TESTING
No. L2264

Part 15C

TEST REPORT

Product Name	CDMA/LTE Smart phone
Model Name	HUAWEI H882L,H882L,Marina,Y301-A3
FCC ID	QISH882L
Client	Huawei Technologies Co., Ltd.
Manufacturer	Huawei Technologies Co., Ltd.
Date of issue	March 19, 2013

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Reference Standard(s)	**FCC CFR47 Part 15C (2013)** Radio Frequency Devices **15.205** Restricted bands of operation; **15.207** Conducted limits; **15.209** Radiated emission limits; general requirements; **15.247** Operation within the bands 902-928 MHz,2400-2483.5 MHz, and 5725-5850MHz. **ANSI C63.4** Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40GHz. (2009) **DA00-705** Filing and Frequency Measurement Guidelines For Frequency Hopping Spread Spectrum System.(2000)
Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 2 of this test report are below limits specified in the relevant standards. General Judgment: **Pass**
Comment	The test result only responds to the measured sample.

Approved by_____ **Revised by**_____ **Performed by**_____

Director RF Manager RF Engineer

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1. General Information

1.1. Notes of the test report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 428261.

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 8510A.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

This report standalone dose not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of **TA Technology (Shanghai) Co., Ltd.** and the Accreditation Bodies, if it applies.

If the electrical report is inconsistent with the printed one, it should be subject to the latter.

1.2. Testing laboratory

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Yang Weizhong
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	yangweizhong@ta-shanghai.com

1.3. Applicant Information

Company:	Huawei Technologies Co., Ltd.
Address:	Administration Building, Headquarters of Huawei Techologies Co., Ltd., Bantian, Longgang District
City:	Shenzhen
Postal Code:	518129
Country:	P.R. China

1.4. Manufacturer Information

Company:	Huawei Technologies Co., Ltd.
Address:	Administration Building, Headquarters of Huawei Techologies Co., Ltd., Bantian, Longgang District
City:	Shenzhen
Postal Code:	518129
Country:	P.R.China

1.5. Information of EUT

General information

Product IMEI:	99000298000408		
Hardware Version:	HL1C8833LM		
Software Version:	H882L V100R001C378B160		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Test Mode	Basic Rate	Enhanced Data Rate(EDR)	
Modulation Type:	GFSK	π/4 DQPSK	8DQPSK
Packet Type:(Maximum Payload)	DH5 (1Mbps)	2DH5 (2Mbps)	3DH5 (3Mbps)
Max. Conducted Power	7.20 dBm	7.84 dBm	7.78 dBm
Power Supply:	Battery or Adapter		
Operating Frequency Range(s)	2400 ~ 2483.5 MHz		

Auxiliary equipment details

AE1: Battery 1	
Model:	HB4W1H
Manufacturer:	Huawei Technologies Co., Ltd.
S/N:	MAICB01X19110345
AE2: Battery 2	
Model:	HB4W1H
Manufacturer:	Huawei Technologies Co., Ltd.
S/N:	MPCCA25919100658
AE3: Adapter 1	
Model:	HW-050100U2W
Manufacturer:	Huawei Technologies Co., Ltd.
S/N:	HWBYAAC71603712
AE4: Adapter 2	
Model:	HW-050100U2W
Manufacturer:	Huawei Technologies Co., Ltd.
S/N:	HWHKAACA2815804
AE5: Adapter 3	
Model:	HW-050100U1W
Manufacturer:	Huawei Technologies Co., Ltd.
S/N:	TPACB0219072
AE6: Adapter 4	
Model:	HW-050100U1W
Manufacturer:	Huawei Technologies Co., Ltd.
S/N:	HKAC10619057

Equipment Under Test (EUT) is a CDMA/LTE Smart phone with internal antenna. The EUT supports Bluetooth.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. Test Date

The test is performed from February 23, 2013 to March 1, 2013.

2. Test Information

2.1. Test Mode

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

EUT is stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) with Adapter 1 and the worst case was recorded.

Test Modes		
Band	Radiated Test Cases	Conducted Test Cases
BT	2DH5 (Channel 39)	DH5 (Channel 0/39/78) 2DH5 (Channel 0/39/78) 3DH5 (Channel 0/39/78)

Note: The maximum RF output power of BT is 2DH5. For Radiated Test Cases, only the maximum RF output power is chosen.

2.2. Summary of test results

Number	Summary of measurements of results	Clause in FCC rules	Verdict
Basic Rate and Enhanced Data Rate(EDR)			
1	Peak Power Output -Conducted	15.247(b)(1)	PASS
2	Occupied Bandwidth (20dB)	15.247(a)(1)	PASS
3	Frequency Separation	15.247(a)(1)	PASS
4	Time of Occupancy (Dwell Time)	15.247(a)(1)(iii)	PASS
5	Band Edge Compliance	15.247(d)	PASS
6	Spurious Radiated Emissions in the restricted band	15.247(d),15.205,15.209	PASS
7	Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
8	Spurious RF Conducted Emissions	15.247(d)	PASS
9	Radiates Emission	15.247(d),15.205,15.209	PASS
10	AC Power Line Conducted Emission	15.207	PASS

2.3. Peak Power Output –Conducted

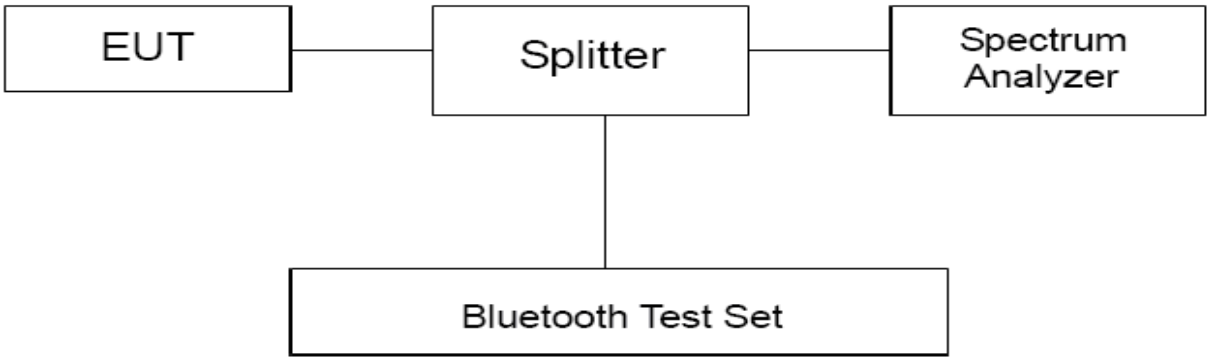
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT was connected to the spectrum analyzer and Bluetooth test setter via a power splitter with a known loss. The EUT is controlled by the Bluetooth test set to ensure max power transmission with proper modulation. The peak detector is used. RBW is set to 2 MHz; VBW is set to 6 MHz. These measurements have been tested at following channels: 0, 39, and 78 of Bluetooth.

Test Setup



Limits

Rule Part 15.247 (b) (1)specifies that " For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts."

Peak Output Power	≤ 0.125W (21dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.44 dB.

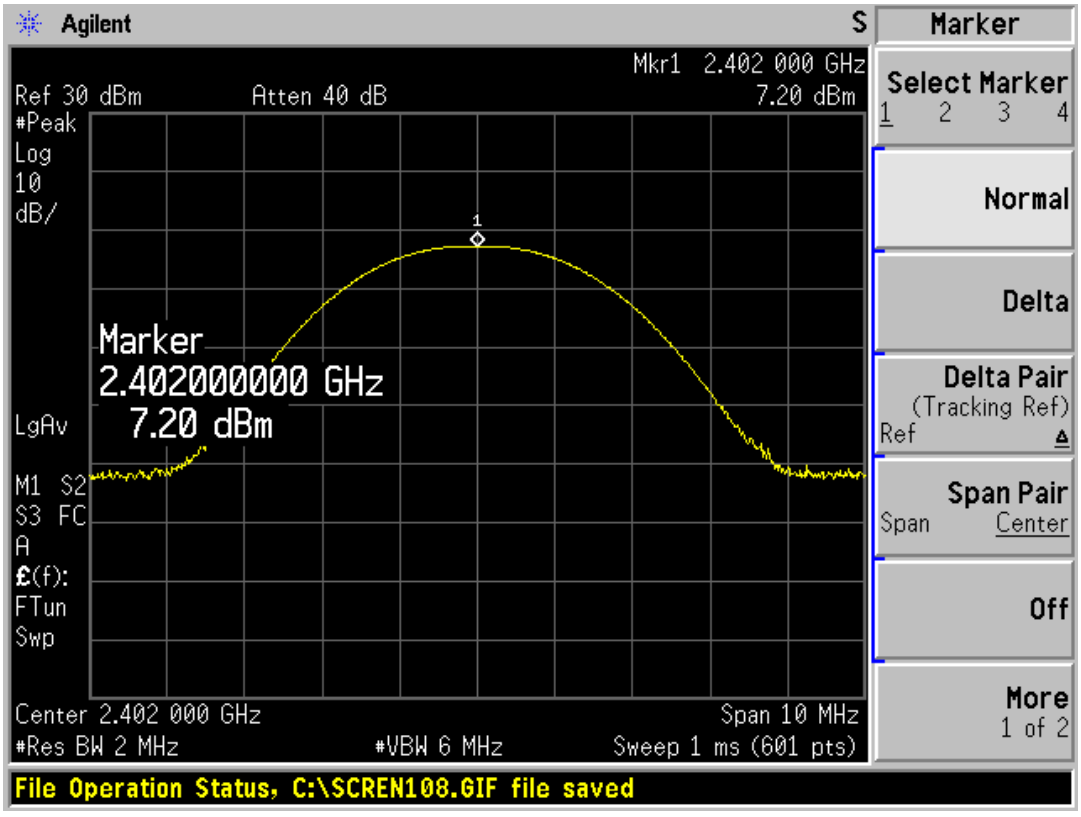
Test Results

Bluetooth

Channel	Frequency (MHz)	Peak Output Power (dBm)			Conclusion
		DH5	2DH5	3DH5	
0	2402	7.20	**7.72**	7.78	PASS
39	2441	7.09	**7.84**	7.69	PASS
78	2480	7.00	**7.55**	7.33	PASS

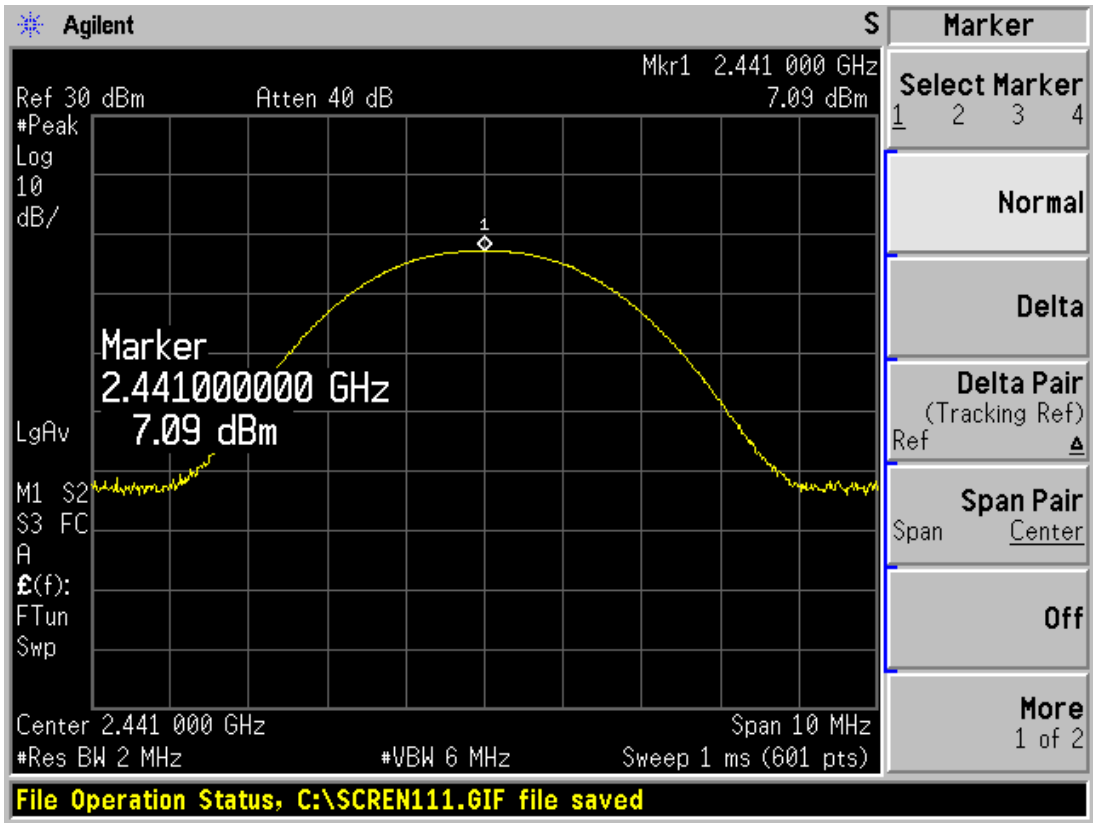
Note: The maximum output power values are marked in bold.

DH5



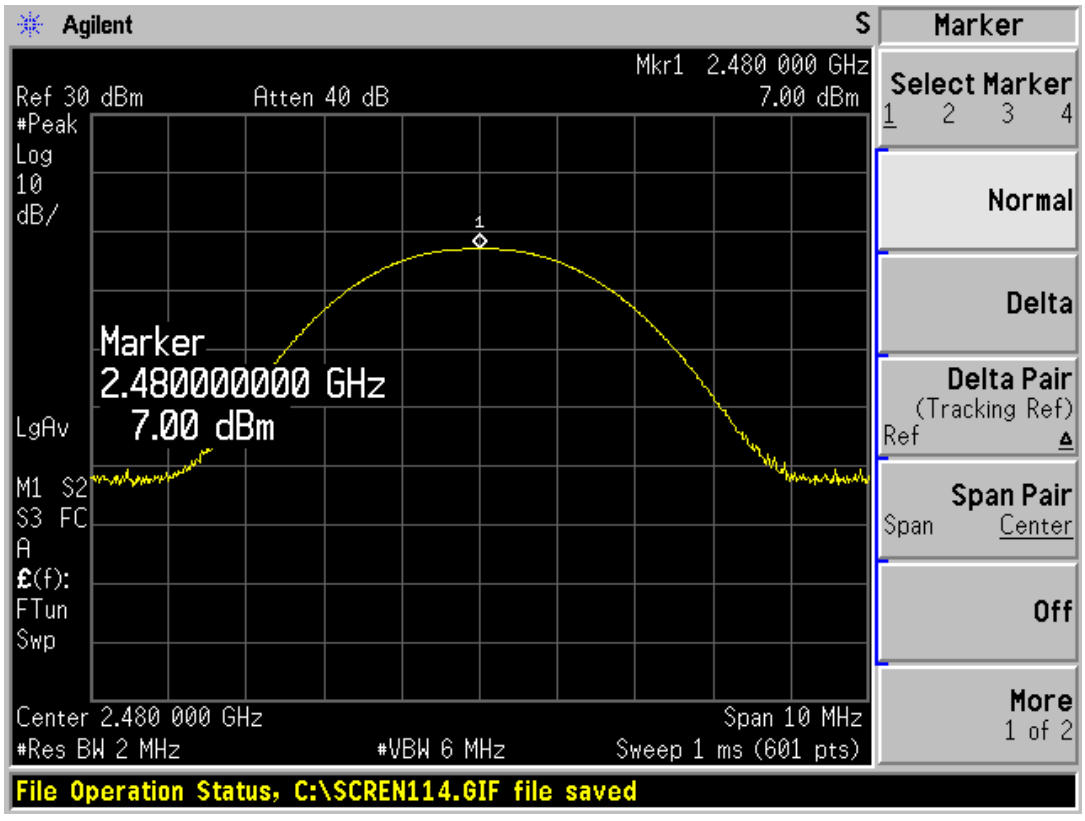
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

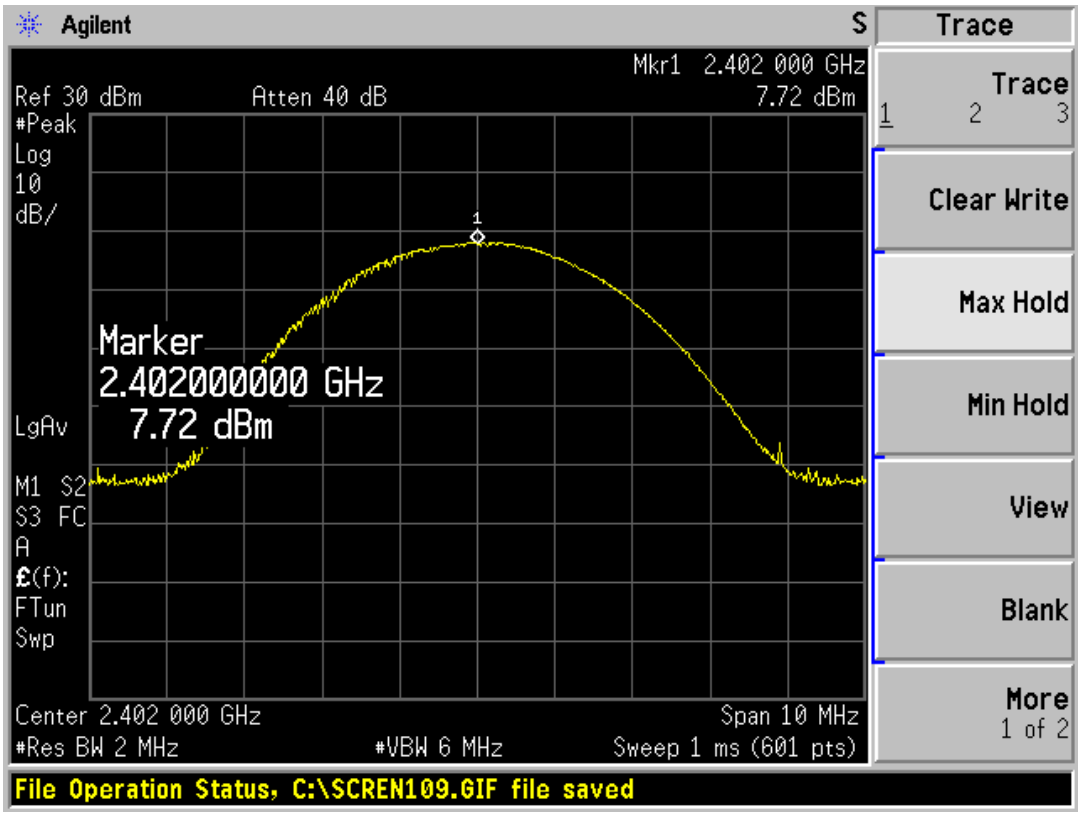
Channel No.:39



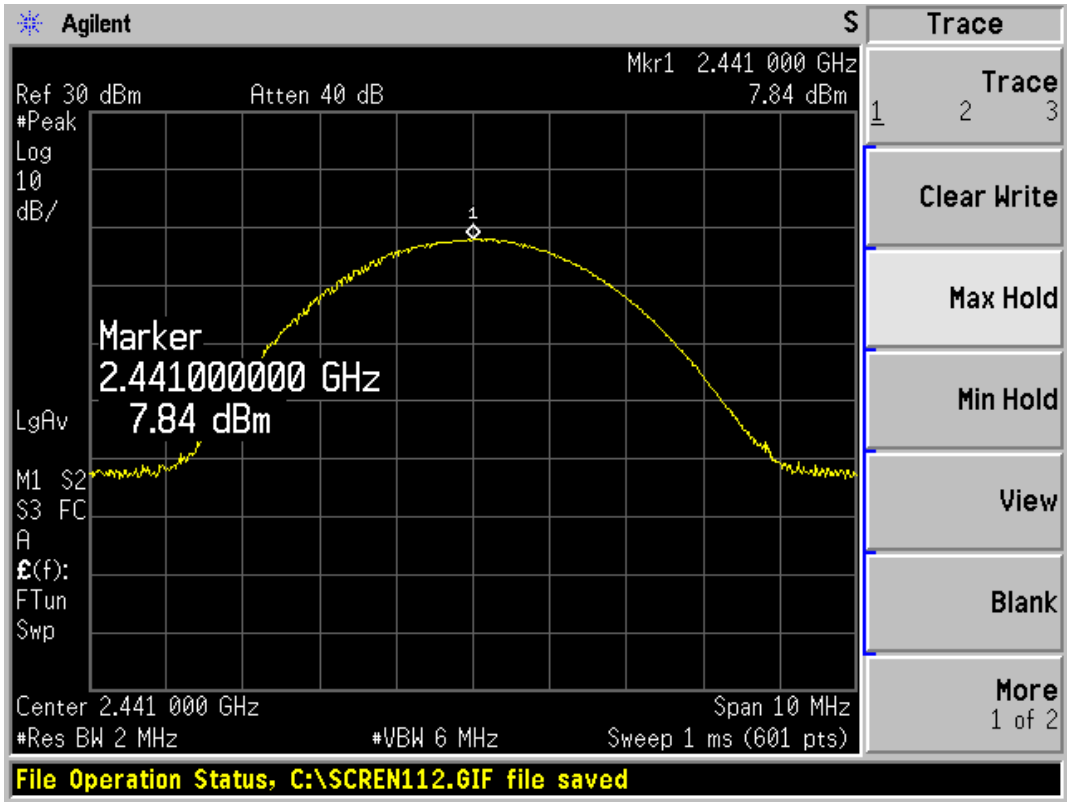
Carrier frequency (MHz): 2480

Channel No.:78

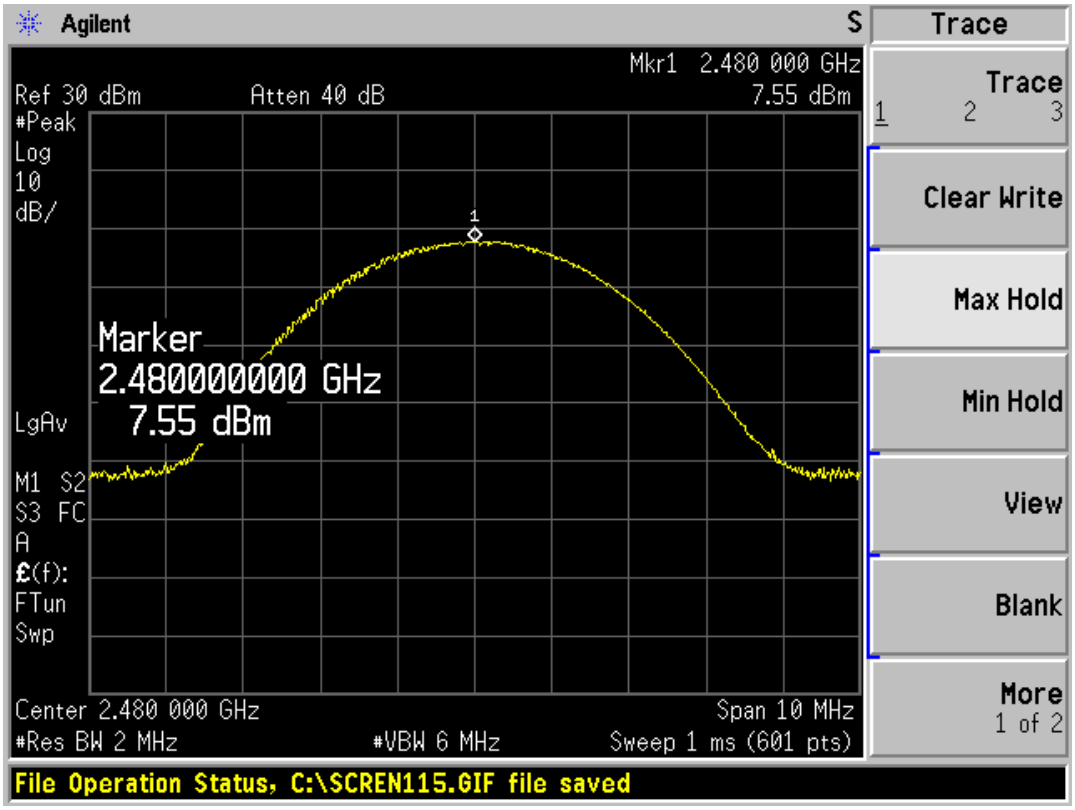
2DH5



Carrier frequency (MHz): 2402
Channel No.:0



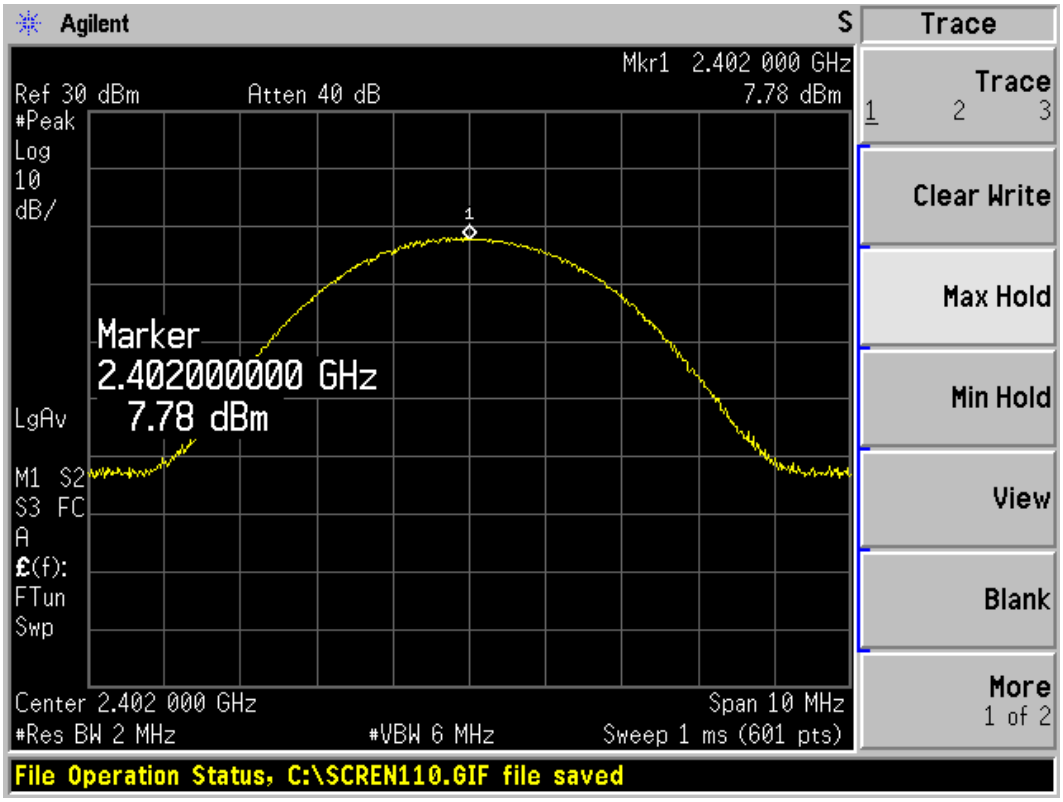
Carrier frequency (MHz): 2441
Channel No.:39



