

FCC Test Report

Equipment: FM Exciter – Transmitter

FCC ID: E6T072503FMW150

Applicant:

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Date Tested: May 3rd, 2004

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General Information

2.1033 **Bext Inc. will supply the XT 150 (150W FM Exciter – Transmitter) with FCC ID: E6T072503FMW150 in quantity, for use under FCC Rules Part 73.801, Low Power FM Broadcast Stations.**

73.317(a-d) FM Transmission System Requirements:
15 kHz audio tone at 600 ohm from the low distortion audio generator was fed into the mono input of the XT 150 exciter-transmitter unit at 0 dBm, as 75 kHz was read on the RF spectrum analyzer. The emission level at the upper and lower sidebands of 240 kHz was –47 dBm.

73.1545(b) From the initialization of the XT 150 exciter-transmitter unit it needs 500 μ S to be stabilized on the frequency of 98.00 MHz. Within 4 hours of operation there was no detection of any frequency shift. Observation was made using the RF spectrum analyzer.

2.1033(a) FCC Form 731 Submitted for LPFM Equipment Certification Process.

2.1033(c)(4) Technical Description

Type of Emission: 300KF8E

$B_n = 2M + 2DK$
 $M = 15000$
 $D = 22 \text{ kHz (Peak Deviation)}$
 $K = 1$
 $B_n = 2(15K) + 2(22K)(1) = 75K$

Allowed Bandwidth by FCC = 200 kHz

2.1033(c)(5) Frequency Range: 88 – 108 MHz

2.1033(c)(6) Power Range and Controls: The EUT can be adjusted from 1 Watt up to the maximum rated power output.

2.1033(c)(7) Maximum Output Power Rating: 150 Watts into 50 ohms resistive load.

2.1033(c)(8) DC Voltages and Current into final amplifier:
 $V_{ce} = 22.85 \text{ Volts}$
 $I_{ce} = 9.33 \text{ Amp.}$
Efficiency = 70.35%

2.1033(c)(9) Tune-Up procedure is included in the technical manual of the XT 150 exciter – transmitter unit within the attached exhibits.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagrams and block diagrams are included in the attached exhibits

2.1033(c)(11) Photographs and Drawings of the ID Label and location are included in the attached exhibits.

2.1033(c)(12) Photographs of External and Internal of the Exciter – Transmitter unit are included in the attached exhibits.

2.1033(c)(13) Digital Modulation is NOT used/included within this EUT.

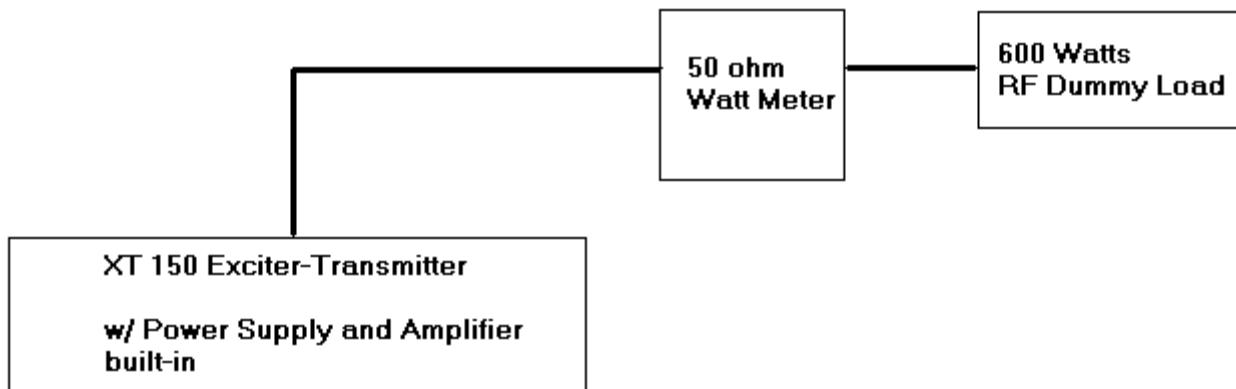
2.1033(c)(14) Data required by Part 2.1046 through Part 2.1057 are included in this test report in the following sections.

2.1046 RF Power Output

73.267(b)(2) Operating the transmitter into a load (of substantially zero reactance and a resistance equal to the transmission line characteristic impedance) and using an electrical device (within $\pm 5\%$ accuracy) or temperature and coolant flow indicator (within $\pm 4\%$ accuracy) to determine the power.

RF Power is measured by Direct Method power using TIA/EIA Standard 603.

Output Power: 150 Watts



2.1047(a)(b)

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

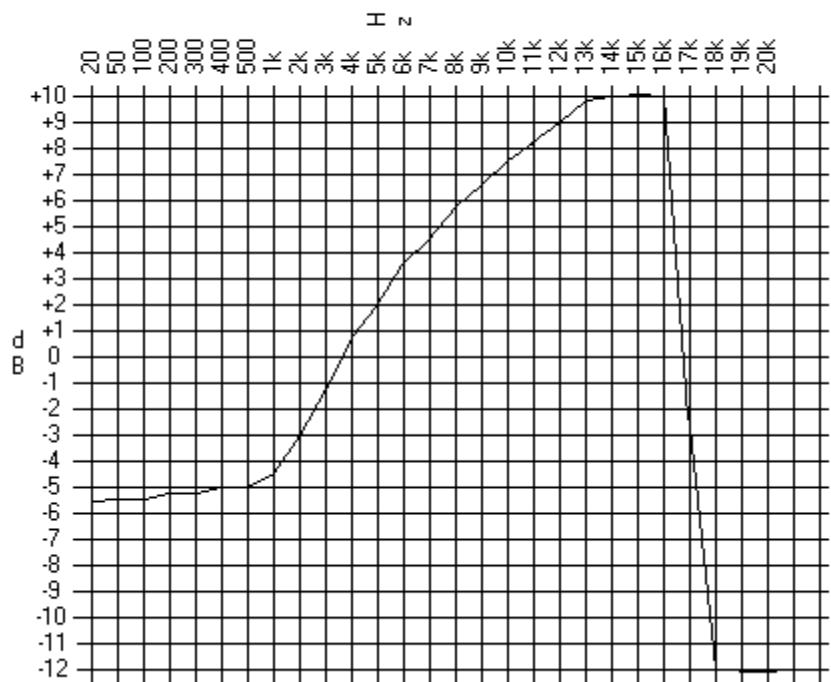
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

Modulation Characteristics:

Audio Frequency Response:

The audio frequency response was measured in accordance with TIA/EIA specification 603. See below for the audio frequency response curve.

Audio Frequency Response



Audio Frequency Response

Frequency (Hz)	Audio Frequency Response (dB)
20	-5.5
50	-5.4
100	-5.4
200	-5.2
300	-5.2
400	-5
500	-5
1k	-4.5
2k	-3
3k	-1.2
4k	+0.8
5k	+2
6k	+3.4
7k	+4.4
8k	+5.8
9k	+6.6
10k	+7.5
11k	+8.2
12k	+9
13k	+9.8
14k	+10
15k	+10
16k	+10
17k	-2.4
18k	-12
19k	-12
20k	-12

2.1047(a)(b)

Audio Low Pass Filter:

The audio frequency response data for the low pass filter is shown in the data above from 15 kHz to 20 kHz for the audio frequency response.

