



FCC PART 74 MEASUREMENT AND TEST REPORT

Applicant : Sam Ash Music Corporation
Address : 262 Duffy Avenue Hicksville, NY 11801 United States
Manufacturer : Sam Ash Music Corporation
Address : 262 Duffy Avenue Hicksville, NY 11801 United States
Factory : Dongguan Jingheng Electron Co., Ltd.
Address : Shenshan Industrial City, Hengli Town, Dongguan, Guangdong 523465, P.R.China
E.U.T. : Wireless Microphone UHF Transmitter
Brand Name : SAMSON
Model No. : AG8
Measurement Standard : FCC PART 74
FCC ID : CCRAG8
Date of Receiver : March 10, 2016
Date of Test : March 11, 2016 to April 25, 2016
Date of Report : April 25, 2016

This Test Report is Issued Under the Authority of :

Prepared by

Bell Wei / Engineer

Approved & Authorized Signer

Mike Lee / Authorized Signatory

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from WH Technology Corp. The test results referenced from this report are relevant only to the sample tested.



Table of Contents

1. GENERAL INFORMATION	5
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST	5
1.2 RELATED SUBMITTAL(S) / GRANT (S)	7
1.3 TEST METHODOLOGY	7
1.4 EQUIPMENT MODIFICATIONS	7
1.5 SUPPORT DEVICE	7
1.6 TEST FACILITY AND LOCATION	7
1.7 SUMMARY OF TEST RESULTS	8
2. SYSTEM TEST CONFIGURATION.....	9
2.1 EUT CONFIGURATION	9
2.2 EQUIPMENT MODIFICATIONS	9
2.3 DESCRIPTION OF TEST MODES	9
2.4 JUSTIFICATION	9
2.5 ENVIRONMENTAL CONDITIONS	9
2.6 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS)	9
3. MAX OUTPUT POWER.....	10
3.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	10
3.2 TEST PROCEDURES.....	10
3.3 LIMIT	10
3.4 MEASUREMENT RESULTS	11
4. EMISSION BANDWIDTH & MASK	15
4.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	15
4.2 MEASUREMENT PROCEDURE	15
4.3 LIMIT	15
4.4 MEASUREMENT RESULTS	16
5. SPURIOUS EMISSIONS AT ANTENNA PORT	26
5.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	26
5.2 MEASUREMENT PROCEDURE	26
5.3 LIMIT	27
5.4 MEASUREMENT RESULTS	27



FCC ID: CCRA8

6. SPURIOUS EMISSION INTENSITY	40
6.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	40
6.2 MEASUREMENT PROCEDURE	41
6.3 LIMIT	42
6.4 MEASUREMENT RESULTS	42
7. FREQUENCY STABILITY	45
7.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	45
7.2 MEASUREMENT PROCEDURE	45
7.3 LIMIT	45
7.4 MEASUREMENT RESULTS	45
8. MODULATION CHARACTERISTICS MEASUREMENT	49
8.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	49
8.2 MEASUREMENT PROCEDURE	49
8.3 LIMIT	49
8.4 MEASUREMENT RESULTS	49
9. TEST EQUIPMENT LIST.....	54



FCC ID: CCRA8

Revision History of This Test Report

Report Number	Description	Issued Date
CF16050403	Initial Issue	2016-04-25



1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

Product Name	: Wireless Microphone UHF Transmitter
Model name	: AG8
Model Difference Description	: N/A
Power Supply	: 1*DC 1.5V AA Battery
Hardware Version	: AG8-HV01
Software Version	: AG8-SV01
Frequency Range	: 470-494MHz, 542-566MHz
Modulation	: FM (F3E)
Number of Channel	: 32
Antenna Type	: Integral
Antenna Gain	: 1.94dBi
Peak Deviation	: 48KHz (Declaration by manufacturer)
Note	: N/A



FCC ID: CCRA8
Channel List

470-494MHz		542-566MHz	
Channel	Frequency MHz	Channel	Frequency MHz
0	470.125	0	542.125
1	471.625	1	543.625
2	473.050	2	545.050
3	474.425	3	546.425
4	474.900	4	546.900
5	477.525	5	549.525
6	479.100	6	551.100
7	480.475	7	552.475
8	482.000	8	554.000
9	484.075	9	556.075
A	486.975	A	558.975
B	487.975	B	559.975
C	489.050	C	561.050
D	490.975	D	562.975
E	492.425	E	564.425
F	493.975	F	565.975

Note: The test channel and frequency see below:

470-494MHz		542-566MHz	
Channel	Frequency MHz	Channel	Frequency MHz
0	470.125	0	542.125
8	482.000	8	554.000
F	493.975	F	565.975



1.2 Related Submittal(s) / Grant (s)

N/A

1.3 Test Methodology

All measurements contained in this report were conducted in accordance with TIA 603-D Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. ANSI C63.10-2013, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

None

1.6 Test Facility and Location

Certificated by FCC, USA via MRA
Registration No.: TW1083
Date of registration: April 07, 2015

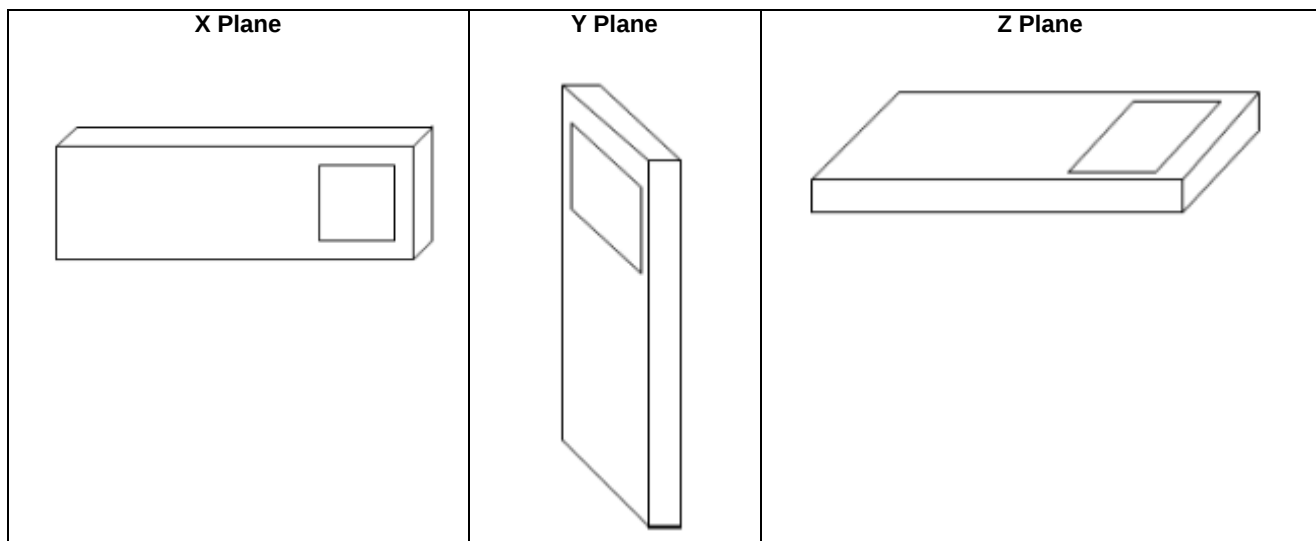
WH Technology Corp.
7F., No.262, Sec. 3, Datong Rd., Xizhi Dist., New
Taipei City 221, Taiwan (R.O.C.)
No. 120, In. 5, Hudong St., Xizhi Dist.,
New Taipei City 221, Taiwan (R.O.C.)



1.7 Summary of Test Results

FCC Rules	Description Of Test	Result
FCC §74.861(e)(1)	RF output power	Compliance
FCC §74.861(e)(3)	Modulation characteristics	Compliance
FCC §74.861(e)(5)(6)	Emission bandwidth & Emission Mask	Compliance
FCC §74.861(e)(6)	Spurious radiation at the Antenna Port	Compliance
FCC §74.861(e)(6)	Field strength of Spurious radiation	Compliance
FCC §74.861(e)(4)	Frequency stability	Compliance

Note: 1. The EUT has been tested as an independent unit. And Continual transmitting in maximum power (The new battery be used during test)
2. The EUT powered by battery and operating multiple positions, so the EUT shall be performed three orthogonal planes. The worst plane is Z.





2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Equipment Modifications

Conducted antenna port was enabled by adding additional RF cable from PCB.

2.3 Description of test modes

The EUT has been tested under continuous operating condition. The Lowest, middle and highest channel were chosen for testing, but only the worst case data is shown in this report.

2.4 Justification

The EUT was configured for testing according to TIA 603-D and ANSI C63.10-2013 Standards.

2.5 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15~35°C
- Humidity: 25~60%
- Atmospheric pressure: 86-106 kPa

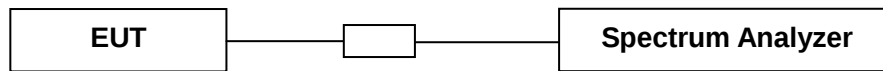
2.6 Measurement Uncertainty (95% confidence levels)

Uncertainty for Radiated Emission :	$\pm 3.74\text{dB}$ (below 1GHz) $\pm 4.85\text{dB}$ (above 1GHz)
Uncertainty for RF Output power:	$\pm 0.84\text{dB}$
Uncertainty for Conducted Emission:	$\pm 1.56\text{dB}$
Uncertainty for Frequency Error (stability) :	$\pm 1 \times 10^{-9}$
Uncertainty for Occupied Bandwidth:	$\pm 0.23\%$



3. Max Output Power

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Procedures

- Connect the EUT to spectrum analyzer and set the spectrum analyzer as following:

Frequency : Test Frequency
SPAN : 3MHz
RBW : 1MHz
VBW : 3MHz
Sweep Time : Auto
Detector Mode : Peak

Max-hold the trace and record the peak value once the trace stabilized.

3.3 Limit

As per FCC §74.861 (e) (1): the power of the measured unmodulated carrier power at the output of the transmitter power amplifier (antenna input power) may not exceed the following:

Frequency (MHz)	Limit (mW)
54-72	50mW
76-88	
174-216	
470-608	250mW
614-698	



3.4 Measurement Results

Please refer to following tables and plots.

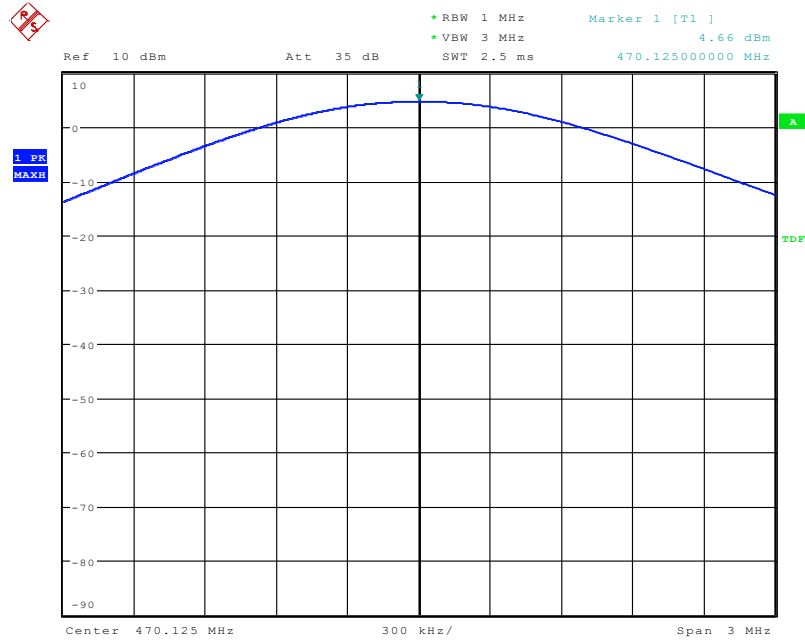
Temperature :	21 °C	Humidity :	46 %
Test By:	Sance	Test Date :	April 20, 2016
Test Result:	PASS		
Channel	Frequency (MHz)	Test Power (dBm)	Limit (dBm)
0	470.125	4.66	24
8	482.000	7.48	24
F	493.975	4.45	24
0	542.125	2.83	24
8	554.000	1.78	24
F	565.975	1.26	24

Note: 1. The EUT was programmed in un-modulation mode.
2. The cable loss have been considered during the test.



