



FCC TEST REPORT (15.407)

REPORT NO.: RF130410C27-1

MODEL NO.: DVW323, DDW364, DVW328, DDW366

FCC ID: XCNDXW3WB

RECEIVED: Apr. 10, 2013

TESTED: Apr. 22 to May 09, 2013

ISSUED: May 17, 2013

APPLICANT: Ubee Interactive Corp.

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ISSUED BY: Bureau Veritas Consumer Products Services
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130410C27-1	Original release	May 17, 2013



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1. CERTIFICATION

PRODUCT: Wireless eMTA
BRAND NAME: Ubee Interactive Corp.
MODEL NO.: DVW323, DDW364, DVW328, DDW366
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Ubee Interactive Corp.
TESTED: Apr. 22 to May 09, 2013
STANDARDS: FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10-2009

The above equipment (Model: DVW323) 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:** May 17, 2013
(Lori Chung, Specialist)

APPROVED BY : , **DATE:** May 17, 2013
(May Chen, Manager)



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2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 5GHz, 5150~5250MHz

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 -12.83dB at 0.50156MHz
15.407(b/1/2/3) (b)(5)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 5150.00MHz.
15.407(a/1/2/3)	Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	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	Antenna connectors is HRS not a standard connector.

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.



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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)	3.54 dB
Radiated emissions (6GHz -18GHz)	4.08 dB
Radiated emissions (18GHz -40GHz)	4.11 dB



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless eMTA
MODEL NO.	DVW323, DDW364, DVW328, DDW366
POWER SUPPLY	DC 12V from internal power supply or DC 6 ~ 8.4V from battery
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 450Mbps
OPERATING FREQUENCY	For 15.407 802.11a/n: 5.18 ~ 5.24GHz
	For 15.247 802.11b/g/n: 2.412 ~ 2.462GHz 802.11a/n: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	For 15.407 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) For 15.247 (5GHz) 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)

MAXIMUM OUTPUT POWER	For 15.407 802.11a: 44.771mW 802.11n (HT20): 40.673mW 802.11n (HT40): 47.862mW
	For 15.247 (2.4GHz) 802.11b: 400.867mW 802.11g: 494.311mW 802.11n (HT20): 990.275mW 802.11n (HT40): 436.801mW
	For 15.247 (5GHz) 802.11a: 166.341mW 802.11n (HT20): 277.363mW 802.11n (HT40): 238.284mW
	ANTENNA TYPE
	DATA CABLE
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

- The EUT has four model names which are identical to each other in all aspects except for the following table:

Model	Difference
DVW323	with VoIP and MoCA accessory: RJ11 cable and RJ45 cable; battery(optional)
DDW364	without VoIP, with MoCA accessory: RJ45 cable
DVW328	with VoIP, without MoCA accessory:RJ11 cable and RJ45 cable; battery(optional)
DDW366	without VoIP and MoCA accessory: RJ45 cable

- The EUT could be supplied with an internal power supply or battery as below:

Item	Brand	Model No.	Spec.
Internal power supply	NA	NA	AC I/P: 100~120V, 60Hz, 0.9A DC O/P: 12V, 2.92A DC O/P cable (unshielded, 1.8m)
Battery	SMP	LIION Battery Pack SMPCM10 2S1P Dumb	$V_{nomal}: 7.4V$ ($V_{min}: 6V$, $V_{max}: 8.4V$)



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

Transmitter Circuit	Brand	Model	Antenna Type	Gain(dBi) Include cable loss	cable loss (dBi)	Connector Type	Frequency range	Cable Length
Chain (0)	WHA YU	C100-4008116-AZ (250mm)	PCB Antenna	4.59	0.55	HRS	2.4~2.5GHz	154mm
				4.67	0.80		4.9~5.825GHz	
Chain (1)		C100-4008116-AZ (250mm)		3.86	0.468		2.4~2.5GHz	130mm
				4.91	0.67		4.9~5.825GHz	
Chain (2)		C100-4008116-AZ (250mm)		4.79	1.11		2.4~2.5GHz	310mm
				4.29	1.61		4.9~5.825GHz	

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

MODULATION MODE	TX/RX FUNCTION
802.11a	1TX/1RX
802.11b	1TX/1RX
802.11g	1TX/1RX
802.11n (HT20)	3TX/3RX
802.11n (HT40)	3TX/3RX

5. Spurious emission of the simultaneous operation (2.4GHz & 5GHz) has been evaluated and no non-compliance was found.

6. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.

7. The EUT is pre-tested under following test modes :

Pre-Mode	Model	Remark
Mode A	DVW323	With battery
Mode B	DVW323	Without battery
Mode C	DDW364	Without battery
Mode D	DVW328	With battery
Mode E	DDW366	Without battery

For the above modes, the worse radiated emissions was found in **Mode A**. Therefore only the test data of the mode were recorded in this report.

8. 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.



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3.2 DESCRIPTION OF TEST MODES

Operated in 5150 ~ 5250MHz 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 (HT40):

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 ≥ 1G	APCM	
-	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ≥ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement

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)
802.11a	36 to 48	48	OFDM	BPSK	6

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)
802.11a	36 to 48	48	OFDM	BPSK	6

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 (HT40)	38 to 46	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 (HT40)	38 to 46	38, 46	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	20deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	25deg. C, 68%RH	120Vac, 60Hz	Tim Ho
RE ³ 1G	23deg. C, 64%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert 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 E (15.407)

789033 D01 General UNII Test Procedures v01 r02

662911 D01 Multiple Transmitter Output v01 r02

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.

