PVT360A
PERFORMANCE VECTOR TESTER

Specifications

Data Sheet
Version 03.00

ROHDE&SCHWARZ
Make ideas real

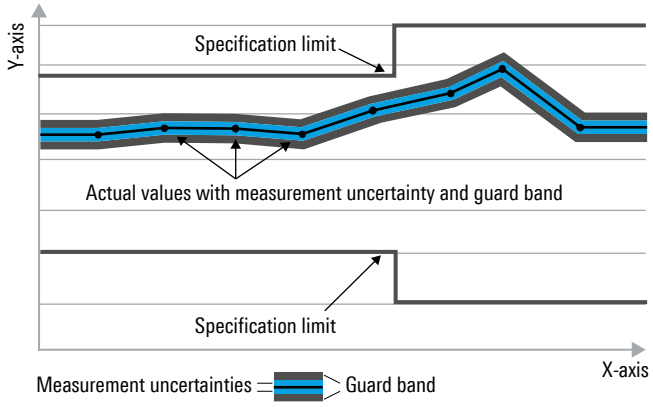
CONTENTS

Definitions

General
Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits
Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as <, ≤, >, ≥, ±, or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Non-traceable specifications with limits (n. trc.)
Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

Specifications without limits
Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)
Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)
Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)
Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties
Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

General technical specifications

Functions

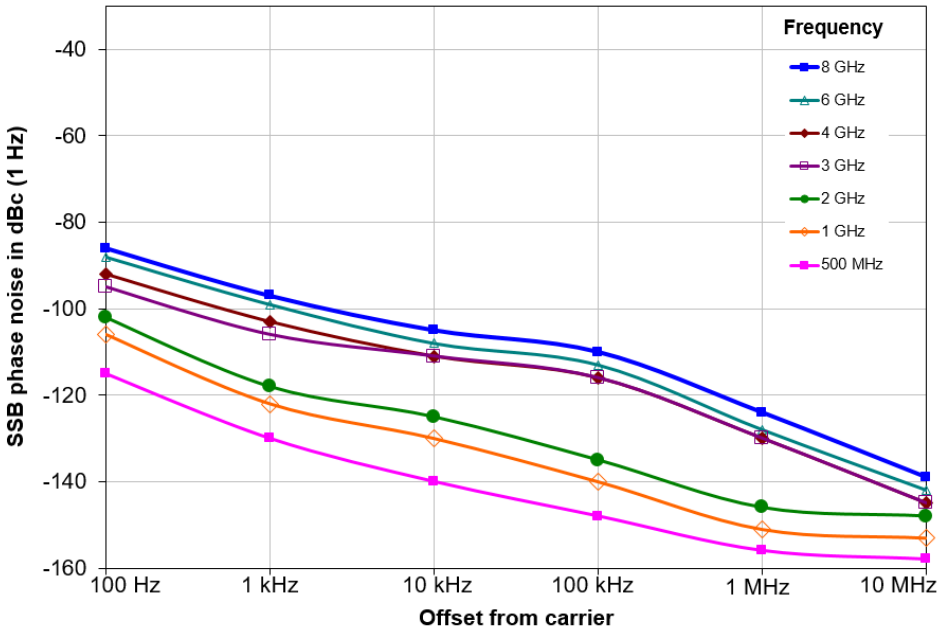
General functions		• dual generator/receiver (TRX) concept with 1 to 8 port switch matrix for each signal source/receiver path • simultaneous receiver and transmitter testing supported
	available configurations	
	R&S®PVT-B106 option (mandatory)	first TRX (TRX1)
	R&S®PVT-KB206 option	second TRX (TRX2)
Receiver test functions		• RF generator signal is split and forwarded to 8 output ports each • every output can be switched off separately • collective output level setting for connectors RF 1.1 to RF 1.8 and RF 2.1 to RF 2.8 • frequency-dependent attenuation (FDA) table for user-specific corrections, separate for connectors RF 1.1 to RF 1.8 and RF 2.1 to RF 2.8
Transmitter test functions		• 8 input signals to be multiplexed to RF analyzer no. 1 • 8 input signals to be multiplexed to RF analyzer no. 2 • frequency-dependent attenuation (FDA) tables for user-specific corrections, separate for connectors RF 1.1 to RF 1.8 and RF 2.1 to RF 2.8

Frequency reference/timebase

Maximum frequency drift	temperature range: 0 °C to +50 °C, referenced to +25 °C	$\pm 5 \times 10^{-9}$
Retrace	at +25 °C, after 24 h power on/2 h power off/ 1 h power on	$\pm 5 \times 10^{-9}$
Maximum aging	at +25 °C, after 10 days of continuous operation	$\pm 3 \times 10^{-8}$/year, $\pm 5 \times 10^{-10}$/day
Warm-up time	at +25 °C, the frequency is in the order of 10 times the frequency drift ($\pm 5 \times 10^{-8}$)	approx. 10 min
Achievable initial calibration accuracy		$\pm 5 \times 10^{-9}$

