TEST REPORT

GALCOM INTERNATIONAL CT-45 FM TRANSMITTER TECHNICAL REPORT

INTRODUCTION

The following information is provided to verify the technical performance of the CT-45 FM transmitter. The following information is supplied for FM broadcast service according to applicable portions of Part 2 and Part 73 of the FCC rules and regulations

1. Power Output Measurements as indicated by FCC Rule Part 2.1046 and Rule Part 73.267.
2. Frequency stability measurements associated with variations in ambient temperature and with variations in line voltage as specified by 73.1545.
3. Occupied BW of the FM signal as specified by FCC Rule Part 73.297, 73.317, 73.322, and 73.1570.
4. Measurement of harmonics and spurious frequencies outside its assigned channel as specified by FCC Rule Part 73.317.
5. Demodulated Amplitude versus Frequency response measurements of the transmitter compliant with the Engineering charts identified in 73.333.
6. Measurement of cabinet radiation of spurs and harmonics as specified in FCC Rule 2.1053 and 2.1057.
7. Measurements of voltage and current to final amp stage as outlined in FCC Rule 2.1033.

Measurements were conducted at power output levels of 45 watts and 12.5 watts and constitute the range of power for which type certification is sought.

All test equipment had been calibrated prior to the use of the equipment by the supplier of the test equipment.

RF Power Output Stability vs Line Voltage

Equipment being tested

Device	Make	Model	Serial
Exciter	Galcom International	Cornerstone CT-X	1
45 W Amplifier	Galcom International	Cornerstone CT-45	1

Test Equipment Used

Device	Make	Model	Calibration Date
Variac	Power Stat	35	
Volt Meter	Fluke	25	
Temperature Chamber		DCF401W	
Wattmeter	Bird	43	2/13/2008
Wattmeter Slug	Bird	50B (50 Watts)	2/13/2008
Attenuator	Bird	8327-300	
Microwattmeter	Boonton	4200	

Test Equipment Configuration

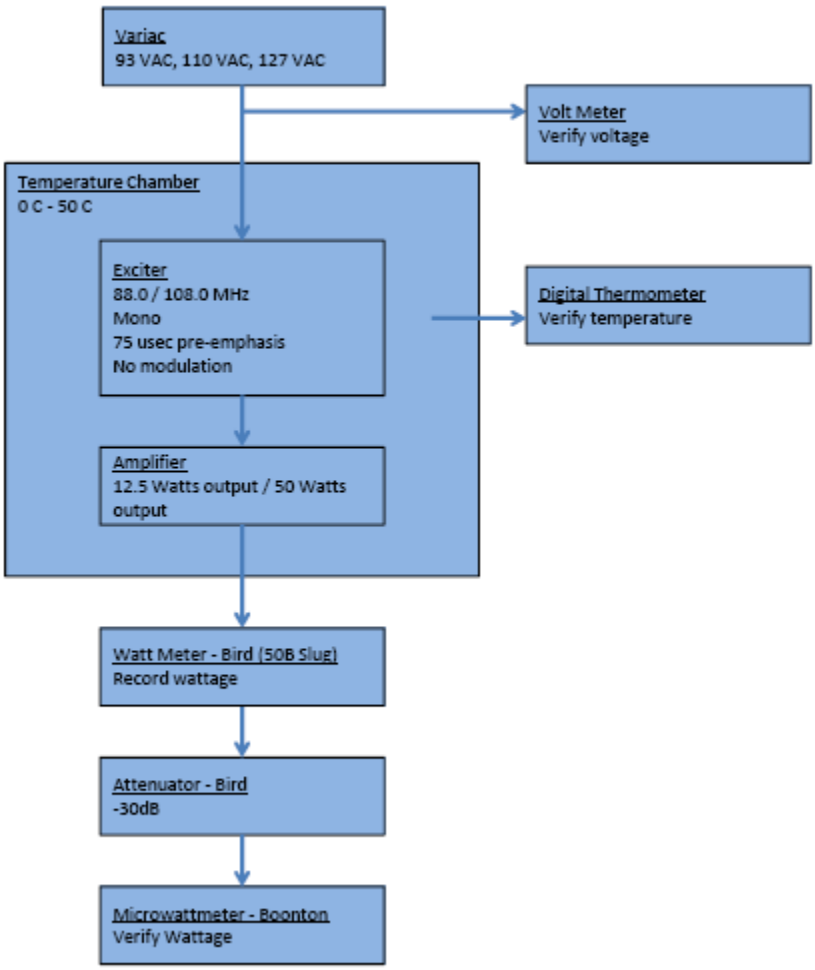


FIGURE 1

The transmitter was energized at room temperature at an initial power output of 45.0 watts. Power was read on the Bird Power Meter. The line voltage was varied from 94 volts to 126 volts using a Variac to adjust the voltage. The test was repeated at an output power of 12.5 watts. The data is tabulated shown below.

RF Power	Power Supply		RF Power	Power Supply
12.0W	$94V_{ac}$		43.7W	$94V_{ac}$
12.5W	$110V_{ac}$		45.0W	$110V_{ac}$
13.0W	$126V_{ac}$		45.6W	$126V_{ac}$

FREQUENCY STABILITY VS LINE VOLTAGE

The equipment was configured as shown in Figure 2. The transmitter was energized at room temperature at a power output of 45 watts. Power was read on the Bird Power Meter. The line voltage was varied from 94 volts to 126 volts. The output frequency was read on the frequency counter. The results are tabulated on the next page.

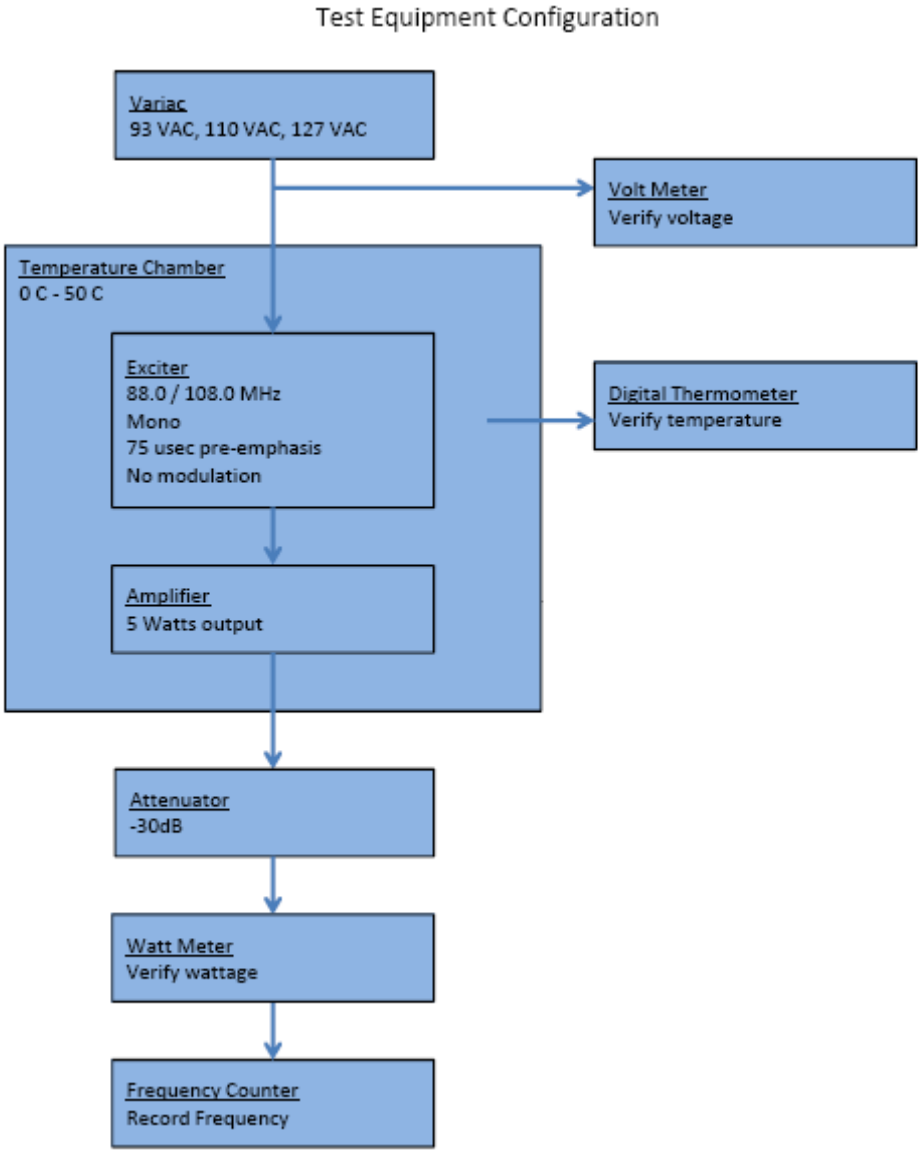


FIGURE 2

RF Frequency	Power Supply
88.000010 MHz	$94V_{ac}$
88,000000 MHz	$110V_{ac}$
88.000010 MHz	$126V_{ac}$

FREQUENCY STABILITY VS TEMPERATURE

The equipment was configured as shown in Figure 2. The transmitter was energized at room temperature at a power output of 45 watts. Power was read on the Bird Power Meter. The temperature was varied from 0° C to +50° C. The time of the measurement was also recorded with the frequency. Measurements were carried out at 88 and at 108 MHz. The output frequency was read on the frequency counter. The results are tabulated on the next page.

