

FCC TEST REPORT

REPORT NO. : RF931005L10

MODEL NO. : APL15-03A

RECEIVED : Oct. 05, 2004

TESTED : Nov. 01 ~ Nov. 17, 2004

ISSUED : Jan. 05, 2005

APPLICANT : Sonicwall Inc.

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1 CERTIFICATION

PRODUCT NAME : TZ 150 WIRELESS, TZ 50 WIRELESS

BRAND NAME : SonicWALL

MODEL NO. : APL15-03A

APPLICANT : Sonicwall Inc.

TESTED : Nov. 01 ~ Nov. 17, 2004

TEST SAMPLE : ENGINEERING SAMPLE

STANDARDS : FCC Part 15, Subpart C (Section 15.247)

ANSI C63.4:2003

The above equipment (model: APL15-03A) 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 : Suntee Liu , **DATE:** Jan. 05, 2005
(Suntee Liu)

TECHNICAL
ACCEPTANCE : Gary Chang , **DATE:** Jan. 05, 2005
Responsible for RF (Gary Chang)

APPROVED BY : Cody Chang , **DATE:** Jan. 05, 2005
(Cody Chang, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -12.27 dB at 0.162 MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -2.50 dB at 2483.50 MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

2.1 GENERAL DESCRIPTION OF EUT

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.65 dB
	1GHz ~ 18GHz	2.20 dB
	18GHz ~ 40GHz	1.88 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT NAME	TZ 150 WIRELESS, TZ 50 WIRELESS
MODEL NO.	APL15-03A
POWER SUPPLY	12Vdc from adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
TRANSFER RATE	11/5.5/2/1 Mbps for DSSS 54/48/36/24/18/12/9/6 Mbps for OFDM
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	64.121 mW
ANTENNA TYPE	Dipole antenna with 2dBi gain
DATA CABLE	NA
I/O PORTS	WAN port x1, LAN port x4

NOTE:

1. The EUT, operates in the 2.4GHz frequency range, lets you connect IEEE 802.11g or IEEE 802.11b devices to the network. With its high-speed data transmissions of up to 54Mbps.
2. The following product names are identical to each other except for their product name due to marketing requirement.

Product Name	Model No.
TZ 150 WIRELESS	APL15-03A
TZ 50 WIRELESS	APL15-03A

3. The TZ 150 WIRELESS was chosen for test.
4. The descriptive name of EUT is "Firewall/VPN Appliance with 802.11g Wireless Router".
5. The EUT was powered by the following adapters.

Brand	FAIRWAY
Model	WN20U-120
Input Rating	100-240Vac, 1.0A, MAX 50-60Hz
Output Rating	12Vdc, 1.66A

Brand	LEADER
Model	MU24-1120166-A1
Input Rating	100-240Vac, 50-60Hz, 1.0A
Output Rating	12Vdc, 1.66A

6. 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

11 channels are provided to this EUT.

Channel	Frequency	Channel	Frequency
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

NOTE:

- Below 1GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11 with OFDM technique, the worst case, was chosen for final test.
- Above 1GHz, the channel 1, 6, and 11 were tested individually.
- After pre-testing all data rates, the worst cases were 11Mbps for DSSS technique and 6Mbps for OFDM technique.
- For conducted emission test, the worst case was 6Mbps with OFDM technique after pre-testing in conducted emission test site.
- For radiated emission, 2 test results are presented in the following sections. The test result A is for DSSS technique and the test result B is for OFDM technique.
- There is a mini PCI card which model is WL-850F provided to the EUT.
- For conducted and radiated emission below 1000MHz test, there are 2 test modes presented in the report as below.

Adapter	Adapter Model
1	WN20U-120
2	MU24-1120166-A1

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Firewall/VPN Appliance with 802.11g Wireless Router (product name: TZ 150 WIRELESS, TZ 150 WIRELESS). According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

ANSI C63.4: 2003

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 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.

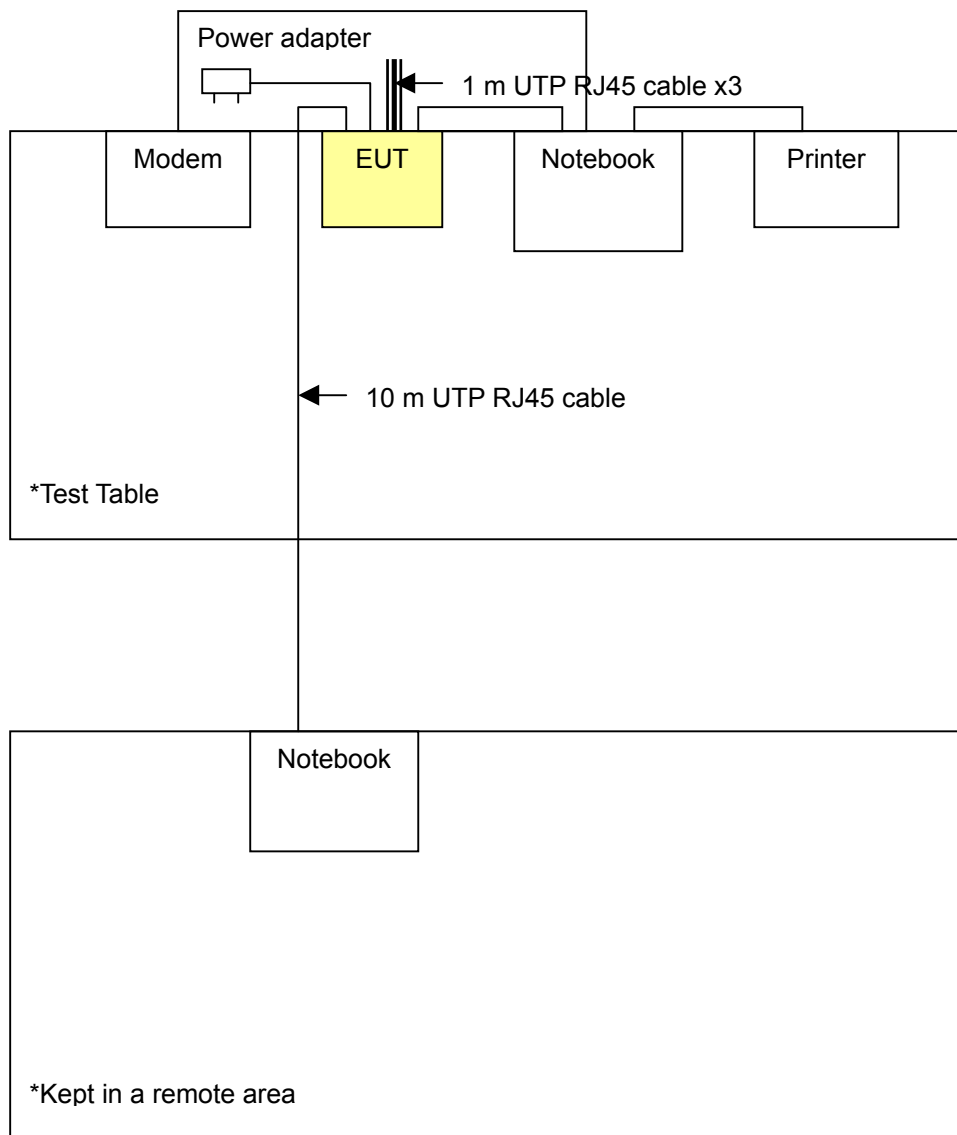
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP05L	16484462992	E2K24CLNS
2	NOTEBOOK COMPUTER	DELL	PP05L	12130898320	E2K24CLNS
3	PRINTER	EPSON	LQ-300+	DCGY054147	FCC DoC Approved
4	MODEM	ACEEX	1414V/3	0401008269	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	1.2m shielded cable
4	1.2m shielded cable

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 2 act as a communication partner to transfer data.

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
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Dec. 12, 2004
RF signal cable Woken	5D-FB	Cable-HYC01-01	Mar. 02, 2005
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Mar. 03, 2005
LISN ROHDE & SCHWARZ	ESH2-Z5	100104	Mar. 02, 2005
Software ADT	ADT_Cond_V3	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 HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.



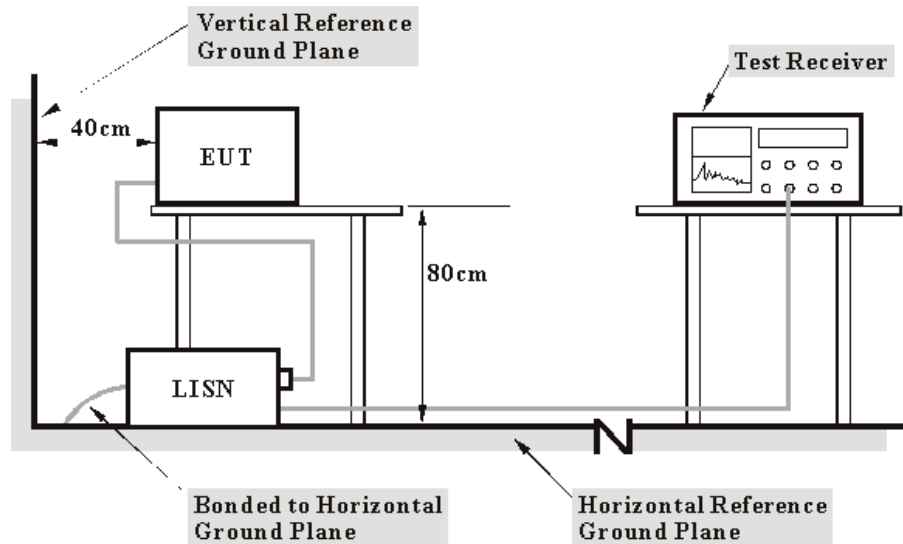
4.1.3 TEST PROCEDURES

- 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 provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels (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) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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

4.1.6 EUT OPERATING CONDITIONS

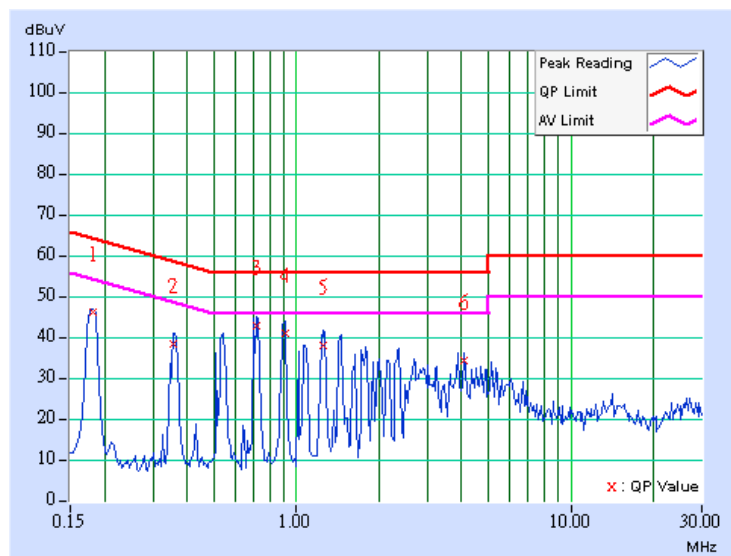
- Placed the EUT on the testing table.
- The notebook sent data to the EUT by command "PING" via UTP cable.
- The notebook sent "H" to its screen and its screen displayed them.
- The notebook "H" messages to modem.
- The notebook sent "H" messages to the printer, and the printer printed them on paper.
- Prepared another notebook placed outside of testing area to act as a communication partner.
- The communication partner ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- Steps c~e were repeated.

4.1.7 TEST RESULTS

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	1
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.11	46.06	-	46.17	-	64.43	54.43	-18.25	-
2	0.357	0.13	38.46	-	38.59	-	58.80	48.80	-20.21	-
3	0.720	0.14	42.88	-	43.02	-	56.00	46.00	-12.98	-
4	0.912	0.15	40.94	-	41.09	-	56.00	46.00	-14.91	-
5	1.250	0.15	37.96	-	38.11	-	56.00	46.00	-17.89	-
6	4.078	0.21	34.32	-	34.53	-	56.00	46.00	-21.47	-

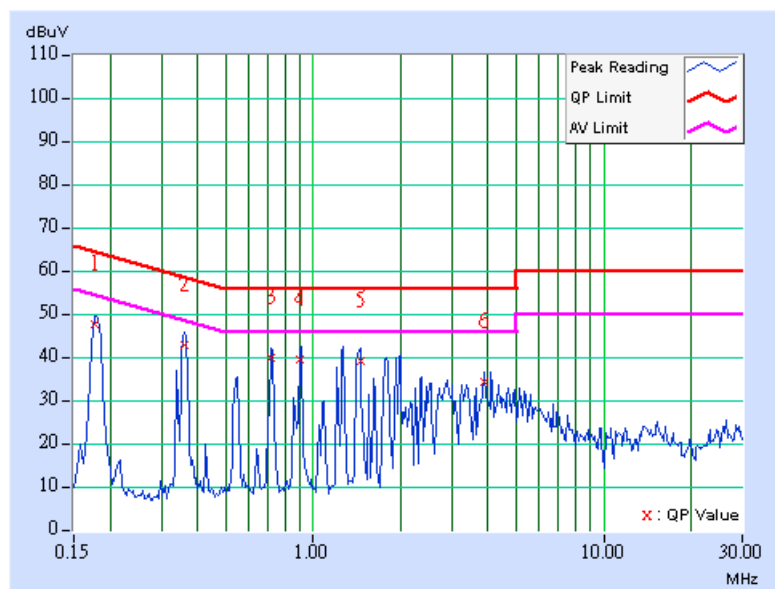
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	1
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.11	47.48	-	47.59	-	64.61	54.61	-17.02	-
2	0.361	0.12	42.88	-	43.00	-	58.71	48.71	-15.71	-
3	0.720	0.13	39.84	-	39.97	-	56.00	46.00	-16.03	-
4	0.896	0.14	39.30	-	39.44	-	56.00	46.00	-16.56	-
5	1.449	0.15	38.92	-	39.07	-	56.00	46.00	-16.93	-
6	3.855	0.20	34.07	-	34.27	-	56.00	46.00	-21.73	-

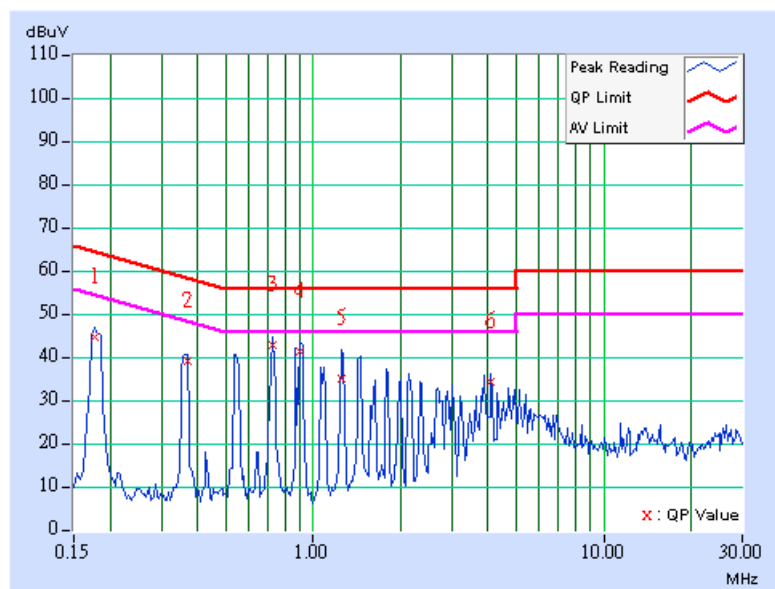
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	1
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.11	44.59	-	44.70	-	64.61	54.61	-19.91	-
2	0.369	0.13	39.05	-	39.18	-	58.53	48.53	-19.35	-
3	0.724	0.14	42.76	-	42.90	-	56.00	46.00	-13.10	-
4	0.904	0.15	41.12	-	41.27	-	56.00	46.00	-14.73	-
5	1.254	0.15	34.93	-	35.08	-	56.00	46.00	-20.92	-
6	4.074	0.21	34.16	-	34.37	-	56.00	46.00	-21.63	-

