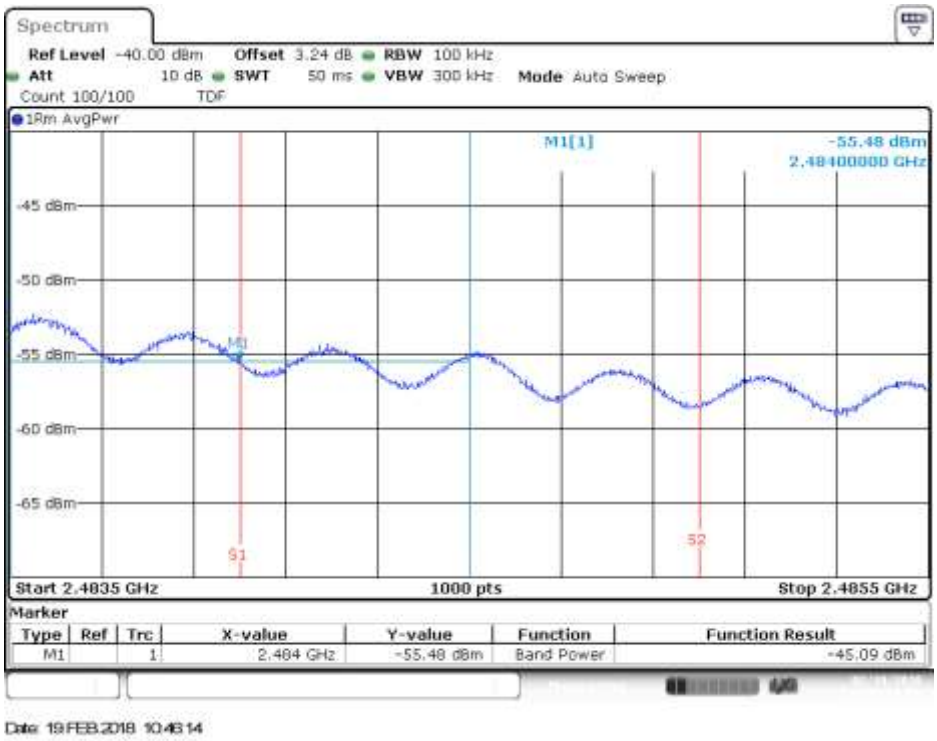
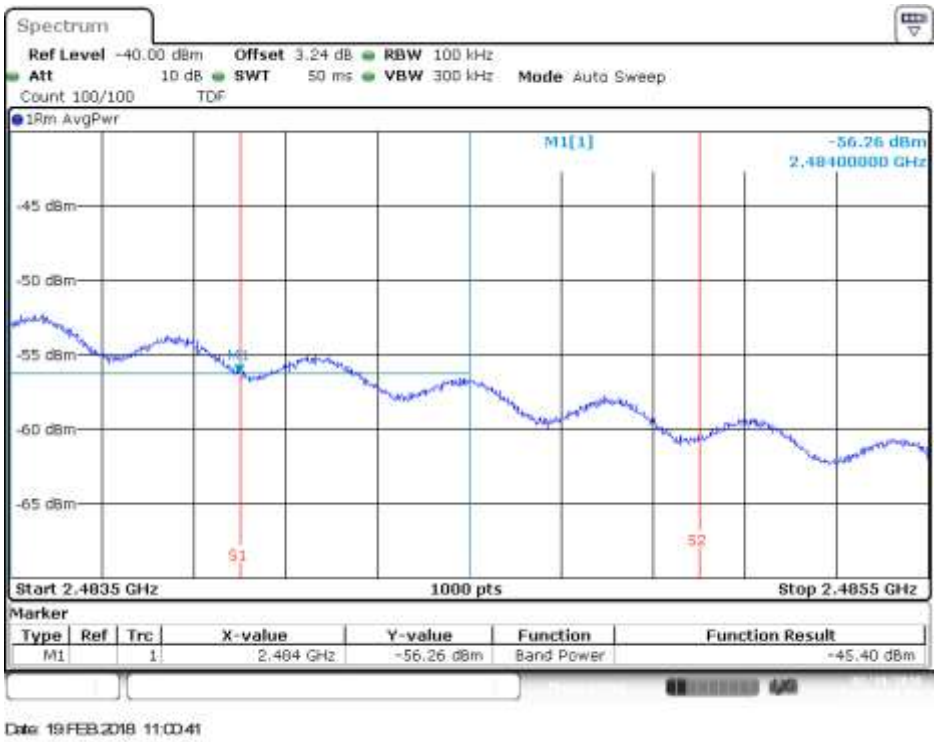
Channel 12 - BE High Freq Section RMS within 2MHz (restricted)

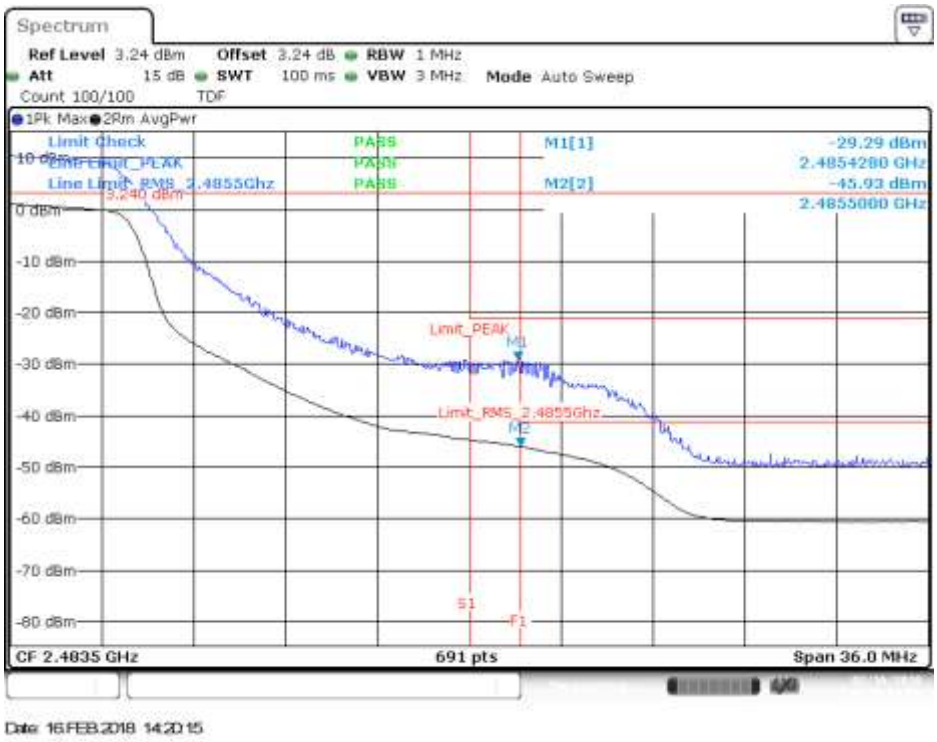


Channel 13 - BE High Freq Section RMS within 2MHz (restricted)

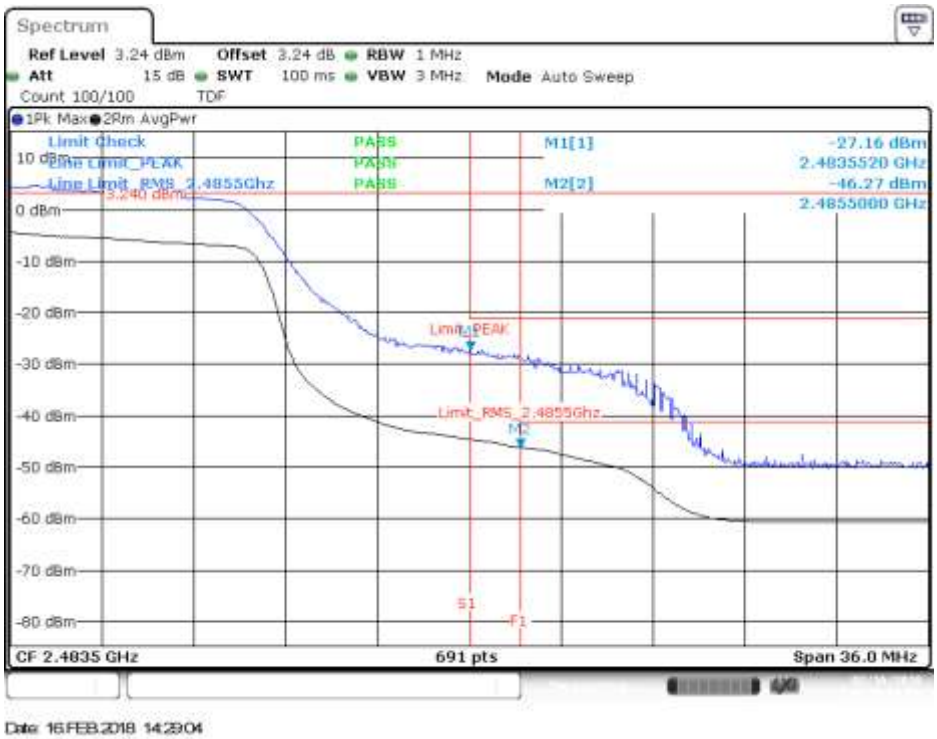


MIMO-A, 802.11n40, HT8

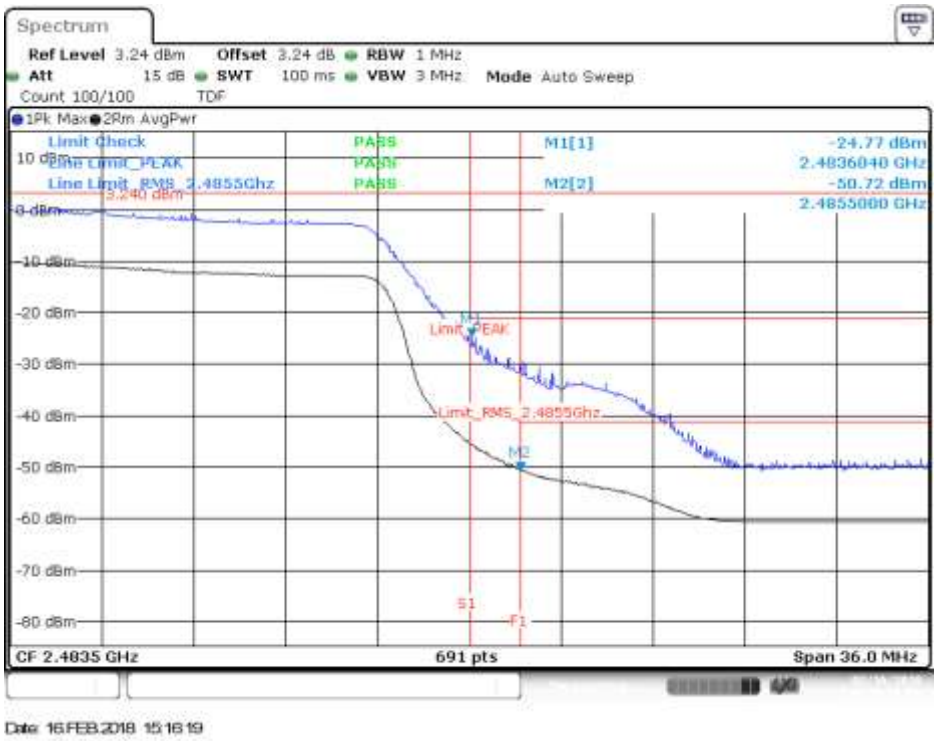
Channel 9F - BE High Freq Section (restricted)



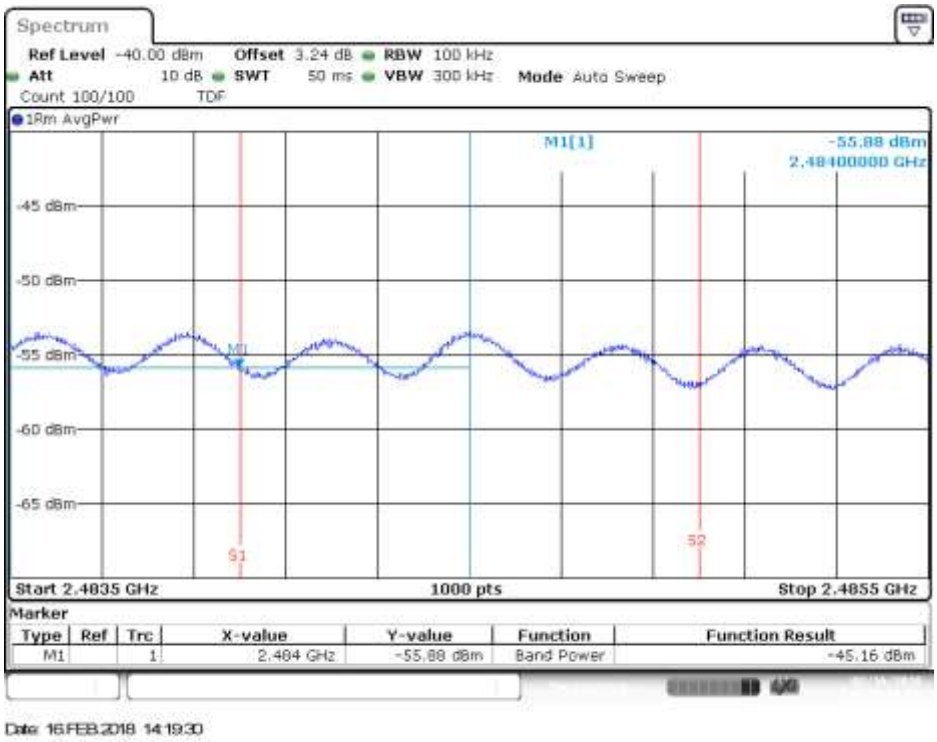
Channel 10F - BE High Freq Section (restricted)



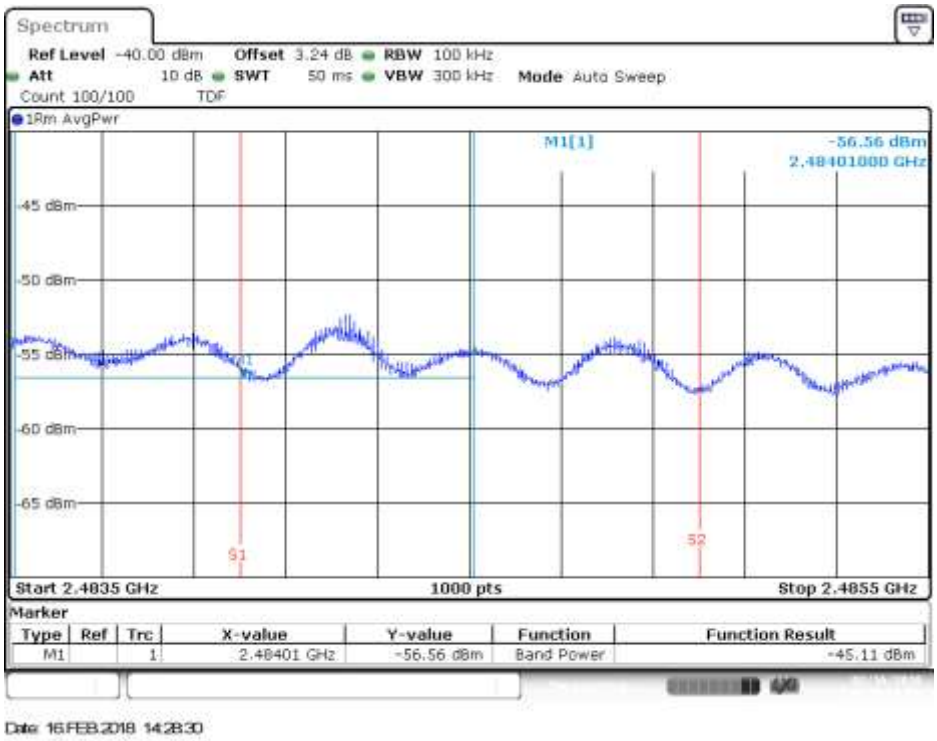
Channel 11F - BE High Freq Section (restricted)



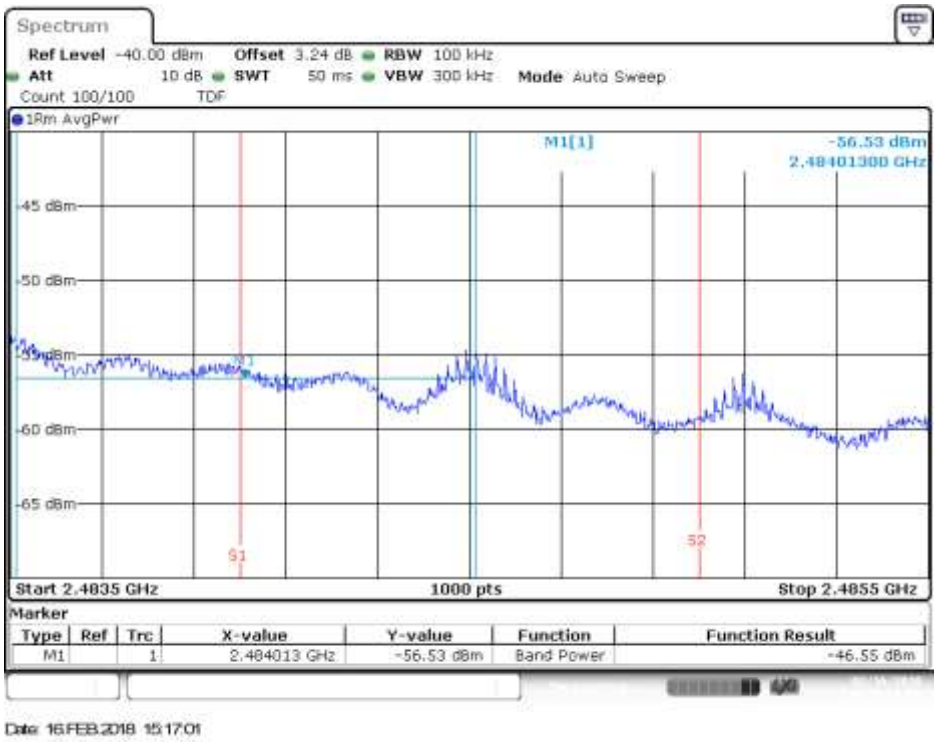
Channel 9F - BE High Freq Section RMS within 2MHz (restricted)



Channel 10F - BE High Freq Section RMS within 2MHz (restricted)

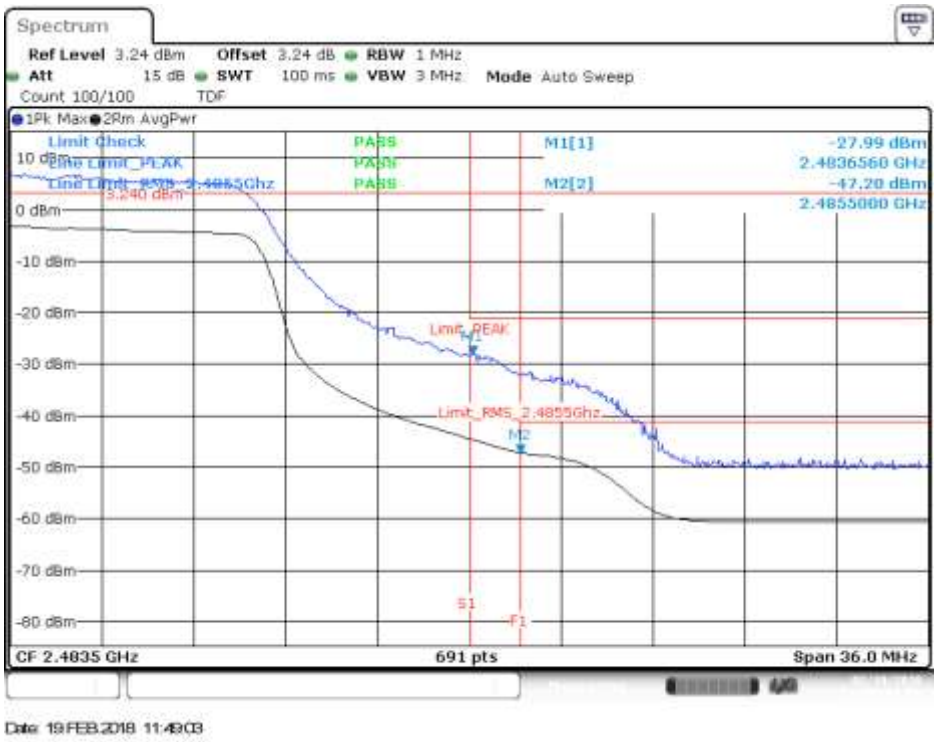


Channel 11F - BE High Freq Section RMS within 2MHz (restricted)

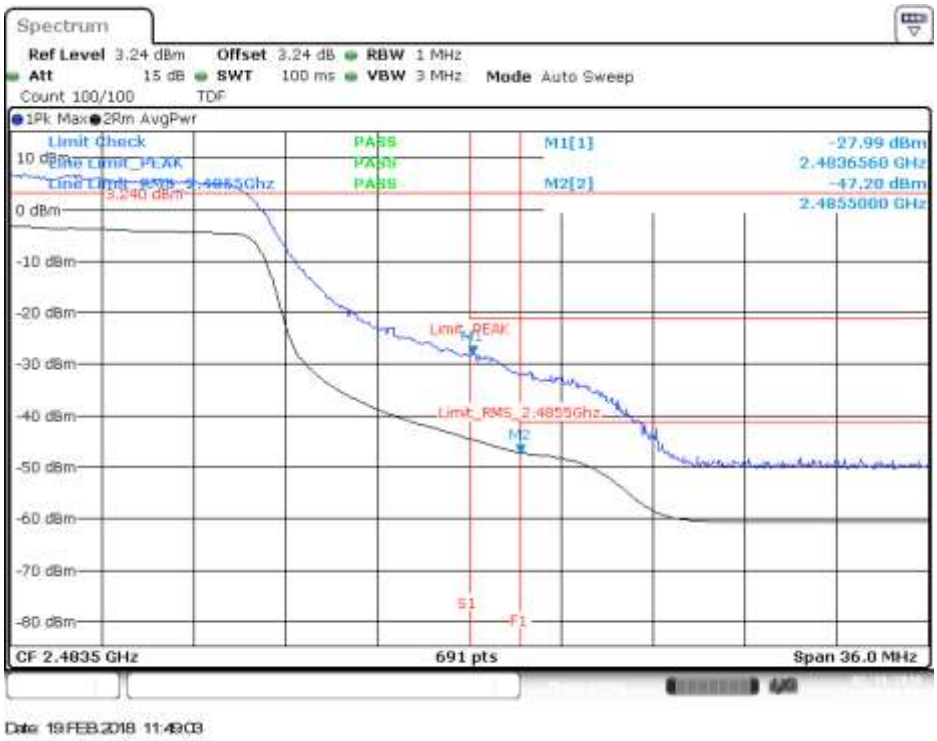


MIMO-B, 802.11n40, HT8

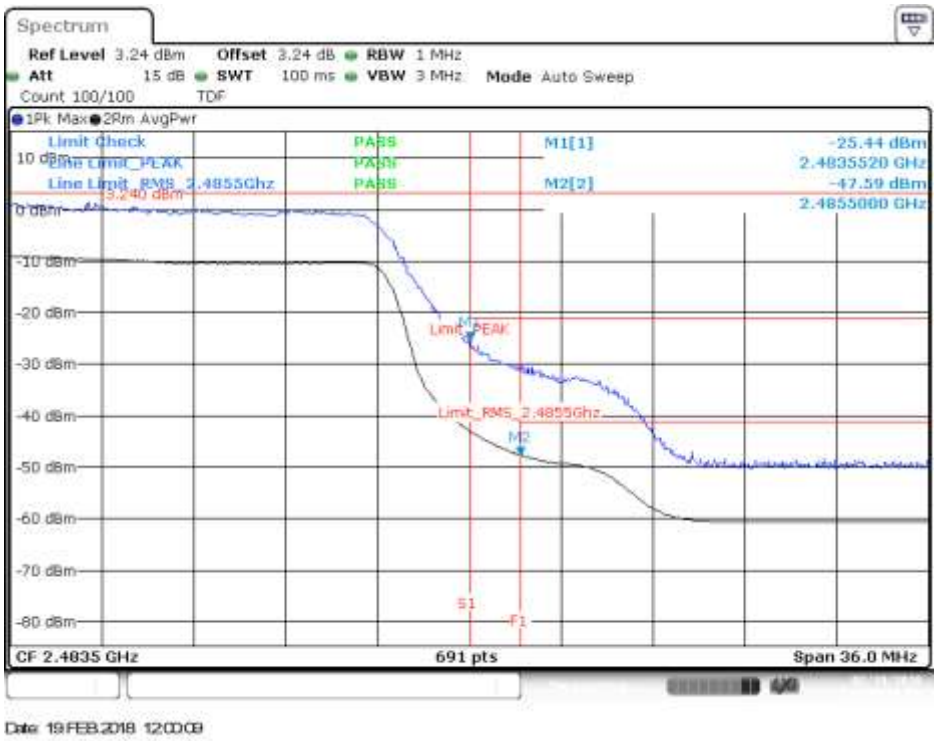
Channel 9F - BE High Freq Section (restricted)



