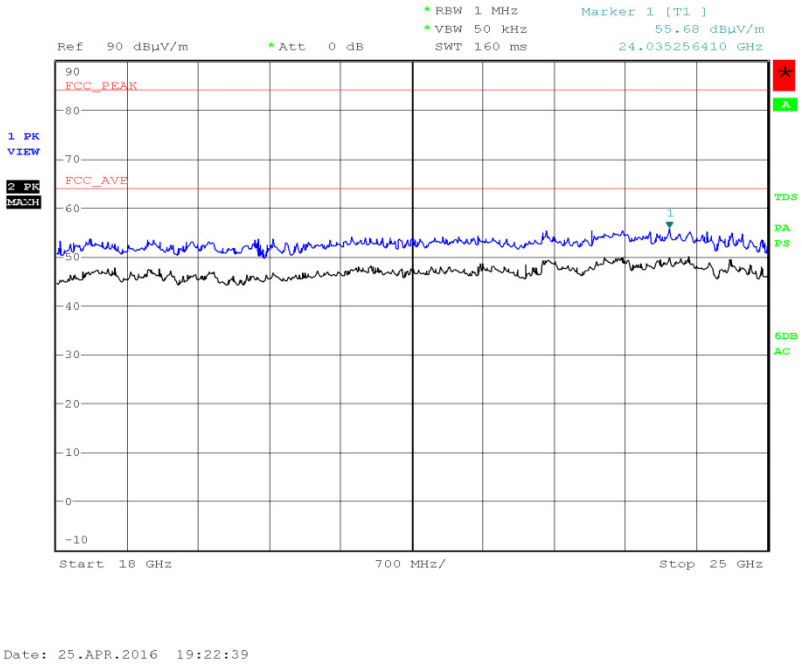
802.11n, 2462 MHz, 65 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



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

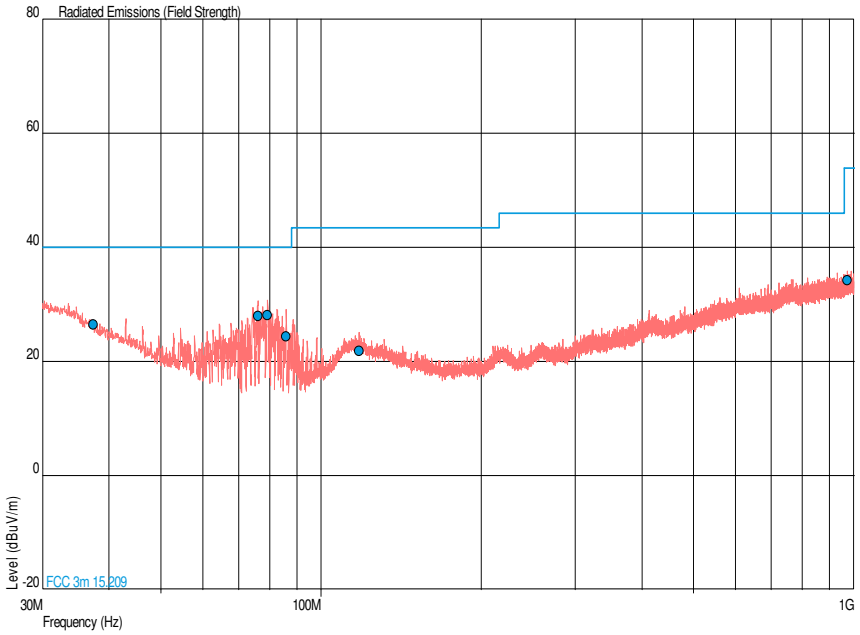
Frequency (MHz)	Field Strength			Measurement Distance (m)
	(µV/m)	Average (dBµV/m)	Peak (dBµV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3

4.0 V DC Supply

Bluetooth Low Energy, 2402 MHz, 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
37.372	26.4	-13.6	20.9	-79.1	360	1.97	Vertical
76.117	27.9	-12.1	24.8	-75.2	152	1.00	Vertical
79.326	28.1	-11.9	25.4	-74.6	287	1.00	Vertical
85.972	24.5	-15.5	16.8	-83.2	329	1.00	Vertical
117.841	21.9	-21.6	12.4	-137.6	187	1.00	Horizontal
971.797	34.2	-19.8	51.3	-449.7	197	1.00	Horizontal

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

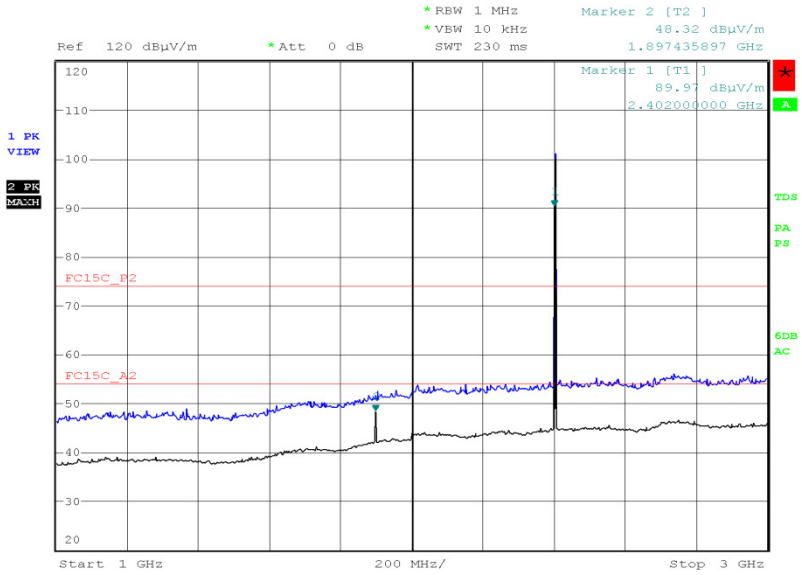


Bluetooth Low Energy, 2402 MHz, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

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.

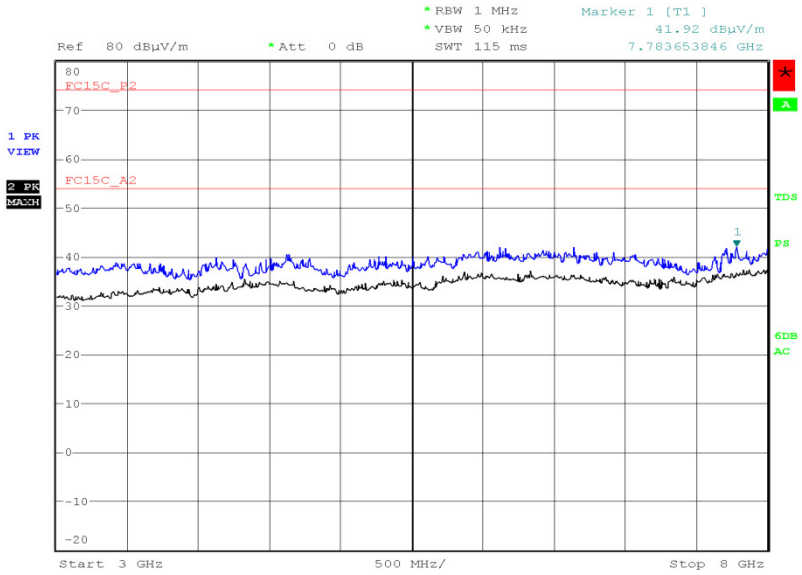
Bluetooth Low Energy, 2402 MHz, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 24.APR.2016 09:53:30

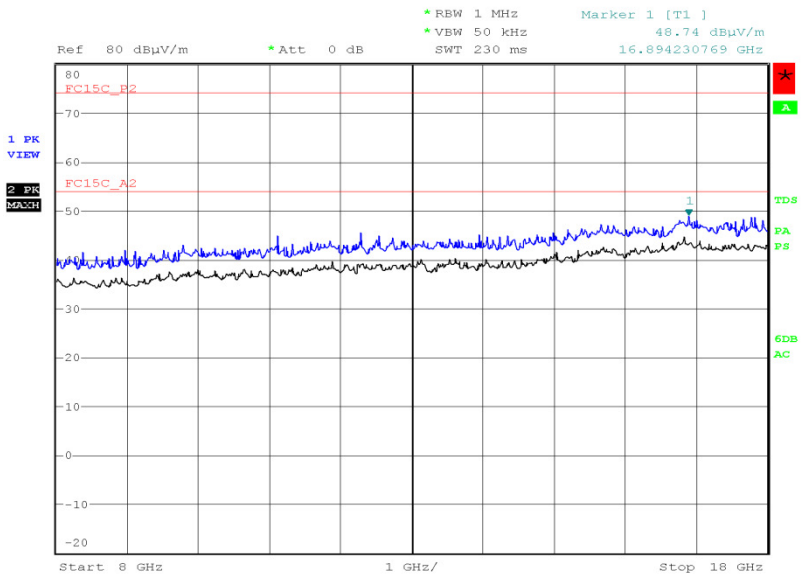
Product Service

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



Date: 24.APR.2016 11:21:07

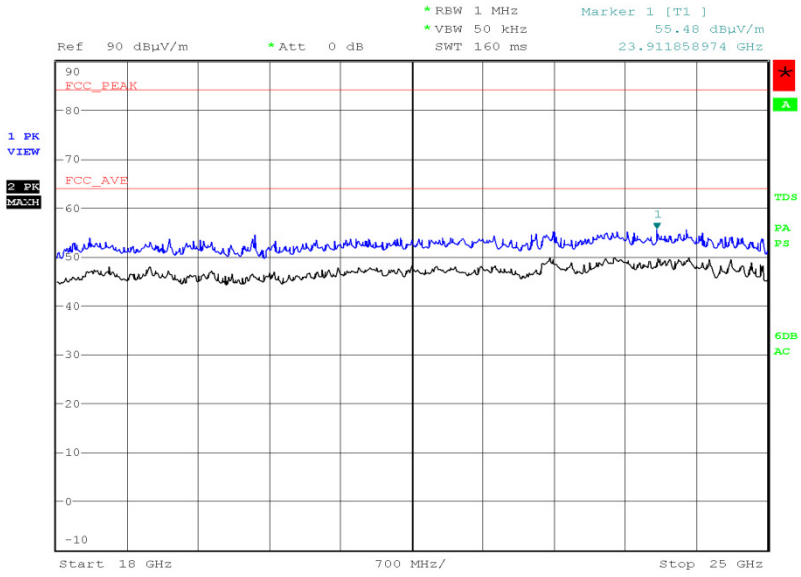
Bluetooth Low Energy, 2402 MHz, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 15:35:15

Product Service

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



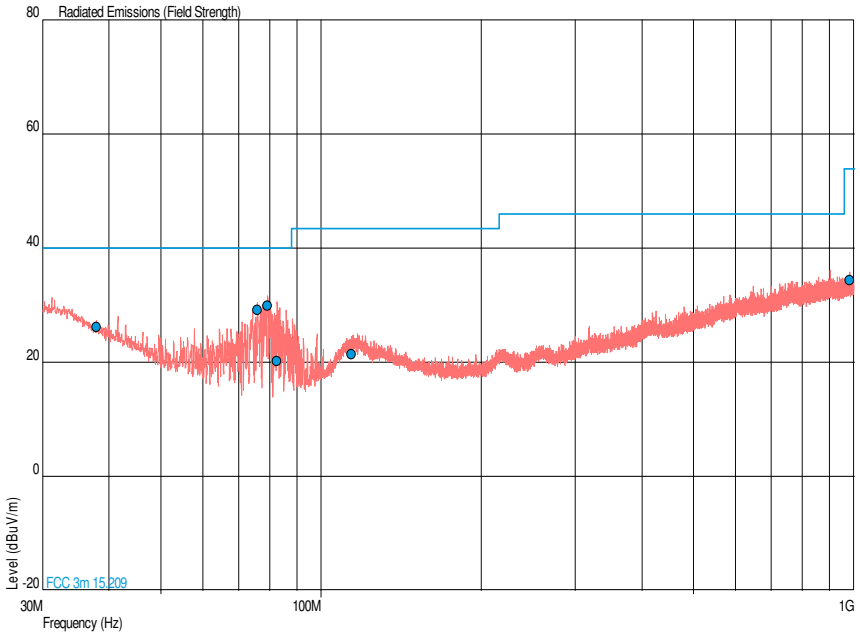
Date: 25.APR.2016 19:24:26

Product Service

Bluetooth Low Energy, 2441 MHz, 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
37.856	26.2	-13.8	20.4	-79.6	360	1.00	Horizontal
76.028	29.1	-10.9	28.5	-71.5	246	1.00	Vertical
79.317	30.0	-10.0	31.6	-68.4	227	1.00	Vertical
82.570	20.3	-19.7	10.4	-89.6	255	1.00	Vertical
114.153	21.4	-22.1	11.7	-138.3	85	1.00	Horizontal
980.600	34.4	-19.6	52.5	-448.5	279	1.00	Horizontal

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



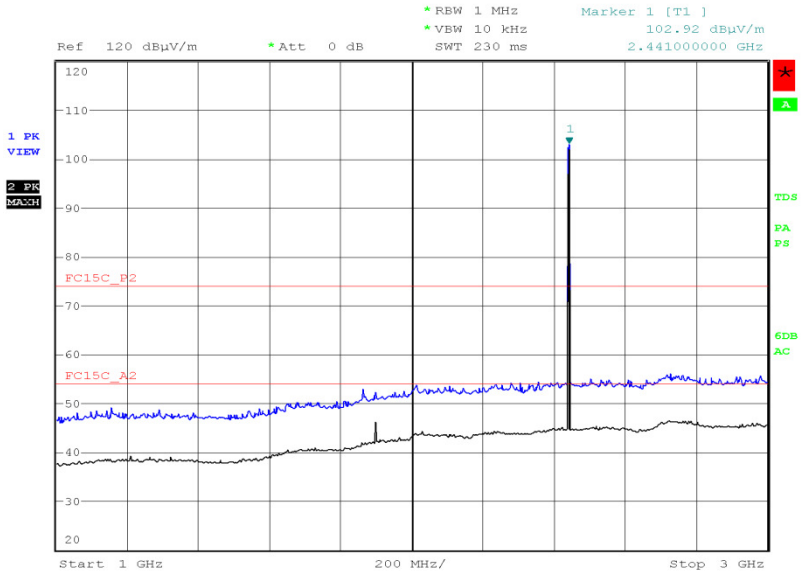
Product Service

Bluetooth Low Energy, 2441 MHz, 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
*							

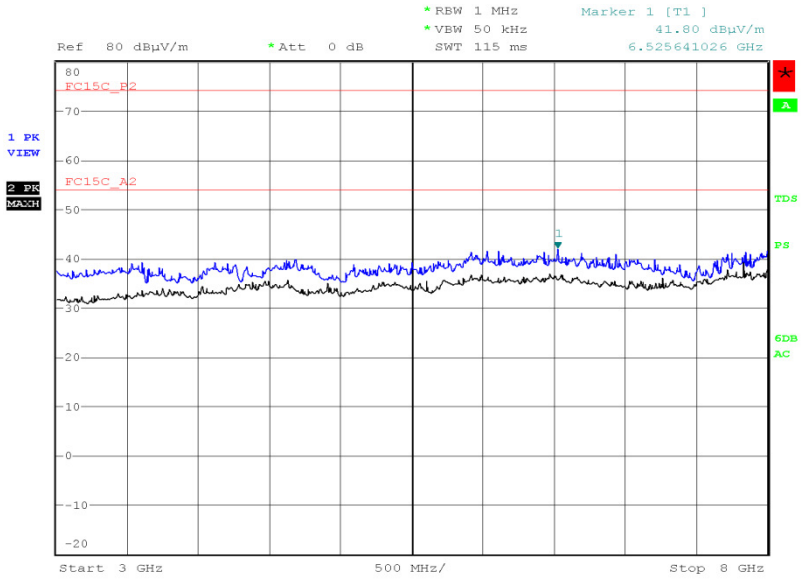
*No emissions were detected within 10 dB of the limit.