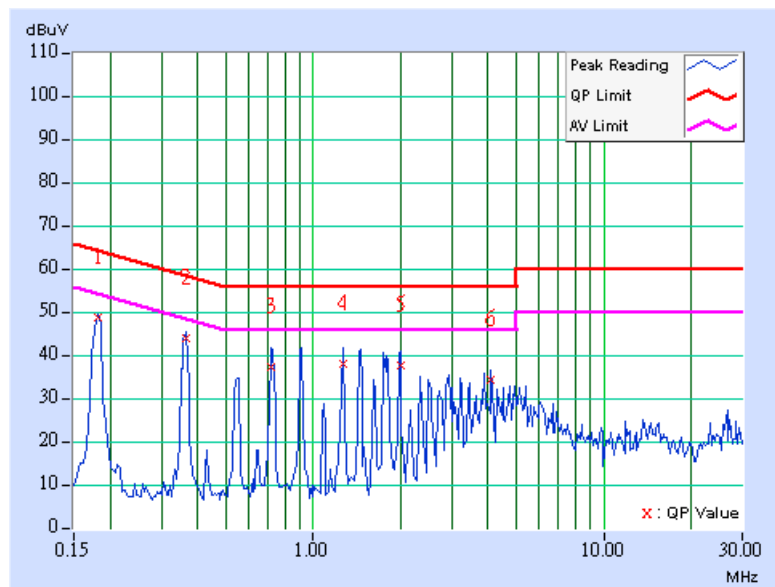
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	1
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.11	48.57	-	48.68	-	64.43	54.43	-15.75	-
2	0.365	0.12	43.88	-	44.00	-	58.62	48.62	-14.62	-
3	0.716	0.13	37.07	-	37.20	-	56.00	46.00	-18.80	-
4	1.262	0.15	37.88	-	38.03	-	56.00	46.00	-17.97	-
5	1.996	0.16	37.55	-	37.71	-	56.00	46.00	-18.29	-
6	4.078	0.20	34.38	-	34.58	-	56.00	46.00	-21.42	-

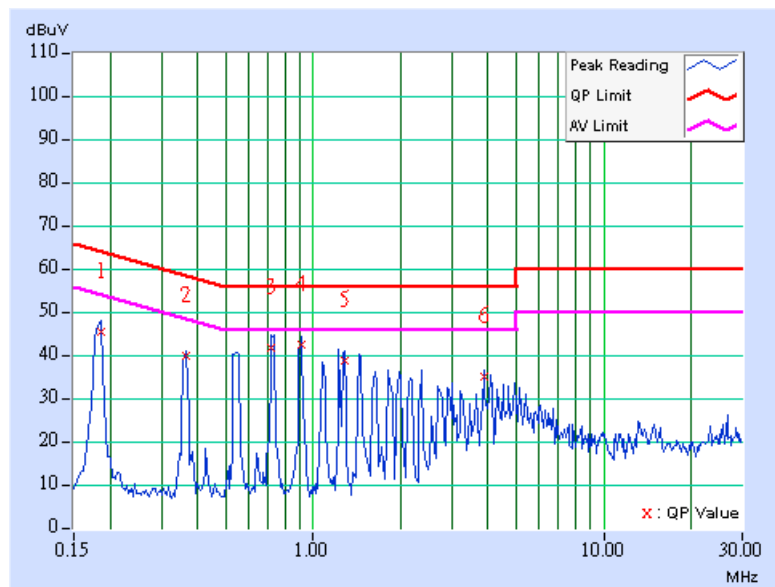
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	1
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.185	0.12	45.32	-	45.44	-	64.25	54.25	-18.82	-
2	0.365	0.13	39.94	-	40.07	-	58.62	48.62	-18.55	-
3	0.720	0.14	41.53	-	41.67	-	56.00	46.00	-14.33	-
4	0.916	0.15	42.39	-	42.54	-	56.00	46.00	-13.46	-
5	1.277	0.15	38.53	-	38.68	-	56.00	46.00	-17.32	-
6	3.867	0.20	34.95	-	35.15	-	56.00	46.00	-20.85	-

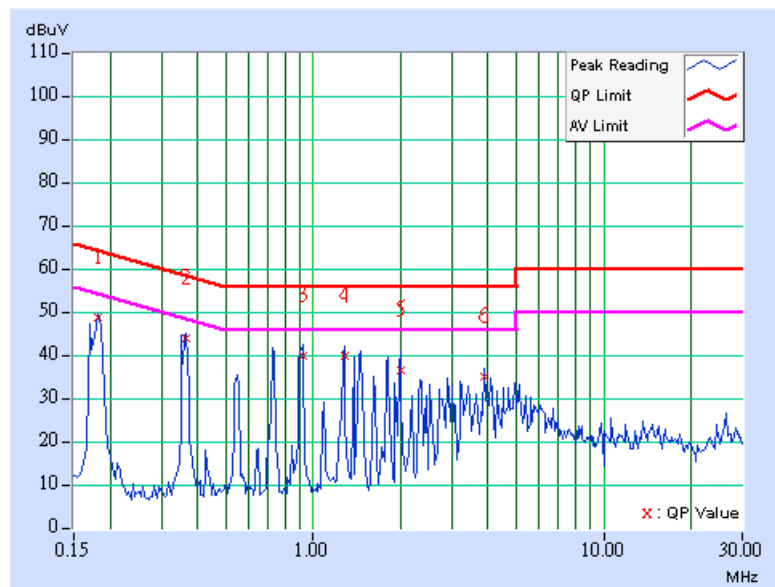
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 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	1
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.11	48.55	-	48.66	-	64.43	54.43	-15.77	-
2	0.365	0.12	43.84	-	43.96	-	58.62	48.62	-14.66	-
3	0.920	0.14	39.97	-	40.11	-	56.00	46.00	-15.89	-
4	1.277	0.15	39.82	-	39.97	-	56.00	46.00	-16.03	-
5	1.996	0.16	36.56	-	36.72	-	56.00	46.00	-19.28	-
6	3.867	0.20	35.07	-	35.27	-	56.00	46.00	-20.73	-

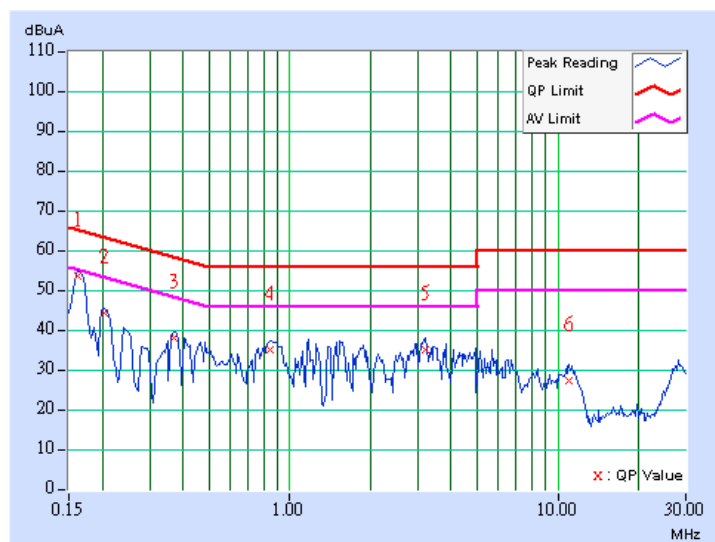
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	2
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.10	53.00	-	53.10	-	65.38	55.38	-12.27	-
2	0.205	0.10	43.73	-	43.83	-	63.42	53.42	-19.59	-
3	0.369	0.11	37.74	-	37.85	-	58.53	48.53	-20.68	-
4	0.849	0.21	34.53	-	34.74	-	56.00	46.00	-21.26	-
5	3.219	0.29	34.45	-	34.74	-	56.00	46.00	-21.26	-
6	11.051	0.57	26.85	-	27.42	-	60.00	50.00	-32.58	-

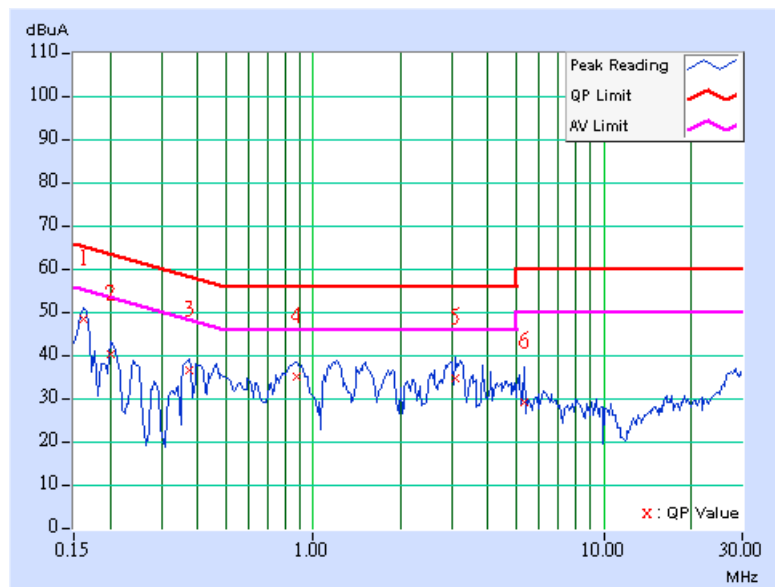
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	2
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.10	48.08	-	48.18	-	65.38	55.38	-17.20	-
2	0.201	0.10	40.05	-	40.15	-	63.58	53.58	-23.43	-
3	0.373	0.11	36.31	-	36.42	-	58.44	48.44	-22.02	-
4	0.873	0.21	34.84	-	35.05	-	56.00	46.00	-20.95	-
5	3.098	0.28	34.44	-	34.72	-	56.00	46.00	-21.28	-
6	5.344	0.36	28.91	-	29.27	-	60.00	50.00	-30.73	-

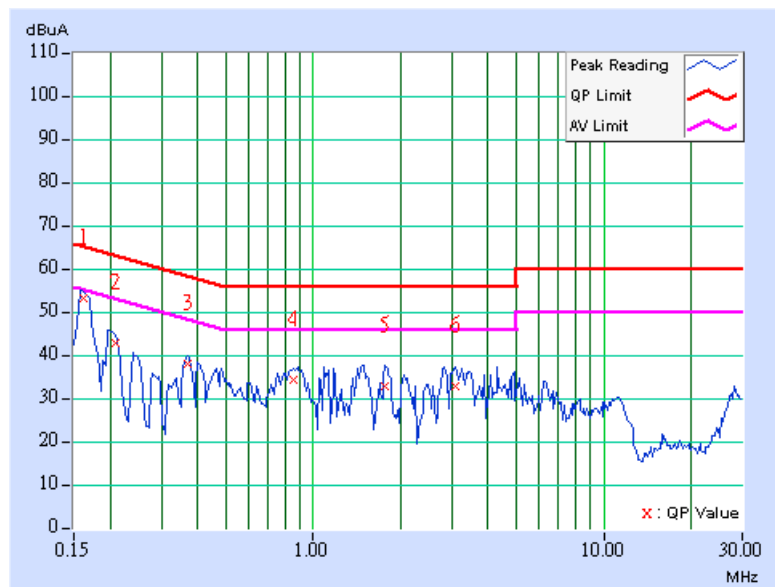
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	2
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.10	52.92	-	53.02	-	65.38	55.38	-12.35	-
2	0.209	0.10	42.68	-	42.78	-	63.26	53.26	-20.48	-
3	0.369	0.11	37.76	-	37.87	-	58.53	48.53	-20.66	-
4	0.853	0.22	34.33	-	34.55	-	56.00	46.00	-21.45	-
5	1.773	0.26	32.80	-	33.06	-	56.00	46.00	-22.94	-
6	3.094	0.29	32.70	-	32.99	-	56.00	46.00	-23.01	-

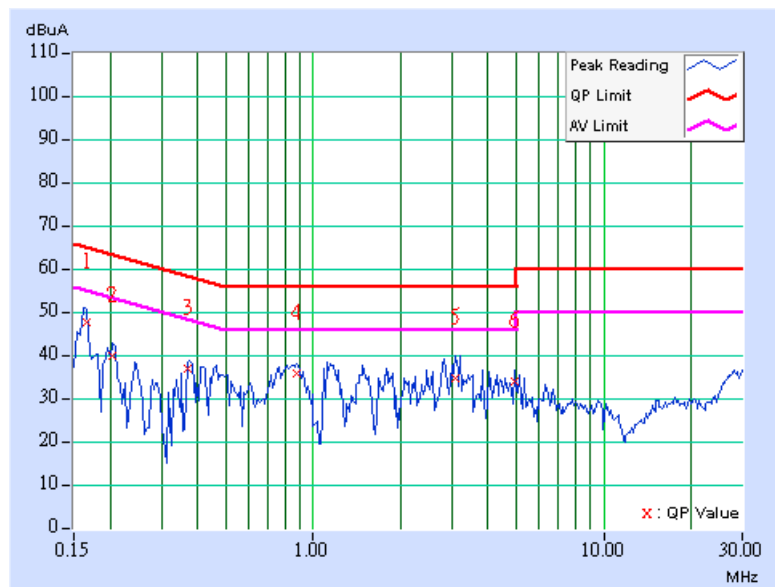
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	2
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.166	0.10	47.39	-	47.49	-	65.18	55.18	-17.69	-
2	0.205	0.10	39.53	-	39.63	-	63.42	53.42	-23.79	-
3	0.369	0.11	36.67	-	36.78	-	58.53	48.53	-21.75	-
4	0.877	0.21	35.63	-	35.84	-	56.00	46.00	-20.16	-
5	3.090	0.28	34.52	-	34.80	-	56.00	46.00	-21.20	-
6	4.914	0.34	33.90	-	34.24	-	56.00	46.00	-21.76	-

