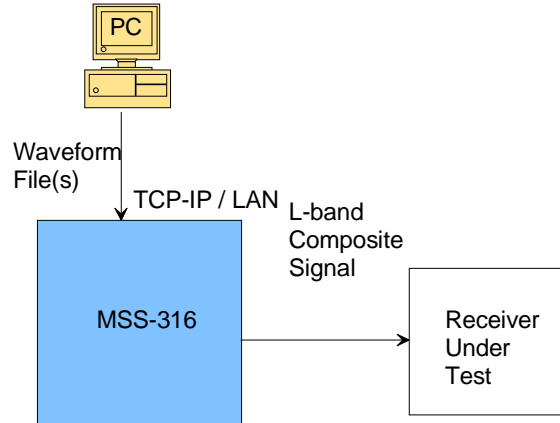
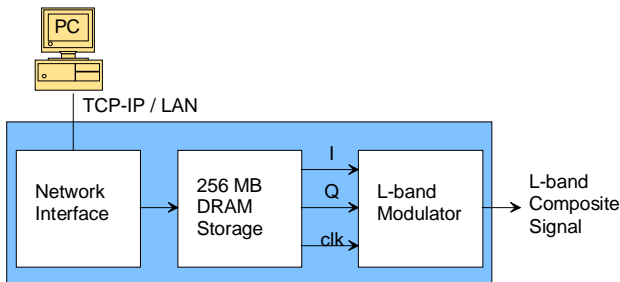


MSS-316 L-BAND SATELLITE SIGNAL GENERATOR

Key Features

- L-band satellite signal generator.
- Plays back stored baseband waveform, for reproduceable test results.
- Single mode or continuous repetitive mode selection.
- Composite waveform includes
 - Real weather information
 - Turbo-code encoding
 - QPSK modulation
 - Doppler
 - Additive white gaussian noise
 - Satellite beacon.
- Waveform duration (single play): 5 minutes.
- Typical waveform bandwidth: 200 KHz.
- Accurate waveform representation as two 10-bit precision digital samples.
- Output signal level: -5 dBm.
- Time to upload the waveform file at power up:
- Includes graphical user interface to upload the waveform file and to playback.
- Deliverable: Matlab programs for precise generation of waveforms.
- 19" rack mount, 1.75" height.
- Universal AC power supply.

Block Diagram



Electrical Interface

Inputs / Outputs

Analog Signals	Definition
RF_OUT	1500 - 1740 MHz. SMA male connector. 50 Ohm impedance. Nominal output level: -5 dBm.
EXT_REF_CLK	External 10 MHz frequency reference for frequency synthesis. Square-wave generally yields better phase noise. Sinewave and clipped sinewave are also acceptable inputs. Minimum level 0.5Vpp. Maximum level: 3.3Vpp. SMA connector.
Serial Monitoring & Control	DB9 connector. 115 Kbaud/s. 8-bit, no parity, one stop bit. No flow control.

Baseband

The primary baseband interface is the LAN, which is used for both data transfer and monitoring and control.

Operations

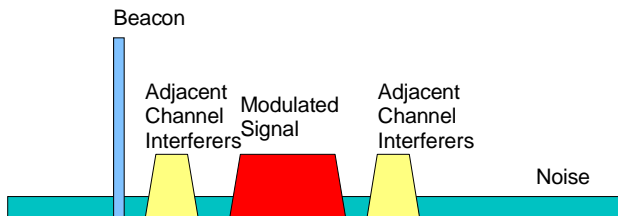
Waveform File Generation

A baseline waveform file is provided with the equipment. This waveform file includes 5 minutes of weather information, including turbo code error correction encoding, differential QPSK modulation, additive white gaussian noise and a satellite beacon. This file will be played repetitively while testing receivers.

In addition to the baseline waveform file, the tools are provided for generating other waveform files with different parameters. A MATLAB program is supplied. This program allows one to accurately set the following parameters:

- the noise level
- the modulated data rate
- the beacon level
- the beacon frequency
- the modulated signal level
- the modulated signal frequency.

