FCC Test Report

FCC EVALUATION REPORT FOR CERTIFICATE	
Project Reference No.	249277
Product	BRV Powerbank 6000
Brand Name	BRAVEN
Model	**BRVPBBO6**
Alternate Model	N/A
Tested according to	FCC Rules and Regulations Part 15 Subpart C 2013, 15.247 ANSI C63.4-2009

Tested in period	2014-01-18
Issued date	2014-01-21
Name and address of the Test House	Nemko Nemko Shanghai Ltd. Shenzhen Branch Unit CD, Floor 10, Tower 2, Kefa Road 8#, Hi-Technology Park, Nanshan District, Shenzhen, China Phone : +86 755 8221 0420 Fax : +86 755 8221 3363
Tested by	Zone Peng 2014-01-21
	Zone Peng ***date***
Verified by	Daria Liu 2014-01-21
	Daria Liu ***date***

Contents of This Report

1. Client Information

1.1 Applicant

Company Name:	Braven LC
Company Address:	6001 Oak Canyon, Irvine, CA 92618 USA

1.2 Manufacturer

Company Name:	Braven LC
Company Address:	6001 Oak Canyon, Irvine, CA 92618 USA

1.3 Scope

●Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.247.

2. Equipment under Test (EUT)

2.1 Identification of EUT

Category:	Bluetooth 4.0 BLE (only)
Name:	BRV Powerbank 6000
Model Name:	**BRVPBBO6**
Alternate model:	N/A
Brand name:	BRAVEN

2.2 Detail spec:

Operation Frequency：2402 MHz -2480MHz
Protocal: Bluetooth 4.0 with BLE only
Type of Modulation : GFSK

Antenna Type：Integral Antenna
Antenna Number : 1
Antenna gain: 2.0dBi
Channel number: 40
Data rate: 1Mbps

Max PK Output power: -2.94dBm

Input ： 5V/0.5-2A, Output:5V/3.4A MAX
Battery :3.7V/6000mAh/Li-Polymer

2.3 Additional Information Related to Testing

CH LOW:2402MHz
CH MID:2442MHz
CH HIGH:2480MHz

Remark: Only the worse case found by prescan is listed

3. General Test Conditions

3.1 Location

Global United Technology Services Co., Ltd. -- Nemko ELA 632

2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

FCC Registration No.:600491

IC Registration No.9079A-1

Note: all test are witnessed by NEMKO engineer

3.2 Operating Environment

All tests and measurements were performed in a shielded enclosure or a controlled environment suitable for the tests conducted. The climatic conditions in the test area are automatically controlled and recorded continuously.

Parameters	Recording during test	Accepted deviation
Ambient temperature	24-25°C	15 – 35 ºC
Relative humidity	50-55%	30 - 60%
Atmospheric pressure	101.2 kPa -101.3kPa	86-106kPa

3.3 Operating During Test

Test mode

TM1 : TX MODE continuous transmitter

Remark : Input voltage have been adjusted from 85% to 115% ,no influence of Fundamental emission found .

A.E.:

Equipments	Manufacturer	Mode name	Serial number	Approval
AC Adapter	Shun Shing	SP5QF-NA	3037251	CE / FCCVOC

3.4 Test Equipment

The test equipments used in testing are calibrated on a regular basis. For most of the testing equipments accredited calibration is conducted once a year. For certain equipment the calibration interval is longer. Between the calibrations all test equipment are controlled and verified on a regular basis. The test equipments used are defined in each test section of this report.

4. Measurement Uncertainty

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95 %.

Conducted Emission : 0.15~30MHz 3.45dB

Radiated Emission: 30MHz~1000MHz 4.50dB

1GHz-18GHz 4.70dB

5. Radiated Electromagnetic Disturbances

5.1 Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast.

The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

For below 1GHz

RBW=120 kHz; VBW=300KHz.QP detector,The frequency range from 30MHz to 1000MHz is checked.

For above 1GHz. The frequency range from 1GHz to 25GHz(10^{th} harmonics) is checked.

RBW=1MHz ; VBW=1MHz,PK detector for peak emissions measurement above 1GHz

RBW=1MHz ; VBW=10Hz, PK detector for average emissions measure above 1GHz

5.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	EMI Test Receiver	Jul. 04 2013	ESU26	GTS203	R&S
☒	BiConiLog Antenna	Feb. 26 2013	VULB9163	GTS214	SCHWARZBECK
☒	Horn Antenna	Feb. 26 2013	BBHA9120D	GTS215	SCHWARZBECK
☒	Horn Antenna	Feb. 26 2013	BBHA9170	GTS216	SCHWARZBECK
☒	Coaxial Cable	Apr. 01 2013	N/A	GTS213	GTS
☒	Coaxial Cable	Apr. 01 2013	N/A	GTS211	GTS
☒	Coaxial cable	Apr. 01 2013	N/A	GTS210	GTS
☒	Coaxial Cable	Apr. 01 2013	N/A	GTS212	GTS
☒	Amplifier	Jul. 04 2013	8347A	GTS204	HP

5.3 Test Result

Remark: If PK value is lower than AV limit , only show PK diagram as below.

From 18GHz to 25GHz, Spurious Emission can not be found .

For restriction band test :Only list the restriction band test which there found emission.

For other restriction band: no emission found.

For Radiated emission test : The EUT have been tested at X,Y,Z axial direction, Only list the worse mode.

Mode	Freq range		Test ANT polarity	Diagram	Test Result
TX MODE	30MHz-1GHz:		H	5-1	Pass
	30MHz-1GHz:		V	5-2	Pass
Mode	**Freq range**	**Channel**	**Test ANT polarity**	**Diagram**	**Test Result**
GFSK	1GHz-18GHz:	CH LOW	H	5-3	Pass
	1GHz-18GHz:	CH LOW	V	5-4	Pass
	1GHz-18GHz:	CH MID	H	5-5	Pass
	1GHz-18GHz:	CH MID	V	5-6	Pass
	1GHz-18GHz:	CH HIGH	H	5-7	Pass
	1GHz-18GHz:	CH HIGH	V	5-8	Pass

NOTES:

1.All modes were measured and only the worst case emission was reported.

2. H =Horizontal V=Vertical

3. Emission = Reading +Antenna Factor + Cable Loss –Amp Factor

4. Emission level dB μ V = 20 log Emission level μ V/m

5. The lower limit shall apply at the transition frequencies

6. All the emissions appearing within 15.205 Restricted bands shall not exceed the limits shown in (15.209 limit)#.

7. Unwanted emissions not falling within restricted frequency bands shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits;

Remark :

The limit of " # "of 3 meter distance is

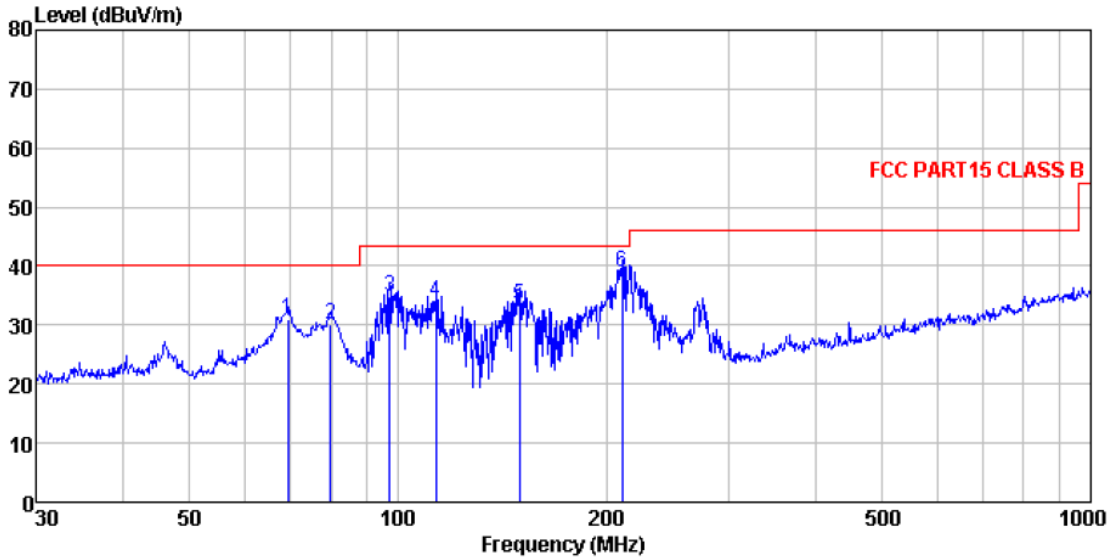
Frequency MHz	Distance m	Field strength		Distance m	Field strength
		μV/m	dBμV/m(QP)		dBμV/m(QP)
30-88	3	100	40.0	10	30.0
88-216	3	150	43.5	10	33.5
216-960	3	200	46.0	10	36.0
960-1000	3	500	54.0	10	44.0
Above 1000	3	74.0 dBμV/m (PK) 54.0 dBμV/m (AV)		/	/

15.205 Restricted bands:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1]0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	[2]
13.36–13.41.			

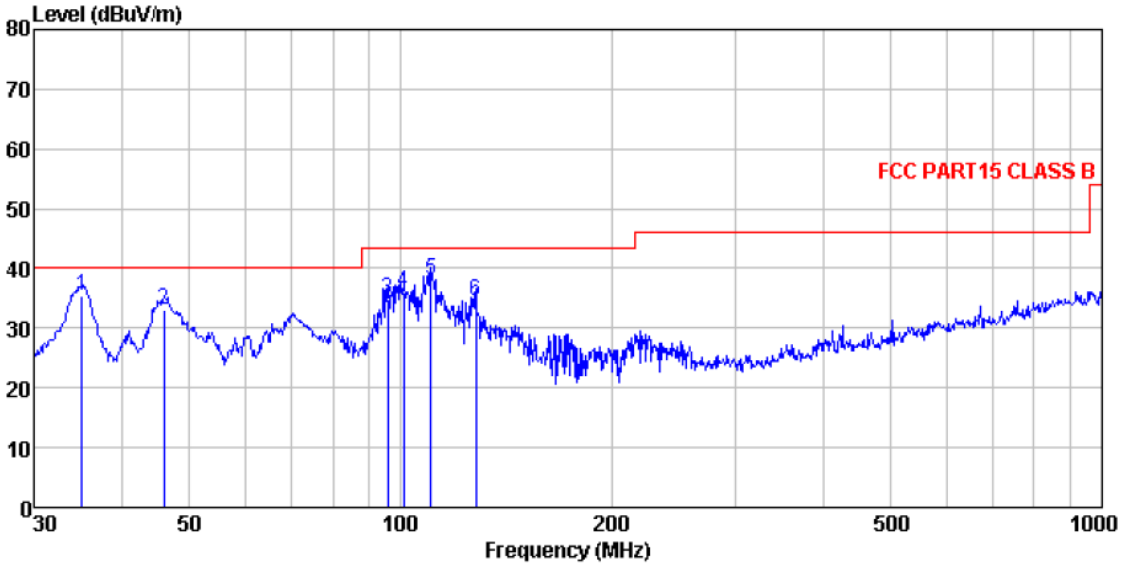
[1]Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2]Above 38.6

5.3.1 Diagram 5-1



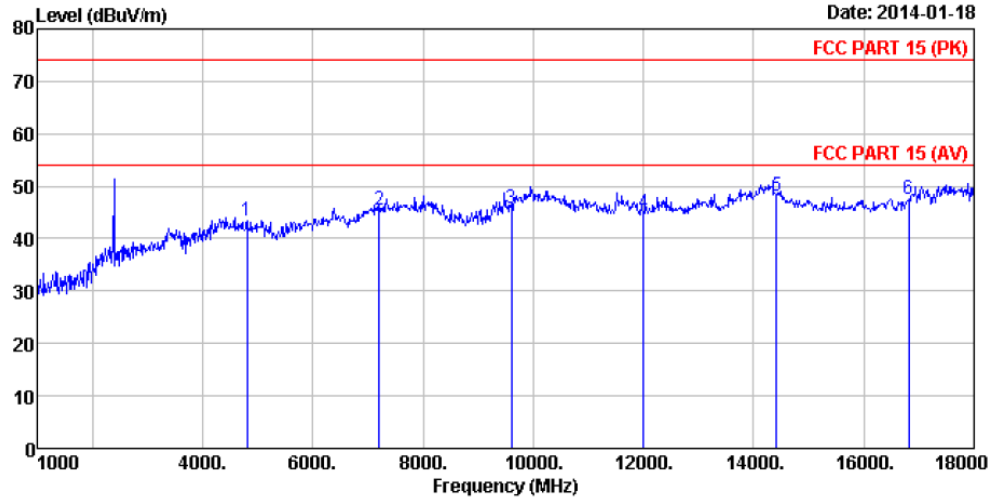
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	69.357	51.08	10.92	0.94	31.88	31.06	40.00	-8.94	QP
2	79.800	50.37	10.54	1.03	31.76	30.18	40.00	-9.82	QP
3	97.115	50.52	14.97	1.17	31.75	34.91	43.50	-8.59	QP
4	113.316	50.75	13.63	1.31	31.83	33.86	43.50	-9.64	QP
5	149.486	53.53	10.26	1.56	31.98	33.37	43.50	-10.13	QP
6	210.786	56.41	12.90	1.90	32.15	39.06	43.50	-4.44	QP

