FCC TEST REPORT (15.407)

REPORT NO.:	RF120323E02-1
MODEL NO.:	G2F
FCC ID:	RRK-G2F
RECEIVED:	Mar. 21, 2012
TESTED:	Mar. 21 to Apr. 05, 2012
ISSUED:	Apr. 23, 2012
APPLICANT:	Alpha Networks Inc.
ADDRESS:	No.8 Li-shing 7th Rd., Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120323E02-1	Original release	Apr. 23, 2012

1. CERTIFICATION

PRODUCT:	MY NET N900 CENTRAL
BRAND NAME:	WD
MODEL NO.:	G2F
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Alpha Networks Inc.
TESTED:	Mar. 21 to Apr. 05, 2012
STANDARDS:	**FCC Part 15, Subpart E (Section 15.407)** ANSI C63.10-2009

The above equipment (Model: G2F) 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:** *Apr. 23, 2012*
(Lori Chung, Specialist)

APPROVED BY : _____ , **DATE:** *Apr. 23, 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 -8.63dB at 0.40000MHz
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 MHF not a standard connector.

NOTE:

1. The EUT was operating in 2400 ~ 2483.5MHz, 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 2400 ~ 2483.5MHz 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	MY NET N900 CENTRAL
MODEL NO.	G2F
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: up to 450Mbps
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 15.407** 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: 13.958mW 802.11n (20MHz): 31.073mW 802.11n (40MHz): 49.286mW **For 15.247 (2.4GHz)** 802.11b: 347.860mW 802.11g: 383.543mW 802.11n (20MHz): 521.340mW 802.11n (40MHz): 450.782mW **For 15.247 (5GHz)** 802.11a: 266.788mW 802.11n (20MHz): 718.798mW 802.11n (40MHz): 700.834mW
ANTENNA TYPE	Please see note
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1

NOTE:

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

For 2.4GHz									
Transmitter Circuit	Brand	Model	Gain (dBi) (Exclude cable loss)	Cable Loss (dB)	Net Gain (dBi) (Include cable loss)	Cable Length (mm)	Antenna Type	Freq. range (MHz to MHz)	Connecter Type
Chain (0)	WHA-YU	C037-511173-A	2.9	0.11	2.79	15	PCB	2400 to 2500	MHF
Chain (1)	WHA-YU	C037-511159-A	3.5	0.13	3.37	40			
Chain (2)	WHA-YU	C037-511160-A	3.3	0.93	2.37	320			
For 5GHz									
Transmitter Circuit	Brand	Model	Gain (dBi) (Exclude cable loss)	Cable Loss (dB)	Net Gain (dBi) (Include cable loss)	Cable Length (mm)	Antenna Type	Freq. range (MHz to MHz)	Connecter Type
Chain (0)	WHA-YU	C037-511161-A	5.2	0.5	4.7	140	PCB	4900 to 5850	MHF
Chain (1)	WHA-YU	C037-511162-A	5.3	0.55	4.75	155			
Chain (2)	WHA-YU	C037-511163-A	4.6	0.8	3.8	225			

2. The EUT must be supplied with a power adapter and following two different models could be chosen as following table:

No	Brand	Model No.	Spec.
1	APD	WA-36A12U	Input: 100-240V, 50-60Hz, 0.9A Output: 12V, 3A DC output cable (unshielded, with one core, 1.8m)
2	APD	WA-36A12	Input: 100-240V, 50-60Hz, 0.9A Output: 12V, 3A DC output cable (unshielded, with one core, 1.8m)
1. The adapter 2 is as same as Adapter 1; except for plug shape is different. 2. From the above adapters, adapter 1 was selected for testing.			

3. The EUT has one internal HDD and following different models could be chosen as following table:

HDD	Brand	Model No.	Difference
1	WD	WD10JPVT	1TB / 5400 RPM / SATA 3.0 GB/s
2	WD	WD20NPVT	2TB / 5200 RPM / SATA 3.0 GB/s
From the above HDD, HDD 2 was selected for testing.			

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

MODULATION MODE	TX/RX FUNCTION
802.11b	3Tx/3Rx
802.11g	3Tx/3Rx
802.11a	3Tx/3Rx
802.11n (20MHz)	3Tx/3Rx
802.11n (40MHz)	3Tx/3Rx

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

6. The EUT is 3 * 3 spatial MIMO (3Tx & 3Rx) without beam forming function.

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

8. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 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	
-	√	√	√	√	√	-

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

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 (40MHz)	38 to 46	38	OFDM	BPSK	13.5

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 (40MHz)	38 to 46	38	OFDM	BPSK	13.5

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	Kyle Huang
RE<1G	22deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
RE≥1G	25deg. C, 74%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang
OB	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang

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 is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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.

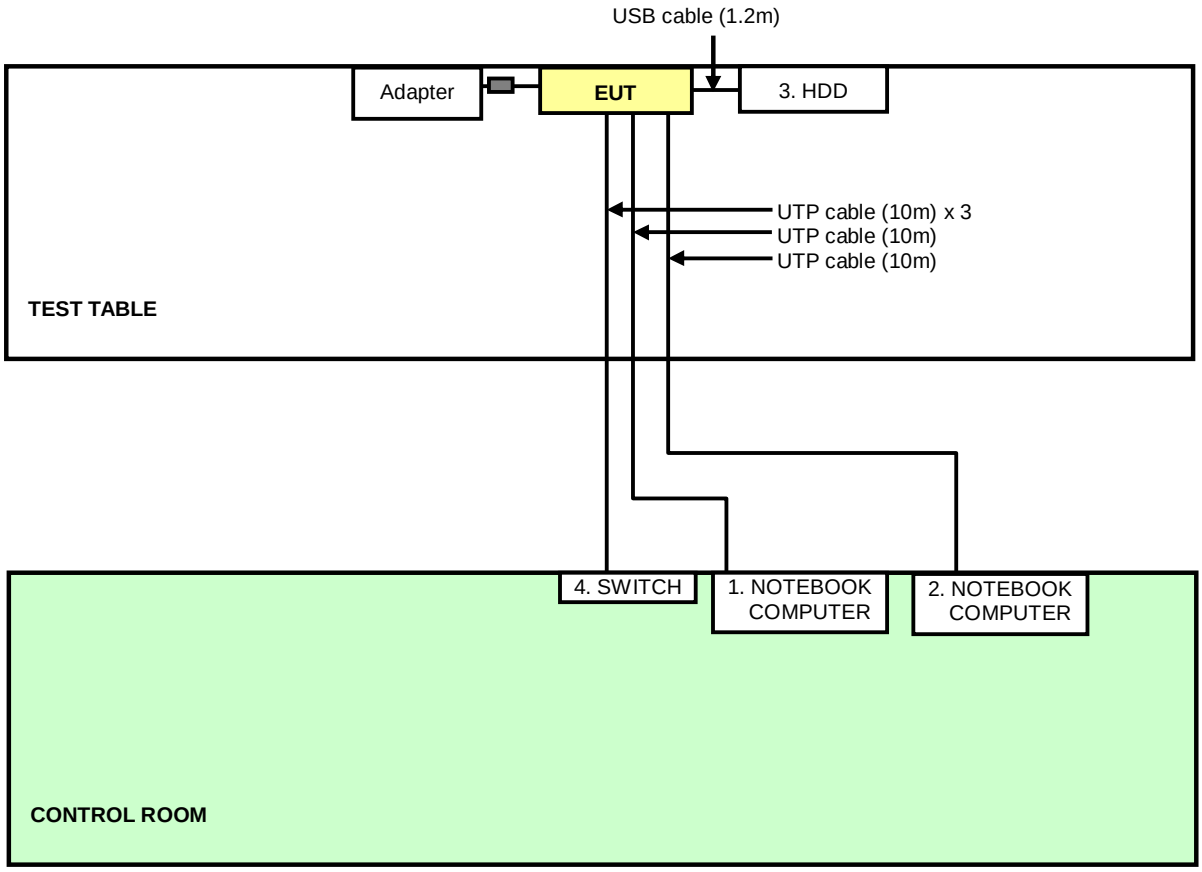
For Conducted test					
NO.	**PRODUCT**	**BRAND**	**MODEL NO.**	**SERIAL NO.**	**FCC ID**
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP27L	7YLB32S	FCC DoC
3	HDD	WD	WDBACW0020HBK-SESN	WMAZA6684355	FCC DoC
4	SWITCH	Alpha	NA	NA	NA
For Other test items					
NO.	**PRODUCT**	**BRAND**	**MODEL NO.**	**SERIAL NO.**	**FCC ID**
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
4	HDD	WD	WDBAAE5000ASL-PESN	WX51A6172904	FCC DoC

For Conducted test	
NO.	**SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS**
1	UTP Cable (10m)
2	UTP Cable (10m)
3	USB cable (1.2m)
4	UTP Cable (10m)
For Other test items	
NO.	**SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS**
1	UTP cable (10m)
2	UTP cable (10m)
3	UTP cable (10m)
4	USB cable (0.5m)

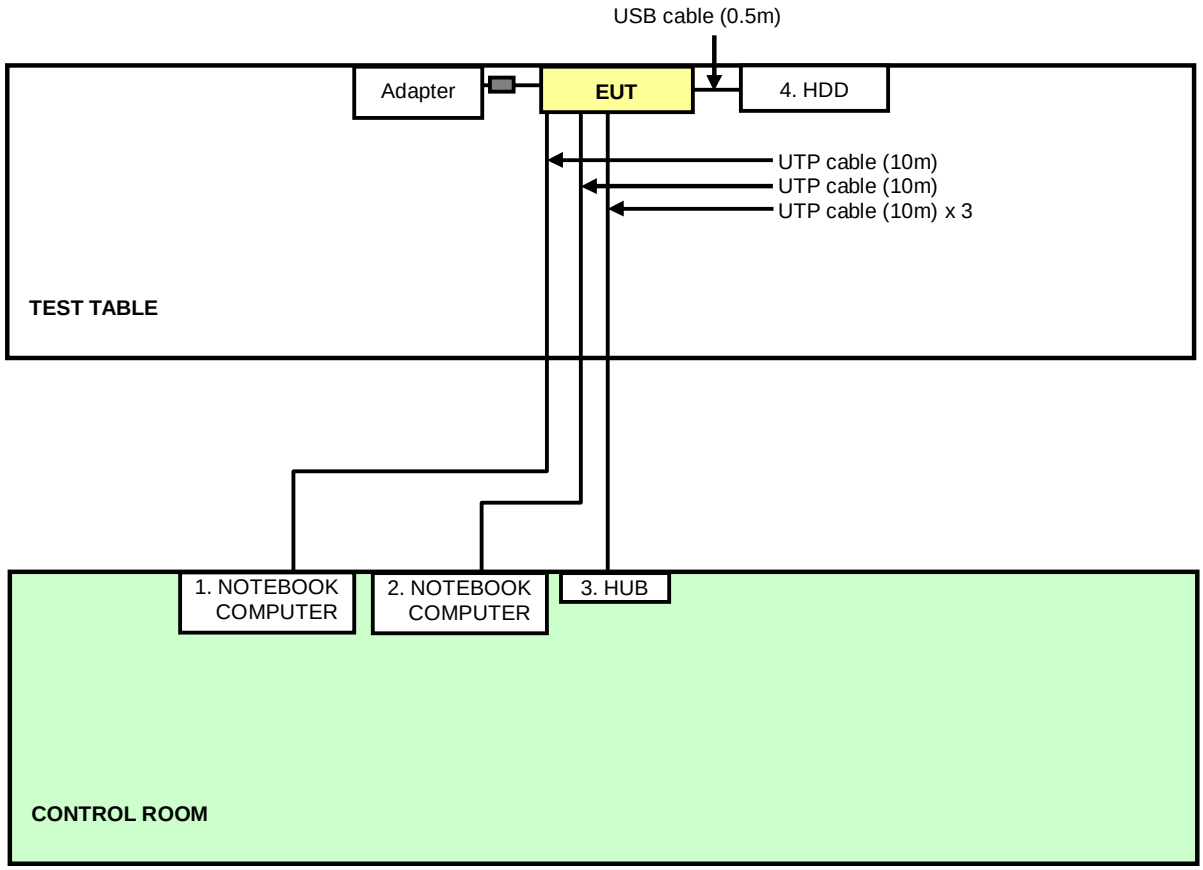
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted test:



For Other test items:



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5 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. 29, 2012

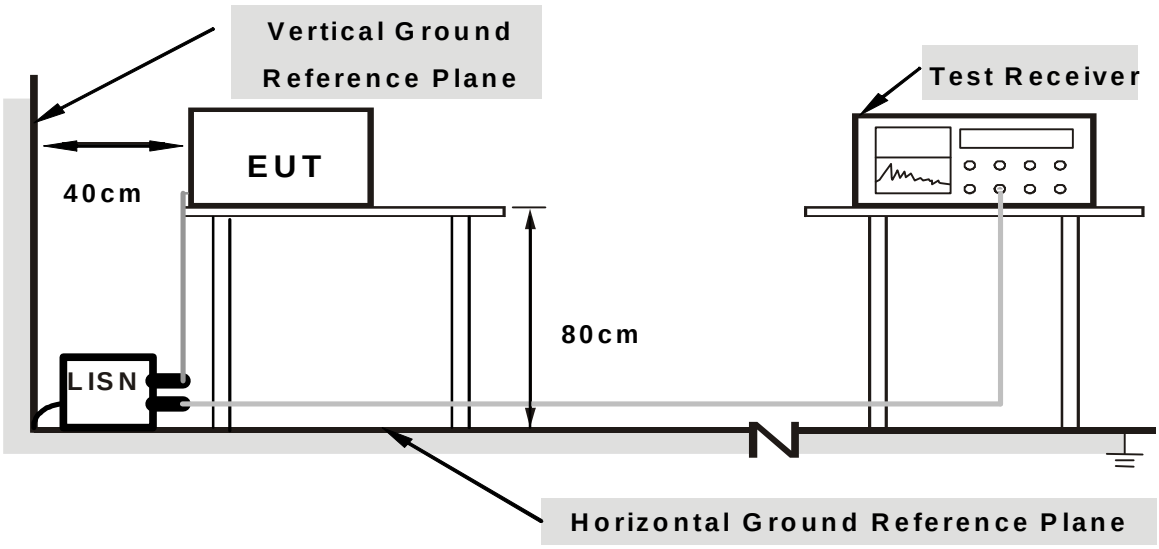
4.1.3 TEST PROCEDURES

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 “artgui.exe” to enable EUT under transmission/receiving condition continuously via one UTP cable transmission.

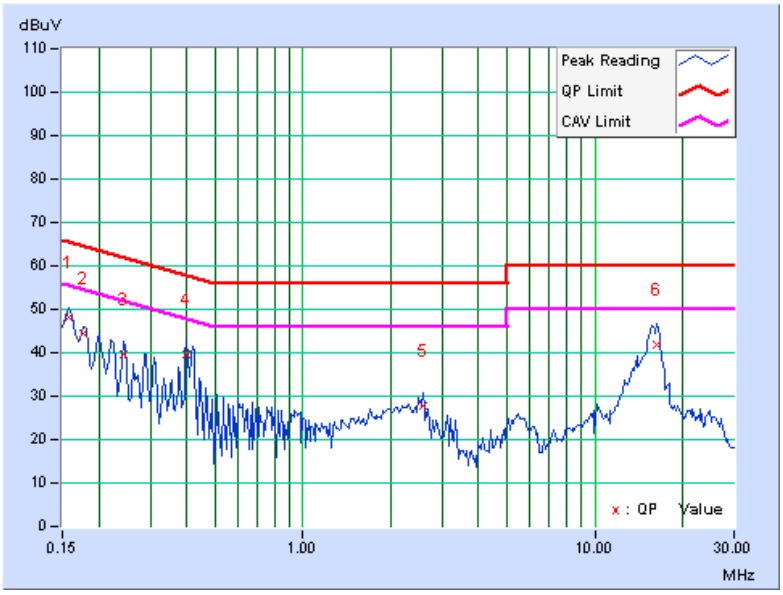
4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.06	48.19	40.29	48.25	40.35	65.58	55.58	-17.33	-15.23
2	0.17734	0.06	44.42	35.62	44.48	35.68	64.61	54.61	-20.13	-18.93
3	0.24375	0.06	39.59	34.66	39.65	34.72	61.97	51.97	-22.31	-17.24
4	**0.40000**	**0.08**	**39.67**	**39.14**	**39.75**	**39.22**	**57.85**	**47.85**	**-18.10**	**-8.63**
5	2.57422	0.25	27.64	21.65	27.89	21.90	56.00	46.00	-28.11	-24.10
6	16.34766	0.85	41.00	34.89	41.85	35.74	60.00	50.00	-18.15	-14.26

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.

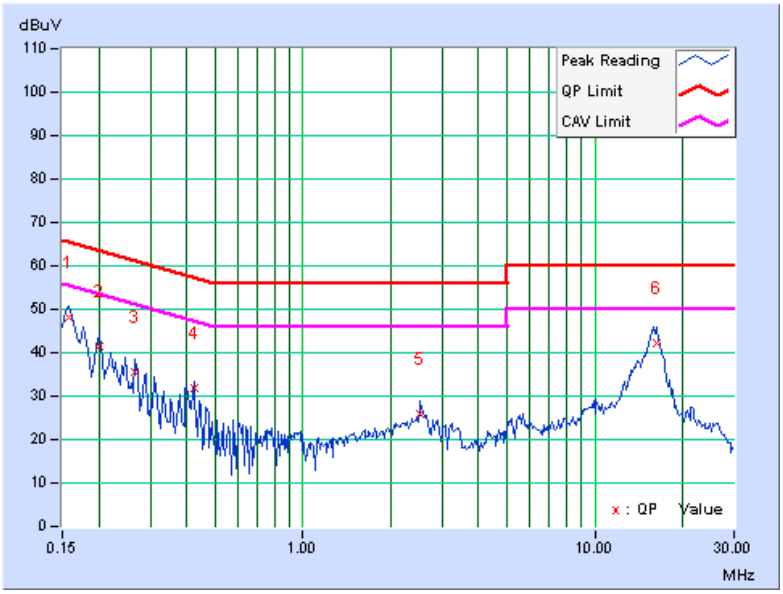


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

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	48.07	39.92	48.14	39.99	65.58	55.58	-17.44	-15.59
2	0.20078	0.08	41.30	33.20	41.38	33.28	63.58	53.58	-22.20	-20.30
3	0.26719	0.08	35.34	28.27	35.42	28.35	61.20	51.20	-25.78	-22.85
4	0.42344	0.09	31.91	28.52	32.00	28.61	57.38	47.38	-25.38	-18.77
5	2.52734	0.25	25.76	19.20	26.01	19.45	56.00	46.00	-29.99	-26.55
6	16.27344	0.84	41.34	34.71	42.18	35.55	60.00	50.00	-17.82	-14.45

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: Mar. 21 to Apr. 04, 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.

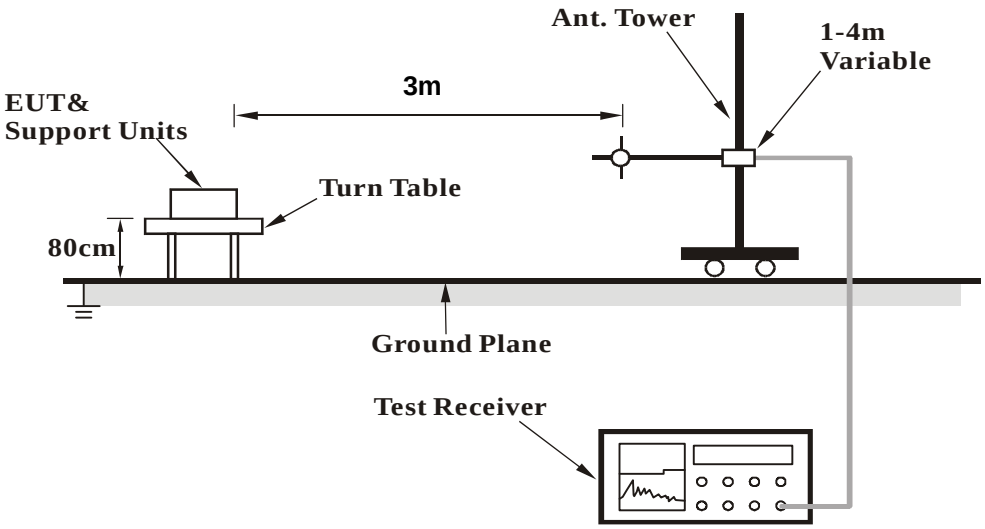
NOTE:

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

802.11n (40MHz)

CHANNEL	TX Channel 38	**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	57.00	30.1 QP	40.0	-9.9	1.75 H	166	16.23	13.87
2	95.20	28.9 QP	43.5	-14.6	1.75 H	165	19.85	9.05
3	250.10	36.8 QP	46.0	-9.2	1.25 H	72	23.45	13.35
4	358.00	37.2 QP	46.0	-8.8	1.00 H	195	20.40	16.84
5	375.50	34.2 QP	46.0	-11.8	1.00 H	334	16.91	17.29
6	642.00	33.5 QP	46.0	-12.5	1.25 H	310	10.74	22.76
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	84.00	30.4 QP	40.0	-9.6	1.00 V	135	21.04	9.39
2	250.03	30.9 QP	46.0	-15.1	1.75 V	111	17.54	13.35
3	500.20	31.9 QP	46.0	-14.1	1.25 V	124	11.56	20.31
4	555.10	30.9 QP	46.0	-15.1	1.75 V	345	9.31	21.59
5	687.80	33.8 QP	46.0	-12.2	1.50 V	345	10.81	22.99
6	900.10	33.7 QP	46.0	-12.4	1.00 V	245	6.29	27.36

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	57.4 PK	74.0	-16.6	1.00 H	261	16.85	40.55
2	5150.00	46.2 AV	54.0	-7.8	1.00 H	261	5.65	40.55
3	*5180.00	101.1 PK			1.16 H	253	60.42	40.68
4	*5180.00	91.0 AV			1.16 H	253	50.32	40.68
5	#10360.00	56.5 PK	68.3	-11.8	1.22 H	53	8.68	47.82
6	15540.00	64.9 PK	74.0	-9.1	1.39 H	123	11.63	53.27
7	15540.00	50.1 AV	54.0	-3.9	1.39 H	123	-3.17	53.27
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	66.2 PK	74.0	-7.8	1.00 V	61	25.65	40.55
2	5150.00	52.0 AV	54.0	-2.0	1.00 V	61	11.45	40.55
3	*5180.00	112.3 PK			1.00 V	249	71.62	40.68
4	*5180.00	101.1 AV			1.00 V	249	60.42	40.68
5	#10360.00	57.0 PK	68.3	-11.3	1.38 V	158	9.18	47.82
6	15540.00	65.5 PK	74.0	-8.5	1.36 V	137	12.23	53.27
7	15540.00	52.7 AV	54.0	-1.3	1.36 V	137	-0.57	53.27

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	100.3 PK			1.16 H	261	59.53	40.77
2	*5200.00	90.4 AV			1.16 H	261	49.63	40.77
3	#10400.00	56.6 PK	68.3	-11.7	1.19 H	58	9.24	47.36
4	15600.00	64.7 PK	74.0	-9.3	1.34 H	121	11.71	52.99
5	15600.00	49.8 AV	54.0	-4.2	1.34 H	121	-3.19	52.99
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	111.8 PK			1.00 V	247	71.03	40.77
2	*5200.00	100.6 AV			1.00 V	247	59.83	40.77
3	#10400.00	57.5 PK	68.3	-10.8	1.16 V	186	10.14	47.36
4	15600.00	62.8 PK	74.0	-11.2	1.32 V	143	9.81	52.99
5	15600.00	50.3 AV	54.0	-3.7	1.32 V	143	-2.69	52.99

