

# Broadcasting FM

**HITACHI**  
Inspire the Next

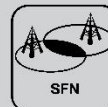
**E-Compact**  
*Less energy. More power.*

## FM Series

DDS Broadband FM Transmitters  
76 to 108 MHz  
1,200 to 40,000 Watts RMS



English - US



## FM Series

The E-Compact line of FM transmitters with DDS (Direct Digital Synthesizer) technology offers superior transmission quality and a wide range of technological advantages, distinguishing it from traditional transmitters modulated directly at the VCO (Voltage-Controlled Oscillator).

- **PLL UNLOCKED NEVER AGAIN!** Transmitters modulated directly at the VCO are susceptible to frequency synchronization loss (PLL UNLOCKED), especially with low-frequency audio, which can take the station off the air. The E-COMPACT FM DDS transmitter, with a digitally synthesized carrier, is not affected by audio variations, ensuring continuous and stable transmission, keeping your station always on the air.
- **EffiMax TECHNOLOGY!** The EffiMax technology present in the E-Compact FM DDS line performs automatic and intelligent corrections of the transmitter efficiency when there are changes in the operating frequency and power. This advanced feature dynamically optimizes performance, taking into account critical parameters such as power supply voltage and exciter signal level. In this way, EffiMax technology ensures more efficient and stable operation, maximizing component durability and energy efficiency, all automatically, without the need for manual intervention.
- **HIGH GAIN HPA – ONE EXCITER MODEL:** The E-Compact FM DDS transmitters are built with high-gain power modules, allowing the use of low-power exciters, which are more robust compared to the high-power exciters commonly used in transmitters with low-gain modules. The whole E-Compact FM DDS transmitter line, from 1,000 watts to 40,000 watts, uses the same FM9001 exciter, warranting a stable and secure operation and providing parts uniformity and reliability.
- **RF POWER COMBINERS, CABLELESS:** E-COMPACT FM DDS transmitters use isolated progressive combiners to combine power modules. RF connections are made with quick-connect terminations and rigid lines, eliminating connectors and coaxial cables prone to failure. This ensures a clean and highly reliable construction for the transmitter.
- **EMBEDDED WEB INTERFACE:** The E-COMPACT FM DDS is developed with SoC (System on Chip) technology, allowing integration with web servers. This provides a graphical and intuitive web interface, accessible from tablets, smartphones, and other devices without the need for additional applications. It facilitates remote monitoring and control of all transmitter functions, offering operational convenience and flexibility.
- **PARAMETRIZABLE SOFT LIMITER:** E-Compact FM DDS transmitters feature an advanced soft limiter that protects the audio signal from distortion and excessive peaks, ensuring modulation limits are within established standards. This feature is user-configurable, allowing precise control over audio dynamics. It ensures consistent quality within the modulation channel, without noticeable clipping or compression in the demodulated audio.
- **INTEGRATED RDS:** The E-COMPACT FM DDS transmitter includes an integrated RDS (Radio Data System) generator, which transmits information such as the station name and program identification. For more advanced functionalities, we offer the optional RDS ENHANCED, enabling remote interactivity with information-generating devices, along with all other RDS system features.
- **DIGITAL AUDIO PROCESSOR:** An optional state-of-the-art digital audio processor is available, with multiband processing. Available in 5 or 10 band options, it features precise equalization, and audio level control, providing dynamic and consistent sound, eliminating the need for additional equipment.
- **AUDIO SERVER (AUTOMATIC AUDIO PLAYER):** An optional audio server is embedded in the web interface, allowing for the upload of audio files in various formats. In the event of an interruption in the transmitter's input signal, the server is automatically activated as a backup, keeping the station on air with preloaded programming. This eliminates the need for USB drives, memory cards, or other external devices.
- **ONBOARD FM SIGNAL ANALYZER:** Optional feature available at the front panel and web interface, providing a Modulation Monitor that samples the signal radiated by the transmitter and uses advanced processing resources to offer real-time measurements such as modulation analysis, which evaluates the signal's quality and fidelity, modulation level indicators, which monitor the intensity of the transmitted signal, and an alarm function that alerts about modulation problems outside specified parameters. All this is available in an intuitive and easy-to-use interface for convenient and efficient operation.
- **GPS SYNCHRONISM TO OPERATE IN SFN:** An option to embed a GPS-based time synchronization mechanism for operation in SFN (Single Frequency Network). High-precision digital synchronization adjustment with sub-microsecond delay or advance resolution.