2.1049

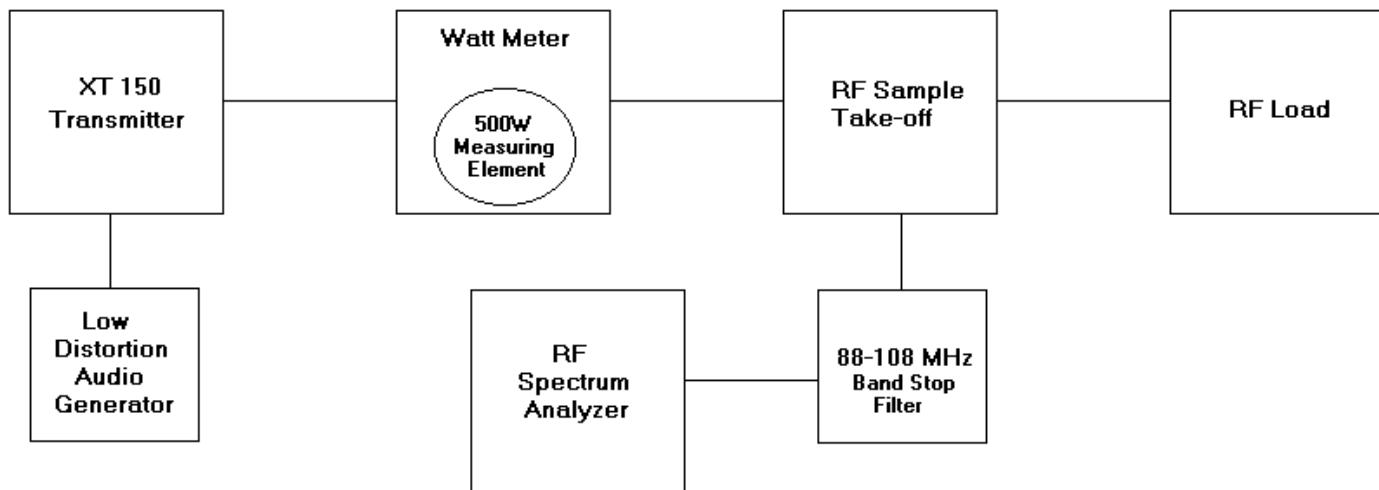
73.317(b-d)

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10 \log_{10} (\text{Power, in watts})$ dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

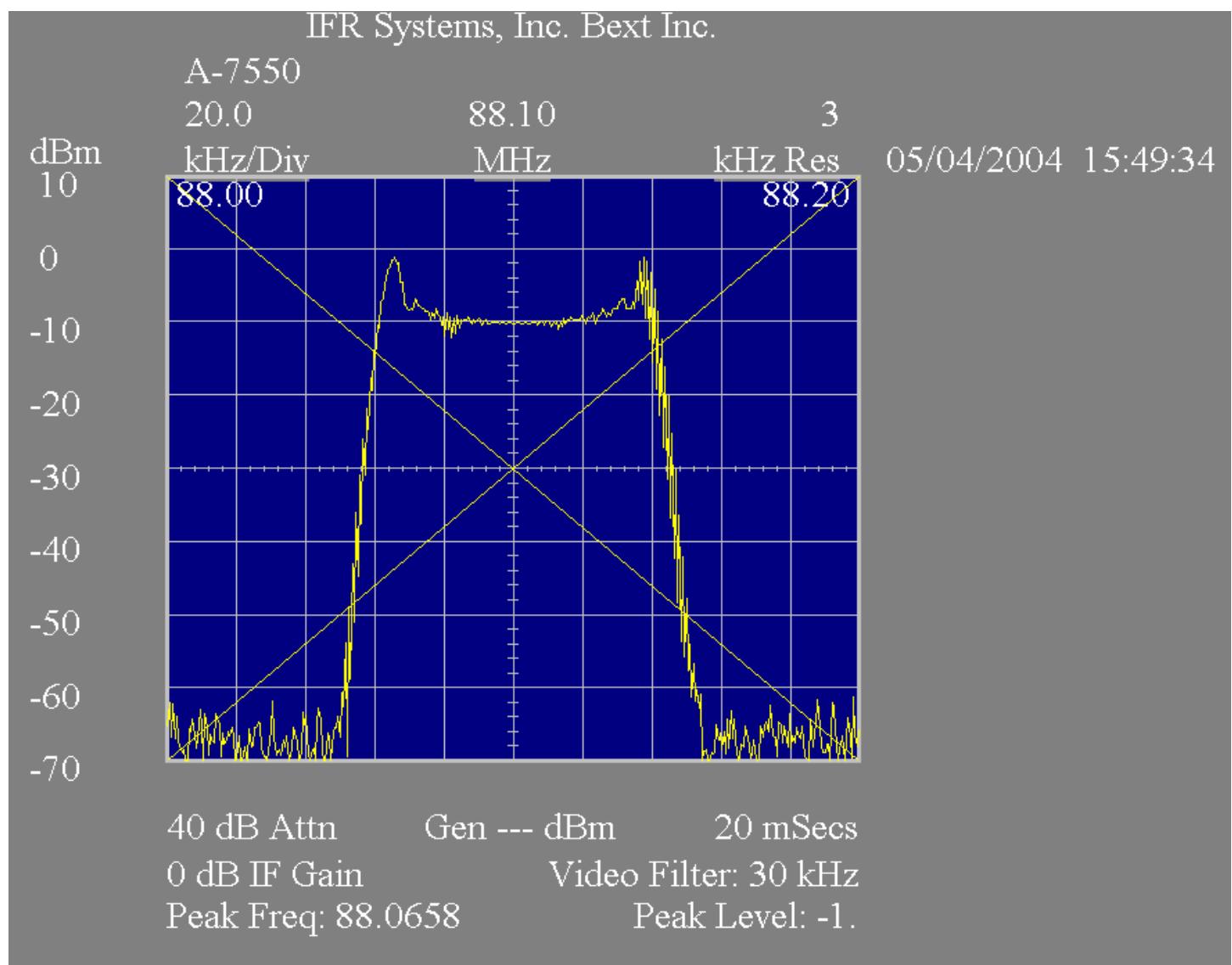
Occupied Bandwidth Measurement Method:



Requirement: Part 73: 200 kHz Emission Bandwidth

2.1049

Occupied Bandwidth Plot (15 kHz)



2.1053(a)(b)

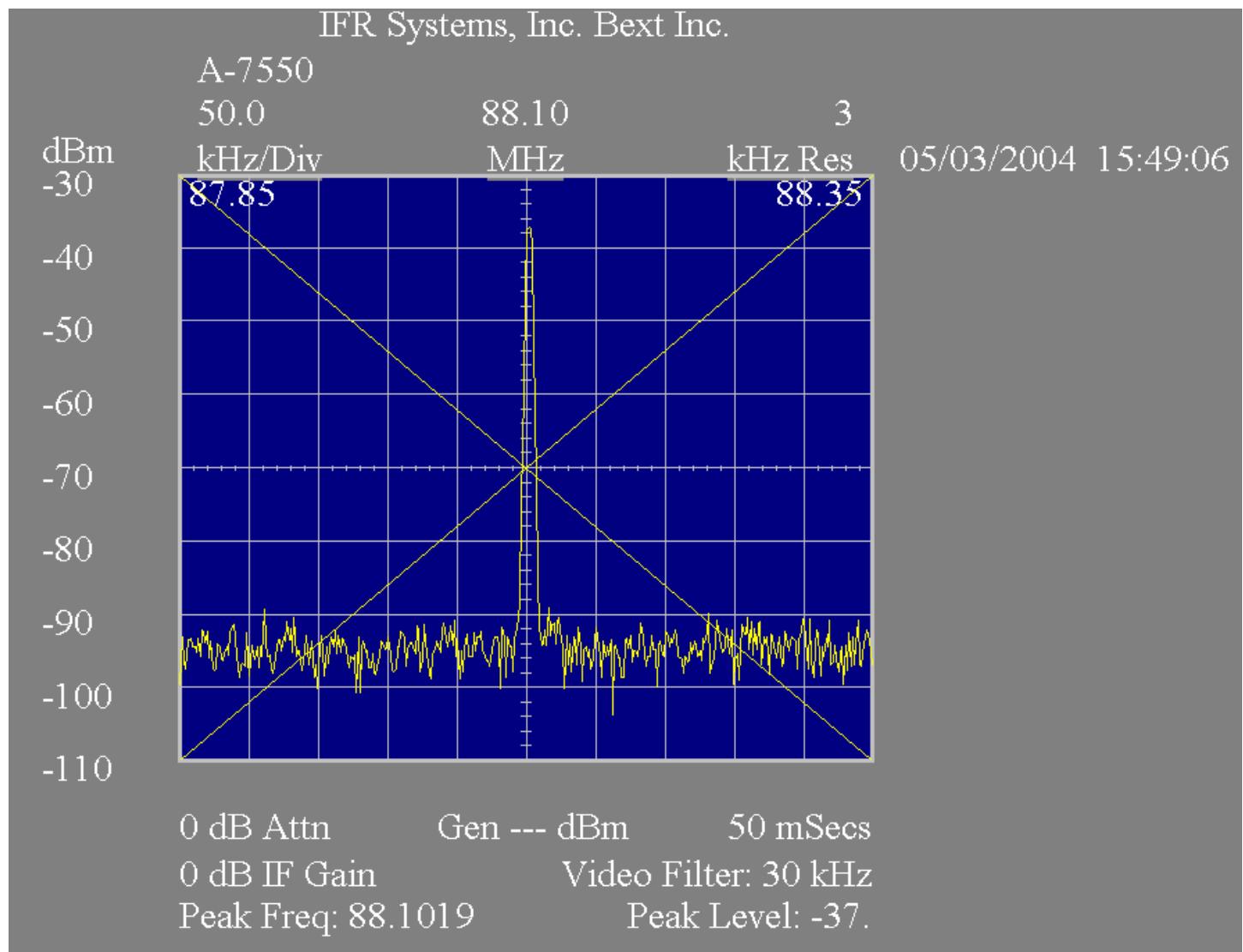
Field Strength of Spurious Emissions:

