FCC TEST REPORT(15.407)

REPORT NO.:	RF120724E01-1
MODEL NO.:	DIR-845L
FCC ID:	KA2IR845LA1
RECEIVED:	July 24, 2012
TESTED:	July 30 to Aug. 21, 2012
ISSUED:	Oct. 12, 2012

APPLICANT:	D-Link Corporation
ADDRESS:	No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.

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
RF120724E01-1	Original release	Oct. 12, 2012

1. CERTIFICATION

PRODUCT:	WHOLE HOME CLOUD ROUTER 2000
BRAND NAME:	D-Link
MODEL NO.:	DIR-845L
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	D-Link Corporation
TESTED:	July 30 to Aug. 21, 2012
STANDARDS:	**FCC Part 15, Subpart E (Section 15.407)** ANSI C63.10-2009

The above equipment (Model: DIR-845L) 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:** *Oct. 12, 2012*
(Claire Kuan, Specialist)

APPROVED BY : _____ , **DATE:** *Oct. 12, 2012*
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 5GHz, 5180~5240MHz

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -4.45dB at 10.29688MHz
15.407(b/1/2/3)(b)(6)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.7dB at 5150.00MHz
15.407(a/1/2)	Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

NOTE: The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2.400 ~ 2.4835GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

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	2.98 dB
Radiated emissions (30MHz-1GHz)	5.59 dB
Radiated emissions (1GHz -6GHz)	3.56 dB
Radiated emissions (6GHz -18GHz)	4.10 dB
Radiated emissions (18GHz -40GHz)	4.24 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	WHOLE HOME CLOUD ROUTER 2000
MODEL NO.	DIR-845L
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11g / a: up to 54Mbps 802.11n (HT20, 800ns GI): up to 130Mbps 802.11n (HT20, 400ns GI): up to 144.444Mbps 802.11n (40MHz, 800ns GI): up to 270Mbps 802.11n (40MHz, 400ns GI): up to 300Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz
	For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (40MHz)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (40MHz) **For 15.247 (5GHz)** 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (40MHz)
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 26.002mW 802.11n (HT20): 25.974mW 802.11n (40MHz): 44.113mW **For 15.247(2.4GHz)** 802.11b: 164.437mW 802.11g: 154.525mW 802.11n (HT20): 307.869mW 802.11n (40MHz): 296.617mW **For 15.247(5GHz)** 802.11a: 558.470mW 802.11n (HT20): 881.259mW 802.11n (40MHz): 779.182mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. There are 2.4GHz and 5GHz WLAN technology used for the EUT. The test report of EUT listed as below table:

Function	Report No.
WLAN	RF120724E01 (15.247) RF120724E01-1(15.407)

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

No	Manufacturer	Brand	Model No.	Spec.
1	CWT	D-Link	SAG024F 4 US	Input: 100-240V, 0.8A, 47-63Hz Output: 12V, 2.0A DC power cable: 1.2m, unshielded
2	AMIGO		AMS4-1202000FU	Input: 100-240V, 0.8A, 50/60Hz Output: 12V, 2.0A DC power cable: 1.2m, unshielded
For radiated test, the EUT was pre-tested with above adapters, the worse case was found in adapter 2. Therefore only the test data of the adapter was recorded in the test report.				

3. There are six antennas provided to this EUT, please refer to the following table:

Antenna 1					
Manufacture	Model name	Antenna Gain (dBi)	Frequency range (MHz to MHz)	Antenna Type	Connector
MEDIATEK	NA	3.33	2400~2483.5	PIFA	NA
		4.8	5150~5350		
		4.44	5470~5725		
		4.4	5725~5850		
Antenna 2					
Manufacture	Model name	Antenna Gain (dBi)	Frequency range (MHz to MHz)	Antenna Type	Connector
MEDIATEK	NA	5.30	2400~2483.5	PIFA	NA
		3.33	5150~5350		
		4.13	5470~5725		
		3.75	5725~5850		

Antenna 3					
Manufacture	Model name	Antenna Gain (dBi)	Frequency range (MHz to MHz)	Antenna Type	Connector
MEDIATEK	NA	3.76	2400~2483.5	PIFA	NA
		2.81	5150~5350		
		3.08	5470~5725		
		2.26	5725~5850		
Antenna 4					
Manufacture	Model name	Antenna Gain (dBi)	Frequency range (MHz to MHz)	Antenna Type	Connector
MEDIATEK	NA	5.23	2400~2483.5	PIFA	NA
		2.42	5150~5350		
		2.35	5470~5725		
		3.21	5725~5850		
Antenna 5					
Manufacture	Model name	Antenna Gain (dBi)	Frequency range (MHz to MHz)	Antenna Type	Connector
MEDIATEK	NA	4.87	2400~2483.5	PIFA	NA
		3.49	5150~5350		
		2.41	5470~5725		
		2.56	5725~5850		
Antenna 6					
Manufacture	Model name	Antenna Gain (dBi)	Frequency range (MHz to MHz)	Antenna Type	Connector
MEDIATEK	NA	4.92	2400~2483.5	PIFA	NA
		2.5	5150~5350		
		1.71	5470~5725		
		1.49	5725~5850		

4. According to the above antennas, there are two antennas will transmit simultaneously. Therefore the following antenna combination modes could be chosen as below table:

COMBINATION MODE	Antenna Configuration	
	CHAIN(0)	CHAIN(1)
1	Antenna 1 - H	Antenna 4 - V
2	Antenna 1 - H	Antenna 5 - V
3	Antenna 1 - H	Antenna 6 - V
4	Antenna 2 - H	Antenna 4 – V
5	Antenna 2 - H	Antenna 5 - V
6	Antenna 2 - H	Antenna 6 - V
7	Antenna 3 - H	Antenna 4 - V
8	Antenna 3 - H	Antenna 5 - V
9	Antenna 3 - H	Antenna 6 - V

Note:
Above antenna combinations were pre-tested in chamber, the worse case was found as below:
1. The antenna 2 was selected as representative antennas for 802.11b and 802.11g final test.
2. The antenna 2 was selected as representative antennas for 802.11a final test.
3. The antenna 2, 4 were selected as representative antennas for 802.11n (2.4GHz) final test.
4. The antenna 2, 6 were selected as representative antennas for 802.11n (5GHz) final test.

5. The EUT incorporates a MIMO function without beam forming.

MODULATION MODE	Tx/Rx FUNCTION
802.11b	1Tx/2Rx
802.11g	1Tx/2Rx
802.11a	1Tx/2Rx
802.11n (HT20)	2Tx/2Rx
802.11n (HT40)	2Tx/2Rx

6. Radiated and Conducted emission of the simultaneous operation (2.4GHz and 5GHz WLAN technology) has been evaluated and no non-compliance was found.

7. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.

8. 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

Operated in 5180 ~ 5240MHz band:

4 channels are provided for 802.11a, 802.11n (HT20):

CHANNEL	FREQUENCY
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY
38	5190 MHz
46	5230 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	
1	√	-	-	-	Adapter 1
2	√	√	√	√	Adapter 2

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

RE ³ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

NOTE: "-"means no effect.

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
802.11n (HT20)	36 to 48	48	OFDM	BPSK	6.5

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	36 to 48	48	OFDM	BPSK	6.5

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11n (HT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (40MHz)	36 to 48	38, 46	OFDM	BPSK	13.5

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11n (HT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (40MHz)	36 to 48	38, 46	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C, 65%RH	120Vac, 60Hz	Kyle Huang
RE<1G	25deg. C, 71%RH	120Vac, 60Hz	Frank Liu
RE≥1G	25deg. C, 66%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

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 E (15.407)

789033 D01 General UNII Test Procedures v01r01

ANSI C63.10-2009

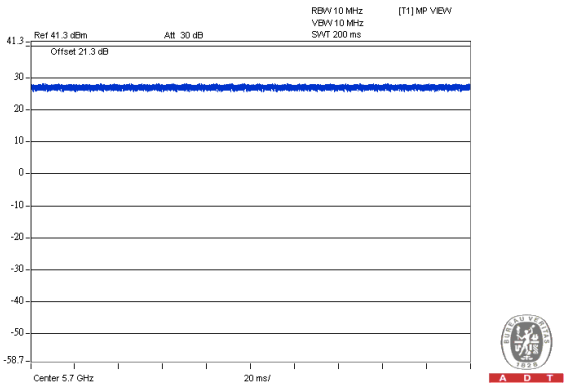
All test items have been performed and recorded as per the above standards.

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.

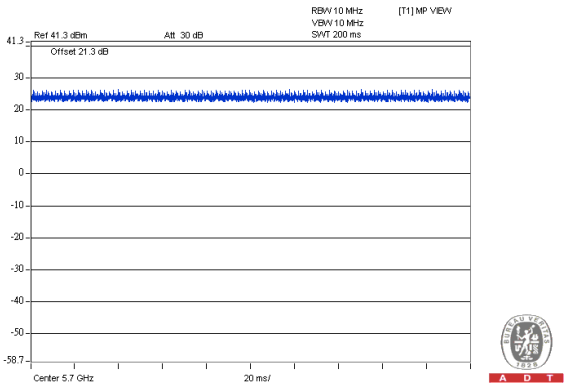
3.4 Duty cycle of test signal

Duty cycle of test signal is 100 % > 98 %, duty factor is not required.

