



# FCC TEST REPORT

**REPORT NO.:** RF980630A04

**MODEL NO.:** W0A5, AVerPen I, AVerPen +, W6A5

**RECEIVED:** June 30, 2009

**TESTED:** July 13 ~ 15, 2009

**ISSUED:** July 20, 2009

**APPLICANT:** AVerMedia INFORMATION, Inc

**ADDRESS:** 5F, 135, Jian Yi Rd., Chung Ho City, Taipei Hsien,  
Taiwan

**ISSUED BY:** Bureau Veritas Consumer Products Services  
(H.K.) Ltd., Taoyuan Branch

**LAB LOCATION:** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou  
Hsiang, Taipei Hsien, 244 Taiwan

This test report consists of 37 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.



## Table of Contents

1.	CERTIFICATION.....	4
2.	SUMMARY OF TEST RESULTS.....	5
2.1	MEASUREMENT UNCERTAINTY.....	5
3.	GENERAL INFORMATION.....	6
3.1	GENERAL DESCRIPTION OF EUT.....	6
3.2	DESCRIPTION OF TEST MODES.....	7
3.2.1	CONFIGURATION OF SYSTEM UNDER TEST.....	7
3.2.2	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:.....	8
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS.....	9
3.4	DESCRIPTION OF SUPPORT UNITS.....	9
4.	TEST TYPES AND RESULTS.....	10
4.1	CONDUCTED EMISSION MEASUREMENT.....	10
4.2	RADIATED EMISSION MEASUREMENT.....	10
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	10
4.2.2	TEST INSTRUMENTS.....	11
4.2.3	TEST PROCEDURES.....	12
4.2.4	DEVIATION FROM TEST STANDARD.....	12
4.2.5	TEST SETUP.....	13
4.2.6	EUT OPERATING CONDITIONS.....	13
4.2.7	TEST RESULTS.....	14
4.3	6dB BANDWIDTH MEASUREMENT.....	19
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT.....	19
4.3.2	TEST INSTRUMENTS.....	19
4.3.3	TEST PROCEDURE.....	19
4.3.4	DEVIATION FROM TEST STANDARD.....	19
4.3.5	TEST SETUP.....	19
4.3.6	EUT OPERATING CONDITIONS.....	19
4.3.7	TEST RESULTS.....	20
4.4	MAXIMUM PEAK OUTPUT POWER.....	22
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT.....	22
4.4.2	INSTRUMENTS.....	22
4.4.3	TEST PROCEDURES.....	22
4.4.4	DEVIATION FROM TEST STANDARD.....	22
4.4.5	TEST SETUP.....	23
4.4.6	EUT OPERATING CONDITIONS.....	23
4.4.7	TEST RESULTS.....	23
4.5	POWER SPECTRAL DENSITY MEASUREMENT.....	26
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT.....	26
4.5.2	TEST INSTRUMENTS.....	26
4.5.3	TEST PROCEDURE.....	26
4.5.4	DEVIATION FROM TEST STANDARD.....	26
4.5.5	TEST SETUP.....	26
4.5.6	EUT OPERATING CONDITION.....	26
4.5.7	TEST RESULTS.....	27



A D T

4.6	BAND EDGES MEASUREMENT .....	29
4.6.1	LIMITS OF BAND EDGES MEASUREMENT .....	29
4.6.2	TEST INSTRUMENTS .....	29
4.6.3	TEST PROCEDURE .....	29
4.6.4	DEVIATION FROM TEST STANDARD .....	29
4.6.5	EUT OPERATING CONDITION .....	29
4.6.6	TEST RESULTS .....	30
4.7	ANTENNA REQUIREMENT .....	34
4.7.1	STANDARD APPLICABLE .....	34
4.7.2	ANTENNA CONNECTED CONSTRUCTION .....	34
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	35
6.	INFORMATION ON THE TESTING LABORATORIES .....	36
7.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	37



A D T

## 1. CERTIFICATION

**PRODUCT:** AVerPen  
**BRAND NAME:** AVerMedia  
**MODEL NO.:** W0A5, AVerPen I, AVerPen +, W6A5  
**APPLICANT:** AVerMedia INFORMATION, Inc  
**TESTED:** July 13 ~ 15, 2009  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003

The above equipment (model no.: W0A5) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** : Celia Chen , **DATE:** July 20, 2009  
( Celia Chen / Senior Specialist )

**TECHNICAL ACCEPTANCE** : Jamison Chan , **DATE:** July 20, 2009  
Responsible for RF ( Jamison Chan / Supervisor )

**APPROVED BY** : Ken Liu , **DATE:** July 20, 2009  
( Ken Liu / Assistant Manager )



A D T

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	N/A	Power supply is 3.7Vdc from battery
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)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -3.09dB at 4808.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

Measurement	Frequency	Uncertainty
Radiated emissions	30MHz ~ 1GHz	3.72 dB
	1GHz ~ 40GHz	2.89 dB

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	AVerPen
<b>MODEL NO.</b>	W0A5, AVerPen I, AVerPen +, W6A5
<b>FCC ID</b>	XKIPDPEN09-1
<b>POWER SUPPLY</b>	3.7Vdc from battery
<b>MODULATION TYPE</b>	GFSK
<b>OUTPUT POWER</b>	1.125mW
<b>OPERATING FREQUENCY</b>	2404MHz ~ 2478MHz
<b>NUMBER OF CHANNEL</b>	75
<b>ANTENNA TYPE</b>	Printed antenna with 2.47dBi gain
<b>DATA CABLE</b>	N/A
<b>I/O PORTS</b>	N/A
<b>ASSOCIATED DEVICES</b>	N/A

#### NOTE:

1. The EUT is an AVerPen with the following model no.:

<b>Product</b>	<b>Model No.</b>	<b>Description</b>
AVerPen	W0A5, AVerPen I, AVerPen +, W6A5 <for marketing differentiation only>	Transceiver

During the test, **model: W0A5** was selected as representative one and therefore only its test data was recorded in this report.

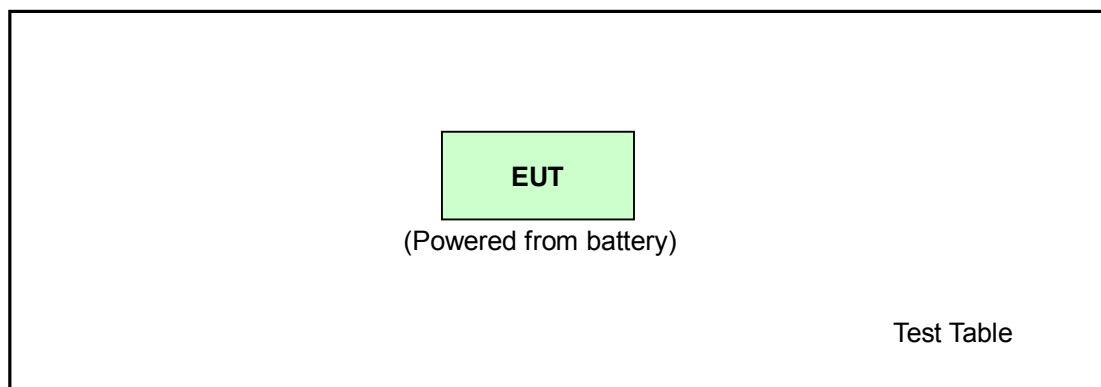
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

75 channels are provided to this EUT:

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2404	20	2424	40	2444	60	2464
1	2405	21	2425	41	2445	61	2465
2	2406	22	2426	42	2446	62	2466
3	2407	23	2427	43	2447	63	2467
4	2408	24	2428	44	2448	64	2468
5	2409	25	2429	45	2449	65	2469
6	2410	26	2430	46	2450	66	2470
7	2411	27	2431	47	2451	67	2471
8	2412	28	2432	48	2452	68	2472
9	2413	29	2433	49	2453	69	2473
10	2414	30	2434	50	2454	70	2474
11	2415	31	2435	51	2455	71	2475
12	2416	32	2436	52	2456	72	2476
13	2417	33	2437	53	2457	73	2477
14	2418	34	2438	54	2458	74	2478
15	2419	35	2439	55	2459		
16	2420	36	2440	56	2460		
17	2421	37	2441	57	2461		
18	2422	38	2442	58	2462		
19	2423	39	2443	59	2463		

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





A D T

### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	Note	√	√	√	-

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

Note: No need to concern of Conducted Emission due to the EUT is powered by battery.