2.1051

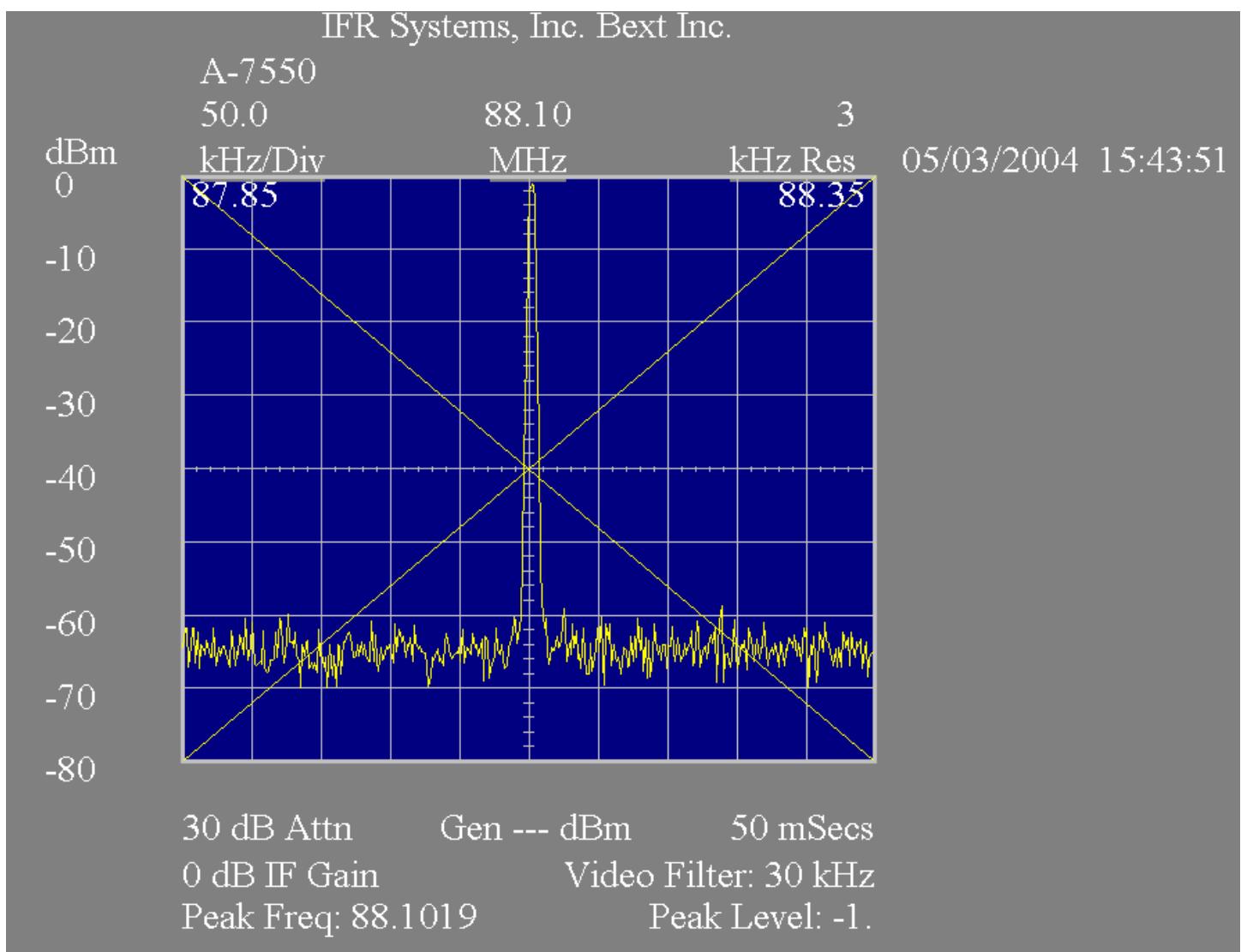
Spurious Emissions at Antenna Terminals:

Spurious Harmonic Plot:

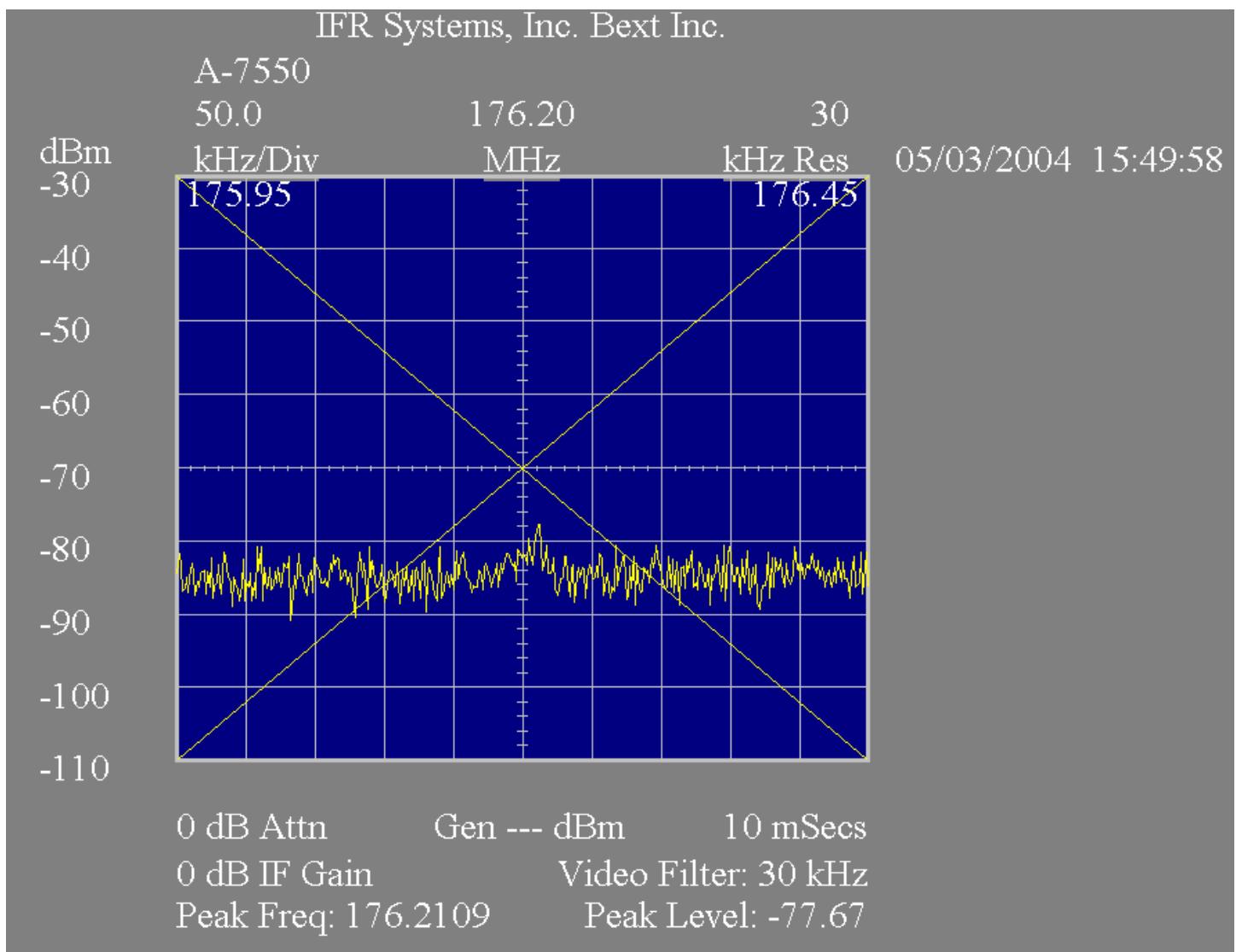
A) *Fundamental (88.1 MHz)*



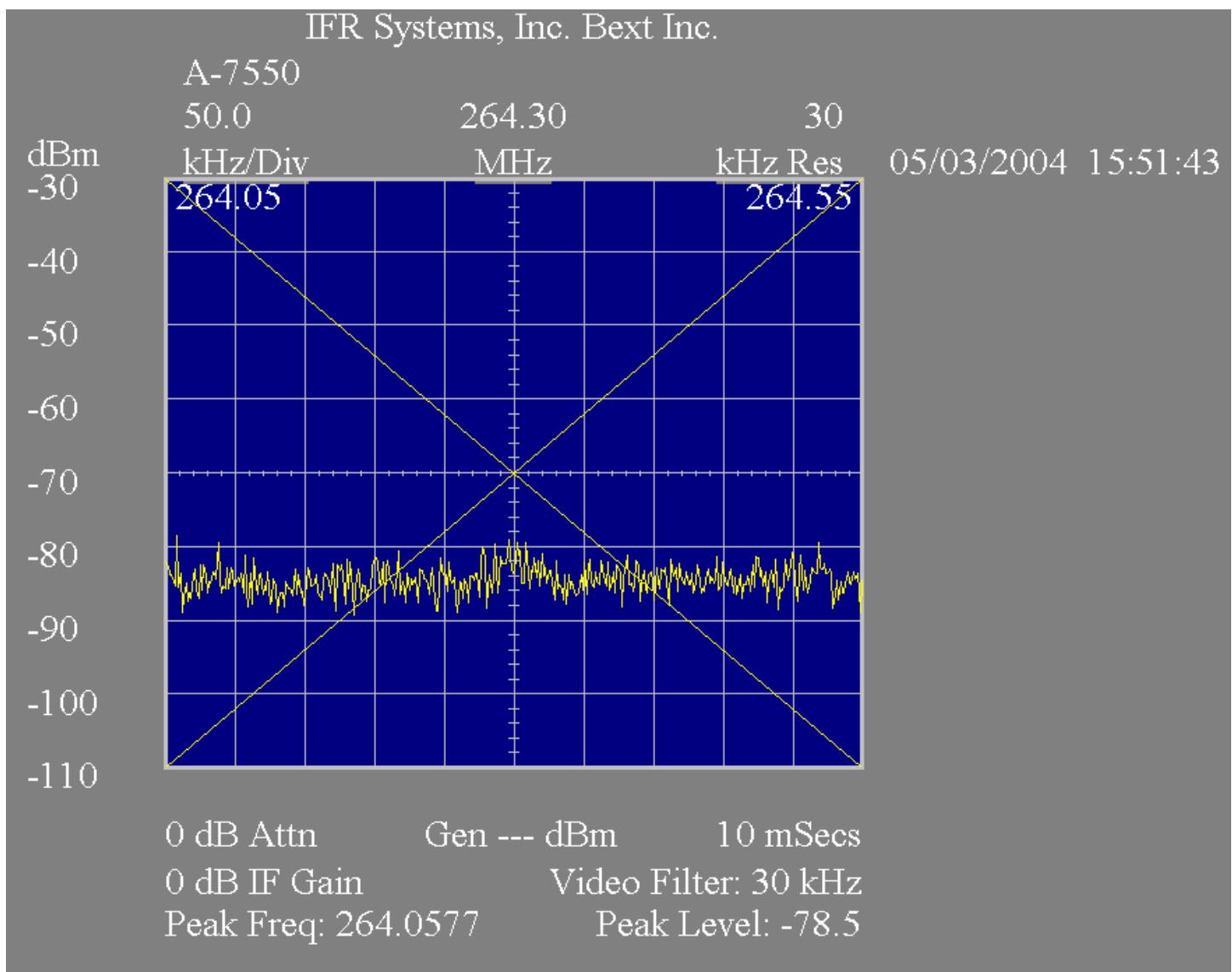
B) *First Harmonic (88.1 MHz)*



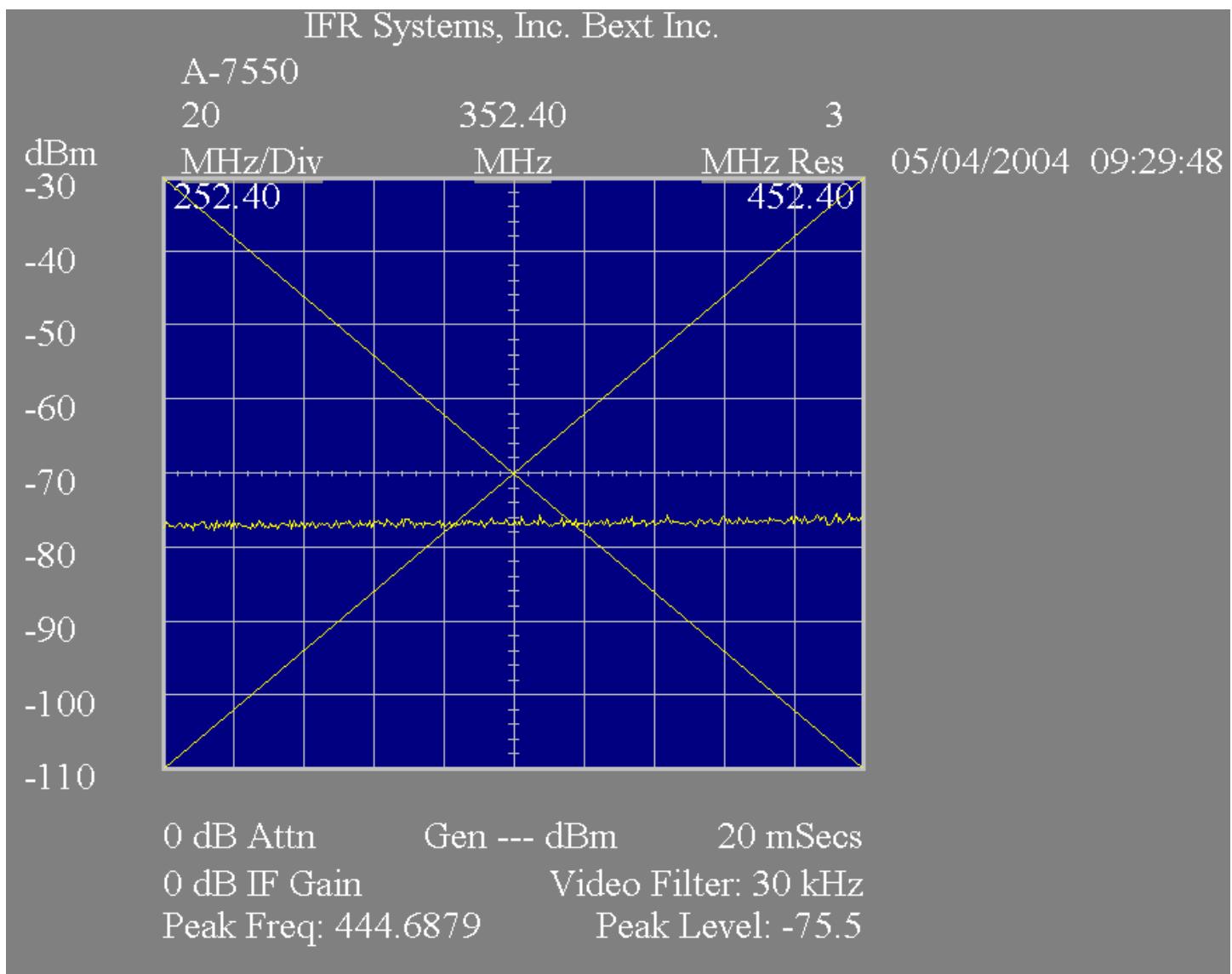
C) Second Harmonic (176.2 MHz)



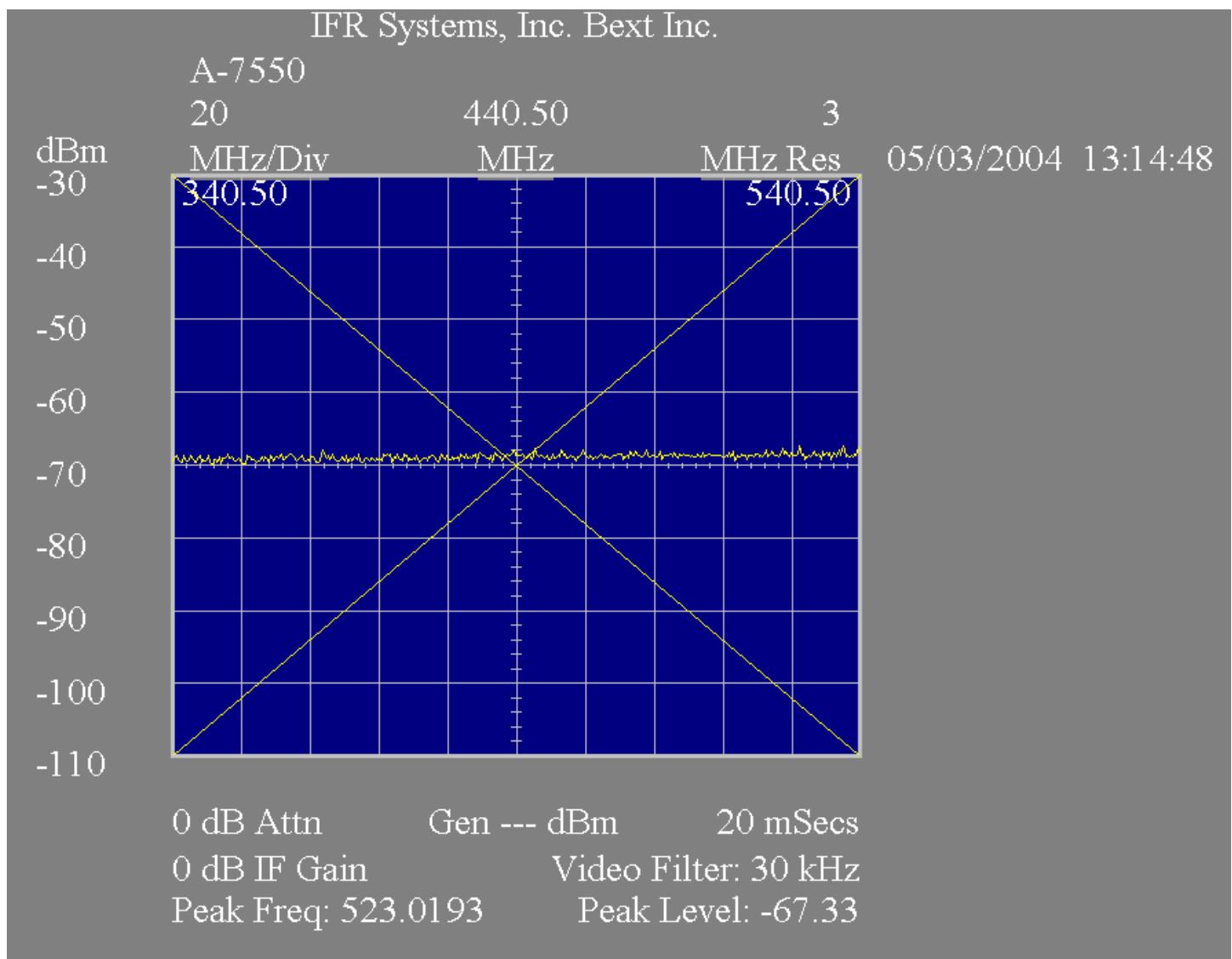
D) Third Harmonic (264.3 MHz)



E) Fourth Harmonic (352.4 MHz)



F) Fifth Harmonic (440.5 MHz)



G) Sixth Harmonic (528.6 MHz)

