FCC Test Report

FCC ID	:	**SWX-UINS**
Equipment	:	**U-Installer**
Model No.	:	**U-Installer**
Brand Name	:	**UBIQUITI**
Applicant	:	**Ubiquiti Networks, Inc.**
Address	:	**2580 Orchard Parkway, San Jose, California, United States 95131**
Standard	:	**47 CFR FCC Part 15.249**
Received Date	:	**Mar. 23, 2017**
Tested Date	:	**Apr. 12 ~ Apr. 13, 2017**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

Table of Contents

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Local Support Equipment List 7
1.3 Test Setup Chart 7
1.4 The Equipment List 8
1.5 Test Standards 9
1.6 Measurement Uncertainty 9

2 TEST CONFIGURATION 10

2.1 Testing Condition 10
2.2 The Worst Test Modes and Channel Details 10

3 TRANSMITTER TEST RESULTS 11

3.1 Conducted Emissions 11
3.2 Radiated Emission 14
3.3 20dB and Occupied Bandwidth 25

4 TEST LABORATORY INFORMATION 26

Release Record

Report No.	Version	Description	Issued Date
FR732302AE	Rev. 01	Initial issue	Apr. 17, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.685MHz 33.49 (Margin -12.51dB) - AV	Pass
15.249(a)	Field Strength of Fundamental	Meet the requirement of limit	Pass
15.249(a)(d)	Field Strength of Harmonics and Emissions Radiated outside of the Specified Frequency Bands	Meet the requirement of limit	Pass
15.215(c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	**Bluetooth Mode**	**Ch. Freq. (MHz)**	**Channel Number**	**Data Rate**
2400-2483.5	V4.0 LE	2402-2480	0-39 [40]	1 Mbps
Note 1: Bluetooth LE (Low energy) uses GFSK modulation.				

1.1.2 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	Internal	1	N/A	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from adapter 7.6Vdc from battery

1.1.4 Accessories

N/A

1.1.5 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

1.1.6 Duty Cycle

Duty cycle of test signal (%)	66.20%
Duty Factor (dB)	1.79

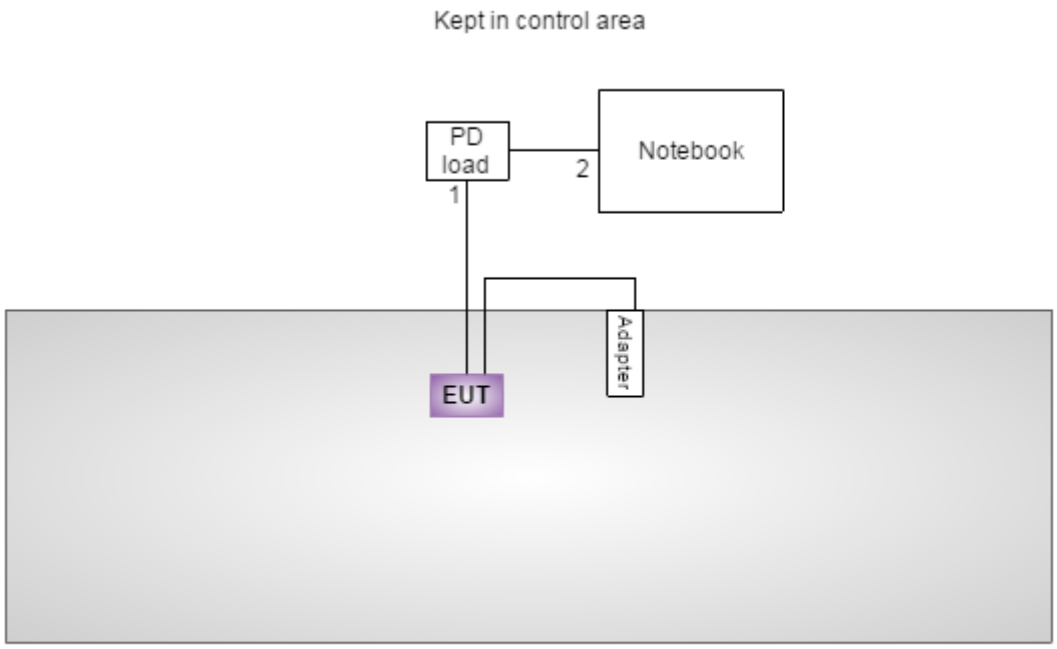
1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6440	DoC	RJ45, 1m non-shielded.
2	PD Load	---	GP-A240-050G	---	RJ45, 10m non-shielded.
3	Adapter	UBIQUITI	GP-M015-QC	---	---

Note: No.2 & 3 were provided by applicant

1.3 Test Setup Chart

Test Setup Diagram



1. RJ45, 10m non-shielded.
2. RJ45, 1m non-shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Dec. 21, 2016	Dec. 20, 2017
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 08, 2016	Nov. 07, 2017
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 20, 2016	Dec. 19, 2017
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 21, 2016	Dec. 20, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 09, 2016	Dec. 08, 2017
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 09, 2016	Dec. 08, 2017
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 09, 2016	Dec. 08, 2017
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 09, 2016	Dec. 08, 2017
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 09, 2016	Dec. 08, 2017
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Mar. 15, 2017	Mar. 14, 2018
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
DC POWER SOURCE	GW INSTEK	GPC-6030D	EM892433	Oct. 20, 2016	Oct. 19, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.249
ANSI C63.10-2013

