Test report

REP0038337-1R1TRFWL

Date of issue: January 16, 2024

Applicant:

Modular Medical, Inc.

Product description:

Insulin pump patch

Model:

MODD1

Product marketing name(s):

N/A

FCC ID:

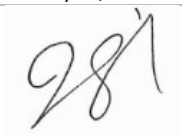
2BDWN23MODD1-1

Specifications:

- FCC 47 CFR Part 15, Subpart C – §15.247
  Operation within the bands 902 – 928 MHz, 2400 – 2483.5 MHz, 5727 – 5850 MHz

Lab and test locations

Company name	Nemko USA Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943; Designation Number: US5058
ISED Test Site	2040B-3

Tested by	Martha Espinoza, Wireless Test Engineer
Reviewed by	James Cunningham, EMC/WL Manager
Review date	January 16, 2024
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.
This report must not be used by the client to claim product certification, approval, or endorsement by ANAB, NIST, or any agency of the U.S. Government.

Copyright notification

Table of Contents

Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart C – §15.247	Operation within the bands 902 – 928 MHz, 2400 – 2483.5 MHz, 5727 – 5850 MHz
Industry Canada RSS-247, Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.2 Exclusions

None.

1.3 Statement of compliance

Testing was performed against all relevant requirements of the test standard(s).

Results obtained indicate that the product under test complies in full with the tested requirements.

The test results relate only to the item(s) tested.

See “Section 2 Summary of test results” for full details.

1.4 Test report revision history

Table 1.4-1: *Test report revision history*

Revision #	Issue Date	Details of changes made to test report
REP0038337-1TRFEMC	January 15, 2024	Original report issued
REP0038337-1R1TRFEMC	January 16, 2024	Updated following TCB feedback

Section 2 Summary of test results

2.1 Sample information

Receipt date	27-Nov-23
Nemko sample ID number	REP0038337

2.2 Testing period

Test start date	27-Nov-23
Test end date	29-Nov-23

2.3 Test results

Table 2.3-1: *FCC 47 CFR Part 15, Subpart B & C, general requirements*

Part	Test description	Verdict
§15.207(a)	Conducted limits	Not applicable [1]
§15.31(e)	Variation of power source	Pass
§15.203	Antenna requirement	Pass

Notes: [1] EUT is DC powered from dedicated DC source or battery powered

Table 2.3-2: *FCC 47 CFR Part 15, Subpart C, §15.247 requirements*

Part	Test description	Verdict
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	Not applicable
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	Pass
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	Not applicable
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	Not applicable
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Pass
§15.247(b)(4)	Transmitting antennas of directional gain greater than 6 dBi	Not applicable
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	Pass
§15.247(f)	Time of occupancy for hybrid systems	Not applicable

Section 3 Equipment under test (EUT) details

3.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

3.2 Applicant

Company name	Modular Medical, Inc.
Address	10740 Thornmint Road
City	San Diego
State	CA
Postal/Zip code	92127
Country	USA

3.3 Manufacturer

Company name	Modular Medical, Inc.
Address	10740 Thornmint Road
City	San Diego
State	CA
Postal/Zip code	92127
Country	USA

3.4 EUT information

Product name	Insulin pump patch
Model	MODD1
Variant(s)	N/A
Serial number	MN-23313106 (radiated sample), MN-23313101 (conducted sample)
Part number	MTL-41
Power requirements	3.2 V DC (Battery)
Description/theory of operation	The MODD1.1 Insulin Delivery System (i.e., MODD1.1 System) is an ambulatory infusion pump intended for the continuous delivery of insulin. The MODD1.1 System features selectable basal rates, on-demand bolus dosing, and the temporary suspension of basal delivery.
Operational frequencies	2400 - 2483.5 MHz
Software details	N/A

3.5 Transmitter Information

Frequency band	2400 – 2483.5 MHz
Transmitter type	☐ Frequency hopping spread spectrum (FHSS) ☒ Digital transmission system (DTS) ☐ Hybrid FHSS / DTS
Minimum frequency (MHz)	2402
Maximum frequency (MHz)	2480
Type of modulation	GFSK
Data rate	☐ 125 kbps operation ☐ 500 kbps operation ☒ 1 Mbps operation ☒ 2 Mbps operation
Tested frequencies	2402 MHz (low), 2440 MHz (middle), and 2480 MHz (high)
Antenna type	Integrated trace antenna
Antenna peak gain	-0.53 dBi (2402 MHz) -1.67 dBi (2440 MHz) -1.50 dBi (2480 MHz)

3.6 EUT setup details

The EUT was controlled by a support laptop to set the transmission on the Low, Middle, and High channels and at 1 MBPS and 2 MBPS as required for testing.

Table 3.6-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number	Rev.
N/A				

Table 3.6-2: *EUT interface ports*

Description	Qty.
N/A	

Table 3.6-3: *Support equipment*

Description	Brand name	Model/Part number	Serial number	Rev.
EFX-293 Battery Stand-in	N/A	N/A	N/A	--
Microship Tech (MIC2941) based Linear DC power supply	N/A	N/A	N/A	--
Laptop	Dell	N/A	N/A	--

Table 3.6-4: *Inter-connection cables*

Cable description	From	To	Length (m)
N/A			

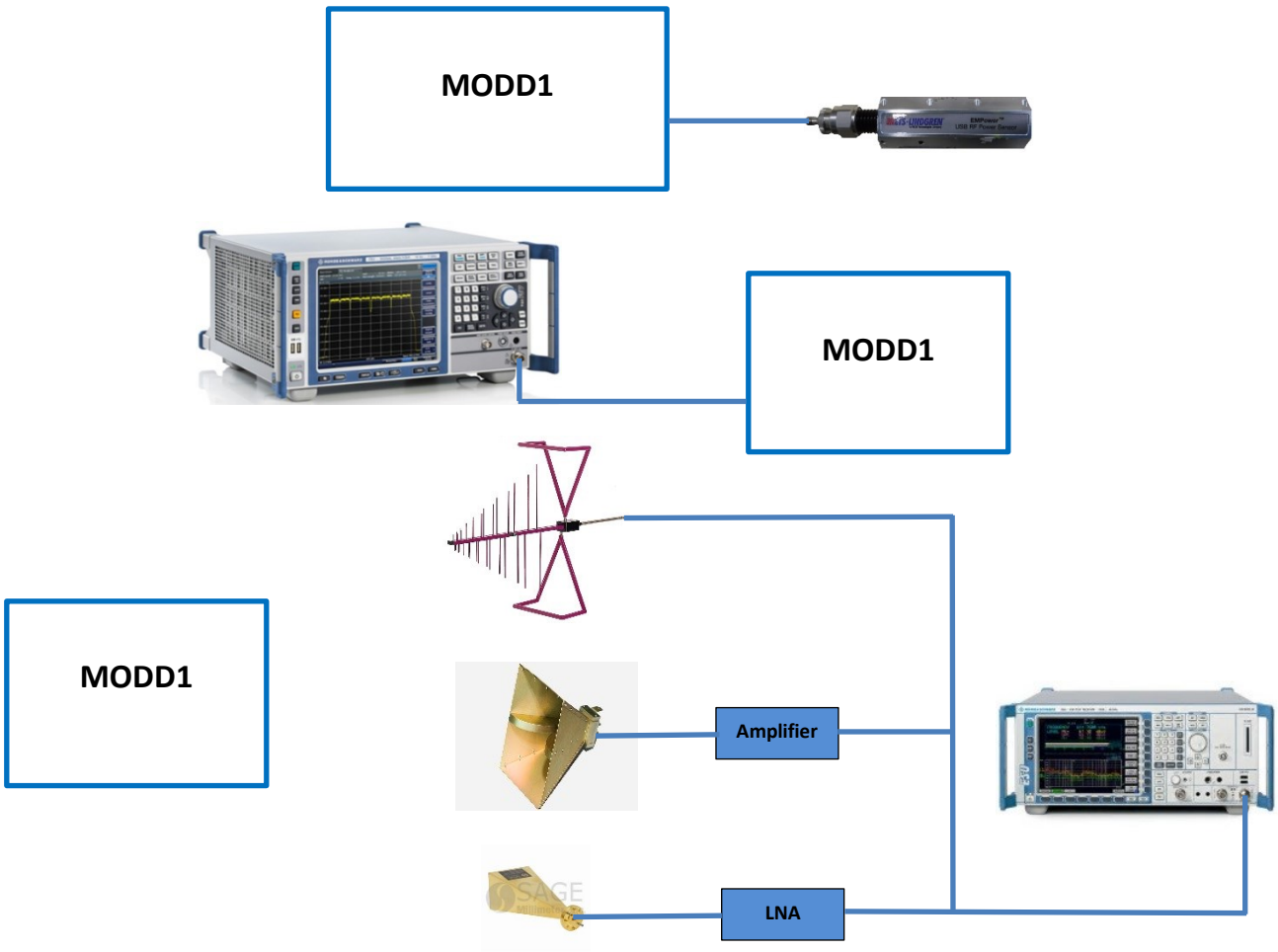


Figure 3.6-1: Test setup diagram

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

None.

4.2 Technical judgement

None.

4.3 Deviations from laboratory test procedures

None.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4-2 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics, and limit modelling – Measurement instrumentation uncertainty. The expression of Uncertainty in EMC testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Table 6.1-1: *Measurement uncertainty calculations*

Measurement		**U_{cispr} dB**	**U_{lab} dB**
Conducted disturbance at AC mains and other port power using a V-AMN	9 kHz to 150 kHz	3.8	2.9
	150 kHz to 30 MHz	3.4	2.3
Conducted disturbance at telecommunication port using AAN	150 kHz to 30 MHz	5.0	4.3
Conducted disturbance at telecommunication port using CVP	150 kHz to 30 MHz	3.9	2.9
Conducted disturbance at telecommunication port using CP	150 kHz to 30 MHz	2.9	1.4
Conducted disturbance at telecommunication port using CP and CVP	150 kHz to 30 MHz	4.0	3.1
Radiated disturbance (electric field strength in a SAC)	30 MHz to 1 GHz	6.3	5.5
Radiated disturbance (electric field strength in a FAR)	1 GHz to 6 GHz	5.2	4.7
Radiated disturbance (electric field strength in a FAR)	6 GHz to 18 GHz	5.5	5.0

Notes: Compliance assessment:

If U_{lab} is less than or equal to U_{cispr} then:

- compliance is deemed to occur is no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit

If U_{lab} is greater than U_{cispr} then:

- compliance is deemed to occur is no measured disturbance level, increased by (U_{lab} - U_{cispr}), exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} - U_{cispr}), exceeds the disturbance limit

V-AMN: V type artificial mains network
AAN: Asymmetric artificial network
CP: Current probe
CVP: Capacitive voltage probe
SAC: Semi-anechoic chamber
FAR: Fully anechoic room

Section 7 Test equipment

7.1 Test equipment list

Table 7.1-1: *Test Equipment List*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Signal and spectrum analyzer	Rohde & Schwarz	FSV3030	E1321	Sep-26-2023	Sep-26-2024
Power sensor	ETS Lindgren	7002-006	EW110	April-14-2023	April-14-2024
EMI Test Receiver	Rohde & Schwarz	ESU26	E1353	Nov-14-2023	Nov-14-2024
EMI Test Receiver	Rohde & Schwarz	ESU40	E1121	Aug-23-2023	Aug-23-2024
System Controller	Sunol Sciences	SC104V	E1191	NCR	NCR
System Controller	Sunol Sciences	SC104V	E1129	NCR	NCR
Bilog Antenna (30-1000 MHz)	Schaffner	CBL 6111D	1763	April-01-2022	April-01-2024
DRG Horn (1-18 GHz)	ETS-Lindgren	3117-PA	E1160	Feb-13-2023	Feb-13-2024
Horn antenna (18-26 GHz)	Eravant	SAZ-2410-42-S1	EW107	VOU	VOU
Low noise amplifier	Sage Millimeter, Inc.	SBL-1834034030-KFKF	E1228	VOU	VOU
High pass filter	Wainwright Instruments	WHKX12-2493-2770-180	E1207	NCR	NCR

Notes: NCR: no calibration required
VBU: verify before use

7.2 Test software list

Table 7.2-1: *Test Software*

Manufacturer	Details
Rohde & Schwarz	EMC 32 V10.60.10 (AC conducted emissions)
Rohde & Schwarz	EMC 32 V10.60.15 (radiated emissions)

Section 8 Testing data

8.1 Variation of power source

8.1.1 References and limits

- FCC 47 CFR Part 15, Subpart A: §15.31(e)
- Test method: ANSI C63.10-2020 §5.13

§15.31(e):
For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

8.1.2 Test summary

Verdict	Pass		
Test date	November 27, 2023	Temperature	19 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	☒ Wireless bench ☐ Other:	Relative humidity	53 %

8.1.3 Notes

Testing was performed with the transmitter operating on a fixed channel (middle) at maximum output power.

8.1.4 Setup details

EUT power input during test	3.2 V DC

8.1.5 Test data

☒	EUT is battery operated. Therefore, all tests performed with a new fully charged battery
☐	EUT power supply voltage varied across supported range. No variation in transmitter output power observed therefore all tests performed at nominal power supply voltage.
☐	EUT power supply voltage varied across supported range. Transmitter output power variation was observed. All tests performed with the EUT operated at the worst-case operating voltage with respect to transmitter output power: V.

8.2 Antenna requirement

8.2.1 References and limits

- FCC 47 CFR Part 15, Subpart C: §15.203

§15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Test summary

8.2.2 Test summary

Verdict	Pass		
Test date	November 27, 2023	Temperature	19 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	☒ Wireless bench ☐ Other:	Relative humidity	53 %

8.2.3 Notes

None

8.2.4 Test data

Antenna part number:	MTL-122
Technical description:	RF TRACE ANT 2.4 GHz 50 OHM
Peak gain (dBi):	-0.53 dBi
Source of gain data:	☐ Declared by client ☐ Antenna data sheet or specification. Document name: ☒ Antenna gain test report. Document name: REP021588-1R1TRFWL

8.3 Minimum 6 dB bandwidth

8.3.1 References and limits

- FCC 47 CFR Part 15, Subpart C: §15.247(a)(2)
- Test method: ANSI C63.10-2020 §11.8.1

§15.247:

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(2) 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.

8.3.2 Test summary

Verdict	Pass		
Test date	November 27, 2023	Temperature	19 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	☒ Wireless bench ☐ Other:	Relative humidity	53 %

8.3.3 Notes

Testing was performed with the transmitter operating on a fixed channel (lowest, middle, and highest) at maximum output power.

The spectral plots within this section have been corrected with all relevant transducer factors.

