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FCC TEST REPORT (BLUETOOTH/DTS)

REPORT NO.: RF140212E04J-1

MODEL NO.: AR5B22-SB

FCC ID: PPD-AR5B22SB

IC: 4104A-AR5B22SB

RECEIVED: Oct. 24, 2014

TESTED: Oct. 24 to Nov. 14, 2014

ISSUED: Nov. 19, 2014

APPLICANT: Qualcomm Atheros, Inc.

ADDRESS: 1700 Technology Drive, San Jose, CA 95110

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
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TABLE OF CONTENTS

RELEASE CONTROL RECORD	4
1 CERTIFICATION	5
2 SUMMARY OF TEST RESULTS	6
2.1 MEASUREMENT UNCERTAINTY	7
3 GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT(BLUETOOTH/DTS).....	8
3.2 DESCRIPTION OF ANTENNA.....	10
3.3 DESCRIPTION OF TEST MODES	11
3.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:	12
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS	15
3.6 DUTY CYCLE OF TEST SIGNAL	16
3.7 DESCRIPTION OF SUPPORT UNITS	17
3.8 CONFIGURATION OF SYSTEM UNDER TEST	17
4 TEST PROCEDURES AND RESULTS(BT-EDR)	18
4.1 MAXIMUM PEAK OUTPUT POWER.....	18
4.1.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	18
4.1.2 INSTRUMENTS	18
4.1.3 TEST PROCEDURES.....	18
4.1.4 DEVIATION FROM TEST STANDARD	18
4.1.5 TEST SETUP	19
4.1.6 EUT OPERATING CONDITION	19
4.1.7 TEST RESULTS	20
4.2 AVERAGE OUTPUT POWER.....	22
4.2.1 FOR REFERENCE.....	22
4.2.2 INSTRUMENTS	22
4.2.3 TEST PROCEDURES.....	22
4.2.4 TEST SETUP	22
4.2.5 EUT OPERATING CONDITION	22
4.2.6 TEST RESULTS	23
4.3 RADIATED EMISSION MEASUREMENT.....	24
4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT	24
4.3.2 TEST INSTRUMENTS	25
4.3.3 TEST PROCEDURES.....	26
4.3.4 DEVIATION FROM TEST STANDARD	26
4.3.5 TEST SETUP	27
4.3.6 EUT OPERATING CONDITIONS.....	28
4.3.7 TEST RESULTS	29
5 TEST TYPES AND RESULTS (DTS).....	36
5.1 CONDUCTED OUTPUT POWER MEASUREMENT	36
5.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT	36
5.1.2 INSTRUMENTS	36
5.1.3 TEST PROCEDURES.....	36
5.1.4 DEVIATION FROM TEST STANDARD	36
5.1.5 TEST SETUP	37



A D T

5.1.6	EUT OPERATING CONDITIONS.....	37
5.1.7	TEST RESULTS	38
5.2	RADIATED EMISSION & BAND EDGE MEASUREMENT	39
5.2.1	LIMITS OF MEASUREMENT	39
5.2.2	TEST INSTRUMENTS	40
5.2.3	TEST PROCEDURES	41
5.2.4	DEVIATION FROM TEST STANDARD	41
5.2.5	TEST SETUP	42
5.2.6	EUT OPERATING CONDITIONS.....	43
5.2.7	TEST RESULTS	44
6	PHOTOGRAPHS OF THE TEST CONFIGURATION	48
7	INFORMATION ON THE TESTING LABORATORIES	49
8	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	50



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140212E04J-1	Original release	Nov. 19, 2014



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1 CERTIFICATION

PRODUCT : PCIE 802.11b/g/n 2.4GHz + USB BT 4.0 card
BRAND NAME : Atheros
MODEL NO. : AR5B22-SB
TEST SAMPLE : R&D SAMPLE
APPLICANT : Qualcomm Atheros, Inc.
TESTED : Oct. 24 to Nov. 14, 2014
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009
Canada RSS-210 Issue 8 (2010-12)
Canada RSS-Gen Issue 3 (2010-12)

The above equipment (Model: AR5B22-SB) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared By :  , **Date:** Nov. 19, 2014
(Lori Chung, Specialist)

Approved By :  , **Date:** Nov. 19, 2014
(May Chen, Manager)

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2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For BT-EDR mode:

APPLIED STANDARD: FCC Part 15, Subpart C; RSS-210; RSS-Gen				
STANDARD SECTION		TEST TYPE AND LIMIT	RESULT	REMARK
FCC Part 15	RSS-Gen RSS-210			
15.247(b)	RSS-210 A8.4(2)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.247(d)	RSS-210 A8.5	Transmitter Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.2dB at 851.35MHz.

