FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : UHF PLL hand-held transmitter
FCC ID. : INGRU-G3TH
Model No. : RU-G3TH
Working Frequency : 470~608 MHz

for

APPLICANT : JTS Professional Co., Ltd.
ADDRESS : NO. 148, 9TH INDUSTRY RD., TA-LI INDUSTRIAL PARK,TAI-LI CITY, TAIWAN, R.O.C.

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 : 17-07-RBF-020

TEST REPORT CERTIFICATION

Applicant	:	JTS Professional Co., Ltd. NO. 148, 9TH INDUSTRY RD., TA-LI INDUSTRIAL PARK, TAI-LI CITY, TAIWAN, R.O.C.
Manufacturer	:	JTS Professional Co., Ltd. NO. 148, 9TH INDUSTRY RD., TA-LI INDUSTRIAL PARK, TAI-LI CITY, TAIWAN, R.O.C.

Description of EUT	:	
a) Type of EUT	:	UHF PLL hand-held transmitter
b) Trade Name	:	JTS
c) Model No.	:	RU-G3TH
d) FCC ID	:	INGRU-G3TH
e) Working Frequency	:	470~608 MHz
f) Power Supply	:	DC 3V Battery

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 : Sep. 25, 2018

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

Table of Contents Page

1. GENERAL INFORMATION 1

1.1 PRODUCT DESCRIPTION 1
1.2 TEST METHODOLOGY 1
1.3 TEST FACILITY 1

2. REQUIREMENTS OF PROVISIONS 2

2.1 DEFINITION 2
2.2 FREQUENCIES AVAILABLE 2
2.3 REQUIREMENTS FOR RADIO EQUIPMENT ON CERTIFICATION 2
2.4 LABELING REQUIREMENT 3

3. OUTPUT POWER MEASUREMENT 4

3.1 PROVISION APPLICABLE 4
3.2 MEASUREMENT PROCEDURE 4
3.3 TEST DATA 4
3.4 TEST EQUIPMENT 5

4. MODULATION CHARACTERISTICS 6

4.1 PROVISIONS APPLICABLE 6
4.2 MEASUREMENT METHOD 6
4.3 MEASUREMENT INSTRUMENT 7
4.4 MEASUREMENT RESULT 7

5. OCCUPIED BANDWIDTH OF EMISSION 9

5.1 PROVISIONS APPLICABLE 9
5.2 MEASUREMENT METHOD 9
5.3 OCCUPIED BANDWIDTH TEST EQUIPMENT 9
5.4 BANDWIDTH MEASURED 10

6. FIELD STRENGTH OF EMISSION 14

6.1 PROVISIONS APPLICABLE 14
6.2 MEASUREMENT PROCEDURE 14
6.3 MEASURING INSTRUMENT 16
6.4 MEASURING DATA 17
6.5 RADIATED MEASUREMENT PHOTOS 25

7. FREQUENCY STABILITY MEASUREMENT 27

7.1 PROVISIONS APPLICABLE 27
7.2 MEASUREMENT PROCEDURE 27
7.3 MEASUREMENT INSTRUMENT 28
7.4 MEASUREMENT DATA 29

8 CONDUCTED EMISSION MEASUREMENT 30

8.1 STANDARD APPLICABLE 30

1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	:	UHF PLL hand-held transmitter
b) Trade Name	:	JTS
c) Model No.	:	RU-G3TH
d) FCC ID	:	INGRU-G3TH
e) Working Frequency	:	470~608 MHz
f) Power Supply	:	DC 3V Battery
g) Emission Designator	:	122KF3E 2M+2DK=2x(4kHz)+2x(57kHz)x1=122kHz

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

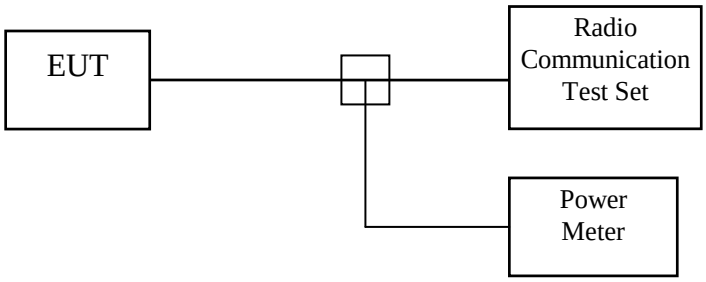
3.1 Provision Applicable

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℃
Test Date : Aug. 27, 2018
Humidity : 68 %

Frequency (MHz)	Transmit Power		Limit (mW)
	(dBm)	(mW)	
470.000	5.20	3.311	250.0
607.875	9.10	8.128	250.0

3.4 Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
POWER METER +SENSOR	ANRITSU	ML2487A +MA2491A	2018/05/23	2019/05/22
Communications Service Monitor	AEROFLEX	2945B	2018/01/10	2019/01/09

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 2, 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.

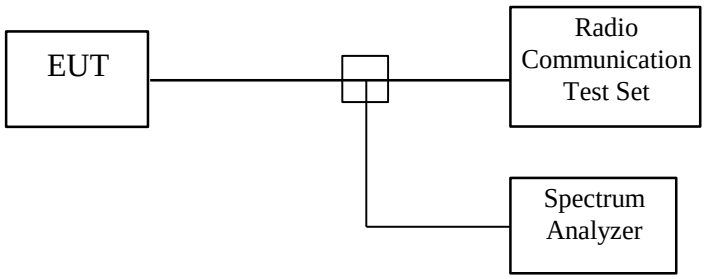
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

B) Frequency response of all circuits

1. Position the EUT as shown in figure 2.

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 2 : Modulation characteristic measurement configuration



4.3 Measurement Instrument

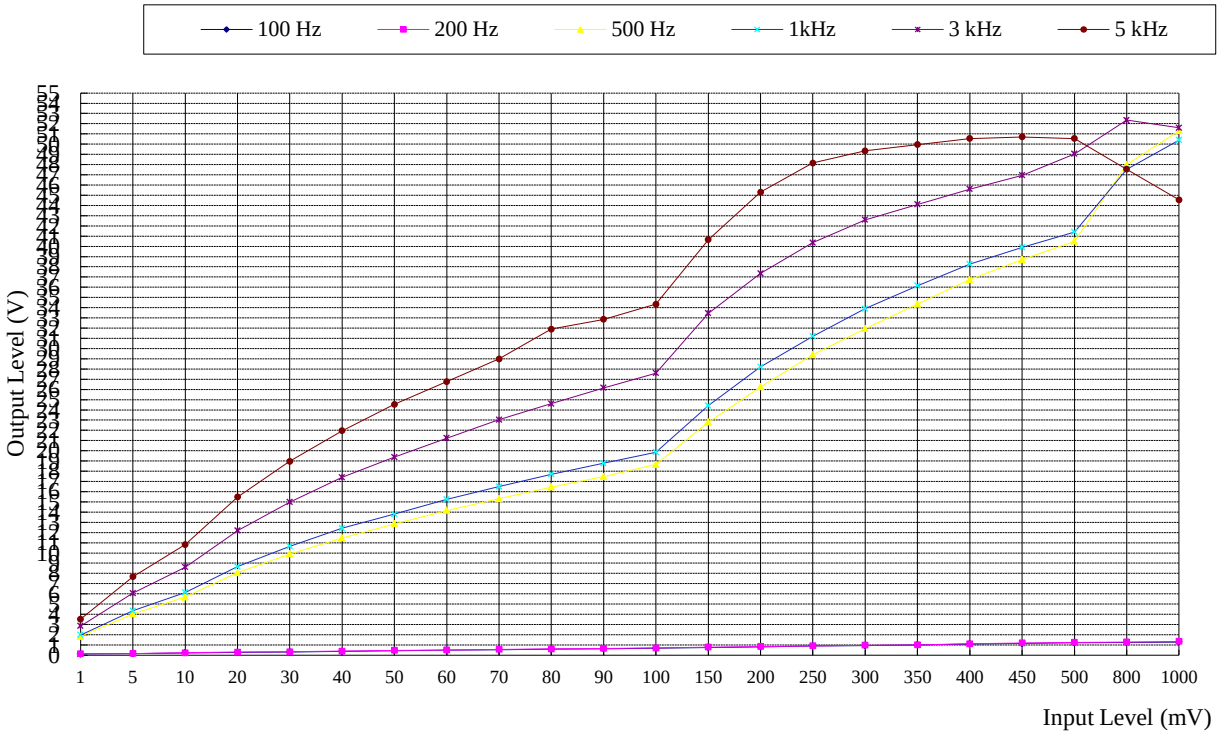
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2018/01/10	2019/01/09
Spectrum Analyzer	Rohde & Schwarz	FSP40	2017/11/02	2018/11/01

