, Juan-dong,Nam-ku, Incheon 402-200, Korea

Overseas Sales
82-32-870-5631
isale@gsinstrument.com
www.gsinstrument.com

Domestic Sales
82-32-870-5641
protek@gsinstrument.com