For BT-LE mode:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) ; RSS-210; RSS-Gen				
STANDARD SECTION		TEST TYPE	RESULT	REMARK
FCC Part 15	RSS-Gen			
15.247(d) 15.209	RSS-210 A8.5	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.0dB at 760.07MHz
15.247(b)	RSS-210 A8.2 (4)	Conducted power	PASS	Meet the requirement of limit.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT(BLUETOOTH/DTS)

PRODUCT	PCIE 802.11b/g/n 2.4GHz + USB BT 4.0 card
MODEL NO.	AR5B22-SB
POWER SUPPLY	3.3Vdc from host equipment
MODULATION TYPE	GFSK, $\pi/4$ -DQPSK, 8DPSK for FHSS 16QAM, QPSK, BPSK for OFDM GFSK for DTS
MODULATION TECHNOLOGY	FHSS, OFDM, DTS
DATE RATE	Up to 3Mbps for BT-EDR mode Up to 24Mbps for BT-HS mode Up to 1Mbps for BT-LE mode
FREQUENCY RANGE	BT-EDR, BT-LE mode: 2402MHz ~ 2480MHz BT-HS mode: 2412MHz ~ 2462MHz
NUMBER OF CHANNEL	BT-EDR mode: 79 BT-HS mode: 11 BT-LE mode: 40
MAX. OUTPUT POWER	BT-EDR mode: 4.613mW BT-LE mode: 2.393mW
ANTENNA TYPE	See item 3.2
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. This report is prepared for FCC Class II change. The difference compared with the Report No.: RF110907E02A-1 R1 design is as the following:

- ◆ Miner Layout change.
- ◆ Schematic change for digital part.
- ◆ Add 1 new antenna (No. 3) as following table:

Original							
No.	Brand	Model	Antenna Type	Connector	Antenna Gain (dBi) <included cable loss>	Cable Loss(dB)	Cable Length(mm)
1&2	WNC	81.EBJ15.005	PIFA	IPEX	3.62	1.15	300
Newly							
No.	Brand	Model	Antenna Type	Connector	Antenna Gain (dBi) <included cable loss>	Cable Loss(dB)	Cable Length(mm)
3	INPAQ	WA-F-LBLB-04-028	PIFA	IPEX	2.38 (Main) 2.30 (Aux)	-0.47	143

2. According to above conditions, only radiated emission / conducted output power need to be performed. And all data was verified to meet the requirements.
3. The device has three configurations (working mode)
 - a. WLAN only (2x2 MIMO)
 - b. BT+WLAN (2x2 MIMO) with reduced power on WLAN
 - c. BT+WLAN (1x1 mode on b/g only, chain 0 is used for BT and chain 1 is used for WLAN)
4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



3.2 DESCRIPTION OF ANTENNA

The antennas provided to this EUT, please refer to the following table:

No.	Brand	Model	Antenna Type	Connector	Antenna Gain (dBi) <included cable loss>	Cable Loss(dB)	Cable Length(mm)
1&2	WNC	81.EBJ15.005	PIFA	IPEX	3.62	1.15	300
3	INPAQ	WA-F-LBLB-04-028	PIFA	IPEX	2.38 (Main) 2.30 (Aux)	-0.47	143

Note: Above antenna gains of antenna are Total (H+V).

3.3 DESCRIPTION OF TEST MODES

79 channels are provided for BT-EDR mode

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

40 channels are provided for BT-LE mode:

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

For BT-EDR mode:

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE < 1G	RE ≥ 1G	APCM	
-	√	√	√	-

Where RE < 1G: Radiated Emission below 1GHz RE ≥ 1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Note In original report, the EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Packet Type
0 to 78	78	GFSK	DH5

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Packet Type
0 to 78	0, 39, 78	GFSK	DH5
0 to 78	0, 39, 78	8DPSK	3DH5

Antenna Port Conducted Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Packet Type
0 to 78	0, 39, 78	GFSK	DH5
0 to 78	0, 39, 78	8DPSK	3DH5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE<1G	26deg. C, 68%RH	120Vac, 60Hz	Robert Cheng
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

For BT-LE mode:

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE < 1G	RE ≥ 1G	APCM	
-	√	√	√	-

Where **RE < 1G**: Radiated Emission below 1GHz **RE ≥ 1G**: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Note In original report, the EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	19	GFSK	1

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	0, 19, 39	GFSK	1

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	0, 19, 39	GFSK	1



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE<1G	26deg. C, 68%RH	120Vac, 60Hz	Robert Cheng
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan

3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (Section 15.247)

558074 D01 DTS Meas Guidance v03r02

ANSI C63.10-2009

Canada RSS-210 Issue 8 (2010-12)

Canada RSS-Gen Issue 3 (2010-12)

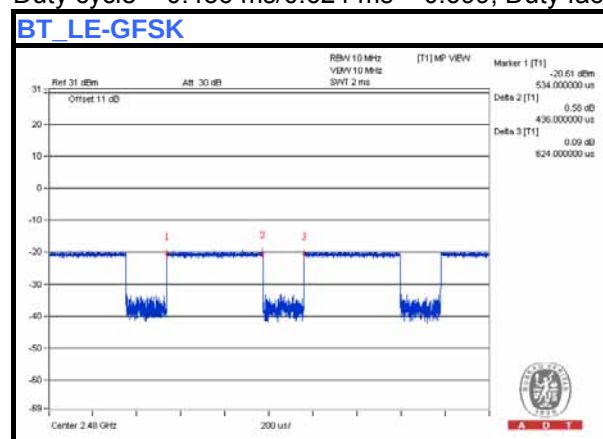
All test items have been performed and recorded as per the above standards.

