Product Service

FCC - TEST REPORT

Report Number	:	**708881503690-00**	Date of Issue:	April 12, 2016

Model	:	U3
Product Type	:	BCT-GLASS
Applicant	:	Suzhou YOKO BCT Electronic Corporation
Address	:	P-48, No.666 Jianlin Road, High tech Zone, Suzhou Jiangsu, People's Republic of China
Production Facility	:	Suzhou YOKO BCT Electronic Corporation
Address	:	P-48, No.666 Jianlin Road, High tech Zone, Suzhou Jiangsu, People's Republic of China

Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	80

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1 Table of Contents

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	MRT Technology (Suzhou) Co., Ltd
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration Number:	809388
Telephone:	+86-512-66308358
Fax:	+86-512-66308368

Test Site 2

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.16 Lane, 1951 Du Hui Road, Shanghai 201108, P.R. China
FCC Registration Number:	904822
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3 Description of the Equipment Under Test

Product:	BCT-GLASS
Model no.:	U3
FCC ID:	2AG8AYKU3A
Options and accessories:	
Rating:	5V, 150mA DC battery
RF Transmission Frequency:	2402~2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, π/4DQPSK,8DPSK
Duty Cycle:	less than 100%
Antenna Type:	PCB
Antenna Gain:	0dBi
Description of the EUT:	Bluetooth Headset

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2013).

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C,				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	12	Site 1	Pass
§15.247(b)(1)	Conducted peak output power	15	Site 1	Pass
§15.247(a)(2)	6dB bandwidth	---	---	N/A
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	22	Site 1	Pass
§15.247(a)(1)	Carrier frequency separation	29	Site 1	Pass
§15.247(a)(1)(iii)	Number of hopping frequencies	36	Site 1	Pass
§15.247(a)(1)(iii)	Dwell Time	40	Site 1	Pass
§15.247(e)	Power spectral density*	---	---	N/A
§15.247(d)	Spurious RF conducted emissions	45	Site 1	Pass
§15.247(d)	Band edge	48	Site 1	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	68	Site 1	Pass
§15.203	Antenna requirement	See note 1		Pass

Remark 1: N/A=Not Applicable.
Note 2: The EUT uses a permanently PCB Antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AG8AYKU3A complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules .

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: November 18, 2015

Testing Start Date: December 19, 2015

Testing End Date: January 28, 2016

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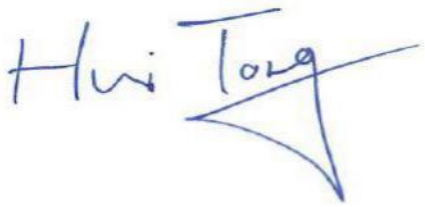
Reviewed by:



_____

Hui TONG
Review Engineer

Prepared by:

_____

Wenwen CHEN
Project Engineer

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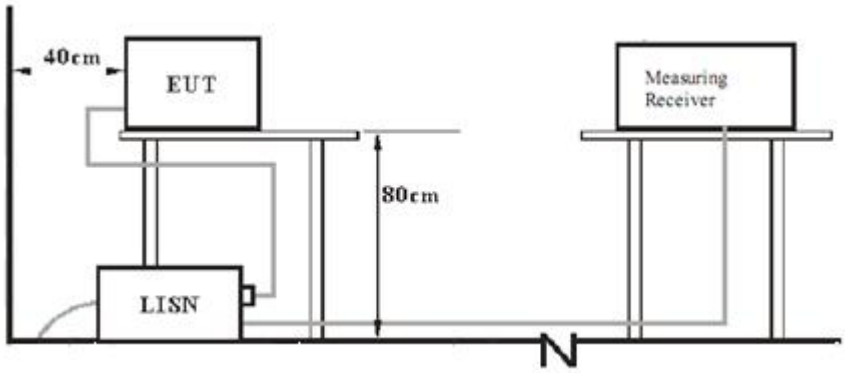
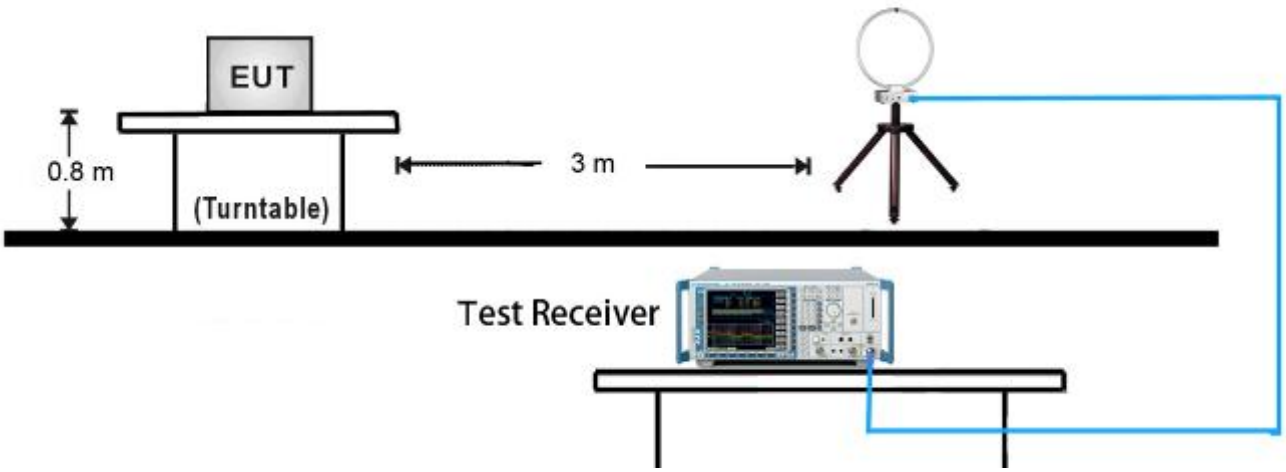
7 Test Setups

7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



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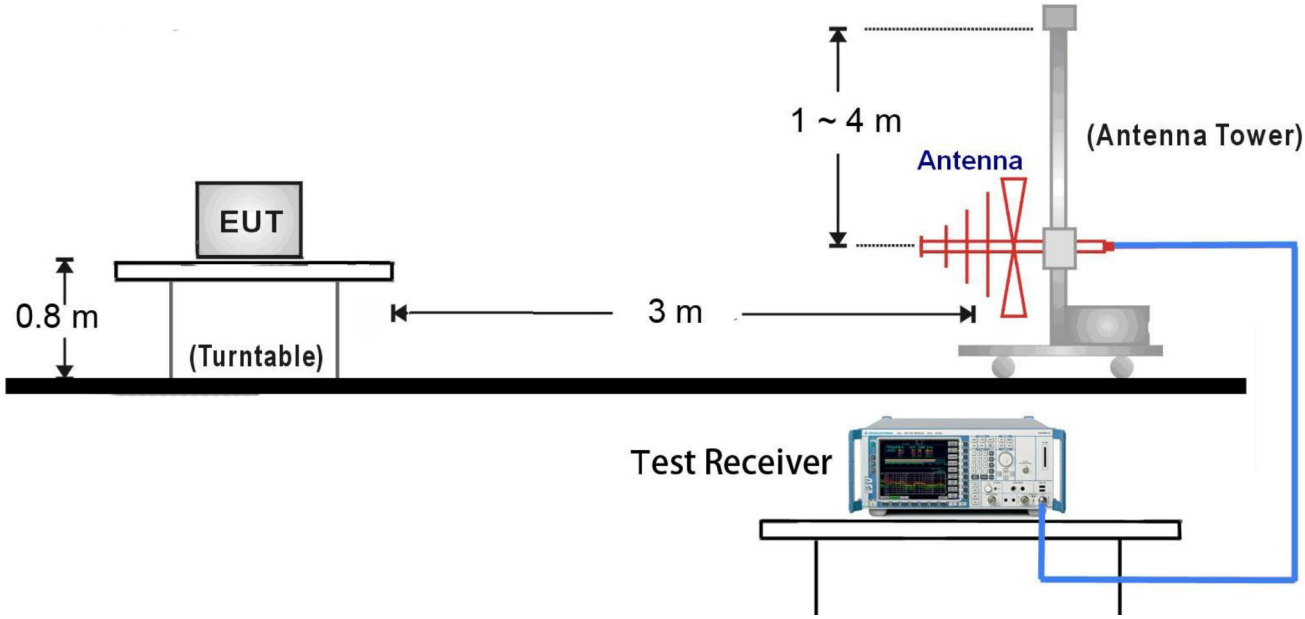
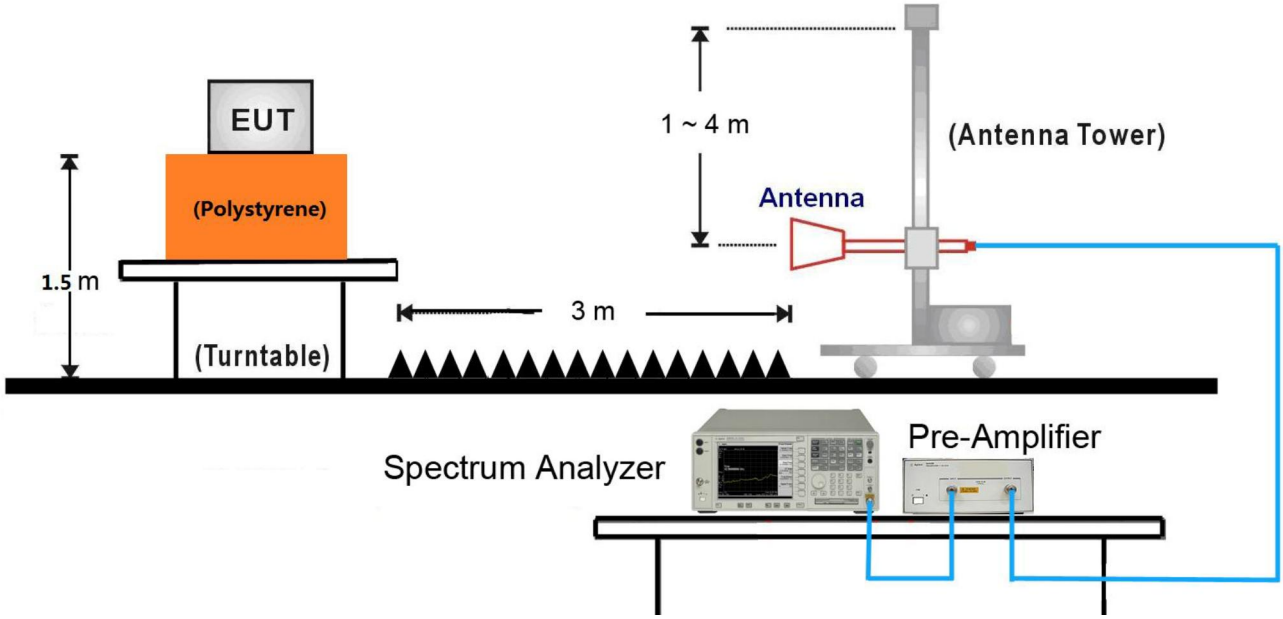
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



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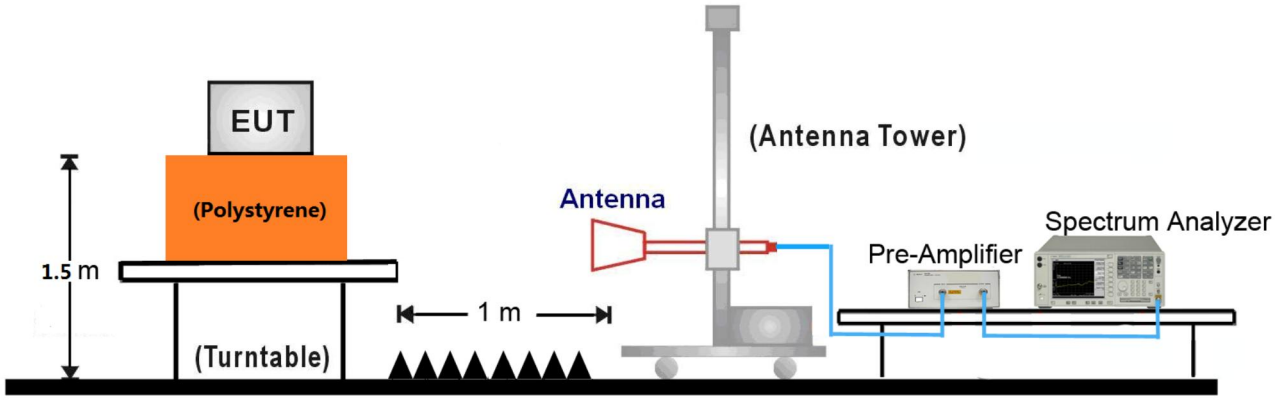
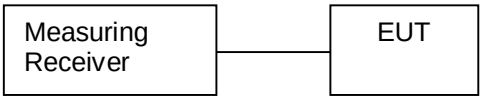
18GHz ~25GHz Test Setup:



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Laptop	Lenovo	X230	---

Test software: BlueTest 3, which used to control the EUT in continues transmitting mode

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

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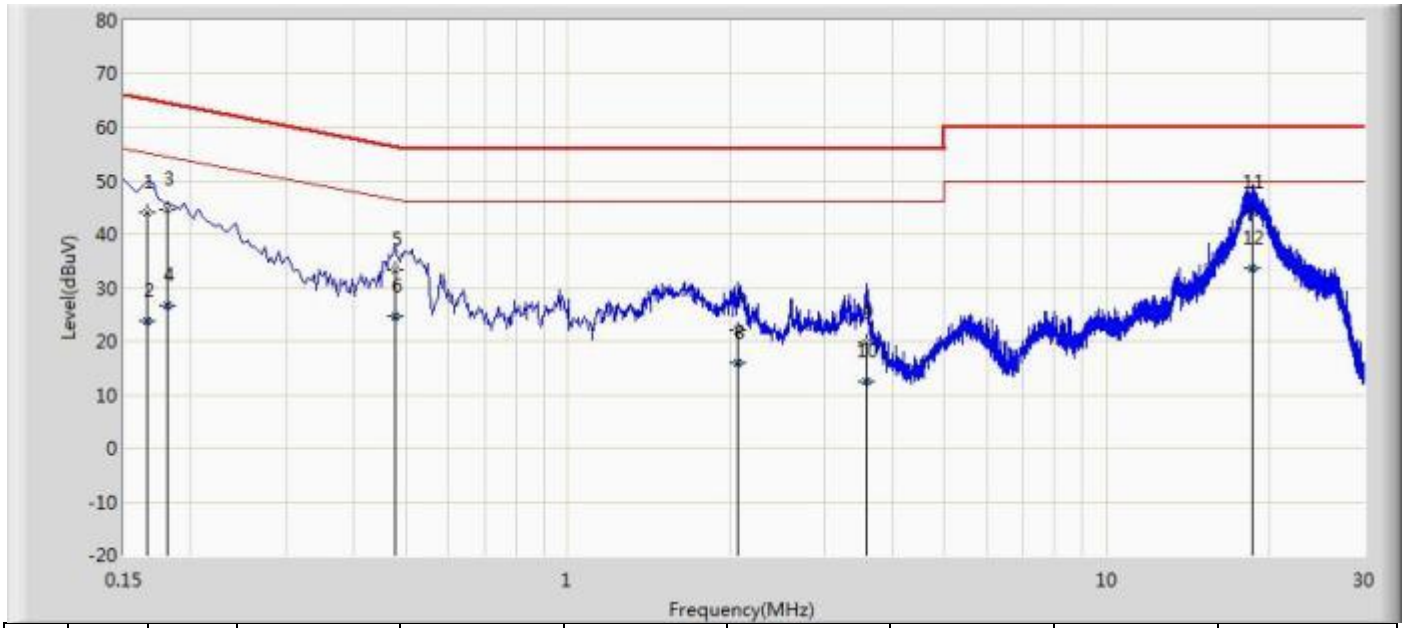
Product Service

Product Type :BCT-GLASS
M/N :U3
Operating Condition : Transmit at channel 2402MHz by 2DH5(worst case mode)
Test Specification : FCC_Part15.207_CE_AC Power
Comment : AC 120V/60Hz, Line



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.166	43.924	33.837	-21.234	65.158	10.087	QP
2			0.166	23.846	13.758	-31.313	55.158	10.087	AV
3			0.180	44.753	34.700	-19.732	64.486	10.053	QP
4			0.180	26.553	16.500	-27.932	54.486	10.053	AV
5			0.478	33.195	23.047	-23.179	56.374	10.149	QP
6			0.478	24.622	14.473	-21.752	46.374	10.149	AV
7			2.066	21.992	12.122	-34.008	56.000	9.869	QP
8			2.066	15.932	6.063	-30.068	46.000	9.869	AV
9			3.590	19.762	9.846	-36.238	56.000	9.917	QP
10			3.590	12.496	2.580	-33.504	46.000	9.917	AV
11		*	18.650	44.171	34.055	-15.829	60.000	10.116	QP
12			18.650	33.733	23.617	-16.267	50.000	10.116	AV

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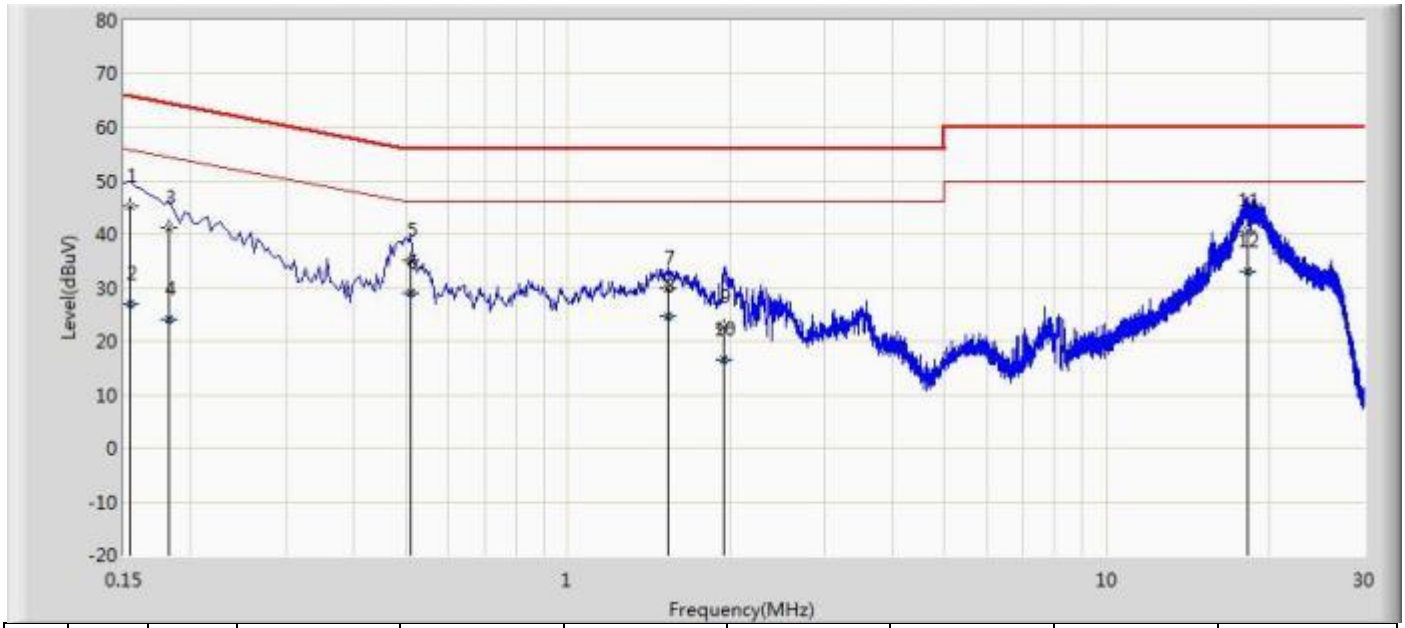
Product Service

Product Type :BCT-GLASS
M/N :U3
Operating Condition : Transmit at channel 2402MHz by 2DH5(worse case mode)
Test Specification : FCC_Part15.207_CE_AC Power
Comment : AC 120V/60Hz, Neutral



