

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**GSM MOBILE PHONE**

**FCC ID: WUMBSTPWRV90**

**MODEL No.: V90+**

**LISTED MODELS: V90, 6690, 6890, V66, 630i**

**BRAND NAME: Bestpower**

**REPORT NO: SCS-SZB081023001**

**ISSUE DATE: Nov 11, 2008**

*Prepared for*

**BESTPOWER DIRECT EXPORT CO. LTD  
21F,BUILDING A, GUO QI PLAZA, SHANG BU NAN ROAD,  
FU TIAN DISTRICT, SHENZHEN, CHINA**

*Prepared by*

**STANDARD COMPLIANCE SERVICES (SHENZHEN) CO., LTD.**

*d.b.a.*

**STANDARD COMPLIANCE SERVICES (SHENZHEN) CO., LTD.  
RM.315, BIG NEW BUILDING, NO.3083, NANXIN RD., NANSHAN,  
SHENZHEN, GUANGDONG, CHINA**

**TEL: 86-755-86174050**

**FAX: 86-755-86174237**

**VERIFICATION OF COMPLIANCE**

Applicant:	Bestpower Direct Export Co. Ltd 21F,Building A, Guo Qi Plaza, Shang Bu Nan Road, Fu Tian District, Shenzhen, China
Product Description:	GSM Mobile Phone
Brand Name:	Bestpower
Model Number:	V90+ (Representative model for test)
Listed Models:	V90, 6690, 6890, V66, 630i
Frequency Range:	2400MHz~2483.5MHz
Type(s) of Modulation:	FHSS
File Number:	SCS-SZB081023001
Date of Test:	Oct 22, 2008 ~ Oct 30, 2008

**We hereby certify that:**

The above equipment was tested by Standard Compliance Services (ShenZhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

**Approved By**

---

**Lisa Chen / Manager****Reviewed By**

---

**Fred/ Engineer**

## Table of Contents

<b>1. GENERAL INFORMATION.....</b>	<b>5</b>
1.1 PRODUCT DESCRIPTION.....	5
1.2 RELATED SUBMITTAL(S) / GRANT (S) .....	5
1.3 TEST METHODOLOGY .....	5
1.4 TEST FACILITY .....	5
1.5 SPECIAL ACCESSORIES .....	6
1.6 EQUIPMENT MODIFICATIONS .....	6
1.7 LABORATORY INFORMATION.....	6
<b>2. SYSTEM TEST CONFIGURATION .....</b>	<b>7</b>
2.1 EUT CONFIGURATION .....	7
2.2 EUT EXERCISE.....	7
<b>3. SUMMARY OF TEST RESULTS .....</b>	<b>8</b>
<b>4. DESCRIPTION OF TEST MODES .....</b>	<b>8</b>
<b>5. CONDUCTED EMISSIONS TEST .....</b>	<b>9</b>
5.1 MEASUREMENT PROCEDURE: .....	9
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	9
5.3 MEASUREMENT EQUIPMENT USED:.....	9
5.4 CONDUCTED POWER LINE EMISSION LIMIT.....	10
5.5 MEASUREMENT RESULT:.....	10
<b>6. SPURIOUS RADIATED EMISSION TEST .....</b>	<b>14</b>
6.1 MEASUREMENT PROCEDURE .....	14
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	14
6.3 MEASUREMENT EQUIPMENT USED:.....	15
6.4 FIELD STRENGTH CALCULATION.....	15
6.5 MEASUREMENT RESULT .....	16
<b>7. 20dB BANDWIDTH MEASUREMENT .....</b>	<b>30</b>
7.1 MEASUREMENT PROCEDURE .....	30
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	30
7.3 MEASUREMENT EQUIPMENT USED:.....	30
7.4 MEASUREMENT RESULTS: .....	30
<b>8. PEAK OUTPUT POWER MEASUREMENT .....</b>	<b>33</b>
8.1 MEASUREMENT PROCEDURE .....	33
8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	33
8.3 MEASUREMENT EQUIPMENT USED:.....	33
8.4 LIMITS OF MAXIMUM PEAK OUTPUT POWER.....	33
8.5 MEASUREMENT RESULTS: .....	33

<b>9. 100 KHz BANDWIDTH OF BAND EDGES MEASUREMENT .....</b>	<b>36</b>
9.1 MEASUREMENT PROCEDURE .....	36
9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	36
9.3 MEASUREMENT EQUIPMENT USED: .....	36
9.4 MEASUREMENT RESULTS: .....	36
<b>10. FREQUENCY SEPARATION .....</b>	<b>40</b>
10.1 MEASUREMENT PROCEDURE: .....	40
10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	40
10.3 MEASUREMENT EQUIPMENT USED: .....	40
10.4 LIMITS AND MEASUREMENT RESULT: .....	40
<b>11. NUMBER OF HOPPING FREQUENCY .....</b>	<b>42</b>
11.1 MEASUREMENT PROCEDURE: .....	42
11.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	42
11.3 MEASUREMENT EQUIPMENT USED: .....	42
11.4 LIMITS AND MEASUREMENT RESULT: .....	42
<b>12. DWELL TIME .....</b>	<b>45</b>
12.1 MEASUREMENT PROCEDURE: .....	45
12.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	45
12.3 MEASUREMENT EQUIPMENT USED: .....	45
12.4 LIMITS AND MEASUREMENT RESULT: .....	45
<b>13. ANTENNA REQUIREMENT .....</b>	<b>48</b>
13.1 STANDARD APPLICABLE .....	48
13.2 ANTENNA CONNECTED CONSTRUCTION .....	48
<b>14. RF EXPOSURE .....</b>	<b>49</b>
14.1 STANDARD APPLICABLE .....	49
14.2 MEASUREMENT RESULT .....	49

## 1. GENERAL INFORMATION

### 1.1 PRODUCT DESCRIPTION

The tested product in the report, Model: V90+ is a Mobile Phone with Bluetooth Function

The EUT is compliance with Bluetooth Standard.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2400~2483.5MHz, 79 channels

B). Modulation type: FHSS

C). Antenna Designation: Micro-strip Antenna, -1.48 dBi, Non-User Replaceable(Fixed)

D). Power Supply: DC 3.7 V From Battery

E). The series models V90+, V90, 6690, 6890, V66, 630i have the same circuit diagram, PCB layout , only the model name are difference intend for market requirement.

### 1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: WUMBSTPWRV90 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a Declaration of Conformity procedure.

### 1.3 TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 TEST FACILITY

The fully anechoic chamber test site and conducted measurement facility used to collect the radiated data is located on the address of QuieTek Technology (Suzhou) Co., Ltd. No.99, Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone, Suzhou, China

The fully anechoic chamber Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements.

## 1.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

## 1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

## 1.7 LABORATORY INFORMATION

### Suzhou Testing Laboratory :

No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., SuZhou, China  
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : [service@quietek.com](mailto:service@quietek.com)



## **2. SYSTEM TEST CONFIGURATION**

### **2.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 EUT EXERCISE**

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.



### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)	20dB Bandwidth	Compliant
§15.247(c)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) (f)	Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	Time of Occupancy	Compliant
§15.203, §15.247(b)(4)(i)	Antenna Requirement	Compliant
§1.1310	RF Exposure	Compliant

### 4. DESCRIPTION OF TEST MODES

1. The EUT has been tested under normal operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.  
Channel low (2402MHz), mid (2441MHz) and high (2480MHz) with highest data rate are chosen for full testing.



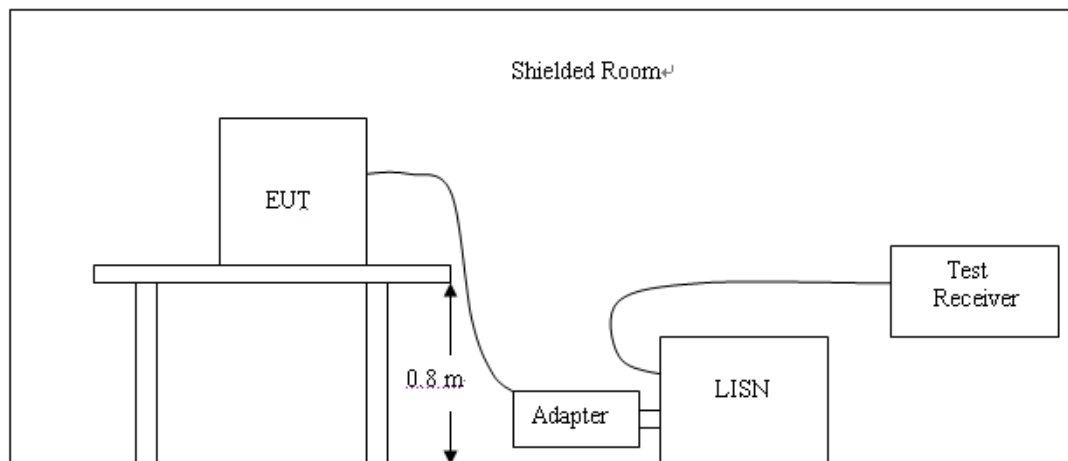
## 5. CONDUCTED EMISSIONS TEST

### 5.1 MEASUREMENT PROCEDURE:

The EUT was tested according to ANSI C63.4 - 2003. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u Henry as specified by section 5.1 of ANSI C63.4 - 2003. Cables and peripherals were moved to find the maximum emission levels for each frequency.

**Note:** The EUT will not be operated during charging the battery with the power adapter.

### 5.2 TEST SET-UP (Block Diagram of Configuration)



### 5.3 MEASUREMENT EQUIPMENT USED:

Name	Manufacture	M / N	S / N	Calibrated date
Two-Line V-Network	R&S	ENV216	100013	2008.11
Two-Line V-Network	R&S	ENV216	100014	2008.11
EMI Test Receiver	R&S	ESCI	100726	2008.11
ISN	Schaffner	ISN T400	21648	2008.11
PLC ISN	Teseq GmbH	ISN PLC 25-16	24047	2008.11
PLC ISN	Teseq GmbH	ISN PLC 25-30	23387	2008.11
Matching Network	SHX	TZ5	06062902	2008.11
Matching Network	SHX	TZ5	06062903	2008.11
Combining Network	SHX	N-50KKK	N/A	2008.11
Power Analyzer	California	PACS-1	72419	2008.11
AC Power Source	California	5001iX-208	56741	2008.11

**Note:** Each piece of equipment is scheduled for calibration once a year.

## 5.4 CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

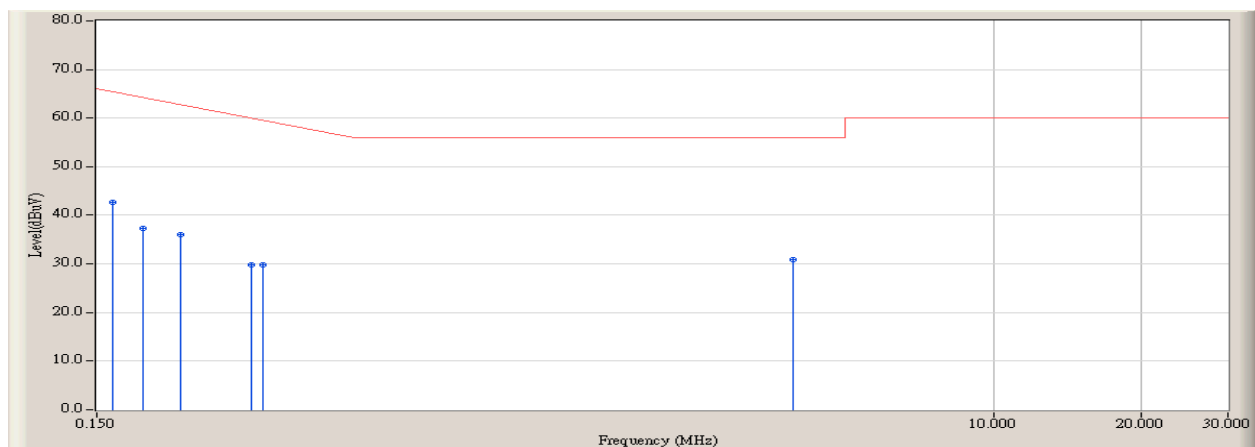
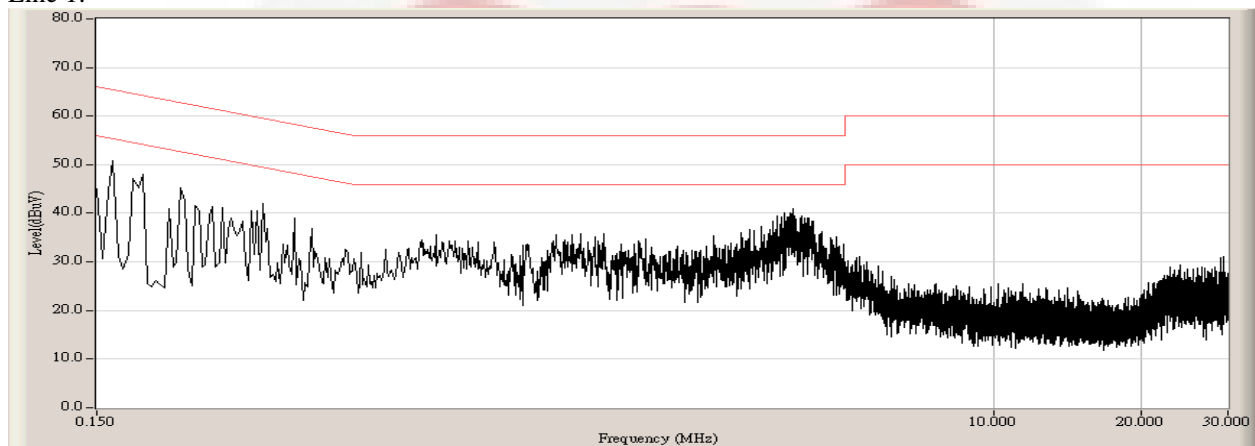
Frequency (MHz)	Maximum RF Line Voltage (dB $\mu$ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

## 5.5 MEASUREMENT RESULT:

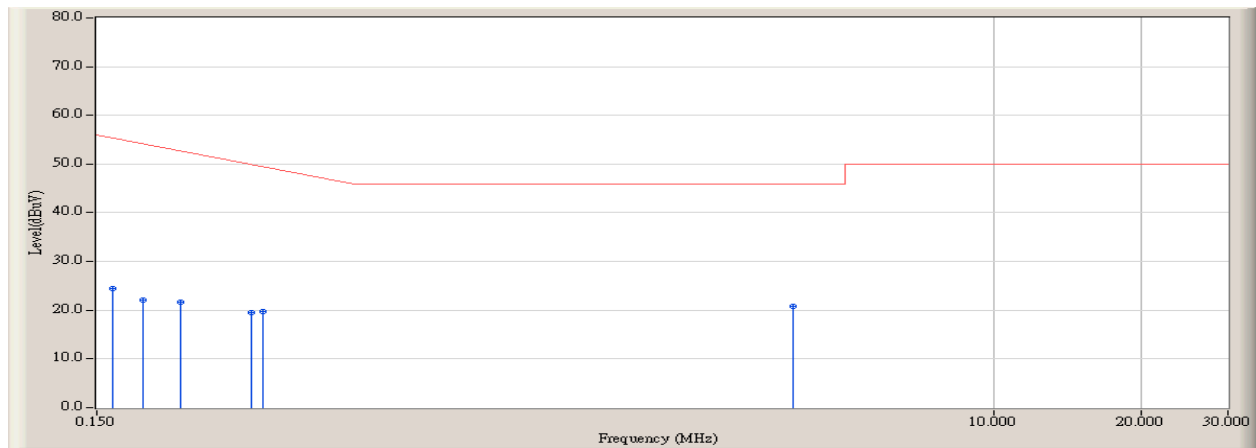
Line 1:



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.162	10.161	32.600	42.761	-22.896	65.657	QUASIPeAK
2		0.186	9.697	27.600	37.297	-27.674	64.971	QUASIPeAK
3		0.222	9.442	26.500	35.942	-28.001	63.943	QUASIPeAK
4		0.310	9.511	20.300	29.811	-31.618	61.429	QUASIPeAK
5		0.326	9.521	20.300	29.821	-31.150	60.971	QUASIPeAK
6		3.922	9.810	21.100	30.910	-25.090	56.000	QUASIPeAK

## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

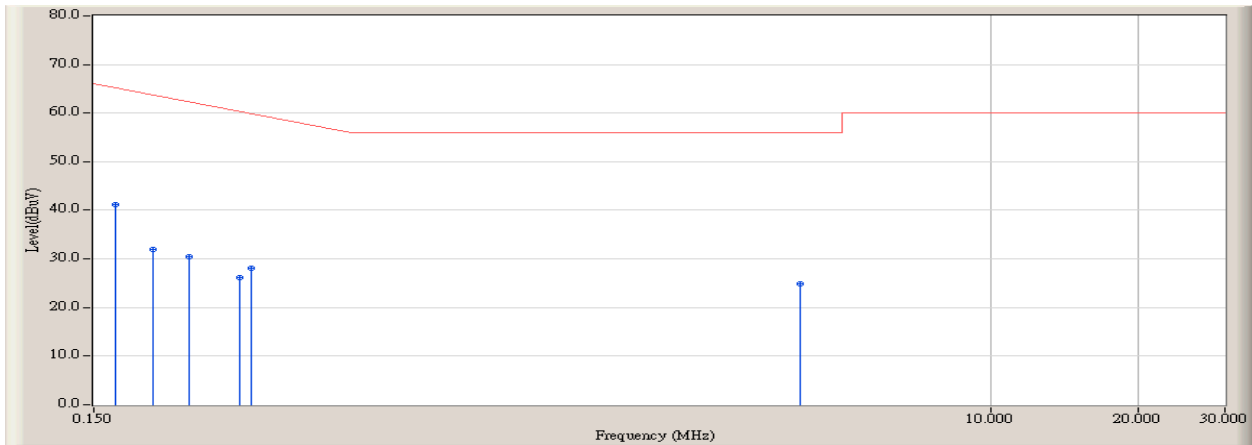
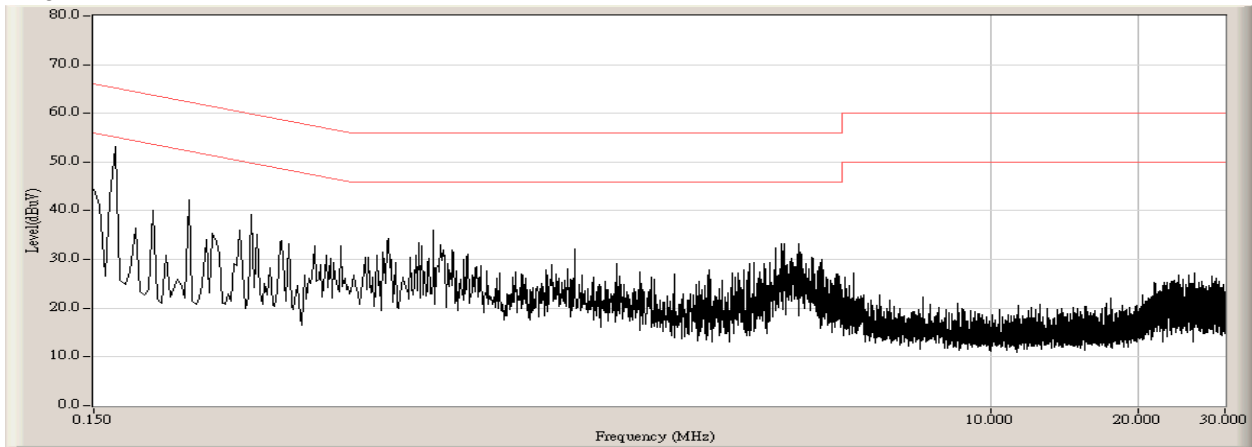


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.162	10.161	14.300	24.461	-31.196	55.657	AVERAGE
2		0.186	9.697	12.300	21.997	-32.974	54.971	AVERAGE
3		0.222	9.442	12.200	21.642	-32.301	53.943	AVERAGE
4		0.310	9.511	10.000	19.511	-31.918	51.429	AVERAGE
5		0.326	9.521	10.200	19.721	-31.250	50.971	AVERAGE
6	*	3.922	9.810	11.100	20.910	-25.090	46.000	AVERAGE

## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

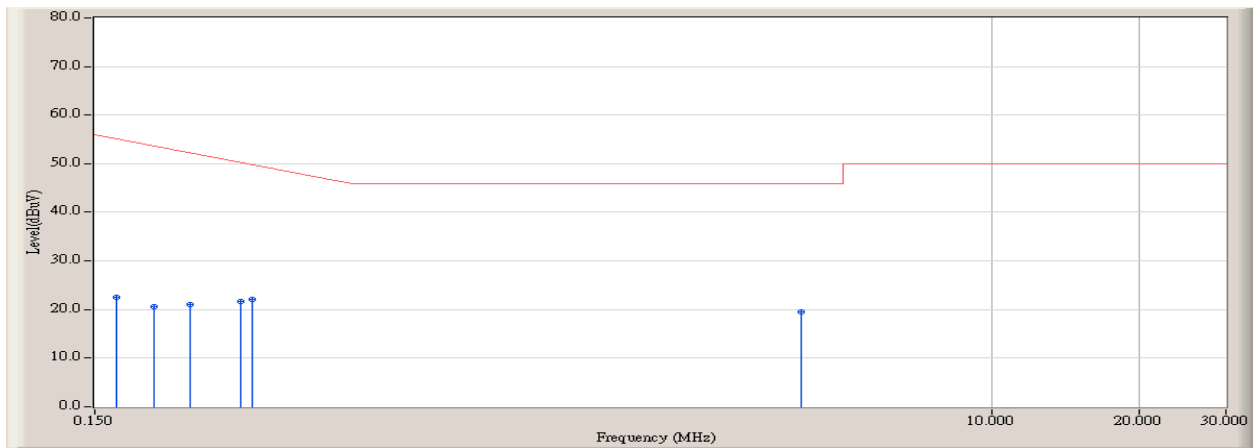
Line 2:



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.166	9.952	31.300	41.252	-24.291	65.543	QUASIPeAK
2		0.198	9.664	22.400	32.064	-32.565	64.629	QUASIPeAK
3		0.234	9.580	20.800	30.380	-33.220	63.600	QUASIPeAK
4		0.298	9.600	16.500	26.100	-35.671	61.771	QUASIPeAK
5		0.314	9.600	18.500	28.100	-33.214	61.314	QUASIPeAK
6		4.090	9.710	15.200	24.910	-31.090	56.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.166	9.952	12.500	22.452	-33.091	55.543	AVERAGE
2		0.198	9.664	10.900	20.564	-34.065	54.629	AVERAGE
3		0.234	9.580	11.500	21.080	-32.520	53.600	AVERAGE
4		0.298	9.600	12.000	21.600	-30.171	51.771	AVERAGE
5		0.314	9.600	12.500	22.100	-29.214	51.314	AVERAGE
6	*	4.090	9.710	9.800	19.510	-26.490	46.000	AVERAGE

## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

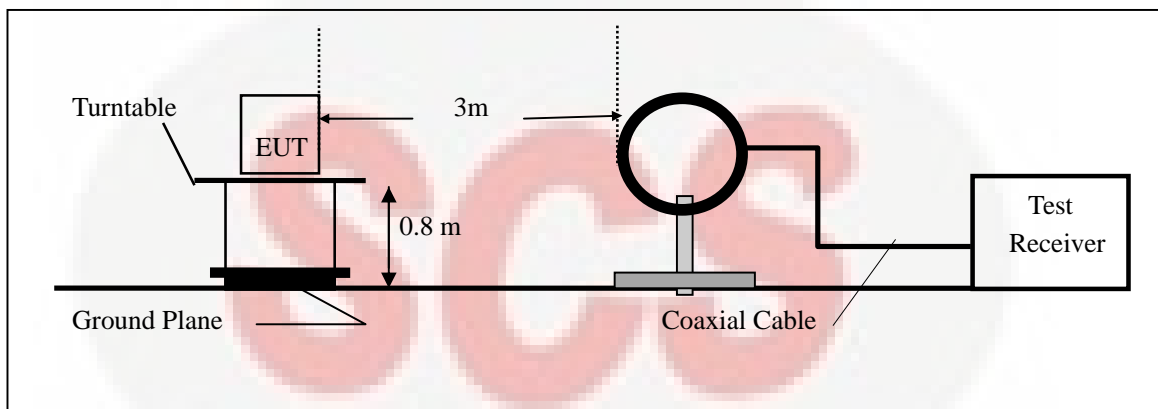
## 6. SPURIOUS RADIATED EMISSION TEST

### 6.1 MEASUREMENT PROCEDURE

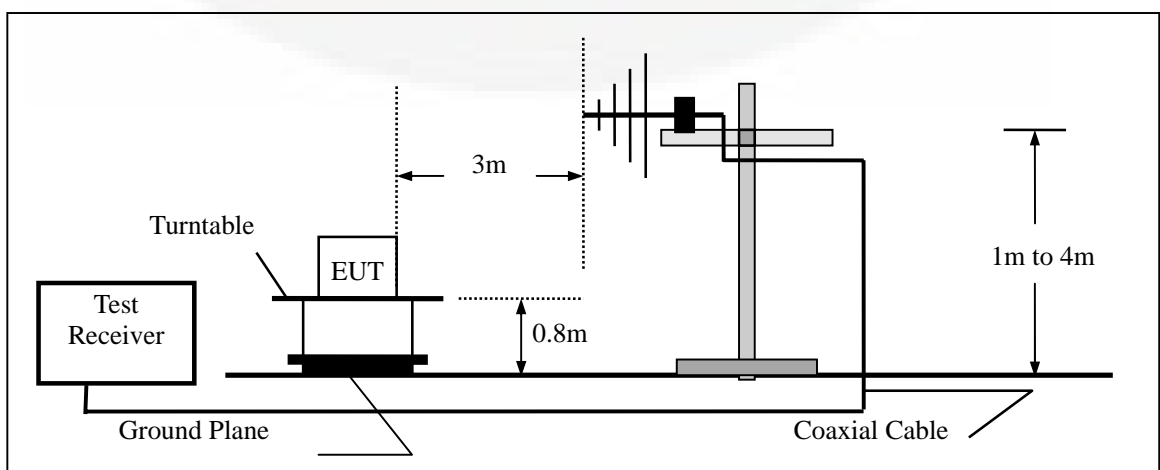
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

### 6.2 TEST SET-UP (Block Diagram of Configuration)

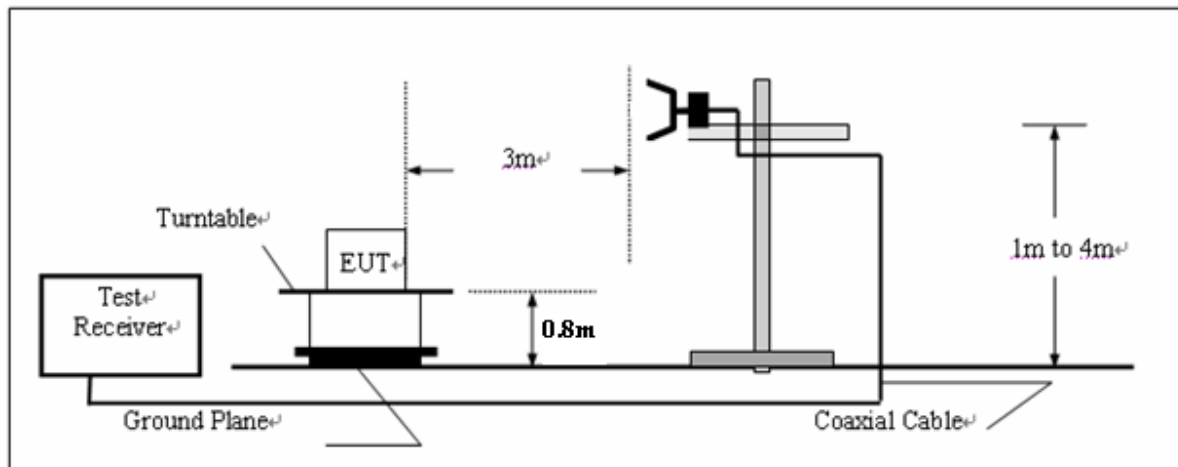
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



## (C) Radiated Emission Test Set-Up, Frequency above 1000MHz



## 6.3 MEASUREMENT EQUIPMENT USED:

Name	Manufacture	M / N	S / N	Calibrated date
Spectrum Analyzer	Agilent	E4408B	MY45102679	2008.11
EMI Test Receiver	R&S	ESCI	100573	2008.11
Preamplifier	Quietek	AP-025C	QT-AP003	2008.11
Preamplifier	Quietek	AP-180C	CHM-0602012	2008.11
Bilog Type Antenna	Schaffner	CBL6112B	2932	2008.11
50ohm Coaxial Switch	Anritsu	MP59B	6200447304	2008.11
Coaxial Cable	Huber+Suhner	AC2-C	04	2008.11
Temperature/Humidity Meter	Zhicheng	ZC1-2	QT-TH002	2008.03

**Note:** Each piece of equipment is scheduled for calibration once a year.

## 6.4 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

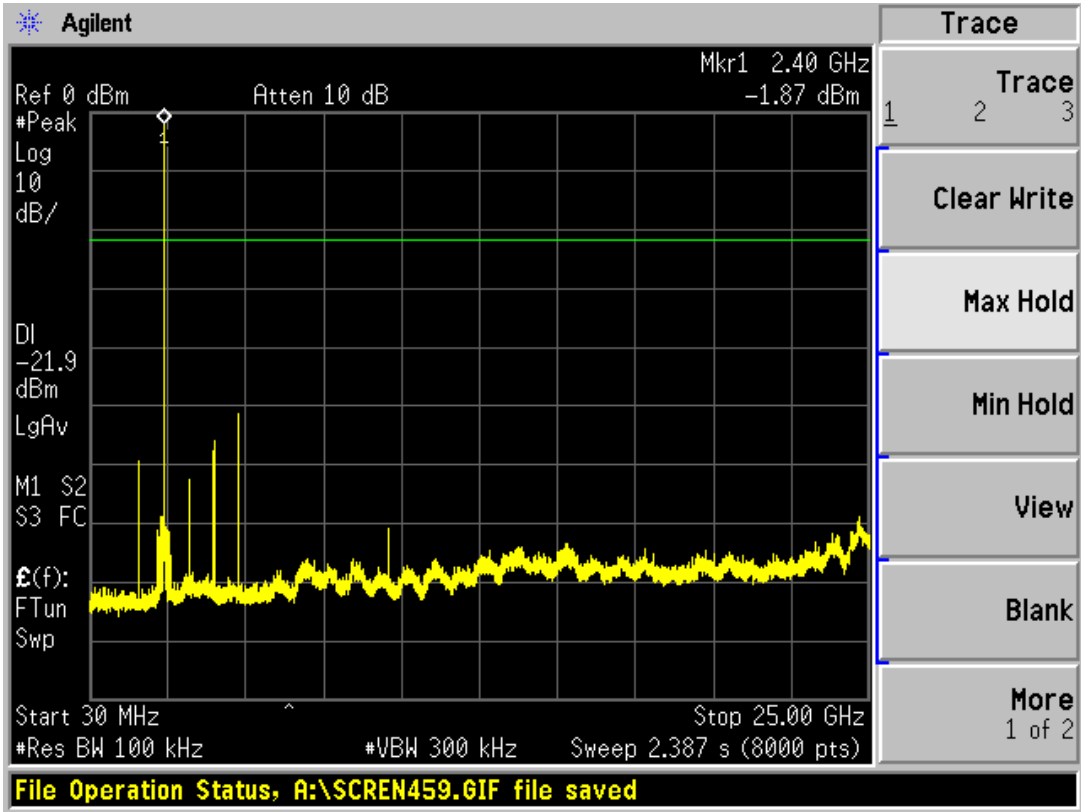
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

6.5 MEASUREMENT RESULT

Refer to attach tabular data sheets.

