FCC TEST REPORT(CC RADIO)

REPORT NO.:	RF131022E08-2
MODEL NO.:	HA1000
FCC ID :	Q87-HA1000
RECEIVED:	Oct. 22, 2013
TESTED:	Oct. 25 to Nov. 01, 2013
ISSUED:	Nov. 08, 2013

APPLICANT :	Linksys LLC
ADDRESS :	131 Theory Drive Irvine California 92617 United States

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131022E08-2	Original release	Nov. 08, 2013

1 CERTIFICATION

PRODUCT:	Staples Connect Hub
BRAND NAME:	Linksys
MODEL NO:	HA1000
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Linksys LLC
TESTED:	Oct. 25 to Nov. 01, 2013
STANDARDS:	**FCC Part 15, Subpart C (Section 15.231)**
	ANSI C63.10-2009

The above equipment (model: HA1000) 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. 08, 2013
(Midoli Peng, Specialist)

APPROVED BY : _____, **DATE:** Nov. 08, 2013
(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 15.231)			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.15dB at 0.41563MHz
15.209 15.231(b)	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -6.6dB at 437MHz.
15.231(c)	Emission Bandwidth Measurement	PASS	Meet the requirement of limit.
15.231(a)	De-activation	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.46 dB
Radiated emissions (1GHz -6GHz)	3.54 dB
Radiated emissions (6GHz -18GHz)	4.08 dB
Radiated emissions (18GHz -40GHz)	4.11 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

PRODUCT	Staples Connect Hub
MODEL NO.	HA1000
POWER SUPPLY	DC 5V from power adapter
MODULATION TYPE	FM
CARRIER FREQUENCY	431MHz ~ 437MHz
NUMBER OF CHANNEL	61
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter x1

NOTE:

1. The EUT is a WLAN, Z-Wave and CC Radio device.

2. The EUT must be supplied with a power adapter as below table:

Brand	Model No.	Spec.
Ktec	KSAS0120500200HU	Input: 100-240V, 0.4A, 50-60Hz Output: 5V, 2.0A DC output cable (1.6m unshielded)

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

WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
WNC	EAAH-N26	PIFA	UFL	2.14	2400 - 2500
Z-Wave Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
WNC	3ASHM1L01S2-111	PIFA	NA	-0.88	908.40 - 916
Clear Connect radio Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
WNC	3ASHM1L01S1-111	PIFA	NA	2.24	431 – 437

4. Spurious emission of the simultaneous operation (WLAN, Z-Wave & CC Radio) has been evaluated and no non-compliance was found.
5. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

61 channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	431	18	432.7	35	434.4	52	436.1
2	431.1	19	432.8	36	434.5	53	436.2
3	431.2	20	432.9	37	434.6	54	436.3
4	431.3	21	433	38	434.7	55	436.4
5	431.4	22	433.1	39	434.8	56	436.5
6	431.5	23	433.2	40	434.9	57	436.6
7	431.6	24	433.3	41	435	58	436.7
8	431.7	25	433.4	42	435.1	59	436.8
9	431.8	26	433.5	43	435.2	60	436.9
10	431.9	27	433.6	44	435.3	61	437
11	432	28	433.7	45	435.4		
12	432.1	29	433.8	46	435.5		
13	432.2	30	433.9	47	435.6		
14	432.3	31	434	48	435.7		
15	432.4	32	434.1	49	435.8		
16	432.5	33	434.2	50	435.9		
17	432.6	34	434.3	51	436		

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

RE ≥ 1G: Radiated Emission above 1GHz **EB:** 20dB Bandwidth measurement

DT: Deactivation Time measurement

NOTE: 1. The EUT's antenna had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on X-plane.

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 61	61	FM

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 XYZ axis.

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 61	61	FM

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 XYZ axis.

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 61	1, 61	FM

EMISSION BANDWIDTH MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 61	1, 61	FM

DEACTIVATION TIME MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 61	27	FM

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C,67%RH	120Vac, 60Hz	Sean Huang
RE<1G	30deg. C, 70%RH	120Vac, 60Hz	Andy Ho
RE≥1G	26deg. C, 70%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 60%RH	120Vac, 60Hz	Gary Cheng
DT	25deg. C, 60%RH	120Vac, 60Hz	Gary Cheng

