FCC TEST REPORT (15.407)

REPORT NO.:	RF120314E09A-1
MODEL NO.:	SMCD3GN4xxxxx (x =0-9, A-Z, a-z, "-", ".", or blank for marketing purpose only)
FCC ID:	JI5-D3GN4
RECEIVED:	Mar. 27, 2012
TESTED:	Mar. 28 to Apr. 12, 2012
ISSUED:	June 12, 2012
APPLICANT:	SMC Networks Inc.
ADDRESS:	20 Mason, Irvine, CA 92618, USA
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
RF120314E09A-1	Original release	June 12, 2012

1. CERTIFICATION

PRODUCT:	Wireless Gateway
BRAND NAME:	SMC
MODEL NO.:	SMCD3GN4xxxxx (x =0-9, A-Z, a-z, "- ", "." , or blank for marketing purpose only)
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	SMC Networks Inc.
TESTED:	Mar. 28 to Apr. 12, 2012
STANDARDS:	**FCC Part 15, Subpart E (Section 15.407)** ANSI C63.10-2009

The above equipment (Model: SMCD3GN4) 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 : Phoenix Huang , **DATE:** June 12, 2012
(Phoenix Huang, Specialist)

APPROVED BY : , **DATE:** June 12, 2012
(May Chen, Deputy Manager)

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 -7.93dB at 0.17734MHz
15.407(b/1/2/3)(b)(6)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.7dB 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	Antenna connector is PIFA not a standard connector.

NOTE:

1. 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	2.45 dB
Radiated emissions (30MHz-1GHz)	3.81 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.56 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Gateway
MODEL NO.	SMCD3GN4xxxxx (x =0-9, A-Z, a-z, "-", ".", or blank for marketing purpose only)
POWER SUPPLY	DC 12V from external power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: up to11Mbps 802.11a / g: up to 54Mbps 802.11n (20MHz, 800ns GI, MCS0 ~ 15): up to 130Mbps 802.11n (40MHz, 800ns GI, MCS0 ~ 15): up to 270Mbps 802.11n (20MHz, 400ns GI, MCS0 ~ 15): up to 144.4Mbps 802.11n (40MHz, 400ns GI, MCS0 ~ 15): up to 300Mbps
OPERATING FREQUENCY	**For 15.407** 802.11a: 5.18 ~ 5.24GHz
	For 15.247 802.11b/g: 2.412 ~ 2.462GHz 802.11a: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.247** 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) **For 15.247 (5GHz)** 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)

MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 31.623mW 802.11n (20MHz): 32.067mW 802.11n (40MHz): 43.767mW **For 15.247 (2.4GHz)** 802.11b: 34.674mW 802.11g: 933.254mW 802.11n (20MHz): 957.514mW 802.11n (40MHz): 991.491mW **For 15.247 (5GHz)** 802.11a: 851.138mW 802.11n (20MHz): 863.096mW 802.11n (40MHz): 833.960mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1

NOTE:

1. Model Name SMCD3GN4xxxxx, the "x" in the model could be defined as 0-9, A-Z, a-z, "-", ".", or blank for marketing differentiation. For the final test, model: SMCD3GN4 was selected as the representative model for the test and its data is recorded in this report.
2. The antennas provided to the EUT, please refer to the following table:

For 2.4GHz					
Transmitter Circuit	Brand	Model	Peak Gain (dBi)	Antenna Type	Connecter Type
Chain (0)	Wanshih	SI6WFI0094	2.39	PIFA	U.FL
Chain (1)	Wanshih	SI6WFI0094	2.46	PIFA	U.FL
For 5GHz					
Transmitter Circuit	Brand	Model	Peak Gain (dBi)	Antenna Type	Connecter Type
Chain (0)	Wanshih	SI6WFI0094	6.41	PIFA	U.FL
Chain (1)	Wanshih	SI6WFI0094	4.22	PIFA	U.FL

3. The EUT must be supplied with a power adapter and following two different model could be chosen:

Adapter 1:	
Brand :	OEM
Model No. :	ADS0271-W 120200
Input power :	AC 100-240V~, 50-60Hz, 0.6A
Output power :	DC 12V, 2.0A (unshielded, 1.5m)
Adapter 2:	
Brand :	Sunny
Model No. :	SYS1428-2412-W2
Input power :	AC 100-240V~, 50-60Hz, 1.0A
Output power :	DC 12V, 2.0A (unshielded, 1.5m)

For radiated emissions test, the EUT was pre-tested with above adapters 1 & 2, the worst case was found in adapter 1. Therefore only the test data of the adapter was recorded in this report.

4. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX/RX FUNCTION
802.11b	1Tx/1Rx
802.11g	1Tx/1Rx
802.11a	1Tx/1Rx
802.11n (20MHz)	2Tx/2Rx
802.11n (40MHz)	2Tx/2Rx

5. 2.4GHz and 5GHz technology cannot transmit at same time.

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

7. 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 5150MHz ~ 5250MHz bands:

Four channels are provided for 802.11a and 802.11n (20MHz):

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

Two 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	OB	
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

OB: Conducted Out-Band Emission Measurement

NOTE:

T he EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane** (for below 1GHz) and **Y-plane** (for above 1GHz)**.**

POWER LINE CONDUCTED EMISSION TEST:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
For 5 GHz 802.11n (20MHz)	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)
For 5 GHz 802.11n (20MHz)	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
For 5 GHz 802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
For 5 GHz 802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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
For 5 GHz 802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
For 5 GHz 802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	26deg. C, 62%RH	120Vac, 60Hz	Leo Peng
RE<1G	22deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
RE≥1G	27deg. C, 76%RH	120Vac, 60Hz	Evan Huang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kent Liu
OB	25deg. C, 60%RH	120Vac, 60Hz	Kent 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)

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

Test tool can set the EUT to transmit at > 98 % duty cycle.

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.

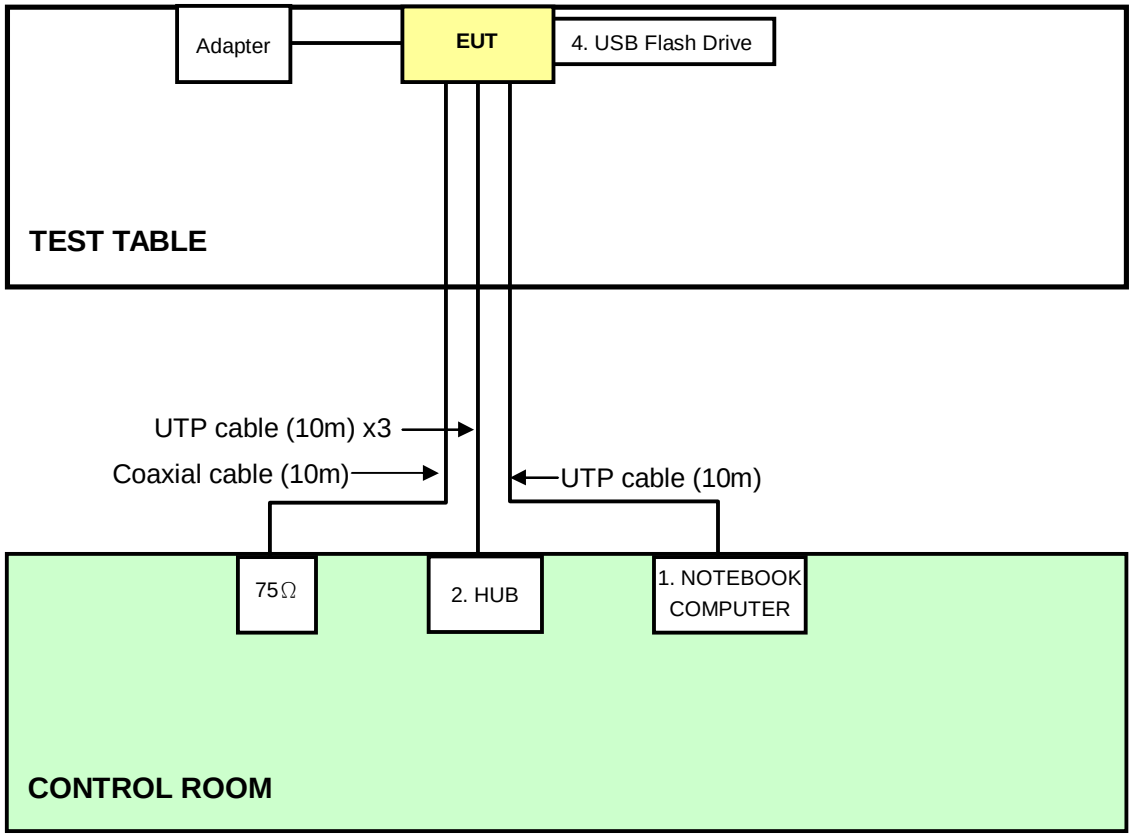
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
3	iPod shuffle	Apple	MC749TA/A	CC4DMFJUDFDM	NA
4	USB Flash Drive	SanDisk	SDCZ2-512-A10	5482374371	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m
2	UTP cable, 10m
3	USB cable, 0.1m
4	NA

