FCC RADIO TEST REPORT
FCC ID: 2AMP8MultispeQ

Product: MULTISPEQ

Trade Name: MultispeQ

Model Name: MULTISPEQ 1.0

Serial Model: N/A

Report No.: POCE17070323RF4

Prepared for

PhotosynQ

325 East Grand River Ave, STE 318, East Lansing,Michigan 48864, USA

Prepared by

Shenzhen POCE Technology Co.,Ltd.

Room 502, Bldg. 1, Xinghua Garden, Baoan Road Xixiang, Baoan District,Shenzhen, China

TEST RESULT CERTIFICATION

Applicant's name ..... : PhotosynQ

Address ..... : 325 East Grand River Ave, STE 318, East Lansing,Michigan 48864, USA

Manufacture's Name..... : PhotosynQ

Address ..... : 325 East Grand River Ave, STE 318, East Lansing,Michigan 48864, USA

Product description

Product name ..... : MULTISPEQ

Model and/or type reference : MULTISPEQ 1.0

Serial Model ..... : N/A

Standards ..... : FCC Part15.247

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

This device described above has been tested by POCE, 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 ..... : 20 June 2017 ~ 02 July 2017

Date of Issue ..... : 02 July 2017

Test Result ..... : **Pass**

Testing Engineer : Ken Li

(Ken Li)

Technical Manager : Jimmy Yao

(Jimmy Yao)

Authorized Signatory : Terry

(Terry 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	

1.1 TEST FACILITY

Shenzhen POCE Technology Co.,Ltd.
Add.: Room 502, Bldg. 1, Xinghua Garden, Baoan Road Xixiang, Baoan District, Shenzhen, China
FCC Registration No.: 222278

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

<table>
<tr><td>Equipment</td><td>MULTISPEQ</td></tr>
<tr><td>Trade Name</td><td>MultispeQ</td></tr>
<tr><td>Model Name</td><td>MULTISPEQ 1.0</td></tr>
<tr><td>Serial Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a MULTISPEQ
<table>
<tr><td>Operation Frequency:</td><td>2402~2480 MHz</td></tr>
<tr><td>Modulation Type:</td><td>GFSK</td></tr>
<tr><td>Bluetooth</td><td>Bluetooth 4.0</td></tr>
<tr><td>Number Of Channel</td><td>40CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr>
<tr><td>Output Power(Peak):</td><td>-3.123dbm</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Adapter</td><td>Input: AC 100-240V; 50/60Hz
Output: DC 5V, 1A</td></tr>
<tr><td>Battery</td><td>DC 3.7V</td></tr>
</table>

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)	Channel	Frequency (MHz)
00	2402	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	19	2440	29	2460	39	2480

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	FPCB	N/A	1.0	BT Antenna

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 2402
Mode 2	TX 2440
Mode 3	TX 2480
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

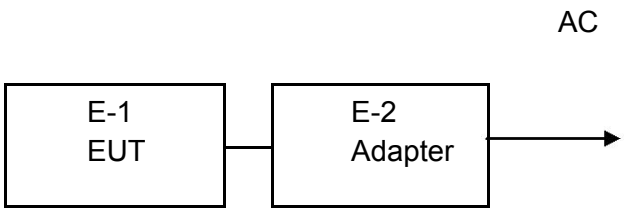
For Radiated Emission	
Final Test Mode	Description
Mode 1	TX 2402
Mode 2	TX 2440
Mode 3	TX 2480

Note:

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

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



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	MULTISPEQ	MultispeQ	MULTISPEQ 1.0	N/A	EUT
E-2	Adapter	Multia	08K8202	N/A	

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

Note:

(1) For detachable type I/O cable should be specified the length in cm in『Length』column.
(2) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.09.06	2017.09.05	1 year
2	Test Receiver	R&S	ESPI	101318	2016.09.07	2017.09.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2016.09.06	2017.09.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.09.07	2017.09.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.09.07	2017.09.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2016.09.06	2017.09.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.09.06	2017.09.05	1 year
8	Amplifier	EM	EM-30180	060538	2016.12.22	2017.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2016.09.08	2017.09.07	1 year
10	Power Meter	R&S	NRVS	100696	2016.09.06	2017.09.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.09.06	2017.09.05	1 year
12	Signal Analyzer	Agilent	N9020A	MY49100060	2016.09.06	2017.09.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.09.06	2017.09.05	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.08.24	2017.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.09.07	2017.09.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.09.07	2017.09.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.09.08	2017.09.07	1 year

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 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

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

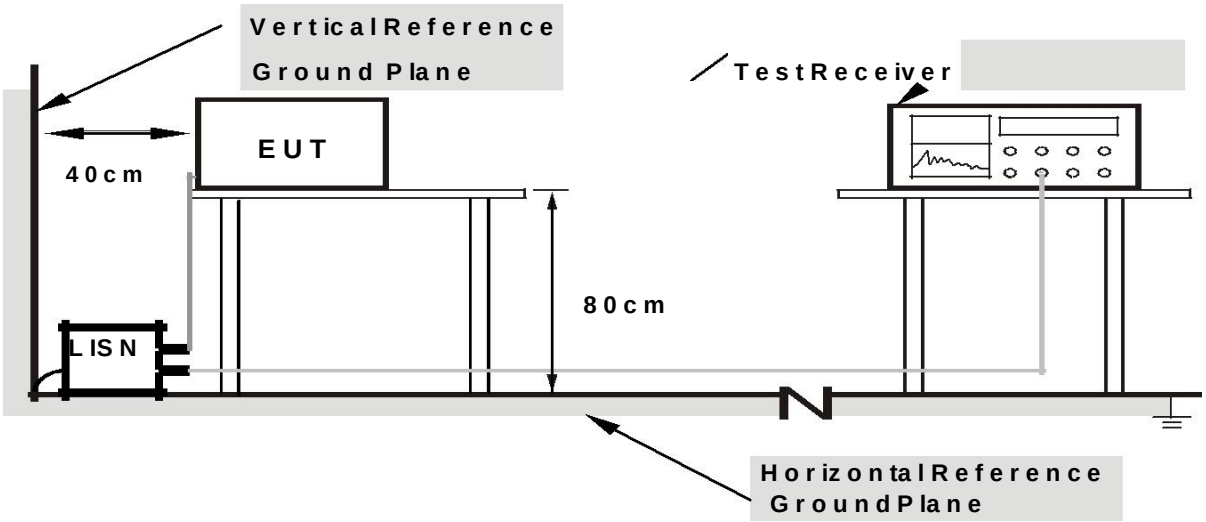
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 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 80cm 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.

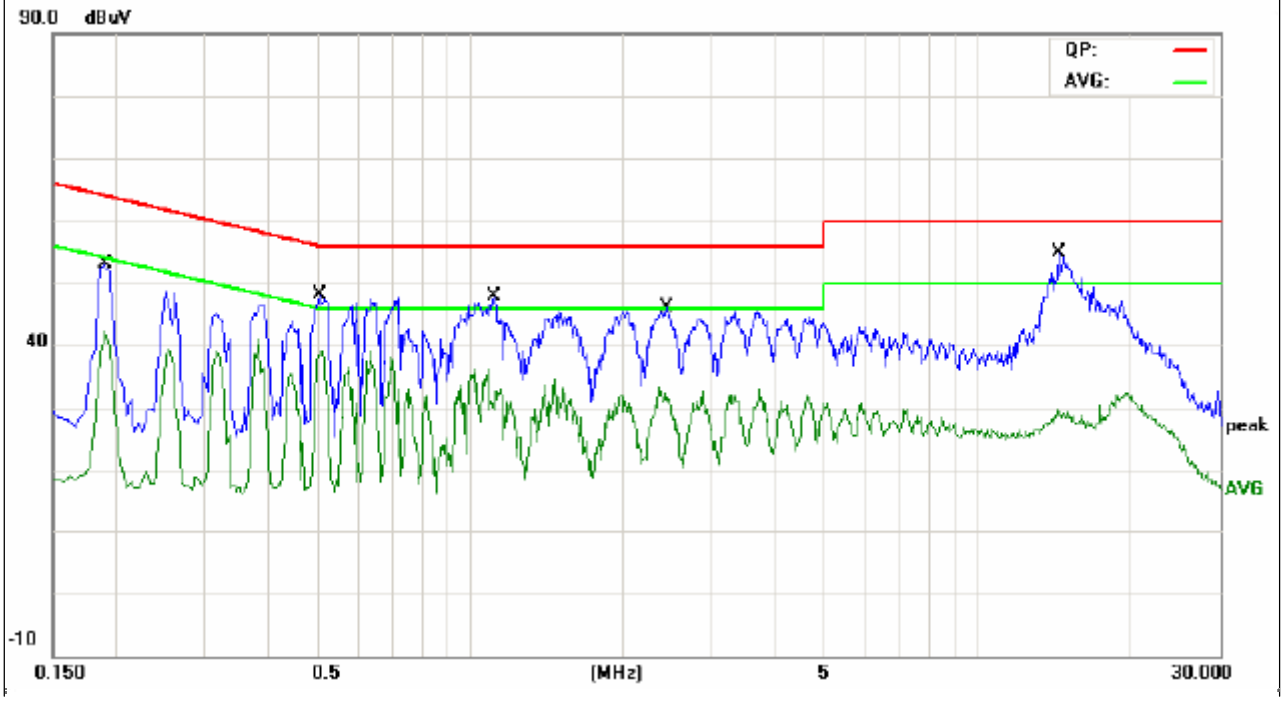
3.1.6 TEST RESULTS

EUT：	MultispeQ	Model Name ：	MULTISPEQ 1.0
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase ：	L
Test Voltage ：	AC 120V/60Hz	Test Mode：	Mode 4