8.3.4 Setup details

EUT power input during test	3.2 V DC
EUT setup configuration	☒ Table-top ☐ Floor standing ☐ Other:

Receiver/spectrum analyzer settings:

Resolution bandwidth	100 kHz
Video bandwidth	300 kHz
Detector mode	Peak
Trace mode	Max Hold
Measurement time	Long enough for trace to stabilize

8.3.5 Test data

Table 8.3-1: *Minimum 6 dB bandwidth test data*

Test Frequency (MHz)	Modulation	DTS Bandwidth (kHz)	Limit (kHz)
2402	GFSK, 1 Mbps	708.23	≥ 500
2440	GFSK, 1 Mbps	716.63	≥ 500
2480	GFSK, 1 Mbps	730.43	≥ 500
2402	GFSK, 2 Mbps	1280	≥ 500
2440	GFSK, 2 Mbps	1160	≥ 500
2480	GFSK, 2 Mbps	1230	≥ 500

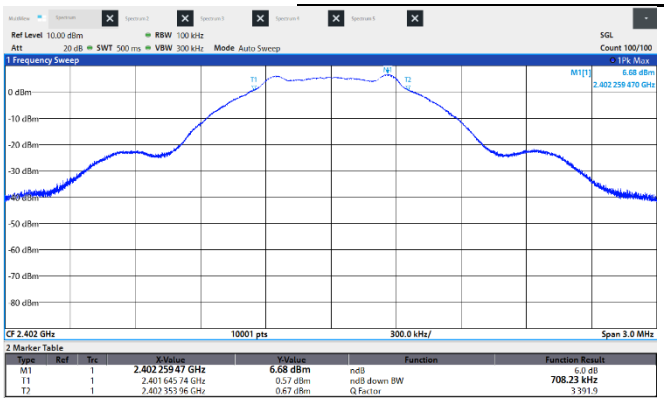


Figure 8.3-1: *Minimum 6 dB bandwidth, GFSK, 1 Mbps, 2402 MHz*

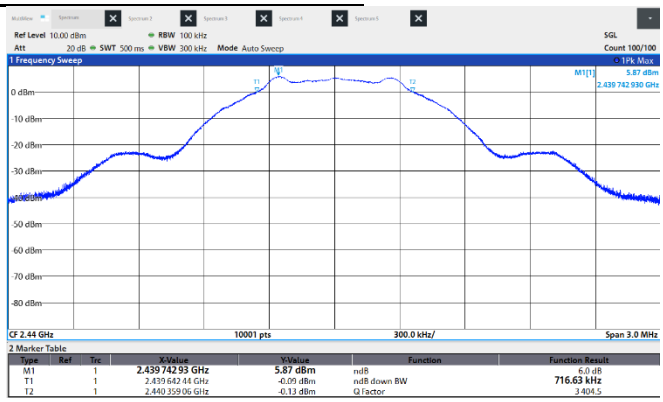


Figure 8.3-2: *Minimum 6 dB bandwidth, GFSK, 1 Mbps, 2440 MHz*

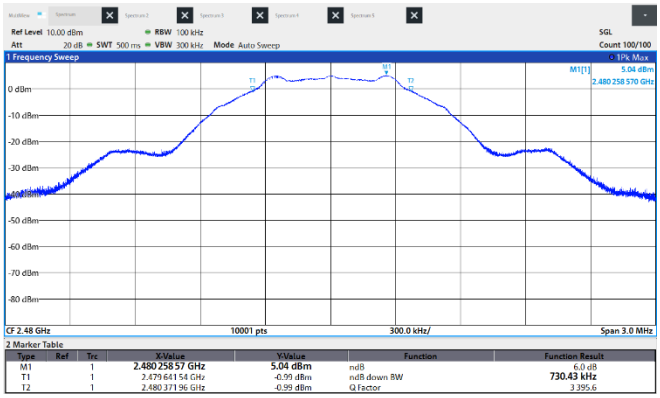
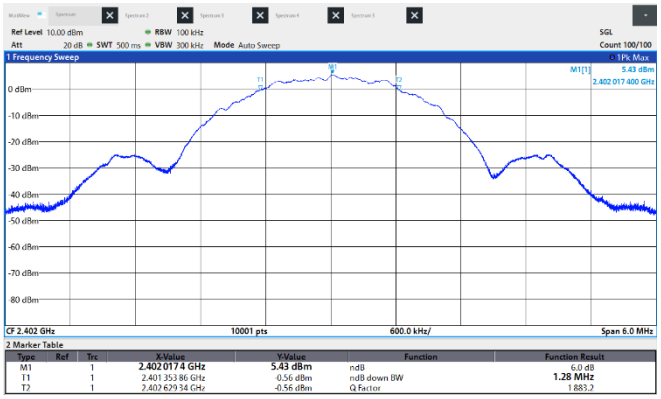


Figure 8.3-3: *Minimum 6 dB bandwidth, GFSK, 1 Mbps, 2480 MHz*



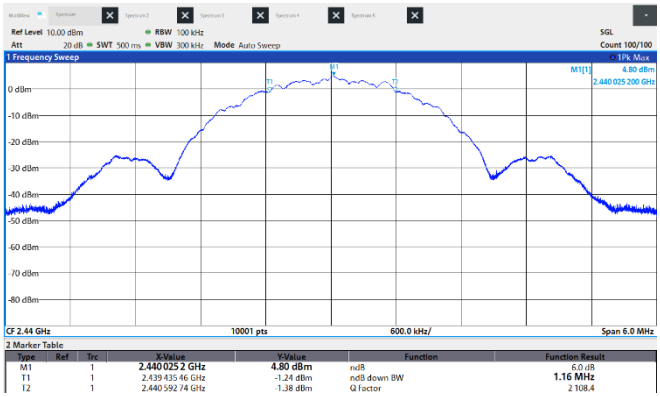


Figure 8.3-4: *Minimum 6 dB bandwidth, GFSK, 2 Mbps, 2402 MHz*

Figure 8.3-5: *Minimum 6 dB bandwidth, GFSK, 2 Mbps, 2440 MHz*

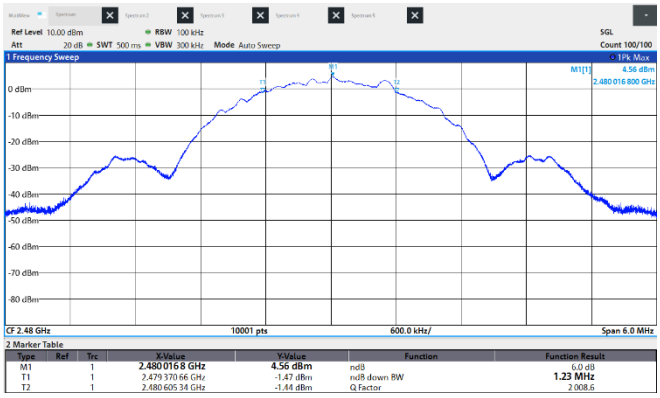


Figure 8.3-6: *Minimum 6 dB bandwidth, GFSK, 2 Mbps, 2480 MHz*

8.4 Maximum peak output power

8.4.1 References and limits

- FCC 47 CFR Part 15, Subpart C: §15.247(b)(3)
- Test method: ANSI C63.10-2020 §11.9.1.3 (Peak Power Meter method)

§15.247:

(b) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(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. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

8.4.2 Test summary

Verdict	Pass		
Test date	November 27, 2023	Temperature	19 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	☒ Wireless bench ☐ Other:	Relative humidity	53 %

8.4.3 Notes

Testing was performed with the transmitter operating on a fixed channel (lowest, middle, and highest) at maximum output power.

The attenuation of the interconnecting path was included in the power meter software as a correction factor.

The antenna gain for each channel is: 2402 MHz = -0.53 dBi, 2440 MHz = -1.67 dBi, 2480 MHz = -1.50 dBi.

EIRP = Conducted Power + Declared Antenna Gain

8.4.4 Setup details

EUT power input during test	3.2 V DC
EUT setup configuration	☒ Table-top ☐ Floor standing ☐ Other:

8.4.5 Test data

Table 8.4-1: *Maximum peak output power test data*

Test Frequency (MHz)	Modulation	Conducted Power (dBm)	Limit (dBm)	EIRP (dBm) (ISED)
2402	GFSK, 1 Mbps	7.30	≤ 30	6.77
2440	GFSK, 1 Mbps	6.79	≤ 30	5.12
2480	GFSK, 1 Mbps	6.14	≤ 30	4.64
2402	GFSK, 2 Mbps	7.27	≤ 30	6.74
2440	GFSK, 2 Mbps	6.78	≤ 30	5.11
2480	GFSK, 2 Mbps	6.13	≤ 30	4.63

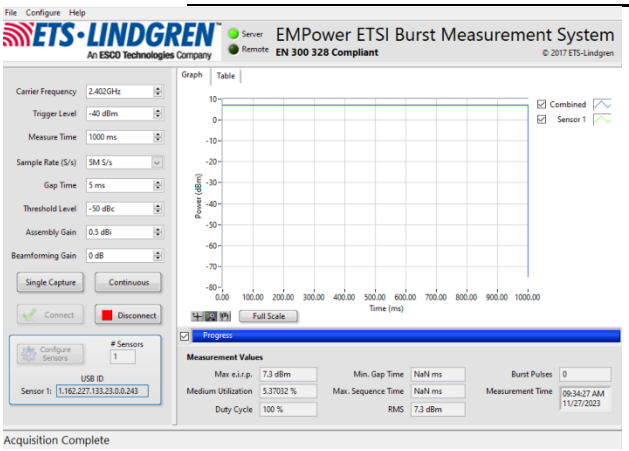


Figure 8.4-1: *Maximum peak output power, GFSK, 1 Mbps, 2402 MHz*

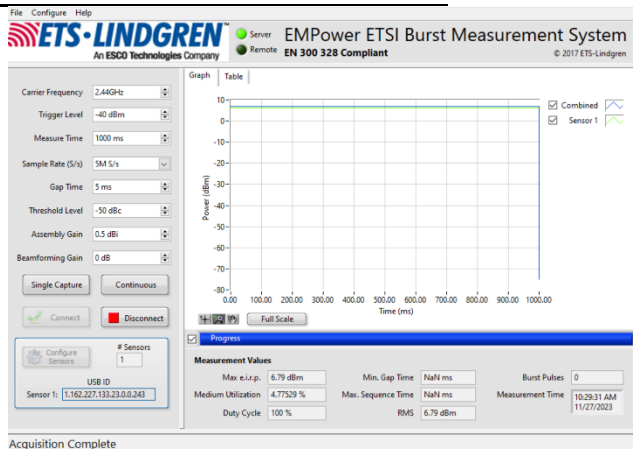


Figure 8.4-2: *Maximum peak output power, GFSK, 1 Mbps, 2440 MHz*

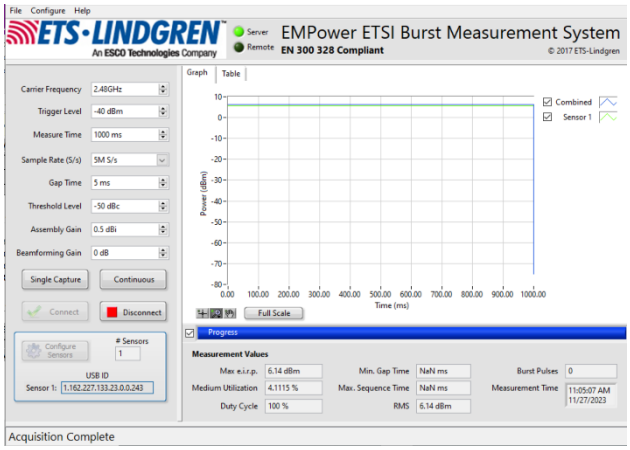


Figure 8.4-3: *Maximum peak output power, GFSK, 1 Mbps, 2480 MHz*

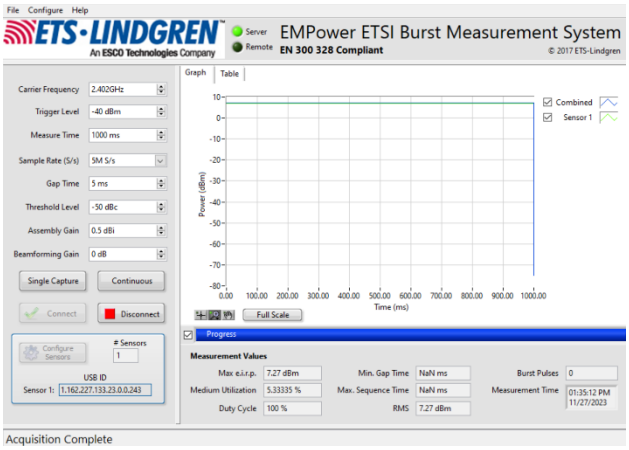


Figure 8.4-4: *Maximum peak output power, GFSK, 2 Mbps, 2402 MHz*

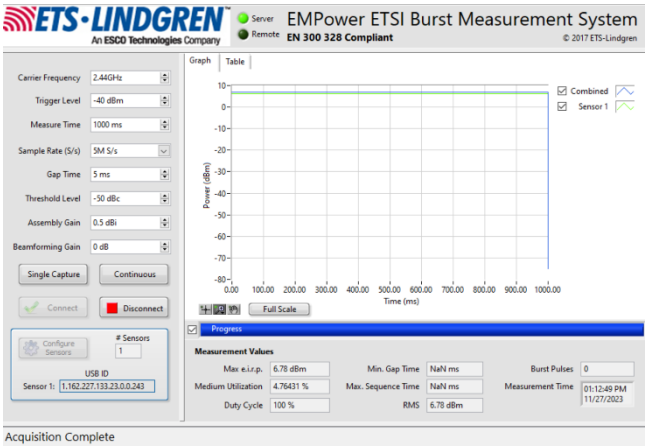


Figure 8.4-5: *Maximum peak output power, GFSK, 2 Mbps, 2440 MHz*

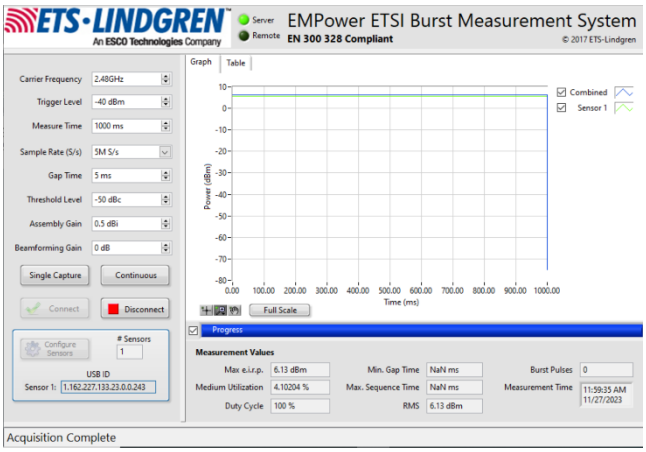


Figure 8.4-6: *Maximum peak output power, GFSK, 2 Mbps, 2480 MHz*

8.5 Spurious emissions

8.5.1 References and limits

- FCC 47 CFR Part 15, Subpart C: §15.247(d)
- Test method: ANSI C63.10-2020 §6.10.4 (authorized band edge)
- Test method: ANSI C63.10-2020 §11.11 (antenna port conducted spurious emissions)
- Test method: ANSI C63.10-2020 §11.12.3 (radiated restricted band edge)
- Test method: ANSI C63.10-2020 §6.5, 6.6 (radiated emissions in restricted bands)

§15.247:

(d) 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, 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) (see § 15.205(c)).

Table 8.5-1: *FCC §15.209– Radiated emission limits*

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.
For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Table 8.5-2: *FCC restricted frequency bands*

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.5.2 Test summary

Verdict	Pass		
Test date	November 27, 2023 November 28, 2023 November 29, 2023	Temperature	19 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	☒ Wireless bench (conducted tests) ☒ 10 m semi-anechoic chamber (radiated tests) ☒ 3 m semi-anechoic chamber (radiated tests) ☐ Other:	Relative humidity	53 %

8.5.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power. Low, middle, and high channels were tested. The spectrum was searched from 30 MHz to 26 GHz (above the 10th harmonic of the highest transmit frequency).

For radiated measurements, the EUT was investigated to identify the worst-case orientation with respect to the fundamental transmitter power. All measurements were performed with the EUT in that worst-case orientation.

The spectral plots within this section have been corrected with all relevant transducer factors.

Radiated emissions are reported for the modulation / data rate settings that produced the highest transmitter output power as a worst-case. For this EUT, the worst-case modulation / data rate setting used was: GFSK, 1 Mbps and 2Mbps.

