FCC TEST REPORT (15.407)

REPORT NO.:	RF970423H02
MODEL NO.:	WRT610N
RECEIVED:	April 23, 2008
TESTED:	May 13 to June 02, 2008
ISSUED:	June 03, 2008

APPLICANT:	Cisco-Linksys LLC
ADDRESS:	121 Theory Drive Irvine, CA 92617(USA)

ISSUED BY:	Advance Data Technology Corporation
TEST LOCATION:	No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien, Taiwan, R.O.C.

TESTING CERT #2177-01

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1. CERTIFICATION

PRODUCT:	Simultaneous Dual-N Band Wireless Router
BRAND NAME:	Linksys
MODEL NO.:	WRT610N
TEST SAMPLE:	ENGINEERING SAMPLE
TESTED:	May 13 to June 02, 2008
APPLICANT:	Cisco-Linksys LLC
STANDARDS:	FCC Part 15, Subpart E (Section 15.407) ANSI C63.4-2003

The above equipment (Model: WRT610N) has been tested by **Advance Data Technology Corporation**, 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:** June 03, 2008
(Midoli Peng, Specialist)

TECHNICAL ACCEPTANCE : _____ , **DATE:** June 03, 2008
Responsible for RF
(Hank Chung, Deputy Manager)

APPROVED BY : _____ , **DATE:** June 03, 2008
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart E (Section 15.407)			
Standard Section	**Test Type**	**Result**	**Remark**
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is –3.07dB at 0.392MHz
15.407(b/1/2/3)(b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit. Minimum passing margin is –2.41dB at 5150.00MHz
15.407(a/1/2/3)	Peak Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.

NOTE:

1. The EUT was operating in 2.400 ~ 2.483.5GHz, 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 ~ 2.483.5GHz 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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions	2.44 dB
Radiated emissions (30MHz-1GHz)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.33 dB
Radiated emissions (18GHz -40GHz)	2.55 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Simultaneous Dual-N Band Wireless Router
MODEL NO.	WRT610N
FCC ID	Q87-WRT610N
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11 / 5.5 / 2 / 1Mbps 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps 802.11a: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps Draft 802.11n (20MHz): 130 / 117 / 104 / 78 / 65 / 58.5 / 52 / 39 / 26 / 19.5 /13 / 6.5Mbps Draft 802.11n (40MHz): 270 / 243 / 216 / 162 / 135 / 121.5 / 108 / 81 /54 / 40.5 / 27 / 13.5Mbps
FREQUENCY RANGE	For 15.407 802.11a: 5.18 ~ 5.24GHz
	For 15.247 802.11b & 802.11g: 2412 ~ 2462MHz 802.11a: 5.745 ~ 5.805GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, draft 802.11n (20MHz) 2 for draft 802.11n (40MHz)
	For 15.247(2.4GHz) 11 for 802.11b, 802.11g, draft 802.11n (20MHz) 7 for draft 802.11n (40MHz) **For 15.247(5GHz)** 4 for 802.11a, draft 802.11n (20MHz) 3 for draft 802.11n (40MHz)

MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 29.076mW draft 802.11n (20MHz): 21.611mW draft 802.11n (40MHz): 32.431mW **For 15.247(2.4GHz)** 802.11b: 66.069mW 802.11g: 117.800mW draft 802.11n (20MHz): 117.768mW draft 802.11n (40MHz): 113.778mW **For 15.247(5GHz)** 802.11a: 123.352mW draft 802.11n (20MHz): 77.810mW draft 802.11n (40MHz): 70.267mW
ANTENNA TYPE	Please see note 1
DATA CABLE	NA
I/O PORT	WAN port x 1, LAN port x 4, USB port x 1

NOTE:

1. There three antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Antenna Type	For 2.4GHz Gain (dBi)	For 5GHz Gain (dBi)	Antenna Connector	Note
Chain(0)	PIFA	0.75	3	NA	TX & RX function
Chain(1)	PIFA	1.5	2.23	NA	TX & RX function
Chain(2)	PIFA	3.5	2.5	NA	Only RX function

2. For radiated test : The EUT was pre-tested in chamber under the following modes:

Test Mode	Description
Mode A	Level-set (Put on tabletop)
Mode B	**Tower-set (Wall-mounted)**

From the above modes, the radiated worst cases were found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

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

Adapter 1	
Brand:	Enertronix
Model No.:	EXA0604UB-1
Input power :	AC 100-240V, 50/60Hz, 0.8A
Output power :	DC 12V, 1.5A Cable:1.8m/unshielded/without core
Adapter 2	
Brand:	FOXLINK
Model No.:	FA-1201500SU
Input power :	AC 100-240V, 50/60Hz, 0.6A
Output power :	DC 12V, 1.5A Cable:1.8m/unshielded/without core
Adapter 3	
Brand:	Hon-Kwang
Model No.:	HK-I118-A12
Input power :	AC 100-240V, 50/60Hz, 0.6A
Output power :	DC 12V, 1.5A Cable:1.8m/unshielded/without core
Adapter 4	
Brand:	LINKSYS
Model No.:	LS120V15ALE
Input power :	AC 100-240V, 50/60Hz, 0.5A Cable:0.5m/unshielded/without core
Output power :	DC 12V, 1.5A Cable:1.8m/unshielded/without core

4. The EUT incorporates a MIMO function with 802.11a, 802.11b, 802.11g, draft 802.11n. Physically, the EUT provides two completed transmit and two completed receivers.

5. The EUT is 2 * 3 spatial MIMO (2Tx & 3Rx) without beam forming function. The antenna configurations are two transmitter antennas and three receiver antennas, as there are 3 PIFA antennas. Spatial multiplexing modes for simultaneous transmission using 2 antennas, and for simultaneous receiver using 3 antennas. The 11b legacy mode is limited to single transmitter only.

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

7. The EUT complies with draft 802.11n standards and backwards compatible with 802. 11a, 802.11b, 802.11g products.

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

3.2 DESCRIPTION OF TEST MODES

Operated in 5150MHz ~ 5250MHz bands:

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

CHANNEL	FREQUENCY
1	5180 MHz
2	5200 MHz
3	5220 MHz
4	5240 MHz

Two channels are provided for draft 802.11n (40MHz):

CHANNEL	FREQUENCY
1	5190 MHz
2	5230 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

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

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

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

ANTENNA COMBINATION MODE:

COMBINATION MODE	OPERATION MODE	CHAIN(0) (TX)	CHAIN(1) (TX)
A	802.11a	√	
B	802.11a		√
C	802.11a	√	√
D	DRAFT 802.11n(20MHz)	√	
E	DRAFT 802.11n(20MHz)		√
F	DRAFT 802.11n(20MHz)	√	√
G	DRAFT 802.11n(40MHz)	√	
H	DRAFT 802.11n(40MHz)		√
I	DRAFT 802.11n(40MHz)	√	√

Note:
1. The above information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
2. Antenna 1 and Antenna 2 are PIFA antennas.
3. From above mode, the different modes were chosen for pretest.
4. Mode C, F & I the worst modes, was selected as representative mode for the report.

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)	TX COMBINATION
For 5 GHz Draft 802.11n (40MHz)	1 to 2	2	OFDM	BPSK	27	I

☒ The EUT was tested as the following test modes:

Test Mode	Description
Mode 1	With Adapter 1
Mode 2	With Adapter 2
Mode 3	With Adapter 3
Mode 4	With Adapter 4

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)	TX COMBINATION
For 5 GHz Draft 802.11n (20MHz)	1 to 4	1	OFDM	BPSK	13	F

☒ The EUT was Pre-tested as the following test modes:

Test Mode	Description
Mode 1	**With Adapter 1**
Mode 2	With Adapter 2
Mode 3	With Adapter 3
Mode 4	With Adapter 4

Mode 1, the worse case one, was chosen for final test.

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)	TX COMBINATION
802.11a	1 to 4	1, 2, 4	OFDM	BPSK	6	C
For 5 GHz Draft 802.11n (20MHz)	1 to 4	1, 2, 4	OFDM	BPSK	13	F
For 5 GHz Draft 802.11n (40MHz)	1 to 2	1, 2	OFDM	BPSK	27	I

☒ The EUT was Pre-tested as the following test modes:

Test Mode	Description
Mode 1	**With Adapter 1**
Mode 2	With Adapter 2
Mode 3	With Adapter 3
Mode 4	With Adapter 4

Mode 1, the worse case one, was chosen for final test.

Bandedge Measurement:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	TX COMBINATION
802.11a	1 to 4	1,4	OFDM	BPSK	6	C
For 5 GHz Draft 802.11n (20MHz)	1 to 4	1, 4	OFDM	BPSK	13	F
For 5 GHz Draft 802.11n (40MHz)	1 to 2	1, 2	OFDM	BPSK	27	I

Antenna Port Conducted Measurement:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	TX COMBINATION
802.11a	1 to 4	1, 2, 4	OFDM	BPSK	6	C
For 5 GHz Draft 802.11n (20MHz)	1 to 4	1, 2, 4	OFDM	BPSK	13	F
For 5 GHz Draft 802.11n (40MHz)	1 to 2	1, 2	OFDM	BPSK	27	I

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Simultaneous Dual-N Band Wireless Router. 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 C63.4-2003

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

3.4 DESCRIPTION OF SUPPORT UNITS

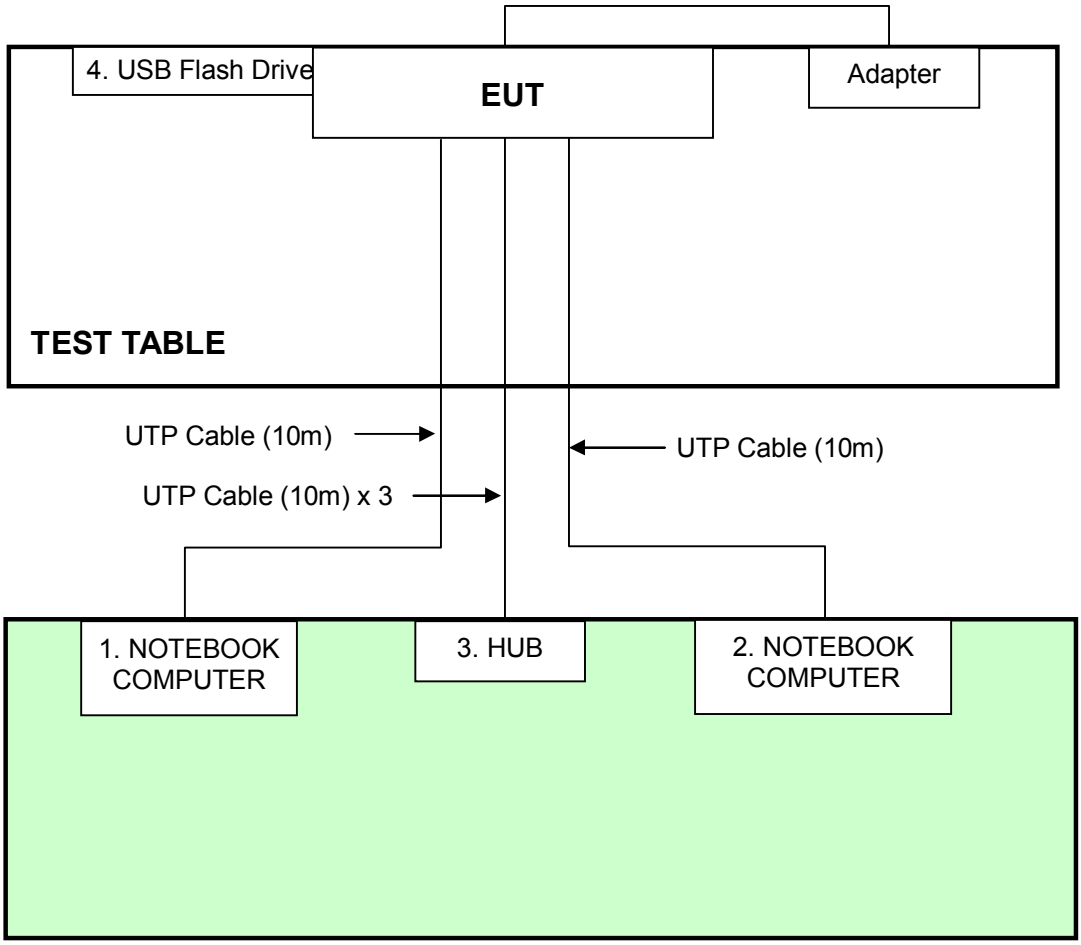
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	6976685584	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP19L	CN-OHC416-70166-5CA-0448	PIW632500516610
3	HUB	AVSYS	110H8	01-20E-000002	FCC DoC
4	USB Flash Drive	SanDisk	SDCZ2-512-A10	5391912401	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	NA
4	NA

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

3.5 CONFIGURATION OF SYSTEM UNDER 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	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 10, 2009
Line-Impedance Stabilization Network(for EUT)	KNW-407	8-1395-12	Aug. 19, 2008
Line-Impedance Stabilization Network(for Peripheral)	ENV-216	100072	Nov. 08, 2008
RF Cable (JETBAO)	RG5B/U-6m	COACAB-9KHz-30MHz	Aug. 15, 2008
50 ohms Terminator	50	3	Nov. 15, 2008
Software	ADT_Cond_V7.3.2	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 ADT Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs

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

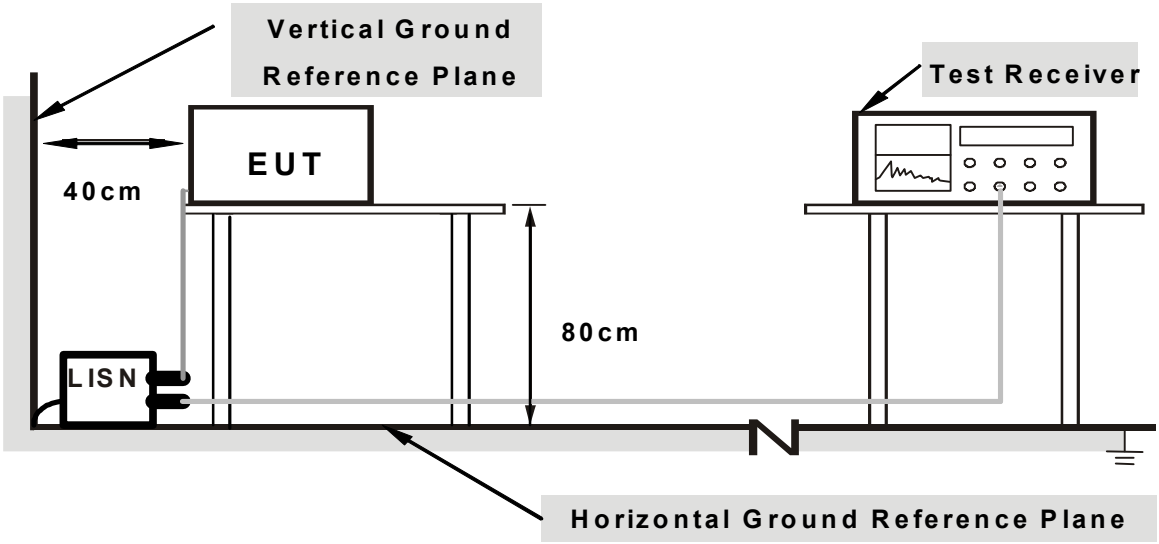
c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

a. Placed the EUT on testing table.

b. Prepared other computer systems (support unit 1 ~ 2) to act as communication partners and placed them outside of testing area.

c. The communication partners run test program “MFGTEST .exe” to enable EUT under transmission/receiving condition continuously via wireless transmission.

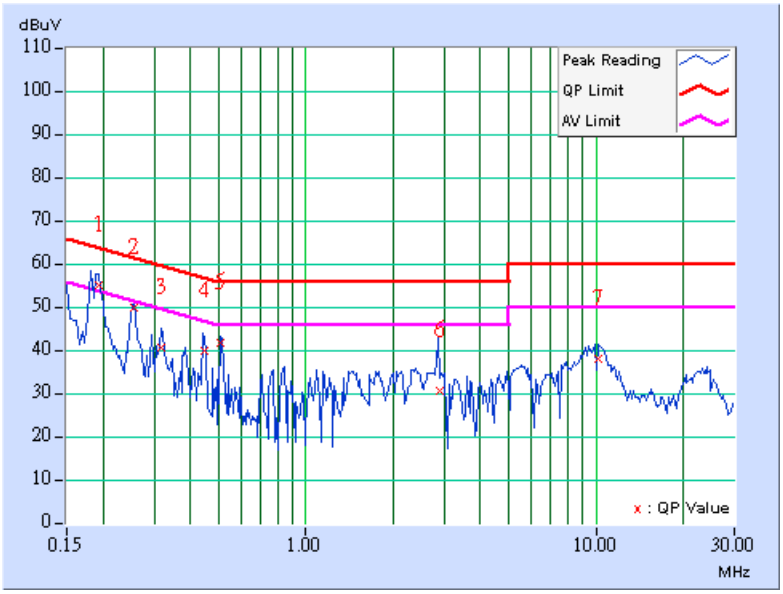
4.1.7 TEST RESULTS – Adapter 1

DRAFT 802.11n (40MHz) OFDM MODULATION:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	**PHASE**	Line (L)
MODULATION TYPE	BPSK	**6dB BANDWIDTH**	9 kHz
TRANSFER RATE	27Mbps	**INPUT POWER**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	**TESTED BY**	Mike Hsieh

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	0.194	0.34	54.79	45.78	55.13	46.12	63.85	53.85	-8.72	-7.73
2	0.255	0.27	49.35	-	49.62	-	61.58	51.58	-11.95	-
3	0.318	0.20	40.17	-	40.37	-	59.76	49.76	-19.39	-
4	0.448	0.12	39.49	-	39.61	-	56.92	46.92	-17.31	-
5	0.510	0.14	41.26	-	41.40	-	56.00	46.00	-14.60	-
6	2.880	0.34	30.28	-	30.62	-	56.00	46.00	-25.38	-
7	10.238	0.56	37.63	-	38.19	-	60.00	50.00	-21.81	-

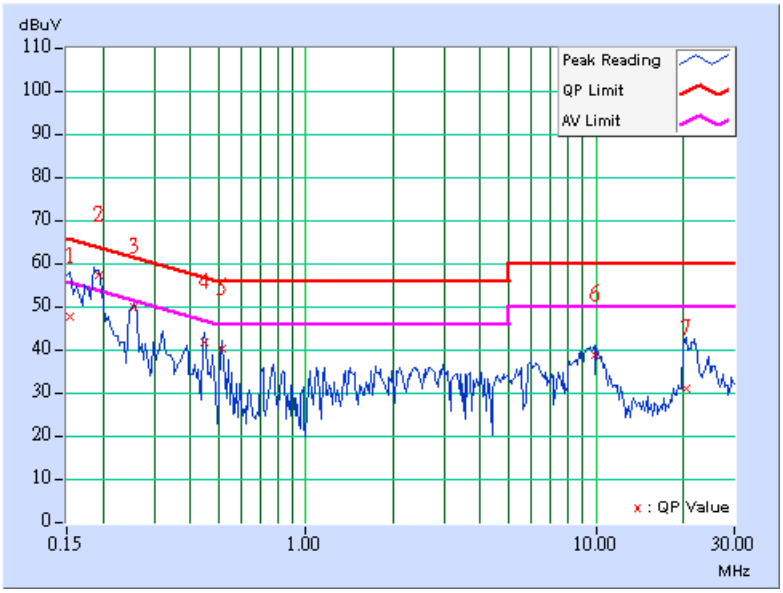
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	PHASE	Neutral (N)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	27Mbps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	TESTED BY	Mike Hsieh

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	0.154	0.37	47.08	-	47.45	-	65.79	55.79	-18.33	-
2	0.193	0.36	56.37	48.48	56.73	48.84	63.90	53.90	-7.17	-5.06
3	0.255	0.29	49.21	-	49.50	-	61.58	51.58	-12.08	-
4	0.447	0.11	41.01	-	41.12	-	56.93	46.93	-15.81	-
5	0.513	0.13	39.54	-	39.67	-	56.00	46.00	-16.33	-
6	9.920	0.54	37.94	-	38.48	-	60.00	50.00	-21.52	-
7	20.512	0.87	30.08	-	30.95	-	60.00	50.00	-29.05	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



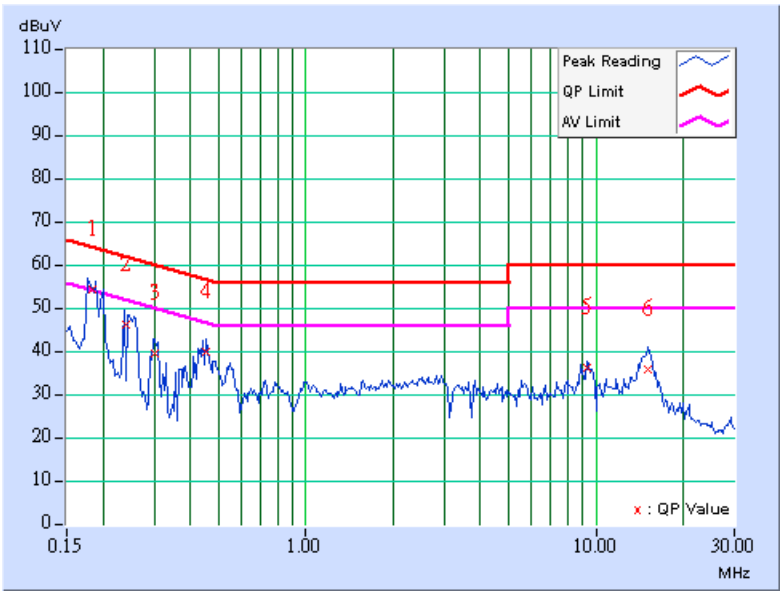
4.1.8 TEST RESULTS – Adapter 2

DRAFT 802.11n (40MHz) OFDM MODULATION:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	PHASE	Line (L)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	27Mbps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	TESTED BY	Mike Hsieh

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	0.183	0.35	53.46	-	53.81	-	64.34	54.34	-10.54	-
2	0.239	0.29	45.32	-	45.61	-	62.14	52.14	-16.53	-
3	0.303	0.22	38.64	-	38.86	-	60.16	50.16	-21.31	-
4	0.451	0.12	39.31	-	39.43	-	56.86	46.86	-17.43	-
5	9.291	0.53	35.59	-	36.12	-	60.00	50.00	-23.88	-
6	15.141	0.86	35.07	-	35.93	-	60.00	50.00	-24.07	-

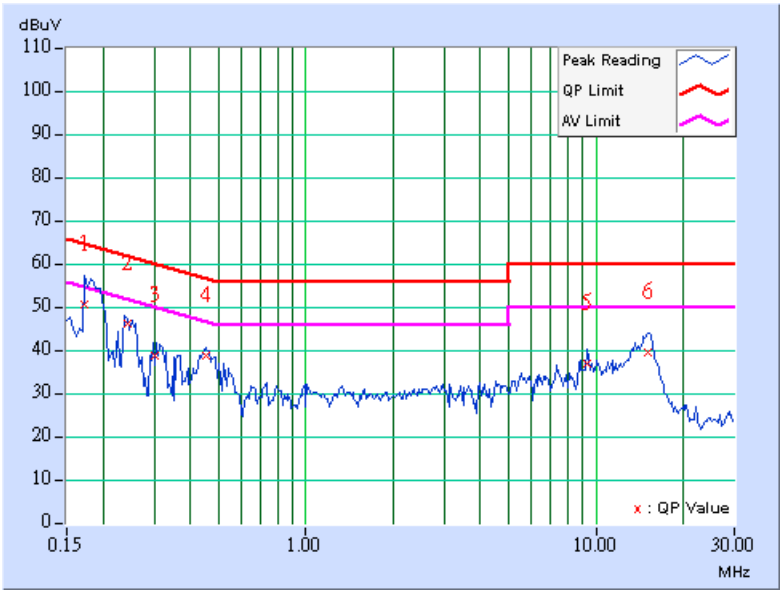
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	PHASE	Neutral (N)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	27Mbps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	TESTED BY	Mike Hsieh

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	0.173	0.37	49.93	-	50.30	-	64.79	54.79	-14.50	-
2	0.242	0.30	45.28	-	45.58	-	62.04	52.04	-16.45	-
3	0.304	0.22	37.98	-	38.20	-	60.15	50.15	-21.95	-
4	0.455	0.11	38.09	-	38.20	-	56.79	46.79	-18.59	-
5	9.293	0.52	36.22	-	36.74	-	60.00	50.00	-23.26	-
6	15.070	0.86	38.71	-	39.57	-	60.00	50.00	-20.43	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



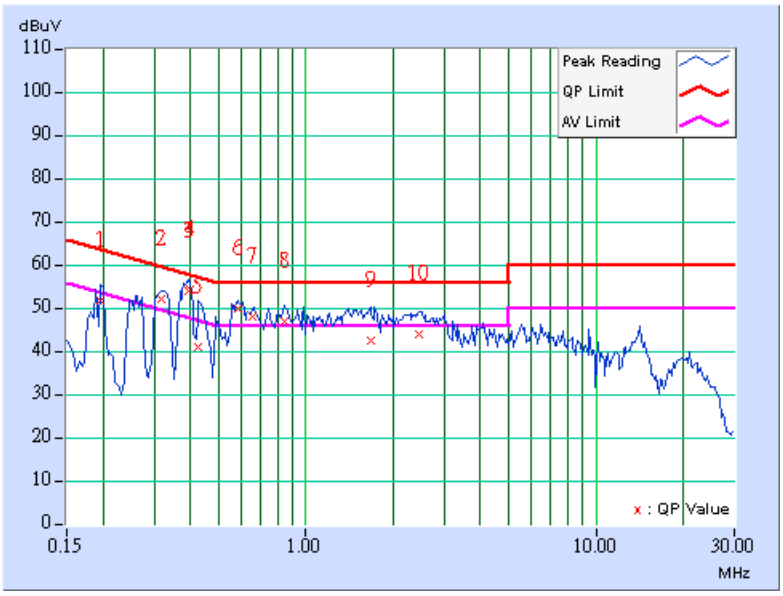
4.1.9 TEST RESULTS – Adapter 3

DRAFT 802.11n (40MHz) OFDM MODULATION:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	PHASE	Line (L)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	27Mbps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	TESTED BY	Mike Hsieh

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	0.197	0.34	51.70	-	52.04	-	63.74	53.74	-11.70	-
2	0.318	0.20	52.01	45.78	52.21	45.98	59.76	49.76	-7.55	-3.78
3	**0.392**	**0.11**	**53.65**	**44.84**	**53.76**	**44.95**	**58.02**	**48.02**	**-4.26**	**-3.07**
4	0.401	0.10	54.15	43.73	54.25	43.83	57.83	47.83	-3.58	-4.00
5	0.427	0.11	40.81	-	40.92	-	57.30	47.30	-16.38	-
6	0.584	0.17	49.70	41.21	49.87	41.38	56.00	46.00	-6.13	-4.62
7	0.658	0.19	47.99	35.19	48.18	35.38	56.00	46.00	-7.82	-10.62
8	0.841	0.26	46.69	37.04	46.95	37.30	56.00	46.00	-9.05	-8.70
9	1.670	0.29	42.41	-	42.70	-	56.00	46.00	-13.30	-
10	2.470	0.31	43.93	-	44.24	-	56.00	46.00	-11.76	-

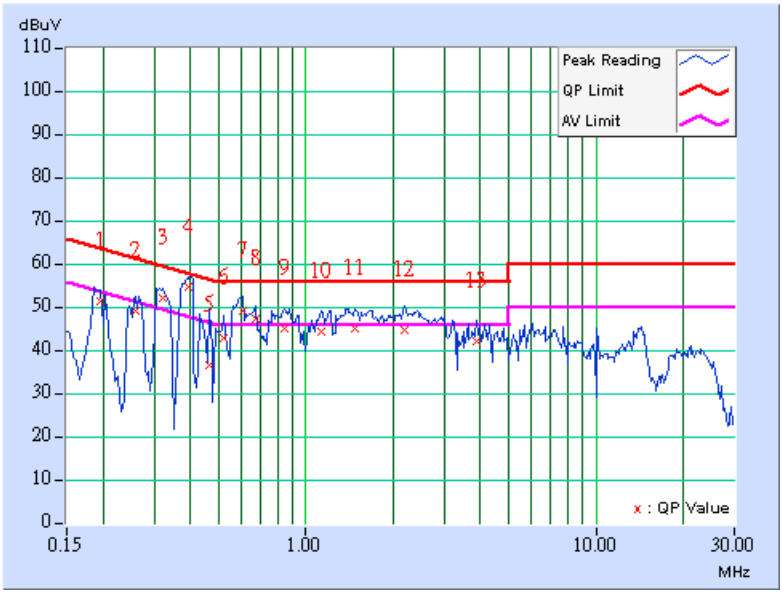
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	PHASE	Neutral (N)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	27Mbps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	TESTED BY	Mike Hsieh

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	0.196	0.36	50.98	-	51.34	-	63.79	53.79	-12.45	-
2	0.259	0.28	48.92	-	49.20	-	61.45	51.45	-12.25	-
3	0.322	0.20	51.81	46.19	52.01	46.39	59.66	49.66	-7.65	-3.27
4	0.392	0.10	54.37	43.99	54.47	44.09	58.02	48.02	-3.55	-3.93
5	0.463	0.11	36.26	-	36.37	-	56.65	46.65	-20.27	-
6	0.521	0.14	42.43	-	42.57	-	56.00	46.00	-13.43	-
7	0.607	0.17	48.85	32.01	49.02	32.18	56.00	46.00	-6.98	-13.82
8	0.673	0.19	47.04	30.87	47.23	31.06	56.00	46.00	-8.77	-14.94
9	0.841	0.26	44.96	-	45.22	-	56.00	46.00	-10.78	-
10	1.134	0.31	44.18	-	44.49	-	56.00	46.00	-11.51	-
11	1.482	0.30	44.72	-	45.02	-	56.00	46.00	-10.98	-
12	2.201	0.29	44.38	-	44.67	-	56.00	46.00	-11.33	-
13	3.855	0.40	41.90	-	42.30	-	56.00	46.00	-13.70	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



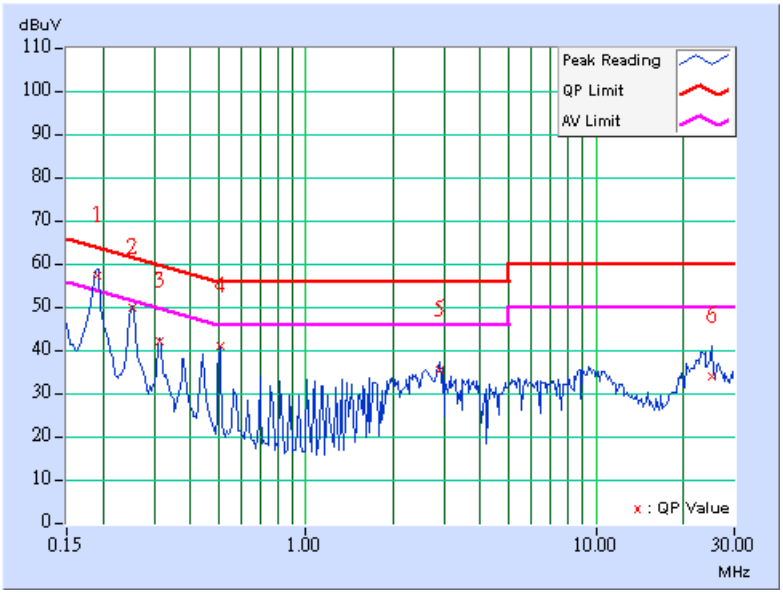
4.1.10 TEST RESULTS – Adapter 4

DRAFT 802.11n (40MHz) OFDM MODULATION:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	**PHASE**	Line (L)
MODULATION TYPE	BPSK	**6dB BANDWIDTH**	9 kHz
TRANSFER RATE	27Mbps	**INPUT POWER**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	**TESTED BY**	Mike Hsieh

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	0.190	0.34	56.51	48.54	56.85	48.88	64.04	54.04	-7.18	-5.15
2	0.252	0.28	49.03	-	49.31	-	61.71	51.71	-12.40	-
3	0.314	0.20	41.18	-	41.38	-	59.86	49.86	-18.48	-
4	0.505	0.14	40.19	-	40.33	-	56.00	46.00	-15.67	-
5	2.904	0.34	34.75	-	35.09	-	56.00	46.00	-20.91	-
6	25.012	0.97	33.03	-	34.00	-	60.00	50.00	-26.00	-

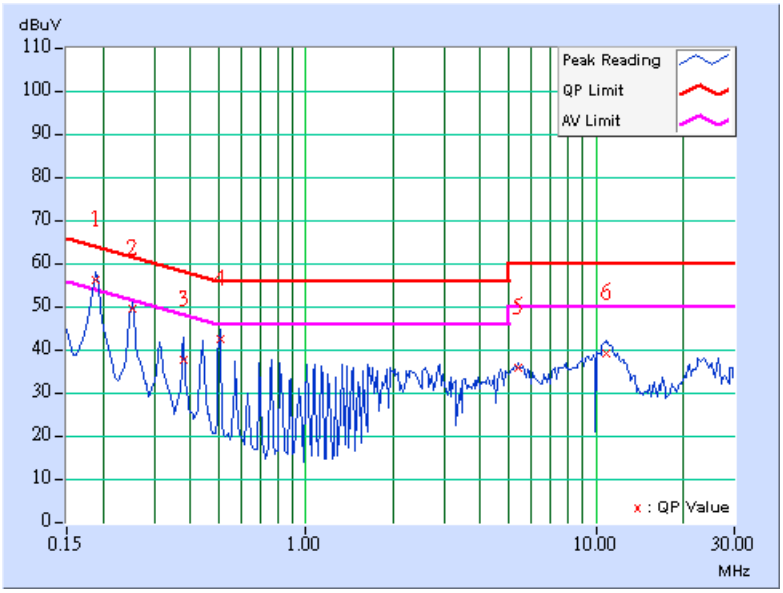
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	PHASE	Neutral (N)
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	27Mbps	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH, 971hPa	TESTED BY	Mike Hsieh

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	0.189	0.36	55.69	48.00	56.05	48.36	64.08	54.08	-8.02	-5.71
2	0.252	0.29	48.87	-	49.16	-	61.71	51.71	-12.55	-
3	0.380	0.12	37.18	-	37.30	-	58.27	48.27	-20.97	-
4	0.506	0.13	42.09	-	42.22	-	56.00	46.00	-13.78	-
5	5.418	0.44	35.34	-	35.78	-	60.00	50.00	-24.22	-
6	10.910	0.60	38.78	-	39.38	-	60.00	50.00	-20.62	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 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 UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 15, 2008
HP Pre_Amplifier	8449B	3008A01922	Oct. 04, 2008
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	Mar. 31, 2009
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	July 26, 2008
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 16, 2008
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 27, 2009
RF Switches (ARNITSU)	CS-201	1565157	Aug. 13, 2008
RF CABLE (Chaintek)	SF102	22054-2	Dec. 06. 2008
RF Cable(RICHTEC)	9913-30M N-N Cable	STCCAB-30M-1 GHz	Aug. 13, 2008
Software	ADT_Radiated_V 7.6.15.8	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	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, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 3789C-3.

4.2.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

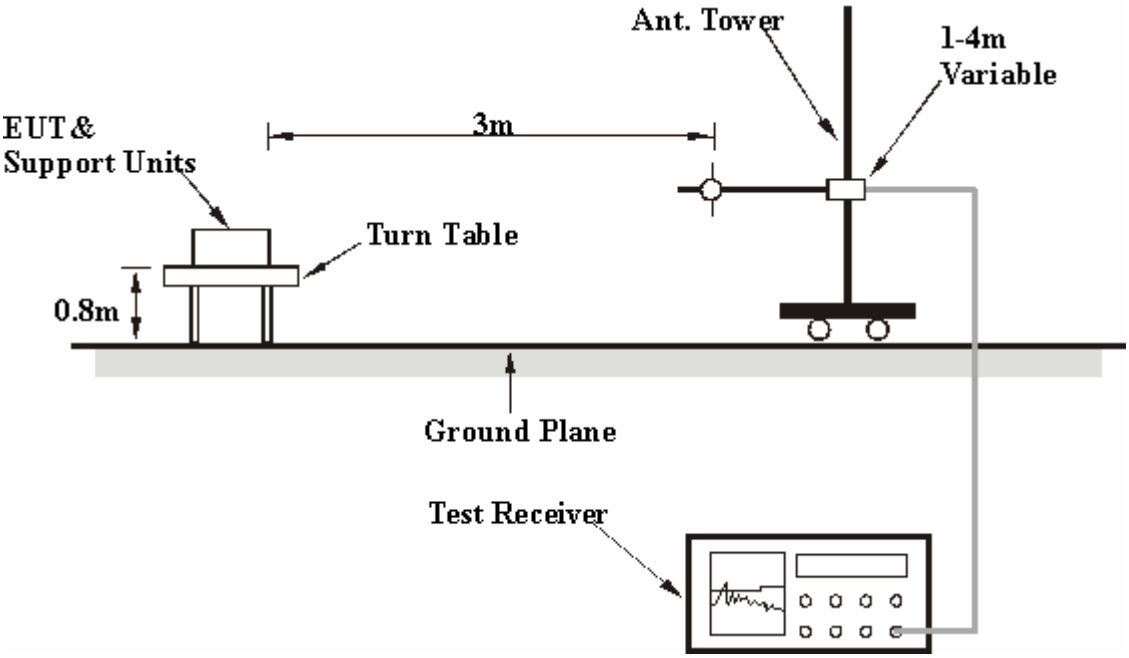
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and 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.