Spectral purity RX and TX

SSB phase noise (1 Hz)		
SSB phase noise vs. carrier offset, RF x.1 to RF x.8	frequency = 1 GHz, carrier offset	
	10 kHz	< –120 dBc
	100 kHz	< –135 dBc
	1 MHz	< –145 dBc
	10 MHz	< –150 dBc
SSB phase noise vs. frequency, RF x.1 to RF x.8	carrier offset 100 kHz, frequency	
	500 MHz	< –145 dBc
	1 GHz	< –135 dBc
	2 GHz	< –130 dBc
	3 GHz	< –115 dBc
	4 GHz	< –110 dBc
	6 GHz	< –108 dBc
	8 GHz	< –103 dBc



Typical phase noise at different frequencies

RF generator

Frequency

Frequency range	B106 (TRX1) or KB206 (TRX2) option	400 MHz to 6000 MHz
	KB108 (TRX1) or KB208 (TRX2) option	400 MHz to 8000 MHz
Frequency resolution		0.1 Hz
Frequency uncertainty		same as timebase + frequency resolution
Frequency settling time		< 400 µs (nom.)

Bandwidth

RF bandwidth		
RF x.1 to RF x.8	standard	250 MHz
	KB505 (TRX1) or KB605 (TRX2) option	500 MHz

TX level

Output level range		
RF x.1 to RF x.8	400 MHz to 6000 MHz	
	continuous wave (CW)	–130 dBm to +8 dBm
	peak envelope power (PEP)	up to +8 dBm
	6000 MHz to 8000 MHz	
	continuous wave (CW)	–130 dBm to +6 dBm
	peak envelope power (PEP)	up to +6 dBm
Output level uncertainty		
RF x.1 to RF x.8	output level > –120 dBm, temperature range: +15 °C to +35 °C [1]	
	400 MHz to 1000 MHz	< ±1.0 dB
	1000 MHz to 2000 MHz	< ±0.8 dB
	2000 MHz to 3800 MHz	< ±1.0 dB
	3800 MHz to 6000 MHz	< ±0.8 dB
	6000 MHz to 8000 MHz	< ±1.0 dB
	output level > –120 dBm, temperature range: +5 °C to +15 °C and +35 °C to +45 °C [1]	
	400 MHz to 1000 MHz	< ±1.0 dB
	1000 MHz to 2000 MHz	< ±0.85 dB
	2000 MHz to 3800 MHz	< ±1.2 dB
	3800 MHz to 8000 MHz	< ±1.0 dB
Output level linearity with fixed RF output attenuator setting using digital gain		
RF x.1 to RF x.8	digital gain: 0 dB to –20 dB	< 0.1 dB
Output level settling time	to within 0.1 dB	< 10 µs
Level repeatability (attenuator switching uncertainty)	typical values after 1 hour warm-up time, always returning to same level and frequency, no temperature change, insignificant time change	< 0.01 dB
Spectral flatness (inband, 95 % confidence level)		
RF x.1 to RF x.8	±50 MHz	±0.27 dB
	±100 MHz	±0.33 dB
	±125 MHz	±0.40 dB
	±200 MHz, KB505 (TRX1) or KB605 (TRX2) option	±0.60 dB
	±250 MHz, KB505 (TRX1) or KB605 (TRX2) option	±1.25 dB

[1] After performing “Self Alignment, mode: Level”. Not more than ±5 °C from temperature at which alignment was performed. Be aware of humidity and aging effects. See user documentation for further information.

TX wideband noise

SNR		
RF x.1 to RF x.8	frequency range: 400 MHz to 3750 MHz	
	–25 dBm ≤ ENP < –20 dBm [2]	> 134 dB (1 Hz)
	–20 dBm ≤ ENP < –10 dBm [2]	> 142 dB (1 Hz)
	ENP ≥ –10 dBm [2]	> 147 dB (1 Hz)
	frequency range: 3750 MHz to 8000 MHz	
	–25 dBm ≤ ENP < –20 dBm [2]	> 130 dB (1 Hz)
	–20 dBm ≤ ENP < 0 dBm [2]	> 139 dB (1 Hz)
	ENP ≥ 0 dBm [2]	> 143 dB (1 Hz)
Wideband noise		
RF x.1 to RF x.8	CW, P_{out} > 0 dBm, carrier offset > 30 MHz	> 140 dBc (1 Hz) (nom.)

TX spurious responses

Attenuation of second harmonic		
RF x.1 to RF x.8	400 MHz to 8000 MHz, P_{out} < +3 dBm	> 20 dB
Attenuation of third harmonic		
RF x.1 to RF x.8	400 MHz to 8000 MHz, P_{out} < +3 dBm	> 40 dB
Third order intermodulation distortion		
RF x.1 to RF x.8	two –6 dBm tones at RF output frequency f ± 3.5 MHz (7 MHz carrier spacing), P_{out} = 0 dBm PEP	
	400 MHz ≤ f < 3 GHz	< –50 dBc
	3 GHz ≤ f ≤ 8 GHz	< –46 dBc
Nonharmonics		
RF x.1 to RF x.8	400 MHz to 8000 MHz, P_{out} < +3 dBm	< –70 dBc (meas.)