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.1900	36.87	10.00	46.87	64.03	-17.16	QP
0.1900	31.16	10.00	41.16	54.03	-12.87	AVG
0.5060	34.63	10.02	44.65	56.00	-11.35	QP
0.5060	28.61	10.02	38.63	46.00	-7.37	AVG
1.1140	30.67	10.06	40.73	56.00	-15.27	QP
1.1140	19.17	10.06	29.23	46.00	-16.77	AVG
2.4380	28.88	10.05	38.93	56.00	-17.07	QP
2.4380	20.14	10.05	30.19	46.00	-15.81	AVG
14.4820	34.15	10.25	44.40	60.00	-15.60	QP
14.4820	16.25	10.25	26.50	50.00	-23.50	AVG

Remark:

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



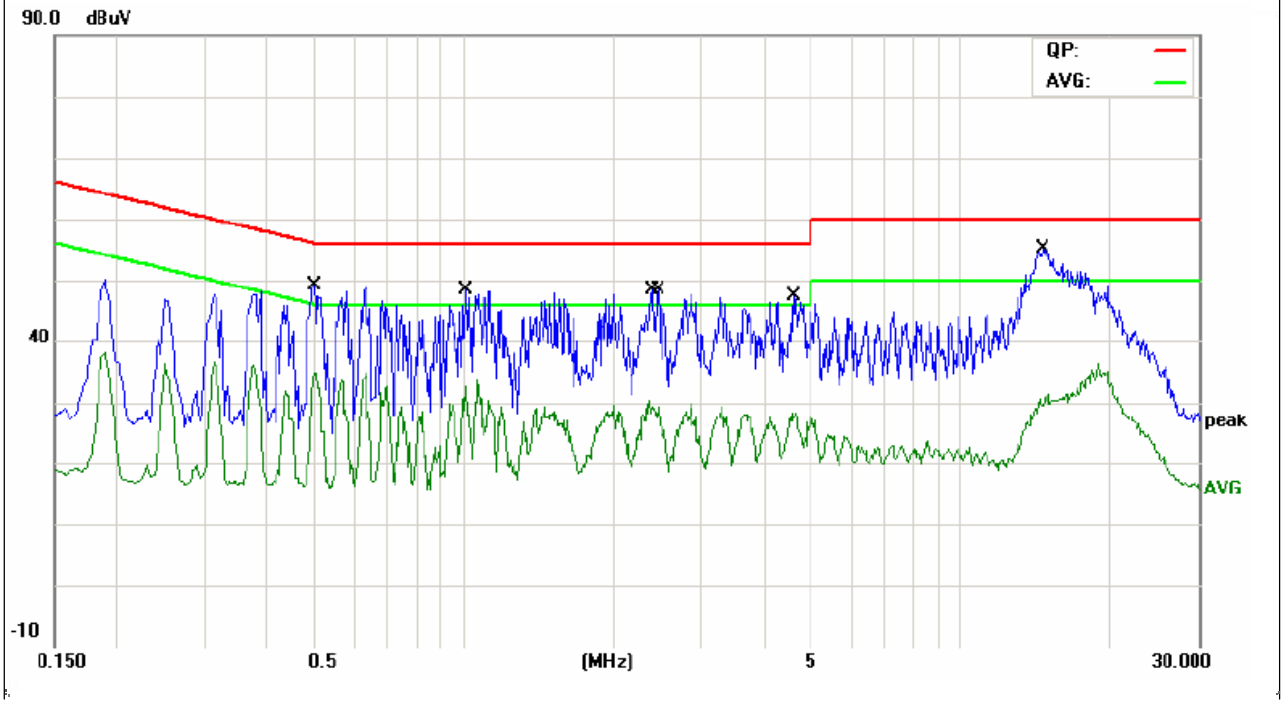
EUT：	MultispeQ	Model Name ：	MULTISPEQ 1.0
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase ：	N
Test Voltage ：	AC 120V/60Hz	Test Mode：	Mode 4

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.5020	33.19	10.02	43.21	56.00	-12.79	QP
0.5020	24.57	10.02	34.59	46.00	-11.41	AVG
1.0100	30.88	10.06	40.94	56.00	-15.06	QP
1.0100	20.01	10.06	30.07	46.00	-15.93	AVG
2.3900	27.30	10.05	37.35	56.00	-18.65	QP
2.3900	16.10	10.05	26.15	46.00	-19.85	AVG
2.4539	27.03	10.04	37.07	56.00	-18.93	QP
2.4539	15.21	10.04	25.25	46.00	-20.75	AVG
4.6140	28.47	9.97	38.44	56.00	-17.56	QP
4.6140	16.89	9.97	26.86	46.00	-19.14	AVG

Remark:

3.2 All readings are Quasi-Peak and Average values.

3.3 Factor = Insertion Loss + Cable Loss.



3.4 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)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	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	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

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:

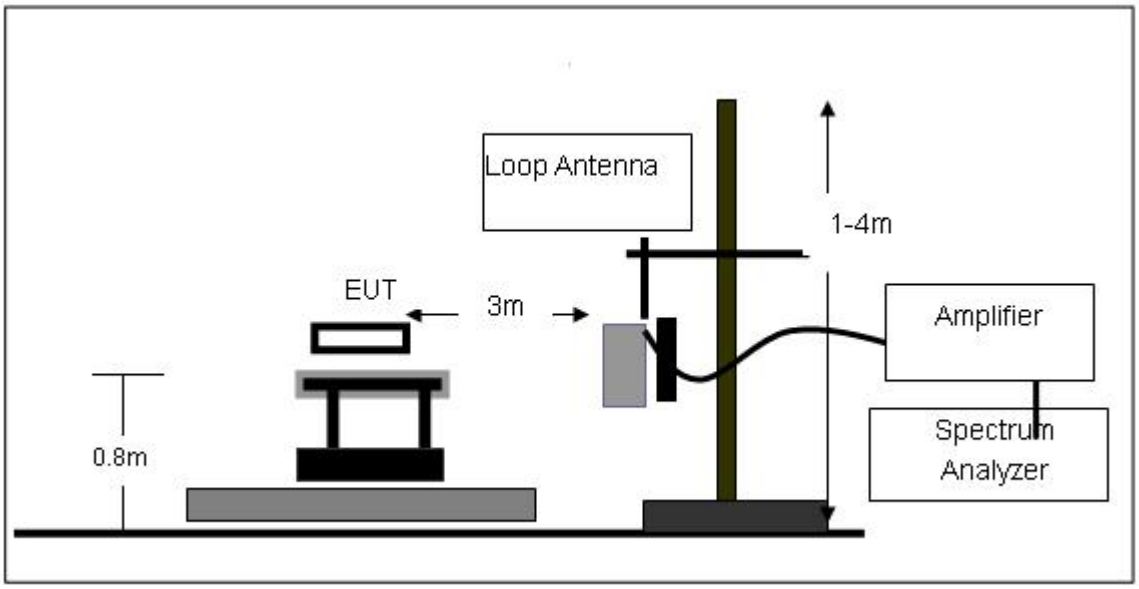
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

