FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : UHF remote microphone system
FCC ID. : 2AA9S-RANGERT
Model No. : Ranger T
Working Frequency : 470~608MHz; 614~698MHz; 944~952MHz

for

APPLICANT : Supportive Hearing Systems Inc.
ADDRESS : 283 MacPherson Avenue, Toronto, Ontario M4V 1A4.

Test Performed by

ELECTRONICS TESTING CENTER (ETC) , TAIWAN
NO. 34. LIN 5, DINGFU VIL., LINKOU DIST.,
NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.
TEL : (02)26023052 FAX : (02)26010910
http:// www.etc.org.tw ; e-mail:emc@etc.org.tw

Report Number : 16-11-RBF-026-01

TEST REPORT CERTIFICATION

Applicant	:	Supportive Hearing Systems Inc. 283 MacPherson Avenue, Toronto, Ontario M4V 1A4.
Manufacturer	:	LINKX ELECTRONICS CO., LTD 4F-1, No.332 Ming-Chen 2nd Road, Tsou-In Dist., Kaohsiung Taiwan
Description of EUT	:	
a) Type of EUT	:	UHF remote microphone system
b) Trade Name	:	Simeon
c) Model No.	:	Ranger T
d) FCC ID	:	2AA9S-RANGERT
e) Working Frequency	:	470~608MHz; 614~698MHz; 944~952MHz
f) Power Supply	:	Battery DC3.7V, 600mAh

Regulation Applied: FCC Rules and Regulations Part 74 Subpart H

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : Jan. 06, 2017

Test Engineer : Brian Huang
(Brian Huang, Engineer)

Approve & Authorized Signer : S. S. Liou
S. S. Liou, Section Manager
EMC Dept. II of ELECTRONICS TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	:	UHF remote microphone system
b) Trade Name	:	Simeon
c) Model No.	:	Ranger T
d) FCC ID	:	2AA9S-RANGERT
e) Working Frequency	:	470~608MHz; 614~698MHz; 944~952MHz
f) Power Supply	:	Battery DC3.7V, 600mAh
g) Emission Designator	:	107KF3E 2M+2DK=2x(1kHz)+2x(52.8kHz)x1=107.6kHz

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10-2013. Test also follow "TIA-603-D(2010)-Land Mobile FM or PM Communications Equipment Measurement and Performance Standsrds" and section 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, and 2.1055 of Part 2 of CFR 47.

Measueement Software

Software	Version	Note
e3	Version 6.100618b	Radiated Emission Test
e3	Version 6.100421	Conducted Emission Test

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan 24442, R.O.C.

This site is FCC 2.948 listed and accepted in a letter dated Jan. 29, 2014.

Registration Number: 90589

2. REQUIREMENTS OF PROVISIONS

2.1 Definition

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Frequencies Available

According to sec. 74.802 of Part 74, the following frequencies are available for low power auxiliary station :

Frequencies (MHz)

26.100-26.480	455.000-456.000
54.000-72.000	470.000-488.000
76.000-88.000	488.000-494.000
161.625-161.775	494.000-608.000
174.000-216.000	614.000-806.000
450.000-451.000	944.000-952.000

2.3 Requirements for Radio Equipment on Certification

(1) RF Output Power
For transmitters, the power output shall be measured at the RF output terminals.

(2) Modulation Characteristics
For 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.

(3) Occupied Bandwidth
For radiotelephone transmitter, other than single sideband or indenpent sideband transmitter, when modulateed by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

(4) Spurious Emissions at Antenna Terminals
The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

(5) Field Strength of Spurious Emissions

Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation.

(6) Frequencies Tolerance

a) The frequency stability shall be measured with variation of ambient temperature.
b) The frequency stability shall be measured with variation of primary supply voltage.

2.4 Labeling Requirement

Each equipment for which a type acceptance application is filed on or after May 1,1981, shall bear an identification plate or label pursuant to § 2.925 （ Identification of equipment） and §2.926（FCC identifier）.

3. OUTPUT POWER MEASUREMENT

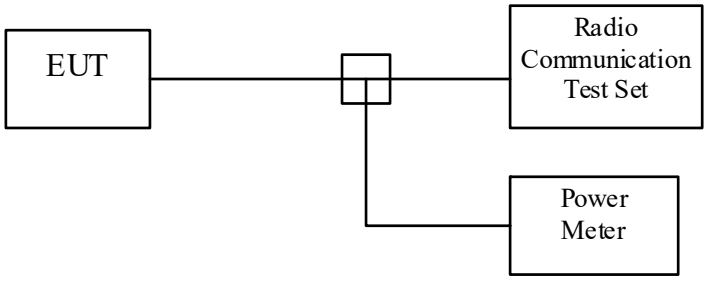
3.1 Provision Applicable

According to §74.861(e)(1)(ii), the output power shall not exceed 250 milliwatts.

3.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 1, and Install new batteries in the EUT. Turn on the EUT ant set it to any one convenient frequency within its operating range.
3. Apply a 2.5 kHz modulation signal to EUT. Record the readings on the instrument.
4. Repeat above procedures until all frequencies measured were complete.

Figure 1: Transmit power measurement configuration.



3.3 Test Data

Operated mode : TX
Temperature : 23°C
Test Date : Dec. 06, 2016
Humidity : 55 %

Frequency (MHz)	Transmit Power		Limit (mW)
	(dBm)	(mW)	
470.075	10.21	10.495	250.0
607.825	8.7	7.413	250.0
614.075	9.03	7.998	250.0
697.825	11.08	12.823	250.0
944.075	4.4	2.754	250.0
951.825	2.0	1.585	250.0

3.4 Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
POWER METER +SENSOR	ANRITSU	ML2487A +MA2491A	2016/05/12	2017/05/11
Communications Service Monitor	AEROFLEX	2945B	2016/11/19	2017/11/18

4. MODULATION CHARACTERISTICS

4.1 Provisions Applicable

According to § 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be measured.

4.2 Measurement Method

A) Modulation Limit

1. Position the EUT as shown in figure 3, adjust the audio input frequency to 100 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.

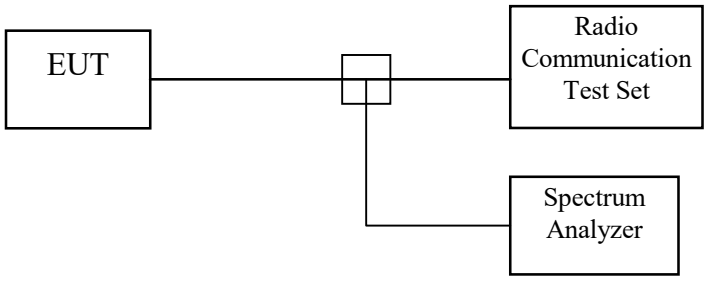
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

B) Frequency response of all circuits

1. Position the EUT as shown in figure 3.

2. Vary the modulating frequency from 100 Hz to 15000 Hz with constant input voltage (derived from 5.4(a) of this test report), and observe the change in output.

Figure 3 : Modulation characteristic measurement configuration



4.3 Measurement Instrument

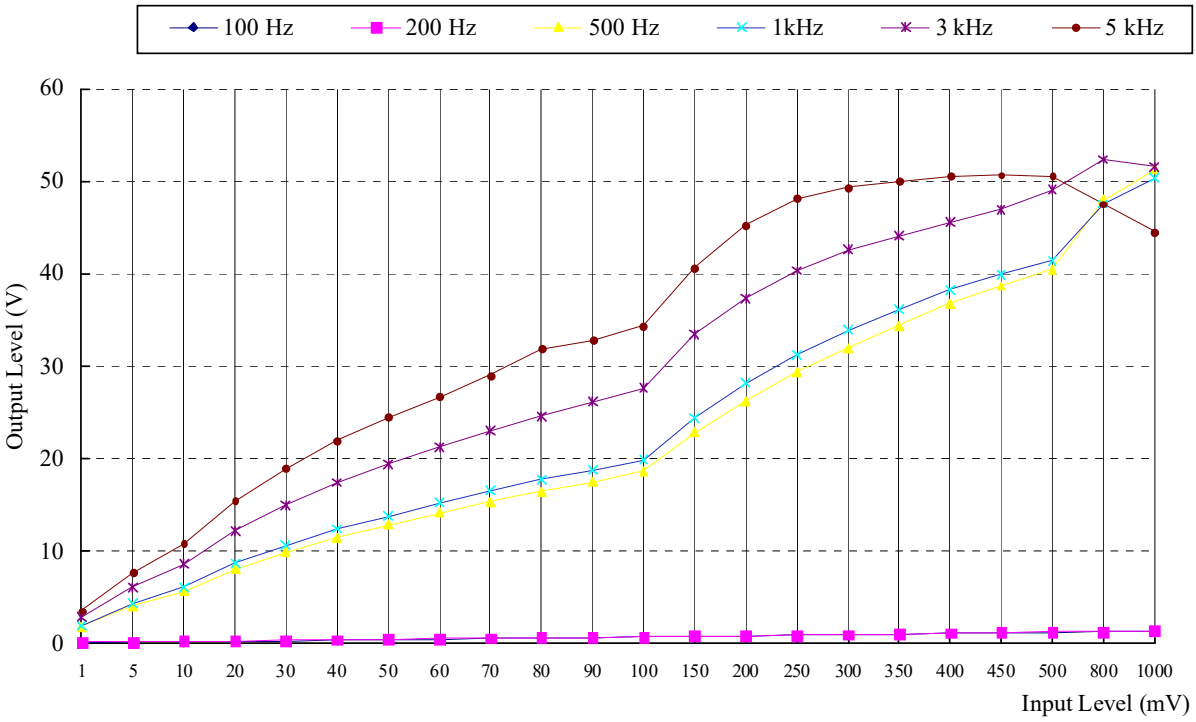
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2016/11/19	2017/11/18
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02

