

R&S®BTC

Broadcast Test Center

Specifications



3
year
warranty

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Definitions

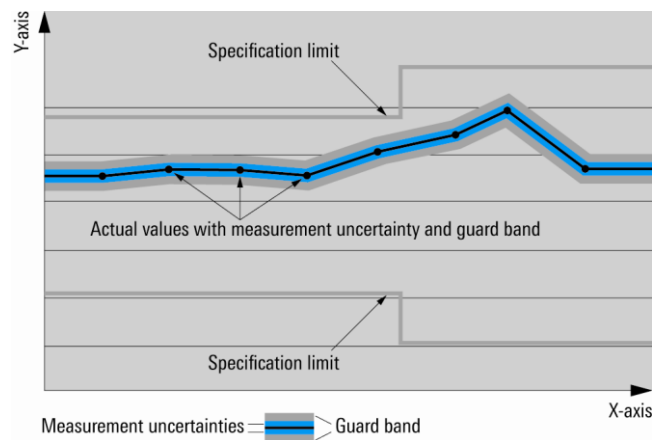
General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as $<$, \leq , $>$, \geq , \pm , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with $<$, $>$ or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

RF characteristics

Frequency

Range	R&S®BTC-B3103, R&S®BTC-B3203	100 kHz to 3 GHz
	R&S®BTC-B3106, R&S®BTC-B3206	100 kHz to 6 GHz
Resolution of setting		0.001 Hz
Resolution of synthesis	fundamental frequency range = 750 MHz to 1500 MHz	
	standard	5 µHz (nom.)
	with R&S®BTC-B3100 option	0.2 µHz (nom.)
Setting time ¹	to within $< 1 \times 10^{-7}$ for $f > 200$ MHz or < 124 Hz for $f < 200$ MHz, with GUI update stopped	
	after IEC/IEEE bus delimiter	< 4 ms, 3 ms (typ.)
Resolution of phase offset setting		0.1°

Frequency sweep

Operating mode		digital sweep in discrete steps
Trigger modes	free run	auto
	execute one full sweep	single
	execute one step	step
Trigger source		rotary knob, touchpanel, remote control
Sweep range		full frequency range
Sweep shape		sawtooth, triangle
Step size	linear	full frequency range
	logarithmic	0.01 % to 100 % per step
Dwell time setting range		10 ms to 100 s
Dwell time setting resolution		10 ms

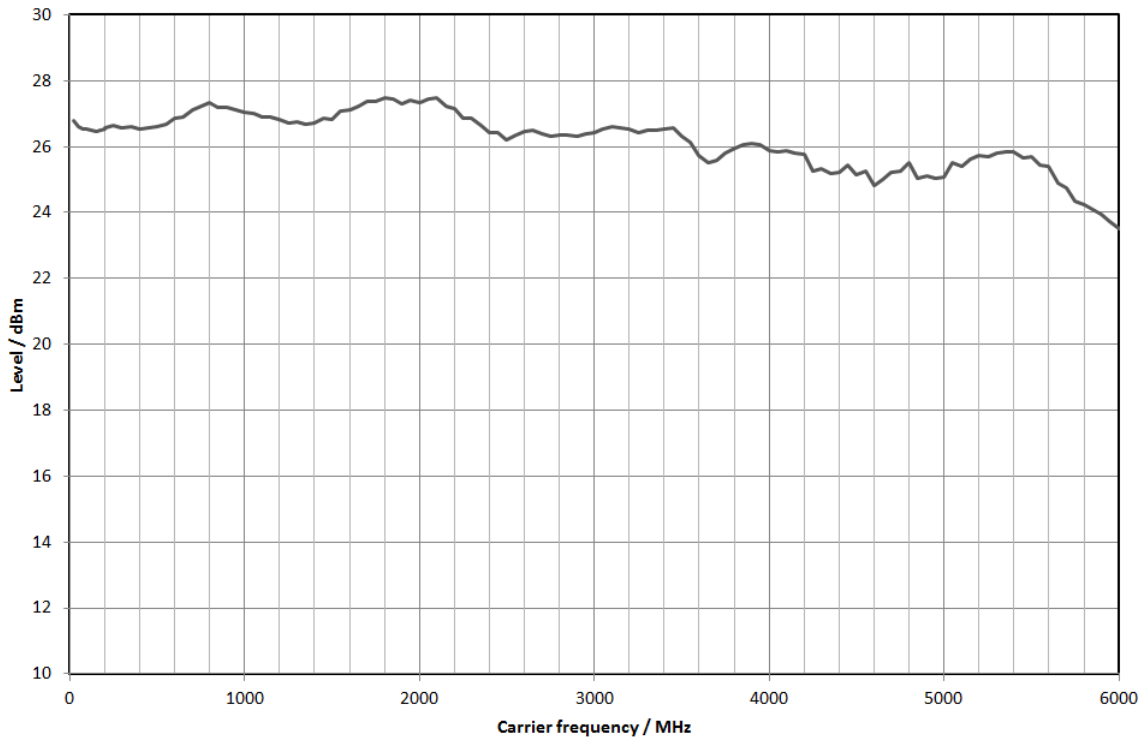
Reference frequency

Frequency error	at time of calibration in production	
	standard	$< 1 \times 10^{-8}$
	with R&S®BTC-B3100 option	$< 5 \times 10^{-9}$
Aging	after 30 days of uninterrupted operation	
	standard	$1 \times 10^{-9}/\text{day}$, $1 \times 10^{-7}/\text{year}$
	with R&S®BTC-B3100 option	$5 \times 10^{-10}/\text{day}$, $3 \times 10^{-8}/\text{year}$
Temperature effect	in temperature range from 0 °C to +50 °C	
	standard	6×10^{-8}
	with R&S®BTC-B3100 option	6×10^{-9}
Warm-up time	to nominal thermostat temperature	≤ 10 min
Output for internal reference frequency		
Connector type	REF OUT on rear panel	BNC female
Output frequency	sine wave	10 MHz or external input frequency
Output level		2 dBm to 9 dBm, 5 dBm to 8 dBm (typ.)
Source impedance		50 Ω (nom.)
Input for external reference frequency		
Connector type	REF IN on rear panel	BNC female
Input frequency		10 MHz
Min. frequency locking range	standard	$\pm 0.5 \times 10^{-6}$
	with R&S®BTC-B3100 option	$\pm 1.5 \times 10^{-7}$
Input level range	level limits	≥ -6 dBm, ≤ 19 dBm
	recommended input level	0 dBm to 19 dBm
Input impedance		50 Ω (nom.)

¹ Installation of software that is not authorized by Rohde & Schwarz for use on the R&S®BTC or installation of antivirus software can deteriorate the setting time performance.

Level

Setting range	$100 \text{ kHz} \leq f < 1 \text{ MHz}$	-145 dBm to +8 dBm
	$1 \text{ MHz} \leq f < 3 \text{ MHz}$	-145 dBm to +13 dBm
	$3 \text{ MHz} \leq f \leq 6 \text{ GHz}$	-145 dBm to +30 dBm
Specified level range	$100 \text{ kHz} \leq f < 1 \text{ MHz}$	-120 dBm to +3 dBm (PEP) ²
	$1 \text{ MHz} \leq f < 3 \text{ MHz}$	-120 dBm to +8 dBm (PEP) ²
	$3 \text{ MHz} \leq f \leq 6 \text{ GHz}$	-120 dBm to +18 dBm (PEP) ²
Resolution of setting		0.01 dB (nom.)
Level error	level setting characteristic: auto, temperature range from +18 °C to +33 °C	
	$100 \text{ kHz} < f \leq 3 \text{ GHz}$	< 0.5 dB
	$3 \text{ GHz} < f \leq 6 \text{ GHz}$	< 0.7 dB
Additional level error	I/Q modulation	< 0.3 dB
Output impedance	level setting characteristic: auto	< 1.6
VSWR in 50 Ω system		
Setting time ³	to < 0.1 dB deviation from final value, with GUI update stopped, no relay switchover, $f > 10 \text{ MHz}$	
	after IEC/IEEE bus delimiter	< 4 ms, 3 ms (typ.)
Interruption-free level setting range	level setting characteristic: uninterrupted level setting	> 20 dB
Reverse power (from 50 Ω source)	maximum permissible RF power in output frequency range of RF path for $f > 1 \text{ MHz}$	
	$1 \text{ MHz} < f \leq 3 \text{ GHz}$	50 W
	$3 \text{ GHz} < f \leq 6 \text{ GHz}$	10 W
Maximum permissible DC voltage		50 V



Measured maximum available output level versus frequency.

² PEP = peak envelope power.

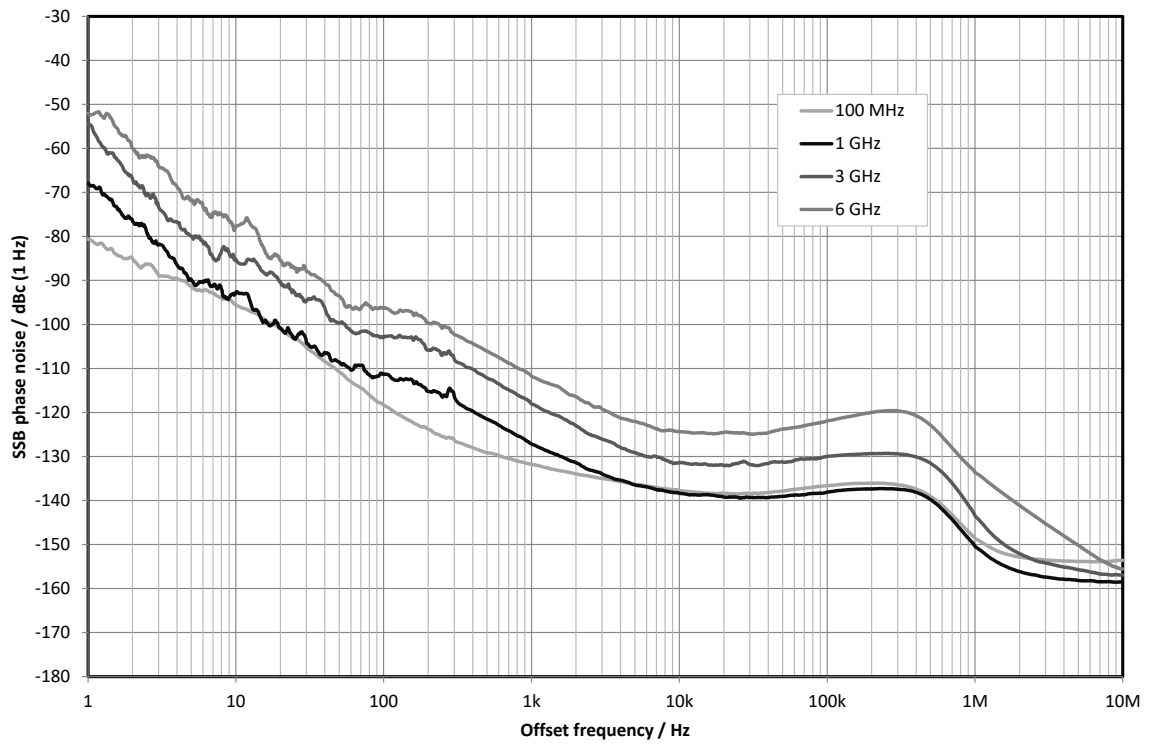
³ Installation of software that is not authorized by Rohde & Schwarz for use on the R&S®BTC or installation of antivirus software can deteriorate the setting time performance.

Level sweep

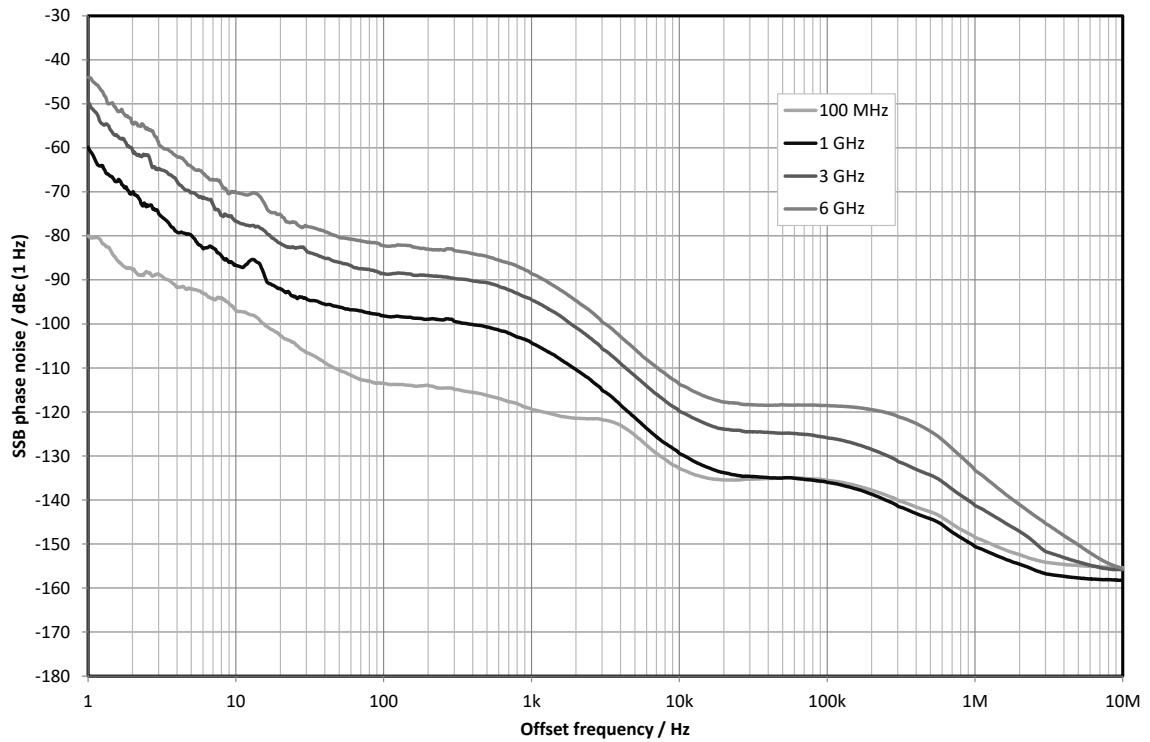
Operating mode		digital sweep in discrete steps
Trigger modes	free run	auto
	execute one full sweep	single
	execute one step	step
Trigger source	internal	rotary knob, touchpanel, remote control
Sweep range	interruption-free level sweep, level setting characteristic: uninterrupted level setting	0.01 dB to 30 dB
Sweep shape		sawtooth, triangle
Step size setting resolution		0.01 dB
Dwell time setting range		10 ms to 100 s
Dwell time setting resolution		10 ms

Spectral purity

Harmonics	CW, level < 10 dBm	< -30 dBc
Nonharmonics	CW, I/Q modulation (full-scale DC input), level > -10 dBm, > 10 kHz offset from carrier and outside the modulation spectrum	
	100 kHz ≤ f ≤ 200 MHz	< -77 dBc
	200 MHz < f ≤ 1500 MHz	< -80 dBc
	1500 MHz < f ≤ 3 GHz	< -74 dBc
	3 GHz < f ≤ 6 GHz	< -68 dBc
	CW, I/Q modulation (full-scale DC input), level > -10 dBm, > 850 kHz offset from carrier and outside the modulation spectrum	
	100 kHz ≤ f ≤ 200 MHz	< -77 dBc
	200 MHz < f ≤ 1500 MHz	< -86 dBc
	1500 MHz < f ≤ 3 GHz	< -80 dBc
	3 GHz < f ≤ 6 GHz	< -74 dBc
Nonharmonics with R&S®BTC-B3100 option	CW, I/Q modulation (full-scale DC input), level > -10 dBm, > 10 kHz offset from carrier and outside the modulation spectrum	
	100 kHz ≤ f ≤ 200 MHz	< -77 dBc, -87 dBc (typ.)
	200 MHz < f ≤ 1500 MHz	< -90 dBc
	1500 MHz < f ≤ 3 GHz	< -84 dBc
	3 GHz < f ≤ 6 GHz	< -78 dBc
Power supply and mechanically related nonharmonics	at RF = 1 GHz, 50 Hz to 10 kHz from carrier	< -80 dBc
Subharmonics	1500 MHz < f ≤ 6000 MHz	< -74 dBc
Wideband noise	carrier offset > 30 MHz, measurement bandwidth = 1 Hz	
	CW, level = 10 dBm	
	20 MHz ≤ f ≤ 200 MHz	< -146 dBc, -149 dBc (typ.)
	200 MHz < f ≤ 6 GHz	< -150 dBc, -152 dBc (typ.)
	I/Q modulation with full-scale internal single carrier signal, I/Q input gain = +2 dB, level = 10 dBm	
	20 MHz ≤ f ≤ 200 MHz	< -139 dBc, -142 dBc (typ.)
	200 MHz < f ≤ 1 GHz	< -141 dBc, -144 dBc (typ.)
	1 GHz < f ≤ 3 GHz	< -142 dBc, -145 dBc (typ.)
3 GHz < f ≤ 6 GHz	< -140 dBc, -143 dBc (typ.)	
SSB phase noise	CW, carrier offset = 20 kHz, measurement bandwidth = 1 Hz	
	20 MHz ≤ f ≤ 200 MHz	< -128 dBc, -132 dBc (typ.)
	f = 1 GHz	< -131 dBc, -135 dBc (typ.)
	f = 2 GHz	< -125 dBc, -129 dBc (typ.)
	f = 3 GHz	< -121 dBc, -125 dBc (typ.)
	f = 4 GHz	< -119 dBc, -123 dBc (typ.)
	f = 6 GHz	< -115 dBc, -119 dBc (typ.)
SSB phase noise with R&S®BTC-B3100 option	CW, carrier offset = 20 kHz, measurement bandwidth = 1 Hz	
	20 MHz ≤ f ≤ 200 MHz	< -135 dBc, -138 dBc (typ.)
	f = 1 GHz	< -136 dBc, -139 dBc (typ.)
	f = 2 GHz	< -130 dBc, -133 dBc (typ.)
	f = 3 GHz	< -126 dBc, -129 dBc (typ.)
	f = 4 GHz	< -124 dBc, -127 dBc (typ.)
	f = 6 GHz	< -120 dBc, -123 dBc (typ.)
Residual FM	RMS value at f = 1 GHz	
	300 Hz to 3 kHz	< 1 Hz
	20 Hz to 23 kHz	< 4 Hz
Residual AM	RMS value (20 Hz to 23 kHz)	< 0.02 %



Measured SSB phase noise performance with R&S[®]BTC-B3100 option, CW mode.



