



# FCC Part 15C Test Report

## FCC ID: 2ABSMSAFR

Product Name:	SAFR
Trademark:	SenseGiz
Model Name :	V1.0
Prepared For :	SenseGiz Technologies Pvt Ltd
Address :	CTS-11, Flat No:8,3rd Floor, Aashraya Empire,Khanapur Road, Tilakwadi, Belgaum, 590006, India
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
Address :	No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	Jul. 27–Aug. 08, 2016
Date of Report :	Aug. 09, 2016
Report No.:	BCTC-160709314E



## TEST RESULT CERTIFICATION

**Applicant's name** ..... : SenseGiz Technologies Pvt Ltd

Address ..... : CTS-11, Flat No:8,3rd Floor, Aashraya Empire,Khanapur Road, Tilakwadi, Belgaum, 590006, India

**Manufacturer's Name** ..... : Kaynes Technologies India Pvt Ltd

Address ..... : Plot No.339. Hebbal Industrial Area, Hebbal, Mysore, 570016, India

**Product description**

Product name ..... : SAFR

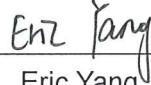
Model and/or type reference : V1.0

**Standards** ..... : FCC Part15.247

Test procedure ..... ANSI C63.10-2013

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Testing Engineer :   
Eric Yang

Reviewer (Supervisor) :   
Jade Yang

Approved & Authorized Signer(Manager) : 

**Table of Contents**

	<b>Page</b>
<b>1 . SUMMARY OF TEST RESULTS</b>	<b>5</b>
<b>1.1 TEST FACILITY</b>	6
<b>1.2 MEASUREMENT UNCERTAINTY</b>	6
<b>2 . GENERAL INFORMATION</b>	<b>7</b>
<b>2.1 GENERAL DESCRIPTION OF EUT</b>	7
<b>2.2 DESCRIPTION OF TEST MODES</b>	8
<b>2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED</b>	9
<b>2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)</b>	9
<b>2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS</b>	10
<b>3 . EMC EMISSION TEST</b>	<b>11</b>
<b>3.1 CONDUCTED EMISSION MEASUREMENT</b>	11
<b>3.1.1 POWER LINE CONDUCTED EMISSION LIMITS</b>	11
<b>3.1.2 TEST PROCEDURE</b>	11
<b>3.1.3 DEVIATION FROM TEST STANDARD</b>	11
<b>3.1.4 TEST SETUP</b>	12
<b>3.1.5 EUT OPERATING CONDITIONS</b>	12
<b>3.1.6 TEST RESULTS</b>	12
<b>3.2 RADIATED EMISSION MEASUREMENT</b>	15
<b>3.2.1 RADIATED EMISSION LIMITS</b>	15
<b>3.2.2 TEST PROCEDURE</b>	16
<b>3.2.3 DEVIATION FROM TEST STANDARD</b>	16
<b>3.2.4 TEST SETUP</b>	16
<b>3.2.5 EUT OPERATING CONDITIONS</b>	17
<b>3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)</b>	18
<b>3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)</b>	19
<b>3.2.8 TEST RESULTS (1GHZ~25GHZ)</b>	21
<b>3.3 RADIATED BAND EMISSION MEASUREMENT</b>	22
<b>3.3.1 TEST REQUIREMENT:</b>	22
<b>3.3.2 TEST PROCEDURE</b>	22
<b>3.3.3 DEVIATION FROM TEST STANDARD</b>	23
<b>3.3.4 TEST SETUP</b>	23
<b>3.3.5 EUT OPERATING CONDITIONS</b>	23
<b>4 . POWER SPECTRAL DENSITY TEST</b>	<b>25</b>

**Table of Contents**

	<b>Page</b>
<b>4.1 APPLIED PROCEDURES / LIMIT</b>	<b>25</b>
<b>4.1.1 TEST PROCEDURE</b>	25
<b>4.1.2 DEVIATION FROM STANDARD</b>	25
<b>4.1.3 TEST SETUP</b>	25
<b>4.1.4 EUT OPERATION CONDITIONS</b>	25
<b>4.1.5 TEST RESULTS</b>	26
<b>5 . BANDWIDTH TEST</b>	<b>28</b>
<b>5.1 APPLIED PROCEDURES / LIMIT</b>	28
<b>5.1.1 TEST PROCEDURE</b>	28
<b>5.1.2 DEVIATION FROM STANDARD</b>	28
<b>5.1.3 TEST SETUP</b>	28
<b>5.1.4 EUT OPERATION CONDITIONS</b>	28
<b>5.1.5 TEST RESULTS</b>	29
<b>6 . PEAK OUTPUT POWER TEST</b>	<b>31</b>
<b>6.1 APPLIED PROCEDURES / LIMIT</b>	31
<b>6.1.1 TEST PROCEDURE</b>	31
<b>6.1.2 DEVIATION FROM STANDARD</b>	31
<b>6.1.3 TEST SETUP</b>	31
<b>6.1.4 EUT OPERATION CONDITIONS</b>	31
<b>6.1.5 TEST RESULTS</b>	32
<b>7 . BAND EDGE</b>	<b>33</b>
<b>7.1 DEVIATION FROM STANDARD</b>	33
<b>7.2 TEST SETUP</b>	33
<b>7.3 EUT OPERATION CONDITIONS</b>	34
<b>7.4 TEST RESULTS</b>	34
<b>8 . ANTENNA REQUIREMENT</b>	<b>35</b>
<b>8.1 STANDARD REQUIREMENT</b>	35
<b>8.2 EUT ANTENNA</b>	35
<b>9 . TEST SEUUP PHOTO</b>	<b>36</b>
<b>10 . EUT PHOTO</b>	<b>38</b>



## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

<b>FCC Part15 (15.247) , Subpart C KBD 558074 D01 DTS Meas Guidance v03r05</b>			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Restricted Band of Operation	PASS	
15.247 (d)	Band Edge (Out of Band Emissions)	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report



## 1.1 TEST FACILITY

Shenzhen BCTC Technology Co., Ltd.

Add. : No.101, Yousong Road, Longhua New District, Shenzhen, China

FCC Registered No.: 187086

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$  , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$  , providing a level of confidence of approximately **95 %** .

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	SAFR	
Trade Name	SenseGiz	
Model Name	V1.0	
Model Difference	N/A	
Product Description	The EUT is a SAFR	
	Operation Frequency:	2402~2480 MHz
	Modulation Type:	GFSK
	Bit Rate of Transmitter	1Mbps
	Number Of Channel	40 CH
	Antenna type:	chip antenna
	Antenna Gain (dBi)	0.9dBi
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.		
Channel List	Please refer to the Note 2.	
Power	DC 3.7V DC 5V from USB	
hardware version	--	
Software version	--	
Serial number	--	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	20	2440		
02	2404	21	2442		
~	~	~	~		
9	2418	39	2478		
10	2420	40	2480		



## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH01
Mode 2	CH20
Mode 3	CH40
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH20
Mode 3	CH40
Mode 4	Link Mode

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.



## 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Emission Test



Conducted Emission Test



## 2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	SAFR	SenseGiz	V1.0	N/A	EUT
E-2	Adapter (Provide by test lab)	N/A	NBS05B050120VUU		I/P:AC 100~240V 50/60Hz O/P: DC 5V/0.5A

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	0.5m	Mini USB cable

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in «Length» column.