4.4 Measurement Result

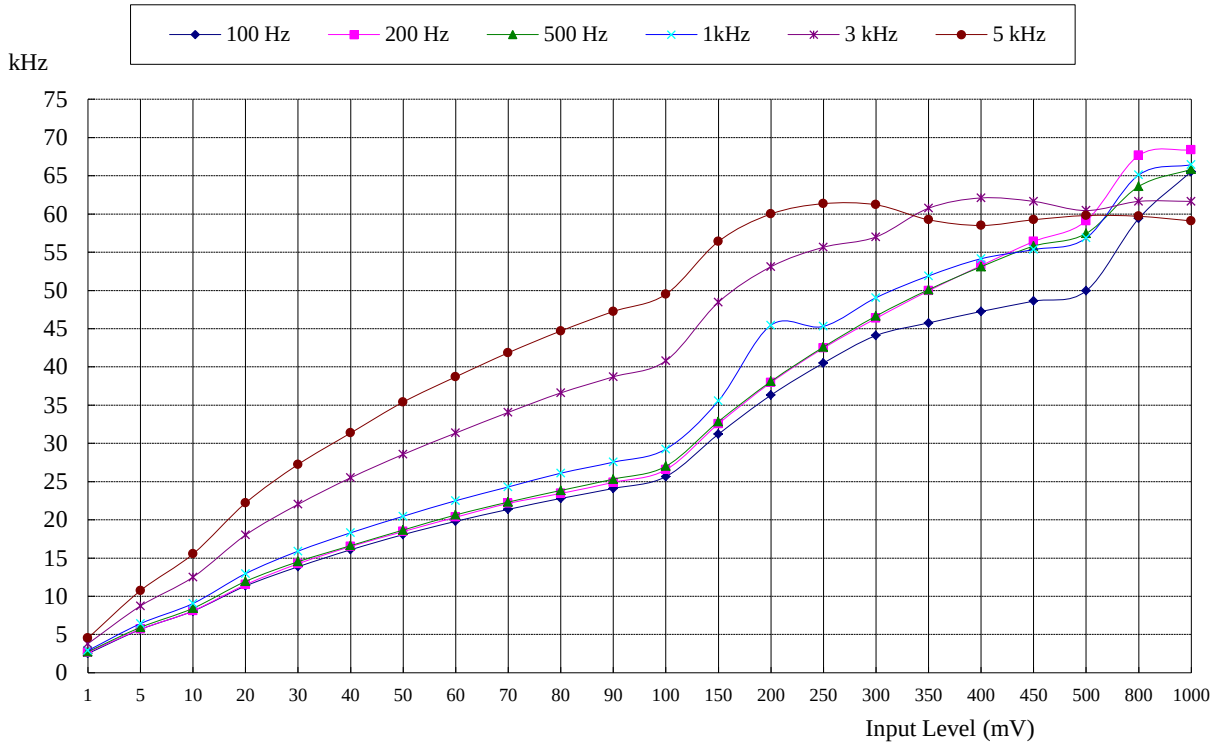
RF Frequency : 470MHz

Test Date : Aug. 27, 2018 Temperature : 26 ℃ Humidity : 68 %

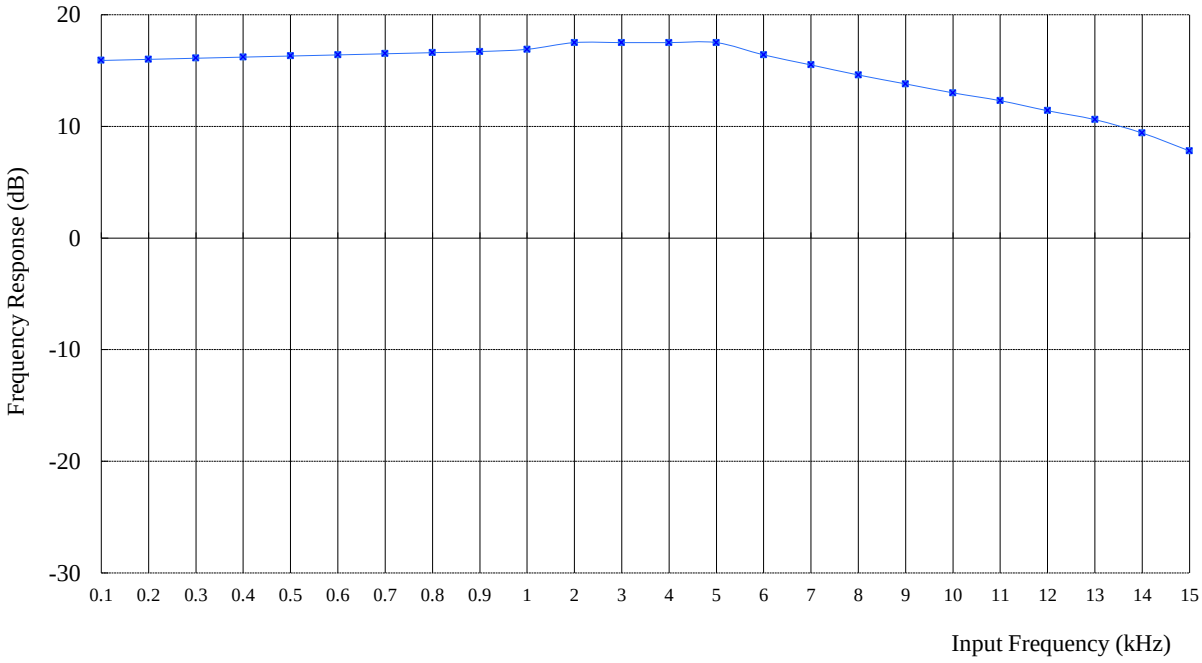
A). Frequency response



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.