4.4 Measurement Result

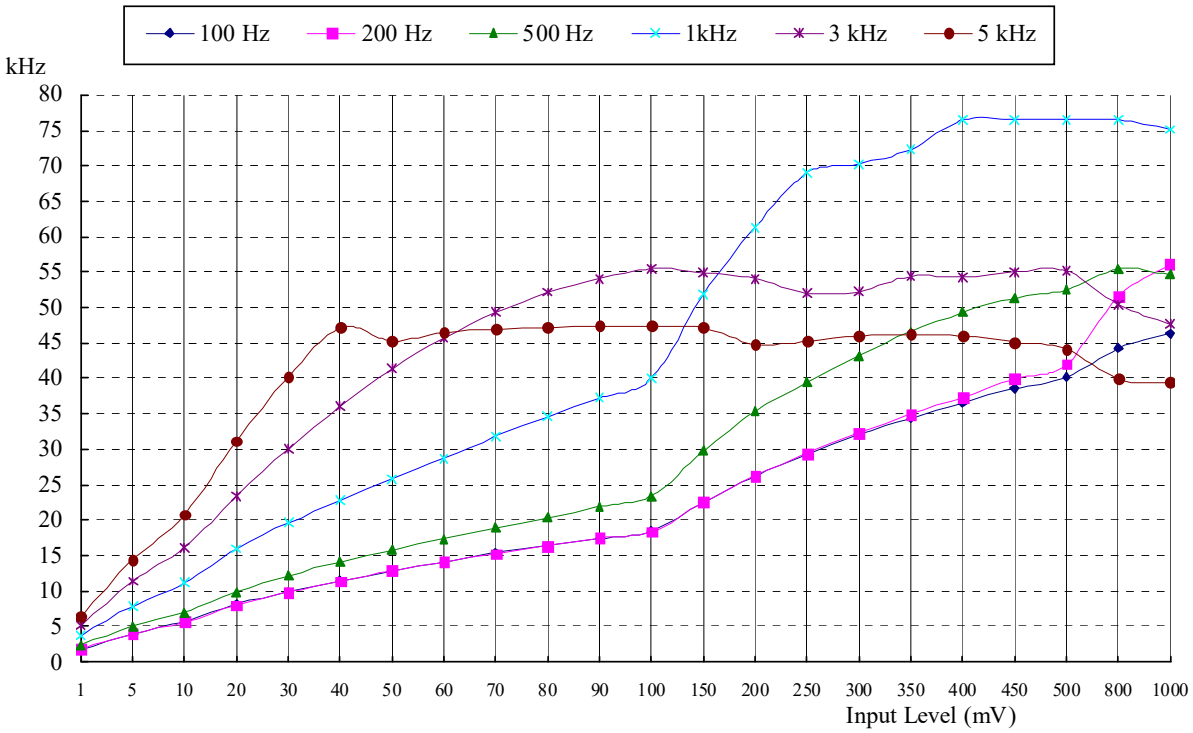
RF Frequency : 697.825MHz

Test Date : Dec. 06, 2016 Temperature : 23 °C Humidity : 55 %

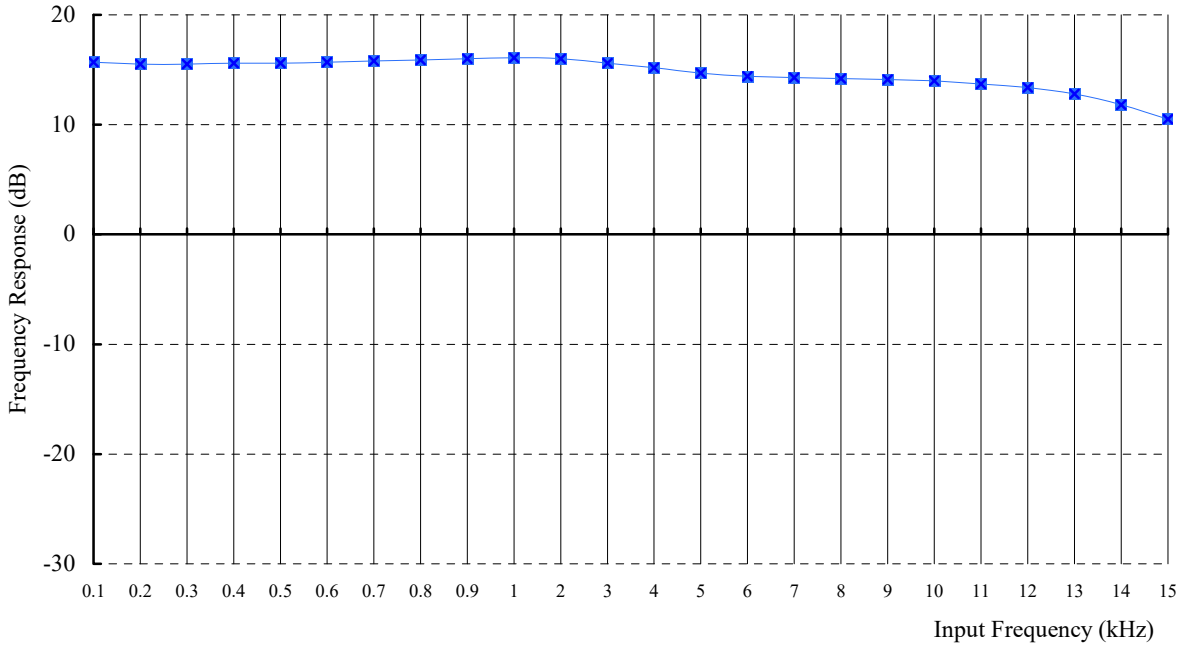
A). Frequency response



B). Modulation Limit



C). Frequency response of all circuits



5. OCCUPIED BANDWIDTH OF EMISSION

5.1 Provisions Applicable

According to §2.1049 (c)(1), For radiotelephone transmitter, other than single sideband or indenpent sideband transmitter, when modulateed by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.
According to §74.861(e)(5), the frequency emission bandwidth shall not exceed 200 kHz.

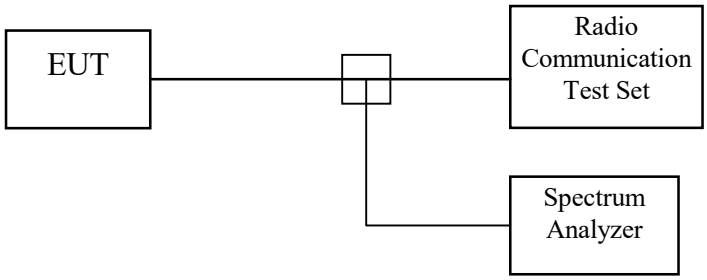
5.2 Measurement Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Position the EUT as shown in figure 4, and Install new batteries in the EUT. Turn on the EUT ant set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

3. Apply a 2.5 kHz modulation signal to EUT and measure the frequencies of the modulated signal from the EUT where it is the specified number of dB below the reference level set in step 2. This is the occupied bandwidth specified.

Figure 4 : Occupied bandwidth measurement configuration



5.3 Occupied Bandwidth Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2016/11/19	2017/11/18
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02

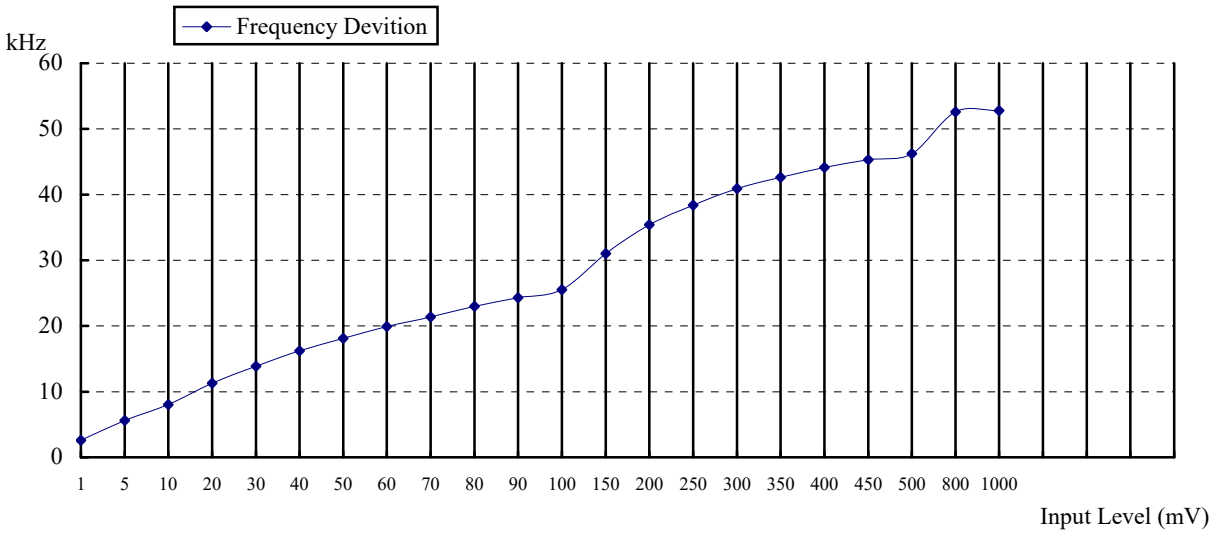
5.4 Bandwidth Measured

5.4.1 Input Level Derived

RF Frequency : 697.825MHz

Test Date : Dec. 06, 2016 Temperature : 23 °C Humidity : 55 %

Input Audio Frequency : 2.5 kHz, Sine Wave



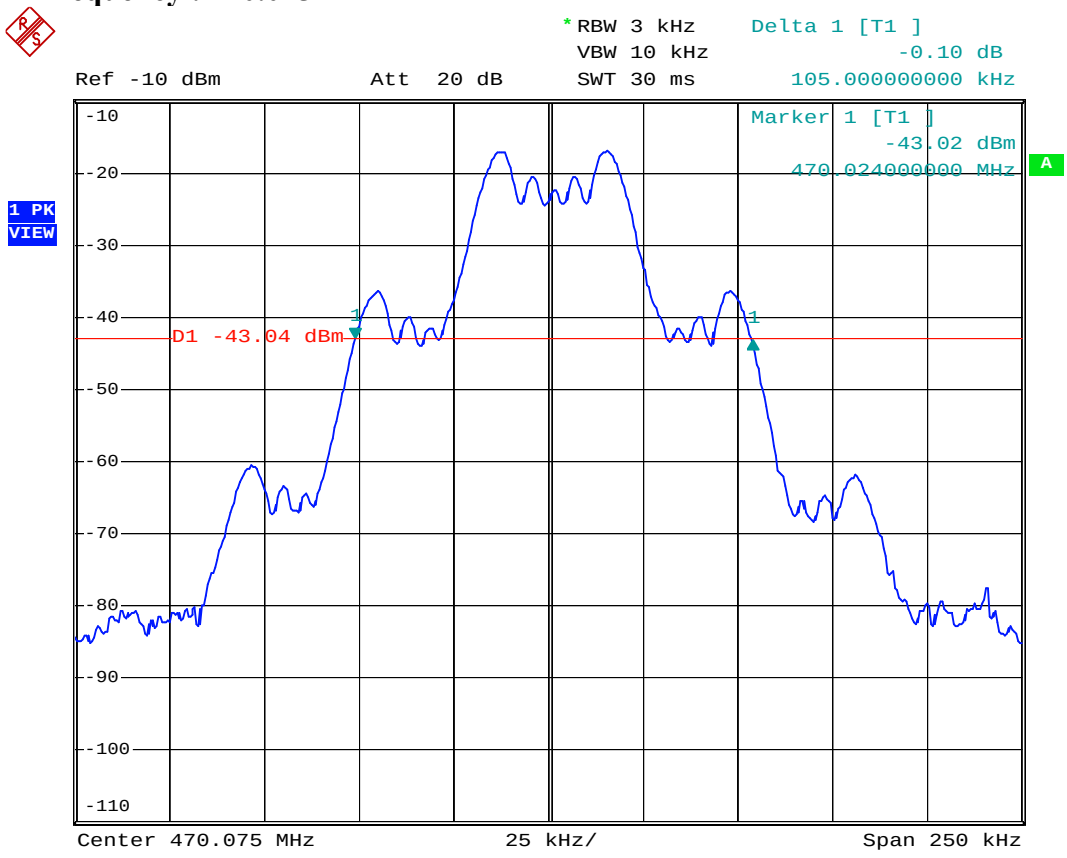
The Level input to produce 50% modulation is 100 mV, therefore the magnitude 16 dB greater than it is 630 mV.

5.4.2 Occupied Bandwidth Plotted

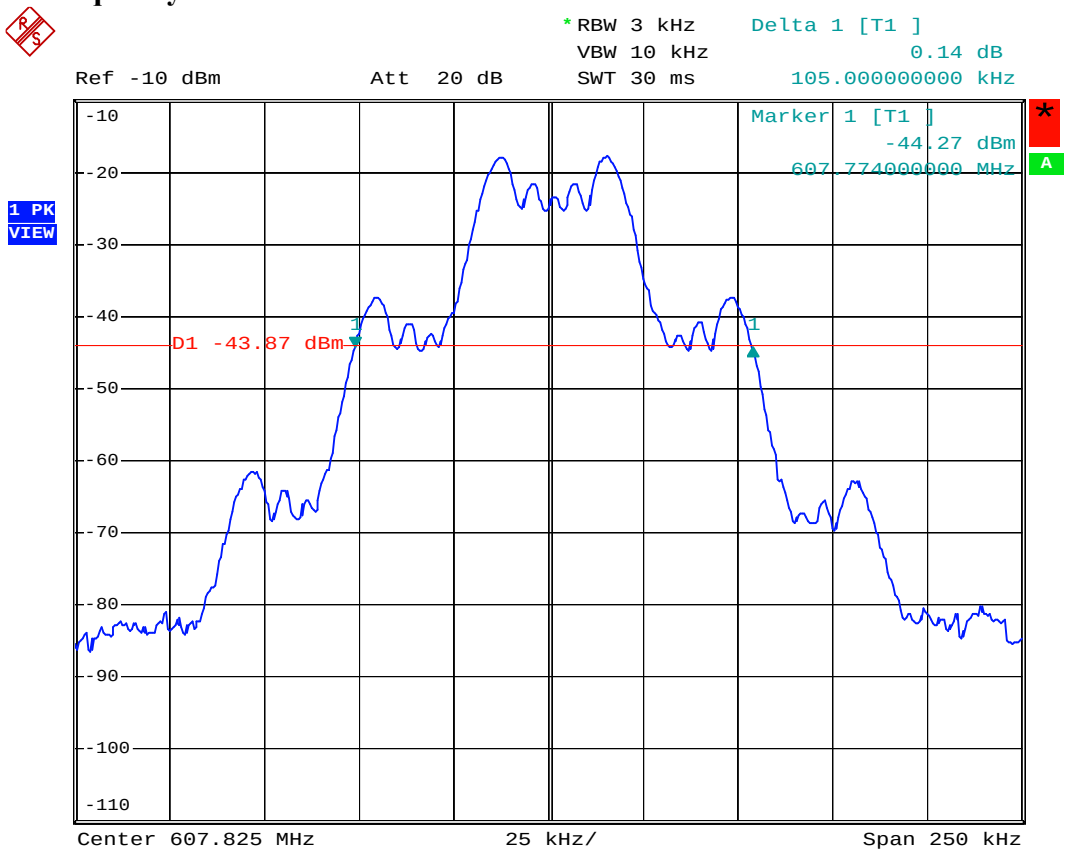
Test Date : Dec. 06, 2016 Temperature : 23 °C Humidity : 55 %