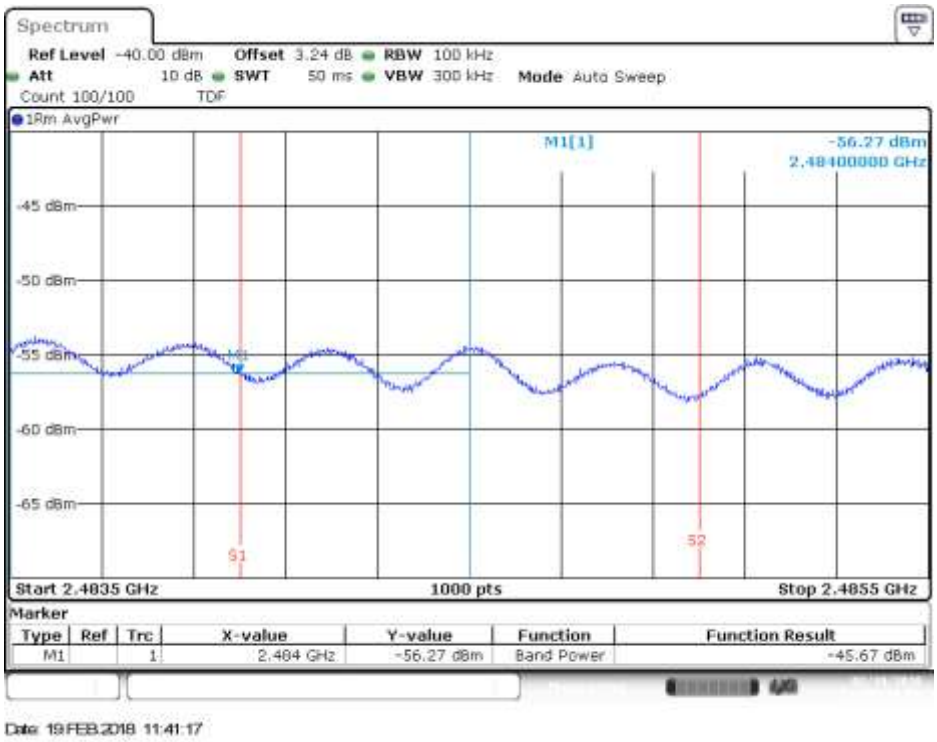
Channel 10F - BE High Freq Section (restricted)



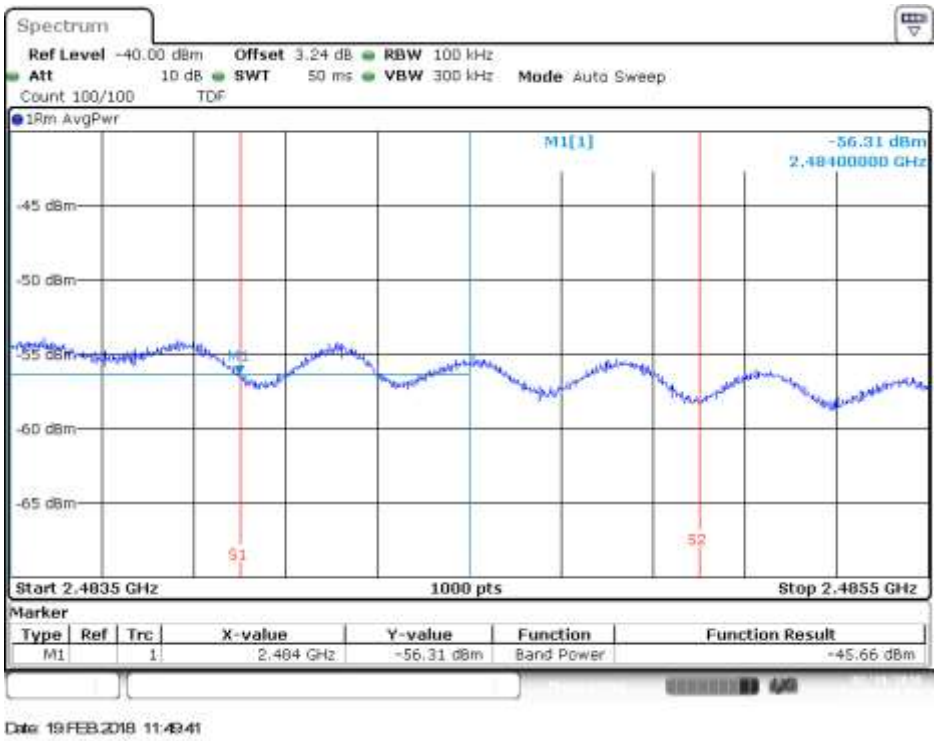
Channel 11F - BE High Freq Section (restricted)



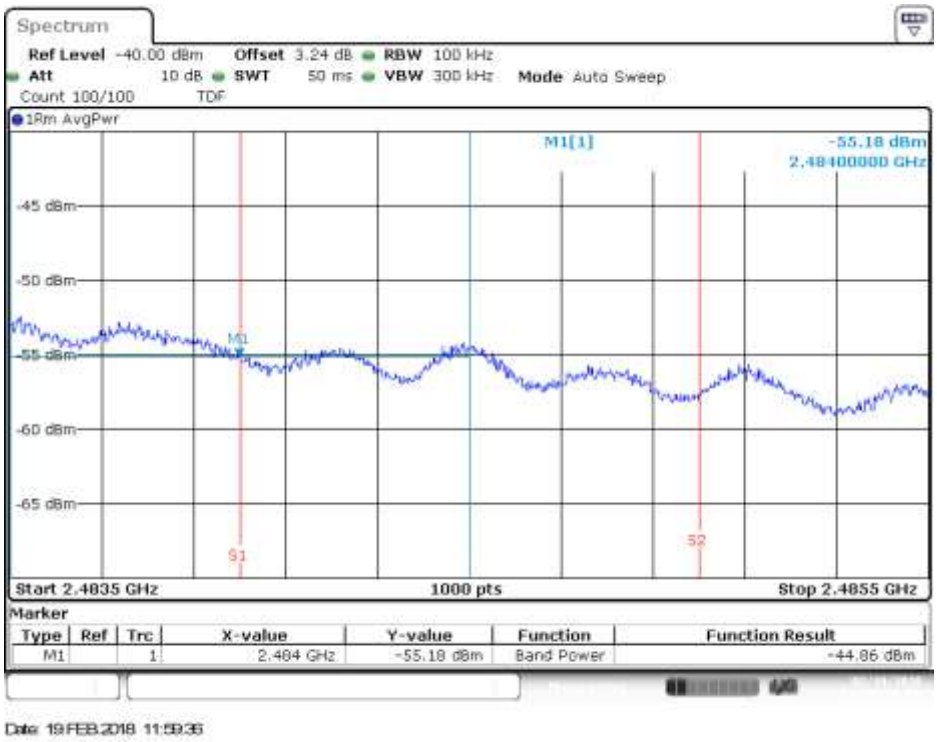
Channel 9F - BE High Freq Section RMS within 2MHz (restricted)



Channel 10F - BE High Freq Section RMS within 2MHz (restricted)



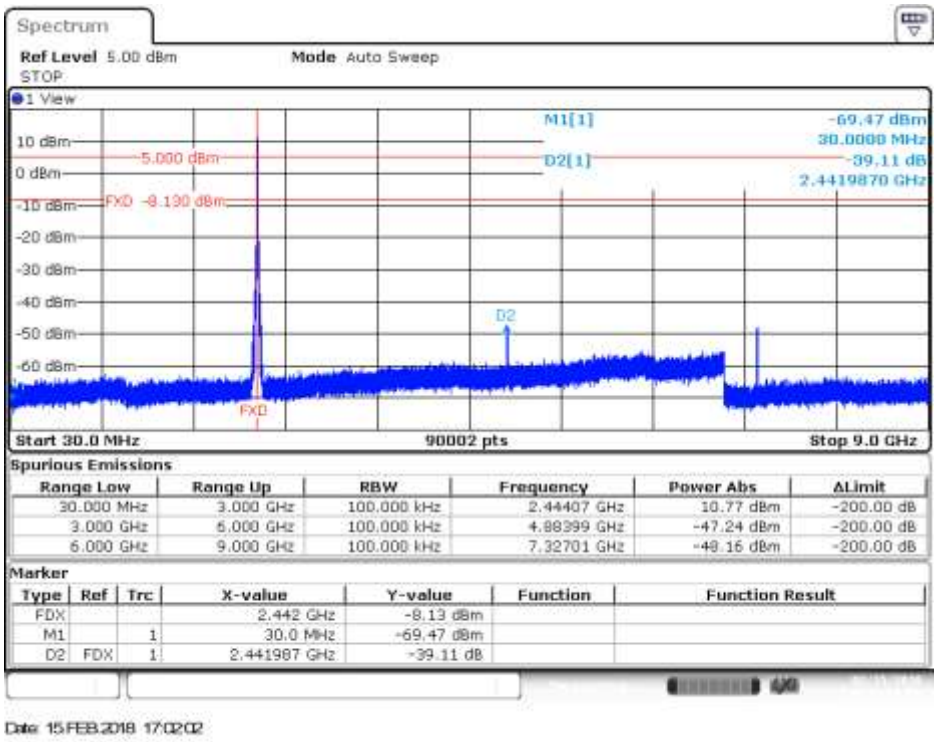
Channel 11F - BE High Freq Section RMS within 2MHz (restricted)



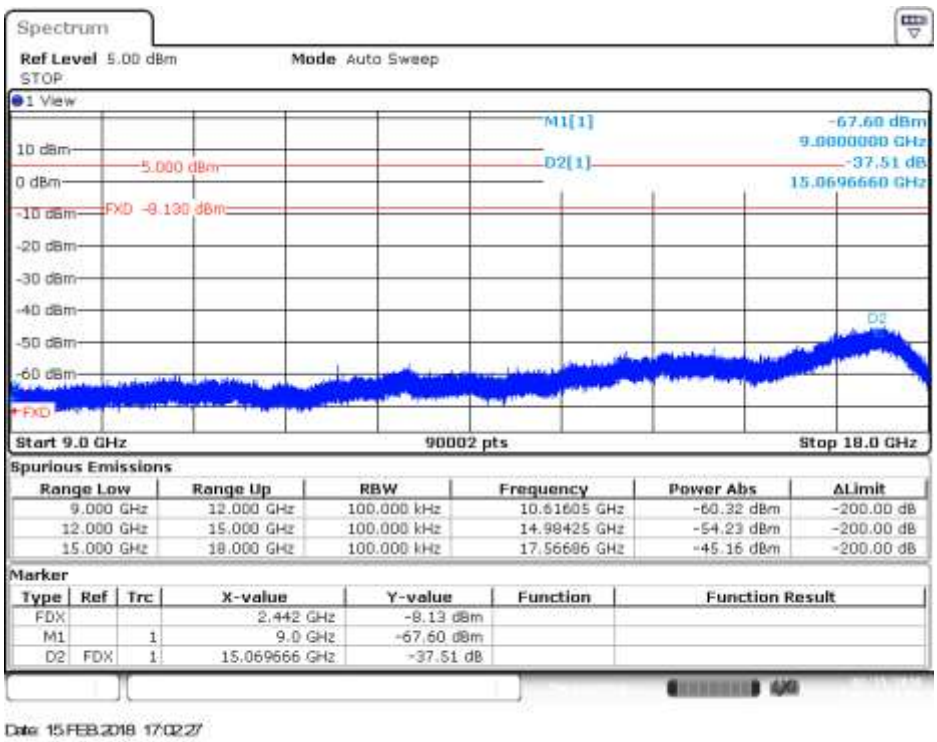
B.3.7 Out of band emissions - spurious

SISO-A, 802.11b, 1Mbps

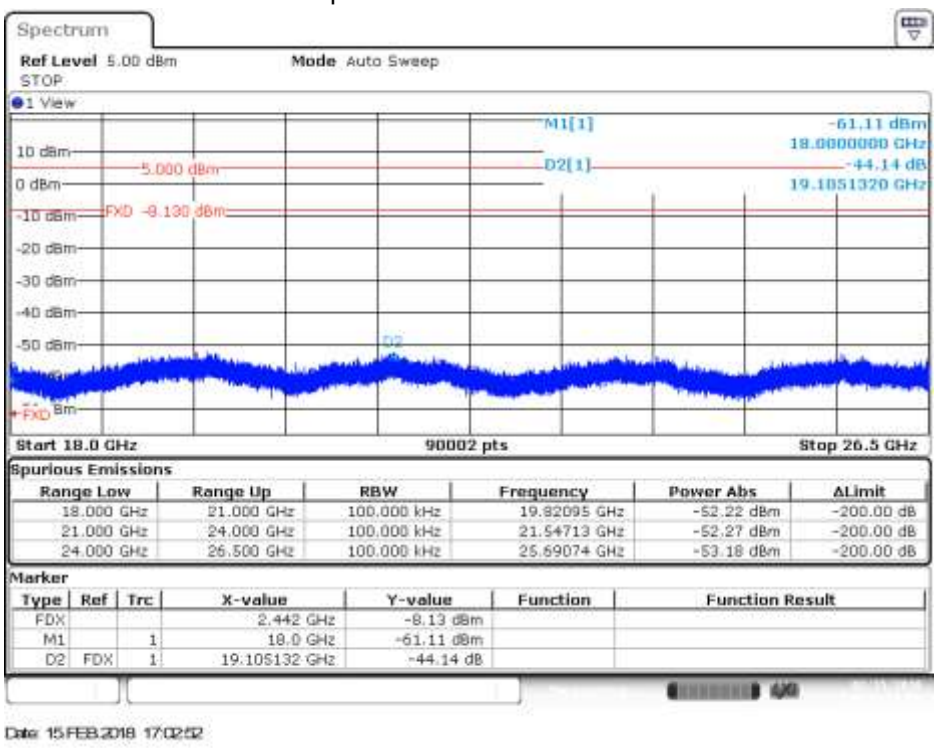
Channel 7 - Spurious 1 Delta Marker Measurement



Channel 7 - Spurious 2 Delta Marker Measurement

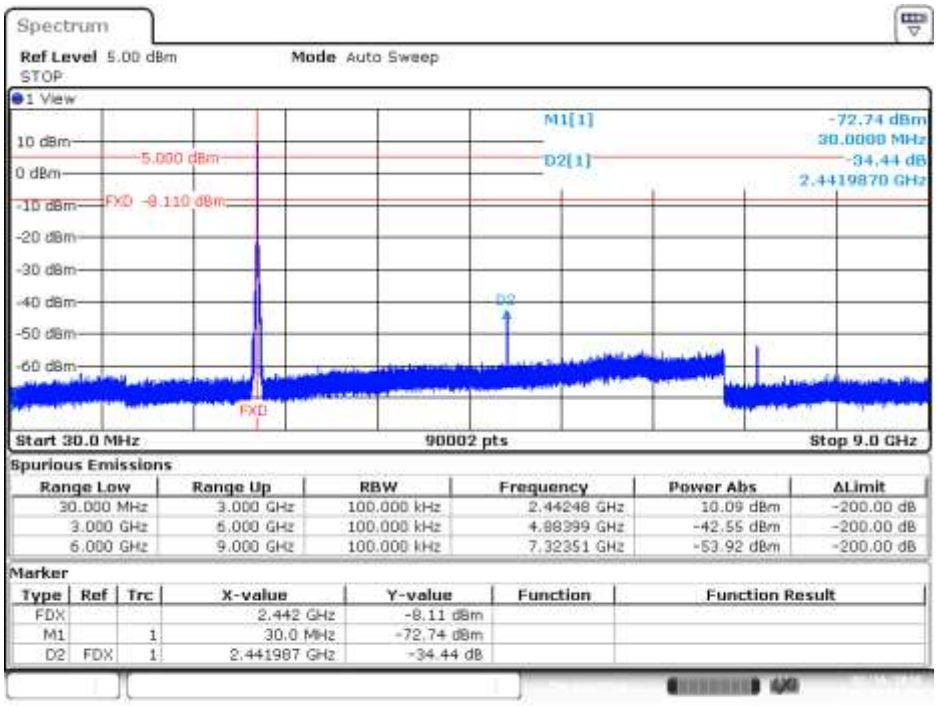


Channel 7 - Spurious 3 Delta Marker Measurement

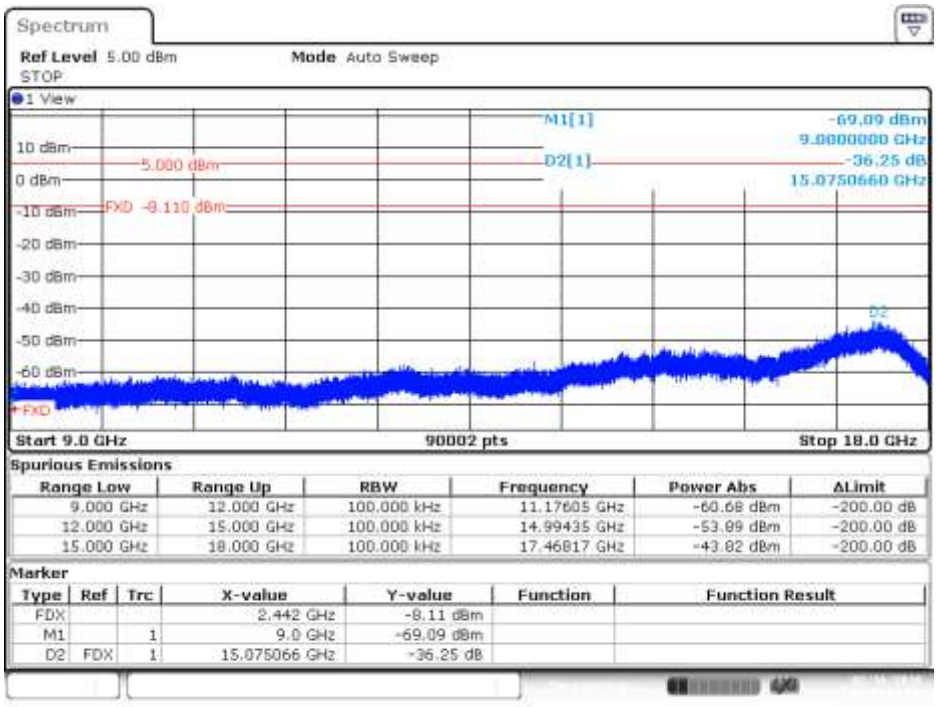


SISO-B, 802.11b, 1Mbps

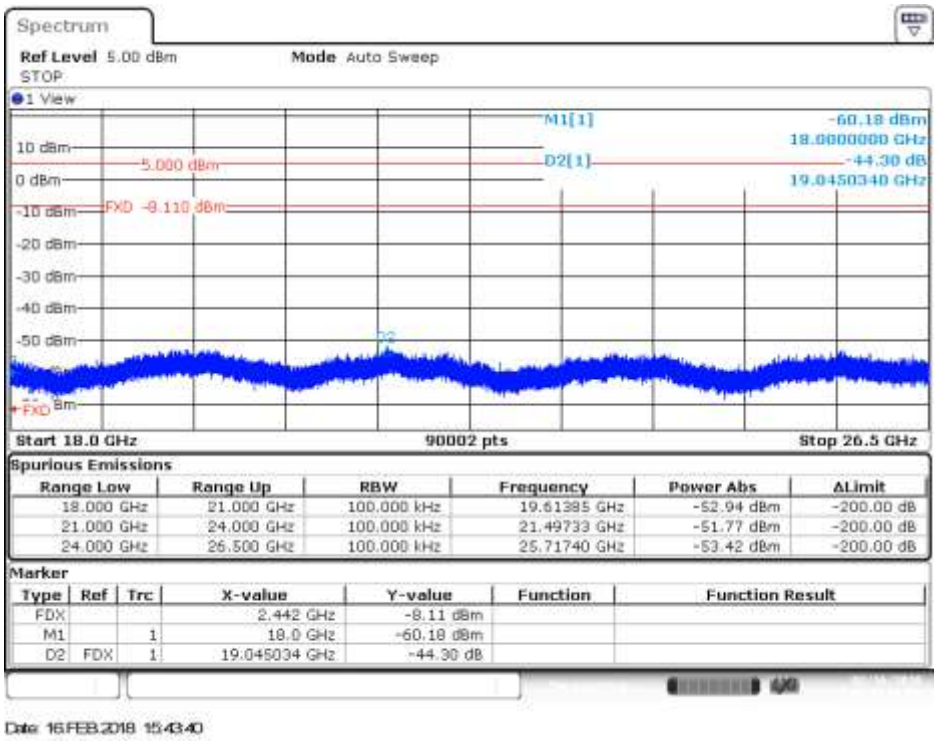
Channel 7 - Spurious 1 Delta Marker Measurement



