Wideband Multi-Modulator

REM

1 PRODUCT DESCRIPTION

The ELTA REM is a multi-carrier wideband multi-carrier modulator. It is your ideal tool to perform advanced testing on broadband satellite receivers and systems.

In addition to a large choice of modulation (up to 32 APSK, GMSK), it offers channel emulation which includes non-linearity effects, phase noise simulations and OMUX/IMUX filtering, in L, S and C band.

Moreover REM was designed to provide multi-band, high-quality and wide bandwidth signals, with up to 4 simultaneous and independent channels, with-in a single main frame.

Each channel is able to generate 2 independent modulated carriers and up to 5 replicated signals, individually configurable, coupled with an Arbitrary Wave Form Generator able to store and replay data internally.

Based on the generic components of the ELTA Spacelink family, and developed by the R&D team in collaboration with CNES (French Space Agency), REM demonstrates ELTA's expertise in the field of high-speed digital signal processing and system integration.

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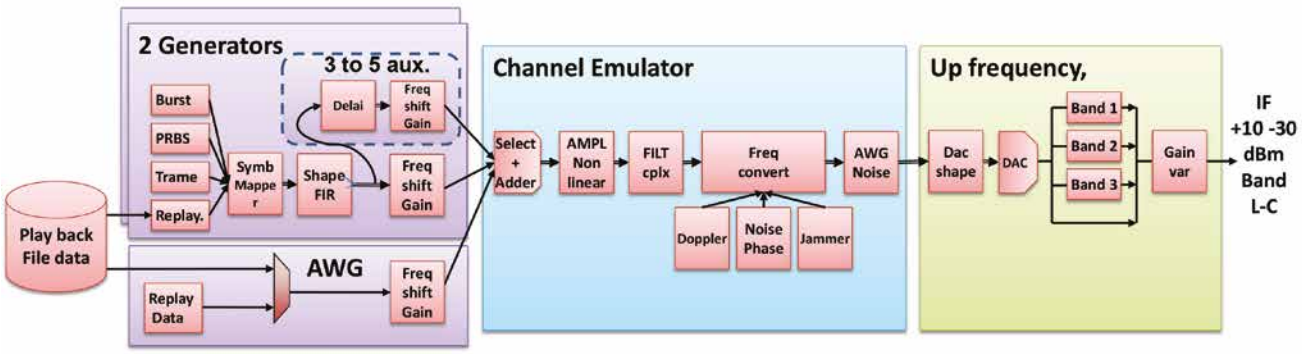
2 MAIN FUNCTIONS

THE REM SIGNAL GENERATION MAIN FUNCTIONS ARE:

- 2 wide band generators and an AWG per channel (4 channels per unit)
- Internal generator or file data stored on hard disk
- Arbitrary Wave Form Generator : IQ samples up to 400 Mbaud
- Data rate: 10 kbaud to 400 Mbaud
- Modulation: π/2-BPSK, π/4 QPSK, BPSK, QPSK, 8PSK, 3π/8-8PSK, 16APSK, 16QAM, OQPSK, 32APSK, GMSK
- Modulation: user defined modulation with up to 128 states (7 bits).
- Burst mode, with configurable probability laws (Uniform, Poisson, Markov)
- Multi Carrier Signal Composition: combination of main carriers, time and frequency replicated carriers.



3 MAIN FEATURES

THE REM CHANNEL EMULATOR MAIN FEATURES ARE:

- Additive White Gaussian Noise
- Time varying Doppler
- Wide band non-linearity emulation (amplifier simulation)
- Phase noise simulation
- OMUX/IMUX filtering
- Configurable FI to allow standard output 720 / 800 / 960 / 1575 / 2300 / 3700 MHz
- Bandwidth up to 840 MHz