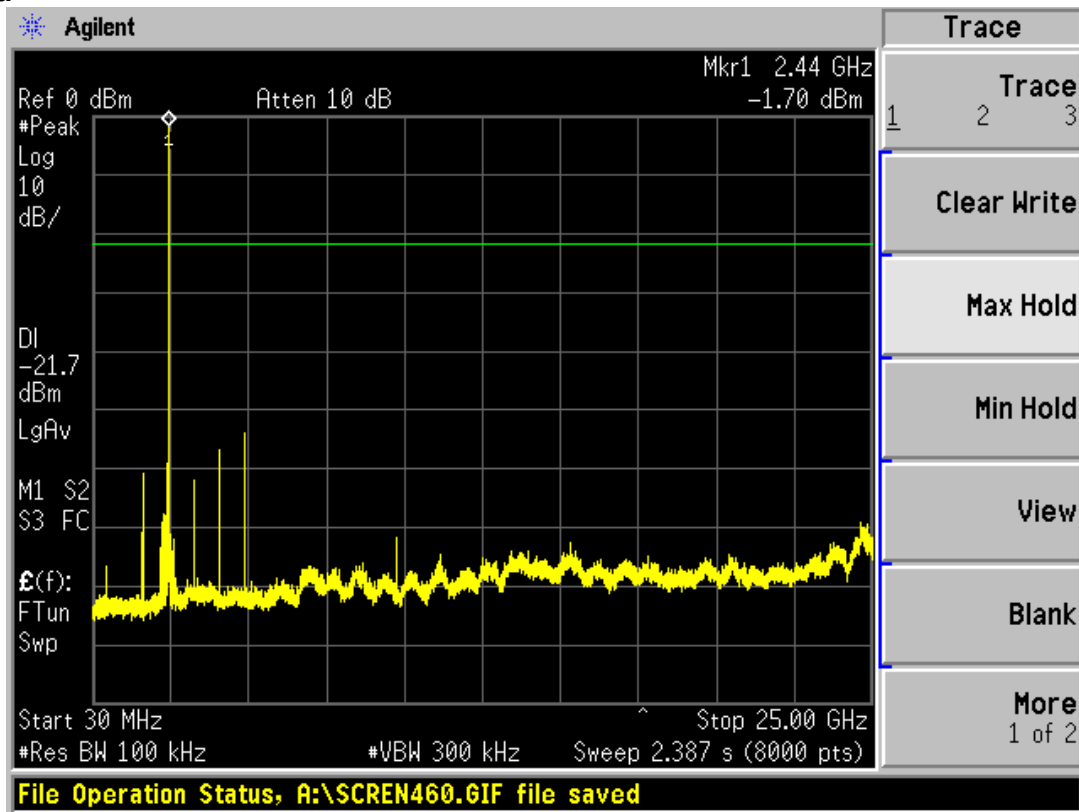
Conducted Spurious Emission Measurement Results

CH Low

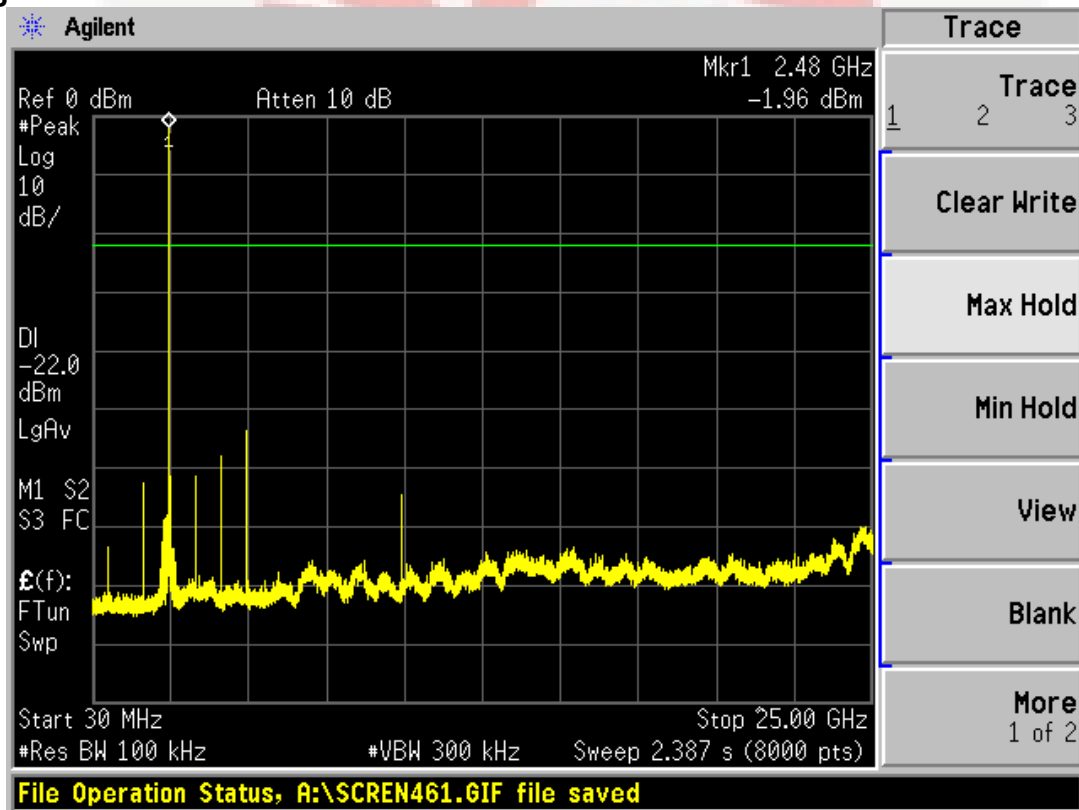




## CH Mid



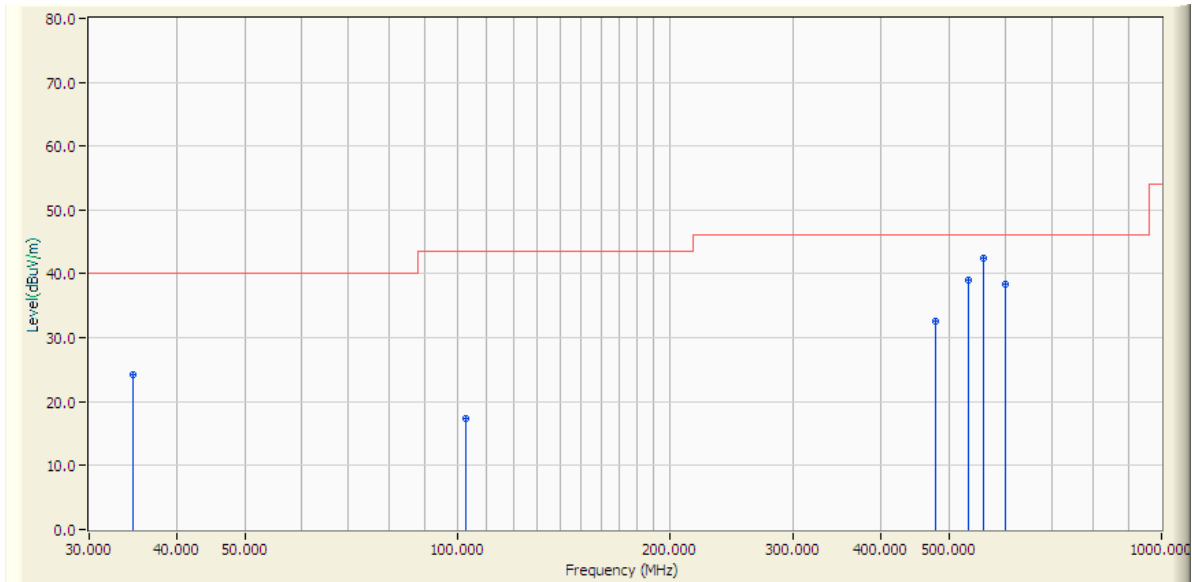
## CH High



**Radiated Spurious Emission Measurement Result (below 1GHz)**

HORIZONTAL

Note : Transmit at channel 2402MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	34.600	-6.035	30.200	24.165	-15.835	40.000	QUASIPeAK
2	103.000	-9.982	27.400	17.419	-26.101	43.520	QUASIPeAK
3	478.000	-2.101	34.600	32.498	-13.522	46.020	QUASIPeAK
4	531.000	-1.033	40.000	38.967	-7.053	46.020	QUASIPeAK
5	* 558.700	-0.029	42.600	42.571	-3.449	46.020	QUASIPeAK
6	600.000	0.045	38.400	38.445	-7.575	46.020	QUASIPeAK

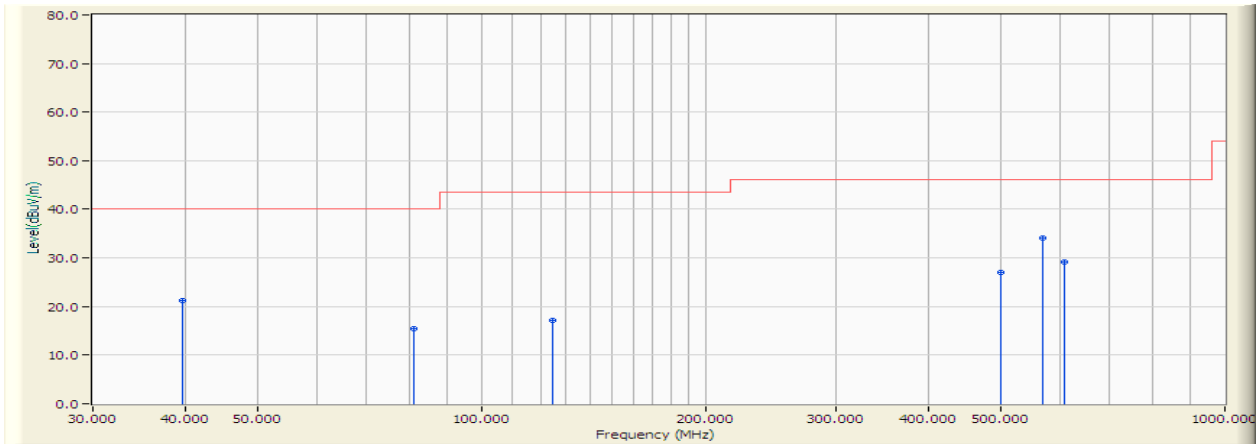
**Remark:**

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

VERTICAL

Note : Transmit at channel 2402MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	39.600	-8.686	30.000	21.314	-18.686	40.000	QUASIPeAK
2	81.000	-14.051	29.400	15.349	-24.651	40.000	QUASIPeAK
3	124.500	-9.067	26.300	17.233	-26.287	43.520	QUASIPeAK
4	500.500	-1.783	28.800	27.016	-19.004	46.020	QUASIPeAK
5	* 568.500	-0.108	34.200	34.091	-11.929	46.020	QUASIPeAK
6	607.200	0.130	29.000	29.130	-16.890	46.020	QUASIPeAK

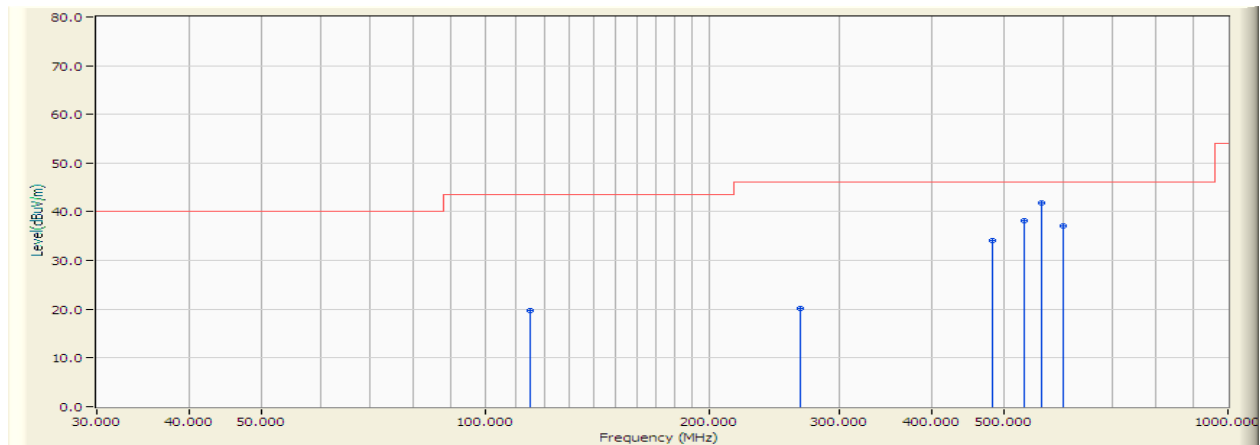
**Remark:**

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

HORIZONTAL

Note : Transmit at channel 2441MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		114.875	-9.403	29.094	19.691	-23.829	43.520	QUASIPeAK
2		265.225	-7.259	27.431	20.172	-25.848	46.020	QUASIPeAK
3		481.050	-1.902	36.004	34.102	-11.918	46.020	QUASIPeAK
4		531.975	-0.963	39.236	38.273	-7.747	46.020	QUASIPeAK
5	*	561.075	-0.164	41.956	41.792	-4.228	46.020	QUASIPeAK
6		599.875	0.050	37.053	37.103	-8.917	46.020	QUASIPeAK

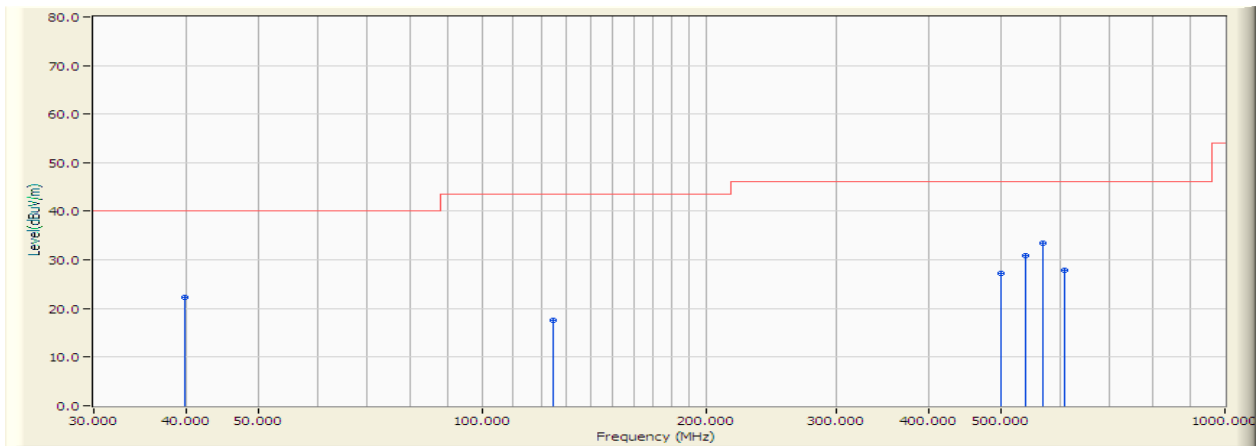
**Remark:**

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

VERTICAL

Note : Transmit at channel 2441MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		39.700	-8.731	30.931	22.200	-17.800	40.000	QUASIPeAK
2		124.575	-9.065	26.579	17.514	-26.006	43.520	QUASIPeAK
3		500.450	-1.786	29.056	27.270	-18.750	46.020	QUASIPeAK
4		539.250	-0.755	31.653	30.898	-15.122	46.020	QUASIPeAK
5	*	568.350	-0.117	33.598	33.481	-12.539	46.020	QUASIPeAK
6		607.150	0.130	27.751	27.881	-18.139	46.020	QUASIPeAK

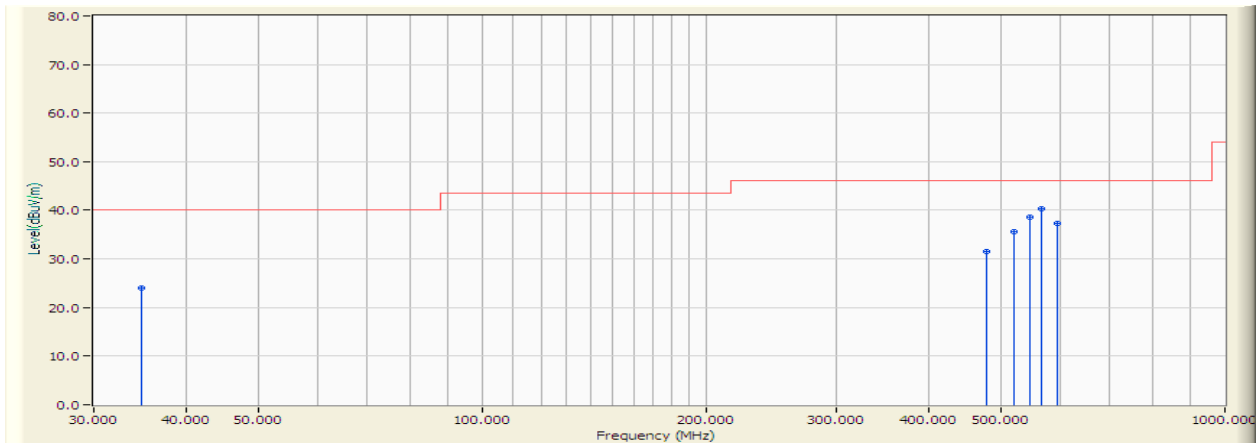
**Remark:**

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

HORIZONTAL

Note : Transmit at channel 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		34.850	-6.174	30.254	24.080	-15.920	40.000	QUASIPeAK
2		478.625	-2.064	33.560	31.496	-14.524	46.020	QUASIPeAK
3		519.850	-1.140	36.713	35.573	-10.447	46.020	QUASIPeAK
4		546.525	-0.422	38.992	38.570	-7.450	46.020	QUASIPeAK
5	*	565.925	-0.330	40.712	40.382	-5.638	46.020	QUASIPeAK
6		595.025	0.283	37.116	37.399	-8.621	46.020	QUASIPeAK

