

Test Certificate

We hereby certify that:

The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15 (15.247), Subpart C.

Project No. : 02E2539
Equipment : BT wireless earset
Model No. : more-30
Applicant : DERAN BUSINESS CO., LTD.
14-2, NO. 57, SEC. 2, Tunhua South RD., 106 Taipei, Taiwan

For the evaluation regarding to the EMC standards, as following:

EMI Standards : FCC Part15, Subpart C
ANCI C63.4 : 1992

George Yao

(Authorized Signature)

General Manager

(Title / Position)

Oct. 30, 2002

(Date)

NEUTRON ENGINEERING INC.

No. 132-1, Lane 329, Sec. 2, Palain Rd.,
Shijr Jen, Taipei, Taiwan

TEL : (02) 2646-5426 FAX : (02) 2646-6815

Measurement Report

FCC ID:QPWBTE30This report concerns (check one) : ☒ Original Grant ☐ Class II Change

Issued Date : Oct. 30, 2002
Project No. : 02E2539
Report No. : 02181
Equipment : BT wireless earset
Model No. : more-30
Applicant : DERAN BUSINESS CO., LTD.
14-2, NO. 57, SEC. 2, Tunhua
South RD., 106 Taipei, Taiwan

Tested by :
Neutron Engineering Inc. EMC Laboratory
Data of Test :
Sep. 23,2002 ~ Oct.13,2002

Testing Engineer : Alan Liu
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(George Yao)

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**0659
ILAC MRA**



Code:200145-0

Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

Neutron's reports apply only to the specific samples tested under conditions. It is manufacture' s responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **Neutron** shall have no liability for any declarations , inferences or generalizations drawn by the client or others from **Neutron** issued reports.

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Neutron' s laboratory quality assurance procedures are in compliance with the **ISO Guide 25** or **17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Assessment Authorities	ISO Guide Adopted	Test Standard/Scope/Item Acceptance
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ISO Guide 17025

FCC Part 15 Subpart B/C
IEC/CISPR22
AS/NZS 3548
CNS 13438



ISO Guide 17025

FCC Part 15 Subpart B/C
CISPR 22/EN 55022
AS/NZS 3548
VCCI -Technical Requirement
CNS 13438
SS IEC/CISPR 22
IEC/EN 61000-3-2 IEC/EN 61000-4-5
IEC/EN 61000-3-3 IEC/EN 61000-4-6
IEC/EN 61000-4-2 IEC/EN 61000-4-8
IEC/EN 61000-4-3 IEC/EN 61000-4-11
IEC/EN 61000-4-4

Table of Contents		Page
1 General Information		6
1.1 Applicant		6
1.2 Manufacturer		6
1.3 Equipment Under Tested		6
1.4 OEM Brand/Model		6
1.5 Product Description		6
1.6 Connecting I/O Port(s)		6
1.7 Power Supplied		6
1.8 Products Covered		7
1.9 Model Difference (Series, Versions, if any)		7
1.10 EUT Modifications		7
1.11 Electric Block Diagram		7
1.12 Photos of EUT		7
2 RFI Emissions Measurement		8
2.1 Test Facility		8
2.2 Standard Compliance		8
2.3 Test Conditions and Channel		8
2.4 Test Methodology		8
2.5 Deviations from Standard Test Method		8
2.6 Sample(s) Tested		9
2.7 Measurement Instrument		9
2.8 Measurement Uncertainty		9
2.9 Tested System Set-Up/Configuration Details		9
Table -1 Equipments Used in Tested System		10
Diagram -1 Block diagram showing the configuration of system tested		11
Table - 2 Equipments Used in Tested System		12
Table - 3 Information of Interface Cable		12
2.10 Max.(Worst Case) RF Emission Evaluation		13
2.11 EUT Operation		13
3 Justification		14
3.1 Limitations		14
3.1.1 Power Line Conducted Emission		14
3.1.2 Radiated Emission Limits		14
3.2 Measurement Justification		15
3.2.1 Conducted Emission		15
3.2.2 Radiated Emission		15
3.2.3 Field Strength Calculation		16
3.3 Measurement Data		18
Table 4 Conducted Emission Data		19
Table 5 Radiated Emission Data		19
4 Hopping Channel Carrier Frequency Separated		24
4.1 Applied standard / limit		24

