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Report On

FCC Testing of the
Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V)
&,Quad-band GSM (850/900/1800/1900) multi mode Cellular phone
with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00236

Document 75933584 Report 18 Issue 1 **May 2016**

Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

REPORT ON

FCC Testing of the
Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)

Document 75933584 Report 18 Issue 1

May 2016

PREPARED FOR

Sharp Telecommunications of Europe Ltd
Inspired
Easthampstead Road
Bracknell
Berkshire
RG12 1NS

PREPARED BY

Natalie Bennett
Senior Administrator, Project Support

APPROVED BY

Matthew Russell
Authorised Signatory

DATED 18 May 2016

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler

M Choudhury

UKAS TESTING 0141

Product Service

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS to the requirements of FCC 47 CFR Part 15C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Serial Number(s)	IMEI 004401115794345 IMEI 004401115794170
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2015)
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	10753 17 February 2016
Start of Test	19 April 2016
Finish of Test	29 April 2016
Name of Engineer(s)	G Lawler M Choudhury
Related Document(s)	ANSI C63.10: 2013

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Bluetooth				
2.1	15.207	AC Line Conducted Emissions	Pass	
2.2	15.247 (a)(1)(iii)	Frequency Hopping Systems - Number of Hopping Channels	Pass	
2.3	15.247 (a)(1)	Frequency Hopping Systems - 20 dB Bandwidth	Pass	
2.4	15.247 (a)(1)	Frequency Hopping Systems - Channel Separation	Pass	
2.5	15.247 (a)(1)(iii)	Frequency Hopping Systems - Average Time of Occupancy	Pass	
2.6	15.247 (b)(3)	Maximum Conducted Output Power	Pass	
2.7	15.247 (d), 15.205 and 15.209	Spurious Radiated Emissions	Pass	
2.8	15.205	Restricted Band Edges	Pass	
2.9	15.247 (d)	Authorised Band Edges	Pass	

Product Service

1.3 PRODUCT TECHNICAL DESCRIPTION

Refer to Model Description APYHRO00236 Rev 1.0 document.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

Radiated measurements were performed with the EUT powered using a battery.
Conducted measurements were powered from a 4.0 V DC supply unless otherwise stated.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 15C (Bluetooth)

Product Service

2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.207

2.1.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794345 - Modification State 0

2.1.3 Date of Test

27 April 2016

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with ANSI C63.10, Clause 6.2.

Remarks

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class B emission limits in FCC 47 CFR Part 15, Clause 15.107.

2.1.6 Environmental Conditions

Ambient Temperature	20.2°C
Relative Humidity	24.0%

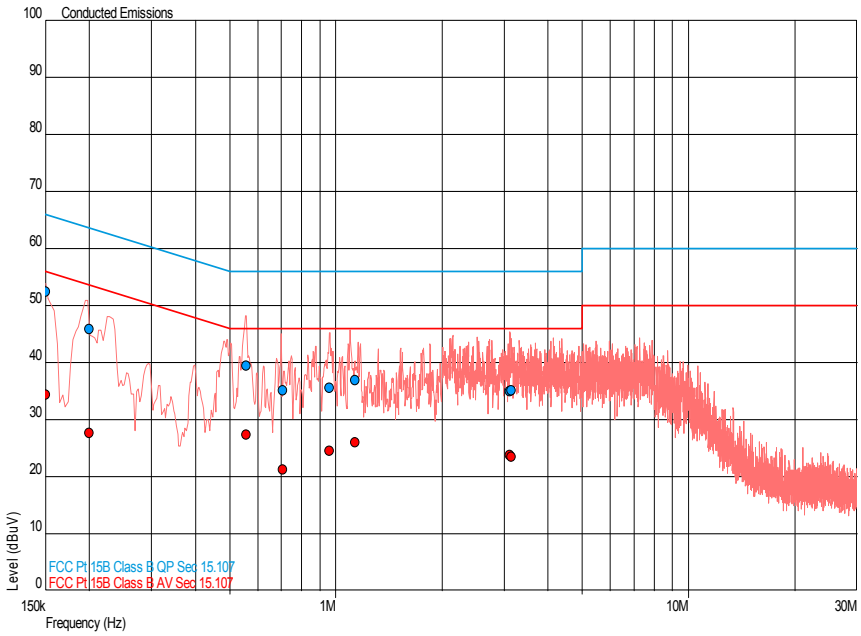
Product Service

2.1.7 Test Results

Bluetooth, Live Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.150	52.5	66.0	-13.5	34.4	56.0	-21.6
0.199	45.9	63.6	-17.8	27.6	53.6	-26.0
0.558	39.4	56.0	-16.6	27.3	46.0	-18.7
0.708	35.1	56.0	-20.9	21.3	46.0	-24.7
0.961	35.6	56.0	-20.4	24.5	46.0	-21.5
1.134	37.0	56.0	-19.0	26.0	46.0	-20.0
3.112	35.0	56.0	-21.0	23.8	46.0	-22.2
3.146	35.1	56.0	-20.9	23.5	46.0	-22.5

Bluetooth, Live Line, AC Line Conducted Emissions Plot

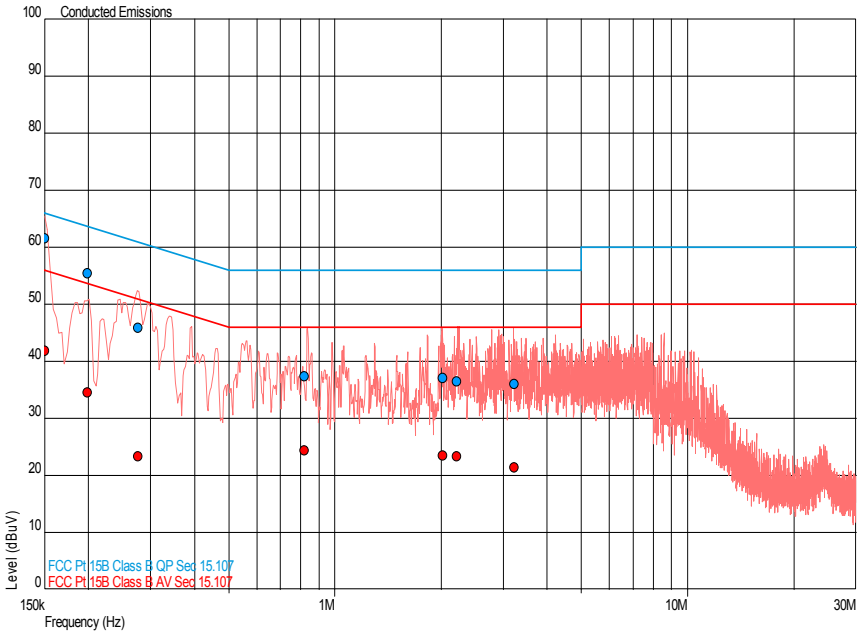


Product Service

Bluetooth, Neutral Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.150	61.6	66.0	-4.4	41.9	56.0	-14.1
0.199	55.5	63.7	-8.2	34.6	53.7	-19.0
0.277	45.9	60.9	-15.0	23.4	50.9	-27.5
0.821	37.4	56.0	-18.6	24.4	46.0	-21.6
2.024	37.2	56.0	-18.8	23.5	46.0	-22.5
2.210	36.5	56.0	-19.5	23.3	46.0	-22.7
3.232	36.1	56.0	-19.9	21.4	46.0	-24.6

Bluetooth, Neutral Line, AC Line Conducted Emissions Plot



FCC 47 CFR Part 15, Limit Clause 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

2.2 FREQUENCY HOPPING SYSTEMS - NUMBER OF HOPPING CHANNELS

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)(iii)

2.2.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794170 - Modification State 0

2.2.3 Date of Test

27 April 2016

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 7.8.3.

2.2.6 Environmental Conditions

Ambient Temperature	23.2°C
Relative Humidity	25.8%

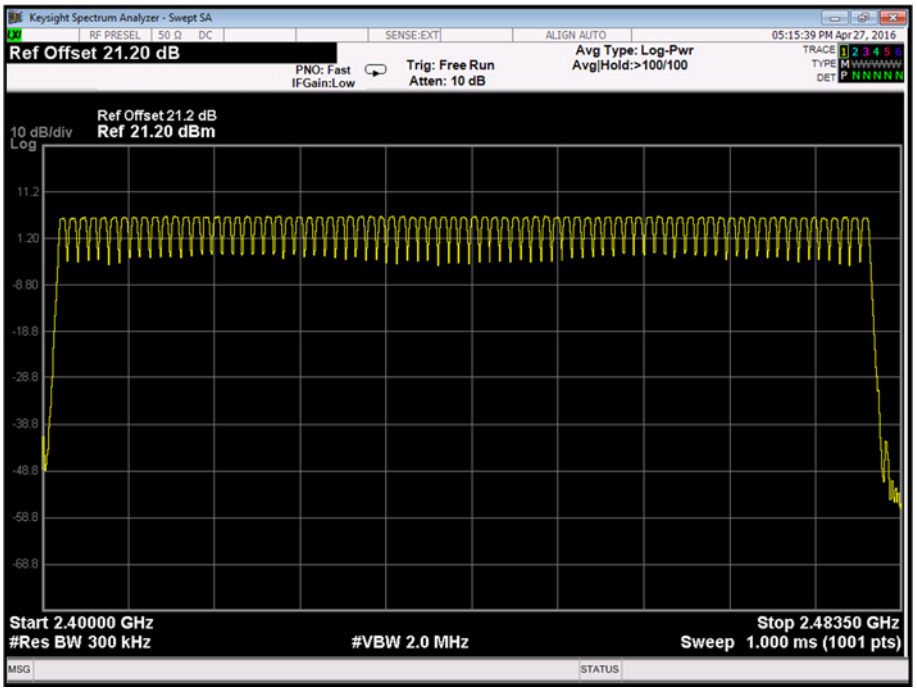
Product Service

2.2.7 Test Results

Bluetooth, Number of Hopping Channels Results

Number of Hopping Channels: 79

Bluetooth, Segment 1, Number of Hopping Channels Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

≥ 15 channels

2.3 FREQUENCY HOPPING SYSTEMS - 20 dB BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)

2.3.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794170 - Modification State 0

2.3.3 Date of Test

28 April 2016

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 6.9.2.

2.3.6 Environmental Conditions

Ambient Temperature	23.2°C
Relative Humidity	25.8%

Product Service

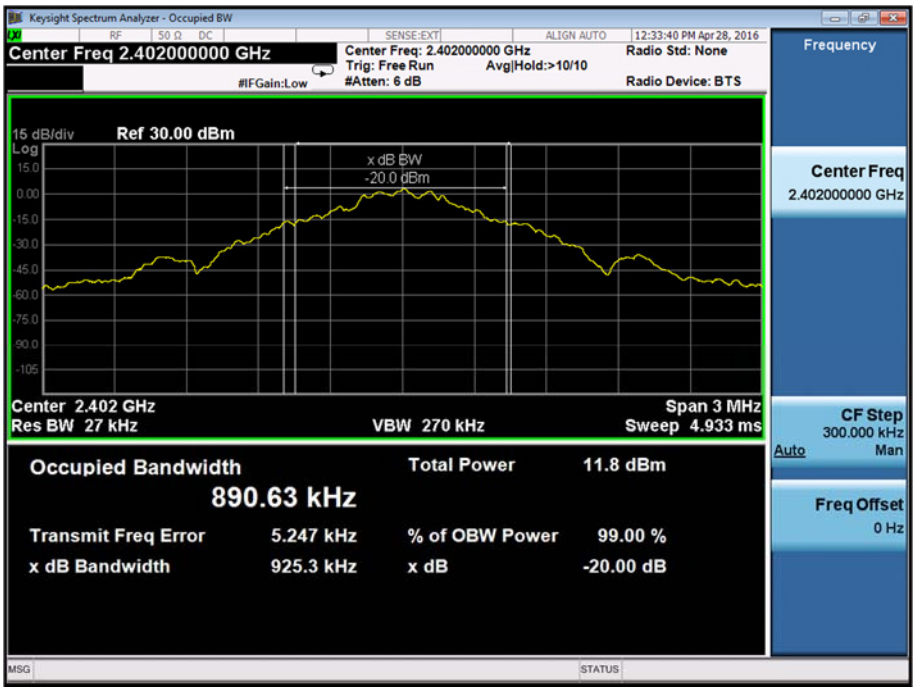
2.3.7 Test Results

4.0 V DC Supply

Bluetooth, 20 dB Bandwidth Results

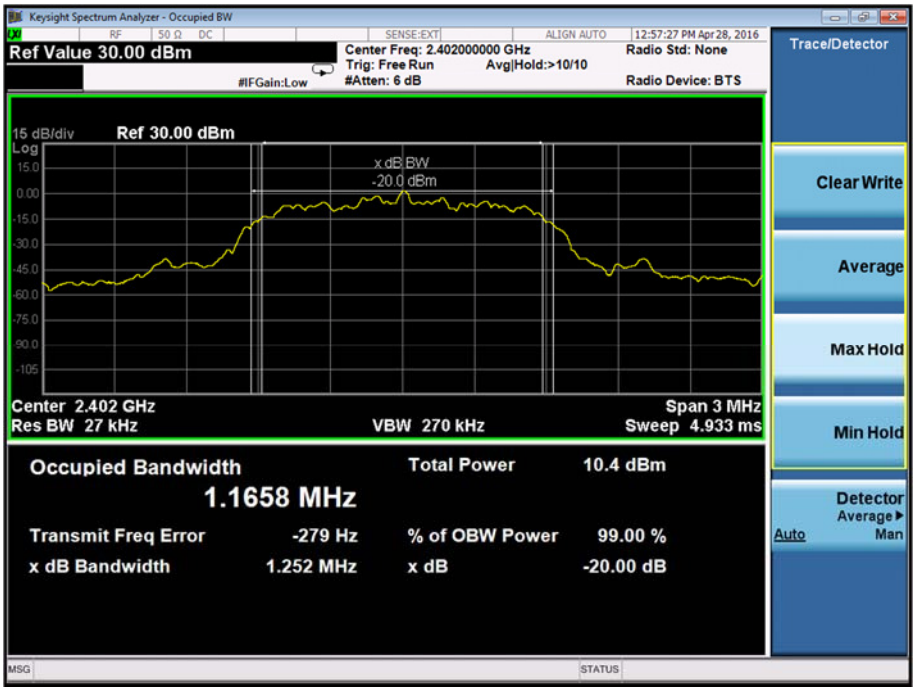
Modulation	2402 MHz	2441 MHz	2480 MHz
	kHz	kHz	kHz
GFSK	925.30	925.10	925.50
pi/4 DQPSK	1252.00	1252.00	1252.00
8-DPSK	1218.00	1219.00	1219.00

