Maximum Permissible Exposure (MPE) Evaluation Report

Report No.: 161100522TWN-001
Model No.: RB8762G-a-G, RB8762J-a-G, RB8762R-a-G, RB8762K-a-G, RB8762G-c-G, RB8762J-c-G, RB8762R-c-G, RB8762K-c-G, RB8762G-a, R8762J-a, RB8762R-a, RB8762K-a, RB8762G-c, RB8762J-c, RB8762R-c, RB8762K-c, RB-8762-a-HM, RB-8762-c-HM, RB-8762-a-HMG, RB-8762-c-HMG
Issued Date: Nov. 29, 2016

Applicant: Radicom Research, Inc.
2148 Bering Drive San Jose, CA 95131, USA

Test Method/ Standard: FCC 1.1310

Test Site: 93910

Test By: Intertek Testing Services Taiwan Ltd.,
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Testing Laboratory
0597

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Revision History

Report No.	Issue Date	Revision Summary
161100522TWN-001	Nov. 29, 2016	Original report

Table of Contents

Summary of Tests 4

1. General information 5
   1.1 Identification of the EUT 5
   1.2 Additional information about the EUT 6
   1.4 Antenna description 7

2. Test specifications 8
   2.1 Introduction 8
   2.2 RF Exposure Limit 9
   2.3 Operation mode 11
   2.4 Peripherals equipment 12
   2.6 Test equipment 12
   2.7 Test Set-up 12

3. Test results 13

Summary of Tests

MPE Evaluation meet FCC OET No. 65: 1997, IEEE C95.1-2005

Test	Reference	Results
MPE Evaluation	FCC Guidelines for Human Exposure IEEE C95.1	Complies

1. General information

1.1 Identification of the EUT

Product:	BT4.2 module
Model No:	RB8762-c-HM
Operating Frequency:	2402 MHz ~ 2480 MHz
Channel Number:	40 channels
Frequency of Each Channel:	2402+2 k MHz, k＝0~39
Access scheme:	GFSK
Rated Power:	2.35-3.6 V
Power Cord:	N/A
Sample Received:	Nov. 08, 2016
Sample condition:	Workable
Test Date(s):	Nov. 10, 2016 ~ Nov. 28, 2016

Note 1: The test report only allows to be revised within three years from its original issued date unless further standard or the requirement was noticed.
Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.
Note 3: *Except where explicitly agreed in writing, all work and services performed by Intertek is subject to our standard Terms and Conditions which can be obtained at our website:* http://www.intertek-twn.com/terms/ *. Intertek's responsibility and liability are limited to the terms and conditions of the agreement.*

1.2 Additional information about the EUT

The EUT is a BT4.2 module, and was defined as information technology equipment.

Explanation of model designation RB8762

G: general	J: joystick	R: remote controller	K: keyboard
a: print antenna	c: IPEX connector		
G: with G sensor	Null: w/o G sensor	HM: Dual-in-line	

Model Numbers	Description
RB8762G-a-G , RB8762J-a-G , RB8762R-a-G , RB8762K-a-G , RB8762G-a , RB8762J-a , RB8762R-a , RB8762K-a 	Surface mount RB8762 Bluetooth module with on-board antenna.
RB8762G-c-G , RB8762J-c-G , RB8762R-c-G , RB8762G-c-G RB8762K-c-G , RB8762G-c , RB8762J-c , RB8762R-c , RB8762K-c 	Surface mount RB8762 Bluetooth module with on-board U.FL connector for external antenna. Models: RB8762-c-S with Slave Code RB8762-c-M with Master Code
RB8762-(a/c)-HM/HMG 	Dual-in-line, through-hole Bluetooth module. RB8762 mounted on Half Inch PCB for DIP (through-hole) interface.

For more detail features, please refer to user's Manual.

1.4 Antenna description

(1) The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain	: 2.0 dBi
Antenna Type	: Dipole Antenna
Connector Type	: IPEX

(2) The EUT uses a permanently connected antenna.

Antenna Gain	: 2.0 dBi
Antenna Type	: PIFA Antenna
Connector Type	: Fixed

2. Test specifications

2.1 Introduction

The EUT operates in the 2.4 GHz band. Due to the EUT (include antenna) at its normal operation is less than 20cm from the human body, the EUT was defined as a portable device.