Carrier frequency (MHz): 2480

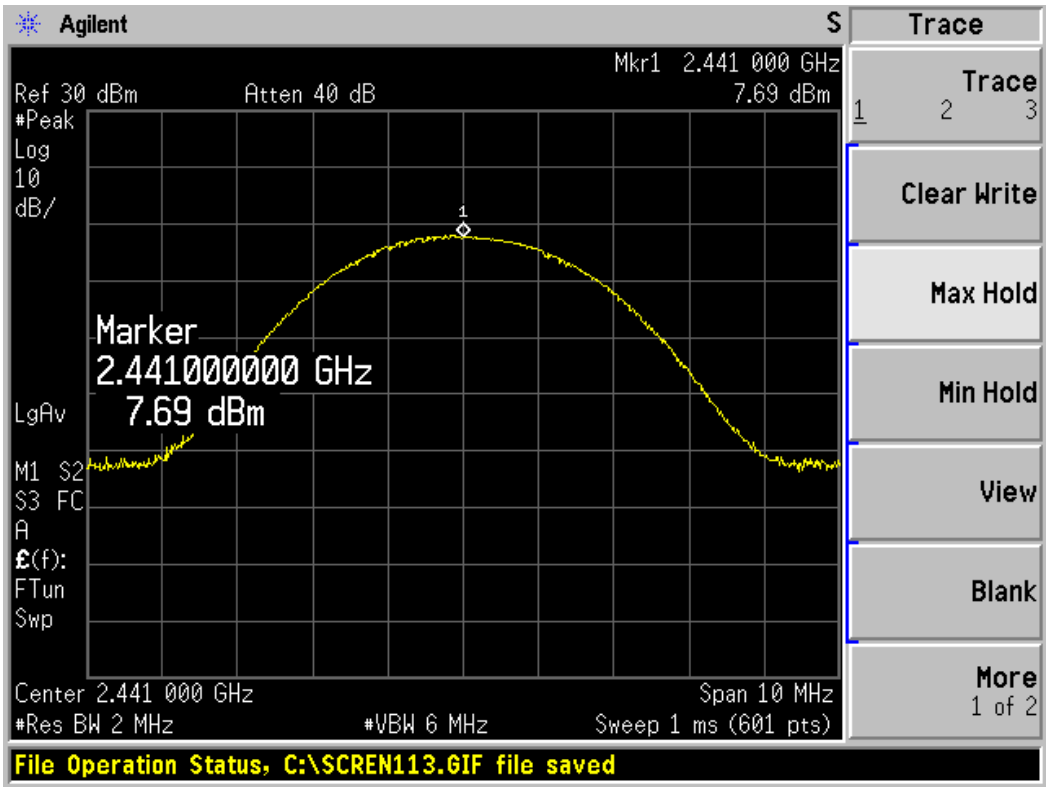
Channel No.:78

3DH5



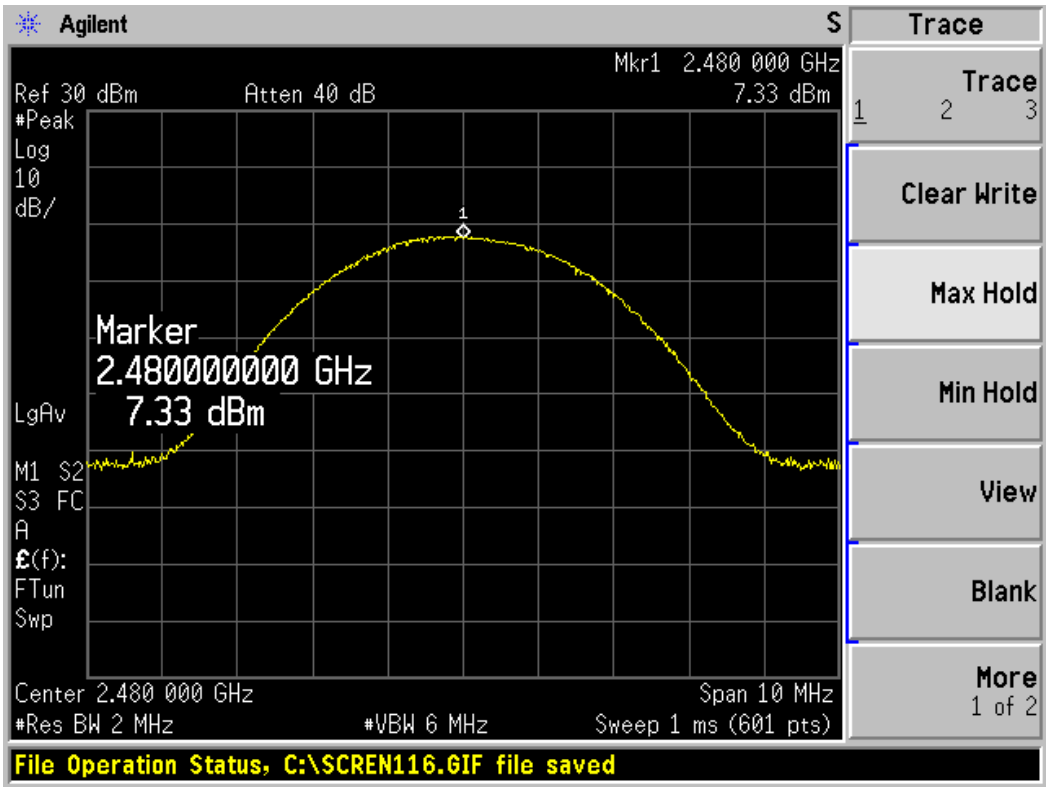
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

Channel No.:39



Carrier frequency (MHz): 2480

Channel No.:78

2.4. Occupied Bandwidth

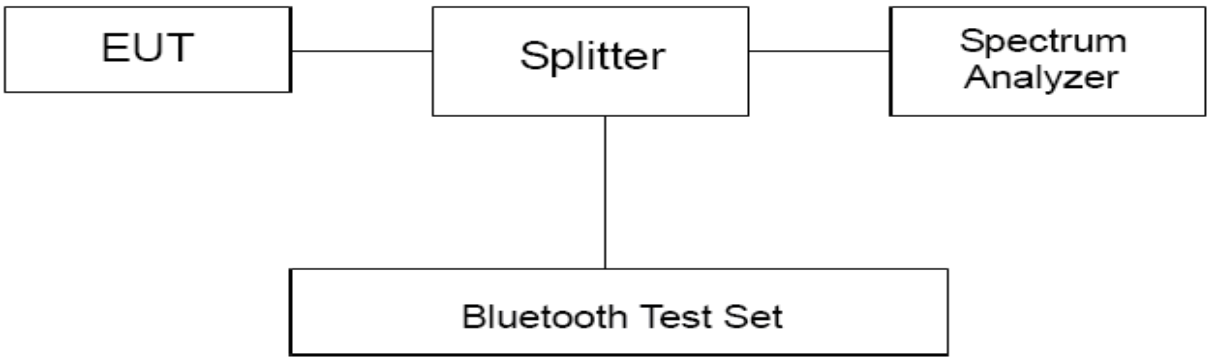
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 20kHz and VBW is set to 62kHz on spectrum analyzer. -20dB occupied bandwidths are recorded.

Test Setup



Limits

No specific occupied bandwidth requirements in part 15.247(a) (1).

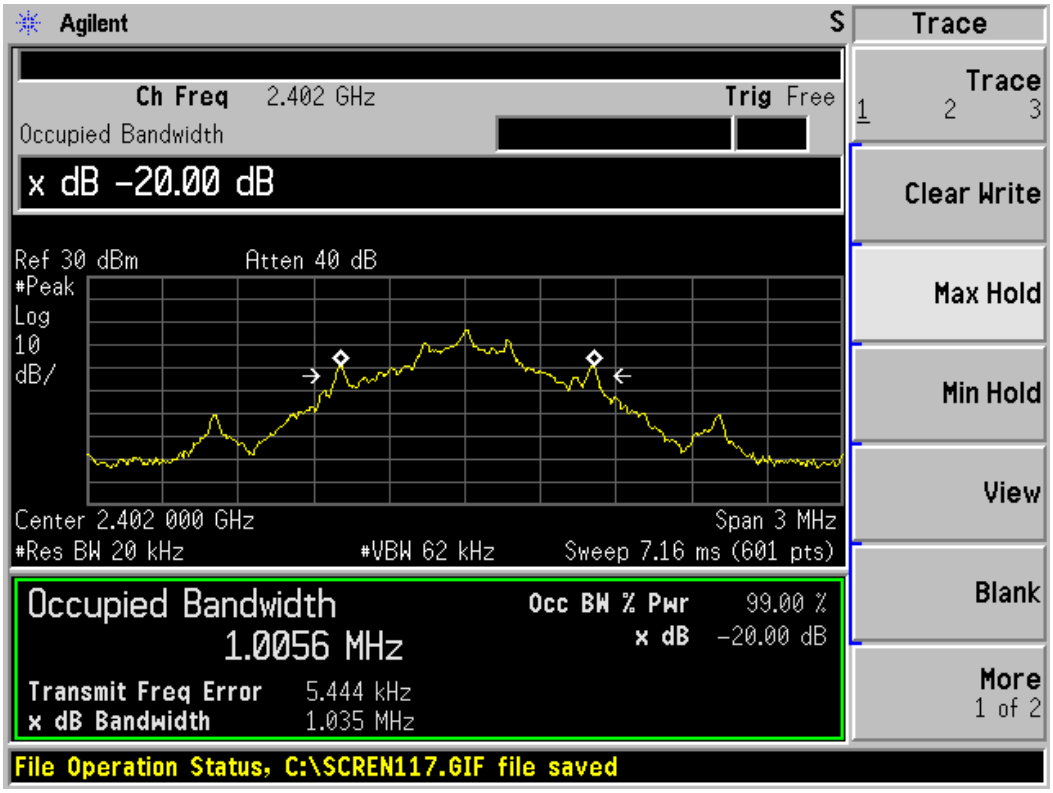
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results

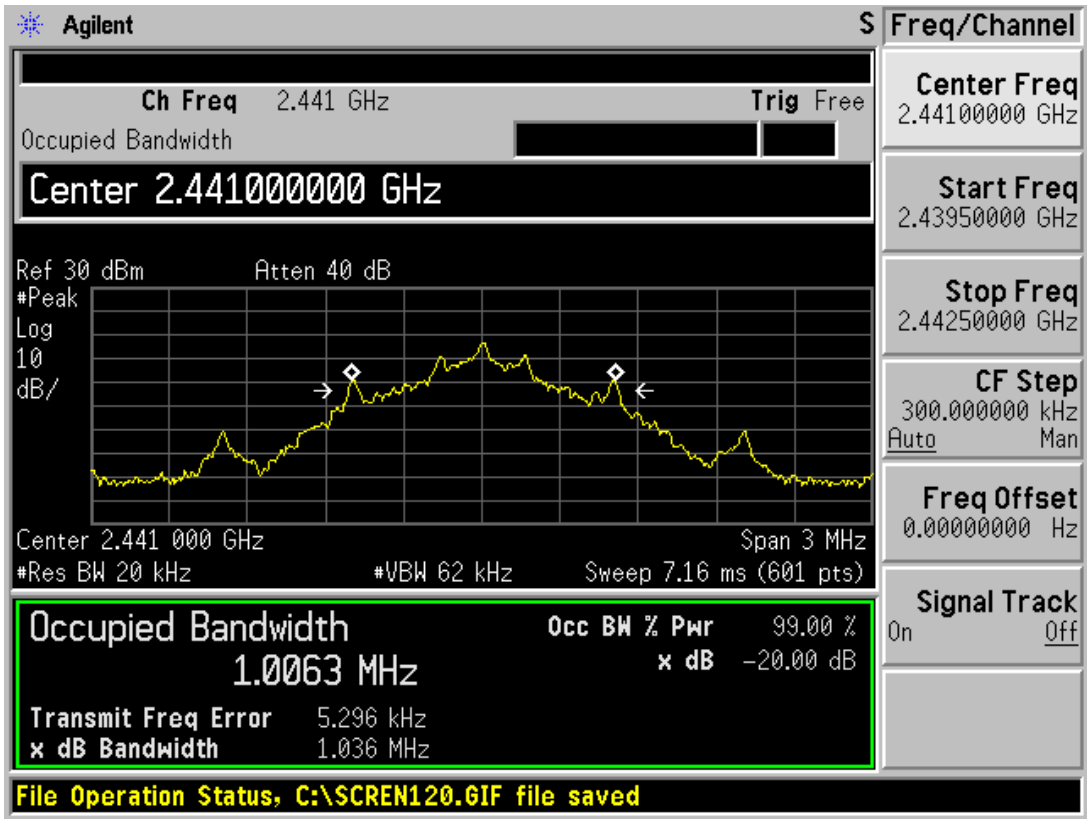
DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.035
39	2441	1.036
78	2480	1.034



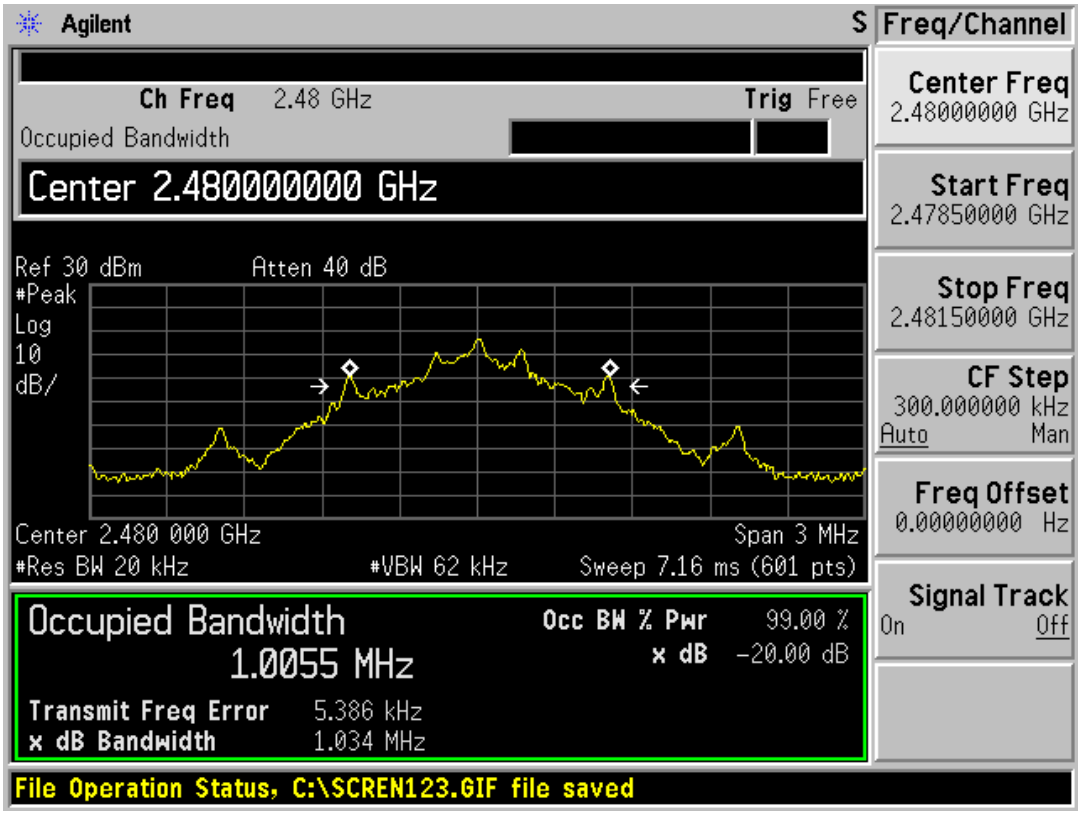
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

Channel No.:39

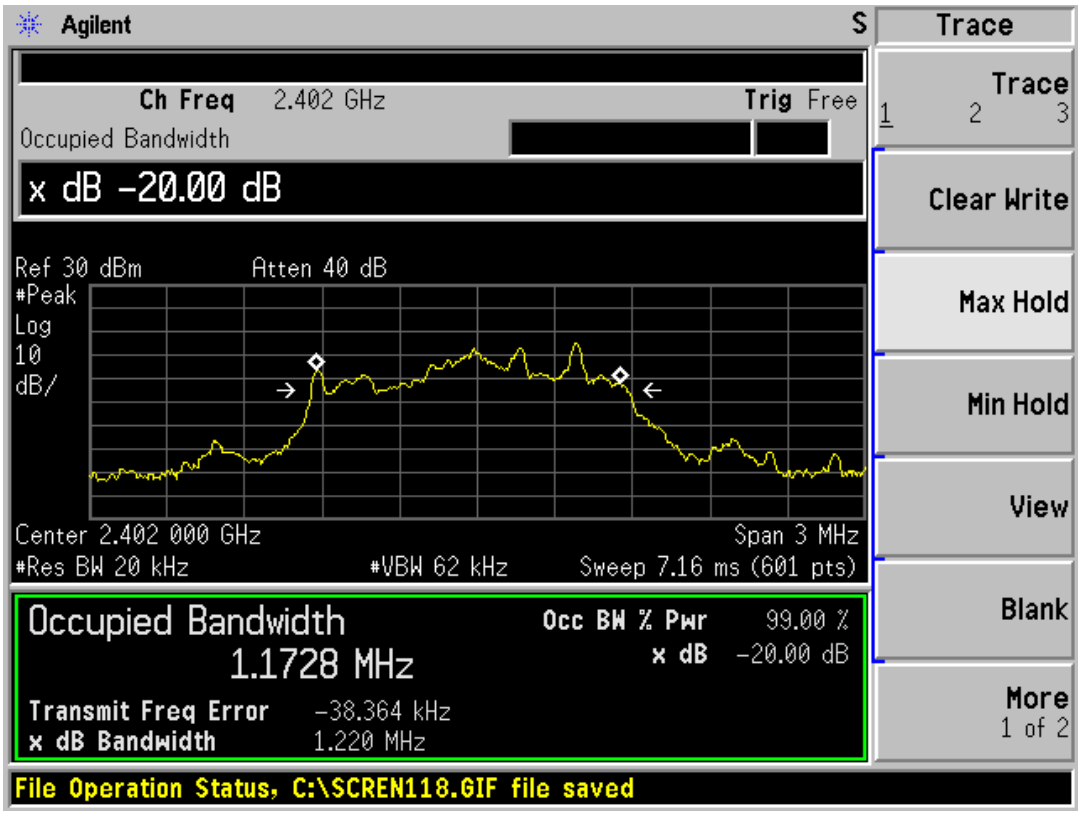


Carrier frequency (MHz): 2480

Channel No.:78

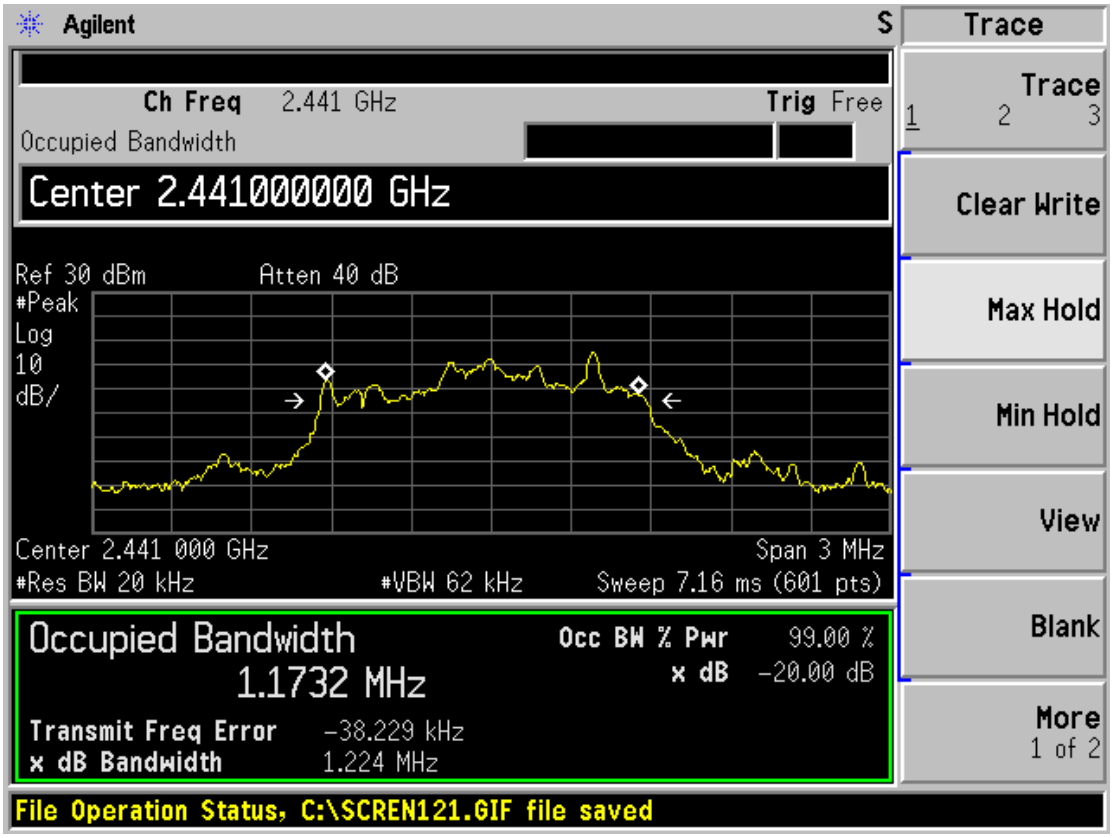
2DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.220
39	2441	1.224
78	2480	1.225



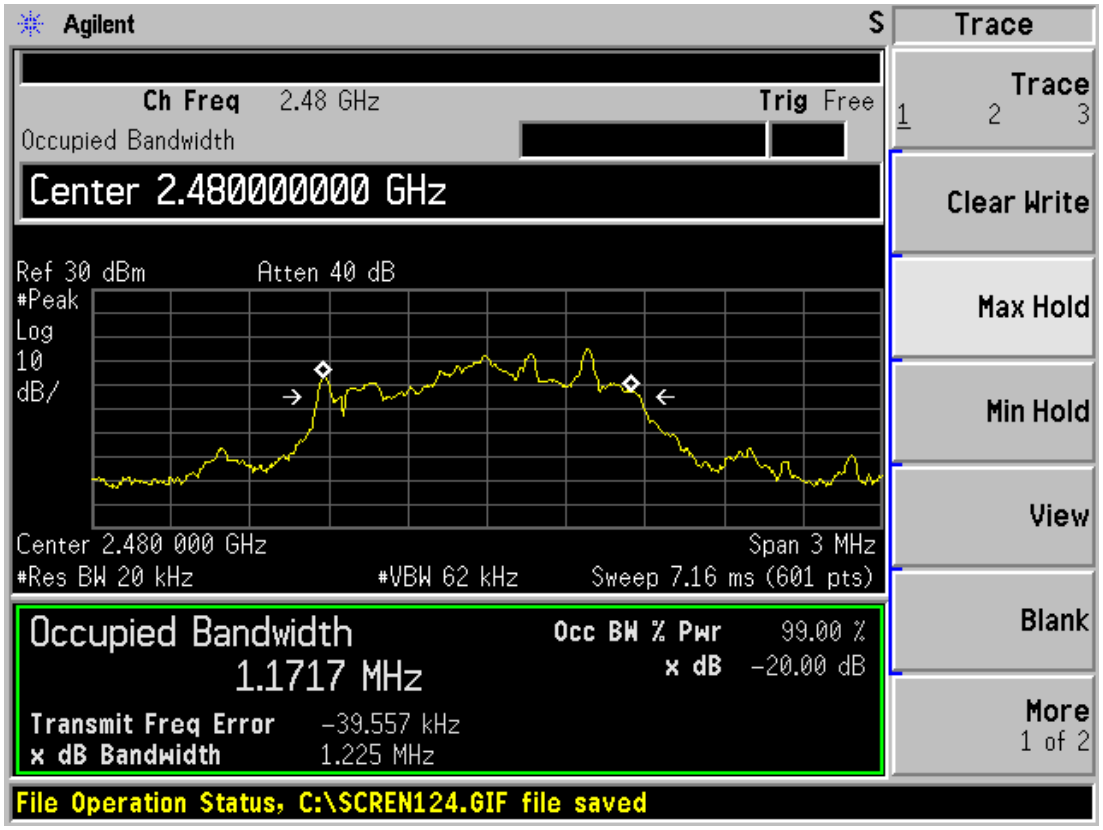
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

Channel No.:39

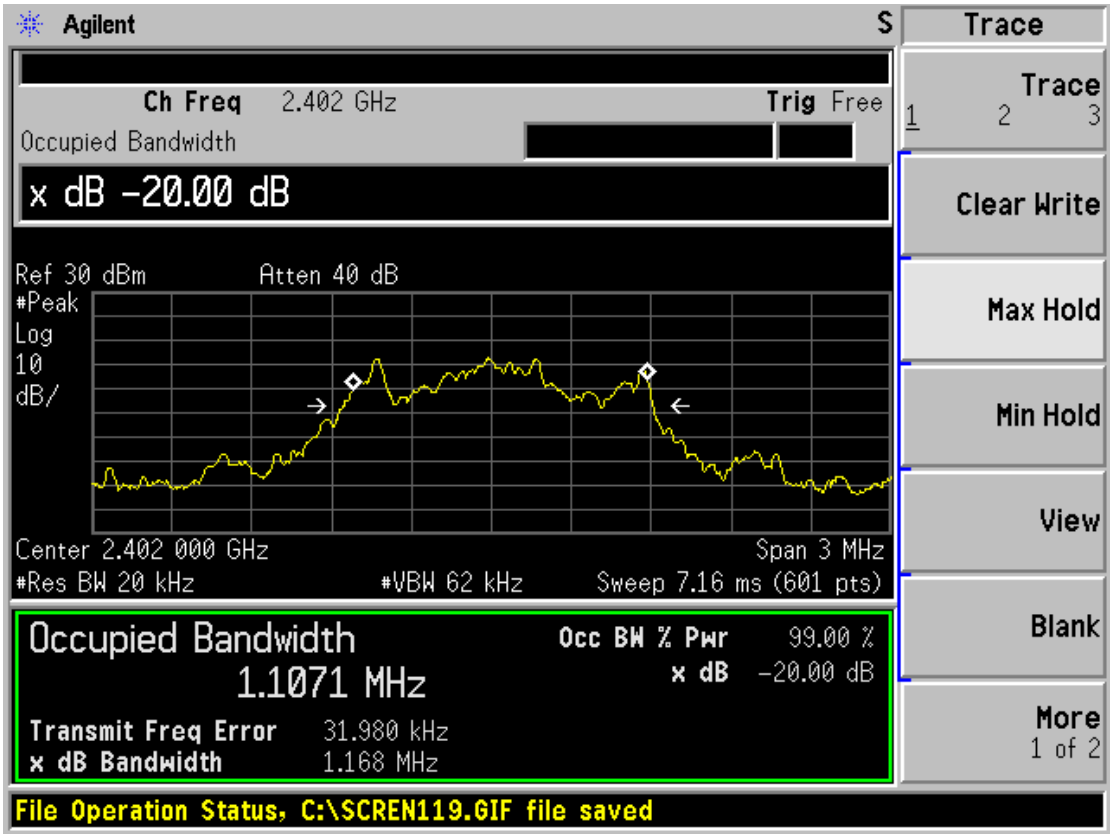


Carrier frequency (MHz): 2480

Channel No.:78

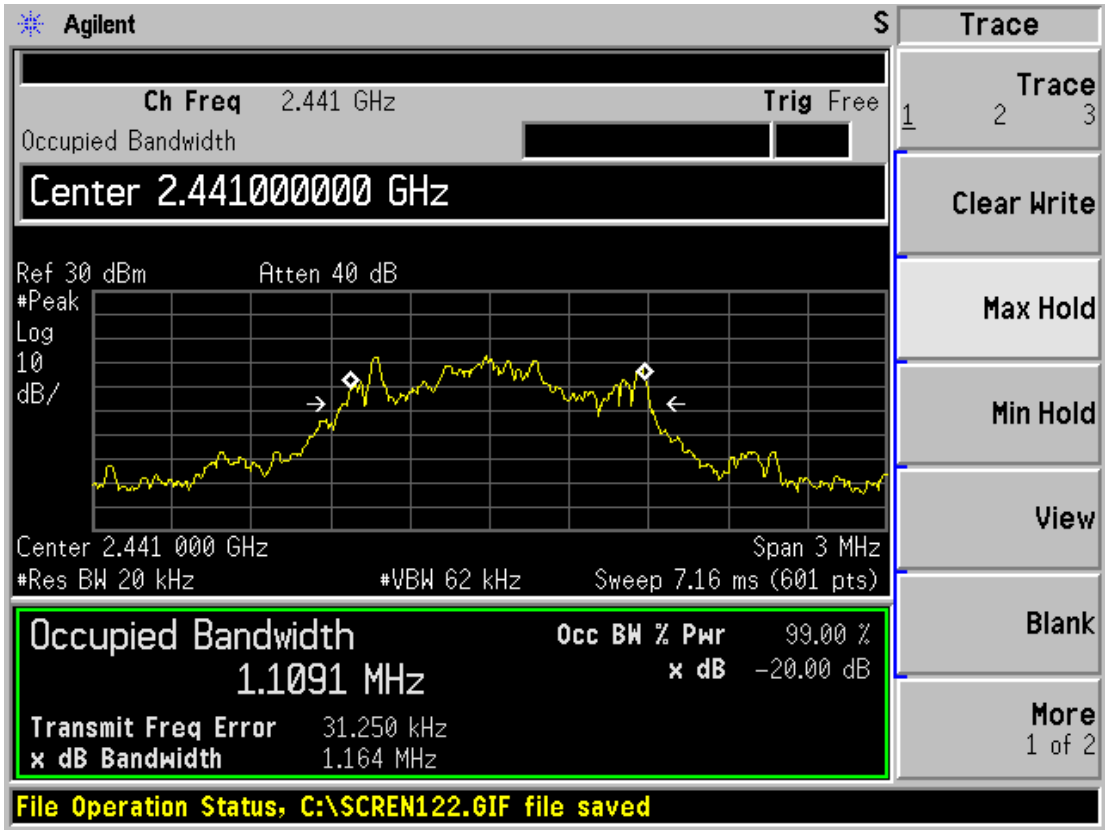
3DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.168
39	2441	1.164
78	2480	1.170