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



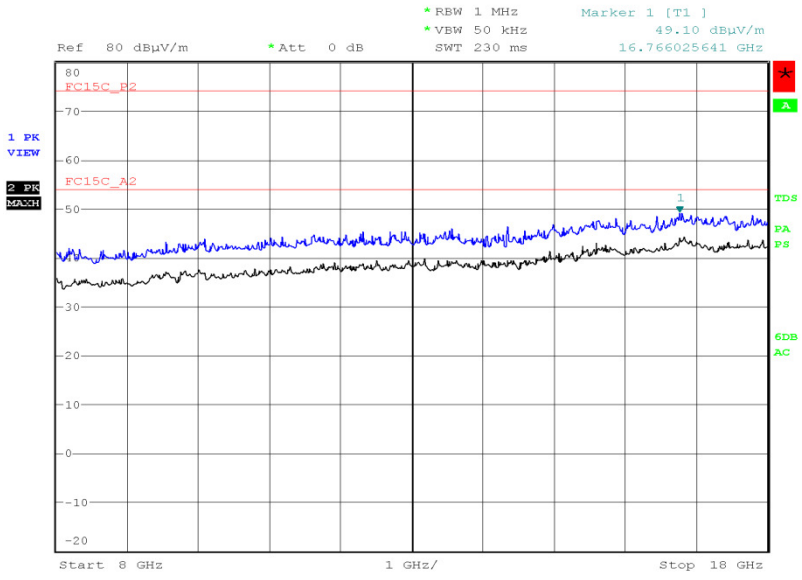
Product Service

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



Date: 24.APR.2016 11:26:58

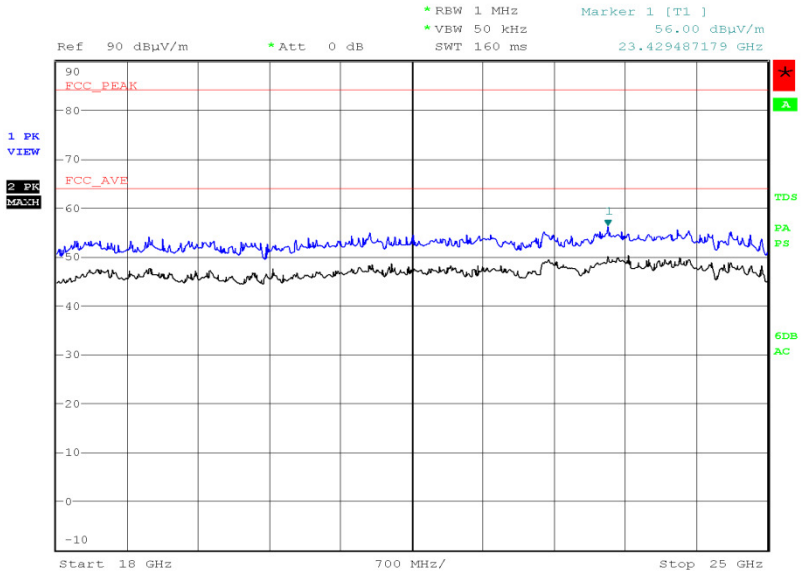
Bluetooth Low Energy, 2441 MHz, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 15:45:22

Product Service

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



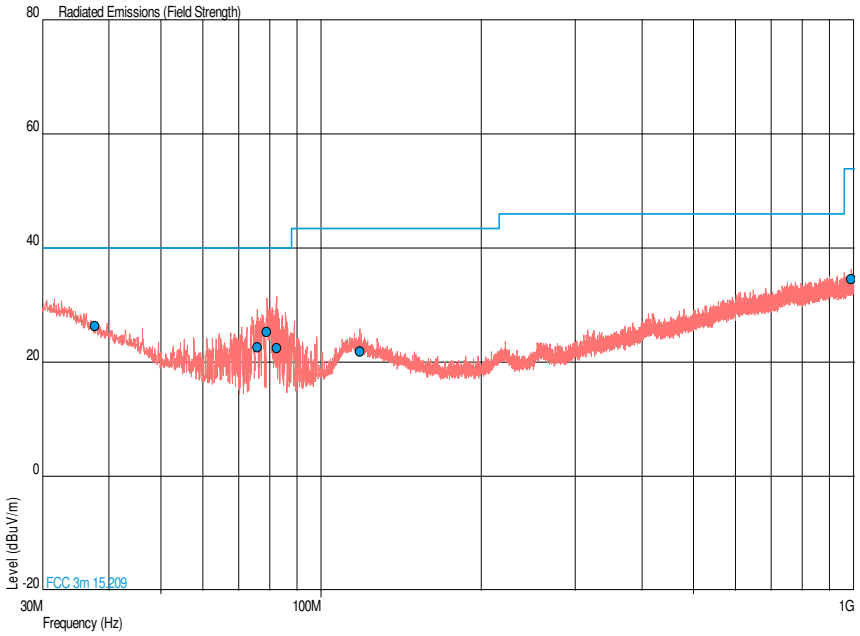
Date: 25.APR.2016 19:26:51

Product Service

Bluetooth Low Energy, 2480 MHz, 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
37.619	26.4	-13.6	20.9	-79.1	244	1.00	Horizontal
75.842	22.6	-17.4	13.5	-86.5	141	1.00	Vertical
79.171	25.2	-14.8	18.2	-81.8	19	1.00	Vertical
82.482	22.5	-17.5	13.3	-86.7	211	1.00	Vertical
118.167	21.9	-21.6	12.4	-137.6	3	1.00	Horizontal
987.274	34.5	-19.5	53.1	-447.9	360	4.00	Horizontal

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

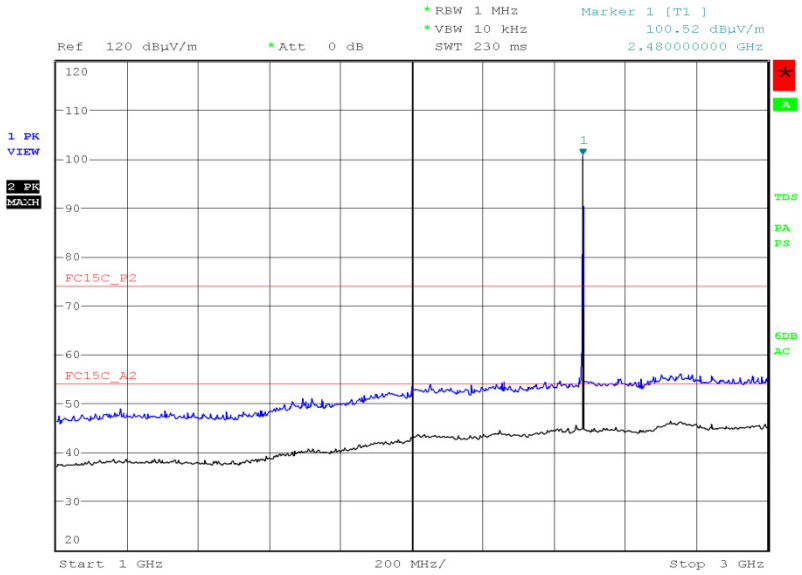


Bluetooth Low Energy, 2480 MHz, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

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

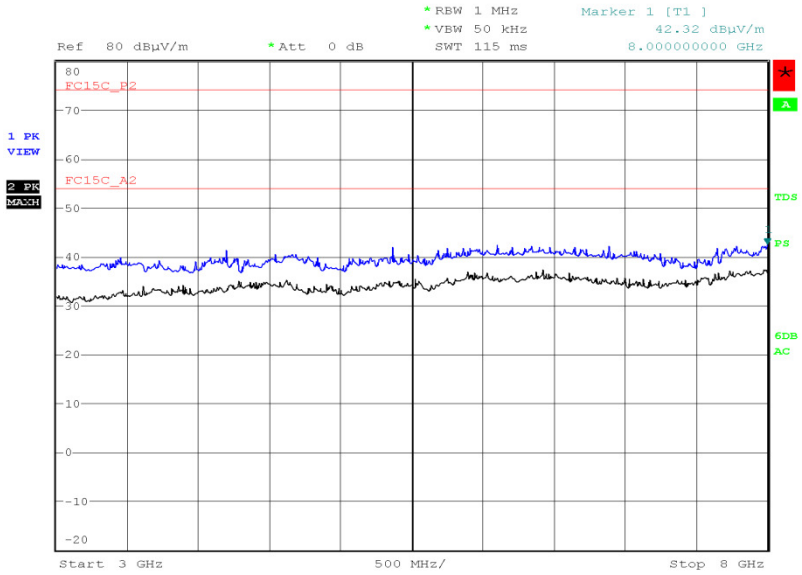
*No emissions were detected within 10 dB of the limit.

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



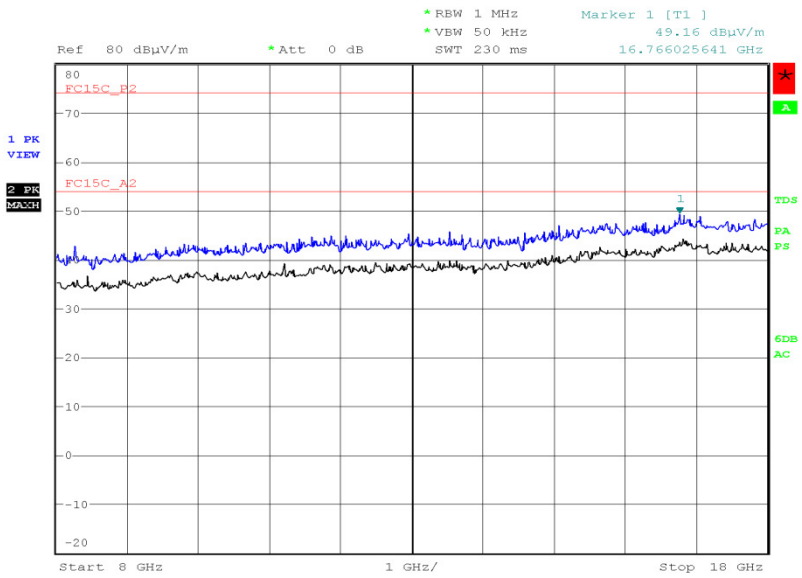
Product Service

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



Date: 24.APR.2016 12:12:19

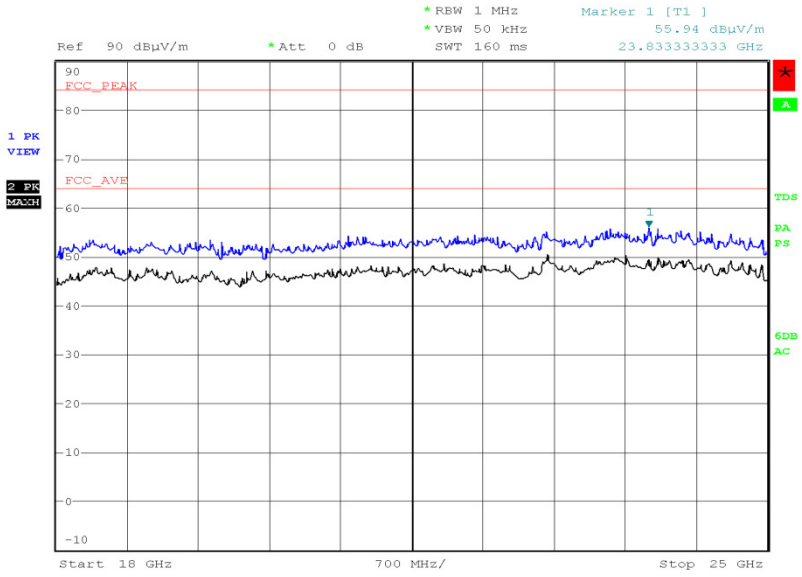
Bluetooth Low Energy, 2480 MHz, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 25.APR.2016 15:53:59

Product Service

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



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

2.5 RESTRICTED BAND EDGES

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205

2.5.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794345 - Modification State 0

2.5.3 Date of Test

19 April 2016 & 24 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

Testing was performed in accordance with ANSI C63.10, clause 11.13.1

Remarks

Plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.3
Final average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.2

2.5.6 Environmental Conditions

Ambient Temperature	19.2 - 20.3°C
Relative Humidity	28.0 - 33.0%

Product Service

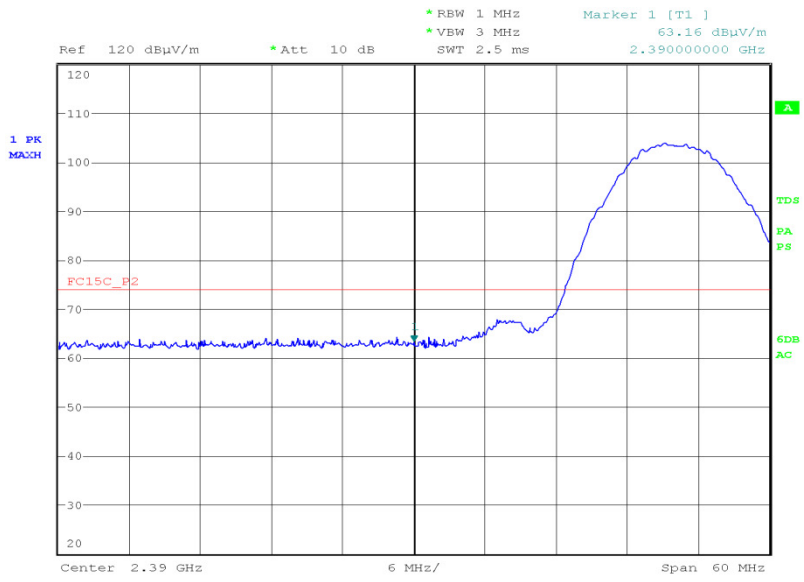
2.5.7 Test Results

4.0 V DC Supply

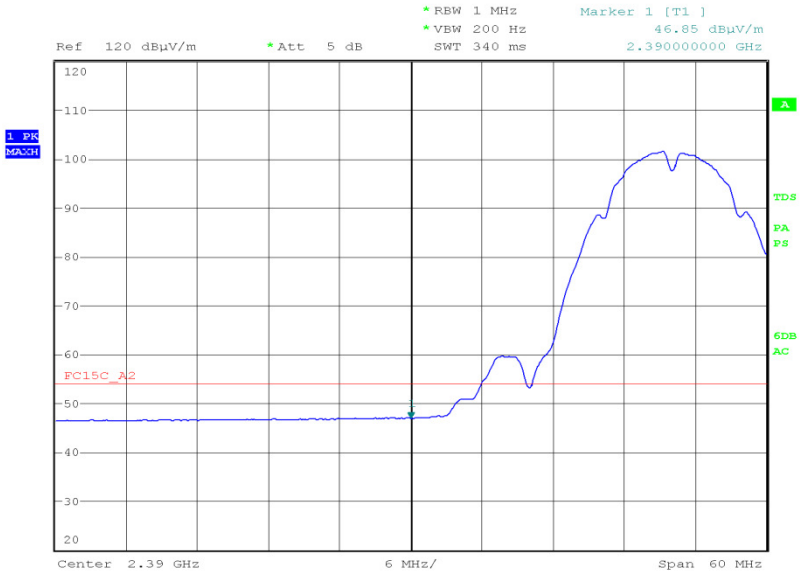
802.11b, 1 Mbps, Restricted Band Edges Results