Bluetooth, 2402 MHz, GFSK, 20 dB Bandwidth Plot

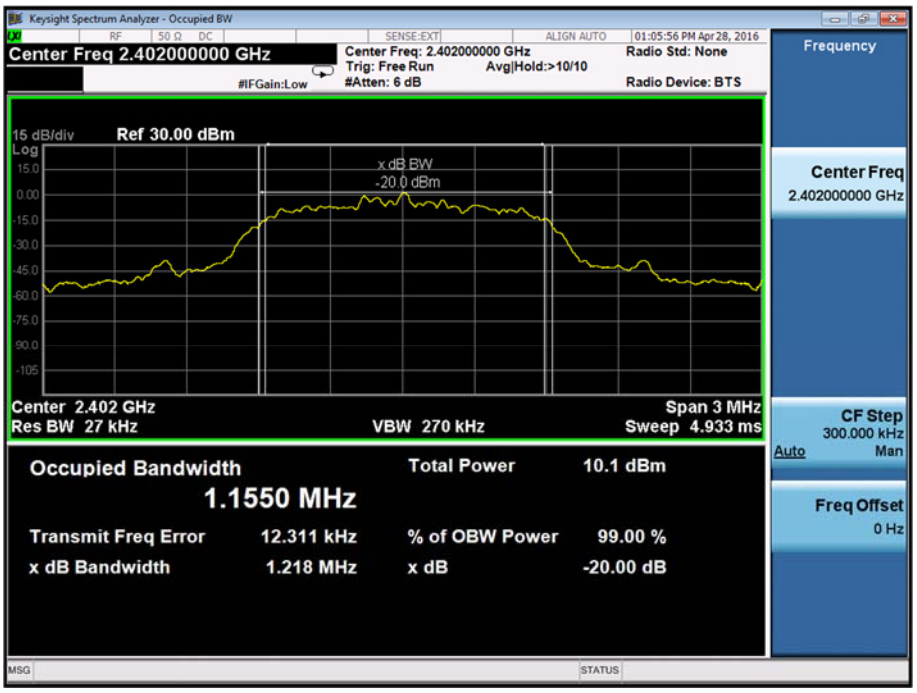


Product Service

Bluetooth,2402 MHz, pi/4 DQPSK, 20 dB Bandwidth Plot

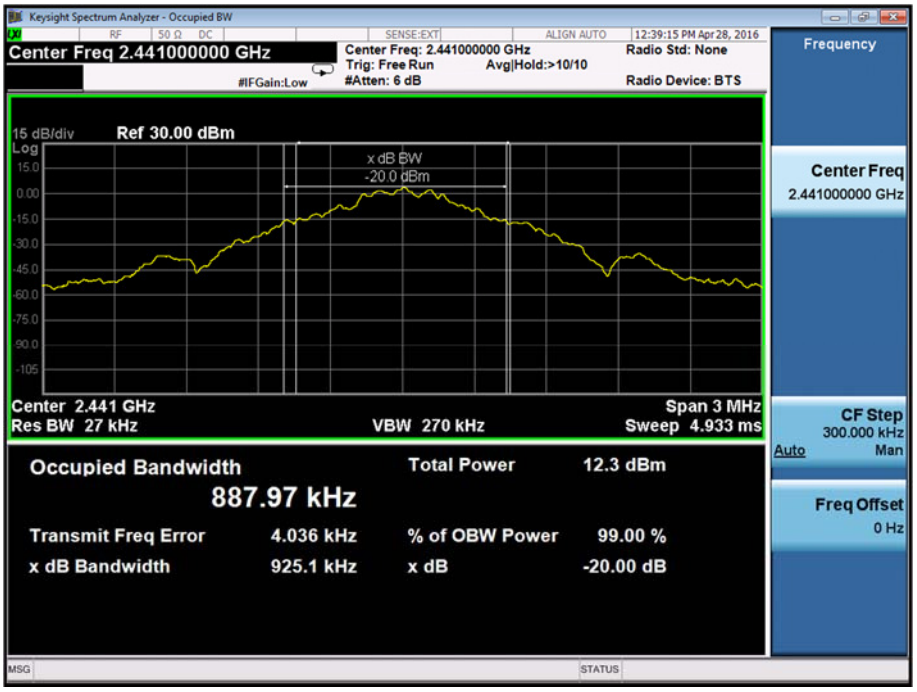


Bluetooth, 2402 MHz, 8-DPSK, 20 dB Bandwidth Plot

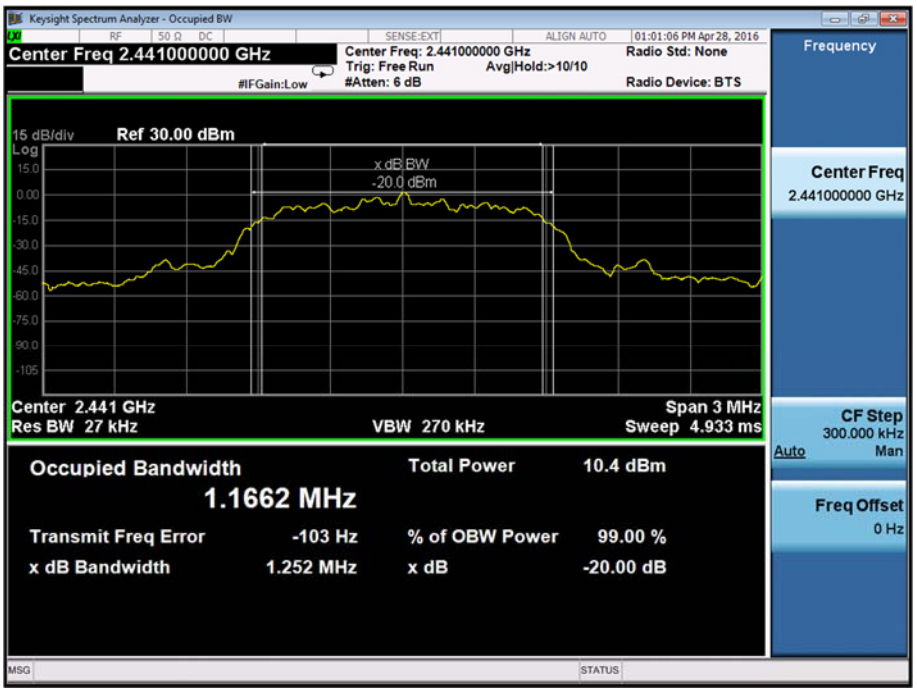


Product Service

Bluetooth, 2441 MHz, GFSK, 20 dB Bandwidth Plot

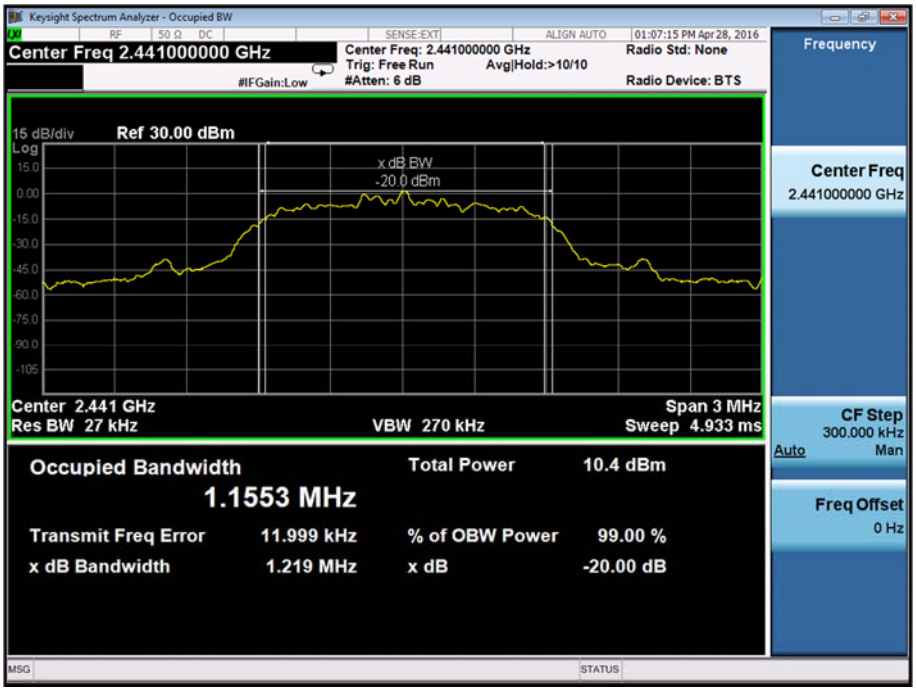


Bluetooth, 2441 MHz, pi/4 DQPSK, 20 dB Bandwidth Plot

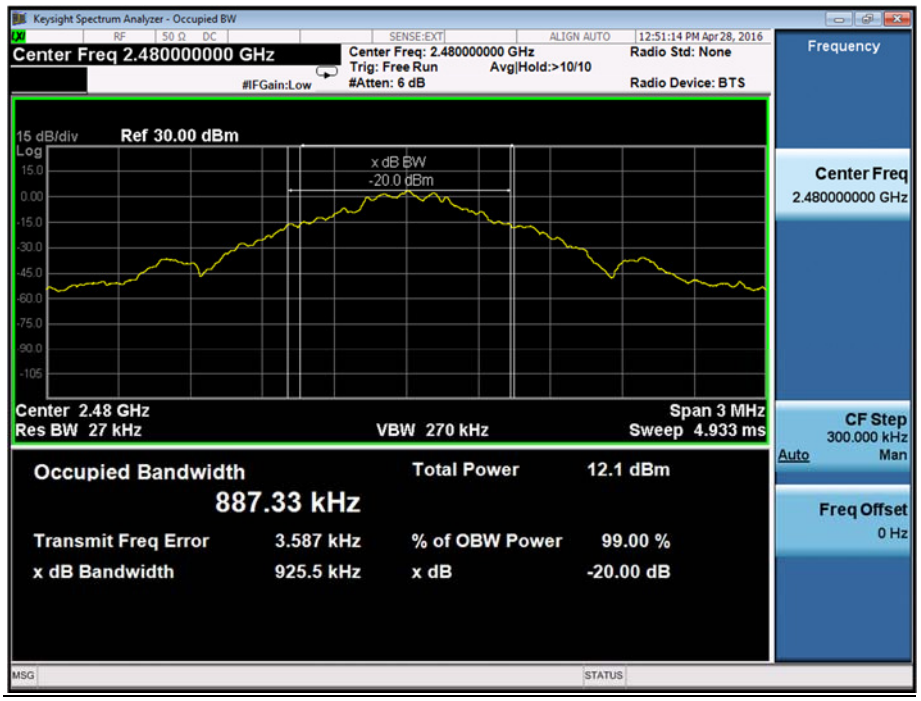


Product Service

Bluetooth, 2441 MHz, 8-DPSK, 20 dB Bandwidth Plot

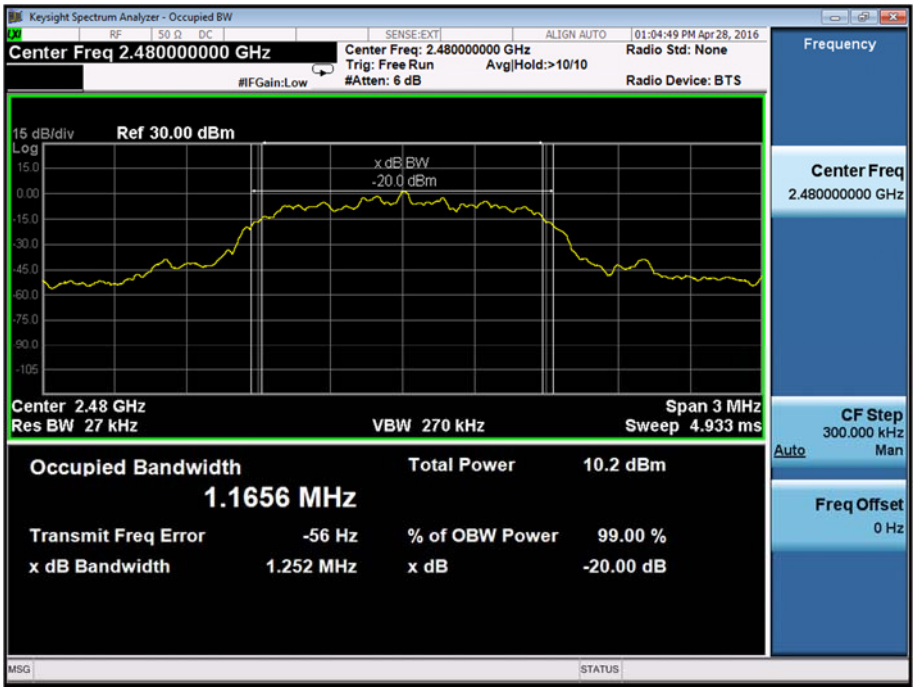


Bluetooth, 2480 MHz, GFSK, 20 dB Bandwidth Plot

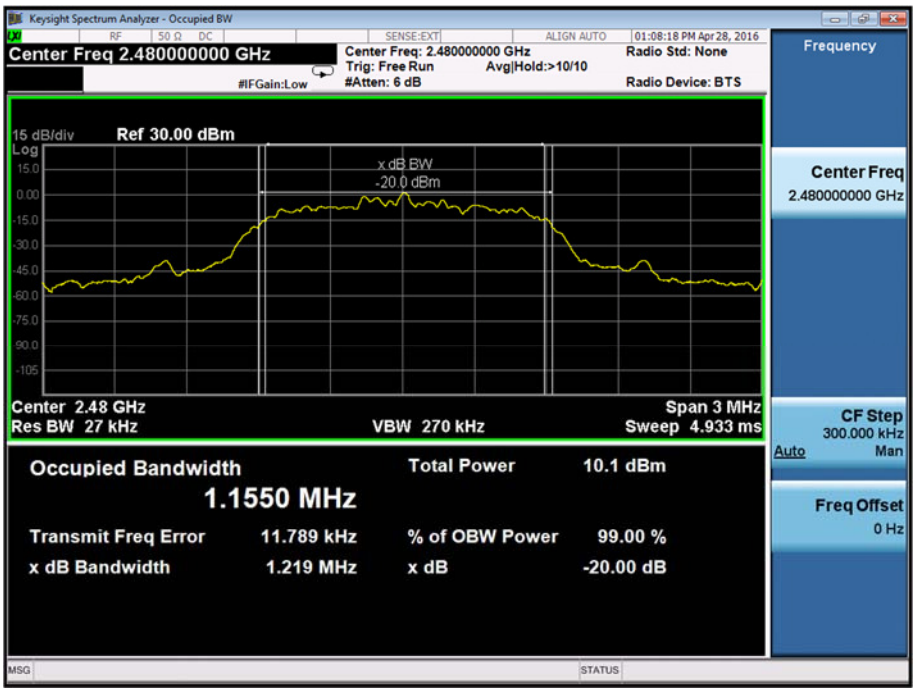


Product Service

Bluetooth, 2480 MHz, pi/4 DQPSK, 20 dB Bandwidth Plot



Bluetooth, 2480 MHz, 8-DPSK, 20 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause

None specified.

2.4 FREQUENCY HOPPING SYSTEMS - CHANNEL SEPARATION

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)

2.4.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794170 - Modification State 0

2.4.3 Date of Test

28 April 2016

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 7.8.2.

Remarks

For pi/4 DQPSK & 8-DPSK modulations it was not possible to make this measurement with frequency hopping enabled as the spectral shape means the peaks from each hopping frequency cannot be differentiated with a single max hold trace. Instead two traces were used, the first on one hopping frequency and another on an adjacent hopping frequency.

2.4.6 Environmental Conditions

Ambient Temperature	23.2°C
Relative Humidity	25.8%

Product Service

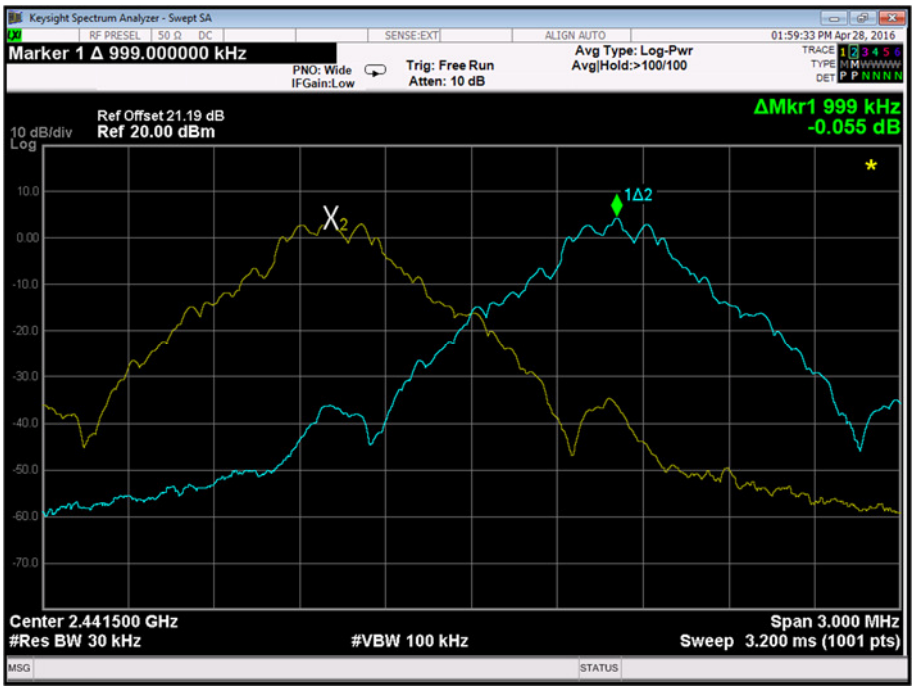
2.4.7 Test Results

4.0 V DC Supply

Bluetooth, Channel Separation Results

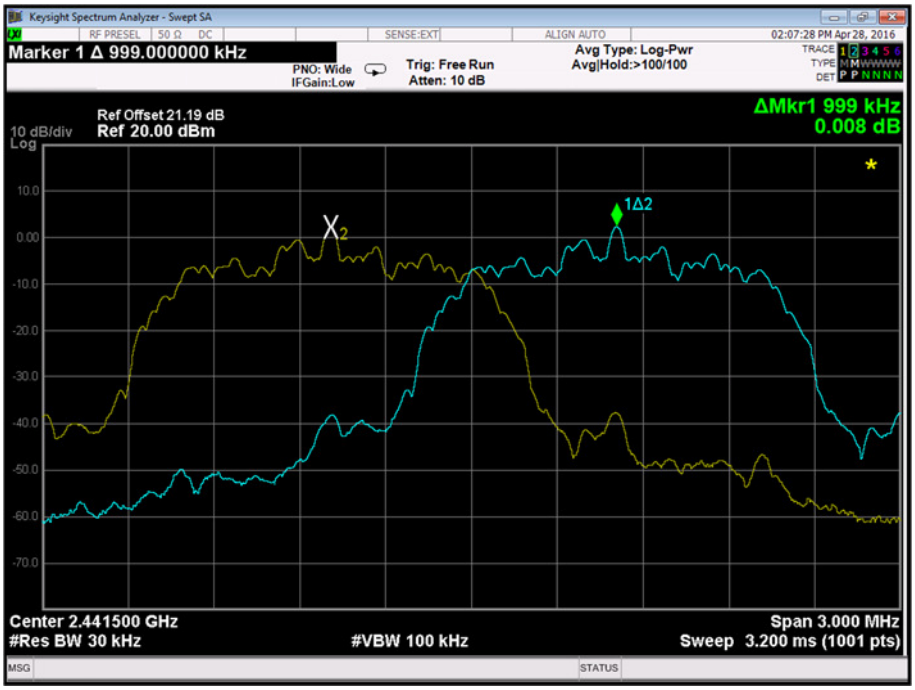
Modulation	Frequency Hopping
	MHz
GFSK	0.999
pi/4 DQPSK	0.999
8-DPSK	0.999

Bluetooth, GFSK, Channel Separation Plot

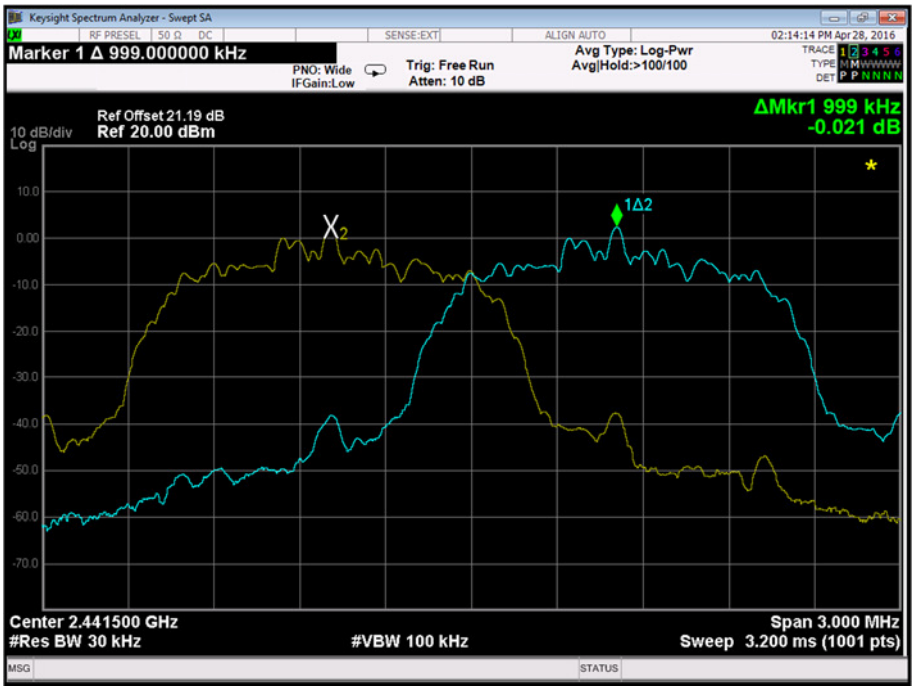


Product Service

Bluetooth, pi/4 DQPSK, Channel Separation Plot



Bluetooth, 8-DPSK, Channel Separation Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz 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 0.125 W.

