

# **FCC Test Report**

FCC ID : 2ACF3BUZZILIGHT

Equipment : Buzzi Light Model No. : Buzzi Light

Brand Name : Blackloud Inc.

Applicant : Blackloud Inc.

Address : 42 Corporate Park #250 Irvine, CA 92606 USA

Standard : 47 CFR FCC Part 15.247

Received Date : Aug. 29, 2015

Tested Date : Sep. 04 ~ Sep. 21, 2015

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.

Approved & Reviewed by:

Gary Chang / Manager

lac MRA



Report No.: FR582901AE Report Version: Rev. 01 Page: 1 of 33



# **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	Test Equipment List and Calibration Data	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	6dB and Occupied Bandwidth	14
3.3	RF Output Power	16
3.4	Power Spectral Density	18
3.5	Emissions in Restricted Frequency Bands	20
3.6	Emissions in non-restricted Frequency Bands	30
4	TEST LABORATORY INFORMATION	33



# **Release Record**

Report No.	Version	Description	Issued Date
FR582901AE	Rev. 01	Initial issue	Oct. 15, 2015

Report No.: FR582901AE Page: 3 of 33



# **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 1.452MHz 36.85 (Margin -9.15dB) - AV	Pass
15.247(d)	Radiated Emissions	[dBuV/m at 3m]: 37.76MHz	Pass
15.209	Radiated Effissions	38.99 (Margin -1.01dB) - QP	Fa55
15.247(b)(3)	Maximum Output Power	Power [dBm]: 9.87	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Report No.: FR582901AE Page: 4 of 33



# 1 General Description

## 1.1 Information

## 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information							
Frequency Range (MHz) Bluetooth 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.	Туре	Connector	Gain (dBi)	Remarks
1	PIFA	N/A	1	

## 1.1.3 Power Supply Type of Equipment under Test (EUT)

### 1.1.4 Accessories

N/A

Report No.: FR582901AE Page: 5 of 33



## 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 Test Tool and Duty Cycle

Test tool	uEngergy Tools, v.2.4.2
Duty cycle of test signal (%)	65.44%
Duty Factor (dB)	1.84

# 1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)				
Wodulation Wode	2402	2440	2480		
GFSK/1Mbps	7	7	7		

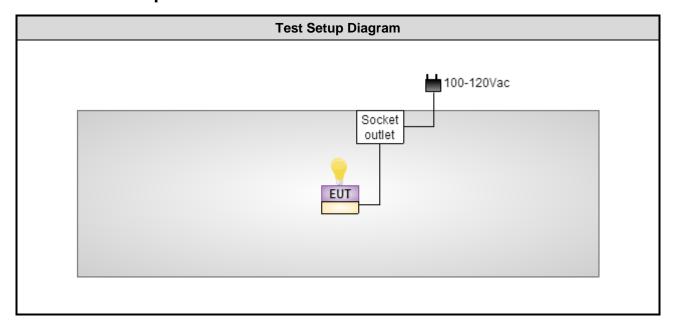
Report No.: FR582901AE Page: 6 of 33



# 1.2 Local Support Equipment List

	Support Equipment List							
No.	No. Equipment Brand Model FCC ID Signal cable / Length (m							
1	Light bulb	tfc	PS75(200W)					
2	Lamp load	ICC			AC cable, 0.5m non-shielded.			

# 1.3 Test Setup Chart



Report No.: FR582901AE Page: 7 of 33



# 1.4 Test Equipment List and Calibration Data

Test Item	Conducted Emission								
Test Site	Conduction room 1 / (	Conduction room 1 / (CO01-WS)							
Instrument	Instrument Manufacturer Model No. Serial No. Calibration Date Calibration Unti								
EMC Receiver	R&S	ESCS 30	100169	Oct. 17, 2014	Oct. 16, 2015				
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 17, 2014	Nov. 16, 2015				
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 2015				
Measurement Software AUDIX e3 6.120210k NA NA NA									
Note: Calibration Interval of instruments listed above is one year.									