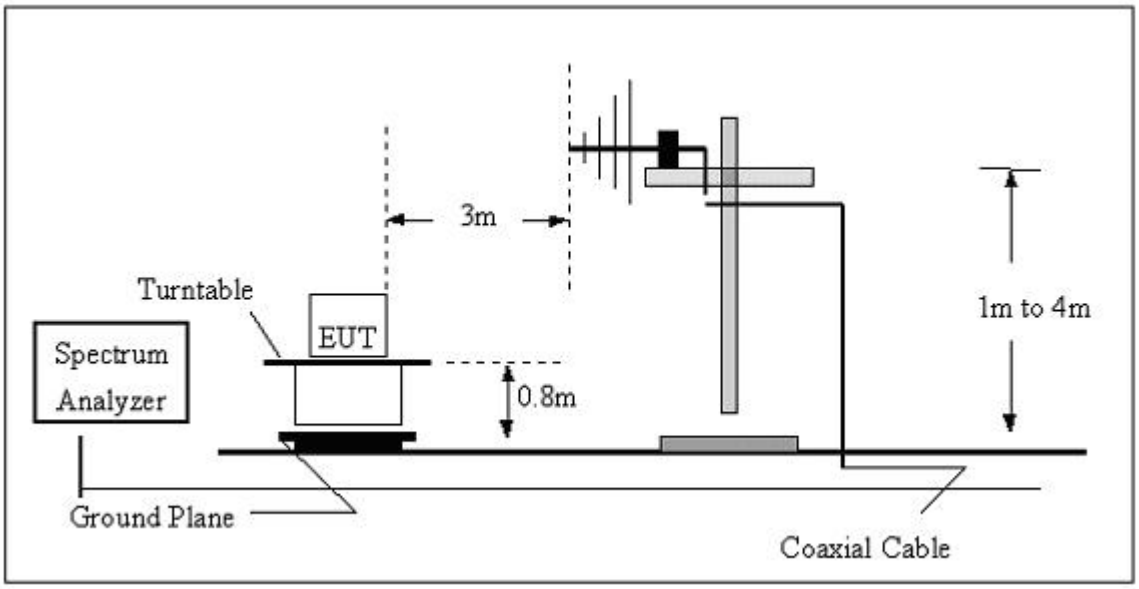
No deviation

3.2.4 TEST SETUP

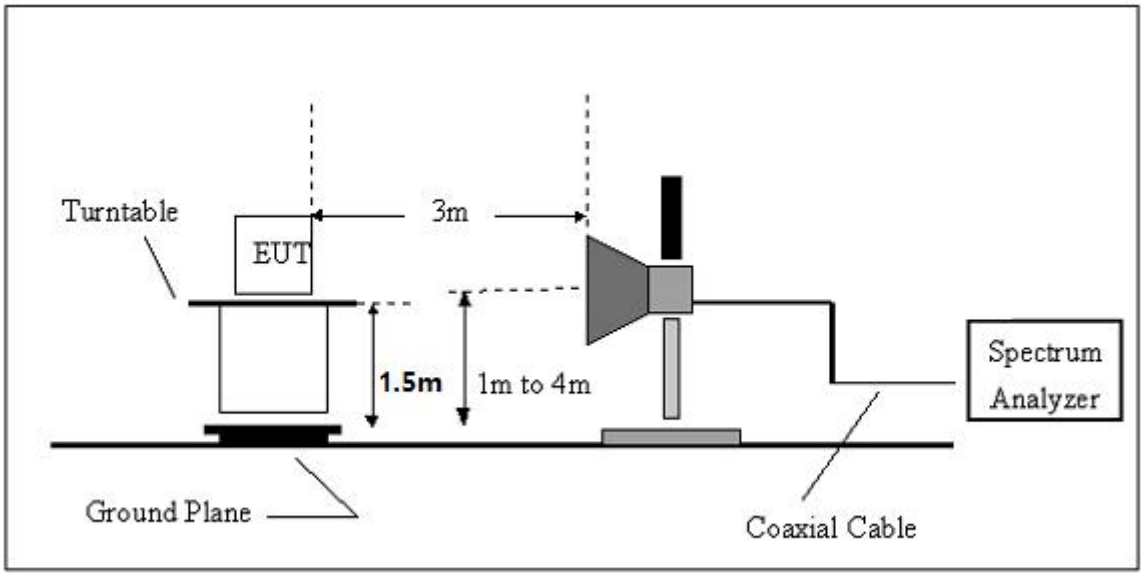
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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)

EUT：	MULTISPEQ	Model Name. ：	MULTISPEQ 1.0
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC3.7V
Test Mode ：	TX	Polarization :	--

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

NOTE:

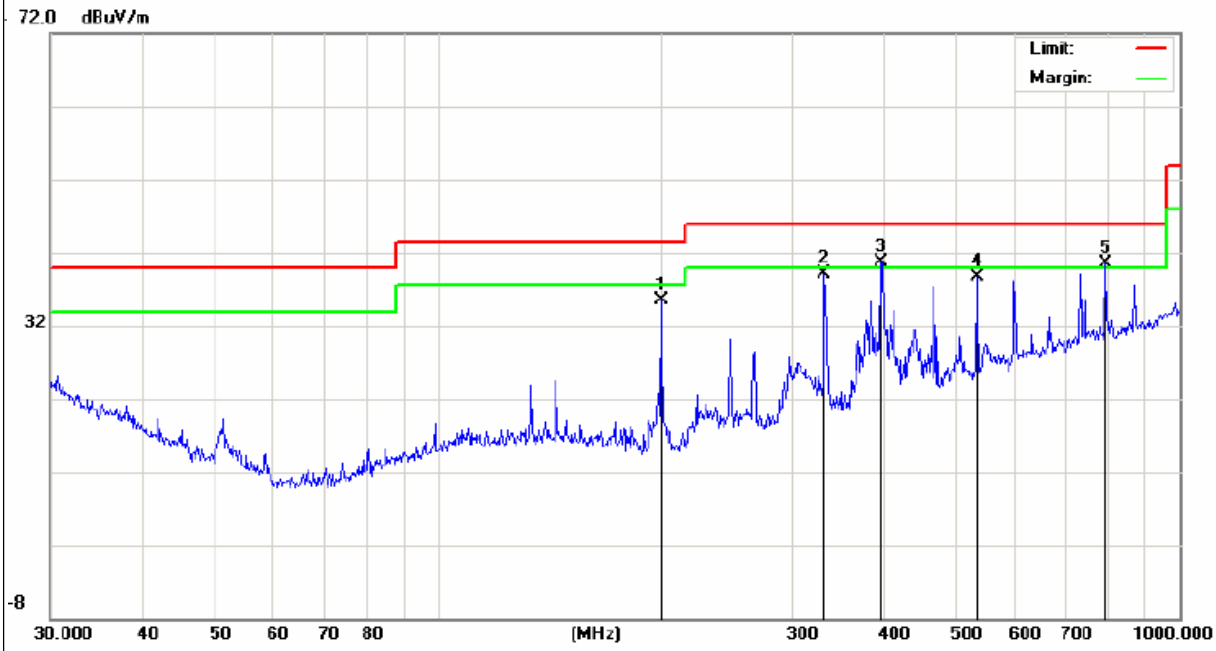
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT:	MULTISPEQ	Model Name :	MULTISPEQ 1.0
Temperature:	20 ℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 2	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
199.2855	26.88	8.71	35.59	43.5	-7.91	QP
331.3546	24.23	14.97	39.2	46	-6.8	QP
394.8543	23.77	17.03	40.8	46	-5.2	QP
531.9633	18.85	19.76	38.61	46	-7.39	QP
793.3958	16.51	23.91	40.42	46	-5.58	QP