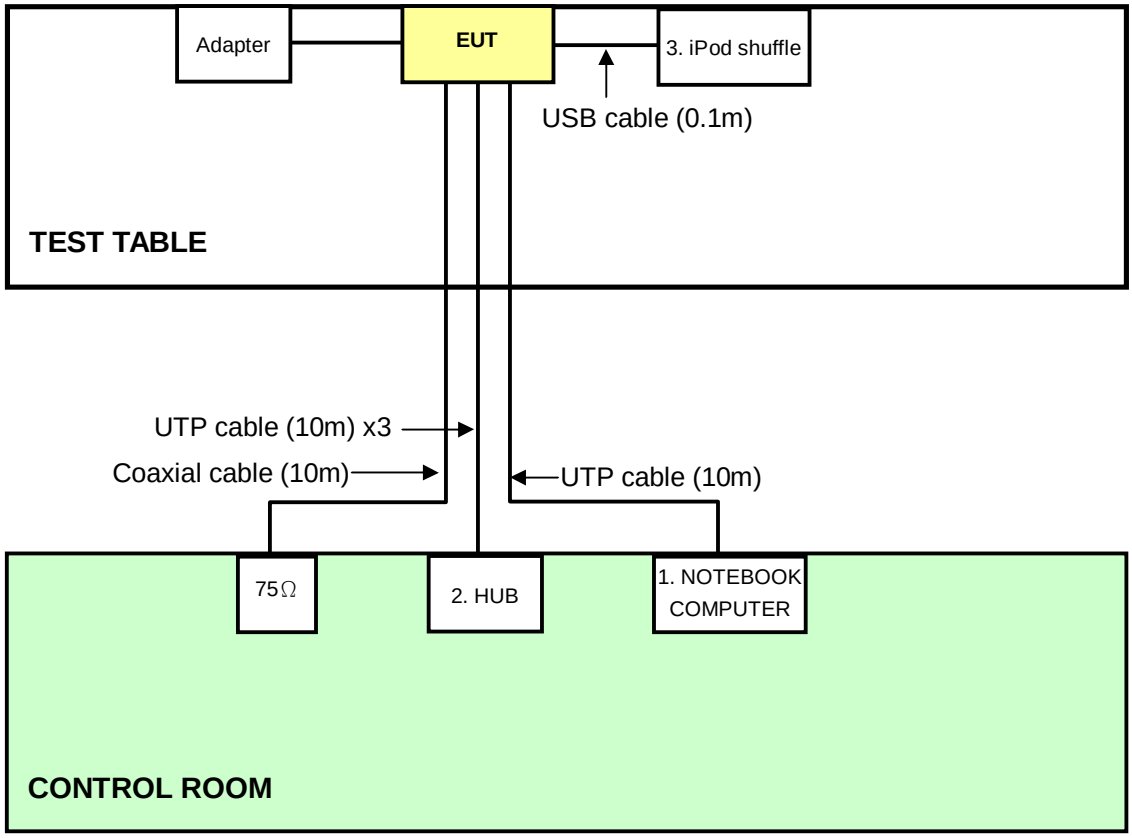
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted emission test:



For Others test:



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 0.5-5 5-30	66 to 56 56 60	56 to 46 46 50

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Feb. 29, 2012	Feb. 28, 2013
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 20, 2011	Sep. 19, 2012
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 10, 2011	June 09, 2012
RF Cable (JYEBAO)	5DFB	COACAB-002	Aug. 06, 2011	Aug. 05, 2012
50 ohms Terminator	50	3	Nov. 02, 2011	Nov. 01, 2012
Software	BV ADT_Cond_V7.3.7	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: Mar. 28, 2012

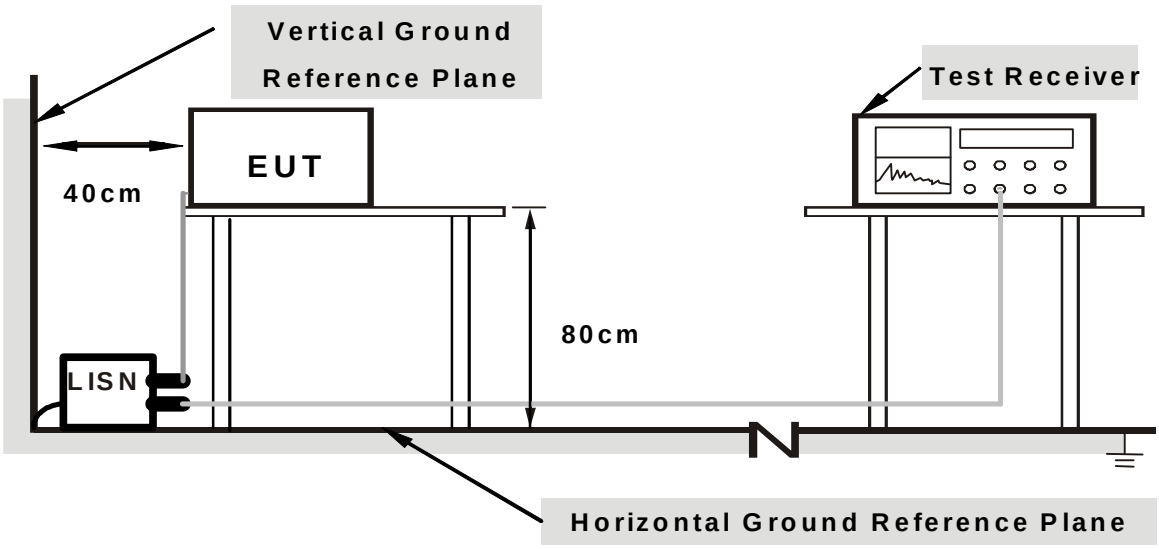
4.1.3 TEST PROCEDURES

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. Emission level under (Limit – 20dB) was not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared other computer system (support unit 1) to act as communication partners and placed them outside of testing area.
3. The communication partners ran test program “MP.TOOL-1221-01” to enable EUT under transmission/receiving condition continuously via one UTP cable transmission.

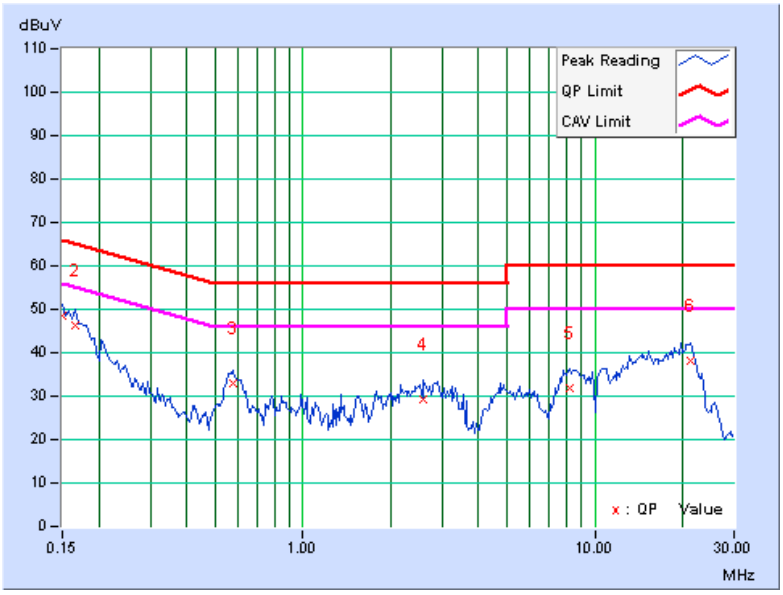
4.1.7 TEST RESULTS (MODE 1)

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	0.15000	0.06	48.43	39.41	48.49	39.47	66.00	56.00	-17.51	-16.53
2	0.16562	0.06	46.37	41.94	46.43	42.00	65.18	55.18	-18.75	-13.18
3	0.57969	0.08	32.83	25.88	32.91	25.96	56.00	46.00	-23.09	-20.04
4	2.59375	0.21	29.21	23.99	29.42	24.20	56.00	46.00	-26.58	-21.80
5	8.16016	0.36	31.48	26.65	31.84	27.01	60.00	50.00	-28.16	-22.99
6	21.40234	0.65	37.47	33.34	38.12	33.99	60.00	50.00	-21.88	-16.01

REMARKS:

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

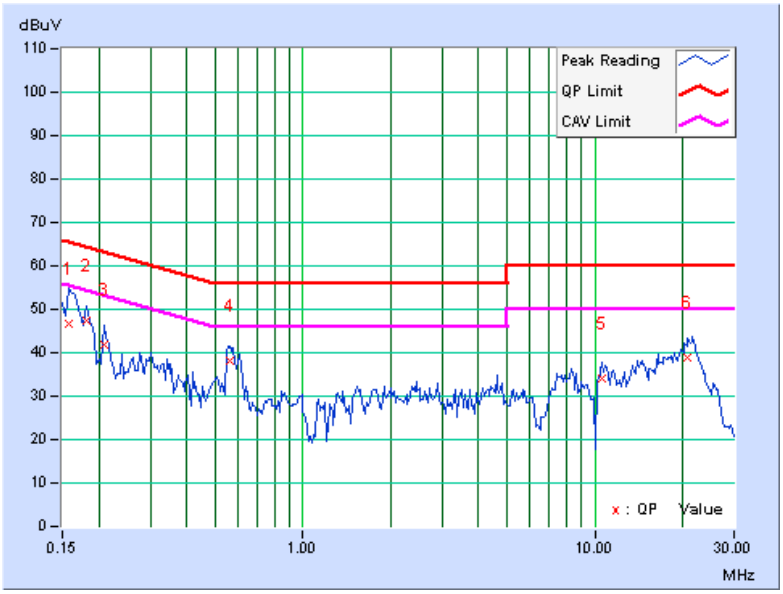


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.07	46.76	35.98	46.83	36.05	65.58	55.58	-18.75	-19.53
2	0.18125	0.07	47.36	36.78	47.43	36.85	64.43	54.43	-17.00	-17.58
3	0.20859	0.07	41.82	32.22	41.89	32.29	63.26	53.26	-21.37	-20.97
4	0.56406	0.09	37.98	30.89	38.07	30.98	56.00	46.00	-17.93	-15.02
5	10.63281	0.40	33.80	28.10	34.20	28.50	60.00	50.00	-25.80	-21.50
6	20.87500	0.62	38.36	33.72	38.98	34.34	60.00	50.00	-21.02	-15.66

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.