Test Item	Radiated Emission								
Test Site	966 chamber 3 / (030	966 chamber 3 / (03CH03-WS)							
Instrument	Manufacturer Model No.		Serial No.	Calibration Date	Calibration Until				
Spectrum Analyzer	Agilent	N9010A	MY53400091	Dec. 09, 2014	Dec. 08, 2015				
Receiver	Agilent	N9038A	MY53290044	Oct. 21, 2014	Oct. 20, 2015				
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-562	Jan. 19, 2015	Jan. 18, 2016				
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 03, 2015	Feb. 02, 2016				
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 10, 2014	Nov. 09, 2015				
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 10, 2014	Nov. 09, 2015				
Preamplifier	EMC	EMC02325	980187	Sep. 26, 2014	Sep. 25, 2015				
Preamplifier	Agilent	83017A	MY53270014	Oct. 09, 2014	Oct. 08, 2015				
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016				
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 09, 2015	Feb. 08, 2016				
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22601/4	Feb. 09, 2015	Feb. 08, 2016				
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 09, 2015	Feb. 08, 2016				
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 09, 2015	Feb. 08, 2016				
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 09, 2015	Feb. 08, 2016				
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 09, 2015	Feb. 08, 2016				
Measurement Software	AUDIX	e3	6.120210g	NA	NA				
Note: Calibration Int	erval of instruments lis	sted 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	Feb. 03, 2015	Feb. 02, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 29, 2014	Sep. 28, 2015
Power Sensor	Anritsu	MA2411B	1207366	Sep. 29, 2014	Sep. 28, 2015
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA

Report No.: FR582901AE Page: 8 of 33



### 1.5 Test Standards

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

47 CFR FCC Part 15.247 ANSI C63.10-2013 FCC KDB 558074 D01 DTS Meas Guidance v03r03

# 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			
Conducted power	±0.808 dB			
Power density	±0.463 dB			
Conducted emission	±2.670 dB			
AC conducted emission	±2.92 dB			
Radiated emission ≤ 1GHz	±3.99 dB			
Radiated emission > 1GHz	±5.52 dB			

Report No.: FR582901AE Page: 9 of 33



# 2 Test Configuration

# 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 56%	Kevin Ma
Radiated Emissions	03CH03-WS	20-22°C / 61-66%	Warren Lee Aska Huang
RF Conducted	TH01-WS	22°C / 63%	Felix Sung

FCC site registration No.: 390588IC site registration No.: 10807C-1

1

### 2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate (Mbps)	Test Configuration
AC Power Line Conducted Emissions	BT LE	2480	1Mbps	
Radiated Emissions ≤ 1GHz	BT LE	2480	1Mbps	
Radiated Emissions > 1GHz	BT LE	2402, 2440, 2480	1Mbps	
Maximum Output Power				
6dB bandwidth	BT LE	2402, 2440, 2480	1Mbps	
Power spectral density				

#### NOTE:

Report No.: FR582901AE Page: 10 of 33

<sup>1.</sup> 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

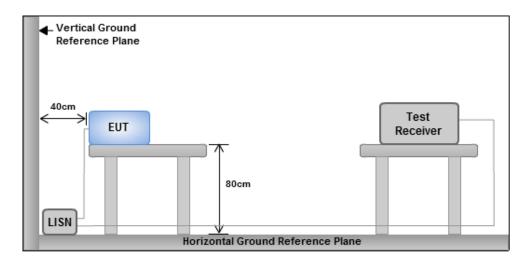
### 3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit						
Frequency Emission (MHz) Quasi-Peak Average						
0.15-0.5 66 - 56 * 56 - 4						
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  $\Omega$  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