2412 MHz		2462 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
63.16	46.54	63.54	48.26

802.11b, 2412 MHz, Measured Frequency 2390 MHz, 1 Mbps, Final Peak, Restricted Band Edges Plot

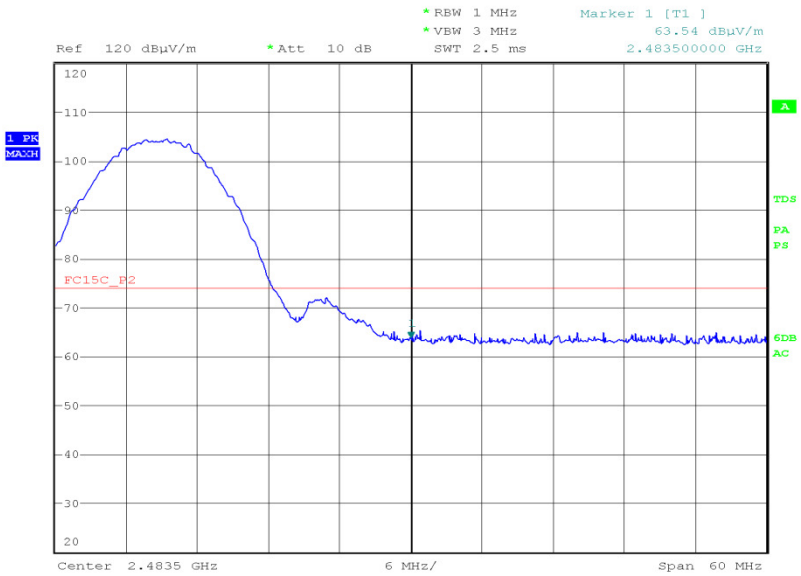


802.11b, 2412 MHz, Measured Frequency 2390 MHz, 1 Mbps, Final Average, Restricted Band Edges Plot



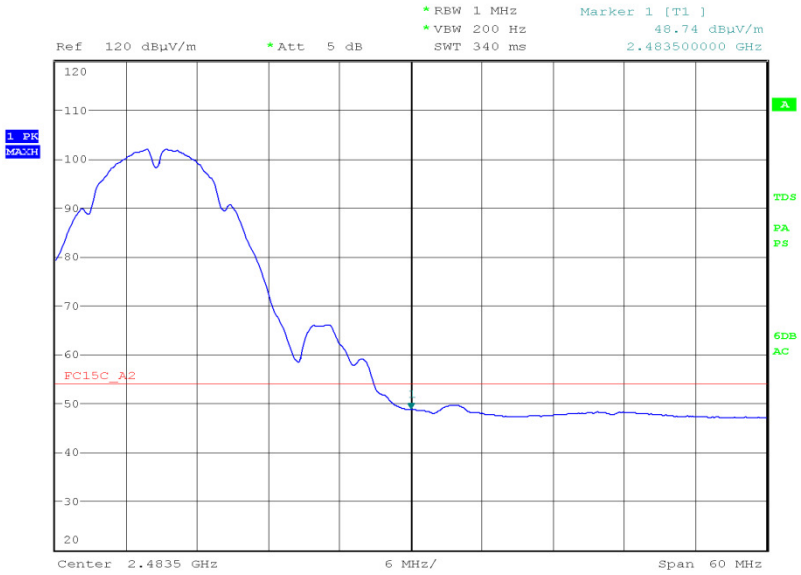
Date: 19.APR.2016 19:06:48

802.11b, 2462 MHz, Measured Frequency 2483.5 MHz, 1 Mbps, Final Peak, Restricted Band Edges Plot



Date: 19.APR.2016 19:27:47

802.11b, 2462 MHz, Measured Frequency 2483.5 MHz, 1 Mbps, Final Average, Restricted Band Edges Plot

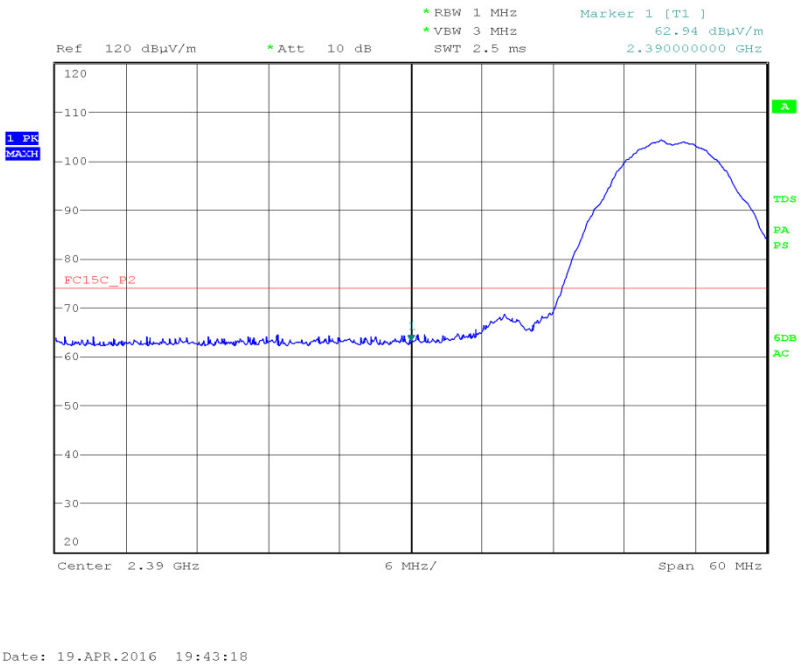


Date: 19.APR.2016 19:28:23

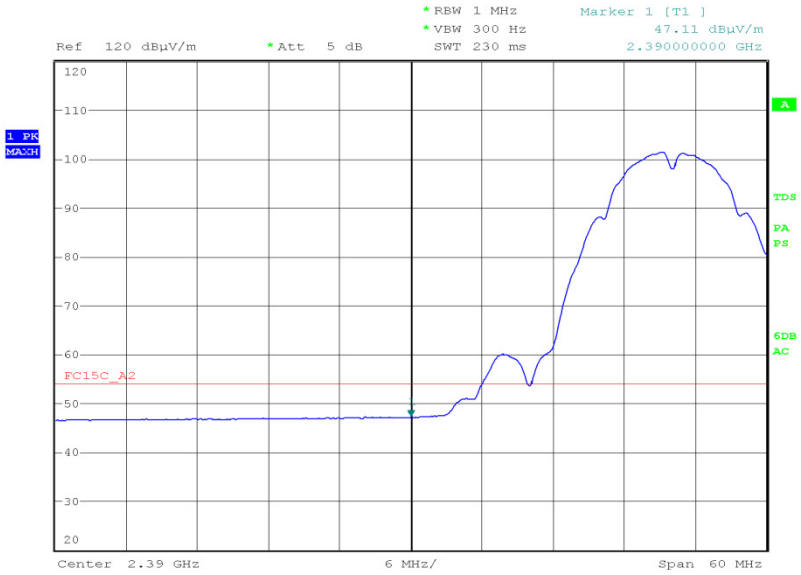
802.11b, 2 Mbps, Restricted Band Edges Results

2412 MHz		2462 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
62.94	46.59	63.32	48.29

802.11b, 2412 MHz, Measured Frequency 2390 MHz, 2 Mbps, Final Peak, Restricted Band Edges Plot

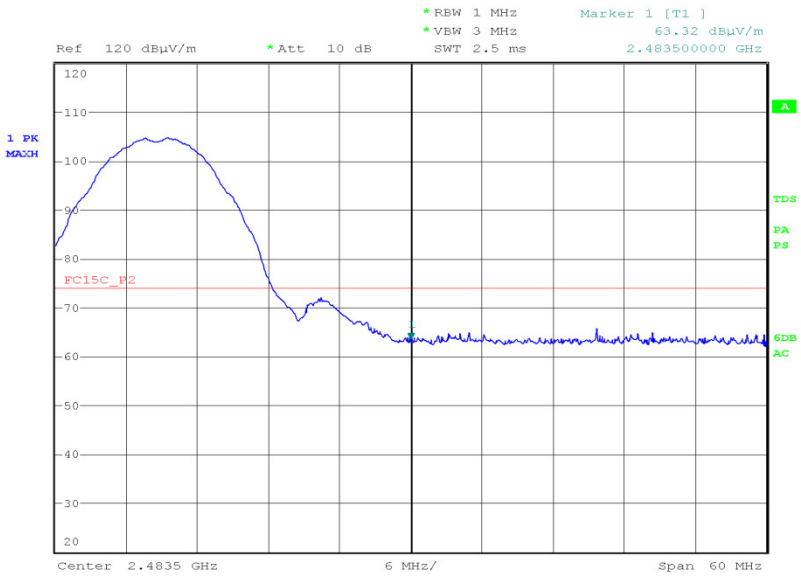


802.11b, 2412 MHz, Measured Frequency 2390 MHz, 2 Mbps, Final Average, Restricted Band Edges Plot



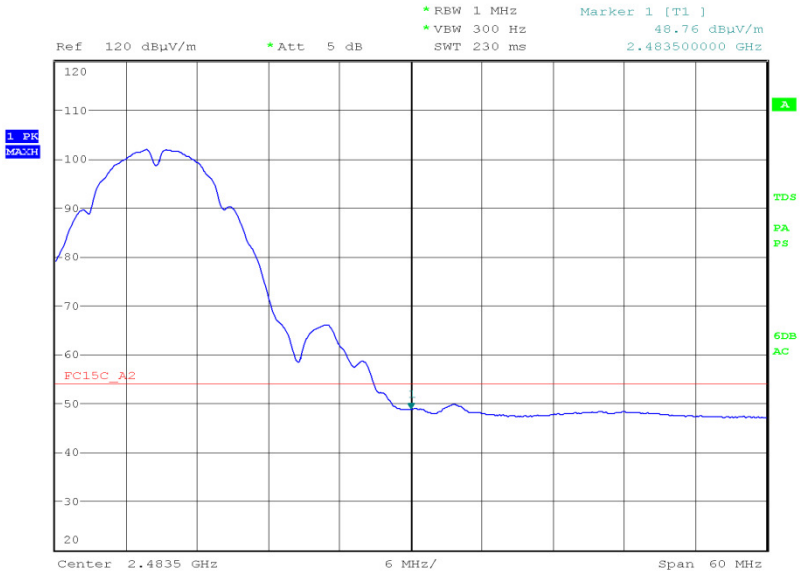
Date: 19.APR.2016 19:40:21

802.11b, 2462 MHz, Measured Frequency 2483.5 MHz, 2 Mbps, Final Peak, Restricted Band Edges Plot



Date: 19.APR.2016 19:49:04

802.11b, 2462 MHz, Measured Frequency 2483.5 MHz, 2 Mbps, Final Average, Restricted Band Edges Plot



Date: 19.APR.2016 19:50:03

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.

The worst case modes for highest output power and widest emission bandwidth were tested.

FCC 47 CFR Part 15, Limit Clause 15.205

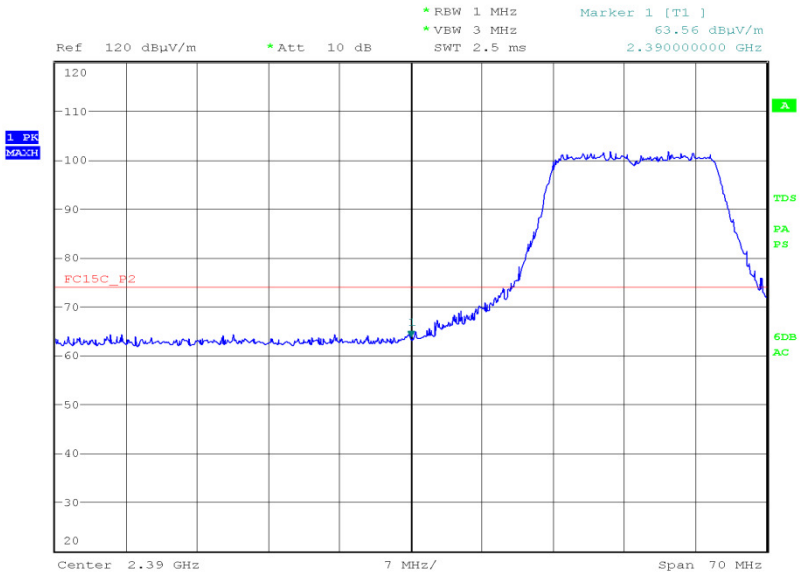
	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

4.0 V DC Supply

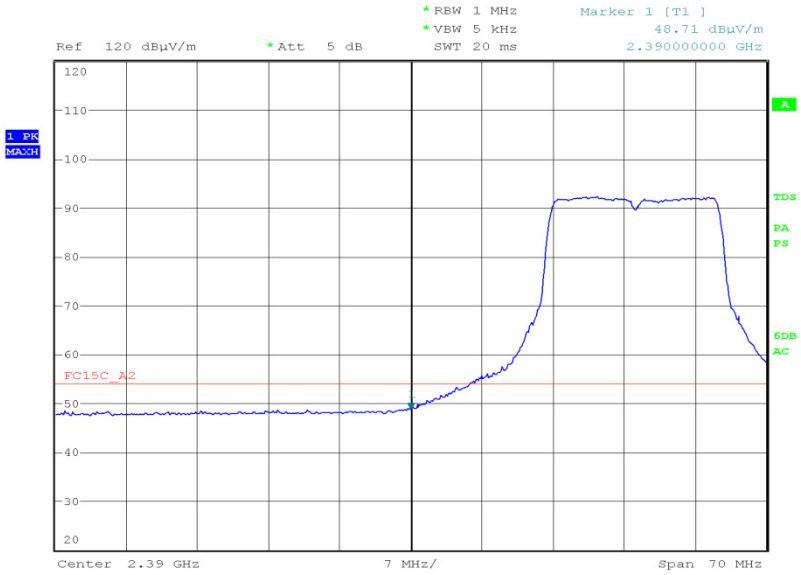
802.11g, 36 Mbps, Restricted Band Edges Results

