

MULTICHANNEL PULSE ANALYSIS

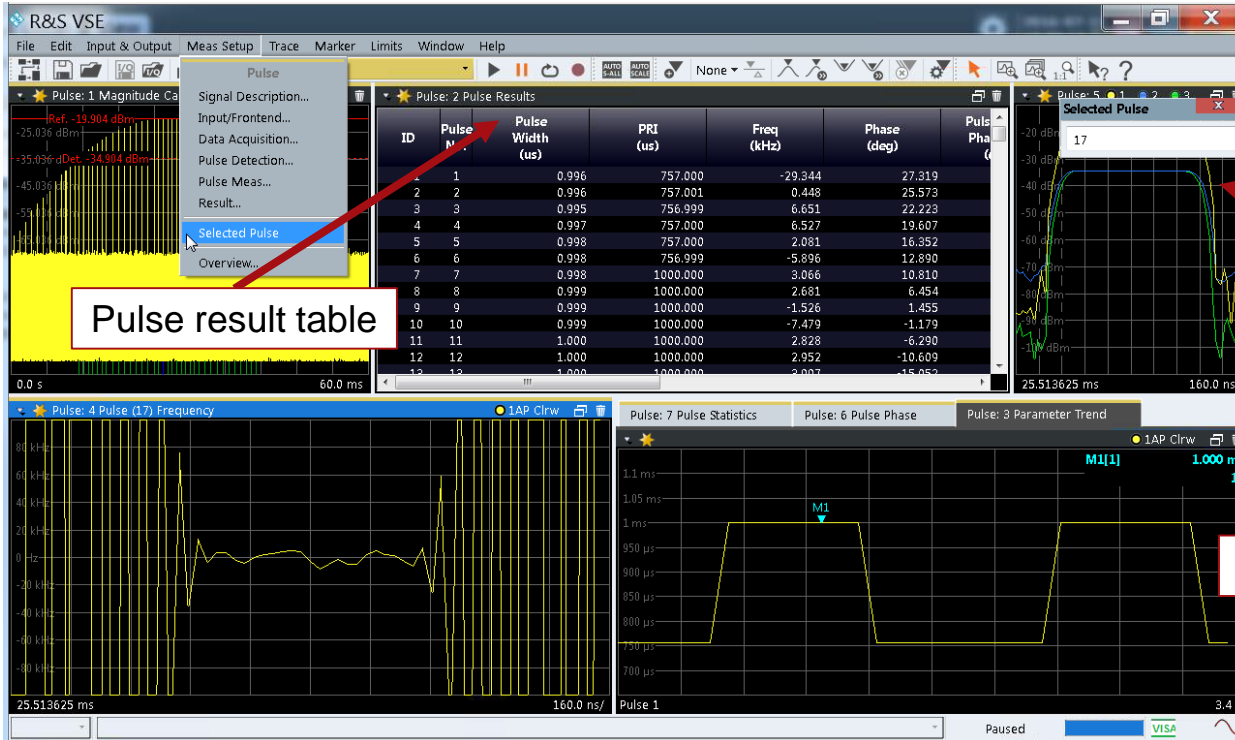
ROHDE & SCHWARZ

Make ideas real



ADVANCED ANALYSIS WITH APPLICATION SW

RADAR PULSE MEASUREMENT WITH VSE-K6



Pulse result table

Magnitude of selected pulse with MIN, MAX and SAMPLE detector

PRI Dwell time

NEW CAPABILITIES :

1 Description

The new option R&S@VSE-K6A option will be available with firmware release R&S@VSE 1.80. This new option is an extension of the R&S@VSE-K6 pulse analysis application and supports simultaneous capture on up to 4 channels on a high end oscilloscope (R&S RTO or R&S RTP). R&S@VSE-K6A delivers a comparison of all R&S@VSE-K6 pulse parameters and statistics over multiple channels within seconds so that the user gets a full picture of the e.g. an AESA radar system.