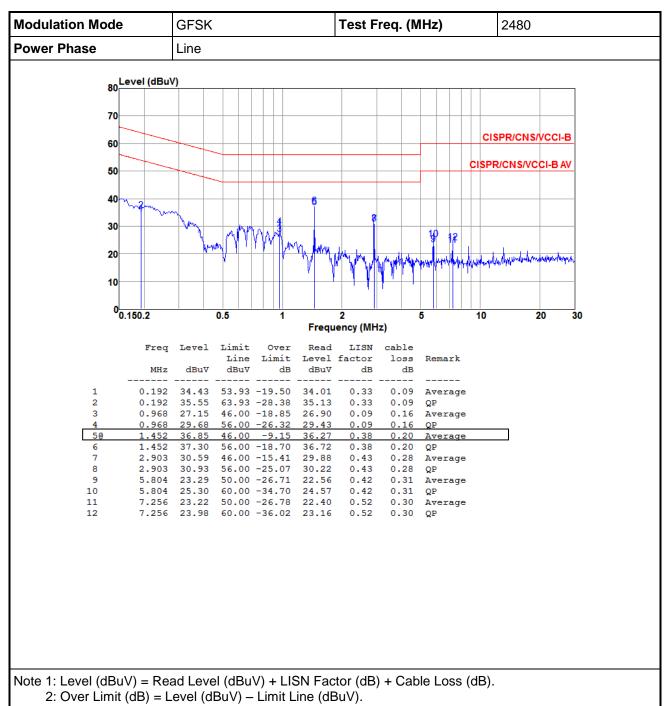
Note: 1. Support units were connected to second LISN.

Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

Report No.: FR582901AE Page: 11 of 33

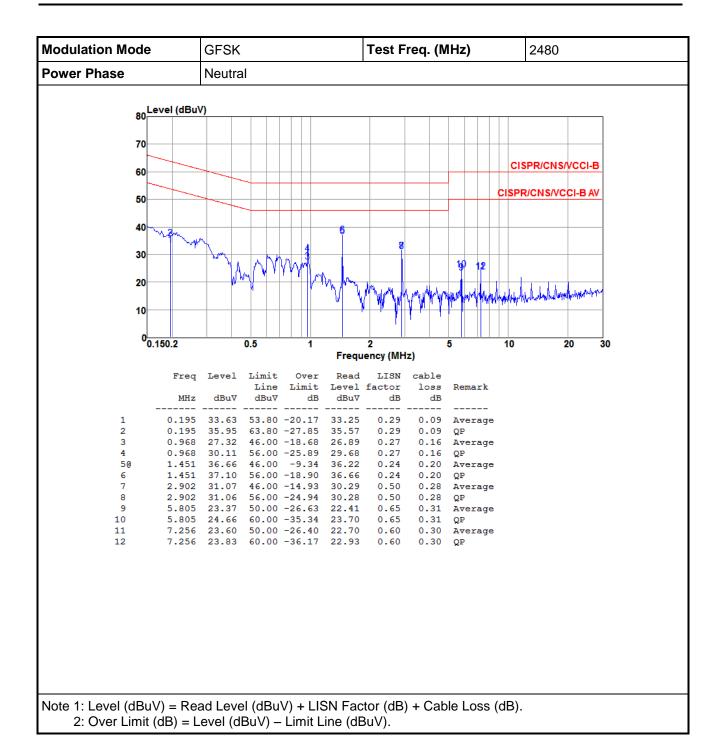


### 3.1.4 Test Result of Conducted Emissions



Report No.: FR582901AE Page: 12 of 33





Report No.: FR582901AE Page: 13 of 33



# 3.2 6dB and Occupied Bandwidth

### 3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

### 3.2.2 Test Procedures

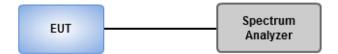
### 6dB Bandwidth

- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- 2. Detector = Peak, 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 6dB relative to the maximum level measured in the fundamental emission.

#### Occupied Bandwidth

- 1. Set resolution bandwidth (RBW) = 30 kHz, Video bandwidth = 100 kHz.
- 2. Detector = Sample, Trace mode = max hold.
- 3 Sweep = auto couple, Allow the trace to stabilize.
- 4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