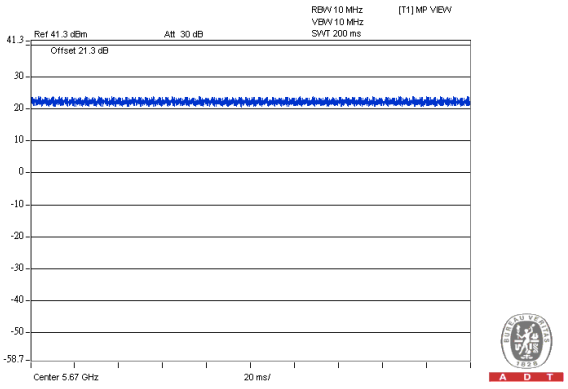
802.11a



802.11n (HT20)



802.11n (40MHz)



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.

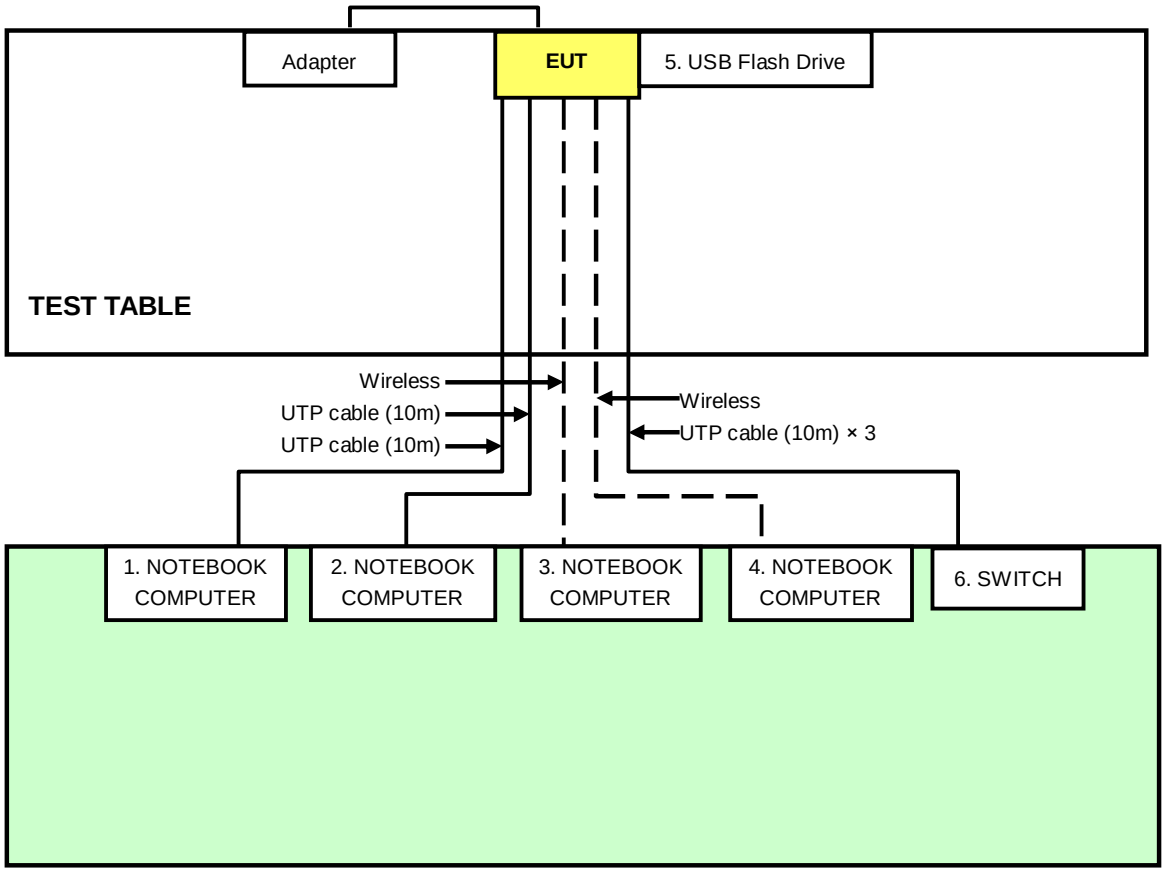
For Conducted emission test					
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	12252644560	FCC DoC
2	NOTEBOOK COMPUTER	DELL	E6420	B92T3R1	FCC DoC
3	NOTEBOOK COMPUTER	DELL	E5420	CHHYLQ1	FCC DoC
4	NOTEBOOK COMPUTER	DELL	PP27L	6YLB32S	FCC DoC
5	USB Flash Drive	SanDisk	SDCZ2-512-A10	5597844849	FCC DoC
6	SWITCH	HP	J9088A	NA	NA
For Other test items					
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	E6420	H62T3R1	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	DSLB32S	FCC DoC
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
4	iPod shuffle	Apple	MC749TA/A	CC4DM9M8DFDM	NA

For Conducted emission test	
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable (10m)
2	UTP cable (10m)
3	NA
4	NA
5	NA
6	UTP cable (10m)
For Other test items	
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m
2	UTP cable, 10m
3	UTP cable, 10m
4	USB cable, 0.1m

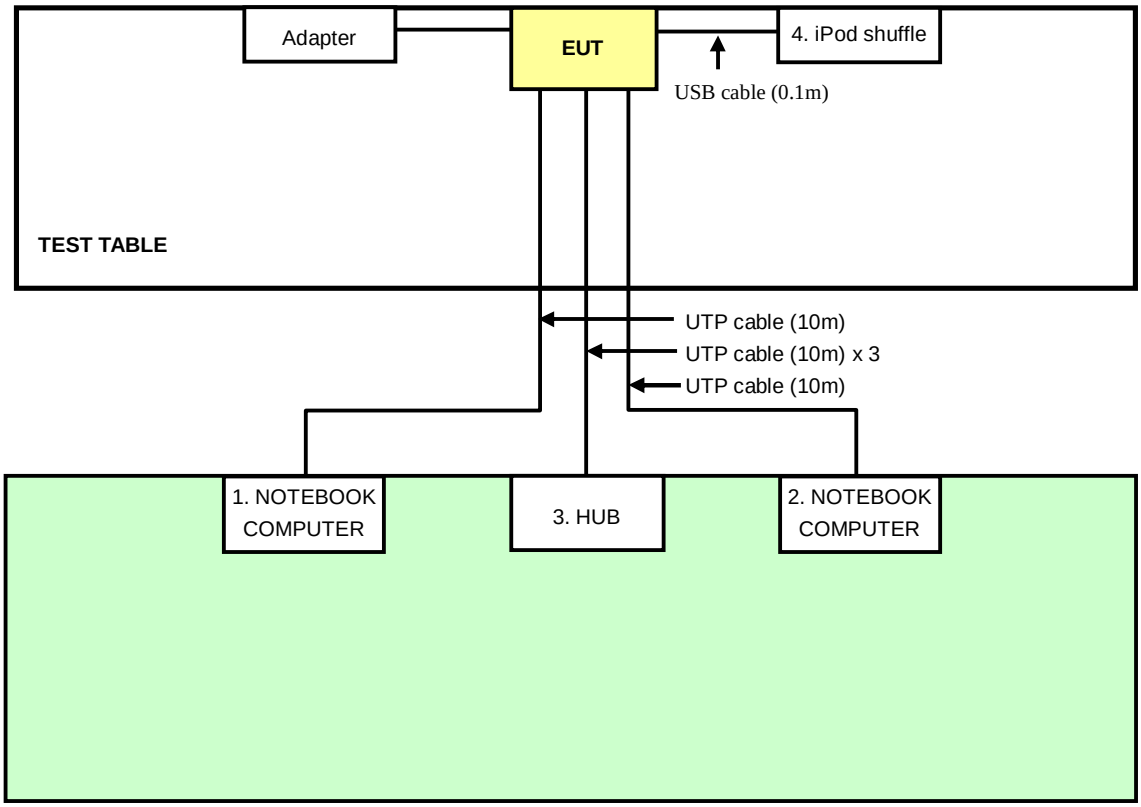
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted emission test:



For Other test items:



4. TEST TYPES 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	100287	Feb. 29, 2012	Feb. 28, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK 8127	8127-523	Sep. 20, 2011	Sep. 19, 2012
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	848773/004	Nov. 01, 2011	Oct. 31, 2012
RF Cable (JYEBAO)	5DFB	COACAB-002	Aug. 05, 2012	Aug. 04, 2013
50 ohms Terminator	50	4	Nov. 12, 2011	Nov. 11, 2012
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. A.
3 The VCCI Con A Registration No. is C-817.
4. Tested Date: Aug. 21, 2012

