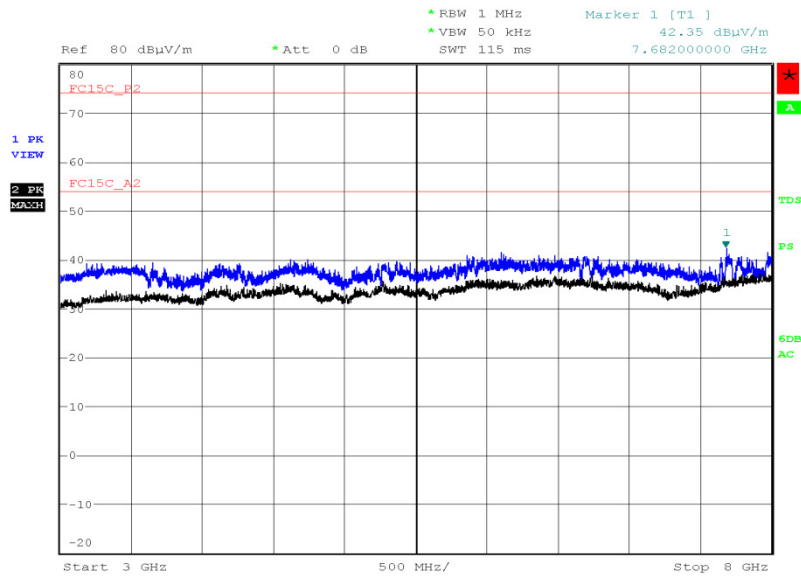
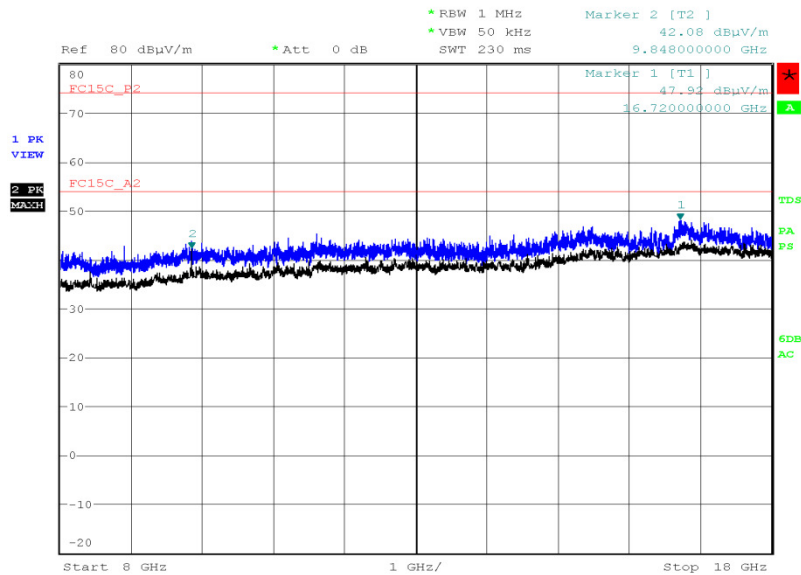




Product Service

802.11n, 2462 MHz, MCS0, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot

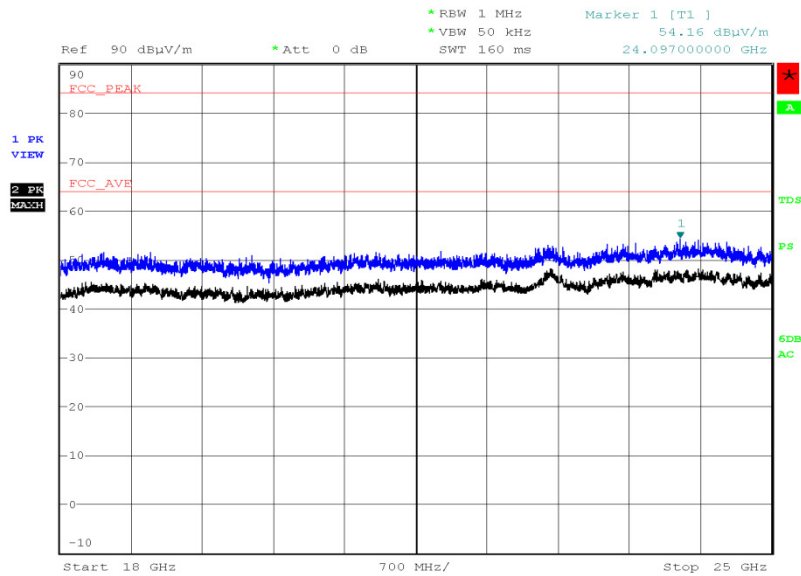
Date: 13.JUN.2016 19:05:58

802.11n, 2462 MHz, MCS0, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot

Date: 13.JUN.2016 21:26:29



802.11n, 2462 MHz, MCS0, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



Date: 13.JUN.2016 23:47:19

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	As per 15.209	As per 15.209

FCC 47 CFR Part 15, Limit Clause 15.209

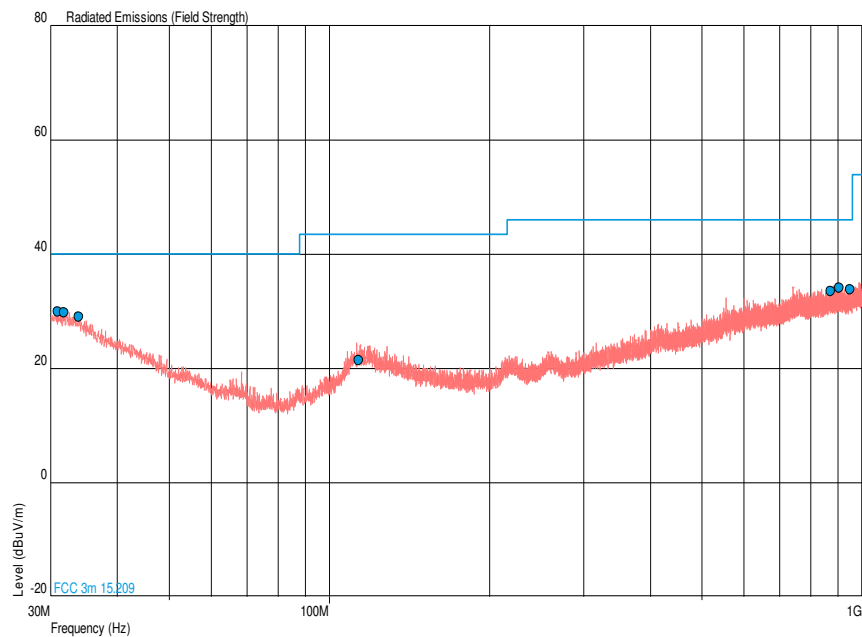
Frequency (MHz)	Field Strength			Measurement Distance (m)
	(μV/m)	Average (dBμV/m)	Peak (dBμV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3



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
30.970	30.0	-10.0	31.6	-68.4	180	1.00	Horizontal
31.843	29.8	-10.2	30.9	-69.1	180	1.00	Vertical
33.863	29.0	-11.0	28.2	-71.8	180	1.00	Vertical
113.566	21.4	-22.1	11.7	-138.3	180	1.00	Horizontal
873.027	33.5	-12.5	47.3	-152.7	180	1.00	Vertical
906.832	34.1	-11.9	50.7	-149.3	180	1.00	Vertical
950.274	33.8	-12.2	49.0	-151.0	180	1.00	Vertical

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



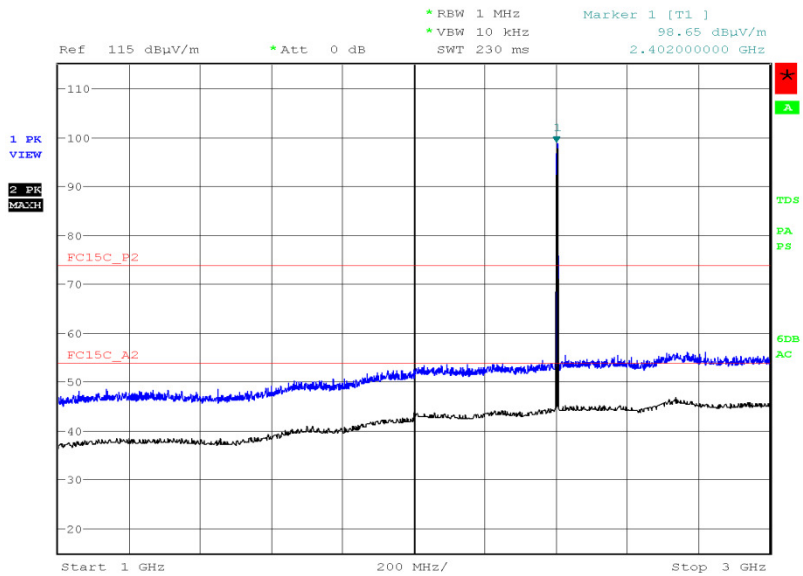
Product Service

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.

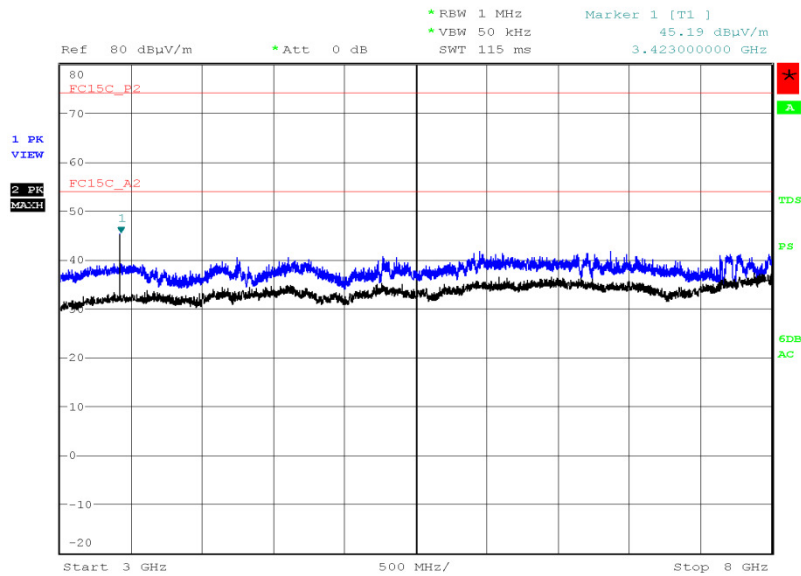
Bluetooth Low Energy, 2402 MHz, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



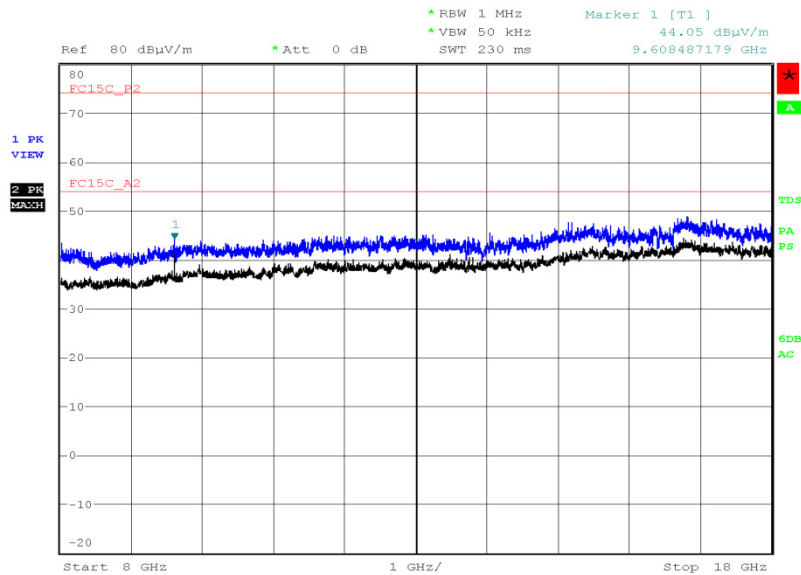
Date: 12.JUN.2016 14:47:55



Product Service

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

Date: 13.JUN.2016 18:07:35

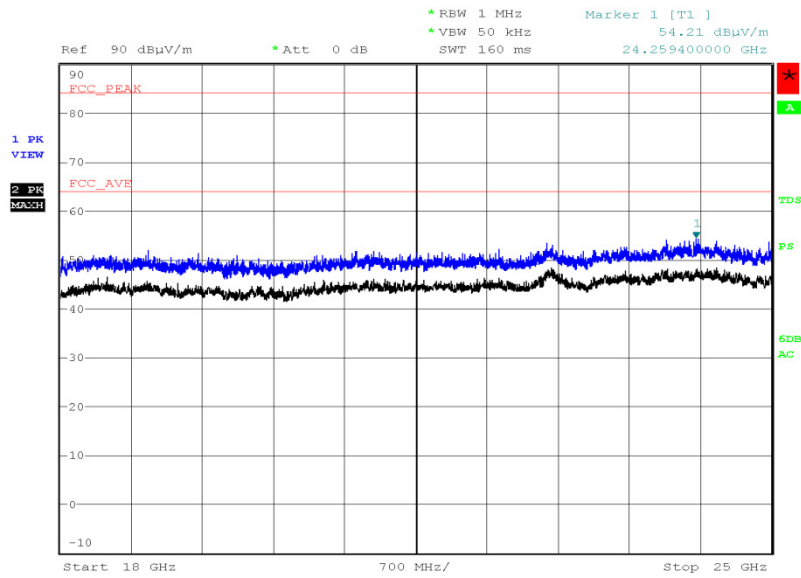
Bluetooth Low Energy, 2402 MHz, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot

Date: 13.JUN.2016 22:11:11



Product Service

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



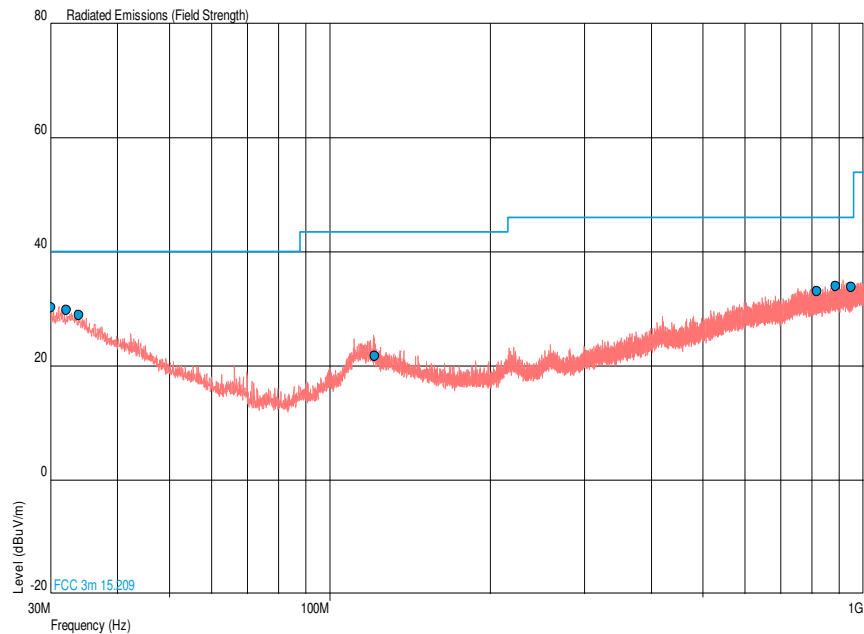
Date: 13.JUN.2016 23:21:53



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

Frequency (MHz)	QP Level (dB μ V/m)	QP Margin (dB μ V/m)	QP Level (μ V/m)	QP Margin (μ V/m)	Angle (°)	Height (m)	Polarisation
30.049	30.2	-9.8	32.4	-67.6	0	1.00	Horizontal
32.086	29.8	-10.2	30.9	-69.1	0	1.00	Vertical
33.929	28.9	-11.1	27.9	-72.1	0	1.00	Horizontal
121.471	21.7	-21.8	12.2	-137.8	180	1.00	Horizontal
818.222	33.1	-12.9	45.2	-154.8	180	1.00	Vertical
888.353	33.9	-12.1	49.5	-150.5	0	1.00	Vertical
950.274	33.9	-12.1	49.5	-150.5	0	1.00	Vertical

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





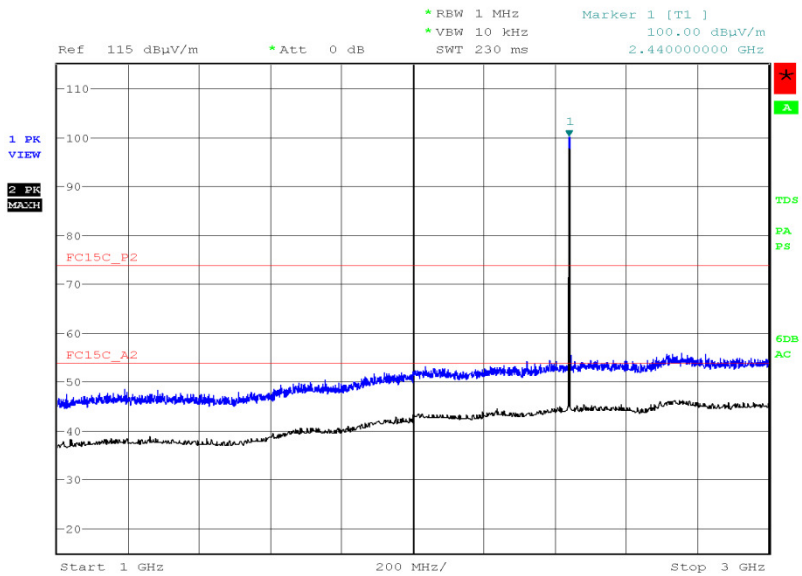
Product Service

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

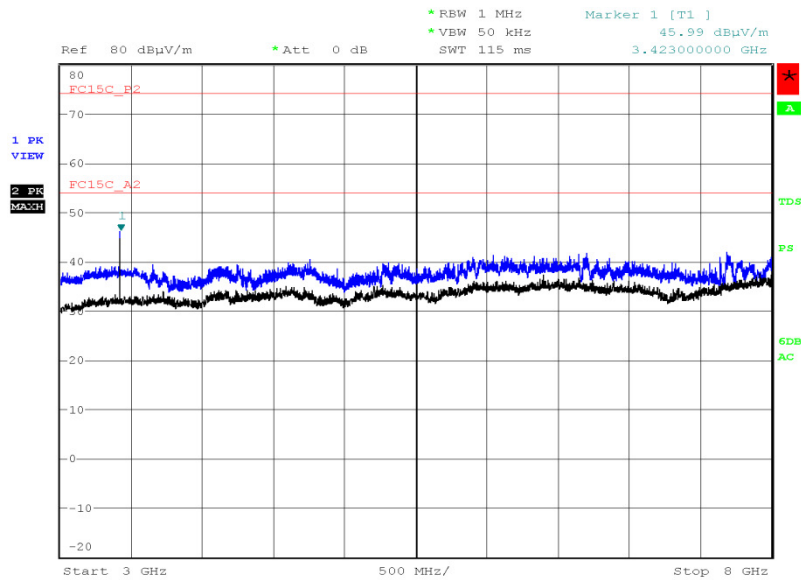
Frequency (MHz)	Final Peak (dBμV/m)	Final Average (dBμV/m)	Final Peak (μV/m)	Final Average (μV/m)	Angle (°)	Height (m)	Polarisation
*							

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

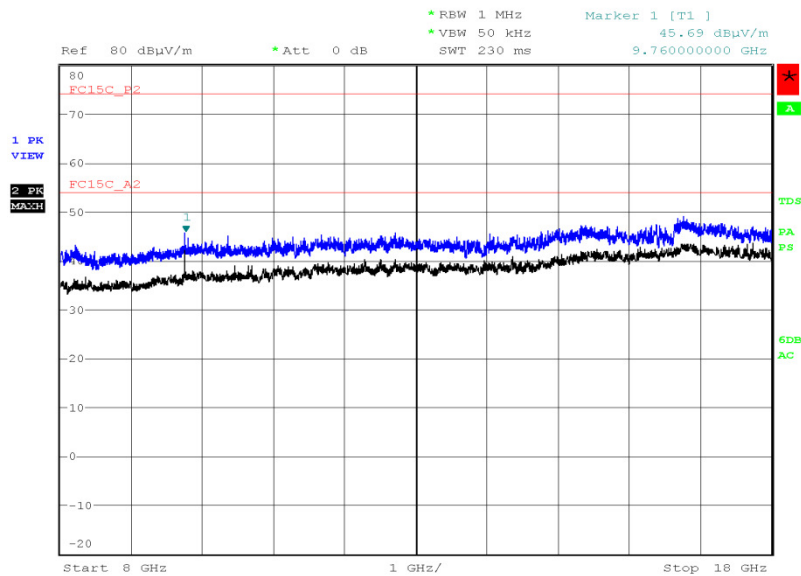
Bluetooth Low Energy, 2441 MHz, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 12.JUN.2016 15:02:07

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

Date: 13.JUN.2016 18:11:10

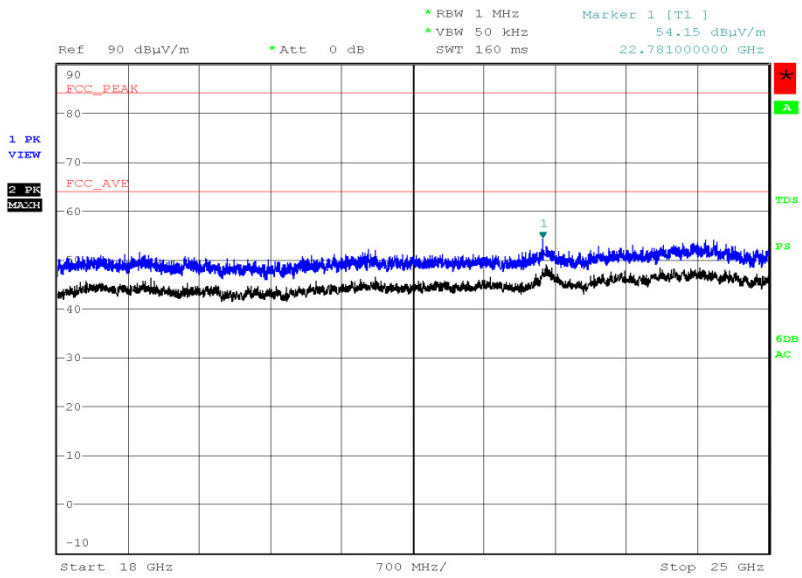
Bluetooth Low Energy, 2441 MHz, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot

Date: 13.JUN.2016 22:19:10



Product Service

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



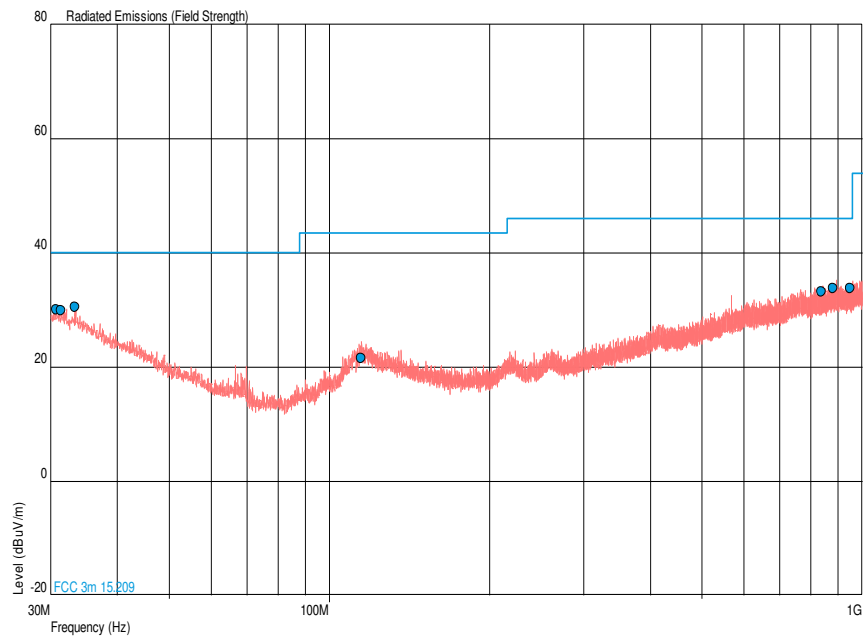
Date: 13.JUN.2016 23:19:59



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

Frequency (MHz)	QP Level (dB μ V/m)	QP Margin (dB μ V/m)	QP Level (μ V/m)	QP Margin (μ V/m)	Angle (°)	Height (m)	Polarisation
30.728	30.0	-10.0	31.6	-68.4	180	1.00	Horizontal
31.407	29.9	-10.1	31.3	-68.7	180	1.00	Vertical
33.298	30.6	-9.4	33.9	-66.1	180	1.00	Horizontal
114.924	21.6	-21.9	12.0	-138.0	0	1.00	Horizontal
837.574	33.2	-12.8	45.7	-154.3	180	1.00	Horizontal
881.612	33.8	-12.2	49.0	-151.0	180	1.00	Vertical
950.274	33.9	-12.1	49.5	-150.5	180	1.00	Vertical