### 3.2.3 Test Setup

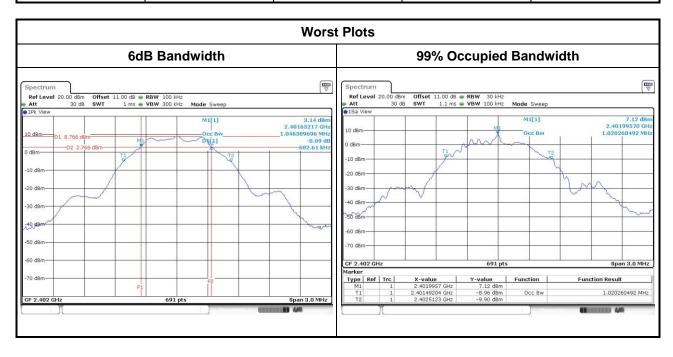


Report No.: FR582901AE Page: 14 of 33



## 3.2.4 Test Result of 6dB and Occupied Bandwidth

Mode	Freq. (MHz)	Freq. (MHz) 6dB Bandwidth (MHz) E		Limit of 6dB Bandwidth (kHz)	
BT LE	2402	0.683	1.02	500	
BT LE	LE 2440 0.683		1.02	500	
BT LE	2480 0.704		1.02	500	



Report No.: FR582901AE Page: 15 of 33



# 3.3 RF Output Power

### 3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

Antenna gain > 6dBi

Non Fixed, point to point operations.
The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

Fixed, point to point operations
Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations, no any corresponding reduction is in transmitter peak output power

### 3.3.2 Test Procedures

Maximum Peak Conducted Output Power

### 

- 1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
- 2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
- 3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

#### Nower meter

- A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.
- Maximum Conducted Average Output Power (For reference only)

#### Nower meter

 A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

### 3.3.3 Test Setup



Report No.: FR582901AE Page: 16 of 33



# 3.3.4 Test Result of Maximum Output Power

Mode	Freq. (MHz)	Peak Power (mW) Peak Power (dBm)		Limit (dBm)
BT LE	2402	8.43	9.26	30
BT LE	2440	9.29	9.68	30
BT LE	2480	9.71	9.87	30

Mode	Freq. (MHz)	AV Power (mW)	AV Power (dBm)	Limit (dBm)
BT LE	2402	7.82	8.93	30
BT LE	2440	8.75	9.42	30
BT LE	2480	9.20	9.64	30

Note: Average power is for reference only

Report No.: FR582901AE Page: 17 of 33



### 3.4 Power Spectral Density

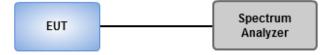
### 3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

#### 3.4.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
  - Set the RBW = 3kHz, VBW = 10kHz.
  - Detector = Peak, Sweep time = auto couple.
  - 3. Trace mode = max hold, allow trace to fully stabilize.
  - 4. Use the peak marker function to determine the maximum amplitude level.
- Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
  - 1. Set the RBW = 100kHz, VBW = 300 kHz.
  - 2. Detector = RMS, Sweep time = auto couple.
  - 3. Set the sweep time to: ≥ 10 x (number of measurement points in sweep) x (maximum data rate per stream).
  - 4. Perform the measurement over a single sweep.
  - 5. Use the peak marker function to determine the maximum amplitude level.\

### 3.4.3 Test Setup

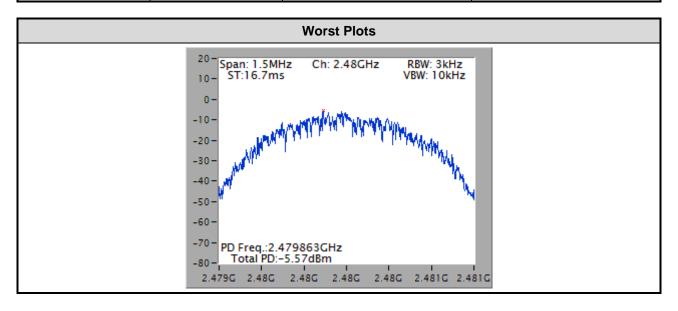


Report No.: FR582901AE Page: 18 of 33



## 3.4.4 Test Result of Power Spectral Density

Mode	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
BT LE	2402	-6.72	8
BT LE	2440	-6.74	8
BT LE	2480	-5.57	8



Report No.: FR582901AE Page: 19 of 33



## 3.5 Emissions in Restricted Frequency Bands

### 3.5.1 Limit of Emissions in Restricted Frequency Bands

Restricted Band Emissions Limit							
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.