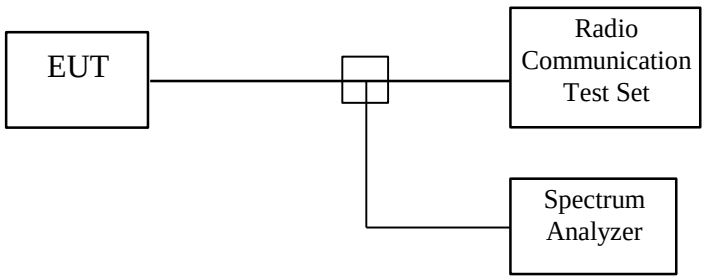
5.2 Measurement Method

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 3, 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 3 : Occupied bandwidth measurement configuration



5.3 Occupied Bandwidth Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2018/01/10	2019/01/09
Spectrum Analyzer	Rohde & Schwarz	FSP40	2017/11/02	2018/11/01

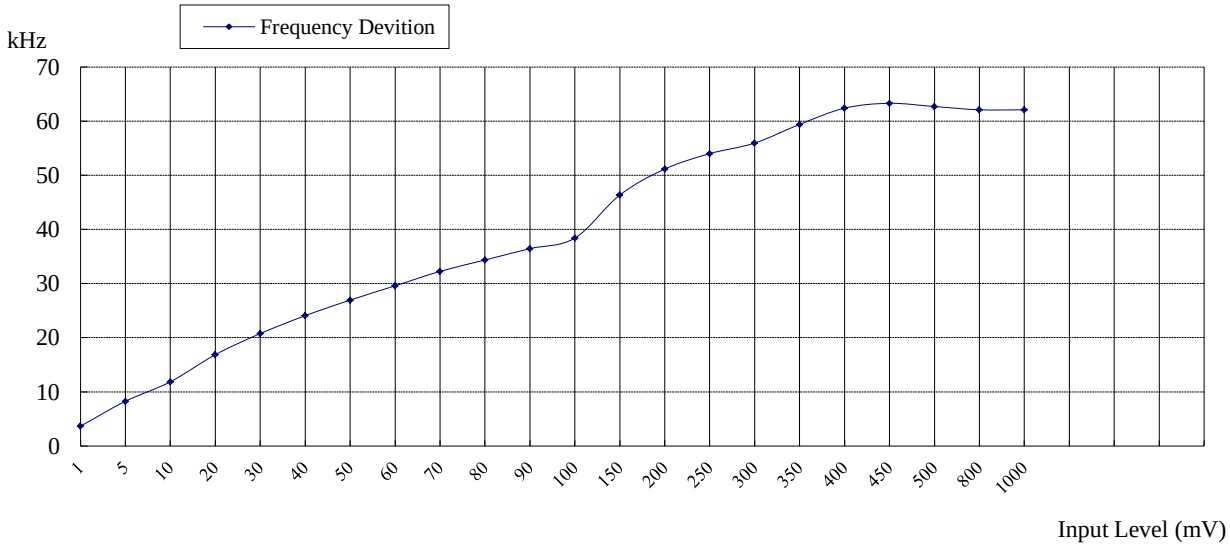
5.4 Bandwidth Measured

5.4.1 Input Level Derived

RF Frequency : 470MHz

Test Date : Aug. 27, 2018 Temperature : 26 ℃ Humidity : 68 %

Input Audio Frequency : 2.5 kHz, Sine Wave

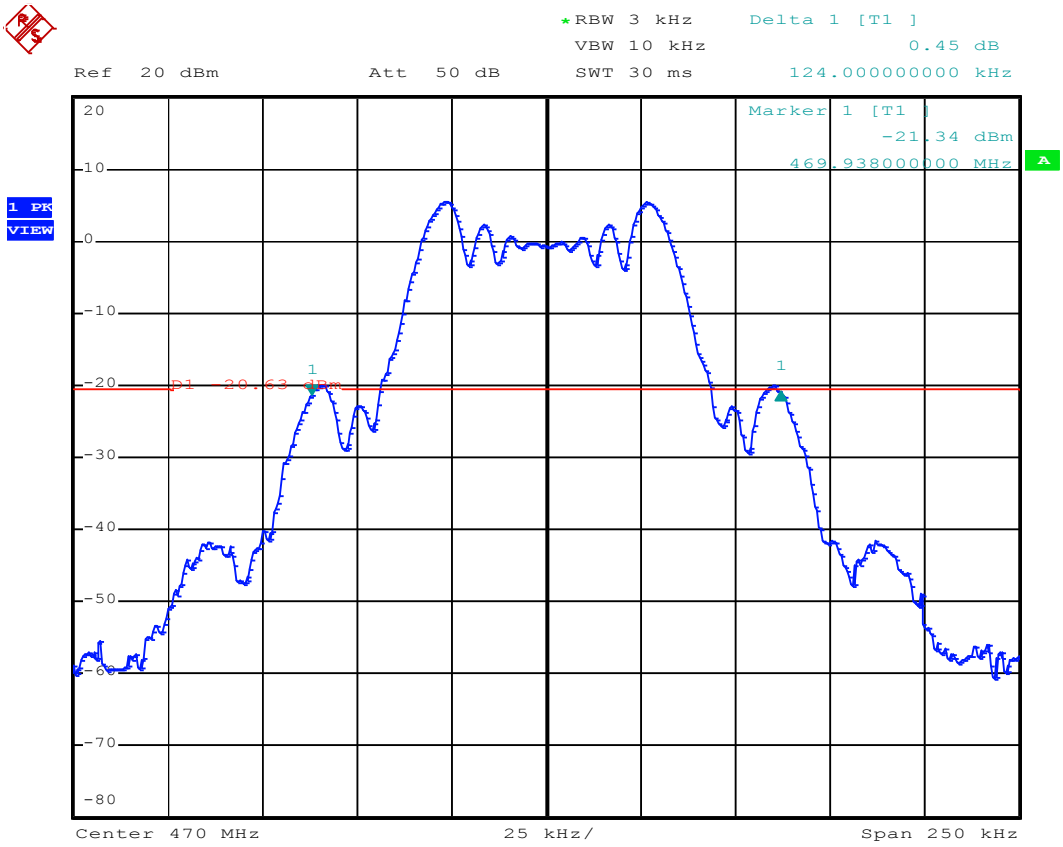


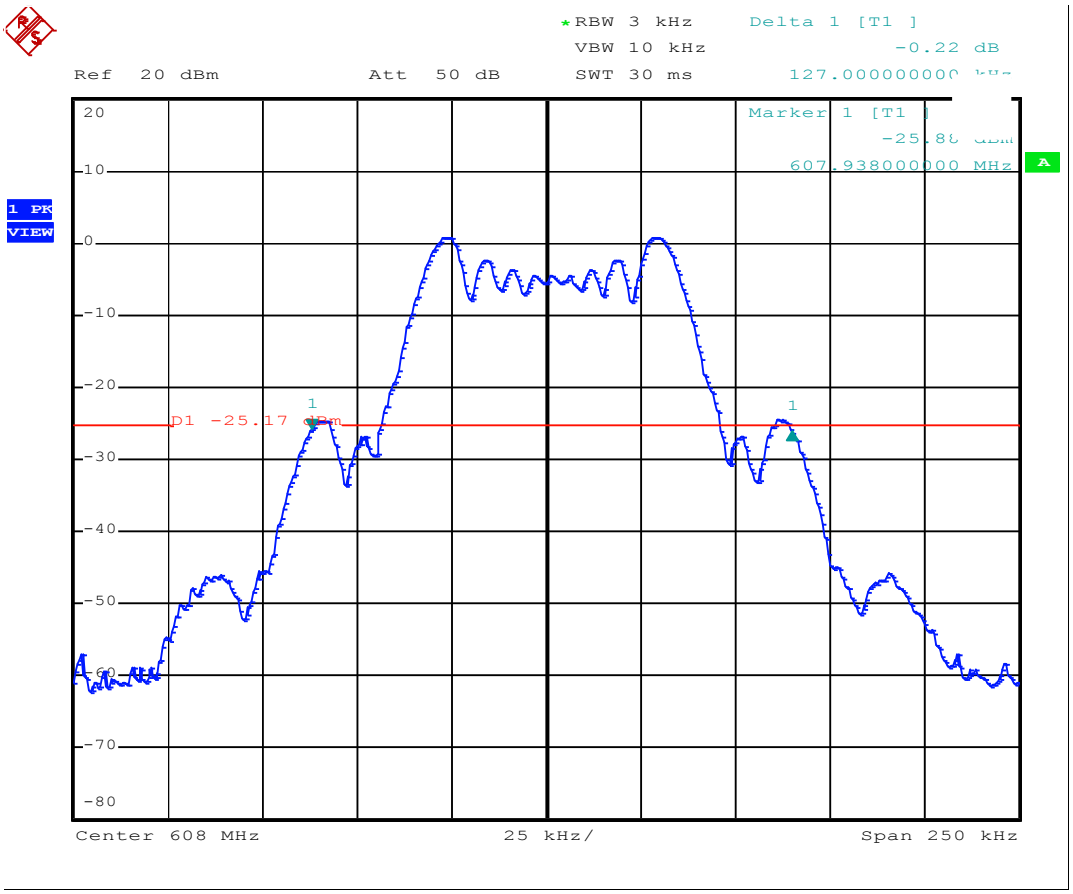
The Level input to produce 50% modulation is 50 mV, therefore the magnitude 16 dB greater than it is 315 mV.

5.4.2 Occupied Bandwidth Plotted

Test Date : Aug. 25, 2018 Temperature : 23 ℃ Humidity : 68 %

RF Frequency (MHz)	26 dB Bandwidth (kHz)
470.000	124.0
607.875	127.0


*RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
0.45 dB
124.000000000 kHz
Ref 20 dBm
Att 50 dB
Marker 1 [T1]
-21.34 dBm
469.938000000 MHz
1 PK
VIEW
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
pl -20.63 dBm
Center 470 MHz
25 kHz/
Span 250 kHz


RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
-0.22 dB
Ref 20 dBm
Att 50 dB
Marker 1 [T1]
607.938000000 MHz
1 PK