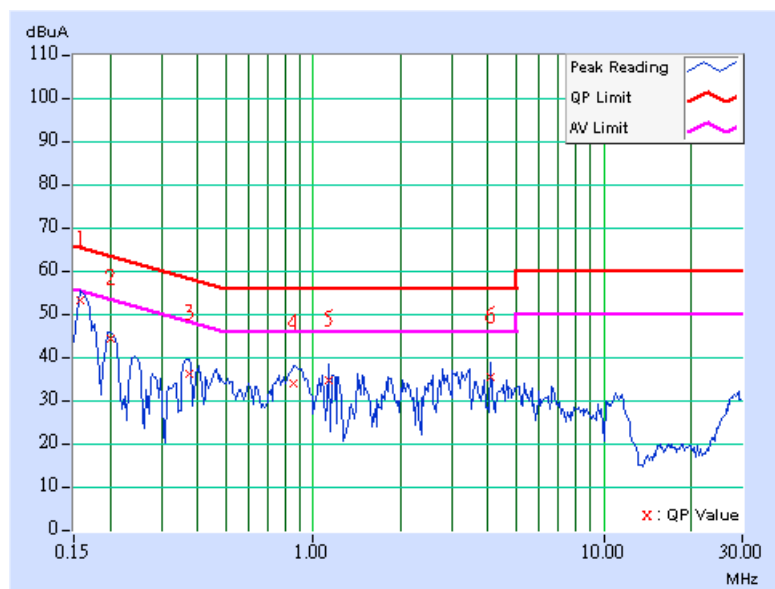
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	2
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	0.10	52.94	-	53.04	-	65.58	55.58	-12.53	-
2	0.201	0.10	44.27	-	44.37	-	63.58	53.58	-19.21	-
3	0.377	0.11	35.80	-	35.91	-	58.35	48.35	-22.44	-
4	0.857	0.22	33.86	-	34.08	-	56.00	46.00	-21.92	-
5	1.133	0.25	34.57	-	34.82	-	56.00	46.00	-21.18	-
6	4.070	0.32	35.18	-	35.50	-	56.00	46.00	-20.50	-

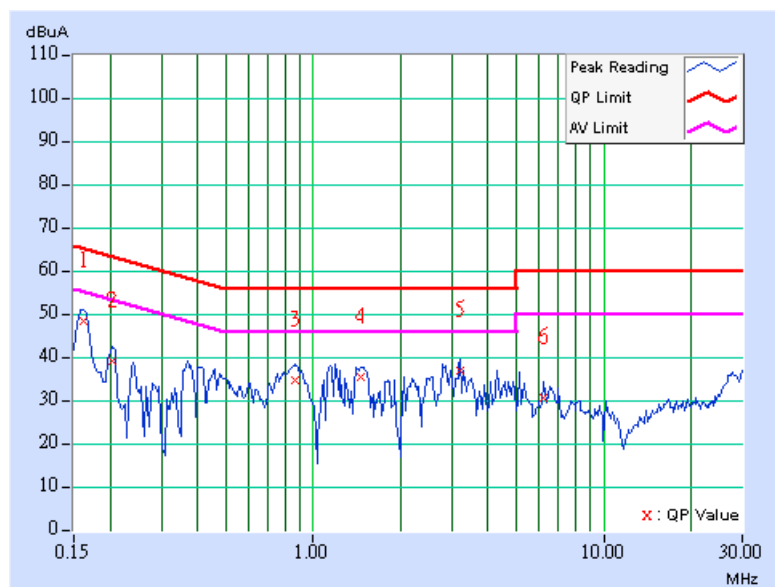
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	ADAPTER	2
TESTED BY	Leo Hung		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.10	48.10	-	48.20	-	65.38	55.38	-17.18	-
2	0.205	0.10	38.83	-	38.93	-	63.42	53.42	-24.49	-
3	0.869	0.21	34.51	-	34.72	-	56.00	46.00	-21.28	-
4	1.457	0.24	35.18	-	35.42	-	56.00	46.00	-20.58	-
5	3.215	0.28	36.47	-	36.75	-	56.00	46.00	-19.25	-
6	6.215	0.39	30.21	-	30.60	-	60.00	50.00	-29.40	-

- 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 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Feb. 09, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 15, 2004
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170242	Feb. 23, 2005
Preamplifier Agilent	8447D	2944A10631	Jan. 15, 2005
Preamplifier Agilent	8449B	3008A01960	Jan. 22, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Mar. 04, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219275/4	Mar. 04, 2005
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	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 HwaYa Chamber 3.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The IC Site Registration No. is IC4924-4.

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The 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 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

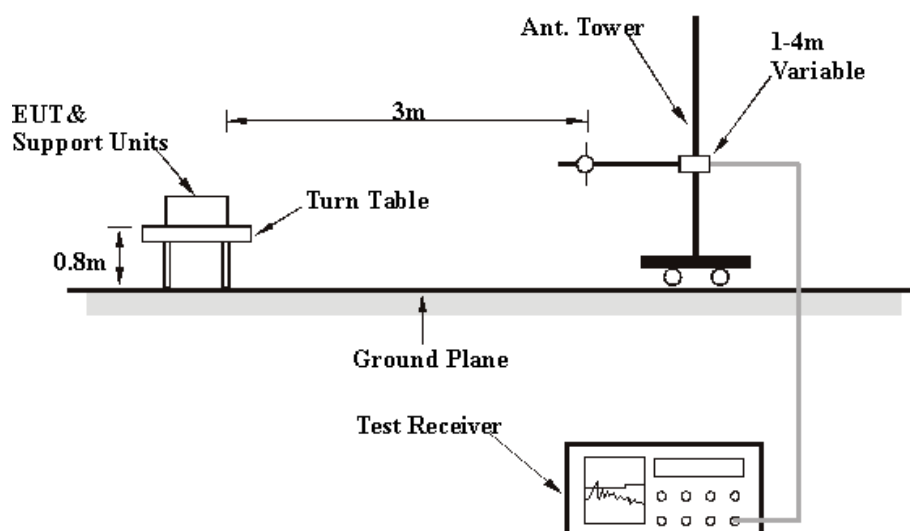
NOTE:

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 and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection 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.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

4.2.7 TEST RESULTS

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	FREQUENCY RANGE	Below 1000 MHz
INPUT POWER (SYSTEM)	120 Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	ADAPTER	1
TESTED BY	Rush Kao		

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	199.12	35.37 QP	43.50	-8.13	1.25 H	13	24.03	11.34
2	374.07	40.18 QP	46.00	-5.82	1.00 H	328	24.08	16.10
3	500.42	38.03 QP	46.00	-7.97	1.00 H	238	19.46	18.58
4	720.08	36.49 QP	46.00	-9.51	1.00 H	52	13.98	22.50
5	766.73	38.73 QP	46.00	-7.27	1.00 H	265	15.41	23.31
6	799.78	37.43 QP	46.00	-8.57	1.00 H	259	13.97	23.46

- 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.

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	FREQUENCY RANGE	Below 1000 MHz
INPUT POWER (SYSTEM)	120 Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	ADAPTER	1
TESTED BY	Rush Kao		

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	53.33	37.29 QP	40.00	-2.71	1.00 V	106	23.02	14.27
2	103.87	38.83 QP	43.50	-4.67	1.25 V	19	27.54	11.29
3	158.30	34.53 QP	43.50	-8.97	1.00 V	145	19.63	14.90
4	199.12	32.08 QP	43.50	-11.42	1.00 V	265	20.74	11.34
5	374.07	33.63 QP	46.00	-12.37	1.25 V	199	17.53	16.10
6	500.42	38.27 QP	46.00	-7.73	1.25 V	79	19.69	18.58

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.

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	FREQUENCY RANGE	Below 1000 MHz
INPUT POWER (SYSTEM)	120 Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24 deg. C, 65% RH, 991 hPa	ADAPTER	2
TESTED BY	Steven Lu		

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	37.78	35.66 QP	40.00	-4.34	1.50 H	292	20.70	14.96
2	68.88	32.60 QP	40.00	-7.40	4.00 H	229	19.99	12.61
3	249.66	28.09 QP	46.00	-17.91	1.00 H	61	14.98	13.11
4	374.07	41.45 QP	46.00	-4.55	1.00 H	274	25.35	16.10
5	500.42	40.01 QP	46.00	-5.99	2.00 H	19	21.43	18.58
6	667.60	37.87 QP	46.00	-8.13	2.50 H	229	16.21	21.66
7	751.18	38.37 QP	46.00	-7.63	1.00 H	301	15.13	23.25
8	799.78	36.45 QP	46.00	-9.55	1.00 H	247	12.99	23.46

- 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.

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	FREQUENCY RANGE	Below 1000 MHz
INPUT POWER (SYSTEM)	120 Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24 deg. C, 62% RH, 991 hPa	ADAPTER	2
TESTED BY	Steven Lu		

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	37.78	36.35 QP	40.00	-3.65	1.00 V	340	21.39	14.96
2	76.65	36.21 QP	40.00	-3.79	1.00 V	325	25.47	10.74
3	107.76	38.52 QP	43.50	-4.98	1.50 V	142	26.86	11.67
4	249.66	32.31 QP	46.00	-13.69	1.00 V	238	19.21	13.11
5	374.07	37.34 QP	46.00	-8.66	1.00 V	352	21.24	16.10
6	500.42	39.63 QP	46.00	-6.37	1.00 V	205	21.05	18.58
7	624.83	32.55 QP	46.00	-13.45	1.00 V	247	11.40	21.15
8	667.60	33.29 QP	46.00	-12.71	2.00 V	316	11.63	21.66
9	751.18	34.43 QP	46.00	-11.57	1.00 V	79	11.18	23.25
10	799.78	32.92 QP	46.00	-13.08	1.00 V	349	9.46	23.46

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.

4.2.8 TEST RESULTS (A)

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	1	FREQUENCY RANGE	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	TESTED BY	Rush Kao

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	1466.00	41.46 PK	74.00	-32.54	1.02 H	10	12.09	29.37
1	2390.00	43.97 PK	74.00	-30.03	1.00 H	309	12.83	31.14
2	*2412.00	103.21 PK			1.00 H	309	72.00	31.21
2	*2412.00	95.51 AV			1.00 H	309	64.30	31.21
3	4824.00	50.36 PK	74.00	-23.64	1.00 H	0	12.48	37.88

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1466.00	42.92 PK	74.00	-31.08	1.00 V	344	13.55	29.37
1	2390.00	54.11 PK	74.00	-19.89	1.00 V	360	22.97	31.14
2	2390.00	45.10 AV	54.00	-8.90	1.00 V	360	13.96	31.14
2	*2412.00	113.35 PK			1.00 V	360	82.14	31.21
3	*2412.00	104.34 AV			1.00 V	360	73.13	31.21
3	4824.00	50.69 PK	74.00	-23.31	1.00 V	297	12.81	37.88

REMARKS:

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

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	6	FREQUENCY RANGE	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	TESTED BY	Rush Kao

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	1466.00	40.63 PK	74.00	-33.37	1.00 H	21	11.26	29.37
1	*2437.00	103.95 PK			1.00 H	307	72.62	31.34
2	*2437.00	96.24 AV			1.00 H	307	64.91	31.34
2	4874.00	50.54 PK	74.00	-23.46	1.00 H	110	12.55	37.99

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1466.00	40.88 PK	74.00	-33.12	1.00 V	342	11.51	29.37
2	*2437.00	113.79 PK			1.00 V	300	82.46	31.34
2	*2437.00	105.17 AV			1.00 V	300	73.84	31.34
3	4874.00	50.23 PK	74.00	-23.77	1.00 V	310	12.24	37.99

REMARKS:

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

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	FREQUENCY RANGE	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	TESTED BY	Rush Kao

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	1466.00	41.17 PK	74.00	-32.83	1.00 H	21	11.80	29.37
2	*2462.00	103.26 PK			1.00 H	303	71.80	31.46
2	*2462.00	95.27 AV			1.00 H	303	63.81	31.46
3	2483.50	46.62 PK	74.00	-27.38	1.00 H	303	15.05	31.57
4	4924.00	50.92 PK	74.00	-23.08	1.04 H	88	12.81	38.11

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	1466.00	41.33 PK	74.00	-32.67	1.00 V	335	11.96	29.37
2	*2462.00	114.23 PK			1.01 V	294	82.77	31.46
2	*2462.00	106.44 AV			1.01 V	294	74.98	31.46
3	2483.50	57.59 PK	74.00	-16.41	1.01 V	294	26.02	31.57
3	2483.50	49.80 AV	54.00	-4.20	1.01 V	294	18.23	31.57
4	4924.00	51.23 PK	74.00	-22.77	1.01 V	20	13.12	38.11
4	4924.00	38.93 AV	54.00	-15.07	1.01 V	20	0.82	38.11

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

4.2.9 TEST RESULTS (B)

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	1	FREQUENCY RANGE	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	TESTED BY	Rush Kao

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	1466.00	50.08 PK	74.00	-23.92	1.00 H	32	20.71	29.37
2	2390.00	48.89 PK	74.00	-25.11	1.00 H	296	17.75	31.14
3	*2412.00	99.33 PK			1.00 H	296	68.12	31.21
3	*2412.00	90.13 AV			1.00 H	296	58.92	31.21
4	4824.00	57.16 PK	74.00	-16.84	1.00 H	19	19.28	37.88
4	4824.00	44.81 AV	54.00	-9.19	1.00 H	19	6.93	37.88

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1466.00	51.39 PK	74.00	-22.61	1.00 V	335	22.02	29.37
1	1466.00	43.86 AV	54.00	-10.14	1.00 V	335	14.49	29.37
2	2390.00	58.15 PK	74.00	-15.85	1.00 V	308	27.01	31.14
2	2390.00	48.89 AV	54.00	-5.11	1.00 V	308	17.75	31.14
3	*2412.00	108.59 PK			1.00 V	308	77.38	31.21
3	*2412.00	99.33 AV			1.00 V	308	68.12	31.21
4	4824.00	57.08 PK	74.00	-16.92	1.06 V	30	19.20	37.88
4	4824.00	44.78 AV	54.00	-9.22	1.06 V	30	6.90	37.88

REMARKS:

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

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	6	FREQUENCY RANGE	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	TESTED BY	Rush Kao

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	1466.00	42.47 PK	74.00	-31.53	1.00 H	308	13.10	29.37
2	*2437.00	98.59 PK			1.00 H	307	67.25	31.34
2	*2437.00	89.67 AV			1.00 H	307	58.34	31.34
3	4874.00	50.51 PK	74.00	-23.49	1.00 H	103	12.52	37.99

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1466.00	44.01 PK	74.00	-29.99	1.00 V	339	14.64	29.37
2	*2437.00	108.27 PK			1.02 V	360	76.94	31.34
2	*2437.00	98.85 AV			1.02 V	360	67.51	31.34
3	4874.00	50.68 PK	74.00	-23.32	1.00 V	320	12.69	37.99

REMARKS:

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

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
CHANNEL	11	FREQUENCY RANGE	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 52% RH, 991 hPa	TESTED BY	Rush Kao

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	1466.00	43.27 PK	74.00	-30.73	1.00 H	205	13.90	29.37
2	*2462.00	97.86 PK			1.00 H	297	66.40	31.46
2	*2462.00	89.03 AV			1.00 H	297	57.57	31.46
3	2483.50	49.65 PK	74.00	-24.35	1.00 H	297	18.08	31.57
4	4924.00	51.34 PK	74.00	-22.66	1.00 H	43	13.23	38.11
4	4924.00	41.74 AV	54.00	-12.26	1.00 H	43	3.63	38.11

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	1466.00	44.48 PK	74.00	-29.52	1.05 V	12	15.11	29.37
2	*2462.00	108.67 PK			1.00 V	343	77.21	31.46
2	*2462.00	99.71 AV			1.00 V	343	68.25	31.46
3	2483.50	60.46 PK	60.46	-13.54	1.00 V	343	28.89	31.57
3	2483.50	51.50 AV	54.00	-2.50	1.00 V	343	19.93	31.57
4	4924.00	52.71 PK	74.00	-21.29	1.00 V	330	14.60	38.11
4	4924.00	45.29 AV	54.00	-8.71	1.00 V	330	7.18	38.11

