

EMCEE

HDTV

TRANSMISSION SYSTEMS

INNOVATIVE TRANSMITTER DESIGNS SINCE 1960



TITANIUM Series[®]
UHF Solid State DTV Transmitters

TITANIUM Series[®] DTV Transmitters

The TITANIUM Series[®] UHF transmitters were developed especially for medium power DTV services. These transmitters feature a 100% solid-state modular architecture and utilize the latest high efficiency LDMOS devices to provide transmitters that are economical to purchase and operate and easy to service. EMCEE engineers also combined soft-fail technology with plug-in convenience to create a transmitter that will supply your desired power, reliability, and performance; all of these features in a transmitter that performs above and is priced below the competition.

Talk About System Versatility!

START with the DRP-1000 modulator/processor and configure your new Titanium Series[®] as a Transmitter or Translator. With either an off-air DTV input or SMPTE310/ASI transport stream input, this modulator provides a 19.39 Mb/s 44 MHz IF output that transfers your packetized audio, video and data. With enhanced baseband processing and patented PSIP Modification, **it is the world's** most versatile ATSC Modulator/Processor.

Fully ATSC A53 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. Transport stream monitoring outputs are also provided.

The DRP-1000 digitally performs ATSC transmission layer coding, 8-VSB modulation, filtering, and up-conversion to produce a pristine IF output signal. Precise frequency offsets are also available using the GPS lock input.

UPGRADE to the new DTVM-2000 loaded with advanced features. This modulator is loaded with enhanced circuits found only in much more expensive modulators. Adaptive Spectral Control (ASC[®]) uses adaptive feedback with linear and non-linear correction, PSIP modification, baseband grooming, and advanced signal processing to drive your transmitter. The DTVM-2000 provides enhanced correction for frequency response distortions in the power amplifiers and in the

high power band-pass filter which directly affect coverage area, error vector magnitude (EVM) and signal-to-noise ratio (SNR). The circuits work adaptively without the use of training signals; it continually optimizes performance over time and varying temperature, without taking the transmitter out of service.

ADD a TouchScreen control system to your Titanium Series[®] transmitter which **will put "drill down" diagnostics** as close as your fingertip. A Windows XP[™] based local control system provides easy to use front panel monitoring and graphical control of the transmitter. Simple and effective, the control system lets you monitor performance, faults, voltages, currents and forward and reflected power.

Built By Engineers For Engineers!

TITANIUM Series[®] transmitters provide a high level of UHF system reliability. Each TITANIUM system includes a control (Base) system, and one or two power amplifier cabinets. The control portion includes the modulator, up-converter, system control, graphical user interface, TouchScreen display, and driver amplifier system.

Up to 3 KW of transmitter power can be housed in a single base cabinet. Additional amplifier cabinets can accommodate power outputs of up to 3 KW each.

Each additional power amplifier cabinet is a self-contained 3 KW average power RF amplifier with its own individual AC power feed, control circuits, interlocks, air cooling, RF amplifier modules and modular power supplies. This distributed architecture provides the ultimate in system redundancy and also supports future expansion.

Each additional power amplifier cabinet houses up to 12 parallel RF power amplifier (PA) modules and nine parallel power supplies—one for every two PA modules with up to

three spares. This architecture assures minimal loss of output power should one or more PA modules or power supplies be removed from service.

"Hot-Swap" PA modules and power supplies, means they may be installed and removed from the transmitter without interrupting transmission. This provides for very easy service and maintenance and a fast return to full power. **"Smart"** micro-controlled PA modules feature individual control and monitoring; also internal protection against high VSWR, overtemp, over current, low gain and RF overdrive.

Designed Right—Built Right—Priced Right

TITANIUM Series[®] DTV Transmitters

Designed for Easy Operation, Control and Monitoring!

TITANIUM Series[®] transmitters feature a color Graphical User Interface (GUI) which displays all monitoring and metering on an easy-to-understand screen. Diagnostics, block diagrams, and fault logging are also included. Pushbutton control is provided on an eye-level front panel, and interfaces for remote control and monitoring are conveniently located. Front-panel LEDs visually indicate operating status of the overall system as well as individual subassemblies. Most components are readily accessible when service is required.

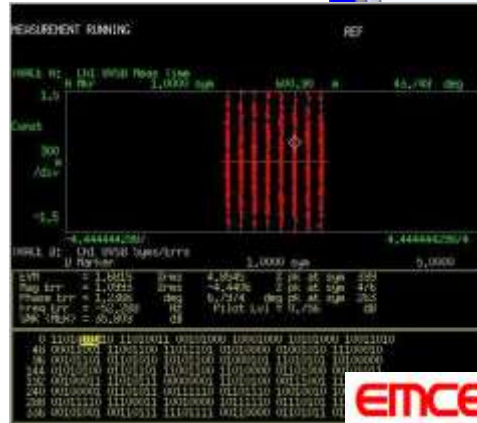
TITANIUM Series[®] transmitters use the same I²C System Area Network (SAN) serial bus used in thousands of proven applications. The main controller facilitates trouble-shooting by providing detailed status information about each module via the SAN serial bus to the Graphical User Interface (GUI). The local/remote control system “lives above” the internal transmitter control system assuring that the transmitter stays “on-air” in the event of a main/remote controller or GUI fault.

