FCC TEST REPORT

Report No: STS1502025F01

Issued for

Shenzhen Bada Sheng Electronics Co., Ltd

BIK 12 Foodstuff Ind Park, Songyuan Village, Guanlan Town, 518110 Shenzhen, China

Product Name:	Transmitter
Brand Name:	HUHD
Model No.:	See page 7
FCC ID:	ODCHW-398M
Test Standard:	FCC Part 15.247

Shenzhen STS Test Services Co., Ltd.
1/F A, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

TEST RESULT CERTIFICATION

Applicant's name ..... :	Shenzhen Bada Sheng Electronics Co., Ltd
Address..... :	BIK 12 Foodstuff Ind Park, Songyuan Village, Guanlan Town, 518110 Shenzhen, China
Manufacture's Name..... :	Shenzhen Bada Sheng Electronics Co., Ltd
Address..... :	BIK 12 Foodstuff Ind Park, Songyuan Village, Guanlan Town, 518110 Shenzhen, China

Product description

Product name ..... :	Transmitter
Band name ..... :	HUHD
Model and/or type reference.. :	HW-399M
Ratings.....	DC 5V by USB Port
Standards ..... :	FCC Part15.247
Test procedure	ANSI C63.10: 2009

This device described above has been tested by STS, 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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Date of Test .....:	
Date (s) of performance of tests.....:	Jan.27.2015 &Jan.30,2015
Date of Issue .....:	Jan.31,2015
Test Result.....:	**Pass**

Testing Engineer **:** (Tony Liu)

Technical Manager **:** (Vita Li)

Authorized Signatory **:** (Bovey Yang)

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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
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	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

Shenzhen STS Test Services Co., Ltd.

Add. : 1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China.

FCC Registration No.: 842334; IC Registration No.: 12108A-1

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± 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	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Transmitter	
Trade Name	HUHD	
Model Name	HW-399M	
Serial Model	HW-398M, HW-939M, HW-933M	
Model Difference	All the same except for the model name.	
Product Description	The EUT is a wireless transmitter	
	Operation Frequency:	2405~2478 MHz
	Modulation Type:	GFSK
	Number Of Channel	74
	Antenna Designation:	Please see Note 3.
	Antenna Gain (dBi)	0 dbi
Channel List	Please refer to the Note 2.	
Power	DC5V by USB Port	
Hardware version number	N/A	
Software versioning number	N/A	
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.

Frequency Band		Channel Number	Frequency	Channel Number	Frequency
2.405~2478MHZ					
Channel Number	Frequency				
0	2405MHZ	26	2431MHZ	52	2457MHZ
1	2406MHZ	27	2432MHZ	53	2458MHZ
2	2407MHZ	28	2433MHZ	54	2459MHZ
3	2408MHZ	29	2434MHZ	55	2460MHZ
4	2409MHZ	30	2435MHZ	56	2461MHZ
5	2410MHZ	31	2436MHZ	57	2462MHZ
6	2411MHZ	32	2437MHZ	58	2463MHZ
7	2412MHZ	33	2438MHZ	59	2464MHZ
8	2413MHZ	34	2439MHZ	60	2465MHZ
9	2414MHZ	35	2440MHZ	61	2466MHZ
10	2415MHZ	36	2441MHZ	62	2467MHZ
11	2416MHZ	37	2442MHZ	63	2468MHZ
12	2417MHZ	38	2443MHZ	64	2469MHZ
13	2418MHZ	39	2444 MHZ	65	2470MHZ
14	2419MHZ	40	2445MHZ	66	2471MHZ
15	2420MHZ	41	2446MHZ	67	2472MHZ
16	2421MHZ	42	2447MHZ	68	2473MHZ
17	2422MHZ	43	2448MHZ	69	2474MHZ
18	2423MHZ	44	2449MHZ	70	2475MHZ
19	2424MHZ	45	2450MHZ	71	2476MHZ
20	2425MHZ	46	2451MHZ	72	2477 MHZ
21	2426MHZ	47	2452MHZ	73	2478 MHZ
22	2427MHZ	48	2453MHZ		
23	2428MHZ	49	2454MHZ		
24	2429MHZ	50	2455MHZ		
25	2430MHZ	51	2456 MHZ		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	Chip Antenna	N/A	0	N/A

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	TX CH0/CH32/CH73
Mode 2	Keeping TX mode

For Conducted Emission	
Final Test Mode	Description
Mode 2	Keeping TX mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX CH0/CH32/CH73
Mode 2	Keeping TX mode

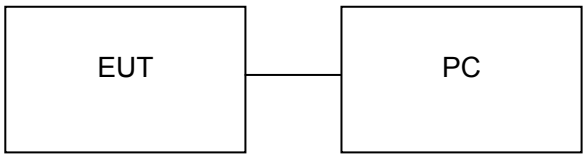
Note:

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

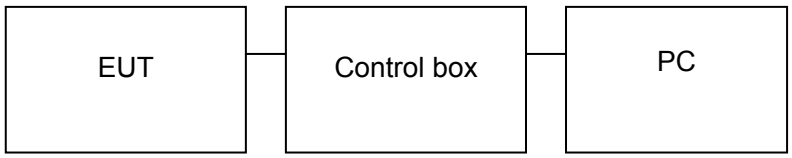
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious EmissionTest

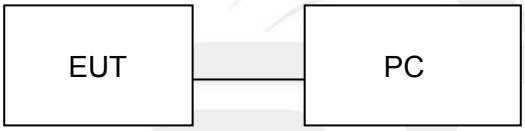
Configure 1: (Mode 2)



Configure 2: (Mode 1)



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
1	Transmitter	HUHD	HW-399M	N/A	EUT
2	PC	N/A	A1465	N/A	FCC DOC approved

Item	Shielded Type	Ferrite Core	Length	Note
1	USB Cable		80	NO

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.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.
(4) N/A means not applicable.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.10.27	2015.10.26
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.06	2015.06.06
Horn Antenna	R&S	9120D	152265	2014.10.27	2015.10.26
Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05
Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21
Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07
Power Meter	Anritsu	ML2495A	1204003	2014.10.25	2015.10.24
Power Sensor	Anritsu	MA2411B	100309	2014.10.25	2015.10.24

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	102086	102086	2014.10.25	2015.10.24
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
LISN	EMCO	3810/2NM	000-23625	2014.10.25	2015.10.24
50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.06	2015.06.06
Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.06	2015.06.06
Absorbing clamp	R&S	MDS-21	100668	2014.10.27	2015.10.26

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

operating frequency band. In case the emission fall within the restricted band specified on Part 15.247&207(a) limit in the table below has to be followed.

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

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.

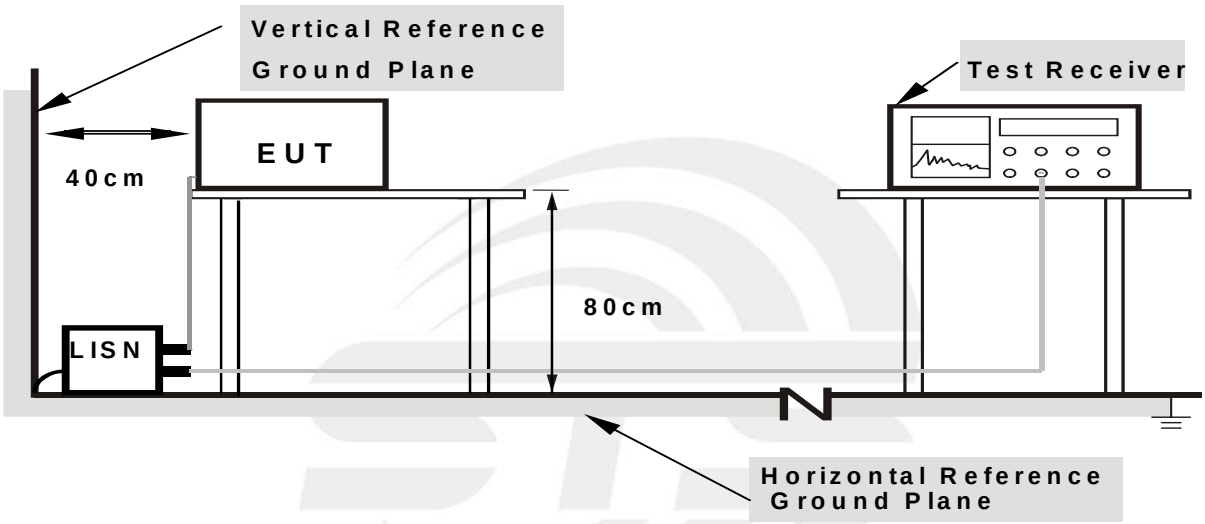
The following table is the setting of the receiver

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

3.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to PC which 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.

3.3 TEST SETUP



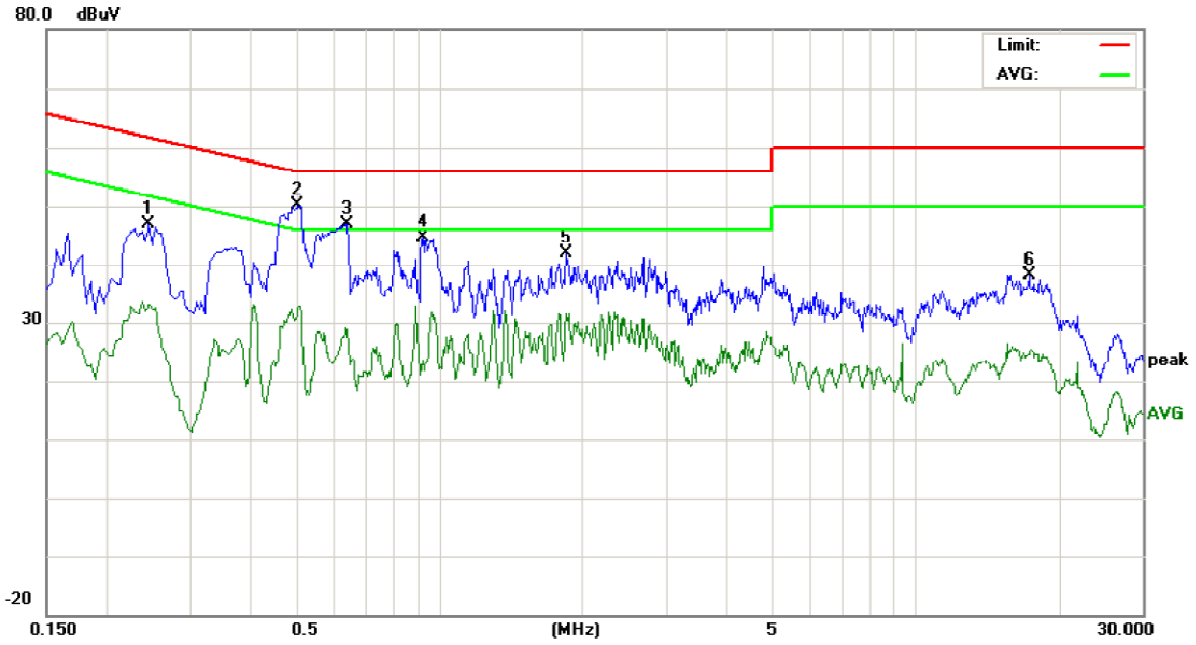
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.4 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.

3.5 TEST RESULTS

Line Conducted Emission Test Line 1-L



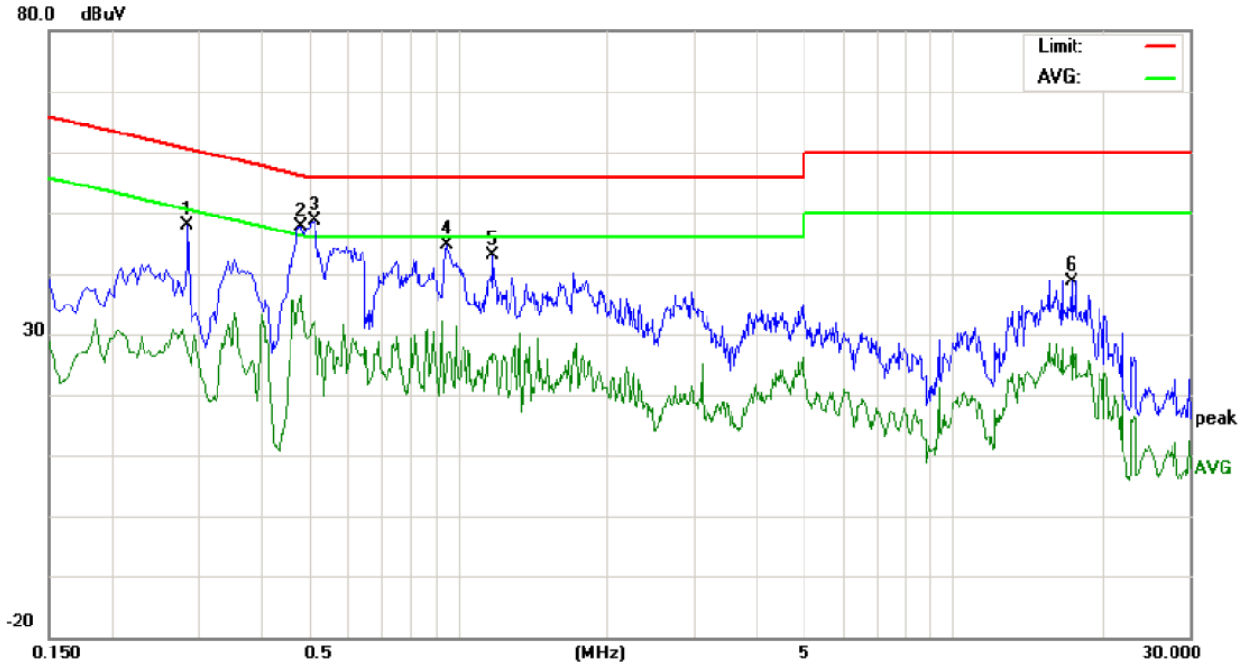
Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: Transmitter
M/N: HW-399M
Mode:Mode 2
Note:

Phase: *L1*
Power: AC 120V/60Hz

Temperature: 26
Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2460	36.62		22.89	10.27	46.89		33.16	61.89	51.89	-15.00	-18.73	P	
2	0.5060	39.70		22.03	10.39	50.09		32.42	56.00	46.00	-5.91	-13.58	P	
3	0.6419	36.57		18.57	10.33	46.90		28.90	56.00	46.00	-9.10	-17.10	P	
4	0.9260	25.48		15.86	10.40	35.88		26.26	56.00	46.00	-20.12	-19.74	P	
5	1.8580	31.50		21.29	10.27	41.77		31.56	56.00	46.00	-14.23	-14.44	P	
6	17.3580	28.01		14.47	10.13	38.14		24.60	60.00	50.00	-21.86	-25.40	P	

Line Conducted Emission Test Line 2-N



Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: Transmitter
M/N: HW-399M
Mode:Mode 2
Note:

Phase: *N*
Power: AC 120V/60Hz

Temperature: 26
Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2860	37.70		16.58	10.28	47.98		26.86	60.64	50.64	-12.66	-23.78	P	
2	0.4780	37.15		24.75	10.38	47.53		35.13	56.37	46.37	-8.84	-11.24	P	
3	0.5140	38.23		21.86	10.39	48.62		32.25	56.00	46.00	-7.38	-13.75	P	
4	0.9500	34.20		14.35	10.39	44.59		24.74	56.00	46.00	-11.41	-21.26	P	
5	1.1820	32.40		16.45	10.37	42.77		26.82	56.00	46.00	-13.23	-19.18	P	
6	17.3620	28.59		17.83	10.13	38.72		27.96	60.00	50.00	-21.28	-22.04	P	

4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMITS

6dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15.247&205(a), then the Part15.247&209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (Frequency Range 9kHz-1000MHz)

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
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier harmonic(Peak/AV)
RB / VB (emission in restricted band)	RBW 1MHz VBW 1MHz peak detector for PK value , RMS detector for AV value

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

4.2 TEST PROCEDURE

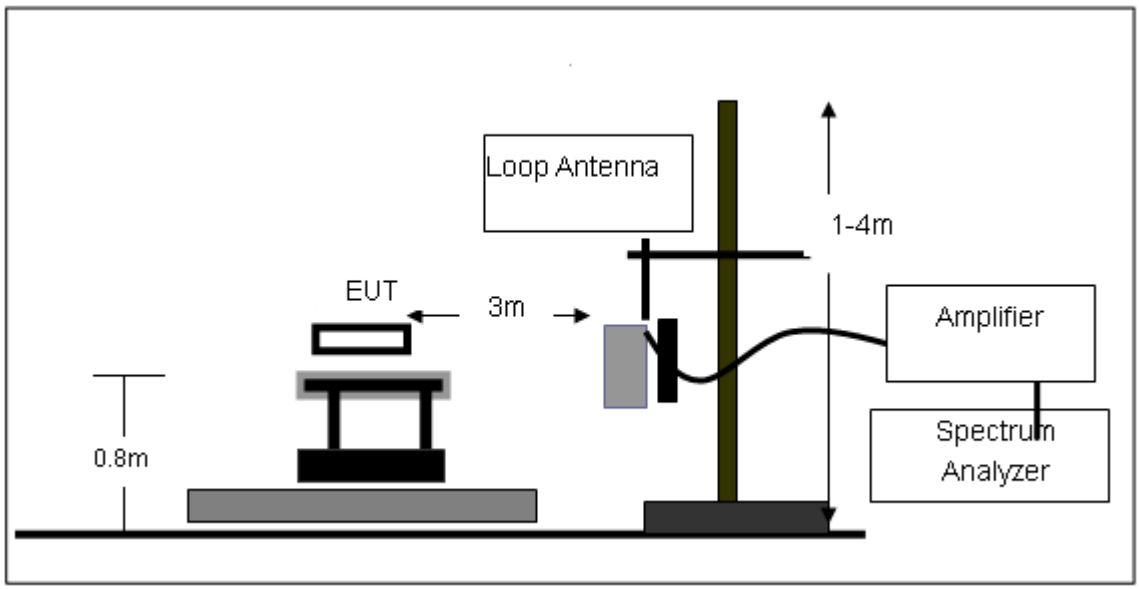
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; 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.
d. 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.
e. 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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

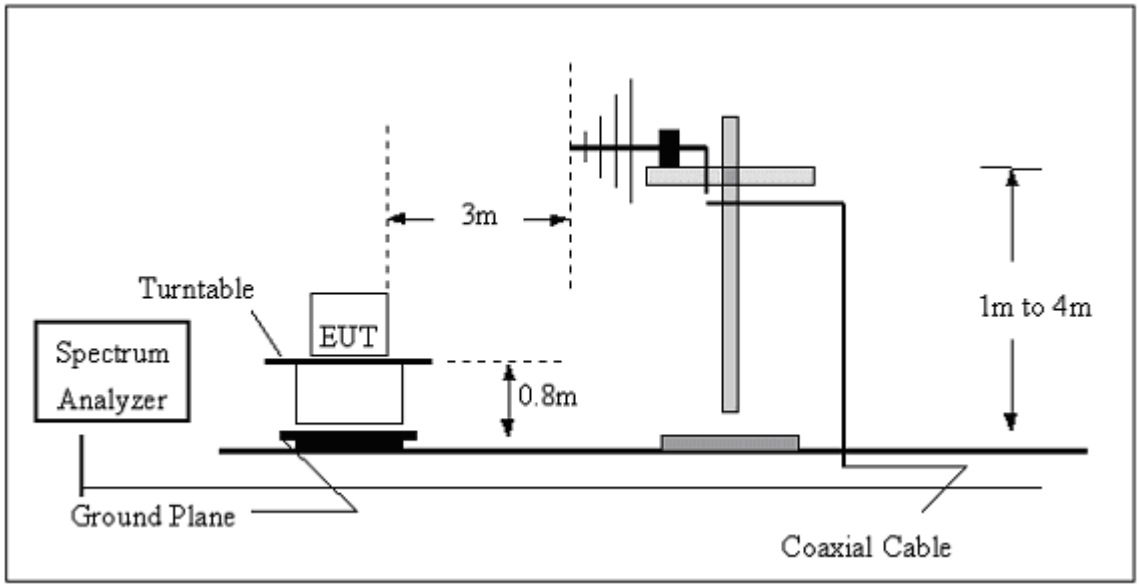
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.3 TEST SETUP

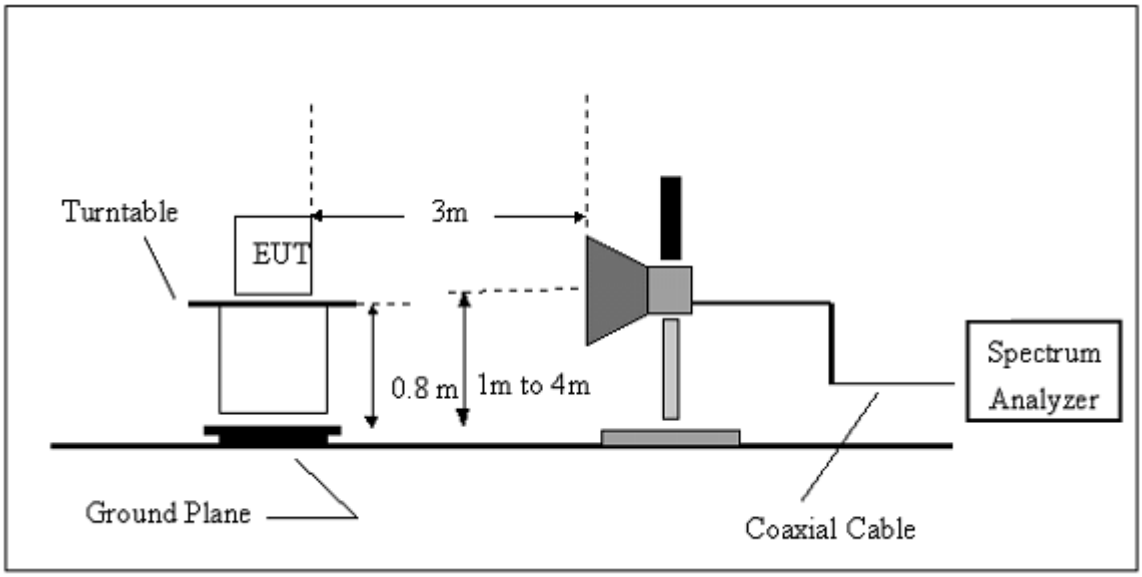
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.4 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.

4.5 TEST RESULTS

Below 30 MHz

EUT：	Transmitter	Model Name.：	HW-399M
Temperature：	23 ℃	Relative Humidity：	50%
Pressure：	1010hPa	Polarization：	---
Test Voltage：	DC 5V		
Test Mode ：	TX Mode		

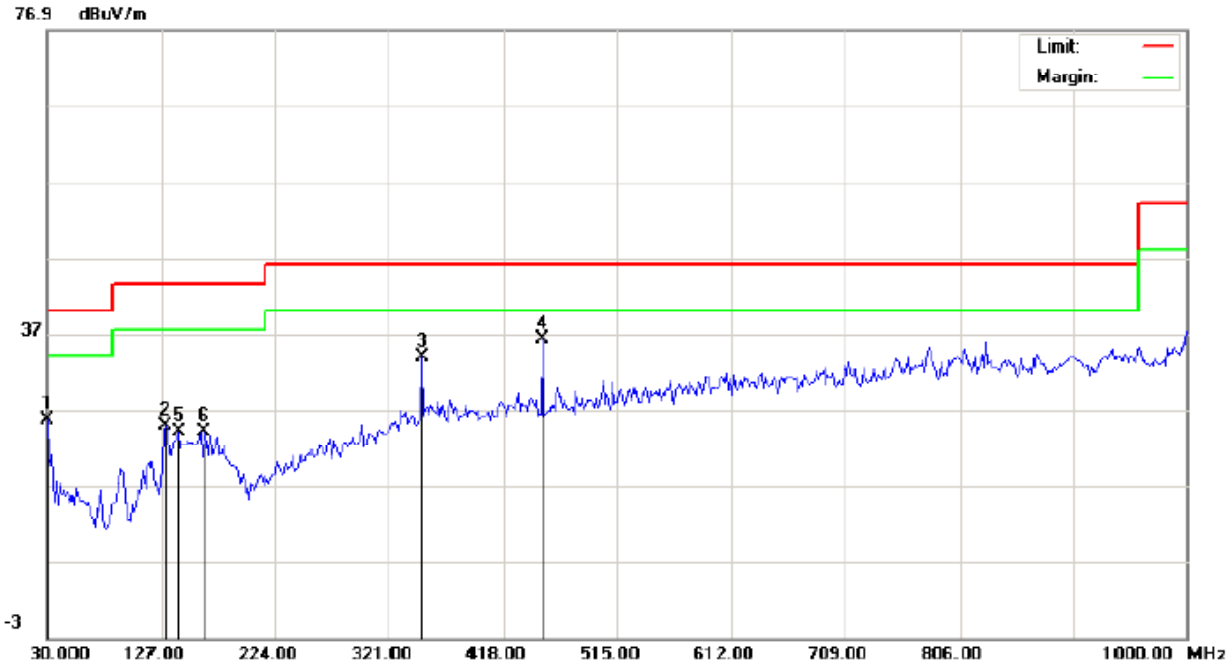
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

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 (specific distance/test distance)(dB);

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



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Transmitter
M/N: HW-399M
Mode: TX Low Channel
Note:

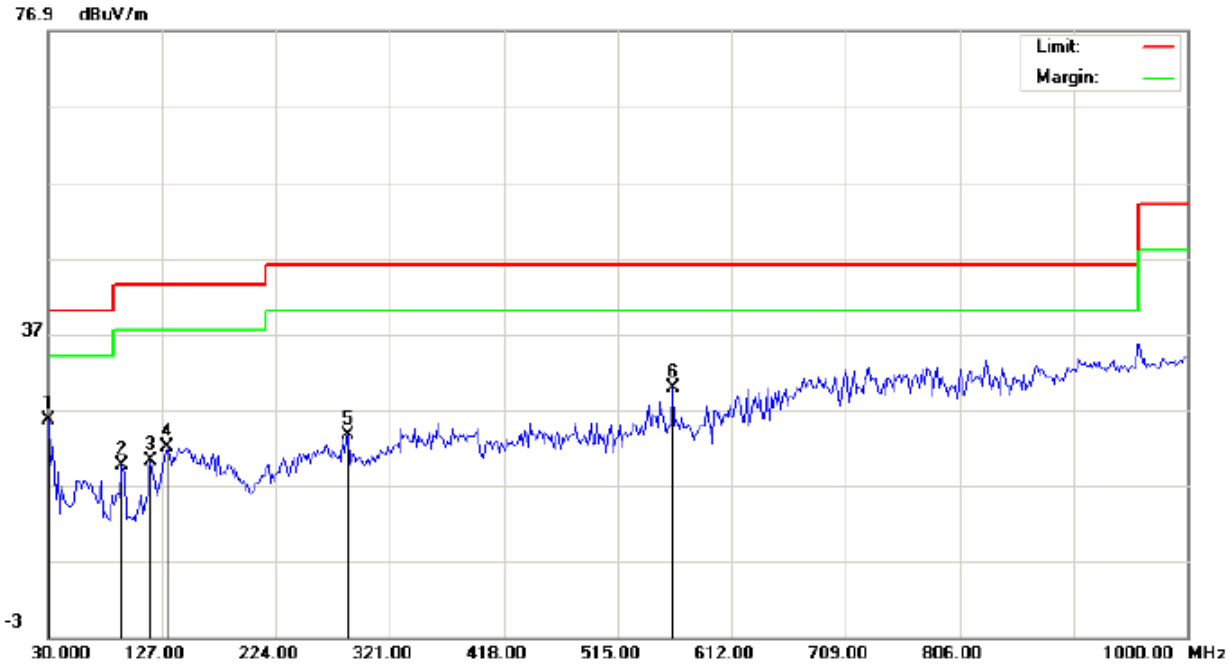
Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		30.0000	29.72	-4.20	25.52	40.00	-14.48	peak			
2		130.2332	13.66	11.13	24.79	43.50	-18.71	peak			
3		348.4833	15.23	18.64	33.87	46.00	-12.13	peak			
4	*	451.9500	15.68	20.61	36.29	46.00	-9.71	peak			
5		141.5500	8.88	15.21	24.09	43.50	-19.41	peak			
6		164.1833	8.96	15.07	24.03	43.50	-19.47	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-LOW CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Transmitter
M/N: HW-399M
Mode: TX Low Channel
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