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

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

NOTE:

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

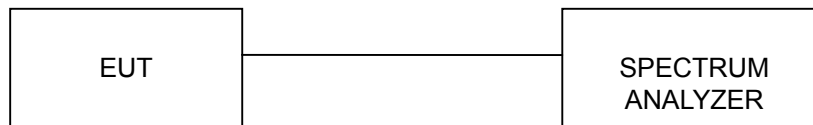
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP



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

4.3.6 EUT OPERATING CONDITIONS

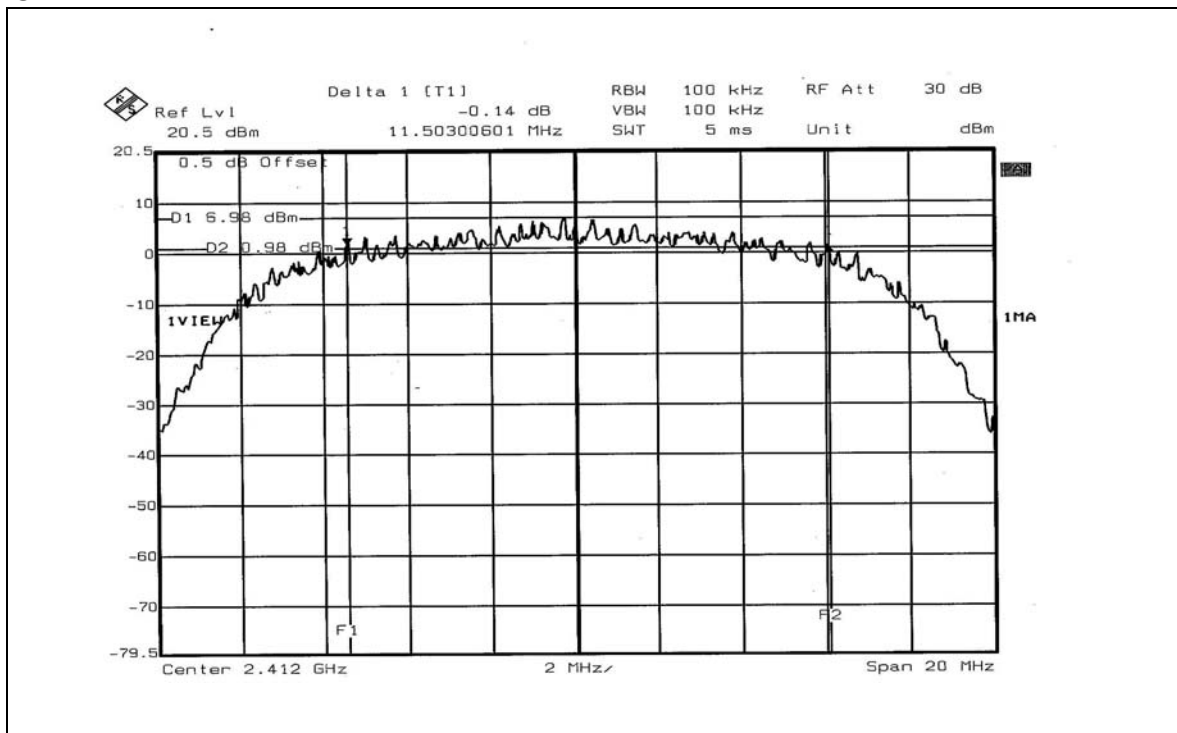
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS (A)

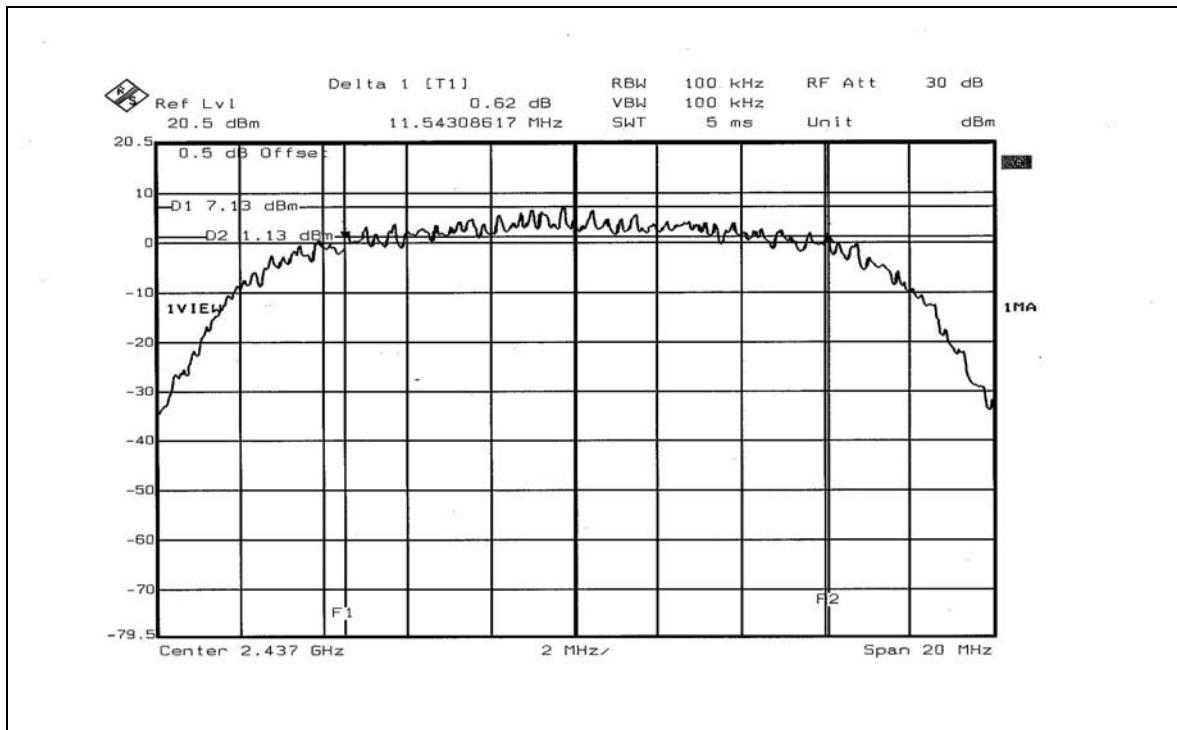
EUT	TZ 150 WIRELESS	MODEL	APL15-03A
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 991 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	11.50	0.5	PASS
6	2437	11.54	0.5	PASS
11	2462	11.50	0.5	PASS

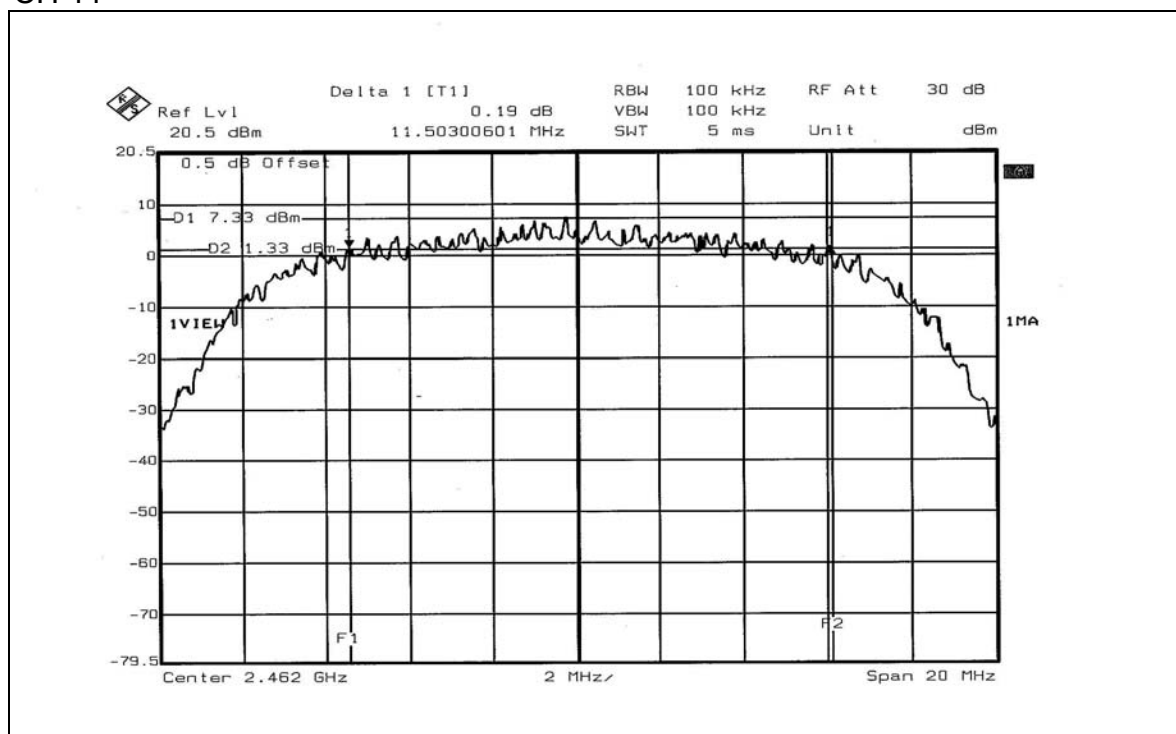
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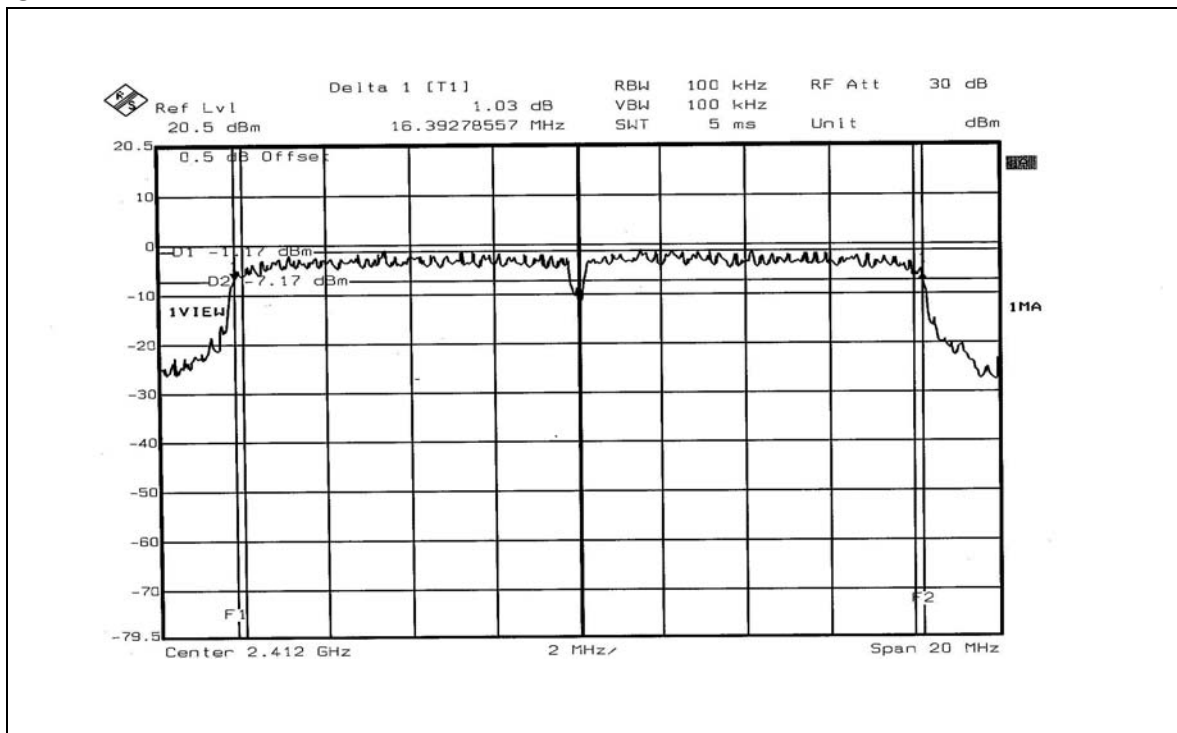


4.3.8 TEST RESULTS (B)

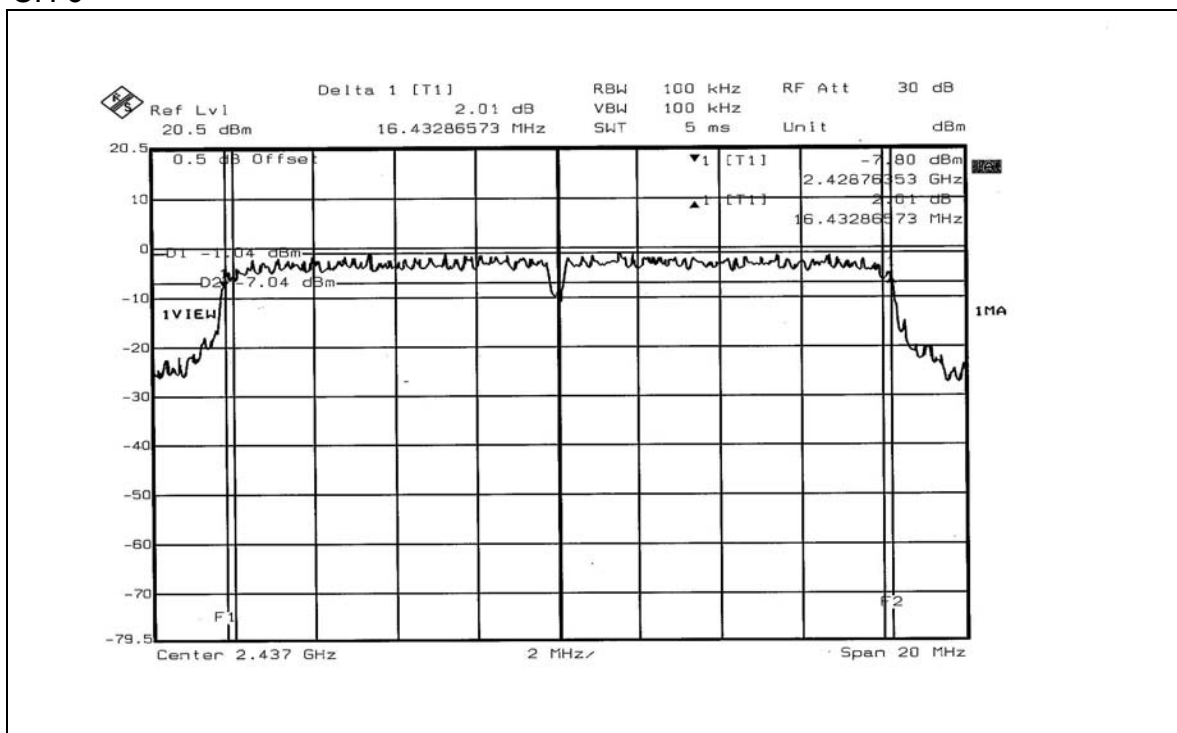
EUT	TZ 150 WIRELESS	MODEL	APL15-03A
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.39	0.5	PASS
6	2437	16.43	0.5	PASS
11	2462	16.43	0.5	PASS