The embedded **TransView[®]** remote control system enables web based IP or SNMP control capability and RS-422 serial style remote control, and parallel interfaces are also supported.

TITANIUM Series[®] transmitters require up to 90 percent less routine maintenance than tube transmitters, with fewer adjustments at less frequent intervals. Most of the modules are readily accessible from the front of the transmitter. TITANIUM Series[®] transmitters are designed so that most maintenance can be performed safely while the transmitter continues to operate.

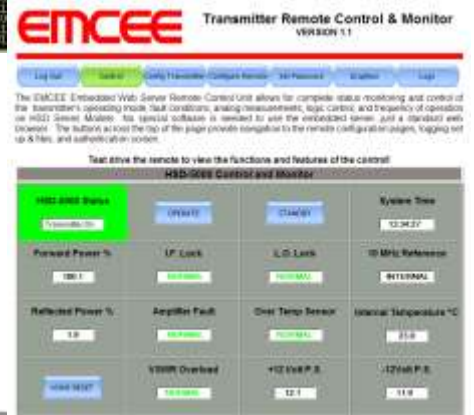
Since the beginning of digital, EMCEE has been innovating DTV designs making your transition to digital broadcasting an easy and affordable task. Get big budget technology with affordable pricing. Choose **EMCEE** for your next DTV transmitter.

TouchScreen GUI Control & Monitoring



Ultra Linear Performance

TCP/IP Network & Web Based Remote Control



Easy Service Low Maintenance Hot Swap PA Modules Redundant Hot Swap Power Supplies

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TITANIUM Series[®] DTV Transmitters

TITANIUM Series[®]— A High-Level Flyby!

Titanium Modulators

Choose from the DRP-1000 modulator/processor for low-cost high-quality modulation, or get enhanced performance with the DTVM-2000. Adaptive Spectral Control (ASC[®]) uses adaptive feedback with linear and non-linear correction, PSIP modification, baseband grooming, and advanced signal processing to excite your transmitter.

Base Cabinet

Houses the system controller, the monitoring system control panel (GUI), modulator, up-converter, and driver amplifier, and six to nine PA modules with their associated power supplies. Web based control with Serial RS-422 and standard parallel remote control interfaces are also included.

Graphical User Interface

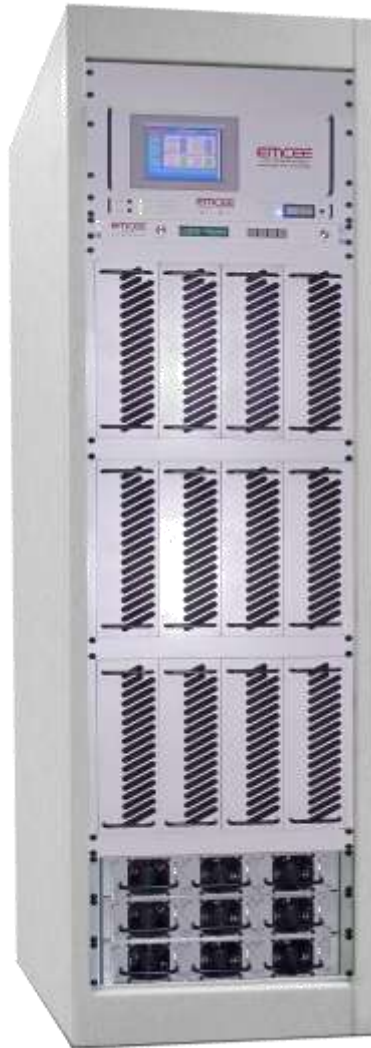
Eye-level interface provides easy to understand transmitter status and control information, complete with signal flow diagrams and analog style bar-graph metering.

Power Amplifier (PA) Cabinets

When fully populated with 12 PA modules, each cabinet is a self-contained RF power amplifier with its own AC power feed, control circuits, interlocks, air cooling, RF amplifiers and power supplies.

Power Amplifiers

All PA modules are identical and inter-changeable. Each hot-swap and pluggable module features a high-speed logic switch which disables the module if a fault occurs or if the module is removed from the transmitter. Modules are protected against high reflected power, over-temperature, low gain and RF overdrive conditions. Fault status and metering are displayed on the main control panel.



Solid State Amplification

EMCEE uses the latest LDMOS technology for the power transistors in the RF amplifiers. These state-of-the-art devices are very efficient and extremely rugged. They provide high efficiency and high gain and exhibit very stable temperature characteristics over a wide operating temperature range. Linearity and distortion performances are much better than older bi-polar designs. And, unlike tube amplifiers which require complicated and costly repairs, solid state amplifiers do not have a limited service life.