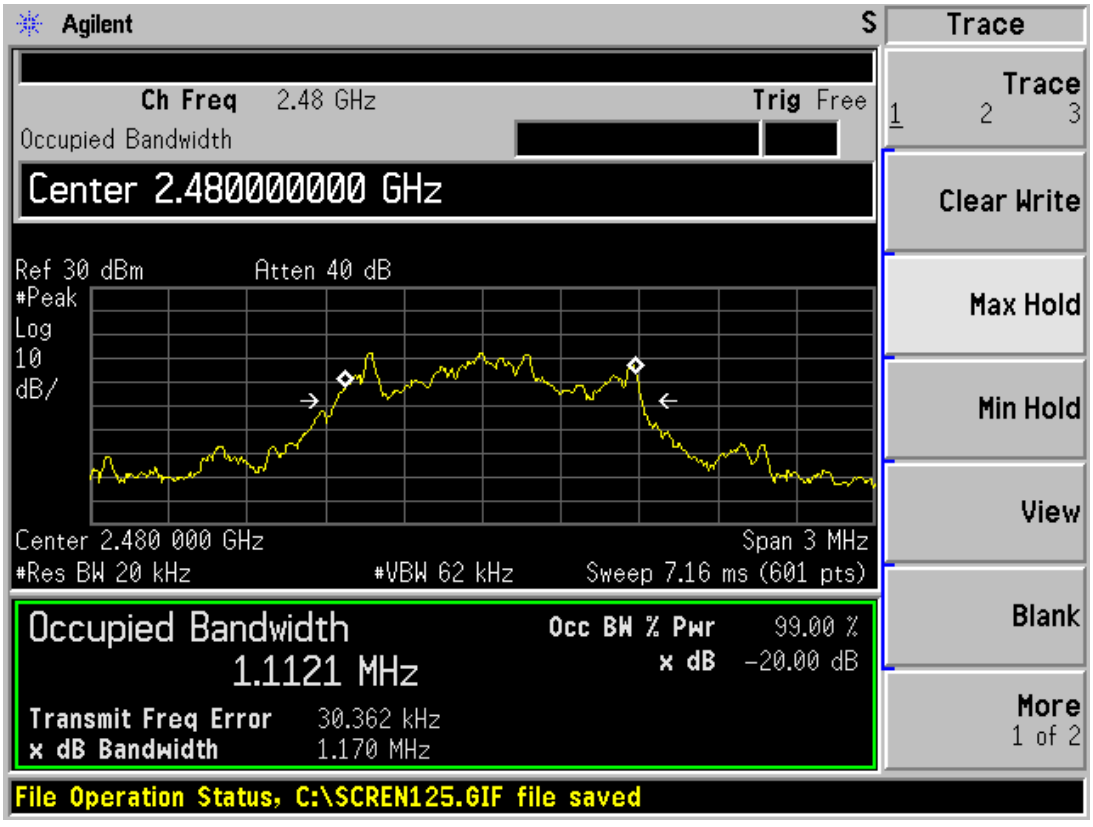
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

Channel No.:39



Carrier frequency (MHz): 2480

Channel No.:78

2.5. Frequency Separation

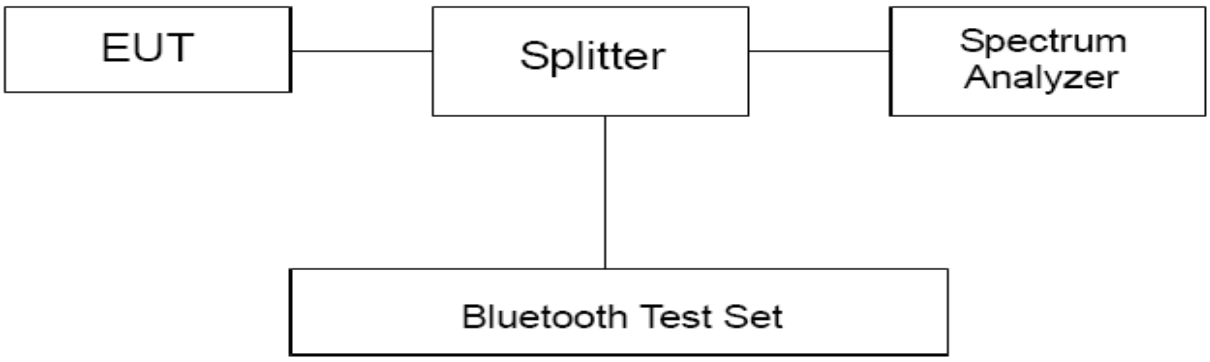
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. RBW is set to 300 kHz and VBW is set to 3MHz on spectrum analyzer. Set EUT on Hopping on mode.

Test setup



Limits

Rule Part 15.247(a)(1)specifies that “Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. ”

Note: The value of two-thirds of 20 dB bandwidth is always greater than 25 kHz.

Measurement Uncertainty

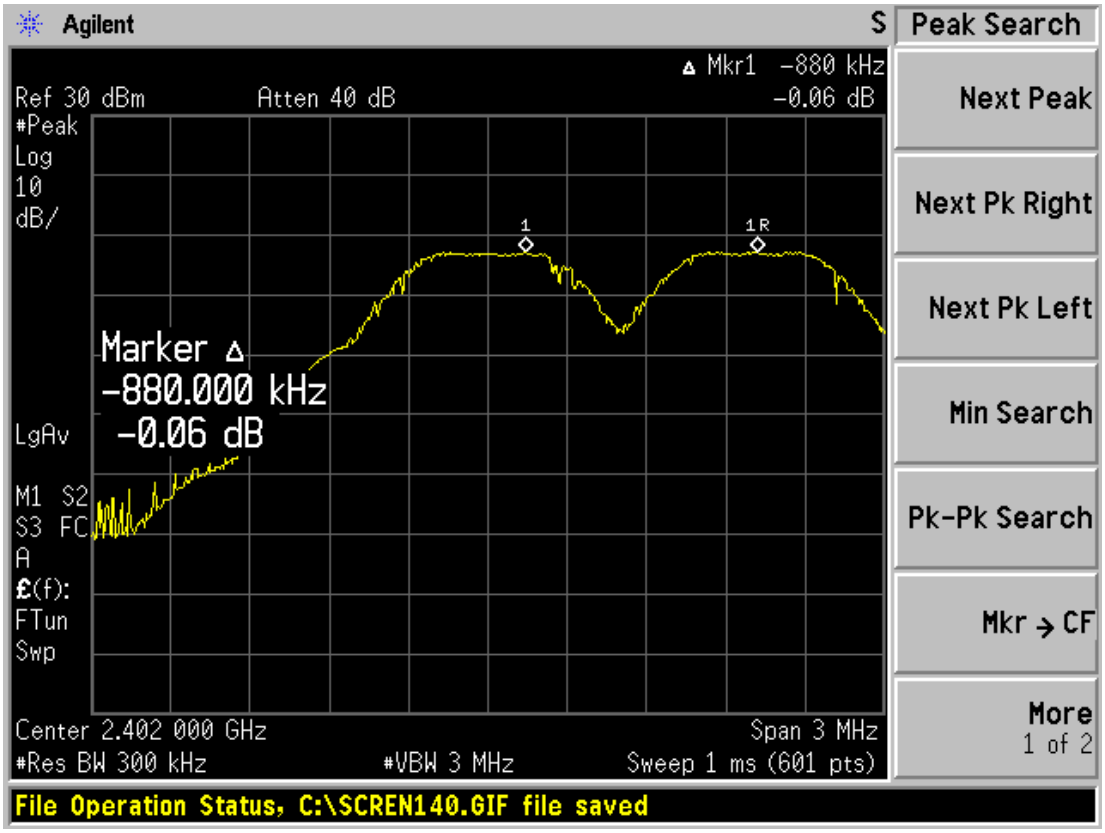
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results:

DH5

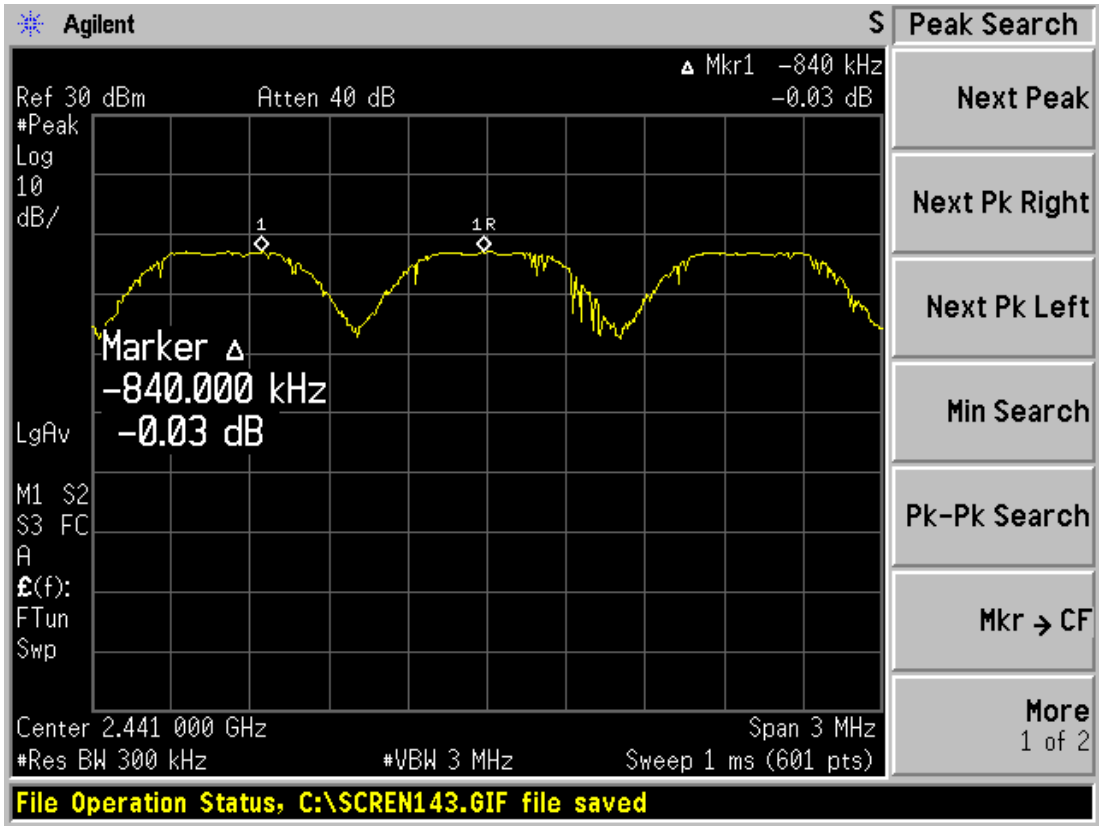
Carrier frequency (MHz)	Carrier frequency separation(kHz)	20dB Bandwidth (kHz)	Limit(kHz)	Conclusion
2402	880	1035	690	PASS
2441	840	1036	691	PASS
2480	690	1034	689	PASS

Note: The limit is two-thirds of 20 dB bandwidth.



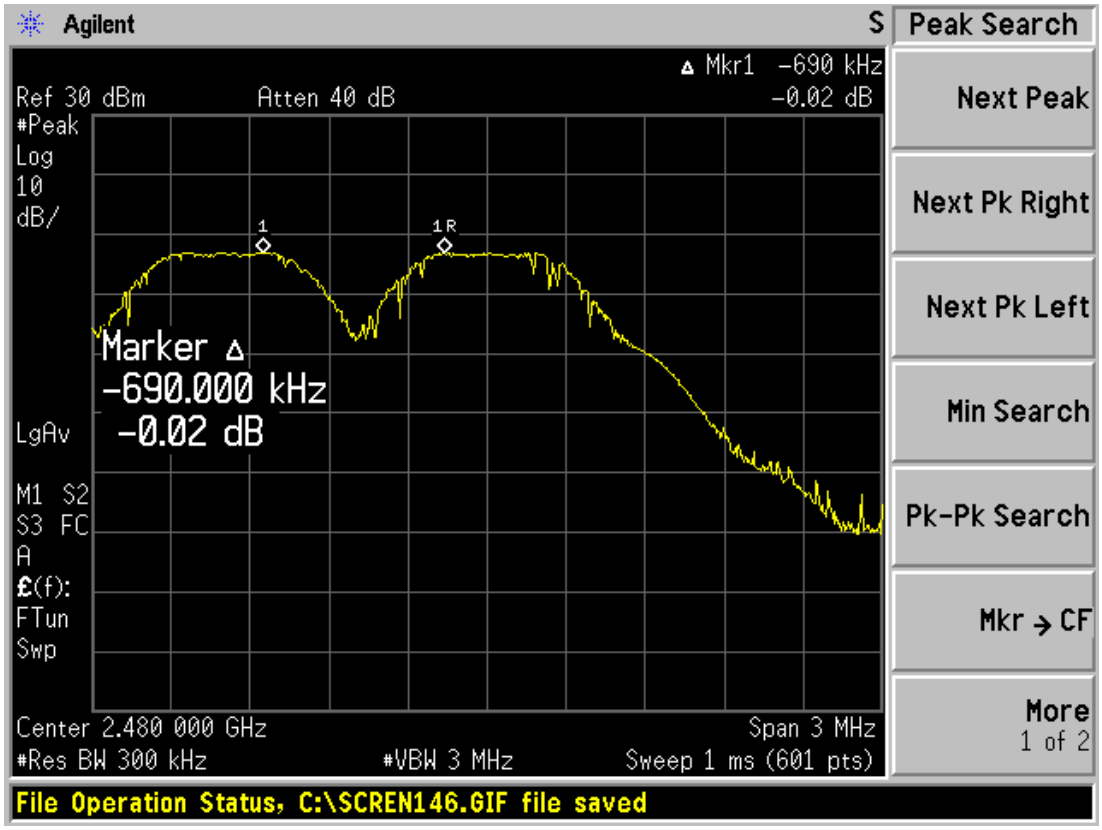
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

Channel No.:39



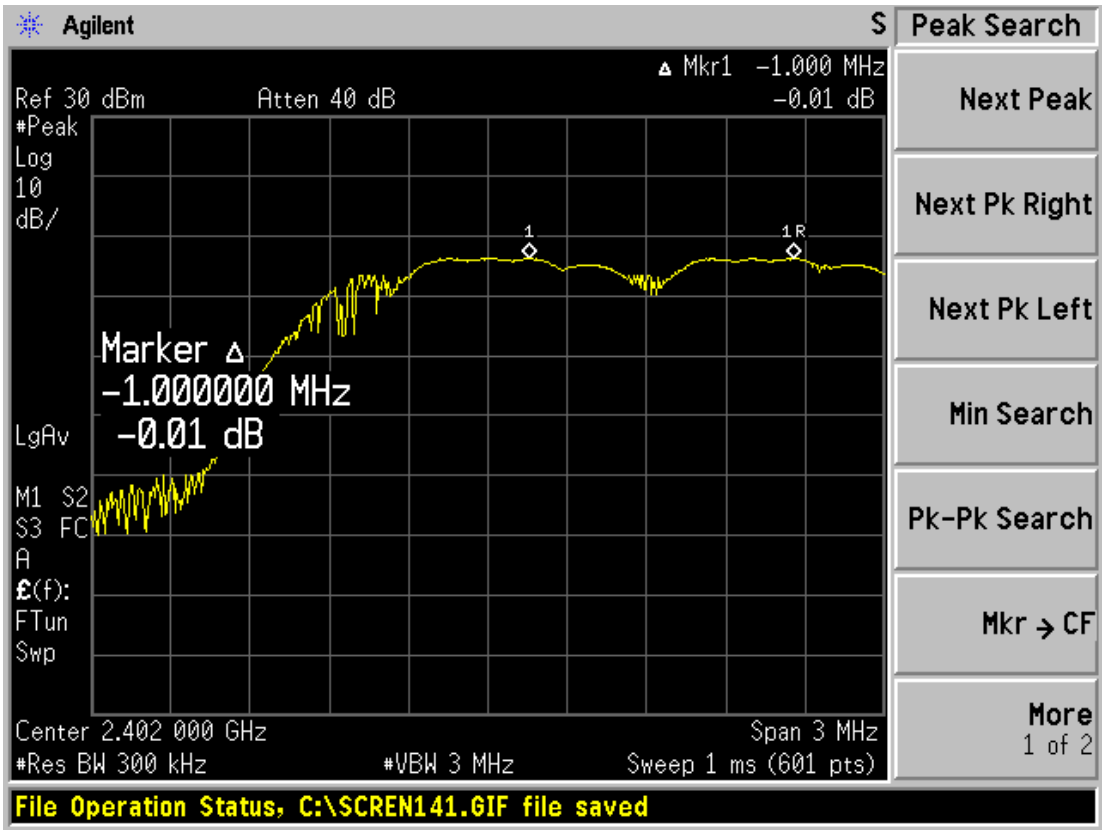
Carrier frequency (MHz): 2480

Channel No.:78

2DH5

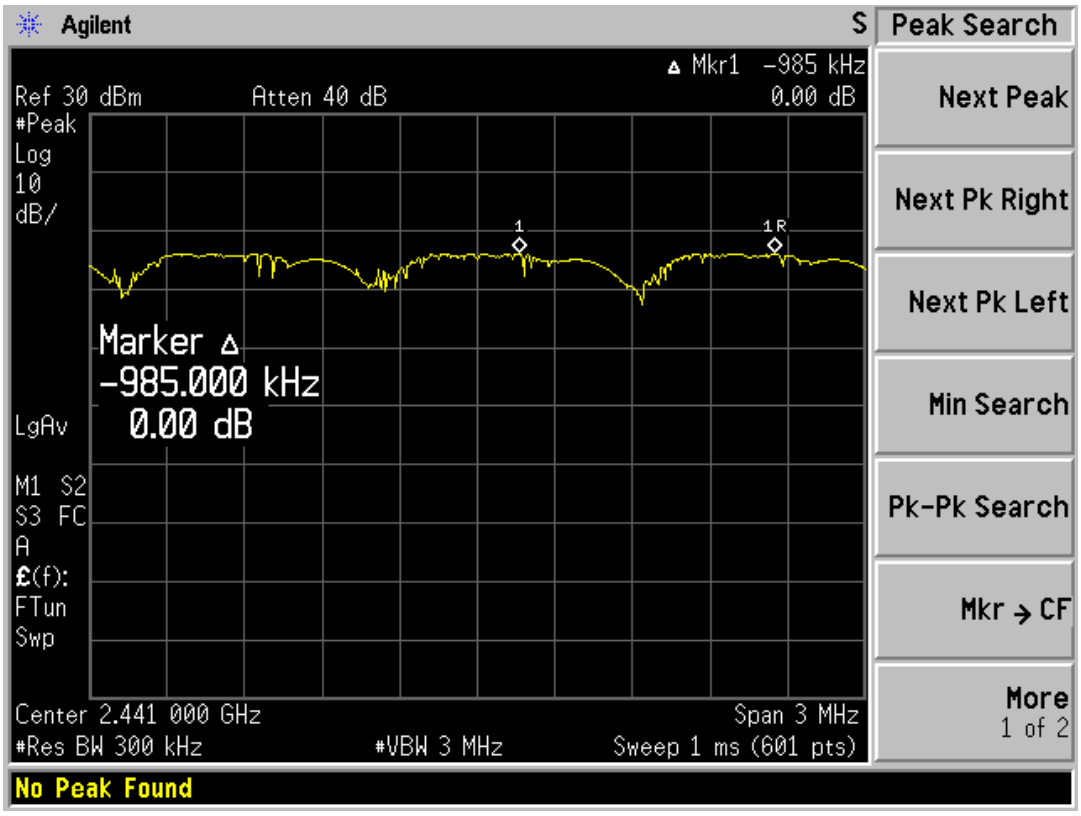
Carrier frequency (MHz)	Carrier frequency separation(kHz)	20dB Bandwidth (kHz)	Limit(kHz)	Conclusion
2402	1000	1220	813	PASS
2441	985	1224	816	PASS
2480	1000	1225	817	PASS

Note: The limit is two-thirds of 20 dB bandwidth.

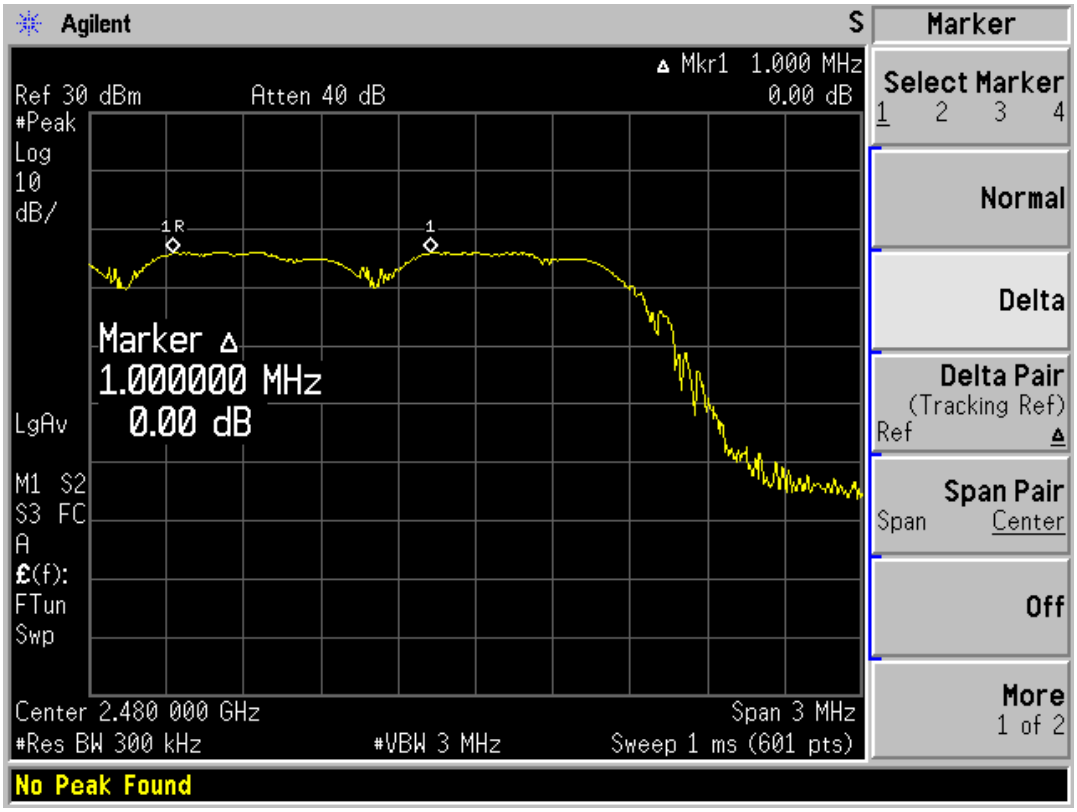


Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441
Channel No.:39

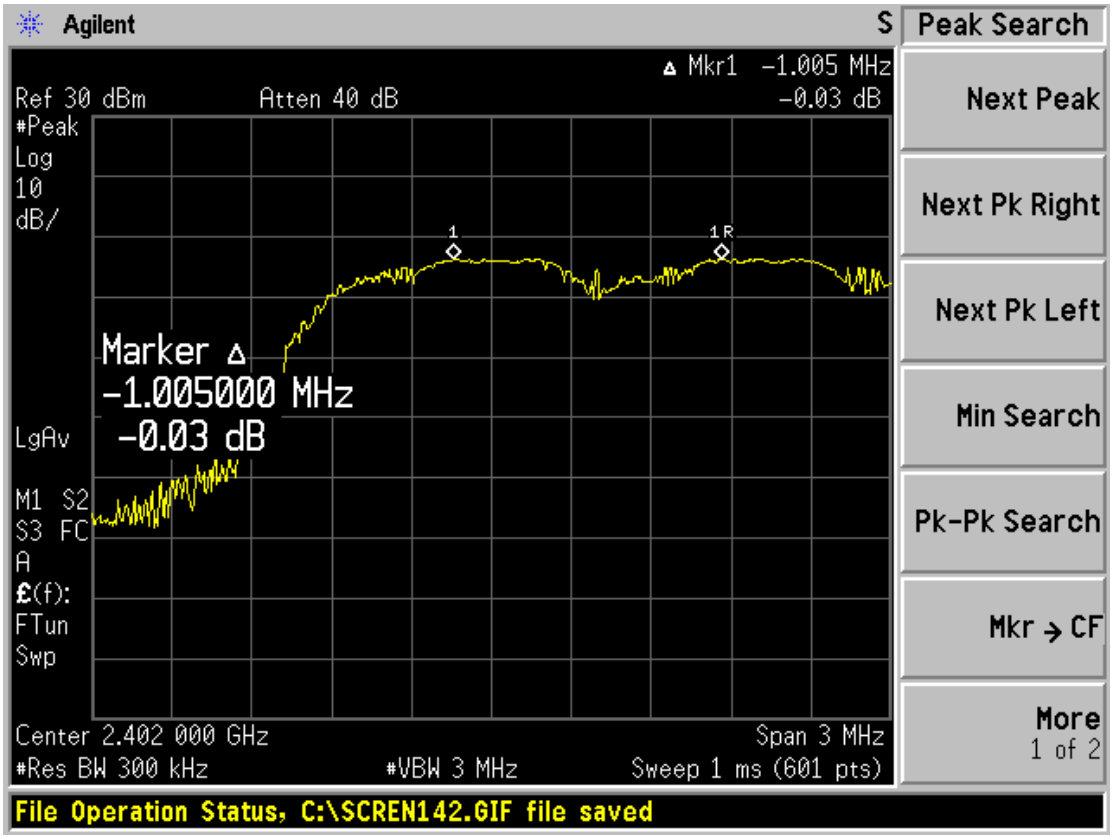


Carrier frequency (MHz): 2480
Channel No.:78

3DH5

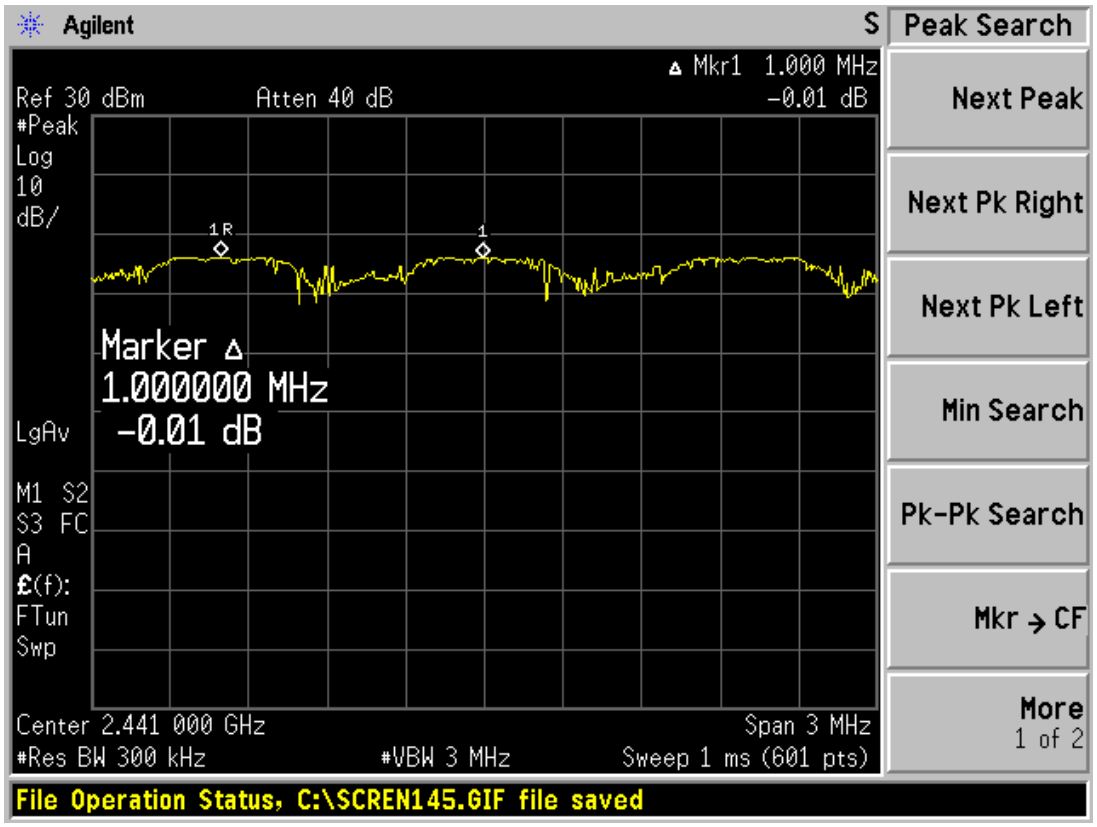
Carrier frequency (MHz)	Carrier frequency separation(MHz)	20dB Bandwidth (MHz)	Limit(MHz)	Conclusion
2402	1.005	1.168	0.779	PASS
2441	1.000	1.164	0.776	PASS
2480	1.005	1.170	0.780	PASS

Note: The limit is two-thirds of 20 dB bandwidth.