Measured SSB phase noise performance, standard instrument, CW mode.

Phase coherence

The R&S®BTC provides phase-coherent RF outputs for the two RF paths or two or more instruments. For frequencies above 200 MHz, the LO output and input frequency are set to the output frequency.

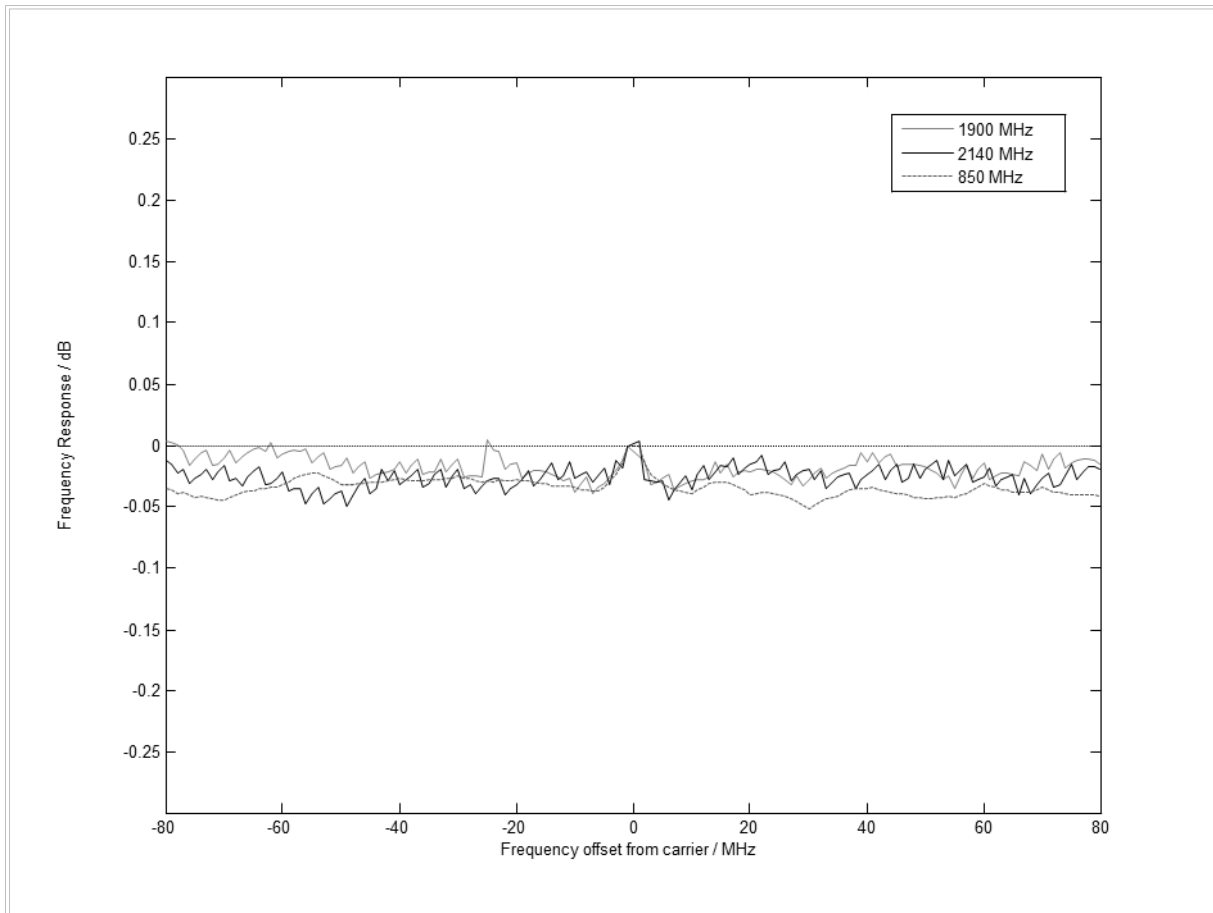
LO coupling modes	This mode corresponds to internal LO operation in path A and path B.	A, B internal
	This mode corresponds to internal LO operation in path A, and LO of path B is coupled to path A.	A internal, A → B coupled
	This mode corresponds to external LO operation at the LO IN connector in path A and internal LO operation in path B.	A external, B internal
	This mode corresponds to external LO operation at the REF/LO IN connector in path A and path B.	A external, A → B coupled
REF/LO OUT states	The active LO signal of path B can be routed to the LO OUT connector (in order to couple two or more instruments).	on/off
Input of phase coherence signal		
Connector type	LO IN on rear panel	SMA female
Input impedance		50 Ω (nom.)
Input level range of external LO signal		7 dBm to 13 dBm
Frequency range of external LO signal	for RF setting 200 MHz < f ≤ 6 GHz	200 MHz to 6 GHz
Output of phase coherence signal		
Connector type	LO OUT on rear panel	SMA female
Output impedance		50 Ω (nom.)
Output level range of internal LO signal		7 dBm to 13 dBm
Frequency range of internal LO signal	for RF setting 200 MHz < f ≤ 6 GHz	200 MHz to 6 GHz

I/Q modulation

I/Q modulation performance

Operating modes		external wideband I/Q, internal baseband I/Q
RF modulation bandwidth	with external wideband I/Q inputs, I/Q wideband on	
	1 MHz ≤ f ≤ 4 GHz	±25 % of carrier frequency
	f > 4 GHz	±1 GHz
	with external wideband I/Q inputs, I/Q wideband off	
	f ≤ 1000 MHz	±10 % of carrier frequency
	f > 1000 MHz	±100 MHz
	with internal baseband I/Q, I/Q wideband on	
1 MHz < f ≤ 320 MHz	±25 % of carrier frequency	
f > 320 MHz	±80 MHz	
RF frequency response in specified RF modulation bandwidth	with external wideband I/Q inputs	
	I/Q wideband on	< 9 dB, < 6 dB (meas.)
	I/Q wideband off	< 5 dB, < 3 dB (meas.)
	with internal baseband I/Q, I/Q wideband on, optimization mode = high quality	
Carrier leakage ⁴	mode: internal baseband I/Q, referenced to full-scale input	
	< -55 dBc	
Suppression of image sideband for entire instrument in modulation bandwidth	mode: internal baseband I/Q, up to 160 MHz RF modulation BW	
Two-tone IMD (2 carriers)	PEP = 0 dBm	
	up to 80 MHz carrier spacing	< -45 dBc (typ.)
I/Q impairments (analog)	These impairments are set within the analog I/Q modulator section. They can be used in external wideband I/Q mode and internal baseband I/Q mode. They cannot be applied to the analog or digital I/Q outputs.	
	I offset, Q offset	
	setting range	-10 % to +10 %
	resolution	0.01 %
	gain imbalance	
	setting range	-1.0 dB to +1.0 dB
	resolution	0.01 dB
	quadrature offset	
	setting range	-10° to +10°
	resolution	0.01°

⁴ Value applies after 1 hour warm-up time and recalibration for 4 hours of operation and temperature variations of less than +5 °C.



Measured RF frequency response with internal baseband I/Q.

Analog I/Q inputs

For each installed RF path A or B, one pair of I and Q inputs are available on the front panel. Analog I/Q input signals are directly applied to the analog I/Q modulation circuit and are not routed through the baseband section of the R&S®BTC.

Input mode		single-ended
Connector types	I, Q on front panel (for each installed RF path A or B)	BNC female
Input impedance		50 Ω (nom.)
VSWR	up to 200 MHz	< 1.2
	200 MHz to 1 GHz	< 1.35
Nominal input voltage for full-scale input		$\sqrt{V_i^2 + V_q^2} = 0.5 \text{ V}$
Damage voltage		±2 V

Internal baseband characteristics (R&S®BTC-B11 or R&S®BTC-B12 option)

The R&S®BTC-B11 option provides one I/Q path to the RF section (to RF path A) as well as one analog I/Q output (i.e. one I and one Q output connector). The R&S®BTC-B12 option provides two I/Q paths to the RF section (if two RF paths are installed) as well as two analog I/Q outputs. With two RF paths, R&S®BTC-B12 is required.

Either R&S®BTC-B11 or R&S®BTC-B12 must be installed on the instrument.

D/A converter		
Data rate		200 MHz
Resolution		16 bit
Sampling rate		800 MHz (internal interpolation × 4)
Aliasing filter	with amplitude, group delay and S _i correction	
Bandwidth, rolloff to -0.1 dB		80 MHz
D/A converter interpolation spectra	up to 10 MHz	< -80 dBc
	up to 80 MHz	< -73 dBc
I/Q impairments (digital baseband)	These impairments are set in the digital baseband section of the R&S®BTC. They act on the I/Q signal sent to the I/Q modulator/RF section, as well as on the I/Q signals at the analog or digital I/Q outputs (of the respective path).	
Carrier leakage	setting range	-10 % to +10 %
	resolution	0.01 %
I ≠ Q (imbalance)	setting range	-10 % to +10 %
	resolution	0.01 %
Quadrature offset	setting range	-10° to +10°
	resolution	0.01°

Differential analog I/Q outputs and digital baseband inputs/outputs (R&S®BTC-K2500 option)

The R&S®BTC-K2500 option enables the analog I/Q outputs, the differential analog I/Q outputs and the digital baseband inputs and outputs.

Analog I/Q outputs (R&S®BTC-K2500 option)

Number of I/Q outputs	with R&S®BTC-B11 option	1
	with R&S®BTC-B12 option	2
Output impedance		50 Ω
Output voltage	EMF (output voltage depends on set modulation signal)	1 V (V _p)
Offset	EMF	< 1 mV
Frequency response ⁵	at R _L = 50 Ω	
Magnitude	up to 10 MHz	0.02 dB (meas.)
	up to 80 MHz	0.03 dB (meas.)
I/Q balance ⁶	at R _L = 50 Ω	
Magnitude	up to 10 MHz	0.01 dB (meas.)
	up to 80 MHz	0.02 dB (meas.)
Spectral purity	at R _L = 50 Ω	
SFDR (sine)	up to 2 MHz	> 70 dB
	up to 20 MHz	60 dB (meas.)
Wideband noise	10 MHz sine wave at 1 MHz offset	-155 dBc (typ.)

⁵ Optimization mode = high quality.

⁶ Value applies after 1 hour warm-up time and recalibration for 4 hours of operation and temperature variations of less than +5 °C.

Differential analog I/Q outputs (R&S®BTC-K2500 option)

With the R&S®BTC-B11 option, differential analog I/Q outputs can be used on signal path A. If the instrument is equipped with the R&S®BTC-B12 option, differential analog I/Q outputs can be used on signal paths A and B simultaneously.

Output impedance		
Single-ended		50 Ω
Differential		100 Ω
Output voltage		
output voltage depends on set modulation signal		
Single-ended	EMF	0.02 V to 2 V (V_p)
Resolution		1 mV
Differential	EMF	0.04 V to 4 V (V_{pp})
Resolution		2 mV
Bias voltage (single-ended and differential)		
	EMF	-3.6 V to +3.6 V ⁷
Resolution		2 mV
Uncertainty		1 % + 4 mV
Offset voltage		
Differential	EMF	-300 mV to +300 mV
Resolution		0.1 mV
Uncertainty		1 % + 0.1 % × bias voltage + 1 mV
Differential signal balance		
at $R_L = 50 \Omega$, output voltage > 0.5 V (V_p)		
Magnitude	up to 10 MHz	< 0.2 dB, 0.05 dB (meas.)
	up to 80 MHz	0.2 dB (meas.)
Frequency response ⁸		
at $R_L = 50 \Omega$, output voltage > 0.5 V (V_p)		
Magnitude	up to 10 MHz	0.02 dB (meas.)
	up to 80 MHz	0.03 dB (meas.)

Digital baseband inputs/outputs (R&S®BTC-K2500 option)

Depending on the installed software and hardware options, the R&S®BTC is able to receive digital baseband signals and to output digital baseband signals. The digital I/Q input/output can be used for the lossless connection of the R&S®BTC to the digital I/Q input/output of other Rohde & Schwarz instruments.

The following table gives an overview of which software and hardware options are required for which digital I/Q connectivity:

Digital I/Q inputs	Digital I/Q outputs	Minimum required R&S®BTC options
–	1	R&S®BTC-B11 + R&S®BTC-K2500
–	2	R&S®BTC-B12 + R&S®BTC-K2500
1	1	R&S®BTC-B1 + R&S®BTC-B11 + R&S®BTC-K2500
1	2	R&S®BTC-B1 + R&S®BTC-B12 + R&S®BTC-K2500
2	2	R&S®BTC-B1 + R&S®BTC-B2 + R&S®BTC-B12 + R&S®BTC-K2500

⁷ The magnitude of the sum of output voltage and bias voltage must not exceed 4 V.

⁸ "Optimize internal I/Q impairments for RF output" switched off.

Output parameters		
Interface		
Standard		in line with R&S®Digital I/Q Interface ⁹ , I/Q data and control signals, data and interface clock
Level		LVDS
Connector		26-pin MDR
I/Q sample rate	With source "user-defined", the sample rate must be entered via the parameter "sample rate", no I/Q data clock being necessary.	
Source		user-defined
Sample rate	max. sample rate depending on connected receiving device	400 Hz to 200 MHz
Resolution (user-defined)		0.001 Hz
Frequency uncertainty (user-defined)		$< (5 \times 10^{-14} + \text{relative deviation of reference frequency}) \times \text{sample rate (nom.)}$
I/Q data		
Resolution		up to 18 bit
Logic format		two's complement
Physical signal level		
Setting range		0 dBFS to -60 dBFS
Resolution		0.01 dBFS
Bandwidth (RF)	sample rate < 200 MHz (interpolation)	0.8 × sample rate

Input parameters		
Input level	peak level	
Peak level		
Setting range		-60 dB to +3 dB, referenced to full scale
Resolution		0.01 dB
Crest factor		
Setting range		0 dB to +30 dB
Resolution		0.01 dB
Adjust level function	automatically determines peak level and crest factor of input signal	
I/Q swap	I and Q signals swapped	on/off
Interface		
Standard		in line with R&S®Digital I/Q Interface ⁹ , I/Q data and control signals, data and interface clock
Level		LVDS
Connector		26-pin MDR
I/Q sample rate	With source "user-defined", the sample rate must be entered via the parameter "sample rate", no I/Q data clock being necessary. With source "digital I/Q in", the sample rate will be estimated based on the applied I/Q data clock.	
Source		user-defined, digital I/Q in
Sample rate	max. sample rate depending on connected transmitting device	400 Hz to 100 MHz
Resolution (user-defined)		0.001 Hz
Frequency uncertainty (user-defined)		$< (5 \times 10^{-14} + \text{relative deviation of reference frequency}) \times \text{sample rate (nom.)}$
I/Q data		
Resolution		18 bit
Logic format		two's complement
Bandwidth		0.625 × sample rate

⁹ R&S®Digital I/Q Interface is a Rohde & Schwarz internal company standard for the transmission of digital I/Q data. It is supported by a wide range of signal generators, signal analyzers and radiocommunications testers.

Digital audio/video

Internal test signals

MPEG-2 TS packet	header + 184 byte payload	00 (hex), FF (hex), PRBS (selectable)
	PID	NULL (1FFF hex)/variable
MPEG-specific TS packet	sync byte + 187 byte payload	00 (hex), FF (hex), PRBS (selectable)
DIRECTV TS packet	header + 127 byte payload	PRBS (DIRECTV only)
DIRECTV-specific TS packet	130 byte payload	PRBS (DIRECTV only)
PRBS	PRBS in line with ITU-T O.151	$2^{23} - 1/2^{15} - 1$ (selectable)

Digital audio/video interfaces

TS serial interface

TS serial input	mode (selectable)	ASI, SMPTE 310M, ETI (only with R&S [®] BTC-B1 or R&S [®] BTC-B2 option)	
	connector	BNC female, front and rear	
	input impedance	75 Ω	
	measured values	packet length, data rate, useful data rate	
	ASI		
	input level	200 mV to 880 mV	
	data rate	270 Mbit/s	
	mode	packet or continuous	
	stuffing	on/off (settable)	
	stuffing packets	see MPEG-2 TS packet under "Internal test signals"	
	SMPTE 310M		
	input level	400 mV to 880 mV	
	data rate	19.392658 Mbit/s	
	stuffing	on/off (settable)	
	stuffing packets	see MPEG-2 TS packet under "Internal test signals"	
	ETI		(only with R&S [®] BTC-B1 or R&S [®] BTC-B2 option)
	ETI input level	0 V to ± 2.37 V (ITU-T G.703/G.704)	
	ETI data rate	2048 kbit/s	
	coding	HDB3	
	TS serial output	(only with R&S [®] BTC-B1 or R&S [®] BTC-B2 option)	
mode		ASI, SMPTE 310M, ETI (selectable)	
connector		BNC female, rear	
output impedance		75 Ω	
ASI			
output level		800 mV	
data rate		270 Mbit/s	
mode		packet or continuous	
SMPTE 310M			
output level		800 mV	
data rate		19.392658 Mbit/s	
ETI		in line with ETI NI, ETI NA5592, ETI NA5376	
output level		0 V to ± 2.37 V (ITU-T G.703/G.704)	
output impedance		75 Ω	
data rate		2048 kbit/s	
coding		HDB3	

TS over IP interface

Each R&S®BTC coder module (R&S®BTC-B1 and R&S®BTC-B2) has one dedicated IP input/output and one TS serial input/output.

