DTV TRANSMITTER PROOF OF PERFORMANCE

WHVL – DT

CHANNEL 27

January 17 2009

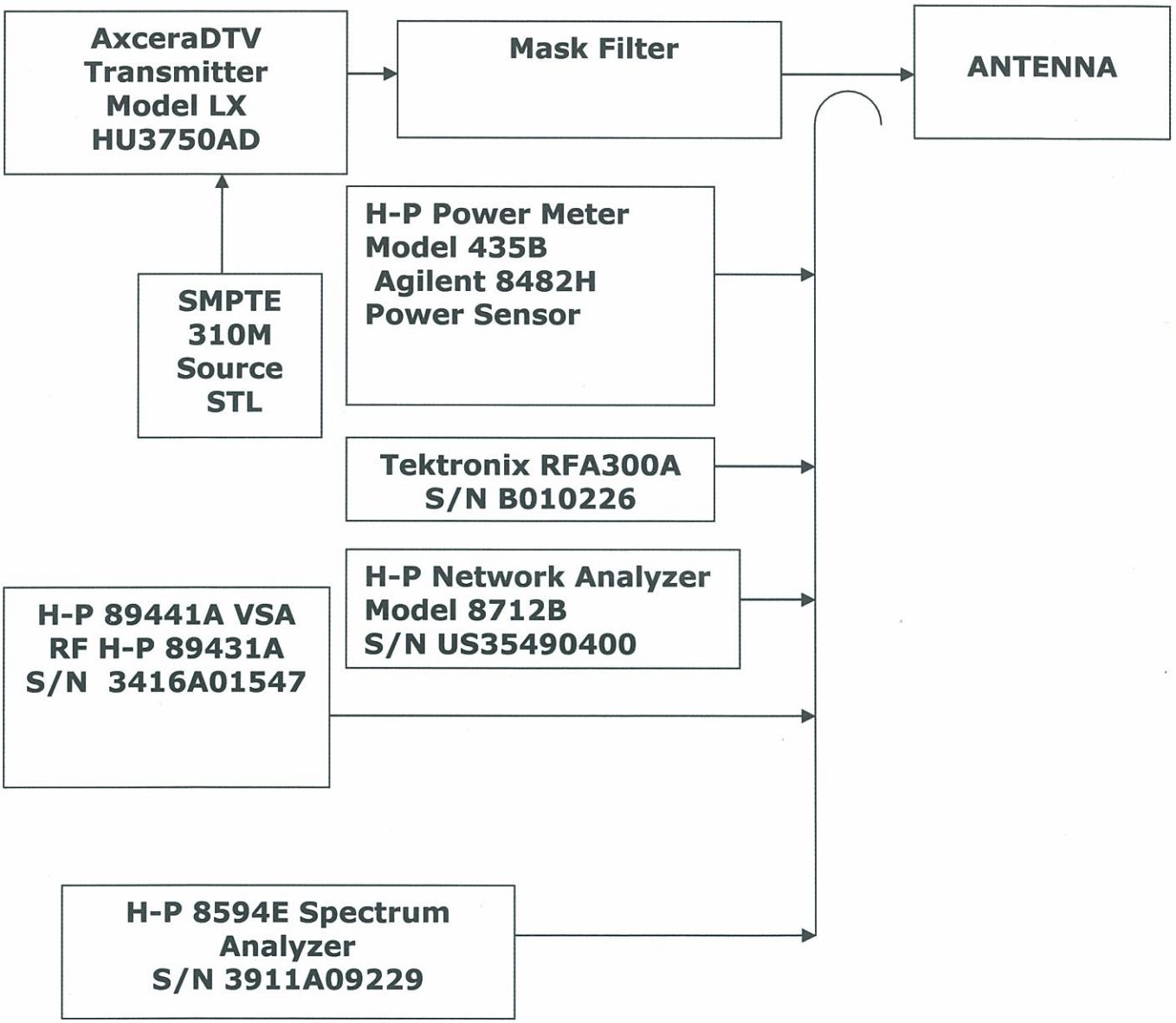
Report compiled by Jim Moore, Field Engineer
Axcera, LLC.

Licensee: WHVL-DT

State College, PA

Channel: 27

Test Equipment Configuration Figure 1.



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Note: Harmonic measurement sample taken before low pass and mask filter at transmitter combiner output.

Transmitter Power Output Metering Calibration

kilowatts = 1950 W.

H-P 435B Power Meter was connected to a precision coupled forward port located at the Station Load Input.

Transmitter output adjusted for 1950W reading on the H-P 435B power meter. Power metering display set on transmitter controller display for 100%.

105% Transmitter TPO: 1.05 X 1950 kW = 2047.5 kW. Power metering display indicated on transmitter controller 105 %.

95% Transmitter TPO: 0.95 X 1950 kW = 1852.5 kW. Power metering display indicated on transmitter controller 95%.

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MEASUREMENTS

Innovator HX Data Captured on 1/17/2009 @ 6:48:21 PM
using Axcera application 1306337 version 1.12.18

	Driver 1	Driver 2
001 Exciter Driver	Installed	Not Installed
002 Transmitter RF Output Status	Operate	
003 System Forward Power	100 % 1.95kw	
004 System Reflected Power	0.0 %	
005 Aural Upconverter Sled	Not Installed	
006 Modulator Sled	Not Installed	
007 IF Processor Sled	Not Installed	
008 Visual Upconverter Sled	Present	
009 Visual UC PLL 1 Status	Locked	
010 Visual UC PLL 2 Status	Locked	
011 Visual UC 10 MHz Reference	External	
012 Visual UC AFC #1 Voltage	0.08 V	
013 Visual UC AFC #2 Voltage	0.25 V	
014 Visual UC AGC #1 Voltage	0.74 V	
015 Visual UC AGC #2 Voltage	0.94 V	
016 Visual UC LO Frequency	595.00 MHz	
017 Visual UC Firmware Version	2.1	
018 Axciter Upconverter Sled	Present	
019 Axciter U/C Mute State	On	N/A
020 Axciter U/C Overdrive State	OK	N/A
021 Axciter U/C PLL Lock State	OK	N/A
022 Axciter U/C IF Input State	OK	N/A
023 Axciter U/C On-Air Status	On-Air	N/A
024 Axciter UC Firmware Version		
025 System Controller Supply	DC OK	
026 SC Remote & Local Controls	Local and Remote	
027 SC Aural UC IF Mute Status	On	
028 SC IF Processor Mute Status	On	
029 SC High Power Supply Enable	On	
030 SC Serial Address	5	
031 SC Model Number	HU03750AD	
032 SC Number of Errors	0	
033 SV Number of Faults	3	
034 SC V FRD PWR Fault Limit	0 %	
035 SC V RFL PWR Fault Limit	25.0 %	
036 SC Number of External Amps	6	
037 SC Run Time Hours	48.9 Hrs.	
038 SC Firmware Version	4.5	
039 Driver Power Amp Sled	Present	
040 Driver Power Amp Enabled	Enabled	
041 Driver PA Forward Power	68 %	
042 Driver PA Reflected Power	0.0 %	
043 Driver PA ICC #1	2.8 A	
044 Driver PA ICC #2	0.2 A	
045 Driver PA ICC #3	0.0 A	
046 Driver PA Supply Voltage	31.70 V	
047 Driver PA Hsink Temperature	42 C	
048 Driver PA +12V Supply	11.7 V	
049 Driver PA -12V Supply	-12.0 V	
050 Driver Power Amp Icc Status	OK	
051 Driver Power Amp Temperature	OK	
052 Driver Power Amp Supply	OK	
053 Driver Power Amp RFL Power	OK	
054 Driver Power Amp +/- 12V	OK	
055 Driver Power Amp Serial COM	OK	