2.5 FREQUENCY HOPPING SYSTEMS - AVERAGE TIME OF OCCUPANCY

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)(iii)

2.5.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794170 - Modification State 0

2.5.3 Date of Test

29 April 2016

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 7.8.4.

2.5.6 Environmental Conditions

Ambient Temperature	23.9°C
Relative Humidity	23.8%

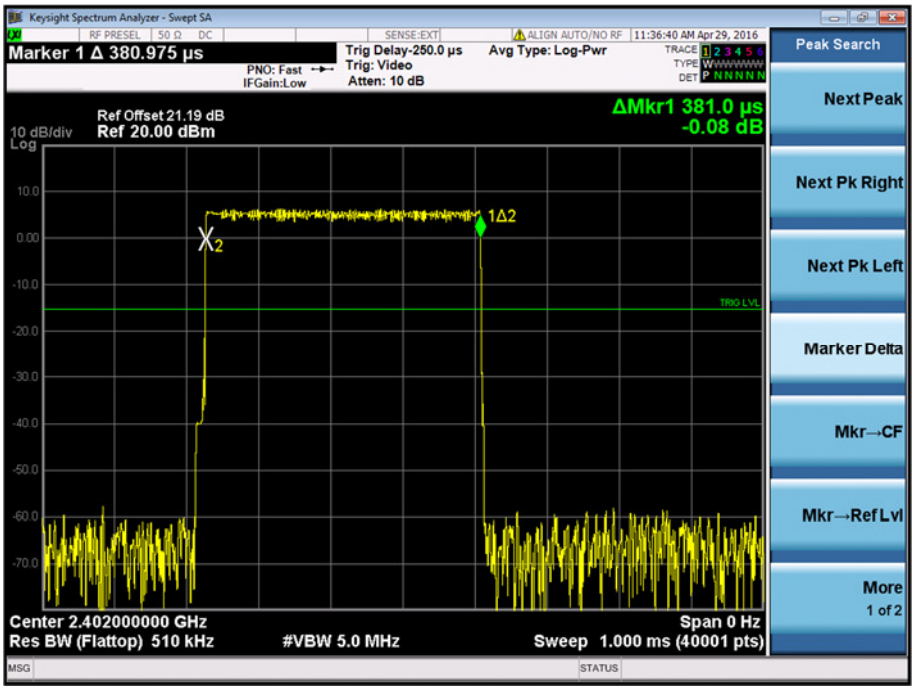
Product Service

2.5.7 Test Results

Bluetooth, Average Time of Occupancy Results

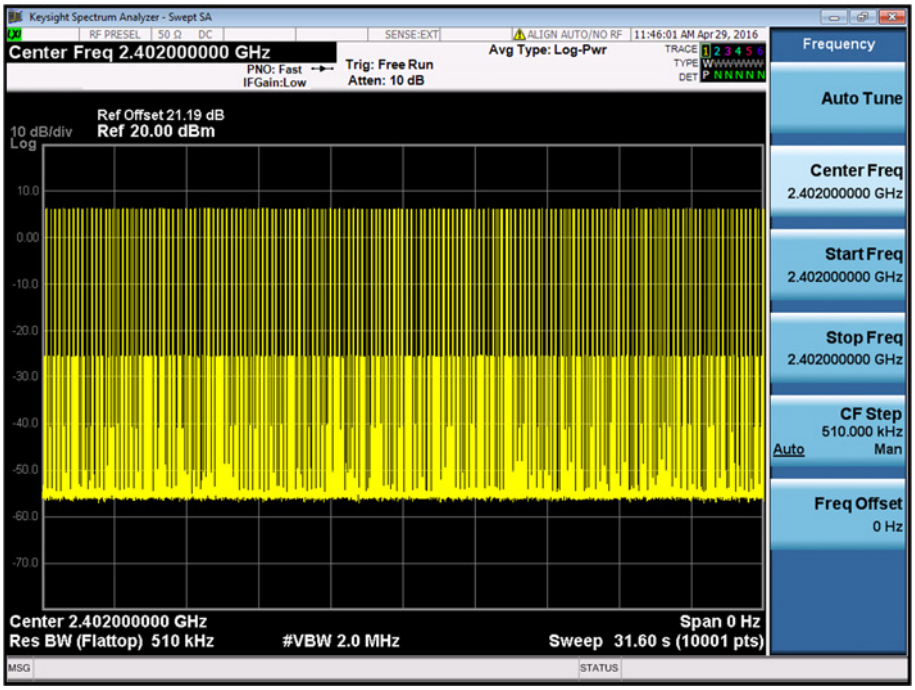
Packet Type	Dwell Time (ms)	Number of Transmissions	Average Occupancy Time (ms)
DH1	0.381	320	121.92
DH3	1.636	173	283.03
DH5	2.885	102	294.27

Bluetooth, DH1, Average Time of Occupancy Plot

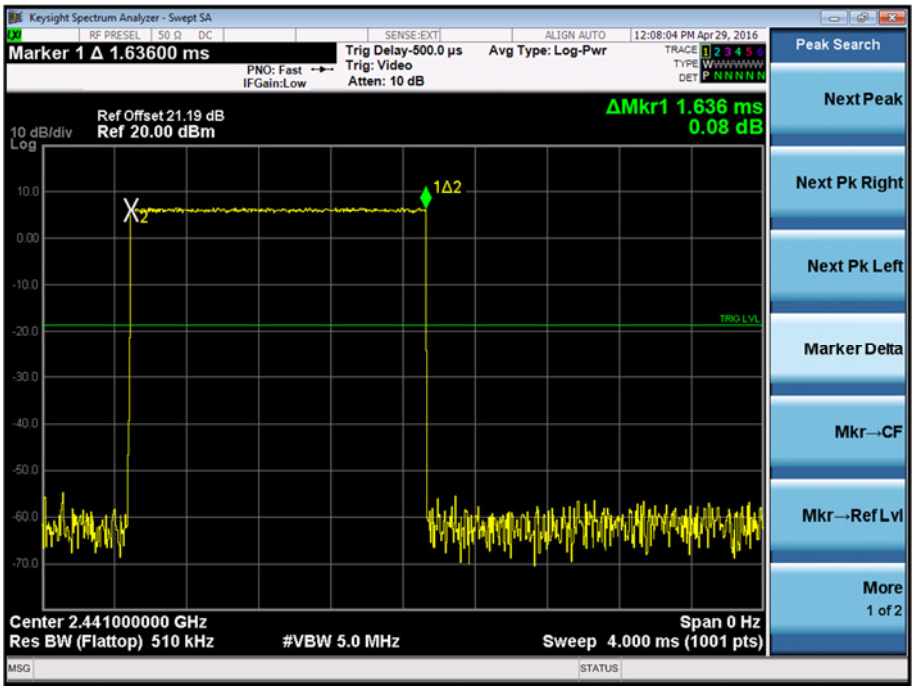


Product Service

Bluetooth, DH1, Total Average Time of Occupancy Plot

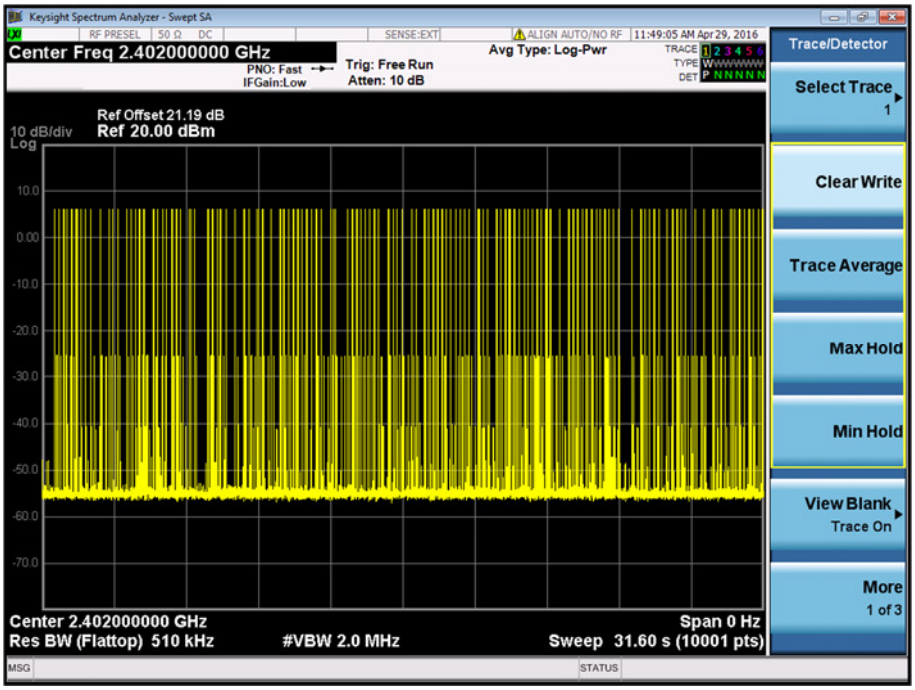


Bluetooth, DH3, Average Time of Occupancy Plot

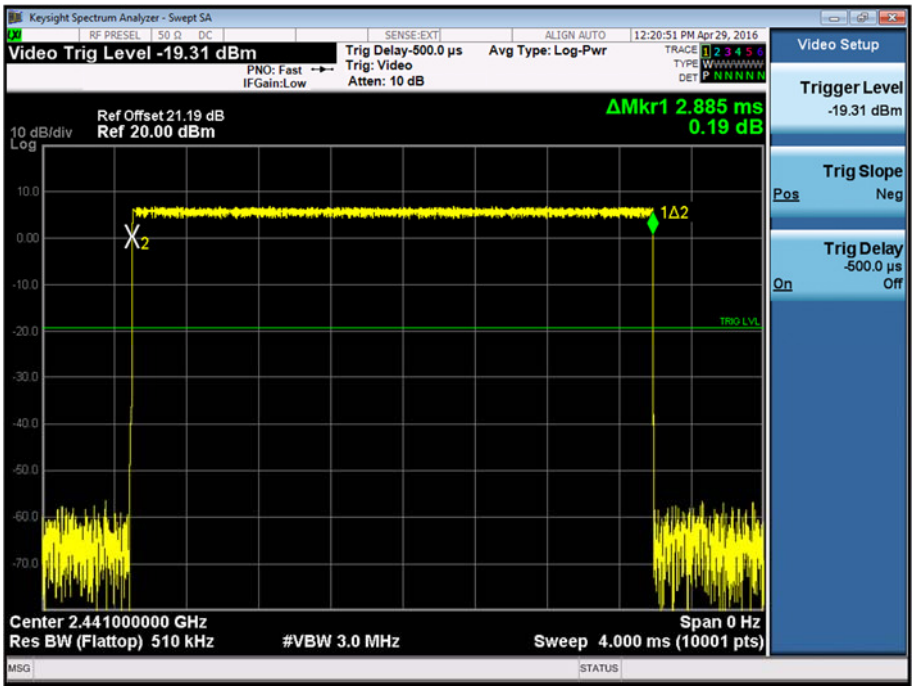


Product Service

Bluetooth, DH3, Total Average Time of Occupancy Plot

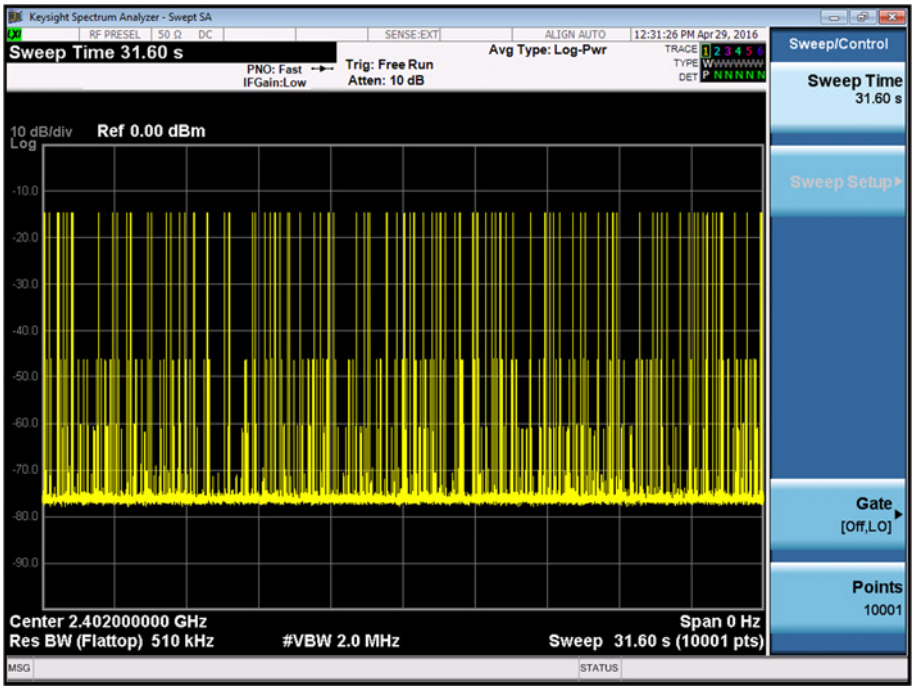


Bluetooth, DH5, Average Time of Occupancy Plot



Product Service

Bluetooth, DH5, Total Average Time of Occupancy Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

2.6 MAXIMUM CONDUCTED OUTPUT POWER

2.6.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)(3)

2.6.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794170 - Modification State 0

2.6.3 Date of Test

27 April 2016

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

This test was performed in accordance with ANSI C63.10, clause 7.8.5

2.6.6 Environmental Conditions

Ambient Temperature	21.9°C
Relative Humidity	25.0%

Product Service

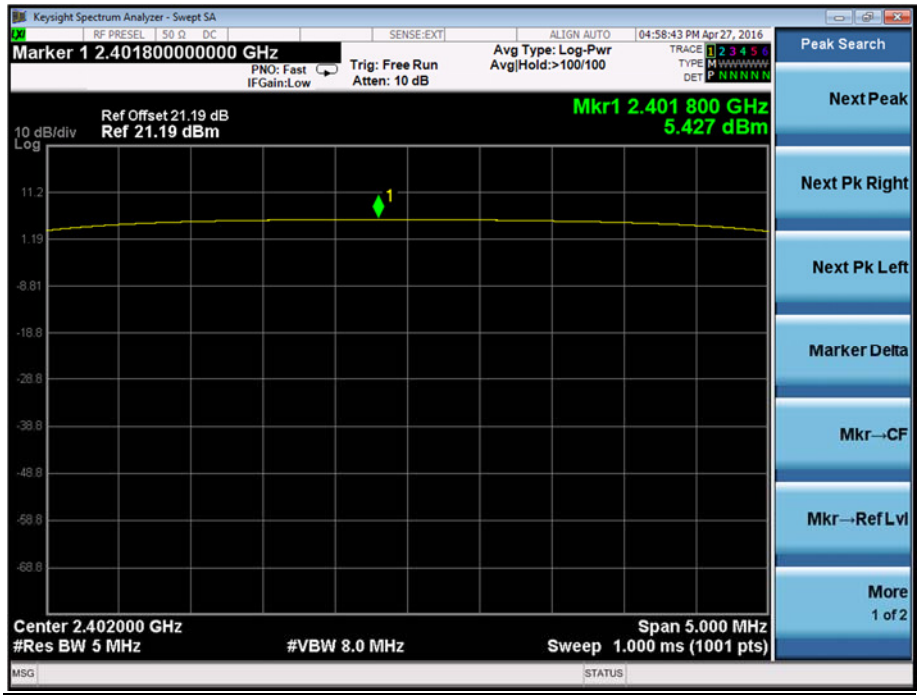
2.6.7 Test Results

4.0 V DC Supply

Bluetooth, DH5, Maximum Conducted Output Power Results

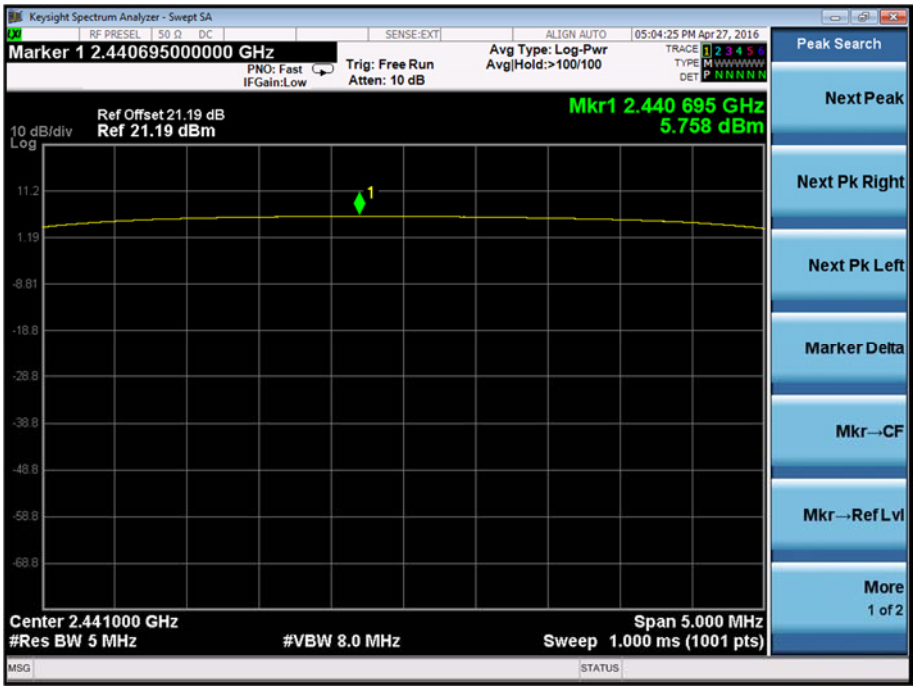
2402 MHz		2441 MHz		2480 MHz	
dBm	mW	dBm	mW	dBm	mW
5.427	3.489	5.758	3.765	5.570	3.606

Bluetooth, 2402 MHz, DH5, Maximum Conducted Output Power Plot

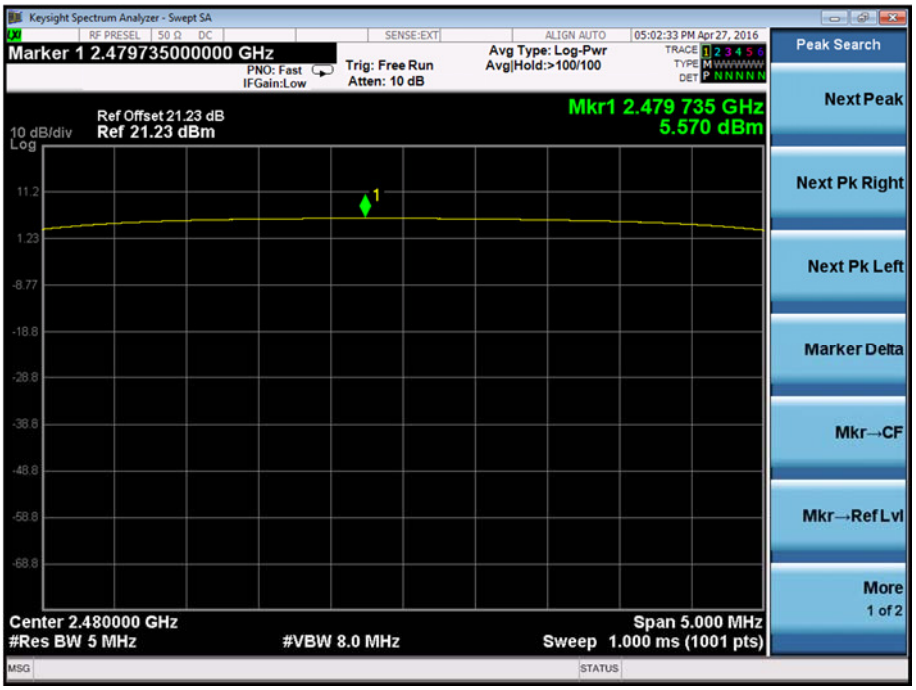


Product Service

Bluetooth, 2441 MHz, DH5, Maximum Conducted Output Power Plot



Bluetooth, 2480 MHz, DH5, Maximum Conducted Output Power Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

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 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

2.7 SPURIOUS RADIATED EMISSIONS

2.7.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d), 15.205 and 15.209

2.7.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794345 - Modification State 0

2.7.3 Date of Test

19 April 2016, 24 April 2016 & 25 April 2016

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

Testing was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

Remarks

Plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.3 Final average measurements were taken using a CISPR average detector as required by ANSI C63.10, clause 4.1.2.

