FCC Certification Test Report

For the
Beijing Techshino Technology Co., Ltd.
Bluetooth Fingerprint Reader
Model: TCS511

FCC ID: 2AGN6201511TCS511

REPORT# **15WB1111020F Rev 0**
Nov.15, 2015
Prepared for:

Beijing Techshino Technology Co., Ltd.
8/F, Building No. 1, Huihuang International Plaza, Shangdi 10th Street,
Haidian District, Beijing, China, 100085

Prepared by:
WASHINGTON TECHNOLOGY INTERNATIONAL LIMITED

This report applies only to the sample evaluated prior to the preparation date stated above.
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Bluetooth Fingerprint Reader
Model: TCS511

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WLL REPORT# **15WB1111020F Rev 0**
Nov.15, 2015

Prepared by:

Henry guo

Reviewed by:

Steven yang

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Abstract

This report has been prepared on behalf of Beijing Techshino Technology Co., Ltd. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Spread Spectrum Transceiver under Part 15.247 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for Beijing Techshino Technology Co., Ltd. Bluetooth Fingerprint Reader.

And Testing was performed by Audix Technology (Shenzhen) Co., Ltd. has been accepted by the FCC, the FCC Registration Number is 90454.

Bluetooth Fingerprint Reader is a Bluetooth 4.0(BR/EDR, no BLE) compliant device and complies with the limits for a Direct Sequence Spread Spectrum Transmitter device under Part 15.247 of the FCC Rules and Regulations.

Revision History	Reason	Date
Rev 0	Initial Release	Nov.15, 2015

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1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	**Standard**	**Results**
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.10 2013	N/A
Radiated Emission Test	FCC Part 15 15.209 FCC Part 15 15.247(d) ANSI C63.10 2013	PASS
Conducted Spurious Emissions	FCC Part 15: 15.247(a)(1) ANSI C63.10 2013	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) ANSI C63.10 2013	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10 2013	PASS
Number Of Hopping Frequency Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Maximum Peak Output Power Test	FCC Part 15 15.247(b)(1)\ ANSI C63.10 2013	PASS
Band Edge Compliance Test	FCC Part 15 15.247(d) ANSI C63.10 2013	PASS

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2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product Name	:	Bluetooth Fingerprint Reader
Model Number	:	TCS511
FCC ID	:	2AGN6201511TCS511
Radio	:	Bluetooth 4.0(BR/EDR, no BLE)
Operation Frequency	:	2402-2480MHz
Modulation Technology	:	Bluetooth 4.0 (BR/EDR, no BLE): GFSK, π/4DQPSK,8-DPSK
Antenna Assembly Gain	:	Antenna Type: Multilayer Chip Antenna, 0.5dBi
Applicant	:	Beijing Techshino Technology Co., Ltd. 01 building, Floor 8th, Shangdi tenth street brilliant international square, Haidian District, Beijing
Date of Test	:	Nov.24~Dec.12, 2015
Date of Receipt	:	Nov.22, 2015

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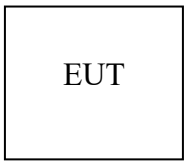
2.2. Block Diagram of connection between EUT and simulators



(EUT: Bluetooth Fingerprint Reader)

2.3. Test information

A special software was used to control EUT work in continuous TX mode (GFSK, π/4DQPSK,8-DPSK Modulation)

Tested mode, channel, and data rate information			
Mode	data rate (Mbps)	Channel	Frequency (MHz)
Tx Mode GFSK modulation	1	Low :CH 0	2402
	1	Middle: CH39	2441
	1	High: CH78	2480
Tx Mode 8-DPSK modulation	3	Low :CH 0	2402
	3	Middle: CH39	2441
	3	High: CH78	2480
Note: π/4DQPSK modulation is same type modulation with 8-DPSK, and according exploratory test, 8-DPSK will have worse emissions, so the final test were only performed with GFSK and 8-DPSK modulation.			

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2.4. Test Facility

Site Description

Name of Firm	:	Audix Technology (Shenzhen) Co., Ltd. No. 6, Ke Feng Rd., 52 Block, Shenzhen Science & Industrial Park,Nantou, Shenzhen, Guangdong, China
3m Anechoic Chamber	:	Certificated by FCC, USA Registration Number: 90454 Valid Date: Dec.30, 2017
3m & 10m Anechoic Chamber	:	Certificated by FCC, USA Registration Number: 794232 Valid Date: Jul.12, 2016
EMC Lab.	:	Certificated by Industry Canada Registration Number: IC 5183A-1 Valid Date: May.14, 2017
	:	Certificated by DAkkS, Germany Registration No: D-PL-12151-01-00 Valid Date: Dec.15, 2016
	:	Accredited by NVLAP, USA NVLAP Code: 200372-0 Valid Date: Mar.31, 2016

2.5. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Radiation Emission test in 3m chamber	2.6 dB(30~200MHz, Polarization: H)
	2.6 dB(30~200MHz, Polarization: V)
	3.0 dB(200M~1GHz, Polarization: H)
	2.8 dB(200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 3m chamber (1GHz-18GHz)	6.3 dB (1~6GHz, Distance: 3m)
	5.7 dB (6~18GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.6 dB
Uncertainty for Conduction Spurious emission test	2.0 dB
Uncertainty for Output power test	0.8 dB
Uncertainty for Bandwidth test	83 kHz
Uncertainty for DC power test	0.1 %
Uncertainty for test site temperature and humidity	0.6℃
	3%

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3. POWER LINE CONDUCTED EMISSION TEST

According to Paragraph (c) of FCC Part 15 section 15.207, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

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4. RADIATED EMISSION MEASUREMENT

4.1.Test Equipment

Frequency range: 30~1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber	AUDIX	N/A	N/A	Mar.28,15	1 Year
2.	EMI Spectrum	Agilent	E4407B	MY41440292	Apr.28,15	1 Year
3.	Test Receiver	Rohde & Schwarz	ESVS10	834468/011	Apr.28,15	1 Year
4.	Amplifier	HP	8447D	2648A04738	Apr.28,15	1 Year
5.	Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-493	May.06,15	1 Year
6.	RF Cable	MIYAZAKI	CFD400-NW(3.5M)	No.3	Apr.28,15	1 Year
7.	RF Cable	MIYAZAKI	CFD400-LW(22M)	No.7	Apr.28,15	1 Year
8.	Coaxial Switch	Anritsu	MP59B	6201397222	Apr.28,15	1 Year
9.	Test Software	AUDIX	E3	6.2009-5-21a(n)	N/A	N/A

Frequency range: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300459	Apr.28,15	1 Year
2.	Horn Antenna	ETC	MCTD 1209	DRH15F03007	Feb.03,15	1 Year
3.	Amplifier	Agilent	8449B	3008A02495	Apr.28,15	1 Year
4.	RF Cable	Hubersuhner	SUCOFLEX106	77977/6	Apr.28,15	1 Year
5.	Horn Antenna	ETS	3116	00060088	Nov.18.15	1 Year
6.	Test Software	AUDIX	E3	6.2009-5-21a(n)	N/A	N/A

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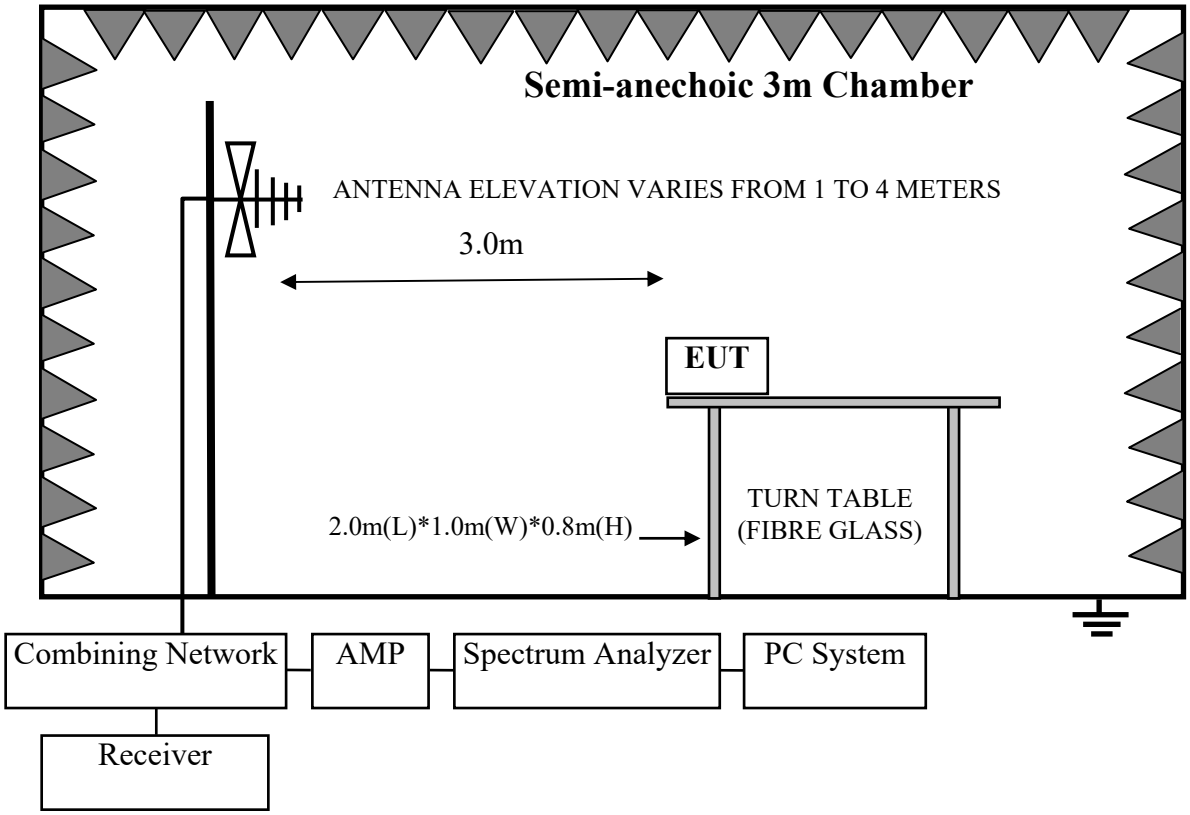
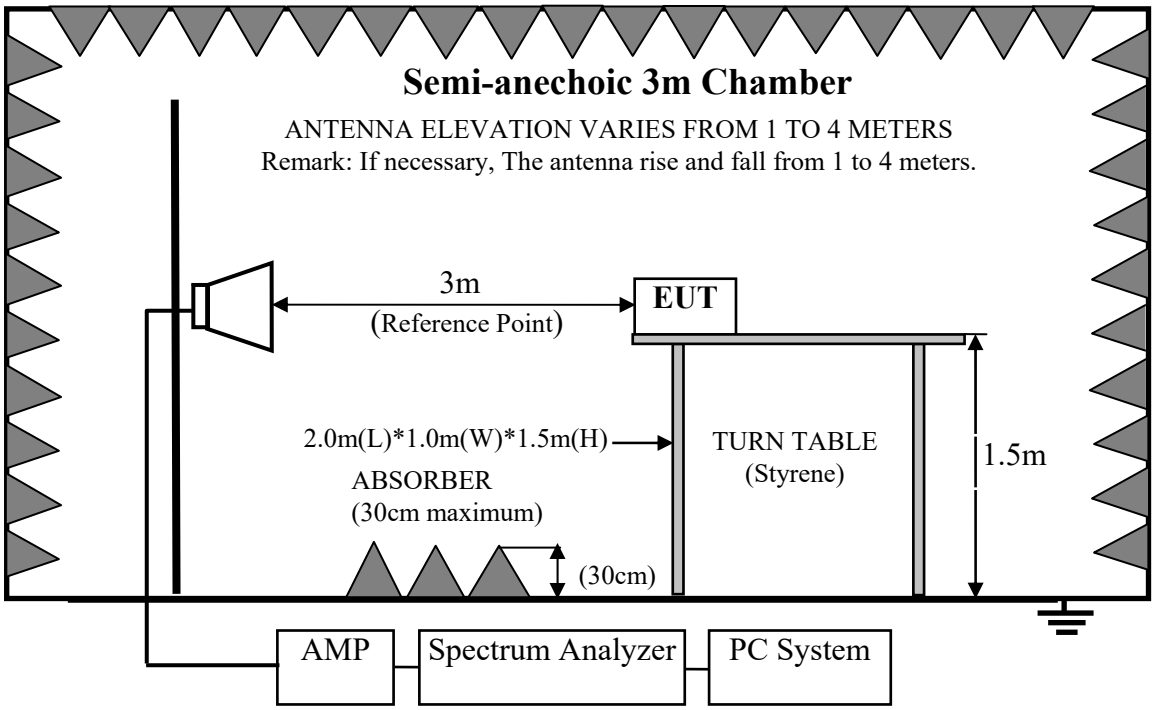
4.2.Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range 1GHz-25GHz



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4.3. Radiated Emission Limit Standard:

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remarks： (1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.4. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4.1. Bluetooth Fingerprint Reader (EUT)

Model Number : TCS511
Serial Number : N/A

4.5. Operating Condition of EUT

4.5.1. Setup the EUT and simulator as shown as Section 4.2.

4.5.2. Turn on the power of all equipments.

4.5.3. Let EUT work in BT 3.0 Tx mode.

4.6. Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)*2.4m(W)*0.3m(H) on the ground . The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it.EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horm antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission Test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as the test photo indicated.

The bandwidth of the EMI test receiver (R&S ESVS10) is set at 120kHz for frequency range from 30MHz to 1000MHz.

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The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz

This device is pulse Modulated, a duty cycle factor was used to calculated average level based measured peak level.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

4.7. Radiated Emission Test Results

PASS.

All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.
Note: The duty cycle factor for calculate average level is -24.533 dB, and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.

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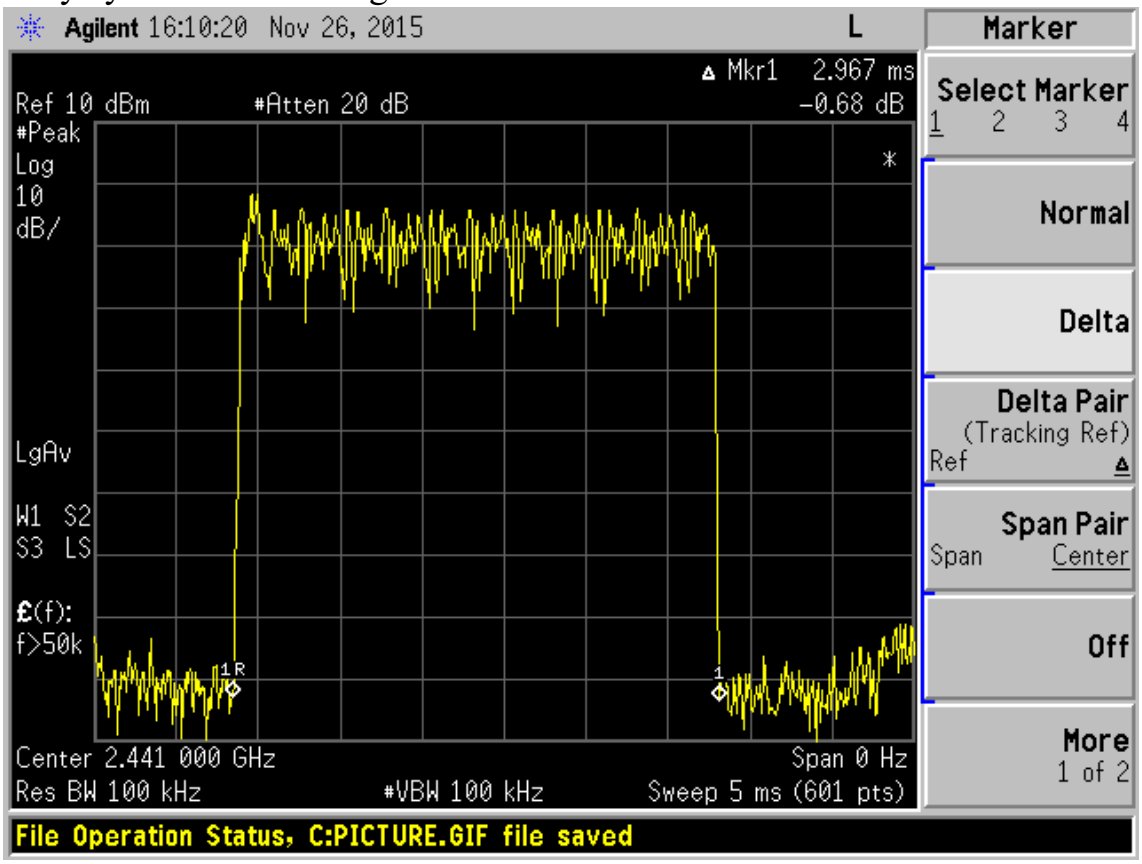
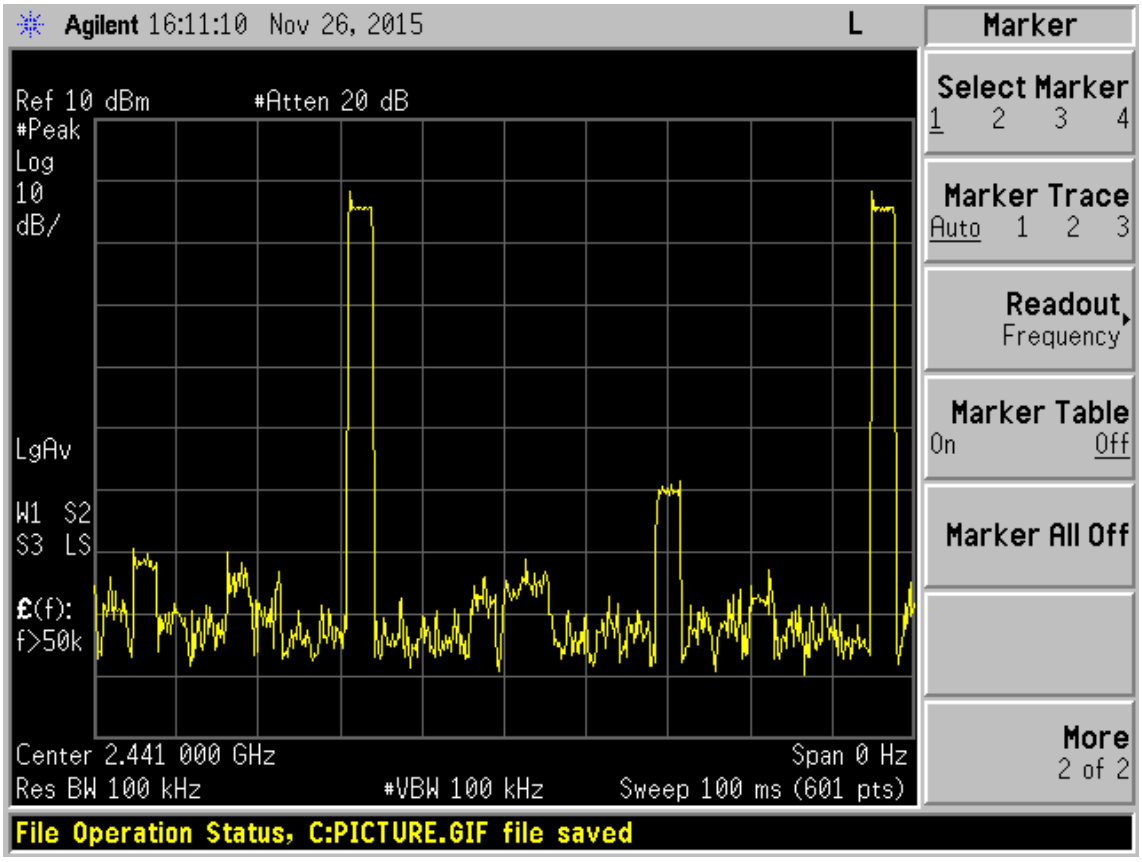
Duty cycle factor = 20log（Dwell time/100ms）= -24.533





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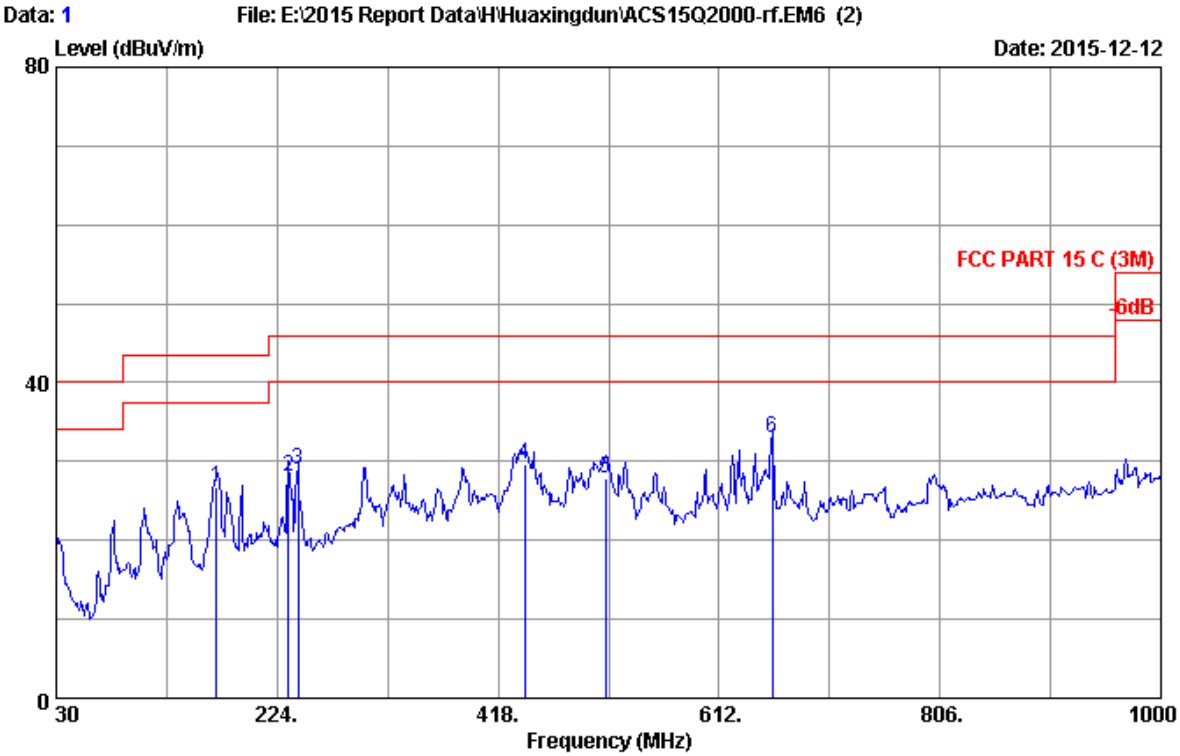
Frequency: 30MHz~1GHz




```
Site no.      : 3m Chamber                    Data no.   : 1
Dis. / Ant.   : 3m   2015 CBL6112D 35375      Ant. pol. : HORIZONTAL
Limit         : FCC PART 15 C (3M)
Env. / Ins.   : 24*C/56%                      Engineer   : donjon
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : Tx Mode
```

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	170.650	10.27	1.38	15.08	26.73	43.50	16.77	QP
2	233.700	11.96	1.62	14.51	28.09	46.00	17.91	QP
3	242.430	12.74	1.68	14.61	29.03	46.00	16.97	QP
4	441.280	17.23	2.34	10.02	29.59	46.00	16.41	QP
5	512.090	18.34	2.54	6.94	27.82	46.00	18.18	QP
6	658.560	19.90	2.91	10.21	33.02	46.00	12.98	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

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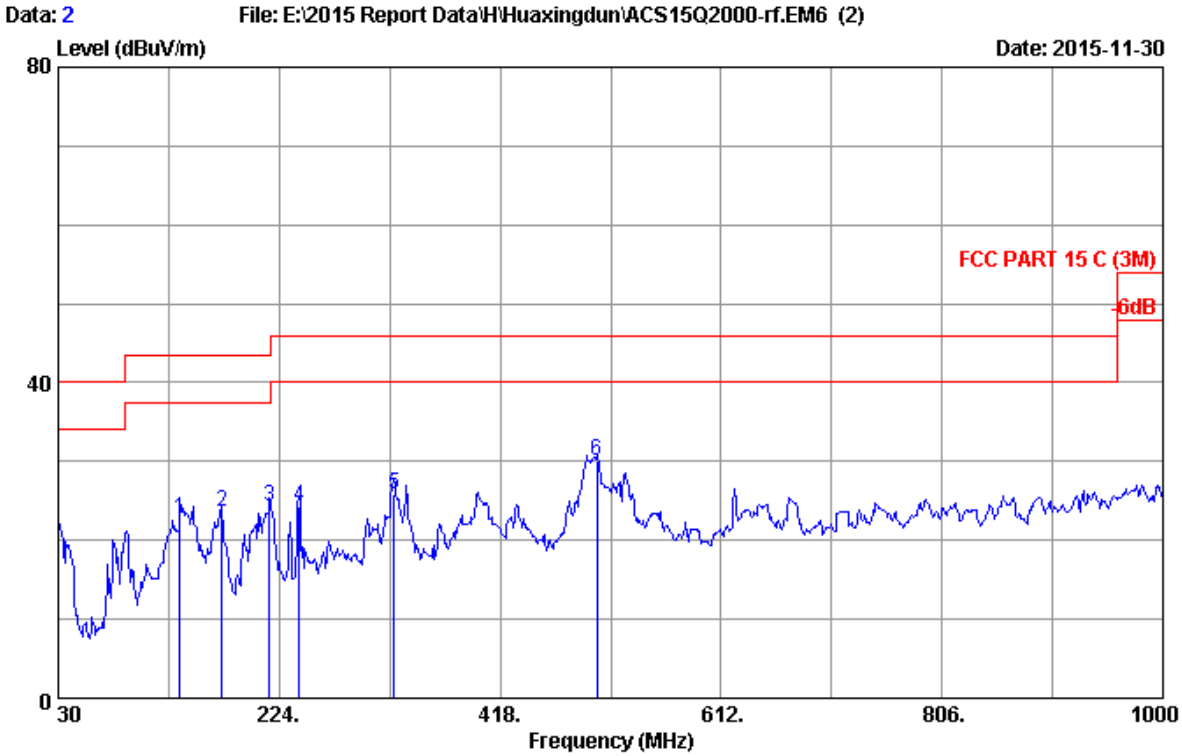

Site no. : 3m Chamber Data no. : 2
Dis. / Ant. : 3m 2015 CBL6112D 35375 Ant. pol. : VERTICAL
Limit : FCC PART 15 C (3M)
Env. / Ins. : 24*C/56% Engineer : donjon
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	136.700	12.43	1.27	8.92	22.62	43.50	20.88	QP
2	173.560	10.20	1.40	11.93	23.53	43.50	19.97	QP
3	215.270	10.76	1.57	12.05	24.38	43.50	19.12	QP
4	241.460	12.67	1.65	10.01	24.33	46.00	21.67	QP
5	324.880	14.70	1.97	9.12	25.79	46.00	20.21	QP
6	503.360	18.38	2.53	9.13	30.04	46.00	15.96	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

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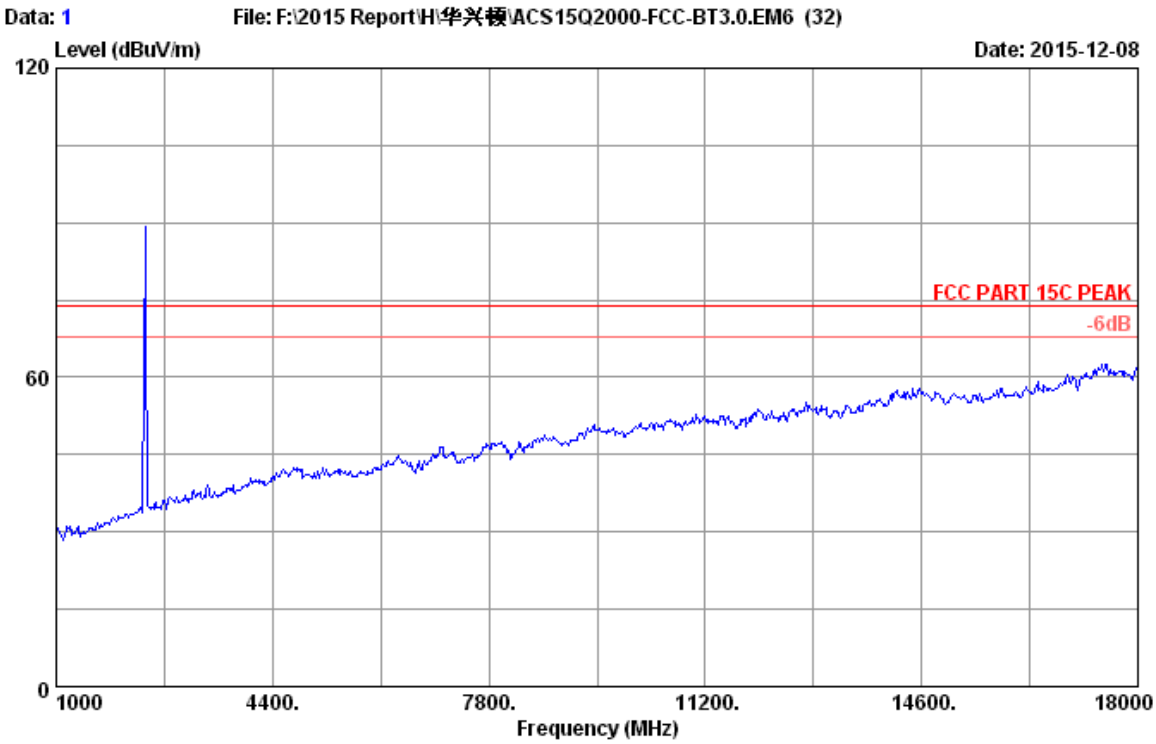
Frequency: 1GHz~18GHz




```
Site no.      : 3m Chamber                        Data no.   : 1
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : GFSK 2402MHz Tx Mode
```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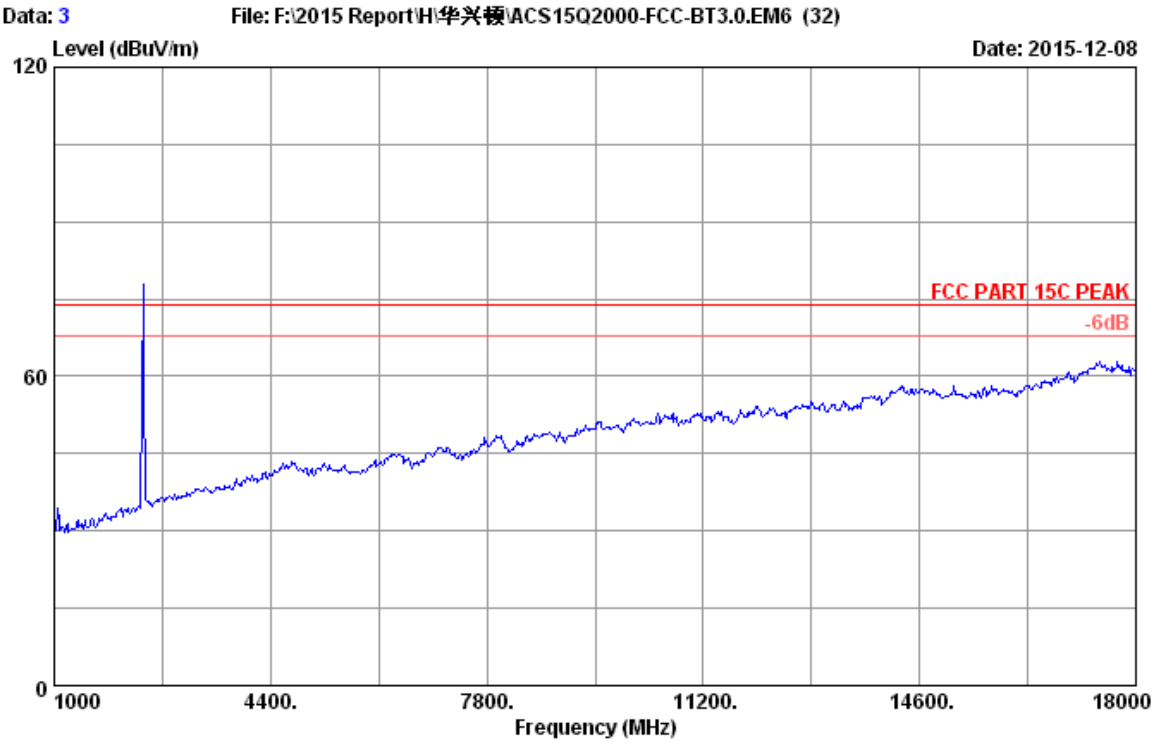


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Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : GFSK 2402MHz Tx Mode
```


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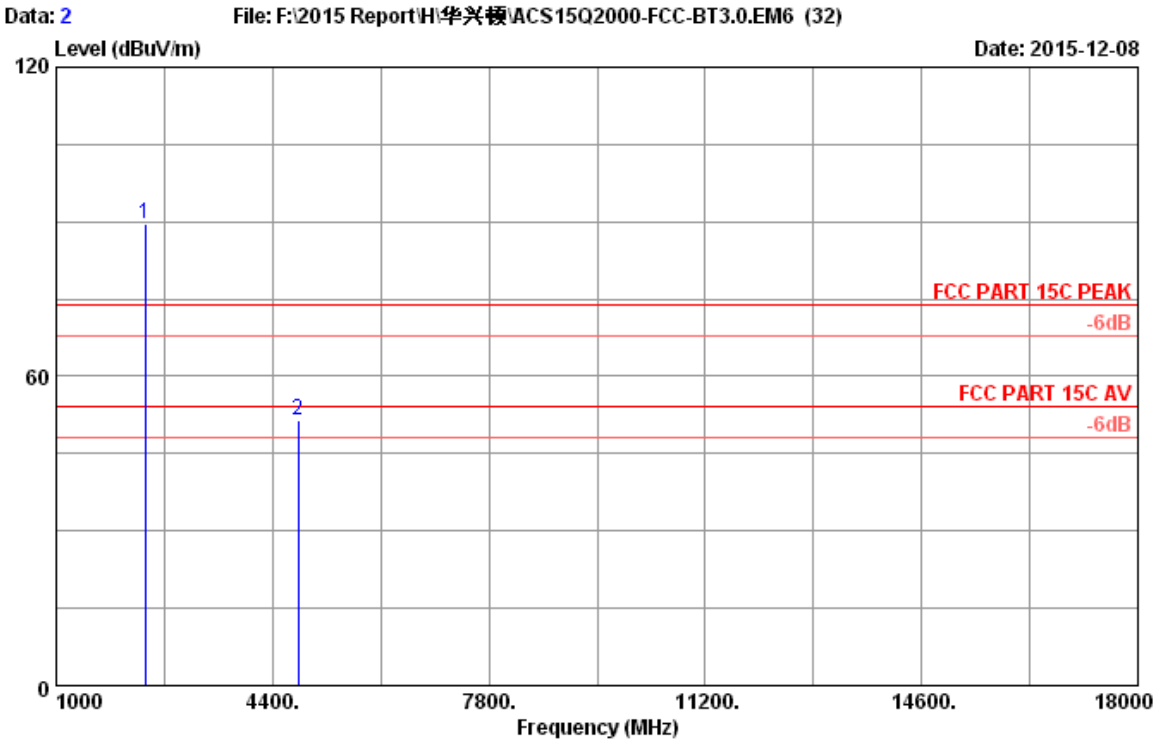

Site no. : 3m Chamber Data no. : 2
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	28.00	7.32	36.62	90.78	89.48	74.00	-15.48	Peak
2	4804.000	33.69	9.46	35.54	43.80	51.41	74.00	22.59	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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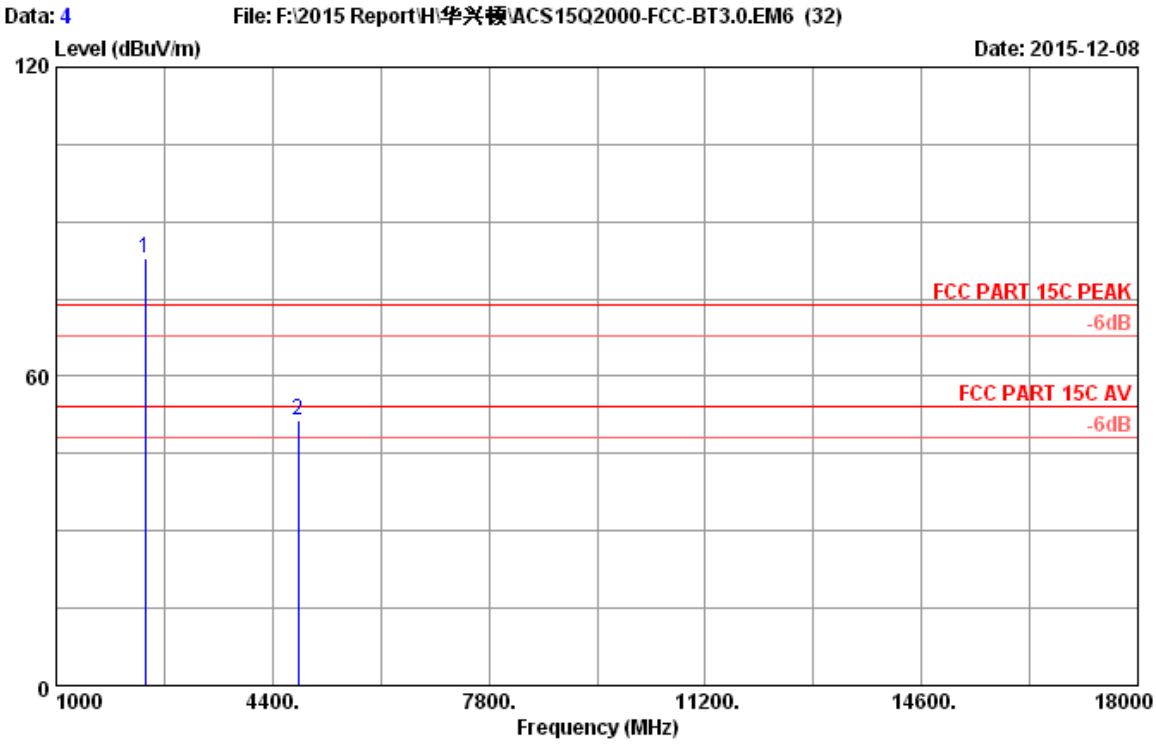

Site no. : 3m Chamber Data no. : 4
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	28.00	7.32	36.62	84.16	82.86	74.00	-8.86	Peak
2	4804.000	33.69	9.46	35.54	43.98	51.59	74.00	22.41	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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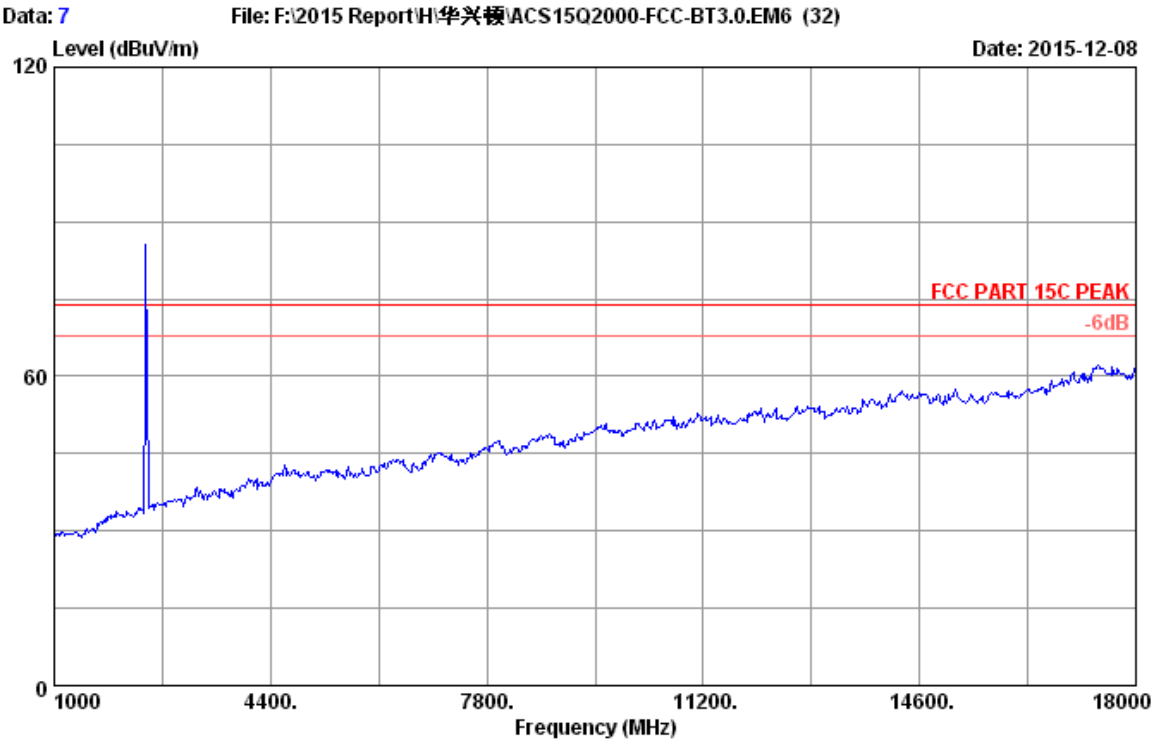


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Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : GFSK 2441MHz Tx Mode
```


