



### HF SIMULATOR: FEATURES & BENEFITS:

- **HF WATTERSON-COON CHANNEL MODEL**
- **8 INDEPENDENT PATHS**
- **ASYMMETRIC SNR:**
  - DUAL LEFT & RIGHT CHANNEL FOR FULL ISB TESTING
  - SEPARATE FORWARD & REVERSE FOR ARQ TESTING
- **PRESET CHANNEL CONDITIONS:** PRESETS FOR CCIR & ITU CHANNELS AND MIL-STD 110D CONDITIONS.
- **DOPPLER SIMULATION:** SWEEP AND OFFSET
- **INTERFERENCE SIMULATION**
- **RELIABLE RESULTS:** DEDICATED HARDWARE

### V/UHF SIMULATOR: FEATURES & BENEFITS :

- **FULL SCATTERING PARABOLIC DOPPLER SPECTRUM**
- **PRESET PROPAGATION TERRAIN MODELS (6)**
- **DOPPLER SHIFT:** FUNCTION OF RF & SPEED

### WIDEBAND HF SIMULATION

HF conditions are simulated using the Watterson-Coon Channel model with some enhancements. These include the addition of radio filters at the input and output, the ability to handle more than two paths (up to 8) and the addition of a time-varying Doppler offset.

Wideband bandwidths of 3, 6, 9, 12, 15, 18, 21 & 24 kHz can be tested.

Fixed frequency, FSK waveform, Swept Continuous Wave and Narrowband channel interference simulation is also available in the **RS10**.

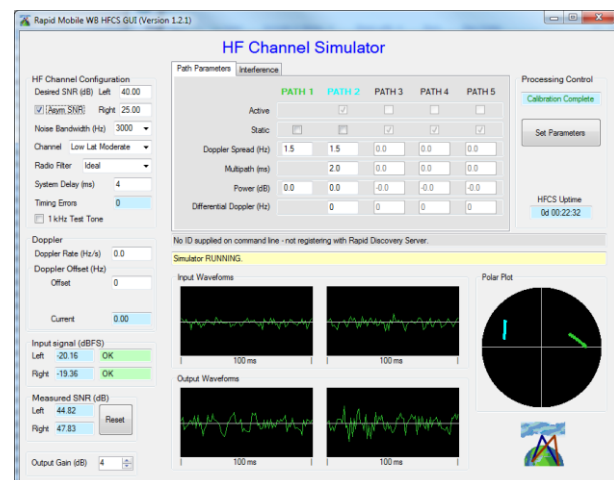
With a maximum system delay of 25 ms, the **RS10** can be used for ALE 3G testing with a zero *k* parameter. When testing ALE, the **RS10** uses the Tx and Rx radio channel numbers, provided via the serial or Ethernet interfaces, to simulate the radio calling and scanning functions.

### RS10 PRODUCT OVERVIEW

The **RapidM RS10** standalone unit can simulate HF and V/UHF channel conditions for reproducible performance evaluation of modems and waveforms at baseband. It is suitable for the performance evaluation of MIL-STD-188-110D modem and MIL-STD-188-141C Automatic Link Establishment (ALE) solutions.

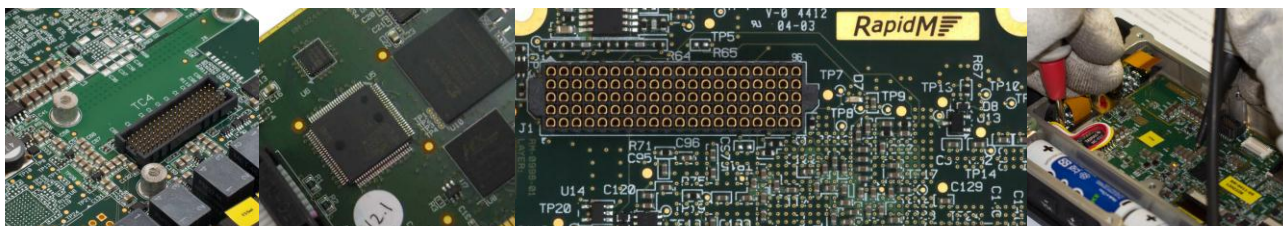
The **RS10** is a baseband simulator providing an audio interface with support for bandwidths of 3, 6, 9, 12, 15, 18, 21 & 24 kHz.