VIEW
A
D1 -25.17
Center 608 MHz
25 kHz/
Span 250 kHz

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 4 and 5 for frequencies measured below and above 1 GHz respectively.

2. [illegible]asured below and above 1 GHz, set the spectrum analyzer [illegible]olution bandwidth respectively.

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 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

4. Repeat step 3 until all frequencies need to be measured were complete.

5. Repeat step 5 with search antenna in vertical polarized orientations.

6. Check the three frequencies of highest emission with varying the placement of cables associated with EUT (if any) to obtain the worse case and record the result.

Note:
According to 12.7.2(d)(2) of ANSI C63.10-2013:

$E[dB\mu V/m] = EIRP[dBm] + 95.2$, for d = 3 m.

12.7.2(e) of ANSI C63.10-2013:
For conducted measurements below 1000 MHz, the field strength shall be computed as specified in item d), and then an additional 4.7 dB shall be added as an upper bound on the field strength that would be observed on a test range with a ground plane for frequencies between 30 MHz and 1000 MHz, or an additional 6 dB shall be added for frequencies below 30 MHz.

Figure 4 : Frequencies measured below 1 GHz configuration

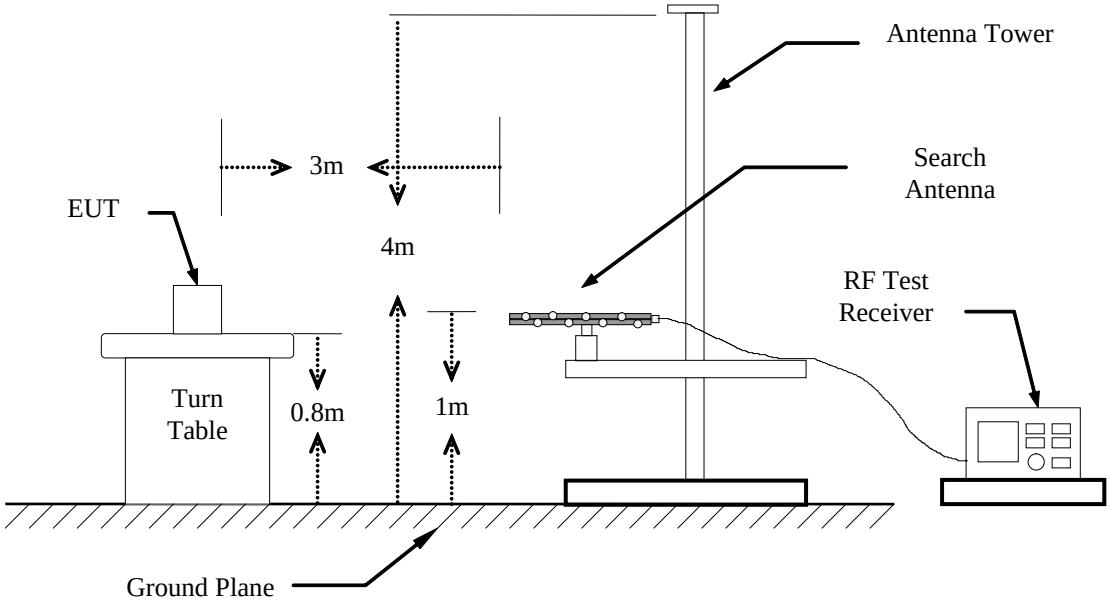
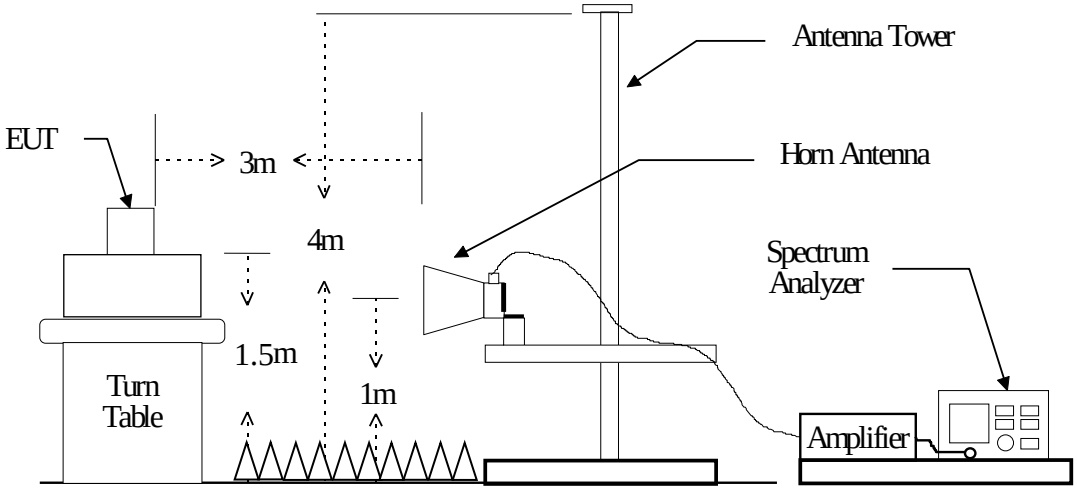


