FCC TEST REPORT

REPORT NO. : RF970803L01
MODEL NO. : 1352
RECEIVED : Aug. 04, 2008
TESTED : Aug. 05 ~ Aug. 07, 2008
ISSUED : Aug. 15, 2008

APPLICANT : Microsoft Corporation

ADDRESS : One Microsoft Way, Redmond WA 98052-6399, U.S.A

ISSUED BY : Advance Data Technology Corporation

LAB ADDRESS : No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

TEST LOCATION : No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

Testing Laboratory
0528

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1. CERTIFICATION

PRODUCT:	Microsoft® SideWinder™ X8 Mouse
MODEL NO.:	1352
BRAND:	Microsoft®
APPLICANT:	Microsoft Corporation
TESTED:	Aug. 05 ~ Aug. 07, 2008
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.249)**
	ANSI C63.4-2003

The above equipment (model: 1352) have been tested by **Advance Data Technology Corporation**, 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 : Peggy Chen **, DATE :** Aug. 15, 2008
Peggy Chen / Specialist

TECHNICAL ACCEPTANCE : Long Chen **, DATE :** Aug. 15, 2008
Responsible for RF
Long Chen / Senior Engineer

APPROVED BY : Gary Chang **, DATE :** Aug. 15, 2008
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.249)			
STANDARD PARAGRAPH	**TEST TYPE**	**RESULT**	**REMARK**
15.207	Conducted Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -5.68dB at 0.172MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -6.36dB at 37.68MHz.

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:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Microsoft® SideWinder™ X8 Mouse
MODEL NO.	1352
FCC ID	C3K1352
POWER SUPPLY	1.2Vdc from rechargeable battery 5.0Vdc from transceiver
MODULATION TYPE	GFSK
TRANSFER RATE	64kbit/sec
FREQUENCY RANGE	2403 ~ 2480MHz
NUMBER OF CHANNEL	24
ANTENNA TYPE	PCB antenna with -0.75dBi gain
DATA CABLE	NA
I/O PORT	NA
ACCESSORY DEVICES	NA

NOTE:

1. Configuration Information:

Configuration #:		**Comments:** DV phase **Mouse** unit for formal report			
Manufacturer	**Component type**	**Part no.**	**Revision no.**	**Description**	**BOM (if known)**
Microsoft	Mouse			Model: 1352	
Diodes	Optical Sensor	11300105200	TR1.1	UAB-M9659-002, OLQFN76	11300105200
Nordic	RF IC	11300070200		NRF24L01, QFN20	11300070200
Rohm	Blue LED	10740031200		SLA560BD2W, T1.75, BLUE	10740031200
Microsoft	firmware			T2_TR12_Opal_V03.08.ram	
Happy, Express	PCB	10230182200	04	OPAL MAIN BORD, T2, 4L, 60X45MM	10230182200
		10230184200	04	OPAL POWER BD, TP~3, 4L, 55X102MM	10230184200
		10230185200	04	OPAL SWITCH BOARD, 2L, 20X26MM	10230185200
KYE	PCB Assy	20000205201	A	PCBA, OPAL, MAIN, MS, 2.4GHz	20000205201
		20000207201	A	PCBA, OPAL, SWITCH, MS, 2.4GHz	20000207201
		20000206201	A	PCBA, OPAL, POWER, MS, 2.4GHz	20000206201

Definition of configuration #: The configuration number (#) is used for traceability to a particular BOM (Bill of Materials). It is an easy way to readily identify and convey the construction of a without having to include all of the details of a BOM on every test data sheet. If two sets of test data have test samples with the same configuration # then the construction details of those test samples can readily be determined (as long as the configuration # correctly corresponds to a BOM) and that these two test samples have been constructed identically.

Detailed information on the configuration of the tested samples is required in order to track performance changes across various revisions of the hardware and to document that the samples tested are representative of the final configuration that will be manufactured in production.

Any prototype or pre-production components must be clearly identified in the configuration table.

2. The details of EUT samples listed as below:

SAMPLE	SERIAL NO.
1	Opal-EV2-104
2	Opal-EV2-106
3	Opal-EV2-108

3. This EUT has transmission function when charging.
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.

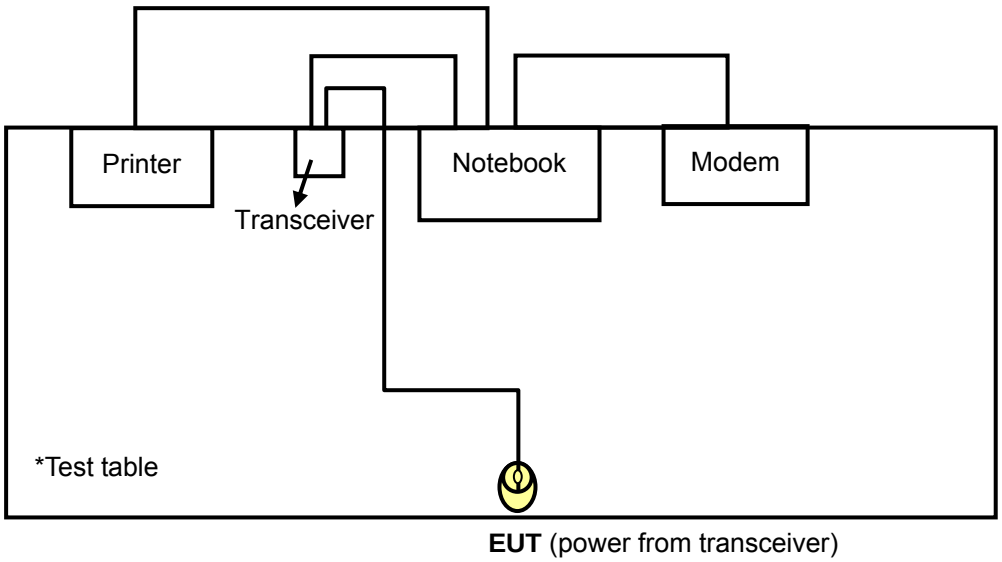
3.2 DESCRIPTION OF TEST MODES

24 channels are provided to this EUT.