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 (15.231)
ANSI C63.10-2009

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

NOTE: The EUT 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

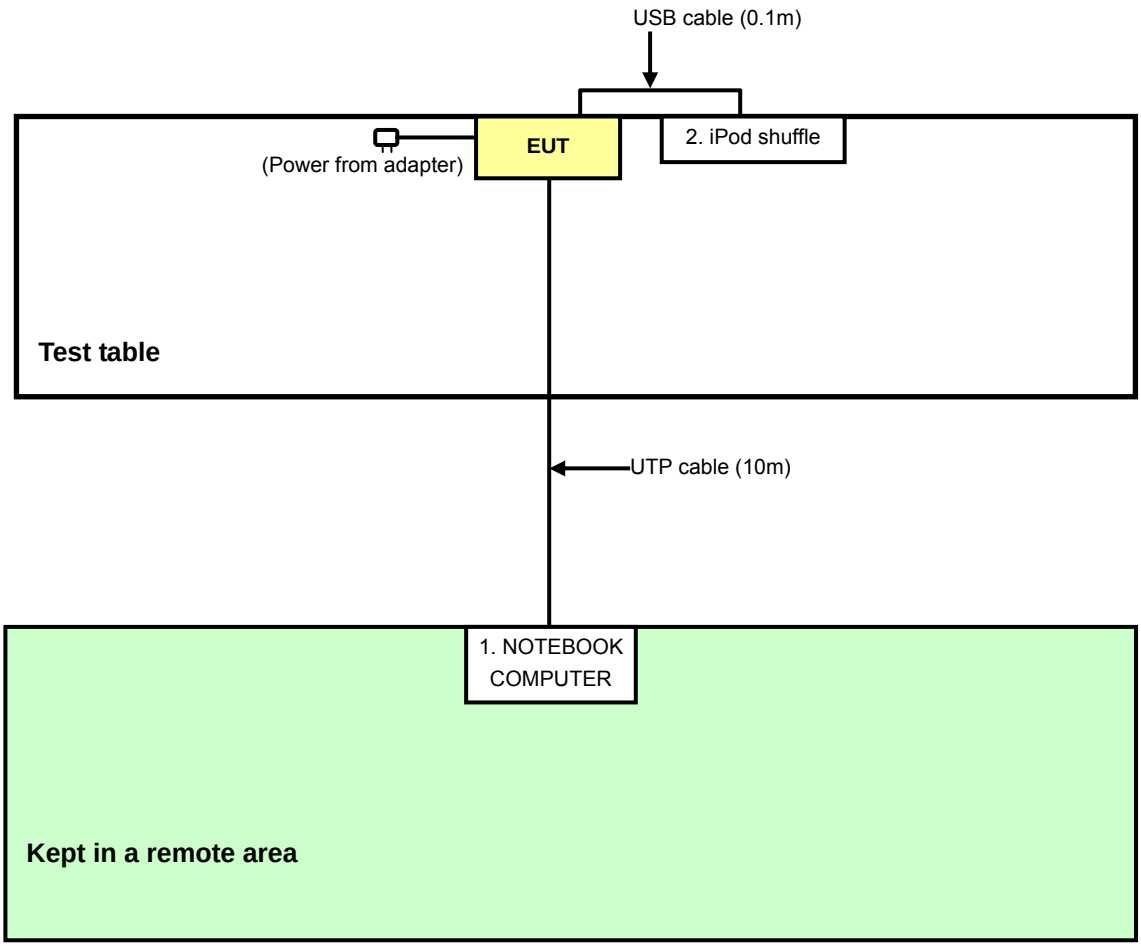
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	iPod shuffle	Apple	MC749TA/A	CC4DMFJUDFDM	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable(10m)
2	USB cable(0.1m)

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST PROCEDURE AND RESULT

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 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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 2014
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. 25, 2013

4.1.3 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.

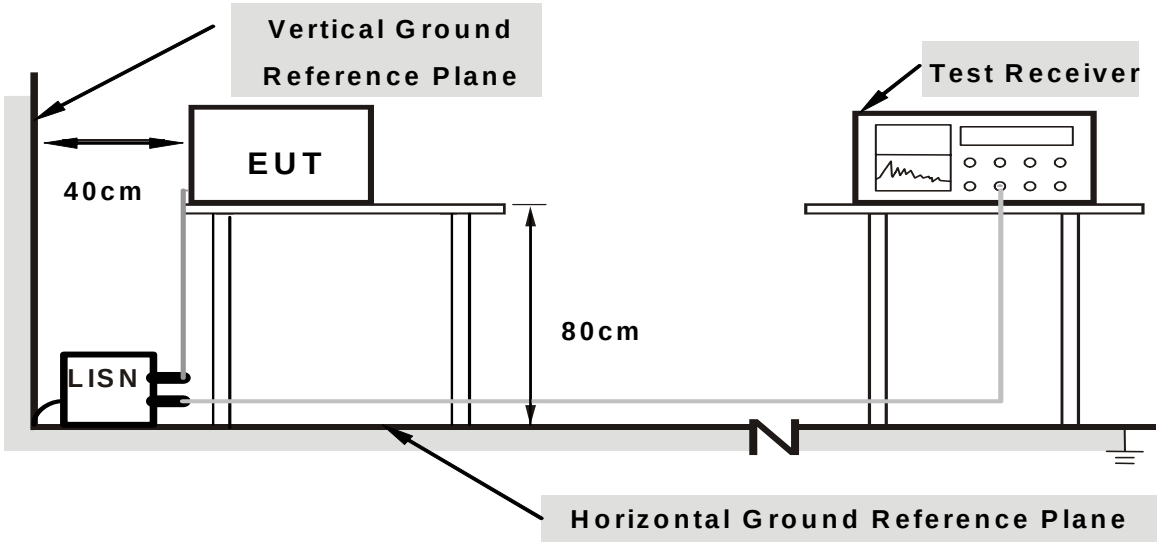
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 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 related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared computer system (support units 1) to act as communication partner.
3. The communication partner ran test program “webpage command” to enable EUT under transmission/receiving condition continuously.