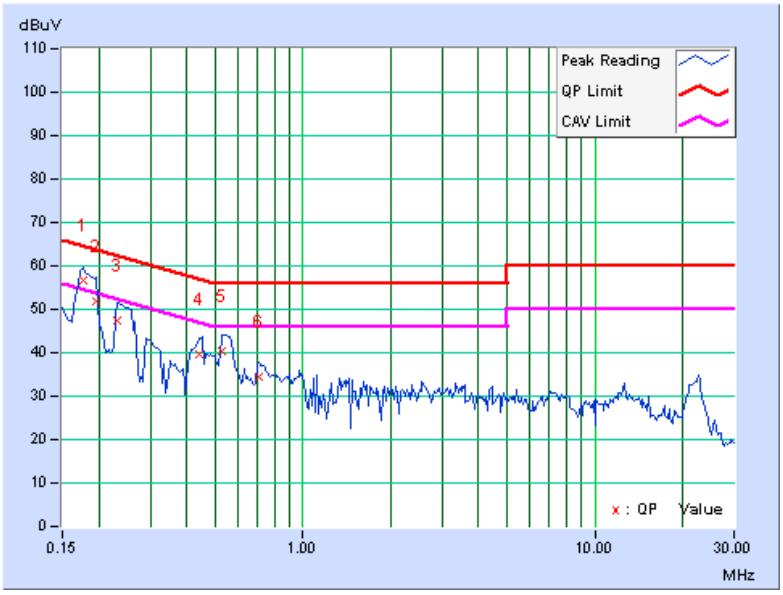
4.1.8 TEST RESULTS (MODE 2)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.06	56.43	39.02	56.49	39.08	64.61	54.61	-8.12	-15.53
2	0.19687	0.06	51.96	33.20	52.02	33.26	63.74	53.74	-11.72	-20.48
3	0.23203	0.06	47.42	30.24	47.48	30.30	62.38	52.38	-14.90	-22.08
4	0.44297	0.07	39.61	27.59	39.68	27.66	57.01	47.01	-17.32	-19.34
5	0.52891	0.08	40.15	27.40	40.23	27.48	56.00	46.00	-15.77	-18.52
6	0.70469	0.10	34.34	22.21	34.44	22.31	56.00	46.00	-21.56	-23.69

REMARKS:

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

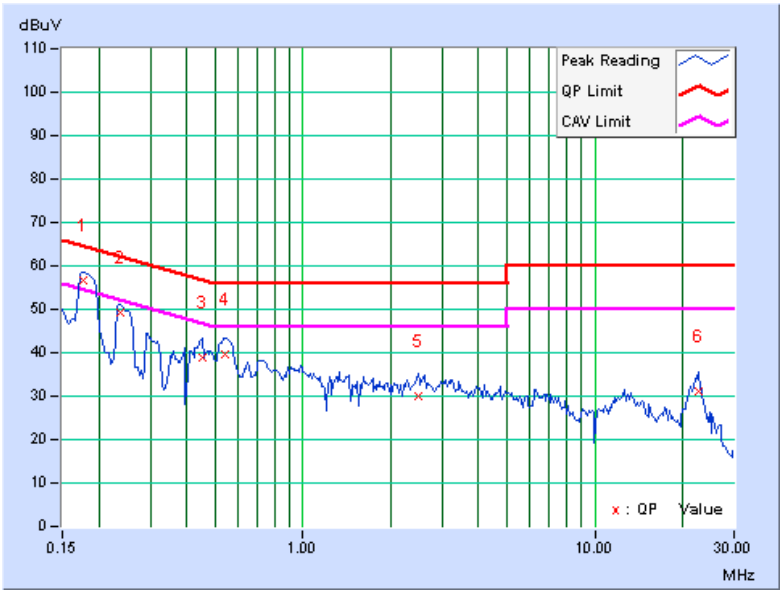


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.17734**	**0.07**	**56.61**	**42.89**	**56.68**	**42.96**	**64.61**	**54.61**	**-7.93**	**-11.65**
2	0.23594	0.07	49.11	29.89	49.18	29.96	62.24	52.24	-13.06	-22.28
3	0.45078	0.08	38.64	24.00	38.72	24.08	56.86	46.86	-18.14	-22.78
4	0.54453	0.09	39.40	27.86	39.49	27.95	56.00	46.00	-16.51	-18.05
5	2.47266	0.20	29.97	22.66	30.17	22.86	56.00	46.00	-25.83	-23.14
6	22.65234	0.66	30.41	25.75	31.07	26.41	60.00	50.00	-28.93	-23.59

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 MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION 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

NOTE:

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
Agilent Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012
Agilent Pre-Selector	N9039A	MY46520311	July 12, 2011	July 11, 2012
Agilent Signal Generator	N5181A	MY49060517	July 12, 2011	July 11, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Agilent Pre-Amplifier	8449B	3008A02578	July 04, 2011	July 03, 2012
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 14, 2011	Apr. 13, 2012
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
SCHWARZBECK Horn_Antenna	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
CT Antenna Tower & Turn Table	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. 10, 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 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

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

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

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

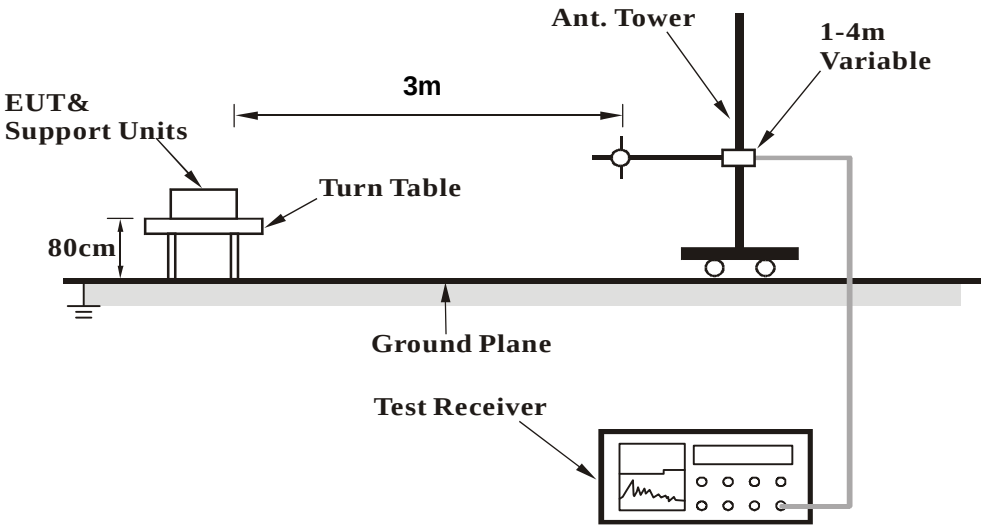
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 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	124.97	27.0 QP	43.5	-16.5	1.50 H	0	14.50	12.48
2	249.99	42.6 QP	46.0	-3.4	2.00 H	360	28.37	14.25
3	374.97	41.6 QP	46.0	-4.4	1.00 H	348	24.23	17.37
4	500.02	40.6 QP	46.0	-5.4	2.00 H	360	19.94	20.63
5	625.07	40.4 QP	46.0	-5.6	1.50 H	0	17.47	22.90
6	874.95	40.1 QP	46.0	-5.9	1.00 H	321	12.99	27.07
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	32.13	36.5 QP	40.0	-3.5	1.00 V	305	16.07	20.44
2	250.03	40.8 QP	46.0	-5.2	1.00 V	335	26.51	14.25
3	374.97	35.4 QP	46.0	-10.6	1.00 V	0	18.07	17.37
4	599.97	37.4 QP	46.0	-8.6	1.00 V	0	14.77	22.63
5	875.06	42.3 QP	46.0	-3.8	1.00 V	0	15.17	27.08
6	959.97	40.2 QP	46.0	-5.8	1.00 V	9	11.93	28.23

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	66.9 PK	74.0	-7.1	1.00 H	85	24.60	42.30
2	5150.00	53.2 AV	54.0	-0.8	1.00 H	85	10.90	42.30
3	*5180.00	117.9 PK			1.00 H	85	75.50	42.40
4	*5180.00	107.8 AV			1.00 H	85	65.40	42.40
5	#10360.00	65.1 PK	68.3	-3.2	1.54 H	310	15.89	49.21
6	15540.00	61.6 PK	74.0	-12.4	1.08 H	276	6.50	55.10
7	15540.00	51.6 AV	54.0	-2.4	1.08 H	276	-3.50	55.10
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	59.2 PK	74.0	-14.8	1.00 V	91	16.90	42.30
2	5150.00	47.9 AV	54.0	-6.1	1.00 V	91	5.60	42.30
3	*5180.00	110.0 PK			1.00 V	83	67.60	42.40
4	*5180.00	99.8 AV			1.00 V	83	57.40	42.40
5	#10360.00	61.3 PK	68.3	-7.0	1.00 V	20	12.09	49.21
6	15540.00	62.0 PK	74.0	-12.0	1.00 V	233	6.90	55.10
7	15540.00	50.9 AV	54.0	-3.1	1.00 V	233	-4.20	55.10

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	5101.00	65.5 PK	74.0	-8.5	1.00 H	83	23.37	42.13
2	5101.00	52.8 AV	54.0	-1.2	1.00 H	83	10.67	42.13
3	*5200.00	119.5 PK			1.00 H	82	77.03	42.47
4	*5200.00	108.5 AV			1.00 H	82	66.03	42.47
5	#10400.00	66.3 PK	68.3	-2.0	1.53 H	302	17.47	48.83
6	15600.00	62.0 PK	74.0	-12.0	1.11 H	287	7.03	54.97
7	15600.00	51.8 AV	54.0	-2.2	1.11 H	287	-3.17	54.97
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	112.1 PK			1.00 V	85	69.63	42.47
2	*5200.00	100.6 AV			1.00 V	85	58.13	42.47
3	#10400.00	61.4 PK	68.3	-6.9	1.08 V	21	12.57	48.83
4	15600.00	61.8 PK	74.0	-12.2	1.00 V	242	6.83	54.97
5	15600.00	50.3 AV	54.0	-3.7	1.00 V	242	-4.67	54.97