## 2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

### Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	MY45109572	2015.08.25	2016.08.24
2	Test Receiver	R&S	ESPI	101396	2015.08.25	2016.08.24
3	Bilog Antenna	SCHWARZBECK	VULB9160	VULB9160-3369	2015.08.25	2016.08.24
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.07.06	2017.07.05
5	Spectrum Analyzer	Agilent	N9020A	MY5051041	2016.07.06	2017.07.05
6	Horn Antenna	SCHWARZBECK	9120D	9120D-1275	2015.08.25	2016.08.24
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05
8	Amplifier	SCHWARZBECK	BBV9718	9718-270	2015.08.25	2016.08.24
9	Amplifier	SCHWARZBECK	BBV9743	9743-119	2015.08.25	2016.08.24
10	Loop Antenna	ARA	PLV1.030/B	1029	2016.07.06	2017.07.05
11	Power Meter	R&S	NRVS	100696	2016.07.06	2017.07.05
12	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05
13	RF cables	R&S	N/A	N/A	2016.07.06	2017.07.05

### Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-101165-ha	2015.08.25	2016.08.24
2	LISN	R&S	NSLK8126	8126466	2015.08.24	2016.08.23
3	LISN	R&S	NSLK8126	8126487	2015.08.24	2016.08.23
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.08.25	2016.08.24
5	RF cables	R&S	R204	R20X	2015.08.25	2016.08.24



### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

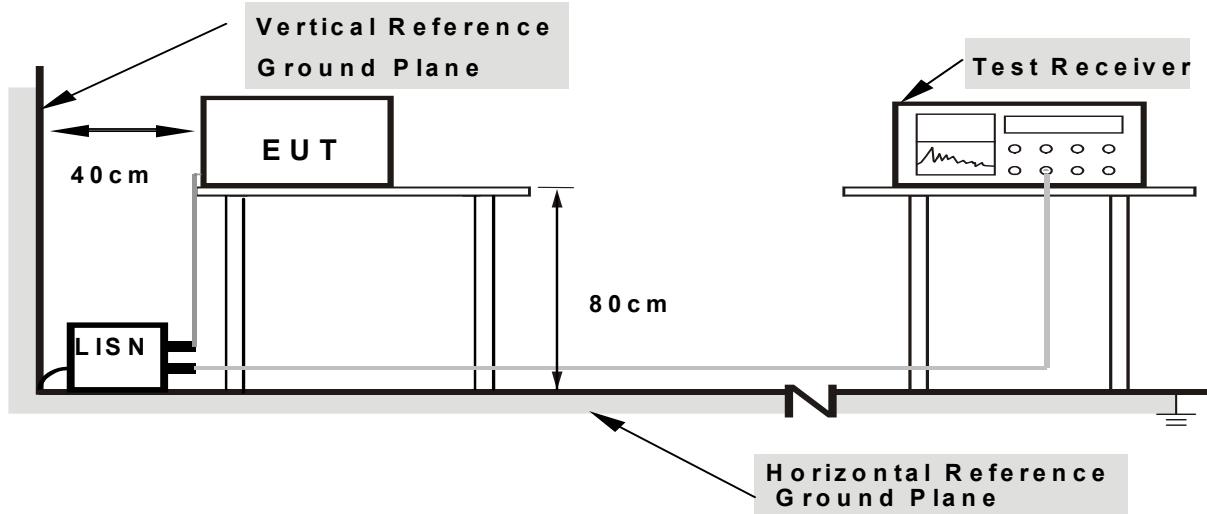
#### 3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 3.1.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.1.4 TEST SETUP



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.5 EUT OPERATING CONDITIONS

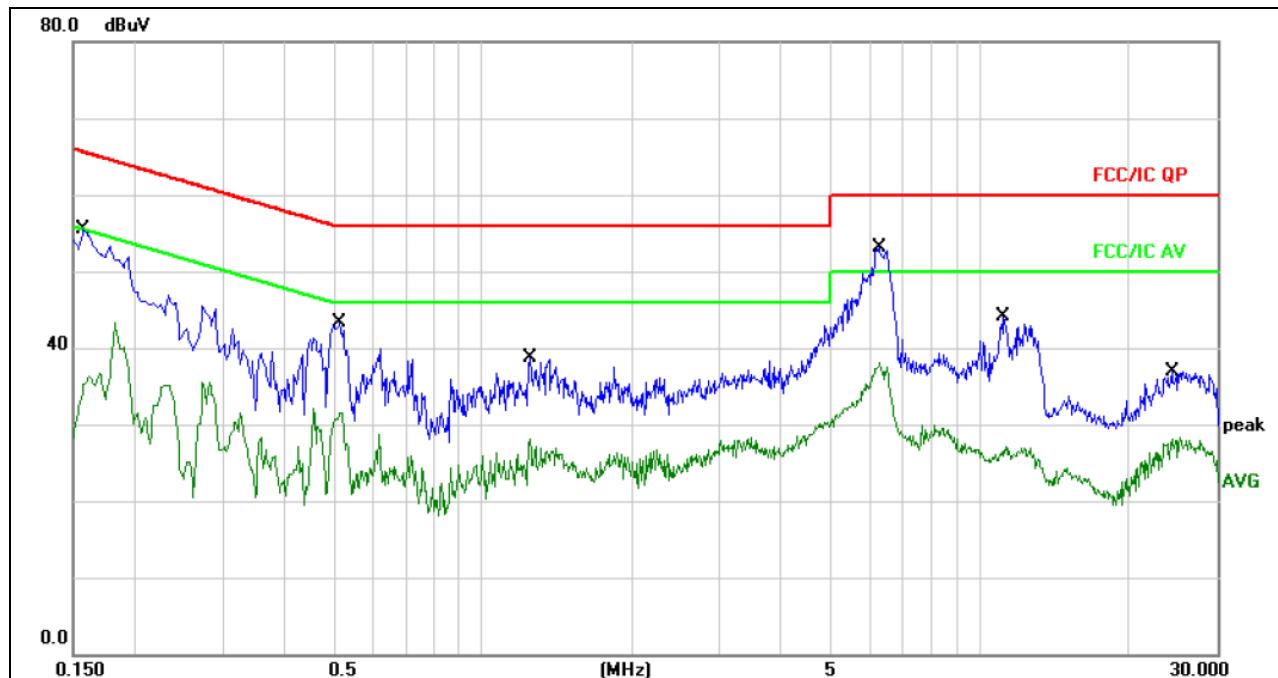
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

### 3.1.6 TEST RESULTS



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 4

**Remark:**

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dB	Over Detector	Comment
1		0.1580	45.51	10.05	55.56	65.56	-10.00	QP
2		0.1580	33.19	10.05	43.24	55.56	-12.32	AVG
3		0.5180	33.10	10.12	43.22	56.00	-12.78	QP
4		0.5180	21.36	10.12	31.48	46.00	-14.52	AVG
5		1.2460	28.40	10.17	38.57	56.00	-17.43	QP
6		1.2460	18.01	10.17	28.18	46.00	-17.82	AVG
7	*	6.2619	43.02	10.09	53.11	60.00	-6.89	QP
8		6.2619	28.00	10.09	38.09	50.00	-11.91	AVG
9		11.1899	34.04	10.13	44.17	60.00	-15.83	QP
10		11.1899	16.99	10.13	27.12	50.00	-22.88	AVG
11		24.3660	26.66	10.19	36.85	60.00	-23.15	QP
12		24.3660	17.99	10.19	28.18	50.00	-21.82	AVG



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 4

**Remark:**

1. All readings are Quasi-Peak and Average values.

2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1740	44.24	10.06	54.30	64.76	-10.46	QP	
2		0.1740	33.07	10.06	43.13	54.76	-11.63	AVG	
3		0.5060	33.52	10.12	43.64	56.00	-12.36	QP	
4		0.5060	22.94	10.12	33.06	46.00	-12.94	AVG	
5		1.2460	29.35	10.17	39.52	56.00	-16.48	QP	
6		1.2460	18.98	10.17	29.15	46.00	-16.85	AVG	
7	*	6.2740	43.81	10.09	53.90	60.00	-6.10	QP	
8		6.2740	28.41	10.09	38.50	50.00	-11.50	AVG	
9		11.2340	34.91	10.13	45.04	60.00	-14.96	QP	
10		11.2340	18.32	10.13	28.45	50.00	-21.55	AVG	
11		25.4460	28.87	10.20	39.07	60.00	-20.93	QP	
12		25.4460	19.99	10.20	30.19	50.00	-19.81	AVG	



### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

### 3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- 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. 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 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre.
- h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