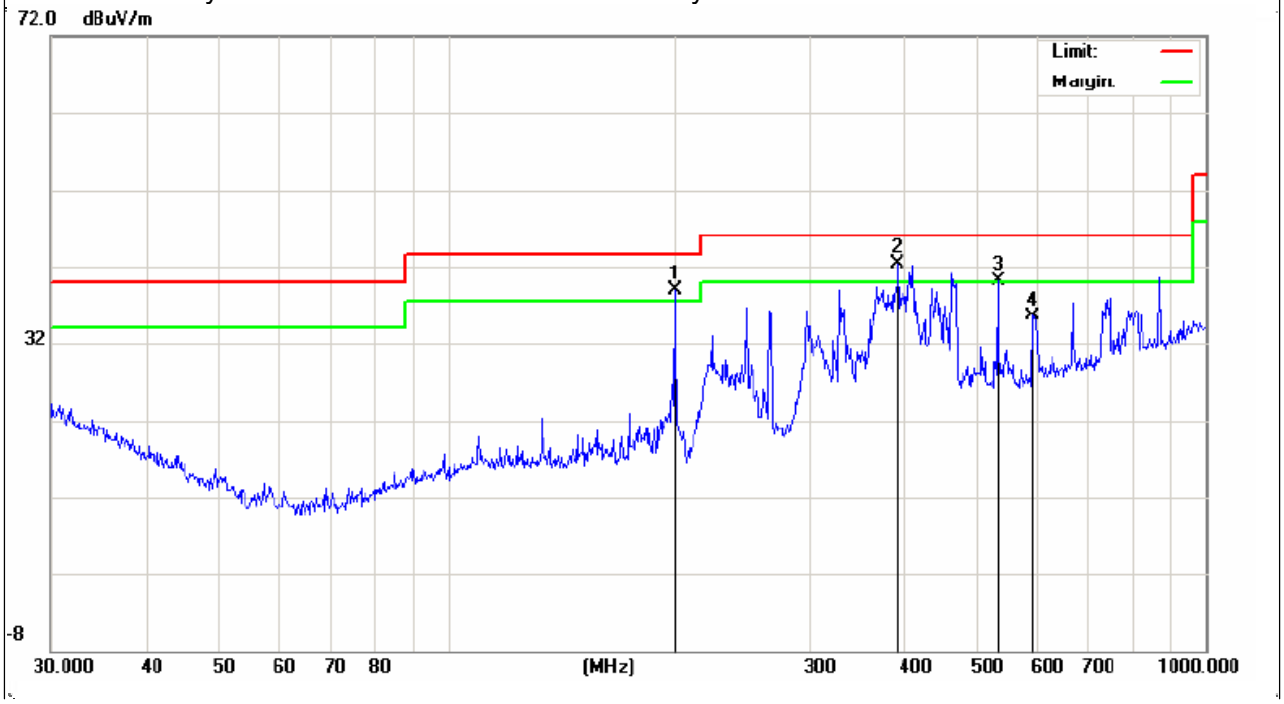
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Factor added by measurement software automatically.



EUT：	MULTISPEQ	Model Name ：	MULTISPEQ 1.0
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC3.7V
Test Mode ：	Mode 2	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
199.2855	30.12	8.71	38.83	43.5	-4.67	QP
392.0951	25.41	16.93	42.34	46	-3.66	QP
531.9633	20.35	19.76	40.11	46	-5.89	QP
590.9737	14.71	20.79	35.5	46	-10.5	QP

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Factor added by measurement software automatically.



3.2.8 TEST RESULTS (1G-26GHZ)

EUT:	MULTISPEQ	Model Name :	MULTISPEQ 1.0
Temperature:	20 ℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC3.7V

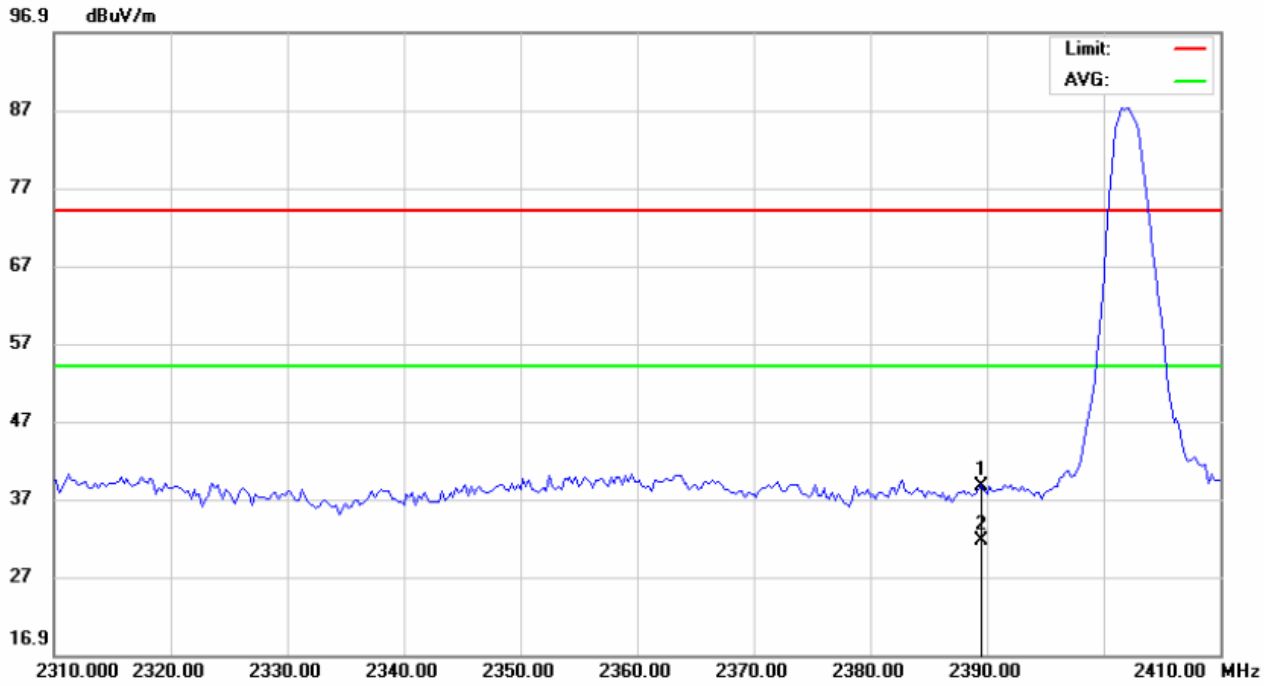
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)							
1127.500	68.40	-19.14	49.26	74.00	-24.74	peak	Vertical
1595.000	61.49	-16.43	45.06	74.00	-28.94	peak	Vertical
3040.000	61.23	-11.63	49.60	74.00	-24.40	peak	Vertical
4804.000	53.64	-3.64	50.00	74.00	-24.00	peak	Vertical
1127.500	71.12	-19.14	51.98	74.00	-22.02	peak	Horizontal
1595.000	68.06	-16.43	51.63	74.00	-22.37	peak	Horizontal
3040.000	59.73	-11.63	48.10	74.00	-25.90	peak	Horizontal
4804.000	51.54	-3.64	47.90	74.00	-26.10	peak	Horizontal
Mid Channel (2441 MHz)							
1340.000	65.91	-17.48	48.43	74.00	-25.57	peak	Vertical
2020.000	59.36	-12.92	46.44	74.00	-27.56	peak	Vertical
2827.500	57.83	-11.73	46.10	74.00	-27.90	peak	Vertical
4882.000	53.38	-3.68	49.70	74.00	-24.30	peak	Vertical
1127.500	67.52	-19.14	48.38	74.00	-25.62	peak	Horizontal
1637.500	61.68	-16.06	45.62	74.00	-28.38	peak	Horizontal
2487.500	56.21	-12.77	43.44	74.00	-30.56	peak	Horizontal
4882.000	50.78	-3.68	47.10	74.00	-26.90	peak	Horizontal
High Channel (2480 MHz)							
1170.000	63.74	-18.54	45.20	74.00	-28.80	peak	Vertical
2275.000	63.37	-12.87	50.50	74.00	-23.50	peak	Vertical
3125.000	55.69	-11.43	44.26	74.00	-29.74	peak	Vertical
4960.000	51.99	-3.59	48.40	74.00	-25.60	peak	Vertical
1127.500	69.94	-19.14	50.80	74.00	-23.20	peak	Horizontal
1340.000	66.40	-17.48	48.92	74.00	-25.08	peak	Horizontal
1850.000	64.33	-14.64	49.69	74.00	-24.31	peak	Horizontal
4960.000	52.69	-3.59	49.10	74.00	-24.90	peak	Horizontal

Note: (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).

(2) Emission Level= Reading Level+Probe Factor +Cable Loss.

(3)All other emissions more than 20dB below the limit.