Test: Frequency Stability over Temperature

Operation	Temp	Carrier Freq.	Line Voltage	Volt Meter	Freq. (MHz)	Day	Time Started
Warm Up (Day 1)		108.0	100%	110	107.9999	1	8:37
1	20C	88.0	100%	110	88.0001	1	9:49
2	20C	88.0	100%	110	88.0002	2	3:38
3	20C	88.0	100%	110	88.0001	2	3:39
4	20C	88.0	100%	110	88.0001	2	3:40
5	20C	88.0	100%	110	88.0001	2	3:41
6	20C	88.0	100%	110	88.0001	2	3:42
7	20C	88.0	100%	110	88.0001	2	3:43
8	20C	88.0	100%	110	88.0001	2	3:44
9	20C	88.0	100%	110	88.0001	2	3:45
10	20C	88.0	100%	110	88.0001	2	3:46
11	20C	88.0	100%	110	88.0001	2	3:47
12	20C	88.0	100%	110	88.0001	2	3:48
13	20C	88.0	100%	110	88.0001	2	3:49
14	20C	88.0	100%	110	88.0001	2	3:50
15	20C	88.0	100%	110	88.0001	2	3:51
1	20C	108.0	100%	110	108.0001	1	9:50
2	20C	108.0	100%	110	108.0002	2	3:52
3	20C	108.0	100%	110	108.0001	2	3:53
4	20C	108.0	100%	110	108.0001	2	3:54
5	20C	108.0	100%	110	108.0001	2	3:55
6	20C	108.0	100%	110	108.0001	2	3:56
7	20C	108.0	100%	110	108.0001	2	3:57
8	20C	108.0	100%	110	108.0001	2	3:58
9	20C	108.0	100%	110	108.0002	2	3:59
10	20C	108.0	100%	110	108.0001	2	4:00
11	20C	108.0	100%	110	108.0001	2	4:01
12	20C	108.0	100%	110	108.0002	2	4:02
13	20C	108.0	100%	110	108.0001	2	4:03
14	20C	108.0	100%	110	108.0002	2	4:04
15	20C	108.0	100%	110	108.0001	2	4:05

Operation	Temp	Carrier Freq.	Line Voltage	Volt Meter	Freq. (MHz)	Day	Time Started
	0C	88.0	85%	92	88.0002	1	10:31
	0C	88.0	100%	110	88.0001	1	10:30
	0C	88.0	115%	127	88.0001	2	10:19
1	5C	88.0	115%	127	88.0001	2	10:22
2	5C	88.0	115%	127	88.0001	2	10:23
3	5C	88.0	115%	127	88.0001	2	10:24
4	5C	88.0	115%	127	88.0001	2	10:25
5	5C	88.0	115%	127	88.0001	2	10:26
6	5C	88.0	115%	127	88.0001	2	10:27
7	5C	88.0	115%	127	88.0001	2	10:28
8	5C	88.0	115%	127	88.0001	2	10:29
9	5C	88.0	115%	127	88.0001	2	10:30
10	5C	88.0	115%	127	88.0002	2	10:31
11	5C	88.0	115%	127	88.0001	2	10:32
12	5C	88.0	115%	127	88.0001	2	10:33
13	5C	88.0	115%	127	88.0002	2	10:34
14	5C	88.0	115%	127	88.0002	2	10:35
15	5C	88.0	115%	127	88.0001	2	10:36
1	5C	88.0	100%	110	88.0001	1	10:50
2	5C	88.0	100%	110	88.0002	1	10:51
3	5C	88.0	100%	110	88.0002	1	10:52
4	5C	88.0	100%	110	88.0001	1	10:53
5	5C	88.0	100%	110	88.0001	1	10:54
6	5C	88.0	100%	110	88.0001	1	10:55
7	5C	88.0	100%	110	88.0002	1	10:56
8	5C	88.0	100%	110	88.0001	1	10:57
9	5C	88.0	100%	110	88.0001	1	10:58
10	5C	88.0	100%	110	88.0002	1	10:59
11	5C	88.0	100%	110	88.0002	1	11:00
12	5C	88.0	100%	110	88.0001	1	11:01
13	5C	88.0	100%	110	88.0001	1	11:02
14	5C	88.0	100%	110	88.0002	1	11:03
15	5C	88.0	100%	110	88.0002	1	11:04

Operation	Temp	Carrier Freq.	Line Voltage	Volt Meter	Freq. (MHz)	Day	Time Started
1	5C	88.0	85%	92	88.0002	1	11:04
2	5C	88.0	85%	92	88.0002	1	11:05
3	5C	88.0	85%	92	88.0002	1	11:06
4	5C	88.0	85%	92	88.0001	1	11:07
5	5C	88.0	85%	92	88.0002	1	11:08
6	5C	88.0	85%	92	88.0001	1	11:09
7	5C	88.0	85%	92	88.0002	1	11:10
8	5C	88.0	85%	92	88.0002	1	11:11
9	5C	88.0	85%	92	88.0001	1	11:12
10	5C	88.0	85%	92	88.0002	1	11:13
11	5C	88.0	85%	92	88.0002	1	11:14
12	5C	88.0	85%	92	88.0001	1	11:15
13	5C	88.0	85%	92	88.0002	1	11:16
14	5C	88.0	85%	92	88.0001	1	11:17
15	5C	88.0	85%	92	88.0001	1	11:18
1	5C	108.0	115%	127	108.0001	2	9:42
2	5C	108.0	115%	127	108.0002	2	9:43
3	5C	108.0	115%	127	108.0001	2	9:44
4	5C	108.0	115%	127	108.0002	2	9:45
5	5C	108.0	115%	127	108.0002	2	9:46
6	5C	108.0	115%	127	108.0001	2	9:47
7	5C	108.0	115%	127	108.0001	2	9:48
8	5C	108.0	115%	127	108.0001	2	9:49
9	5C	108.0	115%	127	108.0002	2	9:50
10	5C	108.0	115%	127	108.0001	2	9:51
11	5C	108.0	115%	127	108.0001	2	9:52
12	5C	108.0	115%	127	108.0001	2	9:53
13	5C	108.0	115%	127	108.0001	2	9:54
14	5C	108.0	115%	127	108.0001	2	9:55
15	5C	108.0	115%	127	108.0002	2	9:56

Operation	Temp	Carrier Freq.	Line Voltage	Volt Meter	Freq. (MHz)	Day	Time Started
	30C	88.0	115%	127	88.0001	2	2:52
	30C	88.0	100%	110	88.0001	2	2:53
	30C	88.0	85%	92	88.0001	2	2:54
	40C	88.0	115%	127	88.0001	2	2:46
	40C	88.0	100%	110	88.0000	2	2:45
	40C	88.0	85%	92	88.0001	2	2:44
1	45c	88.0	115%	127	88.0000	2	1:09
2	45c	88.0	115%	127	88.0000	2	1:10
3	45c	88.0	115%	127	88.0001	2	1:11
4	45c	88.0	115%	127	88.0001	2	1:12
5	45c	88.0	115%	127	88.0000	2	1:13
6	45c	88.0	115%	127	88.0001	2	1:14
7	45c	88.0	115%	127	88.0001	2	1:15
8	45c	88.0	115%	127	88.0001	2	1:16
9	45c	88.0	115%	127	88.0000	2	1:17
10	45c	88.0	115%	127	88.0000	2	1:18
11	45c	88.0	115%	127	88.0001	2	1:19
12	45c	88.0	115%	127	88.0001	2	1:20
13	45c	88.0	115%	127	88.0001	2	1:21
14	45c	88.0	115%	127	88.0001	2	1:22
15	45c	88.0	115%	127	88.0000	2	1:23
1	45c	88.0	100%	110	88.0001	2	1:24
2	45c	88.0	100%	110	88.0000	2	1:25
3	45c	88.0	100%	110	88.0001	2	1:26
4	45c	88.0	100%	110	88.0001	2	1:27
5	45c	88.0	100%	110	88.0000	2	1:28
6	45c	88.0	100%	110	88.0001	2	1:29
7	45c	88.0	100%	110	88.0001	2	1:30
8	45c	88.0	100%	110	88.0000	2	1:31
9	45c	88.0	100%	110	88.0000	2	1:32
10	45c	88.0	100%	110	88.0001	2	1:33
11	45c	88.0	100%	110	88.0001	2	1:34
12	45c	88.0	100%	110	88.0001	2	1:35
13	45c	88.0	100%	110	88.0001	2	1:36
14	45c	88.0	100%	110	88.0001	2	1:37
15	45c	88.0	100%	110	88.0000	2	1:38

Operation	Temp	Carrier Freq.	Line Voltage	Volt Meter	Freq. (MHz)	Day	Time Started
1	45c	88.0	85%	92	88.0001	2	1:39
2	45c	88.0	85%	92	88.0000	2	1:40
3	45c	88.0	85%	92	88.0001	2	1:41
4	45c	88.0	85%	92	88.0000	2	1:42
5	45c	88.0	85%	92	88.0000	2	1:43
6	45c	88.0	85%	92	88.0001	2	1:44
7	45c	88.0	85%	92	88.0000	2	1:45
8	45c	88.0	85%	92	88.0001	2	1:46
9	45c	88.0	85%	92	88.0001	2	1:47
10	45c	88.0	85%	92	88.0001	2	1:48
11	45c	88.0	85%	92	88.0001	2	1:49
12	45c	88.0	85%	92	88.0000	2	1:50
13	45c	88.0	85%	92	88.0001	2	1:51
14	45c	88.0	85%	92	88.0000	2	1:52
15	45c	88.0	85%	92	88.0001	2	1:53
1	45C	108.0	115%	127	108.0001	2	2:24
2	45C	108.0	115%	127	108.0001	2	2:25
3	45C	108.0	115%	127	108.0002	2	2:26
4	45C	108.0	115%	127	108.0001	2	2:27
5	45C	108.0	115%	127	108.0001	2	2:28
6	45C	108.0	115%	127	108.0001	2	2:29
7	45C	108.0	115%	127	108.0001	2	2:30
8	45C	108.0	115%	127	108.0002	2	2:31
9	45C	108.0	115%	127	108.0001	2	2:32
10	45C	108.0	115%	127	108.0002	2	2:33
11	45C	108.0	115%	127	108.0002	2	2:34
12	45C	108.0	115%	127	108.0001	2	2:35
13	45C	108.0	115%	127	108.0001	2	2:36
14	45C	108.0	115%	127	108.0001	2	2:37
15	45C	108.0	115%	127	108.0001	2	2:38

Operation	Temp	Carrier Freq.	Line Voltage	Volt Meter	Freq. (MHz)	Day	Time Started
1	45C	108.0	100%	110	108.0001	2	2:09
2	45C	108.0	100%	110	108.0001	2	2:10
3	45C	108.0	100%	110	108.0001	2	2:11
4	45C	108.0	100%	110	108.0001	2	2:12
5	45C	108.0	100%	110	108.0001	2	2:13
6	45C	108.0	100%	110	108.0001	2	2:14
7	45C	108.0	100%	110	108.0001	2	2:15
8	45C	108.0	100%	110	108.0001	2	2:16
9	45C	108.0	100%	110	108.0001	2	2:17
10	45C	108.0	100%	110	108.0001	2	2:18
11	45C	108.0	100%	110	108.0000	2	2:19
12	45C	108.0	100%	110	108.0001	2	2:20
13	45C	108.0	100%	110	108.0001	2	2:21
14	45C	108.0	100%	110	108.0001	2	2:22
15	45C	108.0	100%	110	108.0001	2	2:23
1	45C	108.0	85%	92	108.0001	2	1:54
2	45C	108.0	85%	92	108.0001	2	1:55
3	45C	108.0	85%	92	108.0001	2	1:56
4	45C	108.0	85%	92	108.0001	2	1:57
5	45C	108.0	85%	92	108.0001	2	1:58
6	45C	108.0	85%	92	108.0001	2	1:59
7	45C	108.0	85%	92	108.0001	2	2:00
8	45C	108.0	85%	92	108.0001	2	2:01
9	45C	108.0	85%	92	108.0001	2	2:02
10	45C	108.0	85%	92	108.0001	2	2:03
11	45C	108.0	85%	92	108.0001	2	2:04
12	45C	108.0	85%	92	108.0001	2	2:05
13	45C	108.0	85%	92	108.0001	2	2:06
14	45C	108.0	85%	92	108.0001	2	2:07
15	45C	108.0	85%	92	108.0001	2	2:08
	50C	88.0	85%	92	88.0001	2	2:42
	50C	88.0	100%	110	88.0000	2	2:41
	50C	88.0	115%	127	88.0001	2	2:40

CONDUCTED EMISSION

Tests were executed with the transmitter configured in the Stereophonic mode. The test equipment was configured as shown in Figure 3.