5.3.2 Diagram 5-2

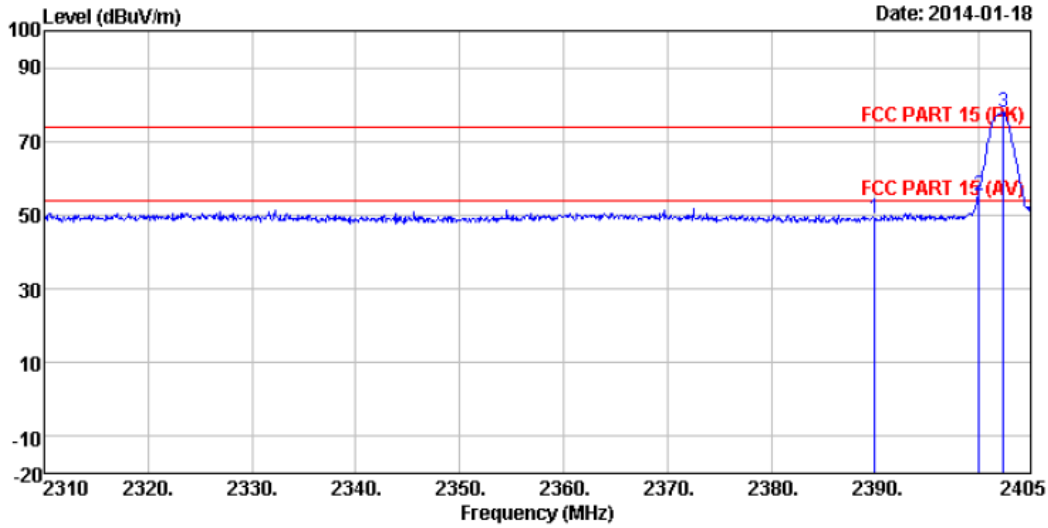


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	35.128	52.43	14.35	0.61	32.06	35.33	40.00	-4.67	QP
2	46.016	48.87	15.49	0.73	32.00	33.09	40.00	-6.91	QP
3	95.762	50.58	14.90	1.16	31.74	34.90	43.50	-8.60	QP
4	100.934	51.42	15.06	1.20	31.76	35.92	43.50	-7.58	QP
5	110.569	54.46	14.15	1.28	31.81	38.08	43.50	-5.42	QP
6	128.113	53.92	11.22	1.42	31.90	34.66	43.50	-8.84	QP

5.3.3 Diagram 5-3

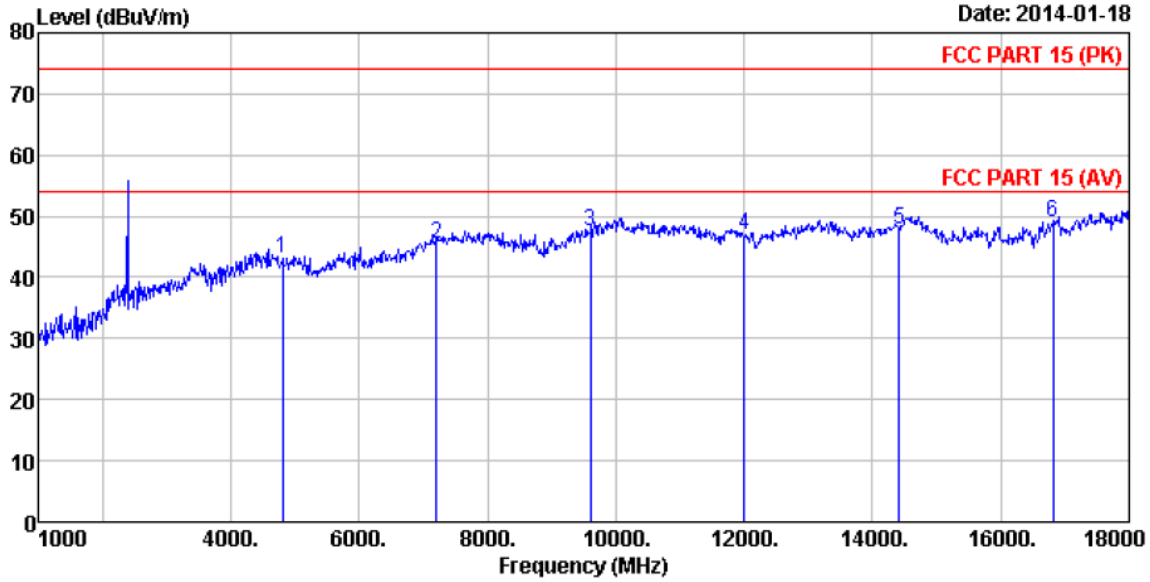


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4804.000	34.97	31.78	8.60	32.09	43.26	74.00	-30.74	Peak
2	7206.000	29.66	36.15	11.65	32.00	45.46	74.00	-28.54	Peak
3	9608.000	25.29	37.95	14.14	31.62	45.76	74.00	-28.24	Peak
4	12010.000	26.42	39.08	15.03	35.51	45.02	74.00	-28.98	Peak
5	14412.000	22.00	42.41	17.15	33.34	48.22	74.00	-25.78	Peak
6	16814.000	20.69	41.78	18.77	33.82	47.42	74.00	-26.58	Peak

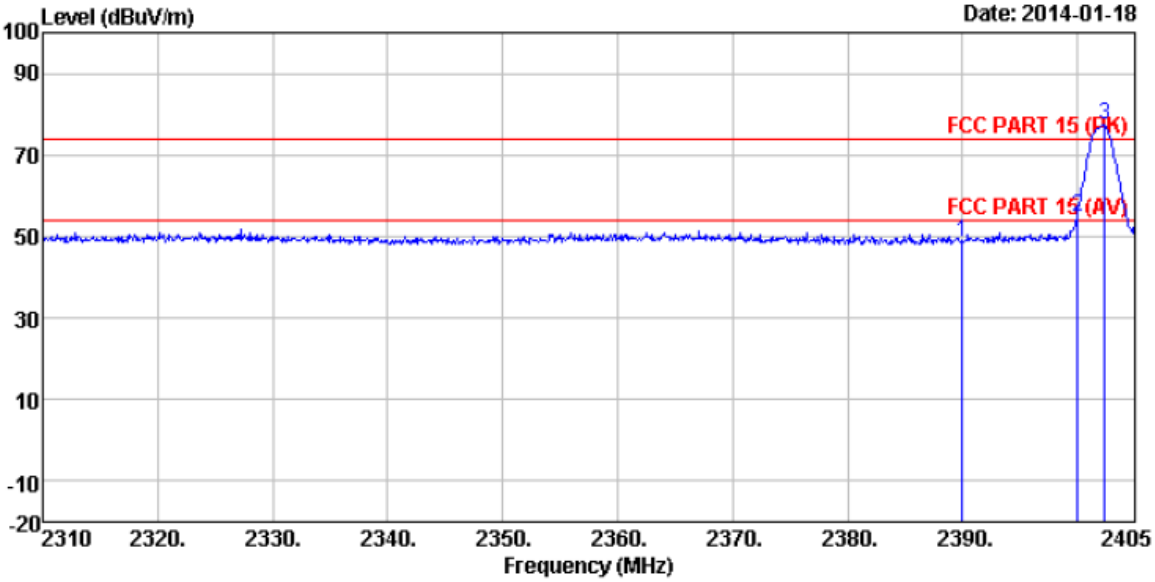


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	46.07	27.59	5.38	30.18	48.86	74.00	-25.14	Peak

5.3.4 Diagram 5-4

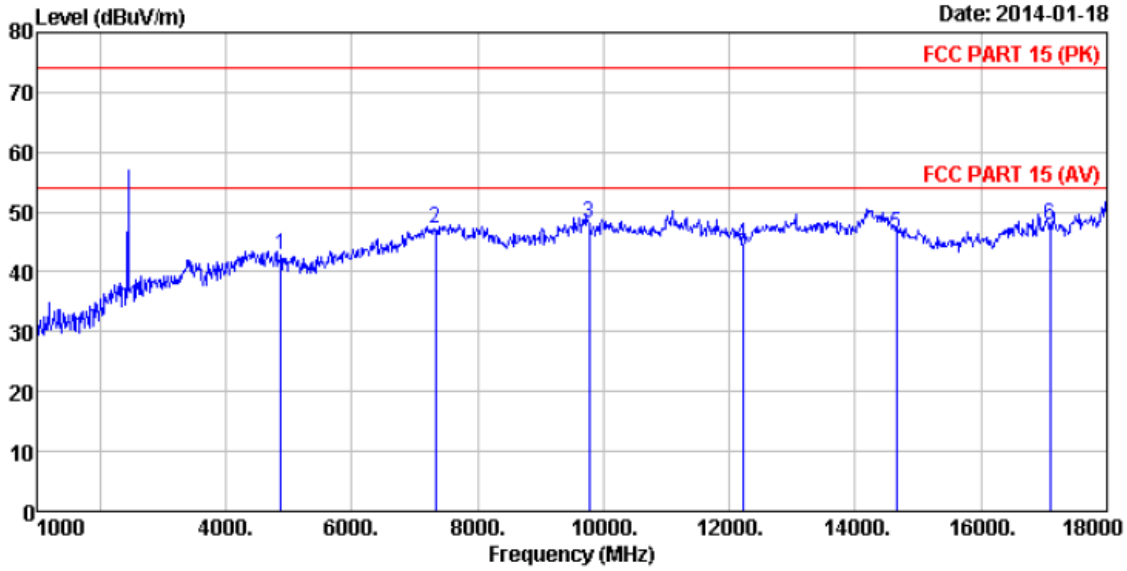


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4804.000	34.78	31.78	8.60	32.09	43.07	74.00	-30.93	Peak
2	7206.000	29.74	36.15	11.65	32.00	45.54	74.00	-28.46	Peak
3	9608.000	27.18	37.95	14.14	31.62	47.65	74.00	-26.35	Peak
4	12010.000	28.33	39.08	15.03	35.51	46.93	74.00	-27.07	Peak
5	14412.000	21.54	42.41	17.15	33.34	47.76	74.00	-26.24	Peak
6	16814.000	22.31	41.78	18.77	33.82	49.04	74.00	-24.96	Peak



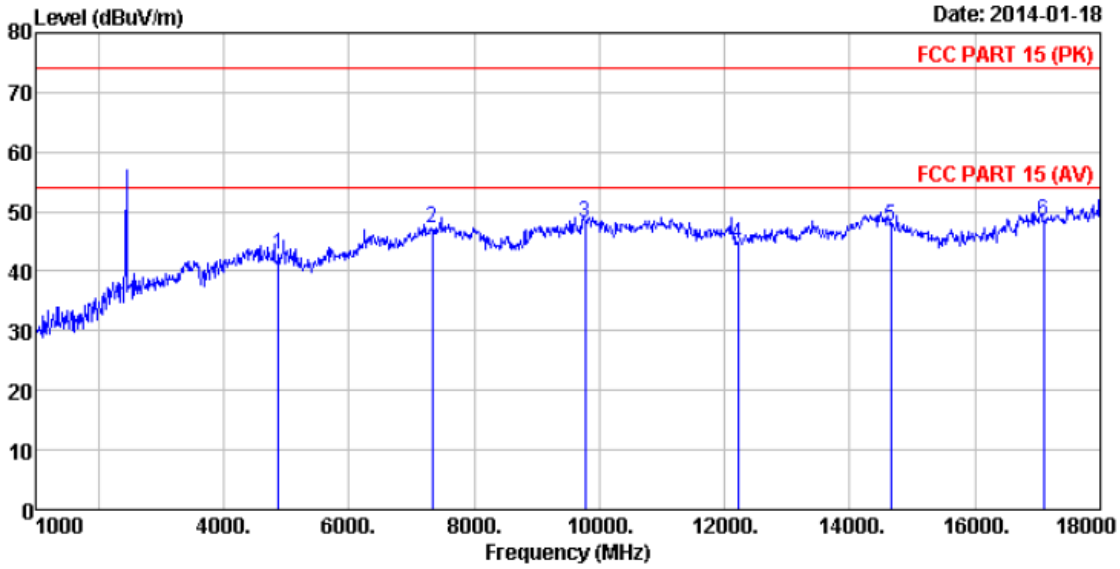
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	45.88	27.59	5.38	30.18	48.67	74.00	-25.33	Peak