The main features of the R&S@VSE-K6A are the following:

- Fast comparison of all R&S@VSE-K6 results across multiple channels integrated in the same display
- Multi-channel segmented capture to reduce memory consumption
- Multi-channel IQ recording and playback via file
- Multi-channel user calibration (R&S@VSE-K544 license needed)

The following figure shows the set-up for measurements on a phased array. The DUT's 4 streams are connected to the oscilloscope. The captured IQ data is transferred to the R&S@VSE where the streams are analyzed and displayed as configured by the user.

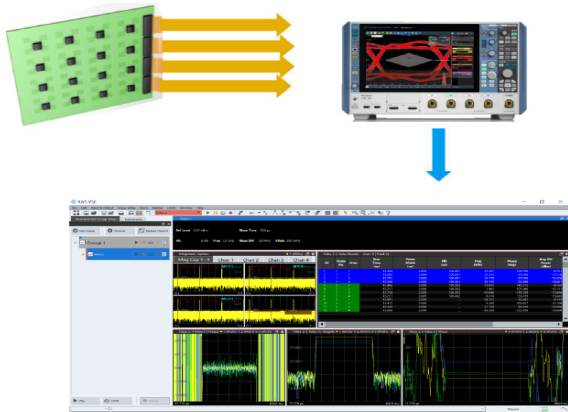


Figure 1: Set-up of a 4 channel measurement on a phased array antenna using a R&S RTO or RTP and the R&S R&S@VSE-K6A

1.1 Extended calibration capabilities

With the existing option R&S@VSE-K544 a setup calibration concept can be now extended to a multi-channel scenario. The user can upload user defined frequency response correction files (.s2p) to multiple channels so that the setup de-embedding is possible. Application examples can be compensation of cable lengths or equalization of multiple signal paths.

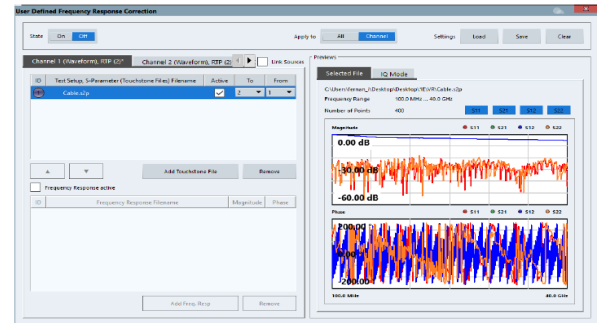


Figure 2: Frequency response calibration files can be now uploaded for multiple channels

2 Applications

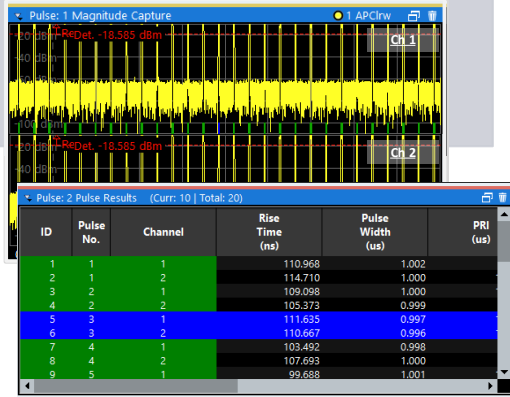
The R&S@VSE-K6A option, as well as the R&S@VSE-K6, is mainly oriented to aerospace & defense customers where pulse modulated signals are used for radar applications. Some application examples are given below:

1. Characterization of phased arrays. In the aerospace & defense scene, phased array antennas are the technology of choice in radar and satellite tracking and surveillance. Analyzing multiple channels simultaneously in early stages of array development can help to achieve improvements in the module design.
2. Radar applications such as detecting and tracking multiple emitter signals coming from an aircraft, ships and missiles.
3. Simulation of signals on DFRM (digital radio frequency memory) scenarios, where some of the pulse signal parameters like phase, frequency, amplitude are modified and played back. (Figure 3).
4. Emulation of EW (Electronic warfare) and electronic attack scenarios being able to compare desired and unwanted signals.