Table of Contents**Page**

4.2 Test Setup	24
4.3 Test Result	24
5. Number of Hopping Channel	25
5.1 Applied standard / limit	25
5.2 Test Setup	25
5.3 Test Result	25
6. Average Time of Occupancy	26
6.1 Applied standard / limit	26
6.2 Test Setup	26
6.3 Test Result	26
7. Bandwidth	27
7.1 Applied standard / limit	27
7.2 Test Setup	27
7.3 Test Result	27
8. Peak Output Power	28
8.1 Applied standard / limit	28
8.2 Test Setup	28
8.3 Test Result	28
9. Antenna conducted Spurious Emission	29
9.1 Applied standard / limit	29
9.2 Test Setup	29
9.3 Test Result	29
10. Maximum Permissible Exposure (MPE)	30
10.1 Applied standard / limit	30
10.2 Test Setup	30
10.3 Test Result	30
11 Attachment	31
A. Electric Block Diagram	32
B. EUT Modification Description	33
C. EUT Test Photos	34
D. EUT Photos	35
E. User' s Manual	36
F. Hopping Channel Carrier Frequency Separated	37
G. Number of Hopping Channel	38
H. Average Time of Occupancy	39
I. Bandwidth	40
J. Peak Output Power	41
K. Antenna conducted Spurious Emission	42
L. Laboratory Accreditation Certificate	43

1. General Information**1.1 Applicant**

Name DERAN BUSINESS CO., LTD.

Address 14-2, NO. 57, SEC. 2, Tunhua South RD., 106 Taipei, Taiwan

1.2 Manufacturer

Name N/A

Address N/A

1.3 Equipment Under Tested

Name: BT wireless earset

Trade Name: Deran

Model No.: more-30

1.4 OEM Brand/Model (if applicable)

OEM Brand(s)/Model(s) except the basic model in sub-clause 1.3 is(are) the follows:

OEM Brand: N/A

Model No.: N/A

1.5 Product Descriptions (Application/Features/Specification)

The EUT is a BT wireless earset. A major technical descriptions of EUT is described as following:

Operation Frequency	2402-2480MHz
Modulation Type	FHSS
Antenna Designation	Integral
Antenna Gain	3dBi
Transfer Rate	1Mbps
Output Power	-3.04dBm(Max)
Number Of Channel	79
Channel List	Please refer to the next page

Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual (Attachment - E.)

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	31	2432	61	2462
02	2403	32	2433	62	2463
03	2404	33	2434	63	2464
04	2405	34	2435	64	2465
05	2406	35	2436	65	2466
06	2407	36	2437	66	2467
07	2408	37	2438	67	2468
08	2409	38	2439	68	2469
09	2410	39	2440	69	2470
10	2411	40	2441	70	2471
11	2412	41	2442	71	2472
12	2413	42	2443	72	2473
13	2414	43	2444	73	2474
14	2415	44	2445	74	2475
15	2416	45	2446	75	2476
16	2417	46	2447	76	2477
17	2418	47	2448	77	2478
18	2419	48	2449	78	2479
19	2420	49	2450	79	2480
20	2421	50	2451		
21	2422	51	2452		
22	2423	52	2453		
23	2424	53	2454		
24	2425	54	2455		
25	2426	55	2456		
26	2427	56	2457		
27	2428	57	2458		
28	2429	58	2459		
29	2430	59	2460		
30	2431	60	2461		

1.6 Connecting I/O Port(s)

Please refer to the User's Manual (Attachment - **E.**)

1.7 Power Supplied

Power Source: Battery supplied

Power Cord: N/A

Power Rating: DC 3.7 Vdc

1.8 Products Covered (if applicable)

The sample tested including the following sub-system/module/accessory :

Sub-system/ Module/ Accessory	Model/Type No.	Int. Inst./ Ext. Cont.
Adapter (1)	N/A	N/A

Note:(1) The EUT can not answer incoming and outgoing call during recharging battery. by adapter.

1.9 Model Difference (Series, Versions, if any)

Except the basic model no. (model designation of the sample tested in this test report), additional model no. covered is(are) :

N/A

1.10 EUT Modifications (if applicable)

No any modification required for the EUT to comply with the standards.

1.11 Electric Block Diagram

Please refer to the Attachment – **A.**

1.12 Photos of EUT

Please refer to the Attachment – **D.**

2. RFI Emissions Measurement

2.1 Test Facility

The test facilities used to collect the test data in this report located at No.132-1, Lane 329, Sec. 2 Palain Road, Shijr City, Taipei, Taiwan.

2.2 Standard Compliance

The test data contained in this report relate only to the item(s) listed below :

FCC Part15, Subpart C / ANCI C63.4 : 1992

The composite system (including receiver and transmitter) in compliance with Subpart B is authorized under a DoC procedure.

2.3 Test Conditions and Channel

Test Channel (1)	EUT Channel	Test Frequency(MHz)
1	CH 1	2402
2	CH 40	2441
3	CH 79	2480

Note:

- (1)The measurements are performed at the highest, middle, lowest available channels with the hopping function disabled.
- (2)Unless otherwise specified the above condition, the test was performed while EUT had its hopping function enabled.

2.4 Test Methodolog

Both conducted and radiated testing were performed during the max. EMI emission evaluation.

