

FCC Test Report

FCC ID : 2AE92CABC-LOL01

Equipment : Lollipop

Model No. : CABC-LOL01

Brand Name : Lollipop

Applicant : Masterwork Aoitek Tech Corp Ltd.

Address : 9F,No.411,Ruiguang Rd,Taipei 11492, Taiwan

Standard : 47 CFR FCC Part 15.247

Received Date : Jun. 24, 2016

Tested Date : Jun. 30 ~ Aug. 17, 2016

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

Report No.: FR662401AE Page: 1 of 33



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information	
1.2	Local Support Equipment List	
1.3	Test Setup Chart	
1.4	Test Equipment List and Calibration Data	
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	
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
FR662401AE	Rev. 01	Initial issue	Oct. 04, 2016

Report No.: FR662401AE Page: 3 of 33



Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.561MHz 31.12 (Margin -14.88dB) - AV	Pass
15.247(d)	Radiated Emissions	[dBuV/m at 3m]: 500.05MHz	Pass
15.209	Nadiated Liffissions	43.63 (Margin -2.37dB) - QP	1 033
15.247(b)(3)	Maximum Output Power	Power [dBm]: 7.34	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.: FR662401AE 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.	Brand	Model	Туре	Gain (dBi)	Connector	Remarks
1	Mag.Layers	MSA-3313-2G4C1-A1	stamped metal	1.01	N/A	

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from adapter
-------------------	-------------------

1.1.4 Accessories

	Accessories					
No.	Equipment	Description				
		Brand Name: Lollipop				
1	AC Adapter	Model Name: KSA29B0500200D5				
	7.07.00.00	Power Rating: I/P: 100-240Vac, 50-60Hz, 0.5A O/P: 5V, 2.0A				
2	USB Cable (For charging only)	3m non-shielded cable without core				

Report No.: FR662401AE 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	telnet
Duty cycle of test signal (%)	67.13%
Duty Factor (dB)	1.73

1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)			
Wiodulation Wiode	2402	2440	2480	
GFSK/1Mbps	Default	Default	Default	

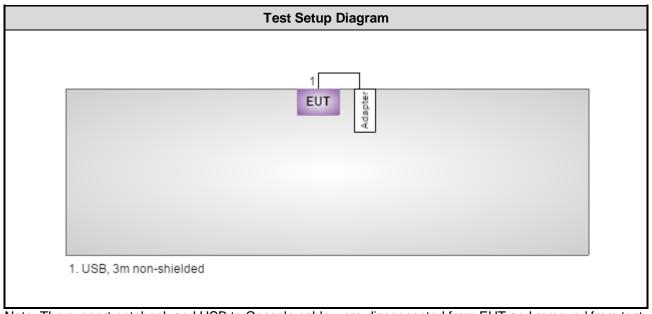
Report No.: FR662401AE Page: 6 of 33



1.2 Local Support Equipment List

	Support Equipment List					
No.	No. Equipment Brand Model FCC ID Signal cable / Length (m)					
1	Notebook	DELL	Latitude E6430	DoC		

1.3 Test Setup Chart



Note: The support notebook and USB to Console cable were disconnected from EUT and removed from test table when EUT is set to transmit continuously.

Report No.: FR662401AE Page: 7 of 33



1.4 Test Equipment List and Calibration Data

Test Item	Conducted Emission	Conducted Emission						
Test Site	Conduction room 1 /	Conduction room 1 / (CO01-WS)						
Instrument	Manufacturer Model No. Serial No. Calibration Date Calibration Until							
EMC Receiver	R&S	ESCS 30	100169	Oct. 21, 2015	Oct. 20, 2016			
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2015	Nov. 12, 2016			
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 21, 2015	Dec. 20, 2016			
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 / (03Ch	H01-WS)			
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 13, 2015	Dec. 12, 2016
Receiver	R&S	ESR3	101658	Nov. 04, 2015	Nov. 03, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 20, 2015	Aug. 19, 2016
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016
Preamplifier	Burgeon	BPA-530	SN:100219	Sep. 10, 2015	Sep. 09, 2016
Preamplifier	Agilent	83017A	MY39501308	Oct. 02, 2015	Oct. 01, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 16, 2015	Nov. 15, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Inter	val of instruments listed	d 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. 17, 2016	Feb. 16, 2017
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
DC POWER SOURCE	GW INSTEK	GPC-3060D	EM884797	Oct. 20, 2015	Oct. 19, 2016
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Inter	rval of instruments liste	d above is one year.	•	•	