5.3.5 Diagram 5-5



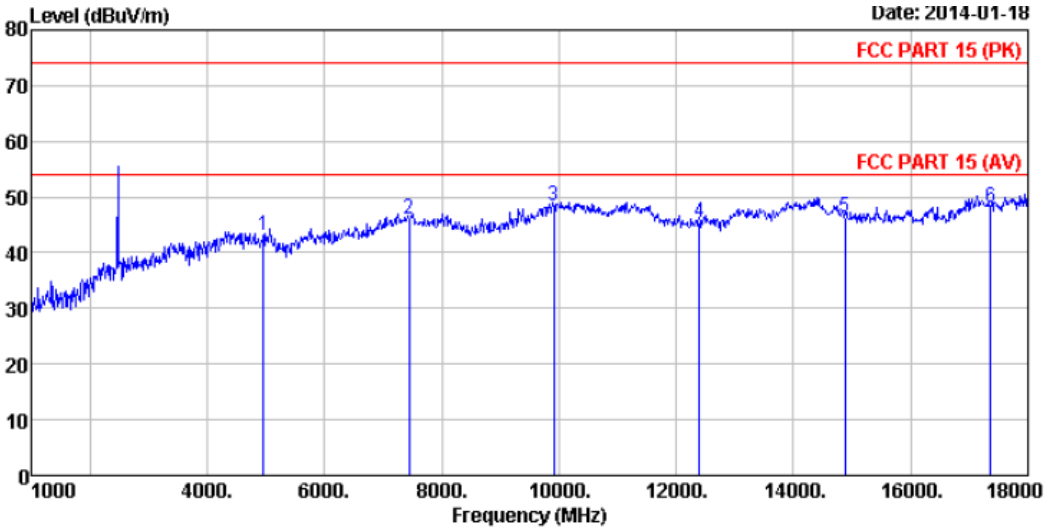
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4884.000	34.29	31.86	8.67	32.12	42.70	74.00	-31.30	Peak
2	7326.000	31.01	36.41	11.72	31.89	47.25	74.00	-26.75	Peak
3	9768.000	27.01	38.35	14.27	31.62	48.01	74.00	-25.99	Peak
4	12210.000	26.06	38.89	15.16	35.65	44.46	74.00	-29.54	Peak
5	14652.000	21.39	42.21	17.28	34.39	46.49	74.00	-27.51	Peak
6	17099.000	17.83	44.30	18.99	33.38	47.74	74.00	-26.26	Peak

5.3.6 Diagram 5-6

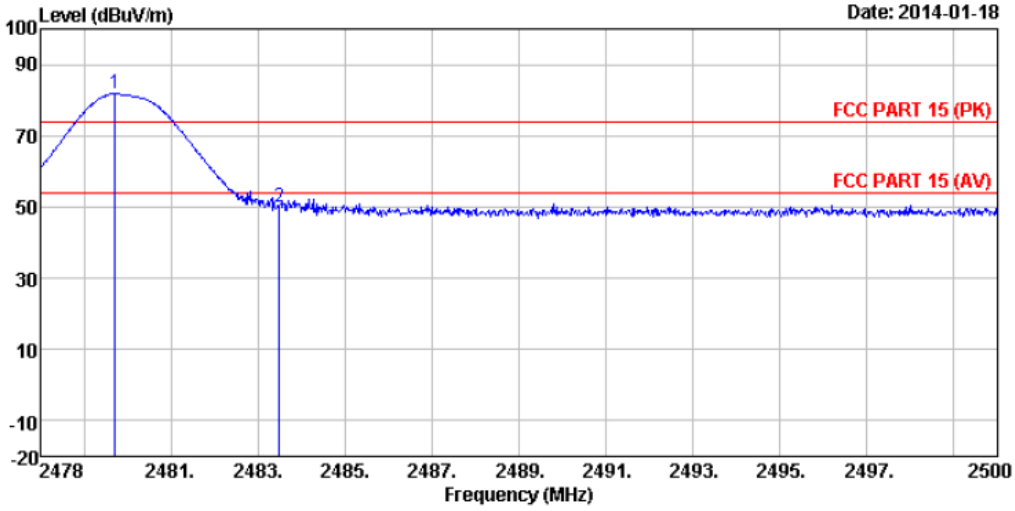


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4884.000	34.51	31.86	8.67	32.12	42.92	74.00	-31.08	Peak
2	7326.000	30.92	36.41	11.72	31.89	47.16	74.00	-26.84	Peak
3	9768.000	27.06	38.35	14.27	31.62	48.06	74.00	-25.94	Peak
4	12210.000	26.03	38.89	15.16	35.65	44.43	74.00	-29.57	Peak
5	14652.000	22.57	42.21	17.28	34.39	47.67	74.00	-26.33	Peak
6	17094.000	18.49	44.30	18.99	33.38	48.40	74.00	-25.60	Peak

5.3.5 Diagram 5-7

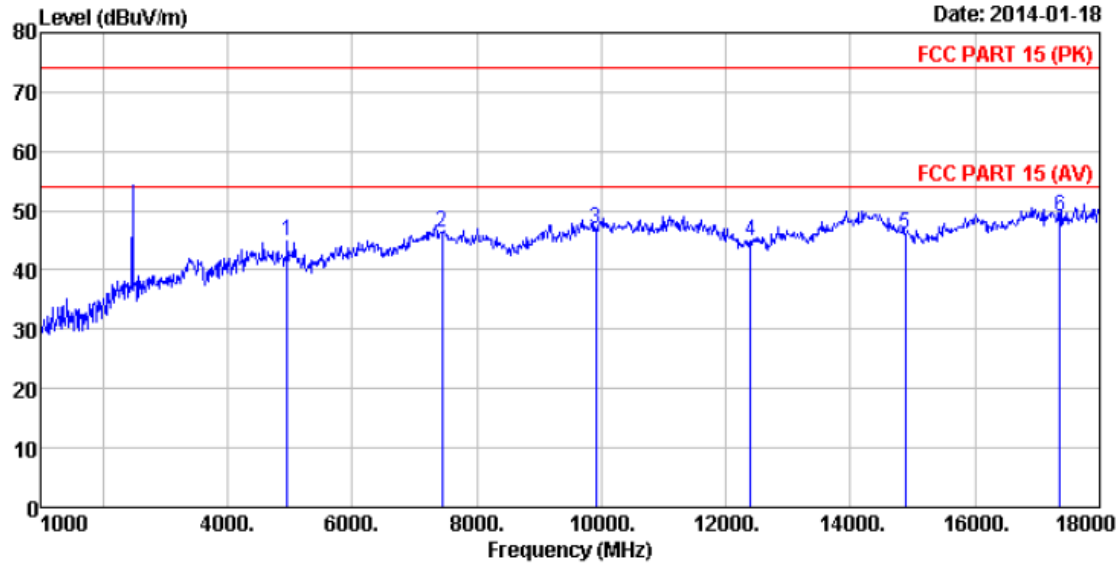


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4960.000	34.62	31.93	8.73	32.16	43.12	74.00	-30.88	Peak
2	7440.000	29.34	36.59	11.79	31.78	45.94	74.00	-28.06	Peak
3	9920.000	27.18	38.81	14.38	31.88	48.49	74.00	-25.51	Peak
4	12400.000	26.69	38.76	15.27	35.27	45.45	74.00	-28.55	Peak
5	14880.000	22.81	41.52	17.39	35.37	46.35	74.00	-27.65	Peak
6	17360.000	17.43	46.19	18.98	34.45	48.15	74.00	-25.85	Peak

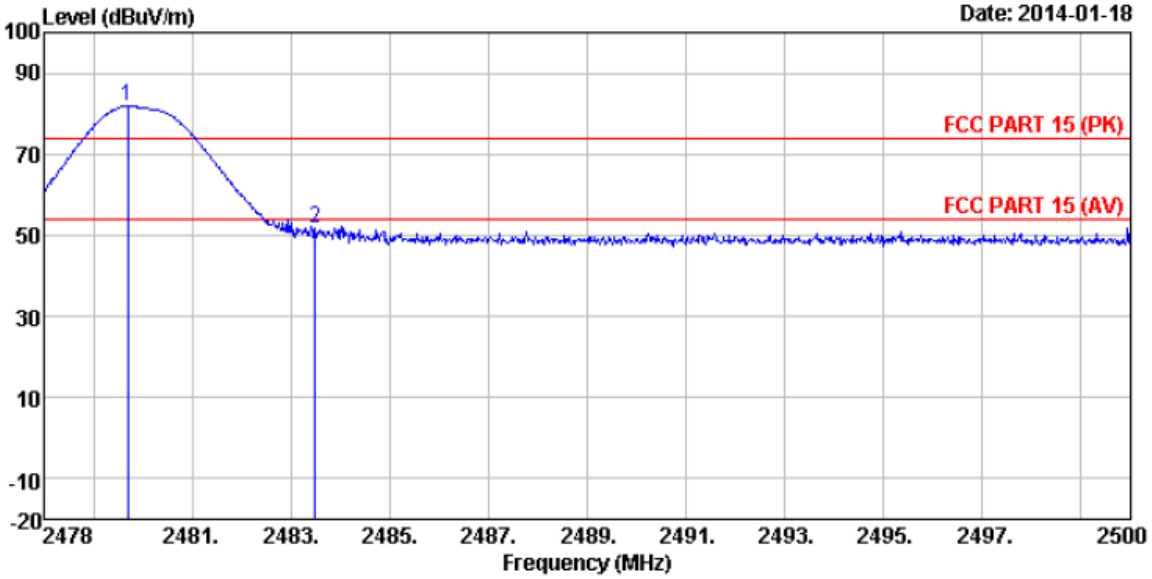


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2479.716	78.75	27.52	5.47	29.93	81.81			Peak
2	2483.500	46.99	27.53	5.47	29.93	50.06	74.00	-23.94	Peak

5.3.6 Diagram 5-8



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4960.000	36.33	31.93	8.73	32.16	44.83	74.00	-29.17	Peak
2	7440.000	29.76	36.59	11.79	31.78	46.36	74.00	-27.64	Peak
3	9920.000	25.52	38.81	14.38	31.88	46.83	74.00	-27.17	Peak
4	12400.000	26.08	38.76	15.27	35.27	44.84	74.00	-29.16	Peak
5	14880.000	22.50	41.52	17.39	35.37	46.04	74.00	-27.96	Peak
6	17360.000	18.22	46.19	18.98	34.45	48.94	74.00	-25.06	Peak



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2479.694	78.87	27.52	5.47	29.93	81.93			Peak
2	2483.500	48.62	27.53	5.47	29.93	51.69	74.00	-22.31	Peak

6. 6dB and 99% Bandwidth test

6.1 Test Procedure

6dB Bandwidth:

Systems using digital modulation techniques may operate in the 902 - 928 MHz,2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

The transmitter output was connected to a spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum with the power of which is lower than peak power for 6dB.

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW)>= 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.

