

FCC Test Report

FCC ID : 2AO36BIOTEK-EINCR1K

Equipment: Health Sensation System

Model No. : CR1000

Brand Name : Einthoven

Applicant : ADVANCED COMM.ENGINEERING SOLUTION

CO., LTD. BIOMEDICAL BRANCH

Address : No.66, Shengyi 2nd Rd., Zhubei City, Hsinchu

County 302, Taiwan (R.O.C.)

Standard : 47 CFR FCC Part 15.247

Received Date : Jan. 10, 2018

Tested Date : Mar. 09 ~ Apr. 10, 2018

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

Taf Testing Laboratory

Report No.: FR811004 Page : 1 of 28



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information	5
1.2	Test Setup Chart	
1.3	Test Equipment List and Calibration Data	7
1.4	Test Standards	
1.5	Measurement Uncertainty	
2	TEST CONFIGURATION	g
2.1	Testing Condition	g
2.2	The Worst Test Modes and Channel Details	
3	TRANSMITTER TEST RESULTS	10
3.1	6dB and Occupied Bandwidth	
3.2	RF Output Power	12
3.3	Power Spectral Density	14
3.4	Emissions in Restricted Frequency Bands	16
3.5	Emissions in non-restricted Frequency Bands	26
4	TEST LABORATORY INFORMATION	28



Release Record

Report No.	Version	Description	Issued Date
FR811004	Rev. 01	Initial issue	May 04, 2018

Report No.: FR811004 Page : 3 of 28



Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	Note ¹	N/A
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 4960.00MHz 53.33 (Margin -0.67dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Power [dBm]: 4.57	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

N/A means Not Applicable.

Note¹: The EUT consumes DC power from battery, so the test is not required.

Report No.: FR811004 Page: 4 of 28



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.	Ant. information	Туре	Connector	Gain (dBi)
1	Brand: Texas Model: CC2511	PIFA	NA	4.5

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3Vdc from battery
-------------------	-------------------

Note: The equipment tests are performed using a new battery.

1.1.4 Accessories

N/A

Report No.: FR811004 Page: 5 of 28



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	Termite, ver. 3.3
Duty cycle of test signal (%)	58.14%
Duty Factor (dB)	2.36

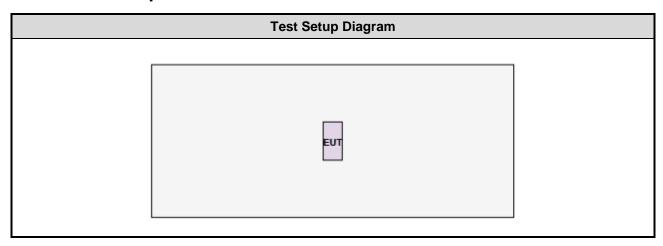
1.1.7 Power Setting

Modulation Mode		Test Frequency (MHz)	
Modulation Mode	2402	2440	2480
GFSK/1Mbps	0b84	0b84	0b84

Report No.: FR811004 Page: 6 of 28



1.2 Test Setup Chart



1.3 Test Equipment List and Calibration Data

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	Dec. 04, 2017	Dec. 03, 2018	
Receiver	R&S	ESR3	101658	Nov. 20, 2017	Nov. 19, 2018	
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 25, 2017	Jul. 24, 2018	
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 20, 2017	Dec. 19, 2018	
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 23, 2017	Nov. 22, 2018	
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2017	Nov. 12, 2018	
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 07, 2017	Dec. 06, 2018	
Preamplifier	EMC	EMC02325	980225	Jul. 28, 2017	Jul. 27, 2018	
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2017	Oct. 05, 2018	
Preamplifier	EMC	EMC184045B	980192	Aug. 22, 2017	Aug. 21, 2018	
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 07, 2017	Dec. 06, 2018	
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 07, 2017	Dec. 06, 2018	
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 07, 2017	Dec. 06, 2018	
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 07, 2017	Dec. 06, 2018	
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 07, 2017	Dec. 06, 2018	
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 07, 2017	Dec. 06, 2018	
Measurement Software	AUDIX	e3	6.120210g	NA	NA	
Note: Calibration Inter	val of instruments liste	d above is one year.				