#### **RADIATED EMISSION TEST (BELOW 1 GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, X, Y, Z Axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	AXIS
0 to 74	0	GFSK	X

#### **RADIATED EMISSION TEST (ABOVE 1 GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, X, Y, Z Axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	AXIS
0 to 74	0, 38, 74	GFSK	X

#### **BANDEDGE MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 74	0, 74	GFSK

#### **ANTENNA PORT CONDUCTED MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 74	0, 38, 74	GFSK





### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.247)**

**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 without any necessary accessory or support unit.

## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

N/A

### 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 DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 04, 2009	May 03, 2010
HP Preamplifier	8449B	3008A01924	Sep. 03, 2008	Sep. 02, 2009
HP Preamplifier	8449B	3008A01292	Aug. 06, 2008	Aug. 05, 2009
ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Dec. 04, 2008	Dec. 03, 2009
Schwarzbeck Antenna	VULB 9168	137	Apr. 29, 2009	Apr. 28, 2010
Schwarzbeck Antenna	VHBA 9123	480	Apr. 21, 2009	Apr. 20, 2010
EMCO Horn Antenna	3115	6714	Oct. 17, 2008	Oct. 16, 2009
EMCO Horn Antenna	3115	9312-4192	Apr. 17, 2009	Apr. 16, 2010
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF104-26.5	CABLE-CH6-17m -01	Aug. 22, 2008	Aug. 21, 2009
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	Apr. 03, 2009	Apr. 02, 2010

- 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 and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  3. The test was performed in Chamber No. 6.
  4. The Industry Canada Reference No. IC 7450E-6.
  5. The FCC Site Registration No. is 447212.

## 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 meter semi- anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak method or average method as specified and then reported in data sheet.

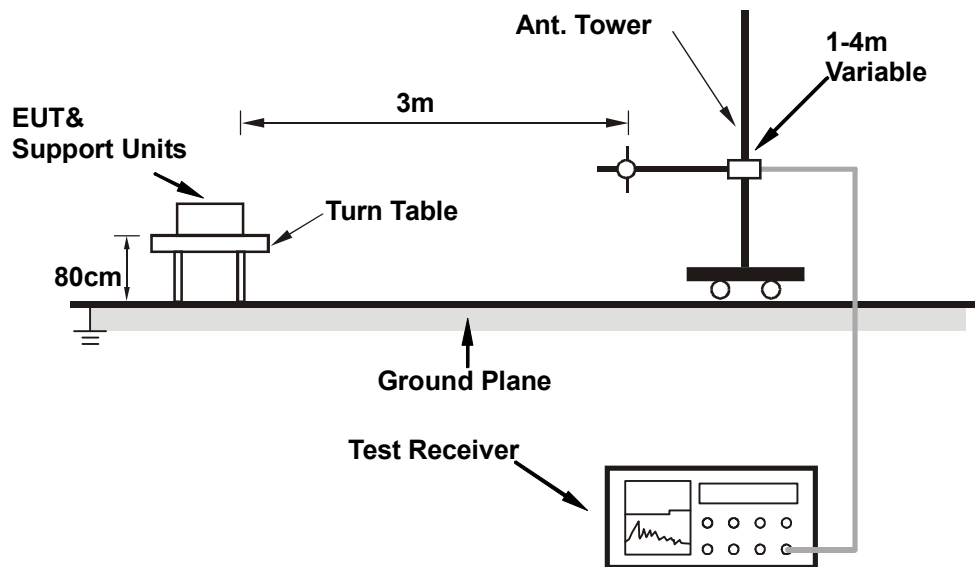
### NOTE:

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

Set the EUT under transmission condition continuously at specific channel frequency.

## 4.2.7 TEST RESULTS

### ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	3.7Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH 1003 hPa	TESTED BY	Nick Chen

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	1600.00	55.10 PK	74.00	-18.90	1.00 H	235	23.19	31.91
2	1600.00	49.81 AV	54.00	-4.19	1.00 H	235	17.90	31.91
3	2390.00	68.09 PK	74.00	-5.91	1.00 H	125	33.02	35.07
4	2390.00	46.68 AV	54.00	-7.32	1.00 H	125	11.61	35.07
5	2400.00	59.55 PK	74.00	-14.45	1.00 H	125	24.46	35.09
6	2400.00	49.20 AV	54.00	-4.80	1.00 H	125	14.11	35.09
7	*2404.00	101.23 PK			1.00 H	125	66.13	35.10
8	*2404.00	90.88 AV			1.00 H	125	55.78	35.10
9	4808.00	55.43 PK	74.00	-18.57	1.00 H	126	12.43	43.00
10	4808.00	44.93 AV	54.00	-9.07	1.00 H	126	1.93	43.00

- 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.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3.7Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH 1003 hPa	TESTED BY	Nick Chen

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	1600.00	44.57 PK	74.00	-29.43	1.00 V	169	12.66	31.91
2	1600.00	35.03 AV	54.00	-18.97	1.00 V	169	3.12	31.91
3	2390.00	63.54 PK	74.00	-10.46	1.00 V	173	28.47	35.07
4	2390.00	46.89 AV	54.00	-7.11	1.00 V	173	11.82	35.07
5	2400.00	54.96 PK	74.00	-19.04	1.00 V	173	19.87	35.09
6	2400.00	45.36 AV	54.00	-8.64	1.00 V	173	10.27	35.09
7	*2404.00	96.64 PK			1.00 V	173	61.54	35.10
8	*2404.00	87.04 AV			1.00 V	173	51.94	35.10
9	4808.00	57.86 PK	74.00	-16.14	1.00 V	180	14.86	43.00
10	4808.00	50.91 AV	54.00	-3.09	1.00 V	180	7.91	43.00

- 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.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3.7Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH 1003 hPa	TESTED BY	Nick Chen

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	1626.00	55.56 PK	74.00	-18.44	1.00 H	234	23.53	32.03
2	1626.00	46.65 AV	54.00	-7.35	1.00 H	234	14.62	32.03
3	*2442.00	100.62 PK			1.13 H	144	65.45	35.17
4	*2442.00	88.52 AV			1.13 H	144	53.35	35.17
5	4884.00	56.59 PK	74.00	-17.41	1.13 H	139	13.44	43.15
6	4884.00	46.45 AV	54.00	-7.55	1.13 H	139	3.30	43.15
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	1626.00	48.78 PK	74.00	-25.22	1.12 V	165	16.75	32.03
2	1626.00	43.06 AV	54.00	-10.94	1.12 V	165	11.03	32.03
3	*2442.00	95.68 PK			1.00 V	177	60.51	35.17
4	*2442.00	84.55 AV			1.00 V	177	49.38	35.17
5	4884.00	59.27 PK	74.00	-14.73	1.00 V	188	16.12	43.15
6	4884.00	49.18 AV	54.00	-4.82	1.00 V	188	6.03	43.15

- 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.