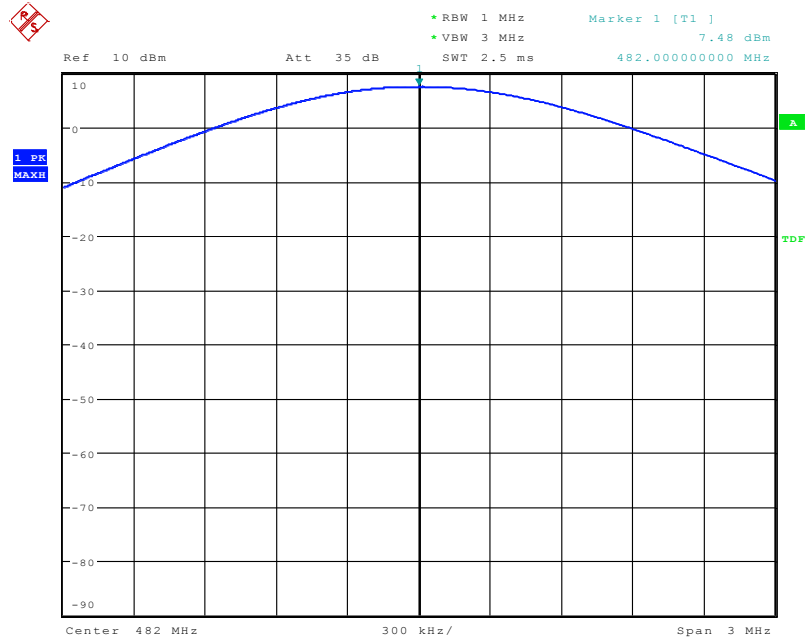
FCC ID: CCRAG8

Low Channel 470.125MHz



Date: 20.APR.2016 16:07:02

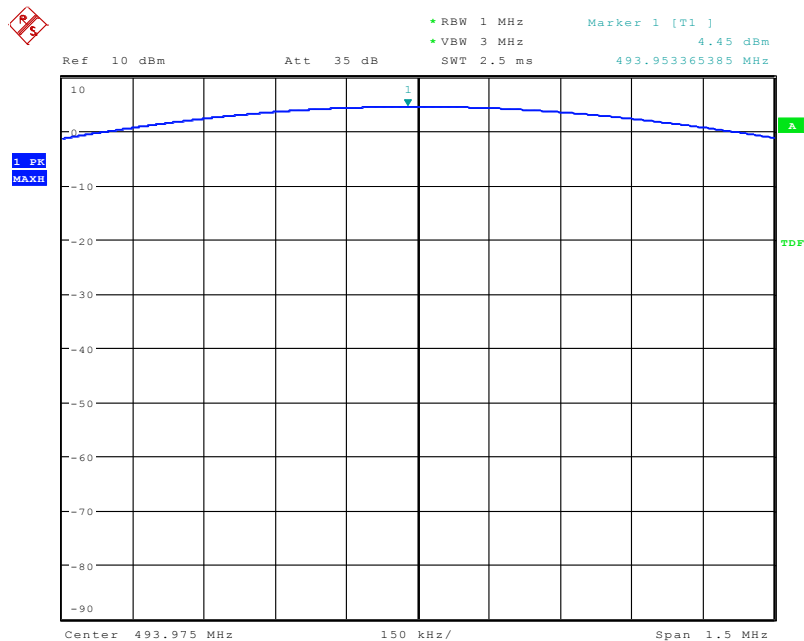
Mid Channel 482MHz



Date: 20.APR.2016 16:18:23

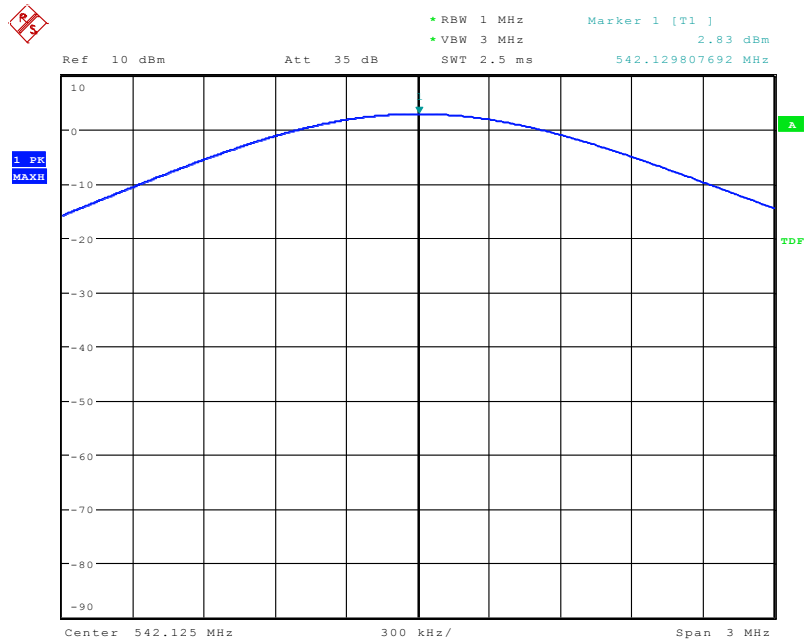


FCC ID: CCRA8
High Channel 493.975MHz



Date: 20.APR.2016 15:52:13

Low Channel 542.125MHz

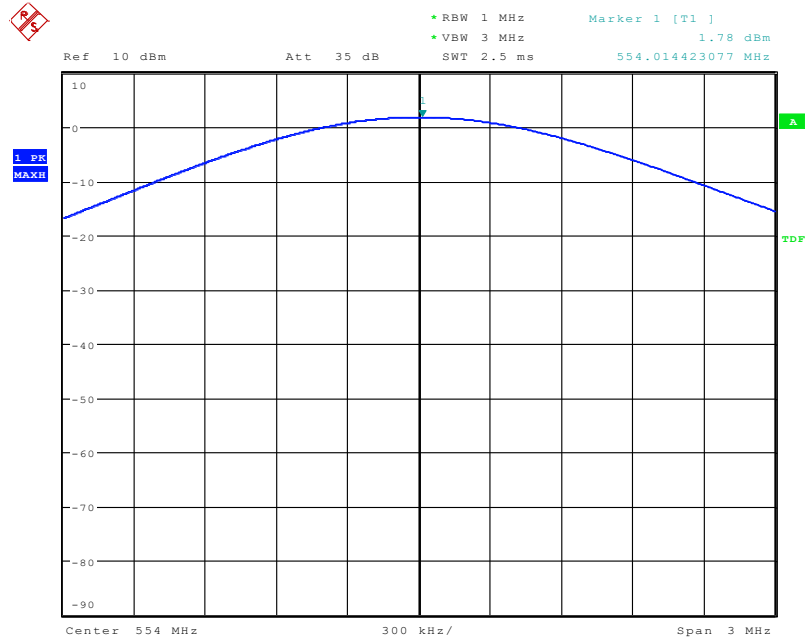


Date: 20.APR.2016 16:54:24



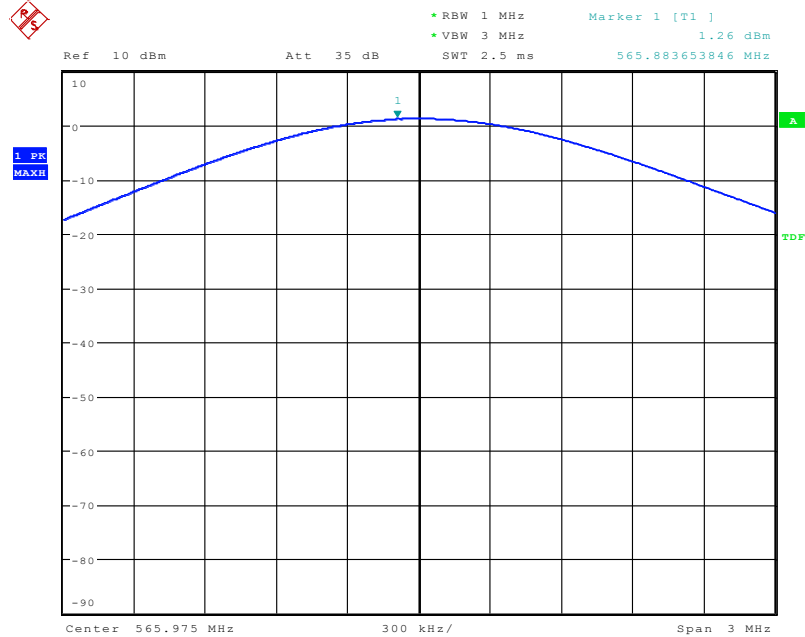
FCC ID: CCRAG8

Mid Channel 554MHz



Date: 20.APR.2016 17:01:36

High Channel 565.975MHz

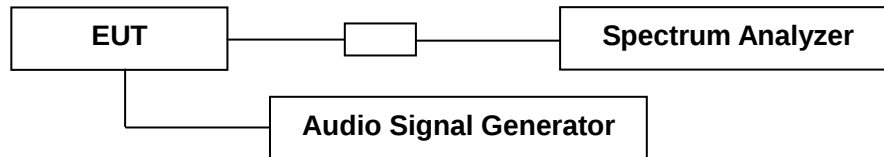


Date: 20.APR.2016 16:46:07



4. Emission Bandwidth & Mask

4.1 Test SET-UP (Block Diagram of Configuration)



4.2 Measurement Procedure

- (1) The EUT was connected to the 50 ohm input of a spectrum analyzer through 20dB of attenuation; the reference offset of the spectrum analyzer was set to the measured value of the attenuation path.
- (2) The unmodulated carrier signal level was recorded and used to set the reference level on the spectrum analyzer.
- (3) The spectrum analyzer span was then set to 1.5 MHz and the resolution bandwidth set to 2 kHz (1% of Authorized BW).
- (4) The emission limits were overlaid on the spectrum analyzer display and the trace was recorded.
- (5) The test item was modulated with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation.

4.3 Limit

The operating bandwidth shall not exceed 200 kHz.

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;

On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log(\text{mean output power in watts})$ dB.



4.4 Measurement Results

Please refer to following tables and plots.

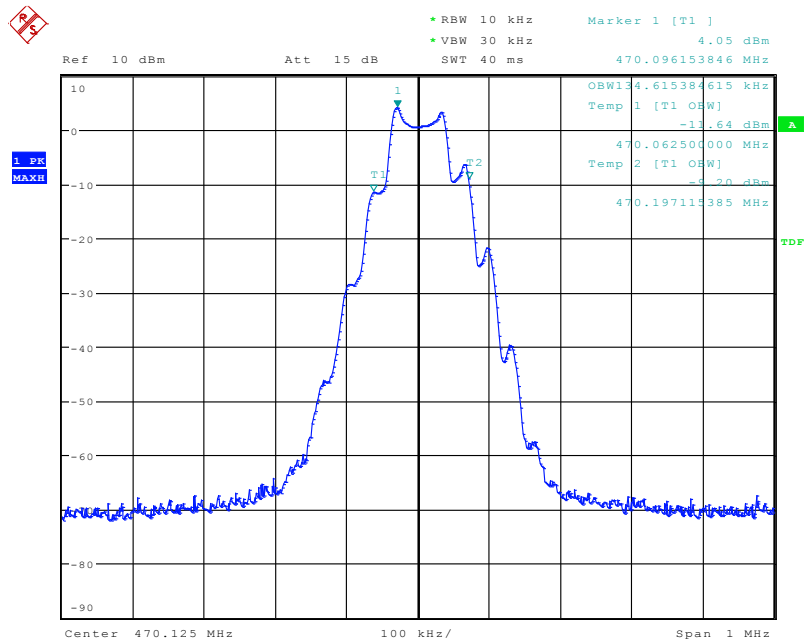
Temperature :	21 °C	Humidity :	46 %
Test By:	Sance	Test Date :	April 20, 2016
Test Result:	PASS		
Channel	Frequency (MHz)	99% Emission Bandwidth (KHz)	Limit (KHz)
0	470.125	134.6	200
8	482.000	134.6	200
F	493.975	136.2	200
0	542.125	110.6	200
8	554.000	113.8	200
F	565.975	113.8	200

Note: The peak deviation is 48KHz.



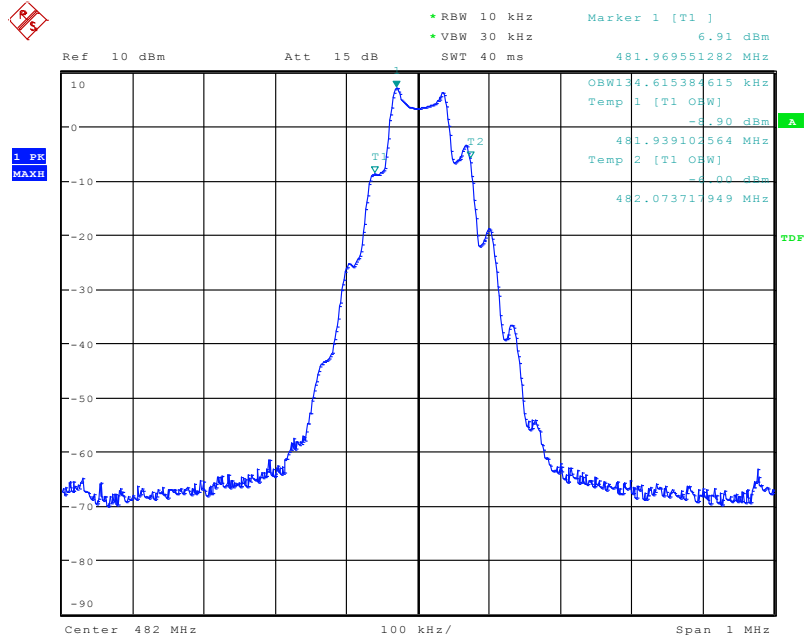
FCC ID: CCRA8

Low Channel 470.125MHz (2500Hz @ 16dB over 50% deviation)



Date: 20.APR.2016 16:14:18

Mid Channel 482MHz (2500Hz @ 16dB over 50% deviation)

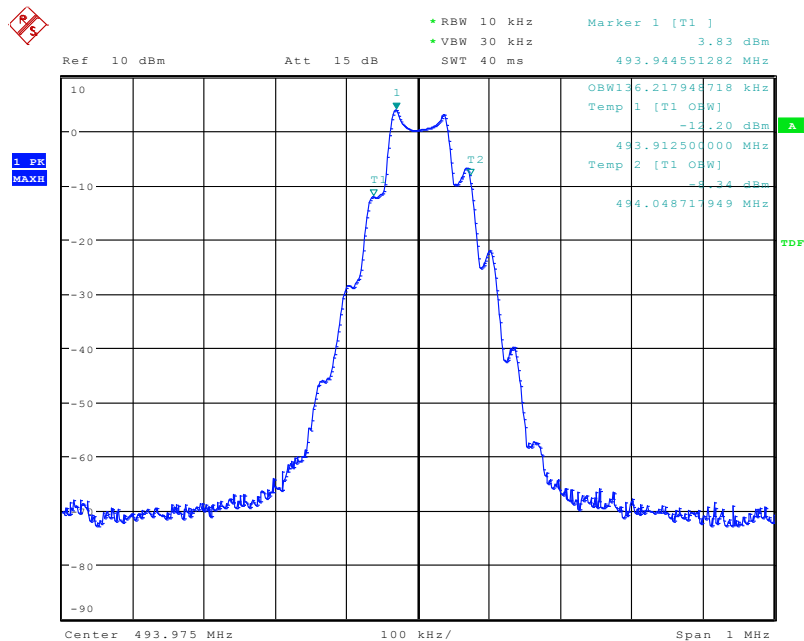


Date: 20.APR.2016 16:29:03



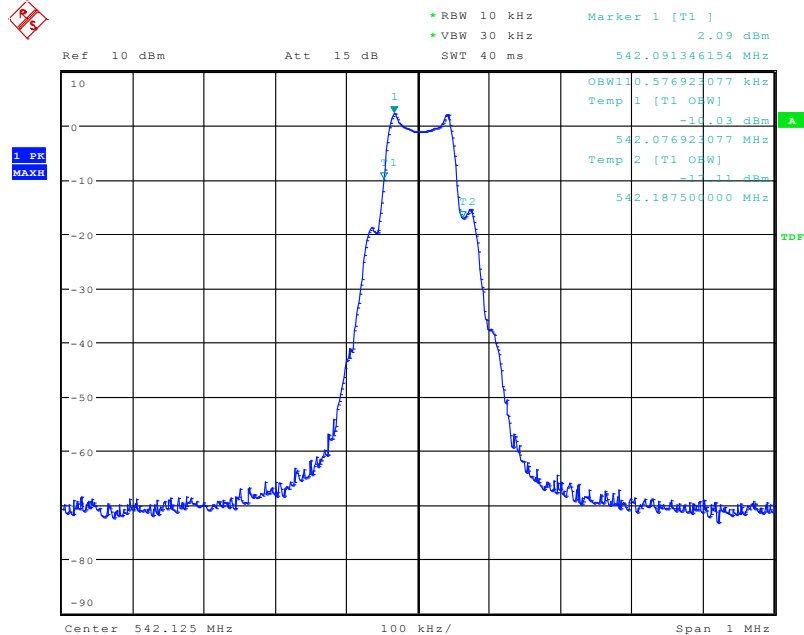
FCC ID: CCRAG8

High Channel 493.975MHz (2500Hz @ 16dB over 50% deviation)



Date: 20.APR.2016 16:03:31

Low Channel 542.125MHz (2500Hz @ 16dB over 50% deviation)