Channel Group	Order they appear by pressing lest button	Frequency (MHz)	Channel Group	Order they appear by pressing lest button	Frequency (MHz)
Subset A	1	2403	Subset D	4	2405
	7	2419		10	2425
	19	2468		16	2444
	13	2478		22	2452
Subset B	2	2429	Subset E	5	2423
	8	2450		11	2446
	14	2470		17	2456
	20	2480		23	2474
Subset C	3	2421	Subset F	6	2417
	9	2431		12	2427
	21	2454		18	2448
	15	2472		24	2476

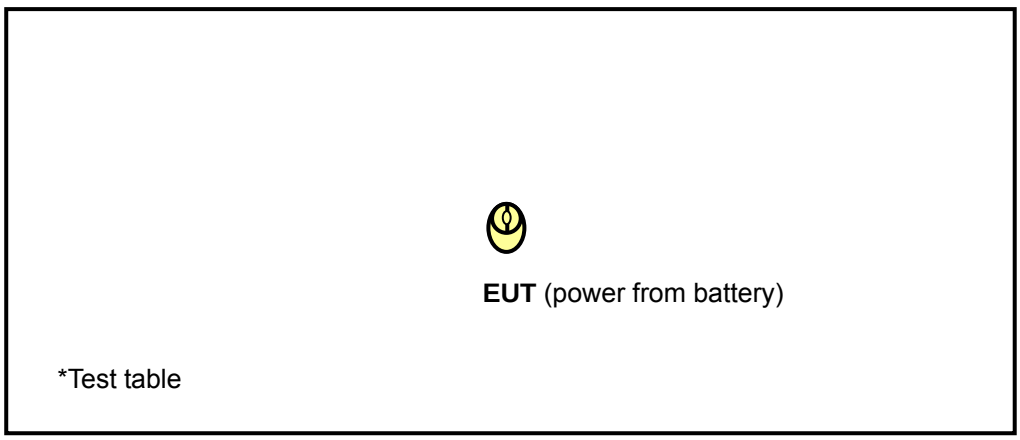
3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Test Mode A1, B1, C1



EUT (power from transceiver)

Test Mode A2, B2, C2



EUT (power from battery)

3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE		APPLICABLE TO				DESCRIPTION	
		RE≥1G	RE<1G	PLC	BM	Serial No.	Function
A	1	√	√	-	-	Opal-EV2-104	Charging and transmission
	2	-	√	-	-		Transmission
B	1	√	√	-	-	Opal-EV2-106	Charging and transmission
	2	-	√	-	-		Transmission
C	1	√	√	√	√	Opal-EV2-108	Charging and transmission
	2	-	√	-	-		Transmission

Where **PLC:** Power Line Conducted Emission **RE<1G:** Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz **BM:** Bandedge Measurement

NOTE: "-" means no effect

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A1, B1, C1	1 to 24	1, 16, 20	GFSK

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A1, A2, B1, B2, C1, C2	1 to 24	1	GFSK

POWER LINE CONDUCTED EMISSION TEST:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
C1	1 to 24	1	GFSK

BANDEDGE MEASUREMENT:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
C1	1 to 24	1, 20	GFSK

3.3 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 15.249)

ANSI C63.4-2003

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 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
1	NOTEBOOK COMPUTER	DELL	PP05L	16484462992	E2K24CLNS
2	PRINTER	EPSON	LQ-300+	DCGY047265	FCC DoC Approved
3	MODEM	ACEEX	1414V/3	0401008269	IFAXDM1414
4	TRANSCEIVER	Microsoft®	1353	NA	C3K1353

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8m braid shielded wire, DB25 connector, w/o core.
3	1.2m braid shielded wire, DB25 & DB9 connector, w/o core.
4	1.8m shielded USB cable without core.

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 4 was provided by client.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, 15.249 as following:

15.209 Limit		
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
15.249 Limit		
Fundamental Frequency	**Field Strength of Fundamental (millivolts/meter)**	**Field Strength of Harmonics (microvolts/meter)**
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	100033	Jun. 29, 2009
Spectrum Analyzer Agilent	FSP	100041	Apr. 21, 2009
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	May 01, 2009
HORN Antenna SCHWARZBECK	9120D	9120D-209	Jun. 23, 2009
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 24, 2008
Preamplifier Agilent	8447D	2944A10633	Oct. 28, 2008
Preamplifier Agilent	8449B	3008A01964	Oct. 23, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283402/4	Dec. 06, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	251644/4	Dec. 06, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 test was performed in HwaYa Chamber 3.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC3789B-3.

4.1.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

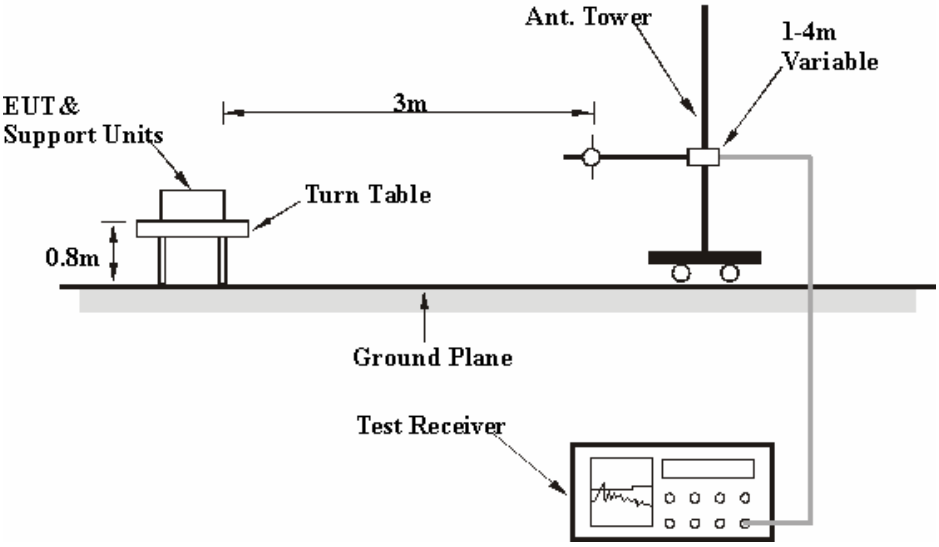
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.
4. Duty cycle of EUT is 4.8 % defined by client.
   We get 3.83% duty cycle when EUT in normal operating mode.
   According to formula as below:
   AV = PK + 20 Log duty cycle
   4.8% is worse than 3.83 %, so we use 4.8 % to calculate AV value.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

Test Mode A1, B1, C1

a. Connected transceiver with notebook by a USB cable and placed on a testing table.
b. The notebook ran a test program (provided by manufacturer) to enable EUT under charging and transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the system in full functions.