A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 74	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3.7Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH 1003 hPa	TESTED BY	Nick Chen

**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	1650.00	57.85 PK	74.00	-16.15	1.00 H	119	25.71	32.14
2	1650.00	49.89 AV	54.00	-4.11	1.00 H	119	17.75	32.14
3	*2478.00	99.47 PK			1.14 H	144	64.22	35.25
4	*2478.00	87.58 AV			1.14 H	144	52.33	35.25
5	2483.50	52.55 PK	74.00	-21.45	1.14 H	144	17.29	35.26
6	2483.50	40.66 AV	54.00	-13.34	1.14 H	144	5.40	35.26
7	4956.00	55.67 PK	74.00	-18.33	1.00 H	196	12.38	43.29
8	4956.00	44.08 AV	54.00	-9.92	1.00 H	196	0.79	43.29

**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	1650.00	47.25 PK	74.00	-26.75	1.04 V	225	15.11	32.14
2	1650.00	41.38 AV	54.00	-12.62	1.04 V	225	9.24	32.14
3	*2478.00	94.79 PK			1.00 V	176	59.54	35.25
4	*2478.00	84.01 AV			1.00 V	176	48.76	35.25
5	2483.50	47.87 PK	74.00	-26.13	1.00 V	176	12.61	35.26
6	2483.50	37.09 AV	54.00	-16.91	1.00 V	176	1.83	35.26
7	4956.00	58.61 PK	74.00	-15.39	1.00 V	168	15.32	43.29
8	4956.00	48.45 AV	54.00	-5.55	1.00 V	168	5.16	43.29

- 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.

### BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3.7Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH 1003 hPa	TESTED BY	Nick Chen

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	64.99	25.04 QP	40.00	-14.96	1.05 H	13	12.53	12.51
2	745.35	24.44 QP	46.00	-21.56	1.00 H	241	-1.26	25.70
3	780.34	25.72 QP	46.00	-20.28	1.03 H	76	-0.57	26.29
4	805.61	25.91 QP	46.00	-20.09	1.22 H	301	-0.79	26.70
5	865.87	25.68 QP	46.00	-20.32	1.27 H	178	-1.92	27.60
6	893.09	26.45 QP	46.00	-19.55	1.22 H	109	-1.50	27.95
7	957.23	26.97 QP	46.00	-19.03	1.24 H	28	-1.70	28.67
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	88.32	28.80 QP	43.50	-14.70	1.02 V	259	20.42	8.38
2	729.80	24.54 QP	46.00	-21.46	1.11 V	202	-0.86	25.40
3	792.00	24.57 QP	46.00	-21.43	1.27 V	34	-1.91	26.48
4	838.66	25.61 QP	46.00	-20.39	1.05 V	178	-1.61	27.22
5	856.15	26.21 QP	46.00	-19.79	1.22 V	127	-1.27	27.48
6	900.86	26.48 QP	46.00	-19.52	1.28 V	346	-1.57	28.05
7	914.47	27.57 QP	46.00	-18.43	1.16 V	313	-0.63	28.20
8	957.23	27.66 QP	46.00	-18.34	1.09 V	256	-1.01	28.67

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

### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Apr. 03, 2009	Apr. 02, 2010

**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 300kHz 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



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



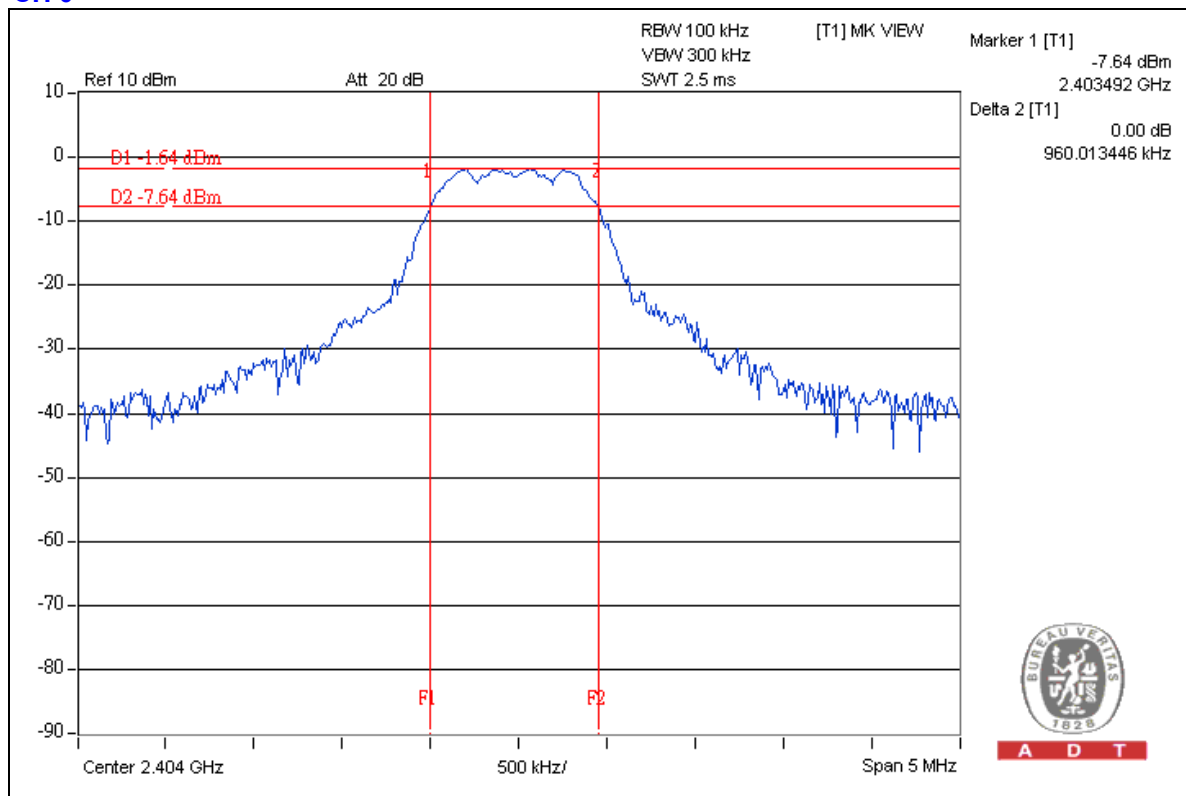
A D T

### 4.3.7 TEST RESULTS

<b>CHANNEL</b>	0, 38, 74	<b>INPUT POWER</b>	3.7Vdc
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 70% RH, 1007hPa	<b>TESTED BY</b>	Nick Chen

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
0	2404	0.960	0.5	PASS
38	2442	0.958	0.5	PASS
74	2478	1.430	0.5	PASS

