

# PVT360A PERFORMANCE VECTOR TESTER

Minimal footprint, ultimate performance



Product Brochure  
Version 04.01

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# AT A GLANCE

The PVT360A is a VSG/VSA single-box vector tester optimized for FR1 base station, small cell and RF component testing in production and characterization environments. Two independent vector signal generators (VSG) and vector signal analyzers (VSA) enable fast parallelized measurements. A frequency range of up to 8 GHz (8.5 GHz in overrange), flexible bandwidth configuration and an optional second TRX channel provide the required performance and enable flexible adaptation in a small form factor.

The PVT360A performance vector tester covers a frequency range from 400 MHz to 8 GHz (8.5 GHz in overrange), a maximum signal bandwidth of 500 MHz and supports standard-compliant 5G NR signal generation and analysis in all FR1 frequency bands. Hardware-accelerated test sequencing enables extremely fast measurements, and an integrated switch matrix allows parallelized and sequential testing for multiple DUTs and multiport devices.

Designed for remote operation, the PVT360A performance vector tester offers automation capabilities for easy integration into testbeds. Preconfigured test routines in line with 3GPP requirements simplify the test process.

The intuitive web user interface gives an overview of all signal generation and measurement parameters and capabilities for manual configuration.

The option concept of the PVT360A performance vector tester enables flexible adaptation to individual needs at any time. The second TRX channel, maximum frequency and bandwidth can be extended easily via keycode.

The PVT360A comes either in the multi port configuration with an integrated switch matrix (R&S®PVT-B106H), or with an high power option providing +20 dBm peak envelope power (R&S®PVT-B306I).

PVT360A with multiport option



# KEY FACTS

- ▶ Two TRX channels with two independent signal generators and analyzers
- ▶ 400 MHz to 8 GHz (8.5 GHz in overrange) frequency range covering all FR1 frequency bands
- ▶ Up to 500 MHz bandwidth
- ▶ Hardware-accelerated test sequencing
- ▶ Small form factor
- ▶ Available in multiport configuration or with +20 dBm output power
- ▶ Extensive signal generation and analysis software

# BENEFITS

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PVT360A with high power option



# FAST SCALABLE SOLUTION

## Keycode options for hardware extensions

The basic PVT360A configuration with the R&S®PVT-B106H option supports a frequency range from 400 MHz to 6 GHz and a bandwidth of 250 MHz on the first TRX, but the instrument comes fully equipped and calibrated for its maximum configuration. It includes all that is needed to activate a frequency range up to 8 GHz (8.5 GHz in overrange), a bandwidth extension of 500 MHz and the second TRX. The instrument can be adapted to your needs at any time.

## Hardware-accelerated test sequencing

Speed is essential when performing multiple tests. The PVT360A provides test automation and hardware-accelerated test sequencing for extremely fast measurements. Using the ARB sequencer, waveforms can directly be queued from the RAM. The integrated signal generator and analyzer enable seamless interaction between the transmit and receive paths.

## Internal switch matrix

The switch matrix of the PVT360A with R&S®PVT-B106H offers outstanding flexibility and maximum resource utilization. When testing multiple DUTs or multiport devices, connectivity to the PVT360A via the various RF ports eliminates the need for an external switch matrix.

Each of the optionally two generators can broadcast signals on up to eight RF output ports. Both signal generators work independently for parallel operation. The signal analysis path can be assigned to one of eight RF input ports per TRX. The high switching speed enables fast sequential measurements.

Concurrent utilization of the signal generator and signal analyzer at the same RF port is also supported.