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.154	45.307	34.591	-20.474	65.781	10.716	QP
2			0.154	26.962	16.246	-28.819	55.781	10.716	AV
3			0.182	41.072	31.030	-23.322	64.394	10.042	QP
4			0.182	24.019	13.977	-30.375	54.394	10.042	AV
5			0.510	35.091	24.915	-20.909	56.000	10.176	QP
6			0.510	29.063	18.887	-16.937	46.000	10.176	AV
7			1.534	29.901	20.013	-26.099	56.000	9.888	QP
8			1.534	24.650	14.761	-21.350	46.000	9.888	AV
9			1.946	22.578	12.703	-33.422	56.000	9.875	QP
10			1.946	16.389	6.513	-29.611	46.000	9.875	AV
11			18.266	40.519	30.381	-19.481	60.000	10.138	QP
12		*	18.266	33.082	22.944	-16.918	50.000	10.138	AV

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

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Conducted peak output power

1DH5

Frequency	Conducted Peak Output Power	Result
MHz	**dBm**	
Low channel 2402MHz	-1.761	Pass
Middle channel 2441MHz	0.381	Pass
High channel 2480MHz	0.244	Pass

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2DH5

Frequency	Conducted Peak Output Power	Result
MHz	**dBm**	
Low channel 2402MHz	-4.03	Pass
Middle channel 2441MHz	-1.795	Pass
High channel 2480MHz	-1.395	Pass

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3DH5

Frequency **MHz**	Conducted Peak Output Power **dBm**	Result
Low channel 2402MHz	-3.646	Pass
Middle channel 2441MHz	-1.357	Pass
High channel 2480MHz	-1.031	Pass

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9.3 20 dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]
N/A

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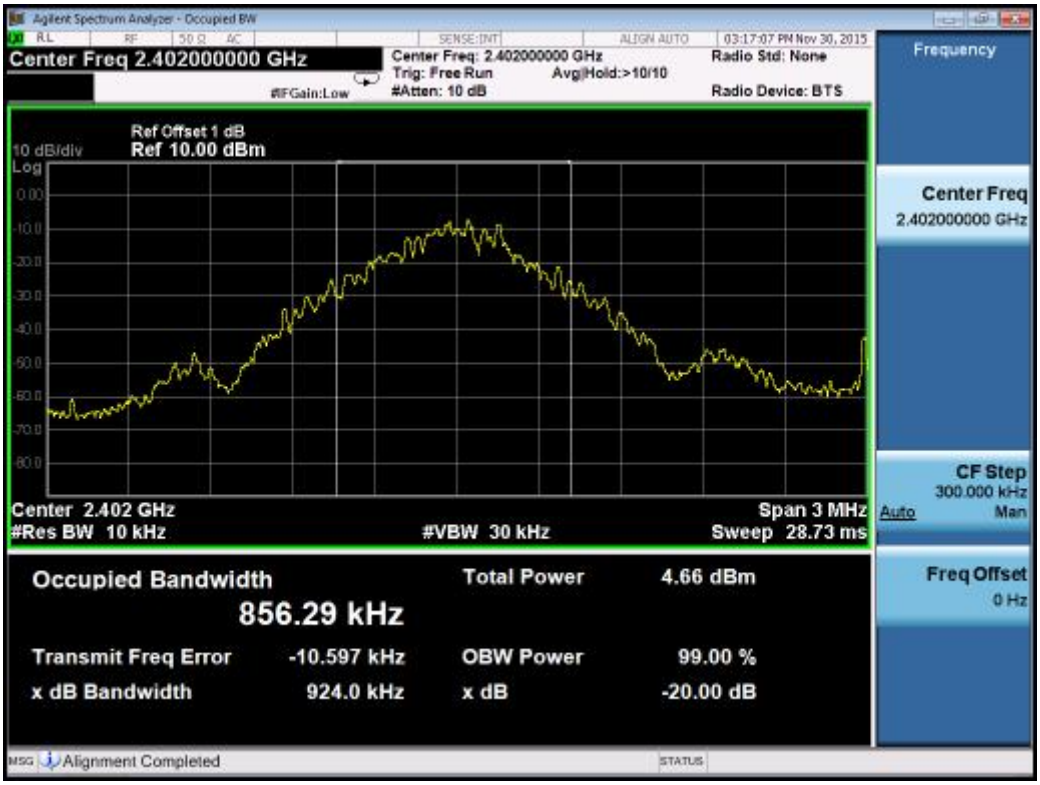
20 dB bandwidth and 99% Occupied Bandwidth

1DH5

Frequency MHz	20dB bandwidth kHz	**99% Bandwidth kHz**	Result
Top channel 2402MHz	924	856.29	Pass
Middle channel 2441MHz	701.4	810.56	Pass
Bottom channel 2480MHz	923.6	860.99	Pass



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20 dB bandwidth and 99% Occupied Bandwidth

2DH5

Frequency MHz	20dB bandwidth kHz	**99% Bandwidth kHz**	Result
Top channel 2402MHz	1247	1171.7	Pass
Middle channel 2441MHz	1235	1165.2	Pass
Bottom channel 2480MHz	1235	1166.5	Pass

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20 dB bandwidth and 99% Occupied Bandwidth

3DH5

Frequency MHz	20dB bandwidth kHz	**99% Bandwidth kHz**	Result
Top channel 2402MHz	1249	1158.1	Pass
Middle channel 2441MHz	1252	1159.9	Pass
Bottom channel 2480MHz	1252	1162.6	Pass

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9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
≥25KHz or 2/3 of the 20 dB bandwidth which is greater

1DH5

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	616
2441	467.6
2480	615.7

2DH5

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	831.33
2441	823.33
2480	823.33

3DH5

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	832.67
2441	834.67
2480	834.67

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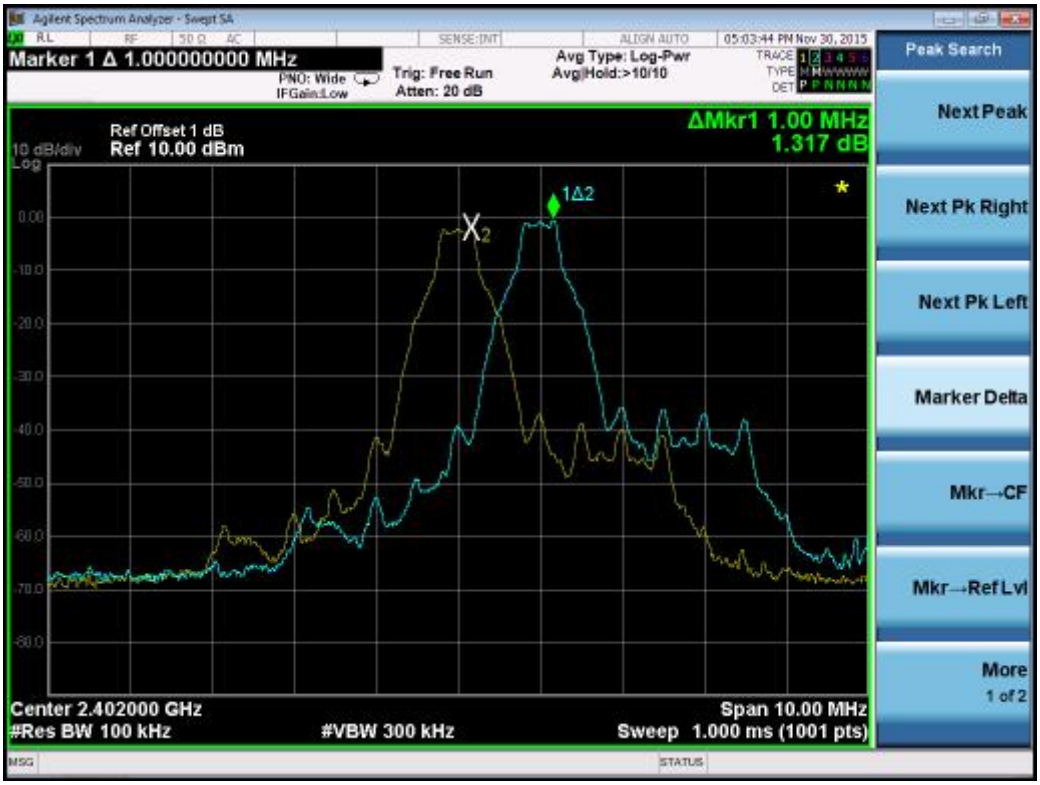
Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here GFSK modulation mode was used to show compliance.

1DH5 test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1000	Pass
2441	1000	Pass
2480	1000	Pass



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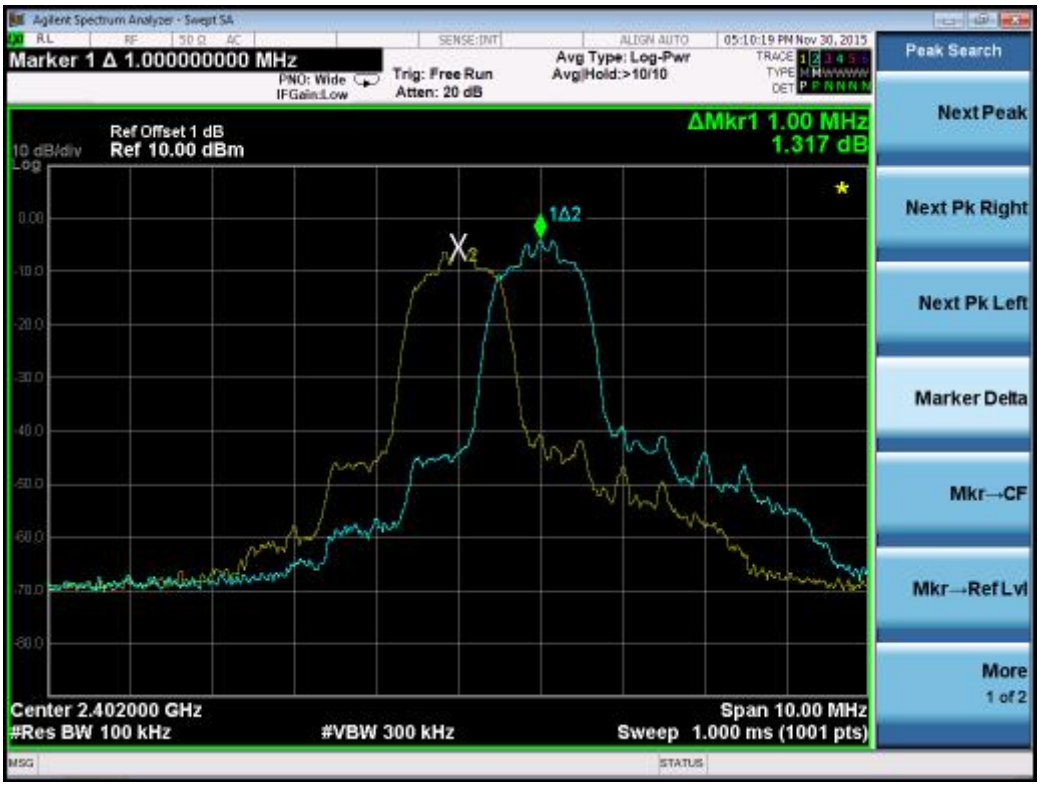
2DH5 test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1000	Pass
2441	1000	Pass
2480	1000	Pass



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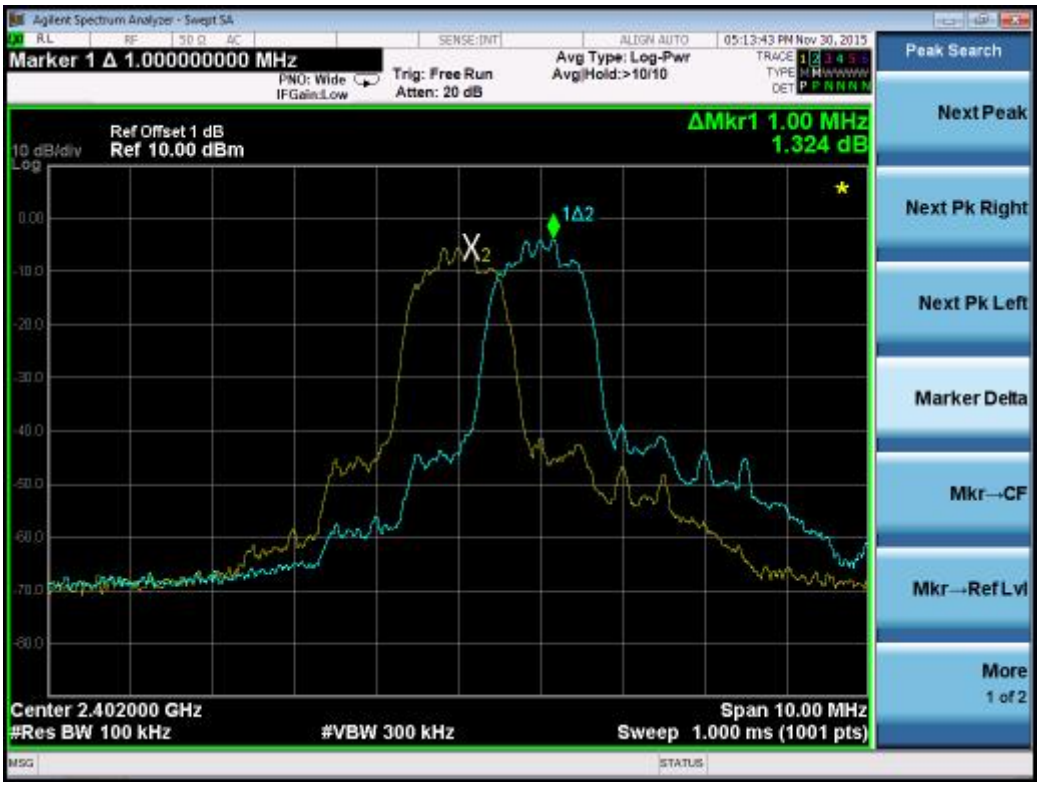
3DH5 test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1000	Pass
2441	1000	Pass
2480	1000	Pass



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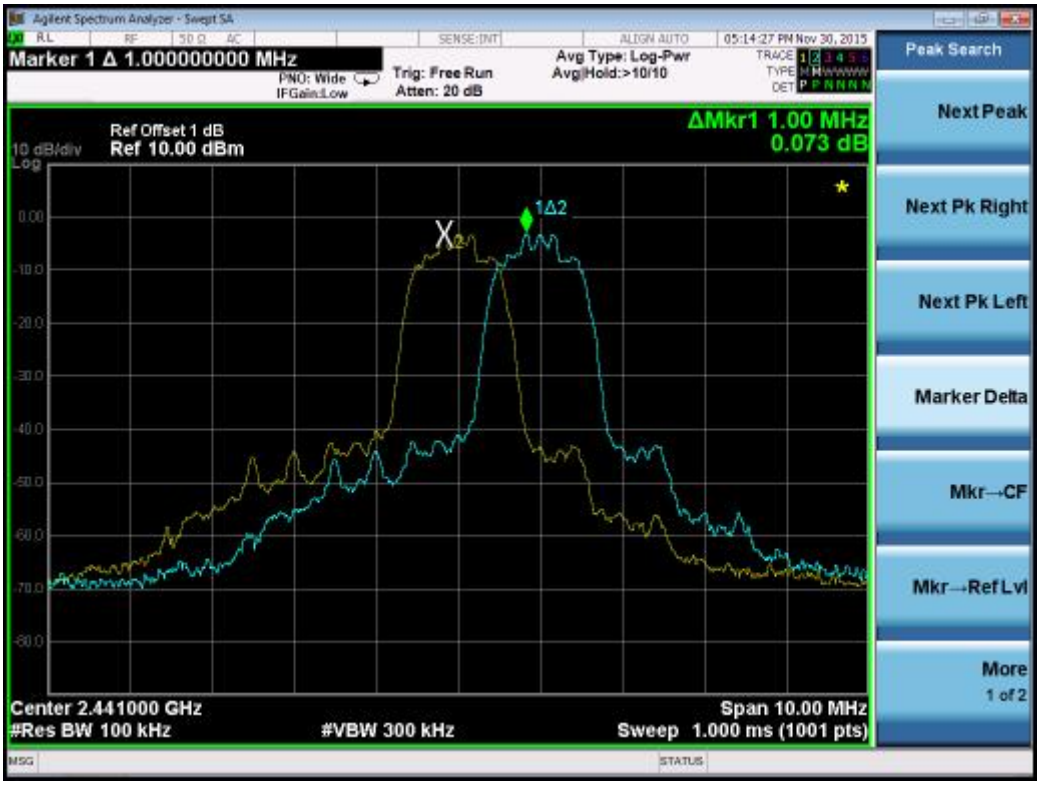
Product Service



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Product Service

9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
≥ 15

Product Service

Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
79	Pass

1DH5 test result

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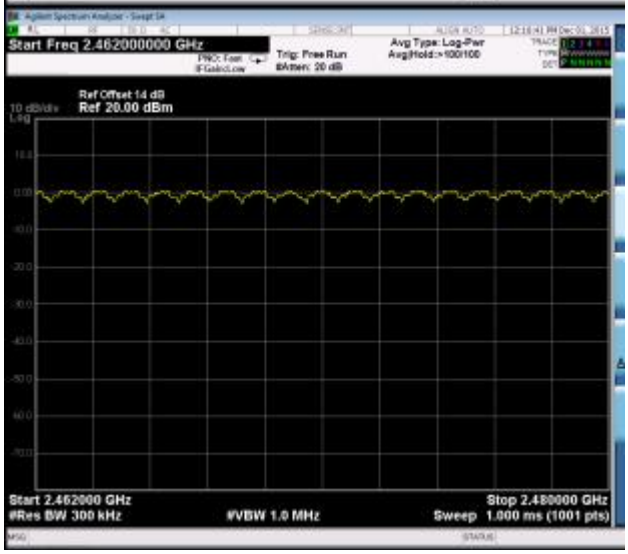
Product Service

2DH5 test result



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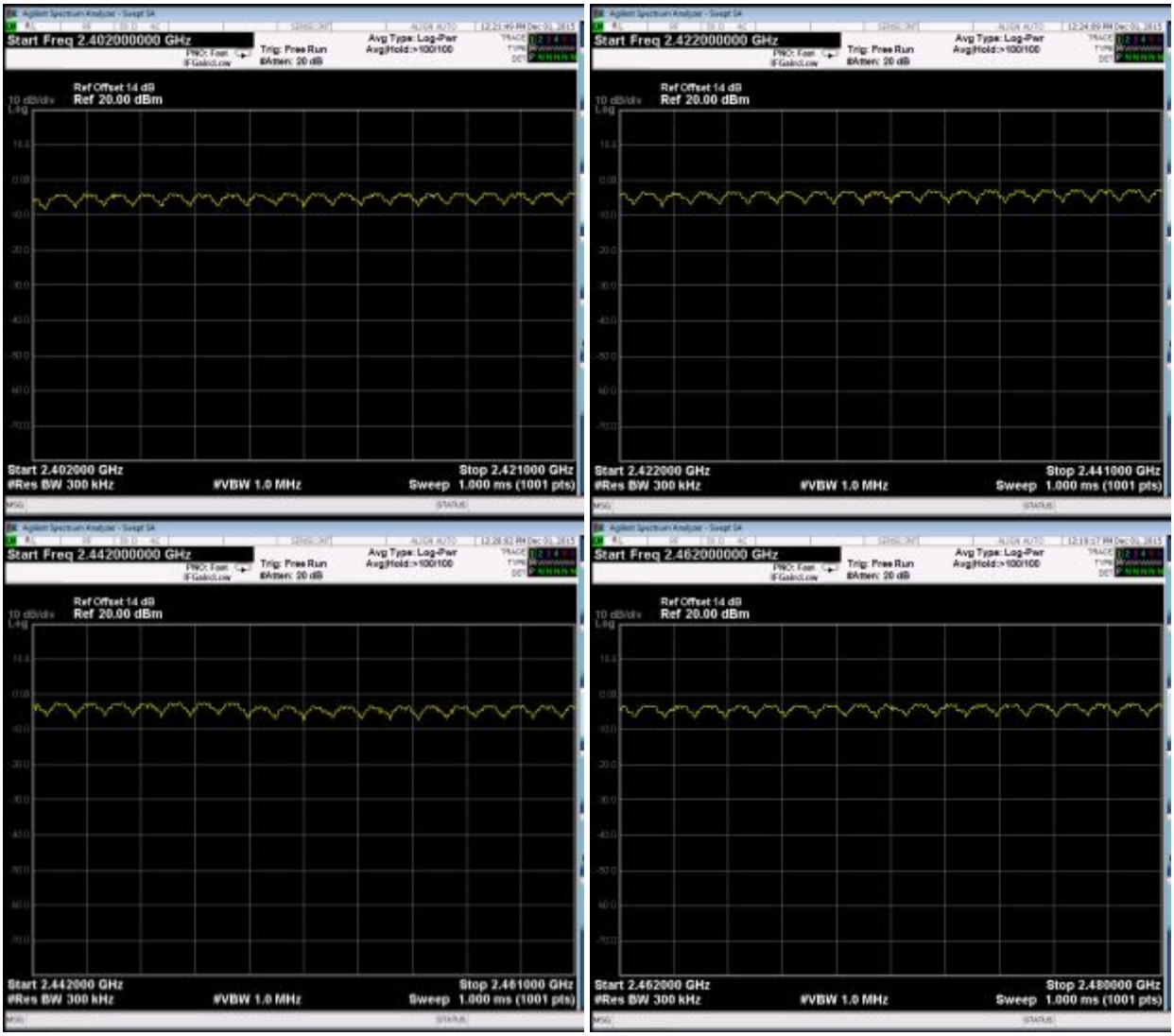
Product Service

3DH5 test result



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Product Service

9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable. Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

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Product Service

Dwell Time

Dwell time

The maximum dwell time shall be 0,4 s.
According to the Bluetooth Core Specification, the worse result (DH5 mode) was reported to show compliance.

