NOVELSAT

XEMULATOR SATELLITE EMULATOR RF CHAMBER

For Lab Testing and SATCOM Validation

PRODUCT SHEET

XEMULATOR SATELLITE TRANSPONDER RF CHAMBER

The Xemulator satellite emulator RF Chamber is a compact Faraday cage, designed to support R&D and production testing of microwave and satellite communication systems. The RF Chamber enables rapid equipment setup, repeatable test conditions, and consistent comparison against reference units, making it ideal for product validation, manufacturing tests, and system integration.

The Xemulator RF Chamber supports the following frequency bands:

- Microwave bands: 6-12 GHz
- Satellite bands: 10.7-14.5 GHz and 17.2-30 GHz

SYSTEM DESCRIPTION

The RF Chamber solution consists of two main elements:

- RF Chamber (Faraday Cage)
- Xemulator satellite transponder emulator (up/down converter unit)

XEMULATOR SATELLITE TRANSPONDER

The Xemulator is the core RF element of the solution. It emulates satellite transponder functionality by interfacing with the ground equipment at L-band while transmitting and receiving signals at satellite frequencies toward the device under test (DUT).

Figure 1 shows the Xemulator mounted on the RF Chamber. The unit interfaces with external equipment through L-band and Ethernet connections while providing over-the-air satellite-frequency transmission within the chamber.

Figure 2 shows the outdoor Xemulator unit.

Figure 1: Xemulator mounted on RF chamber

Figure2: Xemulator outdoor unit

The Xemulator is equipped with an integrated feed horn providing approximately ±30° coverage inside the chamber, enabling reliable communication with a wide range of terminal antenna configurations.

HIGHLIGHTS

- End-to-end RF test environment
- Integrated satellite link emulation (Xemulator)
- 6–30 GHz microwave & SATCOM coverage
- High-isolation Faraday cage design
- Repeatable R&D & production testing
- Rapid DUT setup & validation
- Compact laboratory footprint

The Xemulator can be connected to a modem, signal generator, or other ground segment equipment to emulate the signals normally received from a satellite. This allows comprehensive testing of terminals and RF subsystems under controlled laboratory conditions.

In addition to frequency conversion between L-band and satellite frequencies, the Xemulator incorporates integrated DVB-S modulation and DVB-S/S2 demodulation capabilities, enabling complete end-to-end link emulation.

The internal architecture of the Xemulator is illustrated in Figure 3.

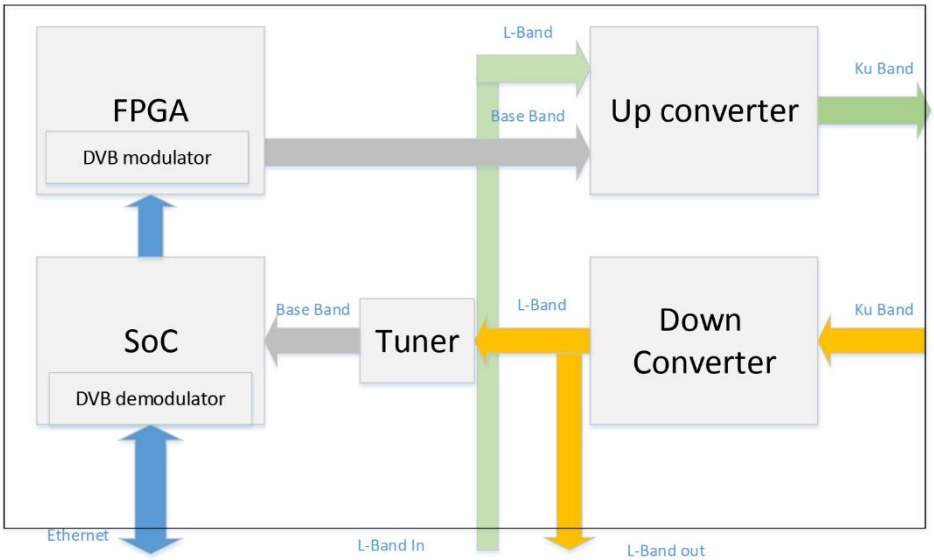

Figure 3: Xemulator internal functional block diagram (Ku-band example)

The integrated architecture combines frequency conversion, modulation, demodulation, monitoring, and control functions within a single platform, simplifying laboratory test setups while providing realistic satellite link emulation.

RF CHAMBER

The RF Chamber is a wall-mounted Faraday cage designed to provide a controlled RF environment for over-the-air testing.

The chamber includes two dedicated mounting locations:

- DUT Port – for the device under test
- Xemulator Port – for the Xemulator unit

Figure 4 shows the Xemulator integrated with the RF Chamber.