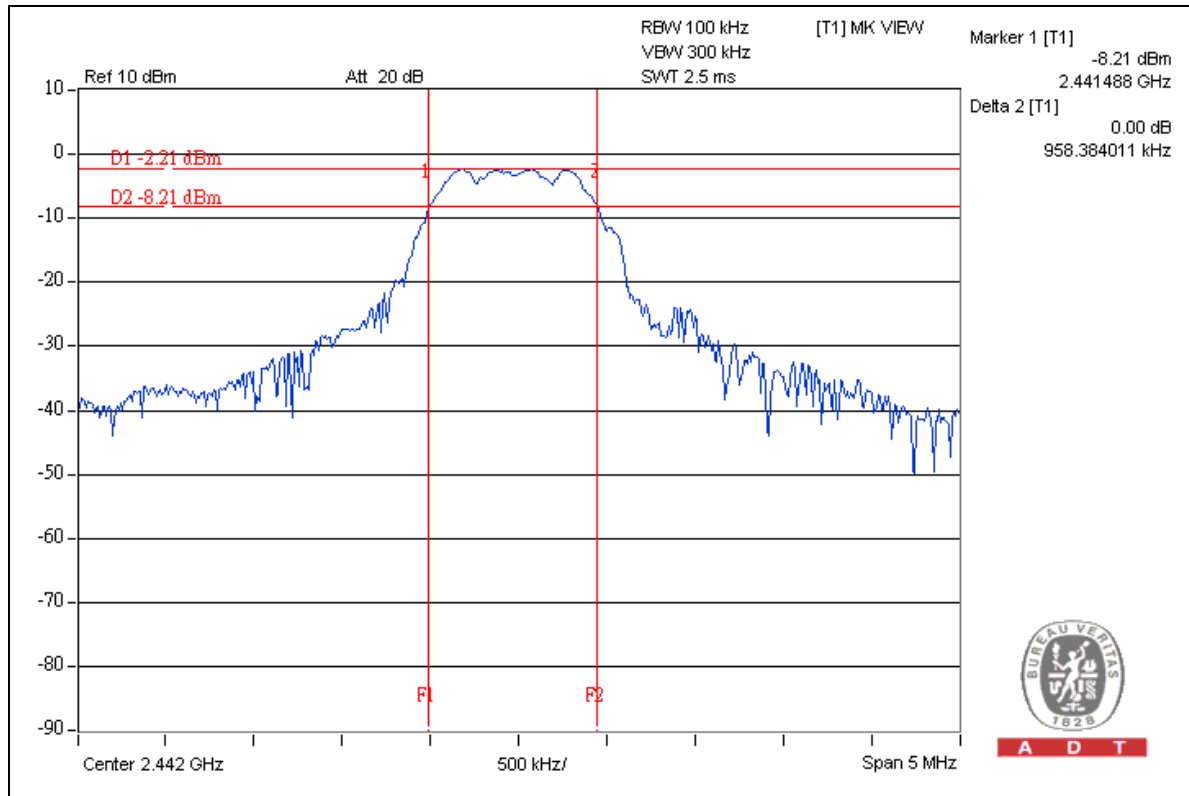
#### CH 0



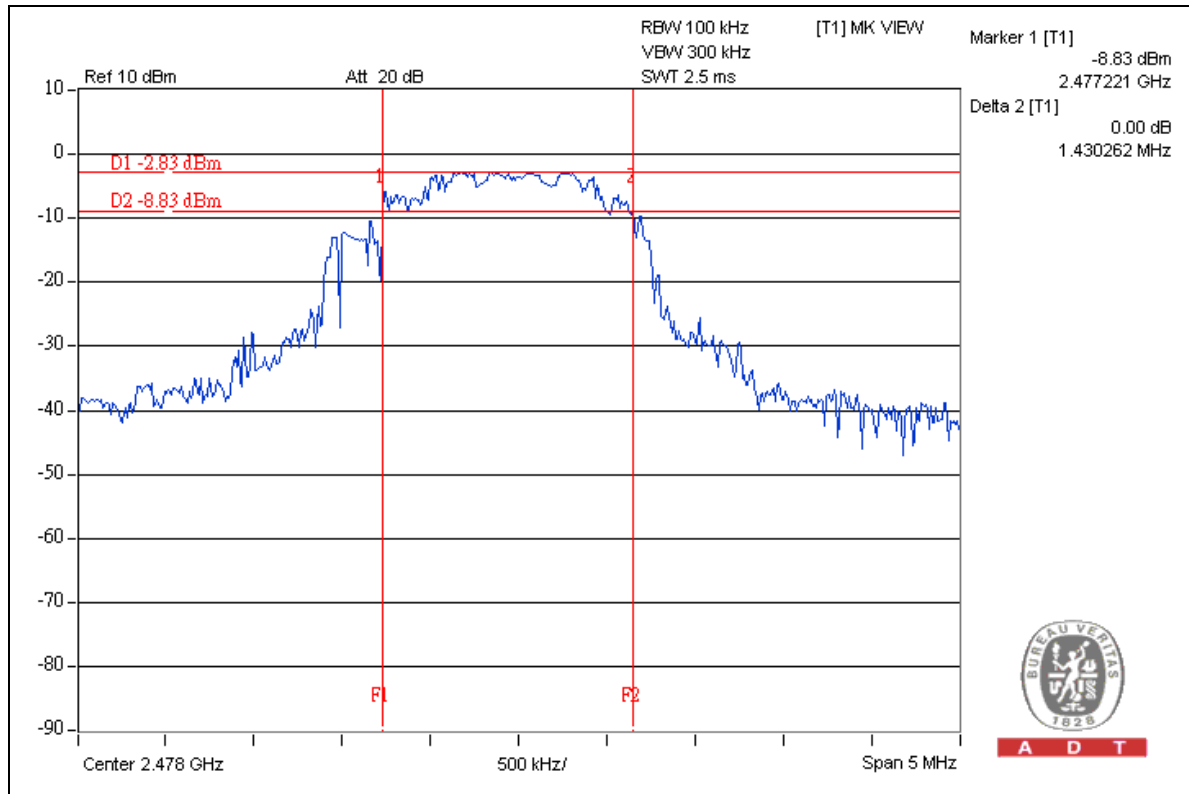


A D T

### CH 38



### CH 74





## 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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Apr. 03, 2009	Apr. 02, 2010

**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

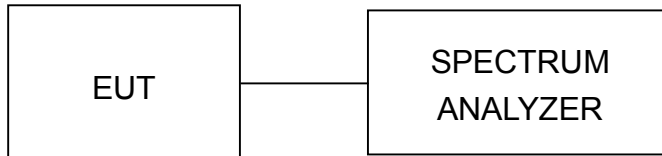
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW, the peak value was measured and recorded.
4. Repeat above procedures until all frequencies measured were complete.

Note: The spectrum plots are attached on following pages.

### 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

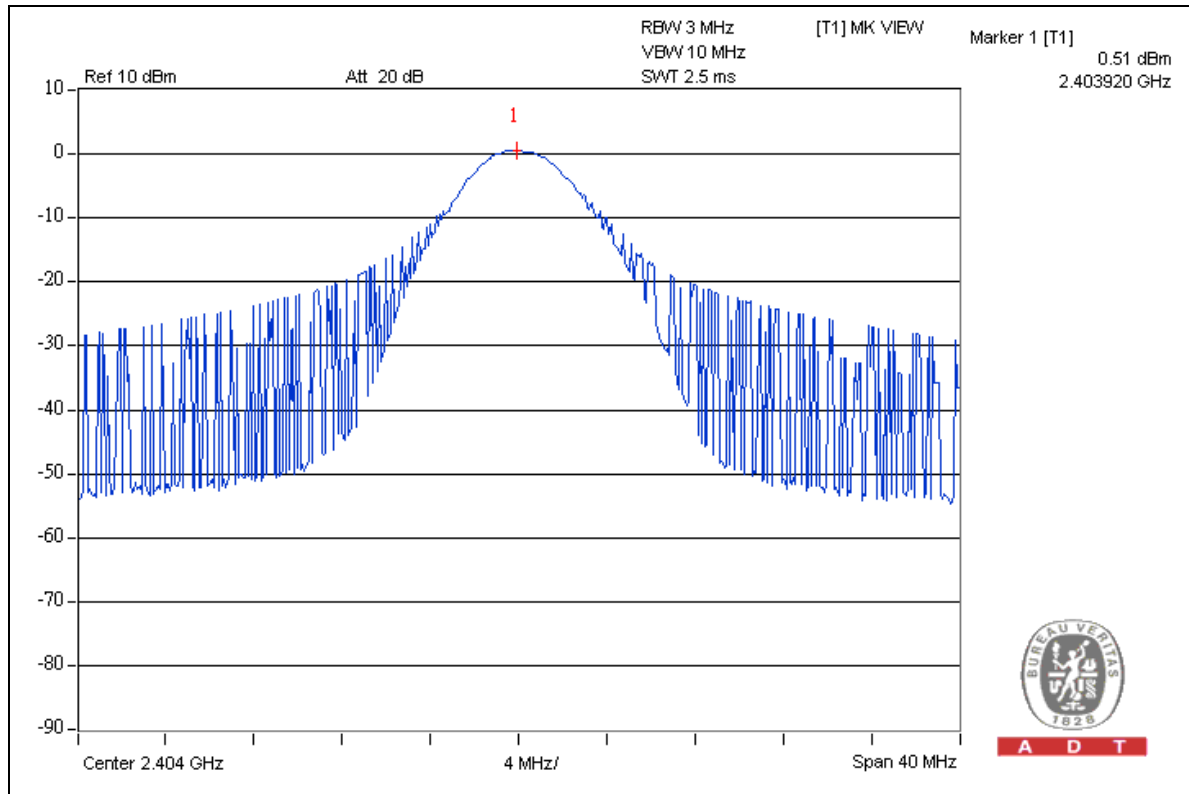
<b>CHANNEL</b>	0, 38, 74	<b>INPUT POWER</b>	3.7Vdc
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 70% RH, 1007hPa	<b>TESTED BY</b>	Nick Chen