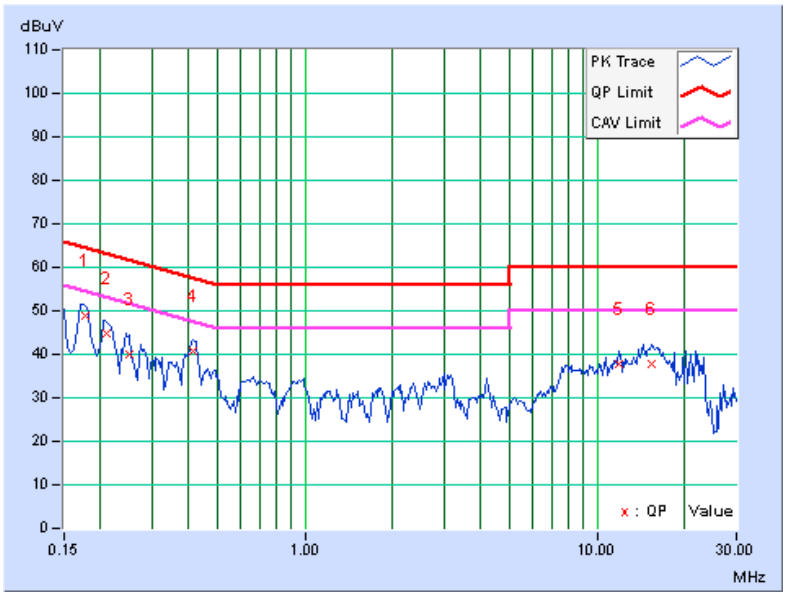
4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.09	48.71	37.54	48.80	37.63	64.61	54.61	-15.81	-16.98
2	0.20859	0.10	44.77	32.65	44.87	32.75	63.26	53.26	-18.39	-20.51
3	0.25156	0.11	39.85	23.39	39.96	23.50	61.71	51.71	-21.75	-28.21
4	**0.41563**	**0.14**	**40.60**	**36.24**	**40.74**	**36.38**	**57.54**	**47.54**	**-16.79**	**-11.15**
5	11.89063	0.53	37.20	30.53	37.73	31.06	60.00	50.00	-22.27	-18.94
6	15.32813	0.63	37.20	30.03	37.83	30.66	60.00	50.00	-22.17	-19.34