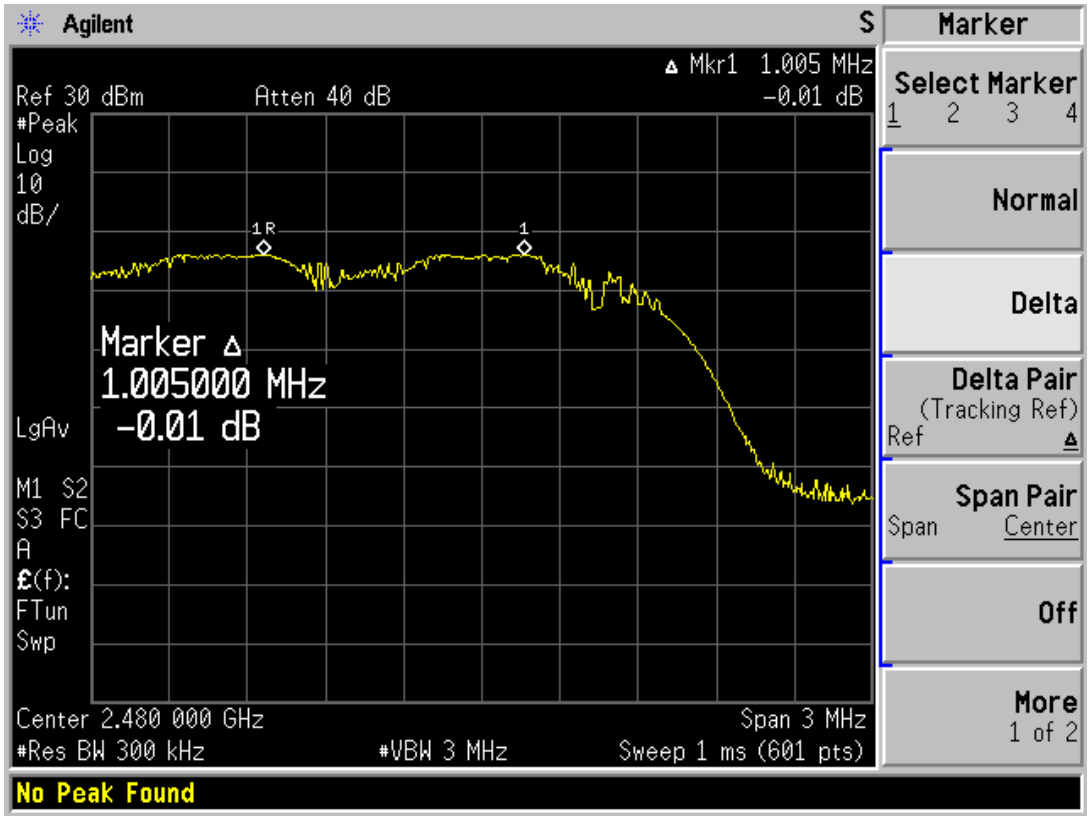
Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2441

Channel No.:39



Carrier frequency (MHz): 2480

Channel No.:78

2.6. Time of Occupancy (Dwell Time)

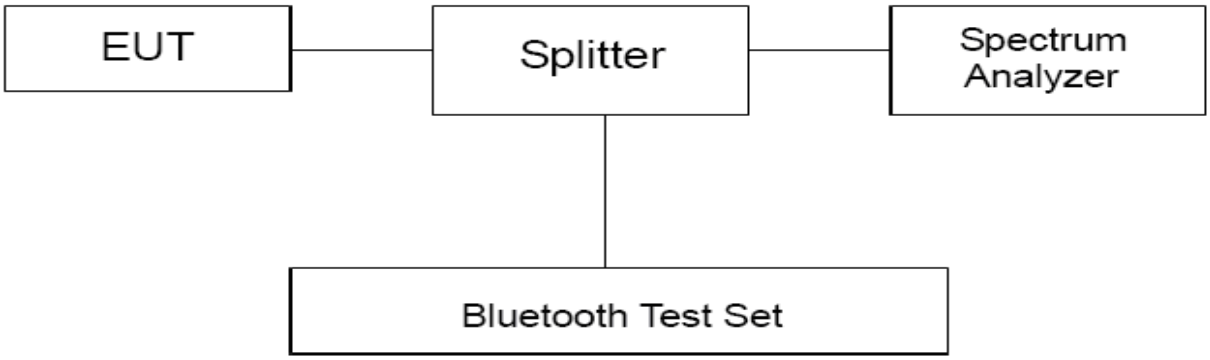
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. RBW is set to 1MHz and VBW is set to 3MHz on spectrum analyzer .The time slot length is measured of three different packet types, which are available in the Bluetooth technology. Those are DH1, DH3 and DH5 packets. The dwell time is calculated by:
Dwell time = time slot length * hop rate * 0.4s with:
- hop rate=1600 * 1/s for DH1 packet =1600
- hop rate=1600/3 * 1/s for DH3 packet =533.33
- hop rate=1600/5 * 1/s for DH5 packet =320

Test Setup



Limits

Rule Part 22.913(a) specifies that " Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.."

Dwell time	⩽ 400ms

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 2.

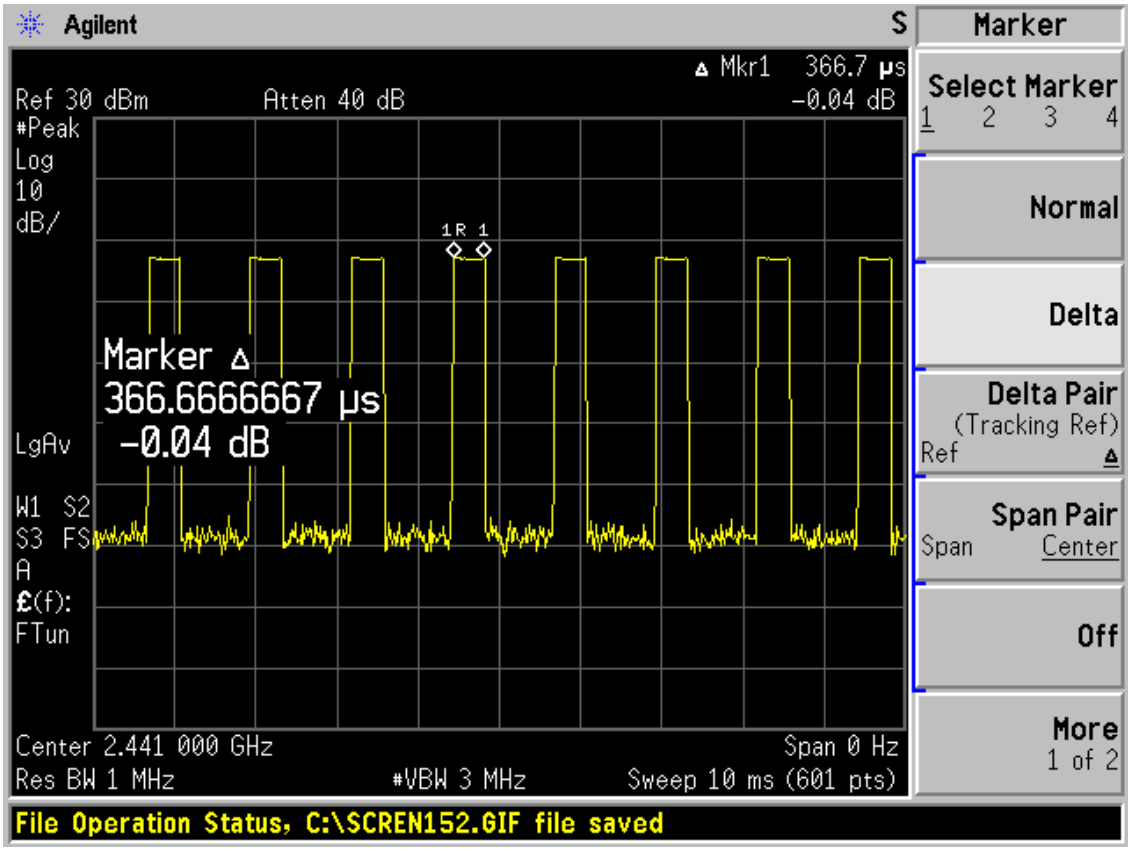
Requirements	Uncertainty	
Dwell Time	DH1	*U*= 0.64ms
	DH3	*U*= 0.80ms
	DH5	*U*= 0.70ms

Test Results:

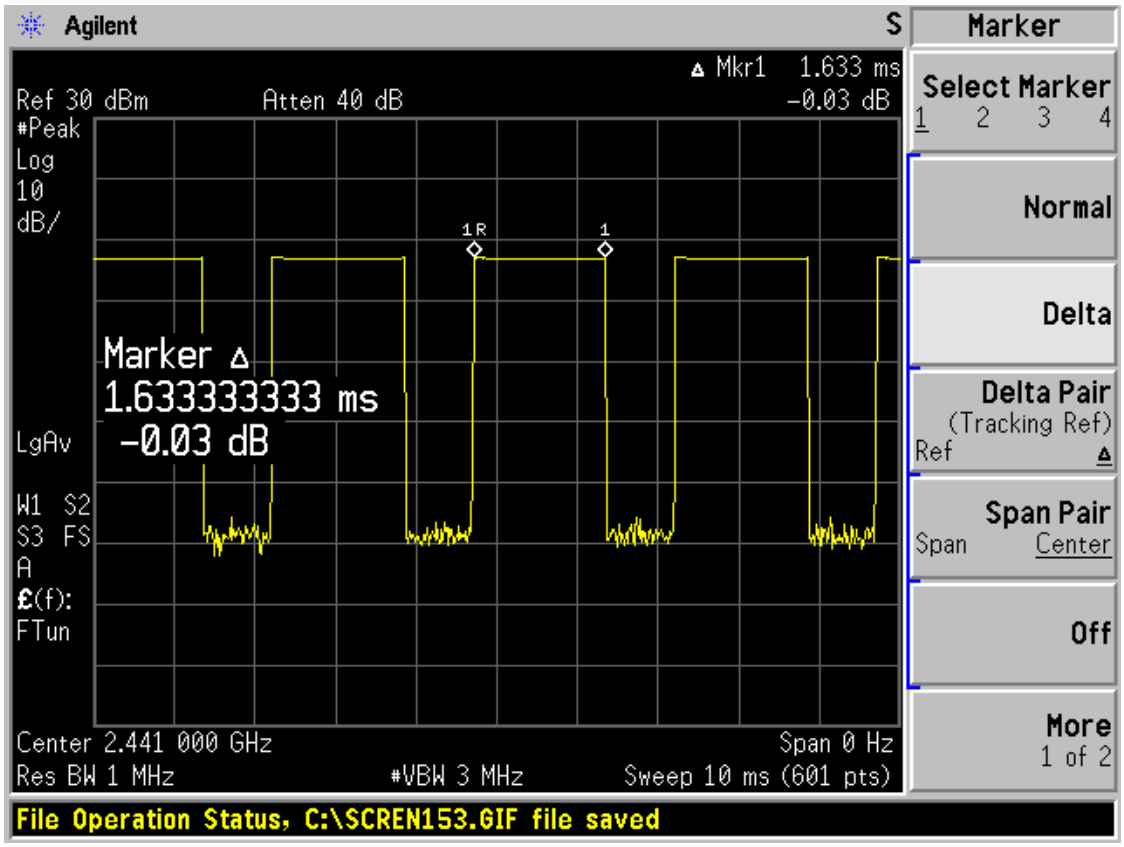
CH 39

Packet type	hop rate (1/s)	Time slot length(ms)	Dwell time (ms)	Limit (ms)	Conclusion
DH1	1600	0.3667	234.688	400	PASS
DH3	533.33	1.633	348.3712	400	PASS
DH5	320	2.867	366.976	400	PASS
2DH1	1600	0.3833	245.312	400	PASS
2DH3	533.33	1.65	351.9978	400	PASS
2DH5	320	2.883	369.024	400	PASS
3DH1	1600	0.3833	245.312	400	PASS
3DH3	533.33	1.617	344.9578	400	PASS
3DH5	320	2.9	371.2	400	PASS

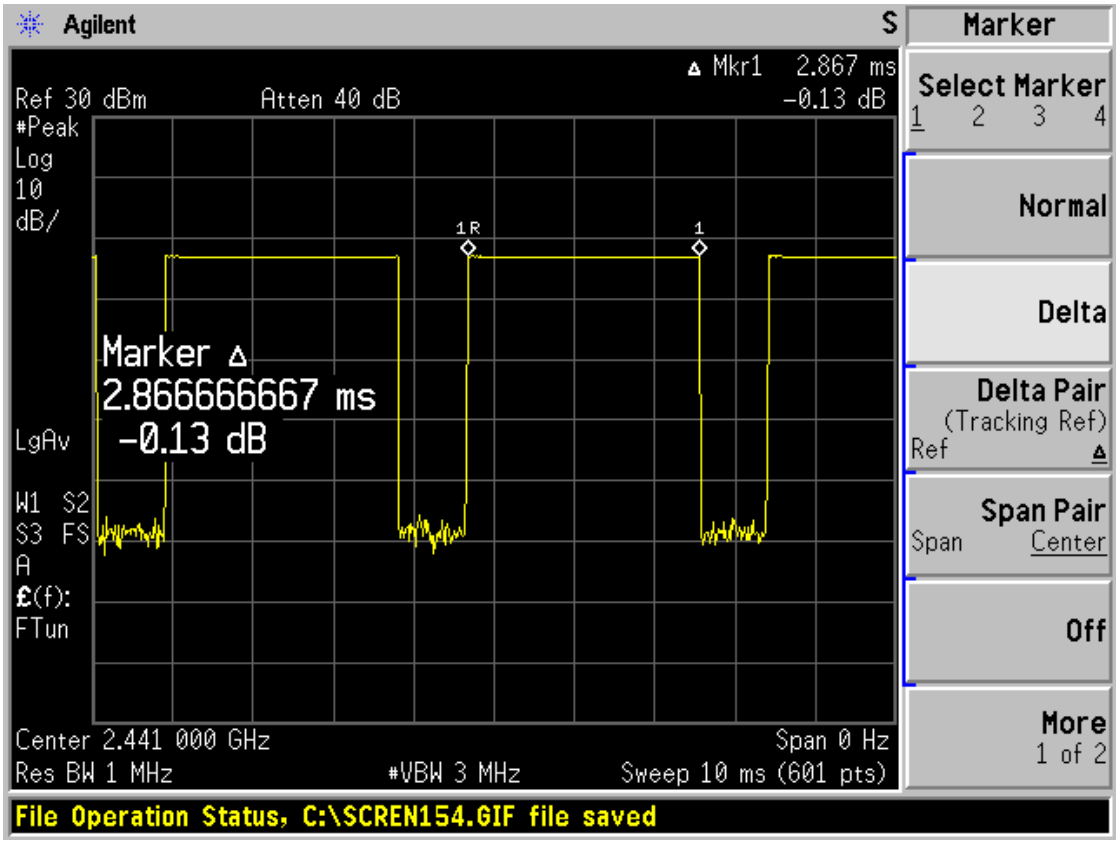
Note: Dwell time = time slot length * hop rate * 0.4s



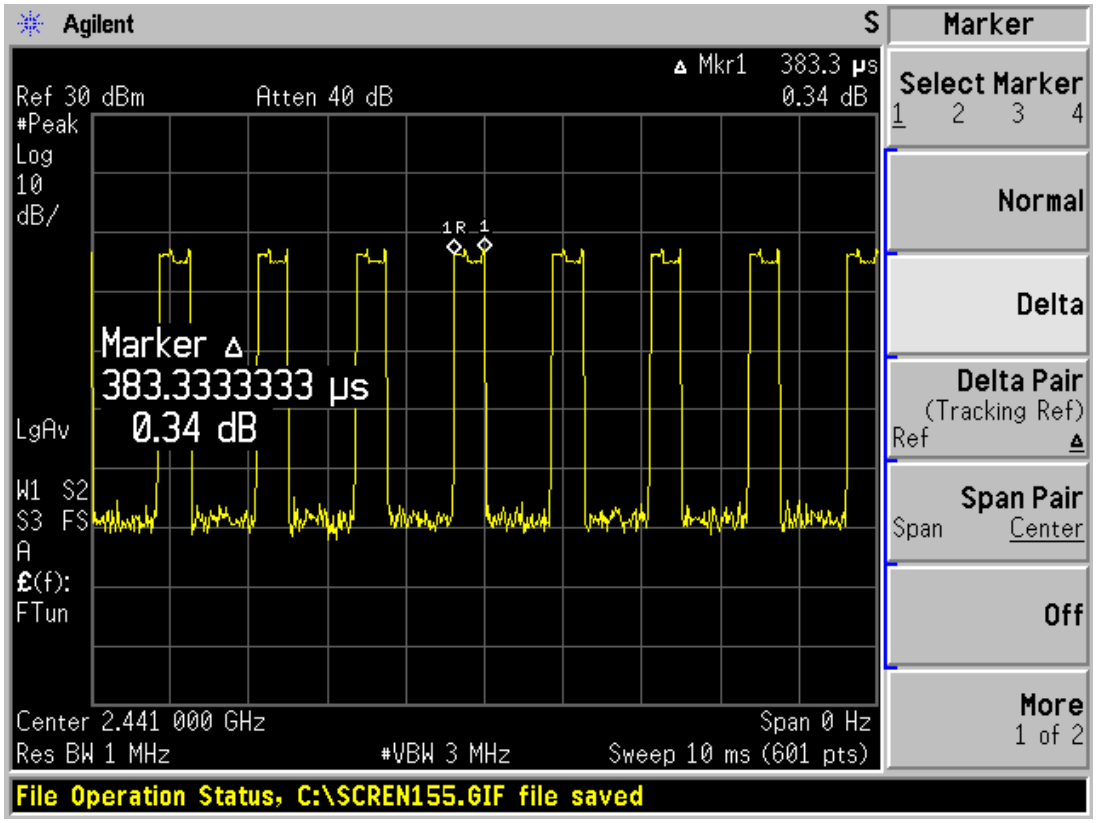
Carrier frequency (MHz): 2441,DH1



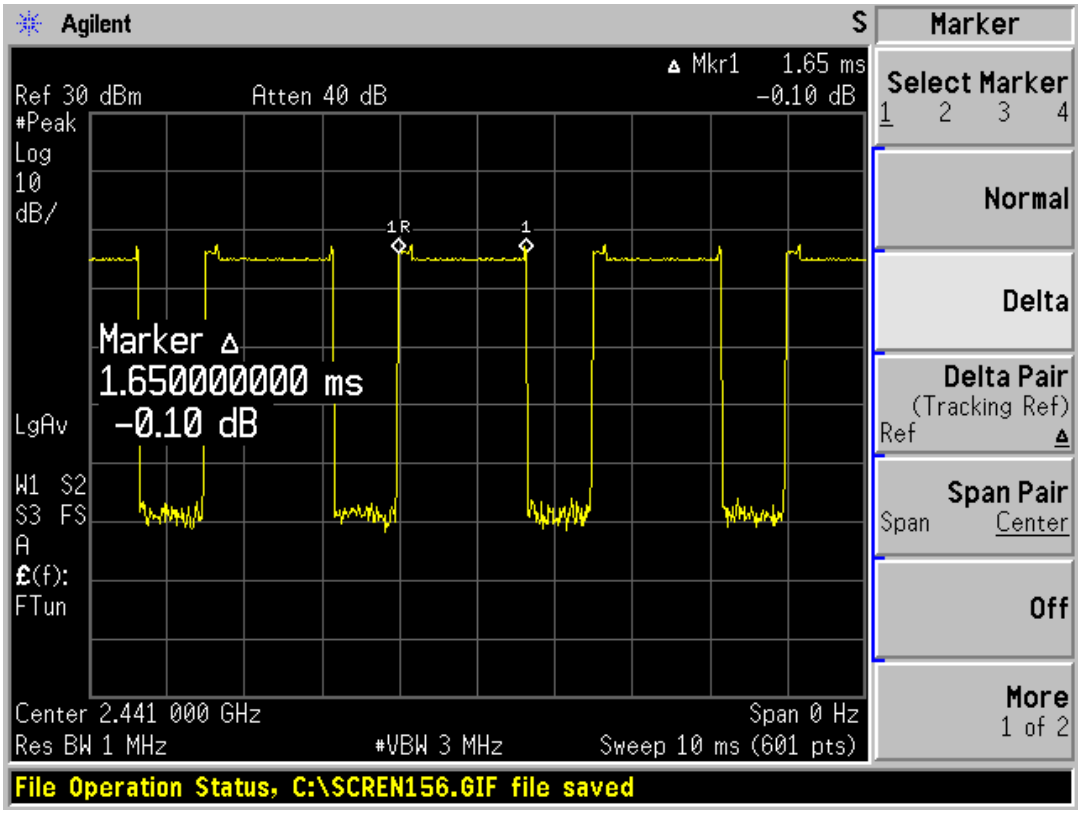
Carrier frequency (MHz): 2441,DH3



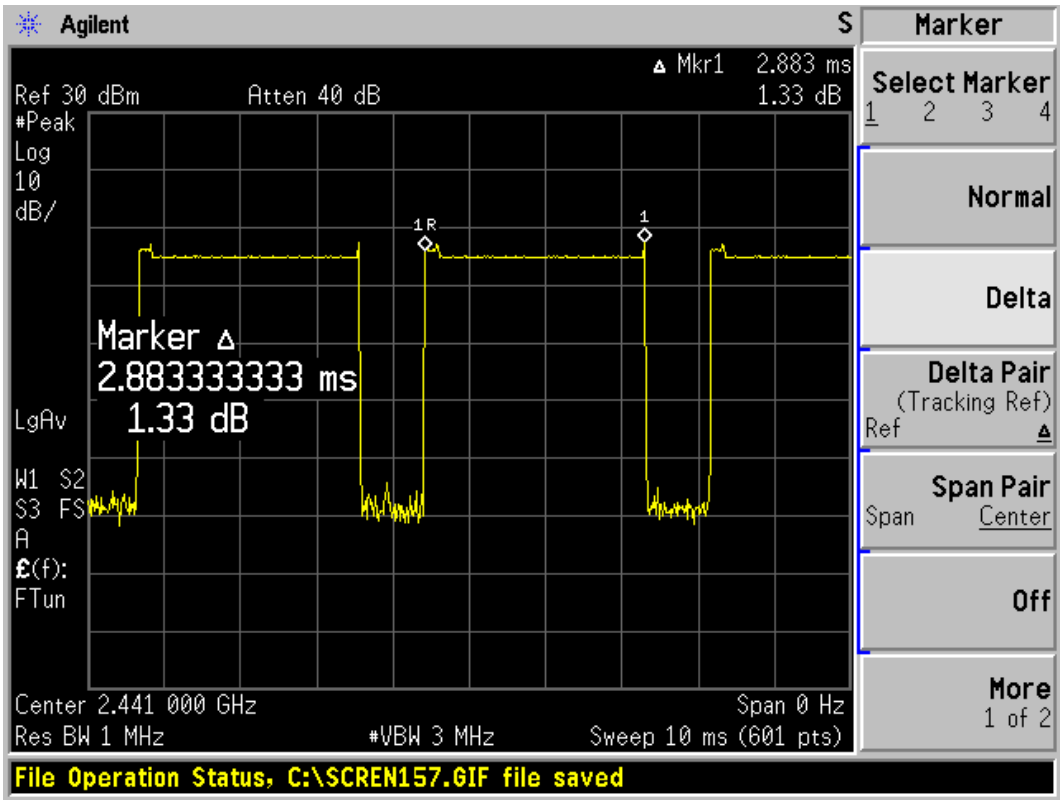
Carrier frequency (MHz): 2441,DH5



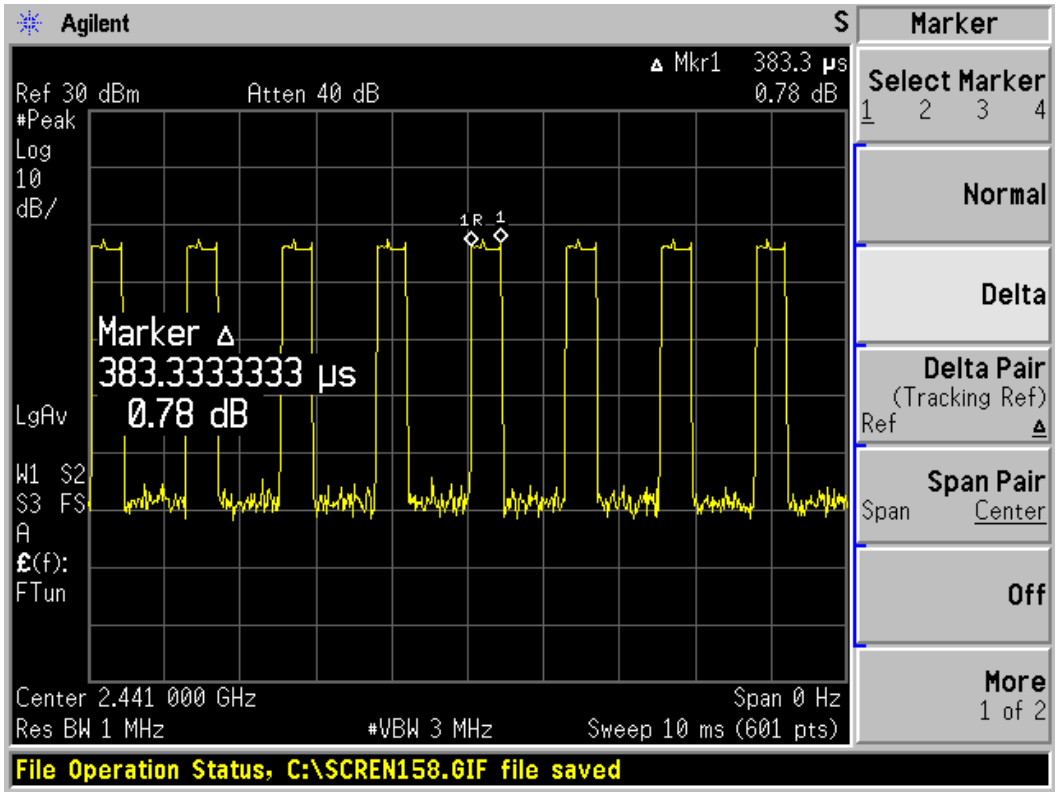
Carrier frequency (MHz): 2441,2DH1



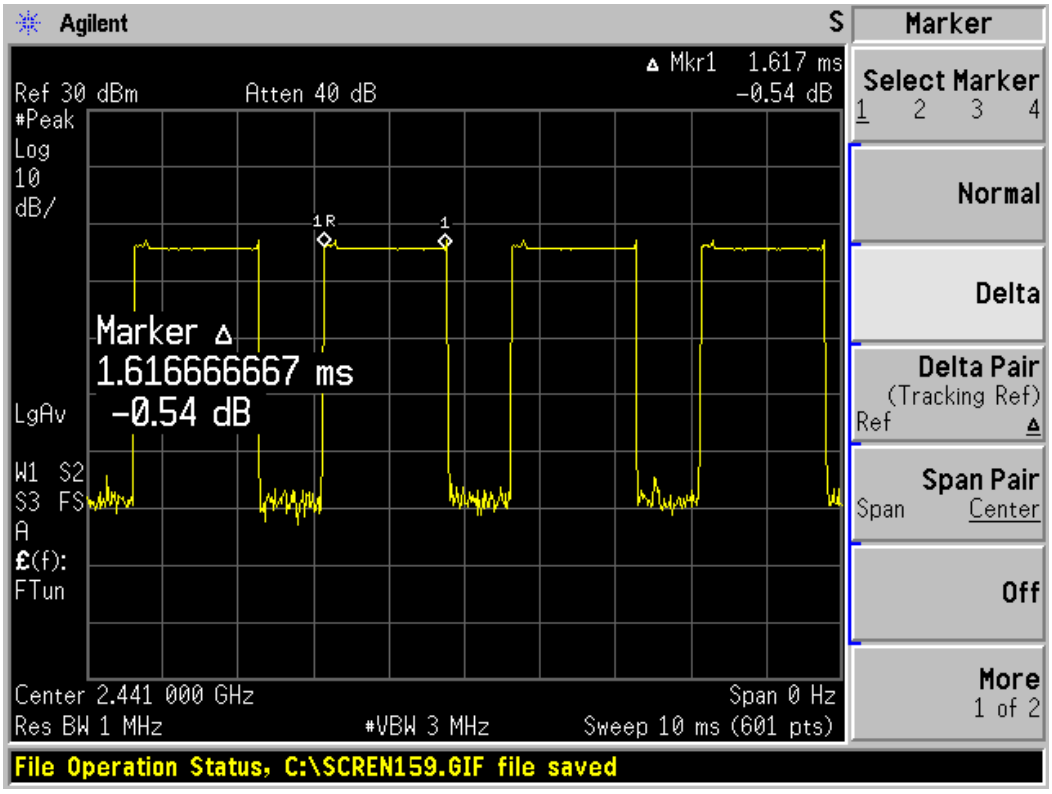
Carrier frequency (MHz): 2441,2DH3



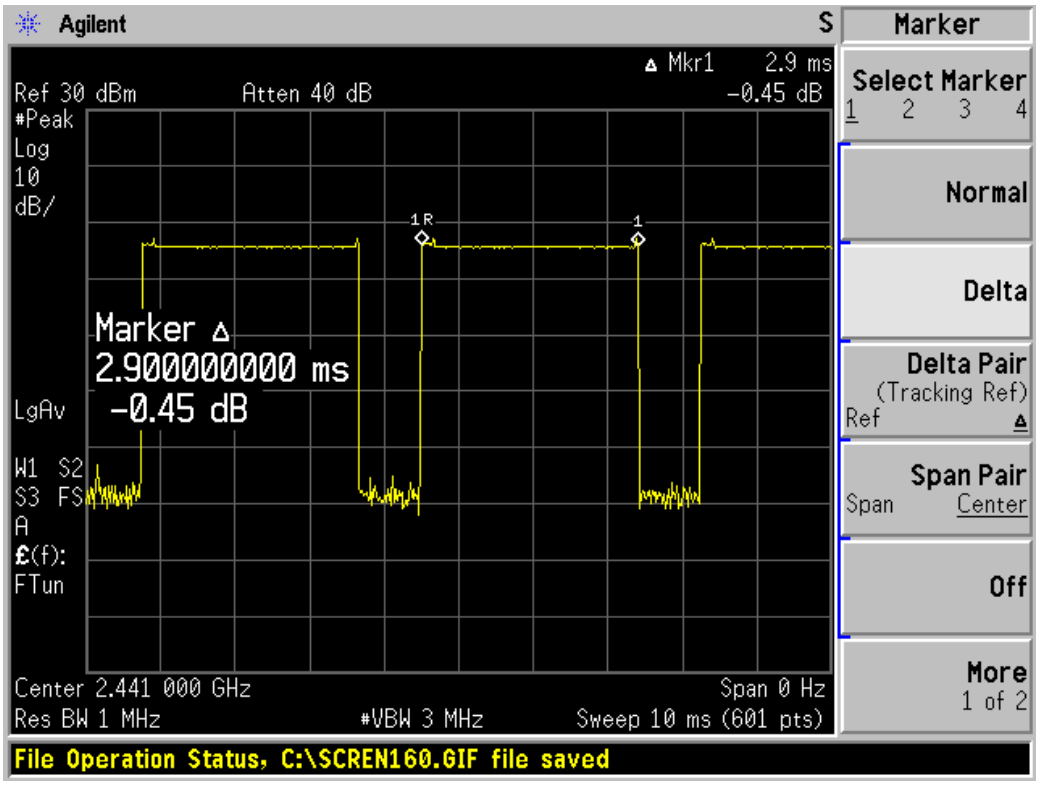
Carrier frequency (MHz): 2441,2DH5



Carrier frequency (MHz): 2441,3DH1



Carrier frequency (MHz): 2441,3DH3



Carrier frequency (MHz): 2441,3DH5

2.7. Band Edge Compliance

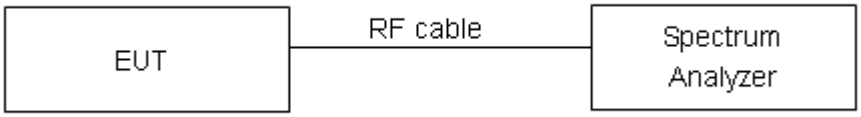
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. The lowest and highest channels were measured. The peak detector is used. RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. EUT test for Hopping On mode and Hopping Off mode.