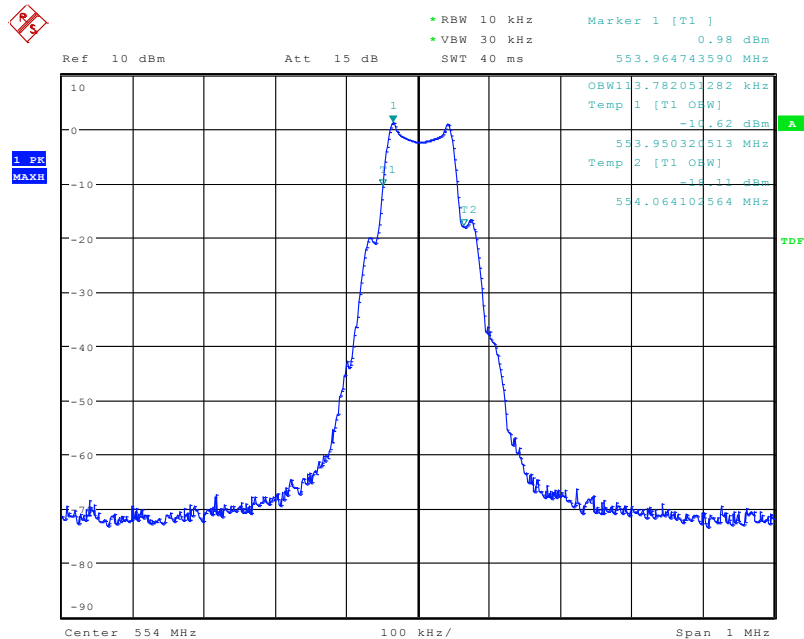


Date: 20.APR.2016 16:57:28



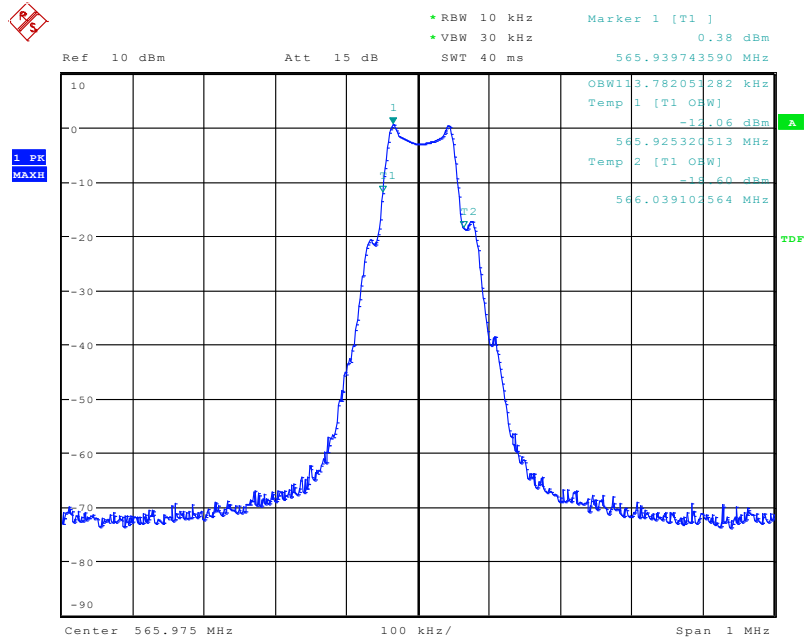
FCC ID: CCRAG8

Mid Channel 554MHz (2500Hz @ 16dB over 50% deviation)

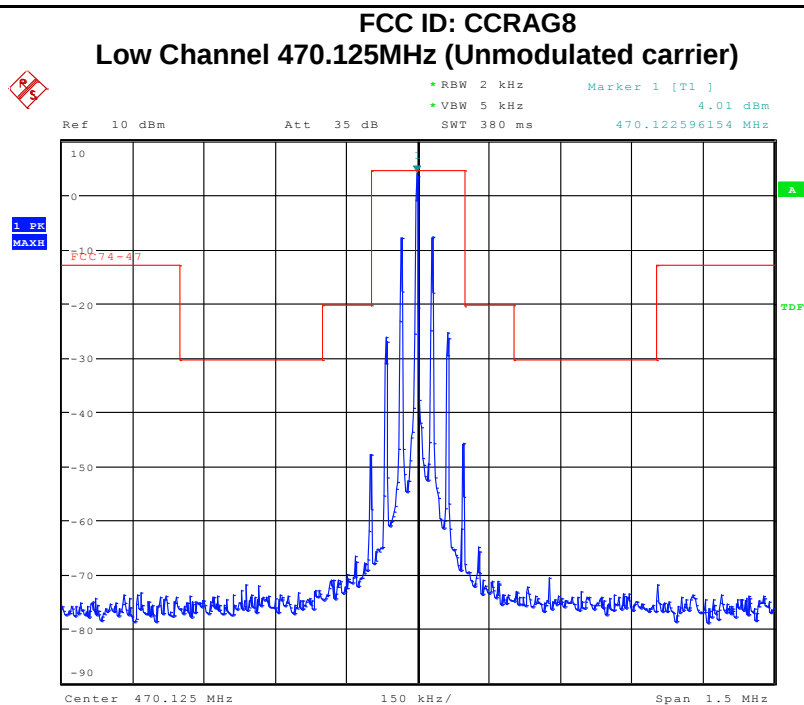


Date: 20.APR.2016 17:04:28

High Channel 565.975MHz (2500Hz @ 16dB over 50% deviation)

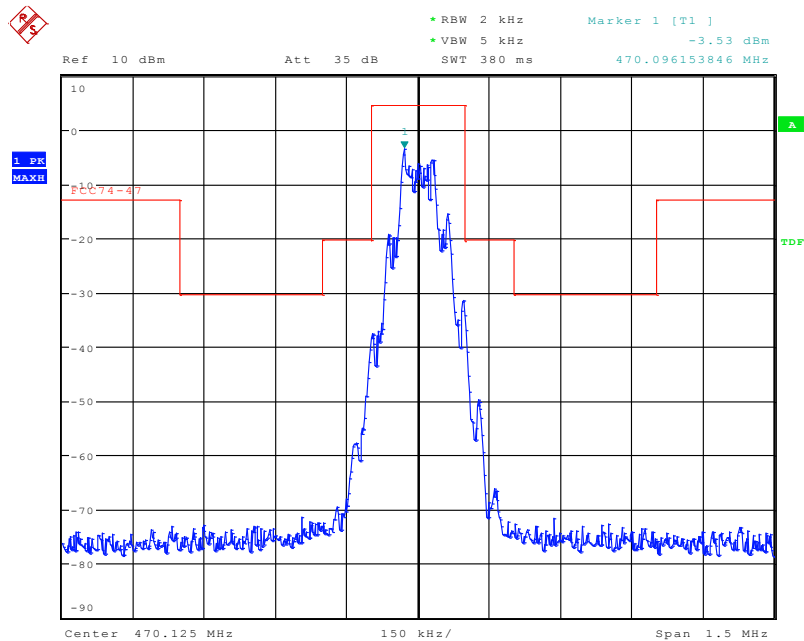


Date: 20.APR.2016 16:49:59

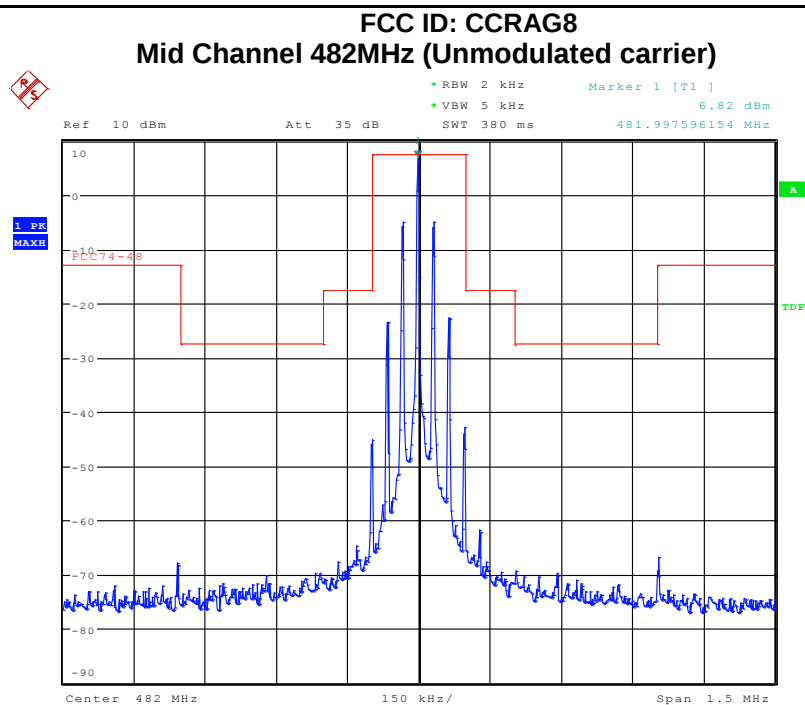


Date: 20.APR.2016 16:08:56

2500Hz @16dB over 50% deviation

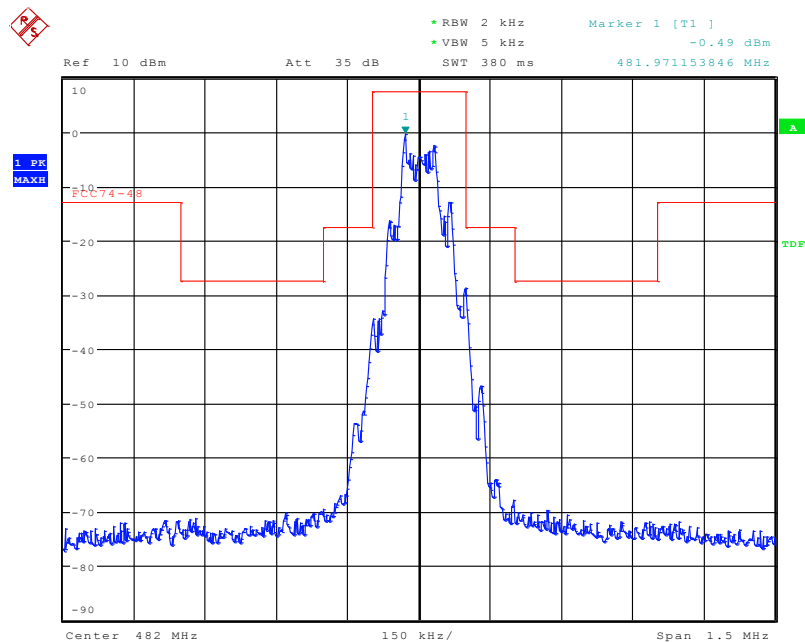


Date: 20.APR.2016 16:09:50



Date: 20.APR.2016 16:19:42

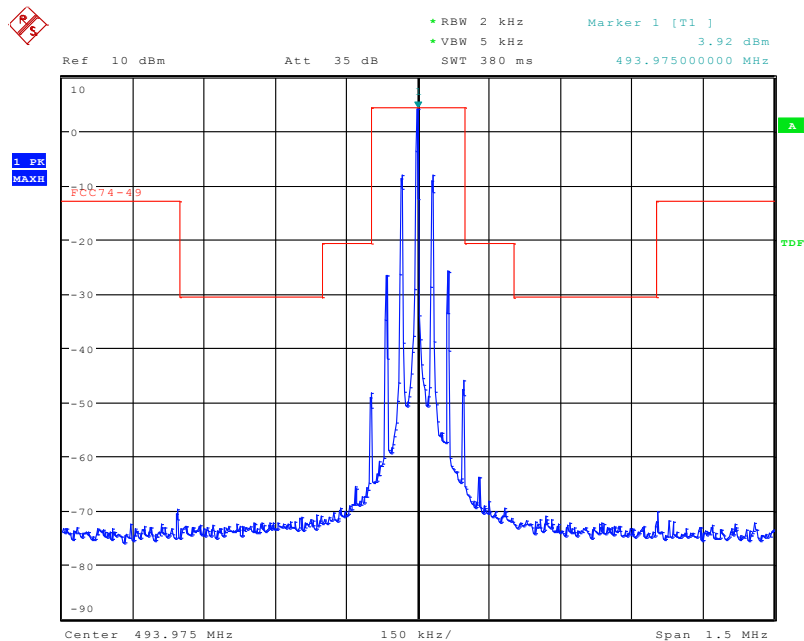
2500Hz @16dB over 50% deviation



Date: 20.APR.2016 16:20:57

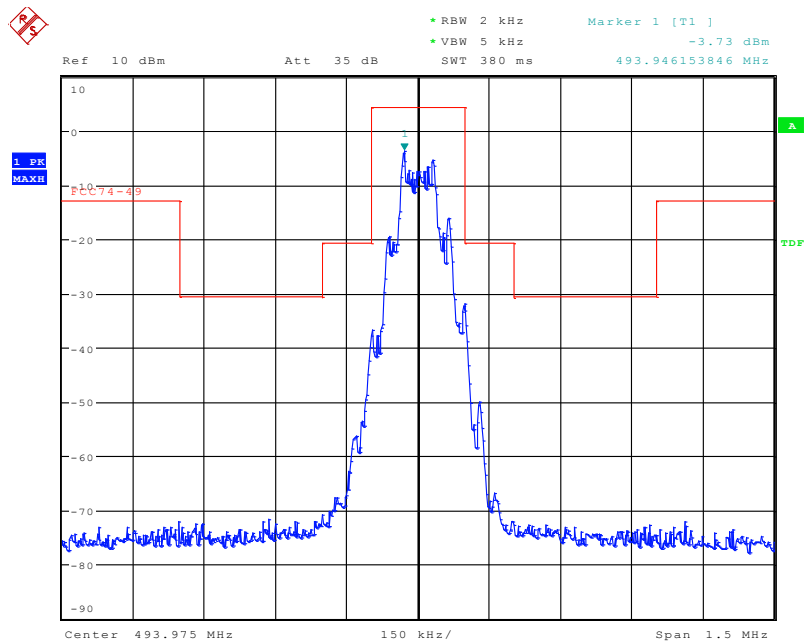


FCC ID: CCRA88
High Channel 493.975MHz (Unmodulated carrier)