Power Supplies

Compact, modular, regulated power supplies can be removed while the transmitter is on the air. Power supplies are protected from incoming AC line transients, over current and over voltage. Up to twelve power supplies per power amplifier cabinet means N+1 power supply redundancy may be configured for additional up-time assurance.

Air Cooling

Air cooling with internal high-efficiency thermal conduction is standard. Exhaust may be ordered out-the-top, out-the-back, or out-the-bottom. External fans may be configured to pull exhaust out of the transmitter building.

Simple Front Panel Control

An easy to use front panel control is the base of the transmitter control system. Use simple push button controls for operating mode and status; an easy to read color LED matrix displays high level status and alarm functions to make things easy for attendant operators. A front panel meter displays up-converter supply voltages and % Forward and Reflected power.

Embedded Web Server Remote Control

With its embedded TCP/IP based web server, remote monitoring and control is a snap! No special software is required. Use your standard browser to control the transmitter. The system even automatically generates error e-mails when a fault occurs. Using standard TCP/IP protocols, you can make the transmitter a part of your IP network.

**Titanium Series[®] Transmitters...
Only from EMCEE!**

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TITANIUM Series[®] DTV Transmitters

TITANIUM Series[®]— Specifications

Note: *Specifications Subject to Change*

General

RF Load Impedance:	50 Ohms, 1.2:1 VSWR over specified TV channel
RF Output Connector:	1-5/8 EIA (Base Cabinet Output) 3-1/8" EIA (PA Cabinet Outputs)
Frequency Range:	Any specified UHF TV Channel, 470-806 MHz
Data Input:	ASI and SMPTE-310M, 19.39 Mbps; or ATSC Off-Air w/DRP-1000
Data Input Connector:	BNC, 75 Ohms; (75 Ohms Off-Air w/DRP-1000 Chan. 2-69)
External Lock Input:	10 MHz sinusoid, 0 to +10 dBm, BNC, 50 Ohms, Automatic

Performance

DTV Power Output¹:

<u>MODEL</u>	<u>OUTPUT POWER</u>	<u>MODEL</u>	<u>OUTPUT POWER</u>
TTHDU-250	.25K W Average	TTHDU-3000	3.0 KW Average
TTHDU-500	.50 KW Average	TTHDU-4000	4.0 KW Average
TTHDU-750	.75 KW Average	TTHDU-5000	5.0 KW Average
TTHDU-1000	1.0 KW Average	TTHDU-6000	6.0 KW Average
TTHDU-1500	1.5 KW Average	TTHDU-7000	7.0 KW Average
TTHDU-2000	2.0 KW Average	TTHDU-8000	8.0 KW Average

Output Power Stability ± 2% or better

Frequency Stability (Pilot): ± 200 Hz/month^{2,8}

Frequency Offsets: Per FCC requirements

SNR (MER): >30dB³ **Phase Noise:** ≤-104dBc/Hz @ 20 KHz

Harmonic & Spurious Radiation: Compliant with FCC requirements (Title 47 CFR 73.622)

Sideband Performance: Compliant with FCC mask, with output mask filter (Title 47 CFR 73.622)

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: 0-8,000 ft. AMSL⁵

Physical Dimensions & Weights:⁶

TTHDU-250 through TTHDU-2000:	Size: 22.0"W x 36.0"D x 72.25"H	Weight: up to 430 lbs
TTHDU-3000 through TTHDU-5000:	Size: 44.0"W x 36.0"D x 72.25"H	Weight: up to 1,150 lbs
TTHDU-3000 through TTHDU-5000:	Size: 66.0"W x 36.0"D x 72.25"H	Weight: up to 1,875 lbs

Electrical Requirements:⁹ 170-264V, 1Ø/3Ø, 3 or 4 wire, 50-60Hz (PA Cabinets),
170-264V, 1Ø/3Ø, 50-60Hz (Base Cabinet),
100-240V, 1Ø, 50-60Hz (Control Section).

Power Factor: 0.98, or better

Power Consumption:

TTHDU-250	2.9 kVA	TTHDU-3000	25.1 kVA
TTHDU-500	4.9 kVA	TTHDU-4000	33.1 kVA
TTHDU-750	6.9 kVA	TTHDU-5000	41.1 kVA
TTHDU-1000	8.9 kVA	TTHDU-6000	49.4 kVA
TTHDU-1500	12.9 kVA	TTHDU-7000	57.4 kVA
TTHDU-2000	16.9 kVA	TTHDU-8000	65.4 kVA

Notes:

¹ Average power rating is power delivered at output of FCC mask filter.

² After initial aging of 60 days.

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

⁴ Derate maximum temperature linearly, from +50° C at sea level by 2 deg C per 1,000 ft., up to 8,000 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 not listed will vary. All values approximate, consult Factory for specifics.

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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.EMCEEcom.com, or call...

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