

TELERAD

Aeronautical and Maritime Radiocommunication Systems

**V/UHF SOFTWARE
DEFINED
TRANSCEIVER**

TRX9020-2G



- 50W RF output power in VHF and UHF
- Low power consumption
- High reliability
- Outstanding ACP performance
- Built-in-test
- Outstanding sensitivity and cositing, performance

OVERVIEW

The TELERAD V/UHF VoIP TRX9020-2G transceiver is specifically designed to meet the operational requirements of military traffic control centers. Fully scalable and with growth capacity, it features high reliability, and remote control and maintenance capability.

MAIN FEATURES

- Multimode functionality in one Software Defined Radio
- VHF: AM, FM (F3E, G3E), ACARS, upgradable VDL Mode 2
- UHF: A3E, F3E
- Wide band 118-144 MHz, 225-400 MHz with option to extend to 108-174 MHz
- 5 to 50 W RF Output Power
- Remote control and maintenance capability, Built-in test
- SNMP, JBUS, TELNET, WEBSERVER
- VoIP conform to EUROCAE ED-137
- 4 Ethernet ports for redundancy (service separation, aggregation...)
- Unique passive cooling
- Motorized V/UHF external cavity management
- Main/Standby management

GENERAL DATA

Frequency range:

VHF: 118-144MHz (108-174MHz as option in FM)
 UHF: 225-400MHz

Frequency stability:

≤ 0.3 ppm

Channel spacing:

V/UHF: 25kHz, 8.33kHz
 UHF: 12.5kHz

Memorized channels:

99 memorized presets channels with frequency parameters, bandwidth, offset carrier, output power level, squelch threshold level

Modulation:

- V/UHF: A3E/F3E/G3E (voice)
- VHF: G3E (voice)
- VHF: AM-MSK 2400 bits/s (ACARS), D8PSK 31500 bits/s (VDL2)

Data interface:

RS485 up to 115.2 Kbps

Maintenance:

- Local (USB) or remote (Ethernet or RS485)
- Maintenance: Built-in test, software loading
- Setup functions: frequency, operation, parameters
- Measurements: Tx output power, VSWR, DC voltage, Rx AGC voltage, ...

Temperature:

- Operating: -20 °C to +55 °C
- Relative humidity: 95 % at +40 °C (non-condensing)
- Storage: -40 °C to +80 °C

Power supply:

- TRX9020A-2G version:
 - ◇ AC : 85-265 V, 50-60 Hz
 - ◇ DC : 24 V_{DC} (21-31 V_{DC})
 - ◇ Automatic switching from AC to DC input
- TRX9020C-2G:
 - ◇ DC : 24 V_{DC} (21-31 V_{DC})

Mechanical characteristics:

- Width: 483 mm
- Overall depth: 550 mm
- Height: 132 mm, 3 U
- Weight: < 14 kg

Power consumption (50 W AM - 1 kHz 80 %):

- 28V_{DC}: 14 A (Typ.)
- 230V_{AC}: 2.2 A (Typ.)
- 115 V_{AC}: 3.9 A (typ.)

IP technology:

- VoIP (according to ED-137-5)
- SNMP V1, V2c, V3 (according to ED-137-4)
- 4 Gigabit Ethernet (Gbe) ports IPv4, IPv6

Standards:

- ICAO SARPS
- ETSI EN 302 617: AM
- ETSI EN 301 489 (-1/-22)
- EUROCAE ED-137: VoIP

TRANSMISSION CHARACTERISTICS

Carrier Offset (ICAO Annex 10):

VHF: 25 kHz channels: up to 5 carriers, 8.33 kHz: 2 carriers only
 UHF: 25 kHz channels: up to 4 carriers

RF output power:

5-50 W in 0.5 dB steps

VSWR:

Up to a VSWR of 2:1 without power reduction

Protections:

Power reduction on overheating, low voltage and high VSWR

Duty cycle:

100 % (with external fan)

A3E modulation:

- Modulation rate > 85 %
- Threshold < 3 % (m = 85 %)
- Audio input adjustable from -30 to 0 dBm (max. +10 dBm)
- Audio input impedance 600 Ω
- AFC AGC regulation < 0.5 dB for +30 dB
- Audio bandwidth at 25 kHz channel spacing: > -3 dB 300-3400 Hz, < -40 dB @ 5000 Hz
- Audio bandwidth at 12.5 kHz channel spacing: > -3 dB 300-2500 Hz, < -40 dB @ 3200 Hz
- Audio bandwidth at 8.33 kHz channel spacing: > -3 dB 300-2500 Hz, < -40 dB @ 3200 Hz

Tx Time Out:

Adjustable from 5 to 300 s in 5 s steps (can be disabled)

Spectral purity:

- VHF harmonics <-36dBm (<-83 dBc)
- UHF harmonics <-33dBm (<-80 dBc)
- VHF spurious <-54dBm (<-101 dBc)
- UHF spurious <-33dBm (<-80 dBc)
- Noise at 1 % of the carrier < -150 dBc/Hz

Adjacent channel power (ACP):

AM 8.33 and 25 kHz < -70 dBc

RECEPTION CHARACTERISTICS

Sensitivity:

A3E: < -105 dBm (SINAD 12 dB, 1 kHz 30 %)

Distortion (1 kHz, 90%):

≤ 5%

AF Bandwidth (A3E):

- 25 kHz channel spacing: > 300-3400 Hz
- 12.5kHz and 8.33 kHz channel spacing: > 300-2500 Hz

AF Noise (-13 dBm, 1 kHz, 90 %):

> 50 dB

Effective Bandwidth at 6 dB:

- 25 kHz channel spacing: > ± 8.5 kHz
- 12.5 kHz channel spacing: > ± 8.5 kHz

Adjacent channel rejection:

VHF: ≥ 70 dB / UHF: ≥ 60 dB

Spurious rejection:

≥ 70 dB

3rd order Intermodulation (SINAD 12 dB, 100 and 200 kHz)

≥ 80 dB

Desensitization:

≥ 100 dB

Cross Modulation:

≥ 85 dB

AGC Response (A3E voice):

- Dynamic range: 100 dB (Variation ≤ 3 dB)
- Attack time: ≤ 20 ms
- Release time: ≤ 25 ms

Audio Line Output:

Adjustable from -11 to +10 dBm in 0.5 dB step
 Impedance: 600 Ω

Squelch:

- Attenuation: > 60 dB
- Type: Carrier detection or Signal/Noise ratio