



VHF / UHF / 700-800 MHz / Tri-Band

Handheld and Class A Mobile

Used In the Field Now

XR25 APCO 25 TRANSCEIVER

Complete off-the-shelf hardware design plus protocol stack

Baseband Hardware Side and Crypto Module

Images shown to size.
Dimensions: 50.8 x 110.5 x 14 mm.



Speed your time to market for public safety and other demanding radio communications.

With the Nexus XR25 APCO 25 Transceiver you can build any high-specification P25 radio: its protocol stack supports all features in the P25 standard, its remarkably small form factor makes it suitable for mobiles or portables and it is available in VHF, UHF, 700-800 MHz or Tri-Band variants. The design also includes an optional FIPS 140-2 Crypto Module for NIST-certified secure communications.

Flexible licensing of hardware and software and a range of manufacturing options make the XR25 ideal for small or large manufacturers wishing to swiftly penetrate new markets or consolidate existing markets with minimum risk.

Key Features

- ▶ VHF / UHF / 700-800 MHz / Tri-Band
- ▶ Etherstack P25 Protocol Stack: Trunking, Conventional, Encryption, OTAR, Packet Data
- ▶ Interoperable with Equipment from All Major Manufacturers
- ▶ Analog FM
- ▶ Optional FIPS-140-2 AES / DES Crypto Module
- ▶ Exceptional Specifications: Class A Mobile Grade
- ▶ Single Board, Compact Form Factor and Competitive BOM
- ▶ Advanced Digital IF SDR Architecture
- ▶ 6.25 kHz and P25 Phase II Options

NEXX

Engineered for Performance

Despite its small form-factor the XR25 achieves excellent specifications. At its core is advanced microprocessor and digital IF technology that yields high performance processing for minimum power consumption – maximizing battery life.

Efficient PA design allows the same hardware to be deployed in handheld and mobile configurations without modification.

Support for a full range of peripheral devices is integral to the platform, including internal and external microphone and ear/speaker amplifiers and codecs, a full-screen color LCD display driver, plentiful keypad and switch inputs, multiple serial and USB interfaces, and smart battery support. All interfaces are brought out to a single connector for ease of assembly.

Configuration tools and support packages are also provided to ensure your radio is fielded smoothly and useable for years to come.

Field Proven P25 – All Features and Modes

The XR25 is supplied with Etherstack P25 protocol stack software in a range of licensing options. This modular, testable

software architecture supports SDR-grade reconfigurability and can be customized if needed. Software modules currently available include conventional analog FM (CTCSS and DCS), Conventional and Trunked APCO 25 (including essential advanced features like encryption, OTAR and packet data) and 6.25 kHz or APCO Phase II options. This software is kept up-to-date with the evolving P25 standards, has been CAP tested on client radios and is interoperability tested on a regular basis against equipment from major manufacturers.

NIST Certified Encryption, Ready to Go

The XR25 has been designed from the ground up with NIST certified security in mind and the FIPS 140-2 Crypto Module is provided as a standard option. It contains all the encryption, decryption, key management and key storage capabilities required in an APCO P25 communications platform.

This module is certified to FIPS 140-2 Level 1 for AES encryption and can easily be removed for re-certification without disturbing the host XR25 platform.

FIPS 140-2 Crypto Module



This optional encryption module is NIST FIPS 140-2 Level 1 certified and connects flush to the board to form an integral component. It implements a standard keyfill device (KFD) interface that the XR25 routes to an external connector and can be rekeyed via P25 OTAR.

Encryption Modes

FIPS 140-2 approved operational modes are AES-256 ECB, AES OFB and AES-256 CBC. Also supported are DES ECB, DES OFB and DES CBC.

Features

- ▶ Dimensions: 28 x 25 mm
- ▶ AES / DES encryption and decryption
- ▶ Over the Air Rekeying (OTAR)
- ▶ Key Fill Device (KFD) and dedicated 3-wire KFD interface
- ▶ TEK, KEK, UKEK and CKEK key management
- ▶ Key storage in secure non-volatile memory
- ▶ Multi-level zeroize of Critical Security Parameters (CSP)
- ▶ HMAC and DSA firmware integrity and load tests
- ▶ Cryptographically sound pseudorandom key generation

U.S.

Common Features For All RF Bands

The XR25 is a single board with an RF transceiver on one side and baseband hardware on the other. The RF transceiver is available in the following RF variants:

XR-25V VHF	136-174 MHz
XR-25U UHF	380-520 MHz
XR-258 700-800 MHz	762-870 MHz
XR-25T Tri-Band	136-174 + 380-520 + 762-870 MHz

All RF variants use the same baseband hardware, mechanical/electrical IO, protocol stack software and optional FIPS 140-2 Crypto Module.

General Platform Features

- ▶ Single board design and competitive BOM,
- ▶ Class A mobile grade specifications,
- ▶ All required RF shields integral to board,
- ▶ Field software upgradeable,
- ▶ Remote Control Interface,
- ▶ -30°C to 70°C operating temperature,
- ▶ 300-400 MIPS ARM CPU with commercial RTOS,
- ▶ 8 MB FLASH, 16-bit access, 70 ns, and
- ▶ 16 MB RAM, 32-bit access, 8 ns cycle time.

Software Features

- ▶ P25 Trunking and P25 Conventional including Encryption, OTAR, Packet Data (SNDCP and SCEP),
- ▶ Analog FM (narrow and wide) with CTCSS & DCS,
- ▶ 6.25 kHz Spectral Efficiency Option,
- ▶ P25 Phase II Option,
- ▶ Programming tools for PC-based configuration, and
- ▶ Production qualification and calibration software.