RF Frequency (MHz)	26 dB Bandwidth (kHz)
470.075	105.0
607.825	105.0
614.075	104.5
697.825	105.0
944.075	104.5
951.825	104.0

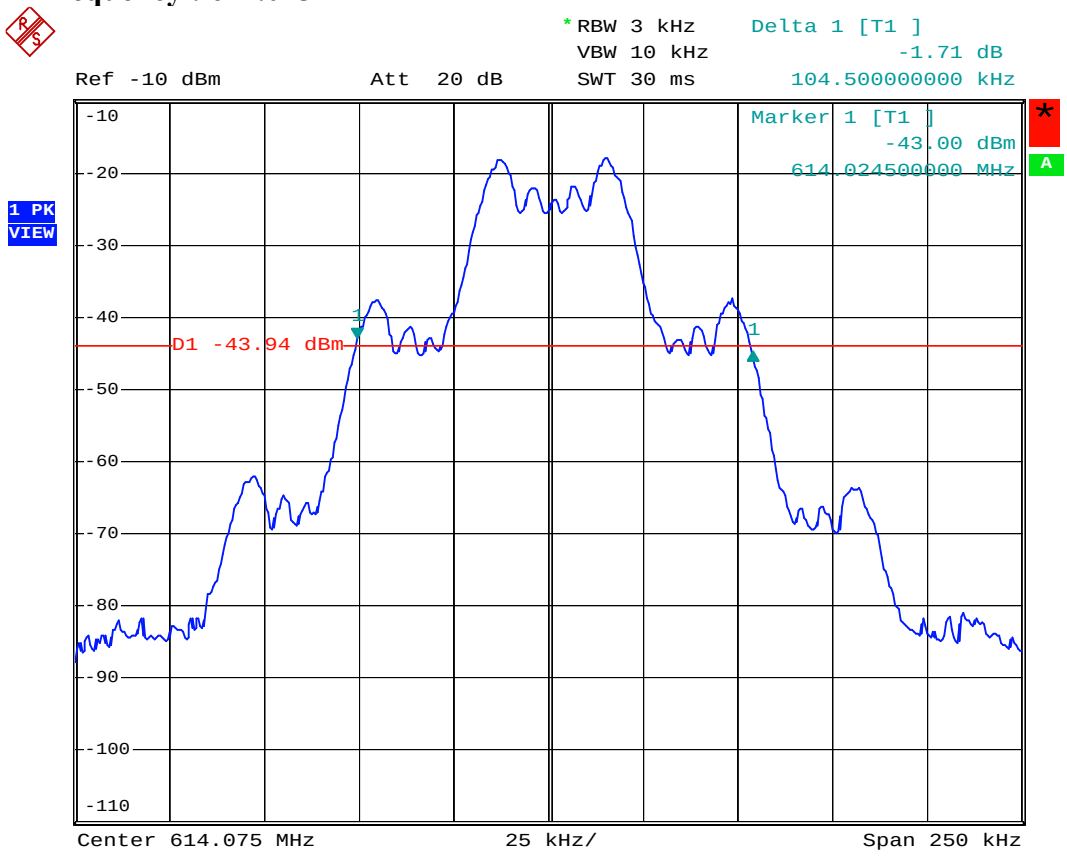
RF Frequency : 470.075MHz



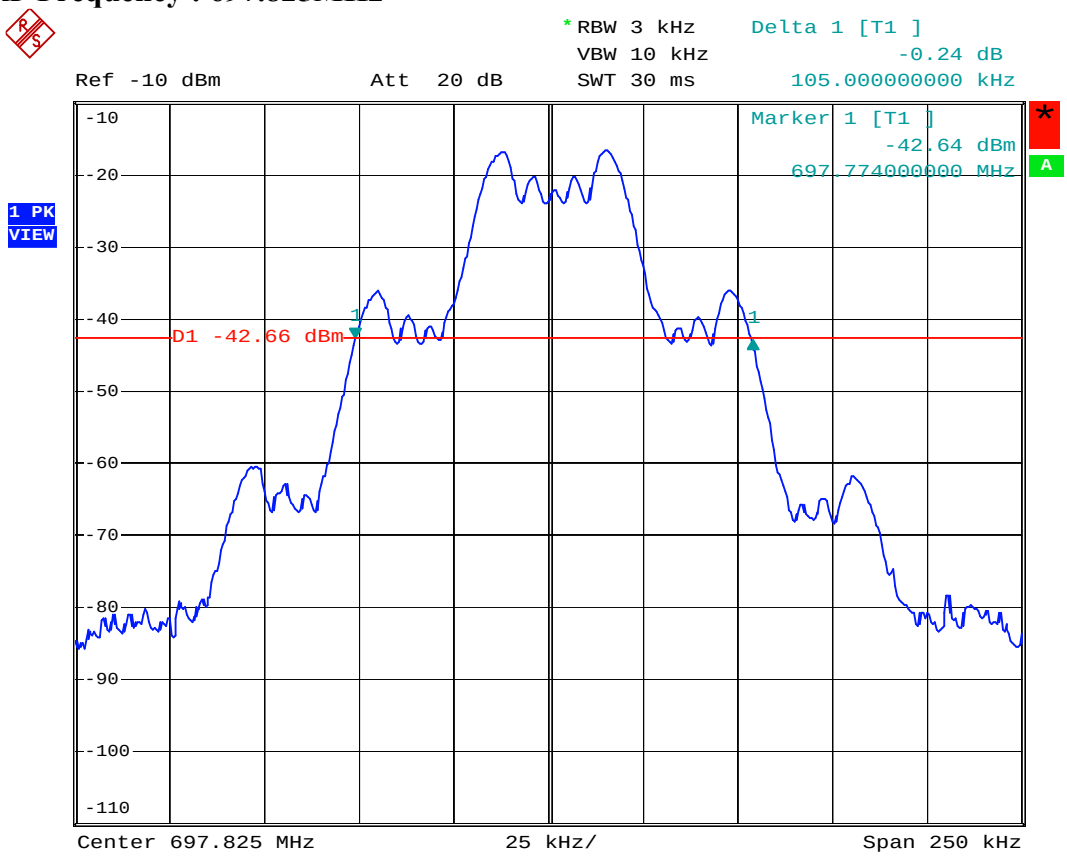
RF Frequency : 607.825MHz



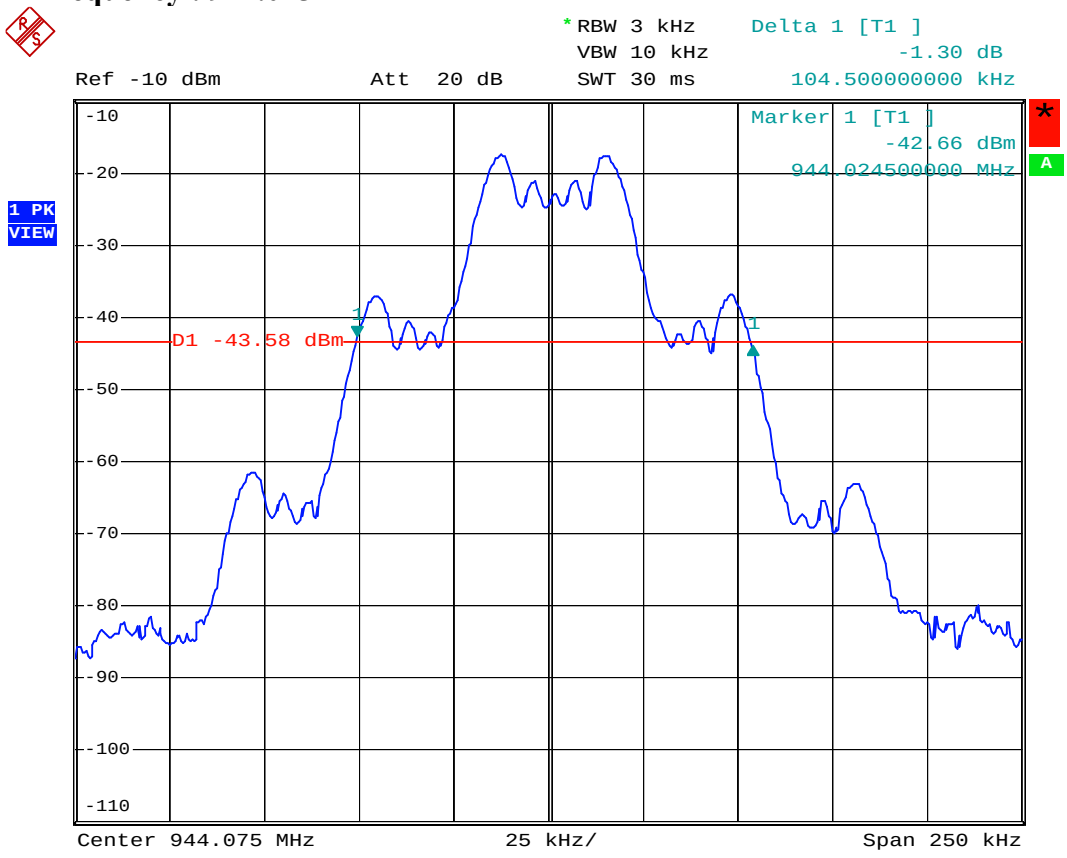
RF Frequency : 614.075MHz



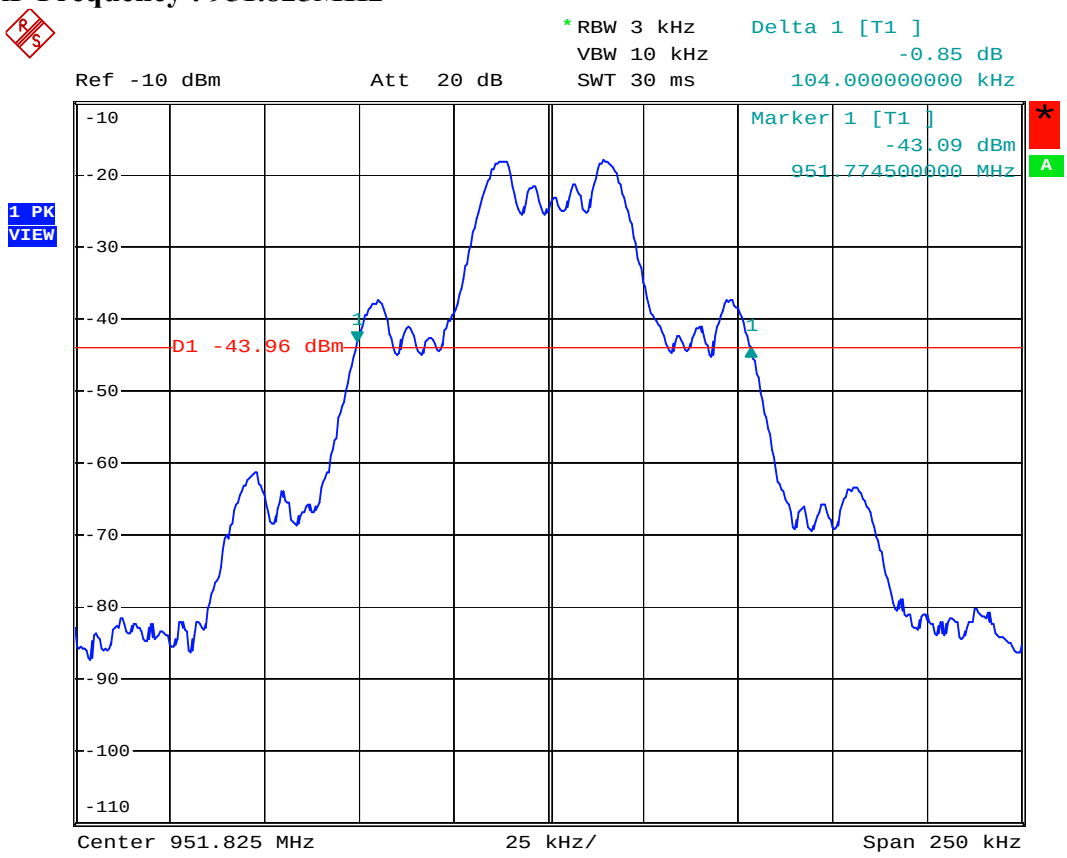
RF Frequency : 697.825MHz



RF Frequency : 944.075MHz



RF Frequency : 951.825MHz



6. FIELD STRENGTH OF EMISSION

6.1 Provisions Applicable

According to §2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to §74.861(e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the follwing sceedule:

(i) 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.

