DEKRA Testing and Certification, S.A.U.
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c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

ENAC ENSAYOS Nº 51/LE147

Test report No:
NIE: 60210RRF.006

Partial Test report

USA FCC Part 15.249, 15.209
CANADA RSS-210, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

(*) Identification of item tested	Wireless hearing instrument
(*) Trademark	ReSound, Beltone, Interton, GN Hearing
(*) Model and /or type reference tested	CSX12
Other identification of the product	FCC ID: X26CSX12 IC: 6941C-CSX12
(*) Features	Audio amplification, proprietary 2.4 GHz wireless functionality (Proximity) and Bluetooth 5.0
Applicant	GN HEARING A/S Lautrupbjerg 7, 2750 Ballerup, Denmark
Test method requested, standard	USA FCC Part 15.249 10-1-18 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, 5725 - 5875 MHz, and 24.0 – 24.25 GHz. USA FCC Part 15.209 10-1-18 Edition: Radiated emission limits; general requirements. CANADA RSS-210 Issue 9 (August 2016). CANADA RSS-Gen Issue 5 (April 2018). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. - Section 15.249 Subclause (a) / RSS-210 B.10 (a). Field strength of Fundamental and harmonic emissions - Section 15.249 Subclause (a) and (d) / RSS-210 B.10 (b). Emissions radiated outside of the specific frequency bands (Transmitter)
Approved by (name / position & signature)	A. Llamas RF Lab. Manager Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2019.07.17 10:59:39 +02'00'
Date of issue	2019-07-17
Report template No	FDT08_22

(*) "Data provided by the client"

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Competences and guarantees

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The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The samples consists of a wireless hearing aid.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
60210C/368	Wireless hearing instrument	CSX12	1900804228	2019/04/15

Sample S/01 has undergone the following test(s): All tests indicated in Appendixes A, B, C.

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)		
			☐	☐	☐		
Supplementary information to the ports..... :							
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 1.45 Vdc (battery)					
Rated Power .....:							
Clock frequencies .....:							
Other parameters.....:							
Software version .....:	Dooku1						
Hardware version.....:	PCBA, DALLAS, MFI, V1.B, C5.0						
Dimensions in cm (W x H x D)....:							
Mounting position.....:	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☒	Other: Hearing aid					

Modules/parts .....:	Module/parts of test item	Type	Manufacturer
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
Documents as provided by the applicant.....:	Description	File name	Issue date

(3): Only for Medical Equipment.

Identification of the client

GN HEARING A/S
Lautrupbjerg 7, 2750 Ballerup, Denmark

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2019-05-05
Date (finish)	2019-05-14

Document history

Report number	Date	Description
60210RRF.006	2019-07-17	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

Manufacturer states that conducted measurements for this model would be identical to the measurements performed on hearing aid platform “CSI12”. Report ref.: 60210RRF.002.

The tests have been performed by the technical personnel: José Gabriel Pendón, Miguel Ángel Torres, Juan Carlos Fuentes, Jose Alberto Aranda.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2.	RF Pre-amplifier 40 dB, 10 MHz - 6 GHz BONN ELEKTRONIK BLNA 0160-01N	2019/02	2020/08
3.	RF Pre-amplifier, 48 dB, 18 GHz - 40 GHz NARDA JS44-18004000-33-8P	2018/02	2020/02
4.	Biconical/Log Antenna ETS LINDGREN 3142E	2017/04	2020/04
5.	Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40	2018/02	2020/02
6.	RF Pre-amplifier, 30 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-3A	2019/04	2020/04
7.	Broadband Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2018/01	2021/01
8.	Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2018/07	2021/07
9.	EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2018/10	2020/10

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

1. Bluetooth Low Energy 5.0 2M, 1M.

FCC PART 15.249 PARAGRAPH / RSS-210			
Requirement – Test case		**Verdict**	**Remark**
Section 15.249 Subclause (a) / RSS-210 B.10. (a)	Field strength of fundamental and harmonics emissions	P	
Section 15.249 Subclause (d) / RSS-210 B.10. (b)	Emissions radiated outside of the specific frequency bands	P	
Supplementary information and remarks: None.			

2. Proprietary protocol 2.4 GHz.

FCC PART 15.249 PARAGRAPH / RSS-210			
Requirement – Test case		**Verdict**	**Remark**
Section 15.249 Subclause (a) / RSS-210 B.10. (a)	Field strength of fundamental and harmonics emissions	P	
Section 15.249 Subclause (d) / RSS-210 B.10. (b)	Emissions radiated outside of the specific frequency bands	P	
Supplementary information and remarks: None.			

Appendix A: Test results. Bluetooth Low Energy 5.0 2M

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TEST CONDITIONS

POWER SUPPLY (V):

Vnominal:	1.45 Vdc
Type of power supply:	Battery
Type of antenna:	Integral antenna
Declared antenna gain:	-0.31 dBi

TEST FREQUENCIES:

Low Channel: 2402 MHz

Middle Channel: 2440 MHz

High Channel: 2480 MHz

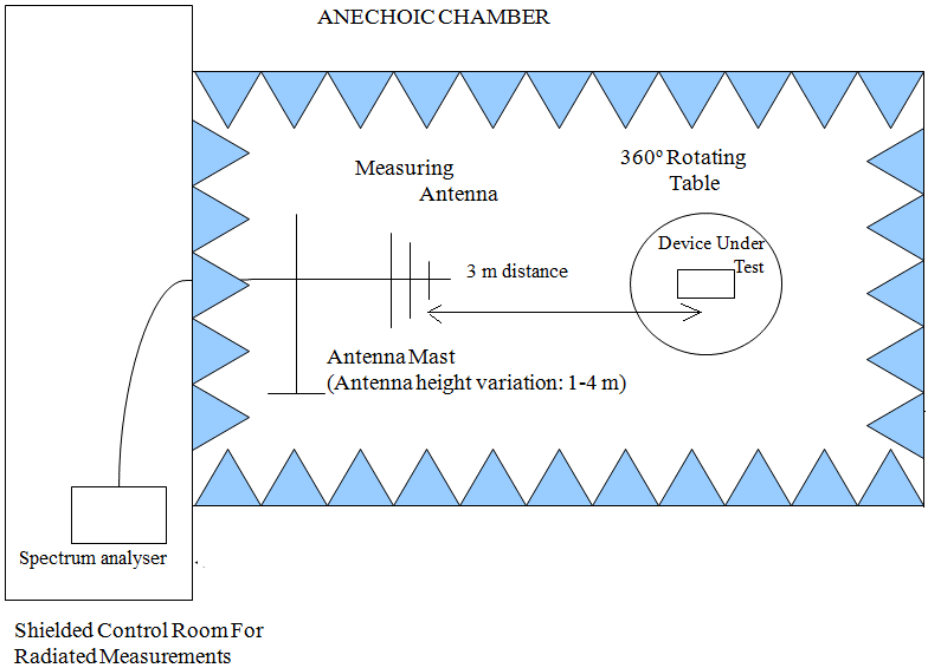
RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

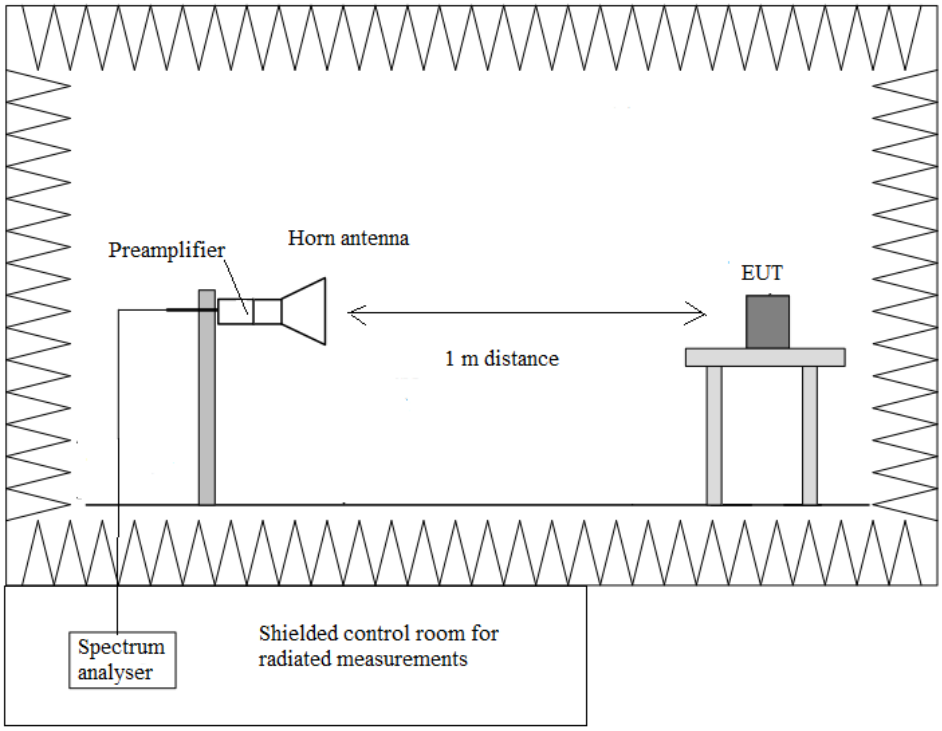
For radiated emissions in the range 1 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.
Radiated measurements setup f < 1 GHz:



Radiated measurements setup f > 1 GHz:



Section 15.249 Subclause (a) / RSS-210 B.10 (a). Field strength of Fundamental and harmonic emissions

SPECIFICATION:

The field strength of emissions from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 – 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000-24250	250	107.96	3

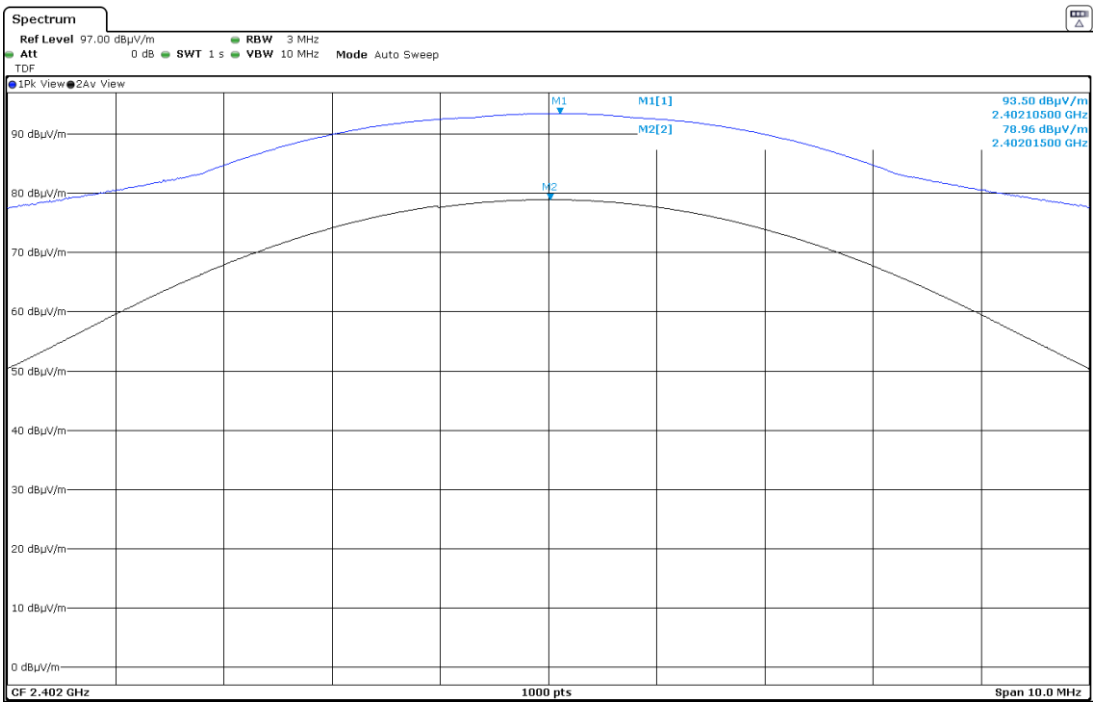
For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

RESULTS:

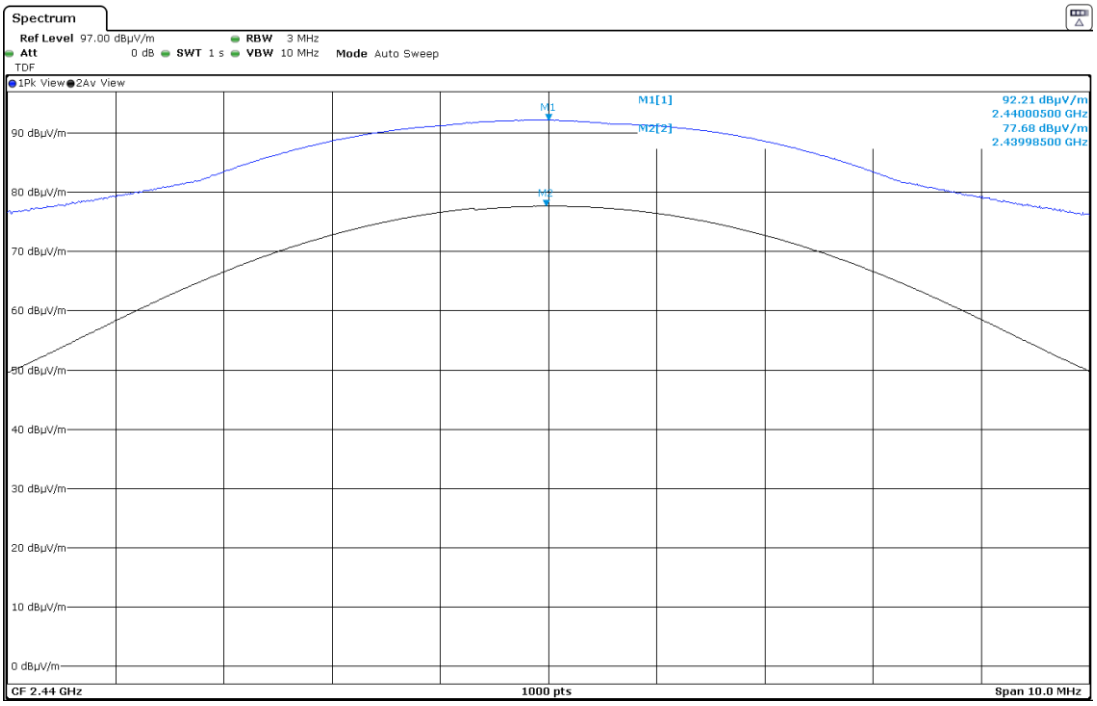
	Low Channel 2402 MHz	Middle Channel 2440 MHz	High Channel 2480 MHz
Average Field Strength (dBµV/m)	78.96	77.68	76.42
Peak Field Strength (dBµV/m)	93.50	92.21	90.90
Measurement Uncertainty (dB)	<±3.70		

Verdict: PASS

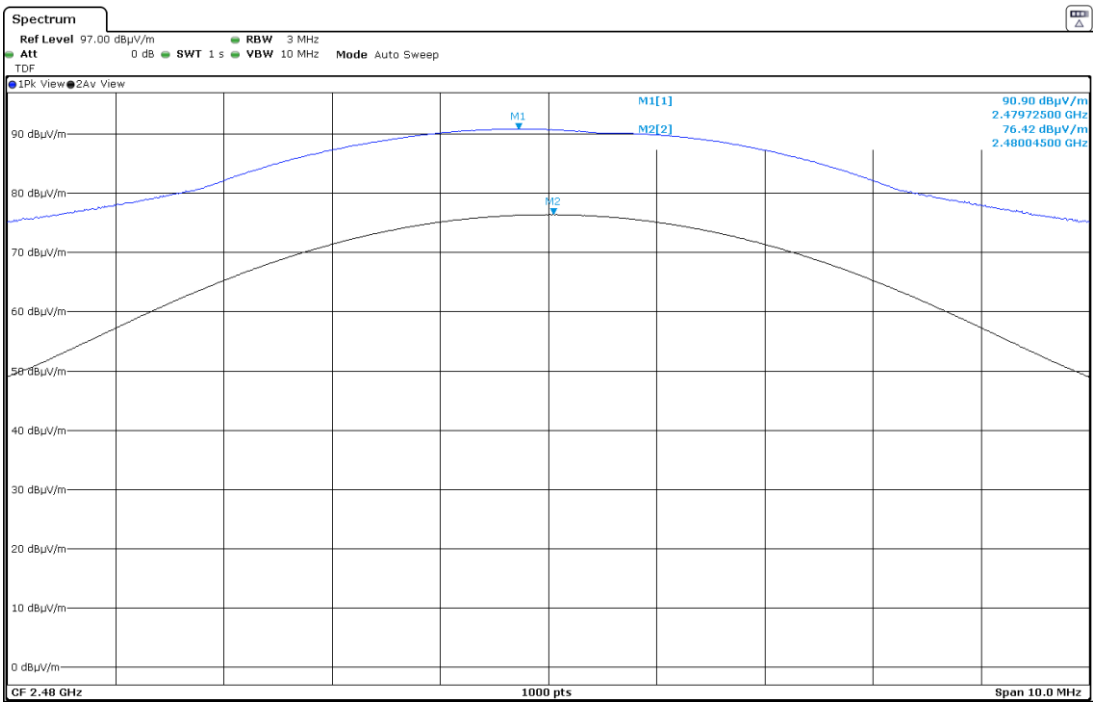
- Low Channel:



- Middle Channel:



- High Channel:



Section 15.249 Subclause (a) and (d) / RSS-210 B.10 (b). Emissions radiated outside of the specific frequency bands (Transmitter)

SPECIFICATION:

The field strength of harmonics from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 – 2483.5	500	54	3
5725 - 5875	500	54	3
24000-24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz - 1 GHz.

The spurious signals detected do not depend on the operating channel.

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 1 - 26 GHz.