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





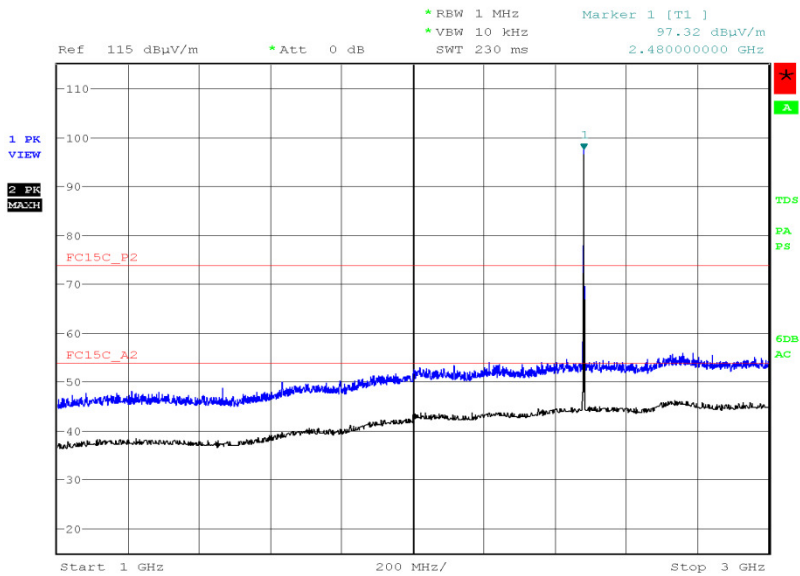
Product Service

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

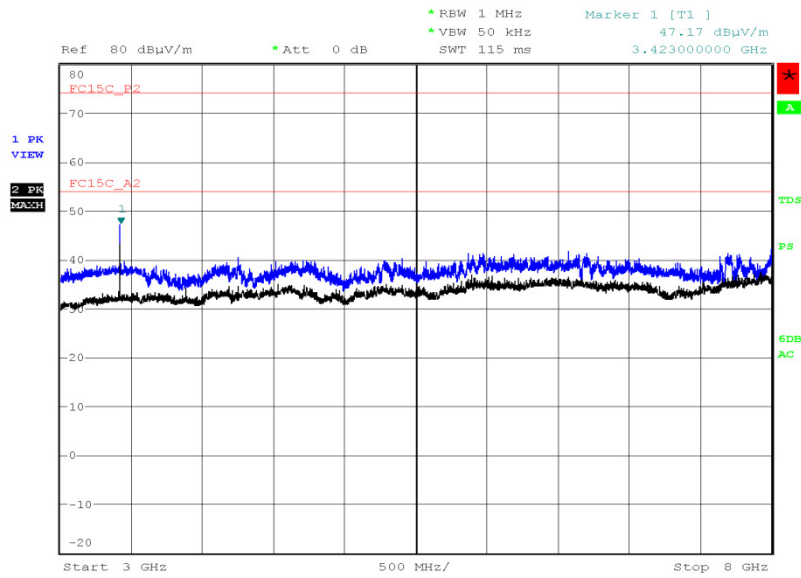


Date: 12.JUN.2016 15:04:29



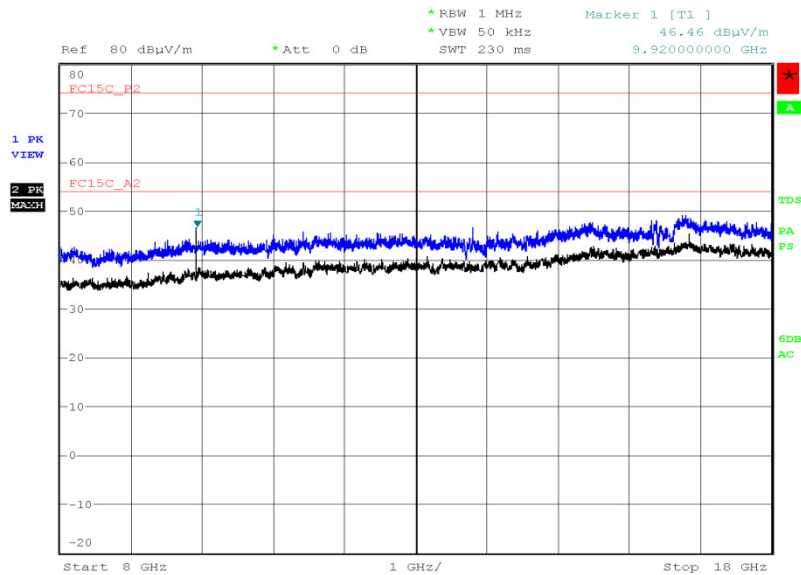
Product Service

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



Date: 13.JUN.2016 18:14:46

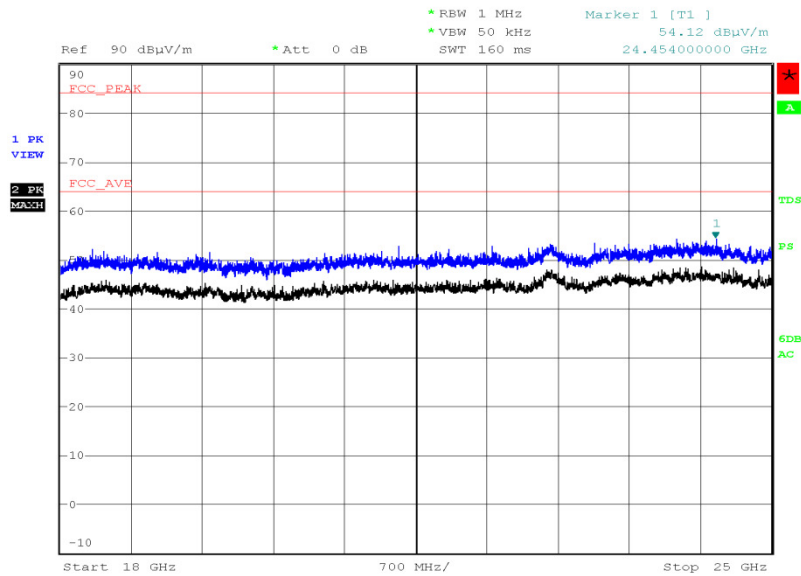
Bluetooth Low Energy, 2480 MHz, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 13.JUN.2016 22:22:55



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



Date: 13.JUN.2016 23:18:15

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	As per 15.209	As per 15.209

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

2.5 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 004401115813590 - Modification State 0

2.5.3 Date of Test

8 June 2016, 12 June 2016 & 20 June 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	18.8 - 19.4°C
Relative Humidity	62.0 - 69.0%



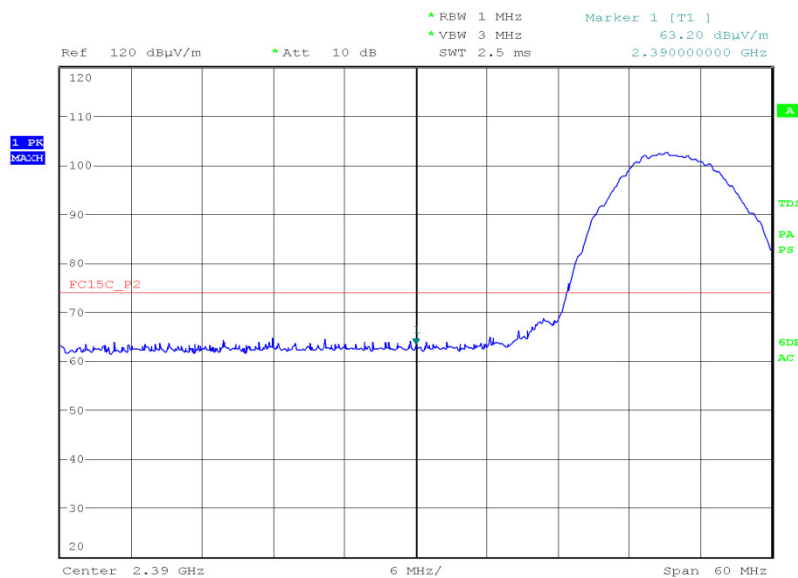
2.5.7 Test Results

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
63.20	46.45	62.44	46.50

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

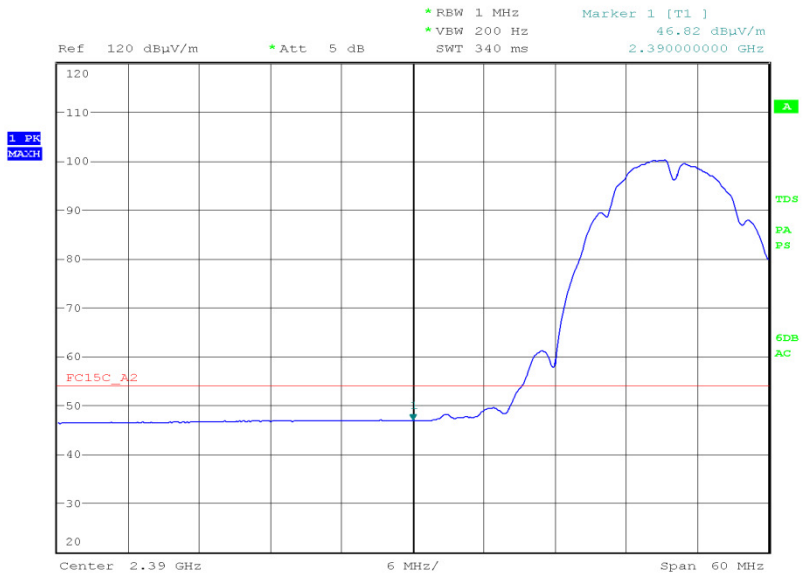


Date: 8.JUN.2016 19:56:01



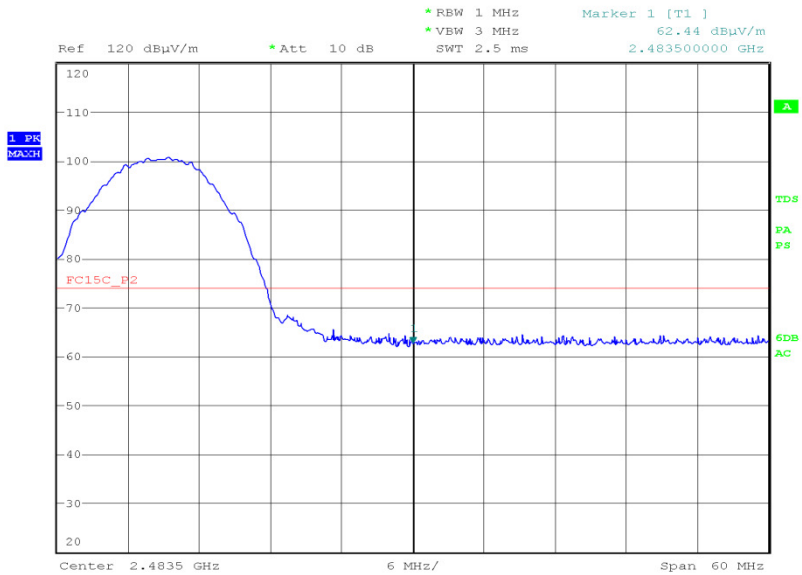
Product Service

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



Date: 8.JUN.2016 19:55:18

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

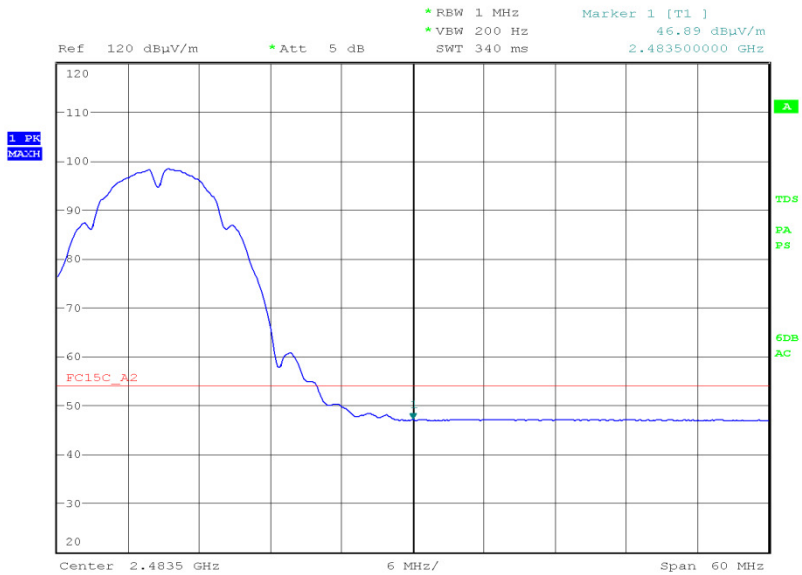


Date: 8.JUN.2016 20:15:49



Product Service

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



Date: 8.JUN.2016 20:16:38



Product Service

Remarks

The test was performed on 1 Mbps only because this was deemed the worst case data rate for Conducted Output Power and 6 dB Bandwidth.

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 (dB μ V/m)	Average (dB μ V/m)
Restricted Bands of Operation	74	54

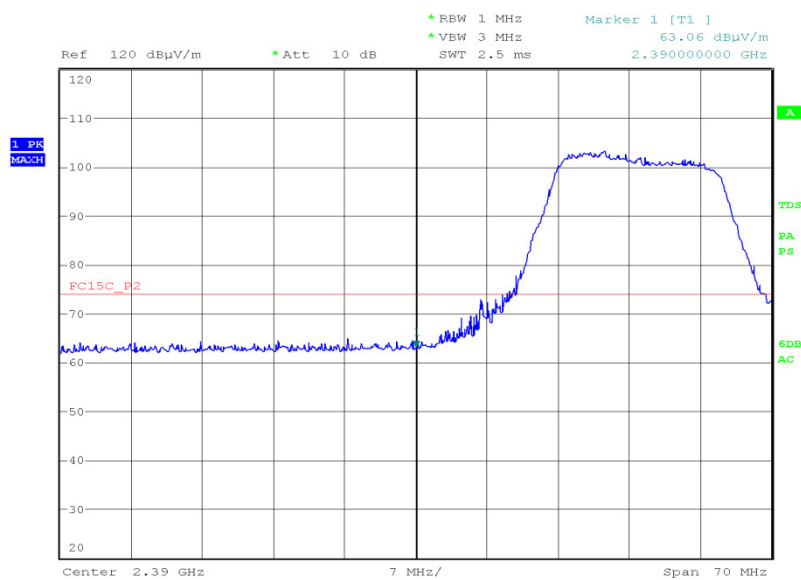


Product Service

4.0 V DC Supply

802.11g, 9 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
63.06	46.77	62.56	47.06

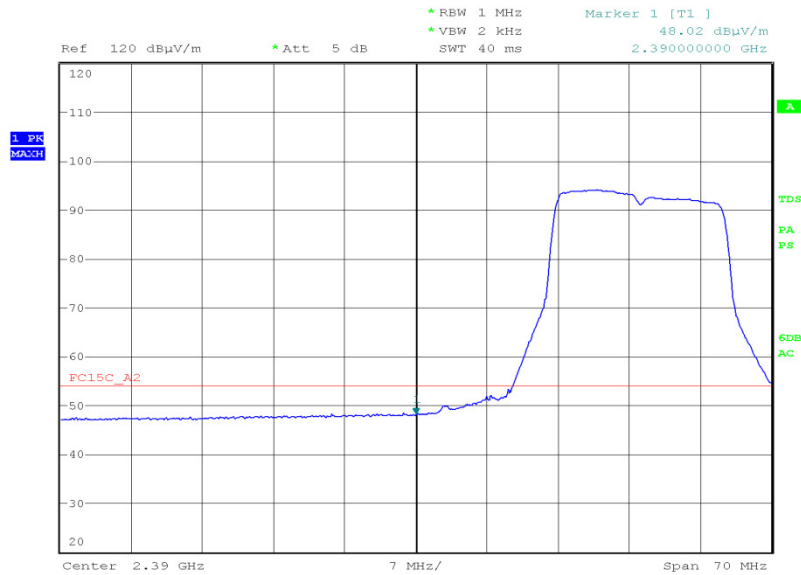
802.11g, 2412 MHz, Measured Frequency 2390 MHz, 9 Mbps, Final Peak, Restricted Band Edges Plot

Date: 8.JUN.2016 21:29:31



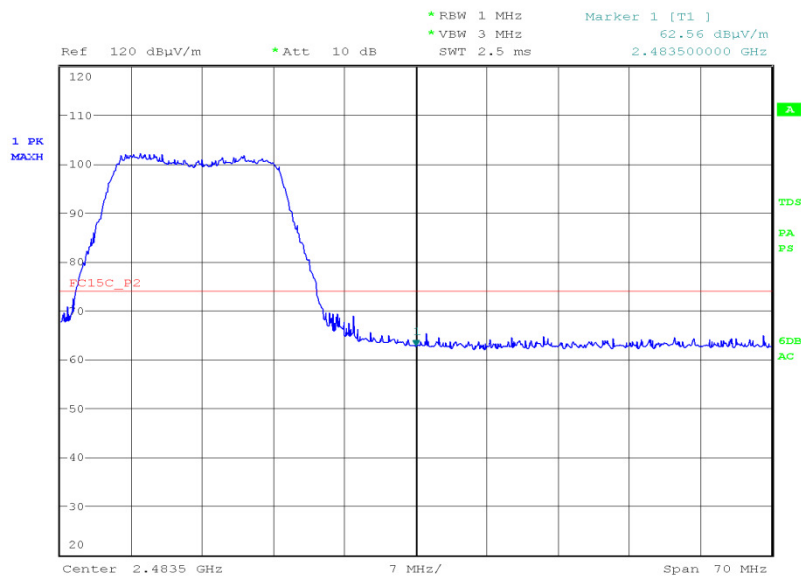
Product Service

802.11g, 2412 MHz, Measured Frequency 2390 MHz, 9 Mbps, Final Average, Restricted Band Edges Plot