3.6 DUTY CYCLE OF TEST SIGNAL

If duty cycle of test signal is < 98%, duty factor shall be considered.

For BT_LE-GFSK:

Duty cycle = $0.436 \text{ ms} / 0.624 \text{ ms} = 0.699$, Duty factor = $10 * \log(1/0.699) = 1.6$

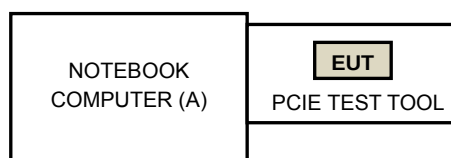


3.7 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	PERSONAL COMPUTER	DELL	E5430	GM1SKV1	FCC DoC	Provided by Lab
B	PCIE TEST TOOL	AzureWave	NA	NA	NA	Supplied by client

3.8 CONFIGURATION OF SYSTEM UNDER TEST





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4 TEST PROCEDURES AND RESULTS(BT-EDR)

4.1 MAXIMUM PEAK OUTPUT POWER

4.1.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

4.1.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100060	May 08, 2014	May 07, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 24, 2014

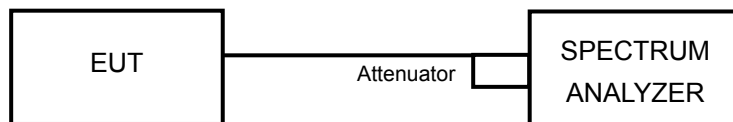
4.1.3 TEST PROCEDURES

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- d. Measure the captured power within the band and recording the plot.
- e. Repeat above procedures until all frequencies required were complete.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



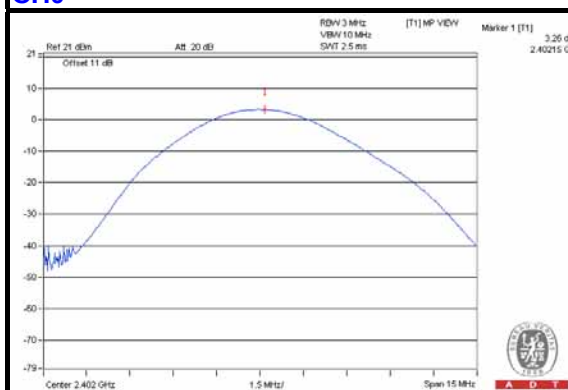
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4.1.7 TEST RESULTS

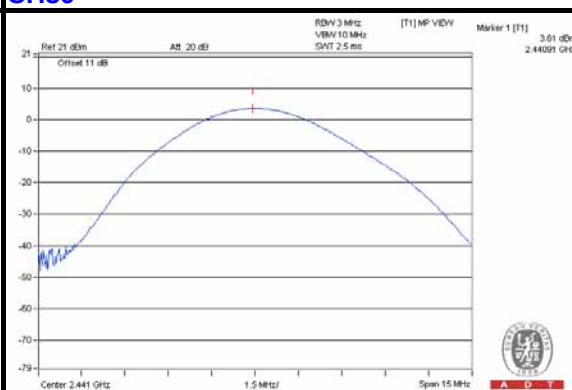
CHANNEL	FREQUENCY (MHz)	OUTPUT POWER (mW)		OUTPUT POWER (dBm)		POWER LIMIT (mW)	PASS / FAIL
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	2.118	3.639	3.26	5.61	125	PASS
39	2441	2.296	4.083	3.61	6.11	125	PASS
78	2480	2.489	4.613	3.96	6.64	125	PASS

