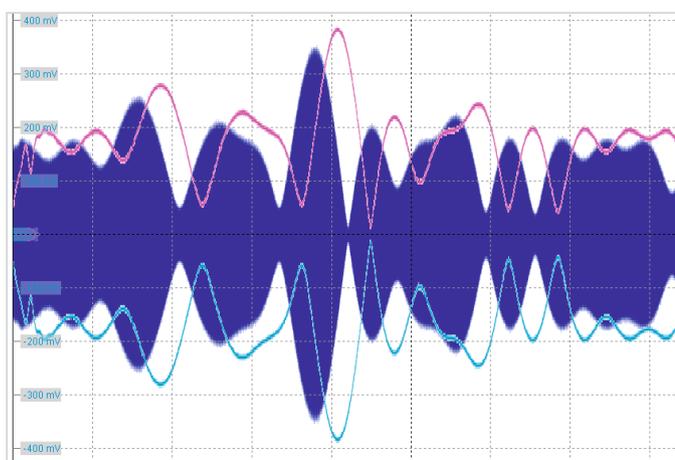


Simplify your envelope tracking test system

The R&S®SMW200A vector signal generator combined with the R&S®FSW signal and spectrum analyzer offers fast and simple power amplifier testing including envelope tracking and digital predistortion, effectively replacing complex test setups.



RF signal and the corresponding envelope signal.

Your task

An increasing number of power amplifiers (PA) support the envelope tracking (ET) technology in order to improve efficiency and reduce power consumption, for example in smartphones and tactical radios. Typical test setups to measure PAs consist minimally of a signal generator and a spectrum analyzer. Envelope tracking requires an additional generator to provide the envelope signal for the DC modulator. Envelope signals demand highly precise adjustable time alignment with the RF signal, shaping capabilities and a signal performance with best spectral purity.

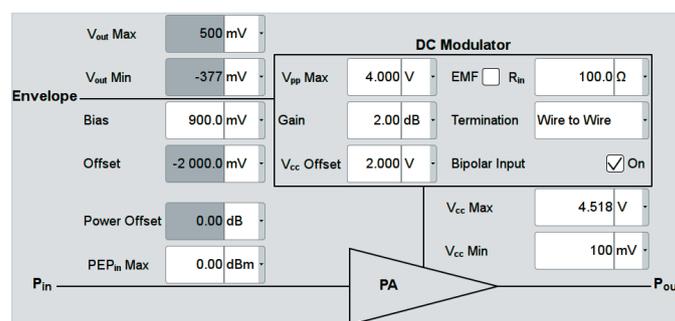
The performance of the PA is characterized by measuring distortions and analyzing the impact of predistortion. Measuring power added efficiency (PAE) requires time synchronous measurement of the PA's input and output power and corresponding power consumption. Highly precise synchronization is the key, a significant challenge when several test instruments are used.

T & M solution

Rohde & Schwarz offers a compact solution for characterizing power amplifiers with envelope tracking using the R&S®SMW200A and the R&S®FSW. Equipped with the R&S®SMW-K540 envelope tracking option, the R&S®SMW200A generates both the RF signal and the corresponding envelope signal. Since the envelope signal is generated from the baseband signal in realtime, any user-specific I/Q file or wireless communications standard, such as LTE or WCDMA, can be used.

Generating the RF signal and the related envelope signal in a single instrument makes it possible to precisely adjust the delay between the two signals. The R&S®SMW200A adjusts the delay in ps steps within a range of $\pm 1 \mu\text{s}$ in realtime, meeting tight requirements such as less than 1 ns for a 20 MHz LTE signal. Shaping of the envelope signal is used to optimize the amplifier for efficiency or linearity. The R&S®SMW200A provides various shaping methods, such as table, polynomial and detrouching, which are applied in realtime.

For power sweeps, the generator automatically calculates the amplitude of the envelope signal, eliminating time-consuming manual recalculation. Additional parameters, such as gain and impedance of the DC modulator, can be adjusted.

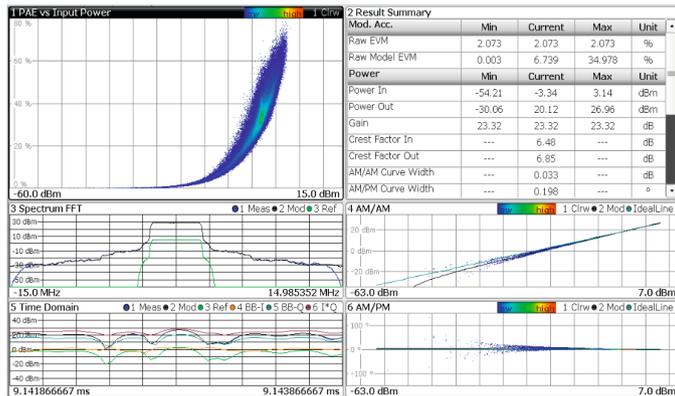


R&S®SMW-K540 option: implemented shaping modes.