Report No.: FR811004 Page: 7 of 28



Test Item	Test Item RF Conducted							
Test Site	(TH01-WS)	(TH01-WS)						
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until			
Spectrum Analyzer	R&S	FSV40	101486	Nov. 20, 2017	Nov. 19, 2018			
Power Meter	Anritsu	ML2495A	1241002	Oct. 16, 2017	Oct. 15, 2018			
Power Sensor	Anritsu	MA2411B	1207366	Oct. 16, 2017	Oct. 15, 2018			
DC POWER SOURCE	GW INSTEK	GPC-6030D	EM892433	Oct. 26, 2017	Oct. 25, 2018			
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA			
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is one year.							

1.4 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 v04

1.5 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.: FR811004 Page: 8 of 28



2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	24°C / 62-63%	Akun Chung Vincent Yeh
RF Conducted	TH01-WS	22°C / 63%	Aska Huang

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
Radiated Emissions ≤ 1GHz	BT LE	2402	1Mbps	
Maximum Output Power 6dB bandwidth Power spectral density Radiated Emissions > 1GHz	BT LE	2402, 2440, 2480	1Mbps	

NOTE:

Report No.: FR811004 Page: 9 of 28

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



3 Transmitter Test Results

3.1 6dB and Occupied Bandwidth

3.1.1 Limit of 6dB Bandwidth

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

3.1.2 Test Procedures

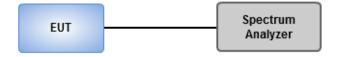
6dB Bandwidth

- 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 = Peak, 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.

3.1.3 Test Setup

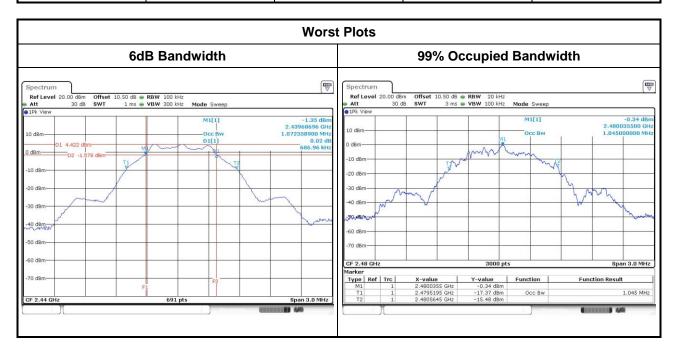


Report No.: FR811004 Page: 10 of 28



3.1.4 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	0.691	1.04	500
BT LE	2440	0.687	1.04	500
BT LE	2480	0.691	1.05	500



Report No.: FR811004 Page: 11 of 28



3.2 RF Output Power

3.2.1 Limit of RF Output Power

Cor	duct	ed power shall not exceed 1Watt.
\boxtimes	Ante	enna gain <= 6dBi, no any corresponding reduction is in output power limit.
	Ante	enna 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

3.2.2 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

1. 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.

3.2.3 Test Setup



Report No.: FR811004 Page: 12 of 28



3.2.4 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	2.864	4.57	30	4.5	9.07	36
BT LE	2440	2.735	4.37	30	4.5	8.87	36
BT LE	2480	2.570	4.10	30	4.5	8.60	36

Mode	Freq. (MHz)	AV Power (mW)	AV Power (dBm)	Limit (dBm)
BT LE	2402	2.786	4.45	
BT LE	2440	2.649	4.23	
BT LE	2480	2.506	3.99	

Note: Average power is for reference only

Report No.: FR811004 Page: 13 of 28



3.3 Power Spectral Density

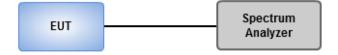
3.3.1 Limit of Power Spectral Density

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

3.3.2 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.
 - 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.