Report No.: FR662401AE 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 v03r05

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	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

Report No.: FR662401AE 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 / 59%	Howard Huang
Radiated Emissions	03CH01-WS	23-24°C / 62-64%	Vincent Yeh Aska Huang
RF Conducted	TH01-WS	23°C / 66%	Alex Huang

FCC site registration No.: 181692IC 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	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: 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.

Report No.: FR662401AE Page: 10 of 33



3 Transmitter Test Results

3.1 Conducted Emissions

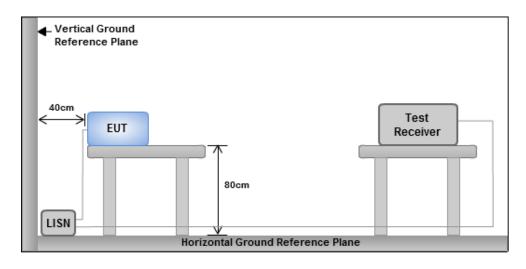
3.1.1 Limit of Conducted Emissions

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



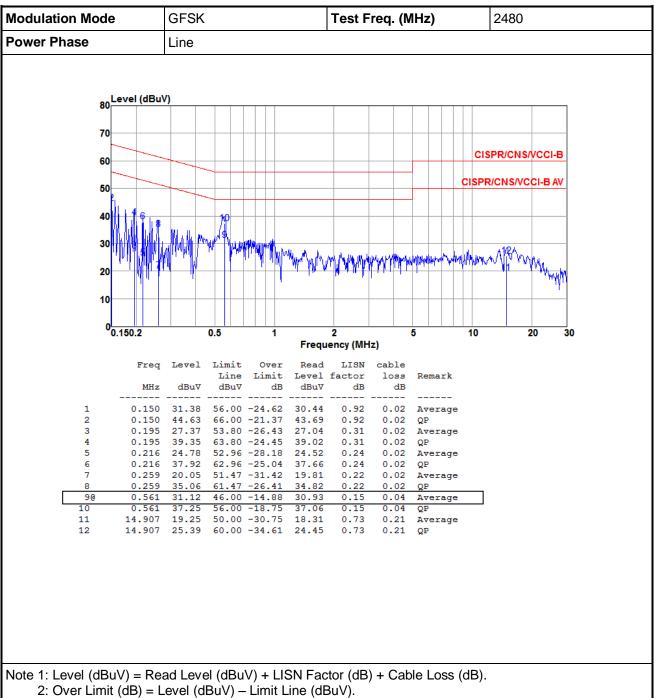
Note: 1. Support units were connected to second LISN.