2412 MHz		2462 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
63.56	47.05	66.58	49.55

802.11g, 2412 MHz, Measured Frequency 2390 MHz, 36 Mbps, Final Peak, Restricted Band Edges Plot

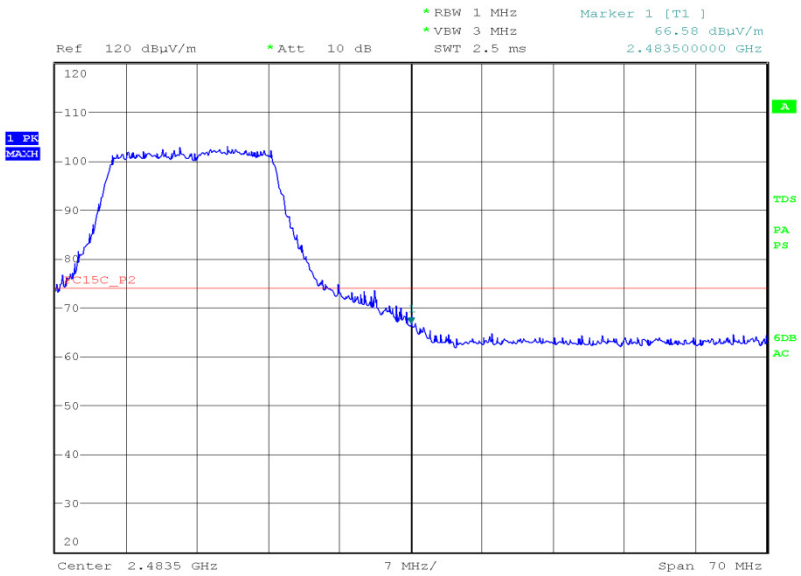


802.11g, 2412 MHz, Measured Frequency 2390 MHz, 36 Mbps, Final Average, Restricted Band Edges Plot



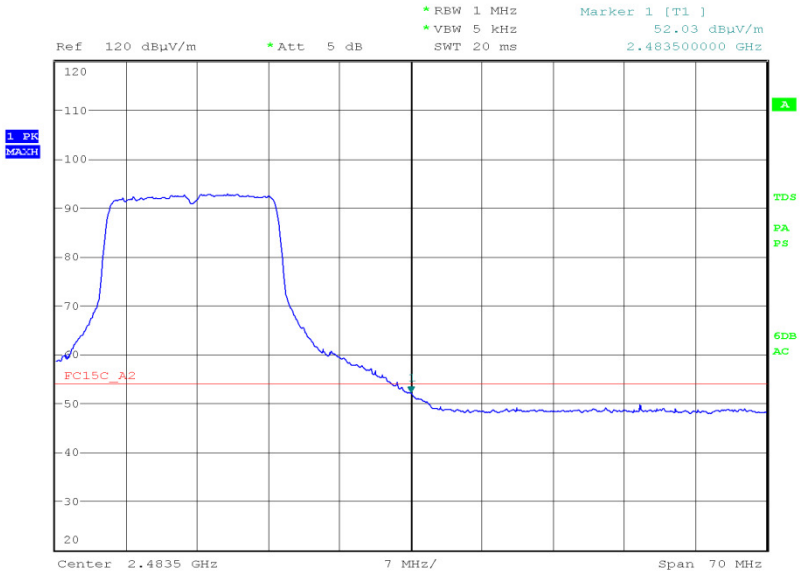
Date: 19.APR.2016 21:52:30

802.11g, 2462 MHz, Measured Frequency 2483.5 MHz, 36 Mbps, Final Peak, Restricted Band Edges Plot



Date: 19.APR.2016 22:04:22

802.11g, 2462 MHz, Measured Frequency 2483.5 MHz, 36 Mbps, Final Average, Restricted Band Edges Plot

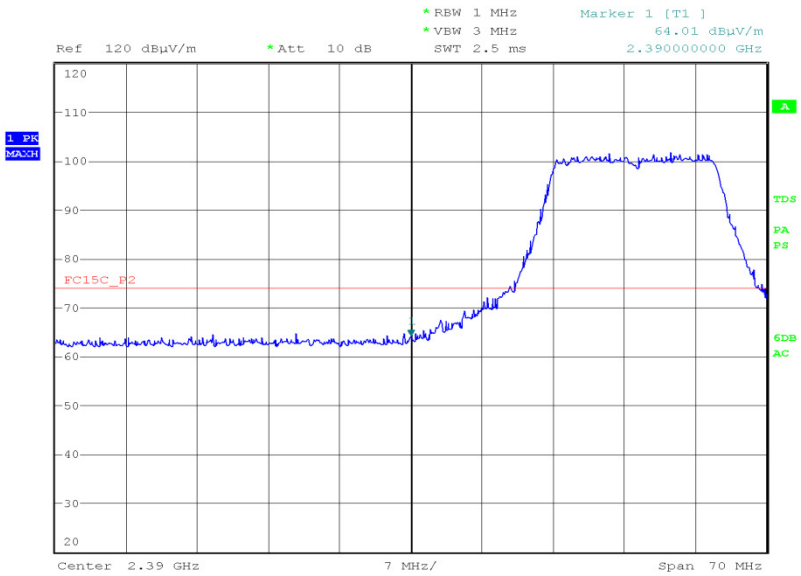


Date: 19.APR.2016 22:26:25

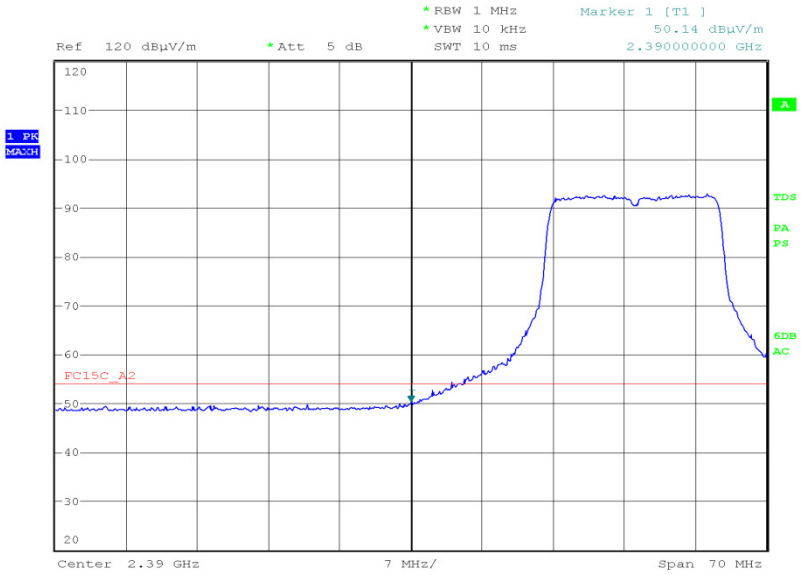
802.11g, 54 Mbps, Restricted Band Edges Results

2412 MHz		2462 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
64.01	47.05	66.25	49.95

802.11g, 2412 MHz, Measured Frequency 2390 MHz, 54 Mbps, Final Peak, Restricted Band Edges Plot

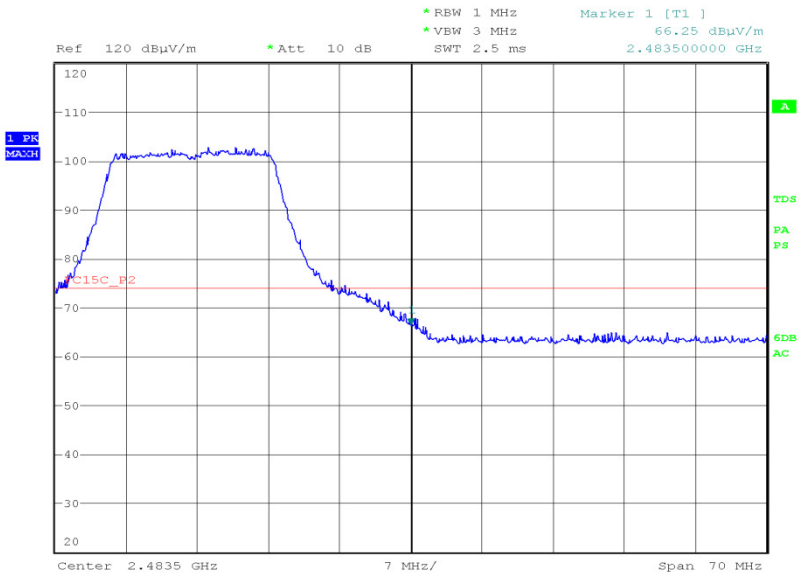


802.11g, 2412 MHz, Measured Frequency 2390 MHz, 54 Mbps, Final Average, Restricted Band Edges Plot



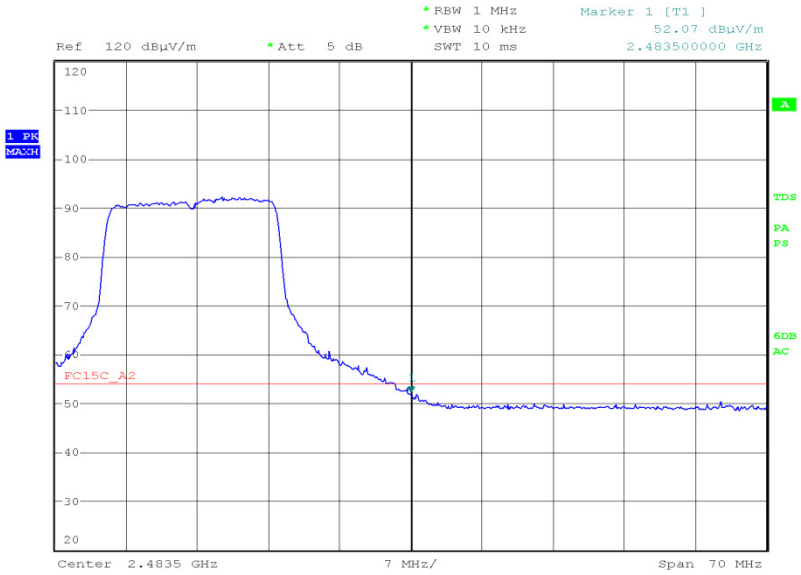
Date: 19.APR.2016 22:18:09

802.11g, 2462 MHz, Measured Frequency 2483.5 MHz, 54 Mbps, Final Peak, Restricted Band Edges Plot



Date: 19.APR.2016 22:37:45

802.11g, 2462 MHz, Measured Frequency 2483.5 MHz, 54 Mbps, 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.

The worst case modes for highest output power and widest emission bandwidth were tested.

FCC 47 CFR Part 15, Limit Clause 15.205

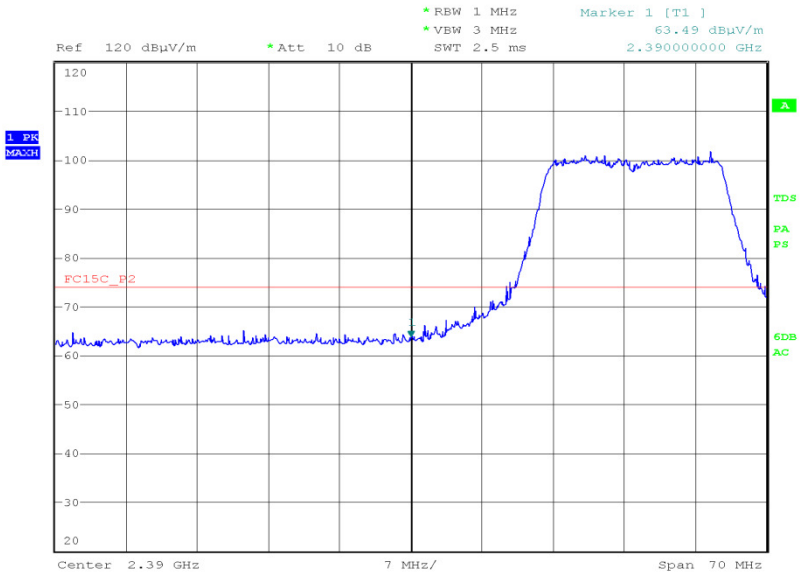
	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

4.0 V DC Supply

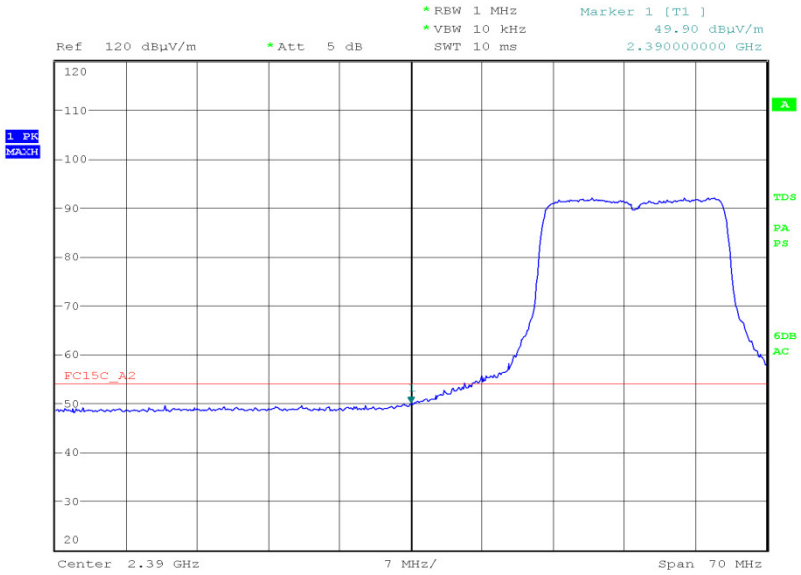
802.11n, 65 Mbps, Restricted Band Edges Results

2412 MHz		2462 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBµV/m		dBµV/m	
Final Peak	Final Average	Final Peak	Final Average
63.49	47.14	66.37	49.14

802.11n, 2412 MHz, Measured Frequency 2390 MHz, 65 Mbps, Final Peak, Restricted Band Edges Plot