Channel 7 - Spurious 2 Delta Marker Measurement

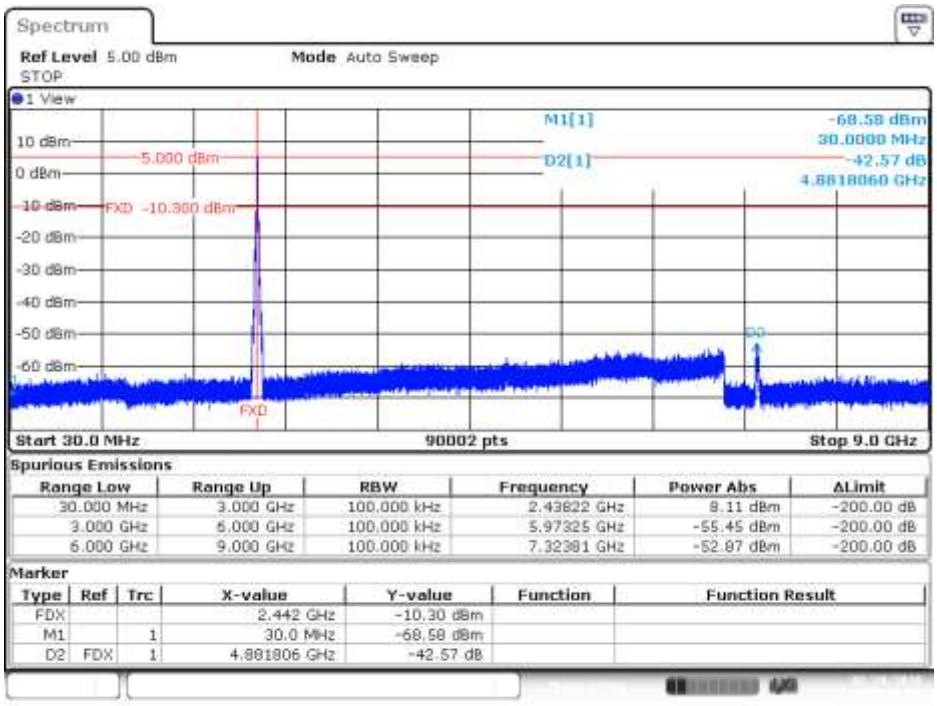


Channel 7 - Spurious 3 Delta Marker Measurement



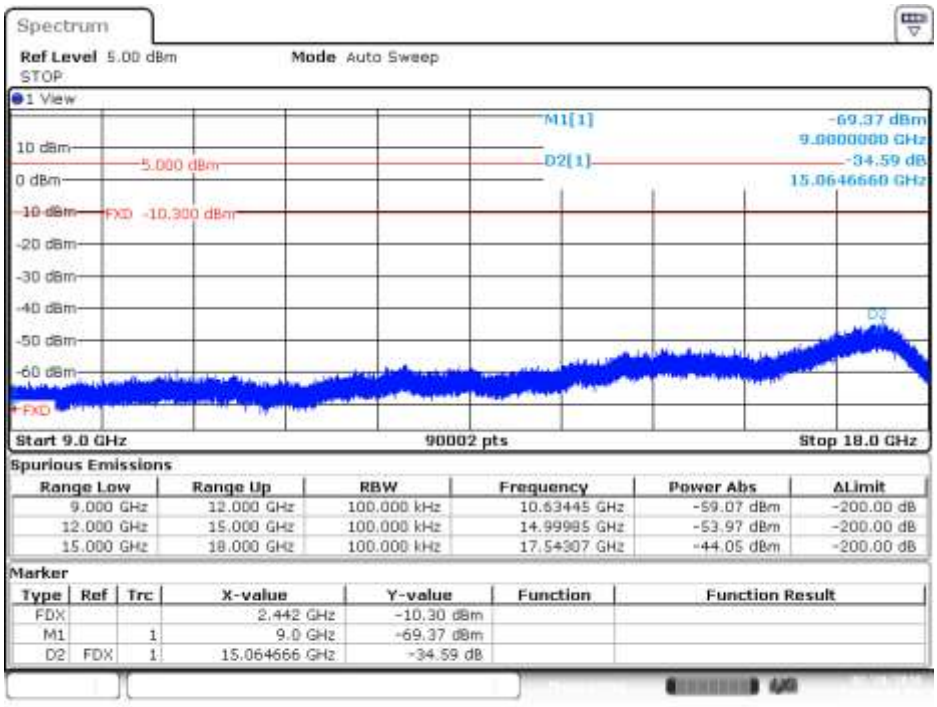
SISO-A, 802.11g, 6Mbps

Channel 7 - Spurious 1 Delta Marker Measurement



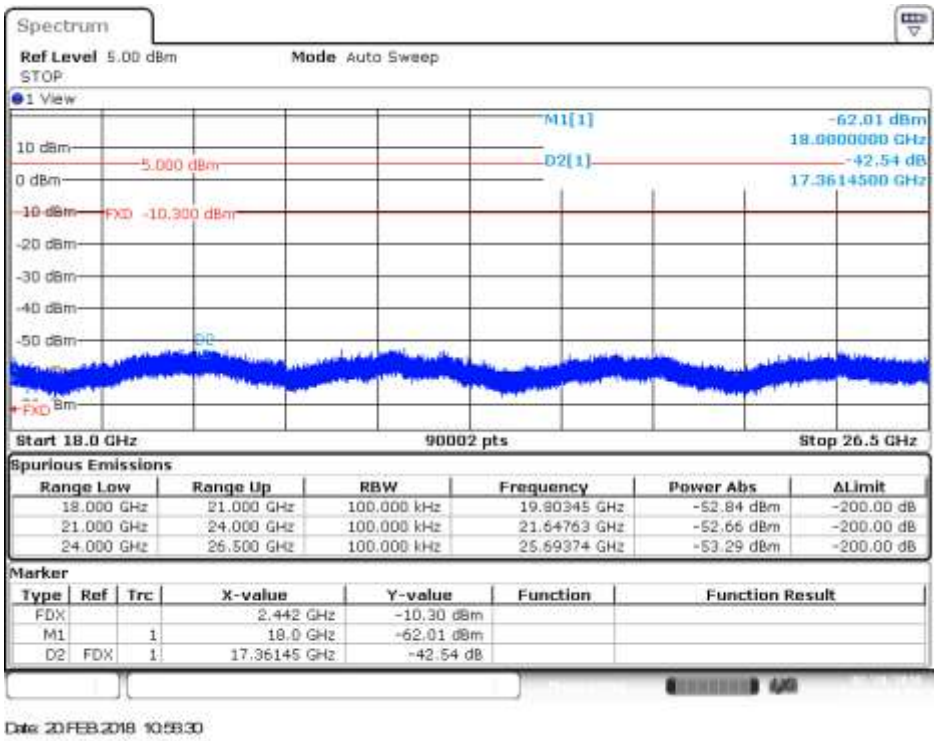
Date: 20.FEB.2018 10:55:40

Channel 7 - Spurious 2 Delta Marker Measurement



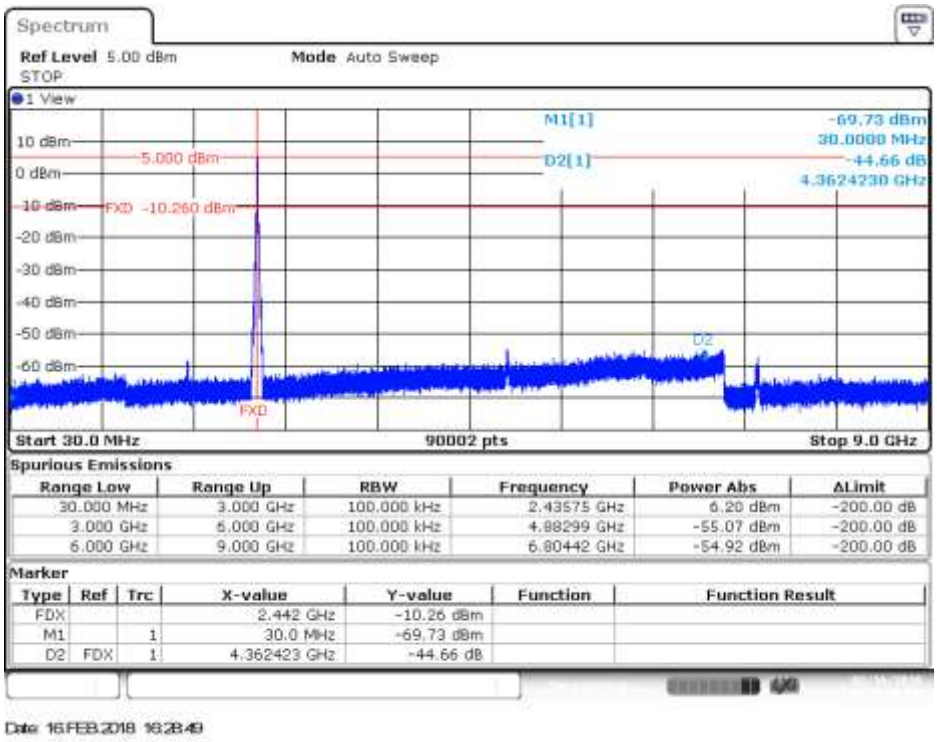
Date: 20.FEB.2018 10:58:05

Channel 7 - Spurious 3 Delta Marker Measurement

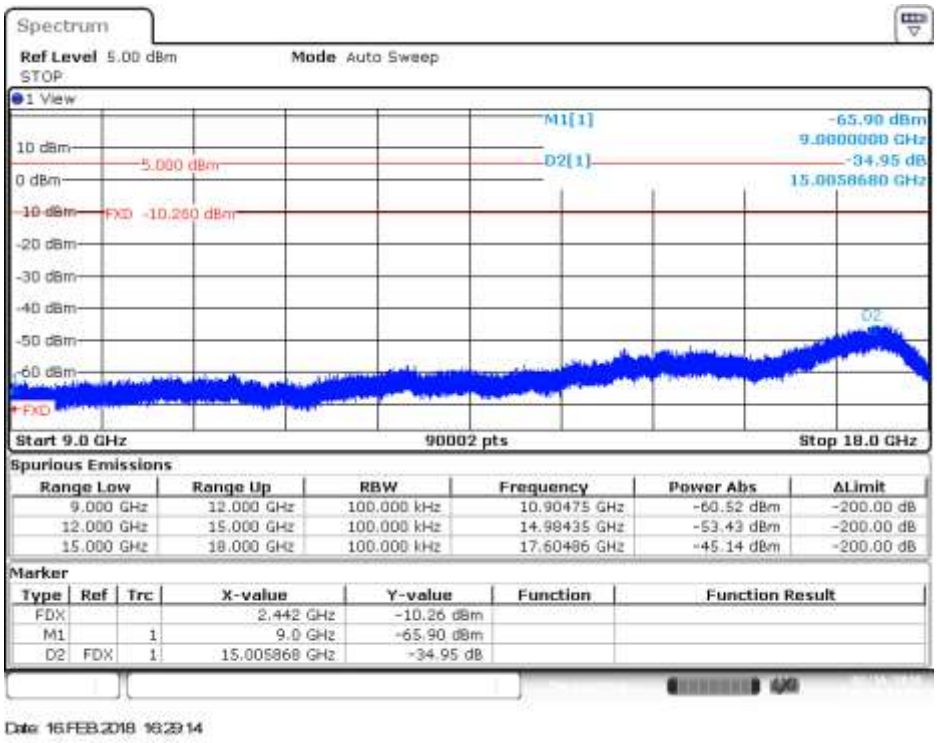


SISO-B, 802.11g, 6Mbps

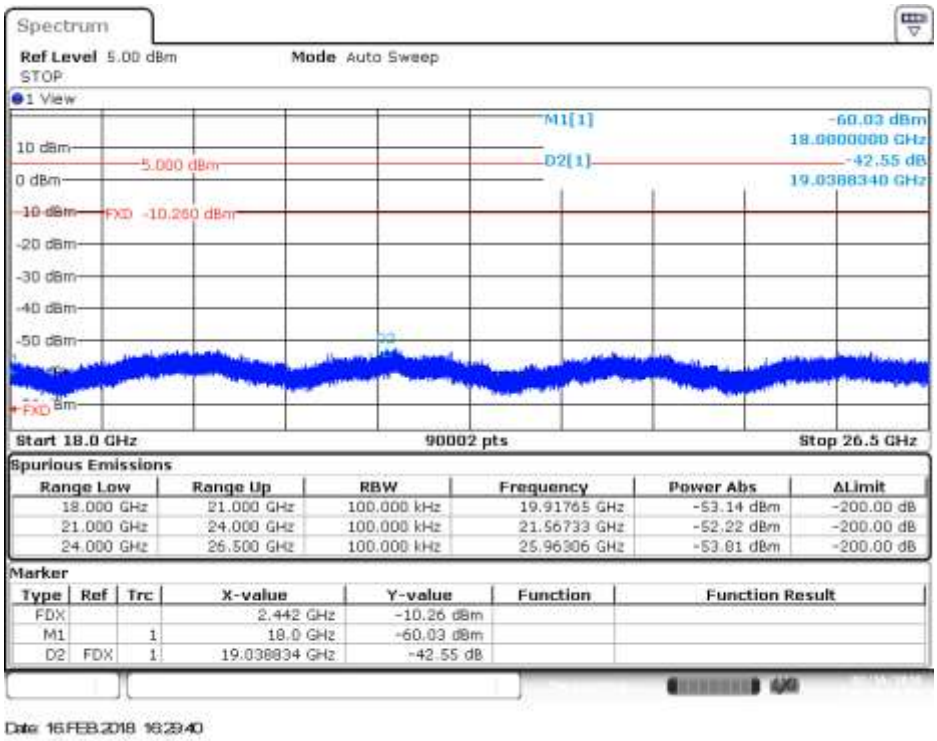
Channel 7 - Spurious 1 Delta Marker Measurement



Channel 7 - Spurious 2 Delta Marker Measurement

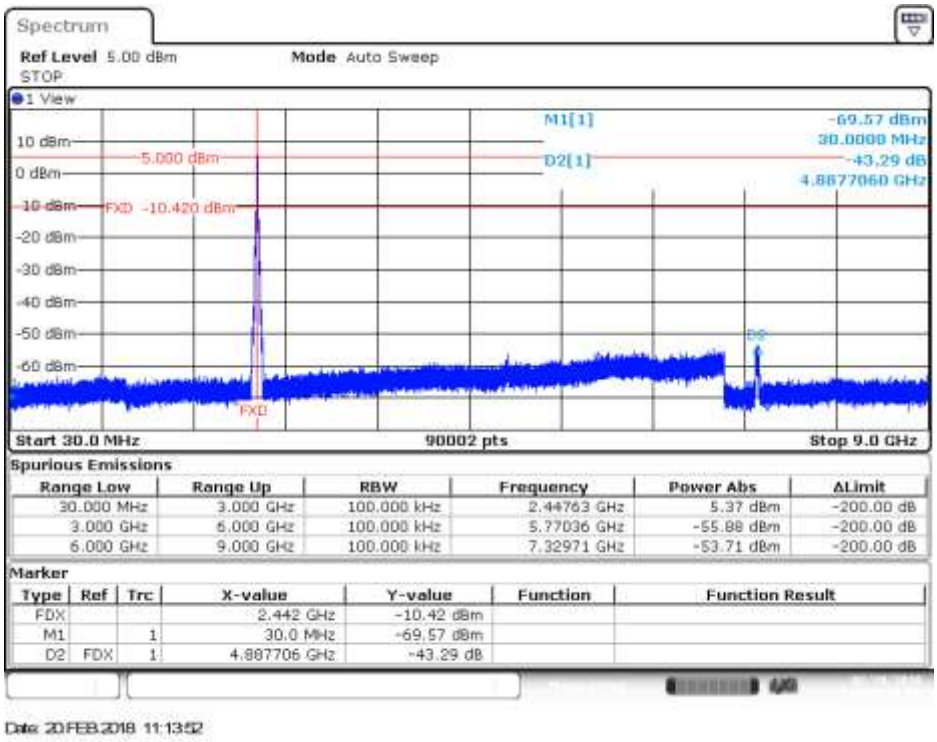


Channel 7 - Spurious 3 Delta Marker Measurement

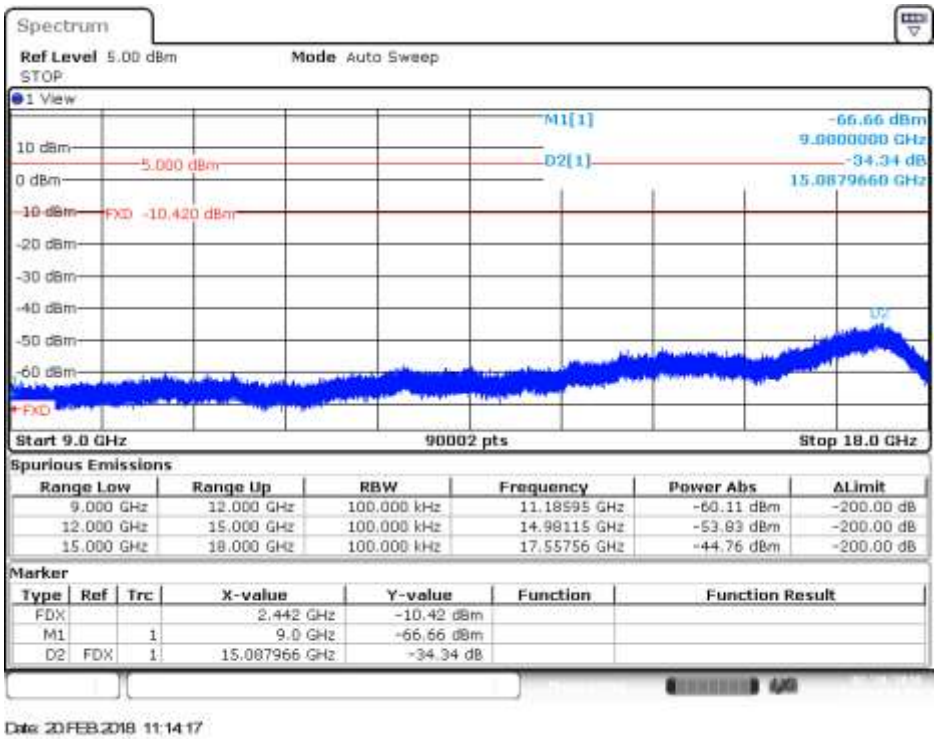


SISO-A, 802.11n20, HT0

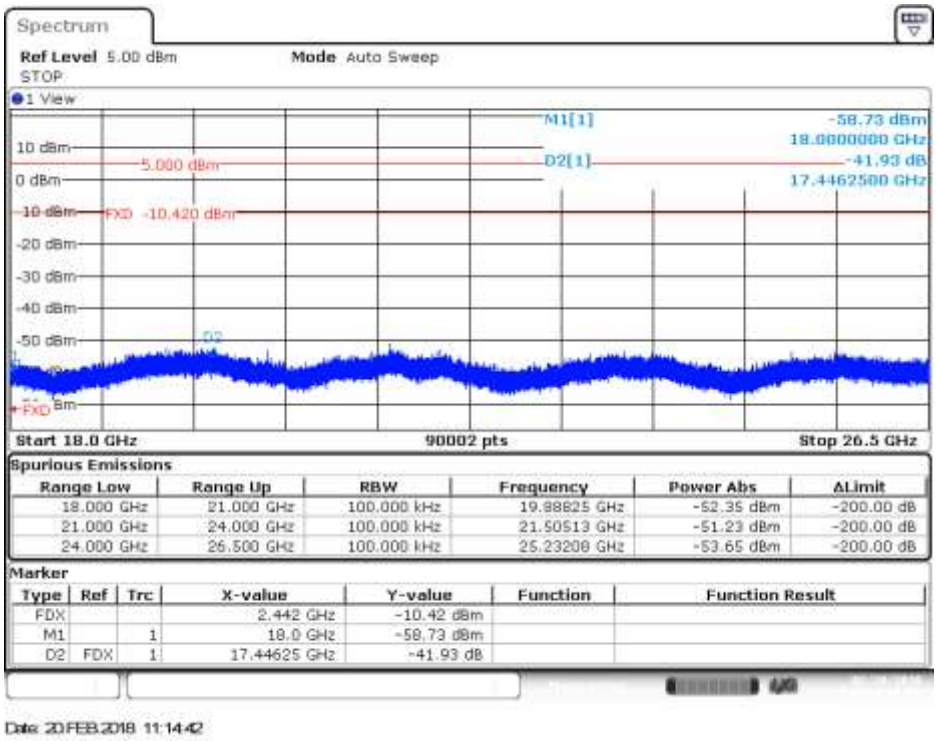
Channel 7 - Spurious 1 Delta Marker Measurement



Channel 7 - Spurious 2 Delta Marker Measurement

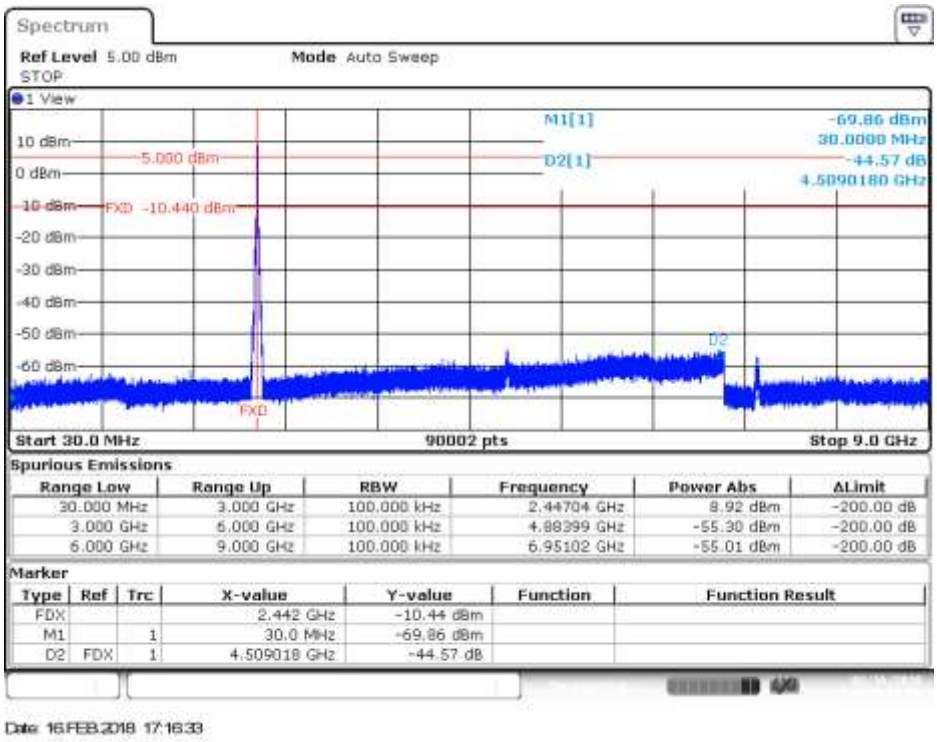


Channel 7 - Spurious 3 Delta Marker Measurement

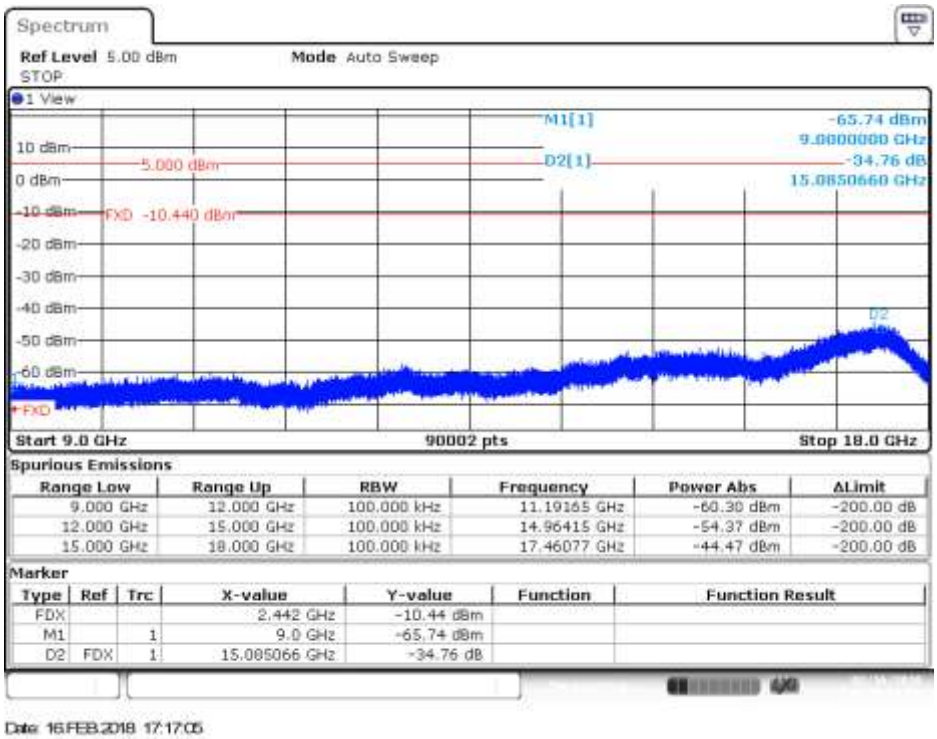


SISO-B, 802.11n20, HT0

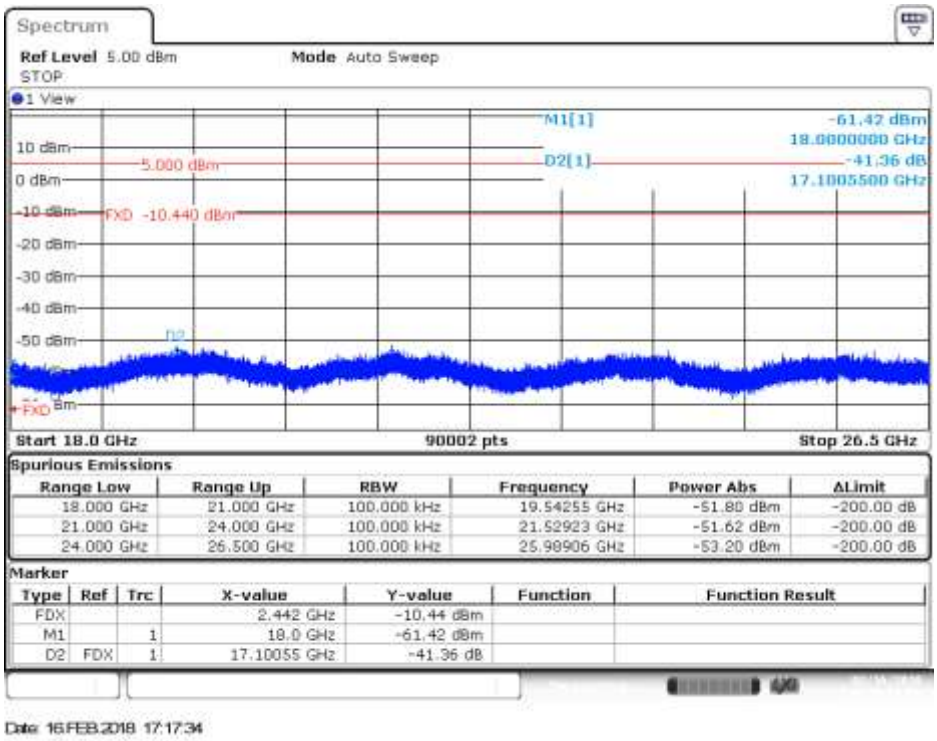
Channel 7 - Spurious 1 Delta Marker Measurement



Channel 7 - Spurious 2 Delta Marker Measurement

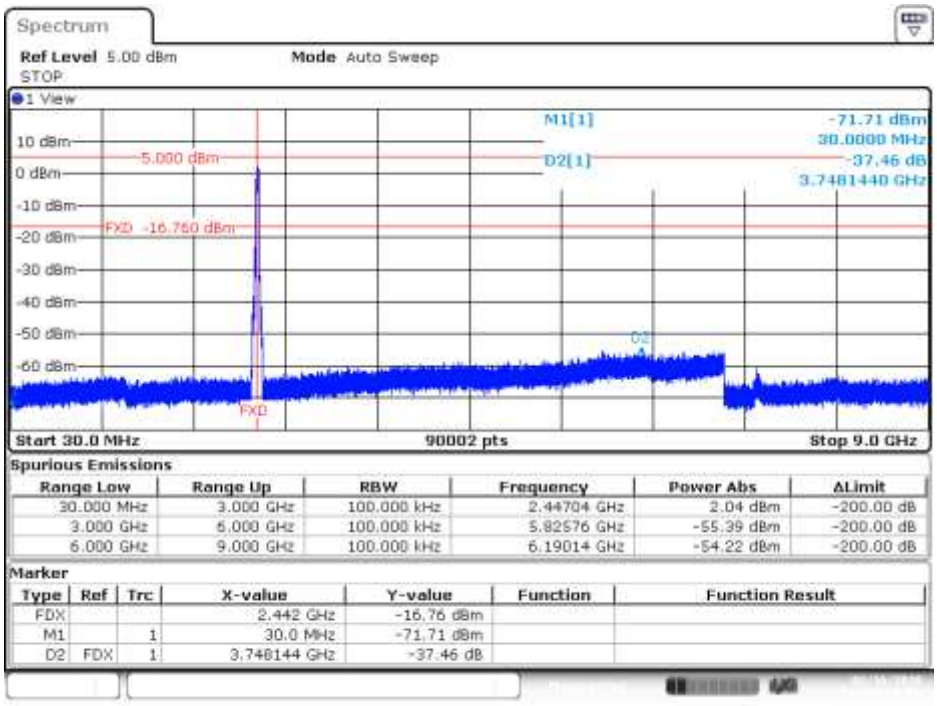


Channel 7 - Spurious 3 Delta Marker Measurement

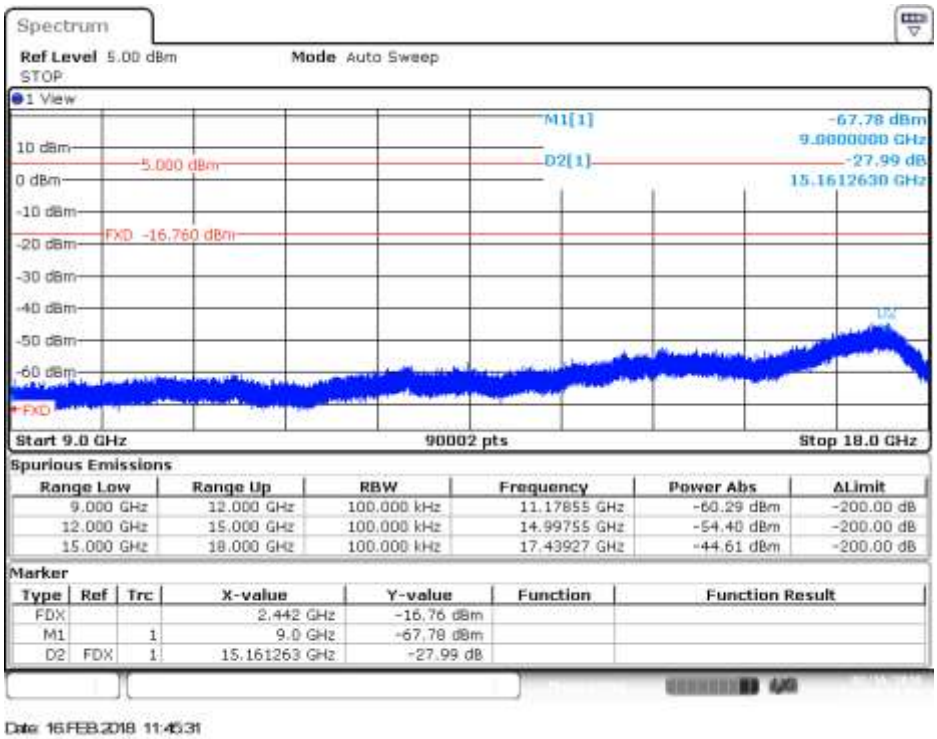


SISO-A, 802.11n40, HT0

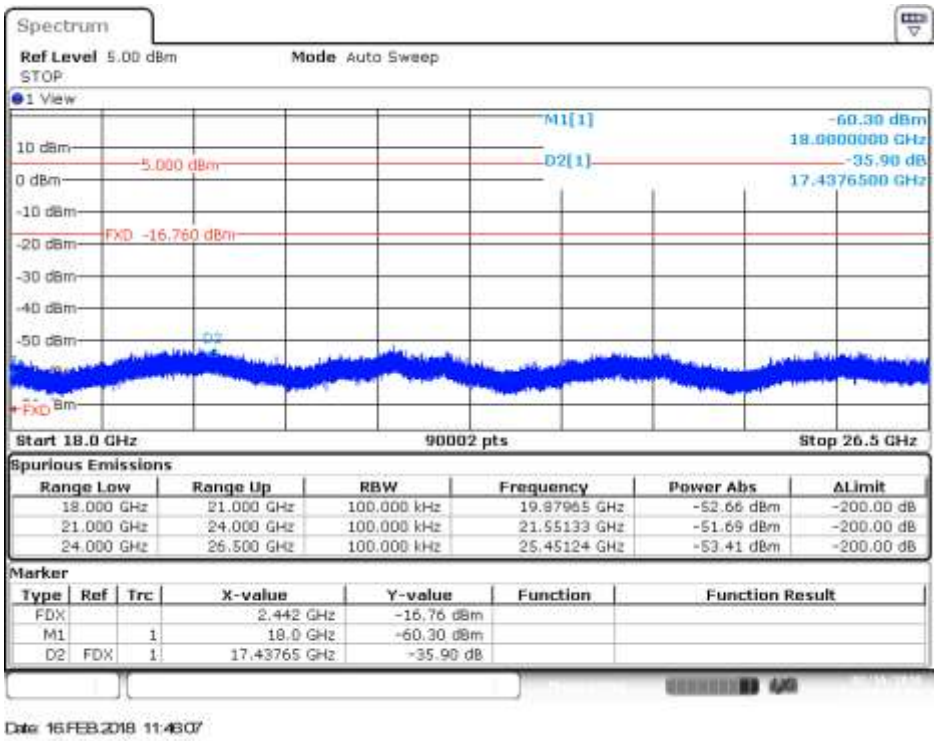
Channel 7F - Spurious 1 Delta Marker Measurement



