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FCC TEST REPORT

(15.249, GFSK)

REPORT NO.: RF141025E01-1

MODEL NO.: M-R0052

FCC ID: JNZMR0052

RECEIVED: Oct. 25, 2014

TESTED: Oct. 27 to 31, 2014

ISSUED: Nov. 06, 2014

APPLICANT: LOGITECH FAR EAST LTD.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd.,
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141025E01-1	Original release	Nov. 06, 2014



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1 CERTIFICATION

PRODUCT : 2.4GHz Cordless Mouse
BRAND NAME : Logitech
MODEL NO. : M-R0052
TEST SAMPLE : ENGINEERING SAMPLE
APPLICANT : LOGITECH FAR EAST LTD.
TESTED : Oct. 27 to 31, 2014
STANDARDS : FCC Part 15, Subpart C (Section 15.249)
ANSI C63.10-2009

The above equipment (Model: M-R0052) 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 : Midoli Peng, **Date:** Nov. 06, 2014
(Midoli Peng, Specialist)

Approved by : May Chen, **Date:** Nov. 06, 2014
(May Chen, 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 -7.34dB at 0.59531MHz
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 -2.0dB at 2400.00MHz

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
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT (GFSK)

PRODUCT	2.4GHz Cordless Mouse
MODEL NO.	M-R0052
POWER SUPPLY	DC 3.7V from battery or DC 5V from USB interface
MODULATION TYPE	GFSK
CARRIER FREQUENCY OF EACH CHANNEL	2405MHz ~ 2474MHz
NUMBER OF CHANNEL	12
ANTENNA TYPE	PCB printed antenna with 0.08dBi antenna gain
DATA CABLE	USB charging cable (shielded, 1.3m) x 1
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Rechargeable battery x1

NOTE:

- The USB port of the EUT is only for charging the rechargeable battery. And the EUT has wireless function under charging mode.
- The EUT could be supplied with rechargeable battery, please refer to the following table:

Brand Name	Model	Rating
Logitech	533-000088 (AHB303450PRT)	3.7V 500mAh

- The EUT was pre-tested under following test modes:

Pre-test Mode	Description
Mode A	Power from USB interface
Mode B	Power from Battery

From the above modes, the worst radiated emission was found in **Mode A**. Therefore only the test data of the modes were recorded in this report individually.

- 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

Twelve channels are provided in this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2405	4	2417	7	2441	10	2465
2	2408	5	2432	8	2444	11	2471
3	2414	6	2435	9	2462	12	2474

3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **PLC**: Power Line Conducted Emission

RE < 1G: Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz

POWER LINE CONDUCTED EMISSION TEST:

- ☒ 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
1 to 12	1	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, 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
1 to 12	1	GFSK

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
1 to 12	1, 8, 12	GFSK

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	30deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	26deg. C, 74%RH	120Vac, 60Hz	Gary Cheng
RE≥1G	25deg. C, 73%RH	120Vac, 60Hz	Gary Cheng



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3.4 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 C63.10-2009

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

3.5 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.

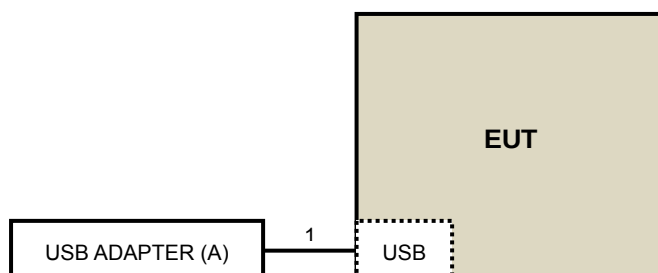
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	USB ADAPTER	Nicelink	US-T12B(W)	NA	NA	Provided by Lab

NOTE:

1. All power cords of the above support units are non-shielded (1.8 m).

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1.	USB charging	1	1.3	Yes	0	Supplied by client

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10, 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software ADT	BV ADT_Cond_V7.3.7. 3	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 test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Oct. 27, 2014