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	5140.00	65.2 PK	74.0	-8.8	1.06 H	83	22.93	42.27
2	5140.00	53.0 AV	54.0	-1.0	1.06 H	83	10.73	42.27
3	*5240.00	128.9 PK			1.06 H	83	86.39	42.51
4	*5240.00	109.7 AV			1.06 H	83	67.19	42.51
5	5350.00	55.6 PK	74.0	-18.4	1.55 H	241	13.01	42.59
6	5350.00	45.3 AV	54.0	-8.7	1.55 H	241	2.71	42.59
7	#10480.00	66.9 PK	68.3	-1.4	1.54 H	306	17.51	49.39
8	15720.00	62.0 PK	74.0	-12.0	1.15 H	291	7.30	54.70
9	15720.00	51.4 AV	54.0	-2.6	1.15 H	291	-3.30	54.70
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	113.2 PK			1.00 V	86	70.69	42.51
2	*5240.00	100.9 AV			1.00 V	86	58.39	42.51
3	5350.00	56.3 PK	74.0	-17.7	1.00 V	26	13.71	42.59
4	5350.00	45.7 AV	54.0	-8.3	1.00 V	26	3.11	42.59
5	#10480.00	61.5 PK	68.3	-6.8	1.07 V	20	12.11	49.39
6	15720.00	61.9 PK	74.0	-12.1	1.00 V	231	7.20	54.70
7	15720.00	50.6 AV	54.0	-3.4	1.00 V	231	-4.10	54.70

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 (20MHz)

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	65.0 PK	74.0	-9.0	1.00 H	290	22.70	42.30
2	5150.00	52.0 AV	54.0	-2.0	1.00 H	290	9.70	42.30
3	*5180.00	116.8 PK			1.00 H	291	74.40	42.40
4	*5180.00	105.2 AV			1.00 H	291	62.80	42.40
5	#10360.00	56.5 PK	68.3	-11.8	1.52 H	313	7.29	49.21
6	15540.00	62.2 PK	74.0	-11.8	1.11 H	276	7.10	55.10
7	15540.00	50.4 AV	54.0	-3.6	1.11 H	276	-4.70	55.10
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	61.1 PK	74.0	-12.9	1.23 V	100	18.80	42.30
2	5150.00	48.6 AV	54.0	-5.4	1.23 V	100	6.30	42.30
3	*5180.00	109.5 PK			1.00 V	140	67.10	42.40
4	*5180.00	98.2 AV			1.00 V	140	55.80	42.40
5	#10360.00	58.3 PK	68.3	-10.0	1.08 V	25	9.09	49.21
6	15540.00	61.3 PK	74.0	-12.7	1.00 V	241	6.20	55.10
7	15540.00	50.7 AV	54.0	-3.3	1.00 V	241	-4.40	55.10

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	117.9 PK			1.00 H	291	75.43	42.47
2	*5200.00	105.6 AV			1.00 H	291	63.13	42.47
3	#10400.00	57.1 PK	68.3	-11.2	1.48 H	311	8.27	48.83
4	15600.00	62.9 PK	74.0	-11.1	1.05 H	275	7.93	54.97
5	15600.00	50.8 AV	54.0	-3.2	1.05 H	275	-4.17	54.97
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	110.2 PK			1.00 V	145	67.73	42.47
2	*5200.00	98.6 AV			1.00 V	145	56.13	42.47
3	#10400.00	58.9 PK	68.3	-9.4	1.07 V	29	10.07	48.83
4	15600.00	61.6 PK	74.0	-12.4	1.00 V	239	6.63	54.97
5	15600.00	51.0 AV	54.0	-3.0	1.00 V	239	-3.97	54.97

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	118.5 PK			1.00 H	291	75.99	42.51
2	*5240.00	106.2 AV			1.00 H	291	63.69	42.51
3	5350.00	56.4 PK	74.0	-17.6	1.00 H	26	13.81	42.59
4	5350.00	46.3 AV	54.0	-7.7	1.00 H	26	3.71	42.59
5	#10480.00	56.9 PK	68.3	-11.4	1.48 H	298	7.51	49.39
6	15720.00	62.4 PK	74.0	-11.6	1.11 H	237	7.70	54.70
7	15720.00	50.2 AV	54.0	-3.8	1.11 H	237	-4.50	54.70
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	111.5 PK			1.00 V	141	68.99	42.51
2	*5240.00	98.9 AV			1.00 V	141	56.39	42.51
3	5350.00	56.2 PK	74.0	-17.8	1.00 V	31	13.61	42.59
4	5350.00	45.8 AV	54.0	-8.2	1.00 V	31	3.21	42.59
5	#10480.00	59.6 PK	68.3	-8.7	1.07 V	31	10.21	49.39
6	15720.00	62.1 PK	74.0	-11.9	1.00 V	241	7.40	54.70
7	15720.00	50.6 AV	54.0	-3.4	1.00 V	241	-4.10	54.70

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)
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	66.8 PK	74.0	-7.2	1.04 H	288	24.50	42.30
2	**5150.00**	**53.3 AV**	**54.0**	**-0.7**	**1.04 H**	**288**	**11.00**	**42.30**
3	*5190.00	111.3 PK			1.04 H	288	68.86	42.44
4	*5190.00	98.6 AV			1.04 H	288	56.16	42.44
5	#10380.00	57.8 PK	68.3	-10.5	1.50 H	274	8.78	49.02
6	15570.00	62.8 PK	74.0	-11.2	1.08 H	226	7.76	55.04
7	15570.00	51.5 AV	54.0	-2.5	1.08 H	226	-3.54	55.04
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	59.9 PK	74.0	-14.1	1.00 V	143	17.60	42.30
2	5150.00	47.5 AV	54.0	-6.5	1.00 V	143	5.20	42.30
3	*5190.00	106.8 PK			1.00 V	142	64.36	42.44
4	*5190.00	92.3 AV			1.00 V	142	49.86	42.44
5	#10380.00	57.9 PK	68.3	-10.4	1.08 V	22	8.88	49.02
6	15570.00	63.1 PK	74.0	-10.9	1.00 V	236	8.06	55.04
7	15570.00	51.6 AV	54.0	-2.4	1.00 V	236	-3.44	55.04

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	*5230.00	114.2 PK			1.03 H	290	71.70	42.50
2	*5230.00	101.9 AV			1.03 H	290	59.40	42.50
3	5350.00	56.3 PK	74.0	-17.7	1.00 H	27	13.71	42.59
4	5350.00	45.4 AV	54.0	-8.6	1.00 H	27	2.81	42.59
5	#10460.00	57.8 PK	68.3	-10.5	1.45 H	270	8.55	49.25
6	15690.00	63.2 PK	74.0	-10.8	1.06 H	223	8.53	54.67
7	15690.00	51.8 AV	54.0	-2.2	1.06 H	223	-2.87	54.67
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	107.8 PK			1.02 V	201	65.30	42.50
2	*5230.00	96.7 AV			1.02 V	201	54.20	42.50
3	5350.00	55.7 PK	74.0	-18.3	1.00 V	360	13.11	42.59
4	5350.00	45.3 AV	54.0	-8.7	1.00 V	360	2.71	42.59
5	#10460.00	58.8 PK	68.3	-9.5	1.09 V	23	9.55	49.25
6	15690.00	62.9 PK	74.0	-11.1	1.00 V	232	8.23	54.67
7	15690.00	51.2 AV	54.0	-2.8	1.00 V	232	-3.47	54.67

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

FOR POWER OUTPUT MEASUREMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Peak Power Meter	ML2495A	0824006	May 04, 2011	May 03, 2012
Power Sensor	MA2411B	0738172	May 03, 2011	May 02, 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 : Apr. 12, 2012

FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 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 : Apr. 12, 2012

4.3.3 TEST PROCEDURE

FOR POWER OUTPUT MEASUREMENT

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

FOR 26dB OCCUPIED BANDWIDTH

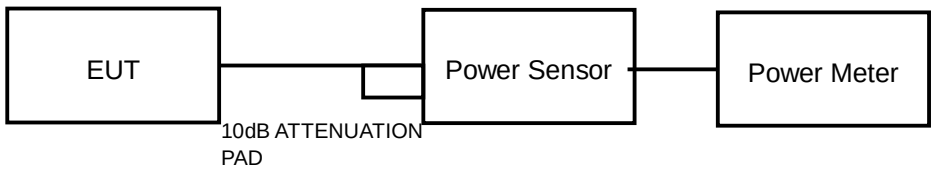
1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement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

4.3.4 DEVIATION FROM TEST STANDARD

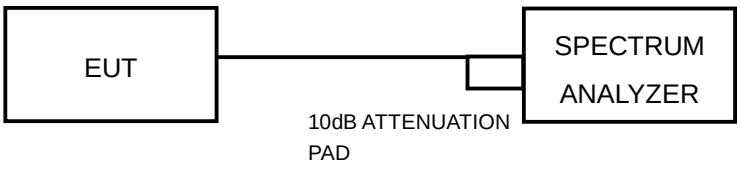
No deviation

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.

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	31.623	15.00	16.59	PASS
40	5200	30.903	14.90	16.59	PASS
48	5240	31.623	15.00	16.59	PASS

NOTE: The directional gain is 6.41dBi, therefore the limit needs to reduce.