Test procedures according to the technical standards : (Antenna to EUT distance is 3 m)

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.207	Conducted Emission	Class B	0.15-30	PASS
15.247 (a)(1)	Hopping Channel Carrier Frequency Separated	$\geq 25\text{KHz}$ or the 20dB bandwidth of the hopping channel	2400-2483.5	PASS
15.247 (a)(1)(ii)	Number of Hopping Channel		2400-2483.5	PASS
15.247 (a)(1)(ii)	Average Time of Occupancy	$\leq 0.4 \text{ sec}$ (a 30 second period)	2400-2483.5	PASS
15.247 (a)(1)(ii)	Bandwidth	$\leq 1\text{MHz}$ (20dB bandwidth)	2400-2483.5	PASS
15.247 (b)(1)	Peak Output Power	1 watt or 30dBm (at least 75 hopping channel)	2400-2483.5	PASS
15.247 (c)	Antenna conducted Spurious Emission	20dB less than the peak value of fundamental frequency	30-25000	PASS
15.247 (c)	Radiated Spurious Emission	15.209(a)	30-25000	PASS

2.5 Deviations from Standard Test Method

N/A

2.6 Sample(s) Tested

The representative sample tested in this reports is(are): more-30

Test results in this test report relate only to the sample(s) tested.

The EUT has been tested according to the following environmental condition:

Input Power	DC:3.7V or AC:120V/60Hz(only for charging mode)
Temperature	24
Relative Humidity	58 %

2.7 Measurement Instruments

Valid measurement instruments used in this report refer to **Table-1** enclosed.

2.8 Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 % , $U=2xUc(y)$

Radiated Emission Measurement ± 2.47 dB

Conducted Emission Measurement ± 2.29 dB

2.9 Tested System Set-Up/Configuration Details

The system was configured for testing in a typical fashion (as a user would normally use) or in accordance with the operating configuration specified in the user's manual. A Block Diagram(please refer to the Diagram - 1) and Photos(please refer to the attachment - **C**) showing the set-up/configuration of system tested. In addition, **Table-2** and **Table-3** provide a detail of all equipment items and cables information used in the system tested.

Table -1 Measurement Instruments List

Item	Instruments	Mfr/Brand	Model/Type No.	Serial No.	Calibrated Date	Next Cali. Date	Note
1	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2002-10-24	2003-10-23	✓
2	LISN	Rolf Heine	NNB-2/16Z	98083	2002-10-20	2003-10-19	✓
3	LISN	Rolf Heine	NNB-2/16Z	98053	2001-11-22	2002-11-21	✓
4	Quasi-Peak Adapter	HP	85650A	2521A00844	2002-10-08	2003-10-07	✓
5	RF Pre-Selector	HP	85685A	2648A00417	2002-10-08	2003-10-07	✓
6	Spectrum Analyzer	HP	85680B	2634A03025	2002-10-08	2003-10-07	✓
7	Spectrum Monitor	HP	85662B	2648A13616	2002-10-08	2003-10-07	✓
8	Pre-Amplifier	Anritsu	MH648A	M09961	2001-12-10	2002-12-09	✓
9	Test Receiver	MEB	SMV41	130	2001-12-05	2002-12-04	✓
10	Pulse Limiter	Electro-Metrics	EM-7600	112644	2001-12-10	2002-12-19	✓
11	Test Receiver	R&S	ESMI	843977/008	2001-11-19	2002-11-18	✓
12	Test Receiver	R&S	ESAI	844348/008	2001-11-19	2002-11-18	✓
13	Signal Generator	R&S	SMT06	832080/007	2002-03-26	2003-03-25	✓
14	Microwave Pre-Amplifier	Agilent	8449B	3008A071714	2002-03-01	2003-02-28	✓
15	Horn Ant.	Emco	3115	9605-4803	2002-05-20	2003-05-19	✓
16	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A	N/A	✓
17	Turn Table	Chance Most	CMTB-1.5	N/A	N/A	N/A	✓

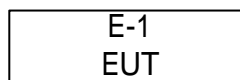
Remark :

(1)" ✓" indicates the instrument used in Test Report.

(2)" N/A" denotes No Model No. / Serial No. and No Calibration specified.

Diagram - 1
Block diagram showing the configuration of system tested

Mode: TX/RX



Mode: Charge mode

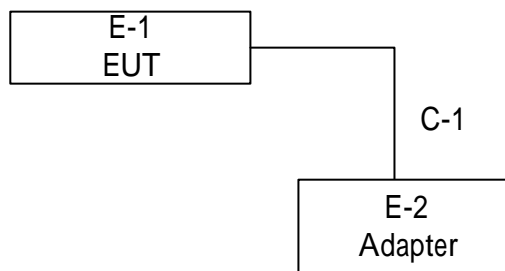


Table - 2 Equipments Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	BT wireless earset	Deran	more-30	QPWBTE30	N/A	EUT

Note:

- (1) Unless otherwise denoted as EUT in 'Remark' column , device(s) used in tested system is a support equipment.
- (2) Unless otherwise marked as in 'Remark' column, Neutron consigns the support equipment to the tested system.
- (3) The support equipment was authorized by Declaration of Confirmation.

Table - 3 Information of Interface Cable

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	100Cm	

Note:

- (1) Unless otherwise marked as in 'Remark' column, Neutron consigns the support equipment to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in 'Length' column.

