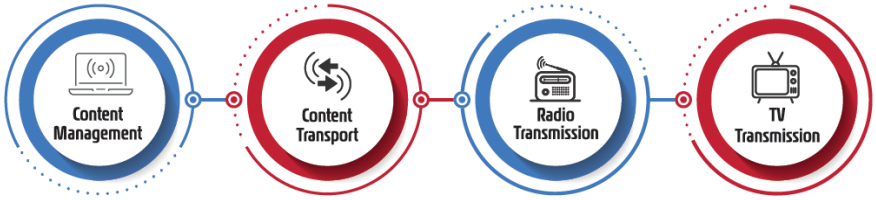
Broadcast Electronics

ETX Series Compact High Efficiency FM Transmitters

Overview

Broadcast Electronics has an over 65-year legacy of providing innovative technology to enable radio and TV broadcasters to deliver compelling content to their audiences and create revenue-generating business opportunities. Supporting global innovation and next generation content delivery, Broadcast Electronics embodies a customer first approach to the market from the company's headquarters in Quincy, Illinois in the United States.

Customer focused solutions from Broadcast Electronics are built on four technology areas:



AudioVault is BE's award-winning suite of Content Management software enabling live and automated program creation and playout, news solutions and digital logging as well as data management.

The Marti range enables content Transportation, powering audio contribution and distribution for point-to-point (STL) wireless connectivity.

Radio Transmission is the heart of Broadcast Electronics with multiple product lines to support AM and FM transmission. The BE STX line of HD Radio® ready FM transmitters provides superior sonic quality and low operating cost. BE ETX analog FM transmitters deliver compact, energy efficiency in a cost-effective package. The BE AM line of transmitters provides for rugged, reliable, energy efficient peace of mind for your AM radio station.

Broadcast Electronics complete line of **low and high-power TV transmitters** are designed around a software defined core exciter that can cover all the global analog and digital TV standards. With solutions covering UHF and VHF frequency bands and air-cooling configurations, BE can craft the right solution to meet your technical, budgetary and operating requirements.

Broadcast Electronics

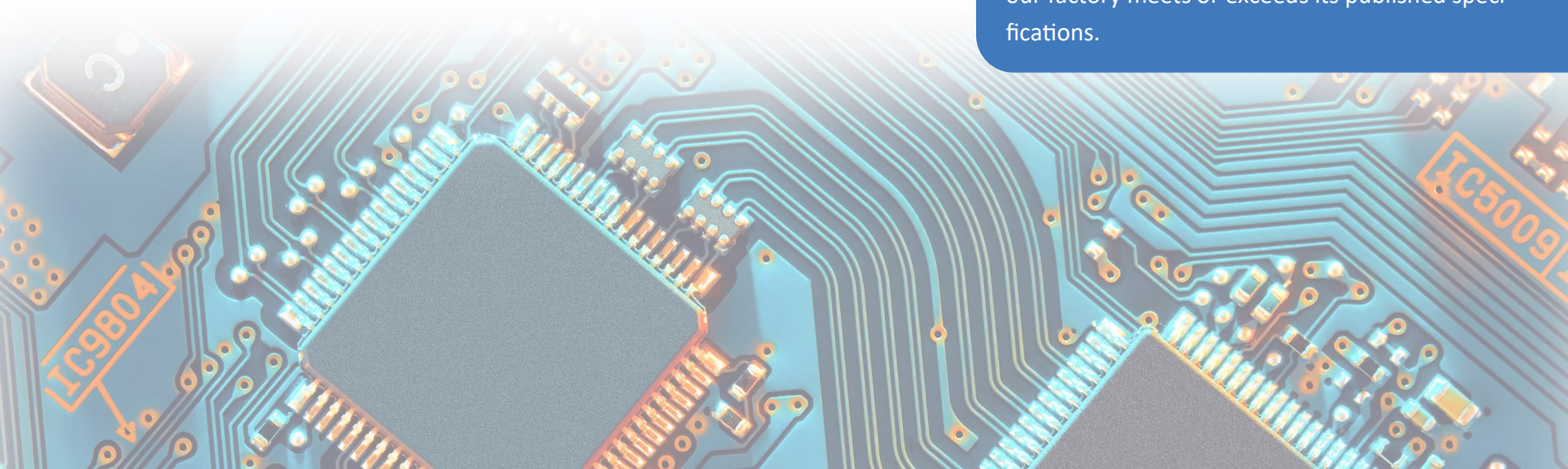
Broadcast Electronics is a global technology company dedicated to driving innovation in broadcast technology providing market leading solutions for software-based content management, Radio & Television transmission, and scientific applications of radio frequency devices.