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in 31.6s for DH5=1600 / 6 / 79 *31.6=106.67

Test Result

Modulation	Mode	Reading (µs)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	DH5	390	106.67	41.601	< 400	Pass
π/4-DQPSK	2DH5	1640	106.67	174.94	< 400	Pass
8-DPSK	3DH5	2880	106.67	307.21	< 400	Pass

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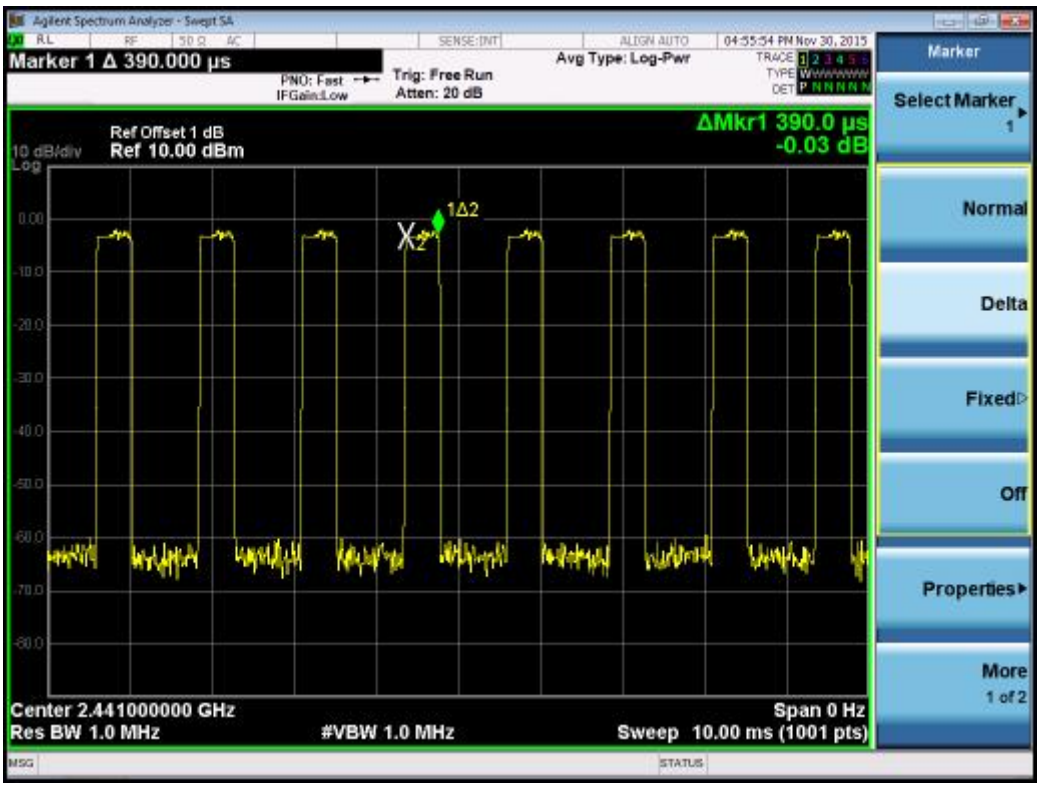
Product Service

3DH1



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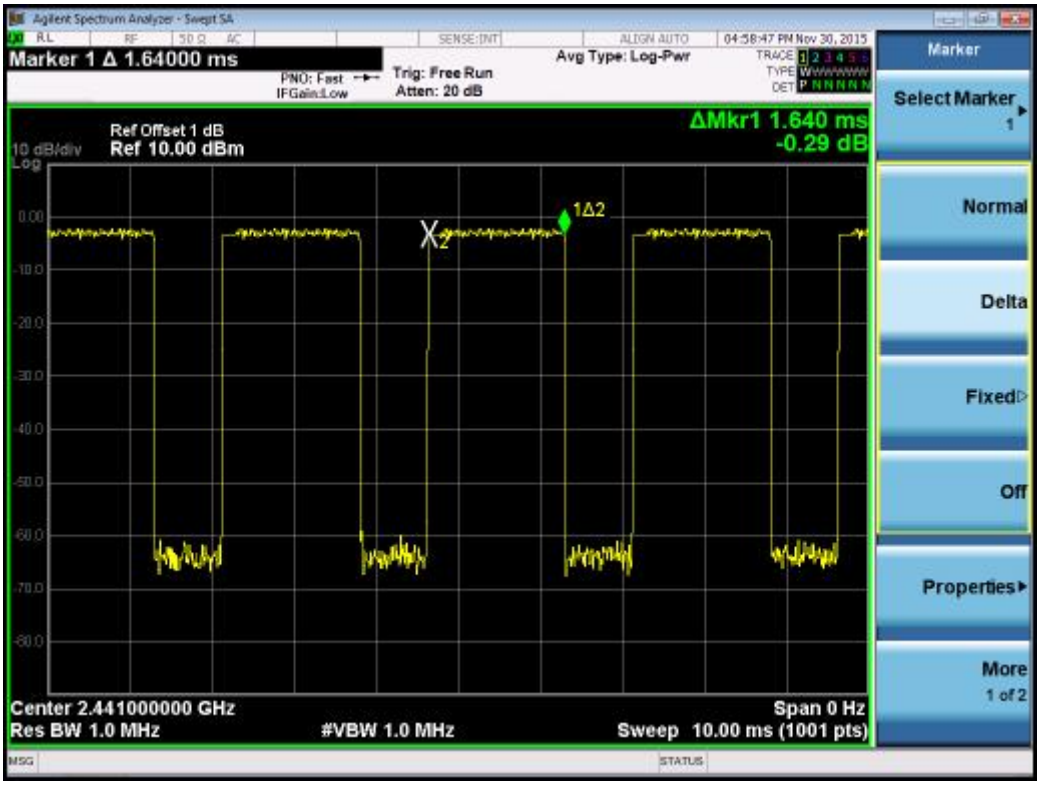
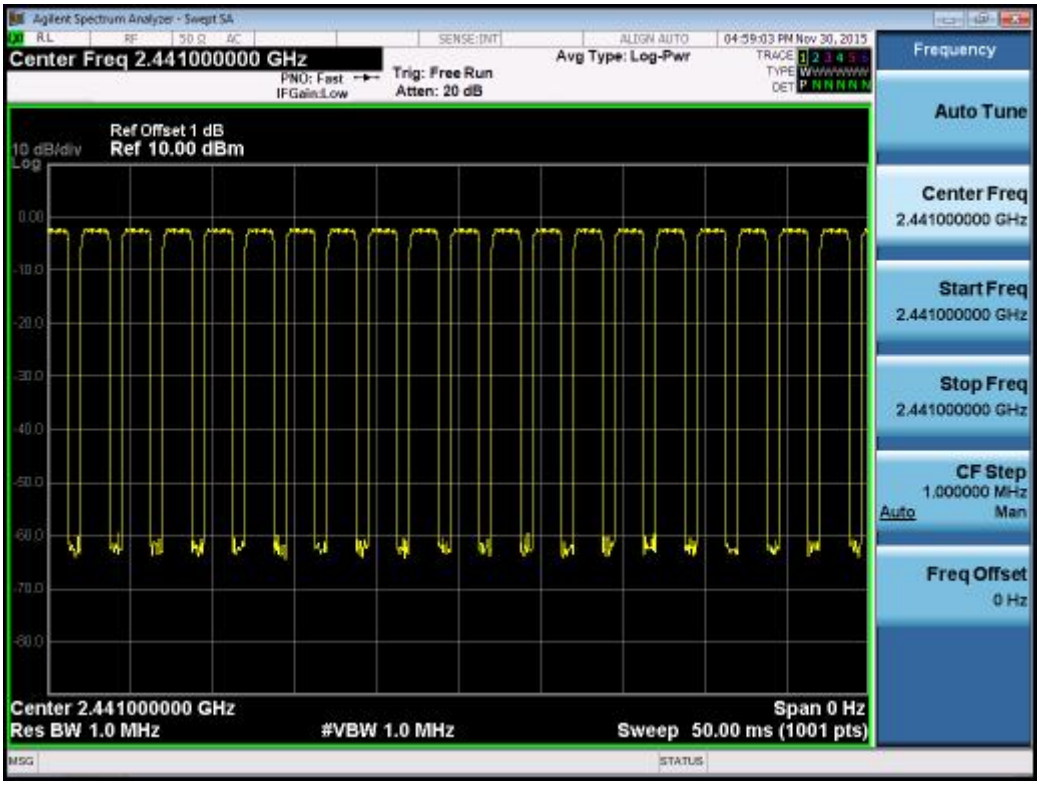
Product Service

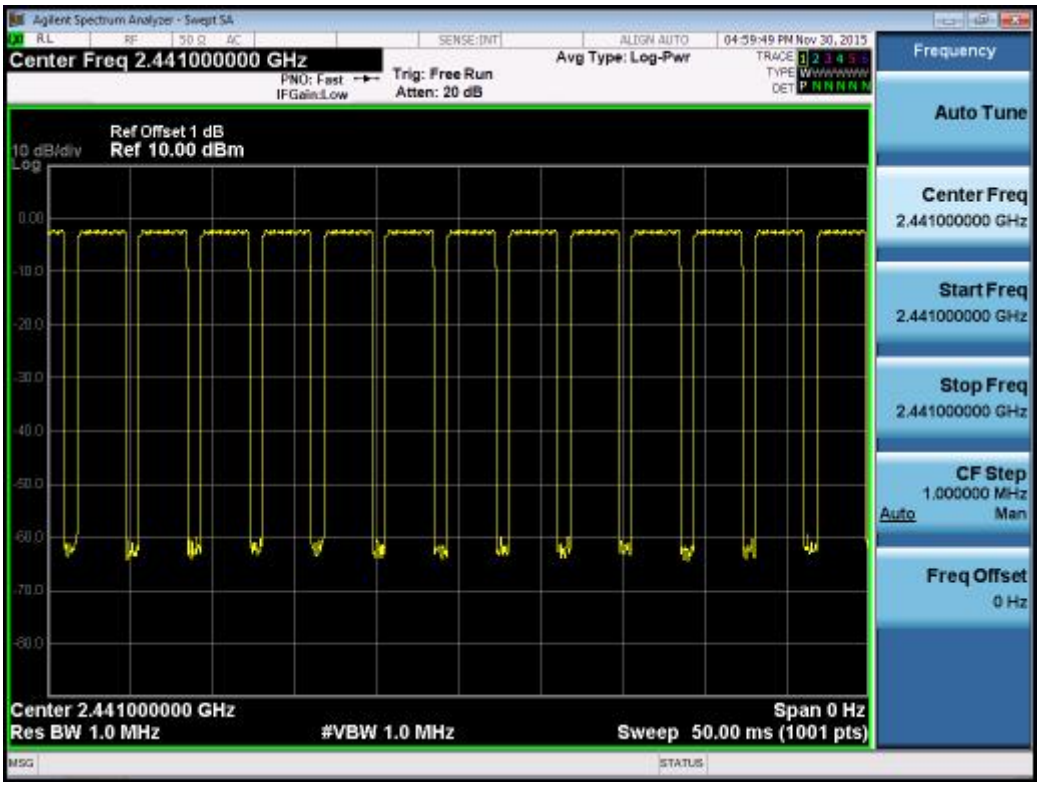
3DH3





Product Service

3DH5



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Product Service

9.7 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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Product Service

Spurious RF conducted emissions

Only the worse case (which is subject to the maximum EIRP, 1DH5 mode) test result is listed in the report.

2402MHz

2441MHz

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Product Service

2480MHz

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Product Service

9.8 Band edge testing

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section. .
4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

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 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

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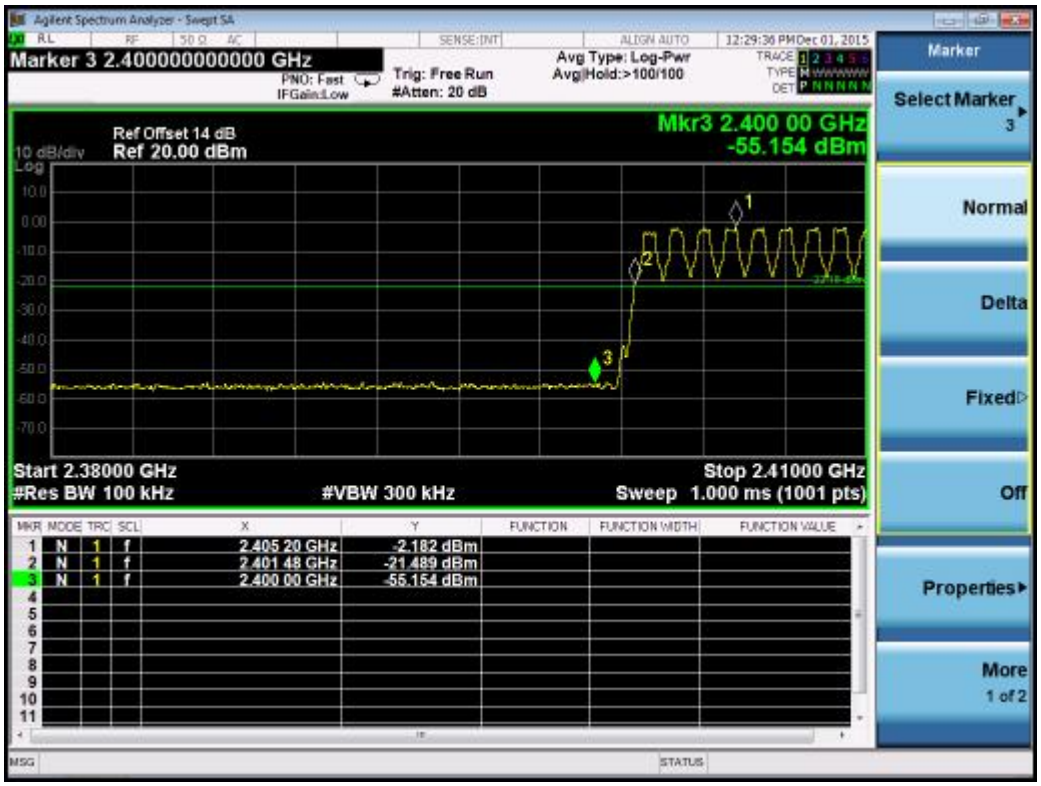
Product Service

Band edge testing

1DH5



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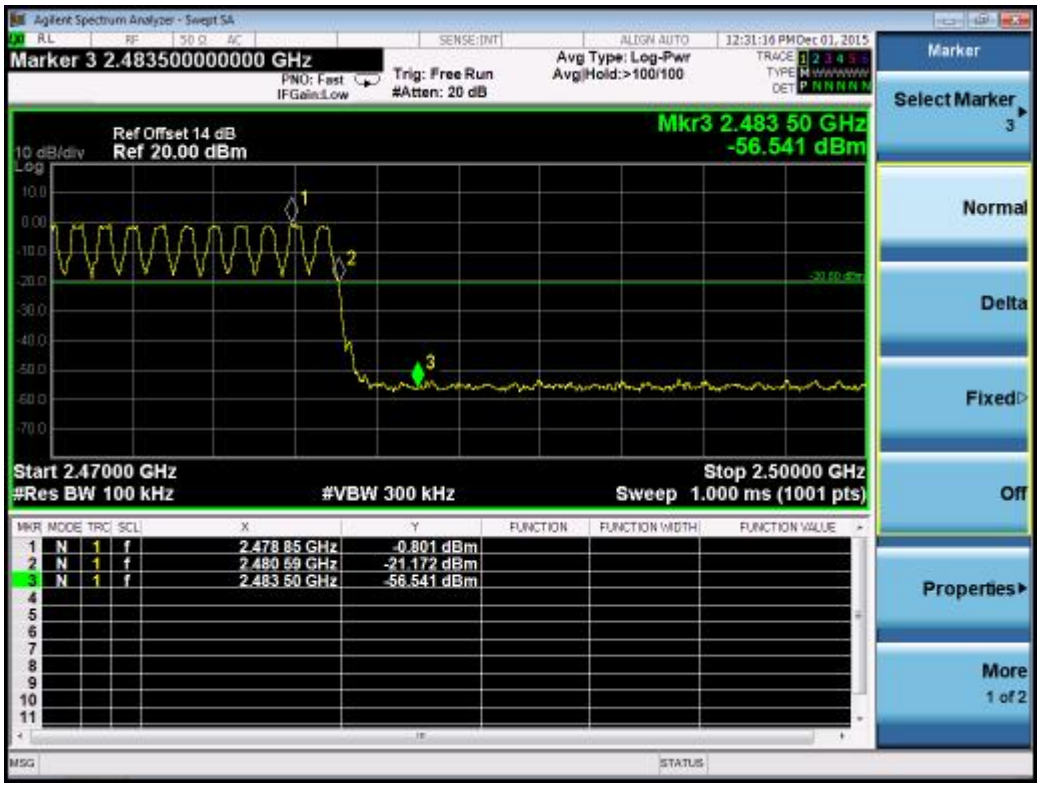
Product Service