3.3.3 Test Setup

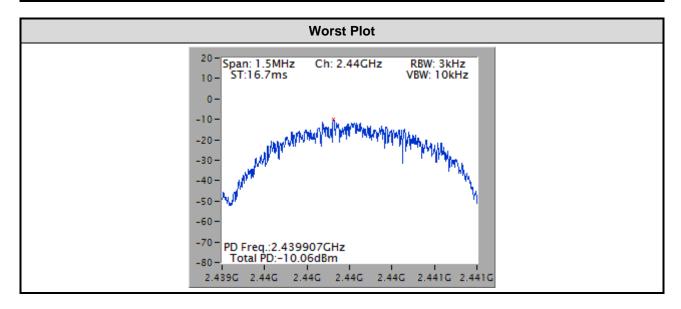


Report No.: FR811004 Page: 14 of 28



3.3.4 Test Result of Power Spectral Density

Mode	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
BT LE	2402	-10.88	8
BT LE	2440	-10.06	8
BT LE	2480	-10.51	8



Report No.: FR811004 Page: 15 of 28



3.4 Emissions in Restricted Frequency Bands

3.4.1 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.

3.4.2 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.

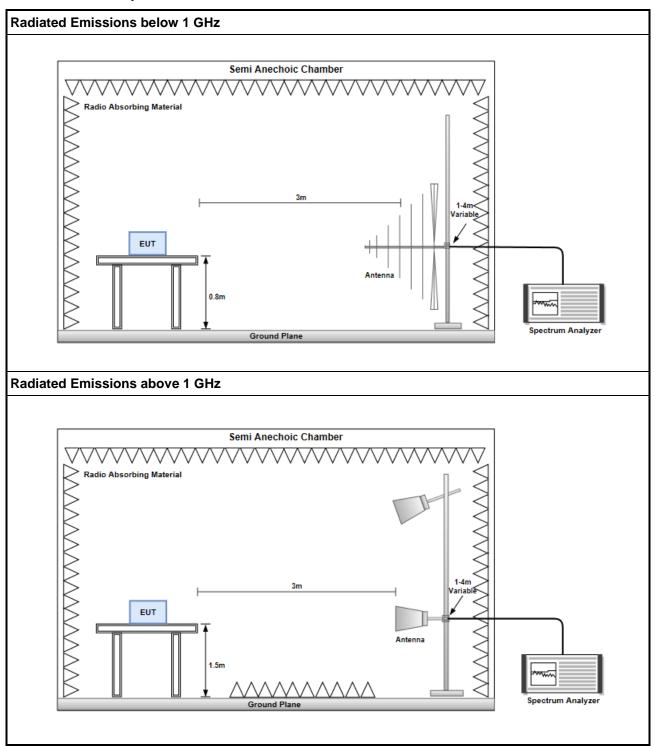
Note:

- 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.: FR811004 Page: 16 of 28



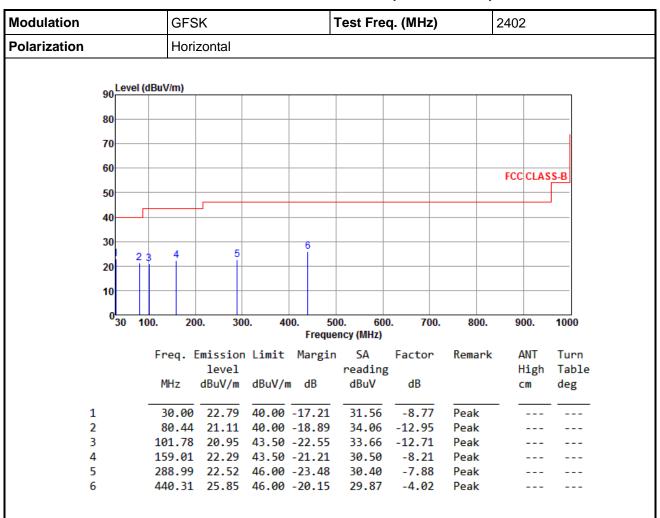
3.4.3 Test Setup



Report No.: FR811004 Page: 17 of 28



3.4.4 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.: FR811004 Page: 18 of 28