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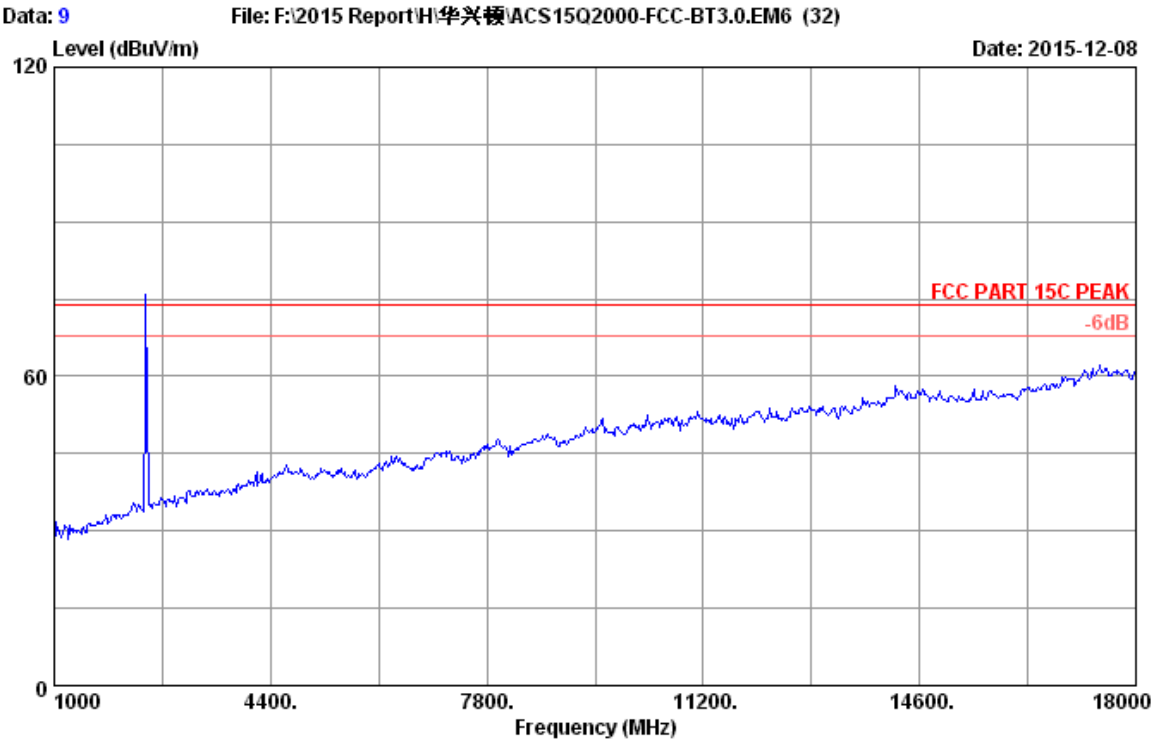


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Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : GFSK 2441MHz Tx Mode
```


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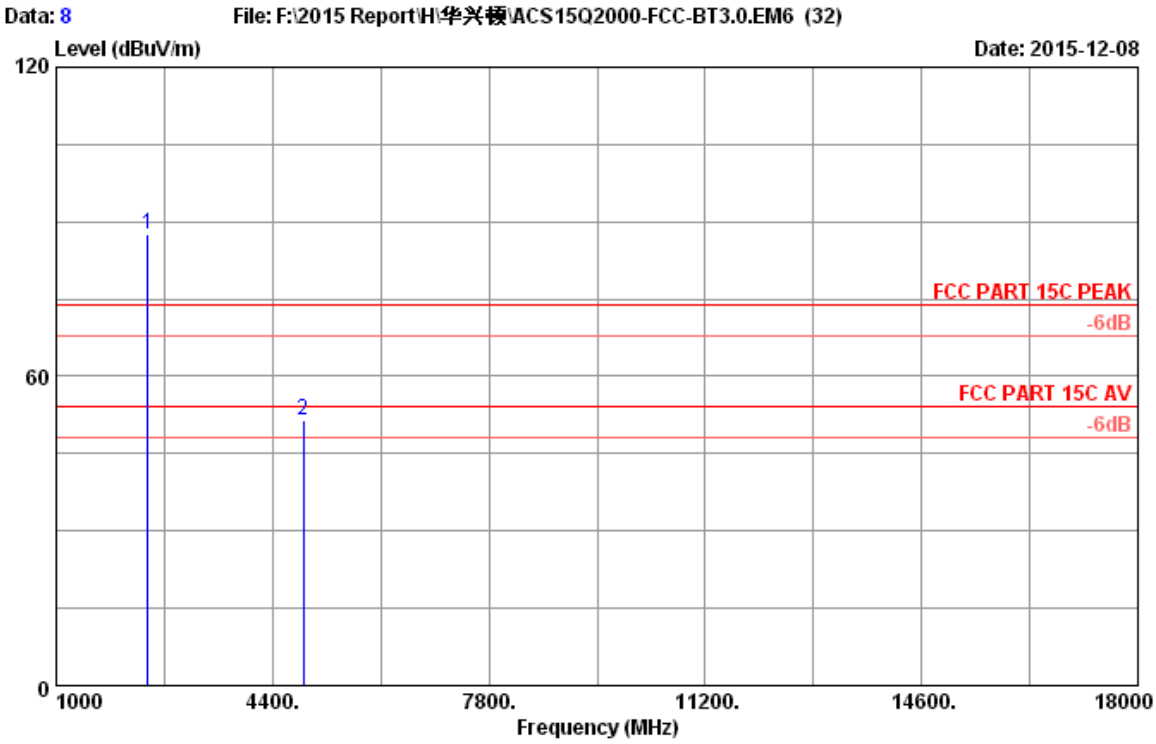

Site no. : 3m Chamber Data no. : 8
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2441MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.000	28.08	7.39	36.60	88.71	87.58	74.00	-13.58	Peak
2	4882.000	33.81	9.49	35.51	43.70	51.49	74.00	22.51	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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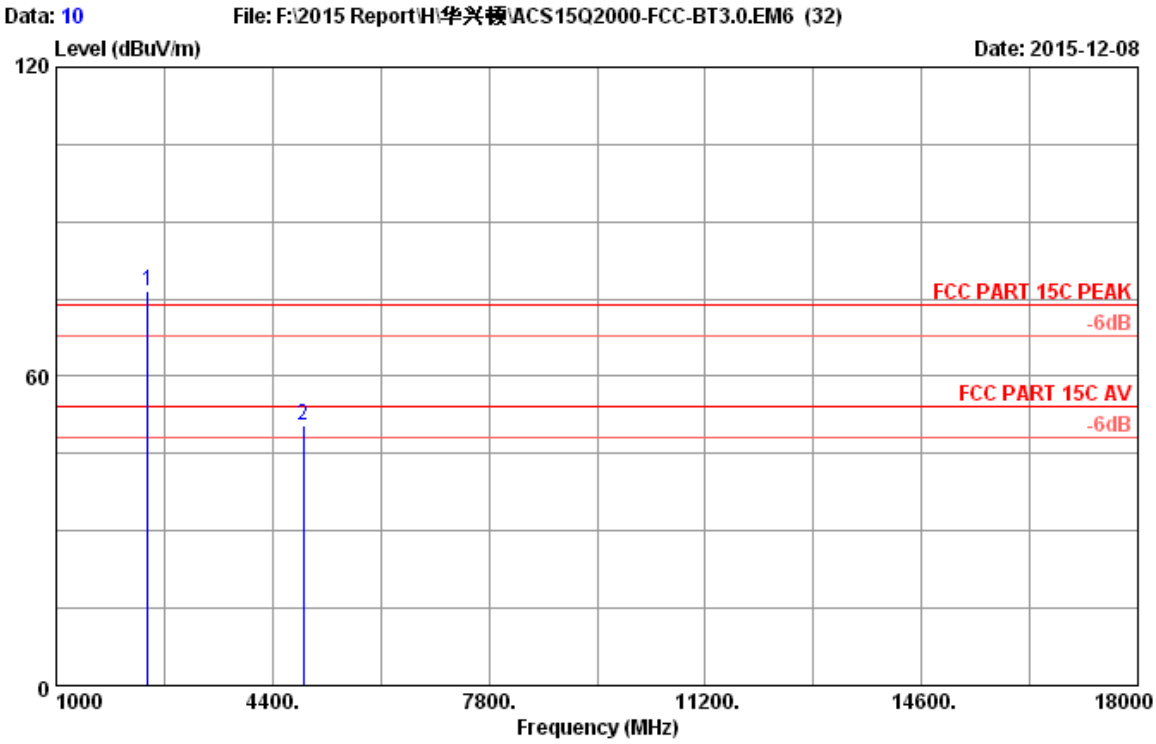

Site no. : 3m Chamber Data no. : 10
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2441MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.000	28.08	7.39	36.60	77.72	76.59	74.00	-2.59	Peak
2	4882.000	33.81	9.49	35.51	42.71	50.50	74.00	23.50	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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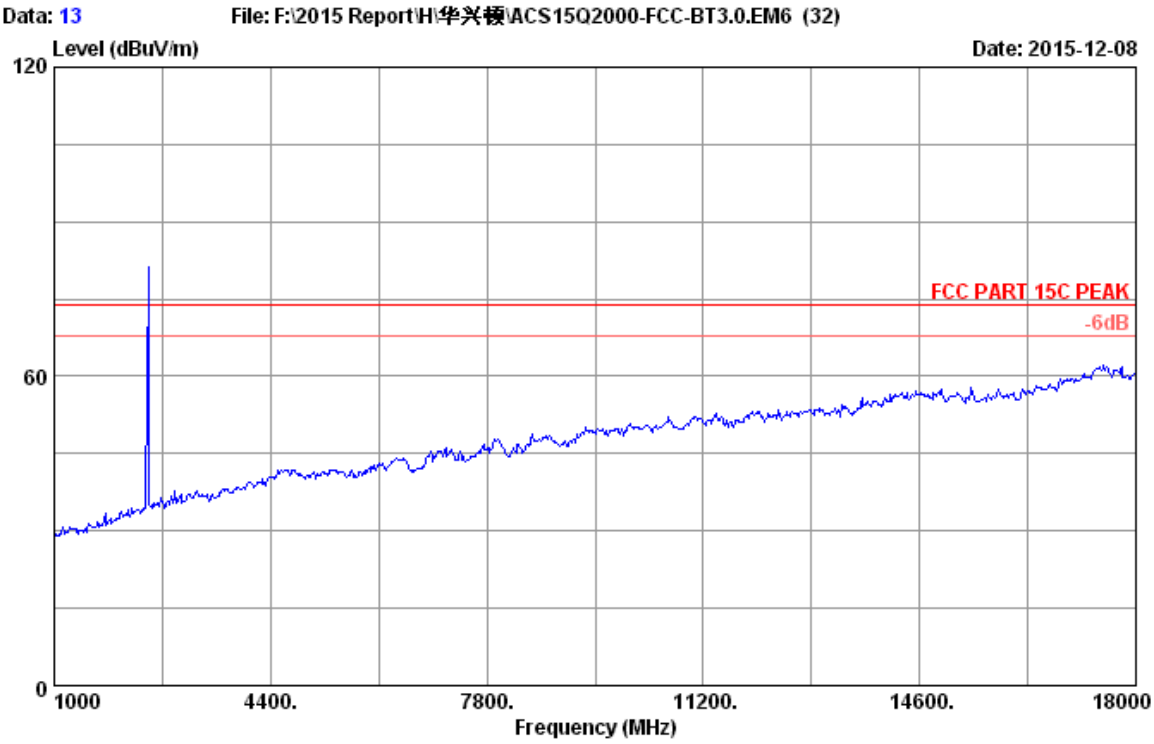


```
Site no.      : 3m Chamber                        Data no.   : 13
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : GFSK 2480MHz Tx Mode
```


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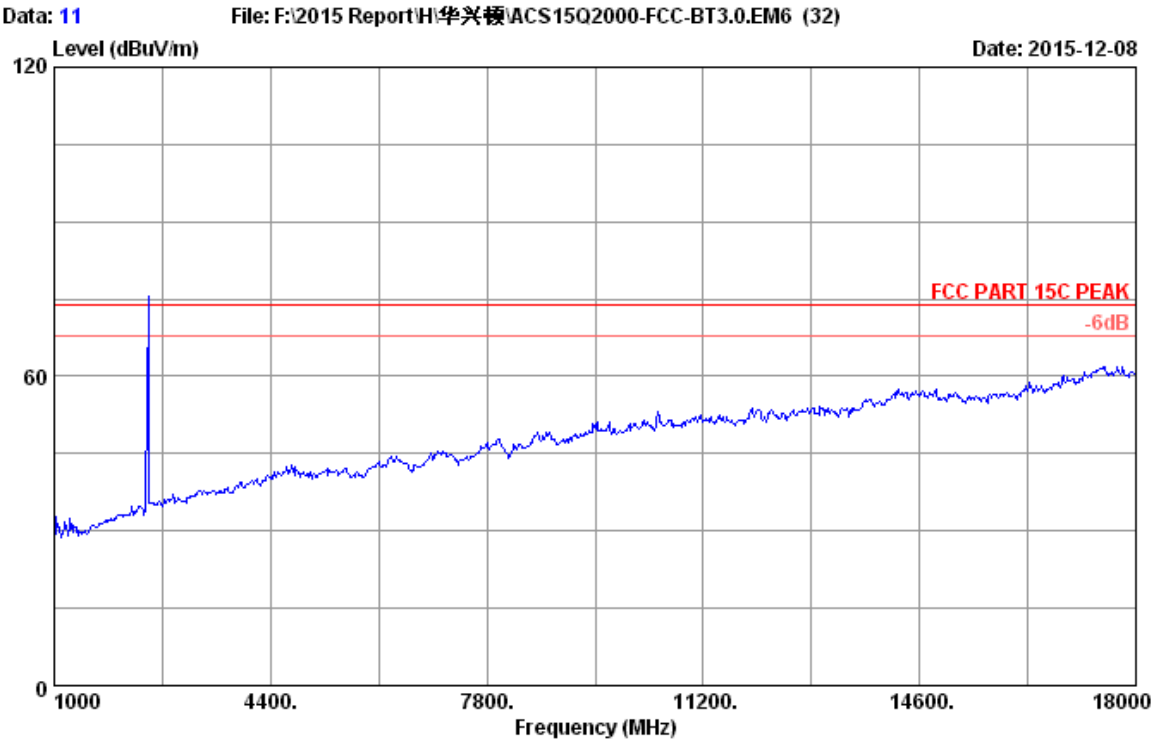


```
Site no.      : 3m Chamber                        Data no.   : 11
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : GFSK 2480MHz Tx Mode
```


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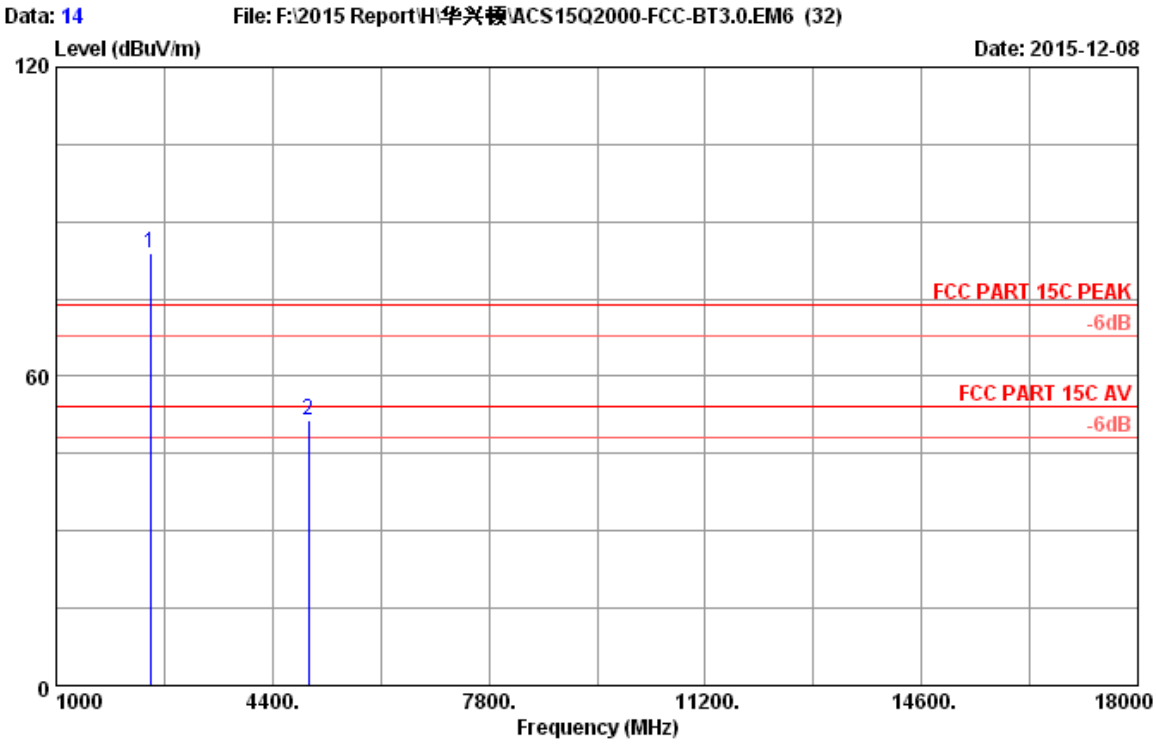

Site no. : 3m Chamber Data no. : 14
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	28.16	7.47	36.59	84.73	83.77	74.00	-9.77	Peak
2	4960.000	33.94	9.52	35.47	43.45	51.44	74.00	22.56	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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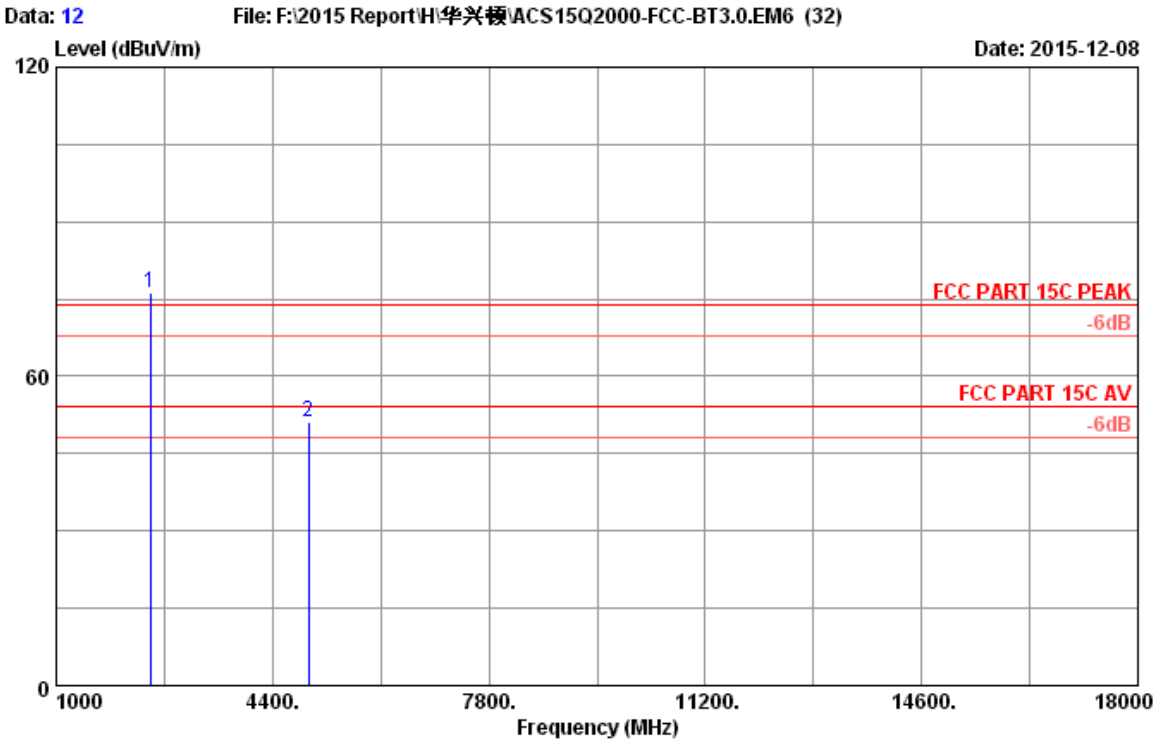

Site no. : 3m Chamber Data no. : 12
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	28.16	7.47	36.59	77.06	76.10	74.00	-2.10	Peak
2	4960.000	33.94	9.52	35.47	43.12	51.11	74.00	22.89	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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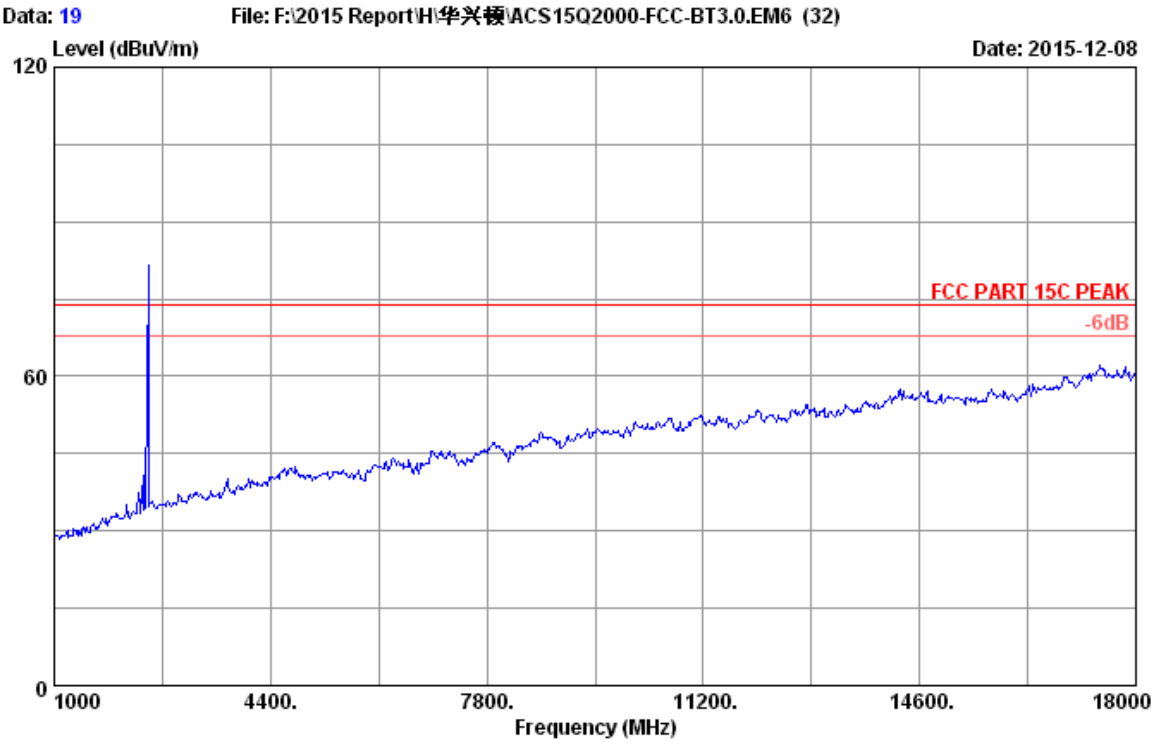


```
Site no.      : 3m Chamber                        Data no.   : 19
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : 8-DPSK 2480MHz Tx Mode
```


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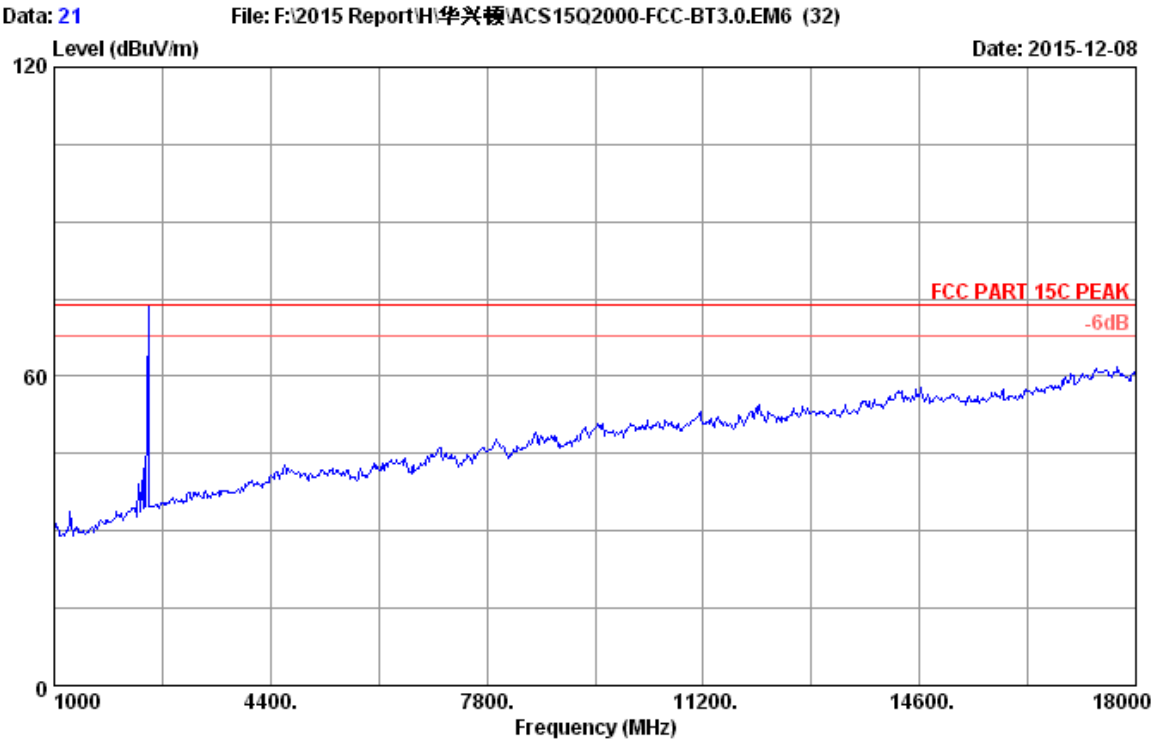


```
Site no.      : 3m Chamber                        Data no.   : 21
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : 8-DPSK 2480MHz Tx Mode
```


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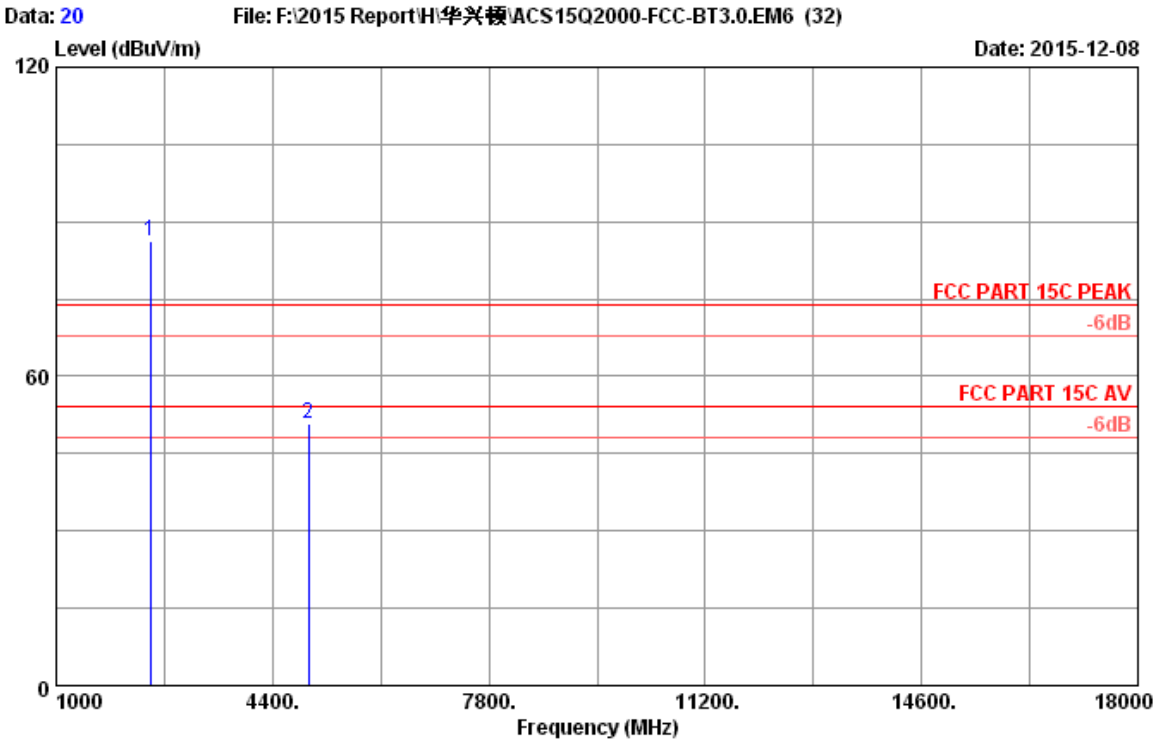

Site no. : 3m Chamber Data no. : 20
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	28.16	7.47	36.59	87.19	86.23	74.00	-12.23	Peak
2	4960.000	33.94	9.52	35.47	42.96	50.95	74.00	23.05	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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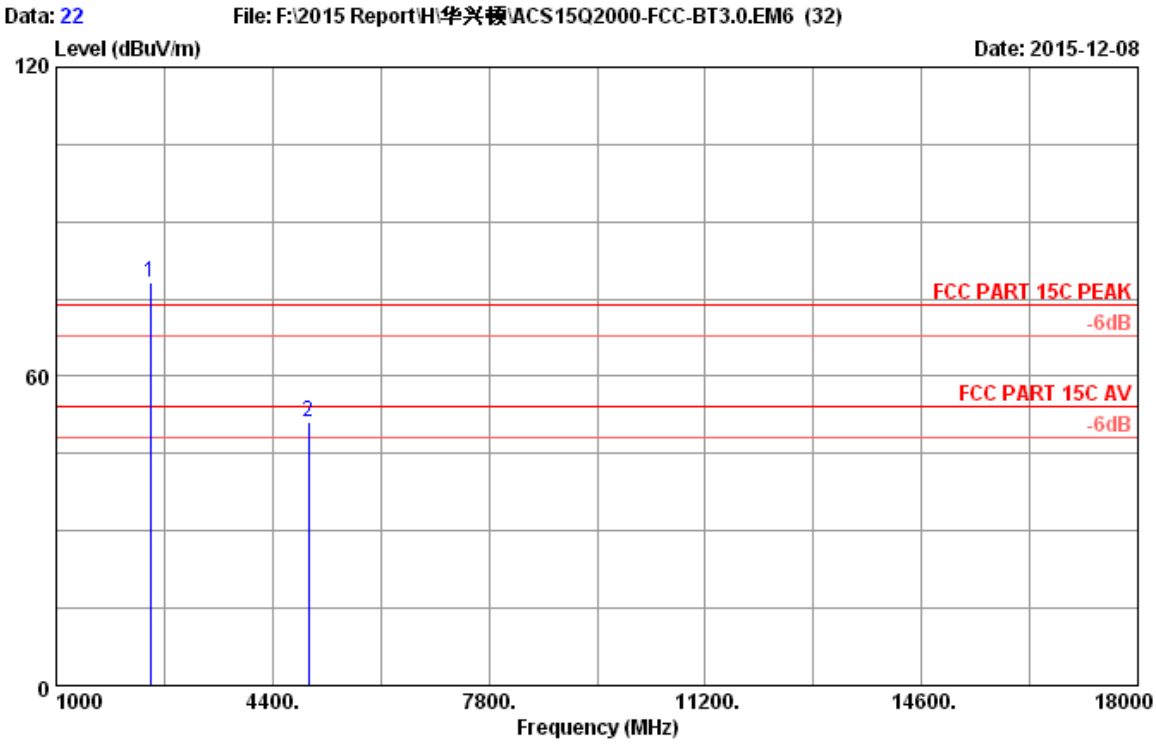

Site no. : 3m Chamber Data no. : 22
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	28.16	7.47	36.59	79.07	78.11	74.00	-4.11	Peak
2	4960.000	33.94	9.52	35.47	43.24	51.23	74.00	22.77	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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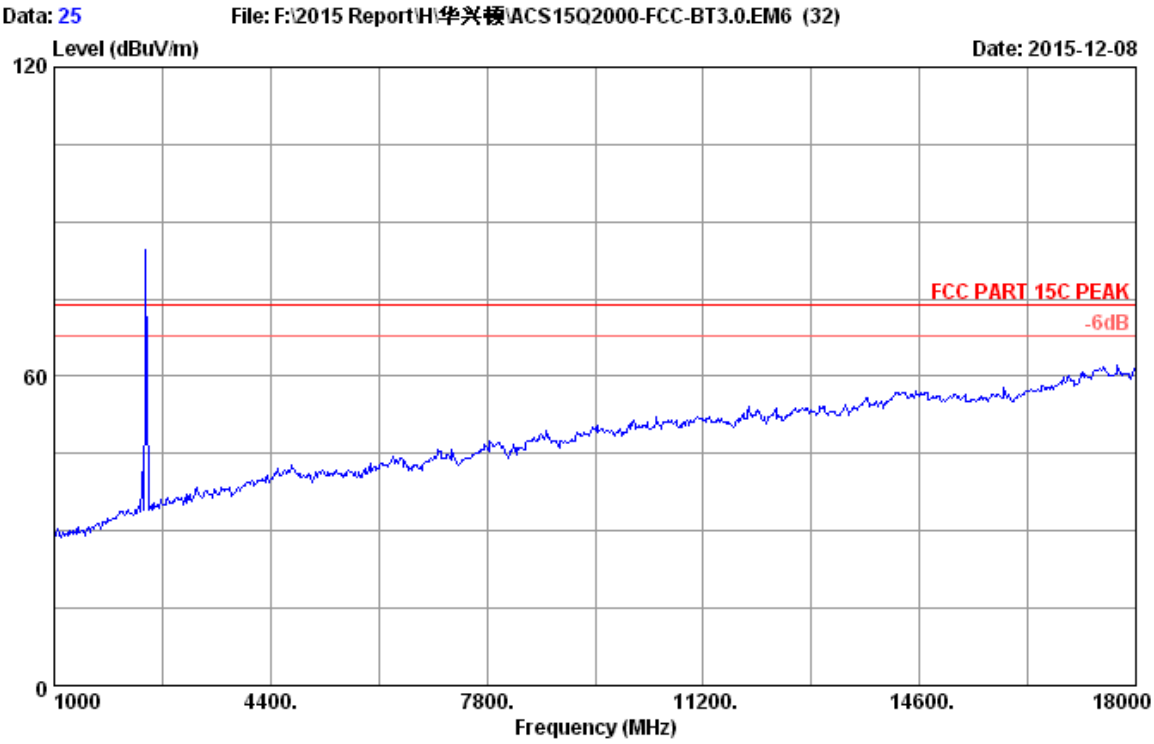