Modulation source: arbitrary waveform generator (ARB)

Memory size		4 Gbyte/channel
Word length	I/Q	32 bit (16 bit I + 16 bit Q)
	marker	8 bit
Maximum waveform length		800 Msample
Maximum sample rate	standard	312.5 MHz
	KB505 (TRX1) or KB605 (TRX2) option	625 MHz
Maximum possible RF bandwidth	depends on arbitrary waveform file	
	standard	250 MHz
	KB505 (TRX1) or KB605 (TRX2) option	500 MHz

[2] Expected nominal power (ENP) is a synonym for the term "reference level" used in signal analyzers.

RF analyzer

Frequency

Frequency range	B106 (TRX1) or KB206 (TRX2) option	400 MHz to 6000 MHz
	KB108 (TRX1) or KB208 (TRX2) option	400 MHz to 8000 MHz
Frequency resolution		0.1 Hz
Frequency readout		
Marker resolution		1 Hz
Uncertainty	normal markers	±(marker frequency × reference accuracy + ½ (span / (trace points –1)) + 1 Hz)
	peak search marker	±(marker frequency × reference accuracy + ½ (last digit))
Span	ranges supported for frequency axis	
	standard	10 MHz, 20 MHz, 40 MHz, 80 MHz, 160 MHz, 250 MHz
	KB505 (TRX1) or KB605 (TRX2) option additionally	500 MHz
Number of trace points	default value	801

Bandwidth

RF bandwidth		
RF x.1 to RF x.8	standard	250 MHz
	KB505 (TRX1) or KB605 (TRX2) option	500 MHz
Resolution bandwidth		span / FFT size
FFT size	supported values (1k = 1024)	1k, 2k, 4k, 8k, 16k

RX I/Q data

Memory size		512 Msamples/channel
Word length	I/Q	32 bit (16 bit I + 16 bit Q)
Data transfer word length	via remote control	64 bit (32 bit I + 32 bit Q, single precision float each)
Maximum sample rate	standard	312.5 MHz
	KB505 (TRX1) or KB605 (TRX2) option	625 MHz
Maximum analysis bandwidth	standard	250 MHz
	KB505 (TRX1) or KB605 (TRX2) option	500 MHz

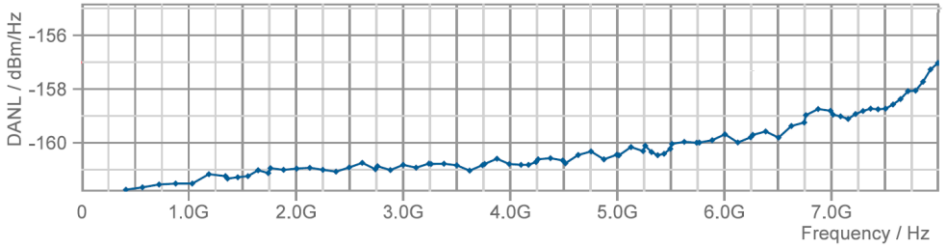
RX level

Maximum safe input level		
RF x.1 to RF x.8	continuous power (RMS)	+30 dBm
	continuous power (PEP)	+38 dBm
	DC voltage	0 V
Level display		
Trace detector		RMS, sample
ENP setting range [2]		
RF x.1 to RF x.8	expected nominal power for ADC full scale, 400 MHz to 8000 MHz	–47 dBm to +38 dBm
Level linearity with fixed expected nominal power setting		
RF x.1 to RF x.8	reference: ENP [2], ENP range: 0 dB to –40 dB	< 0.1 dB
Level repeatability		
Achievable level deviation when changing hardware settings	typical values after 1 hour warm-up time, always returning to same level and frequency, no temperature change, insignificant elapsed time	< 0.01 dB
Port switching time		
RF x.1 to RF x.8	to obtain the same level readout within ±0.1 dB	< 10 µs

Spectral flatness (inband, 95 % confidence level)		
RF x.1 to RF x.8	±50 MHz	±0.23 dB
	±100 MHz	±0.27 dB
	±125 MHz	±0.33 dB
	±250 MHz, KB505 (TRX1) or KB605 (TRX2) option	±0.67 dB
Total level measurement uncertainty, 95 % confidence level		
RF x.1 to RF x.8	temperature range: +15 °C to +35 °C [3]	
	400 MHz to 2400 MHz	< ±0.35 dB
	2400 MHz to 8000 MHz	< ±0.4 dB
	temperature range: +5 °C to +15 °C and +35 °C to 45 °C [3]	
	400 MHz to 8000 MHz	< ±0.5 dB

RX sensitivity

RX DANL	temperature range: +15° C to +35° C	
RF x.1 to RF x.8	400 MHz to 1000 MHz	< –161 dBm (1 Hz)
	1000 MHz to 4000 MHz	< –160 dBm (1 Hz)
	4000 MHz to 6000 MHz	< –159 dBm (1 Hz)
	6000 MHz to 7400 MHz	< –157 dBm (1 Hz)
	7400 MHz to 8000 MHz	< –155 dBm (1 Hz)



RX DANL measured values (meas.)