Test Setup



Limits

Rule Part 15.247(d) specifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.”

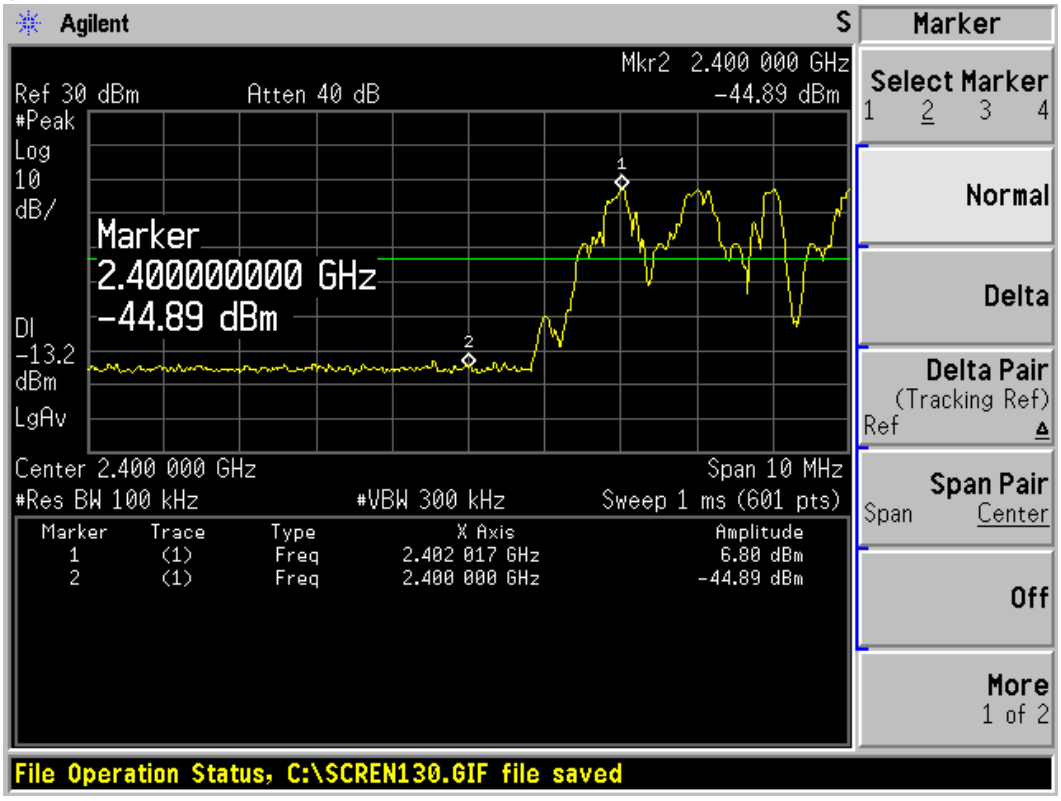
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Test Results: PASS