```
Site no.      : 3m Chamber                        Data no.   : 25
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : 8-DPSK 2441MHz Tx Mode
```


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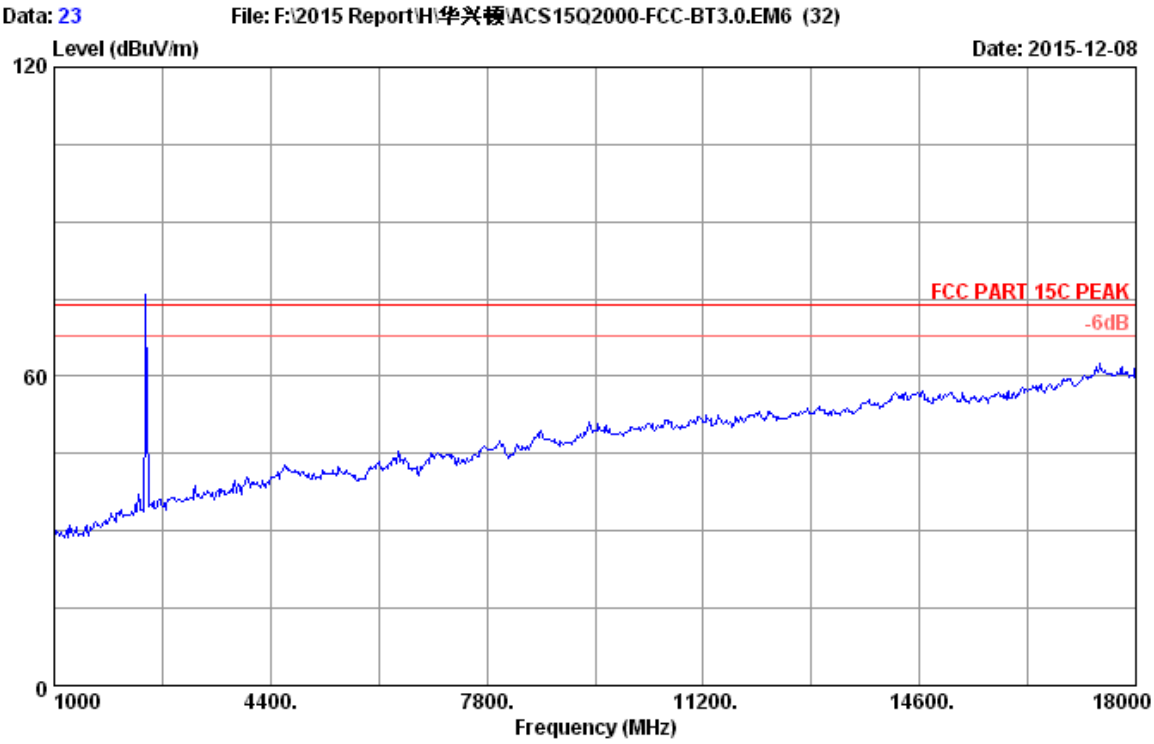


```
Site no.      : 3m Chamber                        Data no.   : 23
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : 8-DPSK 2441MHz Tx Mode
```


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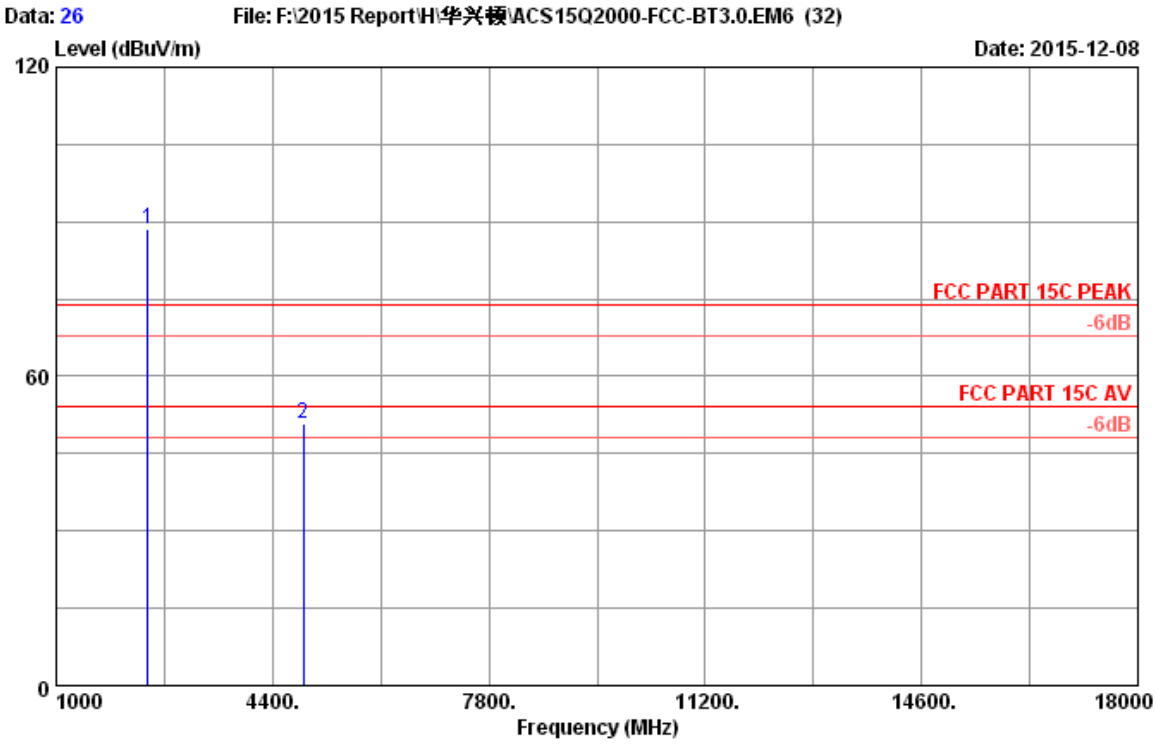

Site no. : 3m Chamber Data no. : 26
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2441MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.000	28.08	7.39	36.60	89.81	88.68	74.00	-14.68	Peak
2	4882.000	33.81	9.49	35.51	43.18	50.97	74.00	23.03	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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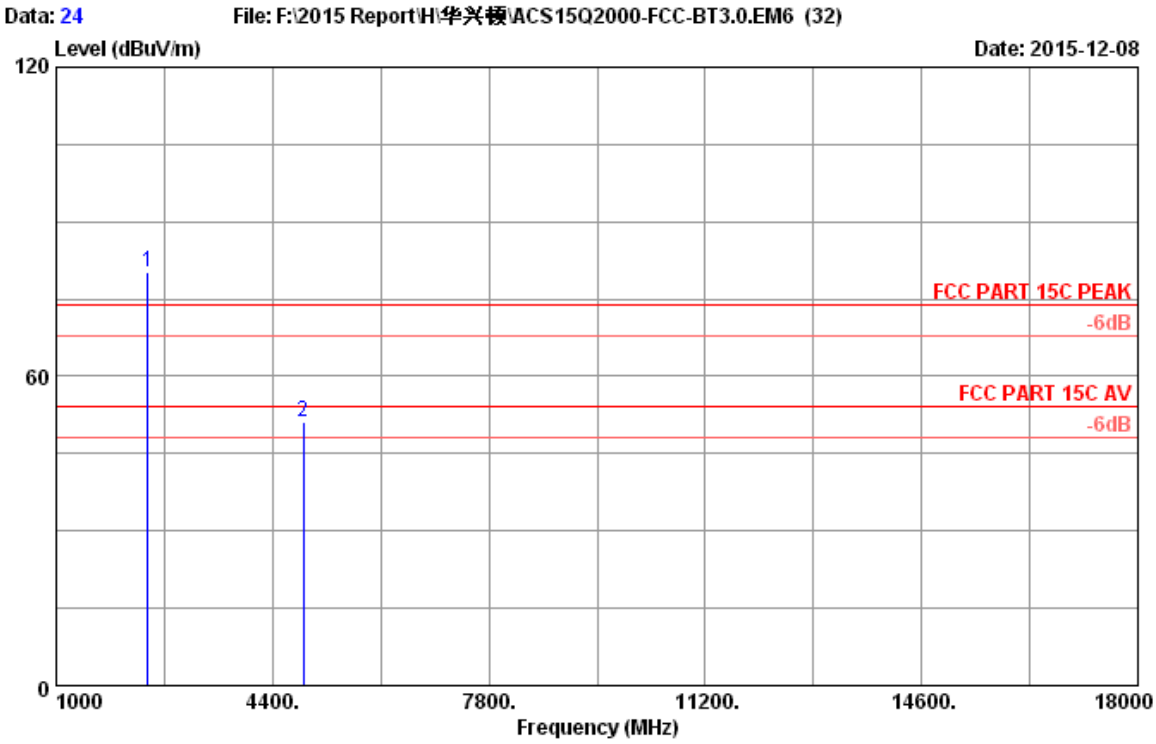

Site no. : 3m Chamber Data no. : 24
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2441MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.000	28.08	7.39	36.60	81.41	80.28	74.00	-6.28	Peak
2	4882.000	33.81	9.49	35.51	43.26	51.05	74.00	22.95	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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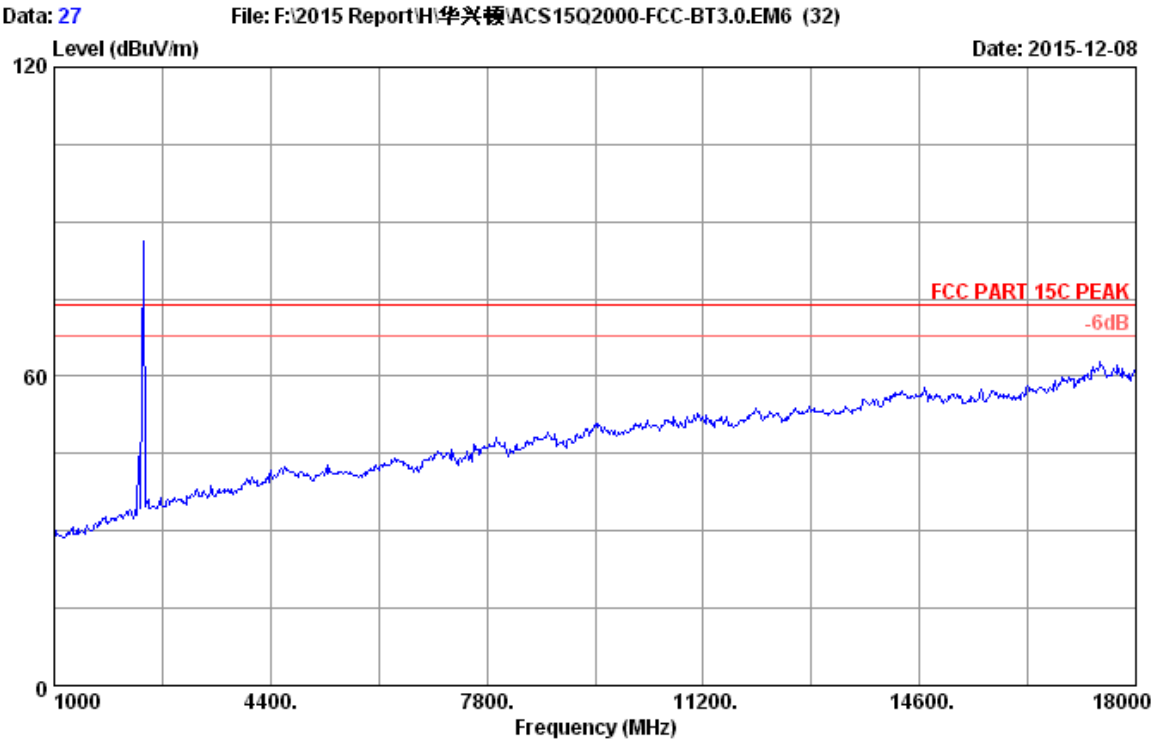


```
Site no.      : 3m Chamber                        Data no.   : 27
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : 8-DPSK 2402MHz Tx Mode
```


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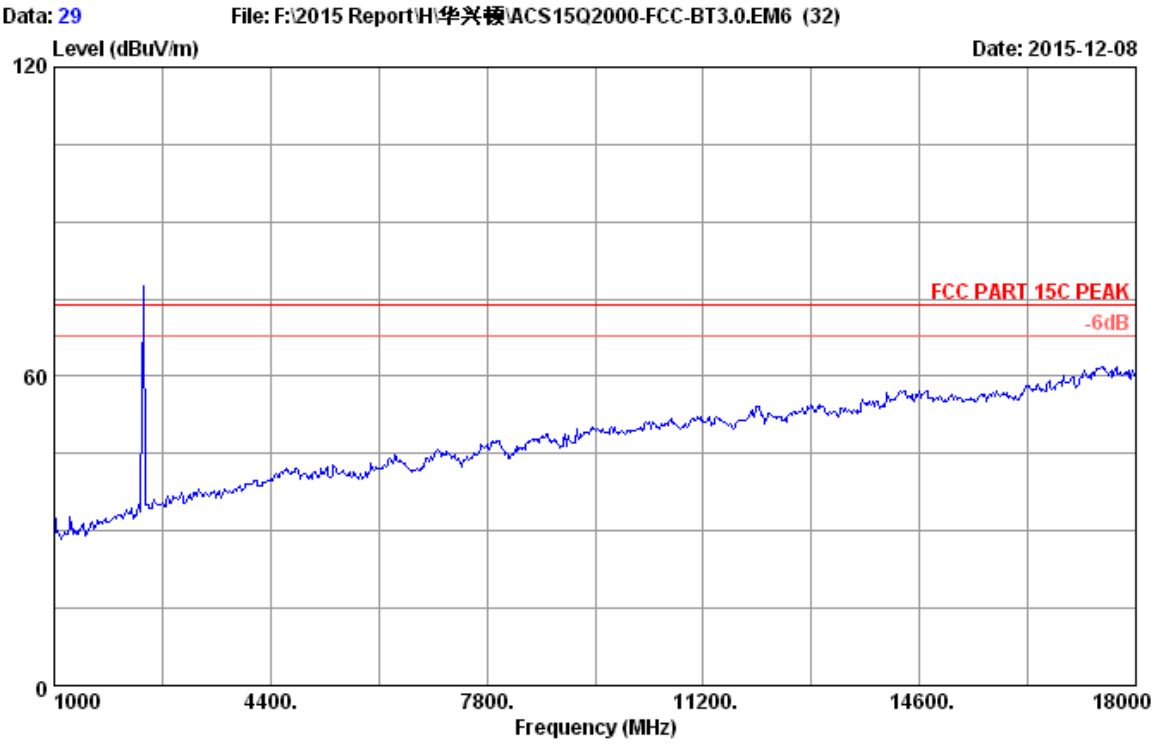