Test Mode A2, B2, C2

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

RADIATED WORST-CASE DATA: ABOVE 1GHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**A1**		

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	54.37 PK	74.00	-19.62	1.32 H	292	21.52	32.85
2	2390.00	28.55 AV	54.00	-25.45	1.32 H	292	-4.30	32.85
3	2400.00	49.48 PK	74.00	-24.52	1.38 H	227	16.59	32.89
4	2400.00	23.10 AV	54.00	-30.90	1.38 H	227	-9.79	32.89
5	*2403.00	93.58 PK	114.00	-20.42	1.38 H	227	60.68	32.90
6	*2403.00	67.20 AV	94.00	-26.80	1.38 H	227	34.30	32.90
7	4806.00	50.59 PK	74.00	-23.41	1.00 H	178	11.57	39.01
8	4806.00	24.21 AV	54.00	-29.79	1.00 H	178	-14.80	39.01

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	A1		

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	49.32 PK	74.00	-24.68	1.34 V	358	16.46	32.85
2	2390.00	28.48 AV	54.00	-25.52	1.34 V	358	-4.38	32.85
3	2400.00	42.40 PK	74.00	-31.60	1.00 V	130	9.51	32.89
4	2400.00	16.02 AV	54.00	-37.98	1.00 V	130	-16.87	32.89
5	*2403.00	86.37 PK	114.00	-27.63	1.01 V	128	53.47	32.90
6	*2403.00	59.99 AV	94.00	-34.01	1.01 V	128	27.09	32.90
7	4806.00	50.14 PK	74.00	-23.86	1.06 V	80	11.12	39.01
8	4806.00	23.76 AV	54.00	-30.24	1.06 V	80	-15.25	39.01

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 16	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**A1**		

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	*2444.00	93.36 PK	114.00	-20.64	1.31 H	286	60.34	33.02
2	*2444.00	66.98 AV	94.00	-27.02	1.31 H	286	33.96	33.02
3	4888.00	51.02 PK	74.00	-22.98	1.03 H	172	11.81	39.21
4	4888.00	24.64 AV	54.00	-29.36	1.03 H	172	-14.57	39.21

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.

   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 16	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**A1**		

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	*2444.00	86.21 PK	114.00	-27.79	1.30 V	324	53.19	33.02
2	*2444.00	59.83 AV	94.00	-34.17	1.30 V	324	26.81	33.02
3	4888.00	50.44 PK	74.00	-23.56	1.08 V	77	11.23	39.21
4	4888.00	24.06 AV	54.00	-29.94	1.08 V	77	-15.15	39.21

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.

   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 20	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**A1**		

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	93.29 PK	114.00	-20.71	1.28 H	288	60.16	33.13
2	*2480.00	66.91 AV	94.00	-27.09	1.28 H	288	33.78	33.13
3	2483.50	47.78 PK	74.00	-26.22	1.38 H	225	14.64	33.14
4	2483.50	21.40 AV	54.00	-32.60	1.38 H	225	-11.74	33.14
5	4960.00	51.00 PK	74.00	-23.00	1.00 H	185	11.53	39.47
6	4960.00	24.62 AV	54.00	-29.38	1.00 H	185	-14.85	39.47

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.

   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

   $$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

   Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 20	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**A1**		

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	86.22 PK	114.00	-27.78	1.26 V	255	53.09	33.13
2	*2480.00	59.84 AV	94.00	-34.16	1.26 V	255	26.71	33.13
3	2483.50	38.52 PK	74.00	-35.48	1.26 V	255	5.38	33.14
4	2483.50	12.14 AV	54.00	-41.86	1.26 V	255	-21.00	33.14
5	4960.00	49.93 PK	74.00	-24.07	1.10 V	73	10.46	39.47
6	4960.00	23.55 AV	54.00	-30.45	1.10 V	73	-15.92	39.47

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	B1		

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	53.53 PK	74.00	-20.47	1.32 H	207	20.67	32.85
2	2390.00	29.14 AV	54.00	-24.86	1.32 H	207	-3.72	32.85
3	2400.00	50.09 PK	74.00	-23.91	1.33 H	223	17.20	32.89
4	2400.00	23.71 AV	54.00	-30.29	1.33 H	223	-9.18	32.89
5	*2403.00	93.21 PK	114.00	-20.79	1.33 H	230	60.31	32.90
6	*2403.00	66.83 AV	94.00	-27.17	1.33 H	230	33.93	32.90
7	4806.00	50.54 PK	74.00	-23.46	1.03 H	166	11.52	39.01
8	4806.00	24.16 AV	54.00	-29.84	1.03 H	166	-14.85	39.01

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	B1		

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	50.48 PK	74.00	-23.52	1.00 V	164	17.62	32.85
2	2390.00	28.57 AV	54.00	-25.43	1.00 V	164	-4.29	32.85
3	2400.00	42.40 PK	74.00	-31.60	1.00 V	125	9.51	32.89
4	2400.00	16.02 AV	54.00	-37.98	1.00 V	125	-16.87	32.89
5	*2403.00	86.76 PK	114.00	-27.24	1.00 V	125	53.86	32.90
6	*2403.00	60.38 AV	94.00	-33.62	1.00 V	125	27.48	32.90
7	4806.00	49.95 PK	74.00	-24.05	1.20 V	38	10.93	39.01
8	4806.00	23.57 AV	54.00	-30.43	1.20 V	38	-15.44	39.01

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.

   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 16	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**B1**		

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	*2444.00	93.15 PK	114.00	-20.85	1.31 H	238	60.13	33.02
2	*2444.00	66.77 AV	94.00	-27.23	1.31 H	238	33.75	33.02
3	4888.00	50.96 PK	74.00	-23.04	1.00 H	158	11.75	39.21
4	4888.00	24.58 AV	54.00	-29.42	1.00 H	158	-14.63	39.21

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 16	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**B1**		

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	*2444.00	86.63 PK	114.00	-27.37	1.01 V	173	53.61	33.02
2	*2444.00	60.25 AV	94.00	-33.75	1.01 V	173	27.23	33.02
3	4888.00	50.06 PK	74.00	-23.94	1.23 V	45	10.85	39.21
4	4888.00	23.68 AV	54.00	-30.32	1.23 V	45	-15.53	39.21

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 20	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	B1		

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	93.25 PK	114.00	-20.75	1.27 H	245	60.12	33.13
2	*2480.00	66.87 AV	94.00	-27.13	1.27 H	245	33.74	33.13
3	2483.50	47.91 PK	74.00	-26.09	1.27 H	245	14.77	33.14
4	2483.50	21.53 AV	54.00	-32.47	1.27 H	245	-11.61	33.14
5	4960.00	51.13 PK	74.00	-22.87	1.00 H	170	11.66	39.47
6	4960.00	24.75 AV	54.00	-29.25	1.00 H	170	-14.72	39.47

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 20	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	B1		