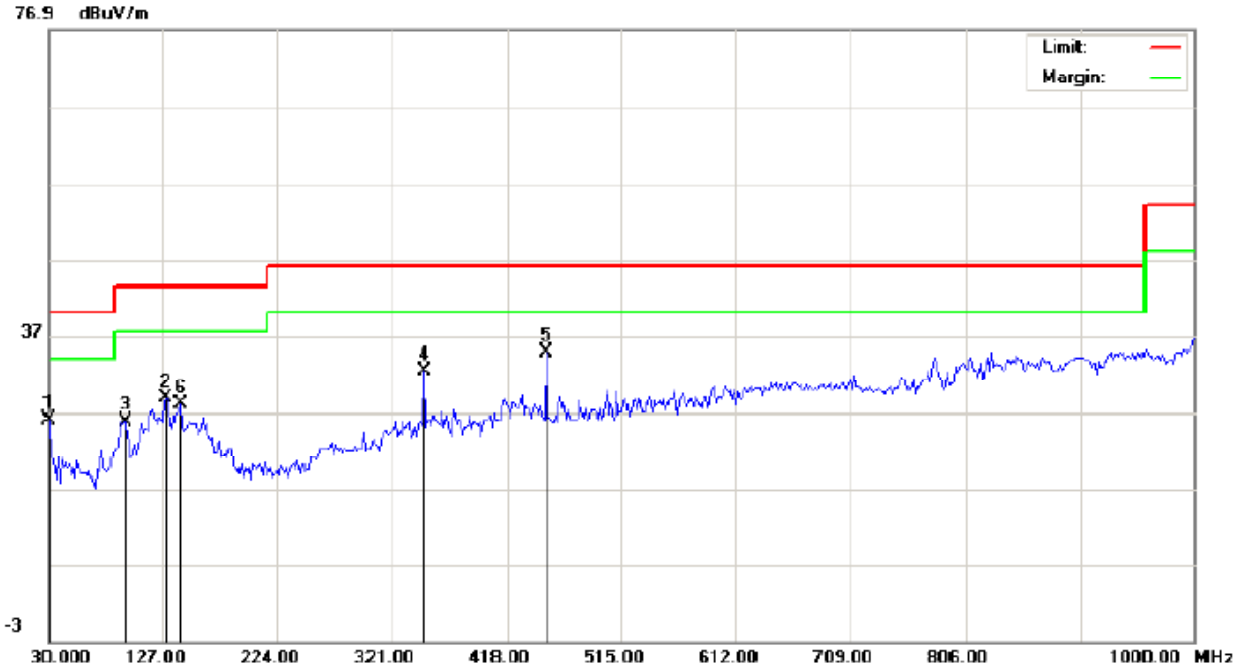
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	30.0000	29.74	-4.20	25.54	40.00	-14.46	peak			
2		93.0500	16.73	2.79	19.52	43.50	-23.98	peak			
3		117.3000	14.74	5.52	20.26	43.50	-23.24	peak			
4		131.8500	10.11	11.80	21.91	43.50	-21.59	peak			
5		285.4333	8.68	14.97	23.65	46.00	-22.35	peak			
6		561.8832	7.17	22.54	29.71	46.00	-16.29	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

2. The “Factor” valuecan be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHZ-1GHZ)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Transmitter
M/N: HW-399M
Mode: TX Middle Channel
Note:

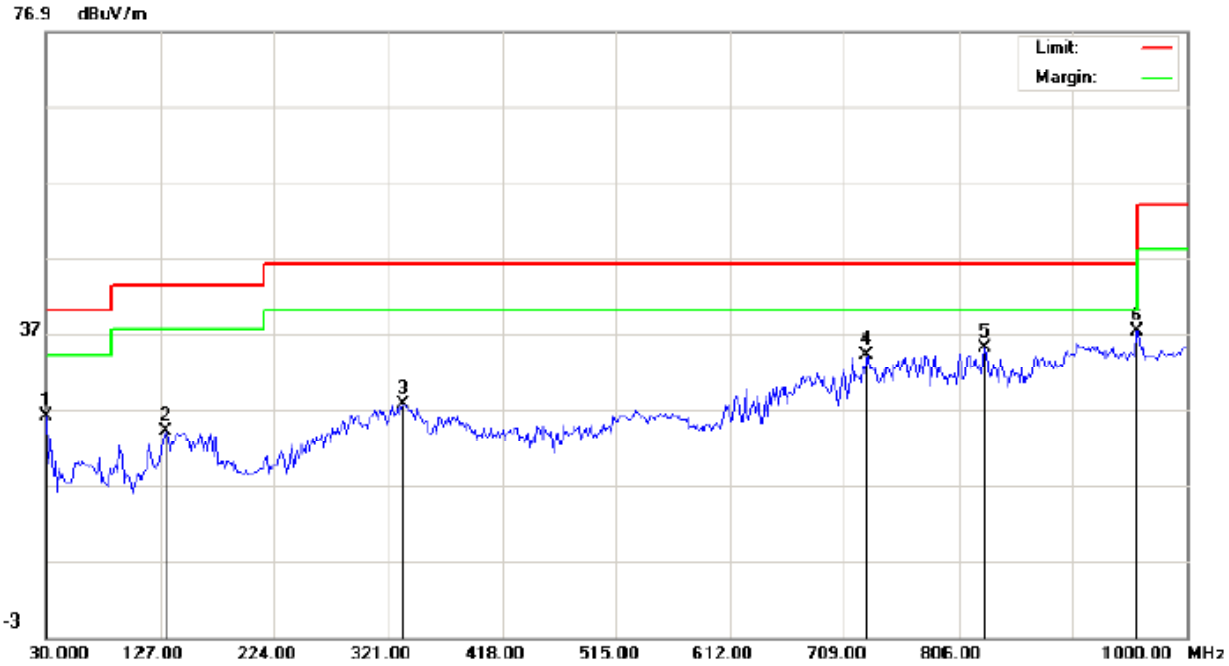
Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		30.0000	30.22	-4.20	26.02	40.00	-13.98	peak			
2		130.2332	17.66	11.13	28.79	43.50	-14.71	peak			
3		94.6667	24.48	1.42	25.90	43.50	-17.60	peak			
4		348.4832	13.73	18.64	32.37	46.00	-13.63	peak			
5	*	451.9499	14.18	20.61	34.79	46.00	-11.21	peak			
6		141.5500	12.88	15.21	28.09	43.50	-15.41	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)- MIDDLE CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Transmitter
M/N: HW-399M
Mode: TX Middle Channel
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

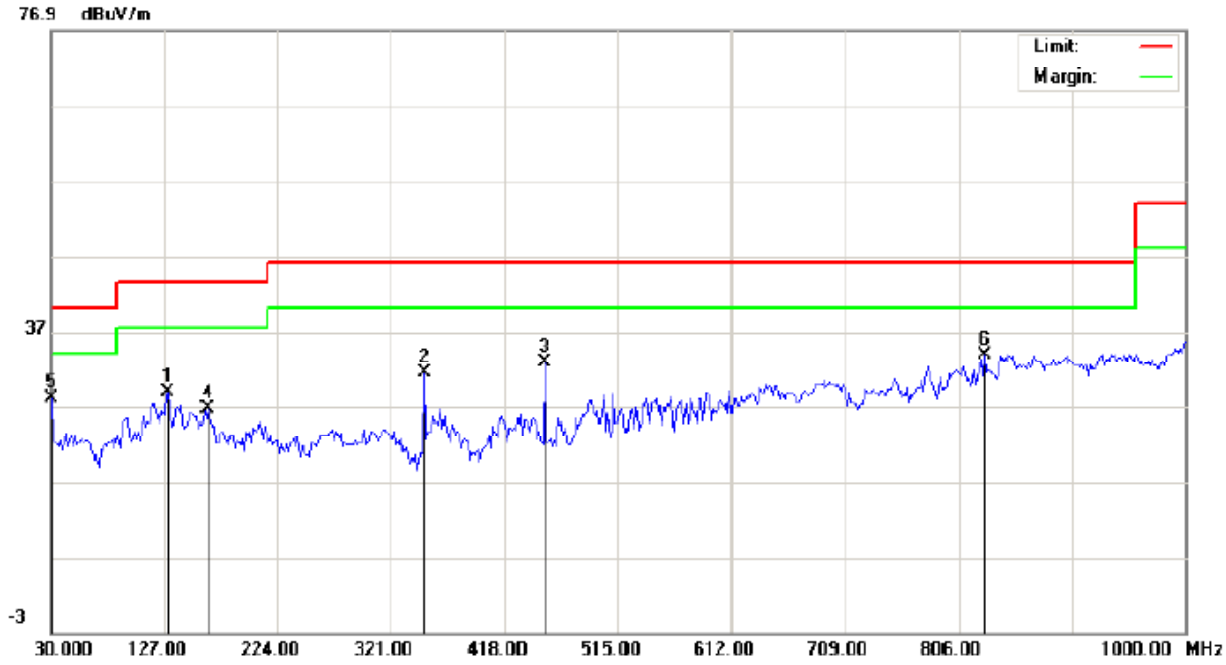
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		30.0000	30.24	-4.20	26.04	40.00	-13.96	peak			
2		131.8499	12.11	11.80	23.91	43.50	-19.59	peak			
3		333.9332	10.03	17.67	27.70	46.00	-18.30	peak			
4		728.3999	8.06	26.01	34.07	46.00	-11.93	peak			
5		828.6332	7.64	27.31	34.95	46.00	-11.05	peak			
6	*	957.9666	7.25	29.92	37.17	46.00	-8.83	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

2. The “Factor” valuecan be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Transmitter
M/N: HW-399M
Mode: TX High Channel
Note:

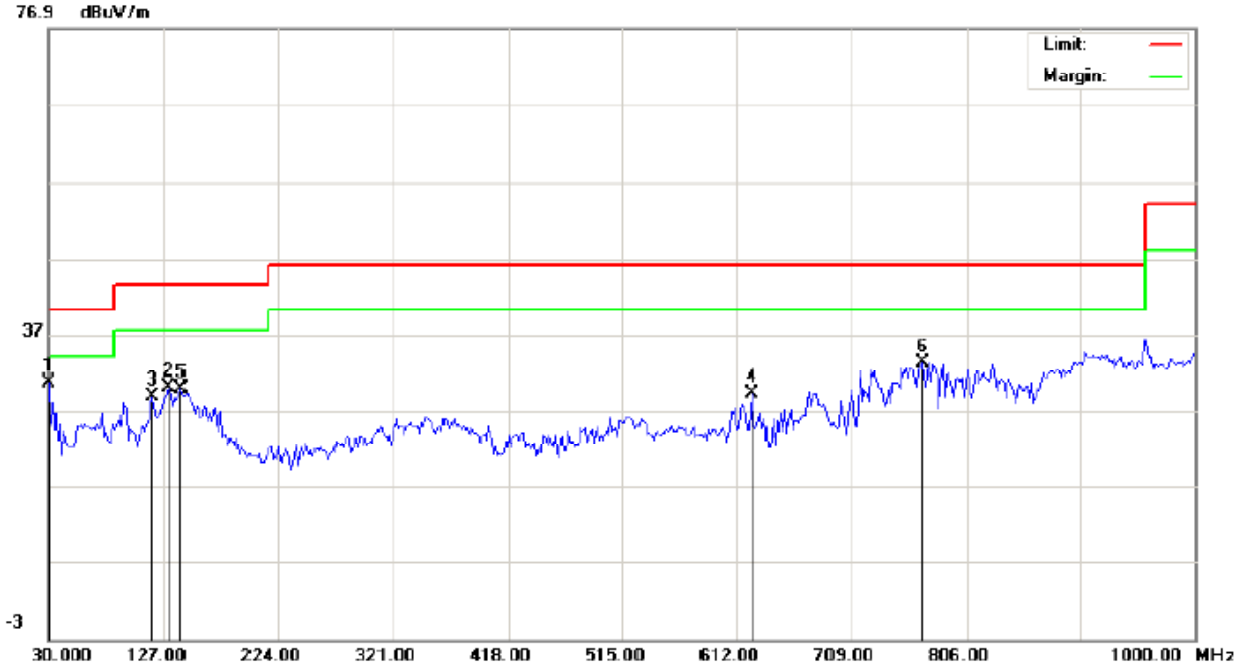
Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		130.2332	17.66	11.13	28.79	43.50	-14.71	peak			
2		348.4832	12.73	18.64	31.37	46.00	-14.63	peak			
3		451.9499	12.18	20.61	32.79	46.00	-13.21	peak			
4		164.1833	11.46	15.07	26.53	43.50	-16.97	peak			
5	*	30.0000	32.22	-4.20	28.02	40.00	-11.98	peak			
6		828.6331	6.55	27.31	33.86	46.00	-12.14	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ)-HIGH CHANNEL -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Transmitter
M/N: HW-399M
Mode: TX High Channel
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	30.0000	34.74	-4.20	30.54	40.00	-9.46	peak			
2		131.8498	18.11	11.80	29.91	43.50	-13.59	peak			
3		117.2998	23.24	5.52	28.76	43.50	-14.74	peak			
4		624.9333	5.88	23.29	29.17	46.00	-16.83	peak			
5		141.5500	14.68	15.21	29.89	43.50	-13.61	peak			
6		768.8165	6.26	26.89	33.15	46.00	-12.85	peak			