```
Site no.      : 3m Chamber                        Data no.   : 29
Dis. / Ant.   : 3m   2015 MCTD1209   3006   Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : 23.9*C/52.8%
Engineer      : Alice_yang
EUT           : Bluetooth Fingerprint Reader  M/N:TCS511
Power rating  : DC 3.7V
Test Mode     : 8-DPSK 2402MHz Tx Mode
```


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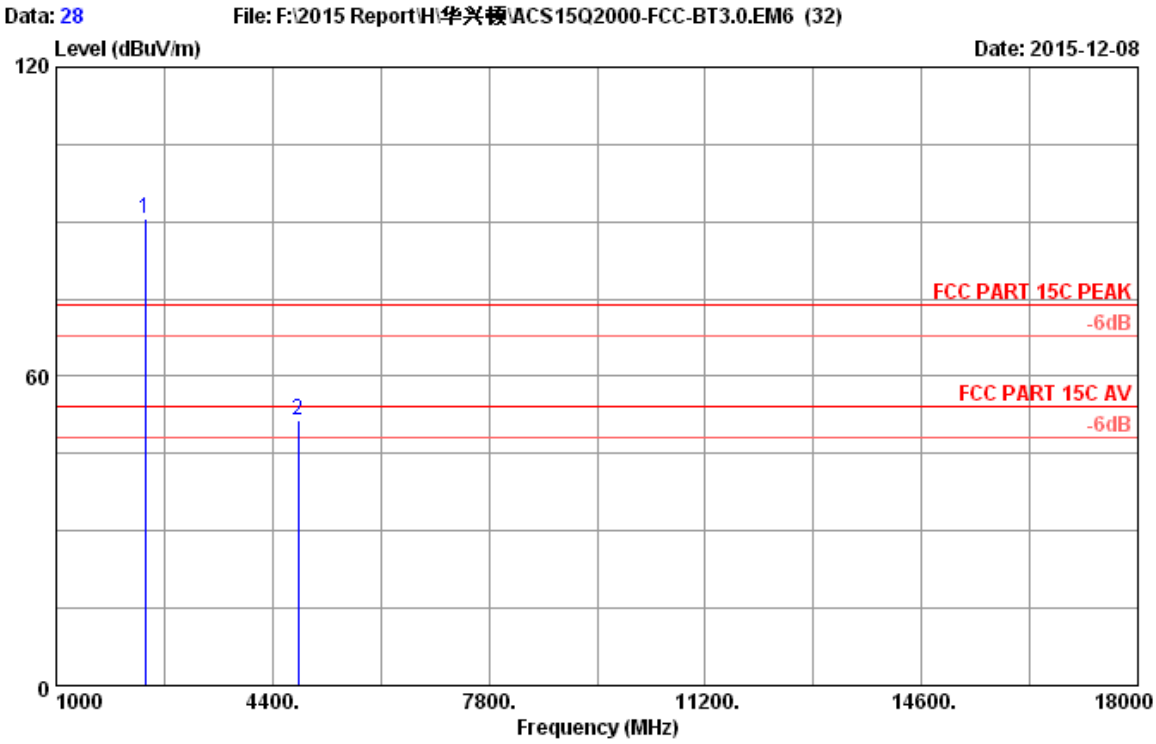

Site no. : 3m Chamber Data no. : 28
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	28.00	7.32	36.62	91.98	90.68	74.00	-16.68	Peak
2	4804.000	33.69	9.46	35.54	43.77	51.38	74.00	22.62	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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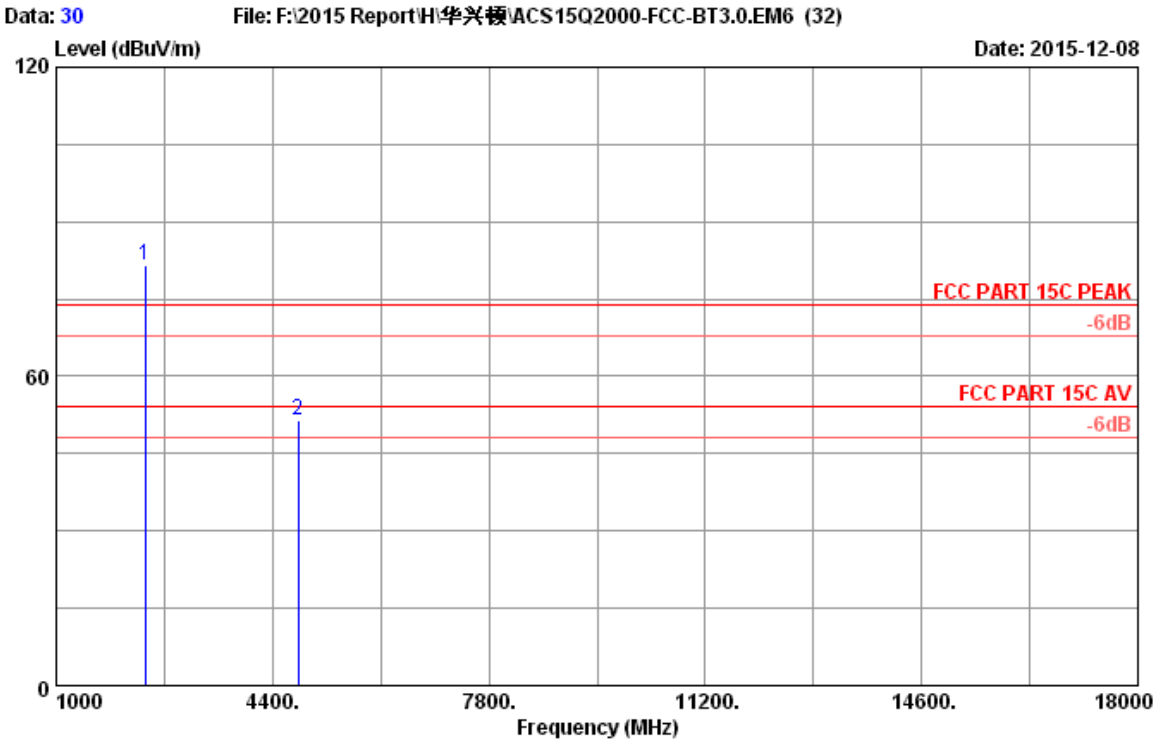

Site no. : 3m Chamber Data no. : 30
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	28.00	7.32	36.62	82.82	81.52	74.00	-7.52	Peak
2	4804.000	33.69	9.46	35.54	43.80	51.41	74.00	22.59	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1Year
3.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr. 28,15	1 Year

5.2. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

5.3. Test Procedure

The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions With peak detector.

5.4. Test result

PASS (The testing data was attached in the next pages.)

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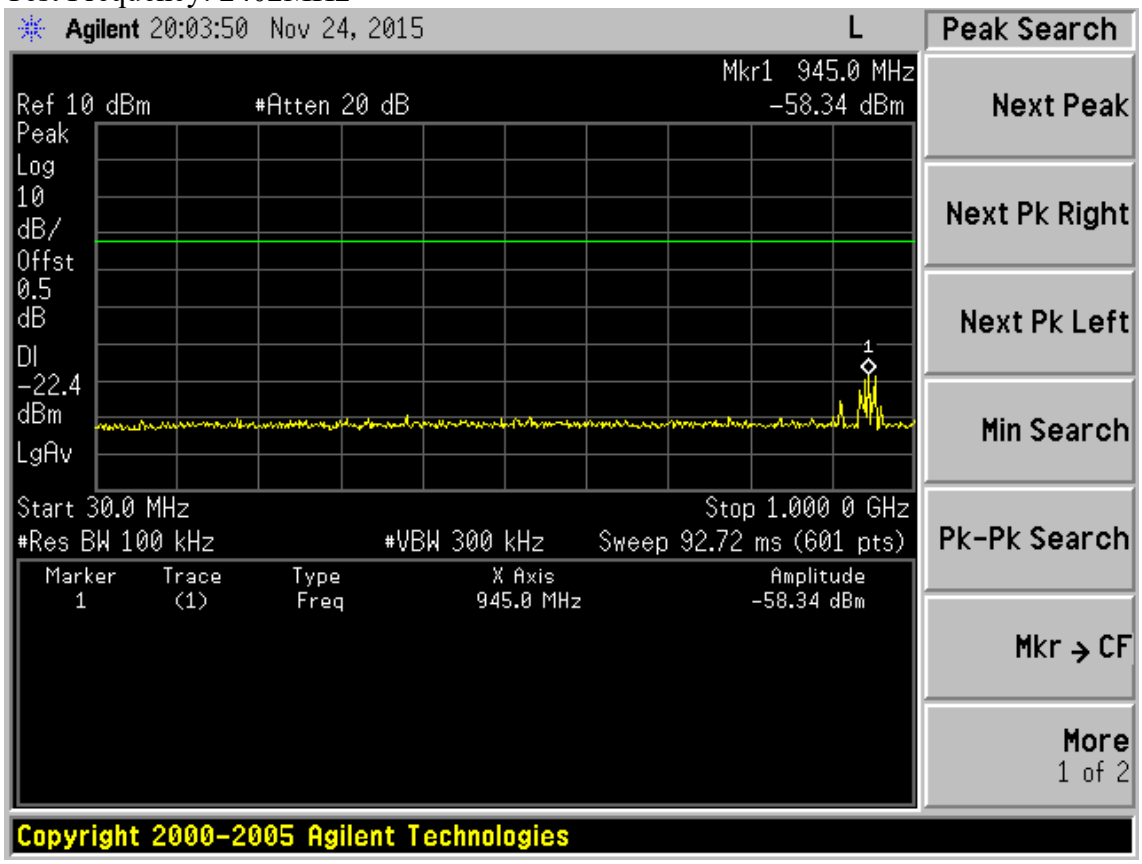
Hopping off
GFSK
Test Frequency: 2402MHz



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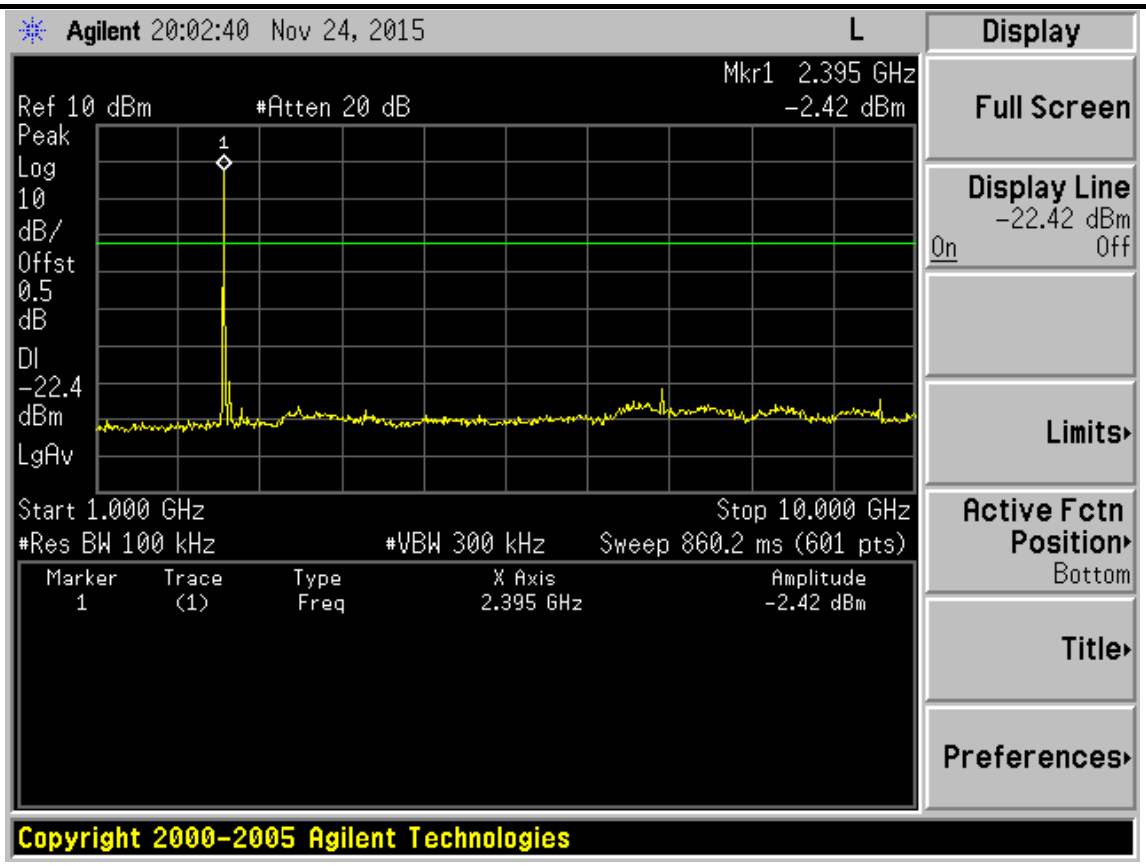

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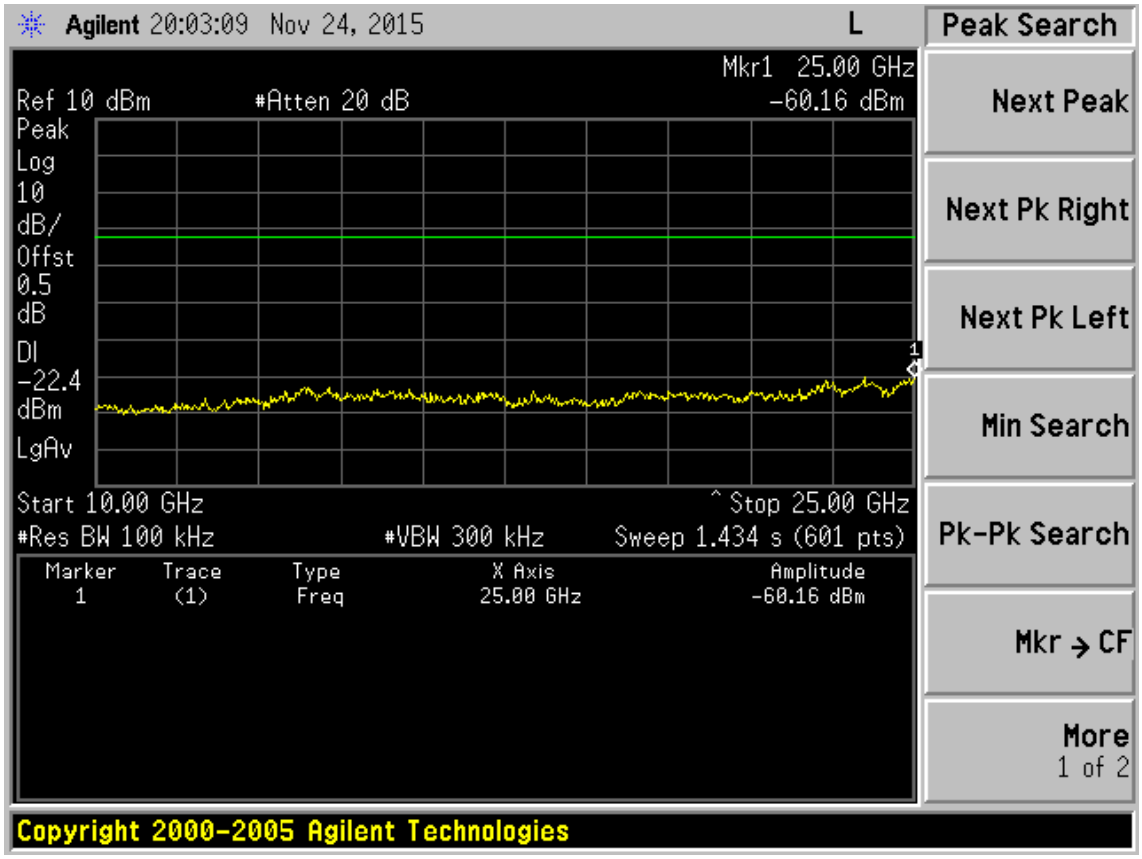

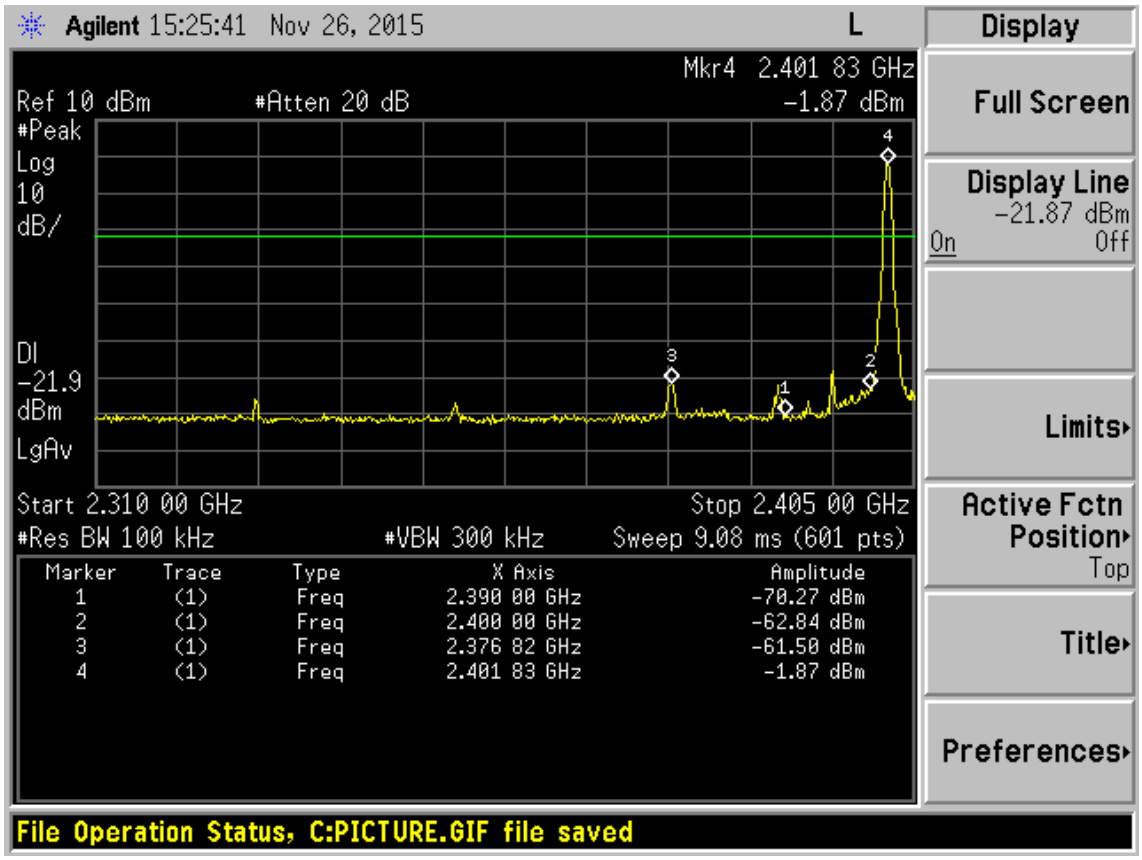

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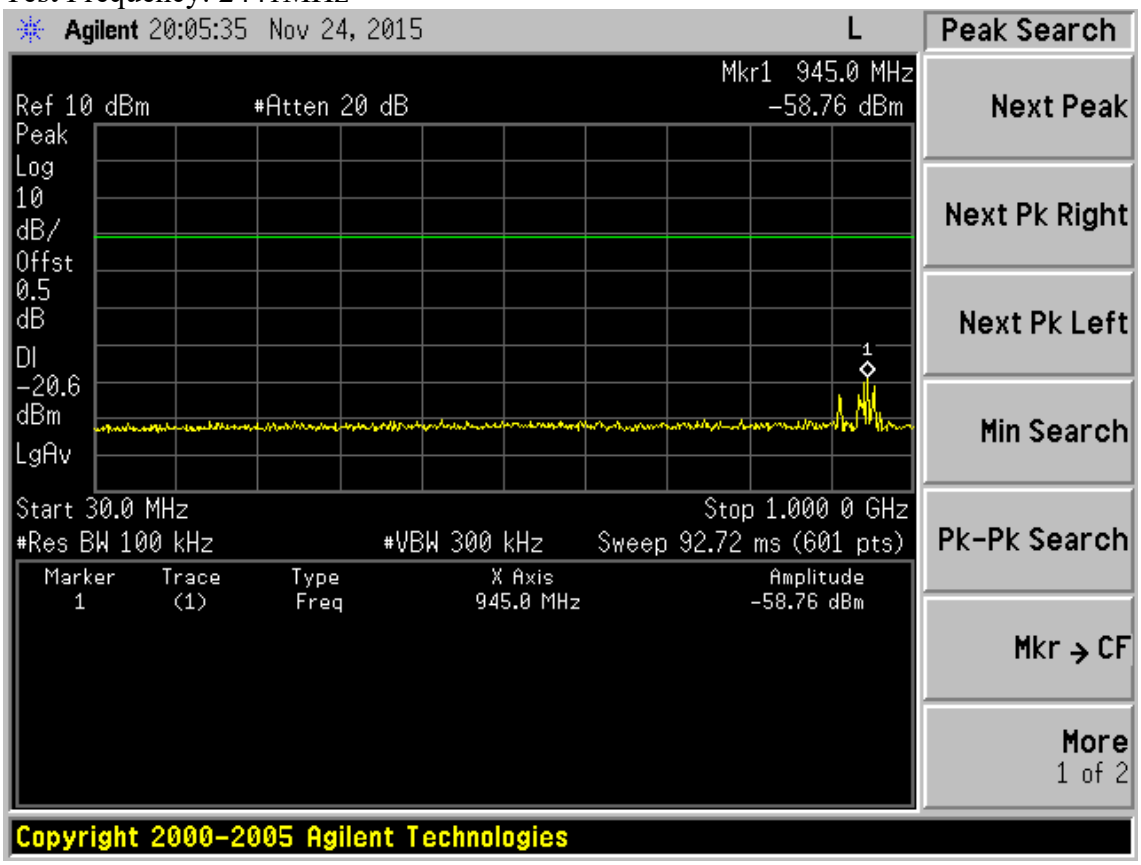
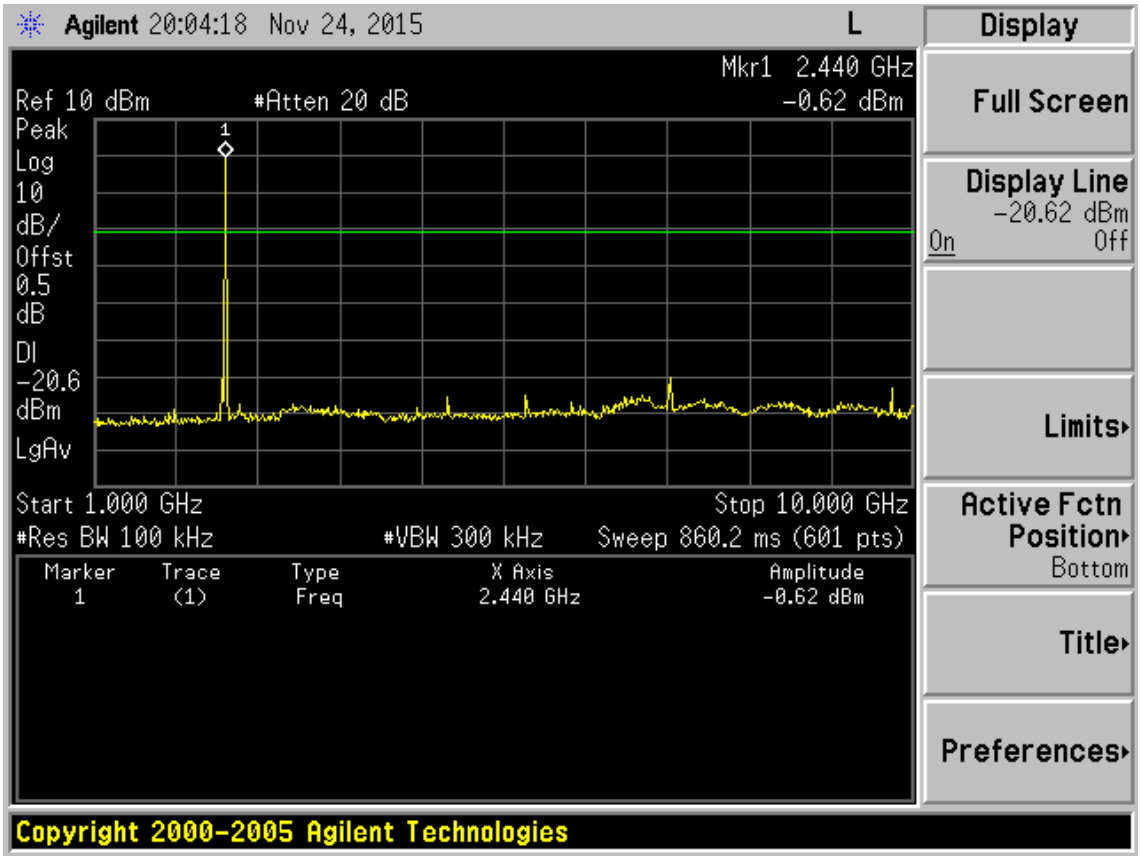
Test Frequency: 2441MHz





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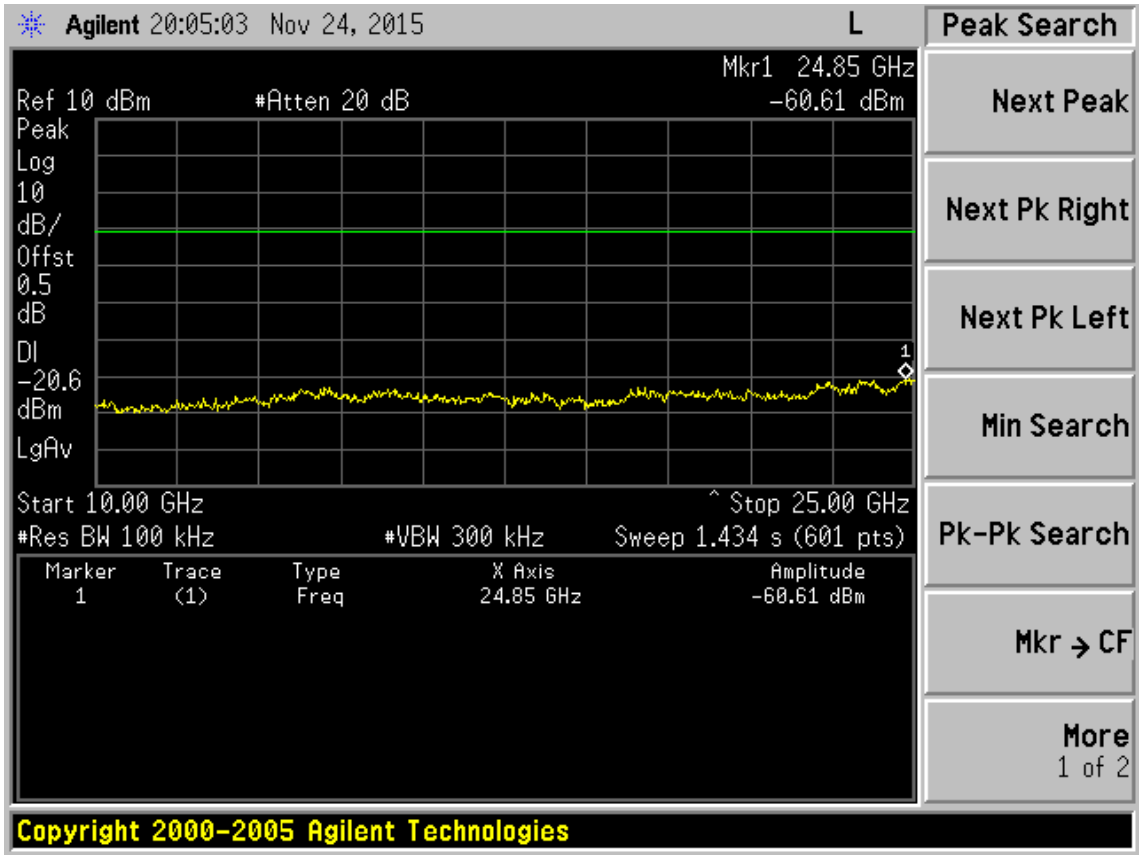
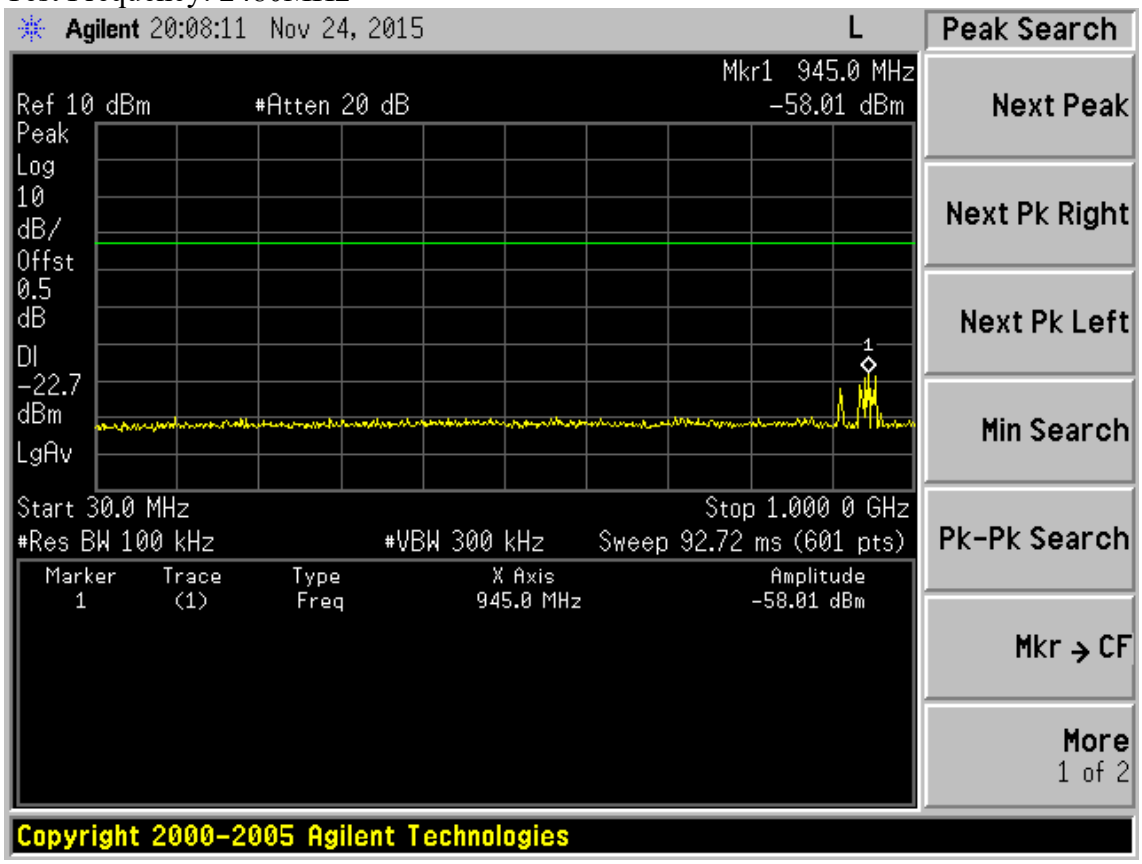


Test Frequency: 2480MHz



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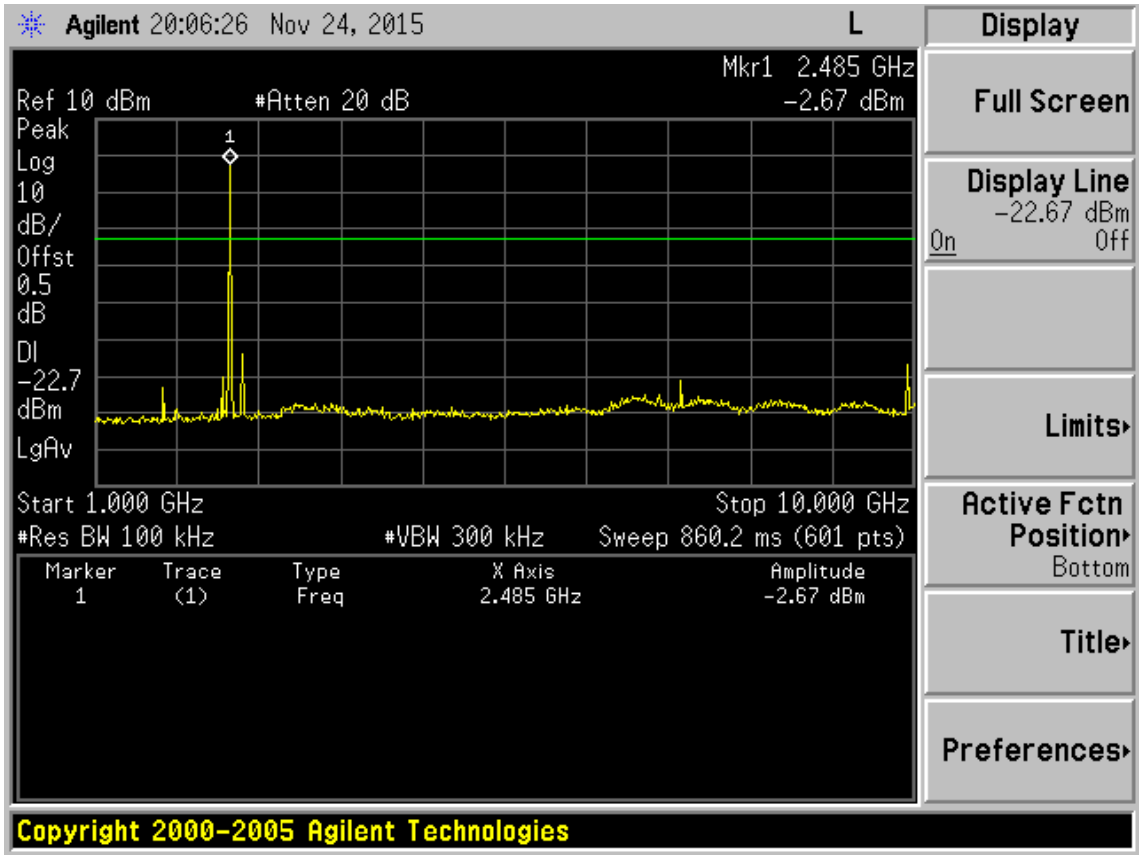

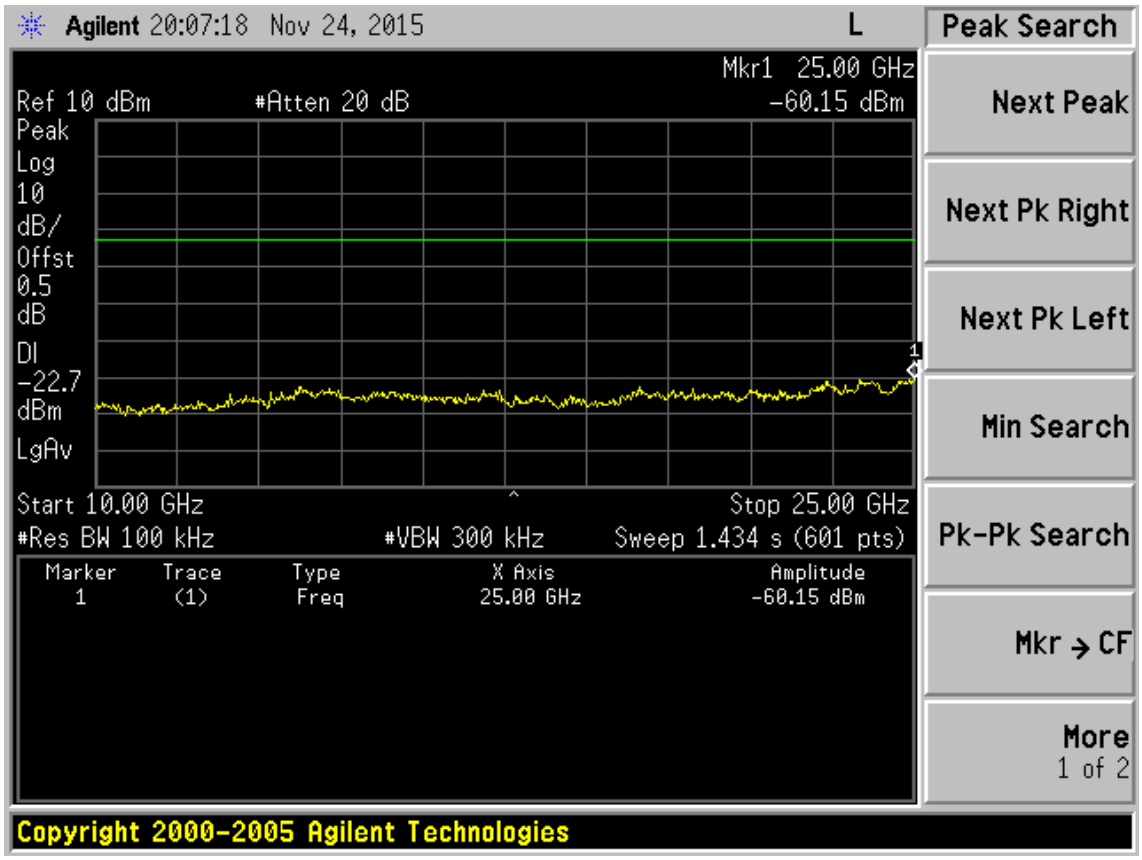

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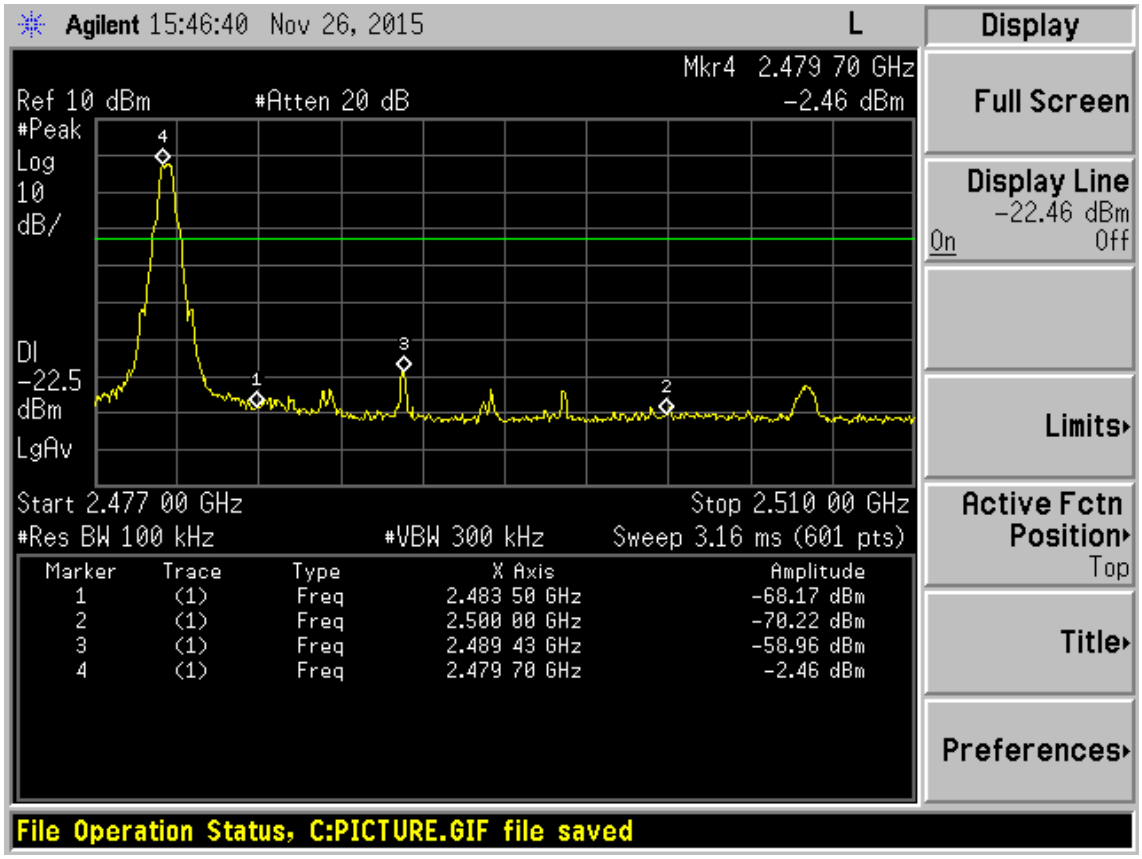

8-DPSK

Test Frequency: 2402MHz

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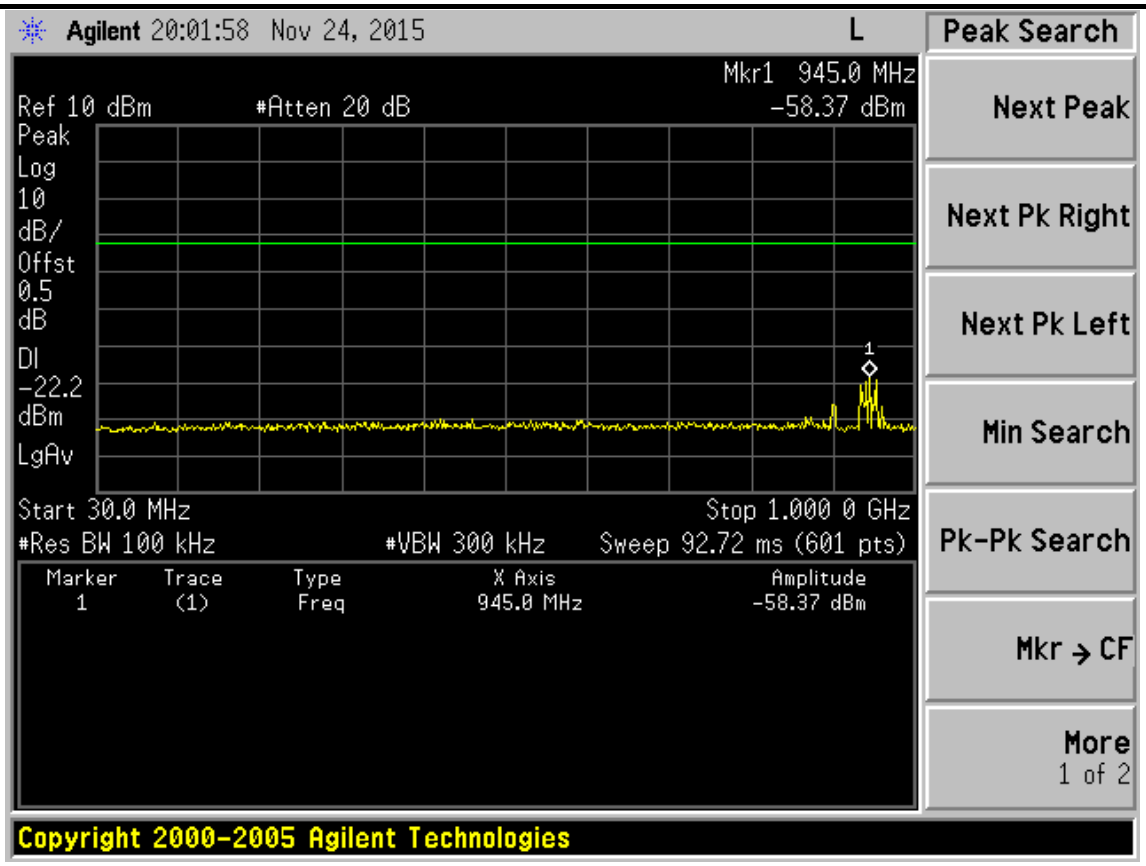

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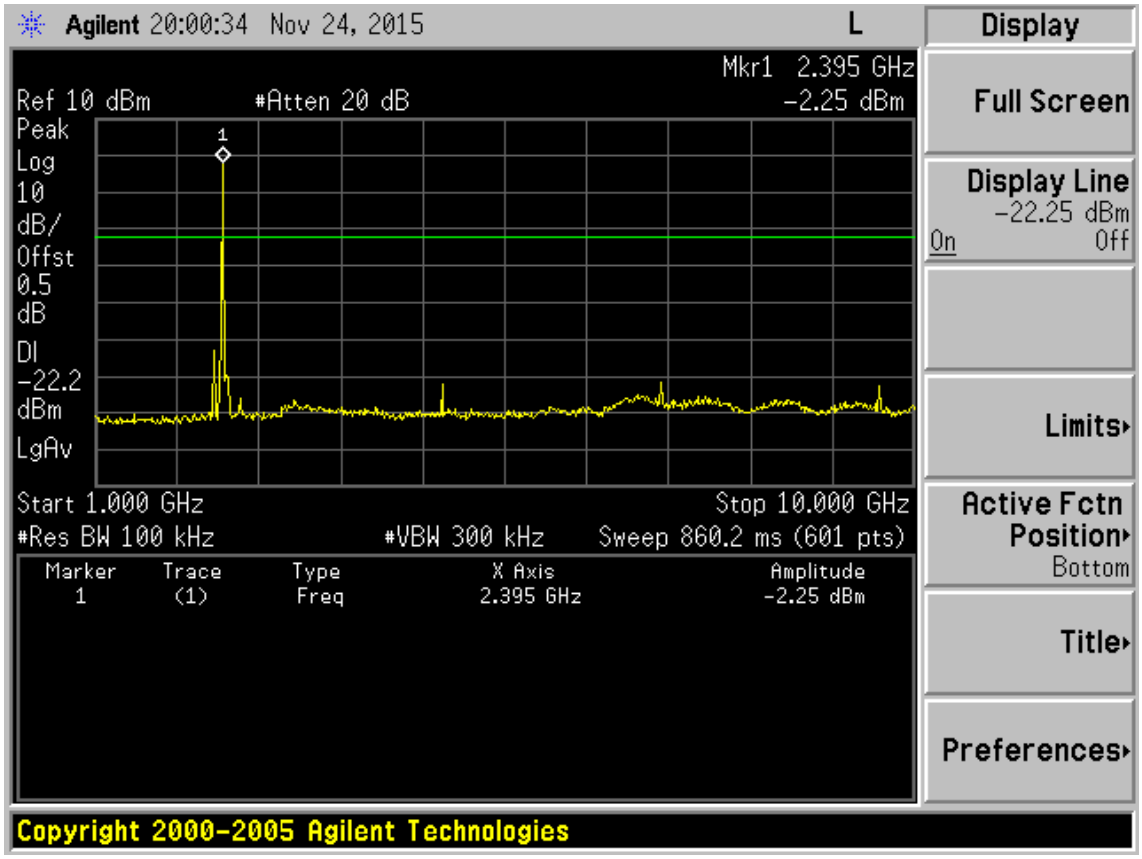

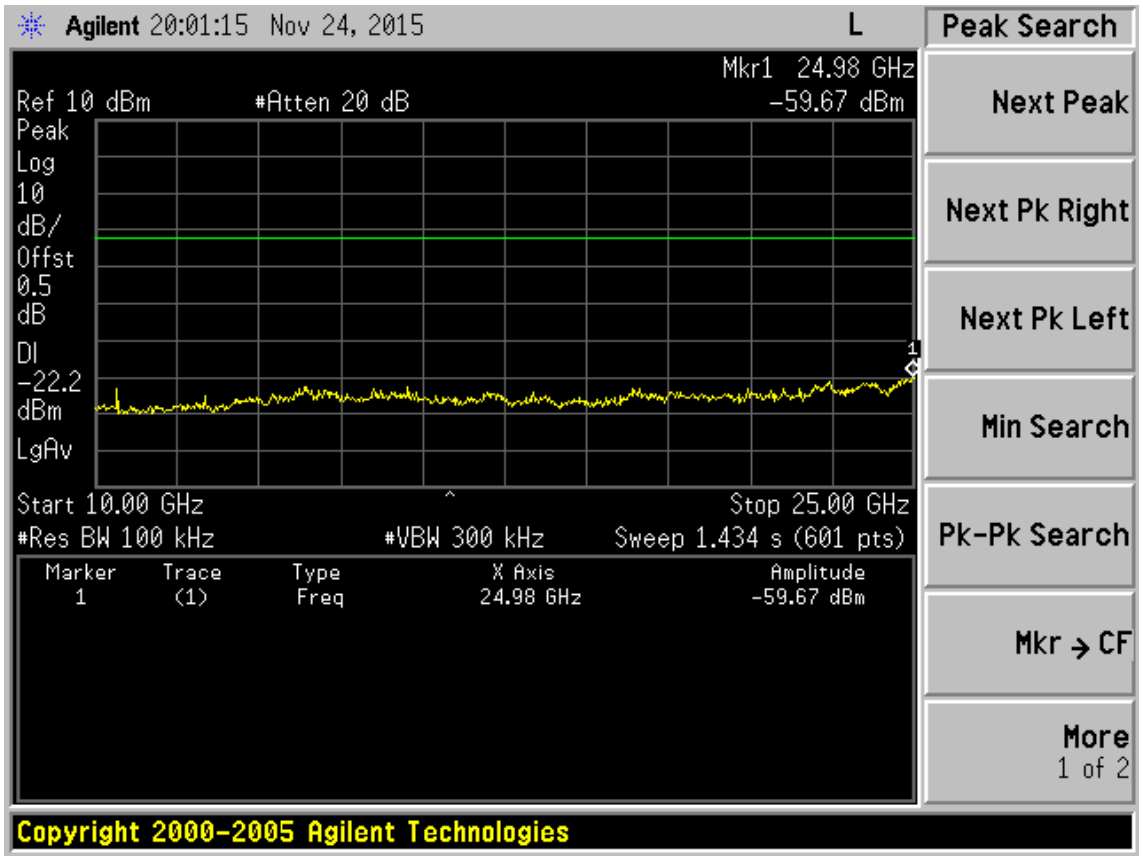

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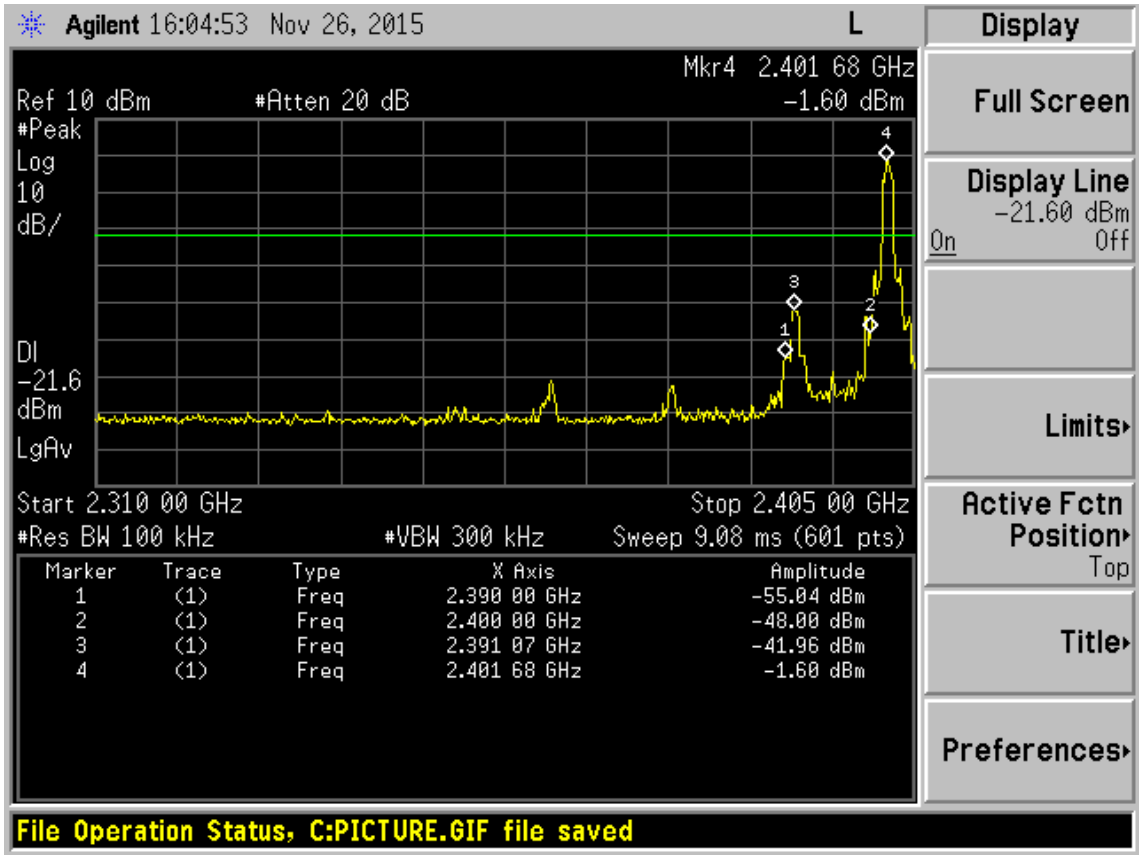
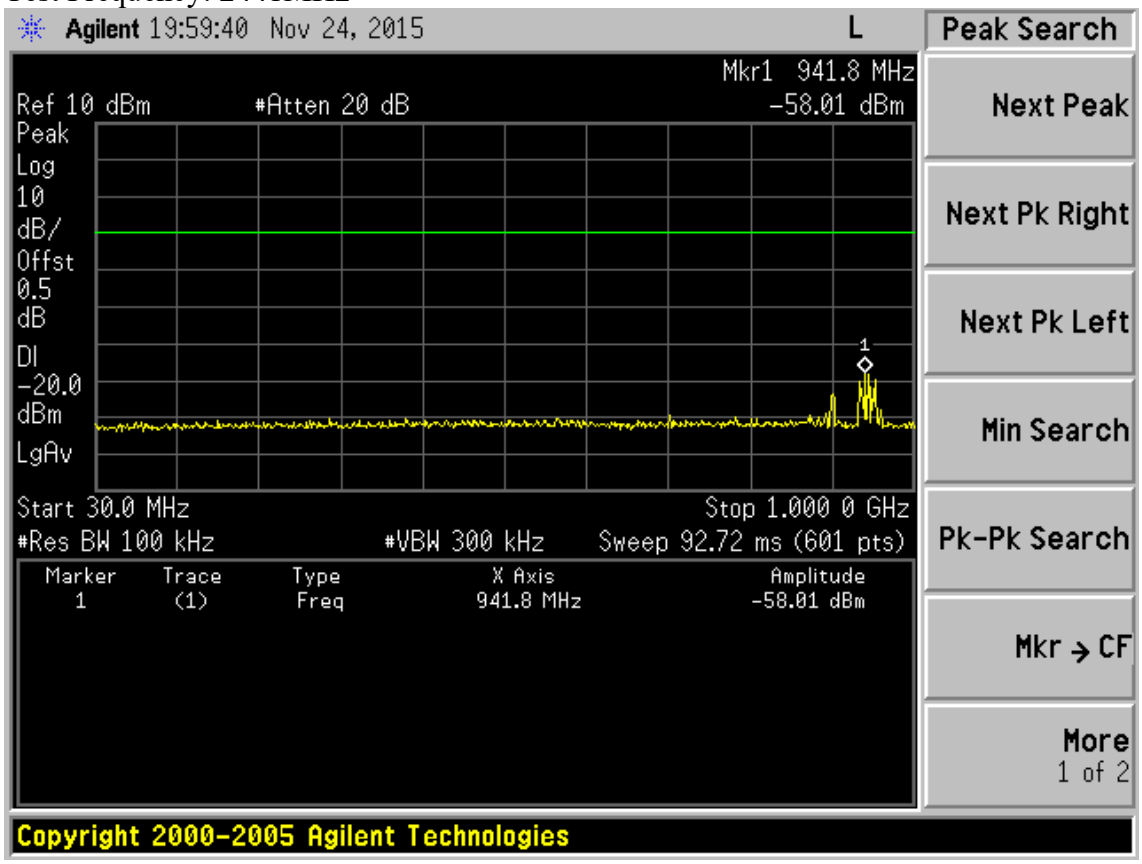


Test Frequency: 2441MHz



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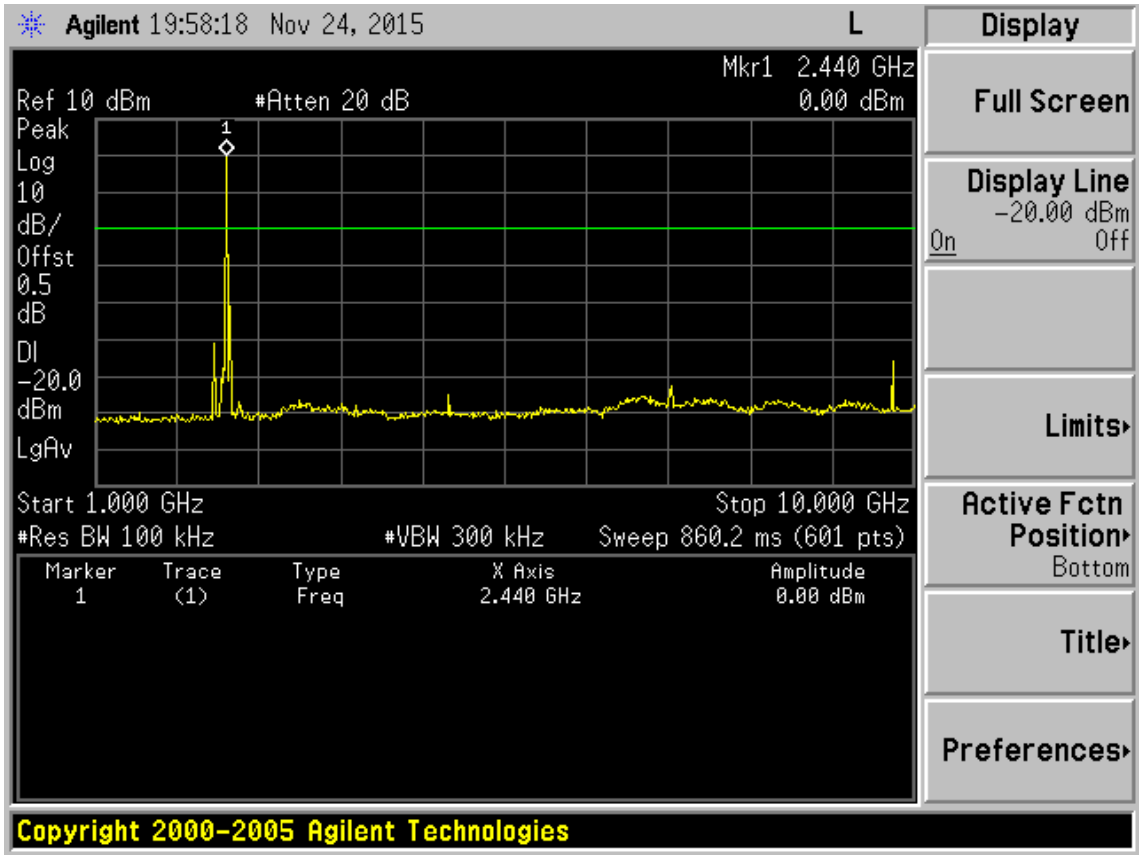

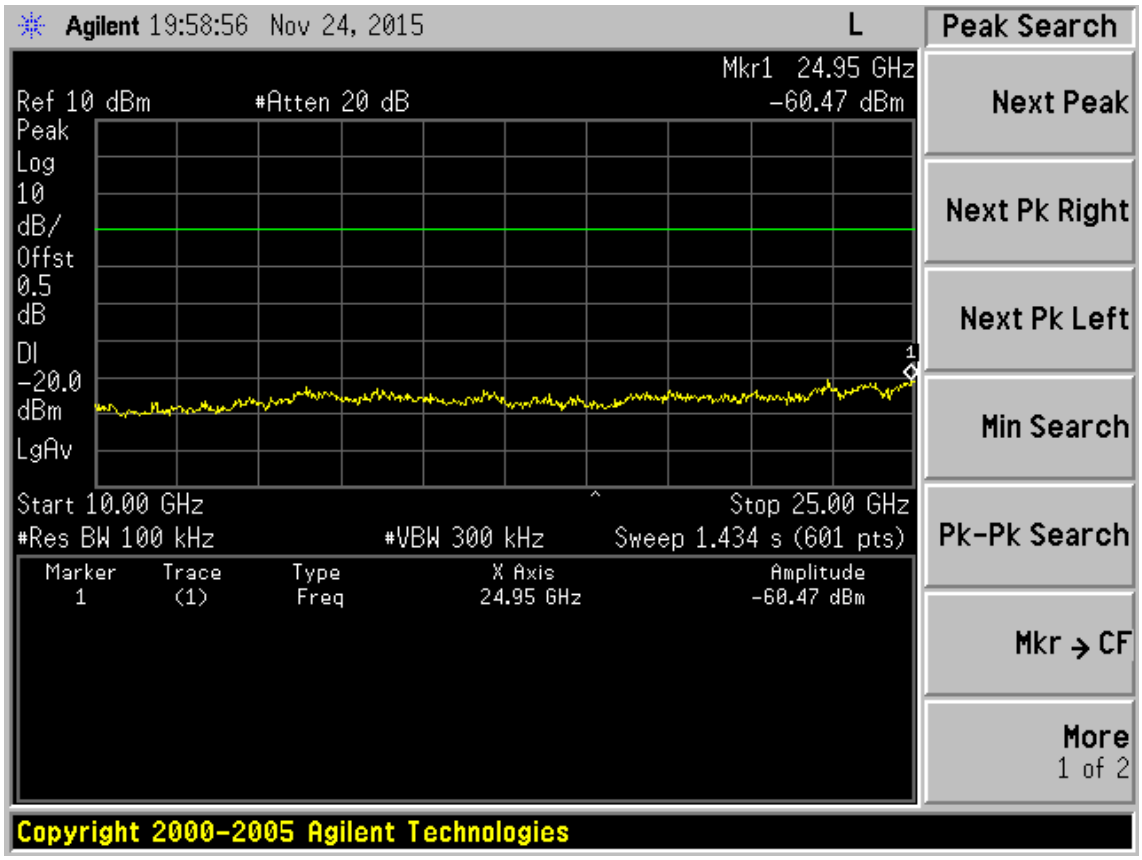

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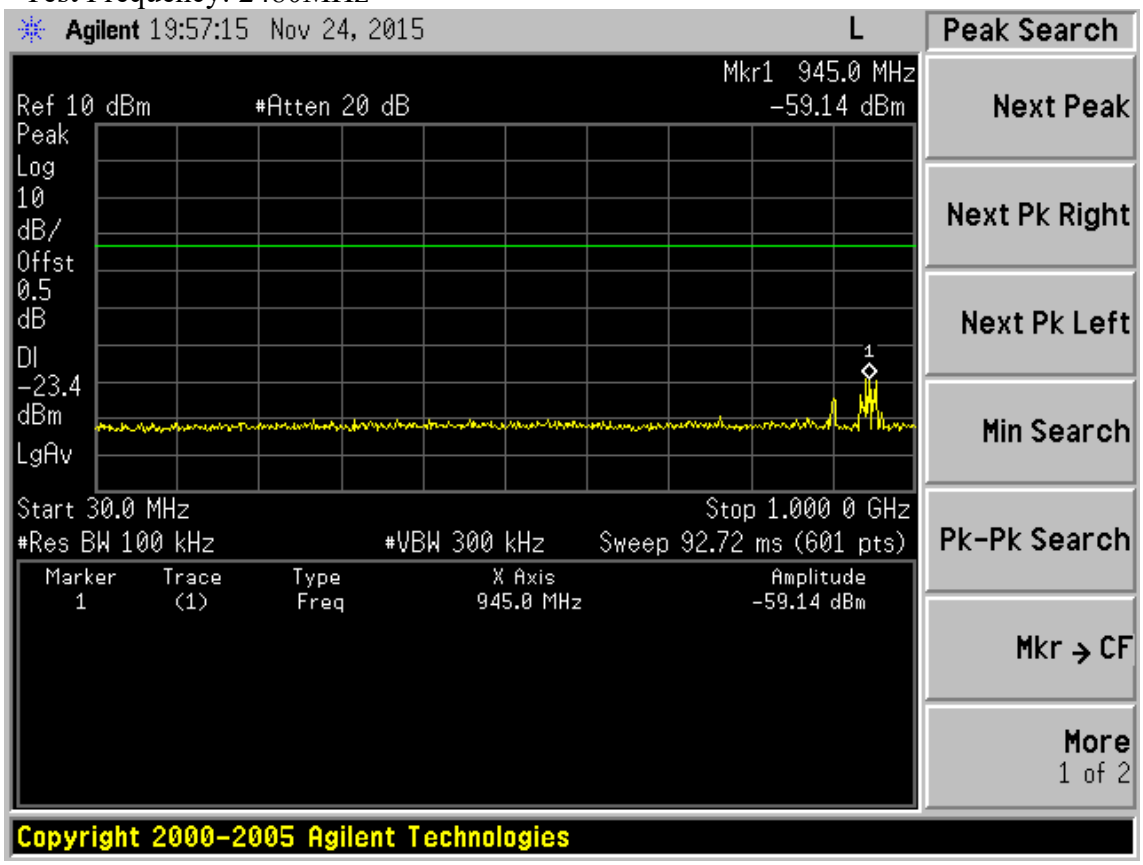
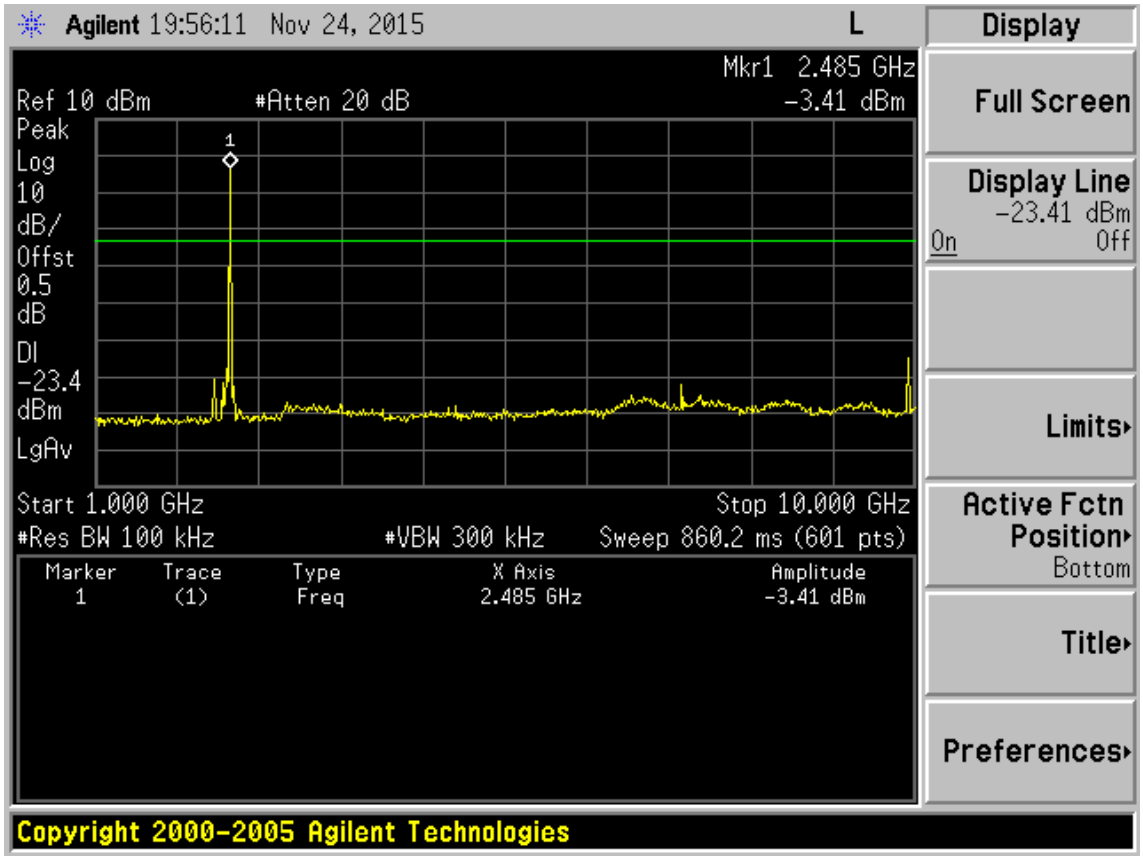
Test Frequency: 2480MHz





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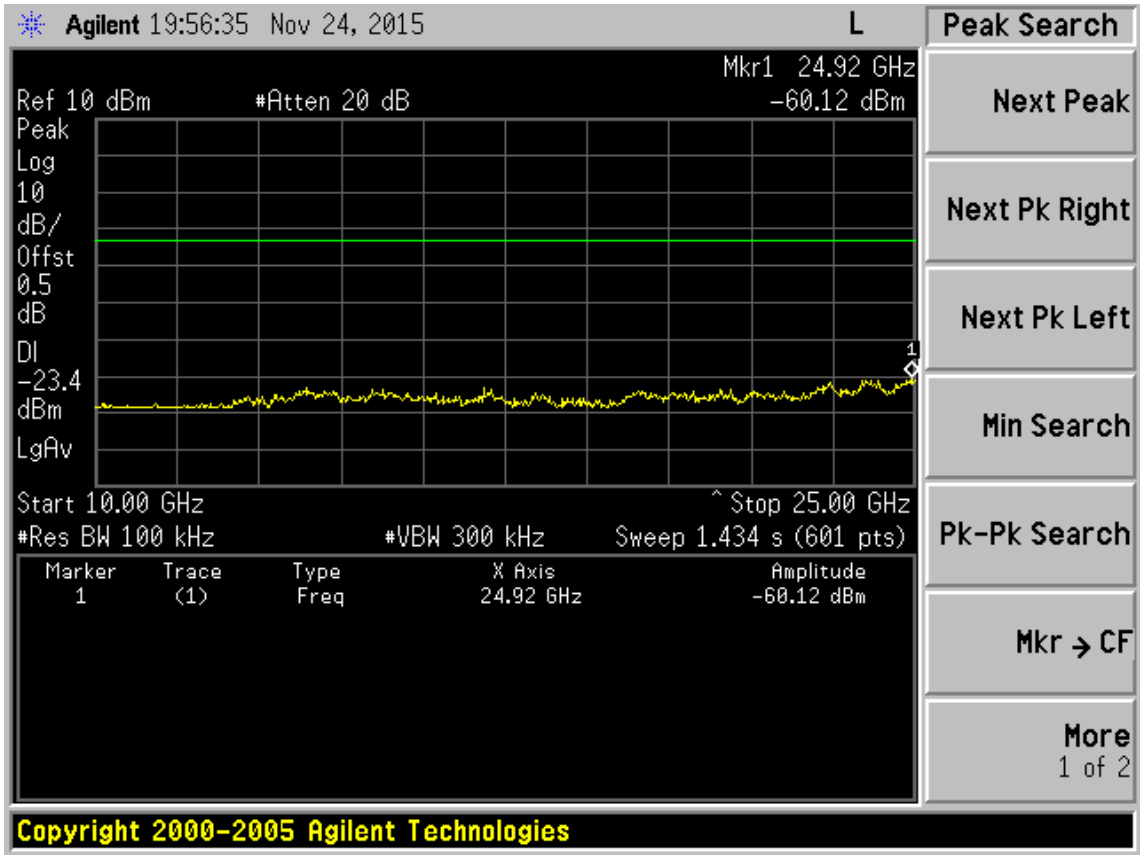

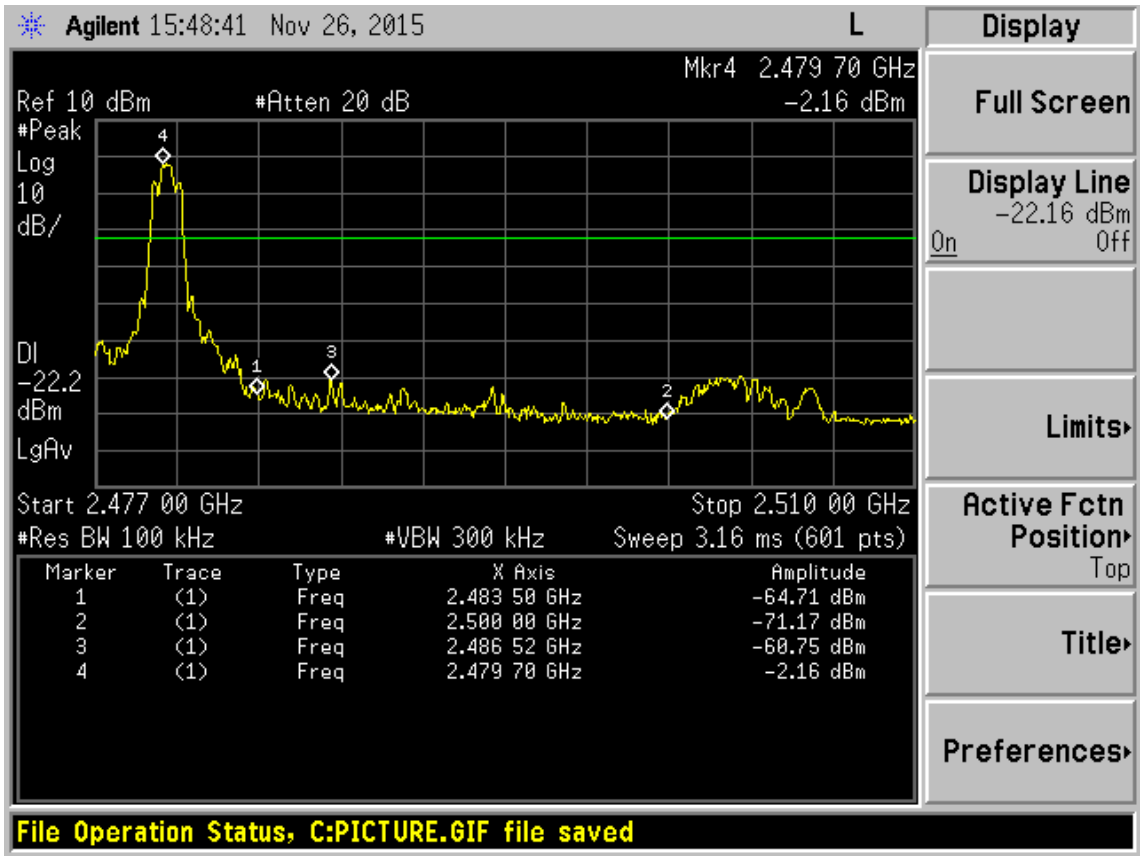

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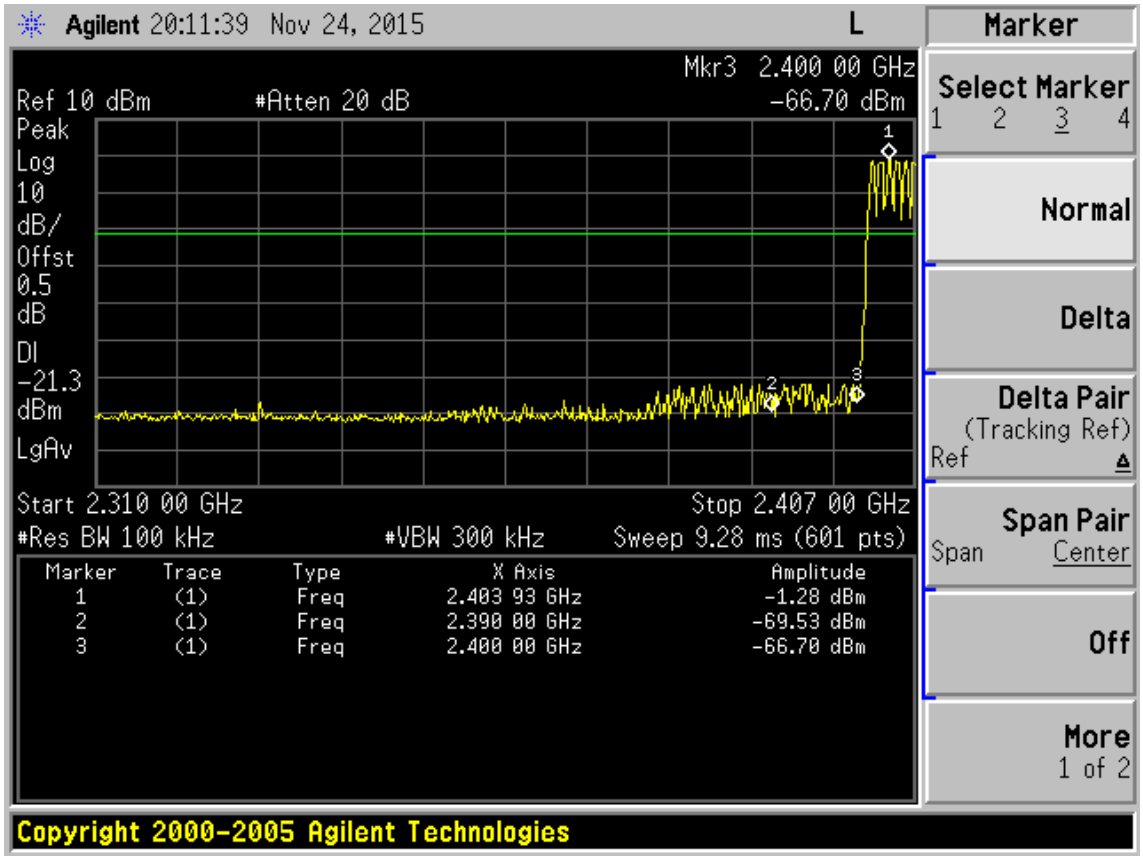
Hopping on
GFSK