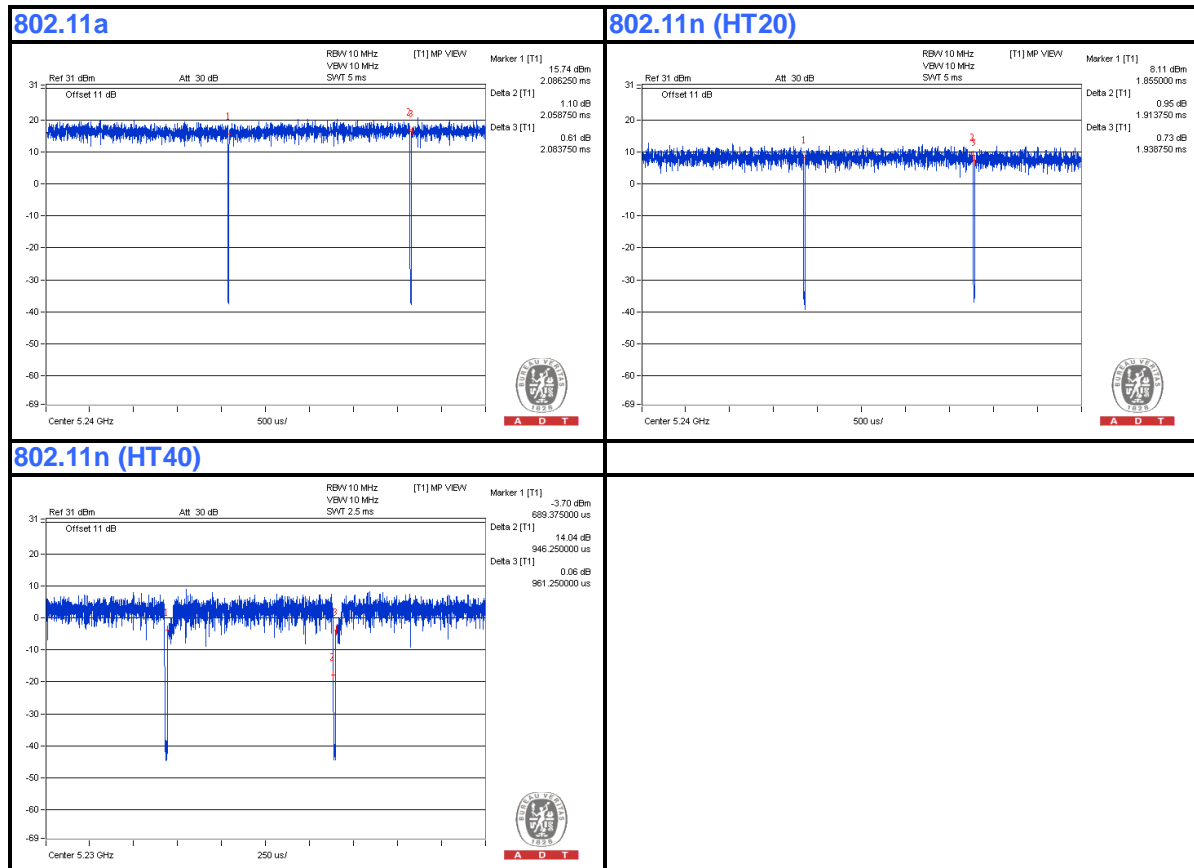
3.4 DUTY CYCLE OF TEST SIGNAL

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

802.11a: Duty cycle = 2.059 ms/2.084 ms = 0.988

802.11n (HT20): Duty cycle = 1.914 ms/1.939 ms = 0.987

802.11n (HT40): Duty cycle = 0.946 ms/0.961 ms = 0.984





3.5 DESCRIPTION OF SUPPORT UNITS

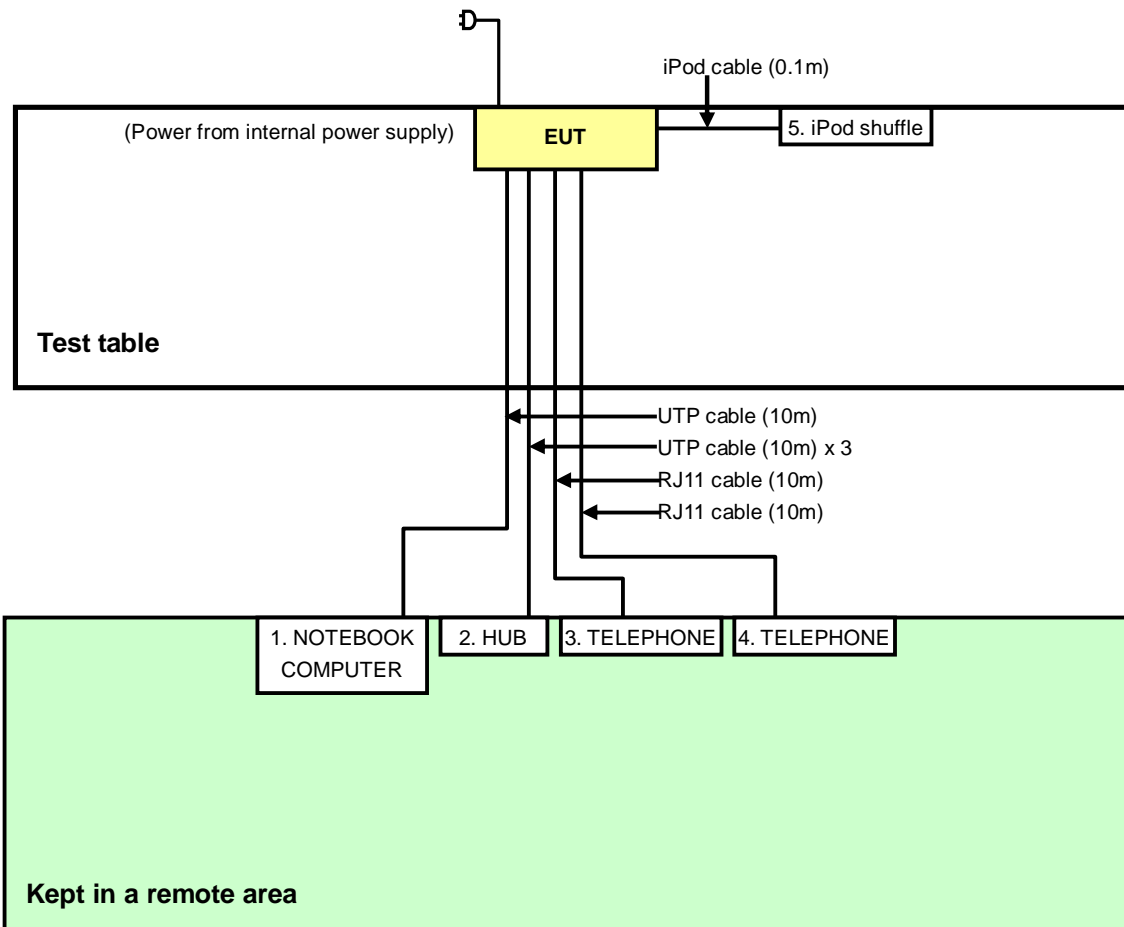
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	PP32LA	FSLB32S	FCC DoC
2	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
3	TELEPHONE	WONDER	WD-303	7C17KA04011	NA
4	TELEPHONE	WONDER	WD-303	7C17KA04440	NA
5	iPod shuffle (For conducted emission test)	Apple	MD778TA/A	CC4JMCMXF4T1	NA
	iPod shuffle (For other test items)	Apple	MC749TA/A	CC4DMFJUDFDM	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable (10m)
2	UTP cable (10m)
3	RJ11 cable (10m)
4	RJ11 cable (10m)
5	iPod cable (0.1m)