TS over IP (TSolP) interface	IP interface	in line with IEEE 802.3 (1000BASET)
	connector	RJ-45 (1000BASET)
	number of interfaces	one IP interface per coder
	data rate	10/100/1000 Mbit/s
	supported transmission protocols	IPv4
	TS over IP encapsulation	in line with Pro-MPEG Code of Practice Release 2 and SMPTE 2022-1/2
	signaling	unicast, multicast
	protocol	UDP and UDP/RTP
	time to live (TTL)	1 to 255
	multicast	IGMPv3, IGMPv2
IP flows in	maximum number	4 (simultaneous)
	maximum bit rate	up to 350 Mbit/s (for all processed IP flows)
	FEC	2D FEC, $L \times D \leq 100$
	FEC L	IP flow (in) port number + 2
	FEC D	IP flow (in) port number + 4
	appliance	applied automatically to IP flow (in) if FEC streams are available

Multimedia generator suite (R&S®BTC-K20 option)

The multimedia generator suite is included in the base unit.

Bitstream player

The bitstream player is included in the multimedia generator suite.

Replay	file formats	TRP, BIN, ETI, T2MI
	length of transport stream packets	corresponding to externally applied/recorded transport stream
	replay time/sequence length	endless
	seamless loop	realtime update of MPEG-2TS parameters
	file formats	TRP, MPG, TS
	continuity counter	on/off (settable)
	PCR, DTS/PTS	on/off (settable)
	TDT/TOT	on/off (settable)
	not seamless	for all other supported file extensions, replay with cut at transition from end of file to beginning of file
	data rate	
	internal usage	100 kbit/s to max. 350 Mbit/s
	external output (ASI)	100 kbit/s to max. 215 Mbit/s
	data volume	corresponding to recorded data volume; limited only by hard disk size
TS serial output	mode	ASI, SMPTE 310M, ETI (selectable)
	stream output	internal and external
	interfaces	see "TS serial interface"
Test signals	bitstream player in stop mode	head 184 payload, head 187 payload, head 200 payload, sync 187 payload, sync 203 payload, sync 207 payload
	bitstream player in play mode	null packets payload "00", payload "FF", payload "PRBS 15", payload "PRBS 23"
Signal set	optional	for additional digital signals and broadcasting standards, see ordering information for stream libraries

Stream libraries (R&S®LIB-Kxx options)

A wide variety of libraries for different digital standards is available as a complement to the multimedia generator suite. For more information see ordering information.

Broadcast multiplexer

DVB multiplexer

The broadcast multiplexer allows realtime multiplexing of MPEG-2 TS for DVB. The broadcast multiplexer is included in the multimedia generator suite (R&S®BTC-K20 option).

Broadcast multiplexer	operating modes	realtime multiplexing and remultiplexing
	supported standards	DVB (DVB-T/DVB-T2, DVB-S/DVB-S2, DVB-C/DVB-C2)
	stream format	MPEG-2 TS
	editor tool	
	MPEG-2 TS tables	
	network information table (NIT)	delivery descriptor
	filtering	PID
	masking	PID
	change of IDs	NETWORK ID, TS ID, ON ID, SERVICE ID, ELEMENTARY PID
	change of descriptors	NIT descriptor loop, CAT descriptor loop, PMT descriptor loop, SDT descriptor loop, ES descriptor loop
	generation of descriptors	NIT descriptor loop, CAT descriptor loop, PMT descriptor loop, SDT descriptor loop, ES descriptor loop
	filter/disable TS parts	network, TS, service, PID
	combine TS parts from different inputs	network, TS, service
	dynamic stream handling	change of IDs, change of descriptors, filter/disable TS parts, combine TS parts
Input	supported streams	user streams and Rohde & Schwarz streams
Output	multiplexed streams	without disruption
	output stream	internal, external
	interfaces	see "TS serial interface"

DVB-T2 multi profile gateway (R&S®BTC-K24 option)

The gateway functionality is part as an independent option of the R&S®Multimedia generator.

T2-MI gateway	stream generation	in line with ETSI TS 102773 v1.1.1, v1.2.1 and v1.3.1 incl. annex I
	maximum number of gateway profiles	2
	maximum number of PLP groups	20
	maximum number of PLPs	20
Input mapping	input source	TS Multiplexer, internal PRBS
	payload type	MPEG-2 TS, content files (big TS)
	data rate	up to 214 Mbit/s
	internal PRBS generation	according to DVB-T2 V&V Working Group
	number of input streams	one per PLP group
	PLP data source	
	full TS	all services of the selected MPEG-2 TS
	service	selected services extracted from input by Annex D splitter
common	common data extracted by Annex D splitter	

PLP mode and stream adaptation	scheduling	static, dynamic
	settable per PLP	
	PLP type	data type 1, data type 2, common
	baseband mode	high efficiency (HEM), normal (NM)
	auto ISSY configuration	on/off
	ISSY	off, short, long
	max. buffer size	0 bit to 2 Mbit
	design delay	settable
	in-band signaling	off, type A, type B
PLP coding and modulation (BICM)	settable per PLP	
	FEC frame	normal (64k), short (16k)
	code rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6
	constellation	QPSK, 16QAM, 64QAM, 256QAM
	rotation	on/off
	time interleaver	settable
	frame interval (I_{jump})	settable
	max. number of blocks	auto, settable
Framing and OFDM	settable per profile	
	FFT size	1k, 2k, 4k, 8k, 16k and 32k COFDM
	guard interval	1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128
	extended carrier mode	on/off
	pilot pattern	PP1, PP2, PP3, PP4, PP5, PP6, PP7, PP8
	bandwidth	1.7/5/6/7/8/10 MHz
	T2 frames per super frame (N_{T2})	settable
	data symbols per T2 frame (L_{DATA})	settable
	sub-slices per T2 frame (N_{SUB})	settable
T2 system	settable per profile	
	transmission system	SISO, MISO, T2 Lite SISO, T2 Lite MISO
	PAPR reduction	off, tone reservation (TR)
	future extension frames (FEF)	on/off
	T2 version	1.1.1, 1.2.1, 1.3.1
	L1 post modulation	BPSK, QPSK, 16QAM, 64QAM
	L1 repetition	on/off
	L1 post scrambled	on/off
	L1 bias balancing bits	on/off
	T2 base lite flag	on/off
	L1 RF frequency	settable
	cell id	settable
	network ID	settable
T2 system ID	settable	
Output stream	structure	DVB-T2 modulator interface (T2 MI)
	T2 MI MPEG-TS encapsulation	single PID, full stream
	T2 MI PID	variable
	T2 MI SID	variable
	T2 timestamp	null, relative
	data rate	up to 72 Mbit/s per profile

Analog audio/video

Audio player

Audio player	waveform file format	WAV, WV (Rohde & Schwarz format)
Waveform memory	play time	up to 670 s
	resolution	16 bit for AF1 and AF2
	nonvolatile memory	hard disk, USB device
Audio signals	number of signals	2 channels, AF1 and AF2
	bandwidth	DC to 15 kHz
	level	16-bit full scale in each channel, corresponding to standard deviation
	frequency response	< ±0.3 dB
Clock generation	clock rate	internal with resampling
Included signals	in line with ETSI EN 303345	AWGN_CCIR559_15kHz.wav AWGN_CCIR559_4500kHz.wav
Additional signals	analog audio signals	standardized .wav files can be replayed

Audio signal generator

Audio signals	number of signals	2, can be set separately
	frequency	30 Hz to 15 kHz, in 1 Hz steps
	level	-60 dBu to +12 dBu, in 0.01 dB steps, 6 dBu corresponds to standard deviation

Video signal generator

Video signal generator		included in R&S®BTC firmware
Video signals	ATV video basic	COLORBARS_75 (PAL)
		COLORBARS_75 (PAL M)
		COLORBARS_75 (PAL N)
		COLORBARS_75 (NTSC)
		COLORBARS_75 (SECAM)
		FuBK (PAL)
Insertion test signal structure	in line with country-specific standards	
PAL – color bar 75 %	first field	
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext test line
	second field	
	line 319	ramp
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin(x)/x
	line 334	15 kHz, 200 ns
line 335	250 kHz, 100 ns	
PAL M – color bar 75 %	first field	
	line 16	2T pulse
	line 17	NTC7 composite
	line 18	FCC composite
	second field	
	line 11	ramp
	line 12	modulated ramp
	line 13	red line
	line 14	15 kHz, 250 ns
	line 15	250 kHz, 125 ns
	line 16	FCC multiburst
	line 17	NTC7 combined
	line 18	sin(x)/x

PAL N – color bar 75 %	first field	
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext test line
	second field	
	line 319	ramp
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin(x)/x
line 334	15 kHz, 200 ns	
line 335	250 kHz, 100 ns	
NTSC – color bar 75 %	first field	
	line 16	2T pulse
	line 17	NTC7 composite
	line 18	FCC composite
	second field	
	line 11	ramp
	line 12	modulated ramp
	line 13	red line
	line 14	15 kHz, 250 ns
	line 15	250 kHz, 125 ns
	line 16	FCC multiburst
line 17	NTC7 combined	
line 18	sin(x)/x	
SECAM – color bar 75 %	first field	
	lines 7 to 15	discriminating signal
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext test line
	second field	
	line 319	ramp
	lines 320 to 328	discriminating signal
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	sin(x)/x
line 334	15 kHz, 200 ns	
line 335	250 kHz, 100 ns	

PAL – FuBK	first field	
	line 16	2T pulse
	line 17	CCIR17
	line 18	CCIR18/1
	line 19	CCIR18/2
	line 20	data line
	line 21	teletext test line
	second field	
	line 319	ramp
	line 329	modulated ramp
	line 330	CCIR330/5
	line 331	CCIR331/1
	line 332	red line
	line 333	$\sin(x)/x$
	line 334	15 kHz, 200 ns
line 335	250 kHz, 100 ns	
Additional signals	analog video signals	see R&S®ATV video option

Analog video library (R&S®LIB-K50 option)

A library with different analog standards. For more information, see product brochure "Stream Libraries for broadcasting T & M equipment from Rohde & Schwarz" (PD 5213.7202.12).

Digital modulation systems

At least one I/Q baseband generator (R&S®BTC-B1 option) must be installed. If two I/Q baseband generators are installed (R&S®BTC-B1 option and R&S®BTC-B2 option) and two signals of the same standard (e.g. DVB-T/DVB-H) are to be output simultaneously, two corresponding software options must also be installed (in this case R&S®BTC-K501). If only one R&S®BTC-K501 is installed and DVB-T/DVB-H is selected in one I/Q baseband generator, the other I/Q baseband generator is disabled for DVB-T/DVB-H. However, a software option is not tied to a specific I/Q baseband generator.

The specified data applies together with the parameters of the respective standard. The entire frequency range, the filter parameters and symbol rates can be set by the user.

Terrestrial standards

DVB-T2 (R&S®BTC-K516 option)

DVB-T2	in line with EN 302755 and TS 102773	v1.1.1, v1.2.1 ¹⁰ and v1.3.1 ¹¹ , incl. Annex I
	single PLP and multi PLP	v1.1.1, v1.2.1 ¹⁰
	T2-Base single profile transmission	v1.3.1 ¹¹
	T2-Lite single profile transmission	v1.3.1 ¹¹ in line with Annex I
Input	transport stream	
	interface	ASI
	format	T2-MI (single PLP and multi PLP) or MPEG-2 TS (single PLP only)
	T2-MI	
	interface	on/off
	PID filter	settable ¹²
	SID filter	settable ¹²
Modulation	modulation	COFDM
	PLP number	1 (single PLP) to 20 (multi PLP)
	single PLP	
	T2-MI interface	off
	PLP number	1
	single PLP and multi PLP	
	T2-MI interface	on
Coding	bandwidth	1.7/5/6/7/8 MHz
	MER	> 40 dB ¹³
	modulation frequency response	< ±0.2 dB
	shoulder attenuation	> 45 dB
	PLP type	common, data type 1, data type 2 ¹²
	baseband mode	normal (NM), high efficiency (HEM)
	ISSY	off, short, long ¹²
	null packet deletion	on/off ¹²
	FEC frame	normal (64k), short (16k)
	code rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 1/3 ^{11, 12} , 2/5 ^{11, 12}
	constellation	QPSK, 16QAM, 64QAM, 256QAM
	rotation	on/off
	time interleaver	settable ¹⁴
	frame interval (I_{ump})	≥ 1 ¹²
	FFT size	1k, 2k, 4k, 8k, 16k and 32k COFDM
	extended carrier mode	on/off
	pilot pattern	PP1, PP2, PP3, PP4, PP5, PP6, PP7, PP8
	guard interval	1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128

¹⁰ Bias balancing cells and unoccupied cell filling between PLP cells not supported.

¹¹ Features in line with T2 v1.3.1, including Annex I (T2-Lite).

¹² With T2-MI interface switched on.

¹³ With internal test signals.

¹⁴ With T2-MI interface switched off.

T2 system	T2 frames per superframe	settable ¹⁴
	data symbols per T2 frame	settable ¹⁴
	subslices per T2 frame	≥ 1 ¹²
	in-band signaling	in line with T2 version ¹²
	transmission system	SISO, MISO, T2-Lite SISO ¹² , T2-Lite MISO ¹²
	MISO group	settable
	PAPR reduction	off, tone reservation (TR) ¹⁵
	future extension frames (FEF)	off, null, noise ^{12, 16}
	T2 version	settable ¹⁴
	L1 post modulation	BPSK, QPSK, 16QAM, 64QAM
	L1 repetition	on/off
	L1 post scrambled	settable in line with T2 version
	T2 base lite	on/off ¹²
	cell ID	settable ¹⁴
	network ID	settable ¹⁴
T2 system ID	settable ¹⁴	
Single-frequency network	network mode	SFN ¹² , MFN
	control	T2-MI ¹² , manual
Test signals		TS test packet with settable payload (PRBS, 0x00, 0xFF) (see "Internal test signals")

DVB-T/DVB-H (R&S®BTC-K501 option)

DVB-T/DVB-H	in line with EN 300744/EN 302304	
Modulation	mode	COFDM
	bandwidth	5 MHz, 6 MHz, 7 MHz, 8 MHz (settable for variable bandwidth: bandwidth used 1 MHz to 10 MHz)
	MER	> 40 dB ¹⁷
	modulation frequency response	< ± 0.2 dB
	shoulder attenuation	> 48 dB
Coding	constellation	QPSK, 16QAM, 64QAM, hierarchical coding
	code rate	1/2, 2/3, 3/4, 5/6, 7/8
	guard interval	1/4, 1/8, 1/16, 1/32
	FFT mode	2k, 4k and 8k COFDM
	interleaver	native and in-depth
	TPS	in line with DVB-T/DVB-H
Special functions	scrambler, sync byte inversion, Reed-Solomon encoder, convolutional interleaver, bit interleaver, symbol interleaver, guard interval	can be switched off
Single-frequency network	network mode	MFN, SFN
	control	MIP, manual
Test signals		TS test packet (see "Internal test signals")
		PRBS before convolutional encoder
		PRBS after convolutional encoder

¹⁵ PAPR reduction in line with T2 version > v1.1.1 not supported yet. Reserved carriers are modulated with 0+j0 only.

¹⁶ Special feature to add noise to the FEF payload instead of Null-FEF payload.

¹⁷ With internal test signals.

ATSC 3.0 (R&S®BTC-K520 option)

ATSC 3.0	in line with ATSC A/322 ¹⁸		
	single subframe with single PLP ¹⁹		
	single or multiple subframes with single or multiple PLPs ²⁰		
Input	transport stream ¹⁹		
	interface	Ethernet	
	format	MPEG-2 TS (single PLP only)	
	IP stream ¹⁹		
	interface	Ethernet	
	format	ROUTE/DASH (single PLP only) MMT (single PLP only)	
	STL ²¹		
	interface	on/off	
	format	in line with ATSC A/324	
Analyzer	ATSC 3.0 specification check and logging ²²		
Modulation	modulation	COFDM	
	PLP number	1 (single PLP) to 64 (multiple PLPs)	
	single PLP		
	STL interface	off	
	PLP number	1	
	single PLP and multiple PLPs		
	STL interface	on	
	PLP number	1 to 64	
	subframe number	1 (single subframe) to 256 (multiple subframes)	
	single subframe		
	STL interface	off	
	subframe number	1	
	single subframe and multiple subframes		
	STL interface	on	
	subframe number	1 to 256	
Coding	bandwidth	6 MHz	
	MER	> 40 dB ^{19, 23}	
	modulation frequency response	< ±0.2 dB	
	shoulder attenuation	> 45 dB	
	PLP layer	core, enhanced ²⁴	
	FEC type	BCH+16K, BCH+64K, CRC+16K, CRC+64K, 16K only, 64K only	
	code rate	2/15, 3/15, 4/15, 5/15, 6/15, 7/15, 8/15, 9/15, 10/15, 11/15, 12/15, 13/15	
	constellation	QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM	
	PLP type	non-dispersed, dispersed ²⁰	
	time interleaver	settable ¹⁹	
	extended interleaving	settable ¹⁹	
	Subframing	MISO	off, 64, 256 coefficients ²¹
		FFT size	8k, 16k, 32k COFDM
reduced carrier mode		settable ¹⁹	
guard interval		192, 384, 512, 768, 1024, 1536, 2048, 2432, 3072, 3684, 4096, 4864	
pilot pattern (SISO)		3_2, 3_4, 4_2, 4_4, 6_2, 6_4, 8_2, 8_4, 12_2, 12_4, 16_2, 16_4, 24_2, 24_4, 32_2, 32_4	
pilot boost mode		settable ¹⁹	
frequency interleaver		settable ¹⁹	
number of data OFDM symbols		settable ¹⁹	

¹⁸ Unsupported features: MIMO, PAPR = ACE/TR+ACE, Channel Bonding, L1-Detail Additional Parity¹⁹ With STL interface switched off.²⁰ With STL interface switched on.²¹ Supported with R&S®BTC firmware 2.30 or higher.²² Logging only with STL interface switched on.²³ With internal test signals.²⁴ Enhanced PLP layer only with STL interface switched on.