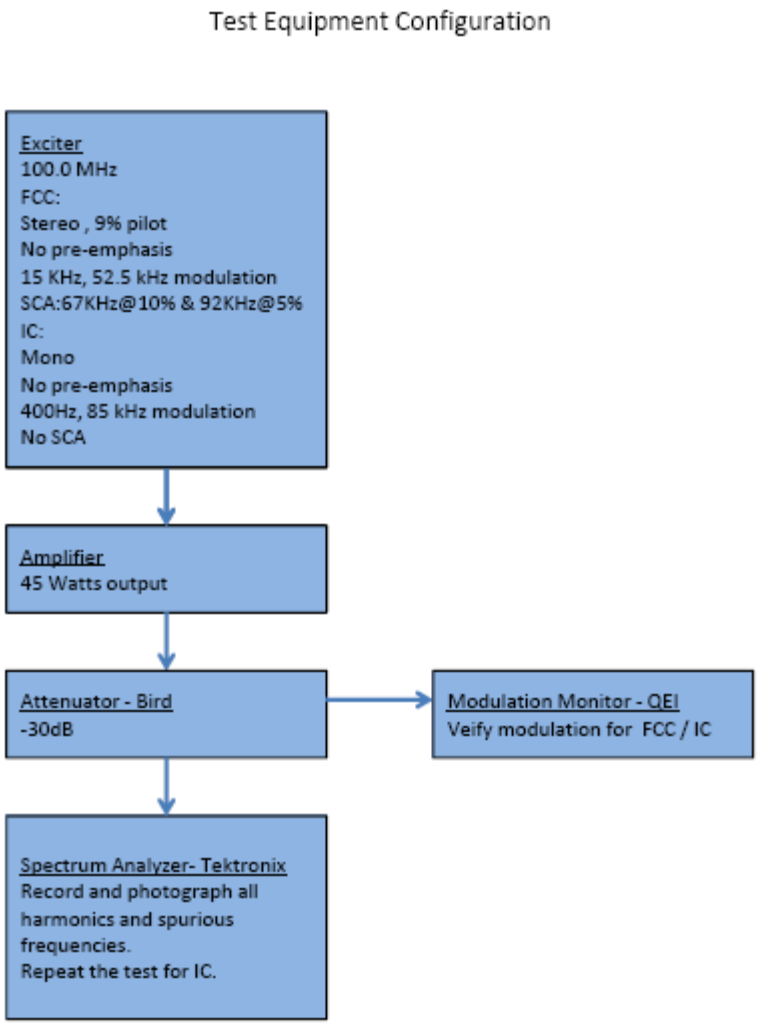


FIGURE 3

Measurements were recorded at an operating frequency of 100 MHz. Spectrum analyzer pictures were recorded with no modulation to establish a reference and then modulation was added and the spectrum was evaluated to determine that all FCC rules were met. The first set of pictures establish a reference level of +16 dBm on the spectrum analyzer which is equivalent to 45 watts output power (after factoring in the 30 dB attenuator). Then various segments of the spectrum away from the carrier frequency were evaluated for compliance with the appropriate “pass level” determined from the +16 dBm figure.

Test: Conducted Radiation

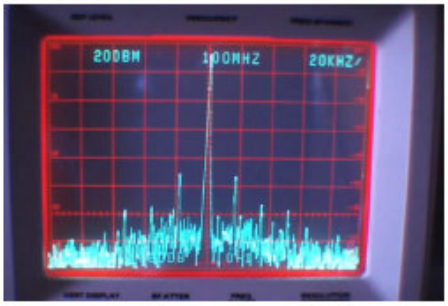
Frequency Level

Unmodulated Carrier

Test: 100.0 MHz 16 dBm

Note: The transmitter should be putting out 45 Watts (between 46 and 47 dBm). With the reading of 16 dBm plus 30 dB (Bird Attenuator) we have a total of 46.4 dBm.

Spectrum Analyzer Photograph



Frq: 100 Mhz
Ref: 20 dBm Span 200 kHz
Attn 60 dB Bandwidth 1 kHz

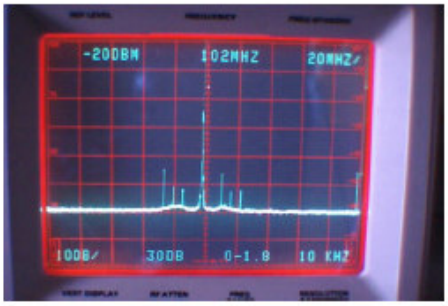
Frequency

Test: 0 - 200 MHz

100.0 MHz

Note: This is just for reference. All the spurs and the first harmonic are visable.

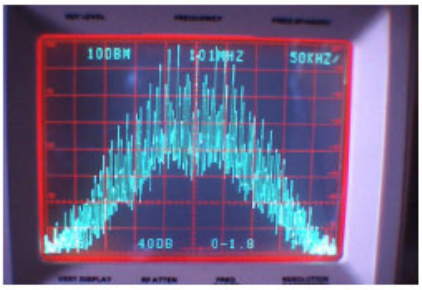
Spectrum Analyzer Photograph



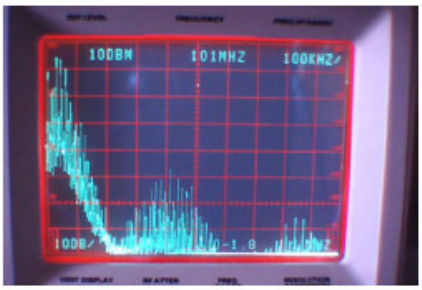
Frq: 100 Mhz
Ref: -20 dBm Span 200 MHz
Attn 30 dB Bandwidth 10 kHz

Test: Conducted Radiation - FCC

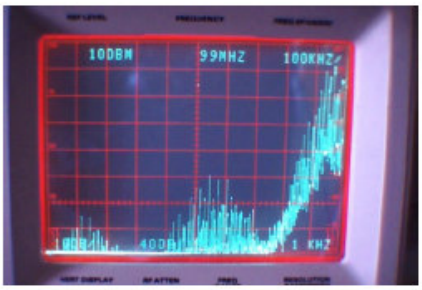
Frequency	Level	Pass Level		Spectrum Analyzer Photograph
Center Frequency: 100 MHz				
100.0 MHz				
Test: 120 kHz to 240 kHz				
100.120 MHz	-18	-9		
100.240 MHz	-58	-9		
Test: -120 kHz to -240 kHz				
99.88 MHz	-16	-9		
99.76 MHz	-56	-9		
Test: 240 kHz to 600 kHz				
100.240 MHz	-64	-19		
100.420 MHz	-38	-19	(Highest)	
100.600 Mhz	-70	-19		
Test: -240 kHz to -600 kHz				
99.760 MHz	-62	-19		
99.560 MHz	-38	-19	(Highest)	
99.4 MHz	-68	-19		



Frq: 100 Mhz
Ref: 10 dBm Span 500 kHz
Attn 40 dB Band' 1 kHz

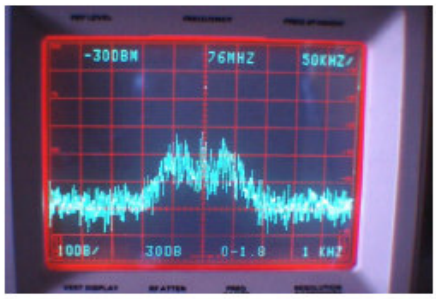


Frq: 101 Mhz
Ref: 10 dBm Span 1000 kHz
Attn 40 dB Bandwidth 1 kHz

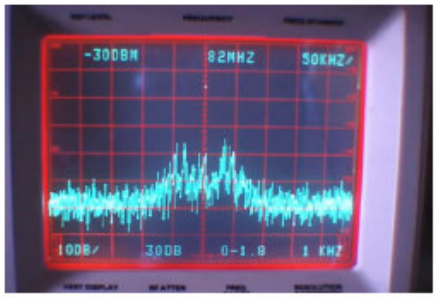


Frq: 99 Mhz
Ref: 10 dBm Span 1 MHz
Attn 40 dB Bandwidth 1 kHz

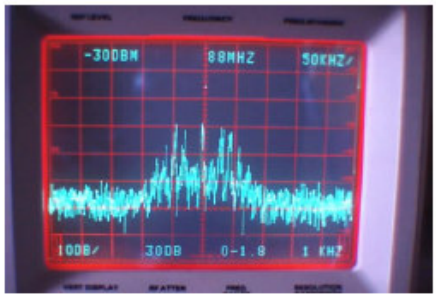
Test: Conducted Radiation - FCC

Frequency	Level	Pass Level	Spectrum Analyzer Photograph
Test: 0 MHz - 91.1 MHz			
76 MHz	-60	-44	

Frq: 76 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

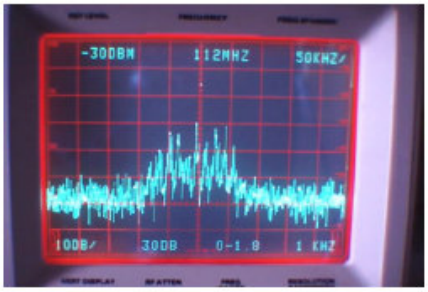
Test: 0 MHz - 91.1 MHz			
82 MHz	-64	-44	

Frq: 82 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

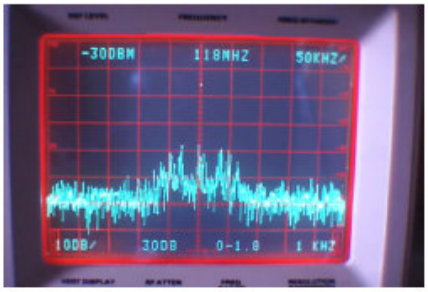
Test: 0 MHz - 91.1 MHz			
88 MHz	-59	-44	