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

3.6 CONFIGURATION OF SYSTEM UNDER TEST





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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	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 08, 2012	June 07, 2013
RF Cable (JYEBAO)	5DFB	COCCAB-003	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
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: Apr. 22, 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.
- 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. Emission level under (Limit – 20dB) was not recorded.

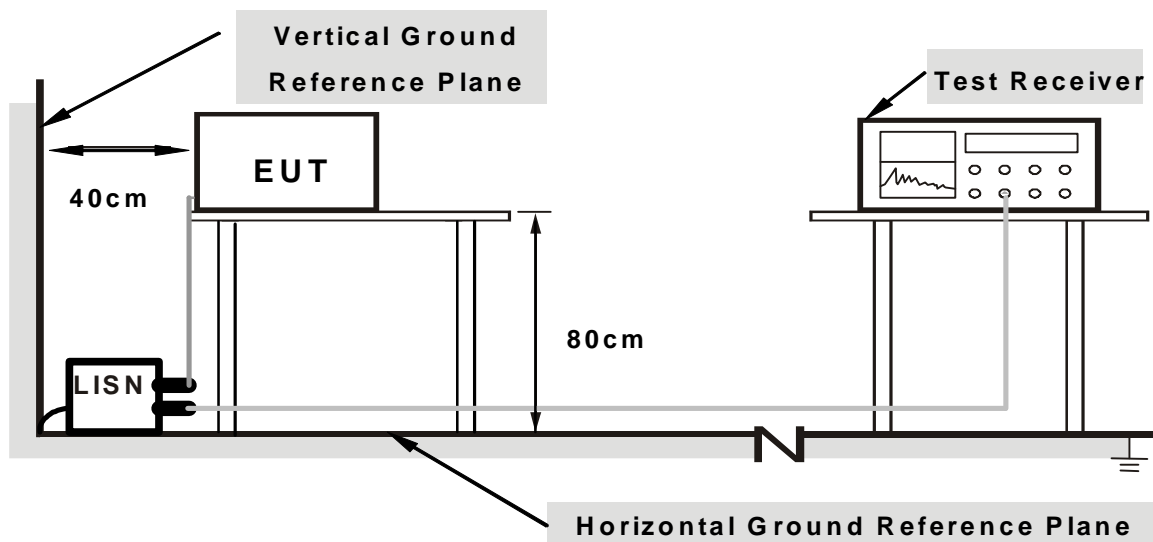
NOTE:

1. 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 “HyperTerminal” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

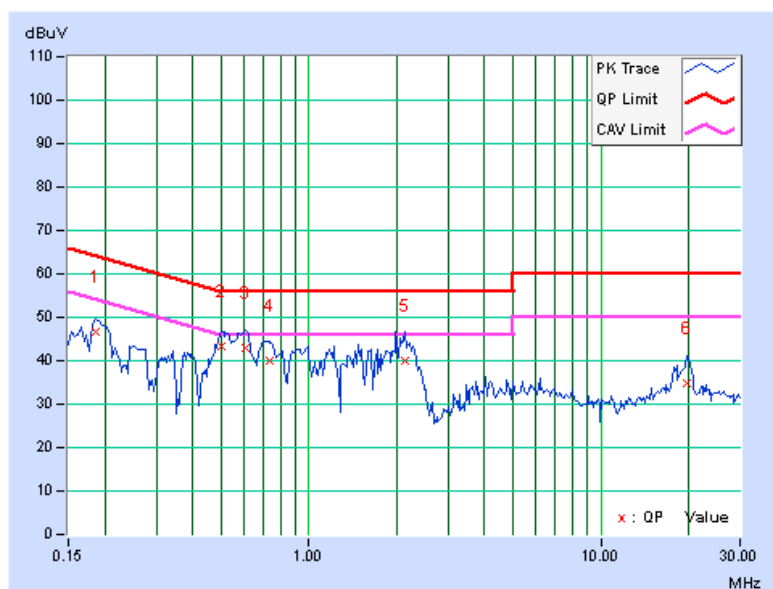
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