8.5.4 Setup details

EUT power input during test	3.2 V DC
EUT setup configuration	☒ Table-top ☐ Floor standing ☐ Other:

Spectrum analyzer settings (conducted emissions):

Resolution bandwidth	100 kHz
Video bandwidth	300 kHz
Detector mode	Peak
Trace mode	Max Hold
Measurement time	Long enough for trace to stabilize

Receiver settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	Peak (preview measurements) Quasi-Peak (final measurements)

Receiver settings for radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (preview measurements) Peak and average (final measurements)

8.5.5 Test data

Antenna port conducted spurious emissions:

- **Authorized band edge:**

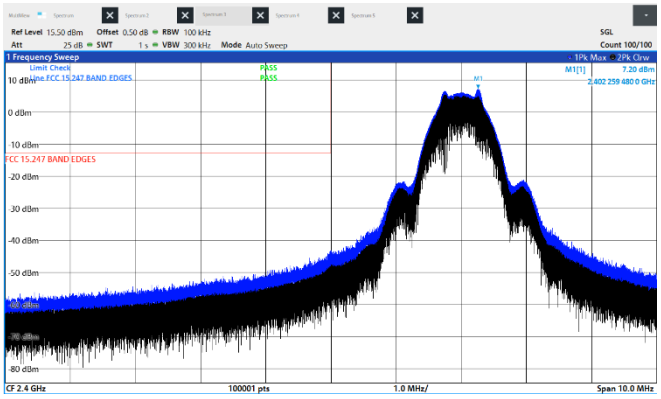


Figure 8.5-1: *Authorized band-edge emissions, GFSK, 1 Mbps, 2402 MHz*

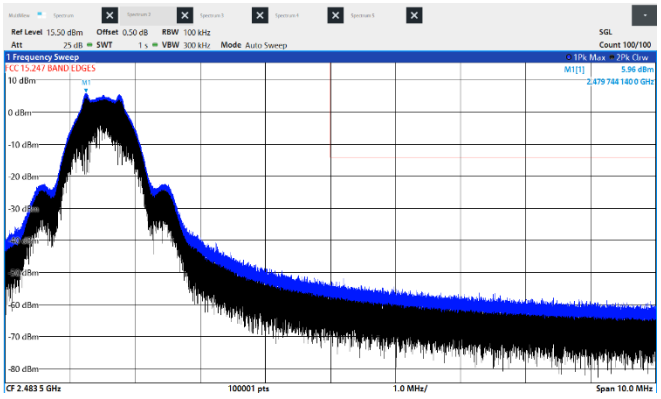


Figure 8.5-2: *Authorized band-edge emissions, GFSK, 1 Mbps, 2480 MHz*

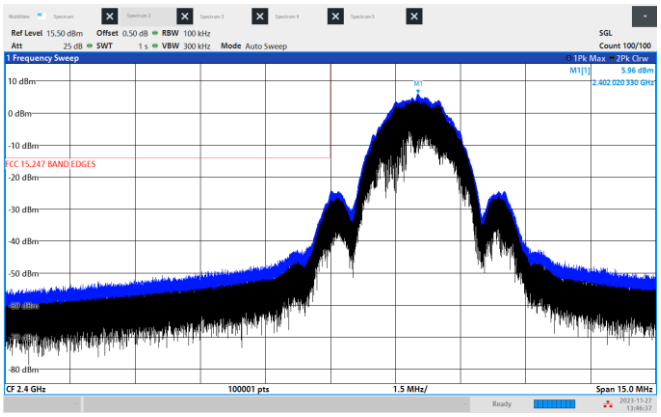


Figure 8.5-3: *Authorized band-edge emissions, GFSK 2 Mbps, 2402 MHz*

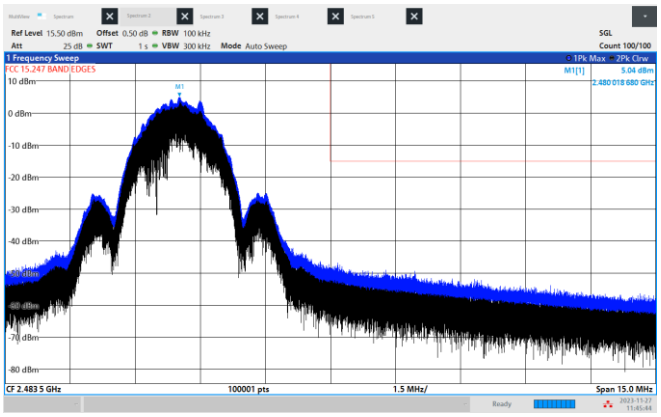


Figure 8.5-4: *Authorized band-edge emissions, GFSK, 2 Mbps, 2480 MHz*

- **Antenna port conducted spurious emissions:**

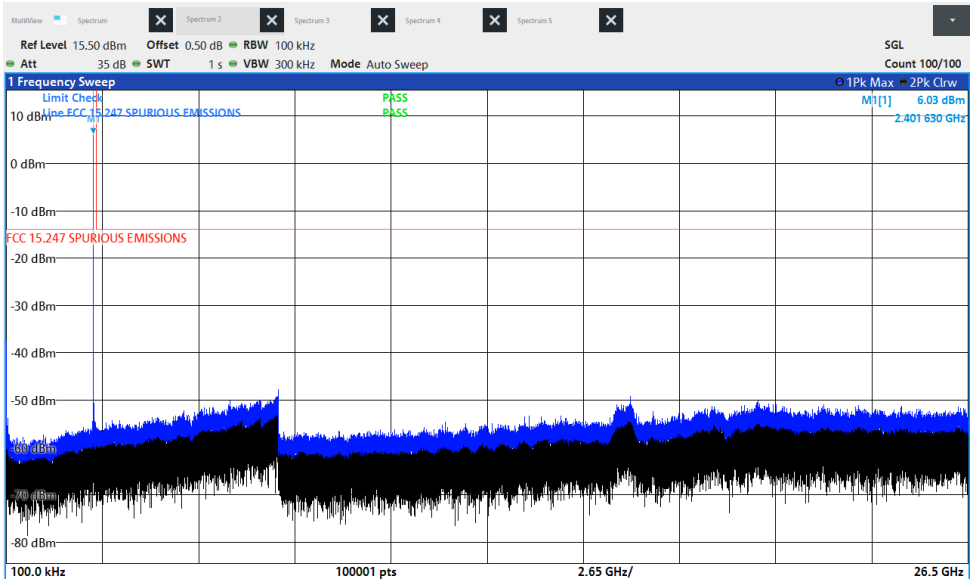


Figure 8.5-5: *Antenna port conducted spurious emissions, GFSK, 1 Mbps, 2402 MHz*

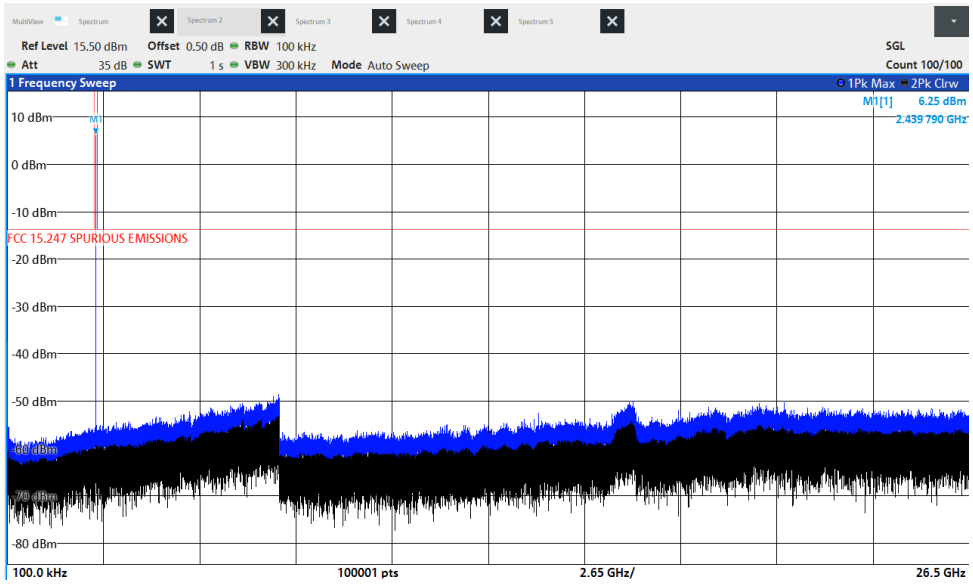


Figure 8.5-6: *Antenna port conducted spurious emissions, GFSK, 1 Mbps, 2440 MHz*

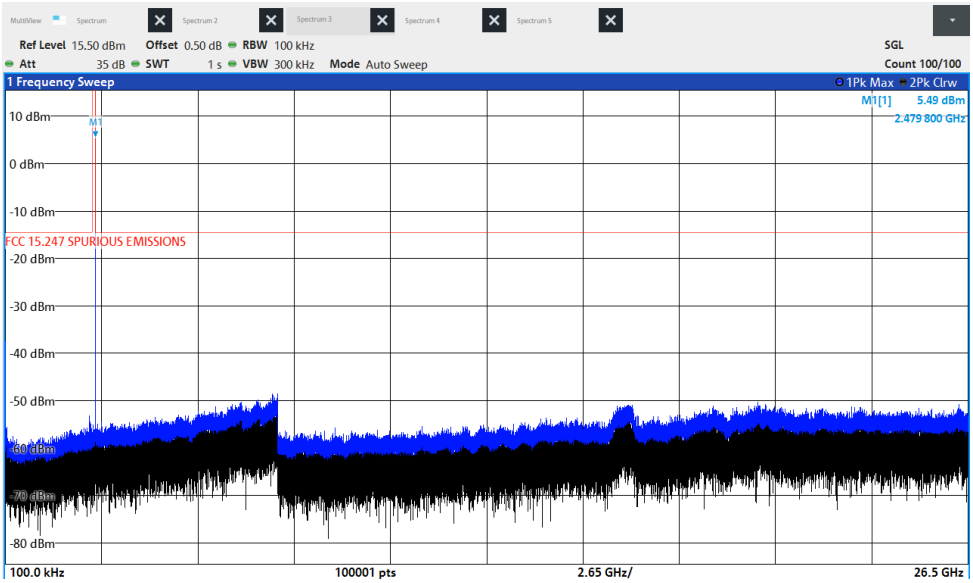


Figure 8.5-7: *Antenna port conducted spurious emissions, GFSK, 1 Mbps, 2480 MHz*

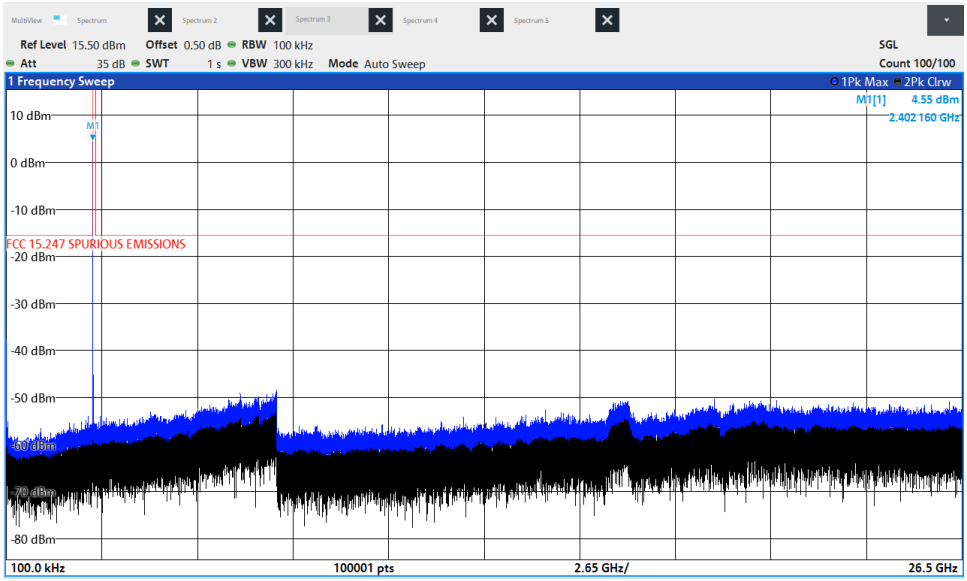


Figure 8.5-8: *Antenna port conducted spurious emissions, GFSK, 2 Mbps, 2402 MHz*

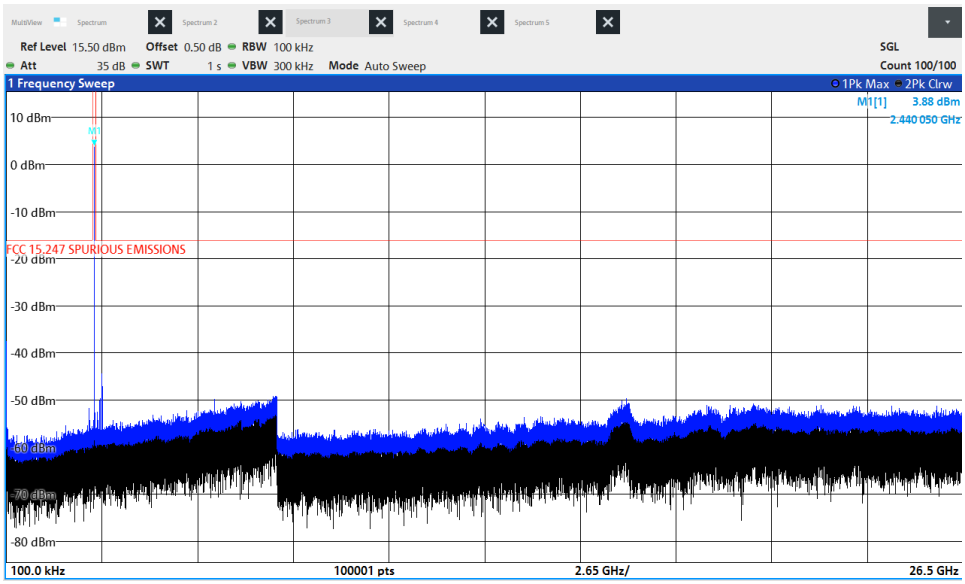


Figure 8.5-9: *Antenna port conducted spurious emissions, GFSK, 2 Mbps, 2440 MHz*

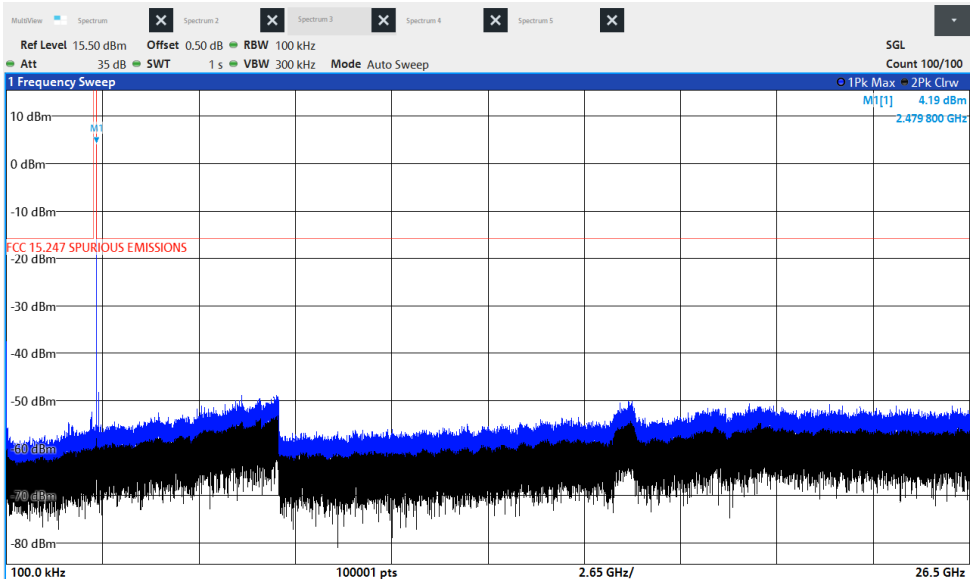


Figure 8.5-10: *Antenna port conducted spurious emissions, GFSK, 2 Mbps, 2480 MHz*

Radiated spurious emissions:

- **Restricted band edge:**

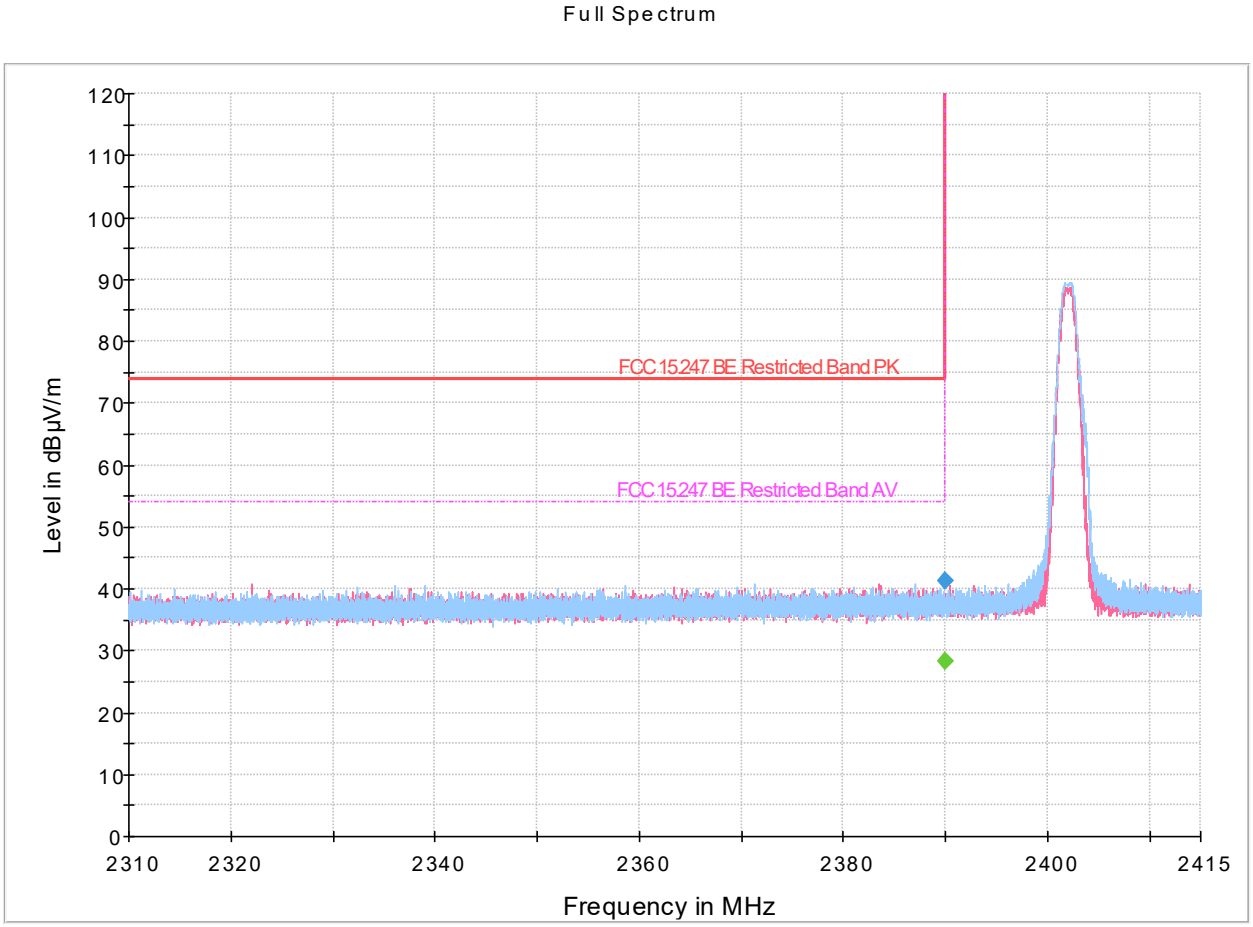


Figure 8.5-11: *Radiated emissions spectral plot (2.31 GHz - 2.415 GHz), 2402 MHz, 1 Mbps*

Table 8.5-3*: Radiated emissions results, 2402 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2390.000000	---	28.29	53.90	25.61	5000.0	1000.000	111.0	H	271.0	-5.3
2390.000000	41.22	---	73.90	32.68	5000.0	1000.000	111.0	H	271.0	-5.3

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

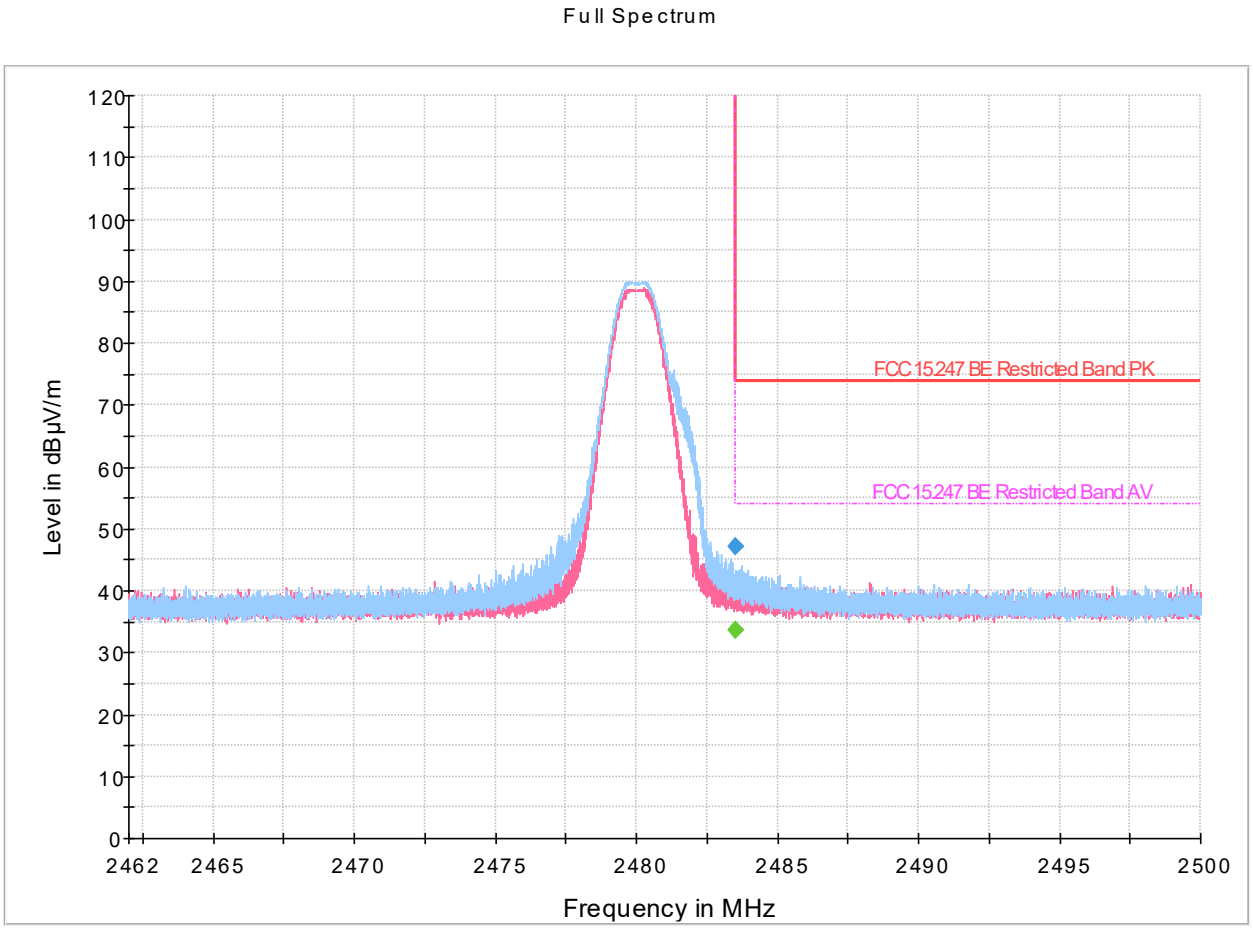


Figure 8.5-12: *Radiated emissions spectral plot (2.462 GHz - 2.5 GHz), 2480 MHz, 2 Mbps*

Table 8.5-4*: Radiated emissions results, 2480 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.500000	---	33.59	53.90	20.31	5000.0	1000.000	106.0	H	321.0	-5.1
2483.500000	47.11	---	73.90	26.79	5000.0	1000.000	106.0	H	321.0	-5.1

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

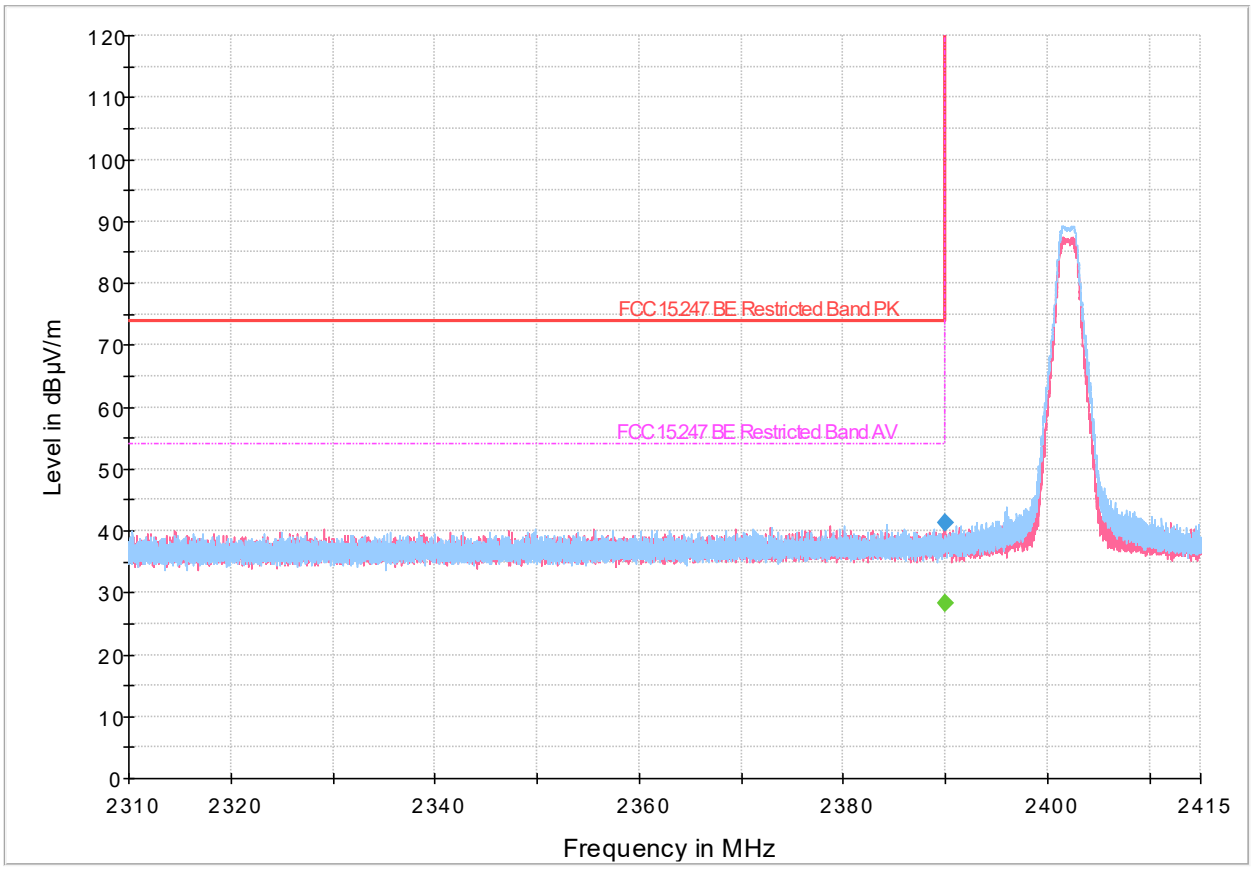


Figure 8.5-13: *Radiated emissions spectral plot (2.31 GHz - 2.415 GHz), 2402 MHz, 2 Mbps*

Table 8.5-5*: Radiated emissions results, 2402 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2390.000000	---	28.27	53.90	25.63	5000.0	1000.000	186.0	V	212.0	-5.3
2390.000000	41.36	---	73.90	32.54	5000.0	1000.000	186.0	V	212.0	-5.3

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

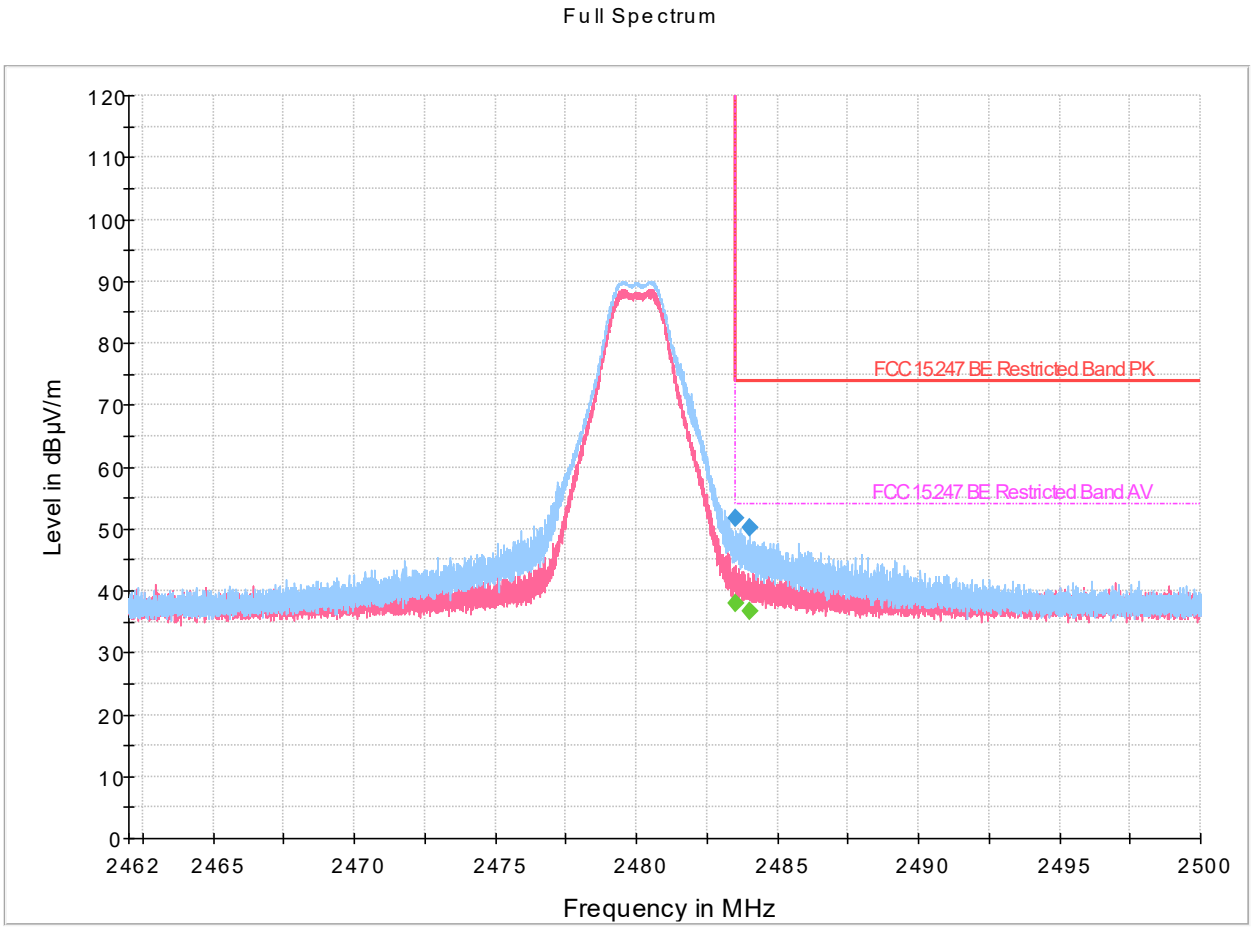


Figure 8.5-14: *Radiated emissions spectral plot (2.462 GHz - 2.5 GHz), 2480 MHz, 2 Mbps*