4.2.5 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

Below 1GHz Test Data

4.2.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA：802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 57%RH 971hPa	TESTED BY	Frank Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	125.00	39.90 QP	43.50	-3.60	1.35 H	85	26.67	13.23
2	201.90	30.42 QP	43.50	-13.08	1.44 H	82	18.36	12.06
3	250.01	36.33 QP	46.00	-9.67	1.00 H	260	23.50	12.83
4	300.00	37.11 QP	46.00	-8.89	1.00 H	282	20.52	16.59
5	375.01	33.42 QP	46.00	-12.58	1.03 H	213	15.94	17.48
6	450.00	32.79 QP	46.00	-13.21	1.82 H	12	12.91	19.88
7	500.00	33.13 QP	46.00	-12.87	1.56 H	190	12.08	21.05
8	625.02	33.48 QP	46.00	-12.52	1.71 H	86	9.48	24.00
9	900.00	34.92 QP	46.00	-11.08	1.80 H	43	5.25	29.67
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	46.49	36.72 QP	40.00	-3.28	1.00 V	57	20.82	15.90
2	125.00	40.10 QP	43.50	-3.40	1.00 V	243	26.87	13.23
3	250.00	33.51 QP	46.00	-12.49	1.00 V	229	20.68	12.83
4	375.00	38.02 QP	46.00	-7.98	1.00 V	353	20.54	17.48
5	384.01	34.33 QP	46.00	-11.67	1.06 V	213	16.64	17.69
6	500.00	34.70 QP	46.00	-11.30	1.00 V	328	13.65	21.05
7	625.00	37.42 QP	46.00	-8.58	1.17 V	355	13.42	24.00
8	750.00	34.90 QP	46.00	-11.10	1.20 V	314	7.64	27.26

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 Test Data

4.2.9 TEST RESULTS

802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	67.41 PK	74.00	-6.59	1.20 H	30	31.03	36.38
2	#5150.00	47.45 AV	54.00	-6.55	1.20 H	30	11.07	36.38
3	*5180.00	113.80 PK			1.20 H	30	77.40	36.40
4	*5180.00	102.40 AV			1.20 H	30	66.00	36.40
5	10360.00	67.80 PK	88.30	-20.50	1.46 H	40	22.22	45.58
6	10360.00	52.90 AV	68.30	-15.40	1.46 H	40	7.32	45.58
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	56.00 PK	74.00	-18.00	1.00 V	184	19.62	36.38
2	#5150.00	38.45 AV	54.00	-15.55	1.00 V	184	2.07	36.38
3	*5180.00	105.60 PK			1.00 V	184	69.20	36.40
4	*5180.00	94.90 AV			1.00 V	184	58.50	36.40
5	10360.00	64.30 PK	88.30	-24.00	1.00 V	1	18.72	45.58
6	10360.00	47.70 AV	68.30	-20.60	1.00 V	1	2.12	45.58

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 falling in the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	114.60 PK			1.18 H	54	78.18	36.42
2	*5200.00	103.20 AV			1.18 H	54	66.78	36.42
3	10400.00	67.70 PK	88.30	-20.60	1.45 H	54	22.07	45.63
4	10400.00	52.80 AV	68.30	-15.50	1.45 H	54	7.17	45.63
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	106.80 PK			1.01 V	197	70.38	36.42
2	*5200.00	95.20 AV			1.01 V	197	58.78	36.42
3	10400.00	63.30 PK	88.30	-25.00	1.00 V	352	17.67	45.63
4	10400.00	48.40 AV	68.30	-19.90	1.00 V	352	2.77	45.63

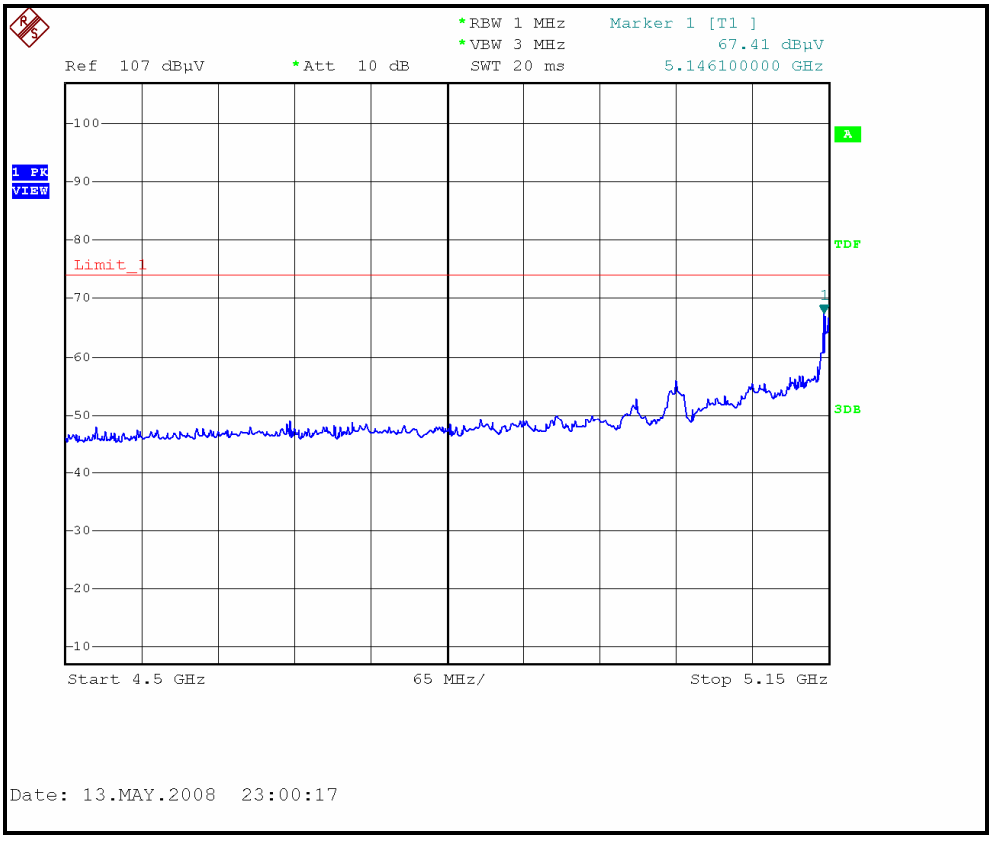
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6.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

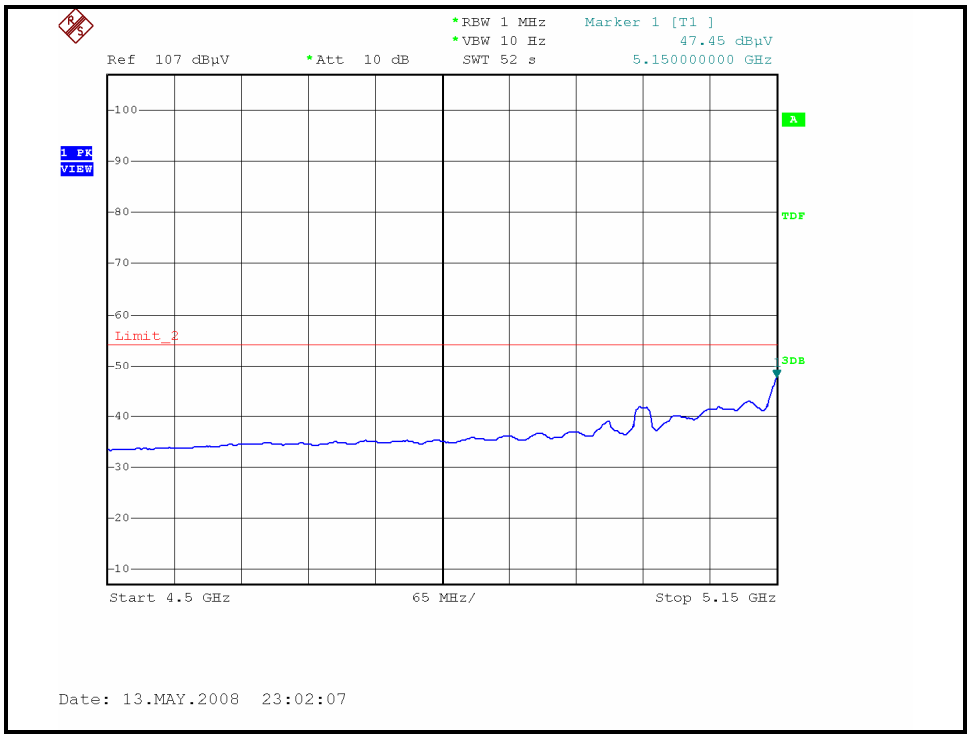
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	114.30 PK			1.14 H	53	77.85	36.45
2	*5240.00	102.90 AV			1.14 H	53	66.45	36.45
3	#5405.00	54.58 PK	74.00	-19.42	1.14 H	53	18.00	36.58
4	#5405.00	41.43 AV	54.00	-12.57	1.14 H	53	4.85	36.58
5	10480.00	67.30 PK	88.30	-21.00	1.45 H	53	21.57	45.73
6	10480.00	51.70 AV	68.30	-16.60	1.45 H	53	5.97	45.73
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	106.60 PK			1.03 V	204	70.15	36.45
2	*5240.00	94.90 AV			1.03 V	204	58.45	36.45
3	#5402.00	49.50 PK	74.00	-24.50	1.03 V	204	12.92	36.58
4	#5402.00	36.03 AV	54.00	-17.97	1.03 V	204	-0.55	36.58
5	10480.00	60.60 PK	88.30	-27.70	1.05 V	317	14.87	45.73
6	10480.00	46.20 AV	68.30	-22.10	1.05 V	317	0.47	45.73

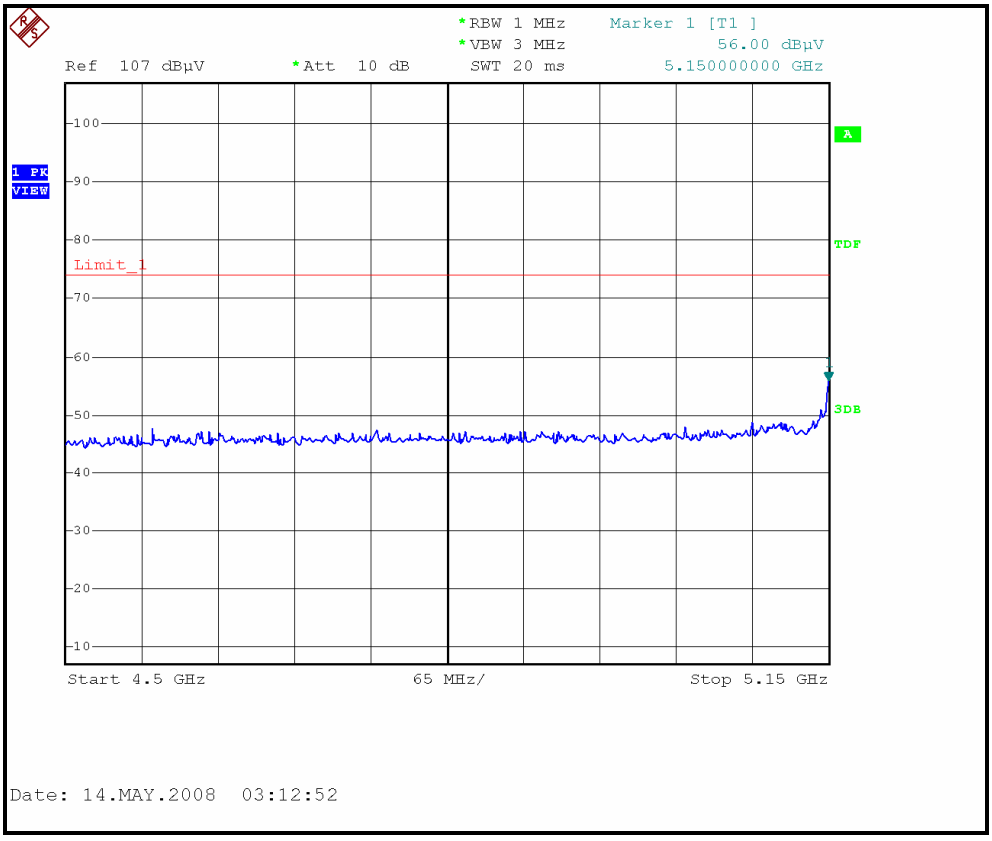
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6.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

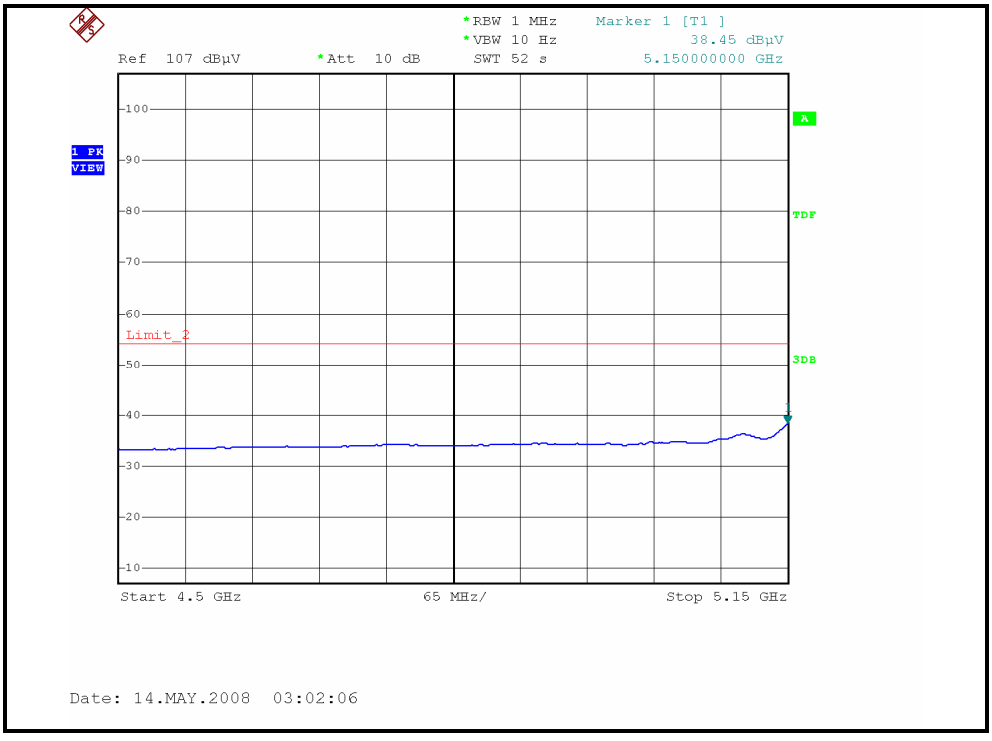
RESTRICTED BANDEDGE (802.11a MODE, CH1, HORIZONTAL)



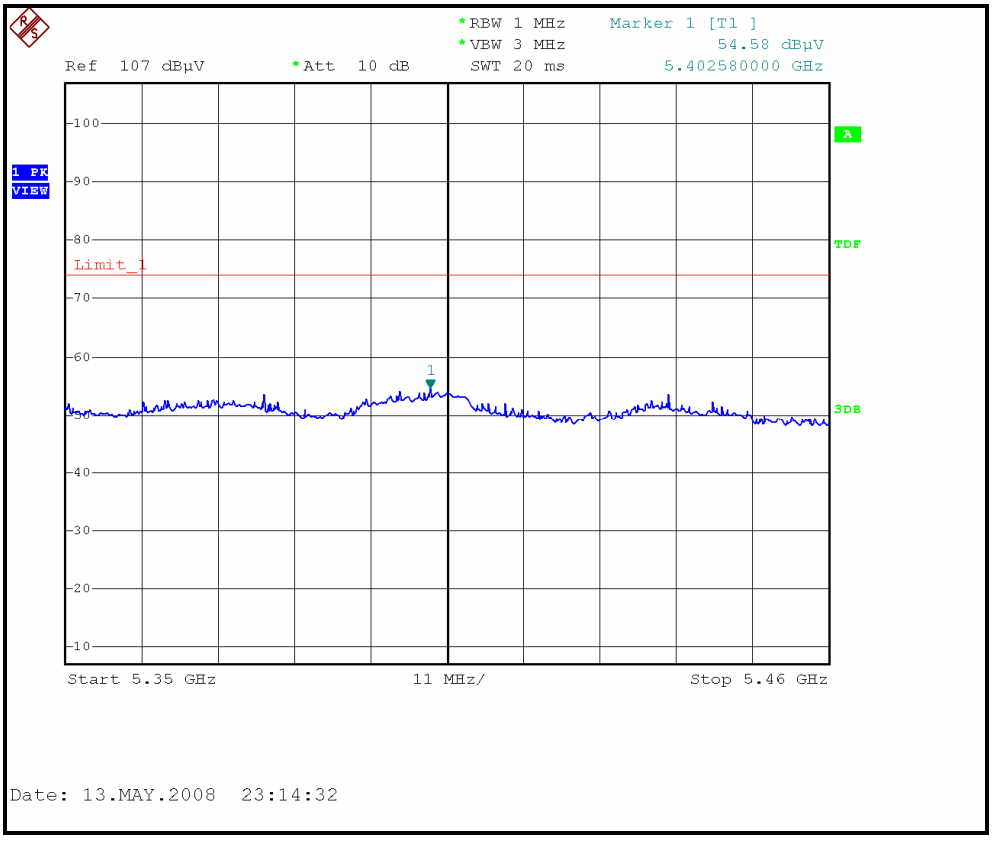


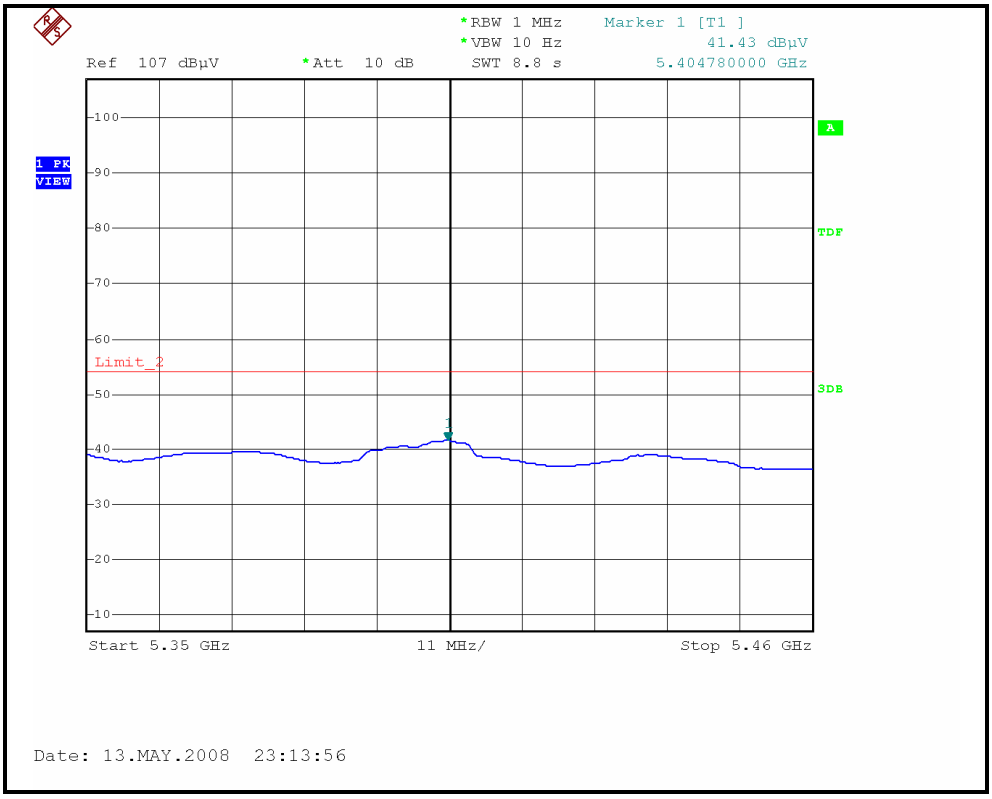
RESTRICTED BANDEDGE (802.11a MODE, CH1, VERTICAL)



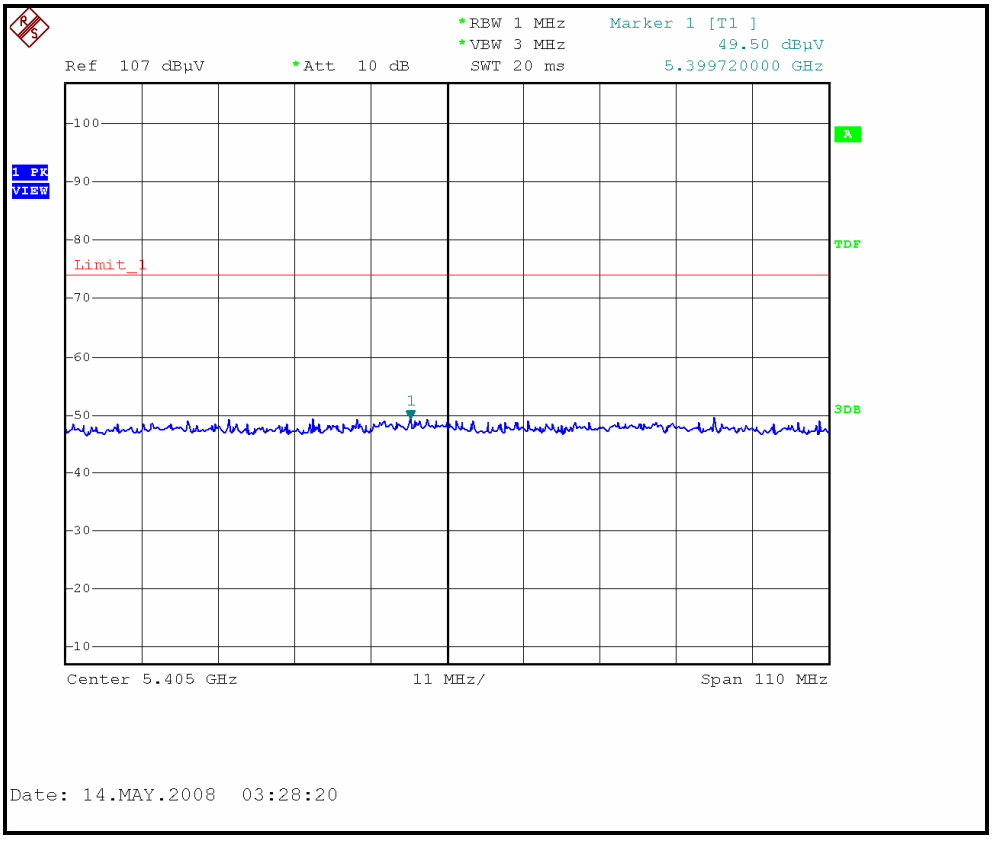


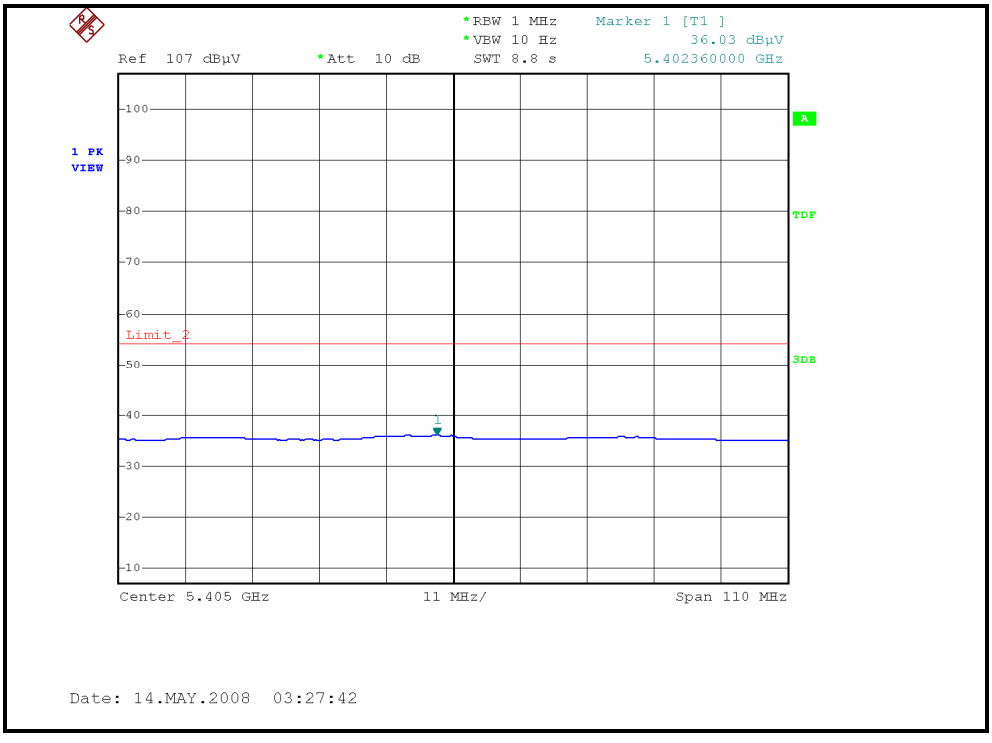
RESTRICTED BANDEDGE (802.11a MODE, CH4, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a MODE, CH4, VERTICAL)





DRAFT 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	55.98 PK	74.00	-18.02	1.18 H	29	19.60	36.38
2	#5150.00	42.23 AV	54.00	-11.77	1.18 H	29	5.85	36.38
3	*5180.00	110.30 PK			1.18 H	29	73.90	36.40
4	*5180.00	98.20 AV			1.18 H	29	61.80	36.40
5	10360.00	63.90 PK	88.30	-24.40	1.45 H	41	18.32	45.58
6	10360.00	47.00 AV	68.30	-21.30	1.45 H	41	1.42	45.58
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	49.51 PK	74.00	-24.49	1.00 V	183	13.13	36.38
2	#5150.00	36.23 AV	54.00	-17.77	1.00 V	183	-0.15	36.38
3	*5180.00	102.90 PK			1.00 V	183	66.50	36.40
4	*5180.00	90.20 AV			1.00 V	183	53.80	36.40
5	10360.00	58.90 PK	88.30	-29.40	1.00 V	1	13.32	45.58
6	10360.00	44.10 AV	68.30	-24.20	1.00 V	1	-1.48	45.58

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 falling in the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	110.30 PK			1.18 H	54	73.88	36.42
2	*5200.00	98.40 AV			1.18 H	54	61.98	36.42
3	10400.00	61.40 PK	88.30	-26.90	1.44 H	48	15.77	45.63
4	10400.00	45.90 AV	68.30	-22.40	1.44 H	48	0.27	45.63
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	103.20 PK			1.02 V	199	66.78	36.42
2	*5200.00	90.50 AV			1.02 V	199	54.08	36.42
3	10400.00	58.30 PK	88.30	-30.00	1.00 V	353	12.67	45.63
4	10400.00	43.80 AV	68.30	-24.50	1.00 V	353	-1.83	45.63

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

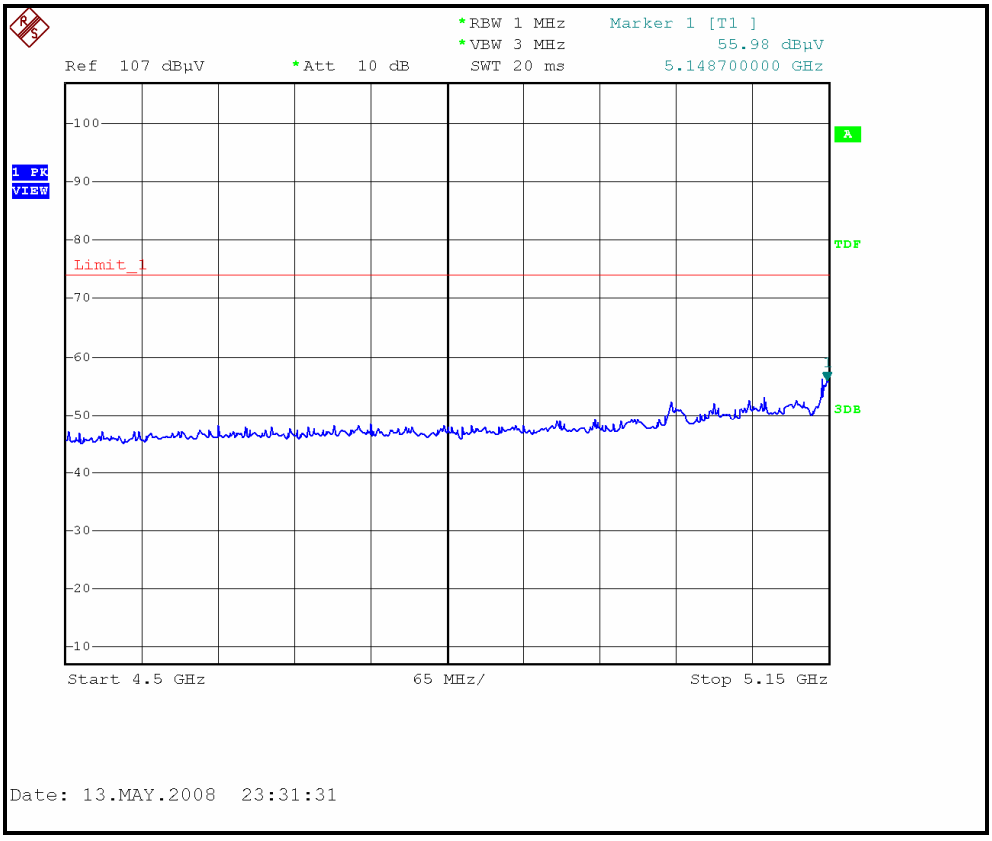
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency falling in the restricted band.

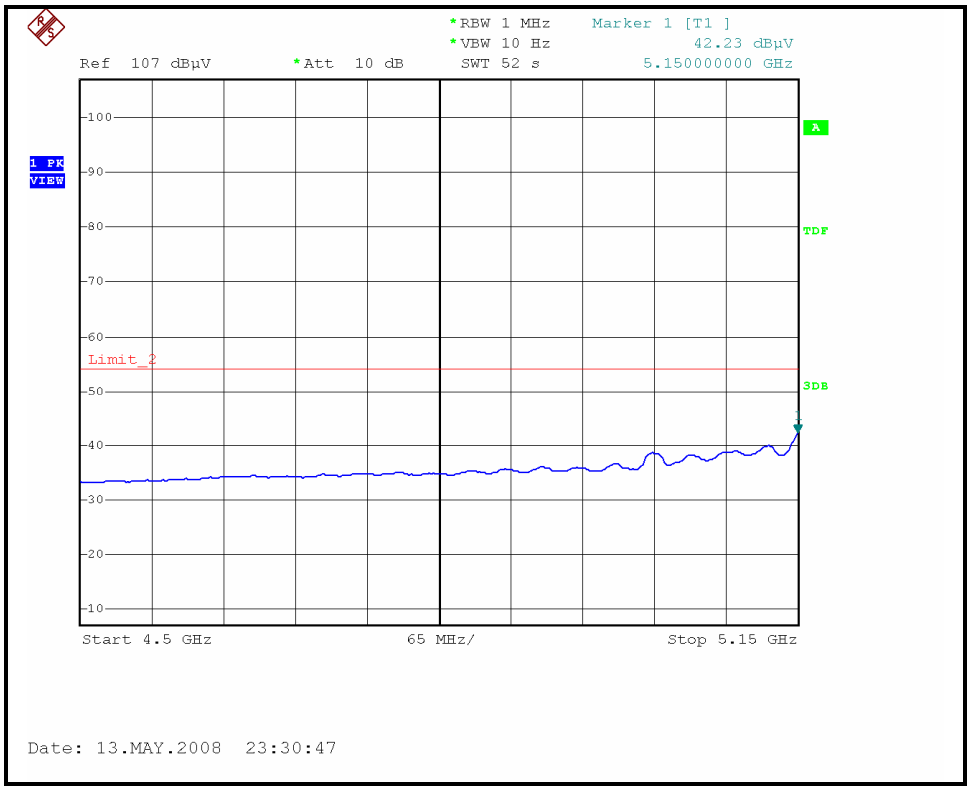
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	111.80 PK			1.14 H	54	75.35	36.45
2	*5240.00	99.50 AV			1.14 H	54	63.05	36.45
3	#5404.00	54.61 PK	74.00	-19.39	1.14 H	54	18.03	36.58
4	#5404.00	40.08 AV	54.00	-13.92	1.14 H	54	3.50	36.58
5	10480.00	62.60 PK	88.30	-25.70	1.45 H	52	16.87	45.73
6	10480.00	46.30 AV	68.30	-22.00	1.45 H	52	0.57	45.73
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	102.70 PK			1.04 V	204	66.25	36.45
2	*5240.00	89.80 AV			1.04 V	204	53.35	36.45
3	#5404.00	48.75 PK	74.00	-25.25	1.04 V	204	12.17	36.58
4	#5404.00	35.69 AV	54.00	-18.31	1.04 V	204	-0.89	36.58
5	10480.00	57.70 PK	88.30	-30.60	1.04 V	316	11.97	45.73
6	10480.00	43.90 AV	68.30	-24.40	1.04 V	316	-1.83	45.73

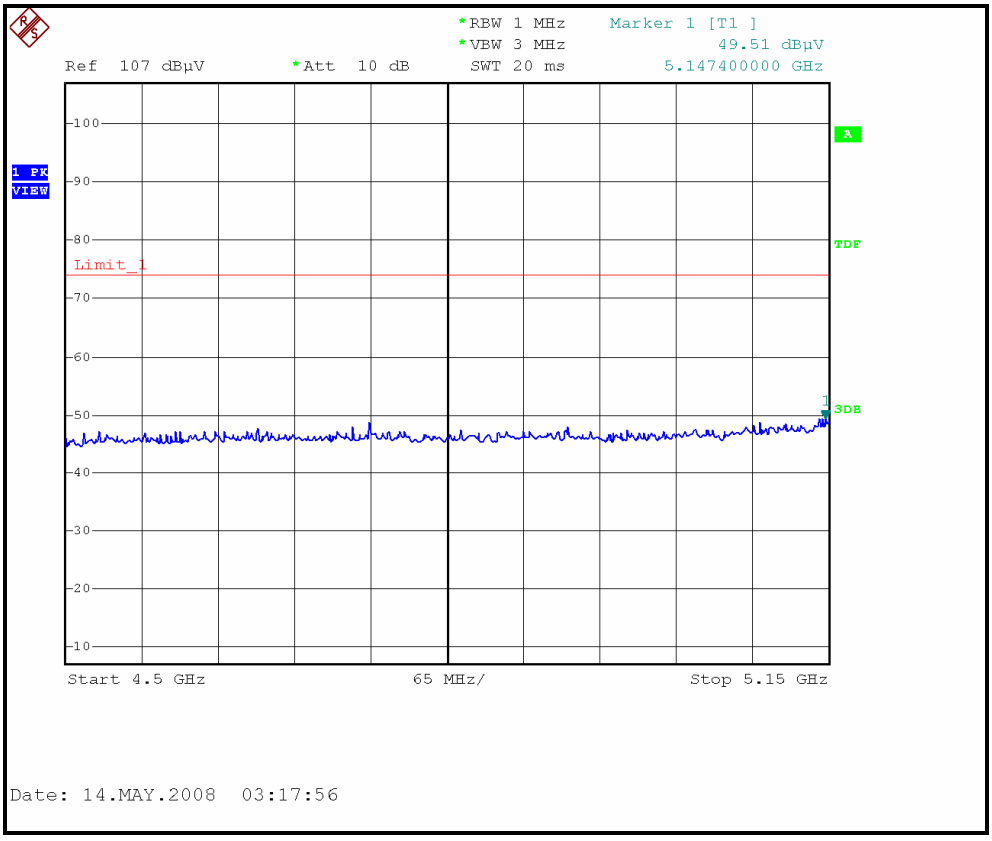
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6.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

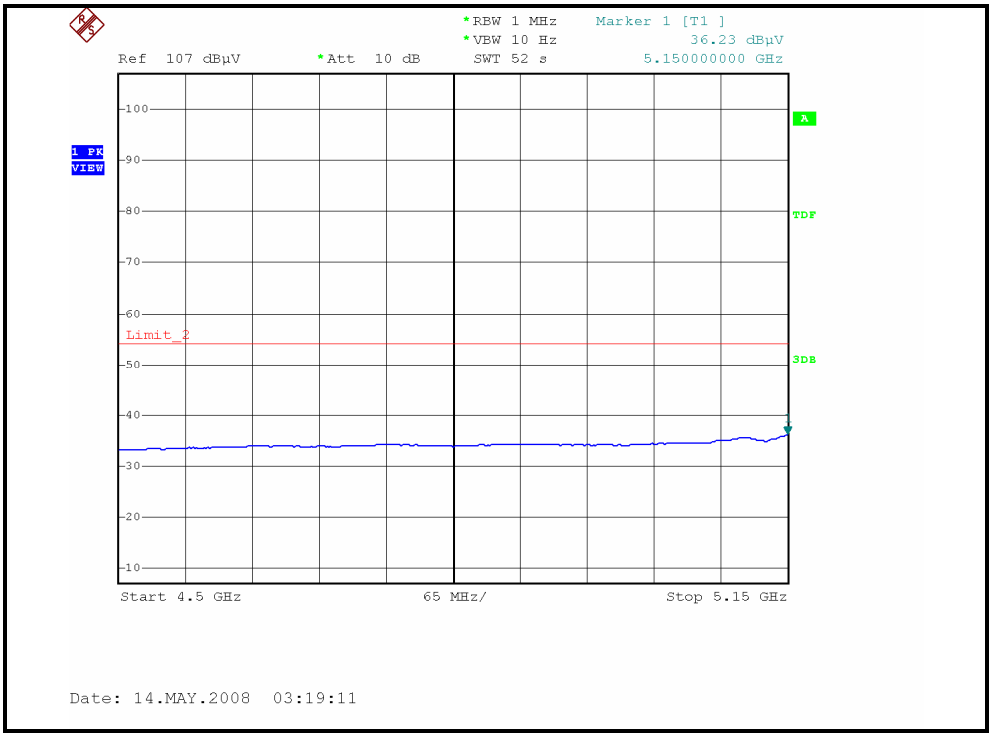
RESTRICTED BANDEDGE (DRAFT 802.11n (20MHz) MODE,CH1, HORIZONTAL)



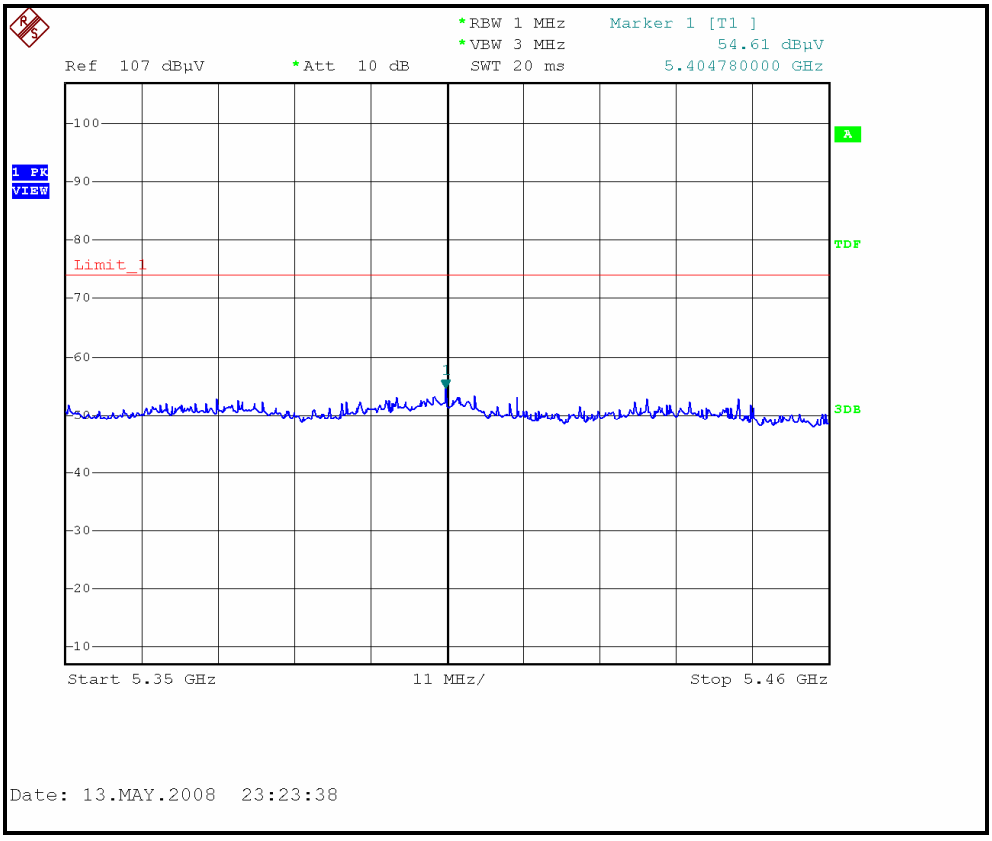


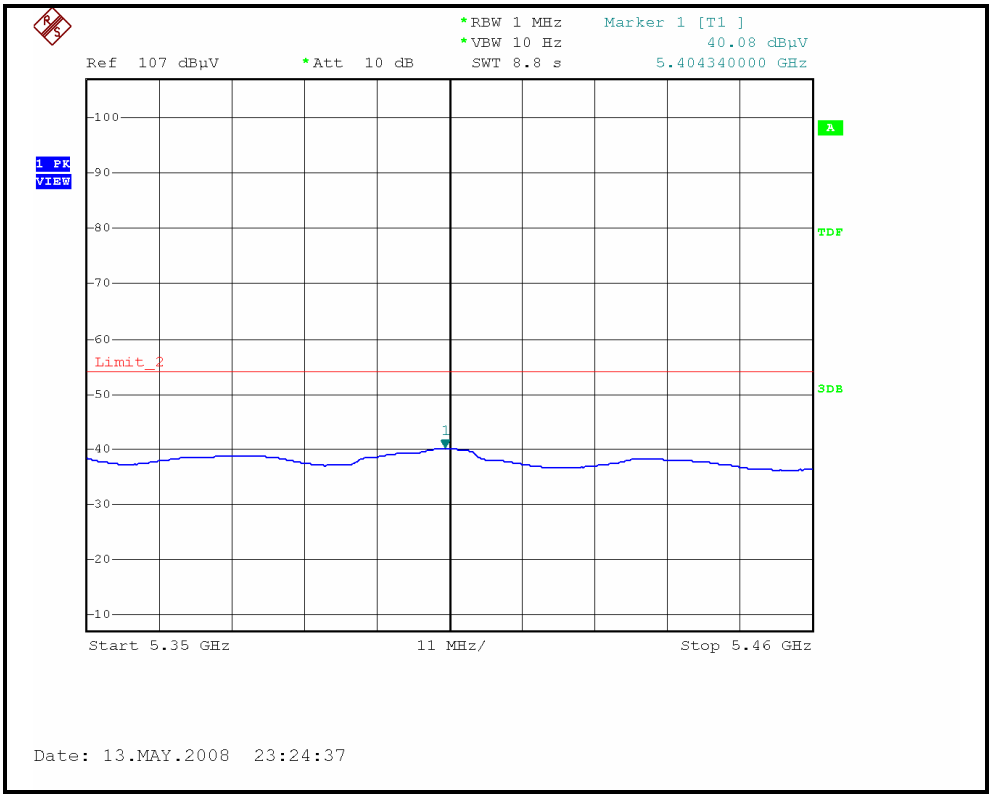
RESTRICTED BANDEDGE (DRAFT 802.11n (20MHz) MODE,CH1, VERTICAL)