Modulation	GFS	GFSK Test Freq. (MHz) 2402								
Polarization	Verti	cal								
	•									
90 Level (dBuV/m)									
00										
80										
70										
60										
00								FCC	CLAS	S-B
50										
40										
1 2										
30 3	1		_ 6							
20			5							
4.0										
10										
0 30 1	00. 20	0. 30	0. 4	00. 50	00. 60	0. 700.	800.	90	00.	1000
				Freque	ency (MHz)					
	Freq. E		Limit	Margin		Factor	Remark		NT	Turn
		level			reading				ligh	Table
	MHz	dBuV/m	dBuV/	m dB	dBuV	dB		C	m	deg
1	32.91	31.91	40.00	-8.09	40.49	-8.58	Peak			
2	55.22	32.18	40.00		40.26	-8.08	Peak			
3	79.47	26.25	40.00	-13.75	39.01	-12.76	Peak			
4	159.01			-14.54	37.17	-8.21	Peak			
5	326.82	21.74		-24.26	28.72		Peak			
6	385.99	24.38	46.00	-21.62	29.73	-5.35	Peak			

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

*Factor includes antenna factor, cable loss and amplifier gain

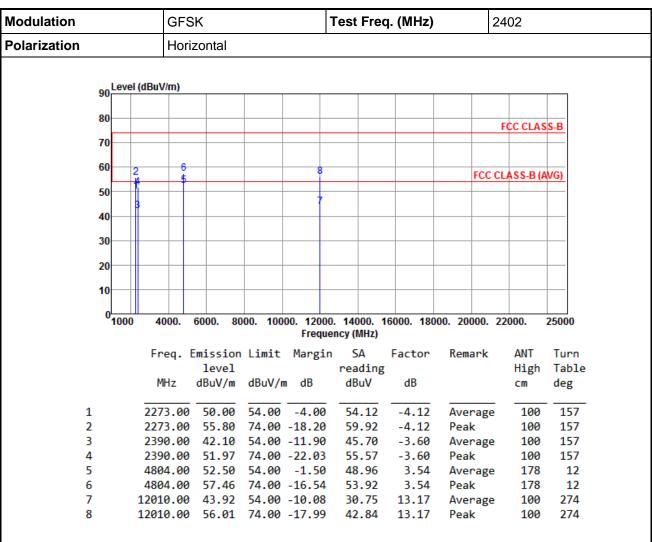
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

Report No.: FR811004 Page: 19 of 28



3.4.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for GFSK



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

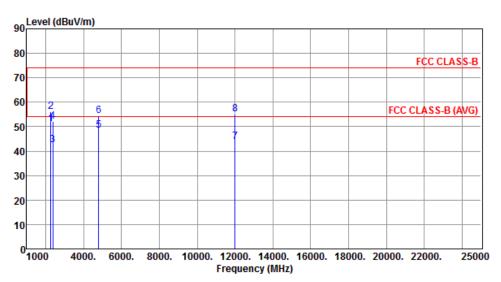
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR811004 Page: 20 of 28



Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Vertical		



	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2273.00	50.99	54.00	-3.01	55.11	-4.12	Average	215	245
2	2273.00	56.27	74.00	-17.73	60.39	-4.12	Peak	215	245
3	2390.00	42.60	54.00	-11.40	46.20	-3.60	Average	169	245
4	2390.00	52.28	74.00	-21.72	55.88	-3.60	Peak	169	245
5	4804.00	48.50	54.00	-5.50	44.96	3.54	Average	135	260
6	4804.00	54.49	74.00	-19.51	50.95	3.54	Peak	135	260
7	12010.00	43.81	54.00	-10.19	30.64	13.17	Average	100	236
8	12010.00	55.04	74.00	-18.96	41.87	13.17	Peak	100	236