The **RS10** is fully controllable via the front panel - standalone unit – or remotely via a PC GUI using the **RAP1/RIPC** protocol.



### V/UHF SIMULATION

V/UHF conditions are simulated to provide a full scattering parabolic Doppler spectrum. Up to 6 independent paths can be simulated. Support for bandwidths of 3, 6, 9, 12, 15, 18, 21 & 24 kHz are provided.



RS10 HARDWARE		
SIZE	<ul style="list-style-type: none"> <li>Width: 212.2 mm</li> <li>Depth: 225.6 mm</li> </ul>	<ul style="list-style-type: none"> <li>Height: 41.1 mm (excl. front panel)</li> <li>Height: 44.1 mm (incl. front panel)</li> </ul>
WEIGHT	2.2 kg	
POWER	AC Supply: 90-264 VAC, 40-440 Hz, 2A; 100-370 VDC	
ENVIRONMENTAL SPECIFICATIONS	<ul style="list-style-type: none"> <li>Climatic: <ul style="list-style-type: none"> <li>Storage: -30°C to +77°C</li> <li>Operation: -30°C to +70°C</li> </ul> </li> <li>Safety: CE: Low Voltage Directive (Directive 73/23/EEC as amended)</li> <li>Safety: CE: Electromagnetic Compatibility (EMC) Directive (Directive 89/336/EEC as amended)</li> </ul>	
INSTALLATION	Compact design: The unit occupies a width less than 1/2 of an 1U 19" rack slot	
INTERFACES	USE	DETAILS
REMOTE CONTROL (DE9M)	Configuration and Control	Remote Control Pins: RS-485 Multi-drop, RS-422 balanced or RS-232 Protocol: Control Protocol (RAP1 + RIPC, ASCII S5066 Annex E)
ETHERNET CTRL PORT (RJ45)	Configuration and Control	Remote Control: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: Control Protocol (RAP1 + RIPC)
LOCAL CONTROL	Configuration and Control	Local control via 32x202 pixel graphical LCD display and 16-key keypad. 3 bi-colour LED indicators. Alphanumeric and digit keypad for fast data entry, 4-way navigation button
RADIO CONTROL & AUDIO PORTS (DB25M)	Left Audio channels (baseband)	Tx (output): Balanced, -40 to +10 dBm adjustable into 600 ohm load Rx (input): 600 Ohm balanced, -20 to +10 dBm without adjustment
	Right Audio channel (baseband)	Tx (output): Balanced, -40 to +10 dBm adjustable into 600 ohm load Rx (input): 600 Ohm balanced, -20 to +10 dBm without adjustment