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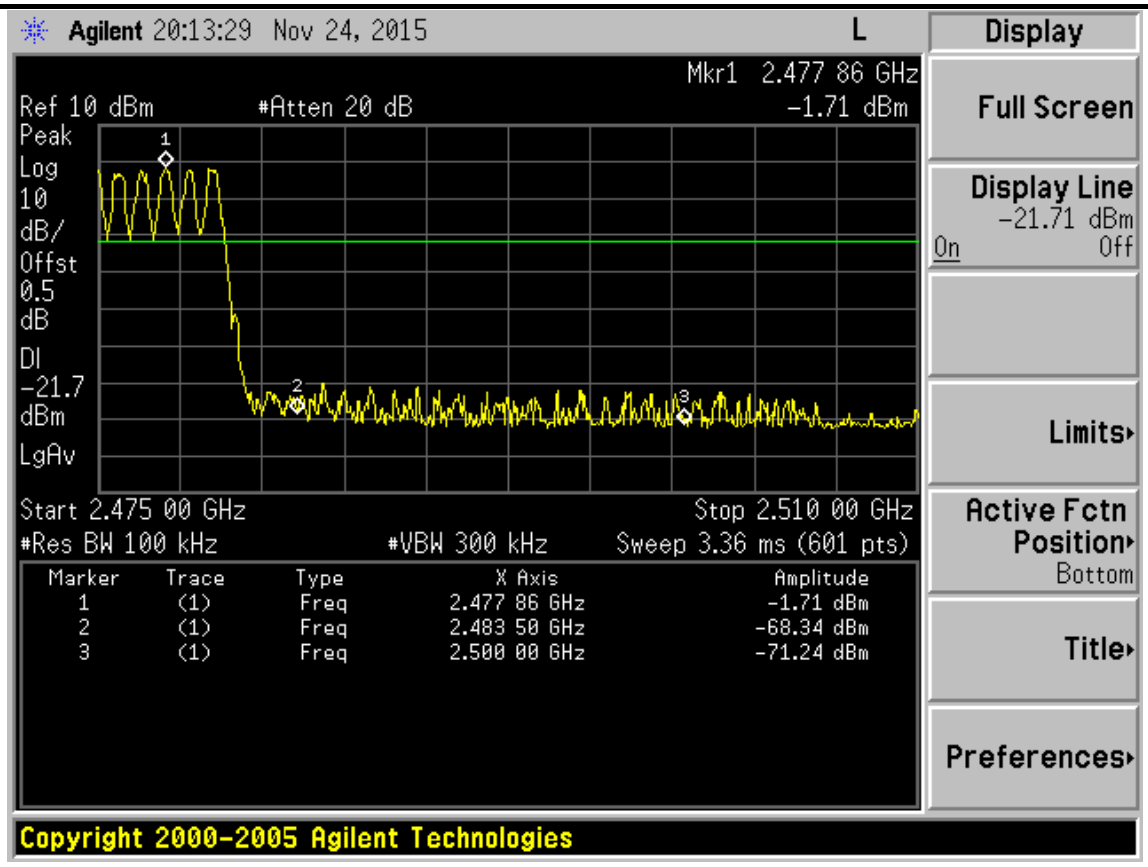

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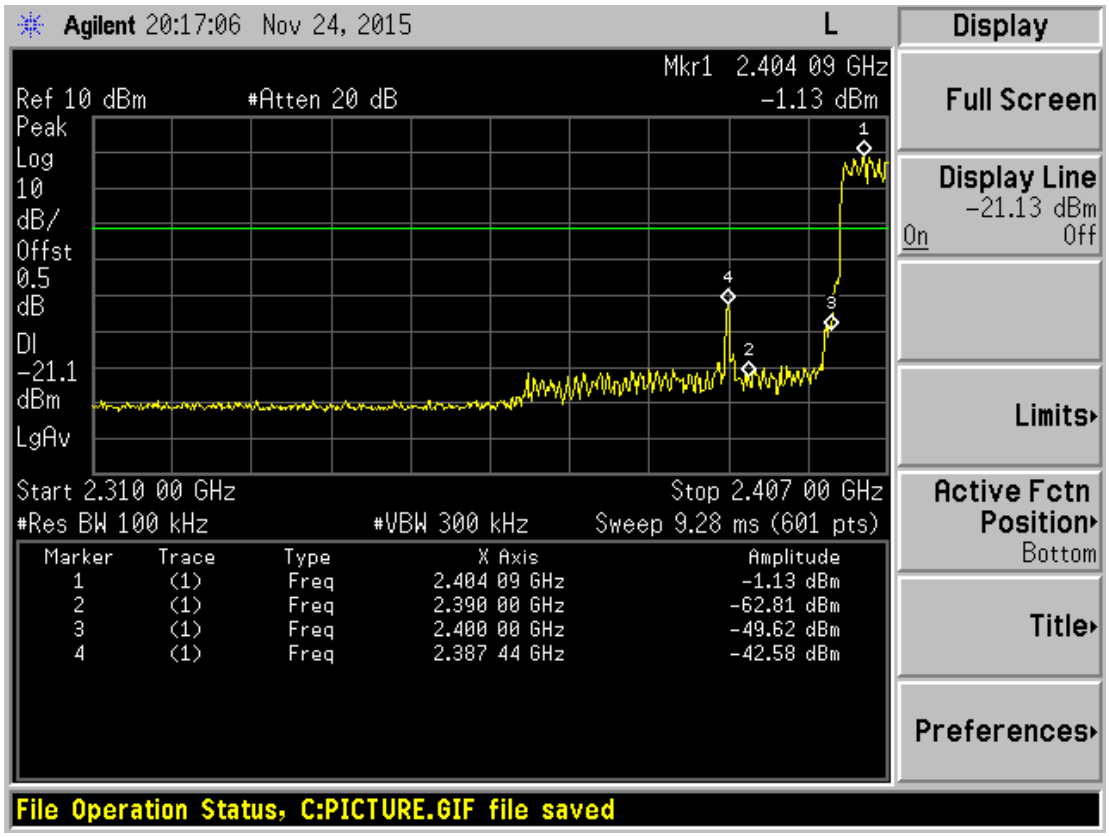
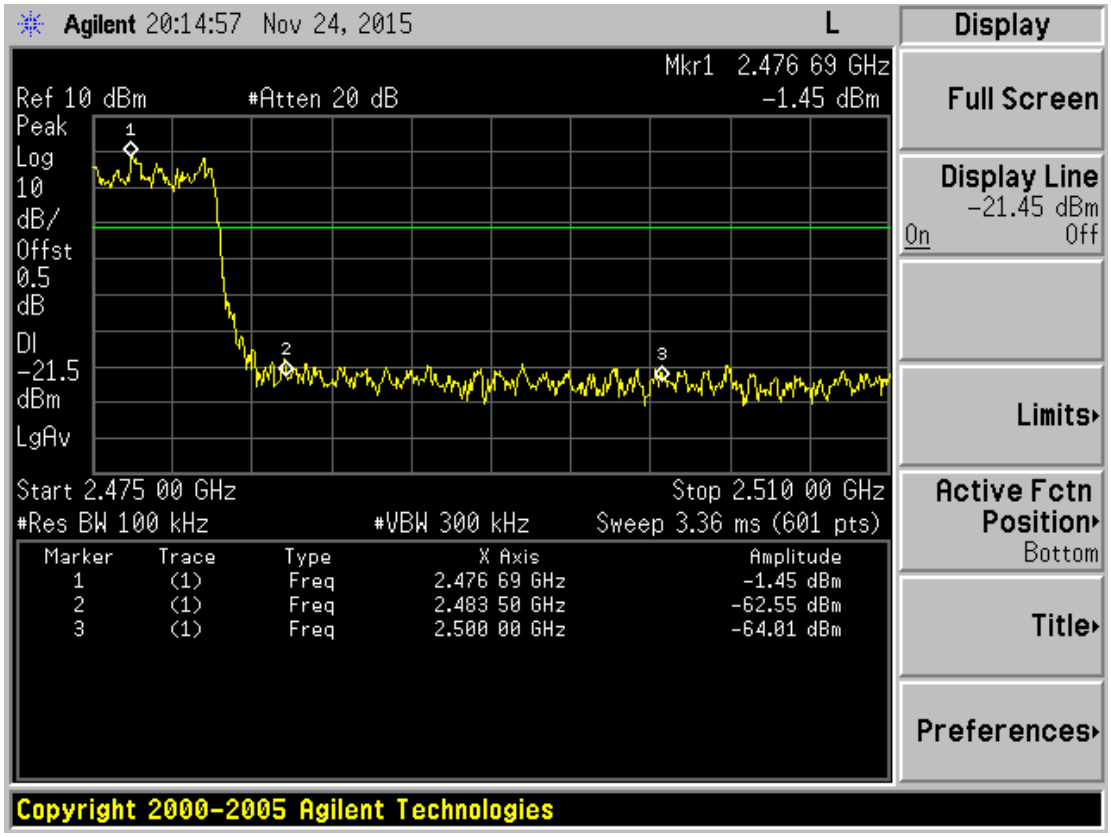
8-DPSK





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6. 20 DB BANDWIDTH TEST

6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1Year
2.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr. 28,15	1 Year

6.2. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.3. Test Results

EUT: Bluetooth Fingerprint Reader		
M/N: TCS511		
Test date: 2015-11-24	Pressure: 101.6±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Donjon_Huang	Test site: RF Site	Temperature: 22.6±0.6℃

Test Mode	Frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)
GFSK	2402	1.075	N/A
	2441	1.078	N/A
	2480	1.076	N/A
8-DPSK	2402	1.377	N/A
	2441	1.395	N/A
	2480	1.379	N/A
Conclusion：PASS			

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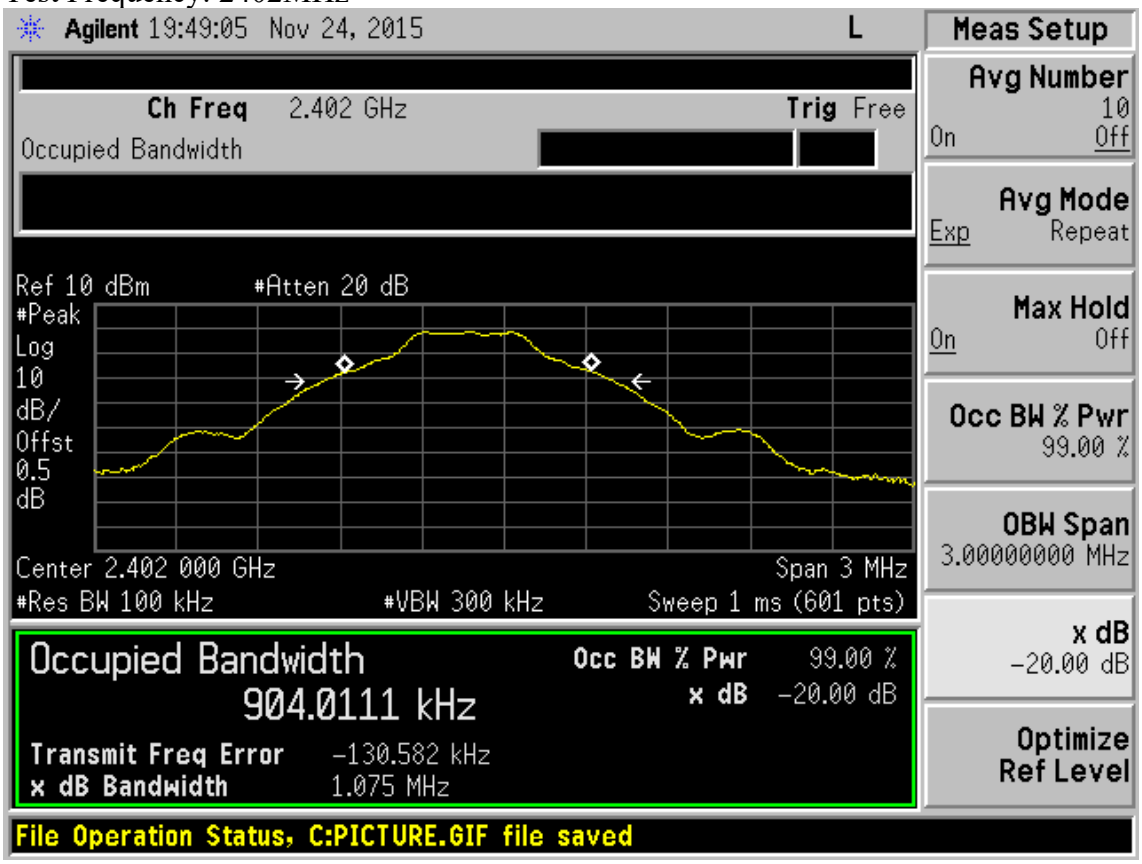
GFSK

Test Frequency: 2402MHz



Test Frequency: 2441MHz

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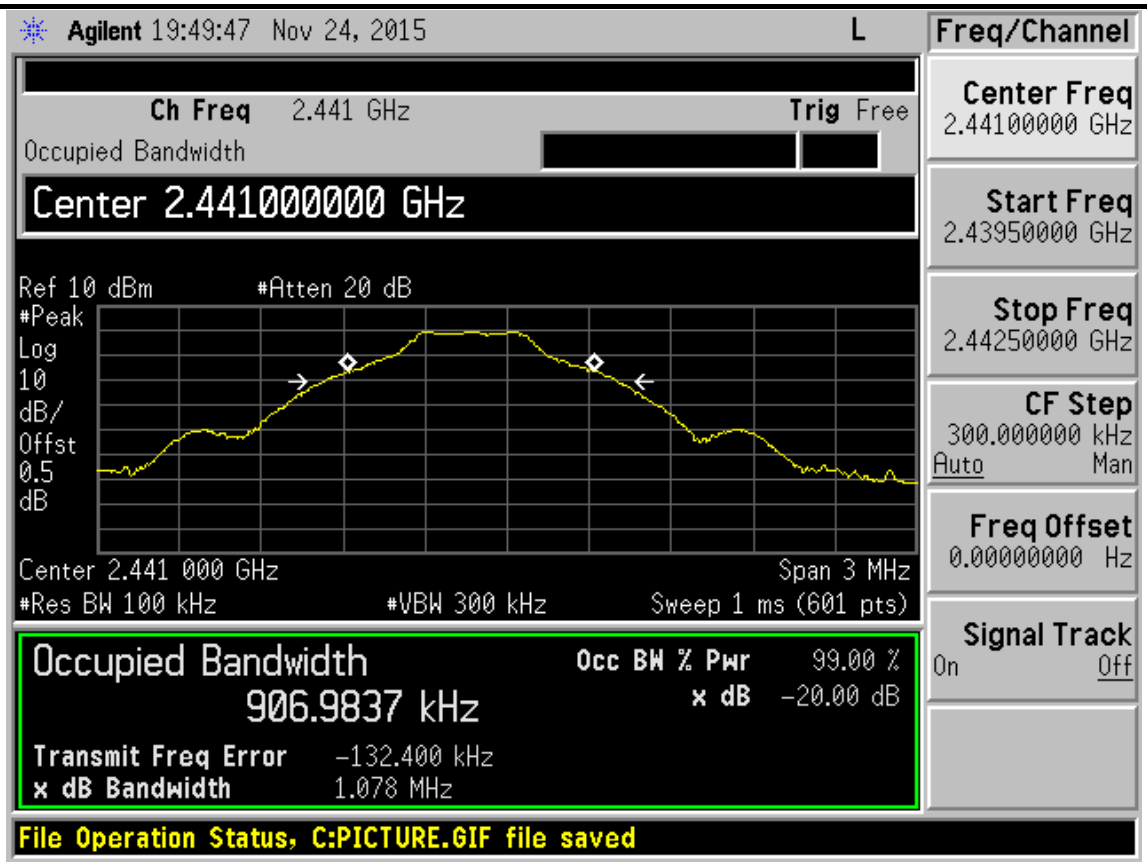

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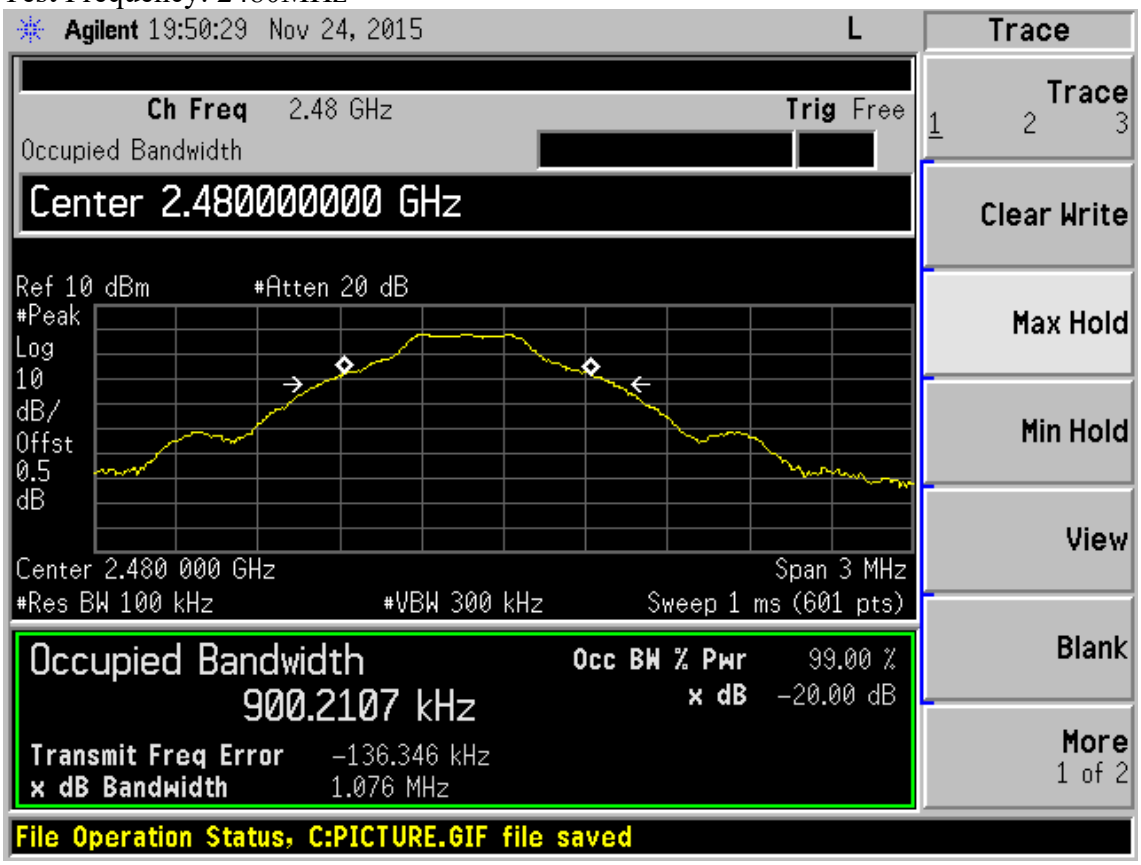
Test Frequency: 2480MHz



8-DPSK

Test Frequency: 2402MHz

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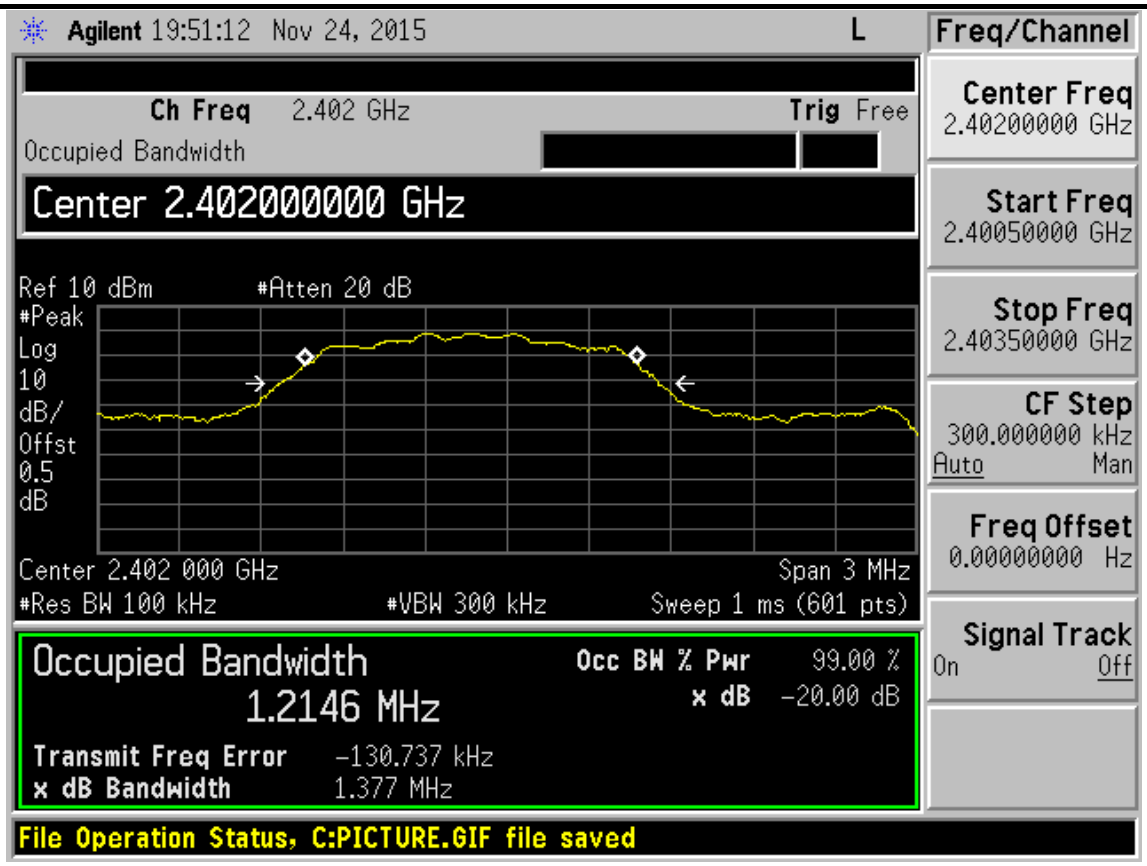

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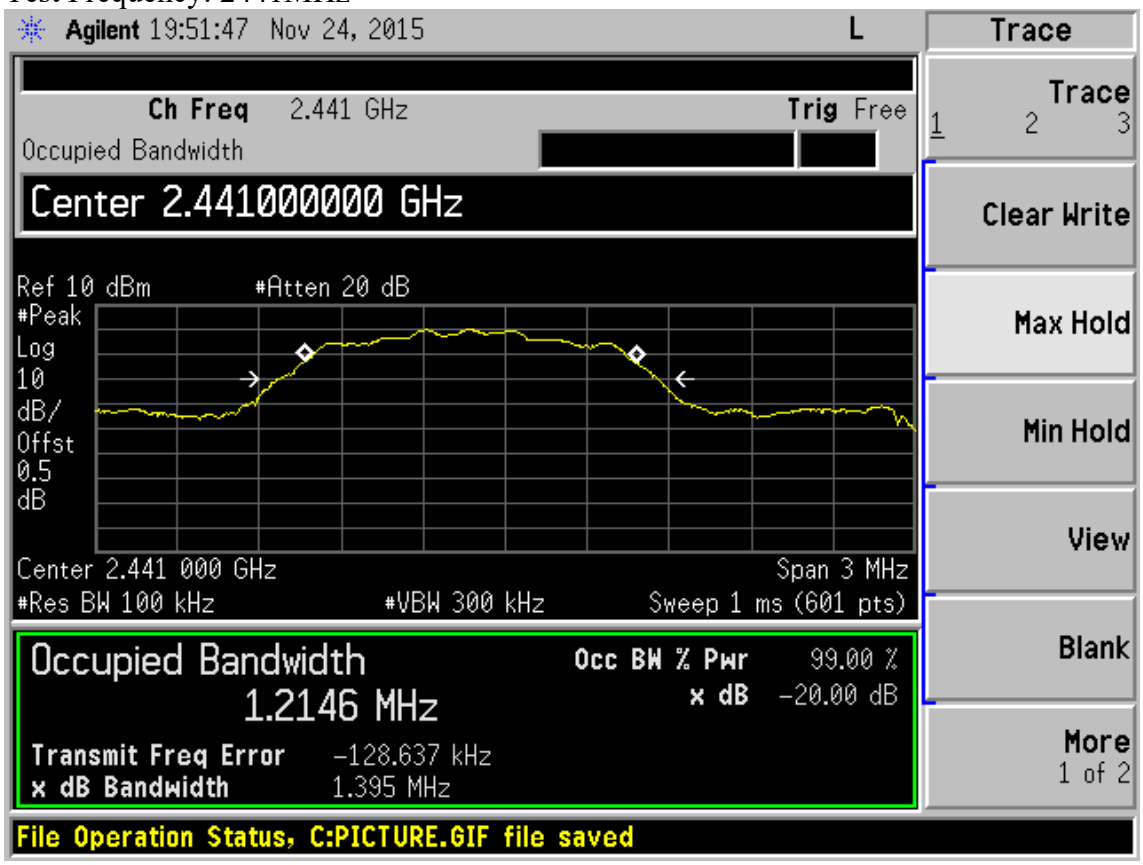
Test Frequency: 2441MHz



Test Frequency: 2480MHz

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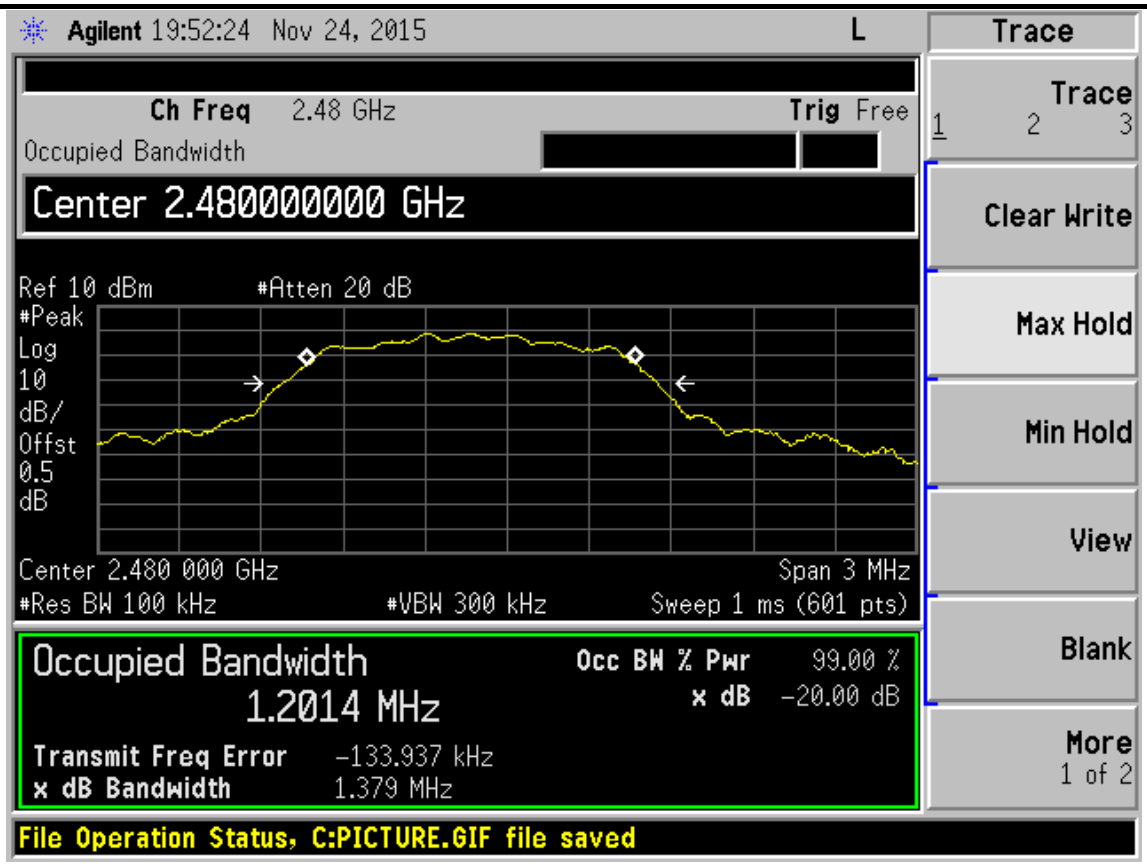

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7. CARRIER FREQUENCY SEPARATION TEST

7.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1Year
2.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr. 28,15	1 Year

7.2.Limit

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB 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.

7.3.Test Results.

EUT: Bluetooth Fingerprint Reader		
M/N: TCS511		
Test date: 2015-11-24	Pressure: 101.6±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Donjon_Huang	Test site: RF Site	Temperature: 22.6±0.6℃

Test Mode	Channel separation	Limit(KHz)	Conclusion
8-DPSK	1.0MHz	581.67	PASS
GFSK	1.0MHz	808.67	PASS

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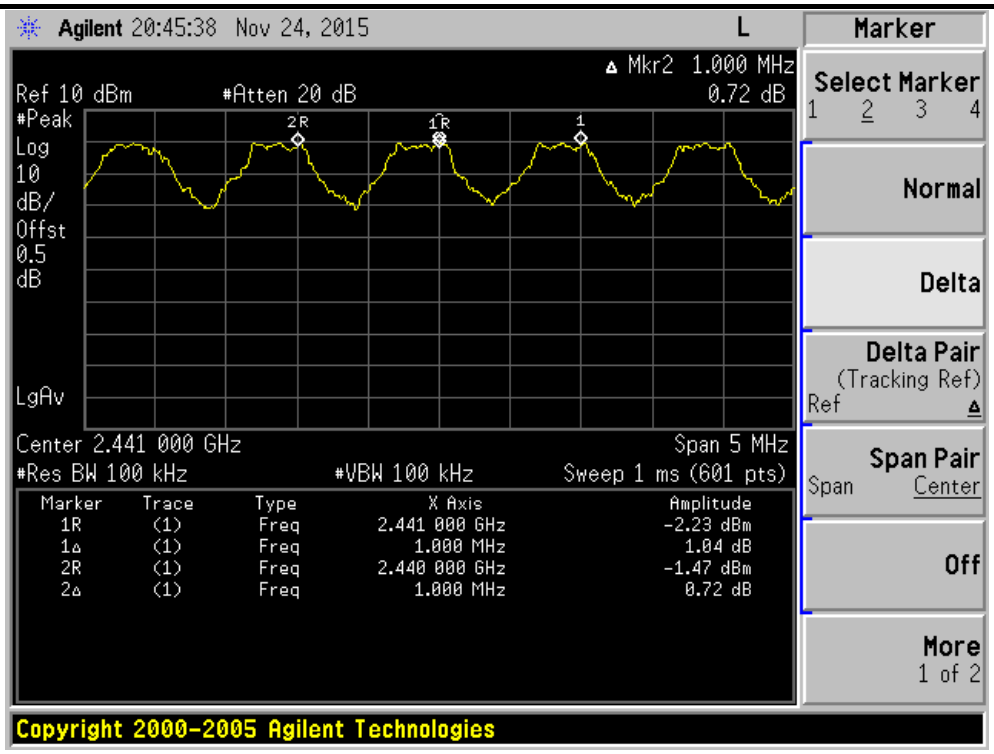

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8. NUMBER OF HOPPING FREQUENCY TEST

8.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1Year
2.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr.28, 15	1 Year

8.2.Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

8.3.Test Results

EUT: Bluetooth Fingerprint Reader		
M/N: TCS511		
Test date: 2015-11-24	Pressure: 101.6±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Donjon_Huang	Test site: RF Site	Temperature: 22.6±0.6℃

Test Mode	Number of channel	Limit	Conclusion
8-DPSK	79	>=15	PASS
GFSK	79	>=15	PASS

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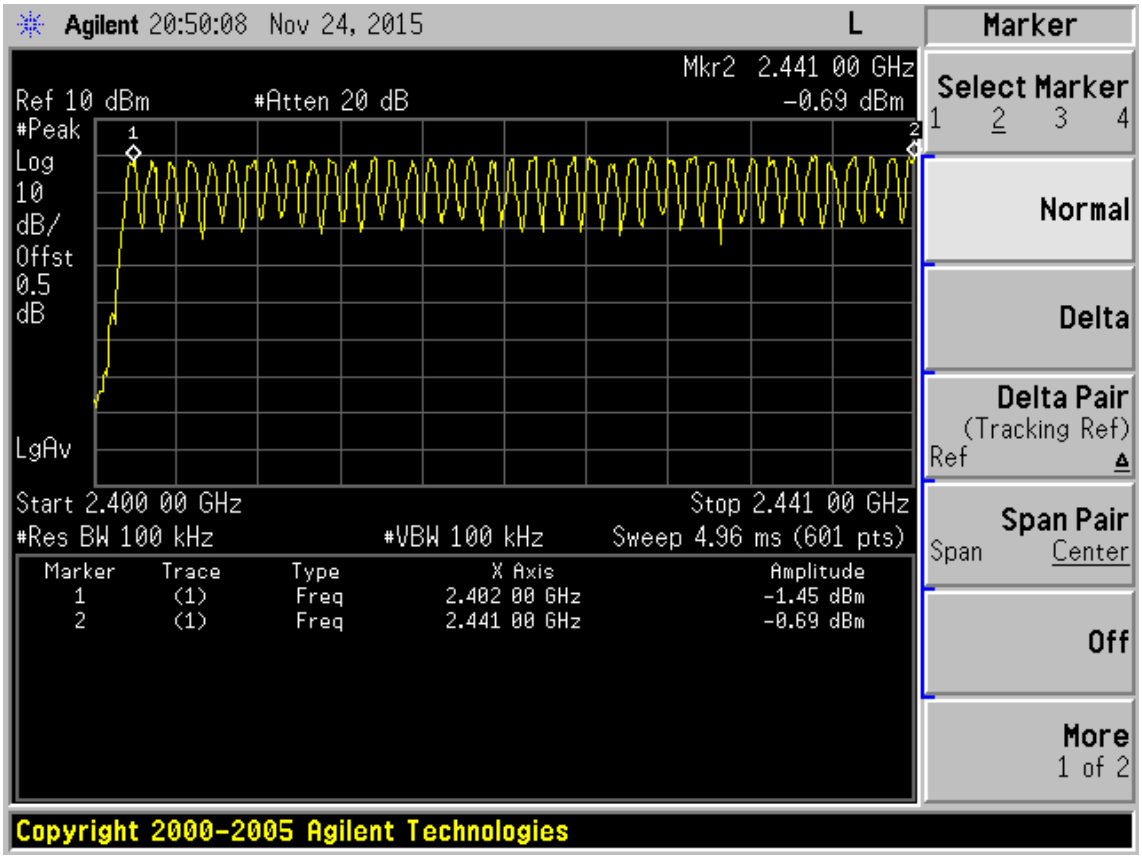

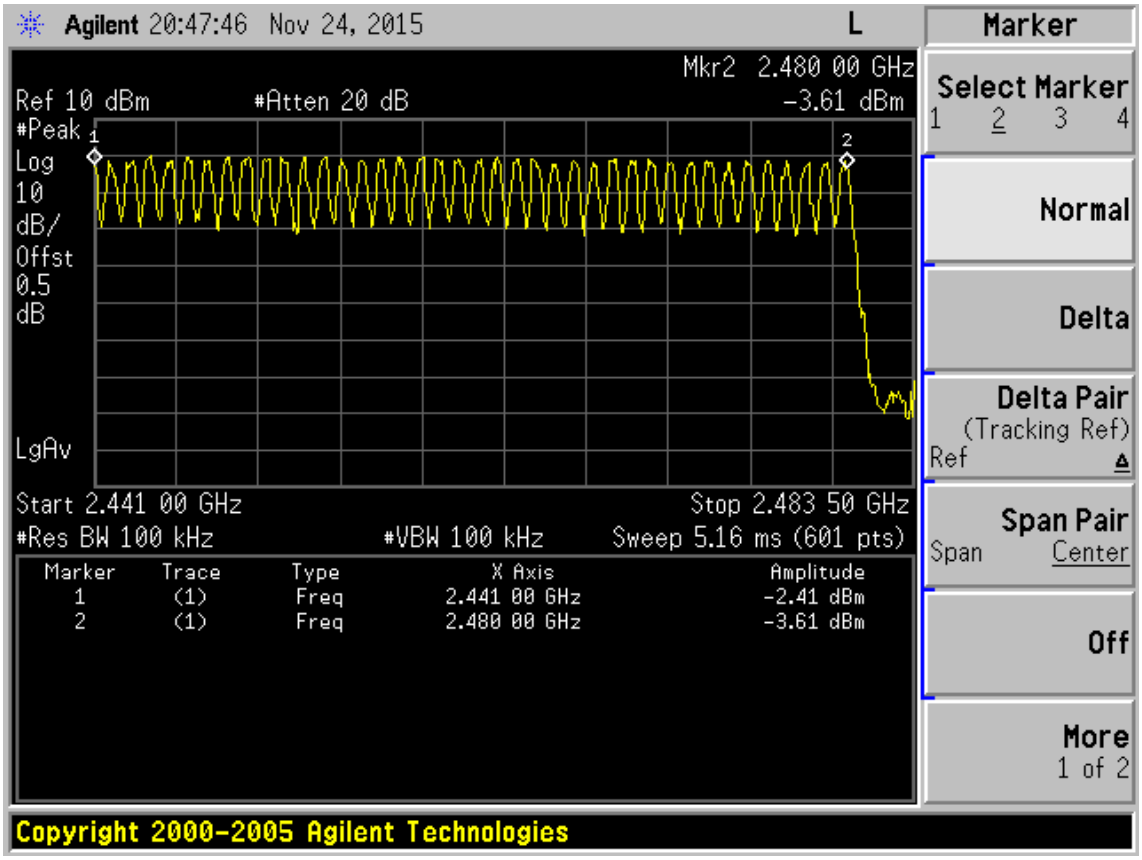

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9. DWELL TIME