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056 Driver PA Run Time Counter	47.9 Hrs.
057 Driver PA Firmware Version	1.9

057 External Power Amplifier Cabinet 1

058 Firmware Version	3.5
059 Cabinet Forward Power	88 %
060 Cabinet Reflected Power	0.1 %
061 Cabinet Average Forward Pwr	0 %
062 Cabinet AGC #2 Voltage	0.69 V
063 Cabinet Inlet Air Temperature	37 C (99 F)
064 Cabinet Exhaust Air Temperature	44 C (111 F)
065 Cabinet Circuit 1 Phase A	212 V
066 Cabinet Circuit 1 Phase B	211 V
067 Cabinet Circuit 1 Phase C	210 V
068 Cabinet Circuit 2 Phase A	212 V
069 Cabinet Circuit 2 Phase B	212 V
070 Cabinet Circuit 2 Phase C	213 V
071 Cabinet +12V Power Supply	12.2 V
072 Cabinet -12V Power Supply	-12.1 V
073 Cabinet Power Supply #1	Enabled
074 Cabinet SCR #1: Output	OK
075 Cabinet SCR #1: Current	OK
076 Cabinet SCR #1: Status	Ready
077 Cabinet Power Supply #2	Enabled
078 Cabinet SCR #2: Output	OK
079 Cabinet SCR #2: Current	OK
080 Cabinet SCR #2: Status	Ready
081 Cabinet Cooling System	OK
082 Cabinet Reflected Power	OK
083 Cabinet Enable Status	Enabled
084 Cabinet Blower Status	Enabled

085 Module Parameter	AMP1	AMP2	AMP3	AMP4	AMP5	AMP6	AMP7	AMP8
086 Module Present Status	Yes	Yes	Yes	No	No	Yes	Yes	Yes
087 Module Enable Status	ON	ON	ON	N/A	N/A	ON	ON	ON
088 Module Forward Power	92 %	93 %	88 %	N/A	N/A	92 %	88 %	88 %
089 Module Reflected Power	1.3 %	1.9 %	1.3 %	N/A	N/A	1.4 %	1.5 %	1.6 %
090 Module Driver Forward Power	97 %	106 %	86 %	N/A	N/A	89 %	111 %	90 %
091 Module Current Icc1 (Driver)	2.7 A	2.5 A	2.5 A	N/A	N/A	2.7 A	2.6 A	2.6 A
092 Module Current Icc2	12.0 A	11.6 A	11.3 A	N/A	N/A	12.2 A	11.0 A	11.8 A
093 Module Current Icc3	11.6 A	11.3 A	11.2 A	N/A	N/A	12.5 A	12.7 A	11.4 A
094 Module Current Icc4	12.2 A	11.4 A	12.3 A	N/A	N/A	12.8 A	12.6 A	11.6 A
095 Module Current Icc5	13.1 A	12.2 A	12.3 A	N/A	N/A	12.5 A	11.6 A	11.8 A
096 Module Current Icc6	2.7 A	2.7 A	2.7 A	N/A	N/A	2.7 A	2.7 A	2.7 A
097 Module Current Icc7	0.0 A	0.0 A	0.0 A	N/A	N/A	0.0 A	0.0 A	0.0 A
098 Module High Supply Voltage	29.7 V	29.7 V	29.9 V	N/A	N/A	30.0 V	30.1 V	30.0 V
099 Module Flange Temperature	66 C	64 C	65 C	N/A	N/A	68 C	66 C	63 C
100 Module Heat Sink Temperature	50 C	48 C	49 C	N/A	N/A	51 C	50 C	50 C
101 Module Icc Fault Status	OK	OK	OK	N/A	N/A	OK	OK	OK
102 Module Temp Fault Status	OK	OK	OK	N/A	N/A	OK	OK	OK
103 Module Supply Fault Status	OK	OK	OK	N/A	N/A	OK	OK	OK
104 Module Visual Reflected	OK	OK	OK	N/A	N/A	OK	OK	OK
105 Module +/- 12V Fault Status	OK	OK	OK	N/A	N/A	OK	OK	OK
106 Module Serial COM Status	OK	OK	OK	N/A	N/A	OK	OK	OK
107 Module Run Time	48.9 Hrs.	48.9 Hrs.	48.9 Hrs.			47.9 Hrs.	48.9 Hrs.	48.6 Hrs.
108 Module Firmware Version	3.1	3.1	3.1	N/A	N/A	3.1	3.1	3.1

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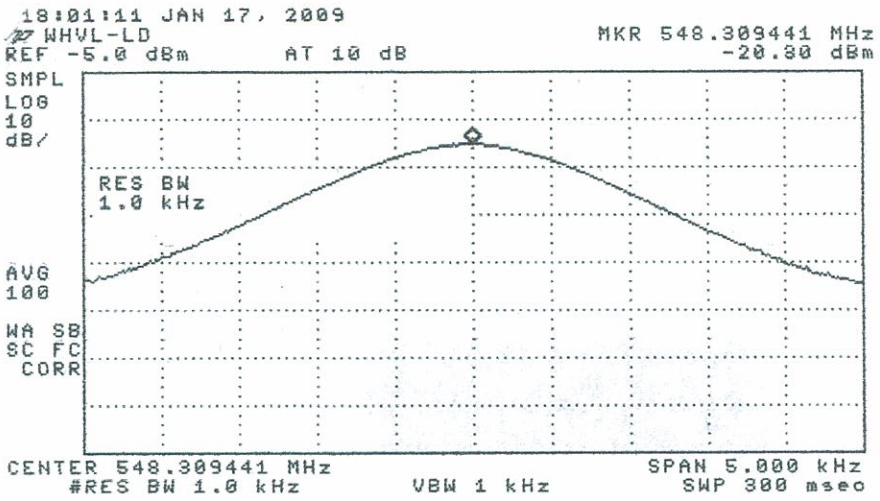
Pilot Frequency Measurement

H-P Spectrum Analyzer was utilized to verify the channel xx pilot frequency met the FCC required frequency stability of 548.309441 MHz. +/- 1000 Hz.