2.10 Max.(Worst Case) RF Emission Evaluation

- (a) Both conducted and radiated testing were performed during the max. EMI emission evaluation.
- (b) The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit & receive during test. This operating condition was tested and used to collect the included data.
- (c) To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of this EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.
These operation modes were used for final testing and collecting test data included in this report.

2.11 EUT Operation

The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use. The measurements are performed at the highest (CH1), middle (CH40), lowest (CH79) available channels with the hopping function disabled. Unless otherwise specified the above condition, the test was performed while EUT had its hopping function enabled.

3. Justification

3.1 Limitations

3.1.1 Power Line Conducted Emission

Measurement Frequency Range (MHz)	Mains Terminal Class A Limits (dBuV)		Mains Terminals Class B Limits (dBuV)		Note CISPR FCC Std.
	QP Mode	AV Mode	QP Mode	AV Mode	
0.15 - 0.50	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 - 5.00	73.00	60.00	56.00	46.00	CISPR
5.00 - 30.0	73.00	60.00	60.00	50.00	CISPR
0.45-1.705	60.00	N/A	48.00	N/A	FCC
1.705-30.0	69.50	N/A	48.00	N/A	FCC

Notes:

- (1). The tighter limit applies at the band edges.
- (2). The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

3.1.2 Radiated Emission Limits (Frequency Range 30MHz-1000MHz)

Measurement Frequency Range (MHz)	Quasi-Peak Mode Class A Limits (dBuV/m)		Quasi-Peak Mode Class B Limits (dBuV/m)		Note CISPR FCC Std.
	10m	30m	10m	3m	
30.00 -230.00	40.00	30.00	30.00	40.00	CISPR
230.0 -1000.0	47.00	37.00	37.00	47.00	CISPR
30.00 - 88.00	39.00	N/A	30.00	40.00	FCC
88.00 - 216.0	43.50	N/A	33.50	43.50	FCC
216.0 -960.0	46.00	N/A	36.00	46.00	FCC
above 960.0	49.50	N/A	46.00	54.00	FCC

Notes:

- (1). The tighter limit applies at the band edges.
- (2). Emission level (dBuV/m)=20log Emission level (uV/m).
- (3). A measuring distance of 10m is a primary used. However, either 3m or 10m (instead of 10m) distance may be allowed. If the distance is 3m, add 10dB to the QP-limit above. If the distance is 10m, subtract 10dB from the QP-limit above.

3.2 Measurement Justification

3.2.1 Conducted Emission

The EUT is placed on a table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** were made with a **Spectrum Analyzer** using **CISPR Quasi-Peak detector mode**.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and these signals are then Quasi Peak detector mode and/or Average detector mode re-measured. Data of **Table - 4** lists the significant emission frequencies, measured levels, limits and safe margins. All readings are Peak Mode measured unless otherwise stated as QP or AV in column of " Remark ".

If the Peak Mode measured value lower than both QP Mode and AV Mode Limit, EUT shall be deemed to compliance with both QP & AV Limits and then no additional QP Mode or AV Mode measurement performed.

If additional QP or AV Mode measurement needed, and if the QP Mode measured value compliance with the QP Mode Limit and lower than AV Mode Limit, the EUT shall be deemed to meet both QP & AV Limits and then only QP Mode was measured, but AV Mode was not performed.

3.2.2 Radiated Emission

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak, Peak or Average detector mode re-measured.

Data of **Table – 5** lists the significant emission frequencies, measured levels, limits and safe margins. All readings are Peak Mode measured unless otherwise stated as QP or AV in column of " Remark ".

If the Peak Mode measured value compliance with and lower than Quasi Peak or Average Mode Limit, the EUT shall be deemed to meet QP/AV Limits and then no additional QP/AV Mode measurement performed.

3.2.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as **FS = RA + AF + CL - AG**

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor (1)

CL = Cable Attenuation Factor(Cable Loss) (1)

AG = Amplifier Gain (1)

Remark :

(1) The Correction Factor = AF + CL - AG, as shown in the data tables' Correction Factor column.