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	86.81 PK	114.00	-27.19	1.00 V	164	53.68	33.13
2	*2480.00	60.43 AV	94.00	-33.57	1.00 V	164	27.30	33.13
3	2483.50	38.66 PK	74.00	-35.34	1.00 V	164	5.52	33.14
4	2483.50	12.28 AV	54.00	-41.72	1.00 V	164	-20.86	33.14
5	4960.00	50.42 PK	74.00	-23.58	1.21 V	43	10.95	39.47
6	4960.00	24.04 AV	54.00	-29.96	1.21 V	43	-15.43	39.47

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	C1		

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	54.05 PK	74.00	-19.95	1.06 H	359	21.19	32.85
2	2390.00	28.55 AV	54.00	-25.45	1.06 H	359	-4.30	32.85
3	2400.00	49.01 PK	74.00	-24.99	1.41 H	223	16.12	32.89
4	2400.00	22.63 AV	54.00	-31.37	1.41 H	223	-10.26	32.89
5	*2403.00	93.73 PK	114.00	-20.27	1.41 H	223	60.83	32.90
6	*2403.00	67.35 AV	94.00	-26.65	1.41 H	223	34.45	32.90
7	4806.00	50.24 PK	74.00	-23.76	1.00 H	176	11.22	39.01
8	4806.00	23.86 AV	54.00	-30.14	1.00 H	176	-15.15	39.01

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	C1		

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	47.05 PK	74.00	-26.95	1.35 V	353	14.20	32.85
2	2390.00	28.59 AV	54.00	-25.41	1.35 V	353	-4.27	32.85
3	2400.00	40.46 PK	74.00	-33.54	1.31 V	129	7.57	32.89
4	2400.00	14.08 AV	54.00	-39.92	1.31 V	129	-18.81	32.89
5	*2403.00	87.54 PK	114.00	-26.46	1.31 V	129	54.64	32.90
6	*2403.00	61.16 AV	94.00	-32.84	1.31 V	129	28.26	32.90
7	4806.00	49.28 PK	74.00	-24.72	1.02 V	75	10.26	39.01
8	4806.00	22.90 AV	54.00	-31.10	1.02 V	75	-16.11	39.01

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 16	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**C1**		

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	*2444.00	93.60 PK	114.00	-20.40	1.12 H	240	60.58	33.02
2	*2444.00	67.22 AV	94.00	-26.78	1.12 H	240	34.20	33.02
3	4888.00	49.33 PK	74.00	-24.67	1.00 H	188	10.12	39.21
4	4888.00	22.95 AV	54.00	-31.05	1.00 H	188	-16.26	39.21

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 16	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	C1		

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	*2444.00	87.42 PK	114.00	-26.58	1.19 V	256	54.40	33.02
2	*2444.00	61.04 AV	94.00	-32.96	1.19 V	256	28.02	33.02
3	4888.00	48.27 PK	74.00	-25.73	1.05 V	69	9.06	39.21
4	4888.00	21.89 AV	54.00	-32.11	1.05 V	69	-17.32	39.21

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 20	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**C1**		

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	93.69 PK	114.00	-20.31	1.23 H	252	60.56	33.13
2	*2480.00	67.31 AV	94.00	-26.69	1.23 H	252	34.18	33.13
3	2483.50	48.35 PK	74.00	-25.65	1.23 H	252	15.21	33.14
4	2483.50	21.97 AV	54.00	-32.03	1.23 H	252	-11.17	33.14
5	4960.00	49.76 PK	74.00	-24.24	1.13 H	110	10.29	39.47
6	4960.00	23.38 AV	54.00	-30.62	1.13 H	110	-16.09	39.47

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 20	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	**TESTED BY**	Kevin Liang
TEST MODE	**C1**		

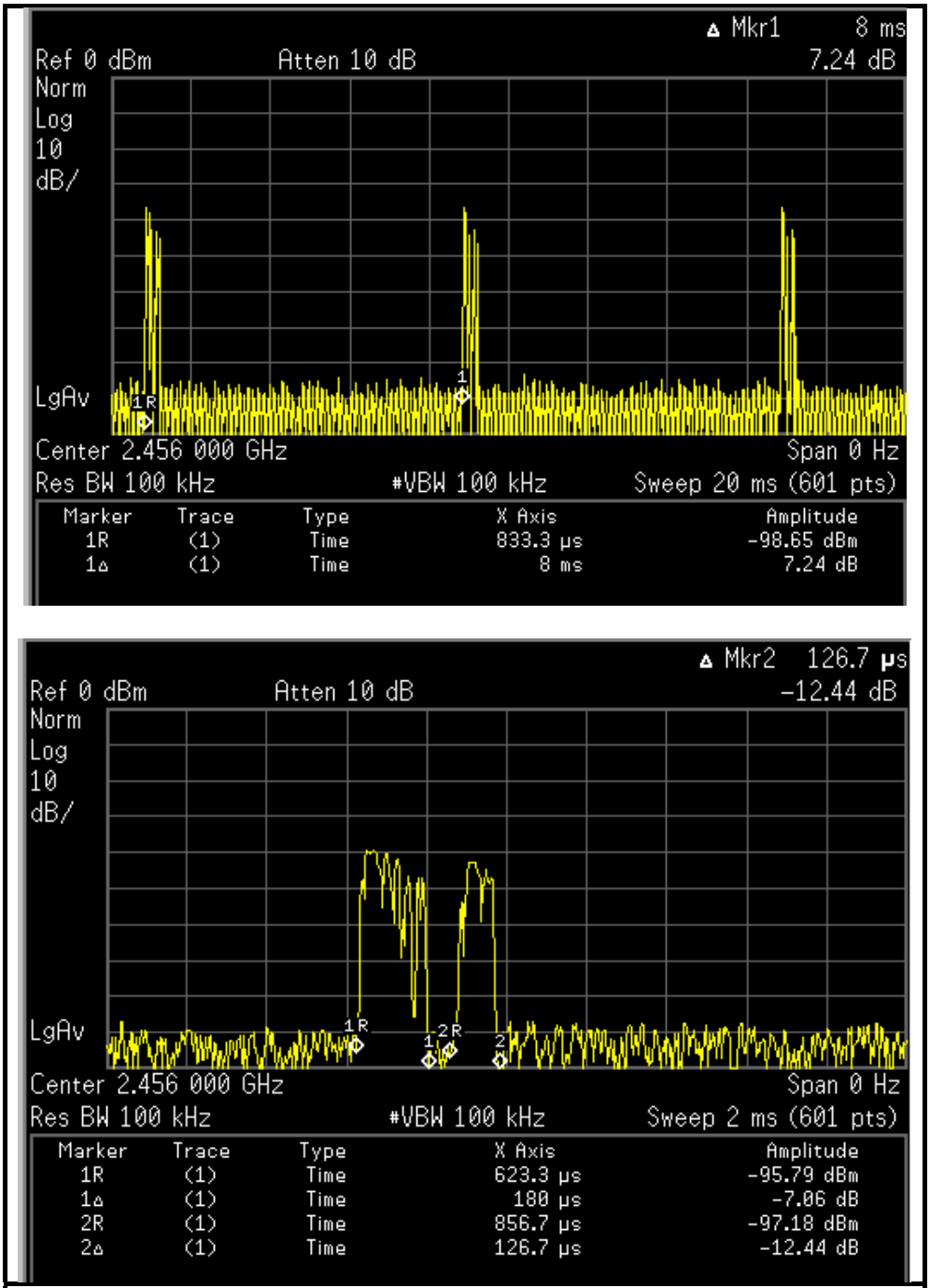
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*2480.00	87.45 PK	114.00	-26.55	1.18 V	228	54.32	33.13
2	*2480.00	61.07 AV	94.00	-32.93	1.18 V	228	27.94	33.13
3	2483.50	38.56 PK	74.00	-35.44	1.18 V	227	5.42	33.14
4	2483.50	12.18 AV	54.00	-41.82	1.18 V	227	-20.96	33.14
5	4960.00	49.52 PK	74.00	-24.48	1.10 V	86	10.05	39.47
6	4960.00	23.14 AV	54.00	-30.86	1.10 V	86	-16.33	39.47