For GFSK

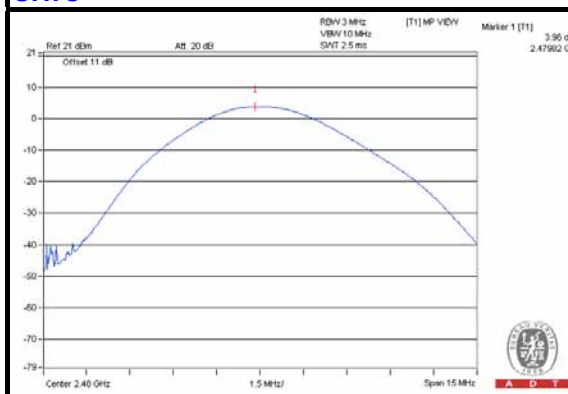
CH0



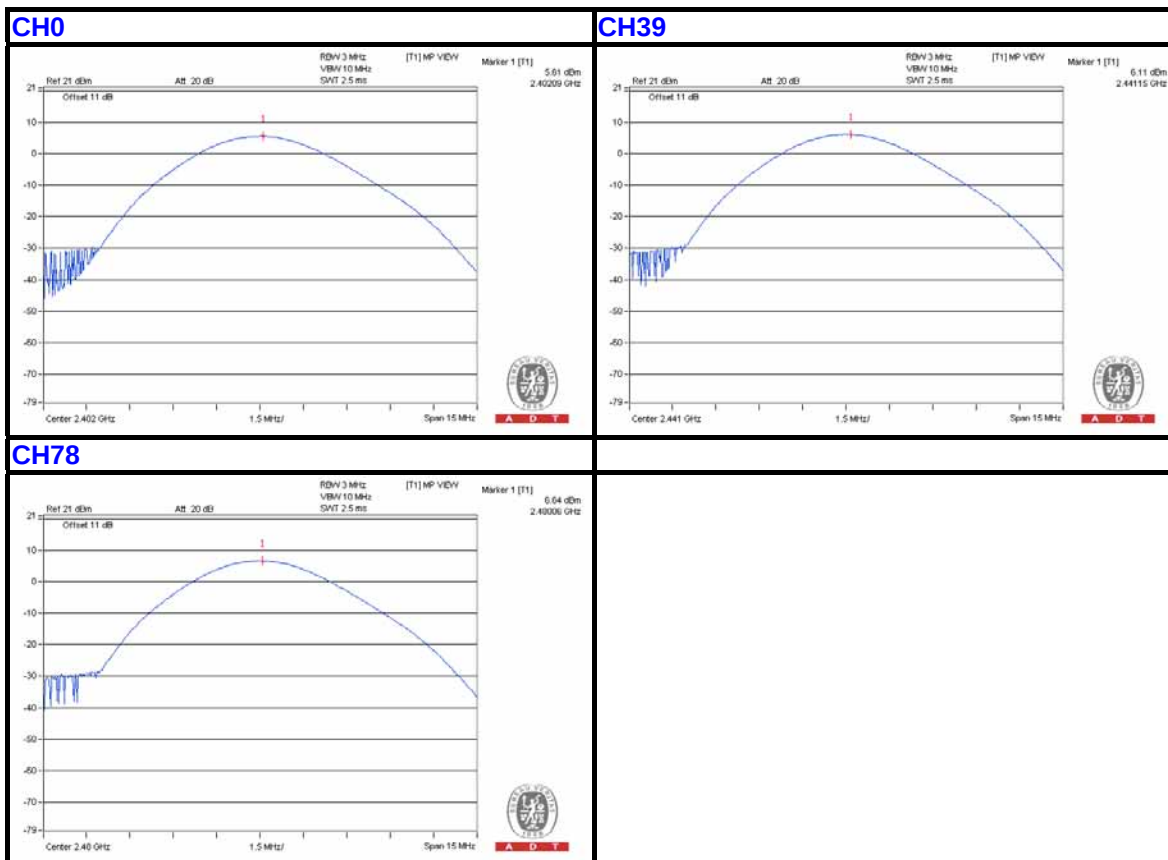
CH39



CH78



For 8DPSK



4.2 AVERAGE OUTPUT POWER

4.2.1 FOR REFERENCE.

4.2.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power Sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 2015

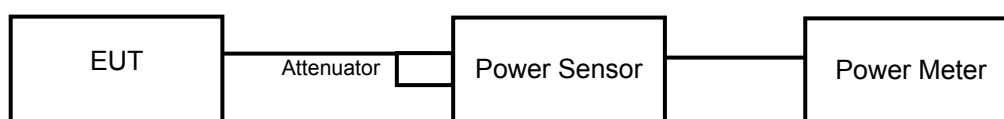
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 24, 2014

4.2.3 TEST PROCEDURES

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the peak power level.

4.2.4 TEST SETUP



4.2.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



4.2.6 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER OUTPUT (dBm)	
		GFSK	8DPSK
0	2402	2.000	2.004
39	2441	2.193	2.223
78	2480	2.355	2.460

4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Oct. 12 to 14, 2014

4.3.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

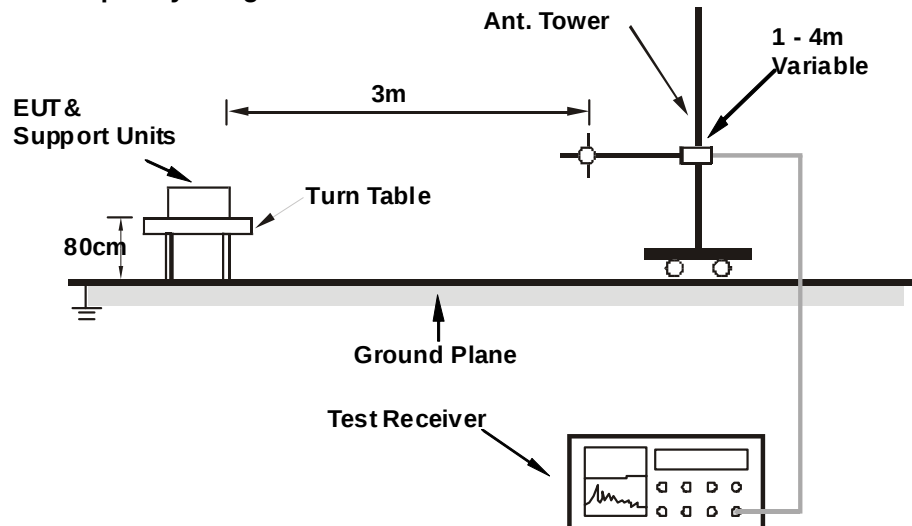
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 1MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.3.4 DEVIATION FROM TEST STANDARD