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	±34.134 Hz
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	19°C / 58%	David Chiu
Radiated Emissions	03CH01-WS	24°C / 62%	Vincent Yeh
RF Conducted	TH01-WS	24°C / 62%	Vincent Yeh

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
AC Power Line Conducted Emissions	BT LE	2440	1 Mbps	---
Field Strength of Fundamental	BT LE	2402, 2440, 2480	1Mbps	---
Radiated Emissions ≤ 1GHz	BT LE	2440	1 Mbps	---
Radiated Emissions > 1GHz	BT LE	2402, 2440, 2480	1 Mbps	---
20dB bandwidth	BT LE	2402, 2440, 2480	1 Mbps	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 Conducted Emissions

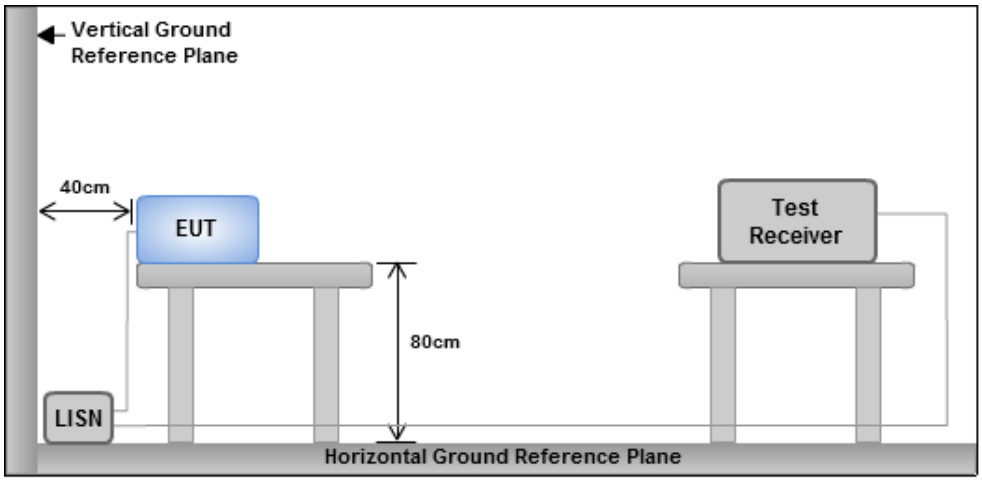
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

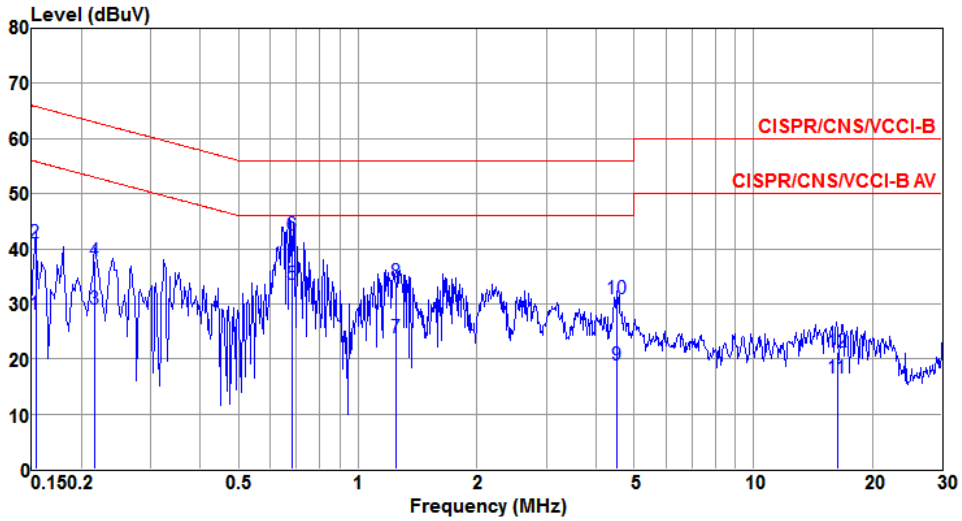
3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