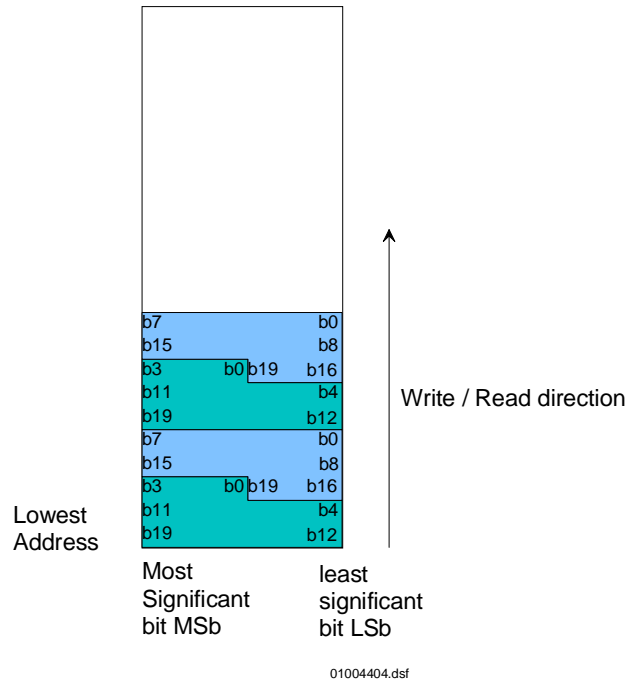
In order to limit the upload time to a practical value, the maximum composite signal bandwidth is 200 KHz.



Output sample width & file format

The waveform file is composed of complex samples, each being represented by a 10-bit unsigned number. 0x000 is the most negative number, while 0x3FF is the most positive number. Zero is in between 0x200 and 0x1FF. It does not have a specific representation.

The issue of packing 10-bit wide samples in a byte-oriented file format must be given some consideration. It is illustrated by the diagram below.



Please be aware that a bit reversal occurs internally: Therefore, in the waveform file, bit b0 is the sample most significant bit.

File Upload

Step 1: Using the Graphical User Interface, open the Pattern Generator Functions window (under the Functions menu). The upper section of the window defines the upload parameters:

- Filename
- File type: binary
- Start upload address: where the first byte will be stored. Must be a multiple of 8.
- Window length: can be explicitly stated in bytes or implicitly specified by the file size.

Step 2: To start the upload, select the “Start Upload” action and press the Apply button. A progress bar shows the percentage of completion.

The data is uploaded at a typical rate of 880 Kbit/s.

ComBlock Control Center

File Operations Functions Help

LAN 10-baseT Interface

Arbitrary Waveform Generator

Pattern Generator Functions

Upload File	esktop\modulator_data.bin	...
Upload File Format	Binary file	▼
Start Upload Address	0	Dec ▼
Upload Window Length Option	Specified	▼
Upload Window Length	1000000	Dec ▼
Start Download Address	0	Hex ▼
Download Window Length	FFFFFFE0	Hex ▼
Output Flow	Data Pushed	▼
Download Speed	15	Dec ▼
Output Pinout Option	COM-4004 ComBlock	▼
Output Width Option	2	▼
Clock	Internal	▼
Action	Start Upload	▼

Ok Apply Cancel

Download

Step 1: Using the Graphical User Interface, configure the download parameters:

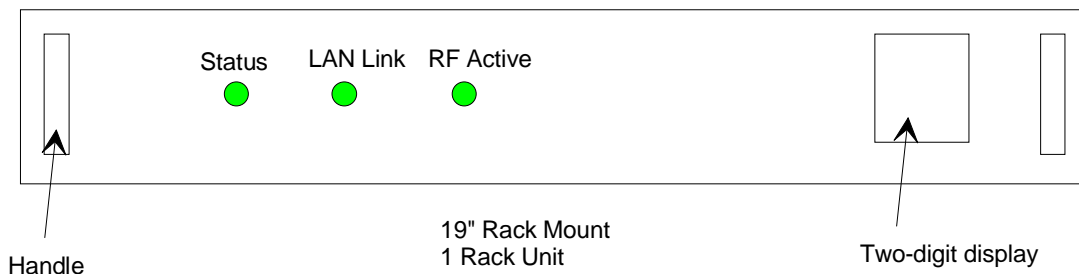
- The data to be downloaded can be segmented into distinct windows. A window can be the entire SDRAM memory or a fraction thereof. The download window is defined by its start address and a window length.
- Flow control: the download clock can be controlled by an internal numerical oscillator (data is “pushed out”), or by an external clock `SAMPLE_CLK_REQ_IN` which typically originates from the module to which data is sent (data is “pulled out”).