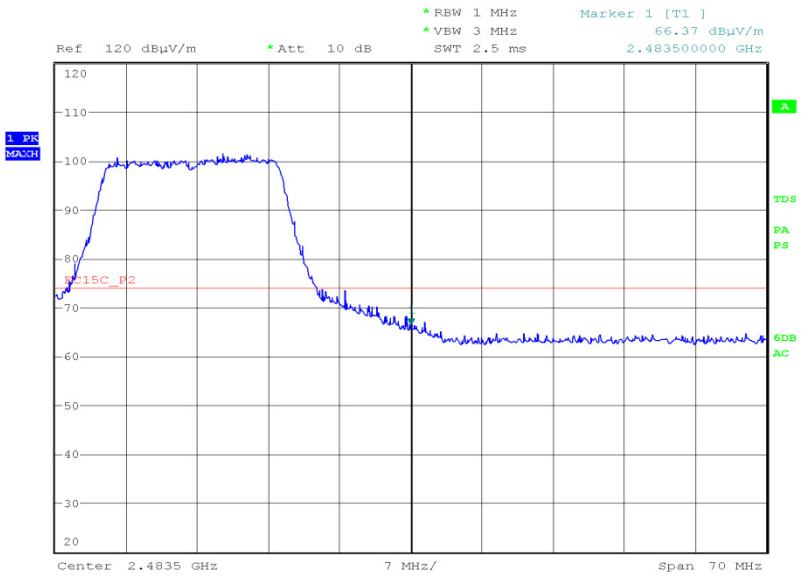


802.11n, 2412 MHz, Measured Frequency 2390 MHz, 65 Mbps, Final Average, Restricted Band Edges Plot



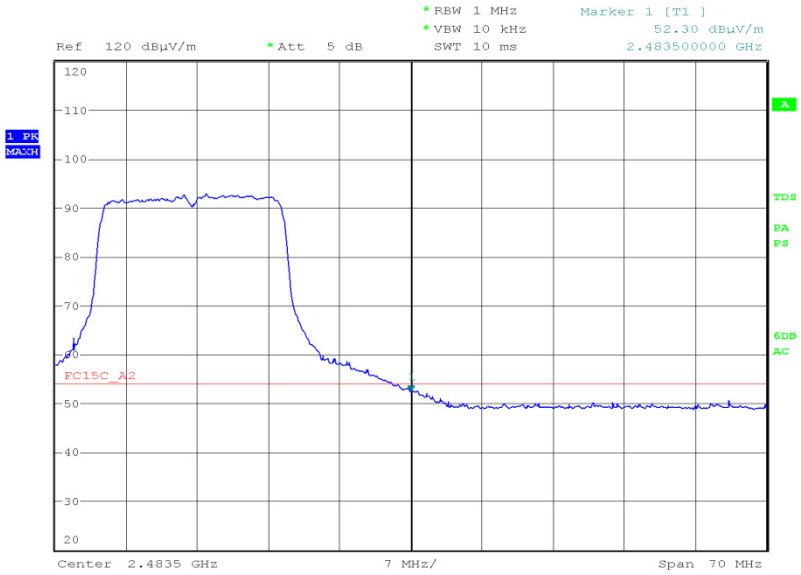
Date: 19.APR.2016 21:15:55

802.11n, 2462 MHz, Measured Frequency 2483.5 MHz, 65 Mbps, Final Peak, Restricted Band Edges Plot



Date: 19.APR.2016 21:34:51

802.11n, 2462 MHz, Measured Frequency 2483.5 MHz, 65 Mbps, 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.

The worst case modes for highest output power and widest emission bandwidth were tested.

FCC 47 CFR Part 15, Limit Clause 15.205

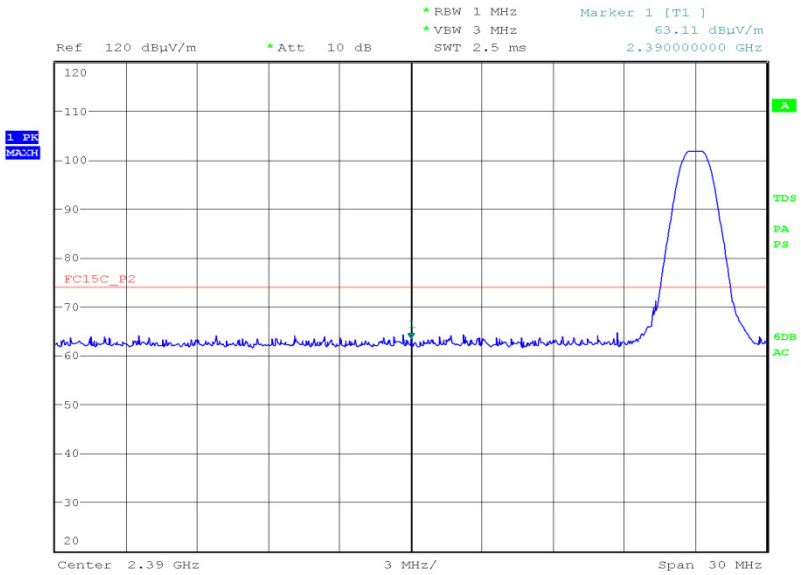
	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

4.0 V DC Supply

Bluetooth Low Energy, 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
63.11	46.27	63.85	46.53

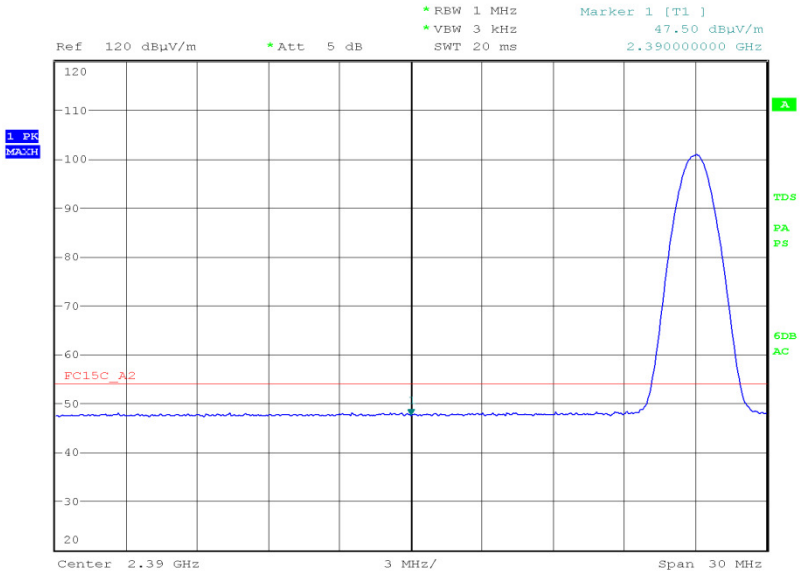
Bluetooth Low Energy, 2402 MHz, Measured Frequency 2390 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 24.APR.2016 11:01:14

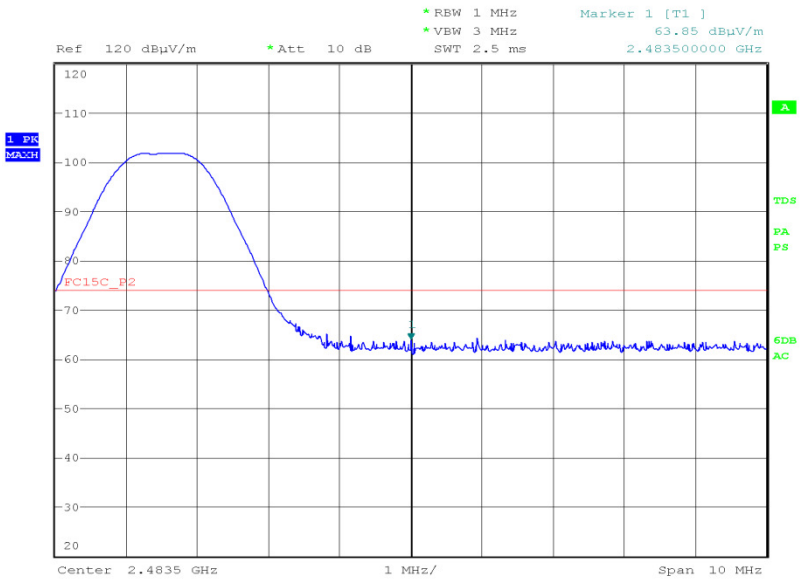
Product Service

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



Date: 24.APR.2016 11:01:55

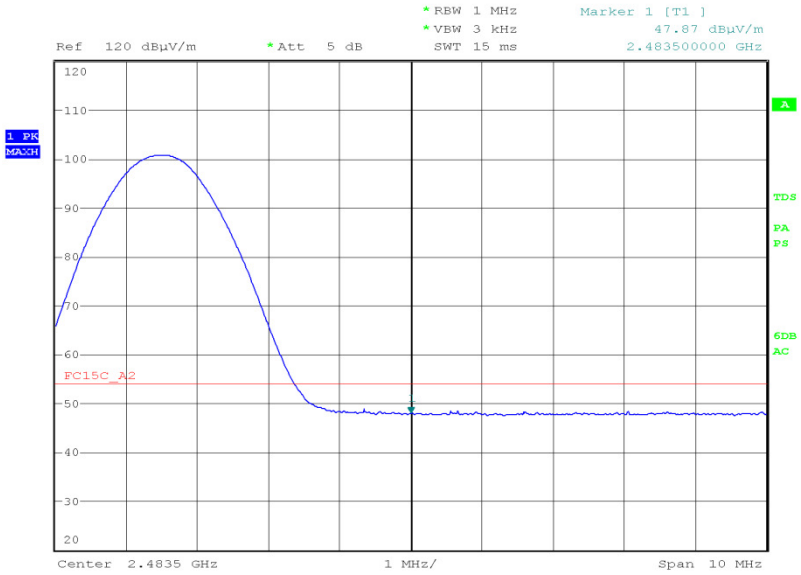
Bluetooth Low Energy, 2480 MHz, Measured Frequency 2483.5 MHz, GFSK, Final Peak, Restricted Band Edges Plot



Date: 24.APR.2016 10:44:40

Product Service

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



Remark

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.

The worst case modes for highest output power and widest emission bandwidth were tested.

FCC 47 CFR Part 15, Limit Clause 15.205

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

2.6 AUTHORISED BAND EDGES

2.6.1 Specification Reference

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

2.6.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794345 - Modification State 0

2.6.3 Date of Test

19 April 2016 & 24 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

Testing was performed in accordance with ANSI C63.10, clause 11.13.1.

2.6.6 Environmental Conditions

Ambient Temperature	19.2 - 20.3°C
Relative Humidity	28.0 - 33.0%

Product Service

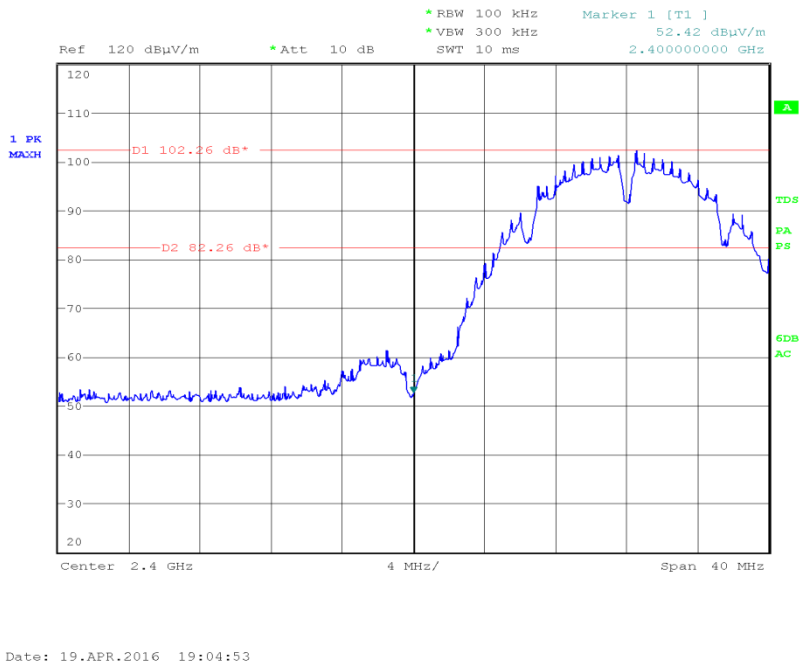
2.6.7 Test Results

4.0 V DC Supply

802.11b, 1 Mbps, Authorised Band Edges Results

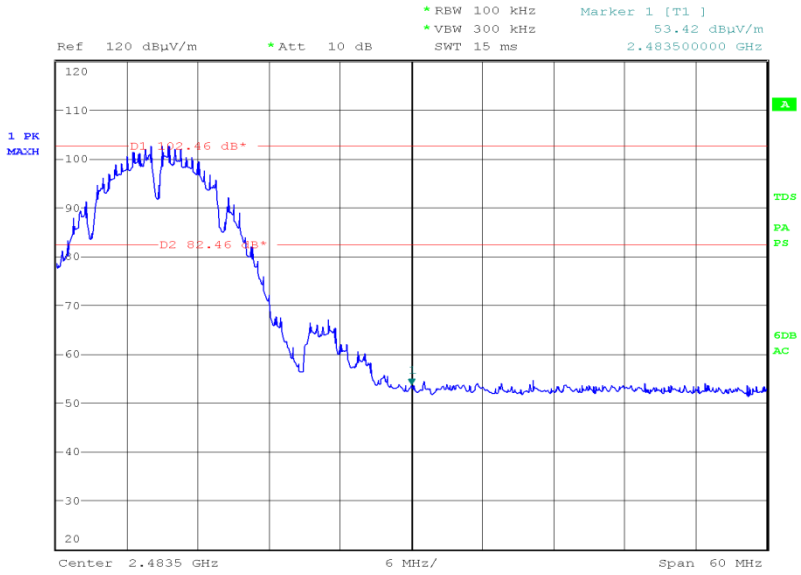
2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
52.42	53.42

802.11b, 2412 MHz, Measured Frequency 2400.00 MHz, 1 Mbps, Final Peak, Authorised Band Edges Plot



Date: 19.APR.2016 19:04:53

802.11b, 2462 MHz, Measured Frequency 2483.50 MHz, 1 Mbps, Final Peak, Authorised Band Edges Plot