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	0.18516	0.11	46.43	32.81	46.54	32.92	64.25	54.25	-17.71	-21.33
2	0.50156	0.14	43.03	30.79	43.17	30.93	56.00	46.00	-12.83	-15.07
3	0.60313	0.14	42.84	29.62	42.98	29.76	56.00	46.00	-13.02	-16.24
4	0.73203	0.15	39.71	27.45	39.86	27.60	56.00	46.00	-16.14	-18.40
5	2.13672	0.22	39.62	31.40	39.84	31.62	56.00	46.00	-16.16	-14.38
6	19.70703	0.98	34.01	26.98	34.99	27.96	60.00	50.00	-25.01	-22.04

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

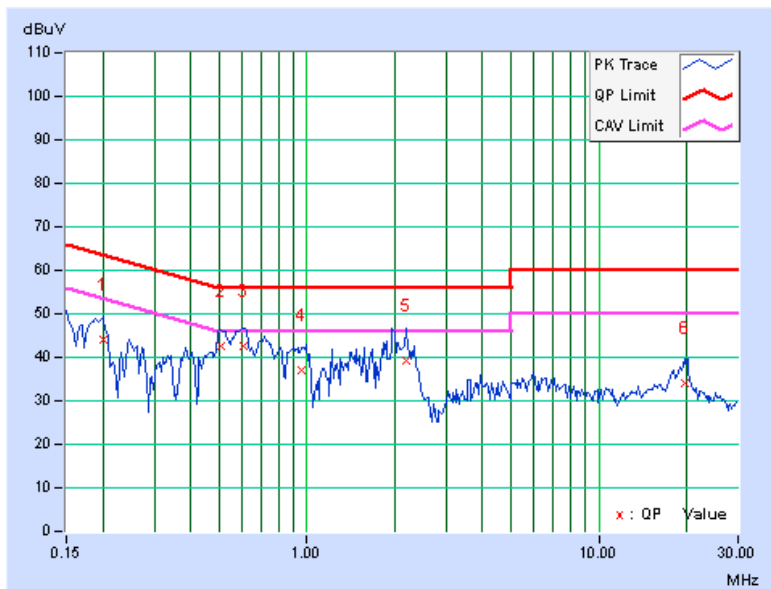


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20078	0.09	44.14	31.59	44.23	31.68	63.58	53.58	-19.35	-21.90
2	0.50547	0.13	42.52	30.43	42.65	30.56	56.00	46.00	-13.35	-15.44
3	0.60313	0.13	42.58	29.39	42.71	29.52	56.00	46.00	-13.29	-16.48
4	0.96250	0.15	36.85	24.15	37.00	24.30	56.00	46.00	-19.00	-21.70
5	2.19141	0.20	39.19	31.29	39.39	31.49	56.00	46.00	-16.61	-14.51
6	19.62891	0.67	33.49	27.19	34.16	27.86	60.00	50.00	-25.84	-22.14

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





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4.2 RADIATED EMISSION AND BANDEGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEGE 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

APPLICABLE TO	LIMIT	
√	FIELD STRENGTH AT 3m (dBμV/m)	
	PK	AV
	74	54
-	EIRP LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBμV/m)
	PK	PK
	-27	68.3

NOTE:

1. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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



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4.2.3 TEST INSTRUMENTS

Below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29,2013	Jan. 28,2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 26, 2012	June 25, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 2013
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. 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: Apr. 25, 2013



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Above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
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
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
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: May 09, 2013

4.2.4 TEST PROCEDURES

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

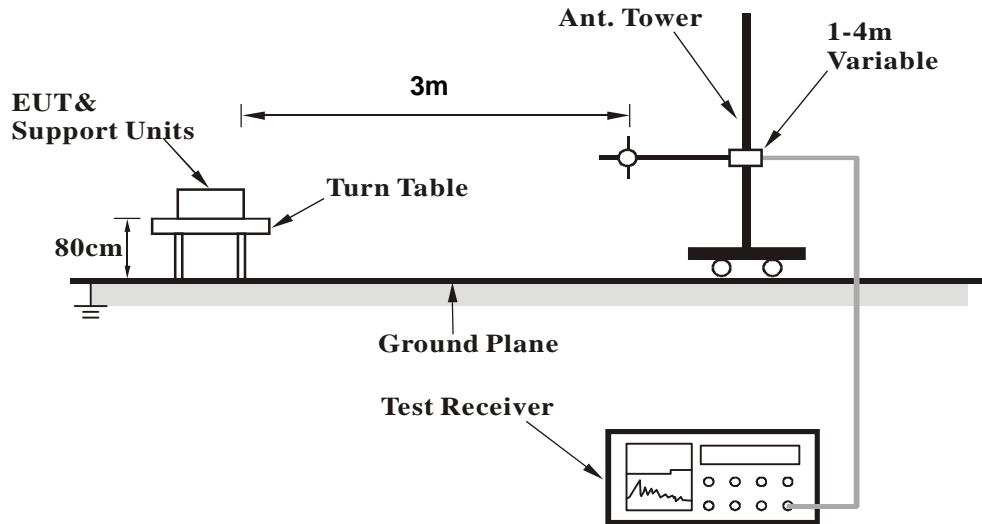
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 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