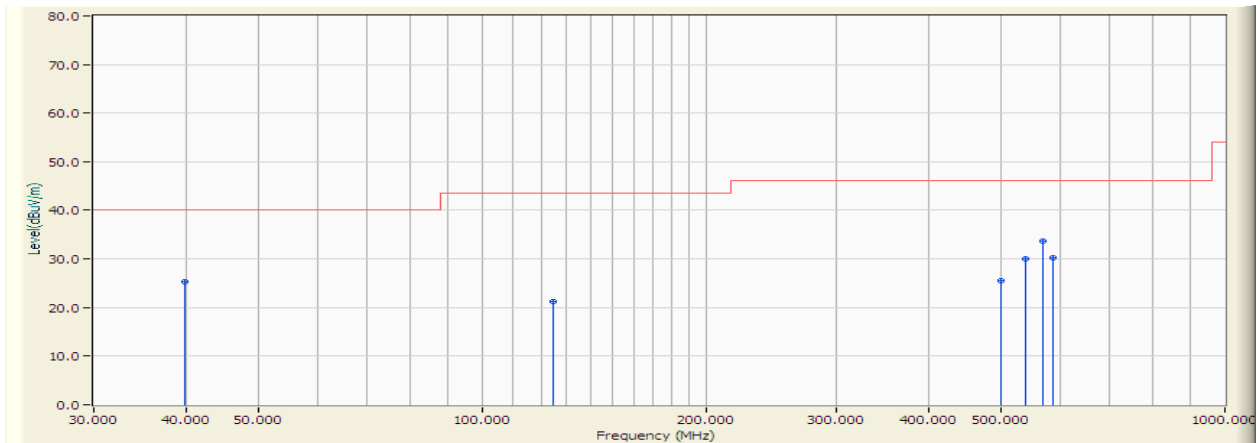
**Remark:**

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

VERTICAL

Note : Transmit at channel 2480MHz



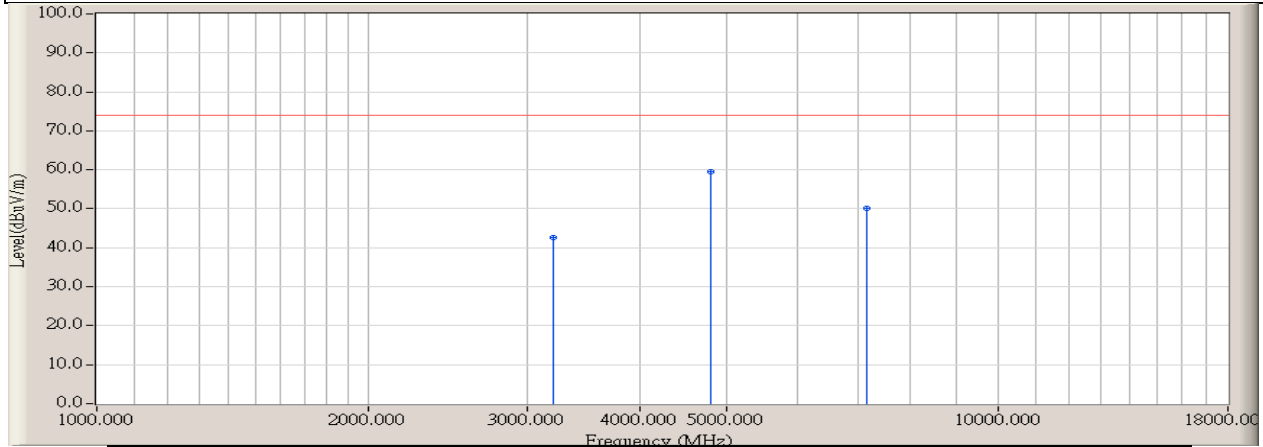
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		39.700	-8.731	34.031	25.300	-14.700	40.000	QUASIPeAK
2		124.575	-9.065	30.379	21.314	-22.206	43.520	QUASIPeAK
3		500.450	-1.786	27.356	25.570	-20.450	46.020	QUASIPeAK
4		539.250	-0.755	30.753	29.998	-16.022	46.020	QUASIPeAK
5	*	568.350	-0.117	33.698	33.581	-12.439	46.020	QUASIPeAK
6		587.750	-0.120	30.468	30.348	-15.672	46.020	QUASIPeAK

**Remark:**

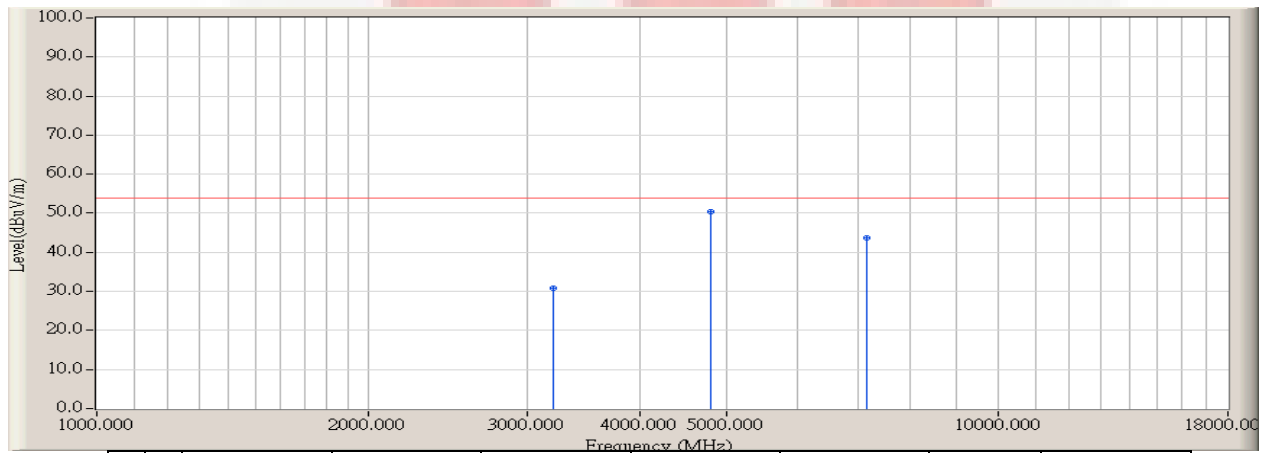
- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

**Radiated Spurious Emission Measurement Result (above 1GHz)****HORIZONTAL**

Note : Transmit at channel 2402MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3210.000	-1.490	44.194	42.704	-31.266	73.970	PEAK
2	*	4796.667	3.490	56.131	59.621	-14.349	73.970	PEAK
3		7148.333	13.013	37.240	50.253	-23.717	73.970	PEAK



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3210.000	-1.490	32.300	30.810	-23.160	53.970	AVERAGE
2	*	4796.600	3.490	46.800	50.290	-3.680	53.970	AVERAGE
3		7148.333	13.013	30.600	43.613	-10.357	53.970	AVERAGE

**Remark:**

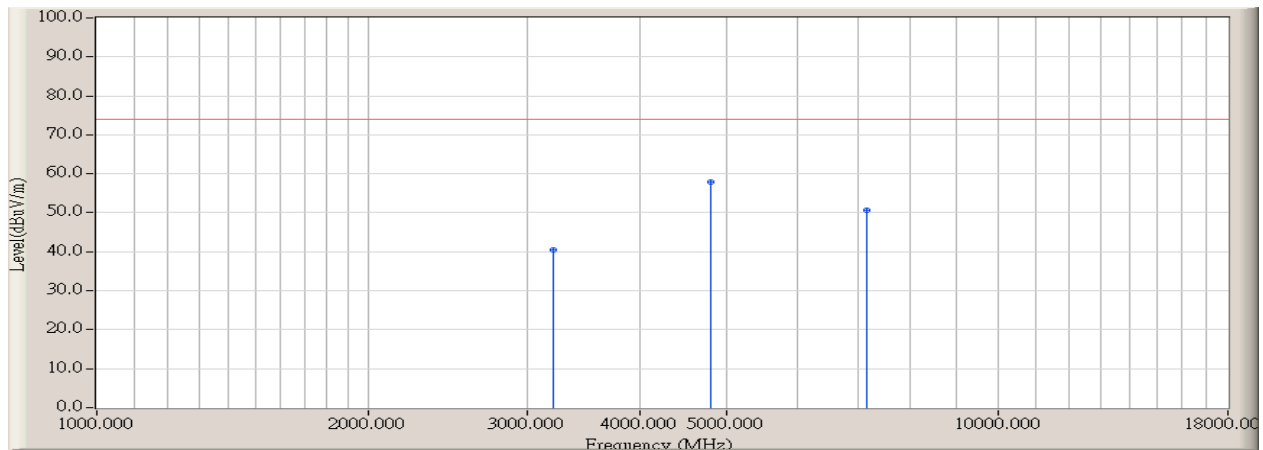
- (1) Measuring frequencies from 1GHz to the 10<sup>th</sup> harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.  
Spectrum AV Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



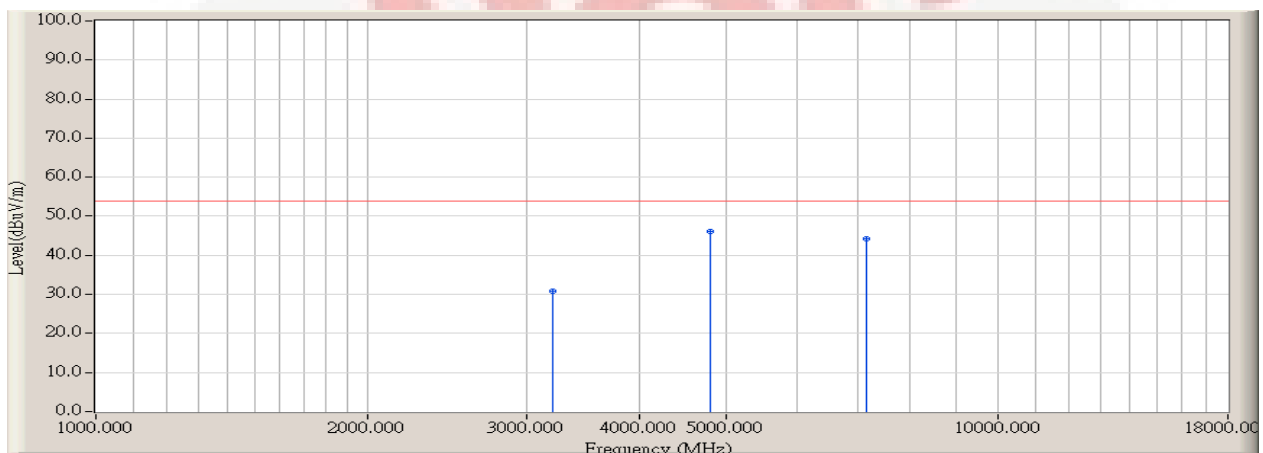
**Radiated Spurious Emission Measurement Result (above 1GHz)**

VERTICAL

Note : Transmit at channel 2402MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3210.000	-1.490	41.929	40.439	-33.531	73.970	PEAK
2	*	4796.667	3.490	54.523	58.013	-15.957	73.970	PEAK
3		7148.333	13.013	37.679	50.692	-23.278	73.970	PEAK



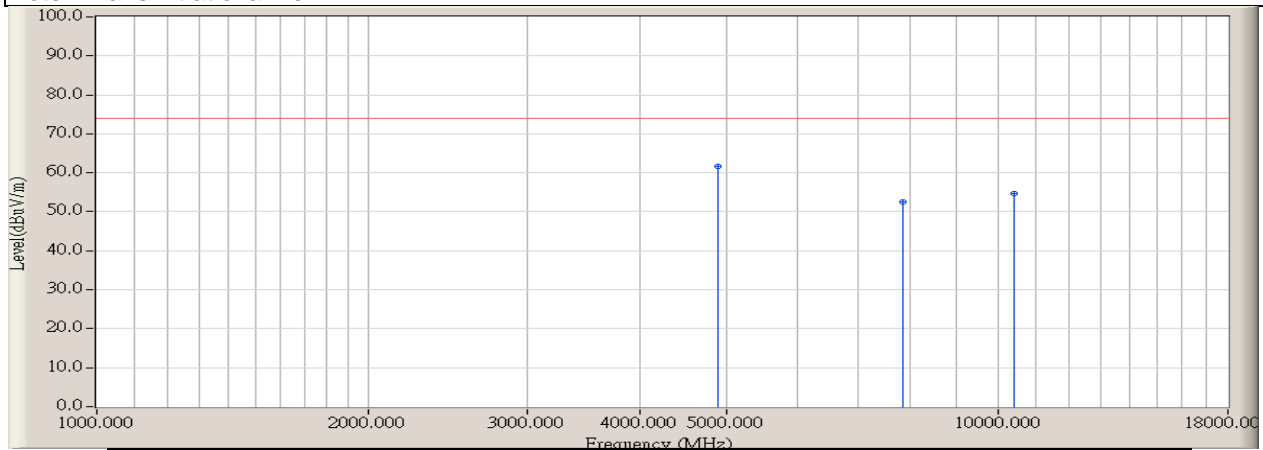
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3210.000	-1.490	32.200	30.710	-23.260	53.970	AVERAGE
2	*	4796.667	3.490	42.600	46.090	-7.880	53.970	AVERAGE
3		7148.333	13.013	31.100	44.113	-9.857	53.970	AVERAGE

**Remark:**

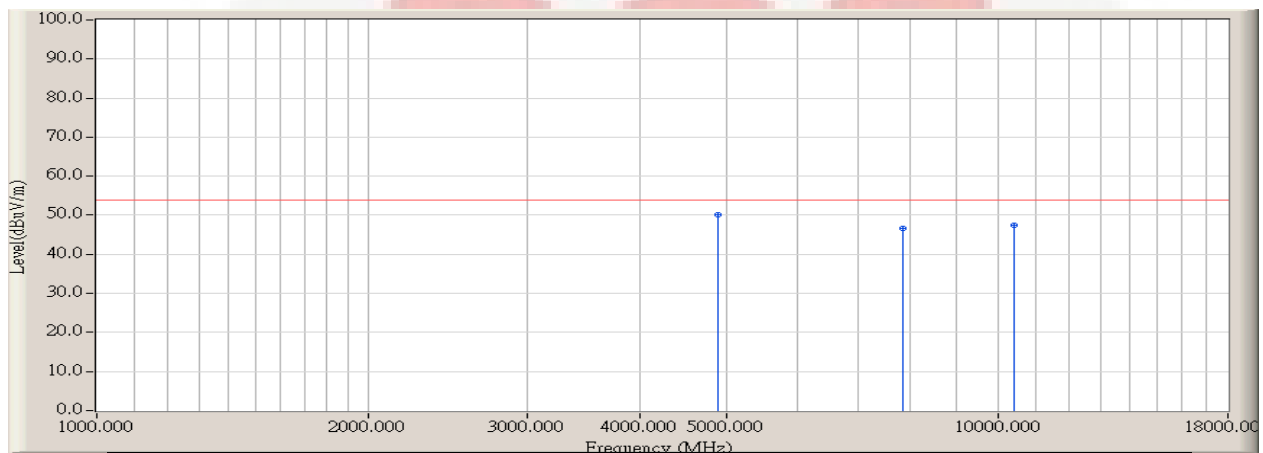
- (1) Measuring frequencies from 1GHz to the 10<sup>th</sup> harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.  
Spectrum AV Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (above 1GHz)****HORIZONTAL**

Note : Transmit at channel 2441MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4881.667	3.633	57.947	61.580	-12.390	73.970	PEAK
2	*	7856.667	14.566	37.877	52.444	-21.526	73.970	PEAK
3		10435.000	16.650	37.928	54.578	-19.392	73.970	PEAK



