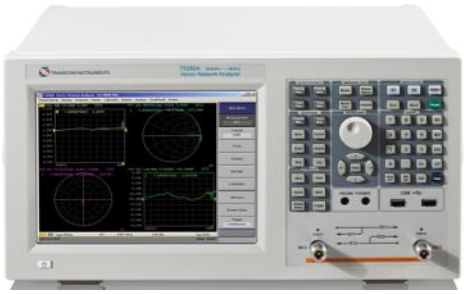
TRANSCOM INSTRUMENTS

Transforming concept into great user experience

A–Series
Vector Network Analyzer

Transcom Vector Network Analyzer



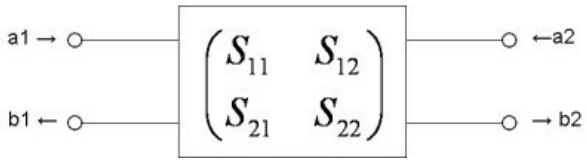
T5280A

T5281A

T5280A | T5281A

300 kHz – 8 GHz

Datasheet



T5280A and T5281A cover a wide range of frequencies from 300 kHz to 8 GHz. User can experience the advantage of large dynamic range and full Two-Ports S-Parameters measurement. This high performance VNA can achieve high levels of accuracy, stability and measurement speed. It is widely used in microwave device measurement in wireless communication, radar devices, semiconductors and many more. T5280A is a bench-top instrument highly suitable for indoor testing whereas T5281A is a portable version, which is specifically designed to facilitate field-testing. Both models have the same set of specification.

Main Features

Large frequency range
300 kHz to 8 GHz

Large dynamic range
>125 dB (IFBW=10 Hz), 130 dB typical

Low noise level
<-120 dB (IFBW=10 Hz)

Low trace noise
1 mdB rms (IFBW=3 kHz)

High measurement speed
100 μs/point (IFBW=30 kHz)

High effective directivity
>45 dB

Remote Control
LAN/GPIB/USB

Very low power consumption
60 W

"One-Key-Test" solution

Specifications Overview

Measurement Range	
Impedance	50Ω, 75Ω[1]
Test port connector	N-type, female
Number of test ports	2
Frequency range	300kHz to 8GHz
Full CW frequency accuracy	±5×10^{-6}
Frequency resolution	1Hz
Number of measurement points	2 to 10001
Measurement bandwidths	1Hz to 30kHz (in 1 / 1.5 / 2 / 3 / 5 / 7 steps)
Dynamic range (IF bandwidth 10 Hz)	125dB, typ.130dB

[1] Use 75Ω connector via adapter

Measurement Accuracy		
Accuracy of transmission measurements (magnitude / phase)		
	+5dB to +15dB	0.2dB/2º
	-50dB to +5dB	0.1dB/1º
	-70dB to -50dB	0.2dB/2º
	-90dB to -70dB	1.0dB/6º
Accuracy of reflection measurements (magnitude / phase)		
	-15dB to 0dB	0.4dB/3º
	-25dB to -15dB	1.0dB/6º
	-35dB to -25dB	3.0dB/20º
Trace stability		
Trace noise magnitude (IF bandwidth 3 kHz)	1mdB rms	
Temperature dependence (per one degree of temperature variation)	0.02dB	

Effective System Data1	
Effective directivity	45 dB
Effective source match	40 dB
Effective load match	45 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 full two-port calibration temperature, at output power of -5 dBm and IF bandwidth 10 Hz.