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

Report No.: FR662401AE Page: 11 of 33

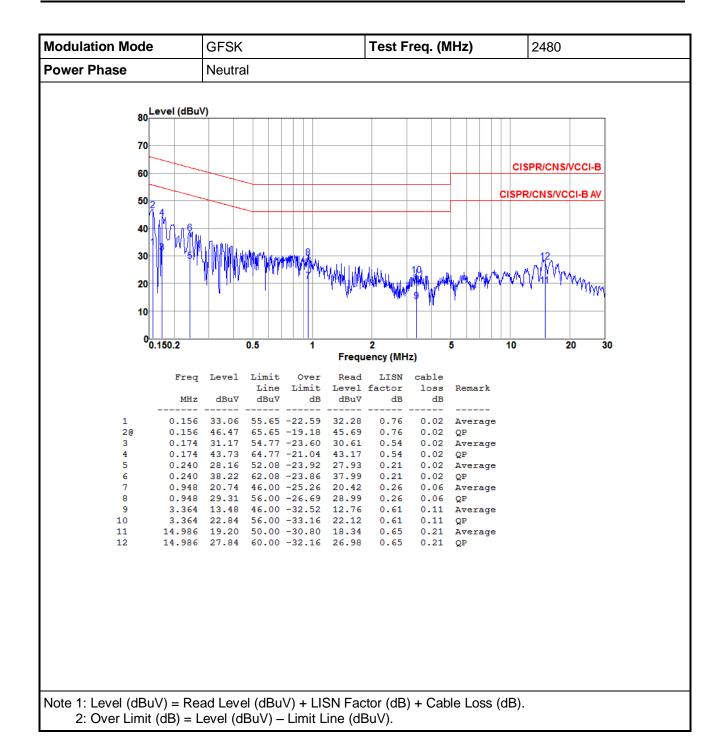


Test Result of Conducted Emissions 3.1.4



Report No.: FR662401AE Page: 12 of 33





Report No.: FR662401AE 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

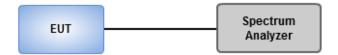
6dB Bandwidth

- 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) = 20 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

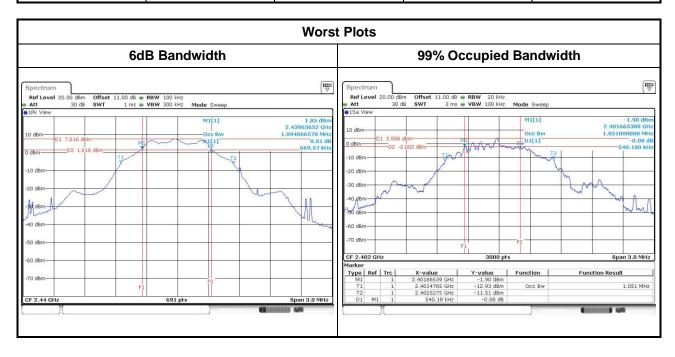


Report No.: FR662401AE Page: 14 of 33



3.2.4 Test Result of 6dB and Occupied Bandwidth

Mode	Freq. (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit of 6dB Bandwidth (kHz)
BT LE	2402	0.674	1.05	500
BT LE	2440	0.670	1.05	500
BT LE	2480	0.674	1.05	500



Report No.: FR662401AE 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

Spectrum analyzer

- 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.

- 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.: FR662401AE Page: 16 of 33



3.3.4 Test Result of Maximum Output Power

			Peak Power		Antenna	EIRP	EIRP
Mode	Freq. (MHz)	Power (mW)	Power (dBm)	Limit (dBm)	gain (dBi)	(dBm)	Limit (dBm)
BT LE	2402	5.260	7.21	30	1.01	8.22	36
BT LE	2440	5.370	7.30	30	1.01	8.31	36
BT LE	2480	5.420	7.34	30	1.01	8.35	36

Mode	Freq. (MHz)	AV Power (mW)	AV Power (dBm)	Limit (dBm)
BT LE	2402	5.152	7.12	
BT LE	2440	5.260	7.21	
BT LE	2480	5.272	7.22	