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.

b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

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

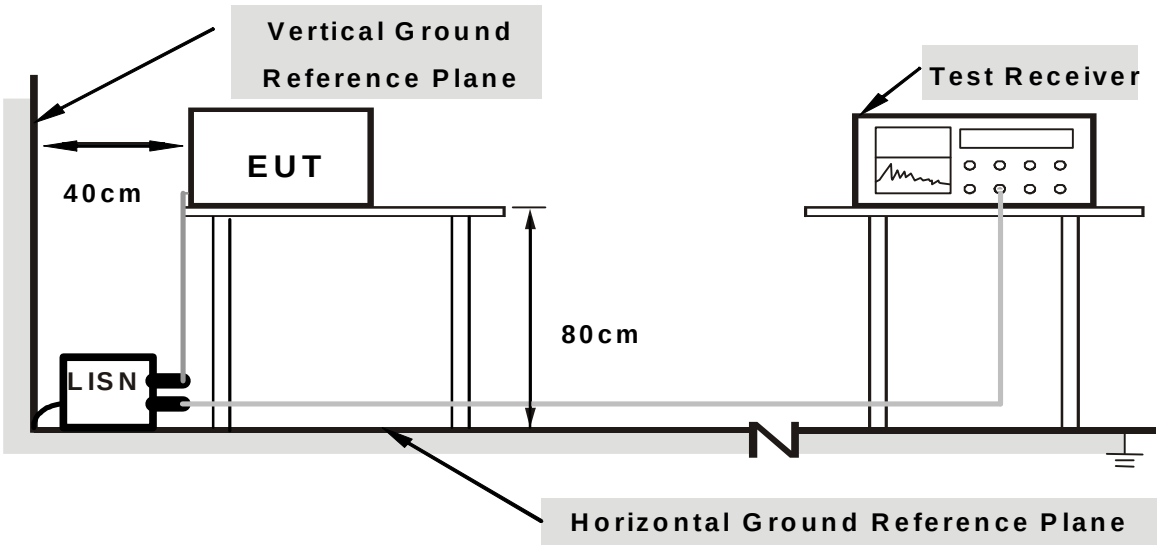
d. The frequency range from 150kHz to 30MHz was searched. At least the disturbance levels and the frequencies of six highest disturbances from each mains port were recorded.

Note: 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



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. Turn on the power of EUT.
2. The communication partner run test program “RT5x9x V1.0.7.6 AP” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

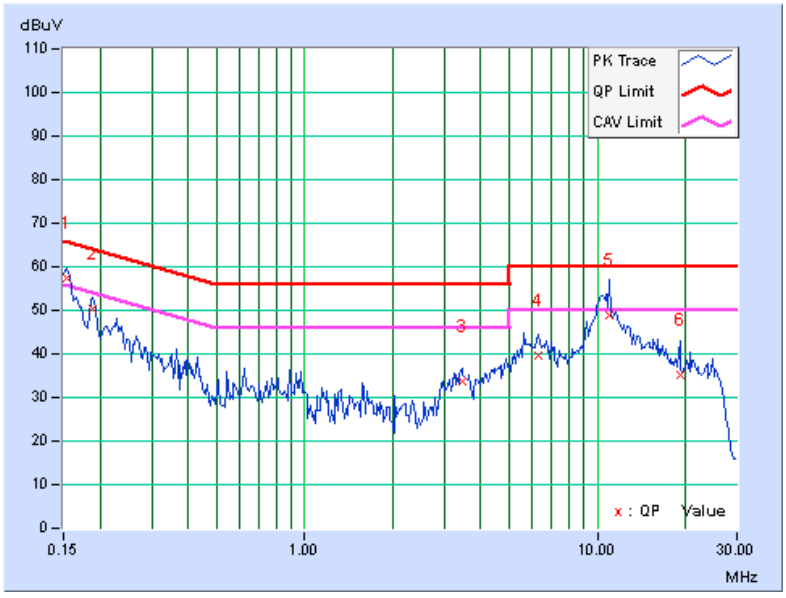
4.1.7 TEST RESULTS(MODE 1)

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	0.15391	0.06	57.37	47.83	57.43	47.89	65.79	55.79	-8.36	-7.90
2	0.18906	0.06	50.37	41.34	50.43	41.40	64.08	54.08	-13.65	-12.68
3	3.45313	0.25	33.33	28.17	33.58	28.42	56.00	46.00	-22.42	-17.58
4	6.31641	0.32	39.34	33.74	39.66	34.06	60.00	50.00	-20.34	-15.94
5	10.98438	0.42	48.37	42.82	48.79	43.24	60.00	50.00	-11.21	-6.76
6	19.11328	0.60	34.63	29.25	35.23	29.85	60.00	50.00	-24.77	-20.15

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.

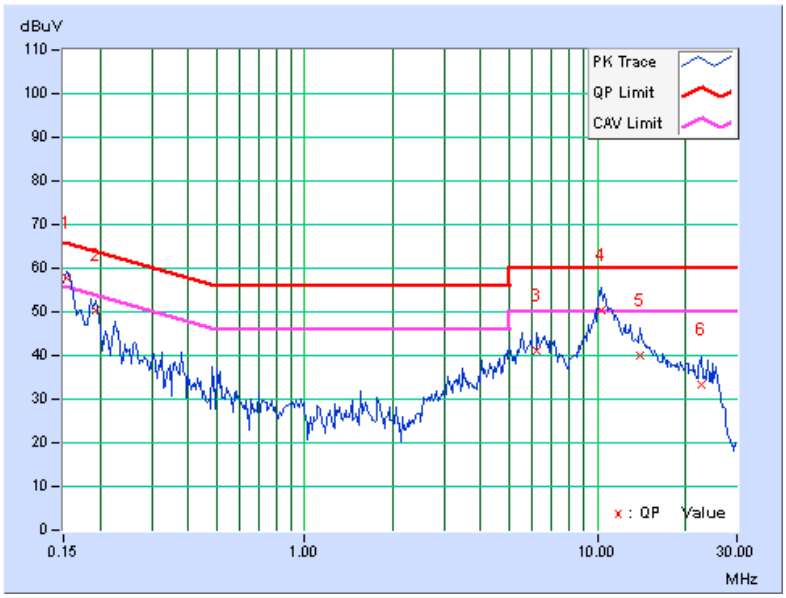


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	57.63	47.61	57.70	47.68	65.79	55.79	-8.09	-8.11
2	0.19297	0.07	50.25	41.04	50.32	41.11	63.91	53.91	-13.59	-12.80
3	6.21875	0.30	40.85	35.48	41.15	35.78	60.00	50.00	-18.85	-14.22
4	**10.29688**	**0.39**	**49.96**	**45.16**	**50.35**	**45.55**	**60.00**	**50.00**	**-9.65**	**-4.45**
5	14.03906	0.48	39.70	34.46	40.18	34.94	60.00	50.00	-19.82	-15.06
6	22.65625	0.66	32.53	27.24	33.19	27.90	60.00	50.00	-26.81	-22.10

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.



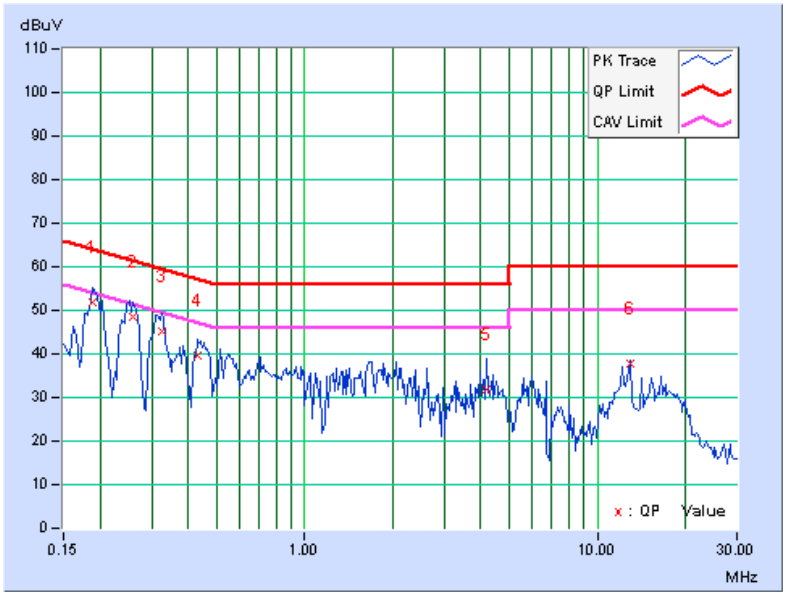
4.1.8 TEST RESULTS(MODE 2)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18906	0.06	51.73	43.87	51.79	43.93	64.08	54.08	-12.29	-10.15
2	0.25938	0.06	48.28	36.71	48.34	36.77	61.45	51.45	-13.11	-14.68
3	0.32578	0.07	45.26	33.71	45.33	33.78	59.56	49.56	-14.23	-15.78
4	0.43125	0.07	39.43	29.94	39.50	30.01	57.23	47.23	-17.73	-17.22
5	4.19531	0.27	31.45	21.95	31.72	22.22	56.00	46.00	-24.28	-23.78
6	13.00781	0.47	37.41	35.51	37.88	35.98	60.00	50.00	-22.12	-14.02

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.