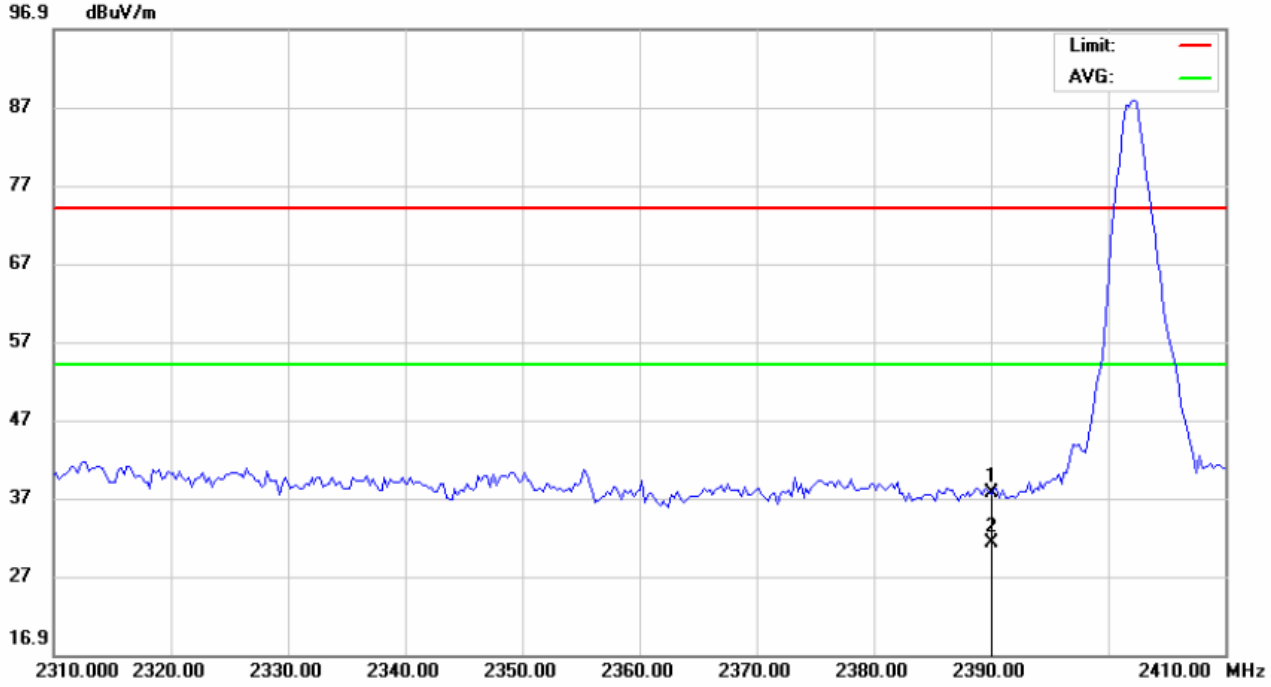
EUT：	MultispeQ	Model Name ：	MULTISPEQ 1.0
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	120V/60Hz
Test Mode ：	GFSK-CH0	Polarization :	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2389.500	47.01	-8.43	38.58	74.00	-35.42	peak			
2	*	2389.500	40.03	-8.43	31.60	54.00	-22.40	AVG			

*:Maximum data x:Over limit !:over margin

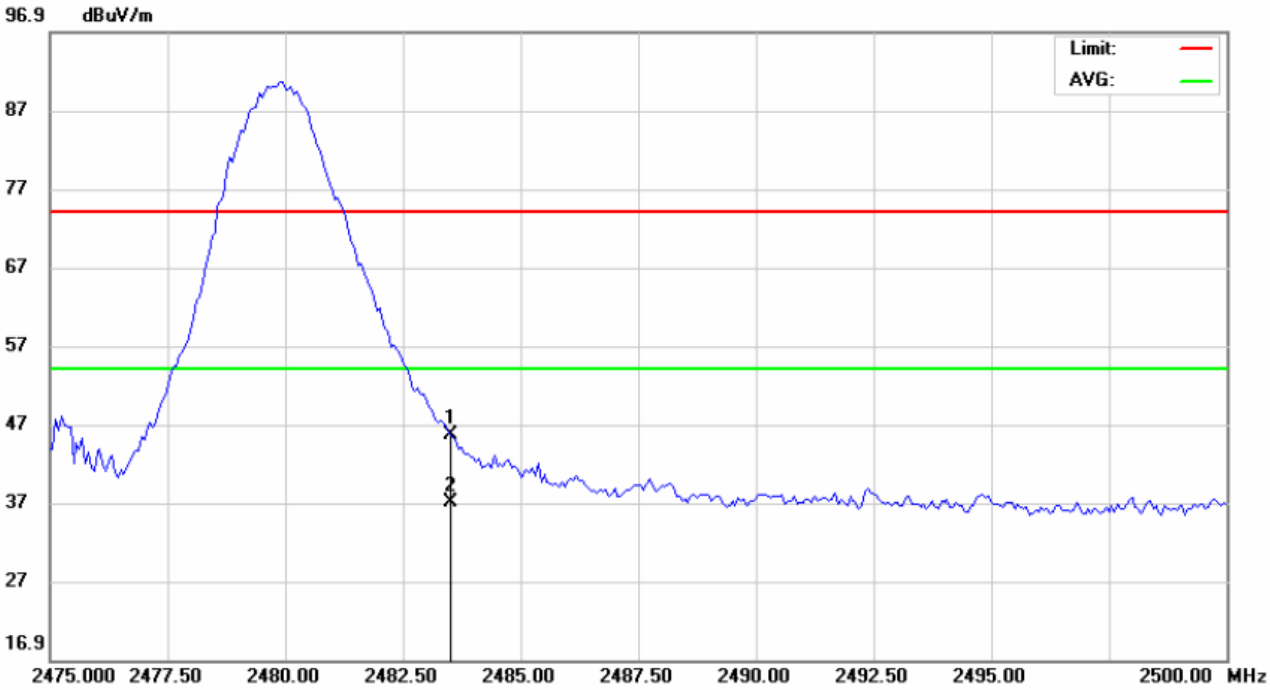
EUT：	MultispeQ	Model Name ：	MULTISPEQ 1.0
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	120V/60Hz
Test Mode ：	GFSK-CH0	Polarization :	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2390.000	46.01	-8.43	37.58	74.00	-36.42	peak			
2	*	2390.000	39.58	-8.43	31.15	54.00	-22.85	AVG			

*:Maximum data x:Over limit !:over margin

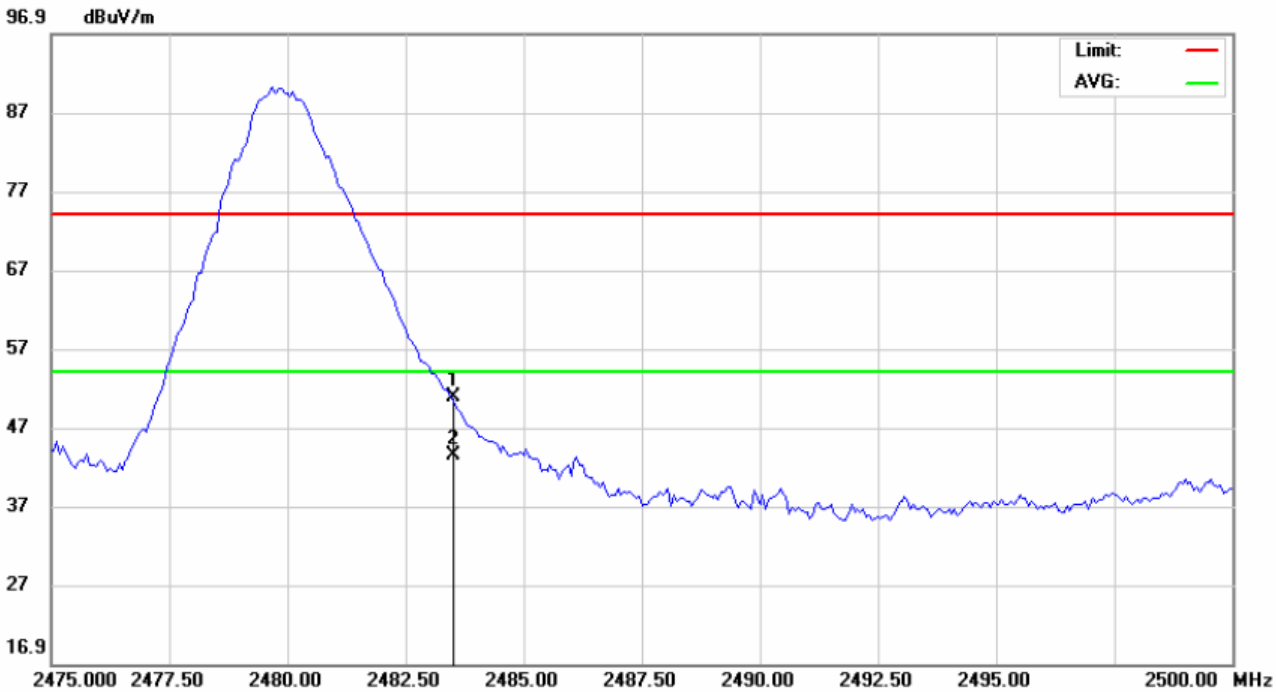
EUT：	MultispeQ	Model Name ：	MULTISPEQ 1.0
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	120V/60Hz
Test Mode ：	GFSK-CH39	Polarization :	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	53.80	-8.29	45.51	74.00	-28.49	peak			
2	*	2483.500	45.20	-8.29	36.91	54.00	-17.09	AVG			