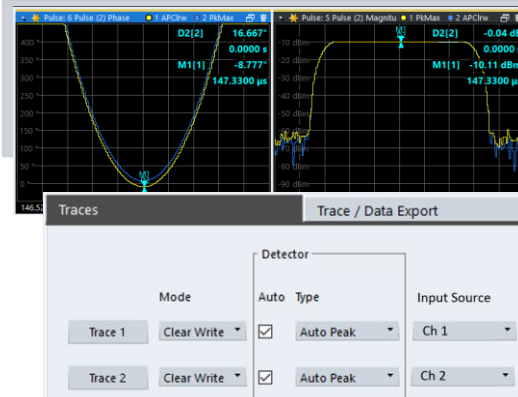
NEW: VSE-K6A MULTI-CHANNEL MEASUREMENTS

Multiple channels of (phase coherent) I/Q data analyzed within a single pulse application

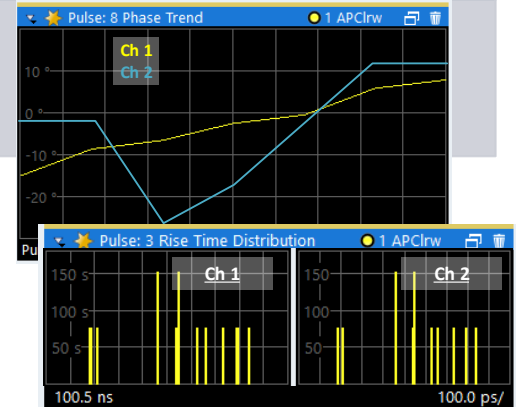
Compare pulse values
in table data linked
across channels



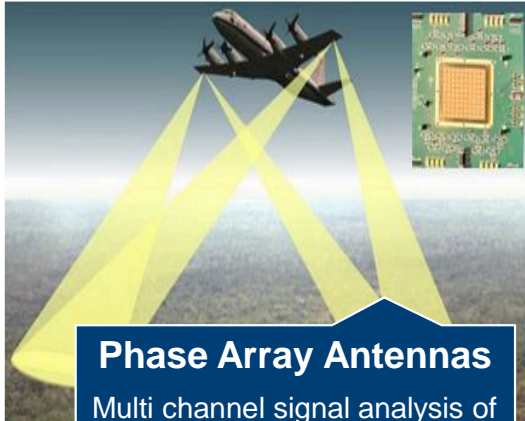
Compare pulse traces
from different
channels in one
display



Parameter Trend &
Distribution plots...



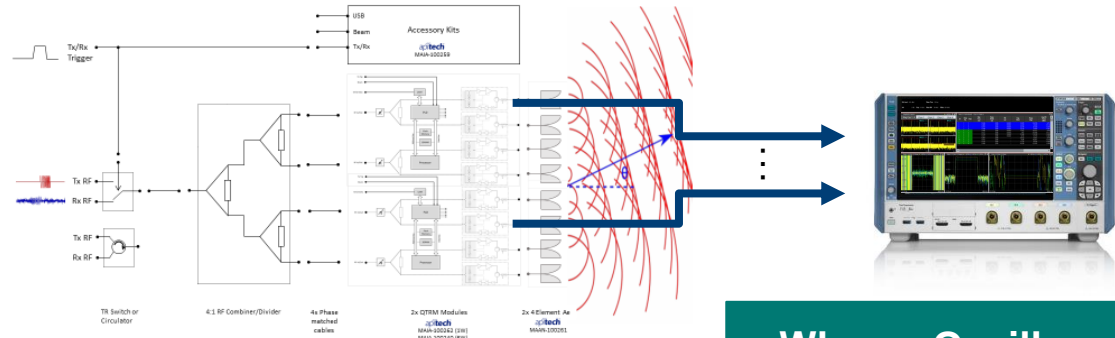
NEW: VSE-K6A MULTI-CHANNEL MEASUREMENTS APPLICATIONS



Phase Array Antennas

Multi channel signal analysis of various radiating elements to analyze constructive/destructive interference required to steer a beam

Source: API Technologies



Example: phase-shift characterization of T/R modules for:

- Naval Radar / Marine Radar
- Airborne Radar
- Ground-based Radar
- Vehicle-mounted Radar
- Air Traffic Control Radar

Why an Oscilloscope?