According to 1.1307 (b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

2.2 RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b) and KDB 447498 D01 General RF Exposure Guidance v06.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

MHz	30	35	40	45	50	mm
150	232	271	310	349	387	SAR Test Exclusion Threshold (mW)
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

Note: 10-g Extremity SAR Test Exclusion Power Thresholds are 2.5 times higher than the 1-g SAR Test Exclusion Thresholds indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and > 50 mm

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table.

MHz	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
150	387	397	407	417	427	437	447	457	467	477	487	497	507	517	527	
300	274	294	314	334	354	374	394	414	434	454	474	494	514	534	554	
450	224	254	284	314	344	374	404	434	464	494	524	554	584	614	644	
835	164	220	275	331	387	442	498	554	609	665	721	776	832	888	943	
900	158	218	278	338	398	458	518	578	638	698	758	818	878	938	998	
1500	122	222	322	422	522	622	722	822	922	1022	1122	1222	1322	1422	1522	mW
1900	109	209	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	
2450	96	196	296	396	496	596	696	796	896	996	1096	1196	1296	1396	1496	
3600	79	179	279	379	479	579	679	779	879	979	1079	1179	1279	1379	1479	
5200	66	166	266	366	466	566	666	766	866	966	1066	1166	1266	1366	1466	
5400	65	165	265	365	465	565	665	765	865	965	1065	1165	1265	1365	1465	
5800	62	162	262	362	462	562	662	762	862	962	1062	1162	1262	1362	1462	

SAR Test Exclusion Thresholds for < 100 MHz and < 200 mm

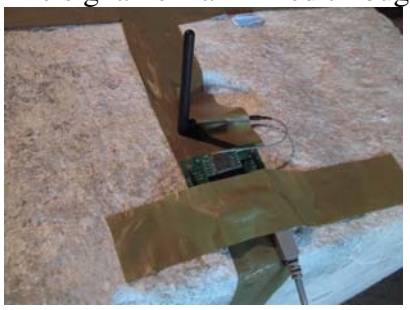
Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table.

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

2.3 Operation mode

TX-MODE is based on the program "BeeMpTool" and the program can select different frequency and modulation.

For RB8762-c-HM
The signal is maximized through rotation and placement in the three orthogonal axes.


X axis


Y axis


Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

For RB8762-a-HM
The signal is maximized through rotation and placement in the three orthogonal axes.


X axis


Y axis


Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

For RB8762-a-HMG
The signal is maximized through rotation and placement in the three orthogonal axes.


X axis


Y axis


Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

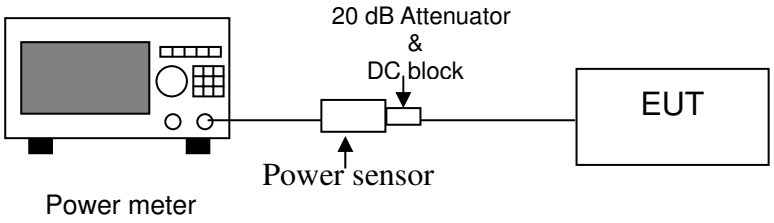
2.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	Description of Data Cable
Notebook PC	DELL	Latitude D610	1YWZKIS	Mini USB cable 0.5 meter

2.6 Test equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Power Meter	Anritsu	ML2495A	0844001	2016/11/09	2017/11/08
Power Sensor	Anritsu	MA2411B	0738452	2016/11/09	2017/11/08
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2016/05/05	2017/05/04

2.7 Test Set-up



Remark: Cable loss = 1.5 dB

3. Test results

Mode	Channel	Frequency (MHz)	Antenna Gain0 (numeric)	Output power to antenna 0 (dBm)	Tune-up Power Tolerance (dB)	Max Tune-up Power (dBm)	Max Tune-up Power (mW)	Limit of SAR Test Exclusion Threshold (mW)
BT 4.2	Low	2402	1.58	-1.00	2.00	1.00	1.26	10.0
	Middle	2442	1.58	-1.00	2.00	1.00	1.26	10.0
	High	2480	1.58	-1.00	2.00	1.00	1.26	10.0

The Output power is maximum value, and the conducted average output power is less than the SAR Test Exclusion Threshold. The SAR is not required to test.