Broadcast Electronics, has been providing high-tech solutions for broadcasters for more than 65 years in over 170 countries. All of our products and services come from a heritage of creativity and innovation unmatched in the industry, focused on developing innovative solutions for customers problems.

Every major innovation that shaped modern radio originated in Quincy, and it is here that BE products are designed, supported and manufactured today.

Our facility in Quincy employs the latest instruments for research, new product design, prototype fabrication and testing.

We take advantage of the best practices of automated production, adding human attention to detail to ensure every product that leaves our factory meets or exceeds its published specifications.



ETX Compact Transmitter Series

The ETX is the latest in a long timeline of reliable, efficient, and performance-leading FM transmitters from Broadcast Electronics. ETX has been designed for high energy efficiency to lower operating costs, world-class audio performance, maximum reliability and uptime, simplified and fast field repair, built-in redundancy, and the flexibility to support continued technological updates over time.

Combining the best of both world

Broadcast Electronics ETX series combines the best characteristics from the ETG family and the BE STX line of transmitters to deliver a high-performance, cost-effective solution with models from 600 W to 30 kW. Leveraging the highly efficient and compact RF technology of the ETG series upgraded with the latest ruggedized LDMOS RF devices the ETX provides the efficiency, compactness, and reliability you have come to expect.

We didn't stop there, drawing from BE's decades of providing the best-sounding FM exciter on the market, we incorporated a digital direct-to-channel FM modulator and ultra-reliable highly efficient hot-pluggable power supplies to deliver the maintainability and robustness of the STX range to provide our customers with a new level of performance and reliability at an exceptional price.

ETX's simple yet powerful control system provides extensive monitoring, logging, and control capabilities with fast-acting protection for maximum reliability. A front panel LCD screen, navigation buttons and bright LED indicators allow easy review, setup, and diagnostics. The RJ-45 port allows you to connect to the intuitive and powerful GUI and SNMP from anywhere in the world. The programable parallel GPI/O interface provides connectivity to a traditional remote-control system.

Flexible options — software enabled

BE knows that in the fast-paced and evolving world of broadcast radio, the old adage—the only constant is change—holds. You need to invest in cost-effective tools for today, but maintain the flexibility to expand your system when things change tomorrow—all without ripping things out and starting over. The ETX comes standard with extensive capabilities to address almost all situations, but also we offer a wide selection of cost-effective options to protect your original investment and extend the usability of the transmitter to deliver your content to your audience.

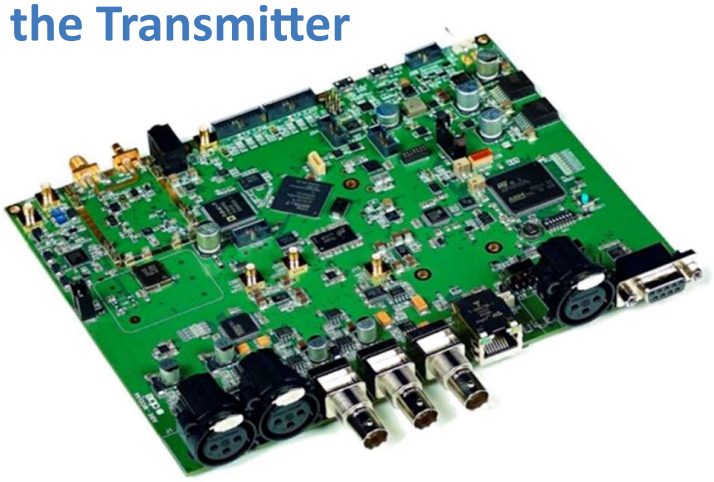
Eliminate multiple outboard boxes when you use cost-effective options like – multi-band audio processing software with composite clipper, Off Air receiver for FM and HD Radio—ideal for a translator, skip the STL or outboard codec—AES 67, Icecast, or multiple MPX over IP solutions inside the ETX, you can even add single or dual satellite receivers, and more…. all integrated into our simple easy to use web GUI.

You bring the content; we will help you deliver it to your audience cost-effectively!