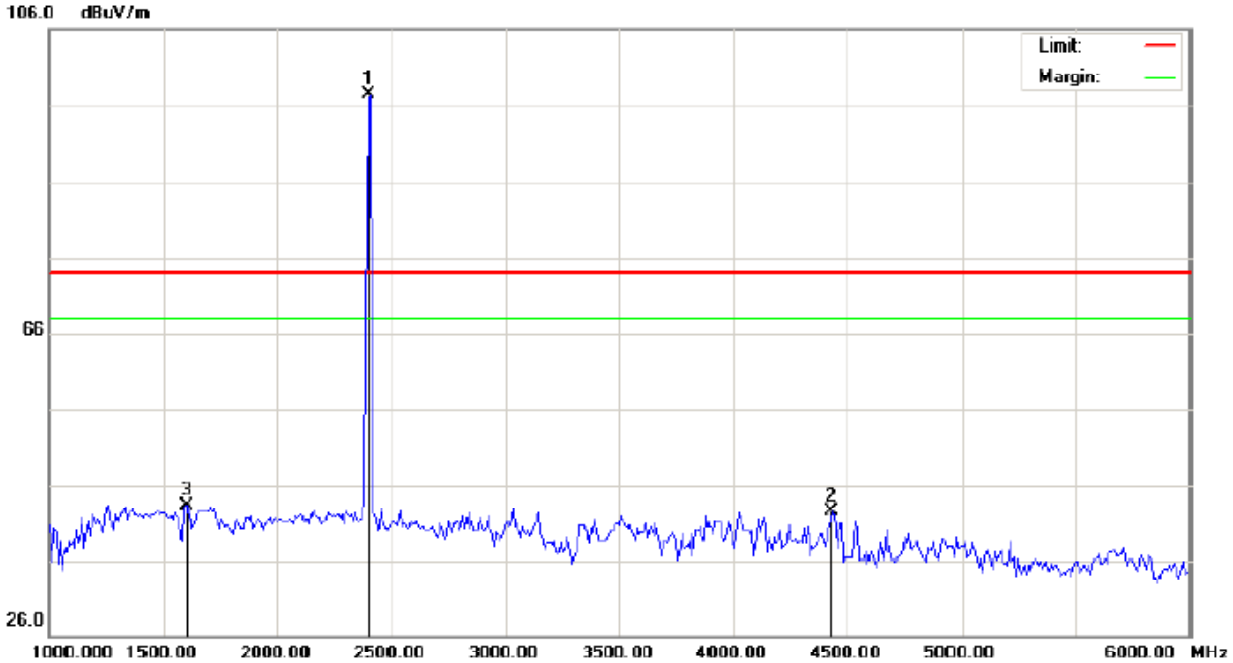
RESULT: PASS

Note: 1. Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

2. The “Factor” valuecan be calculated automatically by software of measurement system.

Above 1000 MHz

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-LOW CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: Low Channel TX
Note:

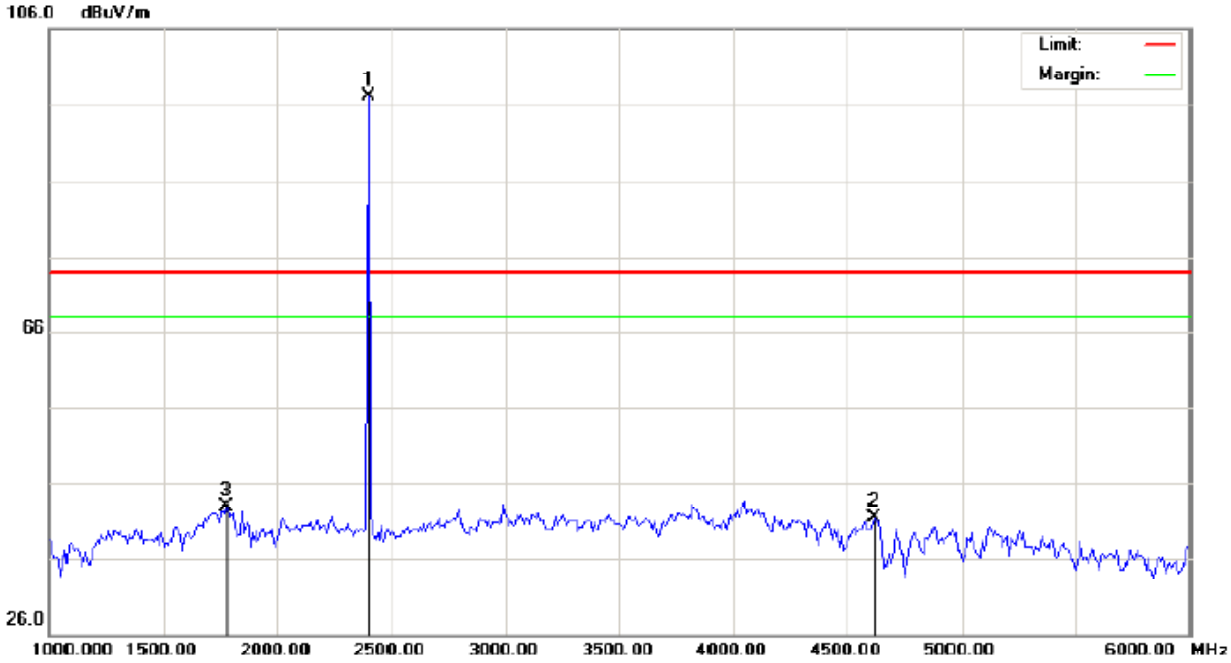
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2405.000	87.14	10.33	97.47	74.00	23.47	peak			
2		4433.333	34.55	8.00	42.55	74.00	-31.45	peak			
3		1600.000	37.66	5.67	43.33	74.00	-30.67	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-LOW CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: Low Channel TX
Note:

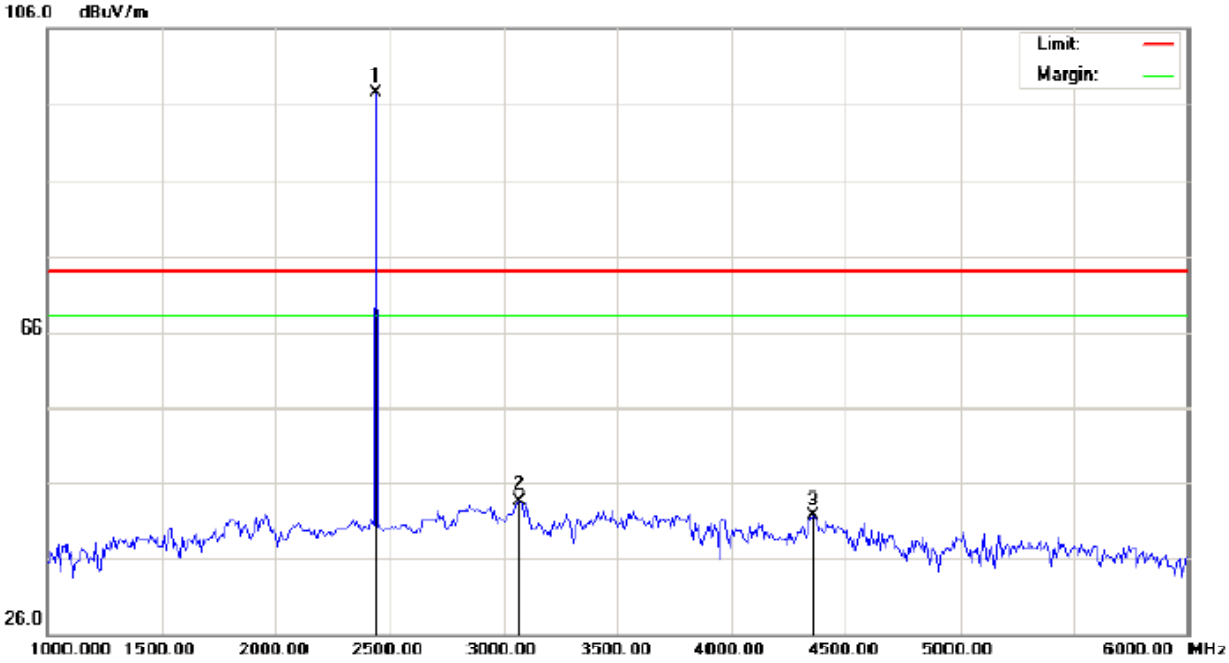
Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2405.000	86.70	10.32	97.02	74.00	23.02	peak			
2		4616.667	34.30	7.20	41.50	74.00	-32.50	peak			
3		1775.000	35.45	7.51	42.96	74.00	-31.04	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-MIDDLE CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: Middle Channel TX
Note:

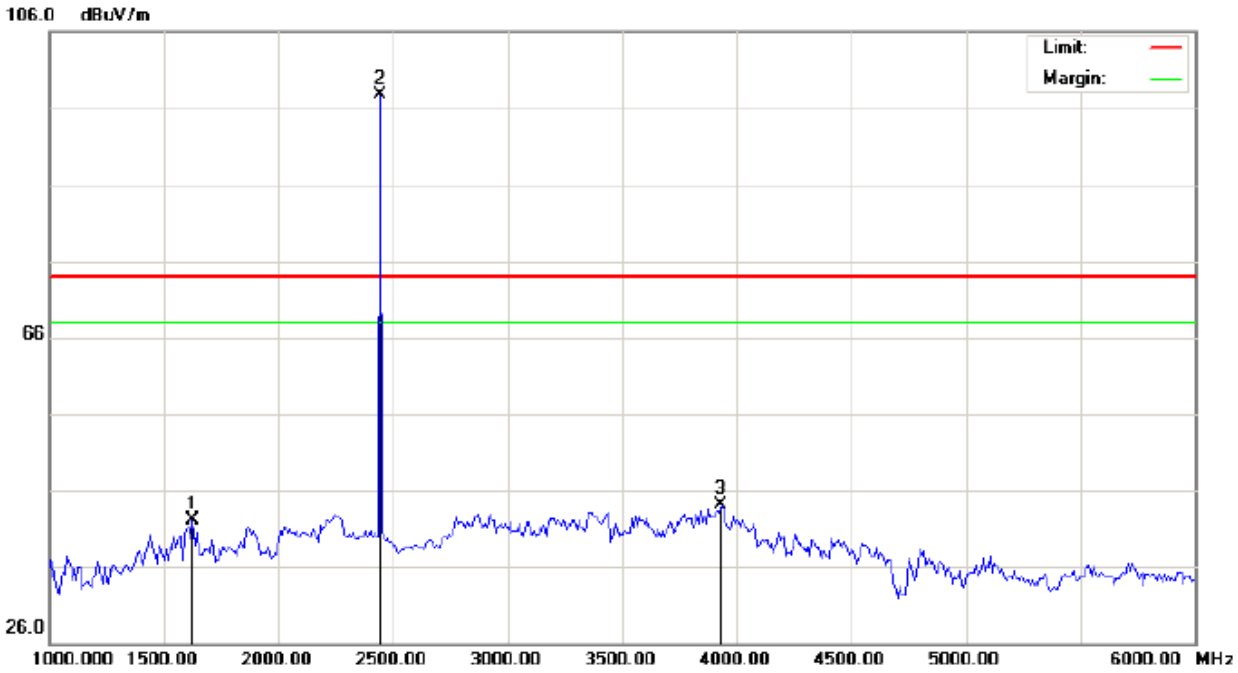
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2437.000	87.10	10.37	97.47	74.00	23.47	peak			
2		3066.667	32.08	11.70	43.78	74.00	-30.22	peak			
3		4358.333	32.51	9.24	41.75	74.00	-32.25	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)- MIDDLE CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: Middle Channel TX
Note:

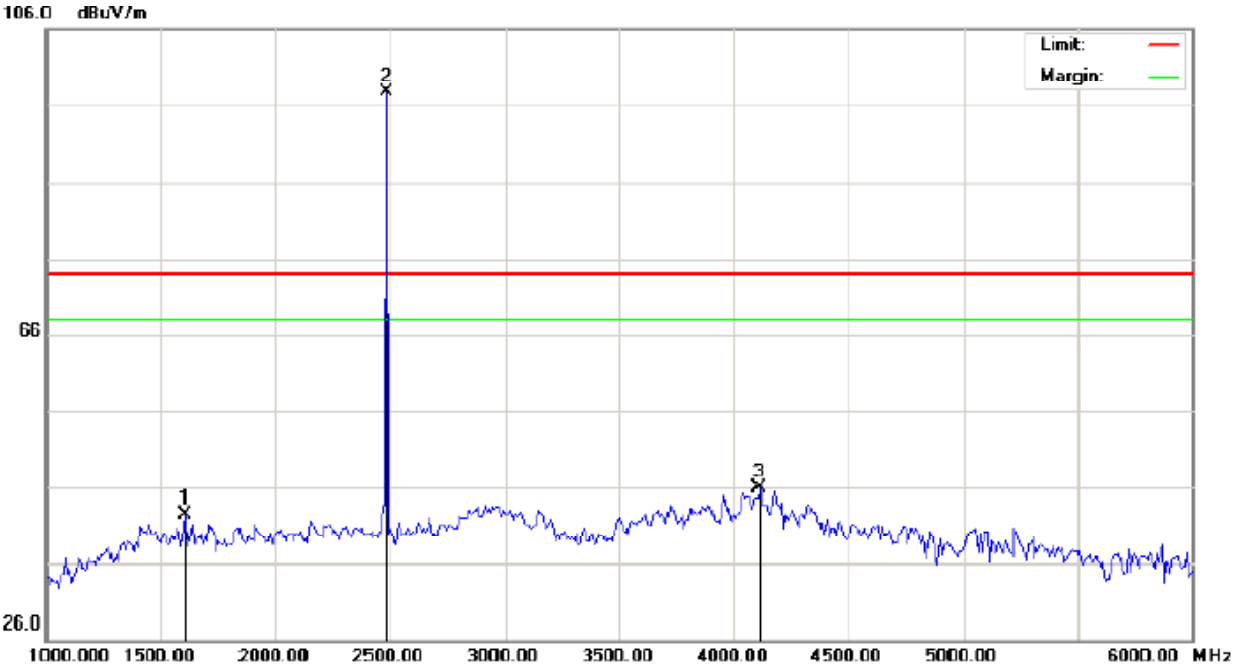
Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1625.000	36.25	5.94	42.19	74.00	-31.81	peak			
2	*	2437.000	87.40	10.37	97.77	74.00	23.77	peak			
3		3933.333	29.39	14.78	44.17	74.00	-29.83	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-HIGH CHANNEL-HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: High Channel TX
Note:

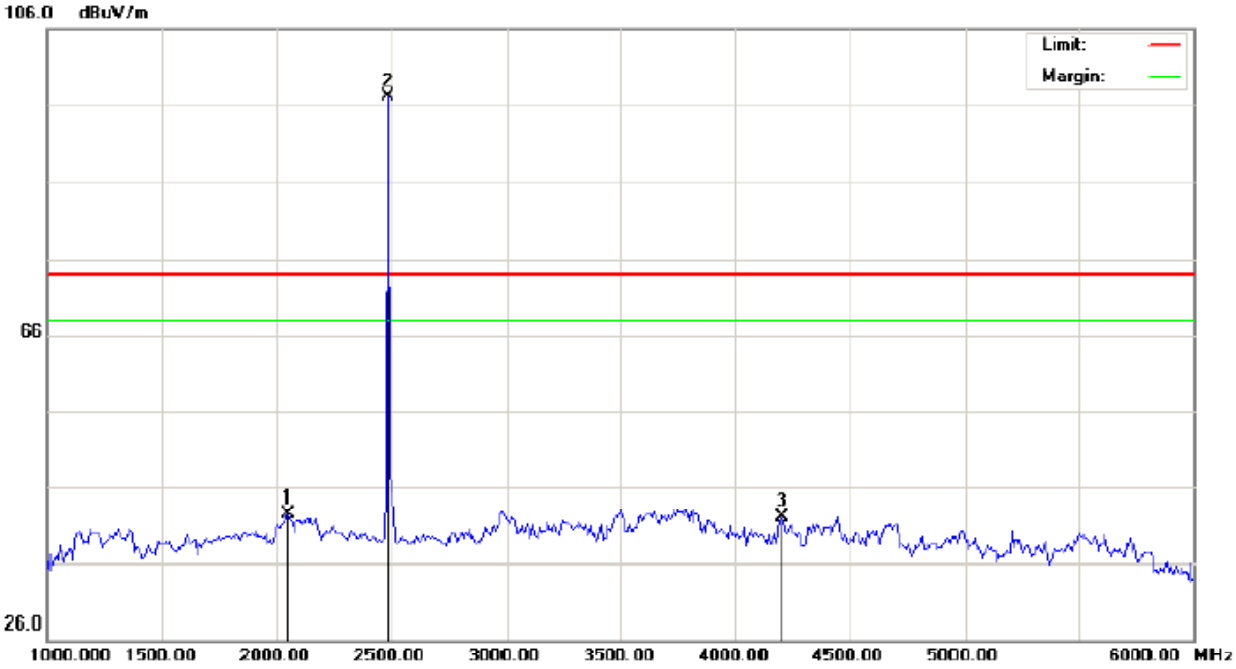
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1600.000	36.87	5.67	42.54	74.00	-31.46	peak			
2	*	2478.000	87.39	10.41	97.80	74.00	23.80	peak			
3		4108.333	32.44	13.39	45.83	74.00	-28.17	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics)-HIGH CHANNEL –VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: High Channel TX
Note:

Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2050.000	32.55	9.93	42.48	74.00	-31.52	peak			
2	*	2478.000	86.76	10.41	97.17	74.00	23.17	peak			
3		4200.000	30.14	11.87	42.01	74.00	-31.99	peak			

RESULT: PASS

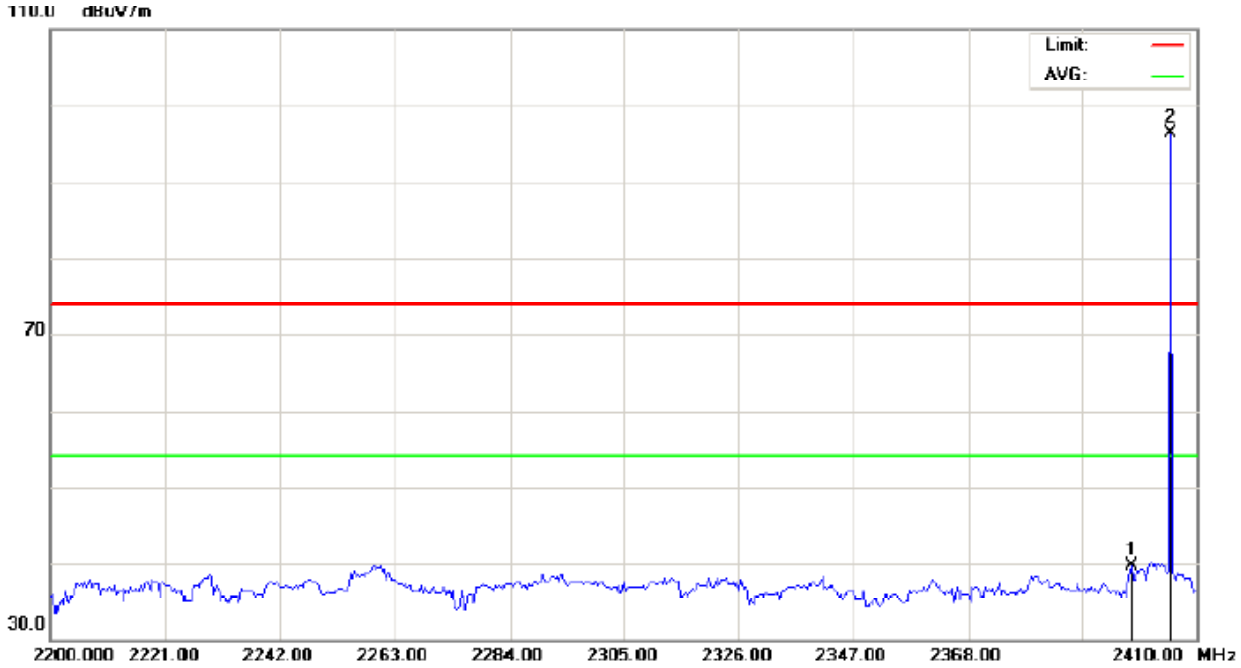
Note: 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor+ Cable loss-Amplifier gain, Margin=Measurement-Limit.

The “Factor” valuecan be calculated automatically by software of measurement system.

4.6 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



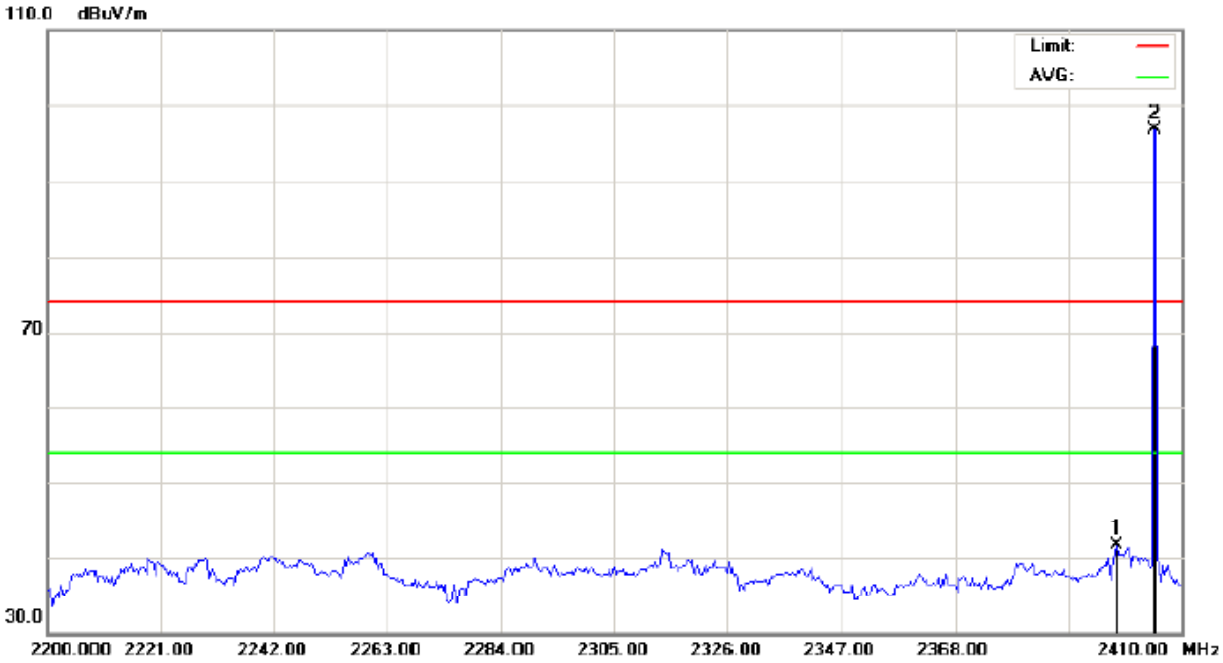
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: Low Channel TX
Note:

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2398.100	49.39	-9.68	39.71	74.00	-34.29	peak			
2	*	2405.000	106.02	-9.67	96.35	74.00	22.35	peak			

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



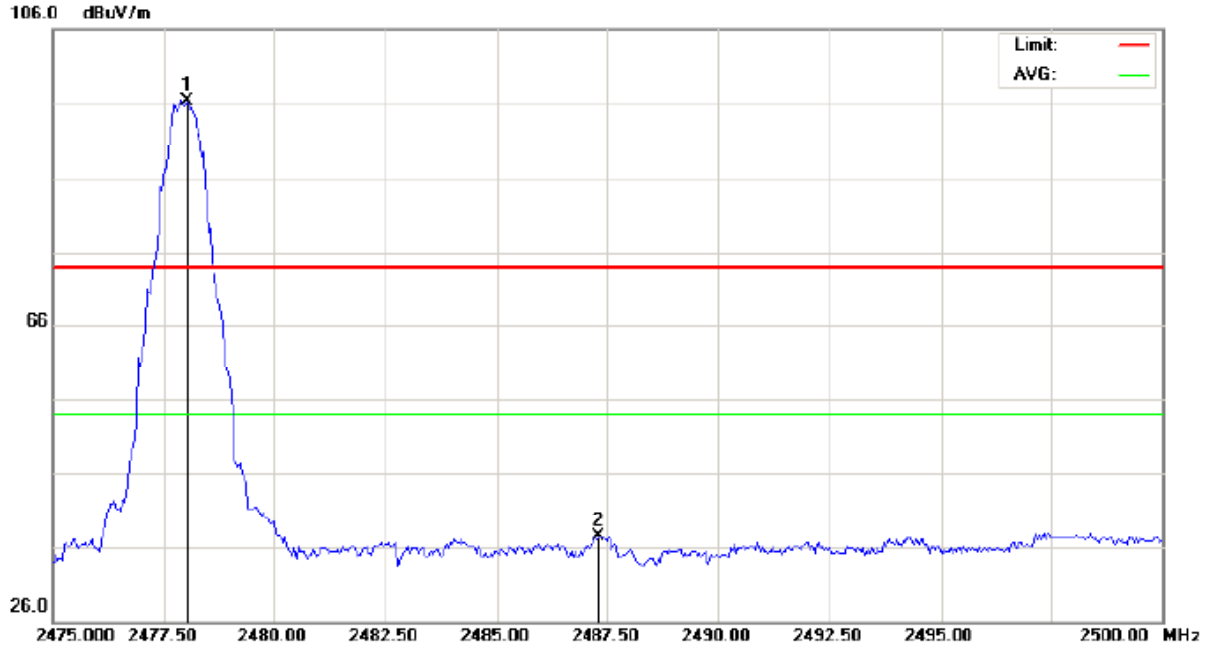
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: Low Channel TX
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2398.100	51.39	-9.68	41.71	74.00	-32.29	peak			
2	*	2405.000	106.52	-9.67	96.85	74.00	22.85	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Horizontal



