

Application Note

8VSB DTV Translator

Model Number: Xtreme Series 2000



INTRODUCTION

The XTREME SERIES 2000 is a cost effective DTV Translator designed to serve television broadcasters during the analog to digital transition. The DTV signal presents on/off like coverage. When the signal is present, a perfect HDTV signal is decoded by consumer set-top-box. But, when the signal power level is marginal, the picture may break-up, stutter, or become a dark picture. Under such condition where signal coverage is poor, the Xtreme Series 2000 DTV Translator can provide additional signal coverage and provide higher quality of 8VSB signal in shadowed area – behind hills and mountains.

Key Benefits

- Additional 8VSB Signal Coverage
- Minimized investment in DTV Translator

FUNCTIONAL DESCRIPTION

This unit is a 19” rack equipped with all the equipment needed to received, generate, test, and transmit an 8-VSB signal on an RF channel. The main features of the XTREME SERIES 2000 are as follows:

- ❑ Received an off-air 8VSB signal at its input
- ❑ Provides all the necessary equipment to put your 8-VSB DTV signal on-air
- ❑ Includes the following equipment:

Model Number	Description
VSB-FRQ-200	8-VSB Demodulator
VSB-ENC-200 Opt 325	8-VSB Modulator with Linear and Non-linear Pre-correction & RF Up-Conversion
VSB-AMP-100W	8-VSB 100 Watt RF Amplifier
BPF-UHF-CHXX	DTV Mask Filter

- ❑ Can be changed to a lower power output level
- ❑ Equipment is contained in a rugged black textured steel 19” portable cabinet with front and back panels
- ❑ Remote Control via RS232C
- ❑ 1 year parts and labor limited warranty

EQUIPMENT DESCRIPTIONS

VSF-FRQ-200

This unit performs an 8VSB off-air reception and demodulation of the input signal. The demodulated signal is processed with RS error correction decoding, trellis decoding, equalization and digital matched filtering to clean up channel multipath and noise errors. An MPEG2 transport stream is generated and SMPTE-310M, DVB-ASI signals are generated as outputs. This unit also performs PSIP modification for Major Channel Number, Minor Channel Number, and Station ID. Thus, in case user needs to modify the PSIP information, this capability is included.

VSF-ENC-200

The VSB-ENC-200 is an 8-VSB Modulator that modulates an MPEG2 transport stream into an 8-VSB signal using linear and nonlinear pre-correction techniques. This unit accepts SMPTE-310M at 19.392 Mbps transport stream inputs and produces an RF (VHF/UHF) channel, specified by customer, at its output. The unit also includes an opt 325 linear and non-linear precorrector. The linear precorrector corrects degradations caused by filters and other linear distortions. The non-linear precorrector algorithm works by estimating non-linear response of a target power amplifier. The pre-correction is done automatically without external equipment. The VSB-ENC-200 complies with the ATSC A53 specification for 8-VSB modulation for terrestrial broadcast of a high definition digital TV signal.

VSF-AMP-100W

The VSB-AMP-100W is an 100W average amplifier was designed to meet power amplifier requirements for DTV Translator using LDMOS technology. All signal interface and control lines required by the FCC in Part 73 and 74 are provided. The RF amplifier is set for either the VHF or UHF band by KTech, thus the users must specify VHF or UHF band when ordering.

BPF-UHF-CHXX

The DTV Mask – Band Pass Filter removes spurious signals so that the final RF output meets FCC specifications. Figure 1 below shows the band pass characteristics of this 8-pole Cheychev filter.

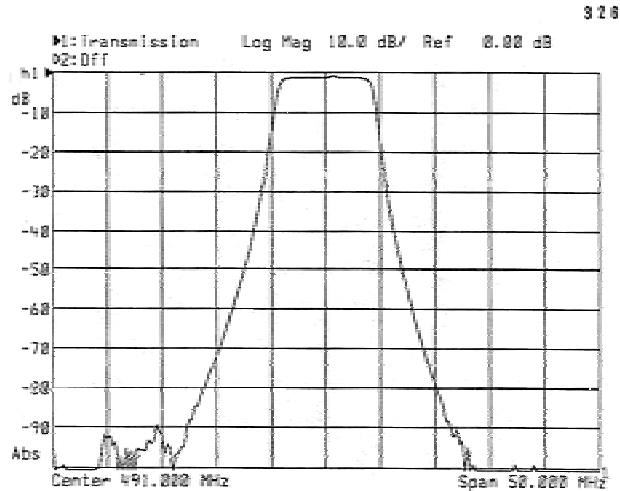


Figure 1: Band Pass Characteristics

The FCC Spectrum Mask is shown below in Figure 2 for reference.

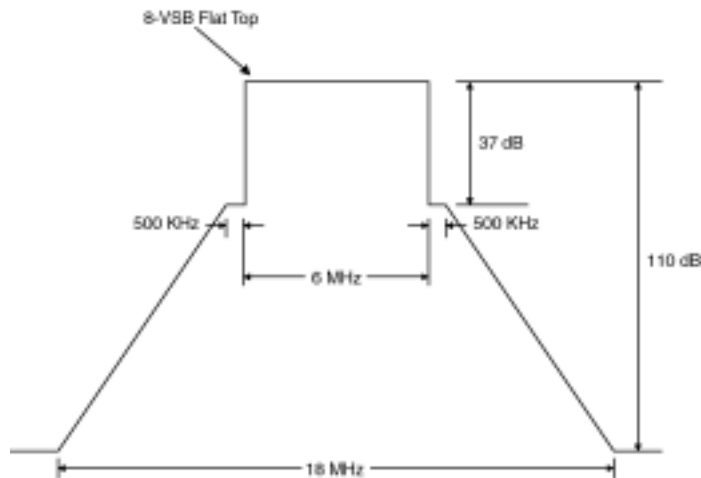
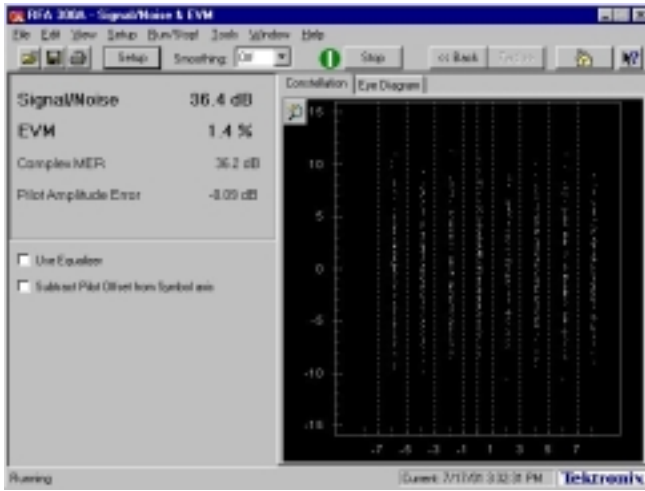


Figure 2: FCC Spectrum Mask

It should be noted that at the time the order is submitted, the channel number for the DTV mask/band pass filter must be specified.

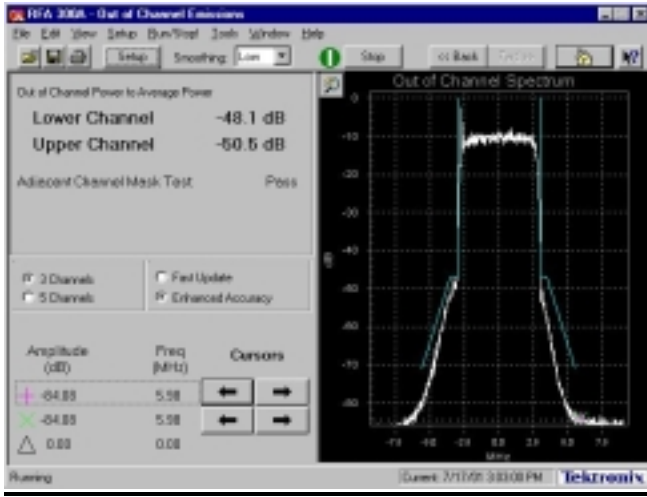
Performance Measurements



Signal Constellation



Phase Noise



Spectrum

APPLICATIONS

The XTREME SERIES 2000 is being used as a DTV Translator with an 8-VSB terrestrial signal as its source. A block diagram of the signal flow through the XTREME SERIES 2000 is shown below in Figure 5:

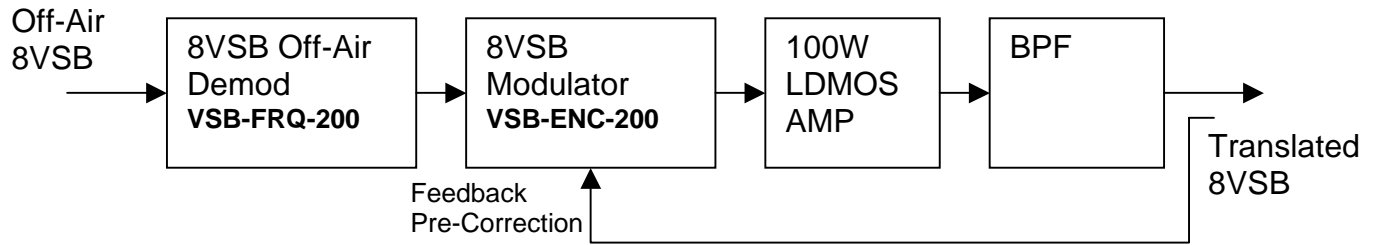


Figure 5: Block Diagram of DTV Translator with 8-VSB RF Source

The 8-VSB terrestrial signal is received by the VSB-FRQ-200 8-VSB to SMPTE-310M Converter, and the PSIP Virtual Channel Table's (VCT) Station ID, Major and Minor Channel Numbers are updated. The updated signal is made available at the SMPTE-310M output of the VSB-FRQ-200. This signal drives the 8-VSB Digital Modulator that modulates the MPEG2 TS into the desired channel frequency. The RF output is connected to the 100W Power Amplifier that amplifies the signal to 100 watts average. The RF output of the VSB-AMP-100W is passed through the Band-Pass-Filter to filter out distortions caused by the amplifier. The output of the BPF-UHF-5P is connected to a Translator antenna for the output.

SPECIFICATIONS (subject to change without notice)

General Specifications

	Specification	Comments
AC Power		
Voltage	220V	
Frequency	50/60 Hz	
Current	10A Max	5A typical @ 25°C
Operating Conditions		
Temperature	0°-50°C	
Altitude	12,000 ft	Max
Humidity	95%	Non-condensing
Cooling	Individual Fans	Forced Convection
Weight		
Net	700 lbs.	
Gross	850 lbs.	Shipping weight
Cabinet Dimensions		
Height	55"	
Width	22"	
Depth	29.5"	
Panel Space	49"	
Cabinet Materials & Features		
Panels & Frame	Black Textured Steel	
Door	Standard Locking	
Power	6 outlet power strip with 6 ft. power cord	UL Approved
Rails	4	@ front and rear panels
Blower	Positive Pressure Airflow System	
Casters	Ball bearing swivel, locking wheels	
Bottom Panel	8.5" diameter opening	for cables and cords

100W Average Amplifier

	Specification	Comments
RF Performance		
Frequency	470-815 MHz	covered in 4 bands
Power Output	100 Watts	average power
Load Mismatch	10:1 VSWR	at all phases, circular protected
Drive Level	-10 dBm	nominal
AC Power		
Voltage	220 VAC	
Frequency	50/60 Hz	
Current	10A Max	
Connectors		
AC	I/O type N pin	
	3-wire twist lock	

Modulator

	Specification	Comments
Mode		8-VSB
Compliance	ATSC Spec	Per ATSC A53 Document
IF Output Specification		
Center Frequency	44.0 MHz	
Pilot Location	Right Hand Side	
Phase Noise	-105 dBc @20KHz	
Roll-off	11.5%	
Impedance	50 ohms	
Power	-18 dBm	Nominal
Spurs	Better than -50 dBc	
Band Attenuation	-50 dB @ ± 3MHz	
In-Band SNR	37 dB	Typical
Pre-correction		
Linear distortion	500 nsec	Group Delay
	8 dB	magnitude tilt
Non-Linear Distortion	3 dB	Typical IMD level improvement
In-band SNR	30 dB	Measured by VSA

SMPTE-310M Serial Interface (Baseband Data Input/Output)

	Specification	Comments
Connector	BNC	
Source Impedance	75 ohms	
Output Coupling	AC	AC inductively coupled
Signal Overshoot	<10%	
Data Format	Biphase Mark Coding	
Transport Stream Bit Rate	19.39265 Mbps	Raw serial data rate ± 2.8 ppm

Demodulator (VSB-FRQ-200)

	Specification	Comments
Mode		8-VSB Terrestrial
Equalizer Span	-5.9µS to +40µS	
Data Rate	19.392658 Mbps	
AdjacentChannel Rejection		TBD
Co-channel Rejection		TBD
SNR Threshold	15dB	

PSIP Update (VSB-FRQ-200)

	Specification	Comments
Virtual Channel Table (VCT)	Major Channel Number Minor Channel Number Station Identification	Front panel adjustment

Ordering Information

Part Number	Description
XTREME SERIES 2000	100W Average DTV Translator

Additional Information at KTech Web Site: www.ktechtelecom.com
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