Frq: 88 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

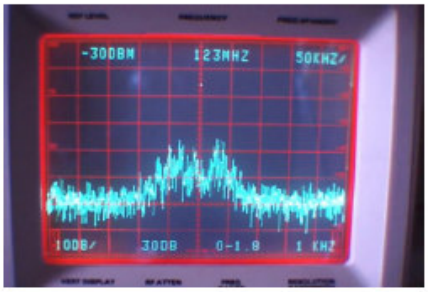
Test: Conducted Radiation - FCC

Frequency	Level	Pass Level	Spectrum Analyzer Photograph
Test: 103 MHz - 1 GHz			
112 MHz	-58	-44	

Frq: 112 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

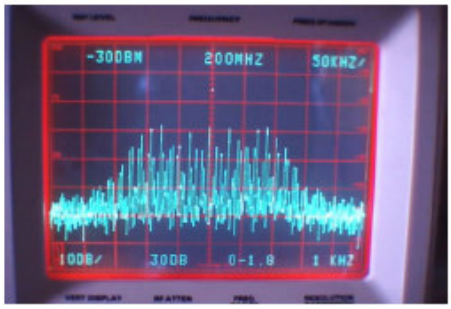
Test: 103 MHz - 1 GHz			
118 MHz	-65	-44	

Frq: 118 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

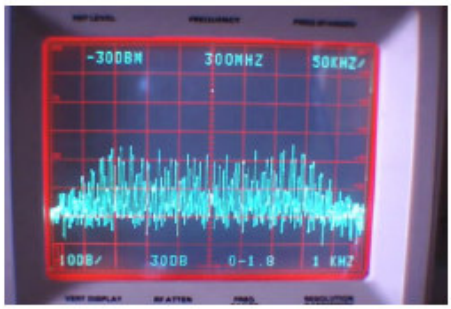
Test: 103 MHz - 1 GHz			
123 MHz	-63	-44	

Frq: 123 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

Test: Conducted Radiation - FCC

Frequency	Level	Pass Level	Spectrum Analyzer Photograph
Test: 103 MHz - 1 GHz			
200 MHz	-58	-44	

Frq: 200 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

Test: 103 MHz - 1 GHz			
300 MHz	-65	-44	

Frq: 300 Mhz
Ref: -30 dBm Span 500 kHz
Attn 30 dB Bandwidth 1 kHz

CONDUCTED HARMONICS AND SPURIOUS

Conducted harmonics and spurious are sampled in the output transmission line and converted to the corrected value (using the directional coupler coupling value and cable loss) and then compared to the power output of the unit under test. In this case energy was seen at the 2nd and 3rd harmonics of the main channel but all energy above this was below the spectrum analyzer noise floor.

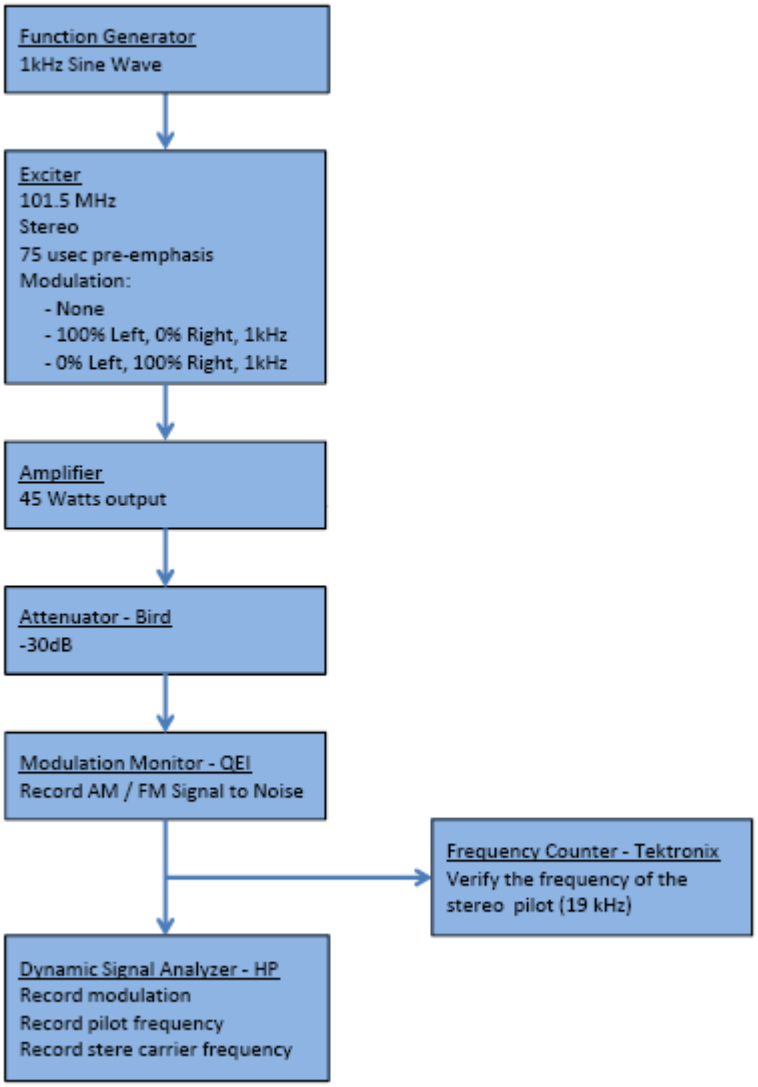
The coupler correction factor and measured level are used to find the actual level.

As can be seen in the photographs above, all levels measured are below the level described by 43+ 10 log Pout (or 59.5 dB).

STEREO COMPLIANCE TEST, PILOT FREQUENCY, AND 38 kHz LEVEL

The test equipment was configured as described in the diagram below. Using the QEI modulation monitor and the HP spectrum Analyzer, the levels of the Pilot frequency, 38 kHz subcarrier, and frequency components in the L+R subband and the L-R subband with specific modulation conditions according to FCC rule 73.322 were measured and the levels were found to be capable of demodulation.

Test Equipment Configuration



The frequency of the pilot tone was measured to be 19.000 kHz. Its deviation was measured as 94% or 7.05 kHz, using the QEI Modulation Monitor.

Test: Pilot Subcarrier Frequency (19 KHz)

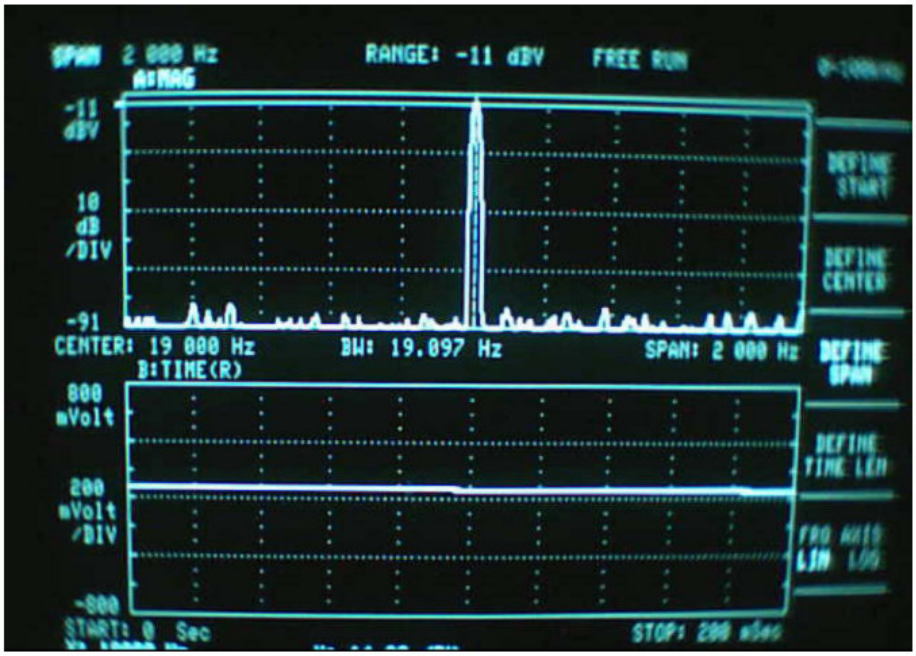
Transmitter:

101.5 MHz

Stereo

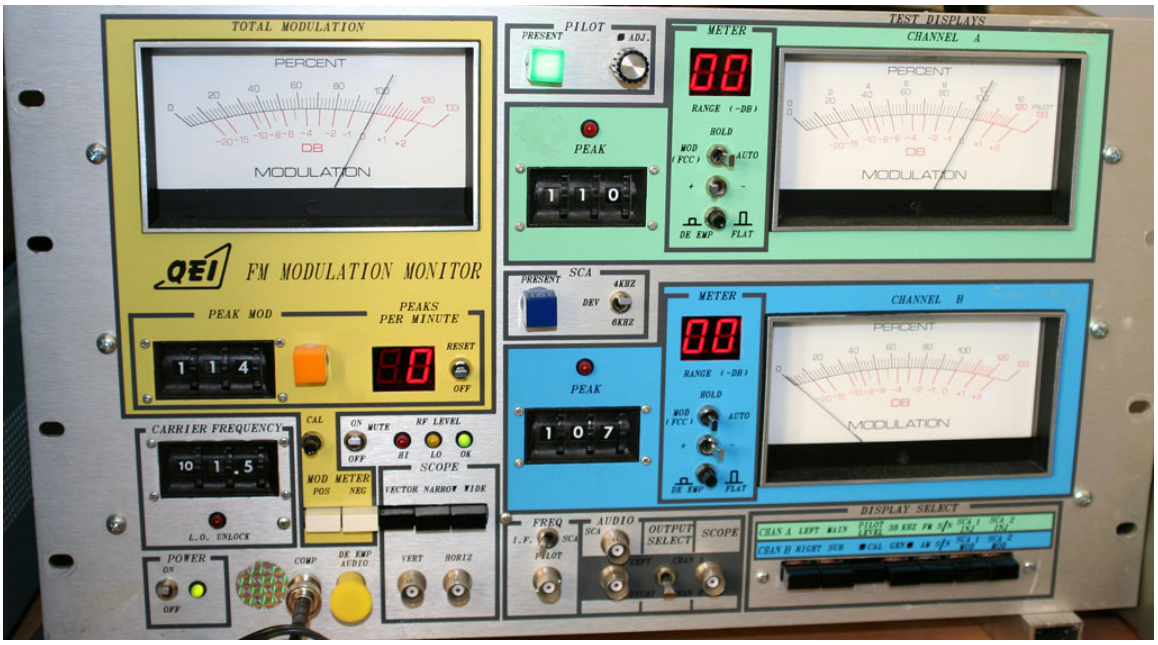
No audio input

Total modulation reading on QEI Modulation Meter:	9.2%
Pilot Level reading on QEI Modulation Meter:	94%
Frequency Counter reading:	19.0001 KHz
Audio Spectrum Analyzer reading:	19.000 KHz