9.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1Year
2.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr.28, 15	1 Year

9.2.Limit

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.

9.3.Test Results

EUT: Bluetooth Fingerprint Reader		
M/N: TCS511		
Test date: 2015-11-24	Pressure: 101.6±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Donjon_Huang	Test site: RF Site	Temperature: 22.6±0.6℃

Mode		dwell time	Limit	Conclusion
GFSK	DH1	48 hops/5s*0.4*79chanels* 0.4133 ms =125.379ms	<400ms	PASS
	DH3	22 hops/5s*0.4*79chanels* 1.695 ms =235.673ms	<400ms	PASS
	DH5	17 hops/5s*0.4*79chanels* 2.95 ms =316.948ms	<400ms	PASS
8-DPSK	3-DH1	48 hops/5s*0.4*79chanels* 0.450 ms =136.512ms	<400ms	PASS
	3-DH3	25 hops/5s*0.4*79chanels* 1.705 ms =269.390ms	<400ms	PASS
	3-DH5	18 hops/5s*0.4*79chanels* 2.95 ms =335.592ms	<400ms	PASS

Note: All the lower levels were signaled from receiver and should not be considered in here.

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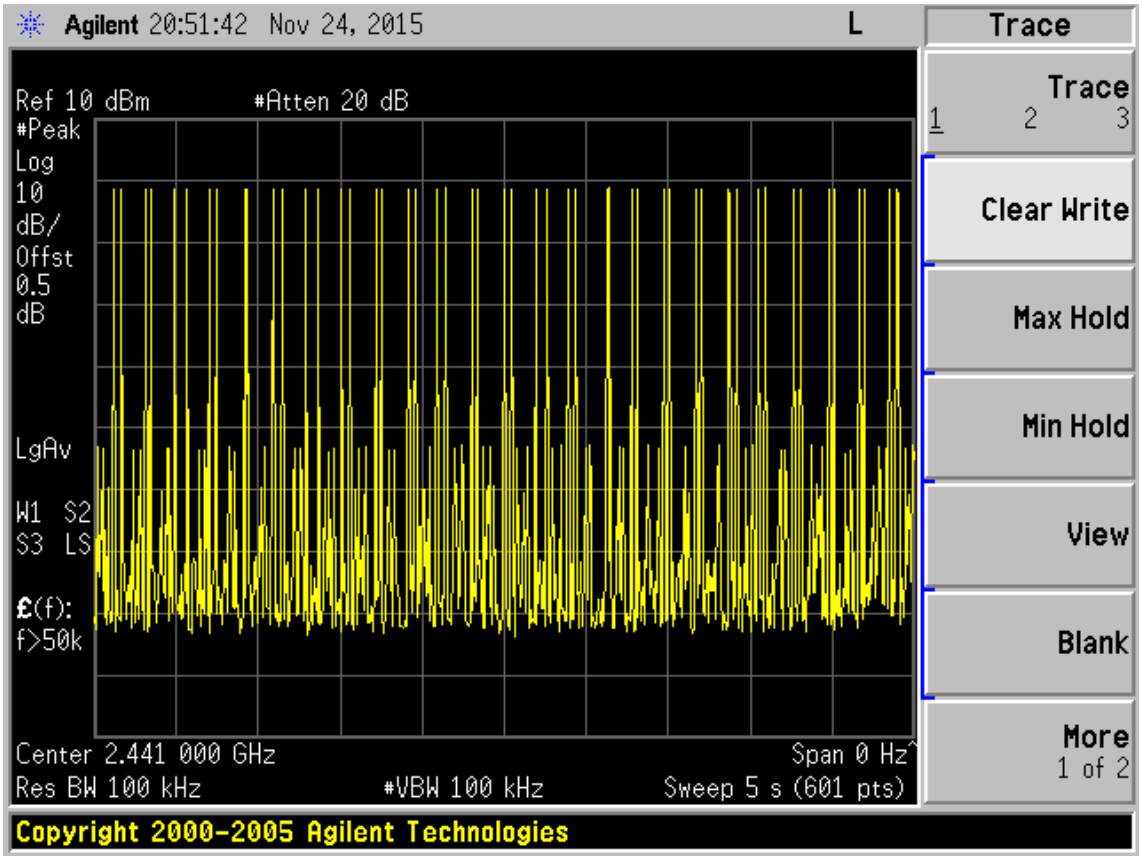
Test Mode: GFSK

DH 1



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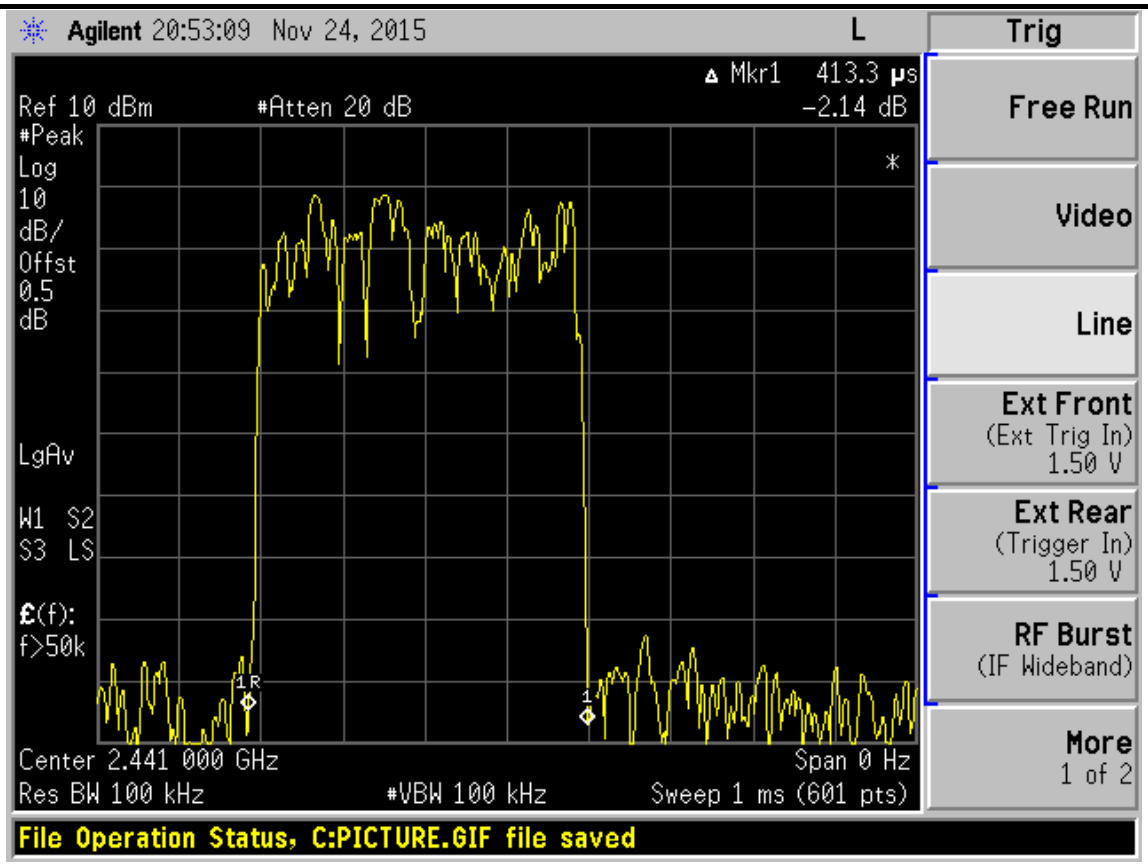

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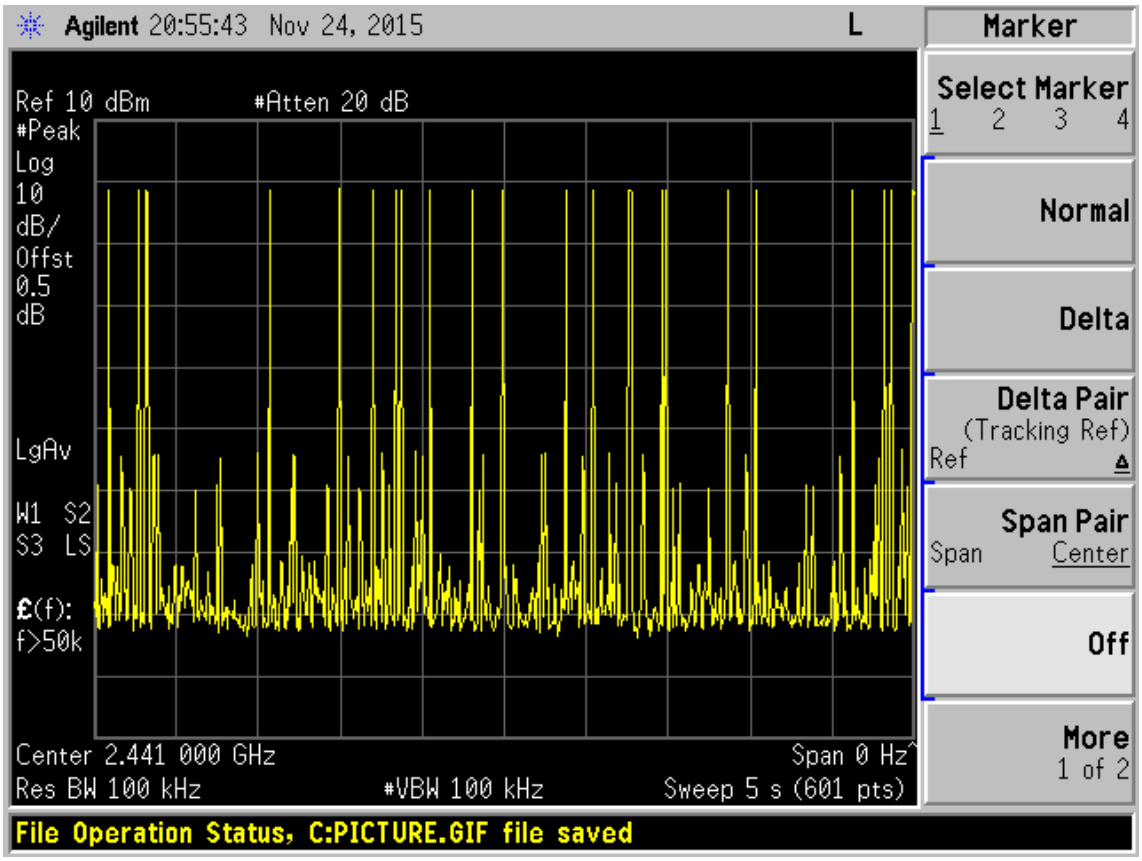
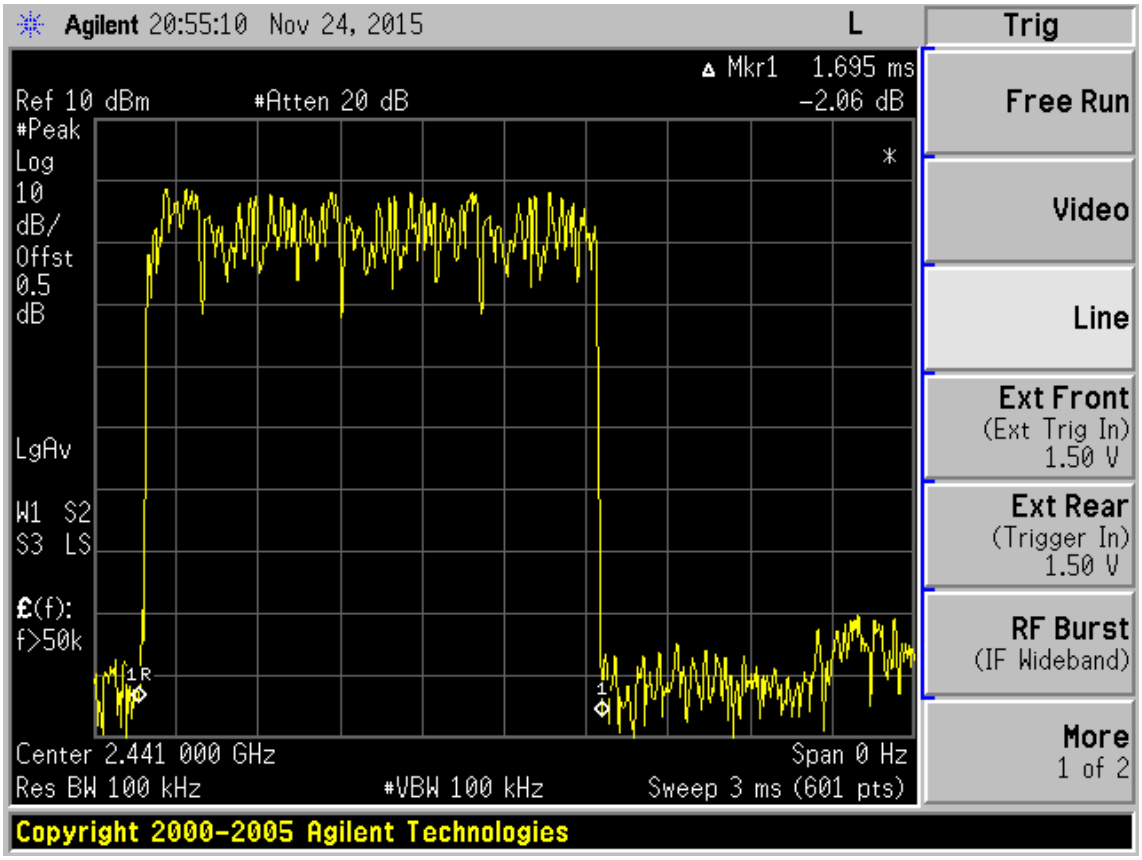
DH 3





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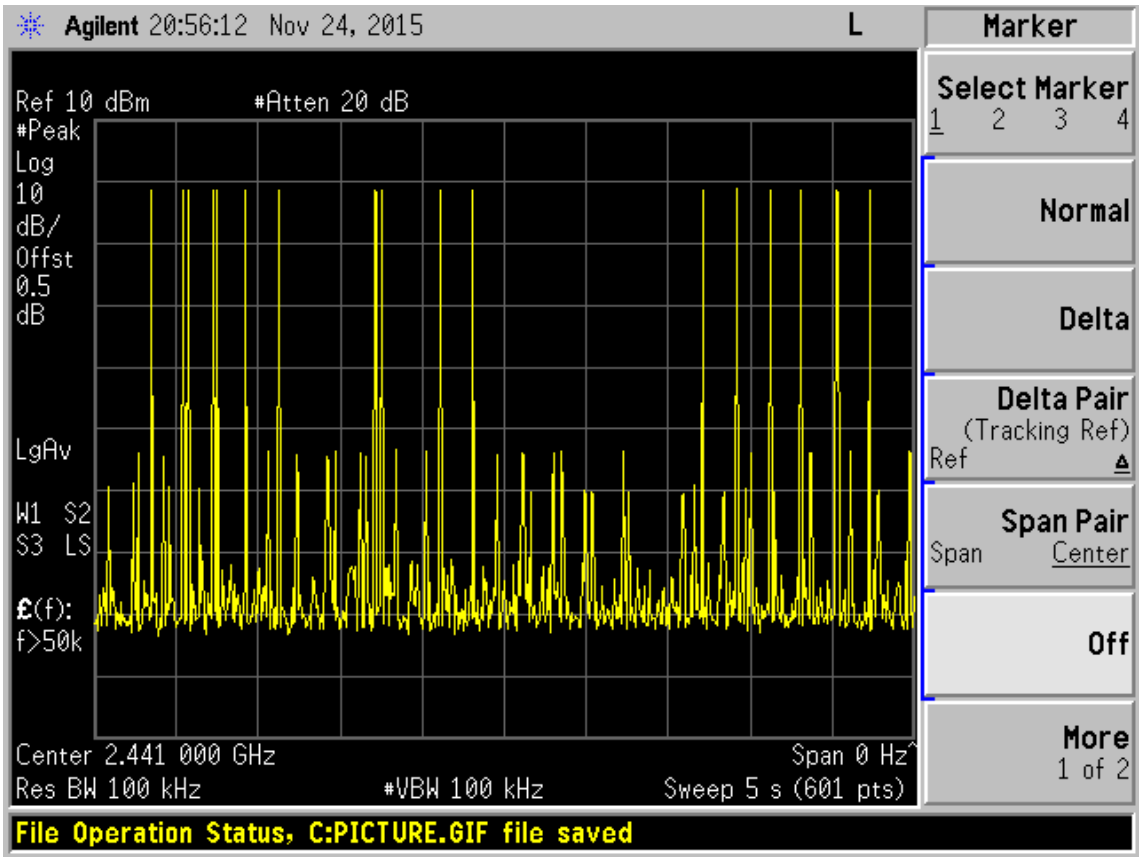
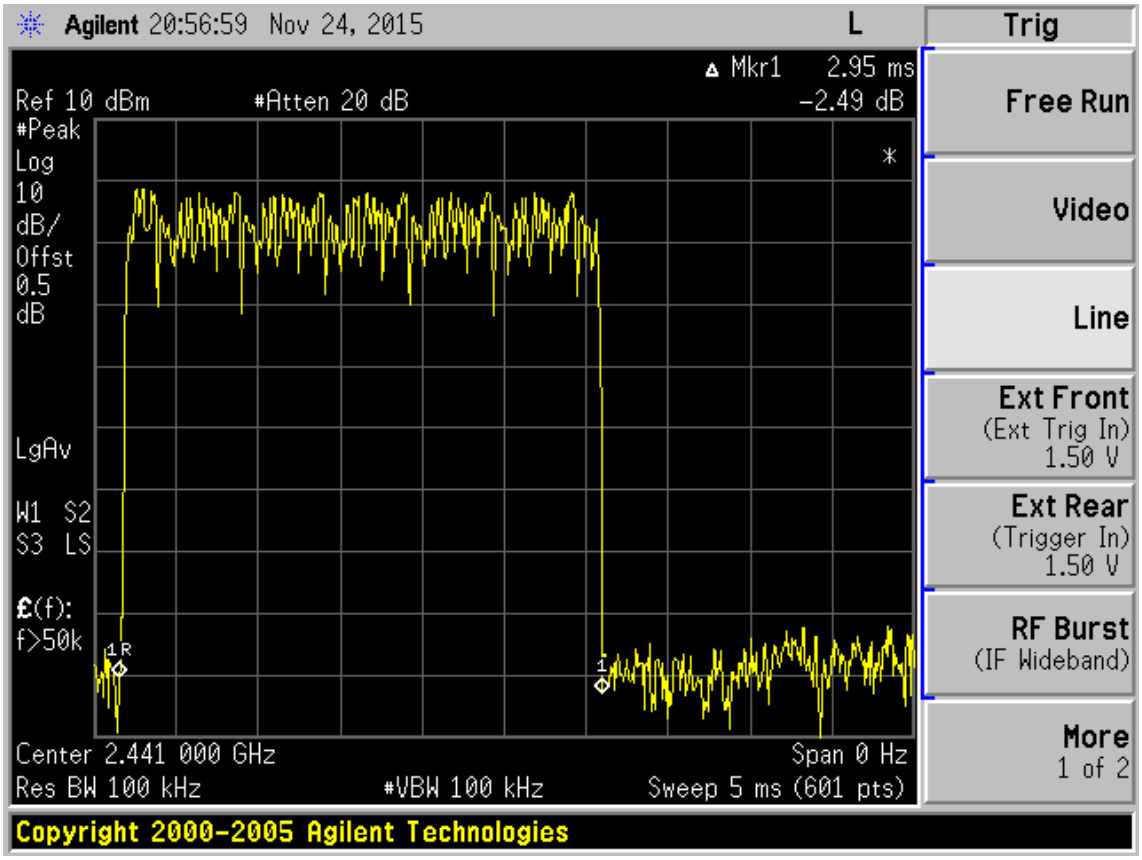
DH 5





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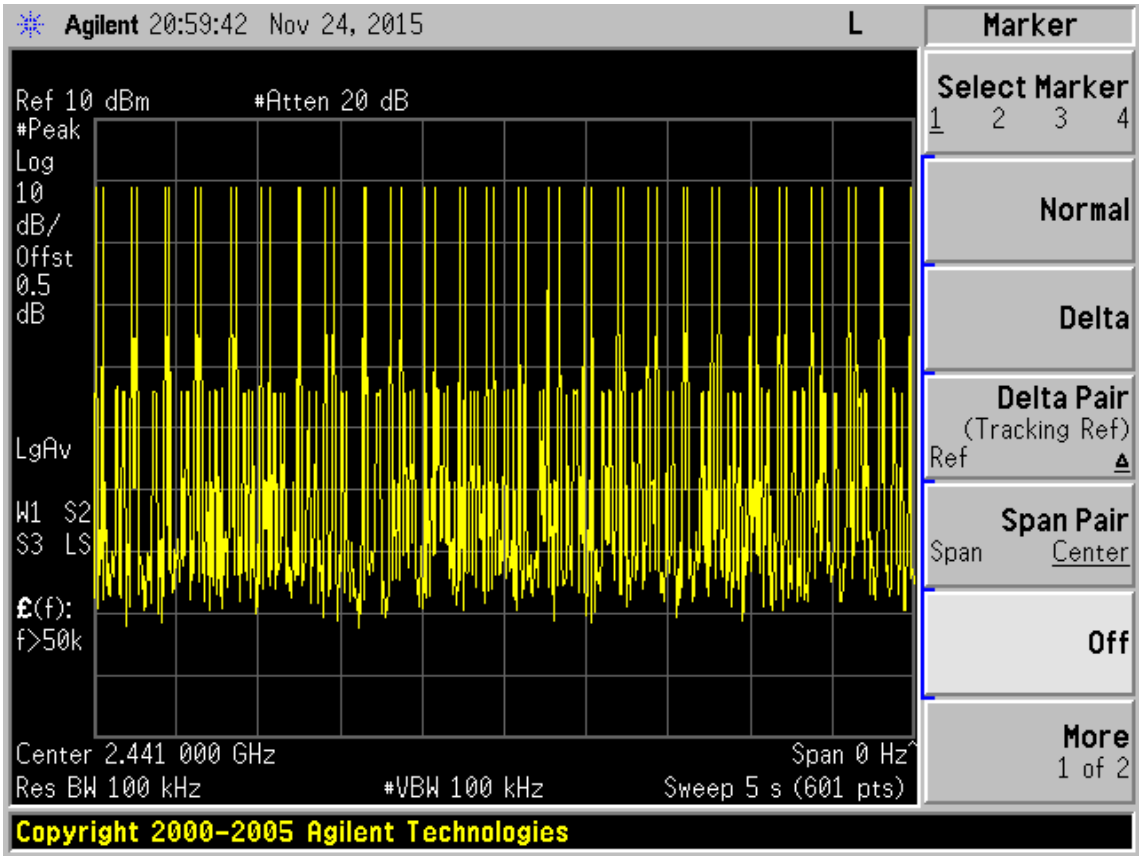
Test Mode: 8-DPSK
3DH 1



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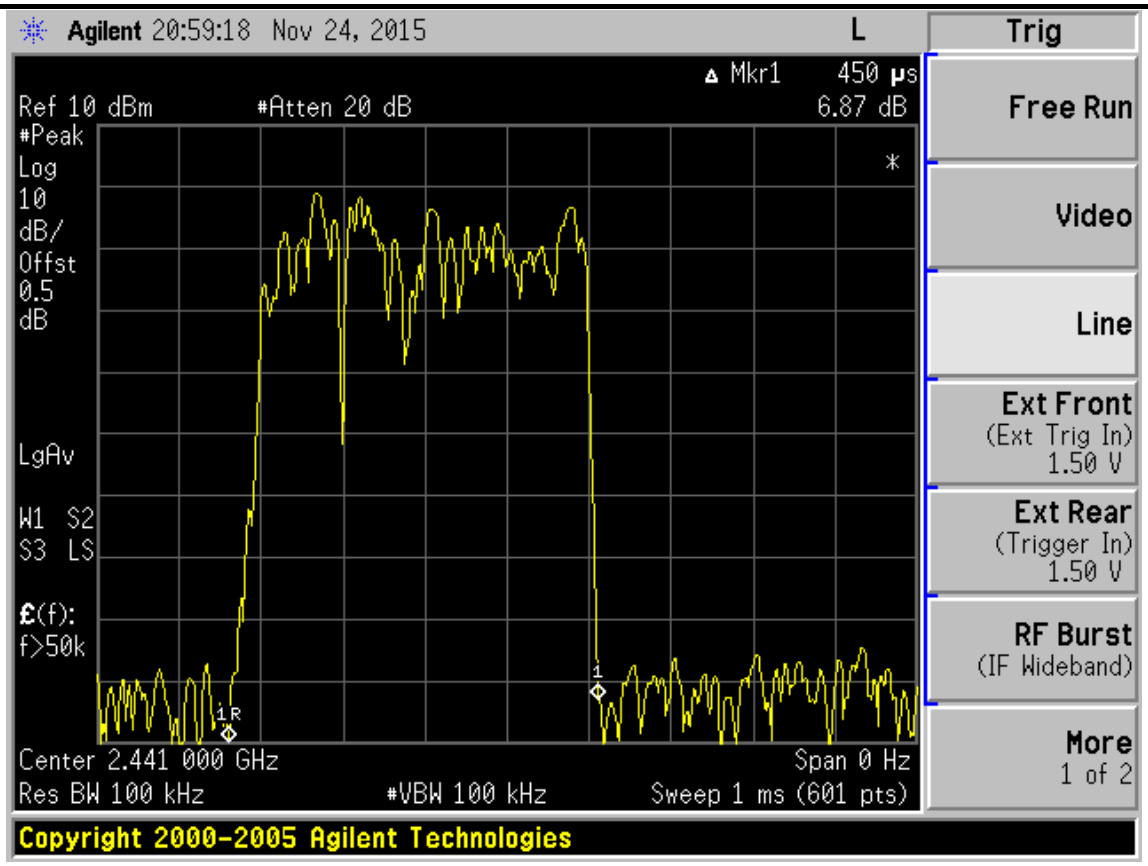

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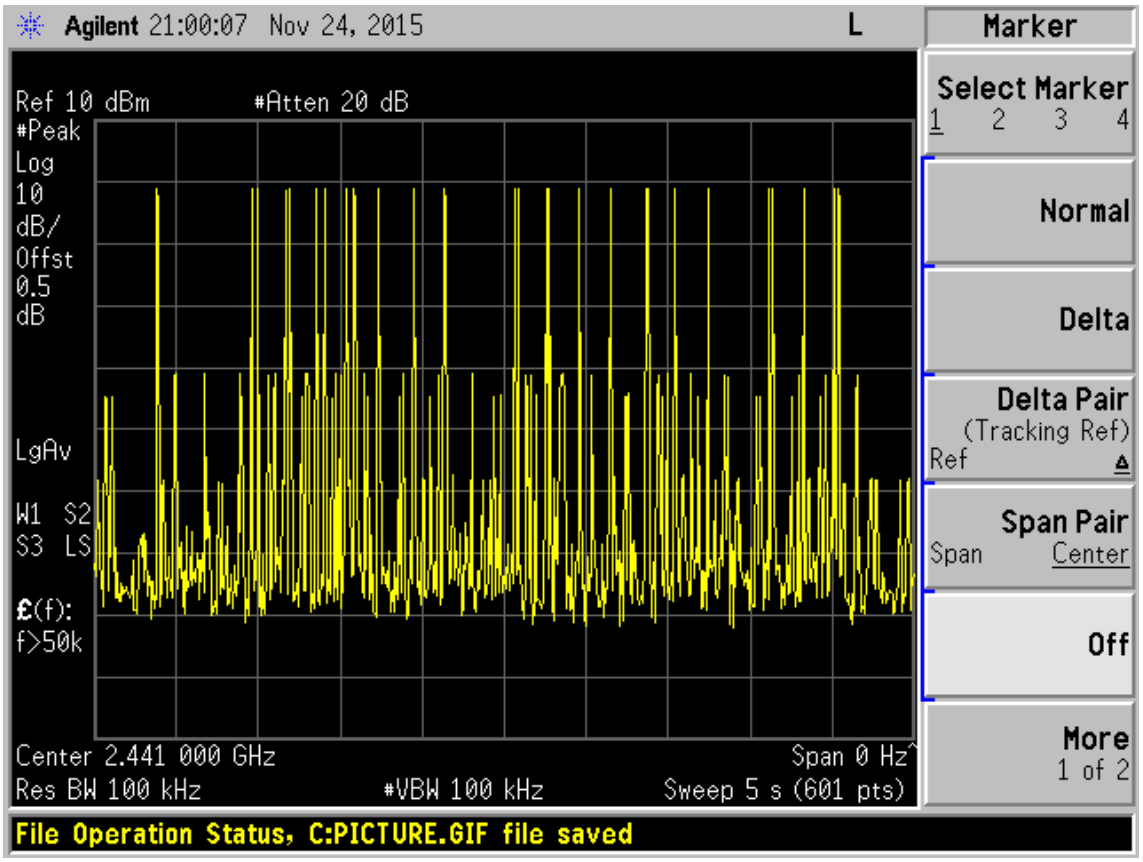
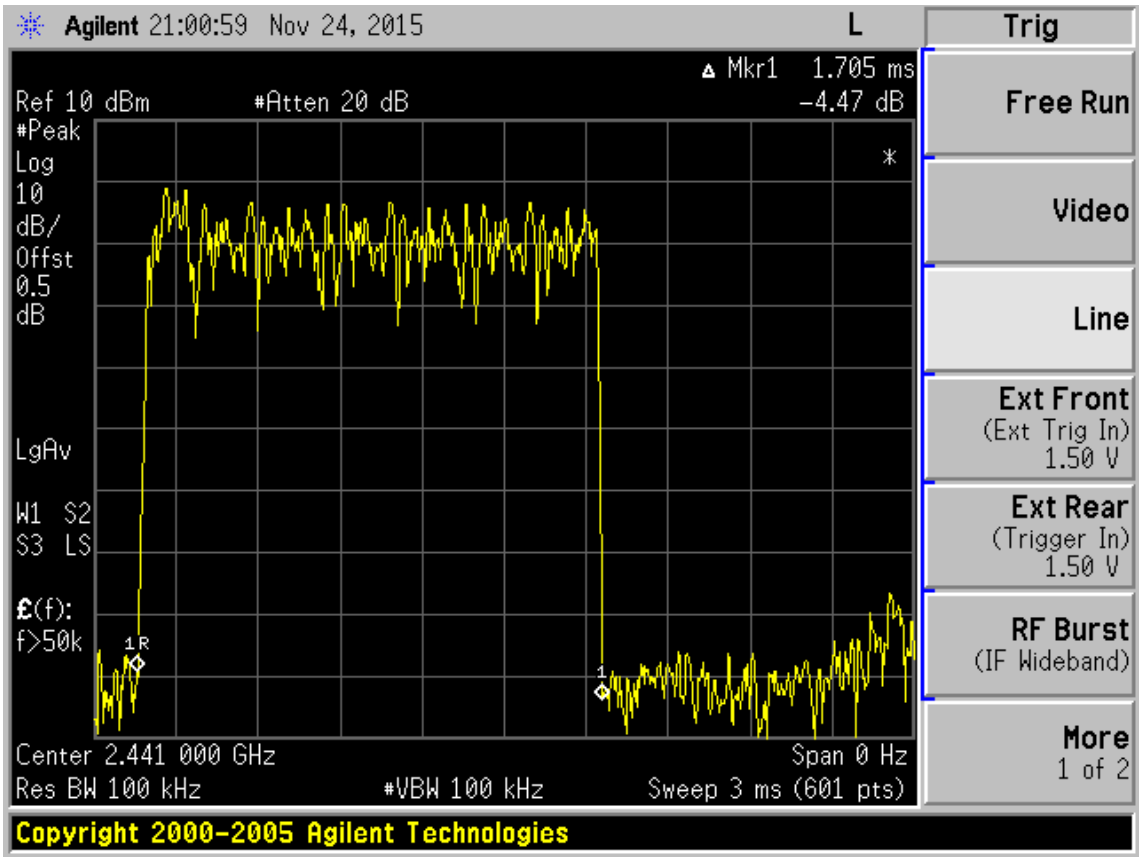
3DH 3





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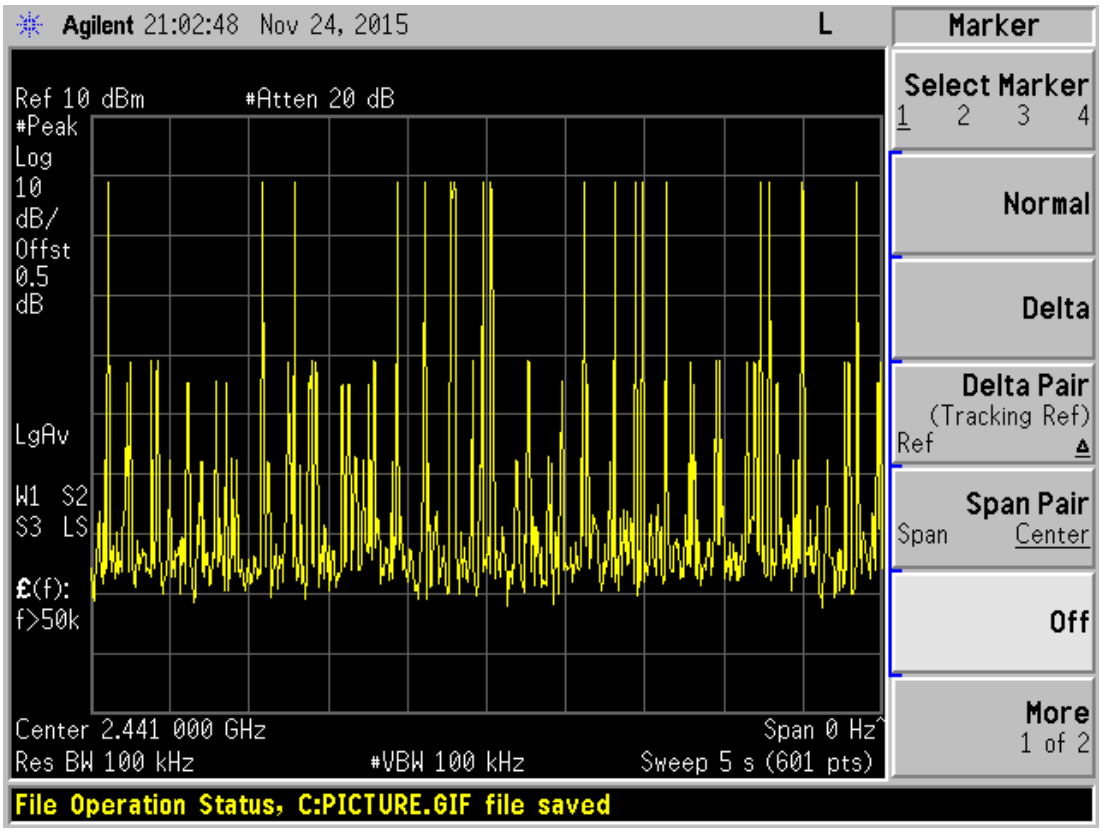
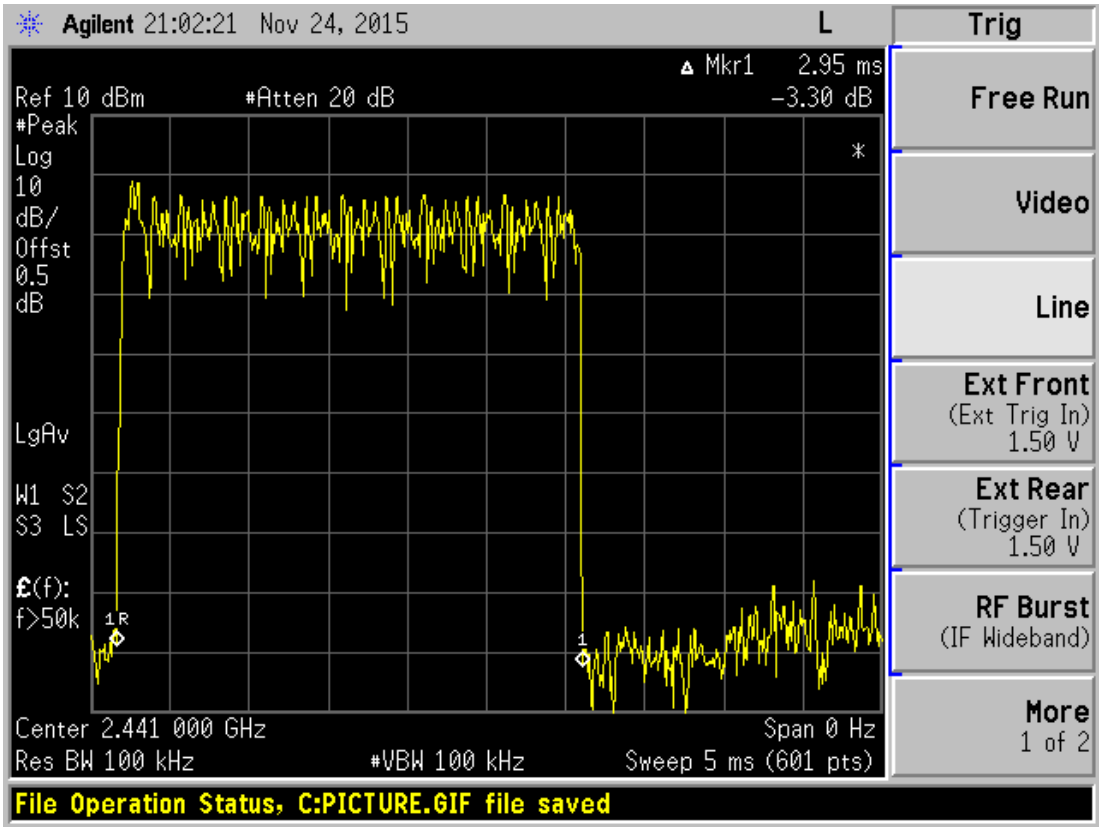
3DH 5





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10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.18,15	1Year
2.	Power meter	Anritsu	ML2487A	6K00002472	Aug.21,15	1Year
3.	Power sensor	Anritsu	MA2491A	0033005	Aug.21,15	1Year
4.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.28,15	1 Year
5.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.17,15	1 Year

10.2. Limit

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.

10.3. Test Procedure

Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power directly.

10.4. Test Results

EUT: Bluetooth Fingerprint Reader			
M/N: TCS511			
Test date: 2015-11-24		Pressure: 101.7±1.0kpa	Humidity: 52.5±1.0%
Tested by: Donjon_Huang		Test site: RF site	Temperature:22.6±1.0 ℃
Test Mode	Frequency (MHz)	Peak output Power (dBm)	Limit (dBm)
GFSK	2402	-1.45	30
	2441	-0.39	30
	2480	-1.84	30
8-DPSK	2402	1.41	30
	2441	1.73	30
	2480	1.07	30
Conclusion: PASS			

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11. BAND EDGE COMPLIANCE TEST

11.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.28,15	1 Year
2.	Amp	HP	8449B	3008A02495	Apr.28,15	1 Year
3.	Horn Antenna	ETC	MCTD 1209	DRH15F03007	Feb.03,15	1 Year
4.	HF Cable	Hubersuhner	Sucoflex104	274094/4	Apr.28,15	1 Year

11.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

11.3. Test Produce