Date: 8.JUN.2016 21:30:35

802.11g, 2462 MHz, Measured Frequency 2483.5 MHz, 9 Mbps, Final Peak, Restricted Band Edges Plot

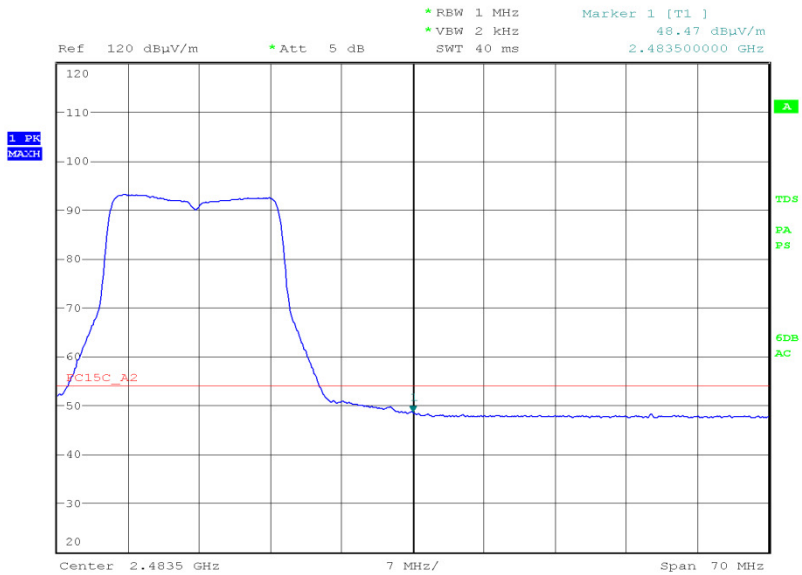


Date: 8.JUN.2016 22:07:33



Product Service

802.11g, 2462 MHz, Measured Frequency 2483.5 MHz, 9 Mbps, Final Average, Restricted Band Edges Plot



Date: 8.JUN.2016 22:08:13

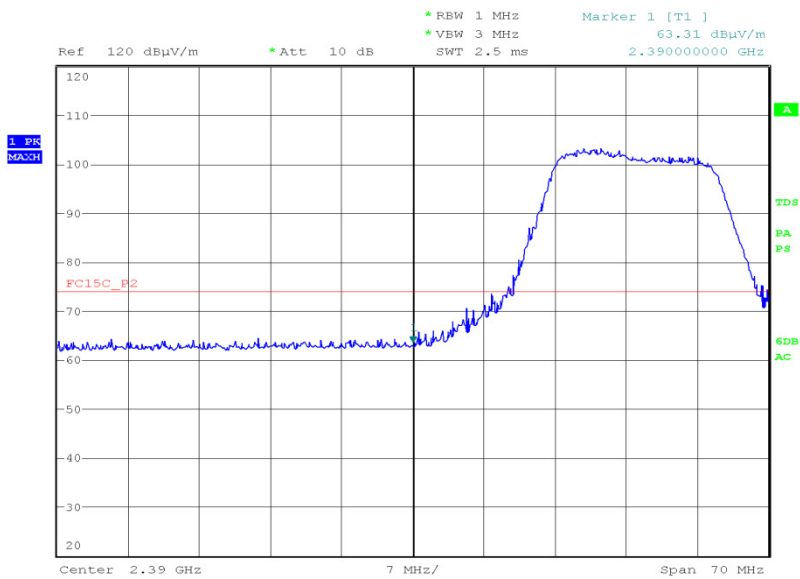


Product Service

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
63.31	46.76	63.28	47.28

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

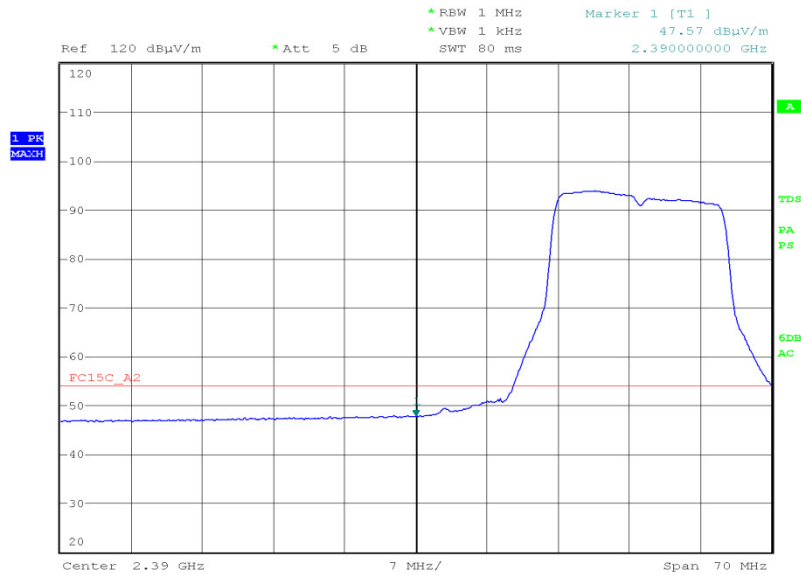


Date: 8.JUN.2016 22:18:07



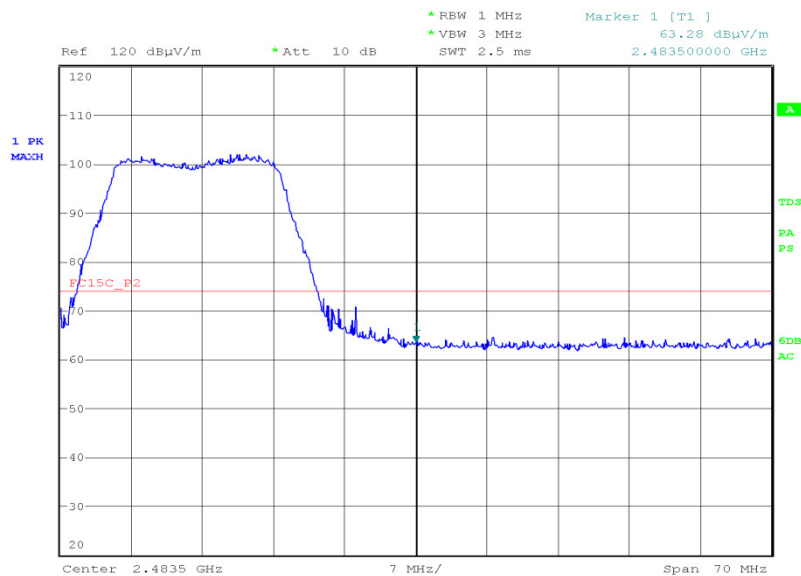
Product Service

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



Date: 8.JUN.2016 22:17:00

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

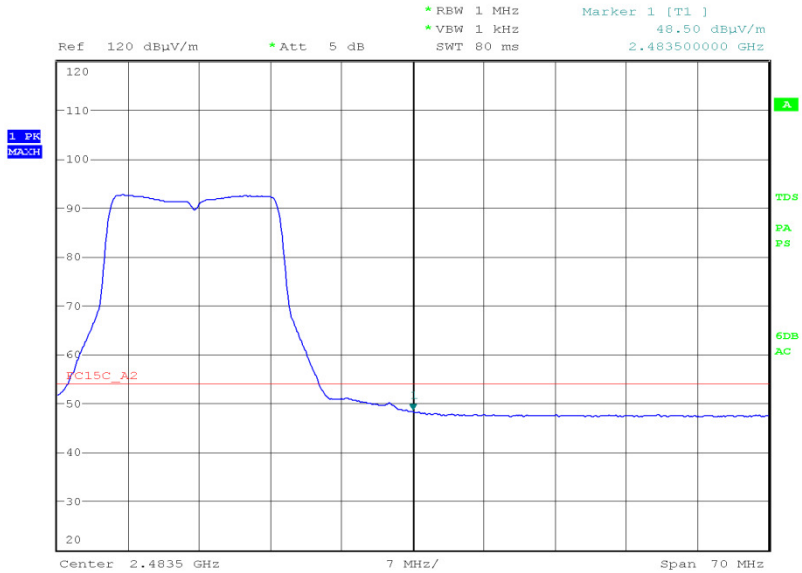


Date: 8.JUN.2016 22:29:29



Product Service

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



Date: 8.JUN.2016 22:30:21

Remark

The test was performed on 9 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 Bandwidth.

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

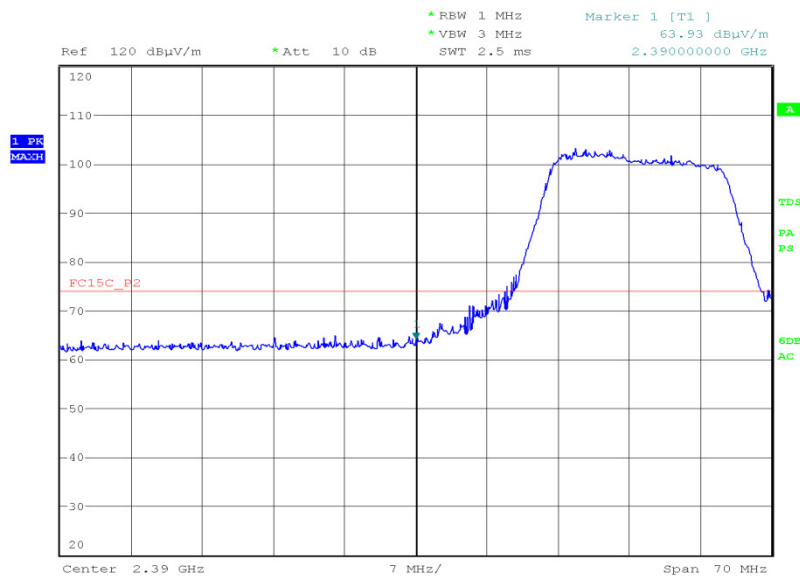
	Peak (dBμV/m)	Average (dBμV/m)
Restricted Bands of Operation	74	54



4.0 V DC Supply

802.11n, MCS0, Restricted Band Edges Results

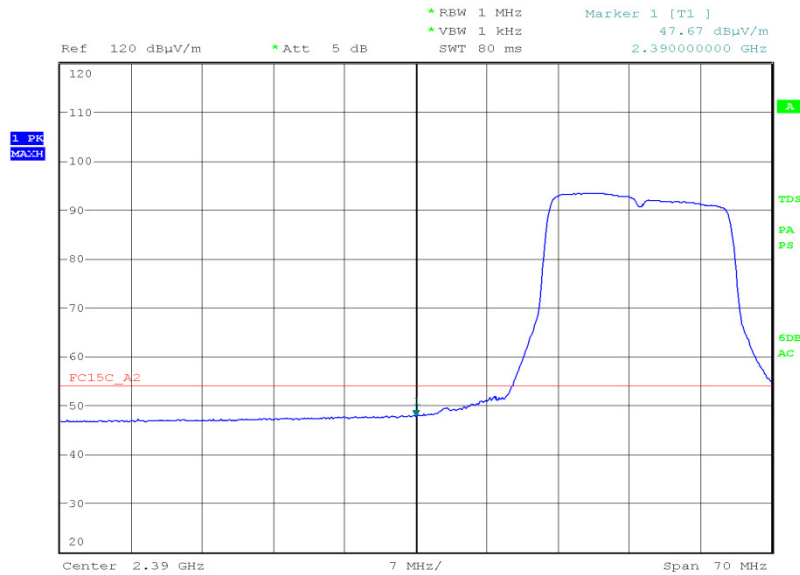
2412 MHz		2462 MHz	
Measured Frequency 2390.00 MHz		Measured Frequency 2483.50 MHz	
dBμV/m		dBμV/m	
Final Peak	Final Average	Final Peak	Final Average
63.93	46.94	62.86	47.38

802.11n, 2412 MHz, Measured Frequency 2390 MHz, MCS0, Final Peak, Restricted Band Edges Plot

Date: 8.JUN.2016 23:08:58

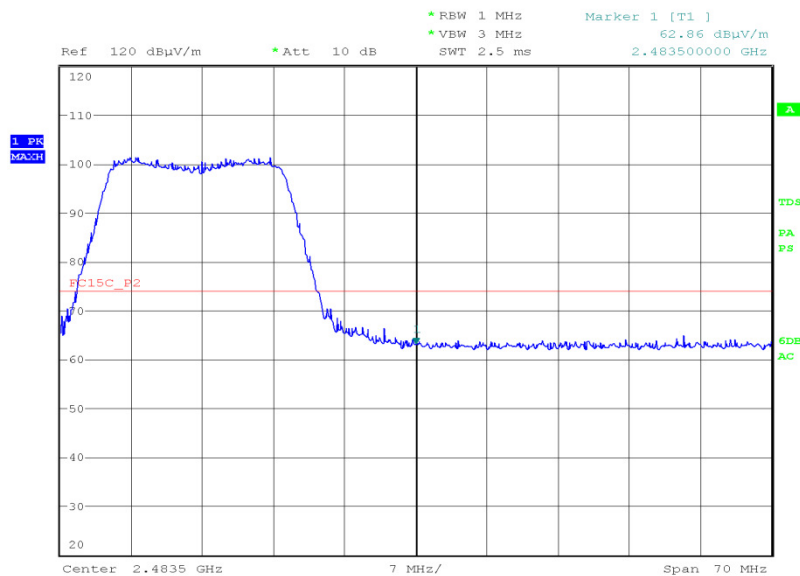
Product Service

802.11n, 2412 MHz, Measured Frequency 2390 MHz, MCS0, Final Average, Restricted Band Edges Plot



Date: 8.JUN.2016 23:09:56

802.11n, 2462 MHz, Measured Frequency 2483.5 MHz, MCS0, Final Peak, Restricted Band Edges Plot