Test Port Output	
Match (w/o system error correction)	18 dB
Power range	
300 kHz to 6.0 GHz	-60dBm to +10dBm
6.0 GHz to 8.0 GHz	-60dBm to +5dBm
Power accuracy	±1.5dB
Power resolution	0.05dB
Harmonics distortion	< -25dBc
Non harmonics distortion	< -30dBc

Test Port Input	
Match (w/o system error correction)	18 dB
Damage level	+26dBm
Damage DC voltage	+35V
Noise level (IF bandwidth 10 Hz)	< -125dBm

Measurement Speed				
Measurement time per point	100µs			
Source to receiver port switchover time	< 10ms			
Typical cycle times versus number of measurement points (IFBW 30kHz)	51	201	401	1601
Uncorrected (Start 300kHz, stop 10MHz)	13.1ms	51.3ms	102.3ms	408.3ms
Full two-port calibration (Start 300kHz, stop 10MHz)	45.5ms	122.0ms	230.5ms	840.5ms
Uncorrected (Start 10MHz, stop 8GHz)	6.5ms	21.1ms	40.5ms	157.7ms
Full two-port calibration (Start 10MHz, stop 8GHz)	32.4ms	61.7ms	100.3ms	333.0ms

General Data	
Display	10.4 inch TFT color LCD, touch screen
External trigger input connector	BNC female, Input level range: 0 to +5 V
External reference frequency	BNC female; 10 MHz; 2 dBm ± 2 dB
VGA video output	15-pin mini D-Sub; female; driving the VGA compatible monitors
GPIB connector (optional)	24-pin D-Sub (type D-24), female; compatible with IEEE-488
USB connector	Female; provides connection to printer, ECal module, USB storage
LAN connector	10/100/1000 Base T Ethernet, 8-pin configuration
Operating temperature range	+5°C to +40°C
Storage temperature range	-45°C to +55°C
Humidity	90% (25°C)
Atmospheric pressure	84 to 106.7 kPa
Calibration interval	3 years
Power supply	220 ± 22 V (AC), 50 Hz
Power consumption	60W
Dimensions (W × H × D) in mm	440 × 231 × 360 (T5280A) 350 × 220 × 150 (T5281A)
Weight	12.5 kg (T5280A) 7.1 kg (T5281A)

T5281A

T5280A

Measurement Capabilities	
Measured parameters	S_{11}, S_{12}, S_{21} & S_{22}
Number of measurement channels	Up to 16 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 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 and imaginary parts, Smith chart diagram and polar diagram.

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 –60 dBm to +10 dBm with resolution of 0.05 dB. In frequency sweep mode the power slope can be set 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

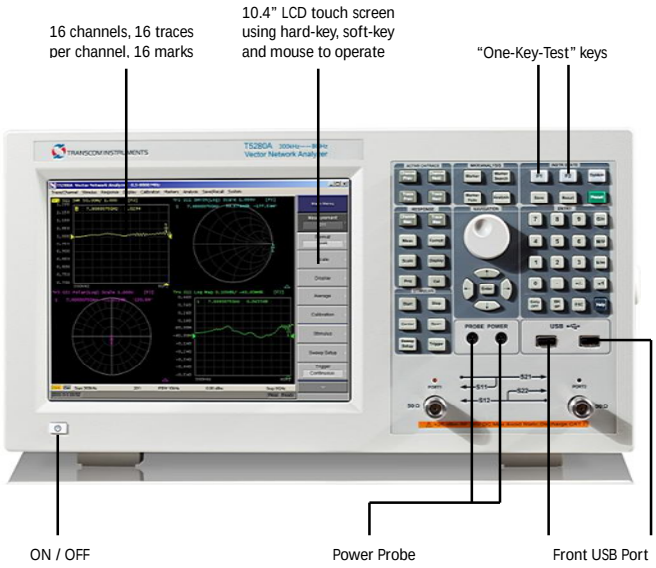
Trace Functions	
Trace display	Data trace, memory trace or simultaneous indication of data and memory traces.
Trace math	Data trace modification by math operations: addition, subtraction, multiplication or division of measured complex values and memory data.
Autoscaling	Automatic selection of scale division and reference level value to have the trace most effectively displayed.
Electrical delay	Calibration plane moving to compensate for the delay in low-loss tests setup. Compensation for electrical delay in a DUT during measurements of deviation from linear phase.
Phase offset	Phase offset defined in degrees
Statistics	Caculation and display of mean, standard deviation and peak-to-peak deviation for a data trace.