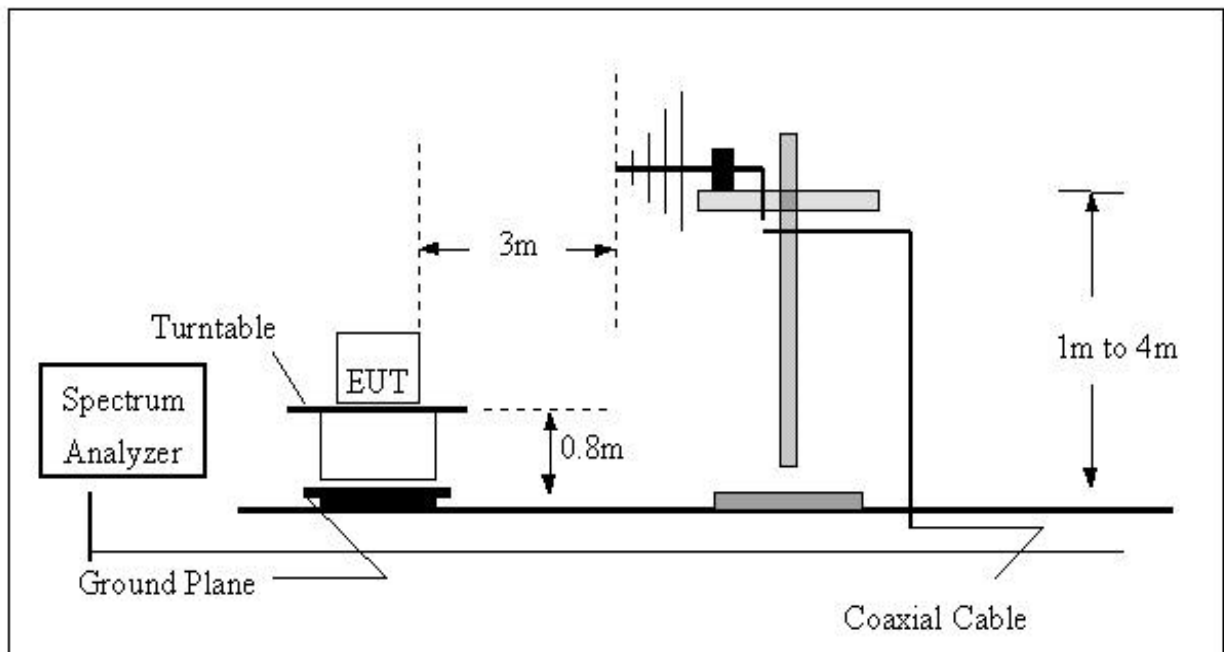
3.3 Measurement Data

Table - 4. Conducted Emission Data (charge mode)

Table - 5. Radiated Emission Data (30-1000MHz)

Radiated Emission Data (above 1000MHz)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz

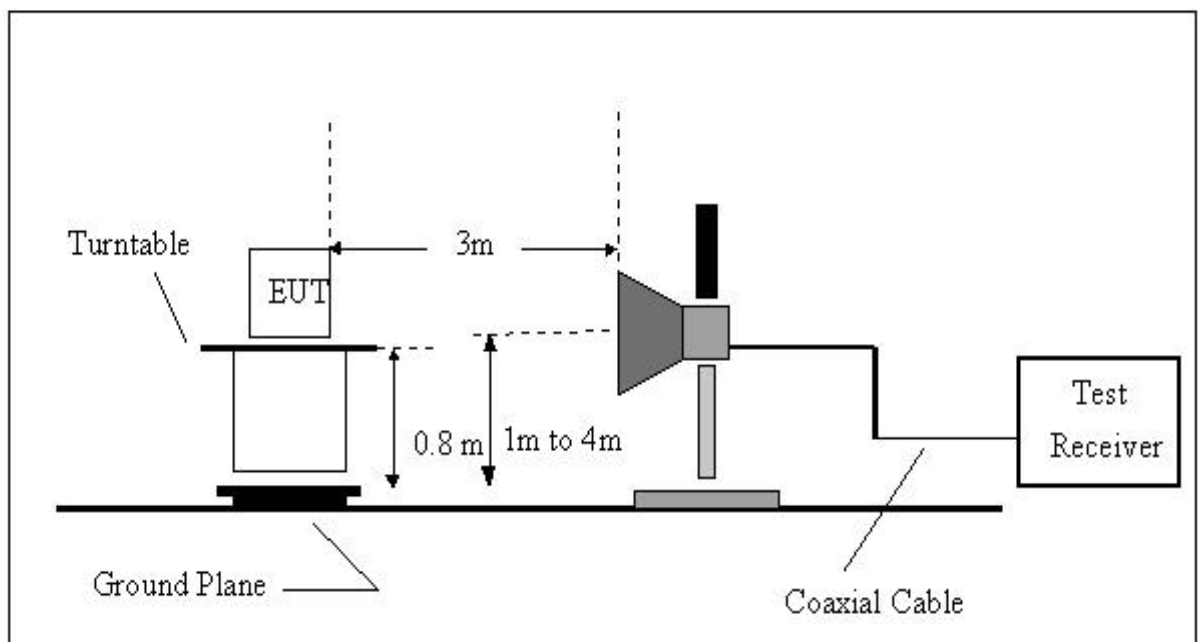


Table 4 Conducted Emission Data

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

CHARGE MODE(TX/RF OFF)