802.11a

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	125.01	33.0 QP	43.5	-10.6	1.50 H	88	48.00	-15.05
2	298.25	39.3 QP	46.0	-6.7	1.00 H	360	52.14	-12.88
3	374.98	37.7 QP	46.0	-8.3	2.00 H	87	48.60	-10.88
4	625.00	43.5 QP	46.0	-2.5	1.00 H	90	48.35	-4.84
5	874.97	42.5 QP	46.0	-3.5	1.50 H	110	43.43	-0.96
6	999.95	39.3 QP	54.0	-14.8	2.00 H	360	38.27	0.98

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	36.16	32.6 QP	40.0	-7.4	1.00 V	52	46.33	-13.71
2	284.33	37.8 QP	46.0	-8.2	1.50 V	24	51.08	-13.32
3	374.98	37.6 QP	46.0	-8.4	1.50 V	72	48.45	-10.88
4	625.00	41.2 QP	46.0	-4.8	1.50 V	106	46.06	-4.84
5	874.97	42.0 QP	46.0	-4.0	1.00 V	83	43.00	-0.96
6	999.95	38.6 QP	54.0	-15.4	1.00 V	63	37.62	0.98

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) if use
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

802.11a

CHANNEL	TX Channel 36	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	5150.00	64.3 PK	74.0	-9.7	1.17 H	154	20.73	43.57
2	5150.00	50.1 AV	54.0	-3.9	1.17 H	154	6.53	43.57
3	*5180.00	105.2 PK			1.17 H	154	61.56	43.64
4	*5180.00	95.8 AV			1.17 H	154	52.16	43.64
5	#10360.00	55.2 PK	74.0	-18.8	1.03 H	301	4.46	50.74
6	#10360.00	50.3 AV	54.0	-3.7	1.03 H	301	-0.44	50.74
7	15540.00	63.3 PK	74.0	-10.7	1.00 H	140	7.24	56.06
8	15540.00	50.9 AV	54.0	-3.1	1.00 H	140	-5.16	56.06

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	66.4 PK	74.0	-7.6	1.11 V	222	22.83	43.57
2	5150.00	52.7 AV	54.0	-1.3	1.11 V	222	9.13	43.57
3	*5180.00	110.4 PK			1.10 V	224	66.76	43.64
4	*5180.00	102.2 AV			1.10 V	224	58.56	43.64
5	#10360.00	55.1 PK	74.0	-18.9	1.04 V	196	4.36	50.74
6	#10360.00	48.9 AV	54.0	-5.1	1.04 V	196	-1.84	50.74
7	15540.00	63.5 PK	74.0	-10.5	1.03 V	316	7.44	56.06
8	15540.00	51.2 AV	54.0	-2.8	1.03 V	316	-4.86	56.06

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 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	5150.00	61.1 PK	74.0	-12.9	1.17 H	154	17.53	43.57
2	5150.00	49.2 AV	54.0	-4.8	1.17 H	154	5.63	43.57
3	*5200.00	107.5 PK			1.17 H	154	63.82	43.68
4	*5200.00	98.2 AV			1.17 H	154	54.52	43.68
5	#10400.00	55.7 PK	74.0	-18.3	1.06 H	315	5.03	50.67
6	#10400.00	50.5 AV	54.0	-3.5	1.06 H	315	-0.17	50.67
7	15600.00	63.1 PK	74.0	-10.9	1.03 H	135	7.09	56.01
8	15600.00	50.7 AV	54.0	-3.3	1.03 H	135	-5.31	56.01

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	63.1 PK	74.0	-10.9	1.10 V	223	19.53	43.57
2	5150.00	51.7 AV	54.0	-2.3	1.10 V	223	8.13	43.57
3	*5200.00	113.3 PK			1.10 V	224	69.62	43.68
4	*5200.00	104.3 AV			1.10 V	224	60.62	43.68
5	#10400.00	55.8 PK	74.0	-18.2	1.00 V	210	5.13	50.67
6	#10400.00	48.8 AV	54.0	-5.2	1.00 V	210	-1.87	50.67
7	15600.00	63.2 PK	74.0	-10.8	1.00 V	315	7.19	56.01
8	15600.00	51.1 AV	54.0	-2.9	1.00 V	315	-4.91	56.01

REMARKS:

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

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	106.8 PK			1.17 H	149	63.07	43.73
2	*5240.00	97.5 AV			1.17 H	149	53.77	43.73
3	5350.00	60.8 PK	74.0	-13.2	1.17 H	149	16.91	43.89
4	5350.00	49.2 AV	54.0	-4.8	1.17 H	149	5.31	43.89
5	#10480.00	55.9 PK	74.0	-18.1	1.03 H	331	4.87	51.03
6	#10480.00	50.5 AV	54.0	-3.5	1.03 H	331	-0.53	51.03
7	15720.00	63.4 PK	74.0	-10.6	1.08 H	131	7.52	55.88
8	15720.00	51.1 AV	54.0	-2.9	1.08 H	131	-4.78	55.88

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	112.7 PK			1.11 V	229	68.97	43.73
2	*5240.00	103.7 AV			1.11 V	229	59.97	43.73
3	5350.00	60.8 PK	74.0	-13.2	1.11 V	229	16.91	43.89
4	5350.00	50.5 AV	54.0	-3.5	1.11 V	229	6.61	43.89
5	#10480.00	56.0 PK	74.0	-18.0	1.02 V	224	4.97	51.03
6	#10480.00	49.0 AV	54.0	-5.0	1.02 V	224	-2.03	51.03
7	15720.00	63.0 PK	74.0	-11.0	1.03 V	323	7.12	55.88
8	15720.00	51.0 AV	54.0	-3.0	1.03 V	323	-4.88	55.88

