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

AUDIO SPECIFICATIONS

STEREO PERFORMANCE WITH DIGITAL AUDIO INPUT

Input Connector

One XLR female and one DB15 male

AES/EBU Input Impedance

110 ohms, balanced

Input Level

0 dBfs to -16 dBfs (adjustable to -25.5 dBfs) for 100% modulation

Data Format

AES/EBU; 16-bit to 24-bit resolution

Data Rate

20 kHz to 192 kHz

Pilot Carrier

19 kHz ±0.01 Hz, programmable 6% to 12% injection level. Available on rear panel BNC as 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 Separation

Better than 70 dB, 30 Hz to 15 kHz

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
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 Separation
Better than 70 dB, 30 Hz to 15 kHz

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)

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

VSHD Digital Exciter

Making Digital Broadcasting **Work** PHONE +1.902.823.2233 FAX +1.902.823.3183 info@nautel.com www.nautel.com

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
DB15 Male

Input Impedance
2 balanced, 600 ohms

Input Level
-12 dBu to 12 dBu for ±7.5 kHz deviation

Amplitude Response
±0.02 dB, 30 Hz to 7.5 kHz

Pre-Emphasis
0 µs, 50 µs, 75 µs or 150 µs

Signal-to-Noise Ratio
60 dB or better

Frequency
20 kHz to 99 kHz, adjustable in 1 Hz steps

Modulation
Narrow band FM with maximum deviation of ±7.5 kHz

Injection Level
0% to 20%, user adjustable

RDS/RBDS 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.

VSHD Front

VSHD Back