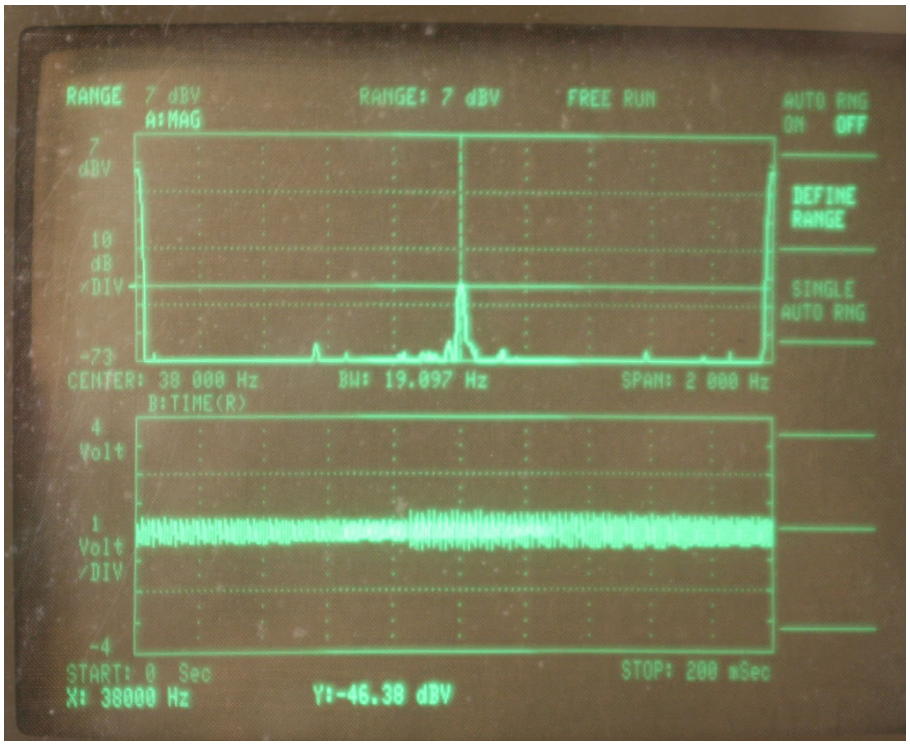
19 kHz Pilot frequency test

- Centered at 19 kHz
- Span: 2 kHz



QEI Modulation Meter displaying pilot level on Channel A and 100% modulation on Total Modulation meter.

The deviation of the subcarrier of the pilot tone (38kHz) must be no more than 0.75kHz (or -40 dB relative to 100% modulation). This is confirmed by examining the demodulated spectrum with the audio spectrum analyzer in order to display the subcarrier level. The photo below demonstrates the frequency to be 38.000 kHz and the amplitude is -46.38 dB relative to 100 % modulation as indicated on the QEI modulation monitor displayed above.



Test: Stereophonic audio deviation - LEFT

Transmitter:

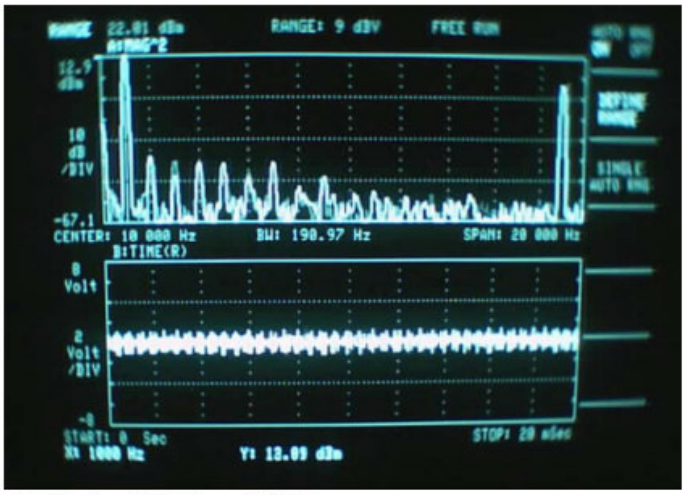
101.5 MHz

Stereo

100% Left Audio Input, 0% Right Audio Input

1 kHz audio signal

Frequency component from 50 Hz to 15 kHz	13.09 dBm
Frequency component from 23 kHz to 53 kHz	7.90 dBm



0kHz to 20kHz - LEFT

13kHz to 63kHz - LEFT (span: 30 kHz centre: 38 kHz)

Test: Stereophonic audio deviation - RIGHT

Transmitter:

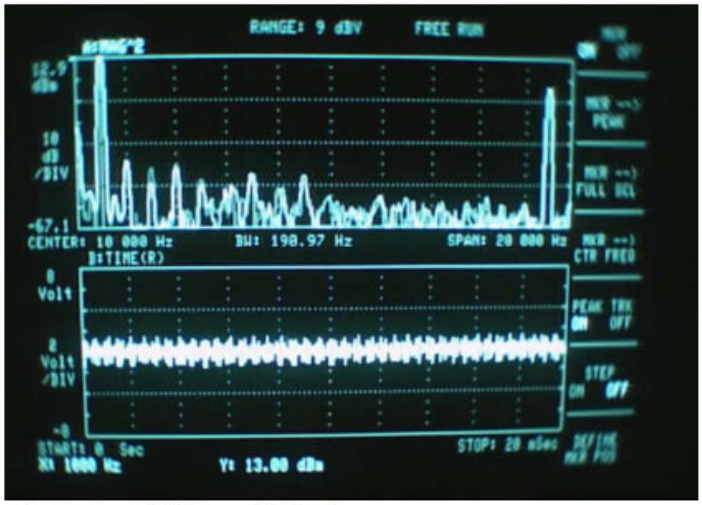
101.5 MHz

Stereo

0% Left Audio Input, 100% Right Audio Input

1 kHz audio signal

Frequency component from 50 Hz to 15 kHz	13.00 dBm
Frequency component from 23 kHz to 53 kHz	7.89 dBm



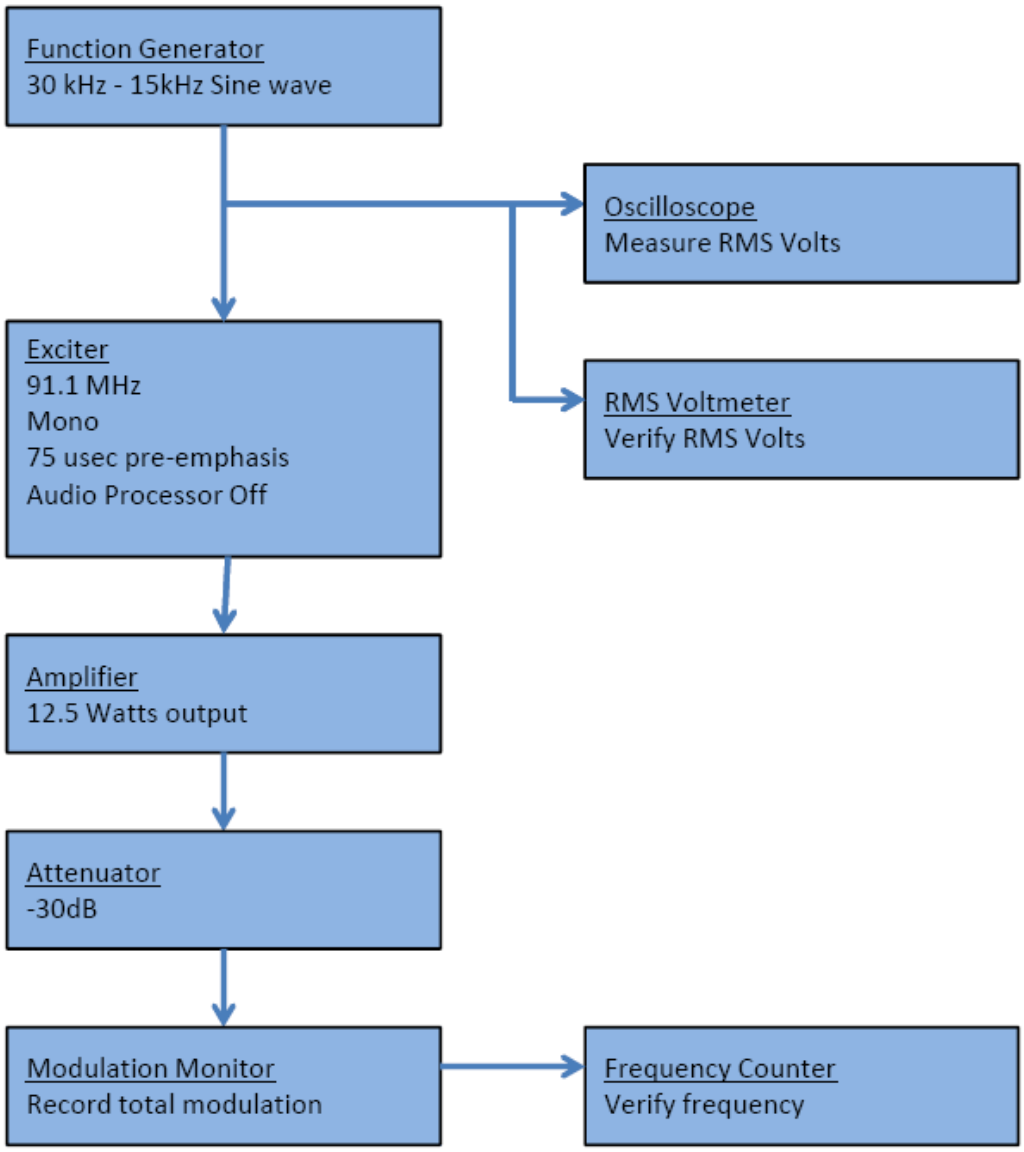
0kHz to 20kHz - RIGHT

13kHz to 63kHz - RIGHT

Audio Frequency Response and Pre-emphasis curve Verification

Frequency Response characteristics were measured using the equipment configured in diagram below. Measurements were recorded from the QEI modulation monitor without de-emphasis and the results are tabulated in the following table and on the graph below the table. All measurements fall within the prescribed limits.