## Available Resources

<p><b>MCCB (Molded Case Circuit Breaker)<sup>4</sup></b> AC distribution module with load capacity from 16 kW to 64 kW composed of circuit breaker and contactor, with operating range of 200Vac to 250Vac (Typ 230Vac). It has 02 safety interlocks to cut the equipment's power.</p>	<b>DEFAULT</b>
<p><b>SPD (Surge Protection Devices)</b> Extra protection integrated into the MCCB acting against overvoltage surges from the electrical network, optional for EC801HP and default for other HP models.</p>	<b>DEFAULT</b>
<p><b>"Easy Maintenance" Concept</b> Power supplies with plug-in connections, eliminating the need for cables and wiring, allowing quick and safe replacement. All fans and air filters of the transmitter are easily accessible from the front panel, allowing for easy cleaning and replacement maneuvers</p>	<b>DEFAULT</b>
<p><b>Embedded WEB Server</b> Remote access to all configurations and management of the transmitter via web browser on PC or Smartphone through the Ethernet port<sup>1</sup>, without the need for driver or application installation.</p>	<b>DEFAULT</b>
<p><b>Remote Software / Firmware Update</b> Remote and secure software updates via the WEB interface, eliminating the need for USB drives, memory cards, or other external devices.</p>	<b>DEFAULT</b>
<p><b>Embedded Soft Limiter</b> Ensures modulation limits are within established standards, preventing distortions and excessive peaks. Configurable according to user preferences, it offers precise control over audio dynamics, ensuring consistent quality within the modulation channel without clipping or compression in the demodulated audio.</p>	<b>DEFAULT</b>
<p><b>Tone Generator</b> Tone generator with adjustable audible frequencies, to assist in installation and maintenance maneuvers. This feature allows quick and precise identification of the transmitted signal during technical checks and adjustments. Configurable frequencies range from 50 Hz to 15 kHz, with adjustable power levels.</p>	<b>DEFAULT</b>
<p><b>Embedded Basic RDS</b> Embedded RDS generator in the WEB interface, providing group 0A/0B functions: PI (Program Identification), unique station identification code, and PS (Program Service Name), radio station name.</p>	<b>DEFAULT</b>
<p><b>Modulator Interfaces</b> Inputs: MPX, SCA, Reference Outputs: Reference</p>	<b>DEFAULT</b>
<p><b>Isolated RF Combiners<sup>4</sup></b> Isolated progressive combiners in the power modules. High-power RF output connections done with rigid lines, eliminating coaxial cables prone to connector failures.</p>	<b>DEFAULT</b>
<p><b>2,700 W Power Supply</b> The HPA operates with 2,700 W PSU(s) in share mode, with front access and plug-in connection. The quantities of line PSU(s) and the total power supply slot capacity are described in the "Models and their specific characteristics" table.</p>	<b>DEFAULT</b>
<p><b>FM Signal Analyzer</b> Evaluates the performance of the transmitted audio by sampling the signal captured from the air. Allows real-time management of measurements such as total modulation, 19kHz pilot subcarrier, positive and negative peaks, right and left channels, main channel (L+R), stereophonic channel (L-R), AM noise, and subcarriers at 38kHz, 57kHz, 67kHz, and 92kHz, the presence of the 19kHz pilot subcarrier, and stereo or mono operation mode.</p>	<b>DEFAULT</b>
<p><b>Digital Manuals</b></p>	<b>DEFAULT</b>
<p><b>Audio Encoder</b> Embedded MPX digital synthesis encoder Digital inputs: AES/EBU, S/PDIF Analog inputs: Left / Right balanced XLR Output: MPX sample</p>	<b>OPTIONAL</b>
<p><b>5-Bands Audio Processor</b> Embedded 5-bands digital audio processor. AGC control, equalization, stereo enhancer, clipping control, and configurable compression.</p>	<b>OPTIONAL</b>
<p><b>10-Bands Audio Processor</b> Embedded state-of-the-art 10-bands digital audio processor. Dynamic span control for each of the 10 bands, equalization, clipping control, and configurable compression.</p>	<b>OPTIONAL</b>
<p><b>Audio Server</b> Integrated audio server in the WEB interface, allowing for the upload of files in various formats. The configurable player can activate predetermined playlists in case of loss of the main audio link, without the need for USB drives, memory cards, or other external hardware.</p>	<b>OPTIONAL</b>
<p><b>Enhanced RDS</b> Fully parameterized RDS generator with all advanced functionalities, such as unique station identification, station name transmission, program type classification, dynamic text message sending, precise time and date information provision, alternative frequency list, traffic bulletin indication, and other station transmission information. It also allows remote interactivity with information-generating devices via ASCII over IP or UECP over IP protocols, all in compliance with international RDS standards.</p>	<b>OPTIONAL</b>
<p><b>Audio Input via IP</b> Allows the two STREAMING ports on the modulator to operate independently as audio input via IP. Supports AAC, MP3, and MPX audio standards. Includes an embedded MPX digital encoder for L/R audio via IP or MPX audio for the modulator.</p>	<b>OPTIONAL</b>
<p><b>MPX OUTPUT VIA IP</b> Provides the MPX signal generated by the transmitter's audio encoder or processor via STREAMING output.</p>	<b>OPTIONAL</b>