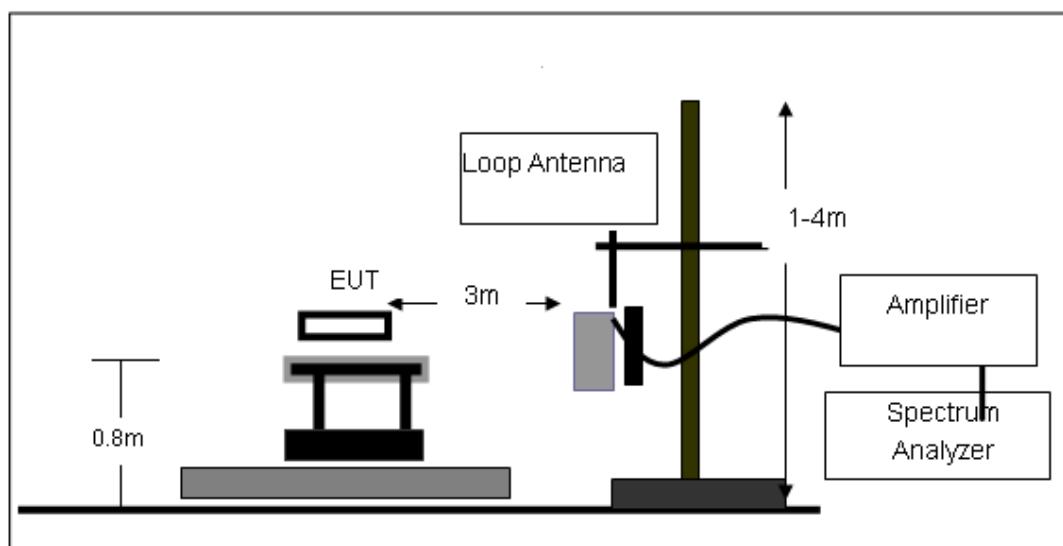
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

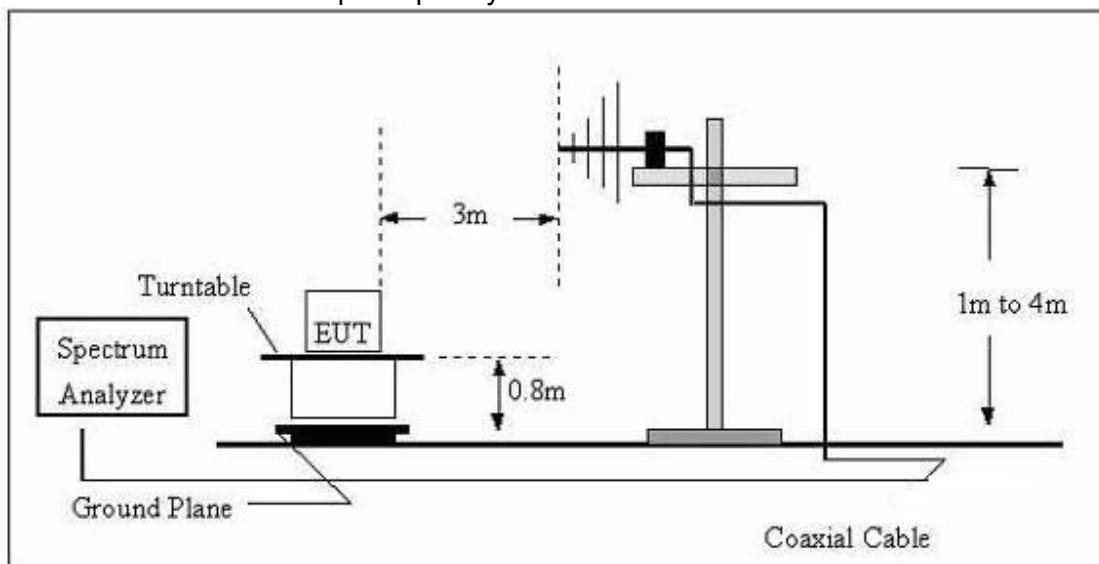
No deviation

### 3.2.4 TEST SETUP

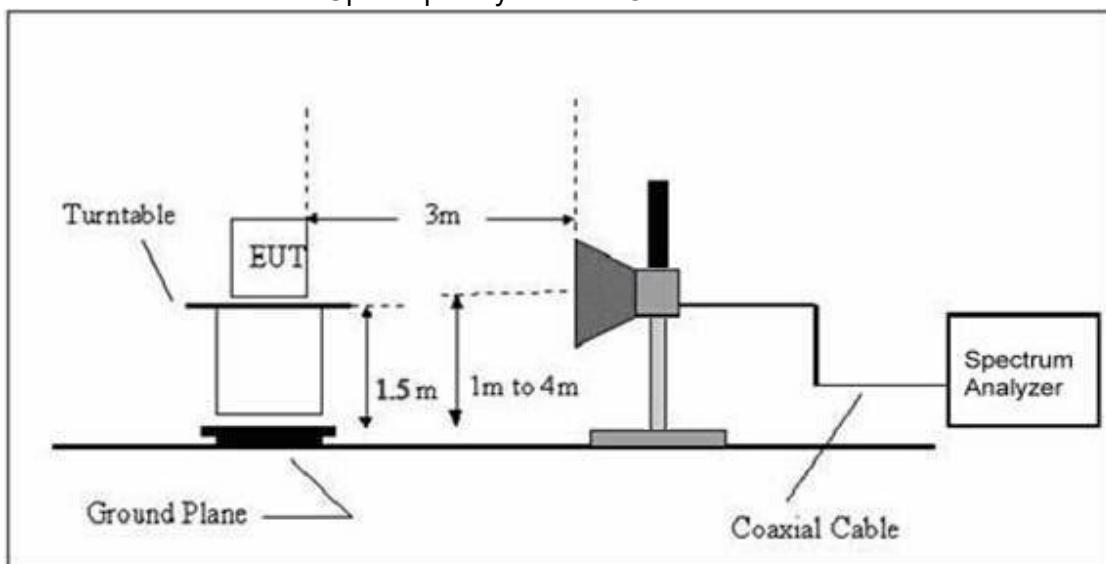
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



### 3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



### 3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT:	SAFR	Model Name. :	V1.0
Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 4	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