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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802.11n (HT20)

CHANNEL	TX Channel 36	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	5150.00	60.2 PK	74.0	-13.8	1.19 H	157	16.63	43.57
2	5150.00	49.6 AV	54.0	-4.4	1.19 H	157	6.03	43.57
3	*5180.00	108.1 PK			1.19 H	157	64.46	43.64
4	*5180.00	100.1 AV			1.19 H	157	56.46	43.64
5	#10360.00	56.0 PK	74.0	-18.0	1.00 H	341	5.26	50.74
6	#10360.00	50.0 AV	54.0	-4.0	1.00 H	341	-0.74	50.74
7	15540.00	63.0 PK	74.0	-11.0	1.08 H	122	6.94	56.06
8	15540.00	50.7 AV	54.0	-3.3	1.08 H	122	-5.36	56.06

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	63.8 PK	74.0	-10.2	1.21 V	104	20.23	43.57
2	5150.00	53.1 AV	54.0	-0.9	1.21 V	104	9.53	43.57
3	*5180.00	113.3 PK			1.31 V	105	69.66	43.64
4	*5180.00	105.4 AV			1.31 V	105	61.76	43.64
5	#10360.00	56.3 PK	74.0	-17.7	1.03 V	234	5.56	50.74
6	#10360.00	48.7 AV	54.0	-5.3	1.03 V	234	-2.04	50.74
7	15540.00	63.3 PK	74.0	-10.7	1.00 V	333	7.24	56.06
8	15540.00	51.2 AV	54.0	-2.8	1.00 V	333	-4.86	56.06

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.

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	5150.00	58.1 PK	74.0	-15.9	1.19 H	158	14.53	43.57
2	5150.00	47.5 AV	54.0	-6.5	1.19 H	158	3.93	43.57
3	*5200.00	112.2 PK			1.19 H	158	68.52	43.68
4	*5200.00	102.7 AV			1.19 H	158	59.02	43.68
5	#10400.00	56.0 PK	74.0	-18.0	1.02 H	339	5.33	50.67
6	#10400.00	49.7 AV	54.0	-4.3	1.02 H	339	-0.97	50.67
7	15600.00	63.2 PK	74.0	-10.8	1.04 H	119	7.19	56.01
8	15600.00	50.9 AV	54.0	-3.1	1.04 H	119	-5.11	56.01

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	62.1 PK	74.0	-11.9	1.13 V	210	18.53	43.57
2	5150.00	51.3 AV	54.0	-2.7	1.13 V	210	7.73	43.57
3	*5200.00	117.3 PK			1.13 V	210	73.62	43.68
4	*5200.00	108.0 AV			1.13 V	210	64.32	43.68
5	#10400.00	57.1 PK	74.0	-16.9	1.02 V	235	6.43	50.67
6	#10400.00	48.9 AV	54.0	-5.1	1.02 V	235	-1.77	50.67
7	15600.00	63.2 PK	74.0	-10.8	1.00 V	336	7.19	56.01
8	15600.00	51.0 AV	54.0	-3.0	1.00 V	336	-5.01	56.01

REMARKS:

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



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CHANNEL	TX Channel 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	117.9 PK			1.16 H	172	74.17	43.73
2	*5240.00	102.6 AV			1.16 H	172	58.87	43.73
3	5350.00	57.7 PK	74.0	-16.3	1.16 H	172	13.81	43.89
4	5350.00	47.2 AV	54.0	-6.8	1.16 H	172	3.31	43.89
5	#10480.00	55.9 PK	74.0	-18.1	1.05 H	355	4.87	51.03
6	#10480.00	50.3 AV	54.0	-3.7	1.05 H	355	-0.73	51.03
7	15720.00	62.9 PK	74.0	-11.1	1.00 H	113	7.02	55.88
8	15720.00	50.9 AV	54.0	-3.1	1.00 H	113	-4.98	55.88

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	115.9 PK			1.00 V	232	72.17	43.73
2	*5240.00	107.9 AV			1.00 V	232	64.17	43.73
3	5350.00	61.0 PK	74.0	-13.0	1.04 V	233	17.11	43.89
4	5350.00	50.5 AV	54.0	-3.5	1.04 V	233	6.61	43.89
5	#10480.00	57.2 PK	74.0	-16.8	1.03 V	225	6.17	51.03
6	#10480.00	48.8 AV	54.0	-5.2	1.03 V	225	-2.23	51.03
7	15720.00	63.4 PK	74.0	-10.6	1.00 V	323	7.52	55.88
8	15720.00	50.9 AV	54.0	-3.1	1.00 V	323	-4.98	55.88

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.

802.11n (HT40)

CHANNEL	TX Channel 38	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	5150.00	61.8 PK	74.0	-12.2	1.16 H	155	18.23	43.57
2	5150.00	51.7 AV	54.0	-2.3	1.16 H	155	8.13	43.57
3	*5190.00	100.2 PK			1.16 H	155	56.54	43.66
4	*5190.00	92.1 AV			1.16 H	155	48.44	43.66
5	#10380.00	55.8 PK	74.0	-18.2	1.07 H	353	5.09	50.71
6	#10380.00	50.1 AV	54.0	-3.9	1.07 H	353	-0.61	50.71
7	15570.00	63.0 PK	74.0	-11.0	1.00 H	120	6.97	56.03
8	15570.00	51.1 AV	54.0	-2.9	1.00 H	120	-4.93	56.03

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	63.0 PK	74.0	-11.0	1.11 V	220	19.43	43.57
2	5150.00	53.5 AV	54.0	-0.5	1.11 V	220	9.93	43.57
3	*5190.00	105.4 PK			1.11 V	225	61.74	43.66
4	*5190.00	97.3 AV			1.11 V	225	53.64	43.66
5	#10380.00	57.4 PK	74.0	-16.6	1.07 V	223	6.69	50.71
6	#10380.00	48.6 AV	54.0	-5.4	1.07 V	223	-2.11	50.71
7	15570.00	63.3 PK	74.0	-10.7	1.00 V	339	7.27	56.03
8	15570.00	50.9 AV	54.0	-3.1	1.00 V	339	-5.13	56.03

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * " : Fundamental frequency.



