

X50 Series[®] Software Defined Digital Television Modulator Products

The X50 Series[®] product line was specifically designed to provide a future proof gateway for digital transmission on all of the world digital TV standards. The design emphasis was to create a generic platform using a power PC running an open standard Linux operating system, enabling true flexibility in modulation capabilities, unlike fixed mode/fixed feature firmware and static FPGA based products. Powerful digital signal processing is employed in the design which provides the functionality of incorporating a wide range of dynamics and protocols as a truly robust and flexible product. EMCEE engineers also combined GPS technology with the flexibility of a large scale FPGA to create the world's most versatile and flexible modulation gateway.

Terrestrial Now, M/H Later...Talk About Versatility!

CONFIGURE your new X50 with terrestrial ATSC or DVB and upgrade to M/H later with an easy to install software upgrade. Fully ATSC A.53 and DVB compliant, the very linear output provides a clean drive to excite your transmitter with a precise signal that has very high SNR (MER) and very low EVM. This is accomplished using adaptive linear and non-linear system distortion processing. All functionalities of the X50 are user definable under an easy to use GUI and web control. Superior performance is delivered all the way from the transport stream input to the RF output. No special software is required to run and configure the modulator. It simply requires a standard web browser for complete remote control.

The X50 Design is completely self-calibrating, consequently no manual calibrations or adjustments are needed, either in manufacturing or in field operation.

Embedded Linux OS-The kernel is very stable and can be upgraded on the fly, meaning Field Upgrades are done with a "load new firmware" and "go new firmware" command. This means that all units in a system can be upgraded asynchronously and then told to switch to the new firmware synchronously all over the network in the middle of the night. For modulators and re-modulators, field upgrades can also be fed from the ASI-input. These features are particularly convenient when upgrading to M/H or to SFN network configurations.

The digital adaptive pre-corrector also facilitates easy and optimum installation.

ADD a SiteLock[®] GPS frequency control system to your transmission system to establish 1 Hertz precision frequency control, or for locking a system to a precision offset; or build a multi-site single frequency network (SFN). All system components can be locked to the X50's built in GPS Receiver.

CONTROL your X50 modulator with the embedded remote control system which enables Ethernet or web based IP or SNMP control capability. RS-422 serial style remote control, and parallel interfaces are also supported. Simple and effective, the standard remote control system lets you monitor performance and faults.

Built By Engineers For Engineers!

High Quality GPS Functionality is built in and can be operated by an active or passive antenna; the 1pps and 10MHz can be taken out externally and used by other pieces of equipment at the site. Naturally, the X50 can also operate with external references.

Completely Synchronous design has been used in order to assure that maintenance and fault finding is much more efficient due to the fact that the various functions of the X50 have repeatably predictable power cycle behavior, and also from unit to unit,

Digital Adaptive Pre-Correction is employed as well as a manual configurable pre-correction tool. The linear and the nonlinear pre-corrector are then adaptively set for optimum performance. This saves on network operational costs due to the fact that each transmitter site adaptively compensates for changes in transmitter performance due to temperature, aging, changes in transistor performance. Note that the manual pre-corrector as well as the adaptive pre-corrector separately optimizes upper and lower channel edges separately.

Total Functionality provides for signal generating capabilities such as modulator, re-modulator and gap filler, uses an extremely sharp, linear phase baseband "channel filter" in order to suppress sidebands arising from modulation with the symbol rate. Channel Filters are on the fly loadable, and can be adapted to special customer needs. There are several special features which provide unique control over the signal RMS and peak values. This is important in real world installations where the RF system consists of several channels, and the total signal properties are complex.

Designed Right—Built Right—Priced Right

X50 Series[®] Software Defined Digital Television Modulator Products

Designed for Easy Operation, Control and Monitoring!

Electronic Architecture Includes—

- Available as a stand alone unit or integrated into any of EMCEE's transmitter/translator systems
- A powerful Power PC micro controller running an open source Linux operating system
- A secondary, efficient micro controller guaranteeing "hard-real-time" responsiveness of the software system
- A built-in GPS system which works with both passive and active antennas
- A powerful Digital Signal Processor
- A large Field Programmable Gate Array (FPGA)
- Several up and down converters for conversion to/from IF and RF
- Real time clock for availability of clock and date for use with event log etc.

*TCP/IP Network
& Web Based
Configuration,
Monitoring, &
Control*



*Ultra Linear
Performance*



*Easy Service and Low
Maintenance
Integrated or Stand-Alone
Installation Options for Total
Flexibility*

The X50 features full TCP/IP connectivity as a standard function, as well as SNMP (with several trap destinations), TELNET, SSH etc. This means that full field upgradeability is possible; debugging can be done remotely both through the extensive logs or even by remote creation and local execution of the system debugging processes.