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER OUTPUT (dBm)</b>	<b>PEAK POWER OUTPUT (mW)</b>	<b>PEAK POWER LIMIT (dBm)</b>	<b>PASS/FAIL</b>
0	2404	0.51	1.125	30	PASS
38	2442	0.17	1.040	30	PASS
74	2478	-0.32	0.929	30	PASS

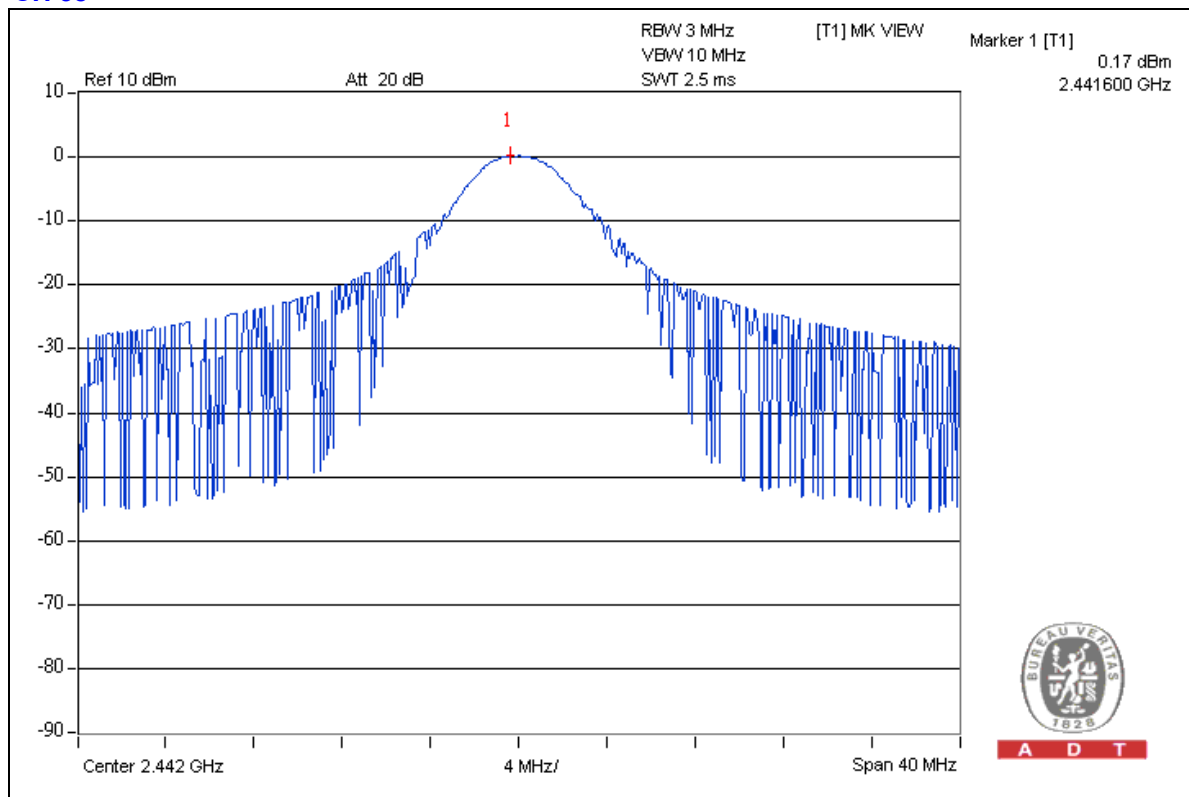


A D T

### CH 0



### CH 38







## 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 DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Apr. 03, 2009	Apr. 02, 2010

**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

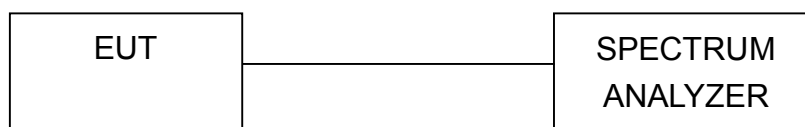
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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 CONDITION