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:
   PW = 192 uSec, T= 4 mSec.
   192 uSec is based on a 32 bytes (max data packet size) which is the max that the Nordic chip can handle. 32 bytes/4 msec = 8Kbytes/sec = 64kbit/sec.
   The duty cycle is 192usec/4 msec = 4.8 %

$$20\log(\text{Duty cycle}) = 20\log\frac{0.192\text{ms}}{4\text{ ms}} = -26.38\text{dB}$$

Please see page 33 for plotted duty.



Duty cycle = $\frac{180+126.7us}{8\ ms}$ x 100% = 3.83%

BELOW 1GHz WORST-CASE DATA：

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	A1		

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	113.50	23.57 QP	43.50	-19.93	1.50 H	232	11.73	11.84
2	164.06	32.94 QP	43.50	-10.56	1.50 H	253	18.34	14.60
3	305.99	24.95 QP	46.00	-21.05	1.00 H	166	10.26	14.69
4	628.74	30.94 QP	46.00	-15.06	1.50 H	340	6.47	24.47
5	665.68	32.22 QP	46.00	-13.78	1.50 H	223	6.70	25.52
6	867.89	31.58 QP	46.00	-14.42	1.00 H	322	2.43	29.15
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	**37.68**	**33.64 QP**	**40.00**	**-6.36**	**1.00 V**	**322**	**18.72**	**14.92**
2	62.95	26.65 QP	40.00	-13.35	1.00 V	13	13.31	13.34
3	103.78	27.96 QP	43.50	-15.54	1.50 V	133	16.02	11.94
4	171.83	26.47 QP	43.50	-17.03	1.50 V	193	12.34	14.13
5	867.89	30.58 QP	46.00	-15.42	1.50 V	10	1.43	29.15
6	935.94	32.44 QP	46.00	-13.56	1.00 V	226	2.15	30.29

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	A2		

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	49.34	22.14 QP	40.00	-17.86	1.50 H	295	8.54	13.59
2	144.61	30.36 QP	43.50	-13.14	1.50 H	49	17.24	13.12
3	216.55	19.26 QP	46.00	-26.74	1.50 H	184	7.97	11.28
4	243.77	20.14 QP	46.00	-25.86	1.50 H	34	7.64	12.50
5	296.27	19.95 QP	46.00	-26.05	1.50 H	316	6.42	13.53
6	545.14	26.76 QP	46.00	-19.24	1.00 H	199	6.56	20.20
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	49.34	31.88 QP	40.00	-8.12	1.00 V	223	18.29	13.59
2	111.56	24.55 QP	43.50	-18.95	1.00 V	10	13.82	10.72
3	144.61	36.58 QP	43.50	-6.92	1.50 V	169	23.46	13.12
4	189.33	28.56 QP	43.50	-14.94	1.00 V	277	17.10	11.46
5	243.77	32.10 QP	46.00	-13.90	1.00 V	13	19.60	12.50
6	296.27	24.38 QP	46.00	-21.62	1.50 V	262	10.84	13.53

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	B1		

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	164.06	30.00 QP	43.50	-13.50	1.50 H	244	15.40	14.60
2	239.88	23.20 QP	46.00	-22.80	1.00 H	235	9.46	13.74
3	304.04	23.53 QP	46.00	-22.47	1.00 H	190	8.94	14.60
4	566.52	27.71 QP	46.00	-18.29	1.50 H	199	4.78	22.94
5	731.79	31.09 QP	46.00	-14.91	1.00 H	238	4.24	26.84
6	932.05	31.04 QP	46.00	-14.96	1.00 H	316	0.79	30.25
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	39.62	31.81 QP	40.00	-8.19	1.00 V	331	16.51	15.30
2	64.90	26.20 QP	40.00	-13.80	1.50 V	10	12.78	13.42
3	103.78	26.35 QP	43.50	-17.15	1.50 V	169	14.41	11.94
4	164.06	25.73 QP	43.50	-17.77	1.50 V	196	11.14	14.60
5	867.89	31.74 QP	46.00	-14.26	1.50 V	241	2.59	29.15
6	932.05	31.22 QP	46.00	-14.78	1.00 V	232	0.97	30.25

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	B2		

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	49.34	21.92 QP	40.00	-18.08	1.50 H	121	8.33	13.59
2	144.61	31.38 QP	43.50	-12.12	1.00 H	94	18.26	13.12
3	216.55	18.42 QP	46.00	-27.58	1.50 H	103	7.14	11.28
4	243.77	20.59 QP	46.00	-25.41	1.50 H	136	8.09	12.50
5	296.27	20.49 QP	46.00	-25.51	1.50 H	115	6.96	13.53
6	545.14	26.62 QP	46.00	-19.38	1.00 H	133	6.41	20.20
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	49.34	31.88 QP	40.00	-8.12	1.50 V	148	18.29	13.59
2	111.56	24.75 QP	43.50	-18.75	1.00 V	166	14.03	10.72
3	144.61	34.31 QP	43.50	-9.19	1.00 V	235	21.19	13.12
4	189.33	28.76 QP	43.50	-14.74	1.00 V	196	17.30	11.46
5	243.77	32.35 QP	46.00	-13.65	1.00 V	10	19.85	12.50
6	296.27	24.13 QP	46.00	-21.87	1.50 V	277	10.59	13.53