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

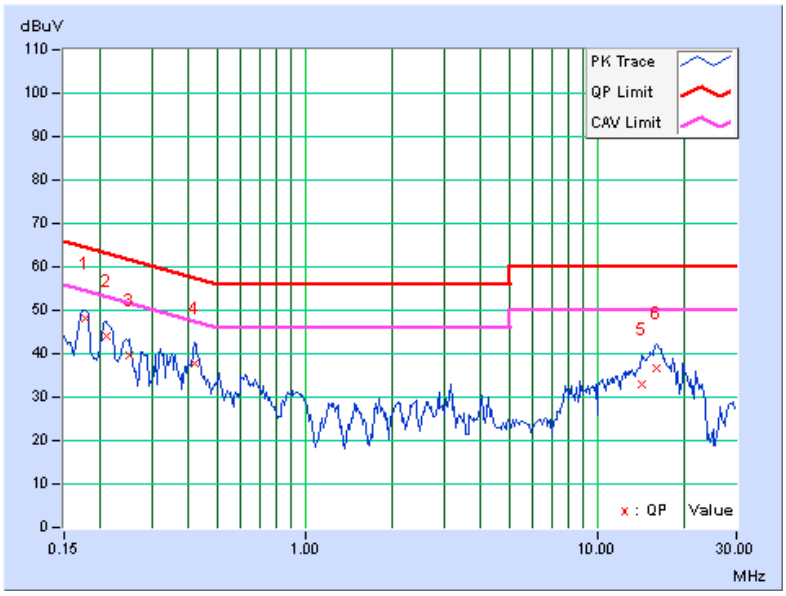


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.10	47.93	34.40	48.03	34.50	64.61	54.61	-16.58	-20.11
2	0.20859	0.10	43.86	28.50	43.96	28.60	63.26	53.26	-19.30	-24.66
3	0.25156	0.11	39.39	22.77	39.50	22.88	61.71	51.71	-22.21	-28.83
4	0.41953	0.14	37.59	32.50	37.73	32.64	57.46	47.46	-19.73	-14.82
5	14.19922	0.59	32.30	22.54	32.89	23.13	60.00	50.00	-27.11	-26.87
6	16.02734	0.63	36.08	25.03	36.71	25.66	60.00	50.00	-23.29	-24.34

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



4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.231(b) the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	uV/meter	dBuV/meter	uV/meter	dBuV/meter
40.66 ~ 40.70	2250	67.04	225	48.04
70 ~ 130	1250	61.94	125	41.94
130 ~ 174	1250 ~ 3750	61.94 ~ 71.48	125 ~ 375	41.94 ~ 51.48
174 ~ 260	3750	71.48	75	37.50
260 ~ 470	3750 ~ 12500	71.48 ~ 81.94	375 ~ 1250	51.48 ~ 61.94
Above 470	12500	81.94	1250	61.94

NOTE:

1. Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F)-6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F)- 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
2. The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.

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

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.

4.1.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 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: Nov. 01, 2013

4.1.3 TEST PROCEDURE

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 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:

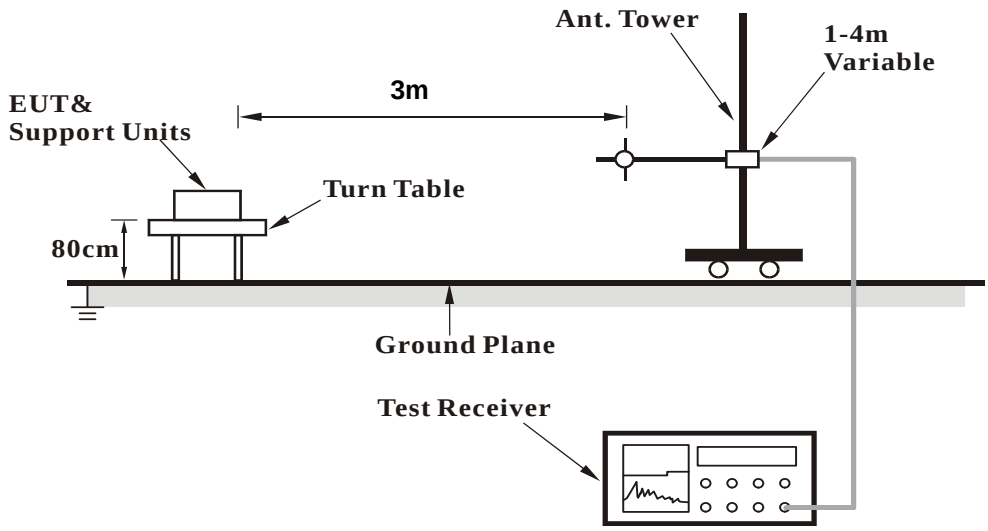
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. If the EUT transiting at duty cycle is < 98%, the duty cycle correction is required that emission.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