*:Maximum data x:Over limit !:over margin

EUT：	MultispeQ	Model Name ：	MULTISPEQ 1.0
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Voltage ：	120V/60Hz
Test Mode ：	GFSK-CH39	Polarization :	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	59.01	-8.29	50.72	74.00	-23.28	peak			
2	*	2483.500	51.70	-8.29	43.41	54.00	-10.59	AVG			

*:Maximum data x:Over limit !:over margin

Note: (1) All other emissions more than 20dB below the 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
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 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.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP

4.1.4 EUT OPERATION CONDITIONS

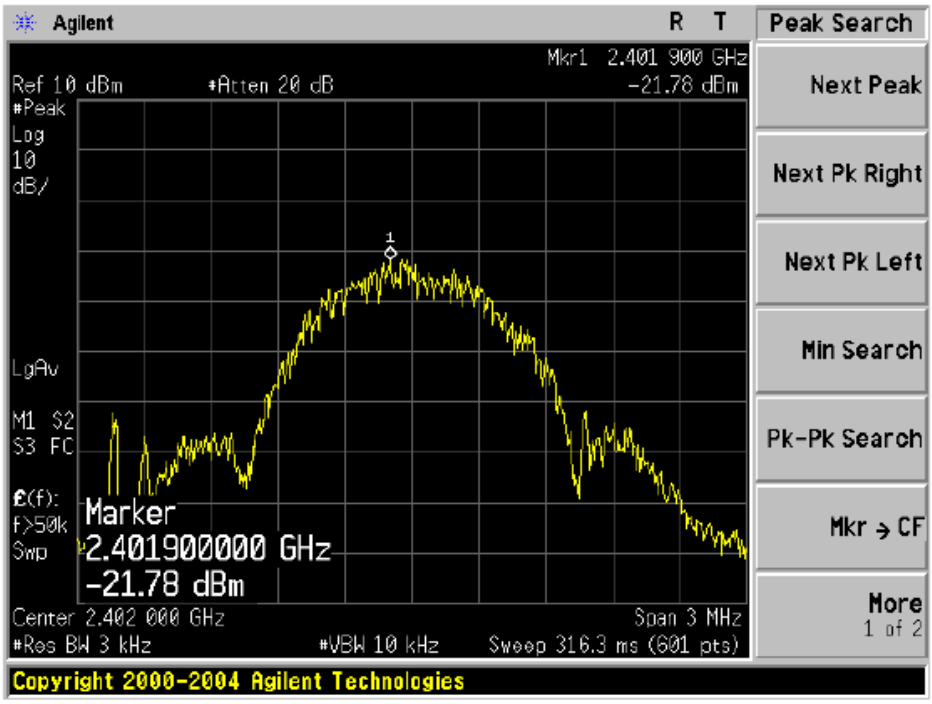
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

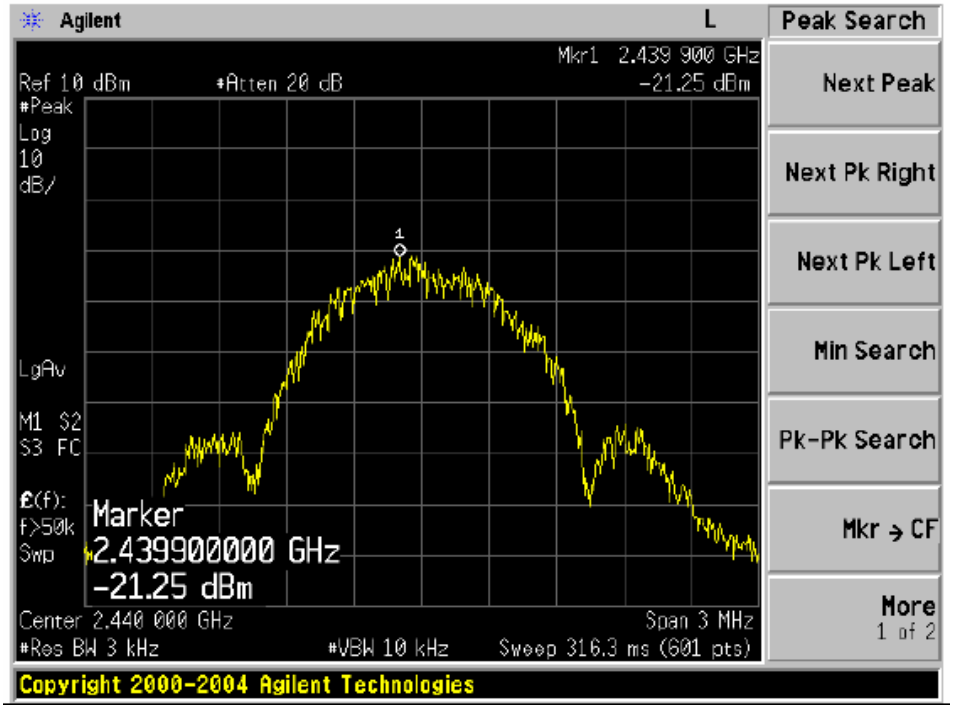
EUT：	MULTISPEQ	Model Name ：	MULTISPEQ 1.0
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC3.7V
Test Mode ：	TX Mode /CH00, CH19, CH39		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2402 MHz	-21.78	8	**PASS**
2440 MHz	-21.25	8	**PASS**
2480 MHz	-21.32	8	**PASS**

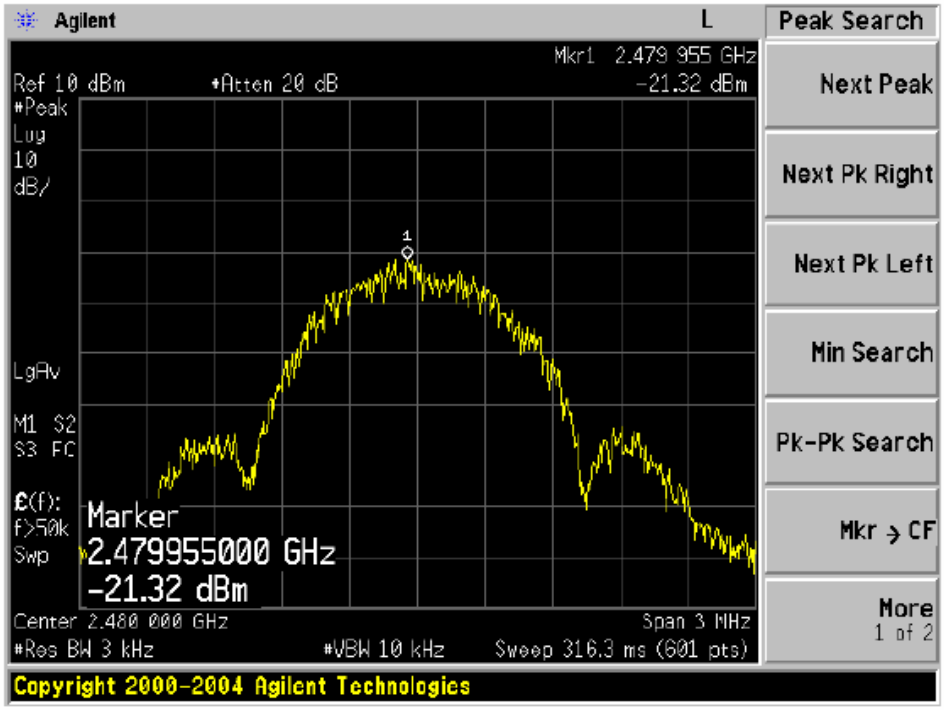
TX CH00



TX CH19



TX CH39



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) ≥ 3 x 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) 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