(ii) 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.

(iii) on any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth shall be attenuated below the unmodulated carrier by at least 43 plus 10 Log(output power in watts) dB.

6.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 °, and record the highest value indicated on spectrum analyzer as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. 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.

7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

6.3 Measuring Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Double Ridged Antenna	EMCO	3115	2016/10/05	2017/10/04
Log-periodic Antenna	EMCO	3146	2016/07/05	2017/07/04
Biconical Antenna	EMCO	3110	2016/07/05	2017/07/04
Half-Wave Dipole Antenna	SCHWARZBECK	VHAP (1166/1167)	2015/09/14	2018/09/13
Half-Wave Dipole Antenna	SCHWARZBECK	UHAP (897/898)	2015/09/14	2018/09/13
Amplifier	HP	8449B	2016/10/14	2017/10/13
Amplifier	HP	8447D	2016/12/05	2017/12/04
Signal generator	HP	83732B	2016/12/06	2017/12/05

Measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz

6.4 Measuring Data

6.4.1. Emission Test Data

a. Tx Frequency: 470.075MHz

Operated mode : TX Test Date :Dec. 06, 2016
Temperature : 23°C Humidity : 55%

Unmodulated carrier output power is 10.21 dBm , or 10.495 mW.
The limit of spurious or harmonics is calculated as following :

10.21-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Amp. Gain	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
940.150	52.3	54.2	-24.4	-18.8	26.4	2.9	-53.7	-48.1	-13.0	-35.1

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1410.225	47.0	49.6	-63.9	-61.1	7.8	-2.0	2.5	-60.6	-57.8	-13.0	-44.8
1880.300	57.6	58.9	-51.1	-49.7	8.2	-2.0	2.9	-47.8	-46.4	-13.0	-33.4
2350.375	60.8	61.4	-46.1	-45.5	9.2	-2.0	3.3	-42.2	-41.6	-13.0	-28.6
2820.450	55.2	60.4	-50.1	-44.8	9.3	-2.0	3.6	-46.4	-41.1	-13.0	-28.1
3290.525	---	---	---	---	9.3	-2.0	3.9	---	---	-13.0	---
3760.600	---	---	---	---	9.4	-2.0	4.2	---	---	-13.0	---
4230.675	---	---	---	---	10.0	-2.0	4.5	---	---	-13.0	---
4700.750	---	---	---	---	10.4	-2.0	4.7	---	---	-13.0	---

Note :

1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

b. Tx Frequency: 607.825 MHz

Operated mode : TX Test Date :Dec. 06, 2016
Temperature : 23°C Humidity : 55%

Unmodulated carrier output power is 8.7 dBm , or 7.413 mW.
The limit of spurious or harmonics is calculated as following :
8.7-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1215.650	49.9	48.4	-61.8	-63.2	6.8	-2.0	2.3	-59.3	-60.7	-13.0	-46.3
1823.475	66.4	69.8	-42.5	-39.1	8.2	-2.0	2.9	-39.2	-35.8	-13.0	-22.8
2431.300	65.3	68.4	-42.4	-38.2	9.4	-2.0	3.3	-37.3	-34.1	-13.0	-21.1
3039.125	---	---	---	---	9.2	-2.0	3.7	---	---	-13.0	---
3646.950	---	---	---	---	9.3	-2.0	4.1	---	---	-13.0	---
4254.775	---	---	---	---	10.0	-2.0	4.5	---	---	-13.0	---
4862.600	---	---	---	---	10.2	-2.0	4.8	---	---	-13.0	---
5470.425	---	---	---	---	10.4	-2.0	5.2	---	---	-13.0	---
6078.250	---	---	---	---	11.0	-2.0	5.4	---	---	-13.0	---

Note :
1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :
   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected
   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

c. Tx Frequency: 614.075 MHz

Operated mode : TX Test Date :Dec. 06, 2016
Temperature : 23°C Humidity : 55%

Unmodulated carrier output power is 9.03 dBm , or 7.998 mW.

The limit of spurious or harmonics is calculated as following :

9.03-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1228.150	49.1	65.8	-62.5	-45.8	6.9	-2.0	2.3	-59.9	-43.2	-13.0	-30.2
1842.225	66.1	66.1	-42.7	-42.7	8.2	-2.0	2.9	-39.4	-39.4	-13.0	-26.4
2456.300	76.8	73.8	-29.8	-32.7	9.5	-2.0	3.3	-25.6	-28.5	-13.0	-12.6
3070.375	64.3	65.1	-40.2	-39.3	9.2	-2.0	3.8	-36.8	-35.9	-13.0	-22.9
3684.450	---	---	---	---	9.3	-2.0	4.2	---	---	-13.0	---
4298.525	---	---	---	---	10.1	-2.0	4.5	---	---	-13.0	---
4912.600	---	---	---	---	10.1	-2.0	4.9	---	---	-13.0	---
5526.675	---	---	---	---	10.4	-2.0	5.2	---	---	-13.0	---
6140.750	---	---	---	---	11.0	-2.0	5.5	---	---	-13.0	---

Note :

1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

d. Tx Frequency: 697.825 MHz

Operated mode : TX Test Date :Dec. 06, 2016
Temperature : 23°C Humidity : 55%

Unmodulated carrier output power is 11.08 dBm , or 12.823 mW.

The limit of spurious or harmonics is calculated as following :

11.08-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1395.650	63.8	66.6	-47.1	-44.2	7.7	-2.0	2.5	-43.9	-41.0	-13.0	-28.0
2093.475	73.7	74.9	-34.1	-33.0	8.5	-2.0	3.1	-30.7	-29.6	-13.0	-16.6
2791.300	66.6	67.6	-38.8	-37.7	9.4	-2.0	3.6	-35.0	-33.9	-13.0	-20.9
3489.125	57.6	58.8	-45.2	-44.1	9.3	-2.0	4.0	-41.9	-40.8	-13.0	-27.8
4186.950	48.7	50.7	-51.7	-50.0	9.8	-2.0	4.5	-48.4	-46.7	-13.0	-33.7
4884.775	---	---	---	---	10.1	-2.0	4.8	---	---	-13.0	---
5582.600	---	---	---	---	10.5	-2.0	5.2	---	---	-13.0	---
6280.425	---	---	---	---	11.2	-2.0	5.5	---	---	-13.0	---
6978.250	---	---	---	---	10.9	-2.0	5.9	---	---	-13.0	---

Note :

1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

e. Tx Frequency: 944.075 MHz

Operated mode : TX Test Date :Dec. 06, 2016
Temperature : 23°C Humidity : 55%

Unmodulated carrier output power is 4.4 dBm , or 2.754 mW.

The limit of spurious or harmonics is calculated as following :

4.4-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1888.150	51.1	67.3	-57.6	-41.3	8.2	-2.0	2.9	-54.3	-38.0	-13.0	-25.0
2832.225	64.5	67.4	-40.8	-37.8	9.3	-2.0	3.6	-37.1	-34.1	-13.0	-21.1
3776.300	77.2	78.5	-24.4	-23.4	9.4	-2.0	4.2	-21.2	-20.2	-13.0	-7.2
4720.375	65.2	64.5	-34.5	-35.1	10.3	-2.0	4.7	-30.9	-31.5	-13.0	-17.9
5664.450	---	---	---	---	10.6	-2.0	5.2	---	---	-13.0	---
6608.525	---	---	---	---	11.3	-2.0	5.7	---	---	-13.0	---
7552.600	---	---	---	---	10.4	-2.0	6.1	---	---	-13.0	---
8496.675	---	---	---	---	10.6	-2.0	6.5	---	---	-13.0	---
9440.750	---	---	---	---	11.1	-2.0	7.3	---	---	-13.0	---

Note :

1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

f. Tx Frequency: 951.825 MHz

Operated mode : TX Test Date :Dec. 06, 2016
Temperature : 23°C Humidity : 55%

Unmodulated carrier output power is 2.0 dBm , or 1.585 mW.

The limit of spurious or harmonics is calculated as following :

2.0-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1903.650	64.7	65.8	-43.9	-42.7	8.2	-2.0	2.9	-40.6	-39.4	-13.0	-26.4
2855.475	75.2	76.6	-30.0	-28.5	9.3	-2.0	3.6	-26.3	-24.8	-13.0	-11.8
3807.300	64.9	66.8	-36.6	-34.9	9.4	-2.0	4.2	-33.4	-31.7	-13.0	-18.7
4759.125	59.6	61.2	-40.1	-38.4	10.3	-2.0	4.8	-36.6	-34.9	-13.0	-21.9
5710.950	49.6	51.6	-49.1	-47.0	10.6	-2.0	5.3	-45.8	-43.7	-13.0	-30.7
6662.775	---	---	---	---	11.2	-2.0	5.7	---	---	-13.0	---
7614.600	---	---	---	---	10.4	-2.0	6.1	---	---	-13.0	---
8566.425	---	---	---	---	10.6	-2.0	6.6	---	---	-13.0	---
9518.250	---	---	---	---	11.2	-2.0	7.3	---	---	-13.0	---

Note :