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A-7550

20

MHz/Div

528.60

MHz

3

MHz Res

dBm

-30

-40

-50

-60

-70

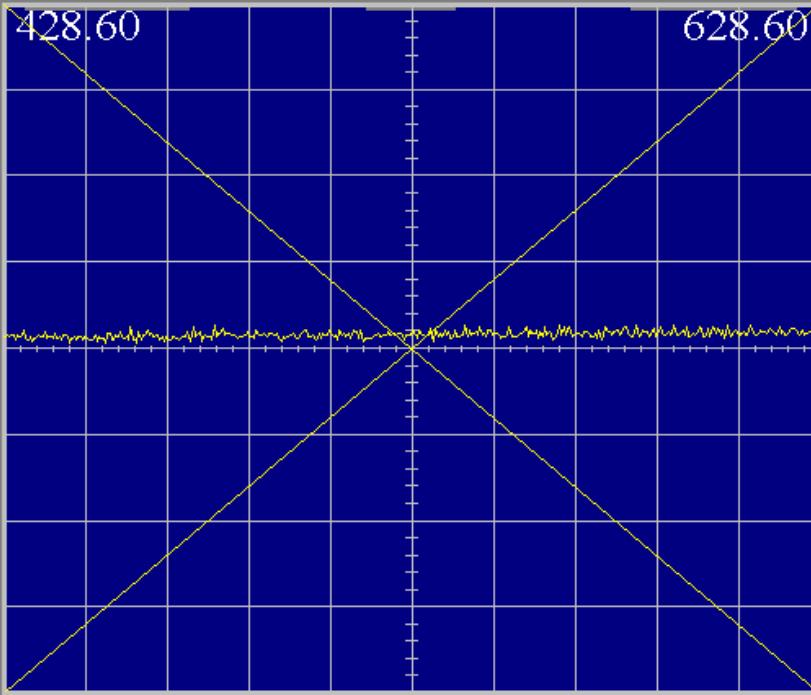
-80

-90

-100

-110

05/03/2004 13:15:53



0 dB Attn

Gen --- dBm

20 mSecs

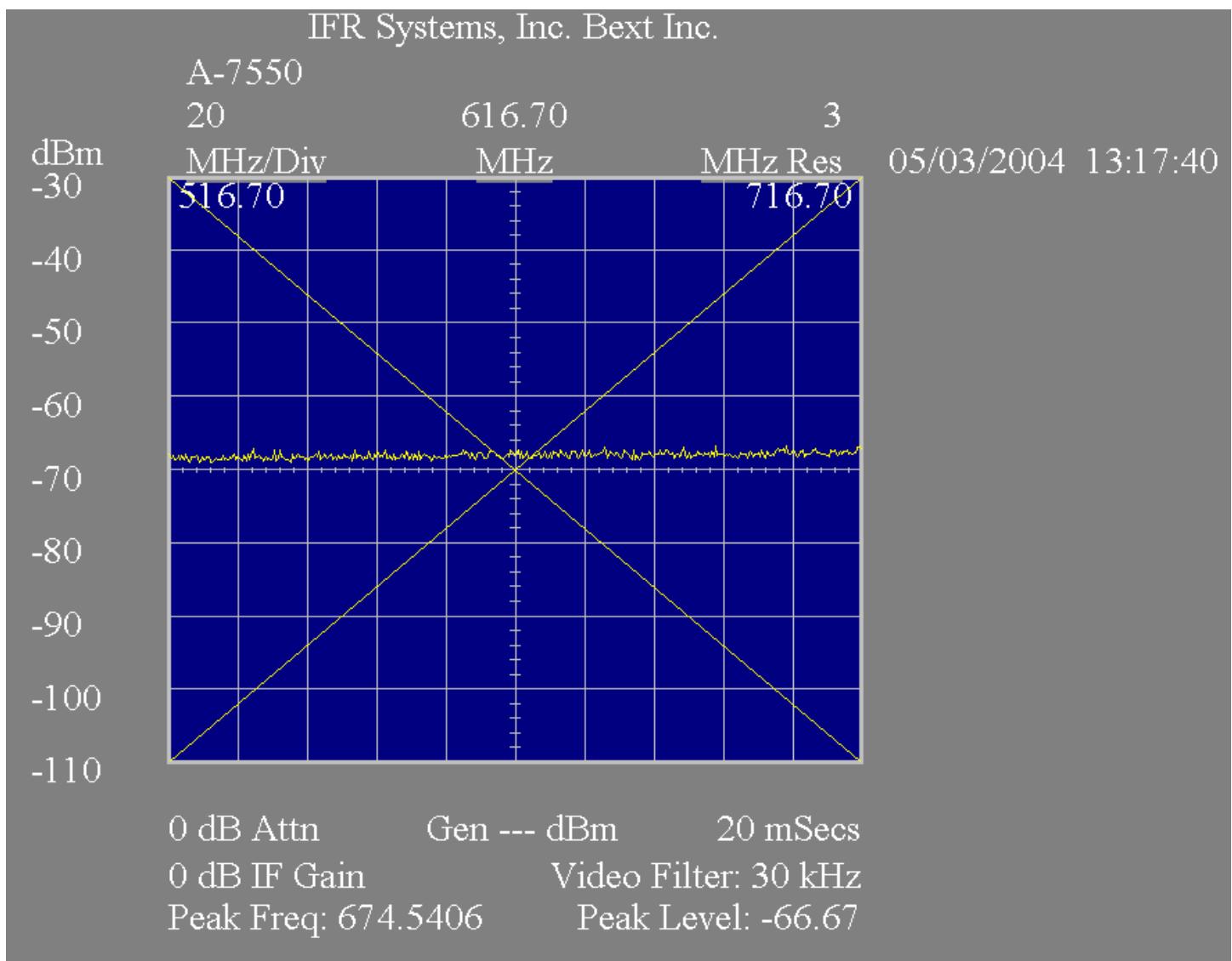
0 dB IF Gain

Video Filter: 30 kHz

Peak Freq: 541.7105

Peak Level: -67.17

H) Seventh Harmonic (616.7 MHz)



I) Eighth Harmonic (704.8 MHz)

IFR Systems, Inc. Bext Inc.