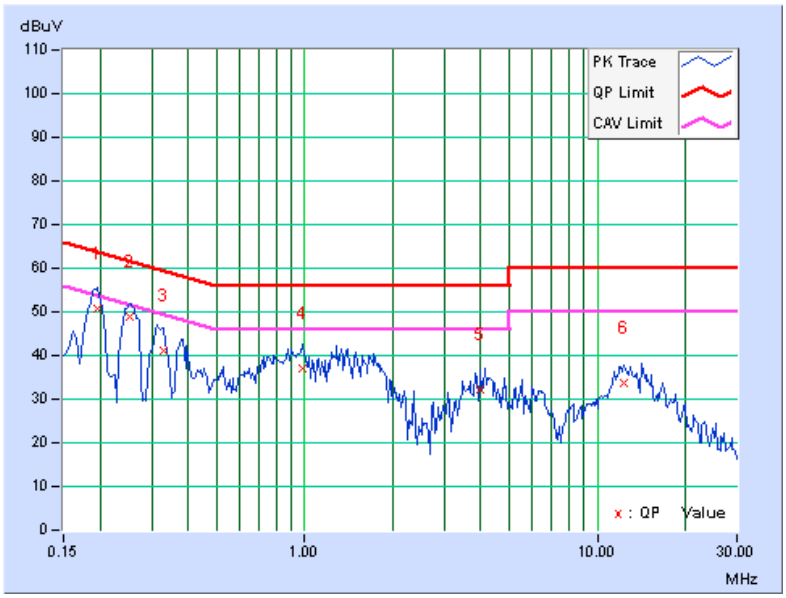


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	0.07	50.67	39.81	50.74	39.88	63.74	53.74	-13.00	-13.86
2	0.25156	0.07	48.64	39.39	48.71	39.46	61.71	51.71	-12.99	-12.24
3	0.32969	0.08	41.16	27.22	41.24	27.30	59.46	49.46	-18.22	-22.16
4	0.98203	0.12	36.87	27.03	36.99	27.15	56.00	46.00	-19.01	-18.85
5	3.98047	0.25	31.99	20.59	32.24	20.84	56.00	46.00	-23.76	-25.16
6	12.35938	0.44	33.42	25.83	33.86	26.27	60.00	50.00	-26.14	-23.73

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 BANDEDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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. 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.

4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	**EIRP Limit (dBm)**	**Equivalent Field Strength at 3m (dBμV/m)** *Note 3
5150~5250	-27	68.3
5250~5350	-27	68.3
5470~5725	-27	68.3
5725~5825	-27 *Note 1	68.3
	-17 *Note 2	78.3

Notes:

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

4.2.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250254	July 09, 2012	July 08, 2013
Pre-Selector Agilent	N9039A	MY46520311	July 09, 2012	July 08, 2013
Signal Generator Agilent	N5181A	MY49060517	July 09, 2012	July 08, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02578	June 26, 2012	June 25, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Apr. 09, 2012	Apr. 08, 2013
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 26, 2011	Dec. 25, 2012
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
Software	ADT_Radiated _V8.7.05	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. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: July 30 to Aug. 03, 2012

4.2.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters 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 height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

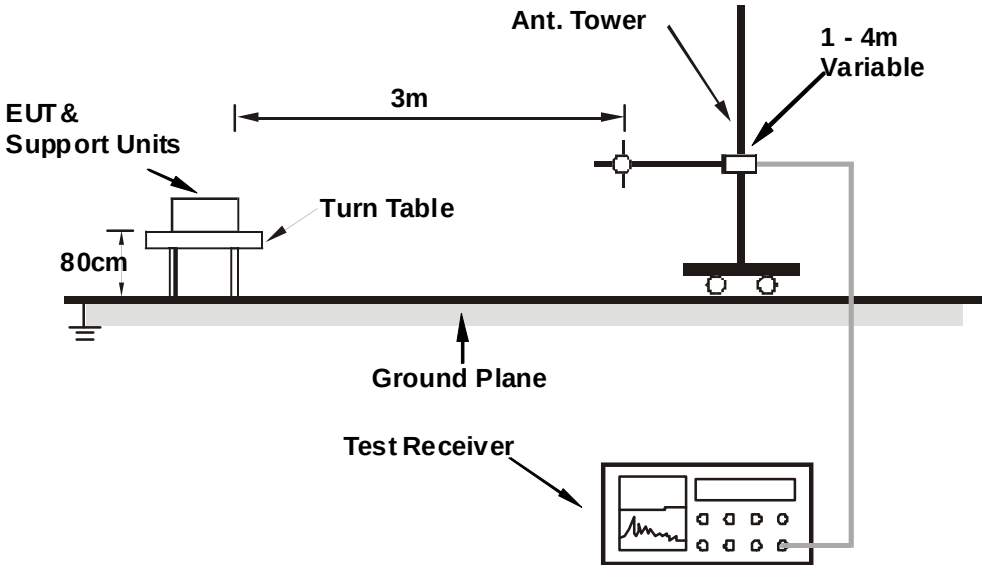
NOTE:

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

4.2.5 DEVIATION FROM TEST STANDARD

No deviation

4.2.6 TEST SETUP



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

4.2.7 EUT OPERATING CONDITION

Same as 4.1.6

4.2.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11n(HT20)

CHANNEL	TX Channel 48	**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	219.00	39.5 QP	46.0	-6.5	1.00 H	75	27.47	11.99
2	233.39	39.9 QP	46.0	-6.1	1.50 H	227	27.27	12.62
3	250.06	34.7 QP	46.0	-11.3	1.00 H	74	21.31	13.35
4	374.94	34.4 QP	46.0	-11.6	1.00 H	35	17.17	17.22
5	700.07	41.3 QP	46.0	-4.7	2.00 H	314	17.30	23.97
6	874.98	39.4 QP	46.0	-6.6	1.50 H	75	12.28	27.12
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	176.22	38.6 QP	43.5	-4.9	1.00 V	312	25.33	13.29
2	221.22	38.6 QP	46.0	-7.4	1.00 V	301	26.52	12.09
3	375.00	31.9 QP	46.0	-14.2	1.00 V	354	14.63	17.22
4	500.05	33.9 QP	46.0	-12.2	1.00 V	360	13.46	20.39
5	700.07	37.5 QP	46.0	-8.5	1.50 V	360	13.57	23.97
6	933.36	34.3 QP	46.0	-11.7	1.00 V	253	6.48	27.80

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.

ABOVE 1GHz DATA

802.11a

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	5150.00	56.3 PK	74.0	-17.7	1.14 H	99	15.75	40.55
2	5150.00	47.4 AV	54.0	-6.6	1.14 H	99	6.85	40.55
3	*5180.00	98.4 PK			1.14 H	99	57.72	40.68
4	*5180.00	89.8 AV			1.14 H	99	49.12	40.68
5	#10360.00	54.3 PK	68.3	-14.0	1.00 H	219	6.48	47.82
6	15540.00	61.7 PK	74.0	-12.3	1.00 H	319	8.43	53.27
7	15540.00	48.2 AV	54.0	-5.8	1.00 H	319	-5.07	53.27
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	5150.00	58.4 PK	74.0	-15.6	1.12 V	48	17.85	40.55
2	5150.00	49.4 AV	54.0	-4.6	1.12 V	48	8.85	40.55
3	*5180.00	105.1 PK			1.12 V	48	64.42	40.68
4	*5180.00	96.3 AV			1.12 V	48	55.62	40.68
5	#10360.00	54.3 PK	68.3	-14.0	1.00 V	136	6.48	47.82
6	15540.00	61.6 PK	74.0	-12.4	1.00 V	211	8.33	53.27
7	15540.00	48.4 AV	54.0	-5.6	1.00 V	211	-4.87	53.27

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5200.00	98.3 PK			1.13 H	89	57.53	40.77
2	*5200.00	89.4 AV			1.13 H	89	48.63	40.77
3	#10400.00	54.9 PK	68.3	-13.4	1.00 H	213	7.54	47.36
4	15600.00	61.4 PK	74.0	-12.6	1.00 H	315	8.41	52.99
5	15600.00	48.0 AV	54.0	-6.0	1.00 H	315	-4.99	52.99
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	*5200.00	105.2 PK			1.11 V	50	64.43	40.77
2	*5200.00	96.1 AV			1.11 V	50	55.33	40.77
3	#10400.00	55.0 PK	68.3	-13.3	1.00 V	135	7.64	47.36
4	15600.00	61.3 PK	74.0	-12.7	1.00 V	215	8.31	52.99
5	15600.00	48.1 AV	54.0	-5.9	1.00 V	215	-4.89	52.99