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

Spurious signals with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

- Low Channel (2402 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.38995	Peak	62.32	H	<±3.70
	Average	43.05		
4.80577	Peak	66.98	H	<±3.70
	Average	50.77		
9.61010	Peak	52.92	H	<±3.70

- Middle Channel (2440 MHz):

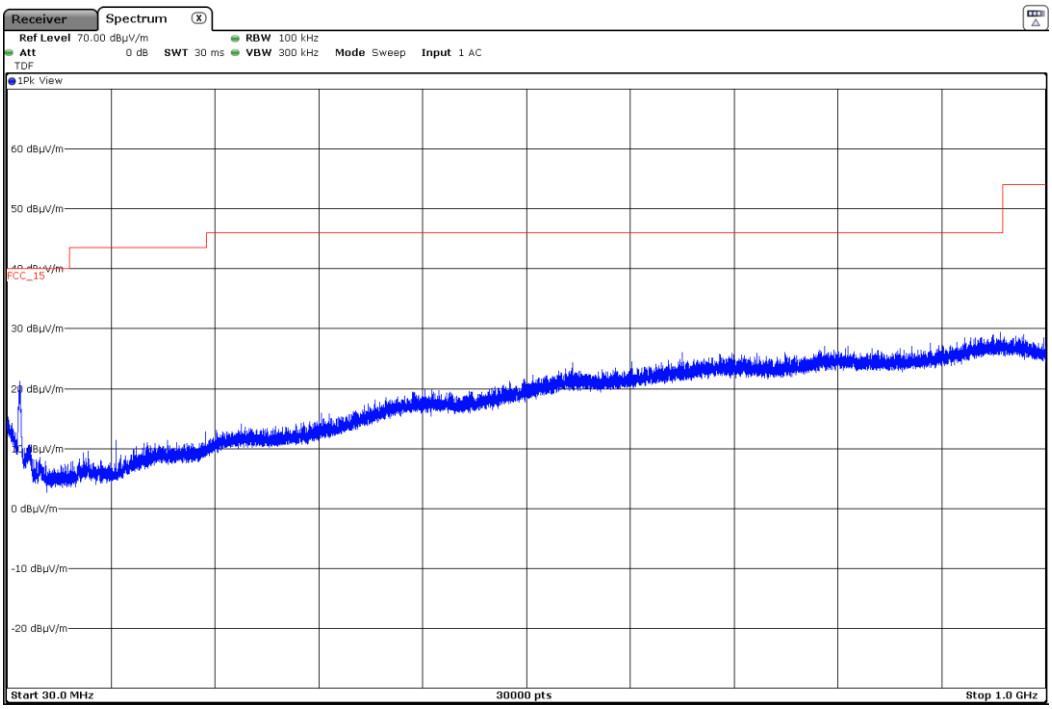
Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
4.88043	Peak	62.83	H	<±3.70
	Average	53.29		
9.75803	Peak	54.38	H	<±3.70
	Average	46.05		

- High Channel (2480 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.48351	Peak	68.96	H	<±3.70
	Average	43.72		
4.96070	Peak	60.66	H	<±3.70
	Peak	50.26		<±3.70
9.91997	Peak	55.08	H	<±3.70
	Average	47.82		

Verdict: PASS

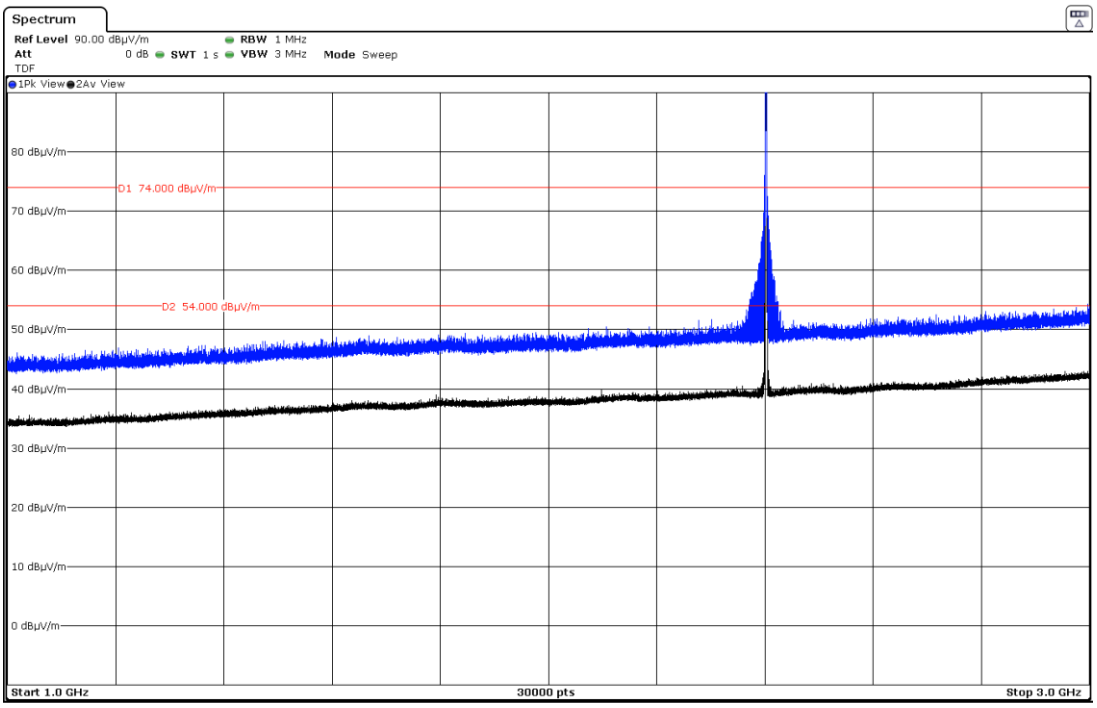
FREQUENCY RANGE 30 MHz - 1 GHz



Note: This plot is valid for all three channels.

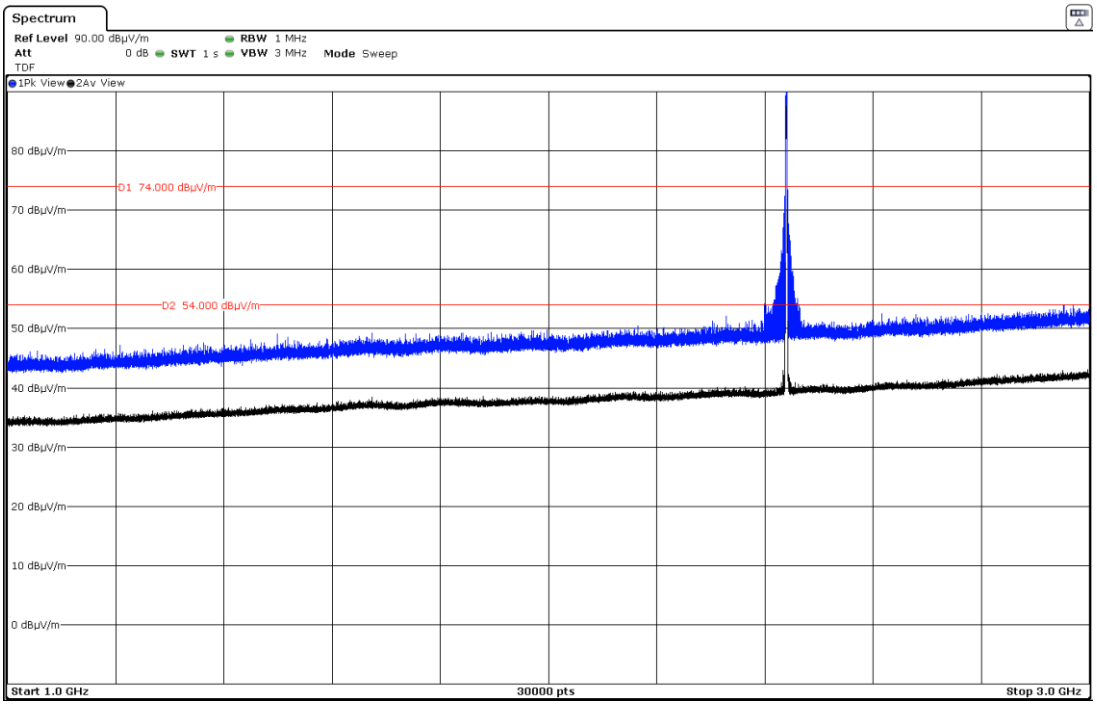
FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



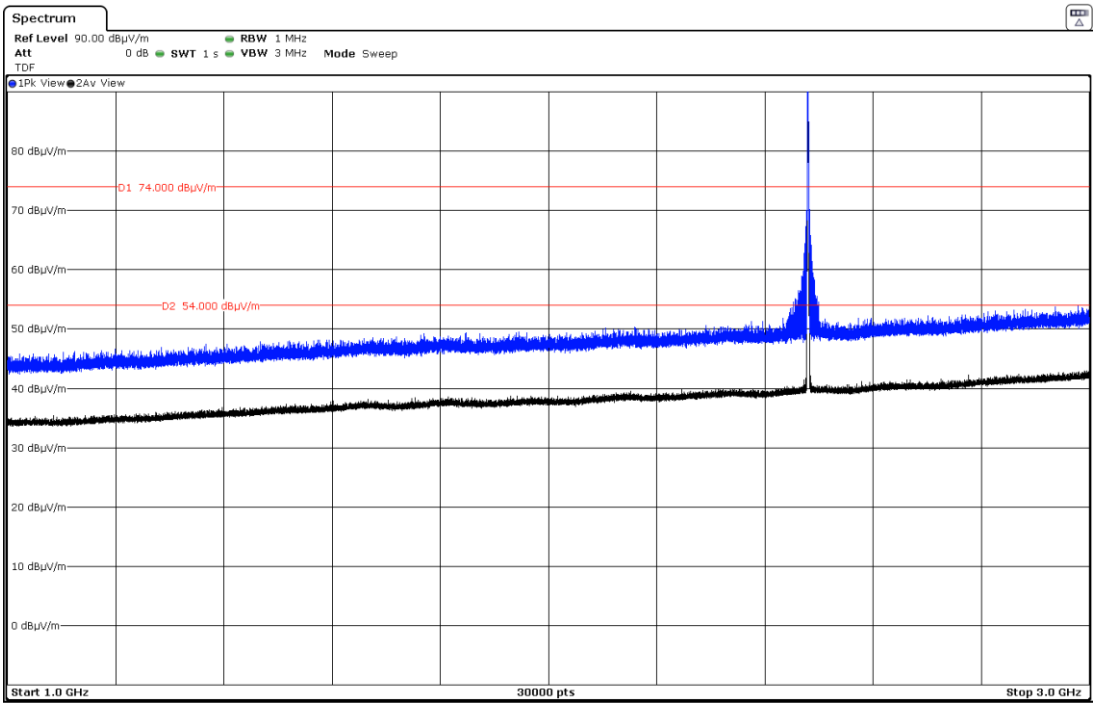
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



The peak shown in the plot above the limit is the carrier frequency.

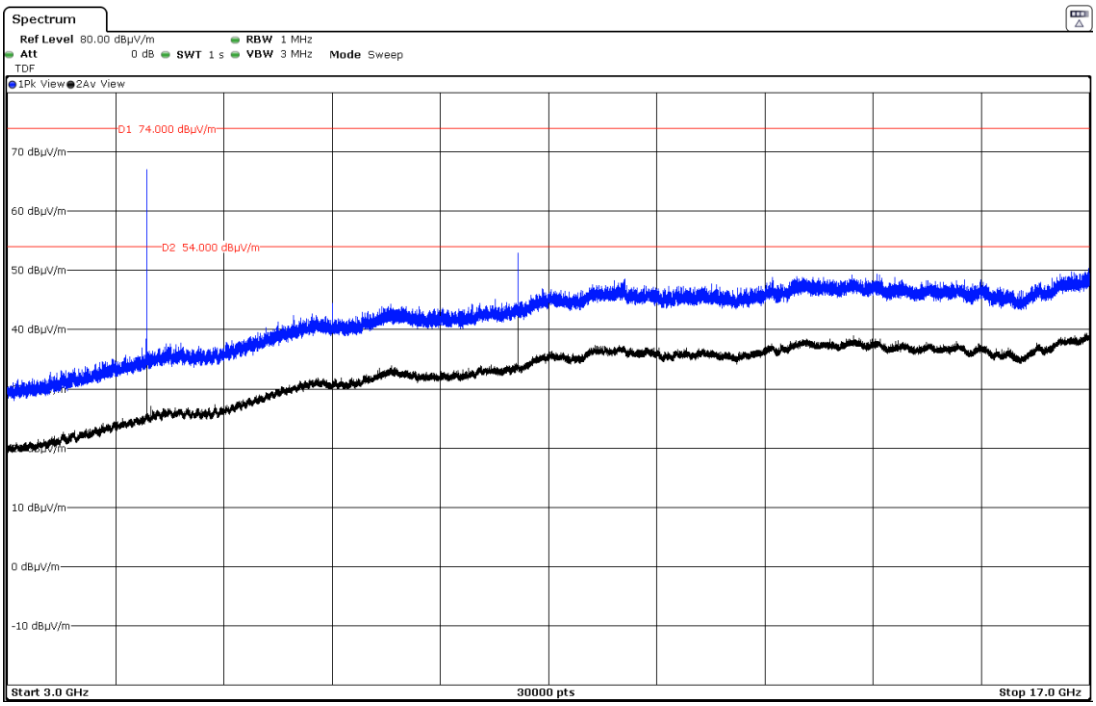
- High Channel:



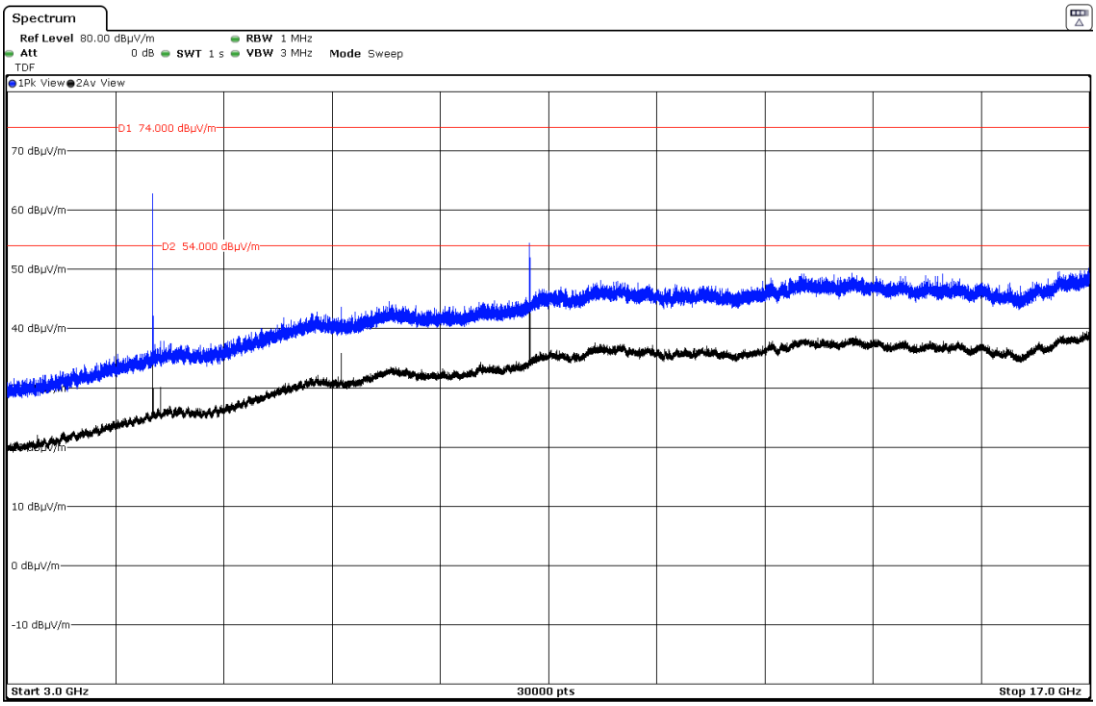
The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz

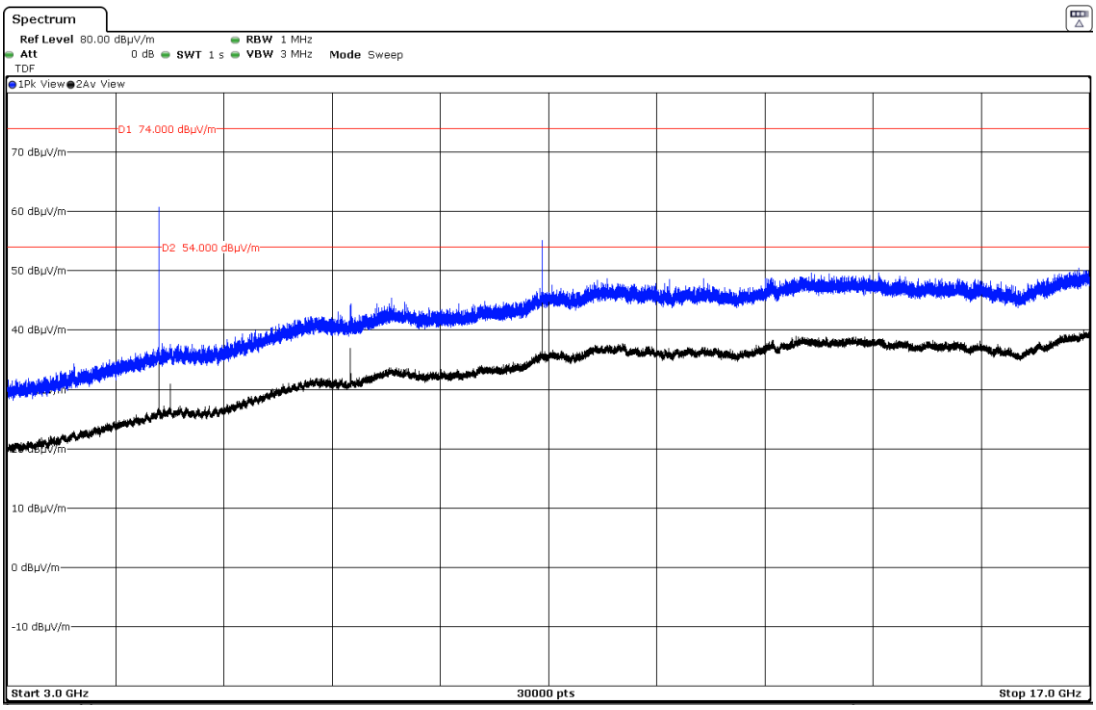
- Low Channel:



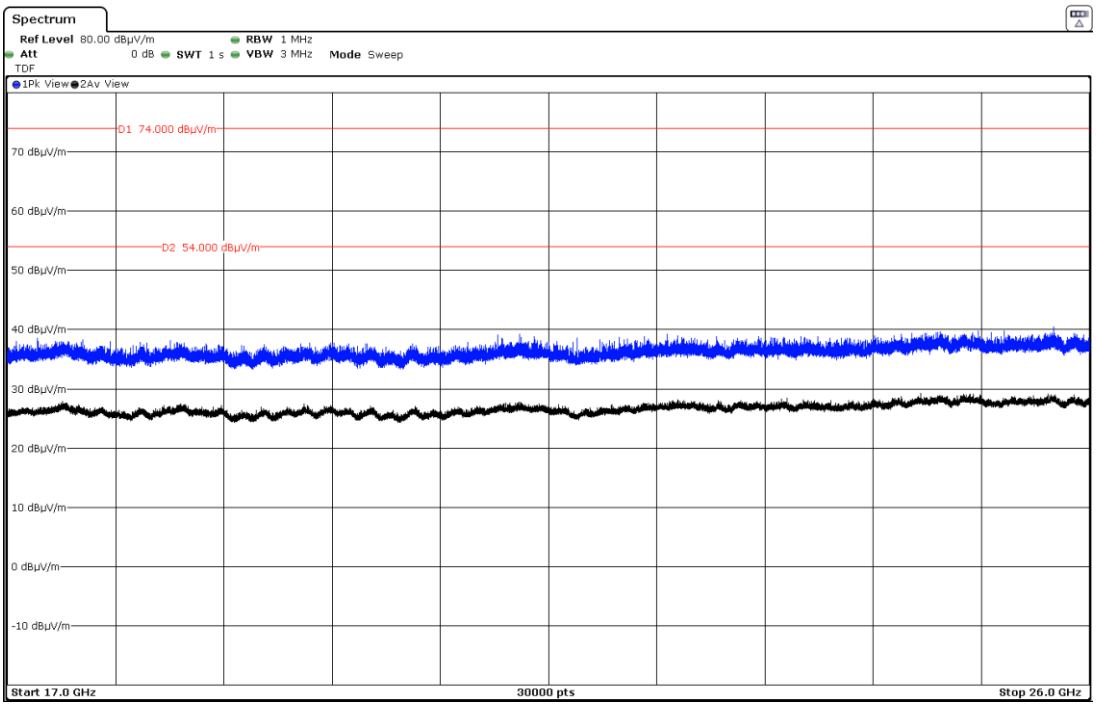
- Middle Channel:



- High Channel:



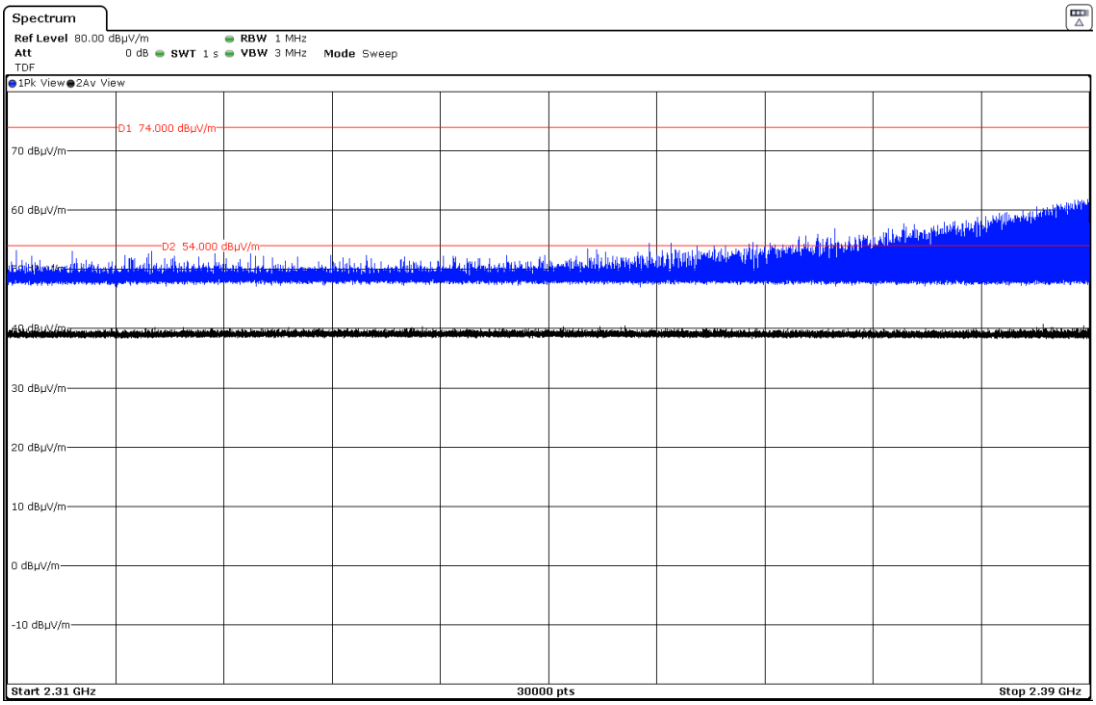
FREQUENCY RANGE 17 - 26 GHz



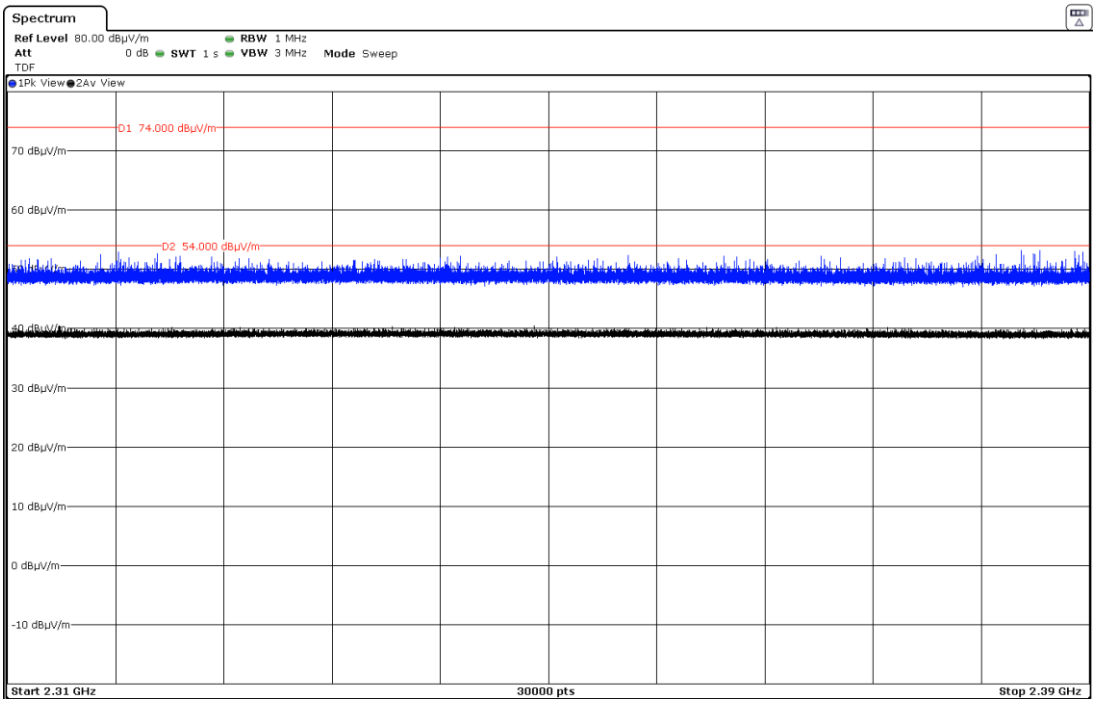
Note: This plot is valid for all three channels.

FREQUENCY RANGE 2.31 - 2.39 GHz. (RESTRICTED BAND 1)

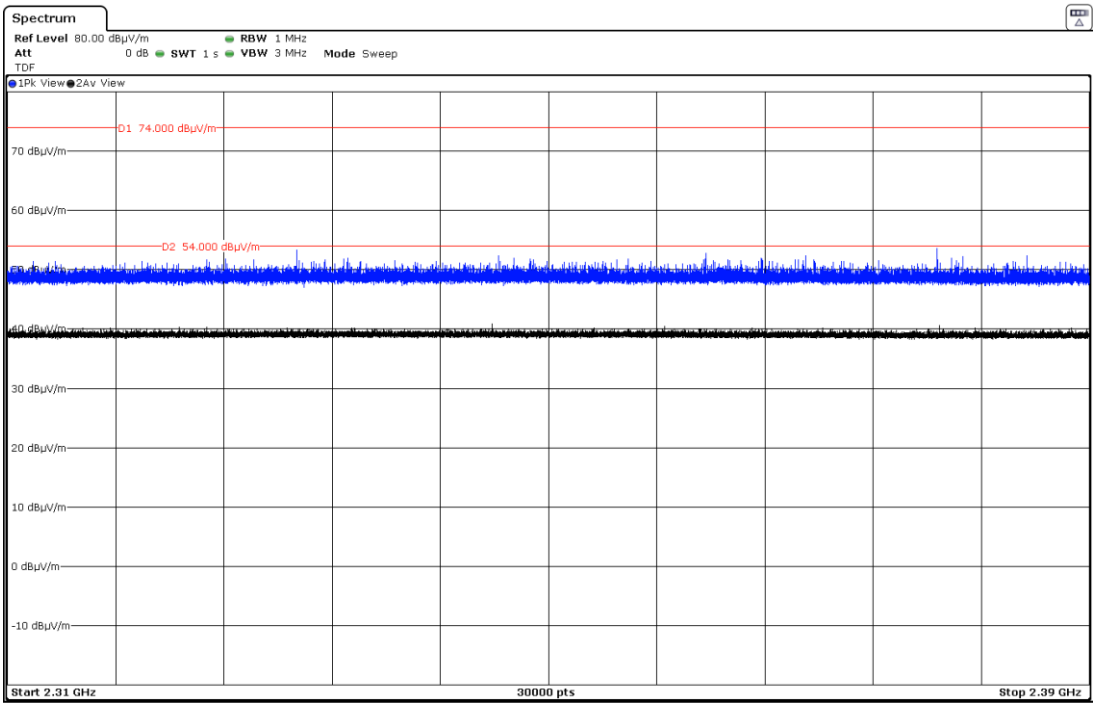
- Low Channel:



- Middle Channel:

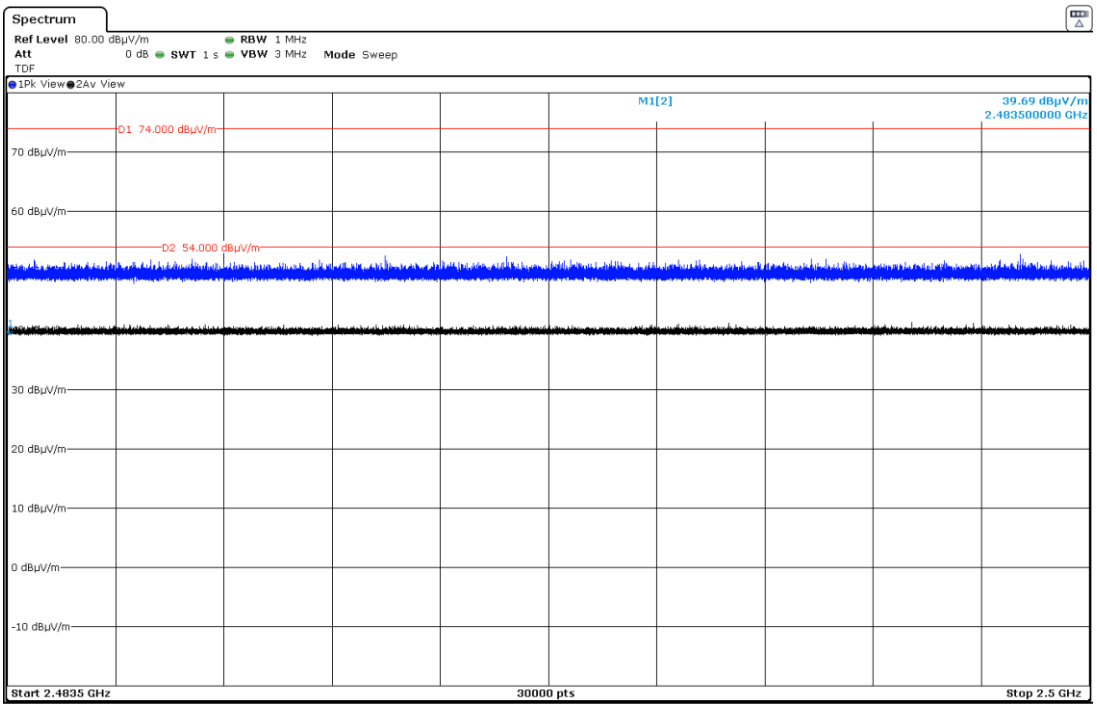


- High Channel:

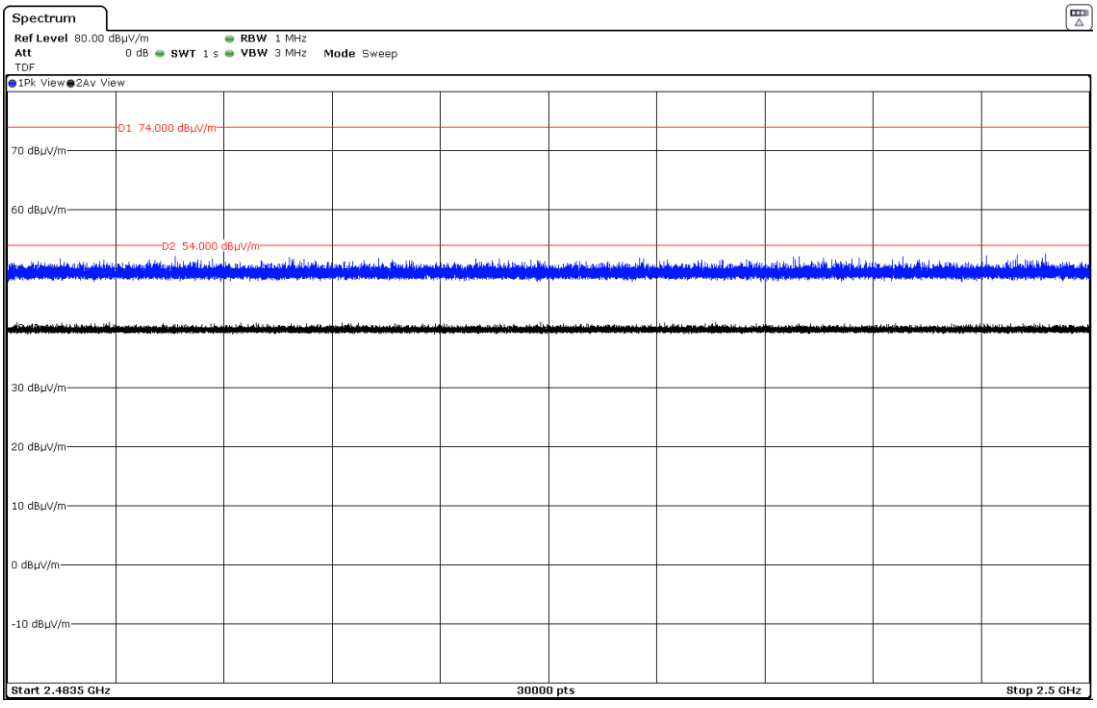


FREQUENCY RANGE 2.4835 - 2.5 GHz. (RESTRICTED BAND 2)

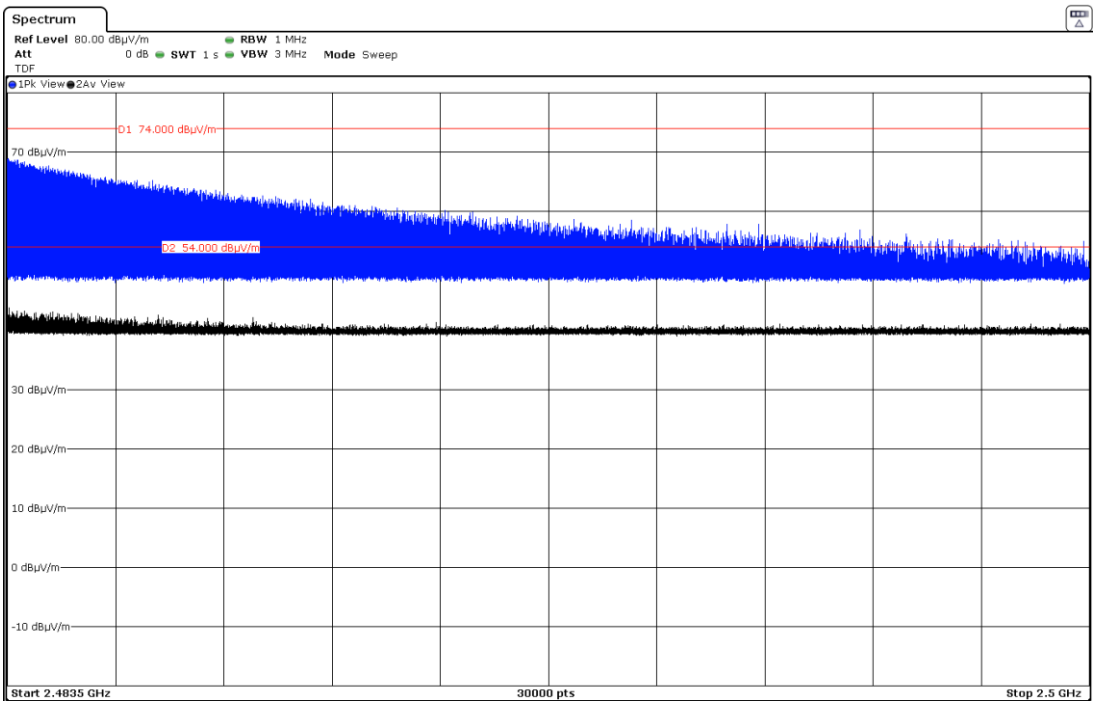
- Low Channel:



- Middle Channel:



- High Channel:



Appendix B: Test results. Bluetooth Low Energy 5.0 1M

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TEST CONDITIONS

POWER SUPPLY (V):

Vnominal:	1.45 Vdc
Type of power supply:	Battery
Type of antenna:	Integral antenna
Declared antenna gain:	-0.31 dBi

TEST FREQUENCIES:

Low Channel: 2402 MHz

Middle Channel: 2440 MHz

High Channel: 2480 MHz

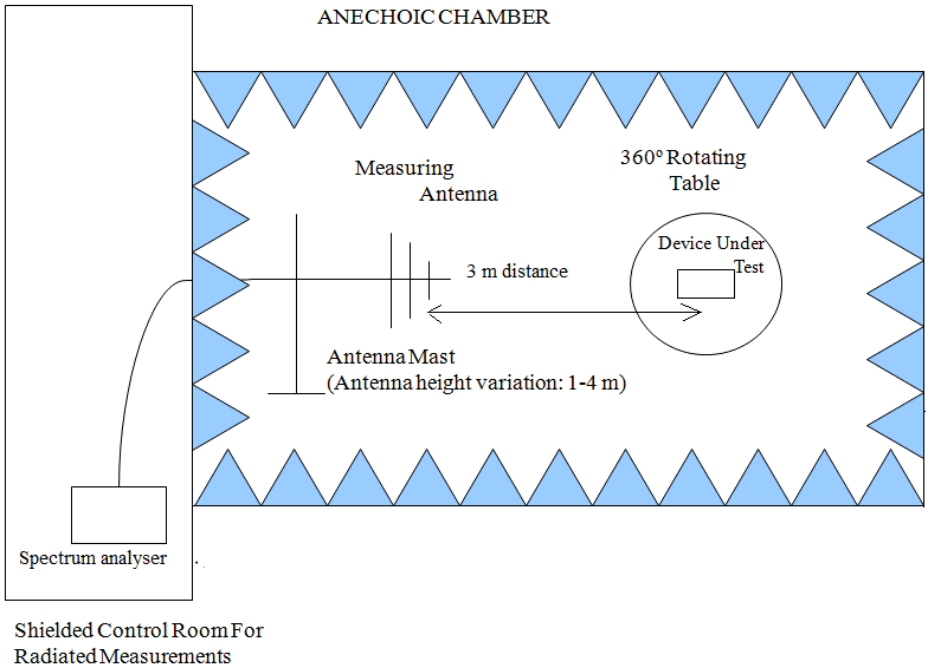
RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