6.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	Spectrum	Jul. 04 2013	FSP30	GTS208	RS

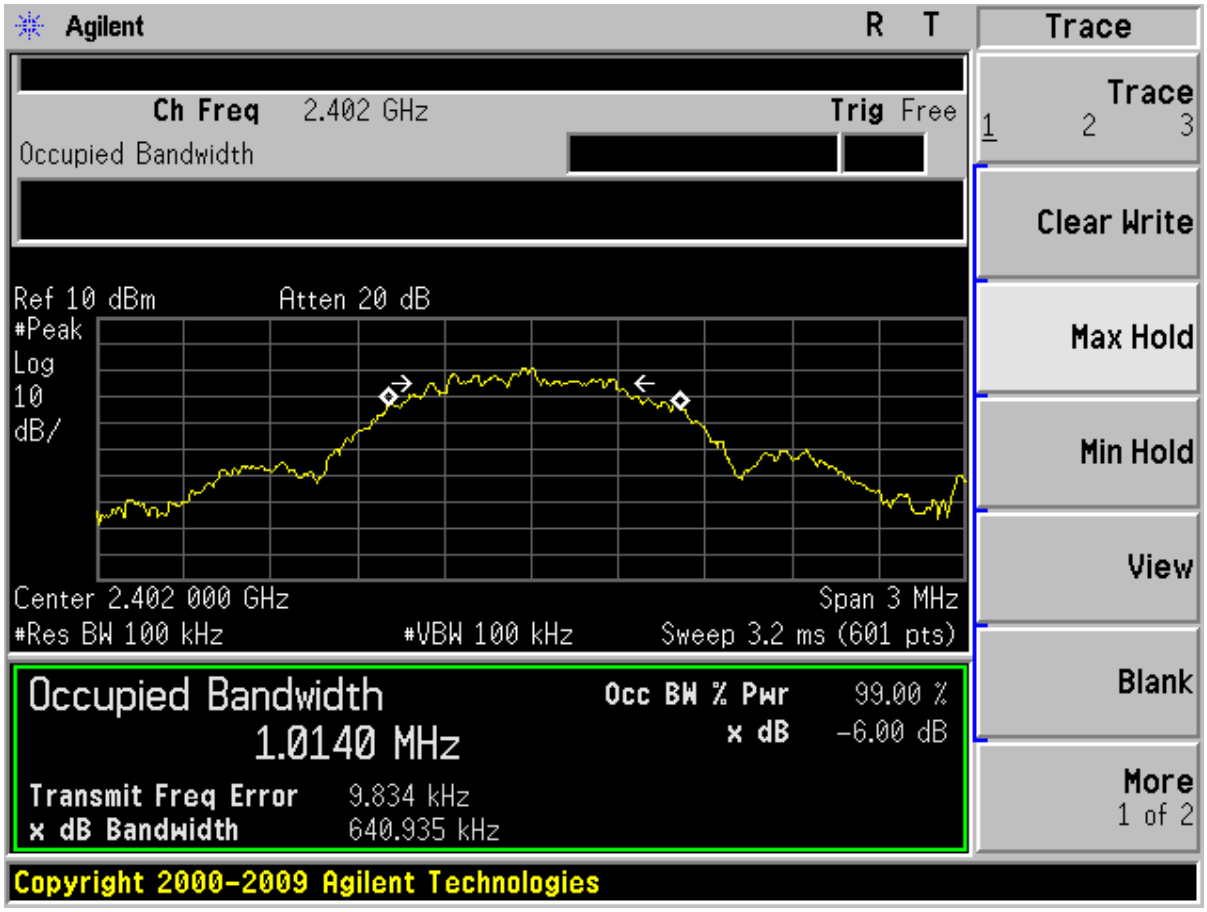
6.3 Test Result

Remark : Conducted measurement.

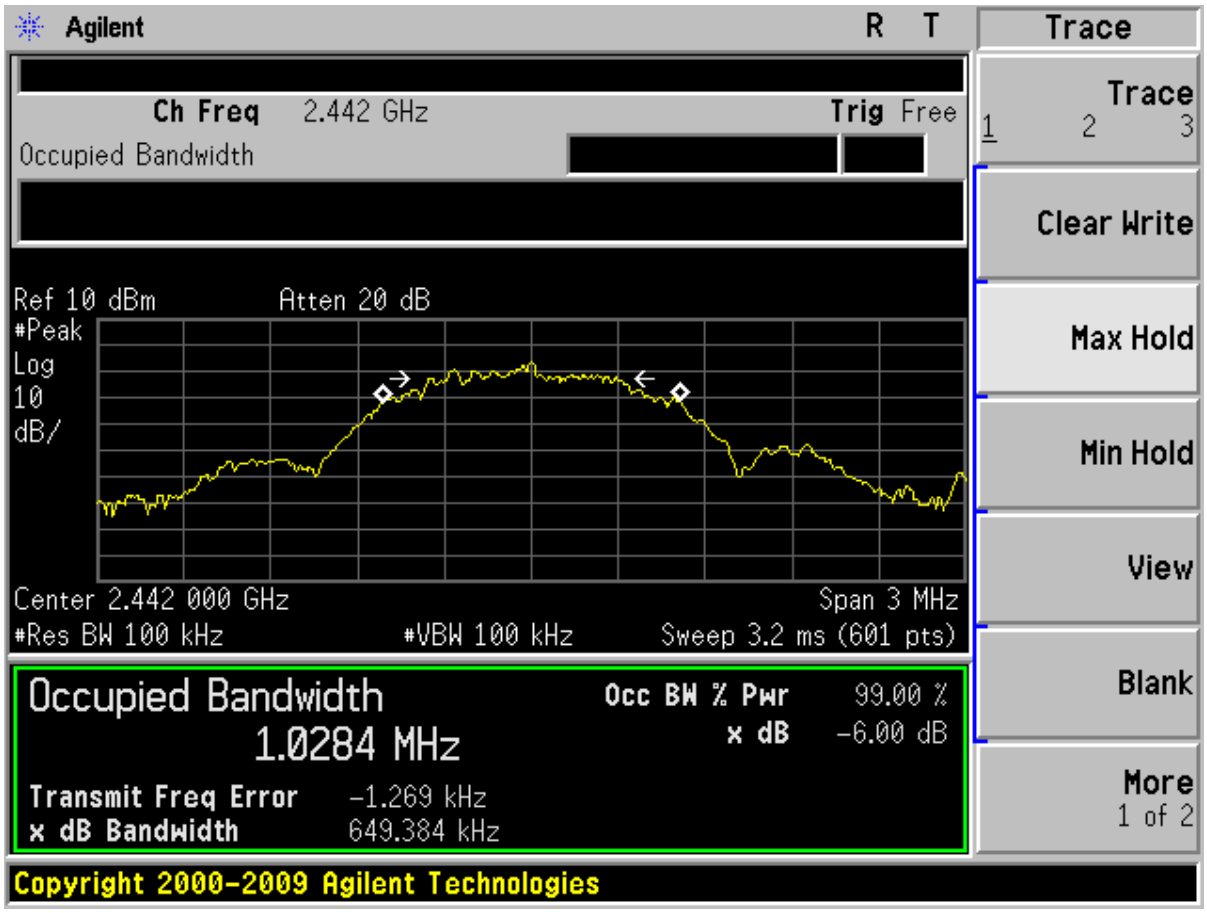
6dB Bandwidth:

GFSK					
Channel	Diagram	6dB bandwidth (kHz)	99% bandwidth (MHz)	>Limit kHz	Result
CH LOW	6-1	640.9	1.014	500	PASS
CH MID	6-2	649.4	***1.028***	500	PASS
CH HIGH	6-3	637.1	1.019	500	PASS

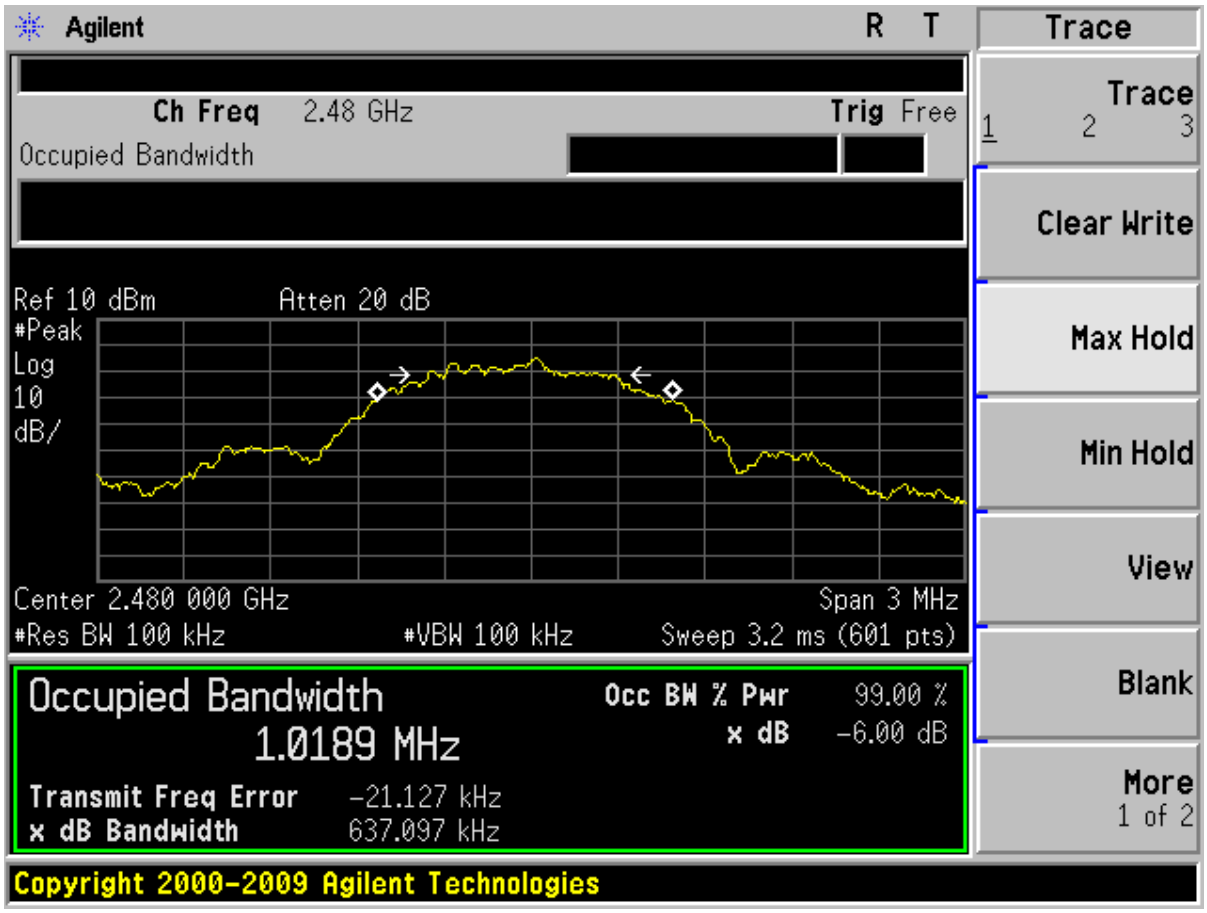
6.3.1 Diagram 6-1



6.3.2 Diagram 6-2



6.3.3 Diagram 6-3



7. Band Edge Compliance Test

7.1 Test Procedure

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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.

7.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	Spectrum	Jul. 04 2013	FSP30	GTS208	RS