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	100.6 PK			1.13 H	251	59.71	40.89
2	*5240.00	90.5 AV			1.13 H	251	49.61	40.89
3	#10480.00	56.8 PK	68.3	-11.5	1.17 H	53	9.15	47.65
4	15720.00	64.8 PK	74.0	-9.2	1.32 H	112	12.21	52.59
5	15720.00	50.0 AV	54.0	-4.0	1.32 H	112	-2.59	52.59
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	111.9 PK			1.00 V	246	71.01	40.89
2	*5240.00	100.8 AV			1.00 V	246	59.91	40.89
3	#10480.00	57.0 PK	68.3	-11.3	1.19 V	172	9.35	47.65
4	15720.00	63.0 PK	74.0	-11.0	1.34 V	138	10.41	52.59
5	15720.00	50.7 AV	54.0	-3.3	1.34 V	138	-1.89	52.59

REMARKS:

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

802.11n (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	61.1 PK	74.0	-12.9	1.00 H	262	20.55	40.55
2	5150.00	49.6 AV	54.0	-4.4	1.00 H	262	9.05	40.55
3	*5180.00	98.8 PK			1.19 H	255	58.12	40.68
4	*5180.00	89.1 AV			1.19 H	255	48.42	40.68
5	#10360.00	56.9 PK	68.3	-11.4	1.17 H	51	9.08	47.82
6	15540.00	63.8 PK	74.0	-10.2	1.34 H	121	10.53	53.27
7	15540.00	49.9 AV	54.0	-4.1	1.34 H	121	-3.37	53.27
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.0 PK	74.0	-8.0	1.00 V	114	25.45	40.55
2	5150.00	53.0 AV	54.0	-1.0	1.00 V	114	12.45	40.55
3	*5180.00	111.0 PK			1.00 V	241	70.32	40.68
4	*5180.00	99.6 AV			1.00 V	241	58.92	40.68
5	#10360.00	56.1 PK	68.3	-12.2	1.15 V	191	8.28	47.82
6	15540.00	61.7 PK	74.0	-12.3	1.35 V	152	8.43	53.27
7	15540.00	49.9 AV	54.0	-4.1	1.35 V	152	-3.37	53.27

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	99.8 PK			1.13 H	241	59.03	40.77
2	*5200.00	90.3 AV			1.13 H	241	49.53	40.77
3	#10400.00	57.1 PK	68.3	-11.2	1.16 H	36	9.74	47.36
4	15600.00	64.0 PK	74.0	-10.0	1.33 H	120	11.01	52.99
5	15600.00	50.3 AV	54.0	-3.7	1.33 H	120	-2.69	52.99
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	110.1 PK			1.00 V	112	69.33	40.77
2	*5200.00	99.4 AV			1.00 V	112	58.63	40.77
3	#10400.00	57.4 PK	68.3	-10.9	1.25 V	181	10.04	47.36
4	15600.00	62.8 PK	74.0	-11.2	1.37 V	143	9.81	52.99
5	15600.00	50.5 AV	54.0	-3.5	1.37 V	143	-2.49	52.99

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	99.9 PK			1.08 H	248	59.01	40.89
2	*5240.00	90.1 AV			1.08 H	248	49.21	40.89
3	#10480.00	57.1 PK	68.3	-11.2	1.11 H	38	9.45	47.65
4	15720.00	63.5 PK	74.0	-10.5	1.36 H	110	10.91	52.59
5	15720.00	50.0 AV	54.0	-4.0	1.36 H	110	-2.59	52.59
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	109.0 PK			1.00 V	62	68.11	40.89
2	*5240.00	98.4 AV			1.00 V	62	57.51	40.89
3	#10480.00	56.9 PK	68.3	-11.4	1.23 V	188	9.25	47.65
4	15720.00	62.4 PK	74.0	-11.6	1.36 V	140	9.81	52.59
5	15720.00	50.2 AV	54.0	-3.8	1.36 V	140	-2.39	52.59

REMARKS:

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

802.11n (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	61.6 PK	74.0	-12.4	1.00 H	257	21.05	40.55
2	5150.00	49.1 AV	54.0	-4.9	1.00 H	257	8.55	40.55
3	*5190.00	95.4 PK			1.04 H	256	54.67	40.73
4	*5190.00	84.9 AV			1.04 H	256	44.17	40.73
5	#10380.00	56.5 PK	68.3	-11.8	1.10 H	44	8.91	47.59
6	15570.00	63.2 PK	74.0	-10.8	1.38 H	99	10.07	53.13
7	15570.00	49.6 AV	54.0	-4.4	1.38 H	99	-3.53	53.13
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.8 PK	74.0	-5.2	1.00 V	251	28.25	40.55
2	**5150.00**	**53.3 AV**	**54.0**	**-0.7**	**1.00 V**	**251**	**12.75**	**40.55**
3	*5190.00	103.7 PK			1.00 V	62	62.97	40.73
4	*5190.00	92.7 AV			1.00 V	62	51.97	40.73
5	#10380.00	54.3 PK	68.3	-14.0	1.23 V	182	6.71	47.59
6	15570.00	60.5 PK	74.0	-13.5	1.41 V	126	7.37	53.13
7	15570.00	49.5 AV	54.0	-4.5	1.41 V	126	-3.63	53.13

REMARKS:

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

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	61.7 PK	74.0	-12.3	1.00 H	263	21.15	40.55
2	5150.00	49.4 AV	54.0	-4.6	1.00 H	263	8.85	40.55
3	*5230.00	99.8 PK			1.03 H	248	58.94	40.86
4	*5230.00	89.6 AV			1.03 H	248	48.74	40.86
5	#10460.00	56.5 PK	68.3	-11.8	1.04 H	39	8.92	47.58
6	15690.00	62.9 PK	74.0	-11.1	1.33 H	101	10.26	52.64
7	15690.00	49.3 AV	54.0	-4.7	1.33 H	101	-3.34	52.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.3 PK	74.0	-11.7	1.00 V	247	21.75	40.55
2	5150.00	49.2 AV	54.0	-4.8	1.00 V	247	8.65	40.55
3	*5230.00	108.1 PK			1.00 V	250	67.24	40.86
4	*5230.00	96.2 AV			1.00 V	250	55.34	40.86
5	#10460.00	56.2 PK	68.3	-12.1	1.27 V	168	8.62	47.58
6	15690.00	60.6 PK	74.0	-13.4	1.35 V	140	7.96	52.64
7	15690.00	48.7 AV	54.0	-5.3	1.35 V	140	-3.94	52.64

REMARKS:

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

4.3 TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

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

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

4.3.2 TEST INSTRUMENTS

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. 05, 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. 05, 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

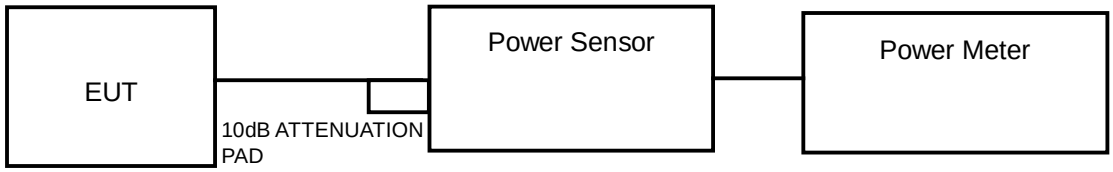
1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement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

4.3.4 DEVIATION FROM TEST STANDARD

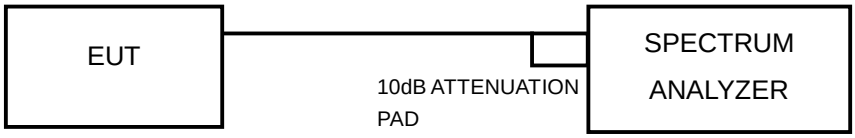
No deviation

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

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	5.80	7.10	6.80	13.717	11.37	13.80	PASS
40	5200	5.90	6.60	6.90	13.359	11.26	13.80	PASS
48	5240	5.80	6.80	7.30	13.958	11.45	13.80	PASS

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^3$ / 3]
Effective Legacy Gain (dBi) = 9.2
The effective legacy gain is 9.2 dBi, 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	CHAIN 2				
36	5180	9.60	10.60	10.20	31.073	14.92	17	PASS
40	5200	9.30	10.20	10.40	29.947	14.76	17	PASS
48	5240	9.40	9.90	10.80	30.505	14.84	17	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
38	5190	11.50	12.40	12.50	49.286	16.93	17	PASS
46	5230	11.20	11.80	12.30	45.301	16.56	17	PASS

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
36	5180	24.84	23.66	24.65	PASS
40	5200	25.06	24.44	23.69	PASS
48	5240	25.13	24.35	23.86	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
36	5180	25.61	25.23	25.18	PASS
40	5200	26.01	24.88	24.77	PASS
48	5240	25.86	25.73	25.13	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
38	5190	54.84	51.73	52.31	PASS
46	5230	55.14	51.66	51.98	PASS

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. 05, 2012

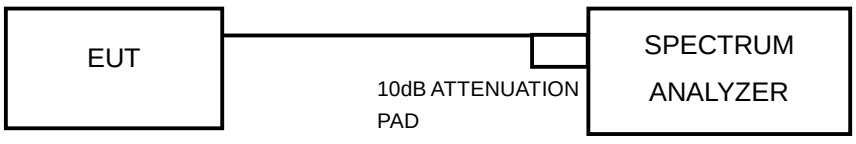
4.4.3 TEST PROCEDURES

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

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
36	5180	-5.47	-5.32	-5.35	-0.80	0.80	PASS
40	5200	-5.76	-5.52	-5.50	-0.91	0.80	PASS
48	5240	-5.86	-5.18	-4.76	-0.56	0.80	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[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^3$ / 3]
Effective Legacy Gain (dBi) = 9.2
The effective legacy gain is 9.2 dBi, 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	CHAIN 2			
36	5180	-2.17	-2.07	-2.10	2.62	4	PASS
40	5200	-2.19	-2.44	-2.00	2.53	4	PASS
48	5240	-2.77	-2.44	-1.80	2.37	4	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.

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
38	5190	-3.49	-2.18	-3.13	1.79	4	PASS
46	5230	-3.39	-2.90	-3.35	1.47	4	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.

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. 05, 2012

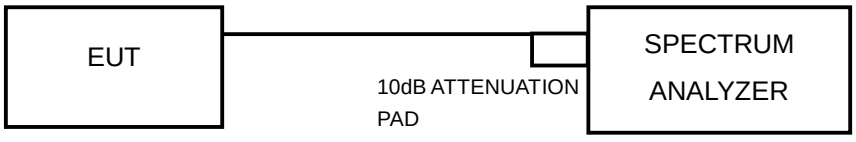
4.5.3 TEST PROCEDURE

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

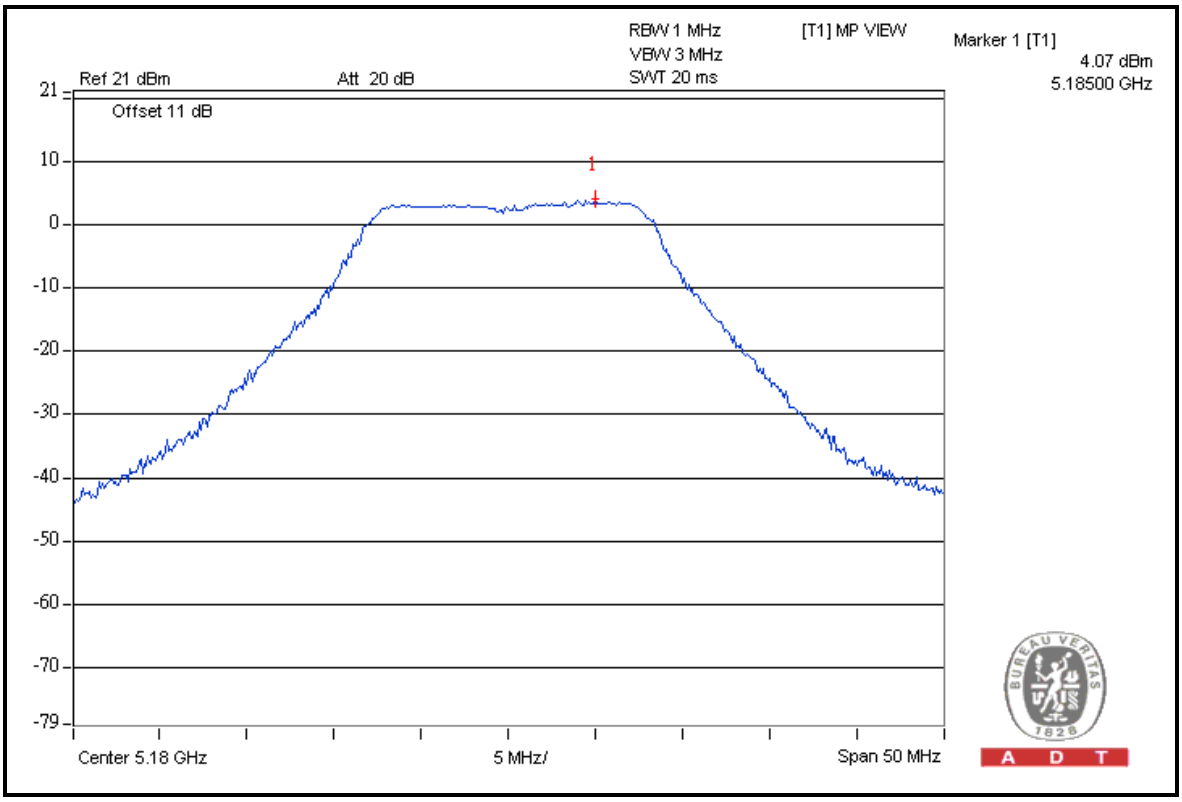
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