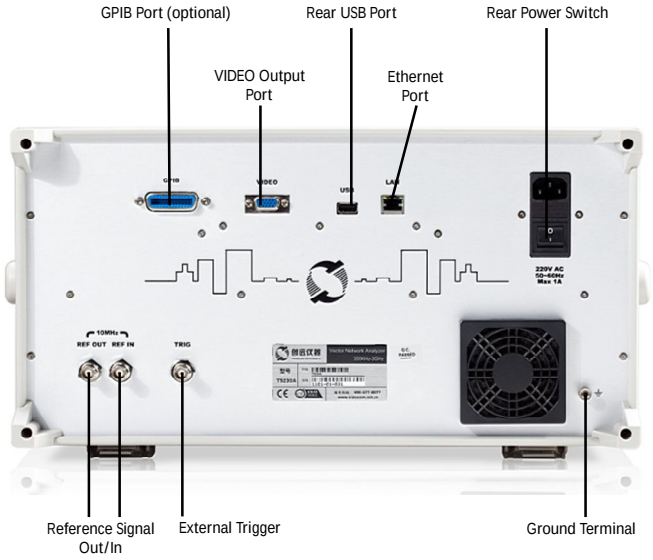
Accuracy Enhancement	
Calibration	Calibration of a test setup (which includes the Analyzer, cables and adapters) significantly increases the accuracy of measurements. Calibration allows for correction of the errors caused by imperfections in the measurement system: system directivity, source and load match, tracking and isolation.
Calibration methods	The following calibration methods with various sophistication and accuracy enhancement level are available: - reflection and transmission normalization; - full one-port calibration; - one-path two-port calibration; - full two-port calibration;
Reflection and transmission normalization	Simplest calibration method. It offers low accuracy.
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. For example, measuring S11 and S21 parameters. It ensures high accuracy for reflection measurement and mean accuracy for transmission measurement.
Full two-port calibration	Method of calibration performed for full S-parameter matrix measurement of a two-port DUT. It ensures high accuracy.
Directivity calibration (optional)	Correction of directivity additional to the reflection normalization.
Isolation calibration (optional)	Correction of isolation additional to transmission normalization, one-path two-port calibration or full two-port calibration.
Error correction interpolation	When the user changes the settings such as start/stop frequencies and number of sweep points, which are different from the settings at the time of calibration, interpolation or extrapolation of the calibration coefficients will be applied.

Marker Functions	
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, andreal/imaginary.
Reference marker	Enables indication of any maker values as 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. A function for specific condition tracking or single operation search.
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
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 the bandwidth between cutoff frequency points of an active marker or absolute maximum. The bandwidth value, center frequency, upper and lower frequencies, Q value and insertion loss are displayed.

Data Analysis	
Port impedance conversion	The function of conversion of the S-parameters measured at 50Ω port into the values, which could be determined if measured at a test port with an 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	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 what allows for obtaining 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.
Limit Test	The limit test is a function to perform the pass/fail judgment based on the limit line you set in the limit table. In limit test, if the measured value is within the upper or lower limits indicated by the limit lines, the result is pass; if it is exceeded, the result is fail for all measurement points on the trace. Measurement points in the stimulus range with no limit lines are consider pass.
Ripple Test	The ripple test is a function for evaluating the results on a pass/fail basis based on the ripple limit, which is set using the ripple limit table. You can specify up to 12 frequency bands, which permits a test for each frequency band.

Front and Rear Panels





Product specification and description in this document subject to change without notice

Transcom VNA Calibration Kit

Transcom has a wide selection of VNA Calibration Kit. Ranges from 3GH to 9GHz. Each kit comes with 8 units of calibrator with eith N-type or SMA connectors enclosed in a wooden box. Torque wrench is also included in the kit.