4.1.3 TEST PROCEDURES

- 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.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

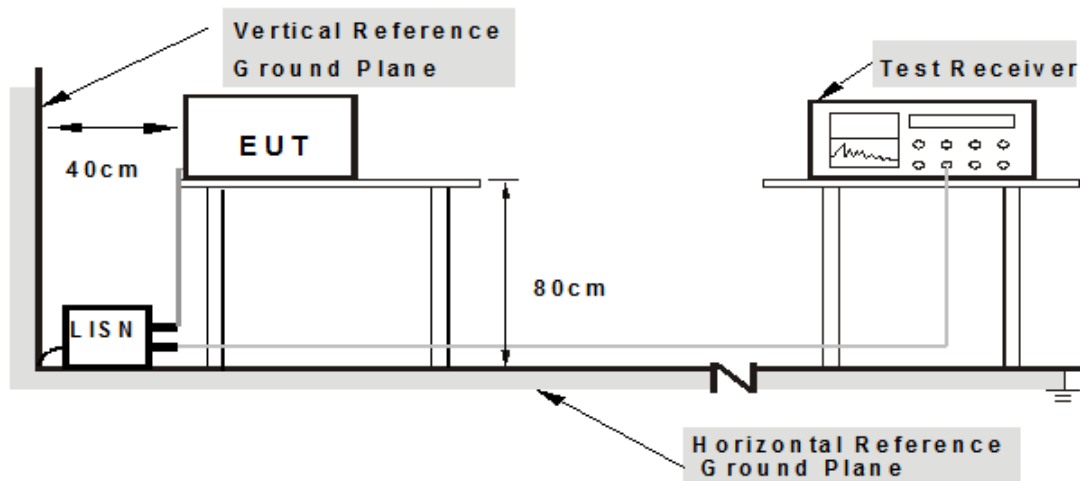
NOTE:

- The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1. Support units were connected to second LISN.

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



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4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of EUT.
2. The communication partner run test program “RF Sample [Num Lock]nRF51822.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

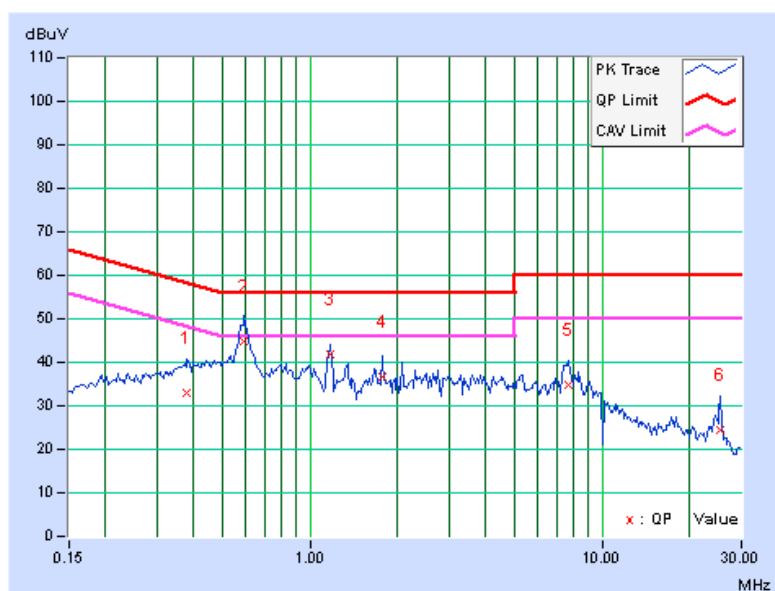
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.38047	0.09	32.98	26.70	33.07	26.79	58.27	48.27	-25.20	-21.48
2	0.59531	0.10	44.79	38.56	44.89	38.66	56.00	46.00	-11.11	-7.34
3	1.17969	0.14	41.62	33.11	41.76	33.25	56.00	46.00	-14.24	-12.75
4	1.76172	0.17	36.61	30.25	36.78	30.42	56.00	46.00	-19.22	-15.58
5	7.64844	0.37	34.62	27.45	34.99	27.82	60.00	50.00	-25.01	-22.18
6	25.53906	0.81	23.63	11.65	24.44	12.46	60.00	50.00	-35.56	-37.54

