RF Proximity Sensor Test System

Production test system for FMCW RF proximity sensors

The RF proximity sensor test system checks FMCW RF proximity sensors operating in different frequency bands after series production, with range to target as the primary measurement. It combines two integrated units. The anechoic test cabinet shields the sensor from outside interference and absorbs reflections, so that the sensor under test sees only the simulated target; it sits on a desk or on a wheeled stand. The echo simulator receives the sensor's transmission through horn antennas inside the cabinet and returns a target signal with the range delay and reflected power defined by the operator, in real time. Test parameters are entered on a laptop connected to the simulator over Ethernet, and a control interface is provided for automatic production testing.

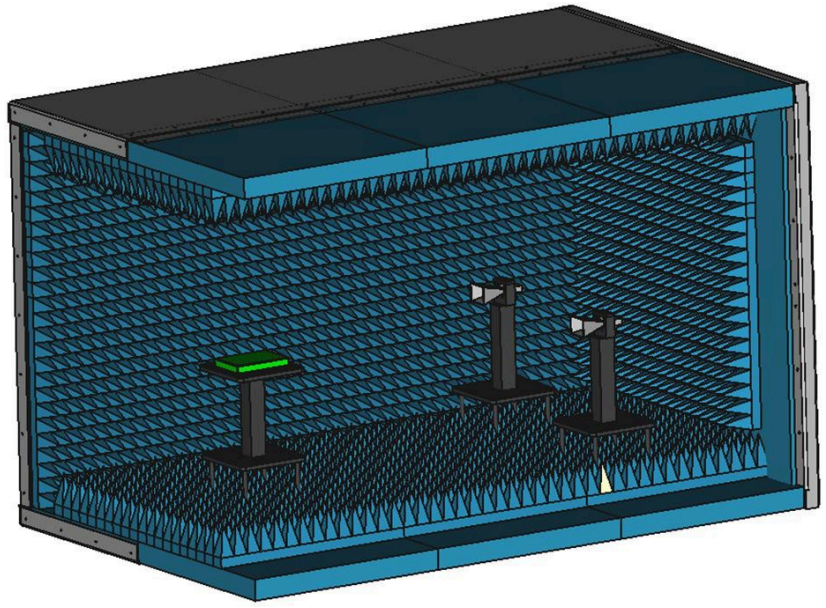


Figure 1. Model of the anechoic test cabinet with the sensor holder and the receive and transmit horn antennas

AT A GLANCE

SIMULATOR FREQUENCY RANGE
6 GHz – 18 GHz (X and Ku band)

SIMULATED RANGE
2 m – 20 m

RANGE RESOLUTION
≤ 0.5 m

INSTANTANEOUS BANDWIDTH
500 MHz

FMCW SWEEP
Up to 500 MHz, chirp period ≥ 1 µs

APPLICATIONS

- End-of-line verification of RF proximity sensors in series production
- Range and functional checks of FMCW sensors in X and Ku band

Key Features

- Real-time range simulation
- FMCW sensor signals in X and Ku band
- Shielded anechoic cabinet
- Built for series production

Capabilities

Real-time range simulation

The echo simulator returns the sensor's signal with the delay of a target from 2 m to 20 m at 0.5 m resolution or better, and with the calculated reflected power. Output level runs from 0 to −50 dBm, and an attenuation stage matches the input to the incoming signal.

FMCW sensor signals in X and Ku band

The simulator works from 6 to 18 GHz with 500 MHz instantaneous bandwidth. It handles sawtooth up, sawtooth down, triangular up/down and triangular down/up FMCW signals with sweeps up to 500 MHz and chirp periods from 1 µs.

Shielded anechoic cabinet

An aluminium cabinet of at most 150 × 100 × 100 cm with RF/EMI gaskets gives at least 70 dB shielding from 6 to 10 GHz and 60 dB from 10 to 18 GHz. Polypropylene pyramid absorbers with −40 dB reflectivity line the inside. The cabinet accepts sensors transmitting up to 40 dBm (10 W).

Built for series production

An IP65-sealed, EMI-shielded door and side access panels with D-sub and 18 GHz SMA feedthroughs give quick access to the sensor. Interchangeable holders and adapters fit different sensor models, and the control interface connects the station to automatic production test software.