2.7.6 Environmental Conditions

Ambient Temperature	19.2 - 20.5°C
Relative Humidity	28.0 - 33.0%

Product Service

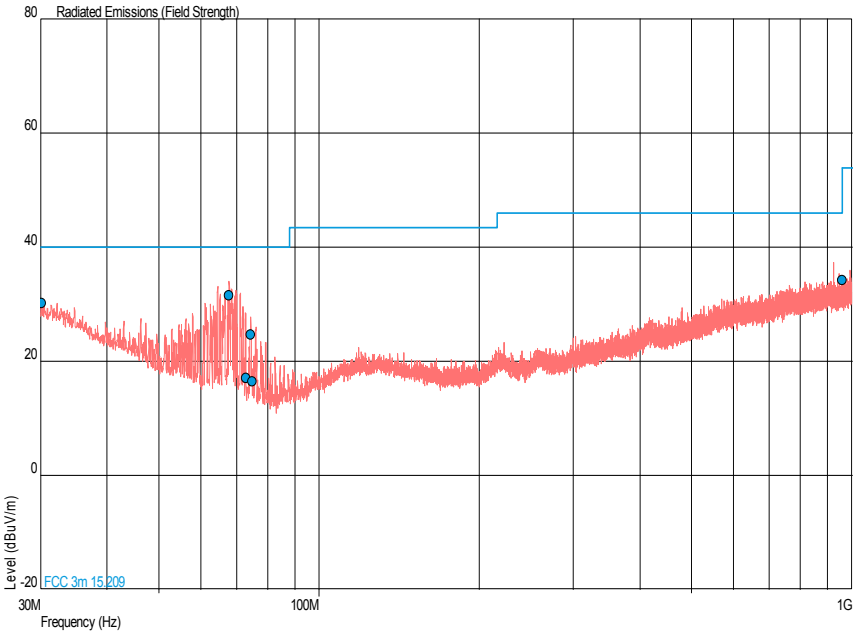
2.7.7 Test Results

4.0 V DC Supply

Bluetooth, 2402 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.194	30.3	-9.7	32.7	-67.3	0	1.00	Vertical
67.782	31.5	-8.5	37.6	-62.4	0	1.00	Vertical
73.045	17.1	-22.9	7.2	-92.8	0	1.00	Vertical
74.483	24.7	-15.3	17.2	-82.8	0	1.00	Vertical
74.843	16.5	-23.5	6.7	-93.3	0	1.00	Vertical
960.150	34.2	-19.8	51.3	-449.7	0	1.00	Vertical

Bluetooth, 2402 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



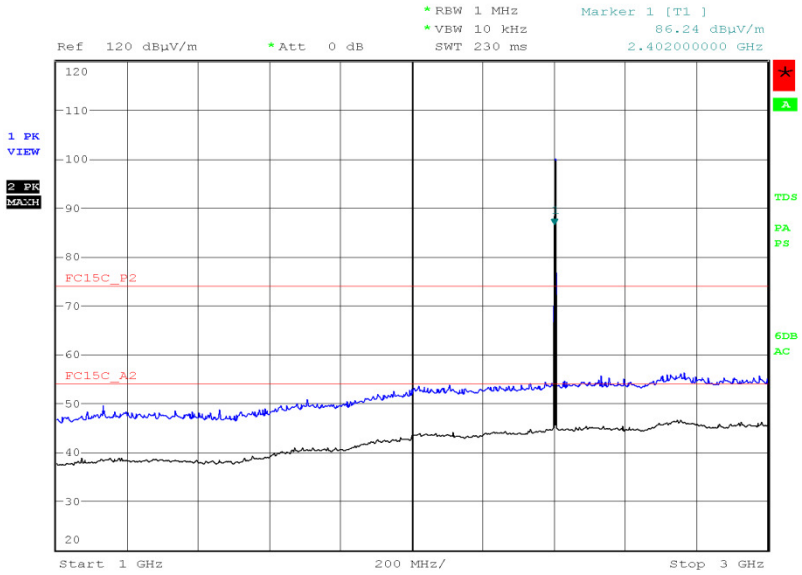
Product Service

Bluetooth, 2402 MHz, DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

*No emissions were detected within 10 dB of the limit.

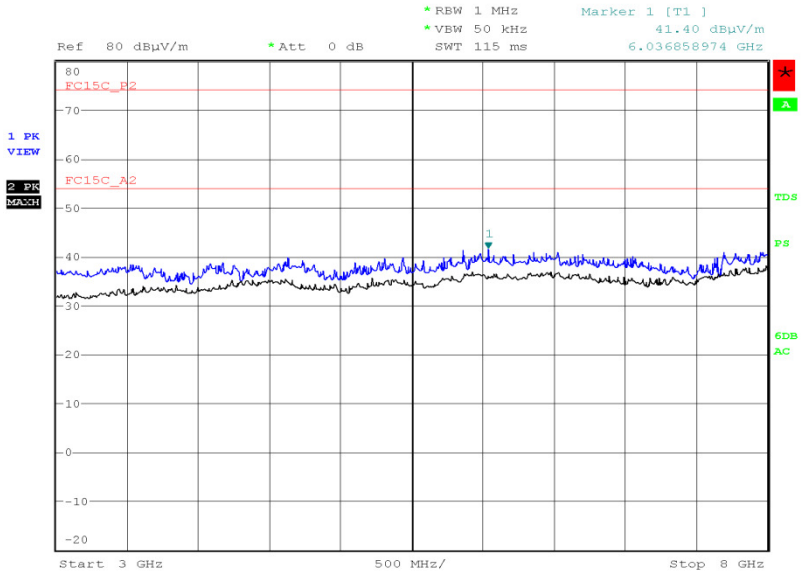
Bluetooth, 2402 MHz, DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 19.APR.2016 23:15:09

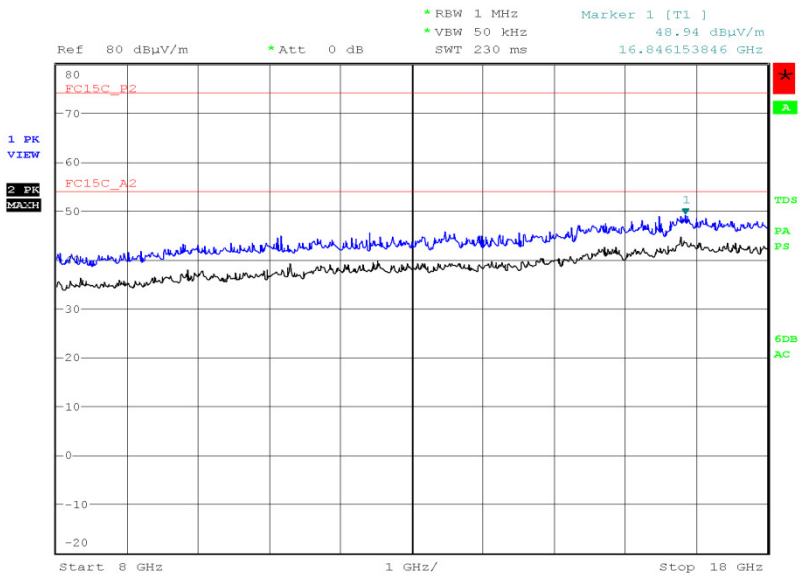
Product Service

Bluetooth, 2402 MHz, DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 24.APR.2016 11:50:33

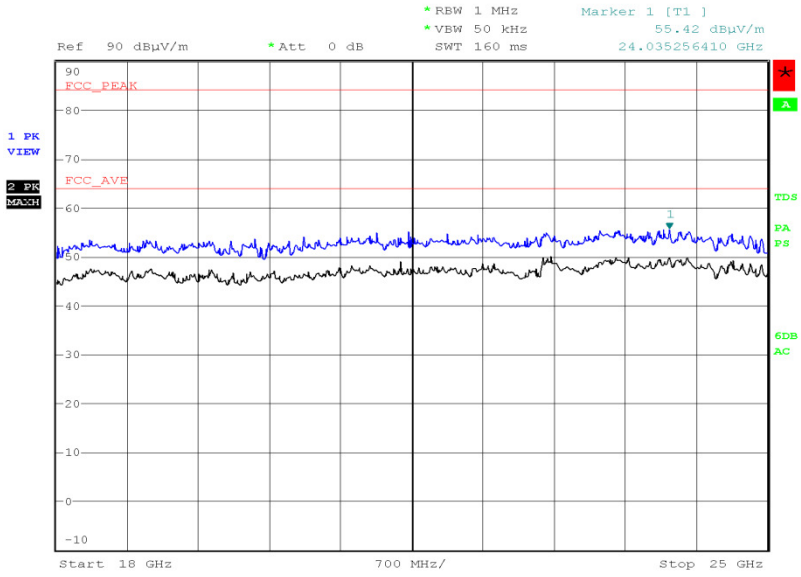
Bluetooth, 2402 MHz, DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 16:04:50

Product Service

Bluetooth, 2402 MHz, DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



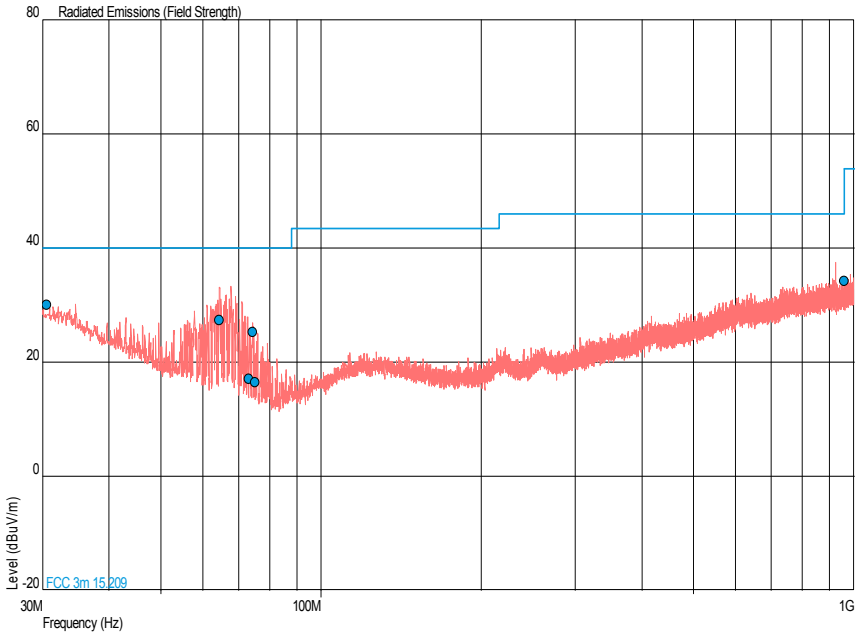
Date: 25.APR.2016 19:31:25

Product Service

Bluetooth, 2441 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.582	30.1	-9.9	32.0	-68.0	0	1.00	Vertical
64.387	27.3	-12.7	23.2	-76.8	0	1.00	Vertical
73.060	17.1	-22.9	7.2	-92.8	0	1.00	Vertical
74.449	25.3	-14.7	18.4	-81.6	0	1.00	Vertical
75.131	16.5	-23.5	6.7	-93.3	0	1.00	Vertical
960.150	34.3	-19.7	51.9	-449.1	0	1.00	Vertical

Bluetooth, 2441 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot

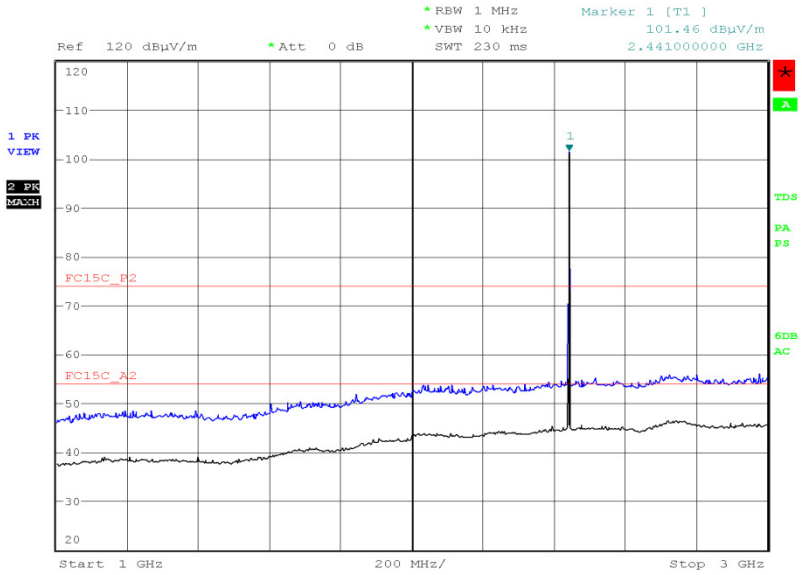


Bluetooth, 2441 MHz, DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

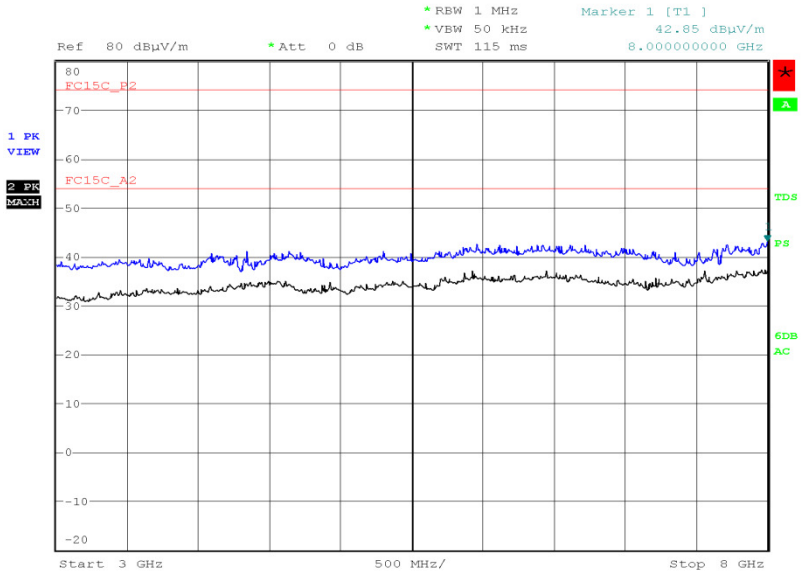
*No emissions were detected within 10 dBof the limit.