Please see figure 1. page 3 for test setup. Axcera provided test equipment was used for measurement. Measured pilot frequency:

Fig. 2, Exciter A Pilot Frequency 548.309441 Hz.



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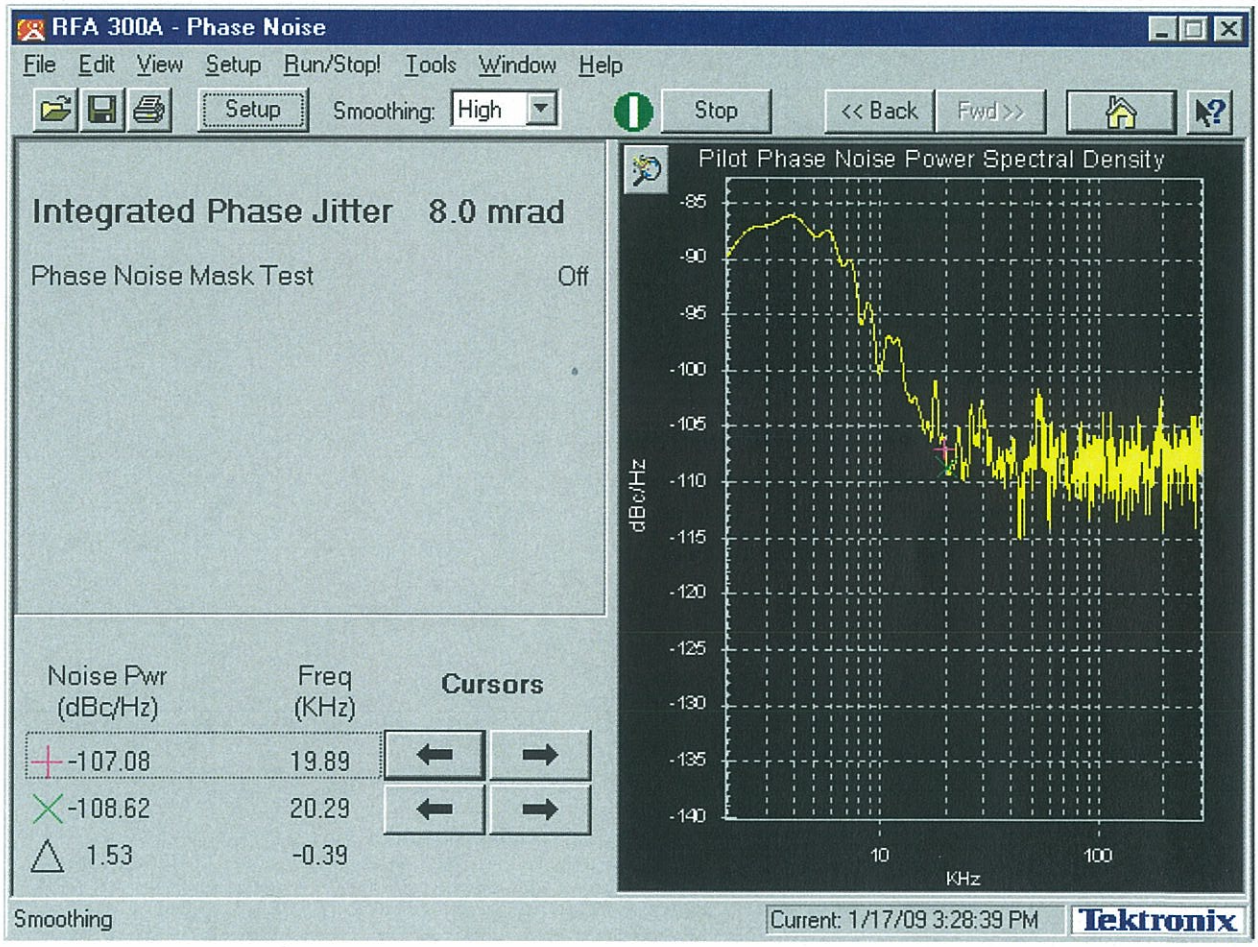
Phase Noise Measurement

Phase noise was measured using a Tektronix RFA-300. See figure 1 on page 3 for test setup. Exciter A phase noise is displayed in figure 4. Exciter B phase noise is displayed in figure 5.