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

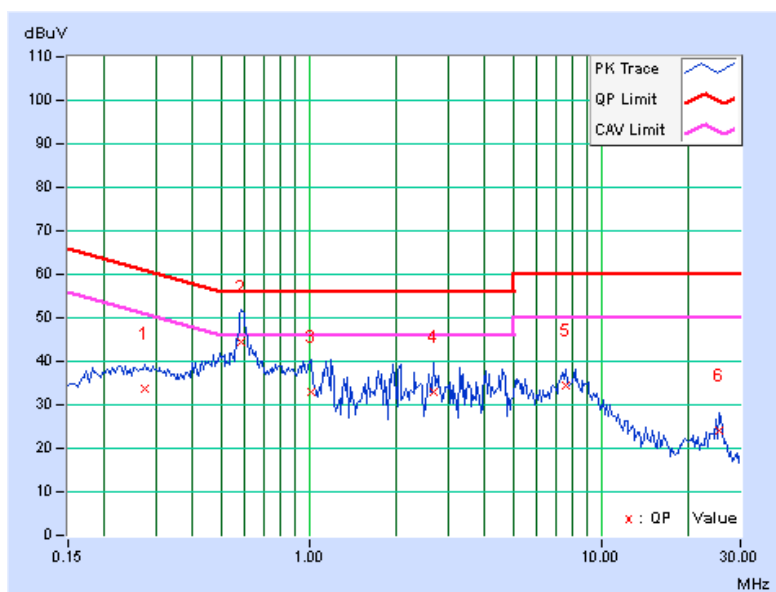


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.27500	0.07	33.62	24.42	33.69	24.49	60.97	50.97	-27.27	-26.47
2	0.58750	0.10	44.51	35.52	44.61	35.62	56.00	46.00	-11.39	-10.38
3	1.01563	0.13	32.78	25.28	32.91	25.41	56.00	46.00	-23.09	-20.59
4	2.66797	0.21	32.61	19.77	32.82	19.98	56.00	46.00	-23.18	-26.02
5	7.60547	0.38	34.02	28.31	34.40	28.69	60.00	50.00	-25.60	-21.31
6	25.44531	0.86	23.15	9.05	24.01	9.91	60.00	50.00	-35.99	-40.09

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.2 RADIATED EMISSION AND BAND EDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BAND EDGE MEASUREMENT

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

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

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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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4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	300801923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	131206 131215 SNMY23685/4	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
Software	ADT_Radiated _V8.7.07	NA	NA	NA
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. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Oct. 27, 2014

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters 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 detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

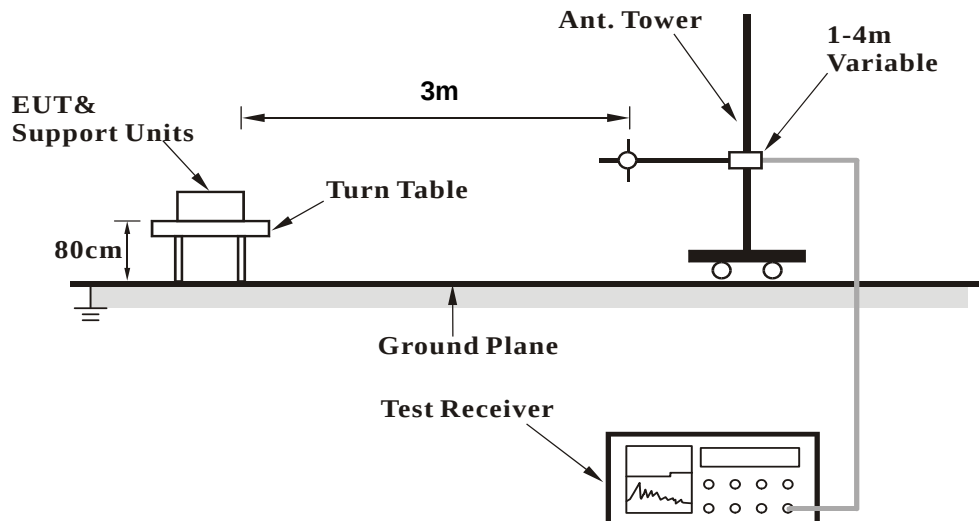
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes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