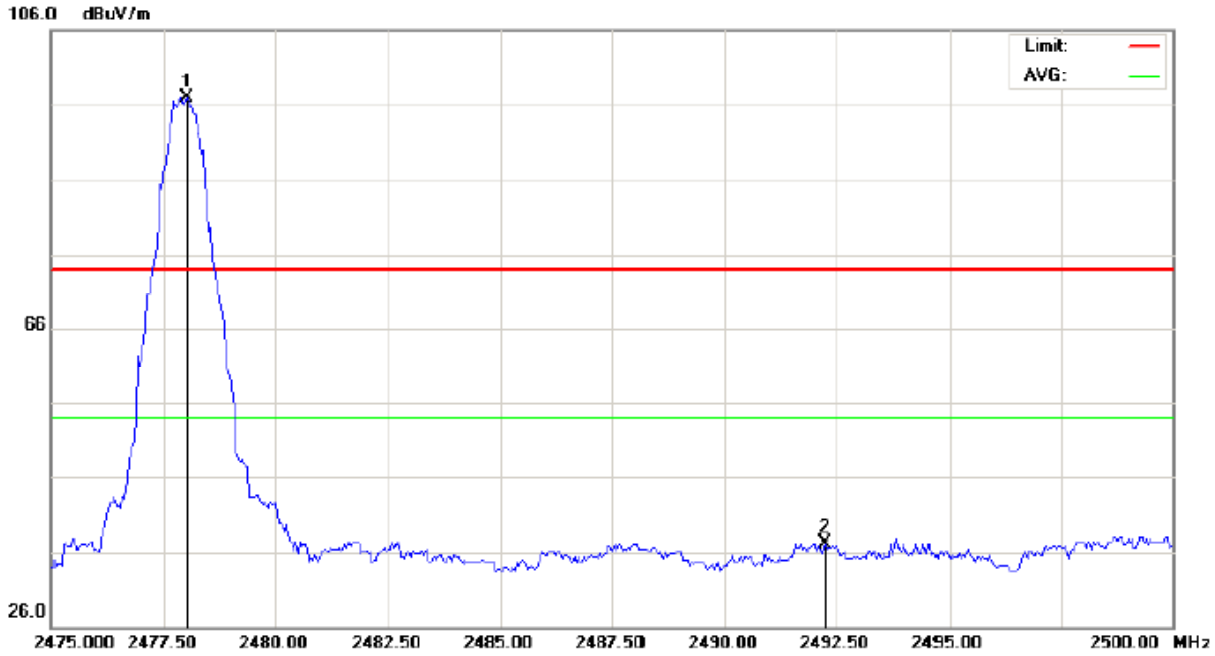
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: High Channel TX
Note:

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2478.000	105.97	-9.59	96.38	74.00	22.38	peak			
2		2487.333	47.07	-9.58	37.49	74.00	-36.51	peak			

TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Vertical



Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: Transmitter
M/N: HW-399M
Mode: High Channel TX
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2478.000	106.47	-9.59	96.88	74.00	22.88	peak			
2		2492.250	46.77	-9.58	37.19	74.00	-36.81	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

2. The “Factor” valuecan be calculated automatically by software of measurement system.

5. CONDUCTED SPURIOUS EMISSIONS

5.1 REQUIREMENT

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.2 TEST PROCEDURE

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

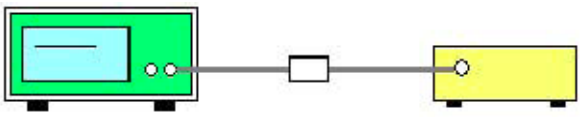
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/100 KHz
Trace-Mode:	Max hold

.

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2395 – 2405 MHz Upper Band Edge: 2478 – 2489 MHz
RB / VB (emission in restricted band)	100 KHz/100 KHz
Trace-Mode:	Max hold

5.3 TEST SETUP



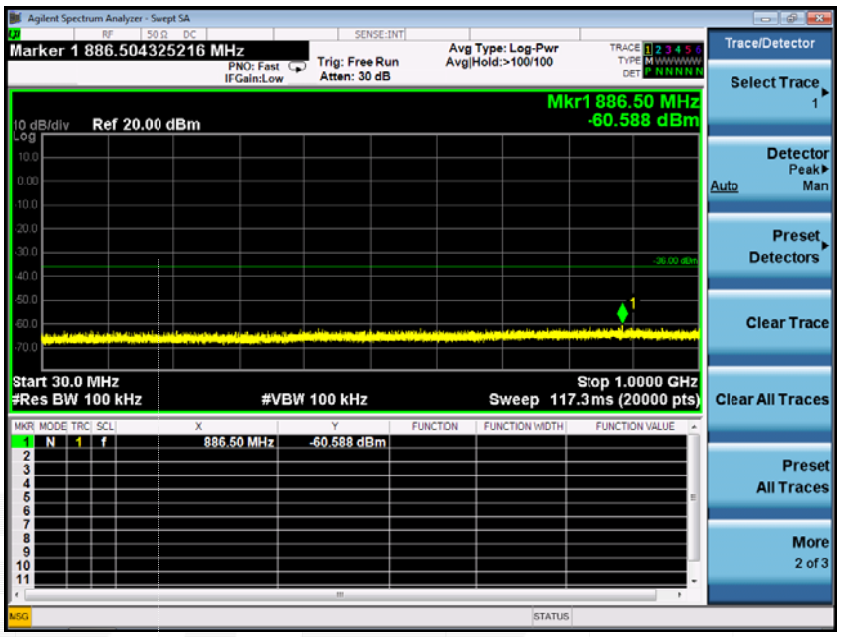
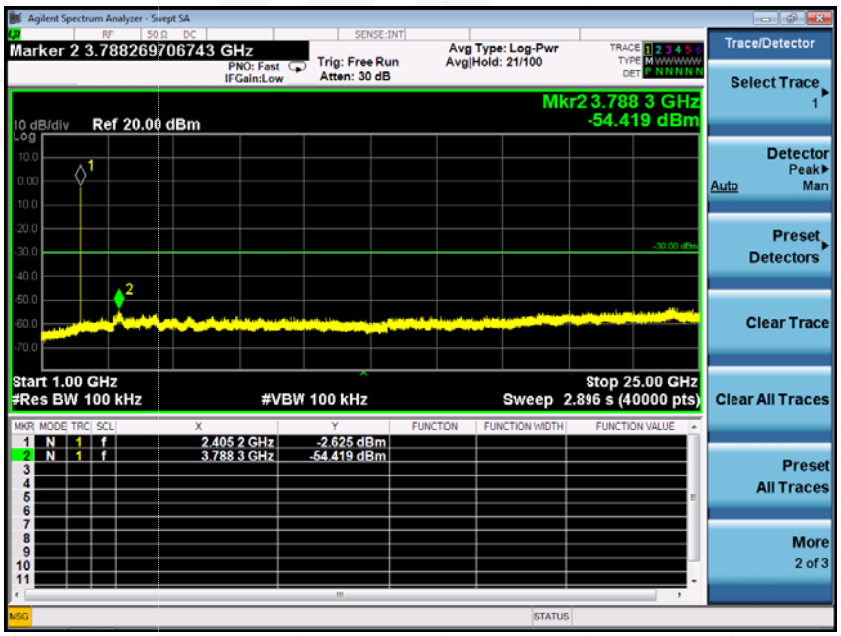
The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

5.4 EUT OPERATION CONDITIONS

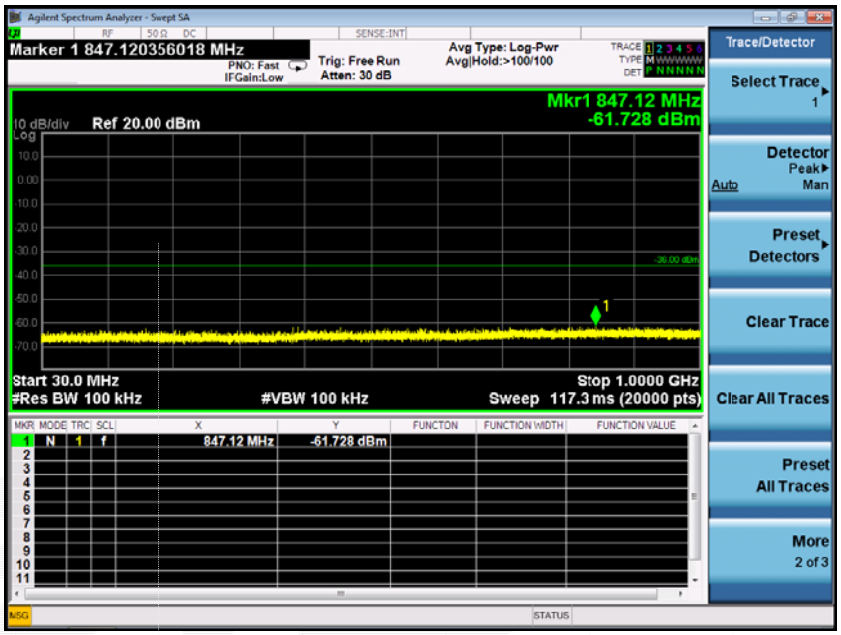
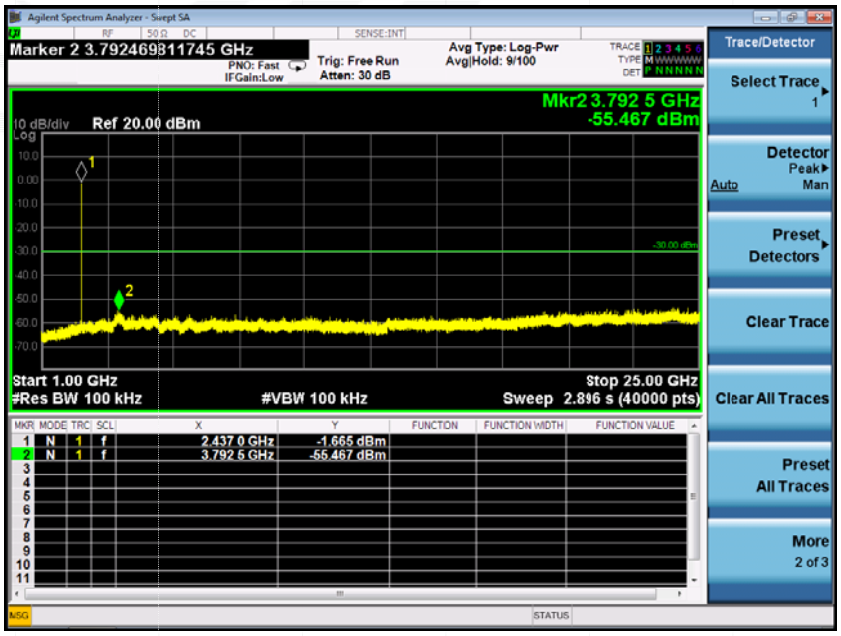
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

5.5 TEST RESULTS

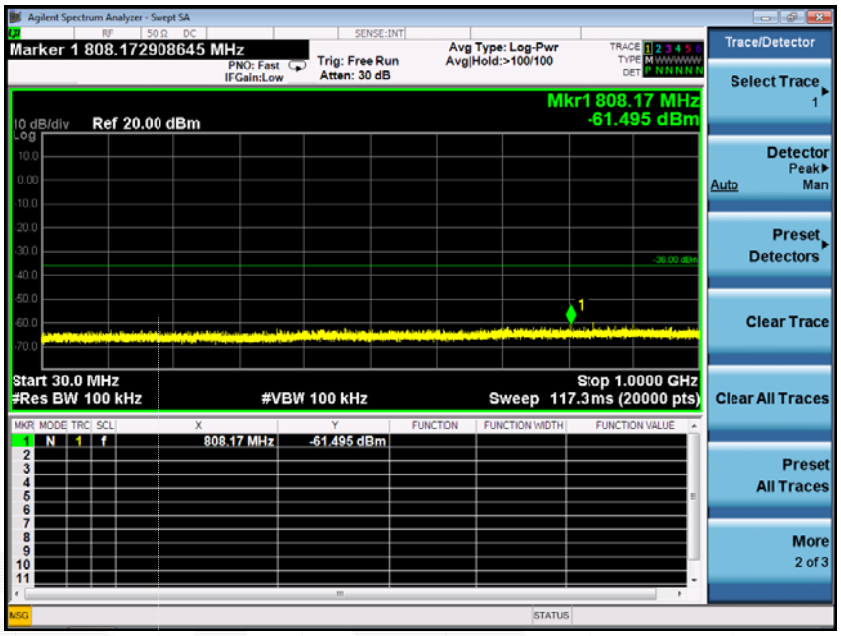
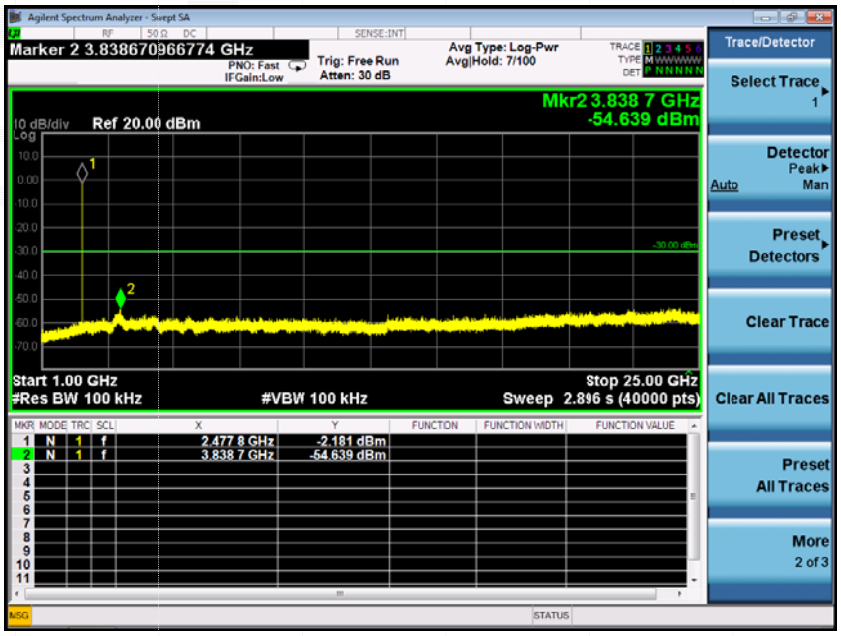
EUT：	Transmitter	Model Name ：	HW-399M
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	Low Channel(GFSK)		