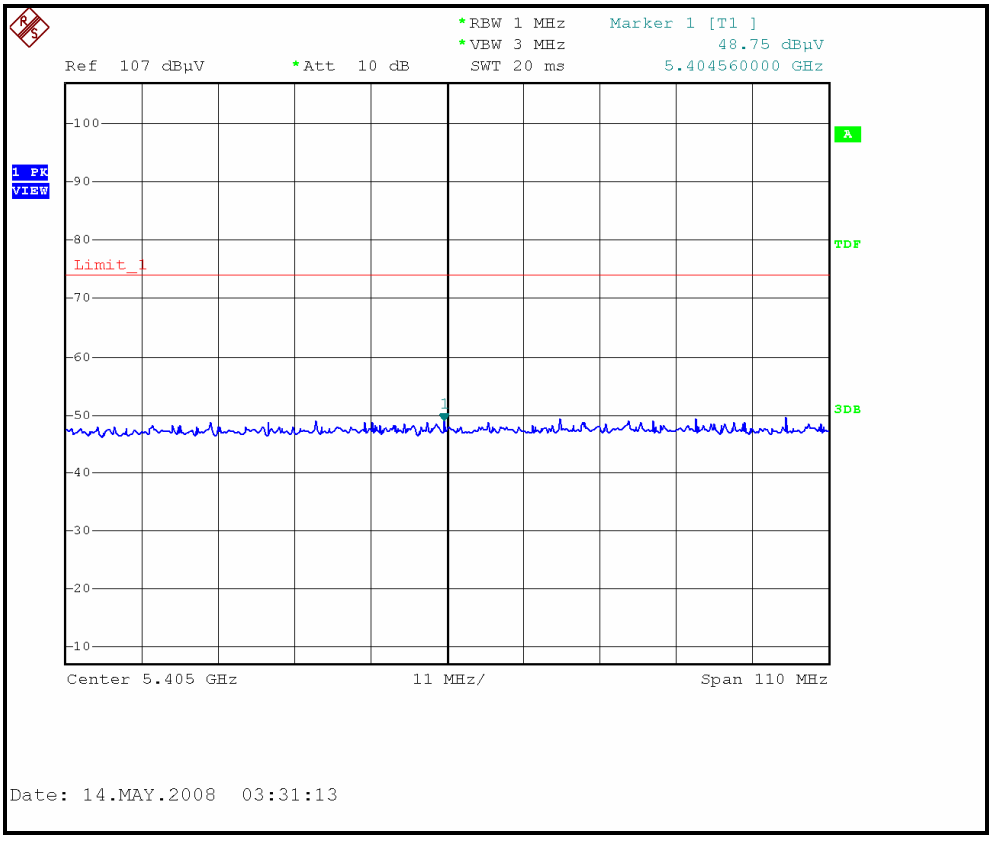


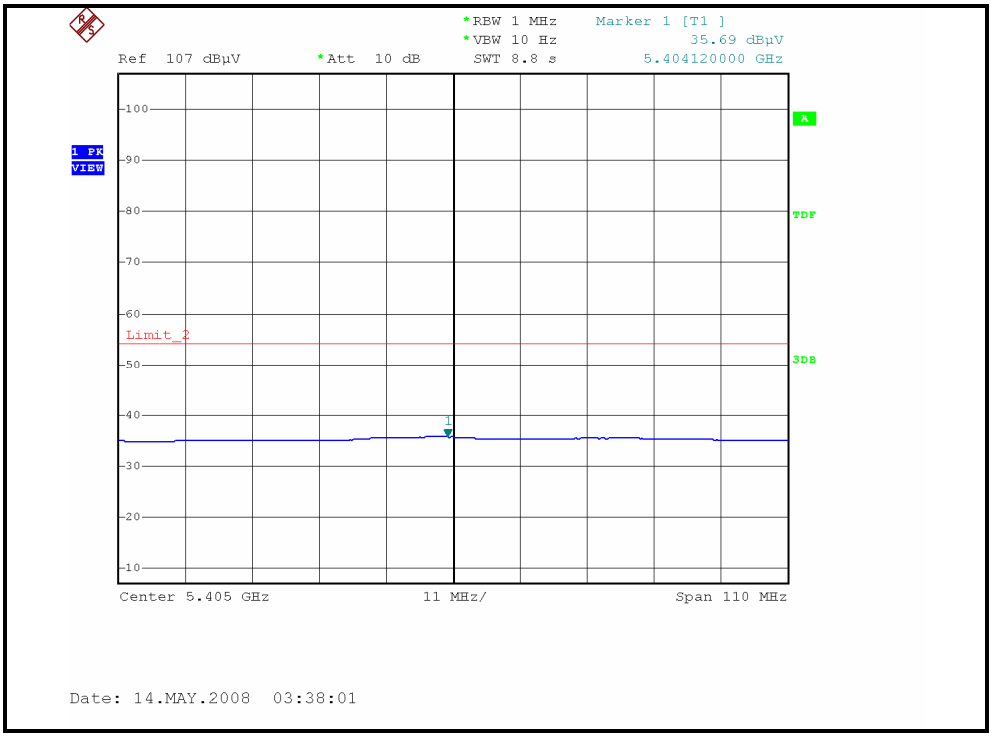
RESTRICTED BANDEDGE (DRAFT 802.11n (20MHz) MODE,CH4, HORIZONTAL)





RESTRICTED BANDEDGE (DRAFT 802.11n (20MHz) MODE,CH4, VERTICAL)





DRAFT 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	69.73 PK	74.00	-4.27	1.19 H	30	33.35	36.38
2	**#5150.00**	**51.59 AV**	**54.00**	**-2.41**	**1.19 H**	**30**	**15.21**	**36.38**
3	*5190.00	110.20 PK			1.19 H	30	73.79	36.41
4	*5190.00	97.50 AV			1.19 H	30	61.09	36.41
5	10380.00	66.90 PK	88.30	-21.40	1.43 H	54	21.30	45.60
6	10380.00	50.20 AV	68.30	-18.10	1.43 H	54	4.60	45.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5150.00	63.07 PK	74.00	-10.93	1.00 V	183	26.69	36.38
2	#5150.00	45.51 AV	54.00	-8.49	1.00 V	183	9.13	36.38
3	*5190.00	103.00 PK			1.00 V	183	66.59	36.41
4	*5190.00	89.60 AV			1.00 V	183	53.19	36.41
5	10380.00	59.00 PK	88.30	-29.30	1.00 V	1	13.40	45.60
6	10380.00	45.50 AV	68.30	-22.80	1.00 V	1	-0.10	45.60

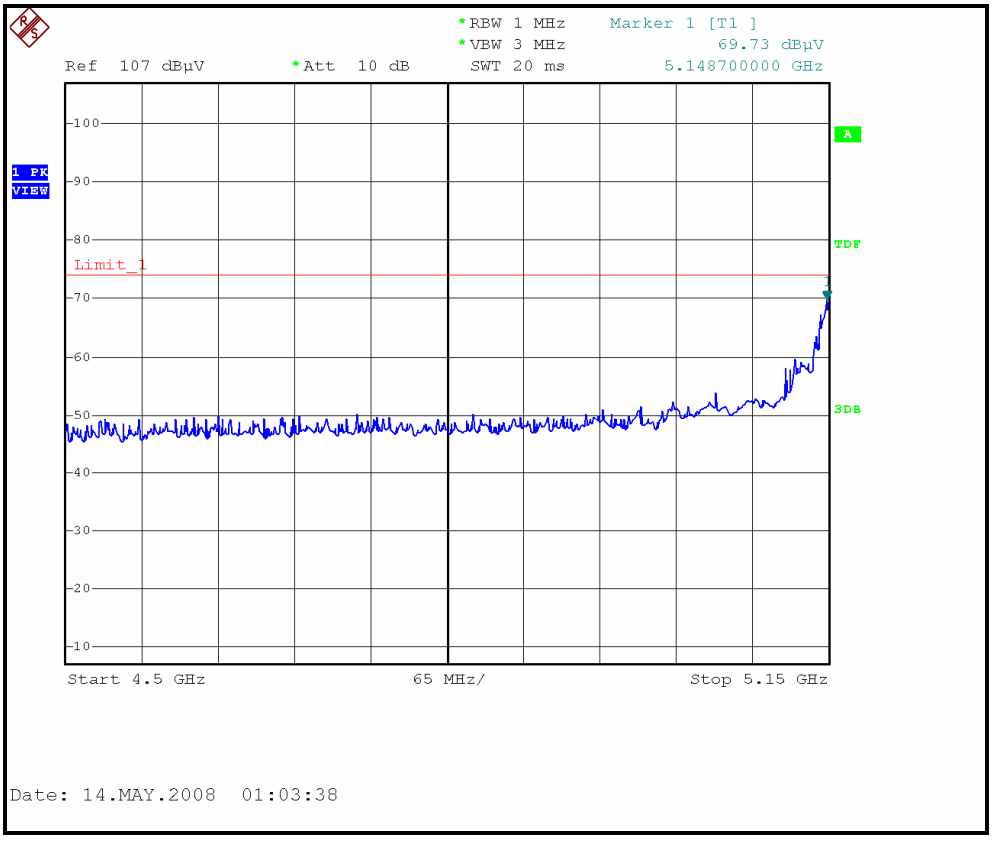
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6.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

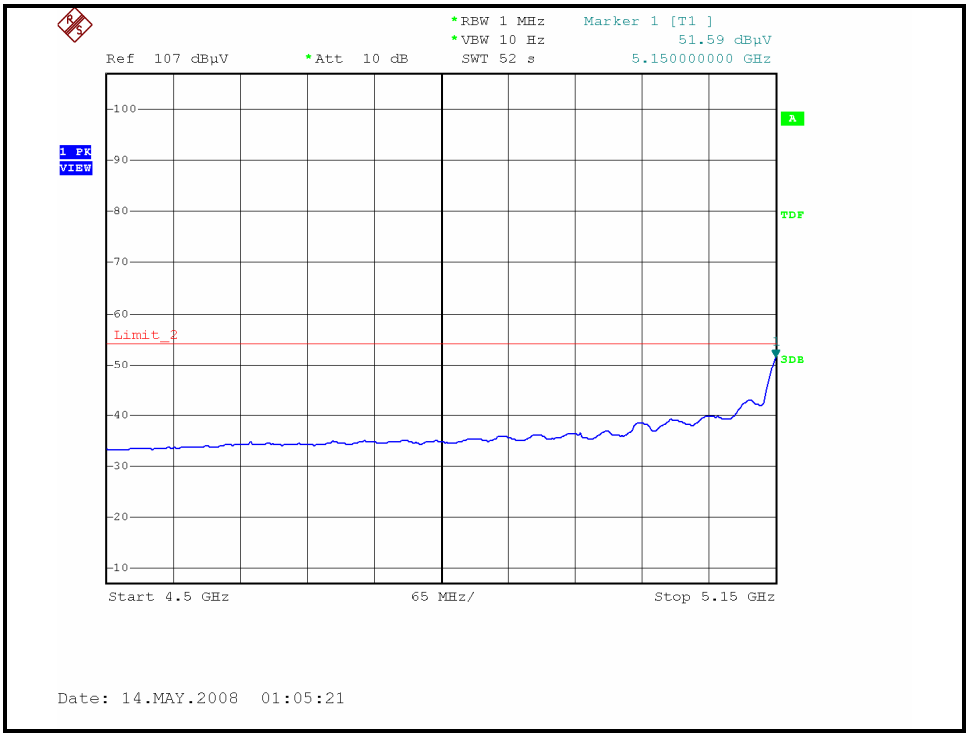
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 75%RH 965hPa	TESTED BY	Rex Huang

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	110.30 PK			1.21 H	52	73.86	36.44
2	*5230.00	97.50 AV			1.21 H	52	61.06	36.44
3	#5376.00	53.80 PK	74.00	-20.20	1.21 H	52	17.24	36.56
4	#5376.00	40.28 AV	54.00	-13.72	1.21 H	52	3.72	36.56
5	10460.00	63.80 PK	88.30	-24.50	1.46 H	53	18.10	45.70
6	10460.00	48.40 AV	68.30	-19.90	1.46 H	53	2.70	45.70
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	*5230.00	102.70 PK			1.03 V	204	66.26	36.44
2	*5230.00	89.50 AV			1.03 V	204	53.06	36.44
3	#5401.00	49.39 PK	74.00	-24.61	1.03 V	204	12.81	36.58
4	#5401.00	35.64 AV	54.00	-18.36	1.03 V	204	-0.94	36.58
5	10460.00	58.80 PK	88.30	-29.50	1.09 V	321	13.10	45.70
6	10460.00	44.40 AV	68.30	-23.90	1.09 V	321	-1.30	45.70

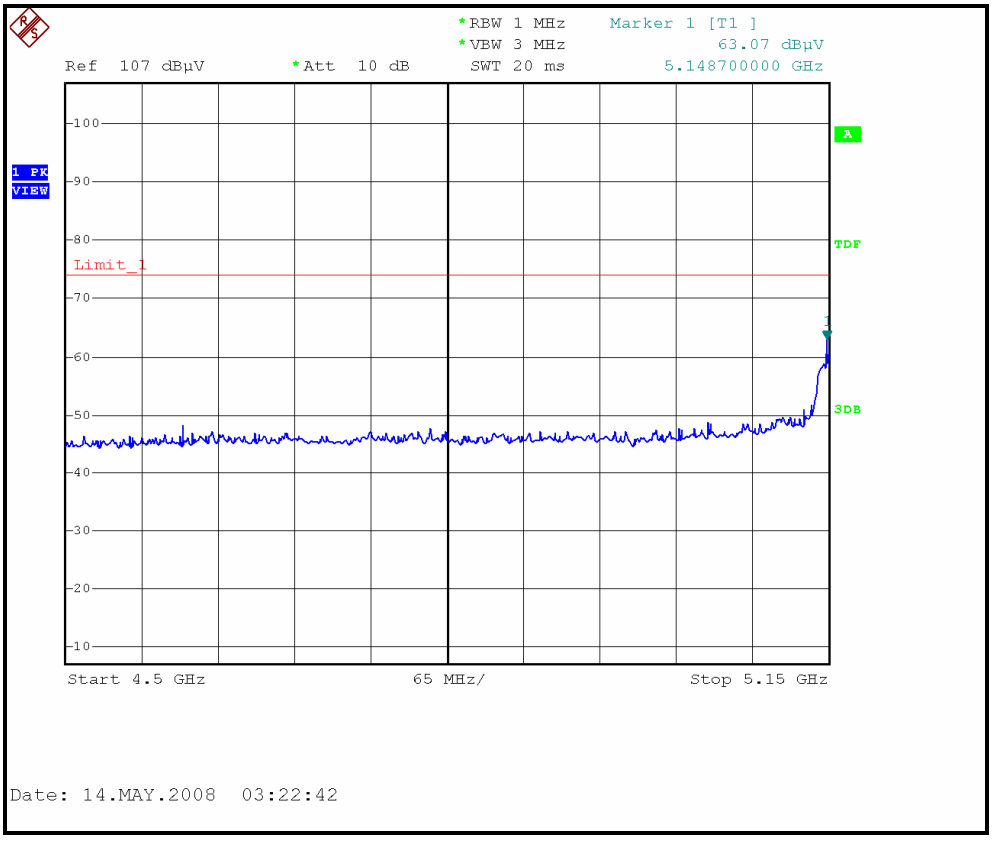
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6.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

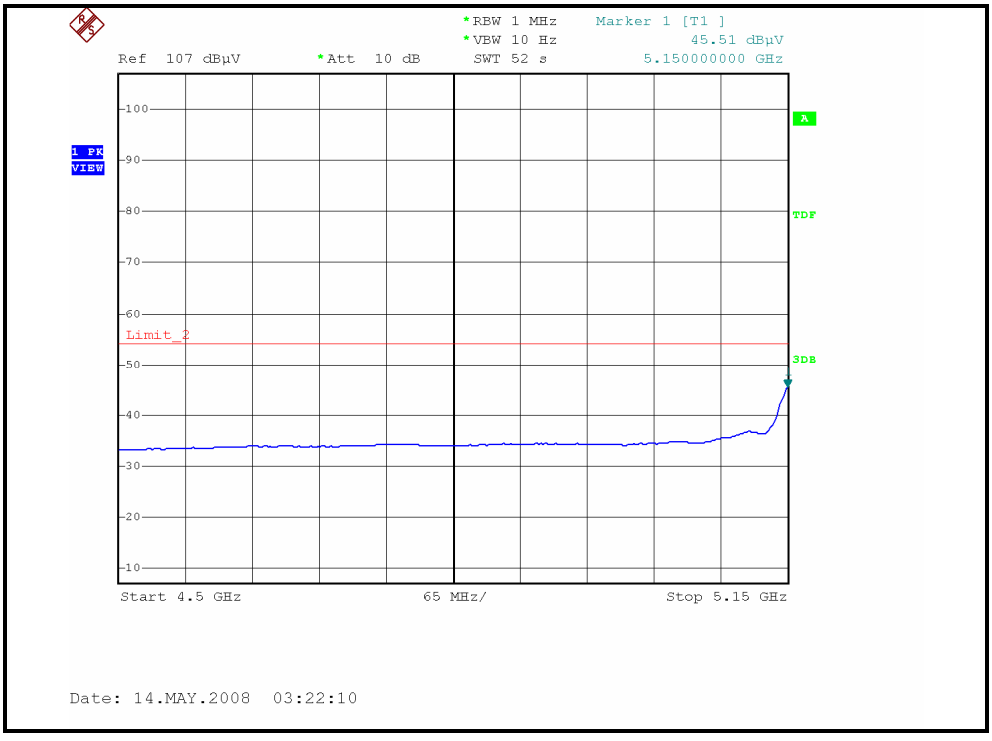
RESTRICTED BANDEDGE (DRAFT 802.11n (40MHz) MODE, CH1, HORIZONTAL)



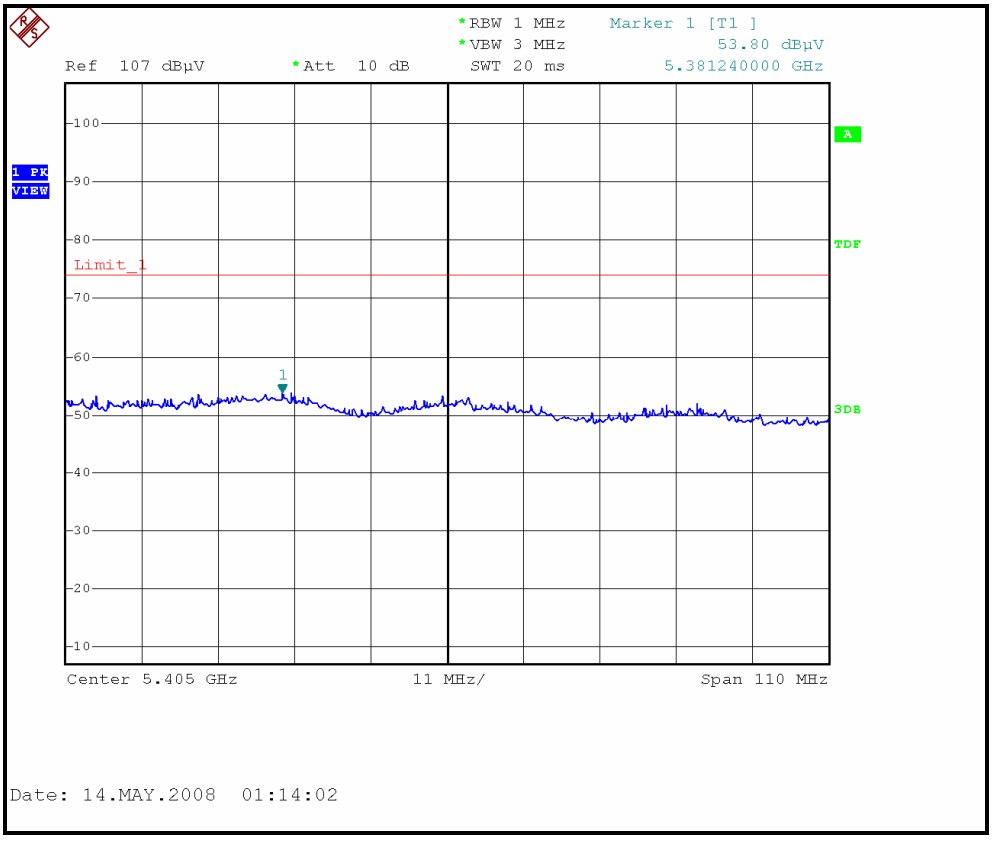


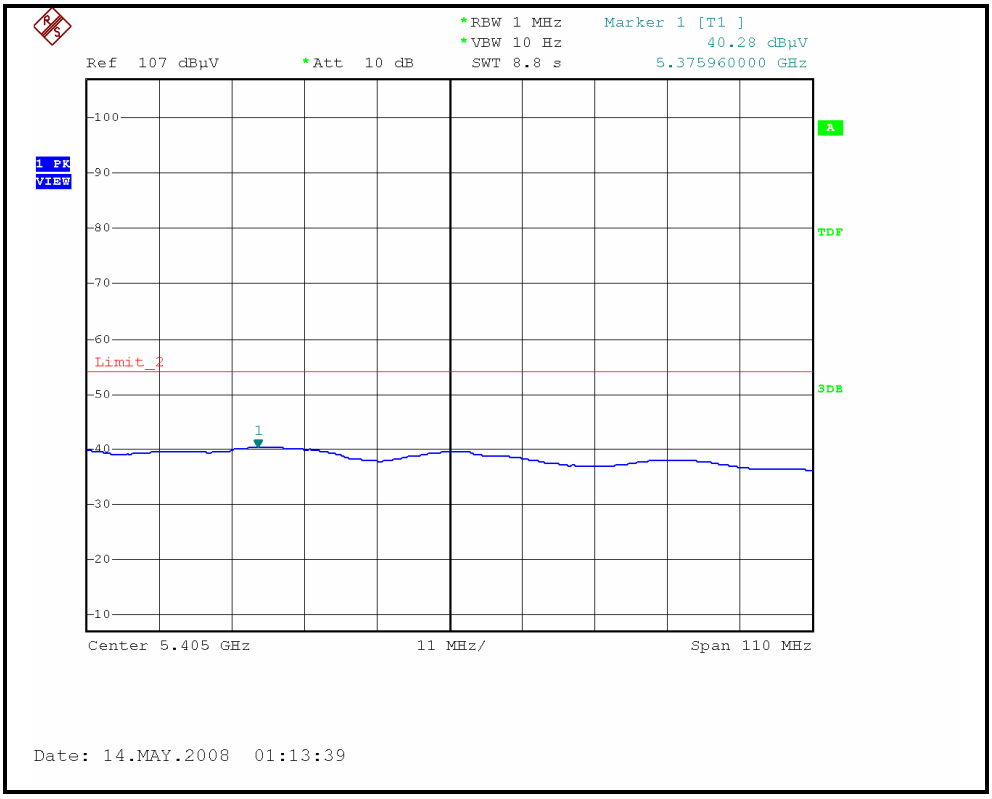
RESTRICTED BANDEDGE (DRAFT 802.11n (40MHz) MODE,CH1, VERTICAL)



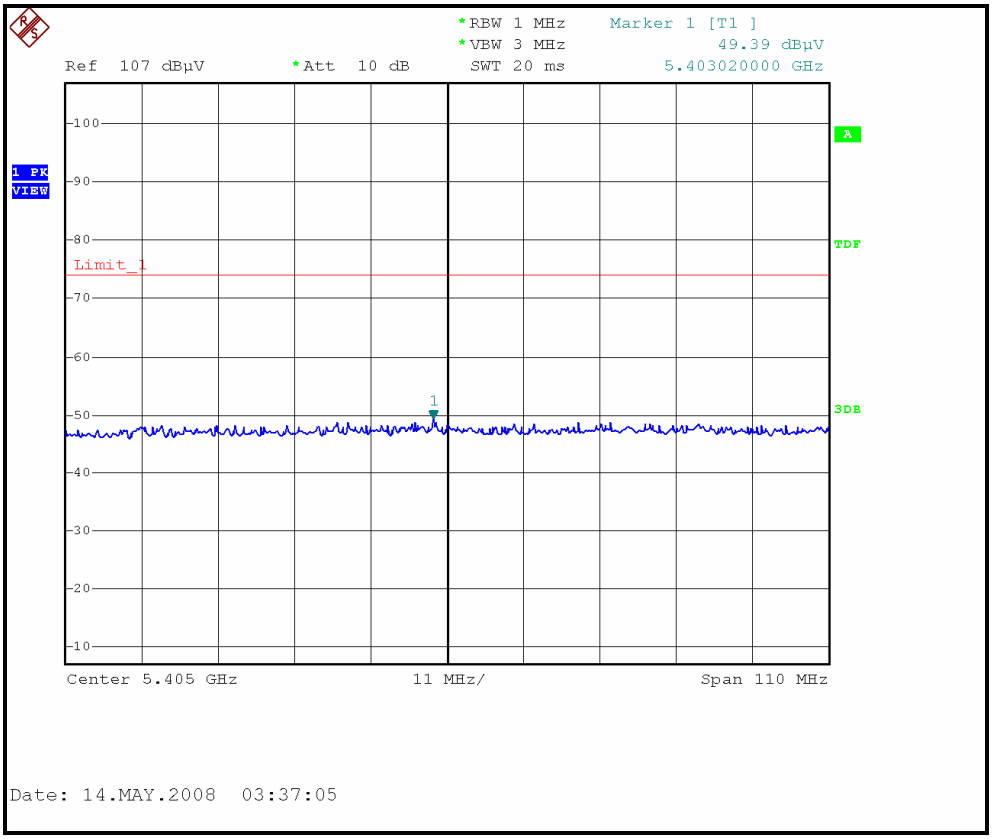


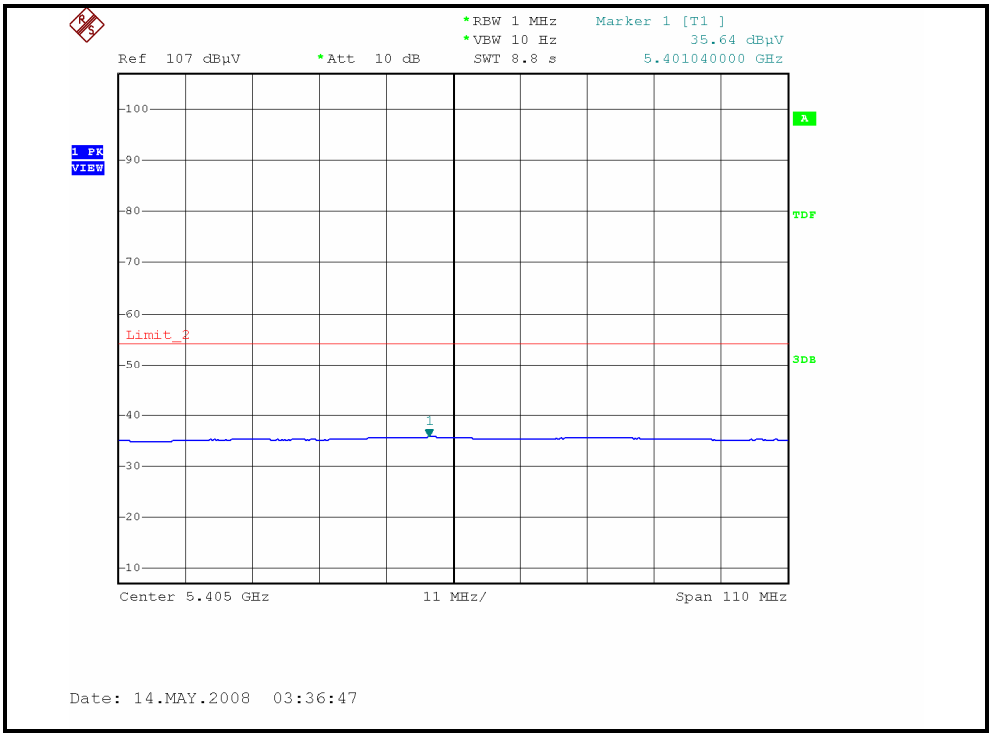
RESTRICTED BANDEDGE (DRAFT 802.11n (40MHz) MODE, CH2, HORIZONTAL)





RESTRICTED BANDEDGE (DRAFT 802.11n (40MHz) MODE, CH2, VERTICAL)





4.3 PEAK TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

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

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

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	July 11, 2008

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set span to encompass the entire emission bandwidth of the signal.
3. Set RBW to 1MHz, VBW to 300kHz.
4. Using the spectrum analyzer's channel power measurement function to measure the output power.

NOTE:
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11a OFDM MODULATION:

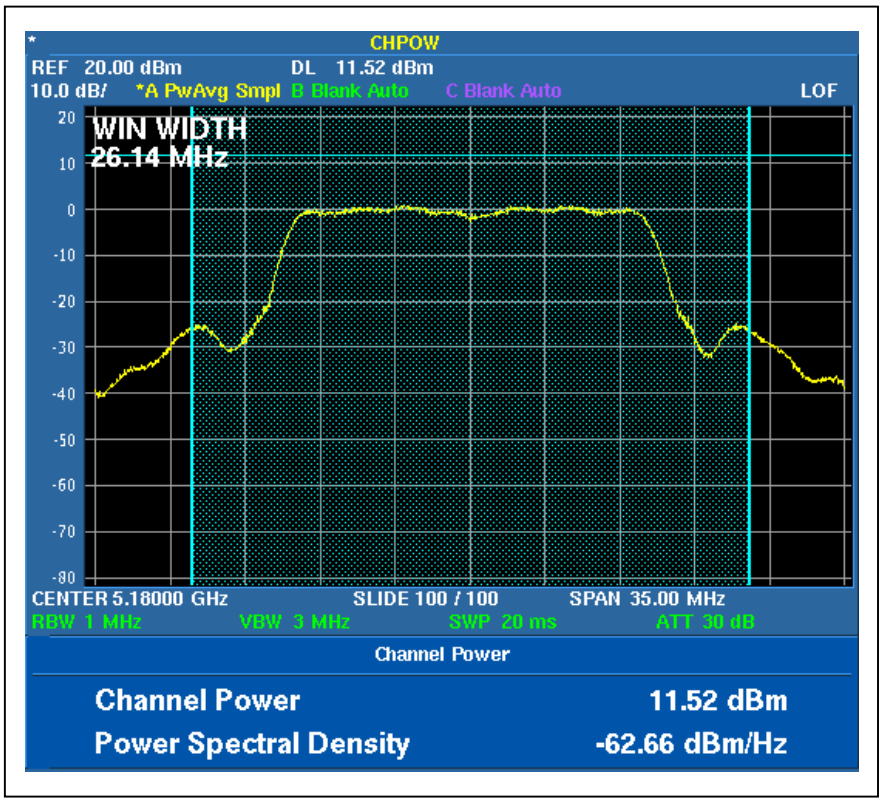
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	20deg.C, 60%RH, 972hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		PEAK POWER OUTPUT (mW)		TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	**PEAK POWER LIMIT (dBm)**	26dBc Occupied Bandwidth (MHz)		PASS/ FAIL
		Chain 0	Chain 1	Chain 0	Chain 1				Chain 0	Chain 1	
1	5180	11.52	11.63	14.191	14.555	14.59	28.746	17.00	26.14	25.06	PASS
2	5520	11.60	11.65	14.454	14.622	14.64	29.076	17.00	25.93	25.16	PASS
4	5240	11.31	11.32	13.521	13.552	14.33	27.073	17.00	26.11	25.16	PASS

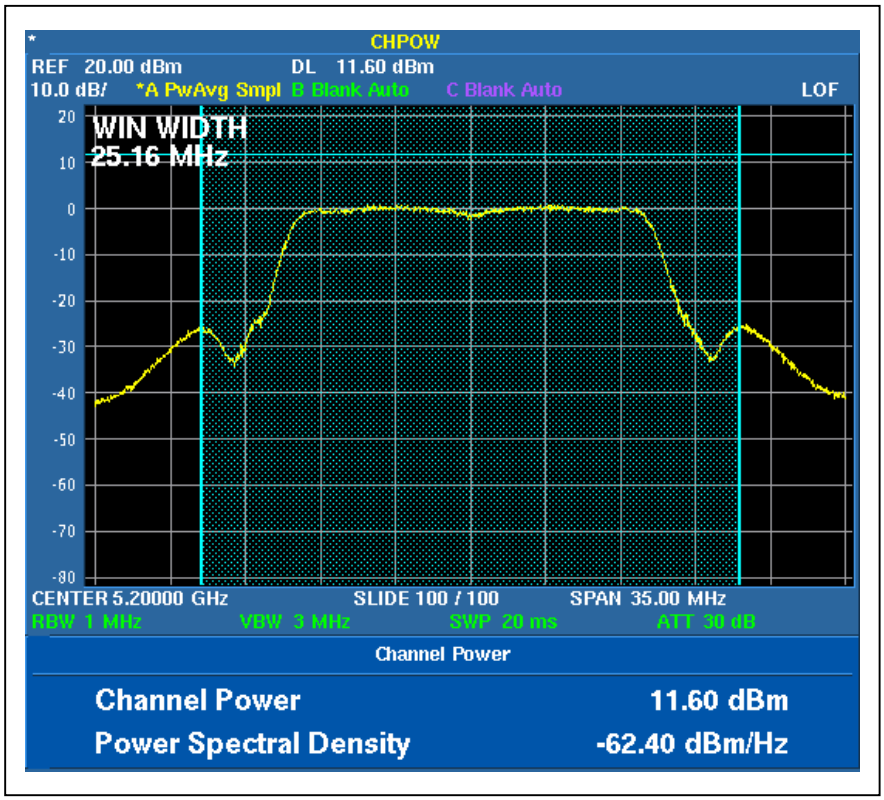
NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.