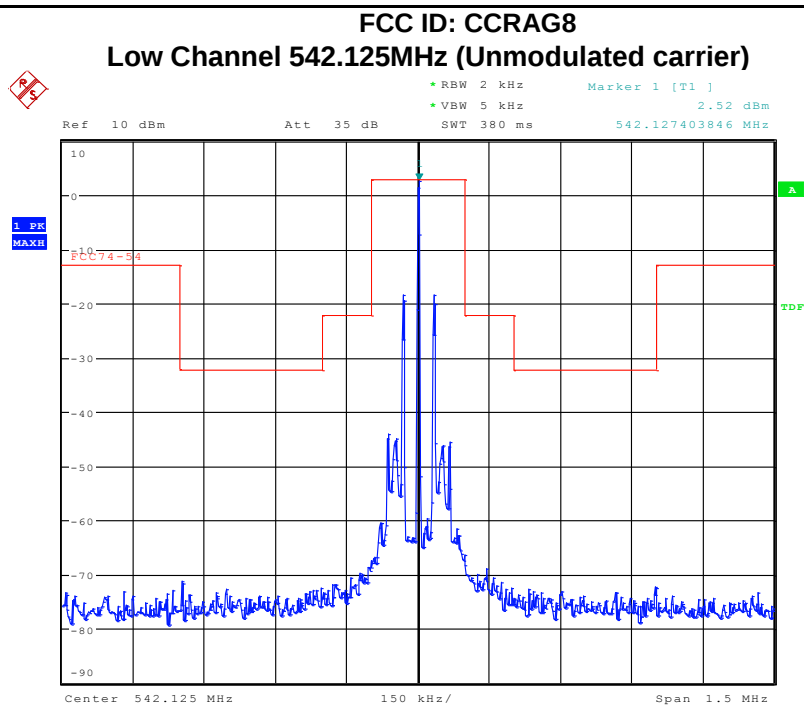


Date: 20.APR.2016 15:54:25

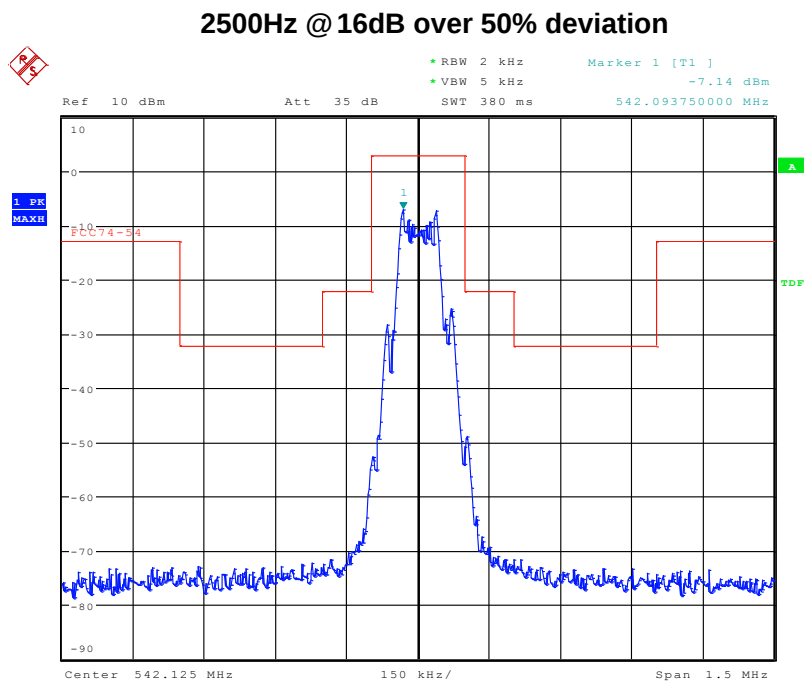
2500Hz @ 16dB over 50% deviation



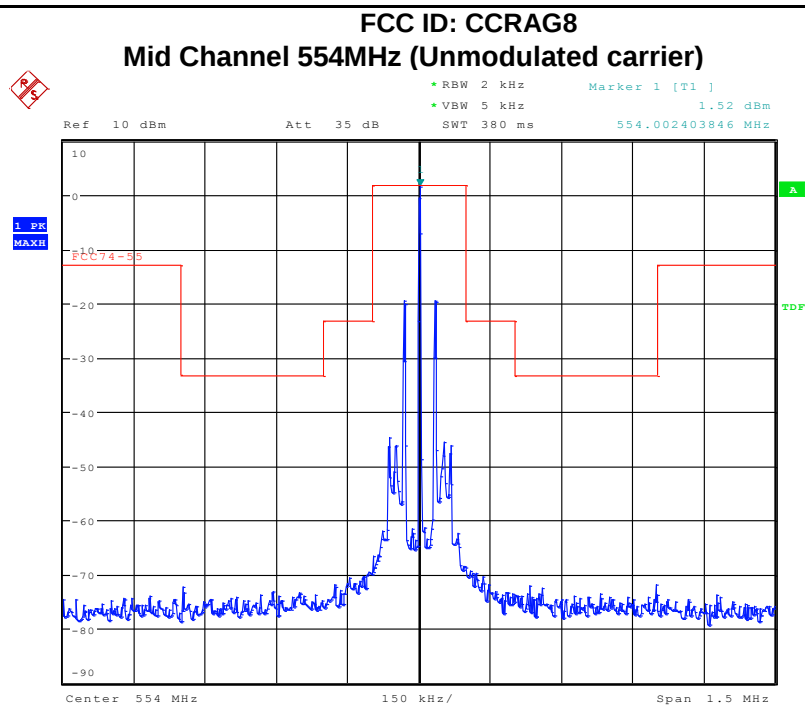
Date: 20.APR.2016 15:56:27



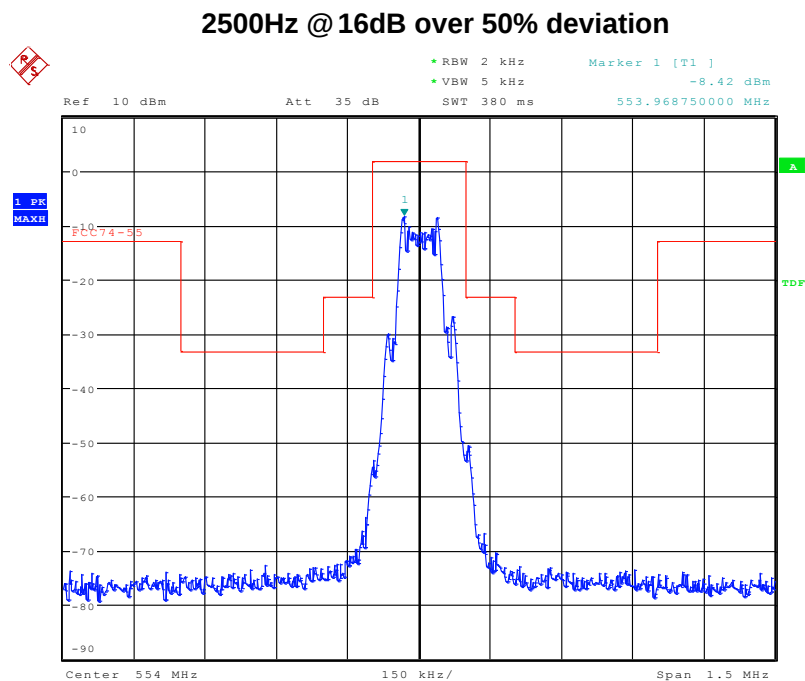
Date: 20.APR.2016 16:55:34



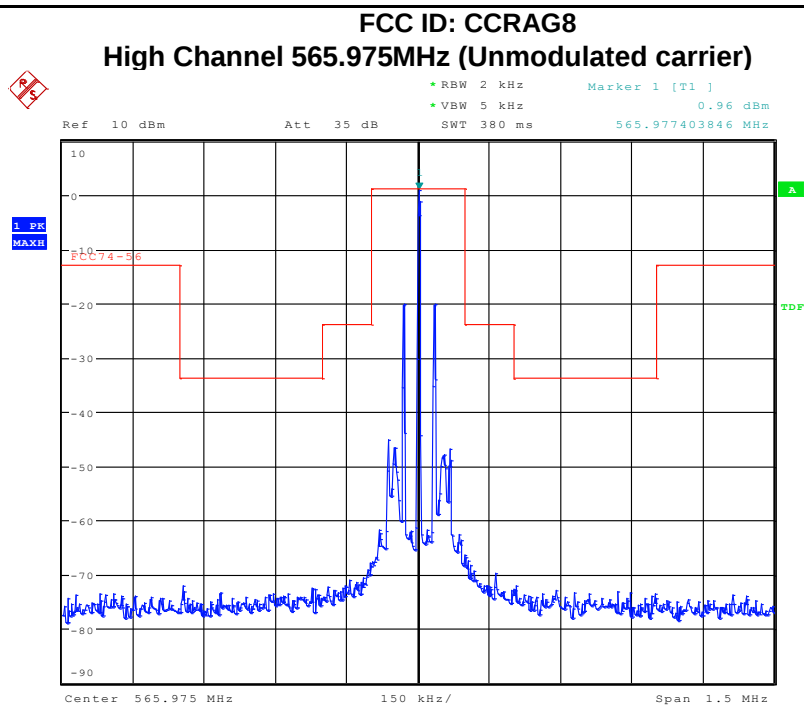
Date: 20.APR.2016 16:57:04



Date: 20.APR.2016 17:02:39

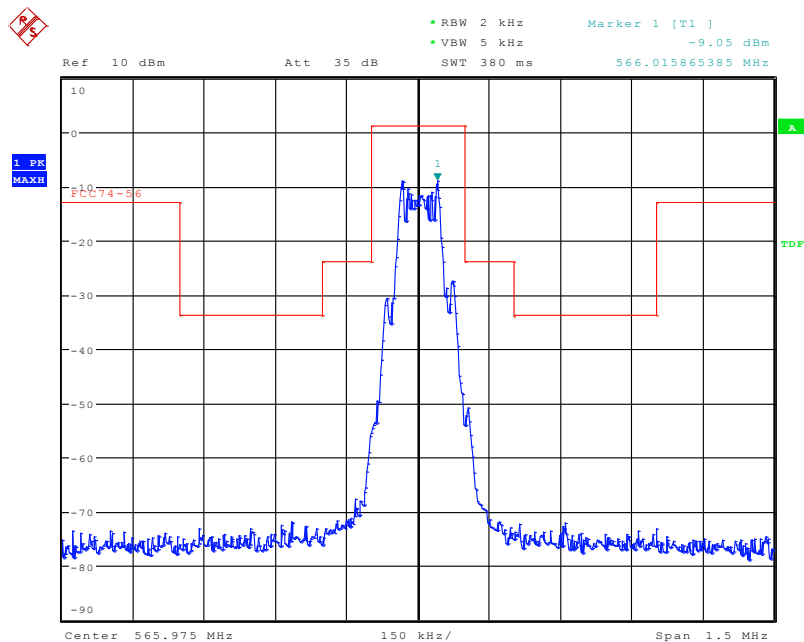


Date: 20.APR.2016 17:03:52



Date: 20.APR.2016 16:47:18

2500Hz @ 16dB over 50% deviation

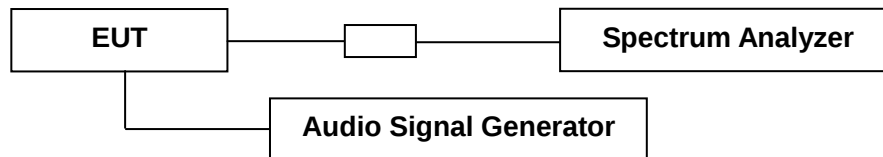


Date: 20.APR.2016 16:49:09



5. Spurious Emissions at Antenna Port

5.1 Test SET-UP (Block Diagram of Configuration)



5.2 Measurement Procedure

According to ANSI/TIA-603-D 2010 section 2.2.13, conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired. The method of measurement is as following:

Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.

Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

Adjust the spectrum analyzer for the following setting:

Resolution bandwidth = 200Hz/10/100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.

Video bandwidth $\geq$ 3 times the resolution bandwidth.

Detector mode = peak.

Record the frequencies and levels of spurious emissions.

In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given in (a) and (b):

(a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency, as well as to those frequencies removed from the carrier by multiple of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value need not be reported.



FCC ID: CCRAG8

When limits are expressed in absolute terms, compliance with the emission limits shall be demonstrated using a CISPR quasi-peak detector and the related measurement bandwidth for emissions below 1000 MHz. as an alternative to CISPR quasi-peak measurement, compliance with the emission limits can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization as required, with an equal or greater measurement bandwidth relative to the applicable CISPR quasi-peak bandwidth.

Above 1000 MHz, compliance with the emission limits shall be demonstrated using an average detector with a minimum resolution bandwidth of 1 MHz.

5.3 Limit

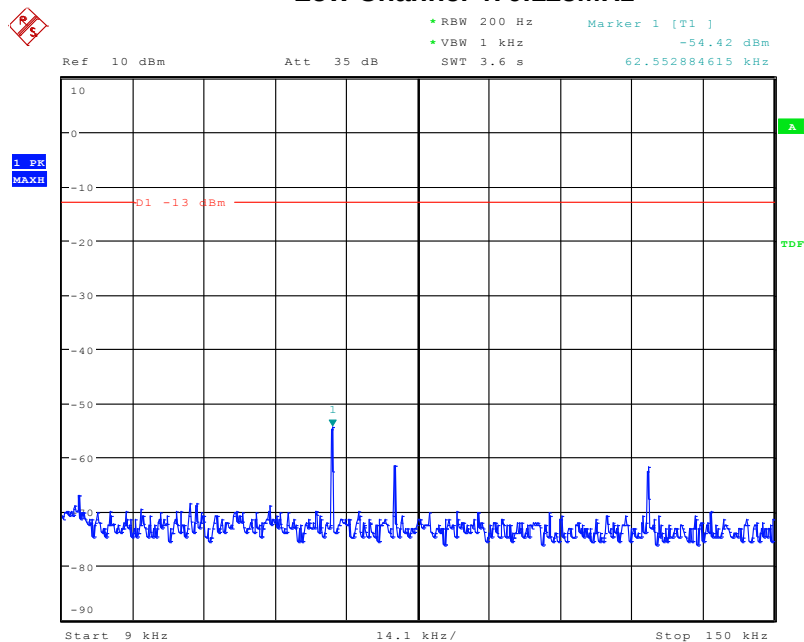
On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log$ (mean output power in watts) dB.

5.4 Measurement Results

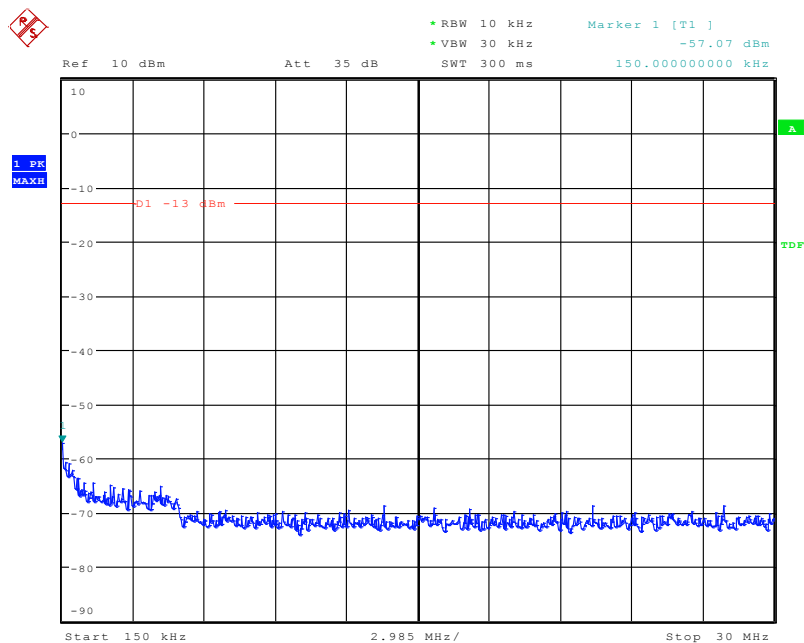
Please refer to following plots.