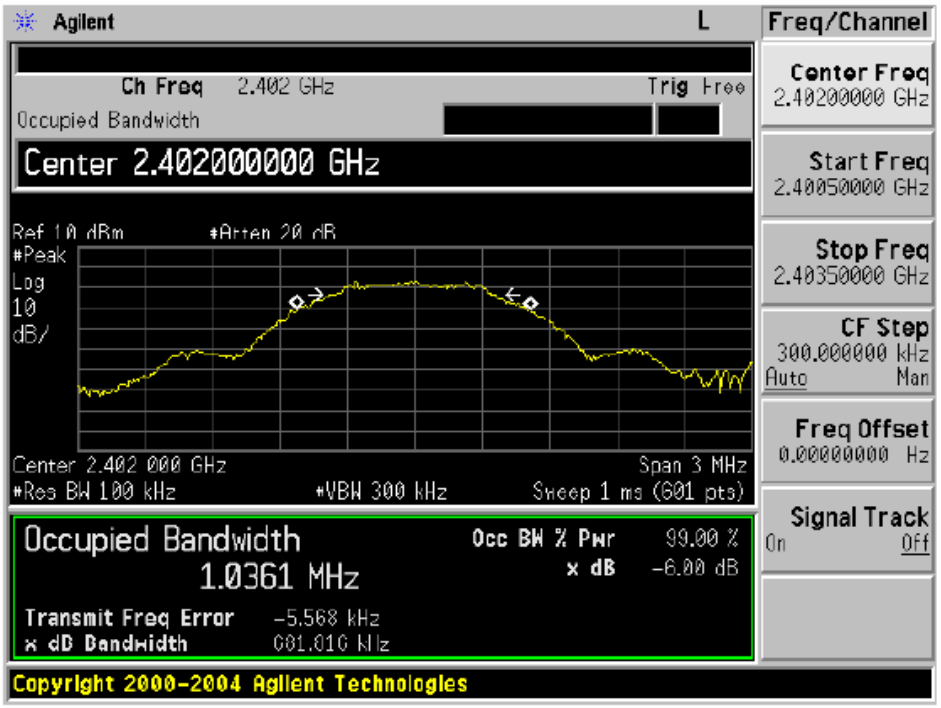
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

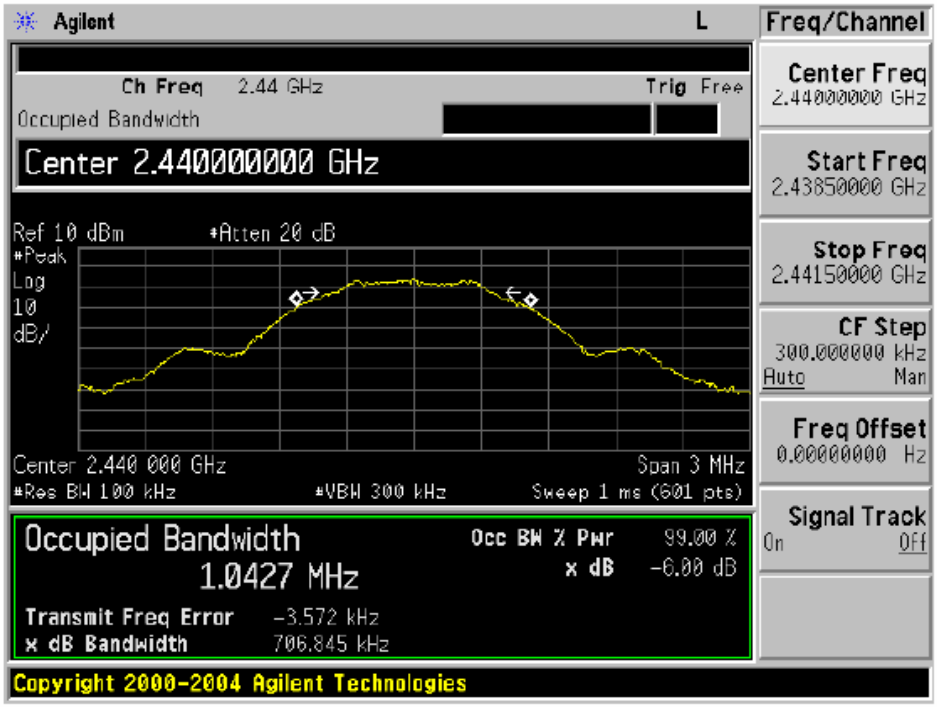
EUT:	MULTISPEQ	Model Name :	MULTISPEQ 1.0
Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC3.7V
Test Mode :	TX Mode/CH00, CH19, CH39		

Frequency	6dB Bandwidth (kHz)	Channel Separation (MHz)	Result
2402 MHz	681.816	>=500KHz	PASS
2440 MHz	706.845	>=500KHz	PASS
2480 MHz	668.542	>=500KHz	PASS

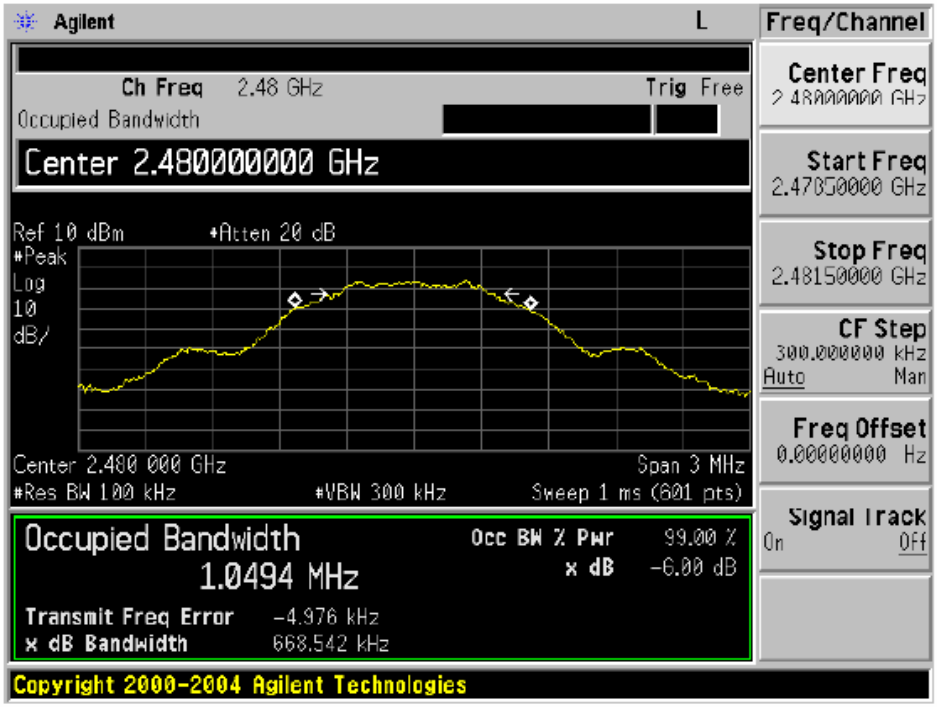
TX CH 00



TX CH 19



TX CH 39



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

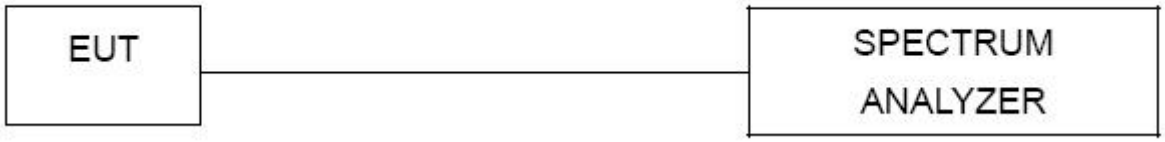
6.1.1 TEST PROCEDURE

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

EUT：	MULTISPEQ	Model Name ：	MULTISPEQ 1.0
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC3.7V
Test Mode ：	TX Mode /CH00, CH19, CH39		

1Mbps				
Test Channel	Frequency (MHz)	Peak Output Power(dBm)	AV Output Power(dBm)	LIMIT (dBm)
CH00	2402	-3.123	-6.312	30
CH19	2440	-3.244	-6.421	30
CH39	2480	-3.422	-6.321	30

7. ANTENNA REQUIREMENT

7.1 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.

7.2 EUT ANTENNA

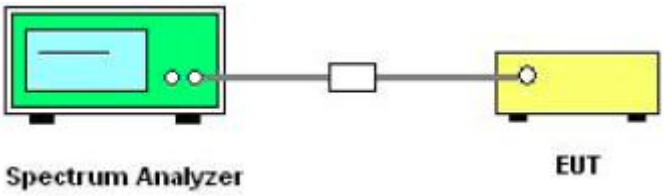
The EUT antenna is FPCB Antenna. It comply with the standard requirement.

8. CONDUCTED SPURIOUS & BAND EDGE EMISSION

8.1 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.

8.2 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 50 Ohm; 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.