GFSK_LCH_Graphs	
Puw	 

EUT：	Transmitter	Model Name ：	HW-399M
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	Middle Channel(GFSK)		

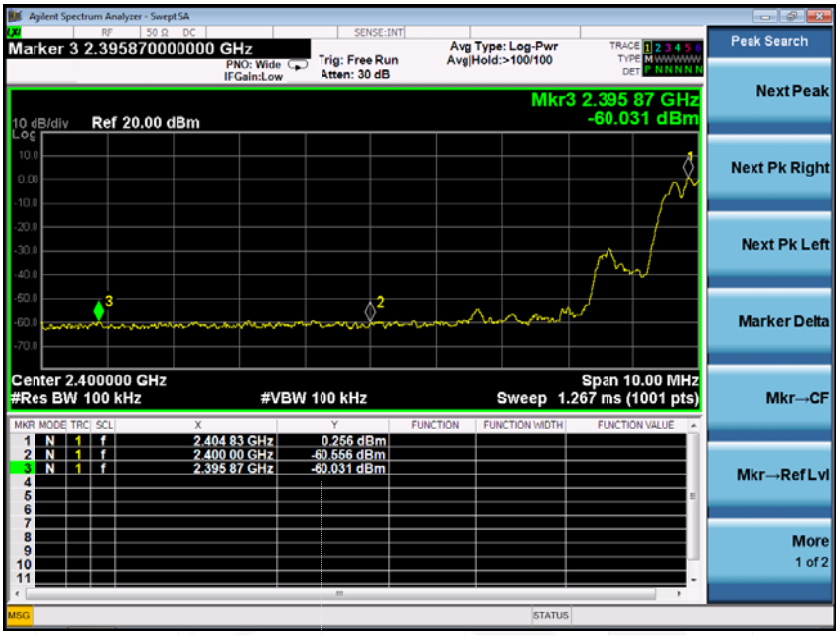
GFSK_MCH_Graphs	
Puw	 

EUT：	Transmitter	Model Name ：	HW-399M
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	High Channel(GFSK)		

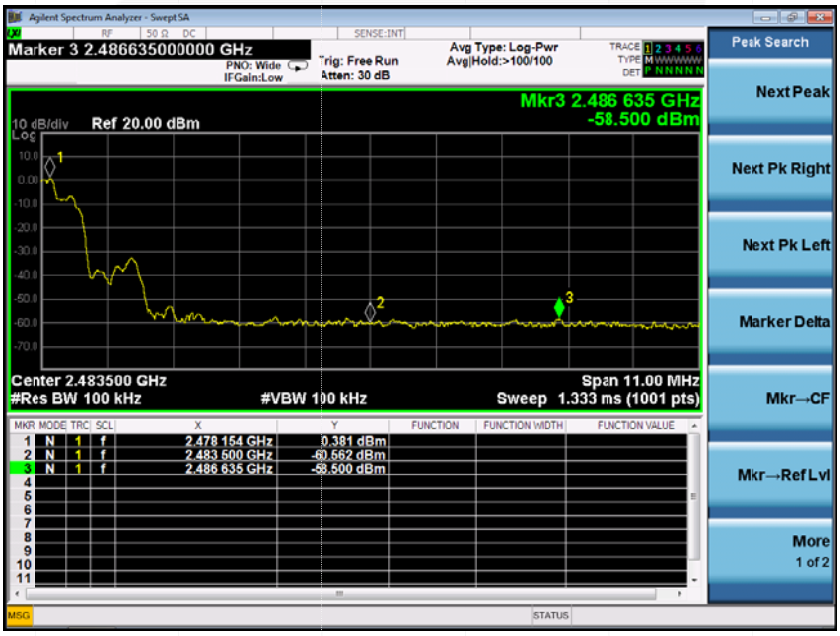
GFSK_HCH_Graphs	
Puw	 

For Band edge

Low Channel



High Channel



6. POWER SPECTRAL DENSITY TEST

6.1 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

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x 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.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 TEST SETUP

6.4 EUT OPERATION CONDITIONS

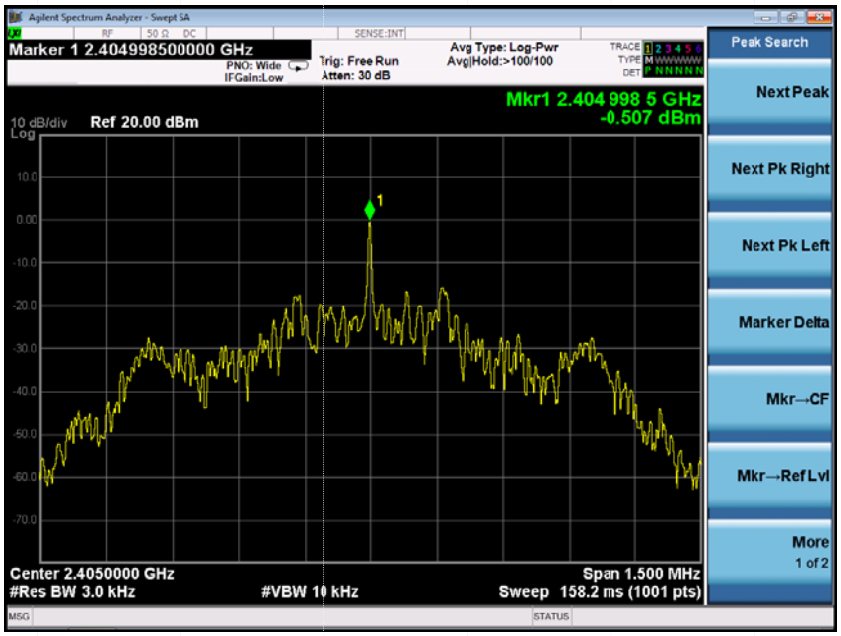
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

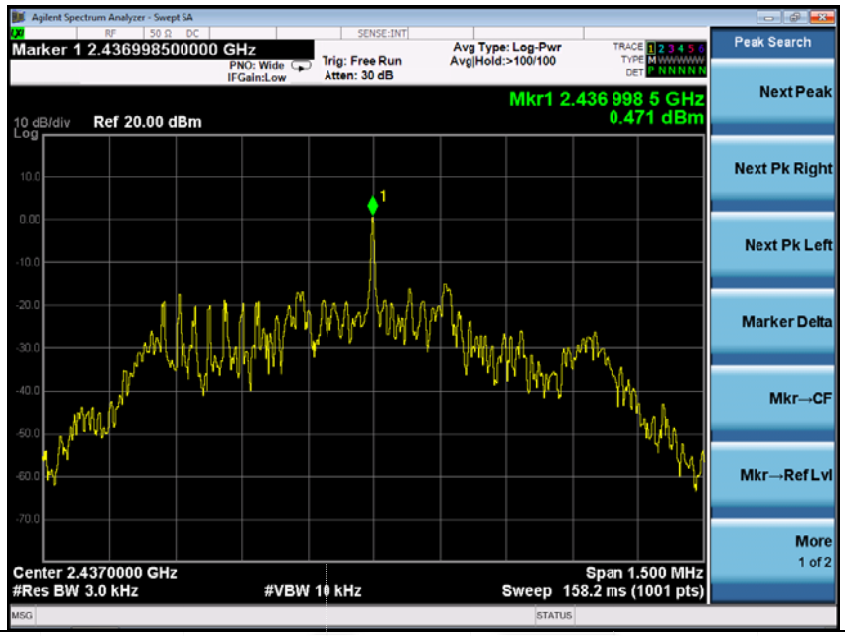
6.5 TEST RESULTS

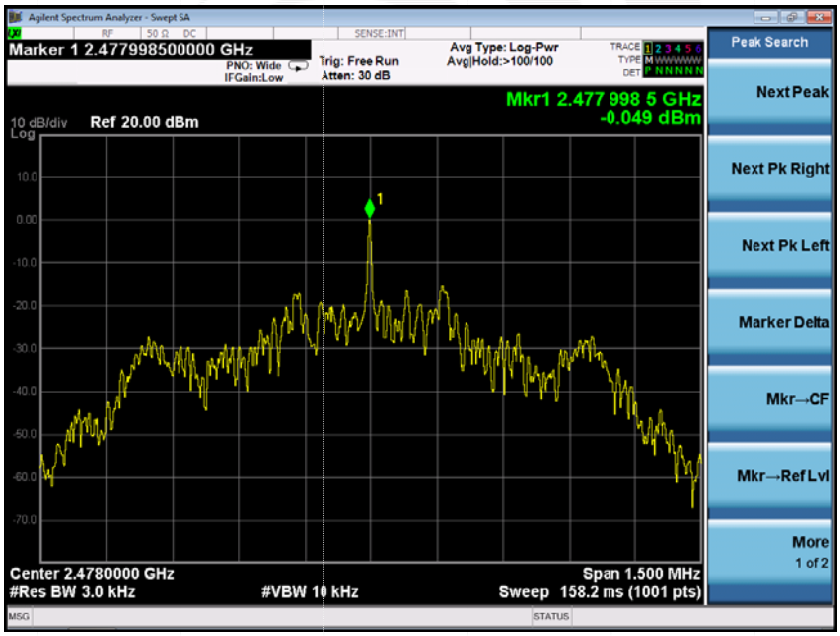
EUT：	Transmitter	Model Name ：	HW-399M
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	Mode 1		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2405 MHz	-0.507	8	**PASS**
2437 MHz	0.471	8	**PASS**
2478 MHz	-0.049	8	**PASS**

Low Channel



Middle Channel


High Channel


7. BANDWIDTH TEST

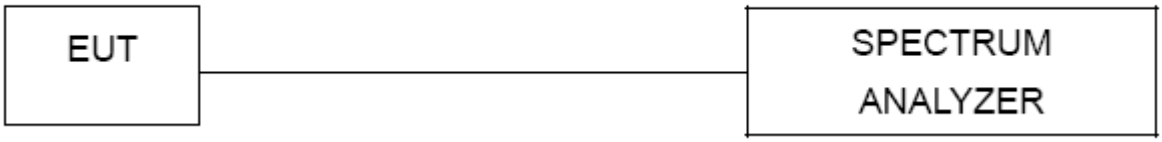
7.1 APPLIED PROCEDURES / LIMIT

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

7.2 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 ´ 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 d B relative to the maximum level measured in the fundamental emission.

7.3 TEST SETUP



7.4 EUT OPERATION CONDITIONS

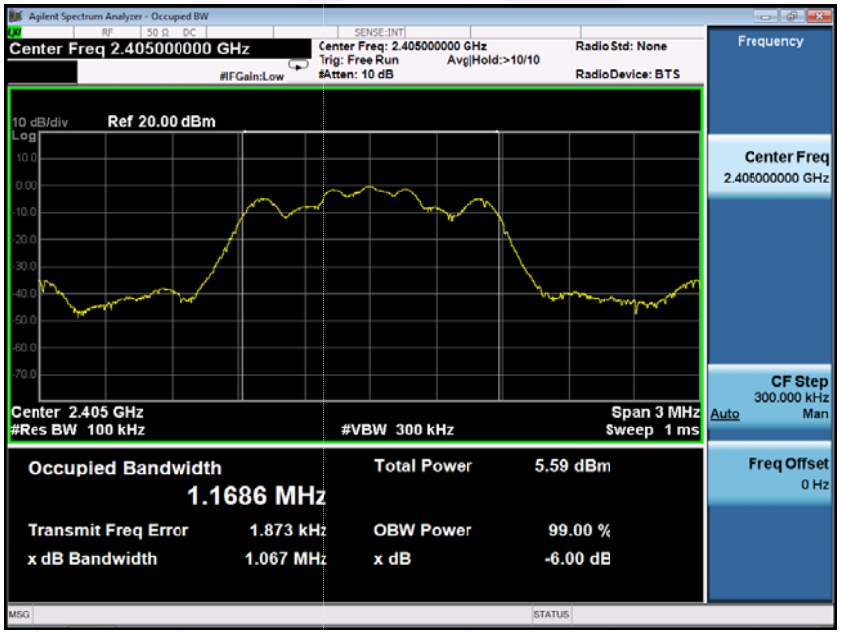
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