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5240.00	98.4 PK			1.12 H	73	57.51	40.89
2	*5240.00	89.3 AV			1.12 H	73	48.41	40.89
3	5350.00	57.1 PK	74.0	-16.9	1.12 H	73	15.95	41.15
4	5350.00	47.4 AV	54.0	-6.6	1.12 H	73	6.25	41.15
5	#10480.00	54.6 PK	68.3	-13.7	1.00 H	244	6.95	47.65
6	15720.00	62.3 PK	74.0	-11.7	1.00 H	316	9.71	52.59
7	15720.00	48.4 AV	54.0	-5.6	1.00 H	316	-4.19	52.59
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	*5240.00	105.4 PK			1.11 V	62	64.51	40.89
2	*5240.00	96.3 AV			1.11 V	62	55.41	40.89
3	5350.00	57.3 PK	74.0	-16.7	1.11 V	62	16.15	41.15
4	5350.00	47.2 AV	54.0	-6.8	1.11 V	62	6.05	41.15
5	#10480.00	54.2 PK	68.3	-14.1	1.00 V	134	6.55	47.65
6	15720.00	61.1 PK	74.0	-12.9	1.00 V	213	8.51	52.59
7	15720.00	48.2 AV	54.0	-5.8	1.00 V	213	-4.39	52.59

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (HT20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	5150.00	58.4 PK	74.0	-15.6	1.27 H	116	17.85	40.55
2	5150.00	47.3 AV	54.0	-6.7	1.27 H	116	6.75	40.55
3	*5180.00	94.8 PK			1.27 H	116	54.12	40.68
4	*5180.00	85.2 AV			1.27 H	116	44.52	40.68
5	#10360.00	56.1 PK	68.3	-12.2	1.00 H	231	8.28	47.82
6	15540.00	59.9 PK	74.0	-14.1	1.00 H	178	6.63	53.27
7	15540.00	50.2 AV	54.0	-3.8	1.00 H	178	-3.07	53.27
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	5150.00	58.1 PK	74.0	-15.9	1.11 V	48	17.55	40.55
2	5150.00	47.1 AV	54.0	-6.9	1.11 V	48	6.55	40.55
3	*5180.00	103.7 PK			1.11 V	48	63.02	40.68
4	*5180.00	94.4 AV			1.11 V	48	53.72	40.68
5	#10360.00	56.3 PK	68.3	-12.0	1.00 V	125	8.48	47.82
6	15540.00	60.2 PK	74.0	-13.8	1.00 V	353	6.93	53.27
7	15540.00	50.0 AV	54.0	-4.0	1.00 V	353	-3.27	53.27

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	*5200.00	94.7 PK			1.24 H	113	53.93	40.77
2	*5200.00	85.3 AV			1.24 H	113	44.53	40.77
3	#10400.00	56.3 PK	68.3	-12.0	1.00 H	213	8.94	47.36
4	15600.00	60.3 PK	74.0	-13.7	1.24 H	118	7.31	52.99
5	15600.00	50.3 AV	54.0	-3.7	1.24 H	118	-2.69	52.99
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	*5200.00	103.6 PK			1.11 V	45	62.83	40.77
2	*5200.00	94.3 AV			1.11 V	45	53.53	40.77
3	#10400.00	56.1 PK	68.3	-12.2	1.00 V	124	8.74	47.36
4	15600.00	60.3 PK	74.0	-13.7	1.00 V	349	7.31	52.99
5	15600.00	50.2 AV	54.0	-3.8	1.00 V	349	-2.79	52.99

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	5053.25	57.3 PK	74.0	-16.7	1.21 H	126	17.09	40.21
2	5053.25	45.2 AV	54.0	-8.8	1.21 H	126	4.99	40.21
3	*5240.00	94.8 PK			1.21 H	126	53.91	40.89
4	*5240.00	85.6 AV			1.21 H	126	44.71	40.89
5	#10480.00	56.8 PK	68.3	-11.5	1.00 H	217	9.15	47.65
6	15720.00	60.4 PK	74.0	-13.6	1.26 H	113	7.81	52.59
7	15720.00	50.4 AV	54.0	-3.6	1.26 H	113	-2.19	52.59
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	5053.25	56.4 PK	74.0	-17.6	1.11 V	62	16.19	40.21
2	5053.25	45.3 AV	54.0	-8.7	1.11 V	62	5.09	40.21
3	*5240.00	103.3 PK			1.11 V	62	62.41	40.89
4	*5240.00	94.2 AV			1.11 V	62	53.31	40.89
5	#10480.00	56.3 PK	68.3	-12.0	1.00 V	126	8.65	47.65
6	15720.00	60.4 PK	74.0	-13.6	1.00 V	346	7.81	52.59
7	15720.00	50.6 AV	54.0	-3.4	1.00 V	346	-1.99	52.59

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (40MHz)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	5150.00	58.4 PK	74.0	-15.6	1.00 H	163	17.85	40.55
2	5150.00	48.4 AV	54.0	-5.6	1.00 H	163	7.85	40.55
3	*5190.00	96.6 PK			1.06 H	151	55.87	40.73
4	*5190.00	87.4 AV			1.06 H	151	46.67	40.73
5	#10380.00	58.1 PK	68.3	-10.2	1.00 H	254	10.51	47.59
6	15570.00	60.6 PK	74.0	-13.4	1.00 H	129	7.47	53.13
7	15570.00	50.3 AV	54.0	-3.7	1.00 H	129	-2.83	53.13
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.1 PK	74.0	-9.9	1.00 V	61	23.55	40.55
2	**5150.00**	**51.3 AV**	**54.0**	**-2.7**	**1.00 V**	**61**	**10.75**	**40.55**
3	*5190.00	105.4 PK			1.00 V	61	64.67	40.73
4	*5190.00	96.3 AV			1.00 V	61	55.57	40.73
5	#10380.00	57.1 PK	68.3	-11.2	1.00 V	121	9.51	47.59
6	15570.00	59.3 PK	74.0	-14.7	1.00 V	355	6.17	53.13
7	15570.00	50.4 AV	54.0	-3.6	1.00 V	355	-2.73	53.13

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	5127.50	57.7 PK	74.0	-16.3	1.00 H	54	17.25	40.45
2	5127.50	48.9 AV	54.0	-5.1	1.00 H	54	8.45	40.45
3	*5230.00	96.4 PK			1.06 H	154	55.54	40.86
4	*5230.00	87.1 AV			1.06 H	154	46.24	40.86
5	#10460.00	58.4 PK	68.3	-9.9	1.00 H	251	10.82	47.58
6	15690.00	59.3 PK	74.0	-14.7	1.00 H	124	6.66	52.64
7	15690.00	50.1 AV	54.0	-3.9	1.00 H	124	-2.54	52.64
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	5127.50	57.3 PK	74.0	-16.7	1.00 V	72	16.85	40.45
2	5127.50	48.4 AV	54.0	-5.6	1.00 V	72	7.95	40.45
3	*5230.00	105.7 PK			1.00 V	46	64.84	40.86
4	*5230.00	96.4 AV			1.00 V	46	55.54	40.86
5	#10460.00	57.3 PK	68.3	-11.0	1.00 V	124	9.72	47.58
6	15690.00	59.4 PK	74.0	-14.6	1.00 V	346	6.76	52.64
7	15690.00	50.3 AV	54.0	-3.7	1.00 V	346	-2.34	52.64

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 radiated frequency is out of the restricted band.

4.3 TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.47 – 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

NOTE: Where B is the 26dB emission bandwidth in MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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 : July 30, 2012

4.3.3 TEST PROCEDURE

FOR AVERAGE POWER MEASUREMENT

Follow FCC KDB 789033 UNII test procedure:
Method SA-1

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW =1MHz.
3. Set the VBW ≥ 3 x RBW.
4. Number of points in sweep ≥ 2 Span / RBW.
5. Sweep time = auto.
6. Set trigger to free run (duty cycle ≥ 98 percent) ; Set video trigger (duty cycle < 98 percent)
7. Detector = RMS.
8. Trace average at least 100 traces in power averaging mode
9. Compute power by integrating the spectrum across the 26 dB EBW of the signal.