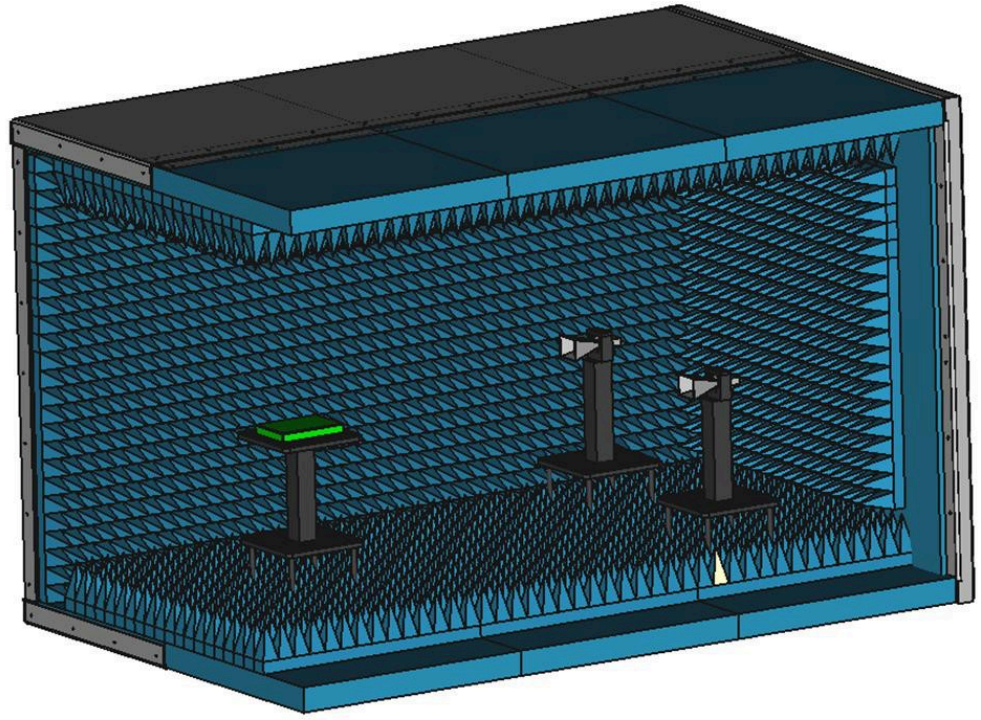


Figure 2. Anechoic test cabinet with the sensor holder and separate receive and transmit horn antennas

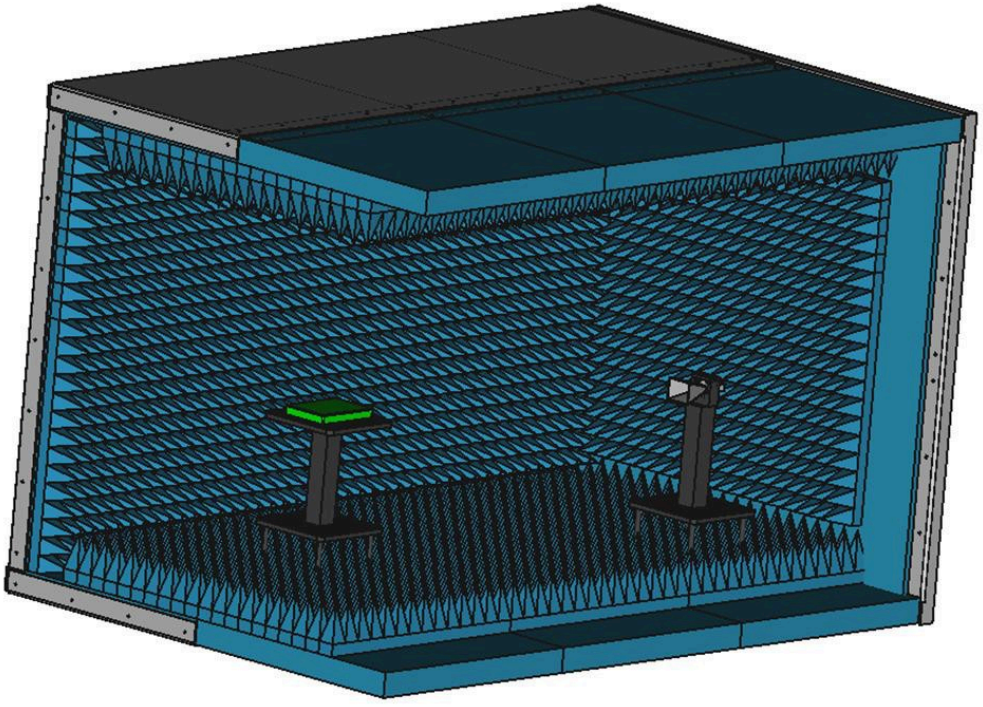


Figure 3. Cabinet interior from another angle, with the sensor holder and horn antenna mount