Figure 5 : Frequencies measured above 1 GHz configuration



6.3 Measuring Instrument

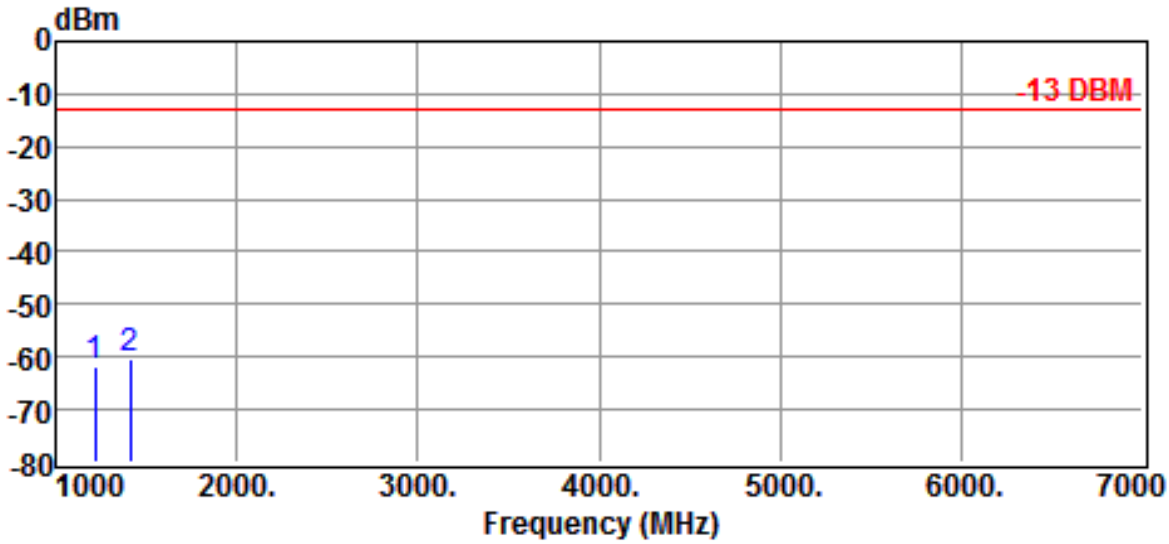
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESU 40	2017/11/15	2018/11/14
Bi-Log Antenna	ETC	MCTD 2786	2018/07/02	2019/07/01
Horn Antenna	EMCO	3115	2017/10/11	2018/10/10
Horn Antenna	EMCO	3116	2017/11/15	2018/11/14
Amplifier	HP	8447D	2017/12/08	2018/12/07
Amplifier	HP	83051A	2018/09/03	2019/09/02

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

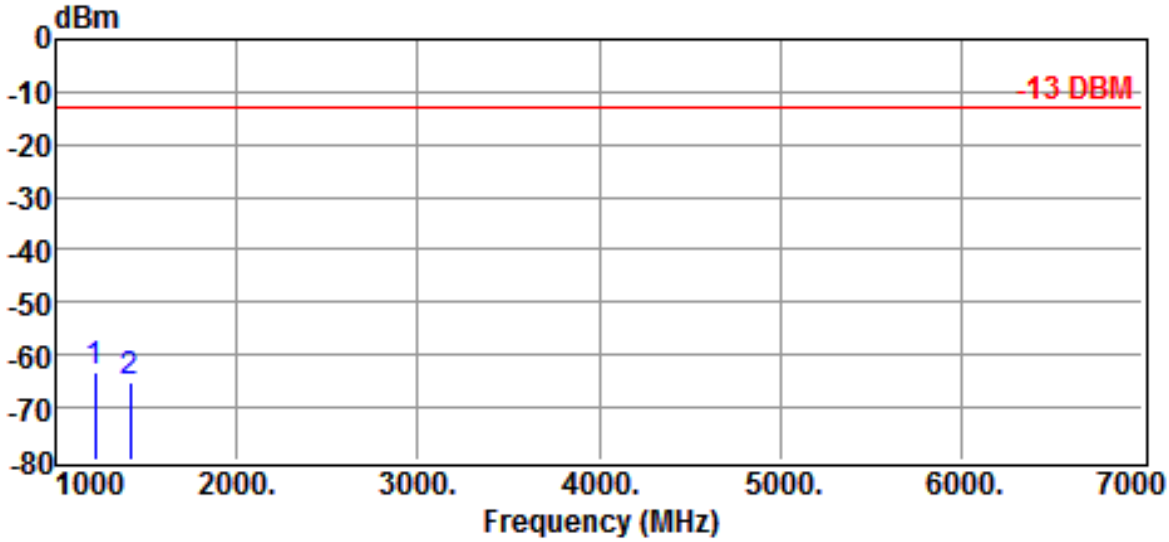
6.4.1. Harmonic Frequencies



Site	: Chamber #2	Date	: 2018-08-27
Limit	: -13 DBM	Ant. Pol.	: VERTICAL
EUT	: Wireless Handheld Microphone	Model	: RU-G3TH
Power Rating	: Battery 3V	Temp.	: 22˚C
Engineer	: Brian Huang	Humi.	: 53 %
Test Mode	: 470MHz-608MHz		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBm	Limits dBm	Over limit dB	Detector
1216.0000	46.41	-108.00	-61.59	-13.00	-48.59	Peak
1410.0000	47.06	-107.38	-60.32	-13.00	-47.32	Peak

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)-EIRP Factor-2.15dB
{EIRP Factor = -99.9dB (30MHz-1GHz) or -95.2dB (1GHz Above)}
{ERP = EIRP – 2.15dB}
3. The expanded uncertainty of the radiated emission tests is 3.53 dB.
4. The margin value=Limit - Result

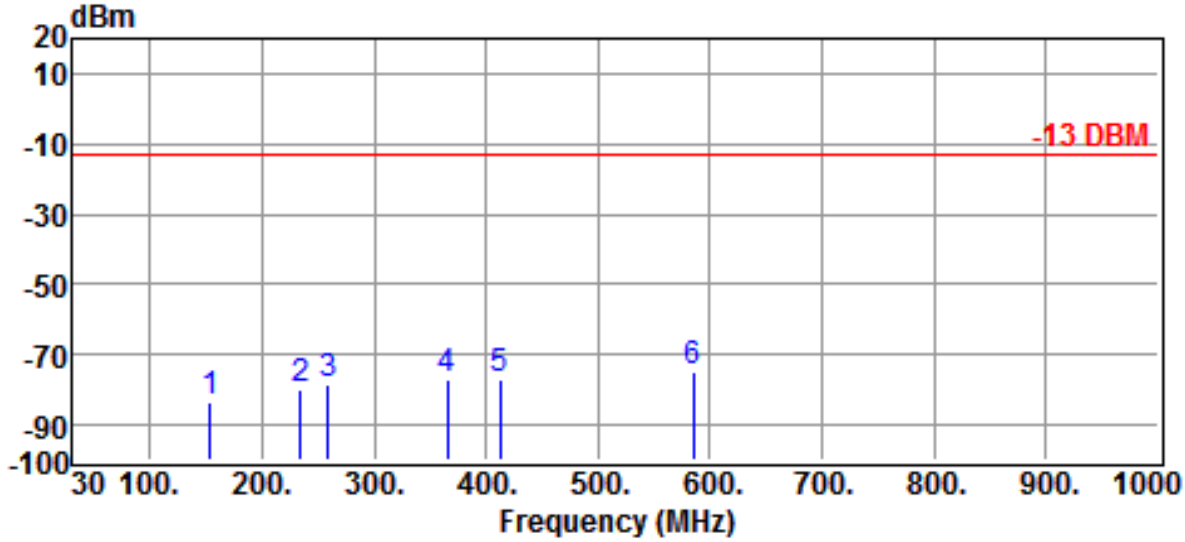


Site	: Chamber #2	Date	: 2018-08-27
Limit	: -13 DBM	Ant. Pol.	: VERTICAL
EUT	: Wireless Handheld Microphone	Model	: RU-G3TH
Power Rating	: Battery 3V	Temp.	: 22°C
Engineer	: Brian Huang	Humi.	: 53 %
Test Mode	: 470MHz-608MHz		
Test Mode	:		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBm	Limits dBm	Over limit dB	Detector
1216.0000	44.68	-108.00	-63.32	-13.00	-50.32	Peak
1410.0000	42.06	-107.38	-65.32	-13.00	-52.32	Peak