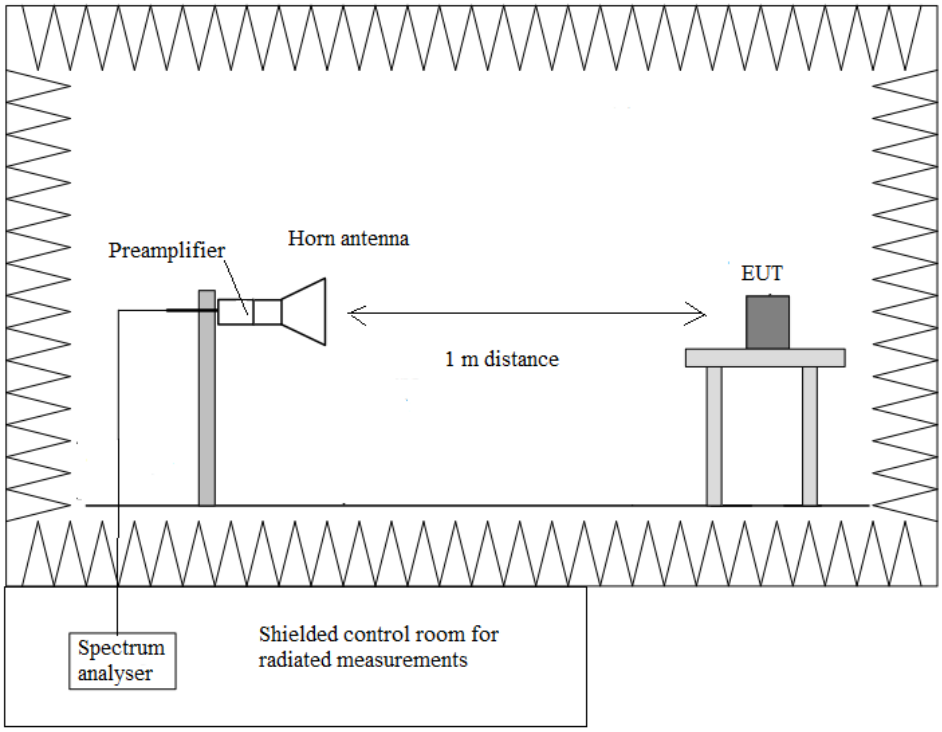
For radiated emissions in the range 1 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.
Radiated measurements setup f < 1 GHz:



Radiated measurements setup f > 1 GHz:



Section 15.249 Subclause (a) / RSS-210 B.10 (a). Field strength of Fundamental and harmonic emissions

SPECIFICATION:

The field strength of emissions from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 – 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000-24250	250	107.96	3

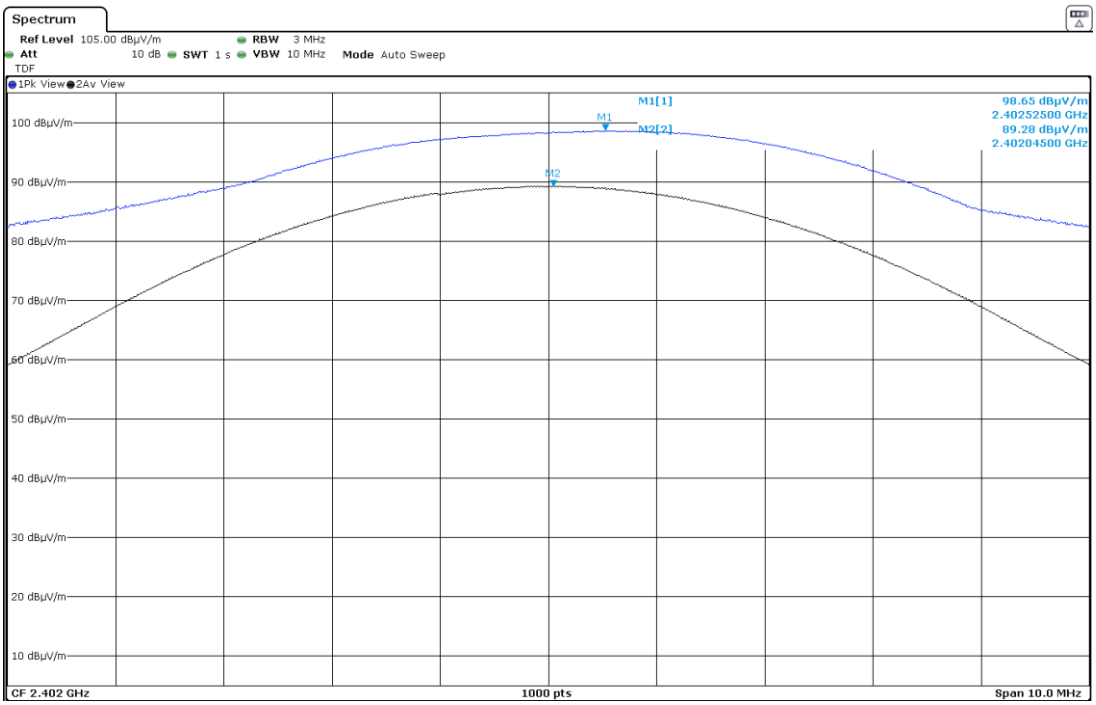
For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

RESULTS:

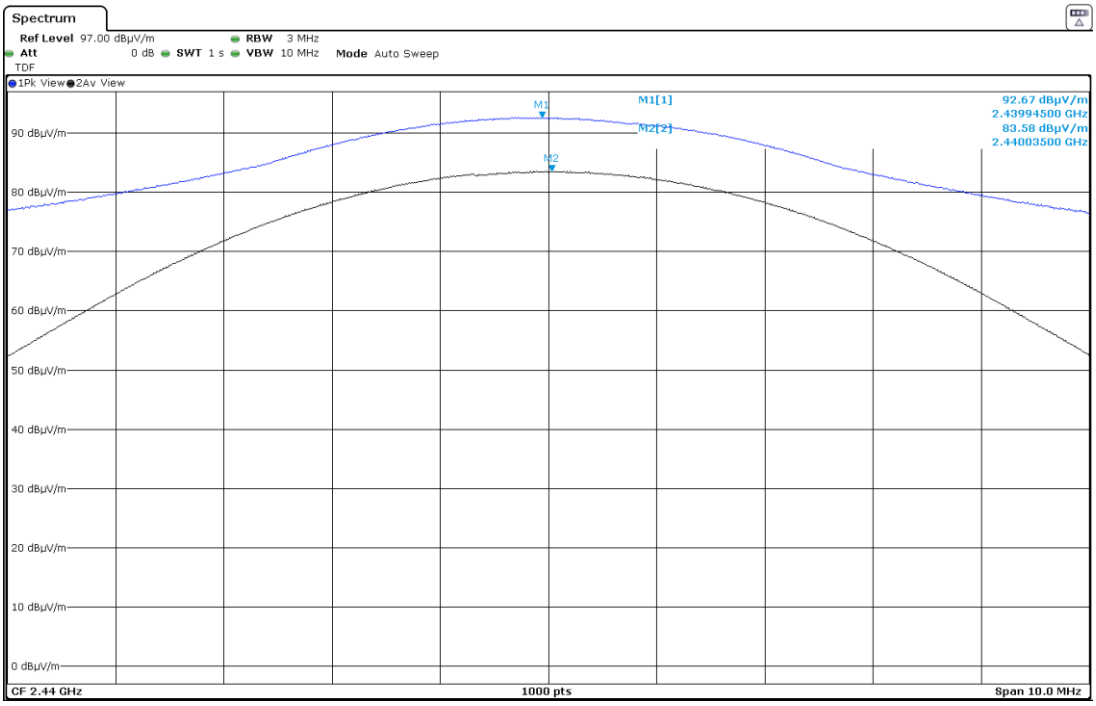
	Low Channel 2402 MHz	Middle Channel 2440 MHz	High Channel 2480 MHz
Average Field Strength (dBµV/m)	89.28	83.58	84.51
Peak Field Strength (dBµV/m)	98.65	92.67	93.74
Measurement Uncertainty (dB)	<±3.70		

Verdict: PASS

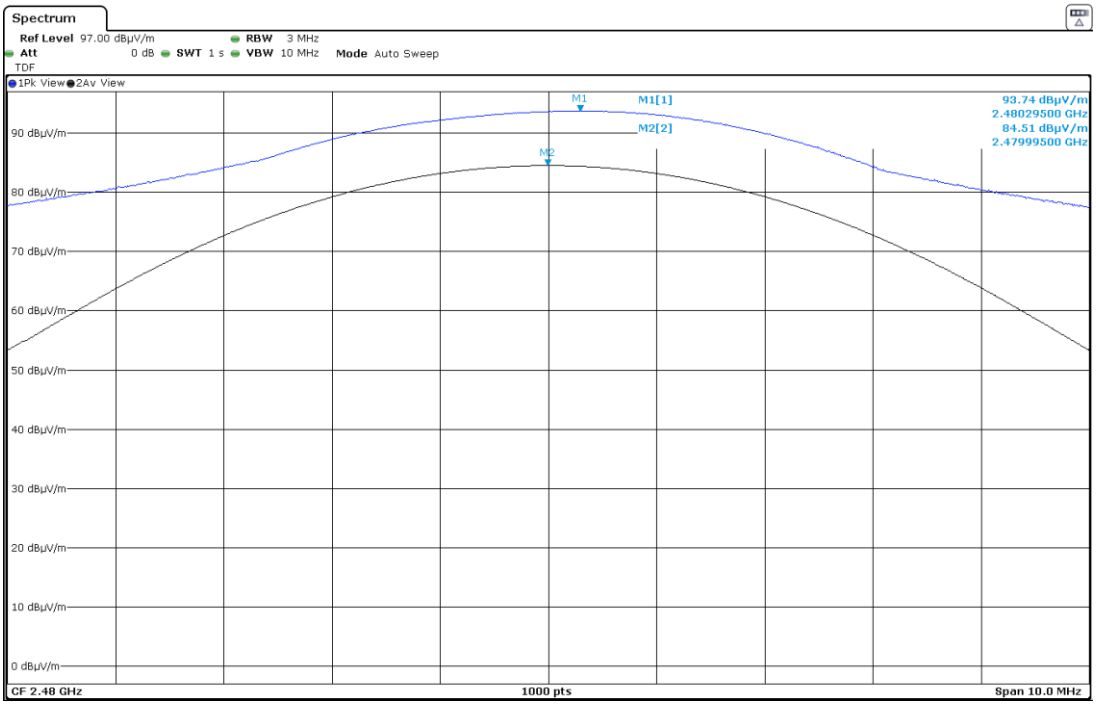
- Low Channel:



- Middle Channel:



- High Channel:



Section 15.249 Subclause (a) and (d) / RSS-210 B.10 (b). Emissions radiated outside of the specific frequency bands (Transmitter)

SPECIFICATION:

The field strength of harmonics from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 – 2483.5	500	54	3
5725 - 5875	500	54	3
24000-24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz - 1 GHz.

The spurious signals detected do not depend on the operating channel.

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 1 - 26 GHz.

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

Spurious signals with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

- Low Channel (2402 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.38906	Peak	63.28	V	<±3.70
	Average	38.55		
4.80530	Peak	61.77	H	<±3.70
	Average	52.78		<±3.70
9.60870	Peak	52.60	H	<±3.70

- Middle Channel (2440 MHz):

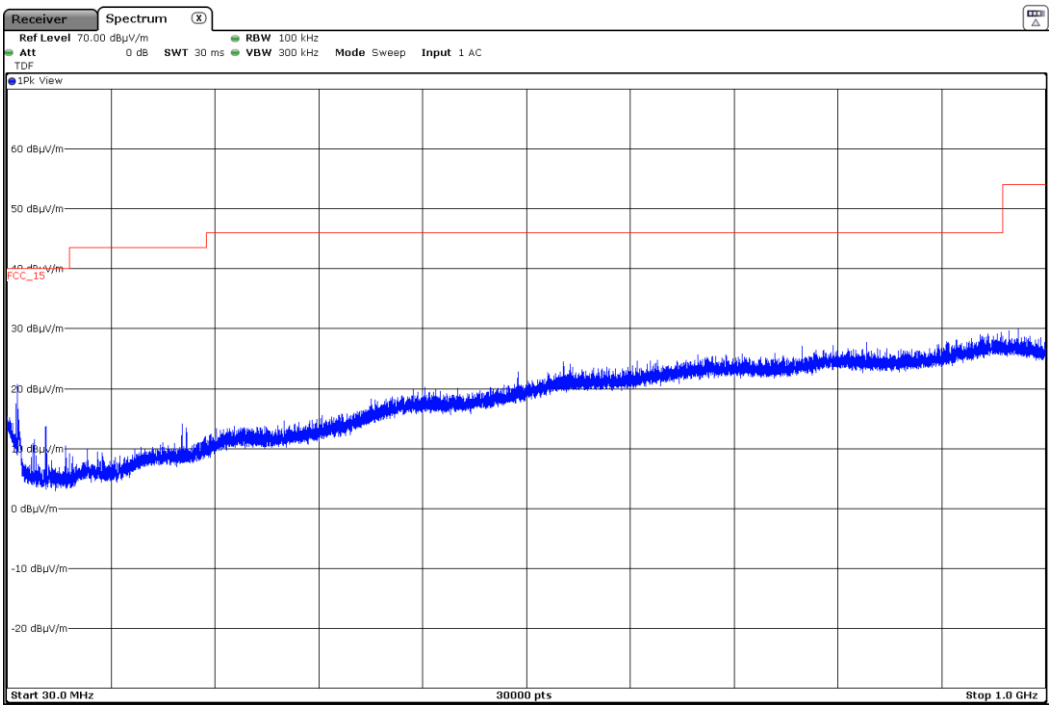
Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
4.88090	Peak	57.52	V	<±3.70
	Average	48.48		
9.76130	Peak	51.98	H	<±3.70

- High Channel (2480 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.48359	Peak	68.72	H	<±3.70
	Average	43.65		
4.96070	Peak	64.55	H	<±3.70
	Average	55.66		
7.43987	Peak	46.82	H	<±3.70
9.91903	Peak	52.98	H	<±3.70

Verdict: PASS

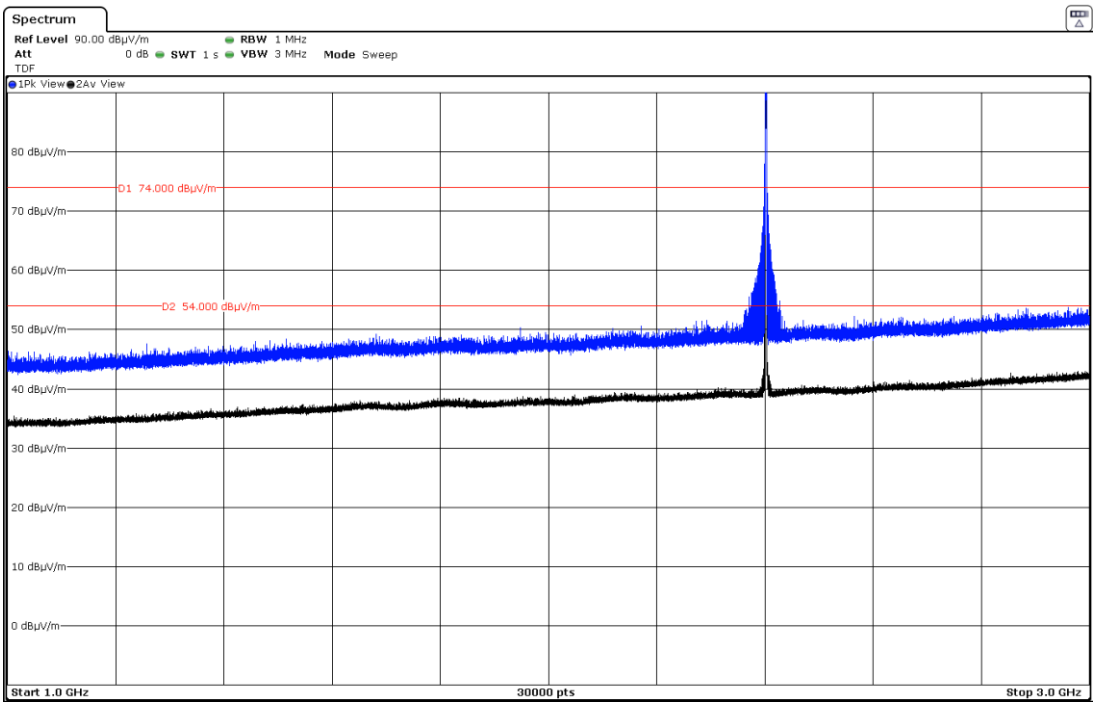
FREQUENCY RANGE 30 MHz - 1 GHz



Note: This plot is valid for all three channels.