#### 3.5.2 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.

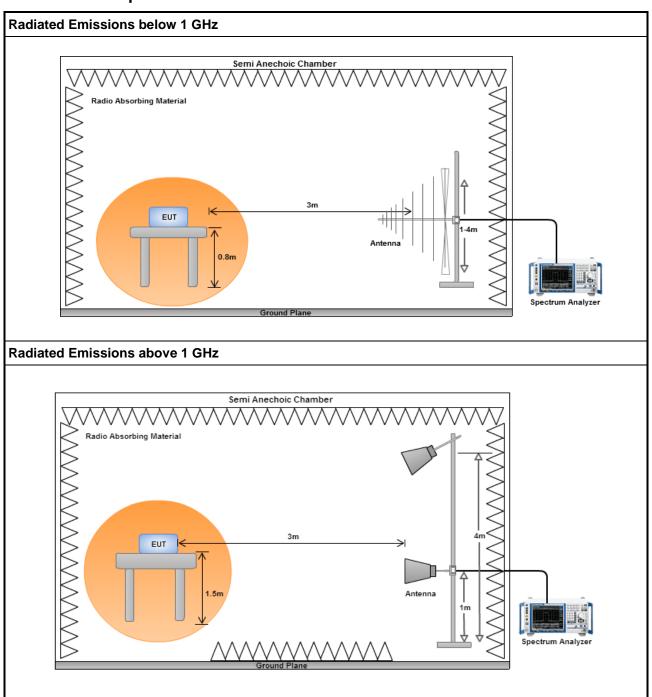
### Note:

- 1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

Report No.: FR582901AE Page : 20 of 33



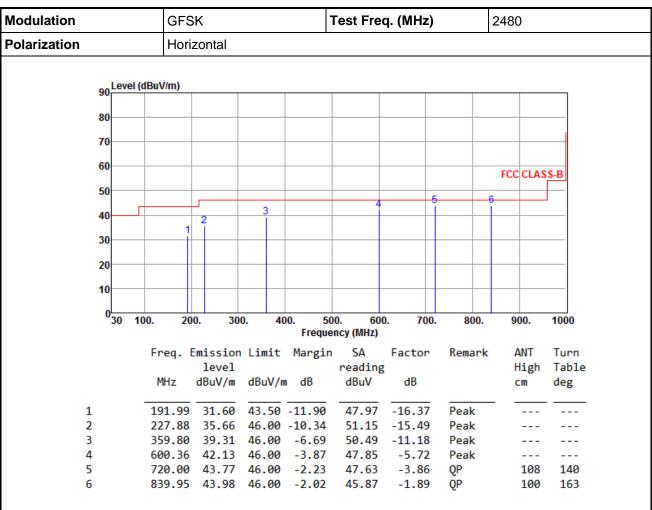
## 3.5.3 Test Setup



Report No.: FR582901AE Page: 21 of 33



## 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

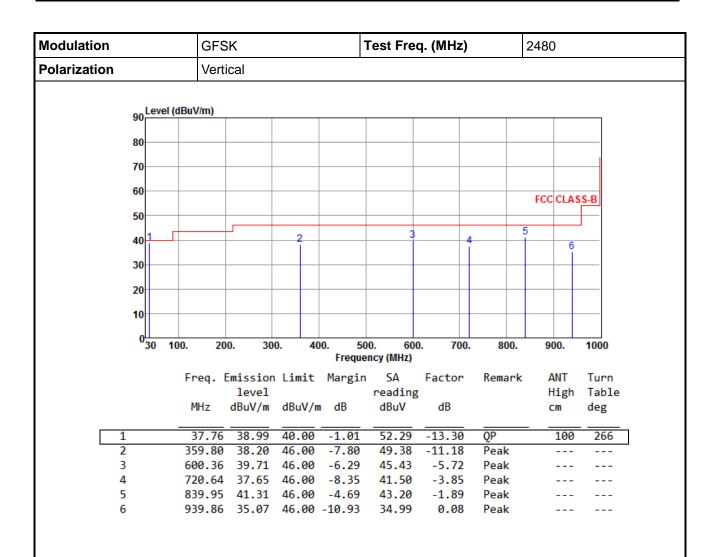
\*Factor includes antenna factor, cable loss and amplifier gain

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.