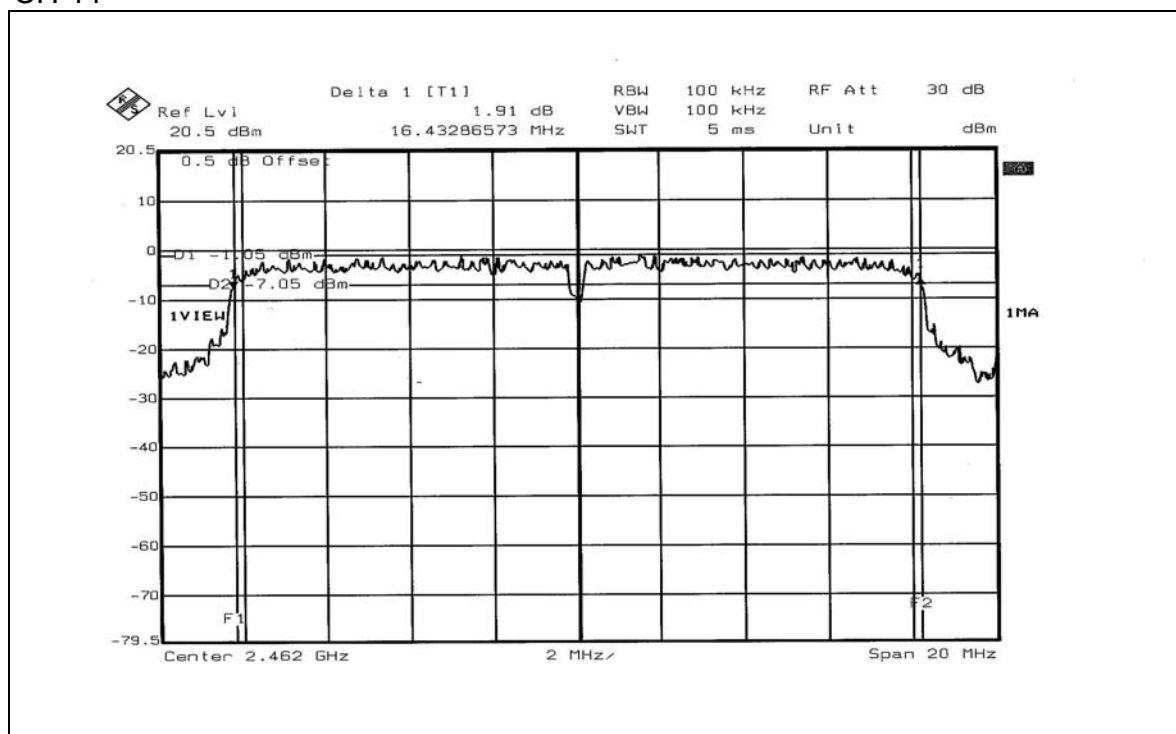
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4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005
AGILENT SIGNAL GENERATOR	E8257C	MY43320668	Dec. 31, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	C019167	Feb. 1, 2005
NARDA DETECTOR	4503A	FSCM99899	NA

NOTE:

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

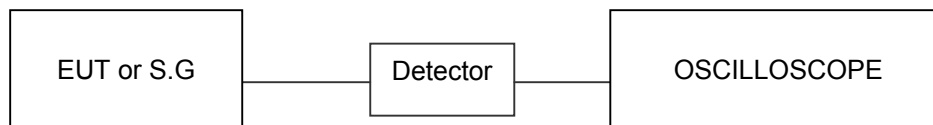
4.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G. was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS (A)

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 991 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	63.533	18.03	30	PASS
6	2437	64.121	18.07	30	PASS
11	2462	63.387	18.02	30	PASS

4.4.8 TEST RESULTS (B)

EUT	TZ 150 WIRELESS	MODEL	APL15-03A
ENVIRONMENTAL CONDITIONS	24 deg. C, 64% RH, 991 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	40.551	16.08	30	PASS
6	2437	41.020	16.13	30	PASS
11	2462	41.687	16.20	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

NOTE:

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

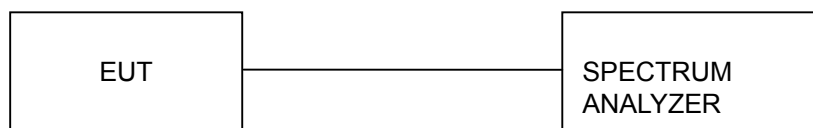
4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

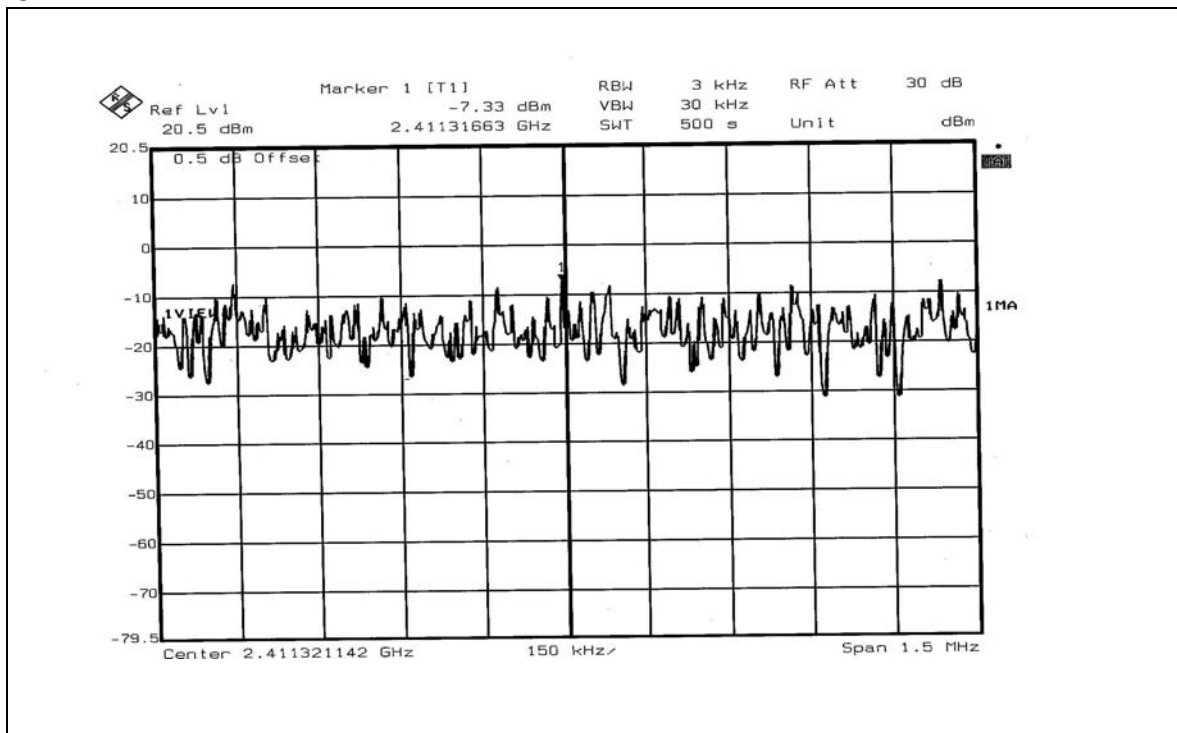
Same as 4.3.6.

4.5.7 TEST RESULTS (A)

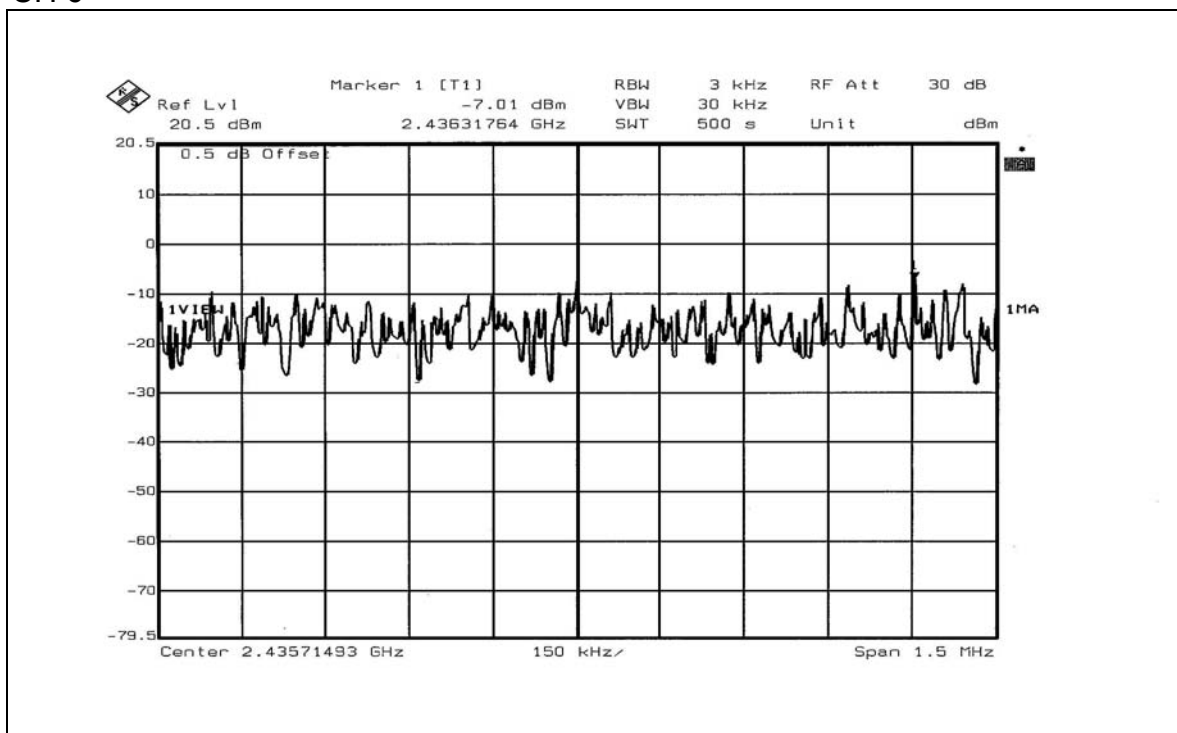
EUT	TZ 150 WIRELESS	MODEL	APL15-03A
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 991 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Rush Kao		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-7.33	8	PASS
6	2437	-7.01	8	PASS
11	2462	-6.80	8	PASS

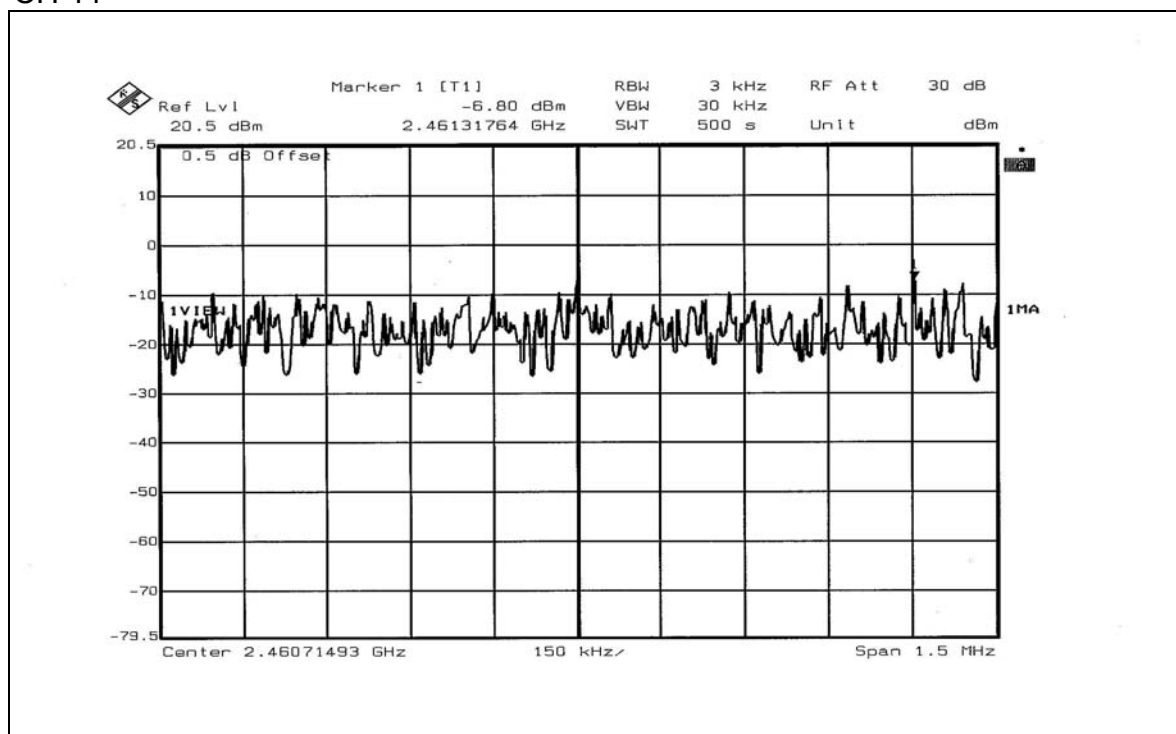
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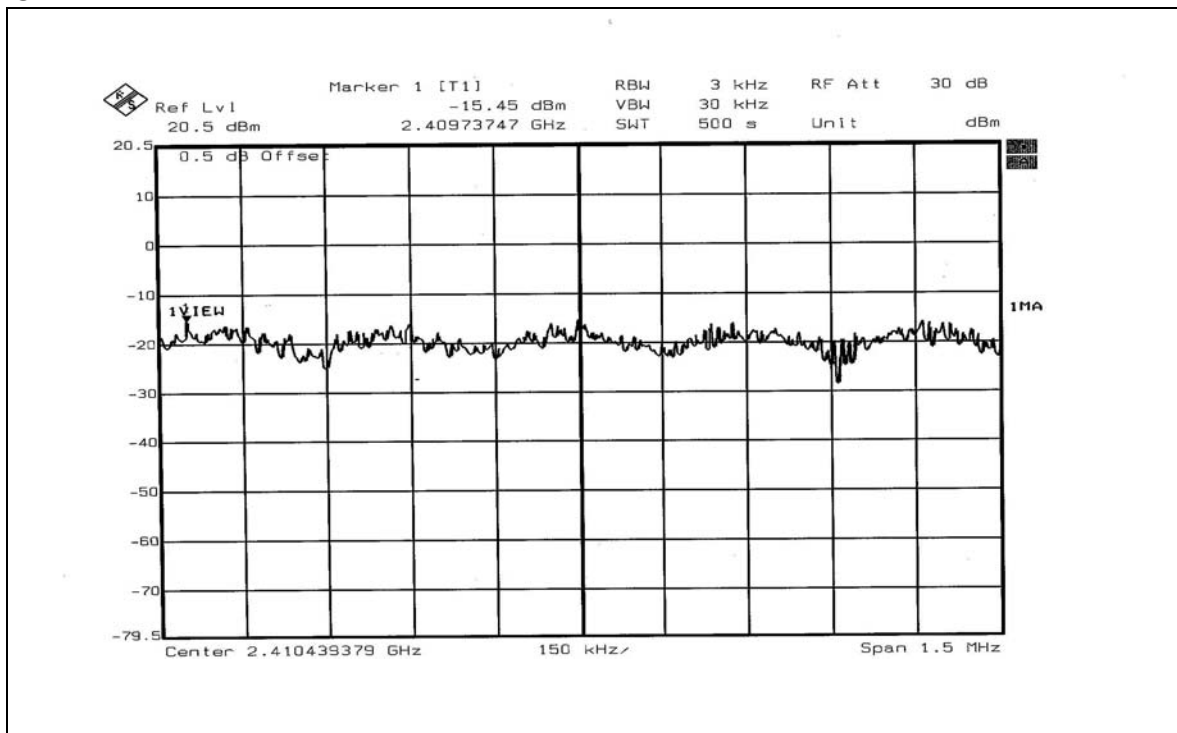