Test & Measurement
Application Card | 02.00

Simplify your envelope
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The R&S®FSW adds the analysis part of the ET test solution. The R&S®FSW-K18 amplifier measurement option fully characterizes any RF amplifier. It analyzes typical RF parameters, such as gain compression, ACLR, EVM, AM/AM and AM/PM distortion. Moreover, the R&S®FSW uses its baseband inputs to measure the supply voltage and current consumption of the PA while using the RF input to measure the RF signal. The simultaneously measured results are displayed in detailed tables and graphs providing the instantaneous PAE, i.e. the efficiency.

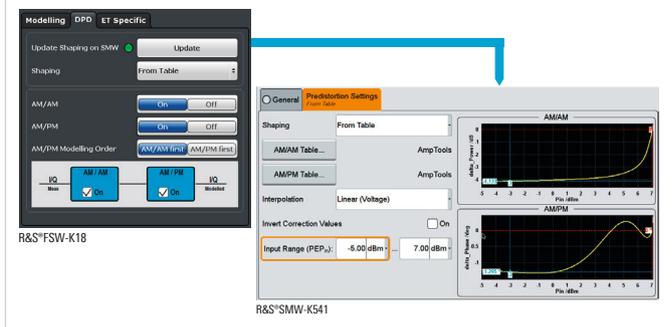


R&S®FSW-K18 option: full amplifier characterization in one measurement.

With envelope tracking the amplifier is operated close to or even in saturation, which leads to distortion at the amplifier output. Therefore ET is often used together with digital predistortion (DPD) to compensate for this effect. The R&S®FSW-K18 can generate a DPD model from its distortion measurement. It automatically transfers the resulting DPD table to the R&S®SMW200A via LAN.

The R&S®SMW-K541 digital predistortion option enables the R&S®SMW200A to apply realtime amplitude and phase corrections to each complex I/Q sample in line with the received DPD table. This enables the user to quickly verify the effect of predistortion, even for different power

The R&S®FSW automatically transfers the measured DPD table to the R&S®SMW200A via LAN



levels, without having to manually recalculate the original waveform file. The R&S®SMW200A equipped with R&S®SMW-K540 envelope tracking and R&S®SMW-K541 digital predistortion options in combination with the R&S®FSW equipped with the R&S®FSW-K18 amplifier measurements option provides a compact test solution that significantly simplifies the setup for adding envelope tracking to your power amplifier tests.

Key features

R&S®SMW200A vector signal generator:

- RF and envelope signals out of one box
- Realtime shaping and delay adjustment
- Realtime digital predistortion

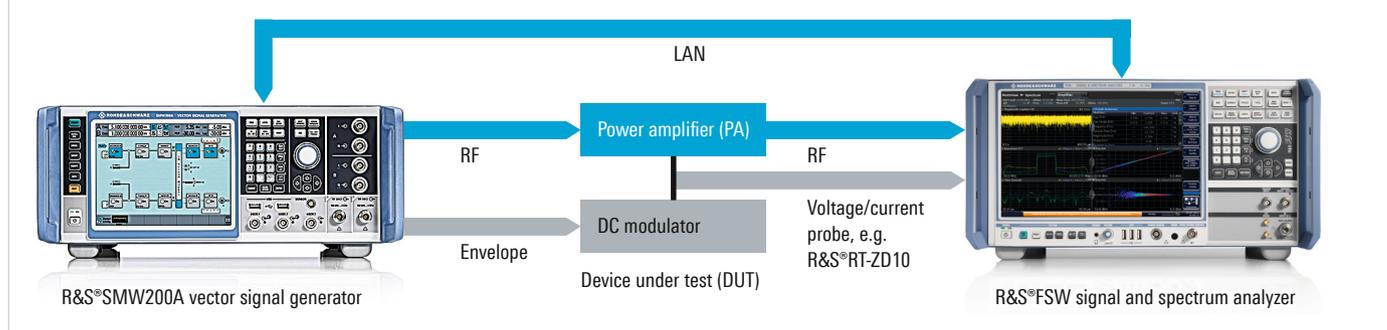
R&S®FSW signal and spectrum analyzer:

- RF and envelope signal analysis in one box
- Full-featured RF and distortion analysis
- Highest dynamic range, simplifying the test setup

See also

- www.rohde-schwarz.com/product/SMW200A
- www.rohde-schwarz.com/product/FSW

Compact Rohde & Schwarz setup for power amplifier tests including envelope tracking



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R&S®SMW200A, R&S®FSW; Simplify your envelope tracking test system

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