

R&S®HMF2525

R&S®HMF2550

Arbitrary Function Generator

Technical Data

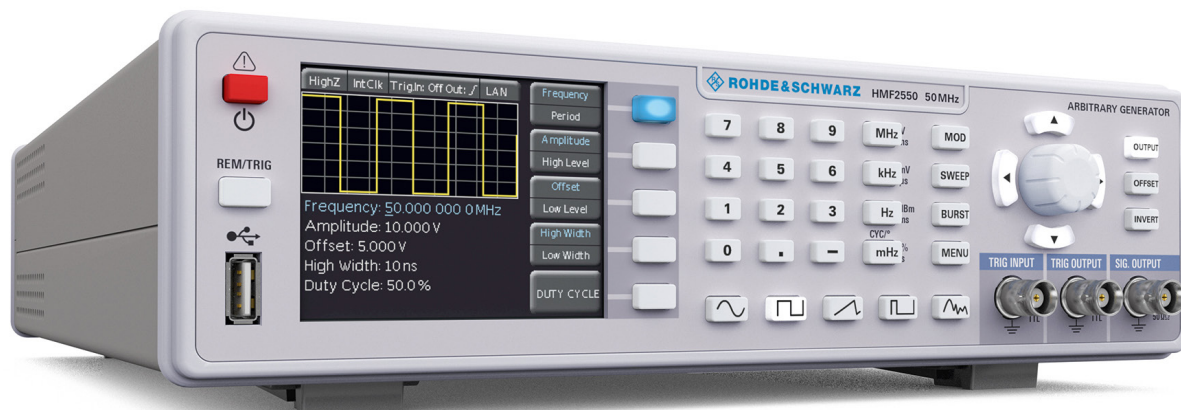
4TECT

ООО «4TECT»

Телефон: +7 (499) 685-4444

info@4test.ru

www.4test.ru



Key facts

- ▮ Frequency range: 10 μ Hz to 25 MHz [50 MHz]
- ▮ Triangle and ramp signal up to 10 MHz
- ▮ Pulse: frequency range from 100 μ Hz to 12.5 MHz [25 MHz]
- ▮ Output voltage: 5 mV_{PP} to 10 V_{PP} (into 50 Ω load)
- ▮ DC offset: \pm 5 mV to 5 V
- ▮ Output impedance steplessly adaptable (1 Ω to 10 k Ω)
- ▮ 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, \pm 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 50 Ω 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 | 1×10^{-6} (+18°C to +28°C) |
| Aging (after one year) | $\pm 1 \times 10^{-6}$ (+25°C) |

Waveform Characteristics

| Sine | |
|---|---|
| Frequency range | |
| R&S®HMF2525 | 10 μHz to 25 MHz |
| R&S®HMF2550 | 10 μHz to 50 MHz |
| Amplitude flatness | |
| up to 10 MHz | ±0.15 dB |
| 10 MHz to 25 MHz | ±0.2 dB |
| above 25 MHz | ±0.4 dB |
| Harmonic distortion | |
| up to 100 kHz | < -70 dBc |
| 100 kHz to 10 MHz | < -55 dBc |
| 10 MHz to 25 MHz | < -40 dBc |
| above 25 MHz | < -37 dBc |
| Total harmonic distortion (THD) up to 100 kHz | 0.04% (typ.) |
| Non-harmonic spurious | |
| up to 1 MHz | < -70 dBc |
| above 1 MHz | < -70 dBc, increasing +6 dB / decade |
| Phase noise (SSB) | |
| 10 kHz Offset | -115 dBc / Hz (typ.) |
| Square | |
| Frequency range | |
| R&S®HMF2525 | 10 μHz to 25 MHz |
| R&S®HMF2550 | 10 μHz to 50 MHz |
| Rise and fall times | 8 ns, fixed |
| Overshoot | < 3% (typ.) |
| Symmetry | duty cycle: 50% accuracy: ±1% + 5 ns |
| Jitter | < 1 ns _{rms} (typ.) |

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

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

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

Output Characteristics

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

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

| DC Offset | |
|------------|--|
| Range | ±5 mV to 5 V (into 50 Ω) ±10 mV to 10 V (open circuit) |
| Resolution | 1 mV (into 50 Ω) |
| Units | V |
| Accuracy | ±2% of offset setting ±0.5% of amplitude setting ±2 mV ±1 mV / 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 | 1 μs to 500 s |

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

| | |
|---|---|
| Trigger sources | immediate (continuous), 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 μ Hz to 50 kHz |
| External modulation bandwidth (-3dB) | 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 μ Hz 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 k Ω 100 pF |
| Polarity | positive, negative slope |
| Level | TTL, protected up to \pm 30V |
| 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 k Ω |
| Voltage level | max. \pm 5V full-scale |
| Bandwidth (-3dB) | DC to 50 kHz (250 kSa/s sampling rate) |
| Frequency reference input | |
| Connector | BNC socket (rear panel) |
| Impedance | 1 k Ω |
| Frequency range | 10 MHz \pm 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 | 0V to 5V 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 4MB) or external USB memory (max. 4GB) |
| General Characteristics | |
| Display | |
| screen size / type | 8.9cm (3.5") QVGA color TFT |
| resolution | 320 x 240 |
| backlight | LED |
| Real-time clock (RTC) | date and time |
| Power supply | |
| AC supply | 105V to 253V, 50 Hz to 60 Hz, CAT II |
| power consumption | 30W (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 specifications 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 |

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