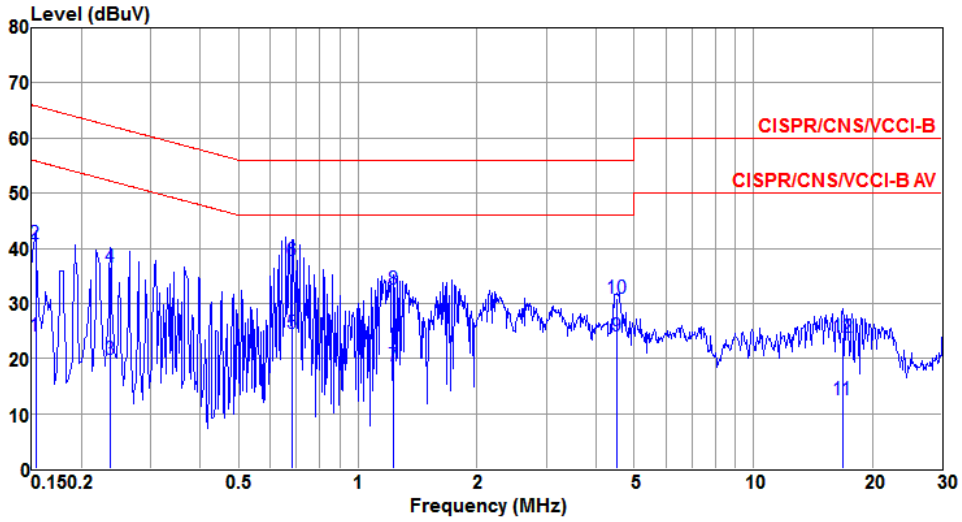
Power Phase	Line	Test Freq. (MHz)	2440



	Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark
1	0.153	28.12	55.82	-27.70	28.01	0.07	0.04	Average
2	0.153	40.97	65.82	-24.85	40.86	0.07	0.04	QP
3	0.216	29.11	52.96	-23.85	28.97	0.10	0.04	Average
4	0.216	37.78	62.96	-25.18	37.64	0.10	0.04	QP
5@	0.685	33.49	46.00	-12.51	33.38	0.07	0.04	Average
6	0.685	42.47	56.00	-13.53	42.36	0.07	0.04	QP
7	1.249	23.87	46.00	-22.13	23.74	0.09	0.04	Average
8	1.249	34.10	56.00	-21.90	33.97	0.09	0.04	QP
9	4.530	18.98	46.00	-27.02	18.64	0.17	0.17	Average
10	4.530	30.95	56.00	-25.05	30.61	0.17	0.17	QP
11	16.323	16.61	50.00	-33.39	16.03	0.34	0.24	Average
12	16.323	21.16	60.00	-38.84	20.58	0.34	0.24	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Neutral	Test Freq. (MHz)	2440



	Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark
1	0.153	24.11	55.82	-31.71	23.97	0.10	0.04	Average
2	0.153	40.91	65.82	-24.91	40.77	0.10	0.04	QP
3	0.237	19.84	52.22	-32.38	19.70	0.10	0.04	Average
4	0.237	36.68	62.22	-25.54	36.54	0.10	0.04	QP
5	0.683	24.50	46.00	-21.50	24.35	0.11	0.04	Average
6@	0.683	37.67	56.00	-18.33	37.52	0.11	0.04	QP
7	1.229	18.74	46.00	-27.26	18.59	0.11	0.04	Average
8	1.229	32.53	56.00	-23.47	32.38	0.11	0.04	QP
9	4.501	24.12	46.00	-21.88	23.79	0.16	0.17	Average
10	4.501	31.02	56.00	-24.98	30.69	0.16	0.17	QP
11	16.839	12.54	50.00	-37.46	11.91	0.39	0.24	Average
12	16.839	23.96	60.00	-36.04	23.33	0.39	0.24	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 Radiated Emission

This section includes field strength of fundamental, field strength of harmonics and emissions radiated outside of the operating frequency bands.

3.2.1 Limit of field strength of fundamental and field strength of harmonics

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400–2483.5 MHz	50	500

3.2.2 Limit of Unwanted Emissions

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in below table, whichever is the lesser attenuation.

Radiated emission limits			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.2.3 Test Procedures

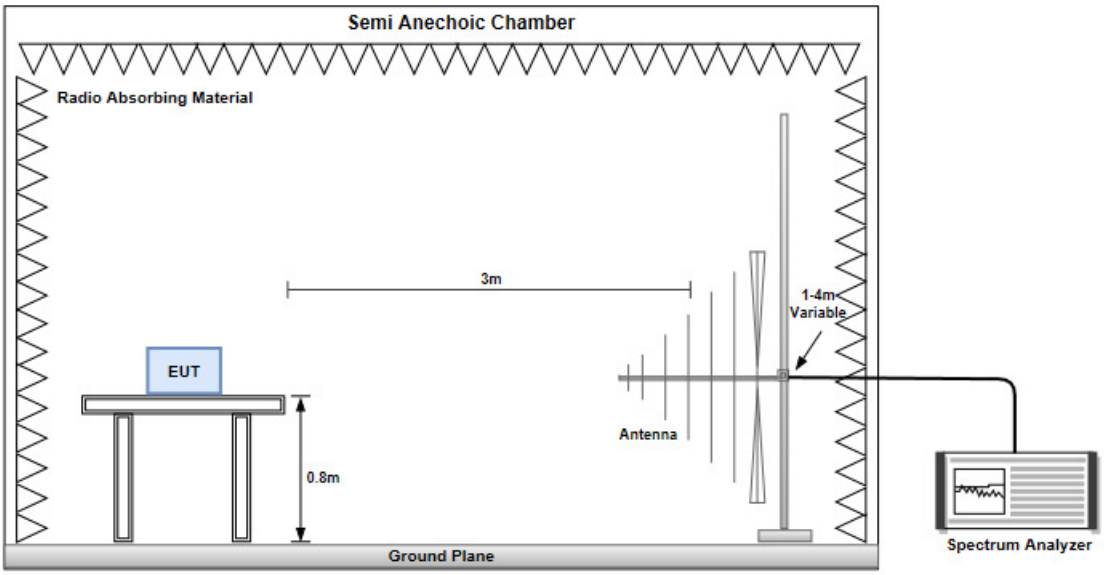
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