FCC ID: CCRA8
Low Channel 470.125MHz



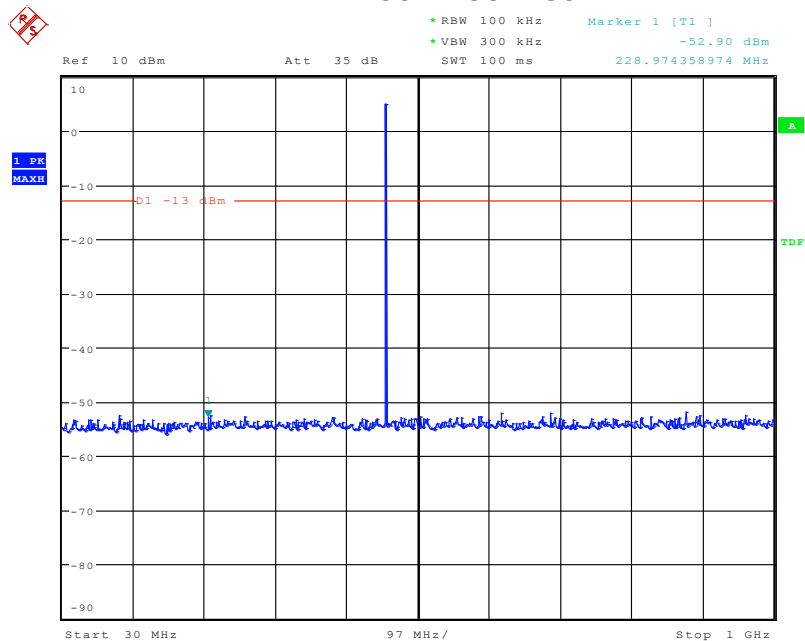
Date: 20.APR.2016 16:11:03



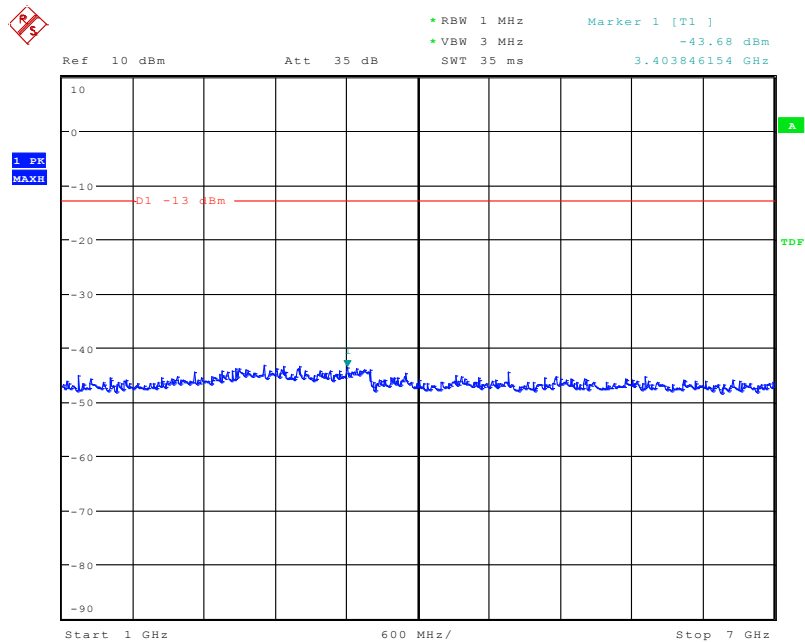
Date: 20.APR.2016 16:11:23



FCC ID: CCRA8



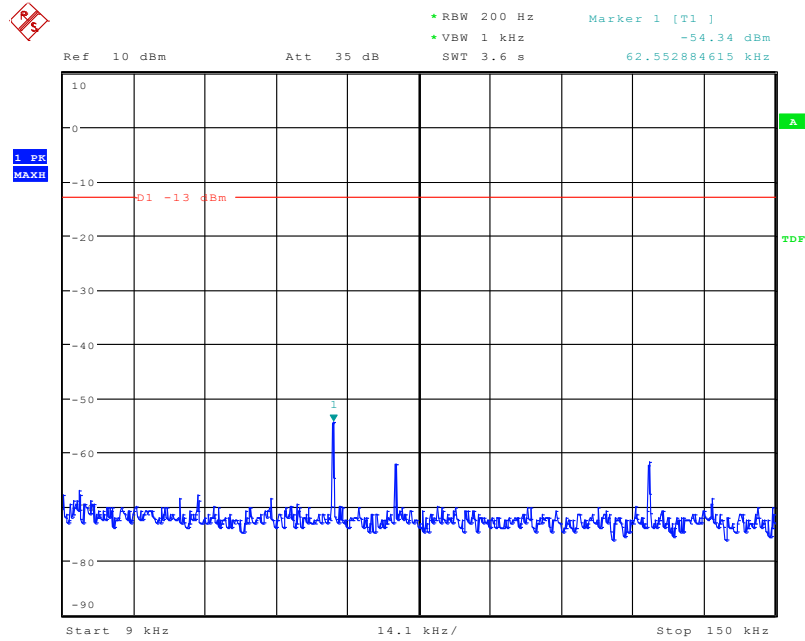
Date: 20.APR.2016 16:12:17



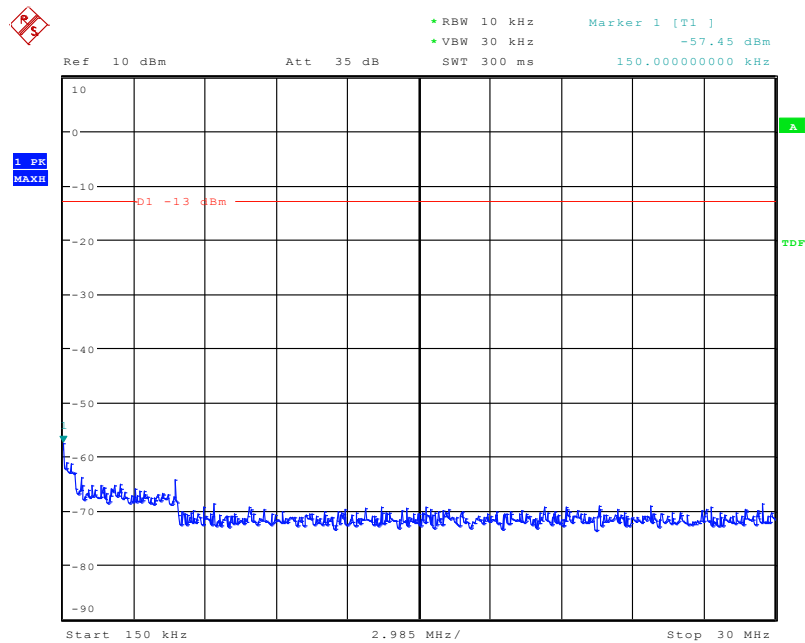
Date: 20.APR.2016 16:13:32



FCC ID: CCRA8
Mid Channel 482MHz



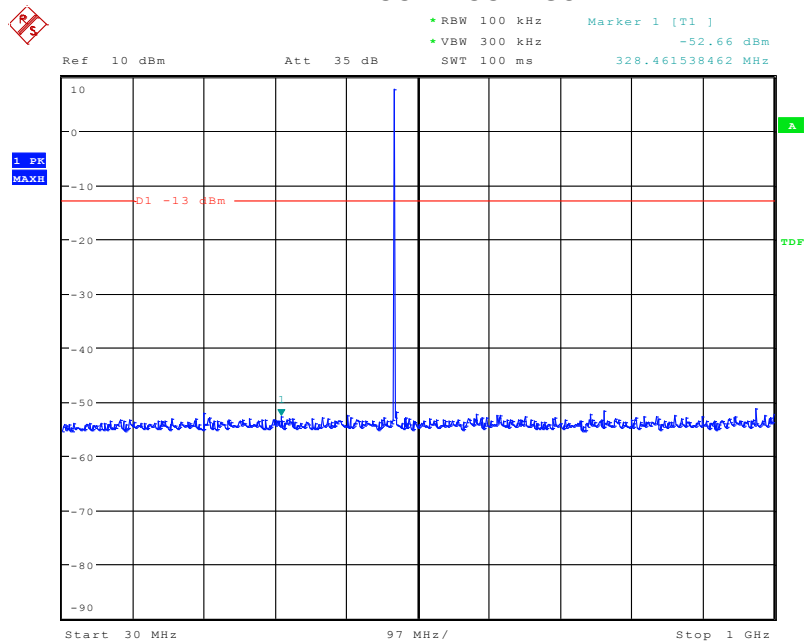
Date: 20.APR.2016 16:21:32



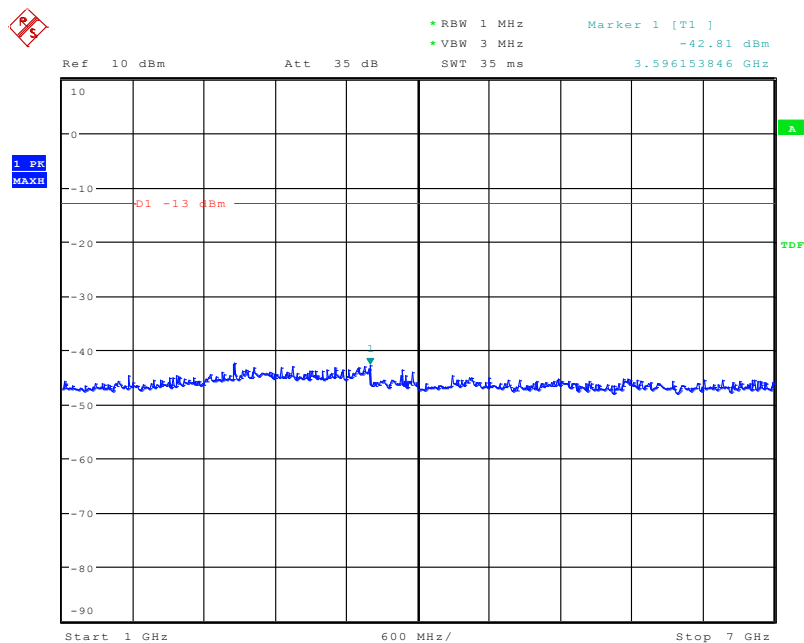
Date: 20.APR.2016 16:22:10



FCC ID: CCRAG8



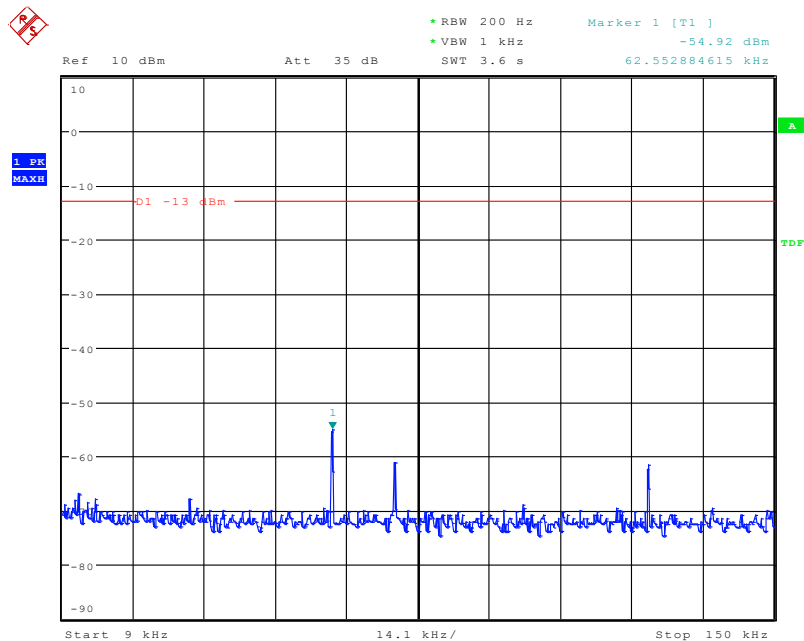
Date: 20.APR.2016 16:22:29



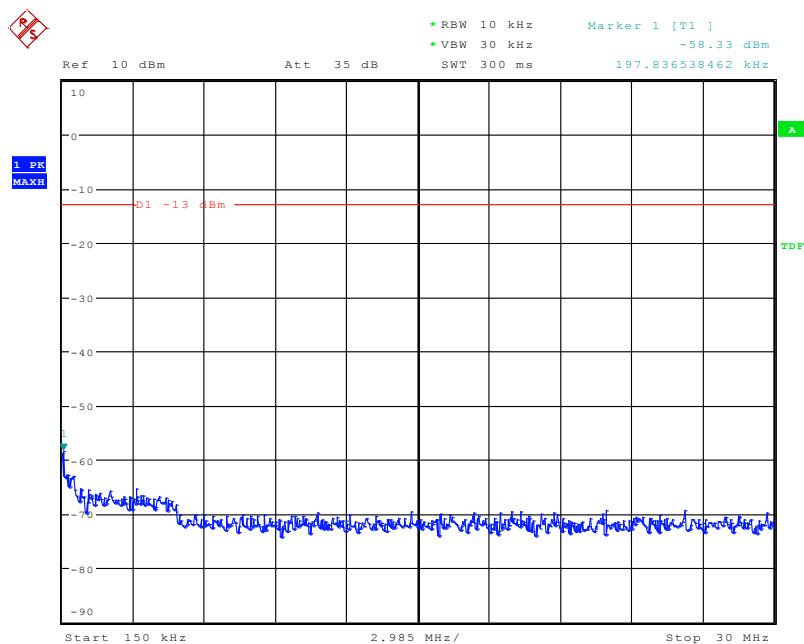
Date: 20.APR.2016 16:28:26



FCC ID: CCRAG8
High Channel 493.975MHz



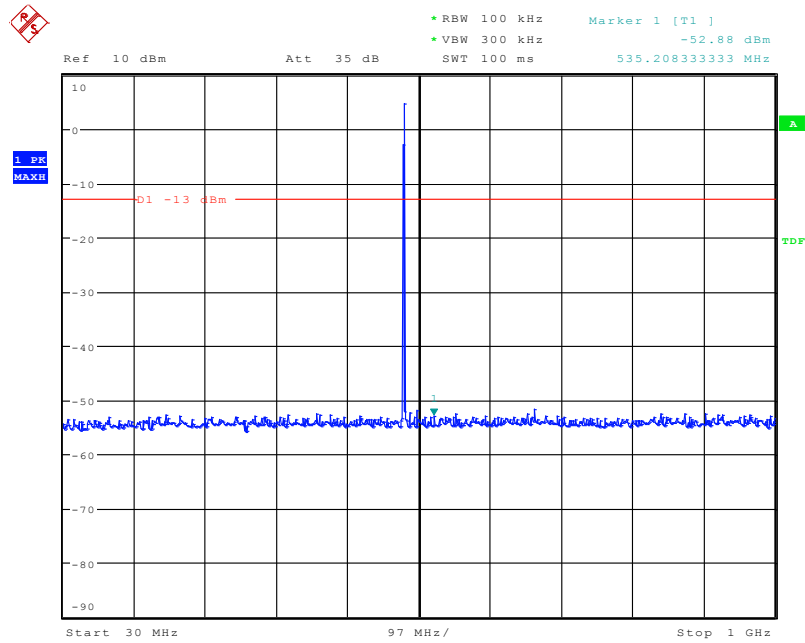
Date: 20.APR.2016 16:04:35



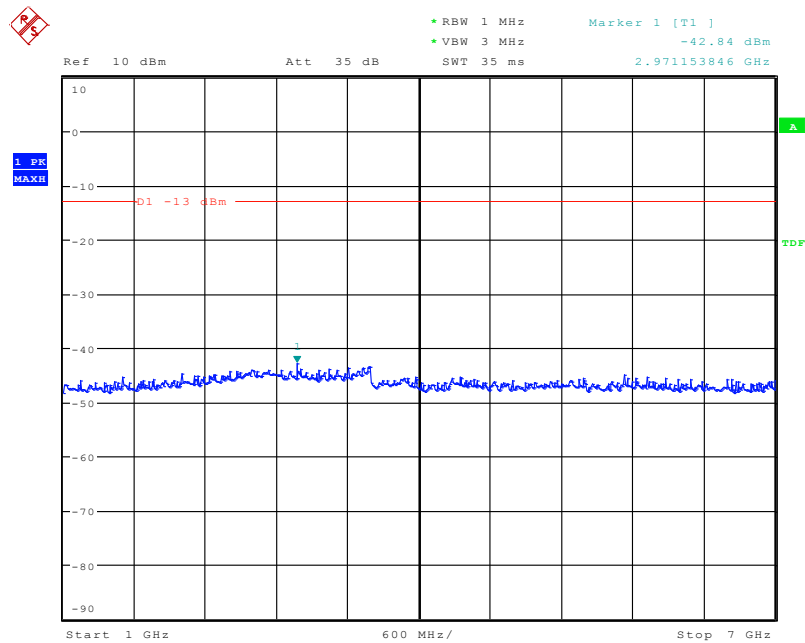
Date: 20.APR.2016 16:04:52



FCC ID: CCRAG8



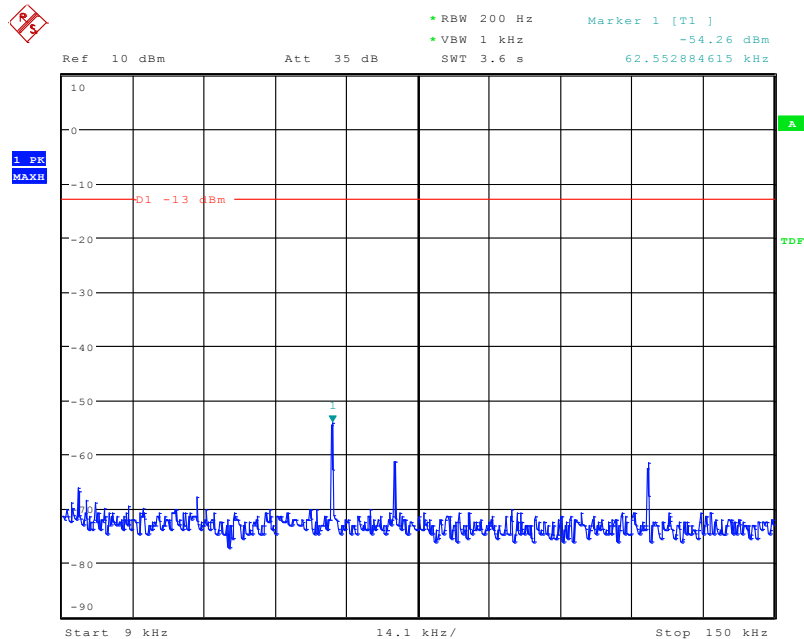
Date: 20.APR.2016 16:05:12



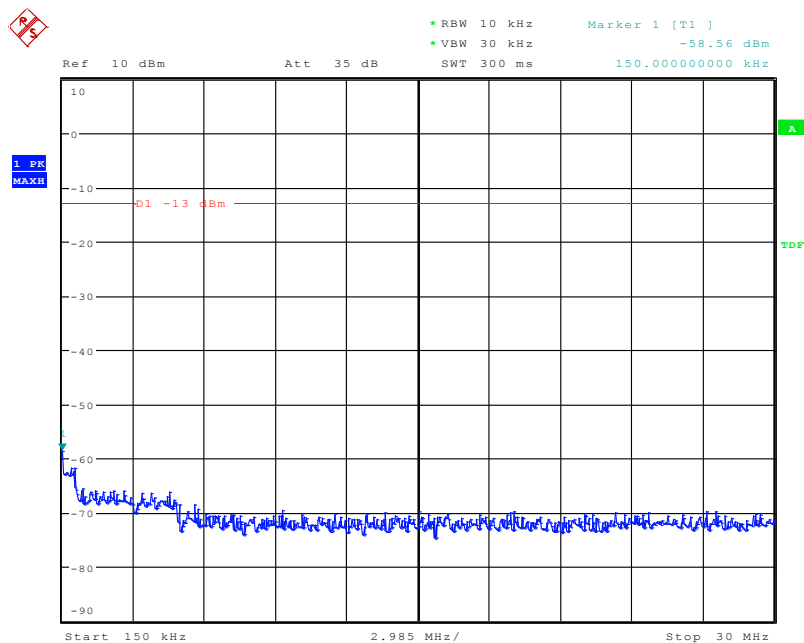
Date: 20.APR.2016 16:05:39



FCC ID: CCRA88
Low Channel 542.125MHz



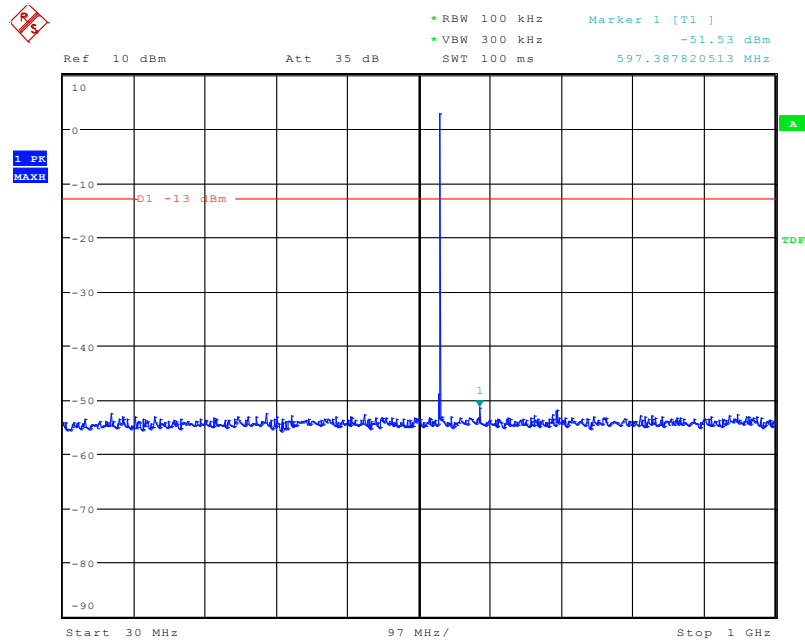
Date: 20.APR.2016 16:57:55



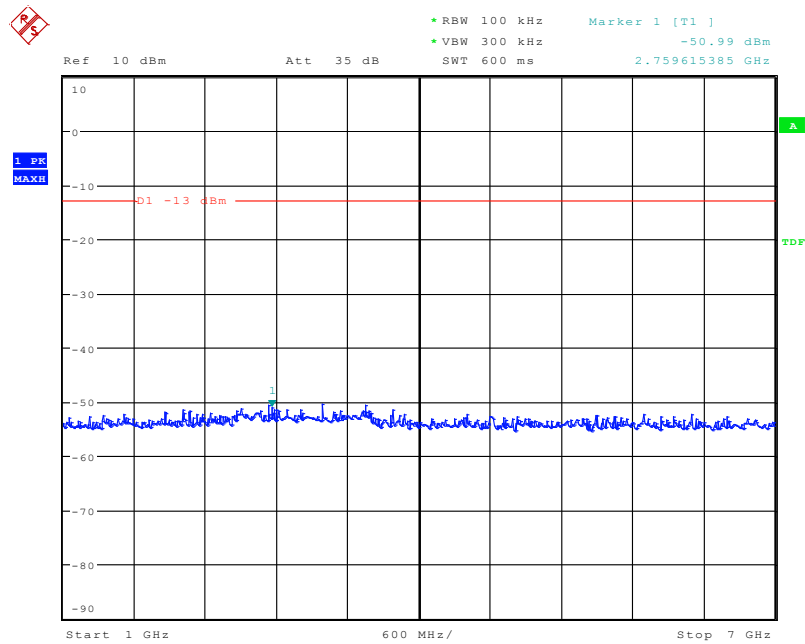
Date: 20.APR.2016 16:58:11



FCC ID: CCRA8



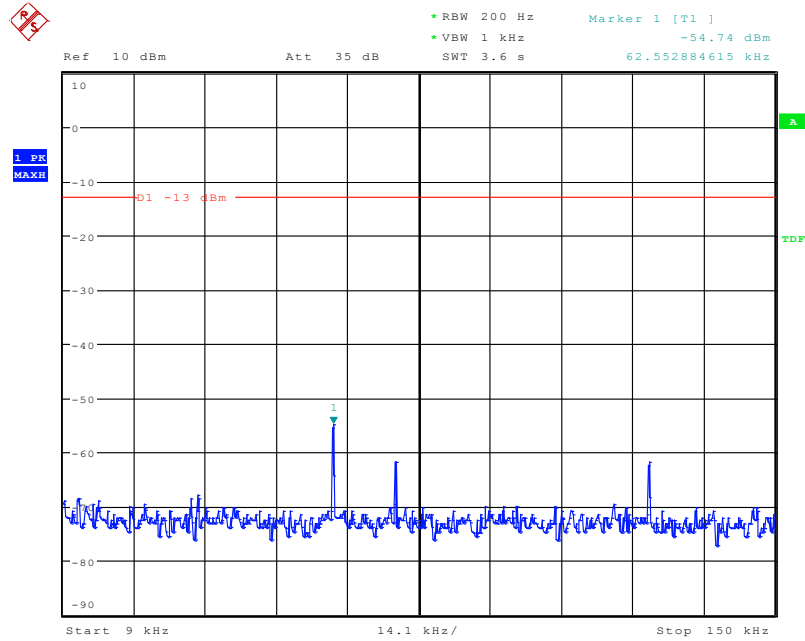
Date: 20.APR.2016 16:58:29



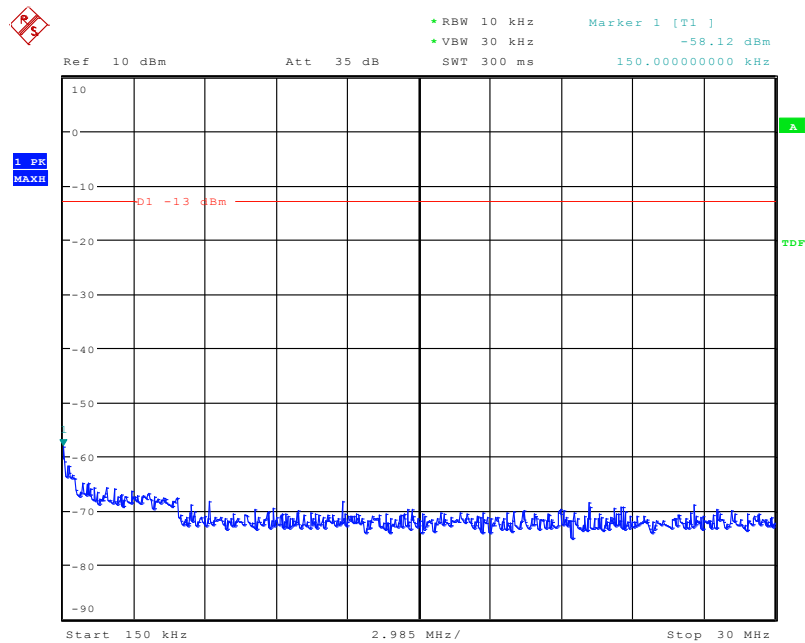
Date: 20.APR.2016 16:58:43



FCC ID: CCRA88
Mid Channel 554MHz



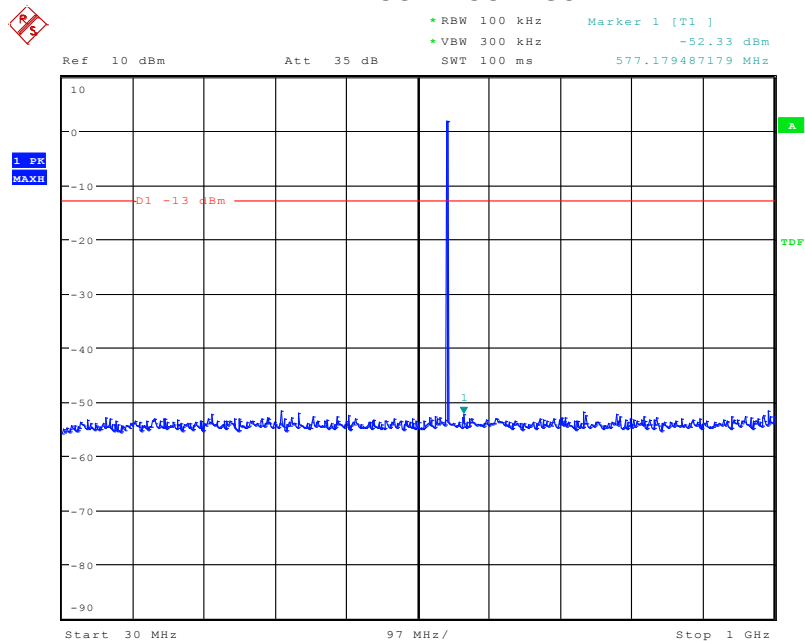
Date: 20.APR.2016 17:04:54



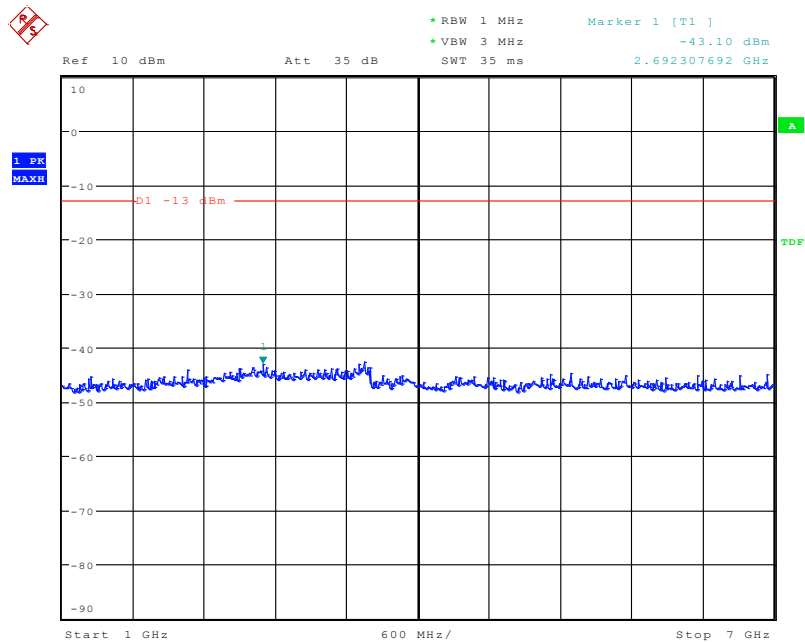
Date: 20.APR.2016 17:05:11



FCC ID: CCRA8



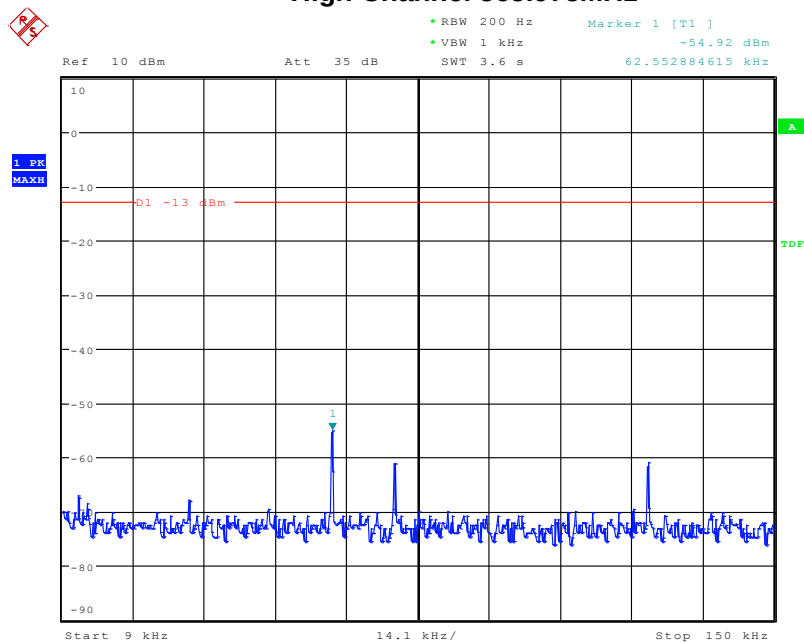
Date: 20.APR.2016 17:05:30



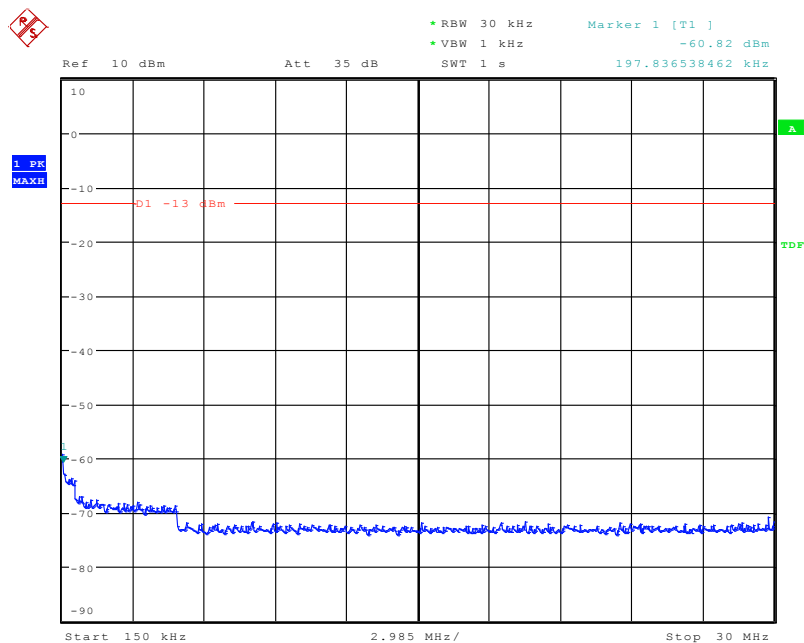
Date: 20.APR.2016 17:06:48



FCC ID: CCRA8
High Channel 565.975MHz



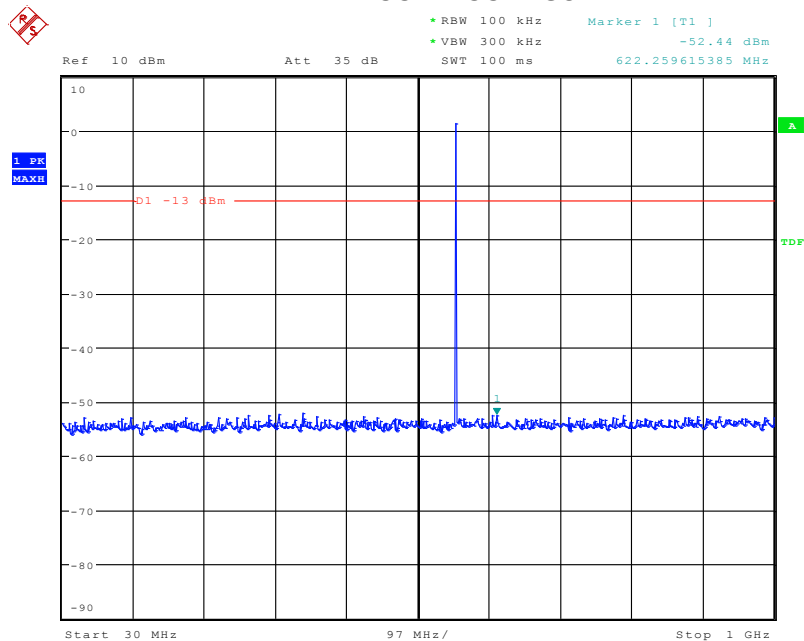
Date: 20.APR.2016 16:50:32



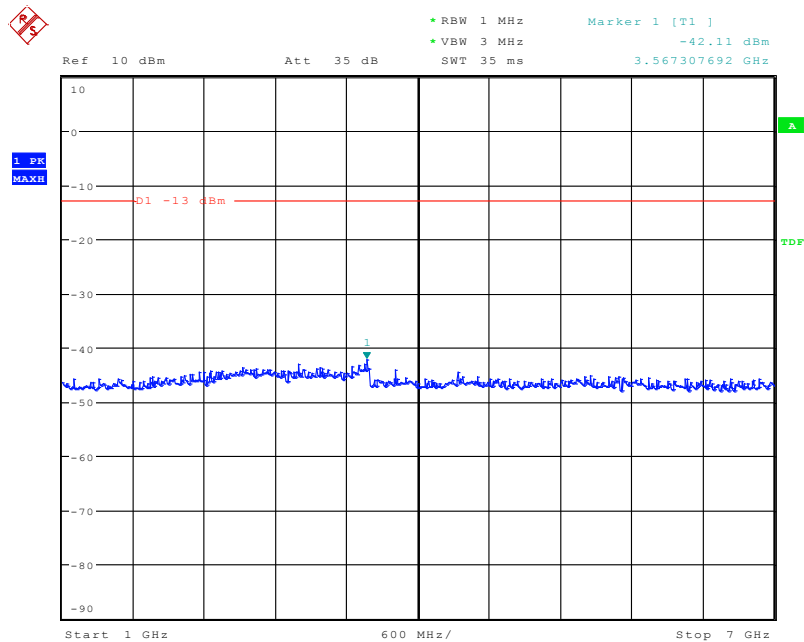
Date: 20.APR.2016 16:50:49



FCC ID: CCRA8



Date: 20.APR.2016 16:51:10



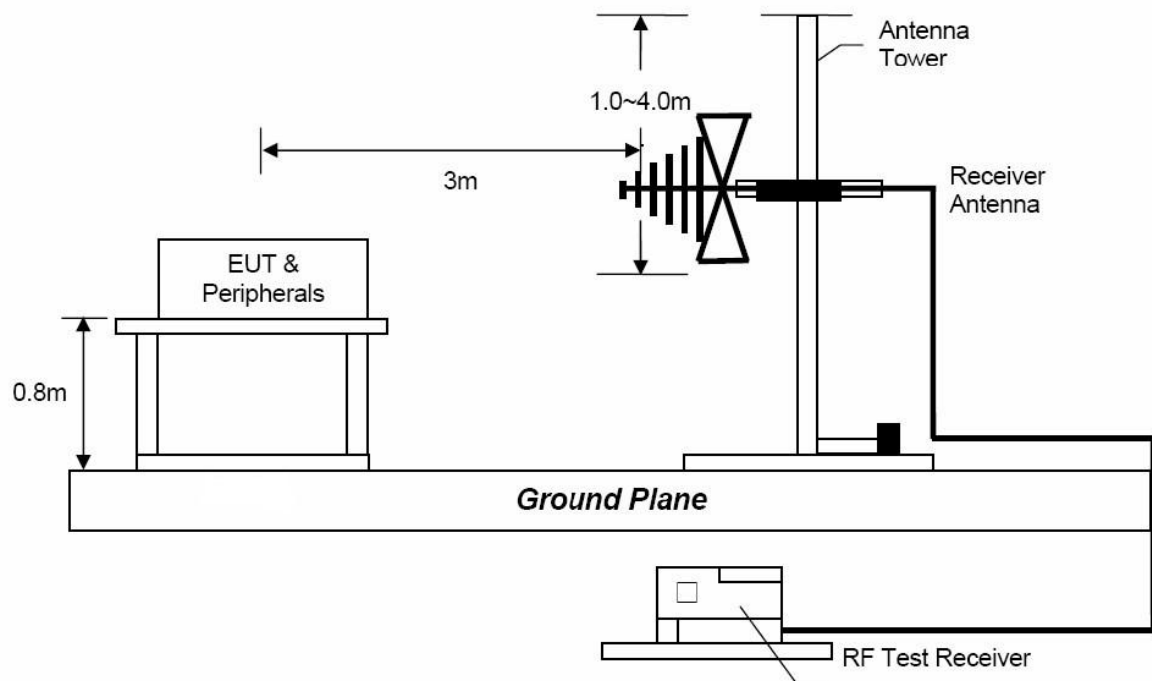
Date: 20.APR.2016 16:51:30



6. Spurious Emission Intensity

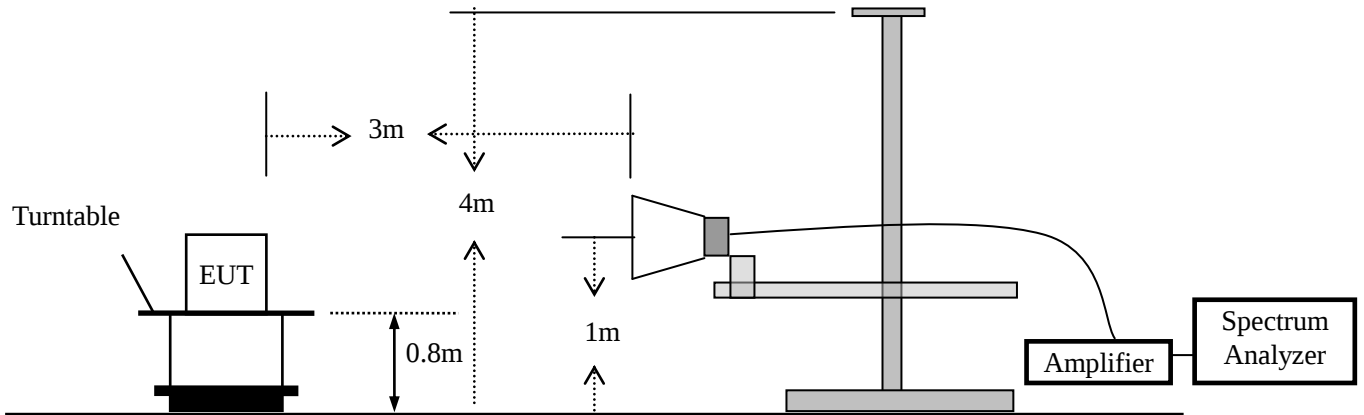
6.1 Test SET-UP (Block Diagram of Configuration)

6.1.1 Radiated Emission Test Set-Up, Frequency Below 1GHz





6.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



6.2 Measurement Procedure

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.
For 30MHz to 1GHz:
Set the spectrum analyzer as: RBW=120kHz, VBW=300kHz, Detector=Quasi-Peak
For Above 1GHz:
Set the spectrum analyzer as: RBW=1MHz, VBW=3MHz, Detector=Peak.



FCC ID: CCRAG8

- f. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.
- g. Repeat step f until all frequencies need to be measured were complete.
- h. Repeat step g with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

6.3 Limit

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log$ (mean output power in watts) dB.