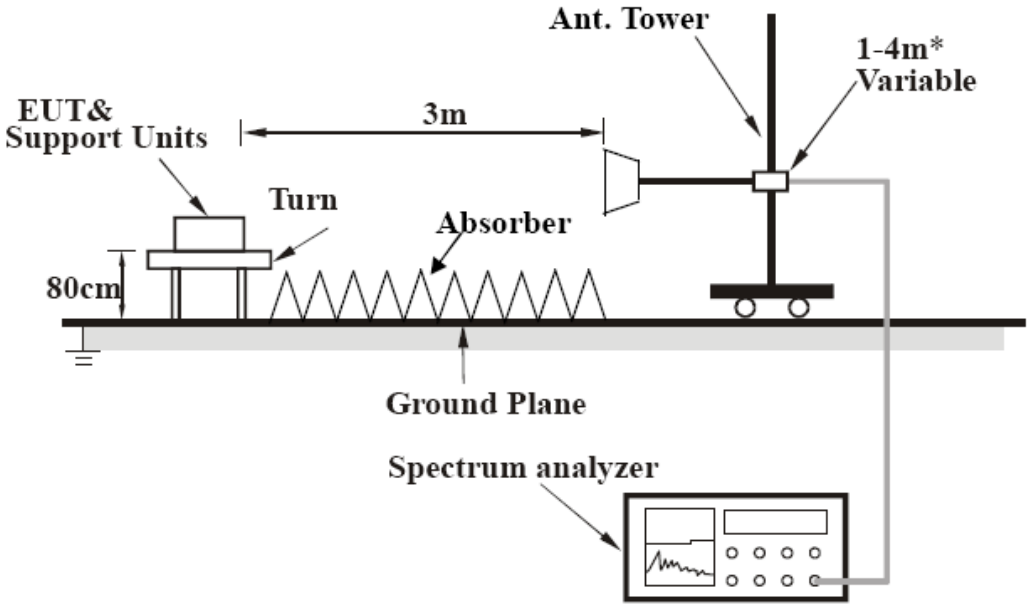
No deviation

4.1.5 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.

4.1.6 EUT OPERATING CONDITION

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

4.1.7 TEST RESULTS

ABOVE 1GHz DATA

CHANNEL	Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 5GHz		Average (AV)

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	1293.00	38.8 PK	80.7	-41.9	1.00 H	102	11.04	27.76
2	1293.00	19.5 AV	60.7	-41.2	1.00 H	102	-8.26	27.76
3	1724.00	38.9 PK	80.7	-41.8	1.00 H	110	9.23	29.67
4	1724.00	19.6 AV	60.7	-41.1	1.00 H	110	-10.07	29.67
5	2155.00	40.3 PK	80.7	-40.4	1.00 H	120	8.75	31.55
6	2155.00	21.0 AV	60.7	-39.7	1.00 H	120	-10.55	31.55
7	2586.00	41.4 PK	80.7	-39.3	1.00 H	205	8.36	33.04
8	2586.00	22.1 AV	60.7	-38.6	1.00 H	205	-10.94	33.04
9	3017.00	42.6 PK	80.7	-38.1	1.00 H	171	8.71	33.89
10	3017.00	23.3 AV	60.7	-37.4	1.00 H	171	-10.59	33.89
11	3448.00	42.7 PK	80.7	-38.0	1.00 H	151	7.48	35.22
12	3448.00	23.4 AV	60.7	-37.3	1.00 H	151	-11.82	35.22
13	3879.00	43.2 PK	74.0	-30.8	1.00 H	126	6.53	36.67
14	3879.00	23.9 AV	54.0	-30.1	1.00 H	126	-12.77	36.67
15	4310.00	45.9 PK	74.0	-28.1	1.00 H	159	7.46	38.44
16	4310.00	26.6 AV	54.0	-27.4	1.00 H	159	-11.84	38.44

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	1293.00	37.4 PK	80.7	-43.3	1.10 V	7	9.64	27.76
2	1293.00	18.1 AV	60.7	-42.6	1.10 V	7	-9.66	27.76
3	1724.00	38.5 PK	80.7	-42.2	1.00 V	211	8.83	29.67
4	1724.00	19.2 AV	60.7	-41.5	1.00 V	211	-10.47	29.67
5	2155.00	42.1 PK	80.7	-38.6	1.00 V	205	10.55	31.55
6	2155.00	22.8 AV	60.7	-37.9	1.00 V	205	-8.75	31.55
7	2586.00	41.8 PK	80.7	-38.9	1.00 V	195	8.76	33.04
8	2586.00	22.5 AV	60.7	-38.2	1.00 V	195	-10.54	33.04
9	3017.00	45.3 PK	80.7	-35.4	1.00 V	106	11.41	33.89
10	3017.00	26.0 AV	60.7	-34.7	1.00 V	106	-7.89	33.89
11	3448.00	43.4 PK	80.7	-37.3	1.00 V	211	8.18	35.22
12	3448.00	24.1 AV	60.7	-36.6	1.00 V	211	-11.12	35.22
13	3879.00	44.7 PK	74.0	-29.3	1.00 V	204	8.03	36.67
14	3879.00	25.4 AV	54.0	-28.6	1.00 V	204	-11.27	36.67
15	4310.00	46.6 PK	74.0	-27.4	1.00 V	119	8.16	38.44
16	4310.00	27.3 AV	54.0	-26.7	1.00 V	119	-11.14	38.44

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

CHANNEL	Channel 61	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 5GHz		Average (AV)