Note: Average power is for reference only

Report No.: FR662401AE Page: 17 of 33



3.4 Power Spectral Density

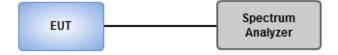
3.4.1 Limit of Power Spectral Density

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

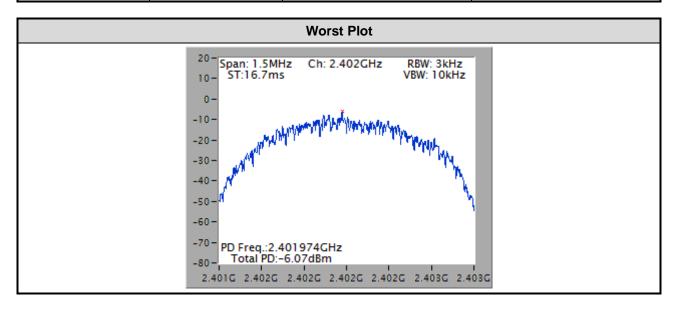


Report No.: FR662401AE Page: 18 of 33



3.4.4 Test Result of Power Spectral Density

Mode	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
BT LE	2402	-6.07	8
BT LE	2440	-6.70	8
BT LE	2480	-7.13	8



Report No.: FR662401AE 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

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.

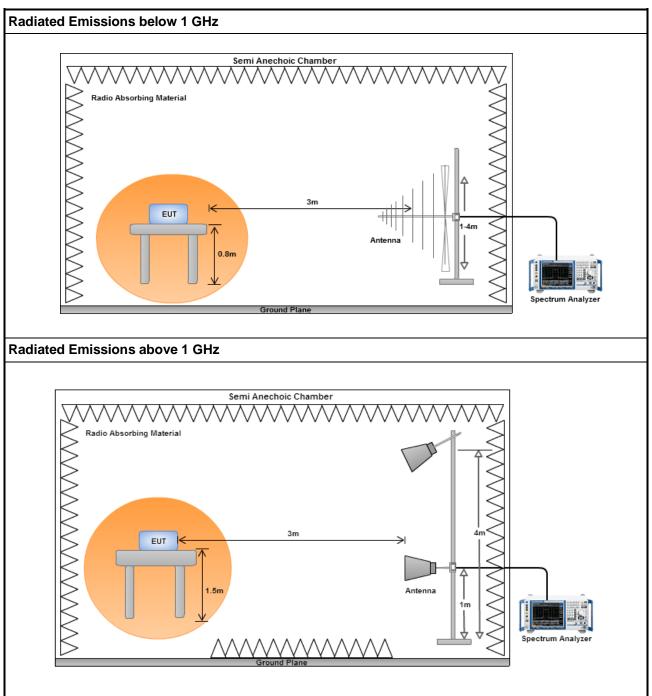
Note:

- 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.
- 3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

Report No.: FR662401AE Page: 20 of 33



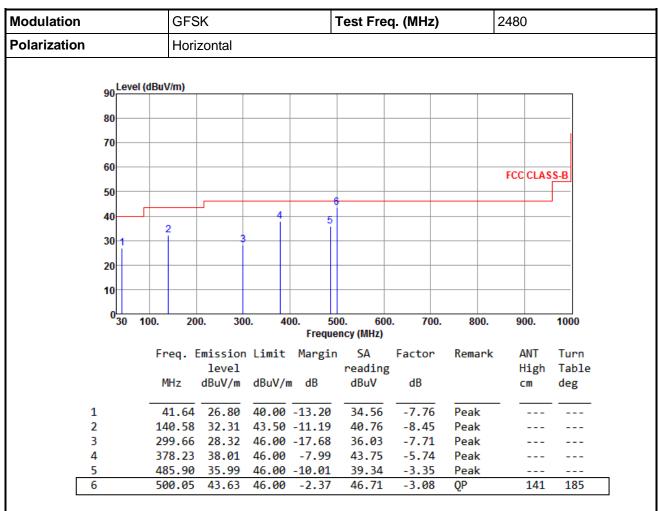
3.5.3 Test Setup



Report No.: FR662401AE 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.: FR662401AE Page: 22 of 33