## SRT PROTOCOL VIA IP

Supports the SRT (Secure Reliable Transport) protocol for secure and reliable audio transmission over the Internet.

Compatible with the latest streaming technologies, the transmitter allows connection to online broadcast servers and platforms, expanding content distribution possibilities and audience reach.

**OPTIONAL**

Includes support for SRT Caller and Listener for bidirectional communication, integrated encryption and authentication for advanced security, and ultra-low latency for real-time transmission.

## Dual Drive<sup>5</sup>

Backup modulator/exciter that enables automatic redundancy without the need of a separate control module.

**OPTIONAL**

## Extra 2,700 W Power Supply for Redundant Operation

The power drawer allows for the addition of an extra power supply in share mode for redundant power operation across all models of the E-Compact FM Line. With frontal access and plug-in connection.

**OPTIONAL**

## GPS Time Base

High-precision time base synchronization via GPS.

High performance for SFN (Single Frequency Network) operation.

Includes an external GPS antenna and surge protector.

**OPTIONAL**

## Remote Telemetry Device via 4G

Remote monitoring of the transmitter using GPRS / 3G / 4G cellular network, compatible with SNMP management software and email alerts for alarms and status. (Telemetry service contracted separately.)

**OPTIONAL**

## SPD (Surge Protection Devices)

Extra protection module against electrical network overvoltage surges, optional for models up to 5,000 Watts and standard for models above 5,000 Watts.

**OPTIONAL**

## S-Guardian Isolating Transformer

Protection device against electrical variations, including voltage spikes, noise, and interference.

Equipped with an electrostatic shield transformer and surge suppression devices, it provides superior electrical isolation from the power grid,

**OPTIONAL**

## General features

Standard 19" Rack;

Fully solid-state;

Air-cooled;

Automatic restart in case of power failure;

Operates in SFN (Single Frequency Network) and MFN (Multiple Frequency Network);

Control and management firmware for the entire equipment;

Access to settings and management of parameters via display interface on the front panel of the Exciter or remotely via Ethernet (WEB server or SNMP);

Alarm indication LEDs present on the front panel of the Exciter (FM9001), the Power Module (HPA) and the Dummy Load Module (DL);

Access to the list of current or past alarms via display interface on the front panel of the Exciter or remotely via WEB interface;

VSWR and Overpower protection via hardware and software, with automatic power reduction;

Software protection against module temperature increase, with alarm signaling and power reduction;

Automatic fan rotation speed control;

Power supply with PFC (Power Factor Correction) and soft start with In-Rush limitation.

