



Version
04.00

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R&S® IMS Integrated Measurement System

Specifications



ROHDE & SCHWARZ

Generator

RF

Frequency range		9 kHz to 3 GHz
Resolution		0.1 Hz
Setting time	for an offset of $<1 \times 10^{-7}$	<10 ms
Reference frequency		10 MHz
Aging		2×10^{-6} /year
Temperature drift	5 °C to 40 °C	1×10^{-6}

Spectral purity

Spurious		
Harmonics	level ≤ 0 dBm, $f_c > 1$ MHz	< -30 dBc
Subharmonics	$f_c > 1$ MHz	< -50 dBc
Nonharmonics	> 10 kHz offset from carrier	< -50 dBc
Wideband noise	$f_c = 1$ GHz, carrier offset > 2 MHz	< -123 dBc
SSB phase noise	$f_c = 1$ GHz, carrier offset 20 kHz	< -95 dBc (1 Hz)
Residual FM	$f_c = 1$ GHz 0.3 kHz to 3 kHz 0.03 kHz to 20 kHz	< 10 Hz, rms < 30 Hz, peak < 60 Hz, rms < 300 Hz, peak
Residual AM	$f_c = 1$ GHz 0.3 kHz to 3 kHz	< 0.03 %, rms < 0.2 %, peak

RF level

Level range		-60 dBm to +13 dBm
Setting time	to < 0.3 dB deviation	< 200 ms
Resolution		0.1 dB
Level uncertainty	$f_c > 100$ kHz, level > -120 dBm 20 °C to 30 °C	< 1 dB

LF generator

Frequency range		20 Hz to 20 kHz
Frequency resolution		0.1 Hz
Frequency response	20 Hz to 20 kHz	< 0.2 dB
Total harmonic distortion	20 Hz to 20 kHz	< 0.1 %

Modulation

Amplitude modulation		
Operating modes		internal, external AC/DC
Modulation depth	The modulation depth that can be set observing the AM specifications continuously decreases from +7 dBm to +13 dBm	0 % to 100 %
Resolution		0.1 %
Setting uncertainty	$f_{LF} = 1$ kHz, $m < 80$ %, level = 0 dBm	< 5 % of setting + 0.2 %
AM total harmonic distortion	$f_{LF} = 1$ kHz, $m < 80$ %, level = 0 dBm	< 2 %
Modulation frequency range		DC/20 Hz to 20 kHz

Frequency modulation		
Operating modes		internal, external AC/DC
Frequency deviation		20 Hz to 100 kHz
Resolution		<1 %, min. 1 Hz
Setting uncertainty	$f_{LF} = 1 \text{ kHz}$	<5 % of setting + 300 Hz
FM total harmonic distortion	$f_{LF} = 1 \text{ kHz}$, deviation = 50 kHz	<1 %
Carrier frequency deviation	external modulation on	<200 Hz
Modulation frequency range		DC/20 Hz to 80 kHz
Phase modulation		
Operating modes		internal
Phase deviation	$f_{LF} \leq 10 \text{ kHz}$ $10 \text{ kHz} < f_{LF} \leq 20 \text{ kHz}$	0 rad to 10 rad 0 rad to 5 rad
Resolution		<1 %, min. 0.001 rad
Setting uncertainty	$f_{LF} = 1 \text{ kHz}$	<5 % of setting + 0.2 rad
ϕ M total harmonic distortion	$f_{LF} = 1 \text{ kHz}$, deviation = 5 rad	<1.5 %
Modulation frequency range		300 Hz to 20 kHz
Pulse modulation		
Operating modes		internal, external AC/DC
Rise/fall time (10%/90%)		<3 μ s
Delay time (external)		<1 %, min. 1 Hz
Pulse width (internal, external)		100 μ s to 1 s
Pulse period (internal)		200 μ s to 2 s
Time resolution		1 μ s

Inputs to generator

Reference frequency input		
Connector		BNC, female
Reference frequency		10 MHz, 5 MHz, 2 MHz
Input voltage		0.5 V to 2 V into 50 Ω
AM/FM modulator input		
Connector		BNC, female
Input voltage for max. modulation depth or deviation		1 V
Input impedance		>100 k Ω
Pulse modulator input		
Connector		BNC, female
Input voltage		TTL voltage

Outputs from generator

RF output		
Connector		N, female
Characteristic impedance		50 Ω
VSWR	1 MHz < f_c > 2.5 GHz 2.5 GHz < f_c > 3 GHz	<1.6 <1.8
Max. input level	1 minute	+36 dBm
Max. DC voltage		30 V
Attenuation to X1 through X3 (RF OUT1 – RF OUT3)		typ. 1.2 dB, max. 2.5 dB
LF output		
Connector		BNC, female
Output level		1 mV to 2 V, rms
Resolution of output voltage		<1 %, 1 mV min. resolution
Interference output		<-60 dBc