Peak Power Output:

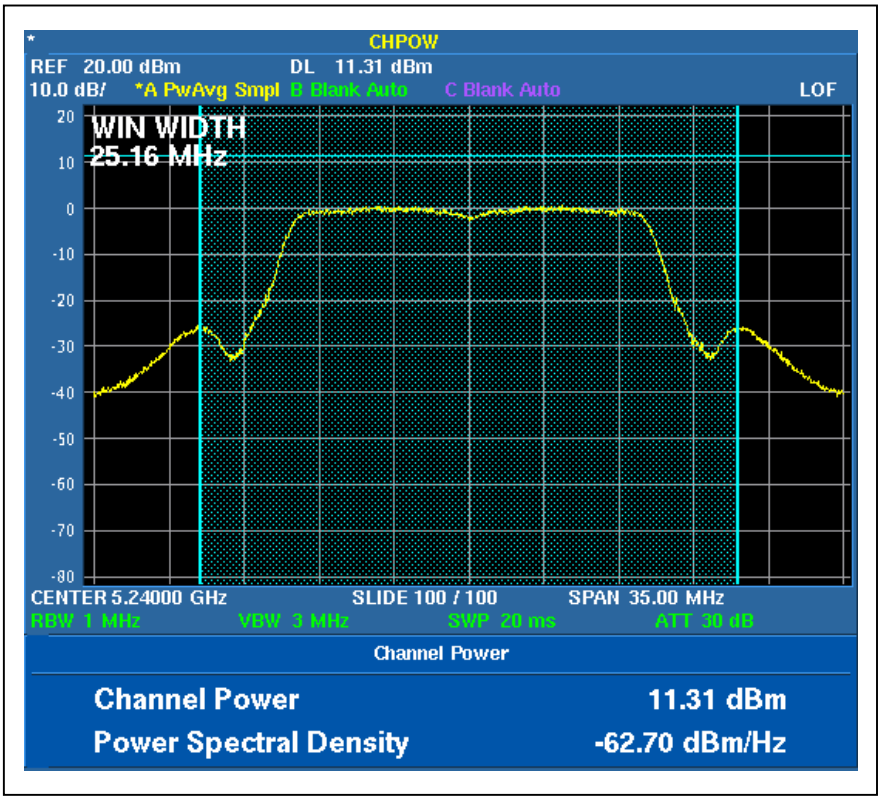
For Chain (0) :CH1



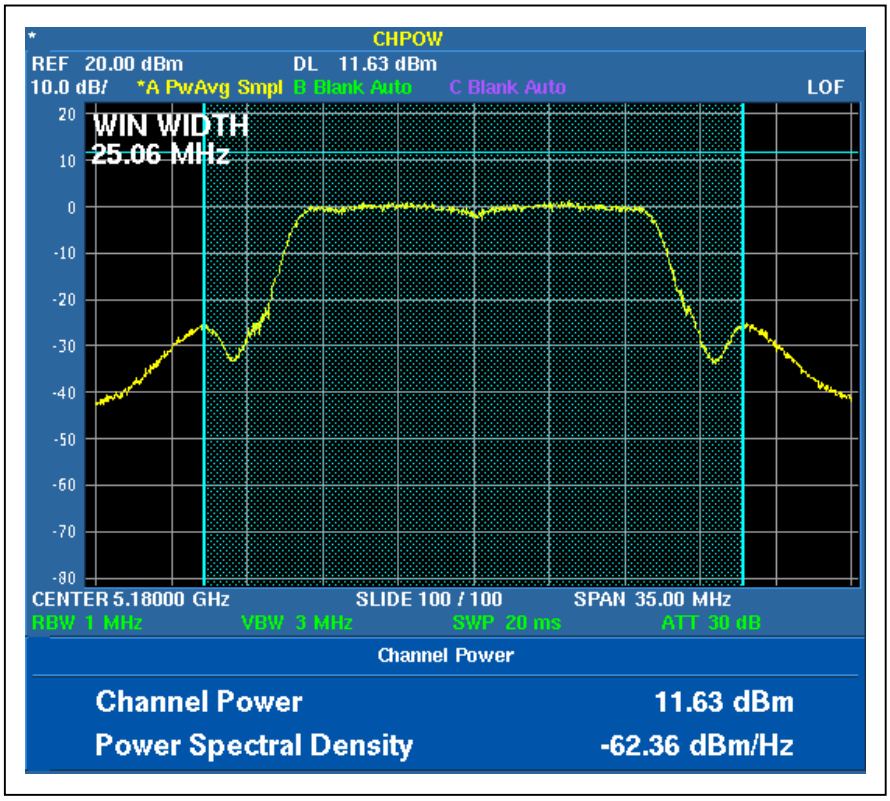
CH2



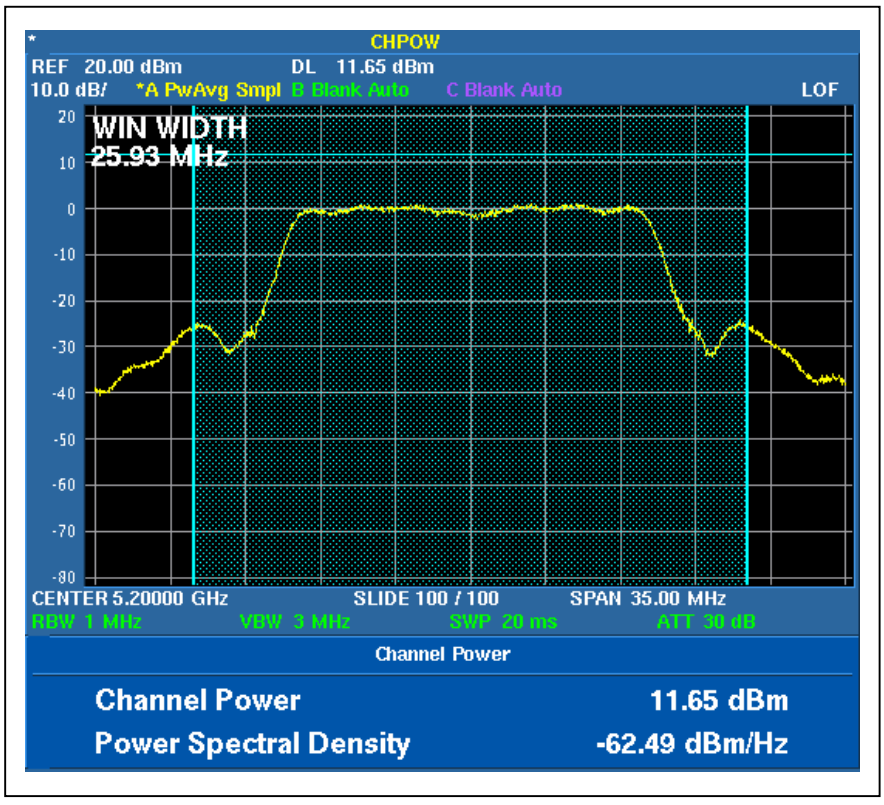
CH4


CHPOW
REF 20.00 dBm
DL 11.31 dBm
10.0 dB/
*A PwAvg Smpl
B Blank Auto
C Blank Auto
LOF
WIN WIDTH
25.16 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB
Channel Power
Channel Power 11.31 dBm
Power Spectral Density -62.70 dBm/Hz

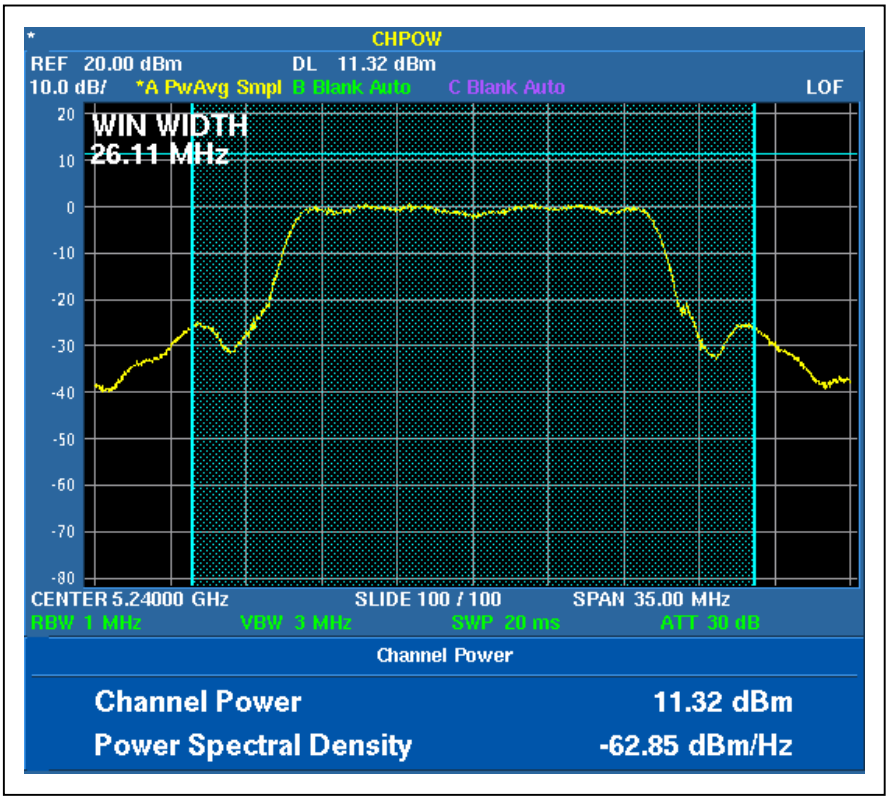
For Chain (1) :CH1



CH2

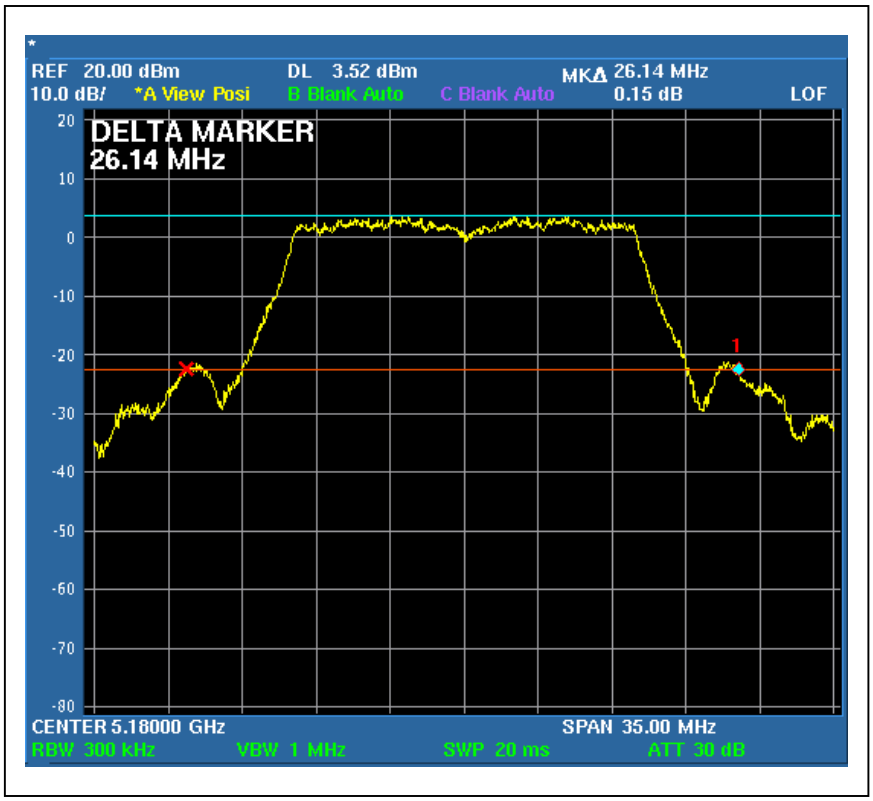


CH4

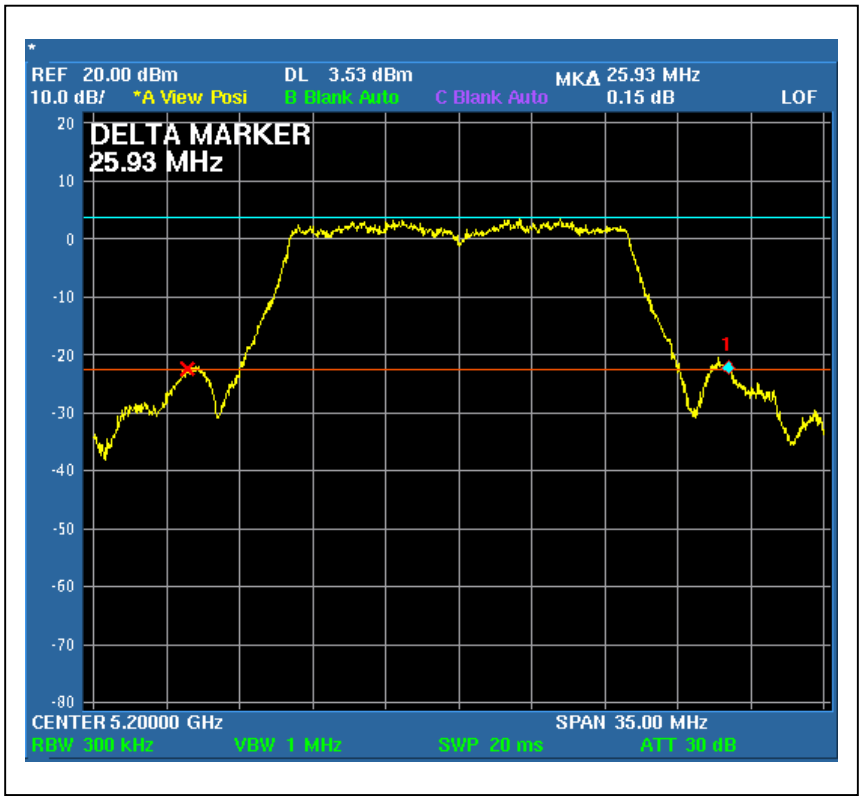

CHPOW
REF 20.00 dBm
DL 11.32 dBm
10.0 dB/
*A PwAvg Smpl
B Blank Auto
C Blank Auto
LOF
WIN WIDTH
26.11 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB
Channel Power
Channel Power 11.32 dBm
Power Spectral Density -62.85 dBm/Hz

26dB Occupied Bandwidth:

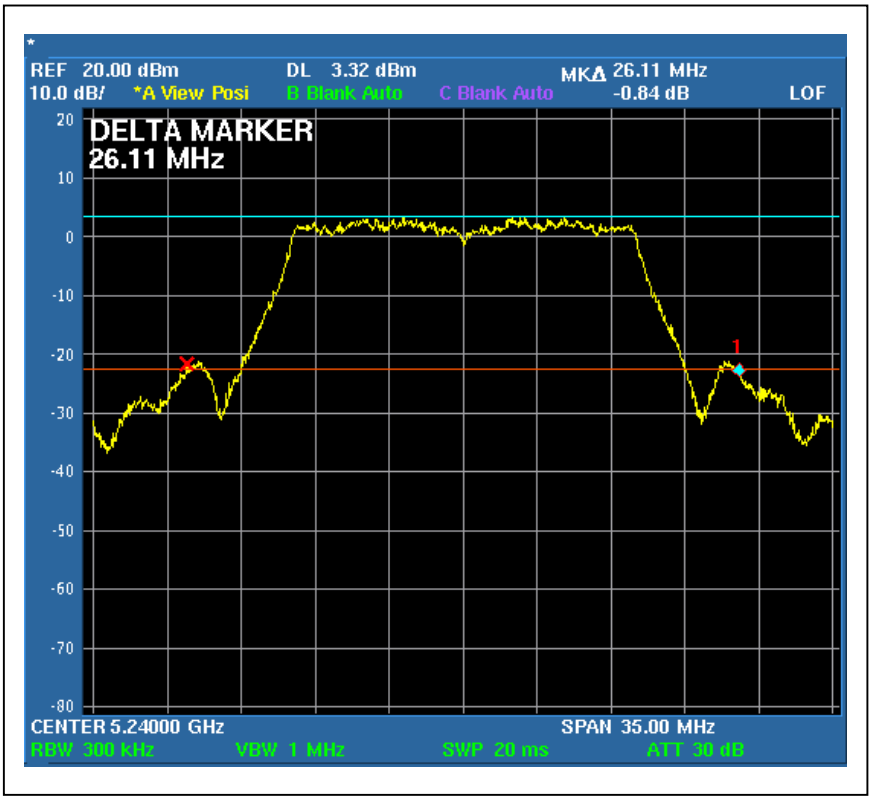
For Chain (0) :CH1



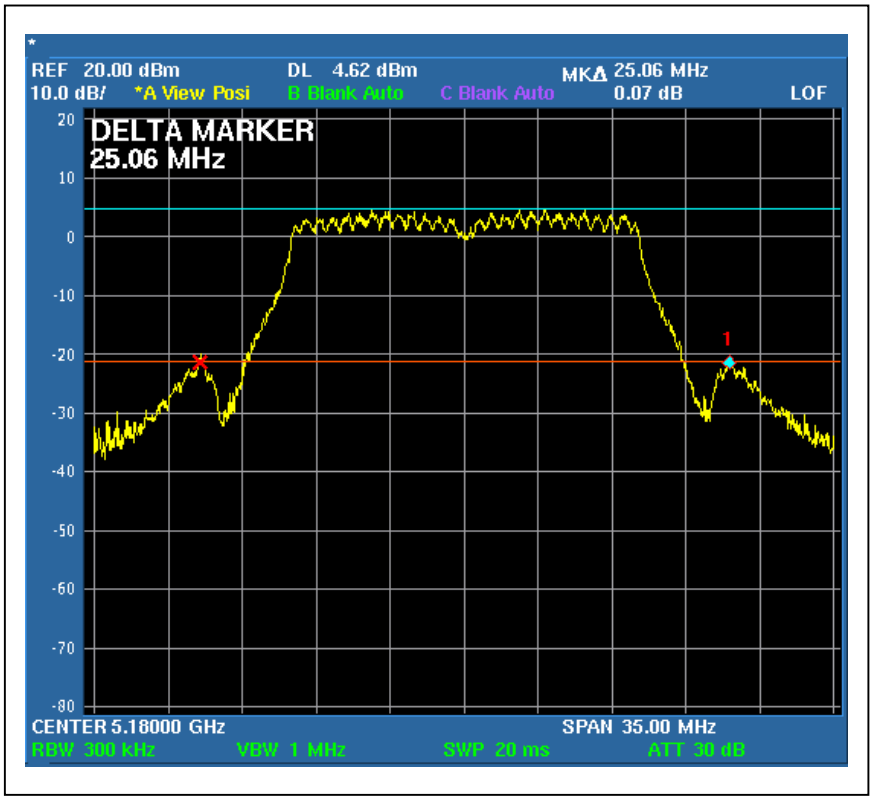
CH2



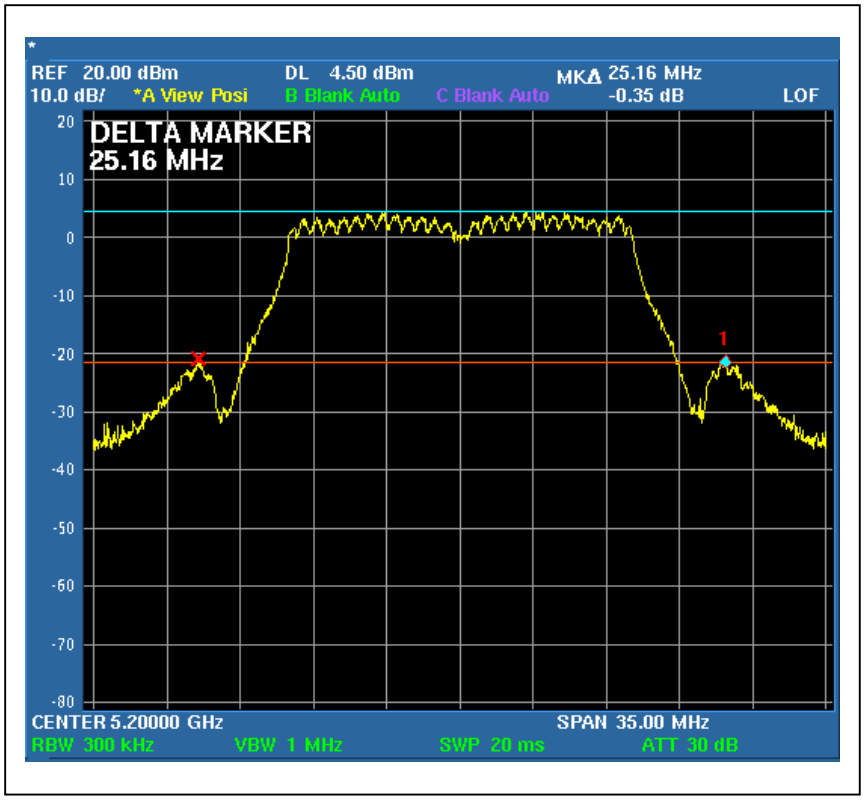
CH4


REF 20.00 dBm
DL 3.32 dBm
MKΔ 26.11 MHz
10.0 dB/ *A View Posi
B Blank Auto
C Blank Auto
-0.84 dB
LOF
DELTA MARKER
26.11 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz
SPAN 35.00 MHz
RBW 300 kHz
VBW 1 MHz
SWP 20 ms
ATT 30 dB

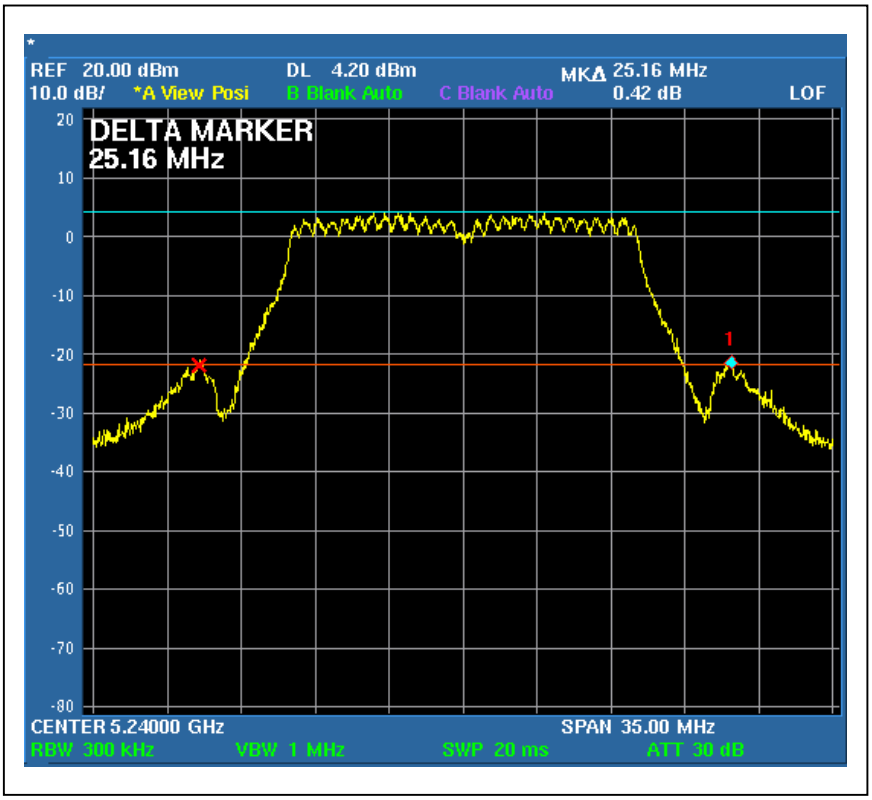
For Chain (1) :CH1



CH2



CH4


REF 20.00 dBm
DL 4.20 dBm
MKΔ 25.16 MHz
10.0 dB/ *A View Posi
B Blank Auto
C Blank Auto
0.42 dB
LOF
DELTA MARKER
25.16 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz
SPAN 35.00 MHz
RBW 300 kHz
VBW 1 MHz
SWP 20 ms
ATT 30 dB

DRAFT 802.11n (20MHz) OFDM modulation:

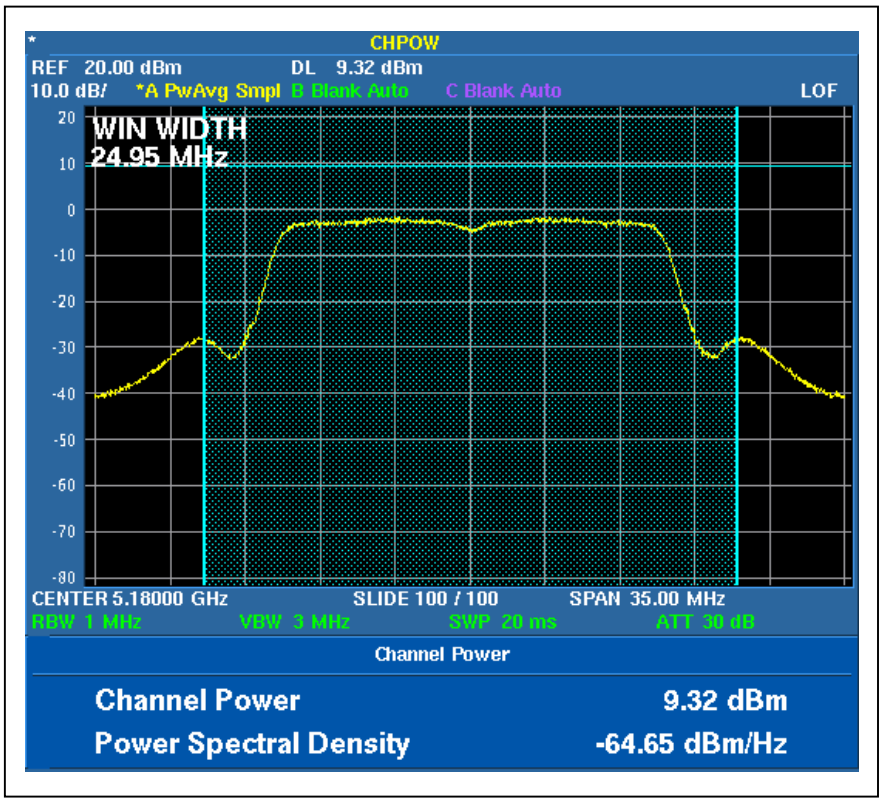
MODULATION TYPE	BPSK	**TRANSFER RATE**	13Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg.C, 72%RH, 972hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		PEAK POWER OUTPUT (mW)		TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	**PEAK POWER LIMIT (dBm)**	26dBc Occupied Bandwidth (MHz)		PASS/ FAIL
		Chain 0	Chain 1	Chain 0	Chain 1				Chain 0	Chain 1	
1	5180	9.32	9.64	8.551	9.204	12.49	17.755	17.00	24.95	25.83	PASS
2	5520	9.14	9.59	8.204	9.099	12.38	17.303	17.00	25.76	25.02	PASS
4	5240	10.09	10.57	10.209	11.402	13.35	21.611	17.00	25.86	25.69	PASS

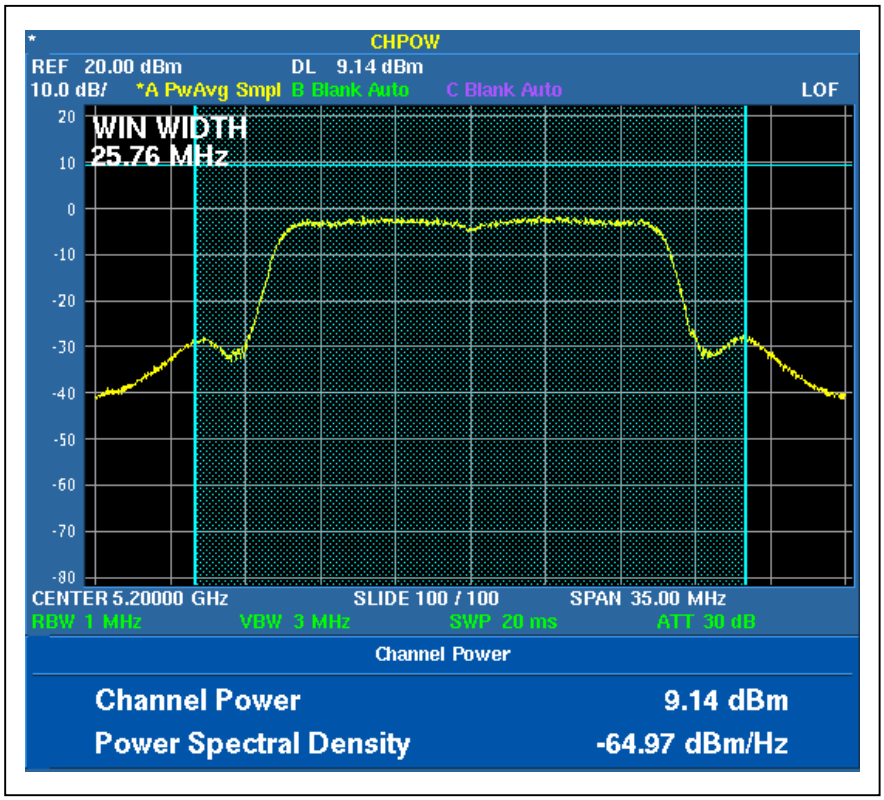
NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.

Peak Power Output:

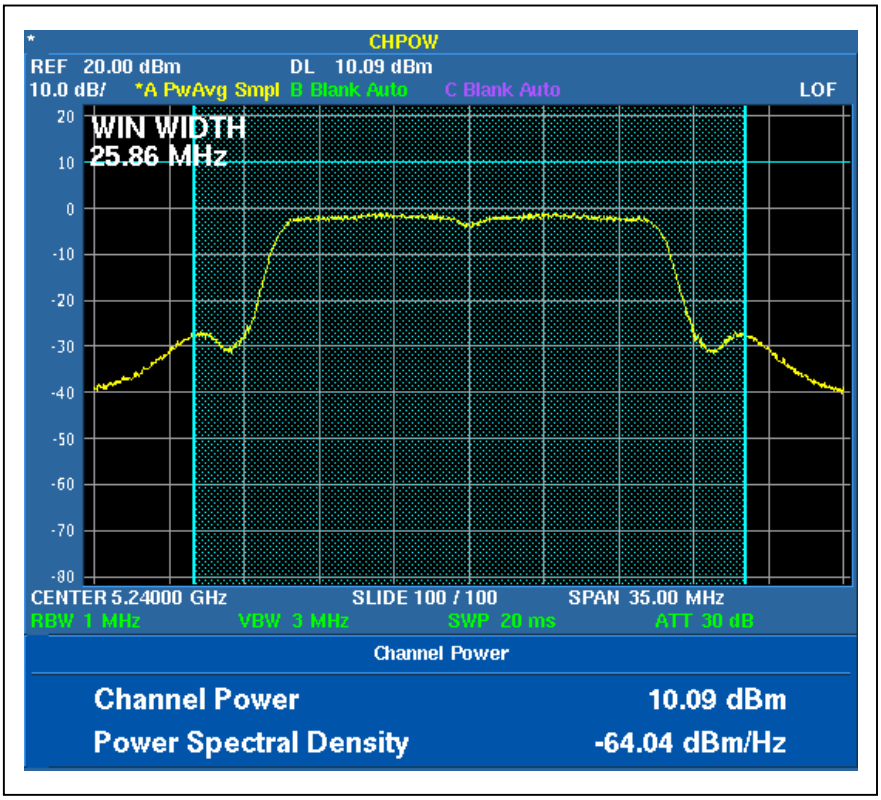
For Chain (0) :CH1



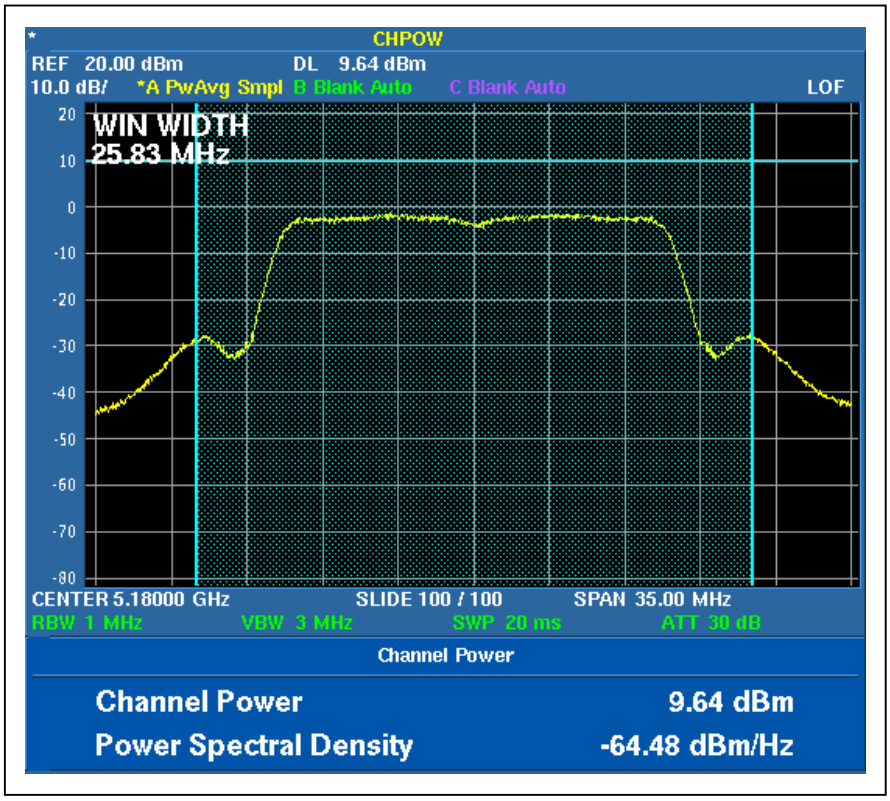
CH2



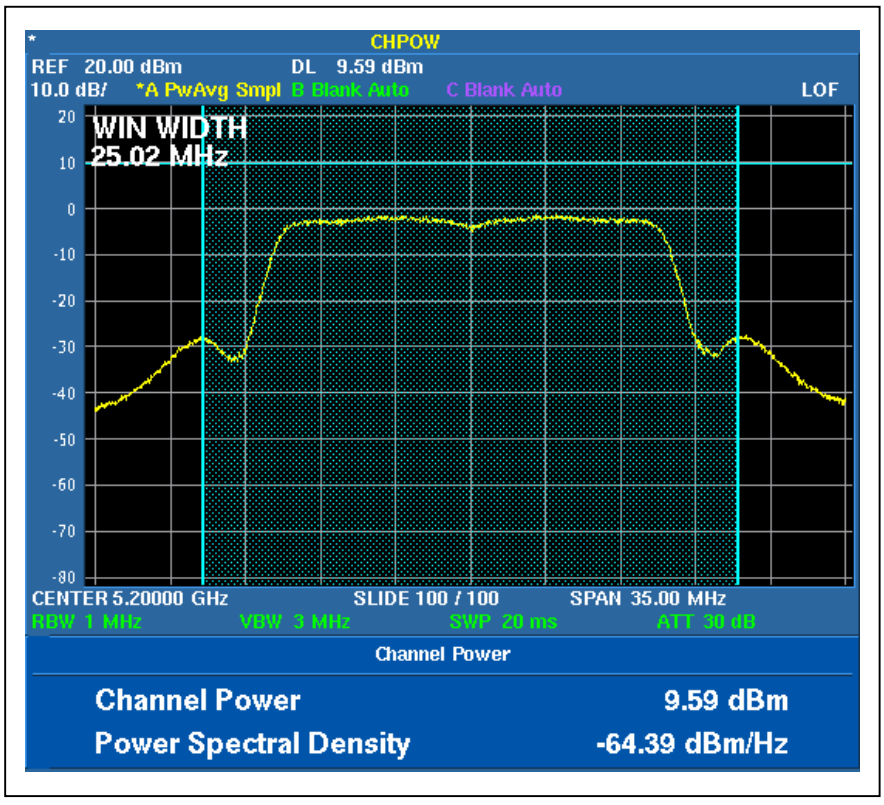
CH4


CHPOW
REF 20.00 dBm
DL 10.09 dBm
10.0 dB/
*A PwAvg Smpl
B Blank Auto
C Blank Auto
LOF
WIN WIDTH
25.86 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB
Channel Power
Channel Power 10.09 dBm
Power Spectral Density -64.04 dBm/Hz

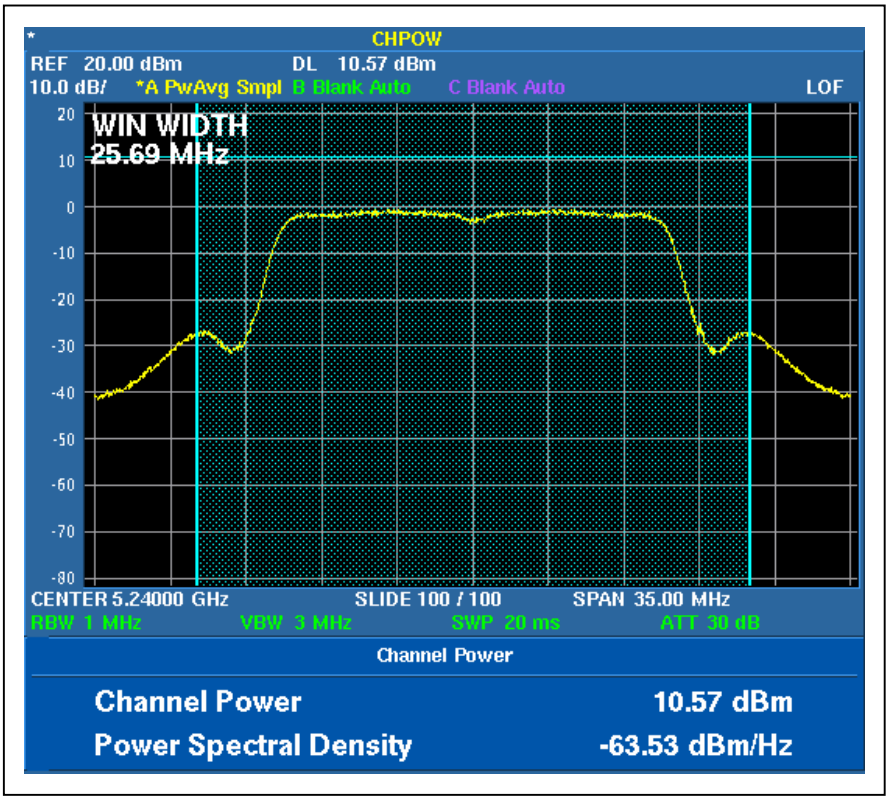
For Chain (1) :CH1



CH2

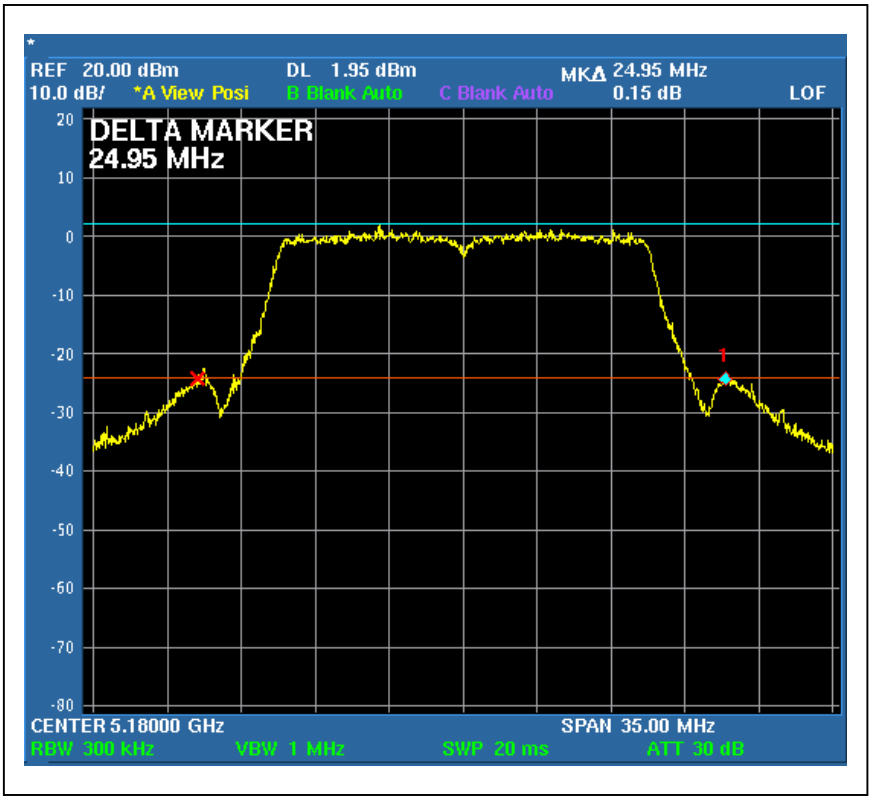


CH4

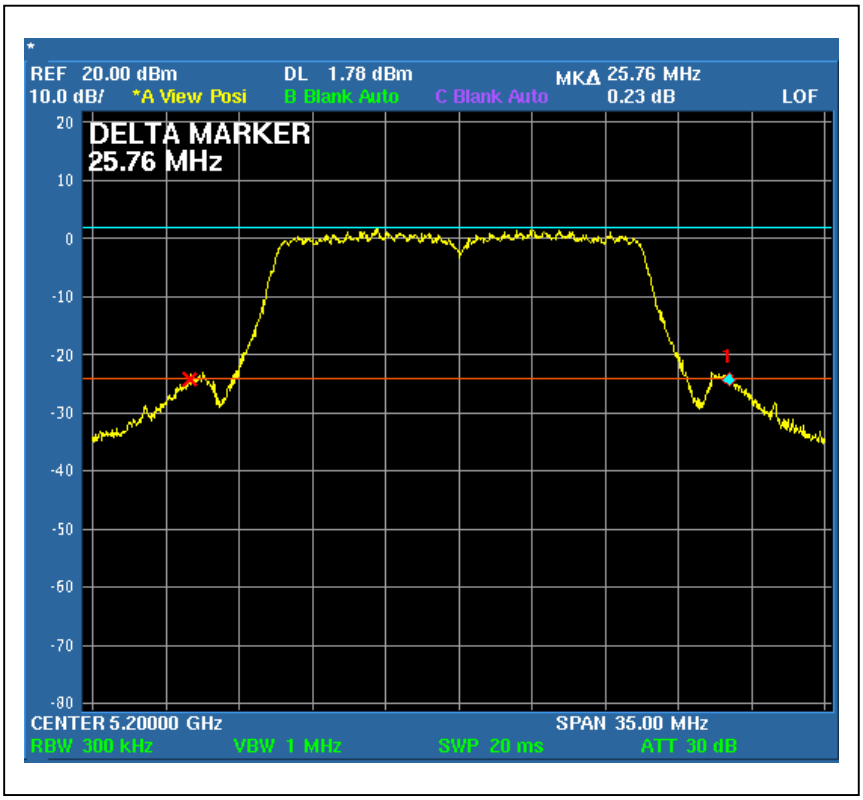

CHPOW
REF 20.00 dBm
DL 10.57 dBm
10.0 dB/
*A PwAvg Smpl
B Blank Auto
C Blank Auto
LOF
WIN WIDTH
25.69 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB
Channel Power
Channel Power 10.57 dBm
Power Spectral Density -63.53 dBm/Hz