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	11.80	11.90	30.624	14.86	16.59	PASS
40	5200	12.00	11.90	31.337	14.96	16.59	PASS
48	5240	12.00	12.10	32.067	15.06	16.59	PASS

NOTE: The directional gain is 6.41dBi, therefore the limit needs to reduce.

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	13.40	13.30	43.258	16.36	16.59	PASS
46	5230	13.50	13.30	43.767	16.41	16.59	PASS

NOTE: The directional gain is 6.41dBi, therefore the limit needs to reduce.

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)
36	5180	22.70
40	5200	22.70
48	5240	23.62

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
36	5180	24.15	23.30
40	5200	24.07	23.52
48	5240	24.14	23.45

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
38	5190	42.79	42.39
46	5230	42.71	42.37

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
Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 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 : Apr. 12, 2012

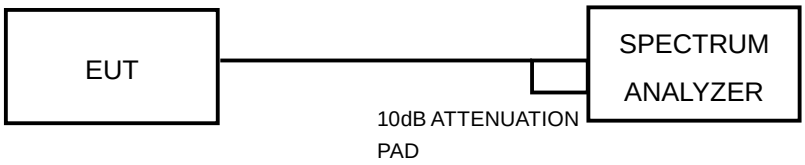
4.4.3 TEST PROCEDURES

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	3.49	3.59	PASS
40	5200	3.37	3.59	PASS
48	5240	2.96	3.59	PASS

NOTE: 1. The directional gain is 6.41dBi, therefore the limit needs to reduce.

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	-0.08	-0.92	2.45	3.59	PASS
40	5200	0.69	0.03	3.37	3.59	PASS
48	5240	0.76	0.82	3.55	3.59	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
2. The directional gain is 6.41dBi, therefore the limit needs to reduce.

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
38	5190	-1.67	-1.69	0.94	3.59	PASS
46	5230	-1.37	-1.79	1.05	3.59	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
2. The directional gain is 6.41dBi, therefore the limit needs to reduce.

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
Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 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 : Apr. 12, 2012

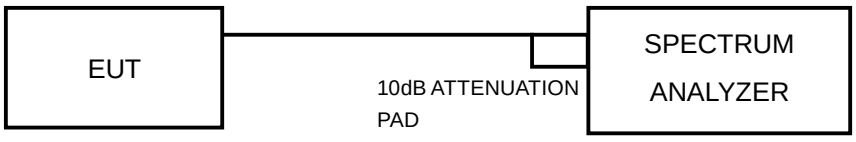
4.5.3 TEST PROCEDURE

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

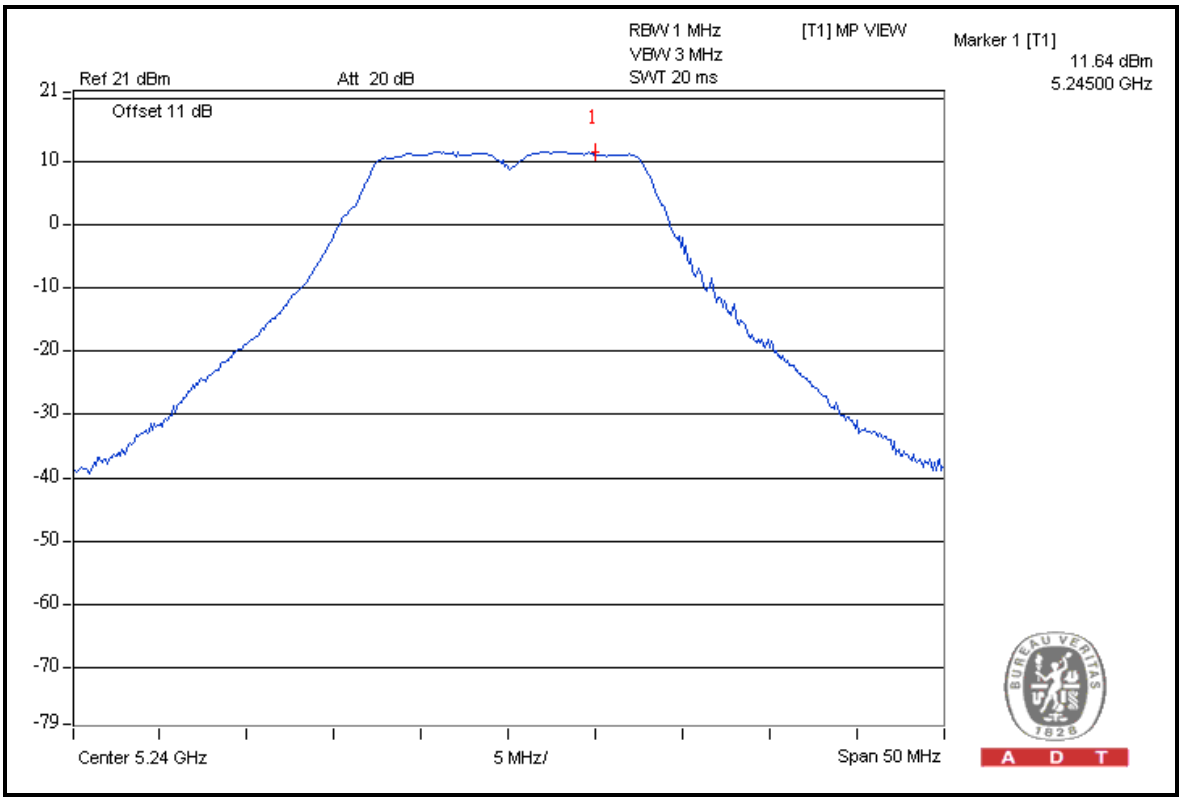
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

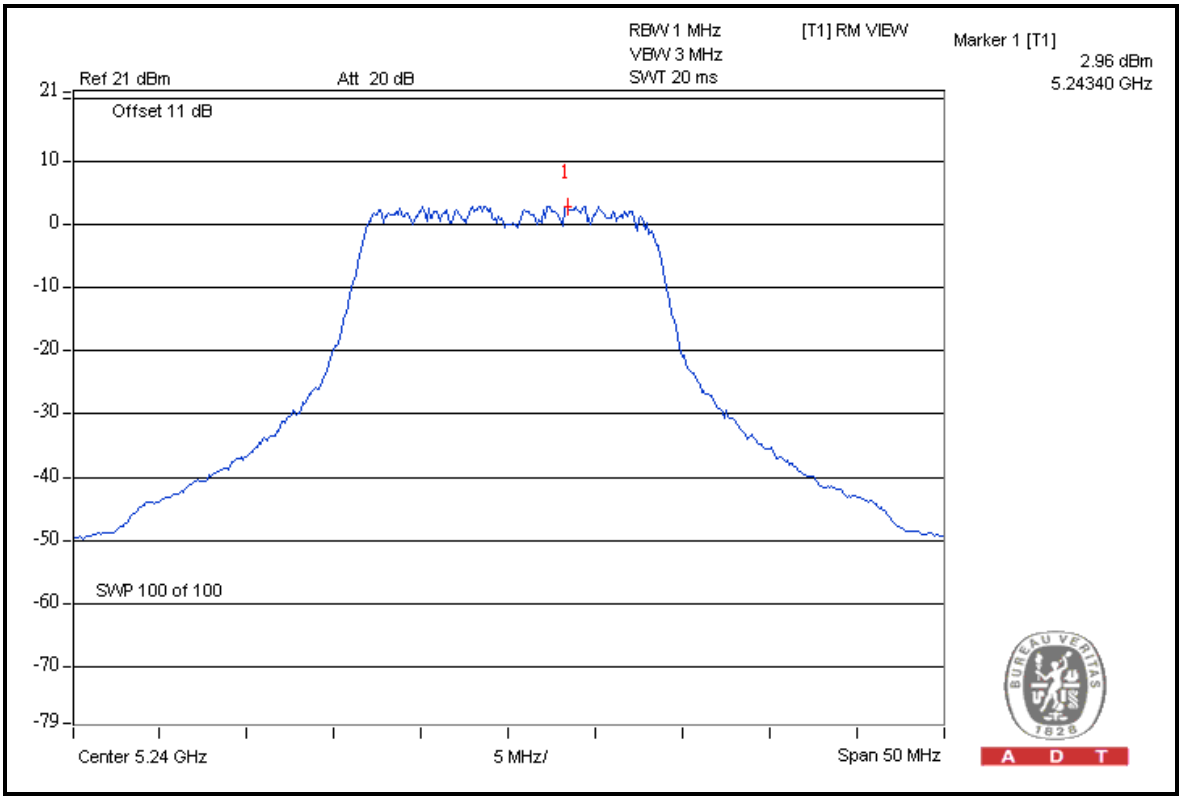
4.5.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK Excursion (dB)	LIMIT (dB)	PASS/FAIL
36	5180	11.96	3.49	8.47	13	PASS
40	5200	11.96	3.37	8.59	13	PASS
48	5240	11.64	2.96	8.68	13	PASS