**NOTE:**

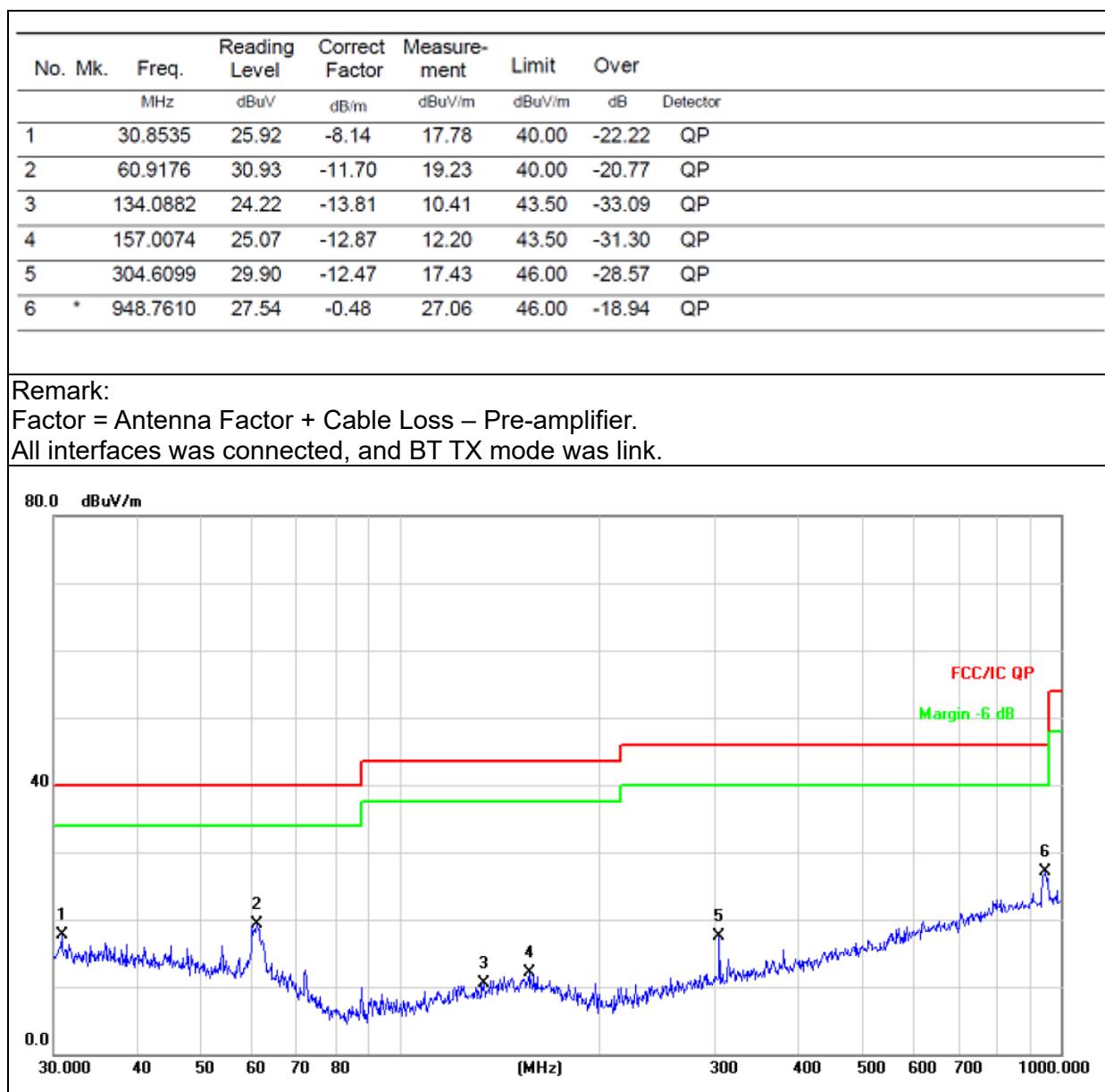
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);  
Limit line = specific limits(dBuV) + distance extrapolation factor.



### 3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	SAFR	Model Name :	V1.0
Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.7V		
Test Mode :	Mode 4		





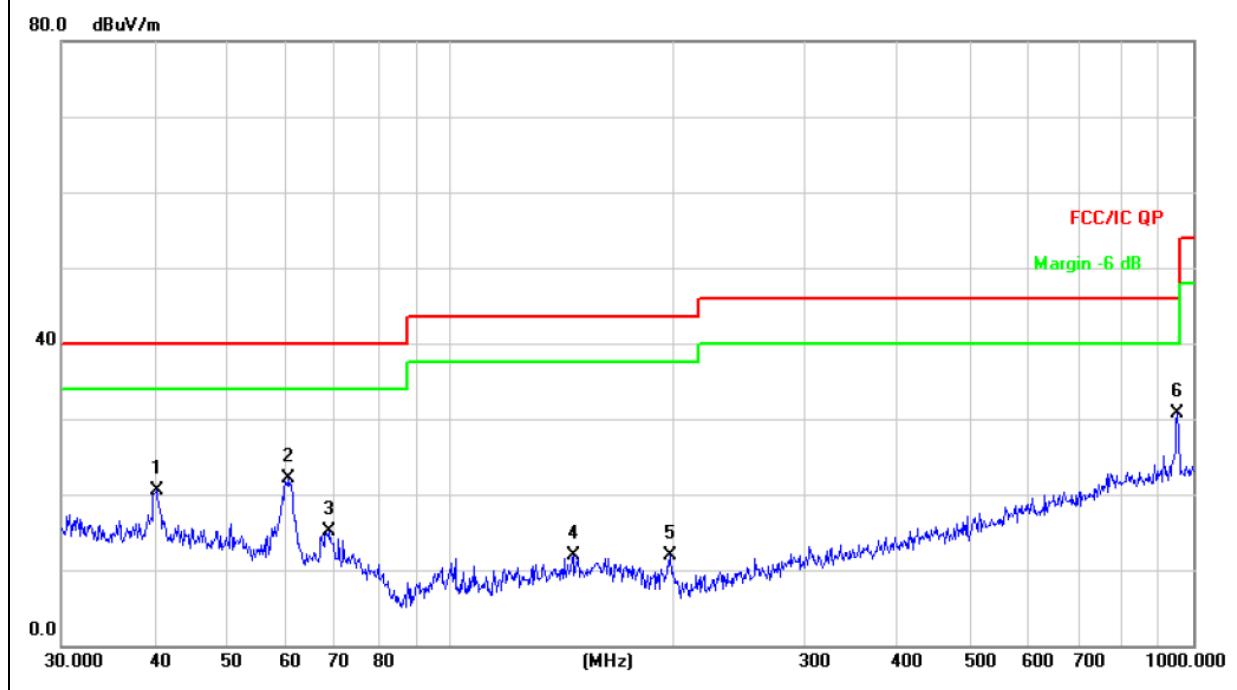
EUT :	SAFR	Model Name :	V1.0
Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 3.7V		
Test Mode :	Mode 4		

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
		MHz	dBuV	dB/m	dBuV/m	dB	Detector
1		40.2757	29.43	-8.89	20.54	40.00	-19.46 QP
2		60.7044	33.71	-11.66	22.05	40.00	-17.95 QP
3		68.8721	29.20	-14.08	15.12	40.00	-24.88 QP
4		146.3735	24.88	-13.05	11.83	43.50	-31.67 QP
5		197.8928	28.02	-16.07	11.95	43.50	-31.55 QP
6	*	952.0937	31.22	-0.46	30.76	46.00	-15.24 QP

**Remark:**

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All interfaces was connected, and BT TX mode was link.



**3.2.8 TEST RESULTS (1GHZ~25GHZ)**

Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable Loss	Amp Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
<b>operation frequency:2402</b>									
V	4804.00	59.81	29.34	4.43	30.26	63.32	74.00	-10.68	PK
V	4804.00	44.96	29.34	4.43	30.26	48.47	54.00	-5.53	AV
V	7206.00	58.45	27.16	6.56	31.42	60.75	74.00	-13.25	PK
V	7206.00	43.82	27.16	6.56	31.42	46.12	54.00	-7.88	AV
V	16130.00	50.24	31.89	10.21	36.87	55.47	74.00	-18.53	PK
H	4804.00	60.67	29.34	4.43	30.26	64.18	74.00	-9.82	PK
H	4804.00	43.84	29.34	4.43	30.26	47.35	54.00	-6.65	AV
H	7206.00	58.17	27.16	6.56	31.42	60.47	74.00	-13.53	PK
H	7206.00	44.11	27.16	6.56	31.42	46.41	54.00	-7.59	AV
H	16130.00	49.97	31.89	10.21	36.87	55.2	74.00	-18.8	PK
<b>operation frequency:2440</b>									
V	4880.00	57.02	29.42	4.74	30.48	60.70	74.00	-13.30	PK
V	4880.00	43.23	29.42	4.74	30.48	46.91	54.00	-7.09	AV
V	7320.00	58.68	27.20	6.78	31.63	61.03	74.00	-12.97	PK
V	7320.00	42.58	27.20	6.78	31.63	44.93	54.00	-9.07	AV
V	16130.00	48.69	31.89	10.21	36.87	53.92	74.00	-20.08	PK
H	4880.00	58.11	29.42	4.74	30.48	61.79	74.00	-12.21	PK
H	4880.00	43.97	29.42	4.74	30.48	47.65	54.00	-6.35	AV
H	7320.00	58.93	27.20	6.78	31.63	61.28	74.00	-12.72	PK
H	7320.00	44.27	27.20	6.78	31.63	46.62	54.00	-7.38	AV
H	16130.00	50.39	31.89	10.21	36.87	55.62	74.00	-18.38	PK
<b>operation frequency:2480</b>									
V	4960.00	58.84	29.51	4.96	30.59	62.72	74.00	-11.28	PK
V	4960.00	44.51	29.51	4.96	30.59	48.39	54.00	-5.61	AV
V	7440.00	59.11	27.24	6.89	31.71	61.53	74.00	-12.47	PK
V	7440.00	43.34	27.24	6.89	31.71	45.76	54.00	-8.24	AV
V	16130.00	50.61	31.89	10.21	36.87	55.84	74.00	-18.16	PK
H	4960.00	58.06	29.51	4.96	30.59	62.94	74.00	-11.06	PK
H	4960.00	44.54	29.51	4.96	30.59	48.42	54.00	-5.58	AV
H	7440.00	58.34	27.24	6.89	31.71	60.76	74.00	-13.24	PK
H	7440.00	42.67	27.24	6.89	31.71	45.09	54.00	-8.91	AV
H	16130.00	50.94	31.89	10.21	36.87	56.17	74.00	-17.83	PK