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe (dBuV)	Margins Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.27	Line	47.11	*	61.00	51.00	-13.89	(QP)
0.69	Line	43.71	*	56.00	46.00	-12.29	(QP)
0.83	Line	44.21	36.80	56.00	46.00	-9.20	(AV)
1.23	Line	44.17	27.80	56.00	46.00	-11.83	(QP)
1.40	Line	43.54	*	56.00	46.00	-12.46	(QP)
2.78	Line	42.17	*	56.00	46.00	-13.83	(QP)
0.29	Neutral	47.81	*	60.58	37.40	-12.77	(QP)
0.71	Neutral	43.21	*	56.00	46.00	-12.79	(QP)
0.85	Neutral	42.31	*	56.00	46.00	-13.69	(QP)
1.28	Neutral	43.46	*	56.00	46.00	-12.54	(QP)
1.44	Neutral	41.94	*	56.00	46.00	-14.06	(QP)

Remark

- (1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector RBW=9KHz ; SPA setting in RBW=10KHz,VBW =10KHz, Sweep Time = 0.3 sec./MHz. Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=1MHz,VBW=10Hz, Sweep Time =0.3 sec./MHz.
- (2) All readings are QP Mode value unless otherwise stated AVG in column of 『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “*” marked in AVG Mode column of Interference Voltage Measured.
- (3) Measuring frequency range from 150KHz to 30MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

Table 5 Radiated Emission Data (30-1000MHz)

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

CHARGE MODE(TX/RF OFF)

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Safe Margins (dBuV/m)	Note
38.000	H	40.60	- 12.12	28.48	40.00	- 11.52	QP
53.800	H	32.11	- 12.25	19.86	40.00	- 20.14	
54.200	V	41.30	- 12.27	29.03	40.00	- 10.97	
72.060	V	45.60	- 14.90	30.70	40.00	- 9.30	
87.100	H	39.20	- 15.22	23.98	40.00	- 16.02	
124.810	V	37.90	- 11.50	26.40	43.50	- 17.10	
137.640	V	39.50	- 10.73	28.77	43.50	- 14.73	
159.000	V	48.90	- 10.14	38.76	43.50	- 4.74	
167.020	V	35.70	- 10.66	25.04	43.50	- 18.46	
512.800	V	35.30	- 5.59	29.71	46.00	- 16.29	
528.000	H	29.70	- 5.20	24.50	46.00	- 21.50	
562.765	V	31.10	- 4.44	26.66	46.00	- 19.34	

Remark :

- (1) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 25GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = 200 ms
- (2) All readings are Peak unless otherwise stated QP in column of 'Note'. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission.
- (5) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Table 5 Radiated Emission Data (30-1000MHz)

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

The following table lists worst case data from TX / RX with various bitrates on various channels.

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Safe Margins (dBuV/m)	Note
46.000	H	34.70	- 12.15	22.55	40.00	- 17.45	
50.600	V	31.10	- 12.09	19.01	40.00	- 20.99	
60.100	V	31.30	- 12.82	18.48	40.00	- 21.52	
60.900	H	31.00	- 12.94	18.06	40.00	- 21.94	
67.700	H	34.40	- 14.03	20.37	40.00	- 19.63	
319.200	V	37.70	- 9.65	28.05	46.00	- 17.95	
323.200	V	35.00	- 9.54	25.46	46.00	- 20.54	
420.000	V	32.60	- 7.50	25.10	46.00	- 20.90	
468.000	V	33.20	- 6.41	26.79	46.00	- 19.21	
496.000	H	31.10	- 5.96	25.14	46.00	- 20.86	
506.000	V	30.67	- 5.72	24.95	46.00	- 21.05	
587.200	V	29.30	- 3.66	25.64	46.00	- 20.36	

Remark :

- (1) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 25GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = 200 ms
- (2) All readings are Peak unless otherwise stated QP in column of 'Note'. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes harmonic frequency. "E" denotes band edge frequency.
- (4) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission.
- (5) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Table 5 Radiated Emission Data (above 1000MHz)

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

CH1(2402MHz) The following table lists worst case data from TX/RX with various orthogonal planes on the EUT Antenna.

Freq. (MHz)	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV (dBuV)	Ant/CF CF(dB)	Peak Act. (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV (dBuV/m)	NOTE
1204.4	V	73.72	67.70	-17.29	56.43	50.41	74.00	54.00	Y
4804.0	V	51.84	-	-6.1	45.74	-	74.00	54.00	Y/H
7206.0	V	46.07	-	-1.87	44.20	-	74.00	54.00	Y/H
9608.0	V	39.24	-	0.18	39.42	-	74.00	54.00	Y/H
12010.0	V	-	-	-	-	-	74.00	54.00	H
14412.0	V	-	-	-	-	-	74.00	54.00	H
1204.4	H	71.74	65.04	-17.29	54.45	47.75	74.00	54.00	X
4804.0	H	50.21	45.17	-6.13	44.08	39.04	74.00	54.00	Z/H
7206.0	H	46.07	41.32	-1.87	44.20	39.45	74.00	54.00	Y/H
9608.0	H	-	-	-	-	-	74.00	54.00	H
12010.0	H	-	-	-	-	-	74.00	54.00	H
14412.0	H	-	-	-	-	-	74.00	54.00	H

Remark :

- (1) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 25GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = 200 ms
- (2) All readings are Peak unless otherwise stated QP in column of 'Note'. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes harmonic frequency. "E" denotes band edge frequency.
- (4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission.
- (5) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) EUT Orthogonal Axes :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Table 5 Radiated Emission Data (above 1000MHz)

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

CH40(2441MHz) The following table lists worst case data from TX/RX with various orthogonal planes on the EUT Antenna.