System	time info	settable ¹⁹
	number of transmitters	2,3,4 ²¹
	transmitter index	1,2,3,4 ²¹
	TxID address	0 to 8191 ²¹
	TxID injection level	STL ^{20,21} , manual ²¹
	PAPR reduction	off, tone reservation (TR) ²⁵
	frame mode	time-aligned, symbol-aligned ¹⁸
	frame length	settable ¹⁸
	L1-Basic FEC type	mode1, mode2, mode3, mode4, mode5 ¹⁸
	L1-Detail FEC type	mode1, mode2, mode3, mode4, mode5, mode6, mode7 ¹⁸
	L1-Detail version	settable ¹⁹
	broadcast stream ID	settable ¹⁹
	reduced carrier mode (preamble)	settable ¹⁹
	pilot pattern Dx (preamble)	3, 4, 6, 8, 12, 16, 24, 32
	Special functions	bootstrap minor version
bootstrap emergency alert signaling		settable ¹⁹
STL preamble compatibility mode		in line with ATSC A/324 2018 or 2016 ^{20,21}
STL TMP compatibility mode		in line with ATSC A/324 2018 or 2016 ^{20,21}
ALP LMT compatibility mode		in line with ATSC A/324 2018 or 2016 ^{19,21}
Single-frequency network	network mode	SFN ^{20,26,27} , MFN
	control	STL ²⁰ , manual
Test signals		TS test packet and IP test packet with settable payload (PRBS, 0x00, 0xFF) (see "Internal test signals")

ATSC 8VSB, ATSC-M/H (R&S®BTC-K518 option)

ATSC 8VSB		in line with ATSC Doc. A/53 (8VSB)
ATSC-M/H		in line with ATSC Doc. A/153 (Mobile DTV)
Modulation	mode	8VSB
	bandwidth	6 MHz
	symbol rate	10.762 Msps
	range	±5 %, settable
	pilot	1.25 (can be switched off)
	range	settable (from 0 to 5 in steps of 0.001)
	pulse filtering	root raised cosine rolloff, $\alpha = 0.115$
	MER	> 42 dB
	modulation frequency response	< ±0.25 dB
shoulder attenuation	> 45 dB	
Coding	input data rate	19.392658 Mbit/s
Special functions	randomizer, interleaver	can be switched off
Test signals		TS test packet (see "Internal test signals")
		PRBS before convolutional encoder
		PRBS after convolutional encoder
		PRBS before mapper

²⁵ If PAPR set to TR, reserved carriers modulated with 0+j0 only.

²⁶ SFN only supported with external ATSC 3.0 Scheduler/Gateway, external 1PPS and 10 MHz reference frequency.

²⁷ Supported with BTC FW 2.34 or higher.

DTMB (R&S®BTC-K512 option)

DTMB (TDS-OFDM)		in line with GB20600-2006
Modulation	mode	COFDM/single carrier
	bandwidth	6 MHz, 7 MHz, 8 MHz
	modulation frequency response	< 0.2 dB
	shoulder attenuation	> 50 dB
Coding	constellation	4QAM, 4QAM-NR, 16QAM, 32QAM, 64QAM
	code rate	0.4, 0.6, 0.8
	guard interval	
	PN sequences	420, 595, 945
	PN sequences 420, 945	variable/constant
	PN sequence 595	constant
	time interleaver	off, 240 symbols, 720 symbols
	FFT mode	4k COFDM/single carrier
	dual pilot tone	can be switched on (single carrier)
Special functions	GI power boost	can be switched off
	SI power normalization	can be switched on
Single-frequency network	network mode	MFN, SFN
	control	SIP, manual
Test signals		TS test packet (see "Internal test signals")

CMMB (R&S®BTC-K515 option)

CMMB		in line with GY/T 220.1-2006
Modulation	mode	COFDM
	bandwidth	2 MHz, 8 MHz
	modulation frequency response	<0,2 dB
	shoulder attenuation	>50 dB
Coding	FFT mode	1k, 4k
	scrambling mode	0 to 7
	number of timeslots	up to 40
	services	up to 40
	Reed-Solomon	(240,240) (240,224) (240,192) (240,176)
	byte interleaver mode	1 to 3
	LDPC	1/2, 3/4
	constellation	BPSK, QPSK, 16QAM
Special functions	Reed-Solomon, byte interleaver, bit interleaver, scrambling	can be switched off

ISDB-T/ISDB-T_{SB}/ISDB-T_B (R&S®BTC-K506 option)

ISDB-T		in line with ARIB STD-B31 version 1.7
ISDB-T _B		in line with Brazilian standard
ISDB-T _{SB}		in line with ARIB STD-B29
Modulation	mode	OFDM
	bandwidth	6/7/8 MHz (variable: ±1000 ppm)
	number of segments	
	ARIB STD-B31	13
	ARIB STD-B29	1, 3
	MER	> 42 dB
	modulation frequency response	< 0.2 dB
Coding	shoulder attenuation	> 60 dB
	FFT mode	2k, 4k and 8k
	number of layers	1 to 3
	constellation	DQPSK, QPSK, 16QAM, 64QAM
	code rate	1/2, 2/3, 3/4, 5/6, 7/8
	guard interval	1/4, 1/8, 1/16, 1/32
	time interleaver	
	ISDB-T	0, 1, 2, 4, 8, 16
	ISDB-T _{SB}	0, 1, 2, 4, 8, 16, 32

Earthquake early warning (EEW)		in line with ARIB STD-B31 version 2.2
	transmission channel	AC carriers of segment No. 0
	area information	56 prefectures
	epicenter information	ID, longitude, latitude, depth, occurrence time
Special functions	scrambler, Reed-Solomon, byte interleaver, bit interleaver, frequency interleaver, guard interval, OFDM segments	can be switched off
	AC information	PRBS, All 1
	TX parameter switching indicator, TMCC next	static settings for test
Single-frequency network	network mode	MFN, SFN
	control	IIP, manual
Test signals		TS test packet (see "Internal test signals")

T-DMB/DAB/DAB+ (R&S®BTC-K511 option)

The realtime coder supports T-DMB, DAB and DAB+. To simulate transmissions with multipath reception, the R&S®BTC must be equipped with the R&S®BTC-B1031 or R&S®BTC-B1032 fading simulator option and also the R&S®BTC-K1032 software option, which supports the Gaussian fading profile.

T-DMB/DAB/DAB+		in line with T-DMB/EN 300401, Korea/Europe
Transmission	modulation	COFDM
	mode	I, II, III, IV
	bandwidth	1.536 MHz
	MER	> 40 dB
	modulation frequency response	< 0.2 dB
	shoulder attenuation	> 45 dB
Single-frequency network	network mode	SFN, MFN
	control	MID, manual
Special functions	external ETI data stream	requires R&S®BTC-B1 option
	PRBS	can be inserted into a subchannel ²⁸

²⁸ Can be inserted into an existing user-selectable subchannel of an incoming, valid ETI data stream.

DRM/DRM+ (R&S®BTC-K519 option)

DRM/DRM+		in line with ETSI ES 201980	
Input	external		
	interface	100BASE-T	
	stream format	UDP/IP stream	
	UDP port	0 to 65535 settable (default 8100)	
	internal player	loadable file	
	file format	DCP (MDI data encapsulated in DCP packets)	
	analysis	display of:	
	audio	number of audio services	
	data	number of data services	
	layer type	base, enhancement	
	label	label of transmitted service	
	Transmission	modulation	OFDM
		robustness mode	A, B, C, D, E settable
constellation			
MSC		displayed	
SDC		displayed	
code rate table		displayed	
MSC		protection profile, protection level, code rate	
SDC		protection profile, protection level, code rate	
interleaver depth			
robustness mode A, B, C, D		2 ms, 400 ms	
robustness mode E		600 ms	
bandwidth			
robustness mode A, B, C, D		4.5 kHz, 5 kHz, 9 kHz, 10 kHz, 18 kHz, 20 kHz	
robustness mode E		100 kHz	
MER		> 40 dB	
modulation frequency response		< 0.2 dB	
shoulder attenuation		> 55 dB	

Cable standards

DVB-C2 (R&S®BTC-K517 option)

DVB-C2		in line with EN 302769
Input	transport stream	
	interface	ASI, SPI
	format	MPEG-2 TS
	PLP	
	number	1 to 4 PLPs
	payload	transport stream or test signal
	ID	settable
	type	normal data PLP
	bundling	supported
	null packet deletion	supported
ISSY	off/short/long	
Modulation	modulation	OFDM
	mode	16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM
	channel raster bandwidth	6 MHz, 8 MHz
	bundled channels	
	number	1 and 2 channels
	bandwidth	5.71 MHz, 7.61 MHz, 11.42 MHz, 15.22 MHz
	MER	> 40 dB ²⁹
	modulation frequency response	< ±0.2 dB
	shoulder attenuation	> 60 dB
	Coding	baseband mode
guard interval		1/64, 1/128
BICM		
FEC frame		normal (64k), short (16k)
code rate (concatenated BCH/LDPC)		2/3, 3/4, 4/5, 5/6, 8/9 (short FEC frame), 9/10 (normal FEC frame)
data slice		
number		1 to 4 data slices
ID		settable
packets		type 1, type 2, stuffing
tune position		settable
tune offset		left, right, settable
FEC frame header type		robust, high efficiency (data slice packet type 2)
number of XFEC frames		1 and 2 (data slice packet type 2)
number of PLPs		1 to 4 PLPs per data slice
time interleaving		none, 4 symbols, 8 symbols, 16 symbols
notch types	narrowband, broadband	
C2 system	C2 system ID	settable
	network ID	settable
	layer 1 part 2 signaling	
	time interleaving	none, best fit, 4 symbols, 8 symbols
	code rate (concatenated BCH/LDPC)	1/2 (16k LDPC)
	mode	16QAM
Test signals		TS test packet with settable payload (PRBS ITU-T O.151, 0x00, 0xFF) (see "Internal test signals")

²⁹ With internal test signals.

J.83/A/B/C coder (DVB-C, US Cable, ISDB-C; R&S®BTC-K502 option)

The J.83/A/B/C coder includes the DVB-C, J.83/B and ISDB-C standards.

DVB-C, ISDB-C (R&S®BTC-K502 option)

DVB-C		in line with EN 300429 (ITU-T J.83/A)
ISDB-C		in line with ITU-T J.83/C
Modulation	mode	16QAM, 32QAM, 64QAM, 128QAM, 256QAM
	symbol rate	0.1 Msps to 8 Msps, settable
	pulse filtering	root raised cosine rolloff ($\alpha = 0.15, 0.13$)
	MER	> 40 dB
	modulation frequency response	± 0.25 dB
	shoulder attenuation	> 48 dB
Special functions	energy dispersal, Reed-Solomon encoder (204, 188, $t = 8$), convolutional interleaver	can be switched off
Test signals		TS test packet (see "Internal test signals")
		PRBS before mapper

J.83/B (R&S®BTC-K502 option)

J.83/B		in line with ITU-T J.83/B
Modulation	mode	64QAM, 256QAM, 1024QAM
	bandwidth	6 MHz
	symbol rate	
	64QAM	5.056941 Msps $\pm 5\%$
	256QAM	5.360537 Msps $\pm 5\%$
	1024QAM	5.360537 Msps $\pm 5\%$
	pulse filtering	root raised cosine rolloff, $\alpha = 0.18$ (64QAM), 0.12 (256QAM/1024QAM)
	MER	> 44 dB
	modulation frequency response	± 0.25 dB
	shoulder attenuation	
	64QAM	> 55 dB
	256QAM	> 55 dB
	1024QAM	> 55 dB
Coding	input data rate	
	64QAM	26.97035 Mbit/s
	256QAM	38.81070 Mbit/s
	1024QAM	49.02525 Mbit/s
	data interleaver	can be switched off, level 1 and level 2
Special functions	randomizer, Reed-Solomon encoder, interleaver, checksum	can be switched off
Test signals		TS test packet (see "Internal test signals")
		PRBS before Trellis encoder
		PRBS before mapper

Satellite standards

DVB-S/DVB-DSNG/DVB-S2 (R&S®BTC-K508 option)

DVB-S/DVB-DSNG (R&S®BTC-K508 option)

DVB-S/DVB-DSNG		in line with EN 300421/EN 301210
Modulation	mode	QPSK, 8PSK, 16QAM
	symbol rate	0.1 Msps to 66 Msps, settable
	pulse filtering	root raised cosine rolloff ($\alpha = 0.20, 0.25, 0.35$)
	MER	> 40 dB (QPSK/8PSK/16QAM, 20 Msps)
	modulation frequency response	± 0.25 dB
	shoulder attenuation	> 50 dB
Coding	constellation	code rate
	QPSK	1/2, 2/3, 3/4, 5/6, 7/8
	8PSK	2/3, 5/6, 8/9
	16QAM	3/4, 7/8
Special functions	energy dispersal, Reed-Solomon encoder (204, 188, $t = 8$), convolutional interleaver	can be switched off
Test signals		TS test packet (see "Internal test signals") PRBS before convolutional encoder

DVB-S2 (R&S®BTC-K508 option)

DVB-S2		in line with EN 302307 part I including Annex M
	supported services	broadcast services, professional services, interactive services, DSNG
Modulation	modulation coding	
	S2-MODCOD	(1 to 28) QPSK, 8PSK, 16APSK, 32APSK
	symbol rate (all constellations)	0.1 Msps to 80 Msps
	pulse filtering	root raised cosine rolloff ($\alpha = 0.05, 0.10, 0.15, 0.20, 0.25, 0.35$)
	MER	> 40 dB (QPSK/8PSK, 20 Msps)
	modulation frequency response	± 0.25 dB
	shoulder attenuation	> 50 dB
Coding	constellation	code rate
	S2 – QPSK (normal)	1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
	S2 – QPSK (short)	1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9
	S2 – 8PSK (normal)	3/5, 2/3, 3/4, 5/6, 8/9, 9/10
	S2 – 8PSK (short)	3/5, 2/3, 3/4, 5/6, 8/9
	S2 – 16APSK (normal)	2/3, 3/4, 4/5, 5/6, 8/9, 9/10
	S2 – 16APSK (short)	2/3, 3/4, 4/5, 5/6, 8/9
	S2 – 32 APSK (normal)	3/4, 4/5, 5/6, 8/9, 9/10
	S2 – 32 APSK (short)	3/4, 4/5, 5/6, 8/9
	S2 FEC frame	settable normal, 64800 bit short, 16200 bit
	pilot insertion	on/off

Coding modulation	mode	CCM, ACM, VCM
	ACM control	via remote control, SCPI scripts, seamless switching of parameters (modulation coding, FEC frame, pilot), PL frame by PL frame
	variable coding modulation	
	number of input streams	1 to 8 input streams, 1 to 2 external inputs supported, 3 to 8 test TS packets
	multiple input streams (MIS)	
	input stream settings	for each input stream: individual setting of ISI, modulation coding, FEC frame, pilot
Annex M	merger	BB frame padding, if number of input streams > 1
	mode	off/on
	number of time slices	1 to 8 time slices, time slice 1: real DVB-S2 FEC, time slices 2 to 8: PRBS data symbols
	time slice settings	for each time slice: individual setting of TSN, modulation coding, FEC frame, pilot
Special function	PL scrambling sequence ID	0x00000 to 0x3FFFD
Test signals		TS test packet (see "Internal test signals")

DVB-S2-X (R&S[®]BTC-K510 option)

The DVB-S2-X option (Part II of the DVB-S2 standard) extends and requires the DVB-S2 option (Part I of the DVB-S2 standard). The two options together provide all the DVB-S2 Part I and Part II functions indicated under the options.

DVB-S2-X		in line with EN 302307 part II (DVB-S2 extensions)
	supported services	broadcast services, professional services, interactive services, DSNG, VL-SNR ³⁰
Modulation	constellation	
	S2-X MODCOD (normal)	QPSK, 8PSK, 8APSK-L, 16APSK, 16APSK-L, 32APSK, 32APSK-L, 64APSK, 64APSK-L, 128APSK, 256APSK, 256APSK-L
	S2-X MODCOD (short)	QPSK, 8PSK, 16APSK, 32APSK
	S2-X VL-SNR (set1)	QPSK, $\pi/2$ BPSK
	S2-X VL-SNR (set2)	$\pi/2$ BPSK
	symbol rate (all constellations)	0.1 Msps to 80 Msps S2-X VL-SNR (set1) QPSK: max. 43 Msps
	pulse filtering	root raised cosine rolloff ($\alpha = 0.05, 0.10, 0.15, 0.20, 0.25, 0.35$)
	MER	> 40 dB (QPSK/8PSK, 20 Msps)
	modulation frequency response	± 0.25 dB
	shoulder attenuation	> 50 dB

³⁰ In preparation.