6.4 Measurement Results

Please refer to following table and plots.



FCC ID: CCRA8

470-494MHz Band							
Humidity :		46 %	Temperature :			21 °C	
Test Result:		PASS	Test By:			Sance	
Channel	Frequency (MHz)	Substituted level (dBm)	Polarization (H/V) Antenna	Gain Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
0	940.60	-62.76	H	8.16	2.84	-57.93	-13.00
	940.25	-60.25	V	8.16	2.84	-55.19	-13.00

8	964.0	-59.64	H	8.17	2.84	-55.16	-13.00
	964.2	-58.23	V	8.17	2.84	-53.64	-13.00

F	987.4	-64.15	H	8.19	2.85	-60.05	-13.00
	9875	-61.49	V	8.19	2.85	-58.92	-13.00

Note: Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits.



542-566MHz Band							
Humidity :		46 %	Temperature :			21 °C	
Test Result:		PASS	Test By:			Sance	
Channel	Frequency (MHz)	Substituted level (dBm)	Polarization (H/V) Antenna	Gain Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
0	1084.50	-65.93	H	7.92	0.79	-62.05	-13.00
	1084.60	-64.12	V	7.92	0.79	-61.73	-13.00

8	1108.0	-68.95	H	7.90	0.79	-64.84	-13.00
	1108.0	-67.11	V	7.90	0.79	-63.30	-13.00

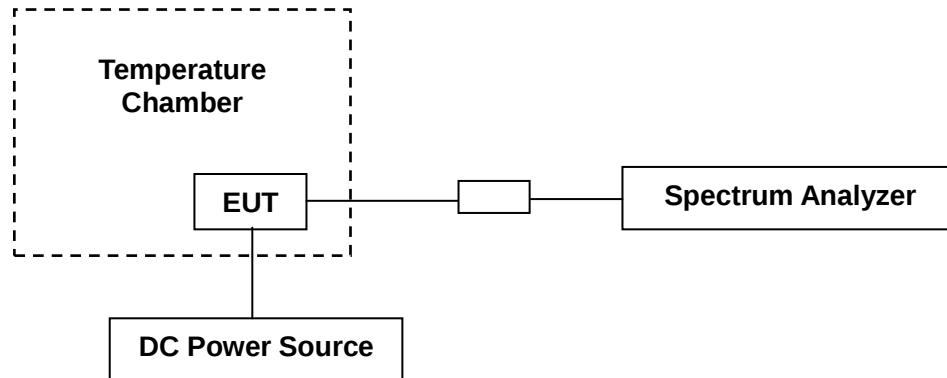
F	1131.96	-67.92	H	7.89	0.80	-63.56	-13.00
	1132.00	-68.37	V	7.89	0.80	-64.29	-13.00

Note: Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits.



7. Frequency Stability

7.1 Test SET-UP (Block Diagram of Configuration)



7.2 Measurement Procedure

According to ANSI/TIA603-D 2010 section 2.2.2, the carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

- (1)The antenna port of the EUT was connected to the 50 Ohm input of a spectrum analyzer.
- (2)The EUT was allowed to soak for ~15 minutes after the temperature chamber reached the set temperature.
- (3)The EUT was then powered on and allowed to stabilize for ~ 1 minute.
- (4)The measured frequency of the transmitter was plotted with the screen capture function of the spectrum analyzer.
- (5)Steps a. through d. were repeated at -20C through +50C in ten degree increments for representative low, mid and high frequencies within the EUTs operational band.

7.3 Limit

As per FCC §74.861(e) (4): The frequency tolerance of the transmitter shall be 0.005 percent.

7.4 Measurement Results

Please refer to following tables.



FCC ID: CCRA88

Humidity :		46 %		Temperature :		21 °C	
Test Result:		PASS		Test By:		Sance	
Temperature (°C)	Measured (MHz)		Channel Frequency (MHz)		Frequency Tolerance (ppm)		Limit (ppm)
Low channel							
-20	470.1236769		470.125		-2.8144		50
-10	470.1235831		470.125		-3.0139		50
0	470.1239434		470.125		-2.2475		50
10	470.1236526		470.125		-2.8660		50
20	470.1236769		470.125		-2.8144		50
30	470.1236518		470.125		-2.8677		50
40	470.1238665		470.125		-2.4111		50
50	470.1238479		470.125		-2.4506		50
Middle channel							
-20	481.9984496		482.000		-3.2166		50
-10	481.9986541		482.000		-2.7923		50
0	481.9986317		482.000		-2.8388		50
10	481.9984561		482.000		-3.2031		50
