



# Test Report

## FCC ID: 2AP6FTTG-KP2

Product Name:	KYCS PRO
Trademark:	N/A
Model Name :	TTG-KP2
Prepared For :	TRACtag Global Inc.
Address :	92 Caplan Avenue, Suite 230, Barrie, Ontario L4N9J2, Canada
Prepared By :	Shenzhen BCTC Testing Co., Ltd.
Address :	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Jul. 05 - Jul. 13, 2018
Date of Report :	Jul. 13, 2018
Report No.:	BCTC-LH180601584E



## TEST RESULT CERTIFICATION

**Applicant's name** ..... : TRACtag Global Inc.

**Address** ..... : 92 Caplan Avenue, Suite 230, Barrie, Ontario L4N9J2,  
Canada

**Manufacture's Name** ..... : TRACtag Global Inc.

**Address** ..... : 92 Caplan Avenue, Suite 230, Barrie, Ontario L4N9J2,  
Canada

**Product description**

**Product name**..... : KYCS PRO

**Trademark** ..... : N/A

**Model and/or type reference** : TTG-KP2

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

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 IC requirements. And it is applicable only to the tested sample identified in the report.

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## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
RSS-GEN 8.8 RSS-247 3.1 15.207	Conducted Emission	N/A	
RSS-247 5.2 (a) 15.247 (a)(2)	6dB Bandwidth	PASS	
RSS-247 5.4 (b) 15.247 (b)	Peak Output Power	PASS	
RSS-247 5.5 15.247 (c)	Radiated Spurious Emission	PASS	
RSS-247 5.2 (b) 15.247 (d)	Power Spectral Density	PASS	
RSS-247 5.5 15.205	Restricted Band of Operation	PASS	
RSS-Gen.6.7 15.203	Band Edge (Out of Band Emissions)	PASS	
RSS-GEN 8.8 RSS-247 3.1 15.207	Antenna Requirement	PASS	

NOTE:

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



## 1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.

Add.: BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded 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	KYCS PRO	
Trade Name	N/A	
Model Name	TTG-KP2	
Model Difference	N/A	
Product Description	The EUT is a KYCS PRO	
	Operation Frequency:	2402-2480 MHz
	Modulation Type:	GFSK
	Number Of Channel	40CH
	Antenna Designation:	Please see Note 3.
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 Source	DC 6V from Battery	
Connecting I/O Port(s)	Please refer to the User's Manual	
Product SW/HW version	PSW: A1.1	
	PHW:V1.2	
Radio SW/HW version	RSW: V1.0	
	RHW:A1.1	
Test SW Version	V1.0	
RF power setting in TEST SW	10dBm	

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	11	2422	21	2442
02	2404	12	2424	22	2444
03	2406	13	2426	23	2446
~	~	~	~	~	~
09	2418	19	2438	39	2478
10	2420	20	2440	40	2480

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
1	N/A	N/A	PCB	1.48	

## 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.

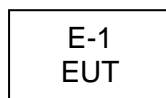
For All Mode	Description	Modulation Type
Mode 1	CH01	GFSK
Mode 2	CH20	
Mode 3	CH40	
Mode 4	Link mode(conducted emission and Radiated emission)	

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) Fully-charged battery is used during the test

## 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious 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	KYCS PRO	N/A	TTG-KP2	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

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	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45108040	2017.08.27	2018.08.26
2	Test Receiver (9kHz-7GHz)	R&S	ESPI	101318	2017.08.27	2018.08.26
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB 9168	VULB91 68-438	2017.08.27	2018.08.26
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1201	2017.09.03	2018.09.02
5	Horn Antenna (14GHz-40GHz)	SCHWARZBECK	BBHA 9170	9170-181	2017.09.03	2018.09.02
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	2017.08.27	2018.08.26
7	Amplifier (1GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	2017.08.27	2018.08.26
8	Amplifier (18GHz-40GHz)	SCHWARZBECK	BBV 9721	9721-205	2017.08.27	2018.08.26
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	00014	2017.09.03	2018.09.02
10	RF cables1 (9kHz-1GHz)	R&S	R203	R20X	2017.08.27	2018.08.26
11	RF cables2 (1GHz-40GHz)	R&S	R204	R21X	2017.08.27	2018.08.26
12	Antenna connector	Florida RF Labs	N/A	RF 01#	2017.08.27	2018.08.26
13	Power Metter	ANRITSU	ML2487A	6K00001568	2017.08.27	2018.08.26
14	Power Sensor (AV)	ANRITSU	ML2491A	030989	2017.08.27	2018.08.26
15	Signal Analyzer 9kHz-26.5GHz	Agilent	N9010A	MY48030494	2017.08.27	2018.08.26
16	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	2017.08.27	2018.08.26
17	D.C. Power Supply	LongWei	PS-305D	010964729	2017.08.27	2018.08.26

### Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-1011 65-ha	2017.08.27	2018.08.26
2	LISN	SCHWARZBECK	NSLK8127	8127739	2017.08.27	2018.08.26
3	LISN	R&S	NSLK8126	8126487	2017.08.27	2018.08.26
4	RF cables	R&S	R204	R20X	2017.08.27	2018.08.26
5	Attenuator	R&S	ESH3-Z2	143206	2017.08.27	2018.08.26



### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

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

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	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

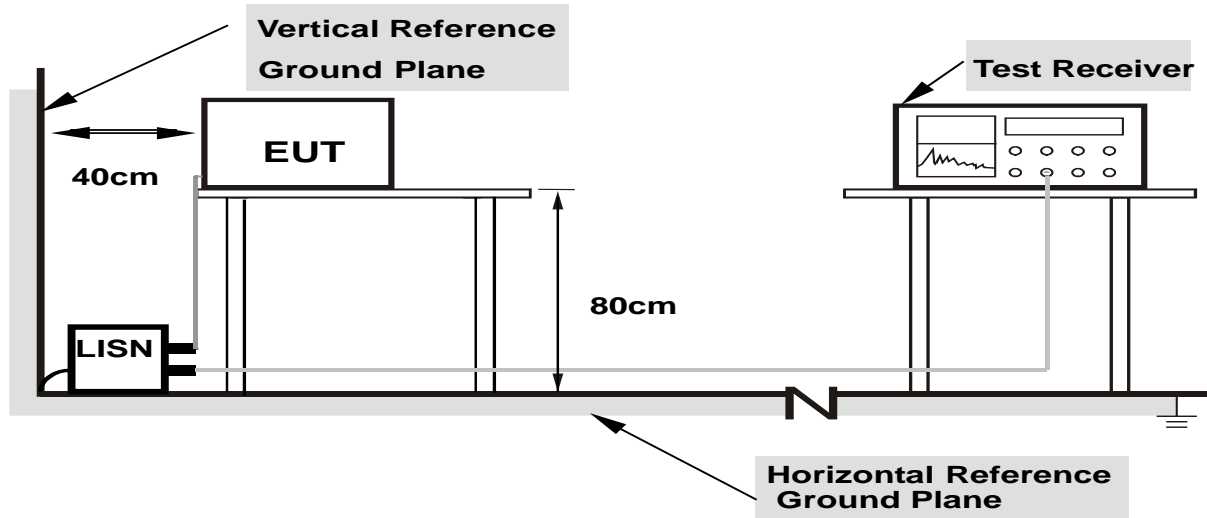
##### 3.1.2 TEST PROCEDURE

- 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  
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.

### 3.1.6 TEST RESULTS

NOTE: This EUT is powered by the battery only, this test item is not applicable.



### 3.2 RADIATED EMISSION MEASUREMENT

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

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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)	Limit (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).

#### FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower



Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
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

- The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Note:

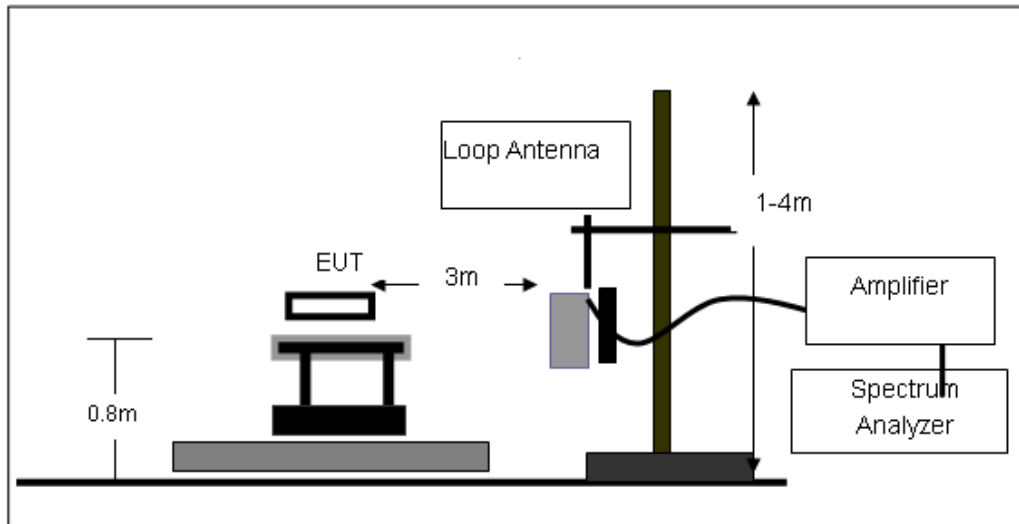
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

No deviation

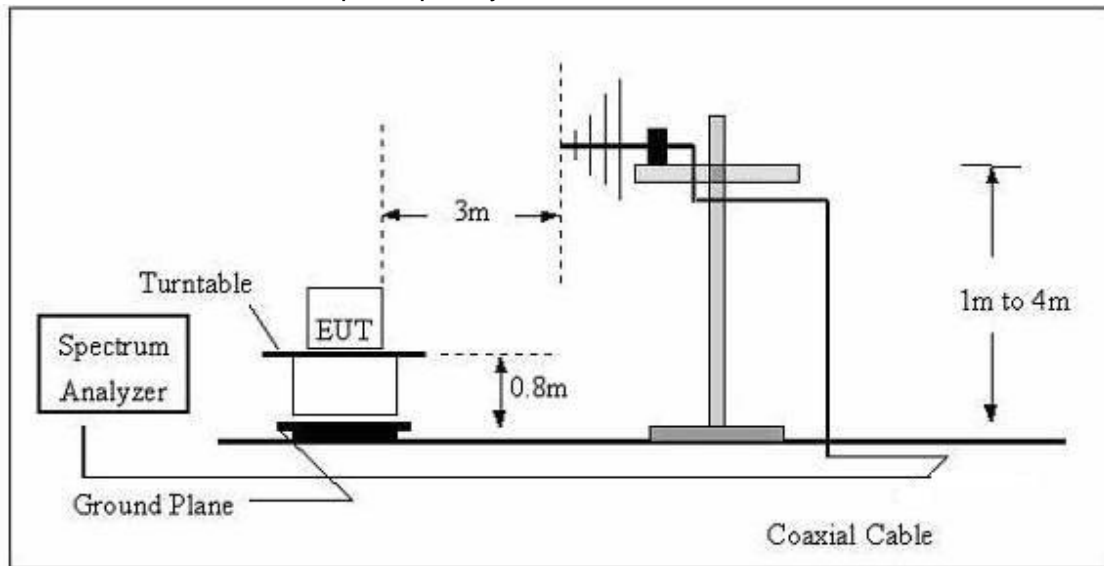
### 3.2.4 TEST SETUP

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

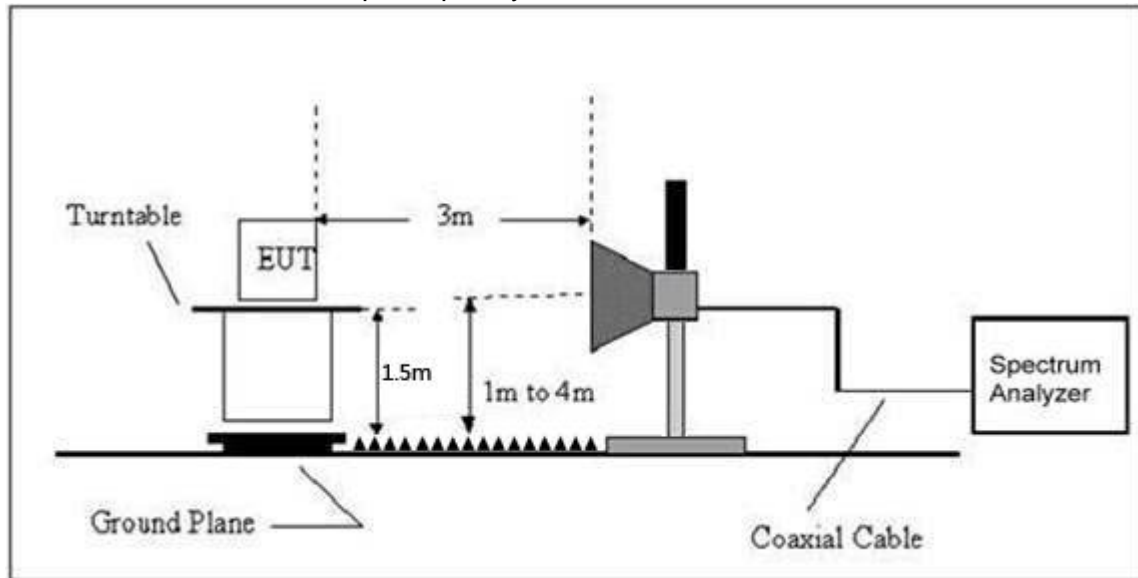




(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



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



### 3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

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

Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 6V
Test Mode :	Mode 4	Polarization :	--

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

**NOTE:**

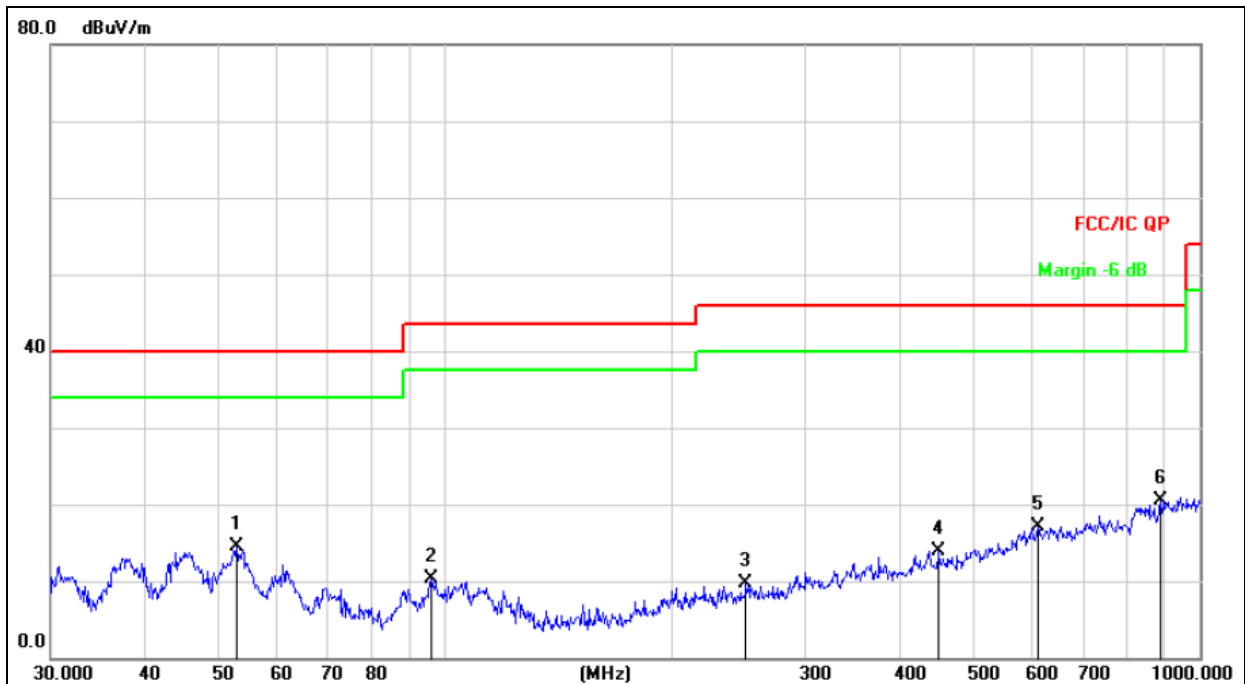
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