Test Equipment Configuration

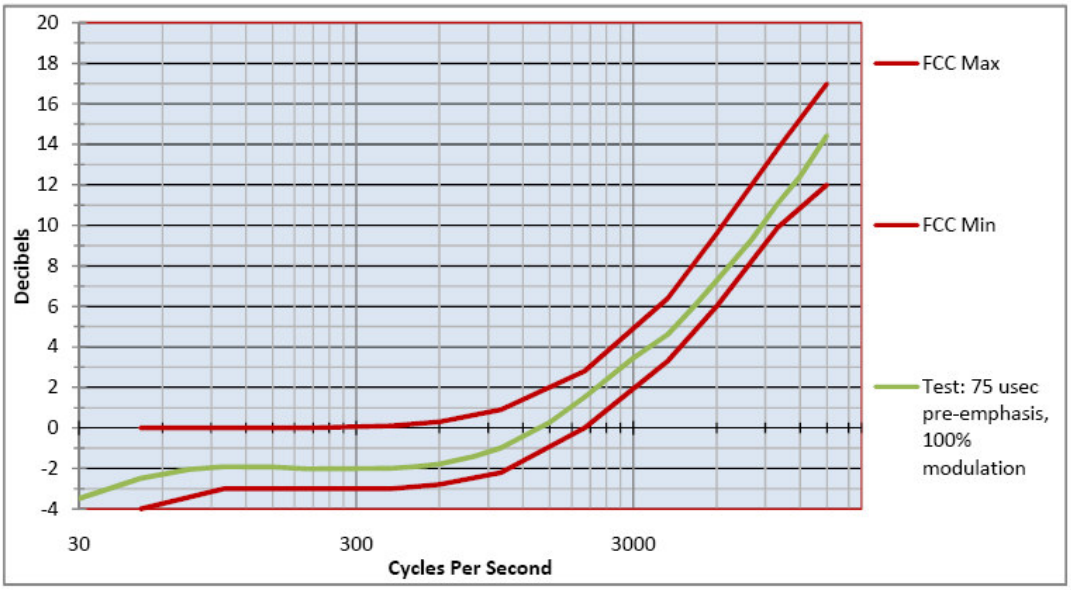


Test: 75 usec pre-emphasis, 100% modulation

Hz	Volts RMS	FCC dB	IC dB
30	0.842	-3.5	-1.5
50	0.751	-2.5	-0.5
75	0.713	-2	-0.1
100	0.703	-1.9	0.07
150	0.704	-1.9	0.06
200	0.711	-2	-0
300	0.71	-2	-0
400	0.709	-2	-0
500	0.701	-1.9	0.1
600	0.692	-1.8	0.21
800	0.662	-1.4	0.59
1000	0.631	-1	1.01
1500	0.546	0.28	2.27
2000	0.473	1.52	3.51
3000	0.379	3.45	5.44
4000	0.331	4.62	6.61
5000	0.281	6.05	8.04
6000	0.244	7.27	9.26
8000	0.194	9.26	11.3
10000	0.157	11.1	13.1
12000	0.135	12.4	14.4
15000	0.107	14.4	16.4

	FCC	IC
Normalize for graph	-1	0.99

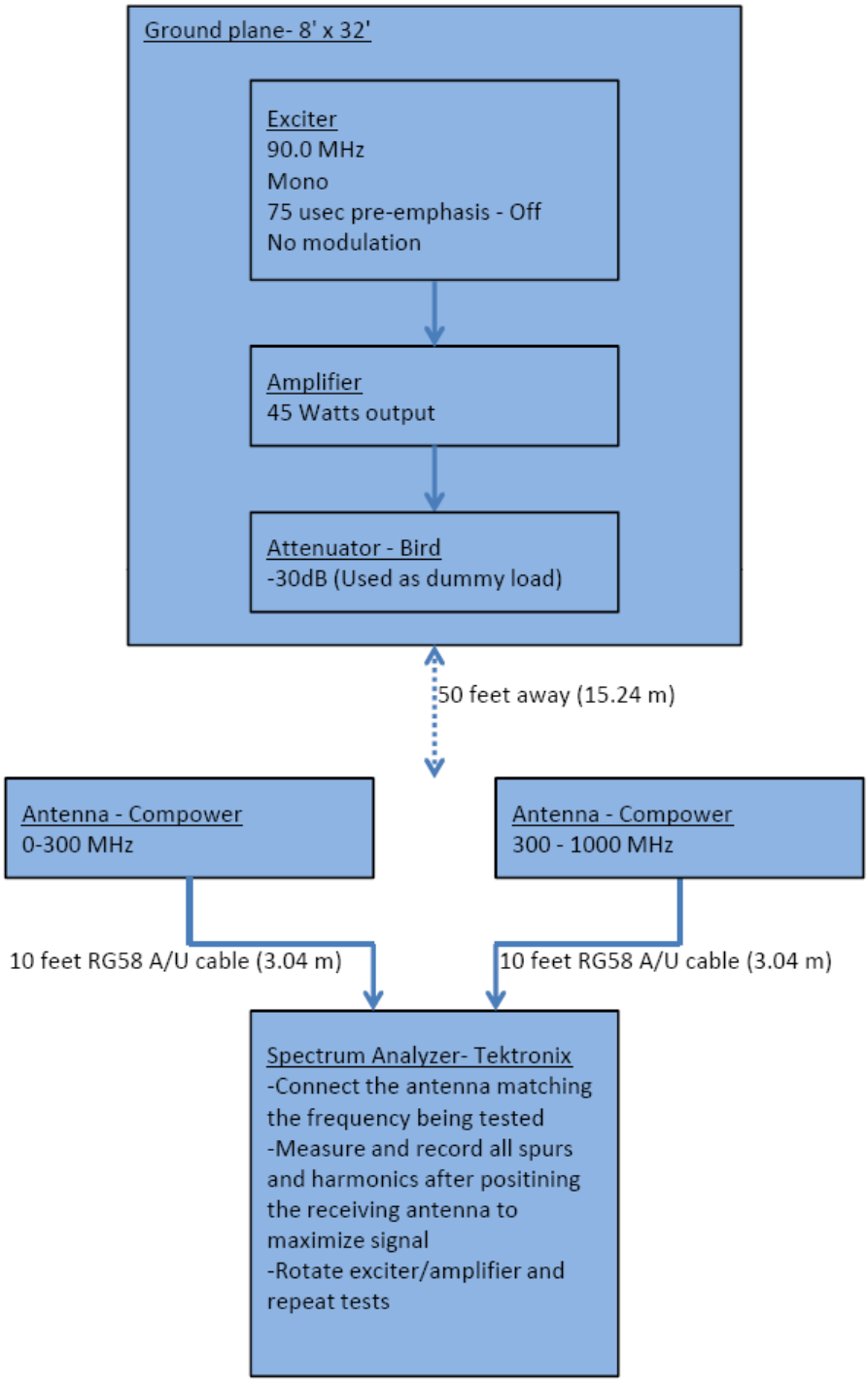
Test Graph : 75 usec pre-emphasis, 100% modulation, FCC Graph



CABINET RADIATION

The transmitter and test equipment were configured as shown below. Specifically, cabinet radiation data for measurement angles of 0 degrees (i.e. facing the transmitter), 90, 180, and 270 degrees was taken. The transmitter was operating at 90 MHz with an operating power of 45 W CW (unmodulated carrier). The free space path loss, cable loss and antenna gain characteristics were obtained at the fundamental frequency and at each of the harmonics of the carrier frequency in order to accurately assess the level of the signal radiated from the cabinet. All spurious and/or harmonic spectral components with levels above the spectrum analyzer noise floor that were radiated from the cabinet were recorded. The frequency range of the main carrier frequency to the 10^{th} harmonic of the carrier was searched. The receiving antenna was oriented to display the highest level of the spurious or harmonic frequency level. The loss of the cable connecting the receiving antenna and the spectrum analyzer is taken into account. The measured values along with raw data photos are tabulated in the table on the following pages. The measured values are referred back to the maximum power of 45 watts or +46 dBm. FCC rules require the level to be -60 dB or better thus the measured level must be less than -14 dBm

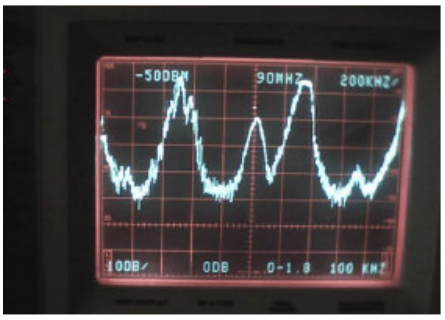
Test Equipment Configuration



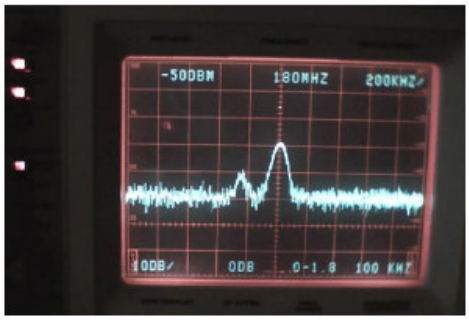
Test: Cabinet Radiation - 0-1000 MHz Facing Antenna

eq. MHz	Recorded Signal (dBm)	Cable Loss (dB)	Path Loss	Antenna Gain (dBi)	Radiated Power (dBm) (-14dBm Max)
90.0	-70	0.51	35.2	6.6	-40.8
180.0	-80	0.76	41.3	-0.2	-37.8
270.0	-84	0.96	44.8	0.54	-38.8
360.0	-75	1.15	47.3	5.4	-32.0
450.0	-77	1.33	49.2	5.9	-32.3
540.0	-86	1.49	50.8	5.16	-38.9
630.0	-80	1.65	52.1	4.62	-30.8
720.0	-81	1.8	53.3	6.32	-32.2
810.0	-88	1.96	54.3	6.4	-38.1
900.0	-78	2.11	55.2	6.4	-27.0

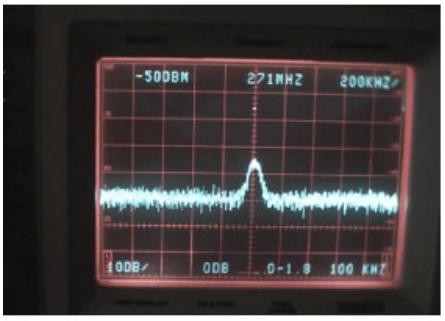
Pictures: Cabinet Radiation - 0-1000 MHz Facing Antenna



