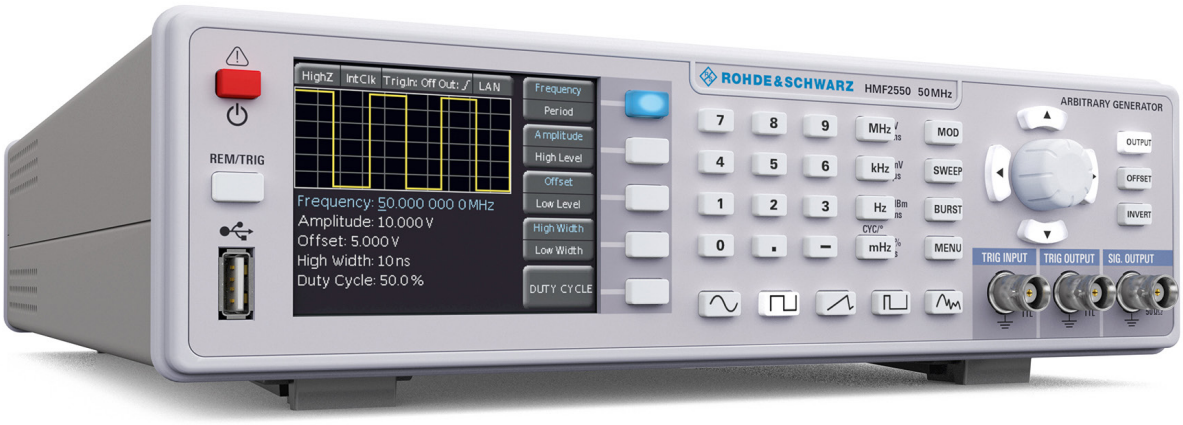
R&S®HMF2525
R&S®HMF2550
Arbitrary Function Generator
Technical Data



Key facts

- Frequency range: 10 µHz to 25 MHz [50 MHz]
- Triangle and ramp signal up to 10 MHz
- Pulse: frequency range from 100 µHz to 12.5 MHz [25 MHz]
- Output voltage: 5 mV_{PP} to 10 V_{PP} (into 50 Ω load)
- DC offset: ± 5 mV to 5 V
- Output impedance steplessly adaptable (1 Ω to 10 kΩ)
- Total harmonic distortion: 0.04 % (f < 100 kHz)
- Waveform modes: sine, square, pulse, triangle, ramp and arbitrary waveforms (incl. standard curves: white noise, pink noise, cardiac, exponential rise and fall, etc.)
- Modulation modes: AM, FM, pulse, PWM, FSK (internal and external)
- Arbitrary waveform generator: 250 MSa/s, 14 bit, 256 kSa
- Easily create your own waveforms using standard PC software
- Oscillographic signal display
- Front USB to easily save and recall waveforms and settings, RS-232/USB dual interface for remote control
- BNC connectors: modulation input, sweep output, trigger (input, output), 10 MHz reference (input, output, ±1 ppm TCXO)
- Fanless design

Technical Data

R&S® Arbitrary Function Generator
R&SHMF2525: 25MHz
R&SHMF2550: 50MHz
from firmware version 2.145

Device Characteristics
All specifications valid into 50Ω load

Models	
R&S®HMF2525	1 channel, frequency range to 25MHz
R&S®HMF2550	1 channel, frequency range to 50MHz
Waveforms	
standard	sine, square, pulse, ramp, triangle
arbitrary waveforms	up to 256kSa
predefined waveforms	sine, square (50%), ramp (positive/negative), triangle (50%), noise (white/pink), cardinal sine, exponential (rise/fall)
Operation modes	continuous, modulate, sweep, burst
Modulation types	AM, FM, PM, FSK, PWM
Temperature stability	1x 10^{-6} (+18°C to +28°C)
Aging (after one year)	±1x 10^{-6} (+25°C)

Waveform Characteristics

Sine	
Frequency range	
R&S®HMF2525	10µHz to 25MHz
R&S®HMF2550	10µHz to 50MHz
Amplitude flatness	
up to 10MHz	±0.15dB
10MHz to 25MHz	±0.2dB
above 25MHz	±0.4dB
Harmonic distortion	
up to 100kHz	< -70dBc
100kHz to 10MHz	< -55dBc
10MHz to 25MHz	< -40dBc
above 25MHz	< -37dBc
Total harmonic distortion (THD) up to 100kHz	0.04% (typ.)
Non-harmonic spurious	
up to 1MHz	< -70dBc
above 1MHz	< -70dBc, increasing +6dB / decade
Phase noise (SSB)	
10kHz Offset	-115dBc / Hz (typ.)

Square	
Frequency range	
R&S®HMF2525	10µHz to 25MHz
R&S®HMF2550	10µHz to 50MHz
Rise and fall times	8ns, fixed
Overshoot	< 3% (typ.)
Symmetry	duty cycle: 50% accuracy: ±1% + 5ns
Jitter	<1 ns_{rms} (typ.)

Pulse	
Frequency range	
R&S®HMF2525	100µHz to 12.5MHz
R&S®HMF2550	100µHz to 25MHz
Rise and fall times	8ns to 500ns, variable
Overshoot	< 3% (typ.)
Duty cycle	0.01% to 99.99%
Pulse width	min. 15ns, resolution 5ns
Jitter	< 500 ps_{rms} (typ.)

Ramp and Triangle	
Frequency range	
R&S®HMF2525	10µHz to 5MHz
R&S®HMF2550	10µHz to 10MHz
Ramp symmetry	0% to 100%, resolution 0.1% (0% ≙ negative ramp, 100% ≙ positive ramp, 50% ≙ triangle)
Linearity	
up to 250kHz	< 0.1% (typ.)
above 250kHz	< 2% (typ.)