Put these powerful capabilities to work for you

- Models from 600 W to 30 kW
- Ultra compact size and low weight
- Direct-to-channel digital modulator
- Outstanding Audio performance
- Adaptive efficiency algorithm delivers up to 75% AC to RF Efficiency
- Hot-Pluggable / Front Access Power Supplies - Redundant 5 kW & above
- Seamless operations over a wide range of voltages and power stability
- Run at maximum power up to 1.5:1 VSWR w/proportional foldback
- IP Connectivity with HTML5 GUI for anytime, anywhere access
- Flexible alerts, monitor and control with SMTP email, SNMP, and SMS
- Comprehensive event log stores 5000 events—simplifies troubleshooting
- Built in RDS Encoder and digital Stereo Generator
- Advanced soft clipper to eliminate overshoots
- Multifunction USB port
- Removable front panel grill and washable filter for clean operation
- Flexible options: include only the capabilities you need including:
- Multiple AOIP options: Icecast, AES67, MPX over IP
- FM & HD Radio® receiver for translator operation
- Micro SD card for audio backup
- Front panel audio headphone jack
- Software based multiband audio processing with composite clipper
- Single or dual satellite receivers

Digital Modulator—The Heart of the Transmitter



Building on BE's long legacy of superior-sounding FM exciters, ETX continues the tradition with a state-of-the-art Digital Direct to Channel (DTC) modulator of unrivaled precision and sonic clarity inside every transmitter.

The ETX digital modulator includes a built-in stereo generator, RDS encoder, Advanced Soft Clipper Limiter to eliminate loudness robbing overshoots, integrated Translator ID generator, and a wide range of audio inputs for maximum flexibility.

Advanced Monitor and Control Capability

Every ETX includes a powerful yet simple-to-use browser-based HTML-5 graphical user interface for control and monitoring of the transmitter anywhere in the world. Extensive TCP/IP network connectivity via integrated RJ-45 connection allows the transmitter to be securely connected to any IP network. The optional 3g/4g model provides for simple connectivity in even the most remote places. Integrated multiuser multilevel password protection ensures only authorized operation on your network.

ETX also supports a robust SNMP – (Simple Network Management Protocol) interface for easy connection with a wide array of powerful software network manager systems and popular transmitter remote controls. The entire transmission system can be controlled and monitored using the standard published MIB protocols.

ETX provides a comprehensive event log that captures all transmitter-related activities, operations, and faults storing the 5000 most recent activities. This allows for detailed diagnostics and simplified routine maintenance.

Remote Monitor and Control interfaces supported include:

- Popular parallel interface to panels and legacy remote-control systems
- Automated Alarms and notifications via Email or SMS text
- SNMP connectivity for alerts, monitoring, and control
- Web GUI via ethernet network connection RJ-45 (10/100Base-T) with TCP/IP protocol

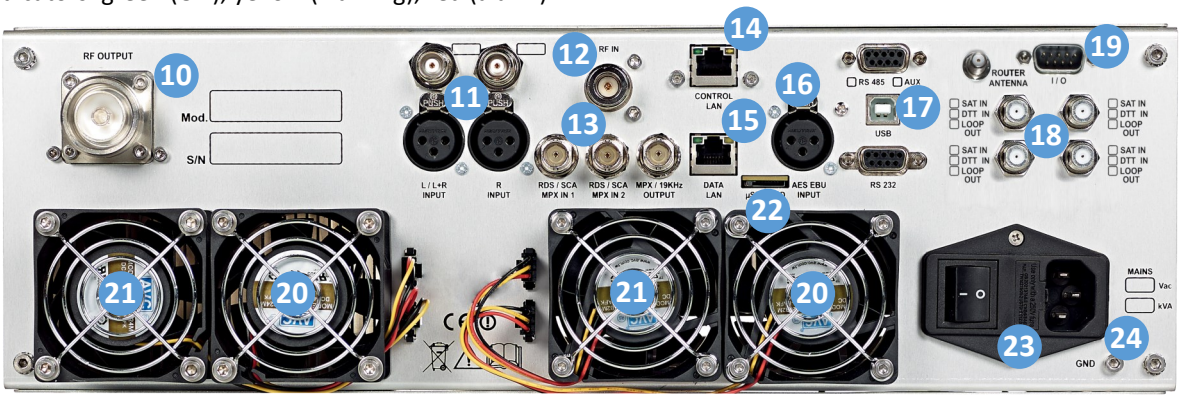
Innovative RF System Delivers Lowest Cost of Ownership

Featuring the latest LDMOS- power amplifier device technology coupled with innovative amplifier design ETX delivers significant increase in power density and efficiency. Our exclusive Adaptive Energy Boost algorithm constantly monitors the power supplies and RF amplifiers to automatically optimize the key parameters to achieve maximum efficiency on any frequency or power level.