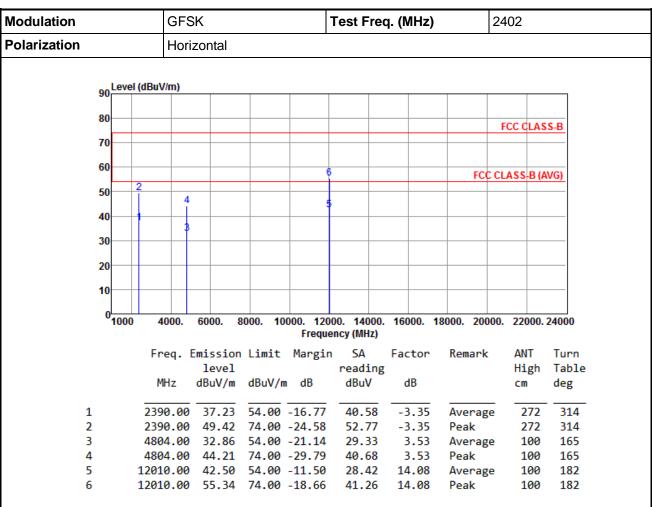
Modulation			GFS	SK			Test Fre	eq. (MHz)		2480)	2480		
Polarization				Verti	ical									
				•										
	90	Level	(dBu\	//m)								ı		
	00													
	80													
	70		+											
	60													
											FCC	CLAS	S-B	
	50							6						
	40		2 ;		_	4	+ 5	1						
	30	1	آ ا	3										
	20													
	10	_												
	0													
		30 1	100.	20	0. 30	10. 4		600. 60 ency (MHz)		800.	90	00.	1000	
			Fr	eq. E	missior	n Limit	Margi	n SA	Factor	Remark	Д	NT	Turn	
					level			reading			Н	ligh	Table	
			М	Hz	dBuV/m	dBuV/	m dB	dBuV	dB		C	m	deg	
	1			2.61	30.83	40.00	-9.17	38.56	-7.73	Peak				
	2			5.36	33.81					Peak				
	3			0.58			-10.75			Peak				
	4			8.23			-10.09			Peak				
	5			5.90			-9.00			Peak				
•	6		50	w.45	41.94	46.00	-4.06	45.01	-3.07	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.

Report No.: FR662401AE 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)

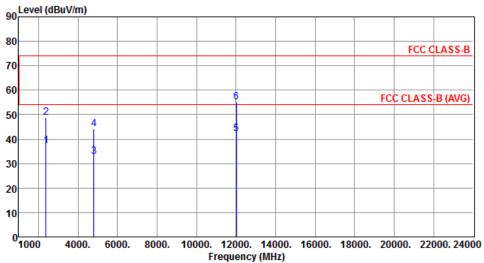
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR662401AE Page: 24 of 33



Modulation	GFSK	Test F	req. (N	(Hz)	2402		
Polarization	Vertical						
90 Level (dBu\	//m)					ı	



	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2390.00	37.17	54.00	-16.83	40.52	-3.35	Average	246	205
2	2390.00	48.88	74.00	-25.12	52.23	-3.35	Peak	246	205
3	4804.00	32.74	54.00	-21.26	29.21	3.53	Average	100	24
4	4804.00	44.08	74.00	-29.92	40.55	3.53	Peak	100	24
5	12010.00	42.34	54.00	-11.66	28.26	14.08	Average	100	310
6	12010.00	55.11	74.00	-18.89	41.03	14.08	Peak	100	310

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.: FR662401AE Page: 25 of 33



Modulation	GF:	GFSK Test Freq. (MHz) 2440											
Polarization	Hor	izontal		'					•				
			•										
	90	Level	(dBuV/m)										_
	80										FCC C	LASS-B	
	70												-
	60									FC	CLASS	-B (AVG)	
	50		2 *		8								-
	40		ļ '		 								
	40			5									
	30												-
	20												_
	20												
	10												-
	0	1000	4000.	6000.	8000. 10	0000. 120	00. 1400	0. 160	00. 1	8000. 200	000. 220	000, 240	_ 00
							ency (MHz						
			Freq.	Emissio	n Limit	Margin	s SA	Fac	tor	Remark	. AN	IT Tu	ırn
				level			readin	•			Hi	_	able
			MHz	dBuV/m	dBuV/	m dB	dBuV	d	В		cm	ı de	₽g
	1		2390.00	37.30	54.00	-16.70	40.65	-3	.35	Averag	e 2	266	310
	2		2390.00	49.39	74.00	-24.61	52.74		.35	Peak		266	310
	3					-16.09	40.84		.93	Averag			310
	4					-23.40	53.53		.93	Peak			310
	5					-21.20	29.03		.77	Averag			168
	6		4880.00	44.15	74.00	-29.85	40.38	5 3	.77	Peak	1	.00 1	168