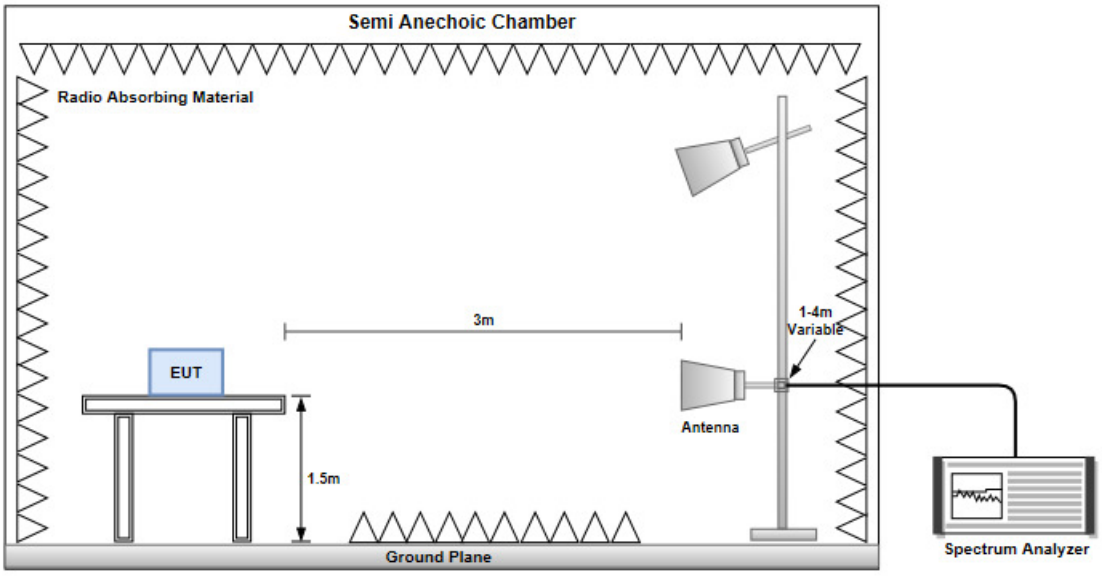
1. Radiated emission below 1GHz
   120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental
   RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value except fundamental
   RBW=1MHz, VBW=3kHz and Peak detector
4. Radiated emission Peak value for fundamental
   RBW=3MHz, VBW=10MHz and Peak detector
5. Radiated emission Average value for fundamental
   RBW=3MHz, VBW=3kHz and Peak detector

3.2.4 Test Setup

Radiated Emissions below 1 GHz

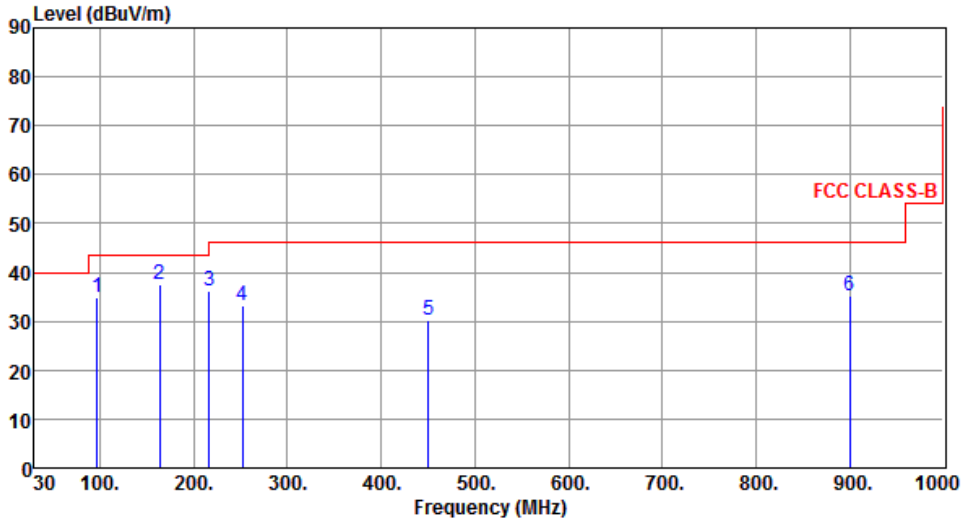


Radiated Emissions above 1 GHz



3.2.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)