26dB Occupied Bandwidth:

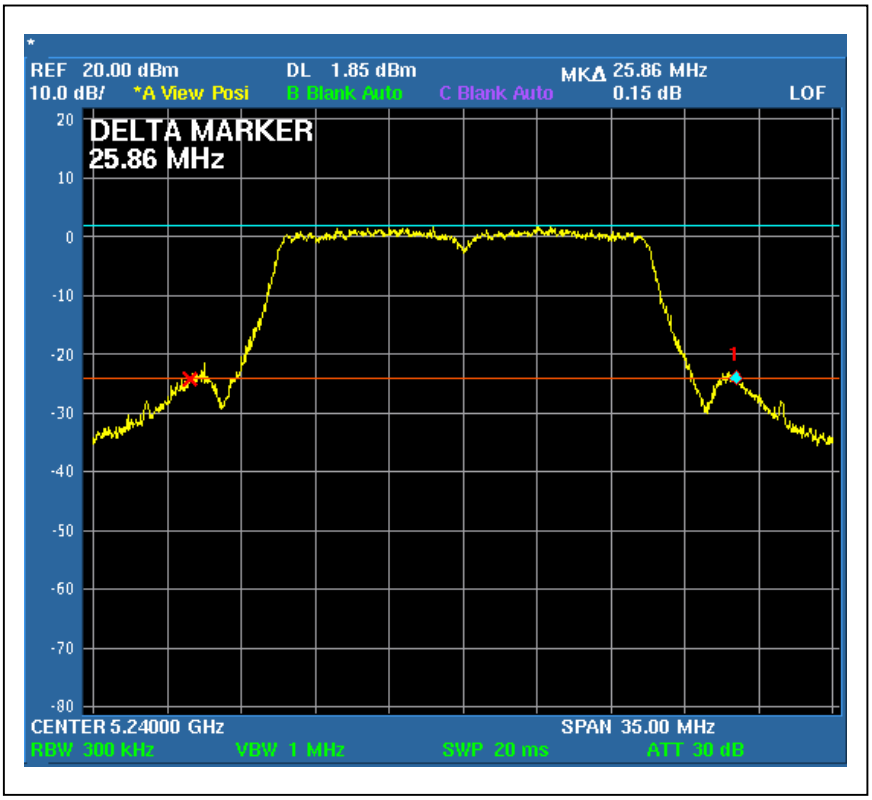
For Chain (0) :CH1



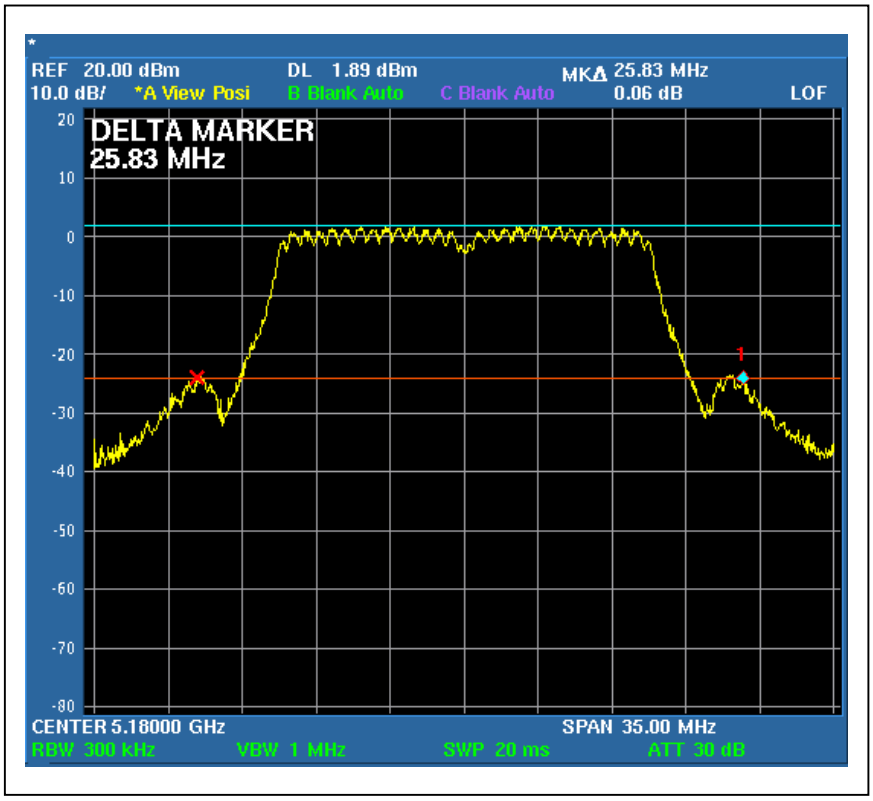
CH2



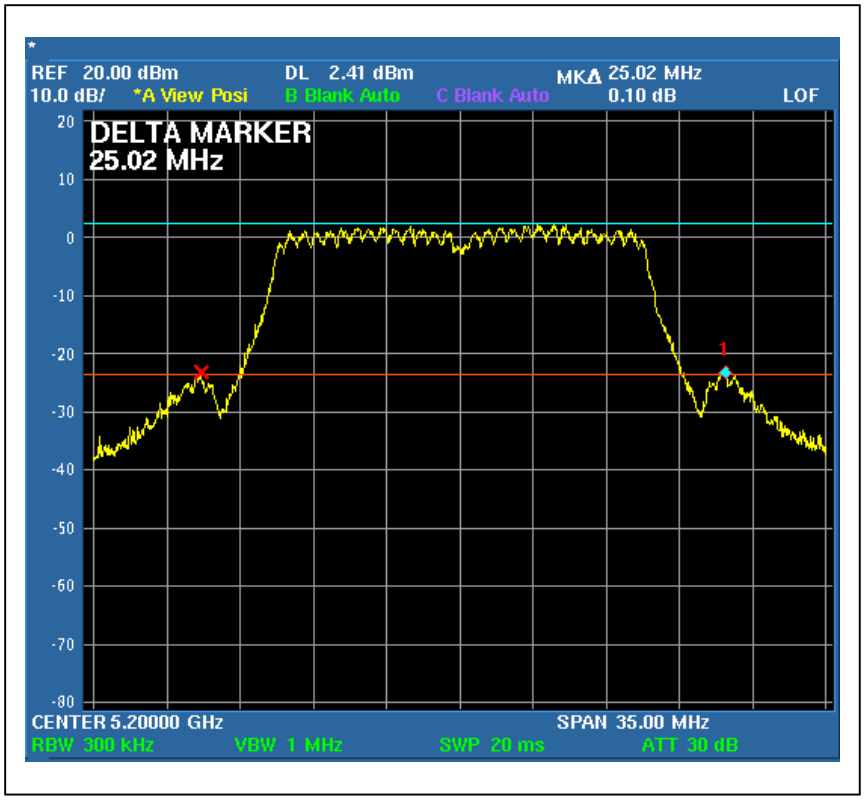
CH4


REF 20.00 dBm
DL 1.85 dBm
MKΔ 25.86 MHz
10.0 dB/ *A View Posi
B Blank Auto
C Blank Auto
0.15 dB
LOF
DELTA MARKER
25.86 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz
SPAN 35.00 MHz
RBW 300 kHz
VBW 1 MHz
SWP 20 ms
ATT 30 dB

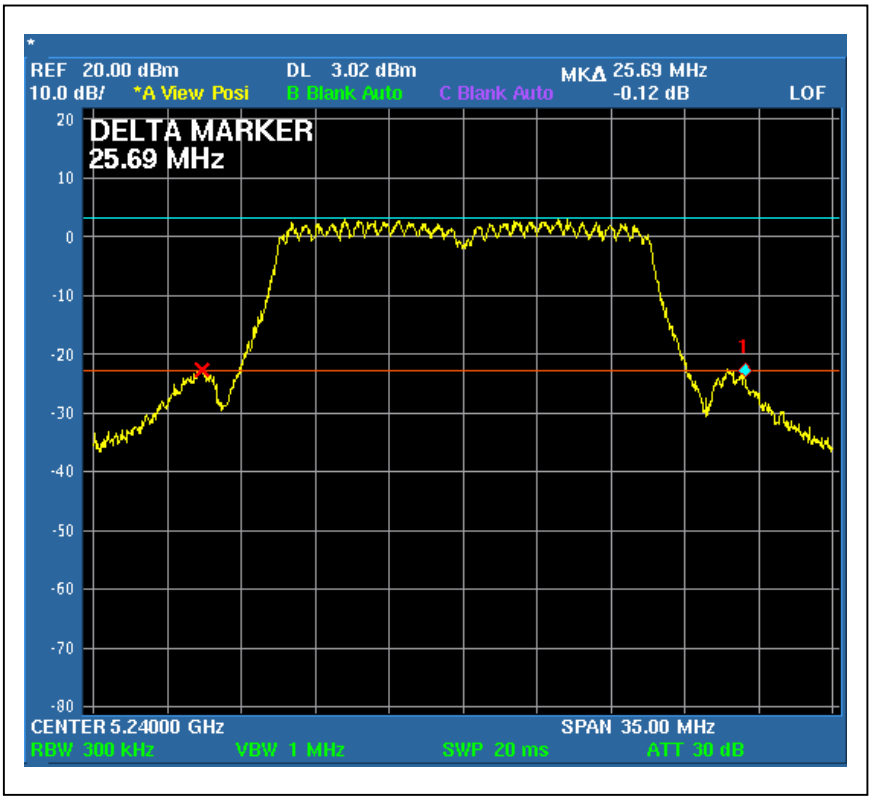
For Chain (1) :CH1



CH2



CH4


REF 20.00 dBm
DL 3.02 dBm
MKΔ 25.69 MHz
10.0 dB/ *A View Posi
B Blank Auto
C Blank Auto
-0.12 dB
LOF
DELTA MARKER
25.69 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz
SPAN 35.00 MHz
RBW 300 kHz
VBW 1 MHz
SWP 20 ms
ATT 30 dB

DRAFT 802.11n (40MHz) OFDM MODULATION:

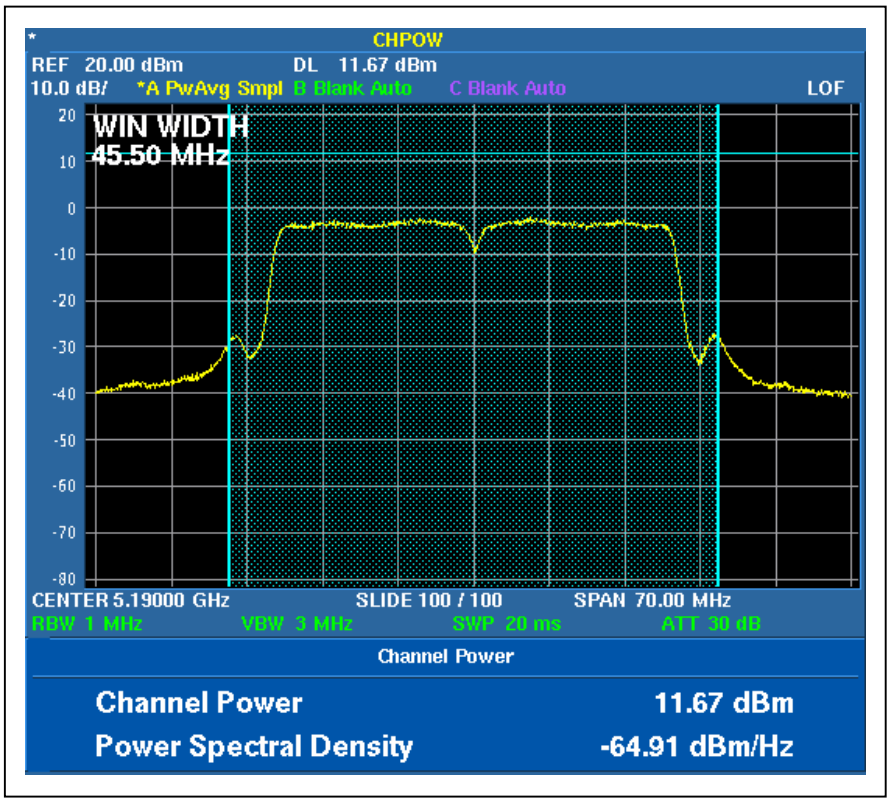
MODULATION TYPE	BPSK	**TRANSFER RATE**	27Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	20deg.C, 60%RH, 972hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		PEAK POWER OUTPUT (mW)		TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	**PEAK POWER LIMIT (dBm)**	26dBc Occupied Bandwidth (MHz)		PASS/ FAIL
		Chain 0	Chain 1	Chain 0	Chain 1				Chain 0	Chain 1	
1	5190	11.67	12.49	14.69	17.74	15.1	32.431	17.00	45.50	44.45	PASS
2	5230	11.24	12.37	13.305	17.258	14.9	30.563	17.00	45.36	44.80	PASS

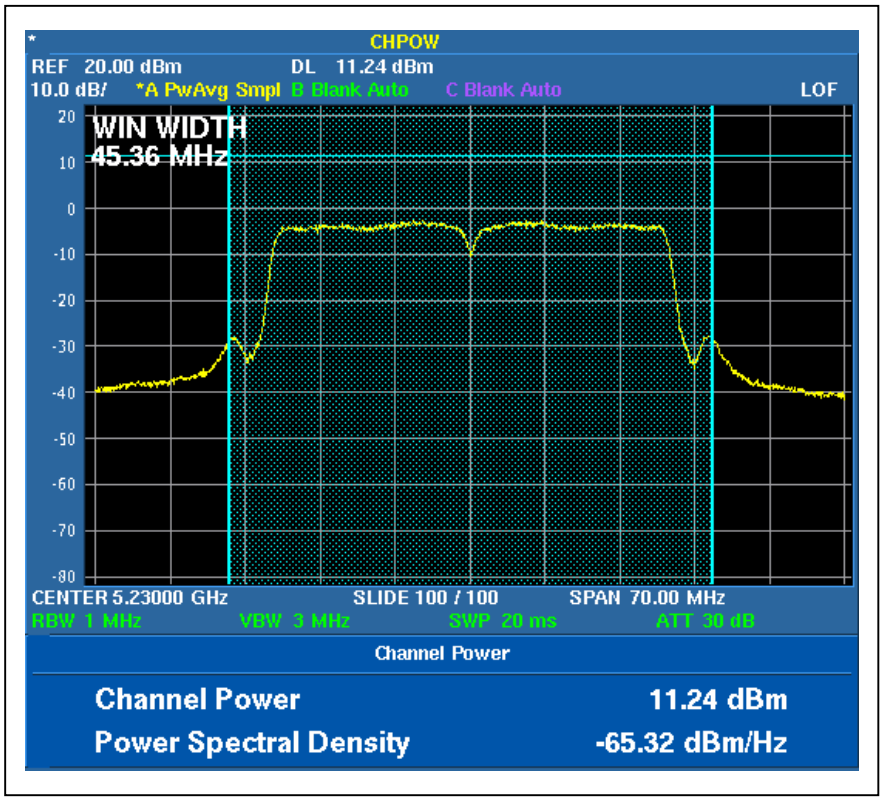
NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.

Peak Power Output:

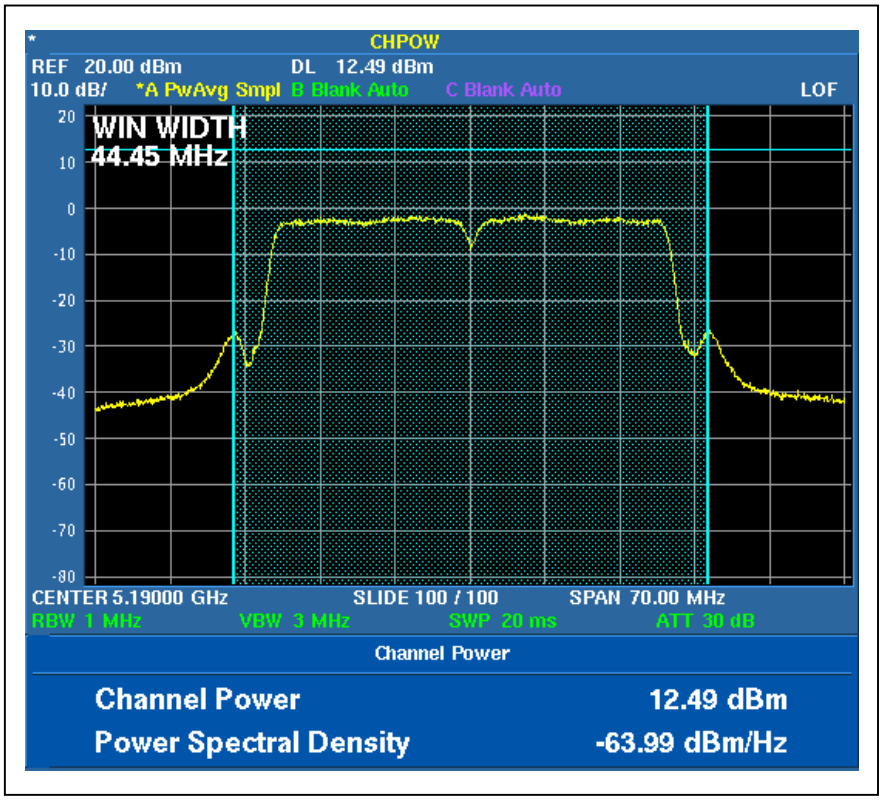
For Chain (0) :CH1



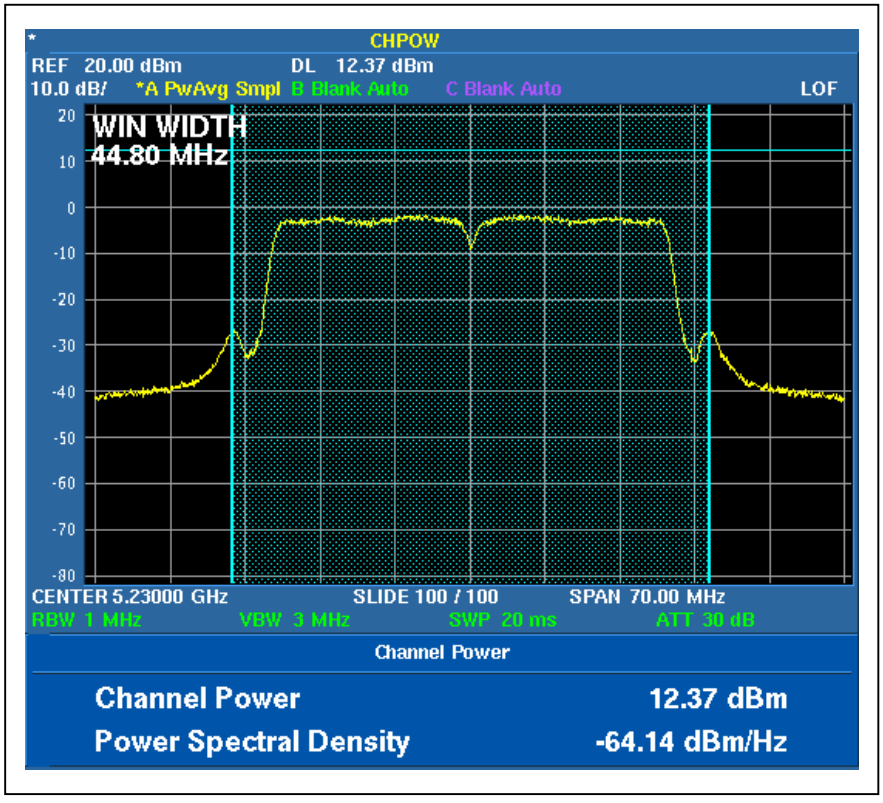
CH2



For Chain (1) :CH1

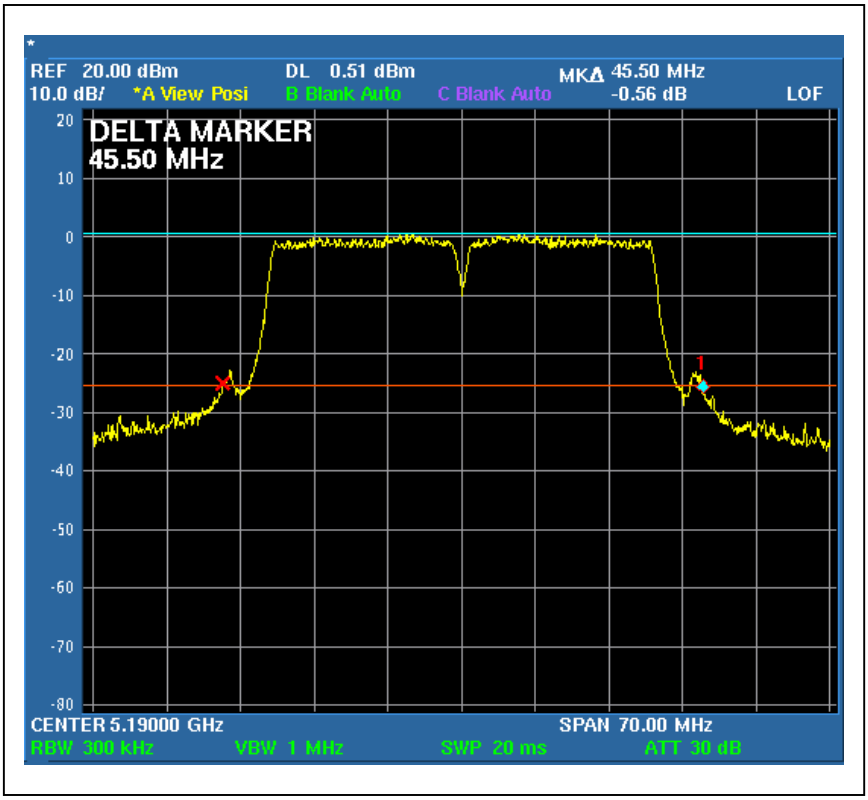


CH2

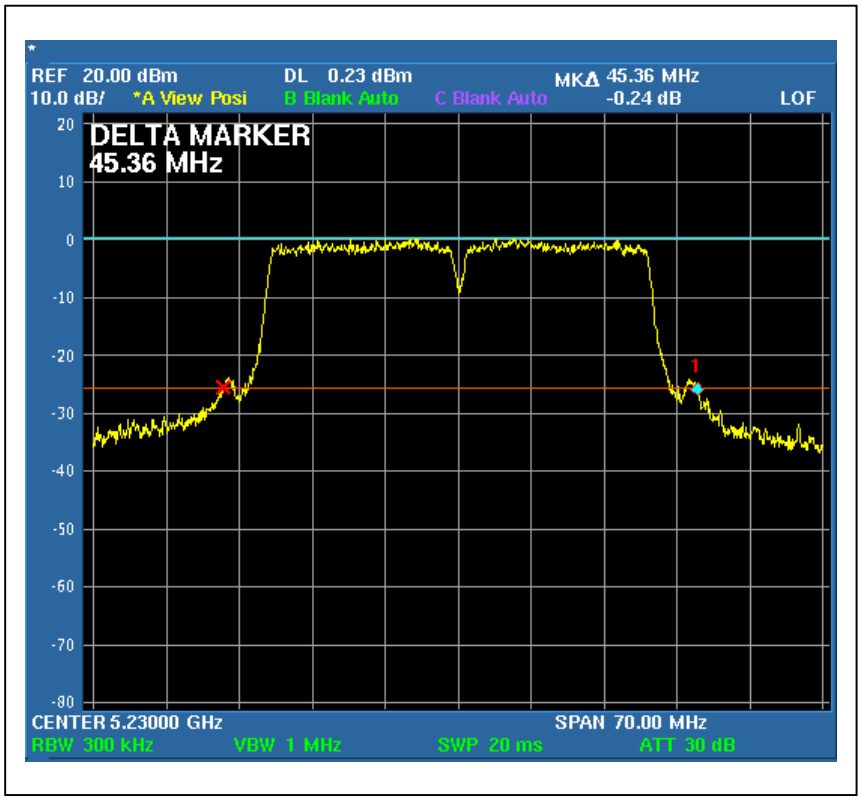


26dB Occupied Bandwidth:

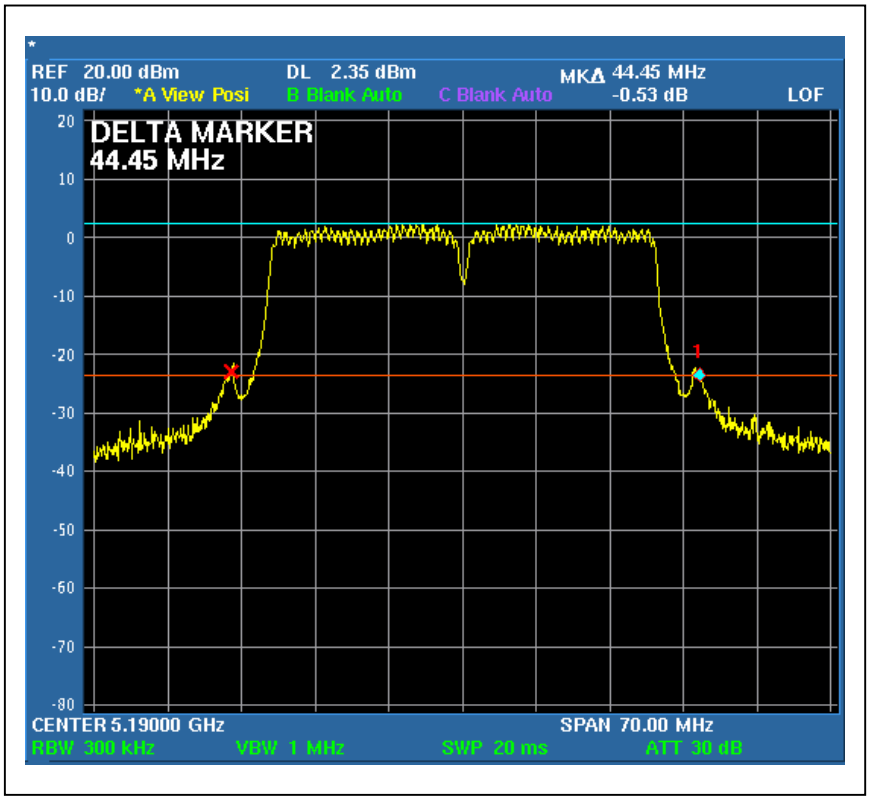
For Chain (0) :CH1



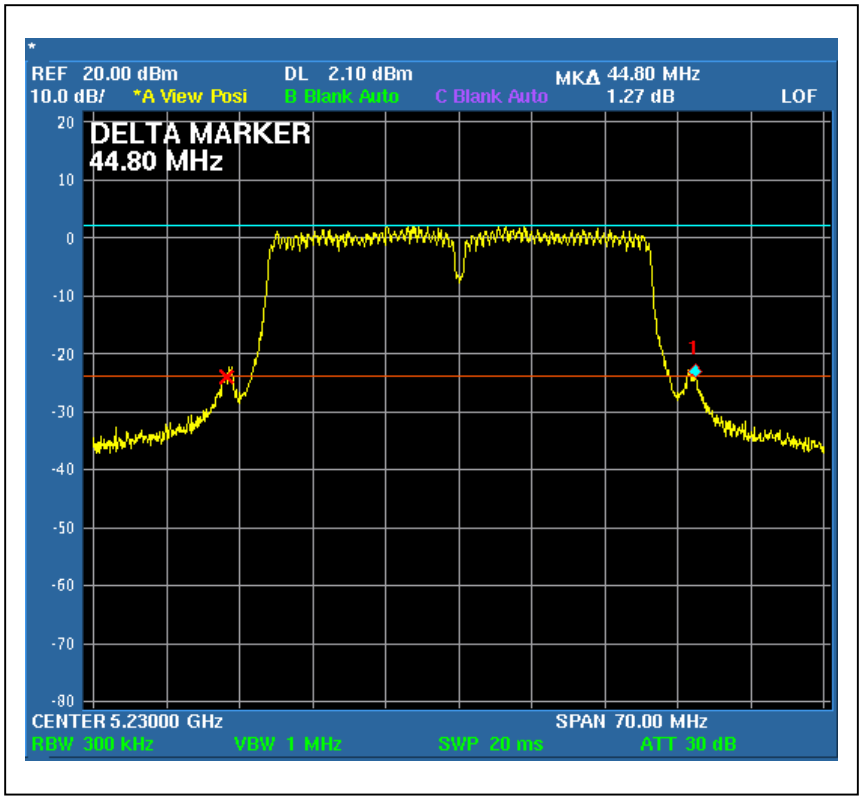
CH2



For Chain (1) :CH1



CH2



4.4 PEAK POWER EXCURSION MEASUREMENT

4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	13dB
5.25 – 5.35 GHz	13dB
5.47 – 5.725GHz	13dB
5.725 – 5.825 GHz	13dB

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	July 11, 2008

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

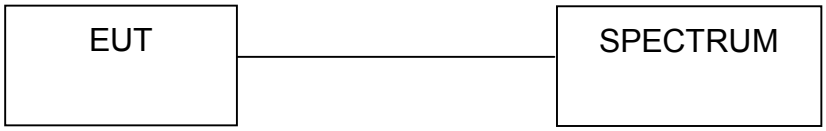
4.4.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum bandwidth span to view the entire spectrum.
3. Using peak detector and Max-hold function for Trace 1 (RB=1MHz, VB=3MHz) and 2 (RB=1MHz, VB=300KHz).
4. The largest difference between Trace 1 and Trace 2 in any 1MHz band on any frequency was recorded.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

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

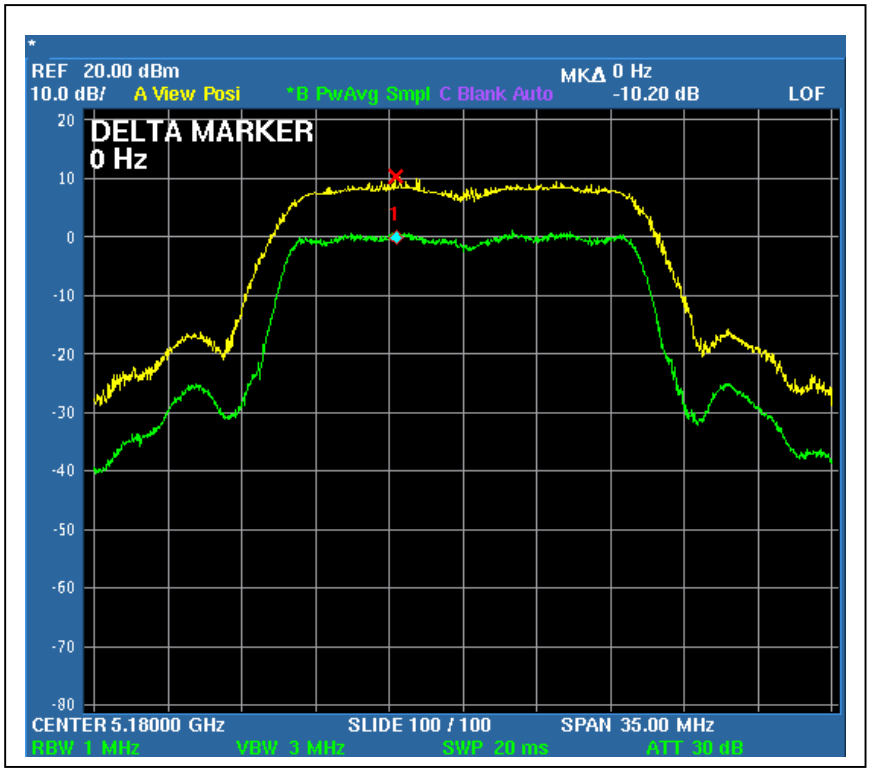
4.4.7 TEST RESULTS

802.11a OFDM modulation

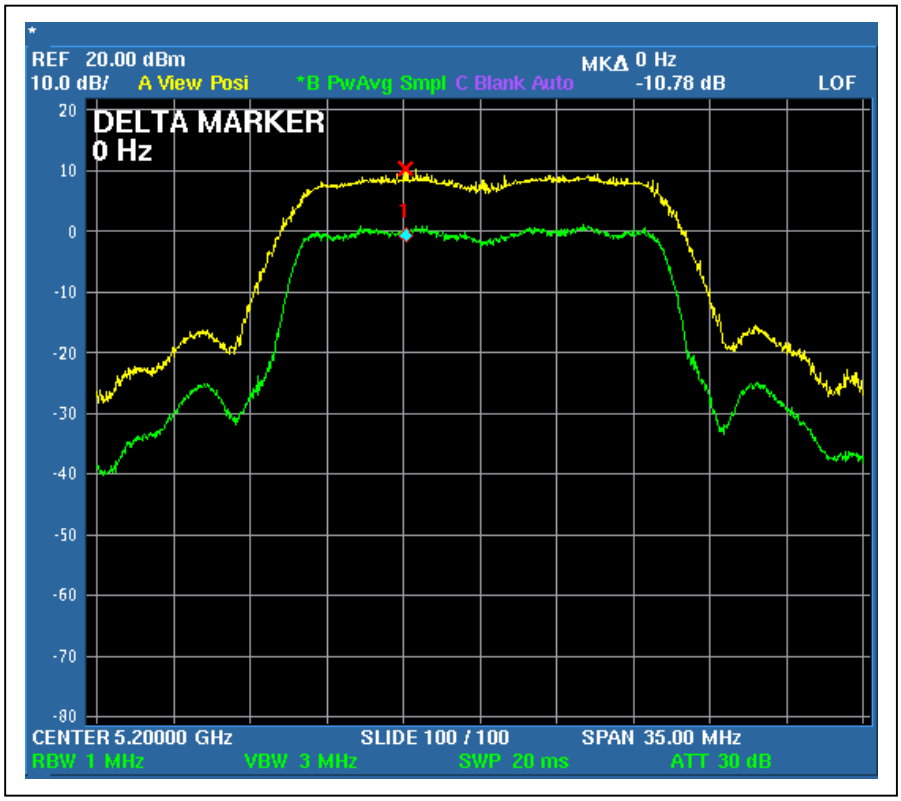
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg.C, 72%RH, 972hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)		PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
		Chain (0)	Chain(1)		
1	5180	10.20	9.90	13	PASS
2	5200	10.78	10.08	13	PASS
4	5240	10.00	9.91	13	PASS

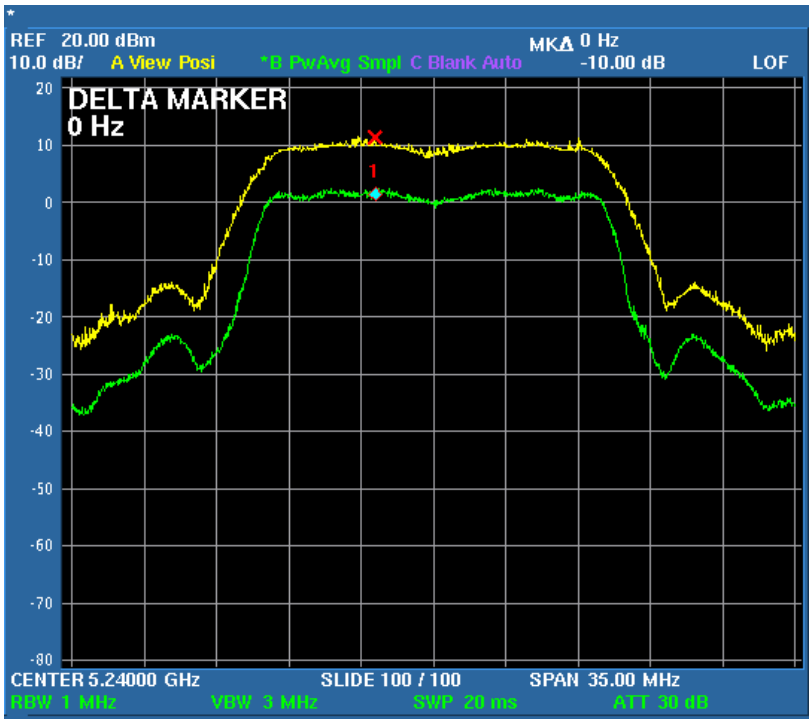
For Chain (0) : CH1



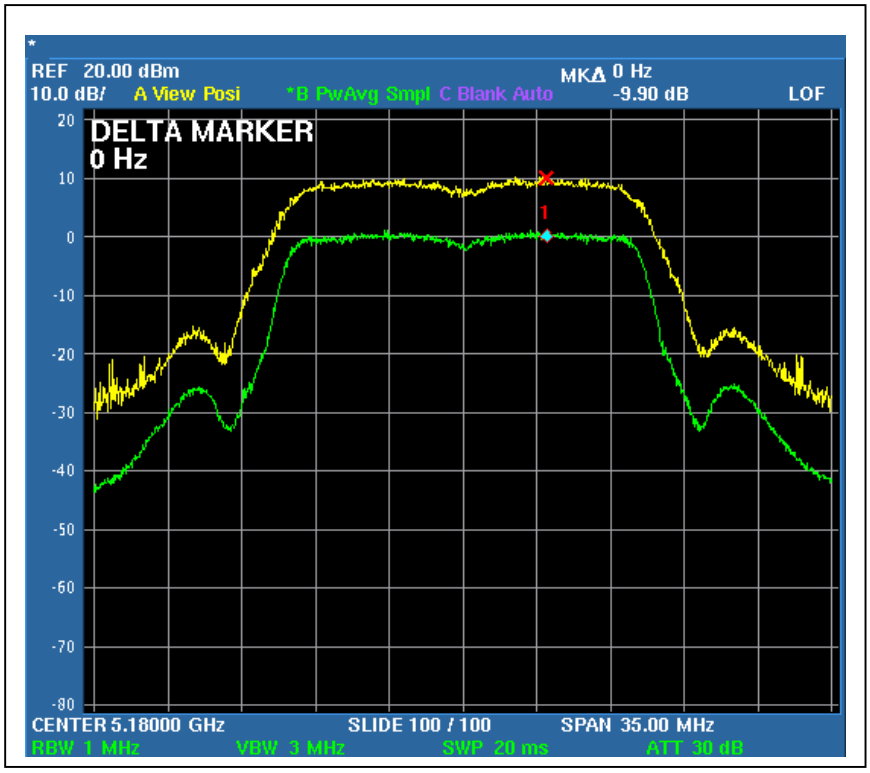
CH2



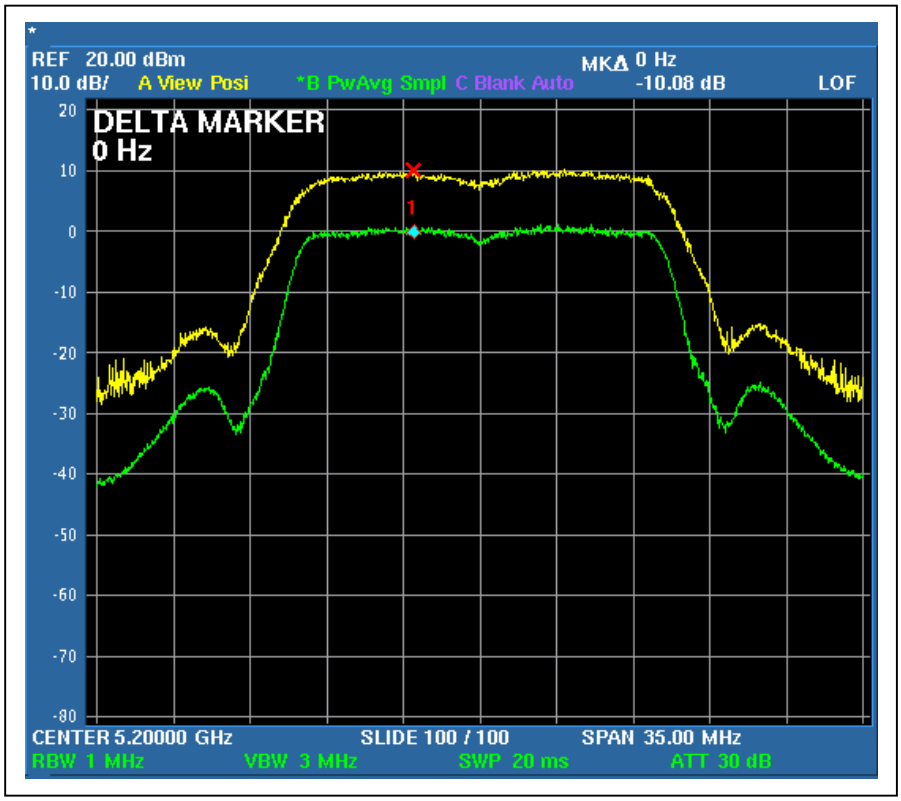
CH4


REF 20.00 dBm
MKΔ 0 Hz
10.0 dB/ A View Posi *B PwAvg Smpl C Blank Auto -10.00 dB LOF
DELTA MARKER
0 Hz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz SLIDE 100 / 100 SPAN 35.00 MHz
RBW 1 MHz VBW 3 MHz SWP 20 ms ATT 30 dB