CH 48

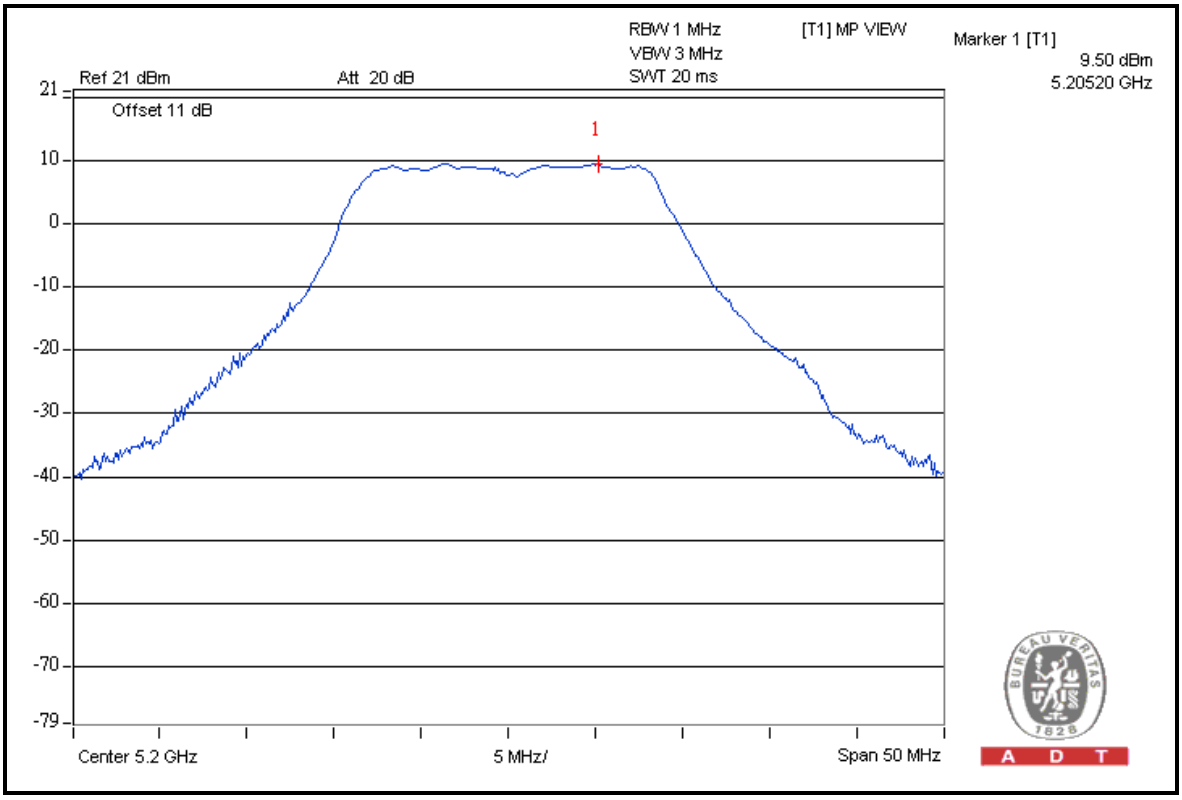

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
11.64 dBm
5.24500 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.24 GHz
5 MHz/
Span 50 MHz

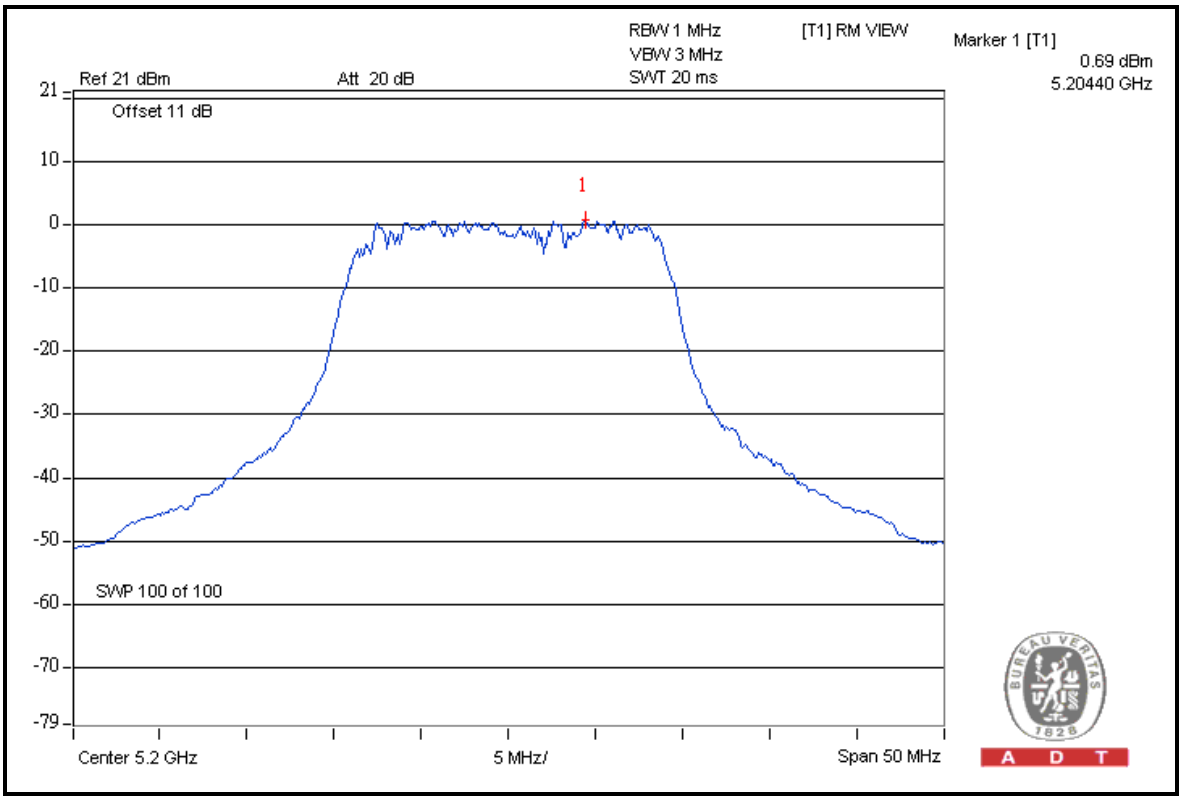

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
2.96 dBm
5.24340 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
SWP 100 of 100
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.24 GHz
5 MHz/
Span 50 MHz

802.11n (20MHz)

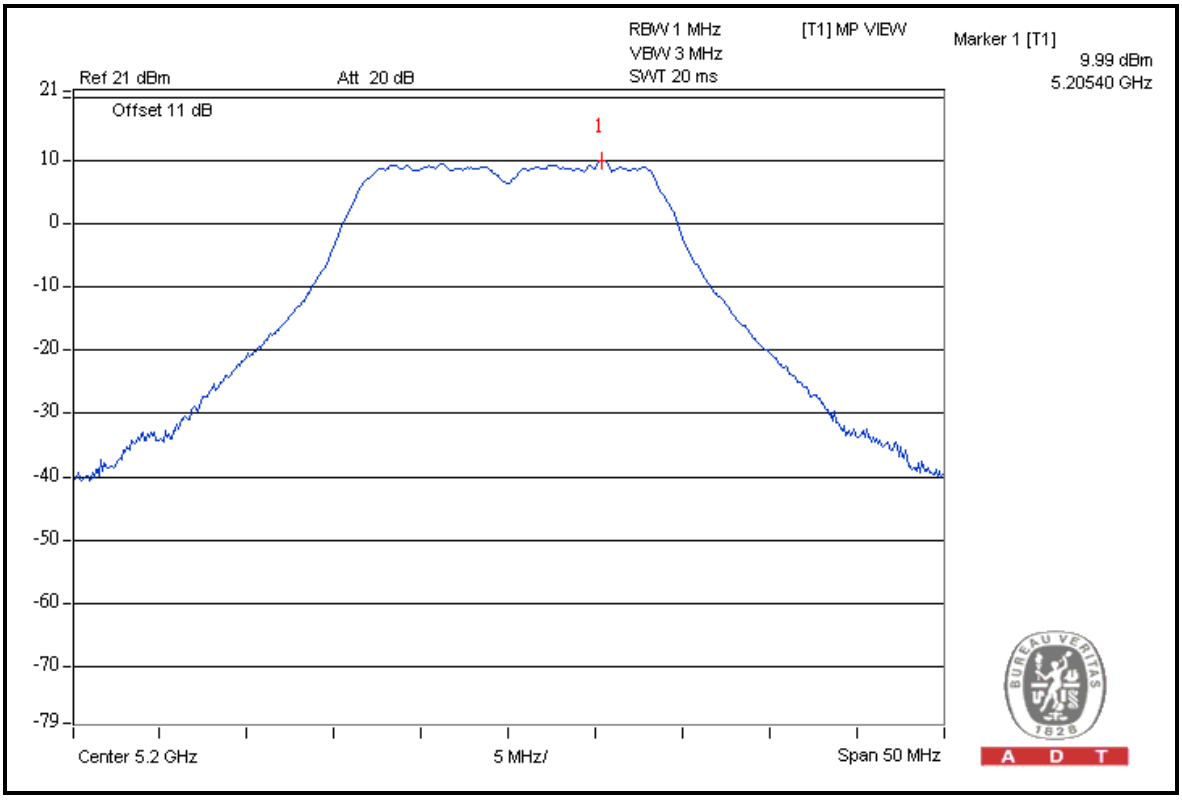
TX chain	CHAN.	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
0	36	5180	8.55	-0.08	8.63	13	PASS
	40	5200	9.50	0.69	8.81	13	PASS
	48	5240	9.55	0.76	8.79	13	PASS
1	36	5180	8.81	-0.92	9.73	13	PASS
	40	5200	9.99	0.03	9.96	13	PASS
	48	5240	10.65	0.82	9.83	13	PASS