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4881.667	3.633	46.500	50.133	-3.837	53.970	AVERAGE
2	*	7856.667	14.566	32.200	46.767	-7.203	53.970	AVERAGE
3		10435.000	16.650	30.900	47.550	-6.420	53.970	AVERAGE

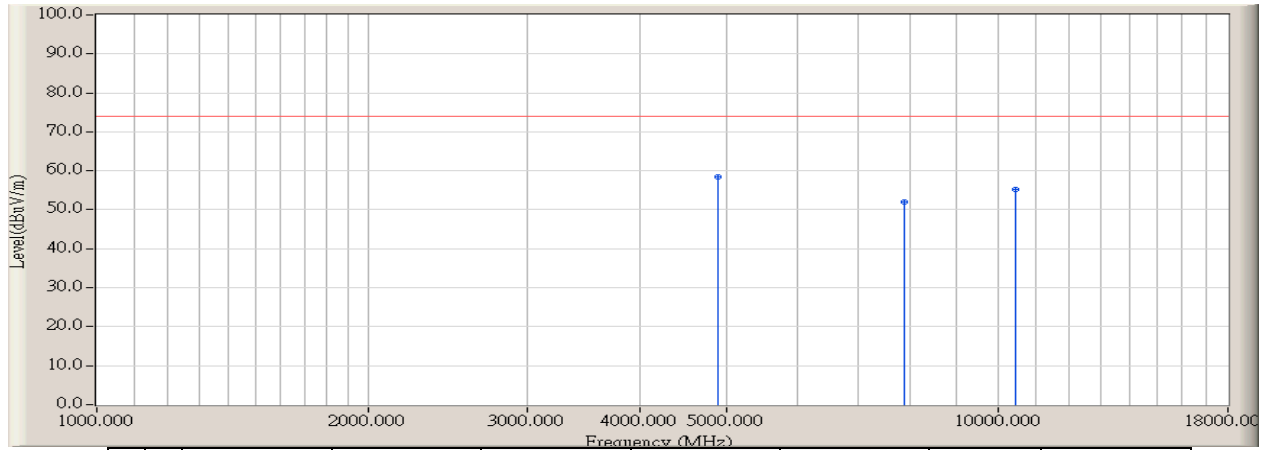
**Remark:**

- (1) Measuring frequencies from 1GHz to the 10<sup>th</sup> harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.  
Spectrum AV Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

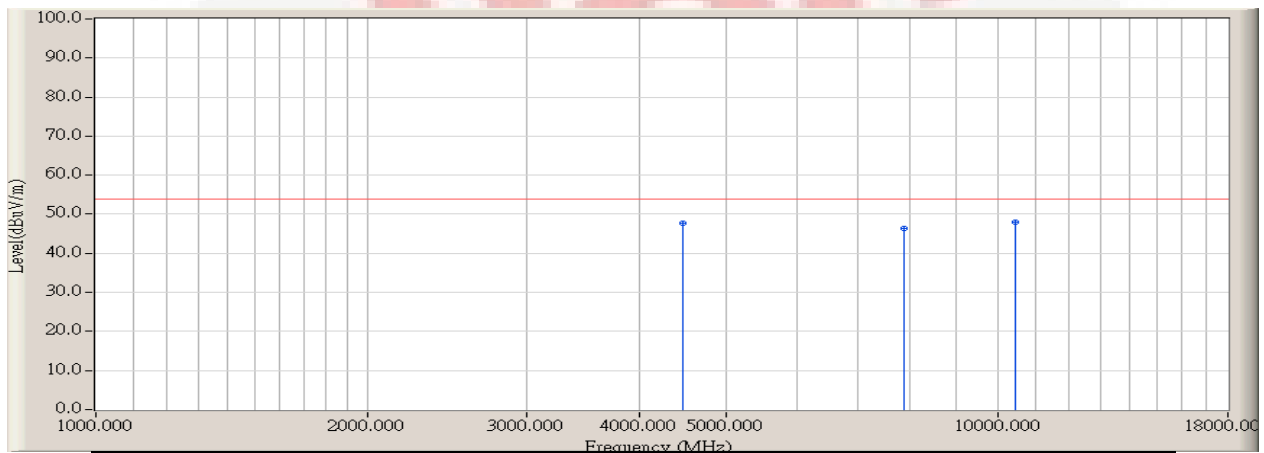
**Radiated Spurious Emission Measurement Result (above 1GHz)**

VERTICAL

Note : Transmit at channel 2441MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	4881.667	3.633	54.755	58.388	-15.582	73.970	PEAK
2	* 7885.000	13.990	38.080	52.070	-21.900	73.970	PEAK
3	10463.333	16.916	38.339	55.256	-18.714	73.970	PEAK



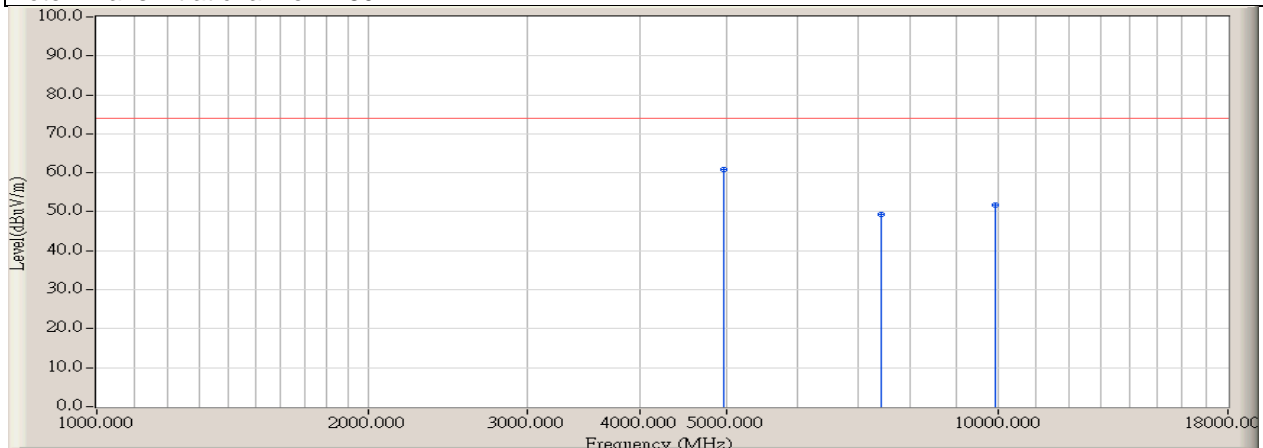
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	4481.667	2.418	45.200	47.618	-6.352	53.970	AVERAGE
2	* 7885.000	13.990	32.500	46.490	-7.480	53.970	AVERAGE
3	10463.330	16.916	31.200	48.117	-5.853	53.970	AVERAGE

**Remark:**

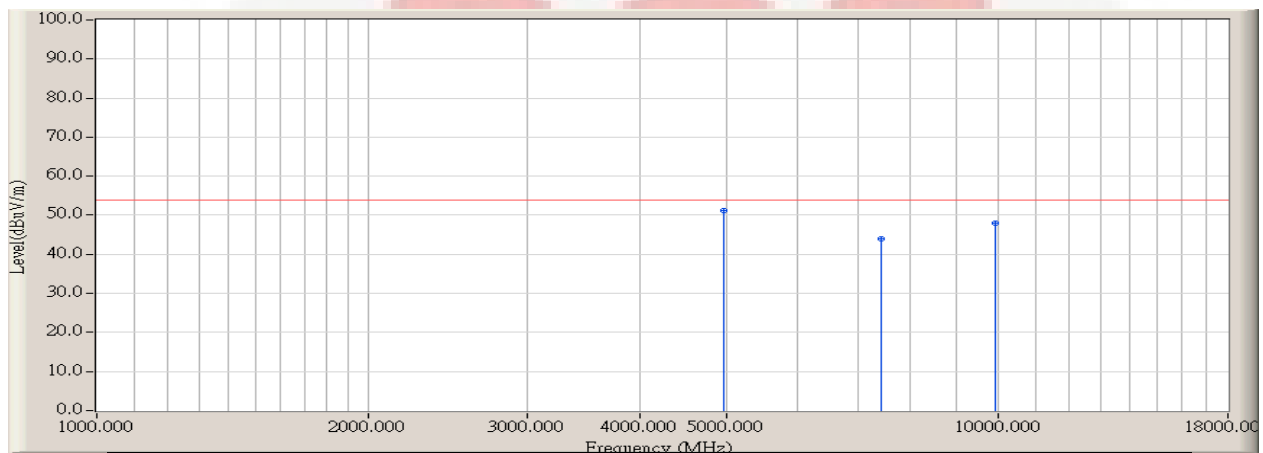
- (1) Measuring frequencies from 1GHz to the 10<sup>th</sup> harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.  
Spectrum AV Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (above 1GHz)****HORIZONTAL**

Note : Transmit at channel 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4966.667	4.073	56.830	60.903	-13.067	73.970	PEAK
2	*	7431.667	11.500	37.820	49.320	-24.650	73.970	PEAK
3		9925.000	15.090	36.696	51.786	-22.184	73.970	PEAK



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4966.667	4.073	47.200	51.273	-2.697	53.970	AVERAGE
2	*	7431.667	11.500	32.400	43.900	-10.070	53.970	AVERAGE
3		9925.000	15.090	32.800	47.890	-6.080	53.970	AVERAGE

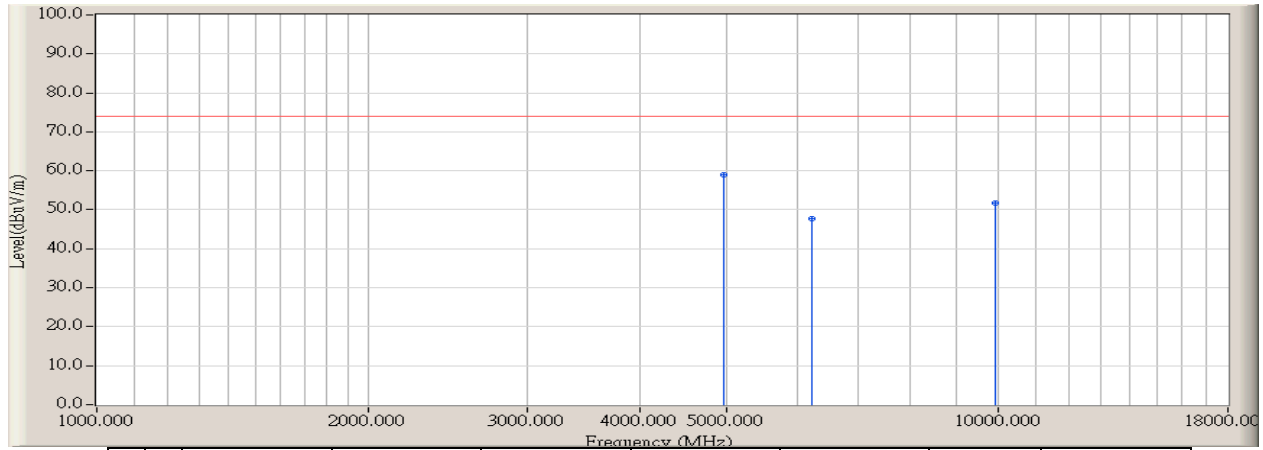
**Remark:**

- (1) Measuring frequencies from 1GHz to the 10<sup>th</sup> harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.  
Spectrum AV Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

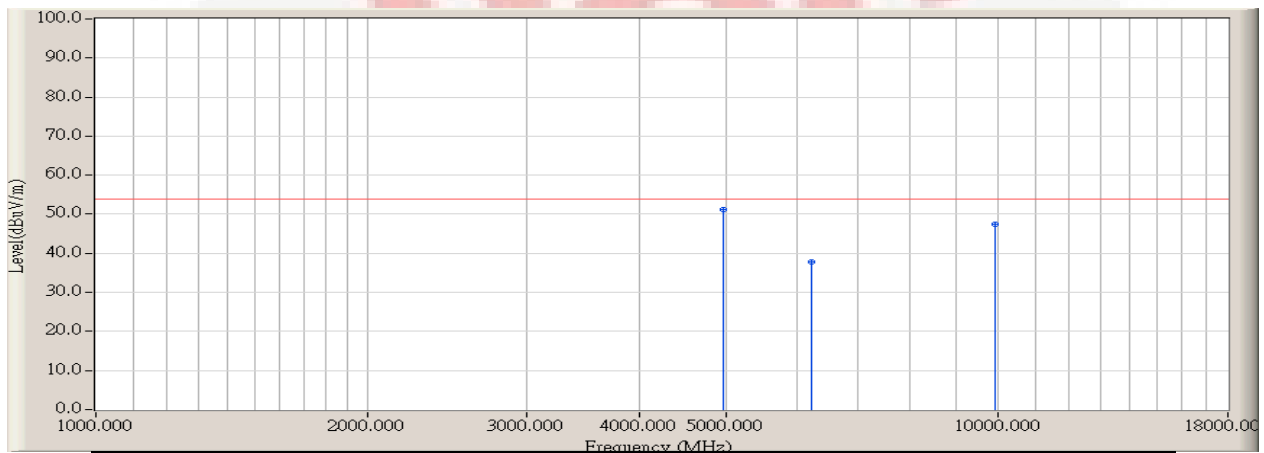
**Radiated Spurious Emission Measurement Result (above 1GHz)**

VERTICAL

Note : Transmit at channel 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4966.667	4.073	54.963	59.036	-14.934	73.970	PEAK
2	*	6213.333	7.690	40.021	47.711	-26.259	73.970	PEAK
3		9925.000	15.090	36.525	51.615	-22.355	73.970	PEAK



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4966.667	4.073	47.200	51.273	-2.697	53.970	AVERAGE
2	*	6213.333	7.690	30.100	37.790	-16.180	53.970	AVERAGE
3		9925.000	15.090	32.400	47.490	-6.480	53.970	AVERAGE

**Remark:**

- (1) Measuring frequencies from 1GHz to the 10<sup>th</sup> harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.  
Spectrum AV Setting: 1GHz- 18GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

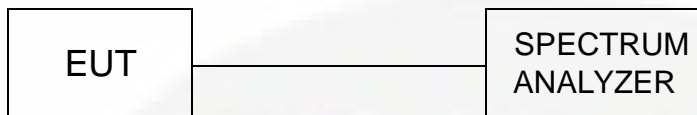
## 7. 20dB BANDWIDTH MEASUREMENT

### 7.1 MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10 KHz VBW=30 KHz. Span=4MHz.
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

**Note:** For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwidth.

### 7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



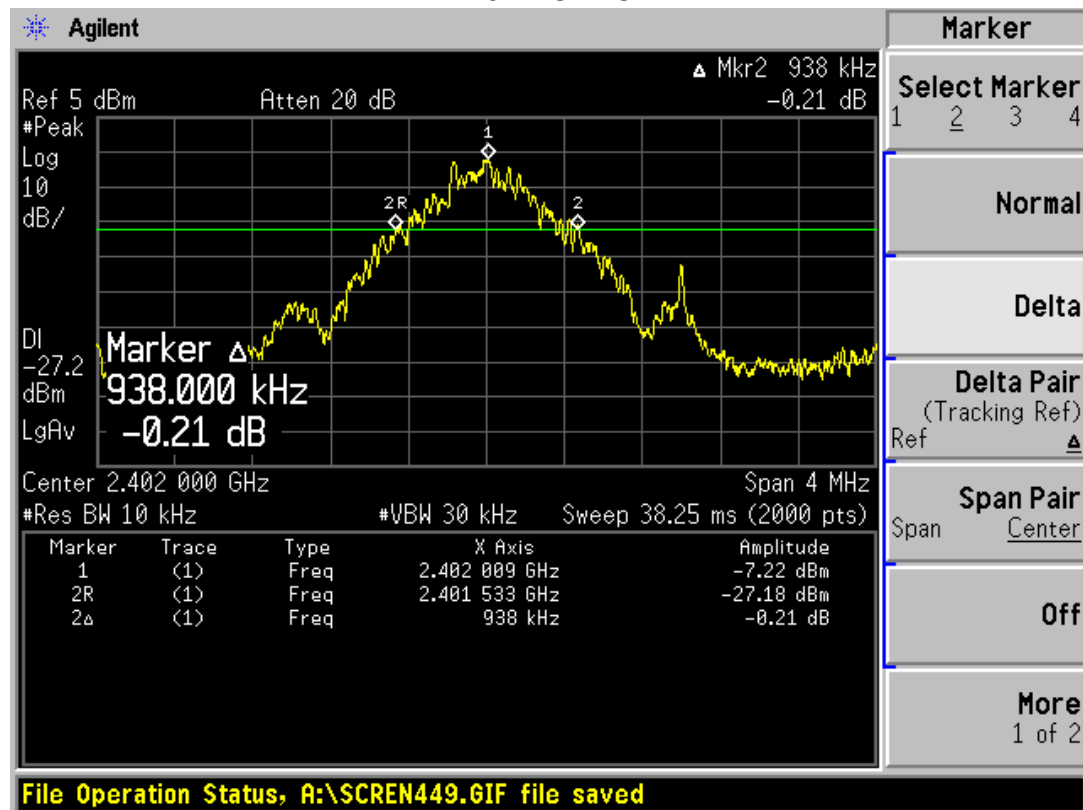
### 7.3 MEASUREMENT EQUIPMENT USED:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Spectrum Analyzer	Agilent	E4408B	MY45102679	2007/11