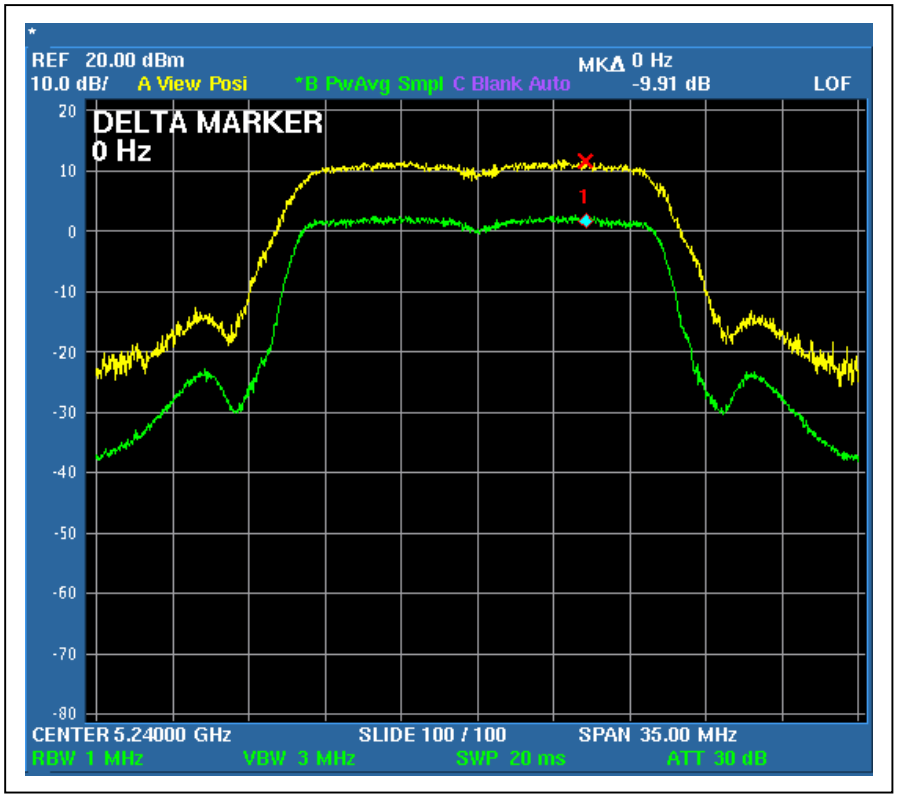
For Chain (1) : CH1



CH2



CH4

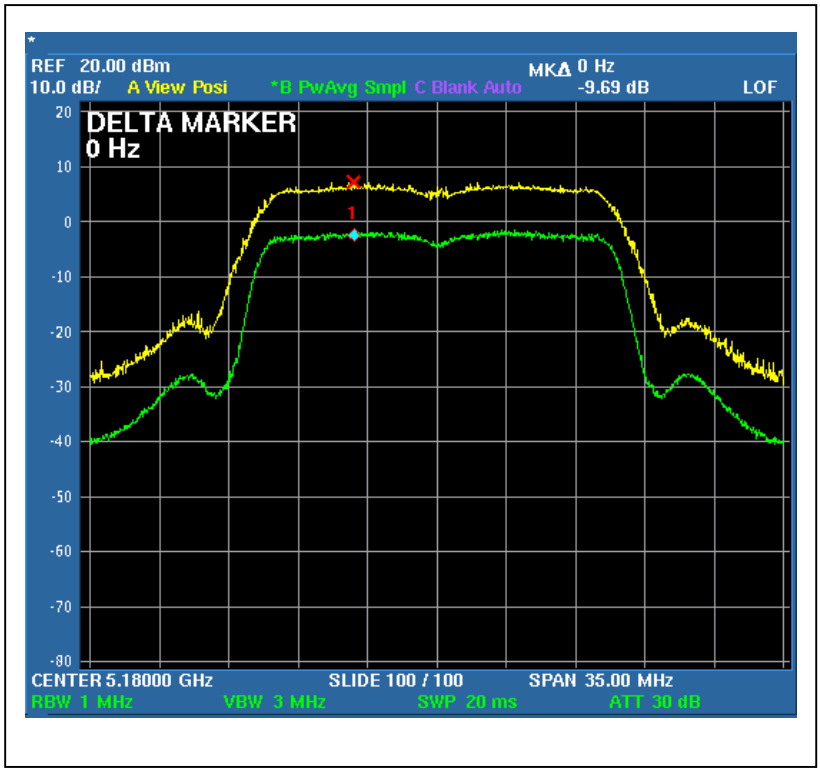

REF 20.00 dBm
MKΔ 0 Hz
10.0 dB/ A View Posi *B PwAvg Smpl C Blank Auto -9.91 dB LOF
DELTA MARKER
0 Hz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz SLIDE 100 / 100 SPAN 35.00 MHz
RBW 1 MHz VBW 3 MHz SWP 20 ms ATT 30 dB

DRAFT 802.11n (20MHz) OFDM MODULATION:

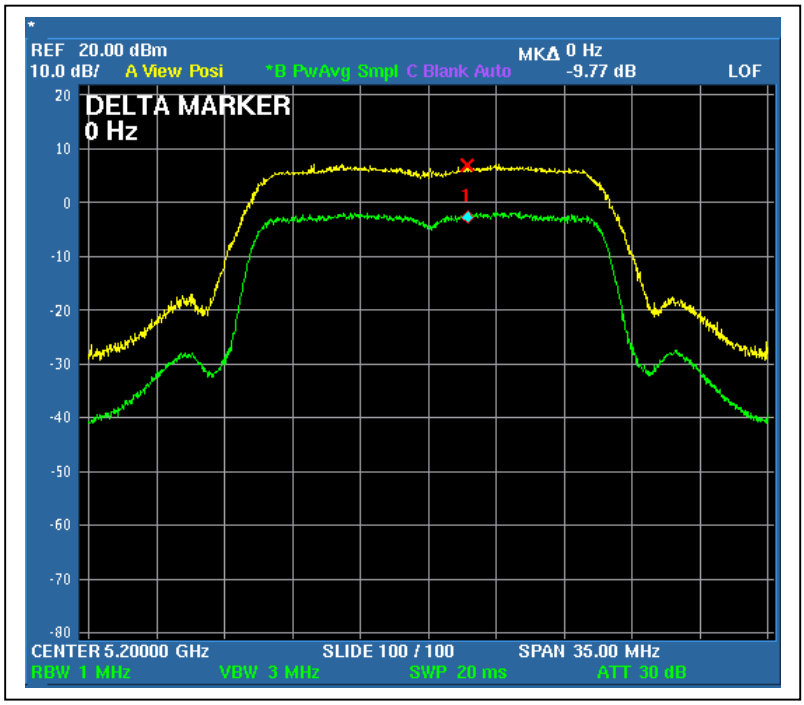
MODULATION TYPE	BPSK	**TRANSFER RATE**	13Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg.C, 72%RH, 972hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)		PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
		Chain (0)	Chain(1)		
1	5180	9.69	9.75	13	PASS
2	5200	9.77	10.29	13	PASS
4	5240	9.73	10.32	13	PASS

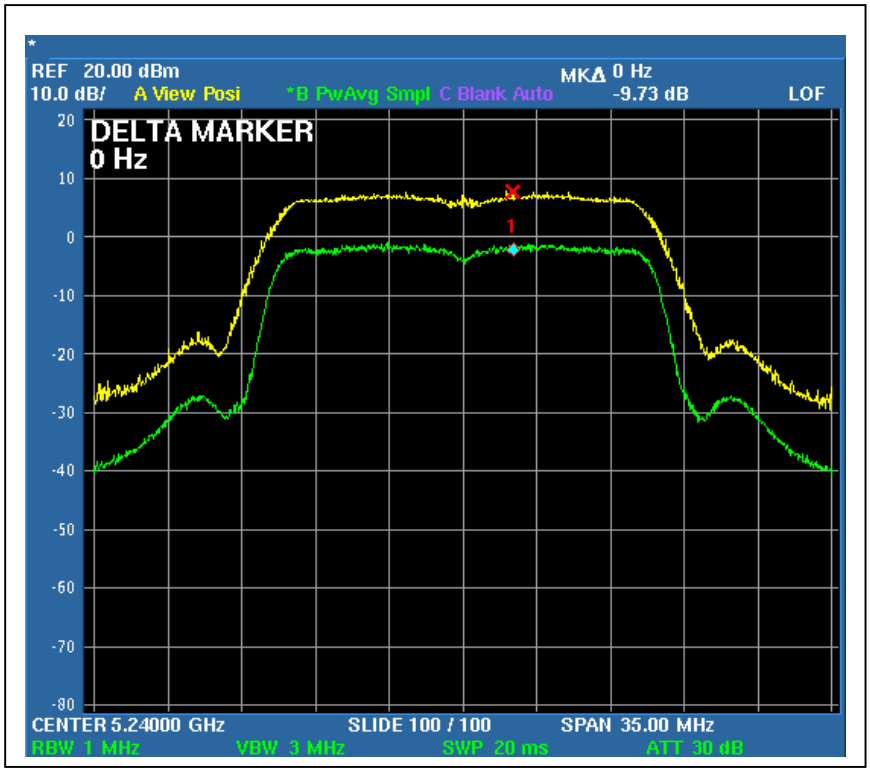
For Chain (0) : CH1



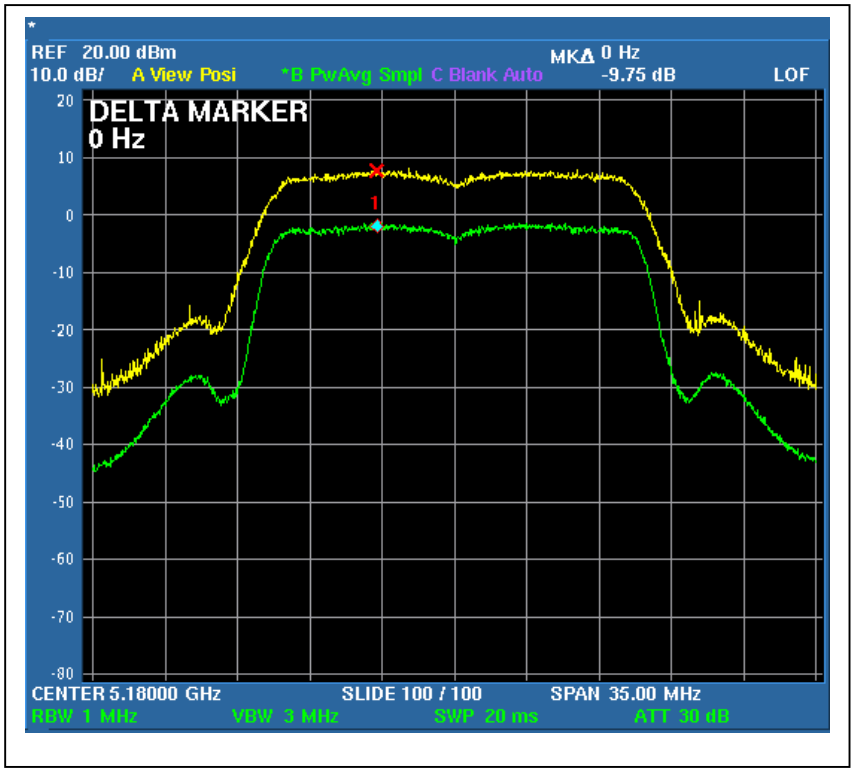
CH2



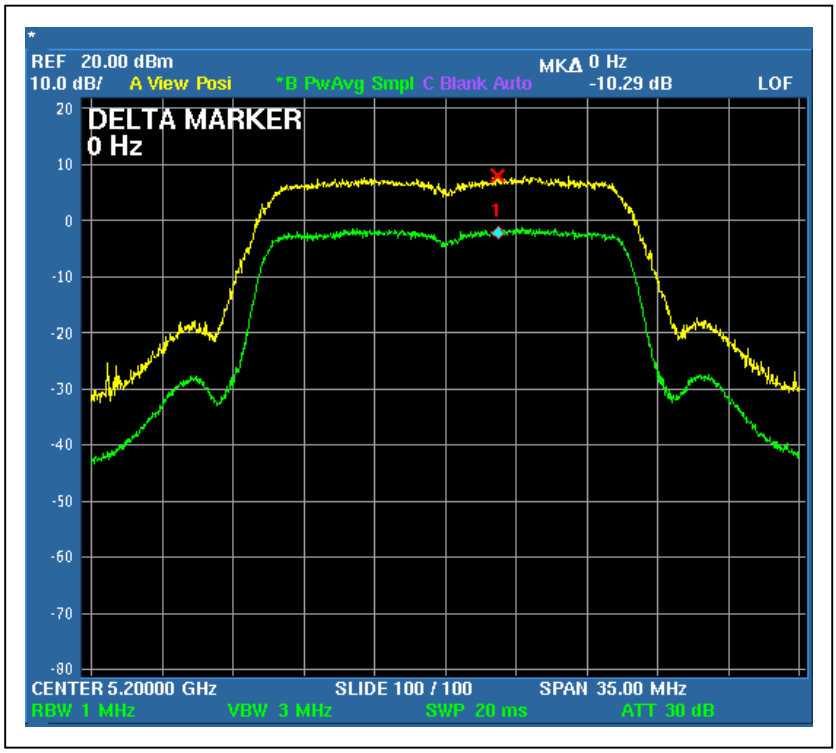
CH4


REF 20.00 dBm
MKΔ 0 Hz
10.0 dB/ A View Posi *B PwAvg Smpl C Blank Auto -9.73 dB LOF
DELTA MARKER
0 Hz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz SLIDE 100 / 100 SPAN 35.00 MHz
RBW 1 MHz VBW 3 MHz SWP 20 ms ATT 30 dB

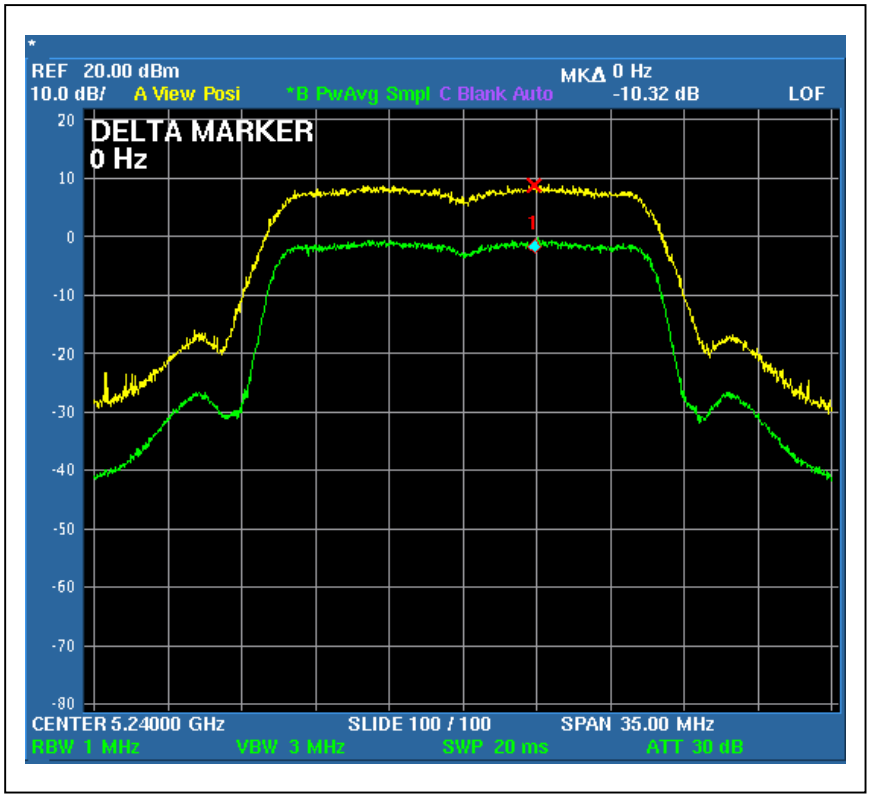
For Chain (1) : CH1



CH2



CH4

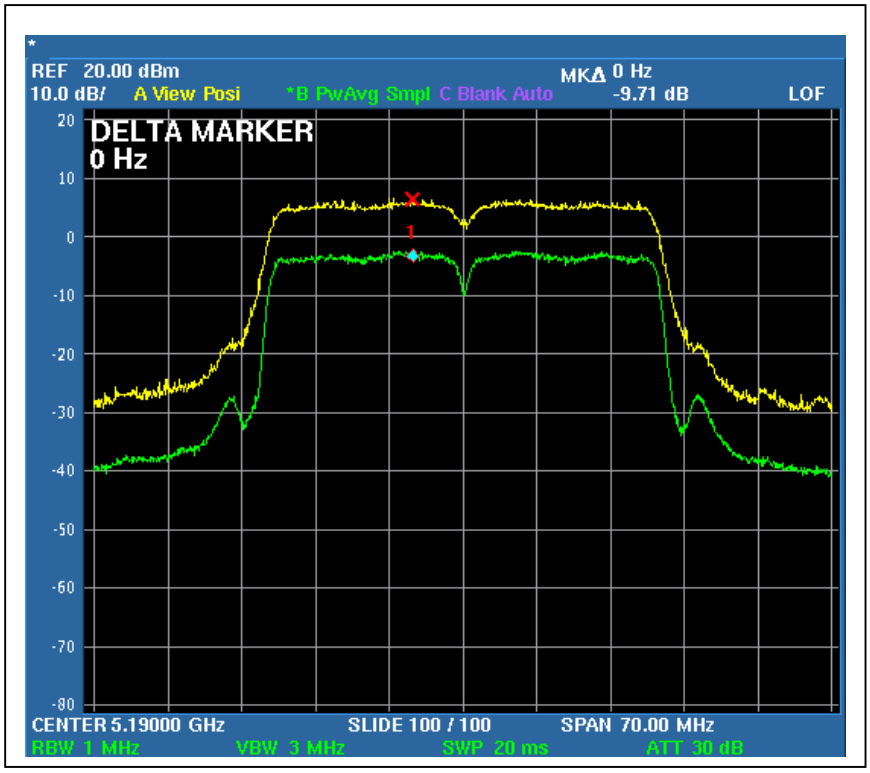

REF 20.00 dBm
MKΔ 0 Hz
10.0 dB/ A View Posi *B PwAvg Smpl C Blank Auto -10.32 dB LOF
DELTA MARKER
0 Hz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
CENTER 5.24000 GHz SLIDE 100 / 100 SPAN 35.00 MHz
RBW 1 MHz VBW 3 MHz SWP 20 ms ATT 30 dB

DRAFT 802.11n (40MHz) OFDM MODULATION:

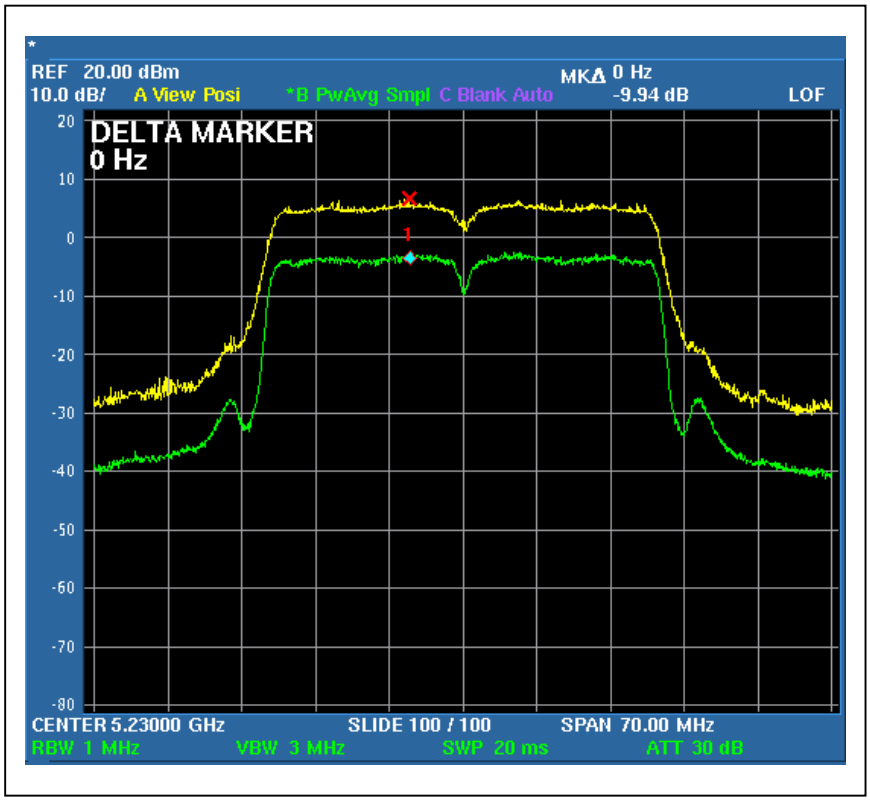
MODULATION TYPE	BPSK	**TRANSFER RATE**	27Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	20deg.C, 60%RH, 972hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)		PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
		Chain (0)	Chain(1)		
1	5190	9.71	10.05	13	PASS
2	5230	9.94	10.21	13	PASS

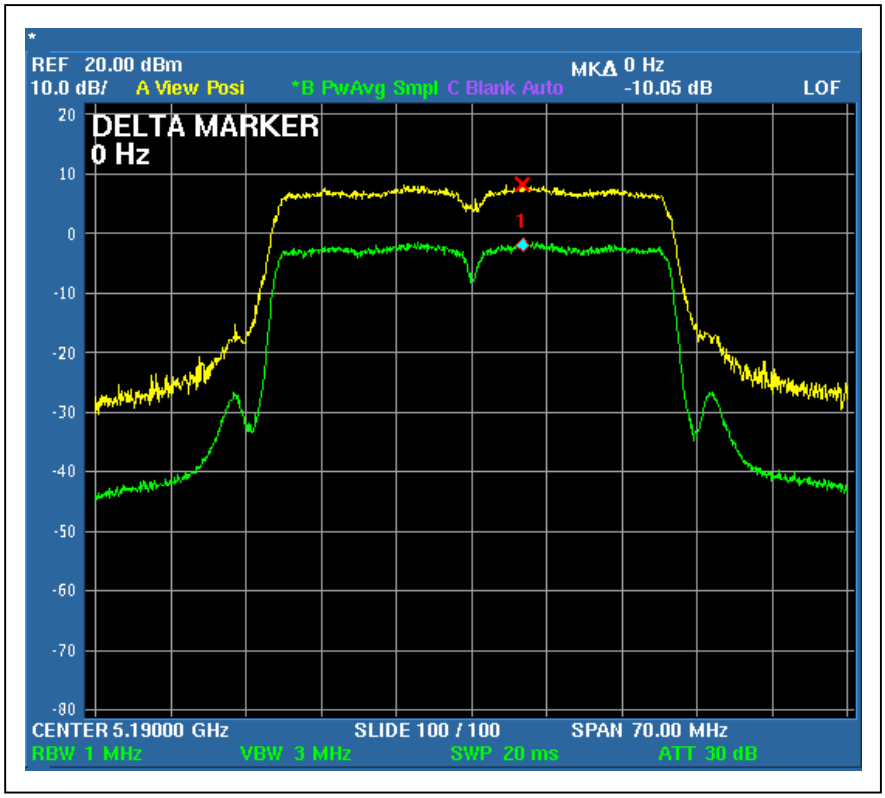
For Chain (0) : CH1



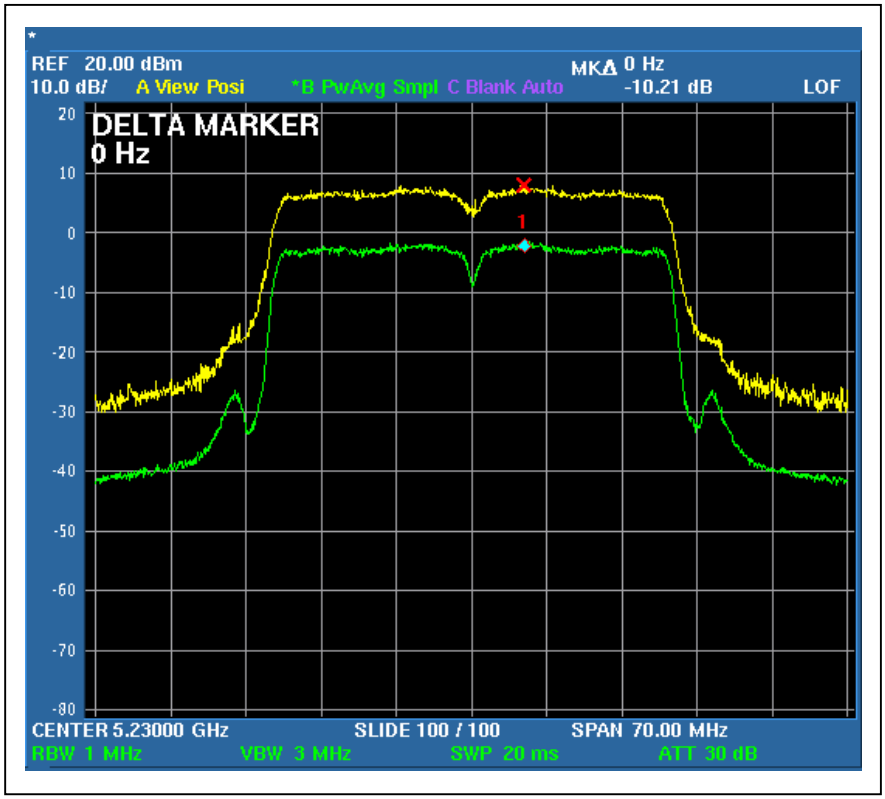
CH2



For Chain (1) : CH1



CH2



4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 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

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	July 11, 2008

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

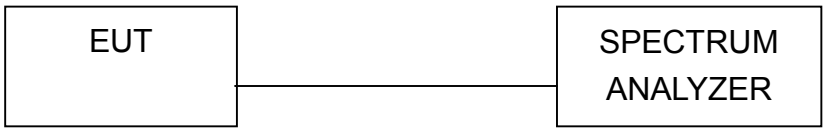
4.5.3 TEST PROCEDURES

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6

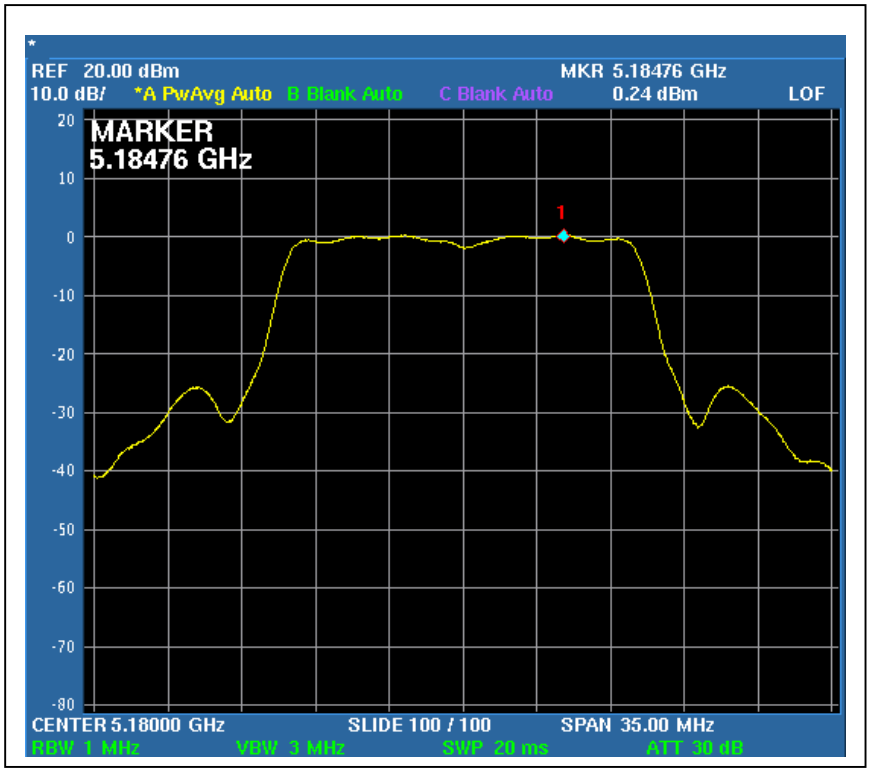
4.5.7 TEST RESULTS

802.11a OFDM modulation

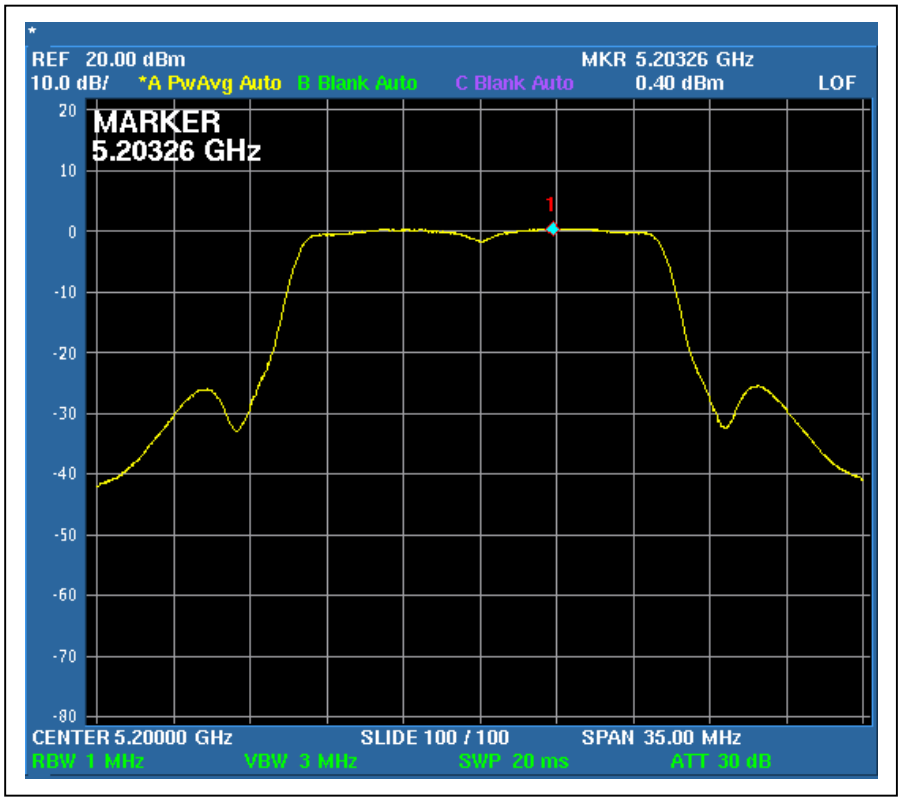
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg.C, 72%RH, 972hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)		
1	5180	0.24	0.48	4	PASS
2	5200	0.40	0.40	4	PASS
4	5240	-0.24	-0.01	4	PASS

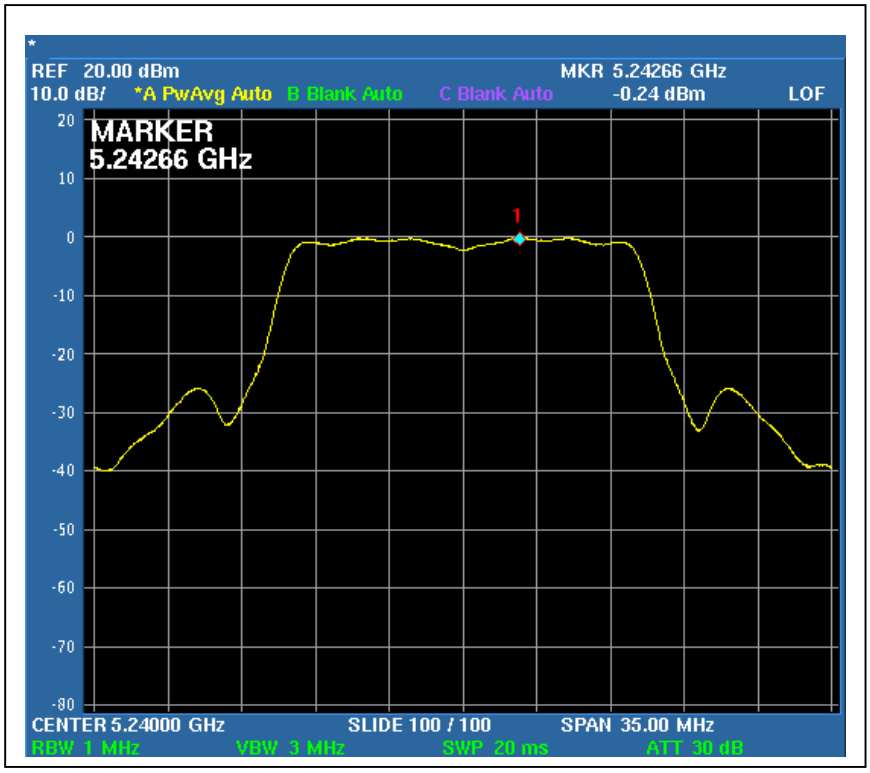
For Chain (0) : CH1



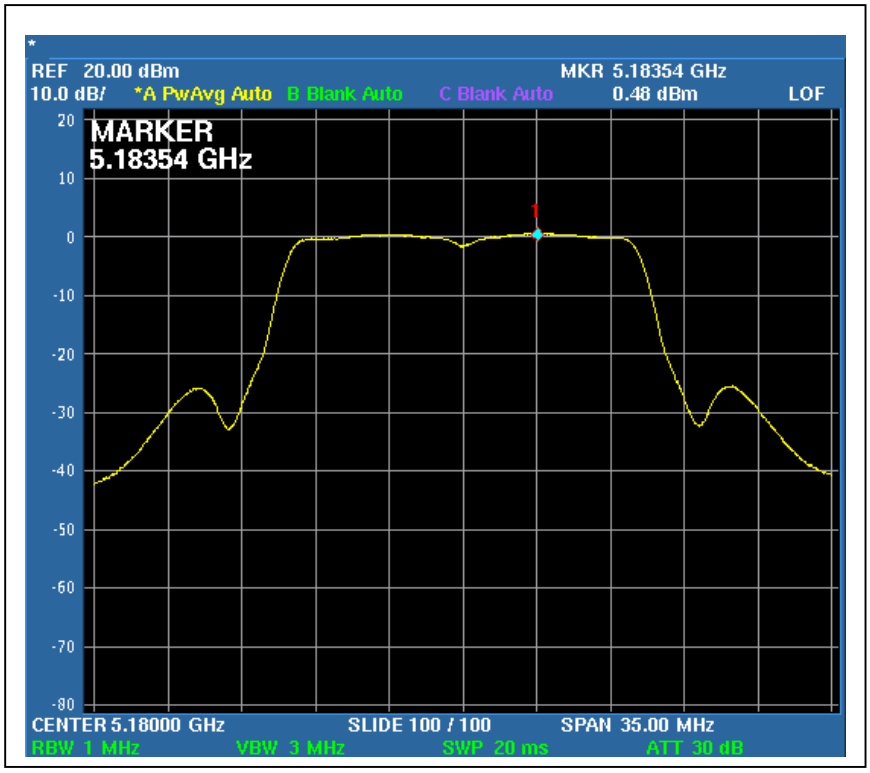
CH2



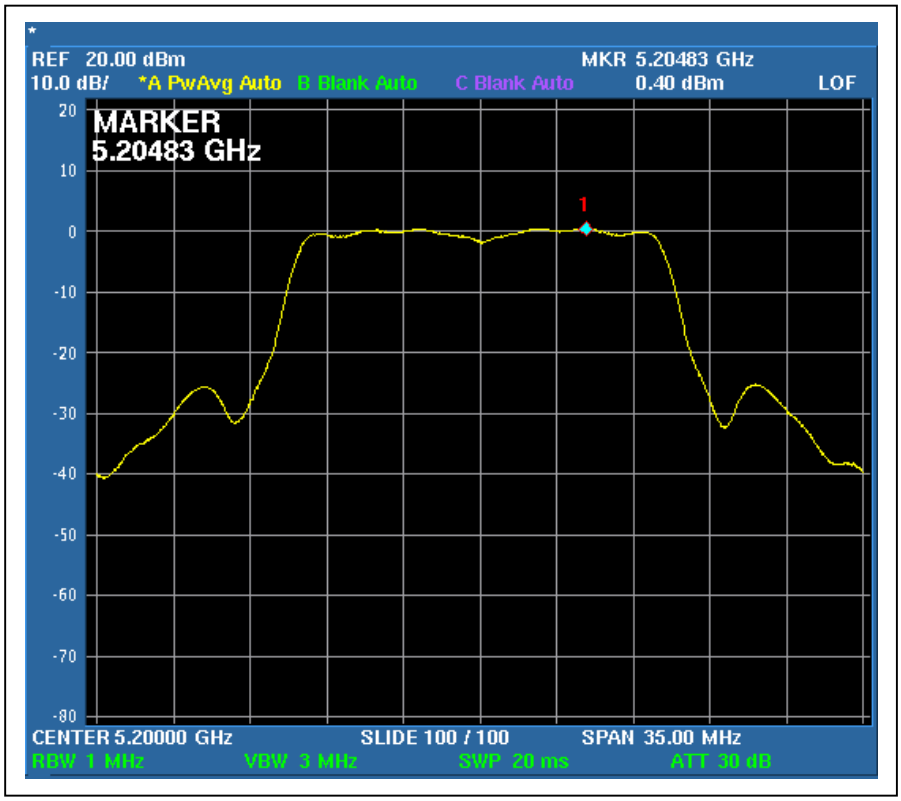
CH4


REF 20.00 dBm
MKR 5.24266 GHz
10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto -0.24 dBm LOF
MARKER
5.24266 GHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB

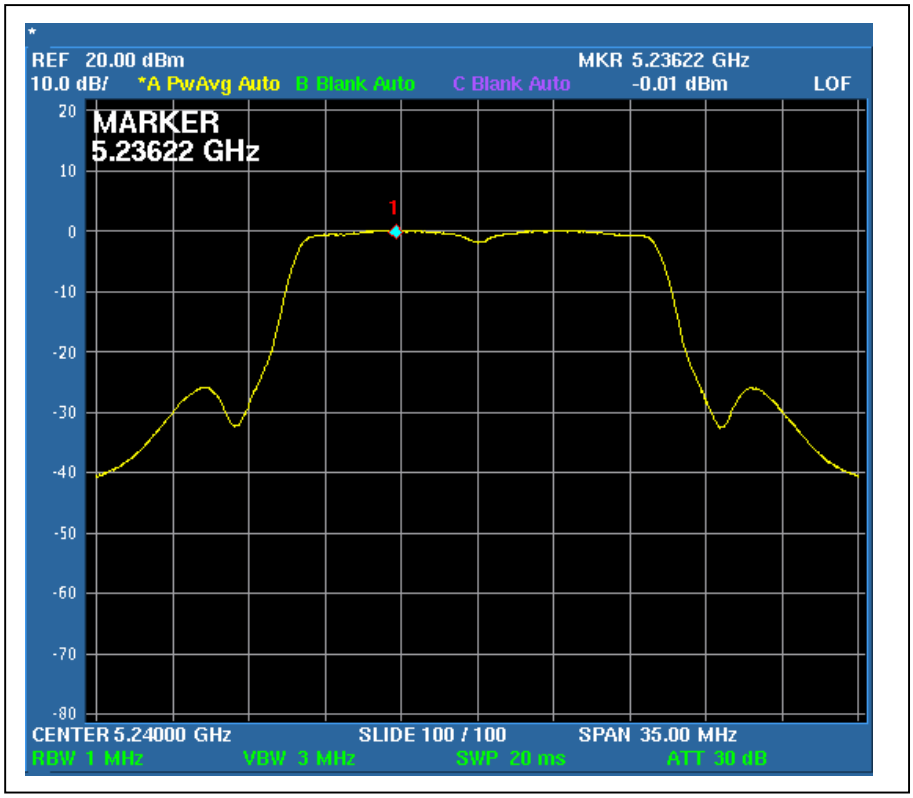
For Chain (1) : CH1



CH2



CH4

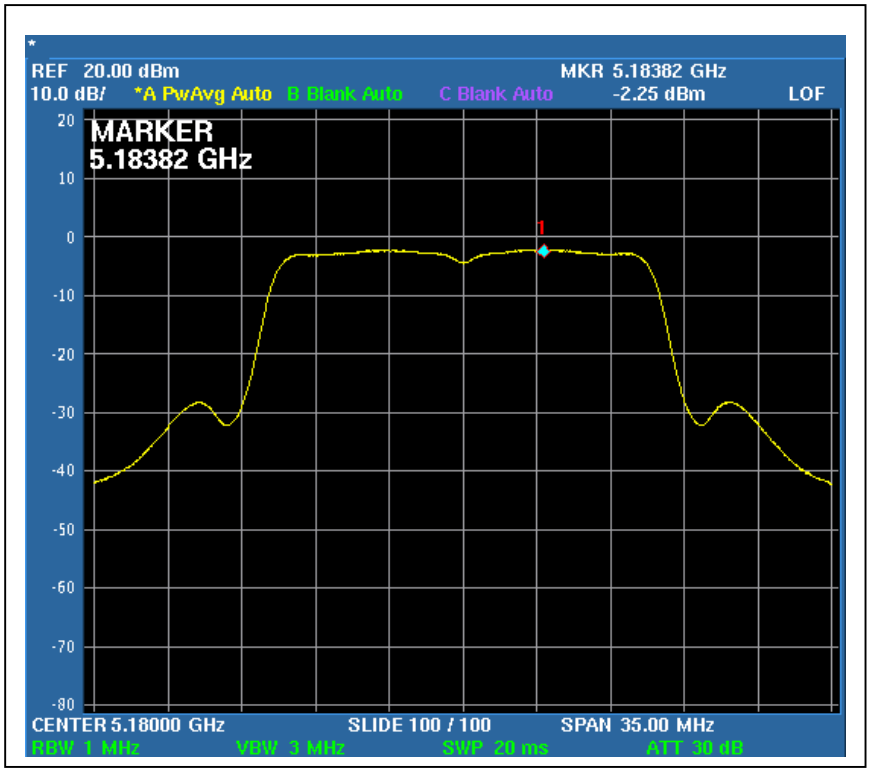

REF 20.00 dBm
MKR 5.23622 GHz
10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto -0.01 dBm LOF
MARKER
5.23622 GHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB

DRAFT 802.11n (20MHz) OFDM MODULATION:

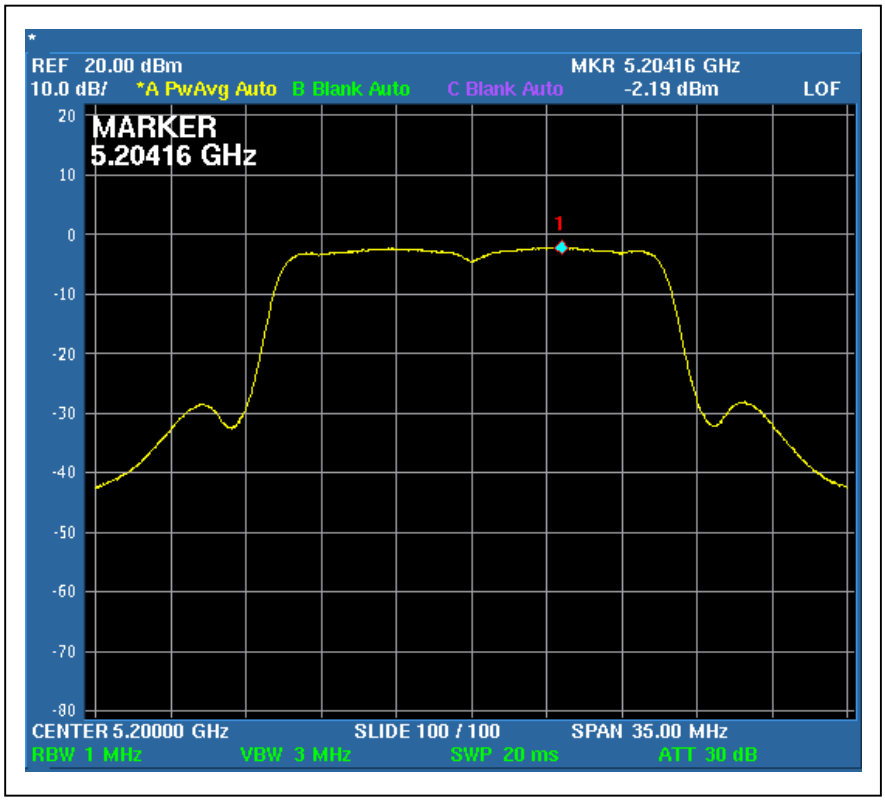
MODULATION TYPE	BPSK	**TRANSFER RATE**	13Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg.C, 72%RH, 972hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)		
1	5180	-2.25	-1.92	4	PASS
2	5200	-2.19	-1.92	4	PASS
4	5240	-1.66	-1.08	4	PASS

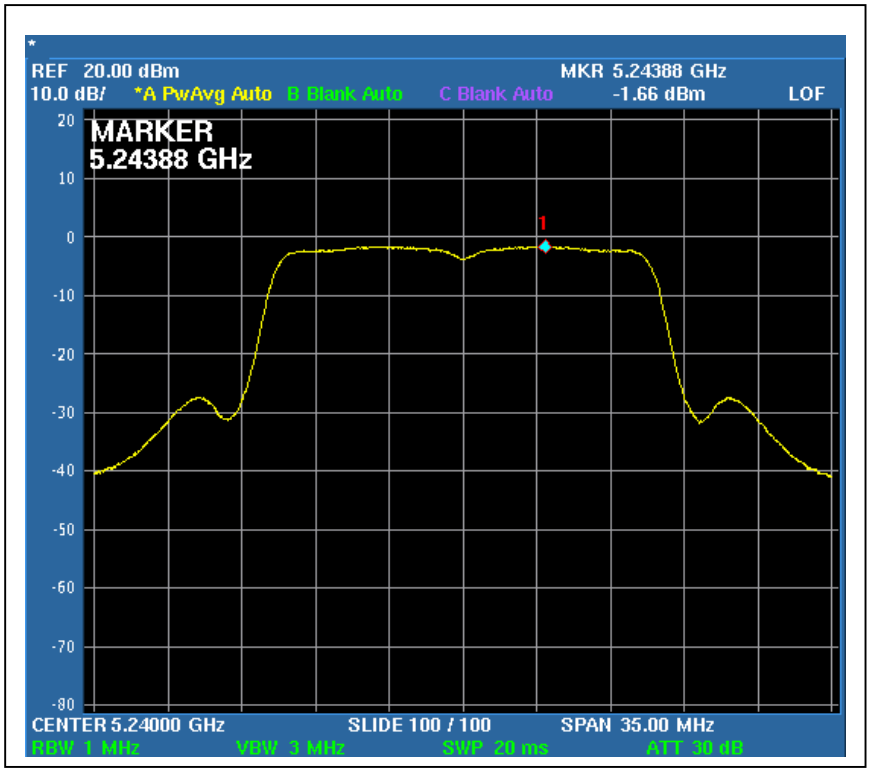
For Chain (0) : CH1



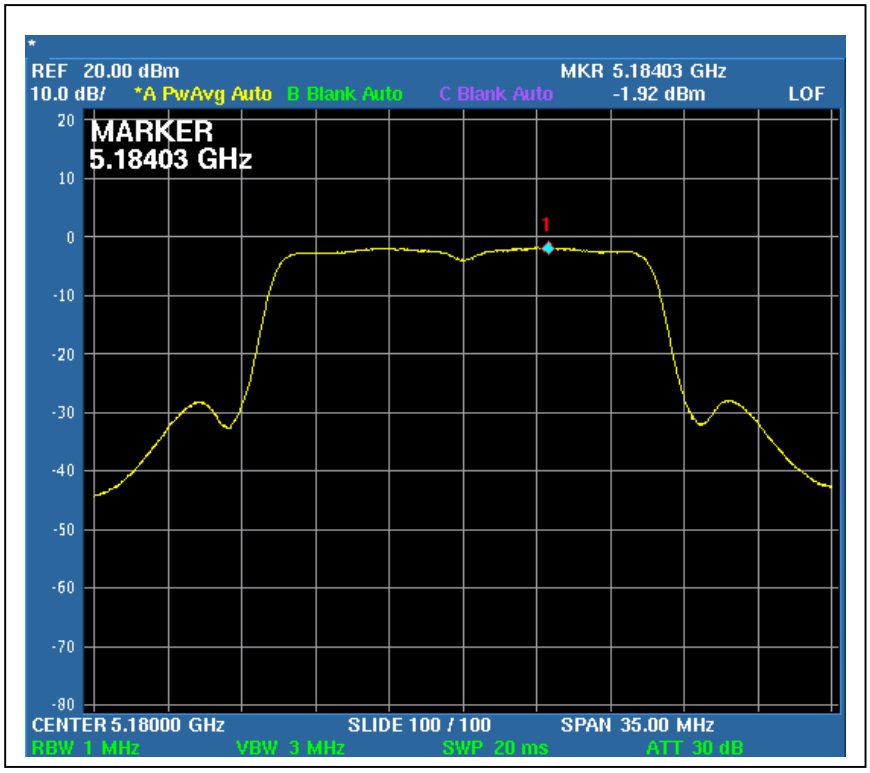
CH2



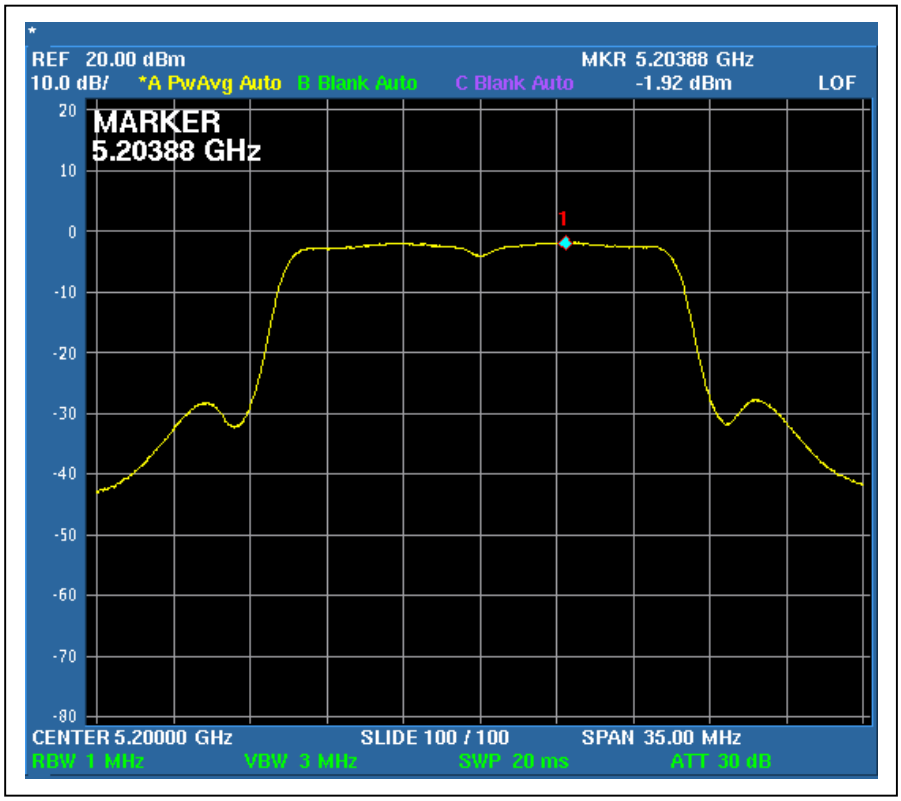
CH4


REF 20.00 dBm
MKR 5.24388 GHz
10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto -1.66 dBm LOF
MARKER
5.24388 GHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB

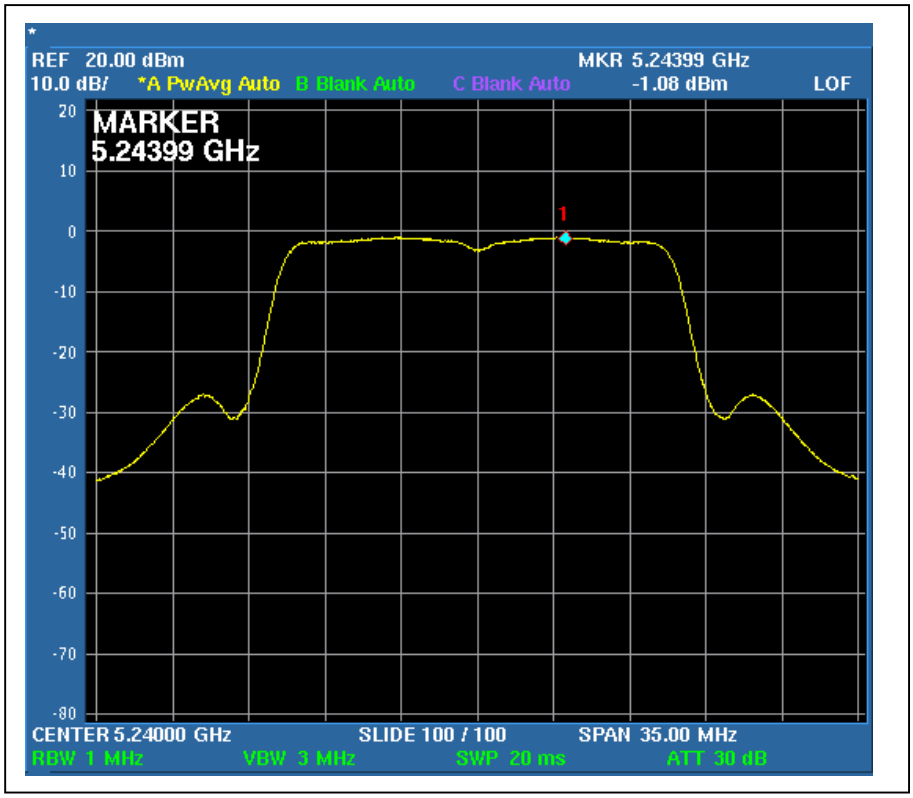
For Chain (1) : CH1



CH2



CH4

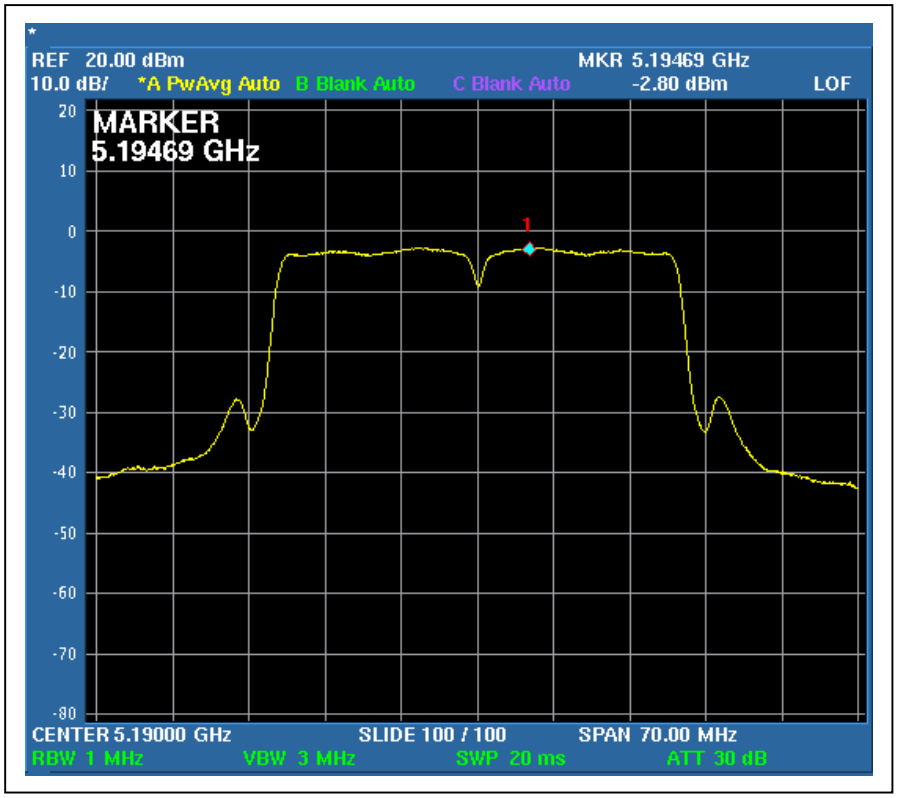

REF 20.00 dBm
MKR 5.24399 GHz
10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto -1.08 dBm LOF
MARKER
5.24399 GHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
CENTER 5.24000 GHz
SLIDE 100 / 100
SPAN 35.00 MHz
RBW 1 MHz
VBW 3 MHz
SWP 20 ms
ATT 30 dB

DRAFT 802.11n (40MHz) OFDM MODULATION:

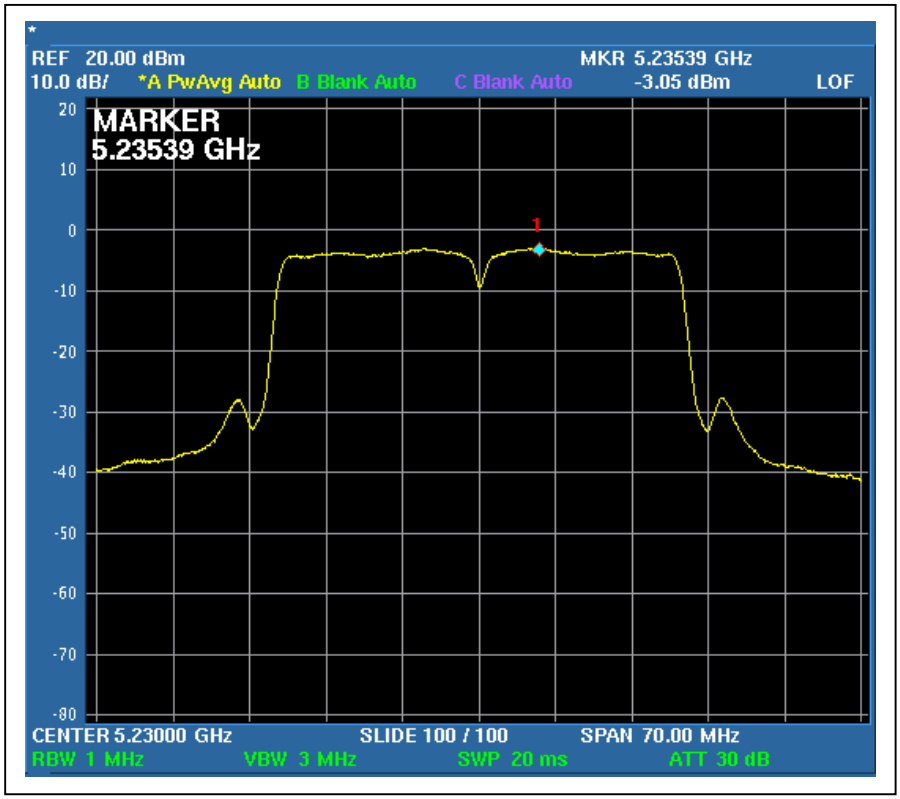
MODULATION TYPE	BPSK	**TRANSFER RATE**	27Mbps
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	20deg.C, 60%RH, 972hPa
TESTED BY	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)		
1	5190	-2.80	-1.90	4	PASS
2	5230	-3.05	-2.02	4	PASS

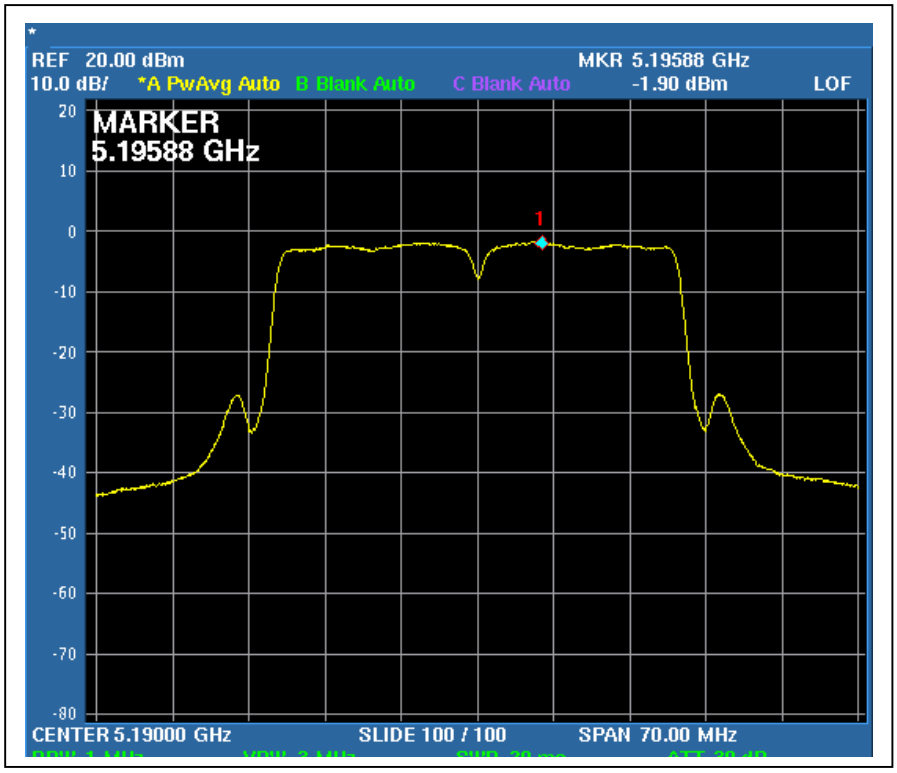
For Chain (0) : CH1



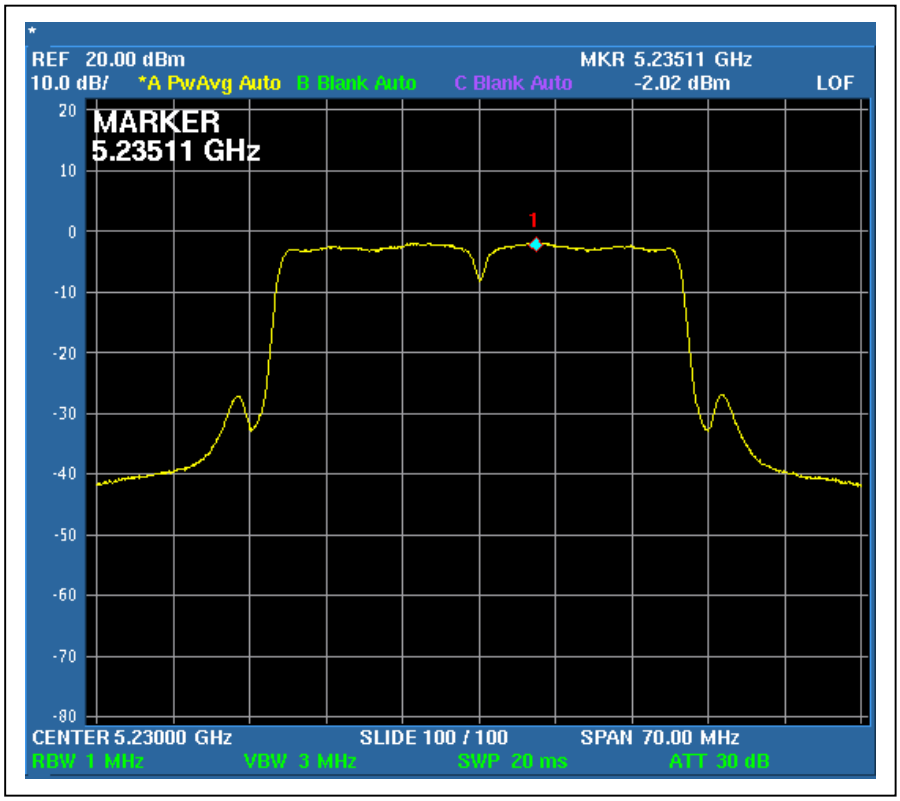
CH2



For Chain (1) : CH1



CH2



4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of –30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 12, 2008

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

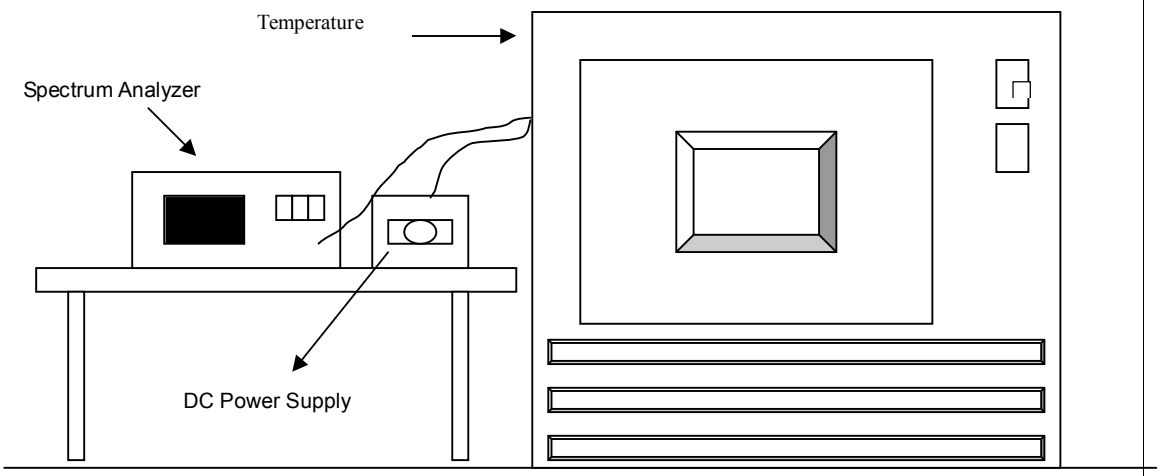
4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC 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

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

4.6.7 TEST RESULTS

Operating frequency: 5180MHz				Limit : ± 0.02%			
Temp. (℃)	Power supply (VAC)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	126.5	5180.0138	0.000266	5180.0096	0.000185	5180.0044	0.000085
	110	5180.0139	0.000268	5180.0116	0.000224	5180.0094	0.000181
	93.5	5180.0140	0.000270	5180.0076	0.000147	5180.0074	0.000143
40	126.5	5179.977	0.000444	5179.9725	0.000531	5179.9761	0.000461
	110	5179.978	0.000425	5179.9757	0.000469	5179.9782	0.000421
	93.5	5179.976	0.000463	5179.9755	0.000473	5179.9720	0.000541
30	126.5	5179.9929	0.000137	5179.9904	0.000185	5179.9899	0.000195
	110	5179.992	0.000154	5179.9918	0.000158	5179.9983	0.000033
	93.5	5179.9809	0.000369	5179.9904	0.000185	5179.9849	0.000292
20	126.5	5179.9862	0.000266	5179.9958	0.000081	5179.9963	0.000071
	110	5179.9842	0.000305	5179.9958	0.000081	5179.9925	0.000145
	93.5	5179.9861	0.000268	5179.9957	0.000083	5179.9982	0.000035
10	126.5	5179.9719	0.000542	5179.9812	0.000363	5179.9877	0.000237
	110	5179.972	0.000541	5179.9872	0.000247	5179.9809	0.000369
	93.5	5179.9819	0.000349	5179.9815	0.000357	5179.9806	0.000375
0	126.5	5180.0068	0.000131	5180.0016	0.000031	5180.0014	0.000027
	110	5180.0078	0.000151	5180.0076	0.000147	5180.0034	0.000066
	93.5	5180.0058	0.000112	5180.0067	0.000129	5180.0034	0.000066
-10	126.5	5180.0184	0.000355	5180.0186	0.000359	5180.0103	0.000199
	110	5180.0182	0.000351	5180.0156	0.000301	5180.0174	0.000336
	93.5	5180.0192	0.000371	5180.0146	0.000282	5180.0104	0.000201
-20	126.5	5179.9954	0.000089	5179.9917	0.000160	5179.9942	0.000112
	110	5179.9959	0.000079	5179.9949	0.000098	5179.9945	0.000106
	93.5	5179.9958	0.000081	5179.9947	0.000102	5179.9942	0.000112
-30	126.5	5180.0202	0.000390	5180.0203	0.000392	5180.0202	0.000390
	110	5180.0222	0.000429	5180.0222	0.000429	5180.0202	0.000390
	93.5	5180.0244	0.000471	5180.02	0.000386	5180.0202	0.000390

4.7 BAND EDGES MEASUREMENT

4.7.1 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 12, 2008

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.7.3 EUT OPERATING CONDITION

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

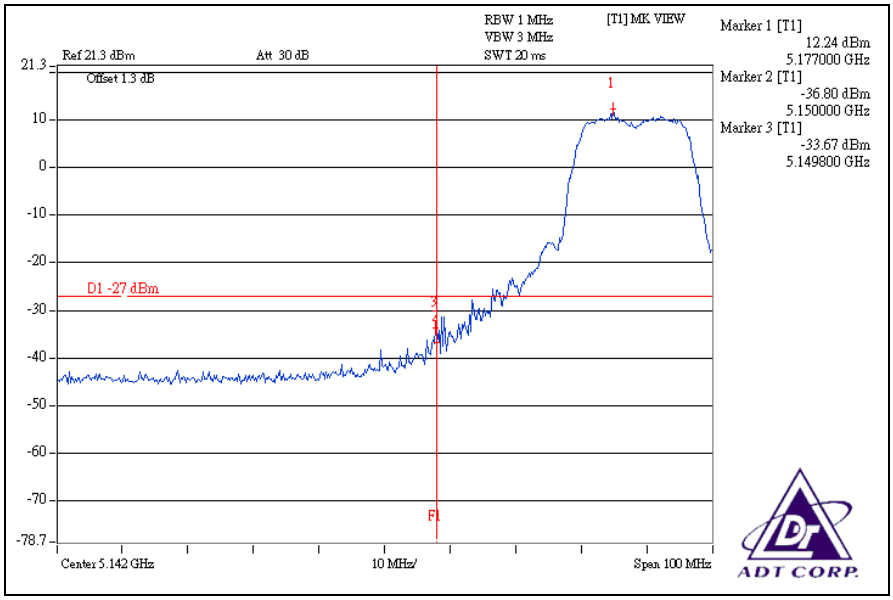
4.7.4 TEST RESULTS

For 5.15 to 5.35GHz band:
The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.