Table 8.5-6*: Radiated emissions results, 2480 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.500000	---	37.95	53.90	15.95	5000.0	1000.000	98.0	H	322.0	-5.1
2483.500000	51.69	---	73.90	22.21	5000.0	1000.000	98.0	H	322.0	-5.1
2484.026700	---	36.80	53.90	17.10	5000.0	1000.000	124.0	H	318.0	-5.1
2484.026700	50.26	---	73.90	23.64	5000.0	1000.000	124.0	H	318.0	-5.1

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

- **Radiated spurious emissions, restricted bands:**

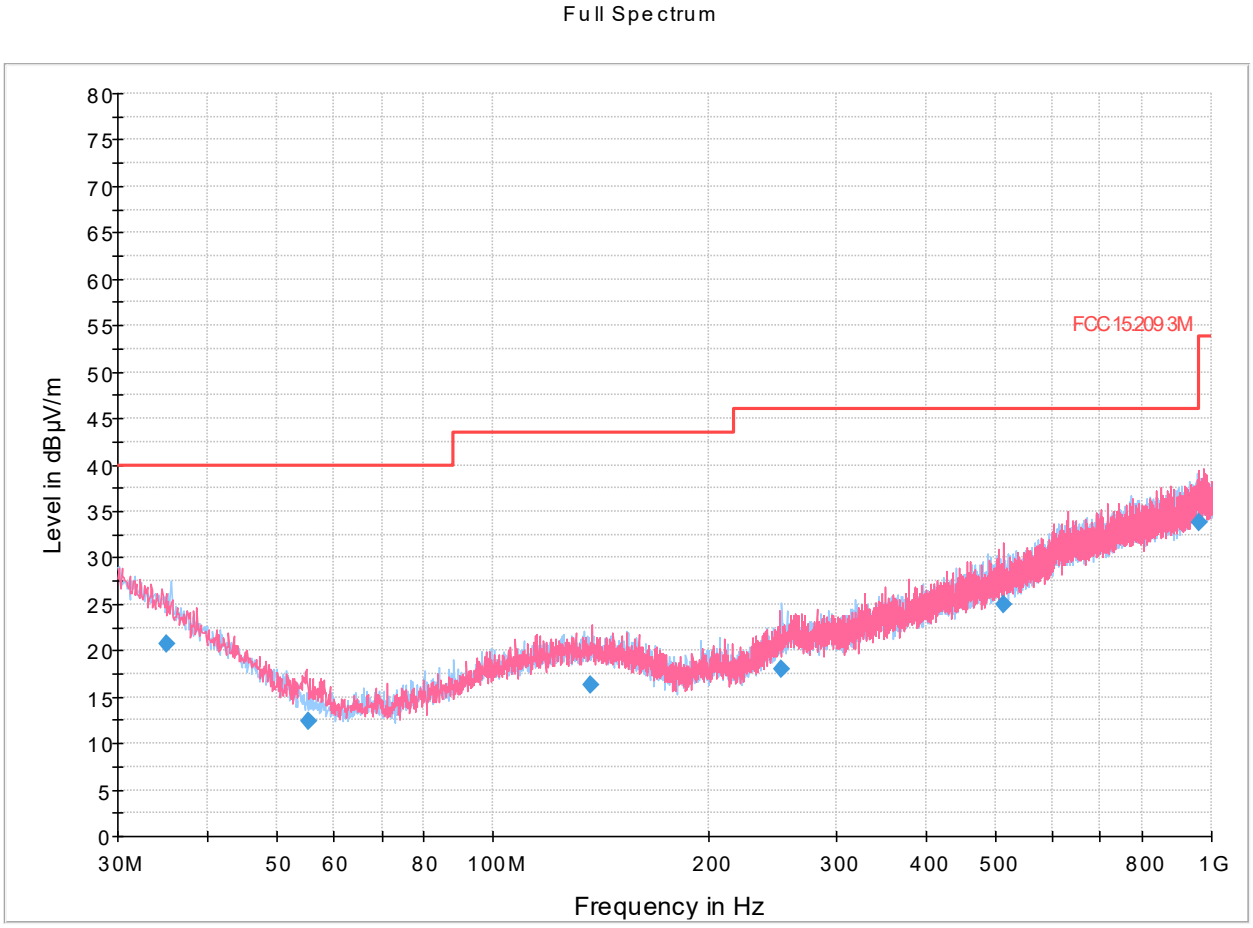


Figure 8.5-15: *Radiated emissions spectral plot (30 MHz - 1 GHz), 2402 MHz, 1 Mbps*

Table 8.5-7*: Radiated emissions results, 2402 MHz, 1 Mbps*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.046000	20.70	40.00	19.30	5000.0	120.000	346.0	H	292.0	23.7
55.269000	12.45	40.00	27.55	5000.0	120.000	98.0	V	142.0	13.6
136.805000	16.37	43.50	27.13	5000.0	120.000	253.0	H	308.0	19.5
252.264000	18.02	46.00	27.98	5000.0	120.000	268.0	H	328.0	21.0
512.560000	24.97	46.00	21.03	5000.0	120.000	138.0	V	80.0	27.0
959.251000	33.75	46.00	12.25	5000.0	120.000	390.0	H	353.0	34.2

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

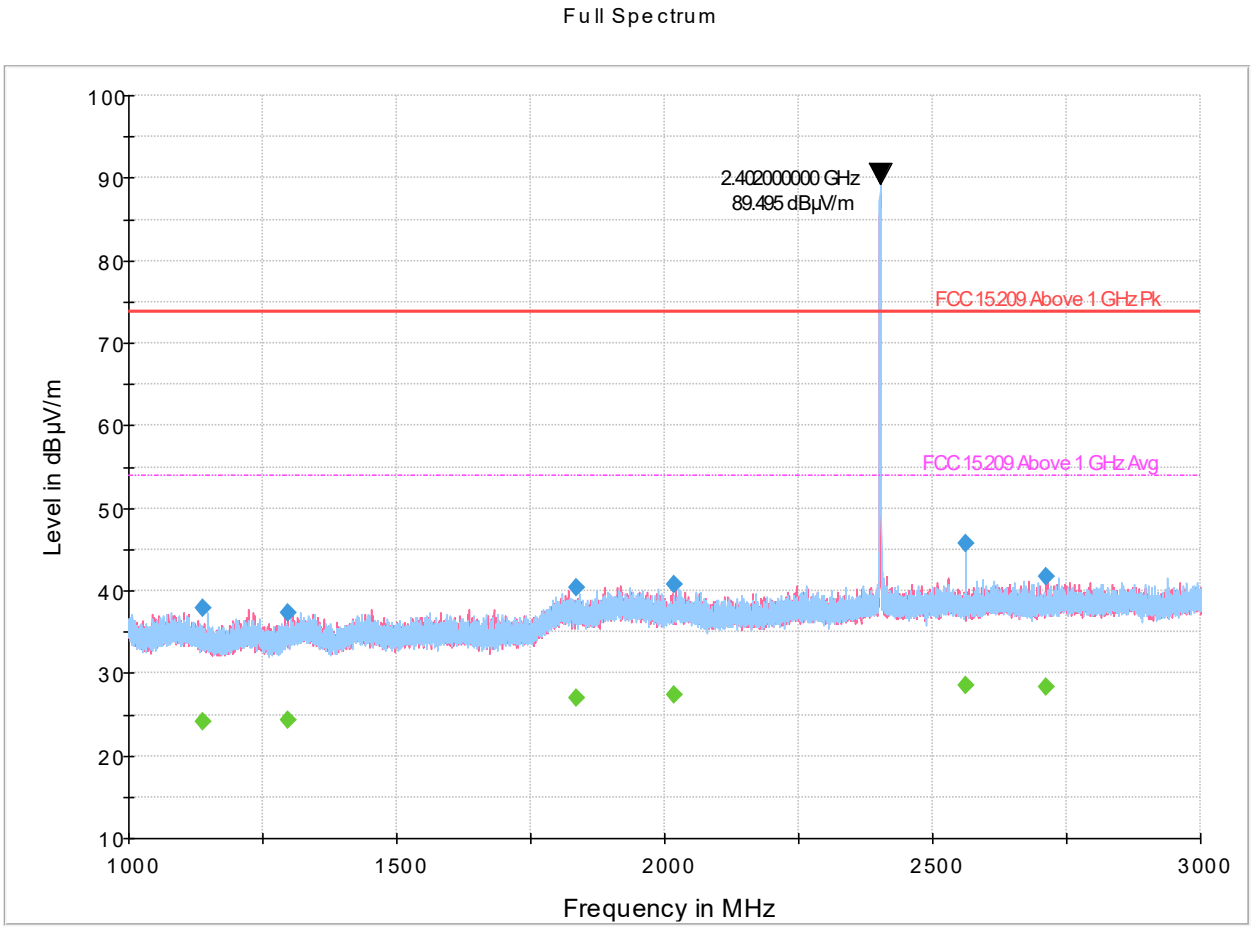


Figure 8.5-16: *Radiated emissions spectral plot (1 GHz - 3 GHz), 2402 MHz, 1 Mbps*

Table 8.5-8*: Radiated emissions results, 2402 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1138.300000	37.96	---	73.90	35.94	5000.0	1000.000	262.0	H	290.0	-11.5
1138.300000	---	24.05	53.90	29.85	5000.0	1000.000	262.0	H	290.0	-11.5
1298.100000	---	24.41	53.90	29.49	5000.0	1000.000	215.0	V	355.0	-11.3
1298.100000	37.35	---	73.90	36.56	5000.0	1000.000	215.0	V	355.0	-11.3
1836.600000	---	27.07	53.90	26.83	5000.0	1000.000	383.0	V	331.0	-7.3
1836.600000	40.47	---	73.90	33.43	5000.0	1000.000	383.0	V	331.0	-7.3
2017.500000	40.85	---	73.90	33.05	5000.0	1000.000	316.0	V	242.0	-7.1
2017.500000	---	27.36	53.90	26.54	5000.0	1000.000	316.0	V	242.0	-7.1
2562.000000	---	28.61	53.90	25.29	5000.0	1000.000	105.0	H	316.0	-4.9
2562.000000	45.80	---	73.90	28.10	5000.0	1000.000	105.0	H	316.0	-4.9
2710.300000	---	28.29	53.90	25.61	5000.0	1000.000	235.0	V	0.0	-4.6
2710.300000	41.77	---	73.90	32.13	5000.0	1000.000	235.0	V	0.0	-4.6

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

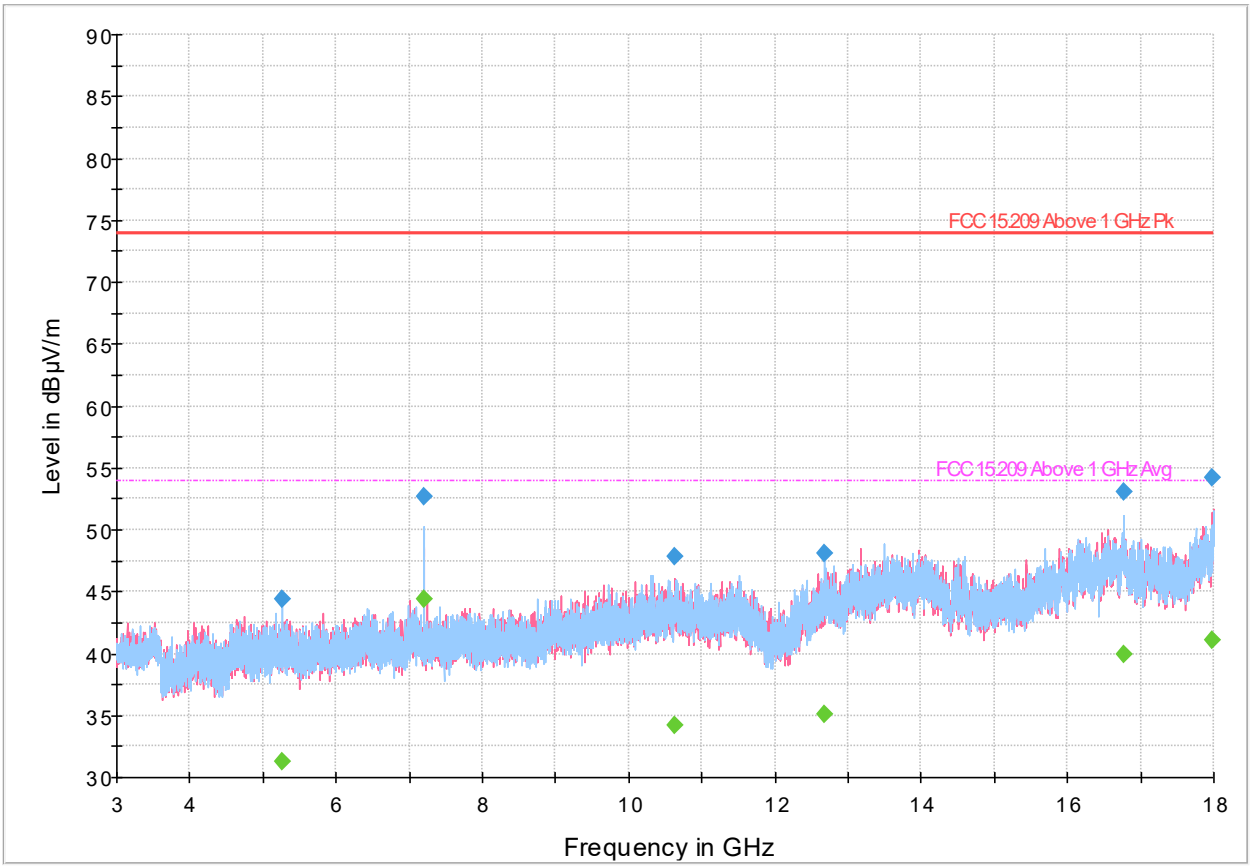


Figure 8.5-17: *Radiated emissions spectral plot (3 GHz - 18 GHz), 2402 MHz, 1 Mbps*

Table 8.5-9*: Radiated emissions results, 2402 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5264.850000	44.35	---	73.90	29.55	5000.0	1000.000	276.0	H	218.0	1.4
5264.850000	---	31.31	53.90	22.59	5000.0	1000.000	276.0	H	218.0	1.4
7205.400000	---	44.43	53.90	9.47	5000.0	1000.000	186.0	H	340.0	3.1
7205.400000	52.70	---	73.90	21.20	5000.0	1000.000	186.0	H	340.0	3.1
10635.250000	47.83	---	73.90	26.07	5000.0	1000.000	240.0	V	328.0	7.7
10635.250000	---	34.25	53.90	19.65	5000.0	1000.000	240.0	V	328.0	7.7
12673.200000	48.06	---	73.90	25.84	5000.0	1000.000	125.0	H	154.0	12.0
12673.200000	---	35.05	53.90	18.85	5000.0	1000.000	125.0	H	154.0	12.0
16770.300000	53.10	---	73.90	20.80	5000.0	1000.000	173.0	H	280.0	17.7
16770.300000	---	39.92	53.90	13.98	5000.0	1000.000	173.0	H	280.0	17.7
17985.250000	---	41.12	53.90	12.78	5000.0	1000.000	220.0	V	0.0	19.5
17985.250000	54.20	---	73.90	19.70	5000.0	1000.000	220.0	V	0.0	19.5