**Remark:**

1. Emission Level = Meter Reading +Antenna Factor+Cable loss-Amp factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



### 3.3 RADIATED BAND EMISSION MEASUREMENT

#### 3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

#### 3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. 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 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the Highest channel

Note:

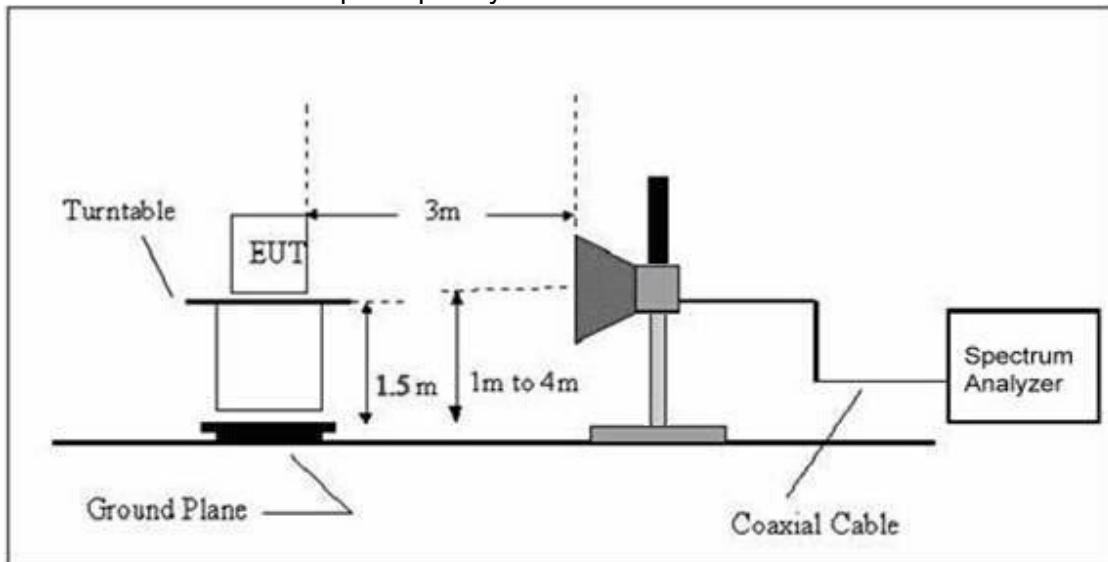
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.3.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



### 3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



### 3.3.6 TEST RESULT

Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable Loss	AMP Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
<b>operation frequency:2402</b>									
V	2390.00	70.30	10.83	1.06	30.04	52.15	74.00	-21.85	PK
V	2390.00	58.60	10.83	1.06	30.04	40.45	54.00	-13.55	AV
V	2400.00	70.48	10.85	1.14	30.09	52.38	74.00	-21.62	PK
V	2400.00	58.13	10.85	1.14	30.09	40.03	54.00	-13.97	AV
H	2390.00	70.60	10.83	1.06	30.04	52.45	74.00	-21.55	PK
H	2390.00	58.63	10.83	1.06	30.04	40.48	54.00	-13.52	AV
H	2400.00	70.43	10.85	1.14	30.09	52.33	74.00	-21.67	PK
H	2400.00	58.54	10.85	1.14	30.09	40.44	54.00	-13.56	AV

Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable Loss	AMP Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
<b>operation frequency:2480</b>									
V	2483.50	70.70	10.83	1.06	30.04	52.55	74.00	-21.45	PK
V	2483.50	59.04	10.83	1.06	30.04	40.89	54.00	-13.11	AV
V	2500.00	70.63	10.85	1.14	30.09	52.53	74.00	-21.47	PK
V	2500.00	58.45	10.85	1.14	30.09	40.35	54.00	-13.65	AV
H	2483.50	70.83	10.83	1.06	30.04	52.68	74.00	-21.32	PK
H	2483.50	59.08	10.83	1.06	30.04	40.93	54.00	-13.07	AV
H	2500.00	70.43	10.85	1.14	30.09	52.33	74.00	-21.67	PK
H	2500.00	59.33	10.85	1.14	30.09	41.23	54.00	-12.77	AV

**Remark:**

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



## 4. POWER SPECTRAL DENSITY TEST

### 4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

#### 4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### 4.1.2 DEVIATION FROM STANDARD

No deviation.

#### 4.1.3 TEST SETUP



#### 4.1.4 EUT OPERATION CONDITIONS

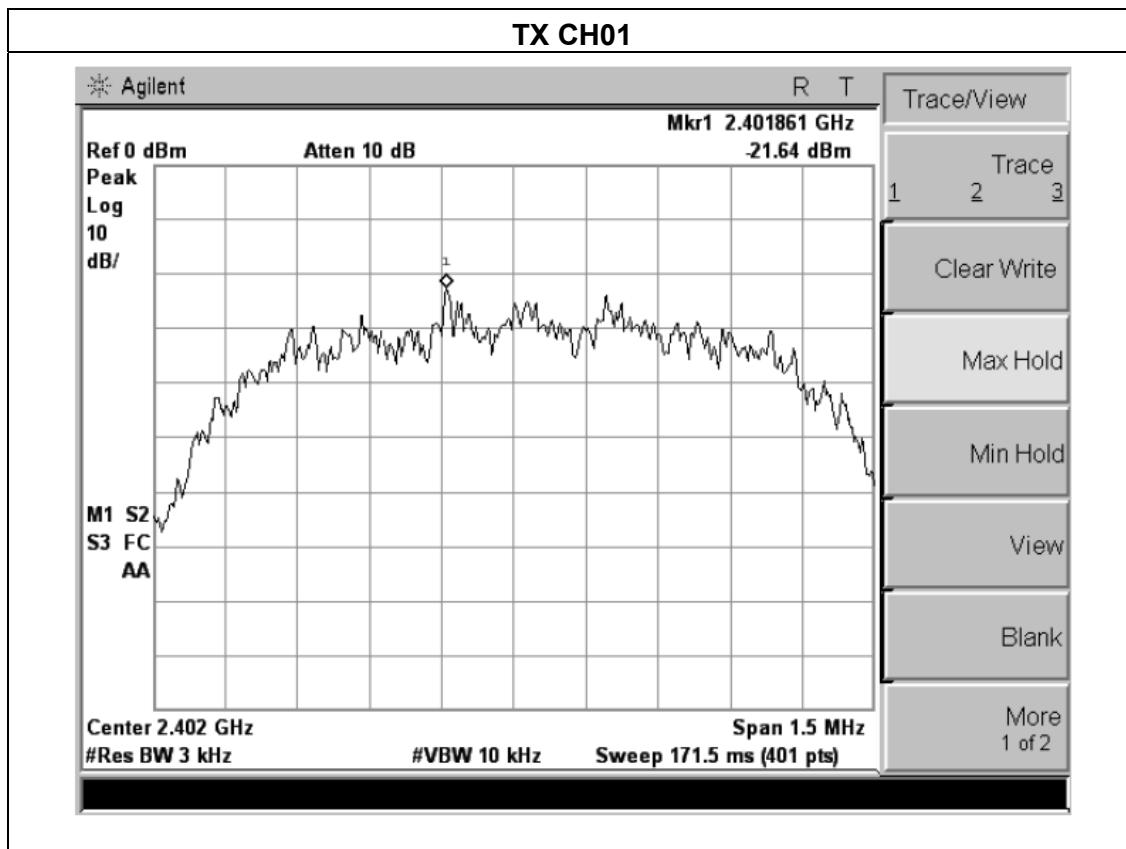
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