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

Temperature :	26°C	Relative Humidity :	54%
Test Voltage :	DC 6V	Polarization :	Horizontal
Test Mode :	Mode 4		



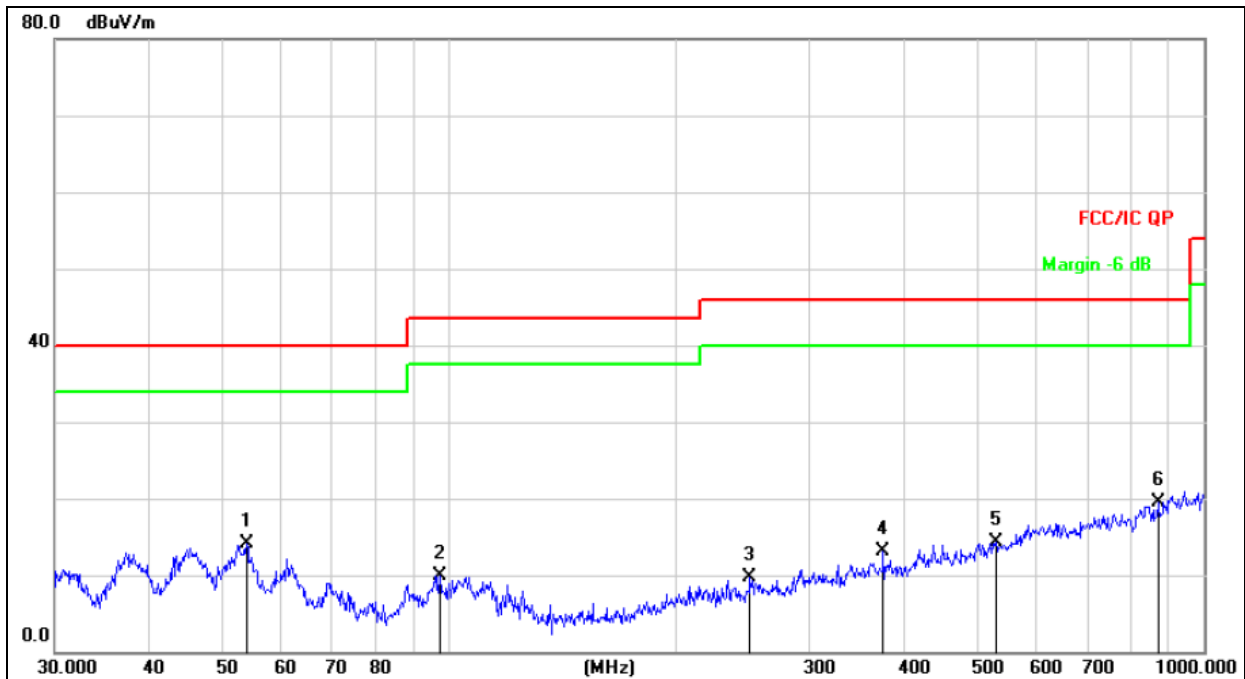
Remark:

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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	52.9453	28.90	-14.43	14.47	40.00	-25.53	QP
2		95.7622	26.55	-16.34	10.21	43.50	-33.29	QP
3		250.3012	24.82	-15.10	9.72	46.00	-36.28	QP
4		451.1350	24.49	-10.60	13.89	46.00	-32.11	QP
5		609.9217	23.66	-6.64	17.02	46.00	-28.98	QP
6		887.6099	23.23	-2.82	20.41	46.00	-25.59	QP



Temperature :	26°C	Relative Humidity :	54%
Test Voltage :	DC 6V	Polarization :	Vertical
Test Mode :	Mode 4		



Remark:

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

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1	*	53.8818	28.64	-14.59	14.05	40.00	-25.95	QP
2		97.1148	26.01	-16.09	9.92	43.50	-33.58	QP
3		250.3012	24.82	-15.10	9.72	46.00	-36.28	QP
4		375.9385	25.28	-12.19	13.09	46.00	-32.91	QP
5		530.1014	23.21	-8.84	14.37	46.00	-31.63	QP
6		869.1302	22.85	-3.40	19.45	46.00	-26.55	QP



## 3.2.8 TEST RESULTS (1GHz~25GHz)

## GFSK

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:2402MHz									
V	4804.00	60.25	39.55	7.85	25.66	54.21	74.00	-19.79	PK
V	4804.00	46.05	39.55	7.85	25.66	40.01	54.00	-13.99	AV
V	7206.00	62.11	38.33	7.52	24.55	55.85	74.00	-18.15	PK
V	7206.00	48.25	38.33	7.52	24.55	41.99	54.00	-12.01	AV
V	15450.00	42.87	35.23	6.75	26.59	40.98	74.00	-33.02	PK
H	4804.00	62.36	39.55	7.85	25.66	56.32	74.00	-17.68	PK
H	4804.00	43.08	39.55	7.85	25.66	37.04	54.00	-16.96	AV
H	7206.00	63.88	38.33	7.52	23.55	56.62	74.00	-17.38	PK
H	7206.00	43.68	38.33	7.52	23.22	36.09	54.00	-17.91	AV
H	15450.00	45.26	35.45	6.75	27.88	44.44	74.00	-29.56	PK

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:2440MHz									
V	2440.00	58.61	38.89	7.57	25.45	52.74	74.00	-21.26	PK
V	2440.00	47.84	38.89	7.57	25.45	41.97	54.00	-12.03	AV
V	4880.00	64.79	38.78	7.35	24.78	58.14	74.00	-15.86	PK
V	4880.00	50.70	38.78	7.35	24.78	44.05	54.00	-9.95	AV
V	16132.00	45.74	35.89	6.42	26.47	42.74	74.00	-31.26	PK
H	2440.00	63.27	38.89	7.57	25.45	57.40	74.00	-16.60	PK
H	2440.00	41.65	38.89	7.57	25.45	35.78	54.00	-18.22	AV
H	4880.00	62.91	38.78	7.35	24.78	56.26	74.00	-17.74	PK
H	4880.00	45.57	38.78	7.35	24.78	38.92	54.00	-15.08	AV
H	16132.00	43.78	36.68	6.42	26.65	40.17	74.00	-33.83	PK