Report No.: FR582901AE Page: 22 of 33





Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

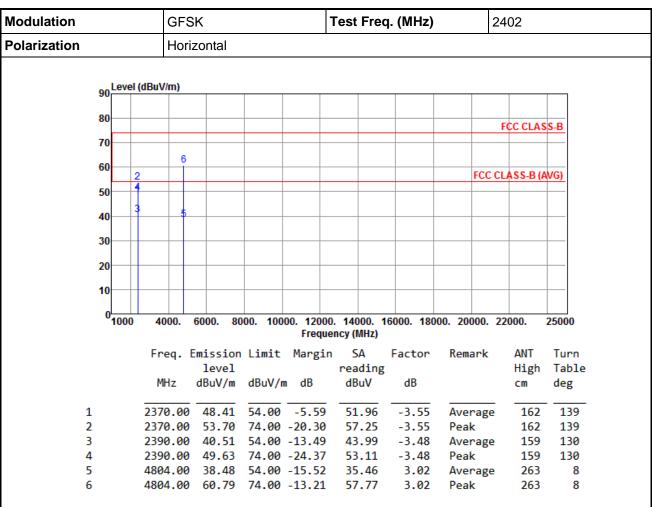
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Report No.: FR582901AE Page: 23 of 33



### 3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for GFSK



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

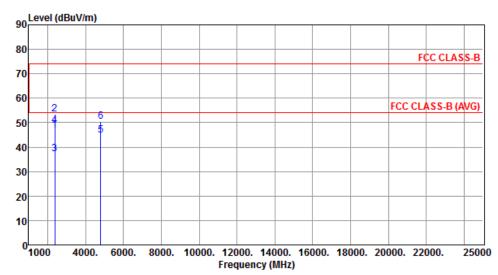
\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR582901AE Page: 24 of 33



Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2370.00	46.67	54.00	-7.33	50.22	-3.55	Average	157	249
2	2370.00	53.35	74.00	-20.65	56.90	-3.55	Peak	157	249
3	2390.00	37.25	54.00	-16.75	40.73	-3.48	Average	161	212
4	2390.00	48.77	74.00	-25.23	52.25	-3.48	Peak	161	212
5	4804.00	44.72	54.00	-9.28	41.70	3.02	Average	267	315
6	4804.00	50.41	74.00	-23.59	47.39	3.02	Peak	267	315

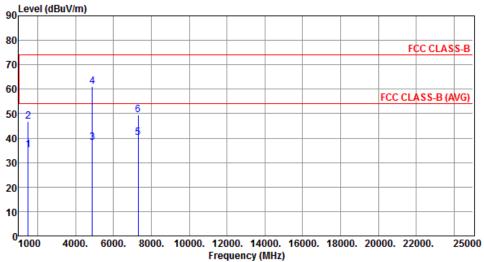
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

Report No.: FR582901AE Page: 25 of 33



Modulation	GFSK	Test Freq. (MHz)	2440							
Polarization	Horizontal									
90 Level (dBuV/m)										



		Emission level		Ū	SA reading		Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	1500.00	35.29	54.00	-18.71	41.42	-6.13	Average	159	185
2	1500.00	46.70	74.00	-27.30	52.83	-6.13	Peak	159	185
3	4880.00	38.30	54.00	-15.70	35.25	3.05	Average	263	8
4	4880.00	60.96	74.00	-13.04	57.91	3.05	Peak	263	8
5	7320.00	40.24	54.00	-13.76	31.29	8.95	Average	269	314
6	7320.00	49.51	74.00	-24.49	40.56	8.95	Peak	269	314

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).