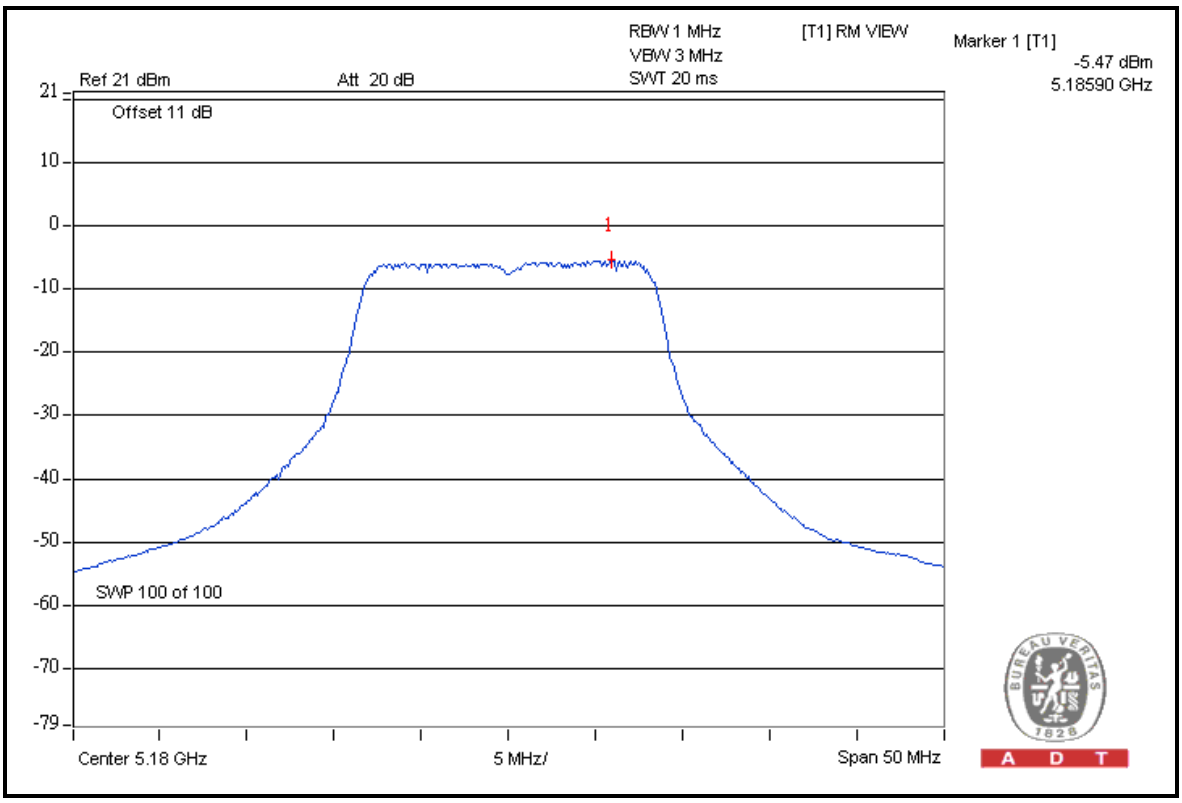
4.5.7 TEST RESULTS

802.11a

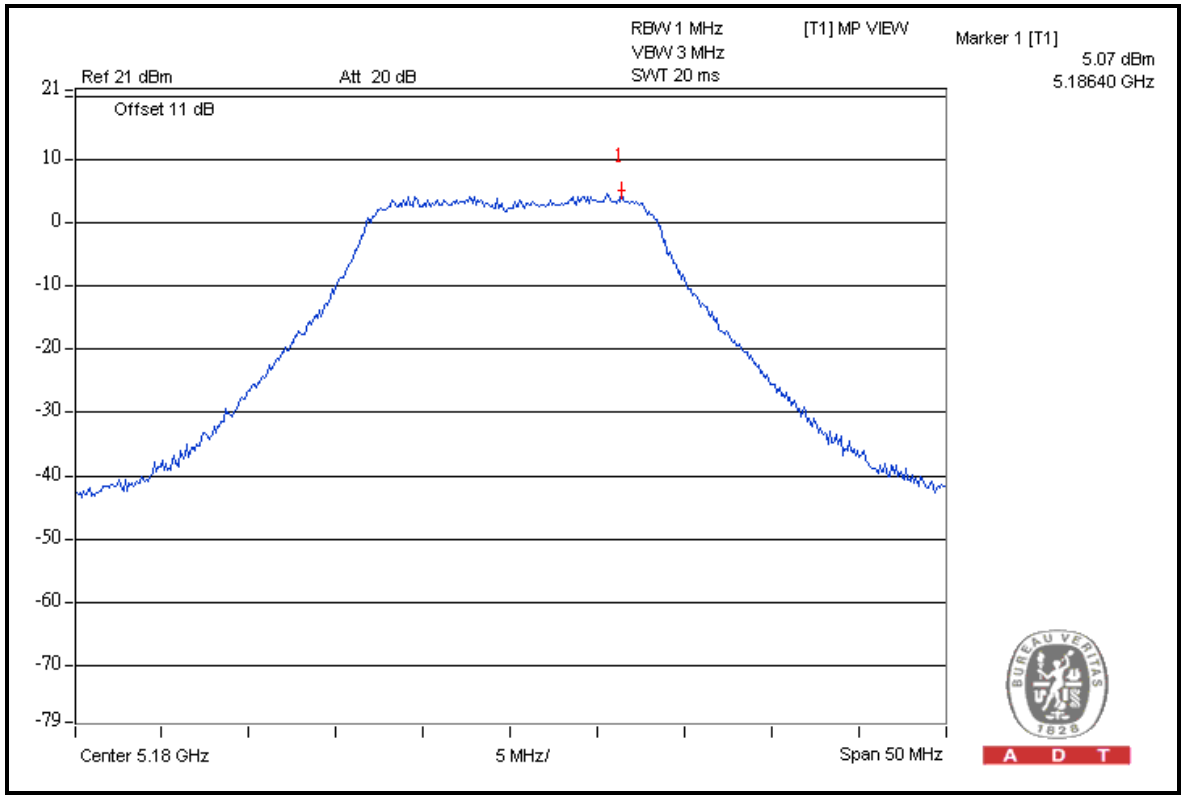
TX chain	CHAN.	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
0	36	5180	4.07	-5.47	9.54	13	PASS
	40	5200	3.87	-5.76	9.63	13	PASS
	48	5240	3.92	-5.86	9.78	13	PASS
1	36	5180	5.07	-5.32	10.39	13	PASS
	40	5200	4.74	-5.52	10.26	13	PASS
	48	5240	4.76	-5.18	9.94	13	PASS
2	36	5180	5.12	-5.35	10.47	13	PASS
	40	5200	5.32	-5.50	10.82	13	PASS
	48	5240	5.69	-4.76	10.45	13	PASS

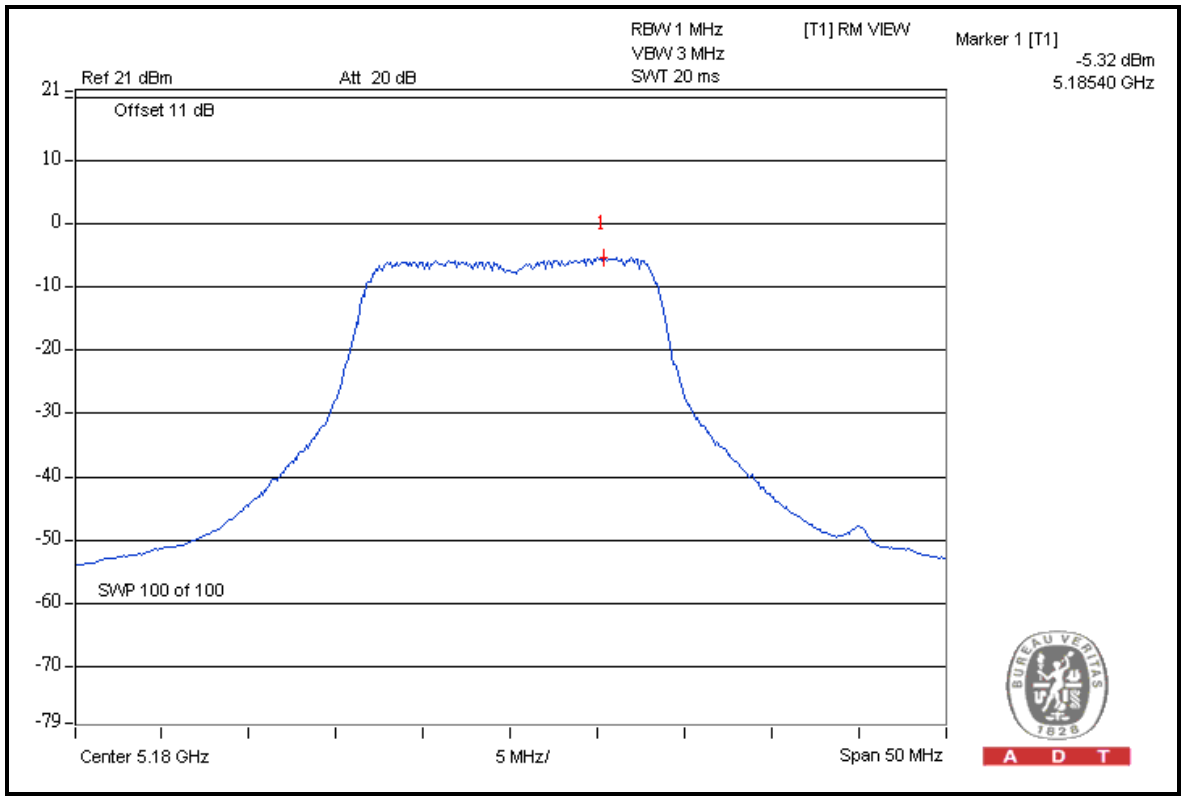
Chain 0: CH 36


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
4.07 dBm
5.18500 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.18 GHz
5 MHz/
Span 50 MHz