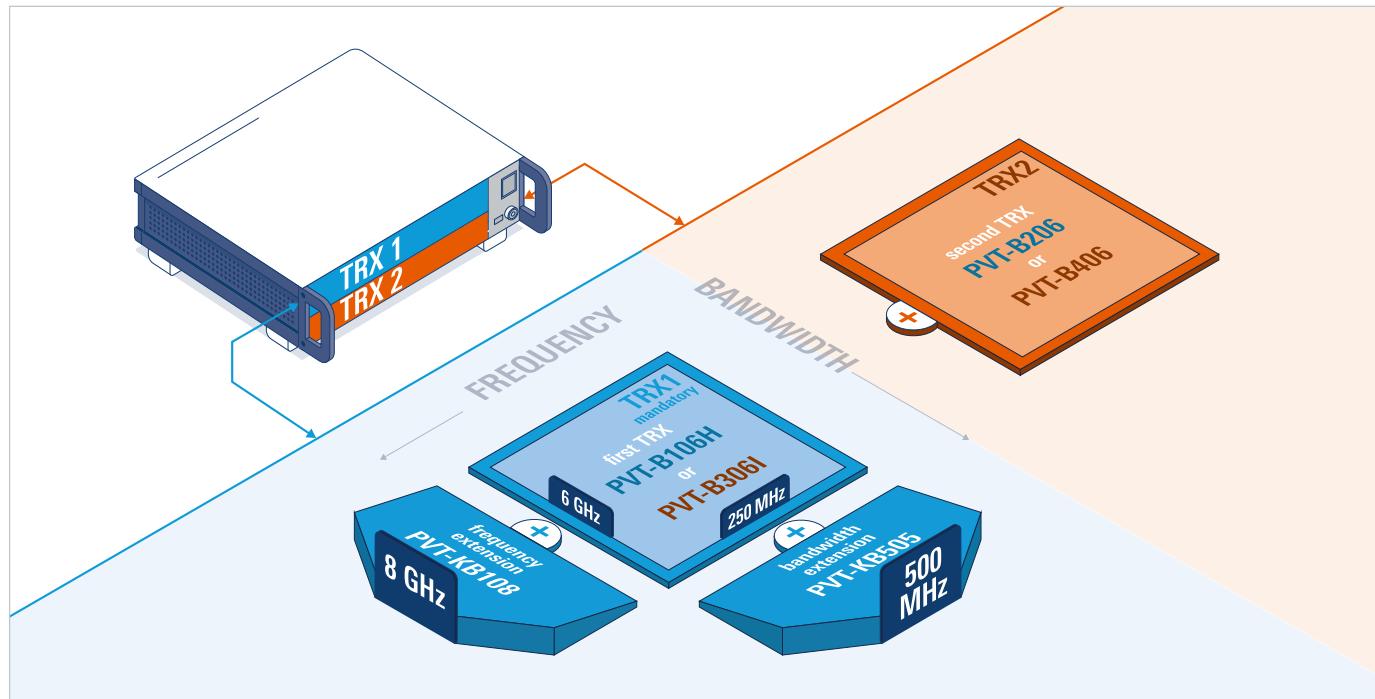
## High power option

The PVT360A configured with the R&S®PVT-B306I option provides up to +20 dBm peak envelope power. With this option, losses occurring in integrated test systems or over-the-air measurements can easily be compensated. The high power configuration comes with direct signal paths for each TX and RX port, without an integrated switch matrix.

## Smart channel

The R&S®PVT-K108 smart channel option divides the PVT360A into as many as eight virtual instruments with the R&S®PVT-KB106H and R&S®PVT-K108 options. Virtual pairs of signal generators and analyzers can be controlled independently of one another. While the generator and analyzer hardware are shared across the virtual instruments, processing and calculation is parallelized for maximum utilization and speed.

## Keycode options for hardware extensions



# OPERATION METHODS

## Manual operation

The GUI of the PVT360A, accessible via a web interface or with a connected monitor, provides a structured overview of signal generation and analysis settings. In the “Test Environment” tab different measurement applications can be assigned. The “Workspace” tab provides an extensive toolbox with all settings and results. When using the smart channel feature, separate workspace tabs enable easy control of different virtual instruments.

