

### FMi 402 - Technical Specifications : Technical Specifications

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#### RF SPECS

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**Output Power:****Range:****HD Radio only:**

1 kW to 1.4 kW (-20 dB HD signal injection ratio)

**FM + HD Radio:**

2 kW to 3.5 kW (-20 dB HD signal injection ratio)

**Exciter:**

Broadcast Electronics FXi 250 digital FM/HD exciter

**PA Efficiency:****HD Radio Only:**

40% or better at rated power

**FM+HD Radio:**

50% or better at rated power

**Overall AC Efficiency:****HD Radio only:**

20% or better at rated power

**FM + HD Radio:**

40% or better at rated power

**Frequency:****Range:**

87.5 MHz to 108 MHz, programmable in 10 kHz steps

**Stability:**

$\pm 150$ Hz,  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  using high accuracy internal oscillator. 10MHz and 1pps input for synchronization to external (GPS) reference. Automatic switching to internal oscillator if external reference fails.

**VSWR:**

Rated power into 1.5:1 VSWR, capable of operating in to higher VSWR with automatic power reduction, open and short circuit protected at all phase angles

**RF Harmonics Suppression:**

Internal harmonic filter meets or exceeds all FCC, IC, CE, CCIR and IEC215 requirements. Meets or exceeds standard NRSC-5A emission limits in all operating modes.

**Modulation Type:**

FM digitally synthesized direct to channel, HD digital direct to channel, FM + HD Radio digital direct to channel.

**Operation Modes:**

On the fly mode switching between FM only, FM + HD Radio, and HD Radio only.

**FM Modulation Capability:**

Great than  $\pm 300$  kHz

**Synchronous AM S/N Ratio:**

50dB minimum below equivalent 100% amplitude modulation with 75us de-emphasis and 400Hz high pass filter (FM deviation  $\pm 75$ kHz by a 400Hz sine wave). 60dB typical below equivalent 100% amplitude modulation with 75us de-emphasis and 400Hz high pass filter (FM deviation  $\pm 75$ kHz by a 400Hz sine wave).

**Asynchronous AM S/N Ratio:**

55dB minimum below equivalent 100% amplitude modulation by 400Hz using 75us de-emphasis (no FM modulation present). 72dB typical minimum below equivalent 100% amplitude modulation by 400Hz using 75us de-emphasis (no FM modulation present).

**Impedance:**

50 ohm

**Regulatory:**

Meets or exceeds all FCC requirements

#### AUDIO SPECIFICATIONS WITH FXI 250 DIGITAL EXCITER

# Broadcast Electronics

## Technical Specifications

### Modes:

Stereo, mono (L+R), L only, R only; remote selectable

### Stereo Performance (AES or analog inputs):

#### Pre-Emphasis:

Selectable None, 50 or 75 microseconds

#### Stereo Pilot Tone:

19kHz  $\pm$  0.03Hz; injection level adjustable 0% to 15% in 0.1% steps; Nominal: 9%; Suppression: 38kHz, 57kHz, 76kHz, and 95kHz; 80dB below  $\pm$  75kHz deviation.

#### Stereo Separation:

65dB or better, 20 to 15kHz

#### Dynamic Stereo Separation:

65dB or better, 20 to 15kHz

#### Amplitude Response:

0.1dB, 20Hz to 15kHz

#### Signal to Noise Ratio:

87dB or better below 100% modulation at 400Hz; measured in a 20Hz to 22kHz bandwidth with 75us de-emphasis and DIN "A" weighting.

#### Total Harmonic Distortion:

<.03%; 20Hz to 15kHz, in bandwidth 20Hz to 22kHz; with 75us de-emphasis

#### Intermodulation Distortion:

##### CCIF:

<.03% or less (14/15kHz 1:1)

##### SMPTE:

<.03% (60 and 7kHz 1:1)

#### Transient Intermodulation Dist:

<.03%; (2.96kHz square wave/14kHz sinewave modulation)

#### Linear Crosstalk:

90 dB below 100% modulation reference

#### Non-Linear Crosstalk:

80 dB below 100% modulation reference

#### Audio Overshoot:

<.2dB

### Mono Performance (AES or analog input):

#### Pre-Emphasis:

Selectable None, 50 or 75 microseconds

#### FM Signal to Noise Ratio:

95dB or better below 100% modulation at 400Hz; measured in a 20Hz to 22kHz bandwidth with 75us de-emphasis and DIN "A" weighting.

#### Amplitude Response:

$\pm$ .1dB, referenced to selected pre-emphasis curve.

#### Intermodulation Distortion:

##### CCIF:

.03% or less (14/15kHz 1:1)

##### SMPTE:

.03% or less (60/7kHz 1:1)

#### Transient Intermodulation Dist:

.03% or less (2.96kHz square wave/14kHz sine wave)

### Composite Analog Input:

#### FM Signal to Noise Ratio:

95dB or better below 100% modulation at 400Hz; measured in a 20Hz to 22kHz bandwidth with 75us de-emphasis and DIN "A" weighting.