A-7550

20

704.80

3

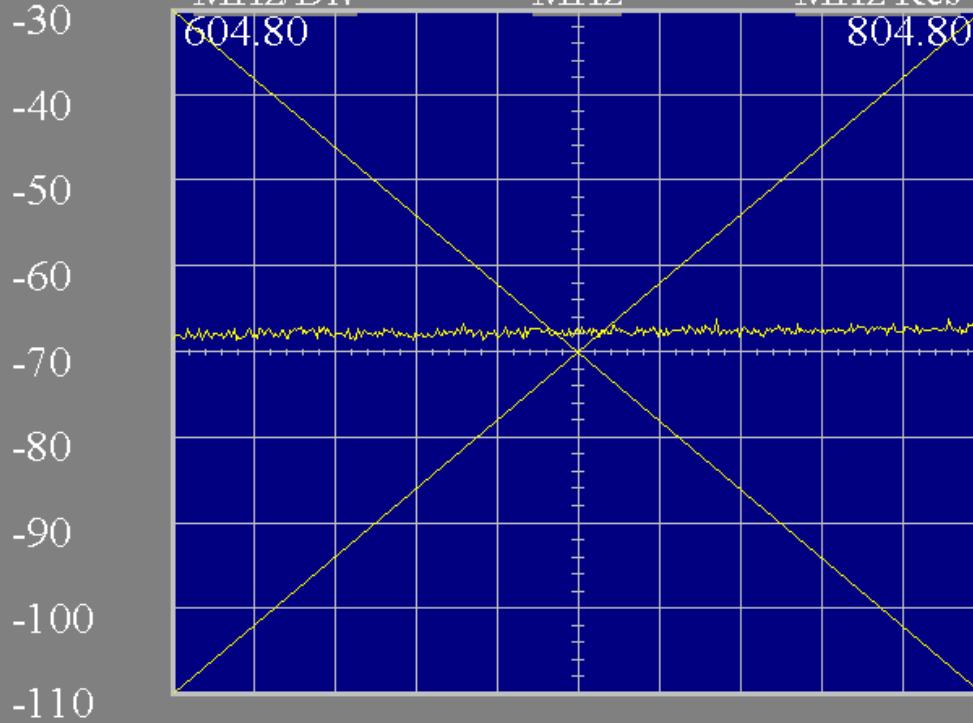
dBm

MHz/Div

MHz

MHz Res

05/03/2004 13:19:09



0 dB Attn

Gen --- dBm

20 mSecs

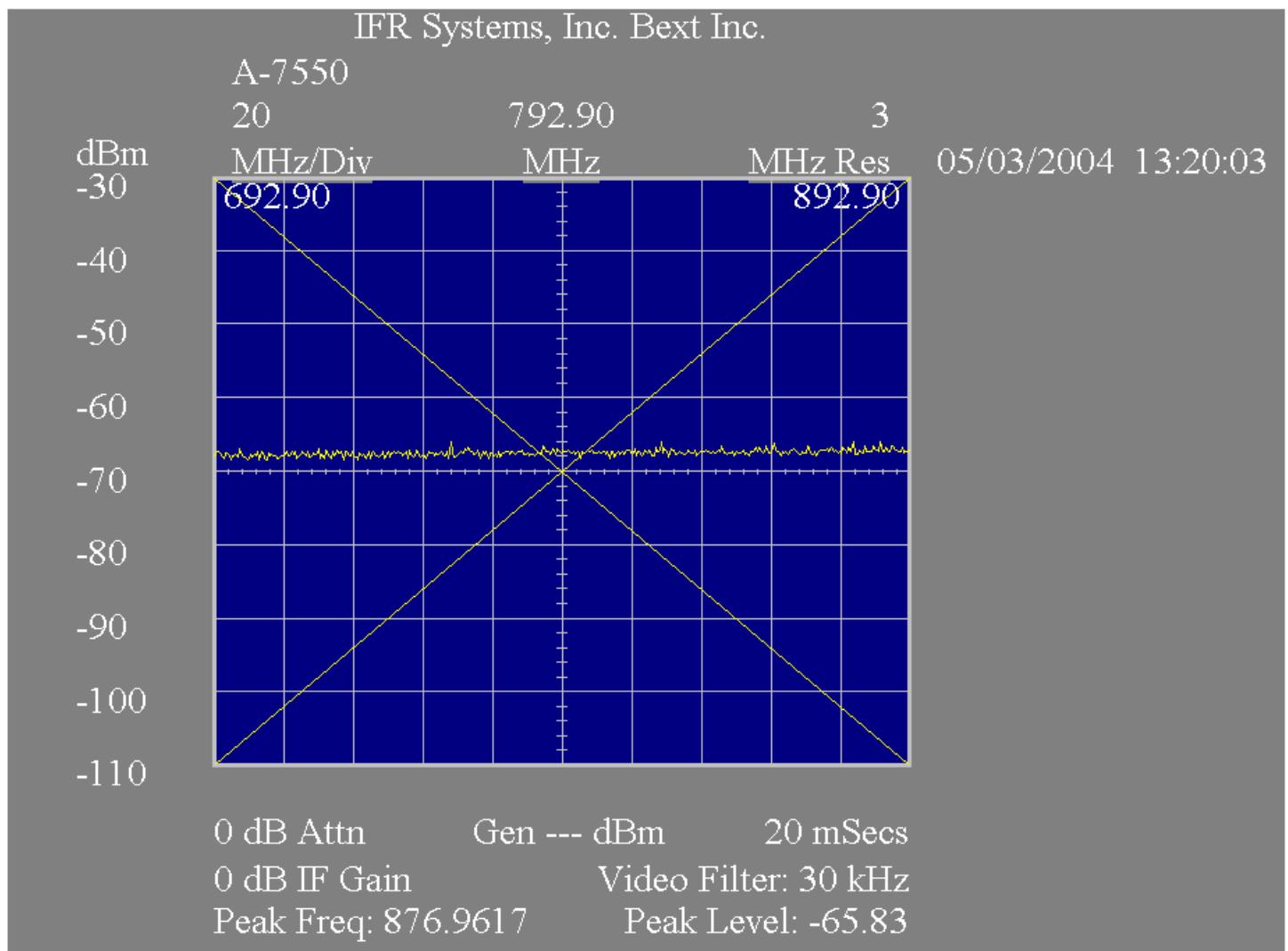
0 dB IF Gain

Video Filter: 30 kHz

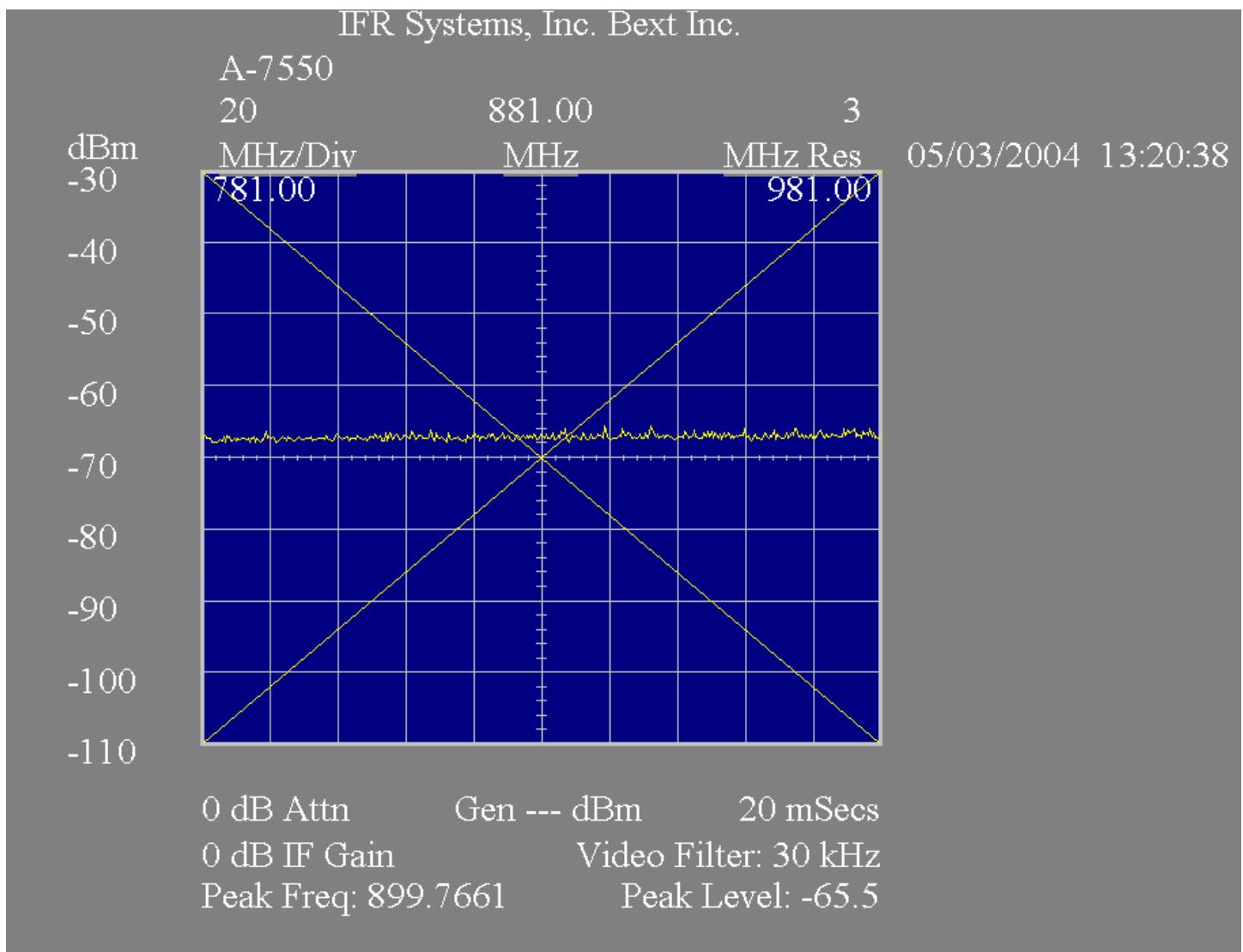
Peak Freq: 738.9902

Peak Level: -66.17

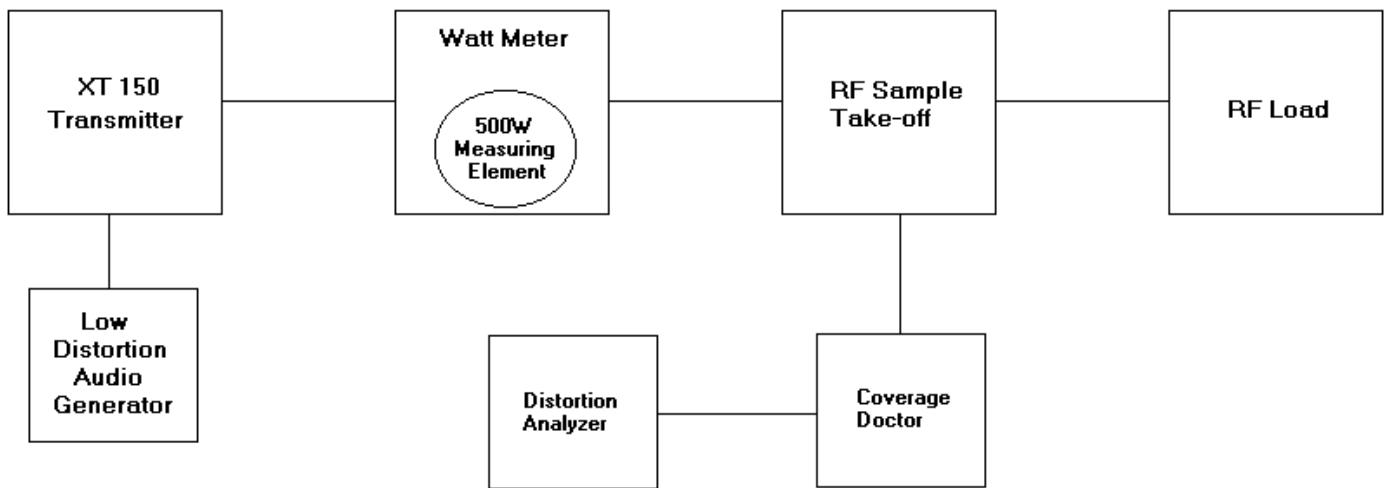
J) Ninth Harmonic (792.9 MHz)