SNR		
RF x.1 to RF x.8	frequency range: 400 MHz to 3750 MHz	
	–25 dBm ≤ ENP < –20 dBm [2]	> 133 dB (1 Hz)
	–20 dBm ≤ ENP < –10 dBm [2]	> 138 dB (1 Hz)
	–10 dBm ≤ ENP < 5 dBm [2]	> 146 dB (1 Hz)
	ENP ≥ 5 dBm [2]	> 150 dB (1 Hz)
	frequency range: 3750 MHz to 8000 MHz	
	–25 dBm ≤ ENP < –20 dBm [2]	> 130 dB (1 Hz)
	–20 dBm ≤ ENP < –10 dBm [2]	> 134 dB (1 Hz)
	–10 dBm ≤ ENP < 5 dBm [2]	> 143 dB (1 Hz)
	ENP ≥ 5 dBm [2]	> 147 dB (1 Hz)

[3] After performing “Self Alignment, mode: Level”. Not more than ±5 °C from temperature at which alignment was performed. Be aware of humidity and aging effects. See user documentation for further information.

RX spurious responses

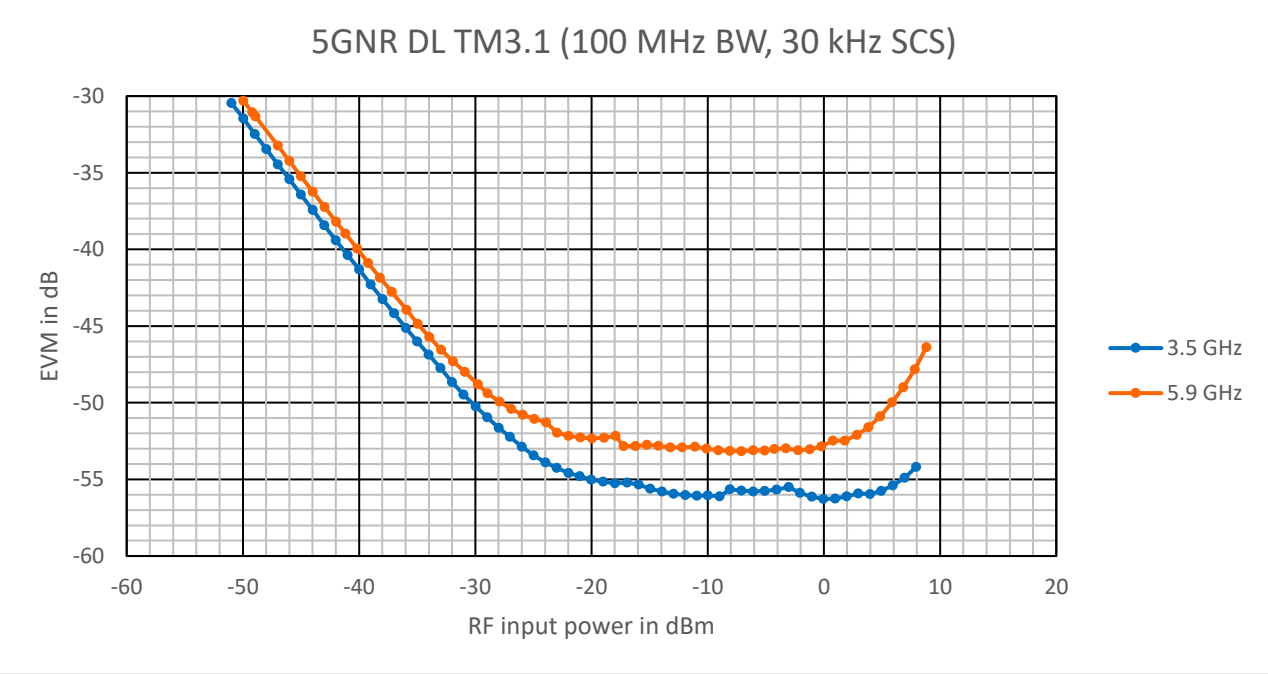
ADC/LO related spurious response	ENP: –20 dBm, 400 MHz to 8000 MHz [2]	
RF x.1 to RF x.8	1 kHz ≤ carrier offset ≤ 10 MHz	< –70 dBc (meas.)
	carrier offset > 10 MHz	< –70 dBc (meas.)
Residual spurious response	no input signal, ENP –20 dBm [24]	
RF x.1 to RF x.8	3750 MHz	< –70 dBFS (nom.)
	5000 MHz, 8000 MHz	< –80 dBFS (nom.)
	500 MHz, 937.5 MHz, 1250 MHz, 1562.5 MHz, 2500 MHz, 6000 MHz, 6250 MHz, 7000 MHz, 7500 MHz	< –85 dBFS (nom.)
	all other frequencies in the range from 400 MHz to 8000 MHz	< –90 dBFS
Second harmonic response		
RF x.1 to RF x.8	f_{in} = 400 MHz to 4000 MHz, $f_{selected}$ = 800 MHz to 8000 MHz	< –30 dBc (nom.)
Third order intermodulation distortion		
RF x.1 to RF x.8	two –20 dBm tones at RF input frequency f ± 3.5 MHz (7 MHz carrier spacing), ENP: –17 dBm [2]	
	400 MHz ≤ f < 3.75 GHz	< –58 dBc
	3.75 GHz ≤ f ≤ 8 GHz	< –53 dBc

[4] Expected nominal power (ENP) is a synonym for the term "reference level" used in signal analyzers. The indicated ENP is the reference for the related dBFS specifications.