## Automation

The PVT360A comes with SCPI support and Python libraries for easy automated testing. ARB sequencing allows ARB files to be accessed directly from the RAM, eliminating file loading times. Hardware based test sequencing further increases test speeds for excellent measurement throughput.

Web GUI providing a structured view for general purpose RF (GPRF) signal generation and analysis settings



# COMPREHENSIVE SIGNAL GENERATION AND ANALYSIS FUNCTIONALITY

## Signal generation

The PVT360A performance vector tester offers various capabilities for external signal generation.

The R&S®WinIQSIM2 external PC software supports configuring and generating ARB signals for multiple cellular and wireless connectivity standards. Integrated into R&S®WinIQSIM2 is direct waveform transfer to PVT360A, which enables easy replay of waveforms on the PVT360A.

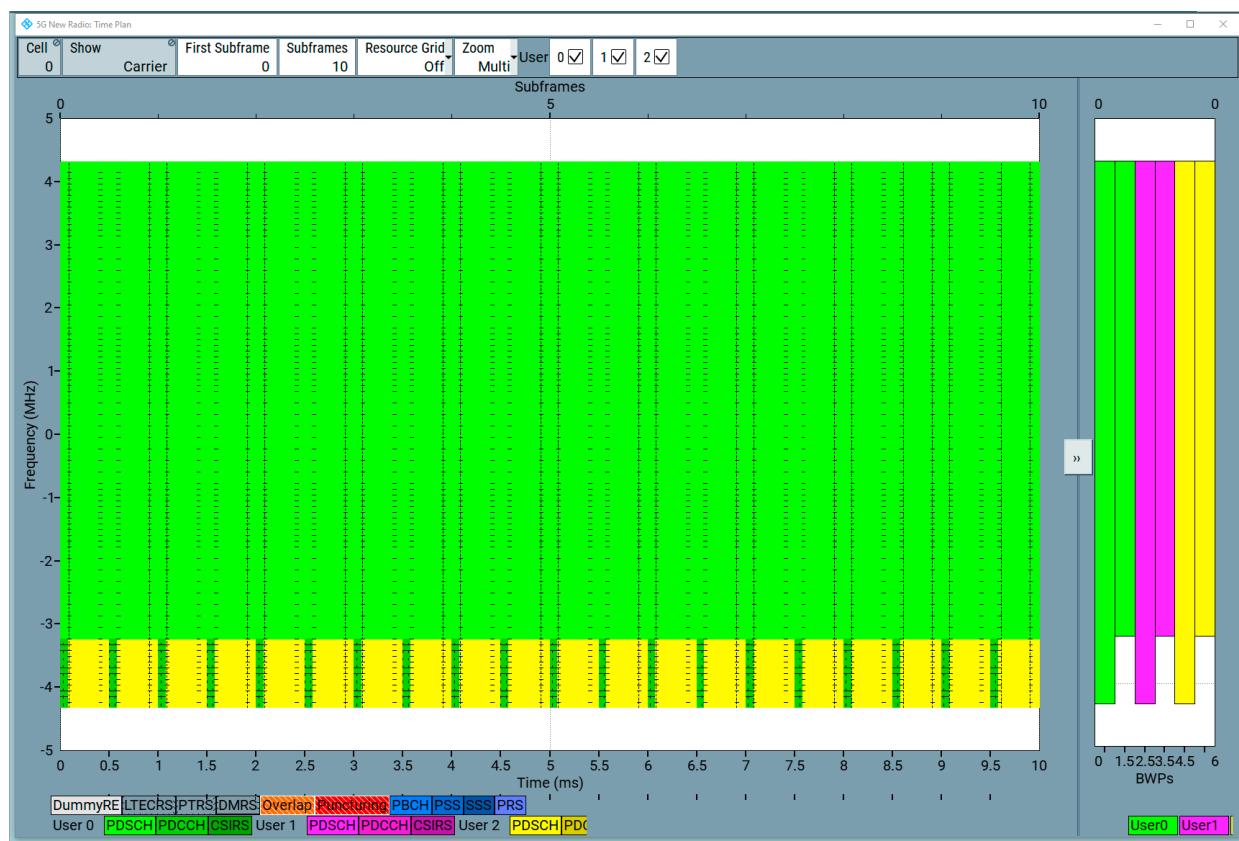
To reduce the waveform transfer time between the control PC and the PVT360A, the R&S®PVT-KW201 waveform creator option supports the internal signal configuration and creation of various digital standards via remote commands.