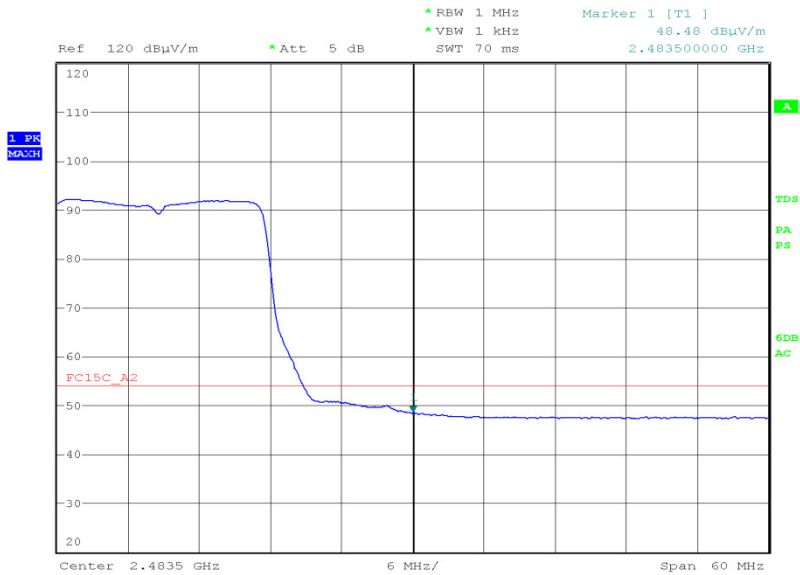


Date: 8.JUN.2016 23:21:45



Product Service

802.11n, 2462 MHz, Measured Frequency 2483.5 MHz, MCS0, Final Average, Restricted Band Edges Plot



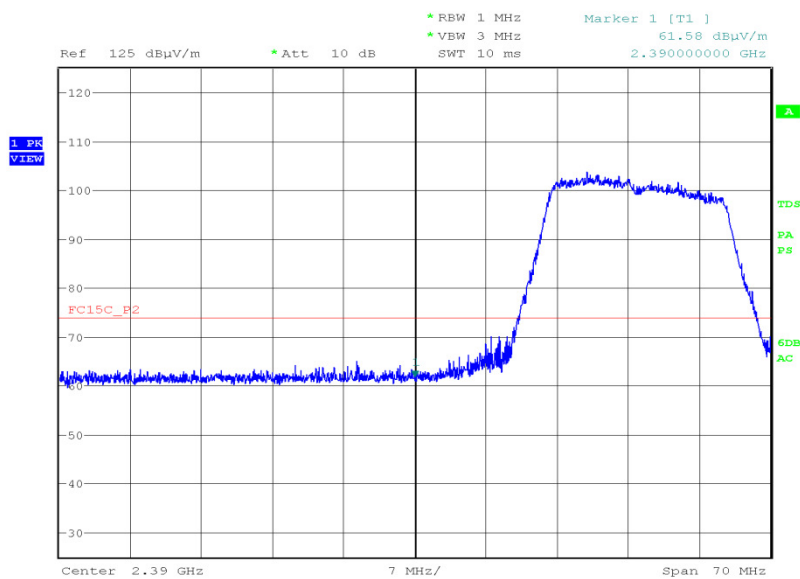
Date: 8.JUN.2016 23:24:39



802.11n, MCS7, 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
61.58	46.60	61.34	46.95

802.11n, 2412 MHz, Measured Frequency 2390 MHz, MCS7, Final Peak, Restricted Band Edges Plot

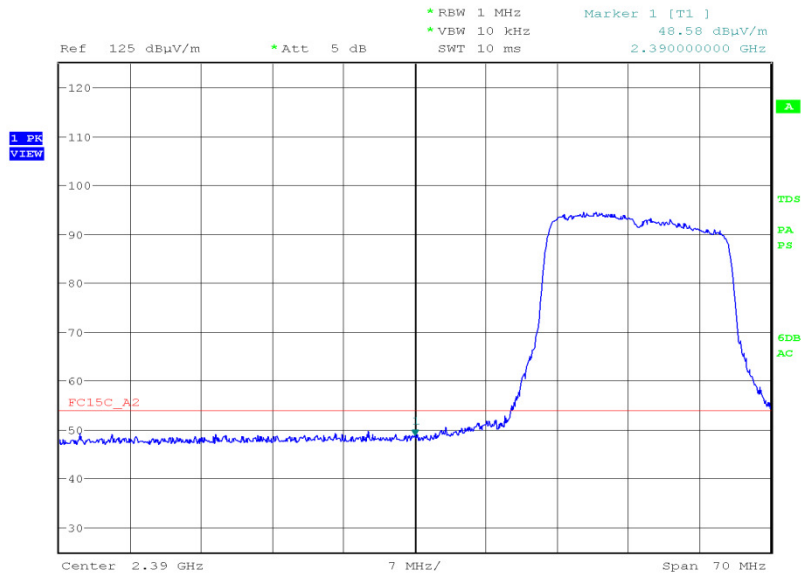


Date: 20.JUN.2016 19:05:46



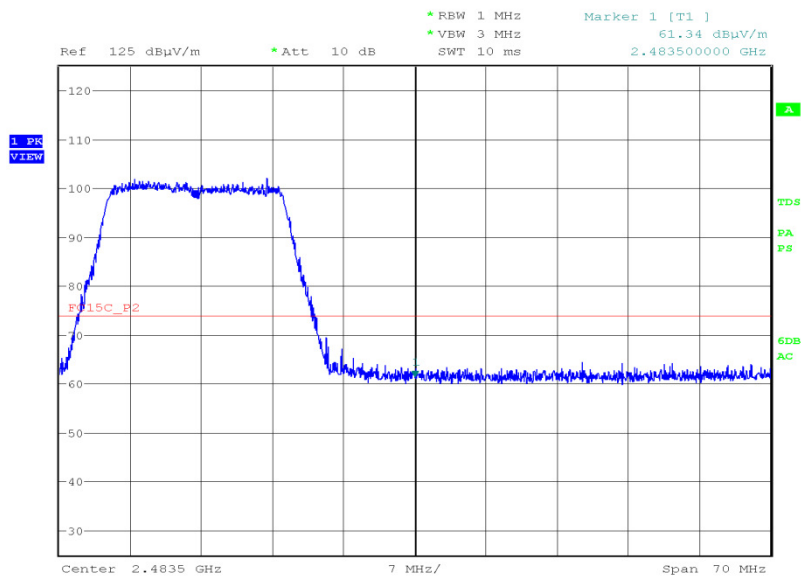
Product Service

802.11n, 2412 MHz, Measured Frequency 2390 MHz, MCS7, Final Average, Restricted Band Edges Plot



Date: 20.JUN.2016 19:07:00

802.11n, 2462 MHz, Measured Frequency 2483.5 MHz, MCS7, Final Peak, Restricted Band Edges Plot

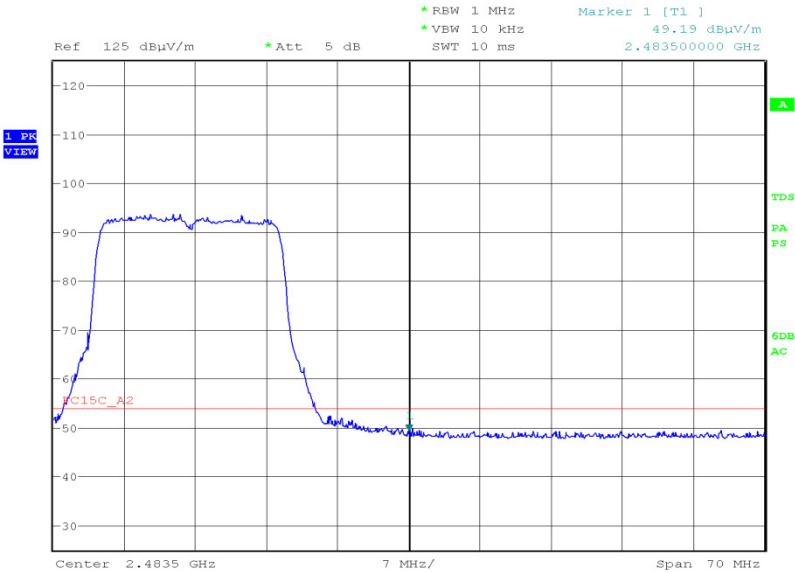


Date: 20.JUN.2016 19:19:35



Product Service

802.11n, 2462 MHz, Measured Frequency 2483.5 MHz, MCS7, Final Average, Restricted Band Edges Plot



Date: 20.JUN.2016 19:20:16

Remark

The test was performed on MCS0 because this was deemed the worst case data rate for Conducted Output Power.

The test was performed on MCS7 because this was deemed the worst case data rate for Bandwidth.

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



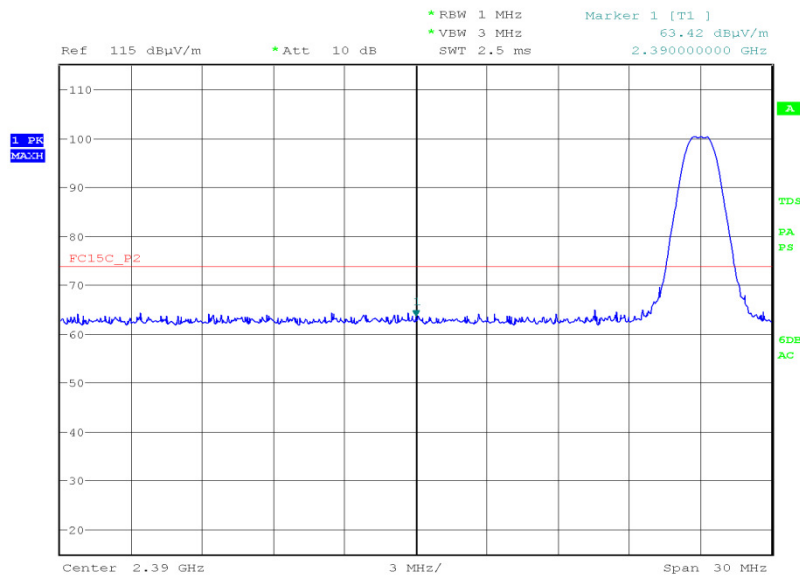
Bluetooth Low Energy

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
63.42	46.19	62.56	46.36

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

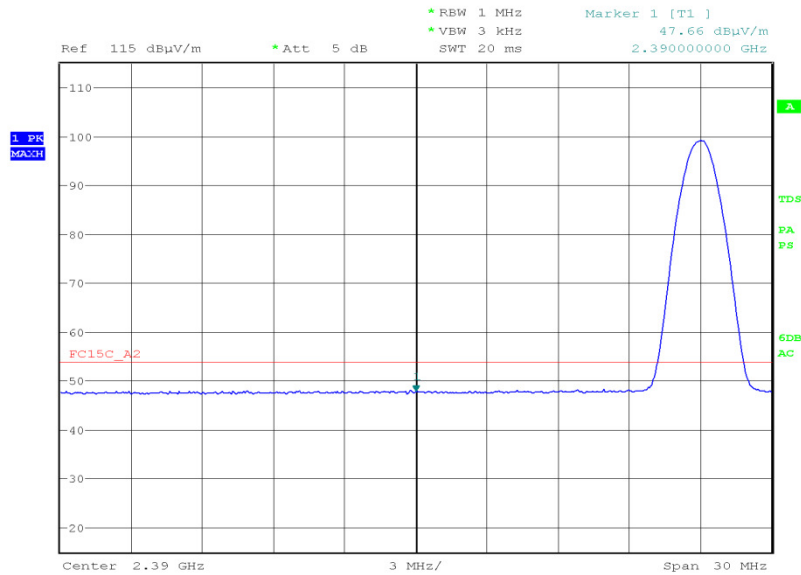


Date: 12.JUN.2016 08:56:53



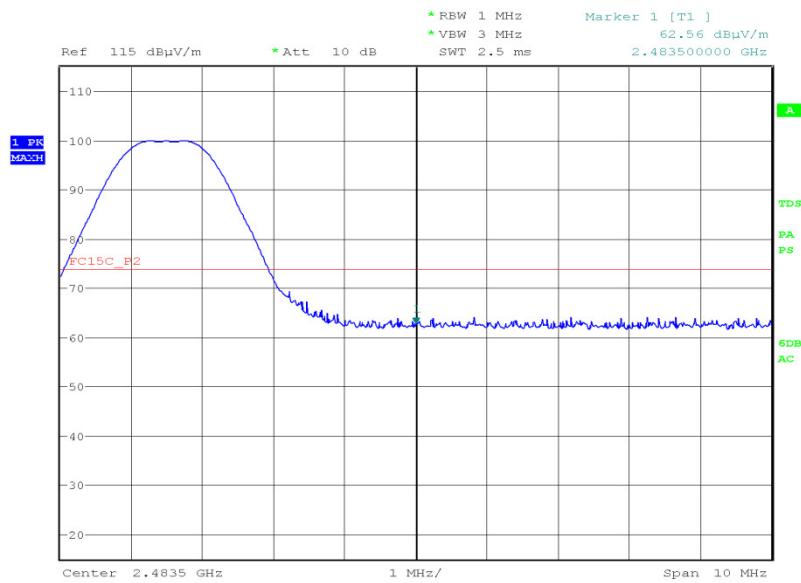
Product Service

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



Date: 12.JUN.2016 08:59:39

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

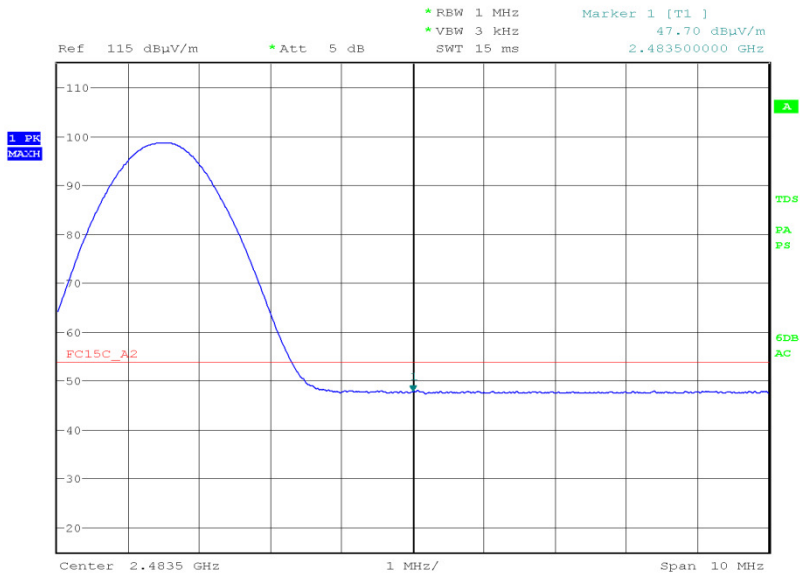


Date: 12.JUN.2016 09:18:14



Product Service

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



Date: 12.JUN.2016 09:18:53

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

2.6 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 004401115813590 - Modification State 0

