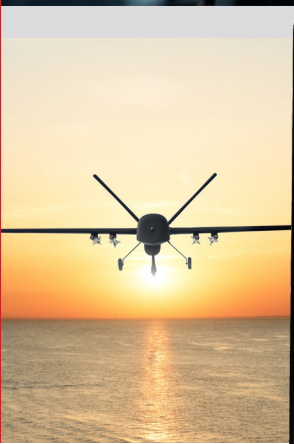




ML-9600X™ /

1.5–30 MHz 100W MODERNIZED
HF WIDEBAND TRANSCEIVER



ML-9600X™

WIDEBAND HF TRANSCEIVER



WIDEBAND HF - MODERNIZED FOR ULTIMATE BLOS PERFORMANCE

FlexRadio's ML-9600X wideband Software Defined Radios deliver uncompromising performance for commercial, government, and defense HF applications. Designed as a Commercial-Off-The-Shelf (COTS) platform, the ML-9600X combines ultra-low phase noise performance with advanced digital signal processing to enable next-generation communications, surveillance, and electronic warfare capabilities.

With up to 78 kHz transmit and 1.2 MHz receive bandwidth, the ML-9600X easily supports modernized HF waveforms and high-speed data operations.

The integrated modem natively supports a broad range of NATO and MIL-STD waveforms, including:

2G/3G/4G ALE, MIL-STD-188-110D, MIL-STD-188-141D, STANAG 4285, 4415, 4529, 4538, 4539, and 5069.

IP-based Ethernet communications provide flexible control options—operate locally via the included Windows application or remotely through the open SmartSDR™ API. Developers can rapidly integrate and control the radio using plain-language commands and standard VITA-49 streaming interfaces for RF/IF and FFT data.

For rapid prototyping and research, the optional GNU Radio source/sink interface supports multiple operating systems, enabling seamless waveform development and test. An optional embedded quad-core CPU allows execution of custom waveforms directly on the radio.

The ML-9600X also includes dual +10 dBm exciter outputs for driving external amplifiers and diversity receivers. When paired with FlexRadio's COTS high-power modular amplifiers, such as the FPA-5K or FPA-10K, the system scales effortlessly to power levels up to 40 kW.

For more information, contact commercial@flexradio.com

FEATURES

- 1.5 to 30 MHz
- Two Low Power +10dBm Exciter Outputs and two 100W Transmit Outputs
- Broad Range of NATO and MIL-STD Waveforms
- 2G/3G/4G ALE
- Full Featured Open Waveform and Open Control API
- Up to 78kHz Available Transceiver Bandwidth
- Up to 1.2 MHz Receiver Bandwidth
- Ethernet Communication
- GNU Radio Source/Link Compatible
- Up to Four Independent Narrowband (20kHz) Receivers
- Up to Four 14 MHz Real Time Spectrum Displays
- Ultra-Low Phase Noise RX/TX
- Diversity Reception
- Simplex and Full Duplex Receive Capable
- Integrated GPSDO for Precision Time/Location
- Optional Precision Time Stamping Enables Wide Range of Applications including DF, TDOA, Beam Steering and More
- Optional Separate 4-Core CPU for Customer Waveforms

PRELIMINARY SPECIFICATIONS

| RECEIVER | |
|---|---|
| Independent Band/Mode Receivers (Max) | 4 |
| ADC Spectral Capture Channels | 2 |
| Simultaneous Receive Antenna Inputs | 2 |
| Diversity Reception | Standard |
| Full Duplex Receive | Standard |
| Frequency Coverage | 100kHz - 80MHz |
| Noise Figure (Max Gain) | 6dB |
| Streaming Channels | 4 @ 24–96 ksps / 4 I/Q @ 0.024-1.536Msps (Standard) |
| Receiver Phase Noise | <-145 dBc/Hz @ 20 kHz |
| Ultimate IF Filter Rejection | 115 dB |
| Line Audio Output | -10 dBV Unbalanced |
| SPECTRUM/WATERFALL DISPLAY | |
| Spectrum/Waterfall Displays (Min/Max) | 4 |
| Spectrum/Waterfall Bandwidth (Min/Max) | 1.2 kHz–14 MHz |
| Spectrum Sensitivity (Max Gain) | > -152 dBm |
| Spectrum Resolution Bandwidth (Min) | 1.5 Hz |
| WAVEFORMS AND PROTOCOLS | |
| Automatic Link Establishment (ALE) | 2G / 3G / 4G* |
| MIL-STD-188-110D | Standard* |
| MIL-STD-188-141D | Standard* |
| STANAG 4285, 4415, 4529, 4538, 4539, 5069 | Standard* |
| TRANSMITTER | |
| High Power Output (2 ports) | 1–100W PEP/CW (50 Ohms) |
| Integrated Antenna Tuner Range | 3:1 VSWR (100 Watts) |
| Exciter Output (2 ports) | 0 – +10dBm (50 Ohms) |
| Frequency Coverage | 1.5 – 29.999999 MHz, 30.0 – 54.0 MHz (reduced specifications) |
| Analog Waveform Channel Bandwidth | 20 kHz (Max, for waveforms supplied as line-level audio) |
| Maximum Transmit Bandwidth | 48 kHz (110D), 78 kHz (VITA-49) |
| Balanced Audio Input | 600 Ohm |
| Mic Level Audio Input | 600 Ohm Pseudo Balanced with Bias Option |
| 3rd Order IMD Products (100 Watt PEP) | -36 dBc Below Equal Tones |
| 3rd Order IMD Products (+10 dBm PEP) | -40 dBc Below Equal Tones |
| Duty Cycle | 100% (+10dBm Exciter), ICAS (100W PEP Power Amplifier) |
| GENERAL | |
| Tuning Resolution | 1 Hz |
| Integrated GPSDO Frequency Stability | 5 x 10 ⁻¹² Over 24 Hours |
| Frequency Stability (GPSDO disabled/denied) | 0.5 ppm (0-50C) |
| External 10 MHz Reference Input | Standard |
| External Up/Down Converter IF Control Display Range | 0-999 GHz |
| Certifications | FCC Part 87 & 90, CE, NTIA Compliant, DD-1494 & JF/12 available |
| Native Modes | USB, LSB, CW, Digital, AM, FM, SAM, FreeDV, RADE, AME |
| Integrated Remote Operation / Multi-User Operation | Standard |
| User Client Interface Options | Windows 10 or above, GNU Radio |
| Power Supply Requirements | 25A, 13.8 VDC Nominal +/- 15% @ 100W Output |
| Dimensions | 6.74"H (171.1 cm) x 14"W (35.6cm) x 13.25"D (33.7cm) |
| Control | 1000BASE-T (IEEE 802.3ab) RJ-45 1GB Ethernet with Open API |

*One receiver at a time



FlexRadio

ML-9600X

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