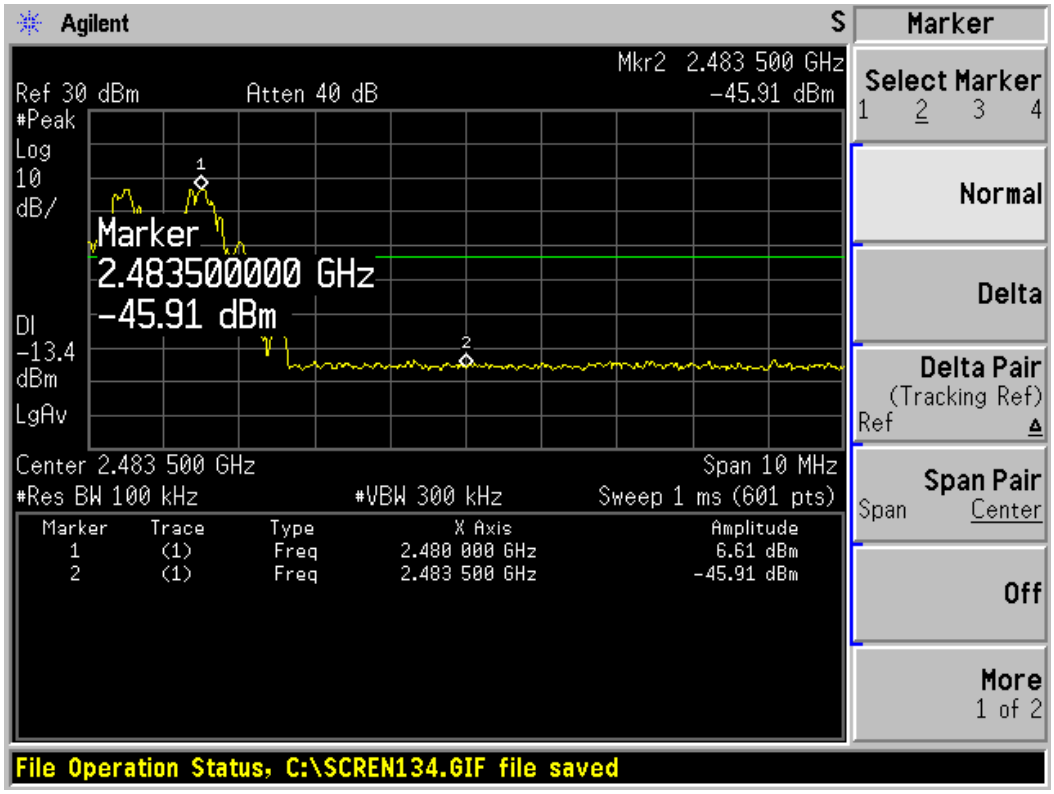
Bluetooth Basic Rate and EDR

Hopping On-DH5-



Carrier frequency (MHz): 2402

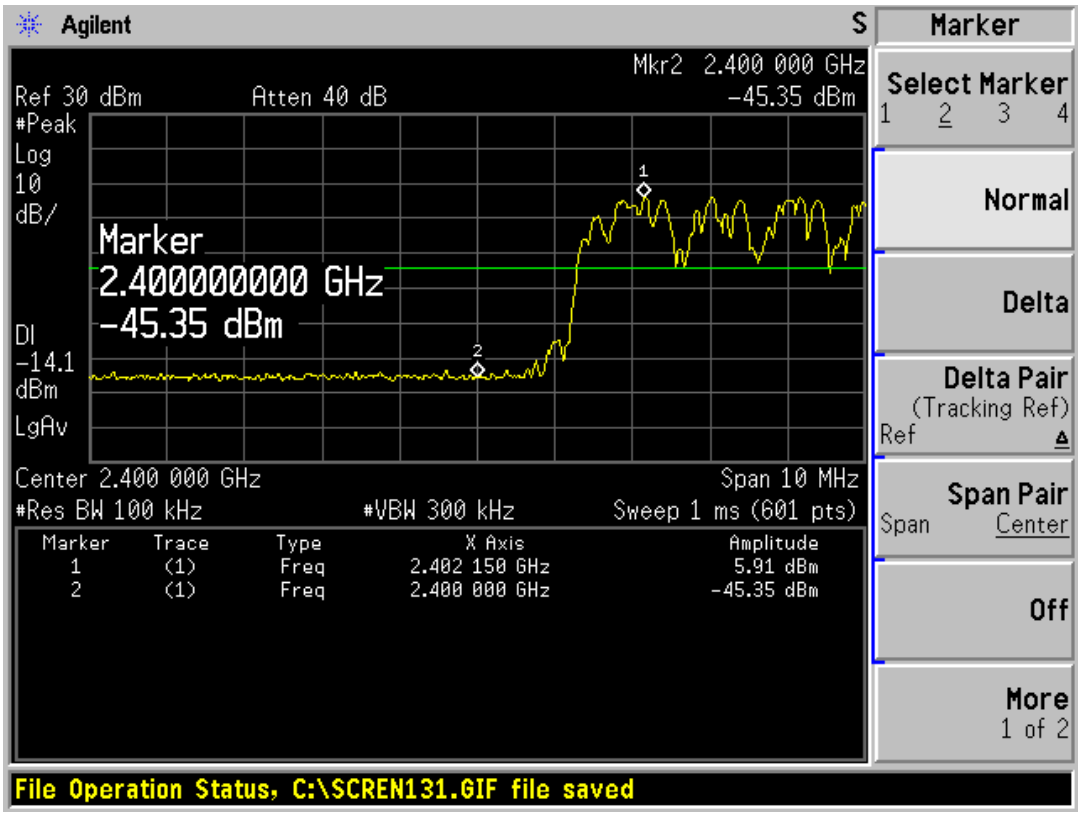
Channel No.:0



Carrier frequency (MHz): 2480

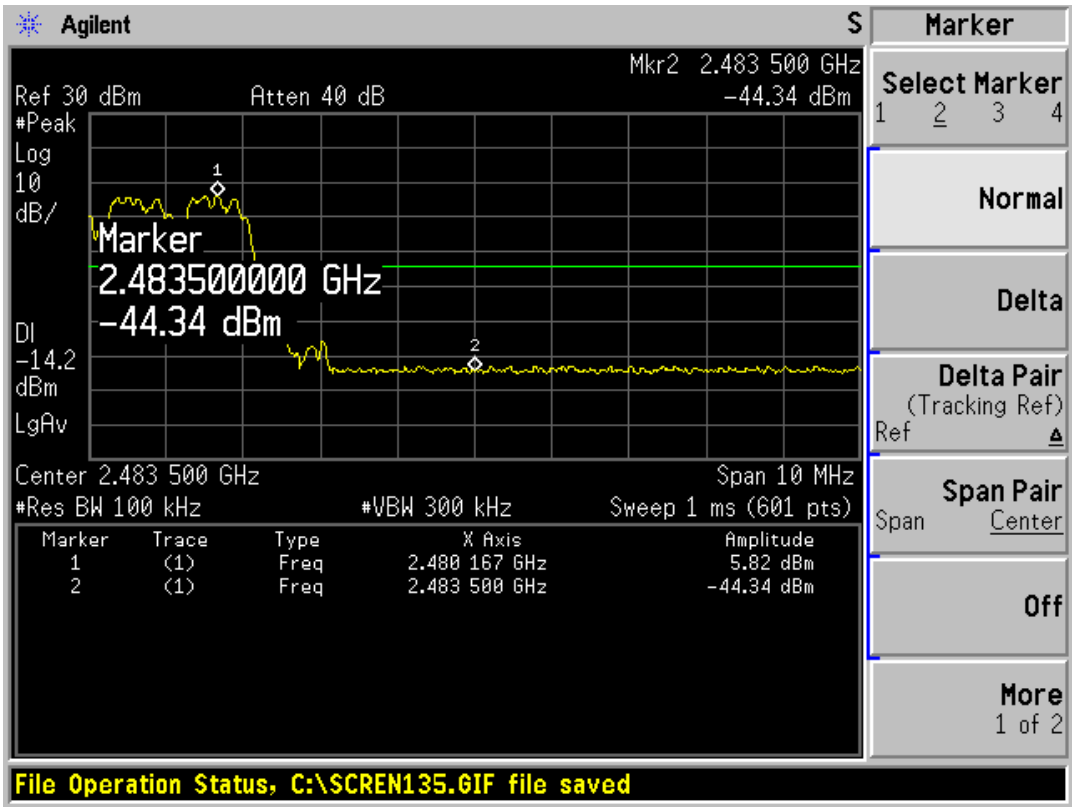
Channel No.:78

Hopping On-2DH5



Carrier frequency (MHz): 2402

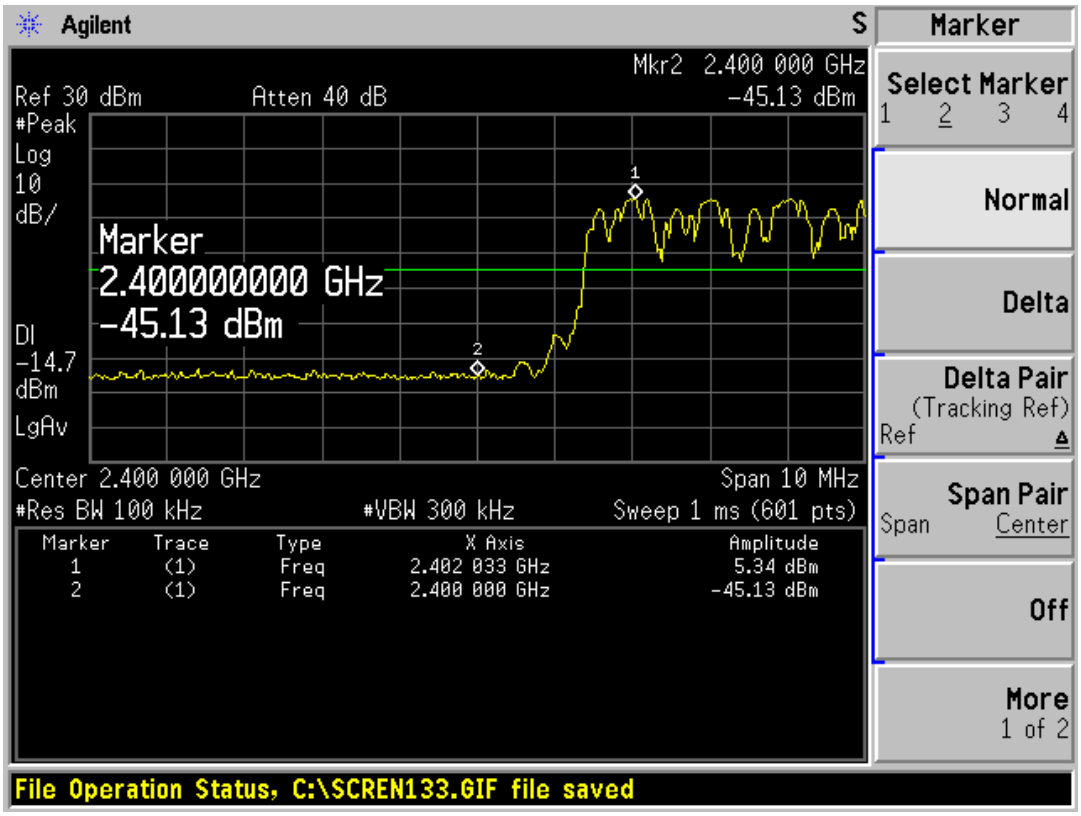
Channel No.:0



Carrier frequency (MHz): 2480

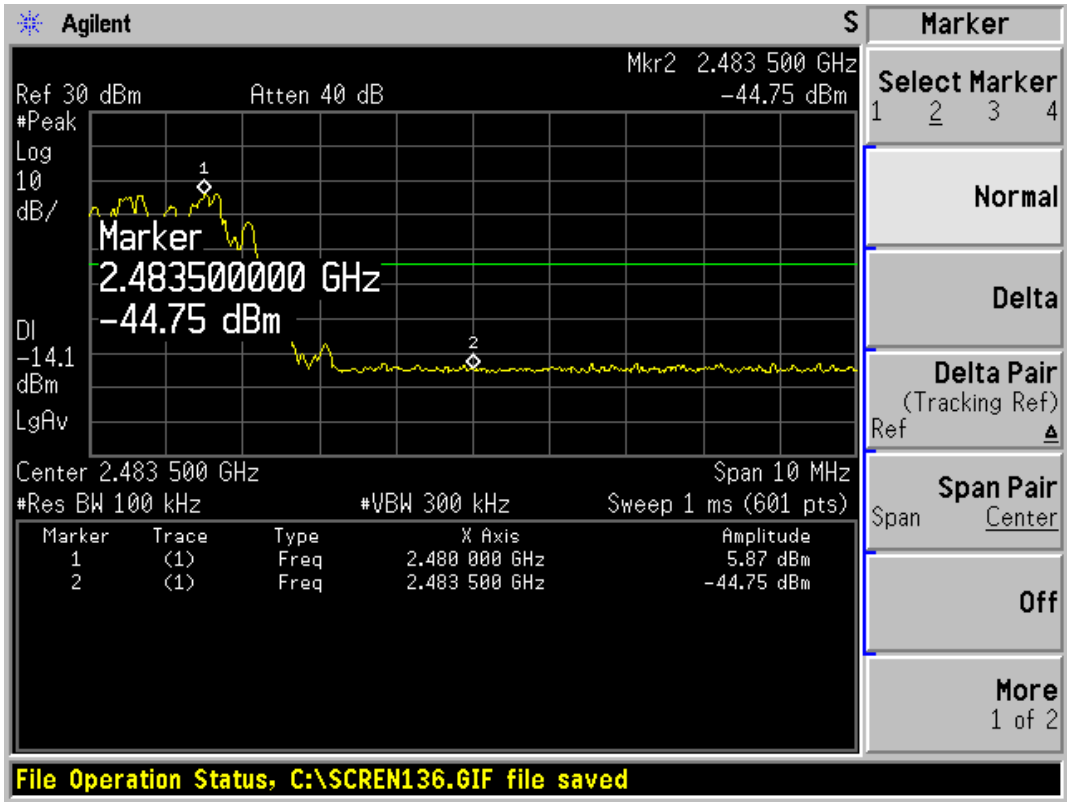
Channel No.:78

Hopping On-3DH5



Carrier frequency (MHz): 2402

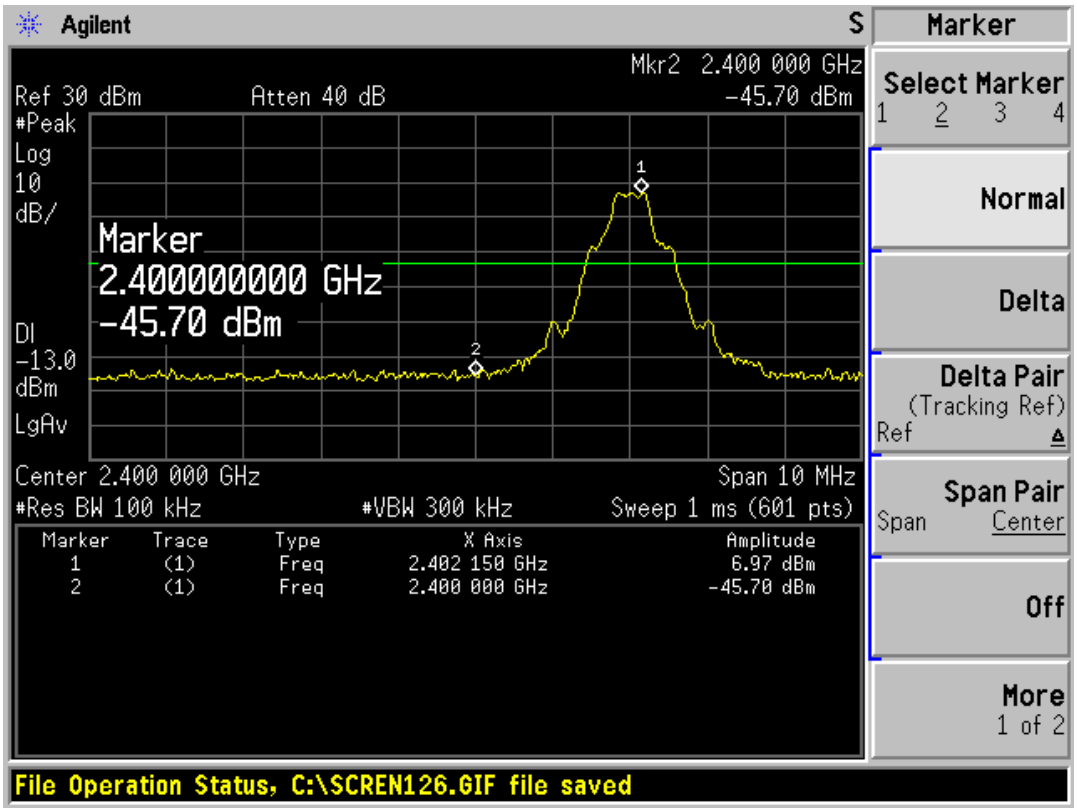
Channel No.:0



Carrier frequency (MHz): 2480

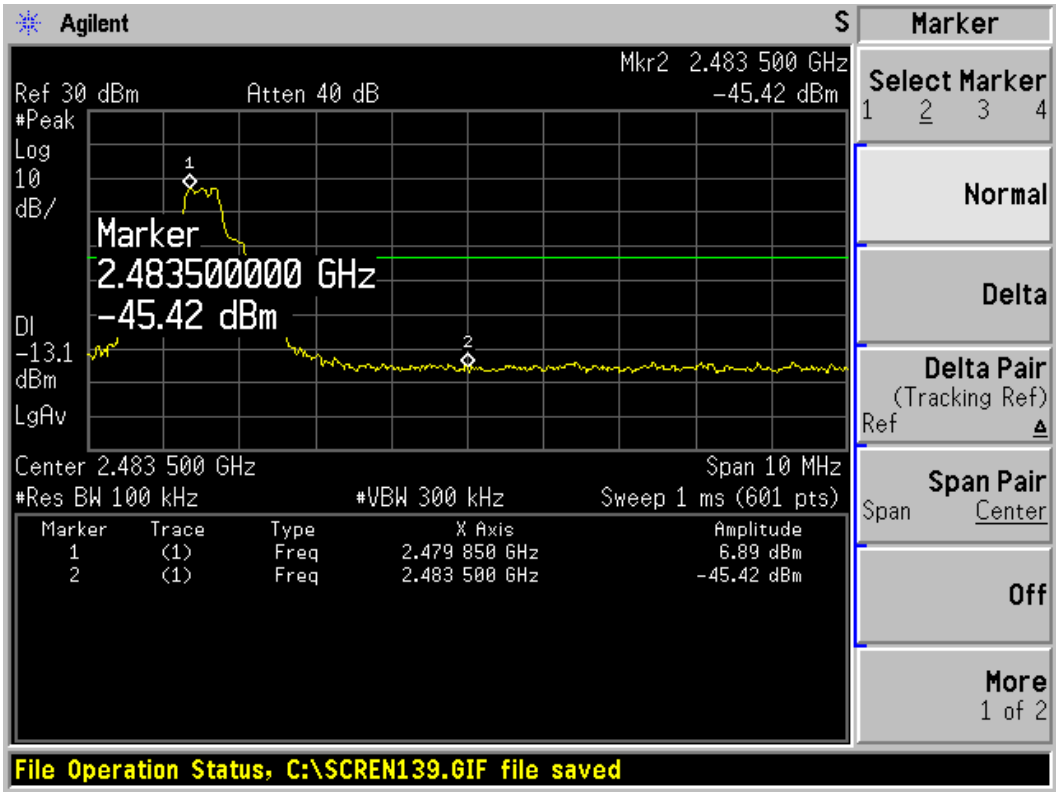
Channel No.:78

Hopping Off-DH5-



Carrier frequency (MHz): 2402

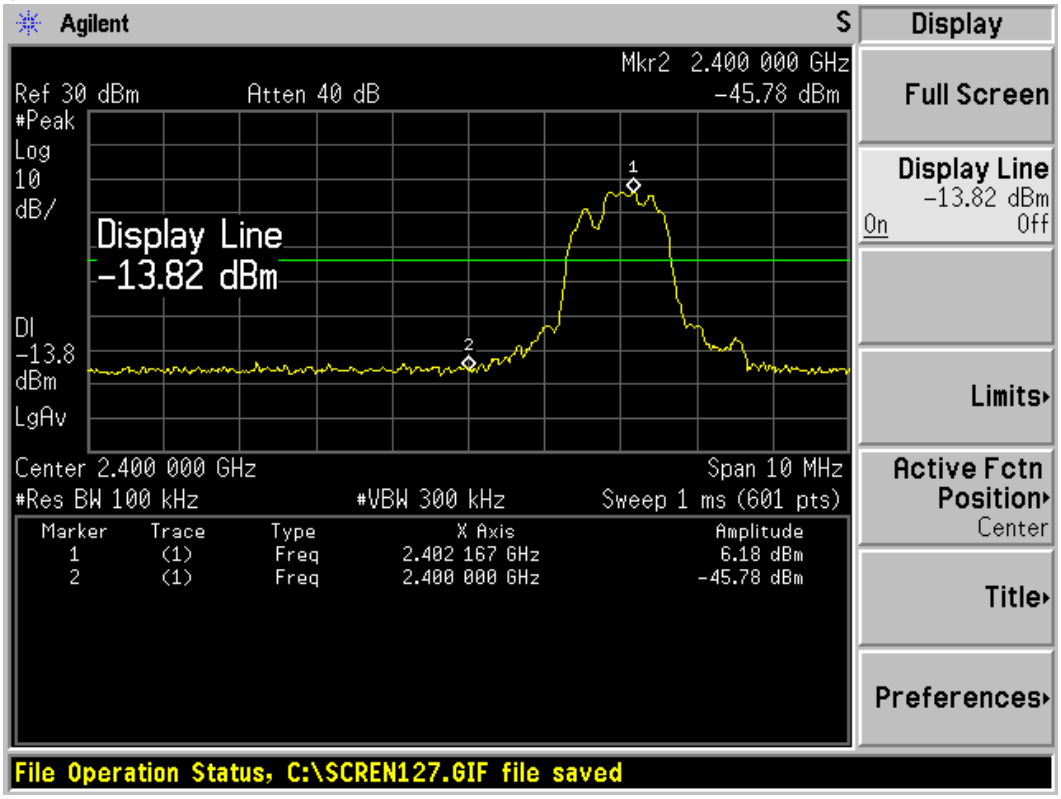
Channel No.:0



Carrier frequency (MHz): 2480

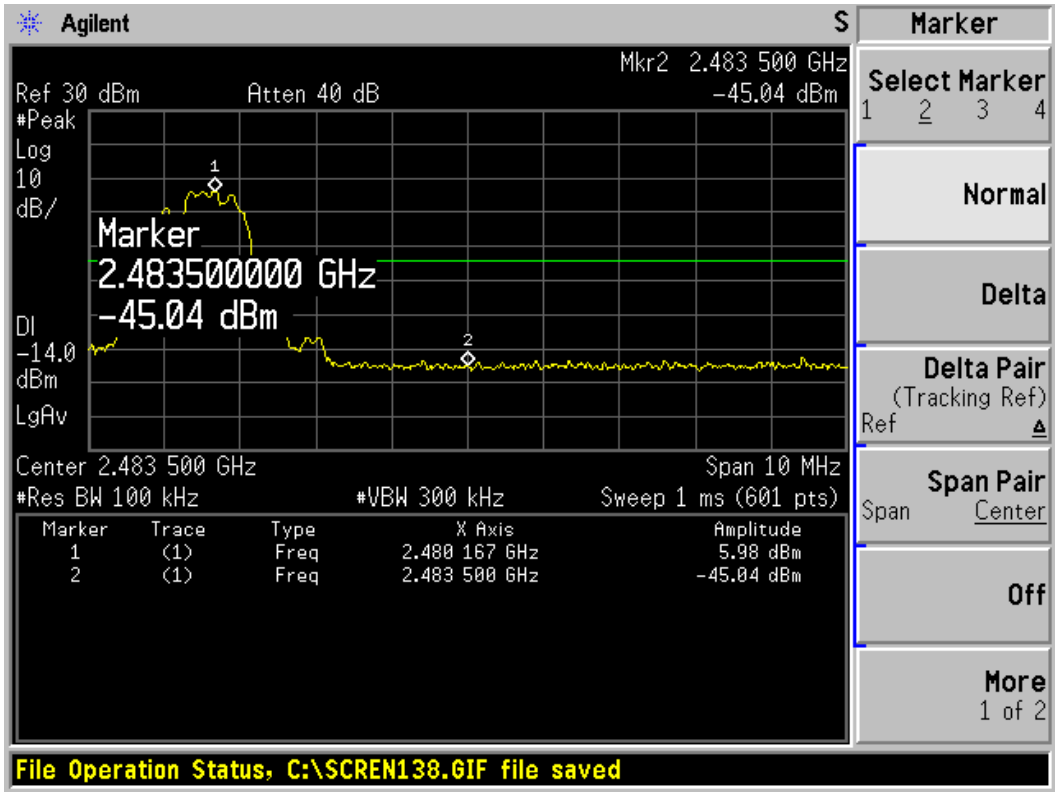
Channel No.:78

Hopping Off-2DH5



Carrier frequency (MHz): 2402

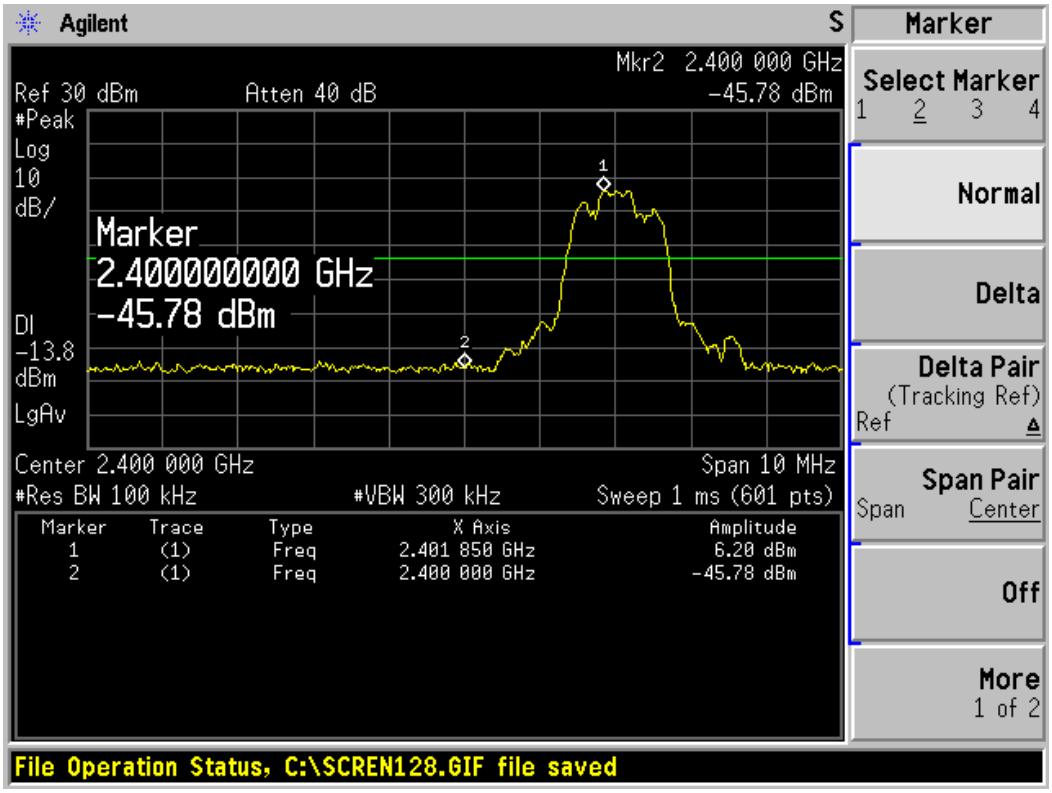
Channel No.:0



Carrier frequency (MHz): 2480

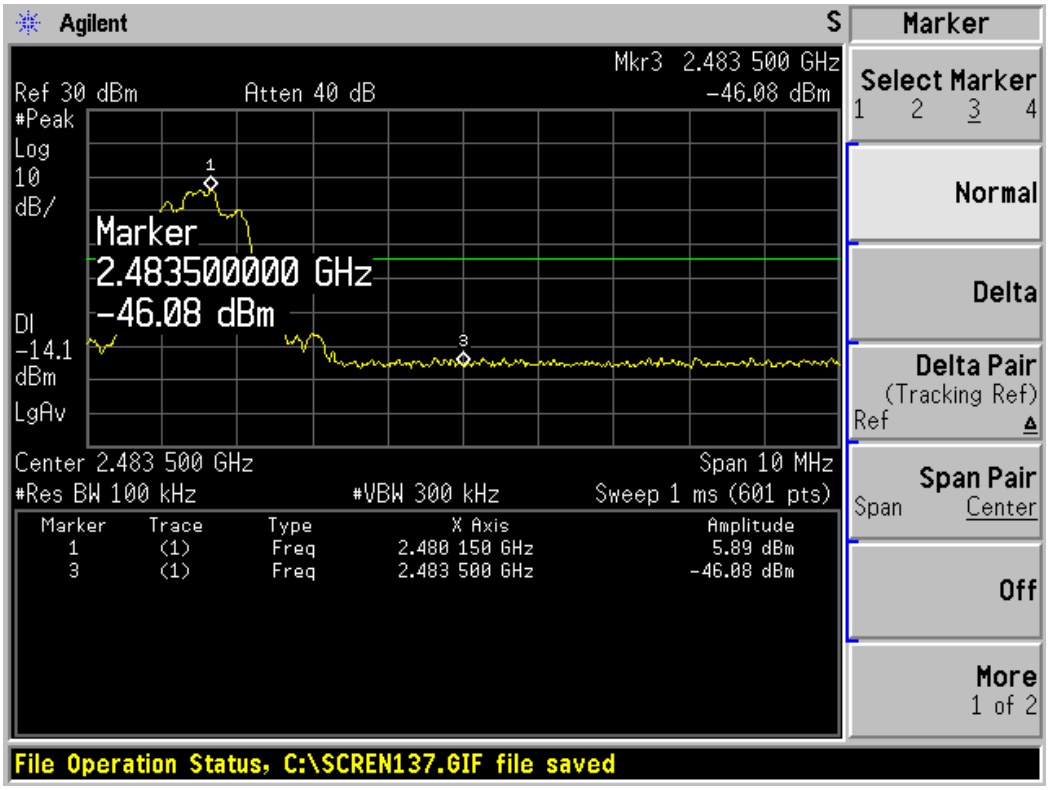
Channel No.:78

Hopping Off-3DH5



Carrier frequency (MHz): 2402

Channel No.:0



Carrier frequency (MHz): 2480

Channel No.:78

2.8. Spurious Radiated Emissions in the Restricted Band

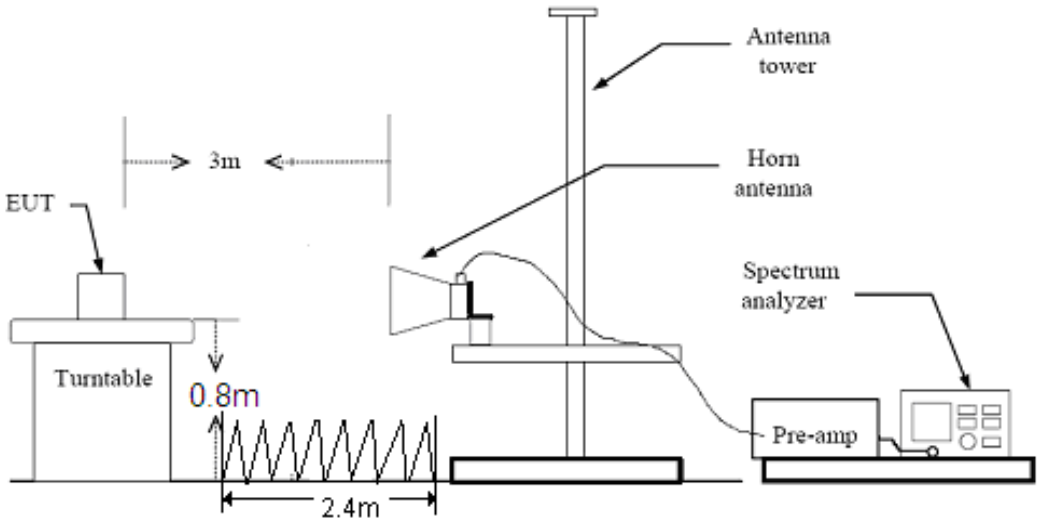
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna.
The data of cable loss
and antenna factor has been calibrated in full testing frequency range before the testing.
Set the spectrum analyzer in the following:
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) The dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit.
If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak- average correction factor, derived form the appropriate duty cycle calculation.
This setting method can refer to **DA00-705.**

Test setup



Note: Area side:2.4mX3.6m

Limits

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

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			

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)
There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
Peak Limit=74 dBuV/m
Average Limit=54 dBuV/m

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U= 3.55 dB.

Test Results: PASS

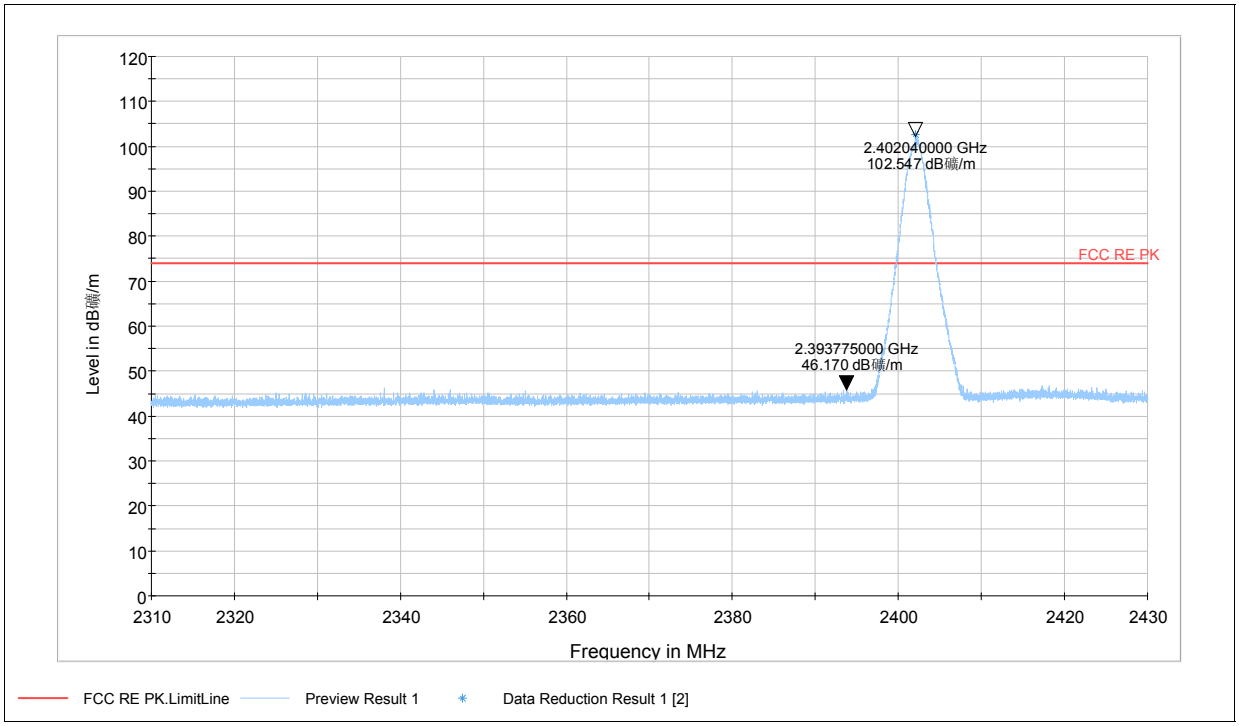
Channel.	Fre. (MHz)	Detection Type	Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading value (dBuV/m)	Correct Factor (dB)	Antenna Height (m)	Table Angle (Degree)	PASS /FAIL
2DH5-Ch0	2393.775	PK	46.170	74	27.830	51.470	-5.3	1.0	0	PASS
2DH5-Ch0	2391.015	AV	32.828	54	21.172	38.128	-5.3	1.0	45	PASS
2DH5-Ch78	2483.294	PK	63.085	74	10.915	67.585	-4.5	1.0	45	PASS
2DH5-Ch78	2483.294	AV	52.608	54	1.392	57.108	-4.5	1.0	180	PASS

Note: 1. PK value= Reading Value+ Correct Factor

2. AV value= Reading Value+ Correct Factor

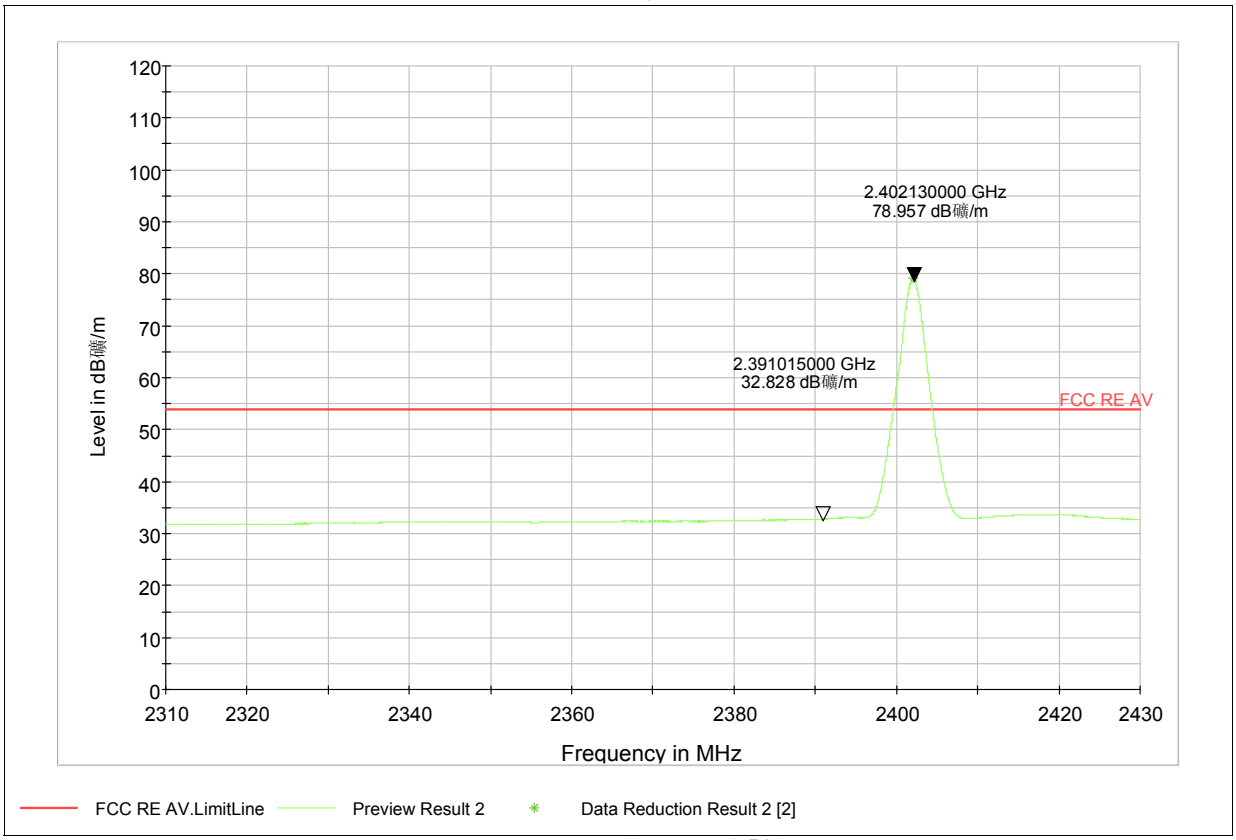
2DH5- Channel 0

Peak



Note: The signal beyond the limit is carrier, a font (Level in dBµV/m) in the test plot =(level in dBuV/m)

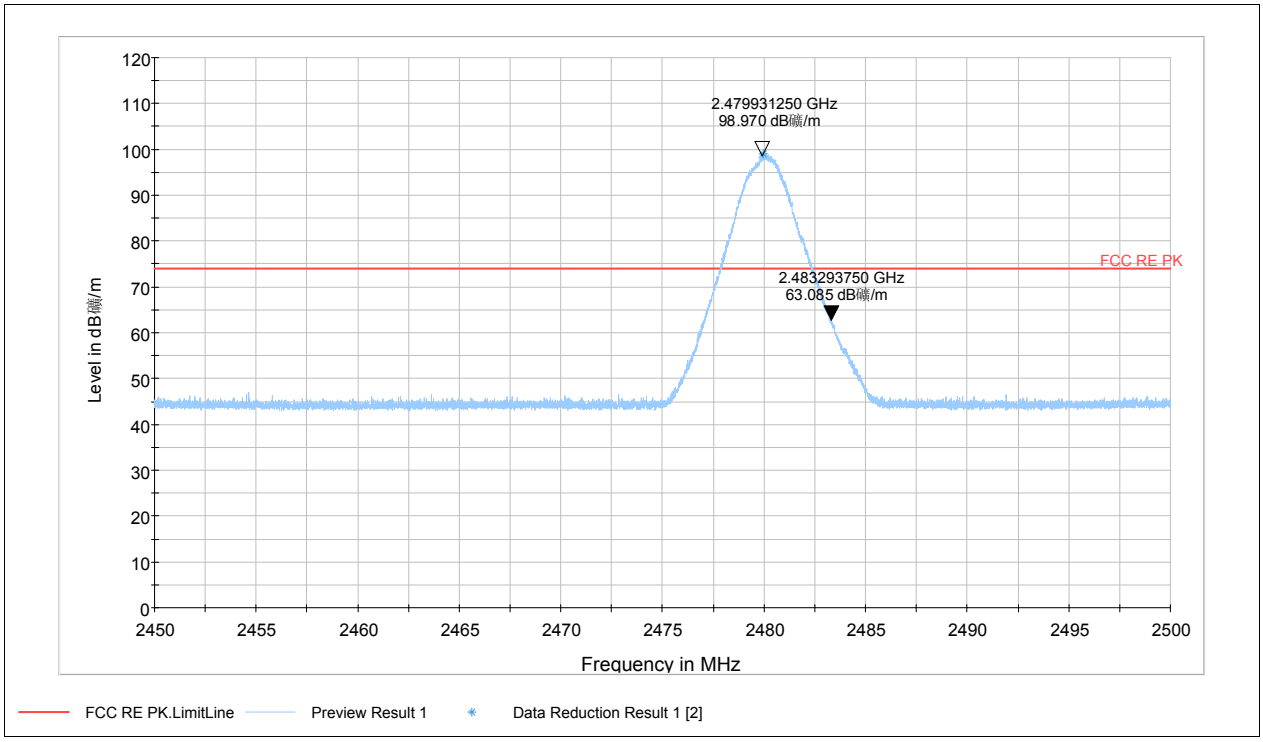
Average



Note: The signal beyond the limit is carrier, a font (Level in dBµV/m) in the test plot =(level in dBuV/m)

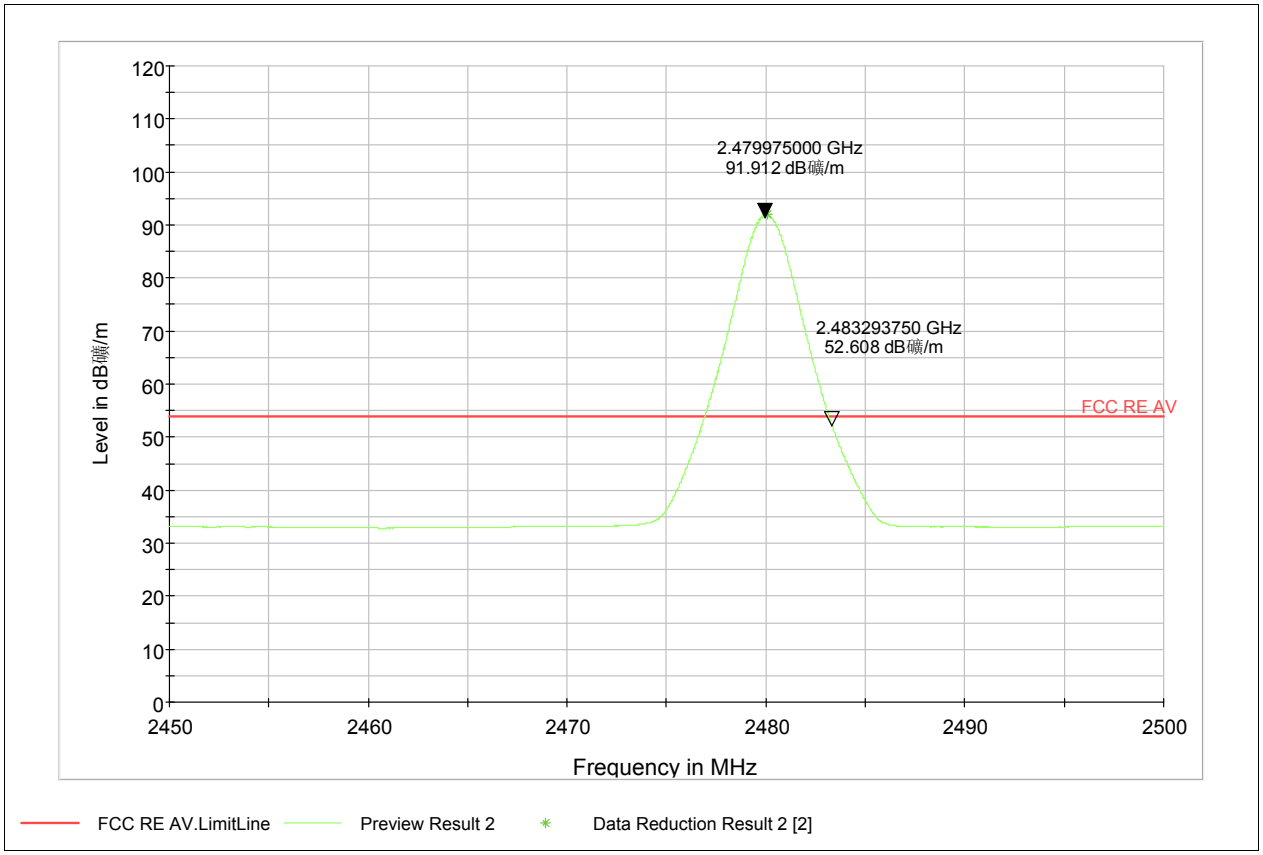
2DH5- Channel 78

Peak



Note: The signal beyond the limit is carrier, a font (Level in dBµV/m) in the test plot =(level in dBuV/m)

Average



Note: The signal beyond the limit is carrier, a font (Level in dBµV/m) in the test plot =(level in dBuV/m)

2.9. Number of hopping Frequency

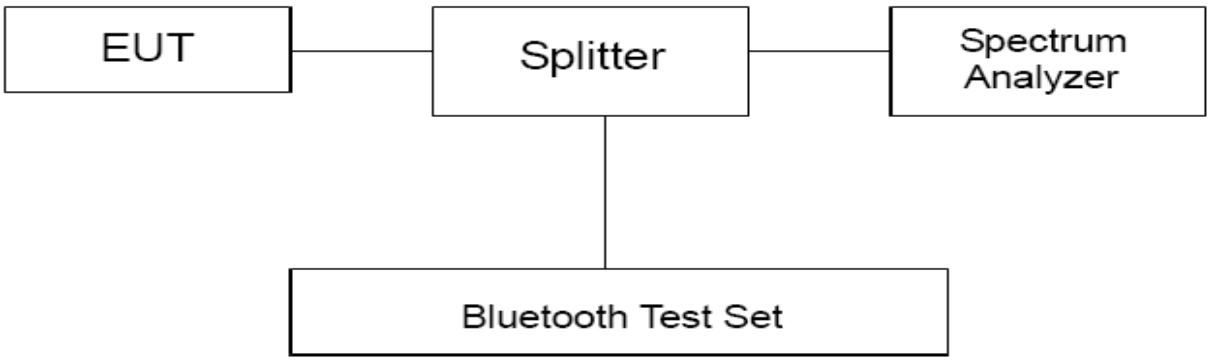
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. RBW is set to 1 MHz and VBW is set to 3 MHz on spectrum analyzer. Set EUT on Hopping on mode.

Test setup



Limits

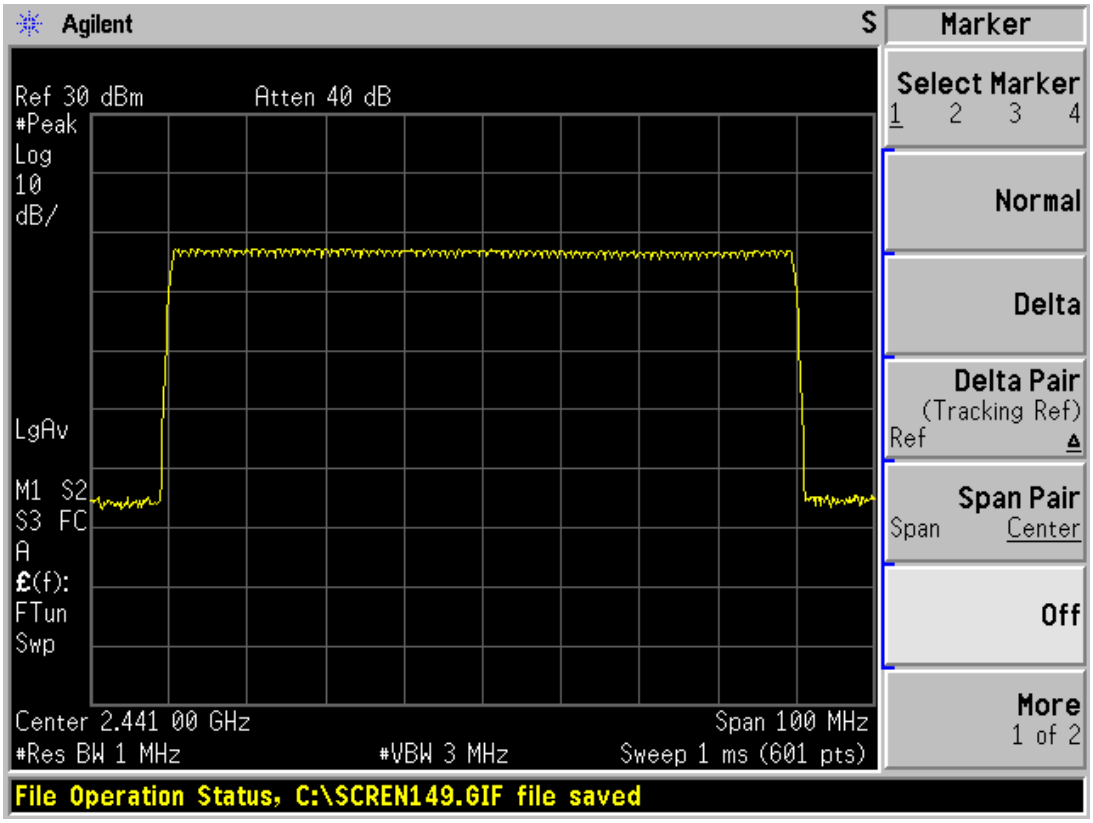
Rule Part 15.247(a) (1) (iii) specifies that" Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels..".