Options

R&S®PVT-KM320/-KM322/-KM326 option, 5G NR measurements, downlink

EVM		
RX, RF x.1 to RF x.8	FR1, bandwidth: 100 MHz, SCS: 30 kHz, 16QAM	
	400 MHz ≤ f ≤ 6 GHz	
	level ≥ –25 dBm	< 0.3 % (meas.)
	6 GHz < f ≤ 8 GHz	
	level ≥ –25 dBm	< 0.5 % (meas.)
TX, RF x.1 to RF x.8	FR1, bandwidth: 100 MHz, SCS: 30 kHz, 16QAM	
	level > –20 dBm	< 0.5 % (meas.)



EVM 5G NR DL TM3.1, 100 MHz bandwidth, 30 kHz SCS, 16QAM, RX vs. RF input power (meas.), signal source: R&S®SMW200A with low phase noise option

R&S®PVT-KM321/-KM323/-KM325 option, 5G NR measurements, uplink

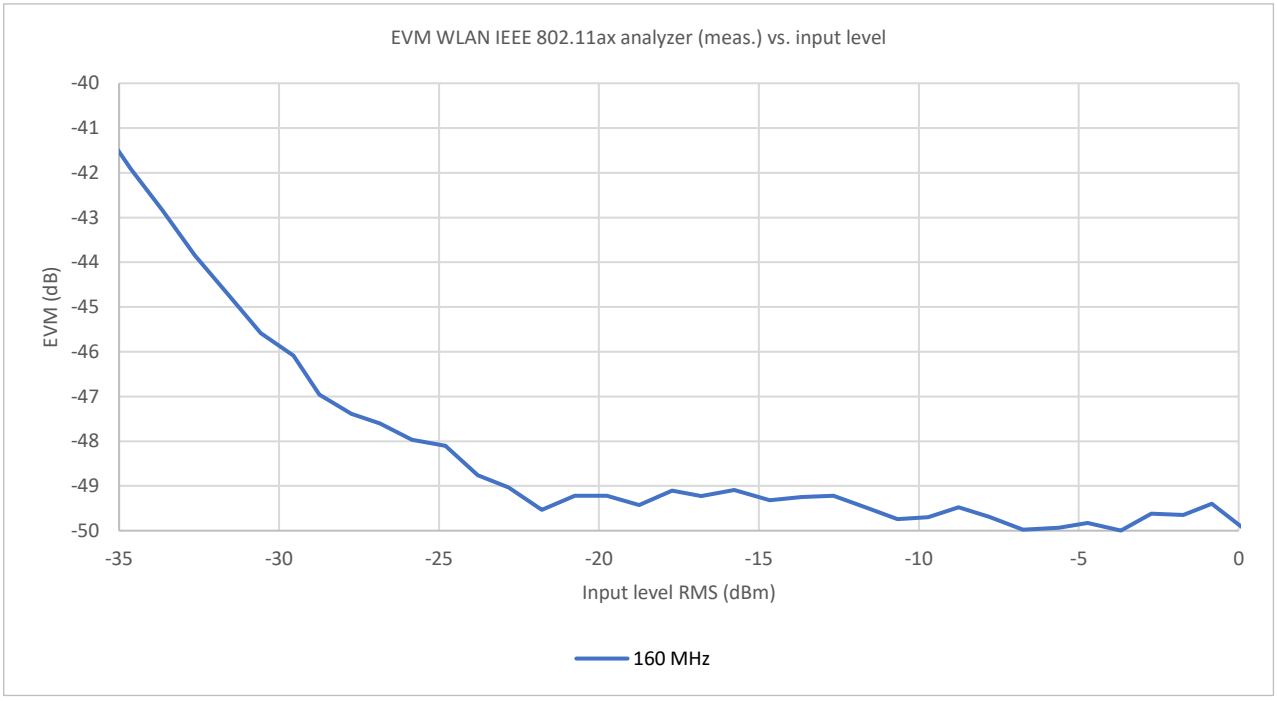
EVM		
RX or TX, RF x.1 to RF x.8	FR1, bandwidth: 100 MHz, SCS: 30 kHz, 16QAM	
	level > –20 dBm	< 0.5 %

R&S®PVT-KM311 LTE and LTE-A measurements, uplink

EVM		
RX or TX, RF x.1 to RF x.8	FR1, bandwidth: 20 MHz, SCS: 30 kHz, 16QAM	
	f ≤ 3.75 GHz, level > –20 dBm	< 0.3 %
	f > 3.75 GHz, level > –20 dBm	< 0.5 %

R&S®PVT-KM411 option, WLAN measurements, IEEE 802.11ax extension

EVM	channel estimation: payload, burst length: > 16 symbols, average: > 20 packets, temperature range: +15 °C to +35 °C	
	input level: –16 dBm	
	bandwidth: 160 MHz	< –46 dB