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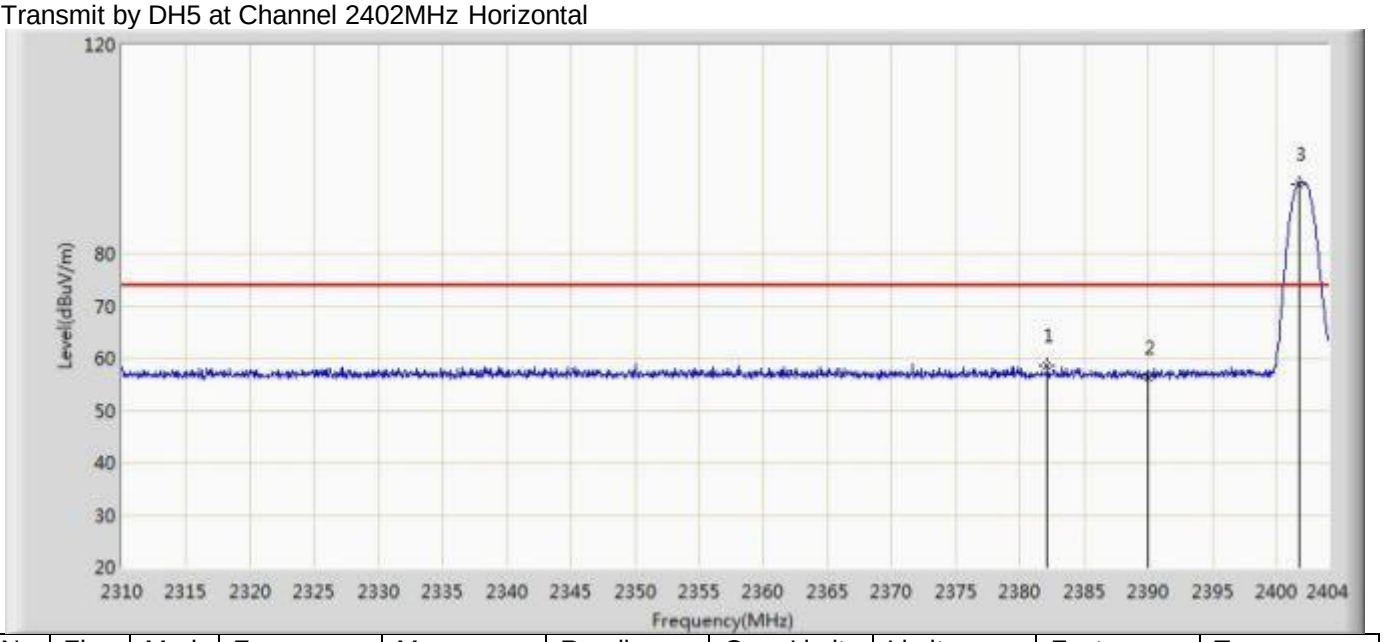
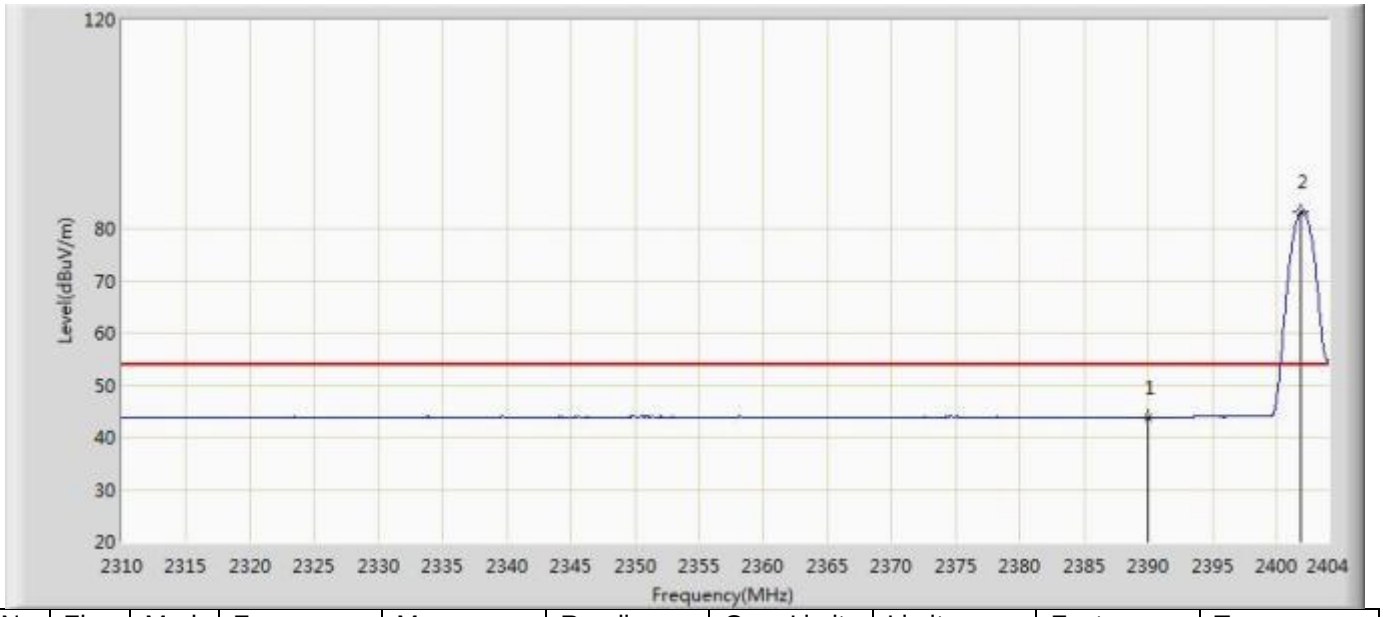
Transmit by DH5 at Channel 2402MHz Horizontal



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2382.098	58.678	27.461	-15.322	74.000	31.217	PK
2			2390.000	56.351	25.148	-17.649	74.000	31.203	PK
3		*	2401.744	93.466	62.282	N/A	N/A	31.184	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.883	12.680	-10.117	54.000	31.203	AV
2		*	2401.932	83.234	52.050	N/A	N/A	31.184	AV

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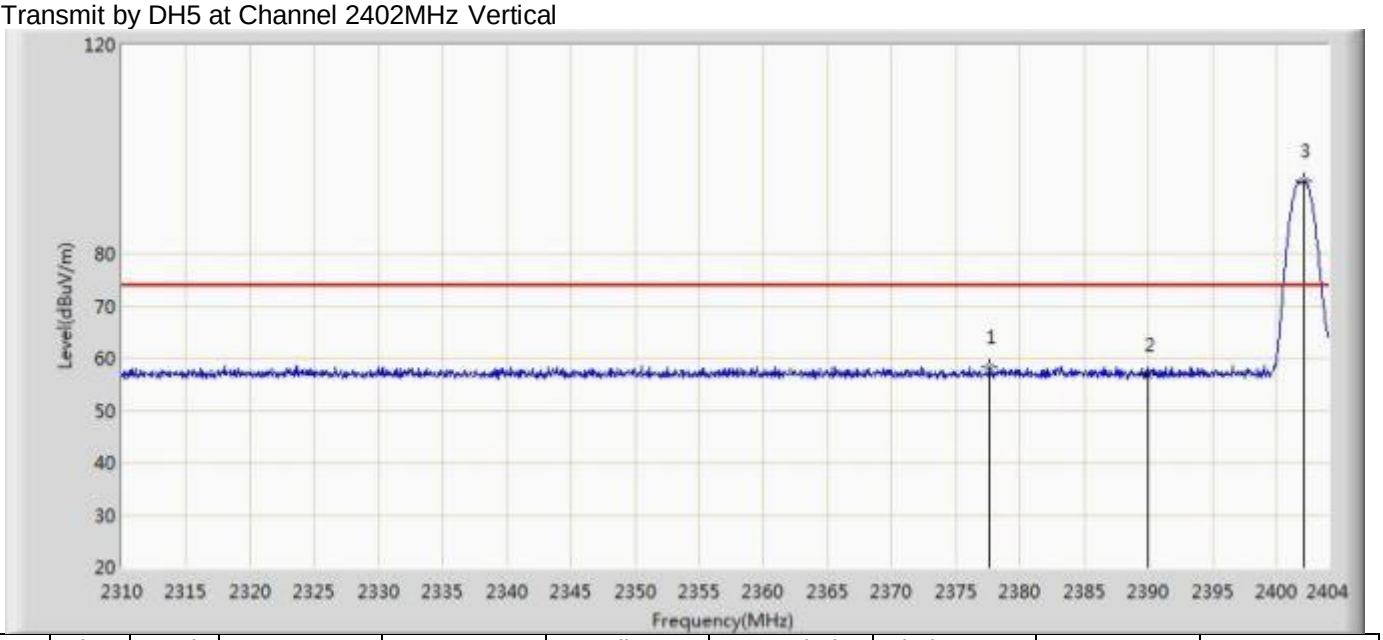
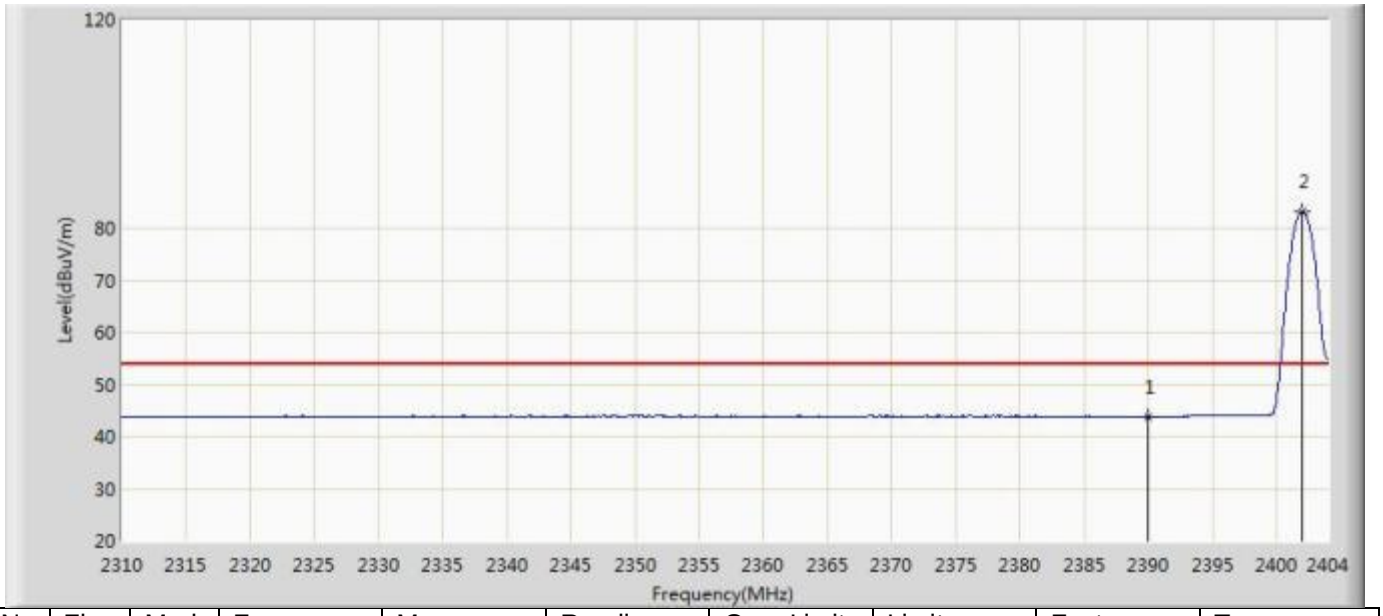
Product Service

Transmit by DH5 at Channel 2402MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2377.633	58.364	27.139	-15.636	74.000	31.225	PK
2			2390.000	56.719	25.516	-17.281	74.000	31.203	PK
3		*	2402.073	93.792	62.608	N/A	N/A	31.184	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.913	12.710	-10.087	54.000	31.203	AV
2		*	2401.979	83.240	52.056	N/A	N/A	31.184	AV

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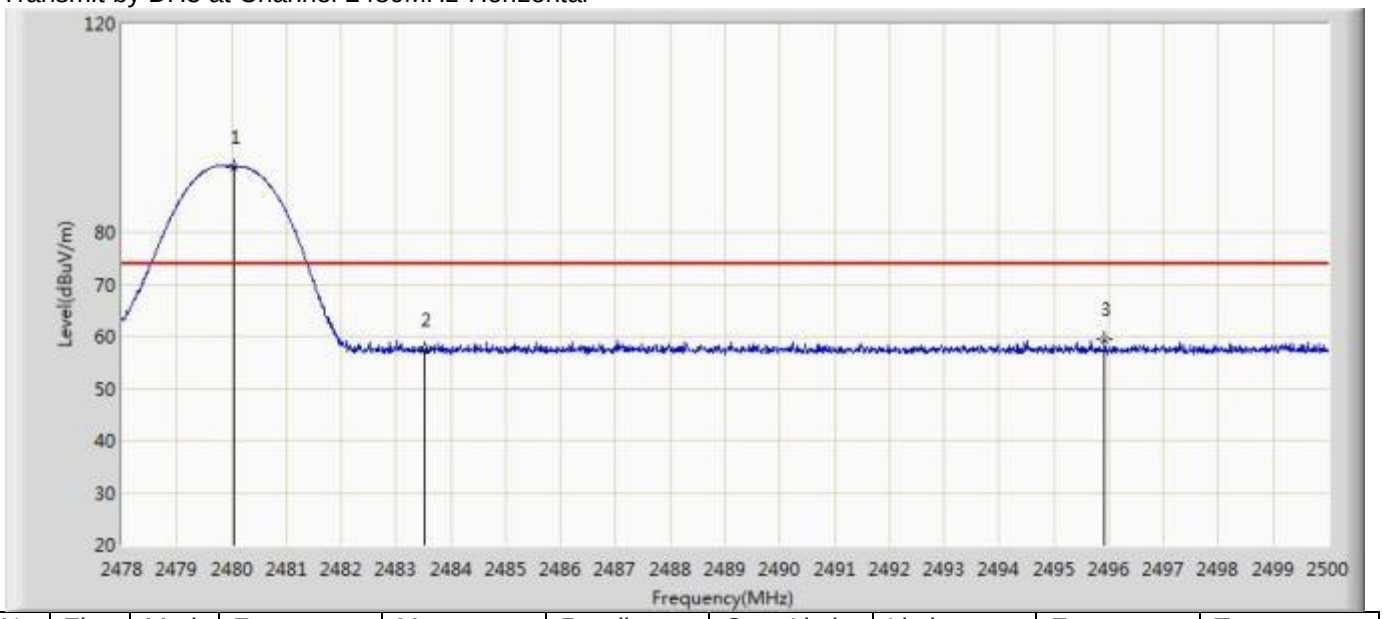
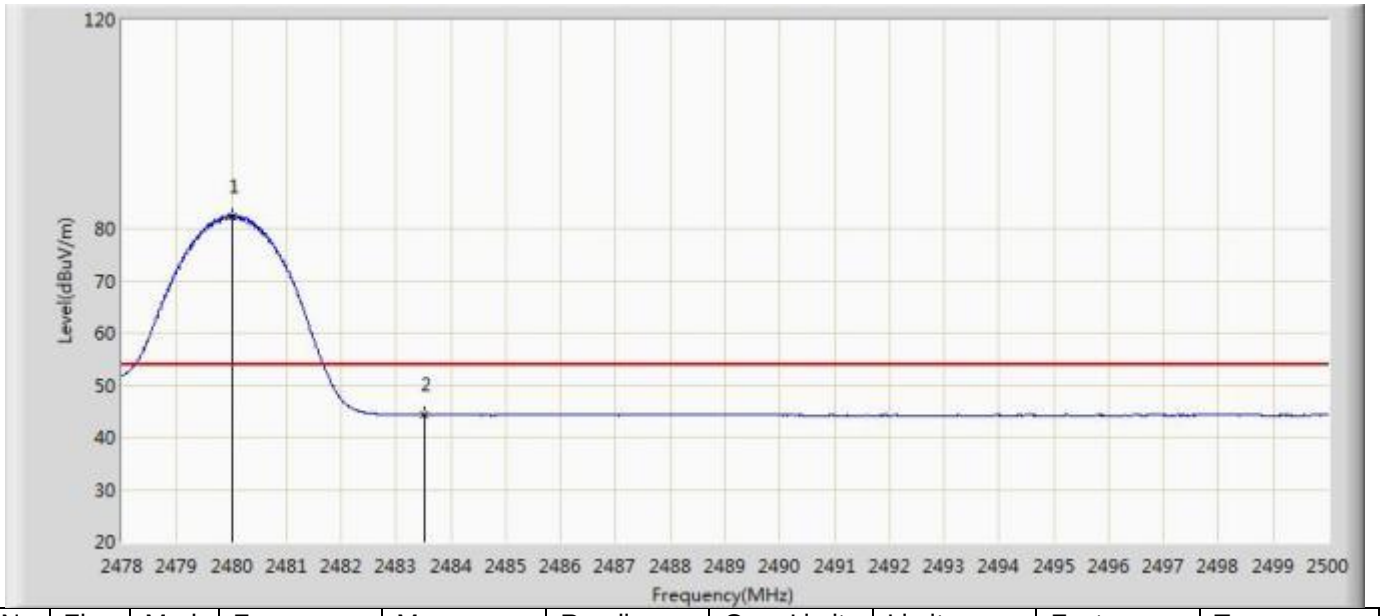
Transmit by DH5 at Channel 2480MHz Horizontal



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	92.586	61.402	N/A	N/A	31.184	PK
2			2483.500	57.273	26.080	-16.727	74.000	31.194	PK
3			2495.930	59.541	28.315	-14.459	74.000	31.226	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.013	82.410	51.226	N/A	N/A	31.184	AV
2			2483.500	44.312	13.119	-9.688	54.000	31.194	AV

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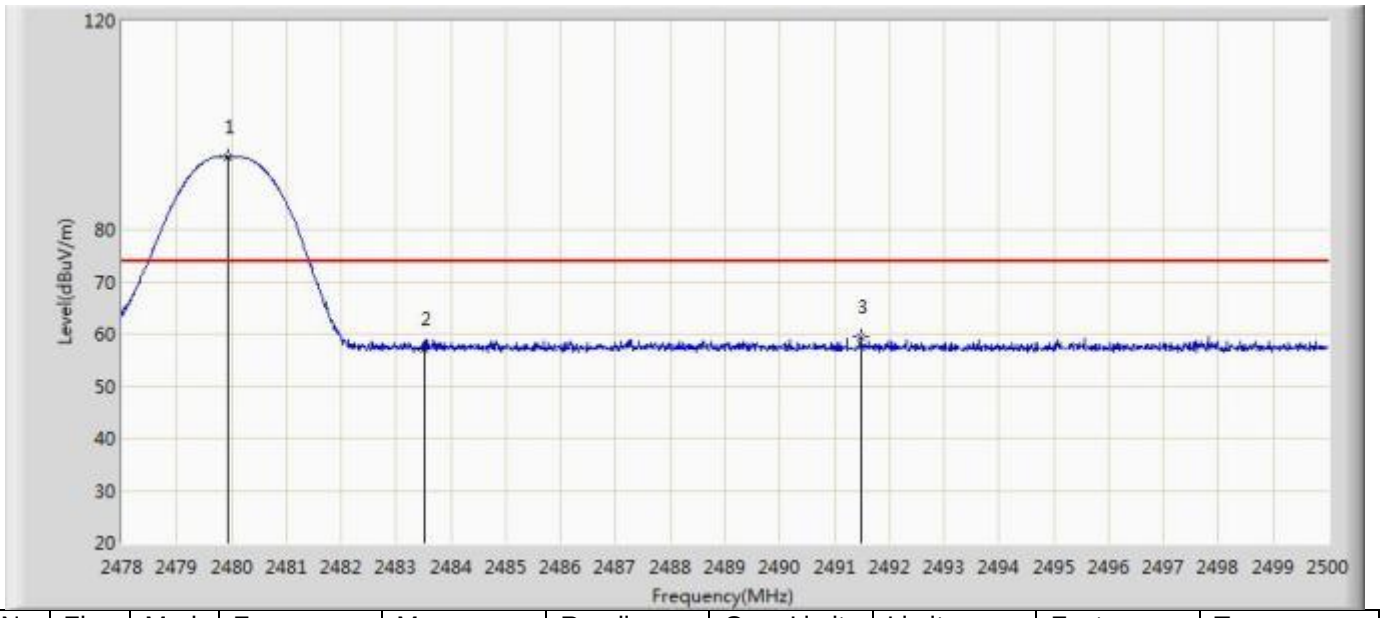
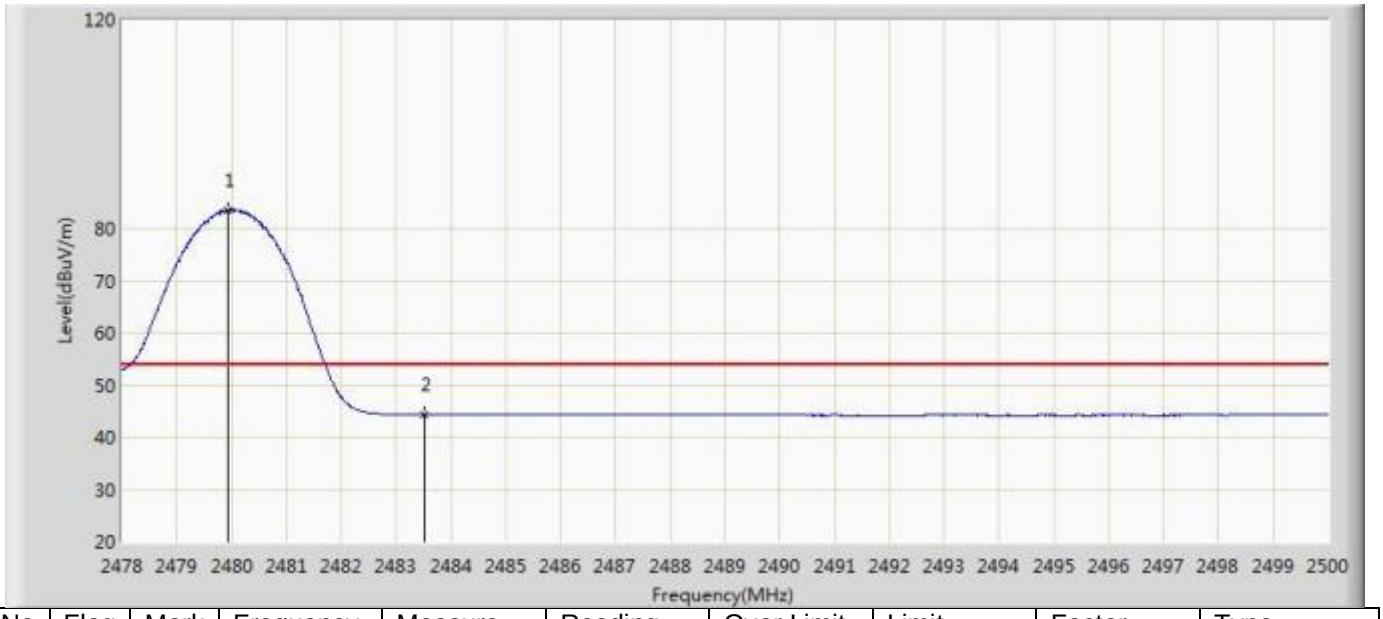
Transmit by DH5 at Channel 2480MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.936	93.954	62.770	N/A	N/A	31.184	PK
2			2483.500	57.054	25.861	-16.946	74.000	31.194	PK
3			2491.475	59.434	28.220	-14.566	74.000	31.214	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.936	83.614	52.430	N/A	N/A	31.184	AV
2			2483.500	44.324	13.131	-9.676	54.000	31.194	AV