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	1311.00	38.7 PK	74.0	-35.3	1.02 H	107	10.86	27.84
2	1311.00	19.4 AV	54.0	-34.6	1.02 H	107	-8.44	27.84
3	1748.00	38.8 PK	80.9	-42.1	1.00 H	109	9.02	29.78
4	1748.00	19.5 AV	60.9	-41.4	1.00 H	109	-10.28	29.78
5	2185.00	40.6 PK	80.9	-40.3	1.01 H	118	8.94	31.66
6	2185.00	21.3 AV	60.9	-39.6	1.01 H	118	-10.36	31.66
7	2622.00	41.4 PK	80.9	-39.5	1.00 H	218	8.28	33.12
8	2622.00	22.1 AV	60.9	-38.8	1.00 H	218	-11.02	33.12
9	3059.00	42.1 PK	80.9	-38.8	1.00 H	186	8.05	34.05
10	3059.00	22.8 AV	60.9	-38.1	1.00 H	186	-11.25	34.05
11	3496.00	42.4 PK	80.9	-38.5	1.00 H	166	6.99	35.41
12	3496.00	23.1 AV	60.9	-37.8	1.00 H	166	-12.31	35.41
13	3933.00	43.7 PK	74.0	-30.3	1.00 H	114	6.81	36.89
14	3933.00	24.4 AV	54.0	-29.6	1.00 H	114	-12.49	36.89
15	4370.00	46.4 PK	74.0	-27.6	1.00 H	160	7.81	38.59
16	4370.00	27.1 AV	54.0	-26.9	1.00 H	160	-11.49	38.59

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	1311.00	37.7 PK	74.0	-36.3	1.14 V	15	9.86	27.84
2	1311.00	18.4 AV	54.0	-35.6	1.14 V	15	-9.44	27.84
3	1748.00	38.5 PK	80.9	-42.4	1.06 V	199	8.72	29.78
4	1748.00	19.2 AV	60.9	-41.7	1.06 V	199	-10.58	29.78
5	2185.00	42.2 PK	80.9	-38.7	1.01 V	214	10.54	31.66
6	2185.00	22.9 AV	60.9	-38.0	1.01 V	214	-8.76	31.66
7	2622.00	41.3 PK	80.9	-39.6	1.00 V	202	8.18	33.12
8	2622.00	22.0 AV	60.9	-38.9	1.00 V	202	-11.12	33.12
9	3059.00	45.1 PK	80.9	-35.8	1.03 V	122	11.05	34.05
10	3059.00	25.8 AV	60.9	-35.1	1.03 V	122	-8.25	34.05
11	3496.00	42.9 PK	80.9	-38.0	1.00 V	204	7.49	35.41
12	3496.00	23.6 AV	60.9	-37.3	1.00 V	204	-11.81	35.41
13	3933.00	44.4 PK	74.0	-29.6	1.00 V	192	7.51	36.89
14	3933.00	25.1 AV	54.0	-28.9	1.00 V	192	-11.79	36.89
15	4370.00	46.7 PK	74.0	-27.3	1.00 V	128	8.11	38.59
16	4370.00	27.4 AV	54.0	-26.6	1.00 V	128	-11.19	38.59

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

BELOW 1GHz DATA

CHANNEL	Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	Below 1000MHz		

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	*431.00	92.3 PK	100.7	-8.4	2.00 H	42	100.54	-8.22
2	*431.00	73.0 AV	80.7	-7.7	2.00 H	42	81.24	-8.22
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	*431.00	90.2 PK	100.7	-10.5	1.50 V	84	98.43	-8.22
2	*431.00	70.9 AV	80.7	-9.8	1.50 V	84	79.13	-8.22

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.

CHANNEL	Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1000MHz		

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	69.67	22.9 QP	60.7	-37.8	2.00 H	299	37.84	-14.94
2	125.01	28.9 QP	43.5	-14.6	2.00 H	269	43.19	-14.33
3	249.99	37.8 QP	46.0	-8.3	1.00 H	67	51.51	-13.76
4	442.01	32.2 QP	60.7	-28.5	2.00 H	119	40.25	-8.03
5	749.99	32.8 QP	60.7	-28.0	1.00 H	360	34.61	-1.84
6	849.98	41.6 QP	60.7	-19.1	1.00 H	16	42.07	-0.49
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	55.85	34.2 QP	60.7	-26.5	2.00 V	360	47.17	-12.95
2	69.19	30.7 QP	60.7	-30.1	1.50 V	322	45.64	-14.99
3	249.99	31.5 QP	46.0	-14.5	1.50 V	360	45.28	-13.76
4	330.02	25.2 QP	46.0	-20.8	1.00 V	133	35.89	-10.65
5	442.02	32.3 QP	60.7	-28.5	2.00 V	66	40.28	-8.03
6	949.99	34.3 QP	60.7	-26.4	1.50 V	4	32.88	1.40

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

CHANNEL	Channel 61	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	Below 1000MHz		

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	*437.00	94.0 PK	100.9	-6.9	2.00 H	40	102.23	-8.19
2	***437.00**	**74.3 AV**	**80.9**	**-6.6**	**2.00 H**	**40**	**82.53**	**-8.19**
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	*437.00	92.3 PK	100.9	-8.6	1.50 V	78	100.51	-8.19
2	*437.00	72.4 AV	80.9	-8.6	1.50 V	78	80.55	-8.19

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.