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel: 2480MHz									
V	2480.00	59.10	38.75	7.46	25.45	53.26	74.00	-20.74	PK
V	2480.00	48.21	38.75	7.46	25.45	42.37	54.00	-11.63	AV
V	4960.00	59.60	38.65	7.22	24.78	52.95	74.00	-21.05	PK
V	4960.00	47.83	38.65	7.22	24.78	41.18	54.00	-12.82	AV
V	16132.00	41.98	35.58	6.35	26.47	39.22	74.00	-34.78	PK
H	2480.00	64.43	38.75	7.46	25.45	58.59	74.00	-15.41	PK
H	2480.00	45.24	38.75	7.46	25.45	39.40	54.00	-14.60	AV
H	4960.00	62.09	38.65	7.22	24.78	55.44	74.00	-18.56	PK
H	4960.00	44.61	38.65	7.22	24.78	37.96	54.00	-16.04	AV
H	16132.00	44.69	36.42	6.32	26.65	41.24	74.00	-32.76	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,

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:

RSS-GEN, RSS-247 5.5

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

FREQUENCY (MHz)	Limit (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:

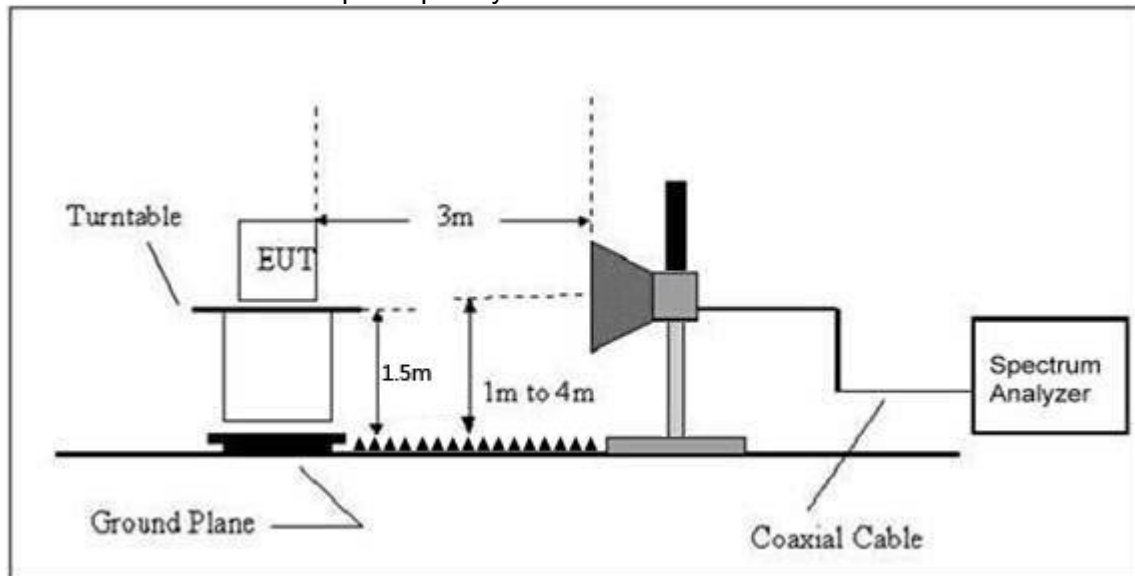
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 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 (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission evel (dBuV/m)	Limits (dBuV/m)		Result
							PK	□PK	AV	
GFSK	Low Channel 2402MHz									
	H	2390.00	60.18	38.06	7.42	20.15	49.69	74.00	54.00	PASS
	H	2400.00	58.33	38.06	7.42	20.15	47.84	74.00	54.00	PASS
	V	2390.00	58.96	38.06	7.42	20.15	48.47	74.00	54.00	PASS
	V	2400.00	57.46	38.06	7.42	20.15	46.97	74.00	54.00	PASS
	High Channel 2480MHz									
	H	2483.50	60.76	38.17	7.45	20.54	50.58	74.00	54.00	PASS
	H	2485.50	59.09	38.17	7.45	20.54	48.91	74.00	54.00	PASS
	V	2483.50	59.88	38.2	7.45	20.54	49.67	74.00	54.00	PASS
	V	2485.50	58.89	38.2	7.45	20.54	48.68	74.00	54.00	PASS
Remark:										
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit										
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.										





## 4. POWER SPECTRAL DENSITY TEST

### 4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
RSS-247 5.2	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

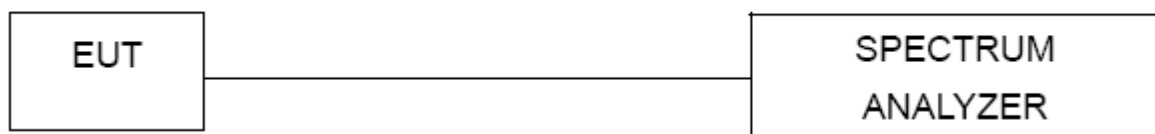
#### 4.1.1 TEST PROCEDURE

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 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

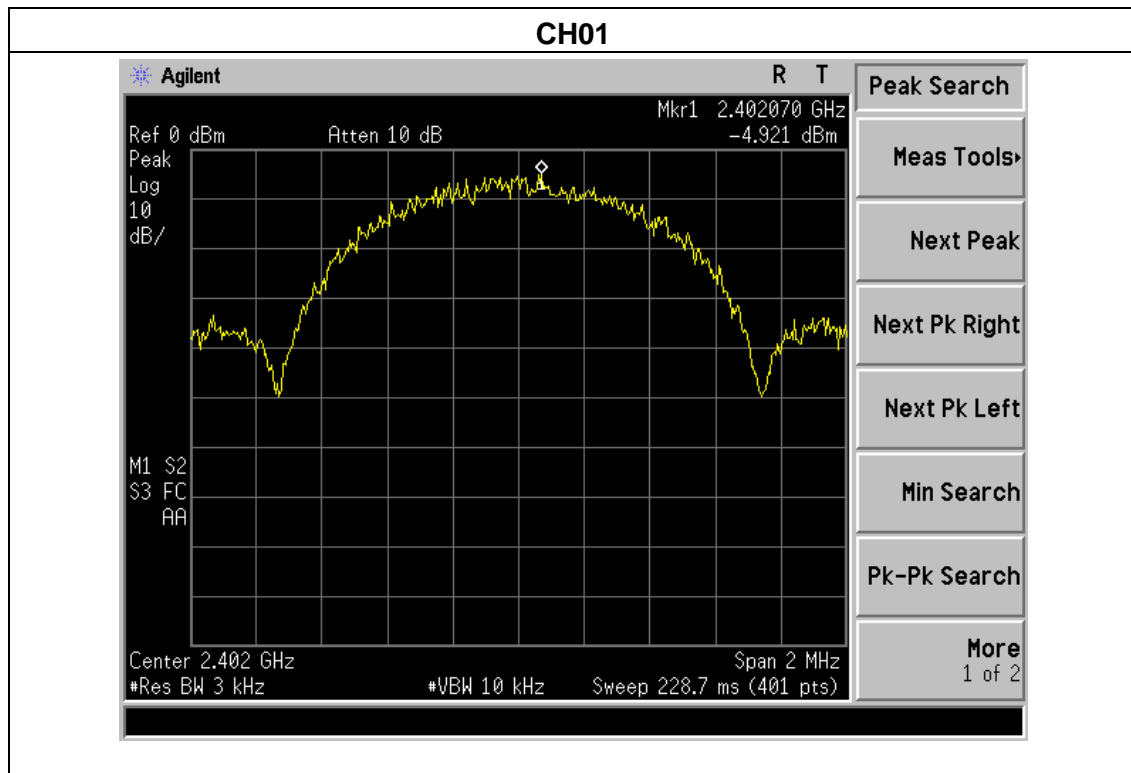
Note: Power Spectral Density(dBm)=Reading+Cable Loss