Since the beginning of digital, EMCEE has been innovating DTV designs making your transition to digital broadcasting an easy and affordable task. Whether UHF or VHF, get big budget technology with affordable pricing. Choose **EMCEE** for your next DTV low power transmitter, translator, or exciter.



Designed Right—Built Right—Priced Right

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Software Architecture— A High-Level Flyby!

The X50 Software Design includes:

- Full field-upgradeability with storage for several local firmware images for redundancy/security
- Non-destroyable onboard system bootloader present for Power PC
- Asynchronous load-and boot-on new firmware
- Automatic fall back to previous image in case of boot failure
- TCP/IP protocol with FTP, RDP/UDP, HTTP, NTP
- Several communications protocols supported (SCPI, SSH, XMLrpc, SNMP, HTTP, Syslog)
- A firmware-upgrade, an "image" can contain a complete collection of firm/soft-ware for all programmable devices on the platform, or only parts thereof
- A multilayer access control system with login/password for different access rights and logout control for specific physical network interfaces (e.g. local/remote)
- A flexible alarms system, which separates the event of an alarm arising and the actions to be taking upon the event. This leaves the decision of alarm reactions to the network operator to configure to his particular needs

X-50 Series[®] Modulator— Specifications

General

RF Load Impedance:	50 Ohms, 1.2:1 VSWR over specified TV channel
RF Output Connector:	Type 'N' (Base Chassis Output) Type 'N' or SMA Integrated Option
Frequency Range:	UHF: Any specified UHF TV Channel, 470-806 MHz VHF: Any specified VHF TV Channel, 54-216 MHz
Data Input:	ASI and SMPTE-310M, 19.39 Mbps; or ATSC Off-Air w/De-mod Option
Data Input Connector:	BNC, 75 Ohms
External Lock Input:	10 MHz sinusoid, 0 to +10 dBm, BNC, 50 Ohms, Automatic

Performance

Output Power Stability	± 2% or better
Frequency Stability (Pilot):	± 200 Hz/month ^{2, 8}
Frequency Offsets:	Per FCC requirements
SNR (MER) :	>35dB ³ Phase Noise: ≤-104dBc/Hz @ 20 KHz
Harmonic & Spurious Radiation:	FCC Compliant
Sideband Performance:	FCC Compliant, with output mask filter

Service Conditions

Ambient Temperature Range:	0 to +50°C (+32 to +122°F) ⁴
Ambient Humidity Range:	0 to 95% relative humidity, non-condensing
Altitude:	0-10,000 ft. AMSL ⁵

Physical Dimensions & Weights:⁶

Size:	19.0"W x 22.0"D x 1.75"H
Weight:	up to 12 lbs (EIA Rack Cabinet)

Electrical Requirements:⁹ 100-240V, 1Ø/3Ø, 3 wire, 50-60Hz

Power Factor: 0.98, or better

Power Consumption: 200 Watts Maximum

Notes:

¹ Average power rating is power delivered at output of FCC mask filter (w/1dB Insertion Loss).

² After initial aging of 60 days.

³ Signal to noise ratio (modulation error ratio) measured with HP89441A Vector Signal Analyzer at output of mask filter.

⁴ Derate maximum temperature linearly, from +50° C at sea level by 2 deg C per 1,000 ft., up to 10,000 ft. For operation outside these limits, consult Factory.

⁵ For higher altitude operation, consult Factory.

⁶ All listed weights approximate and will vary depending on configuration, consult Factory.

⁷ For other AC voltages, consult Factory.

⁸ ±2Hz or better with external precision frequency control input.

⁹ Typical Power Consumption, including internal cooling. Configurations will vary dependent on configuration. All values approximate, consult Factory for specifics.

¹⁰ Specifications Subject To Change with Out Notice!

Service and Support

At EMCEE, we have been committed to customer service excellence since 1960. It is our goal to provide the highest level of support by applying one simple rule: Take ownership of helping your customer succeed! Our support team consists of devoted technical experts who support all situations regarding product performance, integration, and operation. We are experts at providing proven solutions, making projects flow smoother, and ensuring the ultimate reliability of your product and system investment. At EMCEE, our dedicated and experienced team stands ready to help you meet your goals for critical product performance, 100% on-air-time, and reduced maintenance costs.

Warranty

Because we want to assure you that EMCEE stands behind its products and systems solutions, our transmission products carry an industry leading two-year warranty, which is competitive with—and in most cases better—than others in the industry.

Service Packages

We offer value-added services that allow you to customize the level of services you need in meeting mission-critical performance levels. Our service package options offer many ways to upgrade your standard warranty by choosing the EMCEE Warranty^{PLUS} Plan, or by selecting individual services and designing your own maintenance program options. Our service and support team can assist in the selection of the individual services that best suit your requirements.

For more information please visit www.EMCEE.com, or call...

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