Dimensions

Width:	50.8 mm (2.000")
Length:	110.5 mm (4.350") Single-Band 152.4 mm (6.000") Tri-Band
Height:	14 mm (0.55") (includes cans and FIPS Crypto Module)

Mechanical and Electrical Interfaces

Power Supply	12 Vnom platform 7.5 Vnom mobile 16 Vmax
RF Connector	50Ω SMC / MMCX / OSMT
Baseband Connector	Hirose FX8-120-SV 120 pin
Audio Output	2 Channel 1 Wmax 8Ω Internal and external ear / speaker outputs
Audio Input	2 Channel Internal and external microphone inputs
Serial	USB (USB 1.1 Device interface) 2 x RS232 (230.4 kbps) RS485 (921.6 kbps)
Keyfill	KVL3000 / KVL3000+ / P25 OTAR
Smart Battery	SMBus (I ² C)
Indicators	6 LED Indicators
Display	640 x 480 VGA color LCD display driver for PDA
Switch	15 switch inputs
Keypad	3 x 6 keypad input

Visit www.nexuswireless.com for further information or email info@nexuswireless.com.

RF Specifications

General

XR-25V VHF

XR-25U UHF

Frequency Range	136-174 MHz	380-520 MHz
Channel Spacing	6.25 / 12.5 / 25 kHz	6.25 / 12.5 / 25 kHz
Frequency Settable Steps	2.5 / 3.125 kHz steps	2.5 / 3.125 kHz steps
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit
Frequency Accuracy	+/- 1.0 ppm	+/- 1.0 ppm

Transmitter

RF Output Power	12 Vnom: 0.1 / 0.5 / 1 / 2 / 5 / 10 W 7.5 Vnom: 0.1 / 0.5 / 1 / 2 / 5 W	0.1 / 0.5 / 1 / 2 / 5 / 8 W
FM Hum and Noise	- 36 / 42 dB (12.5 / 25 kHz)	- 40 / 46 dB (12.5 / 25 kHz)
Emissions	- 65 dBC @ 10 W	- 70 dBC
Audio Distortion	< 3%	< 2%

Receiver

Sensitivity*	-123 / -122 / -121 dBm (12.5 digital / 12.5 / 25 kHz)	-123 / -122 / -121 dBm (12.5 digital / 12.5 / 25 kHz)
Selectivity	- 60 / 60 / 75 / 80 dB (12.5 digital / 12.5 / 25 / 25 above 162 MHz)	- 60 / 70 dB (12.5 / 25 kHz)
Intermodulation Rejection	> 78 dB	> 75 dB
Image Rejection	> 81 dB	> 75 dB
IF Rejection	> 100 dB	> 75 dB
Spurious Response Rejection	> 80 dB	> 75 dB
FM Hum and Noise	44 / 45 dB (12.5 / 25 kHz)	40 / 45 dB (12.5 / 25 kHz)
Audio Output Distortion	< 2%	< 2%

General

XR-258 700-800 MHz

XR-25T Tri-Band

Frequency Range	762-870 MHz Transmit Bandsplits 700 MHz: 764-776 / 773-797 / 803-806 800 MHz: 806-824 / 851-870 Receive Bandsplits 700 MHz: 764-767 / 773-776 800 MHz: 851-870	136-174 + 380-520 + 762-870 MHz
Channel Spacing	6.25 / 12.5 / 25 kHz	6.25 / 12.5 / 25 kHz
Frequency Settable Steps	2.5 / 3.125 kHz steps	2.5 / 3.125 kHz steps
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit
Frequency Accuracy	+/- 1.0 ppm	+/- 1.0 ppm

Transmitter

RF Output Power	0.1 / 0.5 / 1 / 2 / 3 W	0.1 / 0.5 / 1 / 2 / 5 / 10 W (136-174 MHz) 0.1 / 0.5 / 1 / 2 / 5 / 8 W (380-520 MHz) 0.1 / 0.5 / 1 / 2 / 3 W (762-870 MHz)
FM Hum and Noise	- 40 / 45 dB (12.5 / 25 kHz)	- 40 / 45 dB (12.5 / 25 kHz)
Emissions	< 2%	< 2%
Audio Distortion	- 70 dBC	- 70 dBC
Audio Response	+1,-3 dB (EIA)	+1,-3 dB (EIA)

Receiver

Sensitivity*	- 122 / -121 / -120 dBm (12.5 digital / 12.5 / 25 kHz)	- 122 / -121 / -120 dBm (12.5 digital / 12.5 / 25 kHz)
Selectivity	- 60 / 70 dB (12.5 / 25 kHz)	> 60 / 75 dB (12.5 / 25 kHz, 136-174 MHz) > 60 / 70 dB (12.5 / 25 kHz, 380-520 MHz) > 60 / 70 dB (12.5 / 25 kHz, 762-870 MHz)
Intermodulation Rejection	> 75 dB	> 75 dB
Image Rejection	> 75 dB	> 75 dB
IF Rejection	> 75 dB	> 75 dB
Spurious Response Rejection	> 75 dB	> 75 dB
FM Hum and Noise	40 / 48 dB (12.5 / 25 kHz)	40 / 48 dB (12.5 / 25 kHz)
Audio Output Distortion	< 2%	< 2%

* Typical Sensitivity: less than 1% of channels degraded by more than 4 dB from typical.