

**TELERAD**

Aeronautical and Maritime Radiocommunication Systems

**VHF SOFTWARE  
DEFINED RADIOS**

**EM9000-2G | RE9000-2G**



**EM9000-2G TRANSMITTER**

- 50 W RF output power
- Low power consumption
- High reliability
- Outstanding ACP performance
- Built-in-test

**RE9000-2G RECEIVER**

- Outstanding sensitivity and cositing, performance
- High reliability
- Built-in-test



**OVERVIEW**

The TELERAD Series 9000-2G radio systems are specifically designed to meet the operational requirements of air traffic control centers, commercial airports, and range installations. Fully scalable and with growth capacity, they feature high reliability, and remote control and maintenance capability.

**MAIN FEATURES**

- Multimode functionality in one Software Defined Radio
- AM, FM, ACARS, upgradable VDL Mode 2 (Provisions for Mode 3 and Mode 4)
- Wide band 118-144 MHz, with option to extend to 108-156 MHz; 156-163 MHz (FM)
- 2 to 50 W RF Output Power
- Remote control and maintenance capability, Built-in test
- SNMP, JBUS
- VoIP conform to EUROCAE ED-137
- 2 Ethernet ports for redundancy

**GENERAL DATA**

**Frequency range:**

- AM: 118-144 MHz, (108-156 MHz as option)
- FM: 156-163 MHz
- VDL2: 118-136.975 MHz

**Frequency stability:**

≤ 0.3 ppm

**Channel spacing:**

25 kHz, 8.33 kHz

**Modulation:**

- A3E / F3E / G3E (voice)
- AM-MSK 2400 bits/s (ACARS)
- D8PSK 31500 bits/s (VDL2)

**Data interface:**

RS485 up to 115.2 Kbps

**Maintenance:**

- Local (RS232) or remote (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:**

- EM9000A-2G and RE9000A-2G versions:
  - AC : 85-265 V, 50-60 Hz
  - DC : 24 V<sub>DC</sub> (21-31 V<sub>DC</sub>)
  - Automatic switching from AC to DC input
- EM9000C-2G and RE9000C-2G versions:
  - DC : 24 V<sub>DC</sub> (21-31 V<sub>DC</sub>)

**IP technology:**

- VoIP (according to ED-137-1)
- SNMP V1, V2c, V3 (according to ED-137-4)
- 2 Ethernet ports IPv4, IPv6

**Standards:**

- ICAO SARPS
- ETSI EN 300 676: AM
- ETSI EN 301 841 - 1: VDL2
- ETSI EN 301 489 (-1/-22)
- EUROCAE ED-137: VoIP

**EM9000-2G TRANSMITTER**

**Mechanical characteristics:**

- Width: 483 mm
- Overall depth: 430 mm
- Height: 132 mm, 3 U
- Weight: < 14 kg

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

- 24 V<sub>DC</sub>: 14 A (Typ.)
- 230 V<sub>AC</sub>: 2.2 A (Typ.)
- 115 V<sub>AC</sub>: 3.9 A (typ.)

**Carrier Offset (ICAO Annex 10):**

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

**RF output power:**

2-50 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 8.33 kHz channel spacing: > -3 dB 300-2500 Hz, < -40 dB @ 3200 Hz

**Data Mode:**

ACARS: > -3 dB 200-3400 Hz

**Tx Time Out:**

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

**Spectral purity:**

- Harmonics: < -36 dBm (< -83 dBc)
- Spurious: < -54 dBm (< -101 dBc)
- Noise at 1 % of the carrier: < -150 dBc/Hz

**Adjacent channel power (ACP):**

- AM 8.33 and 25 kHz: < -70 dBc
- D8PSK:
  - 1<sup>st</sup> channel: < -18 dBm (16 kHz)
  - 2<sup>nd</sup> channel: < -28 dBm (25 kHz)
  - 4<sup>th</sup> channel: < -38 dBm (25 kHz)

**RE9000-2G RECEIVER**

**Mechanical characteristics:**

- Width: 483 mm
- Overall depth: 430 mm
- Height: 44.5 mm, 1 U
- Weight: < 4 kg

**Power consumption (receiving):**

- 24 V<sub>DC</sub>: 500 mA (Typ.)
- 230 V<sub>AC</sub>: 180 mA (Typ.)
- 115 V<sub>AC</sub>: 270 mA (Typ.)

**Sensitivity:**

- A3E: ≤ -105 dBm (SINAD 12 dB, 1 kHz 30 %)
- ACARS: -102 dBm (> 99% of messages)
- VDL2: -98 dBm (BER < 10<sup>-3</sup> w/o FEC)

**Distortion (1 kHz, 90 %):**

≤ 5%

**AF Bandwidth (A3E):**

- 25 kHz channel spacing: ≥ 300-3400 Hz
- 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
- 8.33 kHz channel spacing: > ± 2.8 kHz

**Adjacent channel rejection:**

≥ 70 dB

**Spurious rejection:**

≥ 70 dB

**3<sup>rd</sup> order Intermodulation (SINAD 12 dB, 100 and 200 kHz)**

≥ 80 dB

**Desensitizing:**

≥ 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