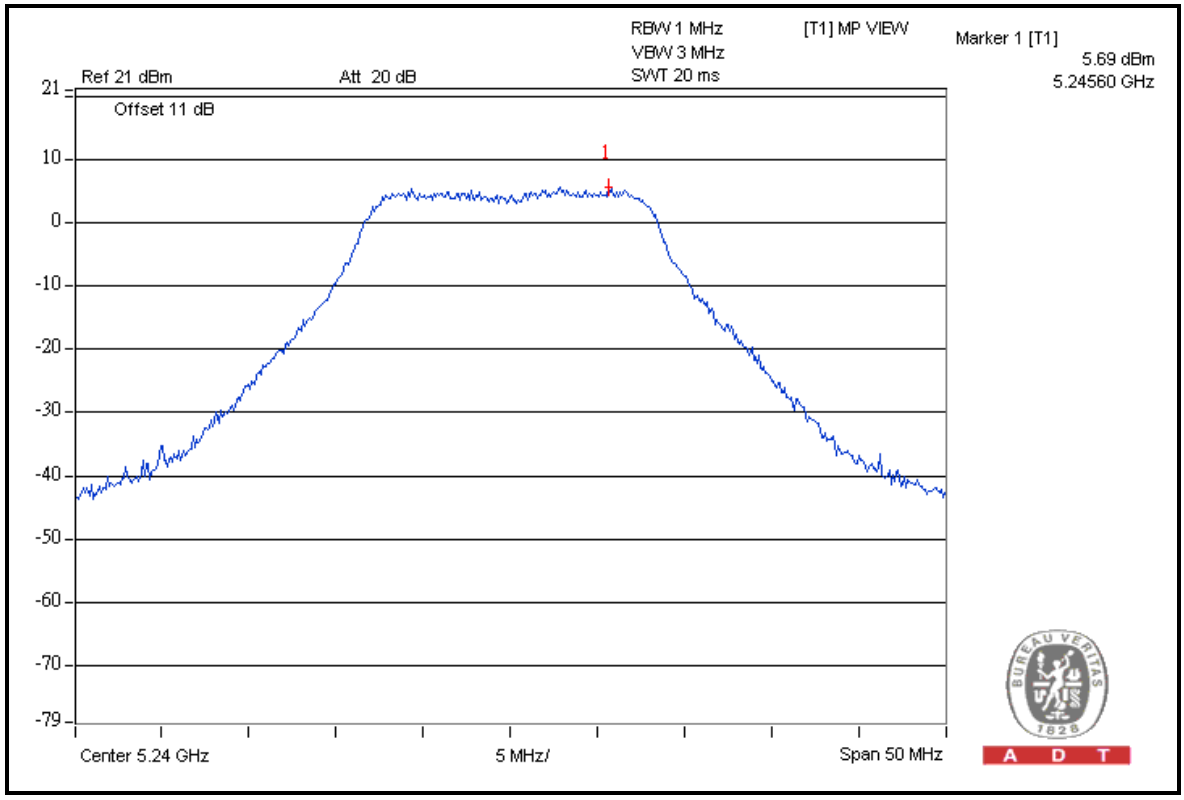

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-5.47 dBm
5.18590 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
SWP 100 of 100
Center 5.18 GHz
5 MHz/
Span 50 MHz

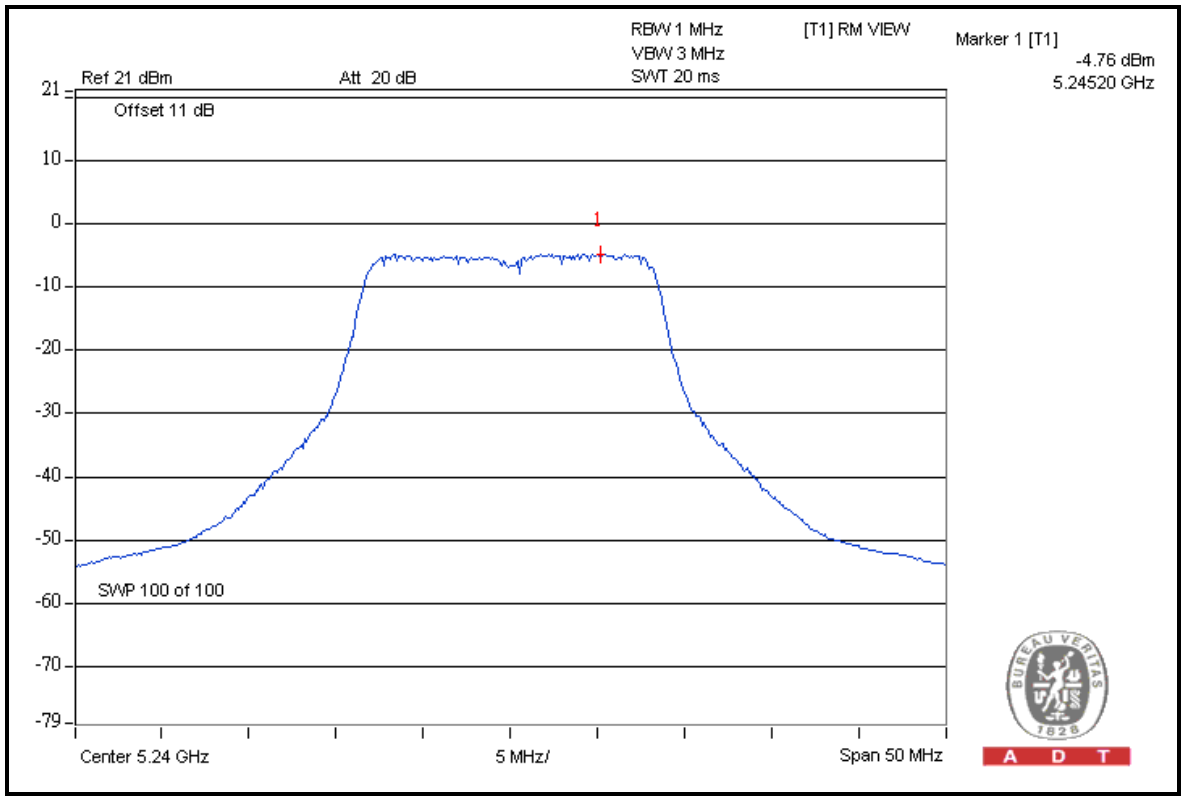
Chain 1: CH 36


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
5.07 dBm
5.18640 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.18 GHz
5 MHz/
Span 50 MHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-5.32 dBm
5.18540 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 5.18 GHz
5 MHz/
Span 50 MHz

Chain 2: CH 48

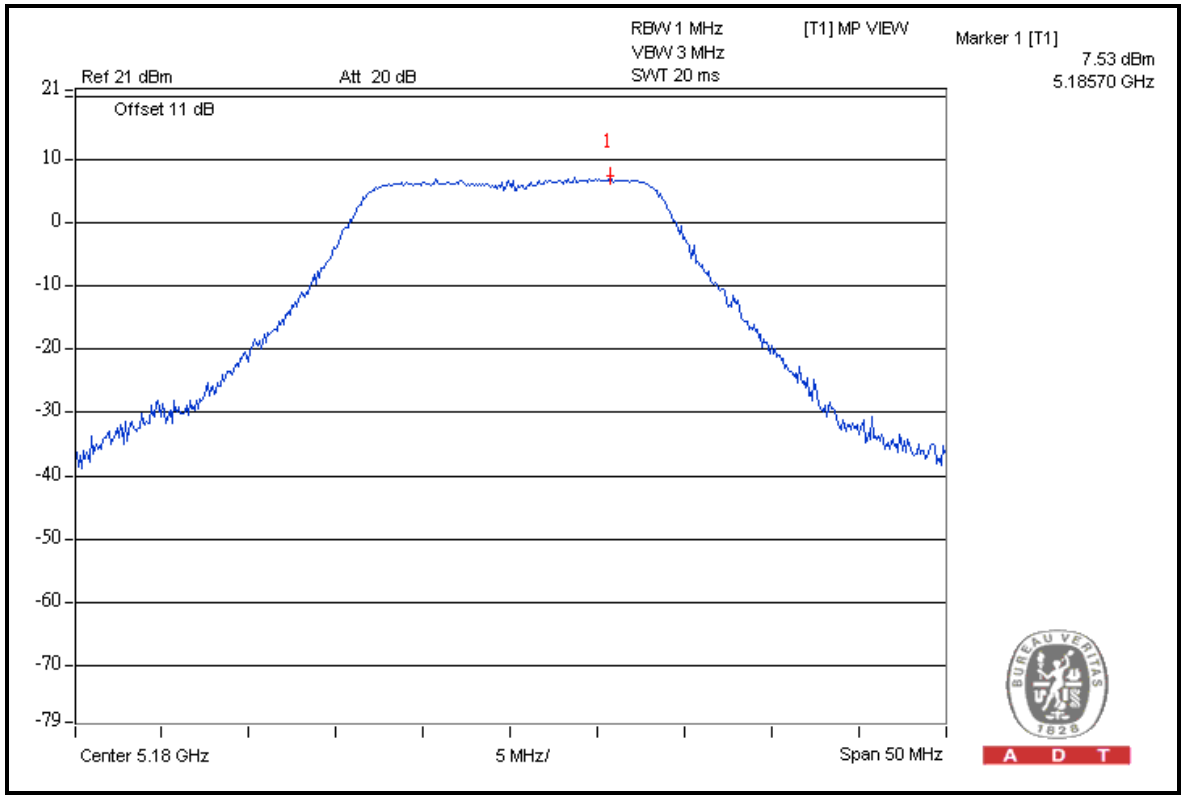

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
5.69 dBm
5.24560 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.24 GHz
5 MHz/
Span 50 MHz

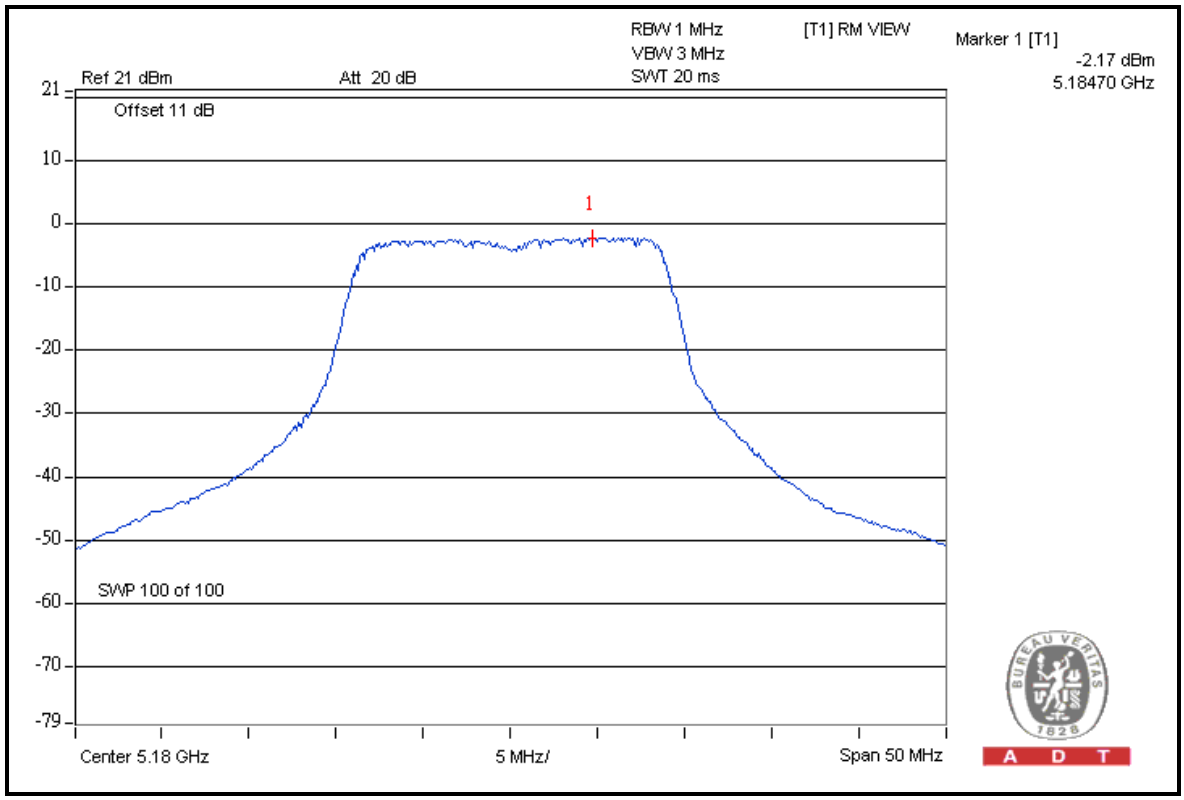

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-4.76 dBm
5.24520 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
SWP 100 of 100
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.24 GHz
5 MHz/
Span 50 MHz

802.11n (20MHz)