Limits	≥ 15 channels

Test Results:

DH5

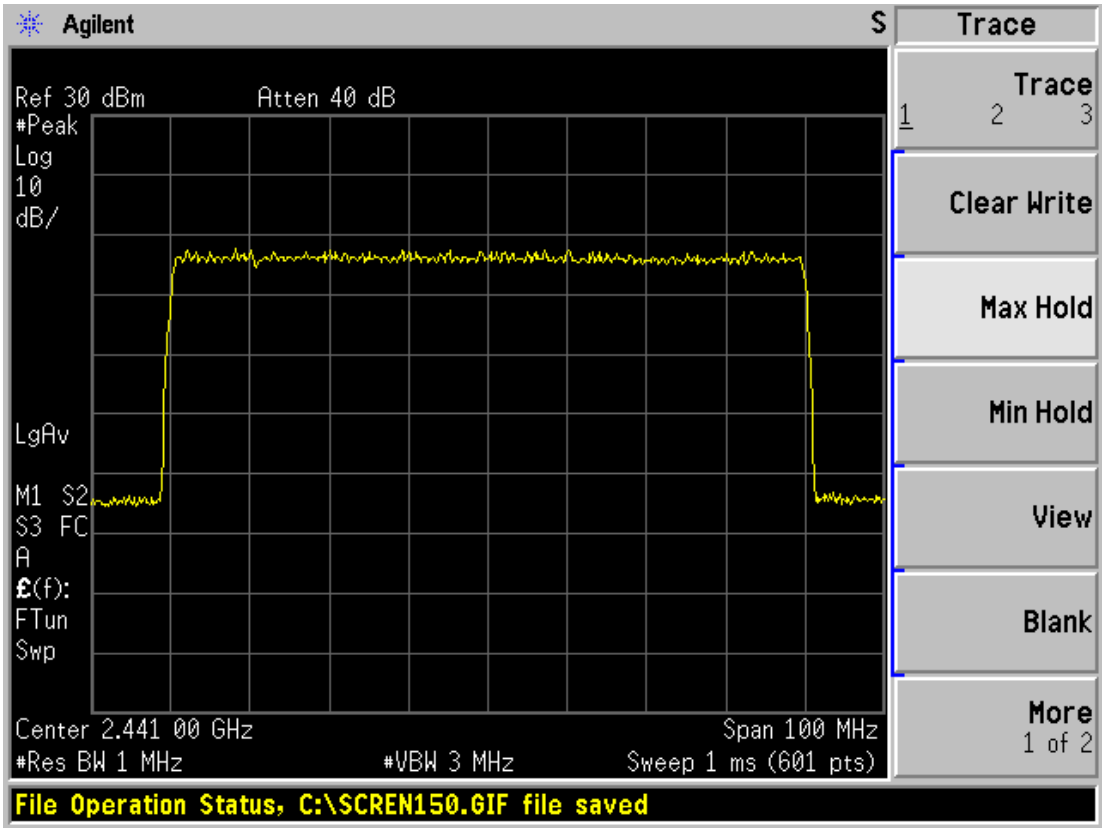
Number of hopping channels	conclusion
79	PASS



2400 MHz – 2483.5 MHz

2DH5

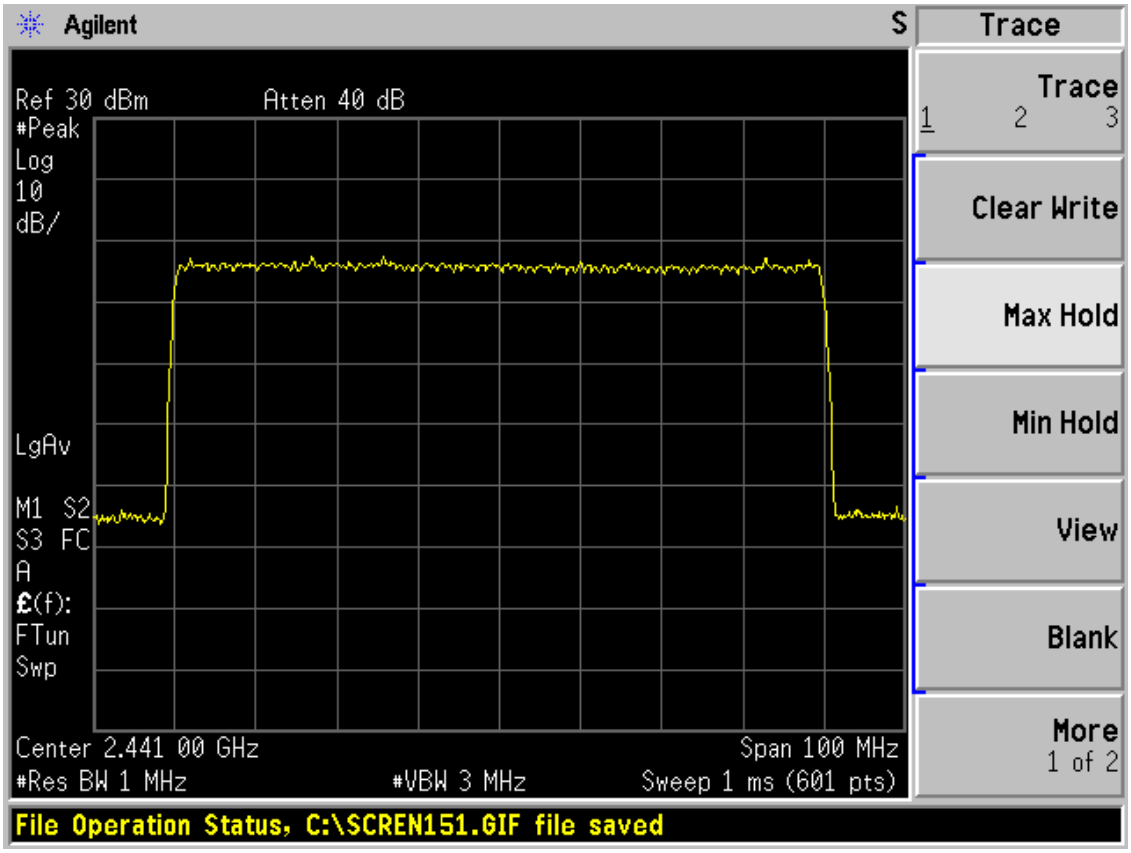
Number of hopping channels	conclusion
79	PASS



2400 MHz – 2483.5 MHz

3DH5

Number of hopping channels	conclusion
79	PASS



2400 MHz – 2483.5 MHz

2.10. Spurious RF Conducted Emissions

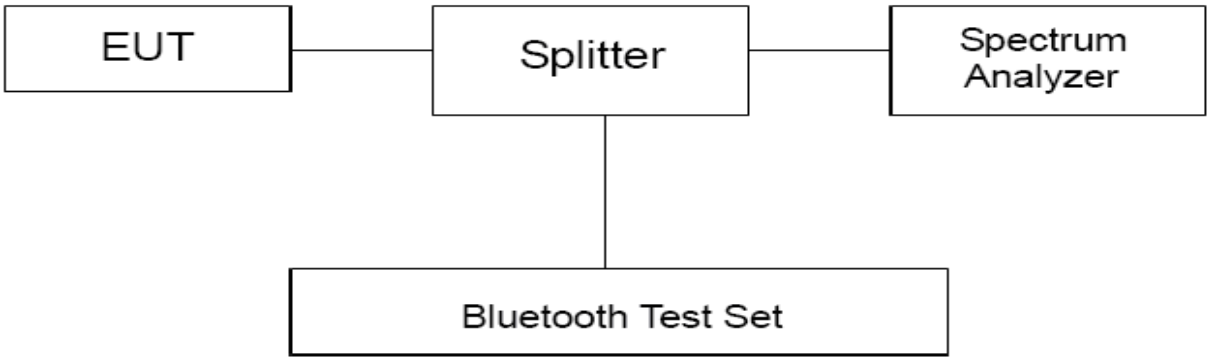
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. RBW and VBW are set to 100 kHz, Sweep is set to ATUO.
The test is in transmitting mode.

Test setup



Limits

Rule Part 15.247(d) pacifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.”

Mode	Carrier frequency (MHz)	Reference value (dBm)	Limit
2DH5	2402	7.72	-12.28
	2441	7.84	-12.16
	2480	7.55	-12.45

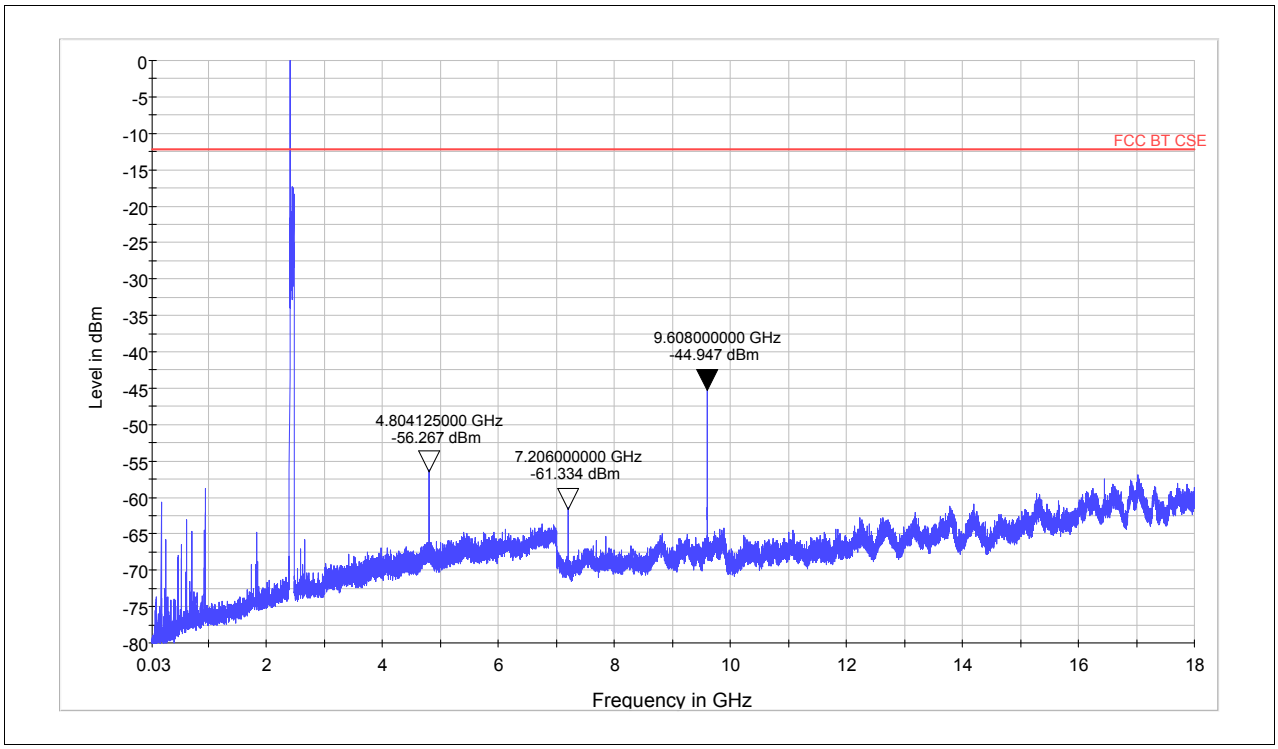
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

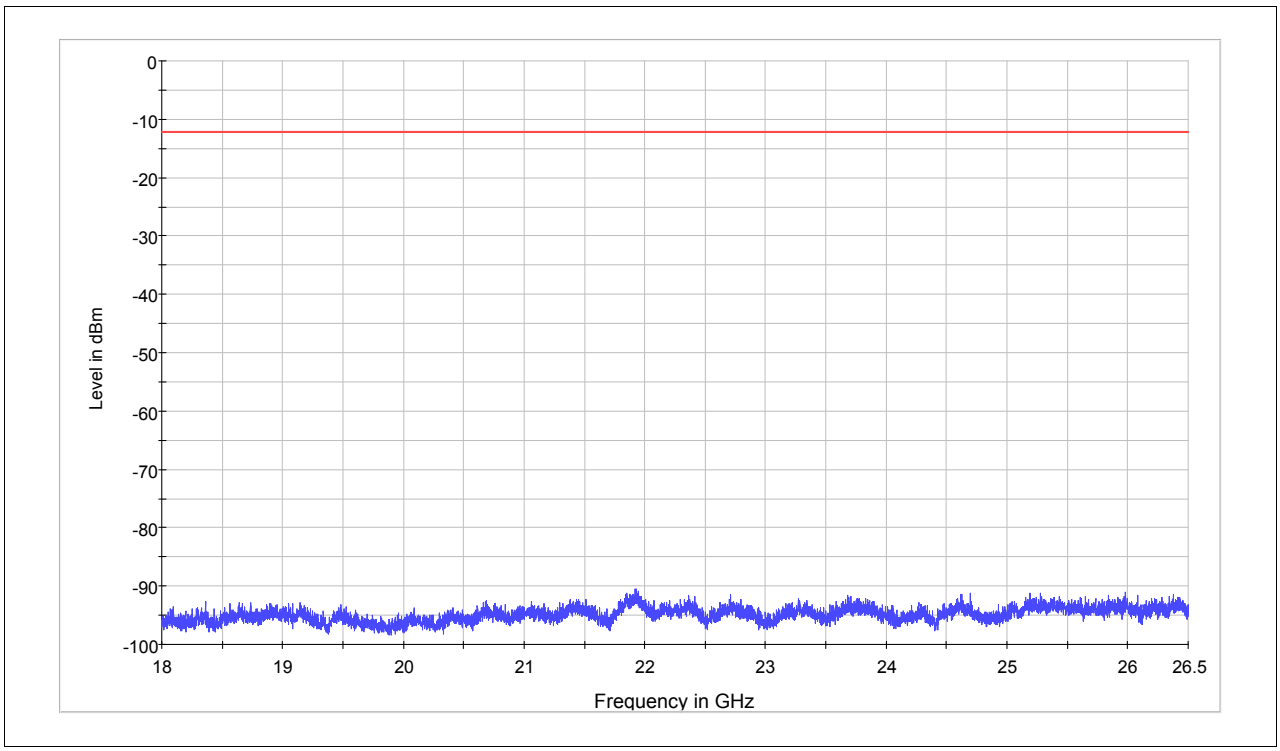
Test Results:

2DH5-CH0：



Note: The signal beyond the limit is carrier. Carrier frequency (MHz): 2402

Spurious RF conducted emissions from 30MHz to 18GHz

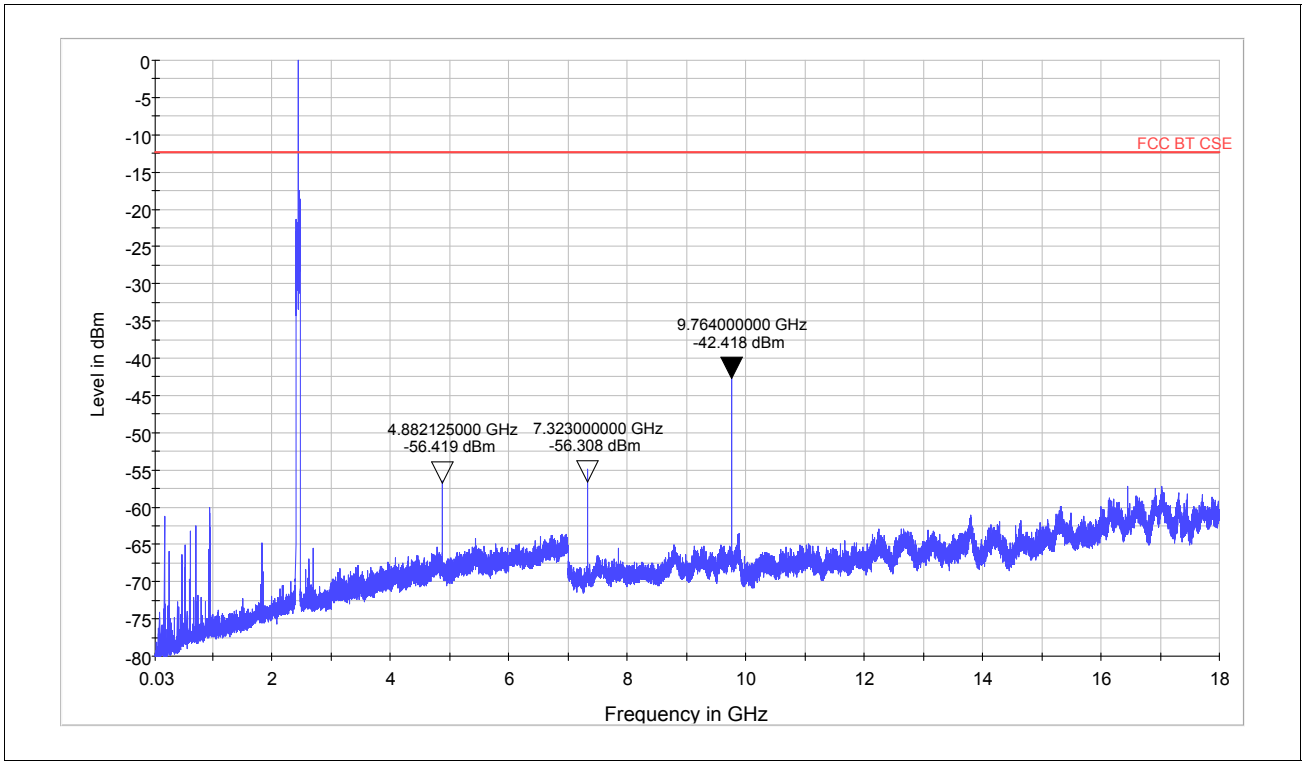


Spurious RF conducted emissions from 18GHz to 26.5GHz

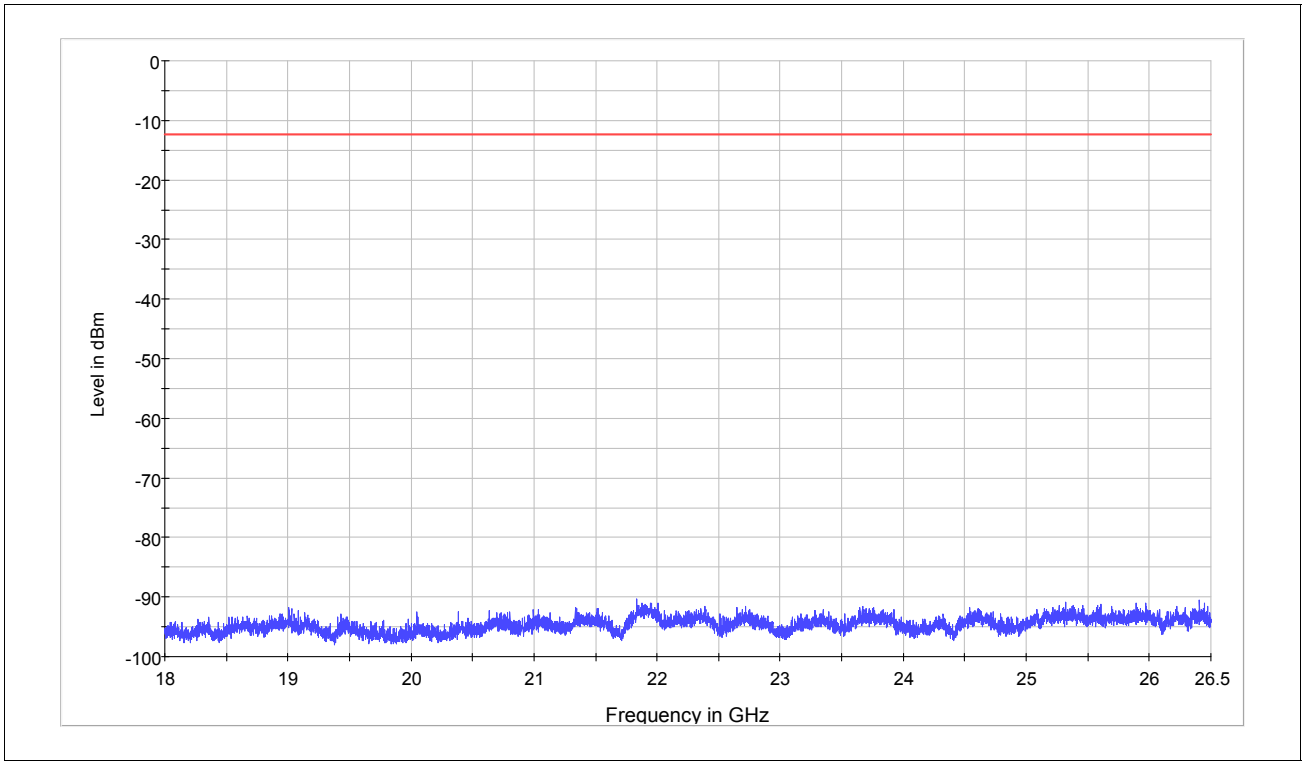
Harmonic	TX ch.0 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	4804.125	-56.267	-12.28
3	7206	-61.334	-12.28
4	9608	-44.974	-12.28
5	12010	Nf	-12.28
6	14412	Nf	-12.28
7	16814	Nf	-12.28
8	19216	Nf	-12.28
9	21618	Nf	-12.28
10	24020	Nf	-12.28
Nf: noise floor			

Note: The other Spurious RF conducted emissions level is no more than noise floor.

2DH5 -CH39：



Note: The signal beyond the limit is carrier. Carrier frequency (MHz): 2441
Spurious RF conducted emissions from 30MHz to 18GHz

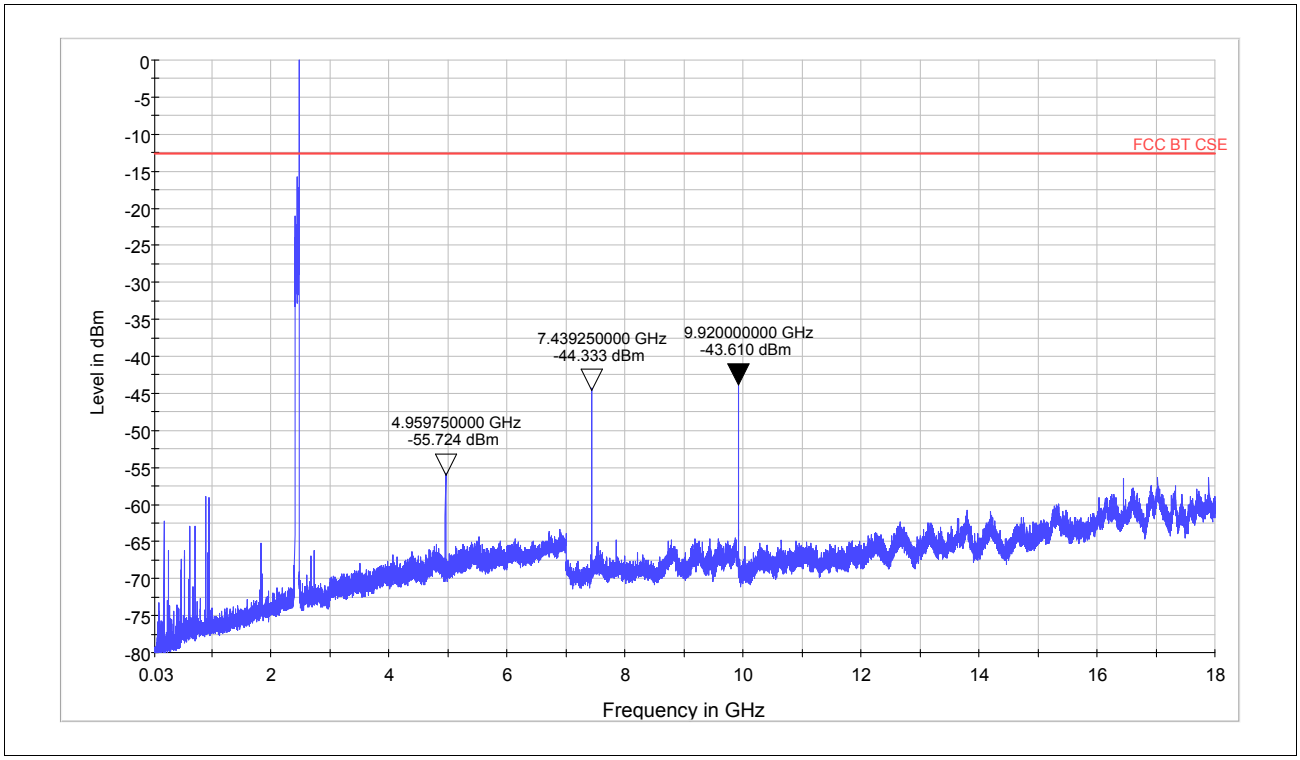


Spurious RF conducted emissions from 18GHz to 26.5GHz

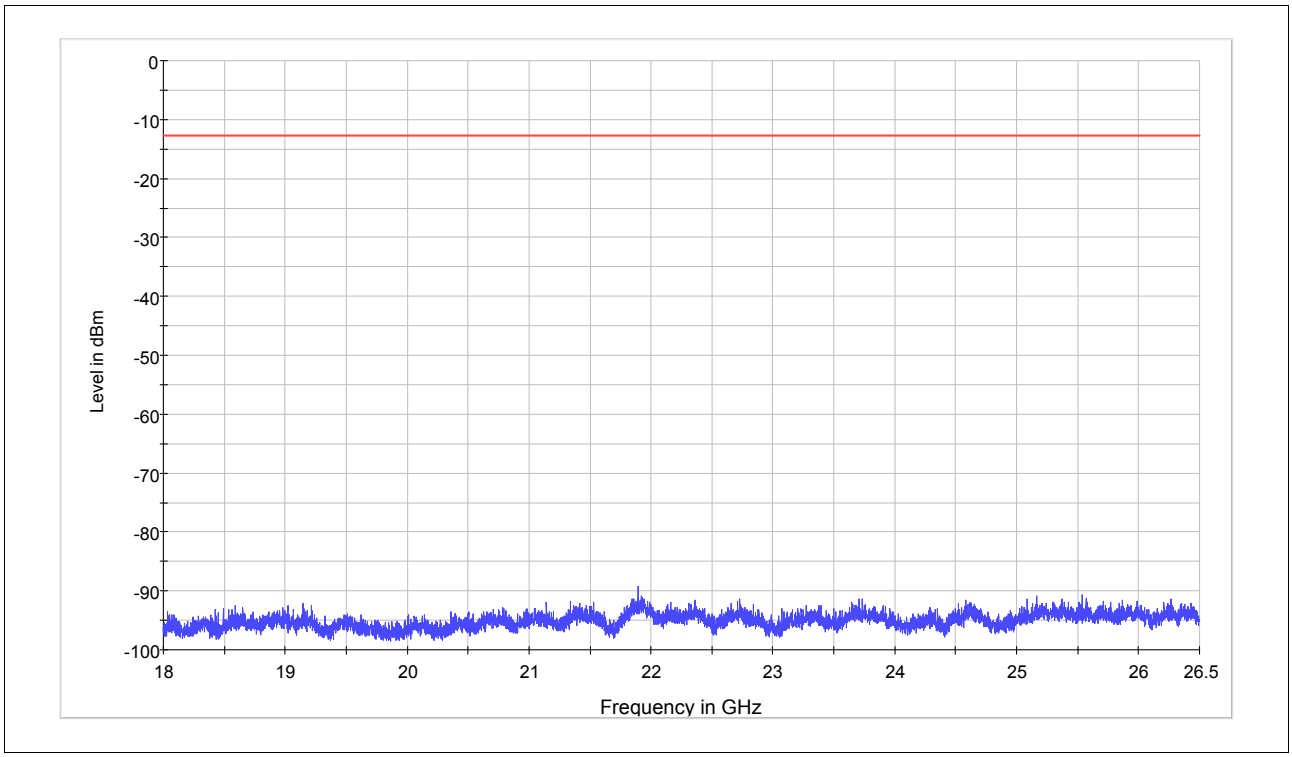
Harmonic	TX ch.39 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	4882.125	-56.419	-12.16
3	7323	-56.308	-12.16
4	9764	-42.418	-12.16
5	12205	Nf	-12.16
6	14646	Nf	-12.16
7	17087	Nf	-12.16
8	19528	Nf	-12.16
9	21969	Nf	-12.16
10	24410	Nf	-12.16
Nf: noise floor			

Note: The other Spurious RF conducted emissions level is no more than noise floor.