Redundant rugged amplifiers and low-loss combiners protect against lightning, antenna system short—and open circuits and high VSWR keeps you on the air, reduces operating and maintenance costs, delivering the lowest cost of ownership over the life of the transmitter - maximizing your investment.

ETX Front & Rear Panel

1. Removable Air Filter— washable filter
2. USB port for system back ups and storing configurations
3. Graphic LCD display
4. Function keys and menu selectors
5. LED indicators: green (ON), yellow (warning), red (alarm)
6. 3.5mm jack for audio monitor
7. Hot Pluggable power supply # 1
8. Hot Pluggable power supply # 2 (option for redundant only for ETX 600 and ETX 1000)
9. RF output monitor (SMA female)



10. RF output connector (DIN 7-16 female)
11. Analog L/R input (XLR connector) | BNC female connector for additional function (e.g.: 1pps, 10MHz external reference or GPS/GLONASS antenna input)
12. “N” connector for FM/HD Radio® receiver
13. BNC female connector for MPX1/RDS1/SCA1, MPX2/RDS2/SCA2 inputs and MPX/19kHz output
14. LAN (RJ45) for management (Web server, SNMP, etc.)
15. LAN (RJ45) for web stream Icecast2 / AES67 / Digital MPX over IP (in/out) / UECP over IP
16. AES/EBU and MPX over AES (AES192) input (XLR connector)
17. DB9 connector for interlock and general alarms contacts | USB Type-B connector for FM modulator console connection | RS232 connector
18. Single or dual Satellite/Terrestrial receiver (“L” Band and VHF/UHF input) | and router antenna input
19. Remote Control—GPIO
20. Main fan (2)
21. Aux fan (option for ETX 600 and ETX1000) (2)
22. µSD card slot
23. AC power supply input and fuse
24. Ground screw

ETX High Power Transmitters

ETX 10000 | ETX 15000 | ETX 20000 | ETX 25000 | ETX 30000

ETX Scalable Architecture to Deliver High Power in a Compact Footprint

The Broadcast Electronics ETX high power family of FM transmitters produces high power output with a combination of ETX 4RU power amplifiers each delivering 5kW of RF power, a single ETX 2RU or dual set of 2 ETX 2RU Exciters and a controller.

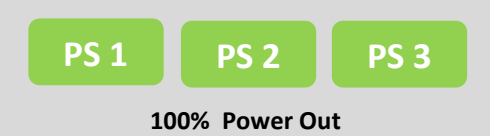
The overall RF power of the models in this product series ranges from 10 KW to 30 KW and each system can be housed in a single 19" rack.

ETX High Power transmitters represent the most advanced technology in terms of electrical efficiency, compactness, reduced weight, ease of use, and diagnostics. They have been designed to guarantee the maximum performance and operation while lowering operational costs through energy saving technology.

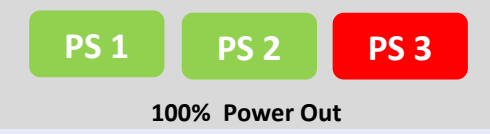
The Broadcast Electronics ETX High Power transmitters achieve levels of overall electrical efficiency unseen in the market today, while also providing an extremely high operational performance under extreme environmental conditions (high external temperatures, poorly adjusted antenna, fluctuations in the power source).

Power Supply Redundancy

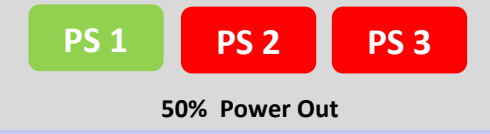
Each ETX 5kW amplifier contains 3 hot pluggable power supplies that operate in a N+1 mode such that with the loss of any one supply the amplifier can still deliver a full 5kW output.



The loss of 2 power supplies still keeps the amplifier operating a 50% or 2.5kW of power ensuring you can stay on the air at very high power levels with multiple failures.