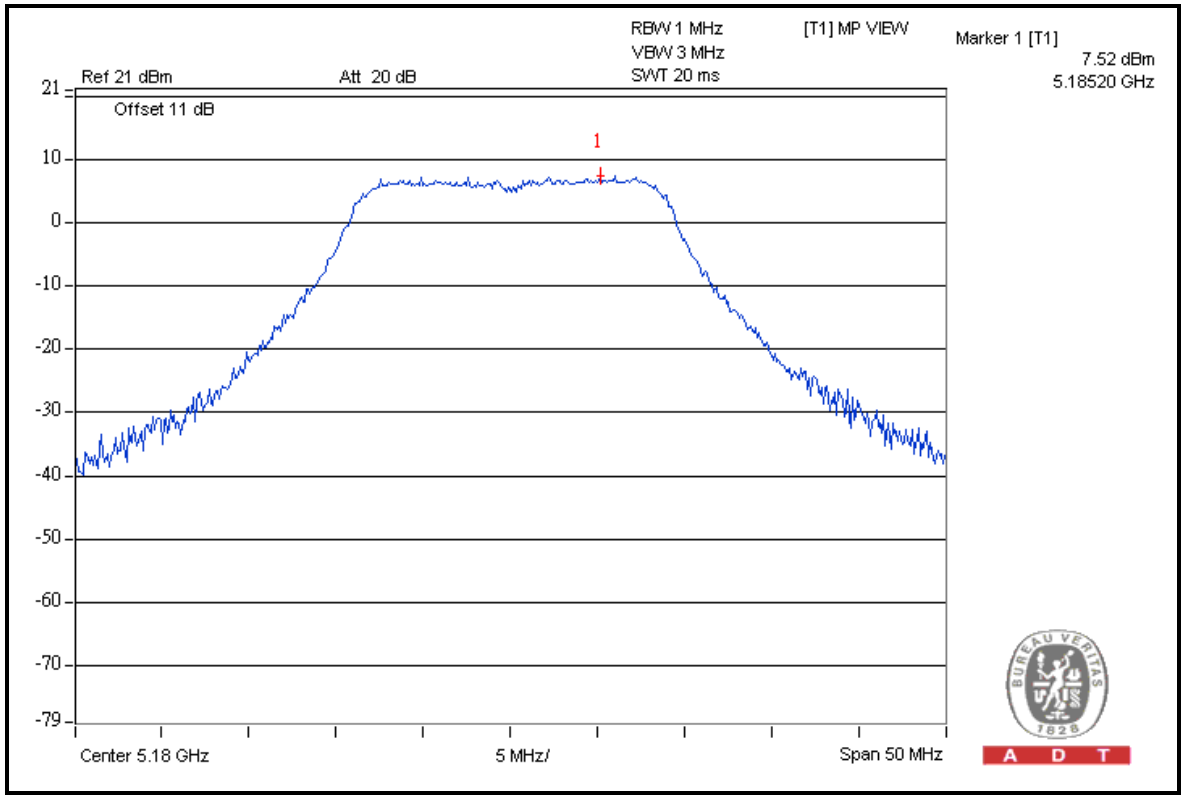
TX chain	CHAN.	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
0	36	5180	7.53	-2.17	9.70	13	PASS
	40	5200	7.09	-2.19	9.28	13	PASS
	48	5240	7.05	-2.77	9.82	13	PASS
1	36	5180	7.52	-2.07	9.59	13	PASS
	40	5200	7.46	-2.44	9.90	13	PASS
	48	5240	7.00	-2.44	9.44	13	PASS
2	36	5180	8.28	-2.10	10.38	13	PASS
	40	5200	8.41	-2.00	10.41	13	PASS
	48	5240	8.75	-1.80	10.55	13	PASS

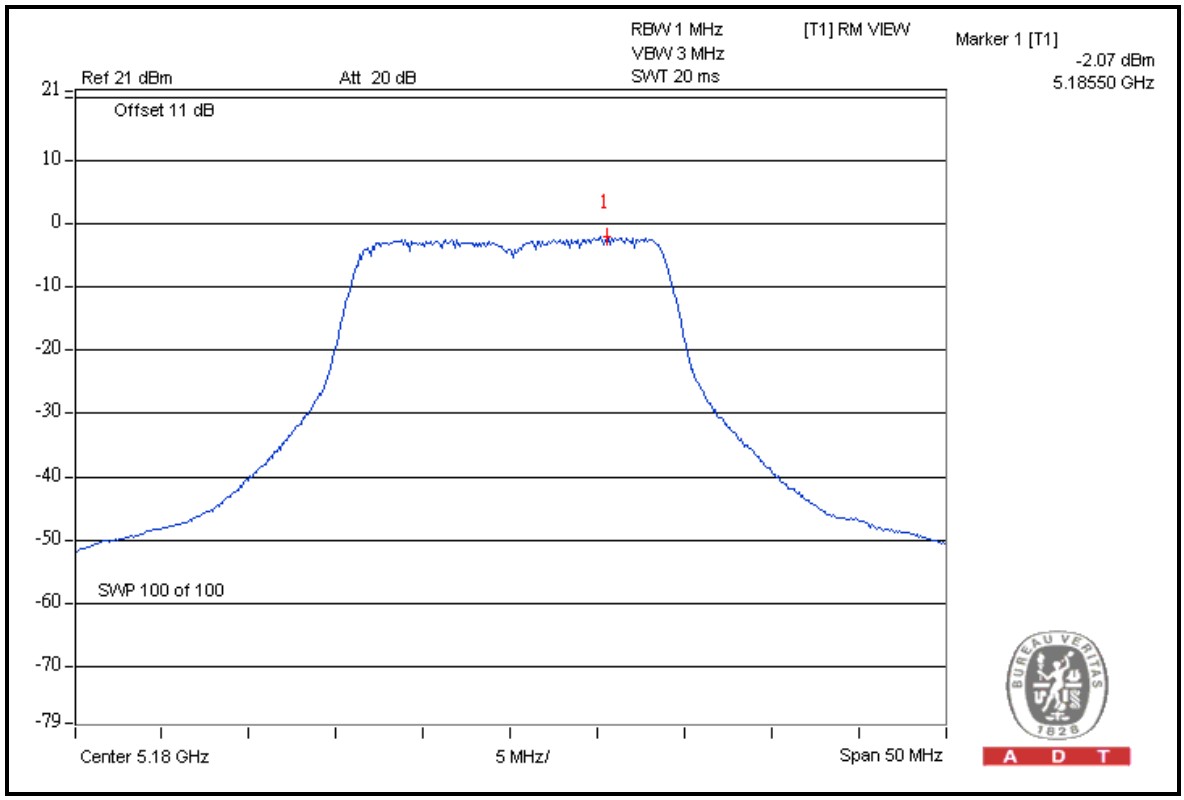
Chain 0: CH 36


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
7.53 dBm
5.18570 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.18 GHz
5 MHz/
Span 50 MHz

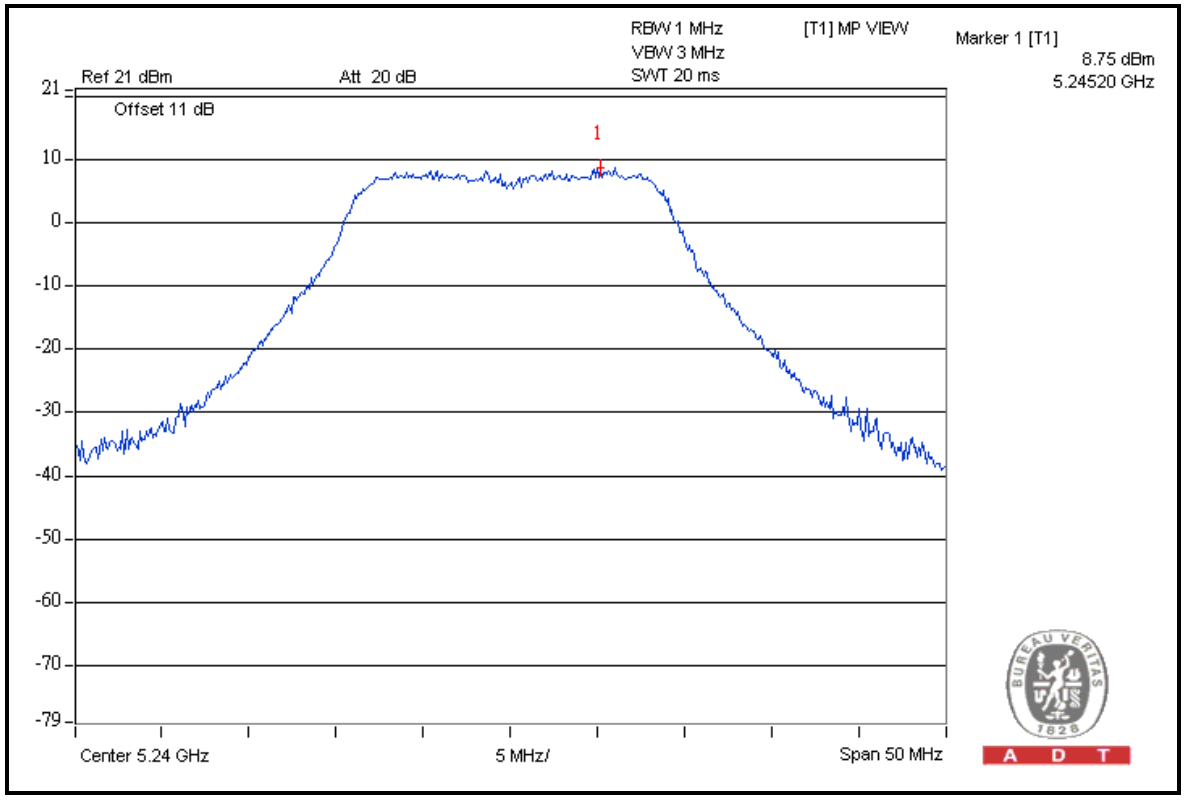

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-2.17 dBm
5.18470 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
SWP 100 of 100
Center 5.18 GHz
5 MHz/
Span 50 MHz

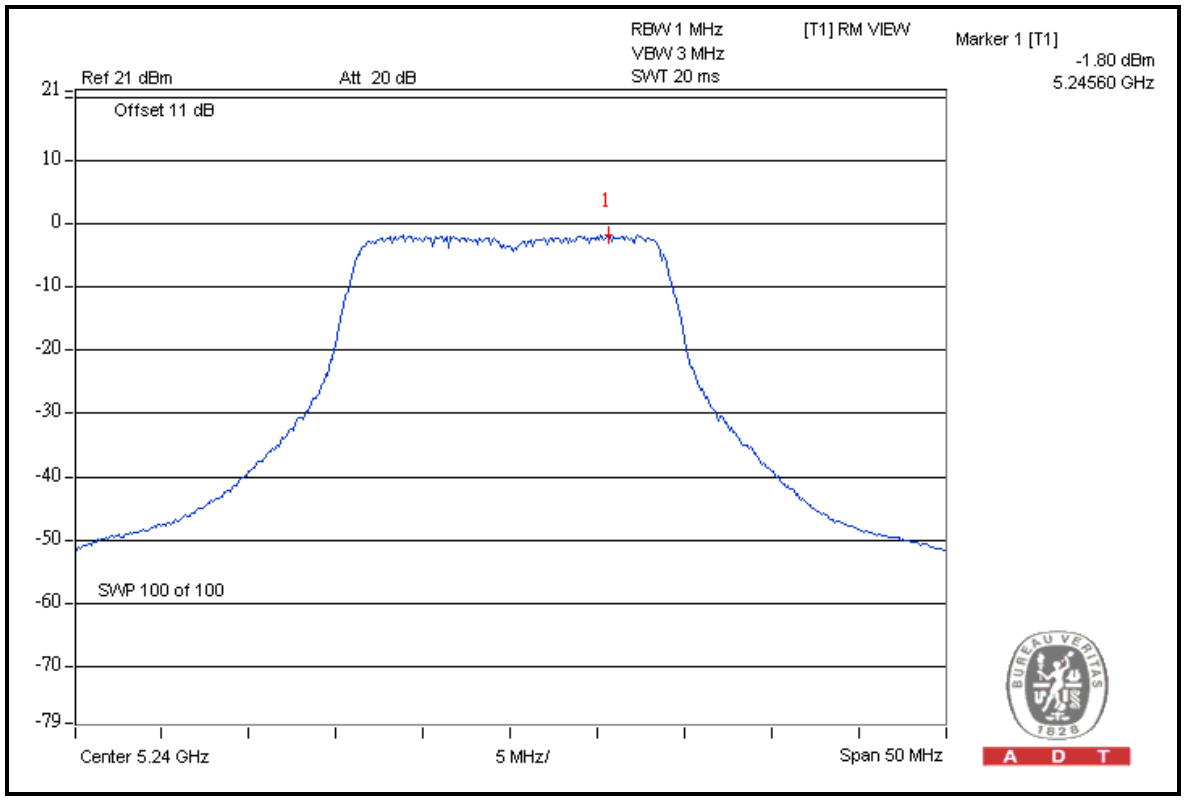
Chain 1: CH 36


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
7.52 dBm
5.18520 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.18 GHz
5 MHz/
Span 50 MHz