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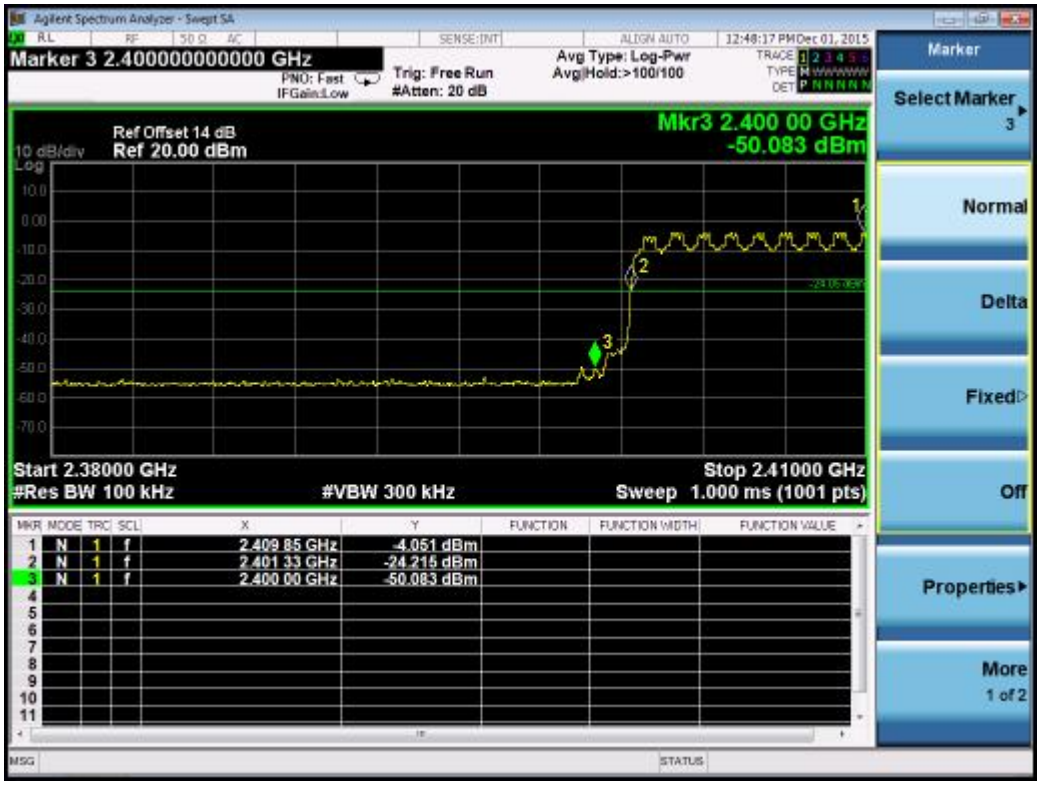
Product Service

2DH5



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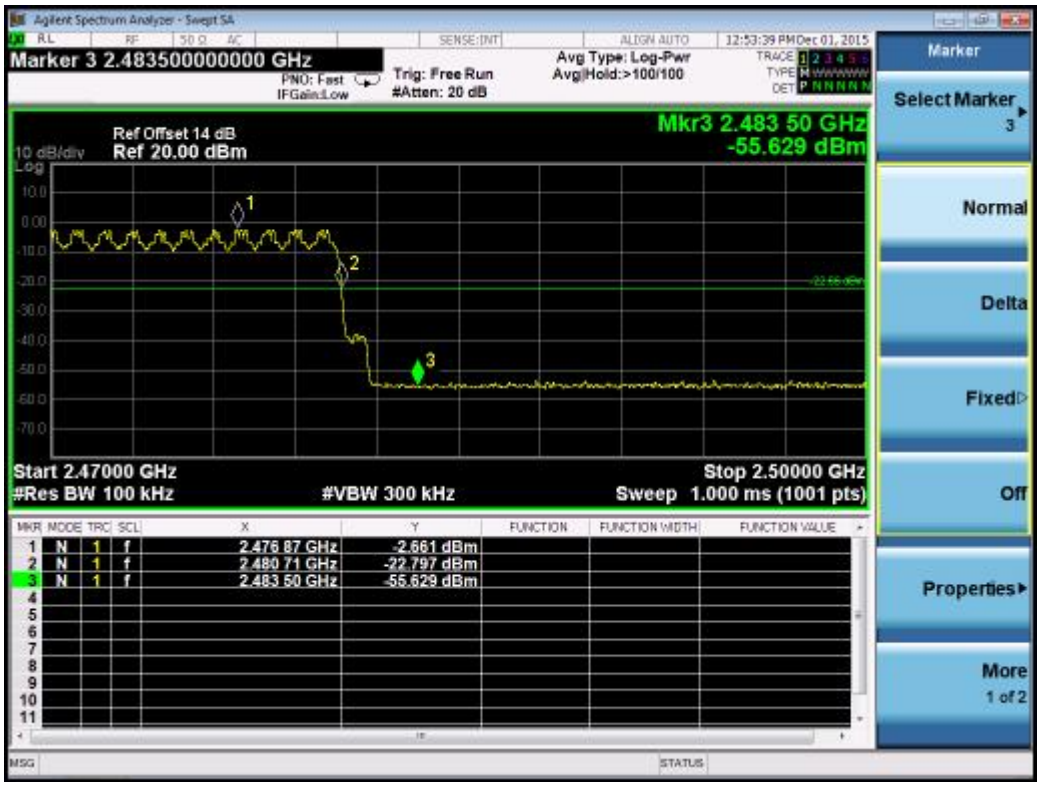
Product Service



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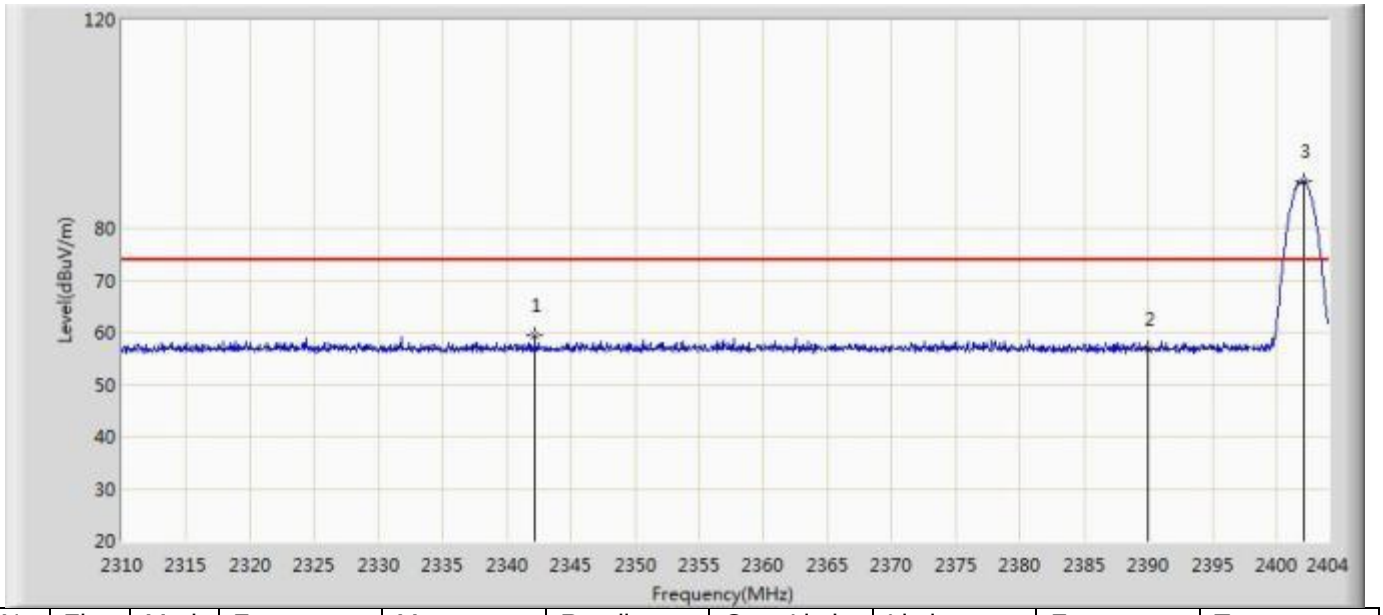
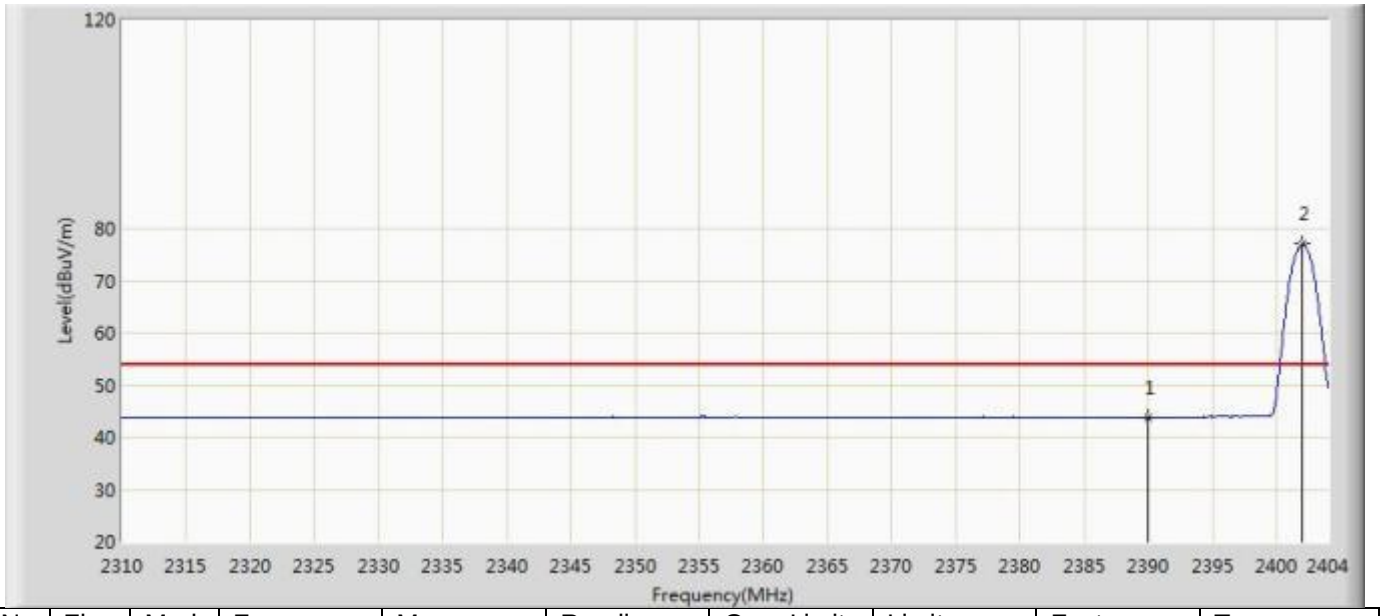
Product Service

Transmit by 2DH5 at Channel 2402MHz Horizontal



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2342.148	59.458	28.136	-14.542	74.000	31.321	PK
2			2390.000	56.758	25.555	-17.242	74.000	31.203	PK
3		*	2402.073	89.031	57.847	N/A	N/A	31.184	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.831	12.628	-10.169	54.000	31.203	AV
2		*	2401.979	76.993	45.809	N/A	N/A	31.184	AV

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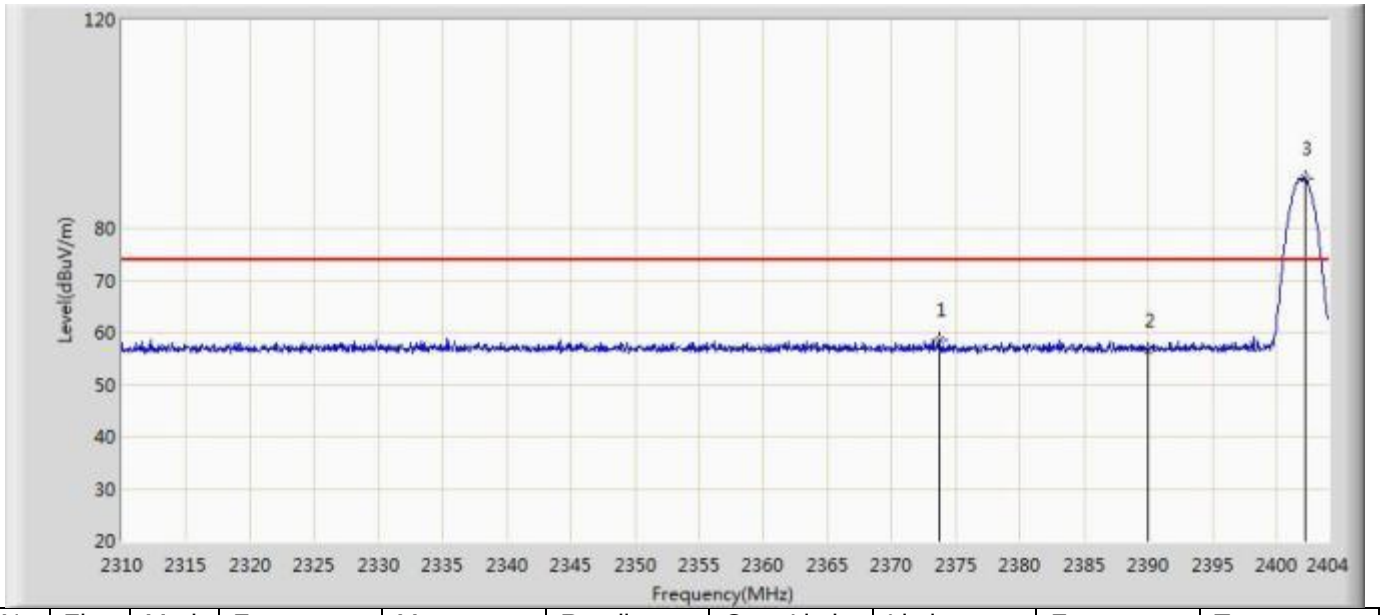
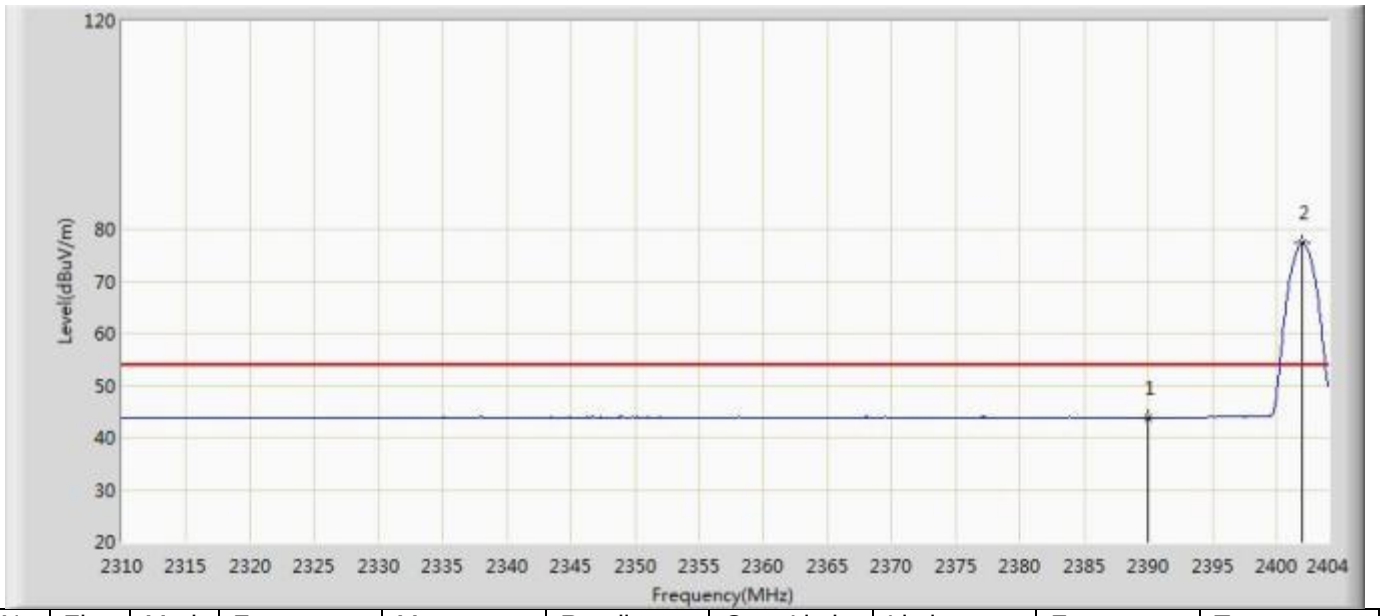
Transmit by 2DH5 at Channel 2402MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2373.779	58.685	27.452	-15.315	74.000	31.233	PK
2			2390.000	56.415	25.212	-17.585	74.000	31.203	PK
3		*	2402.261	89.444	58.260	N/A	N/A	31.184	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.843	12.640	-10.157	54.000	31.203	AV
2		*	2402.026	77.298	46.114	N/A	N/A	31.184	AV