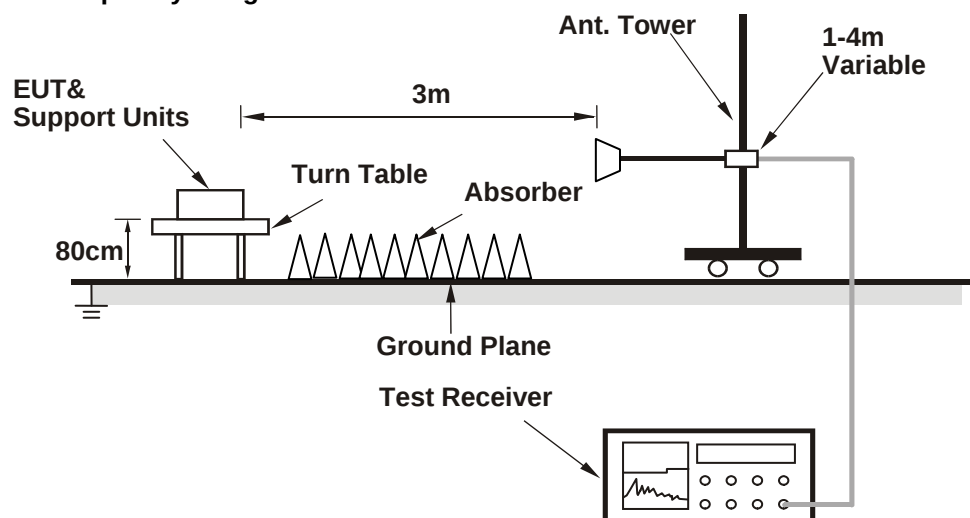
No deviation

4.3.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.3.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “Artgui.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.3.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

BT_GFSK

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	240.11	38.7 QP	46.0	-7.4	1.24 H	345	53.55	-14.90
2	498.79	40.4 QP	46.0	-5.6	1.34 H	204	47.78	-7.36
3	698.11	41.1 QP	46.0	-4.9	1.24 H	240	44.47	-3.36
4	760.15	42.1 QP	46.0	-3.9	1.45 H	201	43.65	-1.54
5	851.35	42.9 QP	46.0	-3.2	1.45 H	201	43.41	-0.56
6	961.54	40.1 QP	54.0	-13.9	1.45 H	201	38.84	1.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	31.76	34.2 QP	40.0	-5.8	1.45 V	64	48.87	-14.67
2	166.11	35.2 QP	43.5	-8.3	1.24 V	243	48.91	-13.67
3	299.12	42.0 QP	46.0	-4.0	1.45 V	175	54.53	-12.52
4	497.75	39.2 QP	46.0	-6.8	1.45 V	245	46.59	-7.35
5	707.24	39.2 QP	46.0	-6.8	1.45 V	275	42.51	-3.27
6	833.00	41.2 QP	46.0	-4.8	1.24 V	220	41.93	-0.69