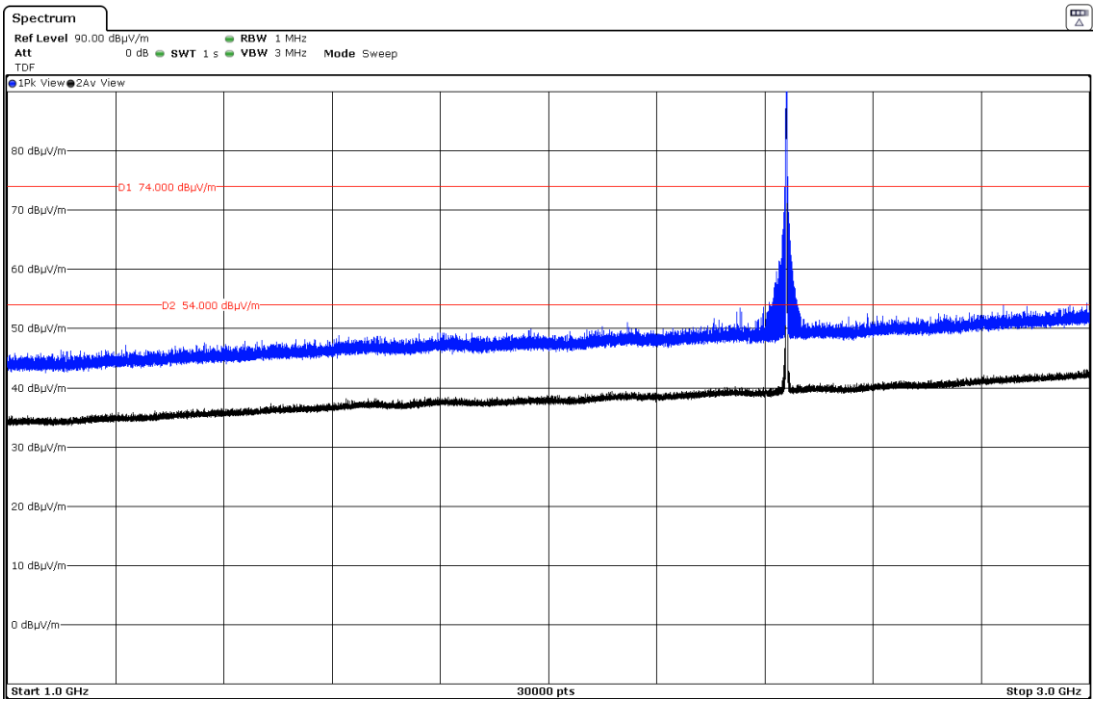
FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



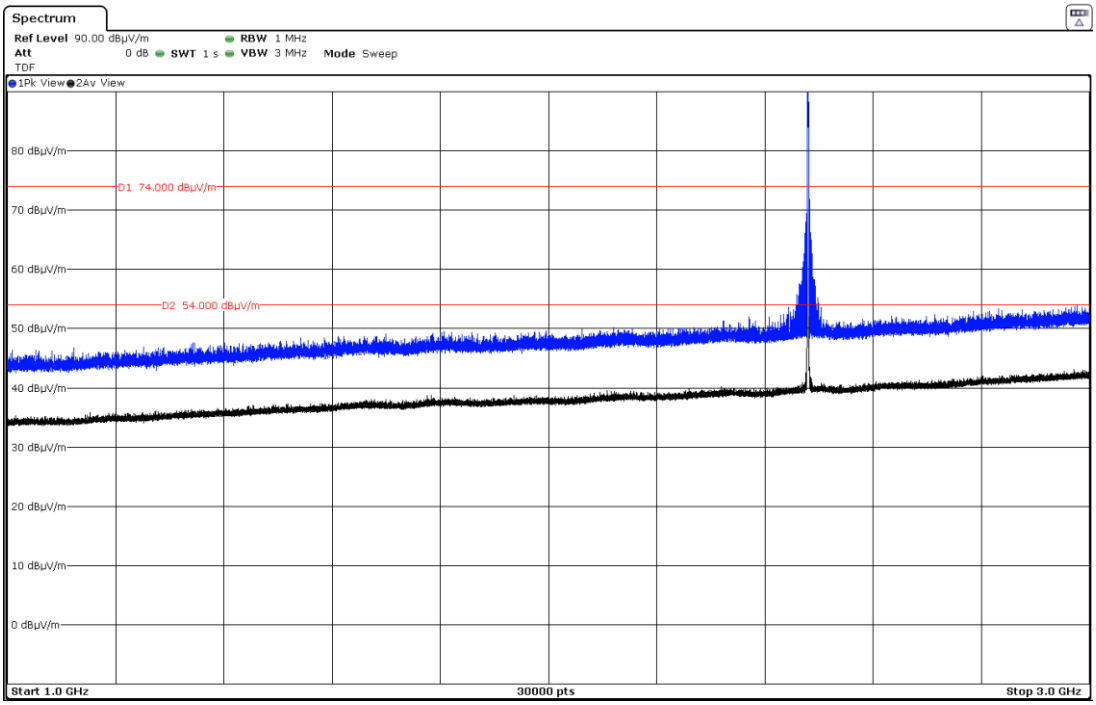
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



The peak shown in the plot above the limit is the carrier frequency.

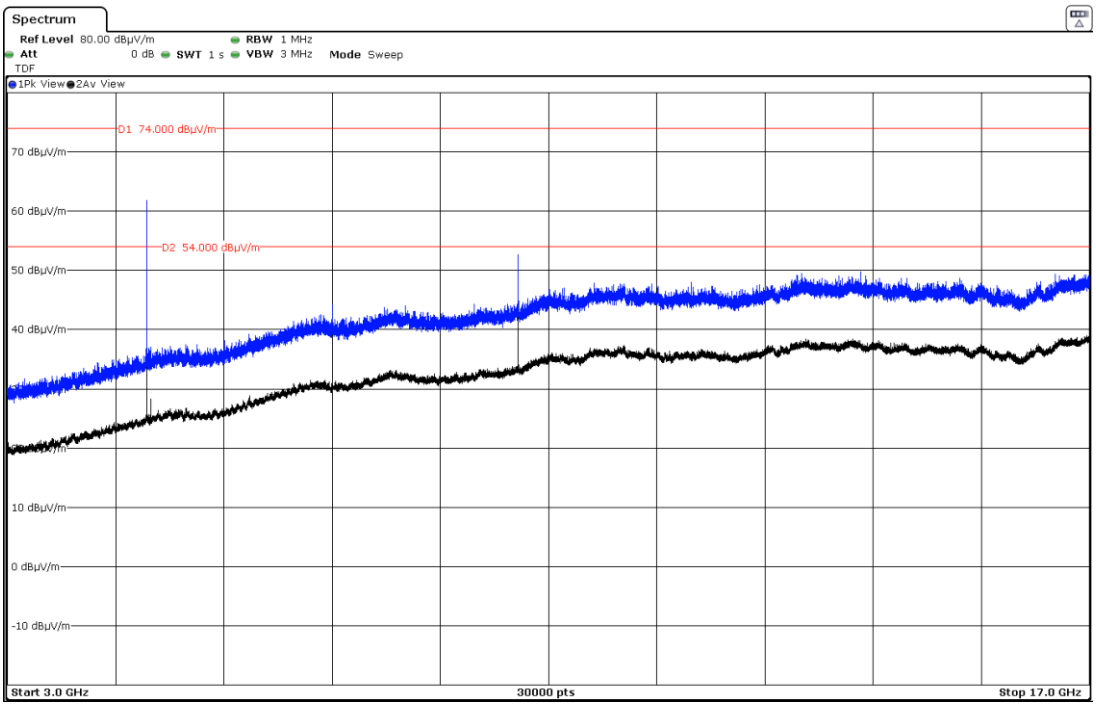
- High Channel:



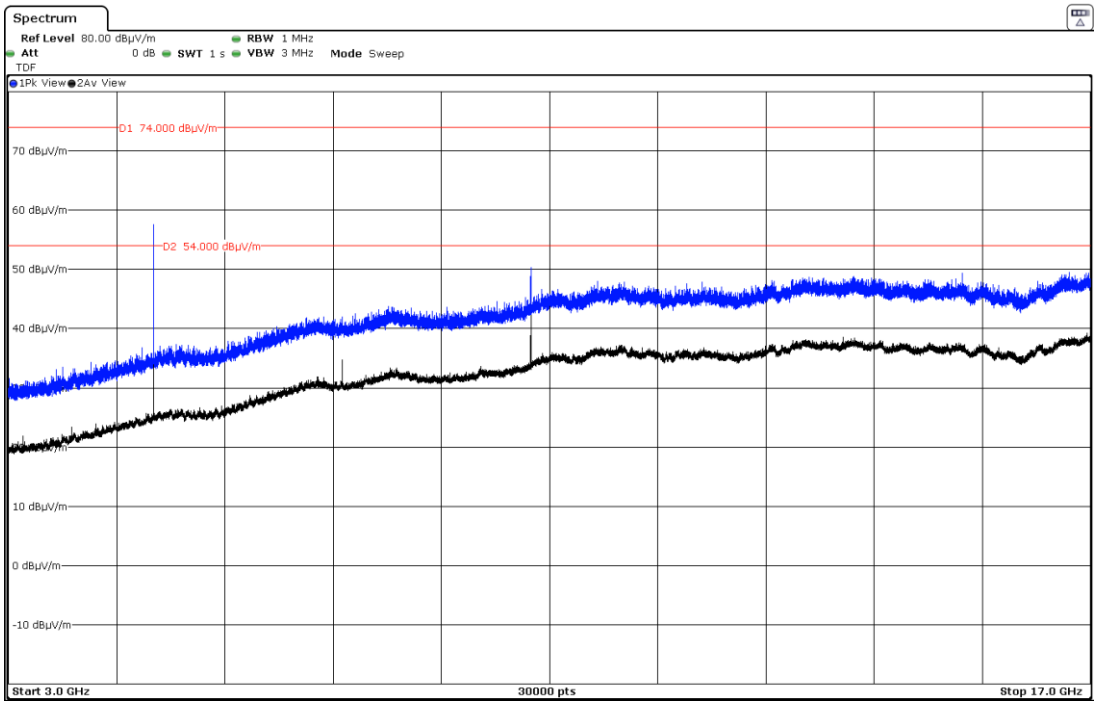
The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz

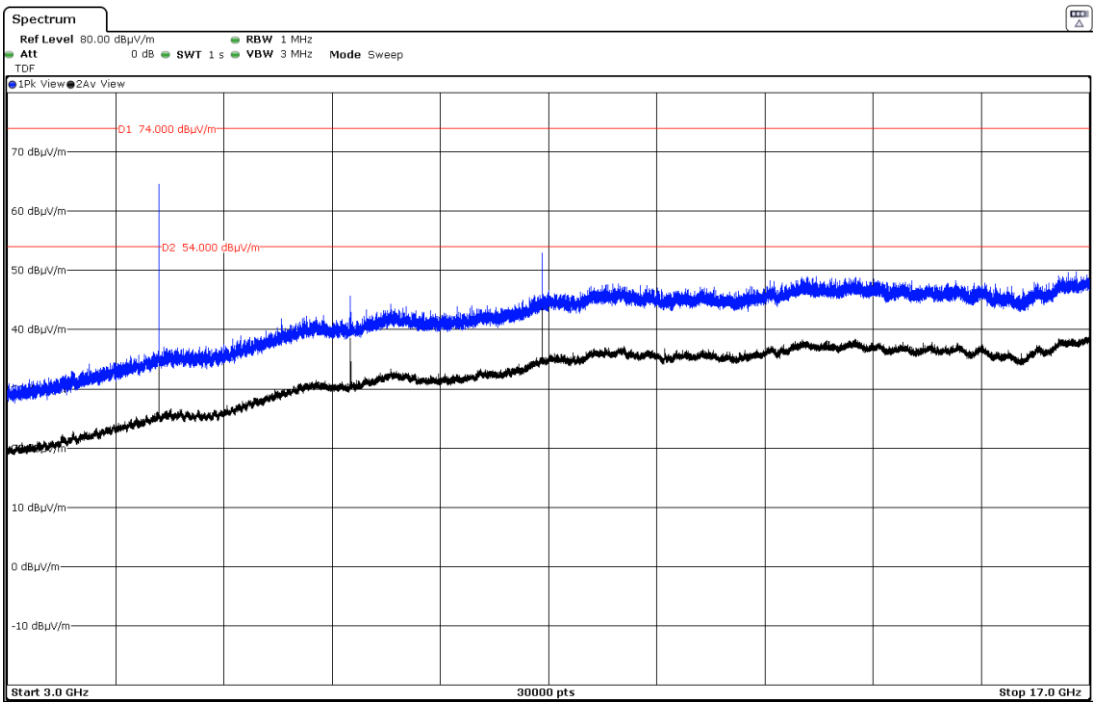
- Low Channel:



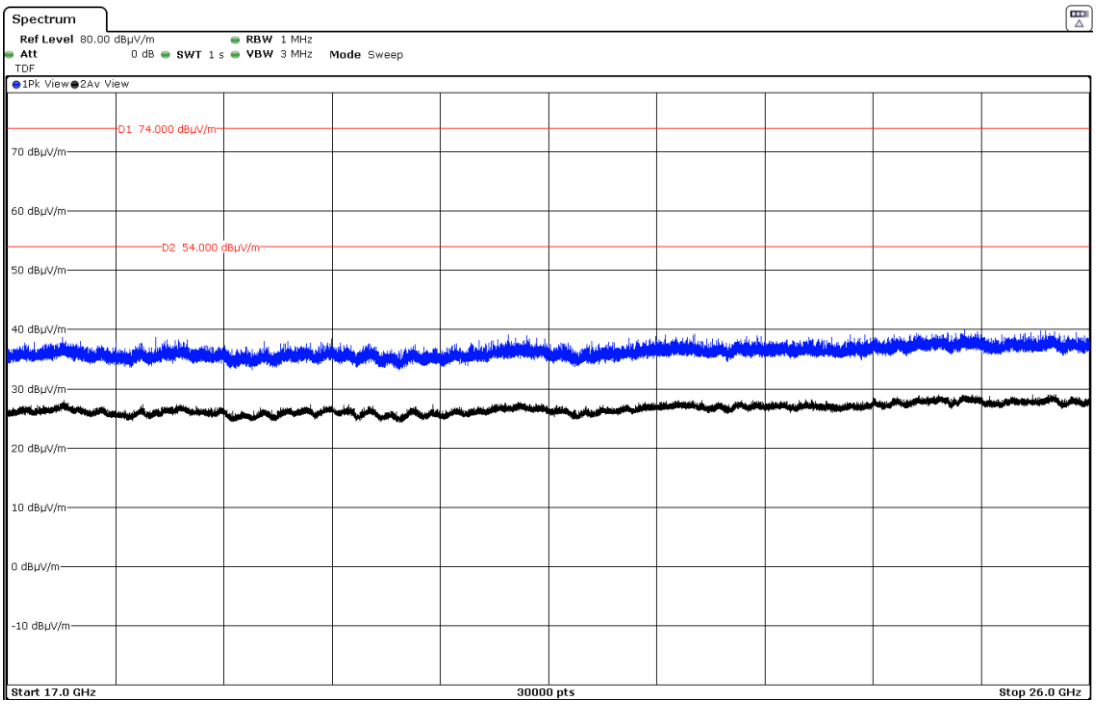
- Middle Channel:



- High Channel:



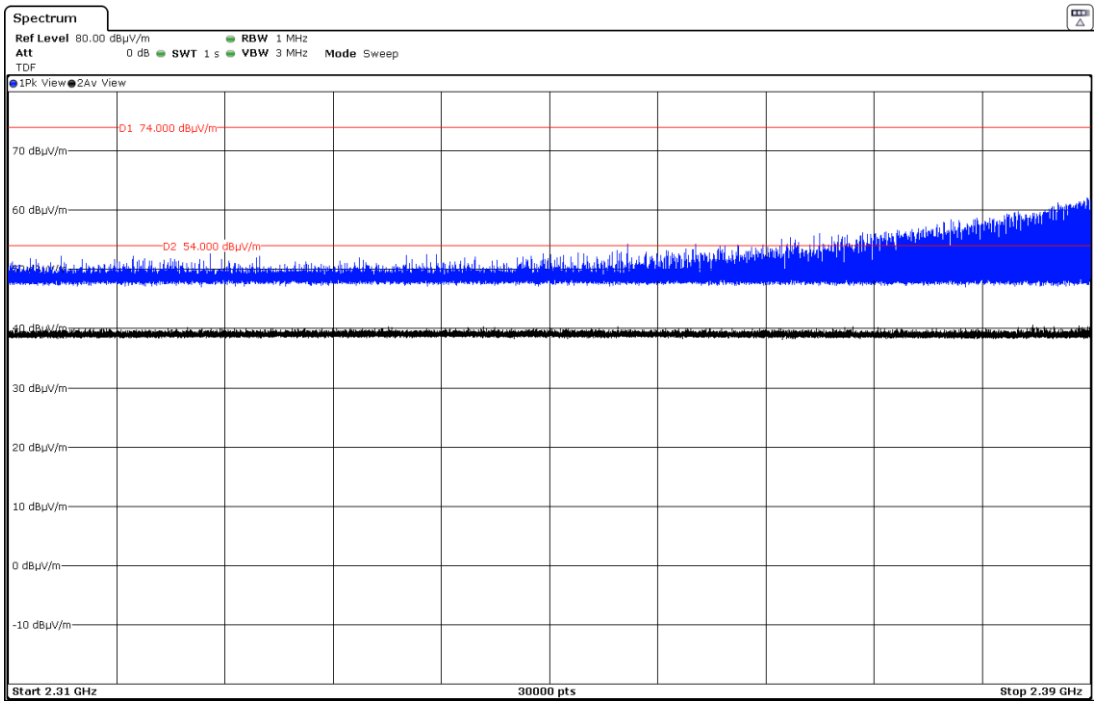
FREQUENCY RANGE 17 - 26 GHz



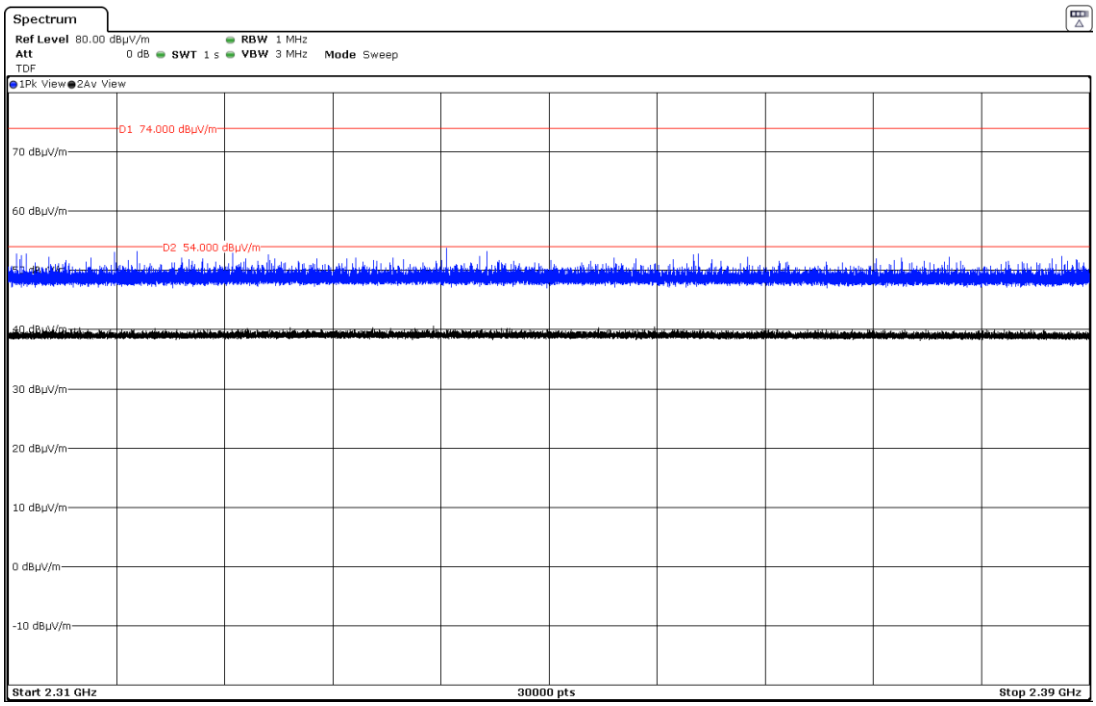
Note: This plot is valid for all three channels.