K) Tenth Harmonic (881.0 MHz)



Method of Measurement:



Field Strength of Spurious Emission

Requirement:

Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10\log(P)$ dB below the level of the un-modulated carrier, or 80 dB, whichever is the lesser attenuation.

High Power: $43 + 10\log(150) = 64.76$ dB (150W Output)

Low Power: $43 + 10\log(1) = 43.00$ dB (1W Output)

Test Data (88.1 MHz, High Power):

Emission Frequency (MHz)	Antenna Polarity	dB Below Carrier (dBc)
88.10	H	0.00
176.20	H	142.43
264.30	H	143.26
352.40	V	140.26
440.50	V	132.09
792.90	V	130.59

Test Data (88.1 MHz, Low Power)

Emission Frequency (MHz)	Antenna Polarity	dB Below Carrier (dBc)
88.10	V	0.00
176.20	H	120.67
264.30	H	121.50
440.50	V	110.33

Test Data (100.1 MHz, High Power)

Emission Frequency (MHz)	Antenna Polarity	dB Below Carrier (dBc)
100.10	H	0.00
200.20	H	146.26
300.30	V	143.56
500.50	H	135.06
700.70	V	133.76
800.80	H	133.96
900.90	H	132.76

Test Data (100.1 MHz, Low Power)

Emission Frequency (MHz)	Antenna Polarity	dB Below Carrier (dBc)
100.10	H	0.00
200.20	H	121.00

Test Data (107.9 MHz, High Power)

Emission Frequency (MHz)	Antenna Polarity	dB Below Carrier (dBc)
107.90	H	0.00
215.80	H	145.76
323.70	V	143.26
971.10	V	133.26

Test Data (107.9 MHz, Low Power)

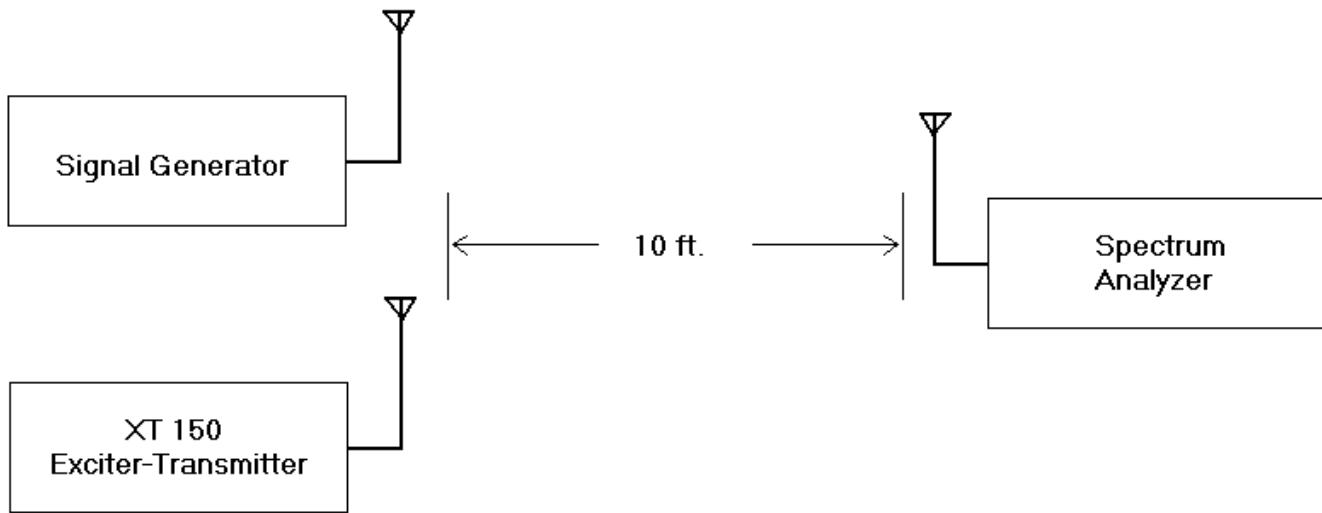
Emission Frequency (MHz)	Antenna Polarity	dB Below Carrier (dBc)
107.90	H	0.00
215.80	H	120.80

Requirement:

Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10\log(P)$ dB below the level of the un-modulated carrier, or 80 dB, whichever is the lesser attenuation.

Method of Measurement:

The tabulated data illustrates the results of the radiated field strength emission test. The spectrum was scanned from 30 to at least the tenth harmonic, as this test is conducted per ANSI/TIA/EIA-603-A-2001 Standard using the substitution method. The test measurements were conducted in the shielded basement of Bext Inc. located at 1045 Tenth Avenue, San Diego, CA 92101



Method of Measurement:

The tabulated data shows the results of the radiated field strength emission test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA Standard 603 using the substitution method. Measurements were made at the shielded test area in the basement of Bext Inc. located at 1045 Tenth Avenue, San Diego CA 92101

2.1055(3)

Frequency Stability:

From 0° to +50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under Part 73. Frequency shall be made at extremes of the specified temperature range at the intervals of not more than 10° centigrade through the range.

73.1545(b)

Carrier Frequency Departure tolerance with Temperature

The departure of the carrier or center frequency of an FM station with an authorized transmitter output power more than 10 watts may not exceed ± 2000 Hz from the assigned frequency.

Temperature	Frequency (MHz)	Change (MHz)
25°C	98.000005	0.000000
0°C	98.000075	0.000070
10°C	98.000049	0.000044
20°C	98.000021	0.000016
30°C	98.000089	0.000016
40°C	98.000065	0.000040
50°C	98.000035	0.000070

The Data Table shown above is supplied by using a climate temperature chamber thermometer and the frequency counter, which measure the XT 150 exciter-transmitter unit operating at 150 Watts of output power under different temperature settings (0°C, 10°C, 20°C, 25°C, 30°C, 40°C, and 50°C). The carrier frequency departure did not exceed the ± 2000 Hz limitation.

Test Equipment List

Device	Model	Brand	Last Calibration
600 ohm Low Distortion Audio Generator	HM 8037	Hameg	04/09/2003
50 ohm Watt Meter	43P	Bird	04/25/2003
20-1000MHz Sample Take-Off	4275	Bird	n/a
Distortion Analyzer	331A	Hewlett Packard	03/20/2004
-40dBm Band Stop Filter	B.S.	R.V.R.	n/a
RF Spectrum Analyzer	IFR	A7550	01/18/2004
600W Dummy Load	8401	Bird	n/a
Climate Temperature Chamber	TY56010	A.C.S.	12/03/2003
Thermometer	Meterman 37XR	Wavetek	11/03/2003
Frequency Counter	FMAB	Rhode & Schwarz	04/11/2003
Audio Signal Analyzer	Coverage Doctor	Bext	01/08/2004
FM Horizontal/Vertical Polarized Antenna	LDR1	Bext	n/a
RF Signal Generator	HP 8656B	Hewlett Packard	01/30/2004