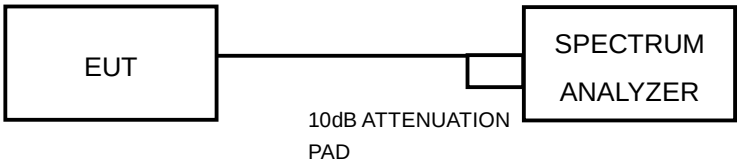
FOR 26dB OCCUPIED BANDWIDTH

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.3.7 TEST RESULTS

POWER OUTPUT: 802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	26.002	14.15	17	PASS
40	5200	25.061	13.99	17	PASS
48	5240	24.946	13.97	17	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	11.14	11.13	25.974	14.15	17	PASS
40	5200	11.17	11.05	25.827	14.12	17	PASS
48	5240	11.07	11.16	25.856	14.13	17	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	13.38	13.49	44.113	16.45	17	PASS
46	5230	13.71	13.06	43.726	16.41	17	PASS

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
36	5180	18.67	PASS
40	5200	18.57	PASS
48	5240	18.96	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
36	5180	19.21	19.17
40	5200	19.22	19.18
48	5240	19.03	19.18

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
38	5190	39.82	39.71
46	5230	39.97	39.90

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 – 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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 : July 30, 2012

4.4.3 TEST PROCEDURES

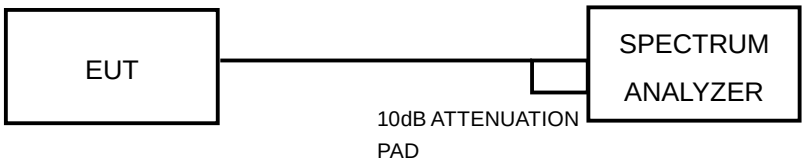
Using method SA-1

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3) Sweep time = auto, trigger set to “free run”.
4) Trace average at least 100 traces in power averaging mode.
5) Record the max value

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6

4.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	3.85	4	PASS
40	5200	3.67	4	PASS
48	5240	3.68	4	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	0.75	0.72	3.74	4	PASS
40	5200	0.77	0.63	3.71	4	PASS
48	5240	0.80	0.76	3.77	4	PASS

Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
38	5190	0.07	0.19	3.13	4	PASS
46	5230	0.38	-0.24	3.09	4	PASS

Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

4.5 PEAK POWER EXCURSION MEASUREMENT

4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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 : July 30, 2012

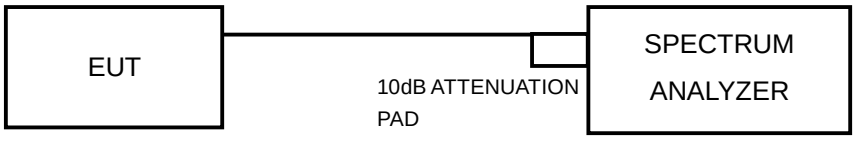
4.5.3 TEST PROCEDURE

1) Set RBW = 1 MHz, VBW ≥ 3 MHz, Detector = peak.
2) Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
3) Use the peak search function to find the peak of the spectrum.
4) Measure the PPSD.
5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

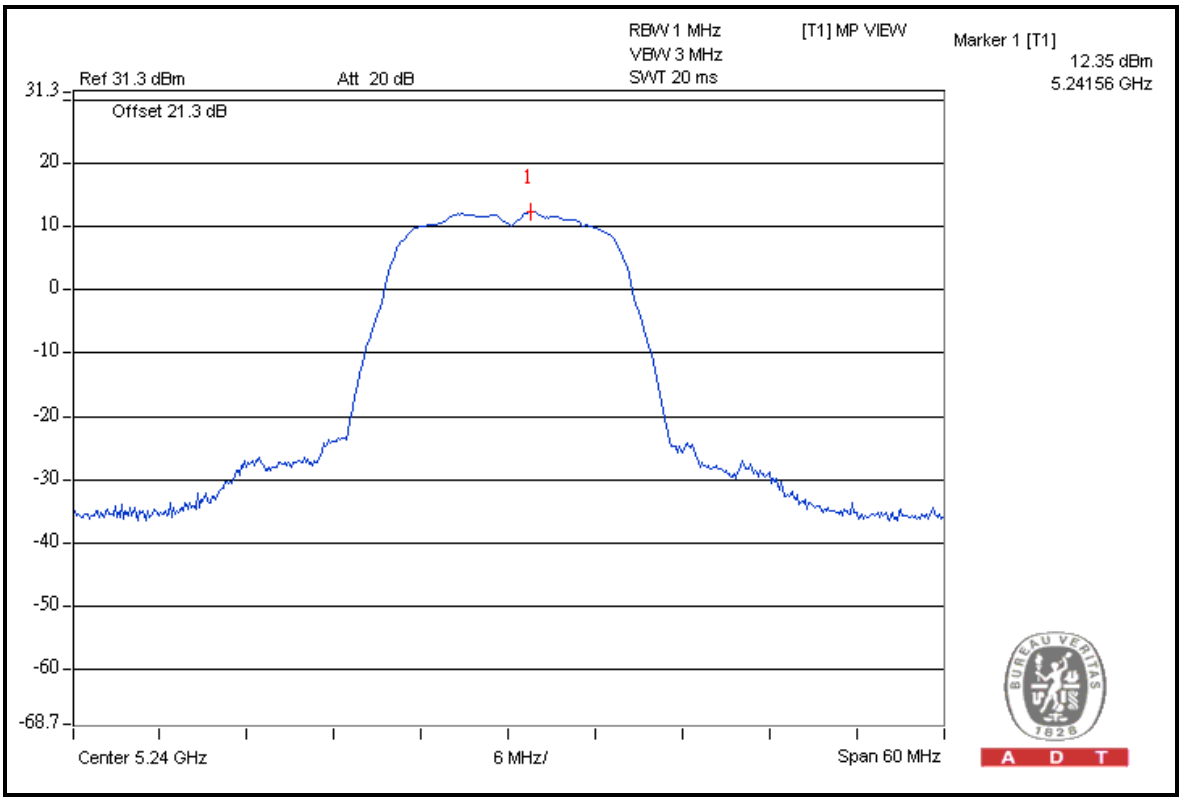
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.5.7 TEST RESULTS

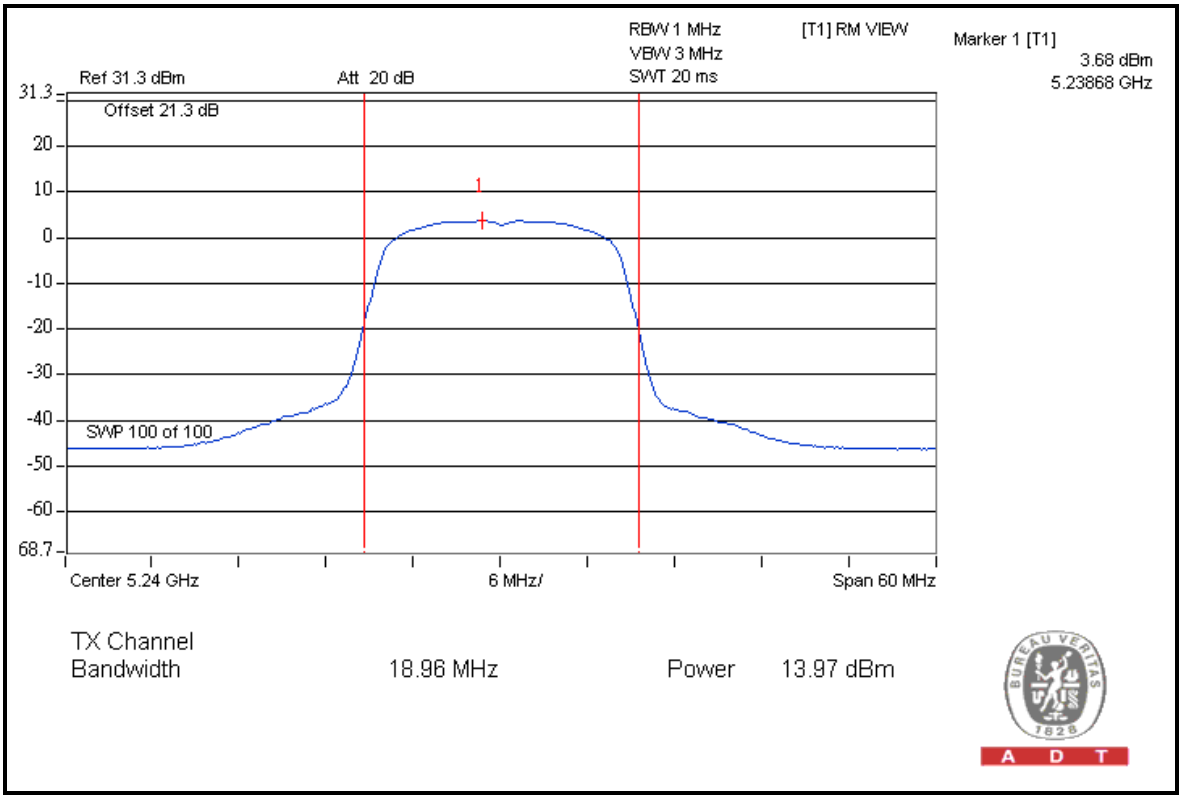
802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS/FAIL
36	5180	12.27	3.86	8.42	13	PASS
44	5220	12.30	3.67	8.63	13	PASS
48	5240	12.35	3.68	8.67	13	PASS