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz DATA

BT_GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2320.00	49.1 PK	74.0	-24.9	1.25 H	102	51.88	-2.78
2	2320.00	19.0 AV	54.0	-35.0	1.25 H	102	21.78	-2.78
3	*2402.00	98.0 PK			1.25 H	102	100.41	-2.41
4	*2402.00	67.9 AV			1.25 H	102	70.31	-2.41
5	4804.00	45.8 PK	74.0	-28.2	1.02 H	138	40.18	5.62
6	4804.00	15.7 AV	54.0	-38.3	1.02 H	138	10.08	5.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2320.00	48.6 PK	74.0	-25.4	1.31 V	247	51.38	-2.78
2	2320.00	18.5 AV	54.0	-35.5	1.31 V	247	21.28	-2.78
3	*2402.00	95.5 PK			1.31 V	247	97.91	-2.41
4	*2402.00	65.4 AV			1.31 V	247	67.81	-2.41
5	4804.00	48.1 PK	74.0	-25.9	1.05 V	168	42.48	5.62
6	4804.00	18.0 AV	54.0	-36.0	1.05 V	168	12.38	5.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	101.1 PK			1.20 H	113	103.34	-2.24
2	*2441.00	71.0 AV			1.20 H	113	73.24	-2.24
3	4882.00	45.8 PK	74.0	-28.2	1.03 H	138	39.86	5.94
4	4882.00	15.7 AV	54.0	-38.3	1.03 H	138	9.76	5.94
5	7323.00	55.1 PK	74.0	-18.9	1.02 H	143	41.92	13.18
6	7323.00	25.0 AV	54.0	-29.0	1.02 H	143	11.82	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	98.8 PK			1.37 V	248	101.04	-2.24
2	*2441.00	68.7 AV			1.37 V	248	70.94	-2.24
3	4882.00	47.5 PK	74.0	-26.5	1.05 V	165	41.56	5.94
4	4882.00	17.4 AV	54.0	-36.6	1.05 V	165	11.46	5.94
5	7323.00	53.9 PK	74.0	-20.1	1.00 V	360	40.72	13.18
6	7323.00	23.8 AV	54.0	-30.2	1.00 V	360	10.62	13.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	100.9 PK			1.21 H	107	102.96	-2.06
2	*2480.00	70.8 AV			1.21 H	107	72.86	-2.06
3	2483.50	48.3 PK	74.0	-25.7	1.21 H	107	50.33	-2.03
4	2483.50	18.2 AV	54.0	-35.8	1.21 H	107	20.23	-2.03
5	4960.00	46.5 PK	74.0	-27.5	1.00 H	149	40.24	6.26
6	4960.00	16.4 AV	54.0	-37.6	1.00 H	149	10.14	6.26
7	7440.00	55.3 PK	74.0	-18.7	1.00 H	156	42.17	13.13
8	7440.00	25.2 AV	54.0	-28.8	1.00 H	156	12.07	13.13
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	98.6 PK			1.27 V	249	100.66	-2.06
2	*2480.00	68.5 AV			1.27 V	249	70.56	-2.06
3	2483.50	49.3 PK	74.0	-24.7	1.27 V	249	51.33	-2.03
4	2483.50	19.2 AV	54.0	-34.8	1.27 V	249	21.23	-2.03
5	4960.00	47.5 PK	74.0	-26.5	1.00 V	163	41.24	6.26
6	4960.00	17.4 AV	54.0	-36.6	1.00 V	163	11.14	6.26
7	7440.00	54.0 PK	74.0	-20.0	1.00 V	360	40.87	13.13
8	7440.00	23.9 AV	54.0	-30.1	1.00 V	360	10.77	13.13

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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BT_8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	49.5 PK	74.0	-24.5	1.27 H	103	51.97	-2.47
2	2390.00	19.4 AV	54.0	-34.6	1.27 H	103	21.87	-2.47
3	*2402.00	98.0 PK			1.27 H	103	100.41	-2.41
4	*2402.00	67.9 AV			1.27 H	103	70.31	-2.41
5	4804.00	46.1 PK	74.0	-27.9	1.01 H	127	40.48	5.62
6	4804.00	16.0 AV	54.0	-38.0	1.01 H	127	10.38	5.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	48.4 PK	74.0	-25.6	1.35 V	257	50.87	-2.47
2	2390.00	18.3 AV	54.0	-35.7	1.35 V	257	20.77	-2.47
3	*2402.00	95.8 PK			1.35 V	257	98.21	-2.41
4	*2402.00	65.7 AV			1.35 V	257	68.11	-2.41
5	4804.00	47.3 PK	74.0	-26.7	1.09 V	172	41.68	5.62
6	4804.00	17.2 AV	54.0	-36.8	1.09 V	172	11.58	5.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1 \text{ dB}$
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	100.0 PK			1.18 H	105	102.24	-2.24
2	*2441.00	69.9 AV			1.18 H	105	72.14	-2.24
3	4882.00	45.5 PK	74.0	-28.5	1.09 H	126	39.56	5.94
4	4882.00	15.4 AV	54.0	-38.6	1.09 H	126	9.46	5.94
5	7323.00	55.5 PK	74.0	-18.5	1.06 H	142	42.32	13.18
6	7323.00	25.4 AV	54.0	-28.6	1.06 H	142	12.22	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	98.0 PK			1.32 V	236	100.24	-2.24
2	*2441.00	67.9 AV			1.32 V	236	70.14	-2.24
3	4882.00	47.4 PK	74.0	-26.6	1.01 V	167	41.46	5.94
4	4882.00	17.3 AV	54.0	-36.7	1.01 V	167	11.36	5.94
5	7323.00	54.0 PK	74.0	-20.0	1.00 V	349	40.82	13.18
6	7323.00	23.9 AV	54.0	-30.1	1.00 V	349	10.72	13.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	100.1 PK			1.20 H	107	102.16	-2.06
2	*2480.00	70.0 AV			1.20 H	107	72.06	-2.06
3	2483.50	47.8 PK	74.0	-26.2	1.20 H	107	49.83	-2.03
4	2483.50	17.7 AV	54.0	-36.3	1.20 H	107	19.73	-2.03
5	4960.00	46.3 PK	74.0	-27.7	1.02 H	138	40.04	6.26
6	4960.00	16.2 AV	54.0	-37.8	1.02 H	138	9.94	6.26
7	7440.00	54.8 PK	74.0	-19.2	1.04 H	144	41.67	13.13
8	7440.00	24.7 AV	54.0	-29.3	1.04 H	144	11.57	13.13
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	98.9 PK			1.41 V	237	100.96	-2.06
2	*2480.00	68.8 AV			1.41 V	237	70.86	-2.06
3	2483.50	49.6 PK	74.0	-24.4	1.41 V	237	51.63	-2.03
4	2483.50	19.5 AV	54.0	-34.5	1.41 V	237	21.53	-2.03
5	4960.00	47.8 PK	74.0	-26.2	1.04 V	163	41.54	6.26
6	4960.00	17.7 AV	54.0	-36.3	1.04 V	163	11.44	6.26
7	7440.00	54.1 PK	74.0	-19.9	1.00 V	360	40.97	13.13
8	7440.00	24.0 AV	54.0	-30.0	1.00 V	360	10.87	13.13