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)-EIRP Factor-2.15dB
{EIRP Factor = -99.9dB (30MHz-1GHz) or -95.2dB (1GHz Above)}
{ERP = EIRP – 2.15dB}
3. The expanded uncertainty of the radiated emission tests is 3.53 dB.
4. The margin value=Limit - Result

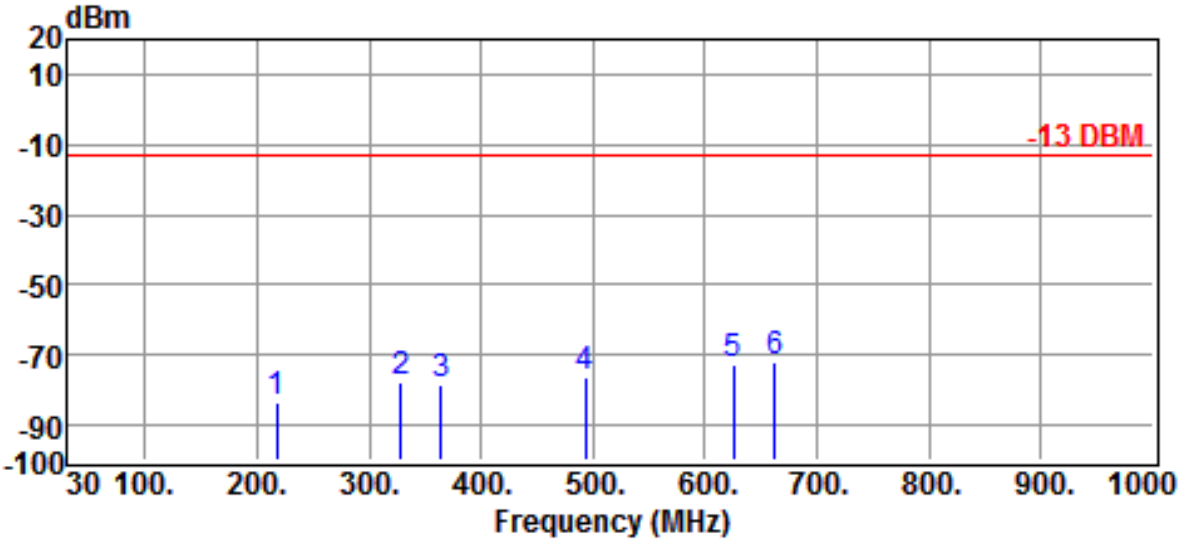
6.4.2 Spurious Emissions



Site	: Chamber #2	Date	: 2018-08-27
Limit	: -13 DBM	Ant. Pol.	: HORIZONTAL
EUT	: Wireless Handheld Microphone	Model	: RU-G3TH
Power Rating	: Battery 3V	Temp.	: 22 ˚C
Engineer	: Brian Huang	Humi.	: 53 %
Test Mode	: 470MHz~608MHz		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBm	Limits dBm	Over limit dB	Detector
153.3200	26.37	-109.73	-83.36	-13.00	-70.36	Peak
234.1900	29.33	-108.95	-79.62	-13.00	-66.62	Peak
258.6200	28.60	-106.91	-78.31	-13.00	-65.31	Peak
365.5150	26.71	-103.89	-77.18	-13.00	-64.18	Peak
412.9200	25.83	-102.65	-76.82	-13.00	-63.82	Peak
585.3290	25.79	-100.40	-74.61	-13.00	-61.61	Peak

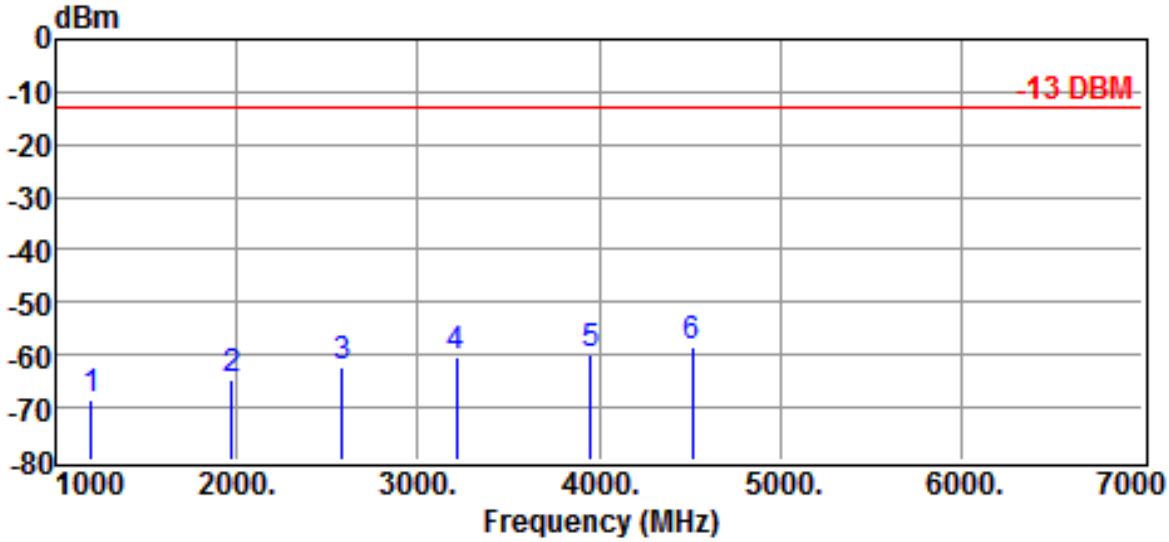
Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)-EIRP Factor-2.15dB
{EIRP Factor = -99.9dB (30MHz-1GHz) or -95.2dB (1GHz Above)}
{ERP = EIRP – 2.15dB}
3. The expanded uncertainty of the radiated emission tests is 3.53 dB.
4. The margin value=Limit - Result



Site	: Chamber #2	Date	: 2018-08-27
Limit	: -13 DBM	Ant. Pol.	: VERTICAL
EUT	: Wireless Handheld Microphone	Model	: RU-G3TH
Power Rating	: Battery 3V	Temp.	: 22°C
Engineer	: Brian Huang	Humi.	: 53 %
Test Mode	: 470MHz~608MHz		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBm	Limits dBm	Over limit dB	Detector
217.9200	25.42	-109.12	-83.70	-13.00	-70.70	Peak
328.8200	26.97	-104.66	-77.69	-13.00	-64.69	Peak
364.2800	25.83	-103.92	-78.09	-13.00	-65.09	Peak
492.6940	25.19	-101.79	-76.60	-13.00	-63.60	Peak
625.5500	26.80	-99.49	-72.69	-13.00	-59.69	Peak
662.3600	26.70	-98.65	-71.95	-13.00	-58.95	Peak