- Phase-coherent multichannel receiver
- Phase-coherence provided by design. No need for complex calibration

NEW: VSE-K6A MULTI-CHANNEL MEASUREMENTS APPLICATIONS

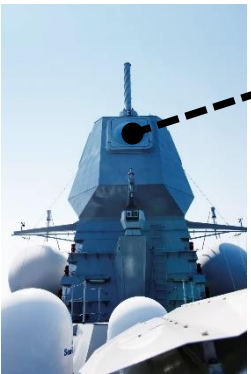
Digital radio frequency memory (DRFM)



True Pulse Echo Signal

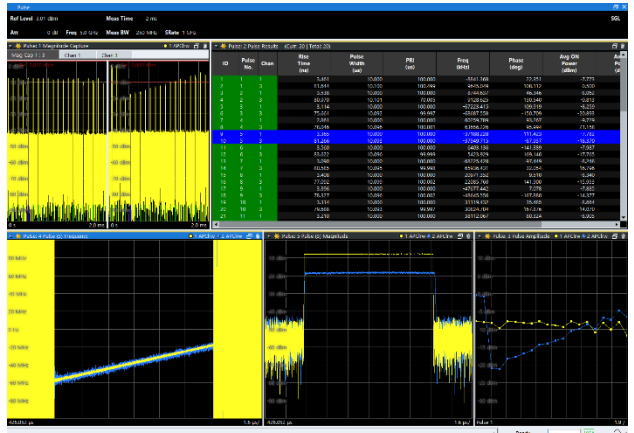
“Spoofed” Pulse Echo Signal

DRFM Jammer

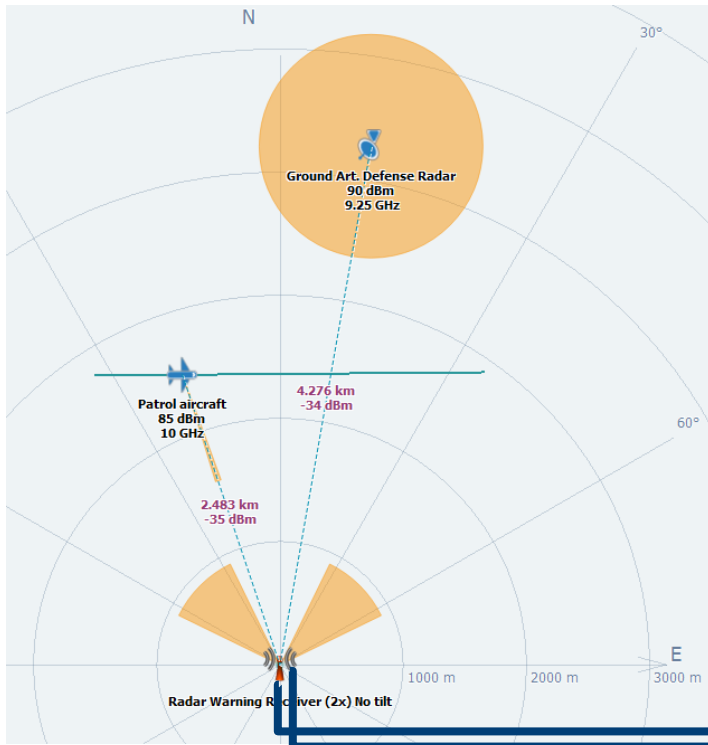


Original Radar Pulse

Application example: Phase-coherent acquisition allows time-aligned analysis of **original radar pulse signal** and **spoofed pulse echo**



NEW: VSE-K6A MULTI-CHANNEL MEASUREMENTS APPLICATIONS



Analysis of complex multichannel radar scenarios

Possibility to use advanced trigger settings (e.g. ABR trigger) to distinguish signals in time domain, that are difficult to separate in frequency domain

E.g. Radar Warning Receiver (RWR). App Car will be published shortly