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

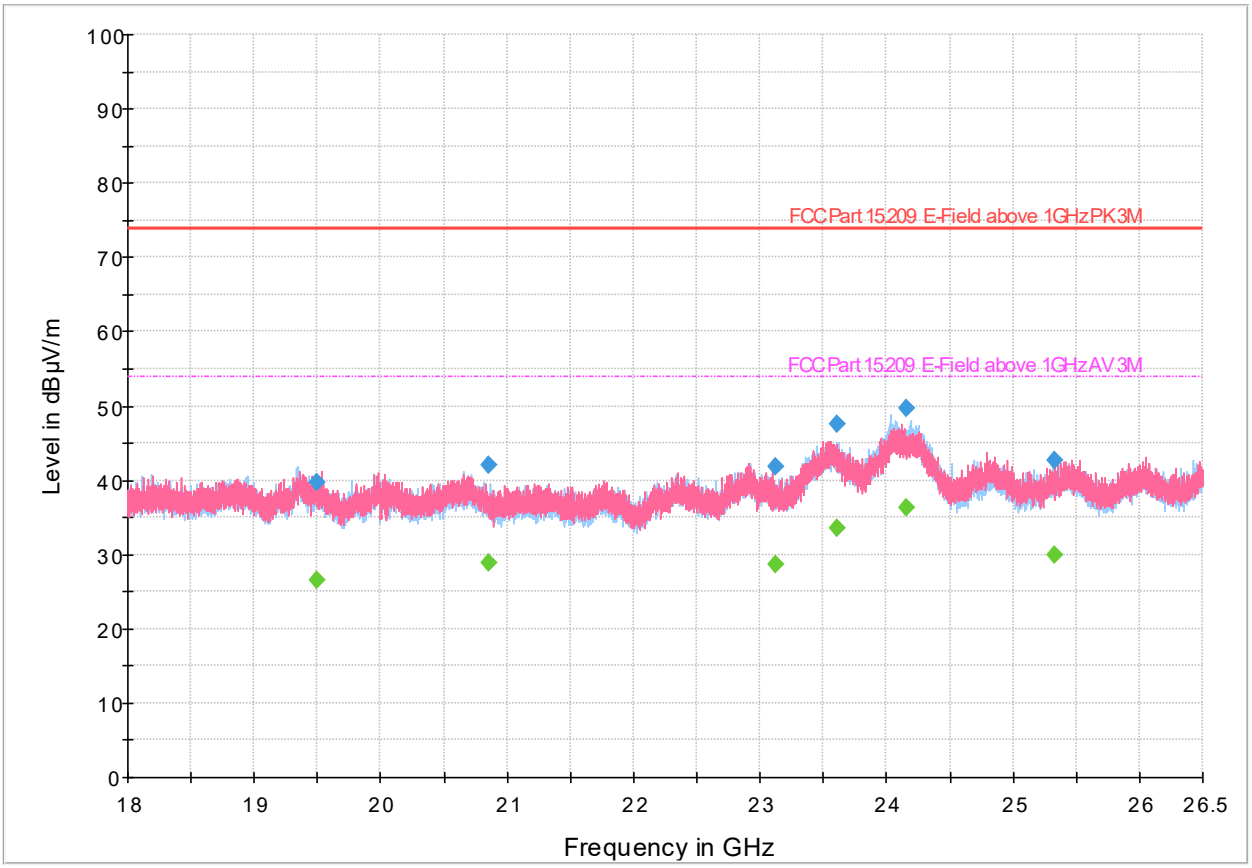


Figure 8.5-18: *Radiated emissions spectral plot (18 GHz - 26.5 GHz), 2402 MHz, 1 Mbps*

Table 8.5-10*: Radiated emissions results, 2402 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19500.253000	---	26.58	53.90	27.32	5000.0	1000.000	220.0	H	236.0	16.7
19500.253000	39.73	---	73.90	34.17	5000.0	1000.000	220.0	H	236.0	16.7
20853.356250	42.05	---	73.90	31.85	5000.0	1000.000	377.0	V	2.0	17.9
20853.356250	---	28.90	53.90	25.00	5000.0	1000.000	377.0	V	2.0	17.9
23120.258000	---	28.67	53.90	25.23	5000.0	1000.000	272.0	H	296.0	19.0
23120.258000	41.81	---	73.90	32.09	5000.0	1000.000	272.0	H	296.0	19.0
23604.262500	---	33.45	53.90	20.45	5000.0	1000.000	207.0	H	149.0	23.5
23604.262500	47.64	---	73.90	26.26	5000.0	1000.000	207.0	H	149.0	23.5
24153.887500	---	36.28	53.90	17.62	5000.0	1000.000	173.0	H	265.0	27.3
24153.887500	49.70	---	73.90	24.20	5000.0	1000.000	173.0	H	265.0	27.3
25326.258500	42.66	---	73.90	31.24	5000.0	1000.000	135.0	V	68.0	22.3
25326.258500	---	29.89	53.90	24.01	5000.0	1000.000	135.0	V	68.0	22.3

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

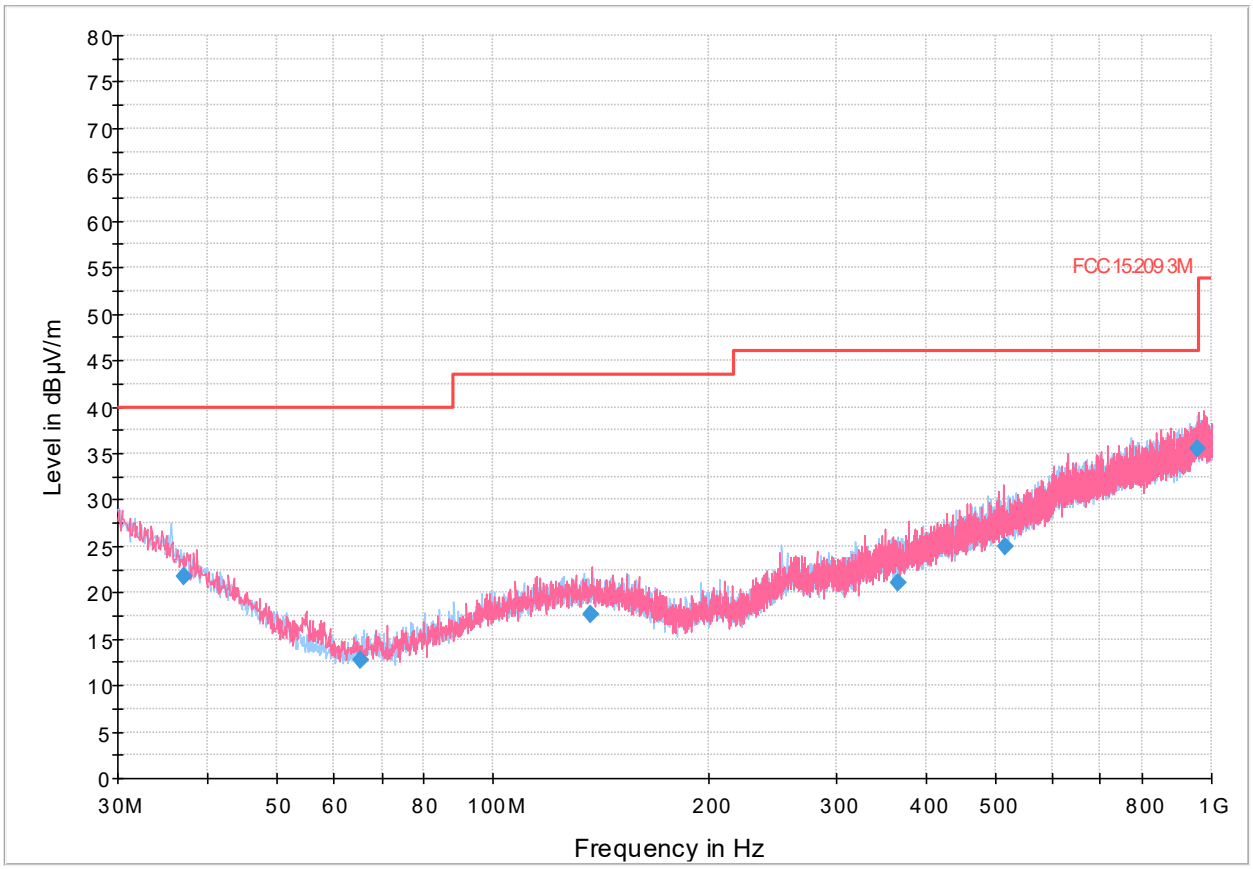


Figure 8.5-19: *Radiated emissions spectral plot (30 MHz - 1 GHz), 2440 MHz, 1 Mbps*

Table 8.5-11*: Radiated emissions results, 2440 MHz, 1 Mbps*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.056000	21.70	40.00	18.30	5000.0	120.000	344.0	H	252.0	23.7
65.399000	12.69	40.00	27.31	5000.0	120.000	97.0	V	135.0	13.6
136.655000	17.73	43.50	25.77	5000.0	120.000	251.0	H	309.0	19.5
365.458000	21.03	46.00	24.97	5000.0	120.000	267.0	H	327.0	21.0
515.960000	25.02	46.00	20.98	5000.0	120.000	139.0	V	83.0	27.0
957.197000	35.53	46.00	10.47	5000.0	120.000	388.0	H	351.0	34.2

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

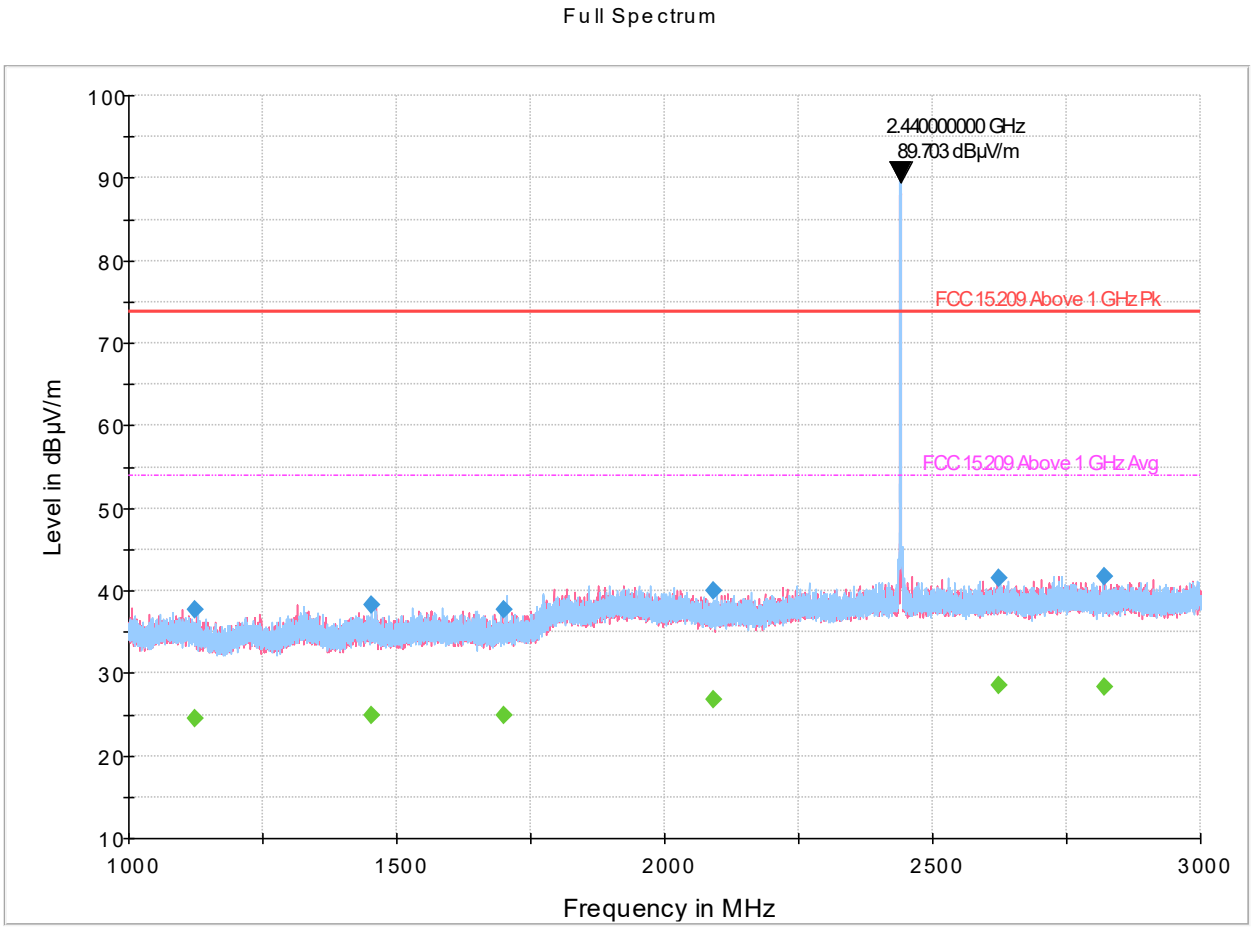


Figure 8.5-20: *Radiated emissions spectral plot (1 GHz - 3 GHz), 2440 MHz, 1 Mbps*

Table 8.5-12*: Radiated emissions results, 2440 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1122.200000	37.69	---	73.90	36.21	5000.0	1000.000	388.0	H	150.0	-11.5
1122.200000	---	24.60	53.90	29.30	5000.0	1000.000	388.0	H	150.0	-11.5
1453.200000	---	24.85	53.90	29.05	5000.0	1000.000	260.0	H	48.0	-10.6
1453.200000	38.32	---	73.90	35.58	5000.0	1000.000	260.0	H	48.0	-10.6
1699.200000	37.73	---	73.90	36.17	5000.0	1000.000	345.0	H	148.0	-10.3
1699.200000	---	24.82	53.90	29.08	5000.0	1000.000	345.0	H	148.0	-10.3
2091.100000	---	26.84	53.90	27.06	5000.0	1000.000	391.0	H	45.0	-7.3
2091.100000	39.99	---	73.90	33.91	5000.0	1000.000	391.0	H	45.0	-7.3
2622.800000	---	28.55	53.90	25.35	5000.0	1000.000	388.0	V	239.0	-4.6
2622.800000	41.43	---	73.90	32.47	5000.0	1000.000	388.0	V	239.0	-4.6
2819.200000	---	28.43	53.90	25.47	5000.0	1000.000	391.0	V	20.0	-4.1
2819.200000	41.68	---	73.90	32.22	5000.0	1000.000	391.0	V	20.0	-4.1