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	C1		

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	132.95	25.99 QP	43.50	-17.51	1.50 H	265	13.16	12.84
2	166.00	31.34 QP	43.50	-12.16	1.50 H	265	16.86	14.48
3	498.47	26.40 QP	46.00	-19.60	1.50 H	223	4.97	21.43
4	576.25	29.38 QP	46.00	-16.62	1.50 H	241	6.24	23.15
5	865.94	31.15 QP	46.00	-14.85	1.50 H	280	2.05	29.10
6	922.33	30.03 QP	46.00	-15.97	1.00 H	193	-0.12	30.14
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	39.62	33.11 QP	40.00	-6.89	1.50 V	235	17.81	15.30
2	70.73	26.87 QP	40.00	-13.13	1.50 V	202	13.62	13.25
3	103.78	27.74 QP	43.50	-15.76	1.00 V	97	15.80	11.94
4	533.47	28.07 QP	46.00	-17.93	1.00 V	259	5.86	22.21
5	865.94	30.03 QP	46.00	-15.97	1.50 V	340	0.92	29.10
6	932.05	31.41 QP	46.00	-14.59	1.00 V	211	1.16	30.25

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 62%RH 1000hPa	TESTED BY	Kevin Liang
TEST MODE	C2		

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	49.34	22.03 QP	40.00	-17.97	1.50 H	85	8.43	13.59
2	144.61	31.18 QP	43.50	-12.32	1.00 H	100	18.06	13.12
3	216.55	19.75 QP	46.00	-26.25	1.50 H	349	8.47	11.28
4	243.77	20.58 QP	46.00	-25.42	1.50 H	1	8.08	12.50
5	296.27	20.86 QP	46.00	-25.14	1.50 H	157	7.33	13.53
6	545.14	27.59 QP	46.00	-18.41	1.00 H	10	7.39	20.20
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	49.34	32.17 QP	40.00	-7.83	1.00 V	325	18.57	13.59
2	103.78	24.44 QP	43.50	-19.06	1.00 V	355	14.67	9.77
3	189.33	27.43 QP	43.50	-16.07	1.00 V	10	15.97	11.46
4	216.55	27.27 QP	46.00	-18.73	1.00 V	34	15.99	11.28
5	243.77	30.73 QP	46.00	-15.27	1.50 V	25	18.23	12.50
6	296.27	24.35 QP	46.00	-21.65	1.00 V	322	10.82	13.53

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5 0.5 ~ 5 5 ~ 30	66 to 56 56 60	56 to 46 46 50

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Sep. 21, 2008
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2009
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 09, 2009
LISN SCHWARZBECK	ESH3-Z5	100311	Jan. 21, 2009
Software ADT	ADT_Cond_V3	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 test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

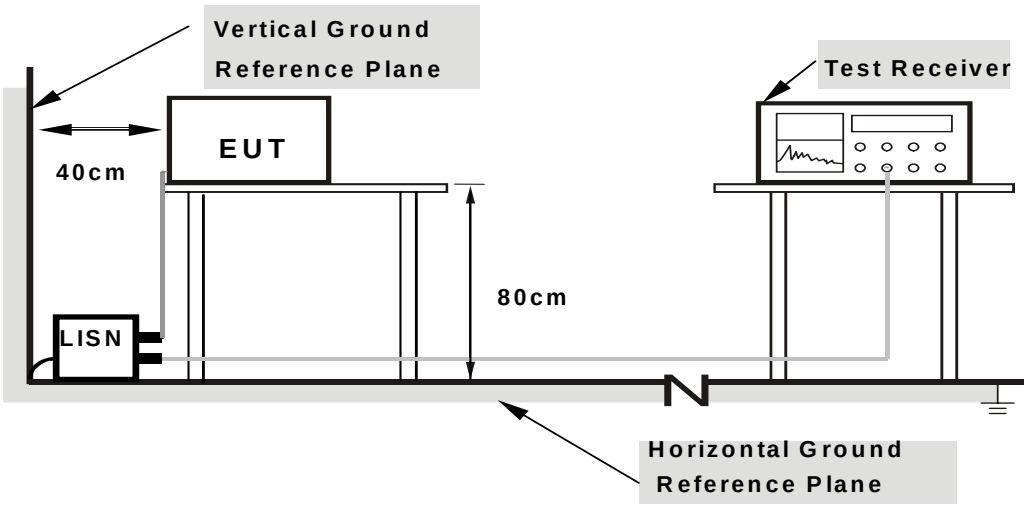
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

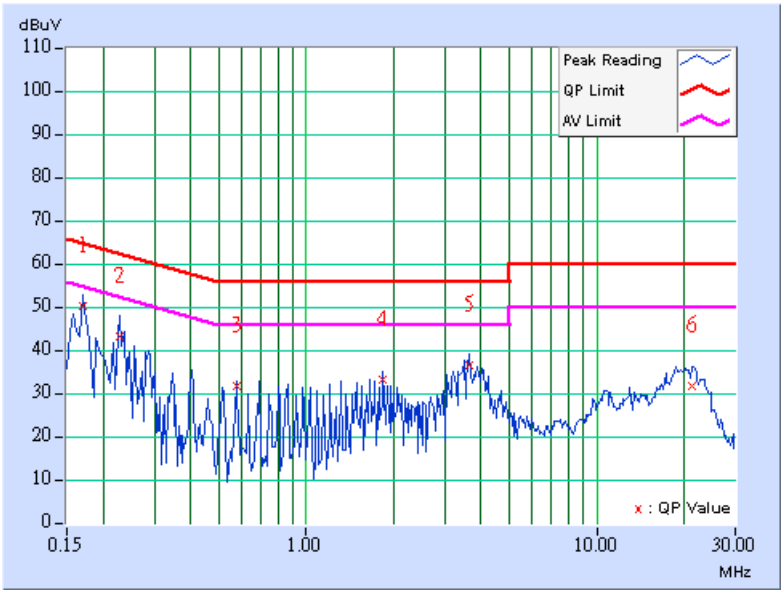
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA：

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 61%RH, 1002hPa
TESTED BY	Kevin Liang	TEST MODE	C1

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.171	0.13	48.92	-	49.05	-	64.92	54.92	-15.87	-
2	0.228	0.13	41.98	-	42.11	-	62.52	52.52	-20.41	-
3	0.576	0.15	30.53	-	30.68	-	56.00	46.00	-25.32	-
4	1.836	0.25	31.97	-	32.22	-	56.00	46.00	-23.78	-
5	3.617	0.41	35.37	-	35.78	-	56.00	46.00	-20.22	-
6	21.297	1.38	30.55	-	31.93	-	60.00	50.00	-28.07	-