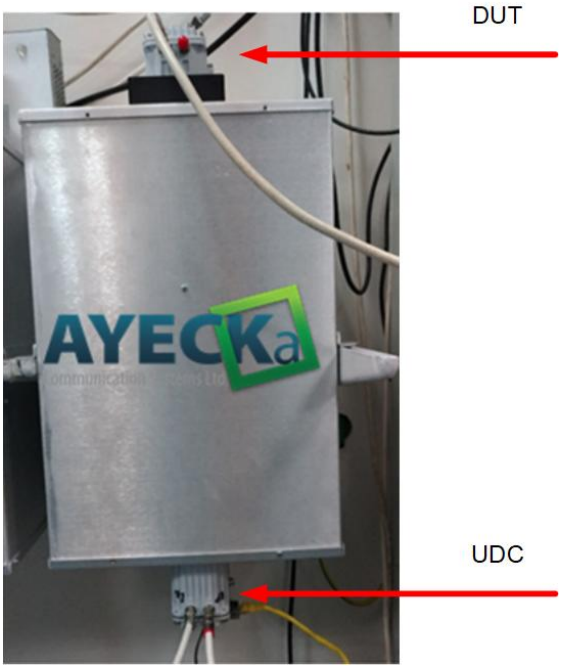

Figure 4: Xemulator Coupled with RF Chamber

The chamber is designed to minimize unwanted reflections and external interference while enabling simple and repeatable DUT positioning. The DUT is mounted at the top of the chamber, while the Xemulator is installed at the bottom. The Xemulator connects to external test equipment through its L-band interfaces, generating the required RF signals for transmission to the DUT and receiving signals transmitted by the DUT.

TYPICAL TEST CONFIGURATION

A complete laboratory test setup using the RF Chamber and signal-processing equipment is shown in Figure 5.

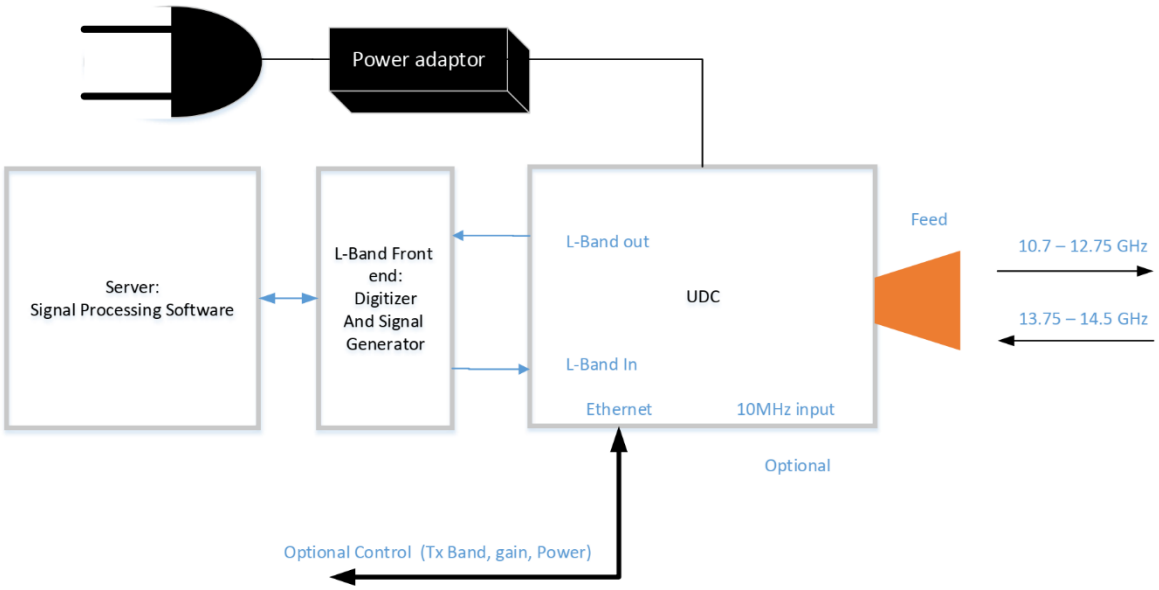

Figure 5: RF Chamber with Signal Processing System

In this configuration, the signal processing equipment generates and analyzes the test waveforms while the Xemulator performs satellite-frequency conversion and over-the-air transmission within the chamber. This arrangement provides a realistic and repeatable environment for development, validation, and production testing of satellite communication equipment.

XEMULATOR SATELLITE EMNULATOR RF CHAMBER – SPECIFICATIONS

PHYSICAL

Dimensions (L x W x H):
30 x 30 x 45 cm

Installation:
Wall-mounted

DUT Port Diameter:
7 cm

RF CHARACTERISTICS

Frequency Range:
6 GHz to 30 GHz

Isolation:
≥ 60 dB

Maximum DUT Power:
1 W

APPLICATION

DUT Types:
Microwave and SATCOM terminals

Test Environment:
Shielded OTA laboratory testing