20	481.9986529		482.000		-2.7948		50
30	481.9988234		482.000		-2.4411		50
40	481.9987253		482.000		-2.6446		50
50	481.9986283		482.000		-2.8459		50
High channel							
-20	493.9734481		493.975		-3.1417		50
-10	493.9736855		493.975		-2.6611		50
0	493.9738460		493.975		-2.3362		50
10	493.9738651		493.975		-2.2975		50
20	493.9738443		493.975		-2.3396		50
30	493.9736524		493.975		-2.7281		50
40	493.9736447		493.975		-2.7437		50
50	493.9734858		493.975		-3.0653		50



FCC ID: CCRA8

Humidity :	46 %	Temperature :	21 °C	
Test Result:	PASS	Test By:	Sance	
Temperature (°C)	Measured (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (ppm)
Low channel				
-20	542.1267884	542.125	3.29887	50
-10	542.1265747	542.125	2.90468	50
0	542.1266258	542.125	2.99894	50
10	542.1265356	542.125	2.83256	50
20	542.1264319	542.125	2.64127	50
30	542.1267375	542.125	3.20498	50
40	542.1267447	542.125	3.21826	50
50	542.1267513	542.125	3.23044	50
Middle channel				
-20	554.0017826	554.000	3.21769	50
-10	554.0015876	554.000	2.86570	50
0	554.0016225	554.000	2.92870	50
10	554.0017234	554.000	3.11083	50
20	554.0013221	554.000	2.38646	50
30	554.0012749	554.000	2.30126	50
40	554.0015083	554.000	2.72256	50
50	554.0017557	554.000	3.16913	50
High channel				
-20	565.9767504	565.975	3.09272	50
-10	565.9765538	565.975	2.74535	50
0	565.9767504	565.975	3.09272	50
10	565.9768562	565.975	3.27965	50
20	565.9765635	565.975	2.76249	50
30	565.9763251	565.975	2.34127	50
40	565.9763527	565.975	2.39003	50
50	565.9766219	565.975	2.86567	50



FCC ID: CCRAG8

Humidity :	46 %	Temperature :	21 °C	
Test Result:	PASS	Test By:	Sance	
Voltage & Temperature (°C)	Measured (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (ppm)
Low channel				
1.8V at 20°C	470.1236482	470.125	-2.8754	50
1.5V at 20°C	470.1236852	470.125	-2.7967	50
1.2V at 20°C	470.1237441	470.125	-2.6714	50
Middle channel				
1.8V at 20°C	481.9984496	482.000	-3.2166	50
1.5V at 20°C	481.9984235	482.000	-3.2707	50
1.2V at 20°C	481.9984551	482.000	-3.2052	50
High channel				
1.8V at 20°C	493.9736980	493.975	-2.6358	50
1.5V at 20°C	493.9736462	493.975	-2.7406	50
1.2V at 20°C	493.9736531	493.975	-2.7267	50
Low channel				
1.8V at 20°C	542.1267884	542.125	3.29887	50
1.5V at 20°C	542.1266386	542.125	3.02255	50
1.2V at 20°C	542.1267652	542.125	3.25608	50
Middle channel				
1.8V at 20°C	554.0017826	554.000	3.21769	50
1.5V at 20°C	554.0017431	554.000	3.14639	50
1.2V at 20°C	554.0017720	554.000	3.19856	50
High channel				
1.8V at 20°C	565.9767548	565.975	3.10049	50
1.5V at 20°C	565.9767662	565.975	3.12063	50
1.2V at 20°C	565.9767519	565.975	3.09537	50



8. Modulation Characteristics Measurement

8.1 Test SET-UP (Block Diagram of Configuration)



8.2 Measurement Procedure

According to ANSI/TIA603-D 2010 section 2.2.3, modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviation in excess of a rated system deviation.

