

R&S®SMU-/SMATE-/ R&S®SMJ-/SMBV-/ R&S®AMU-K54/-K86 Options

Specifications

Definitions

(see Digital Standards for Signal Generators data sheet, PD 5213.9434.22)

IEEE 802.11n digital standard

For the R&S®SMU-K54, R&S®SMATE-K54, R&S®SMJ-K54, R&S®SMBV-K54 and R&S®AMU-K54 options.

Prerequisite for installation – R&S®SMU200A, R&S®SMATE200A, R&S®AMU200A

At least one I/Q baseband generator of the following types must be installed:

- For the R&S®SMU200A: R&S®SMU-B9, R&S®SMU-B10 or R&S®SMU-B11
- For the R&S®SMATE200A: R&S®SMATE-B9, R&S®SMATE-B10 or R&S®SMATE-B11
- For the R&S®AMU200A: R&S®AMU-B9, R&S®AMU-B10 or R&S®AMU-B11

If two I/Q baseband generators are installed and two signals of the same standard (e.g. GSM/EDGE) are to be output simultaneously, two corresponding software options must also be installed (in this case R&S®SMU-K40 for an R&S®SMU200A). If only one R&S®SMU-K40 option is installed and GSM/EDGE is selected in one I/Q baseband generator, the other I/Q baseband generator is disabled for GSM/EDGE. However, a software option is not tied to a specific I/Q baseband generator.

Prerequisite for installation – R&S®SMJ100A

An R&S®SMJ-B9, R&S®SMJ-B10 or R&S®SMJ-B11 I/Q baseband generator must be installed. The options cannot be used with the R&S®SMJ-B50 and R&S®SMJ-B51 I/Q baseband generators.

Prerequisite for installation – R&S®SMBV100A

An R&S®SMBV-B10 baseband generator must be installed. The options cannot be used with the R&S®SMBV-B50 and R&S®SMBV-B51 I/Q baseband generators.

The R&S®SMBV-B92 option (hard disk) must be installed.

IEEE 802.11n digital standard	in line with IEEE 802.11n-2009, IEEE 802.11a-1999, IEEE 802.11b-1999, IEEE 802.11g-2003
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General settings		
Bandwidth		20 MHz, 40 MHz
Clipping		vector or scalar clipping, applied before filtering
Generate waveform file	filtering of data generated in ARB mode and saving it as waveform file	
Marker modes		Restart, Frame Block, Frame, Frame Active Part, Pulse, Pattern, ON/OFF Ratio
Triggering		see data sheet of respective Rohde & Schwarz instrument, "I/Q baseband generator" section
Chip/sample rate	standard	11 Mcps, 20 Msample/s, 40 Msample/s
	range	depends on the respective Rohde & Schwarz instrument
Baseband filter		spectral mask in line with IEEE 802.11a-1999 – wireless LAN MAC and PHY specifications – chapter 17.3.9.6.2 for LEGACY 20 MHz mode, IEEE 802.11n-2009 chapter 20.3.21 for high throughput (HT) modes
	CCK and PBCC	spectral mask in line with IEEE 802.11b-1999 – wireless LAN MAC and PHY specifications – chapter 18.4.7.3
Configure baseband B from baseband A (not available for the R&S®SMBV-K54 and R&S®SMJ-K54 options)		easy setup for MIMO by means of one configuration process for the coupled transmit antennas
Transmit antenna setup	number of antennas	1 to 4
	mapping coefficient range	(–1000 –1000 i) to (+1000 +1000 i) with resolution = 0.01/dimension
	output destination	current baseband, baseband B ¹ , file, OFF
Frame block configuration		
Frame blocks (table rows)		Limited to 100. The wave-file size is checked at the beginning of the computation process to make sure that sufficient ARB memory is available.
Type		DATA, SOUNDING
Physical mode	type = DATA	LEGACY, MIXED MODE, GREEN FIELD
	type = SOUNDING	GREEN FIELD, MIXED MODE
Transmit mode	physical mode = LEGACY	L-20 MHz, L-Duplicate, L-Upper, L-Lower, CCK, PBCC
	physical mode = MIXED MODE or GREEN FIELD	HT-20 MHz, HT-40 MHz, HT-Duplicate, HT-Upper, HT-Lower
Frames		1 frame to 20000 frames (depends on frame duration)
Idle time	time between two successive frames (PPDUs)	
	range	0 s to 1000 ms with 1 µs resolution
Settings for CCK		
PSDU parameters	MAC header	activating and configuring the MAC header with the following parameters: frame control, duration/ID, addresses 1 to 4, sequence control
	frame check sequence	activating or deactivating a 32 bit (4 byte) checksum for protecting MAC header and user data (frame body)
	PLCP preamble and header format	long PLCP and short PLCP
	preamble/header active	The preamble/header can be turned ON or OFF. By turning it OFF and setting Idle Time to 0, the "unframed" mode is available.
	PSDU bit rate	1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps
	PSDU modulation (depends on PSDU bit rate)	DBPSK, DQPSK, CCK

¹ Only if "Configure baseband B from baseband A" coupling is selected.