4.2.4 DEVIATION FROM TEST STANDARD

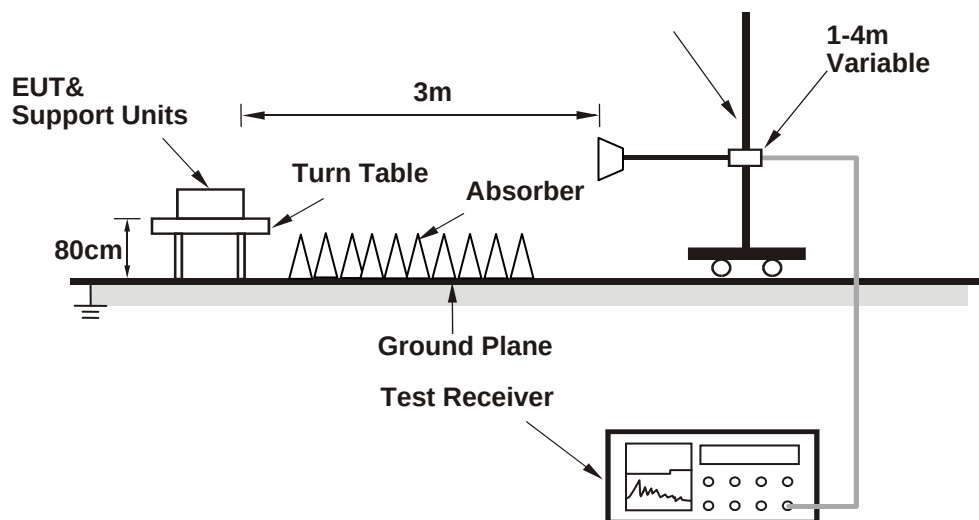
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 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	49.26	16.3 QP	40.0	-23.7	2.00 H	249	29.69	-13.39
2	147.66	18.6 QP	43.5	-25.0	1.00 H	125	31.49	-12.94
3	176.28	19.8 QP	43.5	-23.7	2.00 H	58	33.89	-14.07
4	185.59	21.7 QP	43.5	-21.8	1.50 H	360	36.84	-15.12
5	246.56	16.6 QP	46.0	-29.4	1.50 H	69	30.52	-13.96
6	943.93	25.5 QP	46.0	-20.5	2.00 H	138	24.38	1.08
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	49.21	23.3 QP	40.0	-16.7	1.00 V	150	36.68	-13.38
2	86.50	18.4 QP	40.0	-21.7	1.50 V	117	37.19	-18.84
3	176.23	16.7 QP	43.5	-26.8	1.00 V	213	30.79	-14.07
4	825.01	27.8 QP	46.0	-18.2	1.50 V	360	28.77	-0.98
5	857.99	28.8 QP	46.0	-17.2	1.50 V	291	29.38	-0.62
6	956.91	33.3 QP	46.0	-12.7	2.00 V	262	32.11	1.21

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) – 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