Bluetooth, 2441 MHz, DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



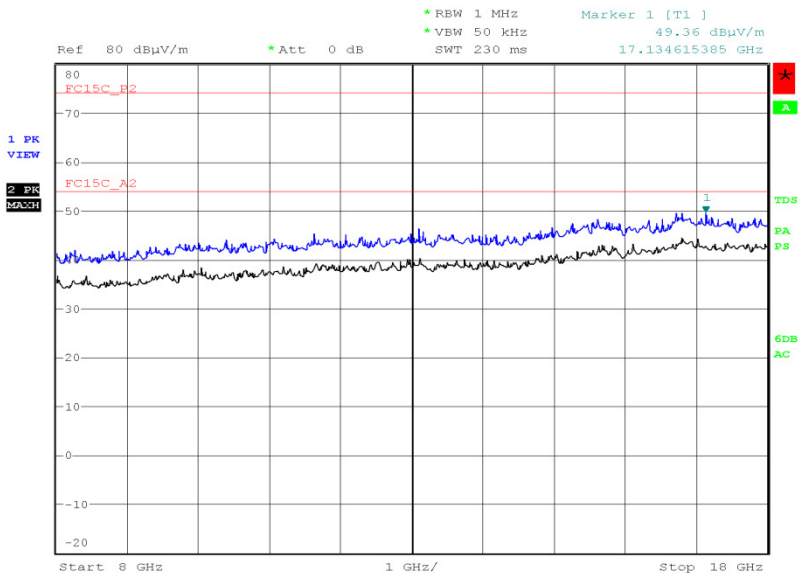
Product Service

Bluetooth, 2441 MHz, DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 24.APR.2016 12:07:05

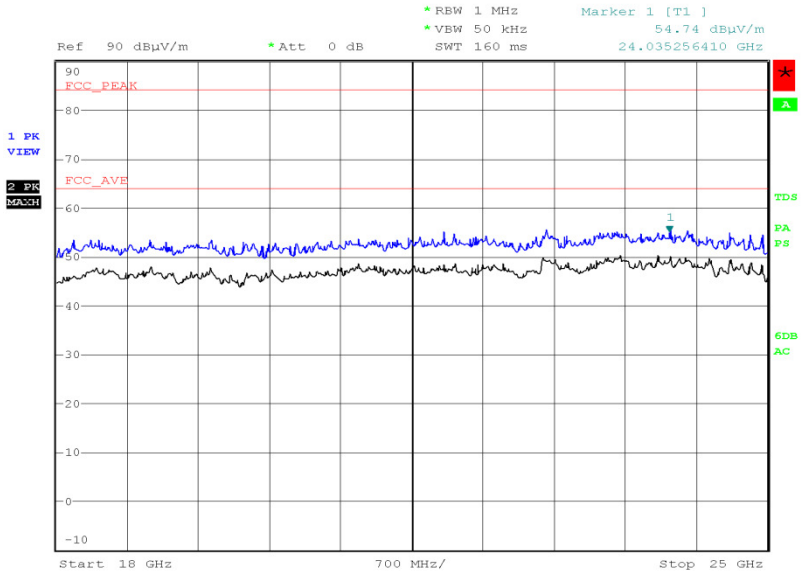
Bluetooth, 2441 MHz, DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 16:17:10

Product Service

Bluetooth, 2441 MHz, DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



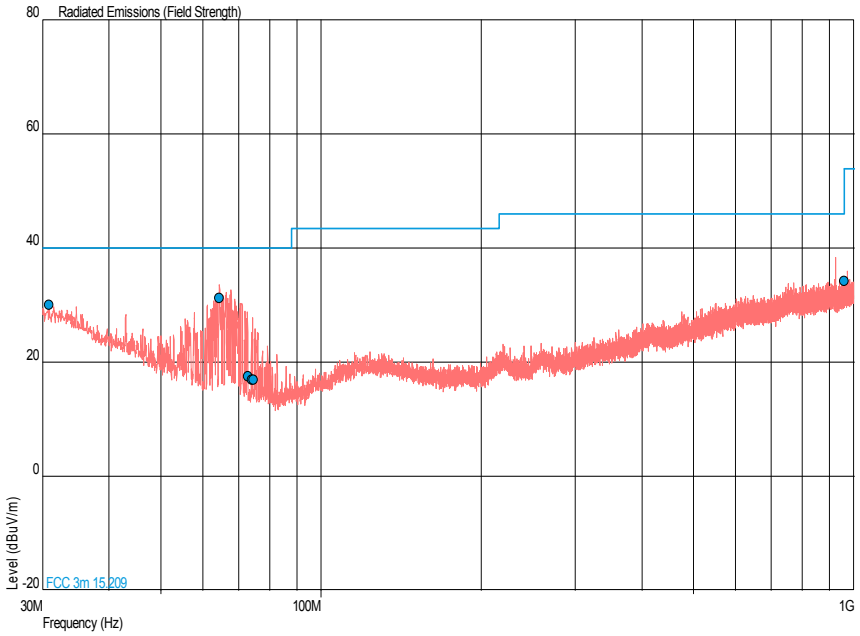
Date: 25.APR.2016 19:33:56

Product Service

Bluetooth, 2480 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.873	30.0	-10.0	31.6	-68.4	180	1.00	Vertical
64.484	31.2	-8.8	36.3	-63.7	180	1.00	Vertical
73.004	17.5	-22.5	7.5	-92.5	180	1.00	Vertical
74.131	16.9	-23.1	7.0	-93.0	180	1.00	Vertical
74.603	16.9	-23.1	7.0	-93.0	180	1.00	Vertical
960.004	34.3	-19.7	51.9	-449.1	180	1.00	Vertical

Bluetooth, 2480 MHz, DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot

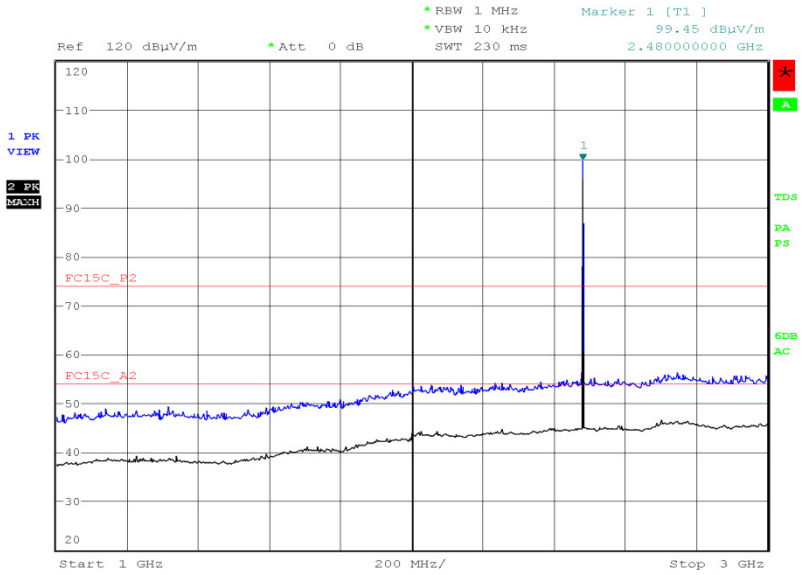


Bluetooth, 2480 MHz, DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

*No emissions were detected within 10 dB of the limit.

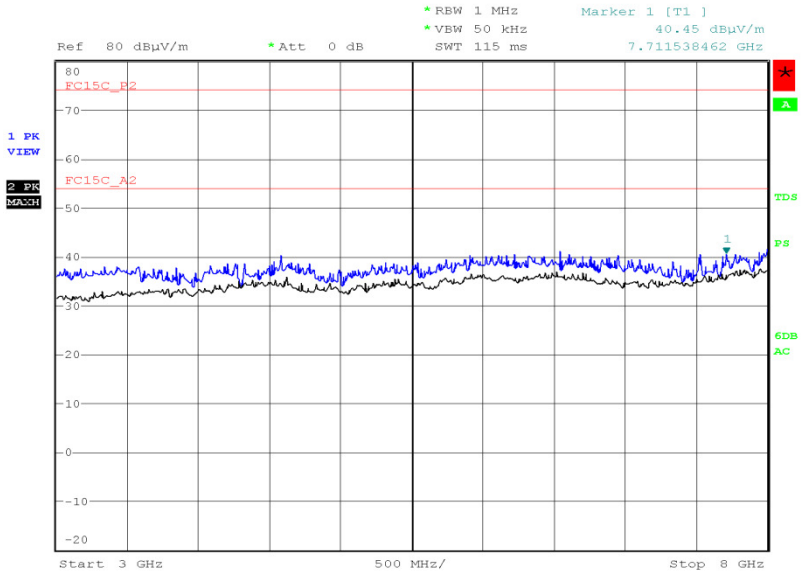
Bluetooth, 2480 MHz, DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 19.APR.2016 23:18:43

Product Service

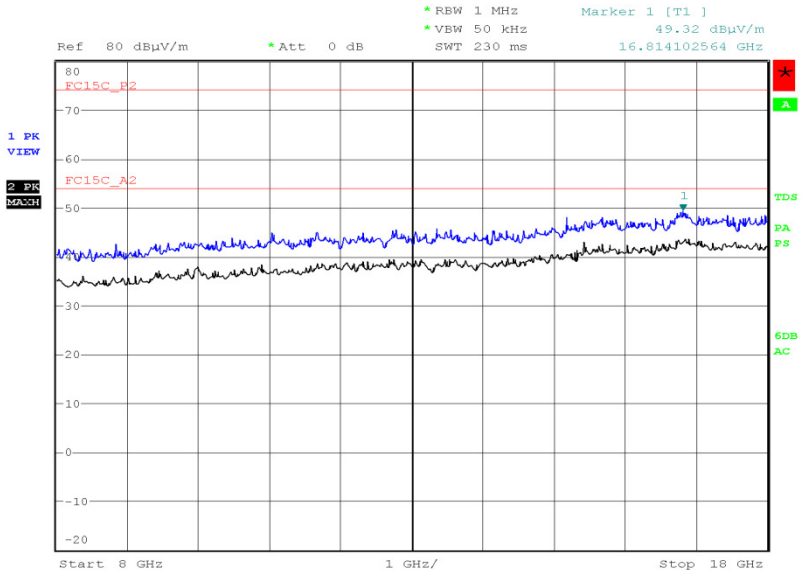
Bluetooth, 2480 MHz, DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 24.APR.2016 12:24:57

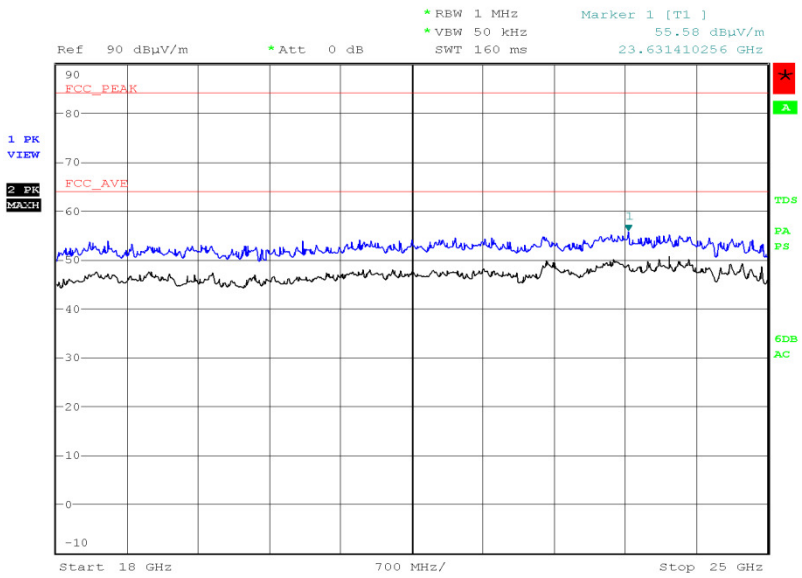
Product Service

Bluetooth, 2480 MHz, DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 16:26:05

Bluetooth, 2480 MHz, DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 19:35:45

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

Emissions outside the restricted bands shall be at least 20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength			Measurement Distance (m)
	(µV/m)	Average (dBµV/m)	Peak (dBµV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3

Product Service

2.8 RESTRICTED BAND EDGES

2.8.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205

2.8.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794345 - Modification State 0

2.8.3 Date of Test

20 April 2016 & 24 April 2016

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Procedure

Testing was performed in accordance with ANSI C63.10, clause 6.10.5.

Remarks

Plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.3 Final average measurements were taken using a CISPR average detector as required by ANSI C63.10, clause 4.1.2. In order to determine the maximum emissions with the restricted band near the band edge, the method described in ANSI C63.10 clause 6.10.5.2 has been used and these plots are included in the report.

2.8.6 Environmental Conditions

Ambient Temperature	20.0 - 20.3°C
Relative Humidity	28.0%

Product Service

2.8.7 Test Results

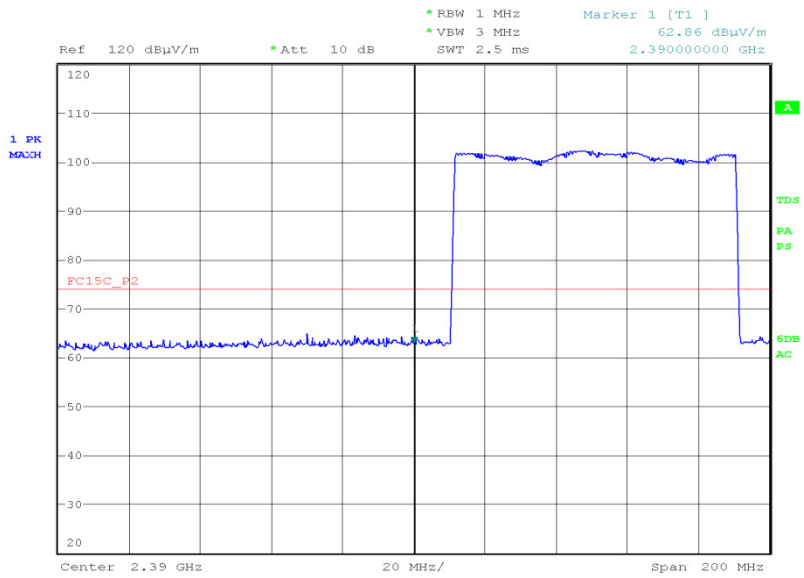
4.0 V DC Supply

Hopping Mode

Bluetooth, GFSK, Restricted Band Edges Results

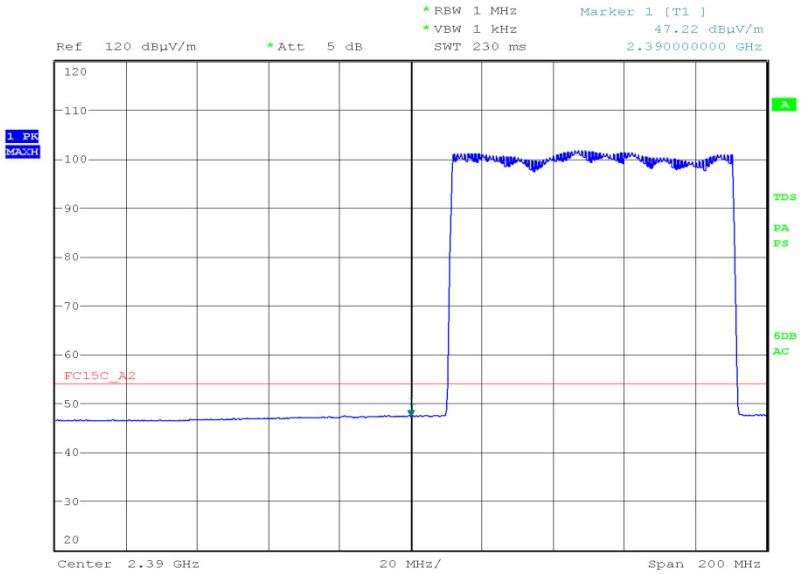
2402 MHz		2480 MHz	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
62.86	46.29	63.08	46.41

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, GFSK, Final Peak, Restricted Band Edges Plot



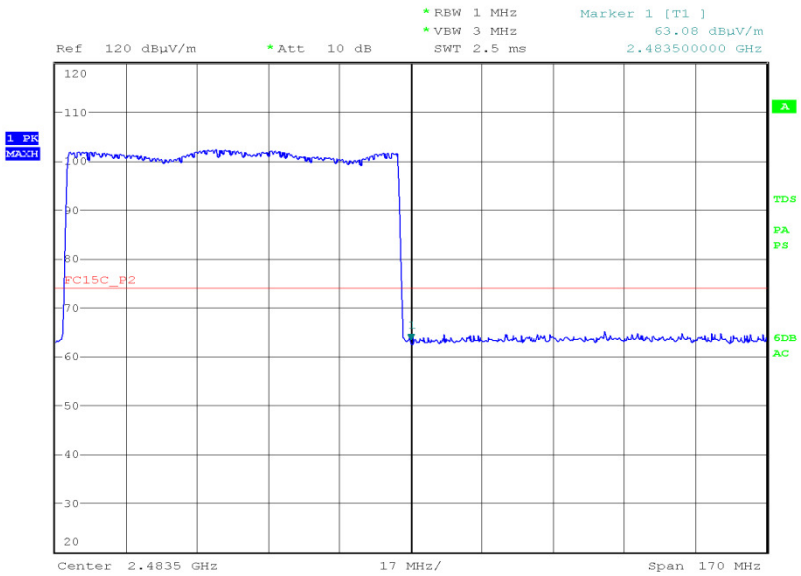
Product Service

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, GFSK, Final Average, Restricted Band Edges Plot



Date: 24.APR.2016 08:02:39

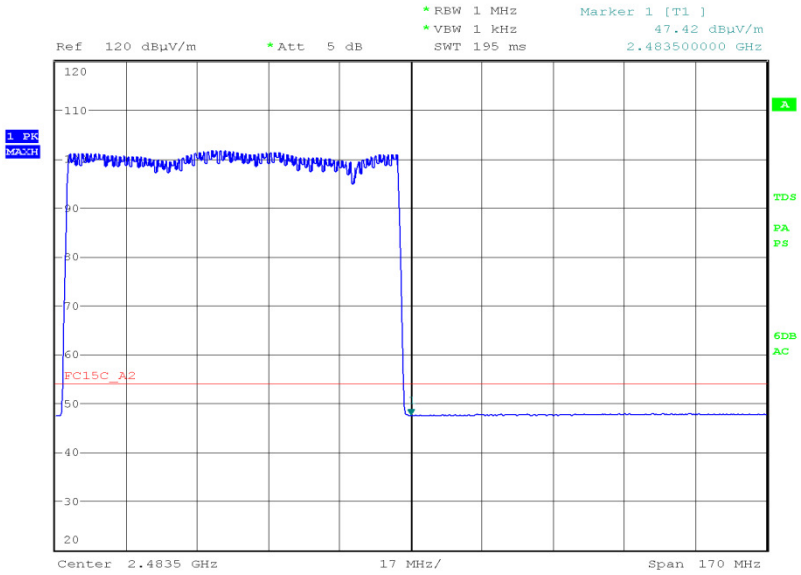
Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 24.APR.2016 08:09:07

Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, GFSK, Final Average, Restricted Band Edges Plot