2.6.3 Date of Test

8 June 2016, 12 June 2016 & 20 June 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 6.10.4

2.6.6 Environmental Conditions

Ambient Temperature	18.8 - 19.4°C
Relative Humidity	62.0 - 69.0%



Product Service

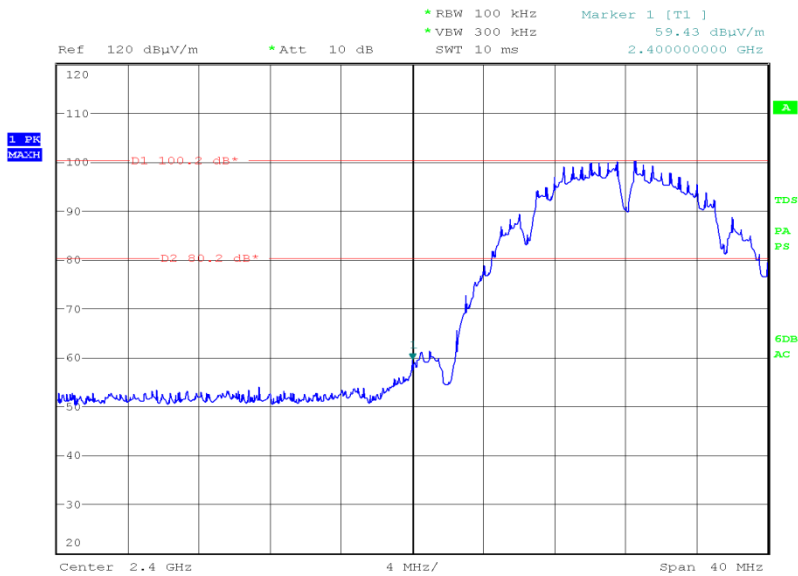
2.6.7 Test Results

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
59.43	52.67

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

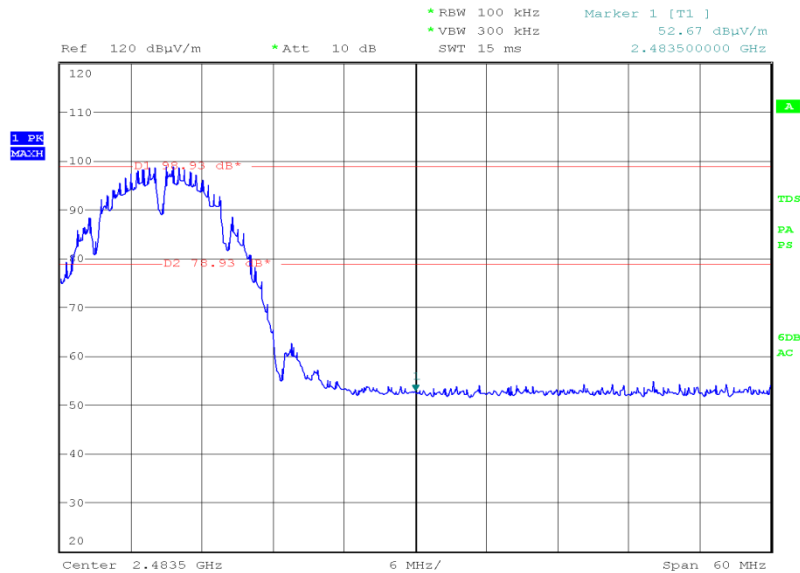


Date: 8.JUN.2016 19:58:22



Product Service

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



Date: 8.JUN.2016 20:15:03

Remark

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

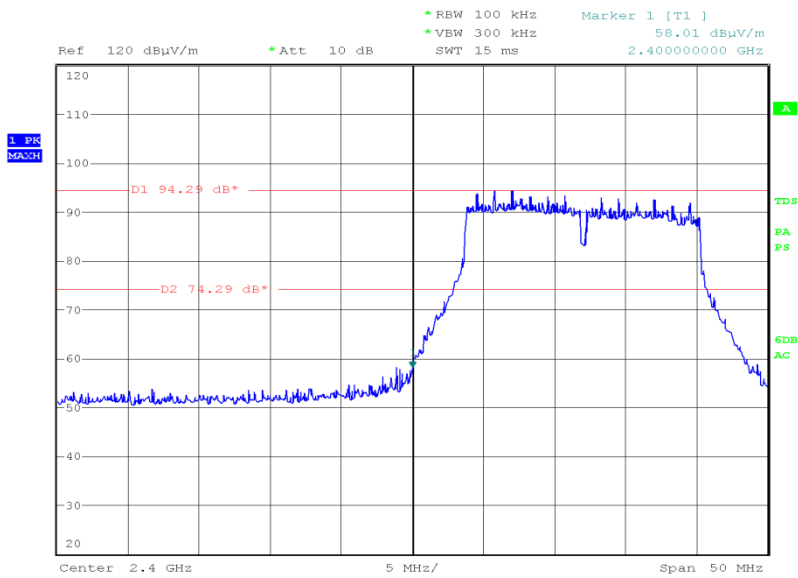


Product Service

802.11g, 9 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
58.01	52.30

802.11g, 2412 MHz, Measured Frequency 2400.00 MHz, 9 Mbps, Final Peak, Authorised Band Edges Plot

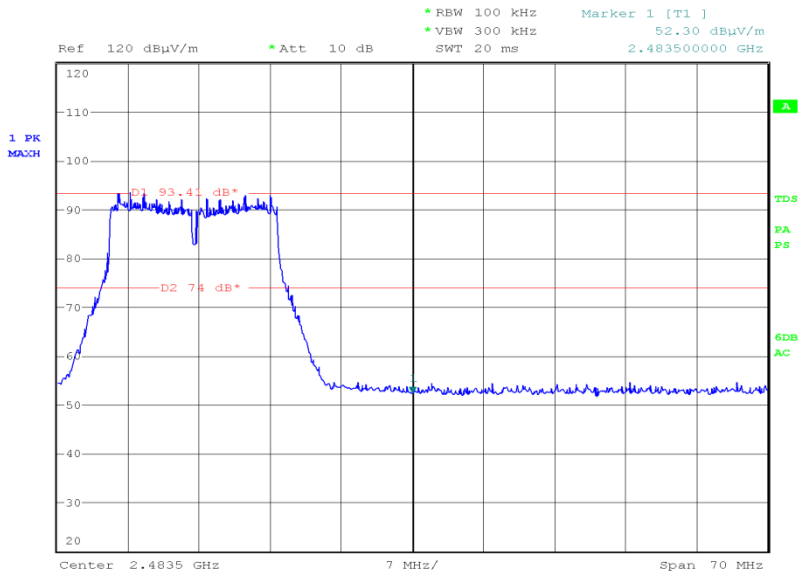


Date: 8.JUN.2016 21:32:36



Product Service

802.11g, 2462 MHz, Measured Frequency 2483.50 MHz, 9 Mbps, Final Peak, Authorised Band Edges Plot



Date: 8.JUN.2016 22:06:48

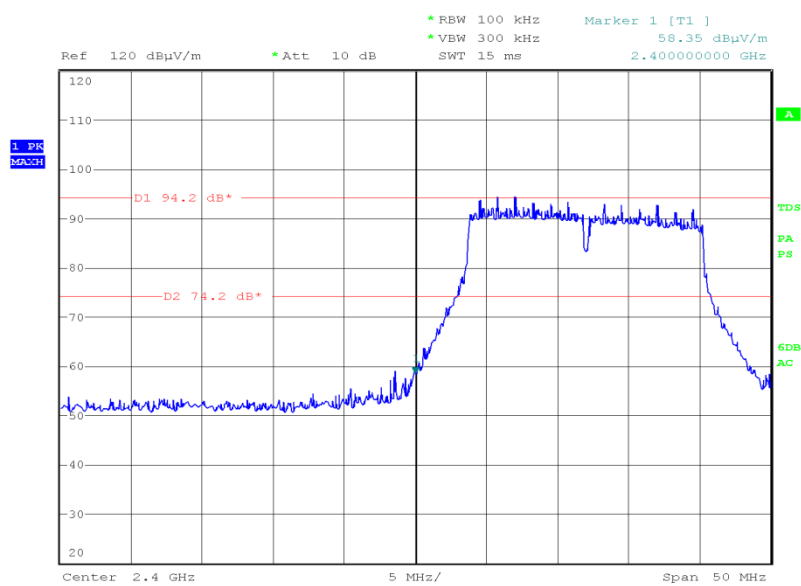


Product Service

802.11g, 54 Mbps, Authorised Band Edges Results

2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dB μ V/m	dB μ V/m
Final Peak	Final Peak
58.35	52.99

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

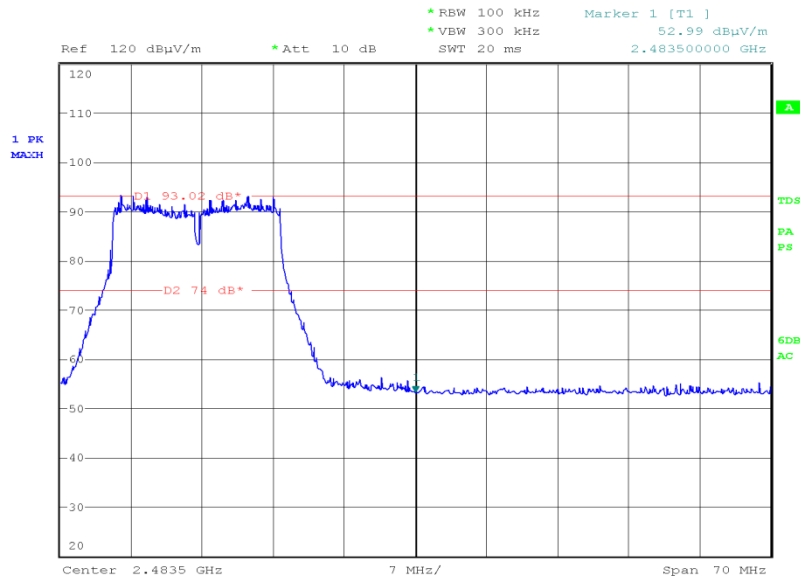


Date: 8.JUN.2016 22:20:09



Product Service

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



Date: 8.JUN.2016 22:28:42

Remark

The test was performed on 9 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.



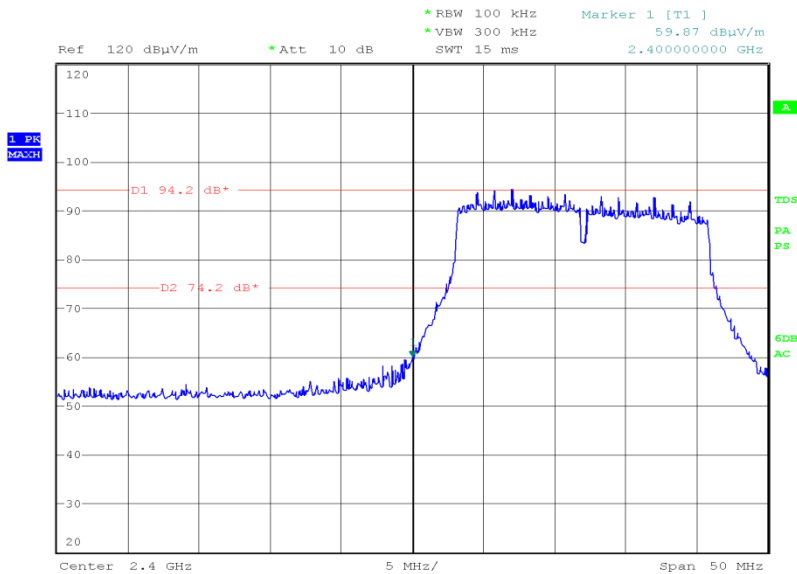
Product Service

4.0 V DC Supply

802.11n, MCS0, 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
59.87	52.37

802.11n, 2412 MHz, Measured Frequency 2400.00 MHz, MCS0, Final Peak, Authorised Band Edges Plot

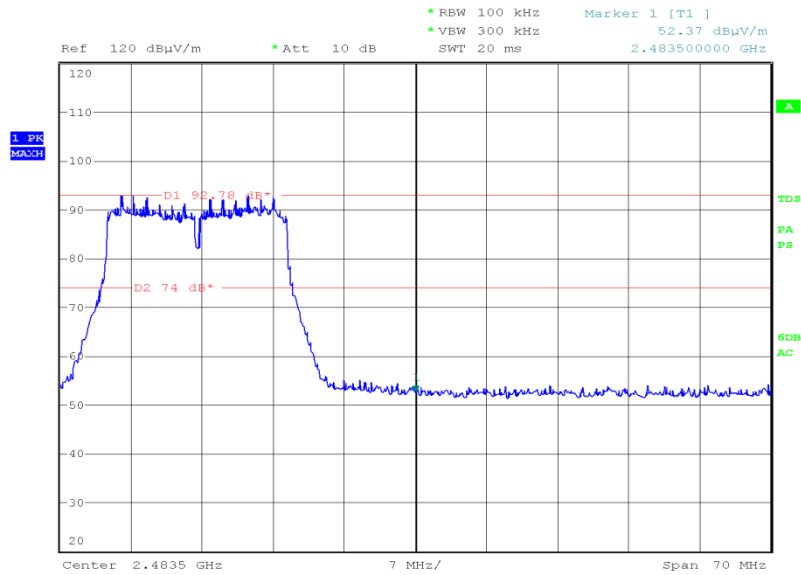


Date: 8.JUN.2016 23:13:40



Product Service

802.11n, 2462 MHz, Measured Frequency 2483.50 MHz, MCS0, Final Peak, Authorised Band Edges Plot