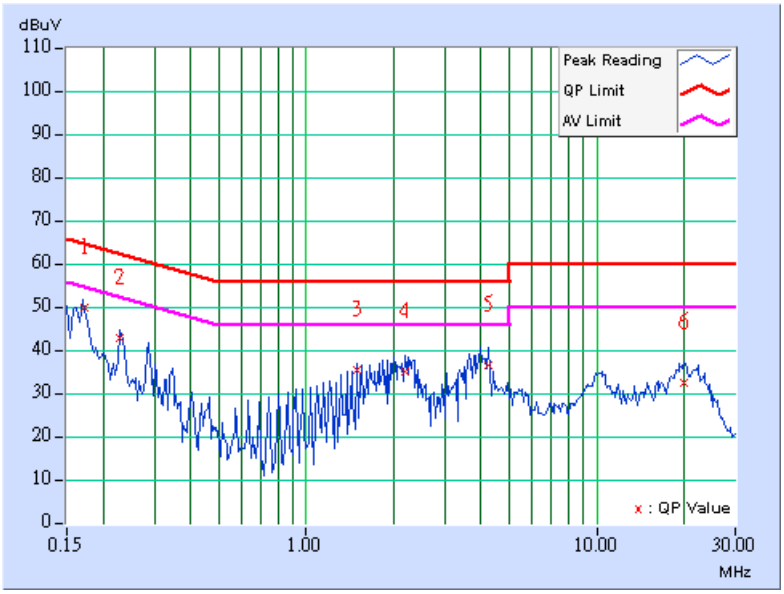
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 61%RH, 1002hPa
TESTED BY	Kevin Liang	TEST MODE	C1

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.172**	**0.14**	**49.15**	**-**	**49.29**	**-**	**64.86**	**54.86**	**-15.57**	**-**
2	0.228	0.14	42.18	-	42.32	-	62.52	52.52	-20.20	-
3	1.492	0.22	34.51	-	34.73	-	56.00	46.00	-21.27	-
4	2.184	0.28	34.32	-	34.60	-	56.00	46.00	-21.40	-
5	4.250	0.44	35.58	-	36.02	-	56.00	46.00	-19.98	-
6	19.926	0.96	31.53	-	32.49	-	60.00	50.00	-27.51	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.3 BAND EDGES MEASUREMENT

4.3.1 LIMITS OF BAND EDGES MEASUREMENT

Below –50dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP40	100041	Apr. 21, 2009

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.
The spectrum plots are attached on the following pages.

4.3.4 DEVIATION FROM TEST STANDARD

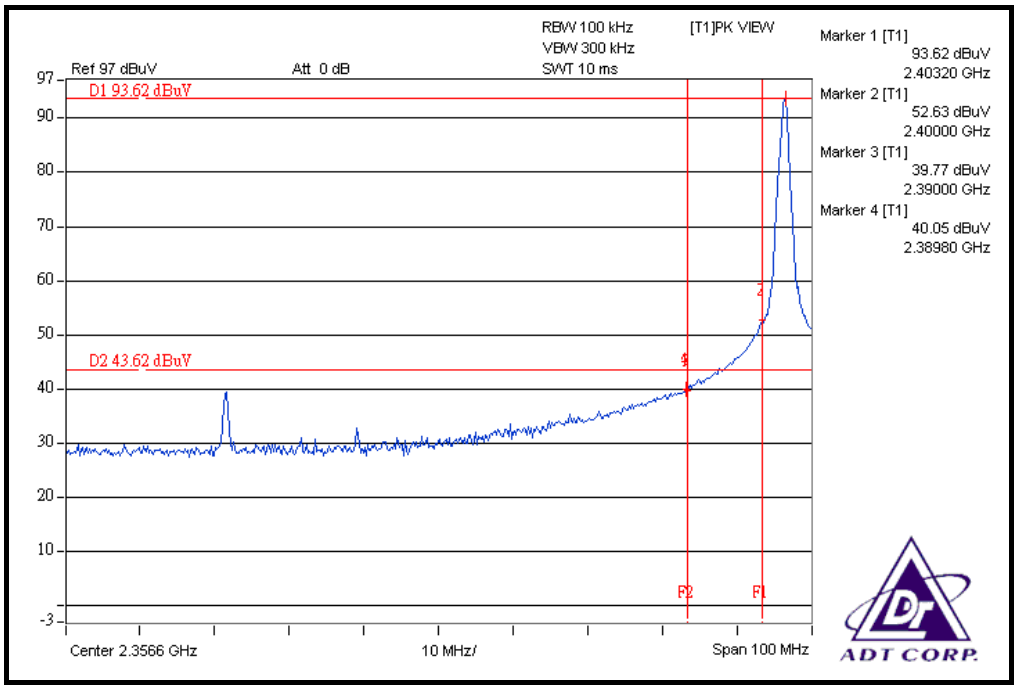
No deviation.