#### 4.1.5 TEST RESULTS

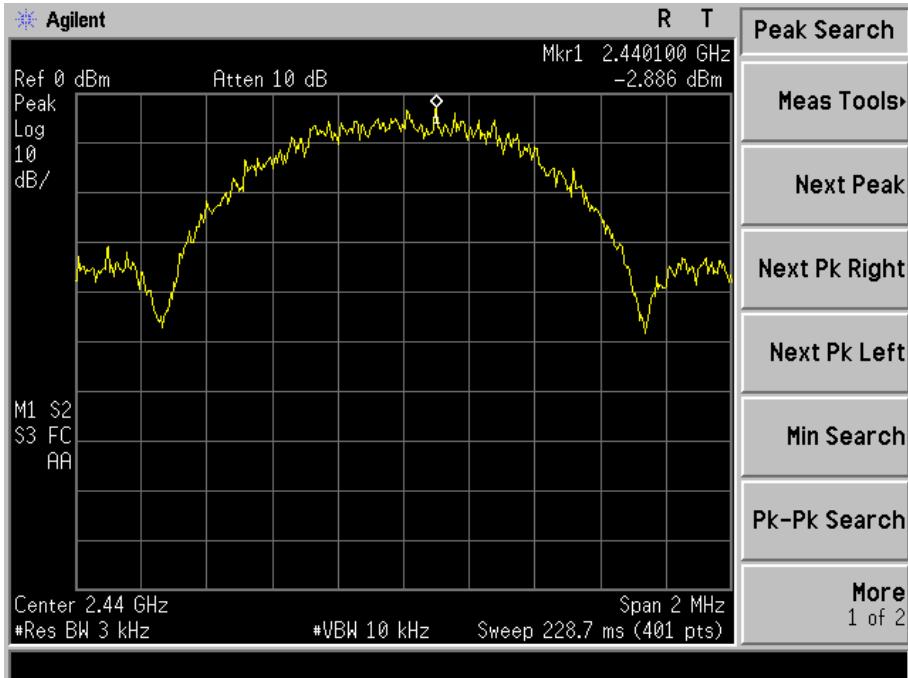
Temperature :	25°C	Relative Humidity :	60%
Test Mode :	GFSK	Test Voltage :	DC 6V

Frequency	Power Spectral Density(dBm)	Limit (dBm)	Result
2402 MHz	-4.921	8	PASS
2440 MHz	-2.886	8	PASS
2480 MHz	-6.591	8	PASS

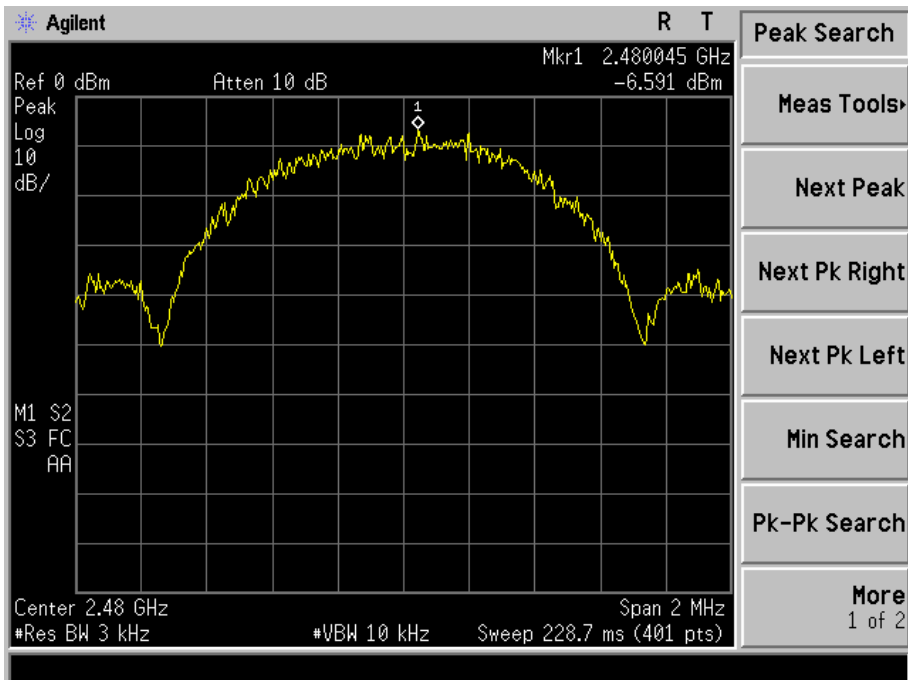




## CH20



## CH40





## 5. BANDWIDTH TEST

### 5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
RSS-247 5.2 15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

#### 5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times \text{RBW}$ .
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

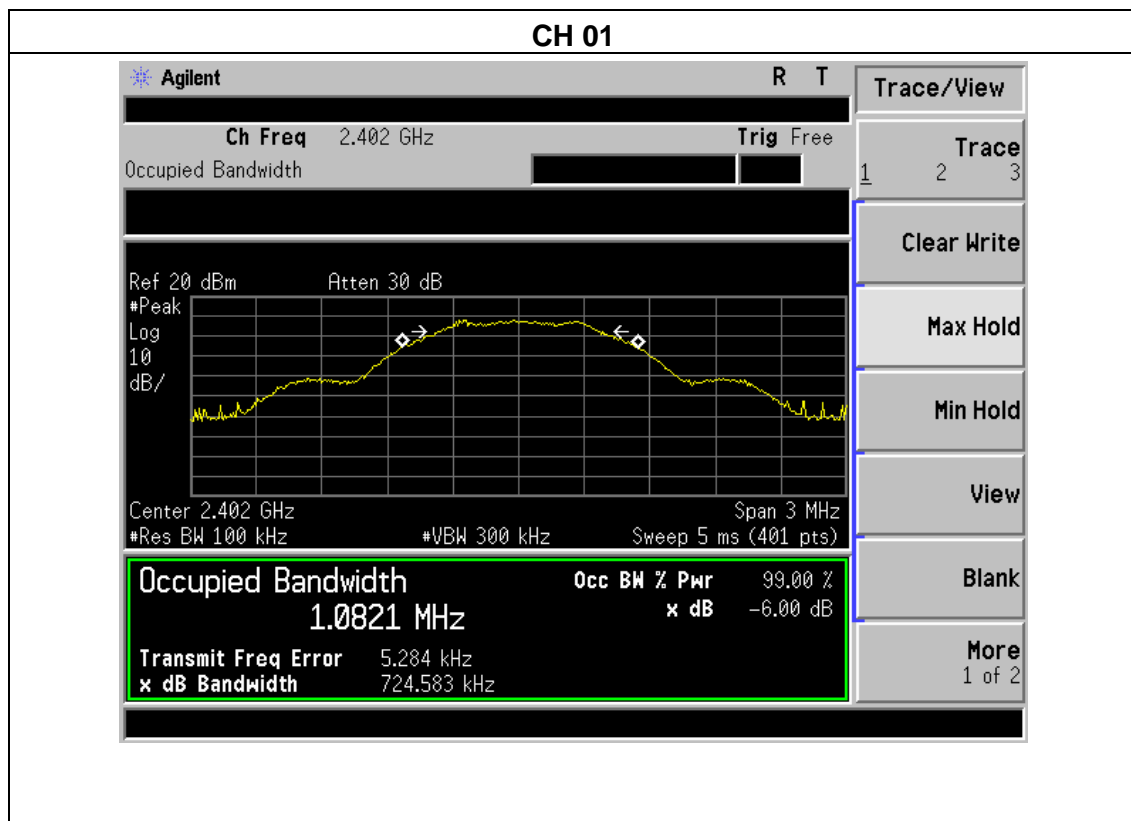
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