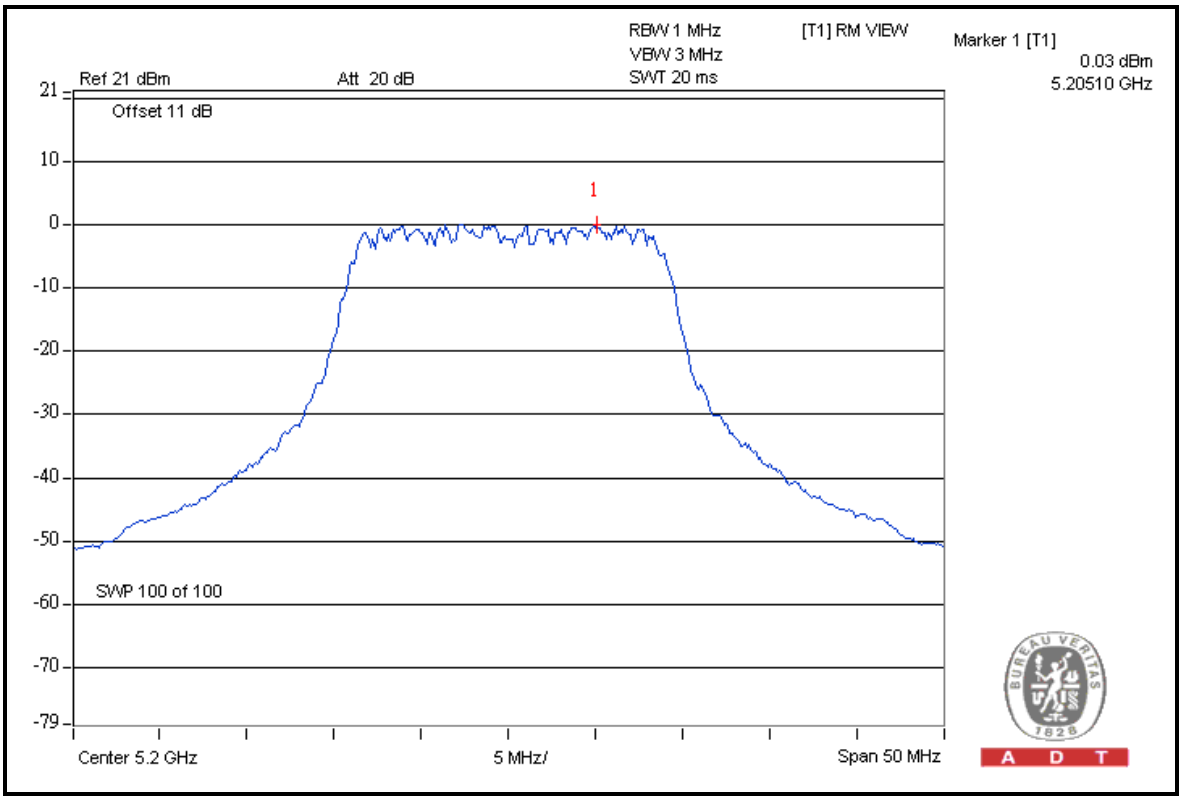
Chain 0 : CH 40


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
9.50 dBm
5.20520 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.2 GHz
5 MHz/
Span 50 MHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
0.69 dBm
5.20440 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
SWP 100 of 100
Center 5.2 GHz
5 MHz/
Span 50 MHz

Chain 1 : CH 40

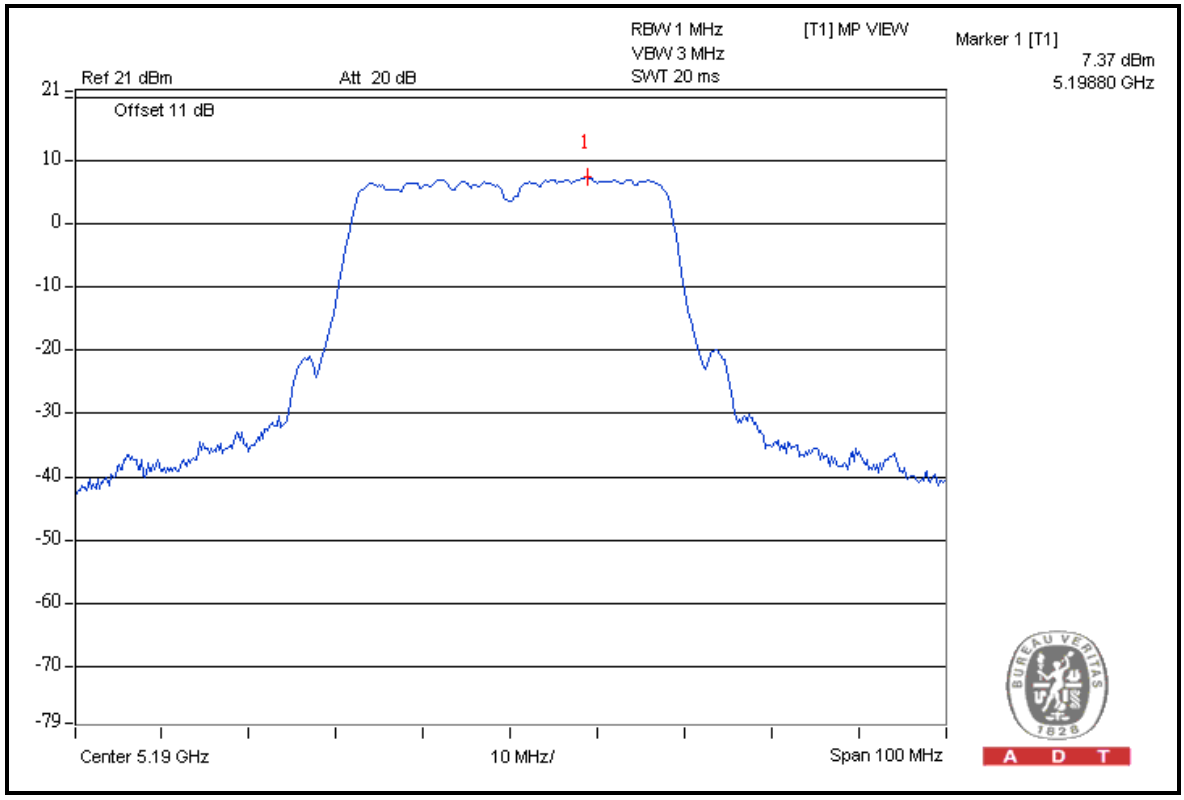

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
9.99 dBm
5.20540 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.2 GHz
5 MHz/
Span 50 MHz

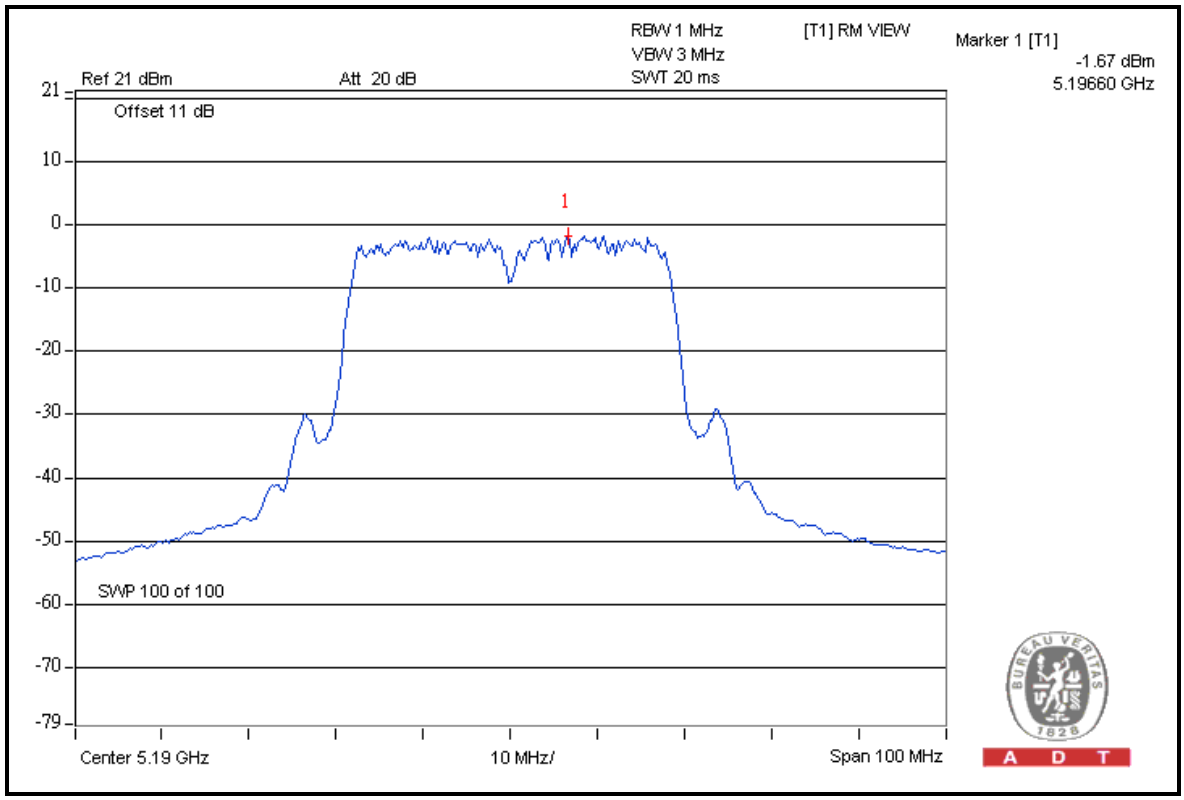

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
0.03 dBm
5.20510 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
SWP 100 of 100
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.2 GHz
5 MHz/
Span 50 MHz

802.11n (40MHz)