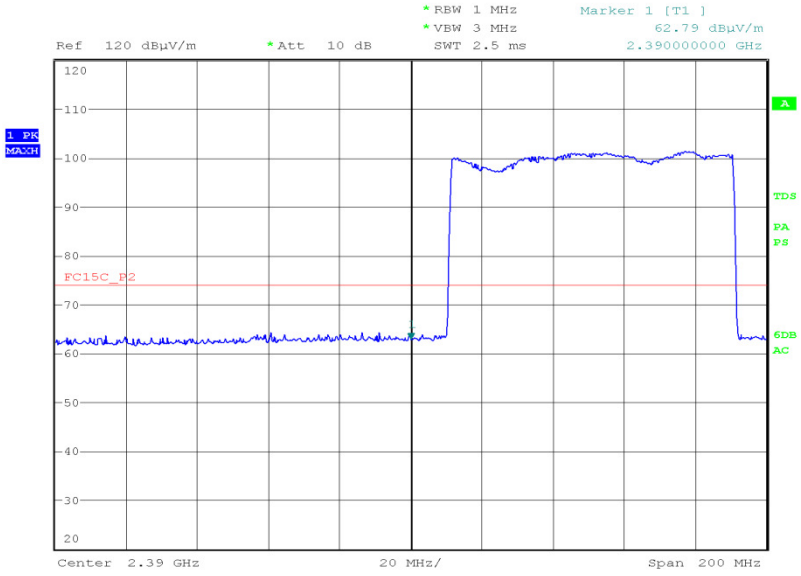
Date: 24.APR.2016 08:08:10

Product Service

Bluetooth, pi/4 DQPSK, Restricted Band Edges Results

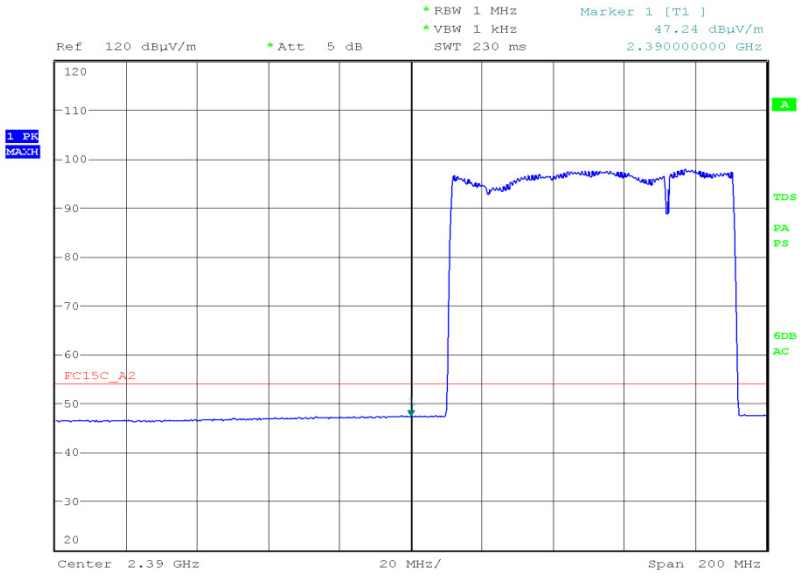
2402 MHz		2480 MHz	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
62.79	46.27	63.20	46.42

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, pi/4 DQPSK, Final Peak, Restricted Band Edges Plot



Product Service

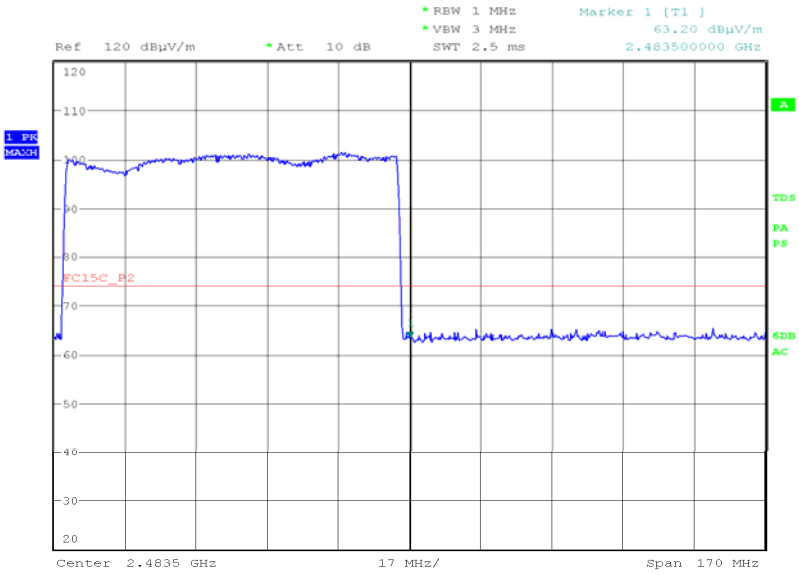
Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, pi/4 DQPSK, Final Average, Restricted Band Edges Plot



Date: 24.APR.2016 08:24:05

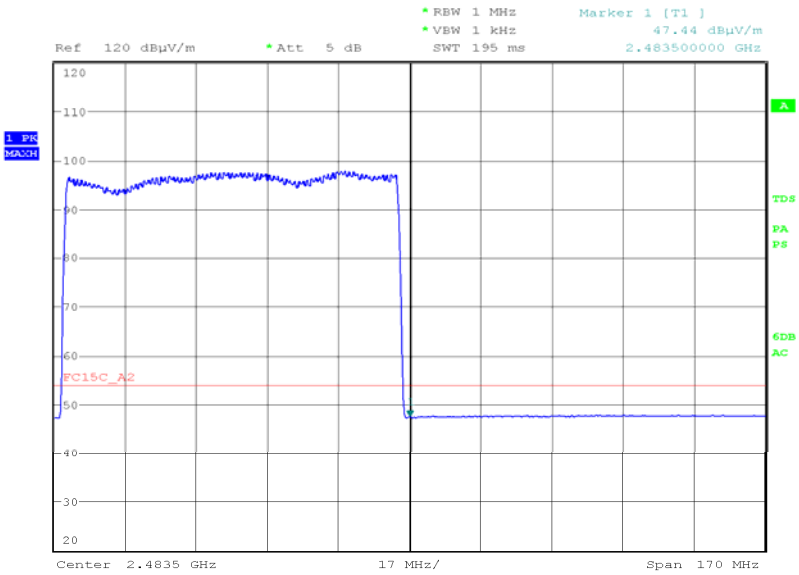
Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, pi/4 DQPSK, Final Peak, Restricted Band Edges Plot



Date: 24.APR.2016 08:28:33

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, pi/4 DQPSK, Final Average, Restricted Band Edges Plot



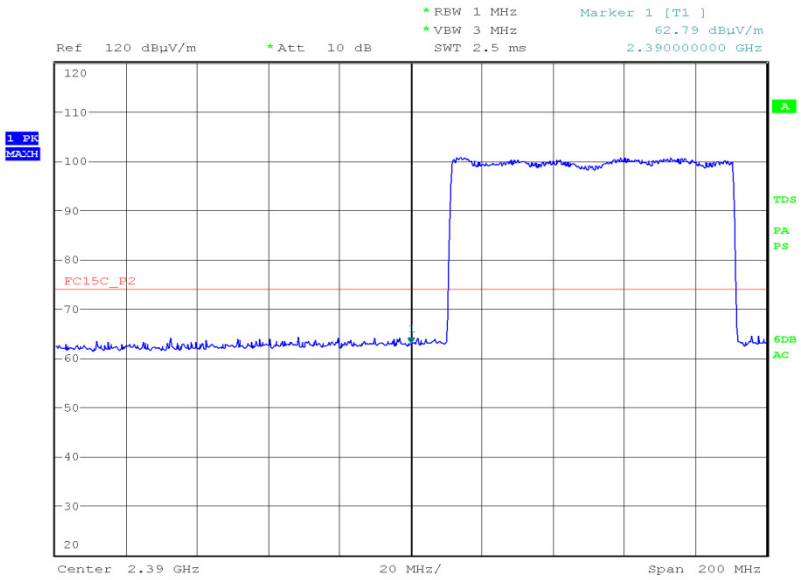
Date: 24.APR.2016 08:26:49

Product Service

Bluetooth, 8-DPSK, Restricted Band Edges Results

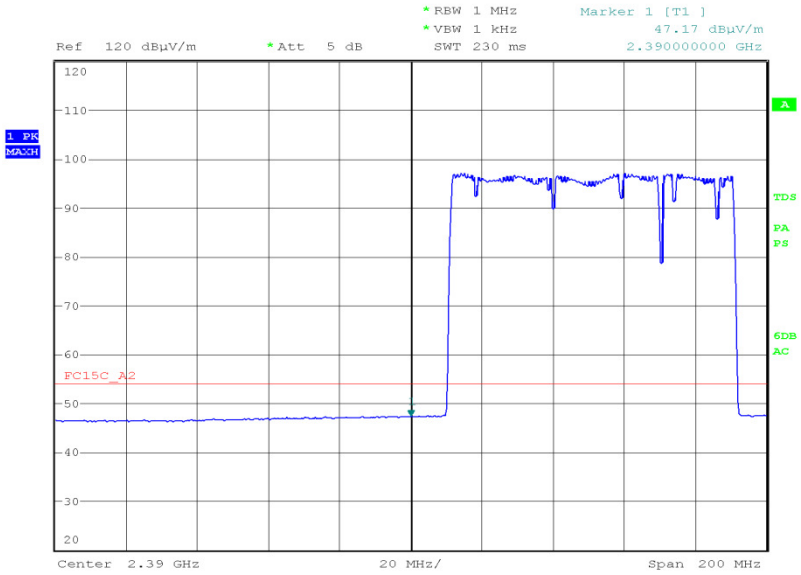
2402 MHz		2480 MHz	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
62.79	46.29	62.90	46.41

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, 8-DPSK, Final Peak, Restricted Band Edges Plot



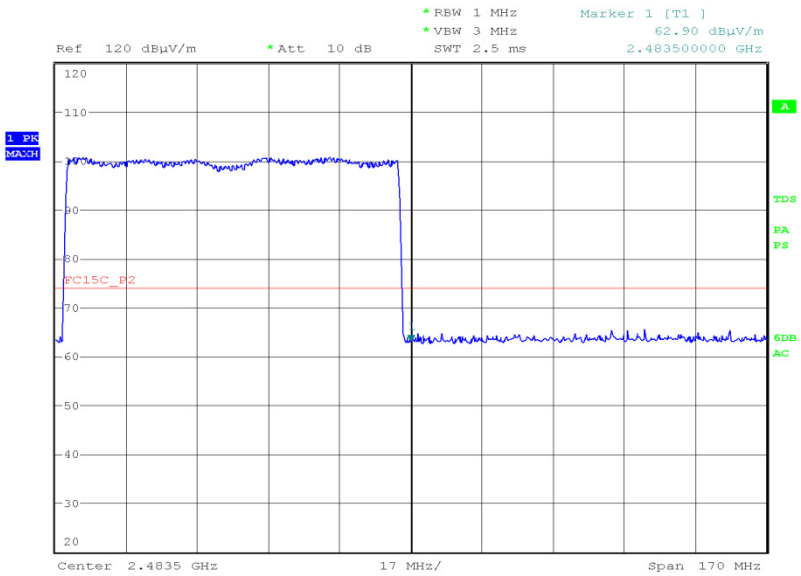
Product Service

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, 8-DPSK, Final Average, Restricted Band Edges Plot



Date: 24.APR.2016 08:42:37

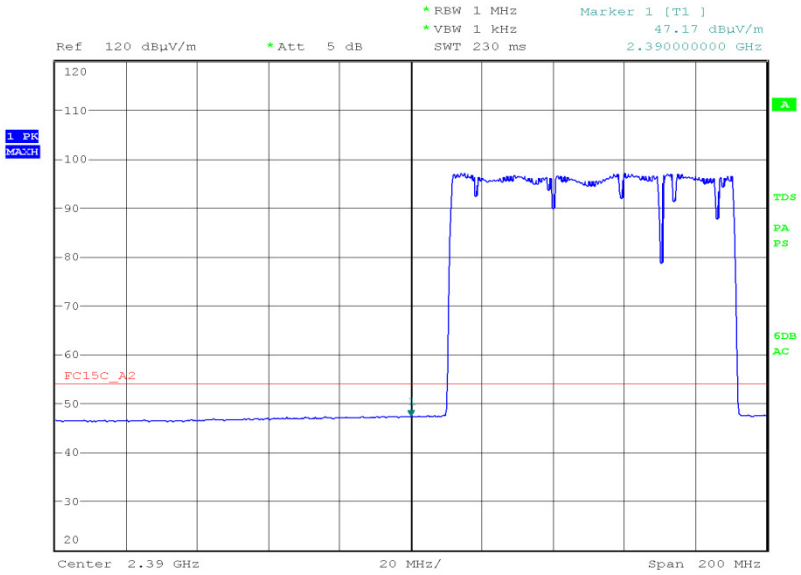
Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, 8-DPSK, Final Peak, Restricted Band Edges Plot



Date: 24.APR.2016 08:49:25

Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, 8-DPSK, Final Average, Restricted Band Edges Plot



Date: 24.APR.2016 08:42:37

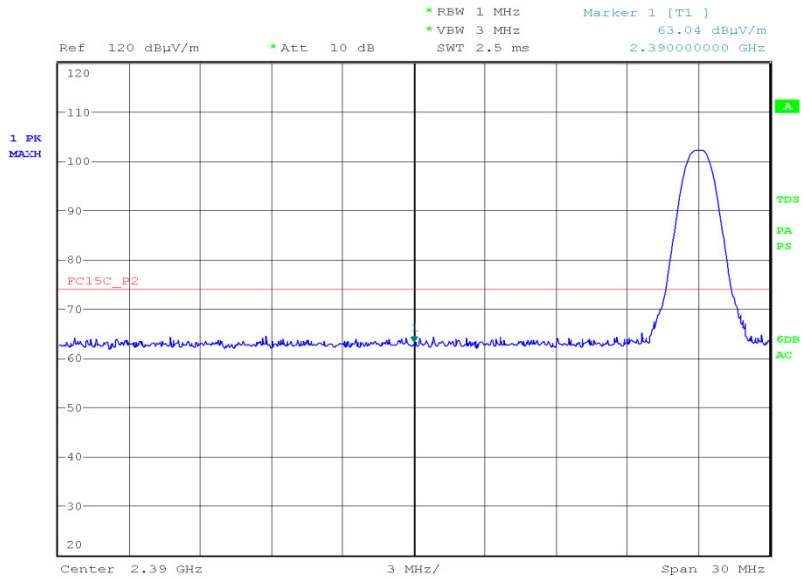
Product Service

Static Mode

Bluetooth, GFSK, Restricted Band Edges Results

2402 MHz		2480 MHz,	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
63.04	46.26	61.85	46.43

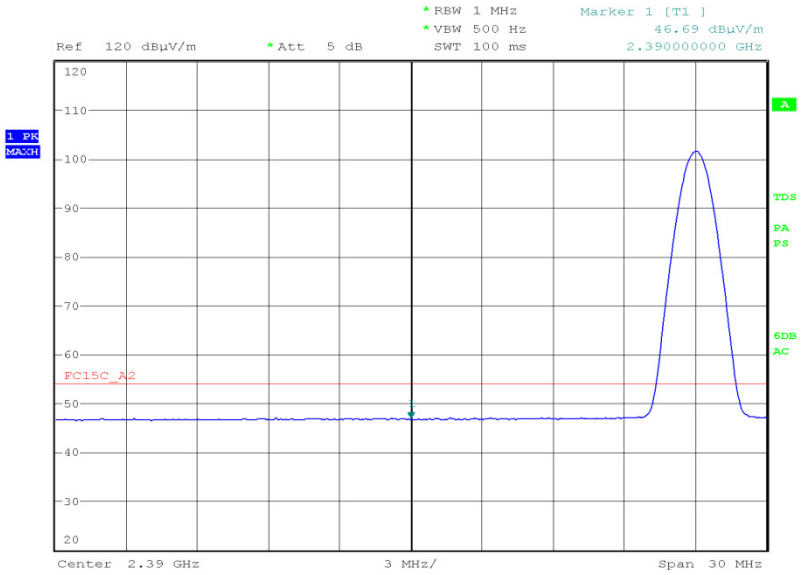
Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 20.APR.2016 18:38:42

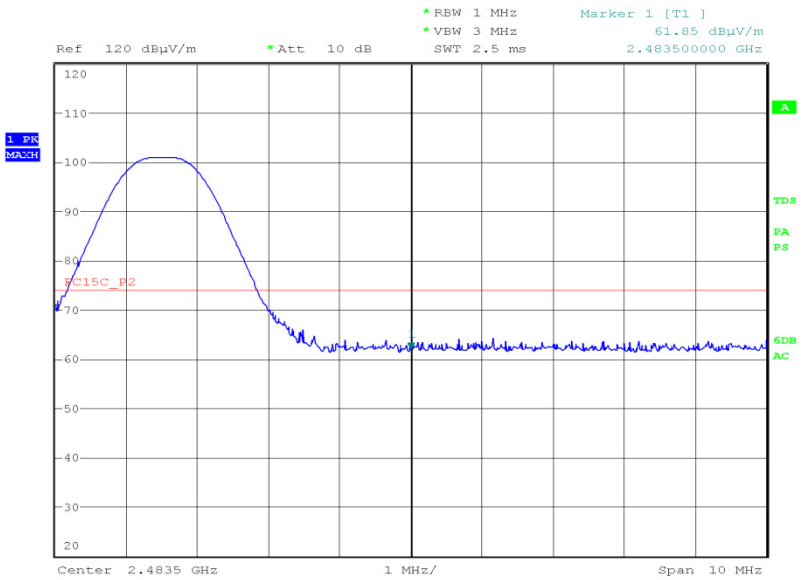
Product Service

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, GFSK, Final Average, Restricted Band Edges Plot



Date: 20.APR.2016 18:40:38

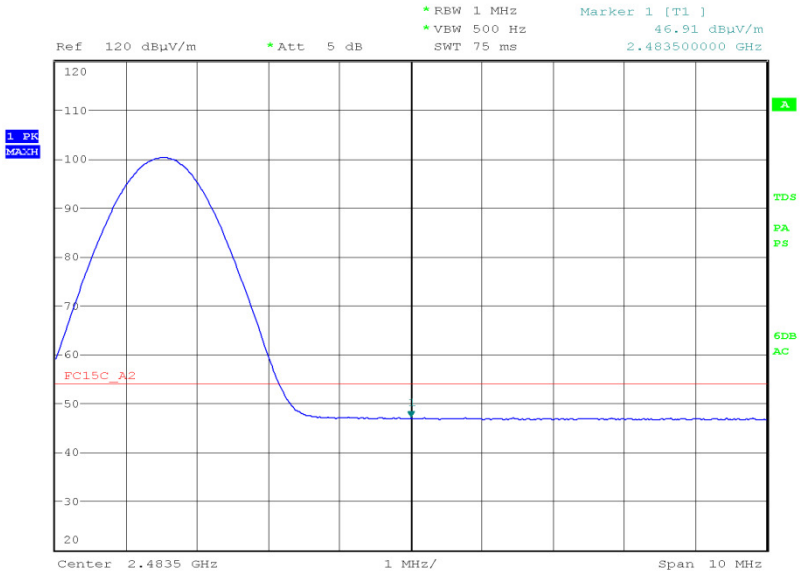
Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 20.APR.2016 19:10:44

Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, GFSK, Final Average, Restricted Band Edges Plot



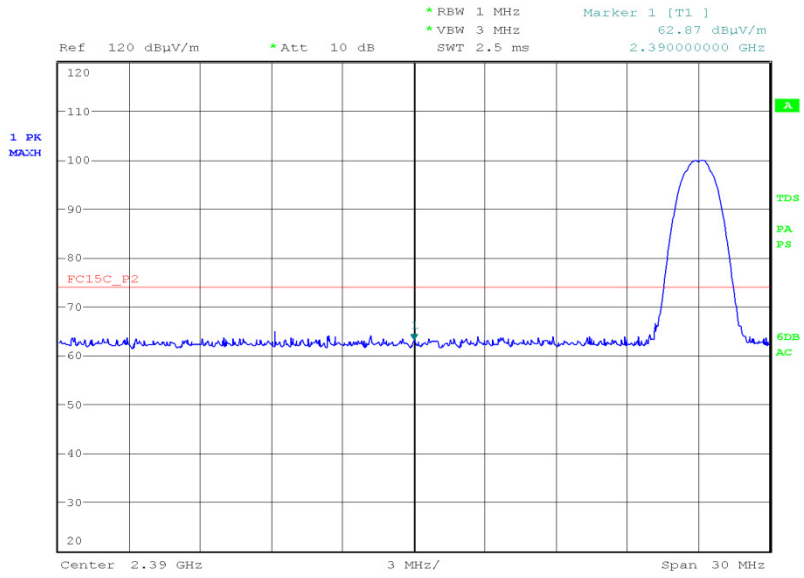
Date: 20.APR.2016 19:11:21

Product Service

Bluetooth, pi/4 DQPSK, Restricted Band Edges Results

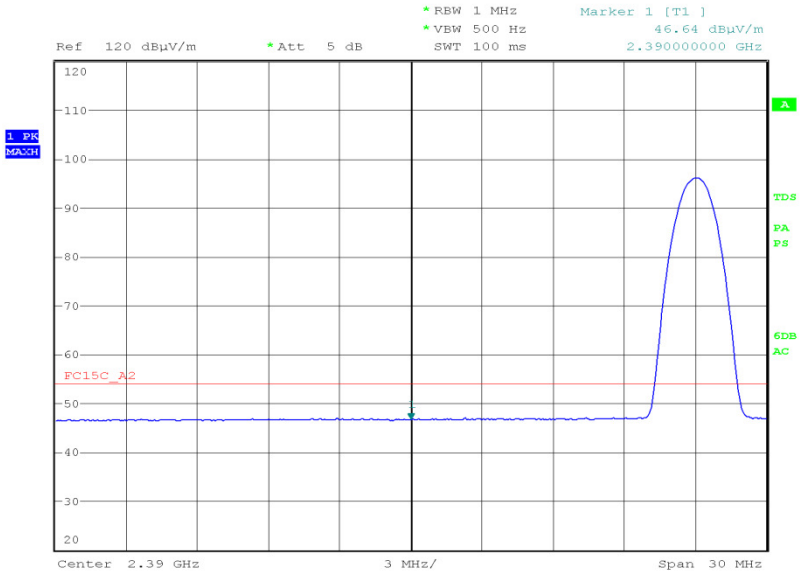
2402 MHz		2480 MHz,	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
62.87	46.19	62.33	46.47

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, pi/4 DQPSK, Final Peak, Restricted Band Edges Plot

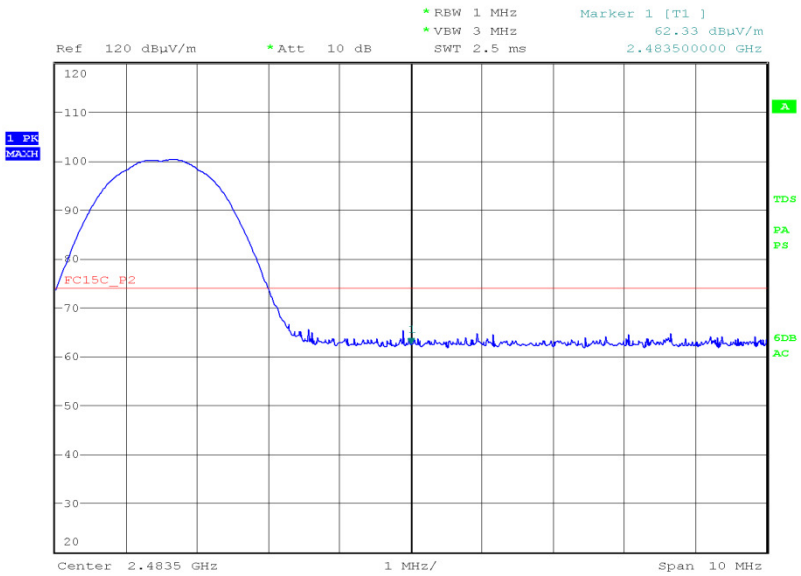


Product Service

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, pi/4 DQPSK, Final Average, Restricted Band Edges Plot

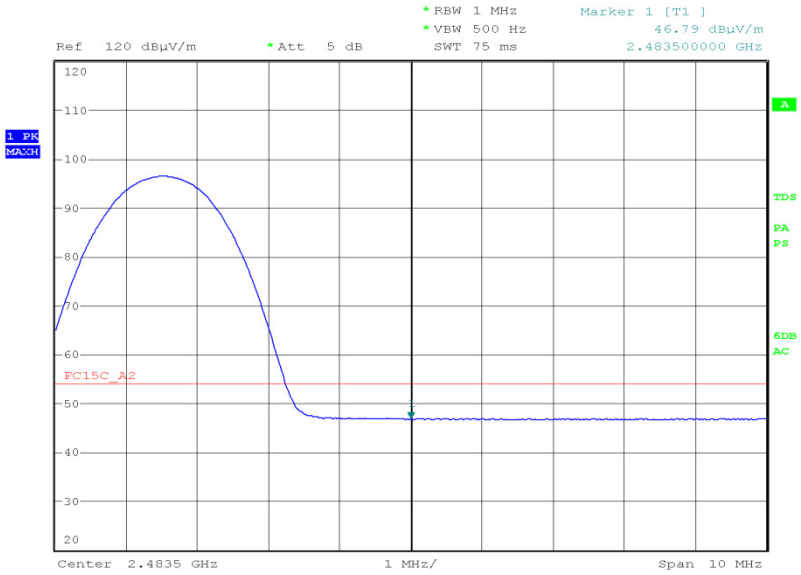


Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, pi/4 DQPSK, Final Peak, Restricted Band Edges Plot



Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, pi/4 DQPSK, Final Average, Restricted Band Edges Plot



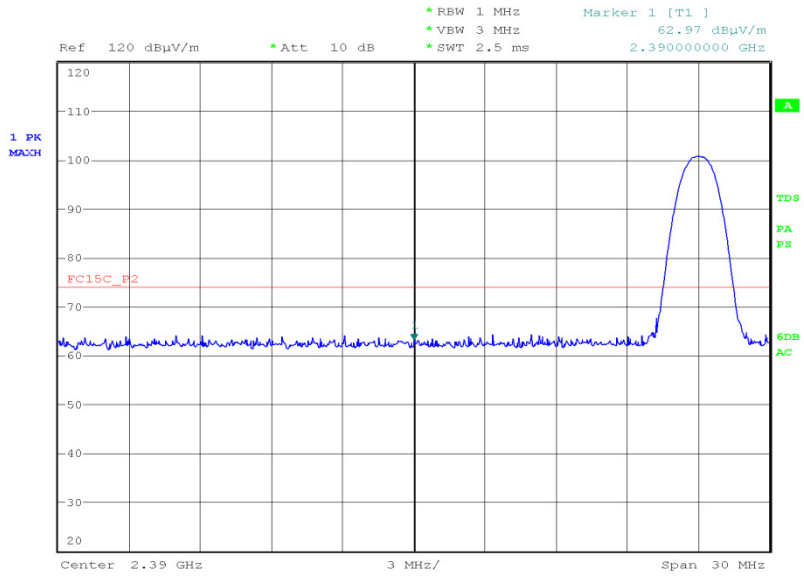
Date: 20.APR.2016 20:01:54

Product Service

Bluetooth, 8-DPSK, Restricted Band Edges Results

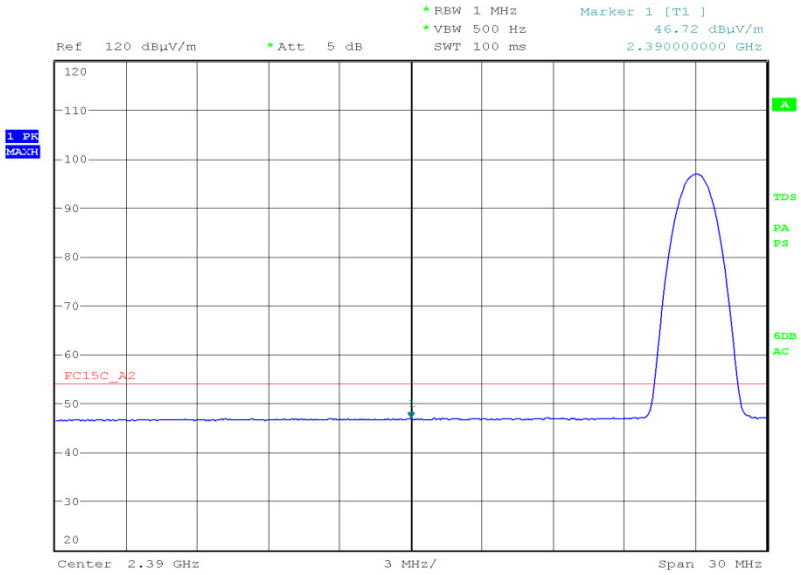
2402 MHz		2480 MHz	
Measured Frequency 2390 MHz		Measured Frequency 2483.5 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
62.97	46.18	62.93	46.50

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, 8-DPSK, Final Peak, Restricted Band Edges Plot



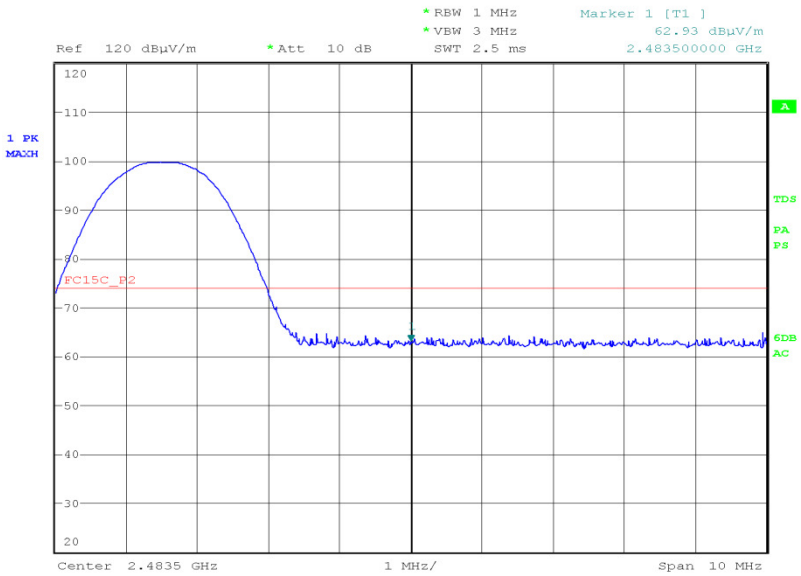
Product Service

Bluetooth, 2402 MHz, Measured Frequency 2390 MHz, 8-DPSK, Final Average, Restricted Band Edges Plot



Date: 20.APR.2016 20:22:52

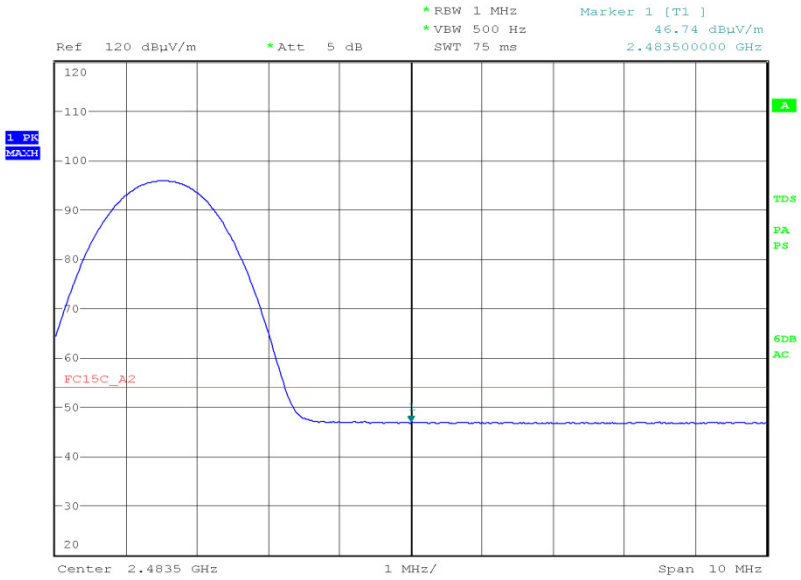
Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, 8-DPSK, Final Peak, Restricted Band Edges Plot



Date: 20.APR.2016 20:33:41

Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.5 MHz, 8-DPSK, Final Average, Restricted Band Edges Plot



Remarks

Final average results shown in the tables above were recorded using a CISPR average detector as described in ANSI C63.10 clause 4.1.2. In order to determine the maximum emissions with the restricted band near the band edge, the method described in ANSI C63.10 clause 6.10.5.2 has been used and these plots are included in the report.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

Product Service

2.9 AUTHORISED BAND EDGES

2.9.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)

2.9.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794345 - Modification State 0

2.9.3 Date of Test

20 April 2016 & 24 April 2016

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Procedure

Testing was performed in accordance with ANSI C63.10, clause 6.10.4

2.9.6 Environmental Conditions

Ambient Temperature	20.0 - 20.3°C
Relative Humidity	28.0%

Product Service

2.9.7 Test Results

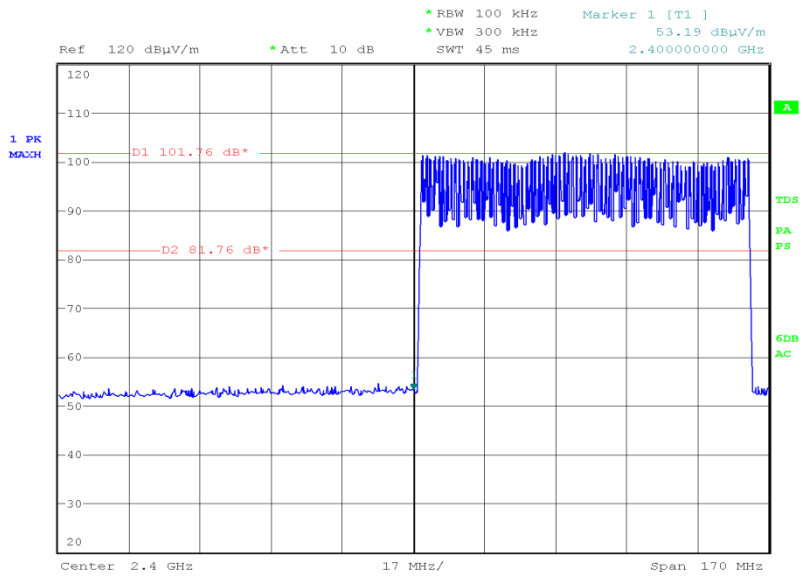
4.0 V DC Supply

Hopping Mode

Bluetooth, GFSK, Authorised Band Edges Results

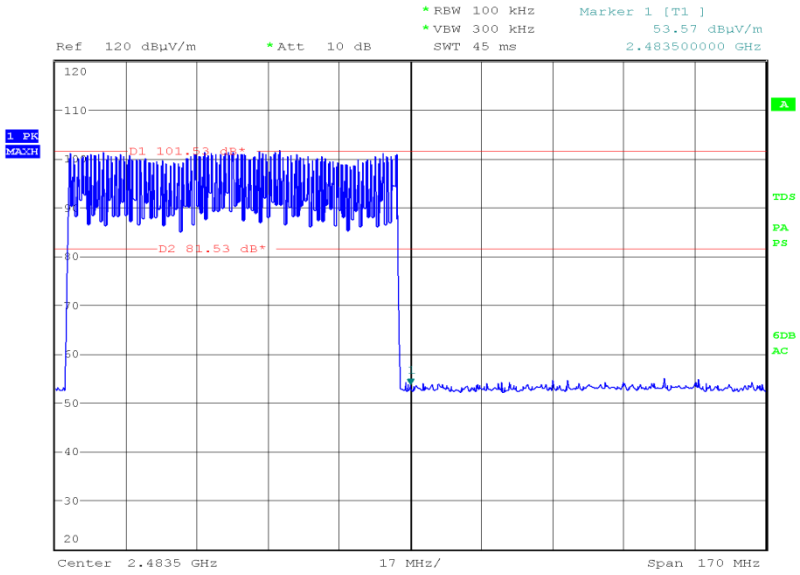
2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
53.19	53.57

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, GFSK, Final Peak, Authorised Band Edges Plot



Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Peak, Authorised Band Edges Plot