8.43

8.43

Average

Peak

182

182

292

292

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

7320.00 39.71 54.00 -14.29 31.28

7320.00 50.11 74.00 -23.89 41.68

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

Report No.: FR662401AE Page: 26 of 33

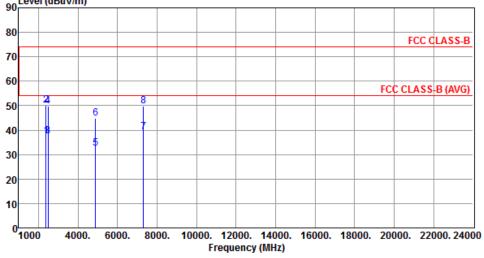
Report Version: Rev. 01

7

8



Modulation		GFSK			Test Freq. (MHz)				2440		
Polarization	Vertical										
on l	_evel (dBu	V/m)									

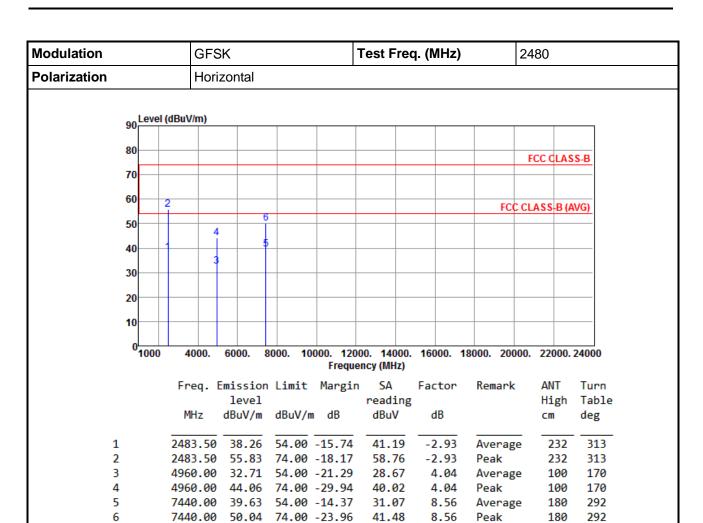


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.54	54.00	-16.46	40.89	-3.35	Average	224	210
2	2390.00	50.18	74.00	-23.82	53.53	-3.35	Peak	224	210
3	2483.50	37.67	54.00	-16.33	40.60	-2.93	Average	224	210
4	2483.50	49.67	74.00	-24.33	52.60	-2.93	Peak	224	210
5	4880.00	32.61	54.00	-21.39	28.84	3.77	Average	100	20
6	4880.00	44.84	74.00	-29.16	41.07	3.77	Peak	100	20
7	7320.00	39.16	54.00	-14.84	30.73	8.43	Average	100	307
8	7320.00	49.86	74.00	-24.14	41.43	8.43	Peak	100	307

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.: FR662401AE Page: 27 of 33



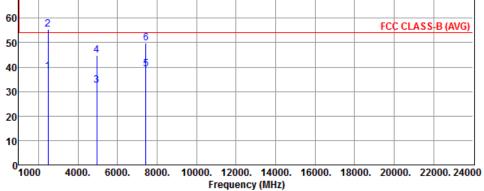


Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor, cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR662401AE Page: 28 of 33



Modulation	GFSK	Test	Freq. (MHz)	2480	2480		
Polarization	Vertical						
90 Level	(dBuV/m)						
90							
80				FCC CLAS	S-B		
70							