PEAK VALUE: CH 48



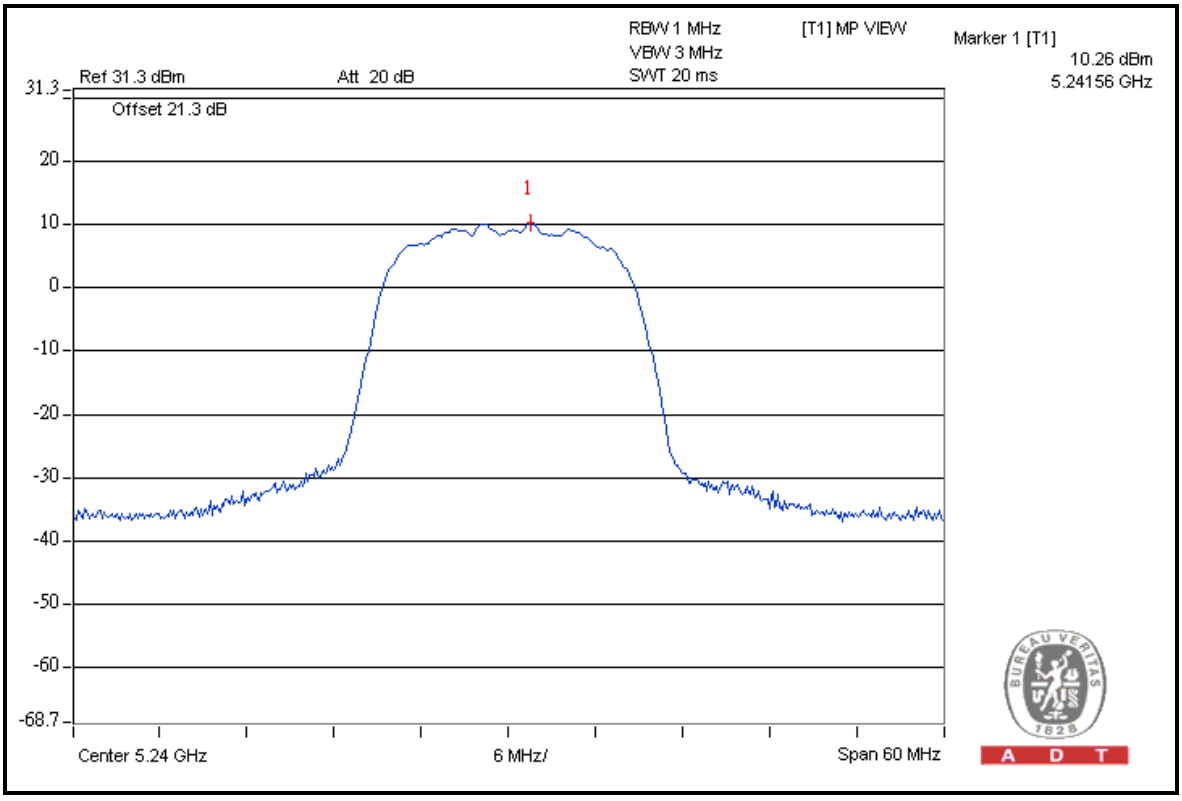
PPSD: CH 48


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
3.68 dBm
5.23868 GHz
Ref 31.3 dBm
Att 20 dB
Offset 21.3 dB
31.3
20
10
0
-10
-20
-30
-40
-50
-60
68.7
SWP 100 of 100
Center 5.24 GHz
6 MHz/
Span 60 MHz
TX Channel
Bandwidth
18.96 MHz
Power
13.97 dBm

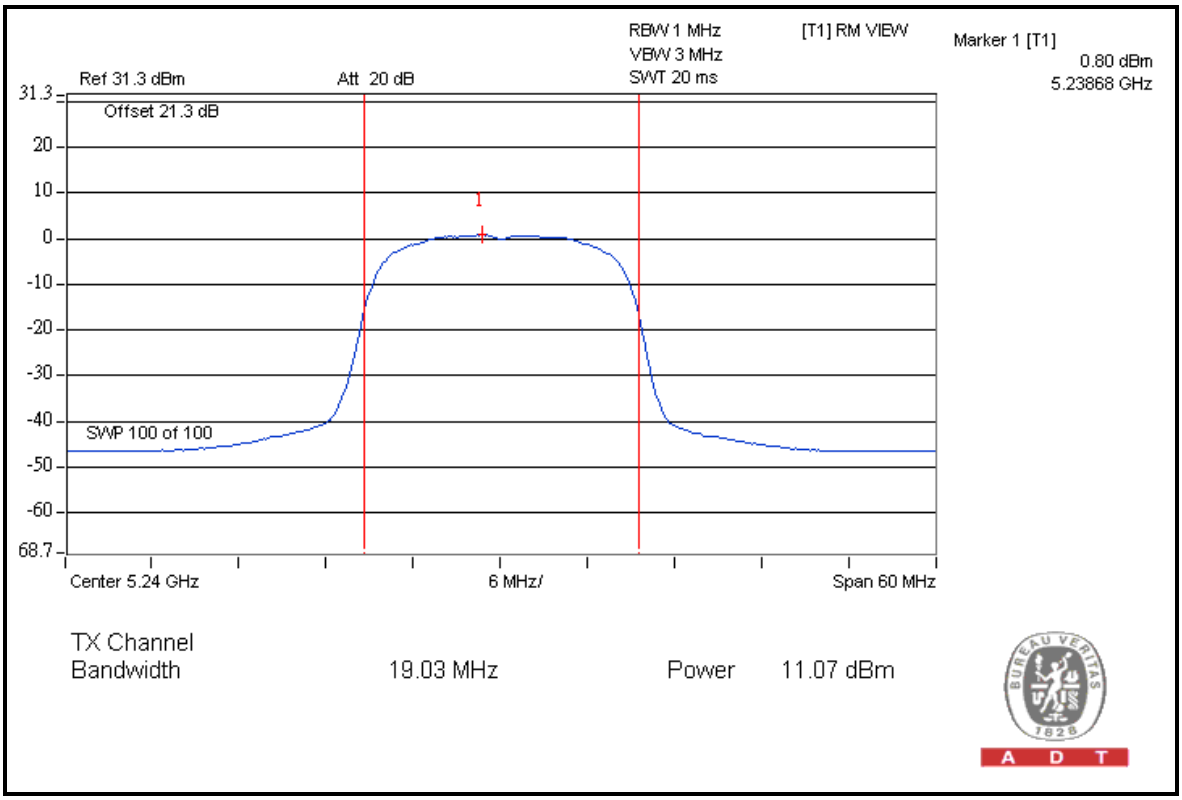
802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)		PPSD (dBm)		PEAK EXCURSION (dB)		LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1		
36	5180	9.31	9.31	0.75	0.72	8.56	8.59	13	PASS
40	5200	9.32	9.24	0.77	0.63	8.55	8.61	13	PASS
48	5240	10.26	9.39	0.80	0.76	9.46	8.63	13	PASS