CHANNEL	Channel 61	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1000MHz		

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	69.67	22.9 QP	60.9	-38.0	2.00 H	299	37.84	-14.94
2	125.01	28.9 QP	43.5	-14.6	2.00 H	269	43.19	-14.33
3	249.99	37.8 QP	46.0	-8.3	1.00 H	67	51.51	-13.76
4	442.01	32.2 QP	60.9	-28.7	2.00 H	119	40.25	-8.03
5	749.99	32.8 QP	60.9	-28.2	1.00 H	360	34.61	-1.84
6	849.98	41.6 QP	60.9	-19.3	1.00 H	16	42.07	-0.49
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	55.86	34.4 QP	60.9	-26.5	1.50 V	360	47.36	-12.95
2	69.19	30.8 QP	60.9	-30.1	1.50 V	322	45.81	-14.99
3	249.99	31.7 QP	46.0	-14.3	1.50 V	360	45.50	-13.76
4	330.03	25.2 QP	46.0	-20.8	2.00 V	133	35.84	-10.65
5	442.02	32.2 QP	60.9	-28.7	1.00 V	66	40.24	-8.03
6	950.00	34.1 QP	60.9	-26.8	1.50 V	4	32.73	1.40

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

4.2 20dB OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Jan. 21, 2013	Jan. 20, 2014

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 : Nov. 01, 2013

4.2.3 TEST PROCEDURE

a. The EUT was placed on the turn table.

b. The signal was coupled to the spectrum analyzer through an antenna.

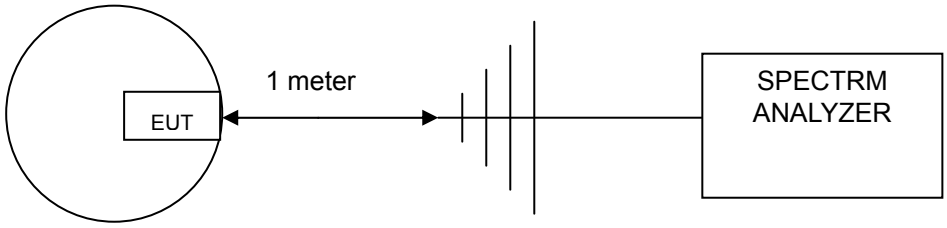
c. Set the resolution bandwidth to 10 kHz and video bandwidth to 30 kHz then select Peak function to scan the channel frequency.

d. The emission bandwidth was measured and recorded.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

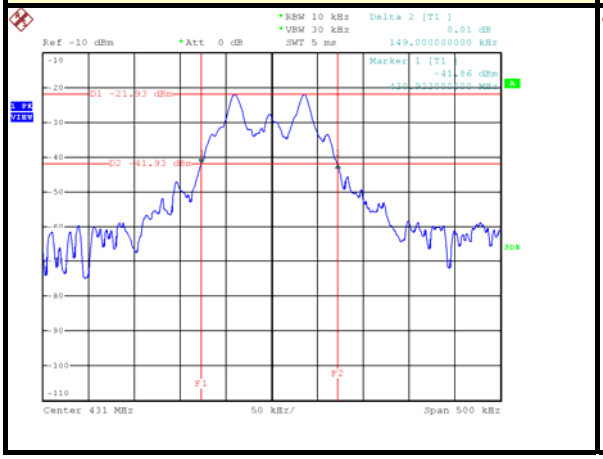
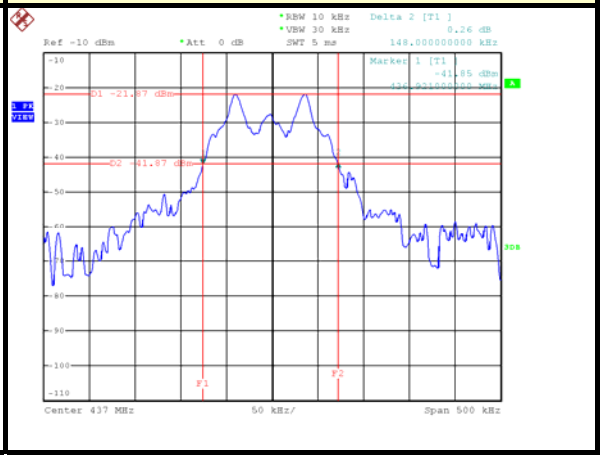
4.2.5 TEST SETUP



4.2.6 TEST RESULTS

FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MAXIMUM LIMIT (kHz)	PASS/FAIL
431	0.149	1077.5	PASS
437	0.148	1092.5	PASS

The plot of test result is attached as below.