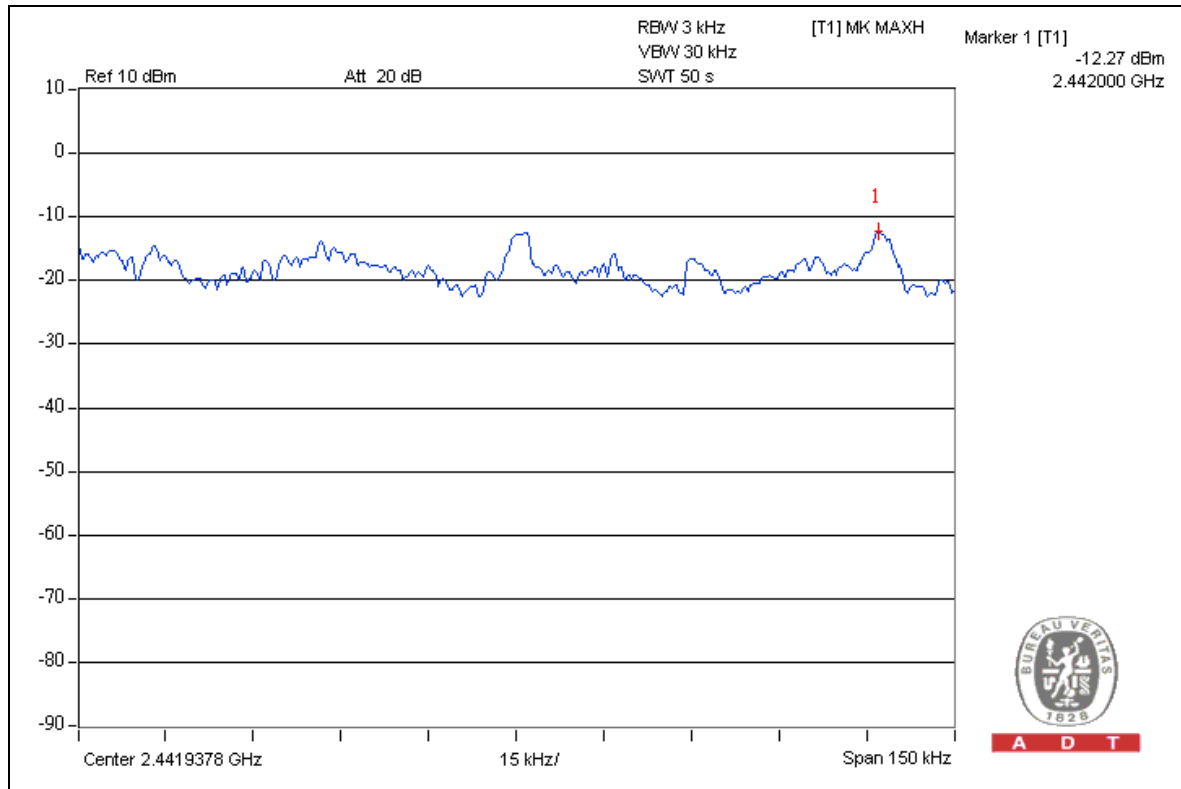
Same as Item 4.3.6



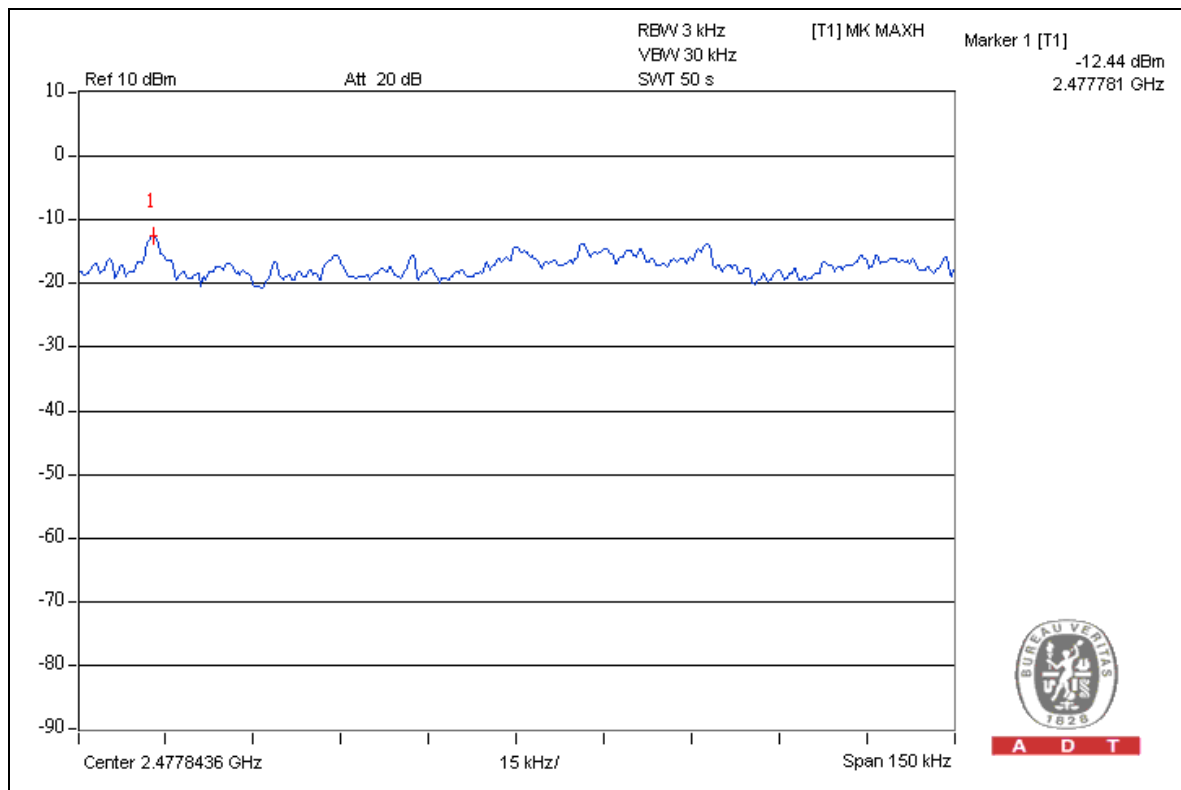


A D T

### CH 38



### CH 74





## 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 DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Apr. 03, 2009	Apr. 02, 2010

**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 lose cable. Set RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW=100kHz, VBW=300kHz; 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 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

### Note 1:

The band edge emission plot on the next page shows 49.74dBc between carrier maximum power and local maximum emission in restrict band (2.3538GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 101.23dBuV/m (Peak), so the maximum field strength in restrict band is  $101.23-49.74=51.49$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot the next page shows 43.15dBc between carrier maximum power and local maximum emission in restrict band (2.3540GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 90.88dBuV/m (Average), so the maximum field strength in restrict band is  $90.88-43.15=47.73$ dBuV/m which is under 54dBuV/m limit.

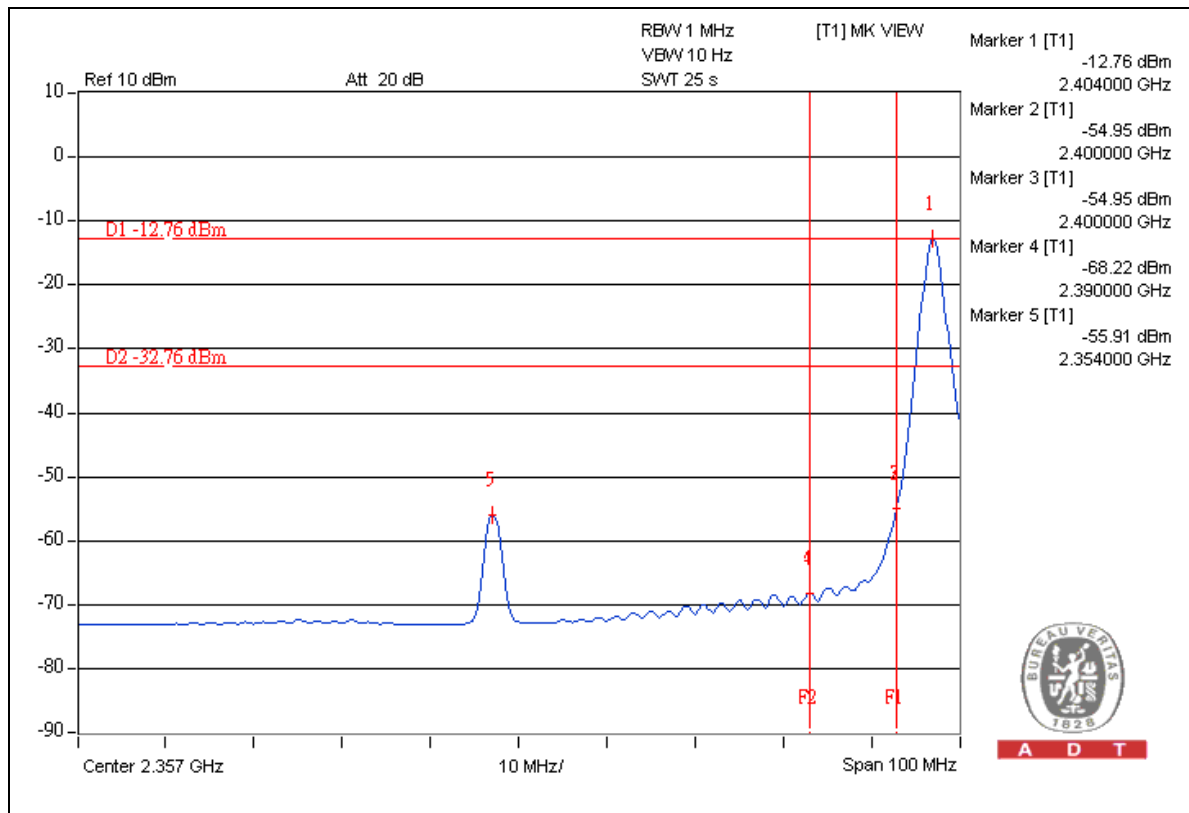
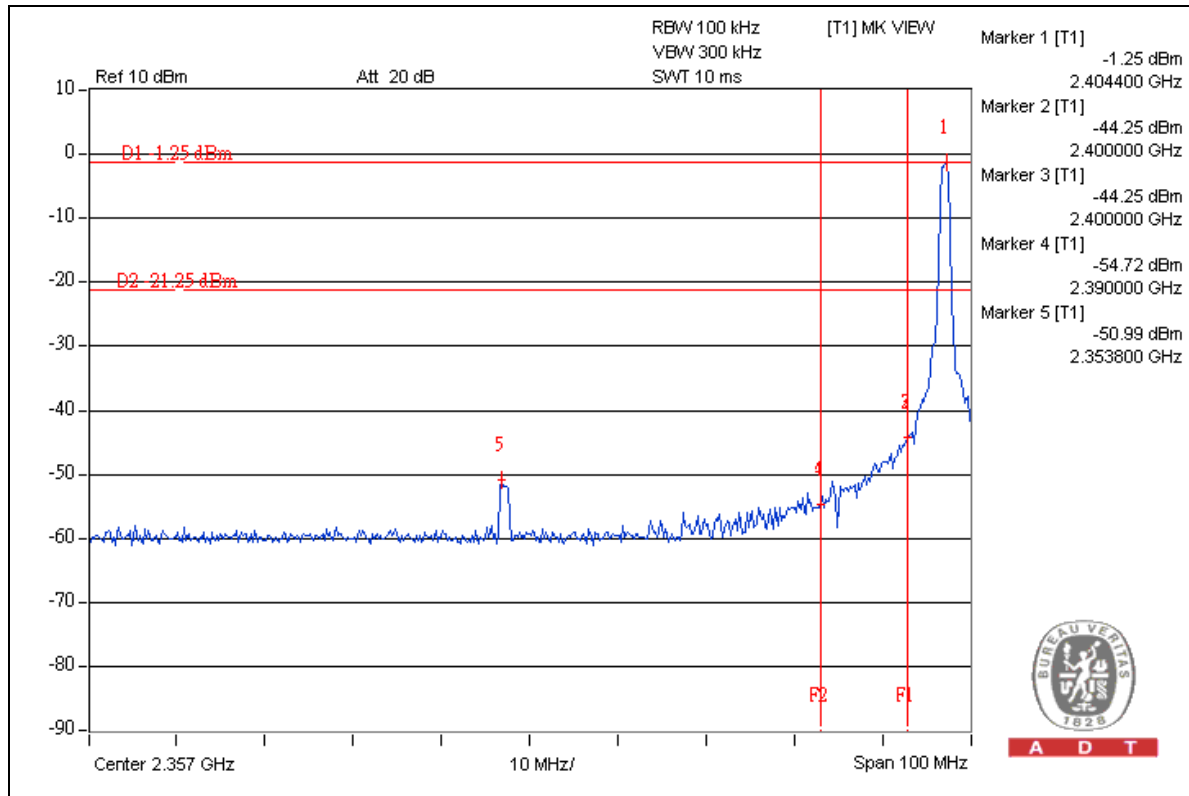
### Note 2:

The band edge emission plot on the next second page shows 45.73dBc between carrier maximum power and local maximum emission in restrict band (2.4836GHz). The emission of carrier strength list in the test result of channel 74 at the item 4.2.7 is 99.47dBuV/m (Peak), so the maximum field strength in restrict band is  $99.47-45.73=53.74$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 46.98dBc between carrier maximum power and local maximum emission in restrict band (2.4385GHz). The emission of carrier strength list in the test result of channel 74 at the item 4.2.7 is 87.58dBuV/m (Average), so the maximum field strength in restrict band is  $87.58-46.98=40.60$ dBuV/m which is under 54dBuV/m limit.

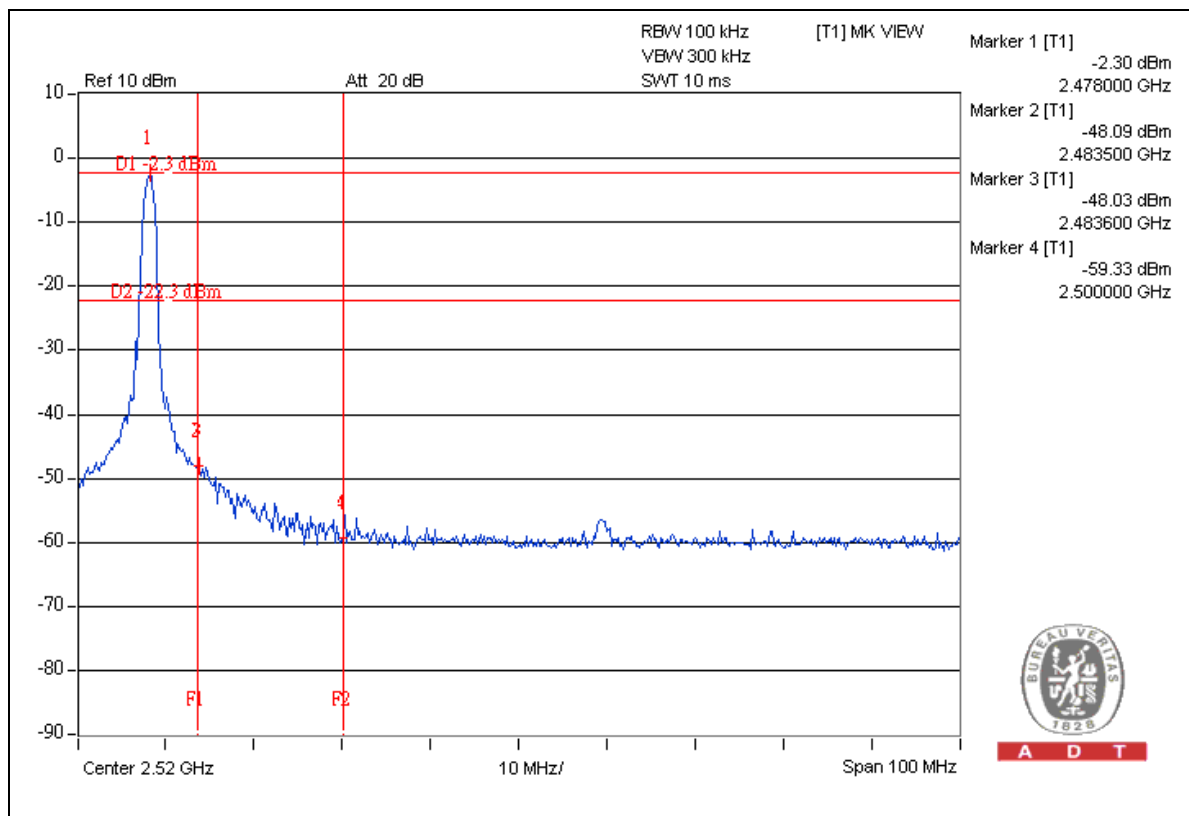
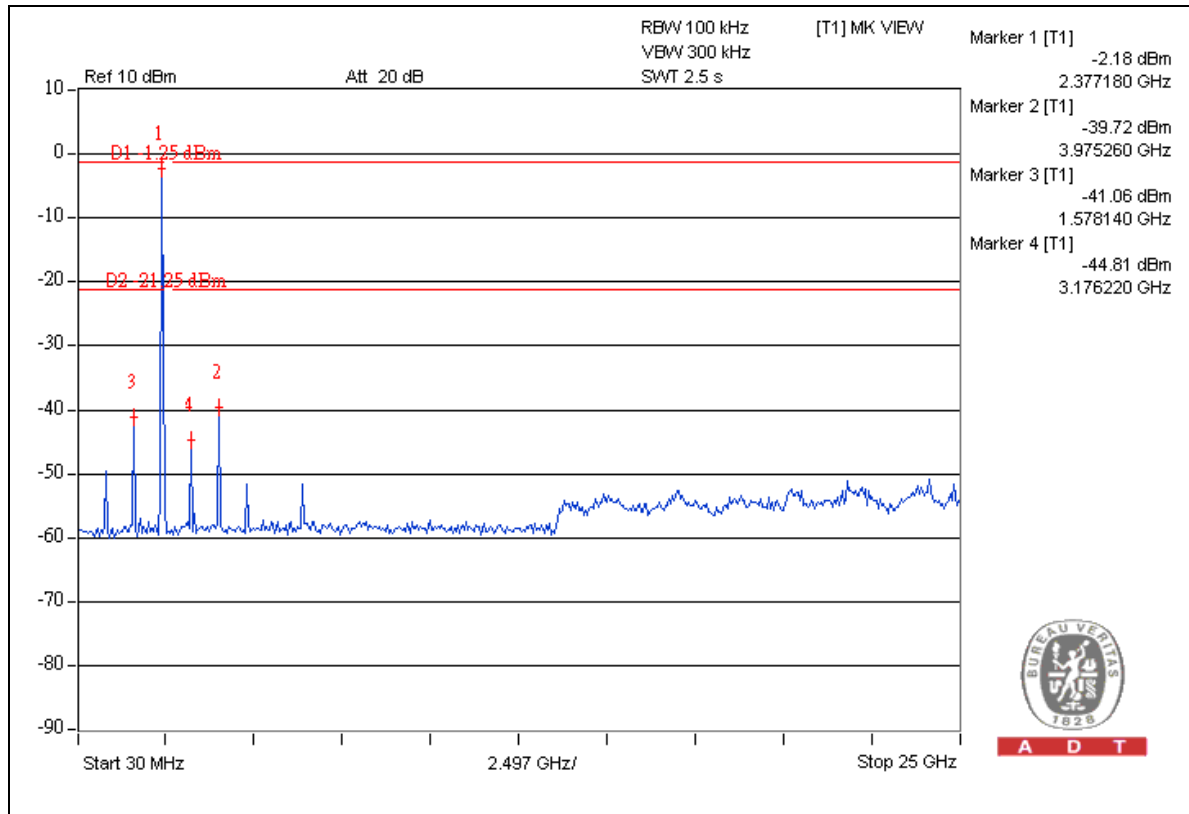