The ETX 30000 for example has enough redundancy so that up to 6 power supplies can fail and the transmitter will still make full output power. This level of redundancy and resiliency is unheard of in competitive FM transmitters



Specifications

	ETX 600	ETX 1000	ETX 2000	ETX 3000	ETX 5000
Range (Output Power)	6 W to 600 W	100 W to 1000 W	200 W to 2000 W	300 W to 3000 W	500 W to 5000 W
Power consumption	Typ. 800VA – 900 VA Max.	Typ. 1,3kVA - Max. <1,5kVA	Typ. 2,7kVA - Max. <3,1kVA	Typ. 4kVA - Max. <4,5kVA	Typ. 6,9kVA - Max. <7,2kVA
# of Power Supplies	1—Option for 2	1—Option for 2	2	3 (1 redundant)	3 (1 redundant)
# LDMOS in the amplifier stage	1	1	2	3	5
Accuracy (Output Power)	2% full scale	2% full scale	1% full scale	1% full scale	1% full scale
Efficiency	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%
Output Connector	7-16 DIN female; EIA 7/8" flange on request	7-16 DIN female; EIA 7/8" flange on request	7-16 DIN female; EIA 7/8" flange on request	EIA 7/8" flange	EIA 7/8" flange
Analog Input	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)
THD + Noise (Stereo with Optional Stereo Card)	<2% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power
MPX/SCA/RDS input	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)
Soft Clipper with band limitation	Included	Included	Included	Included	Included
Operating Temperature	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing
Maximum operating altitude (ft / m)	10000 / 3000	10000 / 3000	10000 / 3000	10000 / 3000	10000 / 3000
AC Input Voltage	90-264Vac, 47 to 63Hz single phase	90-264Vac, 47 to 63Hz single phase	176-264Vac, 47 to 63Hz single phase (90-176Vac with limited output power)	176-264Vac 230Vac, 47 to 63Hz single phase 400Vac three phase star conn. (with power neutral) and 230Vac three phase delta conn. (without power neutral)	
Dimensions (W x H x D, inches / cm)	19 x 3 RU (5.25) x 18 inches 48 x 13 x 46 cm	19 x 3 RU (5.25) x 18 inches 48 x 13 x 46 cm	19 x 4 RU (7) x 28 inches 48 x 18 x 70 cm	19 x 4 RU (7) x 28 inches 48 x 18 x 70 cm	19 x 4 RU (7) x 28 inches 48 x 18 x 70 cm
Weight (LBS / Kgs)	38 / 17	40 / 18	42 / 19	64 / 29	66 / 30

All specifications contained in this document may be changed without prior notice

Specifications

	ETX 10000	ETX 15000	ETX 20000	ETX 25000	ETX 30000
Range (Output Power)	1 kW to 10 kW	1.5 kW to 15 kW	2 kW to 20 kW	2.5 kW to 25 kW	3 kW to 30 kW
Power consumption	Typ. 13.9kVA - Max. <15.2kVA	Typ. 20kVA - Max. <23kVA	Typ. 27.8kVA - Max. <30.4kVA	Typ. 35.6kVA - Max. <38.4kVA	Typ. 43.4kVA - Max. <45.2kVA
# of Power Supplies	6 (2 redundant)	9 (3 redundant)	12 (4 redundant)	15 (5 redundant)	18 (6 redundant)
# LDMOS in the amplifier stage	10	15	20	25	30
Accuracy (Output Power)	1% full scale	1% full scale	1% full scale	1% full scale	1% full scale
Efficiency	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%	Up to 75% Typical always > 70%
Output Connector	EIA 1-5/8" flange, other on request	EIA 1-5/8" flange, other on request	EIA 3-1/8" flange, other on request	EIA 3-1/8" flange, other on request	EIA 3-1/8" flange, other on request
Analog Input	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)	2x XLR female (Balanced; impedance 600Ω/10KΩ selectable)
THD + Noise (Stereo with Optional Stereo Card)	<2% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power	<1.5% at 50% single channel modulation, 50 Hz to 10 kHz at rated power
MPX/SCA/RDS input	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)	2x BNC female (Unbalanced; impedance 50Ω/10KΩ selectable)
Soft Clipper with band limitation	Included	Included	Included	Included	Included
Operating Temperature	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing	-5°C to +45°C 95% non-condensing
Maximum operating altitude (ft / m)	10000 / 3000	10000 / 3000	10000 / 3000	10000 / 3000	10000 / 3000
AC Input Voltage	176-264Vac 230Vac, 47 to 63Hz single phase 400Vac three phase star conn. (with power neutral) and 230Vac three phase delta conn. (without power neutral)				
Dimensions (W x H x D, inches / cm)	19 x 17 RU Rack 22.5 x 49.2 x 39.4 inches 57 x 125 x 100 cm	Rack 22.5 x 74.8 x 39.4 inches 57 x 190 x 100 cm	Rack 22.5 x 74.8 x 39.4 inches 57 x 190 x 100 cm	Rack 22.5 x 74.8 x 39.4 inches 57 x 190 x 100 cm	Rack 22.5 x 74.8 x 39.4 inches 57 x 190 x 100 cm
Weight (LBS / Kgs)	485 / 220	639 / 290	771 / 350	925 / 420	1080 / 490