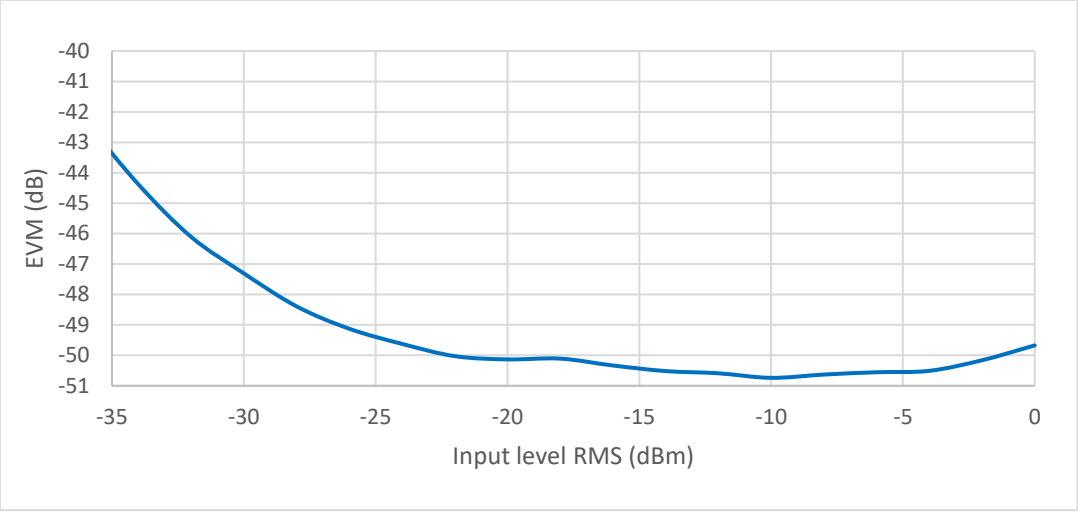
EVM WLAN IEEE 802.11ax analyzer vs. input level at 6985 MHz (meas.)

R&S®PVT-KW411 option, waveform for ARB generator, WLAN IEEE 802.11ax extension

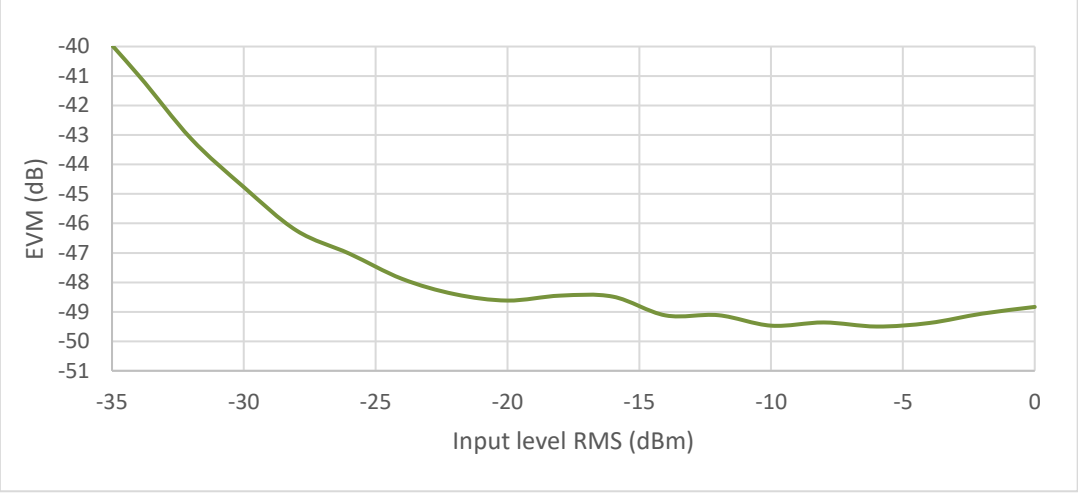
EVM	channel estimation: payload, burst length: > 16 symbols, average: > 20 packets, temperature range: +15°C to +35°C	
	output level: –5 dBm	
	bandwidth: 160 MHz	< –45 dB

R&S®PVT-KM412 option, WLAN measurements, IEEE 802.11be extension

EVM	channel estimation: payload, burst length: > 16 symbols, average: > 20 packets, temperature range: +15 °C to +35 °C	
	input level: > –20 dBm	
	bandwidth: 160 MHz	< –49 dB
	bandwidth: 320 MHz, KB505 (TRX1) or KB605 (TRX2) option	< –48 dB



EVM WLAN IEEE 802.11be 160 MHz analyzer vs. input power at 6985 MHz (meas.)



EVM WLAN IEEE 802.11be 320 MHz analyzer vs. input power at 6985 MHz (meas.)

R&S®PVT-KW412 option, waveform for ARB generator, WLAN IEEE 802.11be extension

EVM	channel estimation: payload, burst length: > 16 symbols, average: > 20 packets, temperature range: +15°C to +35°C	
	output level: –5 dBm	
	bandwidth: 160 MHz	< –45 dB
	bandwidth: 320 MHz, KB505 (TRX1) or KB605 (TRX2) option	< –43 dB