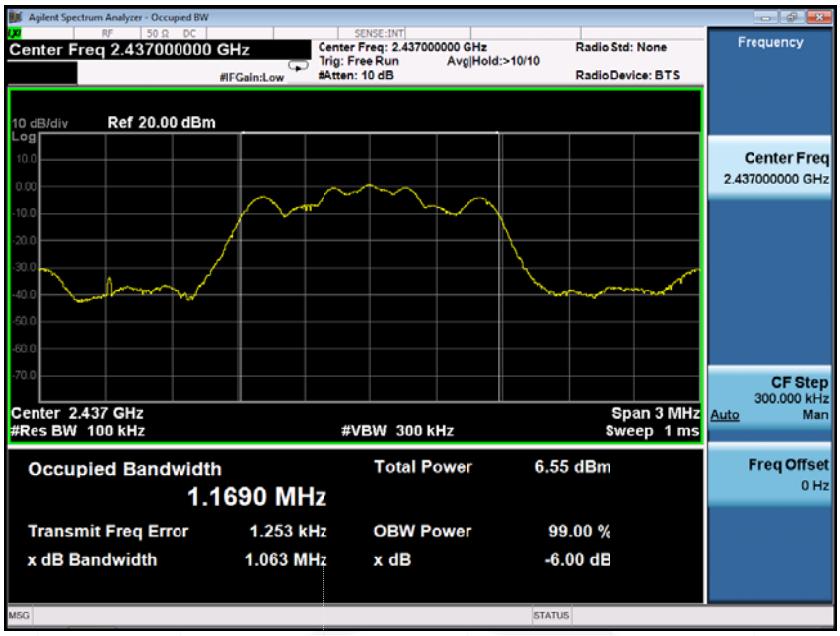
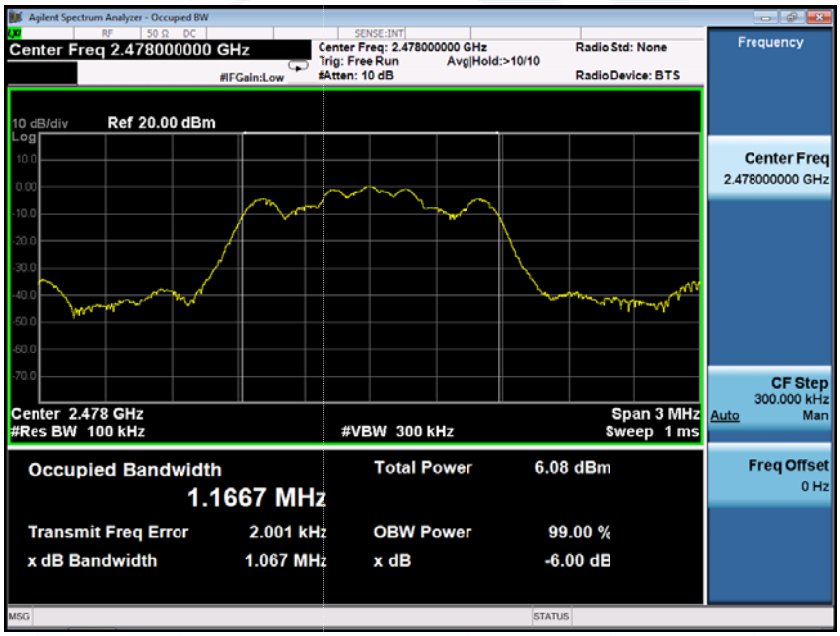
7.5 TEST RESULTS

EUT：	Transmitter	Model Name ：	HW-399M
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	Mode 1		

Frequency	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2405 MHz	1.067	>=500KHz	**PASS**
2437 MHz	1.063	>=500KHz	**PASS**
2478 MHz	1.067	>=500KHz	**PASS**

Low Channel



Middle Channel

High Channel


8. PEAK OUTPUT POWER TEST

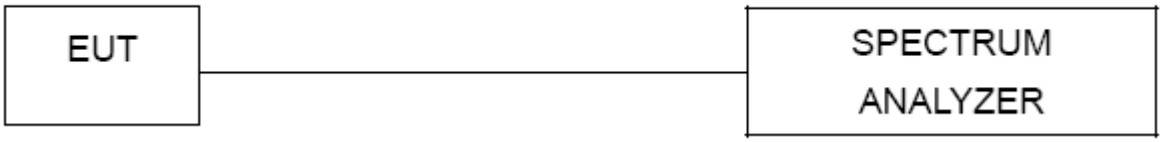
8.1 APPLIED PROCEDURES / LIMIT

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

8.2 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

8.3 TEST SETUP



8.4 EUT OPERATION CONDITIONS

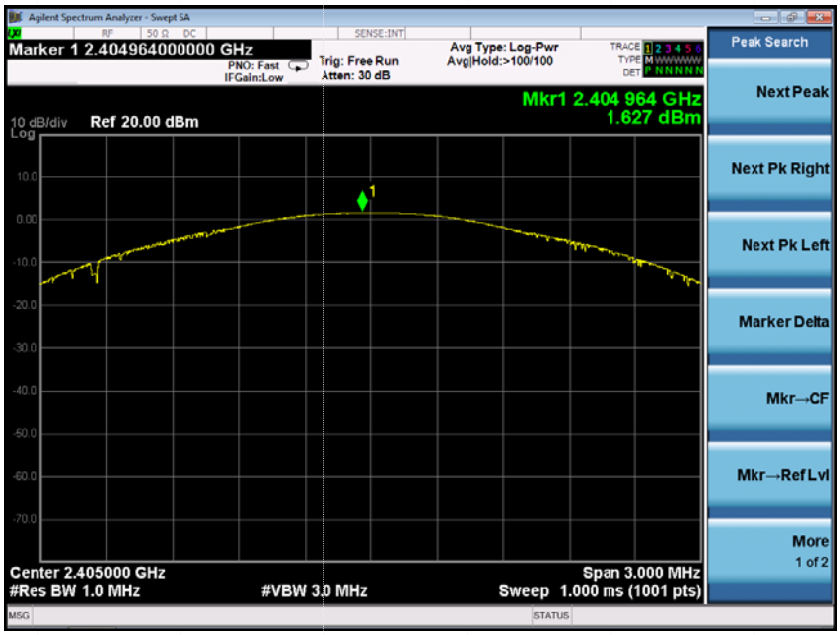
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

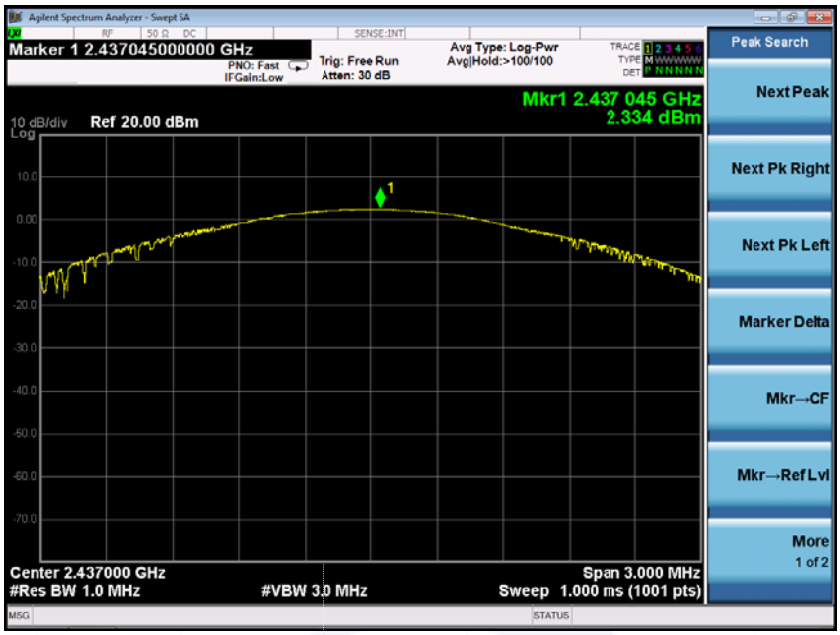
8.5 TEST RESULTS

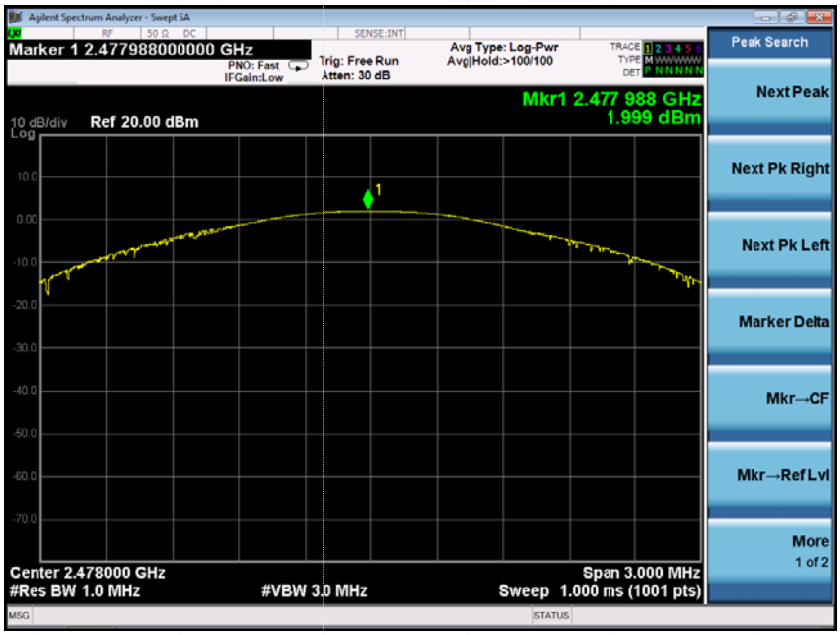
EUT：	Transmitter	Model Name ：	HW-399M
Temperature：	25℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	Mode 1		

TX Mode			
Test Channe	Frequency (MHz)	Peak Conducted Output Power (dBm)	LIMIT dBm
CH00	2405	1.627	30
CH34	2437	2.334	30
CH73	2478	1.999	30

Low Channel



Middle Channel


High Channel


9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

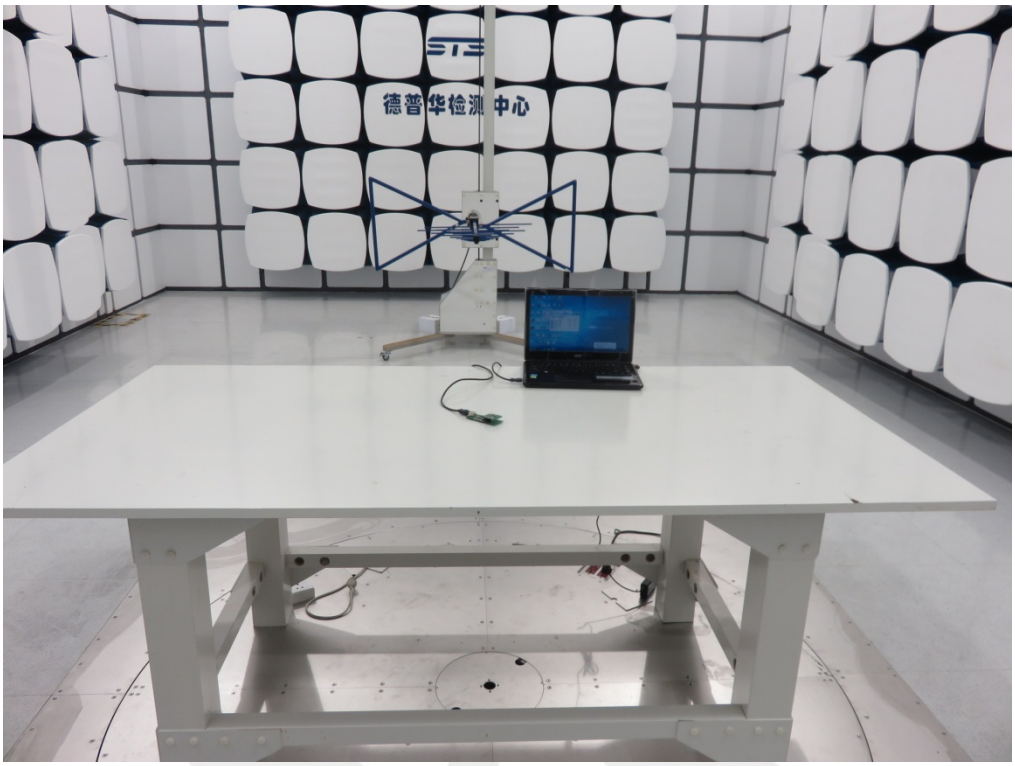
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

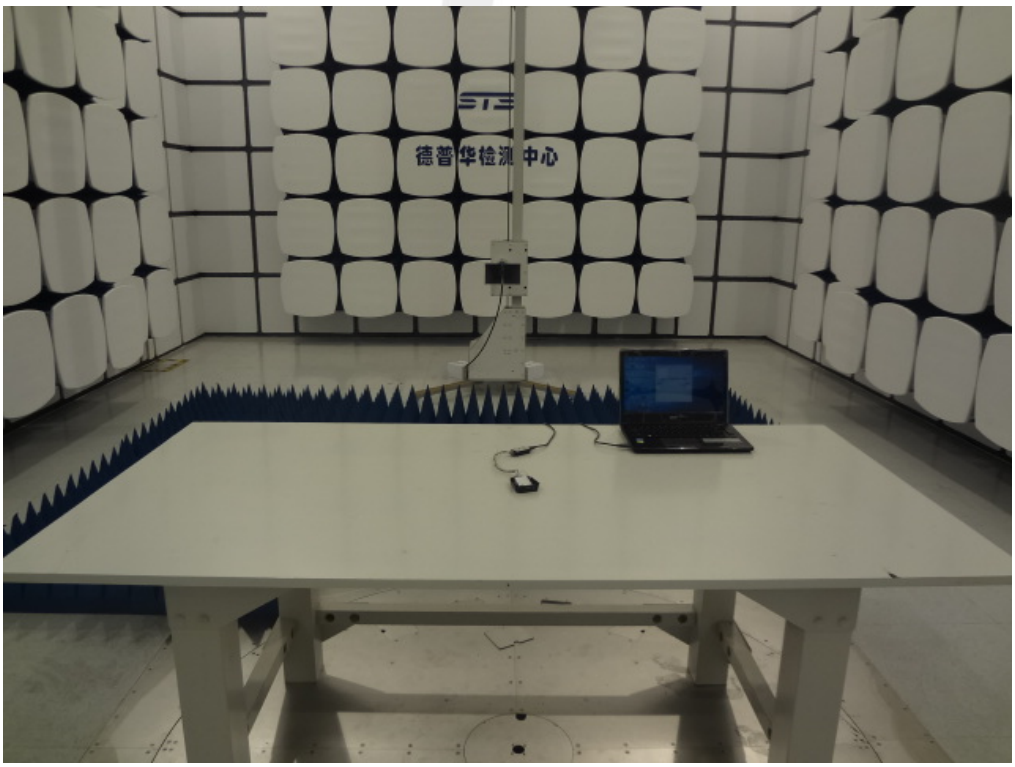
9.2 EUT ANTENNA

The EUT antenna is Chip antenna. It comply with the standard requirement.

10. EUT TEST PHOTO

Radiated Measurement Photos





Conducted Measurement Photos