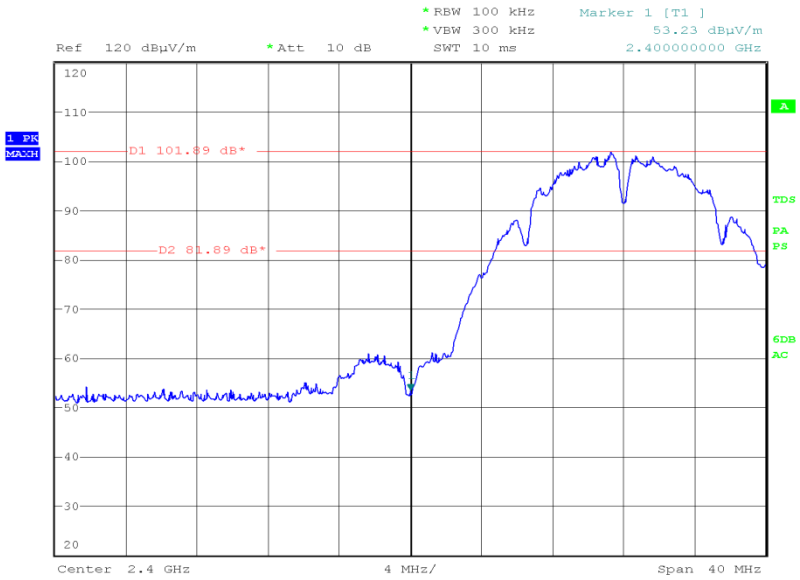
Date: 19.APR.2016 19:26:47

Product Service

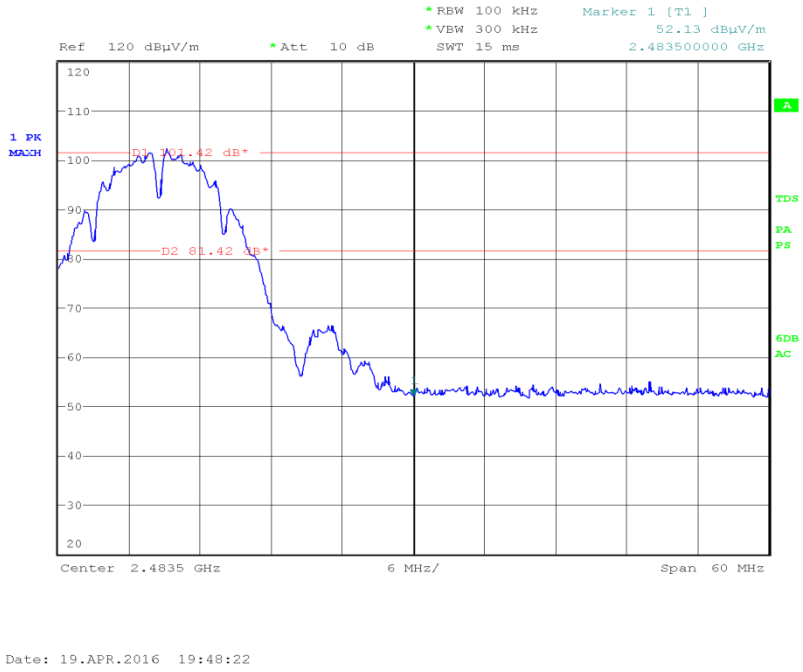
802.11b, 2 Mbps, Authorised Band Edges Results

2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
53.23	52.13

802.11b, 2412 MHz, Measured Frequency 2400.00 MHz, 2 Mbps, Final Peak, Authorised Band Edges Plot



802.11b, 2462 MHz, Measured Frequency 2483.50 MHz, 2 Mbps, Final Peak, Authorised Band Edges Plot



Date: 19.APR.2016 19:48:22

Remark

The test was performed on 1 Mbps because this was deemed the worst case data rate for Conducted Output Power.

The test was performed on 2 Mbps because this was deemed the worst case data rate for 6 dB Bandwidth.

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.

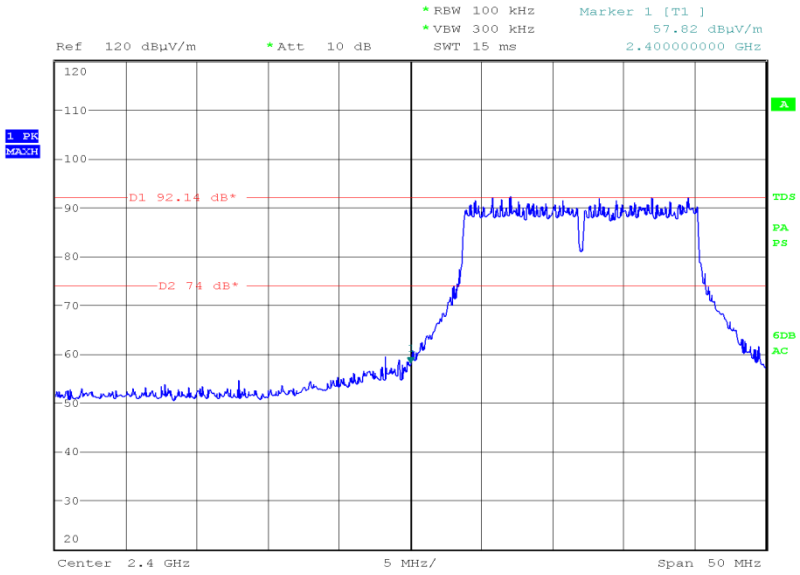
Product Service

4.0 V DC Supply

802.11g, 36 Mbps, Authorised Band Edges Results

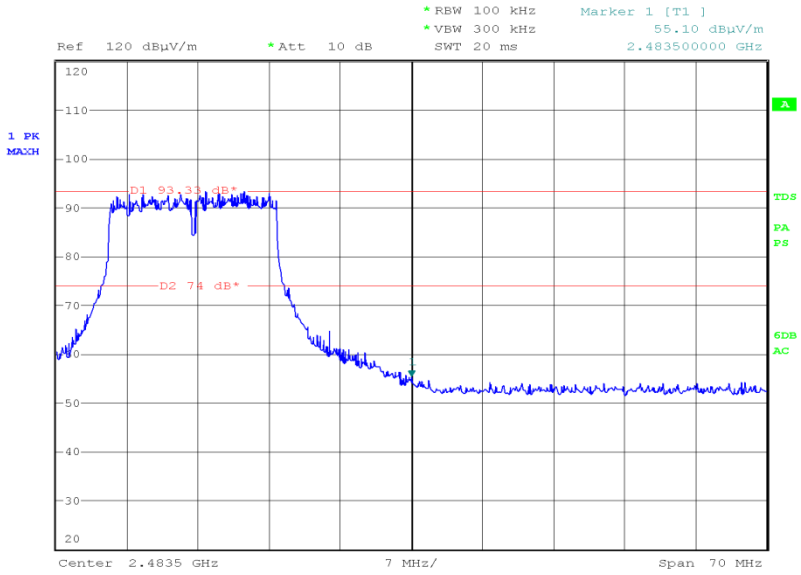
2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
57.82	55.10

802.11g, 2412 MHz, Measured Frequency 2400.00 MHz, 36 Mbps, Final Peak, Authorised Band Edges Plot



Date: 19.APR.2016 21:54:40

802.11g, 2462 MHz, Measured Frequency 2483.50 MHz, 36 Mbps, Final Peak, Authorised Band Edges Plot



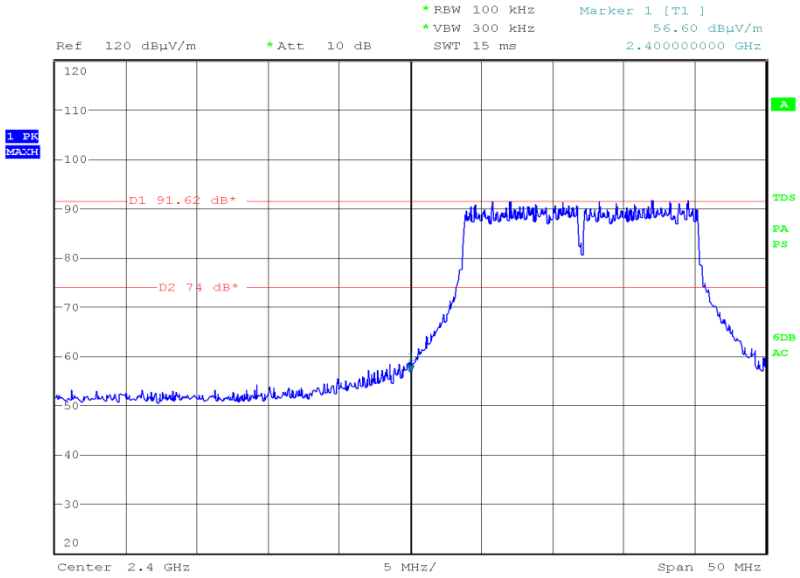
Date: 19.APR.2016 22:02:51

Product Service

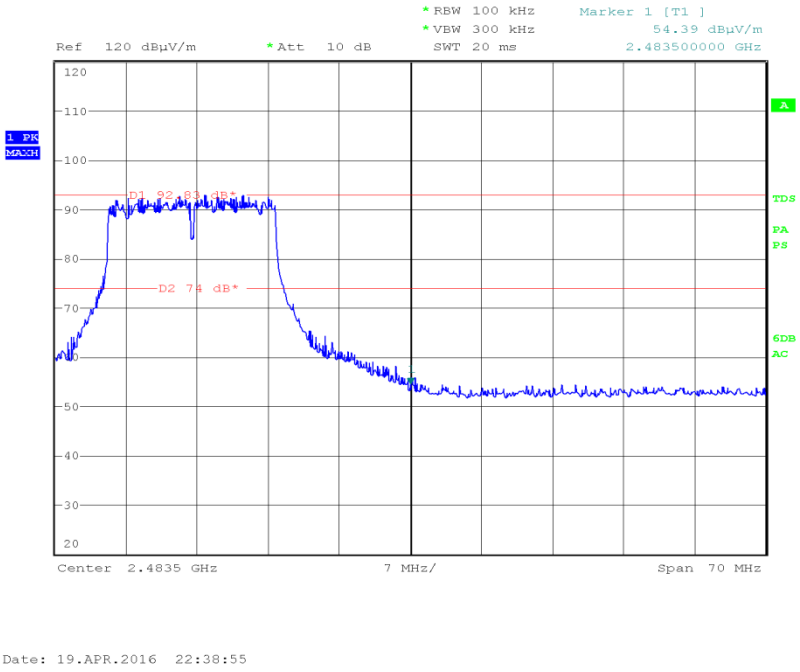
802.11g, 54 Mbps, Authorised Band Edges Results

2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
56.60	54.39

802.11g, 2412 MHz, Measured Frequency 2400.00 MHz, 54 Mbps, Final Peak, Authorised Band Edges Plot



802.11g, 2462 MHz, Measured Frequency 2483.50 MHz, 54 Mbps, Final Peak, Authorised Band Edges Plot



Remark

The test was performed on 36 Mbps because this was deemed the worst case data rate for Conducted Output Power.

The test was performed on 54 Mbps because this was deemed the worst case data rate for 6 dB Bandwidth.

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.

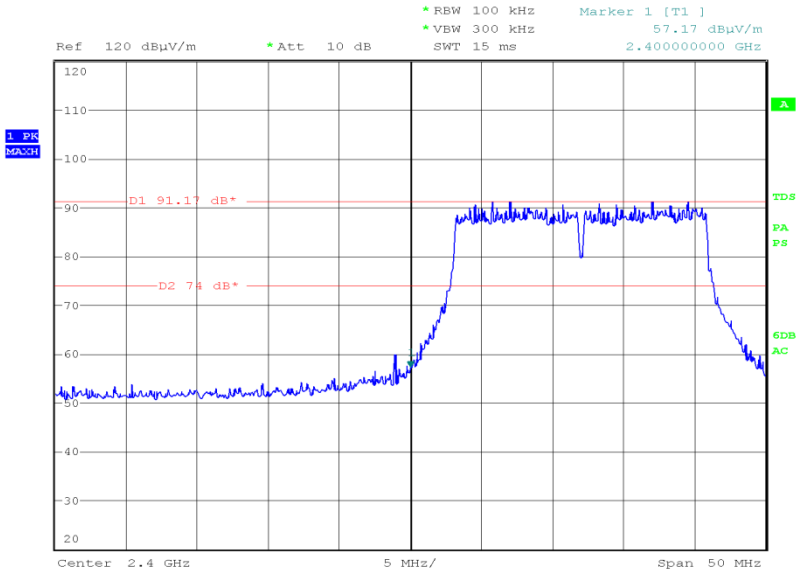
Product Service

4.0 V DC Supply

802.11n, 65 Mbps, Authorised Band Edges Results

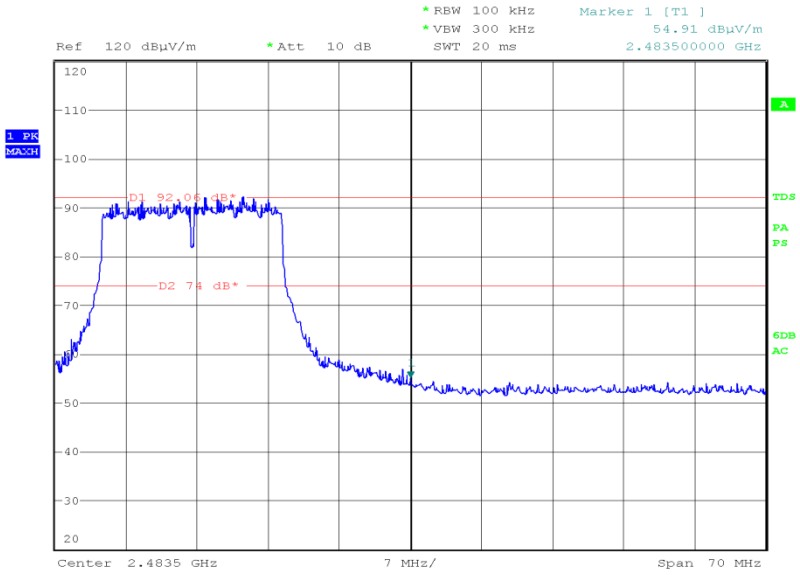
2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
57.17	54.91

802.11n, 2412 MHz, Measured Frequency 2400.00 MHz, 65 Mbps, Final Peak, Authorised Band Edges Plot



Date: 19.APR.2016 21:08:02

802.11n, 2462 MHz, Measured Frequency 2483.50 MHz, 65 Mbps, Final Peak, Authorised Band Edges Plot



Date: 19.APR.2016 20:54:57

Remark

The test was performed on 65 Mbps because this was deemed the worst case data rate for Conducted Output Power.

The test was performed on 65 Mbps because this was deemed the worst case data rate for 6 dB Bandwidth.