## Models and their specific characteristics

	EC801MP	EC802MP	EC803MP	EC801HP	EC802HP	EC803HP	EC804HP	EC805HP	EC806HP	EC808HP
<b>RMS Power:</b>	1.200 W	2.400 W	3.600 W	5.000 W	10.000 W	15.000 W	20.000 W	25.000 W	30.000 W	40.000 W
<b>Typical AC Consumption <sup>2</sup>:</b>	1.710 W	3.430 W	5.140 W	7.140 W	14.280 W	21.420 W	28.570 W	35.710 W	42.850 W	57.140 W
<b>Typical Thermal Dissipation <sup>2</sup>:</b>	1.760 BTU/h	3.510 BTU/h	5.260 BTU/h	7.310 BTU/h	14.620 BTU/h	21.930 BTU/h	29.240 BTU/h	36.550 BTU/h	43.870 BTU/h	58.490 BTU/h
<b>Typical Efficiency <sup>2</sup>:</b>	70%									
<b>Supported Electrical Network:</b>	M220 B220 T220 T380						T220 T380			



	EC801MP	EC802MP	EC803MP	EC801HP	EC802HP	EC803HP	EC804HP	EC805HP	EC806HP	EC808HP
<b>Power Amplifier Model:</b>	PA801MP	PA802MP	PA803MP	PA804HP	PA804HP	PA804HP	PA804HP	PA804HP	PA804HP	PA804HP
<b>Power Amplifier Height:</b>	2 RU		3 RU	4 RU						
<b>Power Pallets per Power Amplifier:</b>	1	2	3	4						
<b>Power Amplifiers (HPA):</b>	1			2	3	4	5	6	8	
<b>PSU per Power Amplifier:</b>	1	2		3						
<b>Capacity of PSU(s) per Power Amplifier (Redundancy):</b>	2	3		4						
<b>RF Output Connector (50Ω):</b>	DIN 7/16" EIA 7/8" EIA 1 5/8"			EIA 7/8" EIA 1 5/8"		EIA 3 1/8"				
<b>Mounting:</b>	DESKTOP			RACK 19" or DESKTOP	RACK 19"					
<b>Number of Racks:</b>	-	-	-	1						2
<b>Height:</b>	3 RU		4 RU	8 RU	20 RU	24 RU	32 RU	36 RU	44 RU	32 RU
<b>Width:</b>	483 mm	483 mm	483 mm	516 mm	600 mm	600 mm	600 mm	600 mm	600 mm	1,200 mm
<b>Length:</b>	590 mm	590 mm	590 mm	816 mm	1,100 mm	1,100 mm	1,100 mm	1,100 mm	1,100 mm	1,100 mm
<b>Weight:</b>	30 Kg	35 Kg	40 Kg	45 Kg	210 Kg	350 Kg	420 Kg	500 Kg	600 Kg	800 Kg

## Technical Features

RF	
<b>Operating Frequency</b>	76 MHz to 88 MHz 88 MHz to 108 MHz
<b>Bandwidth</b>	200 kHz
<b>Minimum Operating Power</b>	1% of the rated power
<b>Power Stability</b>	±10%
<b>Carrier Generation</b>	NCO-based synthesis
<b>Frequency Stability</b>	±50 ppb
<b>Phase Noise</b>	≤-95 dBc/Hz @ 1 kHz

Harmonic and Spurious Attenuation Away from the Main Carrier without Modulation	
<b>From 120 kHz to 240 kHz</b>	>25 dB
<b>From 240 kHz to 600 kHz</b>	>35 dB
<b>&gt; 600 kHz</b>	>74 dB @ 1.200 W RF Out >77 dB @ 2.400 W RF Out >79 dB @ 3.600 W RF Out >80 dB @ ≥5.000 W RF Out

Modulation	
<b>Modulation Type</b>	FM DDS (Direct Digital Synthesis)
<b>Modulation Percentage</b>	100% @ ±75 kHz offset Frequency Response: 20 Hz to 100 kHz Adjustable level; 0 dBu nominal
<b>Analog Input MPX IN</b>	BNC-FEMALE Connector Impedance: 10 kΩ Level: +4 dBu nominal Adjustable: -7 to +7 dBu
<b>Analog Input SCA IN</b>	Resp. de Freq.: Frequency Response: 57 kHz to 100 kHz Level: 2Vpp @ ±7.5kHz deviation BNC-FEMALE Connector Impedance: 10 kΩ Level: -0.8 dBu @ ±7.5kHz deviation

Audio Frequency Response	
<b>Amplitude response for frequencies from 50 Hz to 15 kHz within the established limits of pre-emphasis</b>	25 μs 50 μs 75 μs (Default) Maximum variation of ±1dB within the limits
<b>Flat harmonic distortion from 40 Hz to 15 kHz</b>	< 0,06%
<b>FM Noise from 50 Hz to 15 kHz</b>	< 70 dB @ 100% modulation
<b>AM Noise from 50 Hz to 15 kHz</b>	< 53 dB @ 100% modulation
<b>Analog audio input and composite signal</b>	20 Hz to 100 kHz +4 dBu @ 75 kHz modulation 75kHz @ 100% modulation

## External Synchronization References

**Automatic reference signal input detector** 10 MHz  
1 PPS  
BNC-FEMALE Connector  
Impedance: 50 Ω @10 MHz  
Level: -10 dBm to +10 dBm

**REF IN** Impedance: 10 kΩ @1 PPS  
Level: 3V3TTL (2.2V minimum)

Automatic impedance change on signal detection.