Fig. 4, Exciter A Phase Noise: -104.59 dBc



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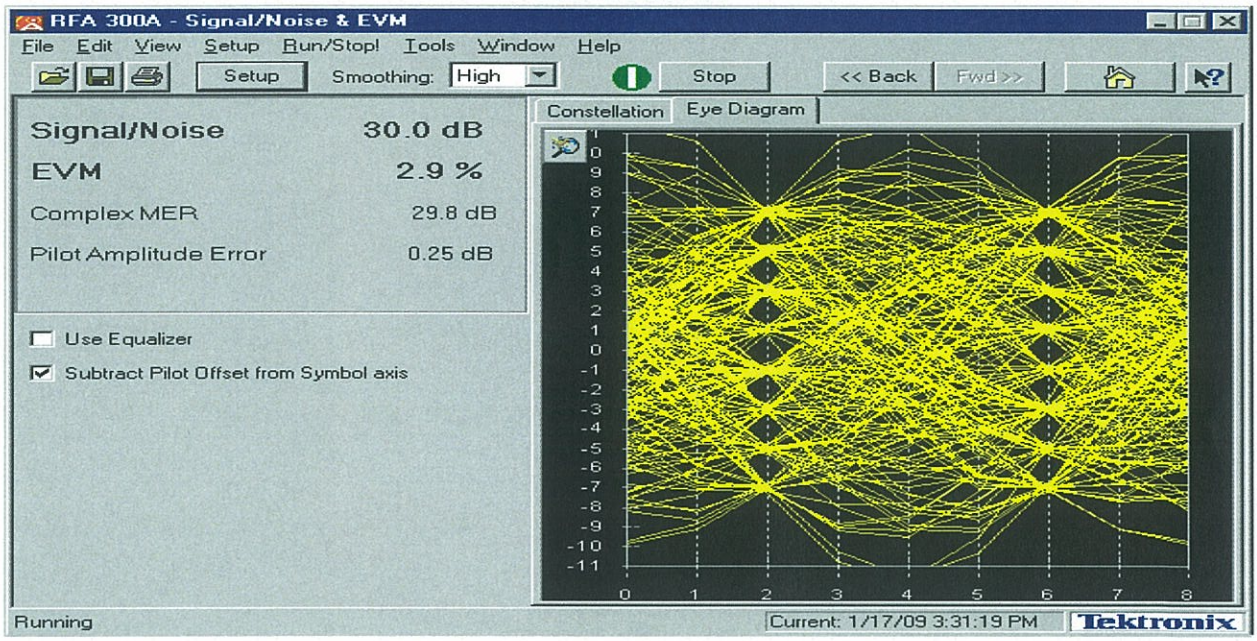
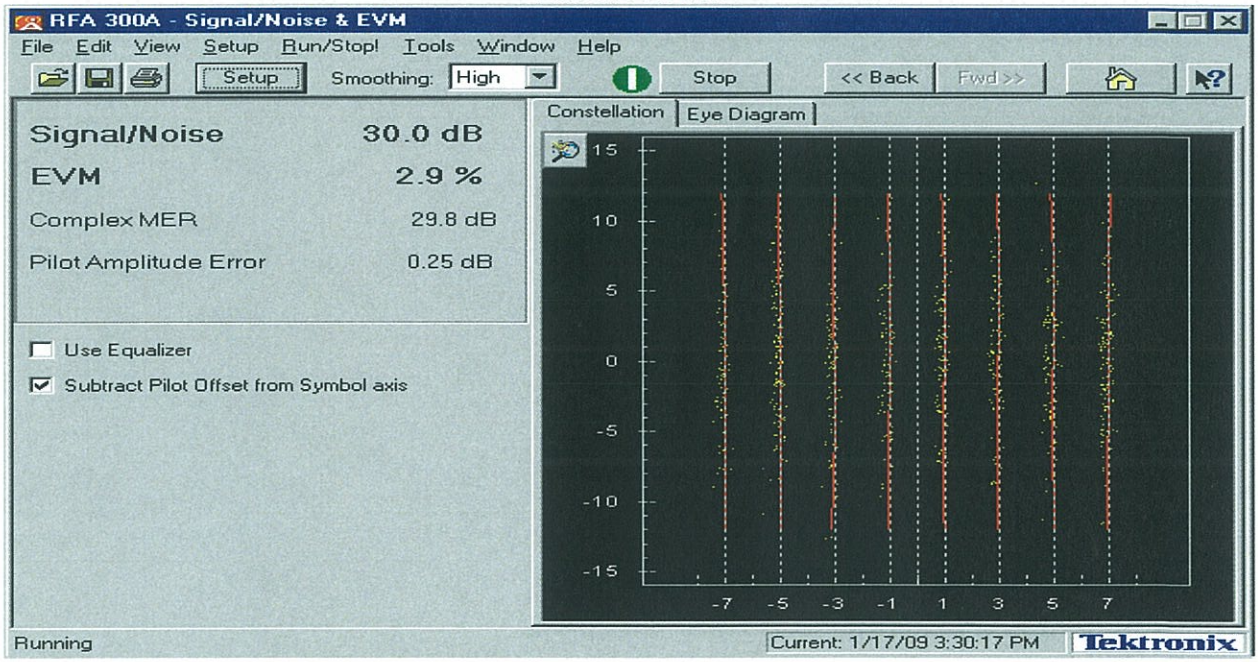
EVM, Error Vector Magnitude

Tektronix RFA 300 was employed to measure the transmitter EVM. RFA 300 data files for instrument un-equalized Eye and Constellation tests are shown within the following text. Instrument un-equalized patterns are within the ATSC/ FCC EVM recommended limit of 4%.

EXCITER A



EXCITER A



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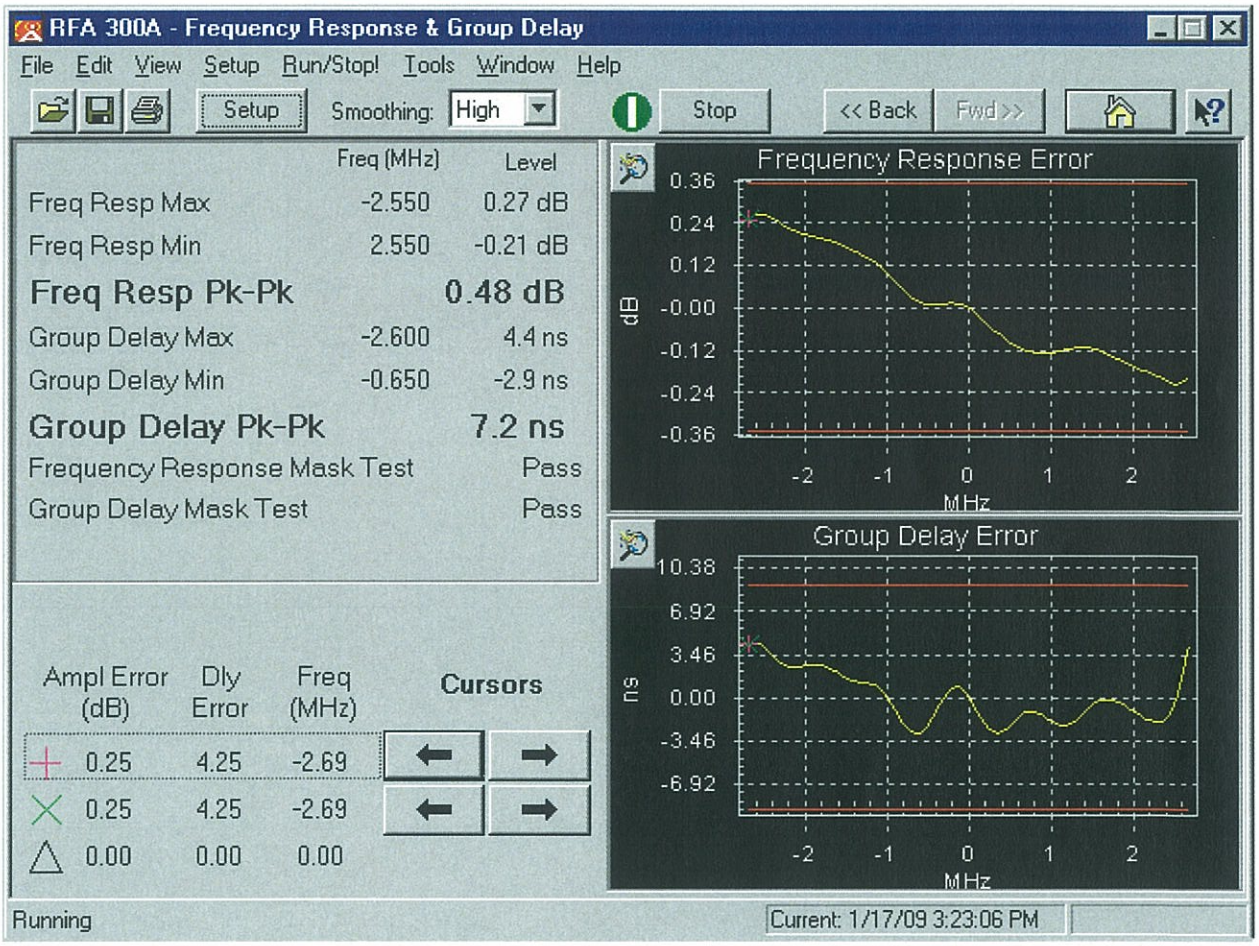
FREQUENCY RESPONSE AND DELAY