4.5.8 TEST RESULTS (B)

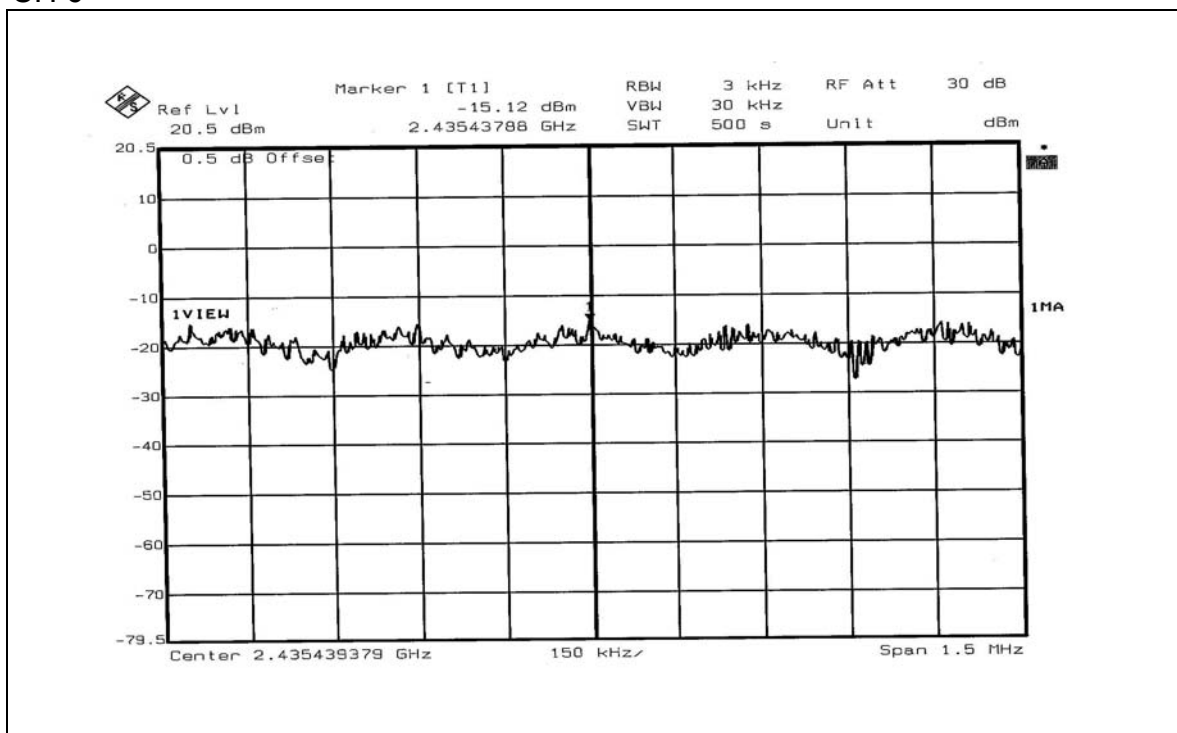
EUT	TZ 150 WIRELESS	MODEL	APL15-03A
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 991 hPa	INPUT POWER (SYSTEM)	120 Vac, 60 Hz
TESTED BY	Rush Kao		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-15.45	8	PASS
6	2437	-15.12	8	PASS
11	2462	-15.34	8	PASS

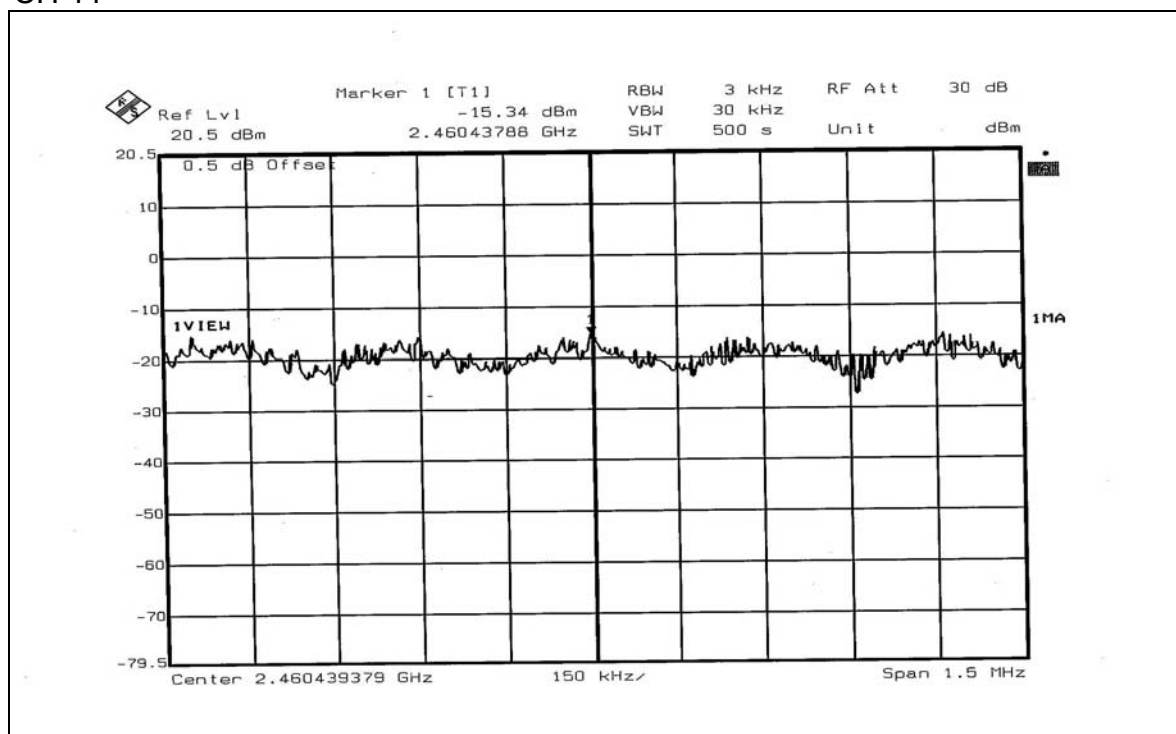
CH 1



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4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

NOTE:

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

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 1MHz and 10Hz with suitable frequency span including 100MHz bandwidth from band edge. The band edges were measured and recorded.

The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

The spectrum plots are attached on the following 6 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

4.6.7 TEST RESULTS(A)

The band edge emission plot of DSSS technique on page 61 shows 58.14dB between carrier maximum power and local maximum emission in restrict band (2.3896GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.8 is 113.35dBuV/m (Peak), so the maximum field strength in restrict band is $113.35 - 58.14 = 55.21$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 61 shows 57.45dB between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.8 is 104.34dBuV/m (Average), so the maximum field strength in restrict band is $104.34 - 57.45 = 46.89$ dBuV/m which is under 54dBuV/m limit.

The band edge emission plot of DSSS technique on page 62 shows 55.68dB between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.8 is 114.23dBuV/m (Peak), so the maximum field strength in restrict band is $114.23 - 55.68 = 58.55$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 63 shows 55.11dB between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.8 is 106.44dBuV/m (Average), so the maximum field strength in restrict band is $106.44 - 55.11 = 51.33$ dBuV/m which is under 54dBuV/m limit.

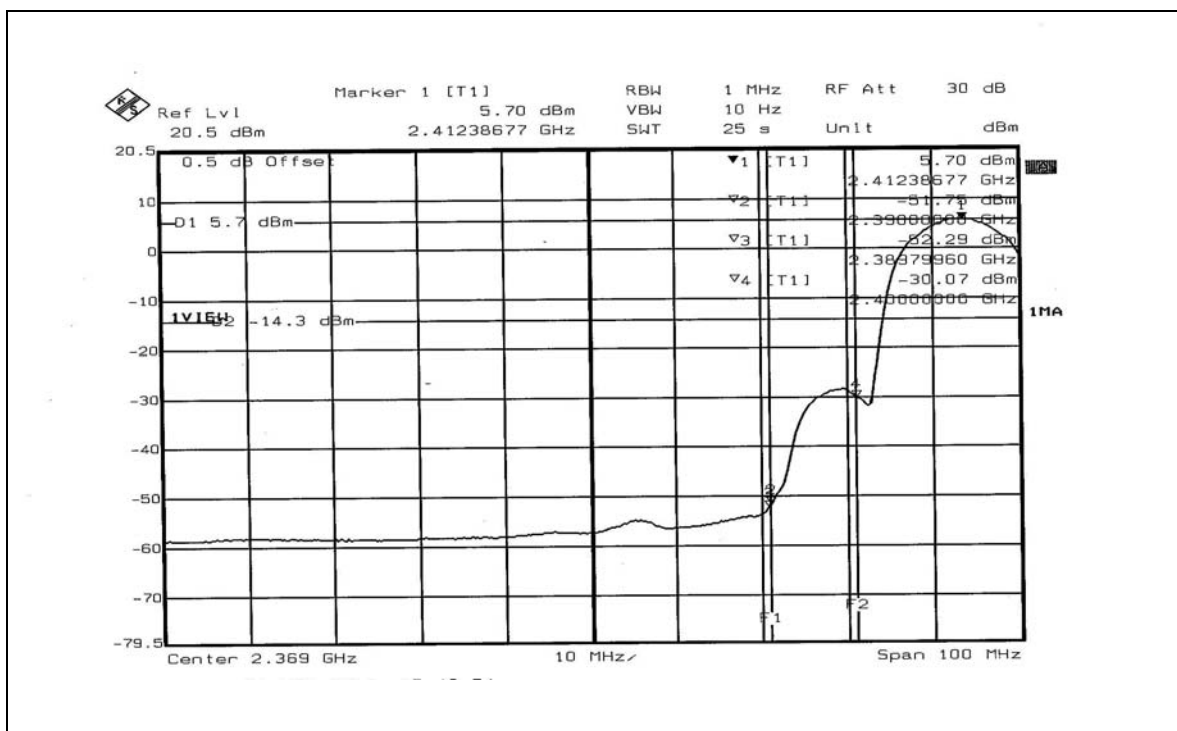
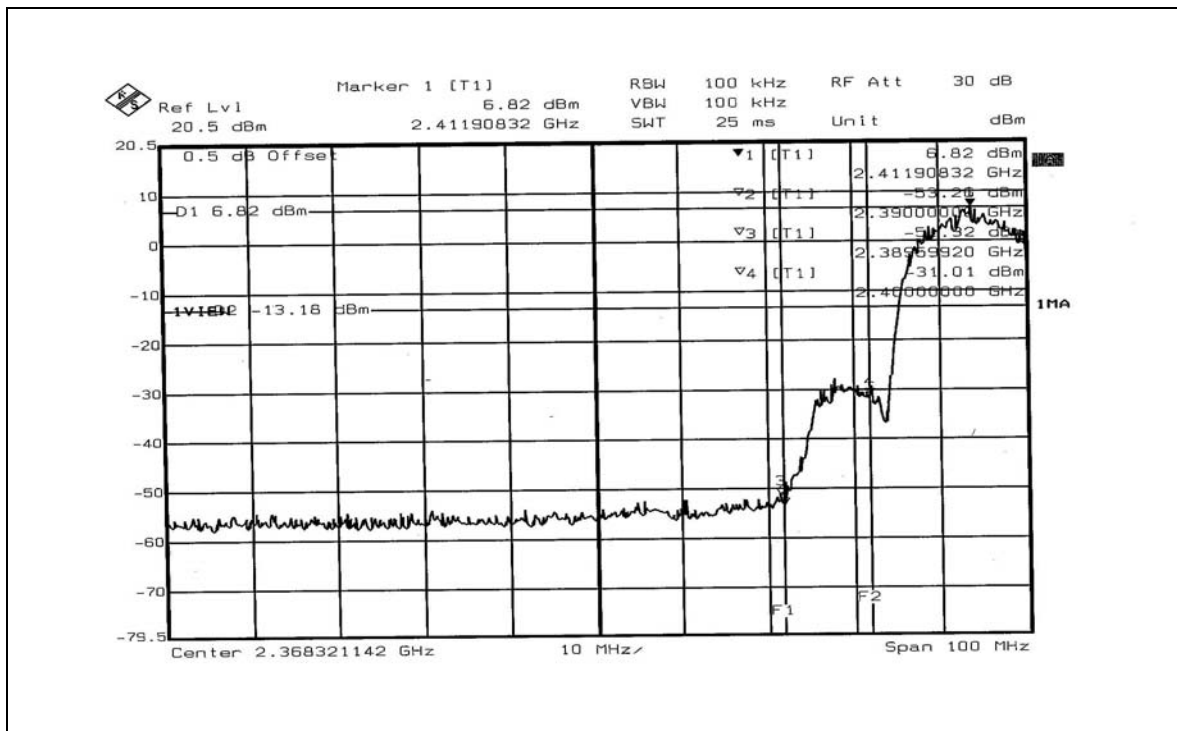
4.6.8 TEST RESULTS(B)