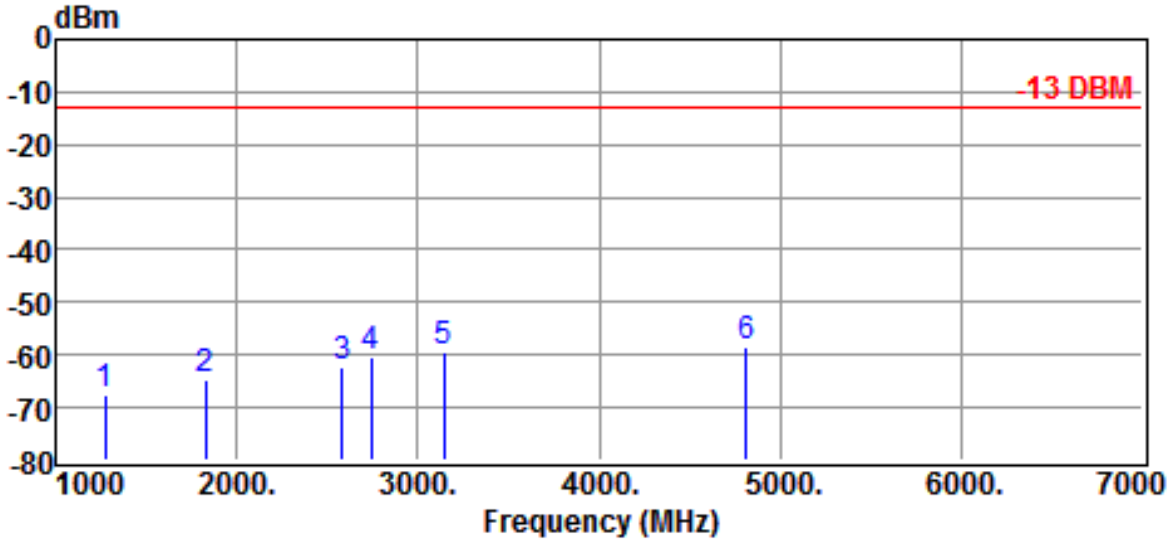
Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)-EIRP Factor-2.15dB
{EIRP Factor = -99.9dB (30MHz-1GHz) or -95.2dB (1GHz Above)}
{ERP = EIRP – 2.15dB}
3. The expanded uncertainty of the radiated emission tests is 3.53 dB.
4. The margin value=Limit – Result



Site	: Chamber #2	Date	: 2018-08-27
Limit	: -13 DBM	Ant. Pol.	: HORIZONTAL
EUT	: Wireless Handheld Microphone	Model	: RU-G3TH
Power Rating	: Battery 3V	Temp.	: 22˚C
Engineer	: Brian Huang	Humi.	: 53 %
Test Mode	: 470MHz-608MHz		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBm	Limits dBm	Over limit dB	Detector
1194.5410	39.35	-108.02	-68.67	-13.00	-55.67	Peak
1974.6500	39.30	-103.96	-64.66	-13.00	-51.66	Peak
2582.5400	39.89	-102.25	-62.36	-13.00	-49.36	Peak
3214.6500	39.60	-99.93	-60.33	-13.00	-47.33	Peak
3955.3300	37.43	-97.27	-59.84	-13.00	-46.84	Peak
4515.2100	38.48	-96.83	-58.35	-13.00	-45.35	Peak

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)-EIRP Factor-2.15dB
{EIRP Factor = -99.9dB (30MHz-1GHz) or -95.2dB (1GHz Above)}
{ERP = EIRP – 2.15dB}
3. The expanded uncertainty of the radiated emission tests is 3.53 dB.
4. The margin value=Limit - Result