		Emission level		J	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		CM	deg
1	2483.50	38.22	54.00	-15.78	41.15	-2.93	Average	227	143
2	2483.50	55.58	74.00	-18.42	58.51	-2.93	Peak	227	143
3	4960.00	32.55	54.00	-21.45	28.51	4.04	Average	100	22
4	4960.00	44.79	74.00	-29.21	40.75	4.04	Peak	100	22
5	7440.00	39.10	54.00	-14.90	30.54	8.56	Average	100	305
6	7440.00	49.79	74.00	-24.21	41.23	8.56	Peak	100	305

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.: FR662401AE 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

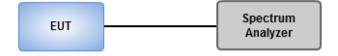
Reference Level Measurement

- 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

- 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.

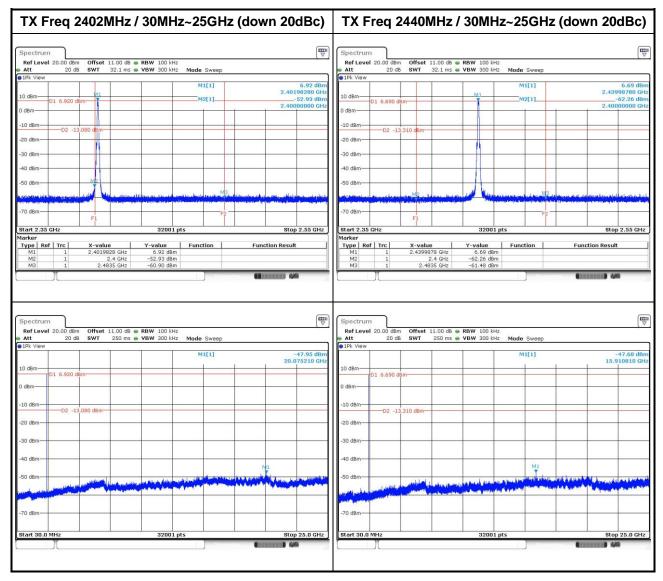
3.6.3 Test Setup



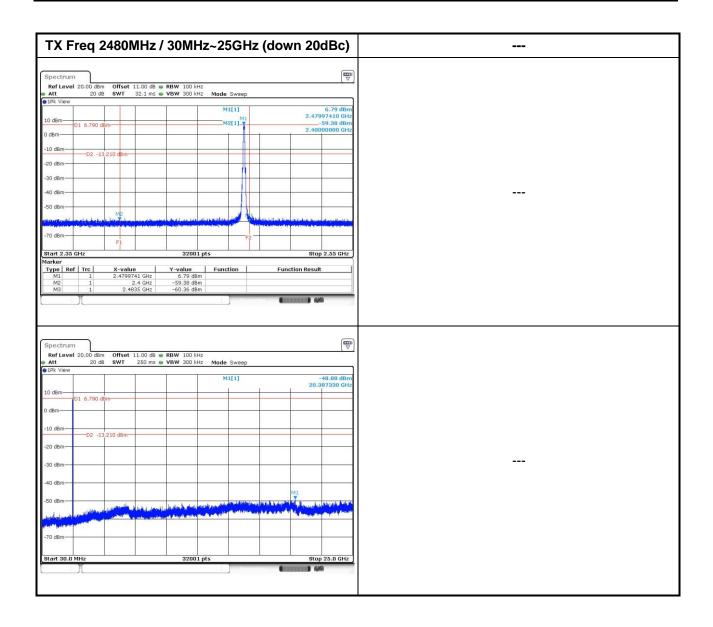
Report No.: FR662401AE Page: 30 of 33



3.6.4 Test Result of Emissions in non-restricted Frequency Bands



Report No.: FR662401AE Page: 31 of 33



Report No.: FR662401AE 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 (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 Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

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 District, Tao Yuan City

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 District, Tao Yuan City 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.: FR662401AE Page: 33 of 33