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz） from the band-edge use below produce:

1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a insulating material (up to 12mm thick) worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
   (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
   (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

11.4. Test Results

Pass (The testing data was attached in the next pages.)

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

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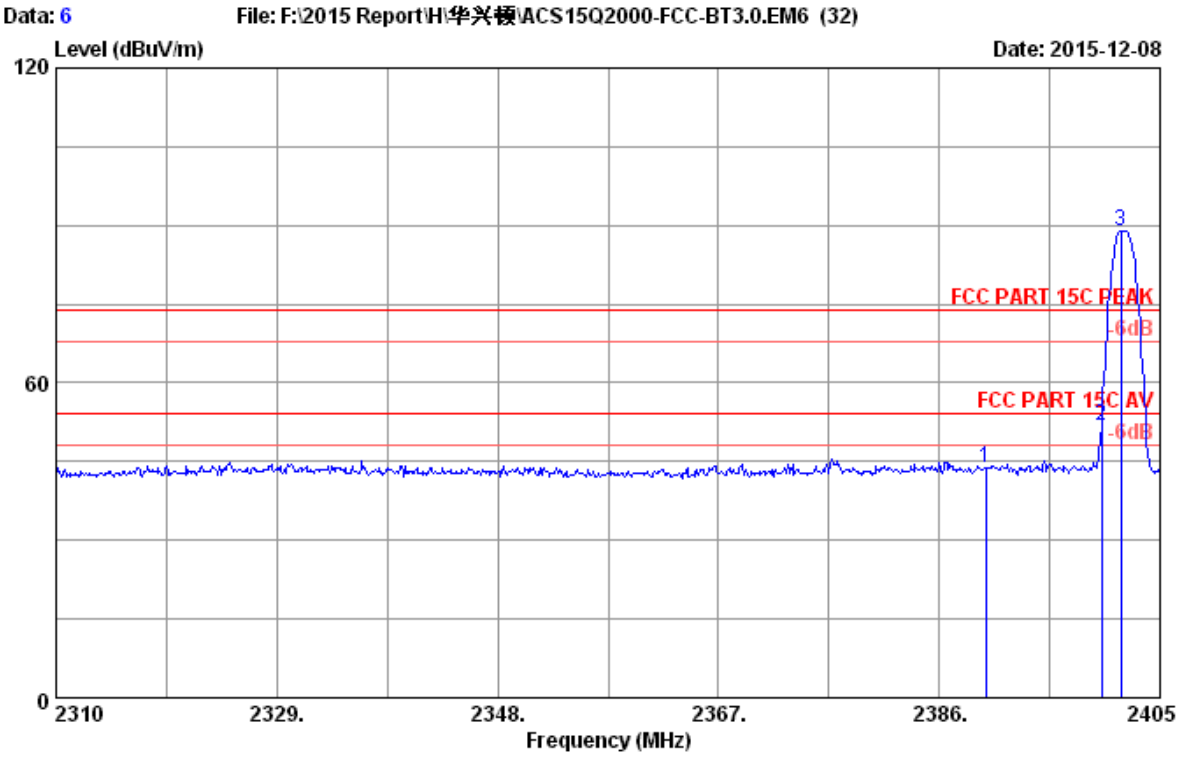

Site no. : 3m Chamber Data no. : 6
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.98	7.28	36.62	45.17	43.81	74.00	30.19	Peak
2	2400.000	28.00	7.32	36.62	53.01	51.71	74.00	22.29	Peak
3	2401.675	28.00	7.32	36.62	90.37	89.07	74.00	-15.07	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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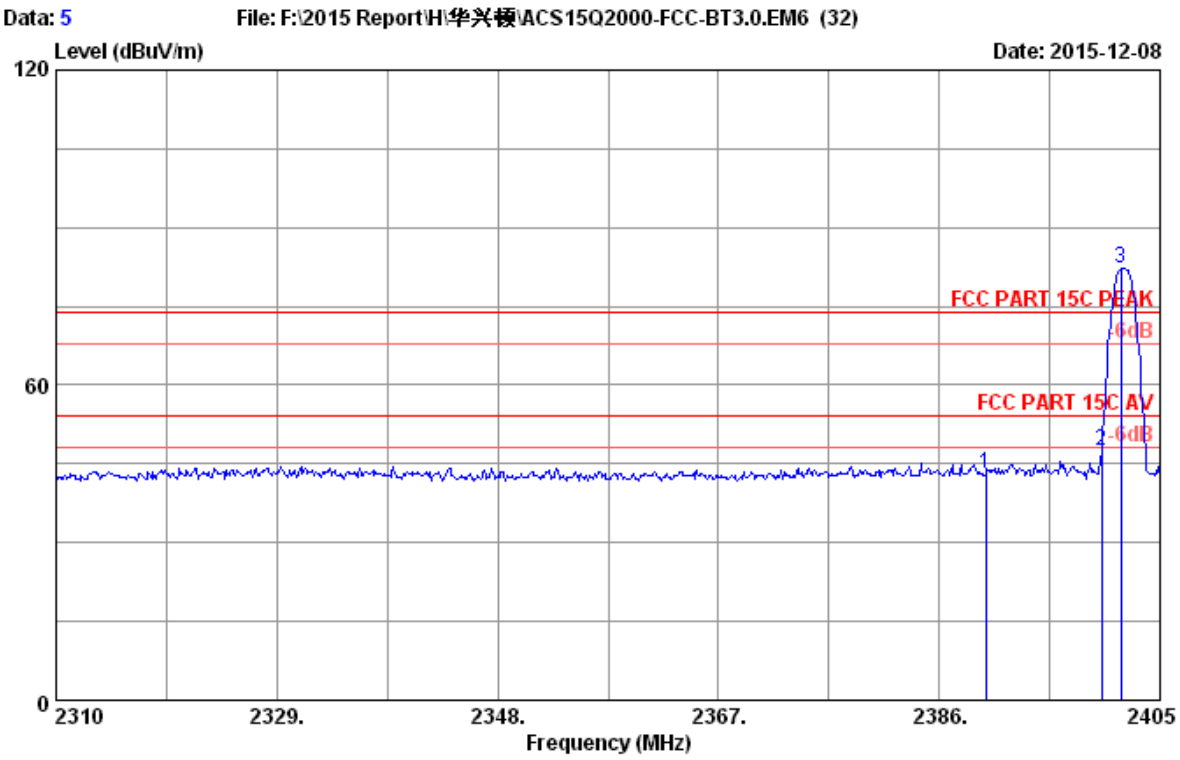

Site no. : 3m Chamber Data no. : 5
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.98	7.28	36.62	44.51	43.15	74.00	30.85	Peak
2	2400.000	28.00	7.32	36.62	48.78	47.48	74.00	26.52	Peak
3	2401.675	28.00	7.32	36.62	83.42	82.12	74.00	-8.12	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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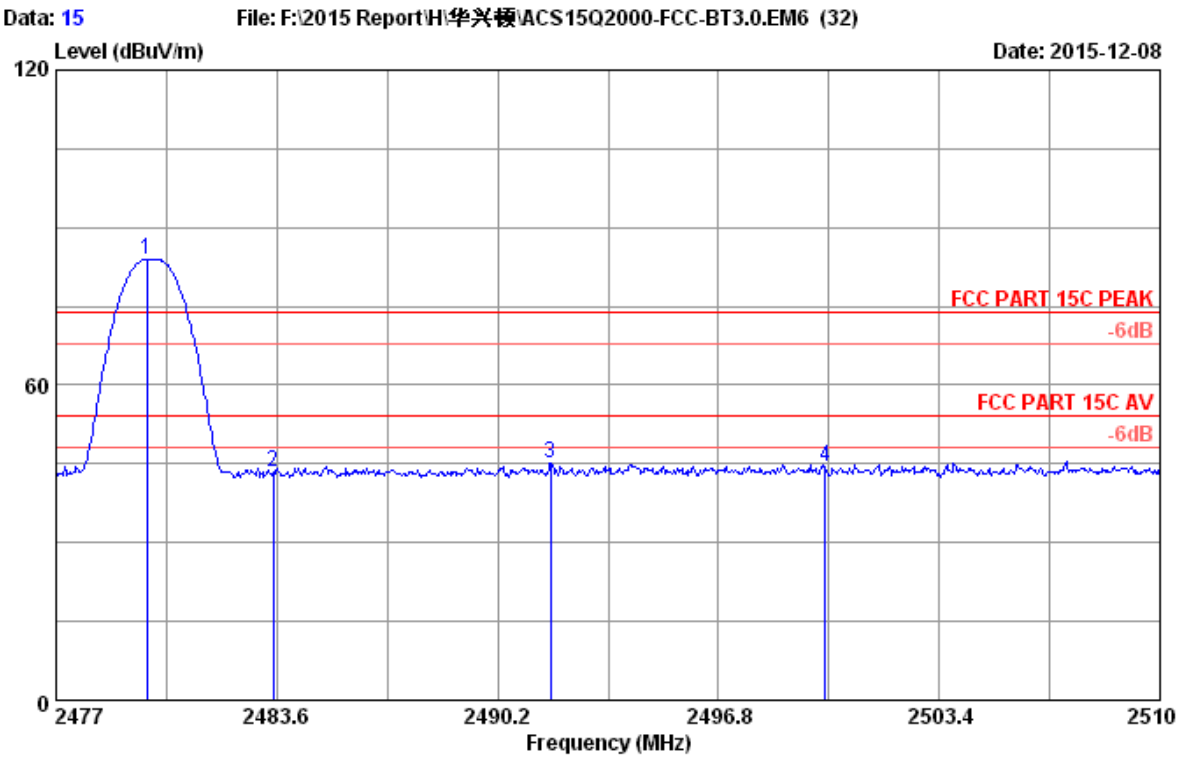

Site no. : 3m Chamber Data no. : 15
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.706	28.16	7.47	36.59	84.84	83.88	74.00	-9.88	Peak
2	2483.500	28.17	7.51	36.59	44.33	43.42	74.00	30.58	Peak
3	2491.784	28.18	7.51	36.58	46.03	45.14	74.00	28.86	Peak
4	2500.000	28.20	7.51	36.58	45.36	44.49	74.00	29.51	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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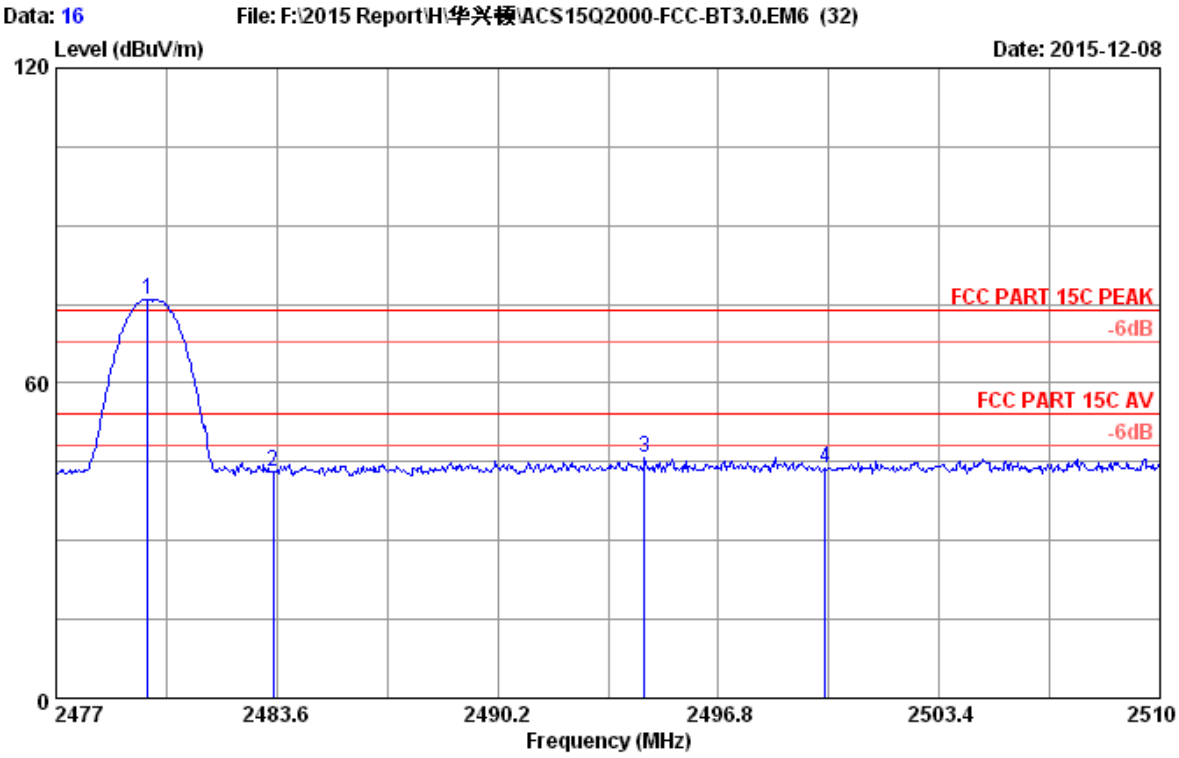

Site no. : 3m Chamber Data no. : 16
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : GFSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.739	28.16	7.47	36.59	76.76	75.80	74.00	-1.80	Peak
2	2483.500	28.17	7.51	36.59	43.89	42.98	74.00	31.02	Peak
3	2494.589	28.19	7.51	36.58	46.79	45.91	74.00	28.09	Peak
4	2500.000	28.20	7.51	36.58	44.57	43.70	74.00	30.30	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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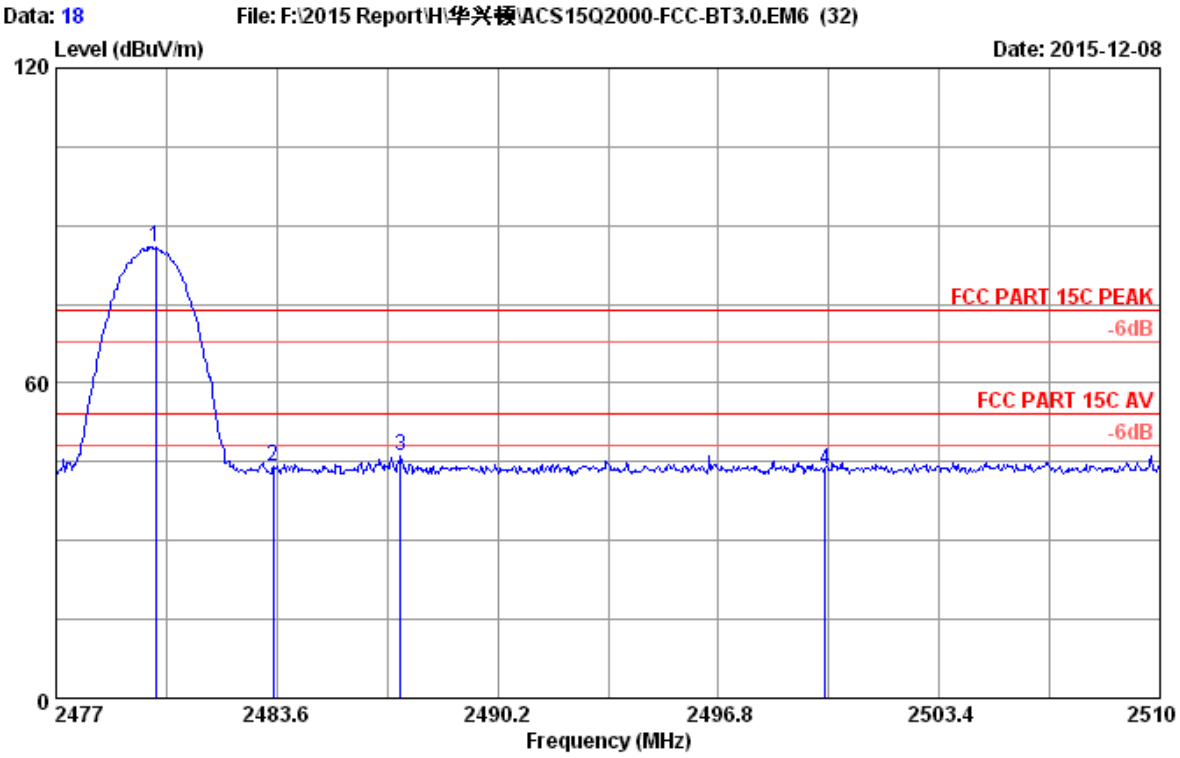

Site no. : 3m Chamber Data no. : 18
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.970	28.16	7.47	36.59	86.78	85.82	74.00	-11.82	Peak
2	2483.500	28.17	7.51	36.59	44.88	43.97	74.00	30.03	Peak
3	2487.296	28.17	7.51	36.59	47.19	46.28	74.00	27.72	Peak
4	2500.000	28.20	7.51	36.58	44.39	43.52	74.00	30.48	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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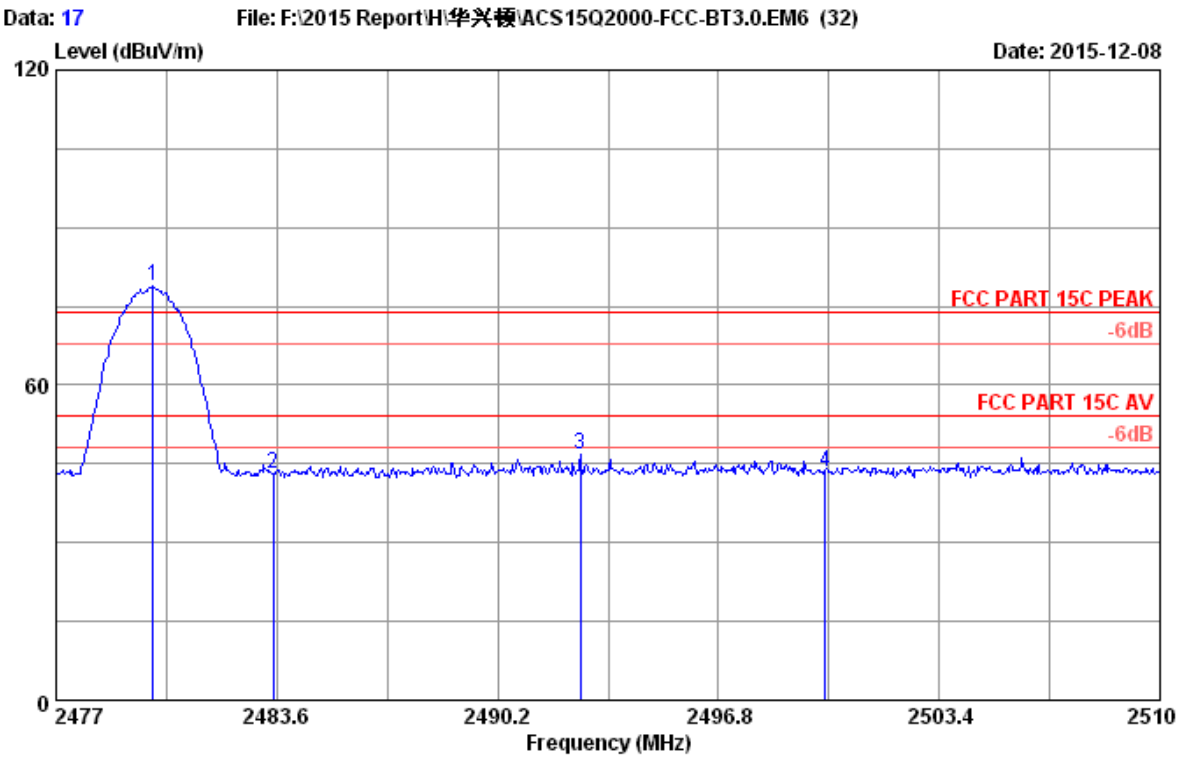

Site no. : 3m Chamber Data no. : 17
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.904	28.16	7.47	36.59	79.68	78.72	74.00	-4.72	Peak
2	2483.500	28.17	7.51	36.59	43.93	43.02	74.00	30.98	Peak
3	2492.675	28.19	7.51	36.58	47.59	46.71	74.00	27.29	Peak
4	2500.000	28.20	7.51	36.58	44.29	43.42	74.00	30.58	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

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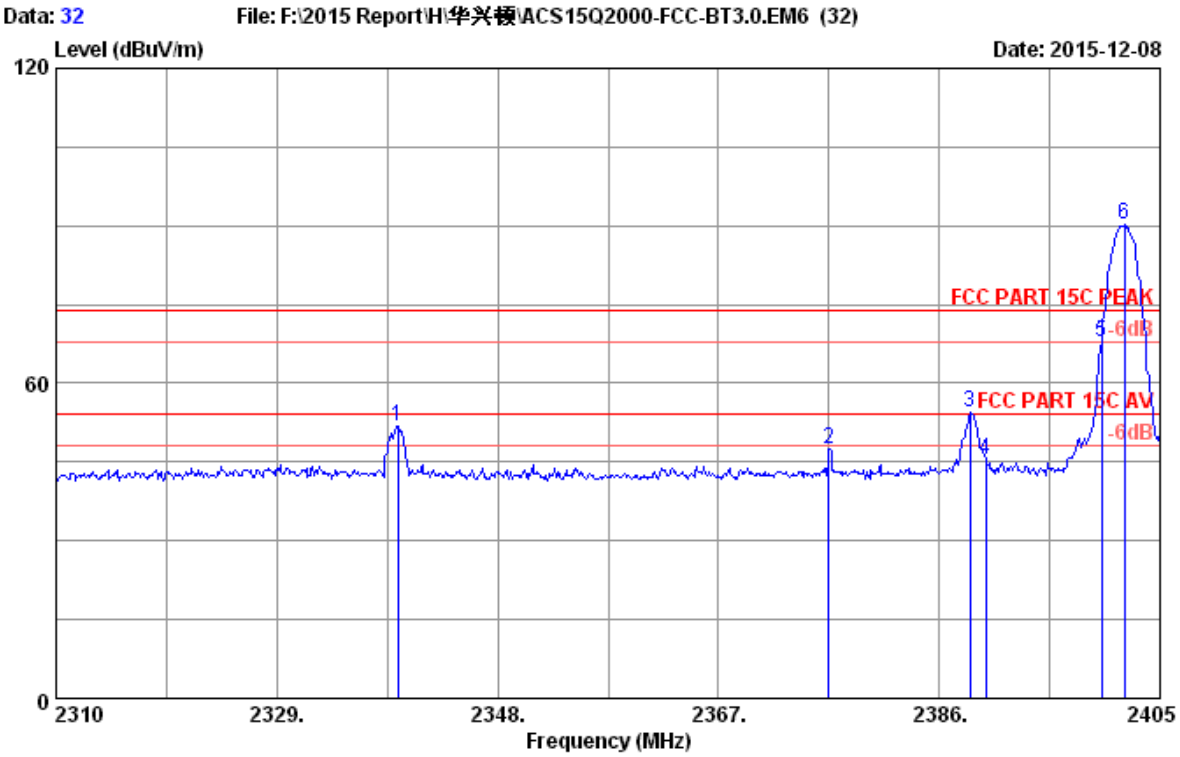