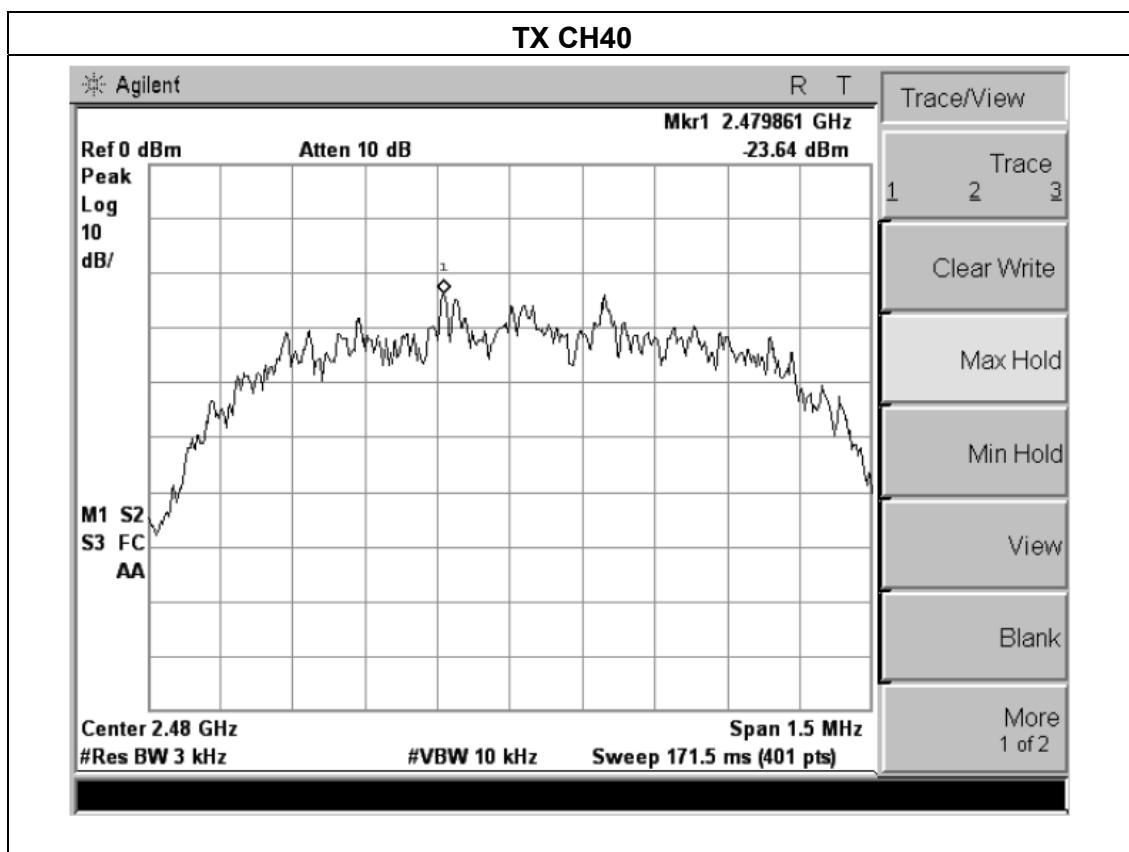
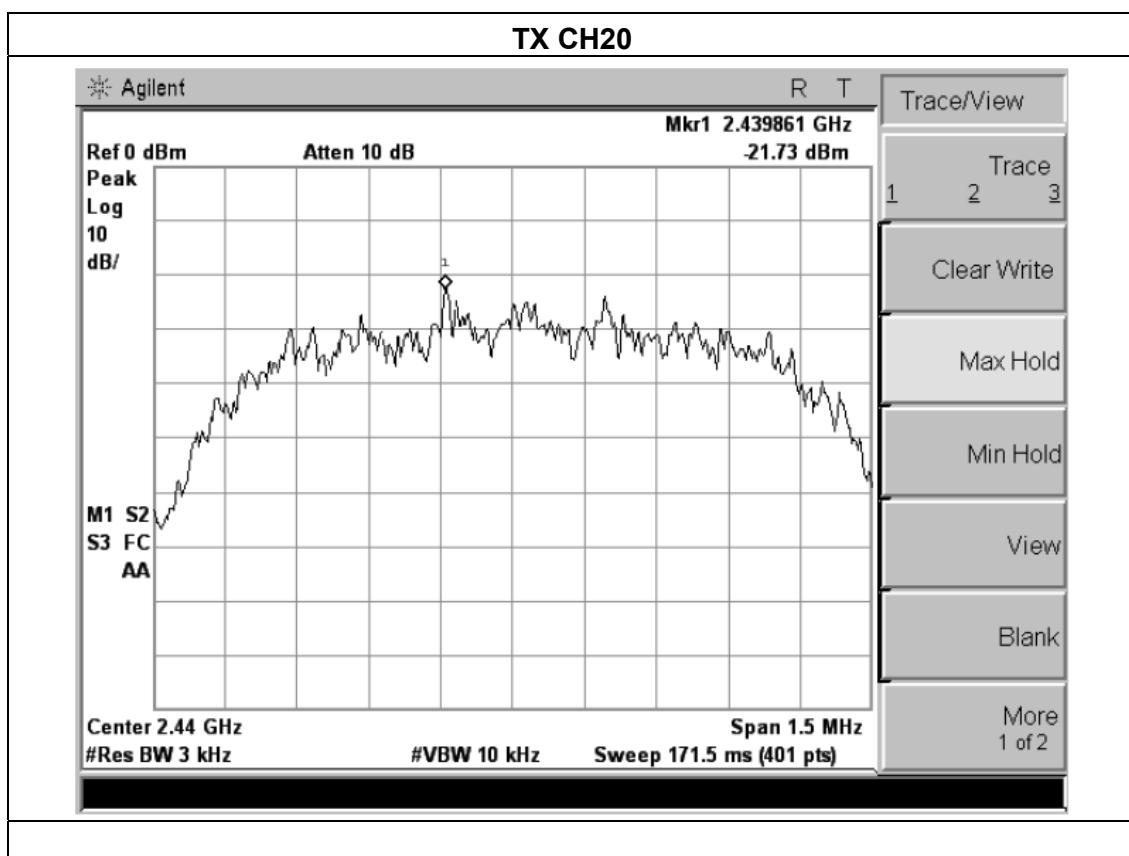


#### 4.1.5 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX Mode /CH01, CH20, CH40		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2402 MHz	-21.64	8	PASS
2440 MHz	-21.73	8	PASS
2480 MHz	-23.64	8	PASS