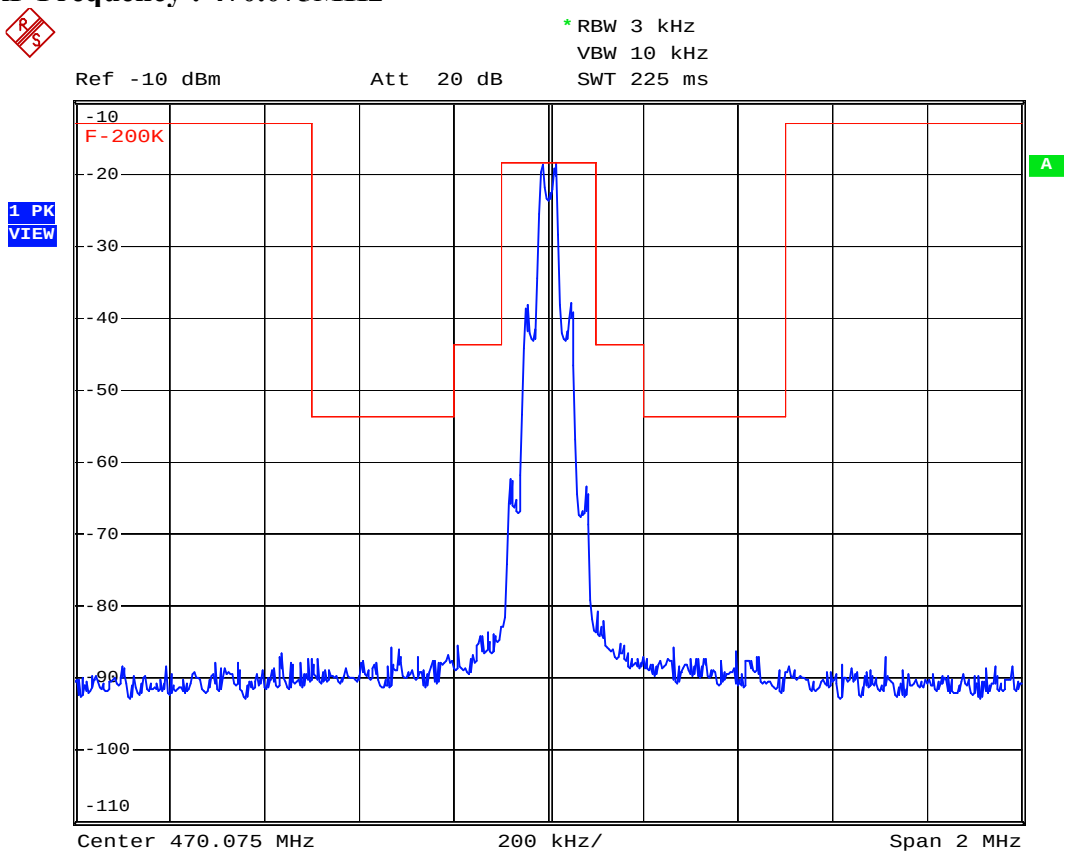
1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

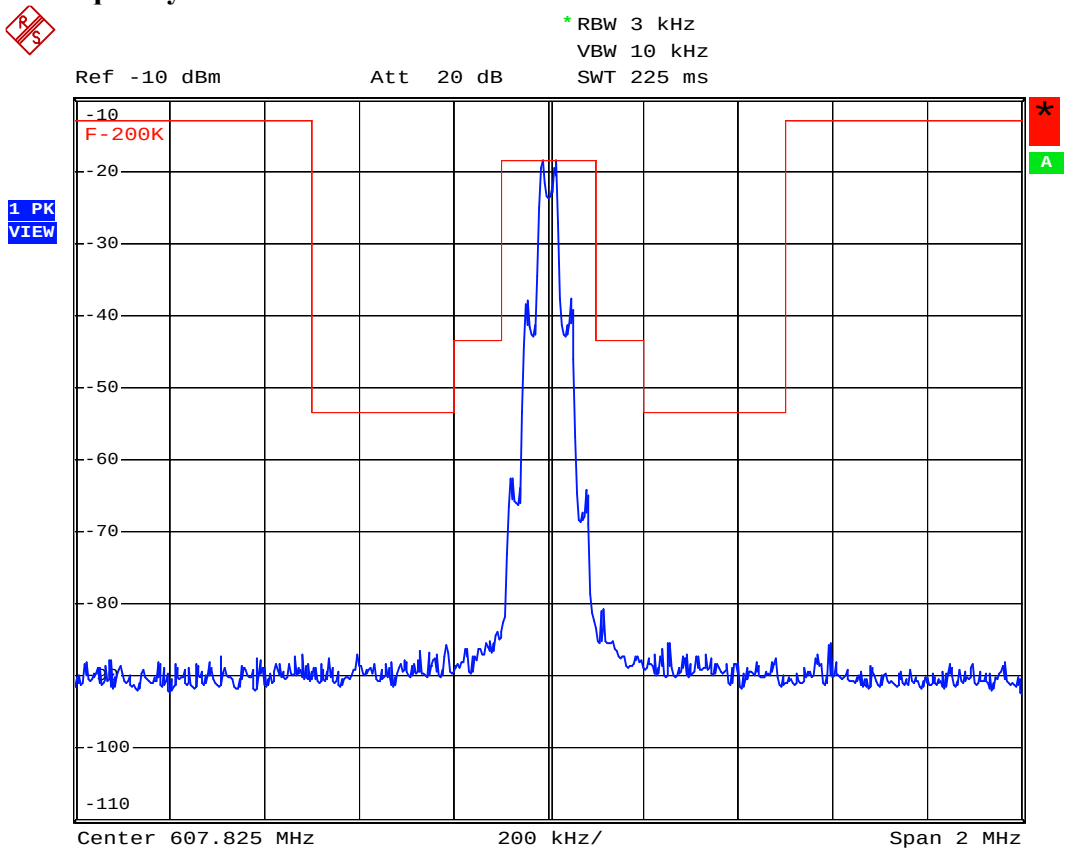
   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