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.: FR811004 Page: 21 of 28



Modulation	GFS	K		-	Test Fred	լ. (MHz)	2	440			
Polarization			Horiz	zontal					<u>.</u>		
	90 <mark>l</mark>	Level	(dBuV/m)								
	80										
										FCC CLAS	S-B
	70										
	60	3	8						500.0	LASS-B (A	VC
	50		7	10)				FCC C	.LA33-B (A	vG)
	40			1							
	30										
	20										
	20										
	10										
	0	1000	4000.	6000. 8	8000. 100	00 12000	14000 1	6000 1000	00. 20000. 2	2000	25000
		1000	4000.	0000. 0	100		ncy (MHz)	0000. 1000	JU. 20000. 2	2000.	23000
			Freq. E	missio	n Limit	Margin	SA	Factor	Remark	ANT	Turn
				level			reading			High	Tabl
			MHz	dBuV/m	dBuV/r	m dB	dBuV	dB		cm	deg
:	l		2312.00	44.30	54.00	-9.70	48.25	-3.95	Average	388	17
	2		2312.00	55.75	74.00	-18.25	59.70	-3.95	Peak	388	17
	3		2390.00	39.80		-14.20	43.40	-3.60	Average	388	17
	1		2390.00	51.37		-22.63	54.97	-3.60	Peak	388	17
	5		2483.50			-13.82	43.37	-3.19	Average	388	17
			2483.50	53.33	74.00	-20.67	56.52	-3.19	Peak	388	17
6	, 7		4880.00			-1.26	48.96	3.78	Average	222	6

100

100

315

315

8.14

8.14

Average

Peak

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

7320.00 38.71 54.00 -15.29 30.57

7320.00 50.04 74.00 -23.96 41.90

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

Report No.: FR811004 Page: 22 of 28

Report Version: Rev. 01

9

10



Modulation Polarization			G	GFSK				Te	Test Freq. (MHz)				24	2440		
			V	Vertical												
	90	Level	(dBuV/m)	_											
	80															
															FCC CLAS	S-B
	70															
	60			_												
			26	8	+ -	0								FCC CI	ASS-B (A	VG)
	50					Ĭ										
	40			_		•										
	30															
	30															
	20					Н										
	10					Ш										
	0	1000	4000	. 6	000.	800	00. 100	00. 120	00. 1	4000. 1	16000.	180	00. 20	000. 2	2000.	25000
								Freq	uency	(MHz)						
			Freq	. Er			Limit	Marg:		SA	Fact	tor	Rem	ark	ANT	Tur
					leve	_	15.144			eading		_			High	Tab
			MHz	(iBuV/	m	dBuV/ı	n dB	(dBuV	di	3			CM	deg
	1		2312.	00	40.0	0	54.00	-14.00	a -	43.95	-3.	.95	Ave	rage	100	
	2		2312.	00	51.7			-22.2		55.74	-3.	.95	Pea	_	100	2
	3		2390.		40.0			-13.9		43.67		.60		rage	100	2
	4		2390.		51.9			-22.10		55.50		.60	Pea		100	2
	5		2483.		40.0			-13.98		43.21		.19		rage	100	2
	6		2483.		52.2			-21.78		55.41		.19	Pea		100	2
	7		4880.		49.1		54.00			45.33		.78		rage	180	2
	8		4880.	90	55.1	ŏ	74.00	-18.8	2	51.40	3.	.78	Pea	K	180	2

100

100

8.14

8.14

Average

Peak

282

282

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

7320.00 38.01 54.00 -15.99 29.87

7320.00 49.86 74.00 -24.14 41.72

*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR811004 Page: 23 of 28

Report Version: Rev. 01

9

10



Modulation Polarization			GF	GFSK				q. (MHz)	2480		
			Но	Horizontal							
	90	Level	(dBuV/m)								
	80										
	ου									FCC CLAS	S-B
	70										
	60			6							
		- 2	4 :	5 8					FCC	CLASS-B (A	WG)
	50	-									
	40		3	1 7							
	30										
	30										
	20										
	10										
	0	1000	4000.	6000. 8	000. 100		. 14000. 1 ency (MHz)	16000. 180	00. 20000.	22000.	25000
			Frea.	Emissio	n Limit			Factor	Remark	ANT	Turn
			4.	level		, ₆ -11	reading			High	Table
			MHz	dBuV/m	dBuV/ı	m dB	dBuV	dB		cm	deg
	1		2352.0	0 42.51	54.00	-11.49	46.28	-3.77	Average	136	155
	2		2352.0	0 51.90	74.00	-22.10	55.67	-3.77	Peak	136	155
	3		2483.5			-13.56	43.63	-3.19	Average		155
	4		2483.5	0 53.05	74.00	-20.95	56.24	-3.19	Peak	136	155