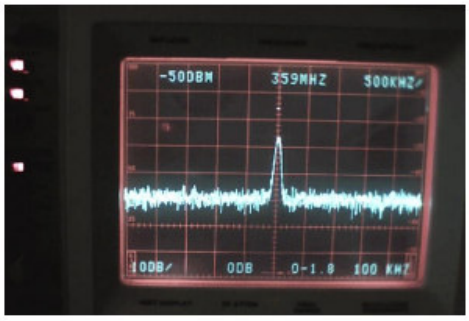
90 MHz



180 MHz

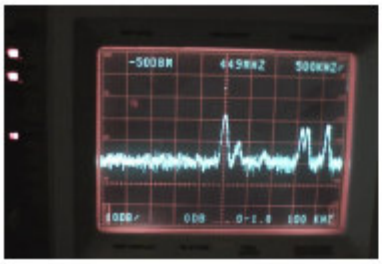


270 MHz

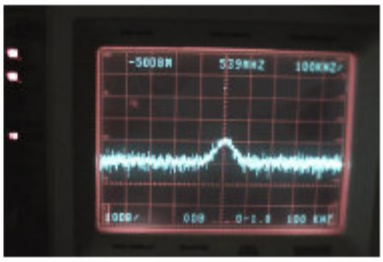


360 MHz

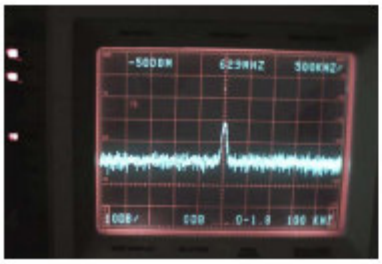
Pictures: Cabinet Radiation - 0-1000 MHz Facing Antenna



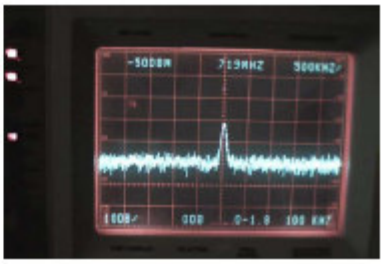
450 MHz



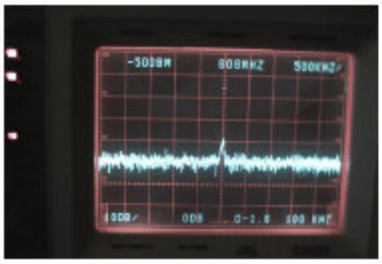
540 MHz



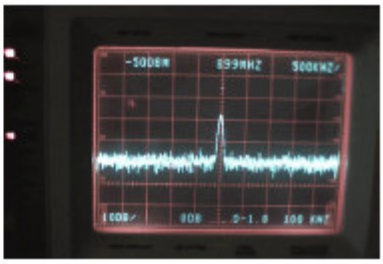
630 MHz



720 MHz



810 MHz



900 MHz

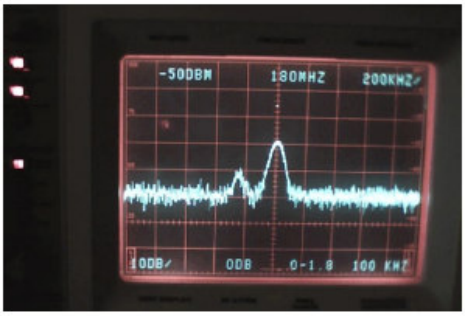
Left Side View

Test: Cabinet Radiation - 0-1000 MHz 270 degrees CW

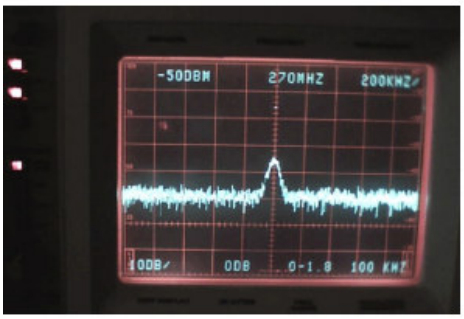
Freq. (MHz)	Recorded Signal (dBm)	Cable Loss (dB)	Path Loss	Antenna Gain (dBi)	Radiated Power (dBm) (-14dBr Max)
90.0	-71	0.51	35.2	6.6	-41.
180.0	-79	0.76	41.3	-0.2	-36.
270.0	-86	0.96	44.8	0.54	-40.
360.0	-74	1.15	47.3	5.4	-31.
450.0	-85	1.33	49.2	5.9	-40.
540.0	-81	1.49	50.8	5.16	-33.
630.0	-81	1.65	52.1	4.62	-31.
720.0	-86	1.8	53.3	6.32	-37.
810.0	-90	1.96	54.3	6.4	-40.
900.0	-83	2.11	55.2	6.4	-32.

Pictures: Cabinet Radiation - 0-1000 MHz 270 degrees CW

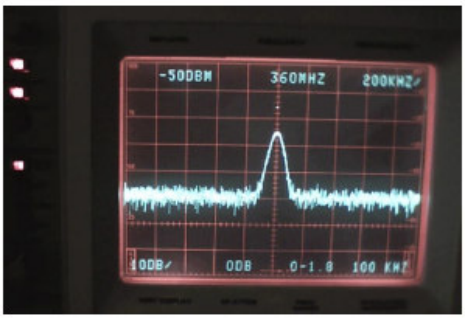
90 MHz



180 MHz



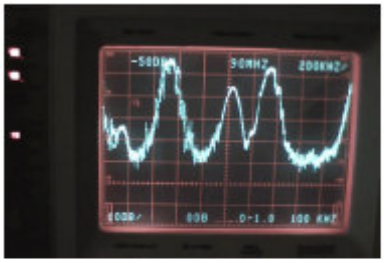
270 MHz



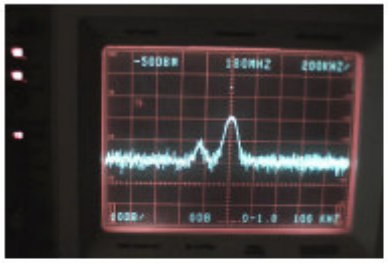
360 MHz

Right Side View

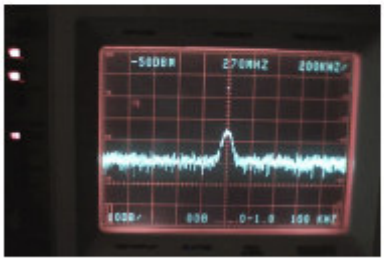
Pictures: Cabinet Radiation - 0-1000 MHz 270 degrees CW



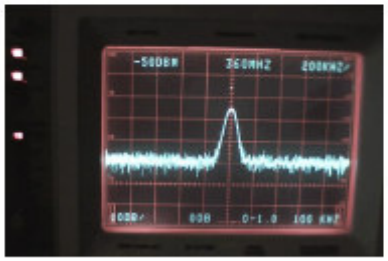
90 MHz



180 MHz



270 MHz

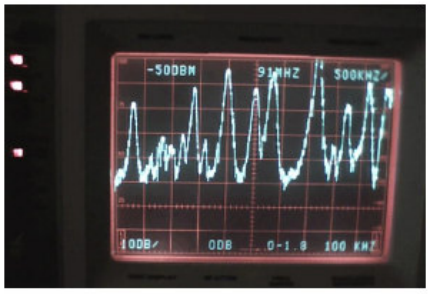


360 MHz

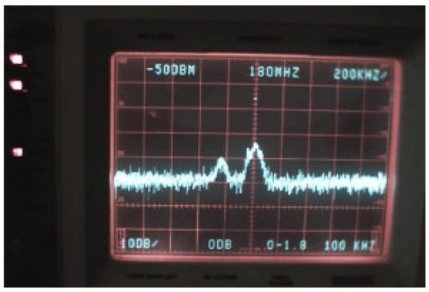
Test: Cabinet Radiation - 0-1000 MHz 90 degrees CW

Freq. (MHz)	Recorded Signal (dBm)	Cable Loss (dB)	Path Loss	Antenna Gain (dBi)	Radiated Power (dBm) (-14dBm Max)
90.0	-61	0.51	35.2	6.6	-31.8
180.0	-82	0.76	41.3	-0.2	-39.8
270.0	-84	0.96	44.8	0.54	-38.8
360.0	-69	1.15	47.3	5.4	-26.0
450.0	-85	1.33	49.2	5.9	-40.3
540.0	-86	1.49	50.8	5.16	-38.9
630.0	-75	1.65	52.1	4.62	-25.8
720.0	-89	1.8	53.3	6.32	-40.2
810.0	-89	1.96	54.3	6.4	-39.1
900.0	-76	2.11	55.2	6.4	-25.0

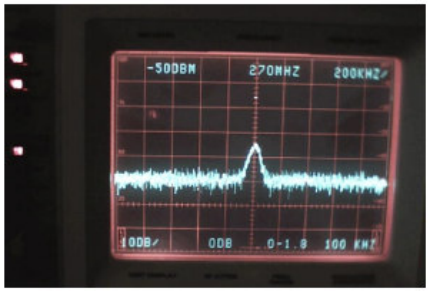
Pictures: Cabinet Radiation - 0-1000 MHz 90 degrees CW



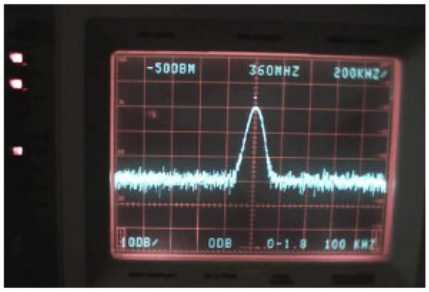
90 MHz



180 MHz

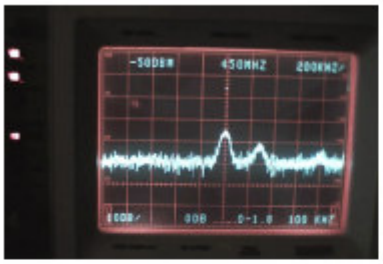


270 MHz

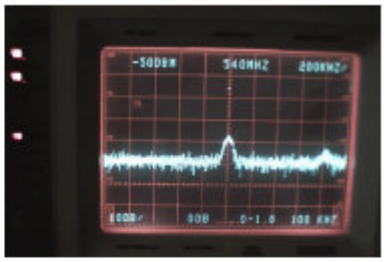


360 MHz

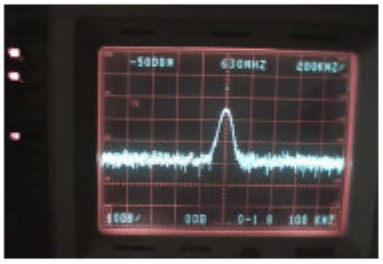
Pictures: Cabinet Radiation - 0-1000 MHz 90 degrees CW