2DH5 -CH78：



Note: The signal beyond the limit is carrier. Carrier frequency (MHz): 2480
Spurious RF conducted emissions from 30MHz to 18GHz



Spurious RF conducted emissions from 18GHz to 26.5GHz

Harmonic	TX ch.78 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	4959.75	-55.724	-12.45
3	7439.25	-44.333	-12.45
4	9920	-43.610	-12.45
5	12400	Nf	-12.45
6	14880	Nf	-12.45
7	17360	Nf	-12.45
8	19840	Nf	-12.45
9	22320	Nf	-12.45
10	24800	Nf	-12.45
Nf: noise floor			

Note: The other Spurious RF conducted emissions level is no more than noise floor.

2.11. Radiates Emission

Ambient condition

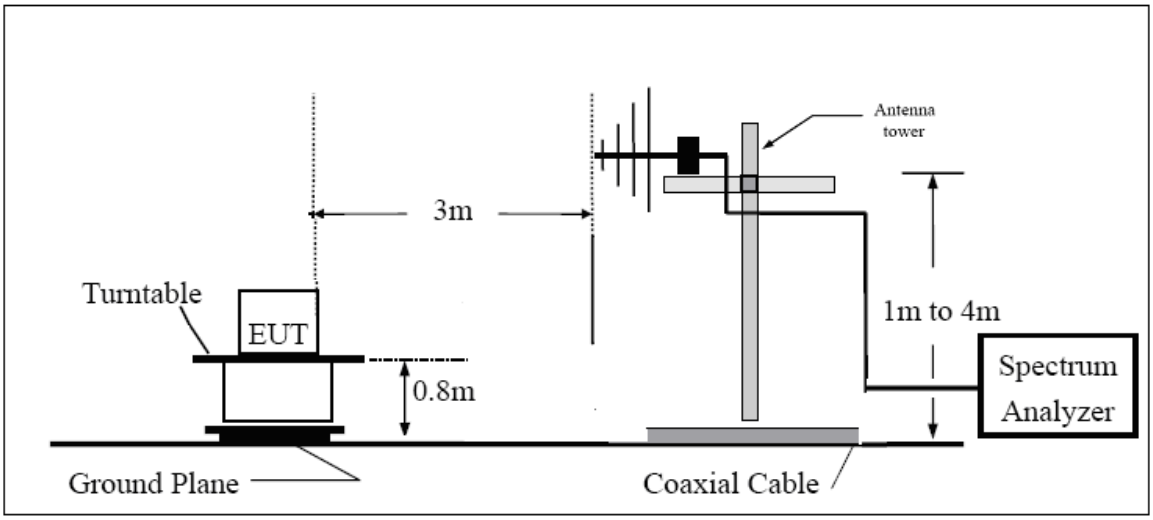
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

Method of Measurement

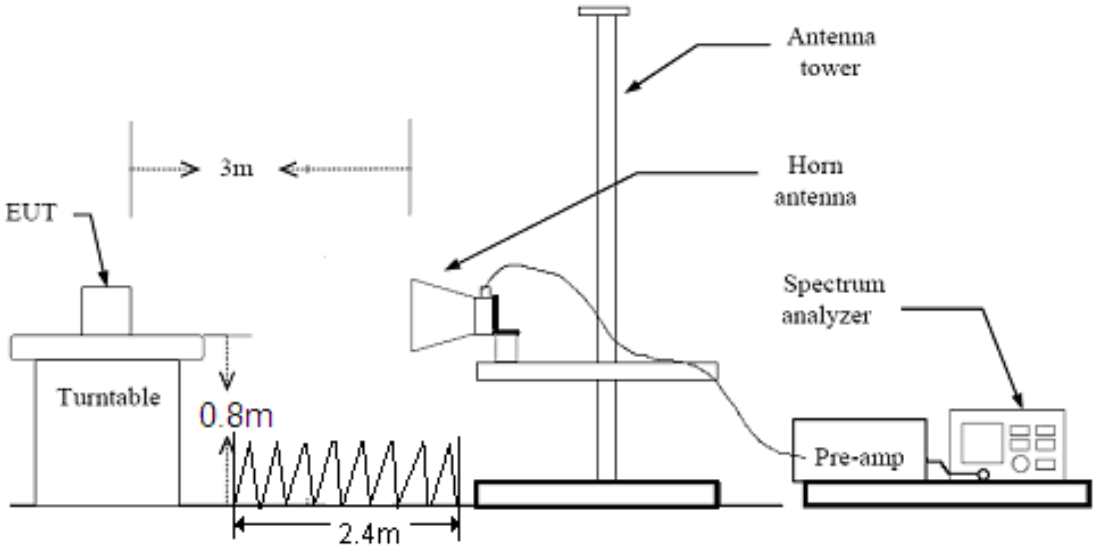
The test set-up was made in accordance to the general provisions of ANSI C63.4-2009.The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.
Sweep the whole frequency band through the range from 30MHz to the 10th harmonic of the carrier. The height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.
Set the spectrum analyzer in the following:
Below 1GHz (detector: Peak and Quasi-Peak)
RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz (detector: Peak):
(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

The test is in transmitting mode.

Test setup
Below 1GHz



Above 1GHz



Limits

Rule Part 15.247(d) specifies that “In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).”

Limit in restricted band

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
1.705–30.0	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above960	500	54

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
30MHz-200MHz	4.19 dB
200MHz-1GHz	3.63 dB
Above 1GHz	3.68 dB

Test result

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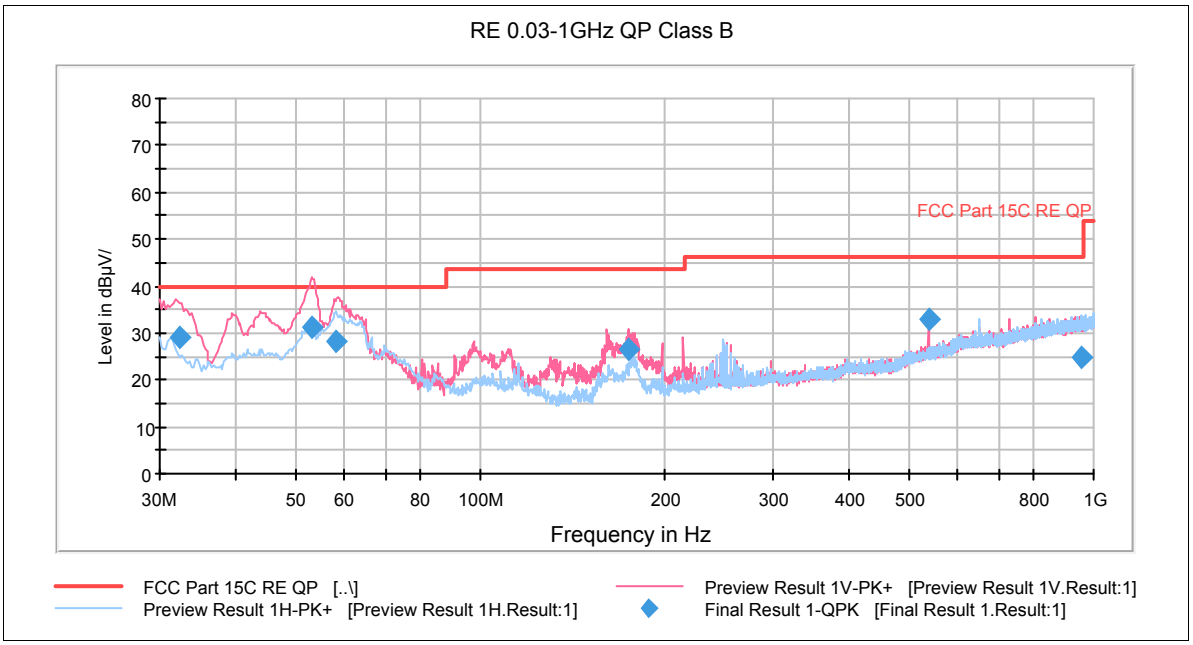
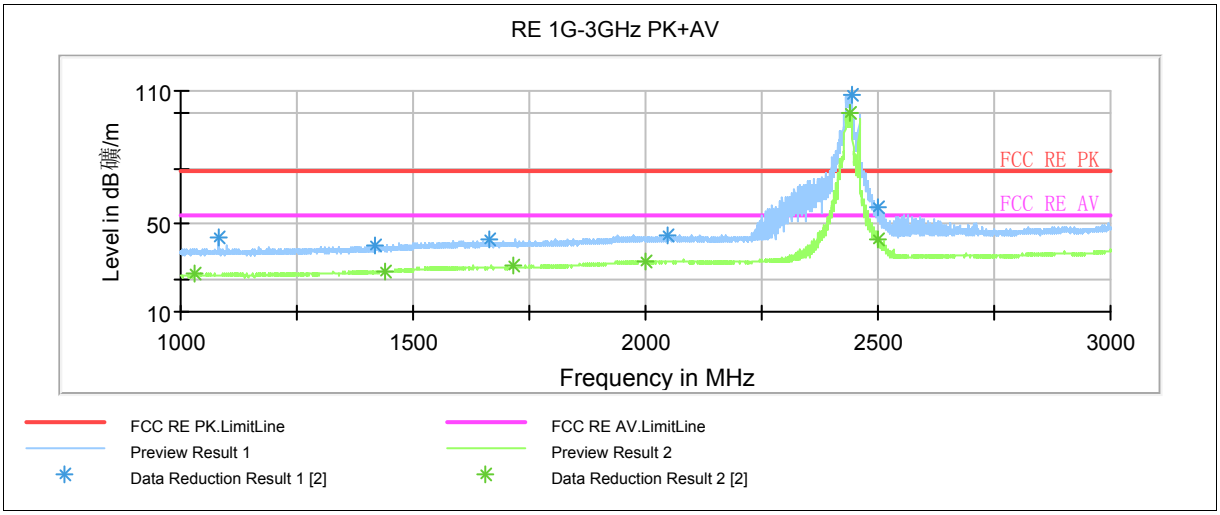


Note: a font (Level in dBµV/m)in the test plot =(level in dBuv/m)
Radiates Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
32.300000	29.2	100.0	V	-11.0	11.8	17.4	10.8	40.0
53.277500	31.2	100.0	V	61.0	12.7	18.5	8.8	40.0
58.335000	28.4	100.0	V	154.0	12.1	16.3	11.6	40.0
174.450000	26.6	100.0	V	244.0	15.5	11.1	16.9	43.5
537.592500	32.9	100.0	V	337.0	12	20.9	13.1	46.0
952.990000	24.8	375.0	H	219.0	-1.3	26.1	21.2	46.0

Remark: 1. Quasi-Peak = Reading value + Correction factor
2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
3. Margin = Limit – Quasi-Peak



Radiates Emission from 1GHz to 3GHz

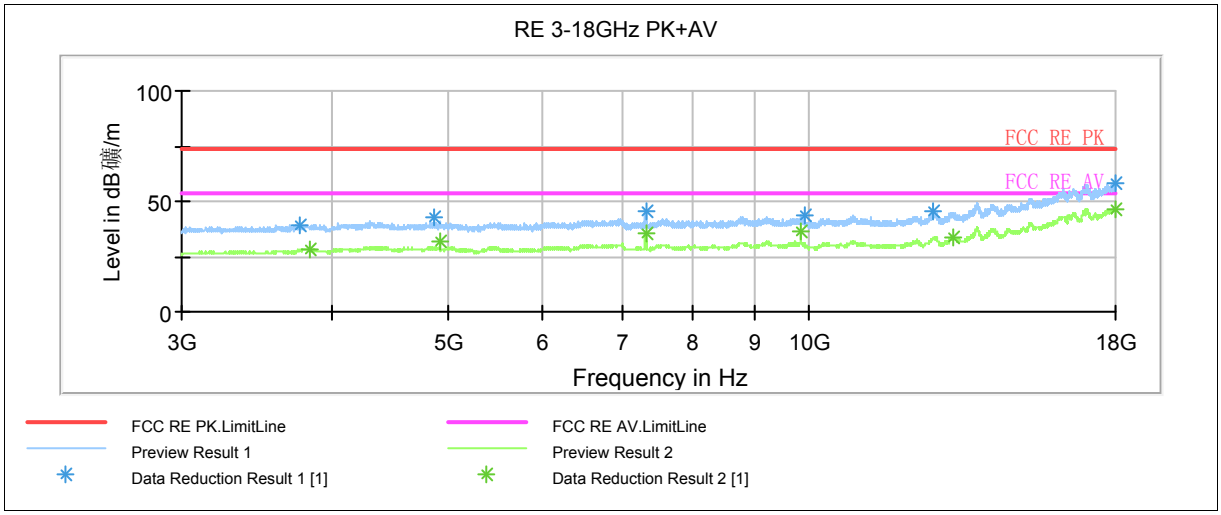
Note: The signal beyond the limit is carrier. a font (Level in dBµV/m)in the test plot =(level in dBuv/m)

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Limit (dBuV/m)		Polarization	Azimuth (deg)	Reading value (dBuV/m)		Correct Factor (dB)
				Peak	Average			Peak	Average	
1083.250000	43.7	26.4	150.0	74	54	V	2.0	56.1	38.8	-12.4
1418.250000	39.8	27.8	100.0	74	54	H	179.0	50.9	38.9	-11.1
1664.750000	42.4	29.9	150.0	74	54	V	198.0	51.4	38.9	-9.0
2049.000000	44.4	32.4	150.0	74	54	H	208.0	50.8	38.8	-6.4
2442.250000	108.5	99.2	100.0	74	54	V	145.0	113.2	103.9	-4.7
2500.000000	57.0	41.5	100.0	74	54	V	154.0	61.3	45.8	-4.3

Remark: 1. Correction Factor = Antenna factor+ Insertion loss (cable loss + amplifier gain)

2. Peak = Reading value + Correction factor

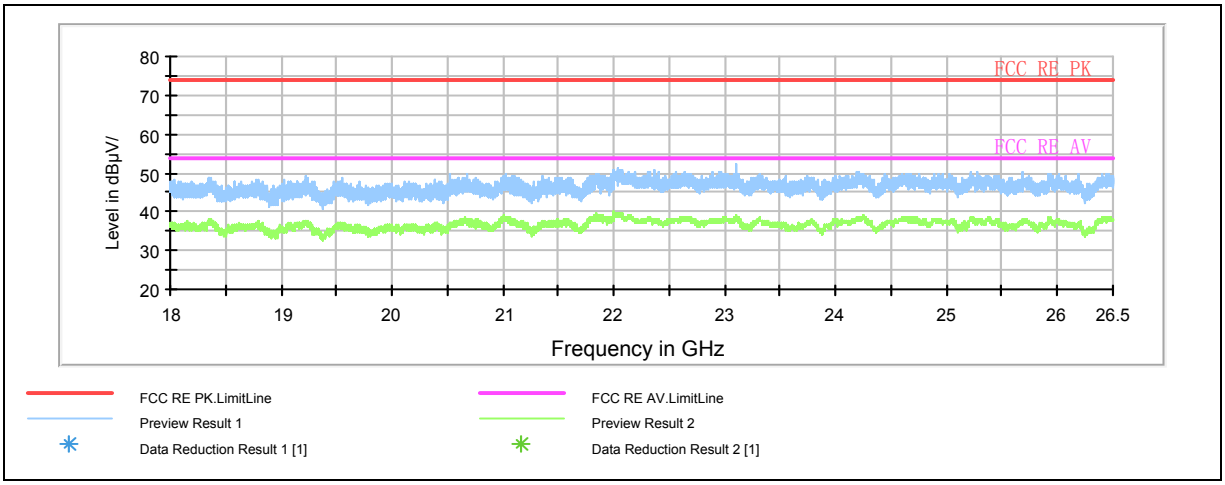
3. **Average= Reading value + Correction factor**



Radiates Emission from 3GHz to 18GHz

Note: a font (Level in dBµV/m)in the test plot =(level in dBuv/m)

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Height (cm)	Limit (dBuV/m)		Polarization	Azimuth (deg)	Reading value (dBuV/m)		Correct Factor (dB)
				Peak	Average			Peak	Average	
3836.250	37.7	28.6	100.0	74	54	V	292.0	37.9	28.8	-0.2
4920.000	40.8	32.0	150.0	74	54	V	0.0	38.9	30.1	1.9
7308.750	43.7	35.4	150.0	74	54	V	13.0	38	29.7	5.7
9840.000	43.5	36.5	150.0	74	54	V	0.0	33.7	26.7	9.8
13162.500	43.4	33.9	150.0	74	54	H	150.0	30.7	21.2	12.7
17992.500	56.7	46.6	100.0	74	54	H	157.0	33.2	23.1	23.5



Radiates Emission from 18GHz to 26.5GHz

Note: a font (Level in dBµV/m)in the test plot =(level in dBuv/m)

2.12. Conducted Emission

Ambient condition

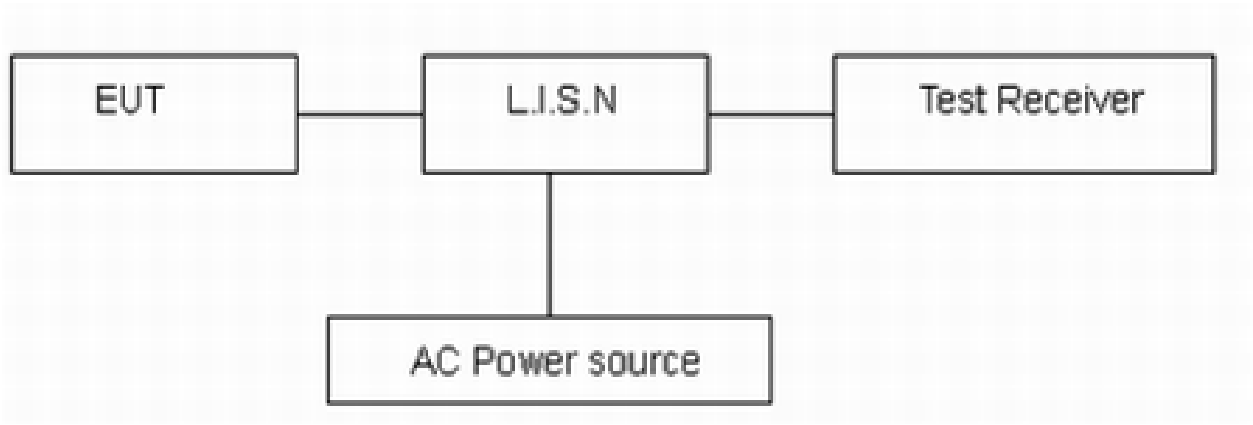
P

23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2009. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz.The measurement result should include both L line and N line.
The test is in transmitting mode.

Test Setup



Note: AC Power source is used to change the voltage from 220V/50Hz to 110V/60Hz.

Limits

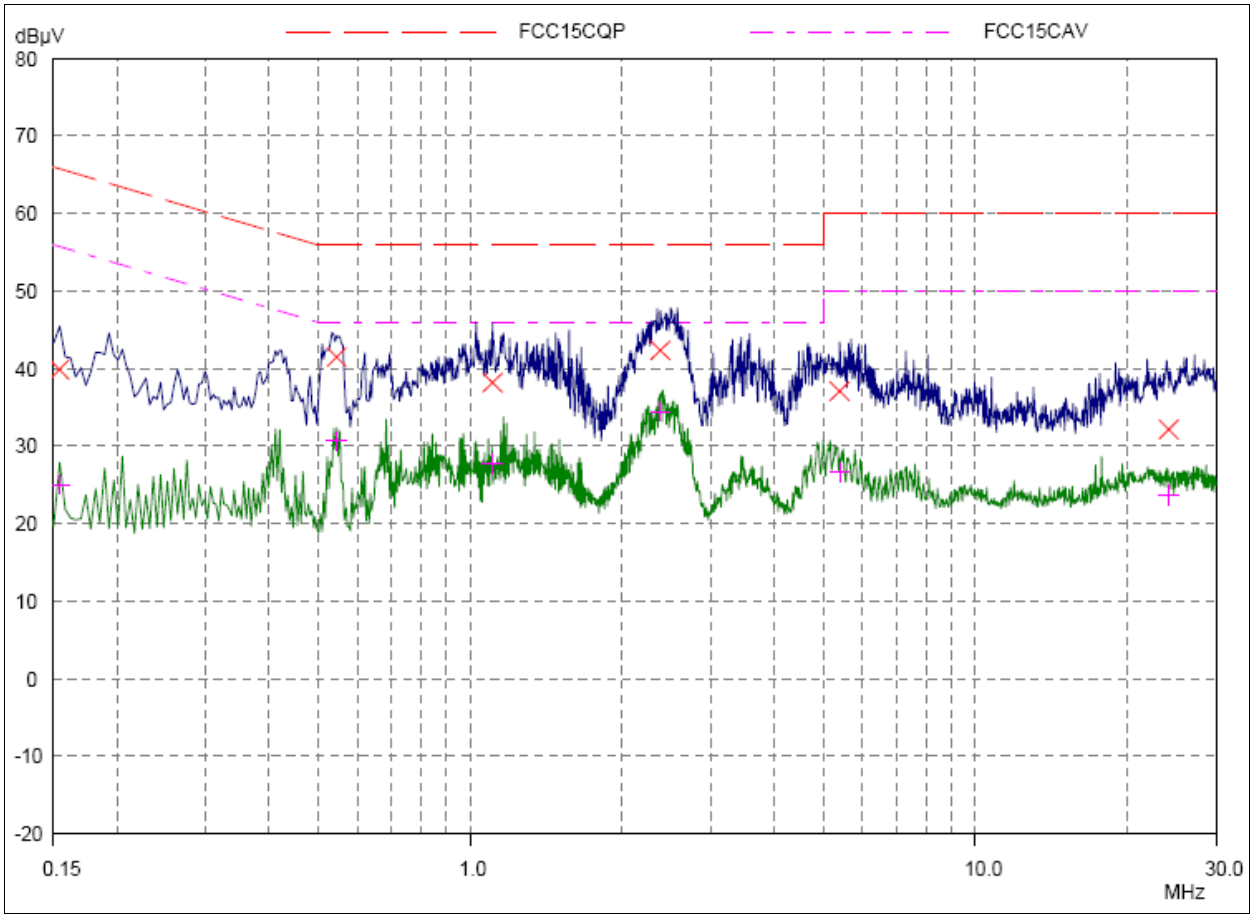
Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U= 2.69 dB.

Test Results:

2DH5 -CH39

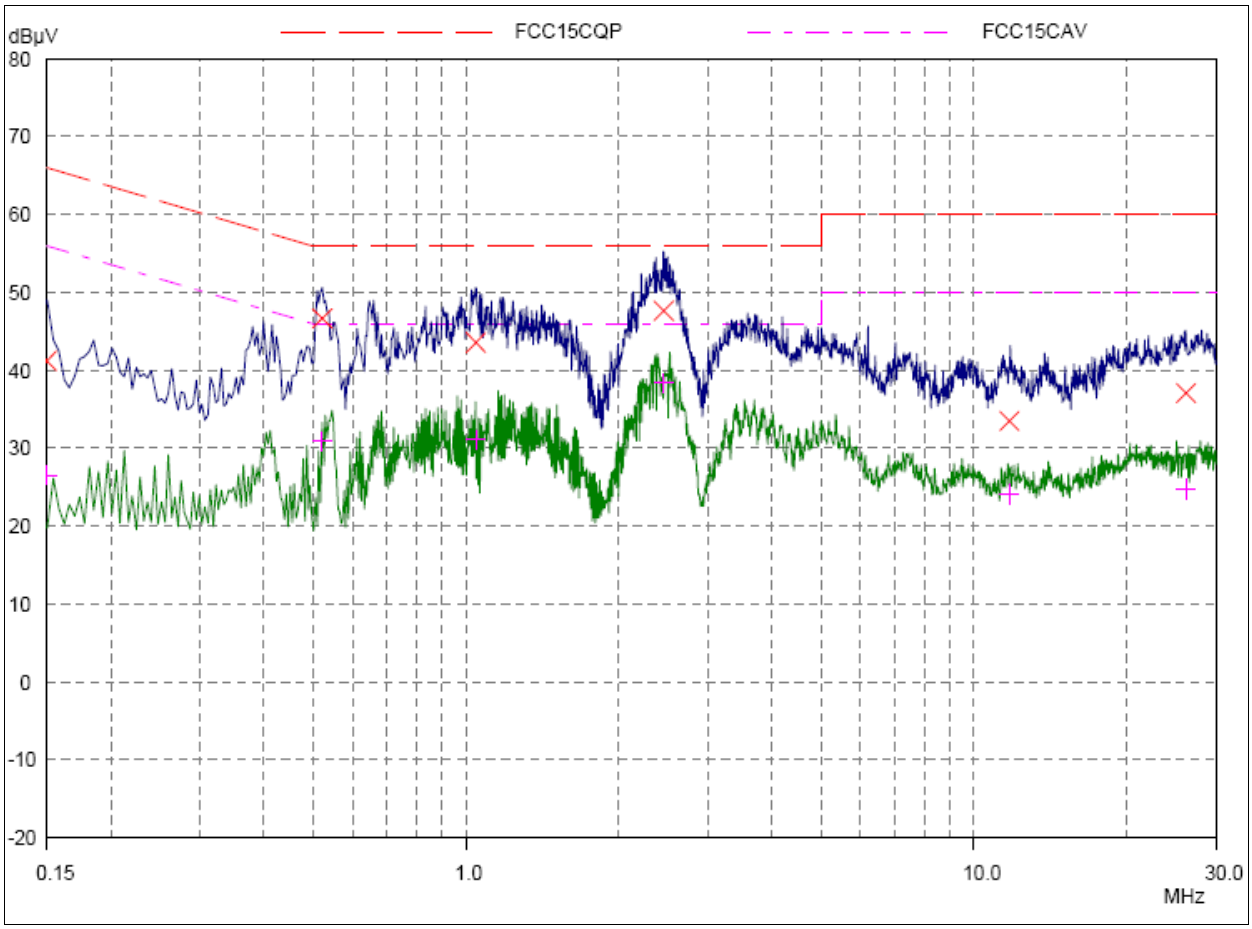


L Line

Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -
0.1539	39.88	65.79	25.91	L1
0.54453	41.51	56.00	14.49	L1
1.10703	38.18	56.00	17.82	L1
2.37656	42.37	56.00	13.63	L1
5.39609	37.07	60.00	22.93	L1
24.12265	32.18	60.00	27.82	L1

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -
0.1539	25.03	55.79	30.76	L1
0.54453	30.68	46.00	15.32	L1
1.10703	27.76	46.00	18.24	L1
2.37656	34.44	46.00	11.56	L1
5.39609	26.61	50.00	23.39	L1
24.12265	23.65	50.00	26.35	L1



N Line

Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -
0.15	41.22	66.00	24.78	N
0.52109	46.68	56.00	9.32	N
1.04843	43.56	56.00	12.44	N
2.45468	47.64	56.00	8.36	N
11.73593	33.49	60.00	26.51	N
26.15781	37.13	60.00	22.87	N

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -
0.15	26.53	56.00	29.47	N
0.52109	30.85	46.00	15.15	N
1.04843	31.07	46.00	14.93	N
2.45468	38.39	46.00	7.61	N
11.73593	24.09	50.00	25.91	N
26.15781	24.82	50.00	25.18	N

3. Main Test Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Valid Period
01	BT Base Station Simulator	CBT	R&S	100271	2012-06-30	One year
02	EMI Test Receiver	ESCS30	R&S	100138	2013-01-15	One year
03	LISN	ENV216	R&S	101171	2010-04-16	Three years
04	EMI Test Receiver	ESCI	R&S	100948	2012-06-30	One year
05	TRILOG Broadband Antenna	VULB 9163	Schwarzbeck	9163-201	2010-06-20	Three years
06	Double Ridged Waveguide Horn Antenna	HF907	R&S	100126	2012-07-02	Three years
07	PSG Analog Signal Generator	E8257D	Agilent	MY49281101	2012-06-30	One year
08	ESG Vector Signal Generator	E4438C	Agilent	MY49070900	2012-06-30	One year
09	Spectrum Analyzer	E4445A	Agilent	MY46181146	2012-06-30	One year
10	Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
11	MOB COMMS DC SUPPLY	66319D	Agilent	MY43004105	2012-06-30	One year
12	Power Sensor	E9304A	Agilent	MY50220022	2012-06-30	One year
13	Power Meter	E4418B	Agilent	MY50000623	2012-06-30	One year
14	Vibration table	ESS-050-120	dongling	D1007126	2010-08-23	Three years
15	Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2012-06-30	One year

*******END OF REPORT BODY*******