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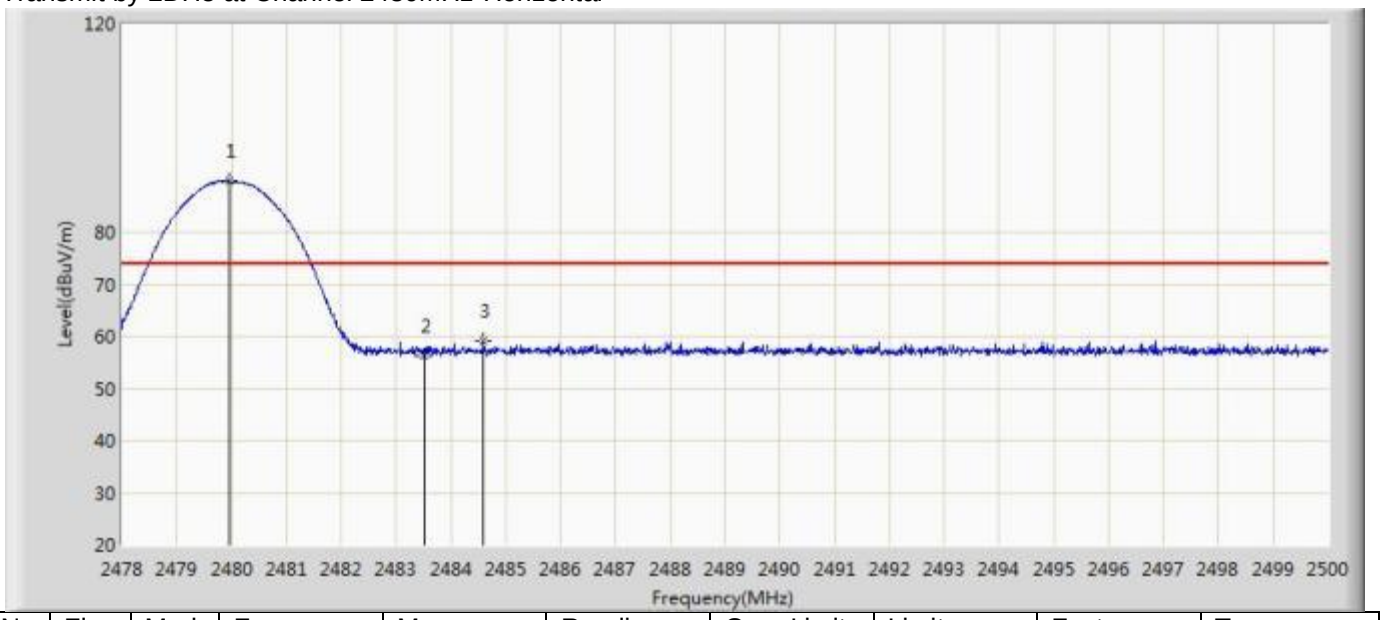
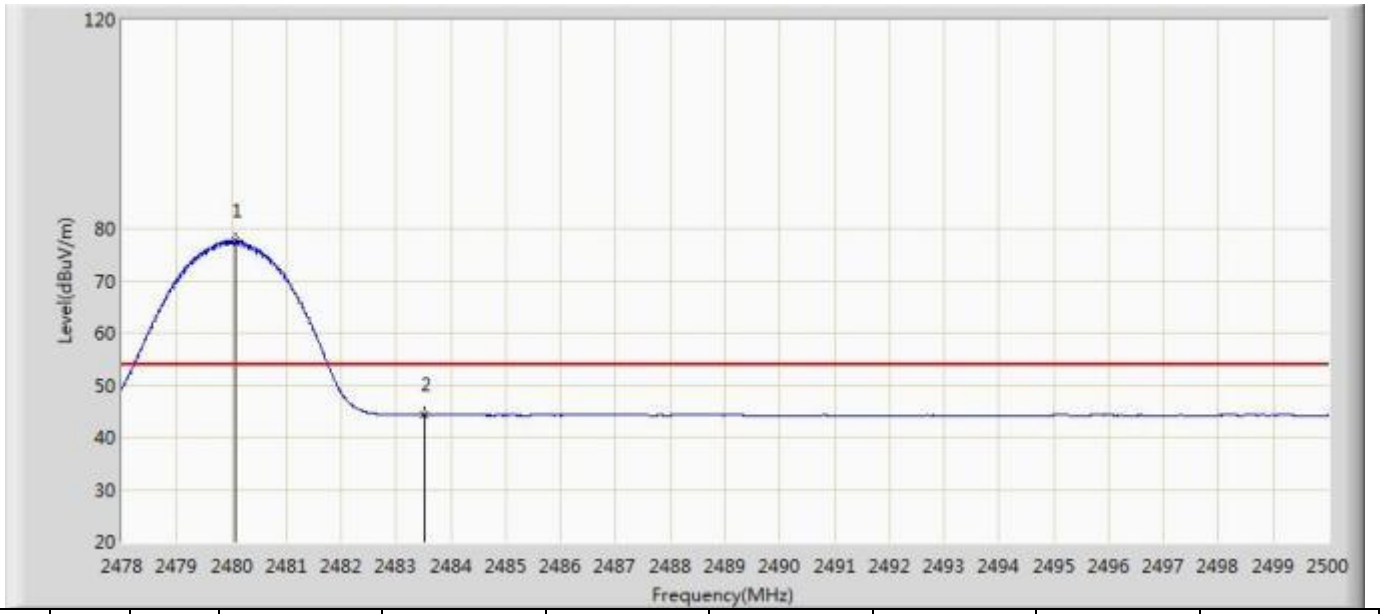
Transmit by 2DH5 at Channel 2480MHz Horizontal



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.969	89.723	58.539	N/A	N/A	31.184	PK
2			2483.500	56.334	25.141	-17.666	74.000	31.194	PK
3			2484.600	59.118	27.922	-14.882	74.000	31.197	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.057	77.650	46.466	N/A	N/A	31.184	AV
2			2483.500	44.273	13.080	-9.727	54.000	31.194	AV

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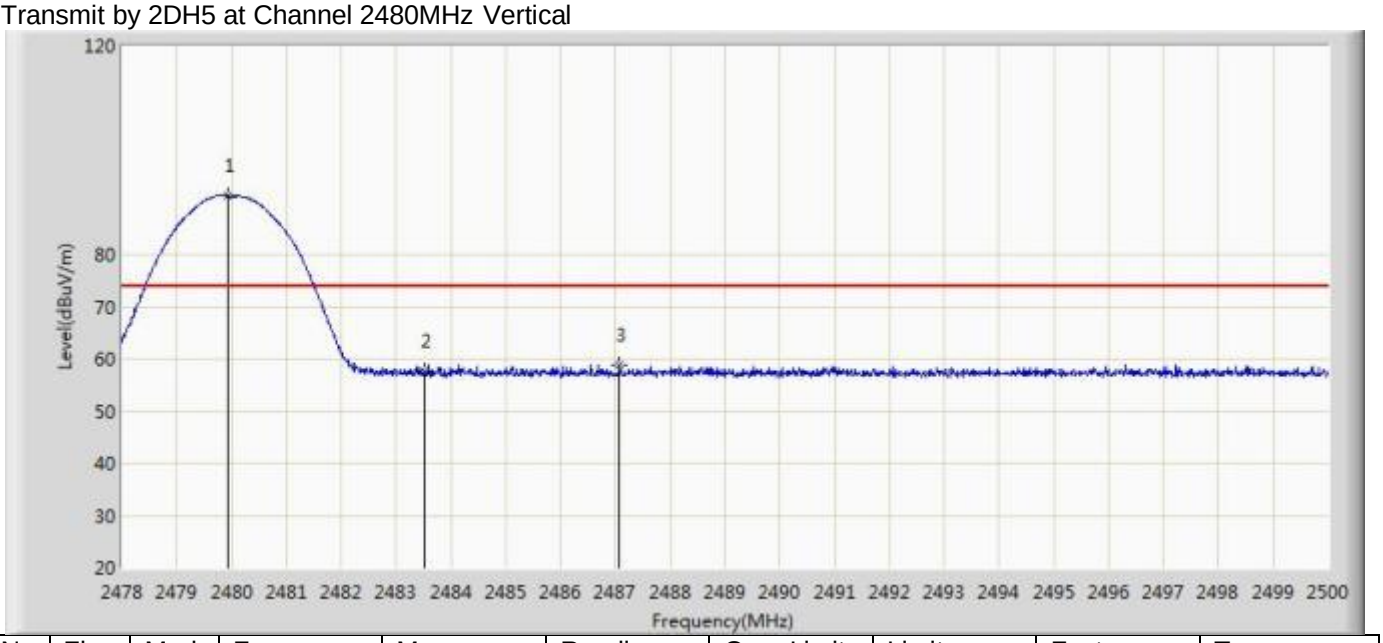
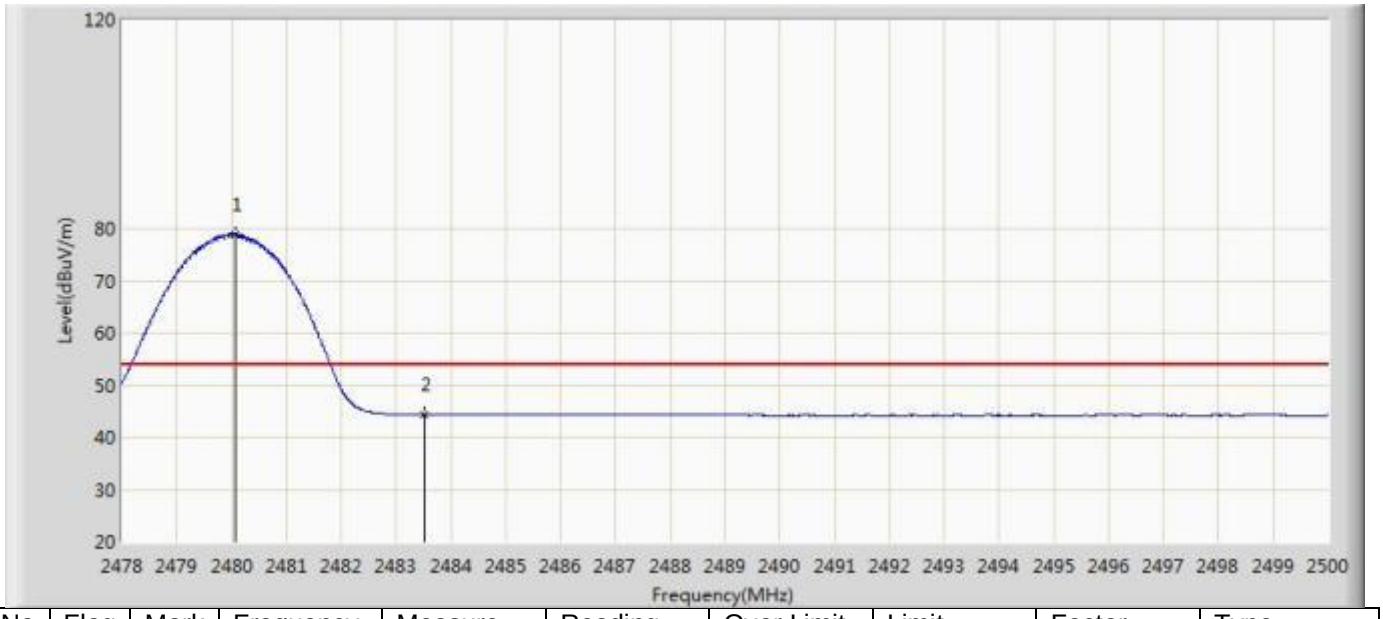
Transmit by 2DH5 at Channel 2480MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.925	91.308	60.124	N/A	N/A	31.184	PK
2			2483.500	57.731	26.538	-16.269	74.000	31.194	PK
3			2487.075	58.858	27.655	-15.142	74.000	31.203	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.079	78.943	47.759	N/A	N/A	31.184	AV
2			2483.500	44.270	13.077	-9.730	54.000	31.194	AV

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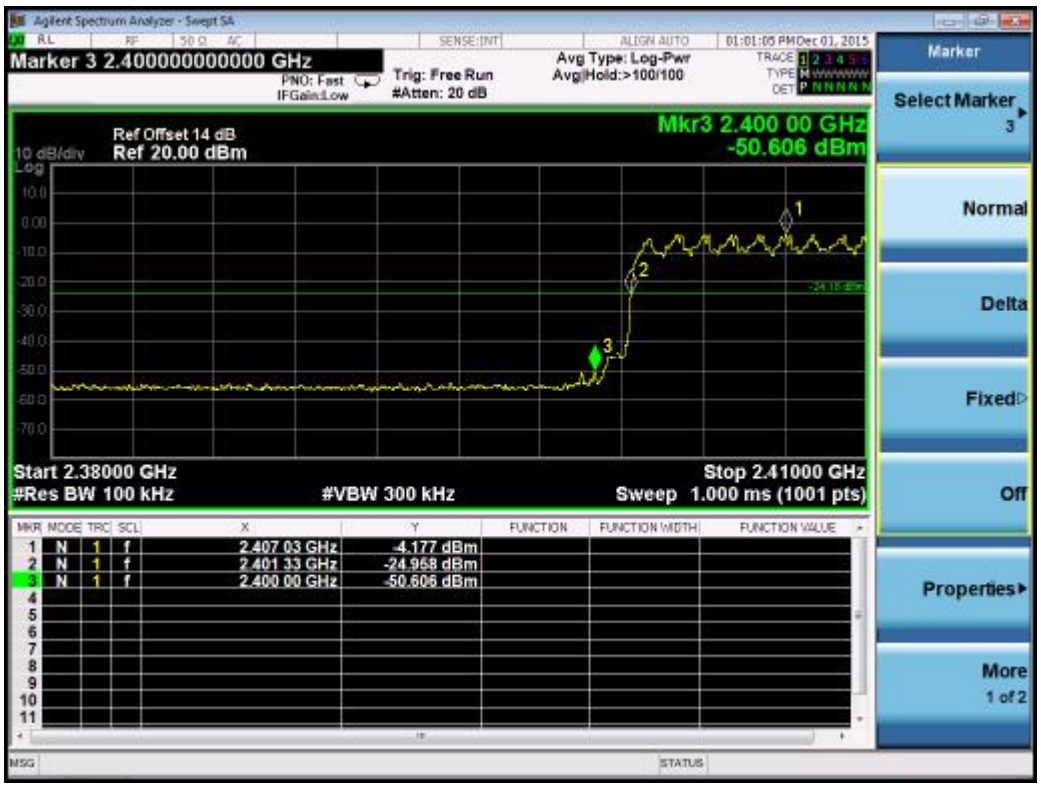
Product Service

3DH5



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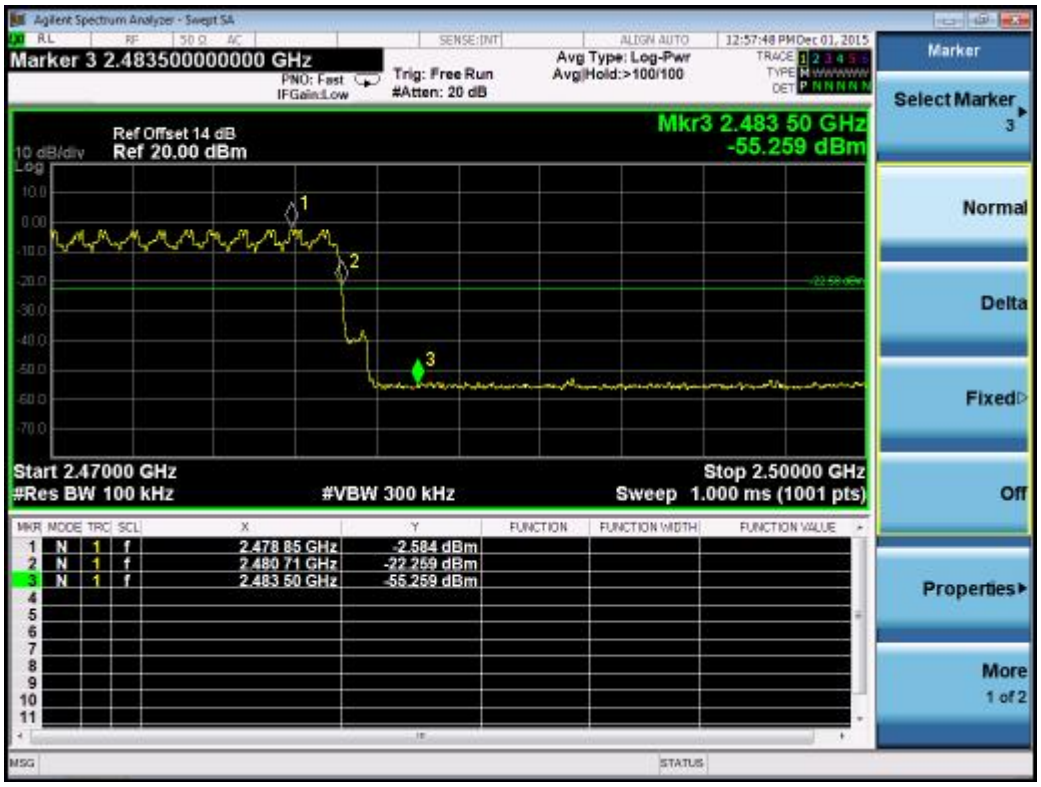
Product Service



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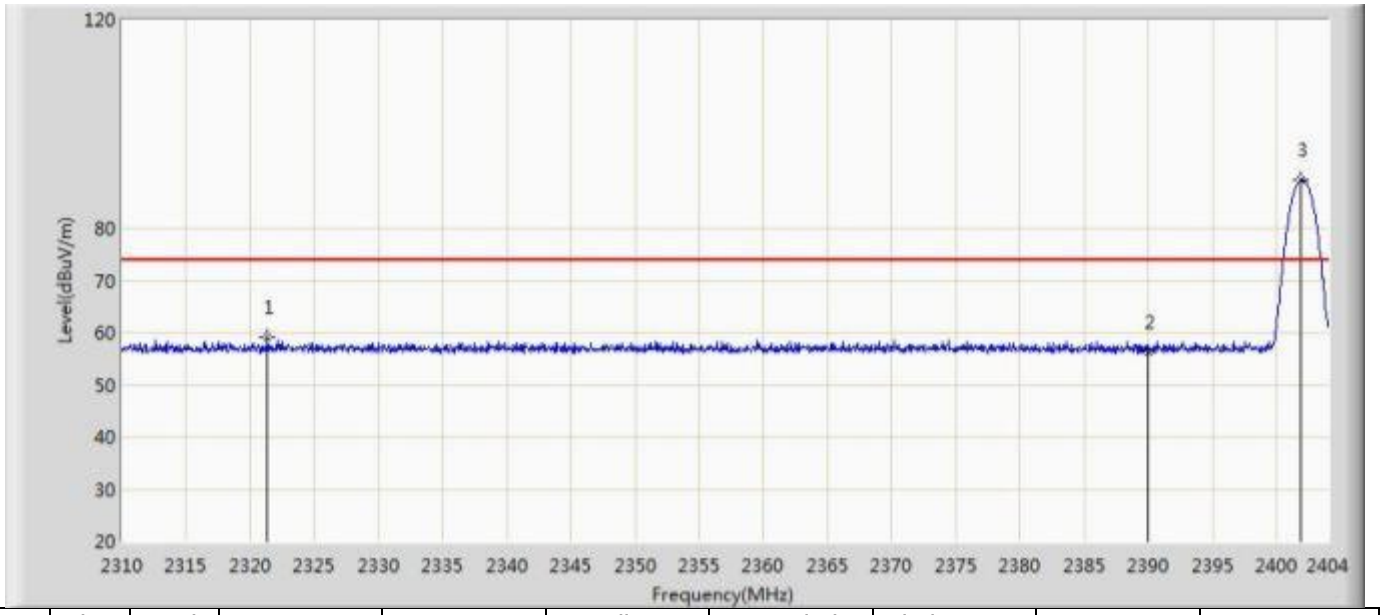
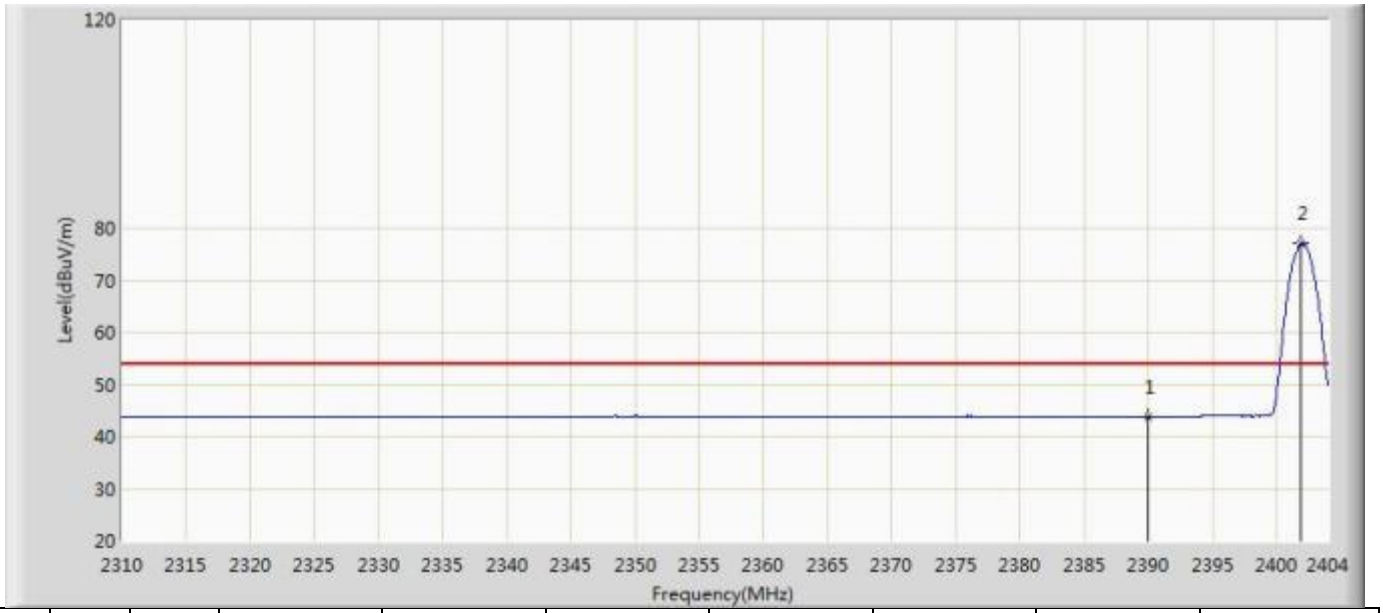
Product Service