236

236

100

100

10

10

295

295

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.: FR811004 Page: 24 of 28

Report Version: Rev. 01

5

6

7

8

4960.00

4960.00

7440.00

53.33

60.57

39.38

7440.00 50.82 74.00 -23.18

54.00

74.00 -13.43

54.00 -14.62

-0.67

49.30

56.54

31.07

42.51

4.03

4.03

8.31

8.31

Average

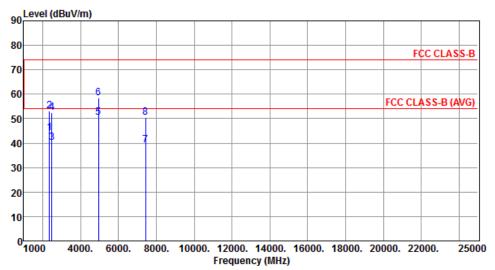
Average

Peak

Peak



Modulation	GFSK	Test Freq. (MHz)	2480
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	2352.00	44.25	54.00	-9.75	48.02	-3.77	Average	357	256
2	2352.00	53.03	74.00	-20.97	56.80	-3.77	Peak	357	256
3	2483.50	40.13	54.00	-13.87	43.32	-3.19	Average	357	256
4	2483.50	52.58	74.00	-21.42	55.77	-3.19	Peak	357	256
5	4960.00	50.43	54.00	-3.57	46.40	4.03	Average	100	27
6	4960.00	58.53	74.00	-15.47	54.50	4.03	Peak	100	27
7	7440.00	39.17	54.00	-14.83	30.86	8.31	Average	100	306
8	7440.00	50.62	74.00	-23.38	42.31	8.31	Peak	100	306

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.: FR811004 Page: 25 of 28



3.5 Emissions in non-restricted Frequency Bands

3.5.1 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.

3.5.2 Test Procedures

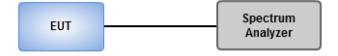
Reference Level Measurement

- 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.

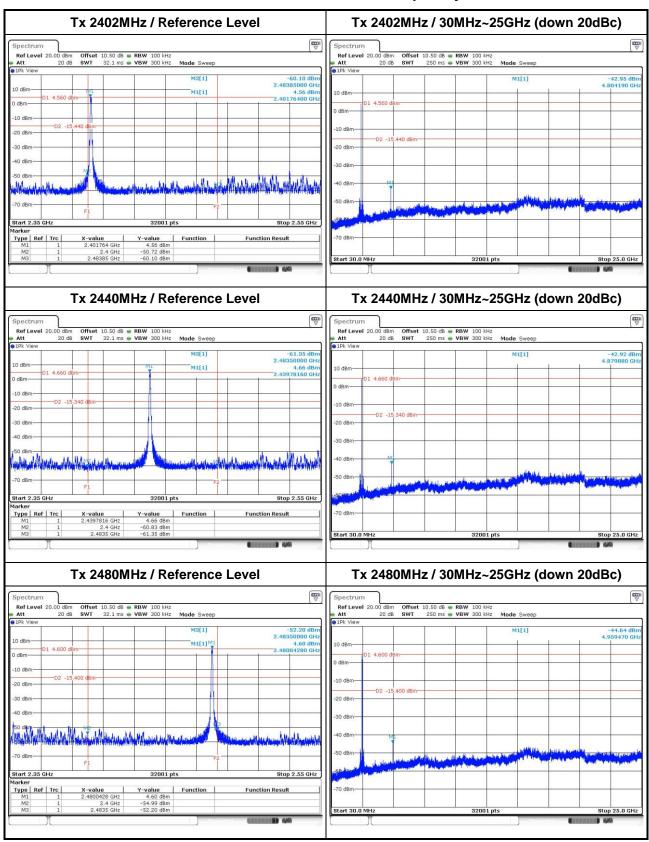
3.5.3 Test Setup



Report No.: FR811004 Page: 26 of 28



3.5.4 Test Result of Emissions in non-restricted Frequency Bands



Report No.: FR811004 Report Version: Rev. 01



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

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.: FR811004 Page: 28 of 28