6.4.2 Emission mask plots

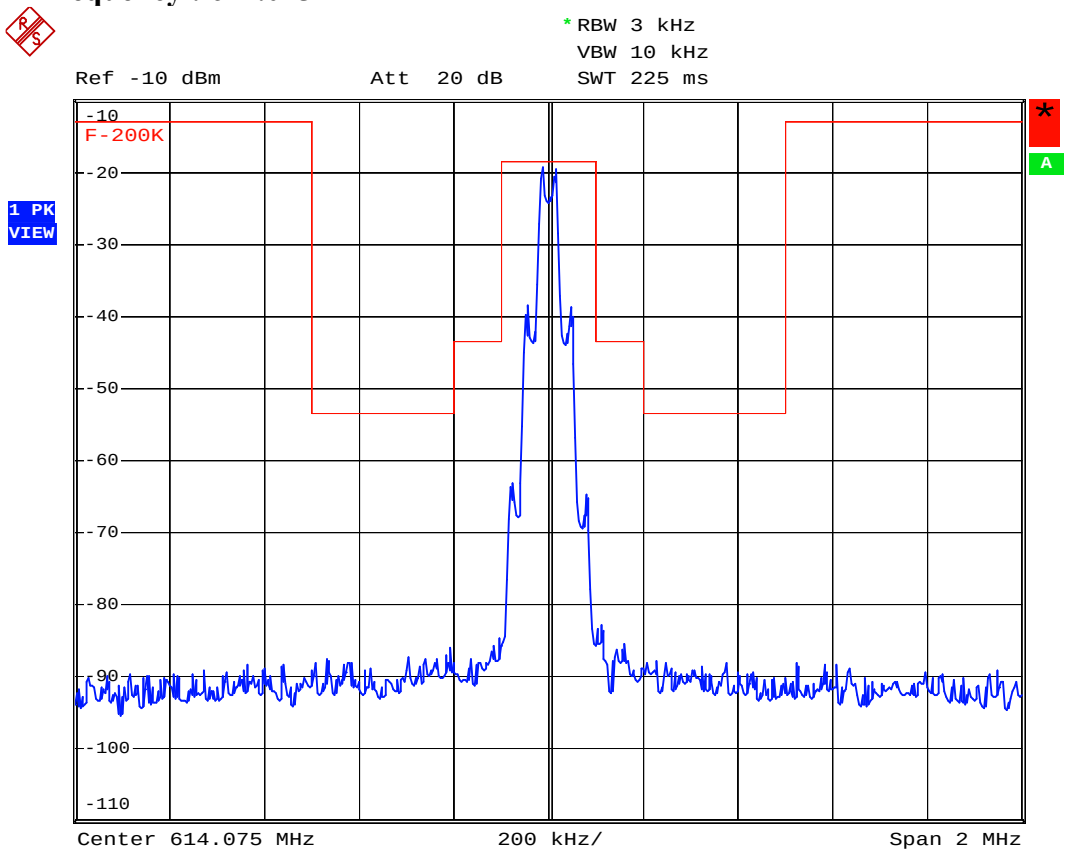
RF Frequency : 470.075MHz



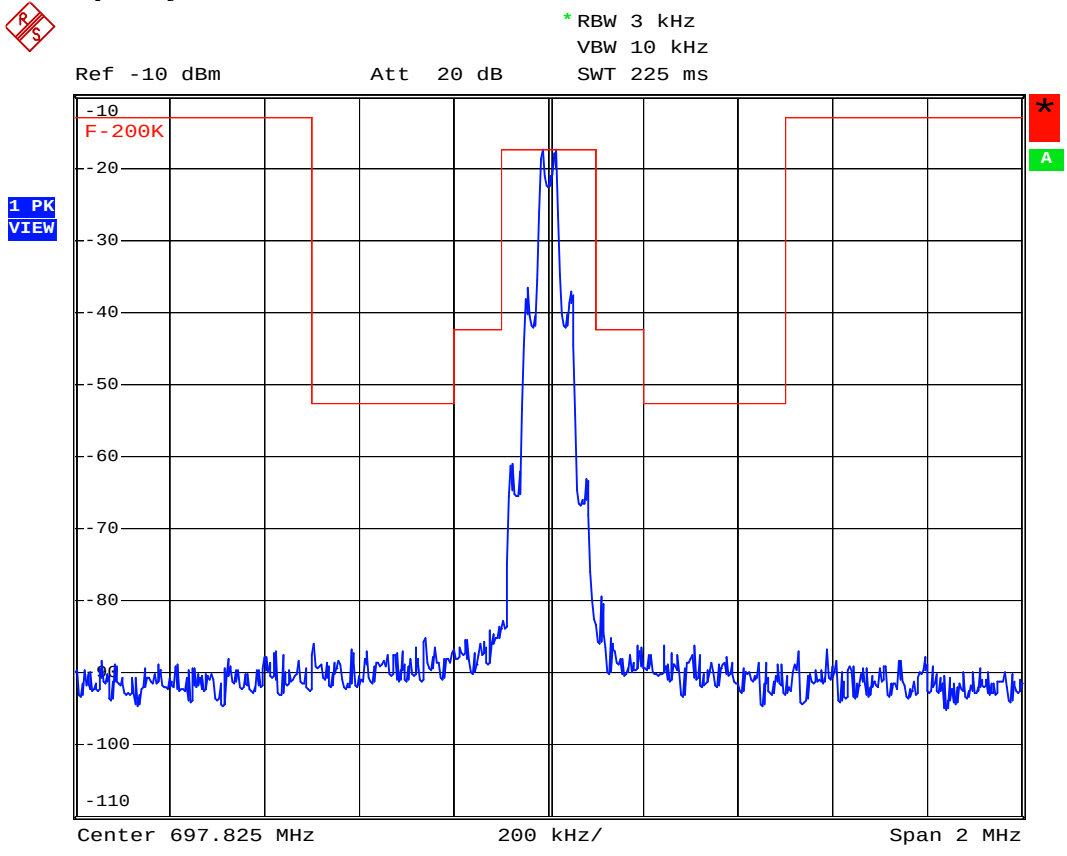
RF Frequency : 607.825MHz



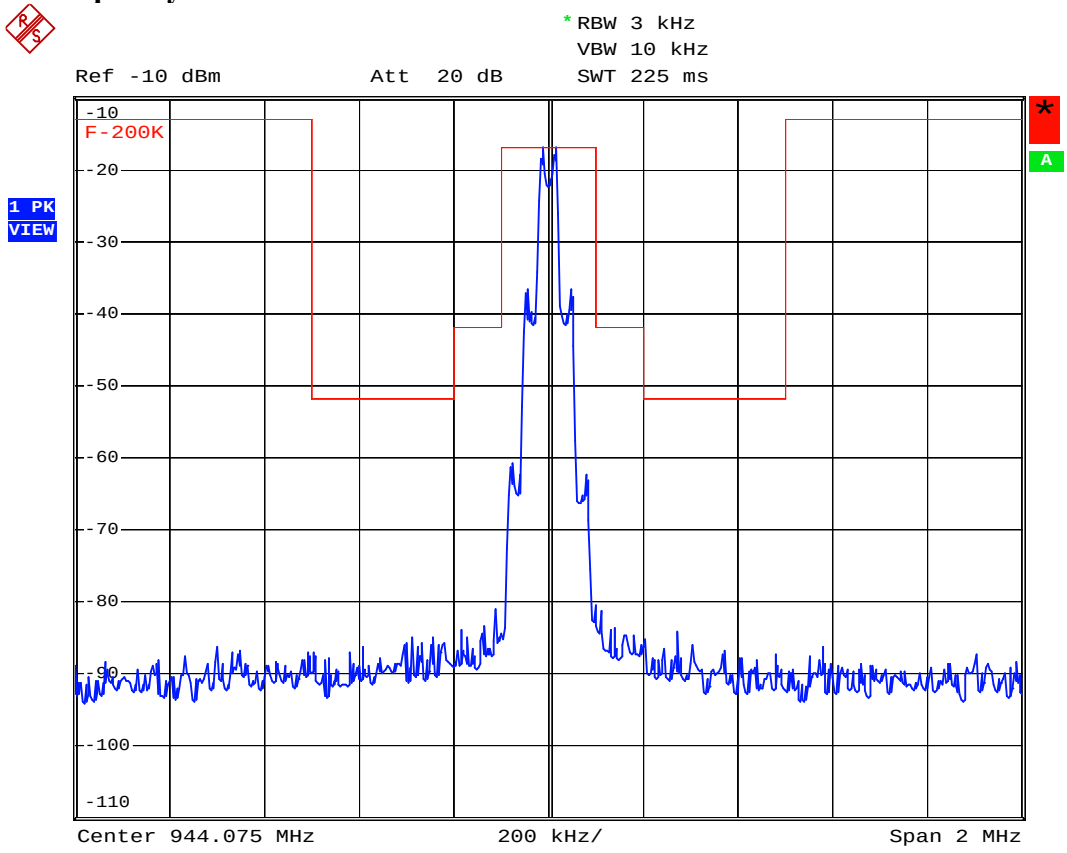
RF Frequency : 614.075MHz



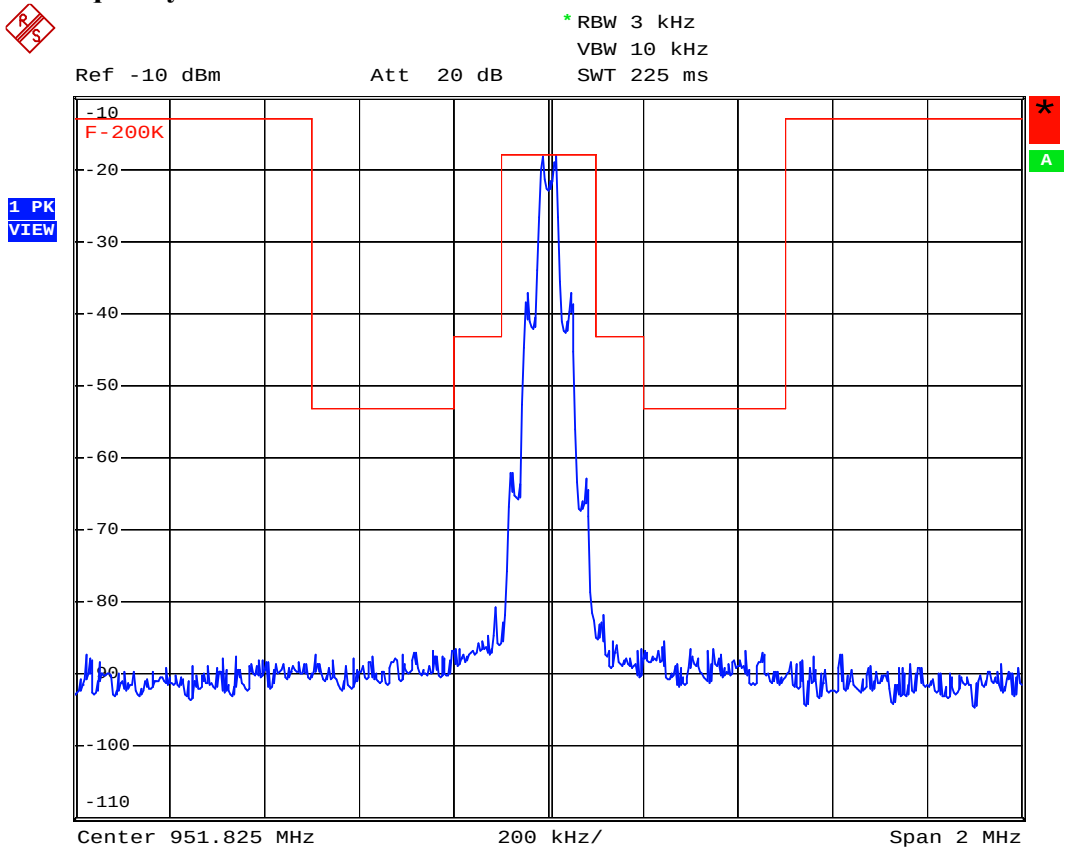
RF Frequency : 697.825MHz



RF Frequency : 944.075MHz

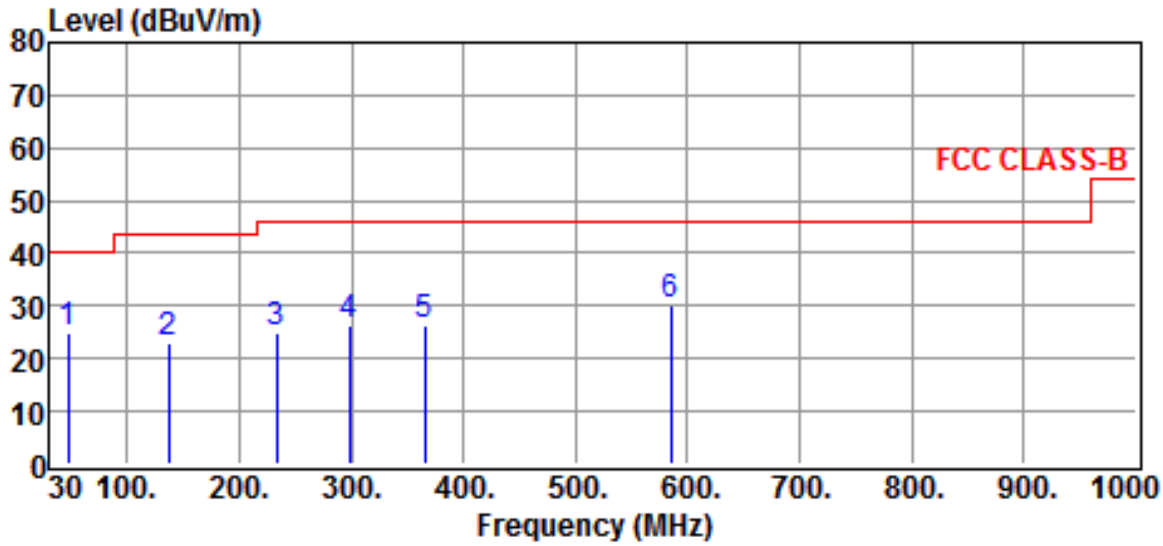


RF Frequency : 951.825MHz



6.5 Other Emission

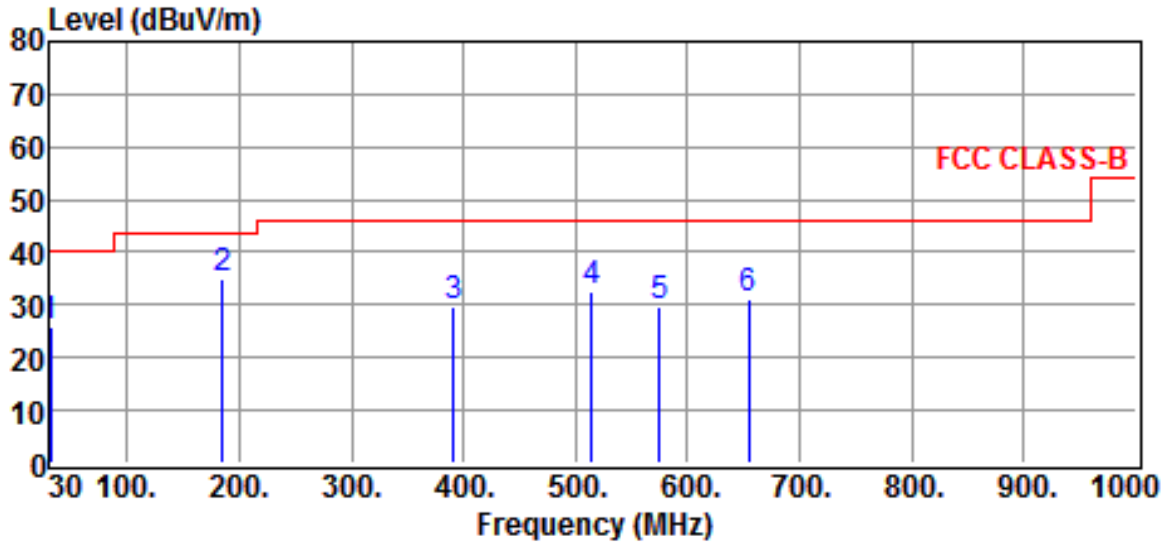
a) Emission frequencies below 1 GHz



Site	:CHAMBER #2	Date	:2016-12-01
Limit	:FCC CLASS-B	Ant. Pol.	:HORIZONTAL
EUT	:UHF remote microphone system	Model	:Ranger T
Power Rating	:DC 5V FROM NB	Temp.	:22°C
Engineer	:Brian Huang	Humi.	:53 %
Test Mode	:TX / Charging		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
47.4600	33.38	-8.59	24.79	40.00	-15.21	QP
136.7000	29.53	-6.75	22.78	43.50	-20.72	QP
233.7000	31.72	-6.71	25.01	46.00	-20.99	QP
297.7200	29.32	-3.04	26.28	46.00	-19.72	QP
365.6200	28.07	-1.77	26.30	46.00	-19.70	QP
584.8400	28.75	1.35	30.10	46.00	-15.90	QP

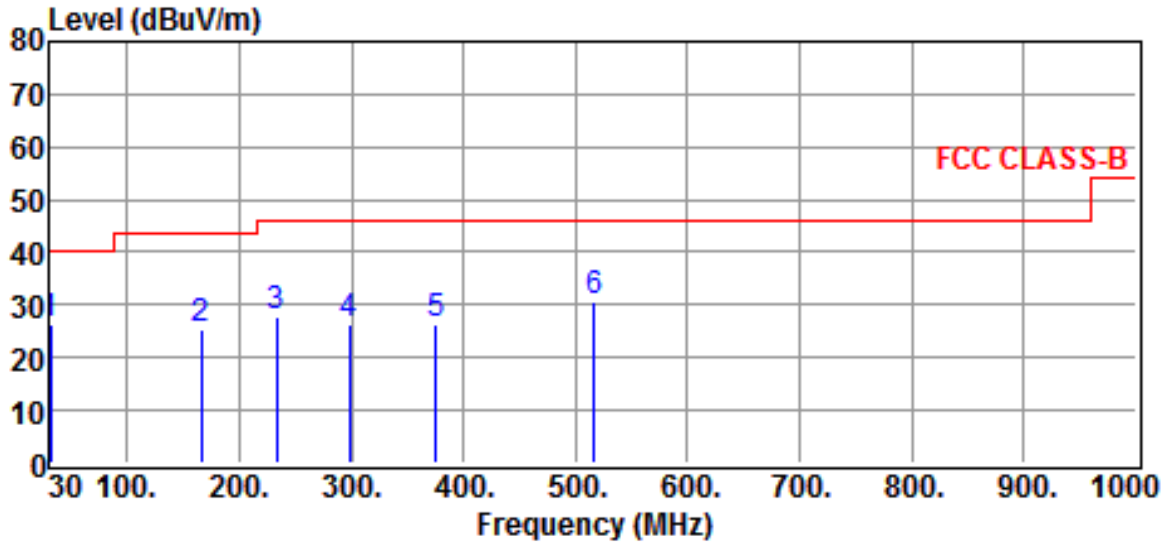
Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit – Result



Site	:CHAMBER #2	Date	:2016-12-01
Limit	:FCC CLASS-B	Ant. Pol.	:VERTICAL
EUT	:UHF remote microphone system	Model	:Ranger T
Power Rating	:DC 5V FROM NB	Temp.	:22˚C
Engineer	:Brian Huang	Humi.	:53 %
Test Mode	:TX / Charging		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
31.9400	28.63	-2.87	25.76	40.00	-14.24	QP
185.2000	44.28	-9.07	35.21	43.50	-8.29	QP
390.8400	31.05	-1.22	29.83	46.00	-16.17	QP
515.0000	32.27	0.43	32.70	46.00	-13.30	QP
575.1400	28.73	1.18	29.91	46.00	-16.09	QP
654.6800	28.50	2.56	31.06	46.00	-14.94	QP