Channel 7F - Spurious 2 Delta Marker Measurement

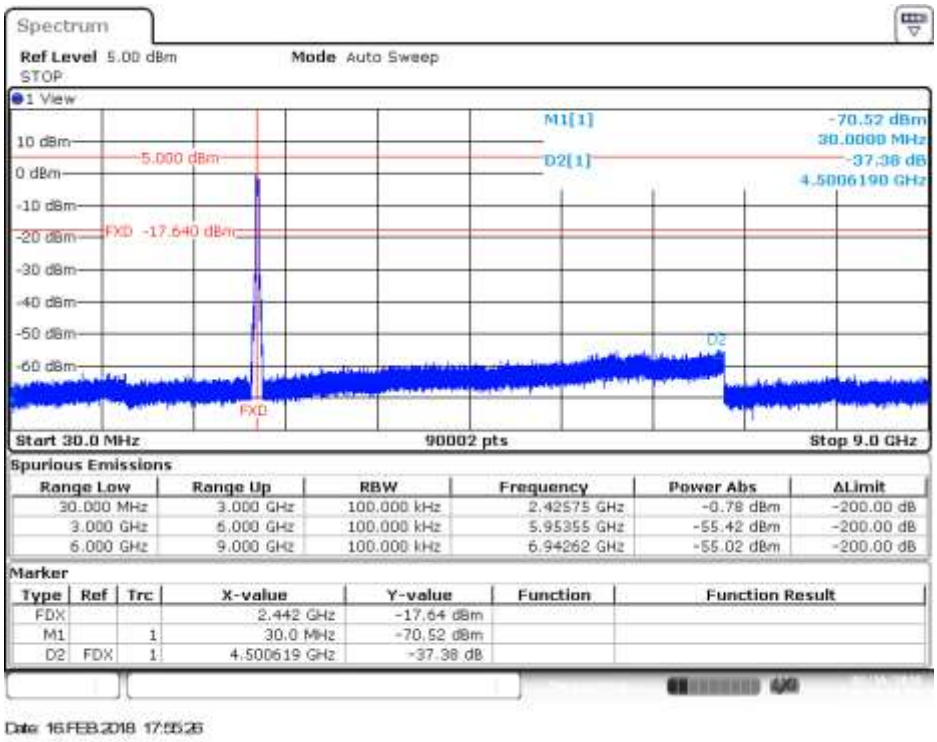


Channel 7F - Spurious 3 Delta Marker Measurement

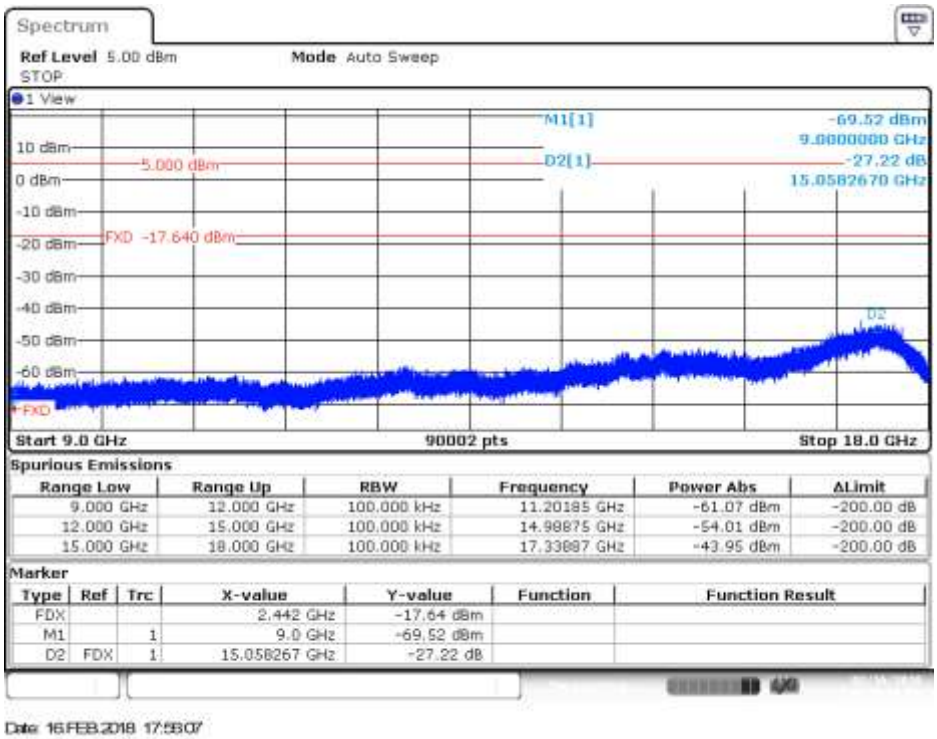


SISO-B, 802.11n40, HT0

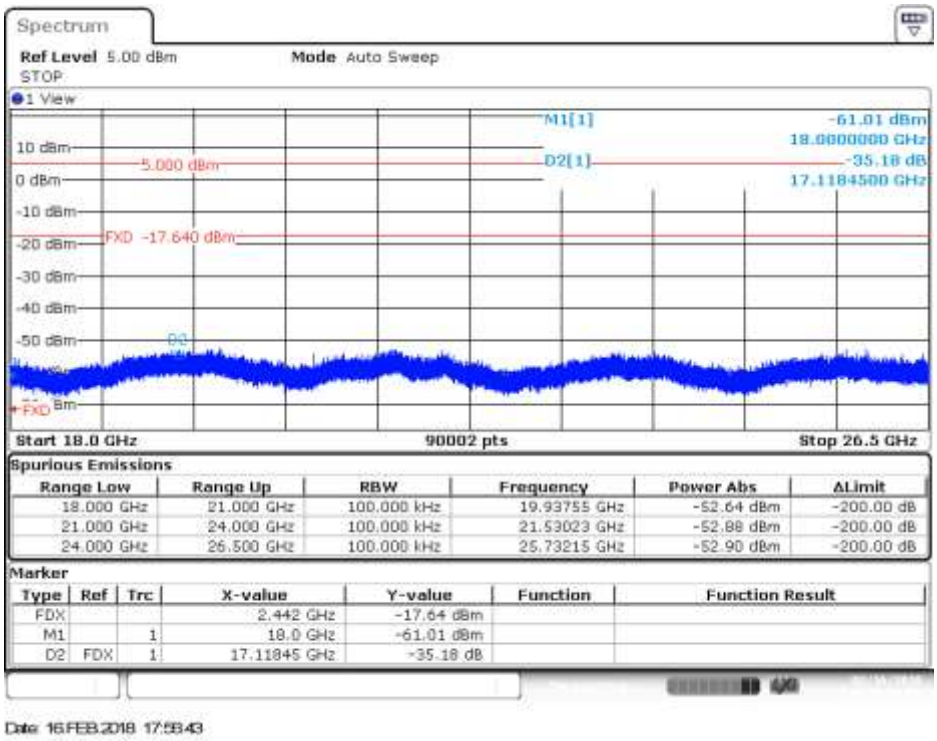
Channel 7F - Spurious 1 Delta Marker Measurement



Channel 7F - Spurious 2 Delta Marker Measurement

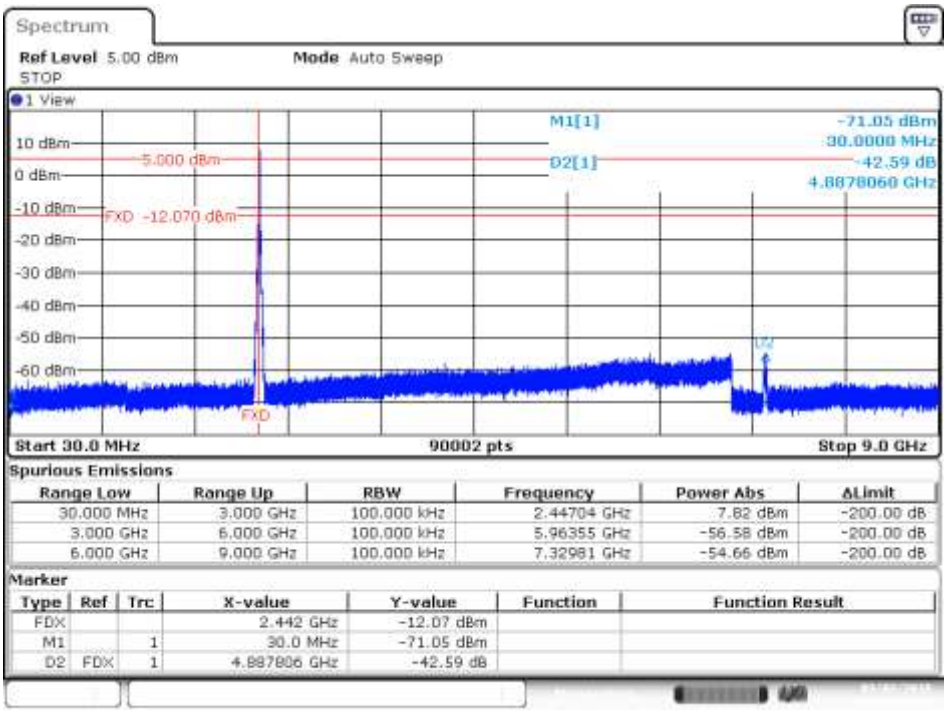


Channel 7F - Spurious 3 Delta Marker Measurement



MIMO-A, 802.11n20, HT8

Channel 7 - Spurious 1 Delta Marker Measurement



Spurious Emissions

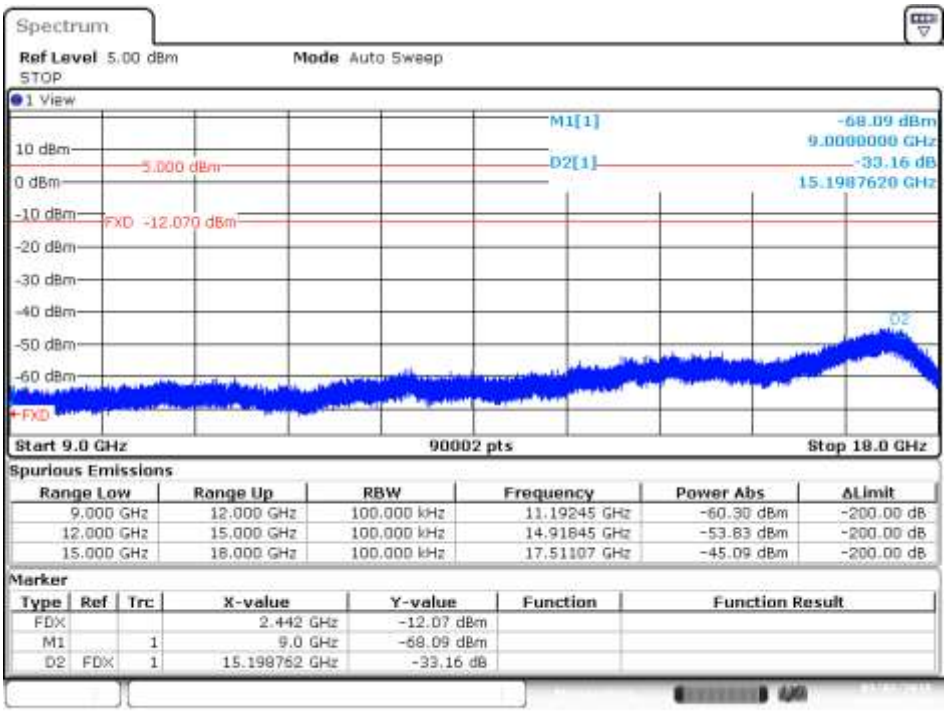
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.44704 GHz	7.82 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.96355 GHz	-56.58 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	7.32981 GHz	-54.66 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-12.07 dBm		
M1		1	30.0 MHz	-71.05 dBm		
D2	FDX	1	4.887806 GHz	-42.59 dB		

Date: 2.MAR.2018 13:53:49

Channel 7 - Spurious 2 Delta Marker Measurement



Spurious Emissions

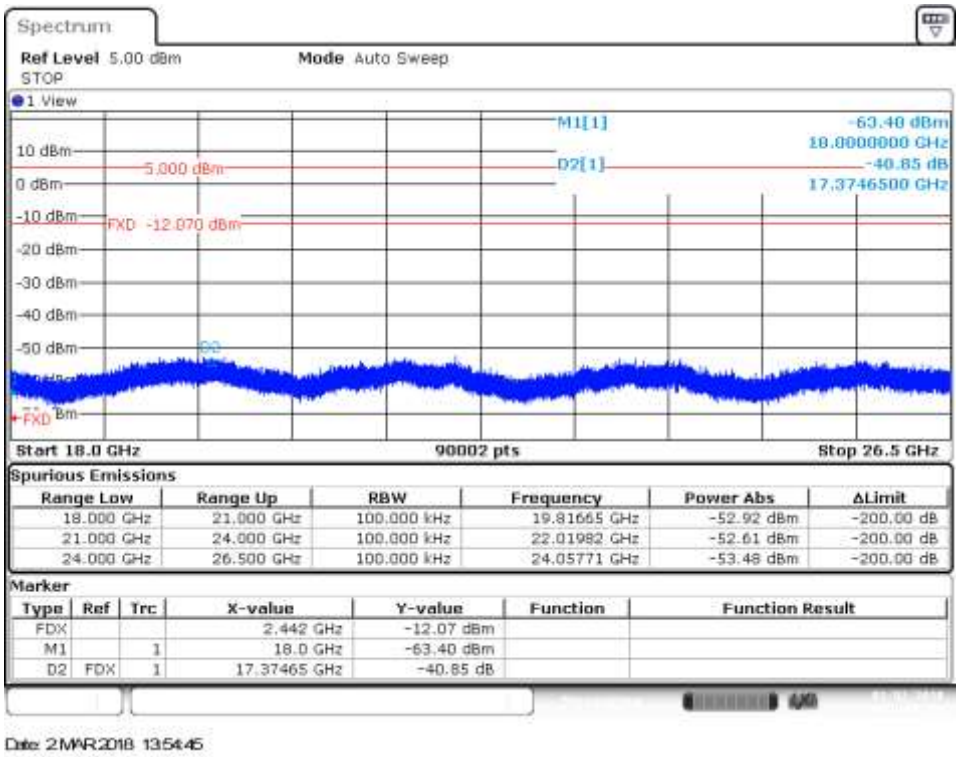
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.19245 GHz	-60.30 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.91845 GHz	-53.83 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	17.51107 GHz	-45.09 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-12.07 dBm		
M1		1	9.0 GHz	-68.09 dBm		
D2	FDX	1	15.198762 GHz	-33.16 dB		

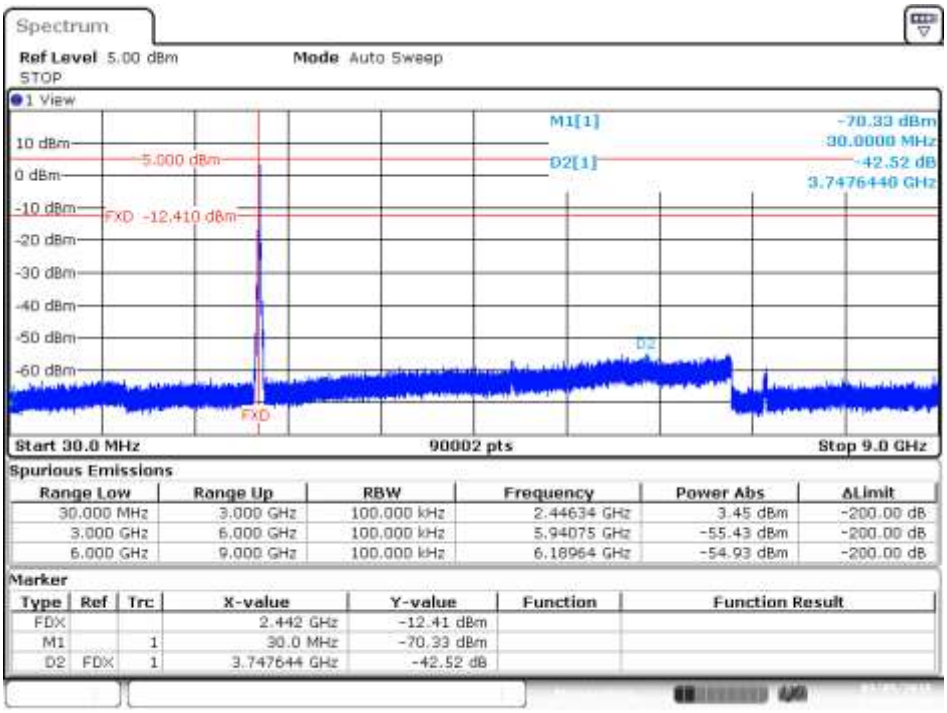
Date: 2.MAR.2018 13:54:17

Channel 7 - Spurious 3 Delta Marker Measurement



MIMO-B, 802.11n20, HT8

Channel 7 - Spurious 1 Delta Marker Measurement



Spurious Emissions

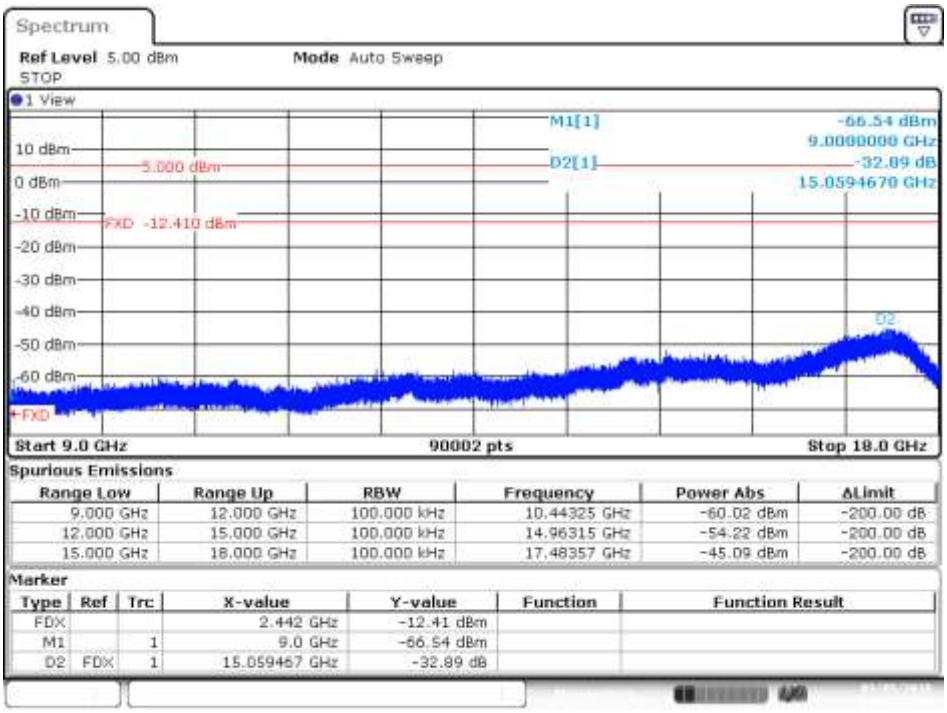
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.44634 GHz	3.45 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.94075 GHz	-55.43 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.18964 GHz	-54.93 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-12.41 dBm		
M1		1	30.0 MHz	-70.33 dBm		
D2	FDX	1	3.747644 GHz	-42.52 dB		

Date: 5.MAR.2018 16:07:23

Channel 7 - Spurious 2 Delta Marker Measurement



Spurious Emissions

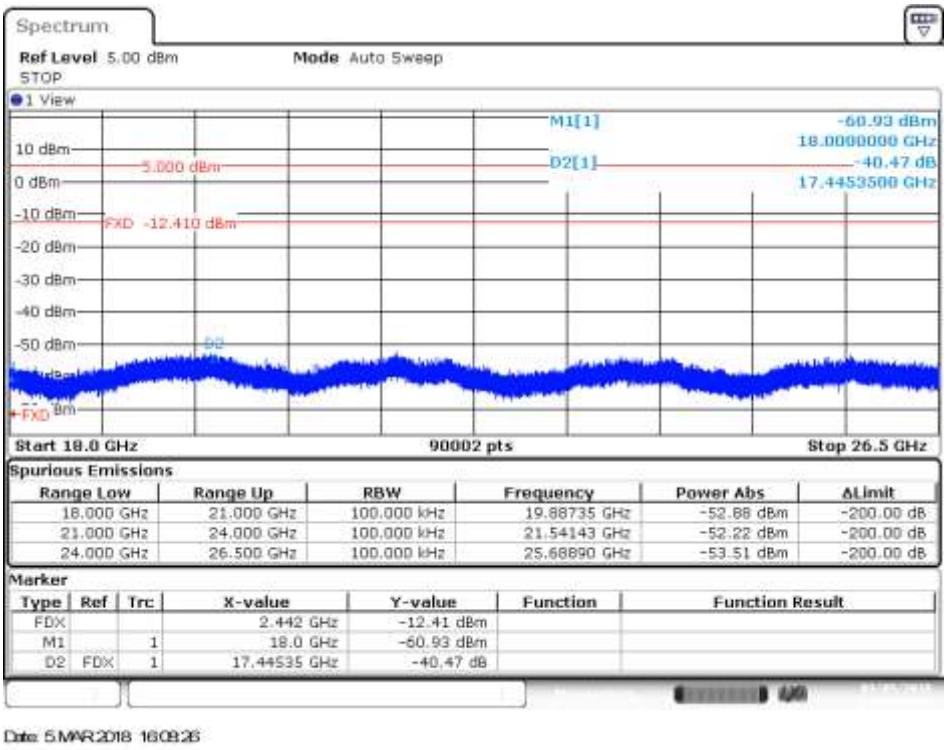
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	10.44325 GHz	-60.02 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.96315 GHz	-54.22 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	17.48357 GHz	-45.09 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-12.41 dBm		
M1		1	9.0 GHz	-66.54 dBm		
D2	FDX	1	15.059467 GHz	-32.89 dB		