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-2.07 dBm
5.18550 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 5.18 GHz
5 MHz/
Span 50 MHz

Chain 2: CH 48

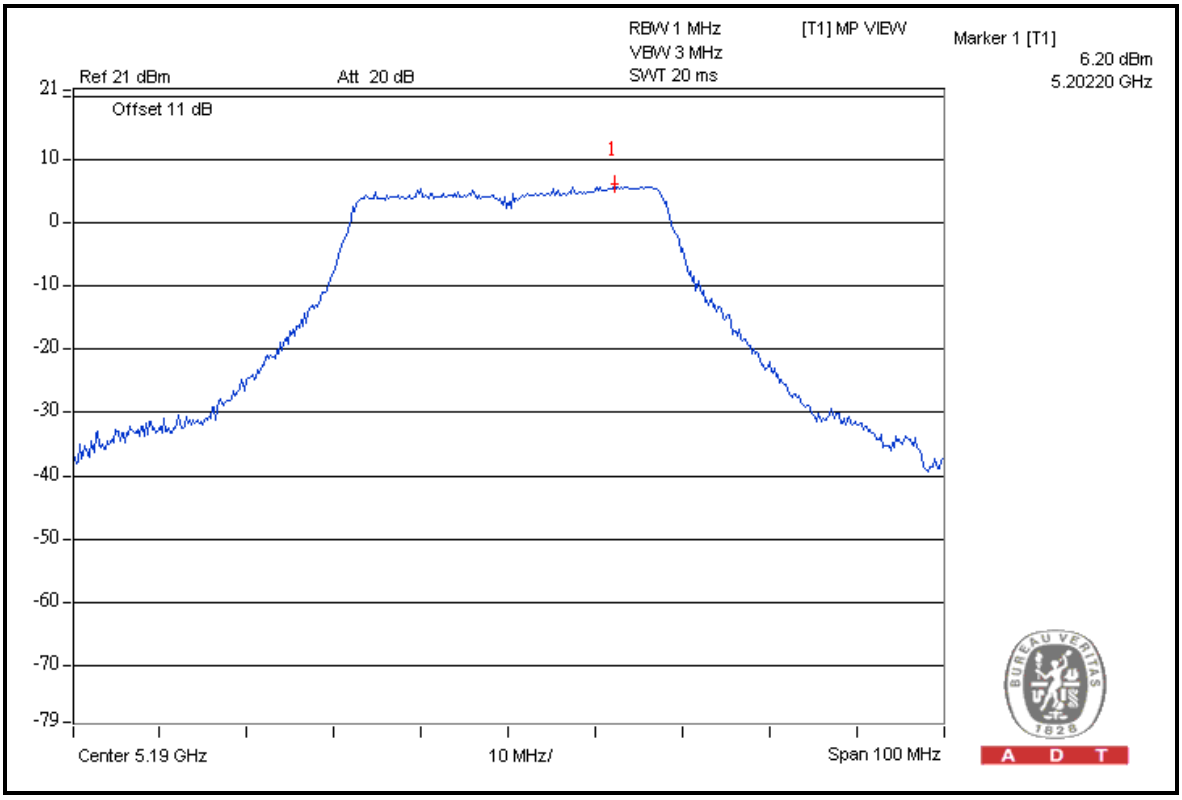

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
8.75 dBm
5.24520 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.24 GHz
5 MHz/
Span 50 MHz

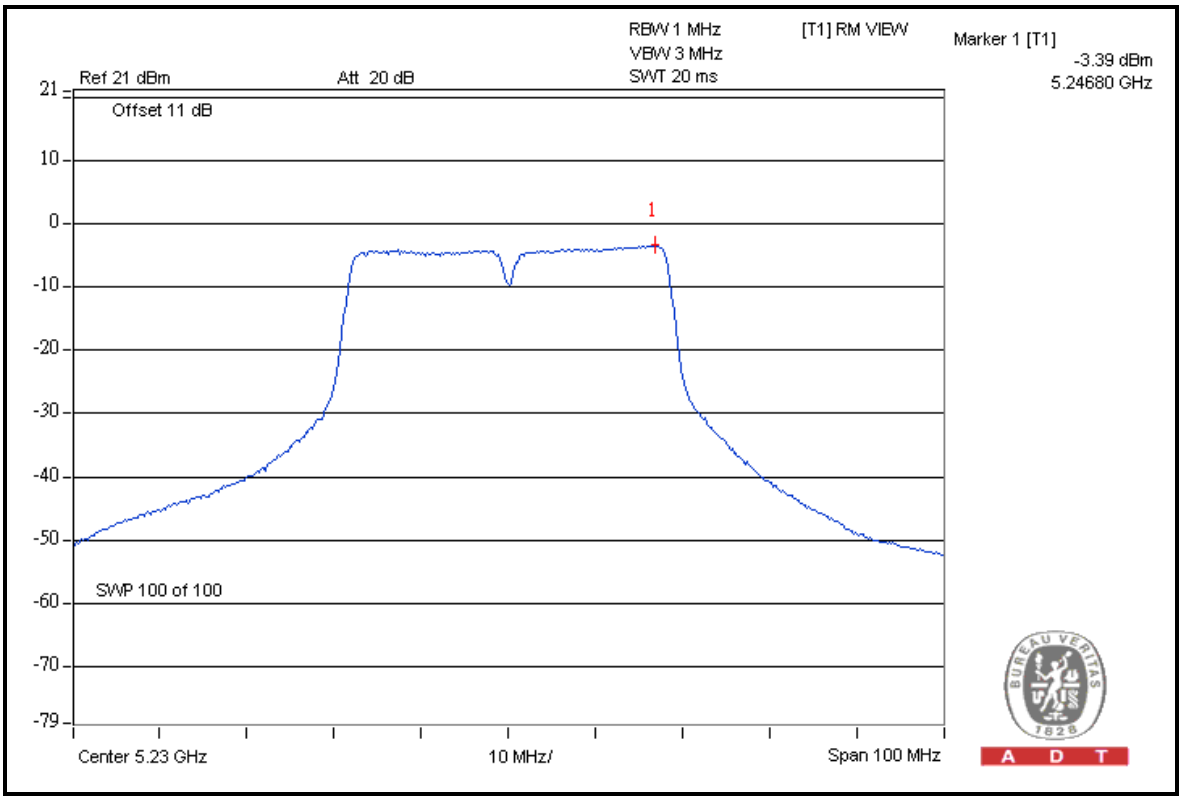

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-1.80 dBm
5.24560 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
SWP 100 of 100
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
Center 5.24 GHz
5 MHz/
Span 50 MHz

802.11n (40MHz)

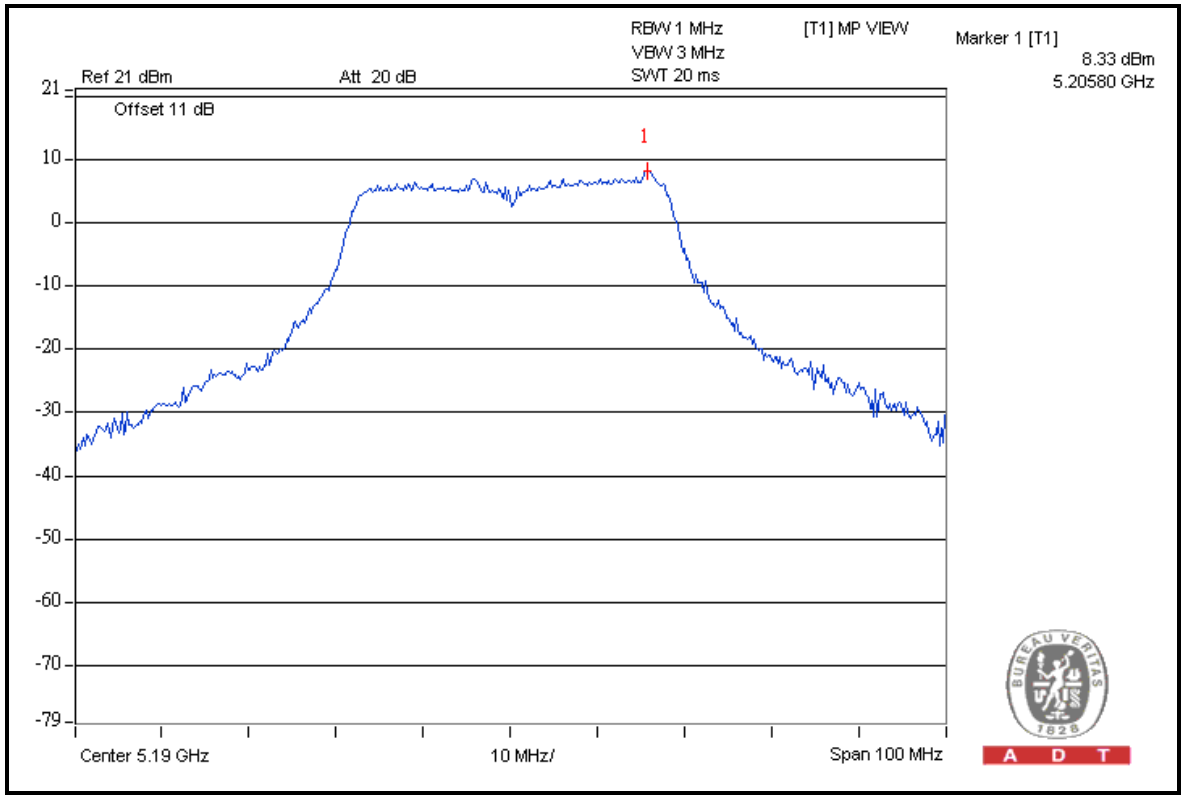
TX chain	CHAN.	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
0	38	5190	6.20	-3.49	9.69	13	PASS
	46	5230	5.70	-3.39	9.09	13	PASS
1	38	5190	8.33	-2.18	10.51	13	PASS
	46	5230	7.59	-2.90	10.49	13	PASS
2	38	5190	7.42	-3.13	10.55	13	PASS
	46	5230	7.23	-3.35	10.58	13	PASS