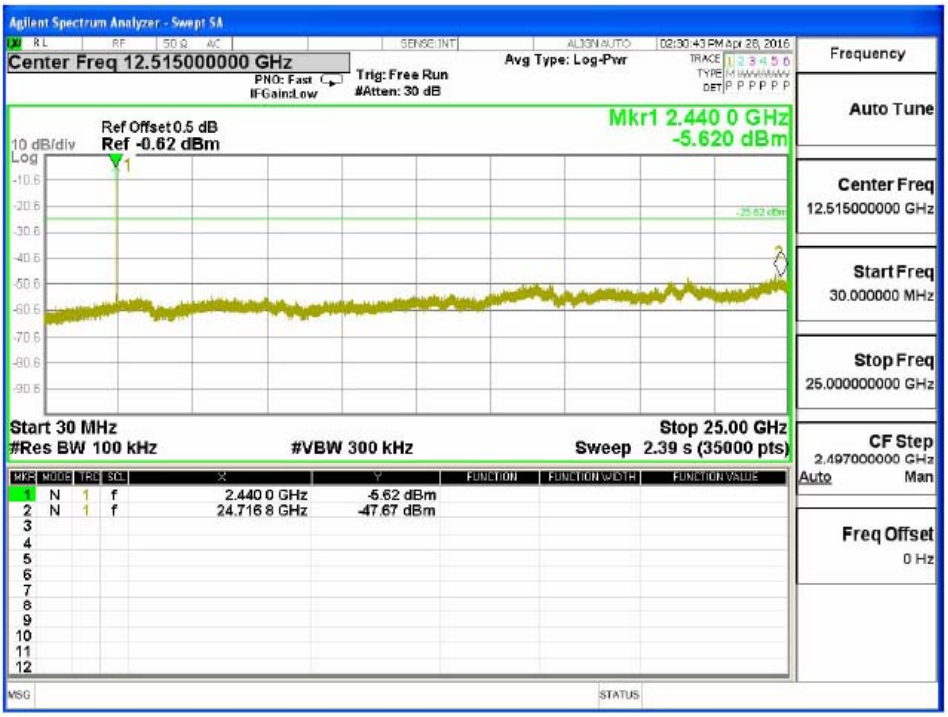
8.3 EUT OPERATION CONDITIONS

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.

8.4. TEST RESULTS

CH01

CH20



CH40

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Ref Offset 0.5 dB
10 dB/div
Ref -0.53 dBm
Mkr1 2.480 0 GHz
-5.530 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (35000 pts)
1 N 1 f 2.480 0 GHz -5.530 dBm
2 N 1 f 24.634 0 GHz -48.767 dBm
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto Man
Freq Offset
0 Hz

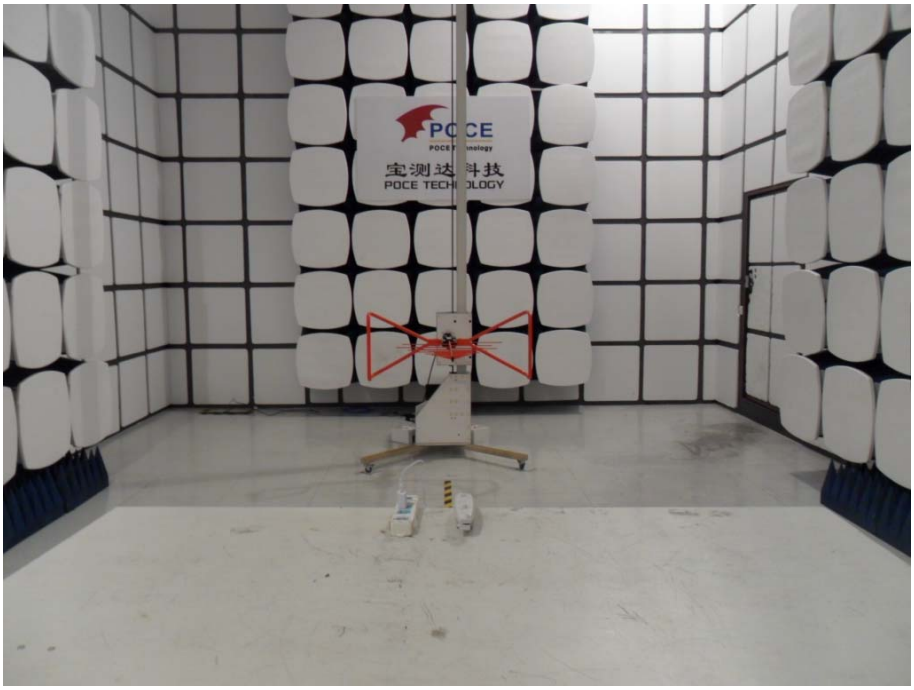
For Band edge:

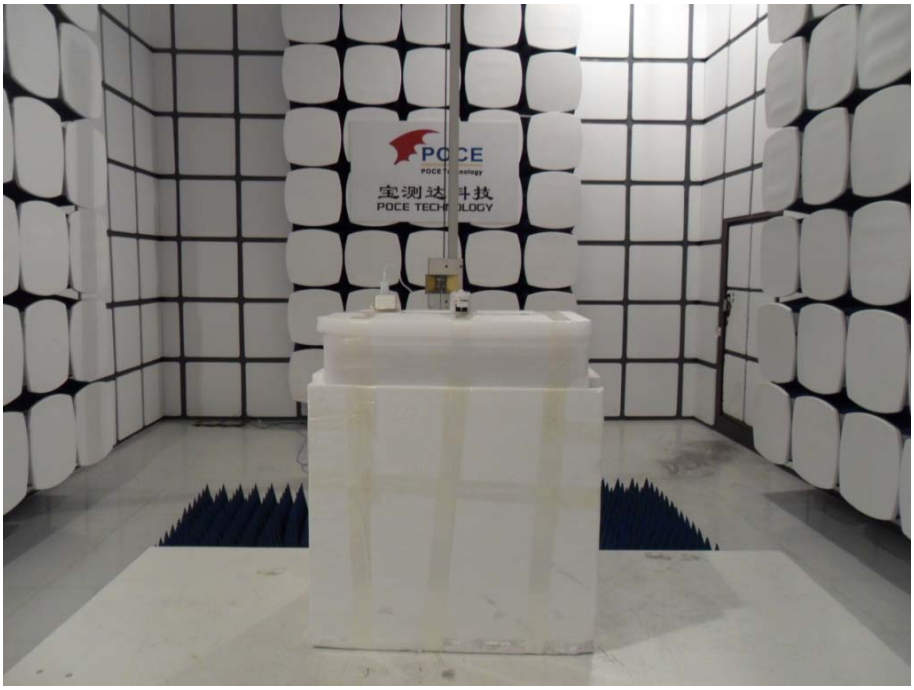
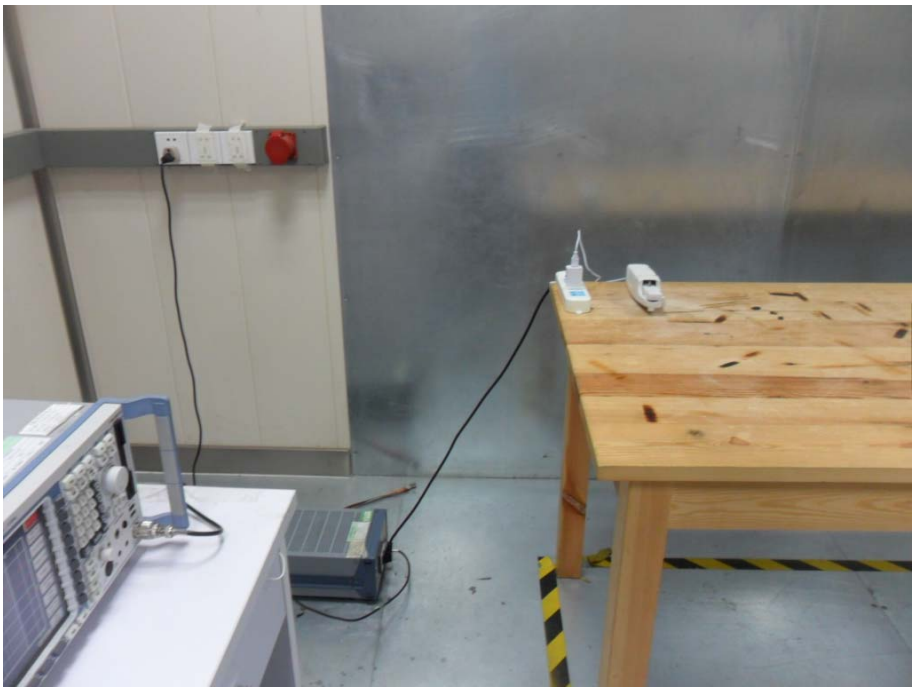
CH01

CH40

9. EUT TEST PHOTO

Radiated Measurement Photos





Conducted Emission