### 5.1.5 TEST RESULTS

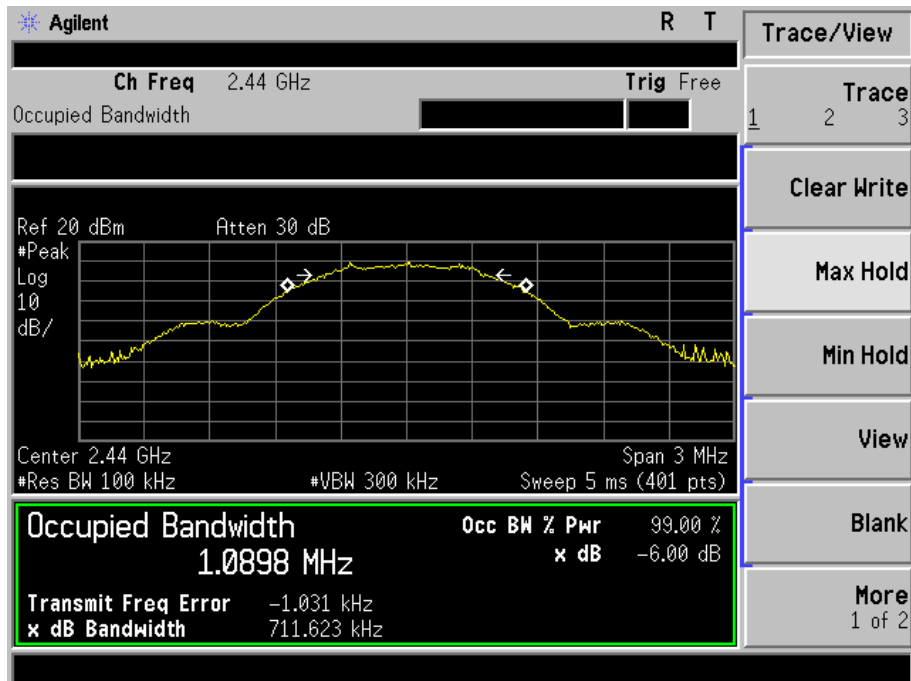
Temperature :	25°C	Relative Humidity :	60%
Test Mode :	GFSK	Test Voltage :	DC 6V

Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2402	0.725	500	Pass
2440	0.712	500	Pass
2480	0.737	500	Pass

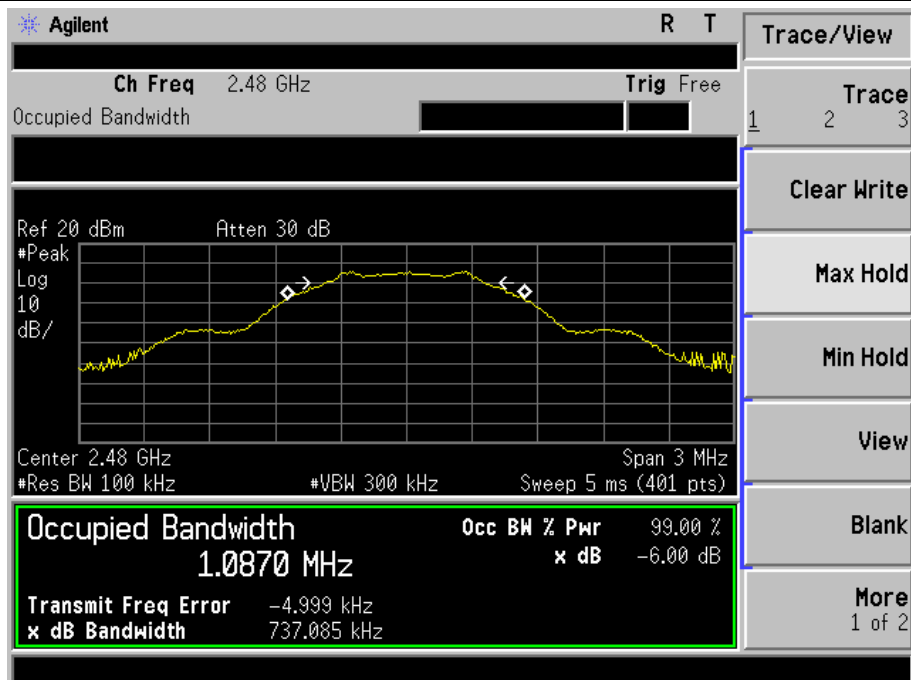




## CH20



## CH40





## 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

- a. 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 2.4 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%
Test Voltage :	DC 6V		

	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
GFSK	2402	6.53	30
	2440	7.23	30
	2480	5.04	30





## 7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

### 7.1 APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

### 7.2 TEST PROCEDURE

Using the following spectrum analyzer setting:

- a) Set the RBW = 100KHz.
- b) Set the VBW = 300KHz.
- c) Sweep time = auto couple.
- d) Detector function = peak.
- e) Trace mode = max hold.
- f) Allow trace to fully stabilize.

### 7.3 DEVIATION FROM STANDARD

No deviation.

### 7.4 TEST SETUP



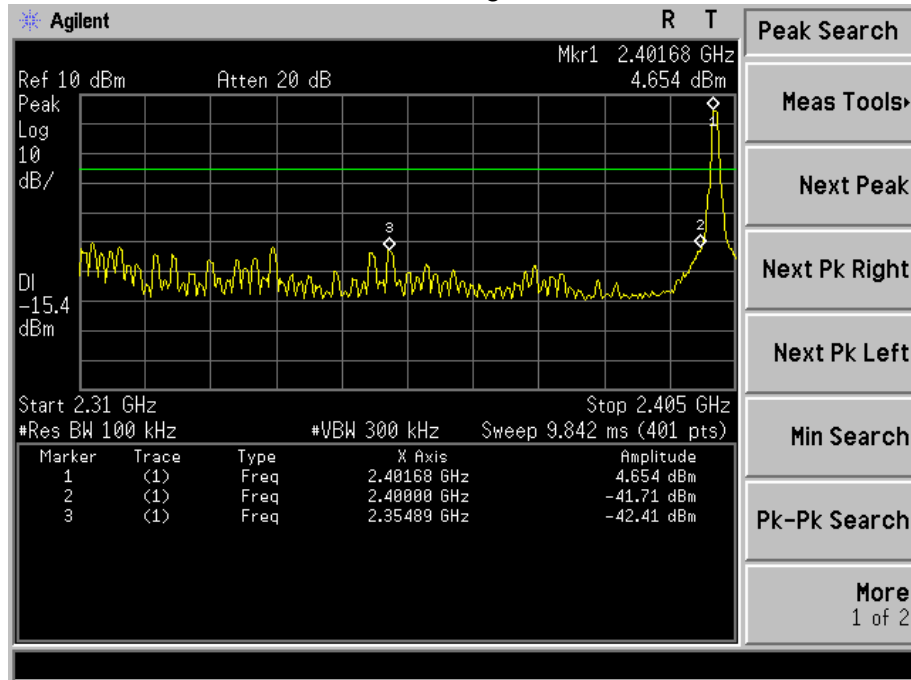
### 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