7.3 Test Result

Conducted measurement

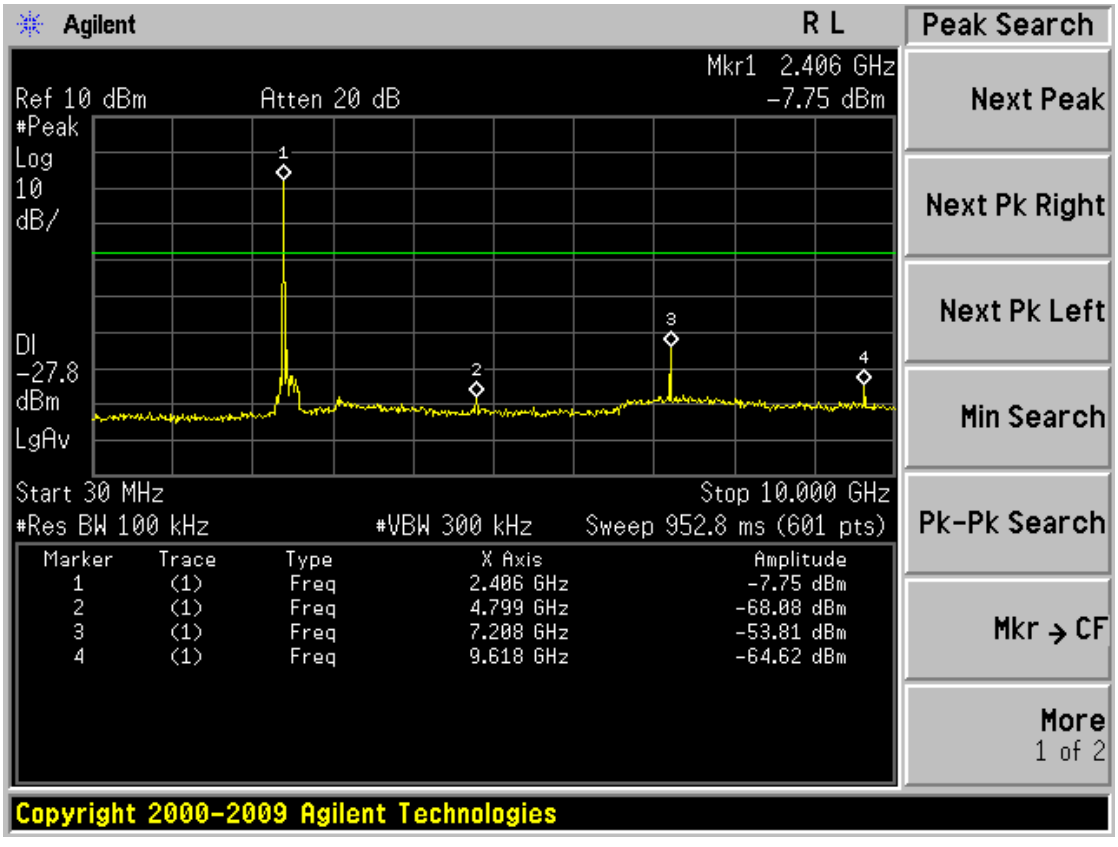
PK detector

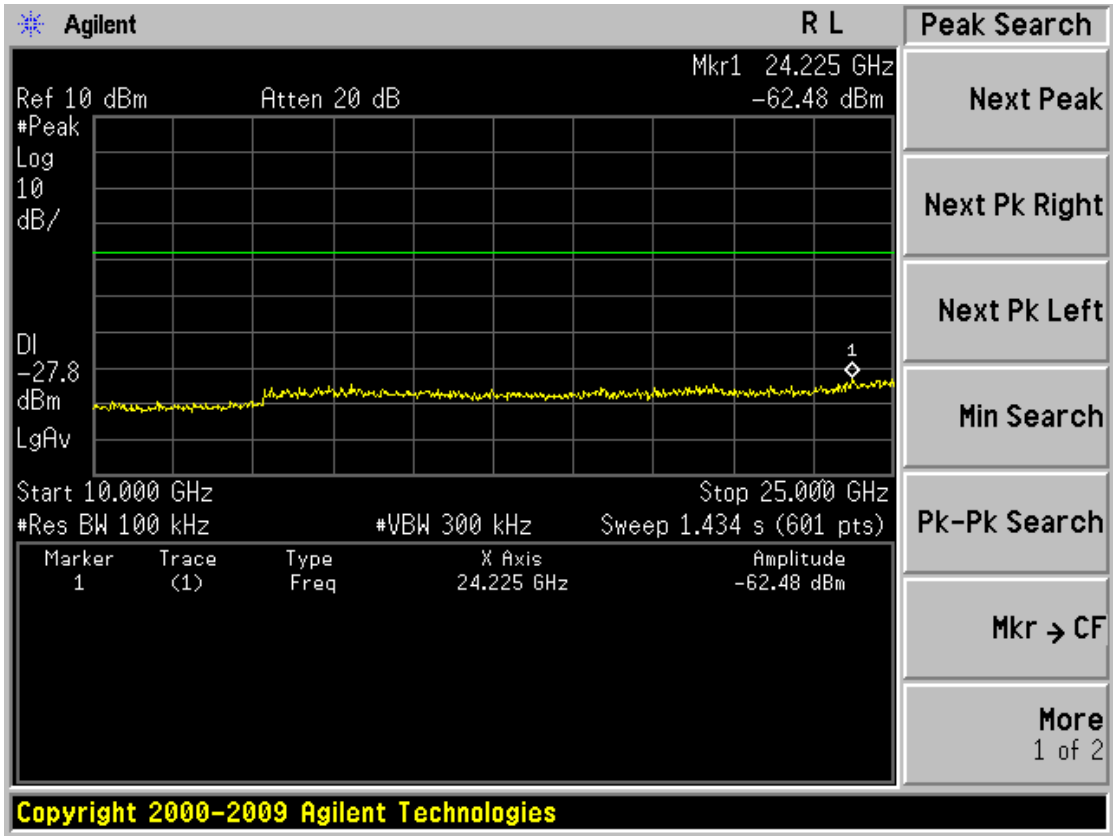
Max hold

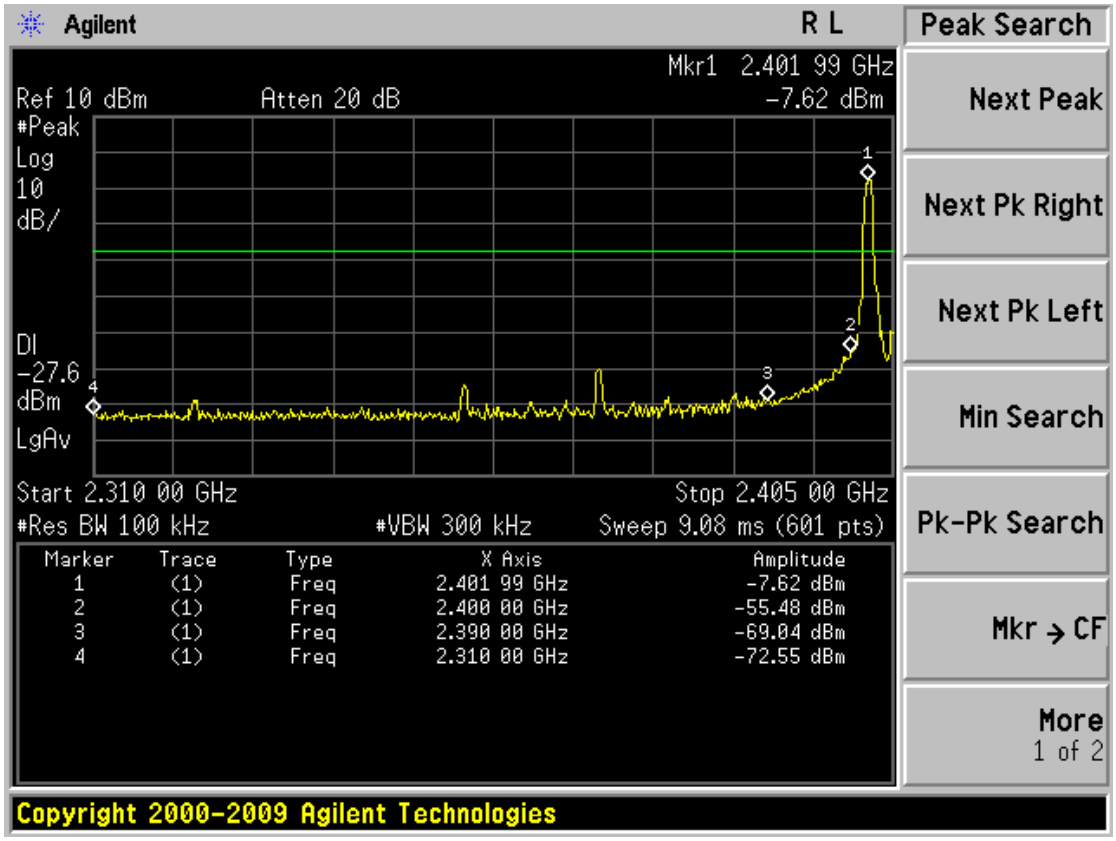
RMB=100kHz VBW=300kHz

Mode	Channel	Test Data	Test Result
GFSK	CH LOW	Diagram 7-1	Pass
	CH MID	Diagram 7-2	Pass
	CH HIGH	Diagram 7-3	Pass

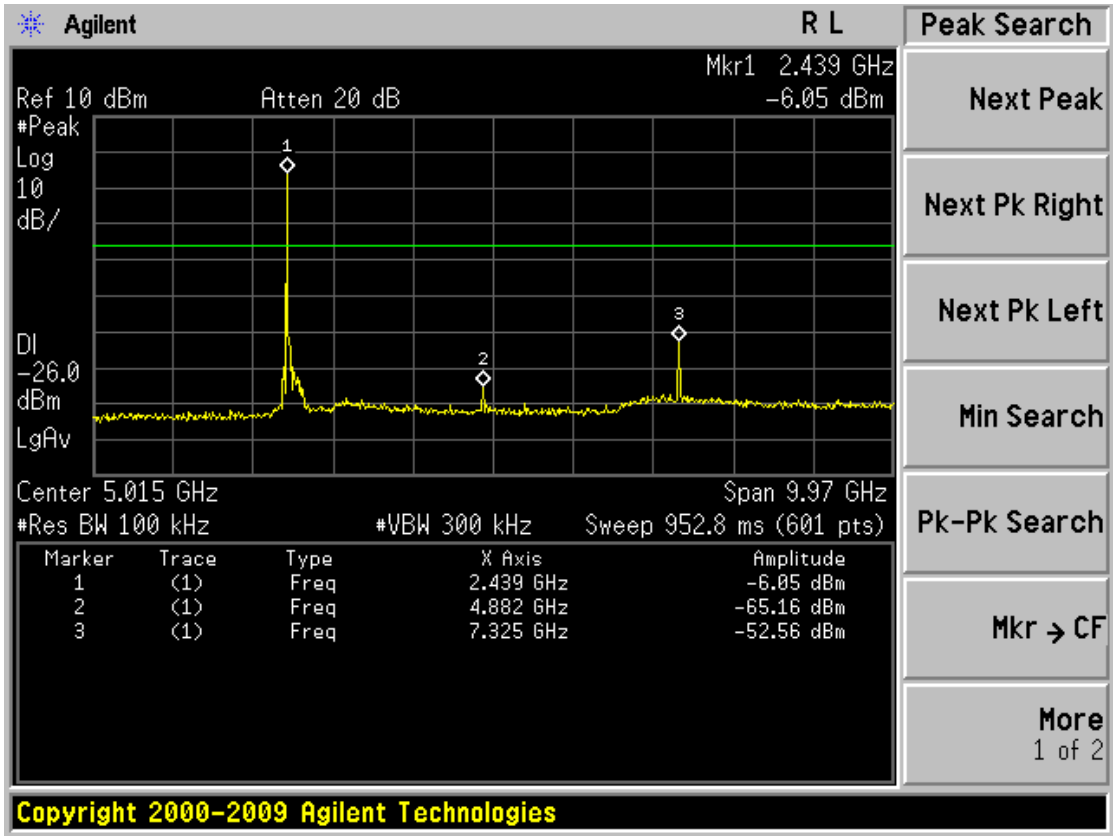
7.3.1 Diagram 7-1

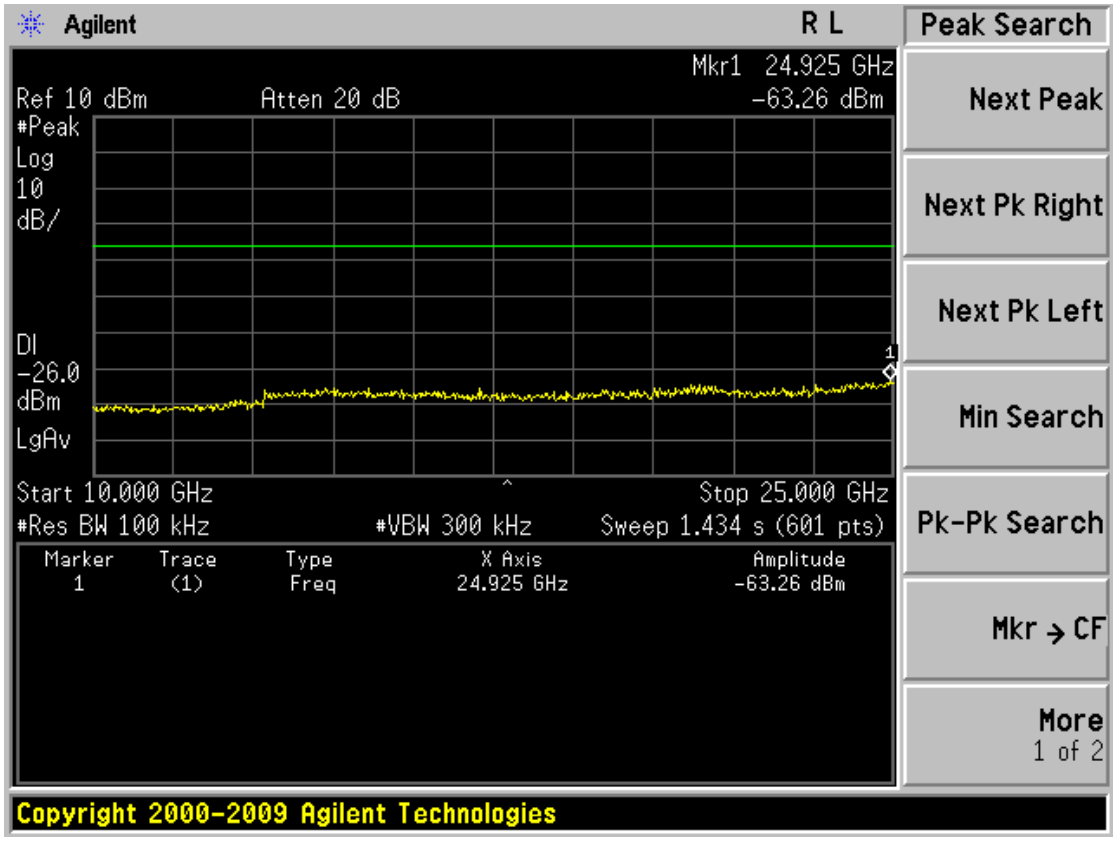



Agilent
R L
Peak Search
Mkr1 24.225 GHz
Ref 10 dBm
Atten 20 dB
-62.48 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-27.8
dBm
LgAv
Start 10.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1.434 s (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 24.225 GHz -62.48 dBm
Copyright 2000-2009 Agilent Technologies