Inputs and outputs

RF input/output		
Impedance		50 Ω
Connector	RF generator/analyzer (TRX) no. 1, RF 1.1 to RF 1.8	8 × SnapN, RF input/output to DUT
	RF generator/analyzer (TRX) no. 2, RF 2.1 to RF 2.8	8 × SnapN, RF input/output to DUT
VSWR		
RF x.1 to RF x.8	400 MHz to 4000 MHz	< 1.6
	4000 MHz to 8000 MHz	< 2.0
Reference frequency inputs/outputs		
Synchronization input		Ref. In BNC connector, rear panel
Frequency	sine wave, square wave	10 MHz
Lock-in range		$\pm 7.5 \times 10^{-7}$
Input voltage range		0.5 V to 2 V (RMS)
Impedance		50 Ω
Synchronization output		Ref. Out BNC connector, rear panel
Frequency		10 MHz from internal reference or frequency at synchronization input
Output voltage		> 1.4 V (peak-to-peak)
Impedance		50 Ω
Remote control interface (rear panel)		
LAN		Ethernet RJ-45 connector, 1000 Mbps
Trigger interfaces (rear panel)		
Trig. A, Trig. B	trigger input/output with R&S®PVT-PB36H option	2 × BNC connector, levels: 1.8 V TTL, 2.5 V TTL, 3.3 V TTL
Additional interfaces (rear panel)		
USB	for keyboard, mouse, USB flash drive	2 × USB 3.1 connector
HDMI™	for external monitor	HDMI™ connector
DisplayPort	for external monitor	DisplayPort connector
Additional interfaces (front panel)		
USB	for keyboard, mouse, USB flash drive	2 × USB 2.0 and 1 × USB 3.0 type A connectors
Power sensor	for R&S®NRPx power sensors	8-pin socket

General data

Display		
Size		1.9" e-paper TFT EPD black/white display
Resolution		144 × 128 pixel
Environmental conditions		
Temperature	operating temperature range	+5 °C to +45 °C
	storage temperature range	–25 °C to +60 °C
Climatic loading		+40 °C, 80 % rel. humidity, steady state, in line with EN 60068-2-78
Altitude		
Maximum operating altitude	above sea level	4600 m (approx. 15100 ft)
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30/EU, UK: in line with Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091)	applied harmonized standards: • EN 61326-1 (industrial environment) • EN 55011 (class A)
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU, UK: in line with Electrical Equipment (Safety) Regulations 2016 (S.I. 2016/1101)	applied harmonized standard: EN 61010-1
	USA/Canada	applied standards: • UL 61010-1 • CAN C22.2 No. 61010-1
International approvals	VDE – Association for Electrical, Electronic and Information Technologies	VDE mark, certificate: 40049747
	CSA – Canadian Standards Association	$_{C}$CSA$_{US}$ mark, certificate: 70214983, file number: LR114196
	Korea – KC	R-R-RnS-CCMP2HG
RoHS	EU: in line with Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment, UK: in line with Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012/3032)	in line with EN IEC 63000
Mechanical resistance	nonoperating mode	
Vibration	sinusoidal	5 Hz to 55 Hz, 0.3 mm double amplitude const.; 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6
	random	8 Hz to 500 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810, method 516, procedure I
Recommended calibration interval		24 months
Warranty		1 year
Power rating		
Rated voltage		100 V to 240 V AC (± 10 %)
Rated frequency		50 Hz to 60 Hz (± 5 %)
Rated current		max. 7.3 A to 4.6 A
Power consumption		approx. 290 W
	standby, with OCXO warm/cold	max. 6 W/10 W
Dimensions	W × H × D, overall	465.1 mm × 106.5 mm × 555.5 mm (18.17 in × 4.20 in × 21.87 in)
	for rack mounting	1/1 19", 2 HU, 500 mm depth
Weight	base unit without options	approx. 15.2 kg (33 lb)