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

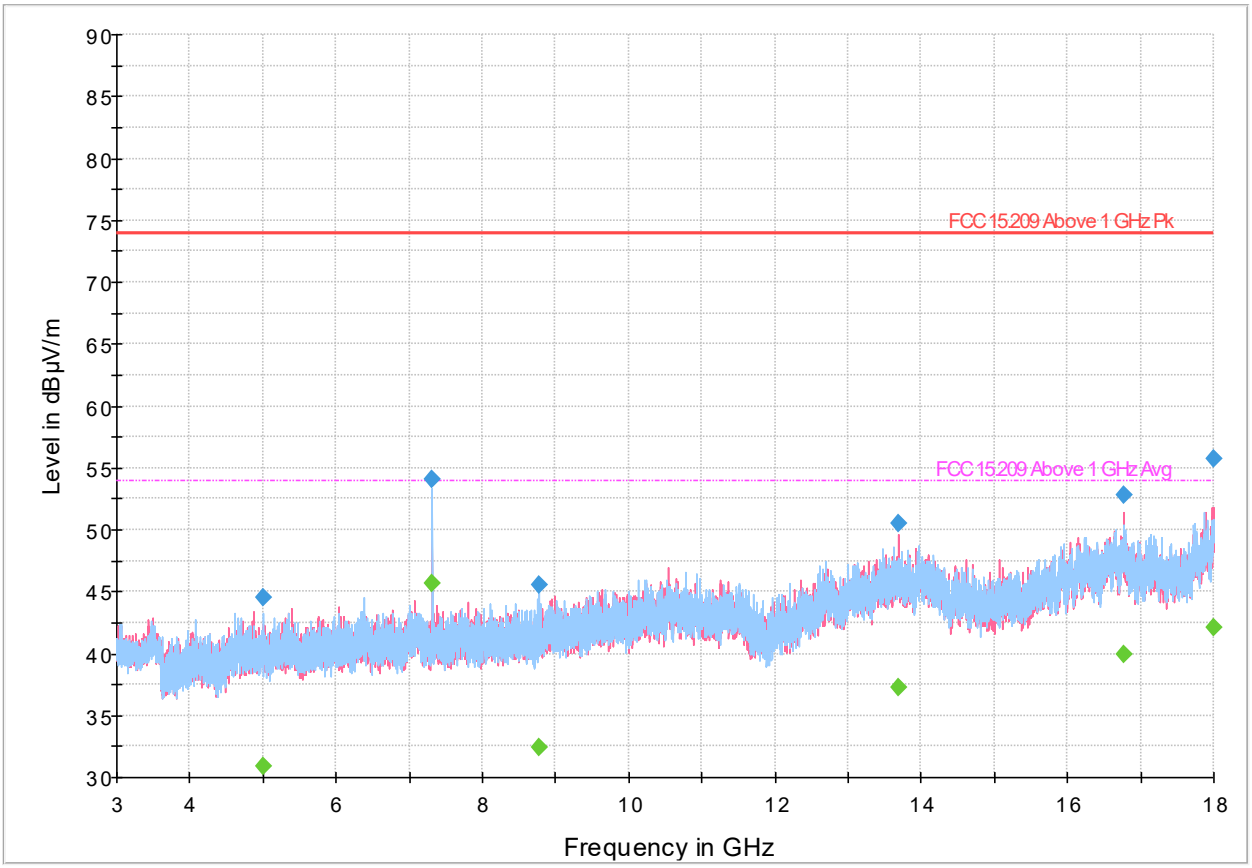


Figure 8.5-21: *Radiated emissions spectral plot (3 GHz - 18 GHz), 2440 MHz, 1 Mbps*

Table 8.5-13*: Radiated emissions results, 2440 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4999.850000	44.52	---	73.90	29.38	5000.0	1000.000	188.0	H	316.0	0.3
4999.850000	---	30.94	53.90	22.96	5000.0	1000.000	188.0	H	316.0	0.3
7320.700000	---	45.68	53.90	8.22	5000.0	1000.000	205.0	H	334.0	3.1
7320.700000	54.01	---	73.90	19.89	5000.0	1000.000	205.0	H	334.0	3.1
8783.450000	45.55	---	73.90	28.35	5000.0	1000.000	199.0	H	86.0	4.6
8783.450000	---	32.44	53.90	21.46	5000.0	1000.000	199.0	H	86.0	4.6
13688.900000	50.50	---	73.90	23.40	5000.0	1000.000	261.0	V	0.0	13.8
13688.900000	---	37.31	53.90	16.59	5000.0	1000.000	261.0	V	0.0	13.8
16767.250000	---	39.95	53.90	13.95	5000.0	1000.000	360.0	V	74.0	17.8
16767.250000	52.80	---	73.90	21.10	5000.0	1000.000	360.0	V	74.0	17.8
17999.500000	55.75	---	73.90	18.15	5000.0	1000.000	240.0	V	100.0	20.4
17999.500000	---	42.12	53.90	11.78	5000.0	1000.000	240.0	V	100.0	20.4

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

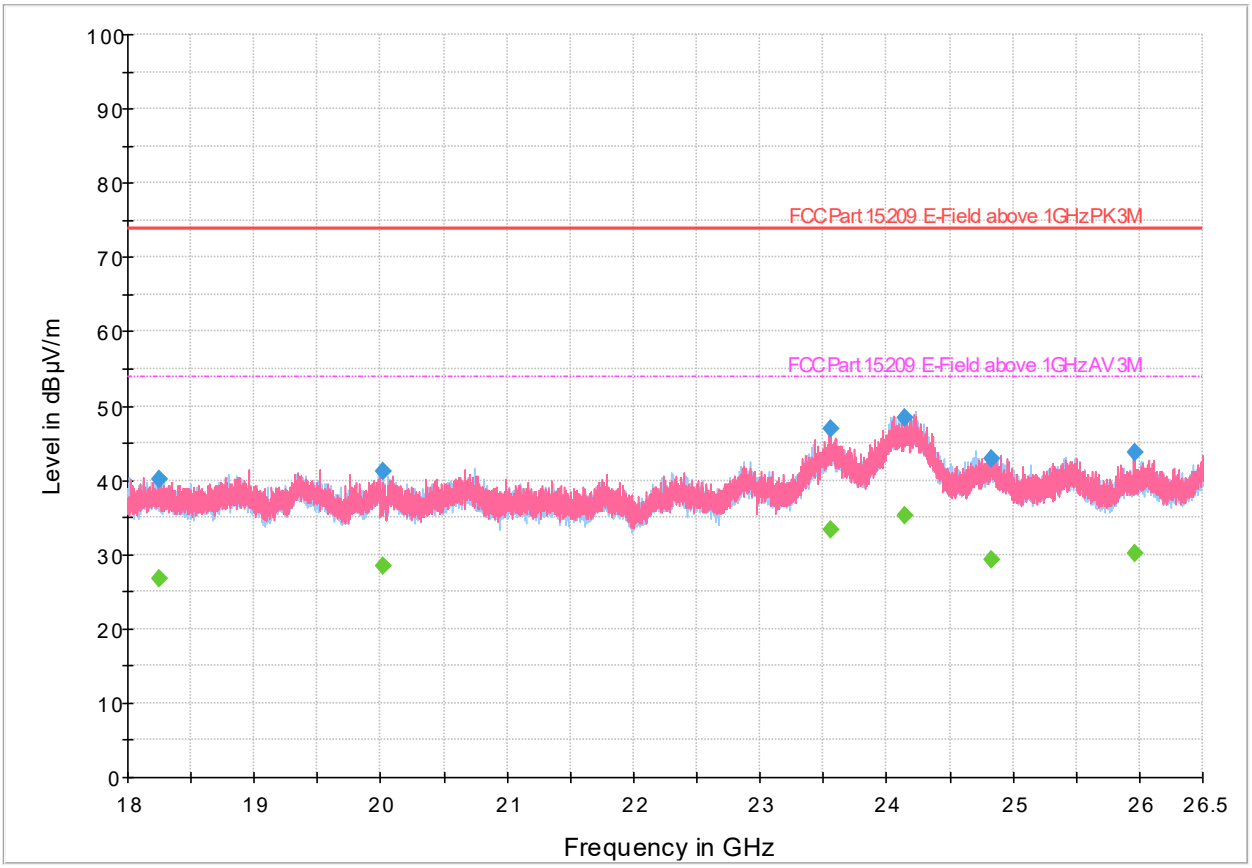


Figure 8.5-22: *Radiated emissions spectral plot (18 GHz - 26.5 GHz), 2440 MHz, 1 Mbps*

Table 8.5-14*: Radiated emissions results, 2440 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18254.600000	40.10	---	73.90	33.80	5000.0	1000.000	275.0	H	350.0	15.9
18254.600000	---	26.78	53.90	27.12	5000.0	1000.000	275.0	H	350.0	15.9
20019.285000	---	28.52	53.90	25.38	5000.0	1000.000	333.0	H	117.0	18.1
20019.285000	41.18	---	73.90	32.72	5000.0	1000.000	333.0	H	117.0	18.1
23556.187000	---	33.33	53.90	20.57	5000.0	1000.000	339.0	V	205.0	23.6
23556.187000	46.93	---	73.90	26.97	5000.0	1000.000	339.0	V	205.0	23.6
24139.105800	---	35.24	53.90	18.66	5000.0	1000.000	127.0	H	14.0	27.0
24139.105800	48.43	---	73.90	25.47	5000.0	1000.000	127.0	H	14.0	27.0
24835.746300	42.85	---	73.90	31.05	5000.0	1000.000	246.0	H	12.0	22.4
24835.746300	---	29.39	53.90	24.51	5000.0	1000.000	246.0	H	12.0	22.4
25959.281900	---	30.15	53.90	23.75	5000.0	1000.000	378.0	V	75.0	21.7
25959.281900	43.65	---	73.90	30.25	5000.0	1000.000	378.0	V	75.0	21.7

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

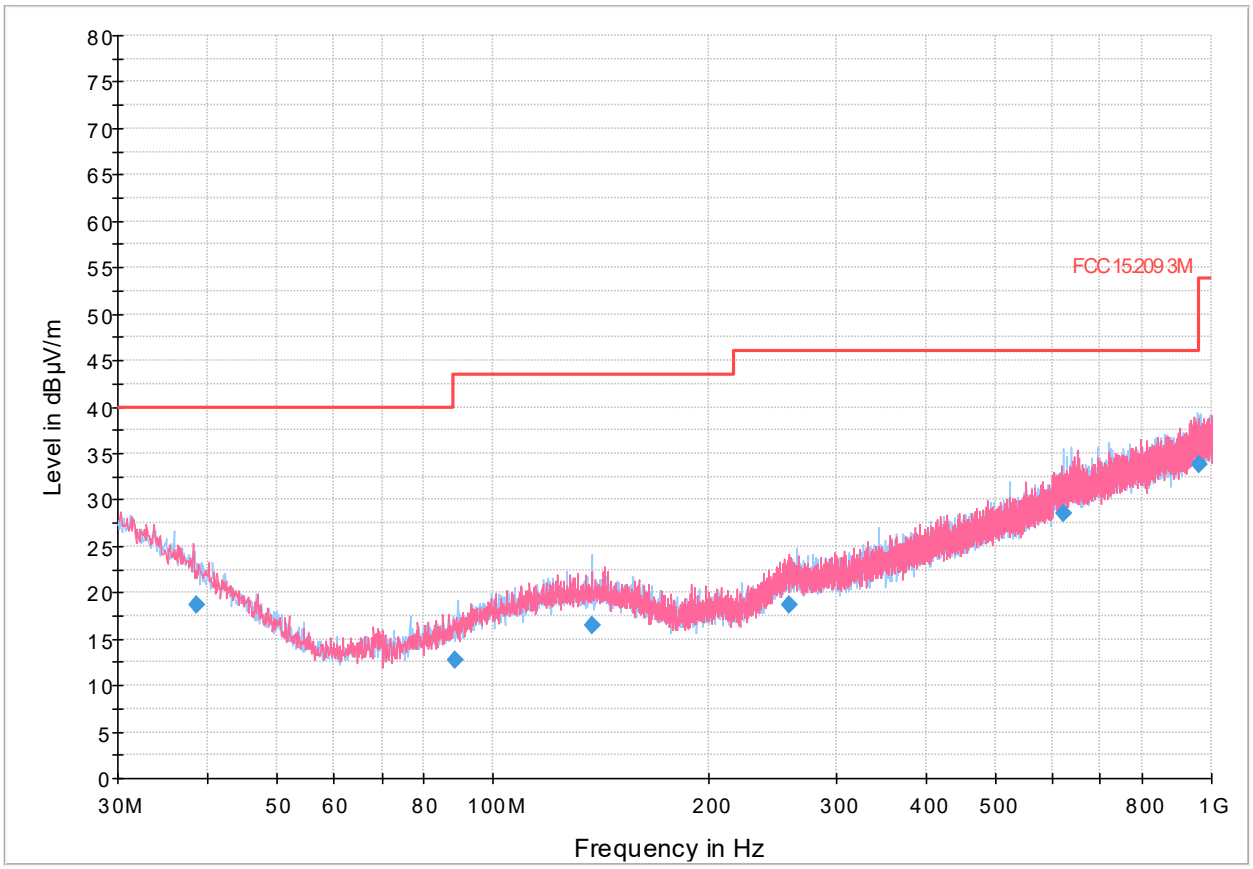


Figure 8.5-23: *Radiated emissions spectral plot (30 MHz - 1 GHz), 2480 MHz, 1 Mbps*

Table 8.5-15*: Radiated emissions results, 2480 MHz, 1 Mbps*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
38.608000	18.69	40.00	21.31	5000.0	120.000	238.0	V	20.0	21.8
88.590000	12.66	43.50	30.84	5000.0	120.000	325.0	H	43.0	15.9
137.525000	16.44	43.50	27.06	5000.0	120.000	365.0	H	58.0	19.5
257.787000	18.72	46.00	27.28	5000.0	120.000	184.0	V	124.0	21.6
621.475000	28.52	46.00	17.48	5000.0	120.000	288.0	H	158.0	28.9
957.985000	33.80	46.00	12.20	5000.0	120.000	232.0	H	21.0	34.2

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

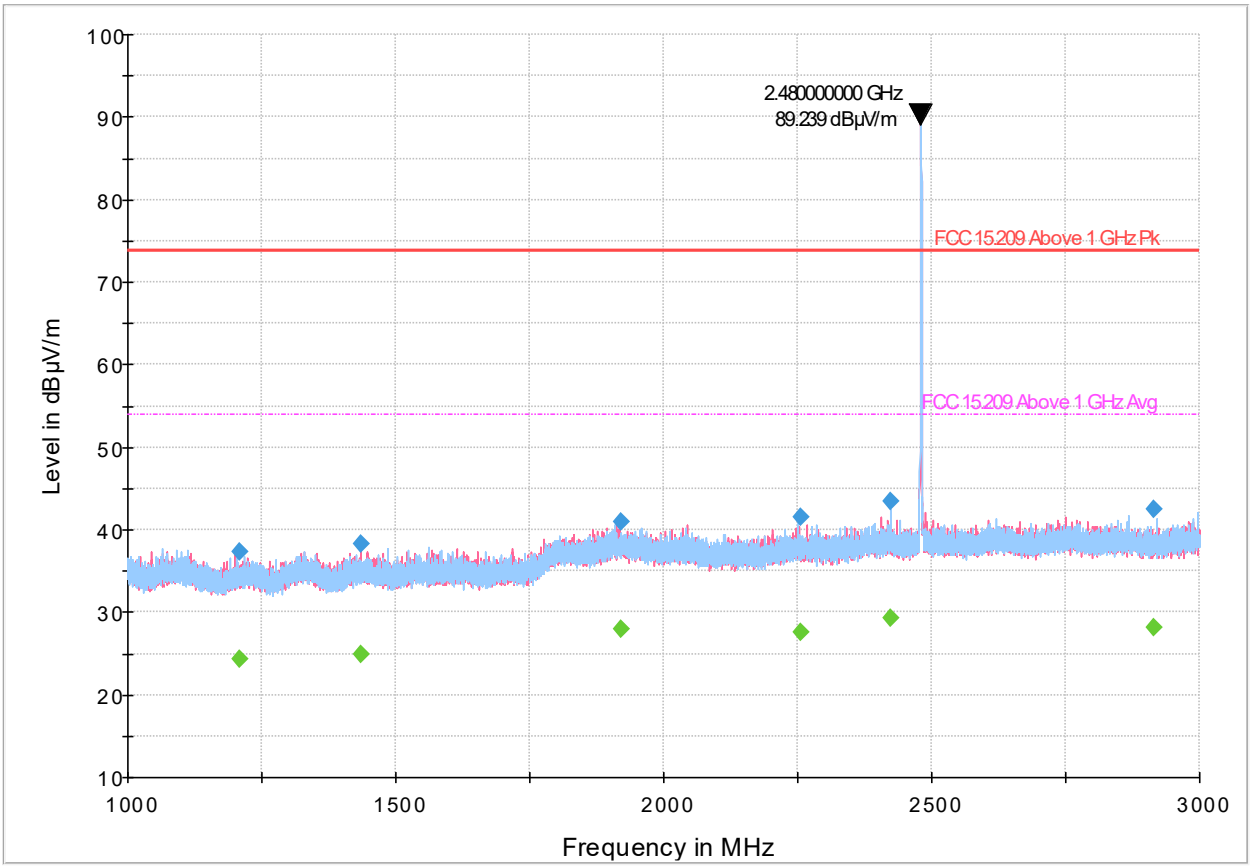


Figure 8.5-24: *Radiated emissions spectral plot (1 GHz - 3 GHz), 2480 MHz, 1 Mbps*