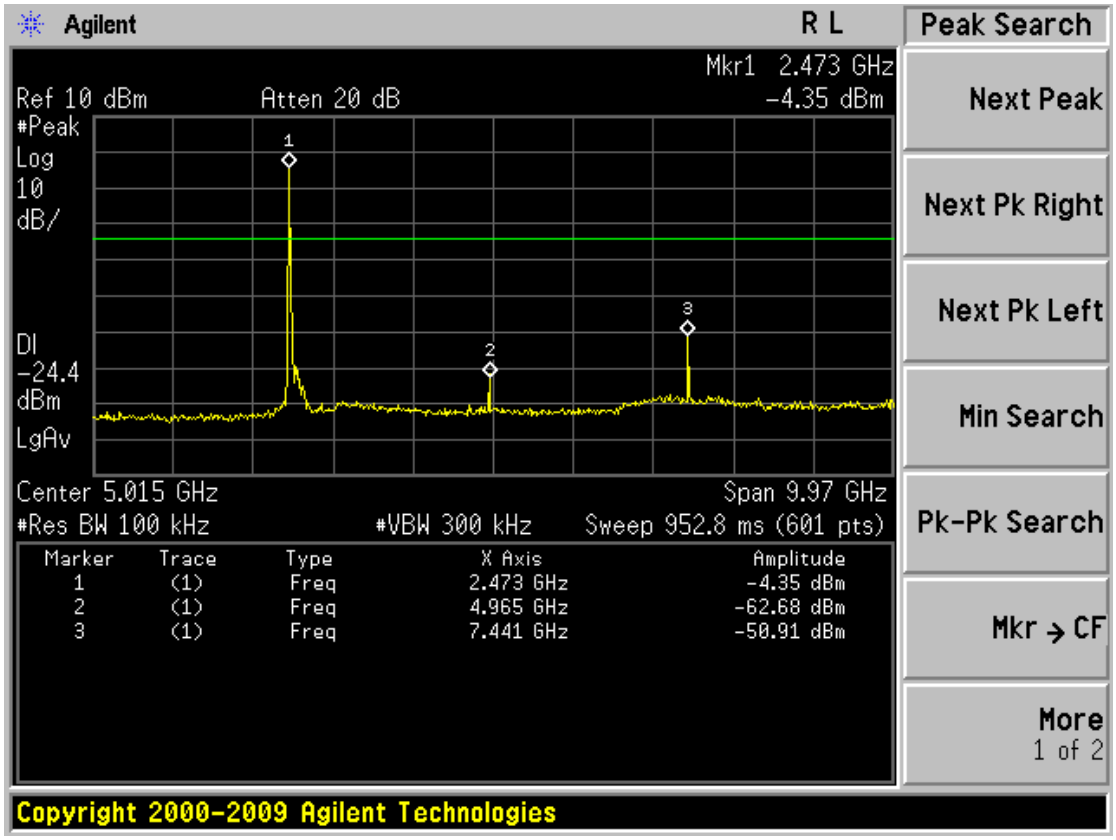

Agilent
R L
Peak Search
Mkr1 2.401 99 GHz
Ref 10 dBm
Atten 20 dB
-7.62 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-27.6
dBm
LgAv
Start 2.310 00 GHz
Stop 2.405 00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 9.08 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.401 99 GHz -7.62 dBm
2 (1) Freq 2.400 00 GHz -55.48 dBm
3 (1) Freq 2.390 00 GHz -69.04 dBm
4 (1) Freq 2.310 00 GHz -72.55 dBm
Copyright 2000-2009 Agilent Technologies

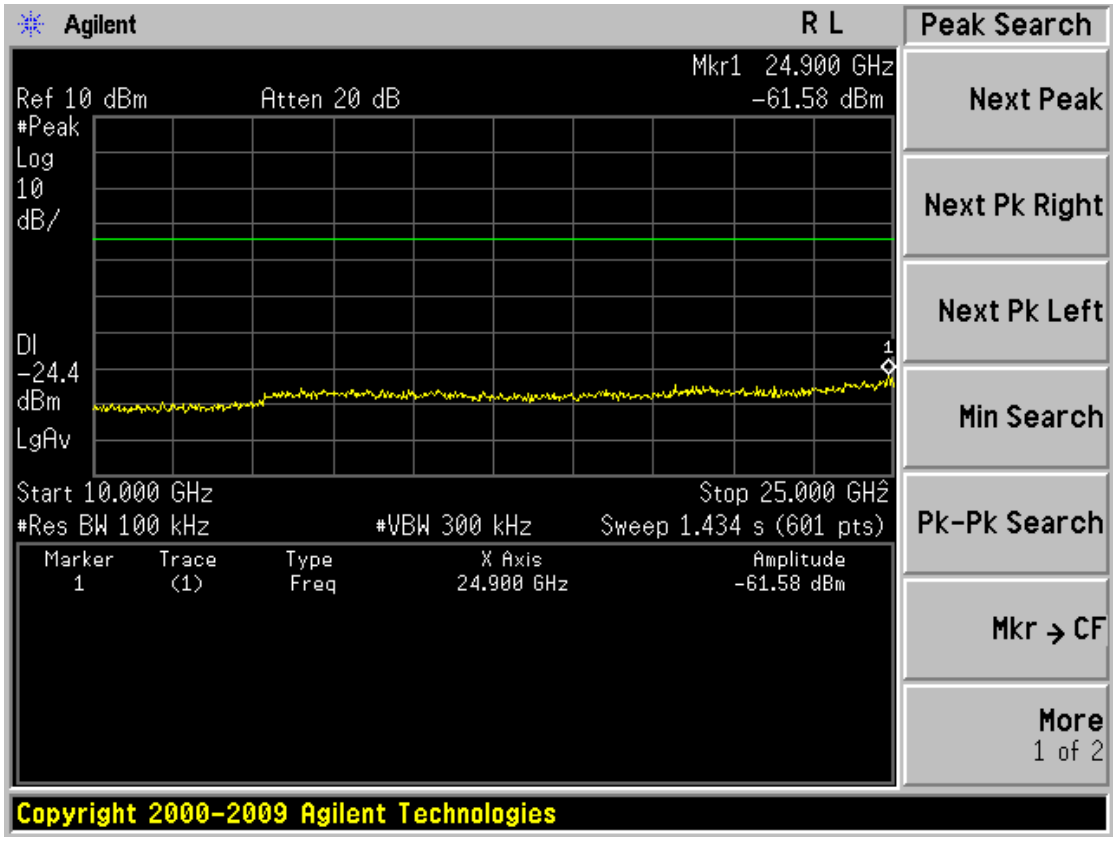
7.3.2 Diagram 7-2

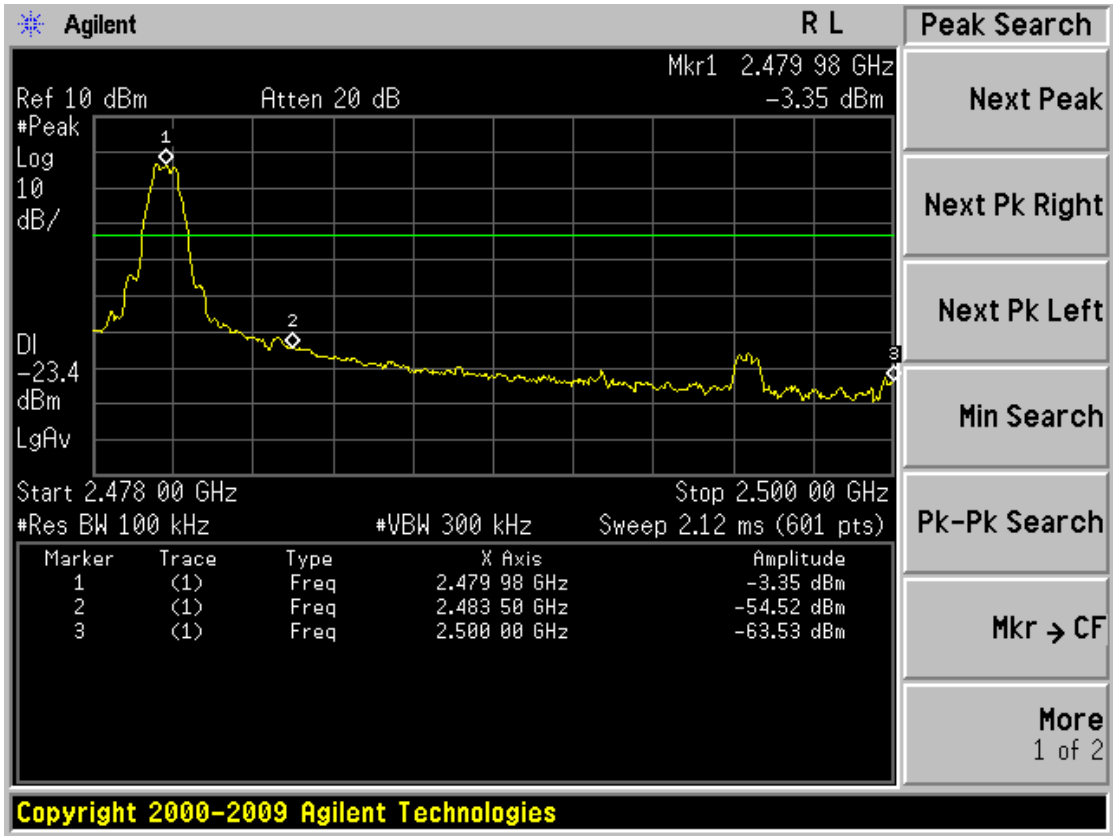




7.3.3 Diagram 7-3






Agilent
R L
Peak Search
Mkr1 2.479 98 GHz
Ref 10 dBm
Atten 20 dB
-3.35 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-23.4
dBm
LgAv
Start 2.478 00 GHz
Stop 2.500 00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.12 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.479 98 GHz -3.35 dBm
2 (1) Freq 2.483 50 GHz -54.52 dBm
3 (1) Freq 2.500 00 GHz -63.53 dBm
Copyright 2000-2009 Agilent Technologies

8. Power Spectral Density Test

8.1 Test Procedure

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

The transmitter output was connected to a spectrum analyzer. The maximum power density level was measured by spectrum analyzer with RBW >3kHz and Detector: PK

Cable loss and attenuator loss have been added in Spectrum setting offset .

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.

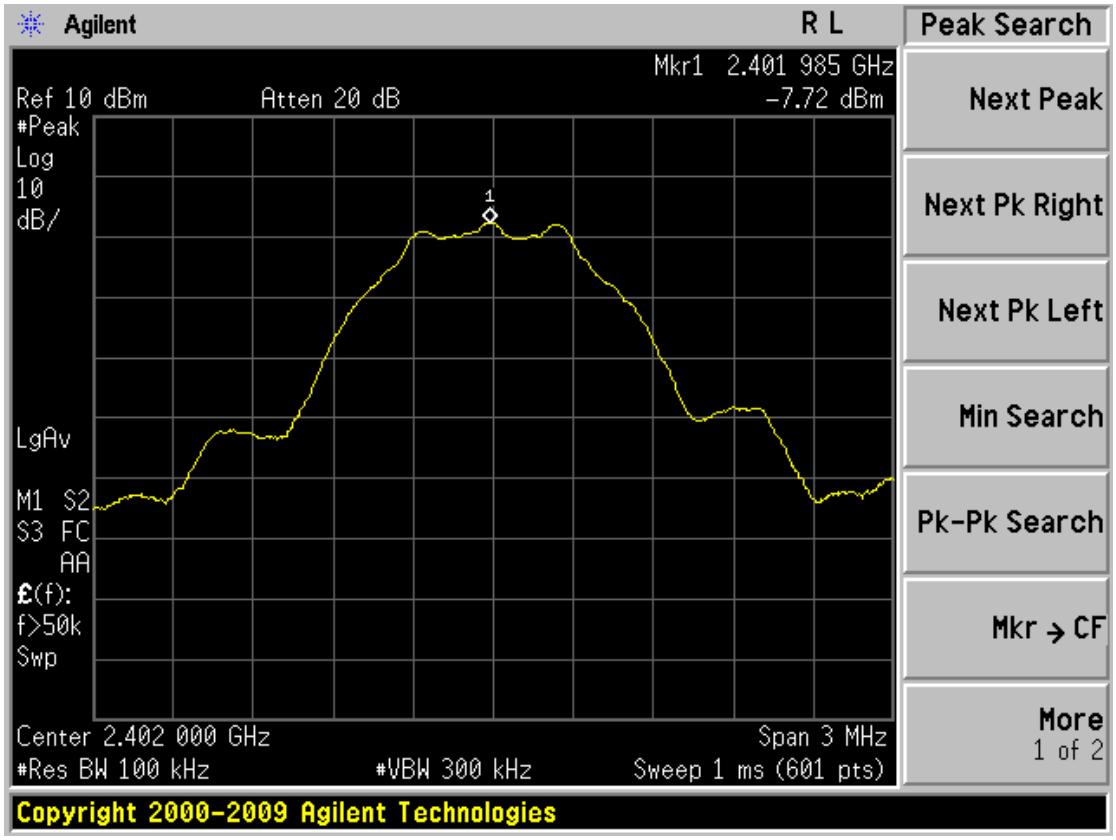
8.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	Spectrum	Jul. 04 2013	FSP30	GTS208	RS