BNC-FEMALE Connector  
Selectable output signal:

**REF OUT** Impedance: 50 Ω @10 MHz  
Level: +8 dBm

Impedance: 10 kΩ @1 PPS  
Level: 3V3 TTL

## Audio / Stereophony Encoder (OPTIONAL)

**Analog Inputs LEFT IN RIGHT IN** Frequency Response: 20 Hz to 15 kHz  
Balanced XLR-FEMALE connector  
Impedance: 600 Ω  
Level: 0 dBu nominal  
Adjustable from -12 to +12 dBu)

**Digital Input AES-EBU IN** Balanced XLR-FEMALE connector  
Impedance: 110 Ω  
Vpto: 192 kSps  
Level: -22 dBfs:  
Adjustable: -50 dBfs to 0 dBfs

**Digital Input S/PDIF IN** BNC-FEMALE Connector  
Impedance: 75 Ω  
Vpto: 192 kSps  
Level: -22 dBfs:  
Adjustable: -50 dBfs to 0 dBfs

**Analog Output MPX OUT** Frequency Response: 20 Hz to 100 kHz  
BNC-FEMALE Connector  
Impedance: 100 Ω  
Adjustable: 0 Vpp to 5 Vpp

**Pilot Carrier Level** 19 kHz ±2 Hz  
Level from 0 to 12% modulation  
0.01% steps

**Pilot Carrier Phase** Adjustable (Step <1°)

**Suppression 19kHz/38kHz** < -63dB

**Separation between stereo channels** > 57dB

## GPS Antenna Input (OPTIONAL)

**Connector** SMA Female

**Impedance** 50 Ω

**Accessories** External antenna, cable, and surge protector

## Interface Ethernet<sup>1</sup> (OPTIONAL)

**Digital Audio Stream** RJ45 Connector (2 ports)  
RTP Receiver: Unicast RTP/UDP compatible receiver  
Decoder: HE-AAC (v.1 and v.2), MPEG-1 Layer 3 or raw PCM

## Interfaces

**Local equipment control interface** Graphic display 256x64 pixels  
Navigation cursor keys

**Modulation Monitoring** Total modulation information on the graphic display or on the WEB Interface

**Signal indication LEDs** Alarm LEDs on the Exciter (FM9001), the Power Module (HPA) and the Dummy Load Module (DL);

**Management (MNGT)** RJ45 Connector  
IEEE802.3u 10 Base-T /100Base TX format  
Ethernet<sup>1</sup> access WEB server and SNMP (Telemetry)

## Electrical Characteristics

**AC Input Voltage** 198~250 VAC  
220 VAC ±10% (Typical)

**AC Frequency** 47~66 Hz

**PFC** 0,98 (Typical),  
0,96 (>20% Load)

## Operating Environment Characteristics

**Operating Altitude** Up to 2,500 meters<sup>3</sup> above sea level

**Ambient Temperature** 0 °C to +50 °C  
(+25 °C recommended)

**Relative Humidity** 0 to 95% non-condensing

**Cooling of Power Amplifiers** Forced ambient air, front-to-back flow through high-volume integral fans

### Notes:

<sup>1</sup> Ethernet is a trademark of Xerox Corporation.

<sup>2</sup> Measurements in optimized channel and environment, may vary according to the operating frequency. Measured efficiency: AC/RF Out.

<sup>3</sup> Rated power up to 2,500m. Above 2,500m, consult the factory.

<sup>4</sup> Available only in the HP line; MCCB only in models EC802HP, EC803HP, EC804HP, EC805HP, EC806HP, EC808HP.

<sup>5</sup> Optional Dual Driver is available for 19" rack mount models (EC801HP-RACK, EC802HP through EC808HP).

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