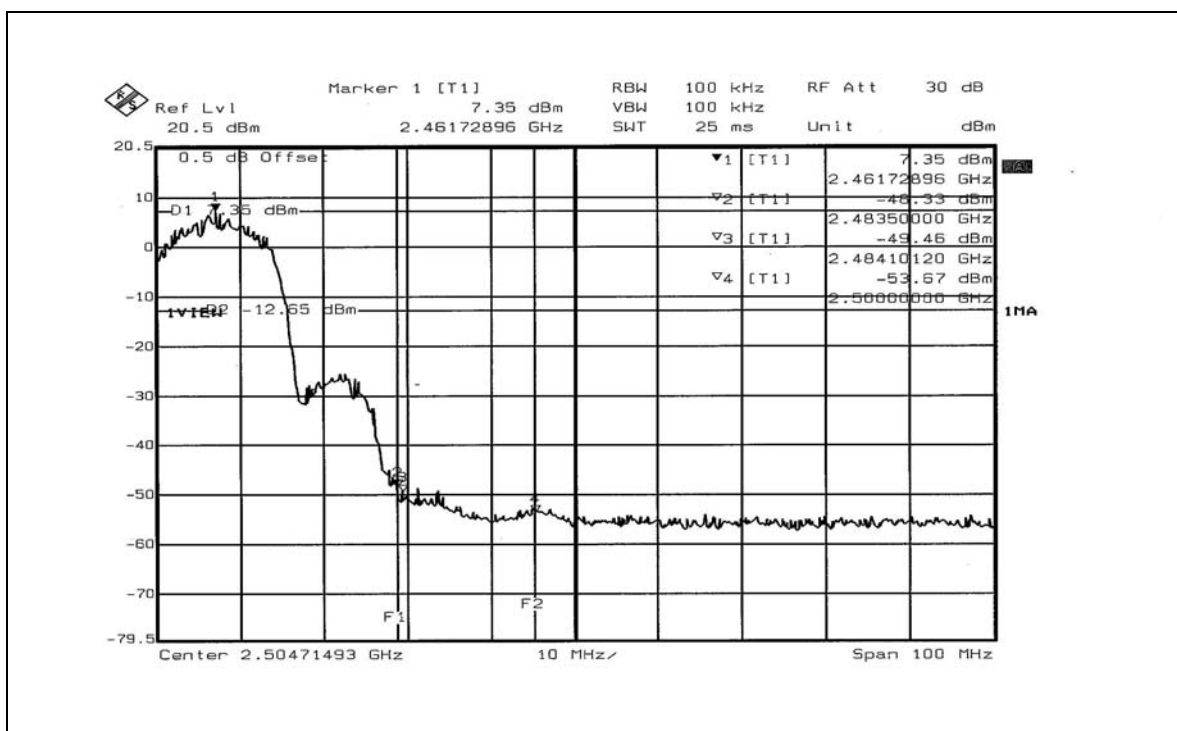
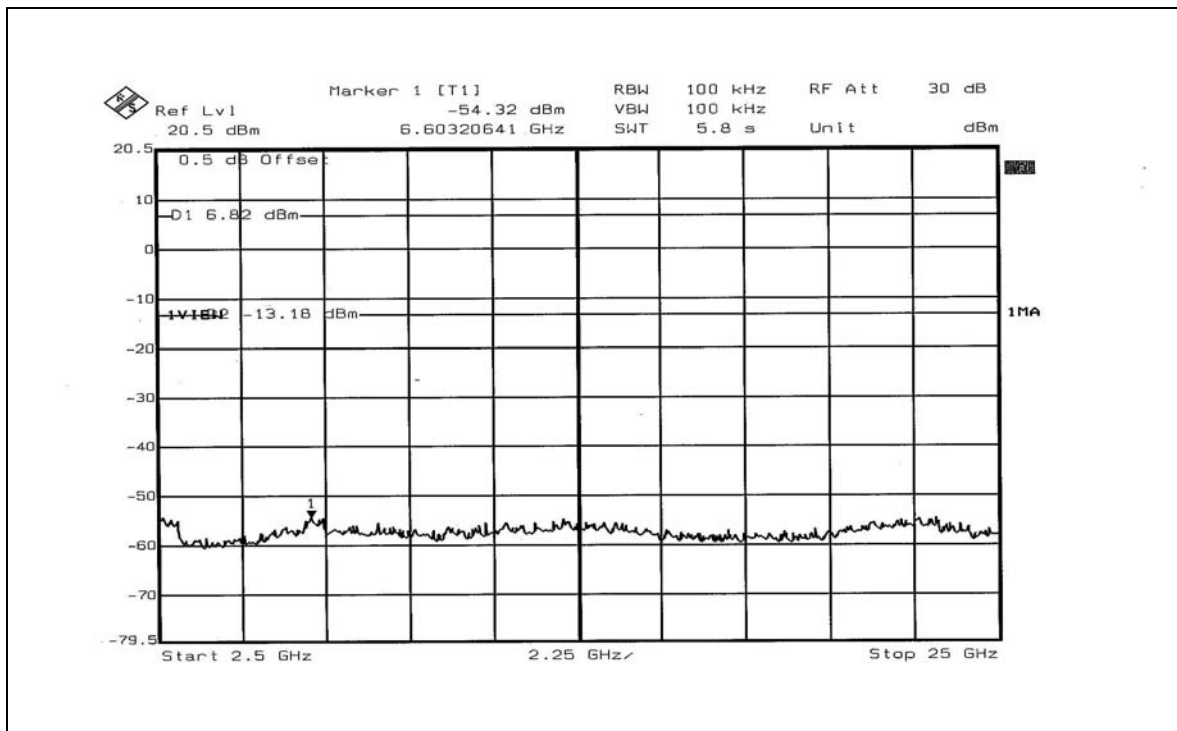
The band edge emission plot of OFDM technique on page 64 shows 46.44dB delta between carrier maximum power and local maximum emission in restrict band (2.3898GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.9 is 108.59dBuV/m (Peak), so the maximum field strength in restrict band is $108.59 - 46.44 = 62.15$ dBuV/m which is under 74dBuV/m limit.

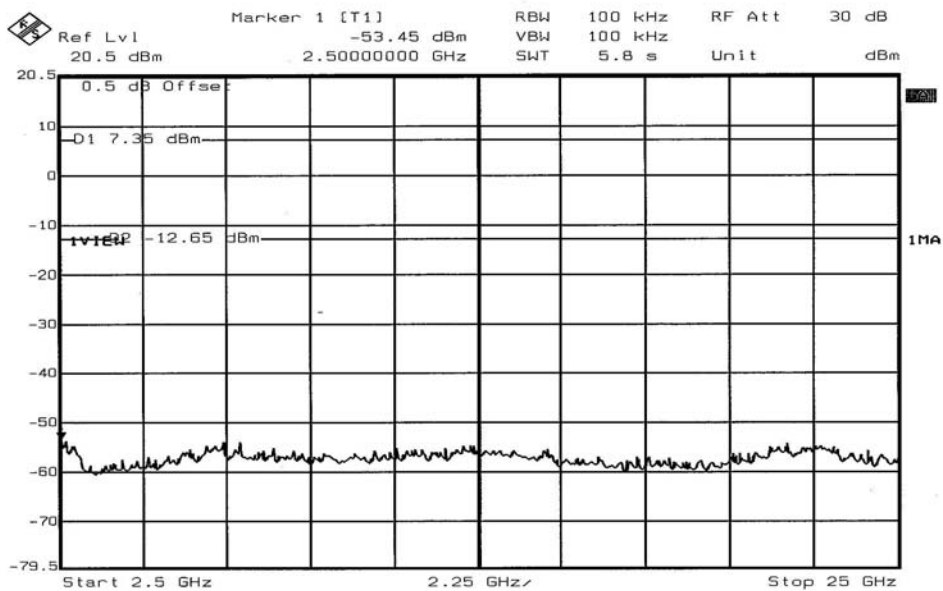
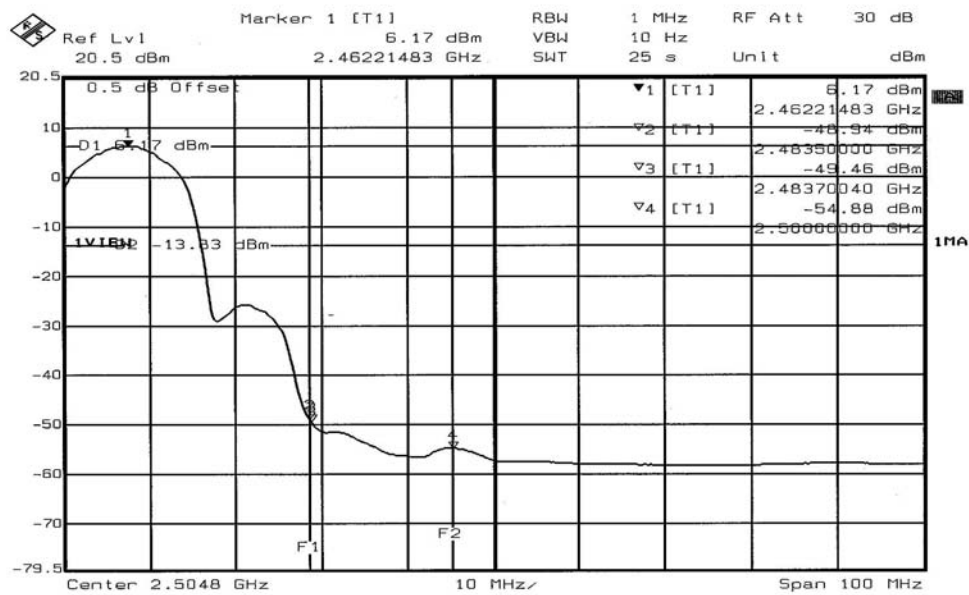
The band edge emission plot of OFDM technique on page 64 shows 46.63dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.9 is 99.33dBuV/m (Average), so the maximum field strength in restrict band is $99.33 - 46.63 = 52.70$ dBuV/m which is under 54dBuV/m limit.

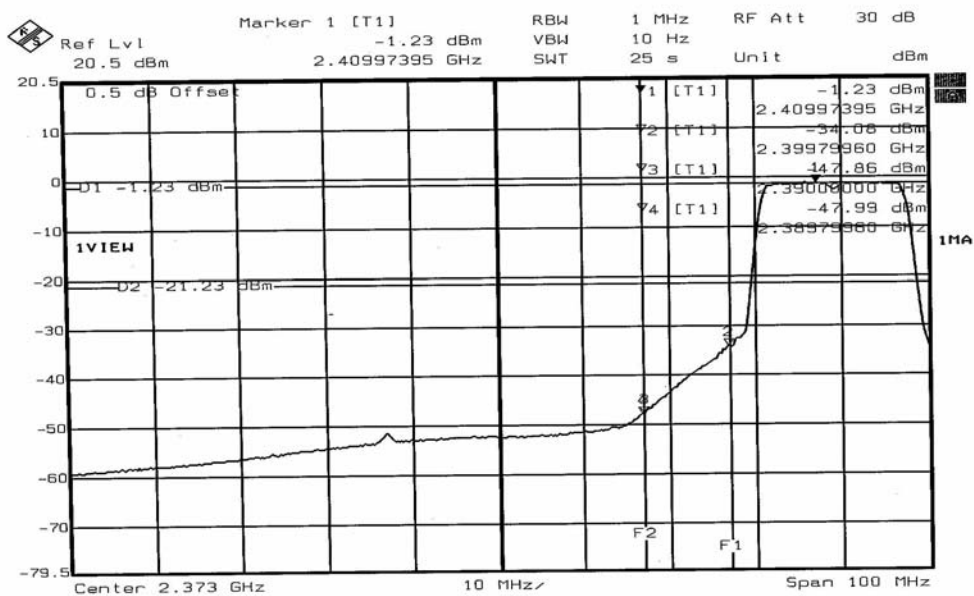
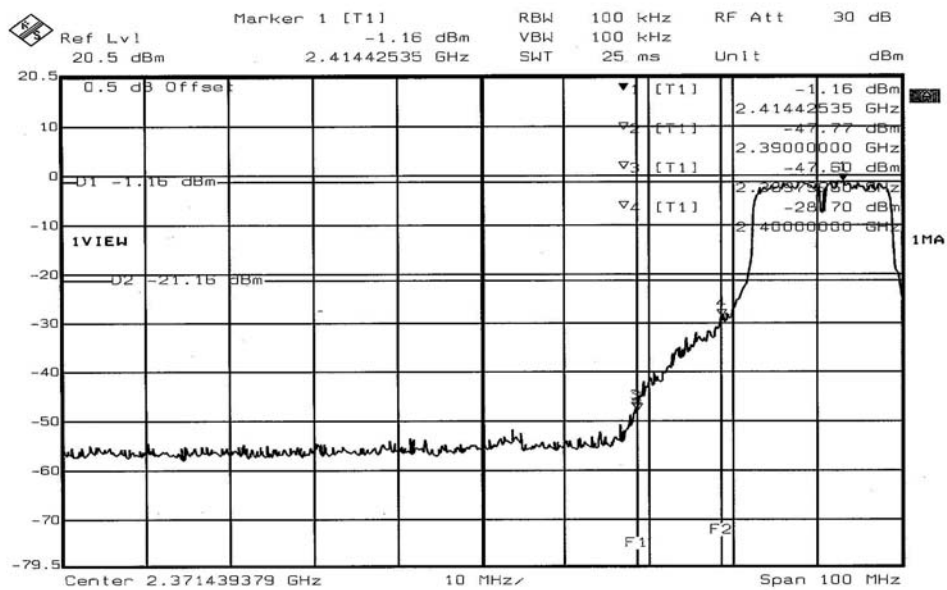
The band edge emission plot of OFDM technique on page 65 shows 44.69dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.9 is 108.67dBuV/m (Peak), so the maximum field strength in restrict band is $108.67 - 44.69 = 63.98$ dBuV/m which is under 74dBuV/m limit.

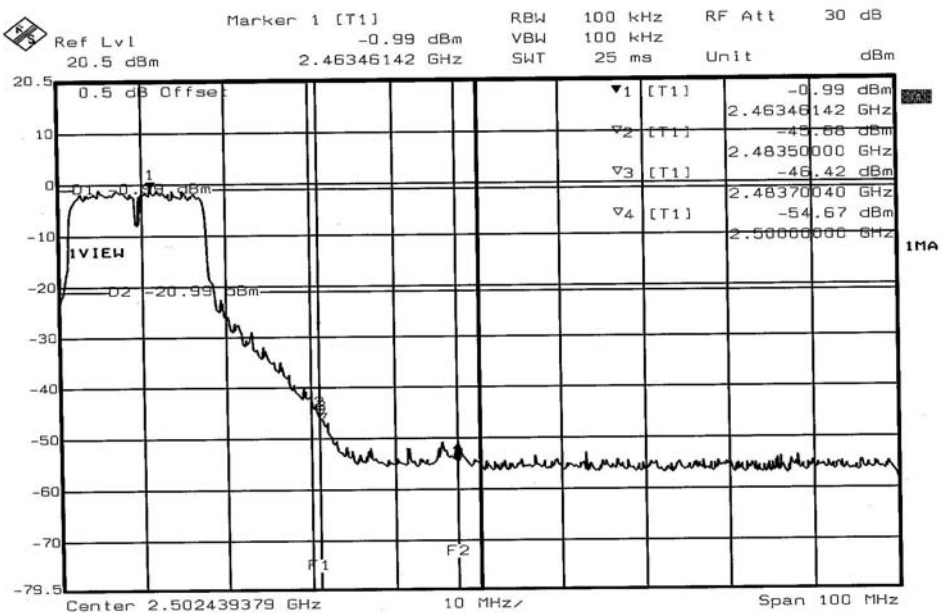
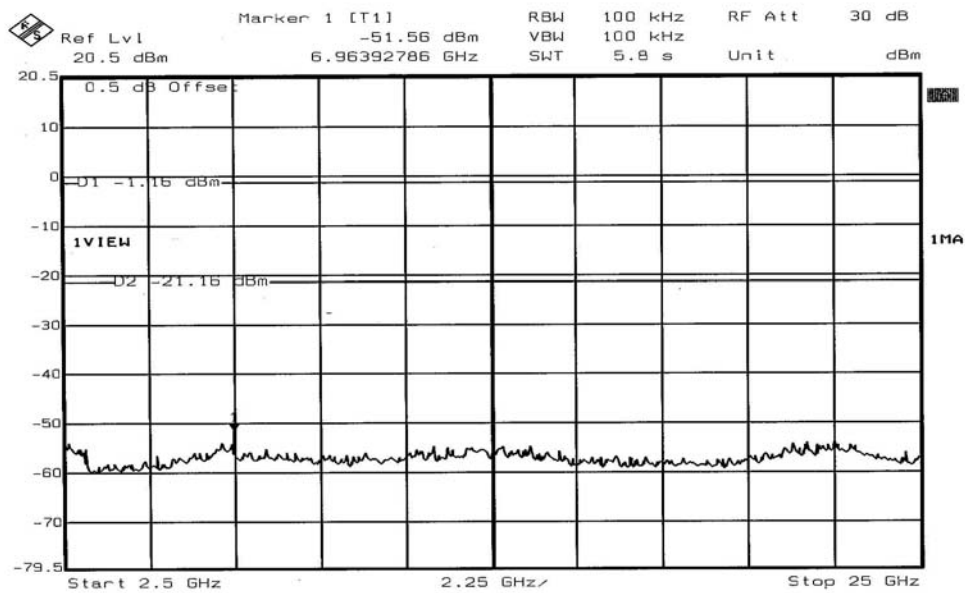
The band edge emission plot of OFDM technique on page 66 shows 47.45dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.9 is 99.71dBuV/m (Average), so the maximum field strength in restrict band is $99.71 - 47.45 = 52.26$ dBuV/m which is under 54dBuV/m limit.