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

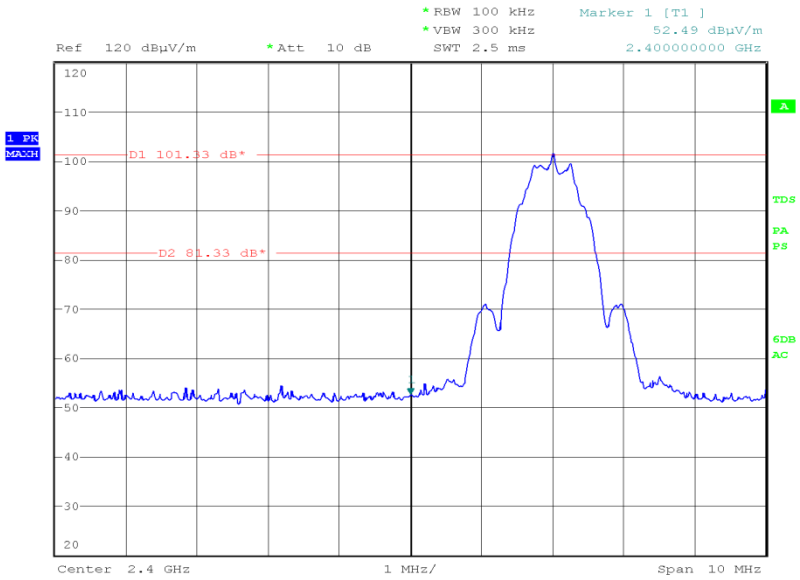
20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

4.0 V DC Supply

Bluetooth Low Energy, GFSK, Authorised Band Edges Results

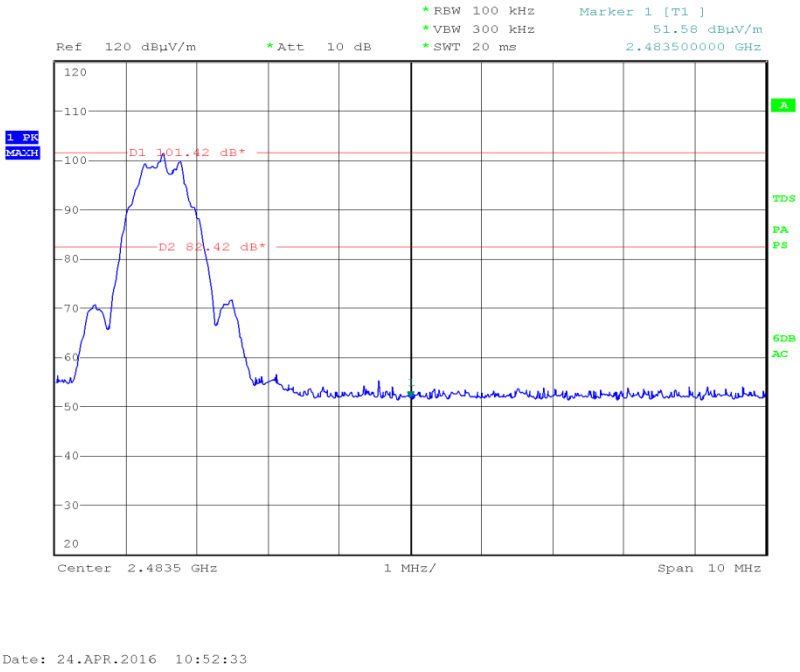
2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dBµV/m	dBµV/m
Final Peak	Final Peak
52.49	51.58

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



Product Service

Bluetooth Low Energy, 2480 MHz, Measured Frequency 2483.50 MHz, GFSK, 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

2.7 POWER SPECTRAL DENSITY

2.7.1 Specification Reference

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

2.7.2 Equipment Under Test and Modification State

S/N: IMEI 004401115794170 - Modification State 0

2.7.3 Date of Test

27 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

The test was performed in accordance with KDB 558074 D01 v03r05, clause 10.2.

2.7.6 Environmental Conditions

Ambient Temperature	21.9°C
Relative Humidity	25.0%

Product Service

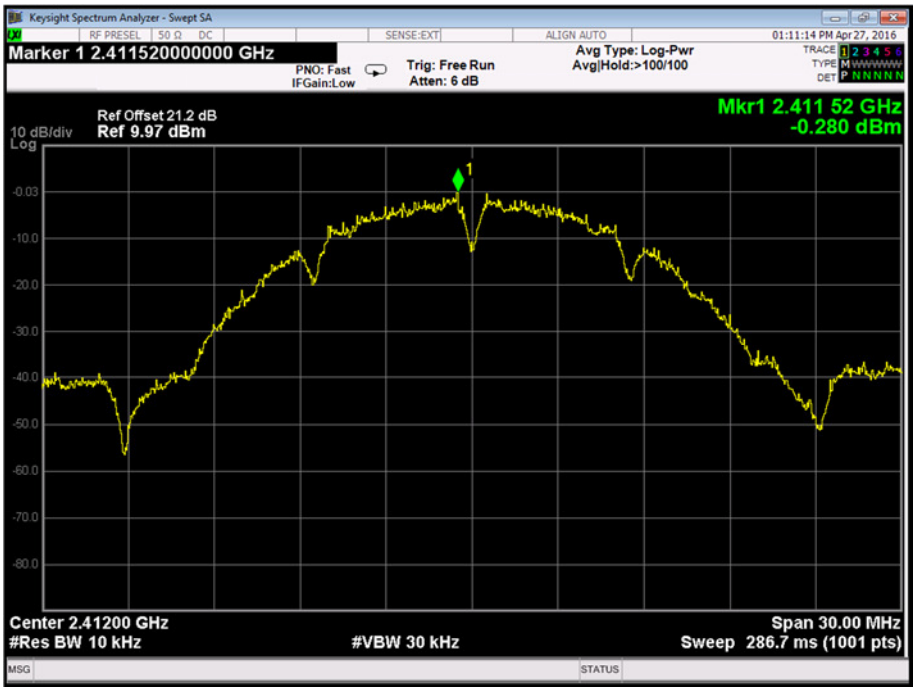
2.7.7 Test Results

4.0 V DC Supply

802.11b, DSSS, 1 Mbps, Power Spectral Density Results

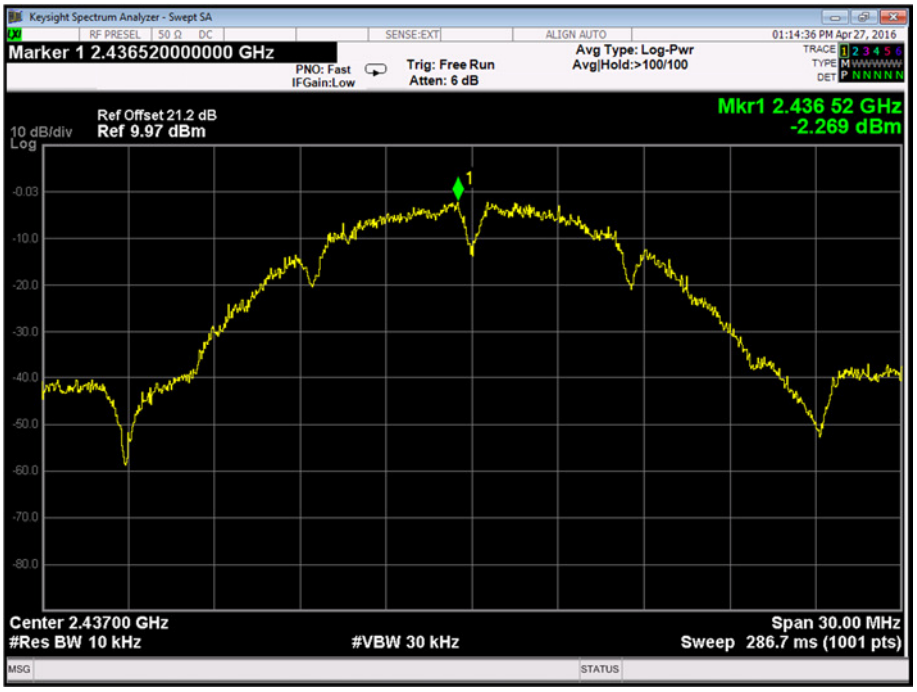
2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-0.280	-2.269	-1.938

802.11b, 2412 MHz, DSSS, 1 Mbps, Power Spectral Density Plot

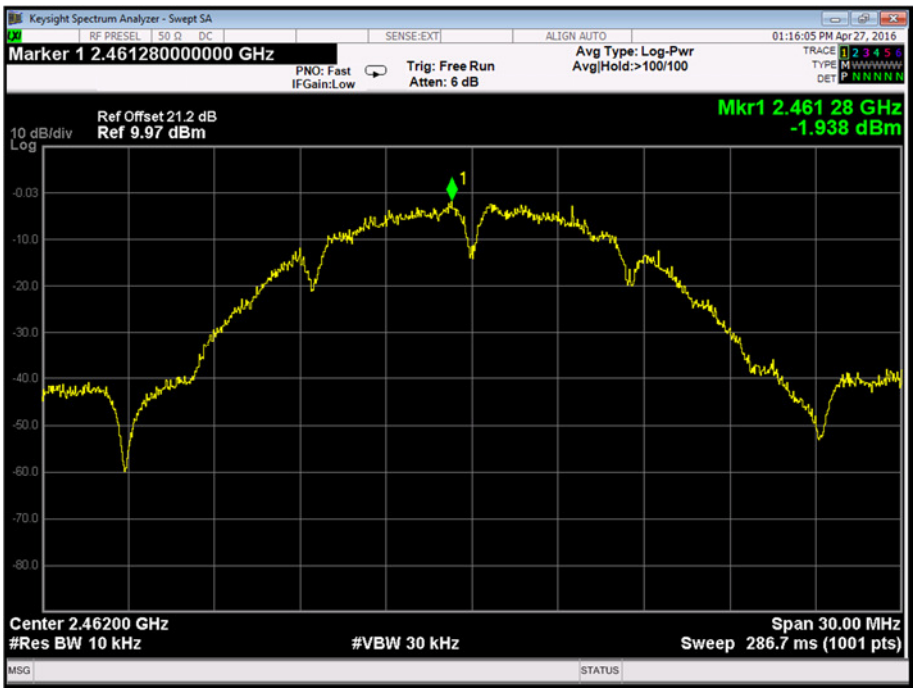


Product Service

802.11b, 2437 MHz, DSSS, 1 Mbps, Power Spectral Density Plot



802.11b, 2462 MHz, DSSS, 1 Mbps, Power Spectral Density Plot



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

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

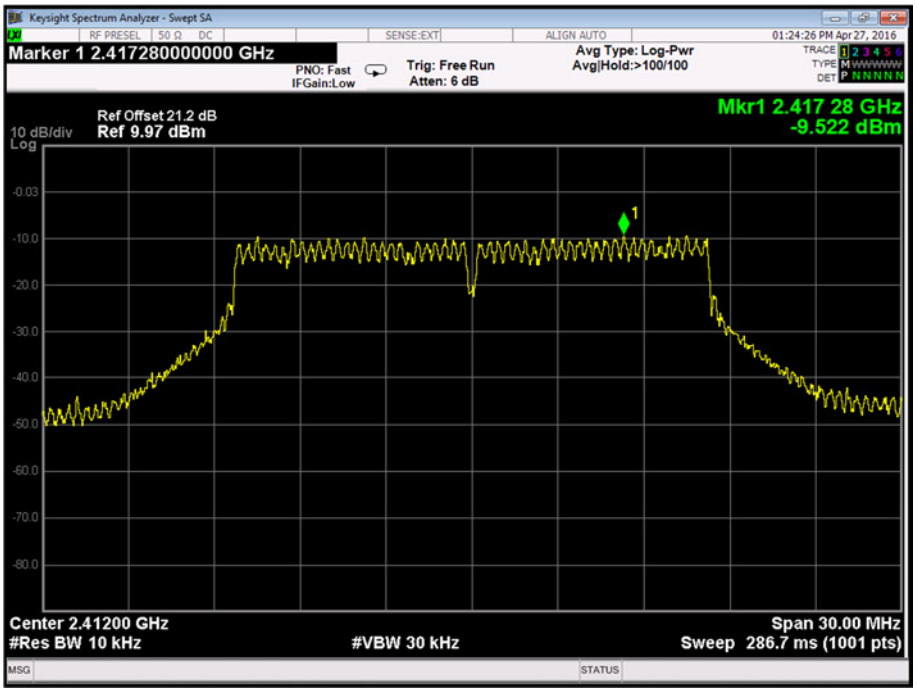
Product Service

4.0 V DC Supply

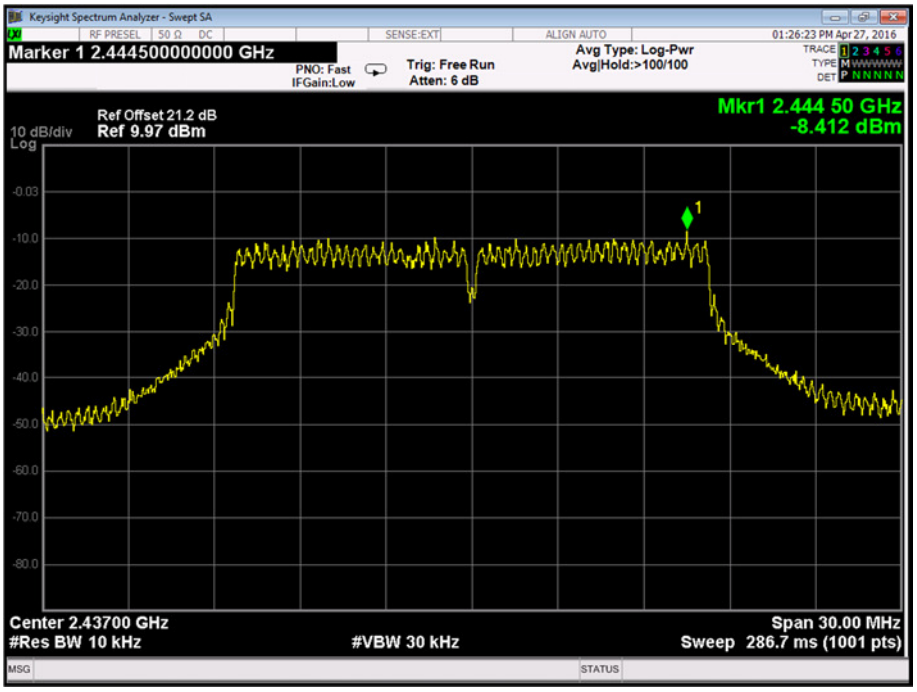
802.11g, OFDM, 36 Mbps, Power Spectral Density Results

2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-9.522	-8.412	-9.138

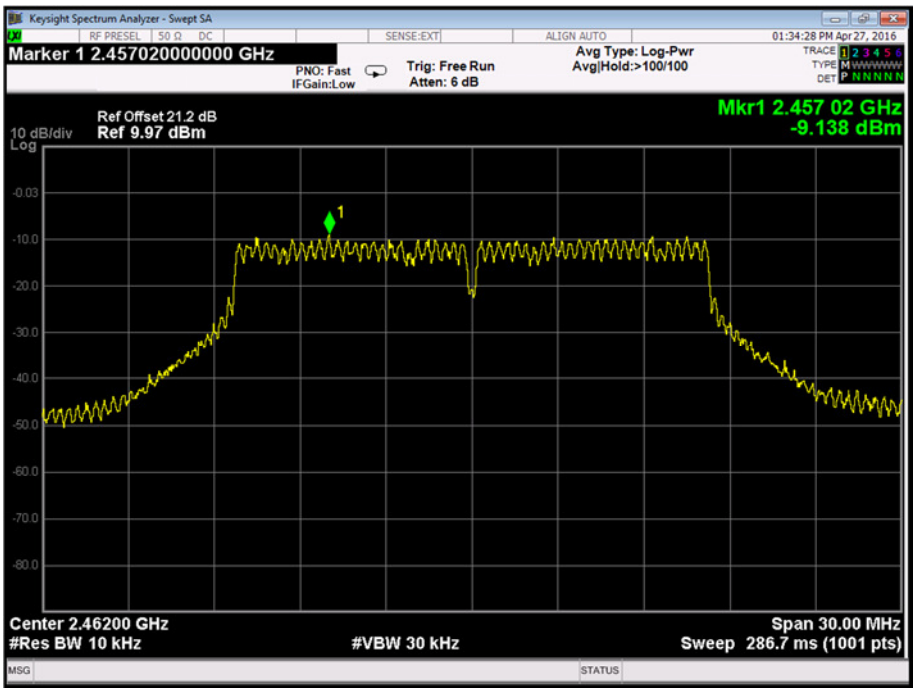
802.11g, 2412 MHz, OFDM, 36 Mbps, Power Spectral Density Plot



802.11g, 2437 MHz, OFDM, 36 Mbps, Power Spectral Density Plot



802.11g, 2462 MHz, OFDM, 36 Mbps, Power Spectral Density Plot



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

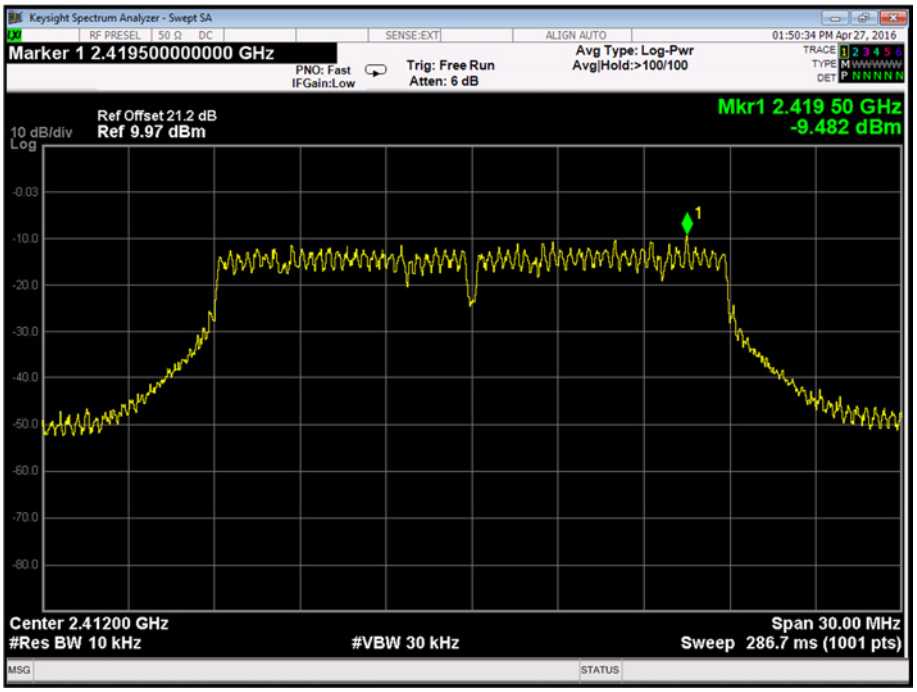
The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.0 V DC Supply

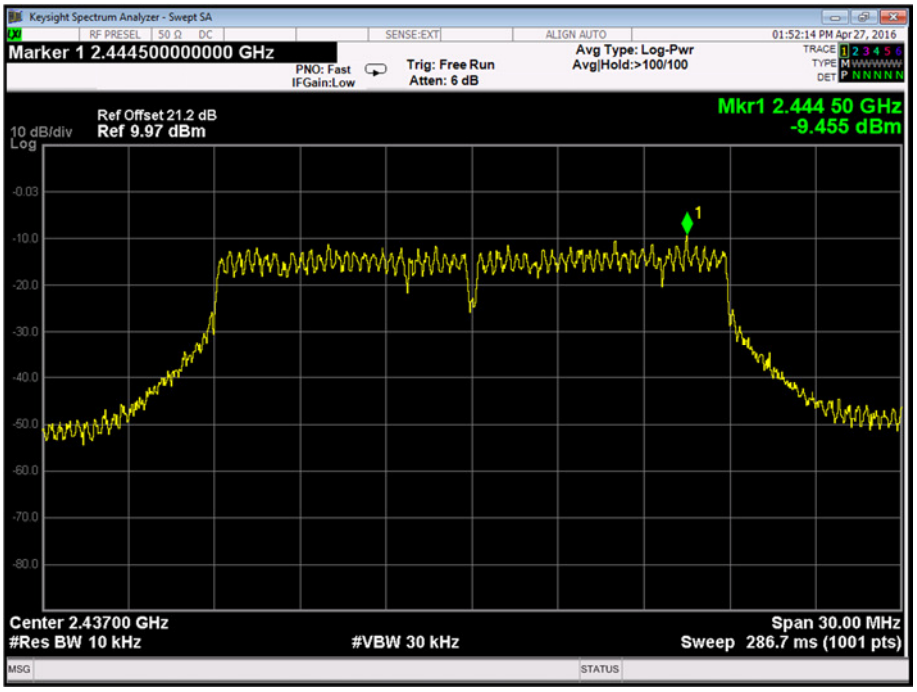
802.11n, OFDM, 65 Mbps, Power Spectral Density Results

2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-9.482	-9.455	-9.723

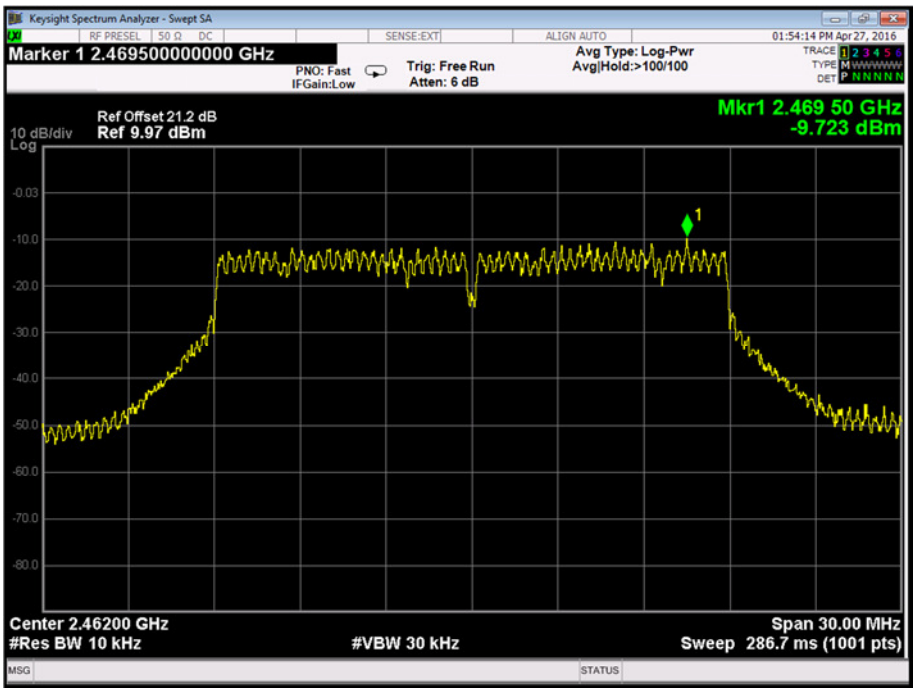
802.11n, 2412 MHz, OFDM, 65 Mbps, Power Spectral Density Plot



802.11n, 2437 MHz, OFDM, 65 Mbps, Power Spectral Density Plot



802.11n, 2462 MHz, OFDM, 65 Mbps, Power Spectral Density Plot



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

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

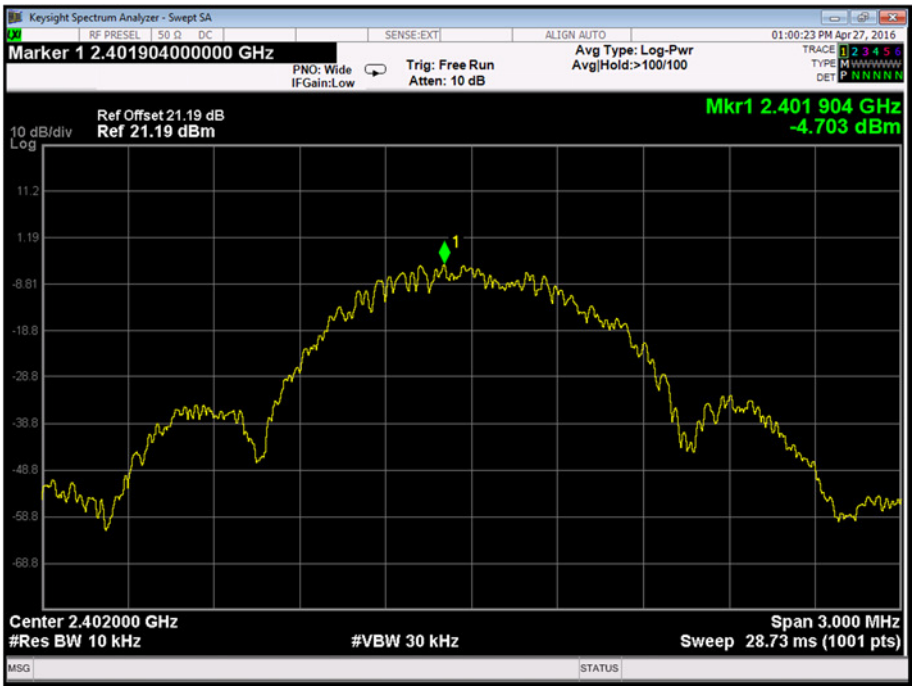
Product Service

4.0 V DC Supply

Bluetooth Low Energy, GFSK, Power Spectral Density Results

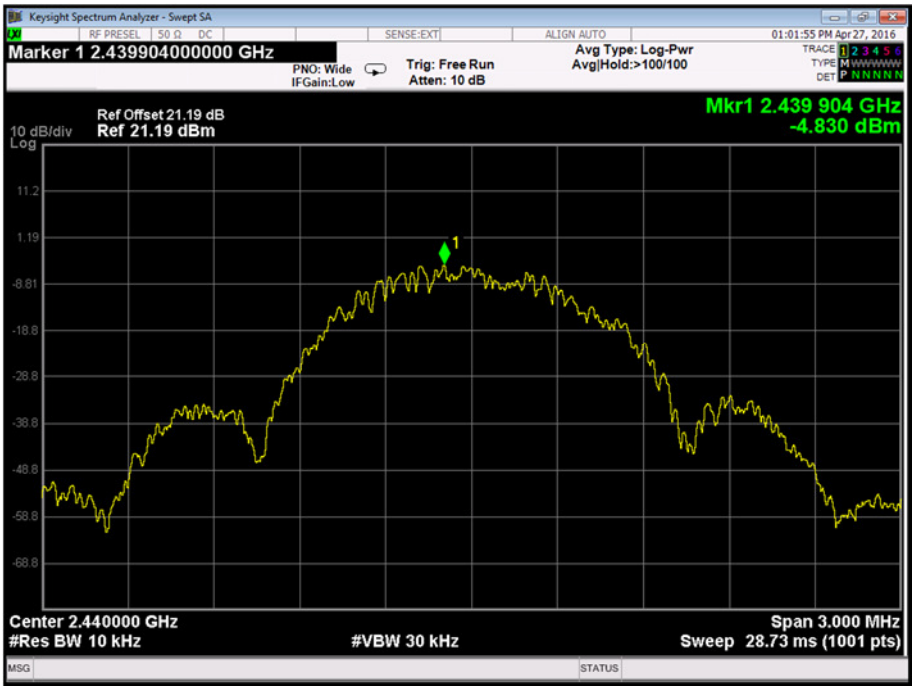
2402 MHz	2441 MHz	2480 MHz
dBm	dBm	dBm
-4.703	-4.830	-4.906

Bluetooth Low Energy, 2402 MHz, GFSK, Power Spectral Density Plot

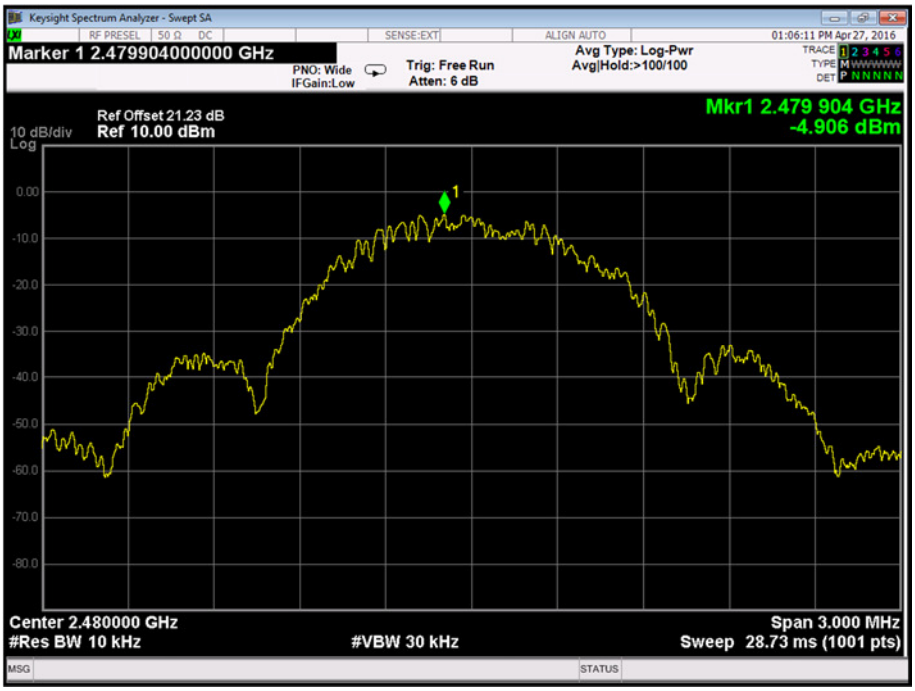


Product Service

Bluetooth Low Energy, 2441 MHz, GFSK, Power Spectral Density Plot



Bluetooth Low Energy, 2480 MHz, GFSK, Power Spectral Density Plot



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

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

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 - 6dB Bandwidth					
Multimeter	Iso-tech	IDM-101	466	12	11-Sep-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2435	-	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	Keysight Technologies	N9030A	4654	12	8-Oct-2016
1 metre SMA Cable	IW Microwave	3PS-1806LC-394-3PS	4662	12	6-Nov-2016
Section 2.3 - Maximum Conducted Output Power					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	2-Jun-2016
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	25-Sep-2016
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	12	25-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

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - 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
Section 2.6 - 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 2.7 - 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

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.7 - Power Spectral Density					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Multimeter	Iso-tech	IDM-101	466	12	11-Sep-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	2435	-	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
EMI Receiver	Keysight Technologies	N9038A MXE	4628	12	3-Sep-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
2 metre SMA Cable	IW Microwave	3PS-1806LC-788-3PS	4661	12	6-Nov-2016
1 metre SMA Cable	IW Microwave	3PS-1806LC-394-3PS	4662	12	6-Nov-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
6 dB Bandwidth	± 212.114 kHz
AC Line Conducted Emissions	± 3.2 dB
Maximum Conducted Output Power	± 0.70 dB
Power Spectral Density	± 3.0 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

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).