## Signal analysis

For signal analysis, a variety of measurement features for general purpose, cellular and wireless standards are available on the instrument. The signal analysis applications provide in-depth insights into the physical layer and RF performance of the analyzed signal. The GUI provides a graphical representation of results which can also be queried with remote commands.

The R&S®VSE vector signal explorer software extends the range of measurement applications and covers various component or generic modulation analysis features. The PVT360A captures signals and provides the respective I/O data to the R&S®VSE software for signal analysis. For more information, see the R&S®VSE vector signal explorer software product brochure (PD 3607.1371.12).

Time plan display in the 5G NR option of the R&S®WinIQSIM2



# BASE STATION AND SMALL CELL TEST

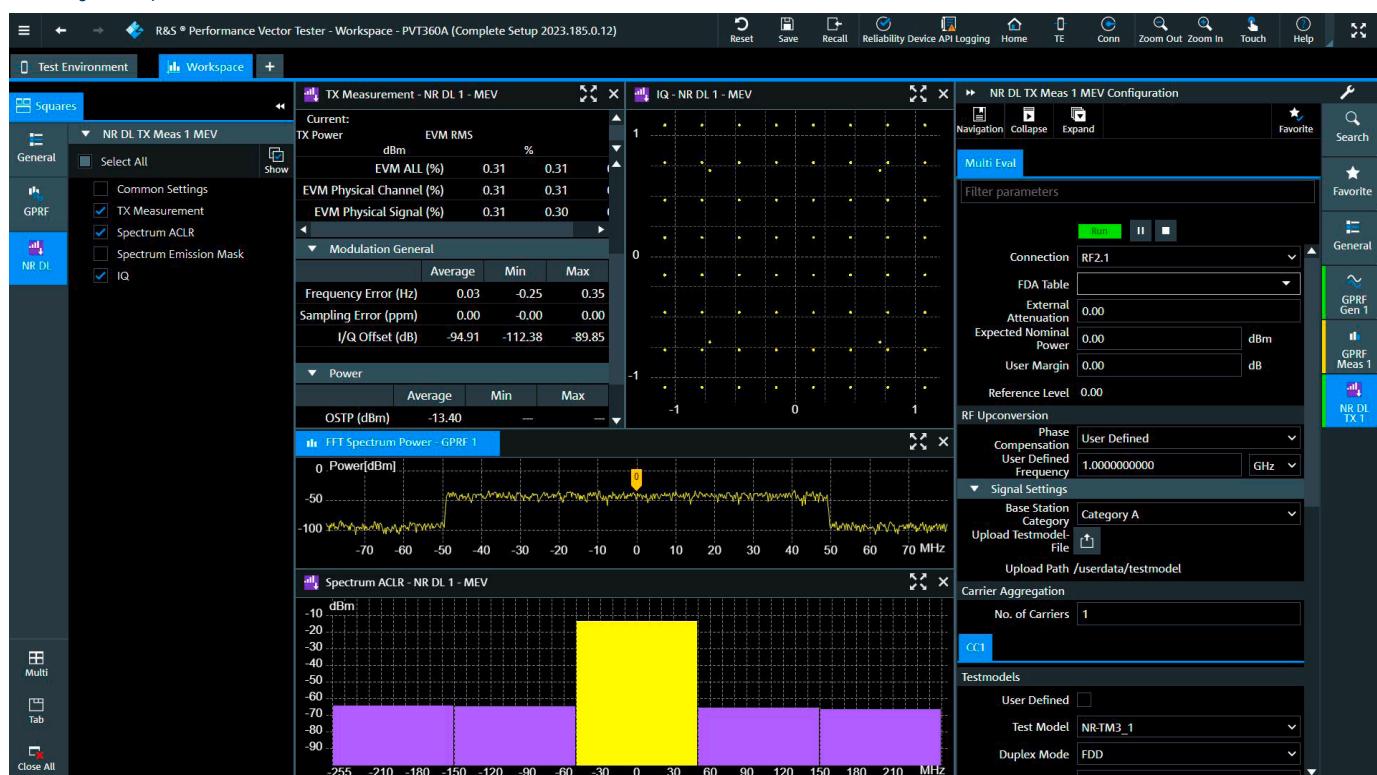
The PVT360A provides measurement capabilities to test the physical layer of base stations and small cells. With frequencies up to 8 GHz and an optional bandwidth configuration of up to 500 MHz, all FR1 frequency bands are covered by the PVT360A. Multi-component carriers can be tested and the optional two pairs of vector signal generators and analyzers enable real MIMO measurements. Standard-compliant signal generation and analysis for LTE and 5G NR up to release 17 provide comprehensive test capabilities. Typical base station transmitter tests, such as EVM, output power or frequency error measurements can be selected from the menu. The graphical representation of the measurement results gives a comprehensive overview of the signal characteristics. The second signal generator benefits users performing receiver tests. Wanted signals and interfering signals as required for in-band blocking and in-channel selectivity tests can be generated in one box.