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RF Specifications	
Transmitter Type	Solid State VHF FM transmitter for analog FM
Output Power	600 W to ~ 30,000W
Efficiency	Up to 75% typical AC to RF
Modulation Type	Direct-to-channel digitally generated FM (no analog up-conversion)
Modulation Capabilities	Standard: ±75 kHz peak deviation – Max: ±200 kHz peak deviation
Spurious and Harmonic	Compliant with ETSI and FCC specification—85dB or better; low pass filter standard
Asynchronous AM S/N Ratio	Better than -65dB (-70dB Typical) referenced to average peak-to-peak carrier amplitude. 75uSec de-emphasis)
Synchronous AM S/N Ratio	Better than 60dB referenced to average peak-to-peak carrier amplitude. 75kHz deviation @400Hz
VSWR	Normal operation up to 1.5:1 Integrated Proportional Fold-back and Fast Protection
Audio Specifications	
Audio Inputs	AES, L&R analog, composite, SCA/ RBDS/RDS external generator input, SCA audio inputs (2)
Amplitude Response	Composite/ AES: +/-0.03dB, 30 Hz to 53 kHz; +/- -0.1dB, 53kHz to 100kHz Analog L&R: +/-0.25, 30Hz to 53kHz
Total Harmonic Distortion + Noise	Composite: 0.005% or less @400Hz, 10-22kHz bandwidth, 75uSec deemphasis. AES/ Analog L/R Stereo: -0.01 typical @400 Hz, 10-22kHz bandwidth 75uSec deemphasis
Composite Intermodulation Distortion	0.13% SMPTE (60/7000 Hz, 1:1 ratio), DIM-B: 0.008% (14kHz)
S/N Ratio	Composite: 85dB below 100& modulation @400 Hz. AES/ Analog L&R Stereo: 80dB below 100% modulation @400Hz. Analog L/R: -70dB, 30Hz to 15kHz
Stereo Separation	AES: -74dB below 100% modulation @400Hz. Analog L/R: -70dB, 30Hz to 15kHz

Service and Support

We know that having the right support behind a product is every bit as important as the features and capabilities it delivers. At Broadcast Electronics we are committed to provide you with not only great products and software, but a dedicated team of service experts to help you keep your station running smoothly for years to come.

Training

Broadcast Electronics has long provided training programs for our products to educate and prepare users to operate and maintain them in the most effective possible manner. Training is offered for all styles of transmitters and Audio Vault systems, featuring a mix of instruction with hands-on operation and troubleshooting. Training programs can be crafted to meet your local needs, offered in our facility, at your location or online. Many of our programs can provide SBE ongoing educational credits.

Warranty

You can rest assured that Broadcast Electronics stands behind its products and services to provide complete satisfaction. Our products offer a standard set of warranty services that exceed others in the industry.

Repair Service

As a leader in providing innovative products and solutions to broadcasters around the globe, Broadcast Electronics understands the needs for long life and years of trouble-free service. You can feel secure that if disaster strikes and your products need service, we offer complete repair and refurbishment service to get you back on the air delivering your high-quality programing quickly.

On-Site Service and Installation

Regardless if you simply need some additional help troubleshooting an existing transmitter or Audio Vault system, or a complete installation of a new one, let the global service team at Broadcast Electronics help you get things up a going quickly. If you just need commissioning, on site set up and test, or an extra pair of hands, we can help with that too.

Broadcast Electronics

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