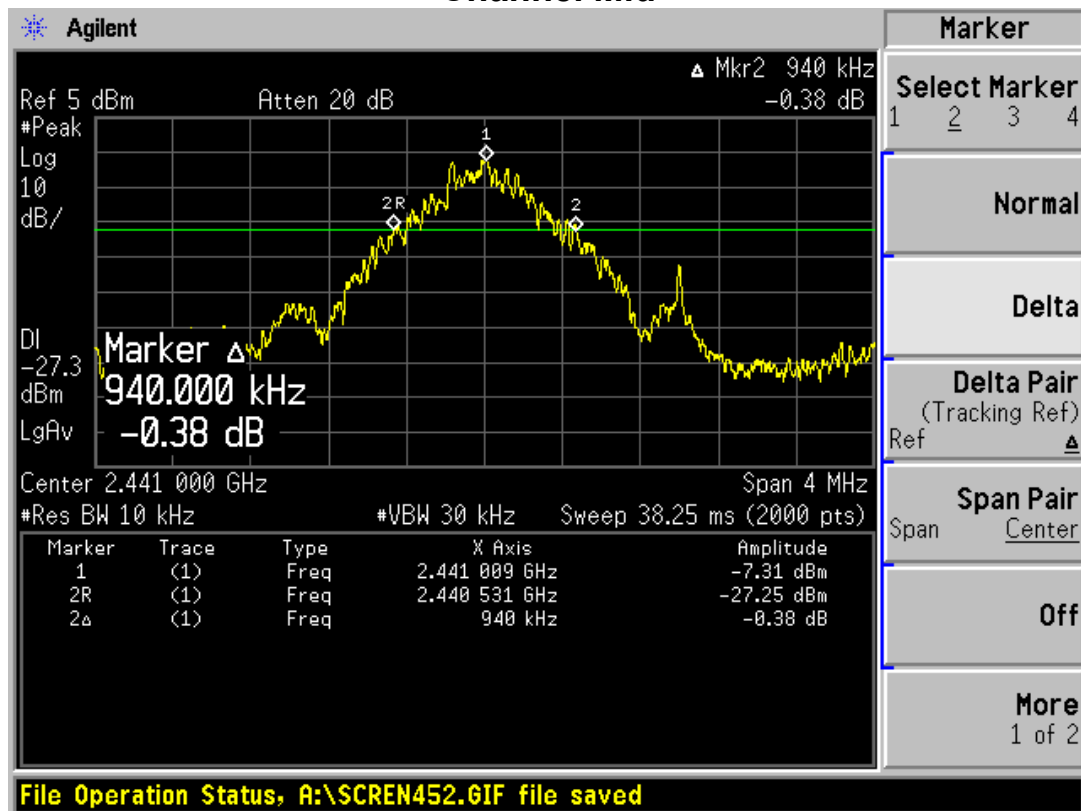
**Note:** Each piece of equipment is scheduled for calibration once a year.

### 7.4 MEASUREMENT RESULTS:

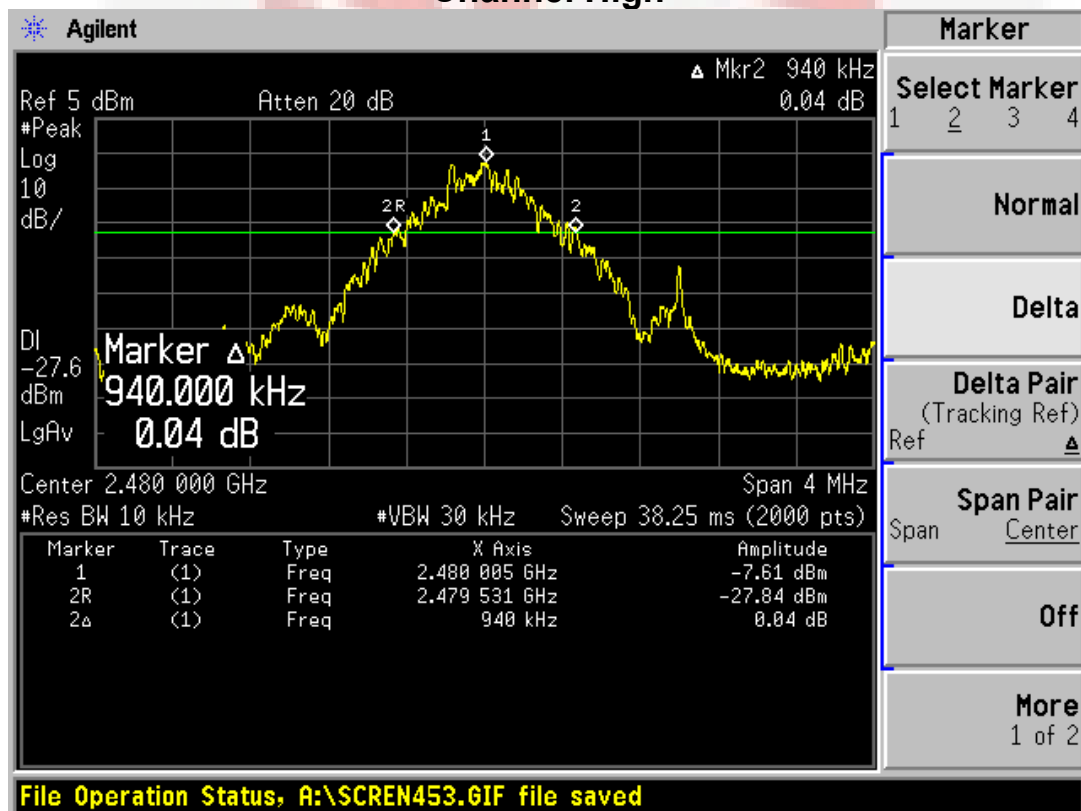
Channel	20 dB Bandwidth (MHz)	Pass / Fail
Lower	0.938	PASS
Mid	0.940	PASS
Higher	0.940	PASS

**20dB Bandwidth Test Plots:****Channel Low**

## Channel Mid



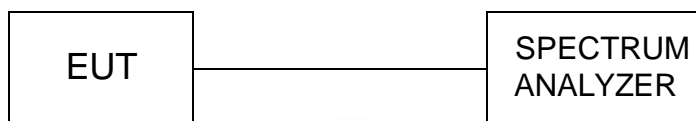
## Channel High





**8. PEAK OUTPUT POWER MEASUREMENT****8.1 MEASUREMENT PROCEDURE**

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=1 MHz, VBW = 3 MHz
4. Repeat above procedures until all frequency measured were complete

**8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)****8.3 MEASUREMENT EQUIPMENT USED:**

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Spectrum Analyzer	Agilent	E4408B	MY45102679	2007/11

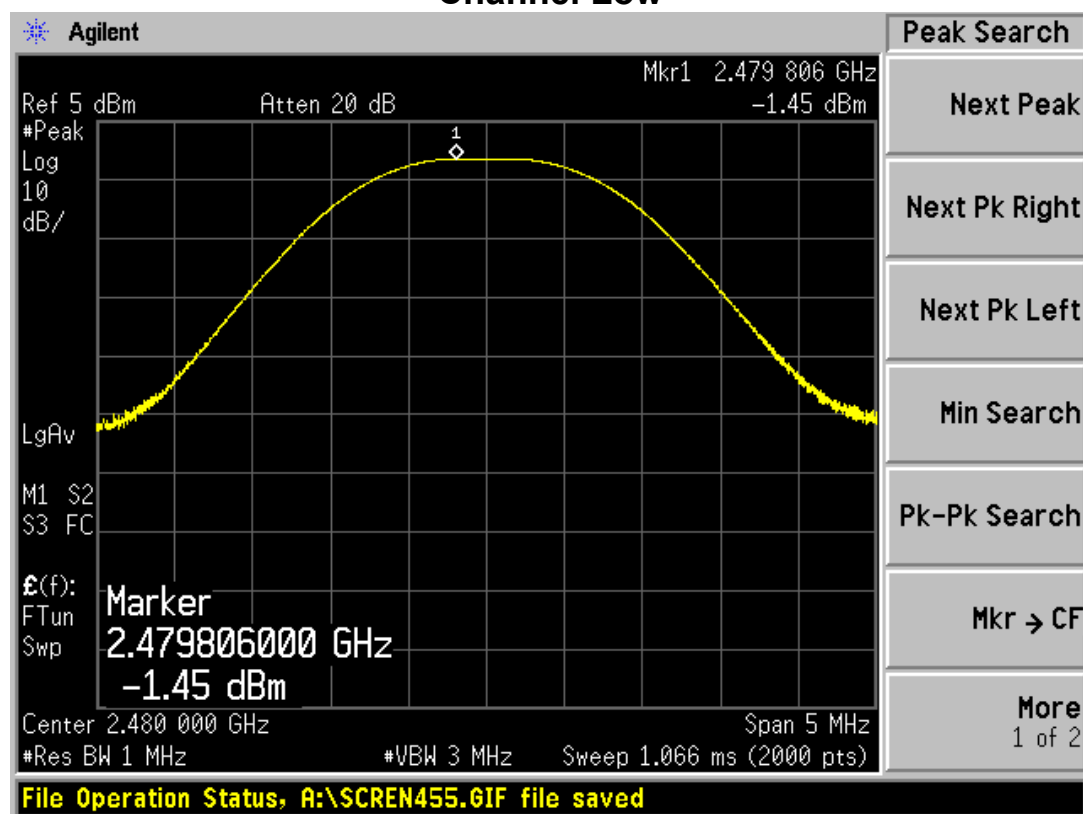
**Note:** Each piece of equipment is scheduled for calibration once a year.

**8.4 LIMITS OF MAXIMUM PEAK OUTPUT POWER**

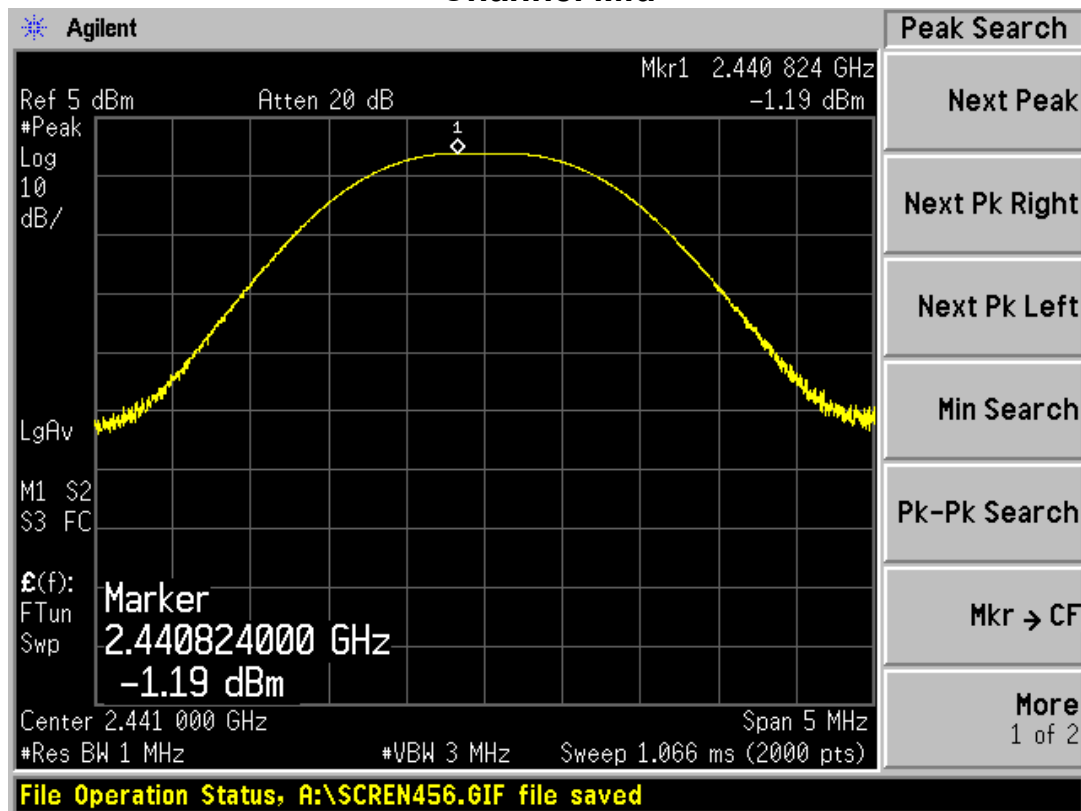
The Peak Output Power Measurement limits are 30dBm.

**8.5 MEASUREMENT RESULTS:**

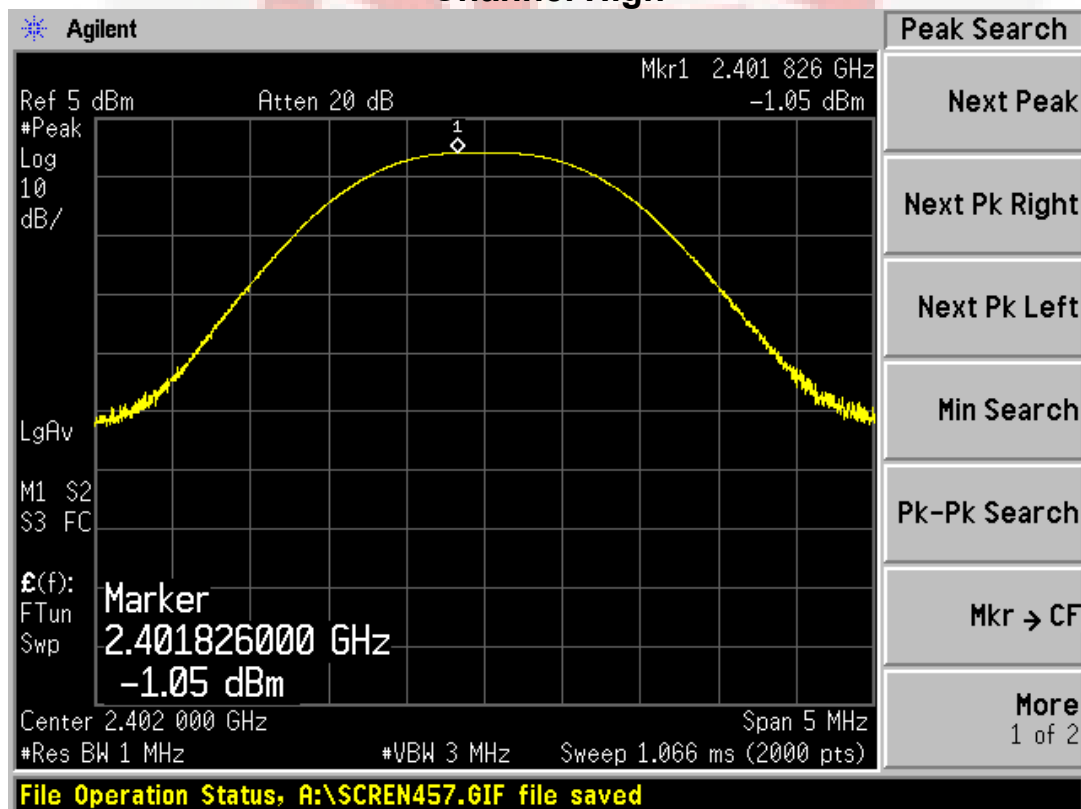
Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
LOW	2402.00	-1.45	30	PASS
MID	2441.00	-1.19	30	PASS
HIGH	2480.00	-1.05	30	PASS