The intuitive GUI provides a wide range of different setting and measurement features while offering a structured overview of both TX and RX settings. All tests can be automated easily with SCPI commands.

The PVT360A comes with an eight-port switch matrix for each of the two optional TRX channels. This makes it easy to test multiport devices in one go. In the TX direction, the signal can be broadcast on all ports. For signal analysis, ports can be switched quickly and measured sequentially. Thanks to the dynamic architecture, base station transmitter and receiver tests can be carried out in parallel and the two independent pairs of signal generators and analyzers enable fully parallelized tests, e.g. for MIMO testing.

A smart channel setting divides the instrument into up to eight virtual instruments which can be controlled separately for optimized resource utilization in the PVT360A.

## 5G NR signal analysis



# COMPONENT TEST AND IN-DEPTH CHARACTERIZATION

## Component test

The PVT360A provides signal generation and analysis capabilities for both cellular and wireless connectivity standards. When testing components with modulated signals, their characteristics can be validated under realistic conditions.

With up to two integrated signal generators and analyzers in one instrument, the PVT360A provides enhanced usability for testing active components. The hardware-accelerated list mode provides outstanding measurement speed and automation options. An optional smart channel in combination with a flexible switch matrix enables high test throughput at low investment costs.

The signal generation and analysis applications enable comprehensive component testing with modulated signals. A broad range of test applications specifically for component testing is available with R&S®WinIQSIM2 and R&S®VSE software such as amplifier measurements and generic modulation analysis.

## In-depth characterization

With its wide range of applications and the performance various wireless standards require, the PVT360A offers new possibilities for component and system characterization. Covering all 5G NR FR1 and Wi-Fi sub 8 GHz frequency bands on two TRX channels, the PVT360A offers the flexibility required for the applications of today and tomorrow.

Internally, and in combination with R&S®VSE and R&S®WinIQSIM2, a wide range of tests can be carried out, from amplifier characterization to signal analysis based on various wireless standards. High RF performance suitable for demanding measurements enables in-depth DUT testing to get an overview of various signal parameters and gain insights into performance while applying digital predistortion.

Measurements performed during the characterization phase can be stripped down and carried out on the box for fast testing in production based on key parameters. The results can then be correlated with the more extensive tests performed during the characterization phase.