Reference frequency output		
Connector		BNC, female
Reference frequency		10 MHz
Output voltage		>0.5 V into 50 Ω

Integrated power amplifier (model 14)

General transmission data

Frequency range		9 kHz to 250 MHz
Input impedance		50 Ω
Output impedance		50 Ω (nominal)
Input VSWR		typ. <2:2
Load VSWR	for $P_n - 0.5$ dB	max. 2:1 ∞ without damage
Nominal output level		>+44 dBm (25 W)
Max. input level	at nominal output level	<0 dBm, typ. -1.5 dBm
2nd order harmonics	at nominal output level	<-20 dBc, typ. -26 dBc
3rd order harmonics	at nominal output level	<-20 dBc, typ. -20 dBc
Spurious	at nominal output level	<-50 dBc
Noise level	measured with power meter	typ. -18 dBm
Decoupling factor of internal directional coupler	forward path	>-41.5 dB, <-38.5 dB
Decoupling factor of internal directional coupler	reflected path	>-41.5 dB, <-38.5 dB

Interfaces

RF connectors		
RF IN1, FWD1, REV1		SMA, female
RF OUT1		N, female
USB device (USB IN/AMP)		
Connector		B, female
Protocol		version 2.0
Command set		device-specific; remote control via supplied Windows drivers
REMOTE CONTROL / INTERLOCK CONTROL		
Connector		15-pin D-Sub, female

Path switching

Attenuation for power measurement paths	9 kHz to 3 GHz	typ./max. attenuation (dB) at 3 GHz
Without option R&S IMS-B7	X4 through X10 to X 11 (FWD)	3.1/4.0
With option R&S IMS-B7	X 5, X 7, X 9, X 10 to X 12 (REV)	3.1/4.0
Max. RF level for power measurement paths	9 kHz to 3 GHz	
	max. level specified by pin diode switch	max. +20 dBm
RF path via transfer relay with cable	9 kHz to 3 GHz	option R&S IMS-B2 (K5)
R&S IMS model 04	AMP RF OUT to RF OUT1	0.9/1.2
	AMP RF OUT to RF OUT2	0.9/1.2
RF path via transfer relay without cable	9 kHz to 3 GHz	option R&S IMS-B2 (K5)
R&S IMS model 02	relay 1 to relay 2	0.2/0.4
	relay 1 to relay 3	0.2/0.4

Analyzer (option)

Frequency

Frequency range		9 kHz to 3 GHz
Reference frequency		
Aging		$2 \times 10^{-6}/\text{year}$
Temperature drift	+5 °C to +30 °C	1×10^{-6}
Frequency counter		
Resolution		1 Hz, 10 Hz, 100 Hz, 1 kHz
Frequency span		1 kHz to 3 GHz, 0 Hz
Spectral purity		
SSB phase noise	10 kHz carrier offset	<-90 dBc (1 Hz)
Residual FM	1 kHz resolution bandwidth 1 kHz video bandwidth	<100 Hz, typ. 60 Hz
Sweep time		
SPAN ≥ 1 kHz		100 ms to 1000 s
SPAN ≥ 0 Hz		10 μ s to 20 s
Bandwidths		
Resolution bandwidths (-3 dB)	in steps of 1, 2, 3, 5	200 Hz to 1 MHz
Video bandwidth	in steps of 1, 2, 3, 5	10 Hz to 1 MHz

Amplitude

Level measurement range		>137 dB
Max. input level		
50 MHz to 3 GHz		+33 dBm
10 MHz to 50 MHz		+26 dBm
9 kHz to 10 MHz		+20 dBm
Intermodulation-free range		
1 MHz to 100 MHz	two-tone signal with 2×-30 dBm, 0 dB input attenuation	≤ -60 dBc
100 MHz to 3 GHz		≤ -70 dBc
Harmonics	-40 dBm, 0 dB input attenuation	≤ -60 dBc
Inherent spurious	terminated input, 0 dB input attenuation	≤ -85 dBm
Other interfering signals	10 MHz to 3 GHz, -30 dBm level at first mixer	≤ -60 dBc
Average displayed noise level	300 Hz resolution bandwidth, 10 Hz video bandwidth, 0 dB input attenuation	≤ -110 dBm, typ. -120 dBm
1 dB compression point of first mixer	100 kHz to 3 GHz, 0 dB input attenuation	-10 dBm
Setting range of reference level		-110 dBm to +36 dBm
Input attenuation range	in 2 dB steps, manually selectable or automatically coupled with reference level	0 dB to 70 dB
Display range		80 dB, 40 dB, 16 dB, 8 dB, linear
Display units		
Logarithmic		dBm, dBmV, dB μ V
Linear		V, W
Level measurement uncertainty		<1.5 dB