A D T





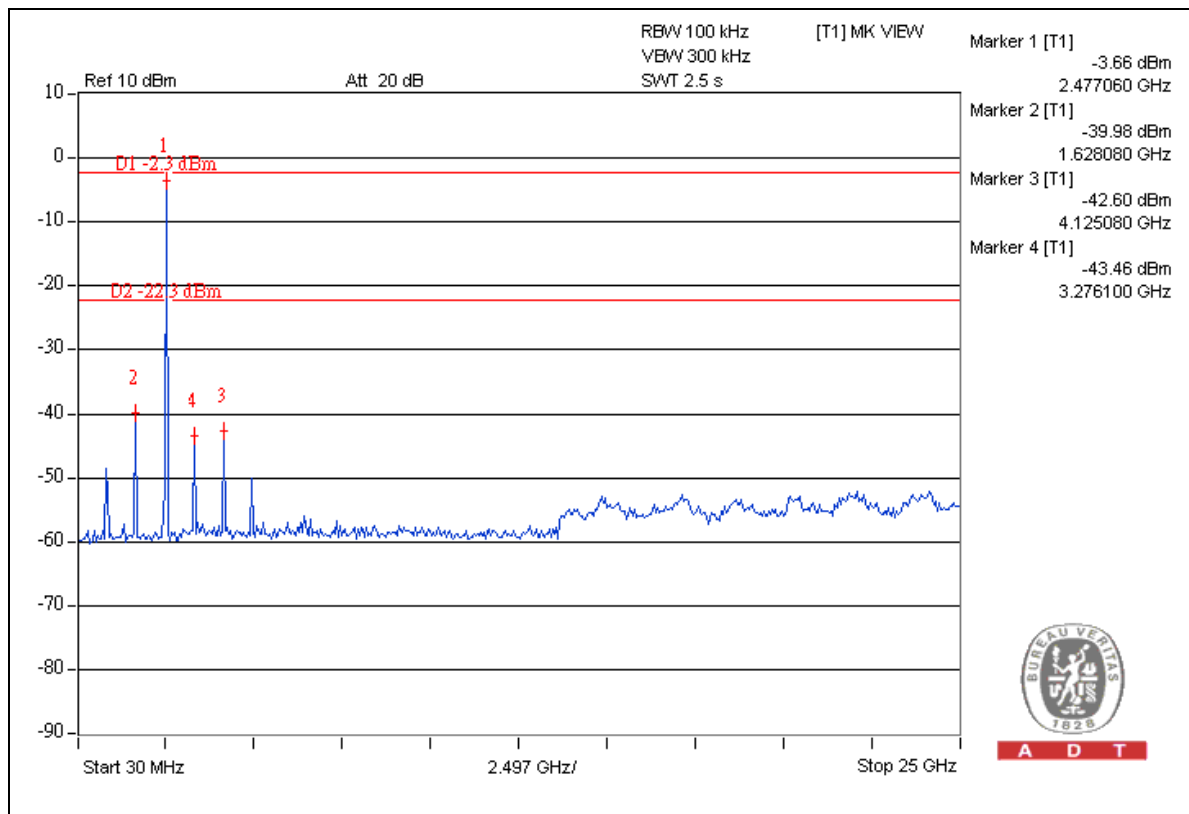
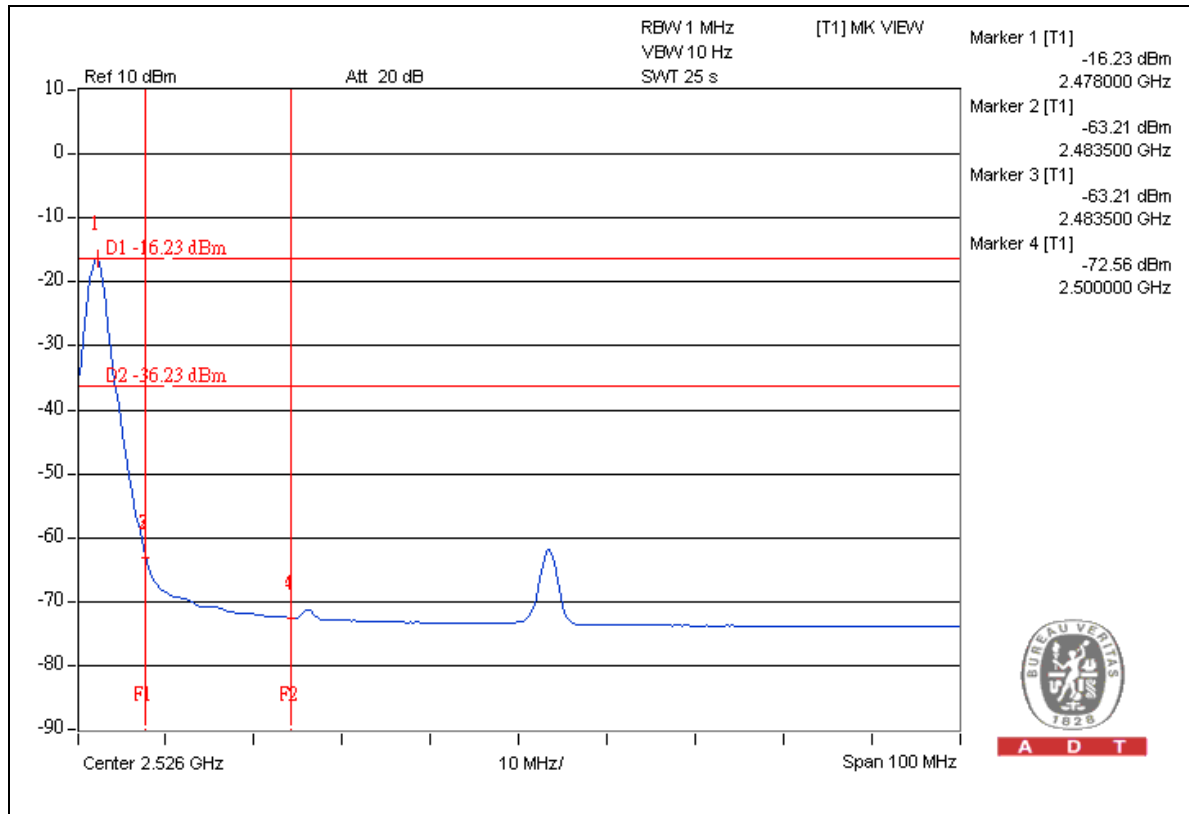
A D T







A D T



## **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 Printed antenna without connector. The maximum gain of the antenna is 2.47dBi.

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



## 6. INFORMATION ON THE TESTING LABORATORIES

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

<b>USA</b>	FCC, NVLAP
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA, CSA
<b>R.O.C.</b>	TAF, BSMI, NCC
<b>Netherlands</b>	Telefication
<b>Singapore</b>	GOST-ASIA(MOU)
<b>Russia</b>	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](http://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: 886-2-26051924

**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](http://www.adt.com.tw)

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

## **7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

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

**--- END ---**