Site no. : 3m Chamber Data no. : 32
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2339.450	27.88	7.20	36.64	53.32	51.76	74.00	22.24	Peak
2	2376.500	27.95	7.28	36.63	49.02	47.62	74.00	26.38	Peak
3	2388.660	27.98	7.28	36.62	55.69	54.33	74.00	19.67	Peak
4	2390.000	27.98	7.28	36.62	46.89	45.53	74.00	28.47	Peak
5	2400.000	28.00	7.32	36.62	69.22	67.92	74.00	6.08	Peak
6	2401.960	28.00	7.32	36.62	91.59	90.29	74.00	-16.29	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

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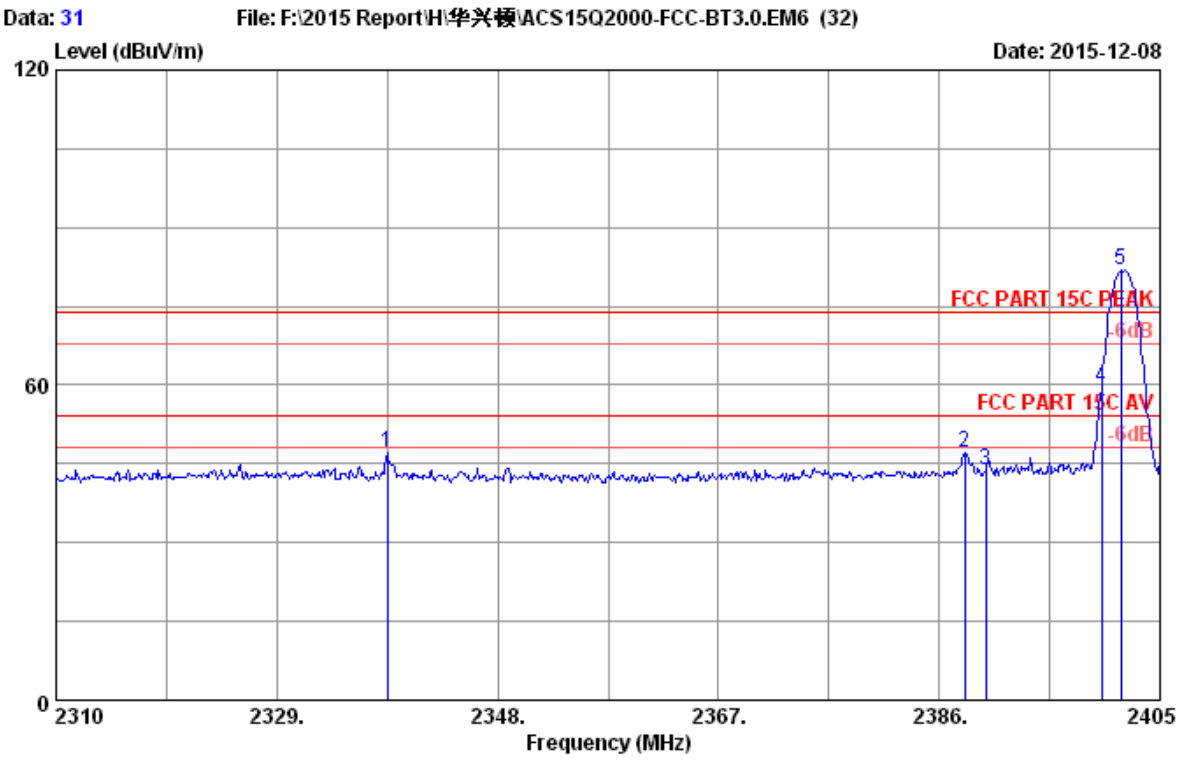

Site no. : 3m Chamber Data no. : 31
Dis. / Ant. : 3m 2015 MCTD1209 3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.9*C/52.8%
Engineer : Alice_yang
EUT : Bluetooth Fingerprint Reader M/N:TCS511
Power rating : DC 3.7V
Test Mode : 8-DPSK 2402MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2338.500	27.88	7.16	36.64	48.85	47.25	74.00	26.75	Peak
2	2388.185	27.98	7.28	36.62	48.47	47.11	74.00	26.89	Peak
3	2390.000	27.98	7.28	36.62	45.12	43.76	74.00	30.24	Peak
4	2400.000	28.00	7.32	36.62	60.92	59.62	74.00	14.38	Peak
5	2401.675	28.00	7.32	36.62	83.13	81.83	74.00	-7.83	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	Peak level (dBuv/m)	Duty cycle factor (dB)	AV level (dBuv/m)	Limit (dBuv/m)	Conclusion
2388.660	55.69	-24.533	31.157	54	Pass

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12. TENNA REQUIREMENT

12.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

12.2. Antenna Connected Construction

The antennas used for this product are Multilayer Chip Antenna antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 0.5dBi

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13. DEVIATION TO TEST SPECIFICATIONS

[NONE]

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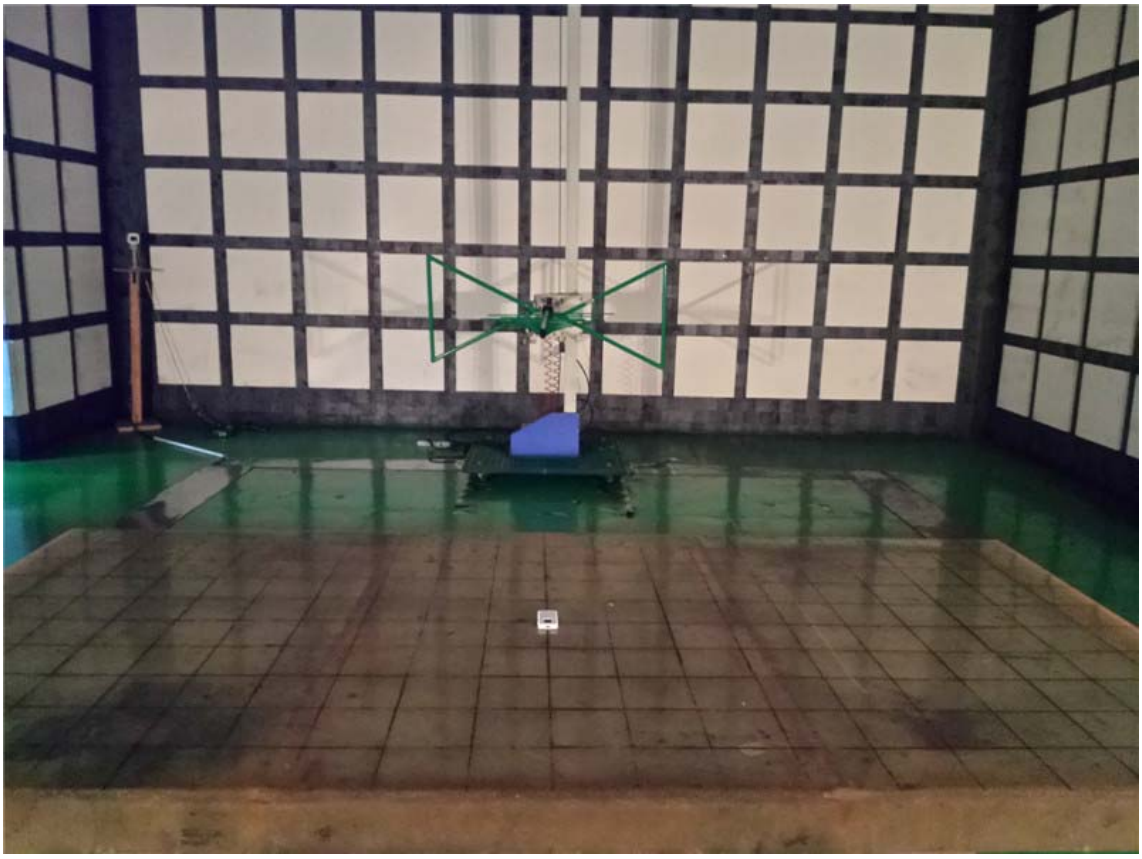
14. PHOTOGRAPH OF TEST

14.1. Photos of Radiated Emission Test

30-1000MHz



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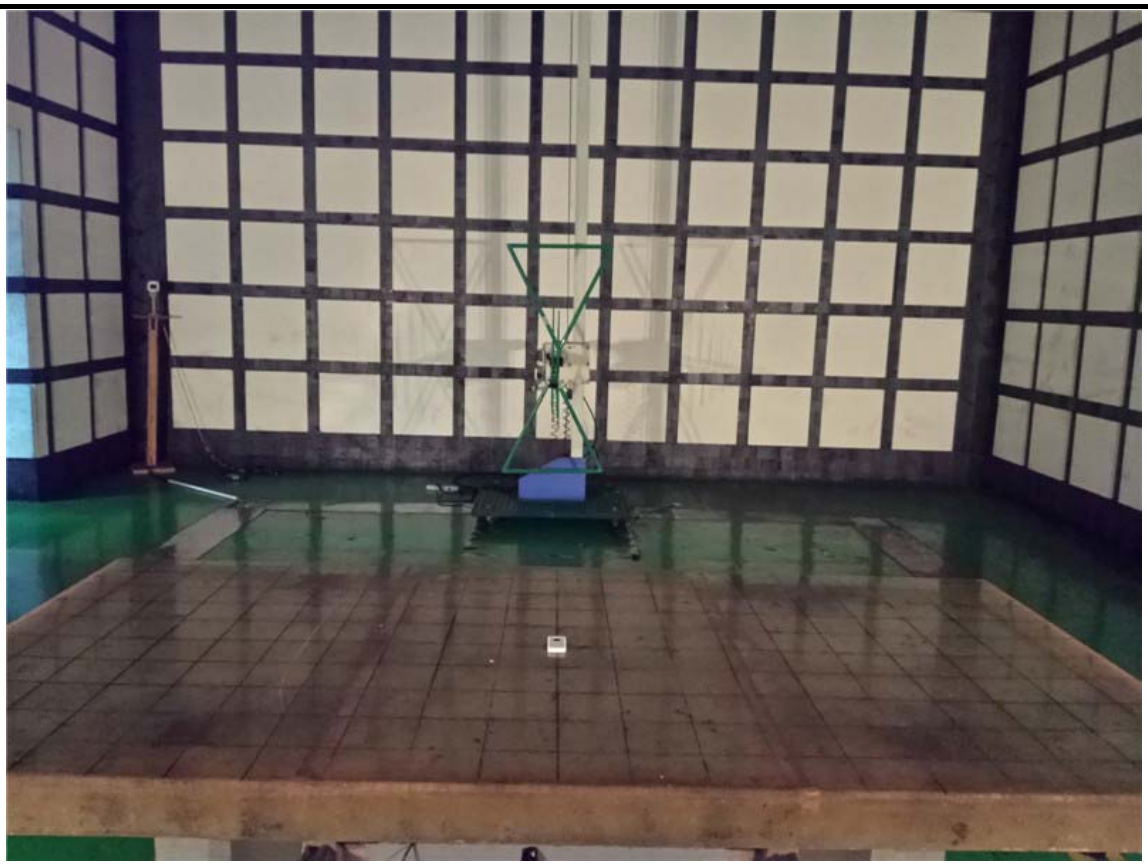

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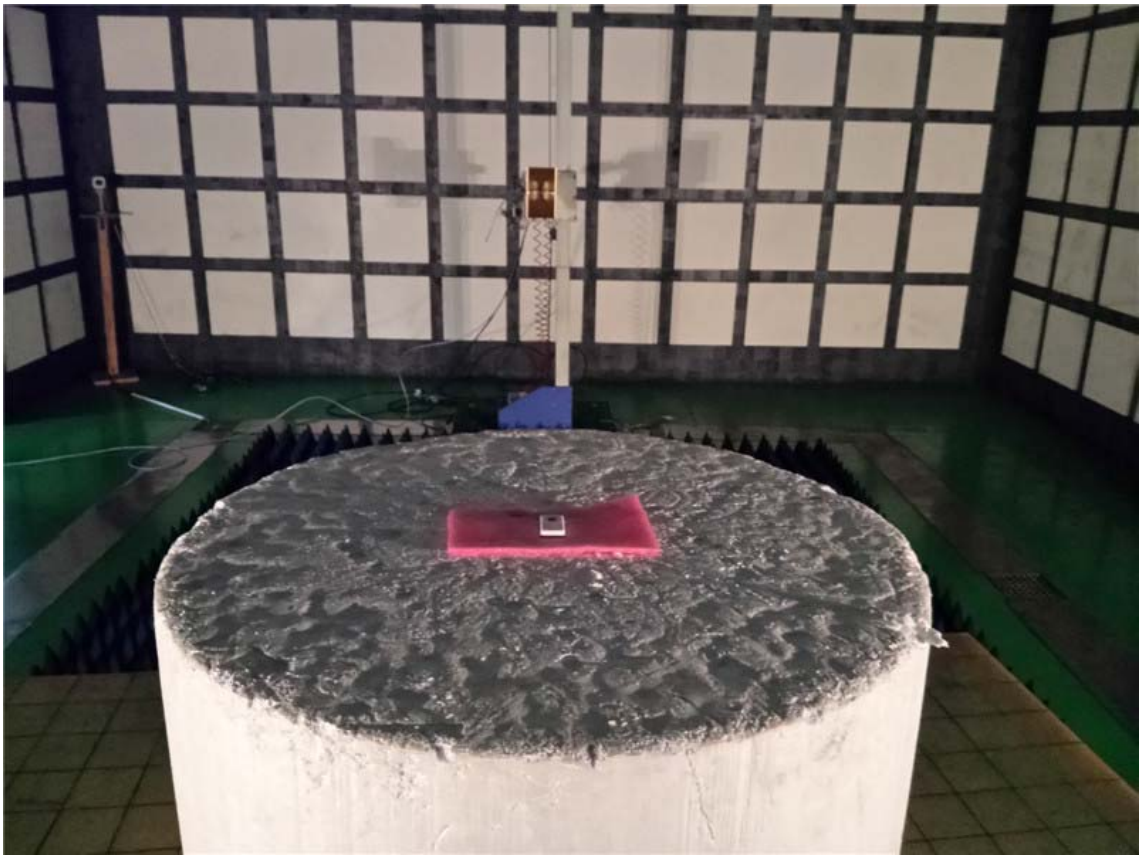
Above 1000MHz



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15. PHOTOGRAPH OF EUT

Figure 1
General Appearance of the EUT

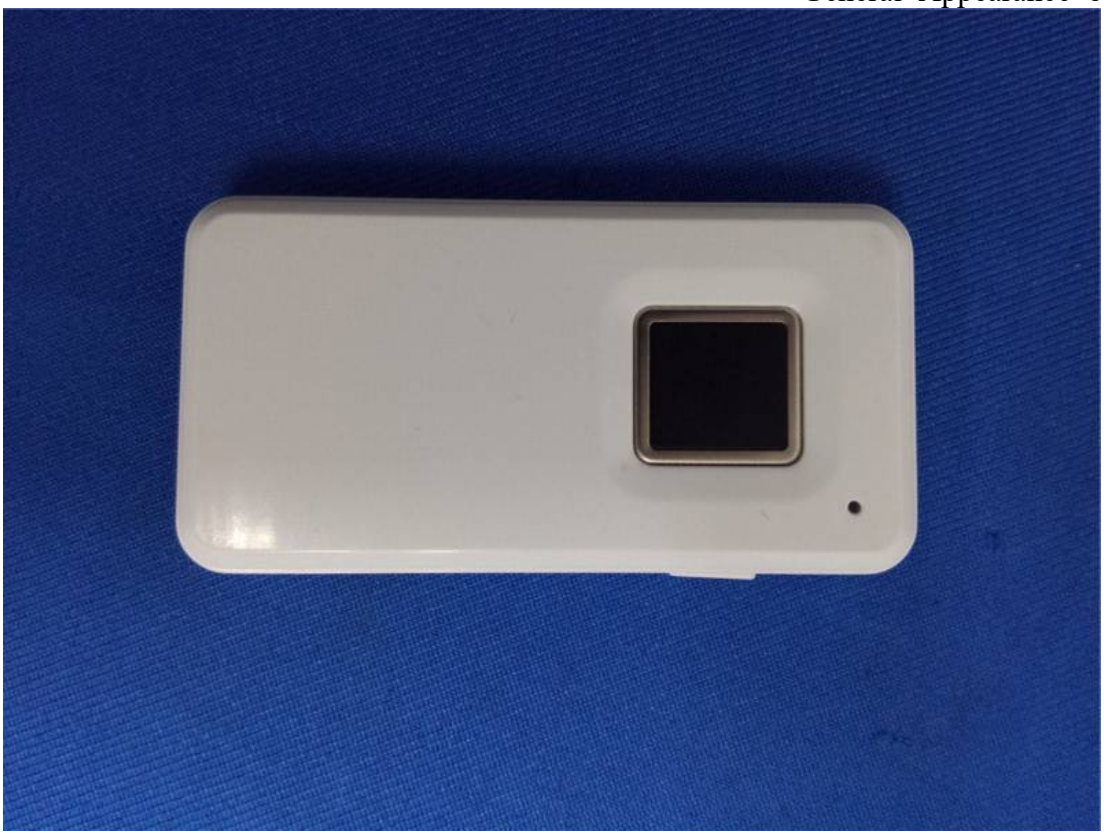

Figure 2
General Appearance of the EUT

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Figure 3
General Appearance of the EUT

Figure 4
General Appearance of the EUT

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Figure 5
I/O Port of the EUT

Figure 6
I/O Port of the EUT

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Figure 7
I/O Port of the EUT

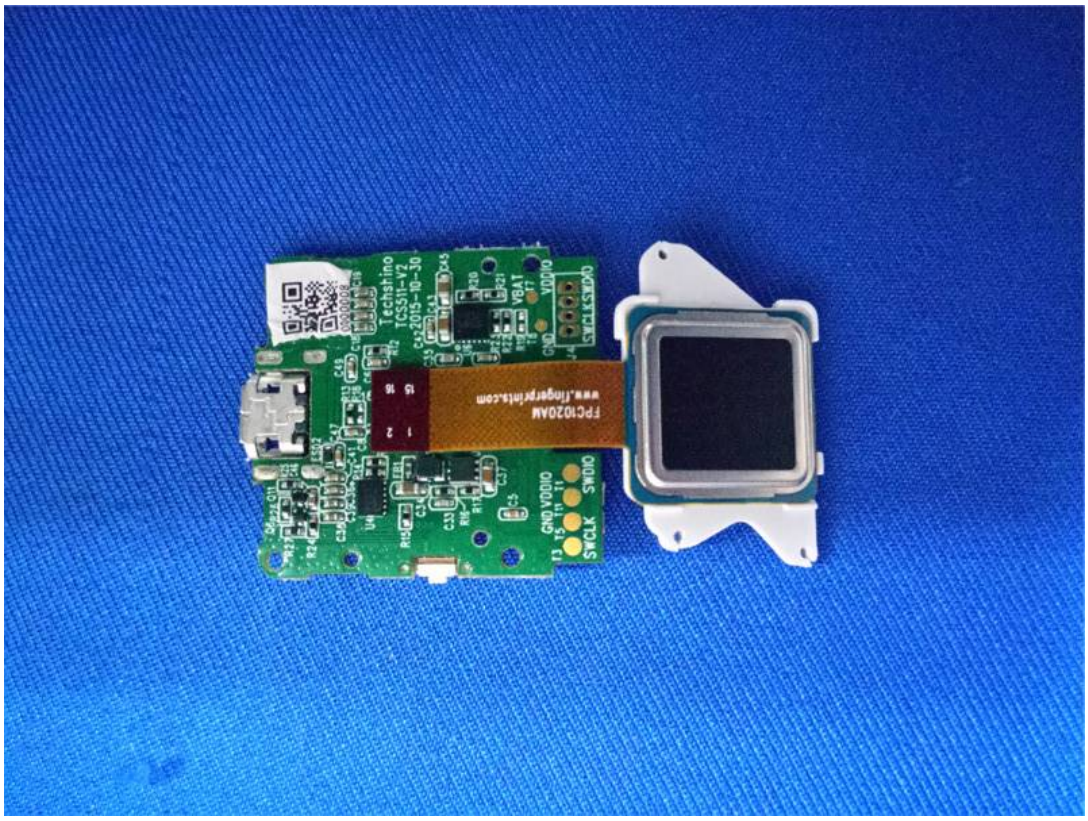

Figure 8
I/O Port of the EUT

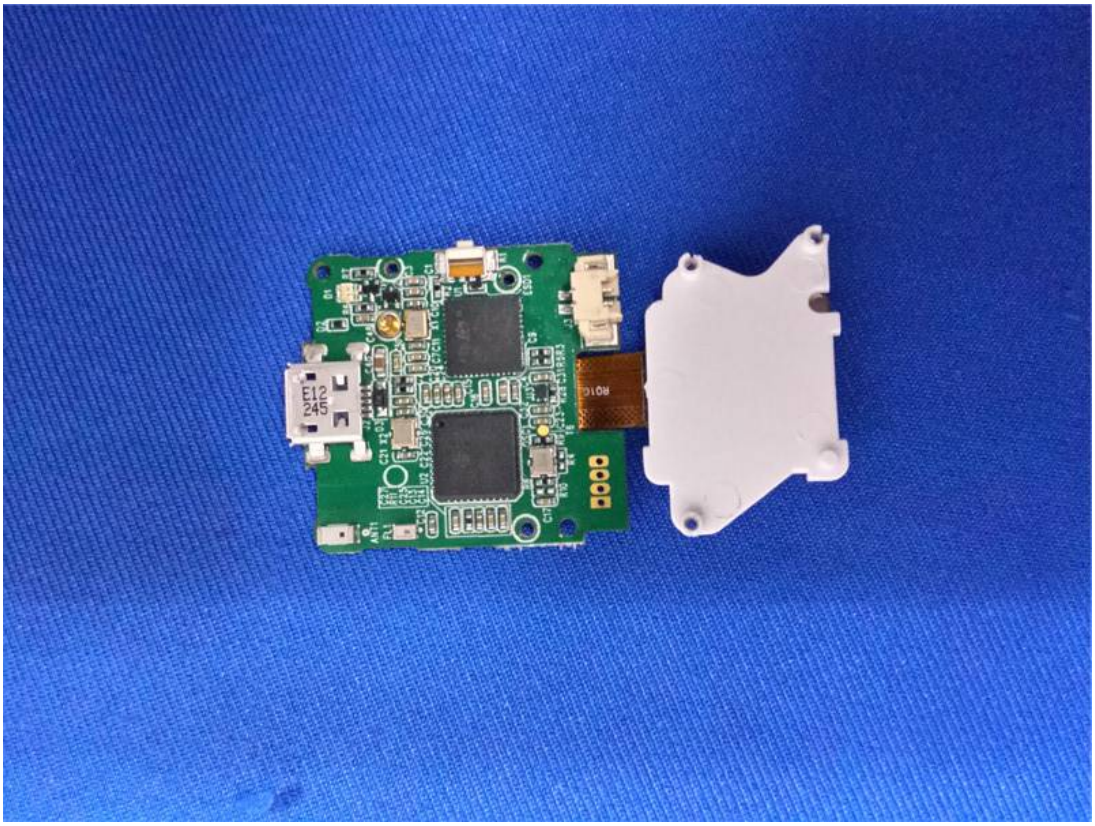

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Figure 9
Inside Configuration of the EUT

Figure 10
Inside Configuration of the EUT

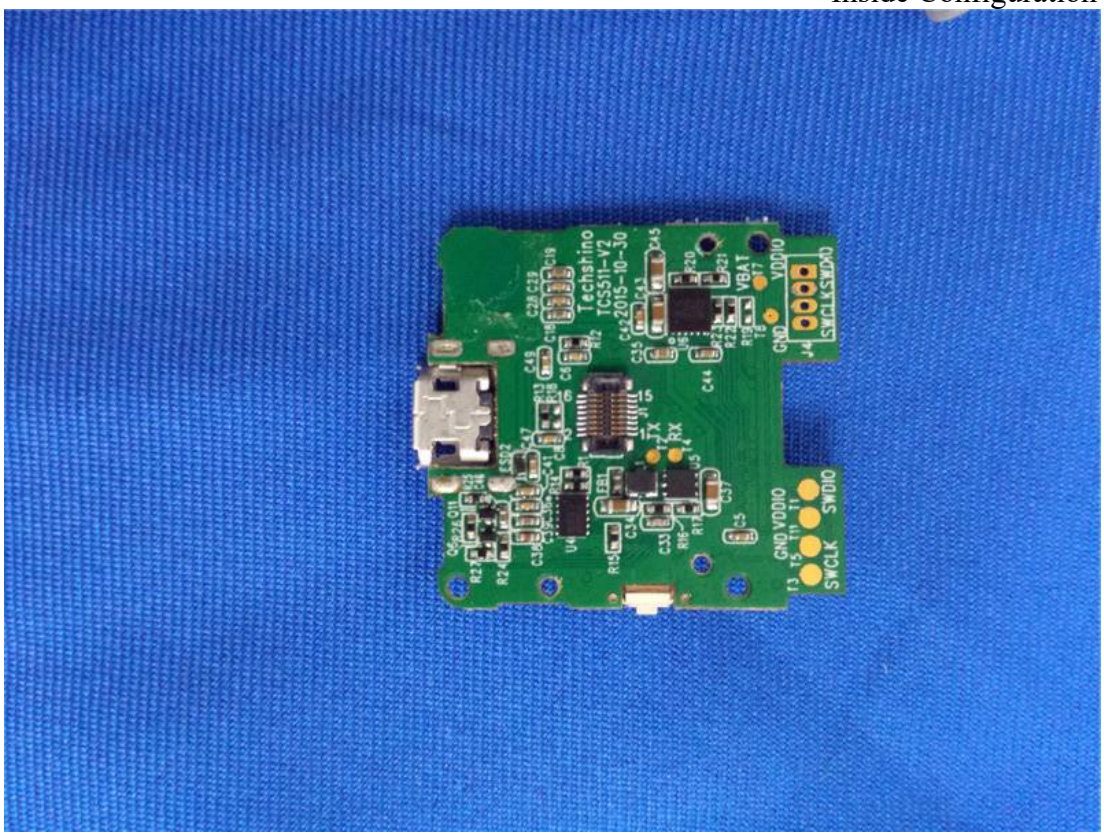

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Figure 11
Inside Configuration of the EUT

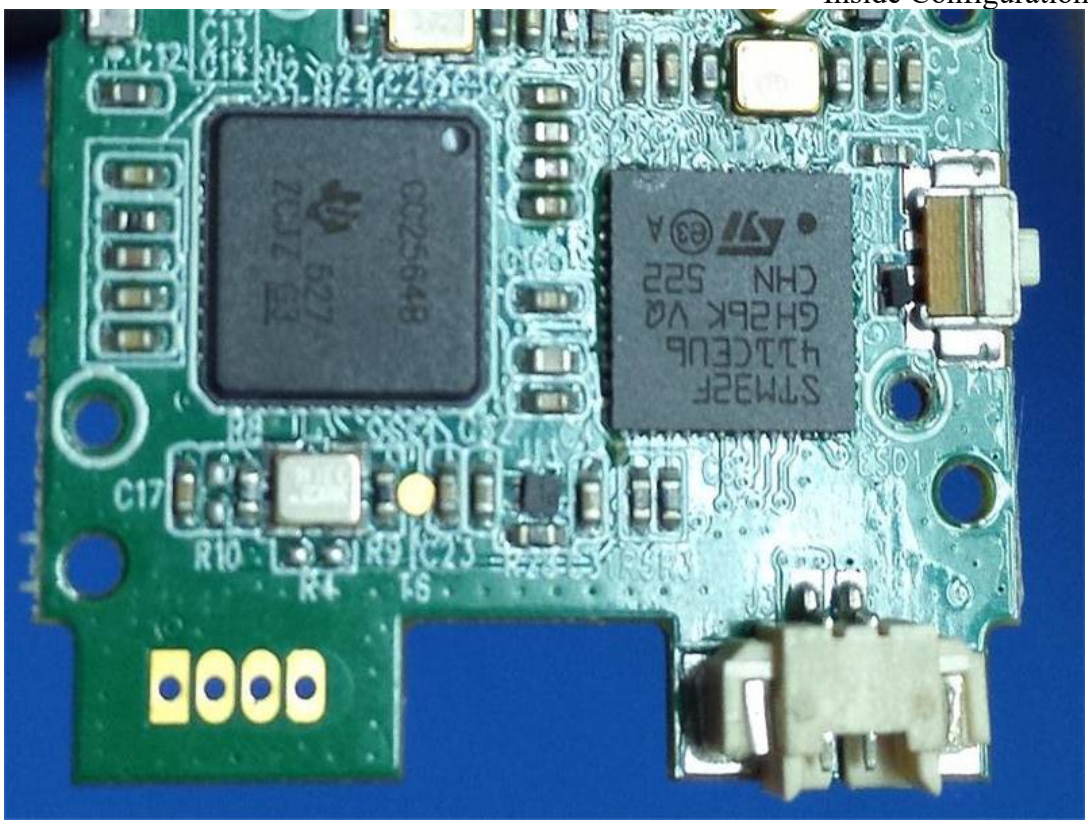
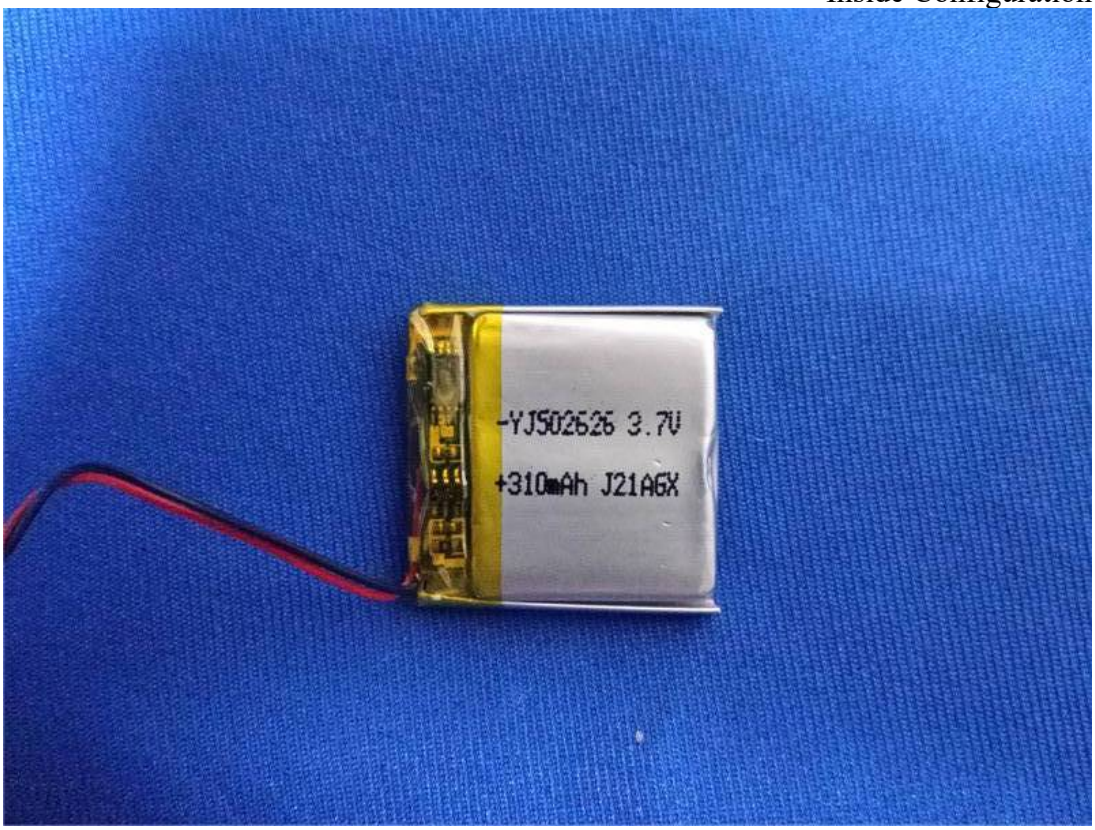


Figure 12
Inside Configuration of the EUT



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