Inputs

RF input		
Input impedance		50 Ω
VSWR	10 MHz to 3 GHz, RF attenuation ≥ 20 dB	<1.5
Max. input level	with 30 dB input attenuation	+33 dBm
Max. DC voltage		30 V
Connector		N, female
External trigger input		
Connector		BNC, female
Trigger voltage		TTL voltage
Reference frequency input to analyzer (option)		
Connector		BNC, female
Reference frequency		10 MHz \pm 50 Hz
Input voltage		0.5 V to 2 V into 50 Ω

Further interfaces R&S IMS

USB device (USB IN/IMS)		
Connector		B, female
Protocol		version 2.0
Command set		device-specific; remote control via supplied Windows drivers
USB host (USB OUT)		
Connector		A, female
Protocol		version 2.0
Interlock		
25-pin D-Sub, female	+12 V to release the interlock	interlock bridge
	floating relay contact, max. 100 V, max. 0.5 A	test-in-progress relay
	floating relay contact, max. 250 V, max. 1.0 A	3 \times 2 relay contacts for releasing the interlock of the amplifiers
	12 V CMOS logic for driving the LEDs on the front panel	six status inputs from the amplifiers for displaying the "operate" and "sum error" statuses
		six TTL inputs
Monitoring		
9-pin D-Sub, female		four TTL inputs four TTL outputs

Power supply

Input voltage range		100 V to 240 V 50 Hz to 60 Hz autoranging
Power consumption	model 02 without amplifier model 04 with amplifier	max. 110 VA max. 280 VA
Fuse	for all voltages	IEC 127 T3.15H/250

General data

Environmental conditions		
Operating temperature range	to DIN EN 60068-2-1/2	+5 °C to +40 °C
Storage temperature range		-20 °C to +70 °C
Relative humidity	to DIN EN 60068-2-1/2 (non-condensing)	95 % at +40 °C
Mechanical resistance		
Sinusoidal vibration	to DIN EN 60068-2-2	5 Hz to 150 Hz, 2 g at 55 Hz 55 Hz to 150 Hz, 0.5 g constant
Random vibration	to DIN EN 60068-2-64	10 Hz to 300 Hz, 1.2 g
Shock	to DIN EN 60068-2-27 and MIL-STD-810	shock spectrum
Electromagnetic compatibility	to EN 55011 class B and EN 61326	
RFI field strength		≤10 V/m
Safety class	to DIN EN 61010-1/IEC61010-1	
Dimensions (W × H × D)		425 mm × 500 mm × 175 mm (4 HU)
Weight		
Model 02		approx. 13 kg
Model 04		approx. 22 kg

System requirements

Prior to installing R&S EMC32, make sure that the PC meets the following minimum system requirements:

- Operating system: Windows XP including Service Pack 2
- Administrator rights (during installation)
- Microsoft Internet Explorer 5.0 or later
- PC with Pentium or compatible processor (3 GHz or higher)
- 512 Mbyte RAM (Windows XP 32 bits)
- 200 Mbyte minimum free hard disk space
- Super VGA monitor, minimum screen resolution 1024 x 768 pixels, 65 536 colors, higher resolution recommended)
- USB interface

We cannot guarantee troublefree operation of the product if any of the above minimum system requirements is not met.

Ordering information

Printed in Germany (bb/we)

Integrated Measurement System	R&S IMS	1502.0009.12
Integrated Measurement System with internal amplifier module 9 kHz to 250 MHz, 25 W	R&S IMS	1502.0009.14
Options		
Spectrum Analyzer Module	R&S IMS-B1	1502.0796.02
Transfer Relay	R&S IMS-B2	1502.0838.02
Generator Interlock Relay	R&S IMS-B3	1502.0873.02
Hardware Option for Using Two Power Sensors	R&S IMS-B7	1502.0721.02
Documentation of R&S IMS Calibration Values	R&S IMS-DCV	0240.2193.14
R&S IMS DKD Calibration (order only with device)	R&S IMS-DKD	1502.0038.14
GPIB interface for USB	R&S TS-PIEC2	1501.9690.02
19" Adapter, 4 HU, 1/1 for design 2000 housing	R&S ZZA-411	1096.3283.00
Accessories supplied		
Power cable, USB cable type A – type B, CD with software, operating manual		
Power sensors supported		
Power Sensor (AVG) 9 kHz to 6 GHz; 200 pW to 200 mW, with short cable (0.4 m)	R&S NRP-Z91	1168.8004.04
USB Adapter (passive) for R&S NRP-Z sensors with short cable (0.4 m)	R&S NRP-Z4	1146.8001.04

For data sheet, see PD 0758.2525.12
and www.rohde-schwarz.com
(search term: IMS)



ROHDE & SCHWARZ

www.rohde-schwarz.com

Europe: +49 1805 12 4242, customersupport@rohde-schwarz.com · USA and Canada: +1 888-837-8772, customer.support@rsa.rohde-schwarz.com

Asia: +65 65130488, customersupport.asia@rohde-schwarz.com

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