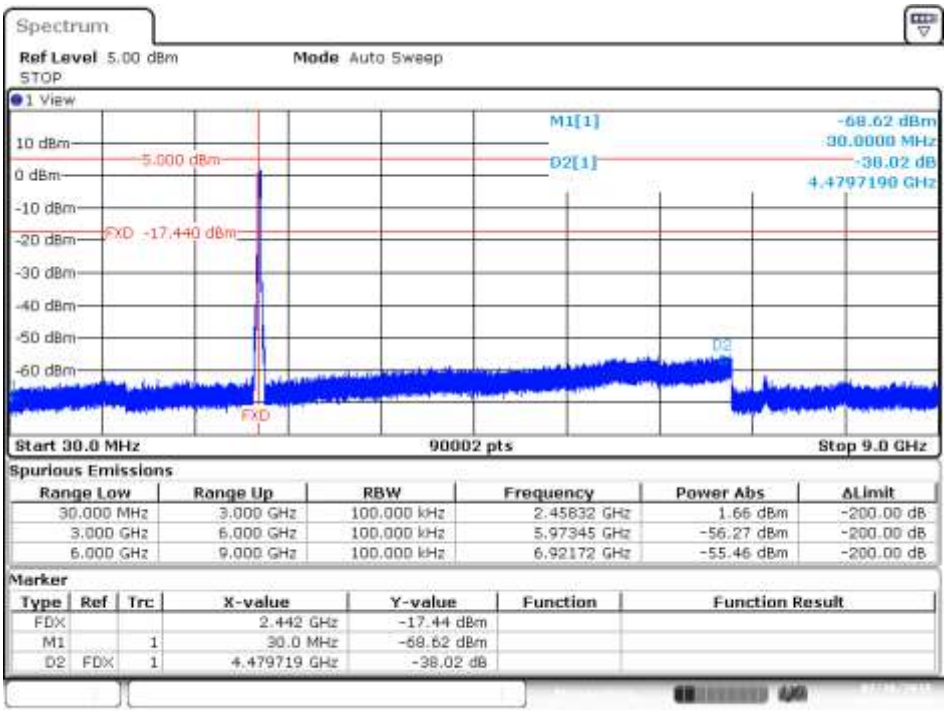
Date: 5.MAR.2018 16:07:55

Channel 7 - Spurious 3 Delta Marker Measurement



MIMO-A, 802.11n40, HT8

Channel 7F - Spurious 1 Delta Marker Measurement



Spurious Emissions

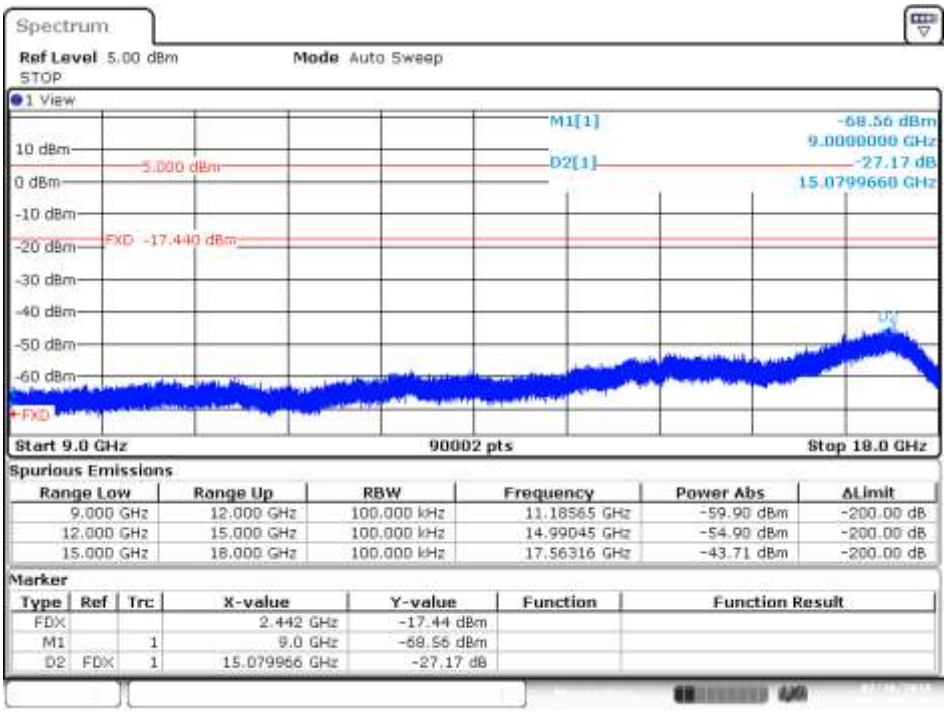
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.45832 GHz	1.66 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.97345 GHz	-56.27 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.92172 GHz	-55.46 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-17.44 dBm		
M1		1	30.0 MHz	-68.62 dBm		
D2	FDX	1	4.479719 GHz	-38.02 dB		

Date: 16.FEB.2018 14:12:45

Channel 7F - Spurious 2 Delta Marker Measurement



Spurious Emissions

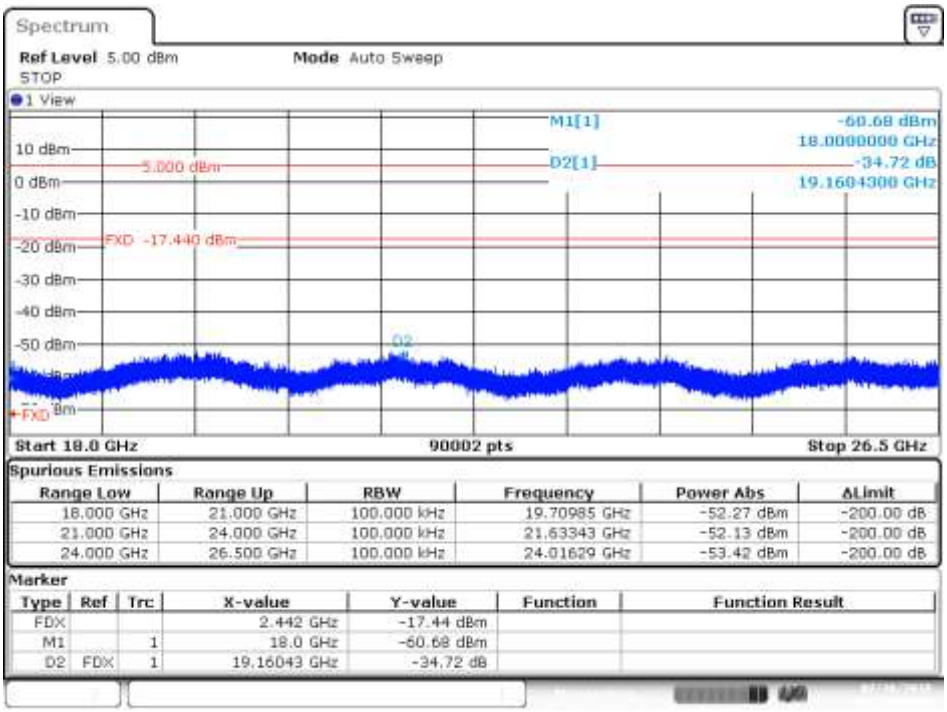
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.18565 GHz	-59.90 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.99045 GHz	-54.90 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	17.56316 GHz	-43.71 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-17.44 dBm		
M1		1	9.0 GHz	-68.56 dBm		
D2	FDX	1	15.079966 GHz	-27.17 dB		

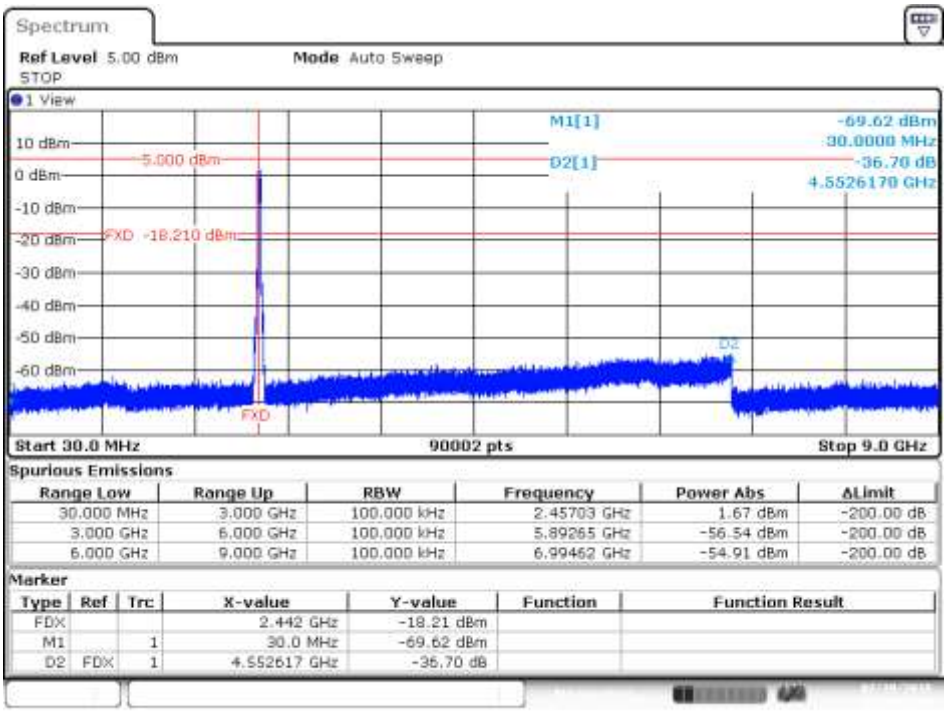
Date: 16.FEB.2018 14:13:11

Channel 7F - Spurious 3 Delta Marker Measurement



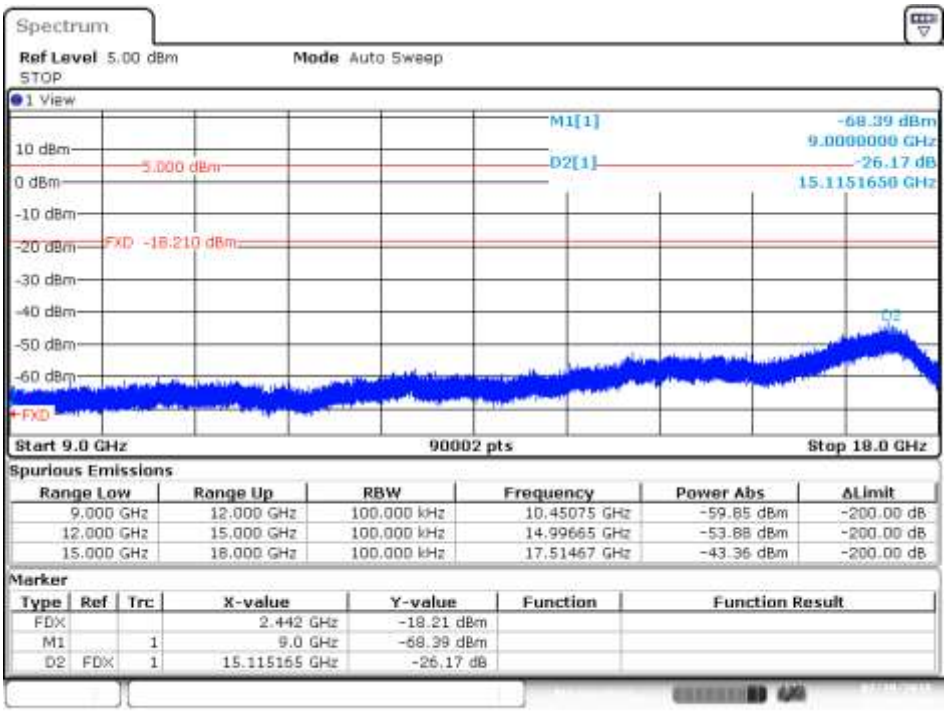
MIMO-B, 802.11n40, HT8

Channel 7F - Spurious 1 Delta Marker Measurement



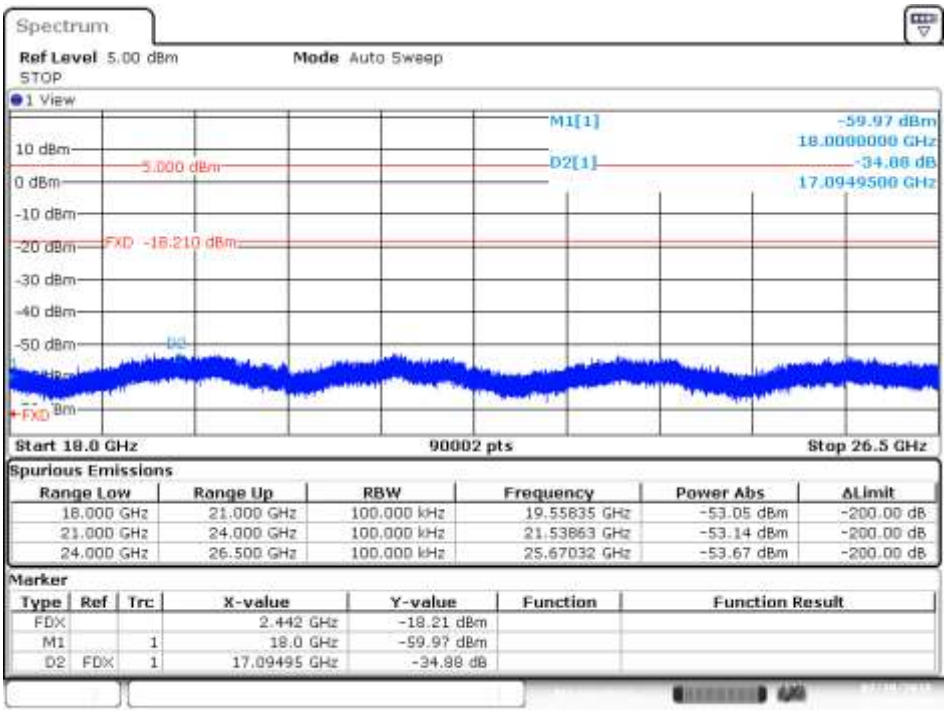
Date: 19.FEB.2018 11:32:02

Channel 7F - Spurious 2 Delta Marker Measurement



Date: 19.FEB.2018 11:32:27

Channel 7F - Spurious 3 Delta Marker Measurement



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
18.000 GHz	21.000 GHz	100.000 kHz	19.55835 GHz	-53.05 dBm	-200.00 dB
21.000 GHz	24.000 GHz	100.000 kHz	21.53863 GHz	-53.14 dBm	-200.00 dB
24.000 GHz	26.500 GHz	100.000 kHz	25.67032 GHz	-53.67 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.442 GHz	-18.21 dBm		
M1		1	18.0 GHz	-59.97 dBm		
D2	FDX	1	17.09495 GHz	-34.88 dB		

Date: 19.FEB.2018 11:32:53

Annex C. Test Results BLE

C.1 Test Results BLE

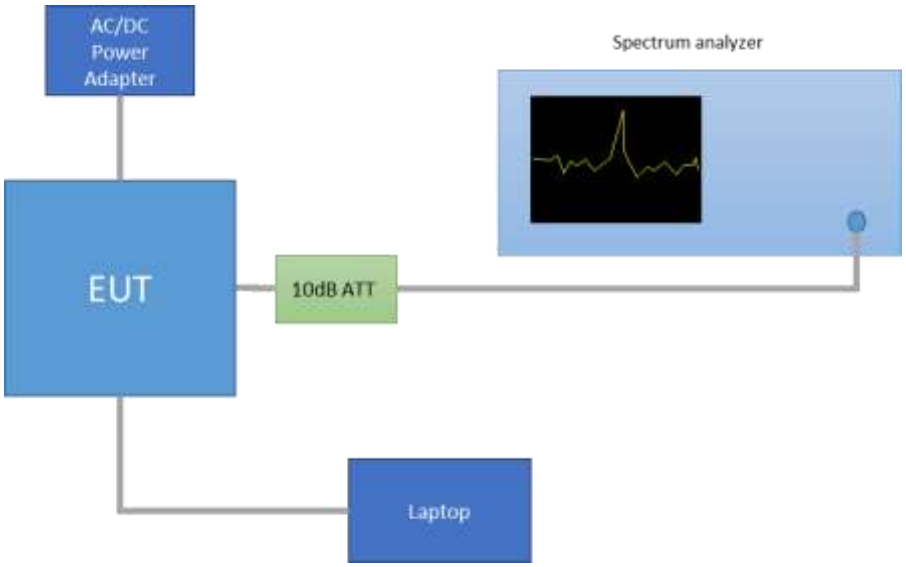
C.1.1 6dB & 99% Bandwidth

Test limits

FCC part	RSS part	Limits
15.247 (a) (2)	RSS-247 Clause 5.2 (a)	Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

The setup below was used to measure the 6dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



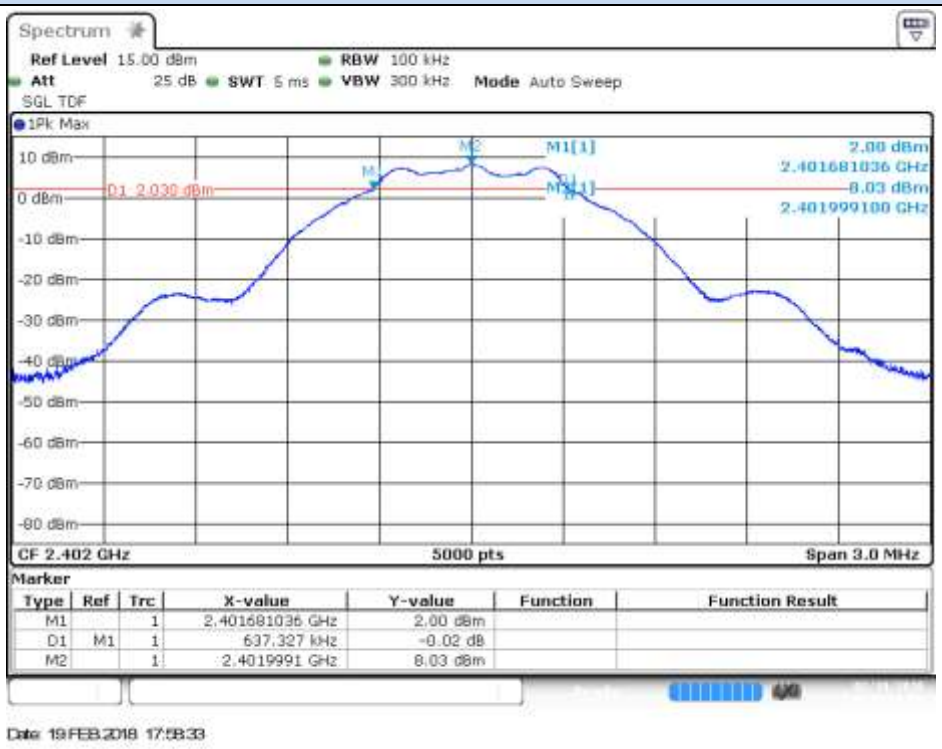
Results tables

Mode	Channel	Frequency [MHz]	6dB BW [MHz]	99% BW [MHz]
BLE	0	2402	0.64	1.15
	19	2440	0.65	1.15
	39	2480	0.65	1.15