Connect the modulation analyzer to EUT and EUT to test receiver.

Apply a 1000Hz modulating signal to the transmitter from the modulation analyzer, and adjust the level to obtain 60% of full rated system deviation.

Increase the level from the modulation analyzer by 5dB in one step, record the deviation obtained from the receiver.

Decrease the level from the modulation analyzer by 5dB in one step, record the deviation obtained from the receiver.

With the level from the modulation analyzer held constant at each level, vary frequency from 300Hz to 15000H. Record the deviation.

8.3 Limit

According to FCC §74.861(e) (3):

Any form of modulation may be used. A maximum deviation of $\pm 75\text{kHz}$ is permitted when frequency modulation is employed.

8.4 Measurement Results

Please refer to following table and plots.



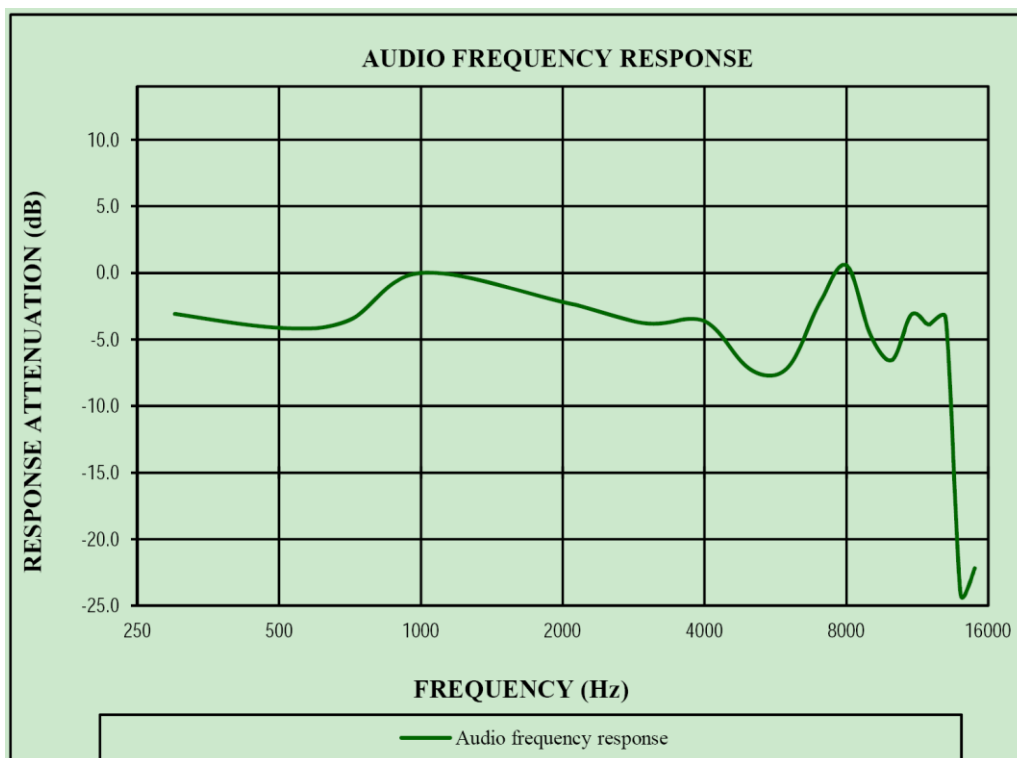
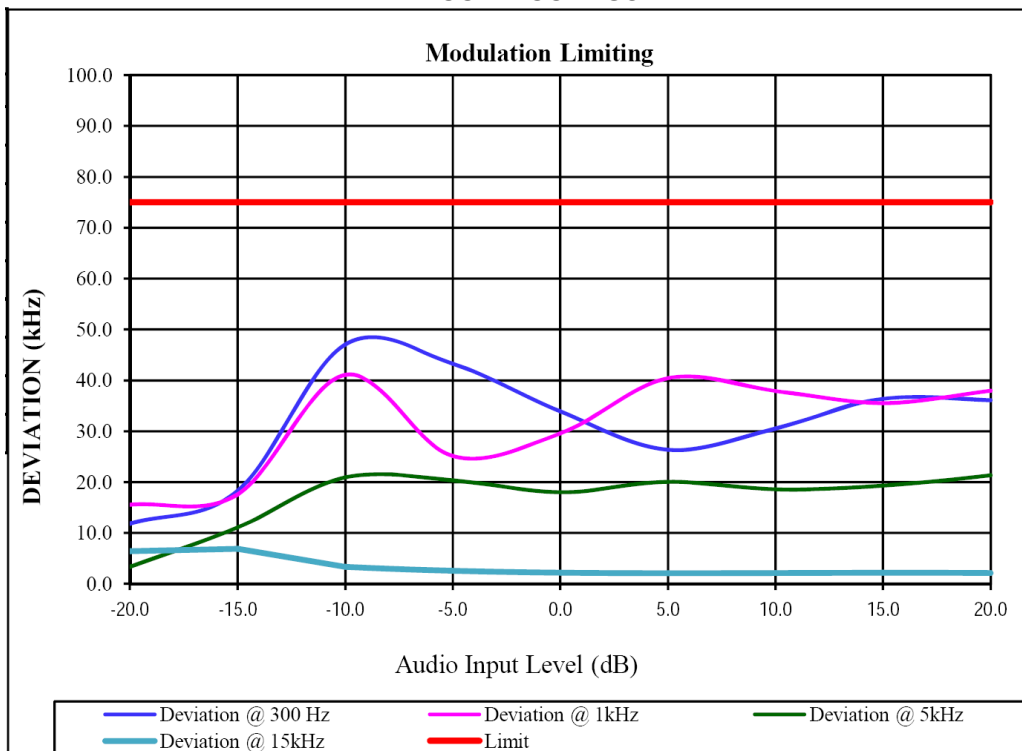
FCC ID: CCRAG8

Temperature :	21 °C	Humidity :	46 %		
Test By:	Sance	Test Date :	April 20, 2016		
Test Result:	PASS				
AF level (dBm)	AF Frequency(Hz) Peak Deviation(kHz)				Limit (kHz)
	300Hz	1000Hz	5000Hz	15000Hz	
470-494MHz Band (Mid Channel)					
20.0	36.11	37.93	21.38	2.16	75
15.0	36.40	35.49	19.33	2.19	75
10.0	30.56	37.91	18.63	2.19	75
5.0	26.39	40.39	20.11	2.17	75
0.0	33.90	29.57	18.05	2.23	75
-5.0	43.26	25.12	20.39	2.56	75
-10.0	47.02	41.04	20.96	3.40	75
-15.0	18.28	17.58	11.14	6.95	75
-20.0	11.86	15.57	3.40	6.41	75

Note: The worst case mid channel was recorded.



FCC ID: CCRA8





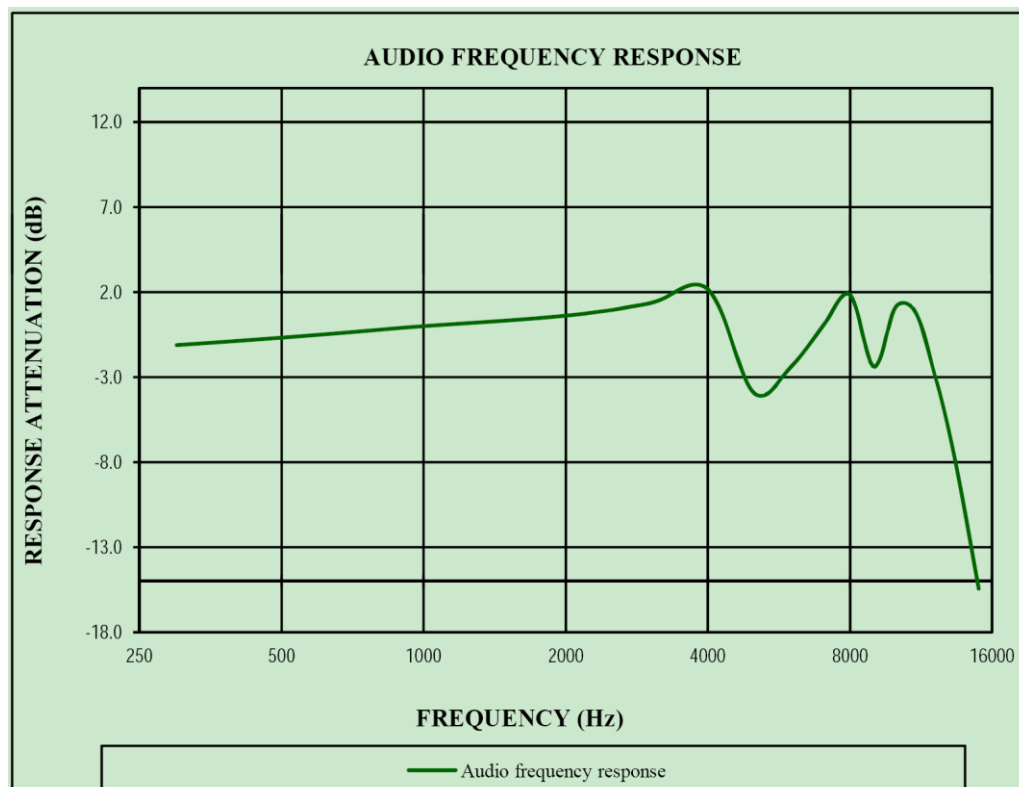
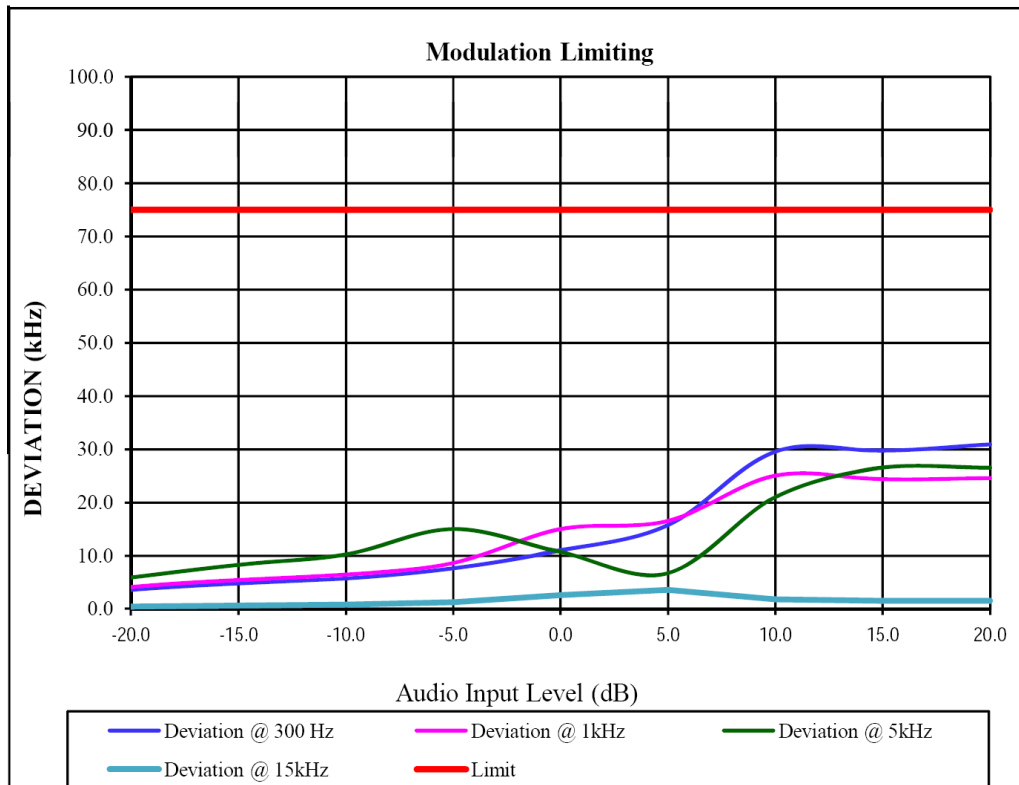
FCC ID: CCRAG8

Temperature :	21 °C	Humidity :	46 %		
Test By:	Sance	Test Date :	April 20, 2016		
Test Result:	PASS				
AF level (dBm)	AF Frequency(Hz) Peak Deviation(kHz)				Limit (kHz)
	300Hz	1000Hz	5000Hz	15000Hz	
542-566MHz Band (Mid Channel)					
20.0	30.88	24.59	26.48	1.55	75
15.0	29.73	24.36	26.49	1.54	75
10.0	29.57	25.06	20.97	1.82	75
5.0	15.77	16.53	6.71	3.63	75
0.0	11.03	15.00	10.69	2.585	75
-5.0	7.67	8.62	14.98	1.294	75
-10.0	5.79	6.46	10.23	0.837	75
-15.0	4.86	5.43	8.26	0.662	75
-20.0	3.63	4.10	5.92	0.481	75

Note: The worst case mid channel was recorded.



FCC ID: CCRA8





9. Test Equipment List

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 07, 2016	Mar. 06, 2017
Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 24, 2016	Mar. 23, 2017
Cable	Huber+Suhner	CBL2-NN-1M	22390001	Mar. 07, 2016	Mar. 06, 2017
Antenna	Teseq	CBL 6111D	27086	Mar. 24, 2016	Mar. 23, 2017
Power Amplifier	HP	HP 8447D	1145A00203	Mar. 07, 2016	Mar. 06, 2017
Horn Antenna	Schwarzbeck	BBHA9170	9170-372	Mar. 24, 2016	Mar. 23, 2017
Horn Antenna	Com-Power	AH-118	071078	Mar. 24, 2016	Mar. 23, 2017
Analyzer Modulation	HP	8901A	2026A00847	Dec. 24, 2015	Dec. 23, 2016
Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 07, 2016	Mar. 06, 2017
Pre-Amplifier	Agilent	8449B	3008A02964	Mar. 07, 2016	Mar. 06, 2017
SMA Cable	REBES	A46-NMNM	N/A	Mar. 07, 2016	Mar. 06, 2017
Temperature & Humidity Chamber	BELL	BE-TH-408	N/A	Dec. 24, 2015	Dec. 23, 2016
DC Source	HUAYI	HY5003-2	N/A	Dec. 24, 2015	Dec. 23, 2016
Audio Signal Generator	LONGWEI	TAG-101	N/A	Mar. 07, 2016	Mar. 06, 2017
Signal Generator	Agilent	N5182A	MY48180739	Mar. 07, 2016	Mar. 06, 2017