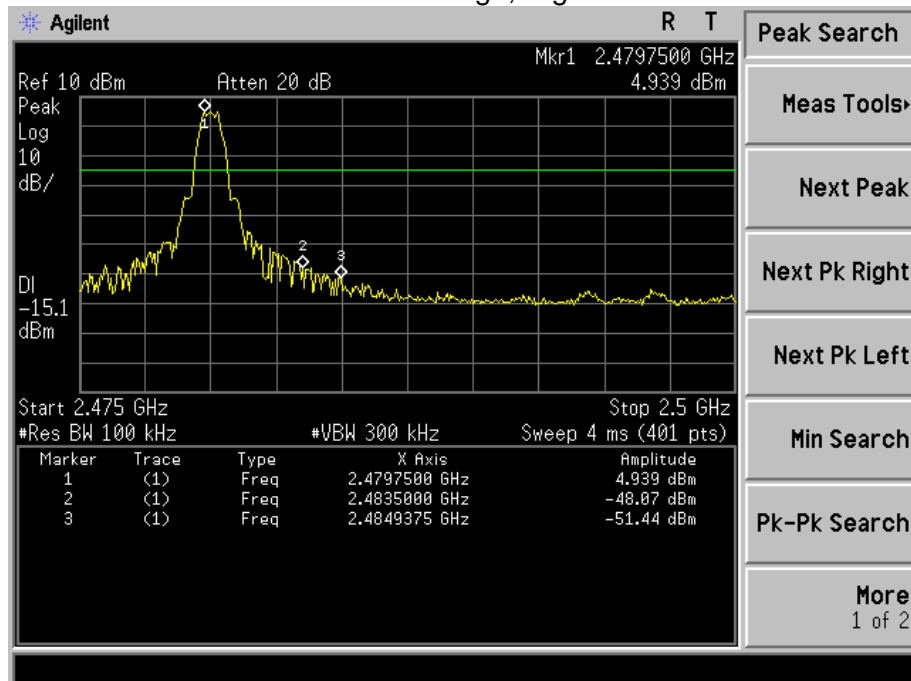
### 7.6 TEST RESULTS



## GFSK: Band Edge, Left Side



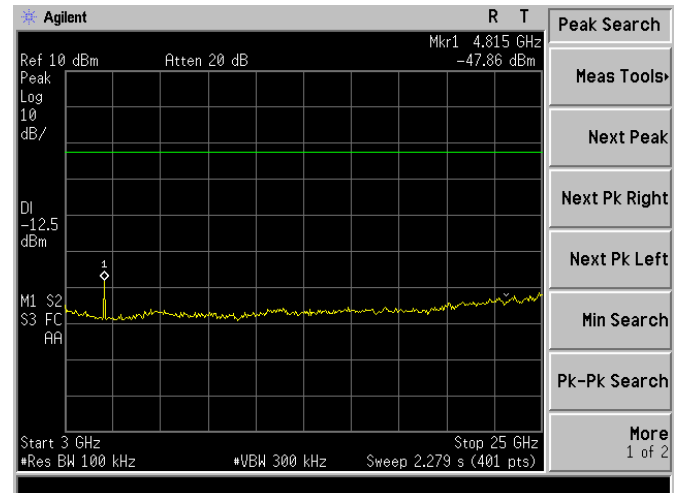
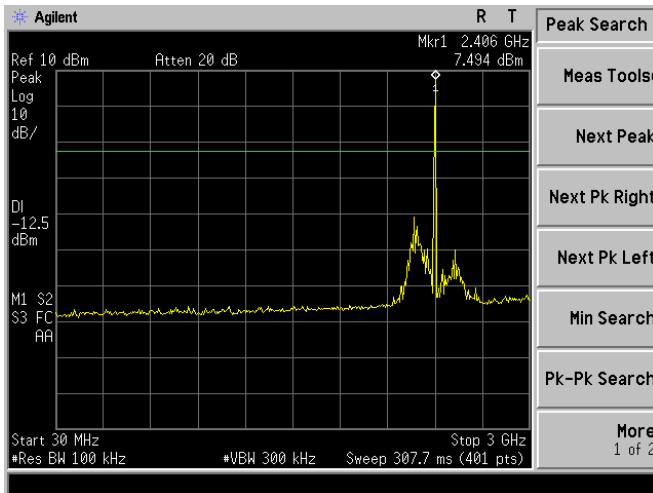
## GFSK: Band Edge, Right Side



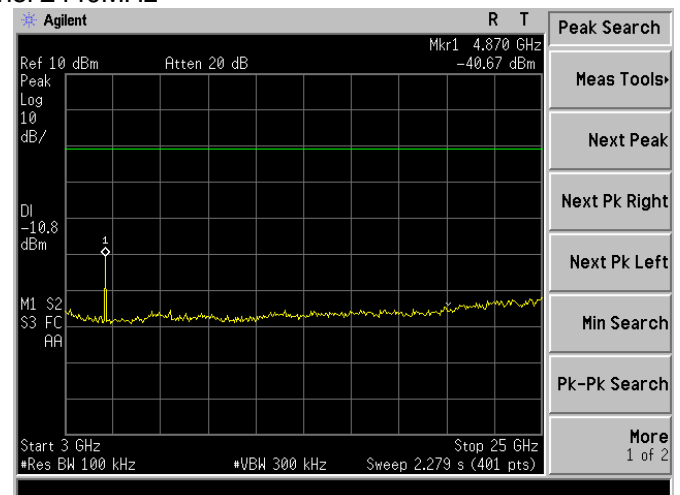
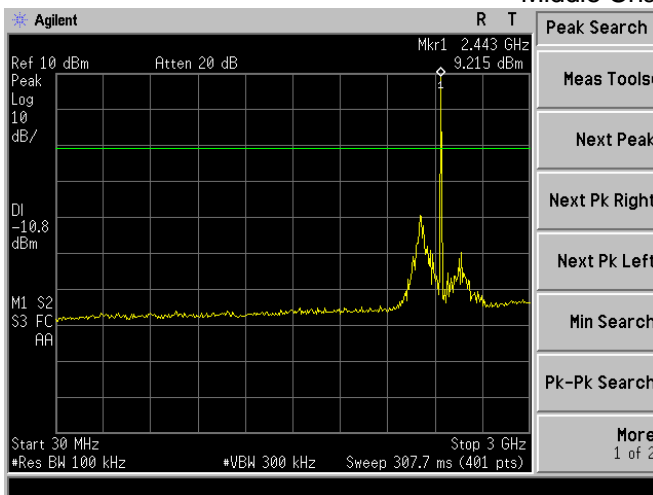
**CONDUCTED EMISSION MEASUREMENT**

GFSK

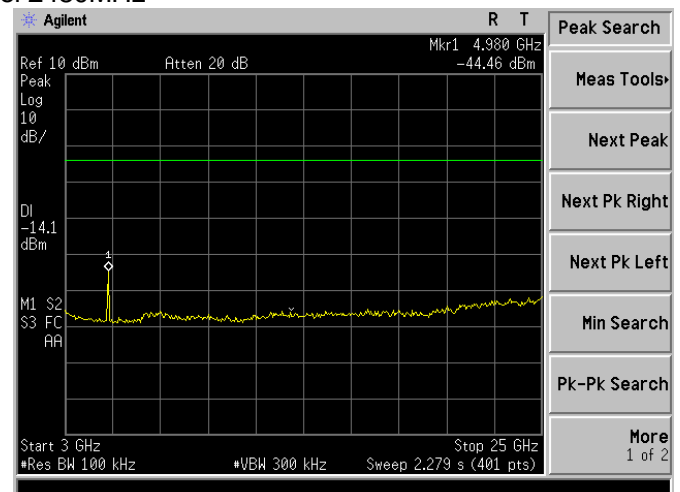
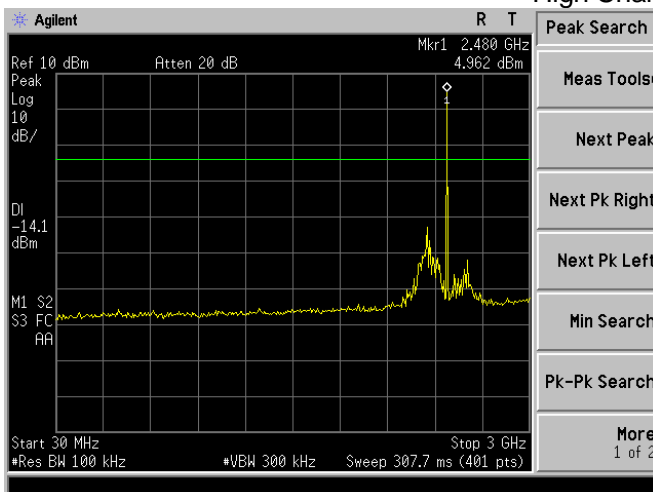
Low Channel 2402MHz