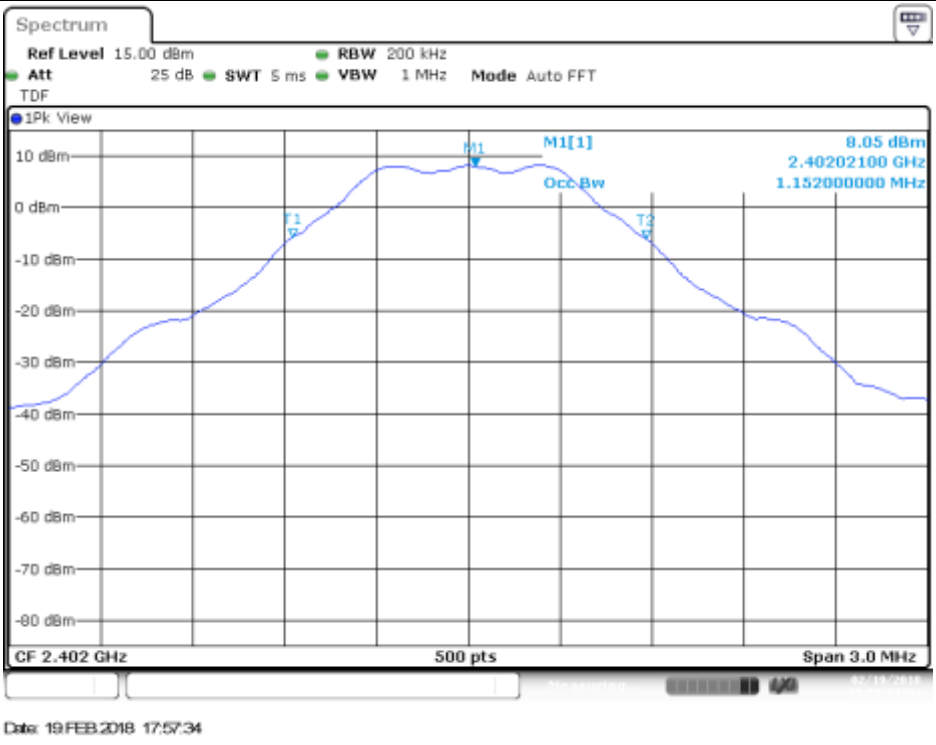
Results screenshot

BLE

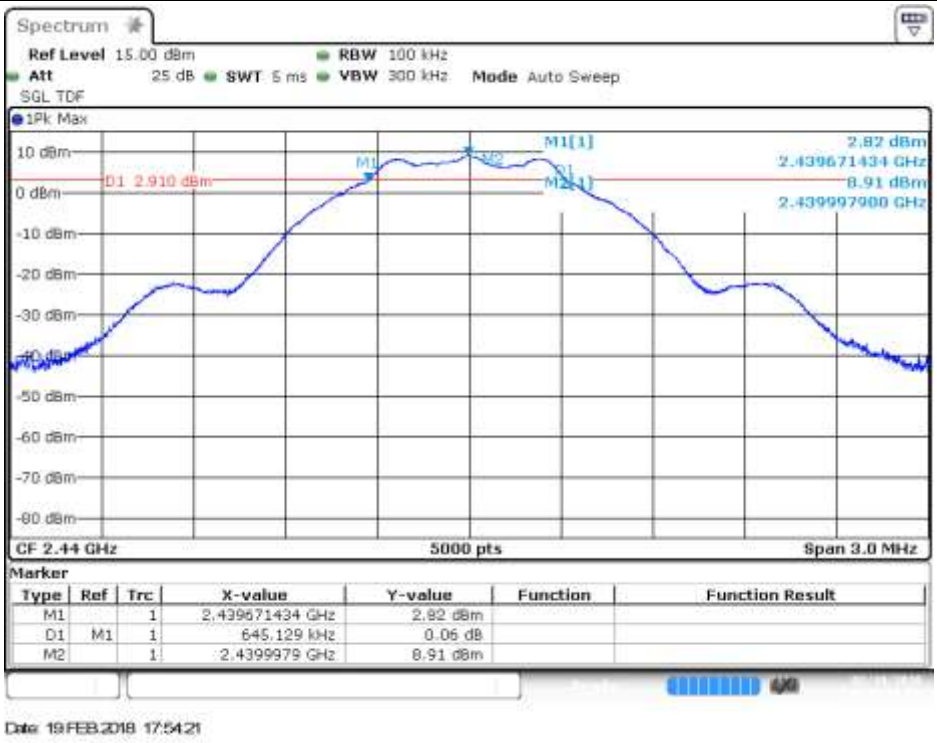
6dB BW – CH0



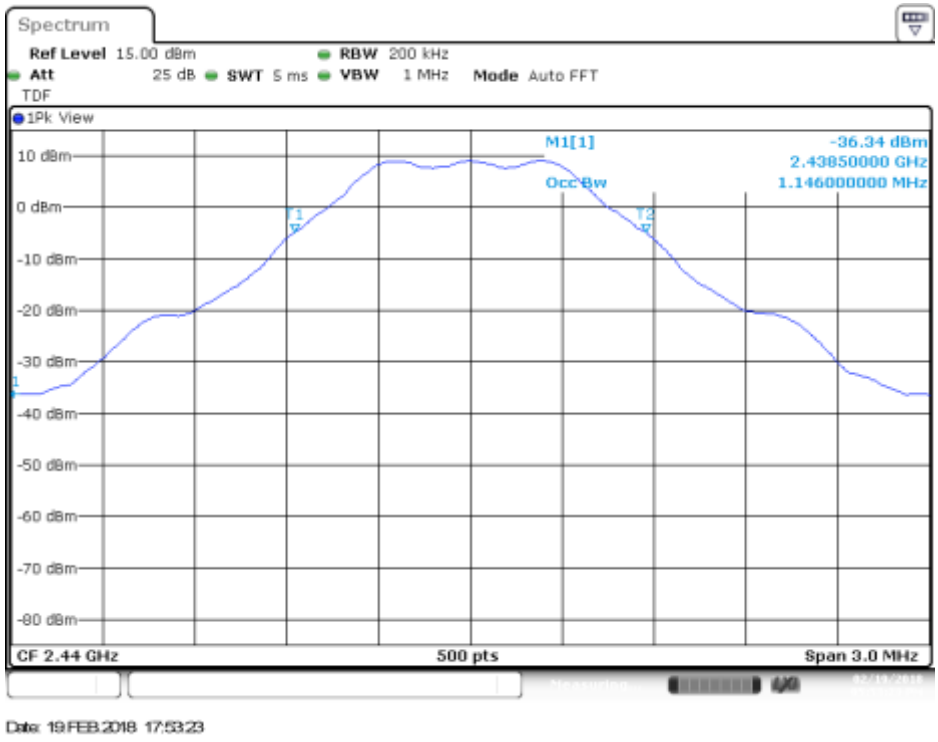
99% BW – CH0



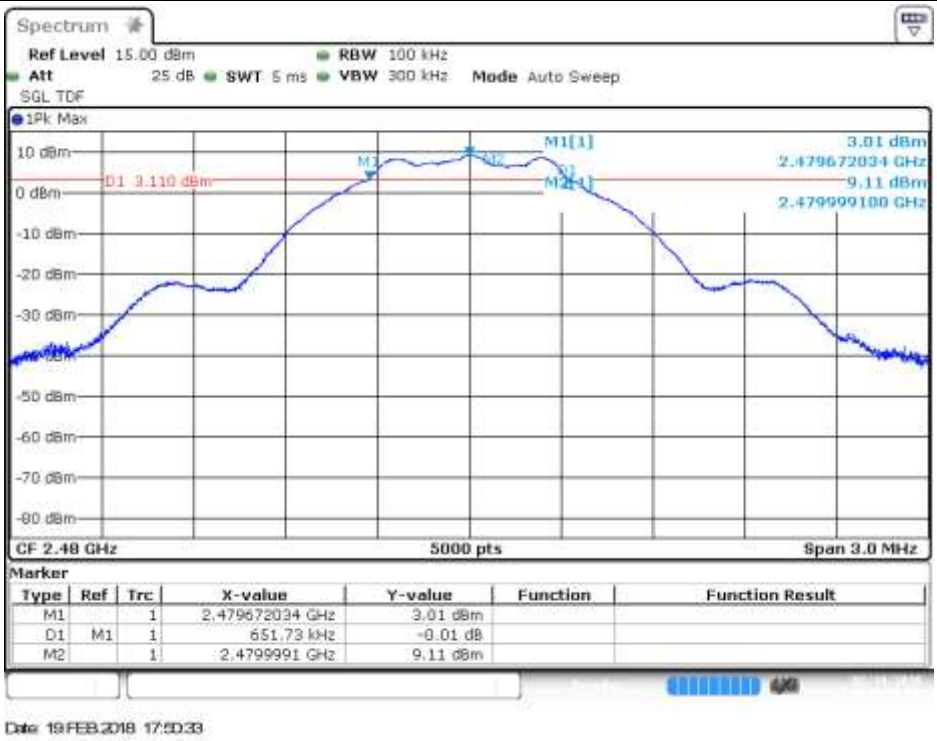
6dB BW – CH19



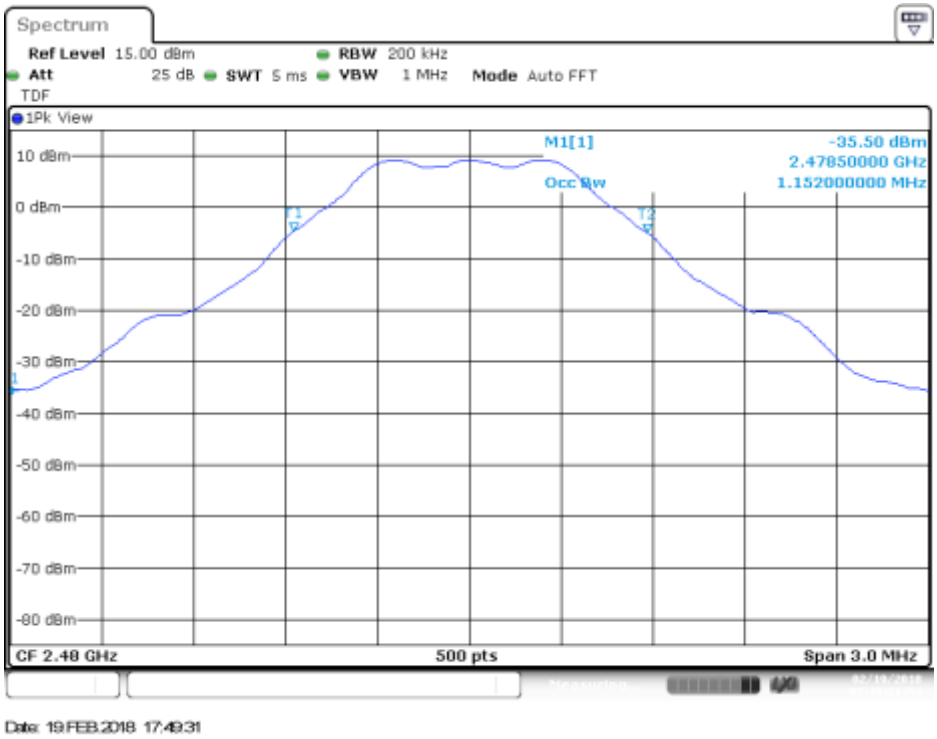
99% BW – CH19



6dB BW – CH39



99% BW – CH39



C.1.2 Maximum Output Power and antenna gain

Test limits

	Limits
FCC Part 15.247 (b) (3)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.
RSS-247 Clause 5.4 (d)	For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode

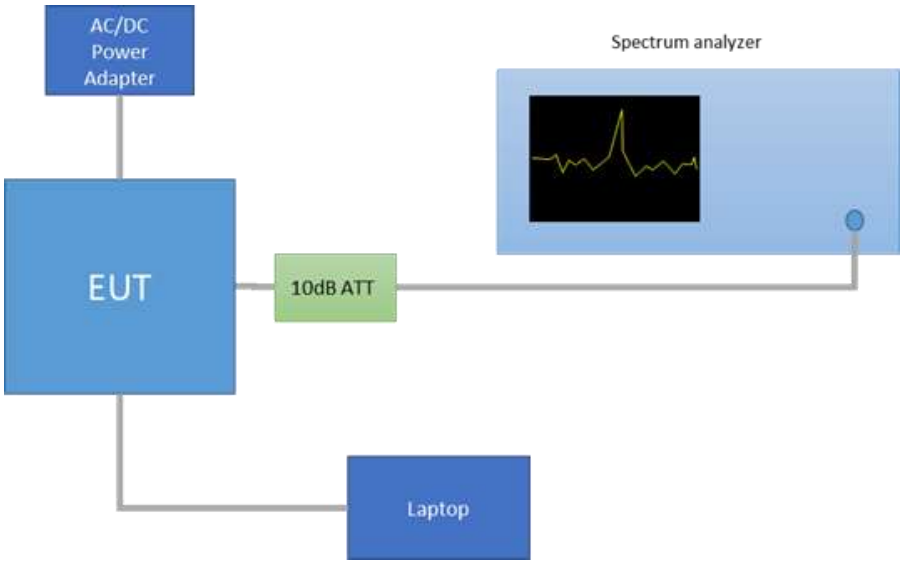
Test procedure:

The Maximum peak conducted output power was measured using the *RBW ≥ DTS bandwidth* method defined in paragraph 9.1.1 of FCC KDB 558074 D01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

The Maximum conducted average output power was measured using the channel integration method according to Method AVGSA-2, defined in paragraph 9.2.2.4 of FCC KDB 558074 D01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power. The declared maximum antenna gain is 3.24dBi.

The setup below was used to measure the maximum conducted output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



Results tables

				Peak Power [dBm]		
Mode	Meas. Duty Cycle [%]	CH	Frequency [MHz]	Measured Conducted Output Power	EIRP	Peak Output Power [mW]
BLE	61.81	0	2402	8.25	11.49	**6.68**
		19	2440	9.10	12.34	8.13
		39	2480	9.32	12.56	**8.55**

Max Value
Min Value

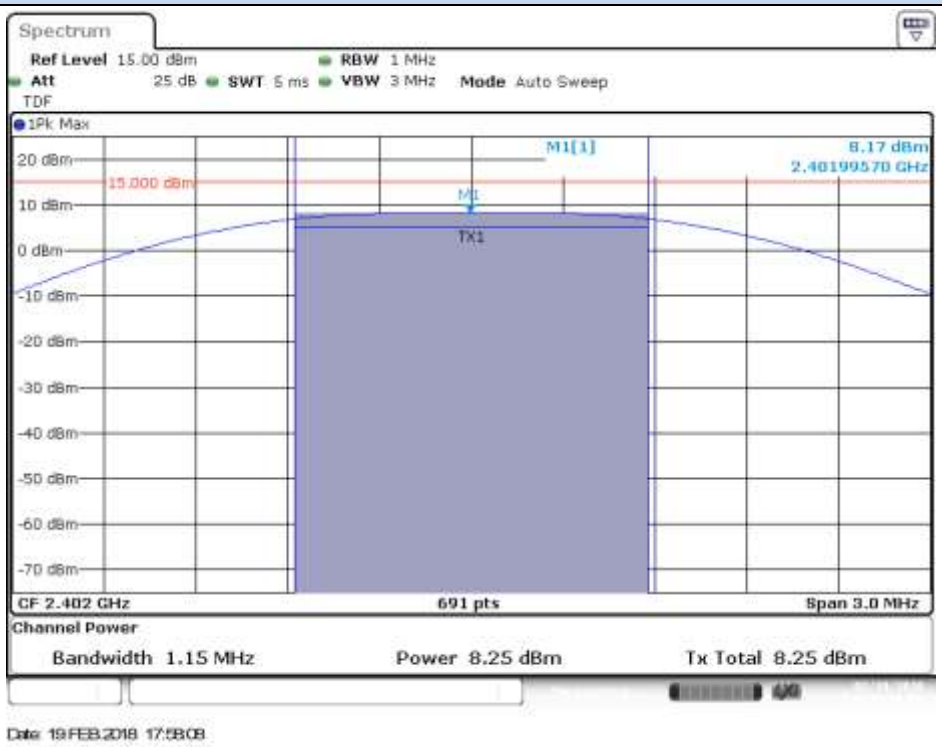
				Average Output Power* [dBm]			
Mode	Meas. Duty Cycle [%]	CH	Frequency [MHz]	Maximum Conducted Output Power	Maximum Conducted Output Power Duty cycle Compensated	EIRP	Average Output Power [mW]
BLE	61.81	0	2402	6.04	8.13	11.37	6.50
		19	2440	6.92	9.01	12.25	7.96
		39	2480	7.11	9.20	12.44	8.32

* Output Power RMS values are shown for indicative purpose only

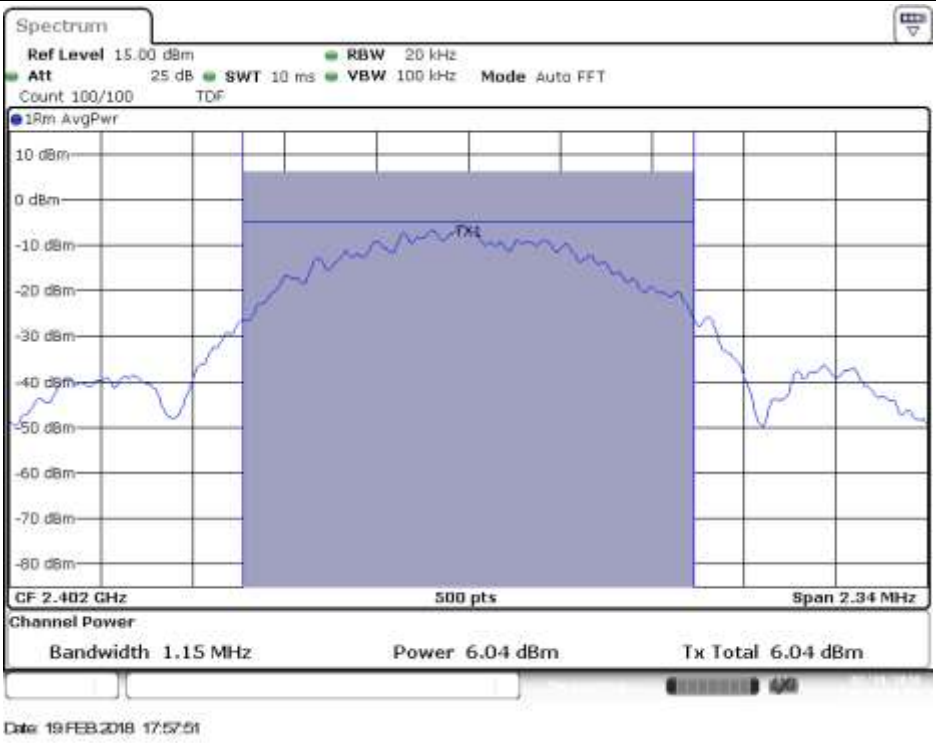
Results screenshot

BLE

Max Power Peak – CH0

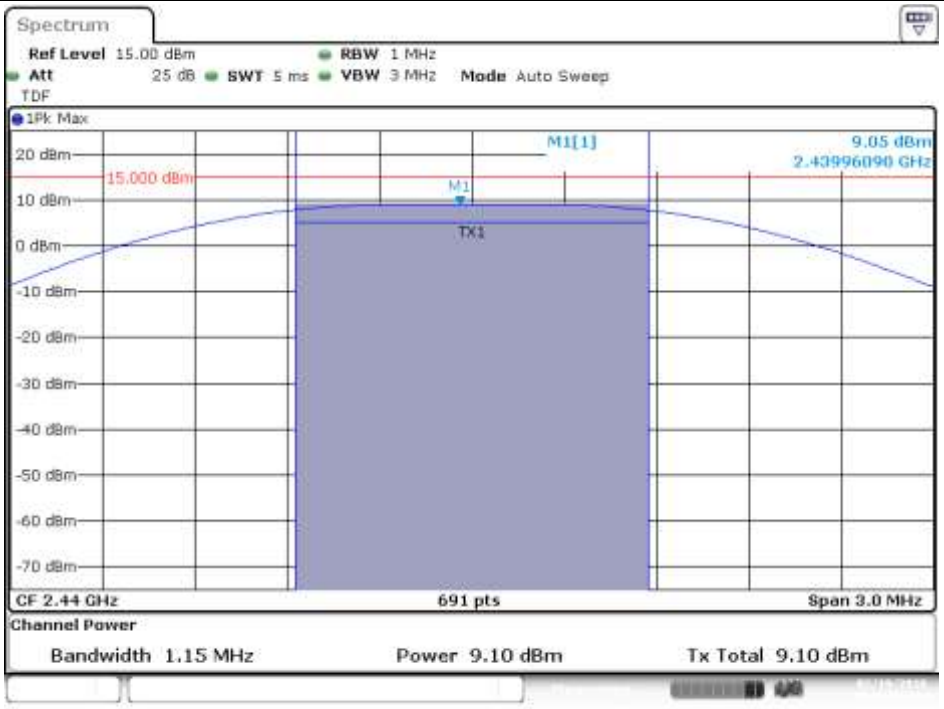


Max Power RMS – CH0



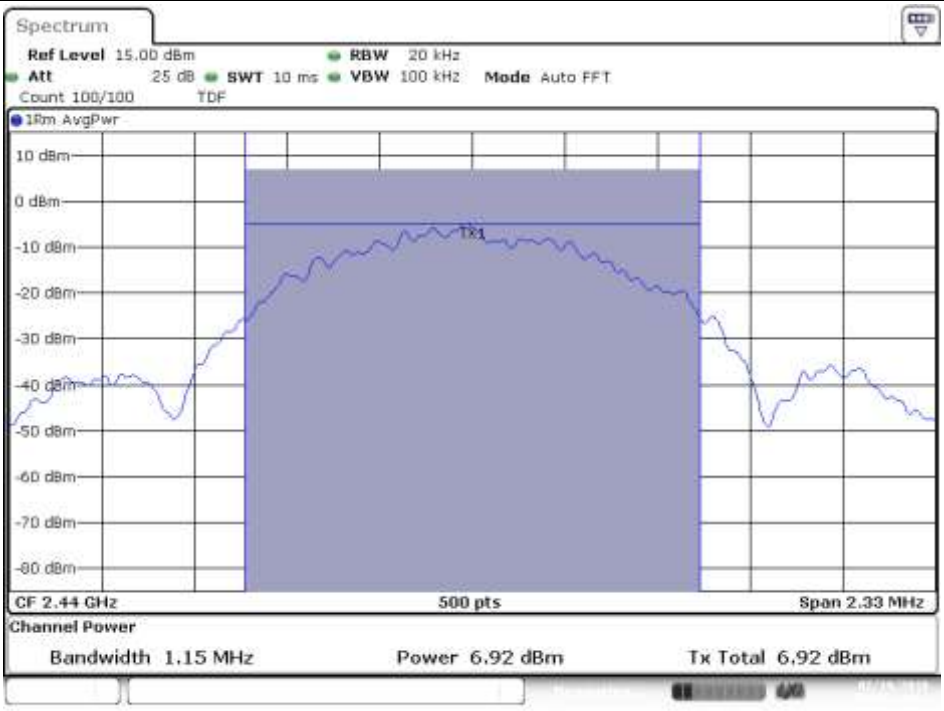
BLE

Max Power Peak – CH19



Date: 19.FEB.2018 17:53:56

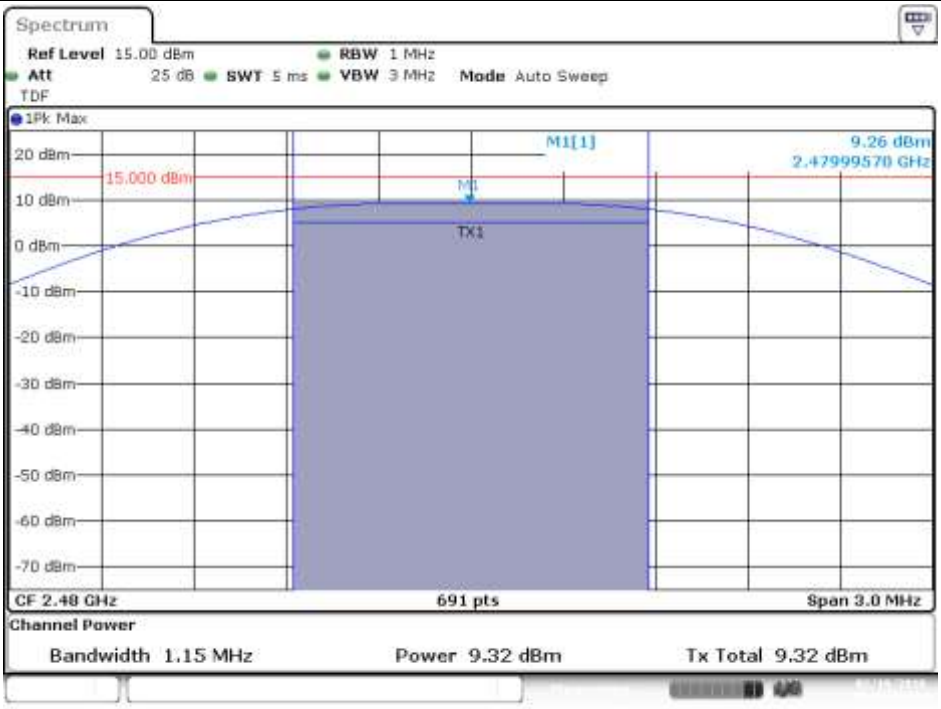
Max Power RMS – CH19



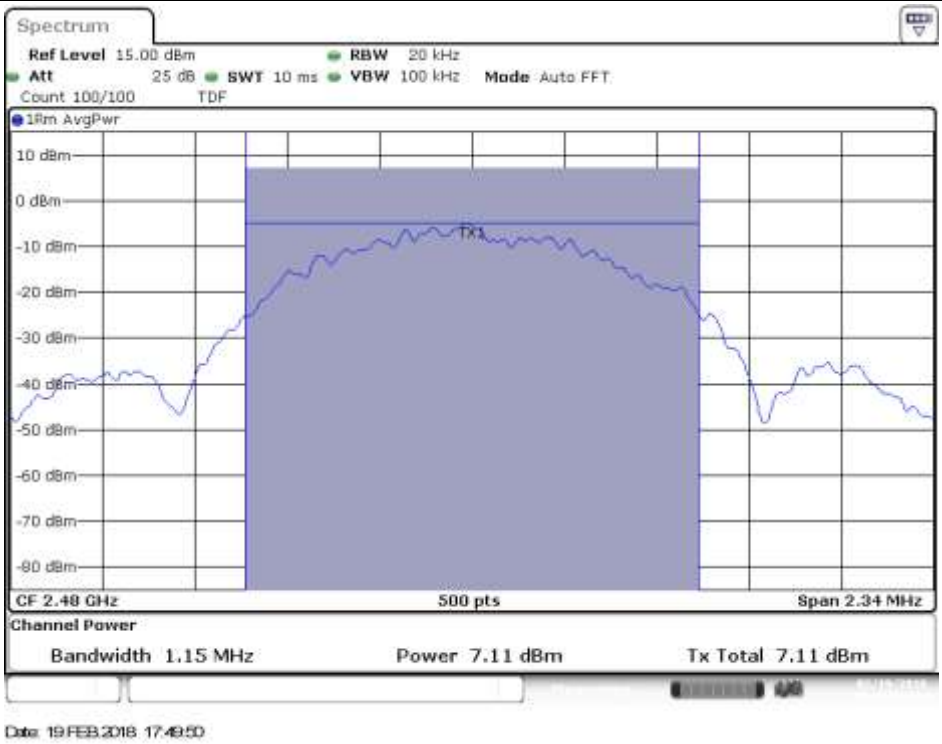
Date: 19.FEB.2018 17:53:40

BLE

Max Power Peak – CH39



Max Power RMS – CH39



C.1.3 Power Spectral Density

Test limits

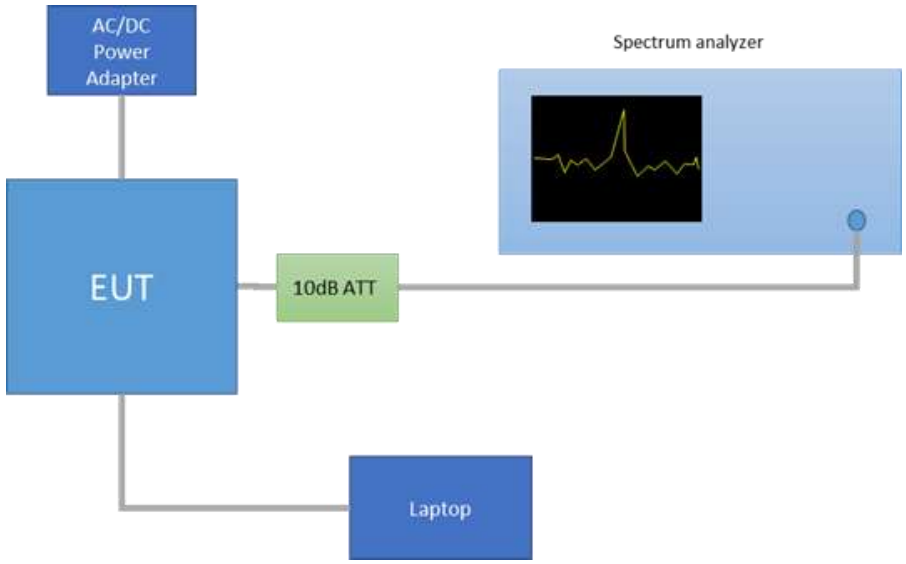
FCC part	RSS part	Limits
15.247 (e)	RSS-247 Clause 5.2 (b)	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test procedure

The maximum peak power spectral density level of the fundamental emission was measured using the method PKPSD, defined in paragraph 10.2 of FCC KDB 558074 D01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

The setup below was used to measure the power spectral density. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

The declared maximum antenna gain is 3.24dBi.