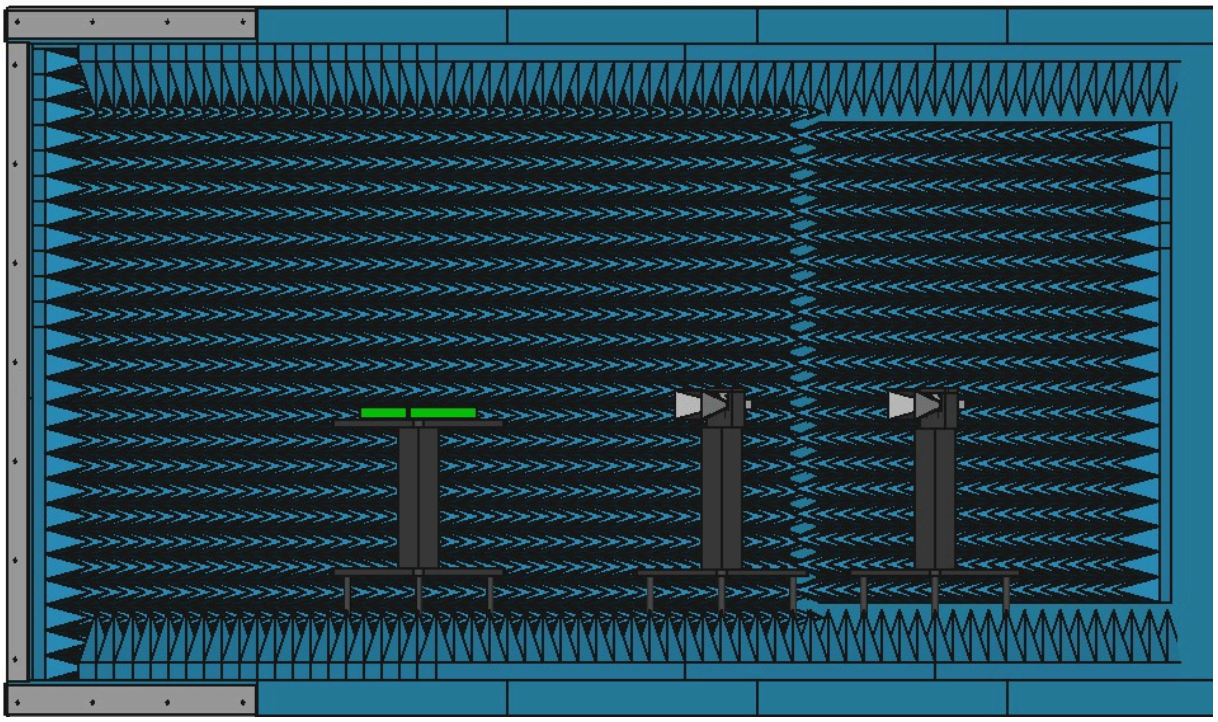


Figure 4. Side section of the cabinet: sensor holder, antenna mounts and pyramid absorbers

Specifications

General	
Simulator frequency range	6 GHz – 18 GHz (X and Ku band)
Simulated range	2 m – 20 m
Range resolution	≤ 0.5 m
Instantaneous bandwidth	500 MHz
FMCW sweep	Up to 500 MHz, chirp period ≥ 1 µs
Simulator output level	0 dBm to −50 dBm
Operational input level	−35 dBm to 0 dBm
Cabinet shielding	≥ 70 dB (6–10 GHz), ≥ 60 dB (10–18 GHz)
Absorber reflectivity	−40 dB (6–18 GHz)
Maximum sensor output power	40 dBm (10 W)
Horn antennas	2 × 6–18 GHz, ≥ 9 dBi, linear polarisation
Cabinet outer dimensions	≤ 150 × 100 × 100 cm

Warranty

All hardware and software procured from Zeta is under warranty against manufacturing or design failures for 2 years. Customer-specific warranty terms may be arranged.

Disclaimer

Due to ongoing research and development, Zeta reserves the right to change product specifications without notice.

About Zeta

Zeta Defence develops electronic intelligence (ELINT) and communication intelligence (COMINT) equipment and radar / electronic warfare simulators. Its capabilities include RF transceiver system design, digital design and large-scale software development.

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