Freq. (MHz)	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV (dBuV)	Ant/CF CF(dB)	Peak Act. (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV (dBuV/m)	NOTE
1222.6	V	76.85	68.40	-17.23	59.62	51.17	74.00	54.00	Y
4882.0	V	51.96	44.26	-5.89	46.07	38.37	74.00	54.00	Z/H
7323.0	V	44.67	39.20	-1.45	43.22	37.75	74.00	54.00	Y/H
9764.0	V	-	-	-	-	-	74.00	54.00	H
12205.0	V	-	-	-	-	-	74.00	54.00	H
14646.0	V	-	-	-	-	-	74.00	54.00	H
1222.6	H	71.60	64.30	-17.23	54.37	47.07	74.00	54.00	Z
4882.0	H	54.35	48.26	-5.89	48.46	42.37	74.00	54.00	Z/H
7323.0	H	39.21	33.10	-1.45	37.76	31.65	74.00	54.00	Z/H
9764.0	H	-	-	-	-	-	74.00	54.00	H
12205.0	H	-	-	-	-	-	74.00	54.00	H
14646.0	H	-	-	-	-	-	74.00	54.00	H

Remark :

- (1) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 25GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = 200 ms
- (2) All readings are Peak unless otherwise stated QP in column of "Note". Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes harmonic frequency. "E" denotes band edge frequency.
- (4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission.
- (5) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) EUT Orthogonal Axes :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Table 5 Radiated Emission Data (above 1000MHz)

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

CH79(2480MHz) The following table lists worst case data from TX/RX with various orthogonal planes on the EUT Antenna.

Freq. (MHz)	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV (dBuV)	Ant/CF CF(dB)	Peak Act. (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV (dBuV/m)	NOTE
1242.2	V	75.68	68.12	-17.18	58.50	50.94	74.00	54.00	Y
4960.0	V	52.75	46.32	-5.74	47.01	40.58	74.00	54.00	Z/H
7440.0	V	43.17	36.17	-0.95	42.22	35.22	74.00	54.00	X/H
9920.0	V	-	-	-	-	-	74.00	54.00	H
12400.0	V	-	-	-	-	-	74.00	54.00	H
14880.0	V	-	-	-	-	-	74.00	54.00	H
1242.2	H	69.23	62.13	-17.18	52.05	44.95	74.00	54.00	X
4960.0	H	54.58	48.60	-5.74	48.84	42.86	74.00	54.00	Z/H
7440.0	H	37.11	31.45	-0.95	36.16	30.50	74.00	54.00	Z/H
9920.0	H	-	-	-	-	-	74.00	54.00	H
12400.0	H	-	-	-	-	-	74.00	54.00	H
14880.0	H	-	-	-	-	-	74.00	54.00	H

Remark :

- (1) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 25GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = 200 ms
- (2) All readings are Peak unless otherwise stated QP in column of 'Note'. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes harmonic frequency. "E" denotes band edge frequency.
- (4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission.
- (5) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) EUT Orthogonal Axes :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity

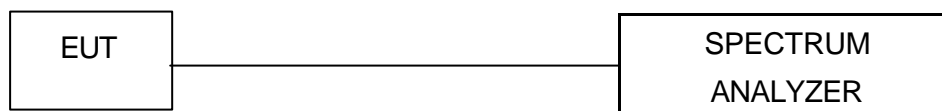
4. Hopping Channel Carrier Frequency Separated

4.1 Applied Standard / limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Hopping Channel Carrier Frequency Separated	$\geq 25\text{KHz}$ or the 20dB bandwidth of the hopping channel	2400-2483.5	PASS

4.2 Test Setup

- (1) EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- (2) Spectrum Setting : RBW= 100KHz, VBW=100KHz,Sweep time = 200 ms.



4.3 Test Result

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Please refer to the attachment F.

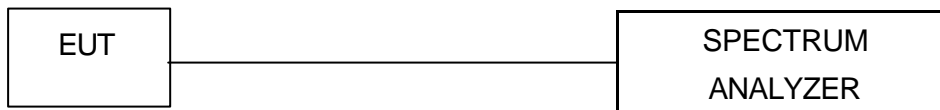
Hopping Channel Carrier Frequency Separated	LIMIT (KHz)
1 MHz	≥ 25

5 Number of Hopping Channel**5.1 Applied Standard / limit**

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Frequency Range (MHz)
15.247 (a)(1)(ii)	Number of Hopping Channel	2400-2483.5

5.2 Test Setup

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- (2) Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

**5.3 Test Result**

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)
Please refer to the attachment G.