## 5. BANDWIDTH TEST

### 5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

#### 5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP



#### 5.1.4 EUT OPERATION CONDITIONS

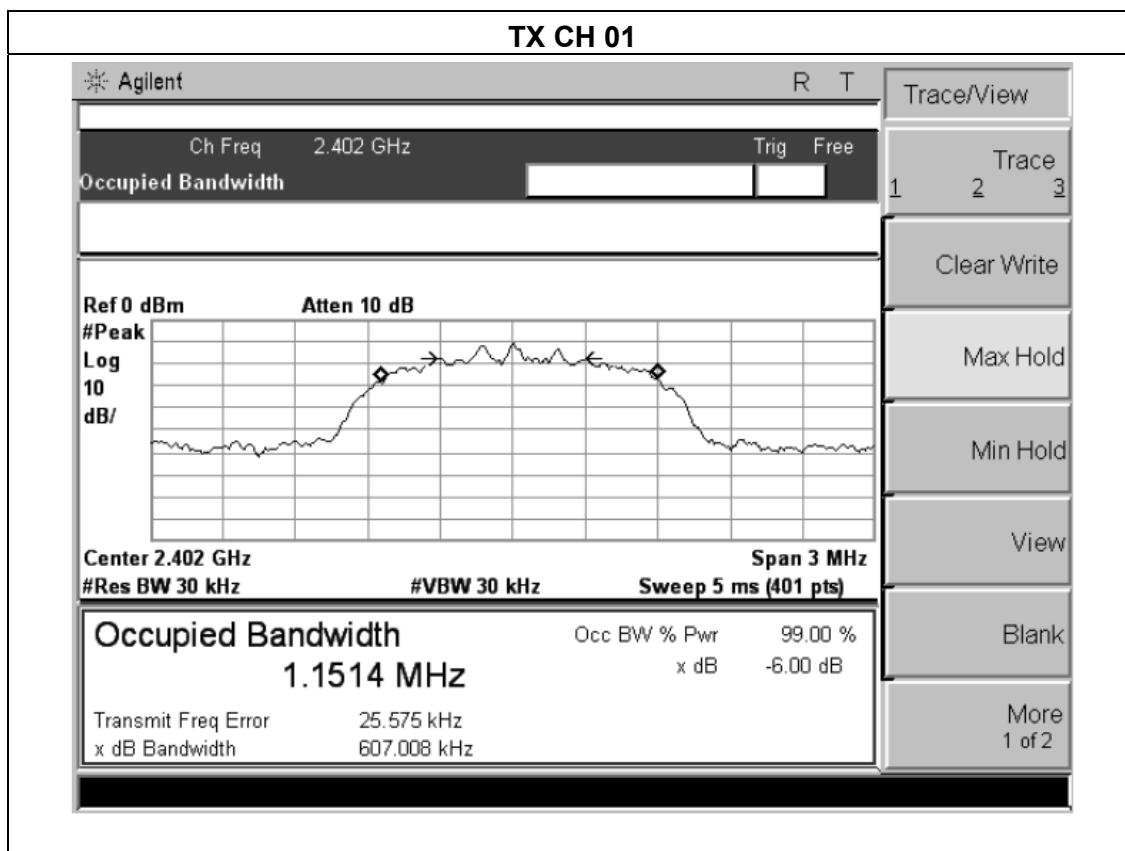
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

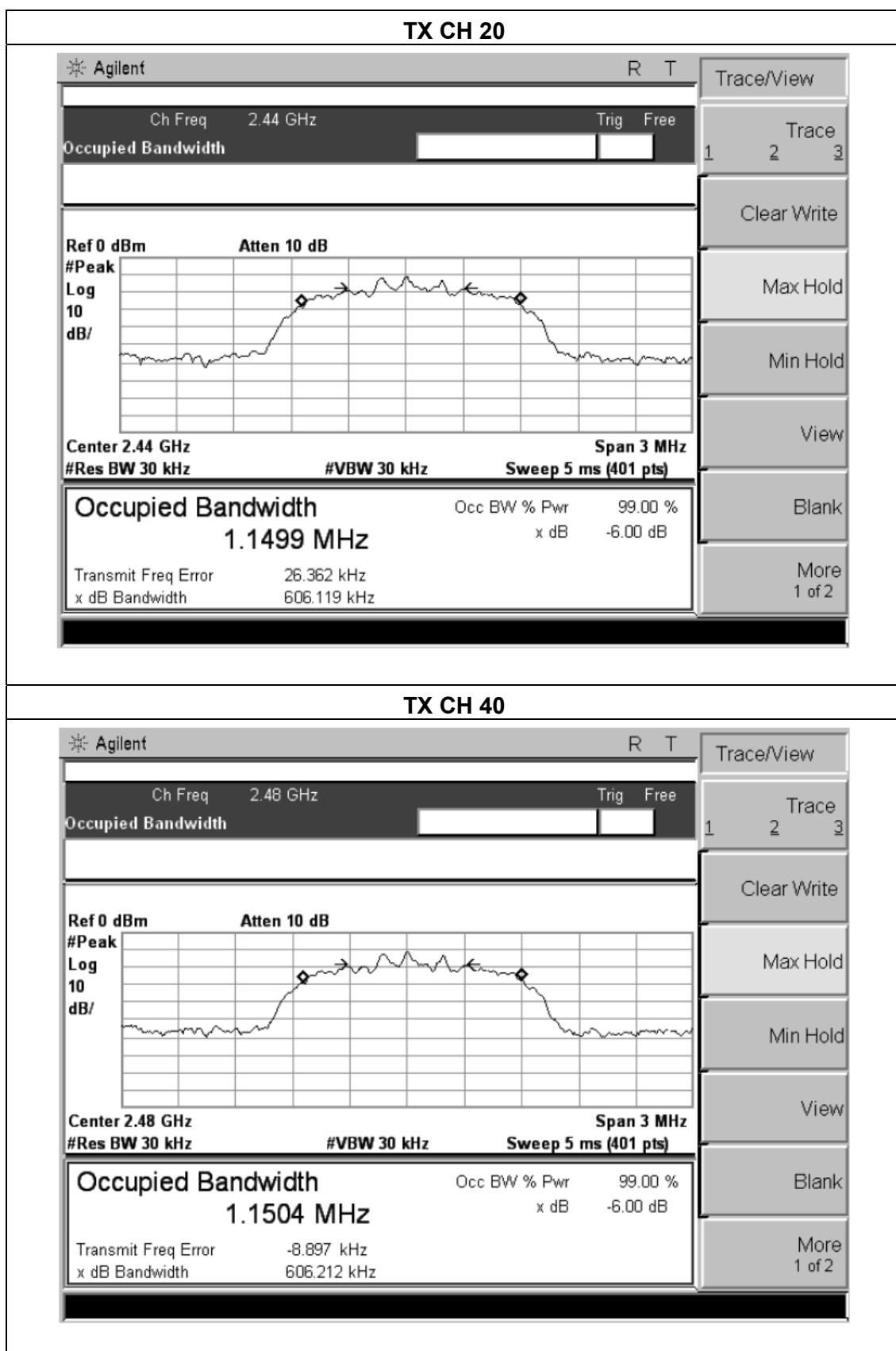


### 5.1.5 TEST RESULTS

EUT :	SAFR	Model Name :	V1.0
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX Mode /CH01, CH20, CH40		

Channel	Frequency (MHz)	6dB bandwidth (KHz)	Limit (kHz)	Result
Low	2402	607.008	500	Pass
Middle	2440	606.119	500	Pass
High	2480	606.212	500	Pass







## 6. PEAK OUTPUT POWER TEST

### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

#### 6.1.1 TEST PROCEDURE

- The EUT was directly connected to the Power meter

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



#### 6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



### 6.1.5 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX Mode		

TX Mode			
Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
CH01	2402	-0.53	30
CH20	2440	-0.48	30
CH40	2480	-0.52	30



## 7. BAND EDGE

### APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### TEST PROCEDURE

- a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- e) Repeat above procedures until all measured frequencies were complete.

#### 7.1 DEVIATION FROM STANDARD

No deviation.