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CHANNEL	TX Channel 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	*5230.00	109.6 PK			1.16 H	155	65.88	43.72
2	*5230.00	101.5 AV			1.16 H	155	57.78	43.72
3	5350.00	61.3 PK	74.0	-12.7	1.16 H	155	17.41	43.89
4	5350.00	49.2 AV	54.0	-4.8	1.16 H	155	5.31	43.89
5	#10460.00	56.0 PK	74.0	-18.0	1.06 H	354	5.06	50.94
6	#10460.00	50.3 AV	54.0	-3.7	1.06 H	354	-0.64	50.94
7	15690.00	62.9 PK	74.0	-11.1	1.00 H	117	6.98	55.92
8	15690.00	51.0 AV	54.0	-3.0	1.00 H	117	-4.92	55.92

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	*5230.00	114.1 PK			1.11 V	224	70.38	43.72
2	*5230.00	106.4 AV			1.11 V	224	62.68	43.72
3	5350.00	60.7 PK	74.0	-13.3	1.11 V	225	16.81	43.89
4	5350.00	50.2 AV	54.0	-3.8	1.11 V	225	6.31	43.89
5	#10460.00	57.2 PK	74.0	-16.8	1.13 V	233	6.26	50.94
6	#10460.00	48.7 AV	54.0	-5.3	1.13 V	233	-2.24	50.94
7	15690.00	63.1 PK	74.0	-10.9	1.00 V	328	7.18	55.92
8	15690.00	50.9 AV	54.0	-3.1	1.00 V	328	-5.02	55.92

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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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.

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

- Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
- Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
- Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.3.2 TEST INSTRUMENTS

FOR POWER OUTPUT MEASUREMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Power Sensor	MA2411B	0738172	May 10, 2012	May 09, 2013

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 : Apr. 26, 2013

FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : Apr. 26, 2013

4.3.3 TEST PROCEDURE

FOR POWER OUTPUT MEASUREMENT

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

FOR 26dB OCCUPIED BANDWIDTH

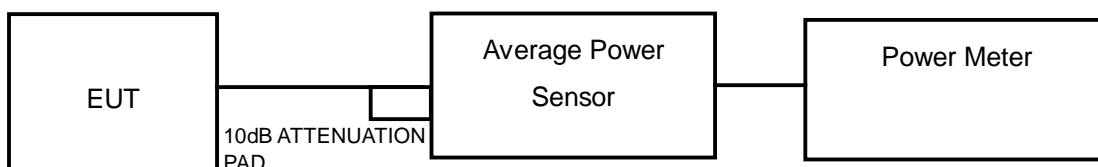
- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat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

4.3.4 DEVIATION FROM TEST STANDARD

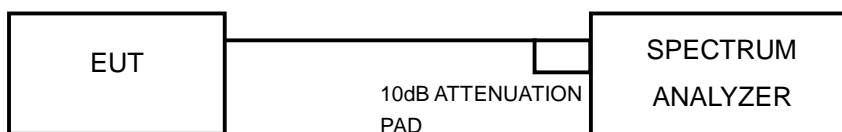
No deviation

4.3.5 TEST SETUP

FOR POWER OUTPUT MEASUREMENT



FOR 26dB OCCUPIED BANDWIDTH



4.3.6 EUT OPERATING CONDITIONS

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



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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	39.446	15.96	17.00	PASS
40	5200	44.566	16.49	17.00	PASS
48	5240	44.771	16.51	17.00	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	CHAIN 2				
36	5180	10.90	11.10	11.60	39.639	15.98	17	PASS
40	5200	10.90	11.10	11.90	40.673	16.09	17	PASS
48	5240	10.70	10.80	11.60	38.226	15.82	17	PASS

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
38	5190	8.78	8.37	9.41	23.152	13.65	17	PASS
46	5230	11.91	11.96	12.21	47.862	16.80	17	PASS



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26dB OCCUPIED BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)
36	5180	26.77
40	5200	27.89
48	5240	29.19

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 0	CHAIN 1	CHAIN 2
36	5180	22.70	22.78	25.27
40	5200	25.29	25.30	20.15
48	5240	22.57	22.68	25.11

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 0	CHAIN 1	CHAIN 2
38	5190	40.57	40.21	40.48
46	5230	40.42	40.07	40.72



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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	100037	Nov. 01, 2012	Oct. 31, 2013

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 : Apr. 26, 2013

4.4.3 TEST PROCEDURES

Using method SA-1

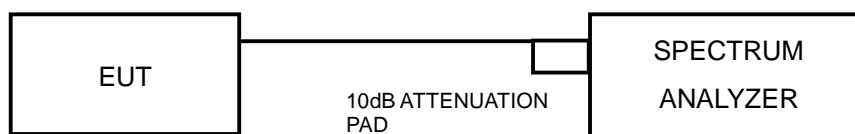
Set span to encompass the entire emission bandwidth (EBW) of the signal.