FREQUENCY RANGE 2.31 - 2.39 GHz. (RESTRICTED BAND 1)

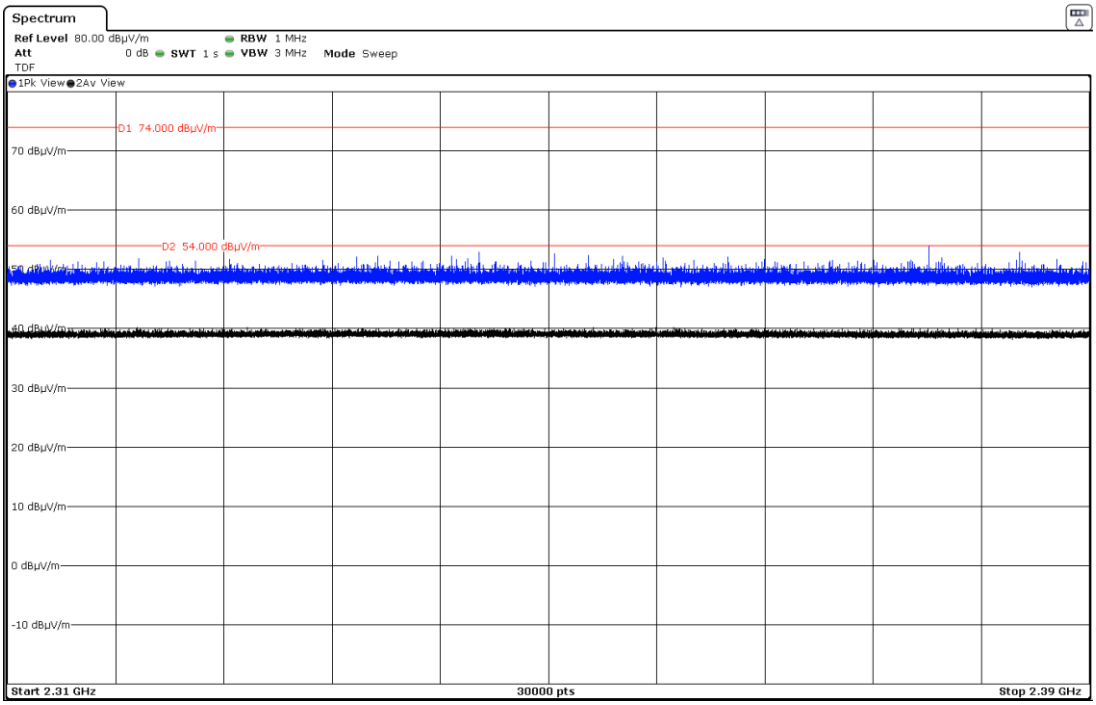
- Low Channel:



- Middle Channel:

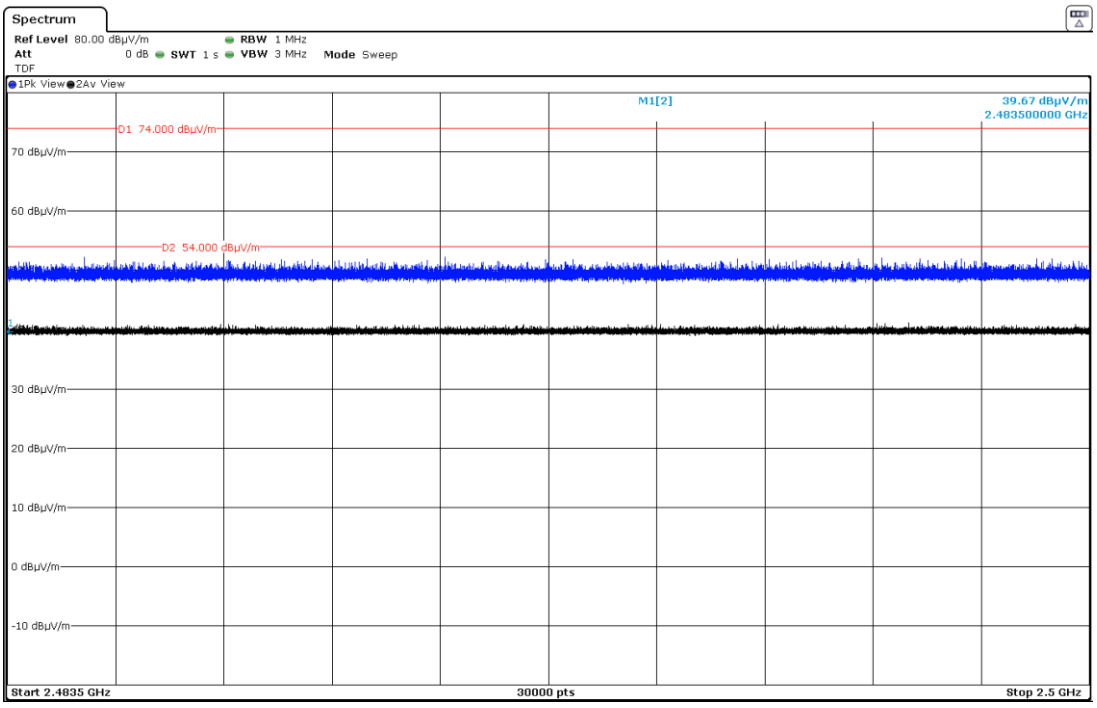


- High Channel:

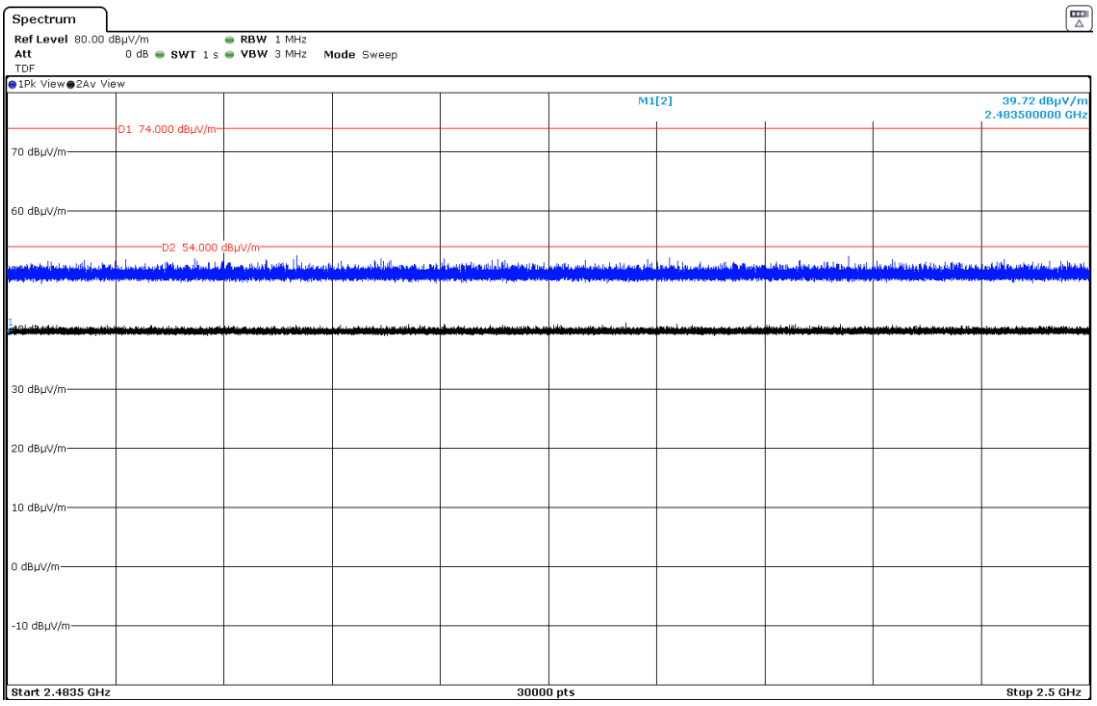


FREQUENCY RANGE 2.4835 - 2.5 GHz. (RESTRICTED BAND 2)

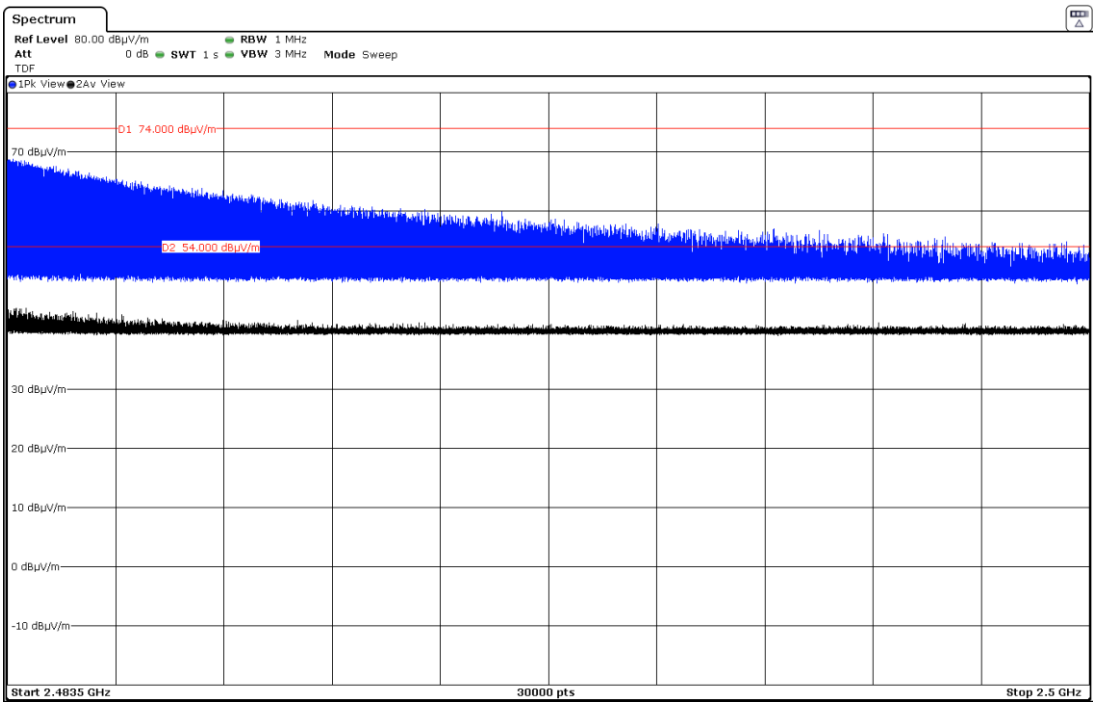
- Low Channel:



- Middle Channel:



- High Channel:



Appendix C: Test results. Proprietary protocol 2.4 GHz

Index

TEST CONDITIONS

POWER SUPPLY (V):

Vnominal:	1.45 Vdc
Type of power supply:	Battery
Type of antenna:	Integral antenna.
Declared antenna gain:	-0.31 dBi

TEST FREQUENCIES:

Low Channel: 2402 MHz

Middle Channel: 2440 MHz

High Channel: 2480 MHz

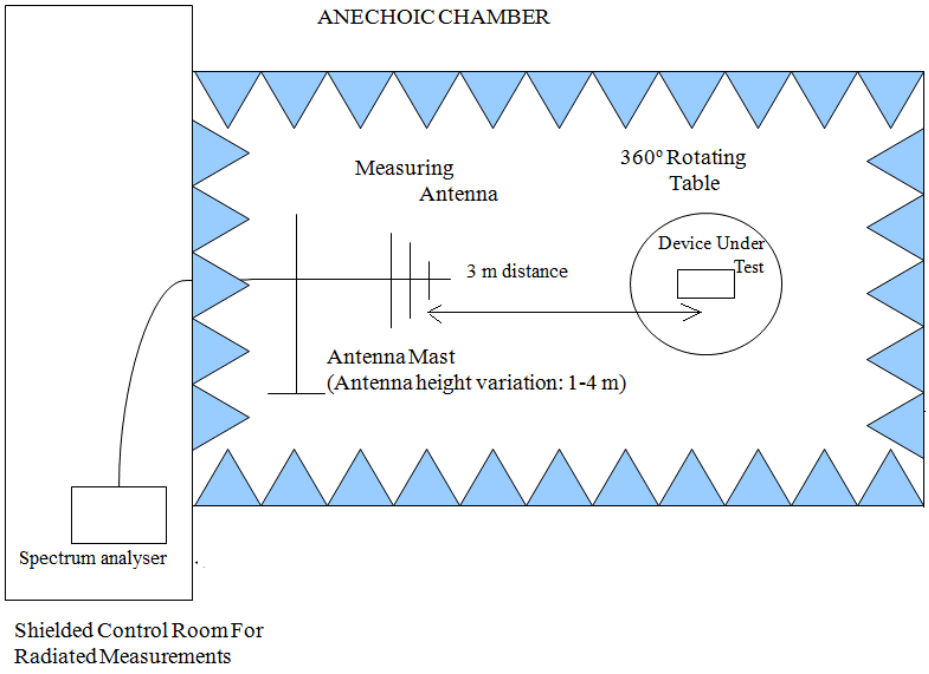
RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

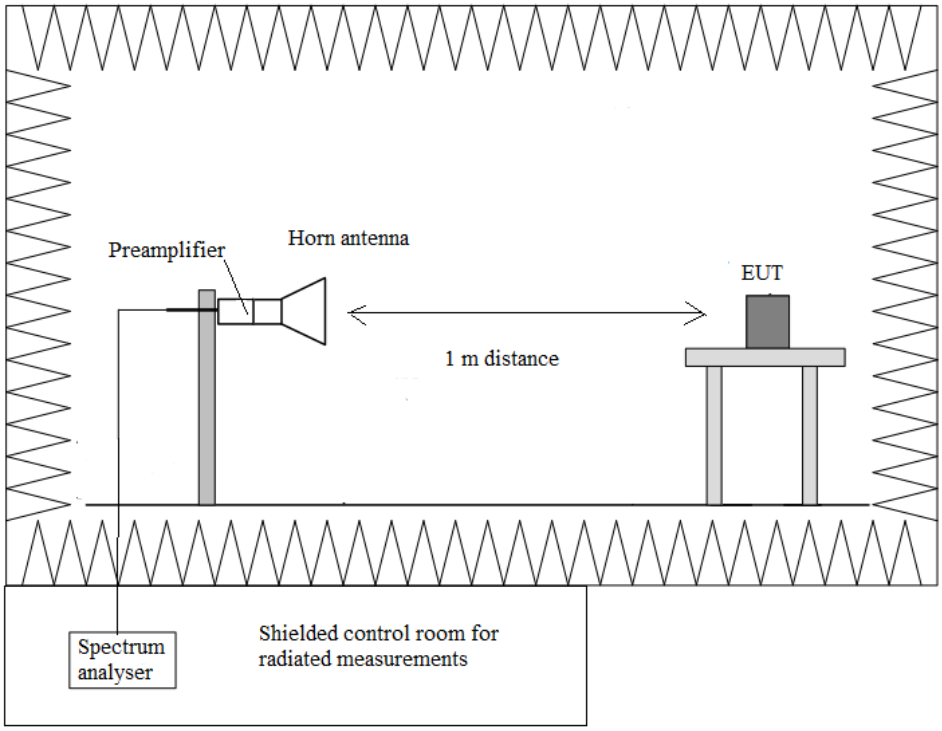
For radiated emissions in the range 1 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.
Radiated measurements setup f < 1 GHz:



Radiated measurements setup f > 1 GHz:



Section 15.249 Subclause (a) / RSS-210 B.10 (a). Field strength of Fundamental and harmonic emissions

SPECIFICATION:

The field strength of emissions from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 – 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000-24250	250	107.96	3

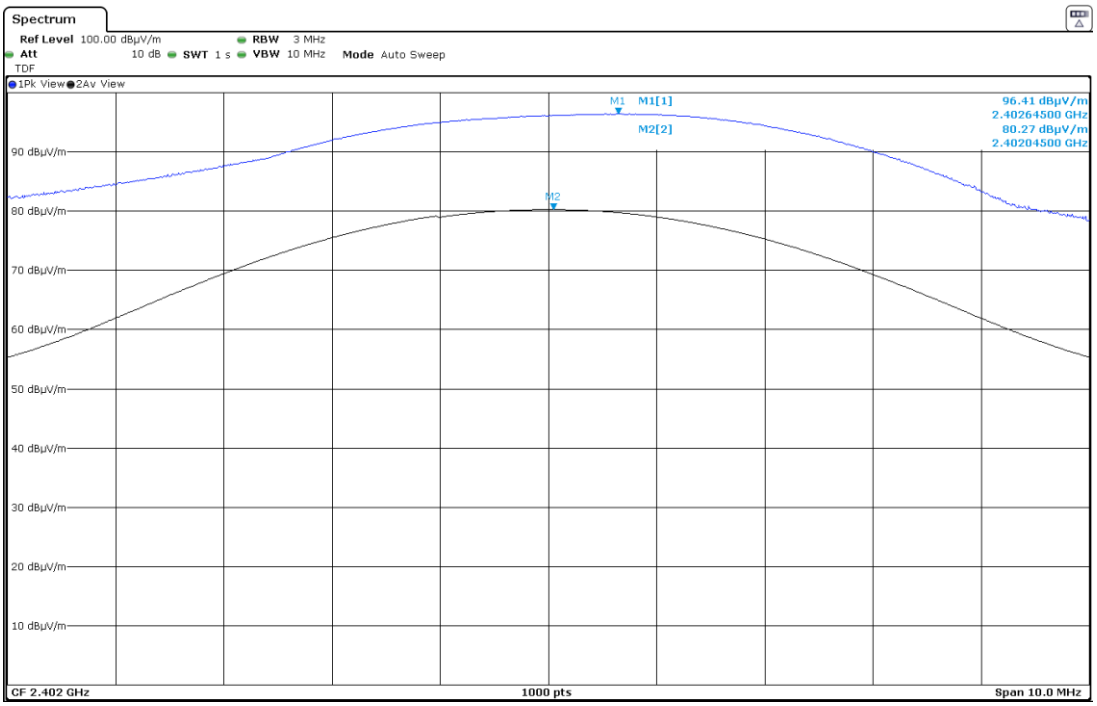
For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

RESULTS:

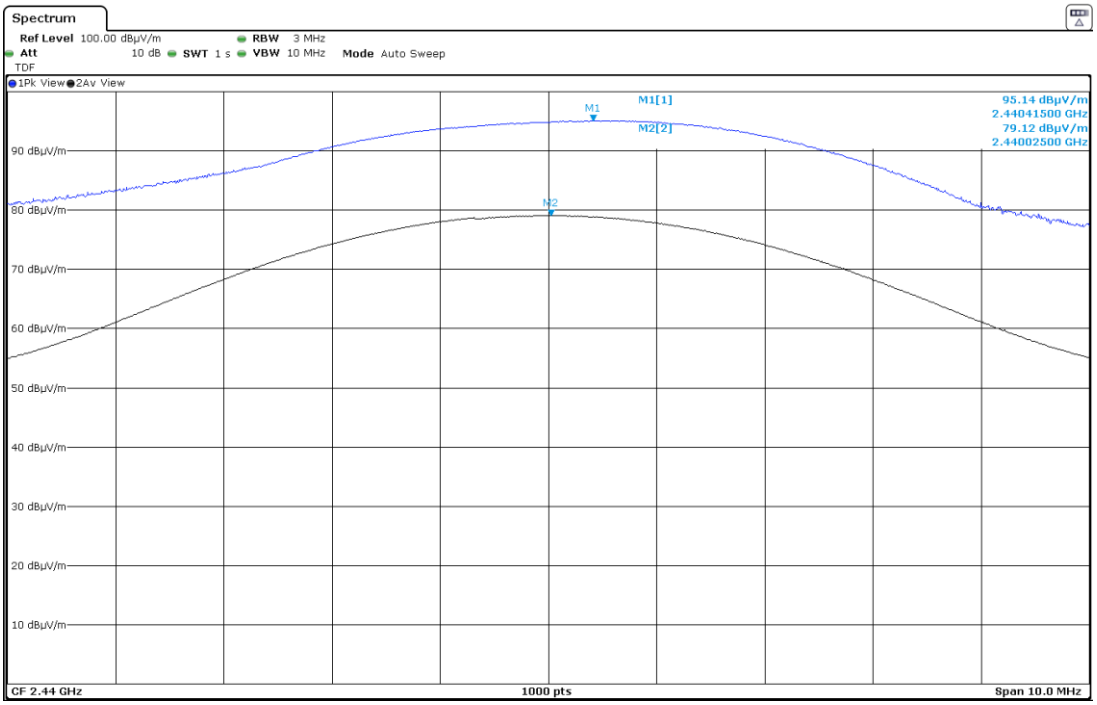
	Low Channel 2402 MHz	Middle Channel 2440 MHz	High Channel 2480 MHz
Average Field Strength (dBµV/m)	80.27	79.12	77.05
Peak Field Strength (dBµV/m)	96.41	95.14	93.15
Measurement Uncertainty (dB)	<±3.70		