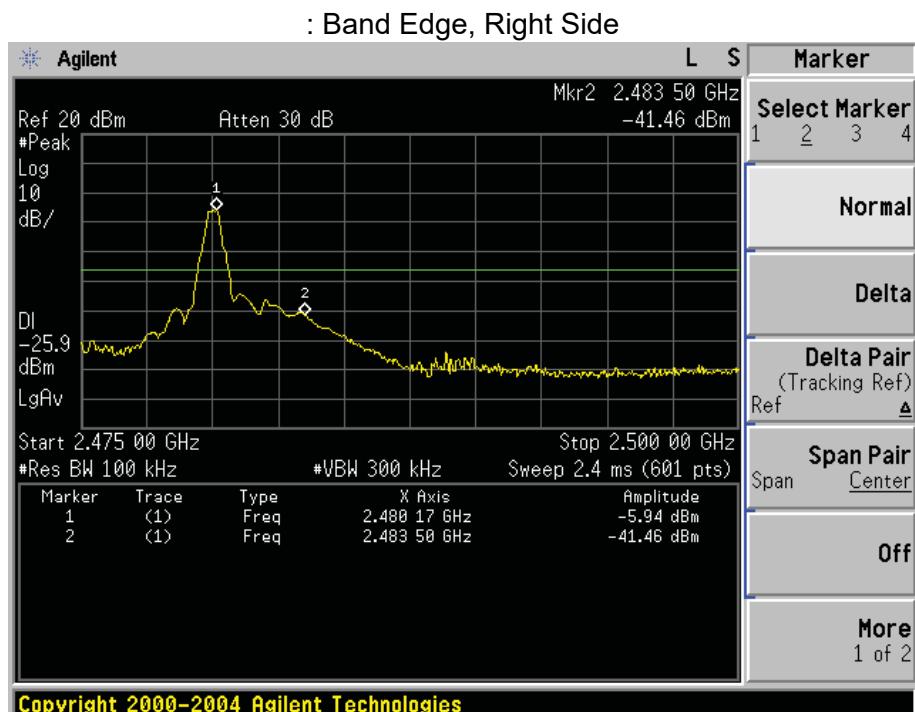
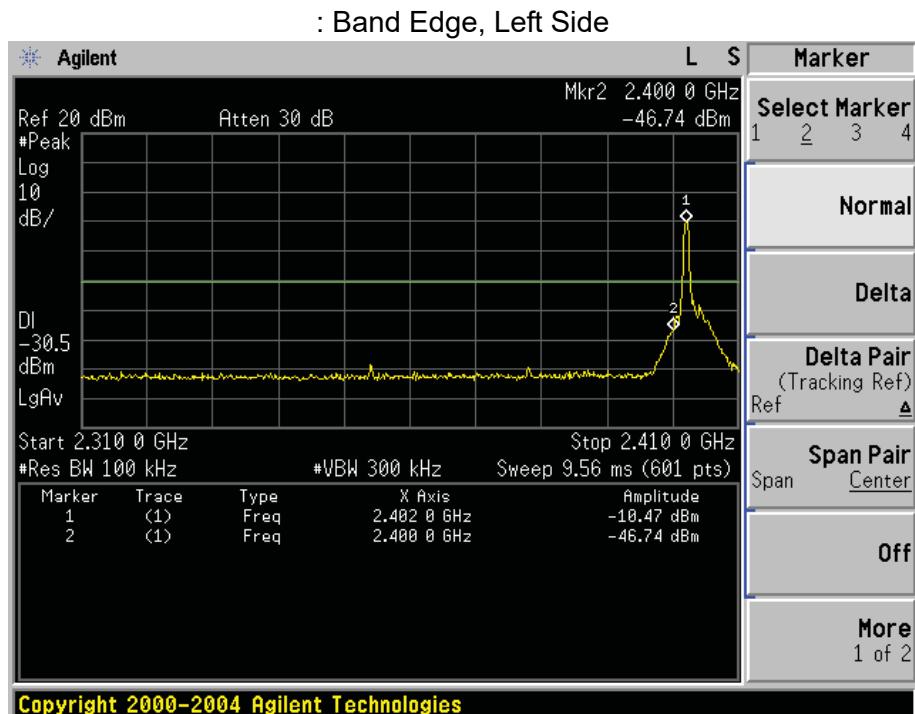
#### 7.2 TEST SETUP



### 7.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

### 7.4 TEST RESULTS





## 8. ANTENNA REQUIREMENT

### 8.1 STANDARD REQUIREMENT

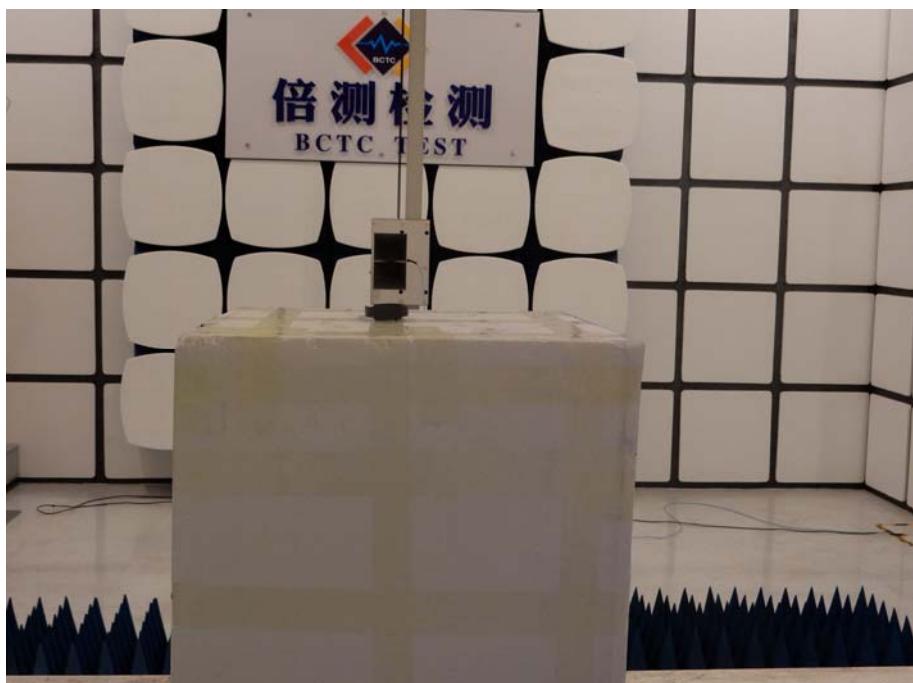
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### 8.2 EUT ANTENNA

The EUT antenna is chip antenna,. It comply with the standard requirement.

## 9. TEST SEUUP PHOTO

Radiated Emission



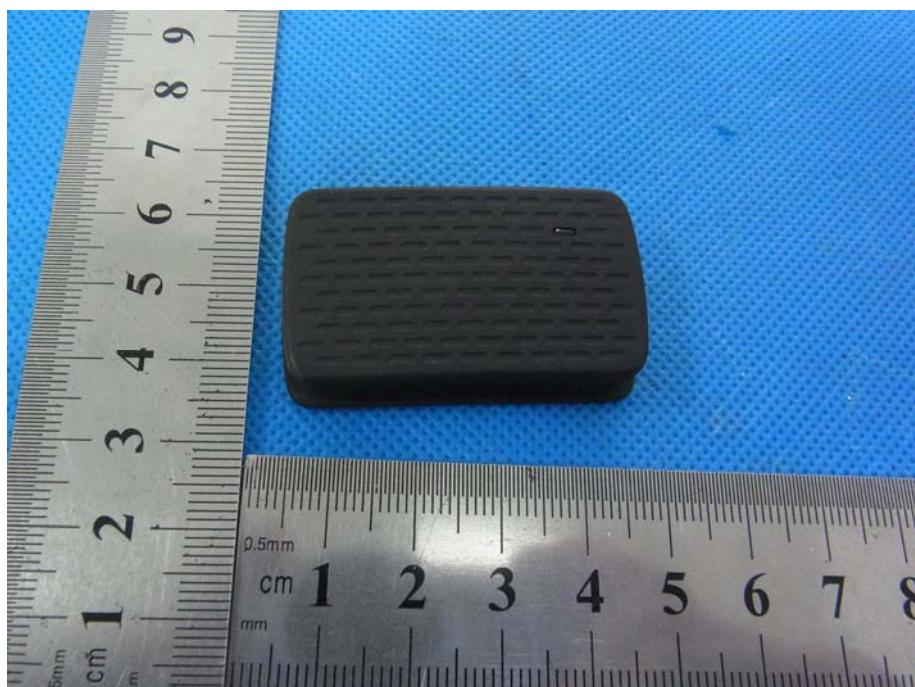


## Conducted Emission



## 10. EUT PHOTO







\*\*\*\*\* END OF REPORT \*\*\*\*\*