Wi-Fi is a registered trademark of Wi-Fi Alliance.



# ENHANCED TESTING IN PRODUCTION ENVIRONMENTS

The cost-effective two-channel TRX solution provides automation capabilities and sets new standards for speed. Packed in a small form factor, the PVT360A is easy to stack and packs robust feature density into its 19"/2 HU size.

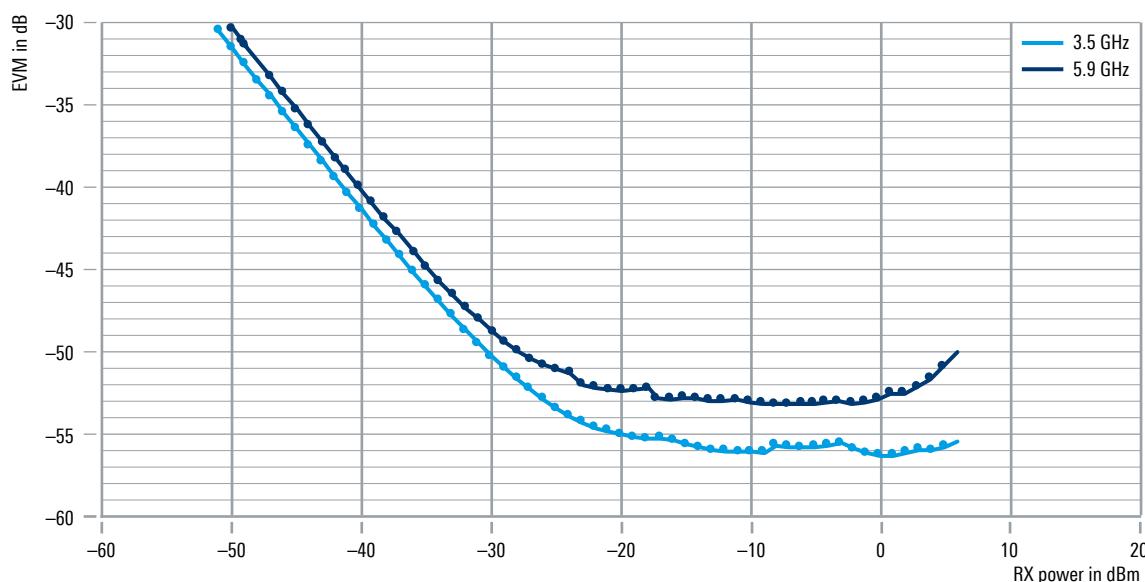
For optimal resource utilization, the PVT360A provides different methods for parallelized tests. The smart channel feature in combination with a  $2 \times$  eight-port switch matrix virtually divides the PVT360A into subinstruments with shared signal generation hardware resources. The measurements can be operated fully in parallel for up to two TRX tests and, if a higher number of DUTs or ports are connected, the tests run in quasi-parallel with automated scheduling of resources.

An ARB sequencer and hardware-accelerated test sequencing for predefined tests result in outstanding measurement speed. The integrated switch matrix minimizes recabling requirements and makes an external switch matrix obsolete. Receive tests can run in parallel thanks to the broadcast mode on the generation path and, for DUT transmit tests, the fast port switching time of  $< 10 \mu\text{s}$  enables quick sequential measurements.

Signal generation and analysis applications provide predefined test models and settings for rapid testing of DUT compliance with the standard of interest. If the PVT360A is already used during characterization, it is easy to derive correlated tests for production. Reliable hardware and software as well as various features optimized for maximum throughput make the PVT360A ideally suited to production lines.

## Measured RX error vector magnitude (EVM) performance of a 5G NR downlink TM 3.1 100 MHz signal

Subcarrier spacing: 30 kHz, modulation: 64QAM. Used: the PVT360A as analyzer and the R&S®SMW200A vector signal generator as a signal source.



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