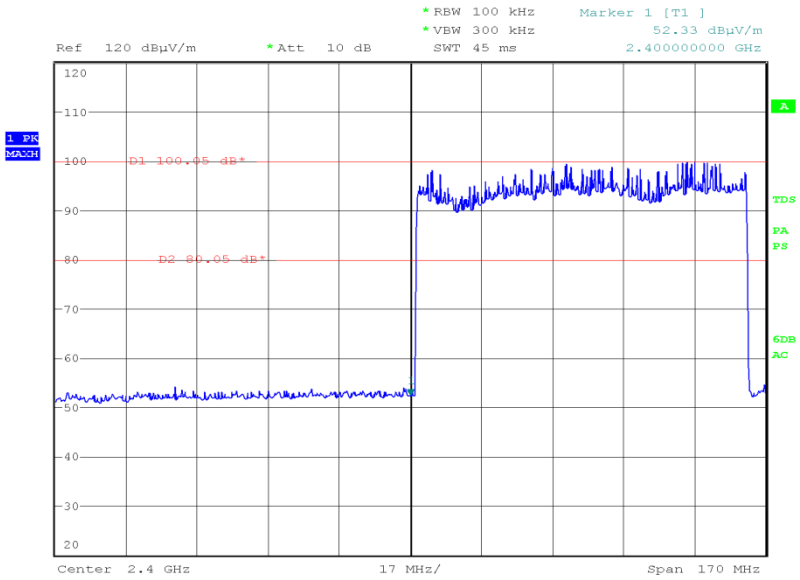
Date: 24.APR.2016 08:10:53

Product Service

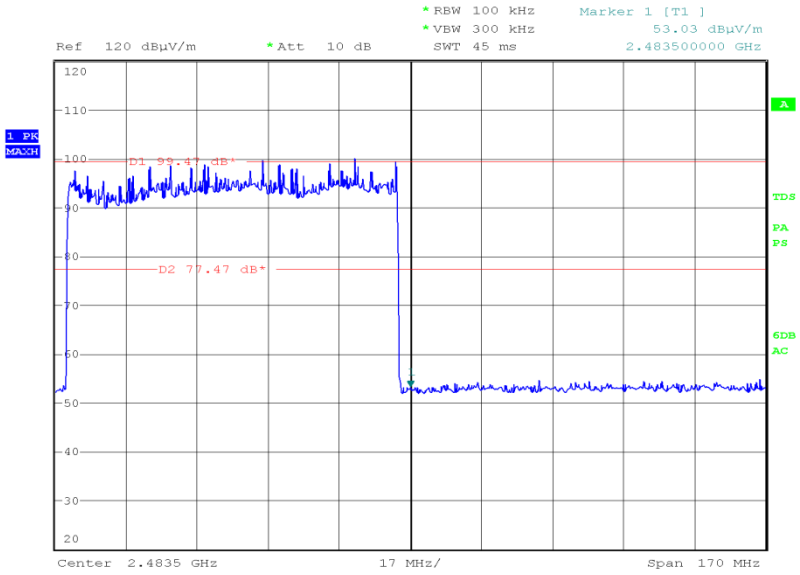
Bluetooth, pi/4 DQPSK, Authorised Band Edges Results

2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
52.33	53.03

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, pi/4 DQPSK, Final Peak, Authorised Band Edges Plot



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, pi/4 DQPSK, Final Peak, Authorised Band Edges Plot



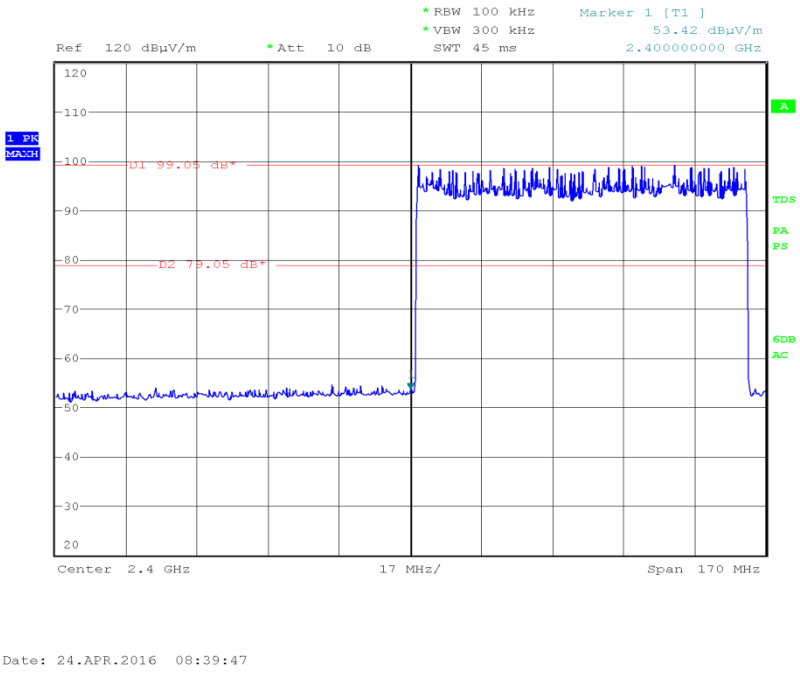
Date: 24.APR.2016 08:30:07

Product Service

Bluetooth, 8-DPSK, Authorised Band Edges Results

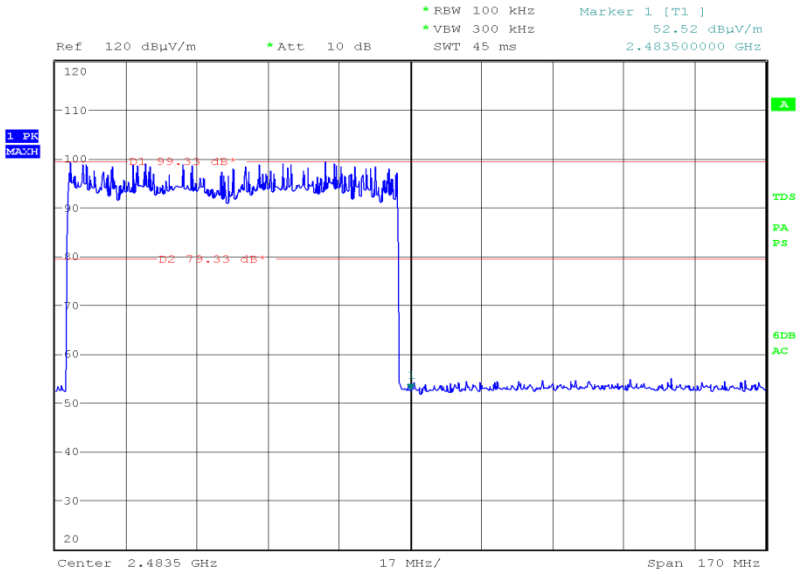
2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
53.42	52.52

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, 8-DPSK, Final Peak, Authorised Band Edges Plot



Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Peak, Authorised Band Edges Plot



Date: 24.APR.2016 08:51:27

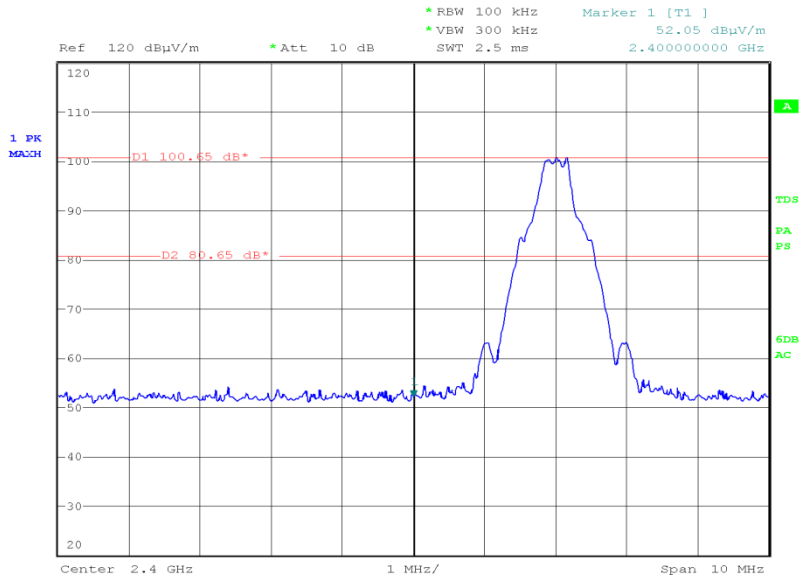
Product Service

Static Mode

Bluetooth, GFSK, Authorised Band Edges Results

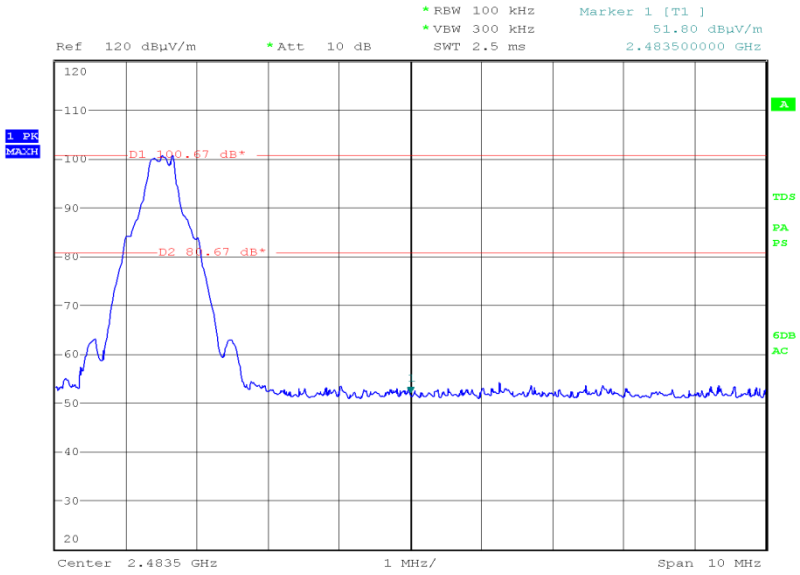
2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
52.05	51.80

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, GFSK, Final Peak, Authorised Band Edges Plot



Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, Final Peak, Authorised Band Edges Plot



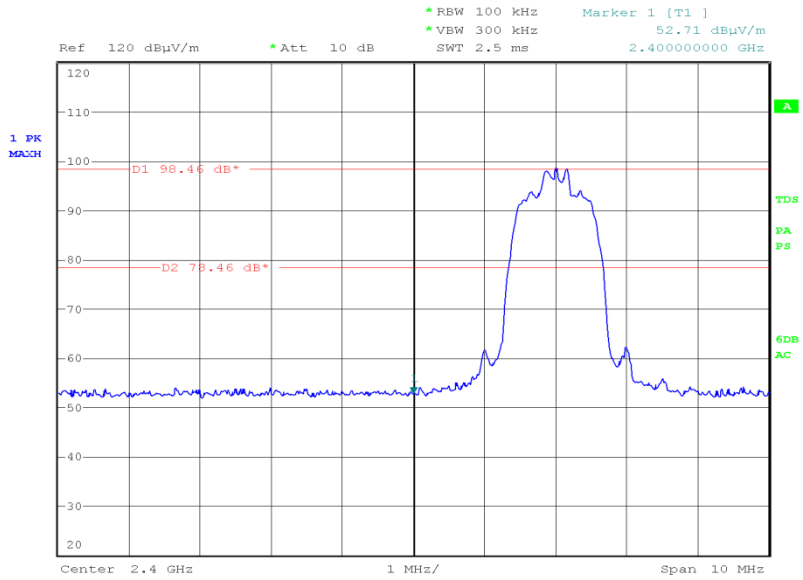
Date: 20.APR.2016 19:10:03

Product Service

Bluetooth, pi/4 DQPSK, Authorised Band Edges Results

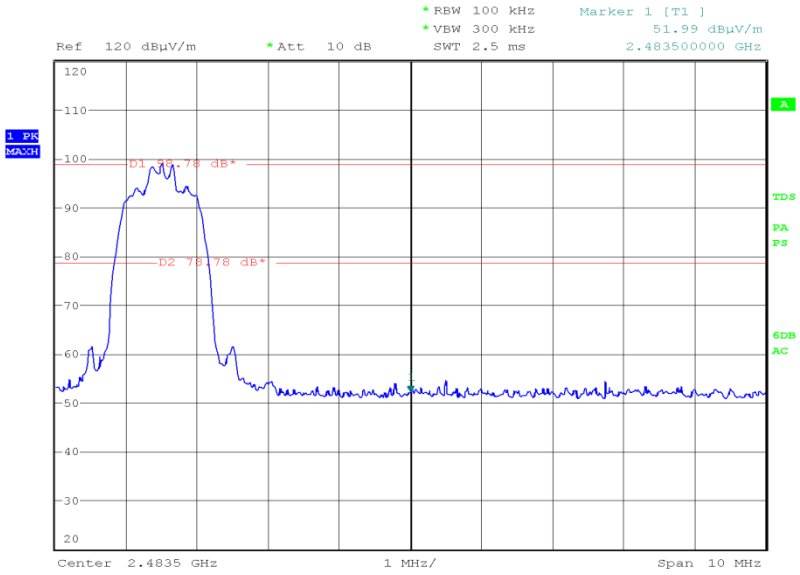
2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
52.71	51.99

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, pi/4 DQPSK, Final Peak, Authorised Band Edges Plot



Product Service

Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, pi/4 DQPSK, Final Peak, Authorised Band Edges Plot

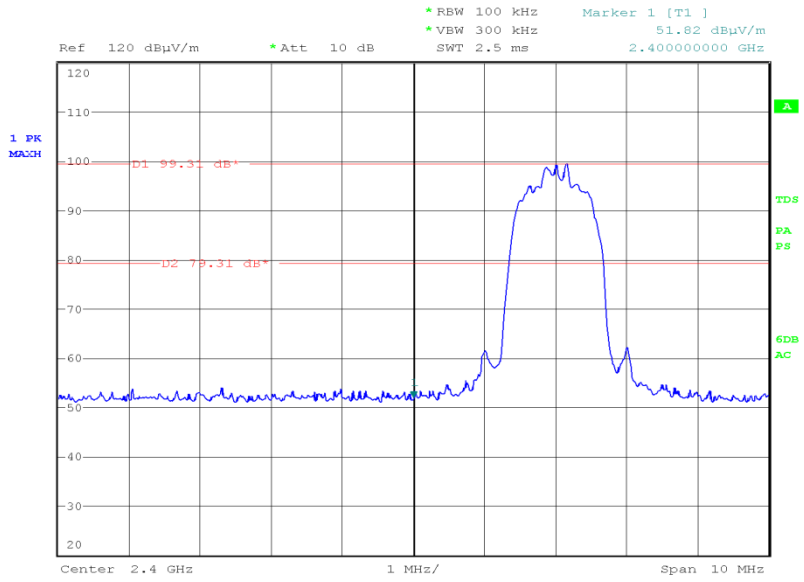


Product Service

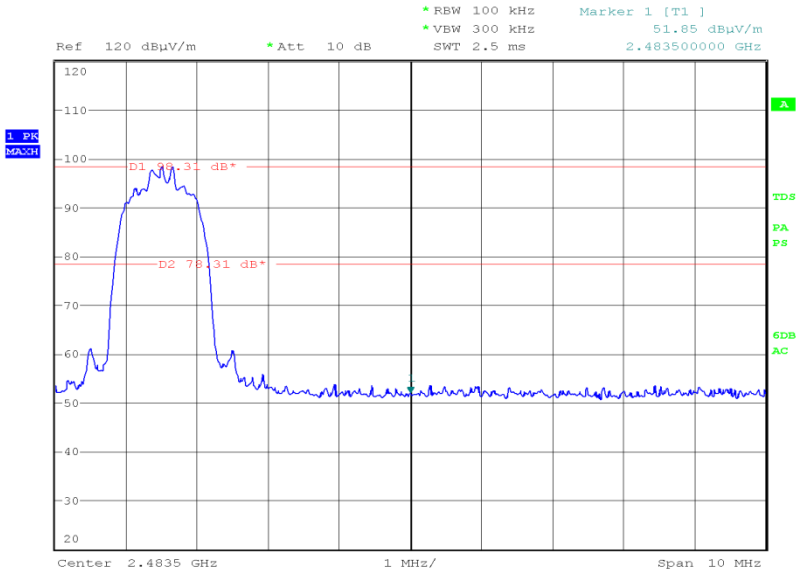
Bluetooth, 8-DPSK, Authorised Band Edges Results

2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
51.82	51.85

Bluetooth, 2402 MHz, Measured Frequency 2400.00 MHz, 8-DPSK, Final Peak, Authorised Band Edges Plot



Bluetooth, 2480 MHz, Measured Frequency 2483.50 MHz, 8-DPSK, Final Peak, Authorised Band Edges Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 – AC Line Conducted Emissions					
LISN	Rohde & Schwarz	ESH2-Z5	17	12	11-Feb-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Transient Limiter	Hewlett Packard	11947A	2377	12	16-Feb-2017
Multimeter	Iso-tech	IDM101	2417	12	29-Sep-2016
Hygromer	Rotronic	A1	2677	12	11-Jun-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Section 2.2 - Frequency Hopping Systems - Number of Hopping Channels					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
EMI Receiver	Keysight Technologies	N9038A MXE	4628	12	3-Sep-2016
2 metre SMA Cable	IW Microwave	3PS-1806LC-788-3PS	4661	12	6-Nov-2016
Section 2.3 - Frequency Hopping Systems - 20 dB Bandwidth					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
EMI Receiver	Keysight Technologies	N9038A MXE	4628	12	3-Sep-2016
2 metre SMA Cable	IW Microwave	3PS-1806LC-788-3PS	4661	12	6-Nov-2016
Section 2.4 - Frequency Hopping Systems - Channel Separation					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
EMI Receiver	Keysight Technologies	N9038A MXE	4628	12	3-Sep-2016
2 metre SMA Cable	IW Microwave	3PS-1806LC-788-3PS	4661	12	6-Nov-2016

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Frequency Hopping Systems - Average Time of Occupancy					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
EMI Receiver	Keysight Technologies	N9038A MXE	4628	12	3-Sep-2016
2 metre SMA Cable	IW Microwave	3PS-1806LC-788-3PS	4661	12	6-Nov-2016
Section 2.6 - Maximum Conducted Output Power					
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Section 2.7 - Spurious Radiated Emissions					
Antenna 18-40GHz (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	27-Nov-2016
Pre-Amplifier	Phase One	PS04-0086	1533	12	30-Jul-2016
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	23-Dec-2016
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2677	12	11-Jun-2016
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4101	12	6-Nov-2016
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	6-Oct-2016
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	23-Mar-2017
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.8 - Restricted Band Edges					
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2677	12	11-Jun-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
Section 2.9 - Authorised Band Edges					
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2677	12	11-Jun-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

Product Service

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Frequency Hopping Systems - 20 dB Bandwidth	± 29.95 kHz
Frequency Hopping Systems - Number of Hopping Channels	-
Frequency Hopping Systems - Average Time of Occupancy	-
AC Line Conducted Emissions	± 3.2 dB
Maximum Conducted Output Power	± 0.70 dB
Authorised Band Edges	Conducted: ± 3.08 dB Radiated: 30 MHz to 1 GHz: ± 5.1 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB
Restricted Band Edges	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Frequency Hopping Systems - Channel Separation	± 29.95 kHz

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).