Number of Hopping Channel	79
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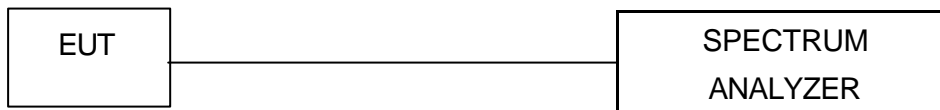
6 Average Time of Occupancy

6.1 Applied Standard / limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(ii)	Average Time of Occupancy	≤ 0.4 sec (a 30 second period)	2400-2483.5	PASS

6.2 Test Setup

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- (2) Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.



6.3 Test Result

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Please refer to the attachment H.

The EUT total hops / second (1)	1600 times (Bluetooth Standard)
Total channel (2)	79
each channel hops/second (3)=(1)/(2)	20.25 times
each channel hops in 30 second (4)=30 x(3)	607.5 times
Average time of signal channel occupancy (5)	400ms(see plot below)
Average Time of Occupancy (6)=(4) x (5)	0.26 second
LIMIT(second)	≤ 0.4 second

7 Bandwidth

7.1 Applied Standard / limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(ii)	Bandwidth	$\leq 1\text{MHz}$ (20dB bandwidth)	2400-2483.5	PASS

7.2 Test Setup

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- (2) Spectrum Setting : RBW= 10KHz, VBW=30KHz, Sweep time = 200 ms.



7.3 Test Result

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Please refer to the attachment I.

CH	CH Frequency (MHz)	Bandwidth (KHz)	LIMIT (MHz)
1	2402	720	≤ 1
40	2441	729.9	≤ 1
79	2480	744	≤ 1

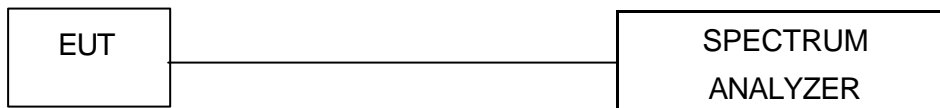
8 Peak Output Power

8.1 Applied Standard / limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(1)	Peak Output Power	1 watt or 30dBm (at least 75 hopping channel)	2400-2483.5	PASS

8.2 Test Setup

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- (2) Spectrum Setting : RBW= 3MHz, VBW= 3MHz, Sweep time = 200 ms.



8.3 Test Result

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Please refer to the attachment J.

CH	CH Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
1	2402	-5.15	30	1
40	2441	-3.04	30	1
79	2480	-4.46	30	1

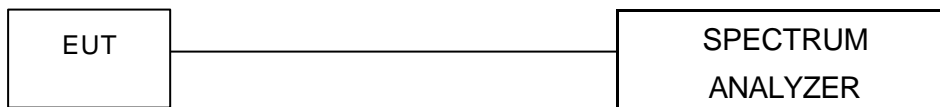
9 Antenna conducted Spurious Emission

9.1 Applied Standard / limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (c)	Antenna conducted Spurious Emission	20dB less than the peak value of fundamental frequency	30-25000	PASS

9.2 Test Setup

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- (2) Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.



9.3 Test Result

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Please refer to the attachment K.

The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2400	-46.08	2438	-3.52
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band, that contains the highest level of the desired power.			

10 RF Exposure**9.1 Applied Standard / limit**

Based upon the new TCB exclusion list published by FCC on July 2002	
Frequency Range(MHz)	Limit (mw)
2402-2480	60/f(GHz) note: f (GHz) is the mid band frequency of transmitter

9.2 Test Result

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Peak output power (dBm)	Ant Gain (dBi)	EIRP (1)		LIMIT(2) (mw)	Result
		(dBm)	mW		
-3.04	3	-0.04	0.99	24.5	PASS

NOTE:

(1) EIRP= Peak output power + Ant Gain

(2) LIMIT=60/2.441(GHz)=24.5(mw)

Attachment

Table Contents

- A. Electric Block Diagram
- B. EUT Modification Description
- C. EUT Photos
- D. EUT Test Photos
- E. User's Manual
- F. Hopping Channel Carrier Frequency Separated
- G. Number of Hopping Channel
- H. Average Time of Occupancy
- I. Bandwidth
- J. Peak Output Power
- K. Antenna conducted Spurious Emission
- L. Laboratory Accreditation Certificate

Attachment - A.

Electric Block Diagram

Attachment - B.

EUT Modification Description

Attachment - C.

EUT Test Photos

- 1. Conducted Measurement Photos**
- 2. Radiated Measurement Photos**

Attachment – D

EUT Photos

- 1. Photo # 1 Front View**
- 2. Photo # 2 Front View / Rear View**
- 3. Photo # 3-5 Unit Partially Disassembled**
- 4. Photo # 6 Front View / Rear View**
- 5. Photo # 7-9 Unit Partially Disassembled**

Attachment – E

User's Manual

Attachment - L.

Laboratory Accreditation Certificate