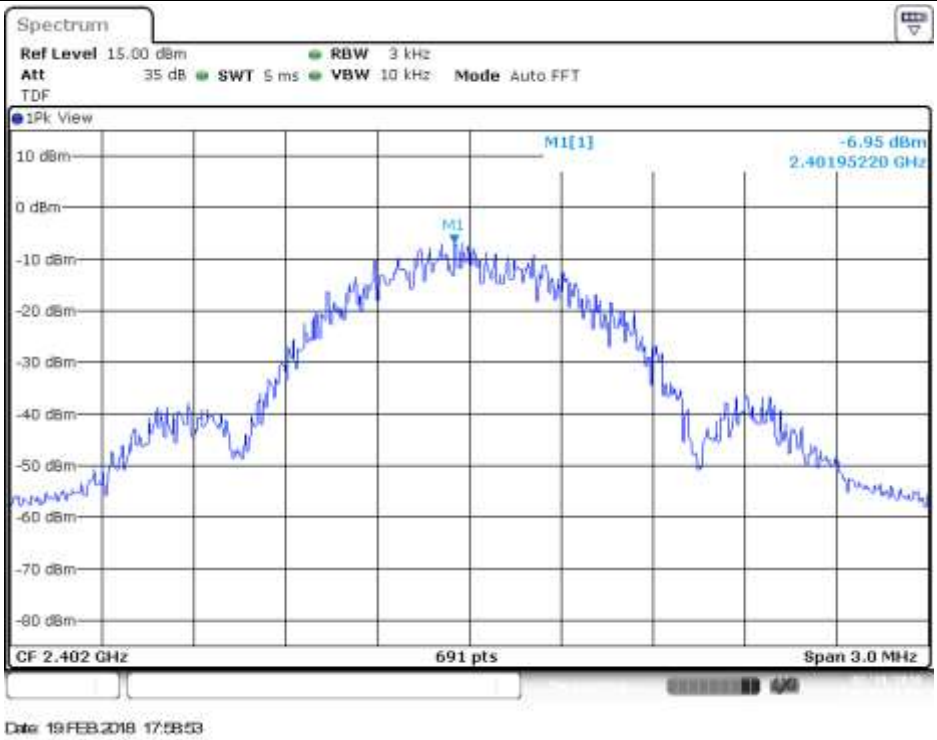


Results tables

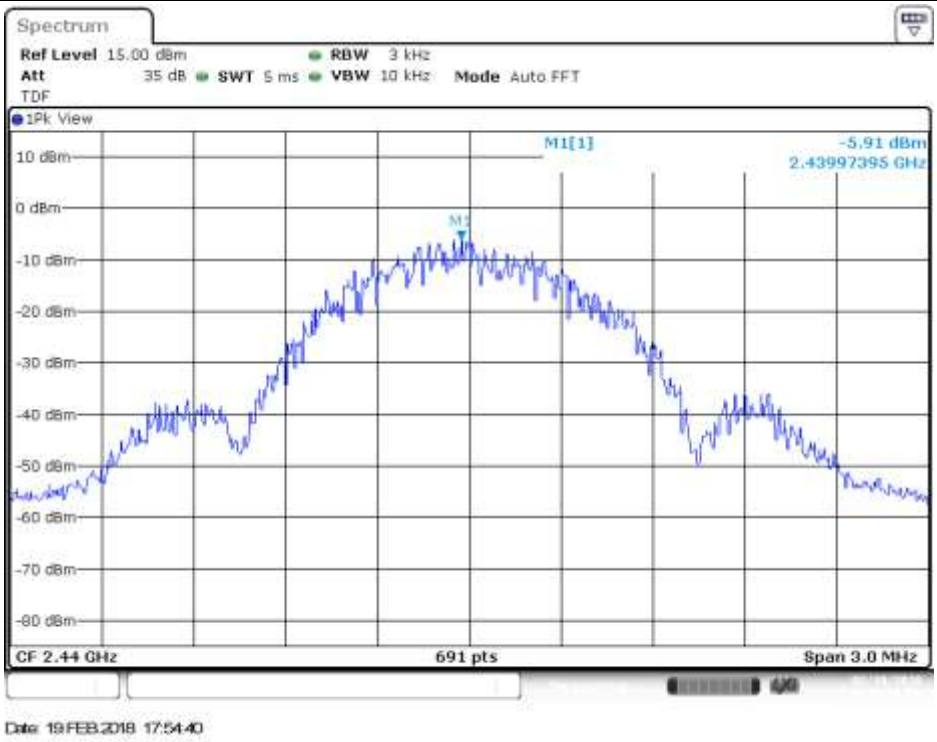
Mode	CH	Frequency [MHz]	PSD Peak [dBm]
BLE	0	2402	-6.95
	19	2440	-5.91
	39	2480	-5.62

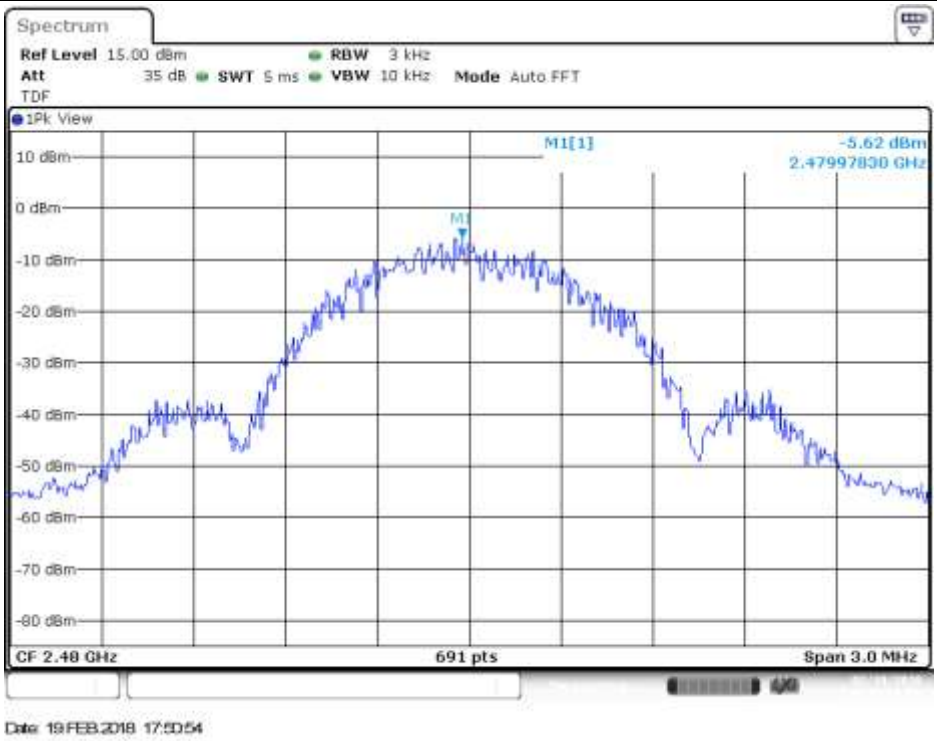
BLE

PSD Peak – CH0



PSD Peak – CH19



PSD Peak – CH39


C.1.4 Out-of-band emission (Conducted)

Test Limits

<table>
<tr><th>FCC part</th><th>RSS part</th><th>Limits</th></tr>
<tr><td>15.247 (d)</td><td>RSS-247
Clause 5.5</td><td>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.</td></tr>
<tr><td>15.209</td><td>RSS-Gen
Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Stregth (µV/m)</th><th>Field Stregth (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

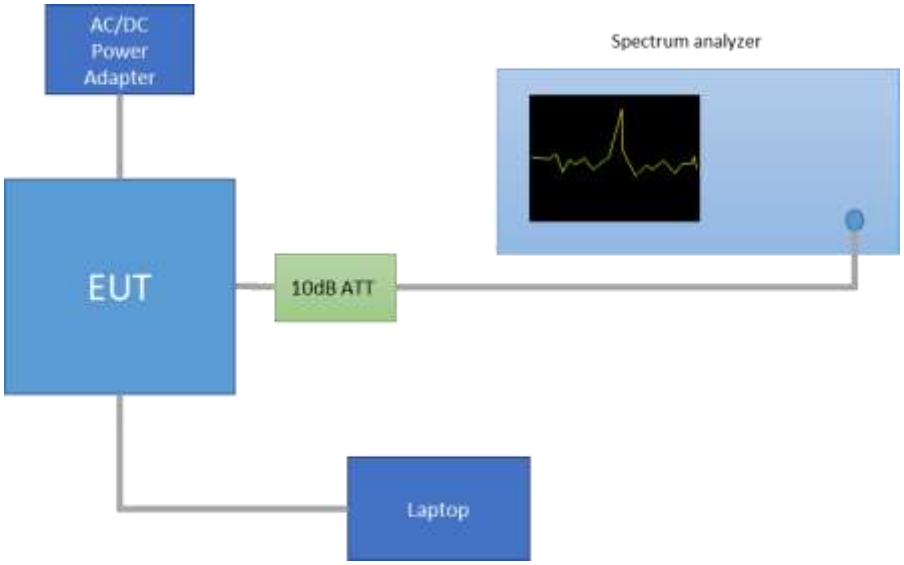
The setup below was used to measure the out-of-band emissions. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

In case of Band Edge measurements falling in restricted bands, the declared Antenna Gain is also compensated in the graph. The declared maximum antenna gain is 3.24dBi.

For Band Edge measurements falling in restricted bands, the following limits in dBm were applied for the average detector after the conversion from the limits detailed above in dBµV/m, according to FCC 47 CFR part 15 - Subpart C – §15.209(a). The limits in dBm for peak detector are 20dB above the indicated values in the table.

§15.209(a)			Converted values	
Freq Range (MHz)	Distance (m)	Field strength (microvolts/meter)	Field strength (dB microvolts/meter)	Power (dBm)
Above 960	3	500	54.0	-41.2

The setup below was used to measure the out-of-band emissions. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

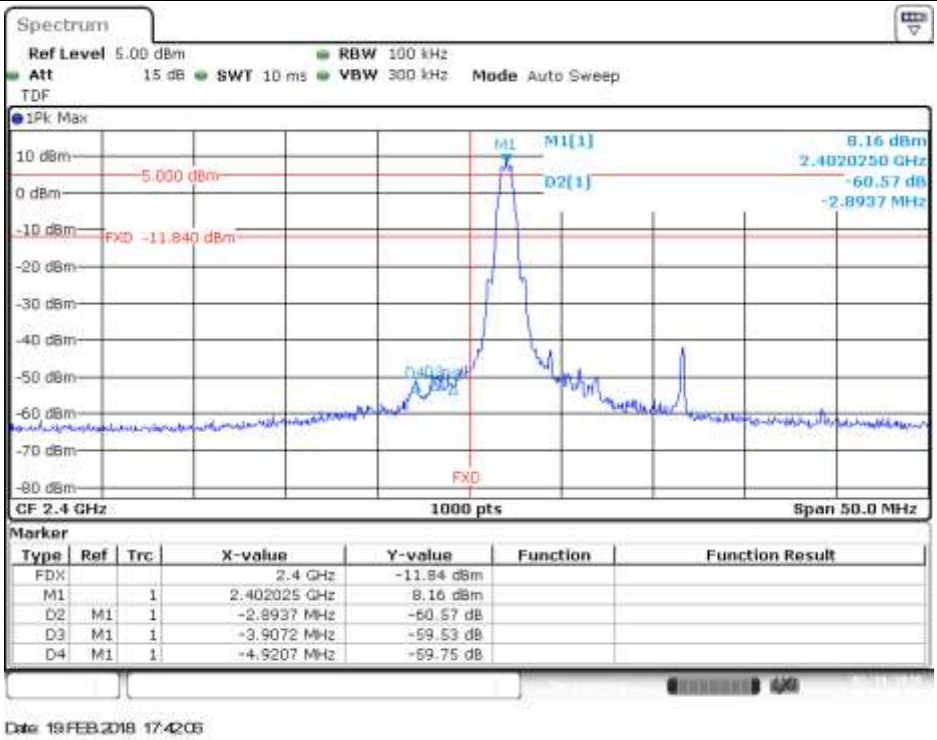


Note: these PSD_{Peak} values are shown just as a reference for the compliance of the Out-of-band Measurements. Thus the RBW used for these measurements was 100kHz.

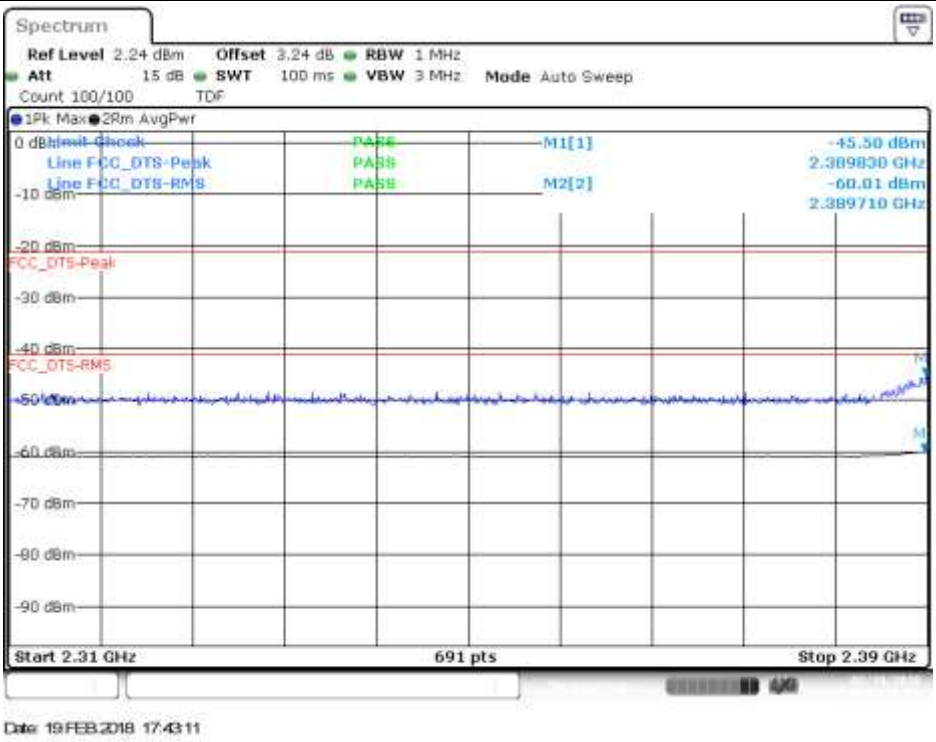
Mode	CH	Frequency [MHz]	PSD Peak [dBm]
BLE	0	2402	8.10
	19	2440	8.92
	39	2480	9.10

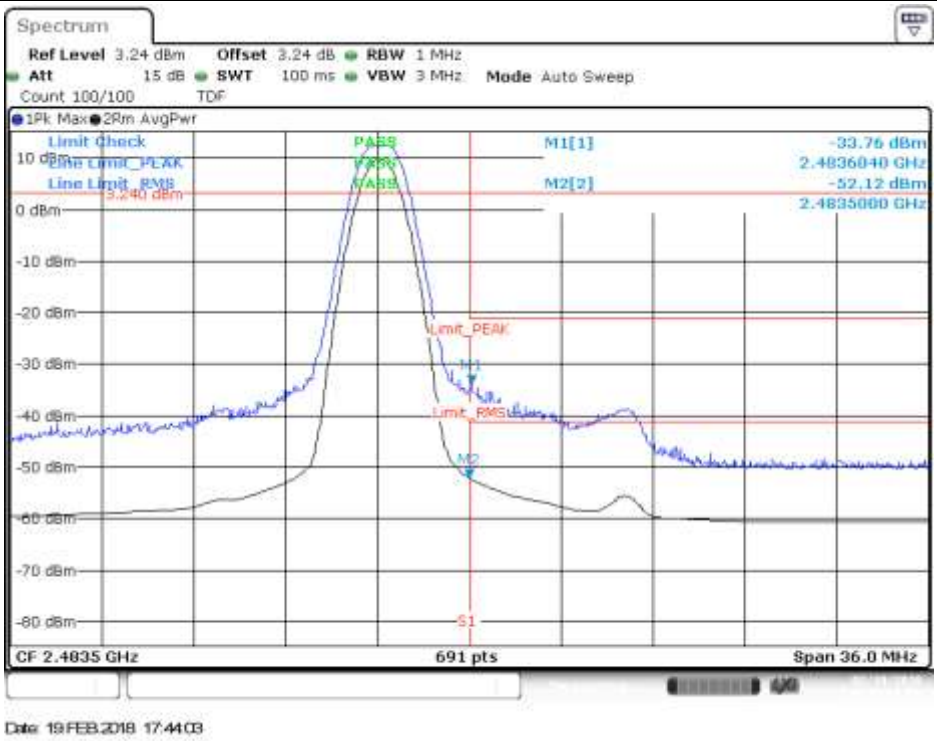
BLE

BE Low Freq Section – CH0



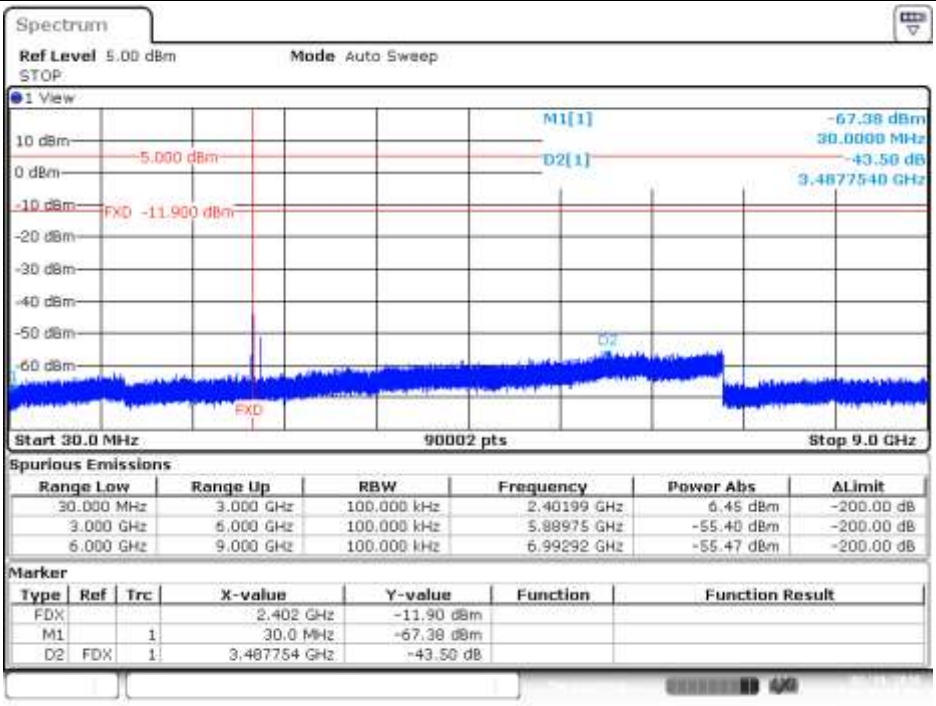
BE Low (Non Restricted) – CH0



BE High Freq Section (Restricted) – CH39


BLE, CH0

Cond Spur, 30MHz – 9GHz



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.40199 GHz	6.45 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.88975 GHz	-55.40 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.99292 GHz	-55.47 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.402 GHz	-11.90 dBm		
M1		1	30.0 MHz	-67.38 dBm		
D2	FDX	1	3.487754 GHz	-43.50 dB		

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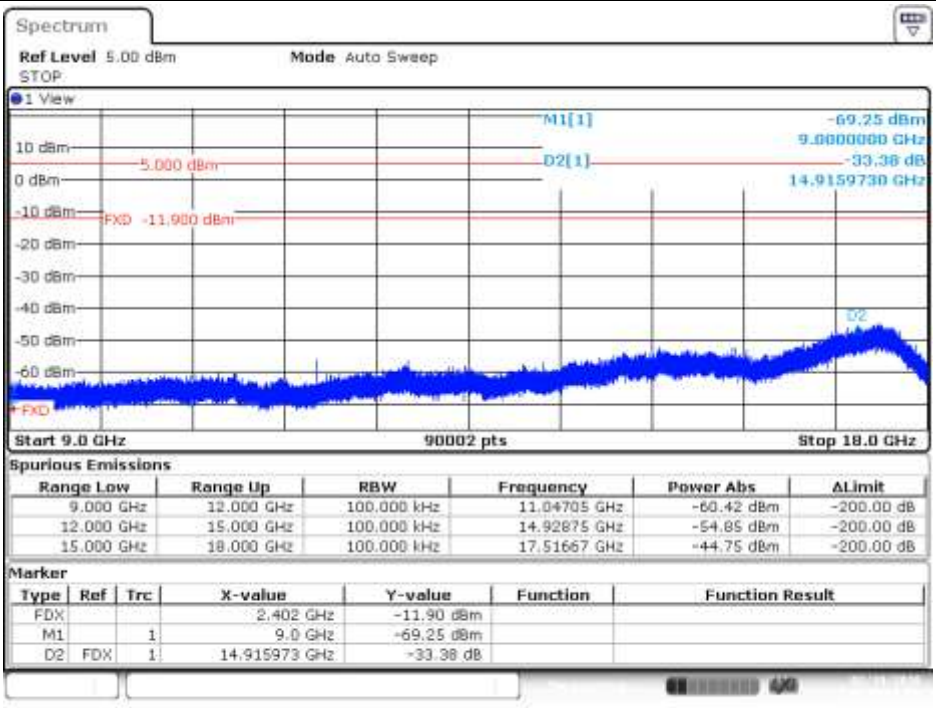
Cond Spur, 9GHz – 18GHz



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.04705 GHz	-60.42 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.92875 GHz	-54.85 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	17.51667 GHz	-44.75 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.402 GHz	-11.90 dBm		
M1		1	9.0 GHz	-69.25 dBm		
D2	FDX	1	14.915973 GHz	-33.38 dB		

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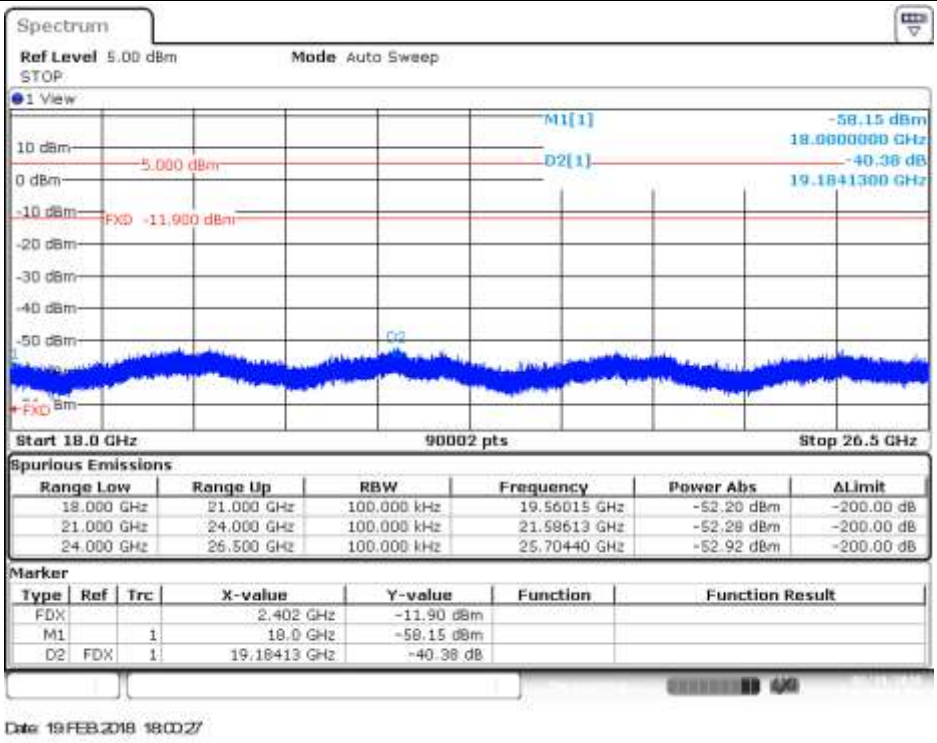
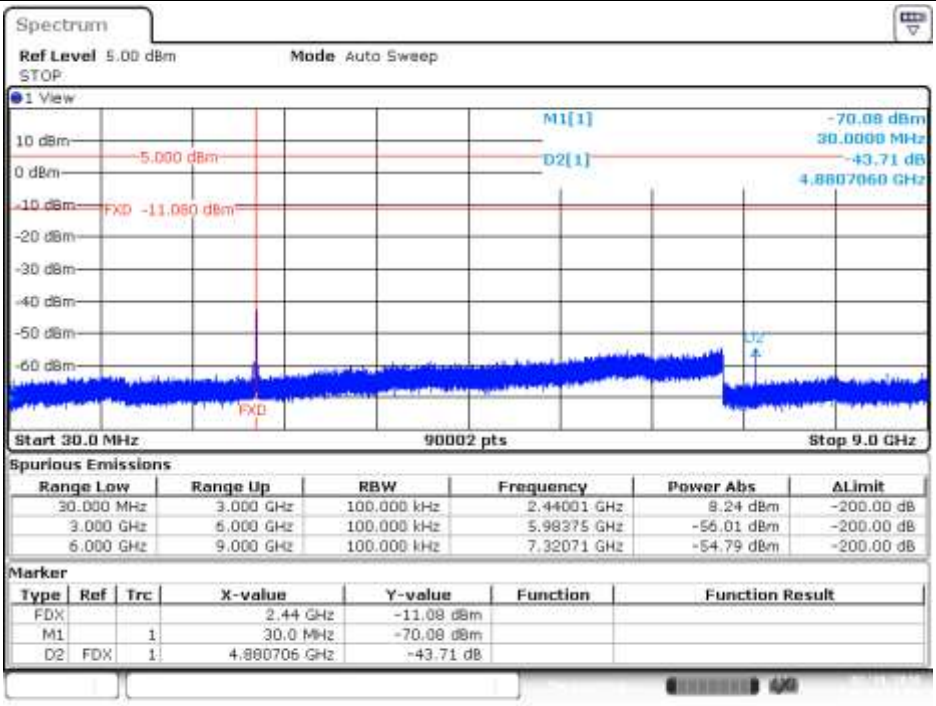
Cond Spur,18GHz – 26.5GHz



BLE, CH19

Cond Spur, 30MHz – 9GHz



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.44001 GHz	8.24 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.98375 GHz	-56.01 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	7.32071 GHz	-54.79 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.44 GHz	-11.08 dBm		
M1		1	30.0 MHz	-70.08 dBm		
D2	FDX	1	4.880706 GHz	-43.71 dB		

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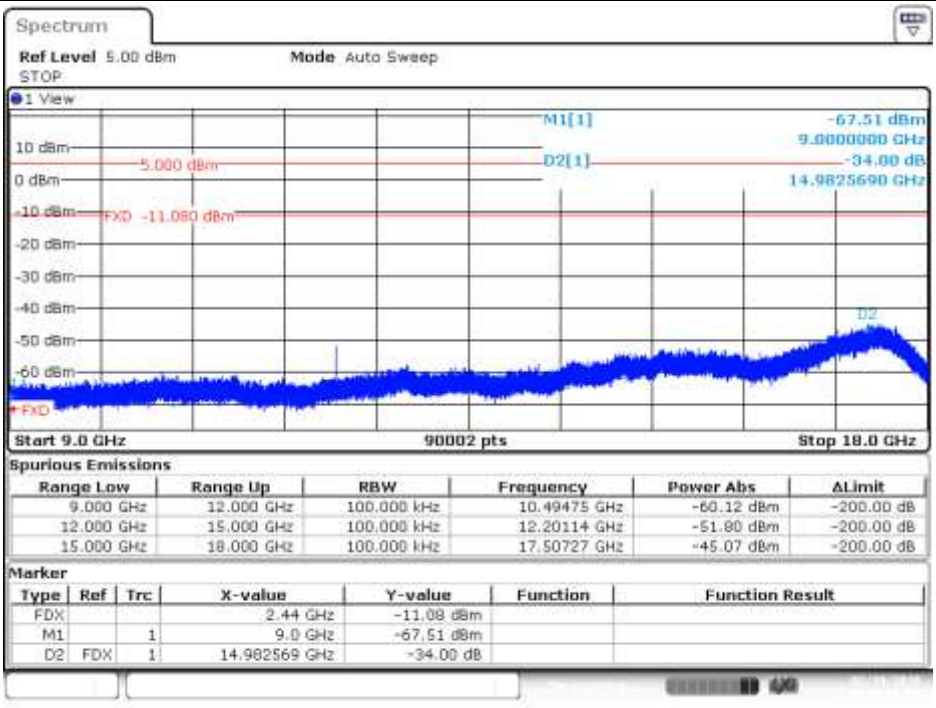
Cond Spur, 9GHz – 18GHz