Middle Channel 2440MHz



High Channel 2480MHz





## 8. DUTY CYCLE OF TEST SIGNAL

### 8.1 STANDARD REQUIREMENT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

### 8.2 FORMULA:

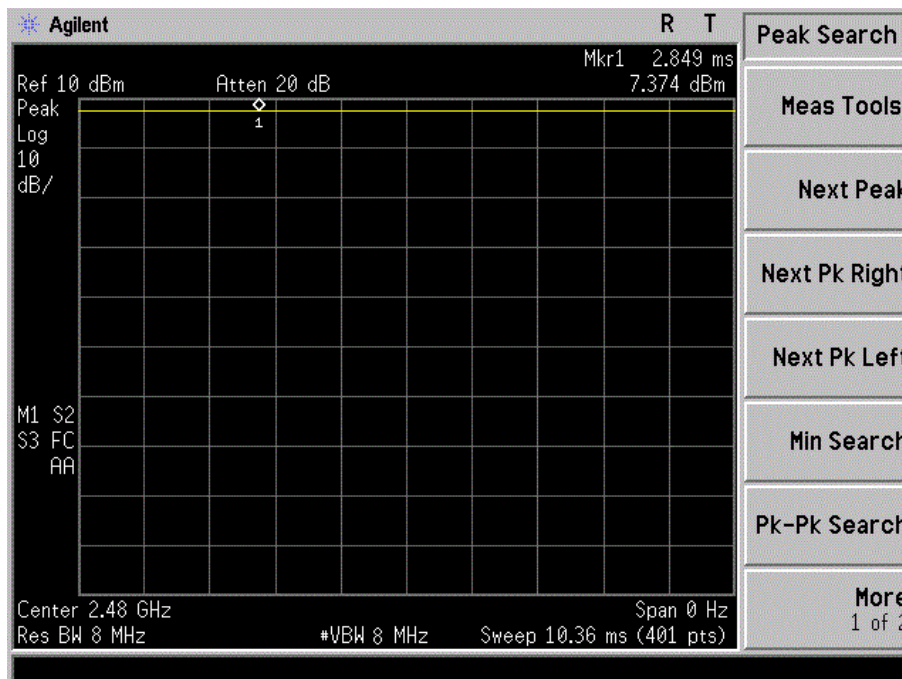
Duty Cycle =  $T_{on} / (T_{on} + T_{off})$

### Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

### Duty Cycle:

	Duty Cycle	Duty Fator (dB)
GFSK	1	0





## **9. ANTENNA REQUIREMENT**

### **9.1 STANDARD REQUIREMENT**

According to RSS-Gen Issue 4, section 8.3, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns.

### **9.2 EUT ANTENNA**

The EUT antenna is Internal PCB Antenna, fulfill the requirement of this section.

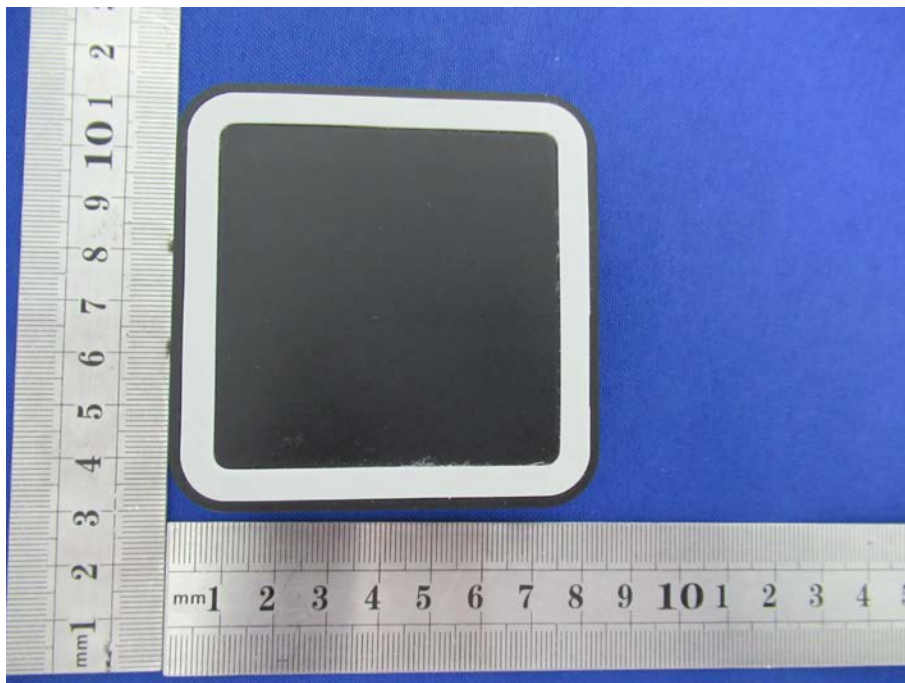
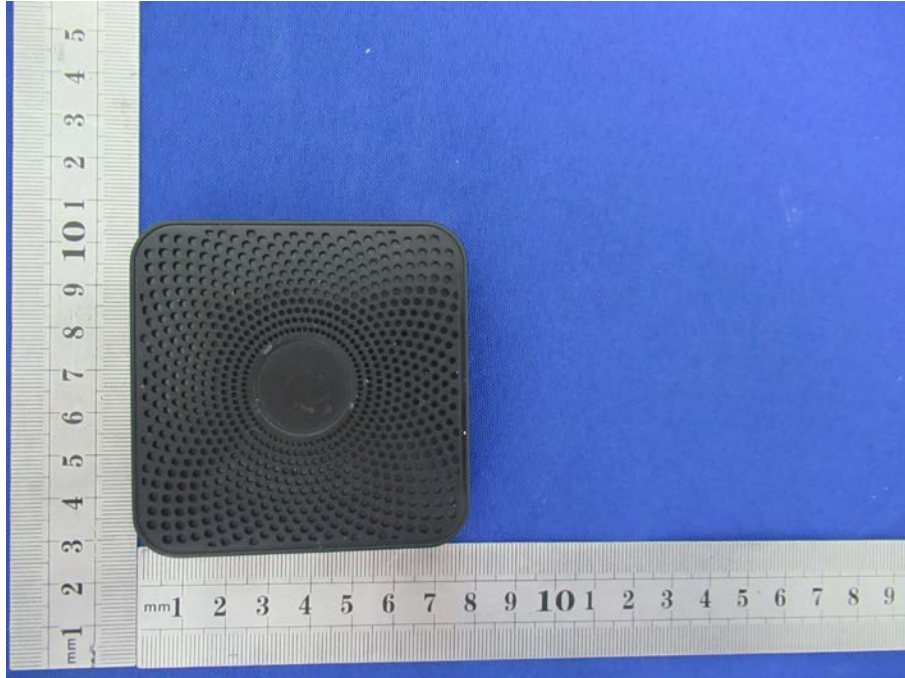
## 10. EUT TEST PHOTO

### Radiated Measurement Photos





## 11. EUT PHOTO



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