Coding	constellation	code rate (implementation MODCOD name)
	S2-X – QPSK (normal)	13/45, 9/20, 11/20
	S2-X – 8PSK (normal)	23/36, 25/36, 13/18
	S2-X – 8APSK (normal)	100/180, 104/180
	S2-X – 16APSK (normal)	90/180, 96/180, 100/180, 26/45, 3/5, 18/30, 28/45, 23/36, 20/30, 25/36, 13/18, 140/180, 154/180
	S2-X – 32APSK (normal)	2/3, 128/180, 132/180, 140/180
	S2-X – 64APSK (normal)	128/180, 132/180, 7/9, 4/5, 5/6
	S2-X – 128ASK (normal)	135/180, 140/180,
	S2-X – 256APSK (normal)	116/180, 20/30, 124/180, 128/180, 22/30, 135/180
	S2-X – QPSK (short)	11/45, 4/15, 14/45, 7/15, 8/15, 32/45
	S2-X – 8PSK (short)	7/15, 8/15, 26/45, 32/45
	S2-X – 16ASK (short)	7/15, 8/15, 26/45, 3/5, 32/45
	S2-X – 32ASK (short)	2/3, 32/45
	S2-X VL-SNR – QPSK (normal)	2/9
	S2-X VL-SNR – BPSK (medium)	1/5, 11/45, 1/3
	S2-X VL-SNR – BPSK (short)	1/5, 11/45, 4/15, 1/3
	S2-X FEC frame	predefined: normal, 64800 bit, short, 16200 bit, medium, 32400 bit
pilot insertion	on/off	

DIRECTV legacy modulation (R&S®BTC-K509 option)

DIRECTV legacy modulation		in line with DIRECTV transmission specifications
Modulation	constellation	QPSK
	symbol rate	20 Msps
	overrange	1 Msps to 30 Msps
	pulse shaping filter	root raised cosine rolloff, $\alpha = 0.20$, variable rolloff (0.15, 0.20, 0.25, 0.35)
	MER	38 dB (20 Msps)
	modulation frequency response	$< \pm 0.25$ dB
	shoulder attenuation	50 dB
Coding	code rate	1/2, 2/3, 6/7
Phase noise	dynamic DIRECTV phase noise	in combination with R&S®BTC-K1043
Special function	user-specific DIRECTV streams	can be replayed in 188 byte format, requires R&S®BTC-K20 option
	error insertion	after convolutional encoder
Test signals		TS test packet (see "Internal test signals")

Analog modulation systems

AM/FM/RDS (R&S®BTC-K570 option)

FM	FM operating modes	stereo, mono
	audio signals	
	internal audio signal generator	see audio signal generator and audio player
	AF frequency range	30 Hz to 15 kHz
	AF frequency response	< 0.2 dB
	attenuation at 19 kHz	> 70 dB
	preemphasis	off, 50 µs, 75 µs
FM stereo	stereo operating modes	L, R, L = R, L = -R, L ≠ R internal RDS signal generation, MPX and RDS signals can be generated simultaneously
	MPX frequency deviation	
	deviation	0 Hz to ±100 kHz
	resolution	1 Hz
	stereo crosstalk attenuation	> 50 dB (at AF = 30 Hz to 15 kHz)
	total harmonic distortion ³¹	< 0.1 % (at 60 kHz audio frequency deviation, AF = 1 kHz)
	SNR (stereo/RDS signal) ³²	at ±40 kHz audio frequency deviation
	ITU-R weighted (quasi-peak)	> 64 dB
	ITU-R unweighted (RMS)	> 70 dB
	pilot tone	
	frequency	19 kHz ±1 Hz
	deviation	0 Hz to ±15 kHz
	resolution	1 Hz
	phase	0° to ±180°
	resolution	0.1°
	RDS	
	subcarrier frequency	57 kHz ± 3 Hz
	deviation	0 Hz to ±10 kHz
	phase	0° to ±180°
	resolution	1 Hz
FM mono	mono frequency deviation	
	deviation	0 Hz to ±100 kHz
	resolution	1 Hz
	total harmonic distortion ³²	< 0.1 % (at ±67.5 kHz audio frequency deviation, AF = 1 kHz)
AM	audio signals	
	internal audio signal generator	see audio signal generator and audio player
	AF frequency range	30 Hz to 15 kHz
	AF frequency response	< 0.2 dB
	modulation	
	modulation depth	0 % to 100 %
	modulation resolution	0.1 %
	AM total harmonic distortion	at AF = 1 kHz
	m = 30 %	< 0.2 %
	m = 80 %	< 0.2 %

³¹ Generator and receiver without preemphasis/deemphasis.

³² Generator without preemphasis, receiver with deemphasis, and left/right input signal source set to audio generator.

RDS/RDBS		included in R&S®BTC-K570 AM/FM RDS/RDBS coder
RDS		in line with IEC 62106/DIN EN 62106
RBDS (United States RDS standard)		in line with NRSC-4-A
Group	group sequence	up to 38 groups
Programs	program identification (PI)	0000 to FFFF hex
	program service name (PS)	up to 8 characters
	program type code (PTY)	0 to 31 decimals
	program type name (PTYN)	up to 8 characters
Traffic programs/announcements	traffic program (TP)	on/off
	traffic announcement (TA)	on/off
Music speech	music speech (MS)	music/speech
Decoder identification (DI)	dynamic PTY	on/off
	compressed PTY	on/off
	artificial head	on/off
	stereo	on/off
Clock time	clock time and date clock time (information from system time)	on/off
	offset	up to +23 h 59 min and 59 s
Radio text	input line	up to 64 characters
Alternative frequencies, method A	number	up to 25 frequencies
	frequency range	87.6 MHz to 107.9 MHz
	frequency resolution	in steps of 100 kHz
Alternative frequencies, method	Number of frequency lists	up to 5
	tuning frequency	one per list
	frequencies per list	up to 12
	order per frequency	ascending or descending
	frequency range	87.6 MHz to 107.9 MHz
Enhanced other network (EON)	frequency resolution	in steps of 100 kHz
	program identification (PI)	0000 to FFFF hex
	program service name (PS)	up to 8 characters
	traffic program (TP)	on/off
	traffic announcement (TA)	on/off
	linkage actuator (LA)	on/off
	extended generic (EG) indicator	on/off
	international linkage set (ILS) indicator	on/off
	linkage set number (LSN)	000 to FFF hex
	program type code (PTY)	0 to 31 decimals
	program identification number (PIN)	0000 to FFFF hex
	alternative frequency	method A/mapped frequency
	number of frequencies	up to 25 frequencies
	mapped frequencies	up to 4 frequencies
	tuning frequency	one
frequency range	87.6 MHz to 107.9 MHz	
frequency resolution	in steps of 100 kHz	
Traffic message channel (TMC)	traffic message channel (TMC)	on/off
	group 3A variant 00 (block 3)	0000 to FFFF hex
	group 3A variant 01 (block 3)	0000 to FFFF hex
	number of 8A groups	up to 6
	group 8A block 2	00 to 1F hex
	group 8A block 3	0000 to FFFF hex
	group 8A block 4	0000 to FFFF hex

Open format	open format	on/off
	group 1A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 1B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 3A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 3B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 4B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 5A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 5B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 6A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 6B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 7A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 7B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 8A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 8B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 9A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF
	group 9B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
	group 10B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF
group 11A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF	
group 11B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF	
group 12A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF	
group 12B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF	
group 13A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF	
group 13B block 2/block 3/block 4	00 to 1F/ – /0000 to FFFF	
group 15A block 2/block 3/block 4	00 to 1F/0000 to FFFF/0000 to FFFF	

Analog TV (R&S®BTC-K595 option)

The analog TV option (R&S®BTC-K595) includes the standards B/G, D/K, I/I1, M/N, and L/L'.

Standard B/G (R&S®BTC-K595 option)

Standard B/G		in line with country-specific standard
Vision modulation	modulation	B/G
	group delay	
	precorrection	CCIR – B/G Germany general half, B/G Australia (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	B/G, can be switched off
	amplitude frequency response	< 0.5 dB (–0.6 MHz to +4.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	S/N ratio	
	video	> 60 dB, weighted
Sound modulation	mode	mono, stereo, dual sound, mono/NICAM, NICAM
	modulation of sound carriers 1, 2	
	modulation mode	FM
	frequency deviation	30 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound carrier frequency spacing	5.5 MHz/5.74 MHz (settable)
	vision/sound carrier level spacing	13 dB/20 dB (settable)
	pilot tone	in sound carrier 2 (can be switched off)
	S/N ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video generator	see "Video signal generator"
Audio signals	internal audio generator	see "Audio signal generator"
	audio player	see "Audio player"

Standard D/K (R&S®BTC-K595 option)

Standard D/K		in line with country-specific standard
Vision modulation	modulation	D/K
	group delay	
	precorrection	OIRT – D/K half (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	DK, DK FM2, DK NICAM, can be switched off
	amplitude frequency response	< 0.5 dB (–1 MHz to +5.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	S/N ratio	
	video	> 60 dB, weighted
Sound modulation	mode	mono, stereo, dual sound, NICAM, mono/NICAM
	modulation of sound carriers 1, 2	
	modulation mode	FM
	frequency deviation	30 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound carrier frequency spacing	6.5 MHz/6.74 MHz (settable)
	vision/sound carrier level spacing	13 dB/20 dB (settable)
	pilot tone	in sound carrier 2 (can be switched off)
	S/N ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video generator	see “Video signal generator”
Audio signals	internal audio generator	see “Audio signal generator”
	audio player	see “Audio player”

Standard I (R&S®BTC-K595 option)

Standard I		in line with country-specific standard
Vision modulation	modulation	I/I1
	group delay	
	precorrection	UK – I (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	I, I1, can be switched off
	amplitude frequency response	< 0.5 dB (–1 MHz to +4.8 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	S/N ratio	
	video	> 60 dB, weighted
Sound modulation	mode	mono, mono/NICAM, NICAM
	modulation of sound carrier 1	
	modulation mode	FM
	frequency deviation	30 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound carrier frequency spacing	6 MHz (settable)
	vision/sound carrier level spacing	13 dB (settable)
	modulation of sound carrier 2	
	modulation mode	NICAM
	vision/sound carrier frequency spacing	6.552 MHz (settable)
	vision/sound carrier level spacing	20 dB (settable)
	S/N ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video generator	see “Video signal generator”
Audio signals	internal audio generator	see “Audio signal generator”
	audio player	see “Audio player”

Standard M/N (R&S®BTC-K595 option)

Standard M/N		in line with country-specific standard
Vision modulation	modulation	M/N
	group delay	
	precorrection	FCC – M/N (can be switched off)
	frequency response	< 20 ns (with/without vestigial sideband filtering)
	vestigial sideband	
	filtering	M, N, can be switched off
	amplitude frequency response	< 0.5 dB (–0.6 MHz to +4 MHz) (with/without vestigial sideband filtering)
	residual carrier	0 % to 30 %, settable in 0.1 % steps
	S/N ratio	
	video	> 60 dB, weighted
Sound modulation	mode	stereo Korea, dual sound Korea, BTSC
	modulation of sound carriers 1, 2	
	modulation mode	FM
	frequency deviation	25 kHz (settable)
	preemphasis	50 µs/75 µs (can be switched off)
	vision/sound carrier frequency spacing	4.5 MHz/4.742 MHz (settable)
	vision/sound carrier level spacing	13 dB/20 dB (settable)
	pilot	in sound carrier 2 (can be switched off)
	S/N ratio	
	sound	> 60 dB, weighted (CCIR)
Video signals	internal video generator	see “Video signal generator”
Audio signals	internal audio generator	see “Audio signal generator”
	audio player	see “Audio player”
	BTSC player	see “BTSC player”

Standard L (R&S®BTC-K595 option)

Standard L		in line with country-specific standard	
Vision modulation	modulation	L/L'	
	group delay		
	precorrection	TDF – L (can be switched off)	
	frequency response	< 20 ns (with/without vestigial sideband filtering)	
	vestigial sideband		
	filtering	L, L NICAM, can be switched off	
	amplitude frequency response	< 0.5 dB (–1 MHz to +5.8 MHz) (with/without vestigial sideband filtering)	
	residual carrier	0 % to 30 %, settable in 0.1 % steps	
	Sound modulation	mode	AM mono, mono/NICAM, NICAM
	modulation of sound carrier 1	modulation mode	NICAM
vision/sound carrier frequency spacing		5.85 MHz (settable)	
vision/sound carrier level spacing		27 dB (settable)	
modulation of sound carrier 2		modulation mode	AM
		frequency deviation	54 % modulation depth (settable)
		vision/sound carrier frequency spacing	6.5 MHz (settable)
		vision/sound carrier level spacing	10 dB (settable)
Video signals		internal video generator	see “Video signal generator”
Audio signals	internal audio generator	see “Audio signal generator”	
	audio player	see “Audio player”	

Simulation

Arbitrary waveform generator (R&S®BTC-K35 option)

Up to eight arbitrary waveform generators are available for each baseband generator. Their sample rate, frequency and level offset settings are independent of each other, but the sum of their waveform length is limited to 1 Gsample.

Arbitrary waveform generators	number of waveform generators operating mode	up to eight arbitrary waveform generators shared memory concept
Waveform length	with R&S®BTC-B3004 option (memory extension)	128 sample to 1 Gsample in one-sample steps, depending on active number of arbitrary waveform generators and loaded waveform length
Nonvolatile memory		hard disk
Waveform loading time	10 Msample	5 s (meas.)
Sample resolution	equivalent to D/A converter	16 bit
Sample rate		400 Hz to 200 MHz
Sample frequency error	internal clock	$< 5 \times 10^{-14} \times \text{sample rate} +$ reference frequency error
Sample clock source		internal
Bandwidth (RF)	using the maximum sample rate, rolloff to -0.1 dB	160 MHz (nom.)
	using a reduced sample rate, rolloff to -0.1 dB (The waveform is automatically interpolated to the internal sample rate of 200 MHz.)	0.625 × sample rate (nom.)
Level offset	independent for each ARB generator	see "Interferer management"
Frequency offset	independent for each ARB generator	see "Interferer management"

Terrestrial standards with I/Q waveforms

Transmission standard	Option	For specification, see separate data sheet
DVB-T2 waveforms	R&S®WV-K809	PD 5214.2662.22
DVB-H waveforms	R&S®WV-K802	PD 5214.3900.22
T-DMB/DAB waveforms	R&S®WV-K801	PD 5214.3898.22
DRM waveforms	R&S®WV-K803	PD 5214.1020.22
DRM+ waveforms	R&S®WV-K811	PD 3607.3439.22
HD Radio™ waveforms ³³ (DTS license required)	R&S®WV-K804	PD 5214.2691.22
ISDB-Tmm waveforms	R&S®WV-K815	PD 2115.3091.02
CDR waveforms	R&S®WV-K807	PD 5215.1676.22
CMMB waveforms	R&S®WV-K808	PD 5214.2656.22
Digital TV interferer waveforms	R&S®WV-K1114	PD 5214.3546.22
ATSC 3.0 waveforms	R&S®WV-K818	PD 5215.1930.22
Analog signals	R&S®WV-K816	PD 5214.3146.22

Cable standards with I/Q waveforms

Transmission standard	Option	For specification, see separate data sheet
MoCA Waveforms	R&S®WV-K814	PD 2115.3004.02
Cable Interferers	R&S®WV-K1116	PD 5214.3930.02

Satellite standards with I/Q waveforms

Transmission standard	Option	For specification, see separate data sheet
Playback of XM Radio™ Waveforms (SiriusXM license required) ³⁴	R&S®BTC-K256	In preparation
ISDB-S Waveforms	R&S®WV-K812	PD 5214.5349.22
Satellite Interferers	R&S®WV-K1123	PD 5214.4888.22

³³ HD Radio™ is a proprietary trademark of DTS Inc. HD Radio™ waveforms require a license agreement with DTS Inc.

³⁴ Signal generation requires waveforms from XM Radio™.

Interferer management

The interferer management functionality is included in the R&S®BTC-K35 arbitrary waveform generator option.

Interferer management	functionality	
	included	in R&S®BTC-K35
	usable	in combination of a real-time coder option with R&S®BTC-K35
Interferer	signal sources	
	arbitrary waveform generator	up to eight interference signals
	digital I/Q IN	external I/Q signal
	level offset range	-70 dB to +70 dB (relative to useful signal level) ³⁵
	frequency offset range	-80 MHz to +80 MHz (relative to center frequency)
Signal set		activated options, waveforms and interferers, user-specific waveforms

Distortion simulation and nonlinearity (R&S®BTC-K1200)

TX distortion simulation

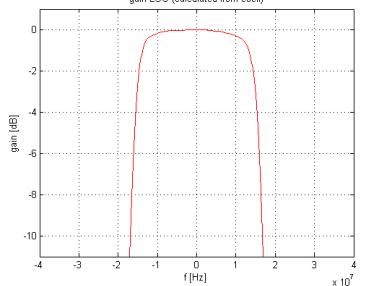
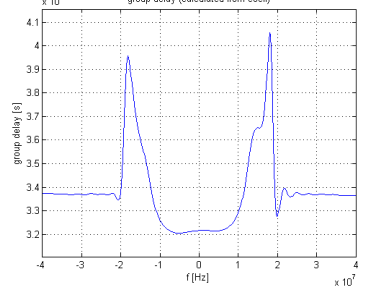
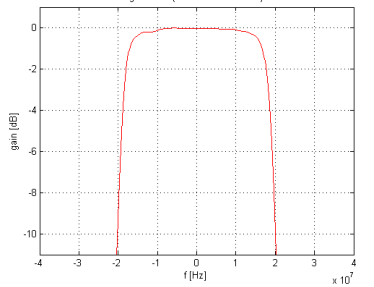
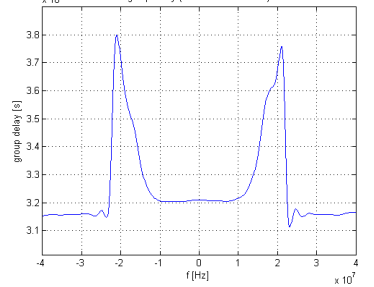
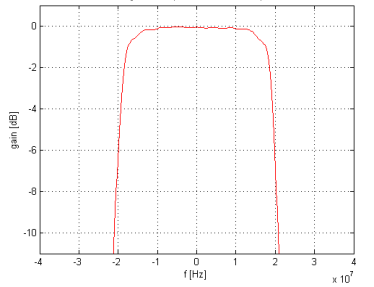
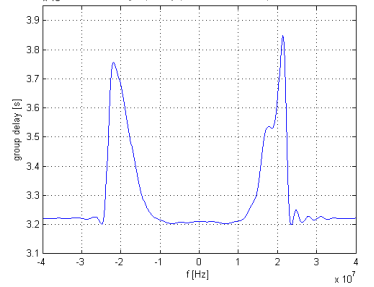
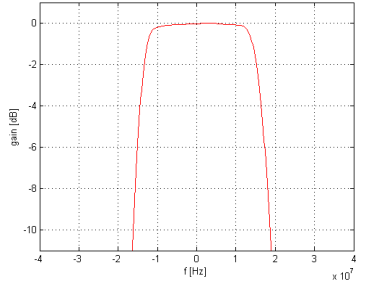
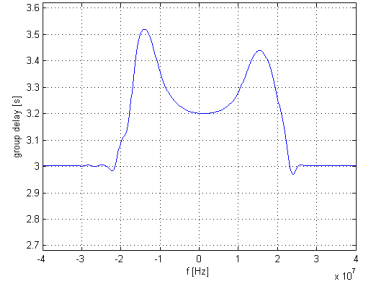
Transmission distortion simulation can be generated either on path A or B with one R&S®BTC-K1200 option. For transmission distortion simulation to be generated on paths A and B simultaneously, two R&S®BTC-K1200 must be installed.