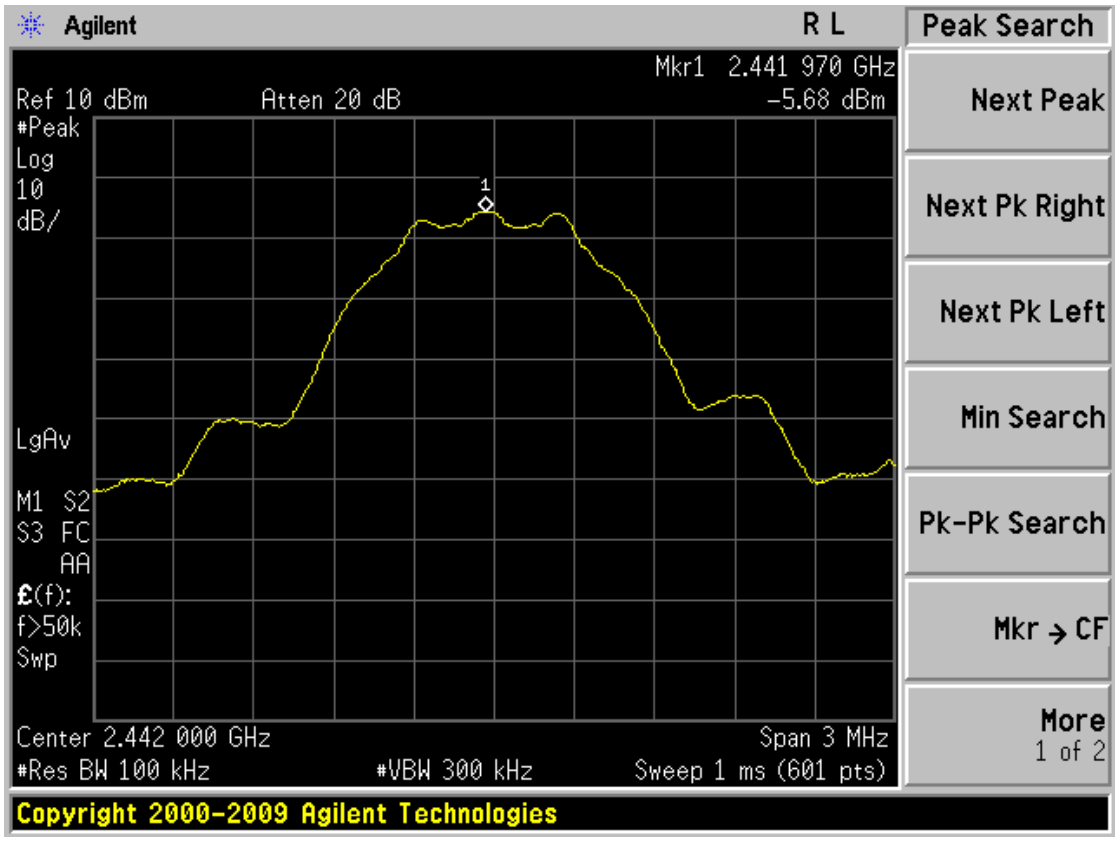
8.3 Test Result

Mode	Channel	Diagram	Result (dBm)	<Limit (dBm)	Result
GFSK	CH LOW	8-1	-7.72	8	Pass
GFSK	CH MID	8-2	-5.68	8	Pass
GFSK	CH HIGH	8-3	-3.52	8	Pass

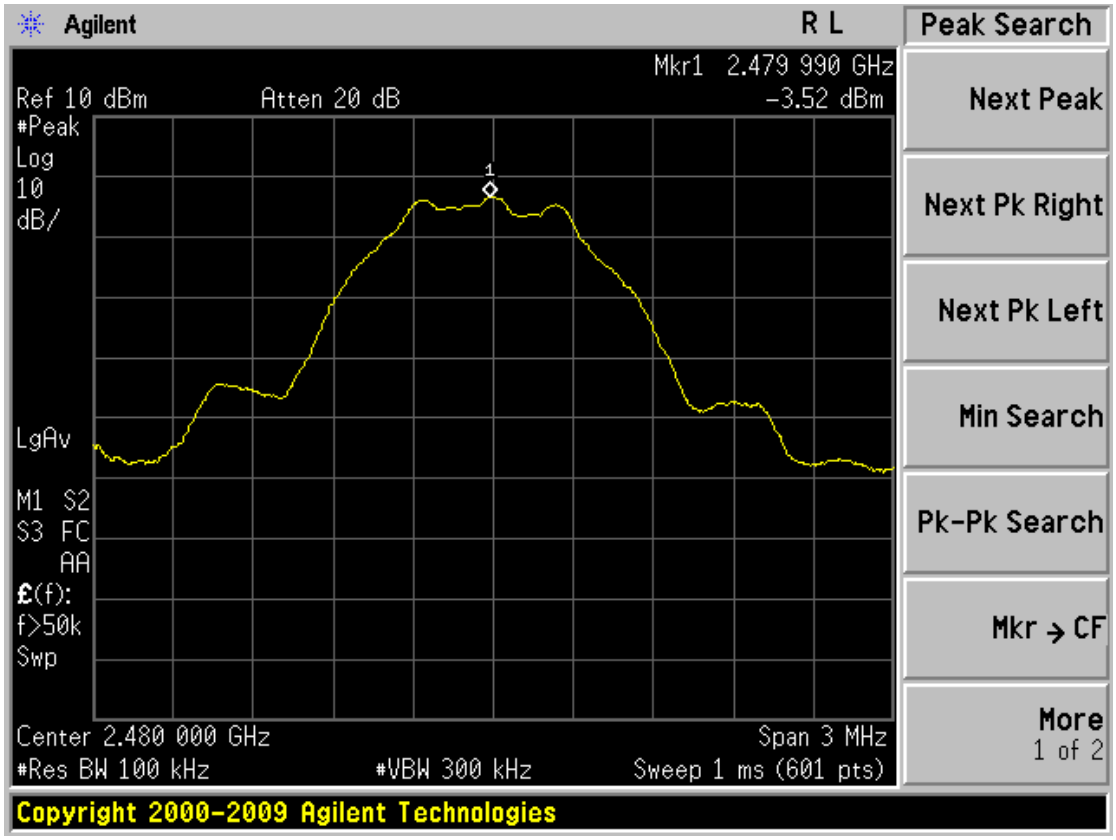
8.3.1 Diagram 8-1



8.3.2 Diagram 8-2



8.3.3 Diagram 8-3



9. Peak Output Power Test

9.1 Test Procedure

For systems using digital modulation in the 2400-2483.5MHz, The Peak output power shall not exceed 1W(30dBm)
PEAK detector
RBW>6dB Bandwidth
VBW>=RBW
Sweep time :AUTO

9.2 Measurement Equipment

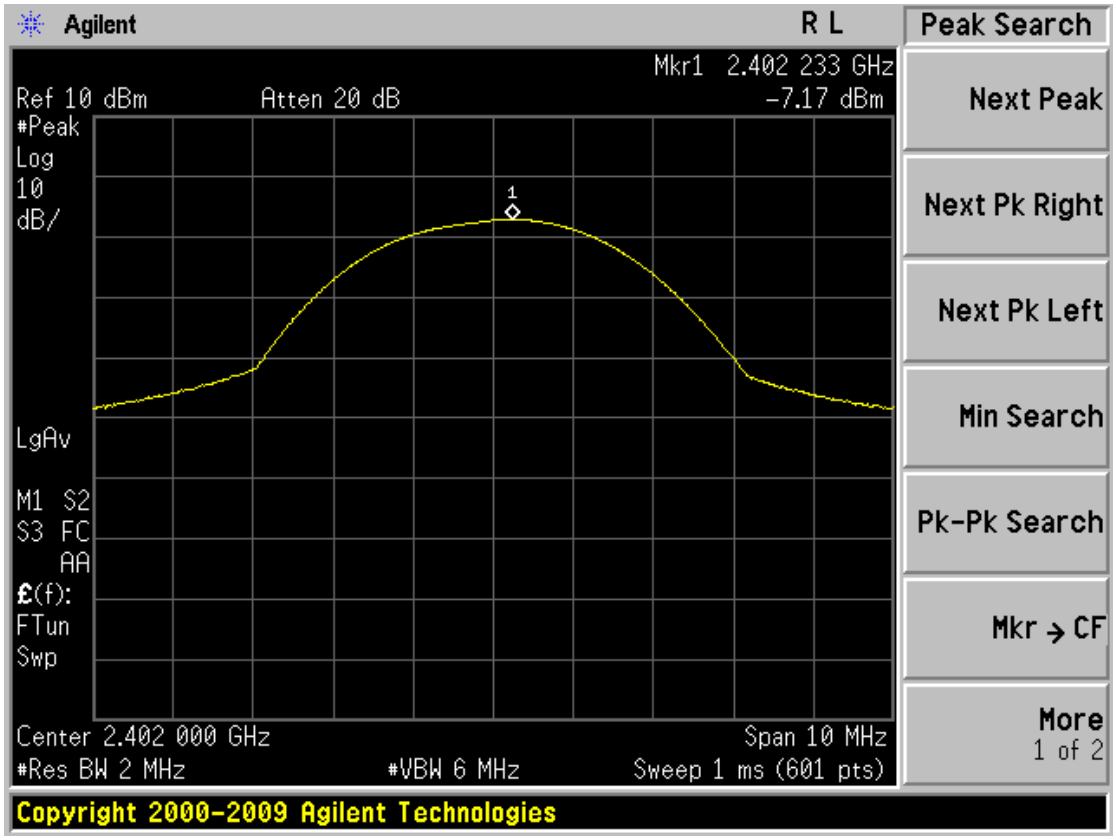
	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	Spectrum	Jul. 04 2013	FSP30	GTS208	RS

9.3 Test Result

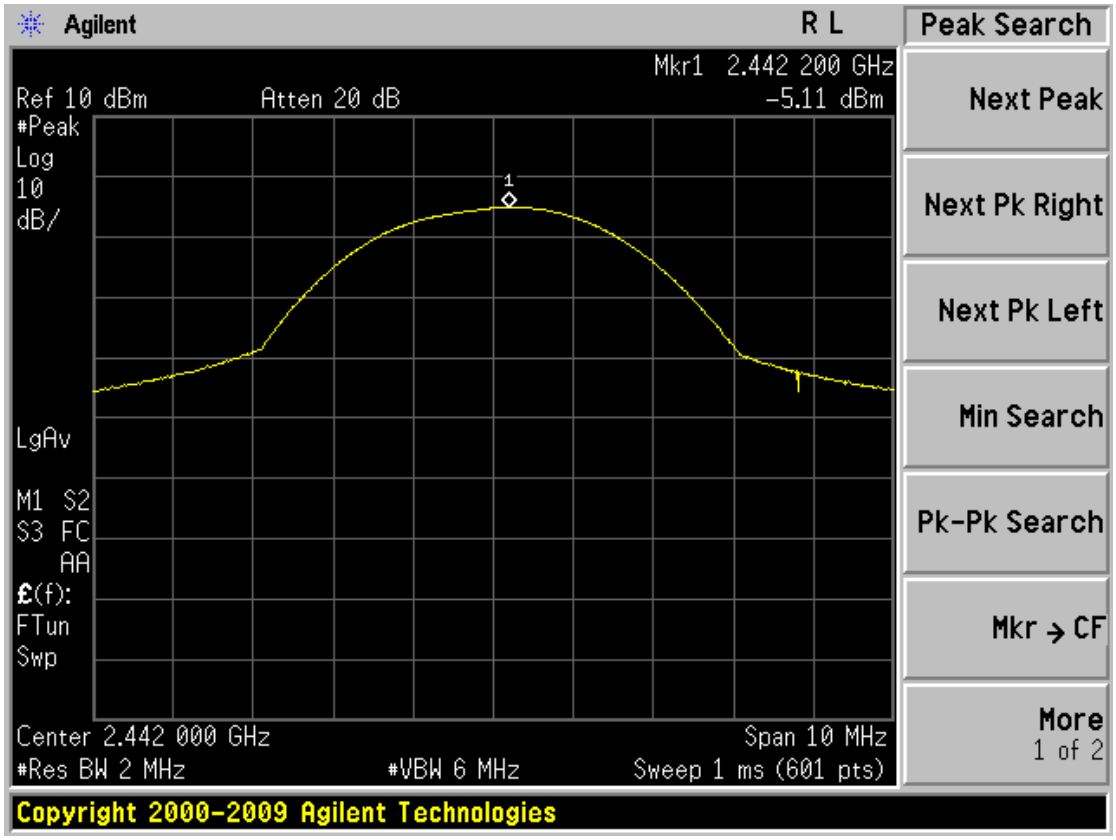
PEAK Output power : PASS

Test Mode	CH	Peak output Power （dBm）	Limit (dBm)
GFSK	CH LOW	-7.17	30
	CH MID	-5.11	30
	CH HIGH	-2.94	30