Ordering information

Designation	Type	Order No.
Base unit		
Performance vector tester, including power cables and getting started guide	PVT360A	1201.0002K36
PVT360A basic assembly	R&S®PVT-PB36H	1214.0106.09
Single instrument interface	R&S®PVT-B40H	1214.0112.09
RF unit, first TRX, frequency: 6 GHz, bandwidth: 250 MHz	R&S®PVT-B106H	1214.0129.09
Second TRX, frequency: 6 GHz, bandwidth: 250 MHz	R&S®PVT-KB206	1214.0141.02
Frequency options		
Frequency extension to 8 GHz, first TRX	R&S®PVT-KB108	1214.0135.02
Frequency extension to 8 GHz, second TRX	R&S®PVT-KB208	1214.0158.02
Baseband		
Bandwidth extension to 500 MHz, first TRX	R&S®PVT-KB505	1214.0164.02
Bandwidth extension to 500 MHz, second TRX	R&S®PVT-KB605	1214.0170.02
PVT360A smart channel	R&S®PVT-K108	1214.0187.02
Measurement options (software)		
LTE measurements, downlink	R&S®PVT-KM310	1214.0193.02
LTE and LTE-A measurements, uplink	R&S®PVT-KM311	1214.0206.02
5G NR measurements, downlink, Rel. 15/Rel. 16	R&S®PVT-KM320	1214.0241.02
5G NR measurements, downlink, multi-carrier extension	R&S®PVT-KM322	1214.0264.02
5G NR measurements, downlink, Rel. 17 extension	R&S®PVT-KM326	1214.0306.02
5G NR measurements, uplink, Rel. 15/Rel. 16/Rel. 17	R&S®PVT-KM321	1214.0258.02
5G NR measurements, uplink, multi-carrier extension	R&S®PVT-KM323	1214.0270.02
5G NR measurements, uplink, MIMO extension	R&S®PVT-KM325	1214.0293.02
Bluetooth® measurements, Bluetooth® Classic, Bluetooth® Low Energy to 5.3	R&S®PVT-KM400	1214.0335.02
WLAN measurements, IEEE 802.11a/b/g/n/ac	R&S®PVT-KM410	1214.0341.02
WLAN measurements, IEEE 802.11ax extension	R&S®PVT-KM411	1214.0358.02
WLAN measurements, IEEE 802.11be extension	R&S®PVT-KM412	1214.0364.02
WLAN measurements, True MIMO extension	R&S®PVT-KM413	1214.0370.02
Measurement applications with R&S®VSE		
R&S®VSE base software with PVT360A	R&S®VSE-PVT	1345.2401.02
Analog modulation analysis (AM/FM/PM)	R&S®VSE-KP7	1345.2460.02
Amplifier measurements	R&S®VSE-KP18	1345.2418.02
Direct DPD measurements	R&S®VSE-KP18D	1345.2424.02
Frequency response measurements	R&S®VSE-KP18F	1345.2430.02
Memory polynomial DPD	R&S®VSE-KP18M	1345.2447.02
Vector signal analysis	R&S®VSE-KP70	1345.2453.02
Multi-modulation analysis	R&S®VSE-KP70M	1345.2476.02
BER PRBS measurements	R&S®VSE-KP70P	1345.2482.02
OFDM signal analysis	R&S®VSE-KP96	1345.2499.02
GSM, EDGE, EDGE Evolution and VAMOS measurements	R&S®VSE-KP10	1345.2501.02
WCDMA FDD measurements, uplink/downlink	R&S®VSE-KP72	1345.2518.02
LTE FDD measurements, uplink/downlink	R&S®VSE-KP100	1345.2524.02
LTE-A and MIMO downlink measurements	R&S®VSE-KP102	1345.2530.02
LTE TDD measurements, uplink/downlink	R&S®VSE-KP104	1345.2547.02
LTE NB-IoT measurements, uplink/downlink	R&S®VSE-KP106	1345.2553.02
5G NR measurements, uplink/downlink, Rel. 15	R&S®VSE-KP144	1345.2560.02
5G NR MIMO measurements, downlink	R&S®VSE-KP146	1345.2576.02
5G NR measurements, uplink/downlink, Rel. 16	R&S®VSE-KP148	1345.2582.02
5G NR measurements, uplink/downlink, Rel. 17	R&S®VSE-KP171	1345.2599.02
O-RAN measurements	R&S®VSE-KP175	1345.2601.02
OneWeb measurements	R&S®VSE-KP201	1345.2618.02
R&S®WinIQSIM2 signal generation options (software)		
Waveform creator	R&S®PVT-KW201	1214.0387.02
GSM R&S®WinIQSIM2 waveforms for ARB generator	R&S®PVT-KW300	1214.0393.02
WCDMA R&S®WinIQSIM2 waveforms for ARB generator	R&S®PVT-KW301	1214.0406.02
LTE R&S®WinIQSIM2 waveforms for ARB generator, LTE/eMTC/Cat. M1	R&S®PVT-KW310	1214.0412.02
NB-IoT R&S®WinIQSIM2 waveforms for ARB generator	R&S®PVT-KW313	1214.0429.02
5G NR R&S®WinIQSIM2 waveforms for ARB generator, Rel. 15/Rel. 16	R&S®PVT-KW320	1214.0435.02
5G NR R&S®WinIQSIM2 waveforms for ARB generator, Rel. 17	R&S®PVT-KW326	1214.0441.02
U-plane generation	R&S®PVT-KW327	1214.0706.02

Bluetooth® R&S®WinIQSIM2 waveforms for ARB generator, Bluetooth® Classic, Bluetooth® Low Energy to 5.3	R&S®PVT-KW400	1214.0458.02
WLAN R&S®WinIQSIM2 waveforms for ARB generator, IEEE 802.11a/b/g/n/ac	R&S®PVT-KW410	1214.0464.02
WLAN R&S®WinIQSIM2 waveforms for ARB generator, IEEE 802.11ax extension	R&S®PVT-KW411	1214.0470.02
WLAN R&S®WinIQSIM2 waveforms for ARB generator, IEEE 802.11be extension	R&S®PVT-KW412	1214.0487.02
OneWeb R&S®WinIQSIM2 user-defined waveforms for ARB generator	R&S®PVT-KW600	1214.0712.02
Extras		
19" adapter, 2 HU, 1/1	R&S®ZZA-KN2OT	1175.3810.00
Documentation		
Documentation of calibration values	R&S®DCV-2	0240.2193.08
Printout of DCV	R&S®DCV-ZP	1173.6506.02
PVT360A accredited calibration	R&S®ACAPVT360A	3599.0682.03

Service options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde & Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty, three years	R&S®WE3	
Extended warranty, four years	R&S®WE4	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with calibration coverage, three years	R&S®CW3	
Extended warranty with calibration coverage, four years	R&S®CW4	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	
Extended warranty with accredited calibration coverage, three years	R&S®AW3	
Extended warranty with accredited calibration coverage, four years	R&S®AW4	

Extended warranty with a term of one to four years (WE1 to WE4)
Repairs carried out during the contract term are free of charge [5]. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration (CW1 to CW4)
Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs [5] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

Extended warranty with accredited calibration (AW1 to AW4)
Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs [5] and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

[5] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

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