HF CHANNEL SIMULATOR		
CHANNEL MODEL	Enhanced Watterson Coon channel model is used	
SAMPLING RATE	96 kHz sampling rate for all channel bandwidths 19.2 kHz sampling rate when using the S4203 radio filter with 3kHz bandwidth	
WIDEBAND CHANNELS	Wideband channels (MIL-STD 110D) with bandwidths of 3, 6, 9, 12, 15, 18, 21 & 24 kHz are supported	
ASYMMETRIC GAUSSIAN NOISE	Band-limited (to the bandwidth selected) Gaussian noise is added independently to the dual left & right channels for ISB testing or forward & reverse channels for ARQ testing (range of -100 – 100 dB)	
RADIO FILTER	Ideal or S4203 radio filter can be used at the input and output of the channel simulator	
DOPPLER	A triangular Doppler sweep (in range -3.5 to +3.5 Hz/s) can be employed between an offset (maximum of ±300 Hz)	
PATH PARAMETERS	Up to 5 paths may be used. Each path contains the following parameters: <ul style="list-style-type: none"> <li>Static: fading or non-fading path</li> <li>Doppler Spread: 0 – 50 Hz (in selected increments)</li> <li>Multipath Delay: 0 – 26 ms</li> <li>Path Gain: -60 – 0 dB</li> <li>Differential Doppler Spread: 0 – 10 Hz</li> </ul>	
PRESET CHANNEL CONDITIONS	Presets for CCIR and ITU defined channel conditions. They are: <ul style="list-style-type: none"> <li>Gaussian</li> <li>CCIR Good</li> <li>CCIR Moderate</li> <li>CCIR Poor</li> <li>Ricean</li> <li>Low Latitude Quiet</li> <li>Low Latitude Moderate</li> <li>Low Latitude Disturbed</li> <li>Mid Latitude Quiet</li> <li>Mid Latitude Moderate</li> <li>Mid Latitude Moderate 2</li> <li>Mid Latitude Disturbed</li> <li>Mid Latitude Disturbed NVIS</li> <li>High Latitude Quiet</li> <li>High Latitude Quiet 2</li> <li>High Latitude Moderate</li> <li>High Latitude Moderate 2</li> <li>High Latitude Disturbed</li> </ul>	
INTERFERENCE	The channel simulator can be used to introduce interference to the channel. The interference can be: <ul style="list-style-type: none"> <li>Fixed Frequency interferer x4 <ul style="list-style-type: none"> <li>ISR for left and right channel (-100 – 100 dB)</li> <li>Frequency for left and right channel (0 – 24 kHz)</li> </ul> </li> <li>Swept Continuous Wave interferer <ul style="list-style-type: none"> <li>ISR for left and right channel (-100 – 100 dB)</li> <li>Low frequency for left and right channel (0 – 24 kHz)</li> <li>High frequency for left and right channel (0 – 24 kHz)</li> <li>Sweep rate for left and right channel (max 48 kHz/s)</li> </ul> </li> <li>FSK Waveform interferer <ul style="list-style-type: none"> <li>ISR for left and right channel (-100 – 100 dB)</li> <li>First frequency for left and right channel (0 – 24 kHz)</li> <li>Second frequency for left and right channel (0 – 24 kHz)</li> <li>Bit rate for left and right channel (max 48 bits/s)</li> </ul> </li> <li>Narrow Band interferer <ul style="list-style-type: none"> <li>BPSK, QPSK, 8-PSK, 16-QAM</li> <li>1.24, 3, 6, 9, 12, 15, 18, 21 &amp; 24kHz bandwidths</li> </ul> </li> </ul>	

V/UHF CHANNEL SIMULATOR		
CHANNEL MODEL	V/UHF conditions are simulated to provide a full scattering parabolic Doppler spectrum	
SAMPLING RATE	96 kHz sampling rate is used for all bandwidths	
WIDEBAND CHANNELS	Wideband channels (MIL-STD 110D) with bandwidths of 3, 6, 9, 12, 15, 18, 21 & 24 kHz are supported	
ASYMMETRIC GAUSSIAN NOISE	Band-limited (to the bandwidth selected) Gaussian noise is added independently to the dual left & right channels for ISB testing or forward & reverse channels for ARQ testing (range of -100 – 100 dB)	
FREQUENCY	Both VHF and UHF frequencies are supported (30 – 500 MHz)	
MAXIMUM DOPPLER SHIFT	Input to the path model which controls path fading, delay and gain Calculated as a function of the: <ul style="list-style-type: none"> <li>Carrier frequency (30 – 500 MHz)</li> <li>Speed (3 – 4000 km/h)</li> </ul>	
PATH PARAMETERS	Up to 6 paths may be used. Each path contains the following parameters: <ul style="list-style-type: none"> <li>Static: fading or non-fading path</li> <li>Doppler Spectrum: Classical Doppler or Rician spectrum</li> <li>Multipath Delay: 0 – 50 μs</li> <li>Path Gain: -60 – 0 dB</li> </ul>	
PROPAGATION MODEL TERRAIN PRESETS	Preset terrain models are given for: <ul style="list-style-type: none"> <li>Rural Area (6 taps)</li> <li>Hilly Terrain (6 taps)</li> <li>Urban Area (6 taps)</li> <li>Equalisation Test (6 taps)</li> <li>Single Path (Gaussian)</li> <li>Tiny Cell (2 taps)</li> </ul>	
INTERFERENCE	The same Fixed Frequency and Swept Continuous Wave interferences from the HF Channel Simulator may be applied to the V/UHF Channel Simulator. (Number of paths limited to 2 when interferences are enabled, no FSK interference in V/UHF mode.)	

ORDERING INFORMATION	STOCK NUMBER	DESCRIPTION
RS10 Wideband HF & V/UHF Channel Simulator – 24 kHz	RME-S0-RA-SAV01	Chan Sim: RS10 HF, V/UHF, 24kHz V01

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