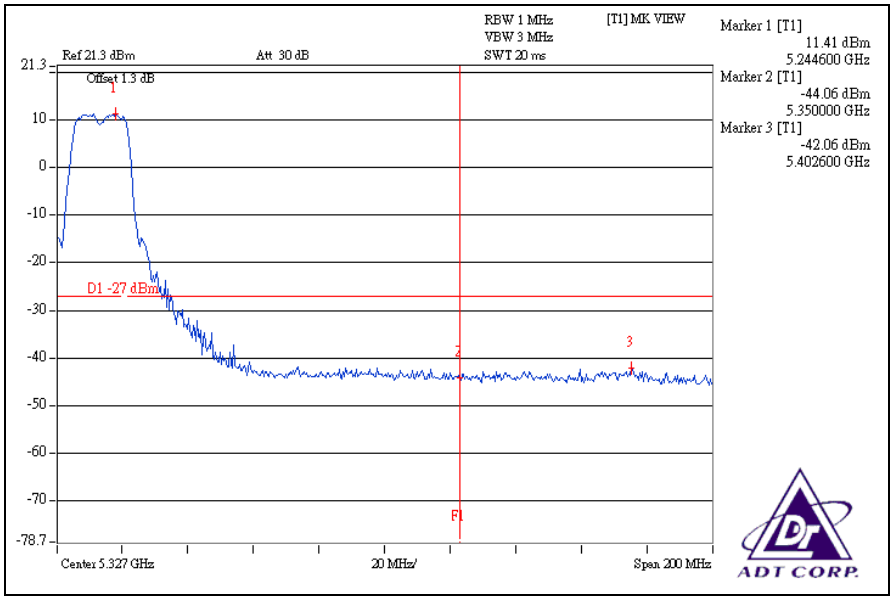
802.11a OFDM modulation

For chain (0):

CH1

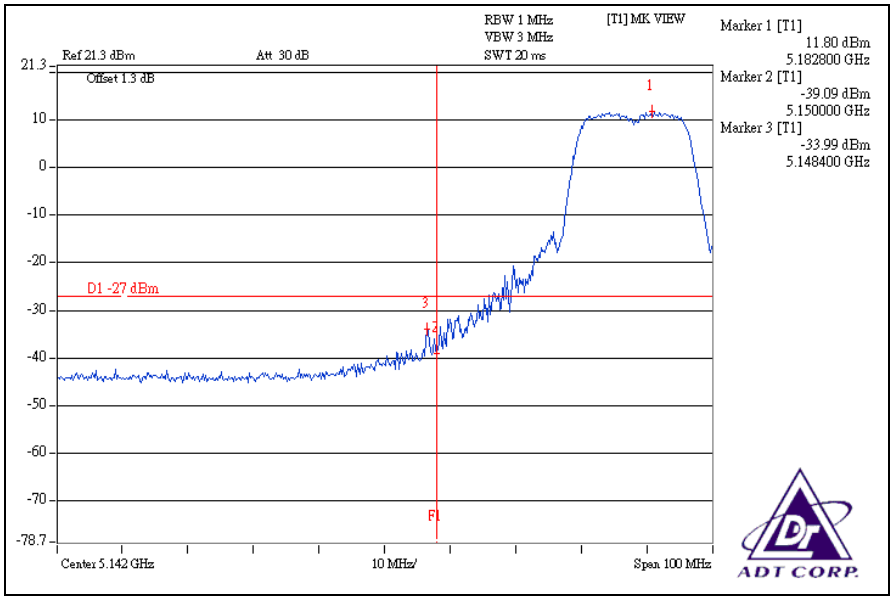


CH4

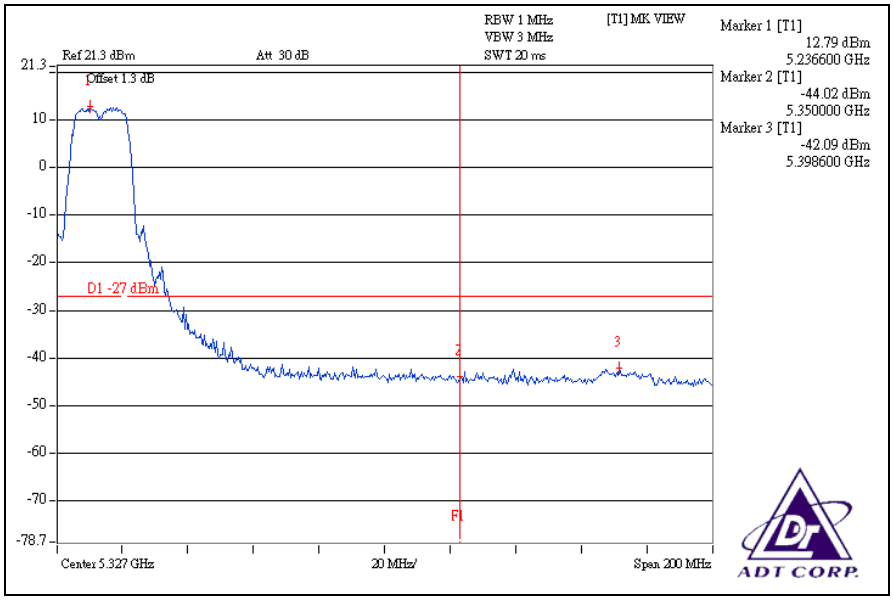


For chain (1):

CH1

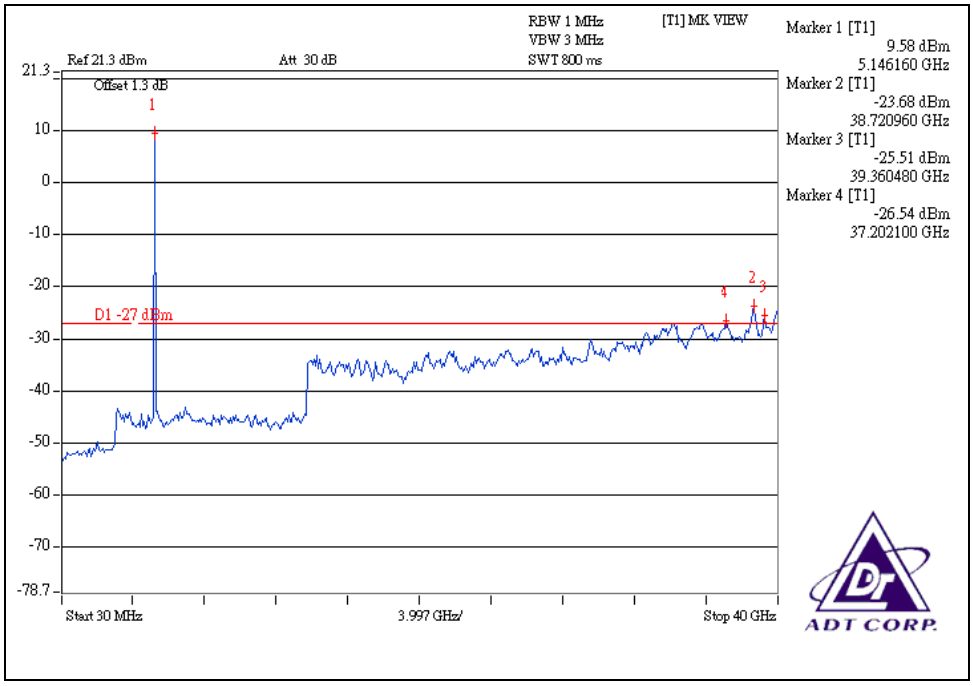


CH4

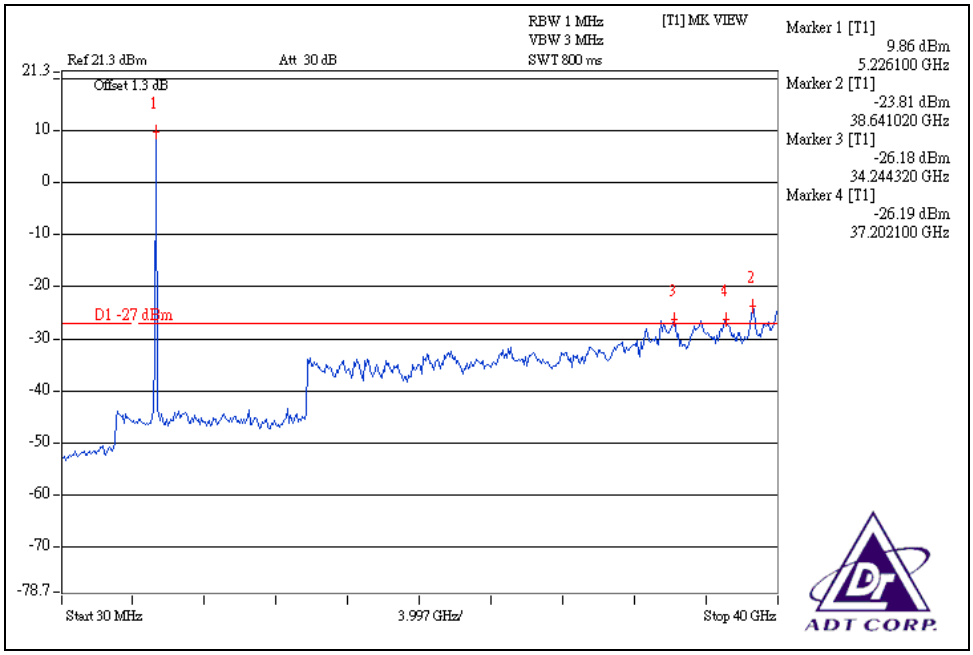


For chain (0):

CH1

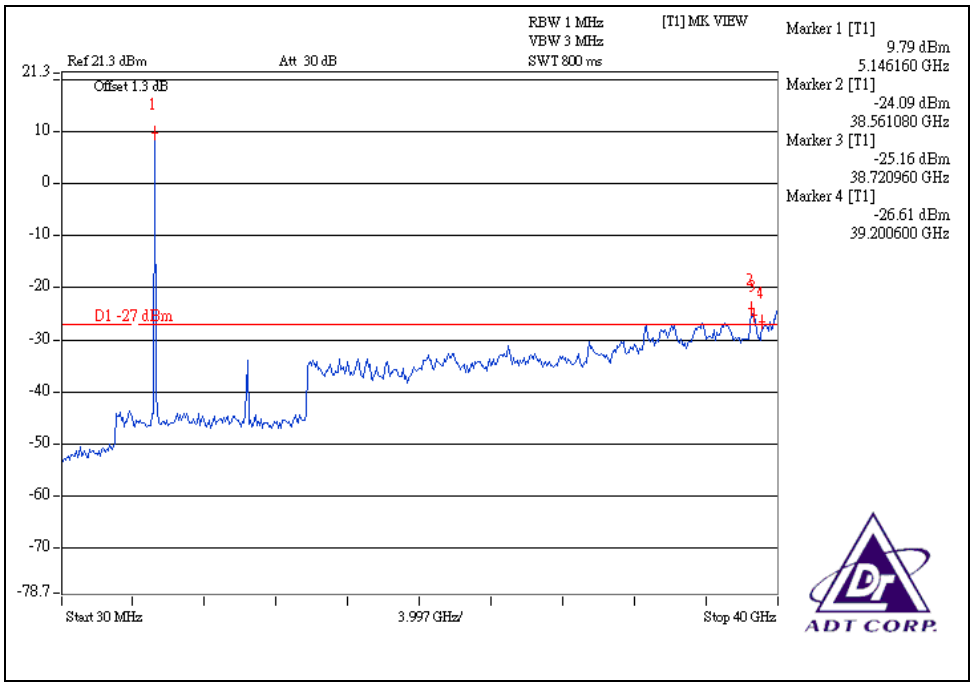


CH4

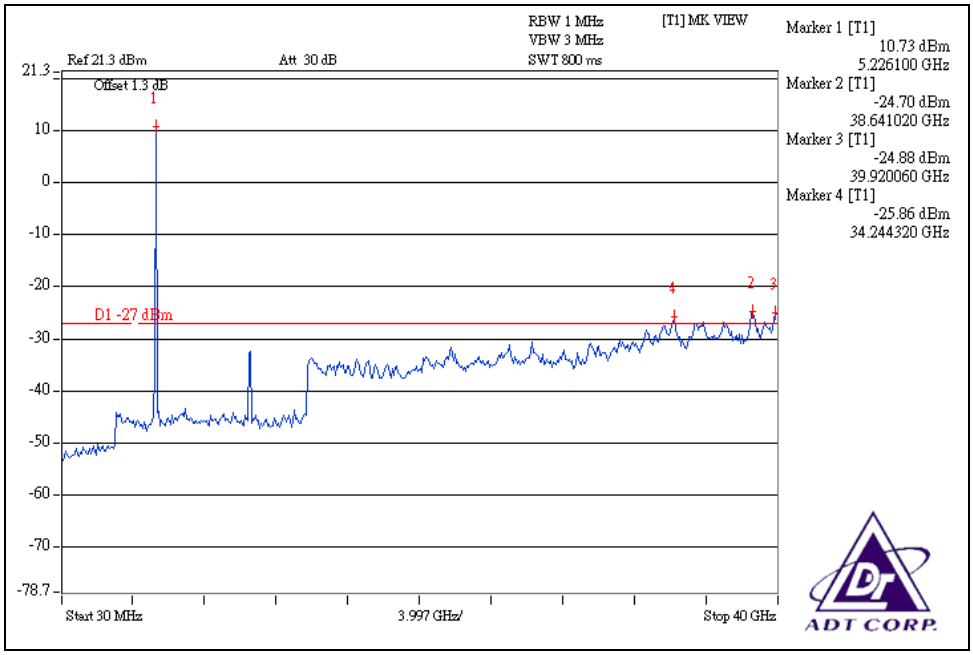


For chain (1):

CH1



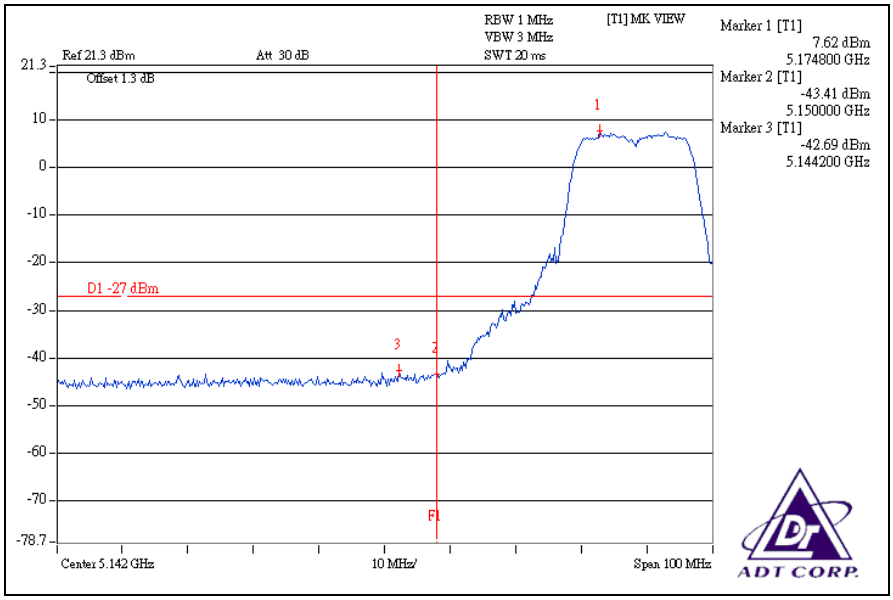
CH4



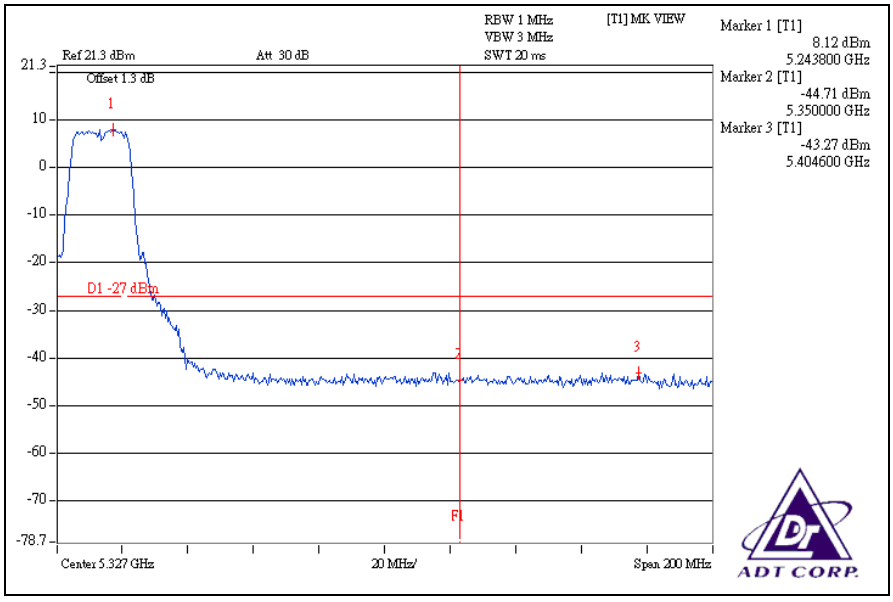
DRAFT 802.11n (20MHz) OFDM MODULATION:

For chain (0):

CH1

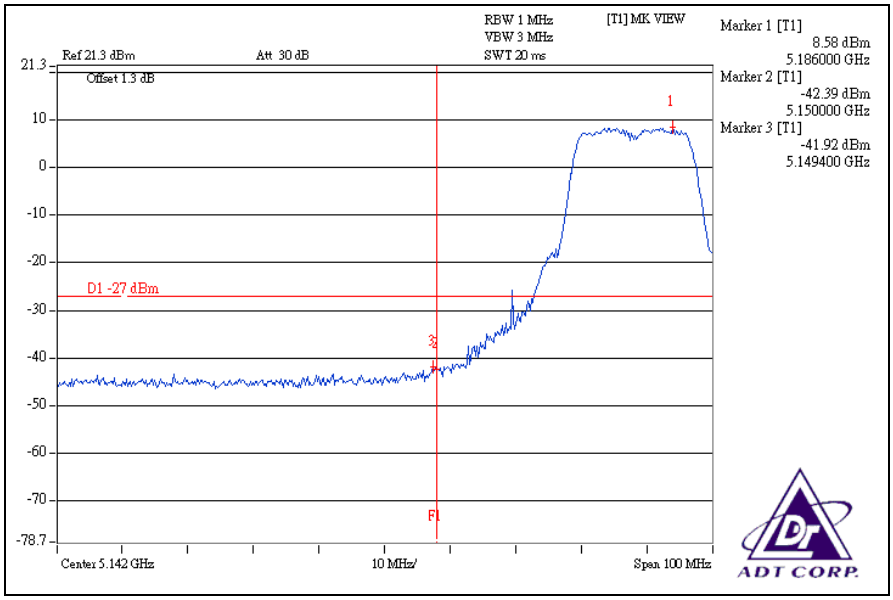


CH4

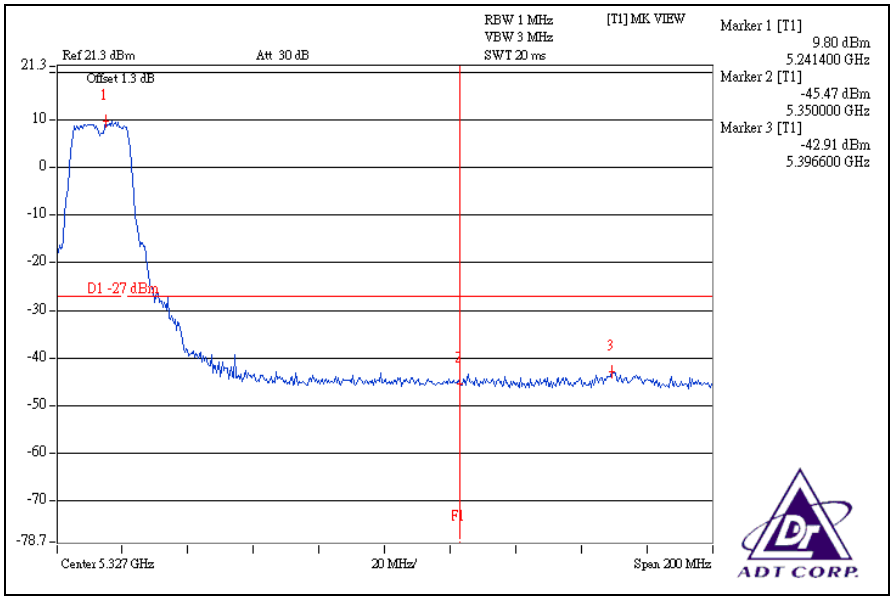


For chain (1):

CH1

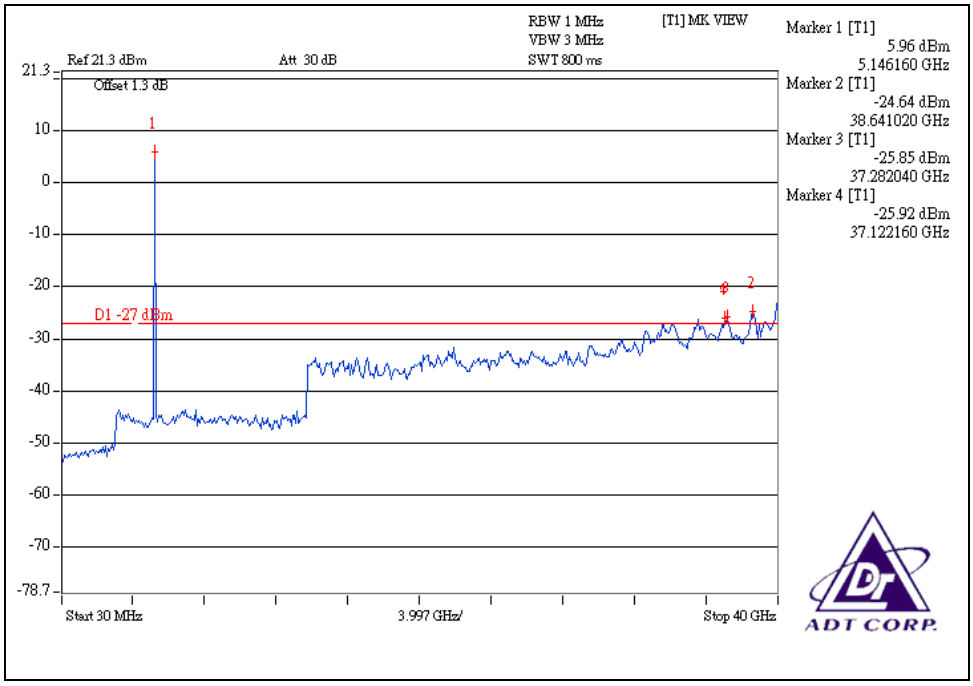


CH4

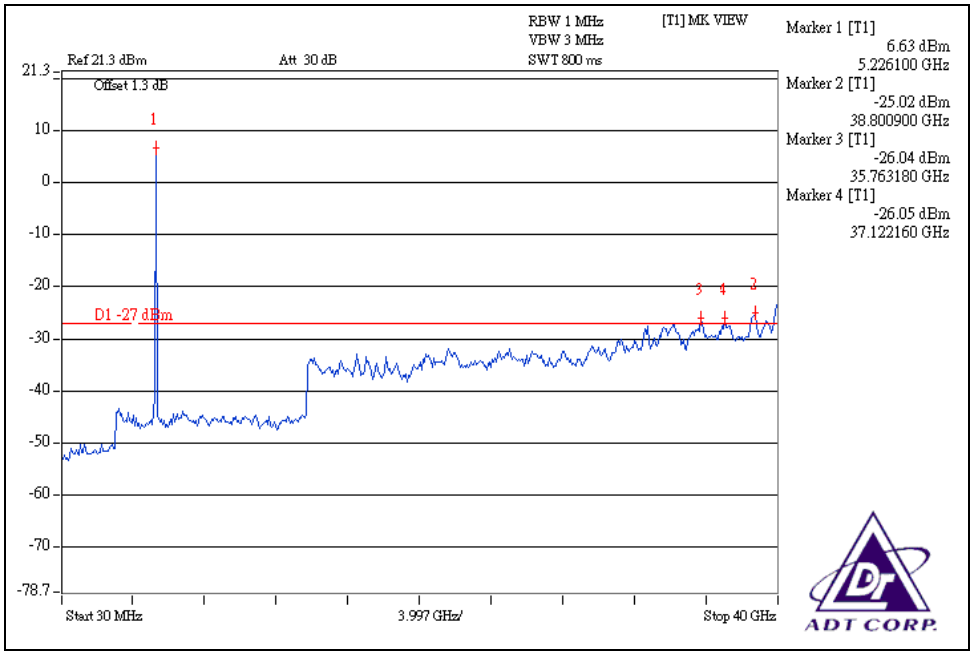


For chain (0):

CH1

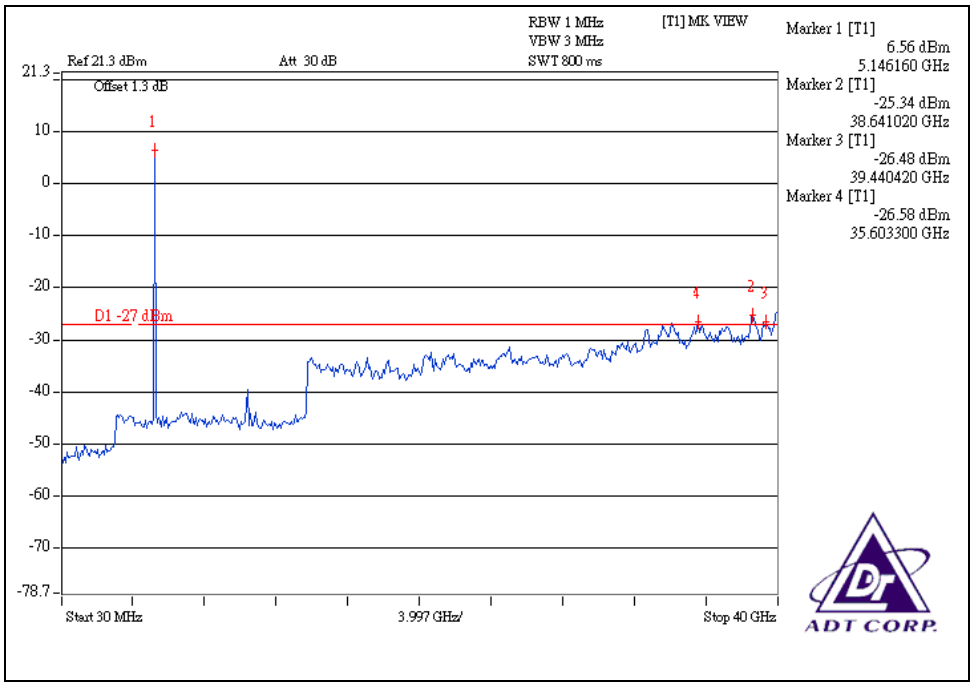


CH4

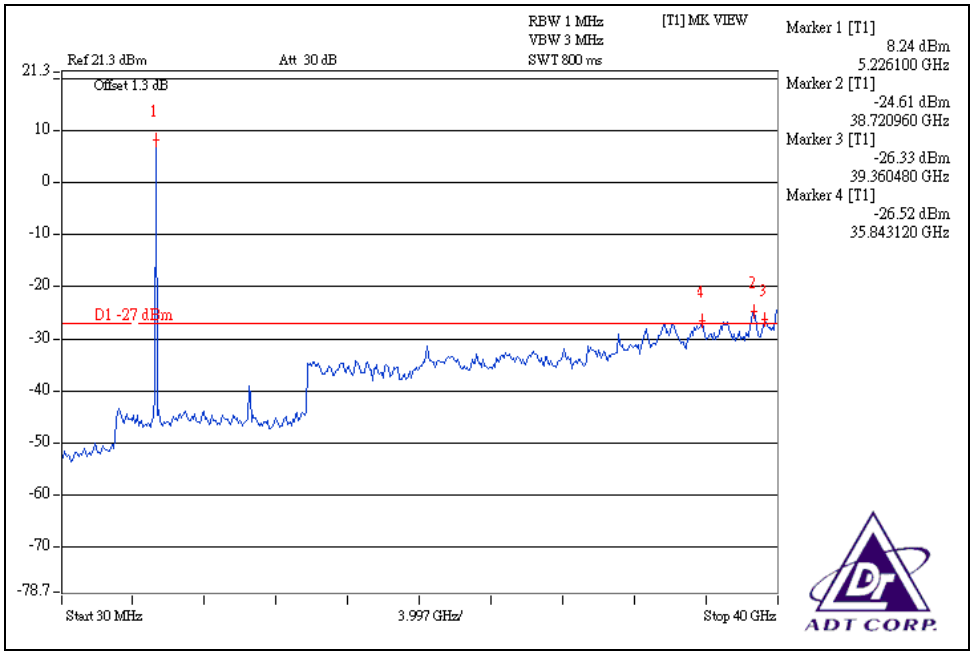


For chain (1):

CH1



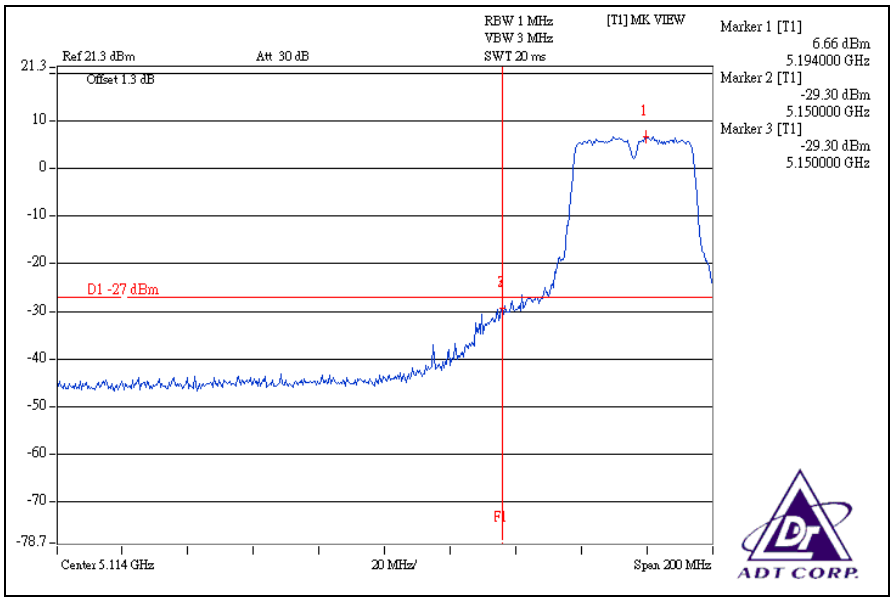
CH4



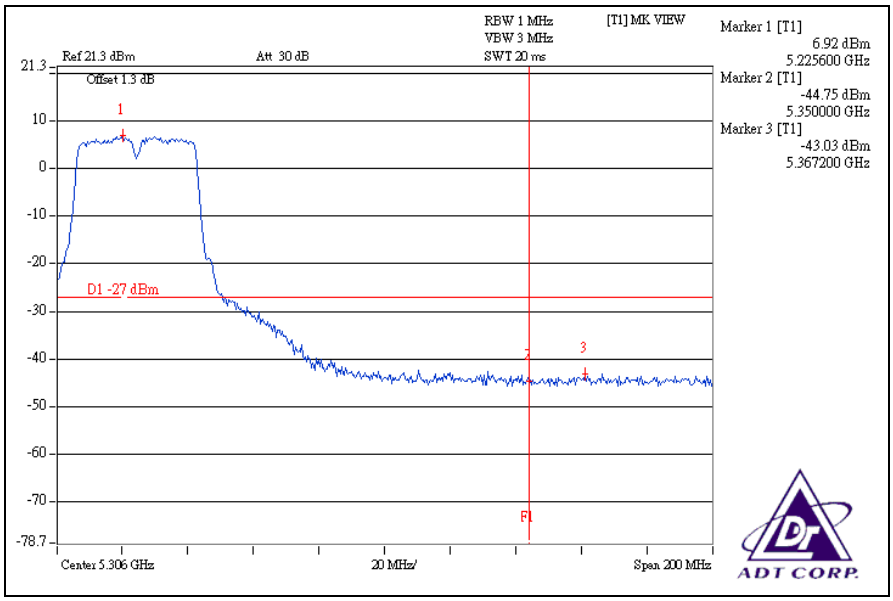
DRAFT 802.11n (40MHz) OFDM MODULATION:

For chain (0):

CH1

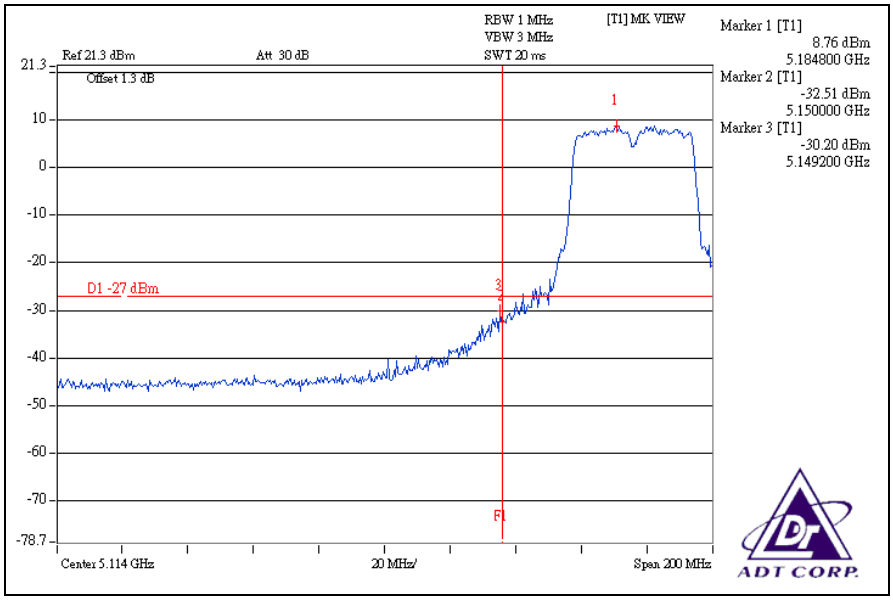


CH2

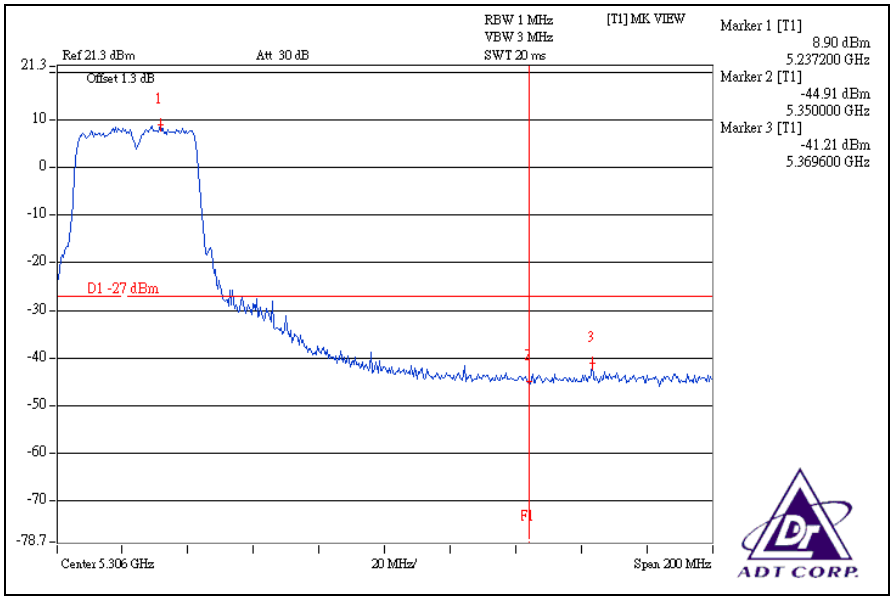


For chain (1):

CH1

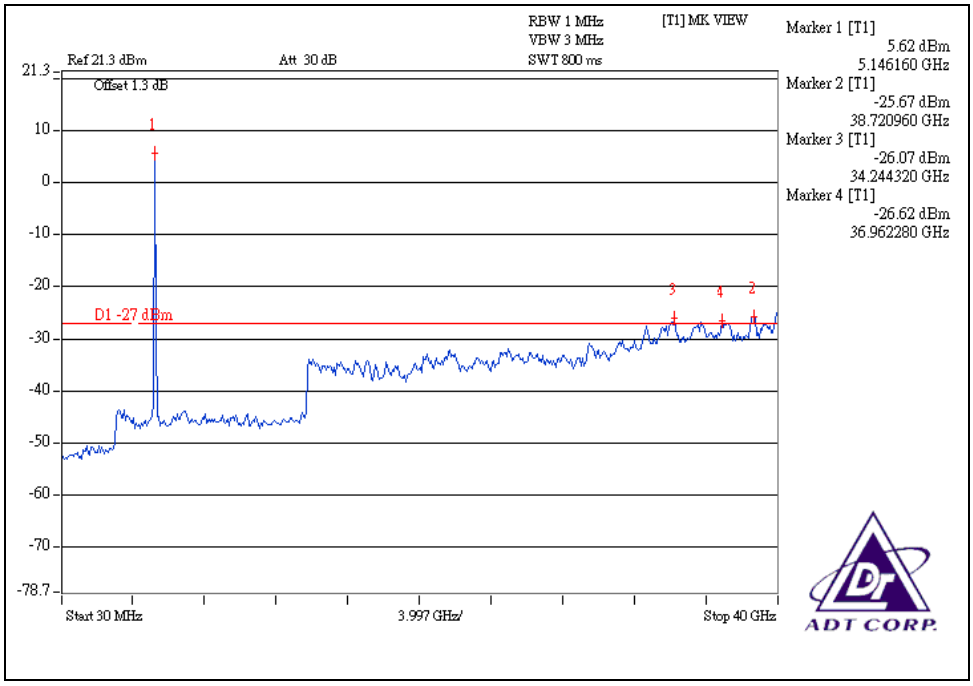


CH2

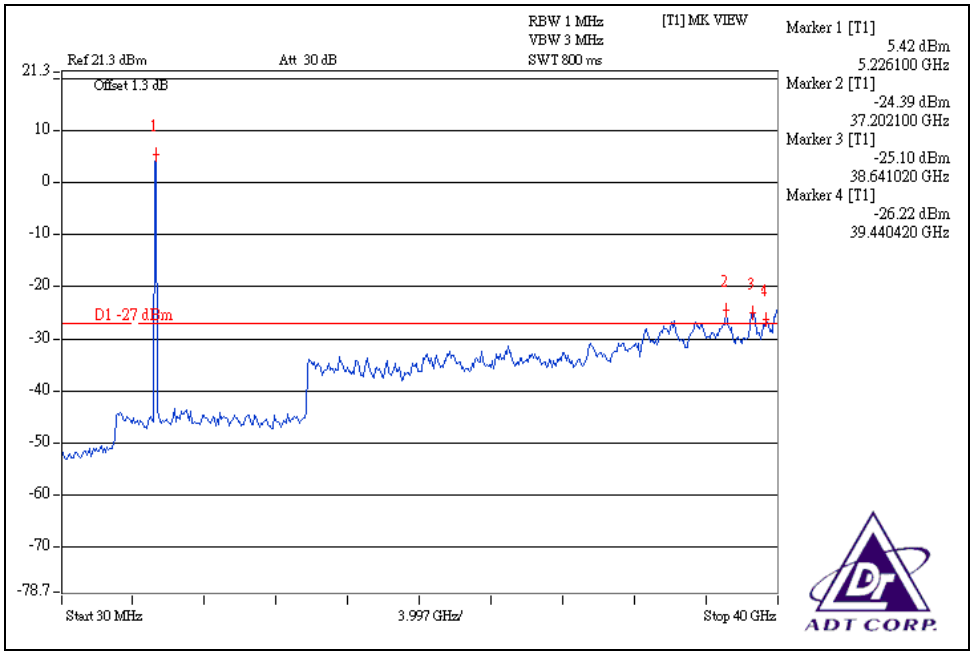


For chain (0):

CH1

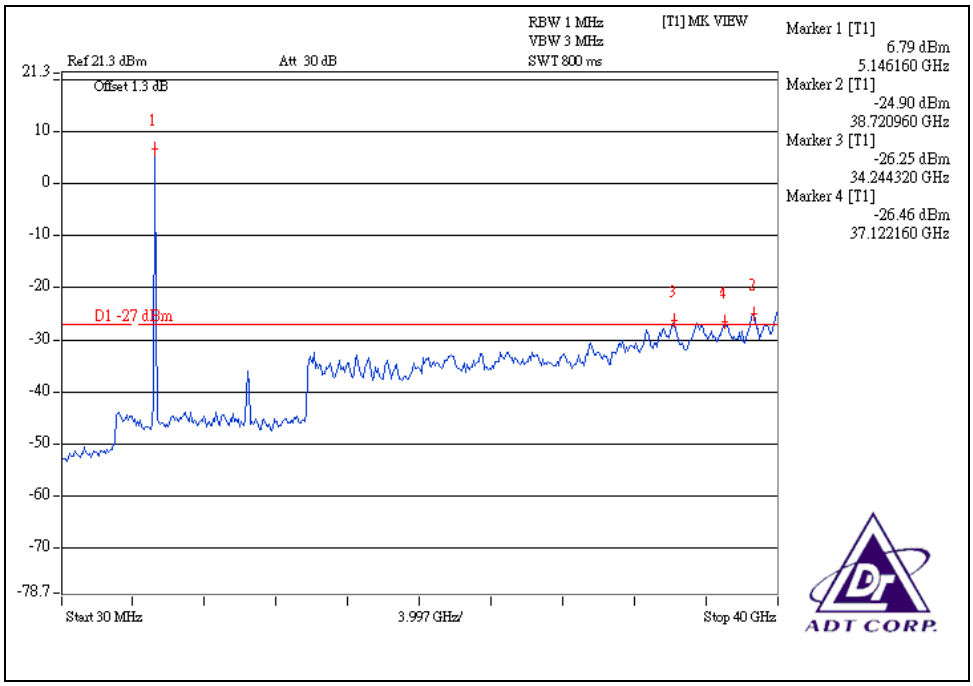


CH2

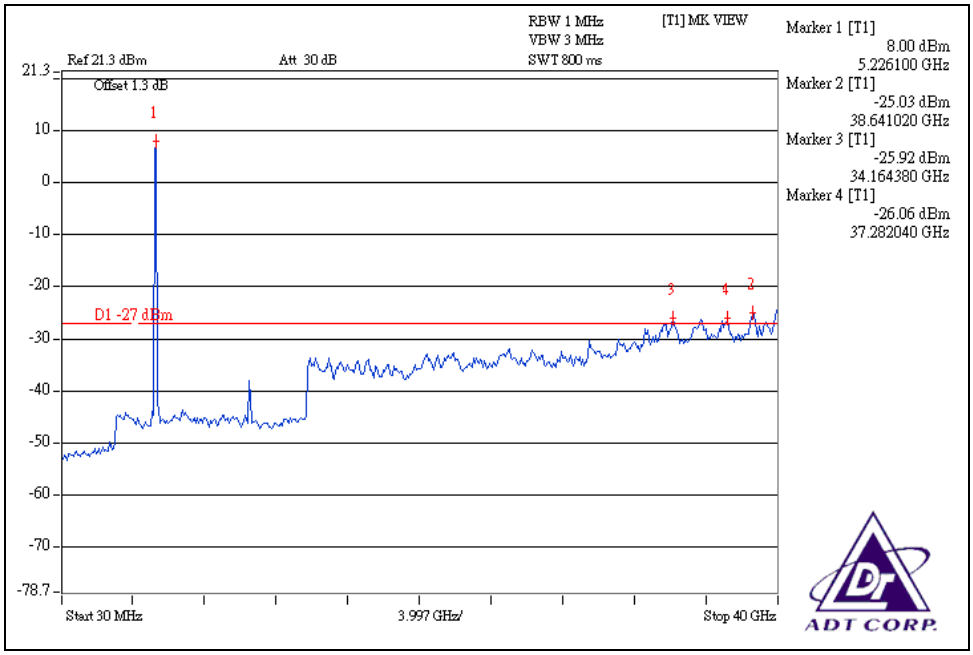


For chain (1):

CH1



CH2



4.8 ANTENNA REQUIREMENT

4.8.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.407(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.8.2 ANTENNA CONNECTED CONSTRUCTION

There three antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Antenna Type	For 2.4GHz Gain (dBi)	For 5GHz Gain (dBi)	Antenna Connector	Note
Chain(0)	PIFA	0.75	3	NA	TX & RX function
Chain(1)	PIFA	1.5	2.23	NA	TX & RX function
Chain(2)	PIFA	3.5	2.5	NA	Only RX function

5. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA(MOU)
Russia	CERTIS(MOU)

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

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

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: 886-3-3185050

Web Site: www.adt.com.tw

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

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

No any modifications are made to the EUT by the lab during the test.