Arbitrary	
Frequency range	
R&S®HMF2525	100µHz to 12.5MHz
R&S®HMF2550	100µHz to 25MHz
Waveform length	up to 256kSa
Sample rate	250MSa/s
Amplitude resolution	14bits
Internal non-volatile memory	up to 4MB

Output Characteristics

Waveform output	BNC socket (front panel)
Output impedance	50Ω
Signal output	on, off, inverted
Overlad protection	short-circuit-proof, max. ±15V of external voltage

Amplitude	
Range	5 mV_{PP} to 10 V_{PP} (into 50Ω) 10 mV_{PP} to 20 V_{PP} (open circuit)
Resolution	1mV
Units	V_{pp} or dBm, selectable
Accuracy	±1% of setting ±1 mV_{PP} at 1kHz

DC Offset	
Range	±5mV to 5V (into 50Ω) ±10mV to 10V (open circuit)
Resolution	1mV (into 50Ω)
Units	V
Accuracy	±2% of offset setting ±0.5% of amplitude setting ±2mV ±1mV / MHz

Burst	
Waveform signals	all (except pulse)
Type	continuous, counted, gated
Count	1 to 50,000 cycles, infinite
Start/Stop phase	0° to 360° (sine only)
Trigger sources	manual, internal or external trigger, via interface
Internal trigger period	1µs to 500s

Sweep	
Waveform signals	all (except pulse)
Type	linear, logarithmic
Direction	up (f_{start} < f_{stop}) down (f_{start} > f_{stop})
Sweep time	1ms to 500s, resolution 1ms

Trigger sources	immediate (continous), internal, external (positive or negative slope)
Marker	adjustable to any frequency between f_{start} and f_{stop}
Modulation	
Modulation types	AM, FM, PM, FSK, PWM
Waveform carrier	all (except pulse)
Internal modulation (waveform)	sine, square (50%), ramp (pos., neg.), triangle (50%), noise (white, pink), cardinal sine, exponential (rise, fall), arbitrary up to 4,096 points
Internal modulation frequency	10 µHz to 50 kHz
External modulation bandwidth (-3 dB)	DC to 50 kHz (250 kSa/s sampling rate)
Amplitude modulation (AM)	
Depth	0% to 100%
Source	internal (basic waveforms, arbitrary), external
Frequency modulation (FM)	
Deviation	10 µHz to 10 MHz
Source	internal (basic waveforms, arbitrary), external
Phase modulation (PM)	
Deviation	-180° to +180°
Source	internal (basic waveforms, arbitrary), external
Frequency shift key modulation (FSK)	
Duty cycle	0% to 100%
Rate	0 Hz to 250 kHz
Hop	any frequency within the carrier signal's range
Source	internal (basic waveforms, arbitrary), external
Pulse width modulation (PWM)	
Deviation	0% to 49.99% of pulse width
Source	internal (basic waveforms, arbitrary), external

Connectors

External trigger / gate	
Connector	BNC socket (front panel)
Impedance	5 kΩ || 100 pF
Polarity	positive, negative slope
Level	TTL, protected up to ±30 V
Pulse width	min. 100 ns
Trigger output	
Connector	BNC socket (front panel)
Impedance	50 Ω
Level	TTL, positive slope
Frequency	max. 10 MHz
Modulation input	
Connector	BNC socket (rear panel)
Impedance	10 kΩ
Voltage level	max. ±5 V full-scale
Bandwidth (-3 dB)	DC to 50 kHz (250 kSa/s sampling rate)
Frequency reference input	
Connector	BNC socket (rear panel)
Impedance	1 kΩ
Frequency range	10 MHz ±100 kHz
Level	TTL
Frequency reference output	
Connector	BNC socket (rear panel)
Impedance	50 Ω
Frequency	10 MHz (norm.)
Level	1.65 V_{PP} (into 50 Ω)
Sweep output	
Connector	BNC socket (rear panel)
Impedance	200 Ω
Level	0 V to 5 V ramp synchronous with frequency sweeps
Interfaces	
for mass storage	1x USB-host (type A), FAT16/32
for remote control	R&S®HO720 dual interface: RS-232 / USB-device (type B)
Optional interfaces	R&S®HO732 dual interface: Ethernet (RJ45) / USB-device (type B) R&S®HO740 interface: IEEE-488 (GPIB)
Save and recall	on internal file system (up to 4 MB) or external USB memory (max. 4 GB)

General Characteristics

Display	
screen size / type	8.9 cm (3.5") QVGA color TFT
resolution	320 x 240
backlight	LED
Real-time clock (RTC)	date and time
Power supply	
AC supply	105 V to 253 V, 50 Hz to 60 Hz, CAT II
power consumption	30 W (typ.)
Safety	safety class I (EN61010-1)
Temperature	
operating temperature range	+5°C to +40°C
storage temperature range	-20°C to +70°C
Rel. humidity	5% to 80% (without condensation)
Mechanical data	
dimensions (W x H x D)	285 x 75 x 365 mm
weight	3.6 kg
All specifiactions at 23°C after 30 minutes warm-up	

Accessories supplied:
Line cord, Operating manual, Software

Recommended accessories:

R&S®HO732	Dual-Interface Ethernet/USB
R&S®HO740	Interface IEEE-488 (GPIB), galvanically isolated
R&S®HZ20	Adapter, BNC to 4mm banana
R&S®HZ24	Attenuators 50 Ω (3/6/10/20 dB)
R&S®HZ42	19" Rackmount kit 2RU
R&S®HZ72	IEEE-488 (GPIB) Cable 2m