**Photo of Peak Output Power Measurement:****Channel Low**

## Channel Mid



## Channel High



**9. 100 KHz BANDWIDTH OF BAND EDGES MEASUREMENT****9.1 MEASUREMENT PROCEDURE**

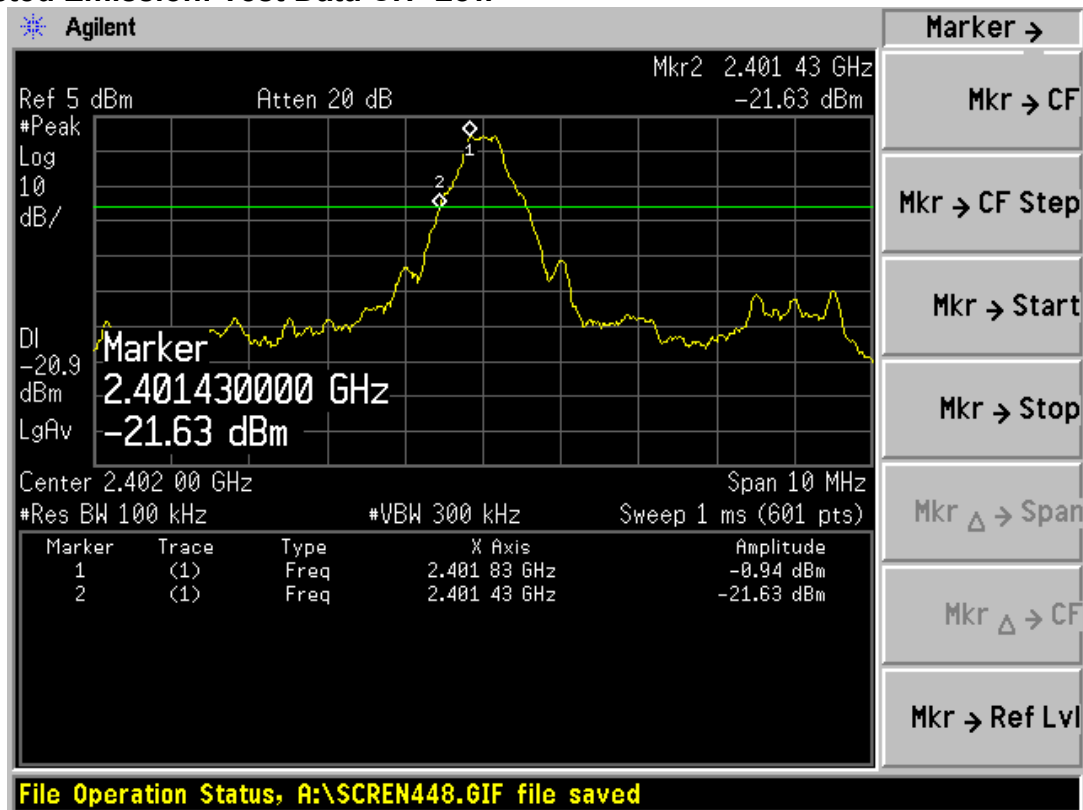
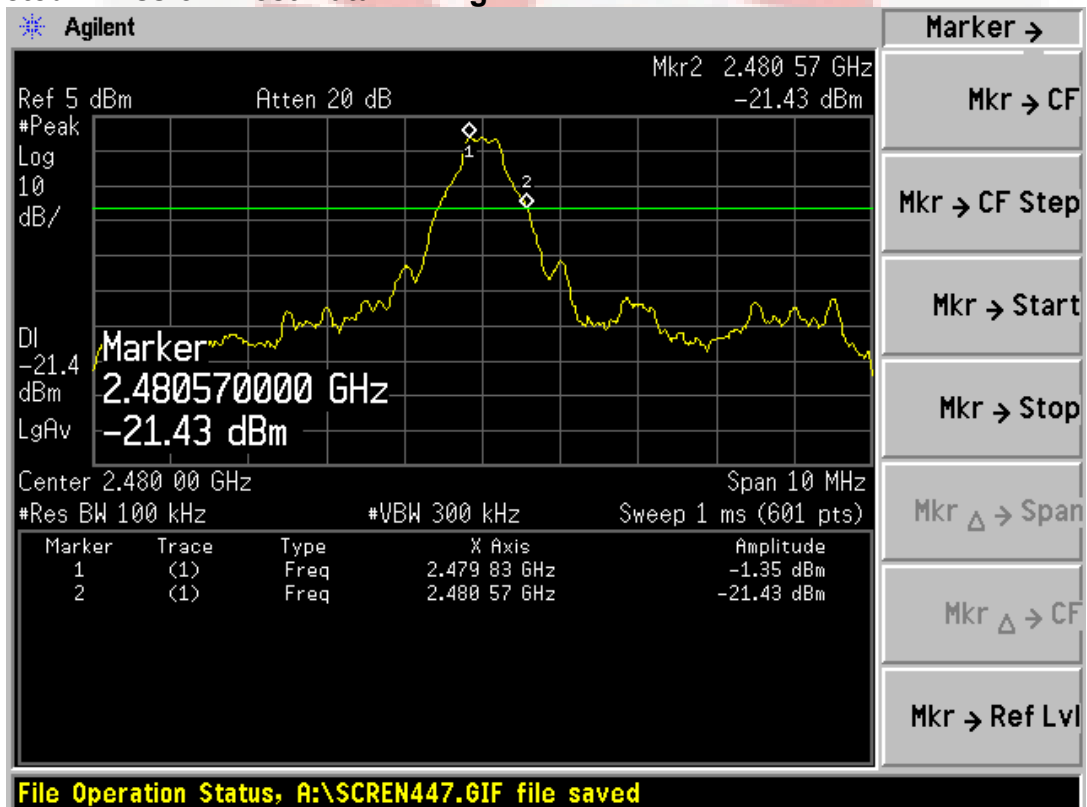
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW, VBW=100 KHz. Span=25MHz, Sweep=auto
4. Set center frequency of spectrum analyzer = operating frequency.
5. Repeat above procedures until all frequency measured was complete.

**9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)****9.3 MEASUREMENT EQUIPMENT USED:**

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Spectrum Analyzer	Agilent	E4408B	MY45102679	2007/11

**Note:** Each piece of equipment is scheduled for calibration once a year.

**9.4 MEASUREMENT RESULTS:**

**Conducted Emission: Test Data CH- Low****Conducted Emission: Test Data CH-High**

**Radiated Emission:**

Operation Mode : TX CH Low

Fundamental Frequency: 2402 MHz

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2390.0	---					74.00	54.00		Peak
2386.0	---					74.00	54.00		Peak
2384.0	---					74.00	54.00		Peak

Operation Mode TX CH Low  
Fundamental Frequency 2402 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Apr. 06, 2005  
Test By Willis  
Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2390.0	---					74.00	54.00		Peak
2386.0	---					74.00	54.00		Peak
2384.0	---					74.00	54.00		Peak

**Remark :**

- (1) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column .
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Operation Mode: TX CH High

Fundamental Frequency: 2480 MHz

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.6	---	---	---	---	---	74.00	54.00	---	Peak
2484.0	---	---	---	---	---	74.00	54.00	---	Peak
2484.8	---	---	---	---	---	74.00	54.00	---	Peak

Operation Mode TX CH High  
Fundamental Frequency 2480 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Apr. 06, 2005  
Test By Willis  
Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.6	---	---	---	---	---	74.00	54.00	---	Peak
2484.0	---	---	---	---	---	74.00	54.00	---	Peak
2484.8	---	---	---	---	---	74.00	54.00	---	Peak

## Remark :

- (1) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

## 10. FREQUENCY SEPARATION

### 10.1 MEASUREMENT PROCEDURE:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100 KHz, VBW=300 KHz. Span=10 MHz
4. Set center frequency of spectrum analyzer = middle of hopping channel.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

### 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in Section 9.2.

### 10.3 MEASUREMENT EQUIPMENT USED:

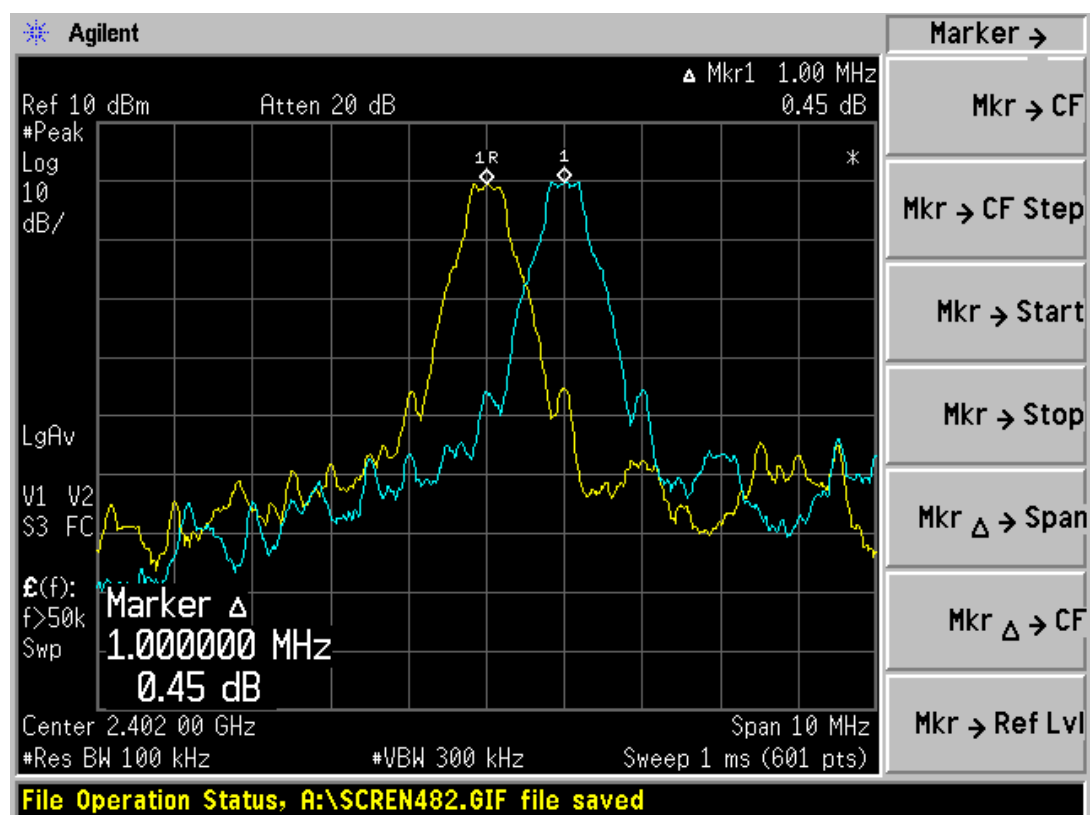
The same as described in Section 9.3

### 10.4 LIMITS AND MEASUREMENT RESULT:

Limits and Measurement Result Of Channel Separation		
Applicable Limits	Measurement Result	
	Test Data	Criteria
Per 15.247 (a)(1) At least 25 KHz or 20 dB bandwidth of the hopping Channel, whichever is greater	1 MHz	PASS



## Frequency Separation Test Data



## 11. NUMBER OF HOPPING FREQUENCY

### 11.1 MEASUREMENT PROCEDURE:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer Start=2400MHz, Stop=2483.5MHz, Sweep=auto.
4. Set the spectrum analyzer as RBW, VBW=100 KHz.
5. Max hold. view and count how many channel in the band.

### 11.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

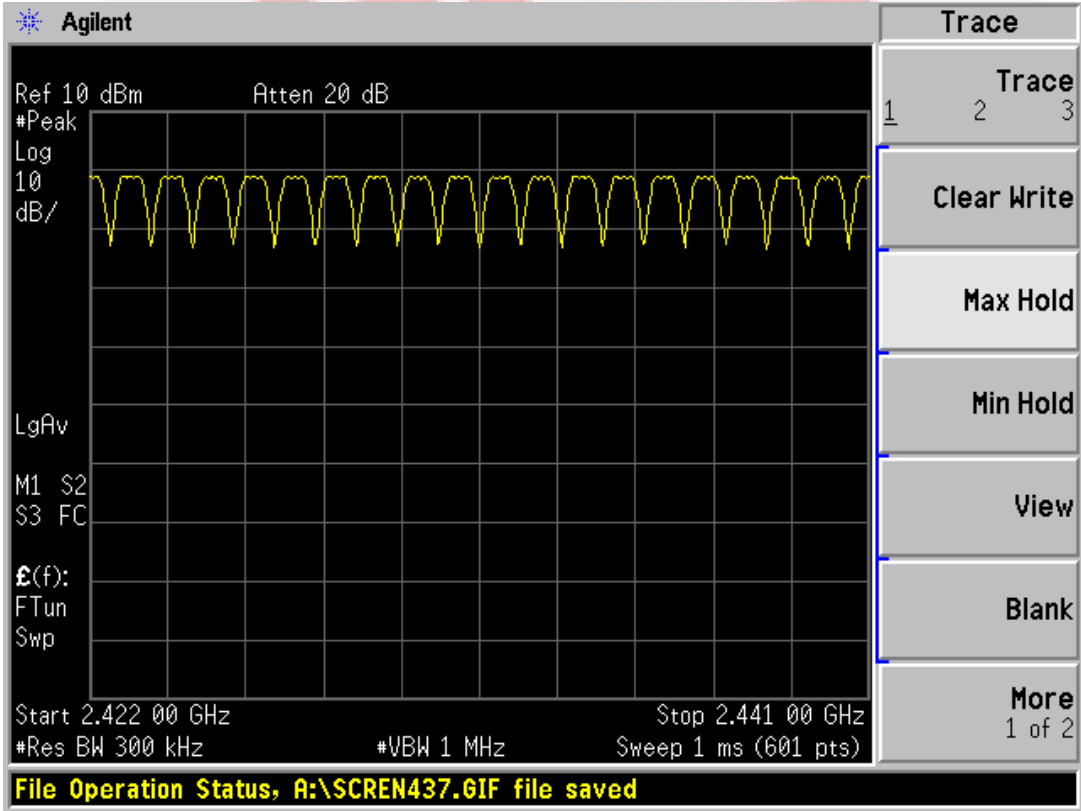
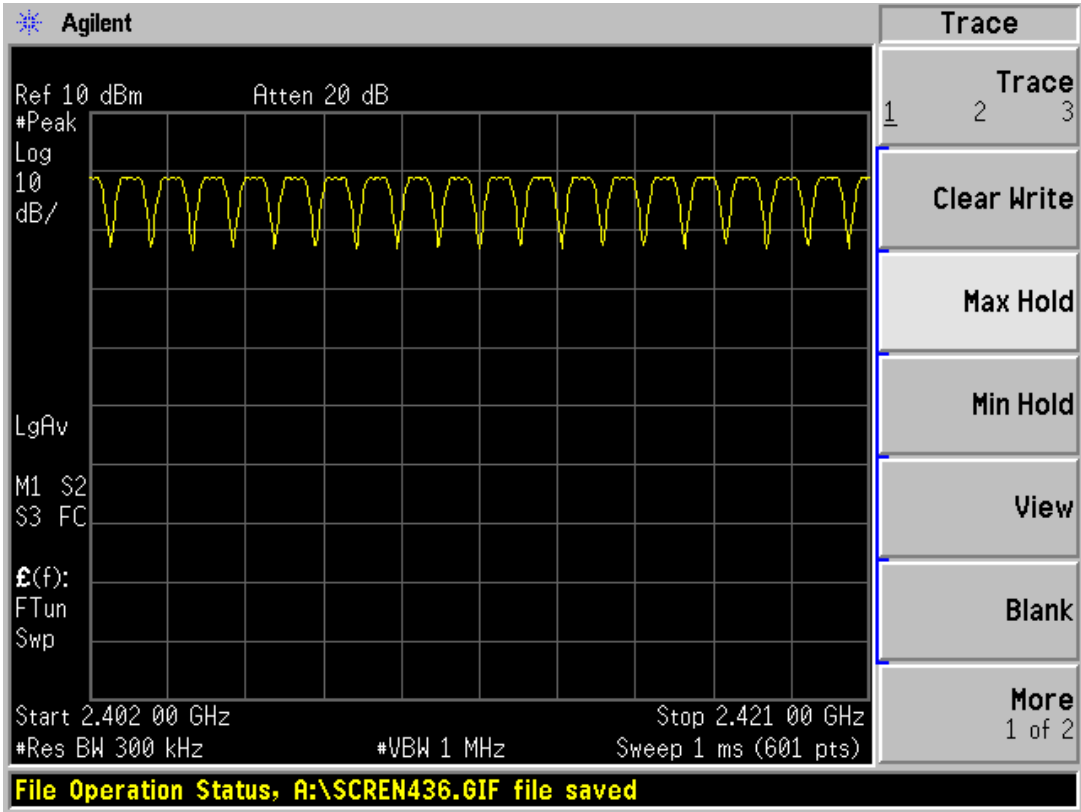
The same as described in Section 9.2.