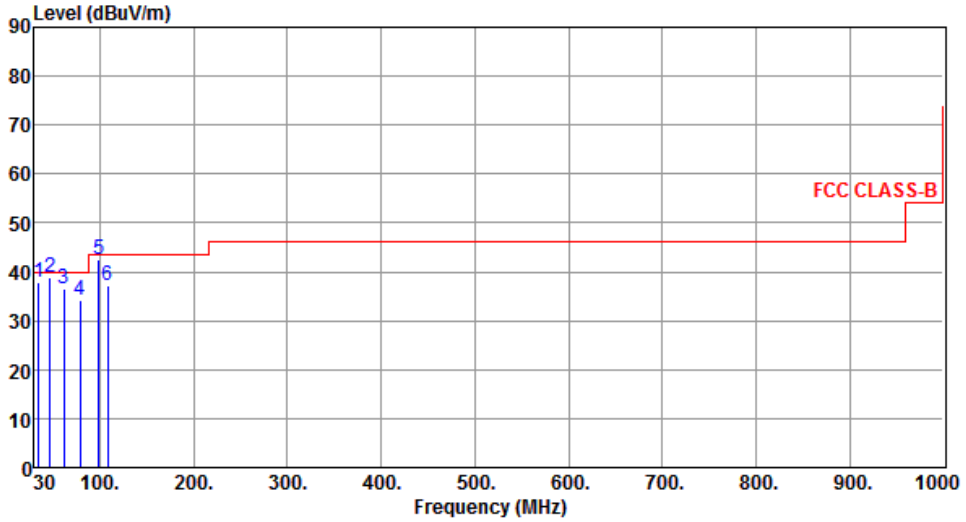
Modulation	GFSK	**Test Freq. (MHz)**	2440
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	96.85	34.73	43.50	-8.77	48.09	-13.36	Peak	---	---
2	163.46	37.64	43.50	-5.86	45.88	-8.24	Peak	---	---
3	216.36	36.13	46.00	-9.87	46.82	-10.69	Peak	---	---
4	252.41	33.12	46.00	-12.88	42.28	-9.16	Peak	---	---
5	450.64	30.23	46.00	-15.77	33.96	-3.73	Peak	---	---
6	900.45	35.23	46.00	-10.77	30.96	4.27	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical		

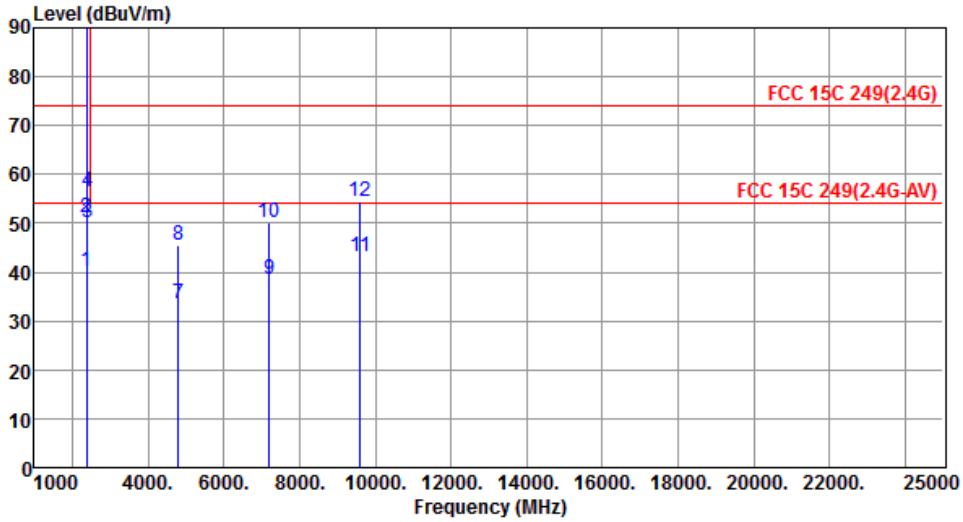


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	34.29	37.85	40.00	-2.15	46.46	-8.61	QP	100	63
2	46.69	38.93	40.00	-1.07	46.51	-7.58	QP	100	325
3	61.36	36.42	40.00	-3.58	45.58	-9.16	QP	100	198
4	78.86	34.23	40.00	-5.77	46.57	-12.34	QP	129	145
5	98.77	42.36	43.50	-1.14	55.42	-13.06	QP	100	278
6	108.23	37.05	43.50	-6.45	48.51	-11.46	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.2.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)

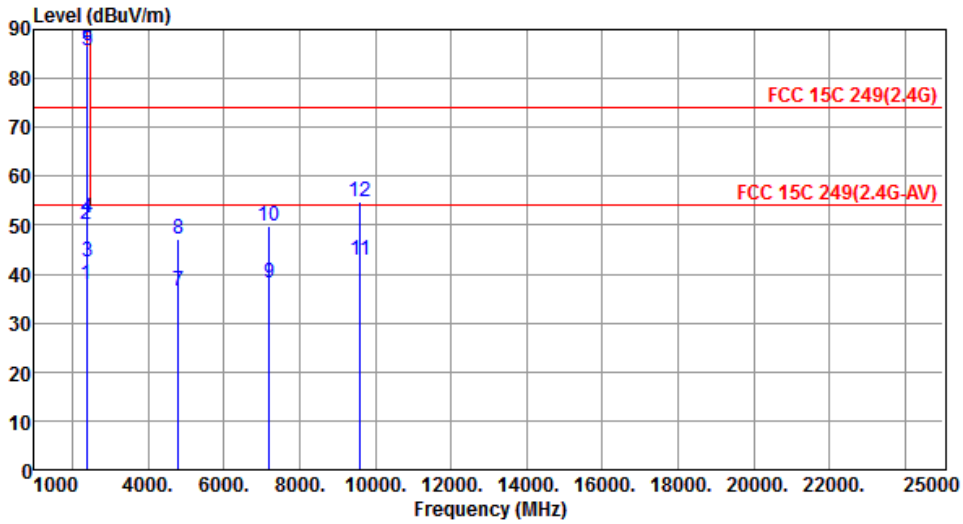
Modulation	GFSK	**Test Freq. (MHz)**	2402
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	40.27	54.00	-13.73	43.45	-3.18	Average	253	172
2	2390.00	51.09	74.00	-22.91	54.27	-3.18	Peak	253	172
3	2400.00	50.27	54.00	-3.73	53.41	-3.14	Average	253	172
4	2400.00	56.54	74.00	-17.46	59.68	-3.14	Peak	253	172
5	2402.00	92.55	94.00	-1.45	95.68	-3.13	Average	253	172
6	2402.00	93.64	114.00	-20.36	96.77	-3.13	Peak	253	172
7	4804.00	33.59	54.00	-20.41	29.85	3.74	Average	100	152
8	4804.00	45.38	74.00	-28.62	41.64	3.74	Peak	100	152
9	7206.00	38.43	54.00	-15.57	30.06	8.37	Average	100	268
10	7206.00	50.08	74.00	-23.92	41.71	8.37	Peak	100	268
11	9608.00	43.11	54.00	-10.89	30.40	12.71	Average	100	77
12	9608.00	54.63	74.00	-19.37	41.92	12.71	Peak	100	77