	PSDU data length (length of user data field in bytes of the packet to be transferred)	
	range	0 byte to 4095 byte
	scrambling	Data scrambling can be activated or deactivated.
Settings for PBCC		
PSDU parameters	MAC header	activating and configuring the MAC header with the following parameters: frame control, duration/ID, addresses 1 to 4, sequence control
	frame check sequence	activating or deactivating a 32 bit (4 byte) checksum for protecting MAC header and user data (frame body)
	PLCP preamble and header format	long PLCP and short PLCP
	preamble/header active	The preamble/header can be turned ON or OFF. By turning it OFF and setting Idle Time to 0, the "unframed" mode is available.
	PSDU bit rate	1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps, 22 Mbps
	PSDU modulation (depends on PSDU bit rate)	DBPSK, DQPSK, PBCC
	PSDU data length (length of user data field in bytes of the packet to be transferred)	
	range	0 byte to 4095 byte
	scrambling	Data scrambling can be activated or deactivated.
Settings for OFDM		
PSDU parameters	MAC header	activating and configuring the MAC header with the following parameters: frame control, duration/ID, addresses 1 to 4, sequence control. For high throughput (HT), i.e. 'Not Legacy', QoS Control and HT Control are also configurable.
	frame check sequence	activating or deactivating a 32 bit (4 byte) checksum for protecting MAC header and user data (frame body)
	number of spatial streams	1 to 4
	number of space-time streams	1 to 4
	number of extended spatial streams	0 to 3
	space-time block coding	activated by simply choosing different values for the number of spatial and space-time streams
	PSDU modulation/space stream	BPSK, QPSK, 16QAM, 64QAM
	data length	1 byte to 4061 byte ² for LEGACY frames, 1 byte to 65495 byte for HT frames. 0 is permissible only with sounding frames.
	number of data symbols (number of OFDM symbols in data portion of packet)	directly proportional to PSDU data length
	raw data rate	up to 600 Mbps
	preamble/header active	The preamble/header can be turned ON or OFF. By turning it OFF and setting Idle Time to 0, the "unframed" mode is available.
	guard interval	short, long
	scrambling	Data scrambling can be activated or deactivated; initial scrambler state can be set randomly or to a user-defined value.

² The maximum PPDU length for legacy is 4095 byte. It can be obtained by activating all the MAC fields. The same applies to HT; 65535 byte can be implemented.

	coding	convolutional coding (BCC) or OFF, 1 or 2 encoders based on setup and coding rates of 1/2, 2/3, 3/4 and 5/6
	interleaver	can be activated or deactivated
	time domain windowing (transition times)	0 s to 1000 ns
	service field	user-defined service field value supported
	spatial mapping	OFF, direct, indirect and spatial expansion

IEEE 802.11ac digital standard

For the R&S[®]SMU-K86, R&S[®]SMATE-K86, R&S[®]SMJ-K86, R&S[®]SMBV-K86 and R&S[®]AMU-K86 options.

For each -K86 option, a -K54 option must also be installed on the respective instrument.

General parameters	This option enhances the -K54 option (IEEE 802.11n) to support IEEE 802.11ac modes. The -K86 option requires the -K54 option (IEEE 802.11n). Therefore, all general parameters of the -K54 option such as frame block configuration or PSDU parameters are also valid for the -K86 option, unless stated otherwise below.	
IEEE 802.11ac digital standard		in line with IEEE P802.11ac/D1.0
General settings		
Bandwidth		20 MHz, 40 MHz, 80 MHz
Sample rate	standard	20/40/80 Msample/s
	range	depends on the respective Rohde & Schwarz instrument
Baseband filter		spectral mask in line with IEEE P802.11ac/D1.0 chapter 22.3.18 for very high throughput (VHT) modes
Frame block configuration		
Transmit mode	physical mode = MIXED MODE	VHT-20 MHz, VHT-40 MHz, VHT-80 MHz
Settings for OFDM		
PSDU parameters	MAC header	activating and configuring the MAC header with the following parameters: frame control, duration/ID, addresses 1 to 4, sequence control. For very high throughput (VHT), QoS Control and VHT Control are also configurable.
	PSDU modulation/space stream	BPSK, QPSK, 16QAM, 64QAM, 256QAM
	data length	1 byte to 65495 byte for VHT frames
	raw data rate	up to 1733.33 Mbps

Ordering information

Designation	Type	Order No.
IEEE 802.11n	R&S [®] SMU-K54	1408.7562.02
IEEE 802.11ac	R&S [®] SMU-K86	1408.8552.02
IEEE 802.11n	R&S [®] SMATE-K54	1404.7951.02
IEEE 802.11ac	R&S [®] SMATE-K86	1404.8864.02
IEEE 802.11n	R&S [®] SMJ-K54	1409.2506.02
IEEE 802.11ac	R&S [®] SMJ-K86	1409.3448.02
IEEE 802.11n	R&S [®] SMBV-K54	1415.8160.02
IEEE 802.11ac	R&S [®] SMBV-K86	1415.8648.02
IEEE 802.11n	R&S [®] AMU-K54	1402.9705.02
IEEE 802.11ac	R&S [®] AMU-K86	1403.0899.02

Rohde & Schwarz GmbH & Co. KG

Europe, Africa, Middle East +49 89 4129 123 45
customersupport@rohde-schwarz.com
North America 1 888 TEST RSA (1 888 837 87 72)
customer.support@rsa.rohde-schwarz.com
Latin America +1 410 910 79 88
customersupport.la@rohde-schwarz.com
Asia/Pacific +65 65 13 04 88
customersupport.asia@rohde-schwarz.com
www.rohde-schwarz.com



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