Page: 26 of 33 Report No.: FR582901AE



2

3

4

5

6

Modulation			GFS	GFSK				Test Freq. (MHz)				
Polarization			Verti	ical		•						
	90 <mark>L</mark>	evel	(dBuV/m)								$\overline{}$	
	80											
										FCC CLAS	SS-B	
	70											
	60	+							FCC	CLASS-B (A	AVG)	
	50	2	4	6							<del>10,</del>	
		ĺ	3	5								
	40	1										
	30										+	
	20											
	40											
	10											
	0 <mark>1</mark>	000	4000.	6000. 80	00. 100	00. 1200	0. 14000.	16000. 180	00. 20000.	22000.	25000	
						Frequ	ency (MHz)					
			Freq. [		Limit	Margi	n SA		Remark	ANT	Turn	
				level	ID 1//	ID.	reading			High		
			MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		CM	deg	
	1		1500.00	33.81	54.00	-20.19	39.94	-6.13	Average	302	184	
	_										_	

52.42

41.59

46.57

30.86

40.10

-6.13

3.05

3.05

8.95

8.95

Peak Average

Peak

Peak

Average

302

261

261

261

261

184

312

312

310

310

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB) \*Factor includes antenna factor, cable loss and amplifier gain

1500.00 46.29 74.00 -27.71

4880.00 44.64 54.00 -9.36

4880.00 49.62 74.00 -24.38

7320.00 39.81 54.00 -14.19 7320.00 49.05 74.00 -24.95

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR582901AE Page: 27 of 33



Modulation			GF	SK			GFSK					Test Freq. (MHz)					
Polarization			Horizontal														
	90	Level	(dBuV/m)														
	80																
	70														FCC CLAS	S-B	
				4													
	60													FCC C	LASS-B (A	WG)	
	50		2		6												
	40	-			5												
	30																
	20																
	10											_					
	0	1000	4000.	6000	. 80	00. 10		12000. reque			6000.	180	00. 20	0000. 2	2000.	25000	
			Freq.	Emis	sion	Limit		-		-	Fact	or	Rem	ark	ANT	Turn	
				le	vel			_	rea	ding					High	Tab1	
			MHz	dBu	V/m	dBuV/	m c	IB	dBi	V۱	dE	3			cm	deg	
	1		2483.5	<del>a</del> 40	.14	54.00	-13	3.86	43	.34	-3.	20	Ave	rage	288	139	
	2		2483.5		.18	74.00				.38	-3.		Pea		288	139	
	3		4960.0							.58		10		rage	261	11	
	4		4960.0							.12		10	Pea		261	11	
	5 6		7440.0							. 23 . 57		29 29	Ave Pea	rage	263 263	312 312	

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

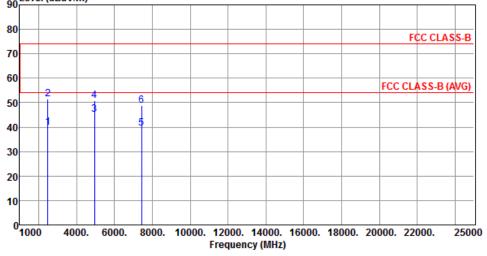
\*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR582901AE Page: 28 of 33

Report Version: Rev. 01



Modulation	GFSK	GFSK				Test Freq. (MHz)					2480		
Polarization	Vertica	al											
90	Level (dB	uV/m)			T	I	T	I	I	I	I		
80										F	CC CLAS	S-B	



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
	11112	ubuv/III	ubuv/III	ub	ubuv	ub		CIII	ueg
1	2483.50	39.69	54.00	-14.31	42.89	-3.20	Average	353	344
2	2483.50	51.38	74.00	-22.62	54.58	-3.20	Peak	353	344
3	4960.00	45.26	54.00	-8.74	42.16	3.10	Average	265	313
4	4960.00	50.93	74.00	-23.07	47.83	3.10	Peak	265	313
5	7440.00	39.64	54.00	-14.36	30.35	9.29	Average	265	318
6	7440.00	48.83	74.00	-25.17	39.54	9.29	Peak	265	318

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).