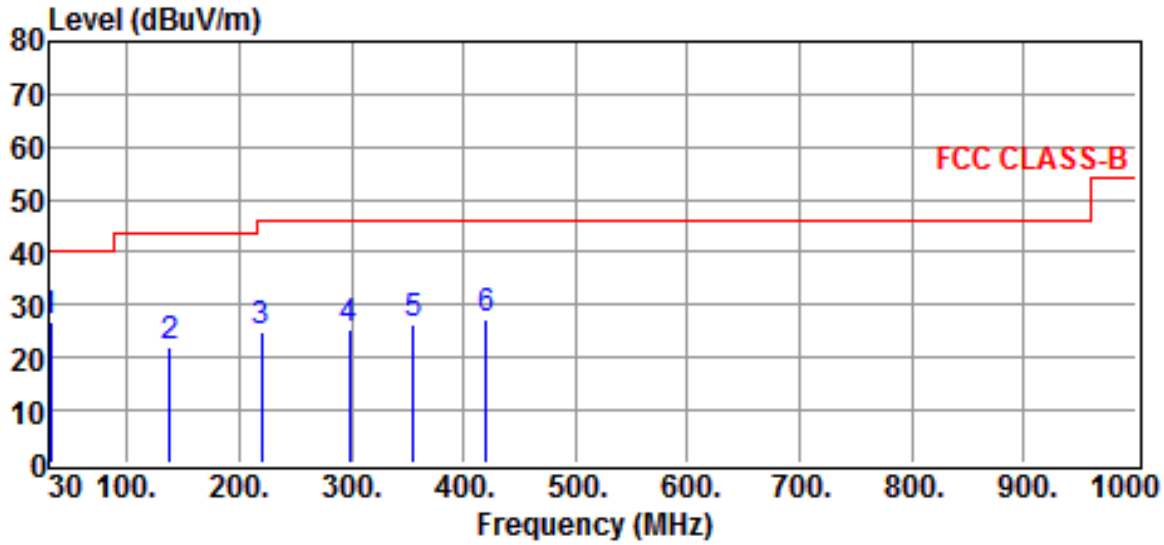
Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit – Result



Site	:CHAMBER #2	Date	:2016-12-01
Limit	:FCC CLASS-B	Ant. Pol.	:HORIZONTAL
EUT	:UHF remote microphone system	Model	:Ranger T
Power Rating	:Battery	Temp.	:22 ˚C
Engineer	:Brian Huang	Humi.	:53 %
Test Mode	:TX		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
31.9400	29.13	-2.87	26.26	40.00	-13.74	QP
165.8000	32.90	-7.66	25.24	43.50	-18.26	QP
233.7000	34.63	-6.71	27.92	46.00	-18.08	QP
297.7200	29.23	-3.04	26.19	46.00	-19.81	QP
375.3200	27.83	-1.55	26.28	46.00	-19.72	QP
516.9400	30.12	0.45	30.57	46.00	-15.43	QP

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit – Result



Site	:CHAMBER #2	Date	:2016-12-01
Limit	:FCC CLASS-B	Ant. Pol.	:VERTICAL
EUT	:UHF remote microphone system	Model	:Ranger T
Power Rating	:Battery	Temp.	:22˚C
Engineer	:Brian Huang	Humi.	:53 %
Test Mode	:TX		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
31.9400	29.65	-2.87	26.78	40.00	-13.22	QP
138.6400	28.78	-6.64	22.14	43.50	-21.36	QP
220.1200	32.30	-7.34	24.96	46.00	-21.04	QP
297.7200	28.34	-3.04	25.30	46.00	-20.70	QP
355.9200	28.31	-1.99	26.32	46.00	-19.68	QP
419.9400	28.32	-0.89	27.43	46.00	-18.57	QP

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit – Result

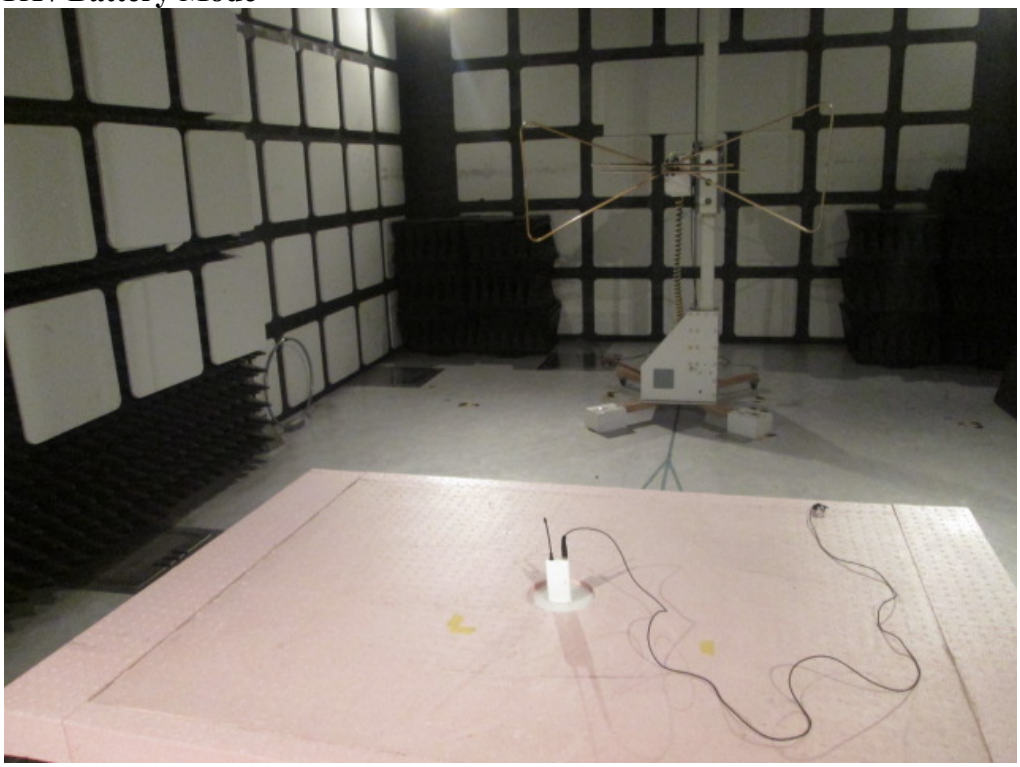
b) Emission frequencies above 1 GHz

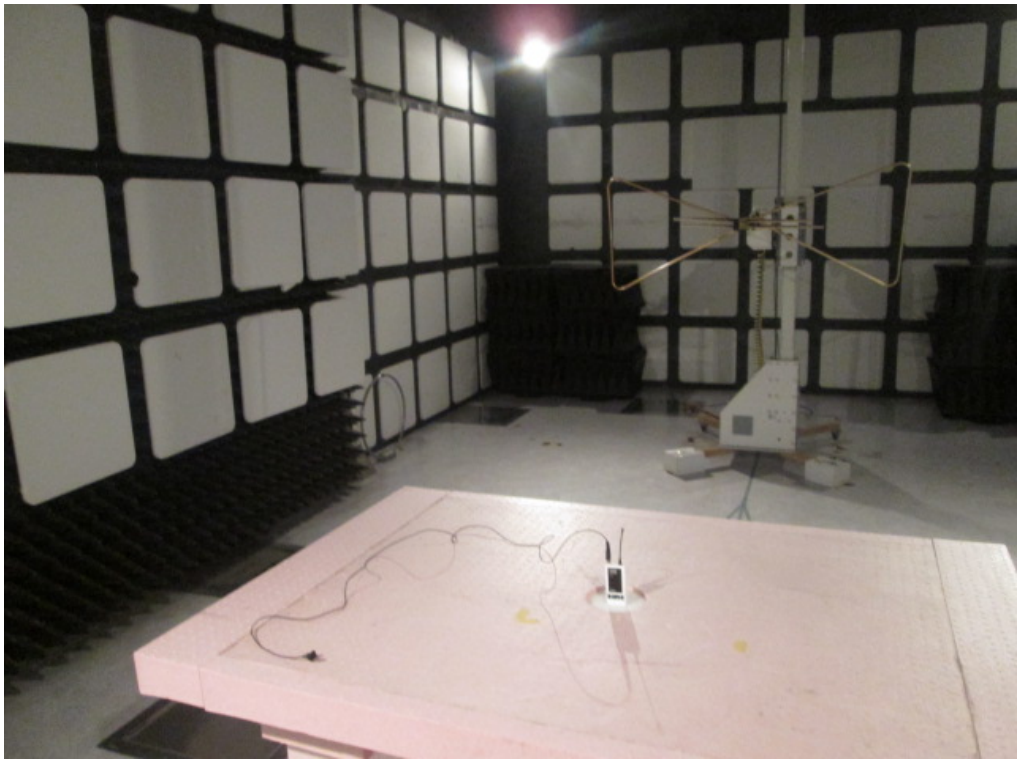
Radiated emission frequencies above 1 GHz to 25 GHz were too low to be measured with a pre-amplifier of 35 dB.

6.6 Radiated Measurement Photos

TX / Charging Mode

TX / Battery Mode





7. FREQUENCY STABILITY MEASUREMENT

7.1 Provisions Applicable

According to §2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃to +50℃centigrade, and according to §2.1055 (d)(2), the frequency stability shall be measured with variation of primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

According to §74.861(e)(4), the frequency tolerance of the transmitter shall be 0.005 percent.

7.2 Measurement Procedure

A) Frequency stability versus environmental temperature

1. Setup the configuration per figure 5 for frequencies measured at ambient temperature if it is within 15℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃shall be used.

2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

4. Repeat step 2 with a 10℃decreased per stage until the lowest temperature -30℃is measured, record all measurement frequencies.

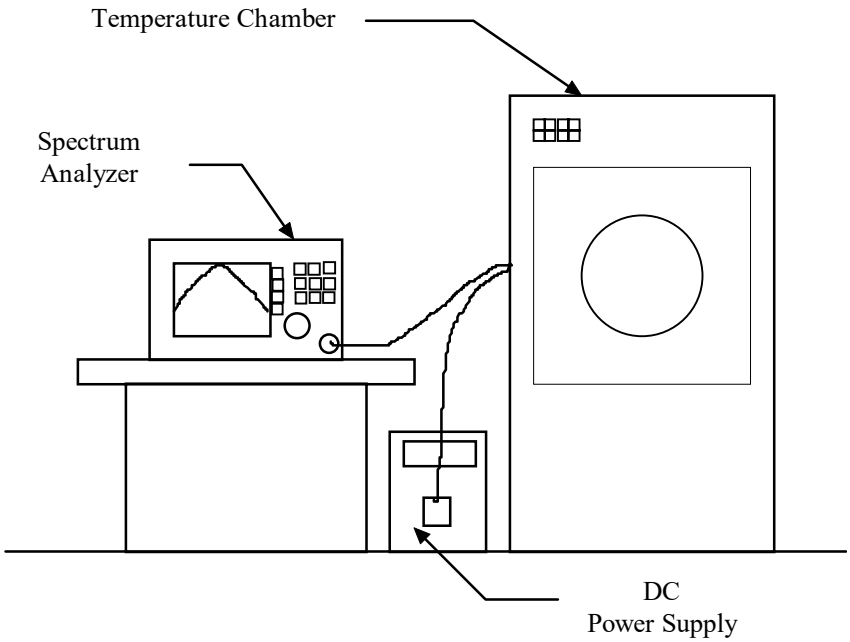
B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃shall be used. Install new batteries in the EUT.

2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. For non hand carried, battery operated device, supply the EUT primary voltage with 85 and 115 percent of the nominal value and record the frequency.