431 MHz	437 MHz
	

4.3 DEACTIVATION TIME

4.3.1 LIMITS OF DEACTIVATION TIME MEASUREMENT

15.231 (a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
15.231 (a)(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 03, 2013	July 02, 2014

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 : Nov. 01, 2013

4.3.3 TEST PROCEDURES

a. The EUT was placed on the turning table.

b. The signal was coupled to the spectrum analyzer through an antenna.

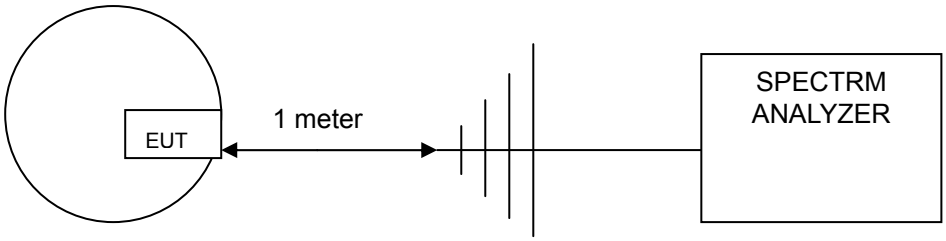
c. Set the resolution bandwidth to 100kHz and video bandwidth to 100kHz. The spectrum analyzer was turned to the centre frequency of the transmitter's and the analyzer's marker function was used to determine the duration of transmission.

d. The transmission duration was measured and recorded.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

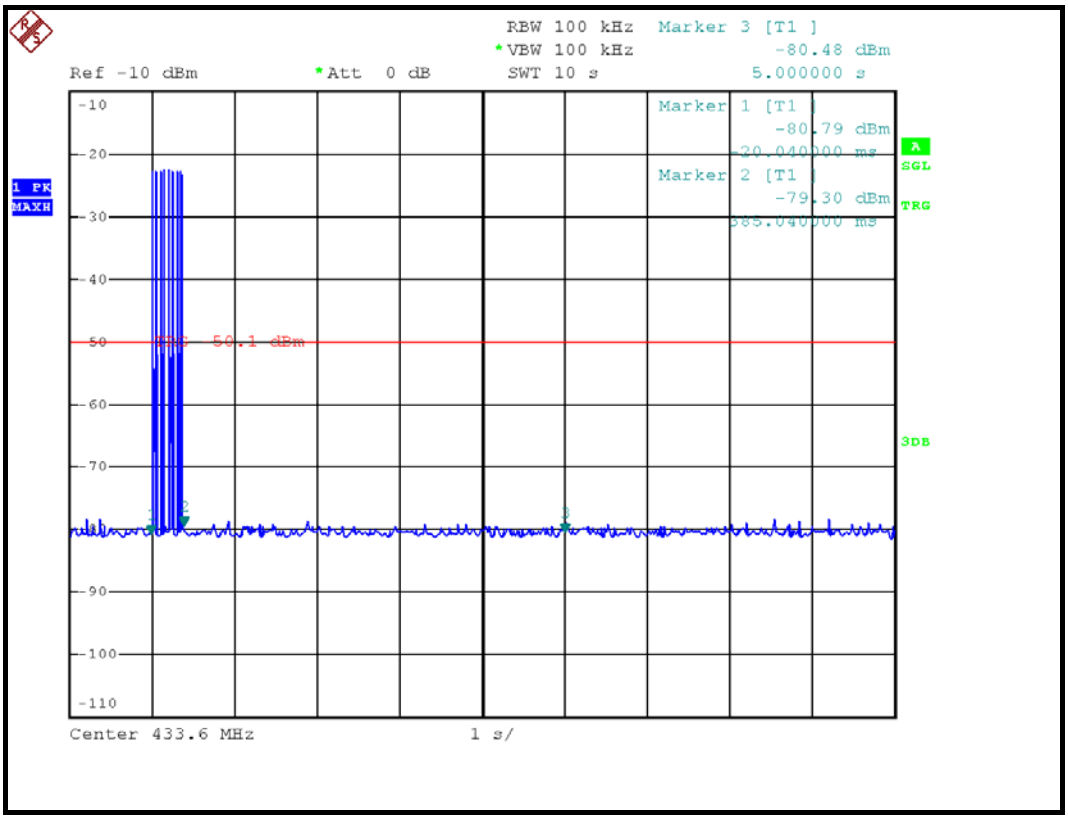
4.3.5 TEST SETUP



4.3.6 TEST RESULTS

PUSH BUTTON	FREQUENCY (MHz)	MAXIMUM LIMIT (sec)	PASS/FAIL
1	433.6	5	PASS

The plots of test results are attached as below.



5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

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.

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: 886-3-3270892

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.

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.

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