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



5 TEST TYPES AND RESULTS (DTS)

5.1 CONDUCTED OUTPUT POWER MEASUREMENT

5.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

5.1.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 24, 2014

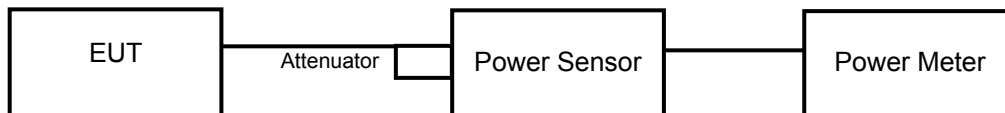
5.1.3 TEST PROCEDURES

The peak / average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the peak power level.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 TEST SETUP



5.1.6 EUT OPERATING CONDITIONS

The software (Artgui.exe) provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

5.1.7 TEST RESULTS

FOR PEAK POWER

BT_LE-GFSK

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
0	2402	2.158	3.34	30	PASS
19	2440	2.28	3.58	30	PASS
39	2480	2.393	3.79	30	PASS

FOR AVERAGE POWER

BT_LE-GFSK

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
0	2402	2.070	3.16
19	2440	2.203	3.43
39	2480	2.333	3.68

5.2 RADIATED EMISSION & Band Edge MEASUREMENT

5.2.1 LIMITS OF MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = $20 \log$ Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Oct. 12 to 14, 2014

5.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

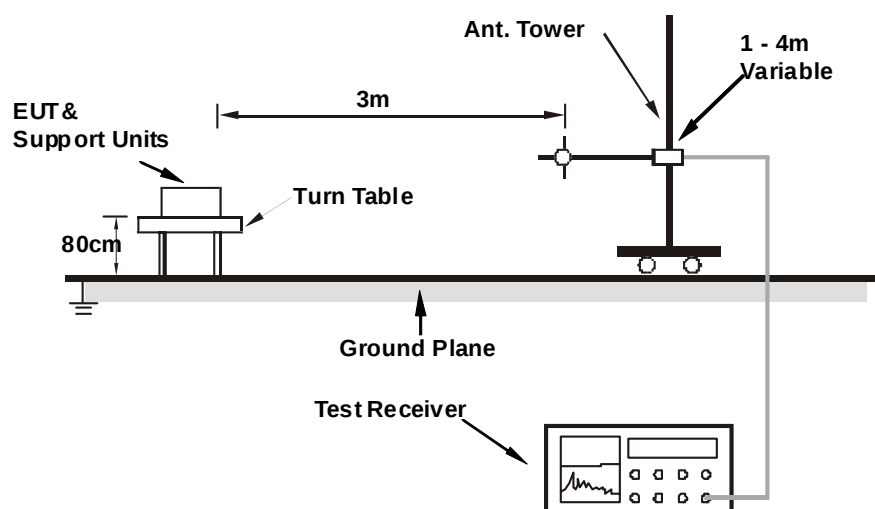
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

5.2.4 DEVIATION FROM TEST STANDARD

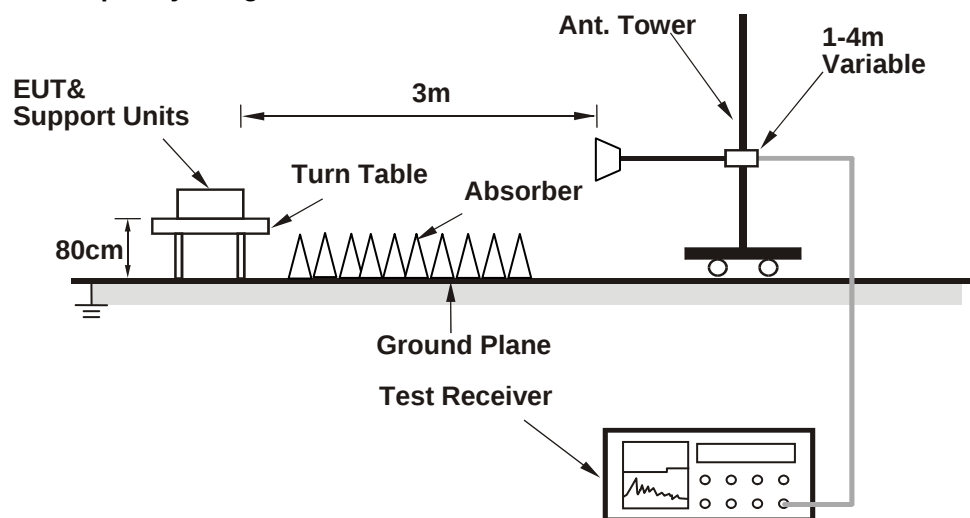
No deviation

5.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

5.2.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “Artgui.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.