Specification	5301N50	5901N50	5902S50
Impedance	50Ω	50Ω	50Ω
Frequency	DC – 3GHz	DC – 9GHz	DC – 9GHz
Open return loss	DC - 3GHz, -0.066dB	DC - 3GHz, -0.024dB 3GHz - 9GHz, 0.056dB	DC - 3GHz, -0.024dB 3GHz - 9GHz, 0.056dB
Short return loss	DC - 3GHz, 0.02dB	DC - 3GHz, -0.02dB 3GHz - 9GHz, -0.05dB	DC - 3GHz, -0.02dB 3GHz - 9GHz, -0.05dB
Load return loss	DC - 3GHz, -40.6dB	DC - 3GHz, -58dB 3GHz - 9GHz, -45dB	DC - 3GHz, -58dB 3GHz - 9GHz, -45dB
Through return loss	DC - 3GHz, -30dB	DC - 3GHz, -50dB 3GHz - 9GHz, -40dB	DC - 3GHz, -50dB 3GHz - 9GHz, -40dB
Power	2W	2W	2W
Teperature	+5°C to +40°C	+5°C to +40°C	+5°C to +40°C
Connector	N-Type	N-Type	SMA

ATE – Automated Test Environment

ATE is a test platform that is independent of VNA. The control of ATE is composed of configuration file, state file and ATE test software. The configuration file is a logic script which serves as the test recipe. The state file stores the state of the VNA for each particular test. It provides the environment for the configuration file.
ATE software can be purhased as an option. When installed, it appears as a functional button on the VNA menu.

VNA Test Cable Assembly

Transcom VNA test cable has the excellent phase and amplitude stability with an integrated environmental protection system for reliable, repeatable measurements over a long service life.

Depending on the type of test, test cable with different frequency range and connector assembly can be purchased.

Specification	T5_RFCAB-NmNm_18101	T5_RFCAB-NmSMAm_18102	T5_RFCAB-NmNm_60101	T5_RFCAB-NmSMAm_60102
Impedance	50Ω	50Ω	50Ω	50Ω
Frequency	18GHz	18GHz	6GHz	6GHz
Insertion loss	<2.2dB@18GHz	<2.2dB@18GHz	<1.2dB @ 6GHz	<1.2dB @ 6 GHz
Amplitude stability	<0.05dB@18GHz	<0.05dB@18GHz	<0.1dB@6GHz	<0.1dB@6GHz
Phase stability	<2º@18GHz & <1º@6GHz	<2º@18GHz & <1º@6GHz	<1.5º@6GHz	<1.5º@6GHz
Return loss	<1.15@18GHz	<1.15@18GHz	<1.35@6GHz	<1.35@6GHz
Cable length	1m	1m	1m	1m
Min. bend radius	20mm	20mm	25mm	25mm
Connector A	N-male	N-male	N-male	N-male
Connector B	N-male	SMA-male	N-male	SMA-male
Temperature	-55°C to +100°C	-55°C to +100°C	-45°C to +85°C	-45°C to +85°C

Vector Network Analyzer – Ordering Information

T5280A
Package content is specified in description

Description
Bench-top Vector Network Analyzer – 300 kHz to 8 GHz
CD User Guide
Trascom Calibration Certificate

T5281A
Package content is specified in description

Description
Portable Vector Network Analyzer – 300 kHz to 8 GHz
CD User Guide
Transcom Calibration Certificate

ATE, Automated Test Environment

Description
CD – ATE Installer
ATE user / programming guide

Transcom VNA Calibration Kit, 5901N50

Description
High precision calibration kit, DC to 9 GHz, 50Ω, 8 units per kit
SHORT N-male, SHORT N-female
OPEN N-male, OPEN N-female
LOAD N-male, LOAD N-female
THROUGH N-male to N-male, THROUGH N-female to N-female
Torque wrench
Wooden box

VNA Test Cable
T5_RFCAB-NmNm_18101
T5_RFCAB-NmSMAm_18102
T5_RFCAB-NmNm_60101
T5_RFCAB-NmSMAm_60102

Description
DC to 18GHz, 50Ω, N(m)-N(m) , 1m
DC to 18GHz, 50Ω, N(m)-SMA(m), 1m
DC to 6GHz, 50Ω, N(m)-N(m), 1m
DC to 6GHz, 50Ω, N(m)-SMA(m), 1m

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Transcom Product Quality Guarantee

All Transcom products are tested under stringent factory test and quality standards set by CQM.