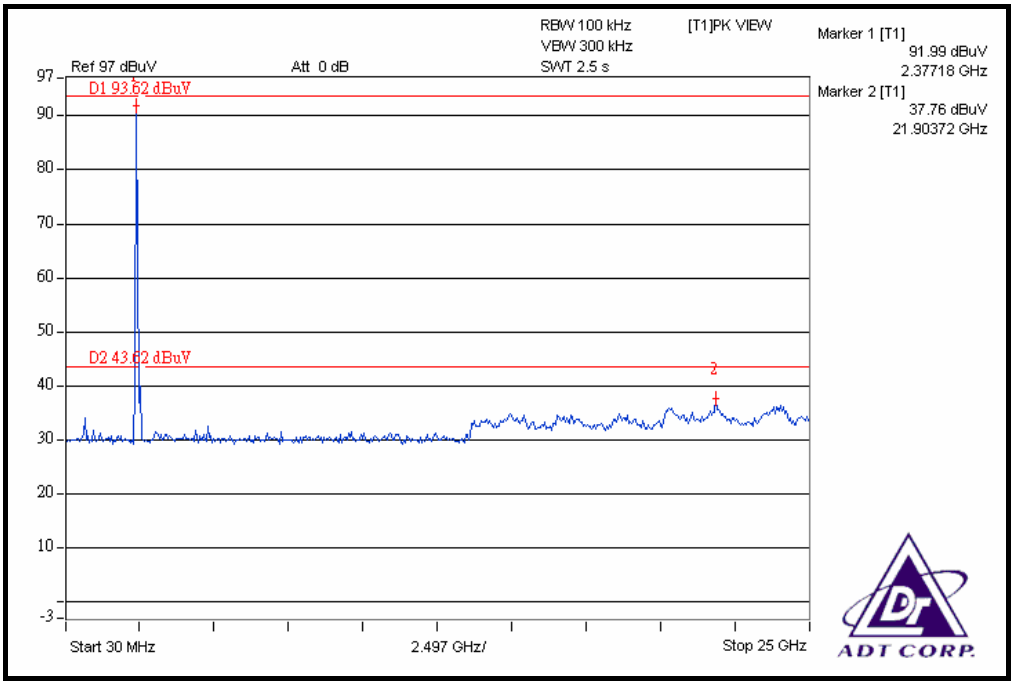
4.3.5 EUT OPERATING CONDITION

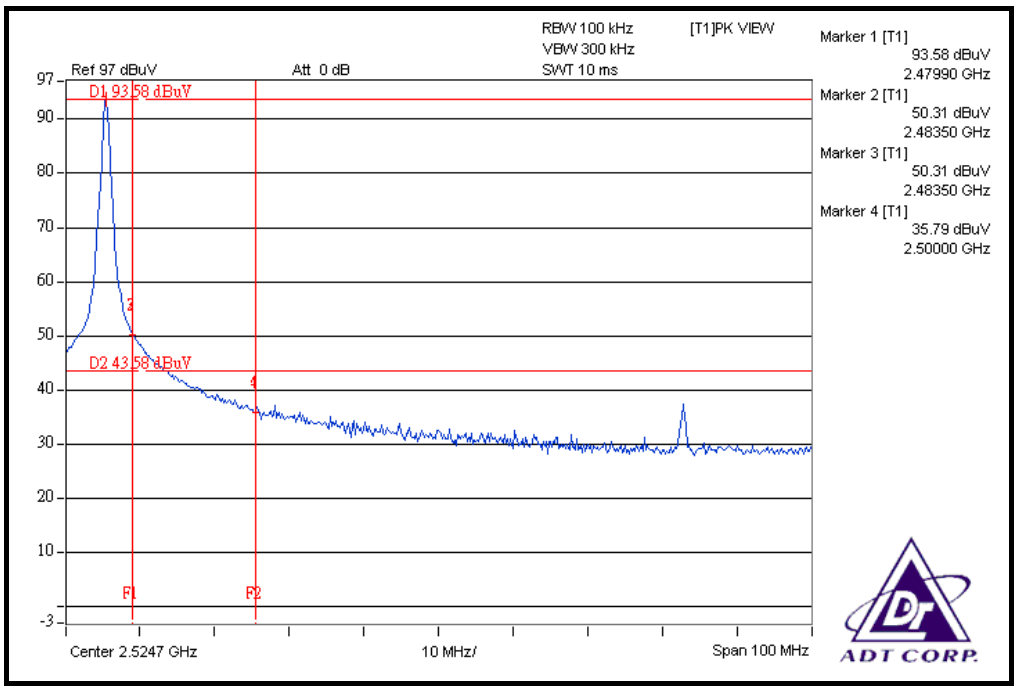
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

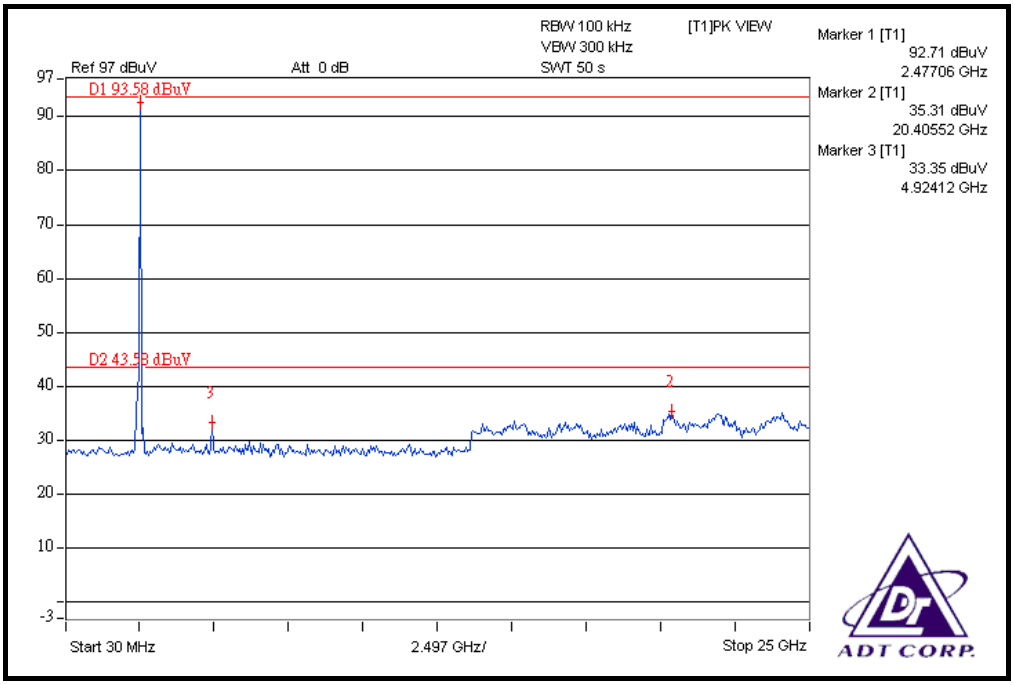
4.3.6 TEST RESULTS

The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, and D2 line indicates the 50dB offset below D1. It shows compliance with the requirement in part 15.249 (d).






RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1]PK VIEW
Ref 97 dBuV
Att 0 dB
D1 93.58 dBuV
D2 43.58 dBuV
Marker 1 [T1]
93.58 dBuV
2.47990 GHz
Marker 2 [T1]
50.31 dBuV
2.48350 GHz
Marker 3 [T1]
50.31 dBuV
2.48350 GHz
Marker 4 [T1]
35.79 dBuV
2.50000 GHz
F1
F2
Center 2.5247 GHz
10 MHz/
Span 100 MHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 50 s
[T1]PK VIEW
Ref 97 dBuV
Att 0 dB
D1 93.58 dBuV
D2 43.58 dBuV
Marker 1 [T1]
92.71 dBuV
2.47706 GHz
Marker 2 [T1]
35.31 dBuV
20.40552 GHz
Marker 3 [T1]
33.35 dBuV
4.92412 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz
ADT CORP.

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, UL
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

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

No any modifications are made to the EUT by the lab during the test.

---END---