A Tektronix RFA 300 was employed to measure the transmitter Out of Channel Response and Delay. RFA 300 data files for Response and Delay follows:

EXCITER A



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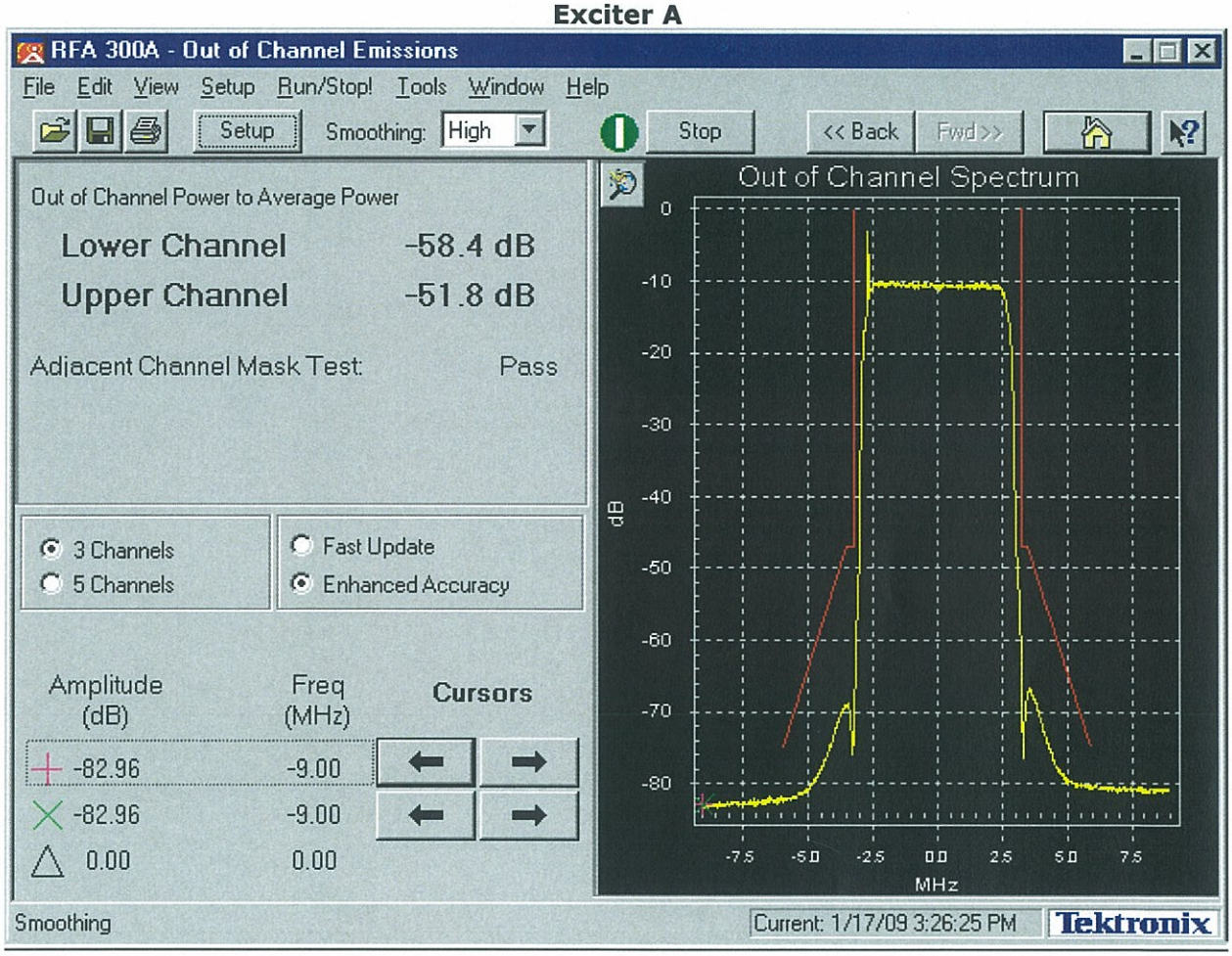
Out of Channel RF Mask Compliance

A Tektronix RFA 300 was employed to measure the transmitter Out of Channel Spectrum. RFA 300 data files for Out of Channel Emissions follow:

Exciter A



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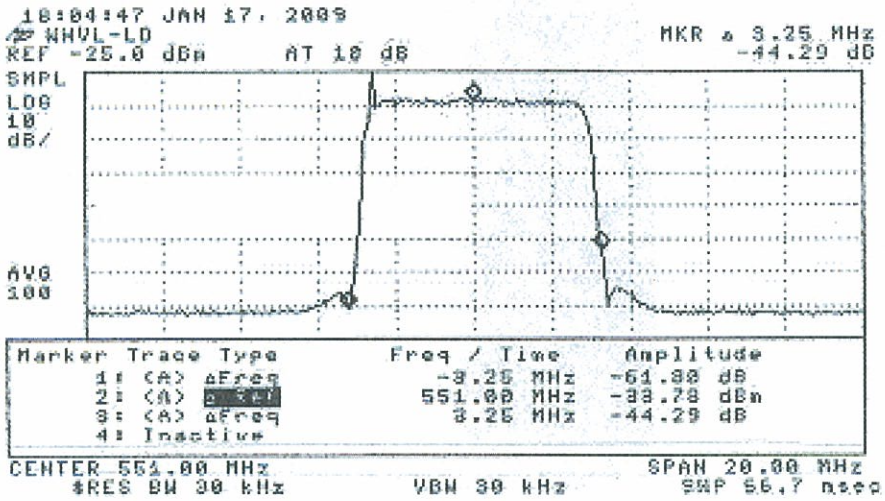
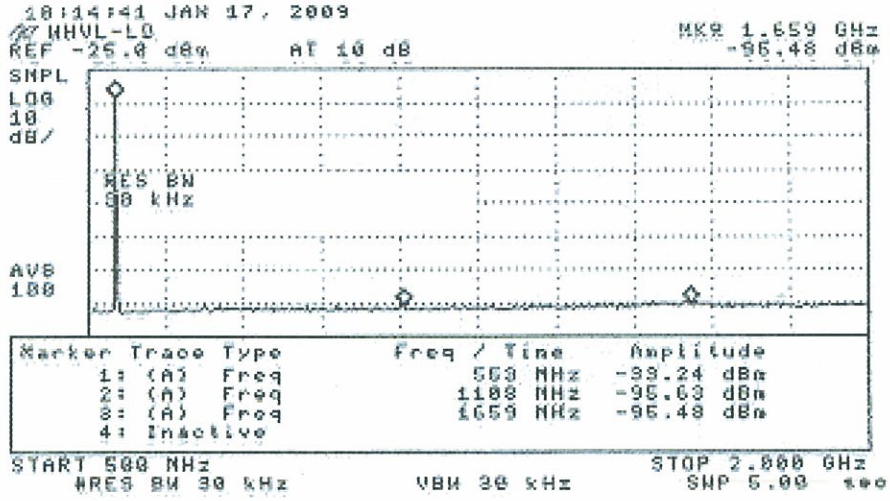
RF Mask Harmonic Suppression

The HP spectrum analyzer was used to measure harmonics before the low pass and mask filter. Then added to filter attenuation at 2nd and 3rd harmonics for a reading of less than –110dB at output of the mask filter.





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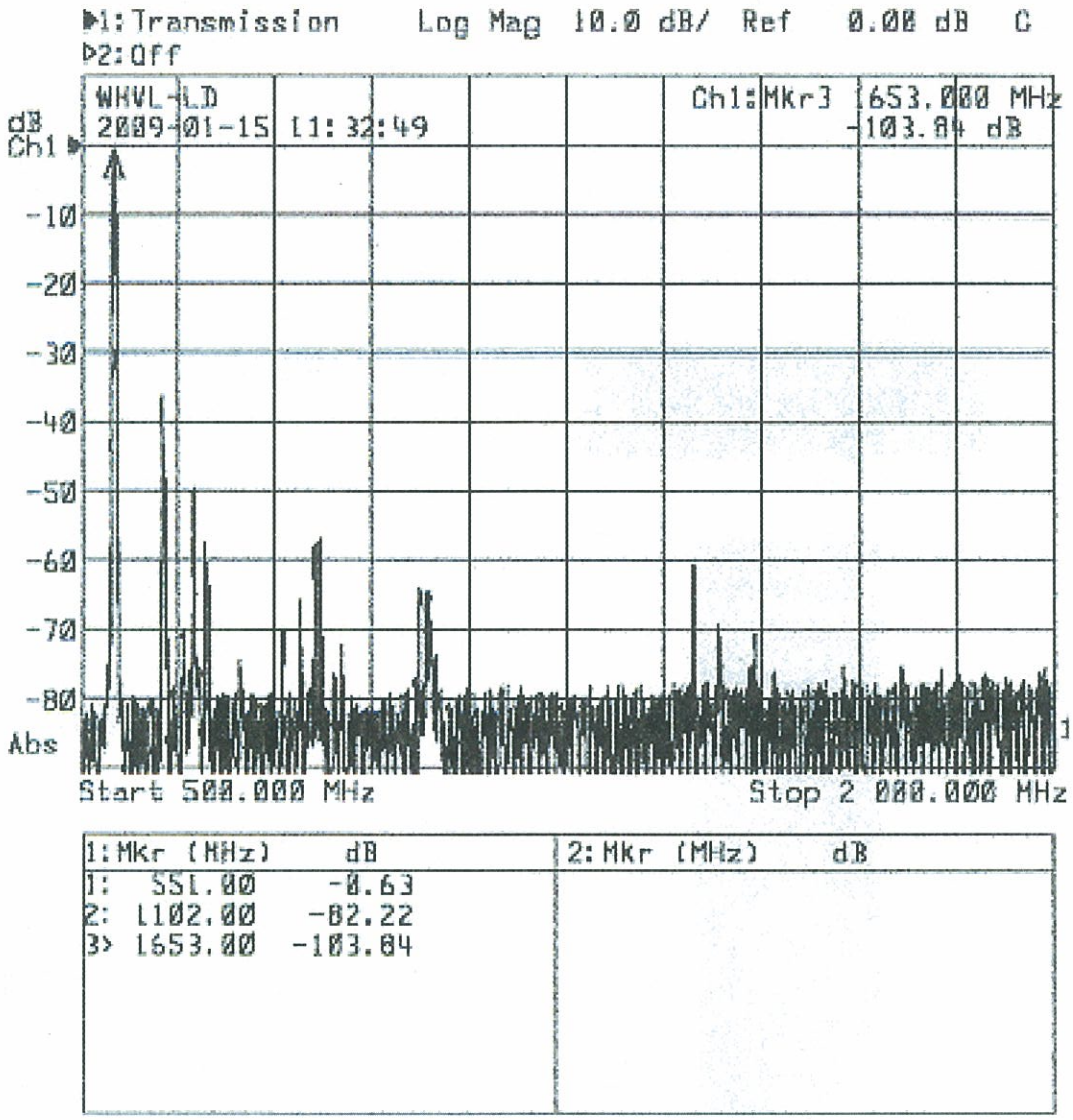

Harmonic	Pre Filter Level	Filter rejection	Post filter level
2nd	-72 db	-82.22db	-154.22db
3rd	-70 db	-103.84db	-173.84db