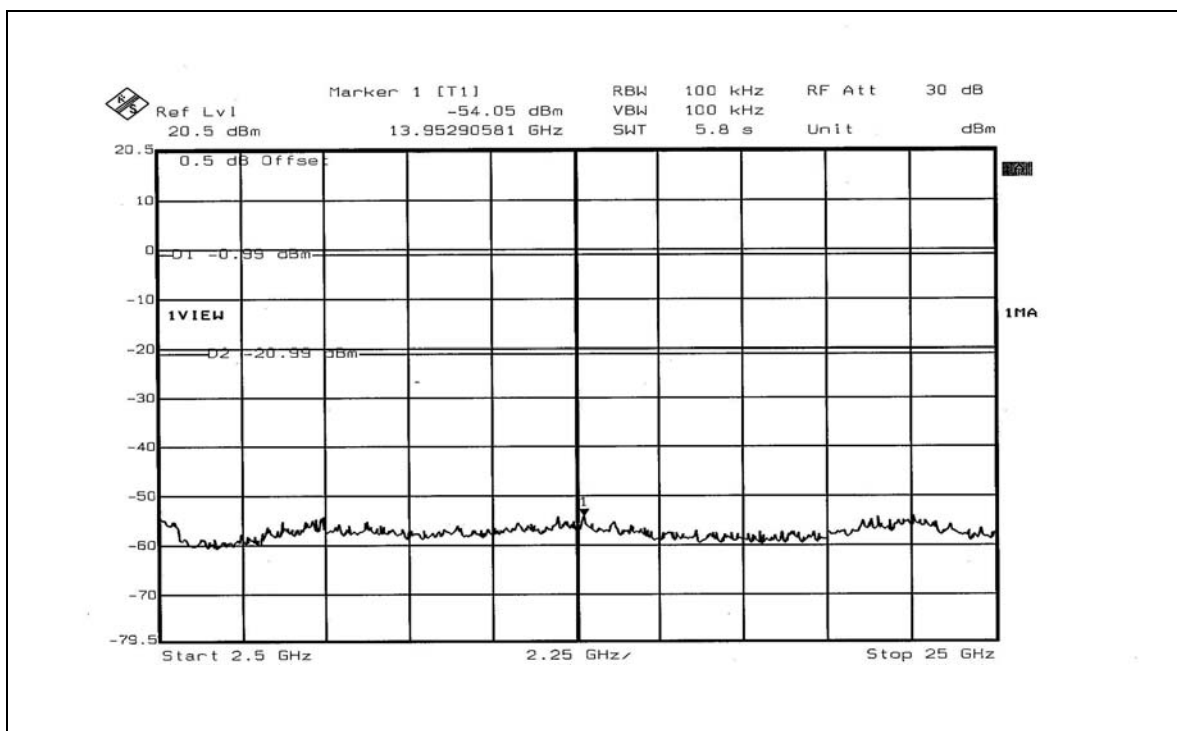
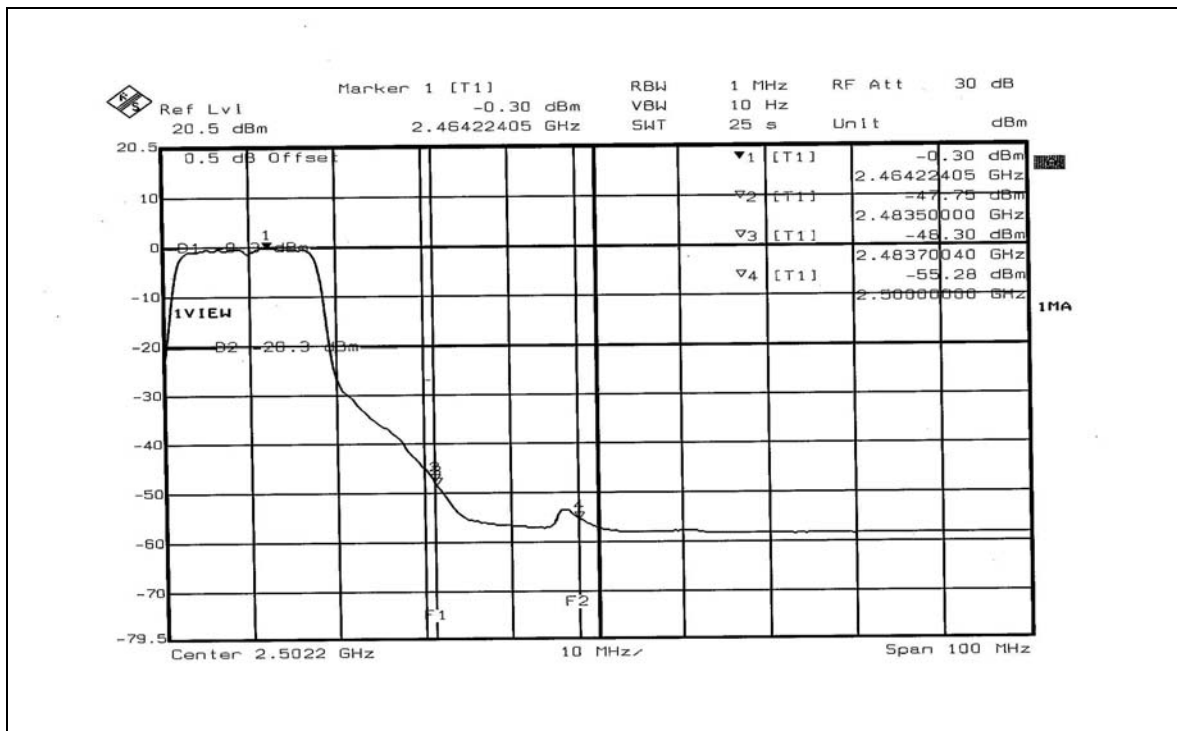














4.7 ANTENNA REQUIREMENT

4.7.1 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 15.247 (b), 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.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

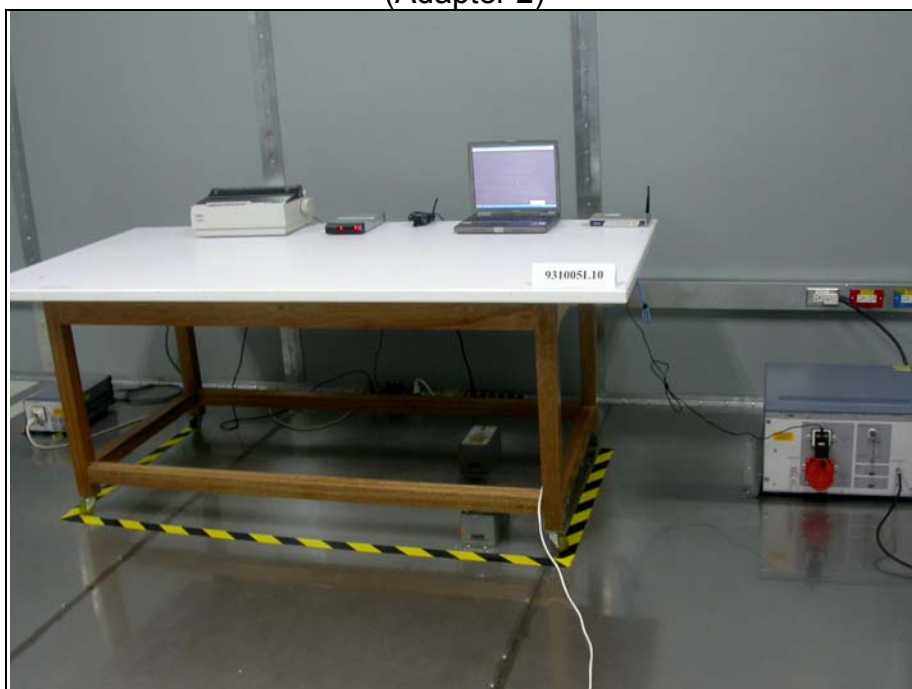
The antenna used in this product is dipole antenna with UFL connector and the maximum gain of this antenna is 2dBi.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

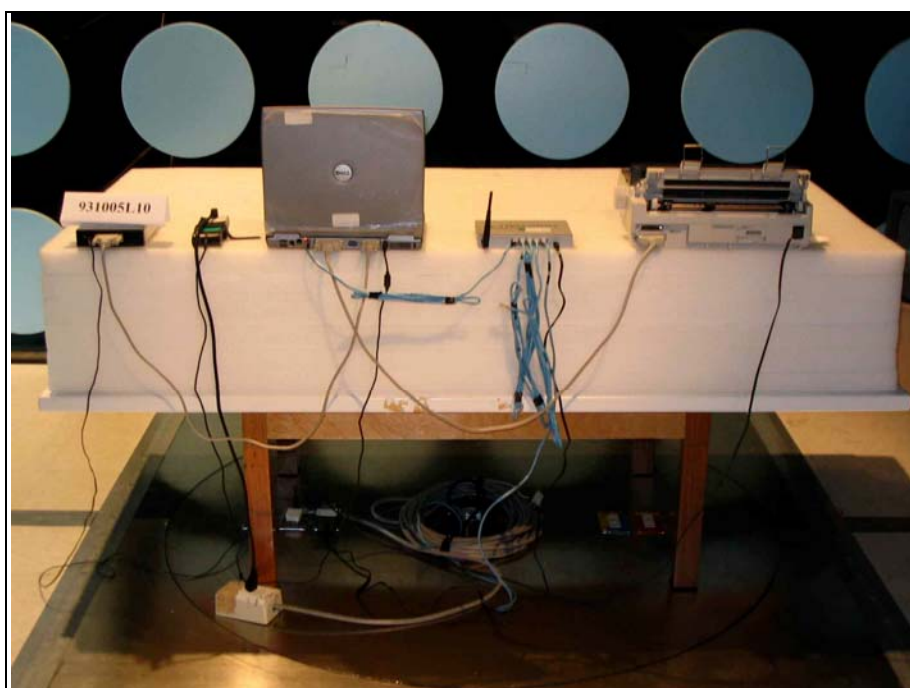
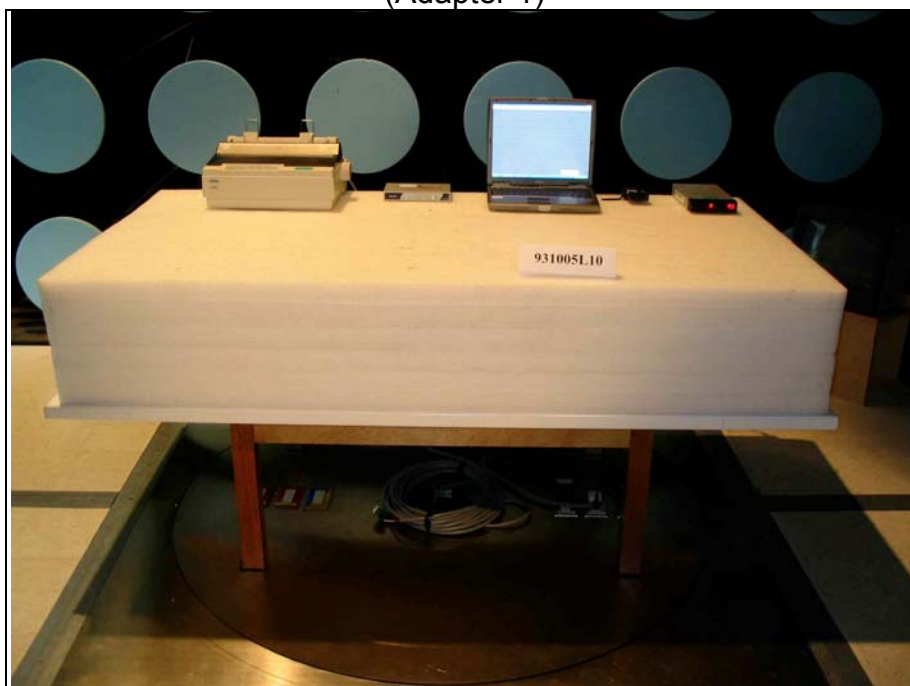
CONDUCTED EMISSION TEST (Adapter 1)



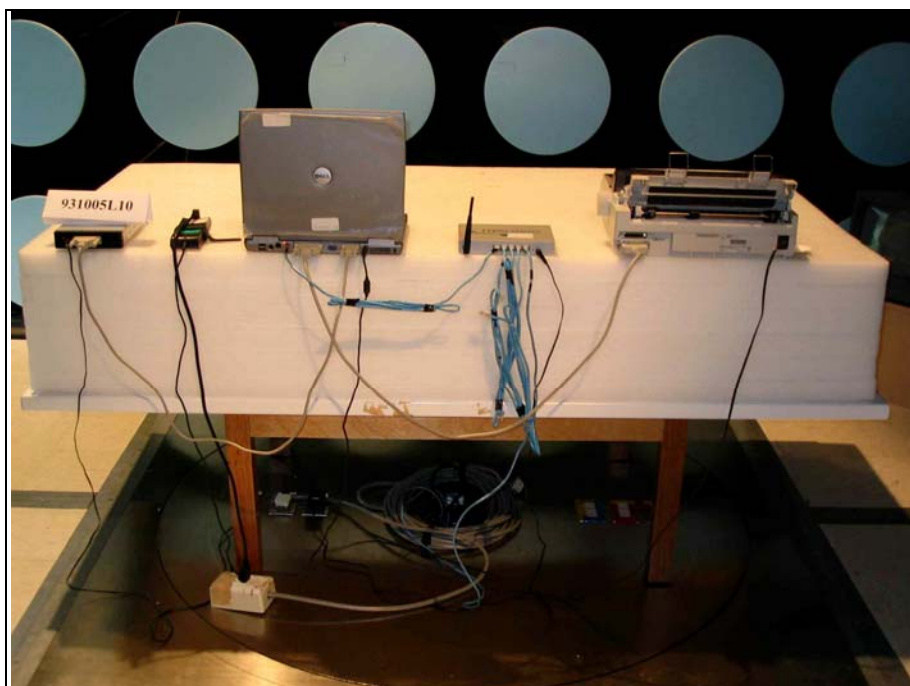
CONDUCTED EMISSION TEST (Adapter 2)



RADIATED EMISSION TEST (Adapter 1)



RADIATED EMISSION TEST (Adapter 2)



6 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, NVLAP, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , 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:

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Fax: 886-2-26052943

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