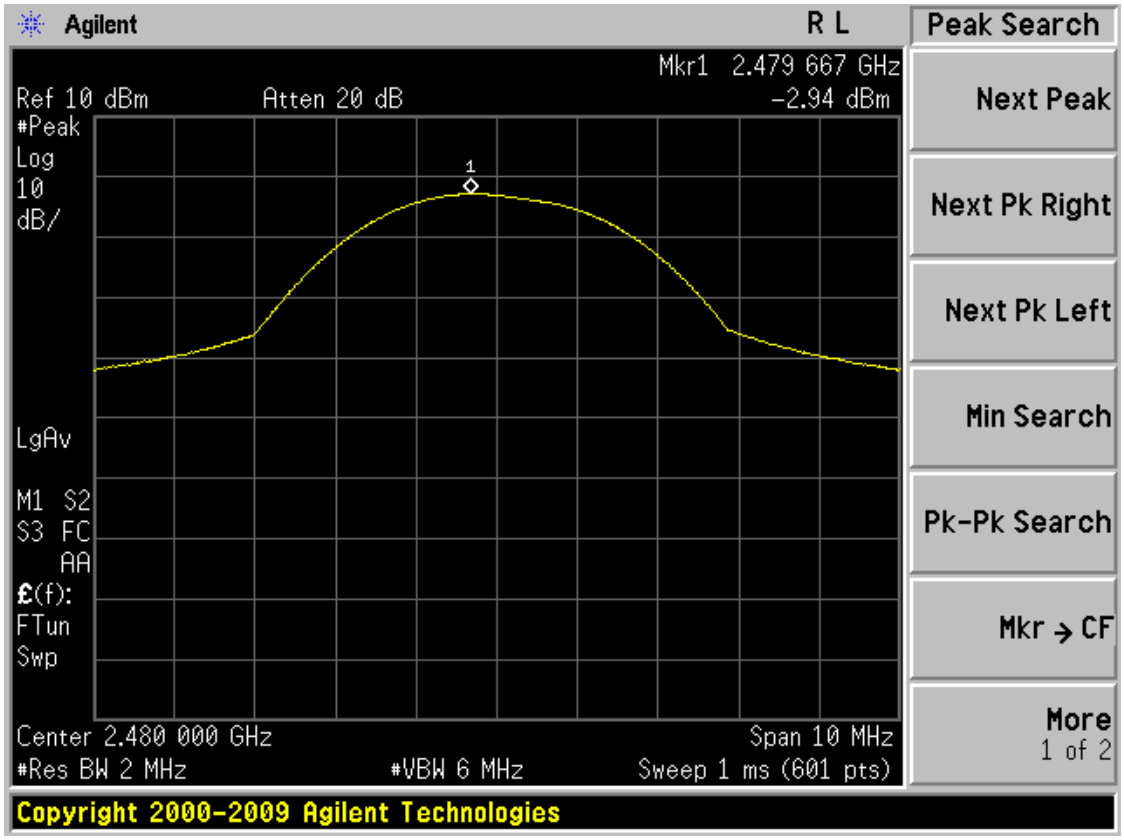
9.3.1 Diagram 9-1


Agilent
R L
Peak Search
Mkr1 2.402 233 GHz
Ref 10 dBm
Atten 20 dB
-7.17 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 2.402 000 GHz
Span 10 MHz
#Res BW 2 MHz
#VBW 6 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2009 Agilent Technologies

9.3.2 Diagram 9-2



9.3.3 Diagram 9-3



10 POWER LINE CONDUCTED EMISSION TEST

10.1 Test Procedure

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50
*-Decreases with the logarithm of the frequency.		

10.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	Shielding Room	Jul. 04 2013	7.0(L)x3.0(W)x3.0(H)	GTS252	ZhongYu Electron
☒	EMI Test Receiver	Jul. 04 2013	ESCS30	1102.4500K30	Rohde & Schwarz
☒	10dB Pulse Limita	Jul. 04 2013	N/A	GTS224	Rohde & Schwarz
☒	LISN	Jul. 04 2013	NSLK 8127	8127549	SCHWARZBECK MESS-ELEKTRONIK
☒	Coaxial Cable	Apr. 01 2013	N/A	N/A	GTS

10.3 Test Result

The EUT was placed on a non-metallic table, 80cm above the ground plane. The other peripheral devices power cord connected to the power mains through another line impedance stabilization network.In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4-2009 on conducted Emission test.

Preview measurements:
0.15 MHz to 30 MHz
Receiver settings: PK&AV detector
RBW:9 kHz

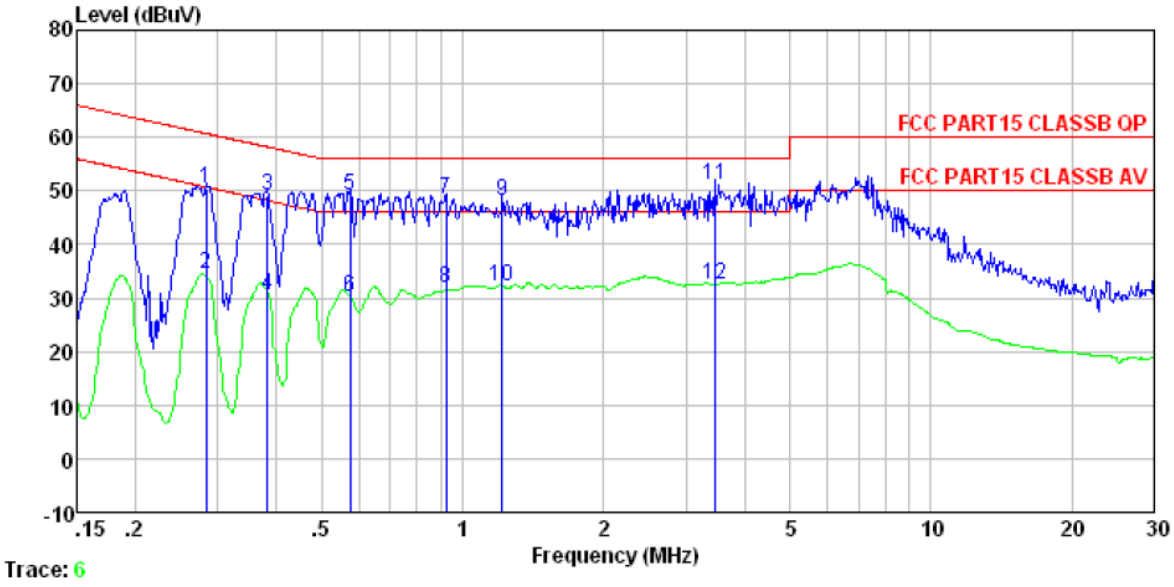
Final measurement:
0.15 MHz to 30 MHz
Receiver settings:QP&AV detector

Test mode	Power Line	Test Data	Test Result
TM1	Line	Diagram 10-1	Pass
	Neutral	Diagram 10-2	Pass

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
3: If PK value is lower than AV limit then QP and AV value are deemed to be complied with rules and only diagram will be shown as below.

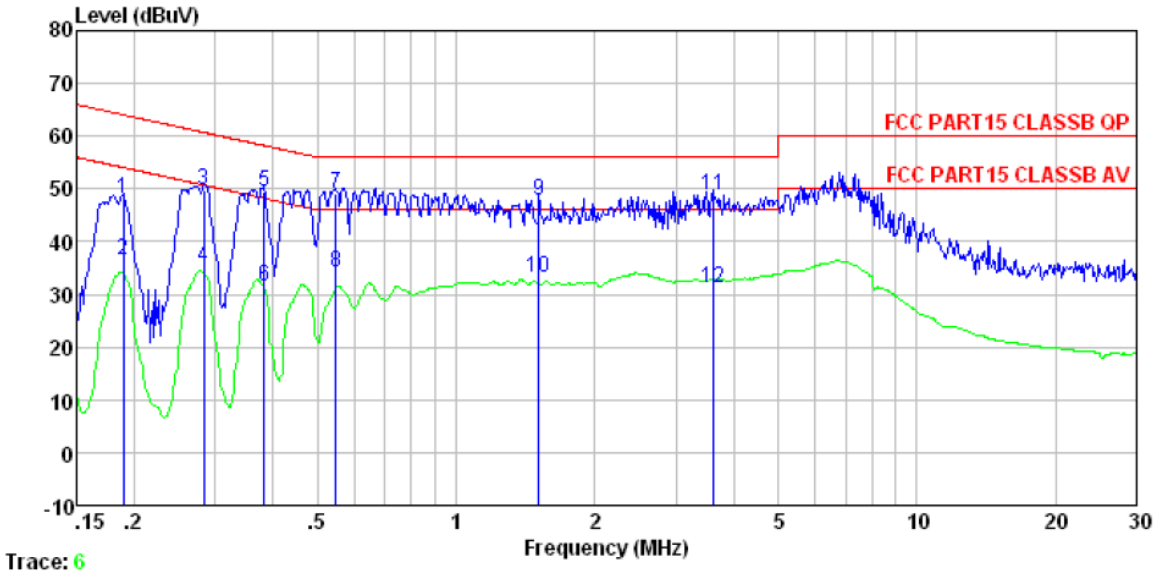
10.3.1 Diagram 10-1



Trace: 6

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.283	50.09	0.11	0.10	50.30	60.72	-10.42	QP
2	0.283	34.31	0.11	0.10	34.52	50.72	-16.20	Average
3	0.383	49.03	0.11	0.10	49.24	58.21	-8.97	QP
4	0.383	30.25	0.11	0.10	30.46	48.21	-17.75	Average
5	0.576	48.73	0.13	0.12	48.98	56.00	-7.02	QP
6	0.576	29.98	0.13	0.12	30.23	46.00	-15.77	Average
7	0.923	48.15	0.14	0.13	48.42	56.00	-7.58	QP
8	0.923	31.42	0.14	0.13	31.69	46.00	-14.31	Average
9	1.216	47.73	0.13	0.13	47.99	56.00	-8.01	QP
10	1.216	31.99	0.13	0.13	32.25	46.00	-13.75	Average
11	3.454	50.81	0.18	0.15	51.14	56.00	-4.86	QP
12	3.454	32.15	0.18	0.15	32.48	46.00	-13.52	Average

10.3.2 Diagram 10-2



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.189	48.06	0.07	0.13	48.26	64.06	-15.80	QP
2	0.189	36.25	0.07	0.13	36.45	54.06	-17.61	Average
3	0.283	49.77	0.06	0.10	49.93	60.72	-10.79	QP
4	0.283	34.94	0.06	0.10	35.10	50.72	-15.62	Average
5	0.383	49.15	0.06	0.10	49.31	58.21	-8.90	QP
6	0.383	31.31	0.06	0.10	31.47	48.21	-16.74	Average
7	0.549	48.87	0.07	0.11	49.05	56.00	-6.95	QP
8	0.549	34.05	0.07	0.11	34.23	46.00	-11.77	Average
9	1.511	47.65	0.09	0.14	47.88	56.00	-8.12	QP
10	1.511	32.87	0.09	0.14	33.10	46.00	-12.90	Average
11	3.603	48.58	0.14	0.15	48.87	56.00	-7.13	QP
12	3.603	30.86	0.14	0.15	31.15	46.00	-14.85	Average

11. Antenna requirement

11.1 Requirement

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2 Result

The antenna used for this product is Internal Patch antenna that no antenna other than that furnished by the responsible party shall be used with the device, The maximum peak gain of this antenna is 2.0dBi.

END OF REPORT