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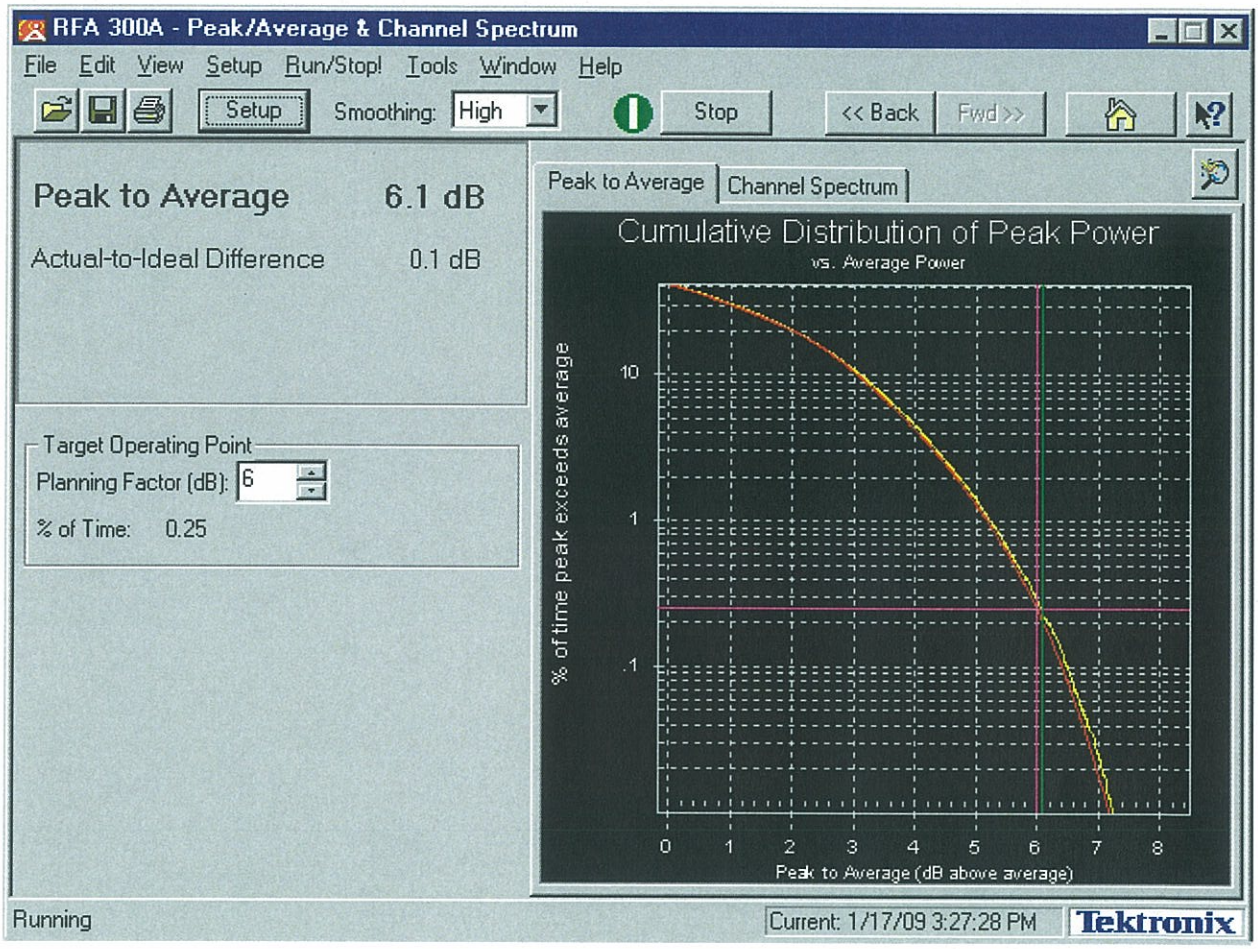
Peak to Average



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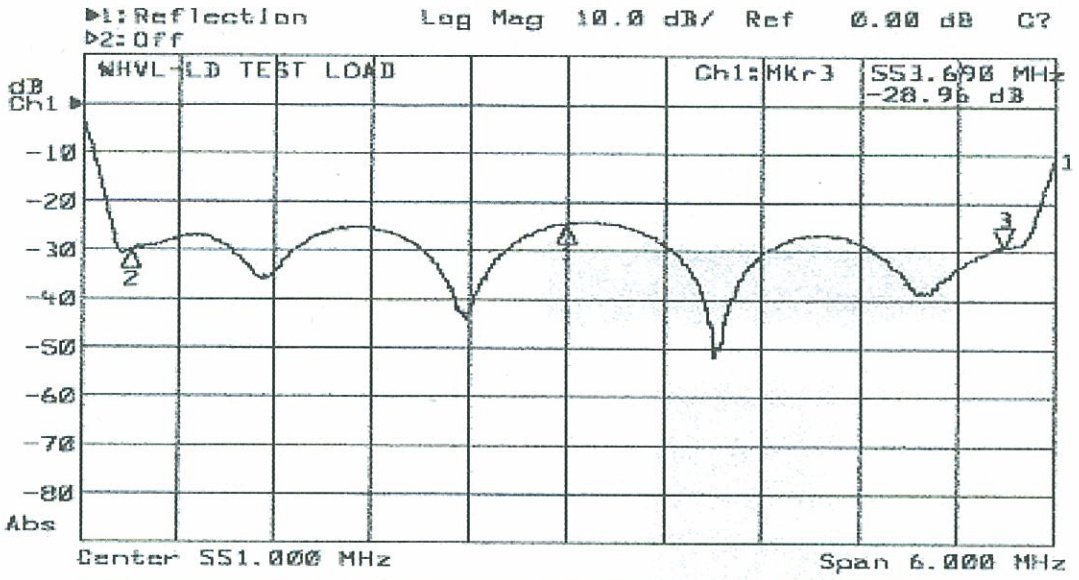
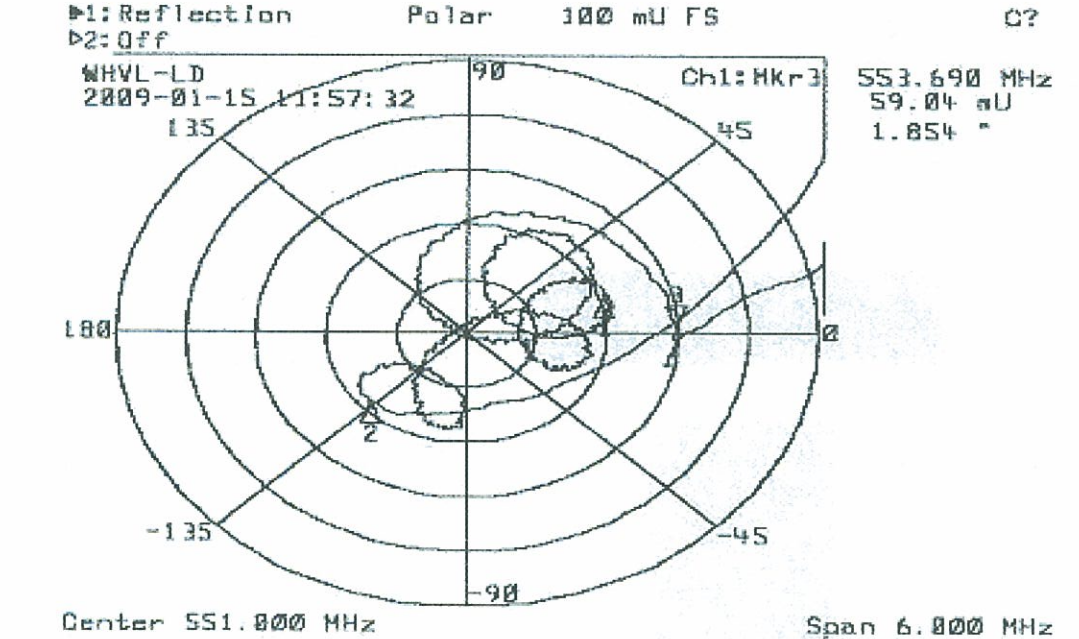
Load