PEAK VALUE: CH 48



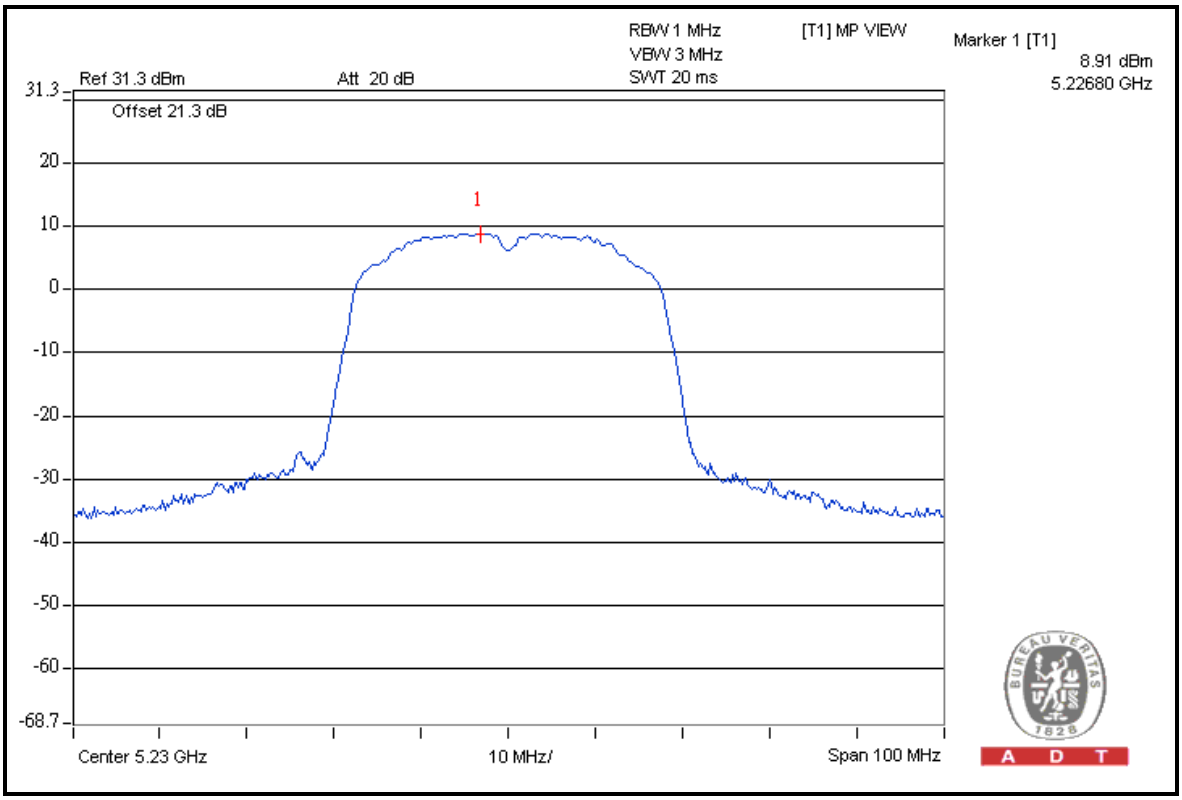
PPSD: CH 48


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
0.80 dBm
5.23868 GHz
Ref 31.3 dBm
Att 20 dB
Offset 21.3 dB
31.3
20
10
0
-10
-20
-30
-40
-50
-60
68.7
SWP 100 of 100
Center 5.24 GHz
6 MHz/
Span 60 MHz
TX Channel
Bandwidth
19.03 MHz
Power
11.07 dBm

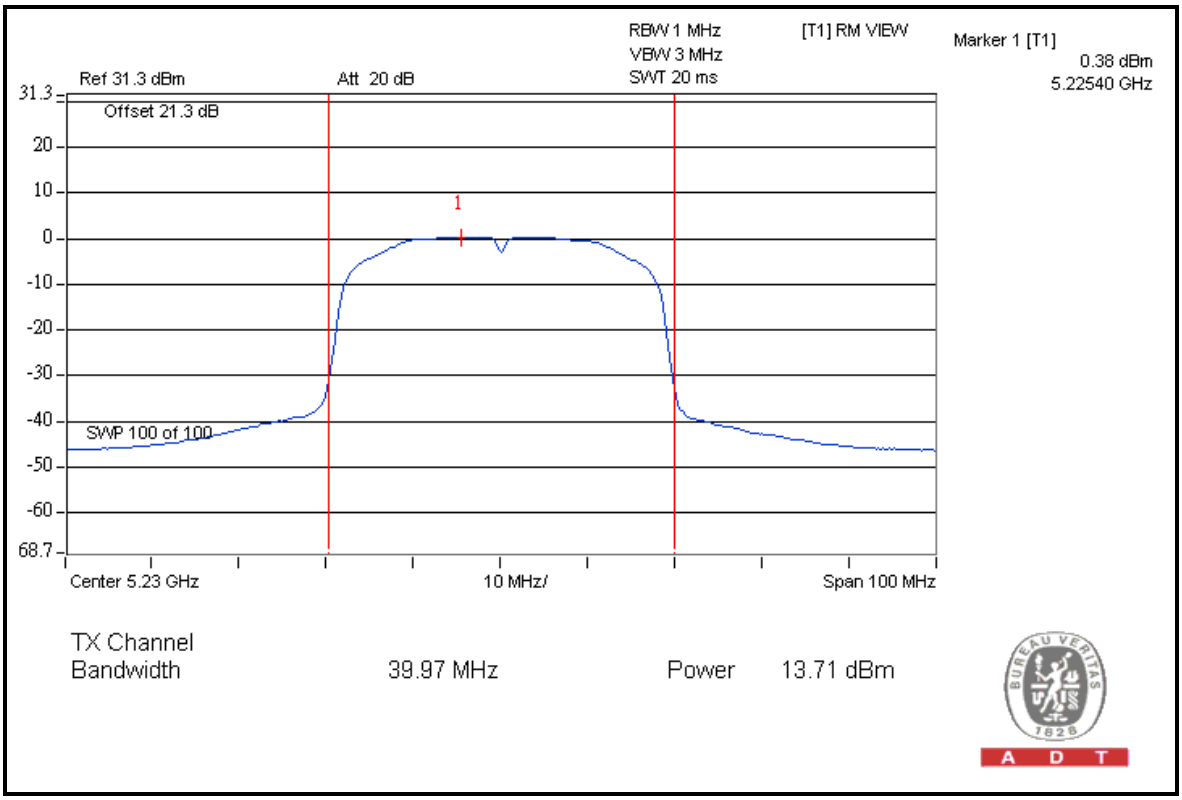
802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)		PPSD (dBm)		PEAK EXCURSION (dB)		LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1		
38	5190	8.61	8.73	0.07	0.19	8.54	8.54	13	PASS
46	5230	8.91	8.29	0.38	-0.24	8.53	8.53	13	PASS

PEAK VALUE: CH 46



PPSD: CH 46


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
0.38 dBm
5.22540 GHz
Ref 31.3 dBm
Att 20 dB
Offset 21.3 dB
31.3
20
10
0
-10
-20
-30
-40
-50
-60
68.7
1
SWP 100 of 100
Center 5.23 GHz
10 MHz/
Span 100 MHz
TX Channel
Bandwidth
39.97 MHz
Power
13.71 dBm

4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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 : July. 30, 2012

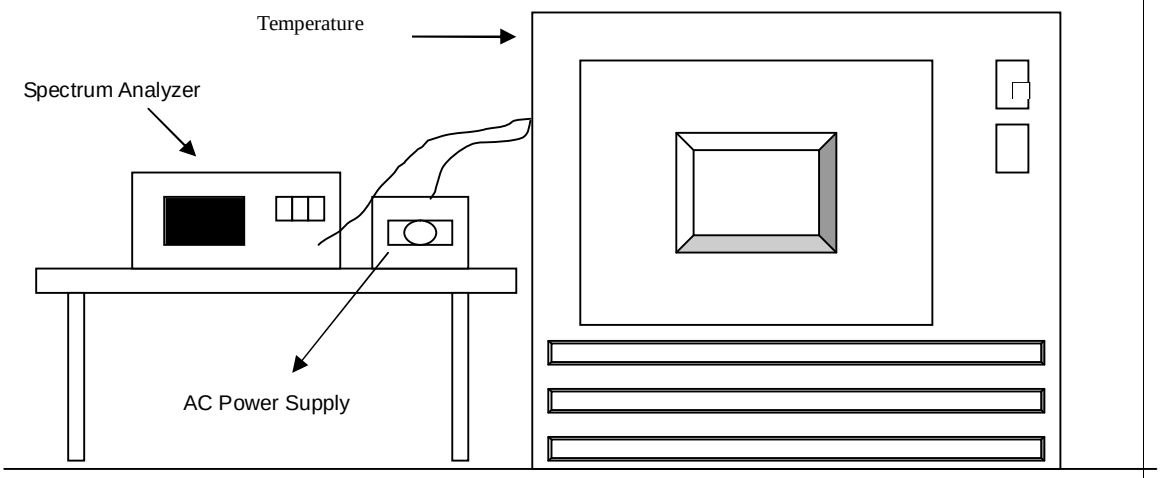
4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
50	120	5239.9916	-1.6031	5239.9868	-2.5191	5239.9834	-3.1679	5239.9788	-4.0458
40	120	5239.9839	-3.0725	5239.9859	-2.6908	5239.985	-2.8626	5239.9826	-3.3206
30	120	5240.0196	3.7405	5240.0167	3.1870	5240.0154	2.9389	5240.0215	4.1031
20	120	5239.9819	-3.4542	5239.9839	-3.0725	5239.9831	-3.2252	5239.9799	-3.8359
10	120	5240.0145	2.7672	5240.0125	2.3855	5240.0102	1.9466	5240.0089	1.6985
0	120	5240.0002	0.0382	5239.9972	-0.5344	5239.9998	-0.0382	5240.0009	0.1718
-10	120	5240.0021	0.4008	5240	0.0000	5240.0032	0.6107	5240.001	0.1908
-20	120	5240.0072	1.3740	5240.0035	0.6679	5240.0014	0.2672	5239.9972	-0.5344
-30	120	5239.9937	-1.2023	5239.9969	-0.5916	5239.9966	-0.6489	5239.999	-0.1908

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
20	138	5239.9812	-3.5878	5239.9851	-2.8435	5239.9835	-3.1489	5239.98	-3.8168
	120	5239.9819	-3.4542	5239.9839	-3.0725	5239.9831	-3.2252	5239.9799	-3.8359
	102	5239.9806	-3.7023	5239.9843	-2.9962	5239.983	-3.2443	5239.9805	-3.7214

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.

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

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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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