#### Amplitude Response:

$\pm$ .01dB, 20Hz to 53kHz;  $\pm$ .1dB, 53kHz to 100kHz

#### Total Harmonic Distortion:

.005% or less over stereo sub band (10Hz to 53kHz) with 75us de-emphasis.



**Intermodulation Distortion:****CCIF:**

.005% or less (14/15kHz 1:1)

**SMPTE:**

.005% or less (60/7kHz 1:1)

**Transient Intermodulation Dist:**

.005% or less (2.96kHz square wave/14kHz sine wave)

**Slew Rate:**

11.8V/us-symmetrical

**Phase Response Variation:**

$\pm 0.05^\circ$  from linear phase, 10Hz to 100kHz

**Group Delay Variation:**

$\pm 5$ ns, 22Hz to 53kHz,  $\pm 30$ ns, 53kHz to 100kHz.

**External SCA, RBDS Performance:****SCA Format:**

Externally generated, analog FM subcarriers in the range 53-99kHz.

**SCA Sub-band Amplitude Response:**

$\pm 0.5$ dB; 40kHz to 100kHz.

**SCA Channel FM Signal to Noise Ratio:**

80dB below +6kHz subcarrier deviation at 400Hz with 150us de-emphasis.

**Harmonic Distortion:**

Less than .2% in audio pass-band of SCA generator

**Intermodulation Distortion:**

SMPTE(60 and 7kHz, 1:1): 0.2% or less, no pre/de-emphasis, SCA generator low-pass filter bypassed.

**Crosstalk:****SCA to Stereo:**

80dB below 100% modulation, L or R channel with 75us de-emphasis.

**Stereo to SCA:**

80dB below 100% modulation referenced to  $\pm 6$ kHz deviation and 150us de-emphasis

**SCA to SCA:**

80dB below 100% modulation referenced to  $\pm 6$ kHz deviation and 150us de-emphasis per channel.

**Dual Internal SCA Performance:****Pre-Emphasis:**

Selectable: 150us, 75us, 50us, none

**Amplitude Response:**

$\pm 0.5$ dB; 20Hz to 7kHz.

**Subcarrier Frequency:**

57kHz to 99kHz

**Signal to Noise Ratio:**

80dB with de-emphasis(150us).

**Total Harmonic Distortion:**

.1% 10Hz to 5kHz

**SCA Deviation Capability:**

1kHz to 10 kHz; software programmable.

**Injection Level:**

2% to 15%, software adjustable in 0.1% increments

**Spurious & Harmonic:****2nd Harmonic:**

Better than 40dB below subcarrier

**3rd Harmonic:**

Better than 45dB below subcarrier

**All other components:**

50Hz to 100kHz: better than 80dB below subcarrier.

# Broadcast Electronics

## Technical Specifications

### **RBDS Generator (Internal):**

#### **Subcarrier Frequency:**

57kHz,  $\pm 0.1$ Hz

#### **Injection Level:**

2% to 15%, software adjustable.

### **MECHANICAL/PHYSICAL**

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#### **Size:**

30.64"W x 30"D x 64"H (77.83 W x 76.2 D x 162.56 H cm)

#### **Weight:**

575 lbs (261 kg)

#### **Heat Dissipation:**

##### **HD Radio Only:**

3400 watts (11,625 BTU/Hr) @ 1500 watts RF output

##### **FM + HD Radio:**

4900 watts (16,800 BTU/Hr) @ 3500 watts RF output

#### **RF Output Connector:**

1-5/8" EIA flange

### **ENVIRONMENTAL**

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#### **Ambient Temperature Range:**

+32°F to +122°F (0°C to 50°C)

#### **Altitude:**

To 10,000 feet (3050m) elevation above mean sea level, 60Hz operation; To 7500 feet (2286m) elevation above mean sea level, 50Hz operation

#### **Humidity:**

To 95% Non-Condensing

### **ELECTRICAL**

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#### **AC Input Voltage:**

##### **3 Phase, Closed Delta:**

196-252 VAC, 50/60 Hz

##### **3 Phase, 4 wire, WYE:**

339-437 VAC, 50/60 Hz

##### **Single Phase:**

196-252 VAC, 50/60 Hz

#### **Power Factor:**

.99 or better at 230 VAC

#### **Current Draw:**

##### **3 Phase:**

###### **HD Radio Only:**

20 amps

###### **FM+HD Radio:**

25 amps

##### **Single Phase:**

###### **HD Radio Only:**

35 amps

###### **FM+HD Radio:**

45 amps

#### **AC Power Consumption:**



# Broadcast Electronics

## Technical Specifications

**HD Radio Only:**

4.9 kW @ 1.5 kW RF output

**FM + HD Radio:**

8.4 kW @ 3.5 kW RF output

**ALL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE**

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