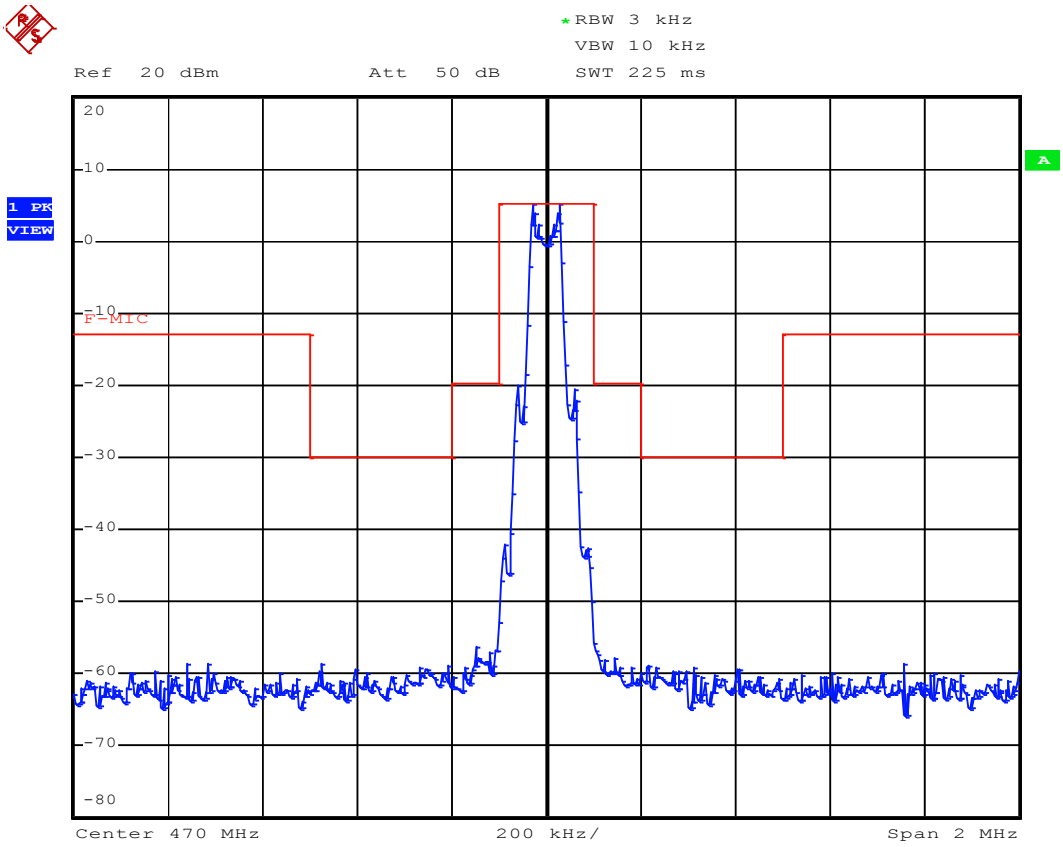


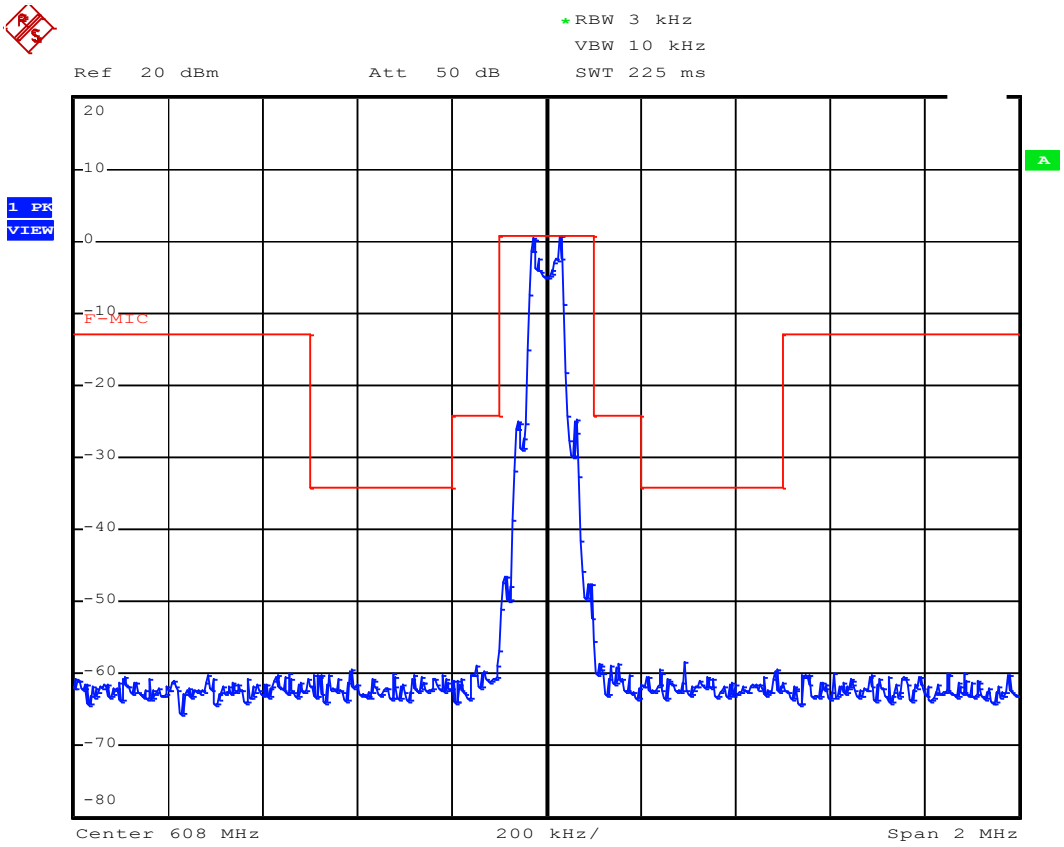
Site	: Chamber #2	Date	: 2018-08-27
Limit	: -13 DBM	Ant. Pol.	: VERTICAL
EUT	: Wireless Handheld Microphone	Model	: RU-G3TH
Power Rating	: Battery 3V	Temp.	: 22 °C
Engineer	: Brian Huang	Humi.	: 53 %
Test Mode	: 470MHz-608MHz		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBm	Limits dBm	Over limit dB	Detector
1272.3350	40.46	-107.78	-67.32	-13.00	-54.32	Peak
1829.3630	40.31	-104.85	-64.54	-13.00	-51.54	Peak
2582.3200	39.86	-102.25	-62.39	-13.00	-49.39	Peak
2741.2100	41.40	-101.65	-60.25	-13.00	-47.25	Peak
3144.2650	40.83	-100.15	-59.32	-13.00	-46.32	Peak
4815.5500	37.21	-95.85	-58.64	-13.00	-45.64	Peak

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)-EIRP Factor-2.15dB
{EIRP Factor = -99.9dB (30MHz-1GHz) or -95.2dB (1GHz Above)}
{ERP = EIRP – 2.15dB}
3. The expanded uncertainty of the radiated emission tests is 3.53 dB.
4. The margin value=Limit - Result

6.4.3 Emission mask plots




RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Ref 20 dBm
Att 50 dB
1 PK
VIEW
A
F-MIC
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 608 MHz
200 kHz/
Span 2 MHz

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.
According to §2.1055 (d)(1), 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 §2.1055 (d)(2), for hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

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 6 for frequencies measured at an environmental chamber.

2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Then turn off the EUT.

3. Set the temperature of chamber to 50℃. Allow sufficient time 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 when the frequency has stablized.

4. Repeat step 3 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measurement frequencies.

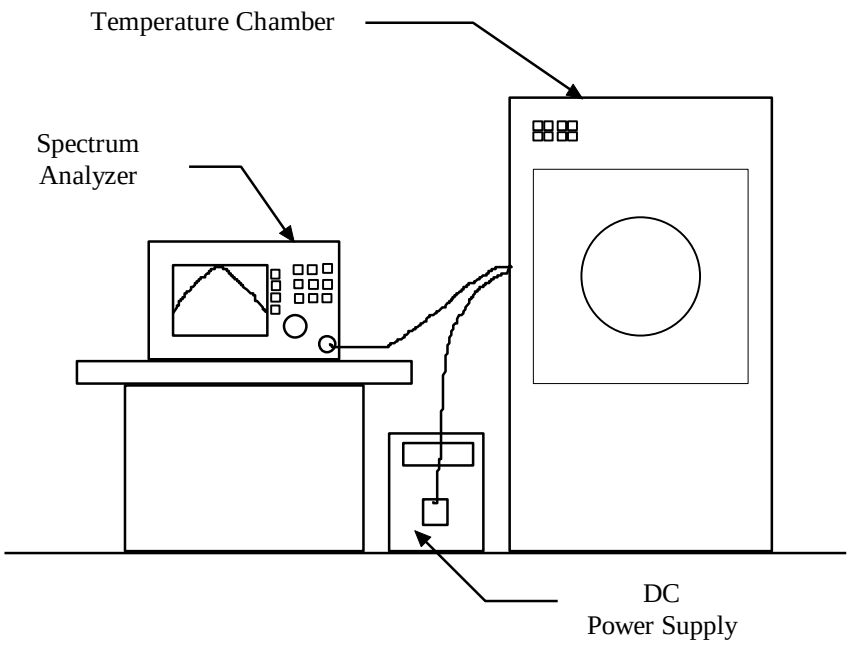
B) Frequency stability versus input voltage

1. Setup the configuration per figure 6 for frequencies measured at an environmental chamber set for a temperature of 25℃.

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.

3. Supply the EUT primary voltage with 85 and 115 percent of the nominal value and record the frequency.

Figure 6 : Frequency stability measurement configuration



7.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2017/11/02	2018/11/01
Temperature Chamber	ESPEC	EFL-3	2018/07/26	2019/07/25

7.4 Measurement Data

Test Date : Aug. 27, 2018 Temperature : 23 ℃ Humidity : 68 %

A. Tx Frequency 470 MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :470 MHz			Limit：0.005%
Enviroment Tempture (℃)	Power Supplied (Vdc)	(MHz)	(%)
50	3.0	469.9884	-0.00247
40		470.0163	0.00347
30		470.0136	0.00289
20		470.0130	0.00277
10		470.0100	0.00213
0		469.9825	-0.00372
-10		469.9827	-0.00368
-20		470.0128	0.00272
-30		469.9849	-0.00321

A2. Frequency stability versus supplied voltage

Reference Frequency : 470 MHz			Limit：0.005%
Enviroment Tempture (℃)	Power Supplied (Vdc)	(MHz)	(%)
25	2.5	469.9829	-0.00364
25	3.5	469.9923	-0.00164

8 CONDUCTED EMISSION MEASUREMENT

8.1 Standard Applicable

This EUT is excused from investigation of conducted emission, for it is powered by DC battery only. According to §15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.