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

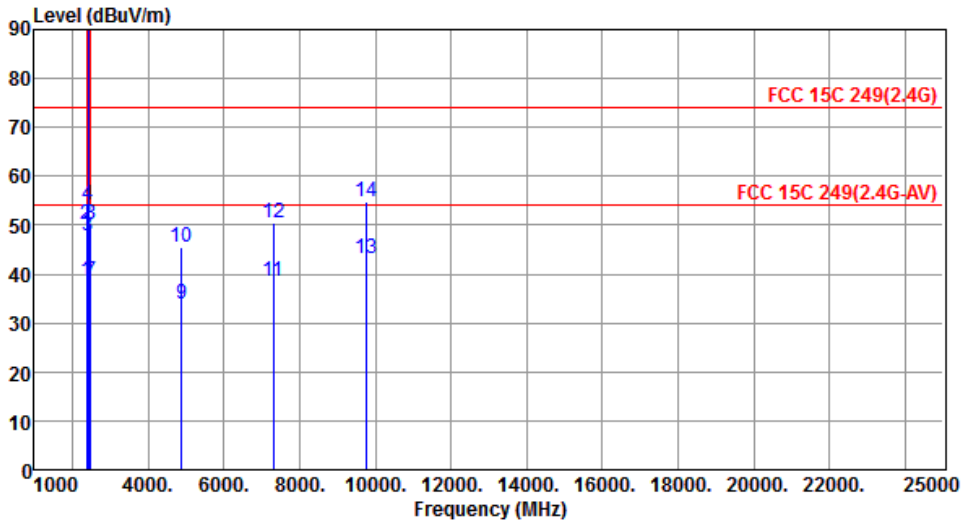
Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.73	54.00	-16.27	40.91	-3.18	Average	176	140
2	2390.00	50.11	74.00	-23.89	53.29	-3.18	Peak	176	140
3	2400.00	42.37	54.00	-11.63	45.51	-3.14	Average	176	140
4	2400.00	51.36	74.00	-22.64	54.50	-3.14	Peak	176	140
5	2402.00	85.67	94.00	-8.33	88.80	-3.13	Average	176	140
6	2402.00	86.69	114.00	-27.31	89.82	-3.13	Peak	176	140
7	4804.00	36.39	54.00	-17.61	32.65	3.74	Average	262	340
8	4804.00	47.26	74.00	-26.74	43.52	3.74	Peak	262	340
9	7206.00	38.29	54.00	-15.71	29.92	8.37	Average	100	231
10	7206.00	49.93	74.00	-24.07	41.56	8.37	Peak	100	231
11	9608.00	42.87	54.00	-11.13	30.16	12.71	Average	100	286
12	9608.00	54.72	74.00	-19.28	42.01	12.71	Peak	100	286

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

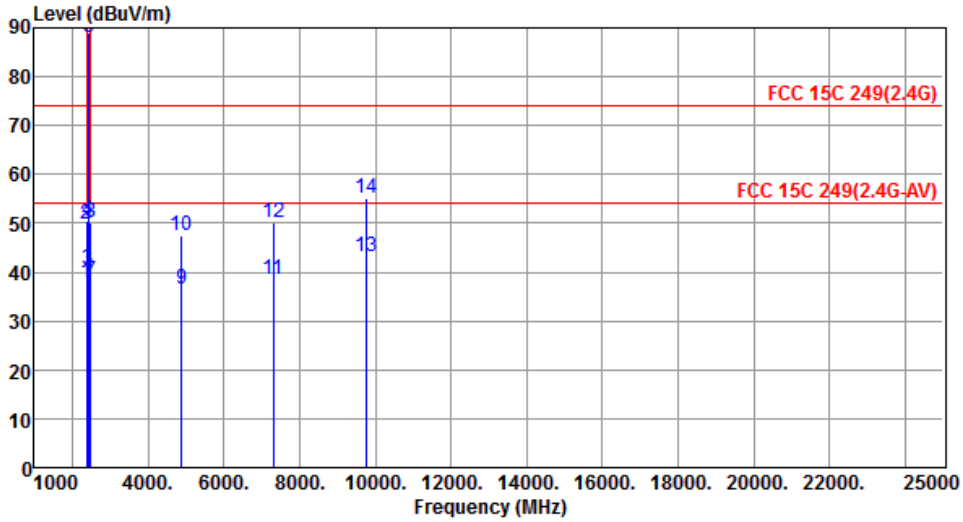
Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.46	54.00	-15.54	41.64	-3.18	Average	283	172
2	2390.00	49.99	74.00	-24.01	53.17	-3.18	Peak	283	172
3	2400.00	47.84	54.00	-6.16	50.98	-3.14	Average	283	172
4	2400.00	53.97	74.00	-20.03	57.11	-3.14	Peak	283	172
5	2440.00	93.65	94.00	-0.35	96.63	-2.98	Average	283	172
6	2440.00	94.82	114.00	-19.18	97.80	-2.98	Peak	283	172
7	2483.50	38.38	54.00	-15.62	41.18	-2.80	Average	283	172
8	2483.50	50.18	74.00	-23.82	52.98	-2.80	Peak	283	172
9	4880.00	33.82	54.00	-20.18	29.86	3.96	Average	100	166
10	4880.00	45.62	74.00	-28.38	41.66	3.96	Peak	100	166
11	7320.00	38.60	54.00	-15.40	30.19	8.41	Average	100	275
12	7320.00	50.34	74.00	-23.66	41.93	8.41	Peak	100	275
13	9760.00	43.29	54.00	-10.71	30.55	12.74	Average	100	68
14	9760.00	54.87	74.00	-19.13	42.13	12.74	Peak	100	68