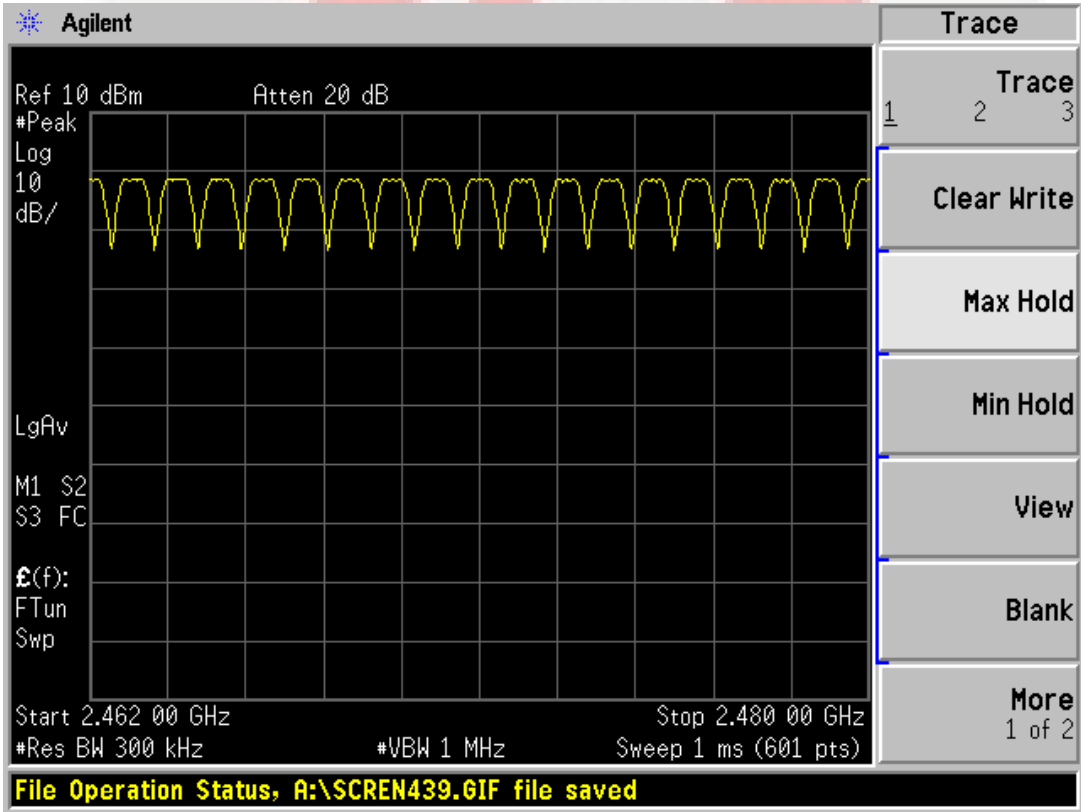
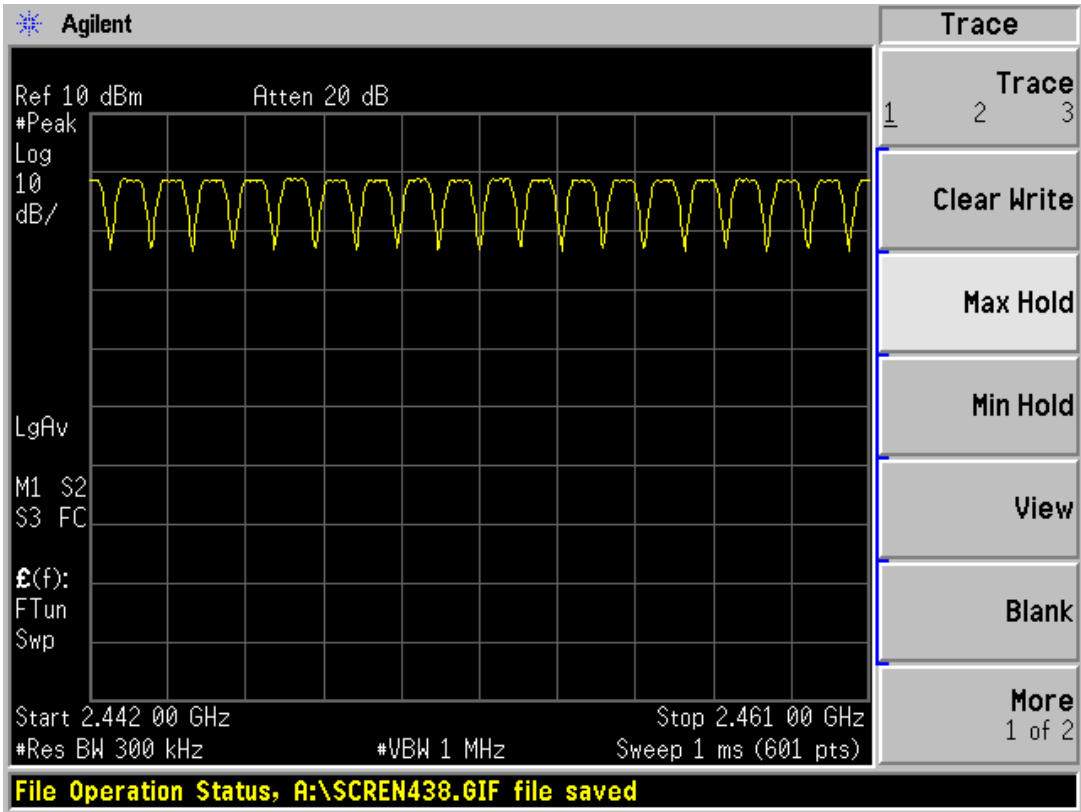
### 11.3 MEASUREMENT EQUIPMENT USED:

The same as described in Section 9.3

### 11.4 LIMITS AND MEASUREMENT RESULT:

Limits and Measurement Result Of Hopping Channel		
Applicable Limits	Measurement Result	
	Test Data	Criteria
Per 15.247 (a)(1)(iii) At least 15 hopping Frequencies	Total 79 Channels	PASS





## 12. DWELL TIME

### 12.1 MEASUREMENT PROCEDURE:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW =1 MHz , VBW =3 MHz. Span=0Hz,
4. Set center frequency of spectrum analyzer = operating frequency.
5. Repeat above procedures until all frequency measured was complete.

### 12.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in Section 9.2.

### 12.3 MEASUREMENT EQUIPMENT USED:

The same as described in Section 9.3

### 12.4 LIMITS AND MEASUREMENT RESULT:

A period time = 0.4 (ms) \* 79 = 31.6 (s)

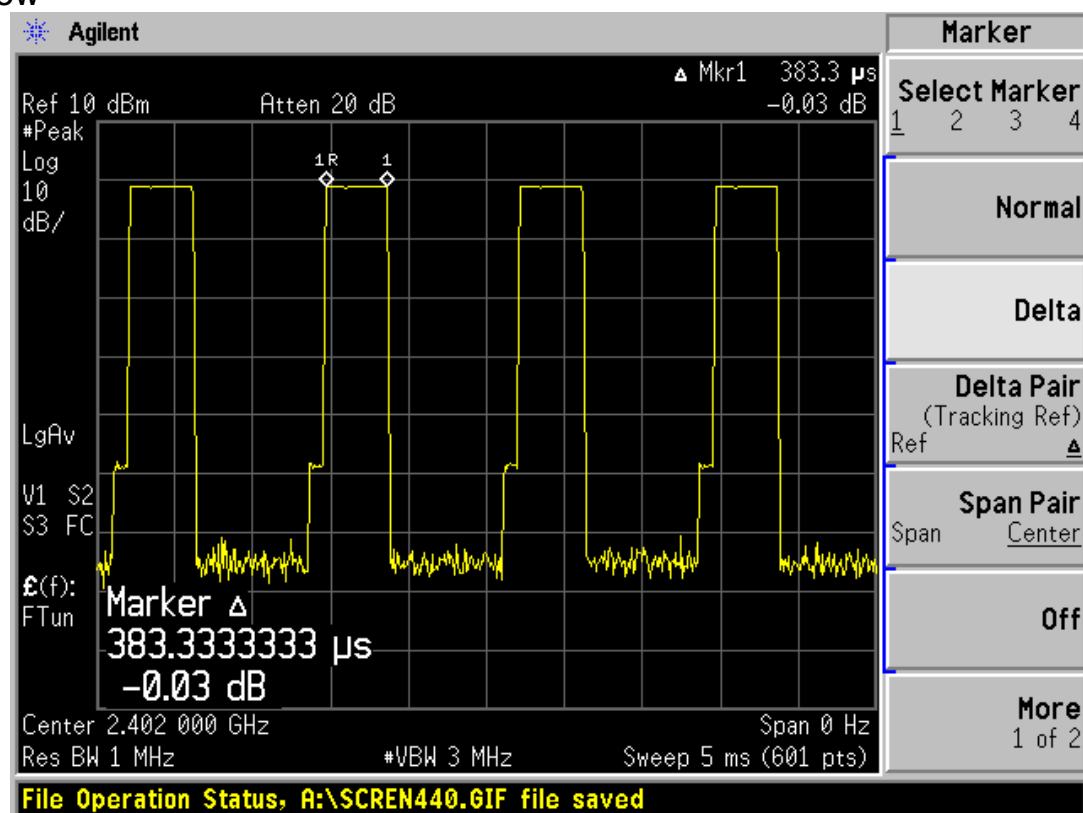
CH Low: Dwell time = 0.383 (ms) \* (1600/ (2\*79))\*31.6 = 122.56 (ms)

CH Mid: Dwell time = 0.392 (ms) \* (1600/ (2\*79))\*31.6 = 125.44 (ms)

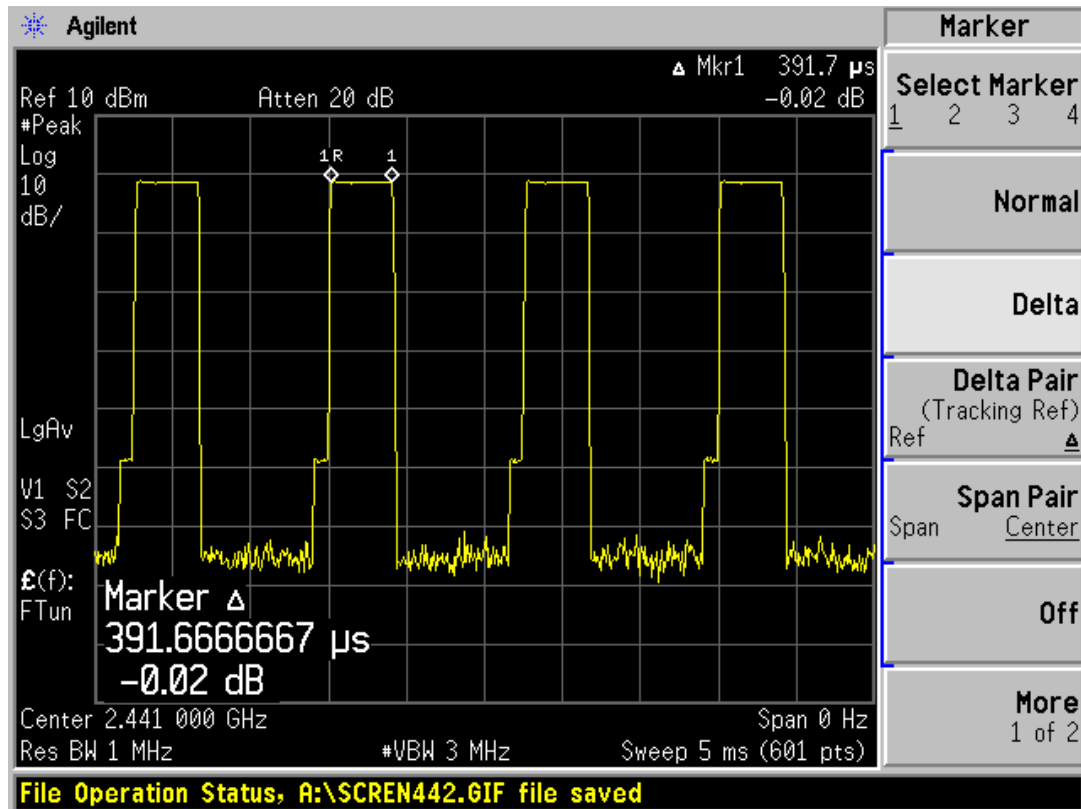
CH High: Dwell time = 0.392 (ms) \* (1600/ (2\*79))\*31.6 = 125.44 (ms)

## Dwell Time Test Data

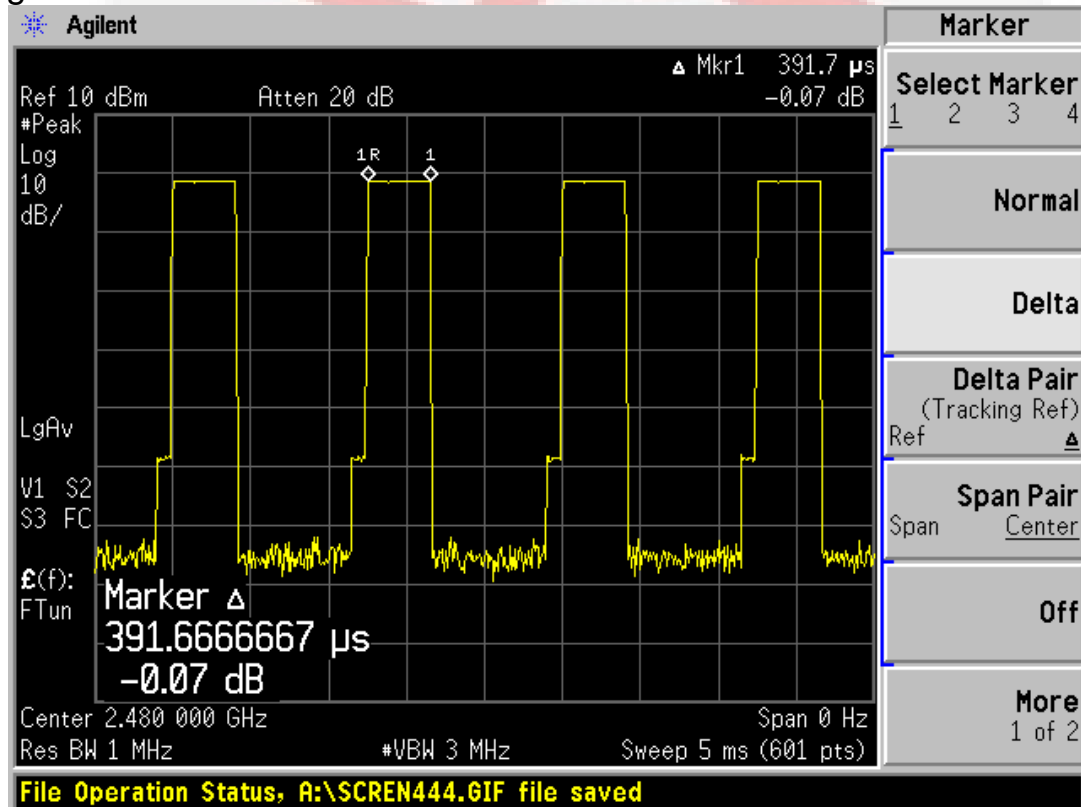
## CH-Low



## CH-Mid



## CH-High



## **13. ANTENNA REQUIREMENT**

### **13.1 Standard Applicable**

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

And according to § 15.247 (4)(1), system operation in the 2400-2483.5 MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

### **13.2 Antenna Connected Construction**

The directional gains of antenna used for transmitting is -1.48 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.





## 14. RF EXPOSURE

### 14.1 Standard Applicable

According to §1.1307 (b)(1), system operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Portable device.

### 14.2 Measurement Result

This is a portable device and the Max peak output power is -1.05dBm (0.785 mW) lower than low threshold 60/fGHz mW (24.48 mW),  $d < 2.5\text{cm}$  in general population category.

The SAR measurement is not necessary.

SCS