CHANNEL	TX Channel 1	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	2400.00	72.0 PK	74.0	-2.0	1.26 H	156	77.59	-5.59
2	2400.00	20.9 AV	54.0	-33.1	1.26 H	156	26.49	-5.59
3	*2405.00	102.1 PK	114.0	-11.9	1.26 H	156	107.67	-5.57
4	*2405.00	51.0 AV	94.0	-43.0	1.26 H	156	56.57	-5.57
5	4810.00	56.4 PK	74.0	-17.6	1.60 H	167	52.53	3.87
6	4810.00	5.3 AV	54.0	-48.7	1.60 H	167	1.43	3.87
7	7215.00	52.4 PK	74.0	-21.6	1.59 H	257	44.51	7.89
8	7215.00	1.3 AV	54.0	-52.7	1.59 H	257	-6.59	7.89
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	2400.00	62.4 PK	74.0	-11.6	1.00 V	274	67.99	-5.59
2	2400.00	11.3 AV	54.0	-42.7	1.00 V	274	16.89	-5.59
3	*2405.00	93.2 PK	114.0	-20.8	1.00 V	274	98.77	-5.57
4	*2405.00	42.1 AV	94.0	-51.9	1.00 V	274	47.67	-5.57
5	4810.00	55.6 PK	74.0	-18.4	1.61 V	257	51.73	3.87
6	4810.00	4.5 AV	54.0	-49.5	1.61 V	257	0.63	3.87
7	7215.00	52.3 PK	74.0	-21.7	1.49 V	116	44.41	7.89
8	7215.00	1.2 AV	54.0	-52.8	1.49 V	116	-6.69	7.89

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 average value of fundamental frequency is: Average = Peak value + 20 log(Duty cycle)
Where the duty factor is calculated from following formula:

$$20 \log (\text{Duty cycle}) = 20 \log (0.038 \text{ ms} / 13.562 \text{ ms}) = -51.1 \text{ dB}$$
Please see page 24 for plotted duty.

CHANNEL	TX Channel 8	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	*2444.00	102.4 PK	114.0	-11.6	1.26 H	152	107.79	-5.39
2	*2444.00	51.3 AV	94.0	-42.7	1.26 H	152	56.69	-5.39
3	4888.00	56.8 PK	74.0	-17.2	1.54 H	181	53.01	3.79
4	4888.00	5.7 AV	54.0	-48.3	1.54 H	181	1.91	3.79
5	7332.00	52.6 PK	74.0	-21.4	1.62 H	248	44.28	8.32
6	7332.00	1.5 AV	54.0	-52.5	1.62 H	248	-6.82	8.32
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	94.6 PK	114.0	-19.4	1.02 V	276	99.99	-5.39
2	*2444.00	43.5 AV	94.0	-50.5	1.02 V	276	48.89	-5.39
3	4888.00	55.9 PK	74.0	-18.1	1.62 V	251	52.11	3.79
4	4888.00	4.8 AV	54.0	-49.2	1.62 V	251	1.01	3.79
5	7332.00	52.8 PK	74.0	-21.2	1.50 V	122	44.48	8.32
6	7332.00	1.7 AV	54.0	-52.3	1.50 V	122	-6.62	8.32

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 average value of fundamental frequency is: Average = Peak value + 20 log(Duty cycle)
Where the duty factor is calculated from following formula:
20 log (Duty cycle) = 20 log (0.038 ms / 13.562 ms) = -51.1 dB
Please see page 24 for plotted duty.



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CHANNEL	TX Channel 12	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		