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

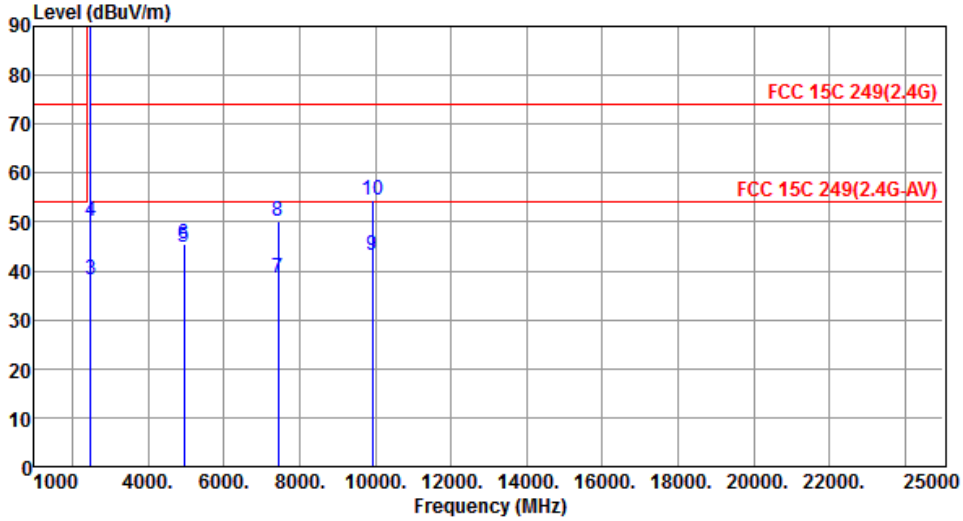
Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.97	54.00	-16.03	41.15	-3.18	Average	164	140
2	2390.00	49.84	74.00	-24.16	53.02	-3.18	Peak	164	140
3	2400.00	40.66	54.00	-13.34	43.80	-3.14	Average	164	140
4	2400.00	50.38	74.00	-23.62	53.52	-3.14	Peak	164	140
5	2440.00	87.91	94.00	-6.09	90.89	-2.98	Average	164	140
6	2440.00	88.93	114.00	-25.07	91.91	-2.98	Peak	164	140
7	2483.50	38.10	54.00	-15.90	40.90	-2.80	Average	164	140
8	2483.50	49.99	74.00	-24.01	52.79	-2.80	Peak	164	140
9	4880.00	36.54	54.00	-17.46	32.58	3.96	Average	297	357
10	4880.00	47.47	74.00	-26.53	43.51	3.96	Peak	297	357
11	7320.00	38.53	54.00	-15.47	30.12	8.41	Average	100	228
12	7320.00	50.14	74.00	-23.86	41.73	8.41	Peak	100	228
13	9760.00	43.07	54.00	-10.93	30.33	12.74	Average	100	296
14	9760.00	54.99	74.00	-19.01	42.25	12.74	Peak	100	296