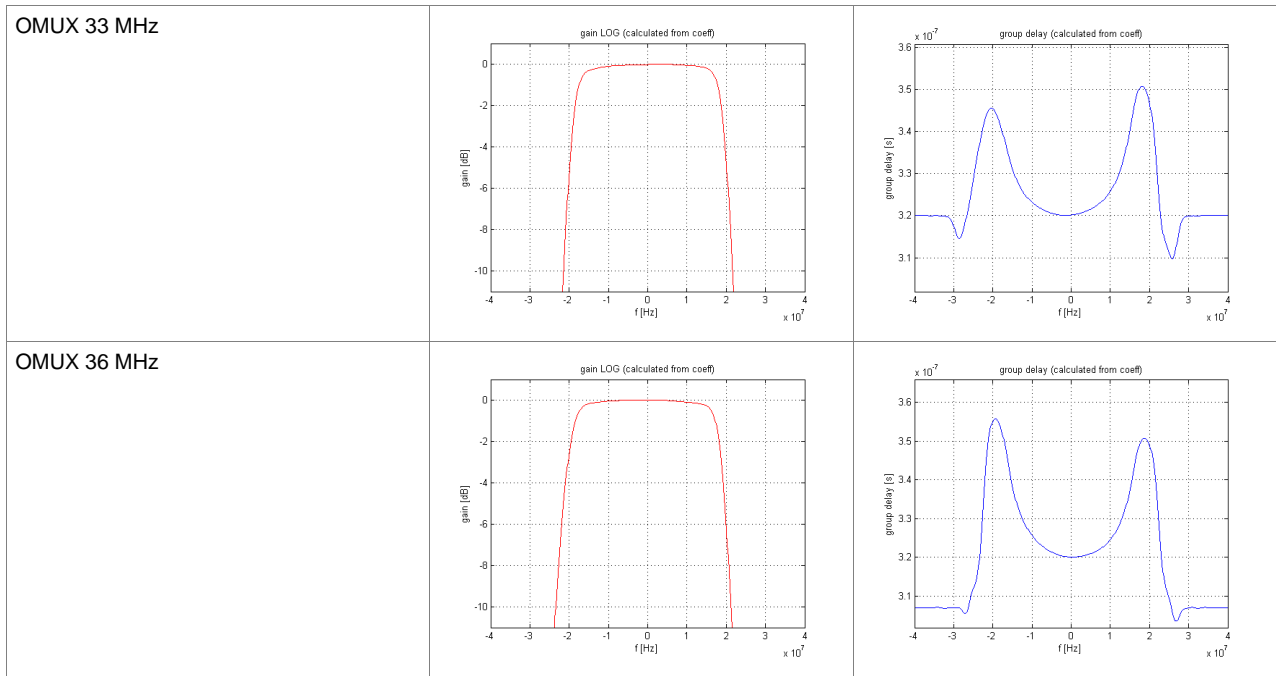
TX distortion simulation		
Nonlinear distortion	limiter	
	limiter position	0 % to 100 %, settable
	nonlinearity	
	gain	-50 % to +50 % deviation, settable
	phase	-10° to +10° deviation, settable
	number of nodes	settable
	curve interpolation	cubic spline
	entry	graphic or table
	curves	can be loaded
	file format	xml
Linear distortion	filter function	complex FIR
	number of taps	128, real and imaginary
	coefficient bit width	18
	number of nodes	settable
	filter design	internal
	filter design method	windowed FIR
	gain	0 dB to 80 dB
	group delay	-100 ns to +100 ns
	entry	by gain and group delay curve table

³⁵ High interferer power diminishes useful signal values.

IMUX/OMUX simulation (in TX distortion only)

IMUX/OMUX simulation can be generated either on path A or B with one R&S®BTC-K1200 option. For IMUX/OMUX simulation to be generated on paths A and B simultaneously, two R&S®BTC-K1200 must be installed.

IMUX/OMUX simulation Predefined simulations	loadable files available Gain	can be modified Group delay
IMUX 26 MHz		
IMUX 33 MHz		
IMUX 36 MHz		
OMUX 26 MHz		



RX distortion simulation

Receiving distortion simulation can be generated either on path A or B with one R&S®BTC-K1200 option. For receiving distortion simulation to be generated on paths A and B simultaneously, two R&S®BTC-K1200 must be installed.

RX distortion simulation		
Nonlinear distortion	nonlinearity	
	gain	-50 % to +50 % deviation, settable
	phase	-10° to +10° deviation, settable
	number of nodes	settable
	curve interpolation	cubic spline
	entry	by curve table
	curves	can be loaded
file format	xml	

Fading simulator (R&S®BTC-B1031, R&S®BTC-B1032 and R&S®BTC-B1034 options)

All frequency and time settings are coupled to the internal/external reference frequency.

Number of installable fading simulator modules		1, 2, 4
Fading simulators	R&S®BTC-B1031	fading simulator on path A
	R&S®BTC-B1032	fading simulator on path A
	R&S®BTC-B1034	additional fading simulator on path A and path B
Number of fading paths (per simulator)	SISO	40
	MIMO	20
Start seed		0 to 9
Fading profiles	basic statistic functions	static path, pure Doppler, Rayleigh, Rice, constant phase, Gauss
	DVB	Easy3, 0 dB Echo, FX Echo, PT Echo, SFN Echo, TU6, RA6, RC20_ANX_B, RL6 ANX B, RL20 ANX B, RED HT100, ET50, Validate100, RC12 ANX B, RL 12 ANX B, TU3 12paths, TU50 12paths, HT100 12paths, MBRAI portable, DVBH ICT, DVBH SFN ICT, DVBH PT, DVBH SFN PT, IEC 62002 Portable, PI 3 km/h, PO 3 km/h, VU 30 km/h, MR 100 km/h
	ATTC	A APP A, B APP A, C APP A, D APP A, E APP A, F APP A, G APP A, 15us APP B, 1APP C, 2 APP C, 3 APP C, Brazil A, Brazil B, Brazil C, Special Brazil C, Modified Brazil C, Brazil D, Modified Brazil D, Brazil E, CRC Dynamic #1, CRC Dynamic #2, CRC Dynamic #3, CRC Dynamic #4, ACATS Ensemble A
	DAB	RA4 DAB(120km/h), RA6 DAB(120km/h), TU12 DAB(25km/h), TU6 DAB(25km/h), DAB SFN(60km/h) DAB Gauss profile requires R&S®BTC-K1032
	DRM	Gauss Watters profile
Fading profile parameter		
Rayleigh	pseudo-noise interval	> 1 year
Constant phase	phase	0° to 360°
	phase resolution	1°
Pure Doppler	maximum resulting Doppler shift	frequency ratio × current Doppler frequency
	frequency ratio	-1 to +1
	resolution	0.01
Rician	combination of Rayleigh and pure Doppler	
	power ratio	-30 dB to +30 dB
Gauss Doppler	sum of pure Doppler and Gaussian distribution	in line with IEC 62002-1, Edition 2.0
Gauss (0.08fd)	Gaussian distribution	
Gauss (0.1fd)	Gaussian distribution	
Gauss Watters	Gaussian distribution, shifted in frequency	in line with ITU-R F.1487
Fading path loss	setting range	0 dB to 50 dB
	resolution	0.01 dB
	accuracy	< 0.01 dB

Fading path delay	The 40 (SISO)/20 (MIMO) fading paths are divided in 8 (SISO)/4 (MIMO) path groups. Each group consists of 3 fine delay and 2 standard delay paths. A basic delay can be set per path group and an additional delay per path. The total delay per path is the sum of the basic delay of the respective group and of the additional delay of the path.	
Basic delay per group	group 1	0 s
	group 2, 3, 4	0 s to 0.5 s
	resolution	5 ns
Additional delay per path	fine delay path setting range	0 s to 20 μ s
	fine delay path resolution	2.5 ps
	standard delay path setting range	0 s to 20 μ s
	standard delay path resolution	5 ns
Speed range	at f = 1 GHz	0 km/h to 4320 km/h
	accuracy	< 0.1 %
Doppler frequency	setting range	0 Hz to 4000 Hz
	accuracy	< 0.1 %
Restart	standard	auto, manual, external
Total insertion loss	automatic or user-definable, with clipping indicator	-3 dB to 30 dB
Correlation	fading paths in signal path A pairwise with fading paths in signal path B	
	correlation coefficient	
	setting range	0 % to 100 %
	resolution	1 %
	correlation phase	
	setting range	0° to 360°
Lognormal	resolution	1°
	standard deviation	0 dB to 12 dB
	resolution	1 dB
	local constant at f = 1 GHz	20 m to 2000 m

Dynamic fading (R&S®BTC-K1031 option)

At least one fading simulator must be installed. If two or more fading simulators are installed (signal paths A and B), dynamic fading can be used either on signal path A or B with one R&S®BTC-K1031 option. For dynamic fading to be used on signal paths A and B simultaneously, two R&S®BTC-K1031 must be installed.

Moving delay mode		
Number of fading paths		2 per signal path
Fading profiles		none
Basic delay	in steps of 5 ns	0 s to 0.5 s
Delay variation	peak to peak	0.3 μ s to 40 μ s
	variation period	10 s to 500 s
	variation speed	0 μ s/s to 5 μ s/s
Delay step size		5 ps
Birth-death mode		
System bandwidth		160 MHz
Number of fading paths		2 per signal path
Fading profiles		pure Doppler
Delay range		0 s to 40 μ s
Delay grid		0 s to 20 μ s ³⁶
Positions		3 to 50 ³⁷
Hopping dwell		100 ms to 5 s
Start offset	separately settable for each signal path	1 ms to 200 ms
Delay resolution		10 ns
Two-channel interferer		
Number of fading paths		2 per signal path
Fading profiles		static path, pure Doppler, Rayleigh
Fading profile parameter		
Rayleigh	pseudo-noise interval	> 1 year
	phase resolution	1°
Pure Doppler	maximum resulting Doppler shift	frequency ratio \times current Doppler frequency
	frequency ratio	-1 to +1
	resolution	0.01

³⁶ The maximum delay range of 40 μ s cannot be exceeded.

Fading path loss	setting range	0 dB to 50 dB
	resolution	0.01 dB
	accuracy	< 0.01 dB
Speed range	at f = 1 GHz	0 km/h to 4320 km/h
	accuracy	< 0.1 %
Min. delay	path 1	0 s to 1638 μ s
	path 2	0 s to 999.9 μ s
Max. delay	path 1	–
	path 2	0.1 μ s to 1000 μ s
Moving mode	path 1	–
	path 2	sliding, hopping
Period/dwell		0.1 s to 10 s

Extended statistic functions (R&S[®]BTC-K1032 option)

At least one fading simulator must be installed. If two or more fading simulators are installed (signal paths A and B), extended statistic functions can be used either on signal path A or B with one R&S[®]BTC-K1032 option. For extended statistic functions to be used on signal paths A and B simultaneously, two R&S[®]BTC-K1032 must be installed.

Fading profiles		
Gauss 1, Gauss 2,	sum of two Gaussian distributions	in line with DAB standard EN 50248:2001
Gauss DAB	Gaussian distribution, shifted in frequency	
WiMAX [™] Doppler	rounded Doppler PSD model	in line with IEEE 802.16a-03-01
WiMAX [™] Rice	same as WiMAX [™] Doppler plus pure Doppler	in line with IEEE 802.16a-03-01

MIMO fading and routing (R&S[®]BTC-K1034 option)

The R&S[®]BTC-K1034 option allows up to 4 fading channels to be simulated. Minimum two fading simulators (R&S[®]BTC-B1031 and R&S[®]BTC-B1032) must be installed (signal paths A and B) and two baseband sources (R&S[®]BTC-B1 and R&S[®]BTC-B2) must be present. In total up to four fading simulators (R&S[®]BTC-B1031, R&S[®]BTC-B1032 and R&S[®]BTC-B1034) are supported for MIMO/diversity/MRC (Multi Reception Channel) testing.

Supported scenarios with R&S[®]BTC-B1031 and R&S[®]BTC-B1032 options:

TX antennas	RX antennas	
	1	2
1	1x1 (SISO)	1x2 (MIMO)
2	2x1 (MISO)	2x2 (MIMO)

With additional R&S[®]BTC-B1034 option the following scenarios are supported:

TX antennas	RX antennas			
	1	2	1	4
1	1x1 (SISO)	1x2 (MIMO)	1x3 (MIMO)	1x4 (MIMO)
2	2x1 (MISO)	2x2 (MIMO)	not applicable	not applicable

Parameter common to all scenarios		
Number of fading paths per fading channel	with two fading simulator options	20, see R&S [®] BTC-B1031 and R&S [®] BTC-B1032
Steering matrix	Can be set by setting the diagonal elements of the correlation matrix.	
Correlation	Correlation between corresponding fading paths of the four signal paths can be set in a correlation matrix. For each fading path index, an individual matrix can be set.	
	correlation coefficient	
	setting range	0 % to 100 %
	resolution	1 %
	correlation phase	
Correlation matrix setting	setting range	0° to 360°
	resolution	1°
Correlation matrix setting		individually or with Kronecker assumption (RX and TX antenna correlation with automatic calculation of matrix)
Matrix representation		(real, imaginary) or (magnitude, phase)

AWGN generator (R&S®BTC-K1040 option)

AWGN can be generated either on path A or B with one R&S®BTC-K1040 option. For AWGN to be generated on paths A and B simultaneously, two R&S®BTC-K1040 must be installed.

AWGN is available before fading and after fading to simulate the overall transmission channel.

Addition of an AWGN signal of settable bandwidth and settable C/N ratio or E_b/N_0 to a wanted signal.

Noise	injection	before fading
		after fading
		before fading and after fading
	distribution density	Gaussian, statistical, separate for I and Q
	crest factor	> 18 dB
	periodicity	> 48 h
	operating modes	add, only
	bandwidth	
	bandwidth coupling	on/off (settable)
	receiver bandwidth	1 kHz to 120 MHz (settable)
generated noise bandwidth	100 kHz to 160 MHz (settable)	
C/N, E_b/N_0	setting range	-30 dB to +60 dB
	resolution	0.1 dB
	uncertainty for system bandwidth = symbol rate, symbol rate < 4 MHz, -24 dB < C/N < 30 dB and crest factor < 12 dB	< 0.1 dB
System bandwidth	bandwidth for determining noise power	
	range	1 kHz to 160 MHz
	resolution	100 Hz

Extended noise generator (R&S®BTC-K1043 option)

Impulsive noise

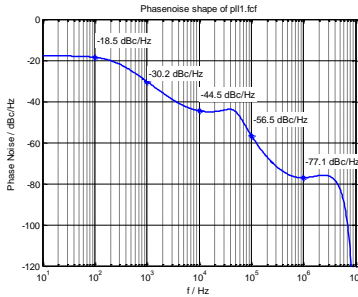
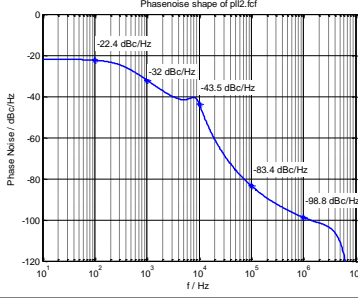
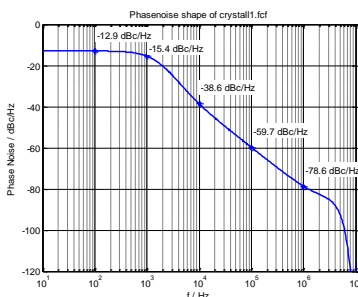
Pulsed addition of an AWGN signal to the useful signal with settable number of pulses per frame and within settable limits of randomly distributed pulse intervals.

Impulsive noise can be generated either on path A or B with one R&S®BTC-K1043 option. For impulsive noise to be generated on paths A and B simultaneously, two R&S®BTC-K1043 must be installed.

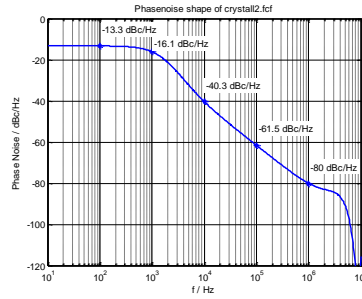
Impulsive noise	required option	R&S®BTC-K1043
	AWGN signal data	see R&S®BTC-K1040 option
Pulse generator		
Frame	duration	10 ms, 100 ms, 1000 ms
Pulse	duration	0.25 μ s, fixed
Pulses per frame	setting range	1 to 40000
Minimum pulse interval	for number of pulses > 1	
	setting range	0.25 μ s to 16 ms
	resolution	0.25 μ s
Maximum pulse interval	for number of pulses > 1	
	setting range	0.25 μ s to 16 ms
	resolution	0.25 μ s
Distribution of pulse intervals	function	PRBS

Phase noise

Phase noise can be generated either on path A or B with one R&S®BTC-K1043 option. For phase noise to be generated on paths A and B simultaneously, two R&S®BTC-K1043 must be installed.