4 TYPICAL APPLICATIONS

- Wideband satellite testing
- High-end wide band receiver testing

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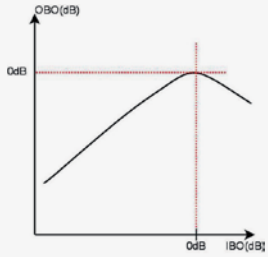
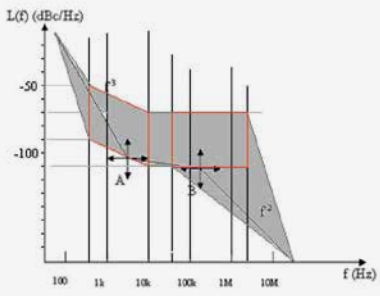
5 SPECIFICATIONS

FLEXIBLE MODULATORS	
Type	Modulation: π/2-BPSK, π/4 QPSK, BPSK, QPSK, 8PSK, 3π/8-8PSK, 16APSK, 16QAM, OQPSK, 32APSK, GMSK User defined up to 128 states
Internal generator	PRBS Length: 2^{11}-1, 2^{15}-1, 2^{23}-1, 2^{31}-1 File data : stored on Hard Disk, up to 480 GB per channel
Number of generator	2 per channel, plus 3/5 time and frequency shifted replicates per channel
Arbitrary Wave Generator	IQ samples up to 480 GB per channel
Pulse Shaping Filtering	Up to 35 configurable taps. SRRC with configurable roll-off. available.
Data rate	10 kbauds to 400 Mbauds
Burst	Burst emission with or without header. Burst emission probability: Poisson, Markovian and uniform
Multicarrier composition	Main generators, replicates and AWG are individually configurable in gain, frequency and delay (up to 6 carriers)

CHANNEL EMULATION	
AWGN (Additive White Gaussian Noise)	S/N selection: -35 to +5 dB
Doppler	+/- 4 MHz, sine and square waveform
Non linearity	Gain and phase characteristics of an amplifier, described through with an AM/AM and AM/PM reference file representative over up to 840MHz. 
Phase Noise Simulation	The digital phase noise generator implements a full customizable phase noise curve composed of 3 areas: • At carrier bottom, f^2 or f^3 shaped, • Nearly flat transition region (+5 dB/decade to -10 dB/decade) corresponding to the Local Oscillator loop bandwidth, • VCO-like curve, f^2 shaped. 

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CHANNEL PARAMETERS	
Number of available channels	Up to 4 channels / board in a single main-frame Each channel generates a 450 to 840 MHz multicarrier signal, connected to a channel emulator.
IF band filters	Flexible frequency band filters customization (3 frequency band filters at order among): • 130 - 970 MHz • 710 - 1230 MHz • 880 - 1510 Mhz • 1150 - 1990 MHz • 1935 - 2605 MHz • 3315 - 4035 MHz
IF bandwidth	450 to 840 MHz @ 1 dB (depends on selected output band)
IF Output level	0 to -30 dBm
IF output spurious	< -50 dBc typical ; < -40 dBc max
Phase noise	In L band • 10 Hz -60 dBc/Hz • 100 Hz -90 dBc/Hz • 1 kHz -105 dBc/Hz • 10 kHz -110 dBc/Hz • 100 kHz -120 dBc/Hz • >1 MHz -125 dBc/Hz
Spectrum analyzer	Spectrum Analyzer included
GRAPHICAL USER INTERFACE	
REMOTE CONTROL	
Interface	Ethernet
Protocols	• TCP/IP for remote monitoring and control • HTTP for remote GUI
ENVIRONMENTAL CONDITIONS	
Operating	• Temperature 10 °C to 40 °C • Humidity Up to 95 % at 30 °C
Non Operating	• Temperature -40 °C to 70 °C • Humidity Up to 95 % at 30 °C
POWER LINE	
Voltage	100 to 250 VAC / 47 to 63 Hz
Power	≤ 300 Watts
Weight	20 kg
PRODUCT REFERENCE	
REM 1 Channel	REM 2 Channels / REM 4 Channels

FOR EACH REM ORDER, THE CHOICE OF THE BAND-FILTER MODELS MUST BE PRECISED.
(group of 3 frequency band filters / channels)

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