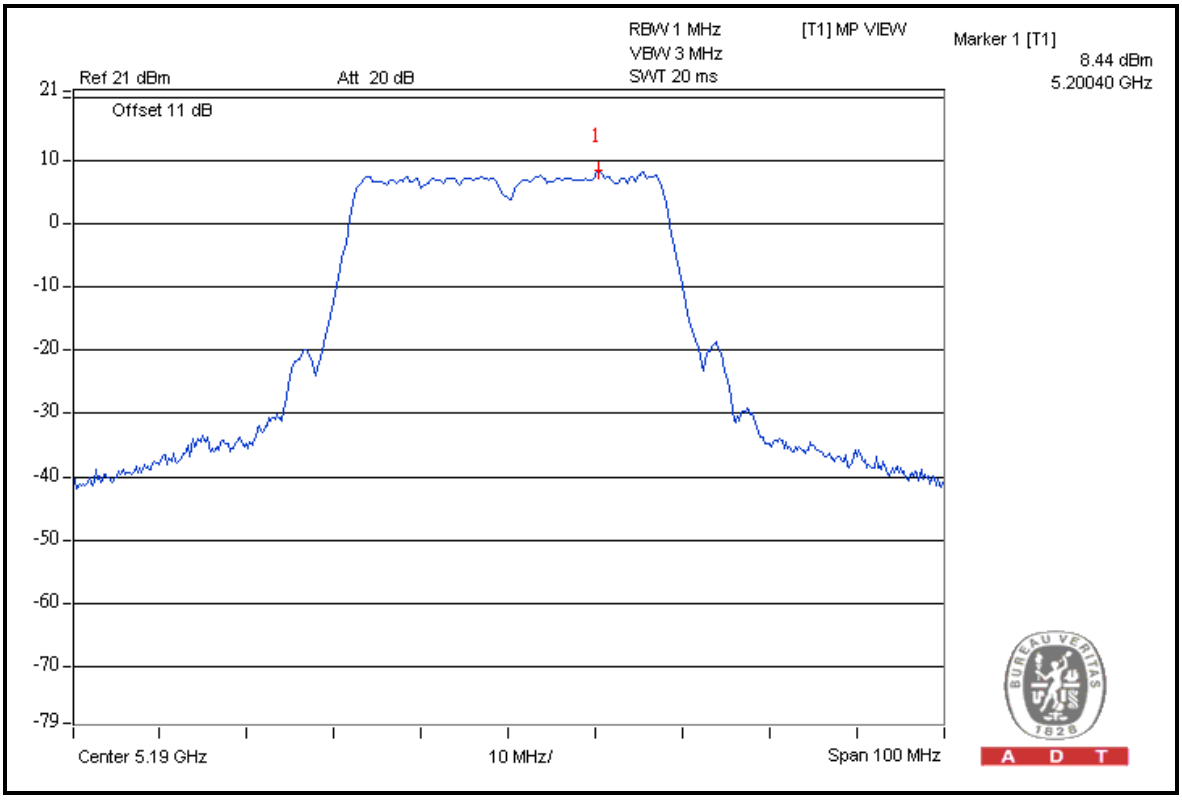
TX chain	CHAN.	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
0	38	5190	7.37	-1.67	9.04	13	PASS
	46	5230	7.63	-1.37	9.00	13	PASS
1	38	5190	8.44	-1.69	10.13	13	PASS
	46	5230	8.31	-1.79	10.10	13	PASS

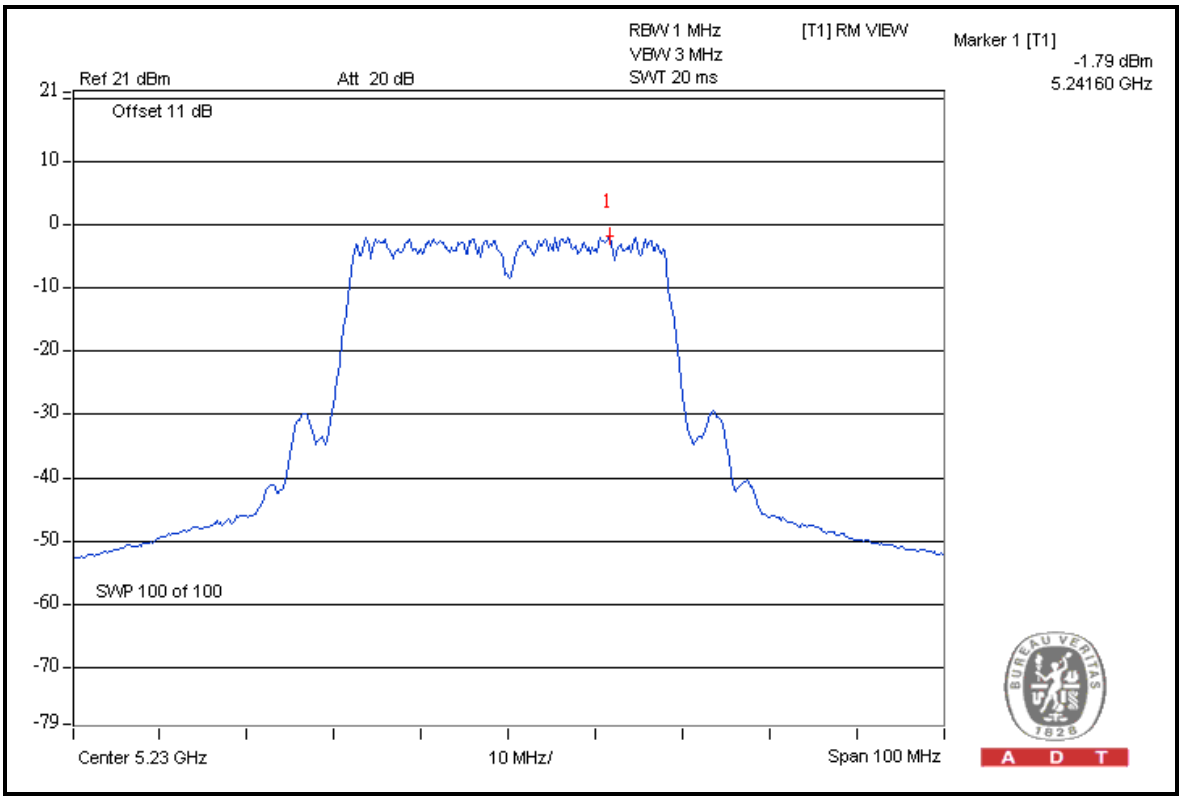
Chain 0 : CH 38


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
7.37 dBm
5.19880 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.19 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-1.67 dBm
5.19660 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
SWP 100 of 100
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.19 GHz
10 MHz/
Span 100 MHz

Chain 1 : CH 38


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
8.44 dBm
5.20040 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.19 GHz
10 MHz/
Span 100 MHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-1.79 dBm
5.24160 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
SWP 100 of 100
Center 5.23 GHz
10 MHz/
Span 100 MHz

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	FSP 40	100060	May 11, 2011	May 10, 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 : Apr. 12, 2012

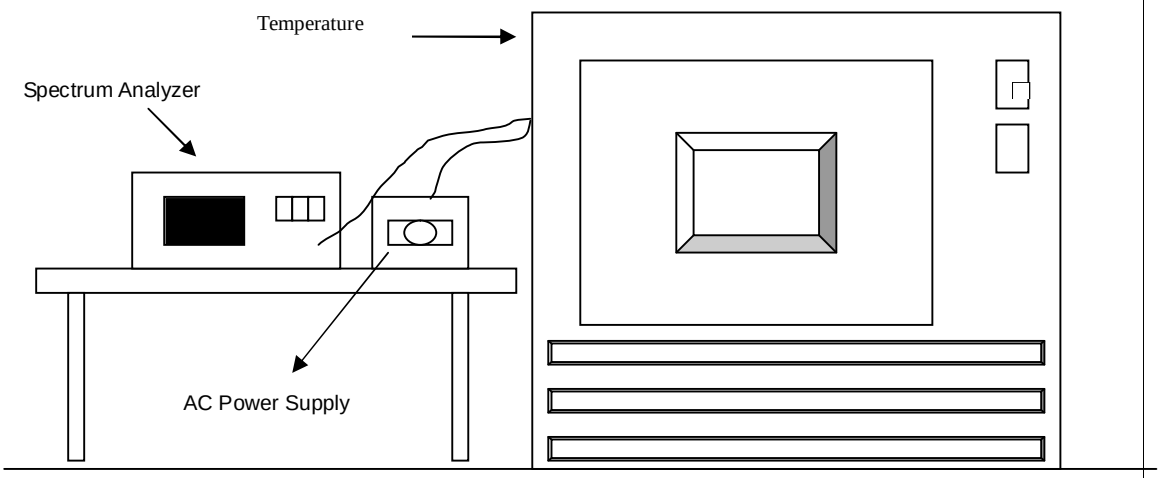
4.6.3 TEST PROCEDURE

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: 5180MHz									
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	5179.9826	-3.3591	5179.9812	-3.6293	5179.9868	-2.5483	5179.9856	-2.7799
40	120	5179.9965	-0.6757	5179.9924	-1.4672	5179.9911	-1.7181	5179.9888	-2.1622
30	120	5179.9907	-1.7954	5179.9951	-0.9459	5179.9893	-2.0656	5179.9929	-1.3707
20	120	5180.0034	0.6564	5180.0051	0.9846	5180.0040	0.7722	5180.0038	0.7336
10	120	5179.9918	-1.5830	5179.9896	-2.0077	5179.9849	-2.9151	5179.9795	-3.9575
0	120	5180.0195	3.7645	5180.0213	4.1120	5180.0233	4.4981	5180.0277	5.3475
-10	120	5180.0117	2.2587	5180.0148	2.8571	5180.0116	2.2394	5180.0124	2.3938
-20	120	5179.9861	-2.6834	5179.9885	-2.2201	5179.9848	-2.9344	5179.9883	-2.2587
-30	120	5180.0070	1.3514	5180.0099	1.9112	5180.0091	1.7568	5180.0114	2.2008

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
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	5180.0023	0.4440	5180.0064	1.2355	5180.0035	0.6757	5180.0045	0.8687
	120	5180.0034	0.6564	5180.0051	0.9846	5180.004	0.7722	5180.0038	0.7336
	102	5180.0028	0.5405	5180.0056	1.0811	5180.0034	0.6564	5180.0042	0.8108

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

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.adt.com.tw

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

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

No modifications were made to the EUT by the lab during the test.

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