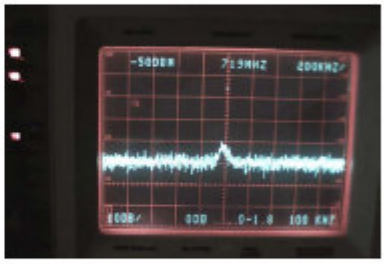
450 MHz



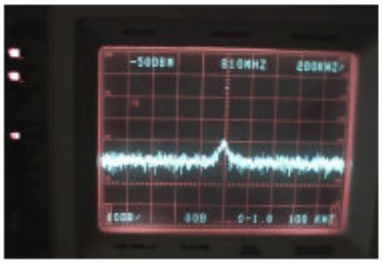
540 MHz



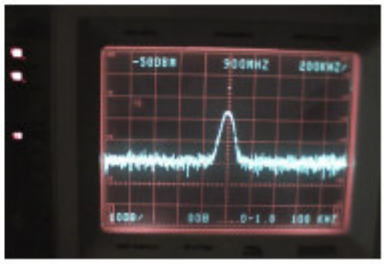
630 MHz



720 MHz



810 MHz

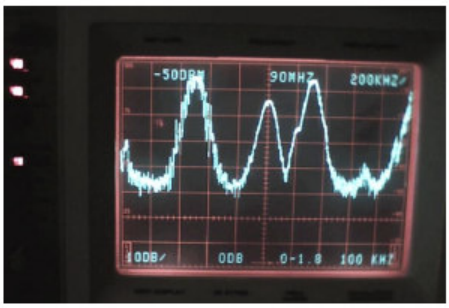


900 MHz

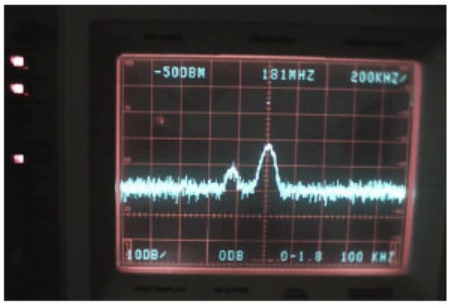
Test: Cabinet Radiation - 0-1000 MHz 180 degrees CW

Freq. (MHz)	Recorded Signal (dBm)	Cable Loss (dB)	Path Loss	Antenna Gain (dBi)	Radiated Power (dBm) (-14dBm Max)
90.0	-64	0.51	35.2	6.6	-34.8
180.0	-81	0.76	41.3	-0.2	-38.8
270.0	-90	0.96	44.8	0.54	-44.8
360.0	-77	1.15	47.3	5.4	-34.0
450.0	-84	1.33	49.2	5.9	-39.3
540.0	-83	1.49	50.8	5.16	-35.9
630.0	-83	1.65	52.1	4.62	-33.8
720.0	-83	1.8	53.3	6.32	-34.2
810.0	-86	1.96	54.3	6.4	-36.1
900.0	-81	2.11	55.2	6.4	-30.0

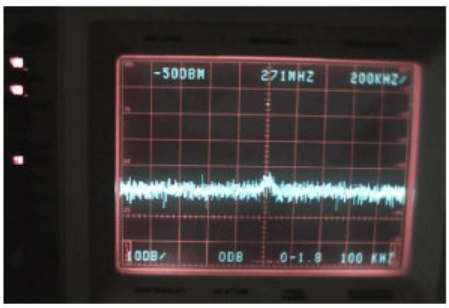
Pictures: Cabinet Radiation - 0-1000 MHz 180 degrees CW



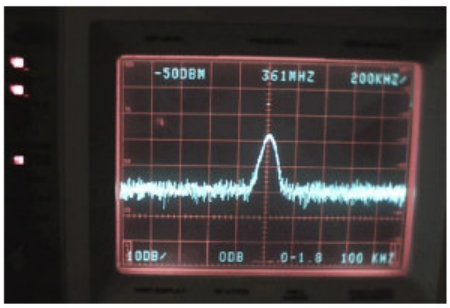
90 MHz



180 MHz

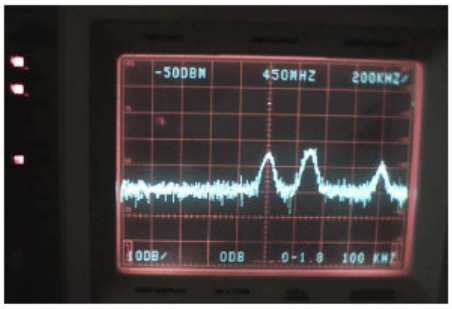


270 MHz

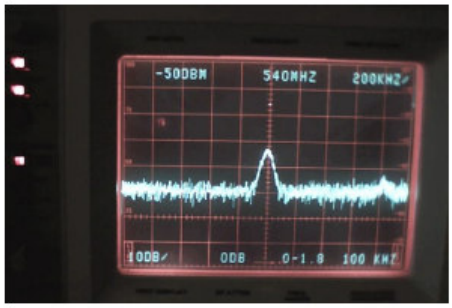


360 MHz

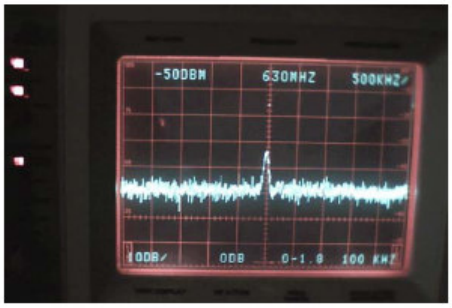
Pictures: Cabinet Radiation - 0-1000 MHz 180 degrees CW



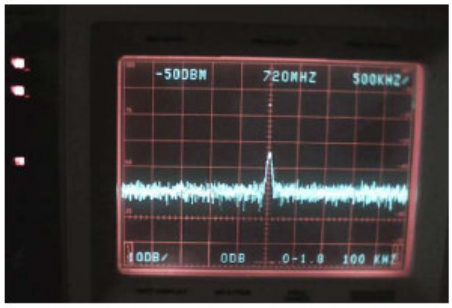
450 MHz



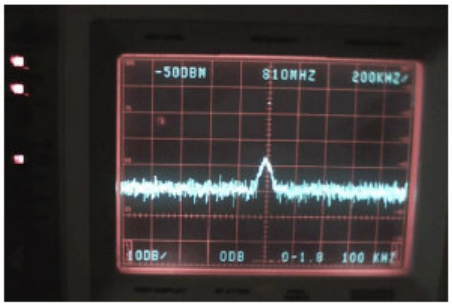
540 MHz



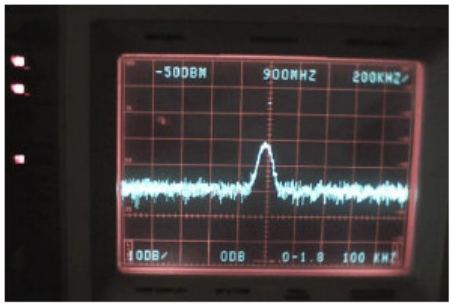
630 MHz



720 MHz



810 MHz



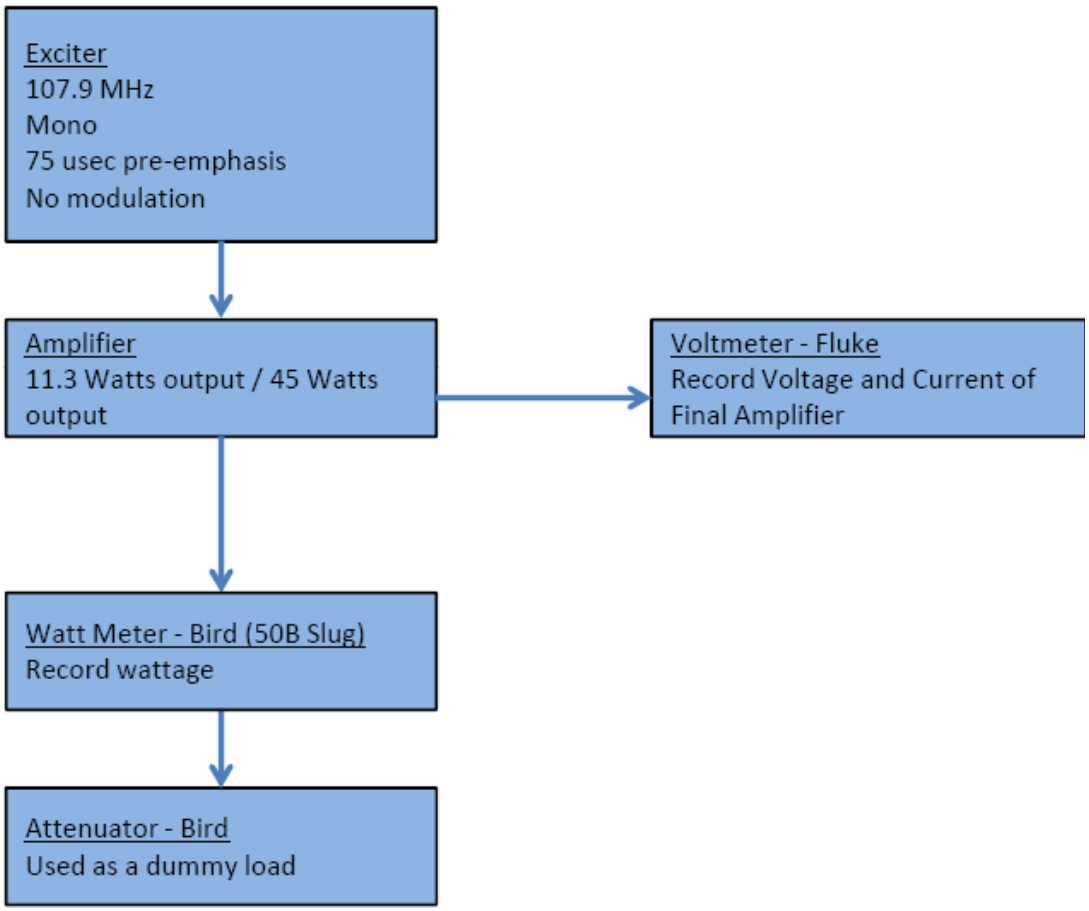
900 MHz

Rear View

The results indicate that the transmitter cabinet radiation meets FCC rule 2.1053. The worst case measured result was -69 dB for the 4th harmonic at the 90° CW position.

VOLTAGE AND CURRENT TO FINAL POWER AMPLIFIER

The transmitter was engaged and the voltage and current to the final amplifier stage were measured at full power and at the indicated reduced power output.



Test: Voltage and Current at 45 Watts

Frequency (MHz)	Amplifier Power	Current (Amps)	Voltage (Volts)
107.9	45 Watts	6.18	11.80

Test: Voltage and Current at 11.3 Watts

Frequency (MHz)	Amplifier Power	Current (Amps)	Voltage (Volts)
107.9	11.3 Watts	2.89	11.94