Transmit by 3DH5 at Channel 2402MHz Horizontal



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2321.327	58.994	27.580	-15.006	74.000	31.414	PK
2			2390.000	56.275	25.072	-17.725	74.000	31.203	PK
3		*	2401.838	89.162	57.978	N/A	N/A	31.184	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.809	12.606	-10.191	54.000	31.203	AV
2		*	2401.932	77.010	45.826	N/A	N/A	31.184	AV

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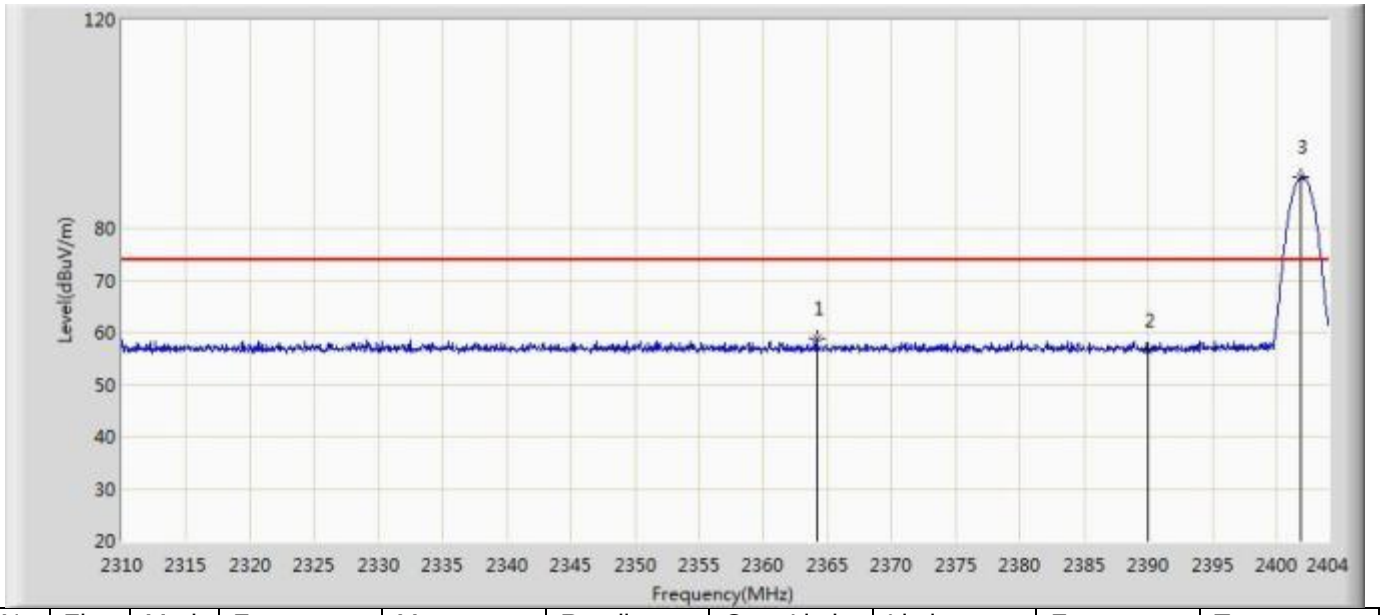
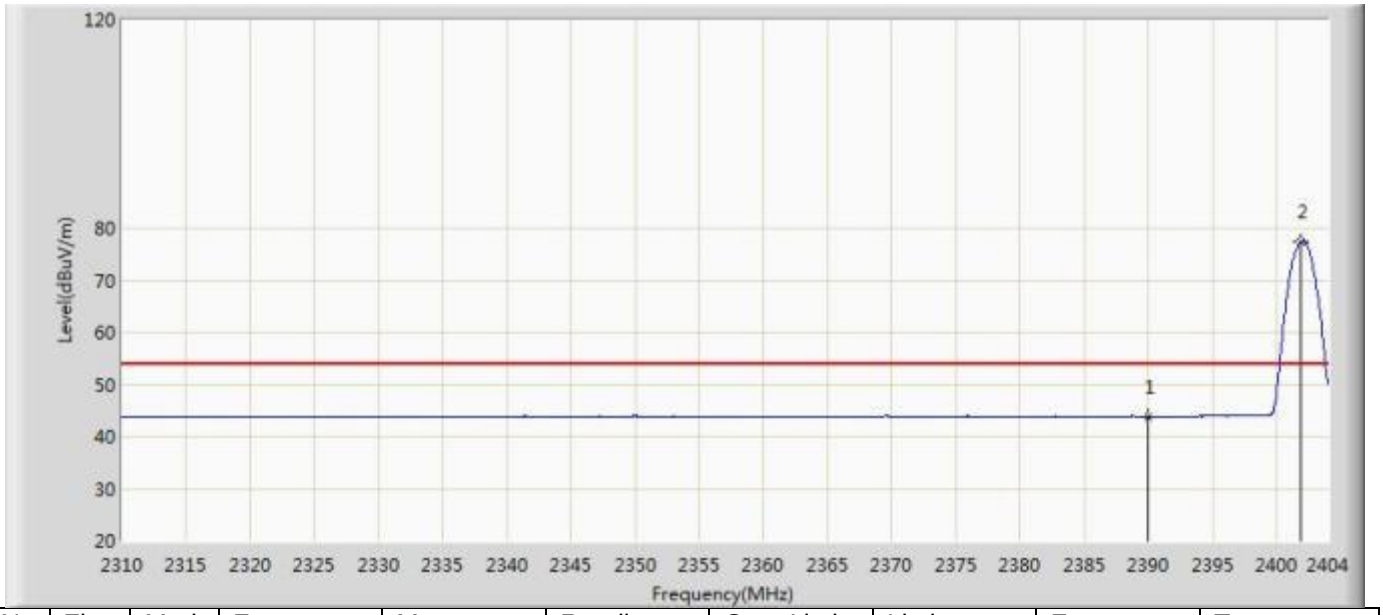
Transmit by 3DH5 at Channel 2402MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2364.191	58.717	27.466	-15.283	74.000	31.251	PK
2			2390.000	56.498	25.295	-17.502	74.000	31.203	PK
3		*	2401.838	89.800	58.616	N/A	N/A	31.184	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.842	12.639	-10.158	54.000	31.203	AV
2		*	2401.885	77.407	46.223	N/A	N/A	31.184	AV

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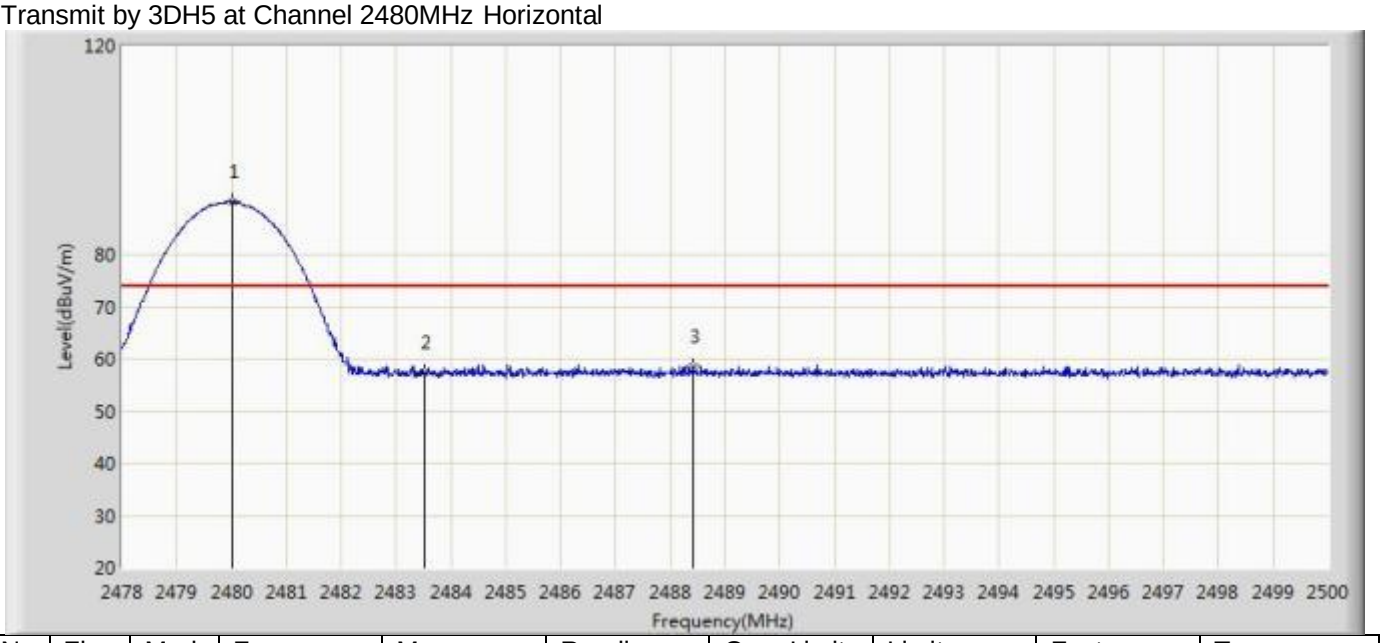
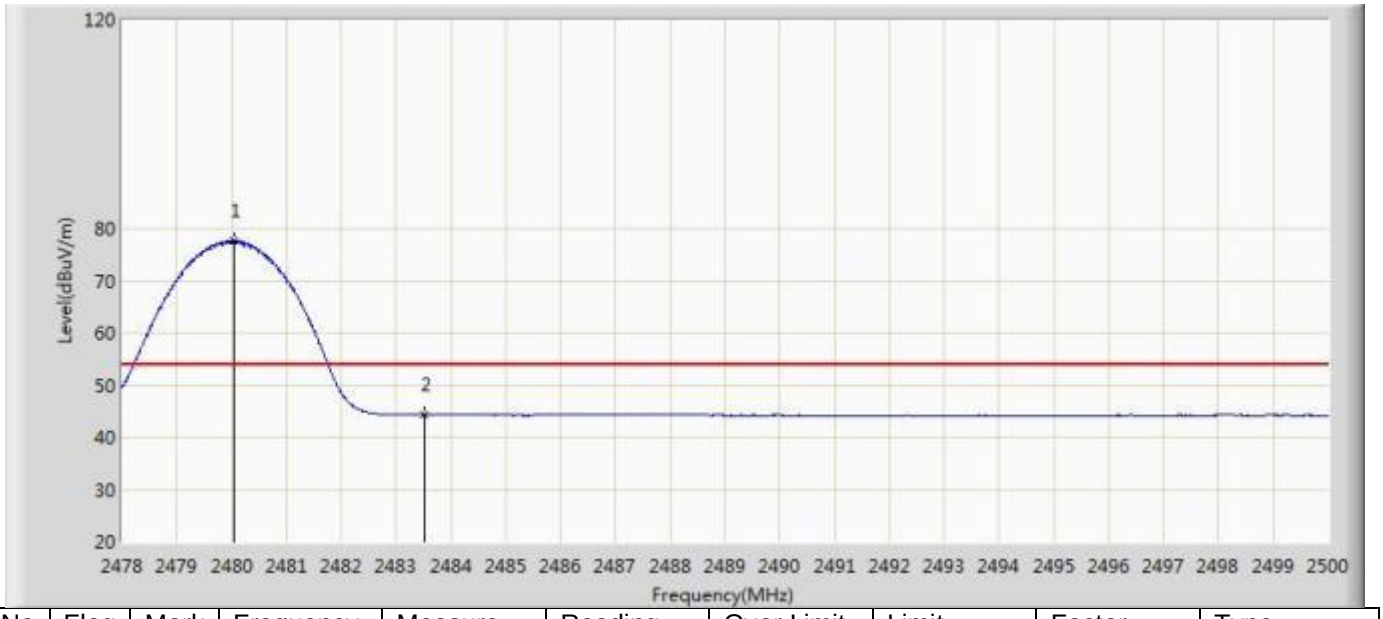
Transmit by 3DH5 at Channel 2480MHz Horizontal



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.002	90.110	58.926	N/A	N/A	31.184	PK
2			2483.500	57.320	26.127	-16.680	74.000	31.194	PK
3			2488.428	58.675	27.469	-15.325	74.000	31.207	PK



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.046	77.618	46.434	N/A	N/A	31.184	AV
2			2483.500	44.247	13.054	-9.753	54.000	31.194	AV

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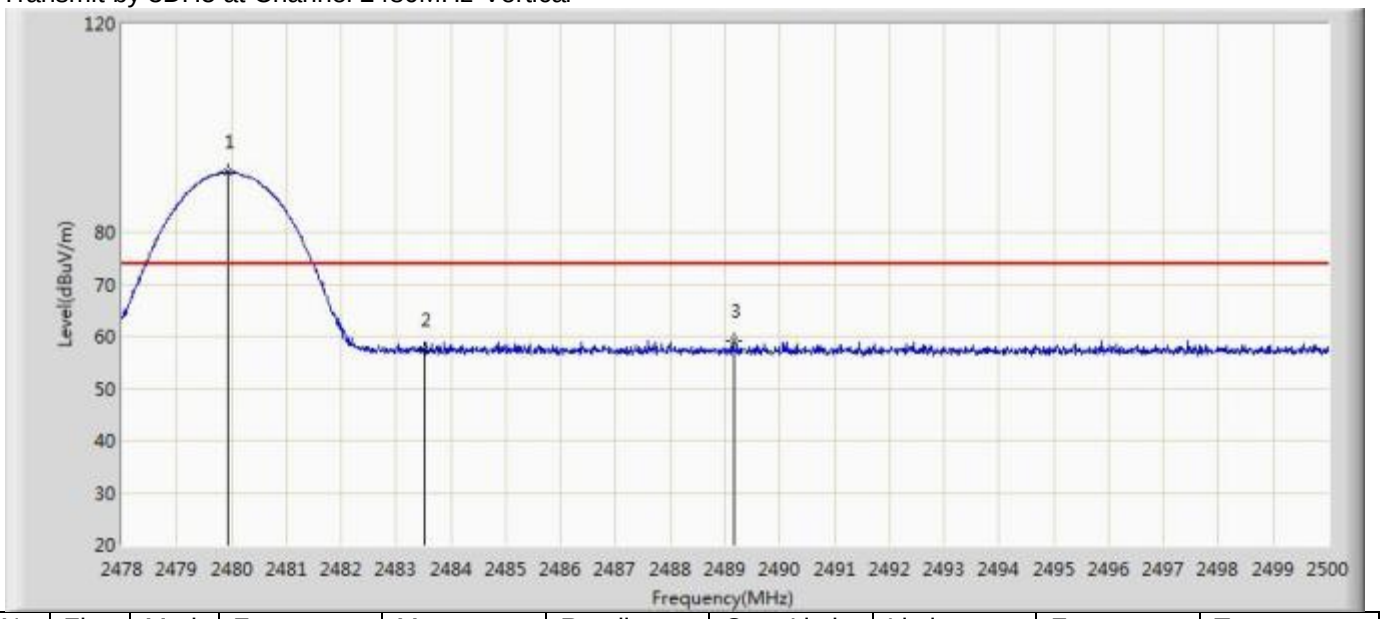
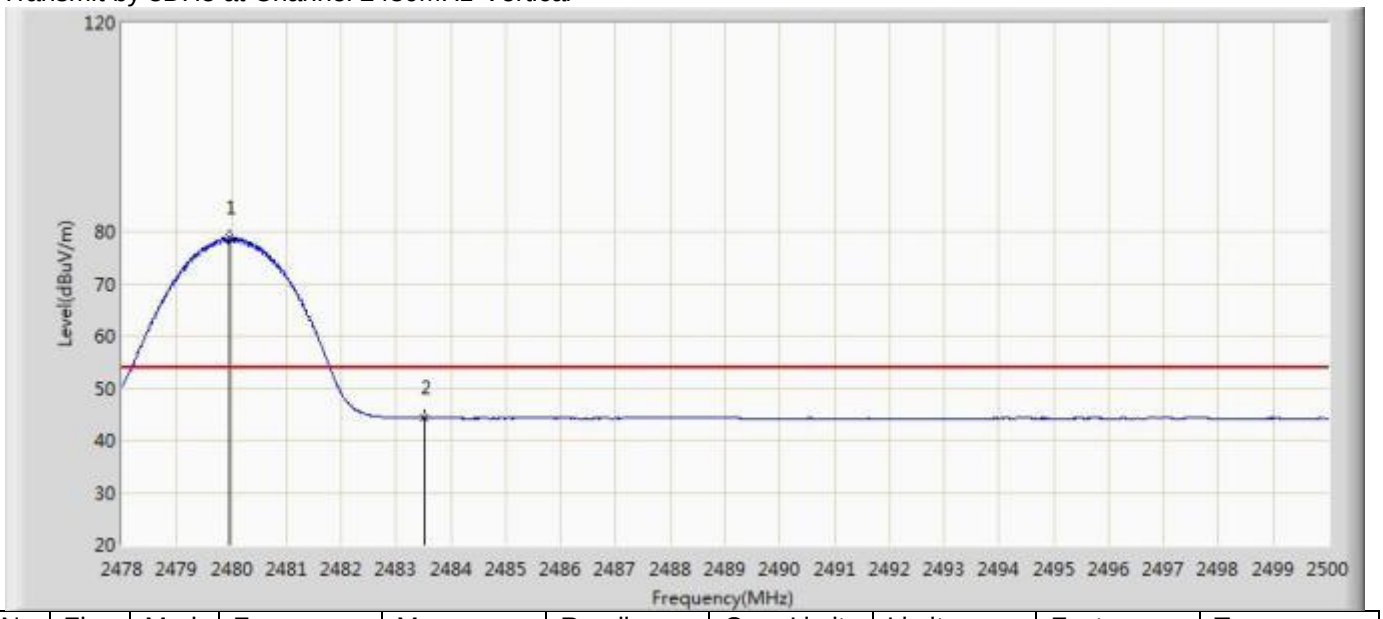
Transmit by 3DH5 at Channel 2480MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.936	91.453	60.269	N/A	N/A	31.184	PK
2			2483.500	57.431	26.238	-16.569	74.000	31.194	PK
3			2489.154	59.194	27.986	-14.806	74.000	31.208	PK

Transmit by 3DH5 at Channel 2480MHz Vertical



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.958	78.716	47.532	N/A	N/A	31.184	AV
2			2483.500	44.251	13.058	-9.749	54.000	31.194	AV

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Product Service

9.9 Spurious radiated emissions for transmitter and receiver

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
   Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
   The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle 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(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions for transmitter and receiver

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (which is subject to the maximum EIRP, DH5 mode) test result is listed in the report.