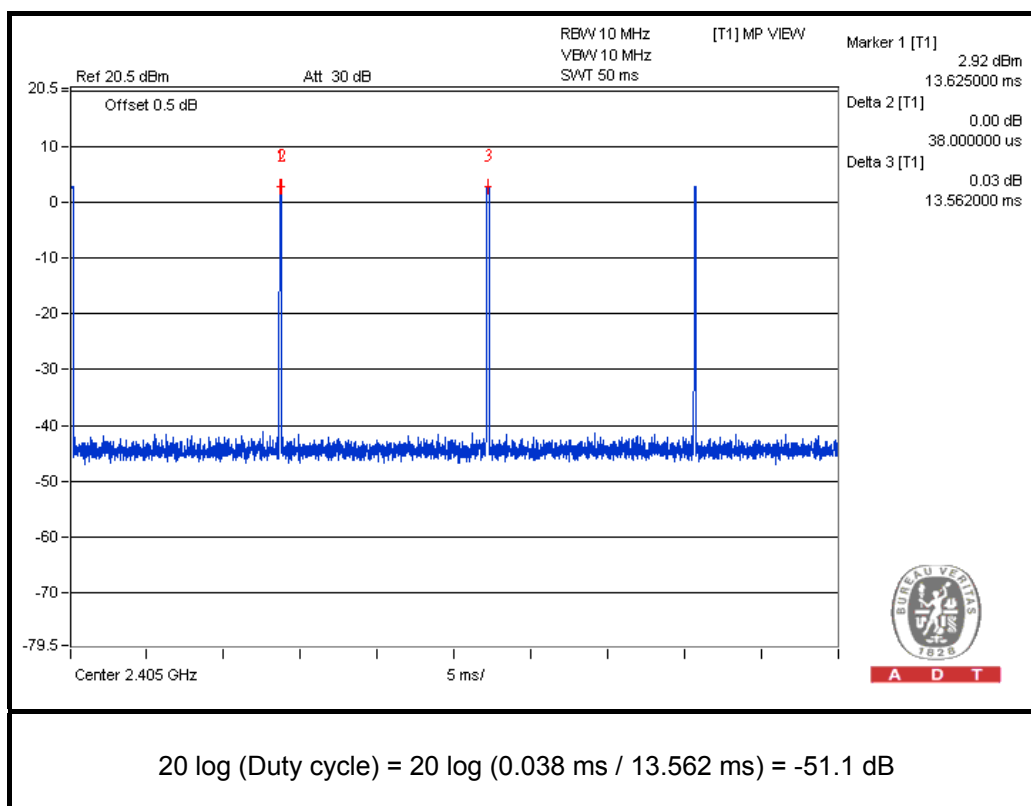
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2474.00	101.6 PK	114.0	-12.4	1.25 H	150	106.86	-5.26
2	*2474.00	50.5 AV	94.0	-43.5	1.25 H	150	55.76	-5.26
3	2483.50	62.9 PK	74.0	-11.1	1.25 H	150	68.10	-5.20
4	2483.50	11.8 AV	54.0	-42.2	1.25 H	150	17.00	-5.20
5	4948.00	56.3 PK	74.0	-17.7	1.61 H	154	52.48	3.82
6	4948.00	5.2 AV	54.0	-48.8	1.61 H	154	1.38	3.82
7	7422.00	53.1 PK	74.0	-20.9	1.57 H	245	44.44	8.66
8	7422.00	2.0 AV	54.0	-52.0	1.57 H	245	-6.66	8.66
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	*2474.00	94.7 PK	114.0	-19.3	1.01 V	277	99.96	-5.26
2	*2474.00	43.6 AV	94.0	-50.4	1.01 V	277	48.86	-5.26
3	2483.50	59.0 PK	74.0	-15.0	1.01 V	277	64.20	-5.20
4	2483.50	7.9 AV	54.0	-46.1	1.01 V	277	13.10	-5.20
5	4948.00	55.4 PK	74.0	-18.6	1.67 V	270	51.58	3.82
6	4948.00	4.3 AV	54.0	-49.7	1.67 V	270	0.48	3.82
7	7422.00	52.6 PK	74.0	-21.4	1.48 V	107	43.94	8.66
8	7422.00	1.5 AV	54.0	-52.5	1.48 V	107	-7.16	8.66

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 average value of fundamental frequency is: Average = Peak value + 20 log(Duty cycle)
Where the duty factor is calculated from following formula:
20 log (Duty cycle) = 20 log (0.038 ms / 13.562 ms) = -51.1 dB
Please see page 24 for plotted duty.



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5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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6 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:

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Web Site: www.bureauveritas-adt.com

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



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7 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 ---