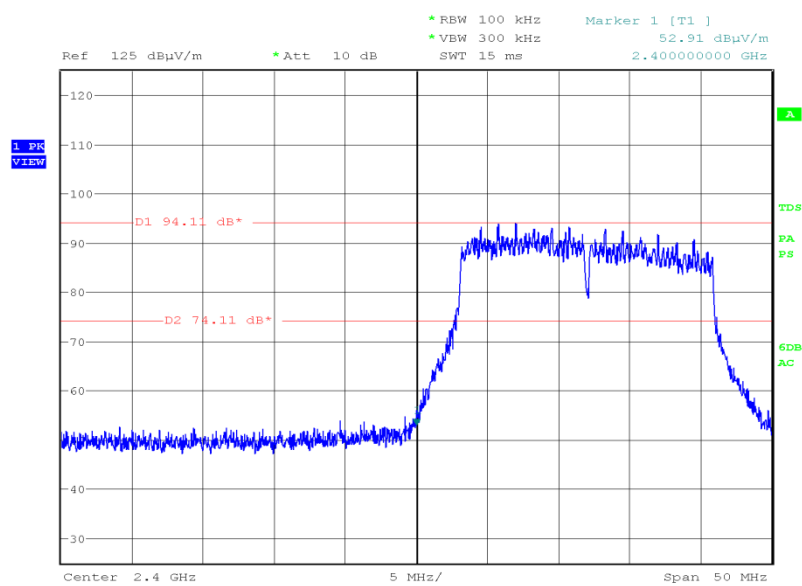
Date: 8.JUN.2016 23:22:34



802.11n, MCS7, Authorised Band Edges Results

2412 MHz	2462 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dB μ V/m	dB μ V/m
Final Peak	Final Peak
52.91	51.09

802.11n, 2412 MHz, Measured Frequency 2400.00 MHz, MCS7, Final Peak, Authorised Band Edges Plot

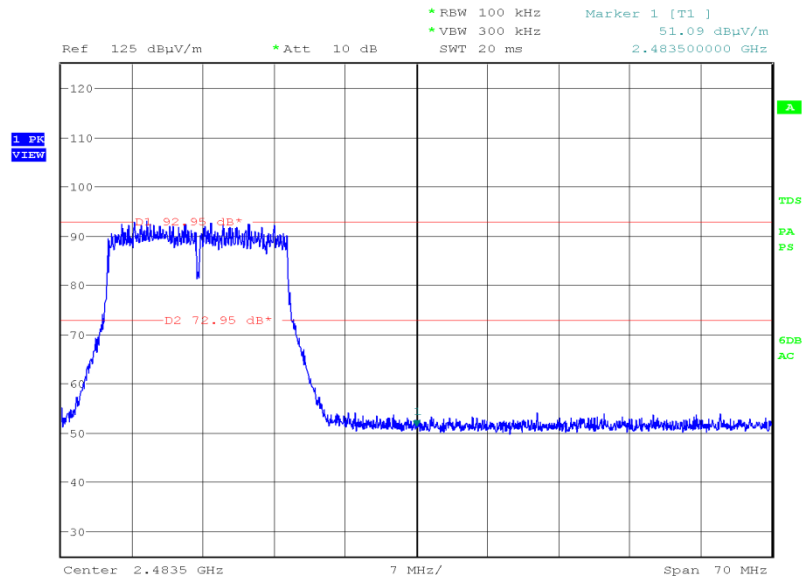


Date: 20.JUN.2016 19:10:30



Product Service

802.11n, 2462 MHz, Measured Frequency 2483.50 MHz, MCS7, Final Peak, Authorised Band Edges Plot



Date: 20.JUN.2016 19:18:32

Remark

The test was performed on MCS0 because this was deemed the worst case data rate for Conducted Output Power.

The test was performed on MCS7 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.

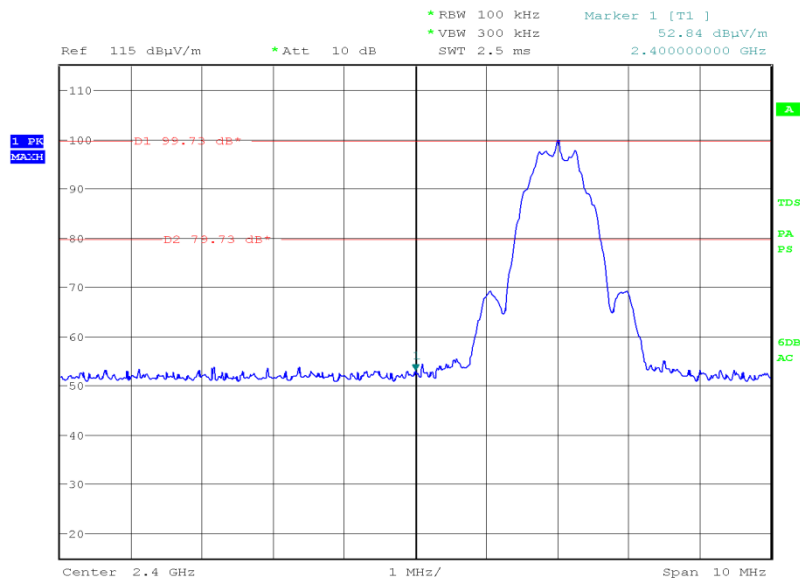


Product Service

4.0 V DC Supply

Bluetooth Low Energy, GFSK, Authorised Band Edges Results

2402 MHz	2480 MHz
Measured Frequency 2400.00 MHz	Measured Frequency 2483.50 MHz
dB μ V/m	dB μ V/m
Final Peak	Final Peak
52.84	52.20

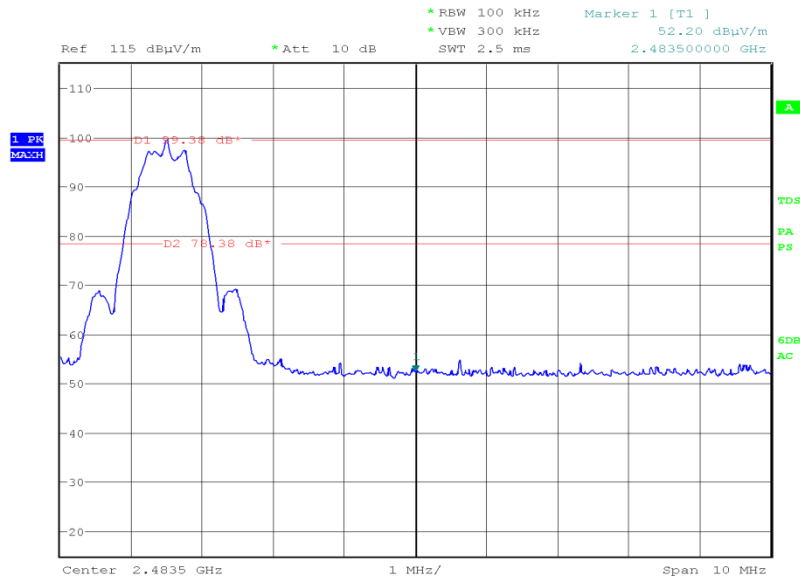
Bluetooth Low Energy, 2402 MHz, Measured Frequency 2400.00 MHz, GFSK, Final Peak, Authorised Band Edges Plot

Date: 12.JUN.2016 09:02:02



Product Service

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



Date: 12.JUN.2016 09:17:17

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 004401115813376 - Modification State 0

2.7.3 Date of Test

10 June 2016 & 13 June 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 ANSI C63.10, clause 11.10.2.

2.7.6 Environmental Conditions

Ambient Temperature	25.0°C
Relative Humidity	45.6%



Product Service

2.7.7 Test Results

4.0 V DC Supply

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

2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-4.023	-5.009	-2.374

802.11b, 2412 MHz, OFDM, 1 Mbps, Port A, Power Spectral Density Plot





802.11b, 2437 MHz, OFDM, 1 Mbps, Port A, Power Spectral Density Plot



802.11b, 2462 MHz, OFDM, 1 Mbps, Port A 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.



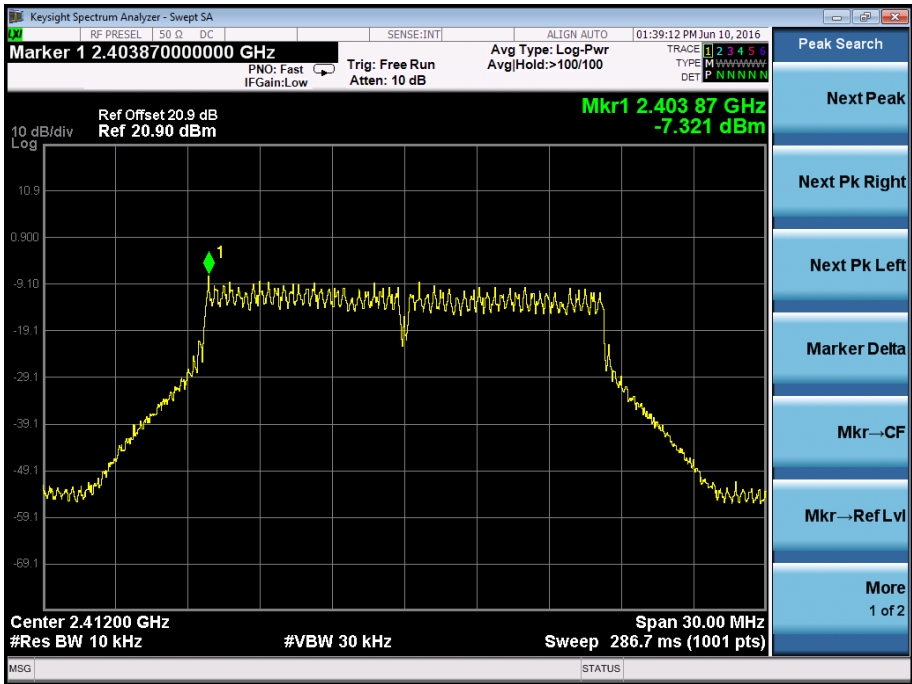
Product Service

4.0 V DC Supply

802.11g, OFDM, 9 Mbps, Power Spectral Density Results

2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-7.321	-8.845	-8.601

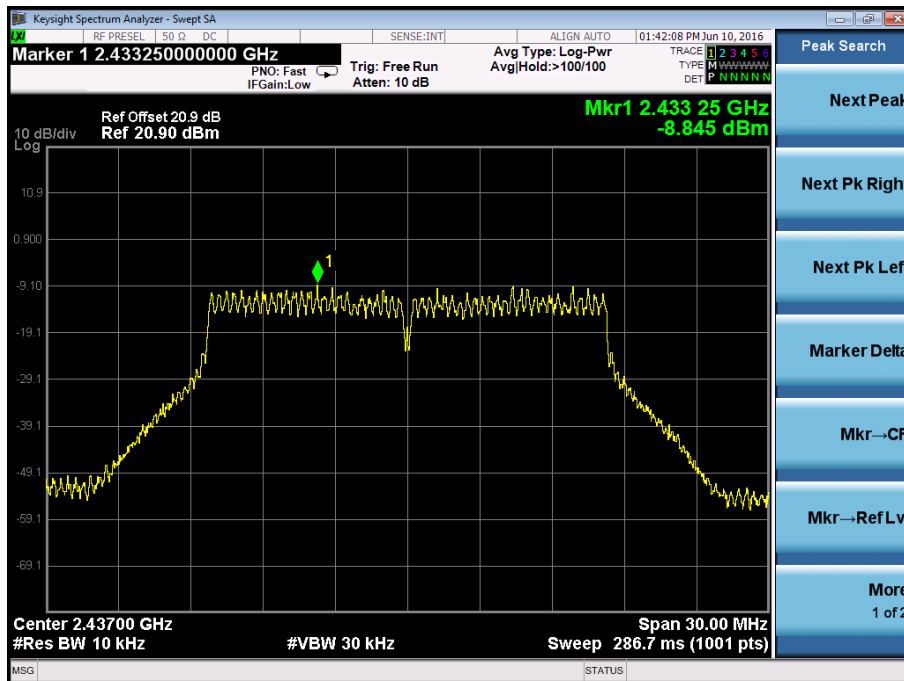
802.11g, 2412 MHz, OFDM, 9 Mbps, Port A, Power Spectral Density Plot



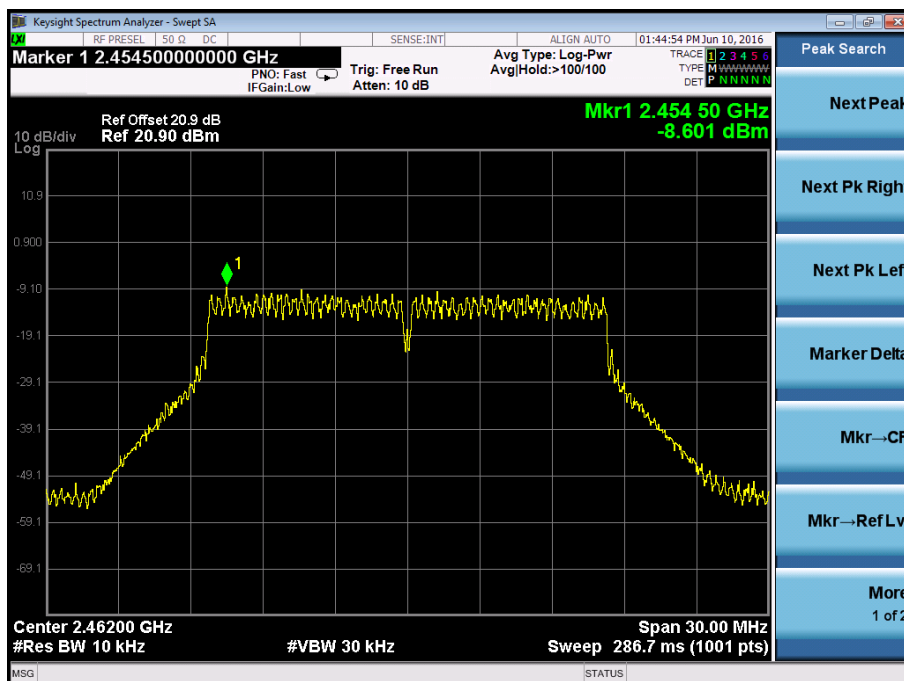


Product Service

802.11g, 2437 MHz, OFDM, 9 Mbps, Port A, Power Spectral Density Plot



802.11g, 2462 MHz, OFDM, 9 Mbps, Port A 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.