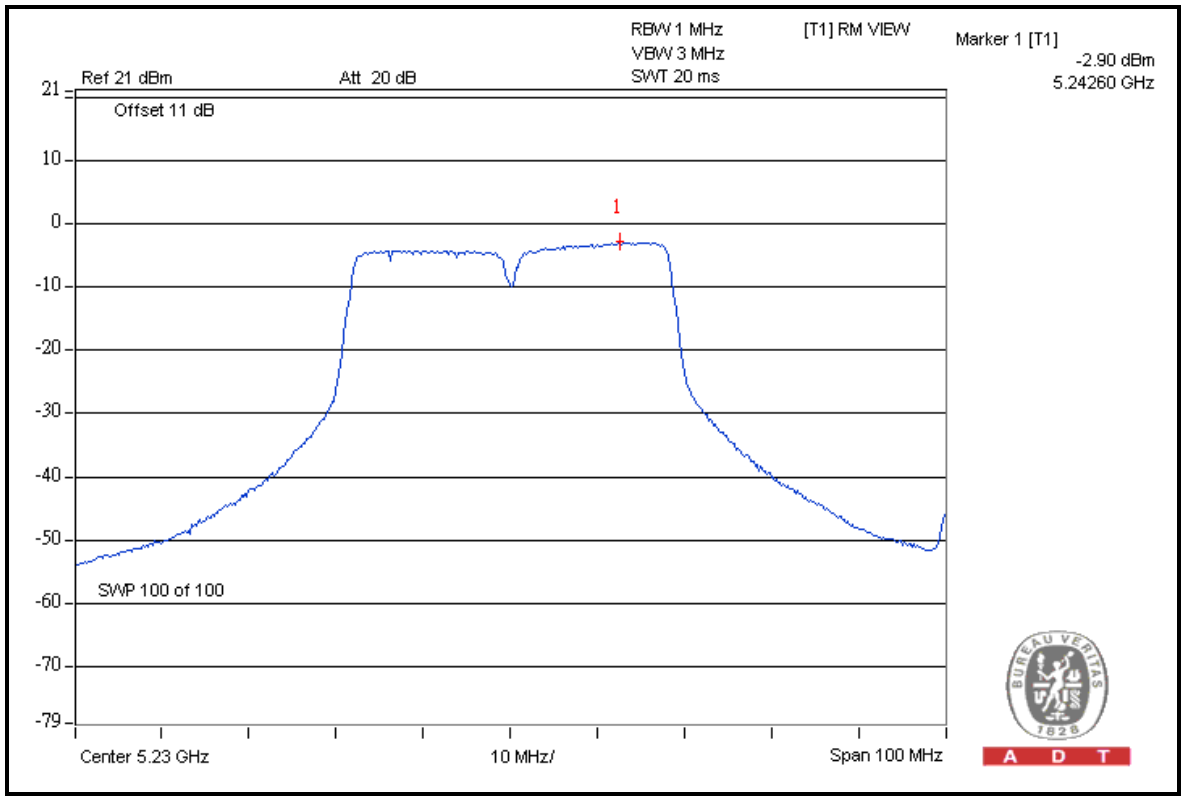
Chain 0: CH 38


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
6.20 dBm
5.20220 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
1
Center 5.19 GHz
10 MHz/
Span 100 MHz

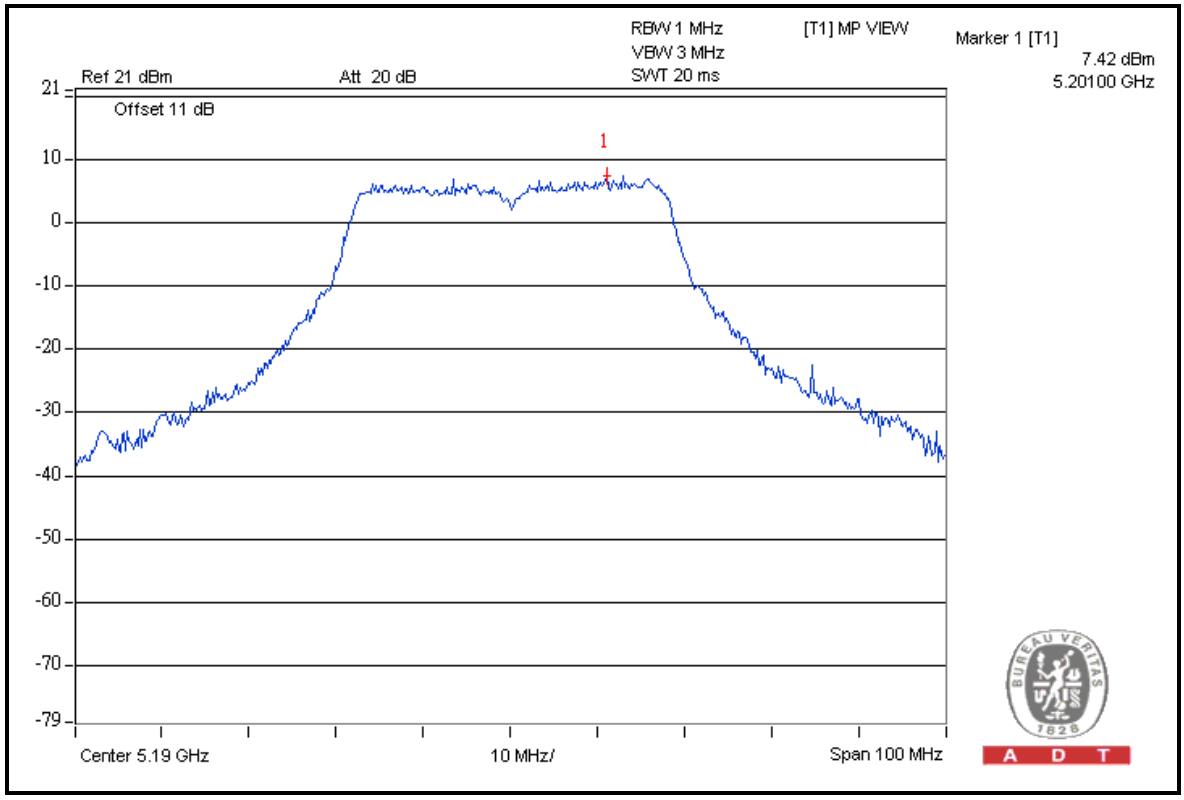

RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] RM VIEW
Marker 1 [T1]
-3.39 dBm
5.24680 GHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
21
10
0
-10
-20
-30
-40
-50
-60
-70
-79
1
SWP 100 of 100
Center 5.23 GHz
10 MHz/
Span 100 MHz

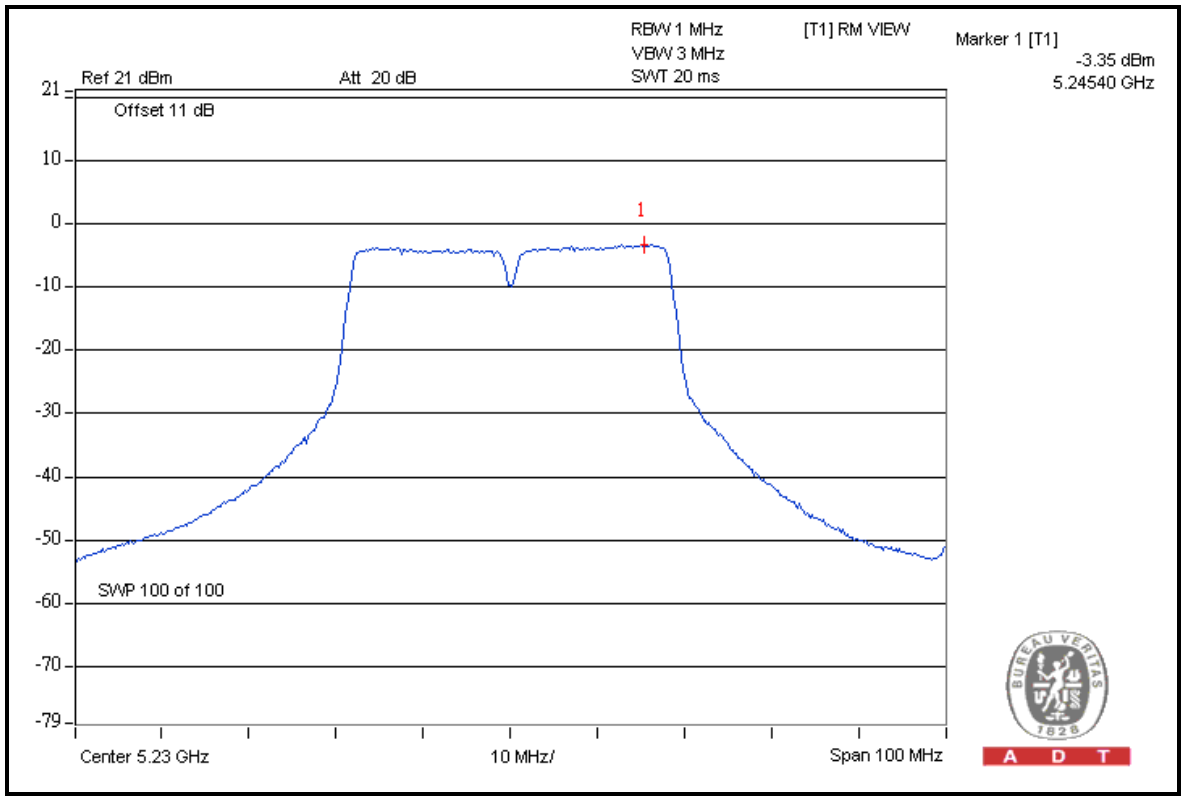
Chain 1: CH 38


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
8.33 dBm
5.20580 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]
-2.90 dBm
5.24260 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 5.23 GHz
10 MHz/
Span 100 MHz

Chain 2: CH 38


RBW 1 MHz
VBW 3 MHz
SWT 20 ms
[T1] MP VIEW
Marker 1 [T1]
7.42 dBm
5.20100 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]
-3.35 dBm
5.24540 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. 05, 2012

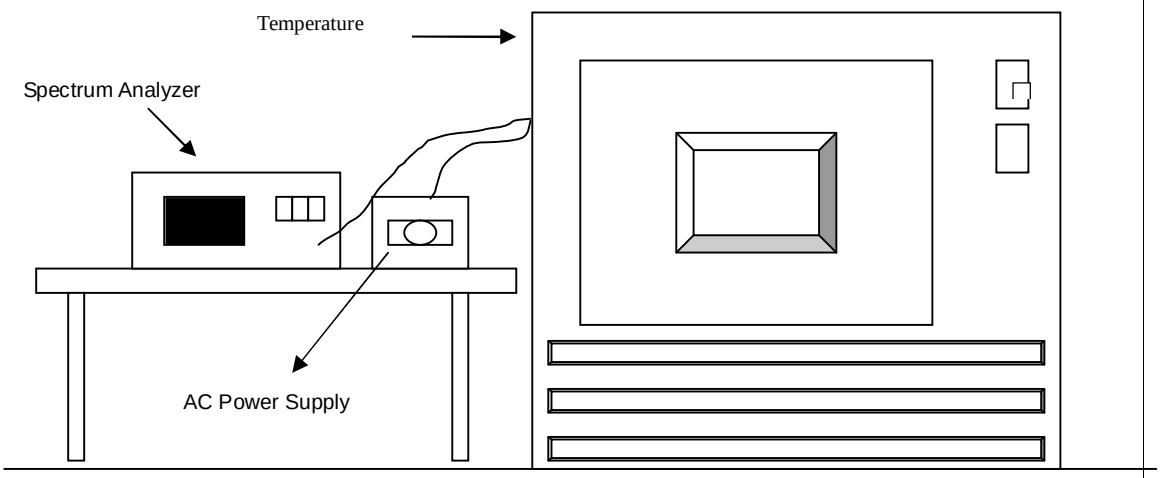
4.6.3 TEST PROCEDURE

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

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

4.6.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
50	120	5239.9844	-2.9771	5239.9817	-3.4924	5239.9762	-4.5420	5239.9775	-4.2939
40	120	5239.9812	-3.5878	5239.977	-4.3893	5239.9815	-3.5305	5239.982	-3.4351
30	120	5240.005	0.9542	5240.0087	1.6603	5240.0076	1.4504	5240.0111	2.1183
20	120	5240.011	2.0992	5240.0097	1.8511	5240.0075	1.4313	5240.0035	0.6679
10	120	5239.9962	-0.7252	5239.9915	-1.6221	5239.9919	-1.5458	5239.9962	-0.7252
0	120	5240.0108	2.0611	5240.0111	2.1183	5240.0141	2.6908	5240.0181	3.4542
-10	120	5239.9883	-2.2328	5239.9845	-2.9580	5239.9806	-3.7023	5239.9794	-3.9313
-20	120	5239.9958	-0.8015	5239.9944	-1.0687	5239.9966	-0.6489	5239.9993	-0.1336
-30	120	5239.9998	-0.0382	5240.0026	0.4962	5240.0023	0.4389	5240.0021	0.4008

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
20	138	5240.0105	2.0038	5240.0089	1.6985	5240.006	1.1450	5240.0043	0.8206
	120	5240.011	2.0992	5240.0097	1.8511	5240.0075	1.4313	5240.0035	0.6679
	102	5240.0106	2.0229	5240.0084	1.6031	5240.0062	1.1832	5240.0046	0.8779

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
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Hwa Ya EMC/RF/Safety/Telecom Lab:
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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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