Spurious Emissions

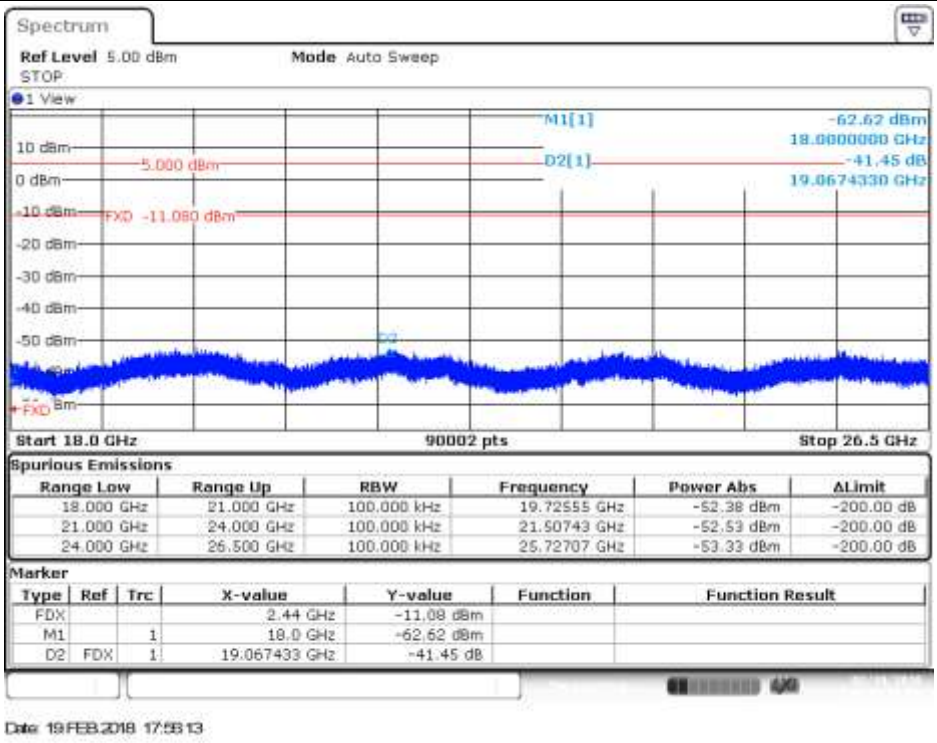
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	10.49475 GHz	-60.12 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	12.20114 GHz	-51.80 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	17.50727 GHz	-45.07 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.44 GHz	-11.08 dBm		
M1		1	9.0 GHz	-67.51 dBm		
D2	FDX	1	14.982569 GHz	-34.00 dB		

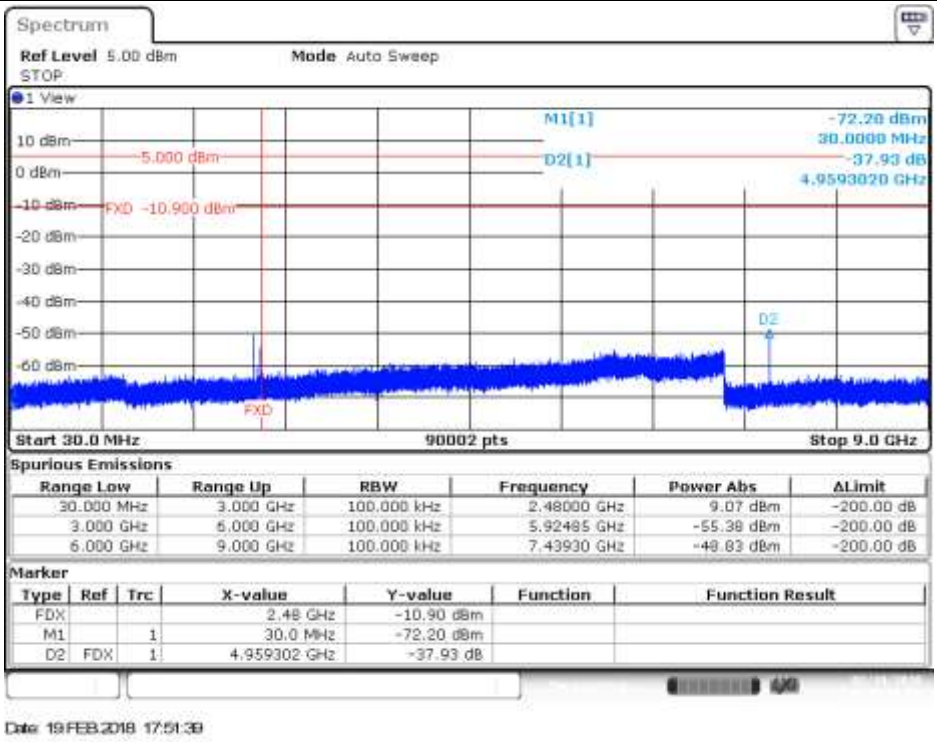
Date: 19.FEB.2018 17:55:48

Cond Spur,18GHz – 26.5GHz

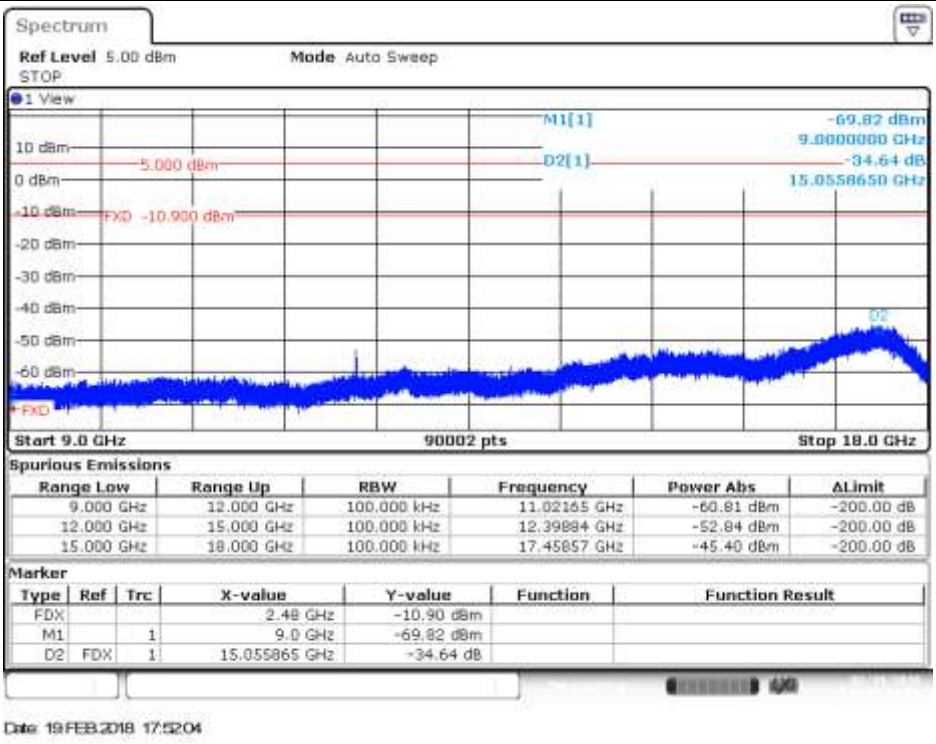


BLE, CH39

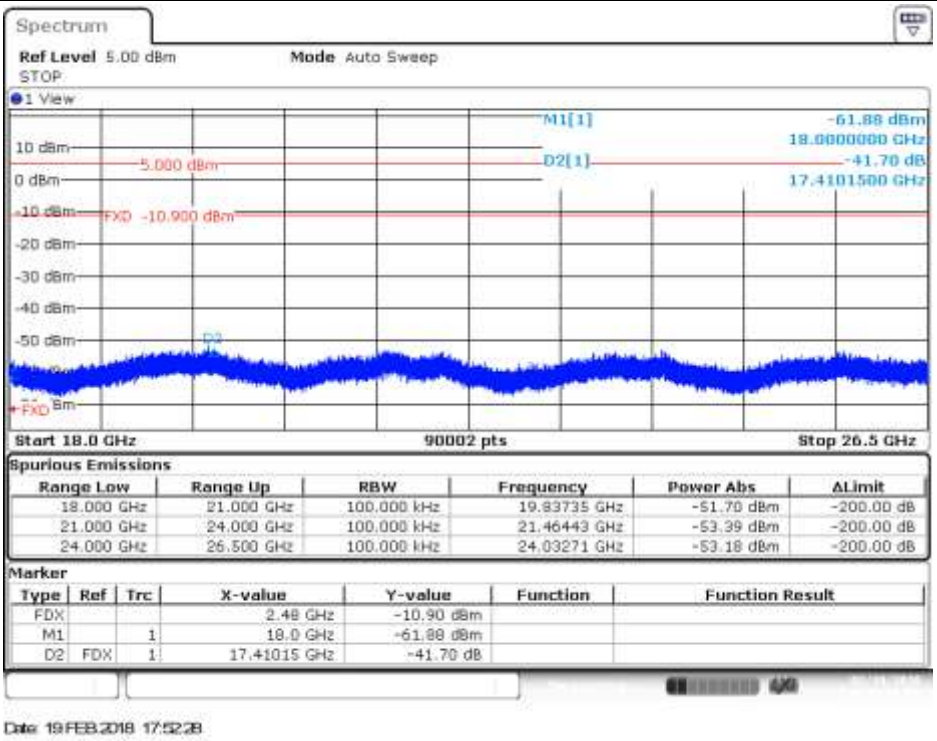
Cond Spur, 30MHz – 9GHz



Cond Spur, 9GHz – 18GHz



Cond Spur,18GHz – 26.5GHz



C.1.5 Radiated spurious emission

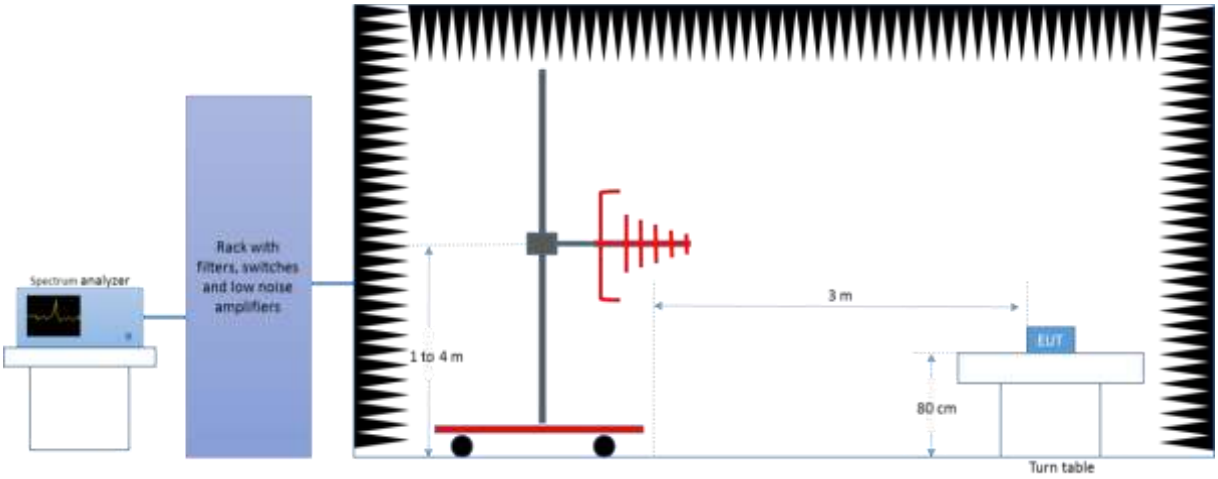
Standards references

<table>
<tr><th>FCC part</th><th>RSS part</th><th>Limits</th></tr>
<tr><td>15.247 (d)
15.209</td><td>RSS-247
Clause 5.5
RSS-Gen
Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Stregth (µV/m)</th><th>Field Stregth (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

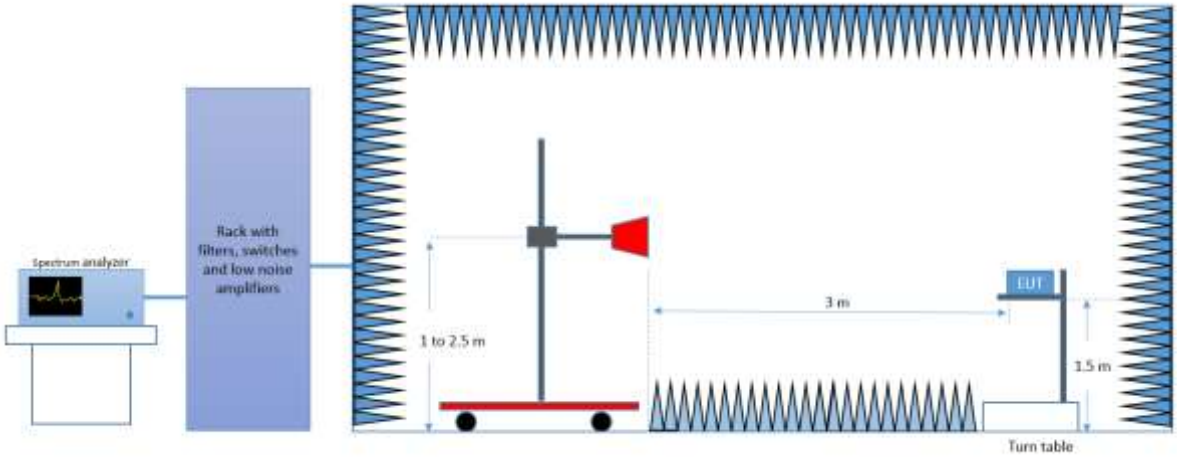
Test procedure

The setups below were used to measure the radiated spurious emissions.
Depending of the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emissions were measured on the lowest, middle and highest channels.

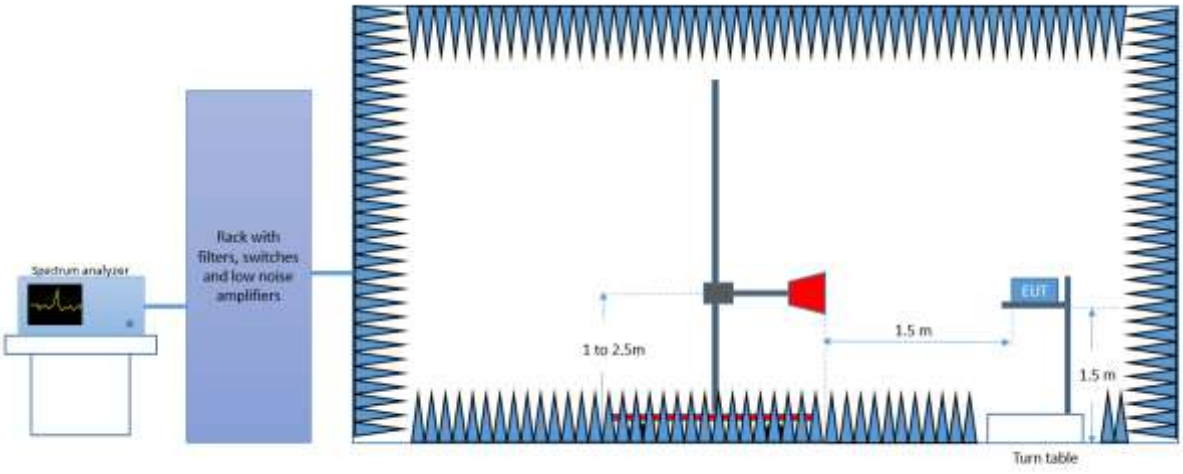
Radiated Setup 30 MHz - 1GHz



Radiated Setup 1 GHz - 18 GHz



Radiated Setup 18 GHz – 26.5 GHz



Sample Calculation

The field strength is deduced from the radiated measurement using the following equation:

$$E = 126.8 - 20\log(\lambda) + P - G$$

where

E is the field strength of the emission at the measurement distance, in dBµV/m

P is the power measured at the output of the test antenna, in dBm

λ is the wavelength of the emission under investigation [300/f_{MHz}], in m

G is the gain of the test antenna, in dBi

NOTE – The measured power P includes all applicable instrument correction factors up to the connection to the test

Antenna e.g. cable losses, amplifier gains.

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{SpecLimit} = E_{Meas} + 20\log(D_{Meas}/D_{SpecLimit})$$

where

$E_{SpecLimit}$ *is the field strength of the emission at the distance specified by the limit, in dBµV/m*

E_{Meas} *is the field strength of the emission at the measurement distance, in dBµV/m*

D_{Meas} *is the measurement distance, in m*

$D_{SpecLimit}$ *is the distance specified by the limit, in m*

Test Results

30 MHz – 26.5 GHz, BLE

Radiated Spurious – CH0

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	28.8	---	43.6	14.8
216.0	27.1	---	43.6	16.5
576.0	36.2	---	46.0	9.8
1113.4	---	40.6	54.0	13.4
1151.9	---	40.2	54.0	13.8
1190.0	53.6	---	74.0	20.4
1190.3	---	42.2	54.0	11.8
12011.0	---	40.0	54.0	14.0
12011.5	51.5	---	74.0	22.5
24237.9	---	34.9	54.0	19.1
24312.3	47.7	---	74.0	26.3

Radiated Spurious – CH19

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	29.0	---	43.6	14.6
216.0	26.6	---	43.6	17.0
576.0	36.9	---	46.0	**9.1**
1113.8	---	40.6	54.0	13.4
1151.9	---	40.1	54.0	13.9
1190.3	---	42.0	54.0	12.0
1190.9	52.4	---	74.0	21.6
12199.0	---	39.1	54.0	14.9
12201.0	50.5	---	74.0	23.5
25929.1	---	34.9	54.0	19.1
25946.8	48.3	---	74.0	25.7

Radiated Spurious – CH39

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	28.8	---	43.6	14.8
216.0	26.5	---	43.6	17.1
576.0	36.7	---	46.0	9.3
1113.4	---	40.6	54.0	13.4
1151.6	52.3	---	74.0	21.7
1151.9	---	40.4	54.0	13.6
1190.3	---	41.8	54.0	12.2
7440.1	---	39.4	54.0	14.6
7440.1	49.3	---	74.0	24.7
12398.7	51.2	---	74.0	22.8
12398.7	---	41.2	54.0	12.8
24243.6	---	35.0	54.0	19.0
24314.4	48.2	---	74.0	25.8

C.1.6 AC power-line conducted emission

Standard references:

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.207</td><td>Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.
<table>
<tr><th rowspan="2">Frequency of emission (MHz)</th><th colspan="2">Conducted limit (dBµV)</th></tr>
<tr><th>Quasi-peak</th><th>Average</th></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
*Decreases with the logarithm of the frequency.</td></tr>
</table>

Test procedure:

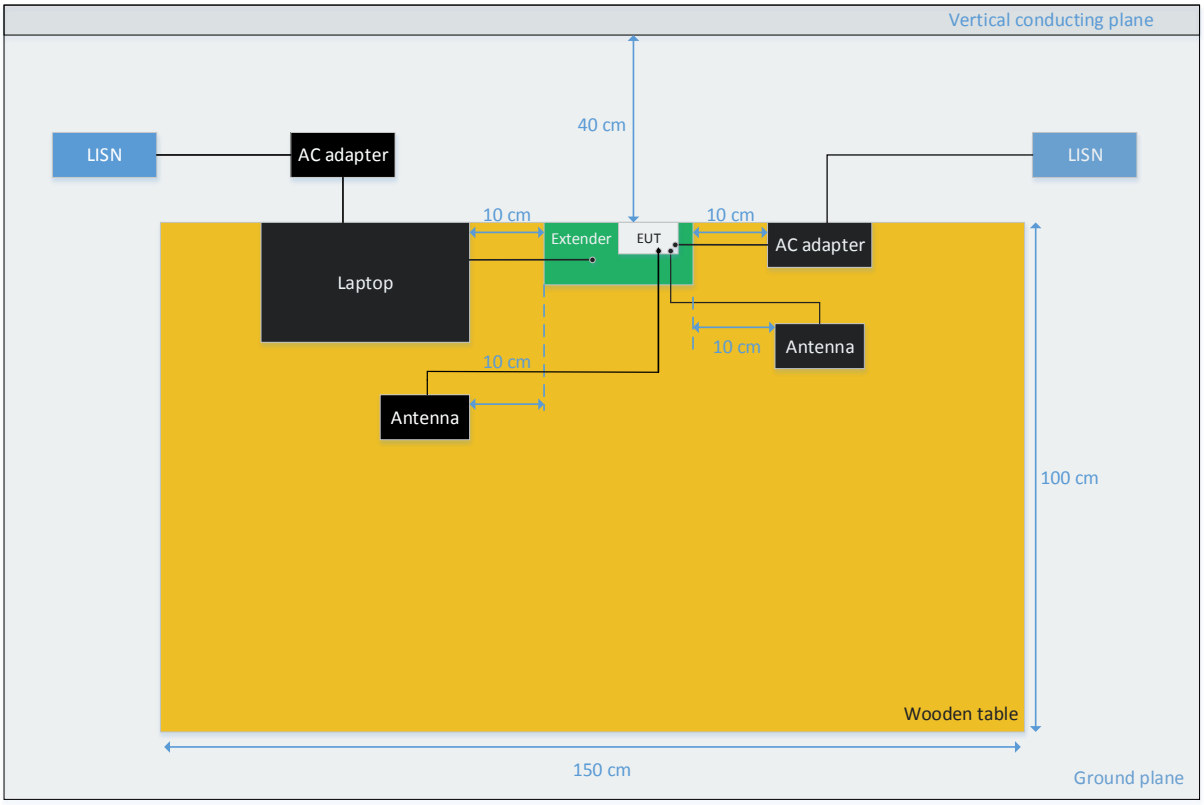
The EUT and peripherals are placed on a wooden table with a nominal size of 1.0 m by 1.5 m, raised 80 cm above the reference ground plane. The EUT is connected to AC-Power line through a Line Impedance Stabilization Network (LISN) to accommodate a 50 Ω/50 µH coupling impedance for the measurement system. The EUT control PC is considered as a peripheric and therefore is connected to a second LISN which has the measurement port connected to a 50 ohms impedance.

Each measurement is done for each current-carrying conductor (Line and Neutral) at the end plug of the EUT power cord. The EUT is tested for several transmission modes (frequency channel, modulation, etc.) and the result providing the maximum measured emission is reported.

The exploratory measurement is done over the frequency range from 150 kHz to 30 MHz, while the measurement receiver is recording the Peak and Average signal at 10 kHz steps in Max Hold mode. The cables manipulation is performed within the range of likely configurations to determine the maximum emission. Once the EUT cable configuration, arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is found the six highest AC power-line conducted emissions relative to 20 dB of the limit are reported as the final measurement. If fewer than six emission frequencies are within 20 dB of the limit, the noise level is reported. For the final measurement, the measurement receiver records the Quasi Peak values with 9 kHz resolution bandwidth and the average values with 10 kHz resolution bandwidth.

The reported results correspond to the configuration of the worst case spurious level detected among all modes.

EUT arrangement for AC power-line conducted emission tests



Sample Calculation:

The measured level at the spectrum analyzer in dBuV is corrected by a transducer factor taking into account the losses of the RF cable and the LISN as follows:

Conducted Emission level (dBuV) = SA_{Level} + $RFCable_{Losses}$ + $LISN_{Losses}$

Where:
SA_{Level} is the voltage level displayed on the measurement receiver, in dBuV.
$RFCable_{Losses}$ is the value of the cable losses between the LISN and the measurement receiver, in dB.
$LISN_{Losses}$ is the value of the insertion losses of the LISN, in dB.

Test Results:

150kHz – 30MHz, all modes

AC power-line conducted – Phase L1

Frequency	Max Peak	Avg	Limit	Margin
MHz	dBµV	dBµV	dBµV	dB
0.16	53.2	---	65.8	12.6
0.16	---	28.9	55.7	26.8
0.37	42.8	---	59.6	16.8
0.37	---	28.1	49.6	21.5
4.00	39.5	---	56.0	16.5
4.00	---	23.8	46.0	22.2
6.67	43.6	---	60.0	16.4
6.75	---	28.1	50.0	21.9
13.55	53.1	---	60.0	6.9
13.56	---	36.2	50.0	13.8
18.05	37.2	---	60.0	22.8
18.11	---	26.1	50.0	23.9

Note: The emissions found do not change with the modulation and/or frequency.

AC power-line conducted – Neutral N

Frequency	Max Peak	Avg	Limit	Margin
MHz	dBµV	dBµV	dBµV	dB
0.16	53.6	---	65.7	12.1
0.16	---	28.3	55.7	27.4
0.38	44.5	---	59.5	15.0
0.37	---	27.9	49.7	21.8
2.79	31.7	---	56.0	24.3
2.79	---	22.9	46.0	23.1
4.21	39.8	---	56.0	16.2
4.28	---	29.7	46.0	16.3
13.57	52.3	---	60.0	7.7
13.57	---	31.6	50.0	18.4
25.55	31.8	---	60.0	28.2
26.01	---	16.9	50.0	33.1

Note: The emissions found do not change with the modulation and/or frequency.