Verdict: PASS

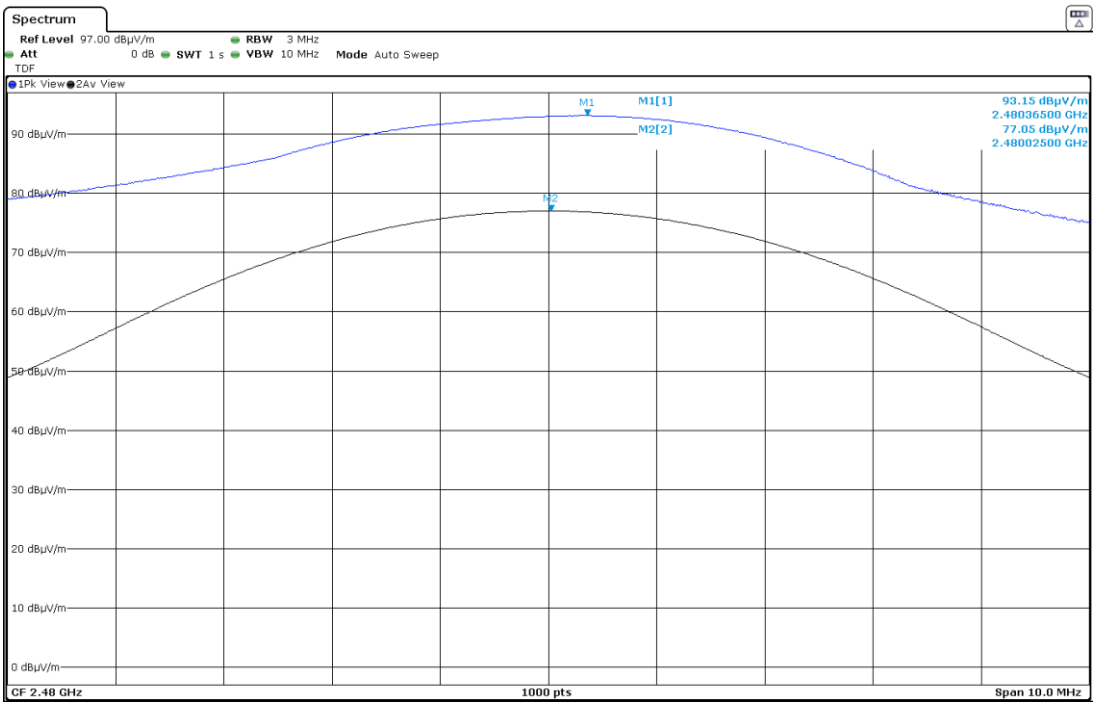
- Low Channel:



- Middle Channel:



- High Channel:



Section 15.249 Subclause (a) and (d) / RSS-210 B.10 (b). Emissions radiated outside of the specific frequency bands (Transmitter)

SPECIFICATION:

The field strength of harmonics from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 – 2483.5	500	54	3
5725 - 5875	500	54	3
24000-24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz - 1 GHz.

The spurious signals detected do not depend on the operating channel.

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 1 - 26 GHz.

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

Spurious signals with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

- Low Channel (2402 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.38919	Peak	65.22	H	<±3.70
	Average	41.65		
4.80390	Peak	64.73	H	<±3.70
	Average	53.54		
9.60683	Peak	52.71	H	<±3.70

- Middle Channel (2440 MHz):

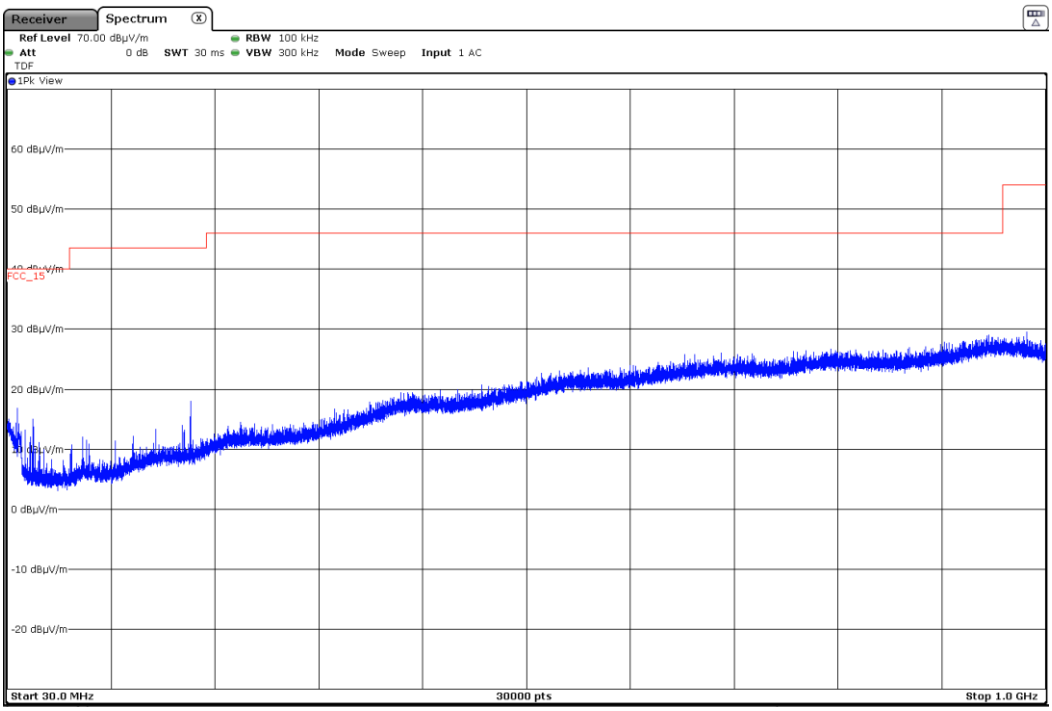
Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.38612	Peak	56.66	H	<±3.70
	Average	48.48		
4.88043	Peak	62.35	H	<±3.70
	Average	53.26		
7.31991	Peak	44.23	H	<±3.70
9.76177	Peak	50.69	H	<±3.70

- High Channel (2480 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.48356	Peak	67.46	H	<±3.70
	Average	43.10		<±3.70
4.95650	Peak	59.43	V	<±3.70
	Average	50.39		<±3.70
9.91250	Peak	51.08	V	<±3.70

Verdict: PASS

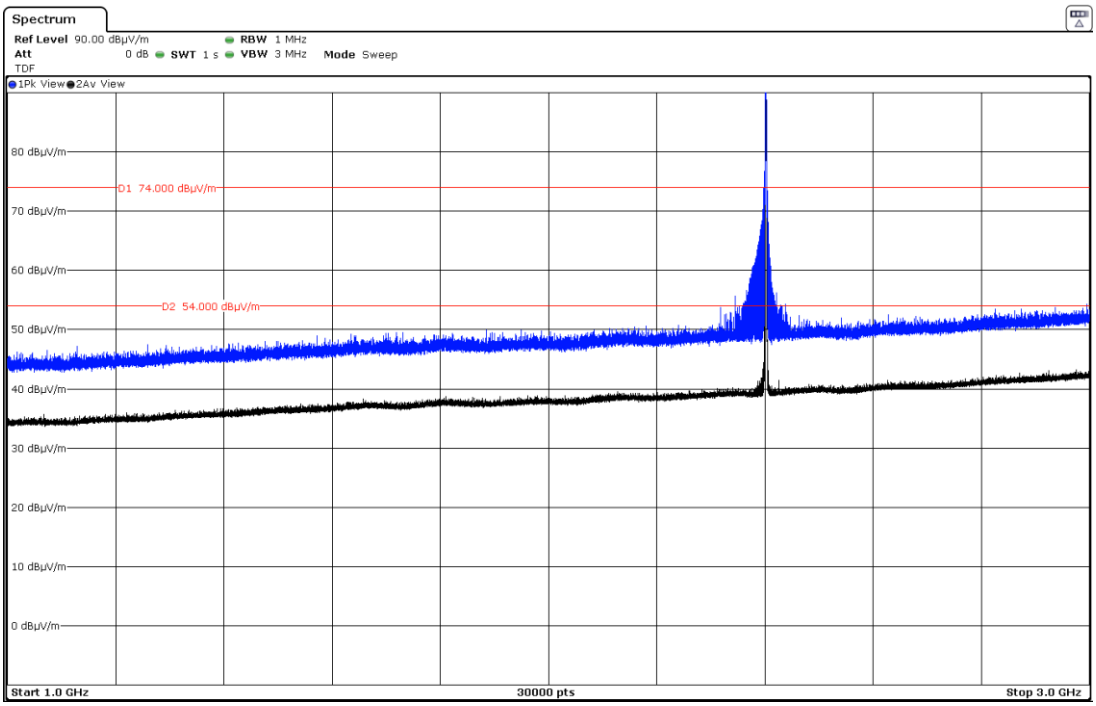
FREQUENCY RANGE 30 MHz - 1 GHz



Note: This plot is valid for all three channels

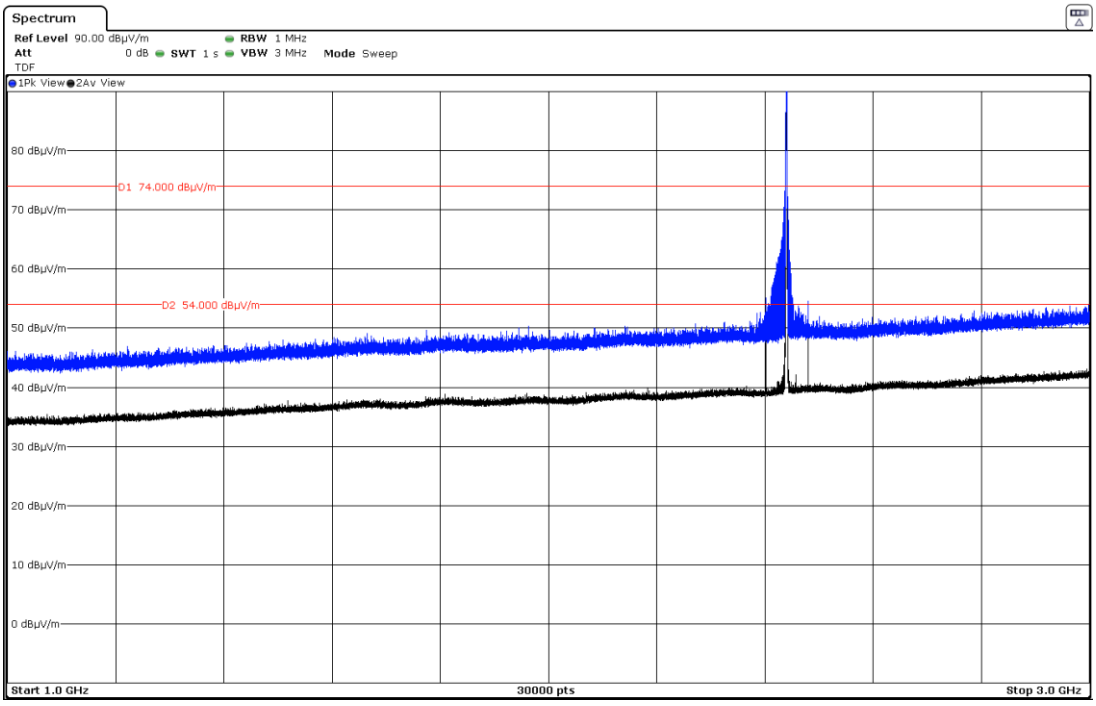
FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



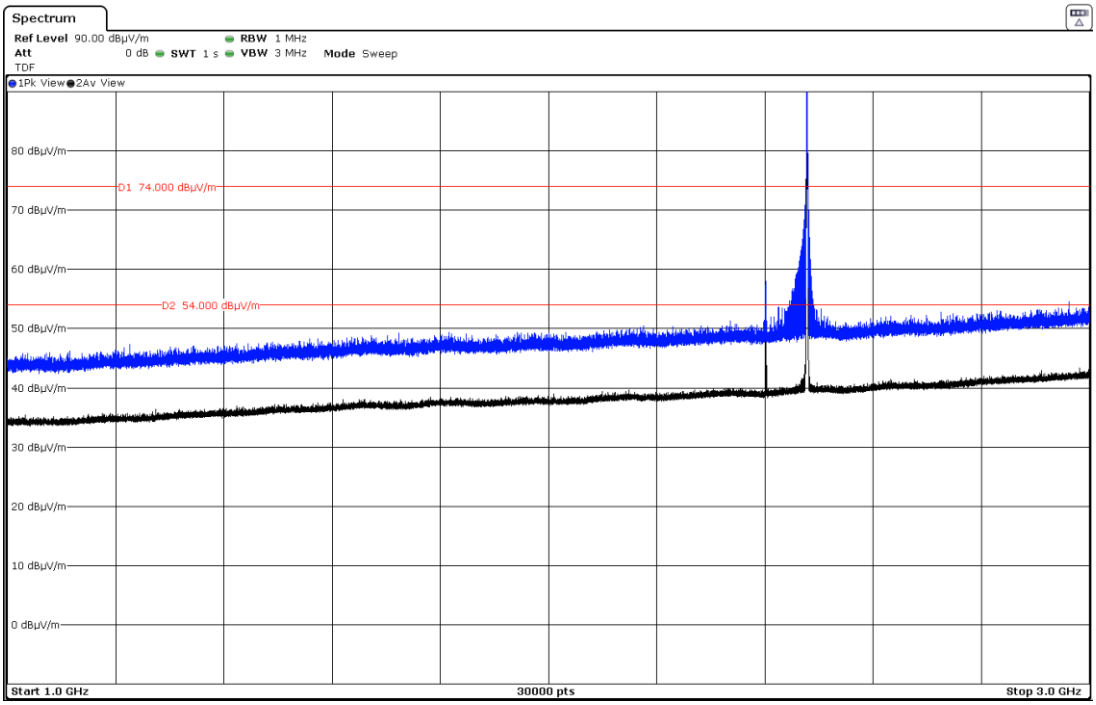
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



The peak shown in the plot above the limit is the carrier frequency.

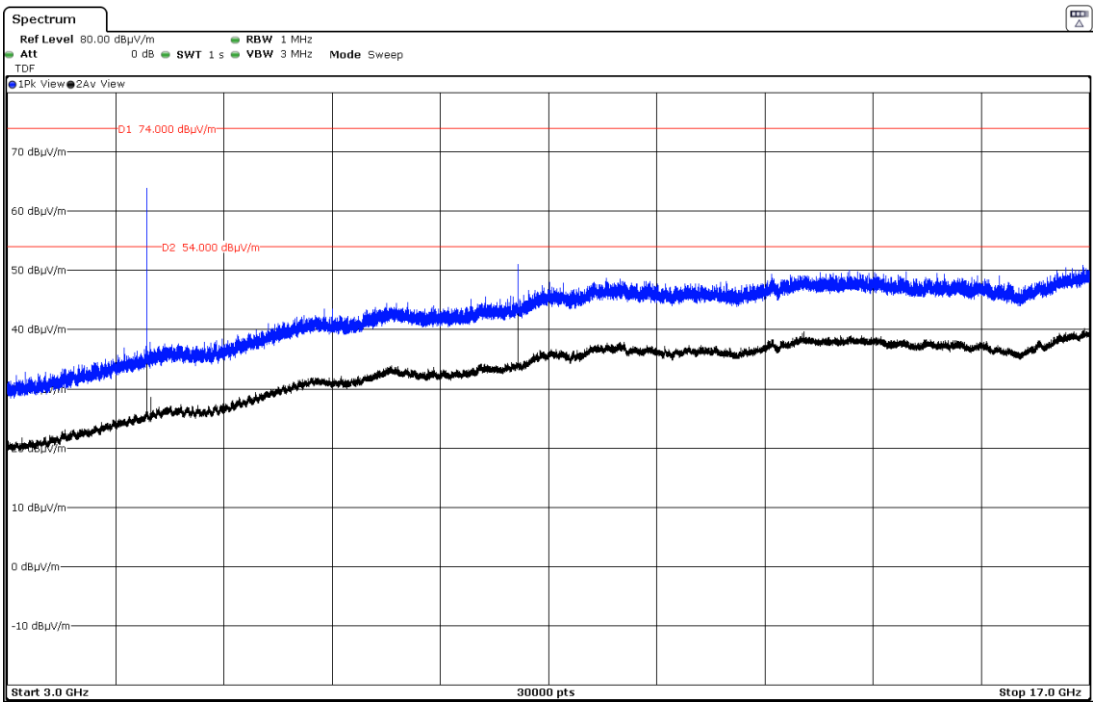
- High Channel:



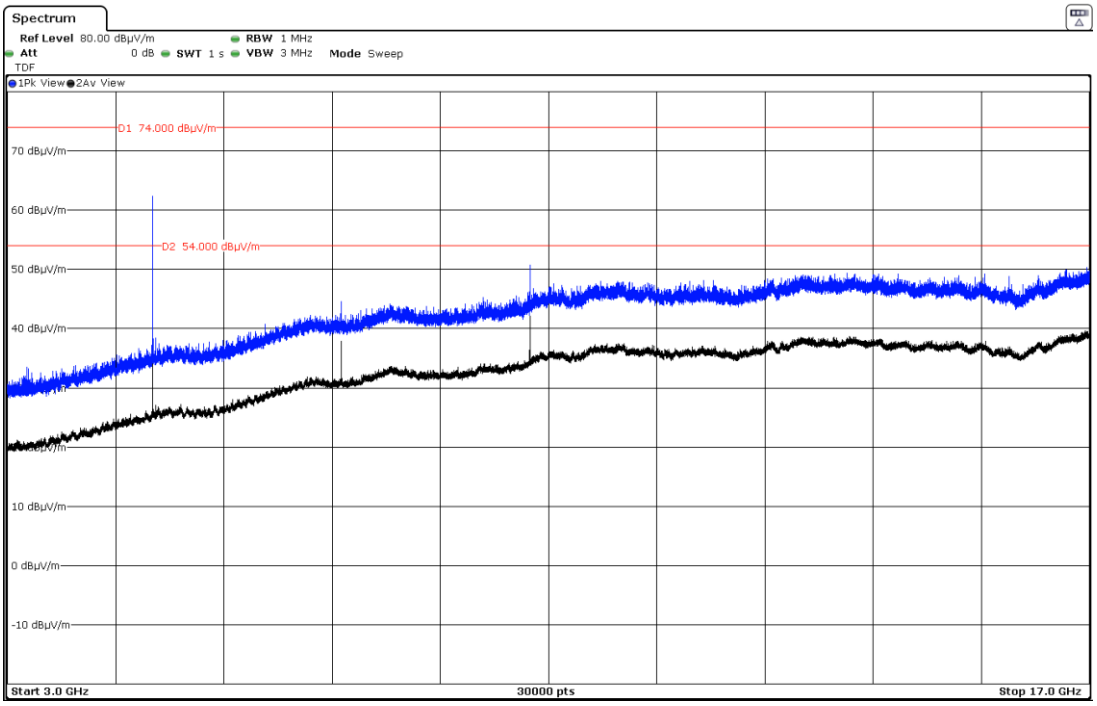
The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz

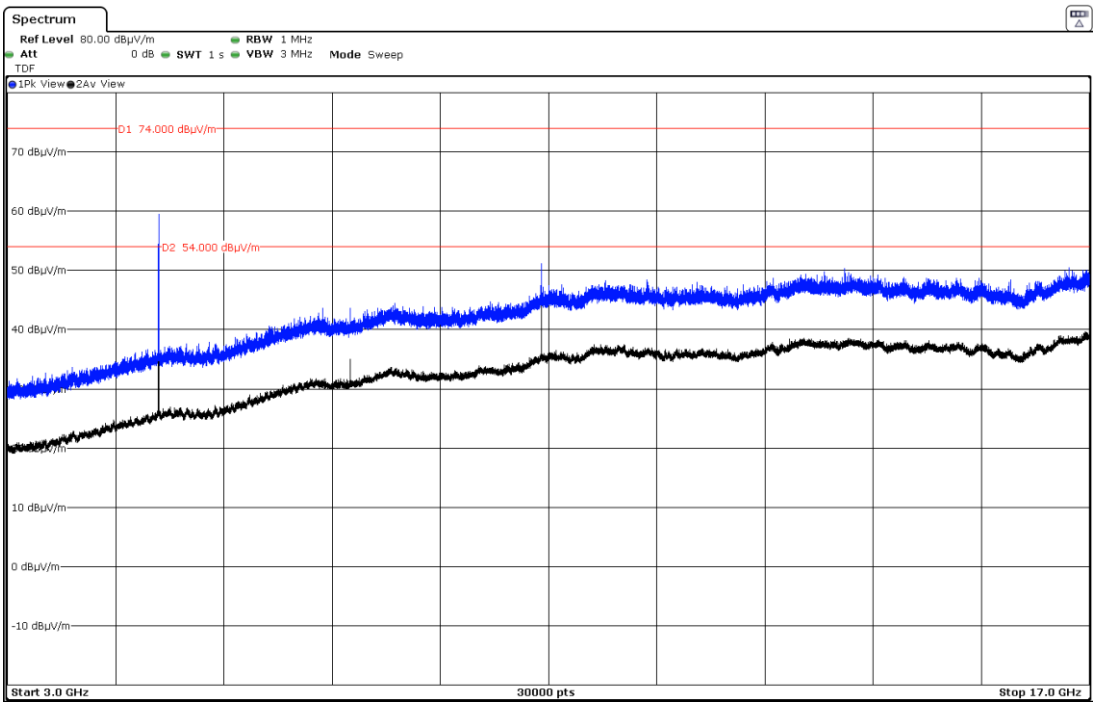
- Low Channel:



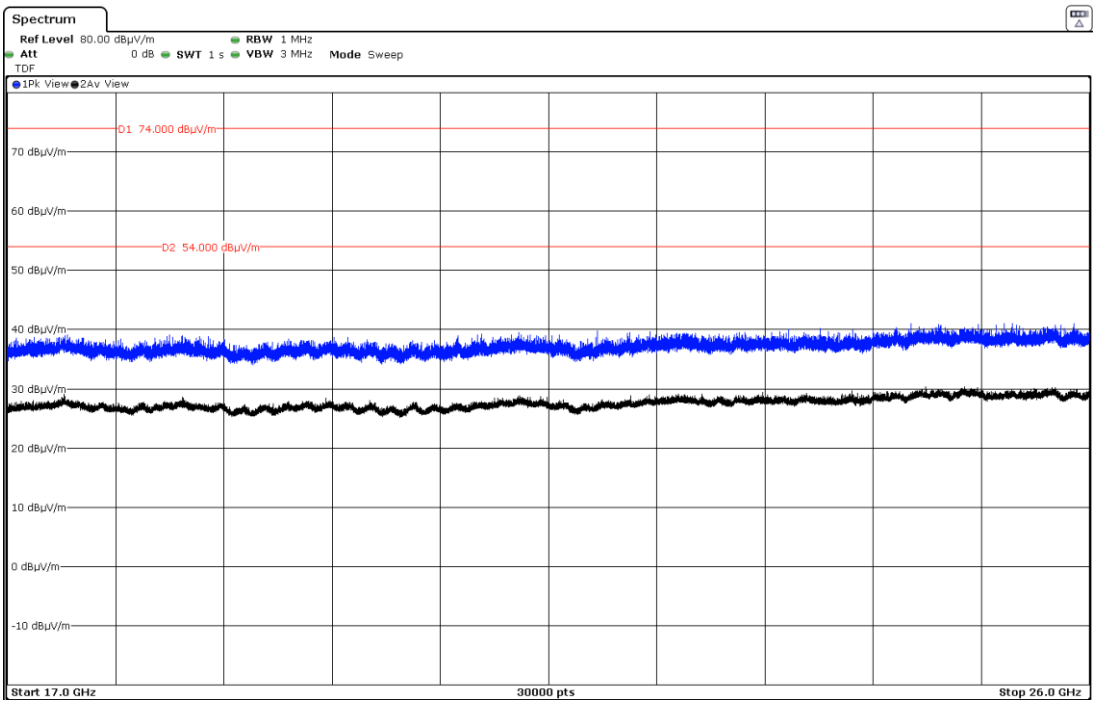
- Middle Channel:



- High Channel:



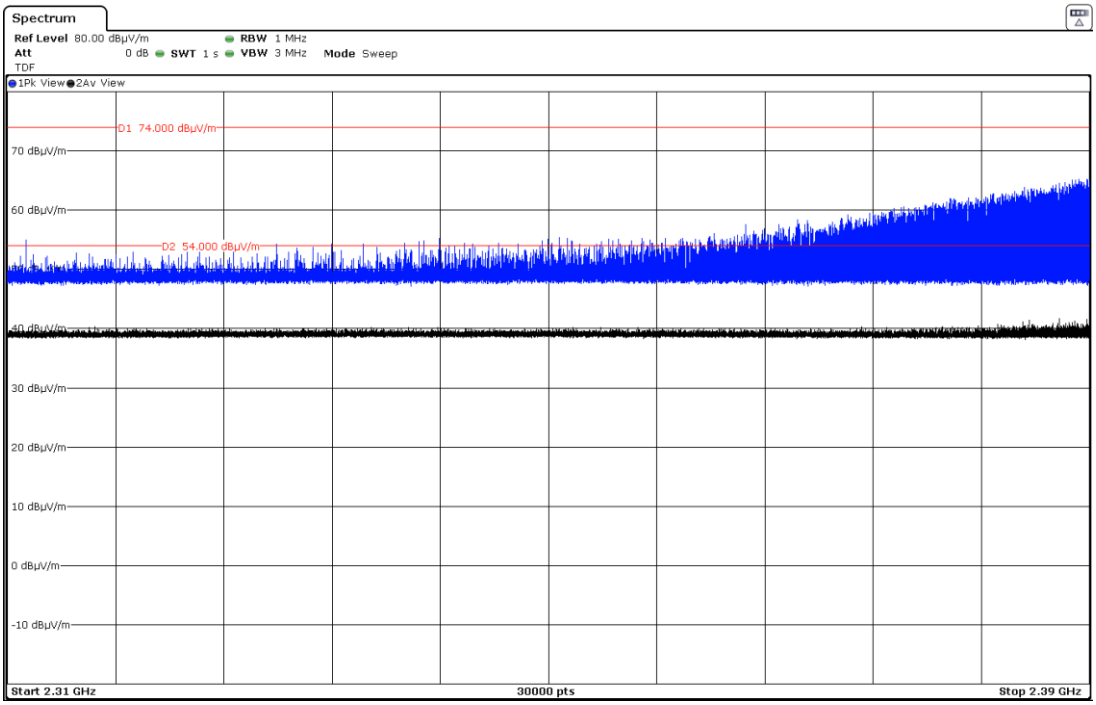
FREQUENCY RANGE 17 - 26 GHz



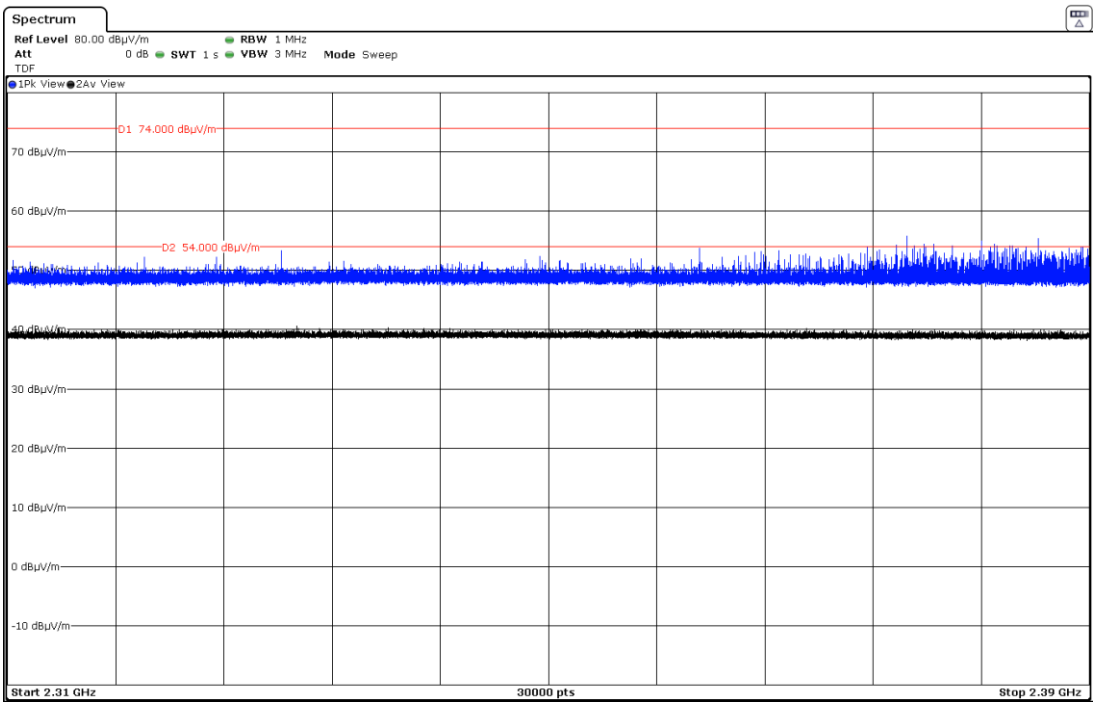
Note: This plot is valid for all three channels.

FREQUENCY RANGE 2.31 - 2.39 GHz. (RESTRICTED BAND 1)

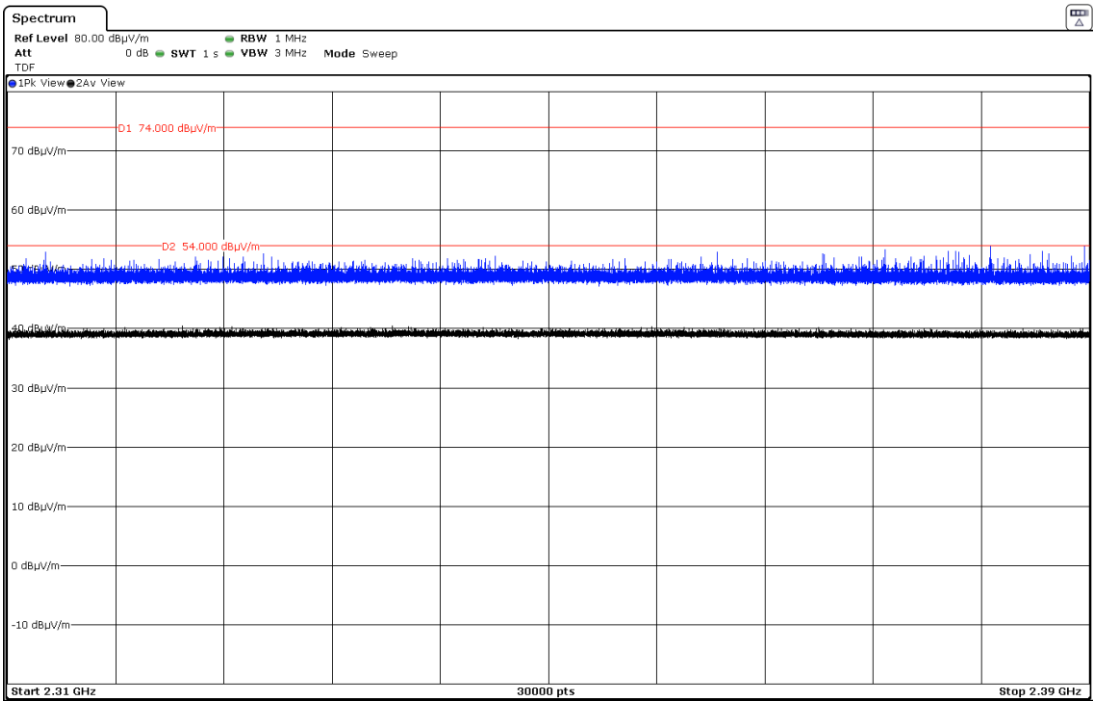
- Low Channel:



- Middle Channel:

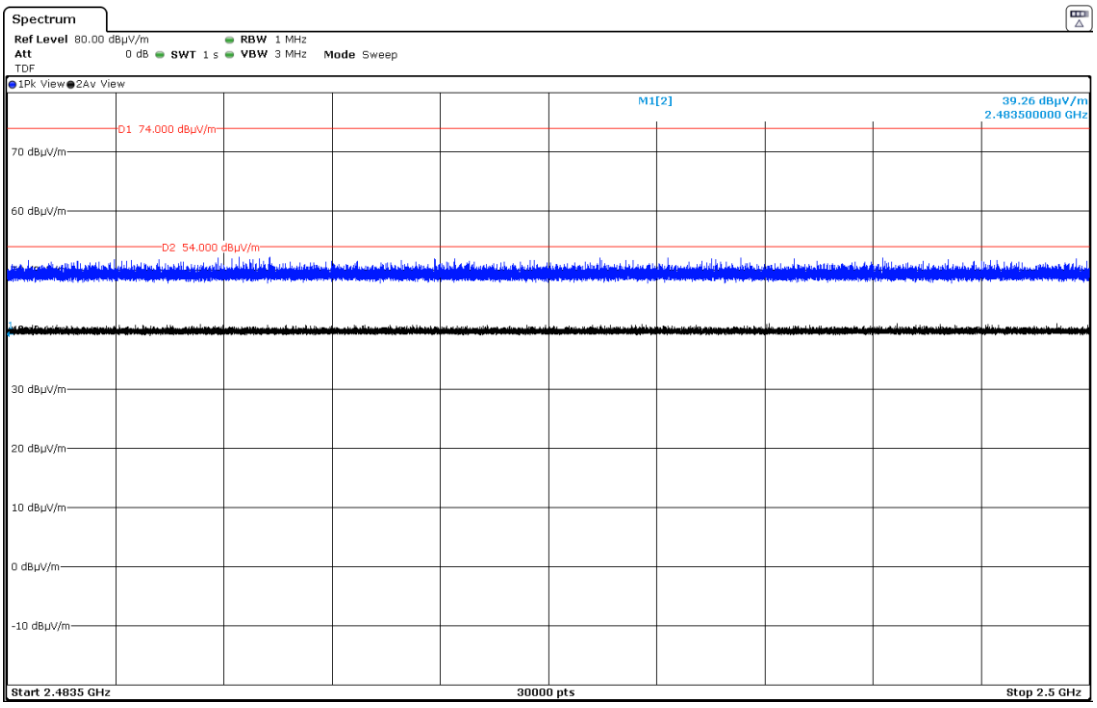


- High Channel:

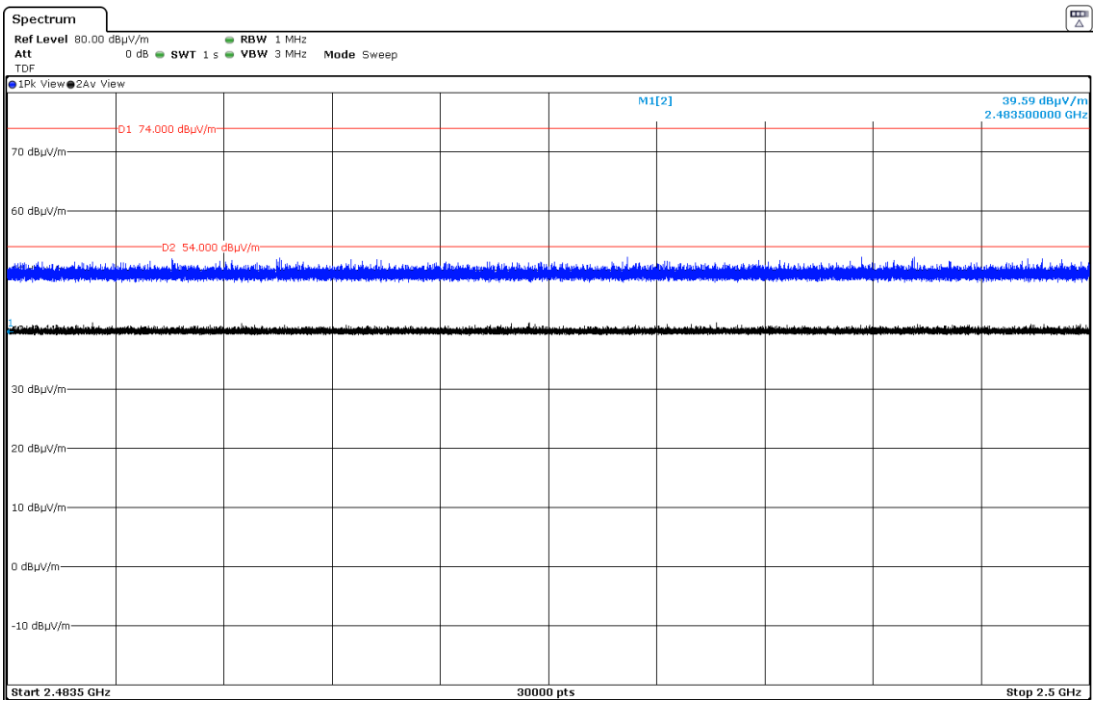


FREQUENCY RANGE 2.4835 - 2.5 GHz. (RESTRICTED BAND 2)

- Low Channel:



- Middle Channel:



- High Channel: