

# Simplify pulse signal modeling with the R&S®Pulse Sequencer software

Combining the R&S®Pulse Sequencer software with one of the vector signal generators from Rohde & Schwarz is the perfect solution for defining and playing pulses.

## Your task

Testing and verifying the performance of radar receivers and components is always an essential task for engineers during all stages of the development cycle. A broad variety of pulse scenarios is required to ensure the functionality of the DUTs. The range of pulse scenarios extends from simple pulses with shaped edges, to pulses with impairments such as overshoots, ripples and droops, to pulses with I/Q modulation on pulse (MOP) or to pulses with high on/off ratio.

Constructing and modeling such a variety of pulse scenarios even for basic pulses should not be the focus of radar engineers, since it consumes valuable time.

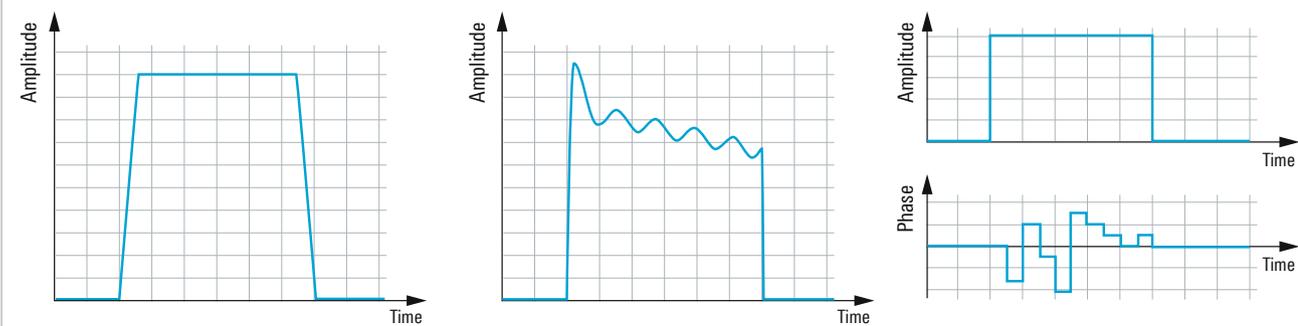
## T&M solution

The R&S®Pulse Sequencer software, together with a vector signal generator from Rohde & Schwarz (R&S®SMW200A, R&S®SMBV100A or R&S®SGT100A), gives engineers a compelling radar signal generation solution. The solution is based on the commercially available R&S®Pulse Sequencer software and off-the-shelf Rohde & Schwarz vector signal generators that are equipped with the K300 pulse sequencing option or the K301 enhanced pulse sequencing option. The software allows modulated or unmodulated pulses to be defined quickly and easily with user-definable pulse shapes. The user quickly gets to know the software through a graphical user interface and visualization of the signals by defining them via templates with e.g. drop-down menus or input fields.

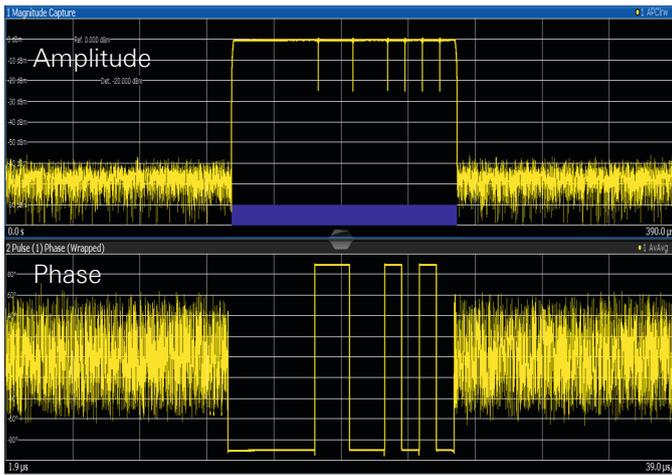
Co-engineered with the industry, this solution has been designed to support all relevant pulse scenarios for testing radar receivers. It shortens design cycles, reduces time to market and allows the user to quickly achieve meaningful results.

All common modulations on pulse (MOP) such as linear frequency modulation, Barker coding, polyphase codes, phase shift keying (PSK) or any classic analog modulation format such as amplitude modulation (AM), frequency modulation (FM) or phase modulation ( $\phi$ M) can quickly be used together with the pulses. In addition, customer-specific modulation formats can be added using the software's open plug-in interface.

## Examples of pulses modeled with the R&S®Pulse Sequencer software

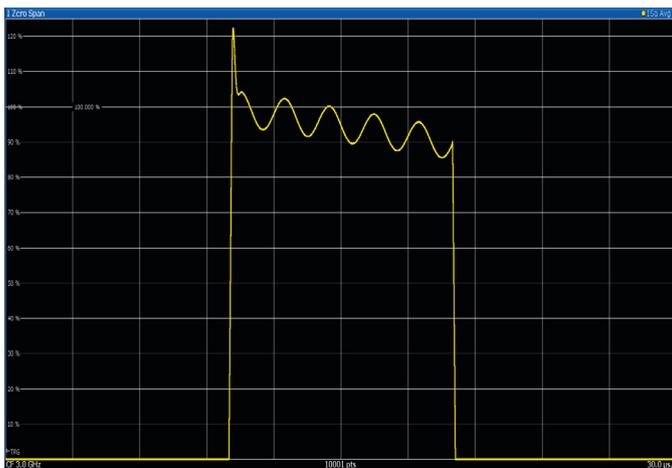


Unmodulated pulse with non-rectangular pulse envelope and with rising and falling edge (left), Unmodulated pulse with non-rectangular pulse envelope, overshoot, droop and ripple (middle), I/Q modulated pulse (MOP) (right).



Generated Barker coded pulse: envelope with typical amplitude dips at phase transitions (top) and corresponding phase (bottom).

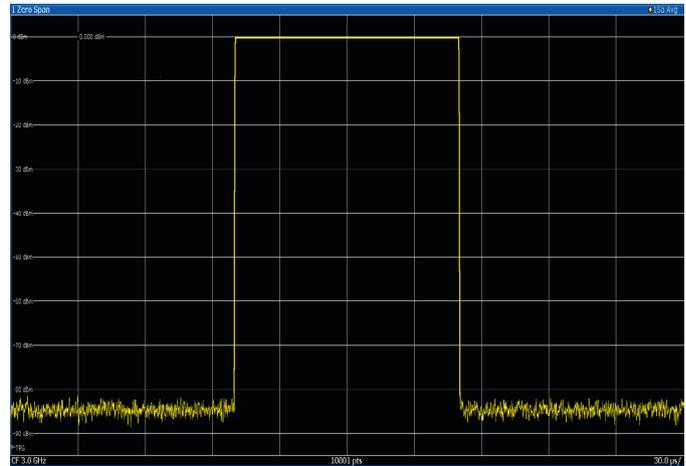
Furthermore, pulses can be impaired by overshoots, ripples or droops of the pulse envelope. This feature enables the user to simulate parasitic effects of real-world scenarios, allowing receivers to be tested against realistic pulse envelopes.



Generated pulse simultaneously impaired with a droop, ripple and overshoot using the R&S®SMW200A.

Radar receivers need to detect echo pulses of faraway objects with power levels close to the noise level (low SNR) and echo pulses with large amplitudes from close objects (high SNR). To simulate this large dynamic range, pulses with high on/off ratio are required. Traditionally analog signal sources are used for these if no I/Q modulation on pulse is required.

The R&S®Pulse Sequencer software is able to define any kind of I/Q modulated or unmodulated pulse with high on/off ratio. By using the high-quality pulse modulator of the R&S SMW200A together with the signal generated in the digital baseband, pulses with on/off ratios of 80 dB can be generated.



Generated pulse with 80 dB on/off ratio using the digital baseband of the R&S®SMW200A vector signal generator together with the pulse modulator.

Groups of pulses are often required for test cases. The R&S®Pulse Sequencer software provides a powerful sequencing mechanism to combine all defined pulses in sequences with repetitions, loops and nested loops.

The R&S®Pulse Sequencer software is the perfect solution for engineers who want to model arbitrary pulse shapes, even with modulations, for any kind of radar receiver or component testing.

### Key features

- Models any kind of pulse with predefined templates, quickly and simply
- Provides many pulse shapes and predefined modulation formats
- Impairs pulse shapes as required for real-world effects
- Generates pulses with 80 dB on/off ratio even for I/Q modulated pulses
- Combines pulses in user-defined sequences
- Can be used with every Rohde&Schwarz vector signal generator, e.g. the R&S®SMW200A

### See also

[www.rohde-schwarz.com/product/pulse-sequencer](http://www.rohde-schwarz.com/product/pulse-sequencer)

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