Figure 5 : Frequency stability measurement configuration



7.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Temperature Chamber	MALLIER	MCT-2X-M	2015/12/15	2016/12/14

7.4 Measurement Data

Test Date : Dec. 06, 2016 Temperature : 23 °C Humidity : 55 %

A. Tx Frequency 470.075MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :470.075 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.7	470.0642	-0.00230	470.0642	-0.00230	470.0642	-0.00230
40		470.0649	-0.00215	470.0649	-0.00215	470.0650	-0.00213
30		470.0668	-0.00174	470.0668	-0.00174	470.0669	-0.00172
20		470.0697	-0.00113	470.0697	-0.00113	470.0697	-0.00113
10		470.0721	-0.00062	470.0721	-0.00062	470.0721	-0.00062
0		470.0737	-0.00028	470.0738	-0.00026	470.0738	-0.00026
-10		470.0773	0.00049	470.0773	0.00049	470.0773	0.00049
-20		470.0803	0.00113	470.0804	0.00115	470.0804	0.00115
-30		470.0841	0.00194	470.0842	0.00196	470.0842	0.00196

A2. Frequency stability versus supplied voltage

Reference Frequency : 470.075 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	3.1	470.0679	-0.00151	470.0680	-0.00149	470.0679	-0.00151
25	4.3	470.0680	-0.00149	470.0681	-0.00147	470.0681	-0.00147

Test Date : Dec. 06, 2016 Temperature : 23 °C Humidity : 55 %

B. Tx Frequency 697.825MHz

B1. Frequency stability versus enviroment tempture

Reference Frequency : 697.825 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.7	697.8050	-0.00287	697.8050	-0.00287	697.8052	-0.00284
40		697.8086	-0.00235	697.8087	-0.00234	697.8087	-0.00234
30		697.8124	-0.00181	697.8125	-0.00179	697.8125	-0.00179
20		697.8172	-0.00112	697.8172	-0.00112	697.8172	-0.00112
10		697.8226	-0.00034	697.8228	-0.00032	697.8228	-0.00032
0		697.8267	0.00024	697.8267	0.00024	697.8268	0.00026
-10		697.8312	0.00089	697.8312	0.00089	697.8313	0.00090
-20		697.8354	0.00149	697.8354	0.00149	697.8354	0.00149
-30		697.8414	0.00235	697.8415	0.00236	697.8415	0.00236

B2. Frequency stability versus supplied voltage

Reference Frequency : 697.825 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	3.1	697.8145	-0.00150	697.8145	-0.00150	697.8146	-0.00149
25	4.3	697.8147	-0.00148	697.8146	-0.00149	697.8147	-0.00148

Test Date : Dec. 06, 2016 Temperature : 23 °C Humidity : 55 %

C. Tx Frequency 951.825MHz

C1. Frequency stability versus enviroment tempture

Reference Frequency : 951.825 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.7	951.7963	-0.00302	951.7963	-0.00302	951.7963	-0.00302
40		951.8037	-0.00224	951.8038	-0.00223	951.8037	-0.00224
30		951.8069	-0.00190	951.8070	-0.00189	951.8070	-0.00189
20		951.8142	-0.00113	951.8143	-0.00112	951.8143	-0.00112
10		951.8215	-0.00037	951.8215	-0.00037	951.8216	-0.00036
0		951.8259	0.00009	951.8258	0.00008	951.8258	0.00008
-10		951.8327	0.00081	951.8327	0.00081	951.8327	0.00081
-20		951.8404	0.00162	951.8404	0.00162	951.8405	0.00163
-30		951.8445	0.00205	951.8445	0.00205	951.8446	0.00206

C2. Frequency stability versus supplied voltage

Reference Frequency : 951.825 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	3.1	951.8105	-0.00152	951.8105	-0.00152	951.8104	-0.00153
25	4.3	951.8105	-0.00152	951.8104	-0.00153	951.8105	-0.00152

8 CONDUCTED EMISSION MEASUREMENT

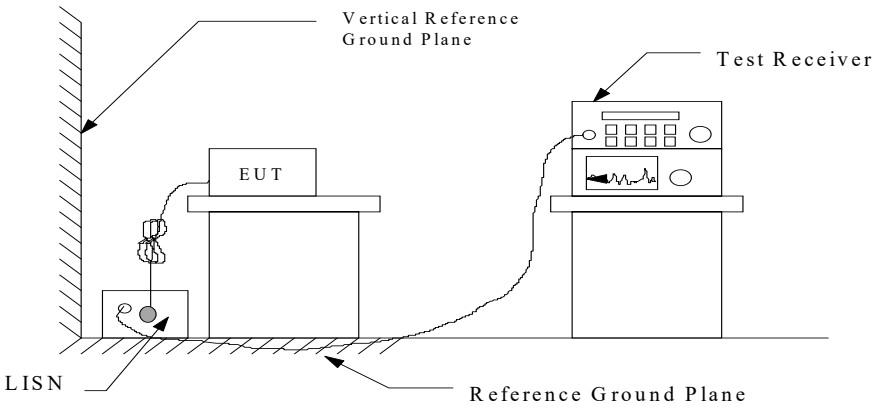
8.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and § 15.207(a) respectively. Both Limits are identical specification.

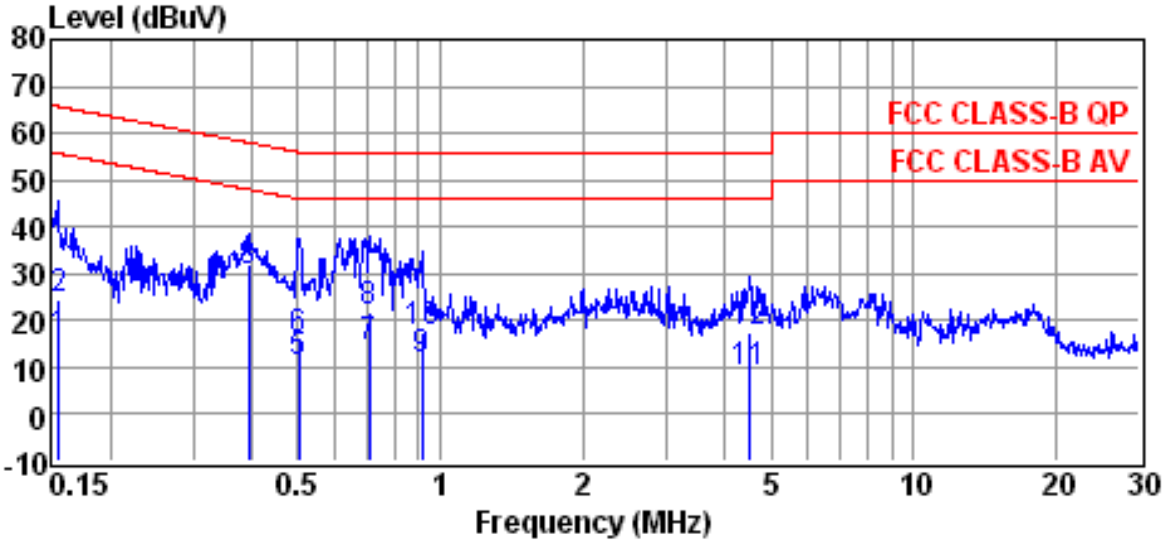
8.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



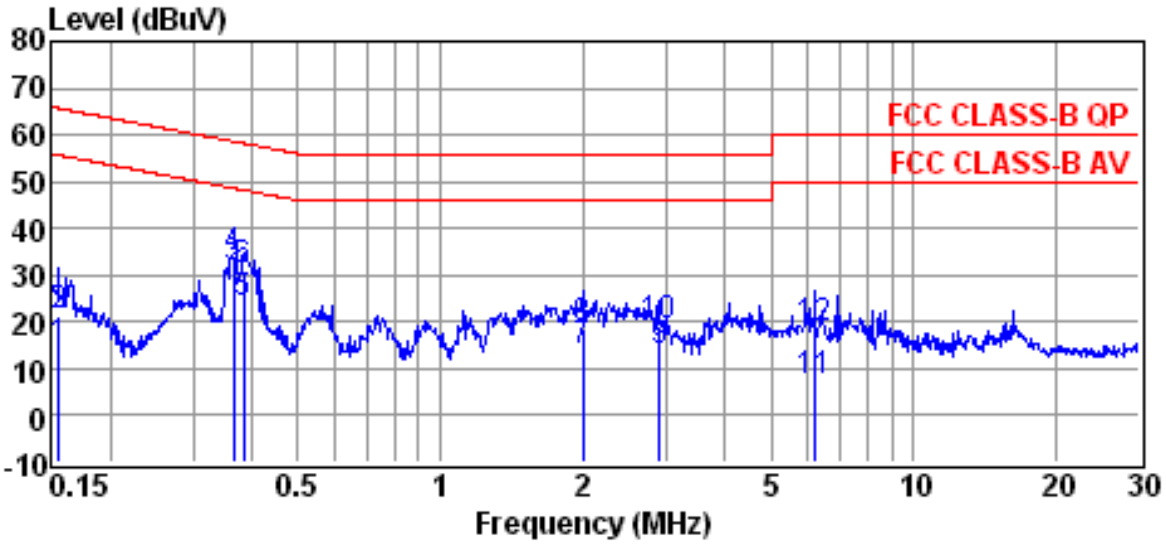
8.3 Conducted Emission Data



Site	: conducted #1	Date	: 12-07-2016
Condition	: FCC CLASS-B QP	LISN	: NEUTRAL
Tem / Hum	: 24 ℃ / 55%	Test Mode	: Ranger T
EUT	: UHF remote microphone system	Power Rating	: DC 5V from NB
Memo	:	Memo	:

Freq (MHz)	Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Remark
0.1557	5.82	10.15	15.97	55.69	-39.72	Average
0.1557	14.15	10.15	24.30	65.69	-41.39	QP
0.3934	20.13	10.17	30.30	47.99	-17.69	Average
0.3934	21.67	10.17	31.84	57.99	-26.15	QP
0.5020	0.87	10.18	11.05	46.00	-34.95	Average
0.5020	5.54	10.18	15.72	56.00	-40.28	QP
0.7084	4.16	10.19	14.35	46.00	-31.65	Average
0.7084	11.39	10.19	21.58	56.00	-34.42	QP
0.9136	1.51	10.21	11.72	46.00	-34.28	Average
0.9136	7.27	10.21	17.48	56.00	-38.52	QP
4.5010	-1.23	10.35	9.12	46.00	-36.88	Average
4.5010	7.32	10.35	17.67	56.00	-38.33	QP

Note :
1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss



Site	: conducted #1	Date	: 12-07-2016
Condition	: FCC CLASS-B QP	LISN	: LINE
Tem / Hum	: 24 ℃ / 55%	Test Mode	: Ranger T
EUT	: UHF remote microphone system	Power Rating	: DC 5V from NB
Memo	:	Memo	:

Freq (MHz)	Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Remark
0.1557	3.84	10.15	13.99	55.69	-41.70	Average
0.1557	11.32	10.15	21.47	65.69	-44.22	QP
0.3653	21.52	10.18	31.70	48.61	-16.91	Average
0.3653	23.61	10.18	33.79	58.61	-24.82	QP
0.3832	13.75	10.18	23.93	48.21	-24.28	Average
0.3832	20.82	10.18	31.00	58.21	-27.21	QP
2.0010	3.67	10.25	13.92	46.00	-32.08	Average
2.0010	8.04	10.25	18.29	56.00	-37.71	QP
2.9000	3.30	10.29	13.59	46.00	-32.41	Average
2.9000	8.84	10.29	19.13	56.00	-36.87	QP
6.1860	-3.23	10.44	7.21	50.00	-42.79	Average
6.1860	8.22	10.44	18.66	60.00	-41.34	QP

Note :
1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss

8.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR

Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μ V.

RESULT = 22.5 + 0.1 = 22.6 dB μ V
Level in μ V = Common Antilogarithm[(22.6 dB μ V)/20]
= 13.48 μ V

8.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2016/12/05	2017/12/05
LISN	Shibasoku	563	2016/05/16	2017/05/15
LISN	Rohde & Schwarz	ESH2-Z5	2016/05/05	2017/05/04

8.6 Photos of Conduction Measuring Setup