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

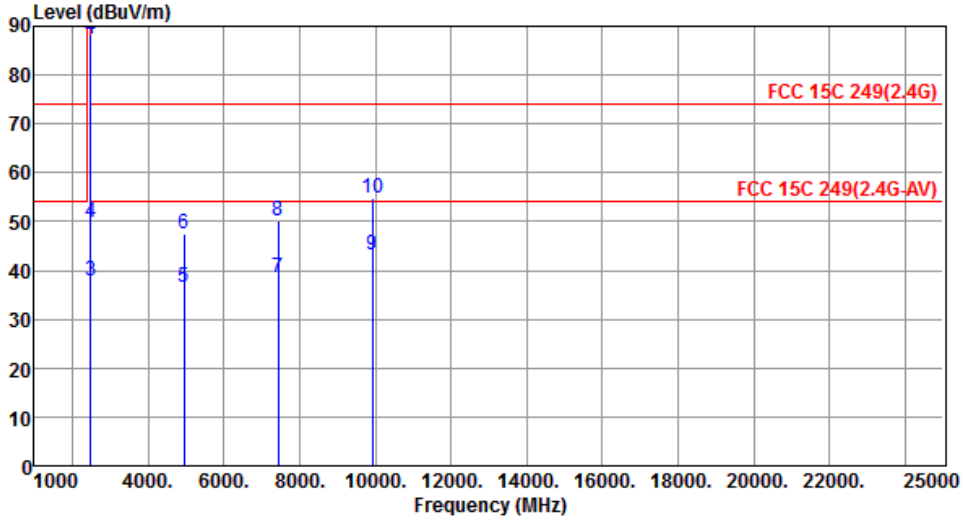
Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2480.00	93.04	94.00	-0.96	95.85	-2.81	Average	209	173
2	2480.00	94.02	114.00	-19.98	96.83	-2.81	Peak	209	173
3	2483.50	38.22	54.00	-15.78	41.02	-2.80	Average	209	173
4	2483.50	50.10	74.00	-23.90	52.90	-2.80	Peak	209	173
5	4960.00	45.00	54.00	-9.00	40.79	4.21	Average	100	159
6	4960.00	45.54	74.00	-28.46	41.33	4.21	Peak	100	159
7	7440.00	38.52	54.00	-15.48	29.99	8.53	Average	100	275
8	7440.00	50.21	74.00	-23.79	41.68	8.53	Peak	100	275
9	9920.00	43.08	54.00	-10.92	30.00	13.08	Average	100	62
10	9920.00	54.62	74.00	-19.38	41.54	13.08	Peak	100	62

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2480.00	87.41	94.00	-6.59	90.22	-2.81	Average	188	124
2	2480.00	88.17	114.00	-25.83	90.98	-2.81	Peak	188	124
3	2483.50	37.95	54.00	-16.05	40.75	-2.80	Average	188	124
4	2483.50	49.83	74.00	-24.17	52.63	-2.80	Peak	188	124
5	4960.00	36.51	54.00	-17.49	32.30	4.21	Average	248	352
6	4960.00	47.48	74.00	-26.52	43.27	4.21	Peak	248	352
7	7440.00	38.63	54.00	-15.37	30.10	8.53	Average	100	242
8	7440.00	50.22	74.00	-23.78	41.69	8.53	Peak	100	242
9	9920.00	43.11	54.00	-10.89	30.03	13.08	Average	100	276
10	9920.00	54.88	74.00	-19.12	41.80	13.08	Peak	100	276

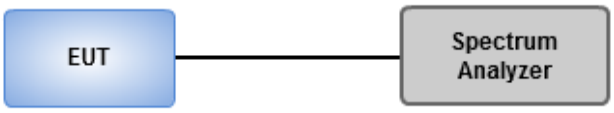
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.3 20dB and Occupied Bandwidth

3.3.1 Test Procedures

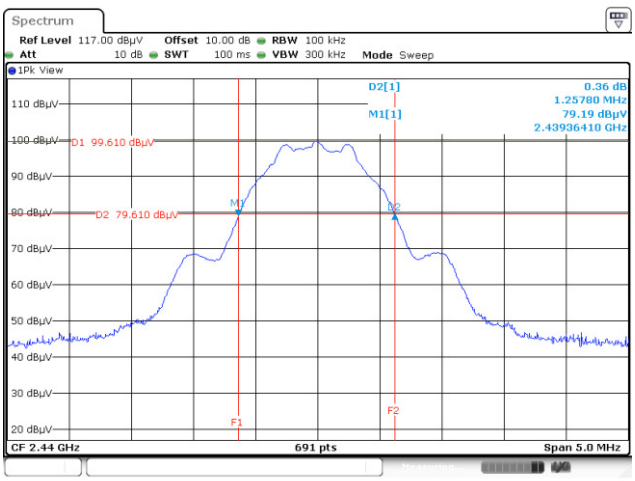
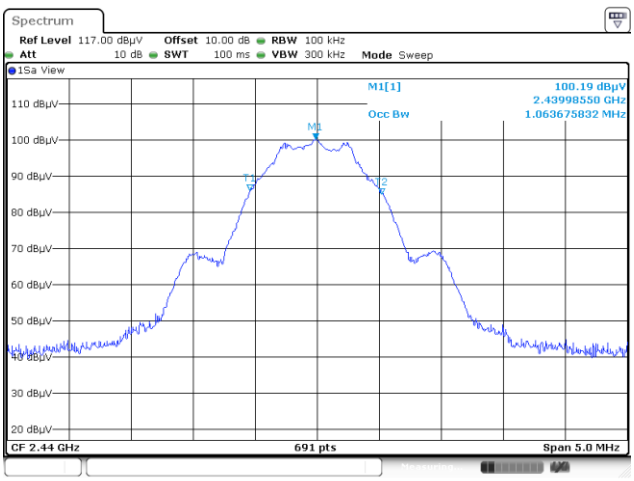
1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak(20 dB bandwidth) / Sample(Occupied bandwidth), Trace mode = max hold
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.
5. Use the occupied measurement function of specturm analyzer to measure 99% occupied bandwidth

3.3.2 Test Setup



3.3.3 20dB and Occupied Bandwidth

Freq. (MHz)	20dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
2402	1.24	1.06
2440	1.26	1.06
2480	1.24	1.06

Worst Plot of 20dB Bandwidth	Worst Plot of Occupied Bandwidth
	

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

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