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5.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

BT_LE-GFSK

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	240.01	38.8 QP	46.0	-7.2	1.00 H	354	53.73	-14.91
2	498.90	40.6 QP	46.0	-5.4	1.50 H	224	47.95	-7.36
3	698.04	41.1 QP	46.0	-5.0	1.00 H	258	44.41	-3.36
4	760.07	43.0 QP	46.0	-3.0	1.00 H	235	44.56	-1.54
5	851.54	43.0 QP	46.0	-3.0	1.00 H	213	43.52	-0.55
6	961.64	40.3 QP	54.0	-13.7	1.50 H	176	38.98	1.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	31.64	34.1 QP	40.0	-5.9	1.34 V	124	48.77	-14.66
2	166.01	35.1 QP	43.5	-8.4	1.35 V	204	48.77	-13.66
3	299.01	42.1 QP	46.0	-3.9	1.34 V	154	54.63	-12.52
4	497.64	39.1 QP	46.0	-6.9	1.34 V	201	46.47	-7.36
5	707.44	39.4 QP	46.0	-6.6	1.24 V	245	42.71	-3.27
6	833.01	41.1 QP	46.0	-4.9	1.34 V	201	41.80	-0.69

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz DATA

BT_LE-GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	48.7 PK	74.0	-25.3	1.25 H	107	51.17	-2.47
2	2390.00	39.3 AV	54.0	-14.7	1.25 H	107	41.77	-2.47
3	*2402.00	96.0 PK			1.25 H	107	98.41	-2.41
4	*2402.00	85.5 AV			1.25 H	107	87.91	-2.41
5	4804.00	46.2 PK	74.0	-27.8	1.09 H	144	40.58	5.62
6	4804.00	34.0 AV	54.0	-20.0	1.09 H	144	28.38	5.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	47.5 PK	74.0	-26.5	1.41 V	238	49.97	-2.47
2	2390.00	37.9 AV	54.0	-16.1	1.41 V	238	40.37	-2.47
3	*2402.00	94.4 PK			1.41 V	238	96.81	-2.41
4	*2402.00	83.7 AV			1.41 V	238	86.11	-2.41
5	4804.00	47.7 PK	74.0	-26.3	1.08 V	163	42.08	5.62
6	4804.00	34.2 AV	54.0	-19.8	1.08 V	163	28.58	5.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	99.2 PK			1.20 H	106	101.44	-2.24
2	*2440.00	88.2 AV			1.20 H	106	90.44	-2.24
3	4880.00	46.6 PK	74.0	-27.4	1.12 H	159	40.66	5.94
4	4880.00	34.4 AV	54.0	-19.6	1.12 H	159	28.46	5.94
5	7320.00	55.1 PK	74.0	-18.9	1.06 H	163	41.91	13.19
6	7320.00	40.8 AV	54.0	-13.2	1.06 H	163	27.61	13.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	97.3 PK			1.40 V	246	99.54	-2.24
2	*2440.00	86.4 AV			1.40 V	246	88.64	-2.24
3	4880.00	47.9 PK	74.0	-26.1	1.12 V	171	41.96	5.94
4	4880.00	33.9 AV	54.0	-20.1	1.12 V	171	27.96	5.94
5	7320.00	53.2 PK	74.0	-20.8	1.12 V	360	40.01	13.19
6	7320.00	40.7 AV	54.0	-13.3	1.12 V	360	27.51	13.19

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	100.7 PK			1.22 H	107	102.76	-2.06
2	*2480.00	89.4 AV			1.22 H	107	91.46	-2.06
3	2483.50	47.6 PK	74.0	-26.4	1.22 H	107	49.63	-2.03
4	2483.50	34.1 AV	54.0	-19.9	1.22 H	107	36.13	-2.03
5	4960.00	46.2 PK	74.0	-27.8	1.06 H	159	39.94	6.26
6	4960.00	34.1 AV	54.0	-19.9	1.06 H	159	27.84	6.26
7	7440.00	55.7 PK	74.0	-18.3	1.09 H	168	42.57	13.13
8	7440.00	41.2 AV	54.0	-12.8	1.09 H	168	28.07	13.13
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	98.7 PK			1.04 V	247	100.76	-2.06
2	*2480.00	87.8 AV			1.04 V	247	89.86	-2.06
3	2483.50	50.8 PK	74.0	-23.2	1.04 V	247	52.83	-2.03
4	2483.50	33.7 AV	54.0	-20.3	1.04 V	247	35.73	-2.03
5	4960.00	47.6 PK	74.0	-26.4	1.12 V	156	41.34	6.26
6	4960.00	33.8 AV	54.0	-20.2	1.12 V	156	27.54	6.26
7	7440.00	53.4 PK	74.0	-20.6	1.06 V	360	40.27	13.13
8	7440.00	41.2 AV	54.0	-12.8	1.06 V	360	28.07	13.13

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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6 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

7 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

8 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

--- END ---