Report No.: FR582901AE Page: 29 of 33



# 3.6 Emissions in non-restricted Frequency Bands

### 3.6.1 Emissions in non-restricted frequency bands limit

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

### 3.6.2 Test Procedures

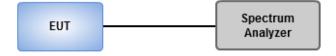
#### **Reference Level Measurement**

- 1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- 2. Set Sweep time = auto couple, Trace mode = max hold.
- 3. Allow trace to fully stabilize.
- 4. Use the peak marker function to determine the maximum amplitude level.

### **Unwanted Emissions Level Measurement**

- 1. Set RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- 2. Trace Mode = max hold, Sweep = auto couple.
- 3. Allow the trace to stabilize.
- 4. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

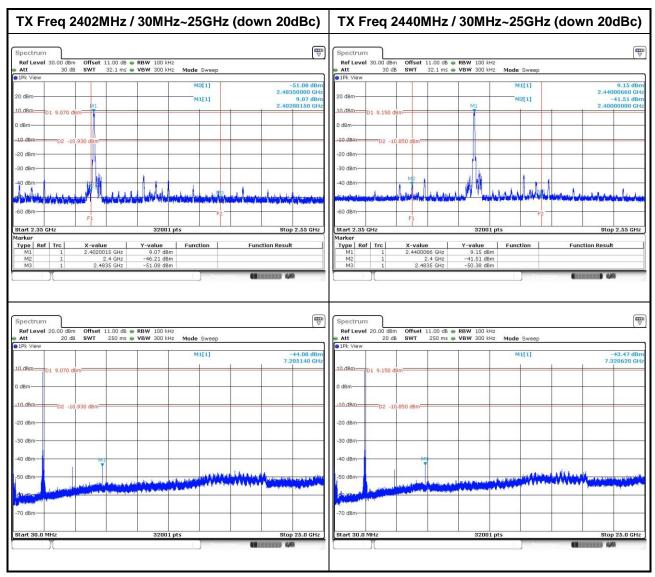
### 3.6.3 Test Setup



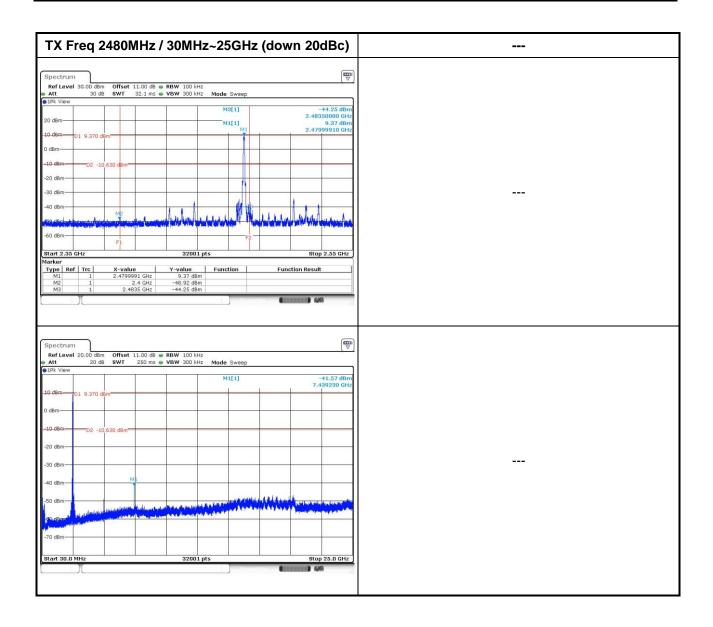
Report No.: FR582901AE Page: 30 of 33



### 3.6.4 Test Result of Emissions in non-restricted Frequency Bands



Report No.: FR582901AE Page: 31 of 33



Report No.: FR582901AE Page: 32 of 33



# 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, 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 Hsiang. Location map can be found on our website <a href="http://www.icertifi.com.tw">http://www.icertifi.com.tw</a>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan,

R.O.C.

Kwei Shan

Tel: 886-3-271-8666 No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan

Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

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

Tel: 886-3-271-8666 Fax: 886-3-318-0155

Email: ICC\_Service@icertifi.com.tw

==END==

Report No.: FR582901AE Page: 33 of 33