- The width of the output samples is selectable among 1,2,8,14,16,20 bit.
- A variety of output interfaces are also supported, as defined in the Pinout section below.

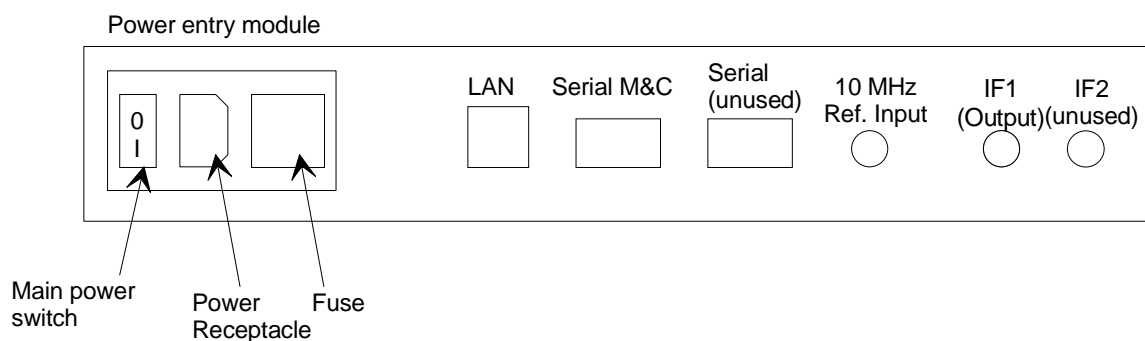
Step 2: Using the Graphical User Interface, start the download mode by selecting single run or continuous run. Press the Apply button.

Whenever the download starts or rewinds, a pulse will be generated on the `TRIGGER_OUT` output pin.

Front / Back Panels



Front Panel



Back Panel

Front-Panel LEDs

LEDs (3 total):	Status/Power RF Active LAN activity
dual seven segment display	configuration and error codes

External Frequency Reference

In order to precisely set the RF center frequency, an external 10 MHz frequency reference must be provided.

This signal is typically available at the back of spectrum analyzers.

Performance

Phase Noise

Phase noise:

- <-50 dBc @ 100 Hz
- <-65 dBc @ 1 KHz
- <-82 dBc @ 10 KHz
- <-110 dBc @ 100 KHz

Output level accuracy:

+/- 0.2 dB

Power Supply

AC: Universal power supply.

90 – 264 VAC, 47-63 Hz single phase, automatic selection.

Power consumption: < 20W.

Mechanical

19" rack mount.

Width : 17.80"

Depth : 14"

Height: 1.74"

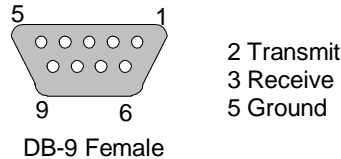
Color: black

Weight: 12 lbs.

Pinout

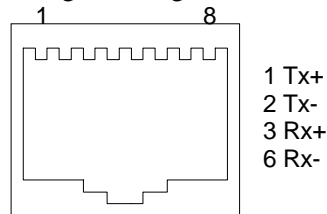
Serial Link

The DB-9 connector is wired as data circuit terminating equipment (DCE). Connection to a PC is over a straight-through cable. No null modem or gender changer is required.



LAN Connector

The RJ-45 Jack is wired as a standard PC network interface card. Connection to a LAN Hub is over a straight-through cable.



RJ-45 Jack

Ordering Information

MSS-316 L-band Satellite Signal Generator

MSS • 18221 Flower Hill Way #A •
Gaithersburg, Maryland 20879 • U.S.A.
Telephone: (240) 631-1111
Facsimile: (240) 631-1676
E-mail: sales@mobile-sat.com