1:Mkr (MHz)	dB	2:Mkr (MHz)	dB
1: 551.00	-24.44		
2: 548.31	-29.77		
3> 553.69	-20.96		



1:Mkr (MHz)	U	Deg	2:Mkr (MHz)	dB
1: 551.00	41.39 m	19.48		
2: 548.31	36.8 m	-137.7		
3> 553.69	59.04 m	1.854		

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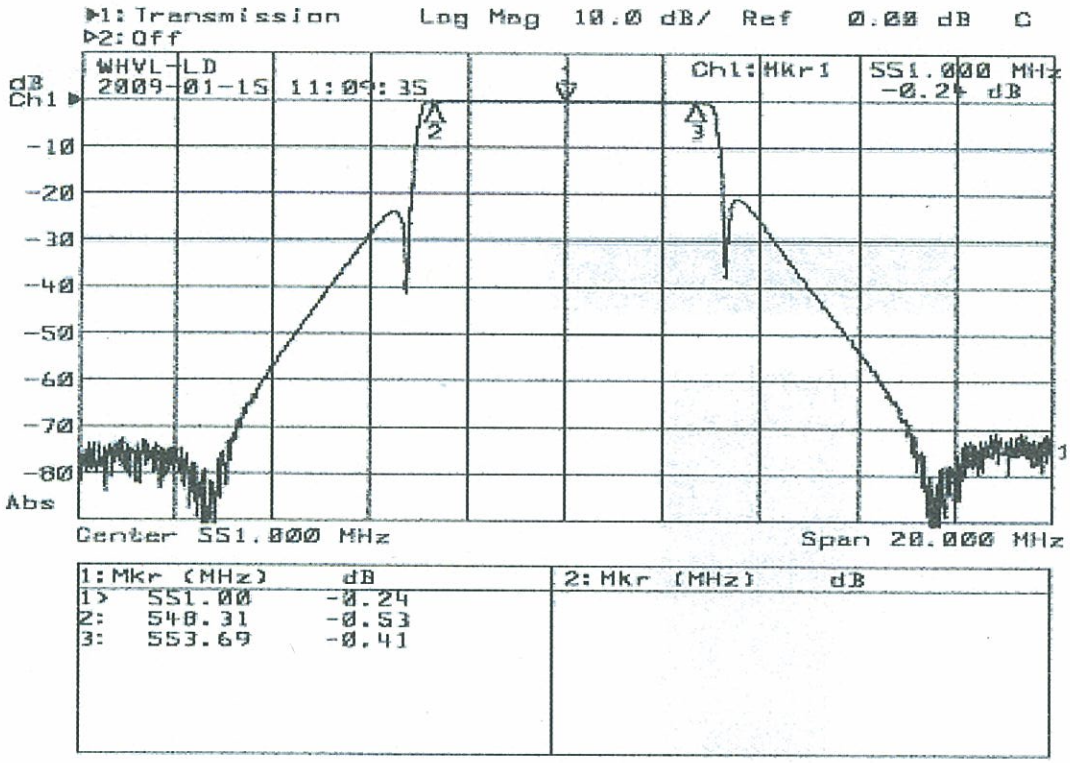
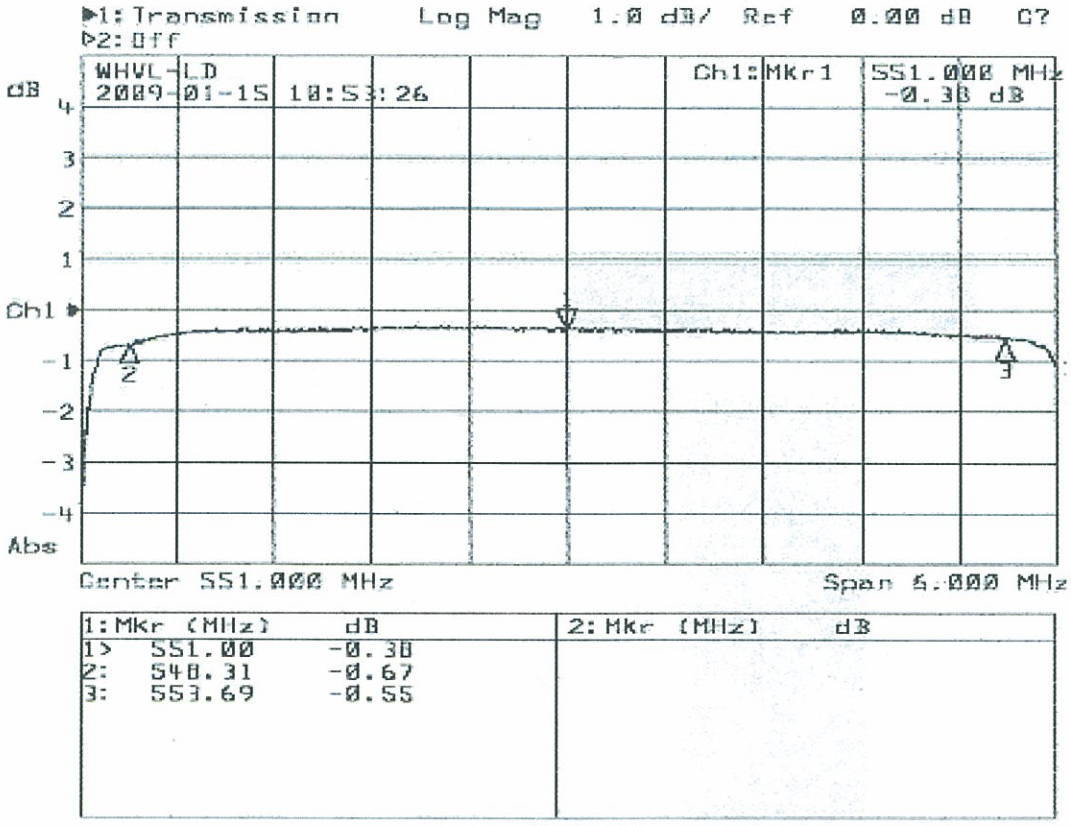
Filter





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