Transmitting spurious emission test result as below:

DH5 2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4808	50.151	H	74	PK	-23.849	Pass
6508	42.035	H	74	PK	-31.965	Pass
8055	45.53	H	74	PK	-28.47	Pass
4808	50.917	V	74	PK	-23.083	Pass
5998	42.226	V	74	PK	-31.774	Pass
8063.5	45.324	V	74	PK	-28.676	Pass

DH5 2441MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4884.5	52.676	H	74	PK	-21.324	Pass
7324	46.179	H	74	PK	-27.821	Pass
9763.5	46.381	H	74	PK	-27.619	Pass
4884.5	52.033	V	74	PK	-21.967	Pass
7324	45.587	V	74	PK	-28.413	Pass
9381	45.932	V	74	PK	-28.068	Pass

DH5 2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4961	51.983	H	74	PK	-22.017	Pass
7443	45.066	H	74	PK	-28.934	Pass
9415	45.746	H	74	PK	-28.254	Pass
4961	48.285	V	74	PK	-25.715	Pass
7936	44.892	V	74	PK	-29.108	Pass
9916.5	48.242	V	74	PK	-25.758	Pass

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2DH5 2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4799.5	44.566	H	74	PK	-29.434	Pass
7213.5	44.67	H	74	PK	-29.33	Pass
9313	45.155	H	74	PK	-28.845	Pass
4808	45.072	V	74	PK	-28.928	Pass
7383.5	44.559	V	74	PK	-29.441	Pass
10154.5	46.133	V	74	PK	-27.867	Pass

2DH5 2441MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4884.5	49.443	H	74	PK	-24.557	Pass
7179.5	43.283	H	74	PK	-30.717	Pass
9126	44.844	H	74	PK	-29.156	Pass
4884.5	48.104	V	74	PK	-25.896	Pass
6610	41.496	V	74	PK	-32.504	Pass
7995.5	46.211	V	74	PK	-27.789	Pass

2DH5 2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4961	46.879	H	74	PK	-27.121	Pass
7128.5	43.616	H	74	PK	-30.384	Pass
9202.5	45.364	H	74	PK	-28.636	Pass
4961	43.401	V	74	PK	-30.599	Pass
7137	43.597	V	74	PK	-30.403	Pass
9372.5	45.45	V	74	PK	-28.55	Pass

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3DH5 2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4808	44.151	H	74	PK	-29.849	Pass
6992.5	42.657	H	74	PK	-31.343	Pass
9389.5	45.442	H	74	PK	-28.558	Pass
4808	44.775	V	74	PK	-29.225	Pass
7205	43.642	V	74	PK	-30.358	Pass
9321.5	45.68	V	74	PK	-28.32	Pass

3DH5 2441MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4884.5	48.692	H	74	PK	-25.308	Pass
7392	44.671	H	74	PK	-29.329	Pass
9287.5	45.289	H	74	PK	-28.711	Pass
4884.5	45.528	V	74	PK	-28.472	Pass
7094.5	43.421	V	74	PK	-30.579	Pass
9372.5	45.455	V	74	PK	-28.545	Pass

3DH5 2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4961	46.843	*	74	PK	-27.157	Pass
7332.5	44.208		74	PK	-29.792	Pass
9466	45.109		74	PK	-28.891	Pass
4961	43.126		74	PK	-30.874	Pass
7205	43.32		74	PK	-30.68	Pass
9296	44.504	*	74	PK	-29.496	Pass

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Product Service

10 Test Equipment List

List of Test Instruments

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2016/11/03
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06114	1 year	2016/11/20

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MRTSUE06028	1 year	2016/12/08
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2016/04/16
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2016/03/29
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2016/12/14
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2016/11/07
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2016/01/05
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06115	1 year	2016/11/20

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2016/05/08
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2016/05/08
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06112	1 year	2016/11/20

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- 20dB bandwidth and 99% Occupied Bandwidth
- Carrier frequency separation
- Number of hopping frequencies
- Dwell Time
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

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Product Service

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 9kHz-1000MHz	4.18dB
Uncertainty for Radiated Emission in 3m chamber 1000MHz-40000MHz	4.76dB
Uncertainty for Conducted Emission 150KHz-30MHz	3.46dB

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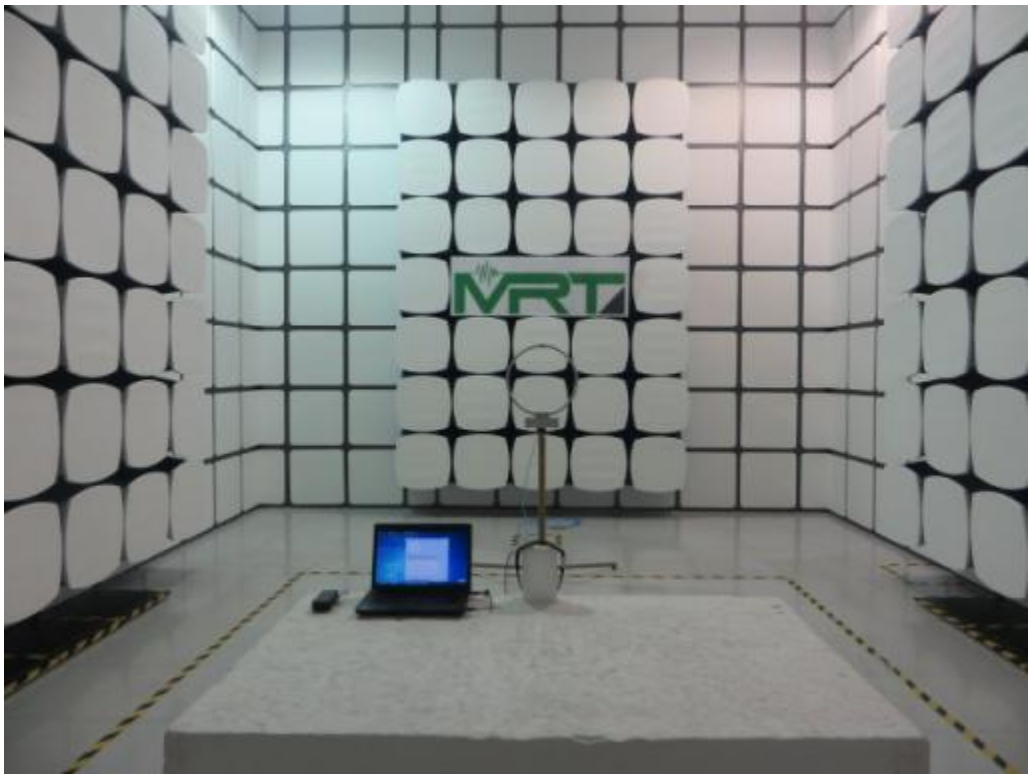
Product Service

12 Photographs of Test Set-ups

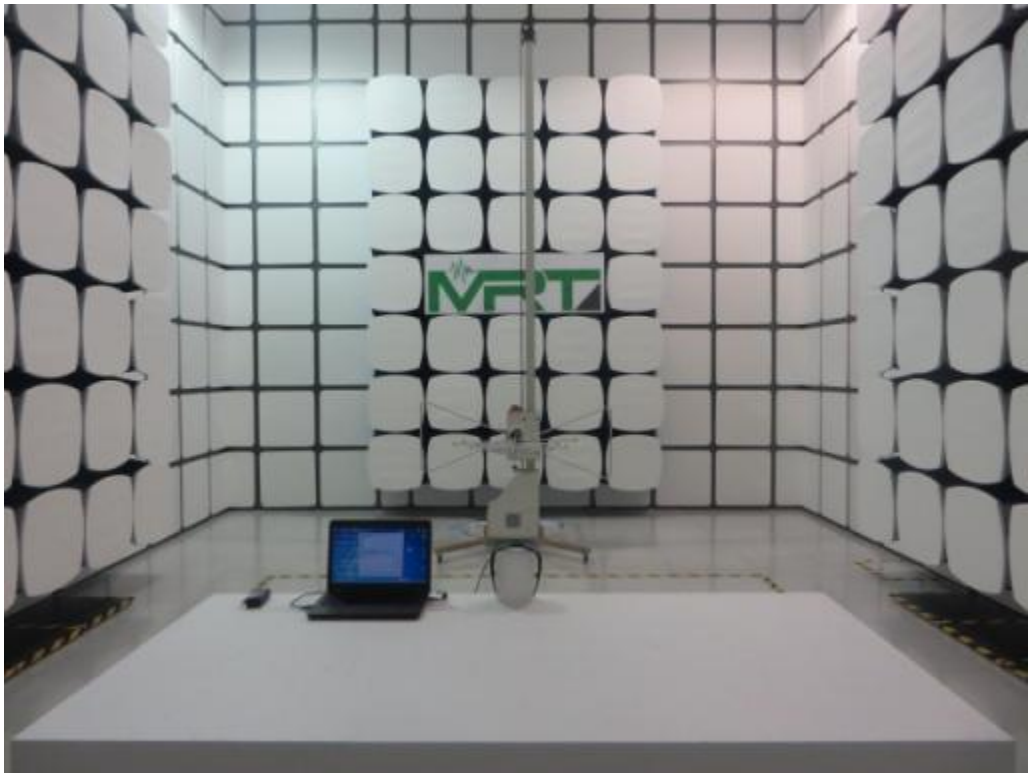
Conducted Emission Setup

Product Service

Radiated Emission Setup
9k~30MHz



30MHz~1GHz



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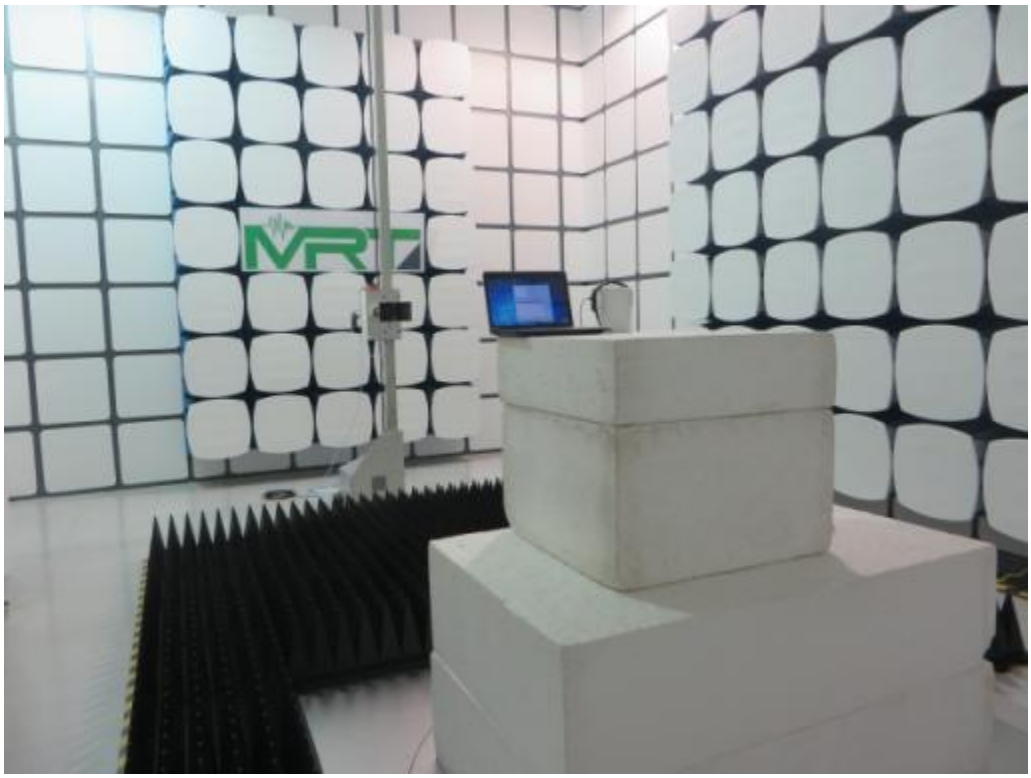
Product Service

1GHz~18GHz



18GHz~40GHz

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Product Service

13 Photographs of EUT

External Photographs

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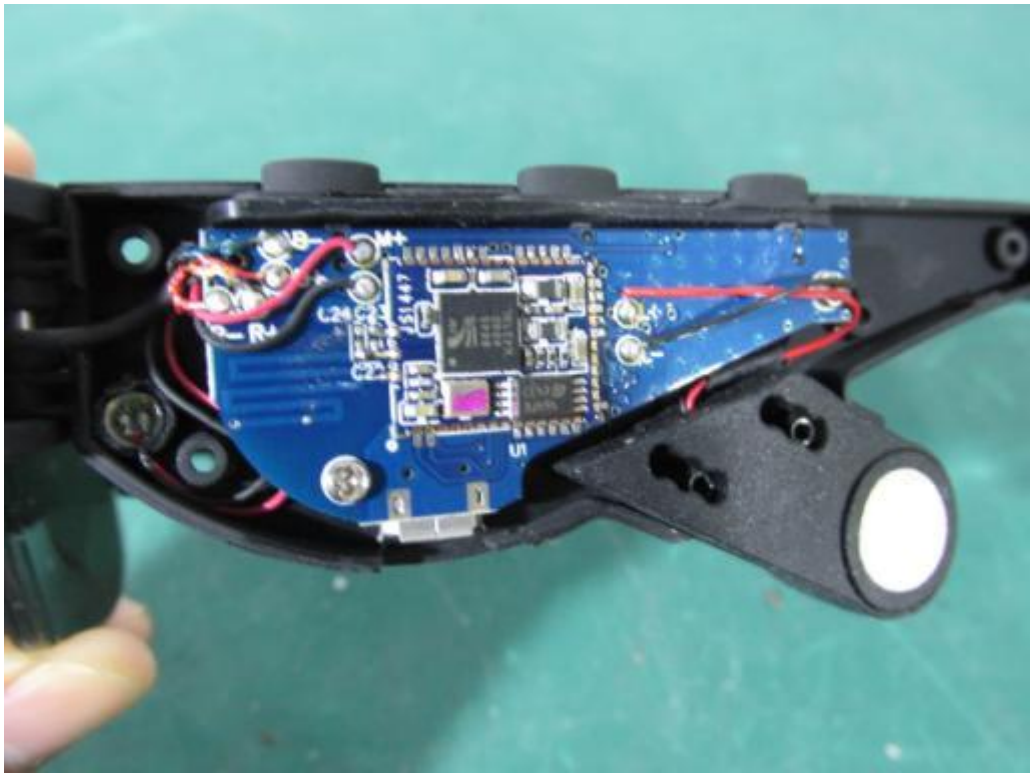
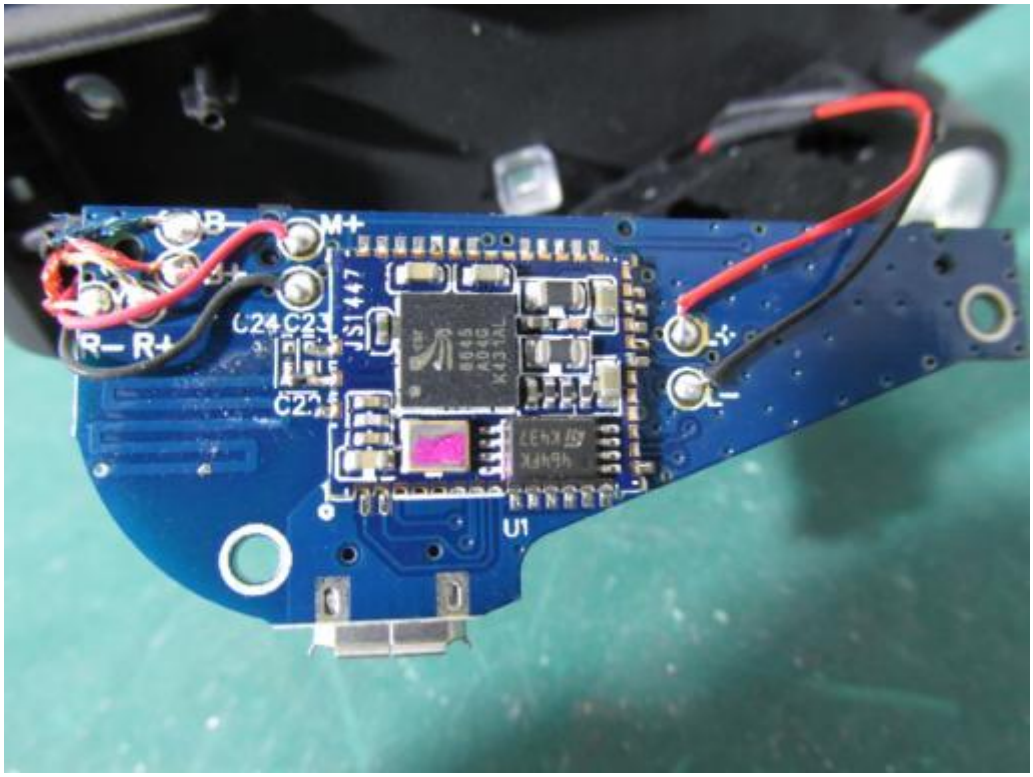
Internal Photographs





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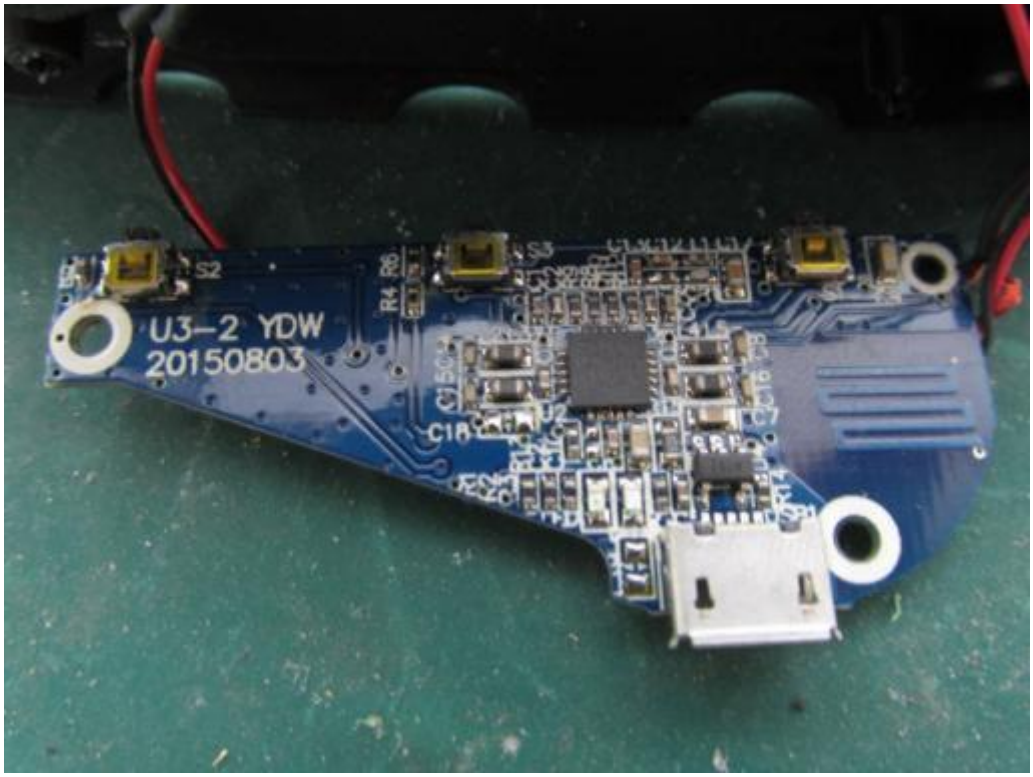

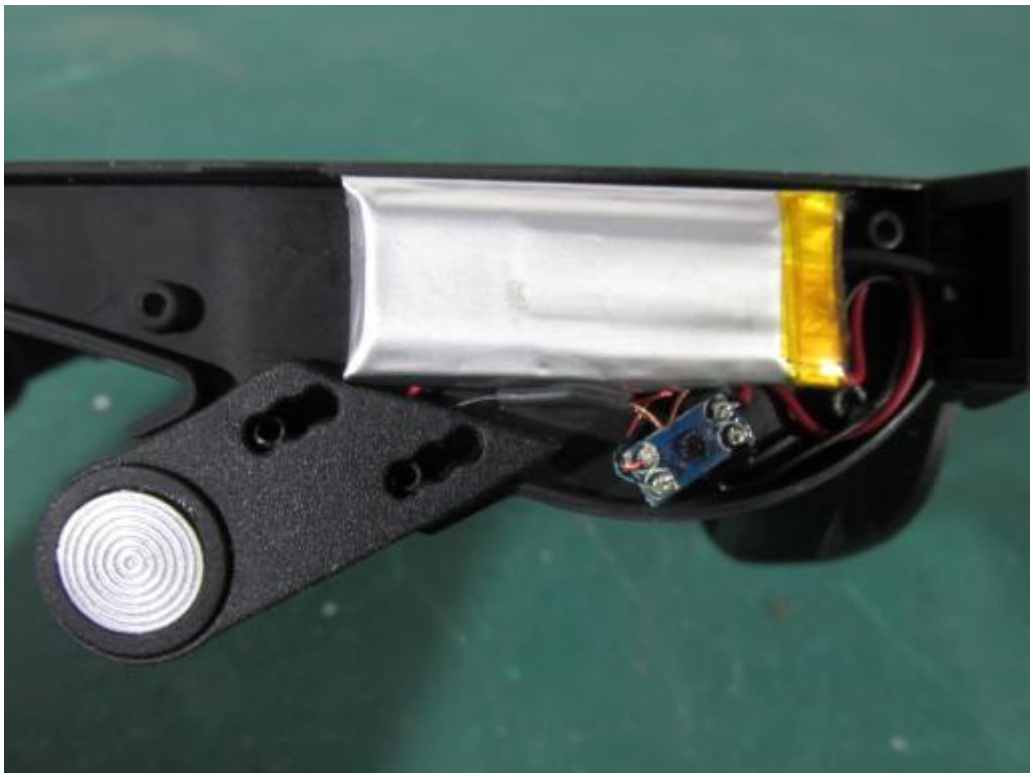

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