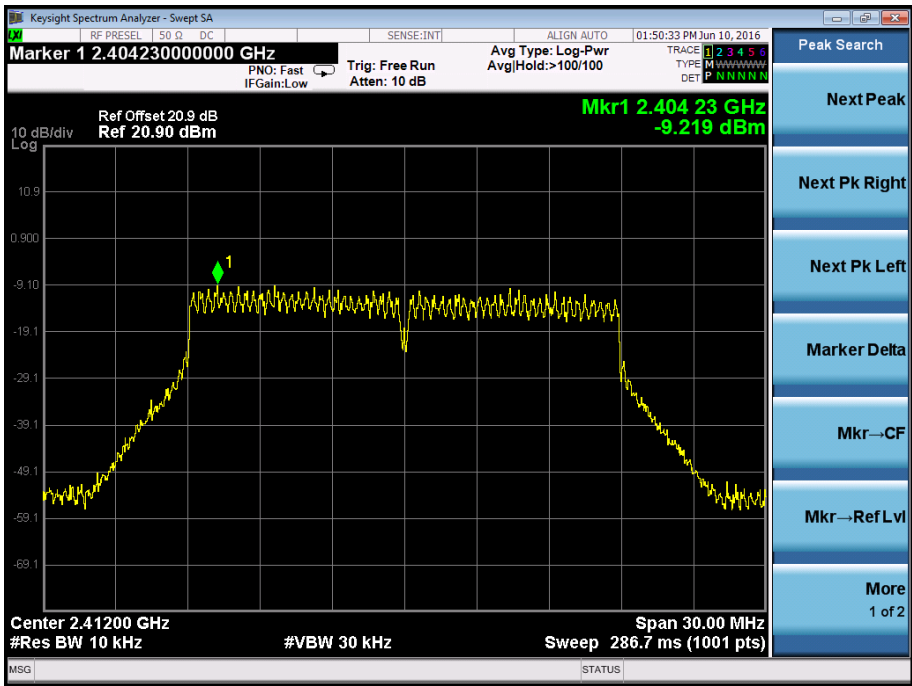
Product Service

4.0 V DC Supply

802.11n, OFDM, MCS0, Power Spectral Density Results

2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-9.219	-9.037	-8.768

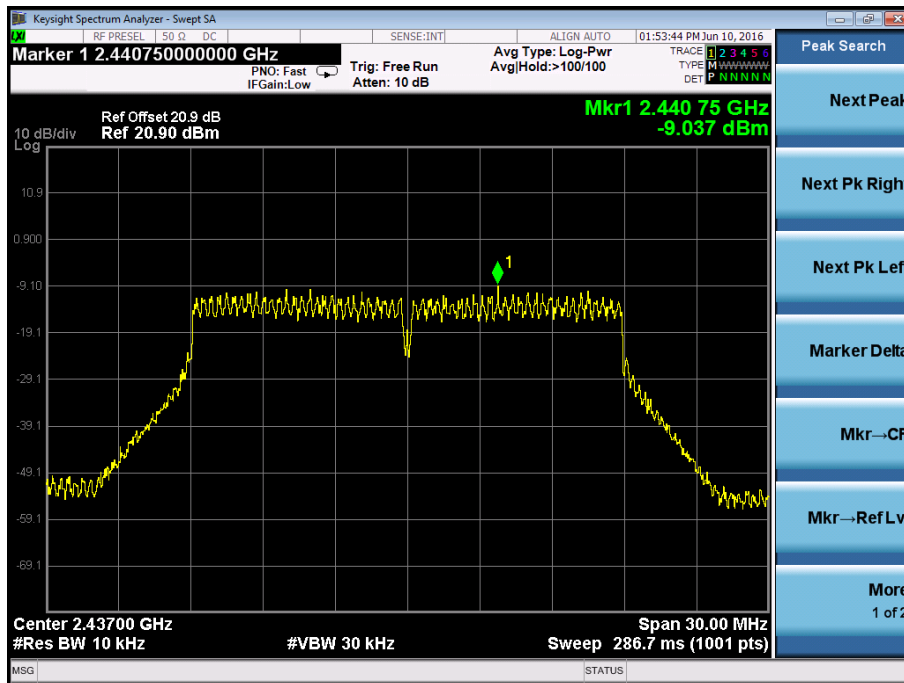
802.11n, 2412 MHz, OFDM, MCS0, Port A, Power Spectral Density Plot



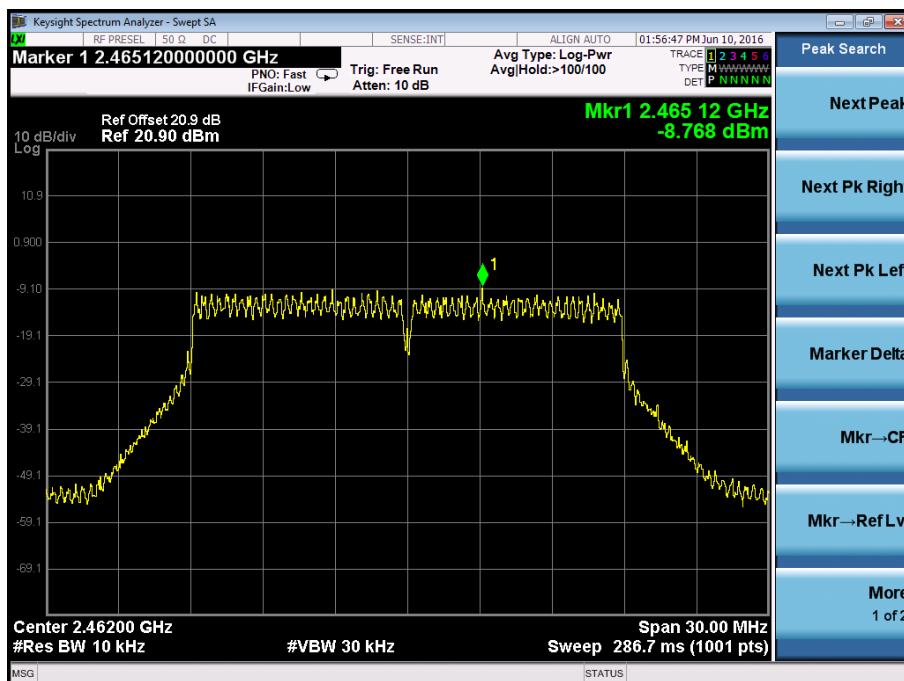


Product Service

802.11n, 2437 MHz, OFDM, MCS0, Port A, Power Spectral Density Plot



802.11n, 2462 MHz, OFDM, MCS0, Port A 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.



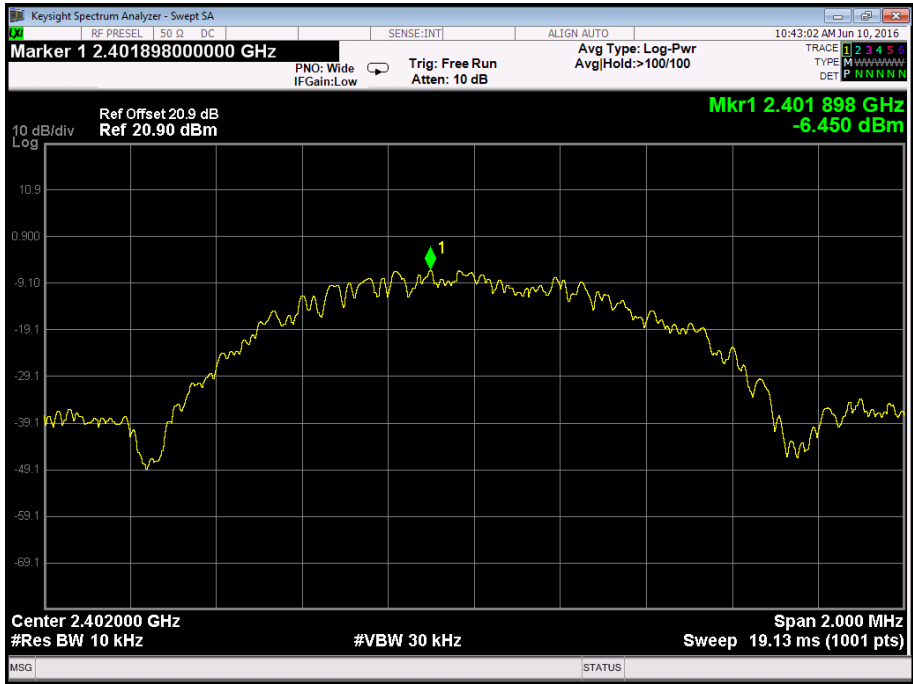
Product Service

4.0 V DC Supply

Bluetooth Low Energy, GFSK, Power Spectral Density Results

2402 MHz	2441 MHz	2480 MHz
dBm	dBm	dBm
-6.450	-6.170	-6.679

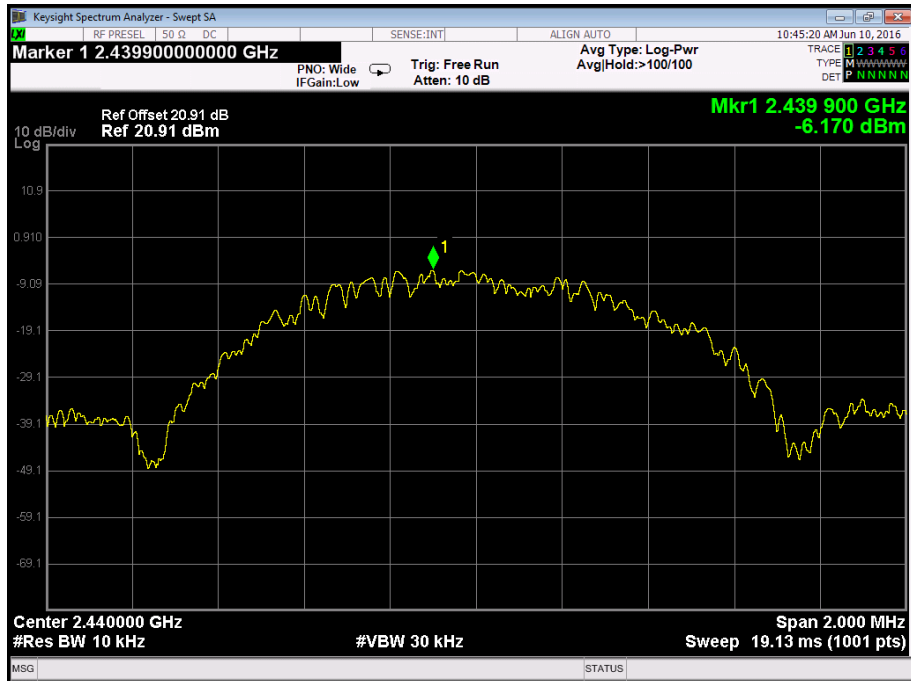
Bluetooth Low Energy, 2402 MHz, GFSK, Power Spectral Density Plot



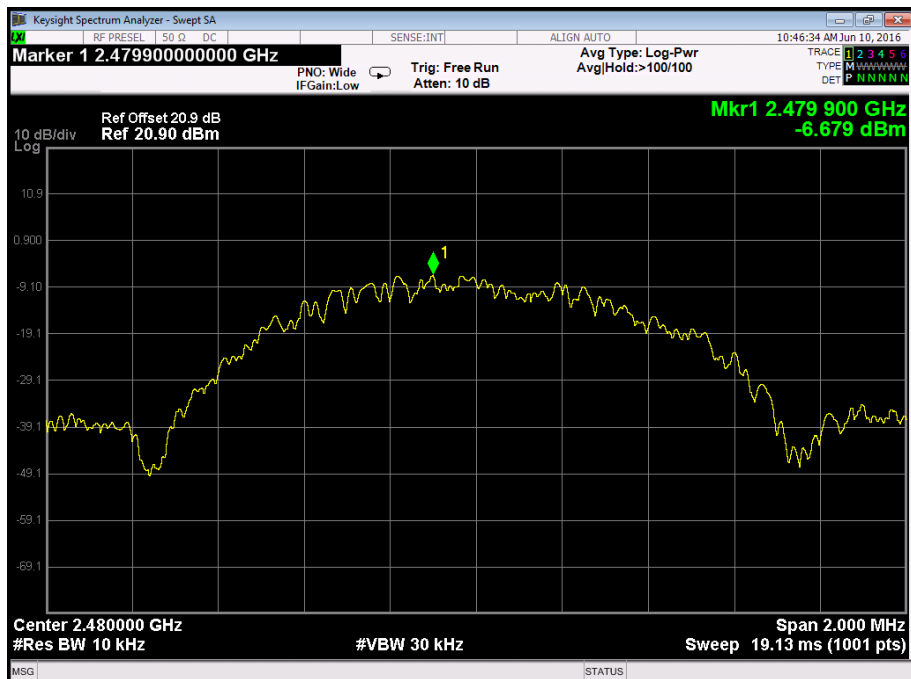


Product Service

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



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
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
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-2017
Section 2.2 - 6dB Bandwidth					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB Attenuator	Narda	4772-20	456	-	TU
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	25-Sep-2016
2 Metre SMA Type Cable	Rhophase	3PS-1801A-2000-3PS	4111	12	6-Nov-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
Section 2.3 - Maximum Conducted Output Power					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
20dB Attenuator	Narda	4772-20	456	-	TU
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	25-Sep-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	9-Dec-2016
2 Metre SMA Type Cable	Rhophase	3PS-1801A-2000-3PS	4111	12	6-Nov-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



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Spurious Radiated Emissions					
Antenna 18-40GHz (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	12-Feb-2018
Hygrometer	Rotronic	A1	1388	12	13-Apr-2017
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
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
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	6-Oct-2016
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-2017
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 2.5 - Restricted Band Edges					
Hygrometer	Rotronic	A1	1388	12	13-Apr-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
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
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-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 - Authorised Band Edges					
Hygrometer	Rotronic	A1	1388	12	13-Apr-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
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
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-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 2.7 - Power Spectral Density					
Power Supply Unit	Farnell	LB30-4	158	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
2 Metre SMA Type Cable	Rhophase	3PS-1801A-2000-3PS	4111	12	6-Nov-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

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



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



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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

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

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