GENERAL

RF Output Power
As required to meet the HD Radio power specifications given on the individual transmitter specification sheets.

The VS-HD exciter is not specified for analog operation.

RF Frequency Range
87.5 MHz to 108 MHz
Digitally programmable via transmitter in 10 kHz steps

RF Terminating Impedance
50 ohms unbalanced
BNC jack (VSWR protected)

RF Output Monitor
-30 dBc, BNC jack

Frequency Stability
± 250 Hz
0°C to +50°C ambient temperature range

Modulation Type
Direct Digital Synthesis (DDS) using a 32-bit NCO
Direct-to-channel RF generation at 635 MS/s with a 16-bit DAC.

Modulation Capability
160% (4 dB) ±75 kHz reference standard;
±300 kHz modulation capable upon request.

VSHD EXCITER/TRANSMITTER INTERCONNECTIONS
Several cables must be connected between the VSHD exciter and the associated VS transmitter to ensure proper operation. These are provided with the VSHD exciter.

Transmitter Link
Cat 5e cable

AES/EBU From Audio Over IP
D-sub to D-sub cable

Transmitter RF Sample
BNC to SMA cable

RF Out
BNC to BNC cable

AC INPUT
Voltage
Universal Input, 85 Vac - 264 Vac, single phase, 47-63Hz

Power Consumption
The typical VSHD power consumption is included in the power consumption section of the associated VS transmitter specification sheet for IBOC operation.

Power Factor
Unity Power Factor Corrected (typically 0.98)

PHYSICAL
Weight
19 lbs (8.6 kg)

Dimensions
Standard 19" EIA rack mountable box
19” W x 3.5” H x 22” D
(48.3cm x 8.9cm x 55.9 cm)

ENVIRONMENTAL
Operating Temperature
0°C to +50°C (32°F to 122°F)

Derate 3°C (5.4°F) per 500m above sea level or 2°C (3.6°F) per 1000 feet

FM Signal-to-Noise Ratio (L or R)
80 dB below 100% modulation (reference 400 Hz, measured in 22 Hz to 22 kHz bandwidth with 75 µs de-emphasis and DIN 'A' weighting)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
Stereo Total Harmonic Distortion (L or R) 0.025% or less, 30 Hz to 15 kHz, measured in 22 Hz to 22 kHz bandwidth with 75 µs de-emphasis

Stereo Crosstalk 60 dB below 100% (30 Hz to 15 kHz). Modulation reference: L+R to L-R and L-R to L+R

Intermodulation Distortion (L or R) CCIF: 0.008% or less (14/15 kHz, 1:1) SMPTE: 0.025% or less (60 Hz and 7,000 Hz, 1:1)

Transient Intermodulation Distortion (DIM) (L or R) 0.05% or less (2.96 kHz square wave/14 kHz sine wave)

Stereo/Monaural Mode Control Monaural mode selectable using left channel

STEREO PERFORMANCE WITH ANALOG STEREO INPUT

Input Connector DB15 male

Input Impedance Balanced, no transformers, 600 ohms

Input Level -12 dBu to 12 dBu for 100% modulation

Input Quantization Sampled at 77.5 kHz with 24-bit ADC

Pre-Emphasis 0 µs, 25 µs, 50 µs or 75 µs, user selectable

Pilot Carrier 19 kHz ±0.01 Hz, programmable 6% to 12% injection level. Available on rear panel as TTL or 1 Vp-p sine wave. Pilot phase may be referenced to GPS 1 PPS (BNC) and adjusted with 1° resolution.

38 kHz Suppression 80 dB below ±75 Hz deviation reference

Stereo Total Harmonic Distortion (L or R) 0.025% or less, 30 Hz to 15 kHz, measured in 22 Hz to 22 kHz bandwidth with 75 µs de-emphasis

Amplitude Response (L or R) ±0.2 dB, 30 Hz to 15 kHz referenced to 0 dB at 400 Hz

FM Signal-to-Noise Ratio (L or R) 80 dB below 100% modulation (reference 400 Hz, measured in 22 Hz to 22 kHz bandwidth with 75 µs de-emphasis and DIN ‘A’ weighting)

Stereo Total Harmonic Distortion (L or R) 0.025% or less, 30 Hz to 15 kHz, measured in 22 Hz to 22 kHz bandwidth with 75 µs de-emphasis

Stereo Crosstalk 50 dB below 100% (30 Hz to 15 kHz). Modulation reference: L+R to L-R and L-R to L+R

Intermodulation Distortion (L or R) CCIF: 0.008% or less (14/15 kHz, 1:1) SMPTE: 0.025% or less (60 Hz and 7 kHz, 1:1)

Transient Intermodulation Distortion (DIM) (L or R) 0.05% or less (2.96 kHz square wave/14 kHz sine wave)

Stereo/Monaural Mode Control Monaural mode selectable using left channel

MONAURAL PERFORMANCE WITH DIGITAL OR ANALOG INPUTS

Amplitude Response (L or R) ±0.2 dB, 30 Hz to 15 kHz referenced to 0 dB at 400 Hz

FM Signal-to-Noise Ratio 90 dB below 100% modulation (reference 400 Hz at ±75 kHz deviation with 75 µs de-emphasis and DIN ‘A’ weighting in 22 Hz to 22 kHz passband)

Stereo Separation Better than 70 dB, 30 Hz to 15 kHz

Harmonic Distortion 0.005% or less at 400 Hz measured in 22 Hz to 22 kHz bandwidth with 75 µs de-emphasis

WIDEBAND COMPOSITE OPERATION

Input Connector BNC connector, balanced

Input Impedance 10,000 ohms

Input Quantization Sampled at 620 KS/s with 16-bit ADC

Input Level 1 Vpp to 5 Vpp; 3.5 Vpp nominal for 100% modulation

Amplitude Response ±0.2 dB, 20 Hz to 100 kHz

Phase Response ±0.1° from linear phase, 20 Hz to 100 kHz

FM Signal-to-Noise Ratio 90 dB below 100% modulation (reference 400 Hz at ±75 kHz deviation with 75 µs de-emphasis and DIN ‘A’ weighting in 22 Hz to 22 kHz passband)

Total Harmonic Distortion 0.005% or less, (reference 400 Hz at ±75 kHz deviation with 75 µs de-emphasis and DIN ‘A’ weighting in 22 Hz to 22 kHz passband)

Stereo Separation 50 dB, 20 Hz to 15 kHz
### SCA (RBDS/RDS) PERFORMANCE

**Input Connector**
Two BNC female connectors

**Input Impedance**
10,000 ohms unbalanced

**Input Level**
1 Vpp to 5 Vpp; 1.24 Vrms nominal for ±7.5 kHz deviation

**Amplitude Response (L or R)**
±0.2 dB, 20 Hz to 100 kHz

**Subcarrier Frequency Range**
53 kHz to 99 kHz stereo
20 kHz to 99 kHz monaural

### SCA Generator PERFORMANCE

**Input Connector**
DB9 female, RS-232 (DCE, 75 to 115.2 kbps)

**Frequency**
57 kHz ±0.03 Hz

**Injection Level**
0% to 10%, user adjustable

**Programming**
ASCII, UECP

**Supported Commands**
PI, PS, PTY, PTYN, TA, TP, MS, DI, RT, AF, ODA (Free-format)

### HD Radio Compatibility

VSHD generates complete hybrid waveform with analog FM and digital IBOC components.

Exciter accepts LVDS IQ stream and 10 MHz frequency reference from Nautel Exgine and Exporter Plus.

**Exgine**
Exgine card is included as standard with VSHD

**Input Connectors**
RJ45 (LVDS IQ), BNC (GPS 10 MHz)

### Notes:
Specifications established with transmitter at rated power unless otherwise noted.
All measurements in 50 ohm resistive load
AC input voltage at nominal level.

### SCA (RBDS/RDS) SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE