AdvancedDigital Inc.

AMIGO- 8VSB (ATSC) digital Modulator

With Linear & Non-Linear Pre-Distortion for HDTV 8-VSB Transmitter

Overview

The LUMANTEK line of Solid State VHF/UHF 8VSB Digital Modulators offers an unparallel combination of features and reliability. It can be used as a DTV broadcast modulator, tester, or the head end of an RF distribution network. It can accept input through its DVB-ASI and SMPTE-310M input ports. The state of the art 1RU design uses readily available RF components, enhancing ease of service and lowering cost.

What sets the AMIGO apart is its advanced functionality which includes Linear and Non Linear Precorrections and built-in TS processing capability allowing for Null-packet Extraction, Insertion, and PCR Restamping. The AMIGO offers better then < - 104 dBc @ 20Khz of phase noise with RF agile type upconverter.

Key Features

- FCC Compliance
- ATSC A.53 8-VSB Compliant
- ASI input over BNC 75Ω Connector up to 100Mbps
- SMPTE-310M Input with 19.39 Mbps
- Output Frequency 50~860 MHz
- Bandwidth 6Mhz
- Output Level -15.0 ~ +7.0 dBm
- RF Connection 50Ω, F Connector / TP-20dB
- Return Loss ≤ -15dB
- Null Packet Insertion
- Reference 10Mhz Input
- Null Packet Extract
- PCR Restamping
- TS Rate Monitoring
- RS232 control port to remote management
- User friendly LCD UI (with 4 line LCD)
- Digital Pre-distortion circuits.
- Non-linear pre-distortion circuits over a 20 MHz bandwidth
- Linear pre-distortion circuits to compensate output filter characteristics
- Reference 10Mhz Input
- Better then < - 104 dBc @ 20Khz

80 Finch Ave E.,Toronto, Unit 5, ON, M2N 4R3, Canada • Tel: +1 (416) 479-0480 • 1 (888) 401 3720 • Fax: +1 (416) 848-0716 • Email: sales@advanceddigital.ca
www.advanceddigital.ca

HDTV
8-VSB Transmitter

AMIGO

ASI/SMPTE-310M Input

DVB-ASI over BNC - 75 Ohm
- Comply with EN50083-9
- 188-byte / 204 byte
- 1 to 100 Mbps
- Auto Null packet insertion & extraction

SMPTE-310M over BNC-75 Ohm
- 19.39 Mbps Input
- Auto Null packet insertion & extraction

Reference 10Mhz Input

- 10Mhz Input

Physical & Power

Dimensions
- 1 RU (19" rack)
- Weight: 3.15 Kg
- All Aluminum case

Power
- Voltage 90-260V
- Power consumption: 60W Max

Environment

Temperature
- Operating : 0 ~ 60℃
- Storage : -40 ~ 70° C
- Humidity : 85% non-condensing
- Vibration and shock : In accordance with MIL-STD-810D

Control & Monitoring

Front Panel
- 4 line - 16 characters LCD display
- 4 cursor keys + 2 function keys

Remote Control
- RS 232 - 9 pin DIN

Modulation

Standard
- ATSC A.53

Modulation Scheme
- 8-VSB

Symbol rate
- Symbol rate 10.762MSps

IF Output

IF Modulator Output
- 44MHz
- Channel Bandwidth 6MHz
- Connector 50Ω F-type

RF Output

VHF/UHF Output

- Frequency : 50 ~ 860 Mhz 100Khz Step
- Level : -15.0 ~ +7.0 dBm
- Attenuation: 0.5 dB step

EVM (before equalizer) : <3% RMS (at RF) RF

Spurious Tones
- Better than -60 dB below output signal

RF Harmonics
- Better than -55 dB below output signal

RF Output connector
- F-type, 50Ω
- -20dB TP Output

Phase Noise (UHF Band)
- Better then < - 98 dBc @ 10Khz
- Better then < - 104 dBc @ 20Khz

MER : >38 dB

Take a Look!

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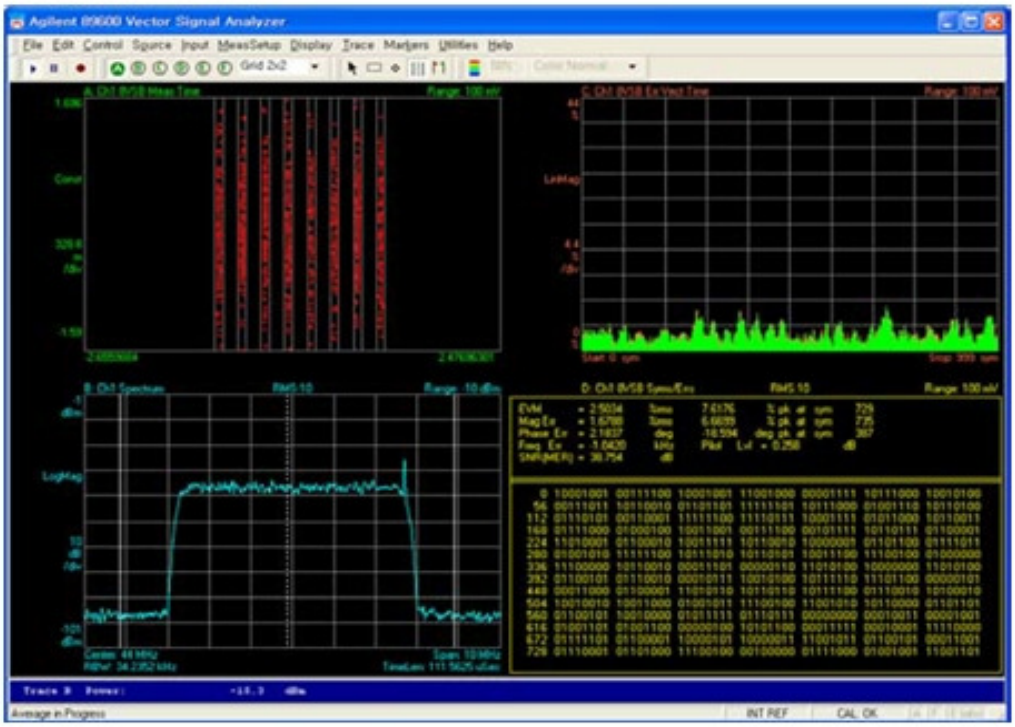
Measured by

Agilent 89600 Vector Scope



The LUMANTEK non-linear pre-distortion is a high efficiency method of compensating the gain and phase non-linearity of the transmitter RF power amplifier. Compensating the gain and phase nonlinearity will significantly reduce the in-band as well as out of band inter-modulation generated by the amplifier. The transmitters' coverage area will be extended, while easing the performance requirement from the transmitter output filter, used for suppressing the radiation in adjacent channels below the maximum allowed level.

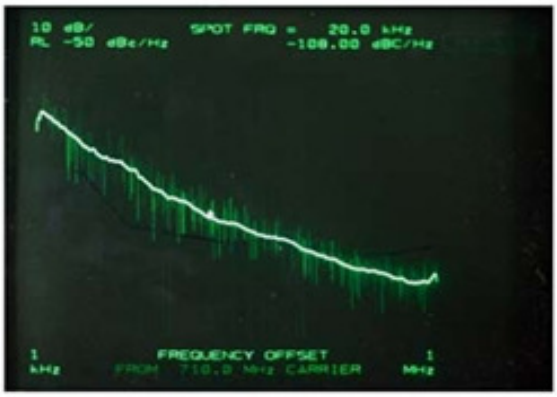
The Linear pre-distortion compensates group delay, level tilt and fluctuation over 20 MHz bandwidth caused by the transmitter channel filters. The linear optimization of the signal radiated from the transmitter means that the channel equalizer of the ATSC receiver may focus all its correction capacity on level and group delay errors originating from the actual transmission path.

The characteristics of the linear pre-distortion curves are set by means of an easy to use and highly intuitive graphical user interface, the Linear Corrector GUI software package with RS 232 interface of the ATSC modulator.

➤ AMIGO RF Performance- Phase Noise Performance at UHF Band by Agilent 8561E

Frequency Offset (MHz)	RF Power (dB)	Freq (KHz)	Phases Noise (dBc/Hz)
710.0 MHz	10 dB	10.0 KHz	- 101. 17 dBc/Hz

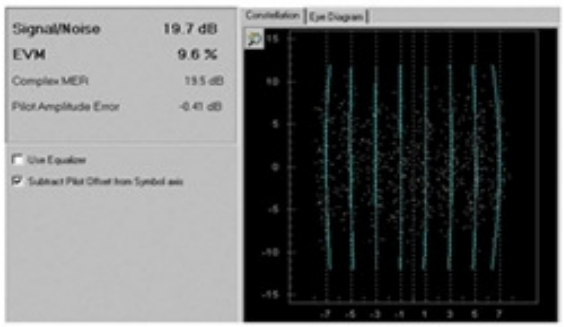
Frequency Offset (MHz)	RF Power (dB)	Freq (KHz)	Phases Noise (dBc/Hz)
710.0 MHz	10 dB	20.0 KHz	- 108. 00 dBc/Hz



➤ AMIGO - Linear & Non Linear Pre-Correction Test by Tektronics RFA300A

Step# 1 Test : Before Pre-distortion

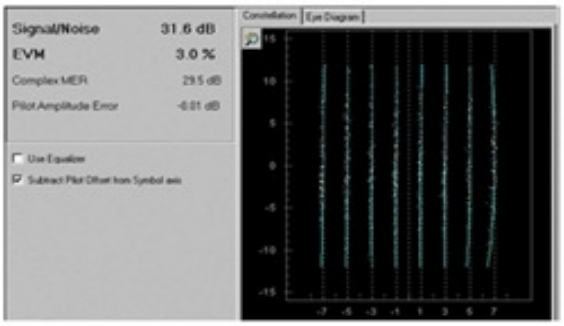
The following Exhibits are the uncorrected ATSC parameters on CH 30. A six section ATSC mask filter with a Power Amplifier of 30 watts was used . A Tektronix RFA 300A ATSC analyzer was used to make all the following exhibits



Step#1 CONSTELLATION

Step# 2 Test : After Pre-distortion

The next exhibits will demonstrate the capabilitie s of the Amigo correction circuits.
Manual correction is used with the Amigo and ac complishing these corrected ATSC parameters



Step#2 CONSTELLATION

➤ AMIGO - Linear & Non Linear Pre-Correction Test by Tektronics RFA300A

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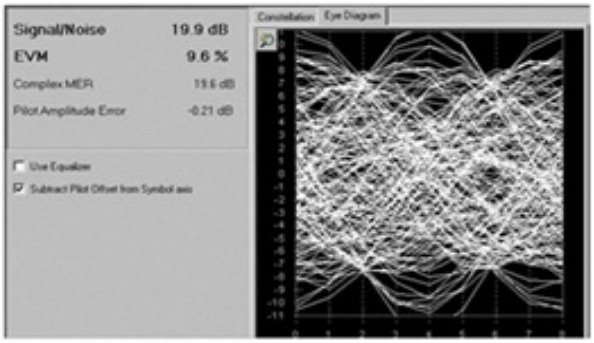

Step#1 EYE PATTERN

Step# 2 Test : After Pre-distortion

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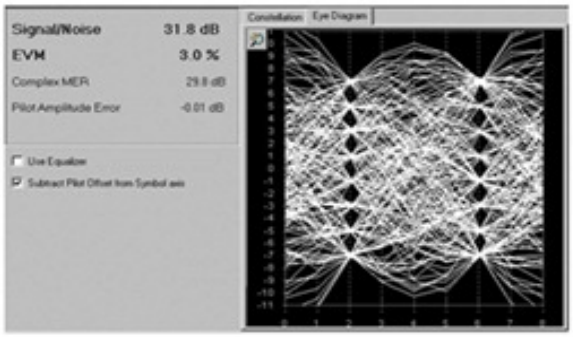

Step#2 EYE PATTERN

➤ AMIGO - Linear & Non Linear Pre-Correction Test by Tektronics RFA300A

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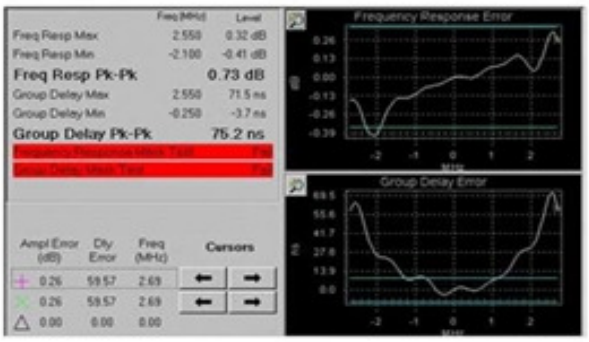

LINEAR AMPLITUDE AND GROUP DELAY

Step# 2 Test : After Pre-distortion

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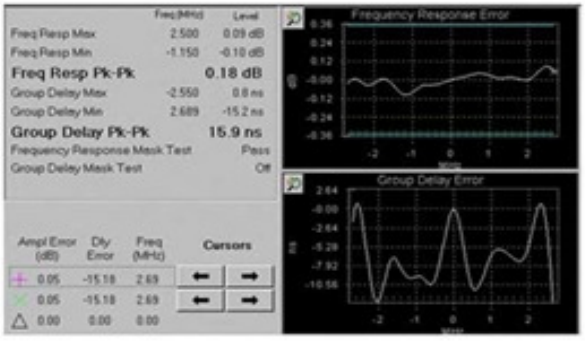

LINEAR AMPLITUDE AND GROUP DELAY

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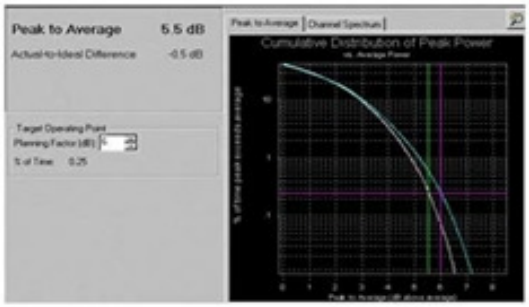

NON-LINEAR PEAK TO AVERAGE RATIO

Step# 2 Test : After Pre-distortion

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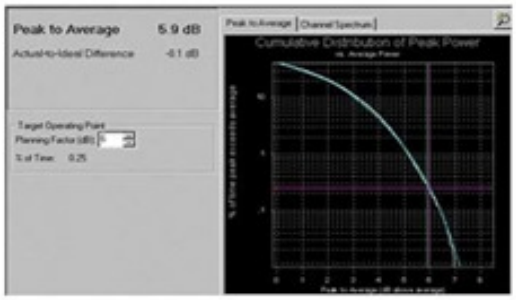

NON-LINEAR PEAK TO AVERAGE RATIO

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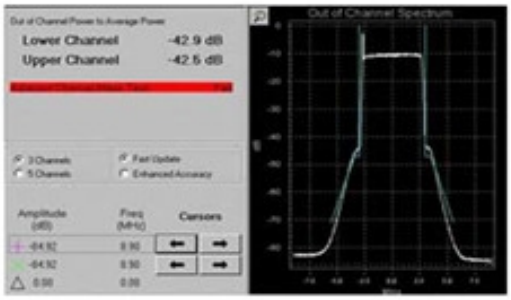

NEAR CHANNNEL MASK PERFORMANCE

Step# 2 Test : After Pre-distortion

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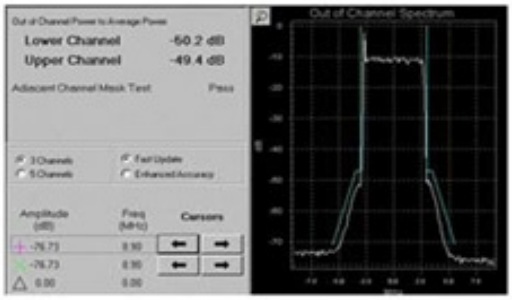

NEAR CHANNEL MASKERFORMANC