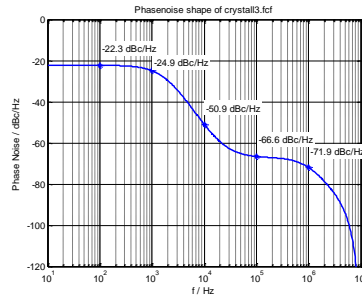
Phase noise	injection profiles	after fading												
		predefined phase noise masks												
		user phase noise masks												
	format	settable on graphical user interface												
	graphical user interface	text files, editable												
	entry	by curve table												
	number of nodes	5 independent points												
	calculation	internal												
	amplitude at $f_{\text{carrier}} \pm 100 \text{ Hz}$													
	setting range	0.0 dBc (1 Hz) to $-110.0 \text{ dBc (1 Hz)}$												
	resolution	0.1 dB/10 Hz												
	max. phase angle	$\pm 180^\circ$												
	density distribution function	Gaussian												
	frequency response	depending on phase noise profile												
System bandwidth	sampling rate	10 MHz												
Predefined PLL phase noise masks	simulation of typ. PLL circuits													
PLL 1		<table border="1"> <thead> <tr> <th>frequency</th> <th>max. phase noise</th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>-18.5 dBc (1 Hz)</td> </tr> <tr> <td>1 kHz</td> <td>-30.2 dBc (1 Hz)</td> </tr> <tr> <td>10 kHz</td> <td>-44.5 dBc (1 Hz)</td> </tr> <tr> <td>100 kHz</td> <td>-56.5 dBc (1 Hz)</td> </tr> <tr> <td>1 MHz</td> <td>-77.1 dBc (1 Hz)</td> </tr> </tbody> </table>	frequency	max. phase noise	100 Hz	-18.5 dBc (1 Hz)	1 kHz	-30.2 dBc (1 Hz)	10 kHz	-44.5 dBc (1 Hz)	100 kHz	-56.5 dBc (1 Hz)	1 MHz	-77.1 dBc (1 Hz)
frequency	max. phase noise													
100 Hz	-18.5 dBc (1 Hz)													
1 kHz	-30.2 dBc (1 Hz)													
10 kHz	-44.5 dBc (1 Hz)													
100 kHz	-56.5 dBc (1 Hz)													
1 MHz	-77.1 dBc (1 Hz)													
PLL 2		<table border="1"> <thead> <tr> <th>frequency</th> <th>max. phase noise</th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>-22.4 dBc (1 Hz)</td> </tr> <tr> <td>1 kHz</td> <td>-32.0 dBc (1 Hz)</td> </tr> <tr> <td>10 kHz</td> <td>-43.5 dBc (1 Hz)</td> </tr> <tr> <td>100 kHz</td> <td>-83.4 dBc (1 Hz)</td> </tr> <tr> <td>1 MHz</td> <td>-98.8 dBc (1 Hz)</td> </tr> </tbody> </table>	frequency	max. phase noise	100 Hz	-22.4 dBc (1 Hz)	1 kHz	-32.0 dBc (1 Hz)	10 kHz	-43.5 dBc (1 Hz)	100 kHz	-83.4 dBc (1 Hz)	1 MHz	-98.8 dBc (1 Hz)
frequency	max. phase noise													
100 Hz	-22.4 dBc (1 Hz)													
1 kHz	-32.0 dBc (1 Hz)													
10 kHz	-43.5 dBc (1 Hz)													
100 kHz	-83.4 dBc (1 Hz)													
1 MHz	-98.8 dBc (1 Hz)													
Predefined VCXO phase noise masks	simulation of typ. oscillator circuits													
Crystal 1		<table border="1"> <thead> <tr> <th>frequency</th> <th>max. phase noise</th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>-12.9 dBc (1 Hz)</td> </tr> <tr> <td>1 kHz</td> <td>-15.4 dBc (1 Hz)</td> </tr> <tr> <td>10 kHz</td> <td>-38.6 dBc (1 Hz)</td> </tr> <tr> <td>100 kHz</td> <td>-59.7 dBc (1 Hz)</td> </tr> <tr> <td>1 MHz</td> <td>-78.6 dBc (1 Hz)</td> </tr> </tbody> </table>	frequency	max. phase noise	100 Hz	-12.9 dBc (1 Hz)	1 kHz	-15.4 dBc (1 Hz)	10 kHz	-38.6 dBc (1 Hz)	100 kHz	-59.7 dBc (1 Hz)	1 MHz	-78.6 dBc (1 Hz)
frequency	max. phase noise													
100 Hz	-12.9 dBc (1 Hz)													
1 kHz	-15.4 dBc (1 Hz)													
10 kHz	-38.6 dBc (1 Hz)													
100 kHz	-59.7 dBc (1 Hz)													
1 MHz	-78.6 dBc (1 Hz)													

Crystal 2



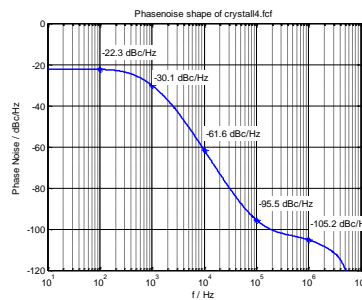
frequency	max. phase noise
100 Hz	-13.3 dBc (1 Hz)
1 kHz	-16.1 dBc (1 Hz)
10 kHz	-40.3 dBc (1 Hz)
100 kHz	-61.5 dBc (1 Hz)
1 MHz	-80.0 dBc (1 Hz)

Crystal 3



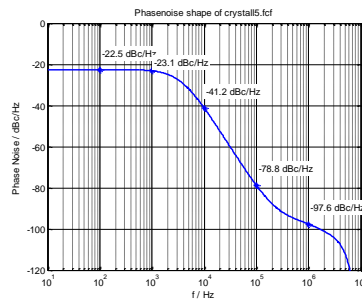
frequency	max. phase noise
100 Hz	-22.3 dBc (1 Hz)
1 kHz	-24.9 dBc (1 Hz)
10 kHz	-50.9 dBc (1 Hz)
100 kHz	-66.6 dBc (1 Hz)
1 MHz	-71.9 dBc (1 Hz)

Crystal 4



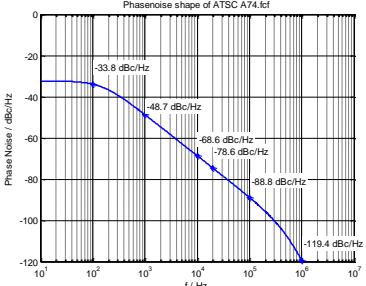
frequency	max. phase noise
100 Hz	-22.3 dBc (1 Hz)
1 kHz	-30.1 dBc (1 Hz)
10 kHz	-61.6 dBc (1 Hz)
100 kHz	-95.5 dBc (1 Hz)
1 MHz	-105.2 dBc (1 Hz)

Crystal 5



frequency	max. phase noise
100 Hz	-22.5 dBc (1 Hz)
1 kHz	-23.1 dBc (1 Hz)
10 kHz	-41.2 dBc (1 Hz)
100 kHz	-78.8 dBc (1 Hz)
1 MHz	-97.6 dBc (1 Hz)

Predefined DVB-S2 phase noise masks		based on EN 302307, DIRECTV	
DVB-S2 P1		frequency	max. phase noise
		100 Hz	-20.1 dBc (1 Hz)
DVB-S2 P2		frequency	max. phase noise
		100 Hz	-20.1 dBc (1 Hz)
DVB-S2 D1		frequency	max. phase noise
		100 Hz	-12.5 dBc (1 Hz)
DVB-S2 A1		frequency	max. phase noise
		100 Hz	-18.6 dBc (1 Hz)
DVB-S2 A2		frequency	max. phase noise
		100 Hz	-20.0 dBc (1 Hz)

Predefined ATSC phase noise masks ATSC A.74	based on ATSC A.74 	<table border="1"> <thead> <tr> <th>frequency</th> <th>max. phase noise</th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>-33.8 dBc (1 Hz)</td> </tr> <tr> <td>1 kHz</td> <td>-48.7 dBc (1 Hz)</td> </tr> <tr> <td>10 kHz</td> <td>-68.6 dBc (1 Hz)</td> </tr> <tr> <td>20 kHz</td> <td>-78.6 dBc (1 Hz)</td> </tr> <tr> <td>100 kHz</td> <td>-88.8 dBc (1 Hz)</td> </tr> <tr> <td>1 MHz</td> <td>-119.4 dBc (1 Hz)</td> </tr> </tbody> </table>	frequency	max. phase noise	100 Hz	-33.8 dBc (1 Hz)	1 kHz	-48.7 dBc (1 Hz)	10 kHz	-68.6 dBc (1 Hz)	20 kHz	-78.6 dBc (1 Hz)	100 kHz	-88.8 dBc (1 Hz)	1 MHz	-119.4 dBc (1 Hz)
frequency	max. phase noise															
100 Hz	-33.8 dBc (1 Hz)															
1 kHz	-48.7 dBc (1 Hz)															
10 kHz	-68.6 dBc (1 Hz)															
20 kHz	-78.6 dBc (1 Hz)															
100 kHz	-88.8 dBc (1 Hz)															
1 MHz	-119.4 dBc (1 Hz)															
Special function		direct entry on graphical user interface user-specific files can be used														

Analysis

Power measurements (R&S®BTC-K2055 option)

The power measurement requires the use of R&S®NRPxx power sensors.

RF power measurements		measurements depend on power sensor
Power measurement	display	measured power
	units	relative power W, dBm, dBμV, selectable
Operating mode	auto	measurement frequency coupled to RF frequency
	user	user-selectable measurement frequency
Filter	auto	automatic setting of filter length
	user	manual setting of filter length
	optimization	auto once
	length	0 to 128, settable
Range	frequency range	depends on the R&S®NRPxx power sensor being used
	level range	
	dynamic range	
Power sensors	connectors	USB, BNC female, front
	calibration	zero
	supported power sensors	R&S®NRP6A, R&S®NRP8S, R&S®NRP18S, R&S®NRP18T, R&S®NRP-Z11, R&S®NRP-Z21, R&S®NRP-Z22, R&S®NRP-Z23, R&S®NRP-Z24, R&S®NRP-Z51, R&S®NRP-Z52, R&S®NRP-Z55, R&S®NRP-Z91, R&S®NRP-Z92

BER measurements (R&S®BTC-K2060 option)

The bit error rate meter counts the errored bits in a data stream and displays the absolute error count and the relative error count referenced to the total number of received bits. It is possible to analyze serial data streams or MPEG-2 transport streams.

At least one I/Q baseband generator (R&S®BTC-B1 option) is required for using the rear panel TS SERIAL IN or IP (1000BASET) interface.

BER measurements	for all digital modulation modes	
Display	measured value	BER
		error count
		measurement time
Control	manual	start, restart, stop
Gating time	automatic	depending on bit error rate
	user-defined	time window (1 s to 100 h), single run, infinite
Logging	control	on/off/reset
	text display, log file	all measured values and error events
PRBS measurements		
Inputs for BER clock, BER data, BER enable	connectors	BNC female, USER 4, 5, 6 on rear panel
	input impedance	selectable, 1 kΩ or 50 Ω
	input level	0 V to 3 V (nom.)
	threshold	settable between 10 mV and 1.9 V
BER data	input data rate	up to 90 Mbit/s
	PRBS	$2^{23}-1/2^{15}-1$ (in line with ITU-T O.151)
BER clock, BER data	polarity	normal, inverted
BER enable		always, active high, active low
MPEG-2 TS measurements		
Input	input interfaces	ASI, SMPTE 310, IP (see "Digital audio/video interfaces")
	input signal	TS packet
	packet length	188, 204, 208
	payload (PRBS in line with ITU-T O.151)	PRBS $2^{23}-1/2^{15}-1$, constant 0x00/0xFF
	PID	NULL (1FFF (hex)), settable (0 to 1FFF(hex)), don't care

MPEG-2 transport stream measurements

A transport stream analyzer is included in the multimedia generator suite and shows the structure of a played or feed in transport stream.

Transport stream analyzer	for MPEG-2 transport streams	see "Multimedia generator suite"
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HDMI and analog A/V signal measurements

Please see chapter "HDMI and analog A/V testing" on page 57.

Remote control

Remote control	systems	IEC/IEEE bus, IEC 60625 (IEEE 488) Ethernet, USB
Interfaces	IEC/IEEE	IEC 60625 (GPIB IEEE 488.2), 24-contact Amphenol
	command set	SCPI 1999.5 or compatible command sets
	bus address	0 to 30
	interface functions	IEC: SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0
	Ethernet/LAN	10/1000BaseT, RJ-45
	protocols and services	<ul style="list-style-type: none"> • VISA VXI-11 (remote control) • Telnet/RawEthernet (remote control) • VNC (remote operation with web browser) • FTP (file transfer protocol) • SMB (mapping parts of the instrument to a host file system)
	addressing	DHCP, static, support of ZeroConf and M-DNS for easy direct connection to a system controller
USB		2.0 (high speed)
	protocol	VISA USB-TMC

Connectors

Front panel connectors

The following connectors are located on the front panel of the instrument.

RF 50 Ω (path A)	RF output path A	N female
RF 50 Ω (path B)	RF output path B	N female
I (path A)	I modulation input signal, path A	BNC female
Q (path A)	Q modulation input signal, path A	BNC female
I (path B)	I modulation input signal, path B	BNC female
Q (path B)	Q modulation input signal, path B	BNC female
TS serial in 1, TS serial in 2,	user-configurable inputs or outputs, serial transport stream inputs (ASI or SMPTE-310)	BNC female
User in/out	trigger input or marker output	
SENSOR	connector for R&S®NRPxx power sensor	6-pin ODU mini-snap series B
USB	USB 2.0 connector for external USB devices such as mouse, keyboard, R&S®NRPxx power sensors (with R&S®NRP-Z4 adapter cable), memory stick for software update and data exchange, or USB serial adapter for RS-232 remote control	USB type A

Rear panel connectors

Base unit frame		
REF IN	reference frequency input	BNC female
REF OUT	reference frequency output	BNC female
INST TRG A	not supported	BNC female
INST TRG B	not supported	BNC female
USER 4, USER 5, USER 6	user-configurable inputs or outputs, used for serial BER option (R&S®BTC-K2060)	BNC female
EFC	not supported	BNC female
LO IN	phase-coherent LO input	SMA female
LO OUT	phase-coherent LO output	SMA female
IEEE 488	remote control of instrument via GPIB	24-pin Amphenol series 57 female
Controller module		
DISPLAY PORT	output for external monitor	
DVI	output for external monitor	
LAN	provides remote control functionality and other services, see "Remote control"	RJ-45
USB IN	USB 2.0 (high speed) remote control of instrument (USB-TMC)	USB type B
USB DEVICE	USB 2.0 (high speed) connector for external USB devices, mouse and keyboard for enhanced operation, R&S®NRP-Zxx power sensors (with R&S®NRP-Z4 adapter cable) for external power measurements and level adjustment of instrument, memory stick for software update and data exchange, USB serial adapter for RS-232 remote control	USB type A
Baseband main module		
EXT 1, EXT 2	not supported	BNC female
DIG I/Q OUT 1, DIG I/Q OUT 2	digital output connectivity in line with R&S®Digital I/Q Interface to connect to the R&S®EX-IQ-Box, for example	26-pin MDR

Analog I/Q outputs		
I / LF OUT 1	analog I output	BNC female
	alternative function: LF generator output	not supported
\bar{I} Q / LF OUT 2	analog \bar{I} output	BNC female
	analog Q output	BNC female
\bar{Q} 1	alternative function: LF generator output	not supported
	analog \bar{Q} -bar output	BNC female
\bar{I} , I, Q, \bar{Q}	second set of analog I, I-bar, Q, Q-bar outputs	BNC female
Baseband generator/realtime coder modules		
1000BaseT	input interface for IP-embedded MPEG-2 TS and bitstreams	RJ-45
TS SERIAL IN	input interface for MPEG-2 TS with ASI and SMPTE 310, for ETI streams and bitstreams	BNC female, 75 Ω
TS SERIAL OUT	output interface for MPEG-2 TS with ASI and SMPTE 310, for ETI streams and bitstreams	BNC female, 75 Ω
DIG IQ IN/OUT 1, DIG IQ IN/OUT 2,	digital input or output connectivity in line with R&S®Digital I/Q Interface	26-pin MDR
Fading simulator modules		
T/M/C 1, T/M/C 4	not supported	BNC female
T/M 2, T/M 3, T/M 5, T/M 6	not supported	BNC female
DIG IQ IN/OUT 1, DIG IQ IN/OUT 2	digital input or output connectivity in line with R&S®Digital I/Q Interface	26-pin MDR

General data

Power supply	input voltage range, AC, nominal	100 V to 240 V
	AC supply frequency	50 Hz to 60 Hz/400 Hz
	input current	max. 7.3 A
	power factor correction	in line with EN 61000-3-2
EMC		in line with EN 55011 class B, EN 61326
Immunity to interfering field strength		up to 10 V/m
Environmental conditions	operating temperature range	+5 °C to +45 °C, in line with DIN EN 60068-2-1, DIN EN 60068-2-2
	storage temperature range	-40 °C to +60 °C, temperature gradient < 5 K/hour
	climatic resistance	+40 °C, 90 % rel. humidity in line with DIN EN 60068-2-3
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, 55 Hz to 150 Hz, 0.5 g const., in line with DIN EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with DIN EN 60068-2-64
Shock		40 g shock spectrum , in line with DIN EN 60068-2-27, MIL-STD-810E
Electrical safety		in line with EN 61010-1
Sound pressure level	T _{ambient} = +25 °C, distance: 1 m	typ. 46 dB(A)
Dimensions	W × H × D	435 mm × 192 mm × 460 mm (17.1 in × 7.6 in × 18.1 in)
Weight	fully equipped	21 kg (46.3 lb)
Recommended calibration interval		3 years

Stream libraries, waveform libraries and interferer signals

Details are given in the related product brochures and specifications. An overview on the available libraries, waveforms and signals is given under the ordering information.

HDMI and analog A/V testing

The R&S®BTC can also be equipped with modules and related options from the R&S®VTC/VTE/VTs video tester family. The number of modules that can be installed and used depends on the number of free slots on the R&S®BTC. An overview on the available options is given under the ordering information ("HDMI and analog A/V testing"). For more information about the individual options, see the R&S®VTC/VTE/VTs specifications (PD 3606.7776.22).

Ordering information

R&S®BTC base unit and options

Designation	Type	Order No.
Broadcast Test Center ³⁷ including power cable, quick start guide	R&S®BTC	2114.3000.02
Frequency options		
RF Path A		
100 kHz to 3 GHz	R&S®BTC-B3103	2114.3100.02
100 kHz to 6 GHz	R&S®BTC-B3106	2114.3200.02
RF Path B		
100 kHz to 3 GHz	R&S®BTC-B3203	2114.3300.02
100 kHz to 6 GHz	R&S®BTC-B3206	2114.3400.02
Low Phase Noise	R&S®BTC-B3100	2114.6000.02
Baseband main modules		
Baseband Main Module, one I/Q path to RF	R&S®BTC-B11	2114.6500.02
Baseband Main Module, two I/Q paths to RF	R&S®BTC-B12	2114.6600.02
Baseband		
Baseband Generator first channel	R&S®BTC-B1	2114.3500.02
Baseband Generator second channel	R&S®BTC-B2	2114.3600.02
Extended Baseband Routing	R&S®BTC-K8	2114.6968.02
Extended I/Q Interfaces	R&S®BTC-K2500	2114.7293.02
Audio/video generation		
Multimedia Generator Suite	R&S®BTC-K20	included in base unit
DVB-T2 Multiprofile Gateway	R&S®BTC-K24	2114.7006.02
Transmission standards		
DVB-T2 Coder	R&S®BTC-K516	2114.7035.02
DVB-T/DVB-H Coder	R&S®BTC-K501	2114.6980.02
DAB/DAB+/T-DMB Coder	R&S®BTC-K511	2114.7106.02
ATSC 3.0 Coder	R&S®BTC-K520	2114.7212.02
ATSC M/H, 8VSB Coder	R&S®BTC-K518	2114.7135.02
DTMB Coder (GB20600-2006)	R&S®BTC-K512	2114.7112.02
CMMB Coder	R&S®BTC-K515	2114.7129.02
ISDB-T/ISDB-T _B /ISDB-T _{SB} Coder	R&S®BTC-K506	2114.7087.02
DVB-C2 Coder	R&S®BTC-K517	2114.7041.02
J.83/A/B/C Coder (DVB-C, US Cable, ISDB-C)	R&S®BTC-K502	2114.6997.02
DVB-S/DVB-S2, DSNG Coder	R&S®BTC-K508	2114.7093.02
DVB-S2-X Coder Extension	R&S®BTC-K510	2114.7170.02
DIRECTV Legacy Coder	R&S®BTC-K509	2114.7270.02
DRM/DRM+ Coder	R&S®BTC-K519	2114.7058.02
AM/FM RDS RDBS Coder	R&S®BTC-K570	2114.7141.02
ATV Multistandard Coder	R&S®BTC-K595	2114.7287.02
Transmission simulations		
Arbitrary Waveform Generator	R&S®BTC-K35	2114.6974.02
Fading Simulator (path A)	R&S®BTC-B1031	2114.3700.02
Fading Simulator (path B)	R&S®BTC-B1032	2114.3800.02
Fading Simulator Extension (path C and D)	R&S®BTC-B1034	2114.3900.02
Dynamic Fading	R&S®BTC-K1031	2114.7158.02
Extended Statistic Functions	R&S®BTC-K1032	2114.7164.02
MIMO Fading	R&S®BTC-K1034	2114.7064.02
Additive White Gaussian Noise (AWGN)	R&S®BTC-K1040	2114.7070.02
Extended Noise Generator	R&S®BTC-K1043	2114.7235.02
Distortion Simulation	R&S®BTC-K1200	2114.7329.02
BER Measurement	R&S®BTC-K2060	2114.7264.02
Power Measurement	R&S®BTC-K2055	2114.7258.02
Other options		
Rear Panel Connectors (path A)	R&S®BTC-B3121	2114.6300.02
Rear Panel Connectors (path B)	R&S®BTC-B3122	2114.6400.02
19" Rack Adapter	R&S®ZZA-KN4	1175.3033.00

³⁷ The base unit can only be ordered with an R&S®BTC-B31xx frequency option.

Stream libraries, waveform libraries and interferer signals

Designation	Type	Order No.
Stream libraries		
Analog Video Signal Library	R&S®LIB-K50	2116.9358.02
T-DMB/DAB Streams	R&S®LIB-K51	2116.9364.02
DAB+ Streams	R&S®LIB-K53	2116.9387.02
ISDB-T Transport Streams	R&S®LIB-K54	2116.9393.02
CMMB Transport Streams	R&S®LIB-K55	2116.9406.02
ATSC-M/H Transport Streams	R&S®LIB-K56	2116.9412.02
DVB-T2 MI Streams	R&S®LIB-K57	2116.9429.02
EMC Streams	R&S®LIB-K58	2116.9435.02
DMB Streams, France	R&S®LIB-K59	2116.9441.02
DRM/DRM+ MDI Stream Library	R&S®LIB-K60	2116.9458.02
Basic Stream Library	R&S®LIB-K70	2116.9558.02
Extended SDTV Library	R&S®LIB-K71	2116.9564.02
Extended HDTV Library	R&S®LIB-K72	2116.9570.02
3D Library	R&S®LIB-K73	2116.9587.02
HEVC Stream Library	R&S®LIB-K78	2116.9641.02
Waveform libraries		
T-DMB/DAB Waveforms	R&S®WV-K801	2116.9787.02
DVB-H Waveforms	R&S®WV-K802	2116.9793.02
DRM Waveforms	R&S®WV-K803	2116.9806.02
HD Radio™ Waveforms ³⁸ (DTS license required)	R&S®WV-K804	2116.9812.02
Playback of XM Radio™ Waveforms (SiriusXM license required)	R&S®BTC-K256	2114.7206.02
CDR Waveforms	R&S®WV-K807	2116.9841.02
CMMB Waveforms	R&S®WV-K808	2116.9858.02
DVB-T2 Waveforms	R&S®WV-K809	2116.9864.02
DRM+ Waveforms	R&S®WV-K811	2116.9887.02
ISDB-S Waveforms	R&S®WV-K812	2116.9893.02
MoCA Waveforms	R&S®WV-K814	2116.9912.02
ISDB-Tmm Waveforms	R&S®WV-K815	2116.9929.02
Analog Signals	R&S®WV-K816	2116.9935.02
ATSC 3.0 Waveforms	R&S®WV-K818	2116.9941.02
Interferer signals		
Digital TV Interferers	R&S®WV-K1114	2116.9964.02
Cable Interferers	R&S®WV-K1116	2116.9970.02
Satellite Interferers	R&S®WV-K1123	2116.9987.02
Digital Standard GSM/EDGE	R&S®WV-K1140	2114.8260.02
Digital Standard EDGE Evolution	R&S®WV-K1141	2114.8277.02
Digital Standard 3GPP FDD	R&S®WV-K1142	2114.8283.02
Digital Standard GPS 1 Satellite	R&S®WV-K1144	2114.8302.02
Digital Standard CDMA2000®	R&S®WV-K1146	2114.8325.02
Digital Standard 1xEV-DO	R&S®WV-K1147	2114.8331.02
Digital Standard IEEE 802.16	R&S®WV-K1149	2114.8354.02
Digital Standard TD-SCDMA	R&S®WV-K1150	2114.8360.02
Digital Standard TD-SCDMA Enhanced	R&S®WV-K1151	2114.8377.02
Digital Standard IEEE 802.11a/b/g/n	R&S®WV-K1154	2114.8402.02
Digital Standard EUTRA/LTE	R&S®WV-K1155	2114.8419.02
Digital Standard Bluetooth® EDR	R&S®WV-K1160	2114.8431.02
Multicarrier CW Signal Generation	R&S®WV-K1161	2114.8448.02
Additive White Gaussian Noise	R&S®WV-K1162	2114.8454.02
Digital Standard TETRA Release 2	R&S®WV-K1168	2114.8460.02
Digital Standard 3GPP FDD HSPA/HSPA+	R&S®WV-K1183	2114.8477.02
Digital Standard LTE Release 9	R&S®WV-K1184	2114.8483.02
Digital Standard LTE Release 10	R&S®WV-K1185	2114.8490.02
Digital Standard IEEE 802.11ac	R&S®WV-K1186	2114.8502.02
Digital Standard 1xEV-DO Rev. B	R&S®WV-K1187	2114.8519.02
Digital Standard NFC A/B/F	R&S®WV-K1189	2114.8525.02

³⁸ HD Radio™ is a proprietary trademark of iBiquity Digital Corp. HD Radio™ waveforms require a license agreement with iBiquity Digital Corporation.

HDMI and analog A/V testing

Designation	Type	Order No.
HDMI options 600 MHz		
HDMI RX/TX 600 MHz Module	R&S®VT-B2363	2115.7716.06
HDMI TX	R&S®VT-K364	2115.8570.02
HDMI Moving Pictures	R&S®VT-K361	2115.7545.02
HDMI TX User Defined	R&S®VT-K362	2115.8293.02
HDMI 1.4 CTS Sink Test	R&S®VT-K367	2115.8612.02
HDMI 2.0 CTS Sink Test	R&S®VT-K368	2115.8629.02
HDMI RX	R&S®VT-K2364	2115.8587.02
HDMI 1.4 CTS Source Test	R&S®VT-K2367	2115.8635.02
HDMI 2.0 CTS Source test	R&S®VT-K2368	2115.8641.02
CEC/DDC Analyzer	R&S®VT-K2391	2115.8658.02
HDMI Pass-through Adapter	R&S®VT-Z2390	2115.7680.02
HDMI options 300 MHz		
HDMI Generator Module	R&S®VT-B360	2115.7500.06
HDMI Moving Pictures	R&S®VT-K361	2115.7545.02
HDMI User Defined Timing	R&S®VT-K362	2115.8293.02
HDMI CTS Sink Test	R&S®VT-K365	2115.8312.02
HDMI RX 300 MHz	R&S®VT-B2361	2115.7639.06
HDMI CTS Source Test	R&S®VT-K2365	2115.8270.02
CEC Tracer	R&S®VT-K2366	2115.8306.02
Analog options		
Analog A/V RX	R&S®VT-B2370	2115.7600.06
Component Support	R&S®VT-K2371	2115.8258.02
A/V analysis options		
Video Analysis	R&S®VT-K2100	2115.8029.02
Video Measurements	R&S®VT-K2101	2115.8264.02
A/V Distortion Analysis	R&S®VT-K2111	2115.8041.02
Audio Analysis	R&S®VT-K2150	2115.8235.02
Compressed Audio Support	R&S®VT-K2151	2115.8535.02
Speech Quality Measurement PESQ, acc. to ITU-T rec. P.862	R&S®VT-K2158	2115.8541.02
Listening Quality Analysis POLQA, acc. To ITU-T rec. P.863	R&S®VT-K2159	2115.8558.02
TDA options		
TMDS (6 Gbit/s) Time Domain Analyzer	R&S®VT-B2380	2115.7597.06
HDMI CTS Source Test (electrical)	R&S®VT-K2385	2115.8529.02
HDMI Type A (plug) Test Point Adapter	R&S®VT-Z2385	2115.7668.02

Service options

Warranty		
Base unit		3 years
All other items ³⁹		1 year
Options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	

Extended warranty with a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge ⁴⁰. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration coverage (CW1 and CW2)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs ⁴¹ and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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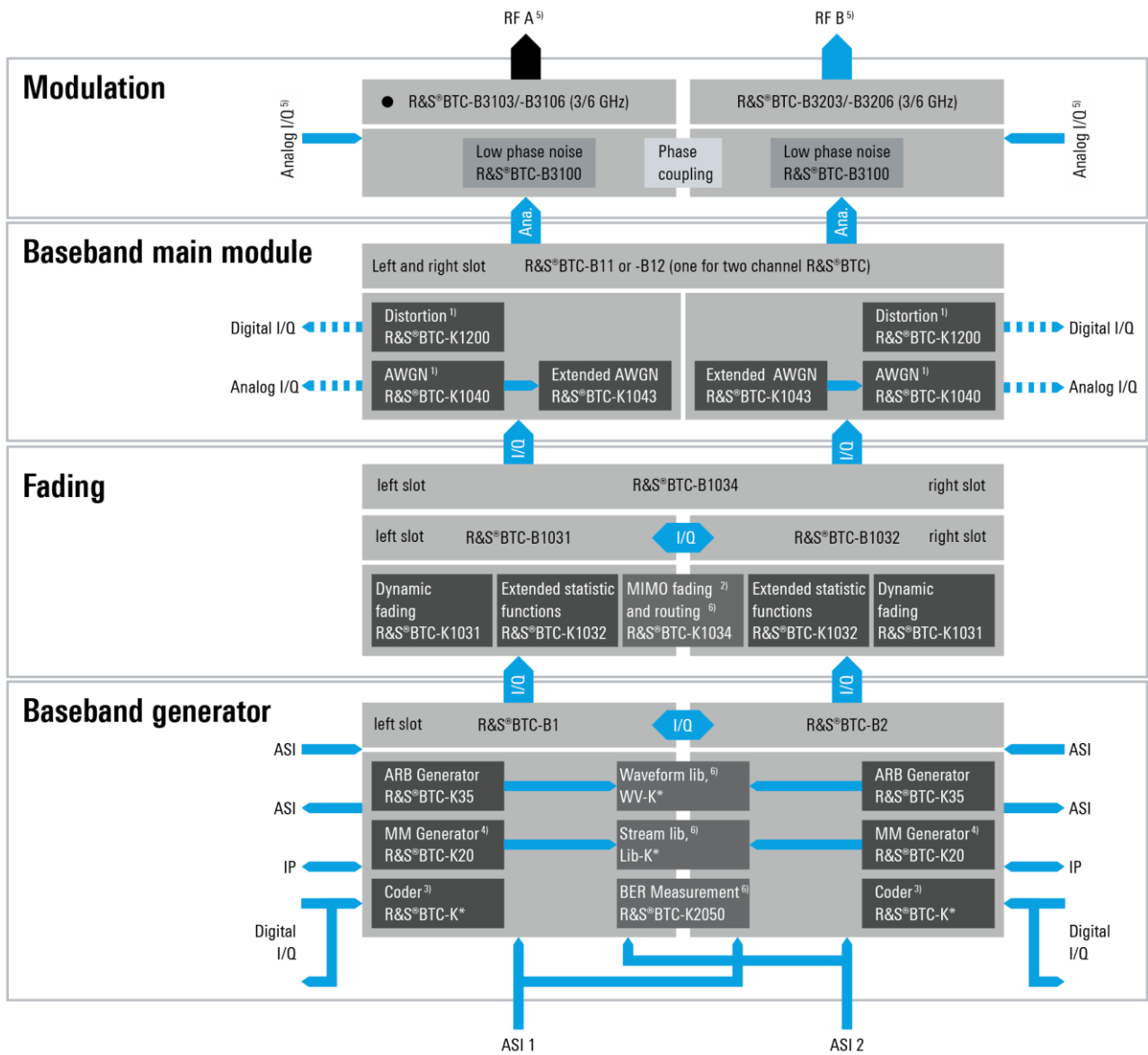
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³⁹ For options that are installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

⁴⁰ Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Function overview of R&S®BTC options



Legend: "Option B" requires "Option A":



1 R&S®BTC-K1040 and R&S®BTC-K1200 can also be used before fading.
 2 R&S®BTC-K1034 requires minimum R&S®BTC-B1031 and R&S®BTC-B1032 fading modules and can also be used in combination with R&S®BTC-B1031 and R&S®BTC-B1032 and R&S®BTC-B1034.
 3 R&S®BTC-K510 requires R&S®BTC-K508.
 4 R&S®BTC-K20 option always included in base unit.
 5 With R&S®BTC-B3121/ R&S®BTC-B3122, RF out and analog I/Q in are installed at the back plane of the R&S®BTC.
 6 Option only required once.
 7 R&S®BTC-B3100 requires always R&S®BTC-B12.

General remarks

- Further options like power sensors and service options can be added.
- Hardware options are dedicated to path A/B.
- Every selected hardware option is assigned first to path A.
- Software options can be assigned to path A/B.
- Simultaneous use of same coder, ARB Generator, noise, fading or distortion for both paths simultaneously requires two licenses.
- Several options are available as packet options (R&S®BTC-PKxxxx) including two licenses for same option and usage on path A and path B.
- R&S®BTC has eight hardware slots in total. R&S®VTC/VTE/VTX options can be installed in empty slots.

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.

To find your nearest Rohde & Schwarz representative, visit www.sales.rohde-schwarz.com. An electronic product configurator is available on the Internet (www.rohde-schwarz.com, search term: BTC).

Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- | Environmental compatibility and eco-footprint
- | Energy efficiency and low emissions
- | Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

Rohde & Schwarz training

www.training.rohde-schwarz.com

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R&S®BTC Broadcast Test Center

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