1. Set RBW = 30 KHz, Set VBW \geq 1 MHz, Detector = RMS
2. Set Channel power measure = 1MHz
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





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4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6



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4.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	0.86	4.00	PASS
40	5200	1.53	4.00	PASS
48	5240	1.55	4.00	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
36	5180	-5.32	-4.91	-4.31	-0.06	0.6	PASS
40	5200	-5.35	-4.72	-4.18	0.05	0.6	PASS
48	5240	-5.38	-5.13	-4.36	-0.16	0.6	PASS

- NOTE:**
- 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.
 - Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.4\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $4-(9.4-6) = 0.6\text{dBm}$.

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
38	5190	-8.67	-9.60	-8.16	-4.00	0.6	PASS
46	5230	-6.16	-5.85	-5.89	-1.19	0.6	PASS

- NOTE:**
- 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.
 - Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.4\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $4-(9.4-6) = 0.6\text{dBm}$.

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	100037	Nov. 01, 2012	Oct. 31, 2013

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 : Apr. 26, 2013

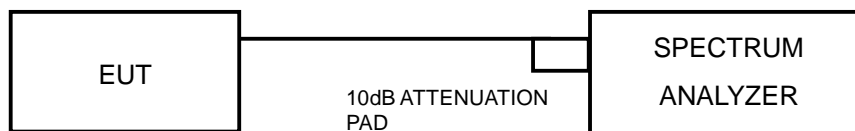
4.5.3 TEST PROCEDURE

1. Set RBW = 1 MHz, VBW \geq 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.



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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	10.13	0.86	9.27	13	PASS
40	5200	11.03	1.53	9.50	13	PASS
48	5240	10.78	1.55	9.23	13	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
36	5180	3.86	5.79	5.90	-5.32	-4.91	-4.31	9.18	10.70	10.21	13	PASS
40	5200	4.38	6.17	5.80	-5.35	-4.72	-4.18	9.73	10.89	9.98	13	PASS
48	5240	4.47	5.26	5.71	-5.38	-5.13	-4.36	9.85	10.39	10.07	13	PASS

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
38	5190	0.65	1.17	1.76	-8.67	-9.60	-8.16	9.32	10.77	9.92	13	PASS
46	5230	3.43	4.47	4.20	-6.16	-5.85	-5.89	9.59	10.32	10.09	13	PASS

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	100037	Nov. 01, 2012	Oct. 31, 2013

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 : Apr. 26, 2013

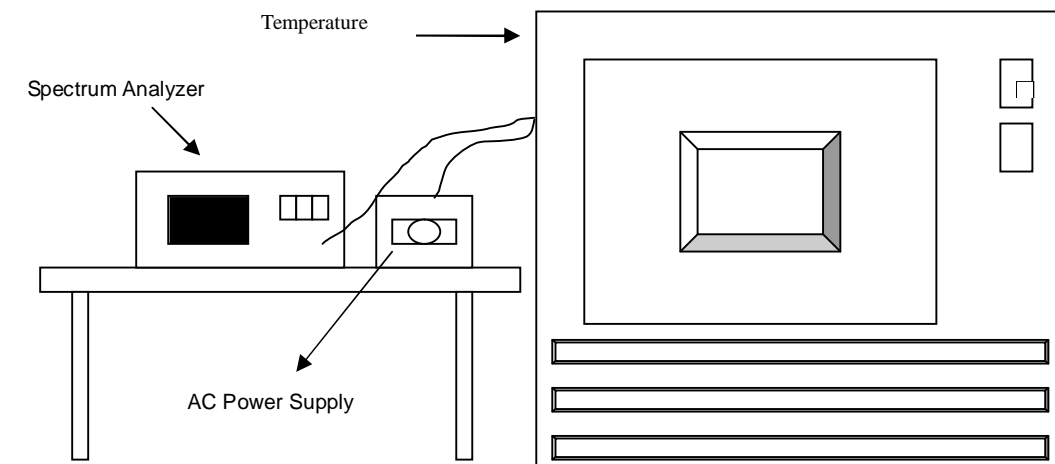
4.6.3 TEST PROCEDURE

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.



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4.6.7 TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	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	5240.019	3.6260	5240.0214	4.0840	5240.0161	3.0725	5240.0194	3.7023
40	120	5240.0081	1.5458	5240.0046	0.8779	5240.0106	2.0229	5240.0065	1.2405
30	120	5240.0091	1.7366	5240.0118	2.2519	5240.0153	2.9198	5240.0102	1.9466
20	120	5240.0051	0.9733	5240.0028	0.5344	5240.0076	1.4504	5240.0084	1.6031
10	120	5239.9848	-2.9008	5239.9883	-2.2328	5239.9865	-2.5763	5239.9807	-3.6832
0	120	5240.0193	3.6832	5240.0193	3.6832	5240.0147	2.8053	5240.0176	3.3588
-10	120	5239.9996	-0.0763	5239.999	-0.1908	5240.0009	0.1718	5239.9947	-1.0115
-20	120	5239.9872	-2.4427	5239.9918	-1.5649	5239.9912	-1.6794	5239.9837	-3.1107
-30	120	5240.0124	2.3664	5240.0208	3.9695	5240.0163	3.1107	5240.0209	3.9885

FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	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	5240.0043	0.8206	5240.0031	0.5916	5240.0073	1.3931	5240.0081	1.5458
	120	5240.0051	0.9733	5240.0028	0.5344	5240.0076	1.4504	5240.0084	1.6031
	102	5240.0043	0.8206	5240.0031	0.5916	5240.008	1.5267	5240.0075	1.4313



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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:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26052943

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.



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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 ---