Table 8.5-16*: Radiated emissions results, 2480 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1208.600000	37.39	---	73.90	36.51	5000.0	1000.000	193.0	V	202.0	-11.9
1208.600000	---	24.30	53.90	29.60	5000.0	1000.000	193.0	V	202.0	-11.9
1434.600000	---	24.86	53.90	29.04	5000.0	1000.000	299.0	V	22.0	-10.8
1434.600000	38.23	---	73.90	35.67	5000.0	1000.000	299.0	V	22.0	-10.8
1920.800000	41.04	---	73.90	32.86	5000.0	1000.000	145.0	V	0.0	-6.7
1920.800000	---	27.91	53.90	25.99	5000.0	1000.000	145.0	V	0.0	-6.7
2256.600000	---	27.66	53.90	26.24	5000.0	1000.000	381.0	H	33.0	-6.2
2256.600000	41.46	---	73.90	32.44	5000.0	1000.000	381.0	H	33.0	-6.2
2423.900000	43.48	---	73.90	30.42	5000.0	1000.000	98.0	H	-2.0	-5.1
2423.900000	---	29.36	53.90	24.54	5000.0	1000.000	98.0	H	-2.0	-5.1
2914.900000	42.44	---	73.90	31.46	5000.0	1000.000	335.0	H	188.0	-4.2
2914.900000	---	28.18	53.90	25.72	5000.0	1000.000	335.0	H	188.0	-4.2

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

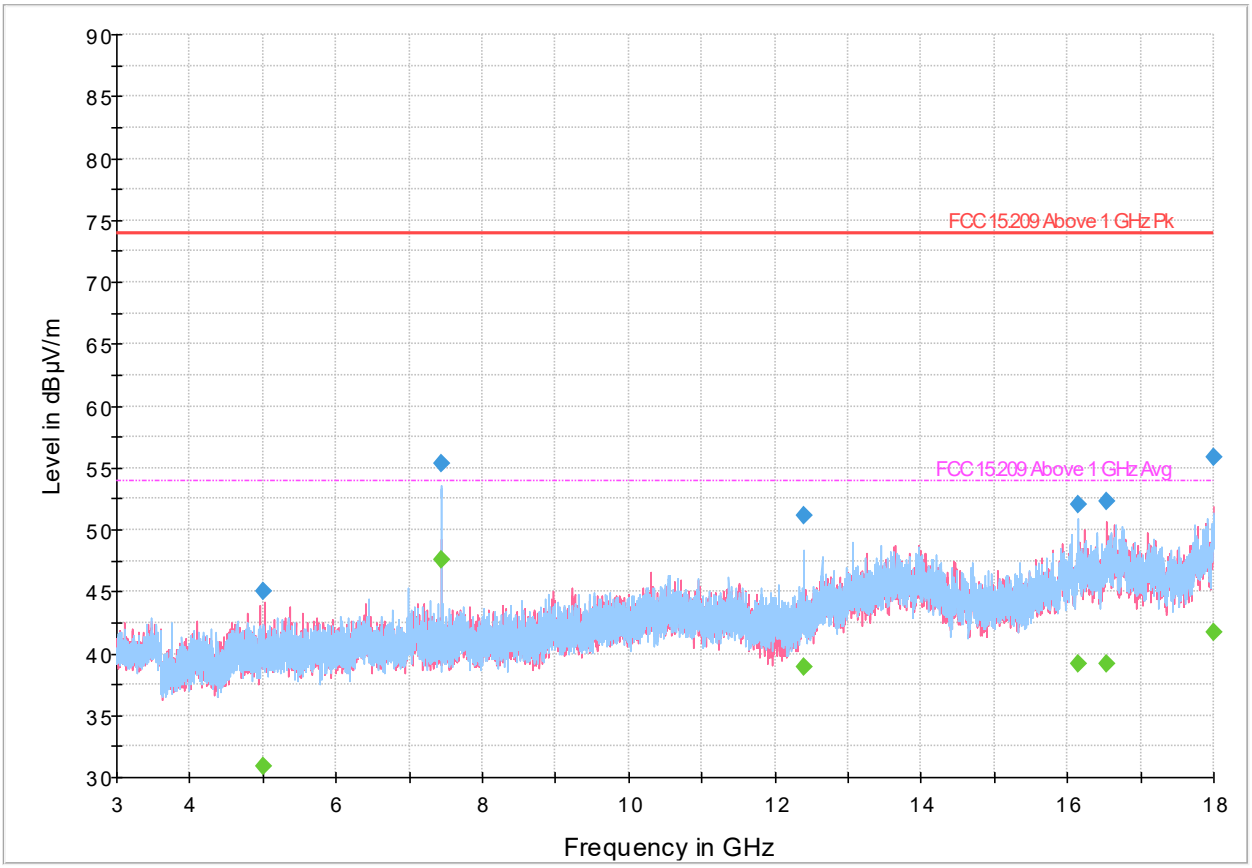


Figure 8.5-25: *Radiated emissions spectral plot (3 GHz - 18 GHz), 2480 MHz, 1 Mbps*

Table 8.5-17*: Radiated emissions results, 2480 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5009.600000	45.03	---	73.90	28.87	5000.0	1000.000	375.0	V	0.0	0.3
5009.600000	---	30.85	53.90	23.05	5000.0	1000.000	375.0	V	0.0	0.3
7439.400000	55.40	---	73.90	18.50	5000.0	1000.000	188.0	H	0.0	3.1
7439.400000	---	47.57	53.90	6.33	5000.0	1000.000	188.0	H	0.0	3.1
12398.450000	51.21	---	73.90	22.69	5000.0	1000.000	194.0	H	329.0	11.6
12398.450000	---	38.94	53.90	14.96	5000.0	1000.000	194.0	H	329.0	11.6
16155.950000	---	39.16	53.90	14.74	5000.0	1000.000	316.0	H	0.0	17.9
16155.950000	52.06	---	73.90	21.84	5000.0	1000.000	316.0	H	0.0	17.9
16534.400000	52.32	---	73.90	21.58	5000.0	1000.000	377.0	V	353.0	17.9
16534.400000	---	39.11	53.90	14.79	5000.0	1000.000	377.0	V	353.0	17.9
17996.200000	---	41.74	53.90	12.16	5000.0	1000.000	254.0	V	308.0	20.2
17996.200000	55.89	---	73.90	18.01	5000.0	1000.000	254.0	V	308.0	20.2

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

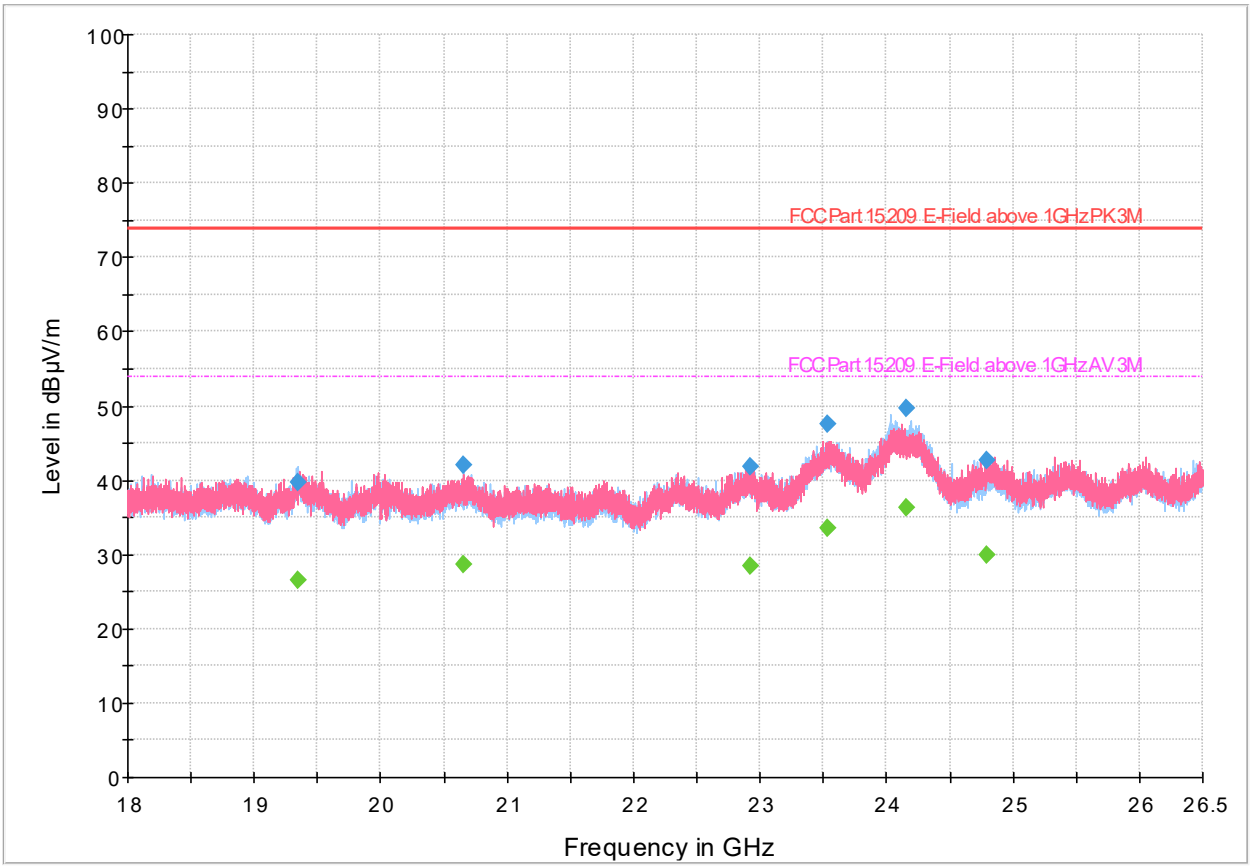


Figure 8.5-26: *Radiated emissions spectral plot (18 GHz - 26.5 GHz), 2480 MHz, 1 Mbps*

Table 8.5-18*: Radiated emissions results, 2480 MHz, 1 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19347.300000	---	26.57	53.90	27.33	5000.0	1000.000	227.0	H	238.0	16.7
19347.300000	39.69	---	73.90	34.21	5000.0	1000.000	227.0	H	238.0	16.7
20651.356250	42.01	---	73.90	31.89	5000.0	1000.000	379.0	V	0.0	17.9
20651.356250	---	28.72	53.90	25.18	5000.0	1000.000	379.0	V	0.0	17.9
22923.412500	---	28.55	53.90	25.35	5000.0	1000.000	274.0	H	298.0	19.0
22923.412500	41.82	---	73.90	32.08	5000.0	1000.000	274.0	H	298.0	19.0
23534.262500	---	33.45	53.90	20.45	5000.0	1000.000	209.0	H	148.0	23.5
23534.262500	47.61	---	73.90	26.29	5000.0	1000.000	209.0	H	148.0	23.5
24151.987500	---	36.22	53.90	17.68	5000.0	1000.000	176.0	H	263.0	27.3
24151.987500	49.68	---	73.90	24.22	5000.0	1000.000	176.0	H	263.0	27.3
24795.725000	42.64	---	73.90	31.26	5000.0	1000.000	138.0	V	71.0	22.3
24795.725000	---	29.92	53.90	23.98	5000.0	1000.000	138.0	V	71.0	22.3

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

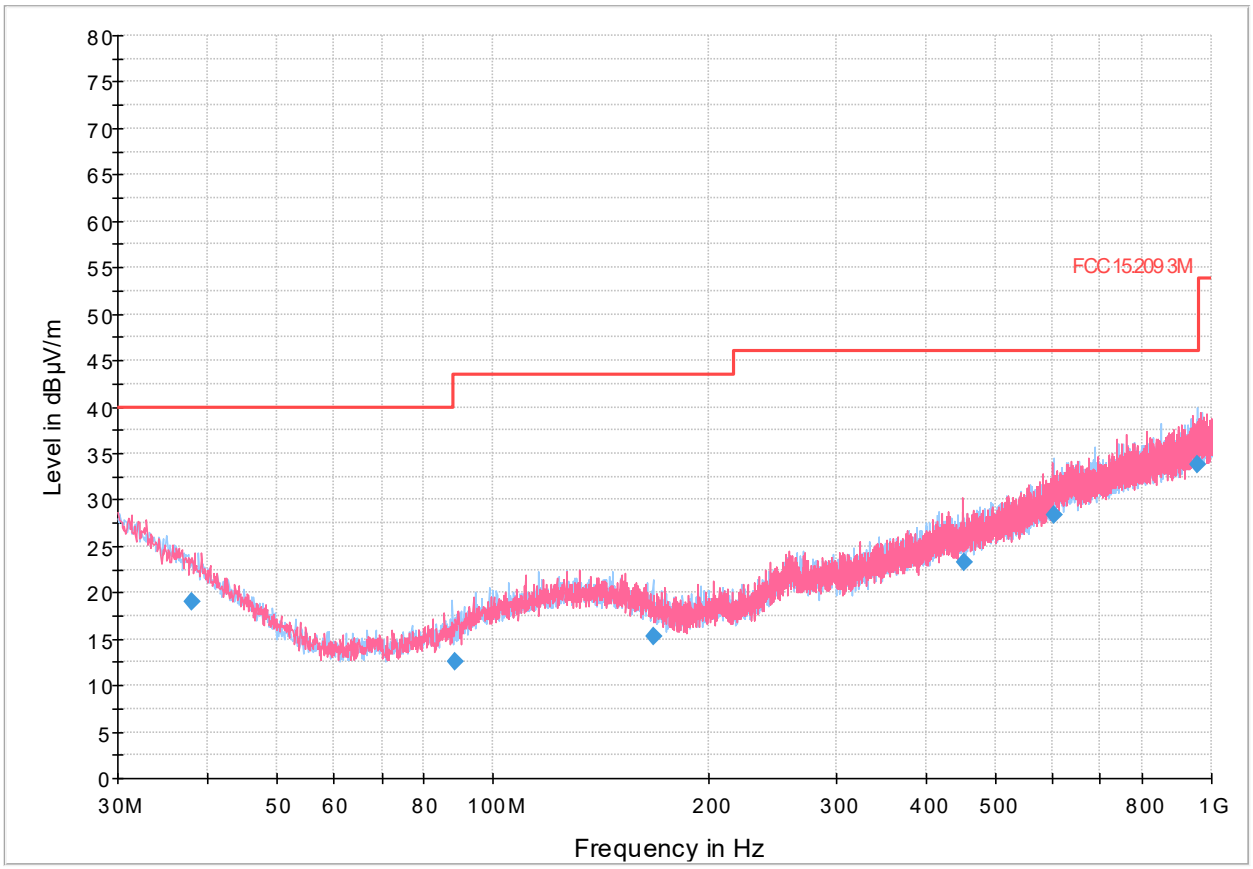


Figure 8.5-27: *Radiated emissions spectral plot (30 MHz - 1 GHz), 2402 MHz, 2 Mbps*

Table 8.5-19*: Radiated emissions results, 2402 MHz, 2 Mbps*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
38.087000	19.04	40.00	20.96	5000.0	120.000	376.0	H	0.0	22.1
88.255000	12.60	43.50	30.90	5000.0	120.000	401.0	H	0.0	15.9
167.190000	15.26	43.50	28.24	5000.0	120.000	191.0	H	287.0	18.0
451.554000	23.32	46.00	22.68	5000.0	120.000	191.0	V	233.0	25.6
603.872000	28.29	46.00	17.71	5000.0	120.000	399.0	H	0.0	28.6
955.862000	33.74	46.00	12.26	5000.0	120.000	144.0	H	163.0	34.2

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

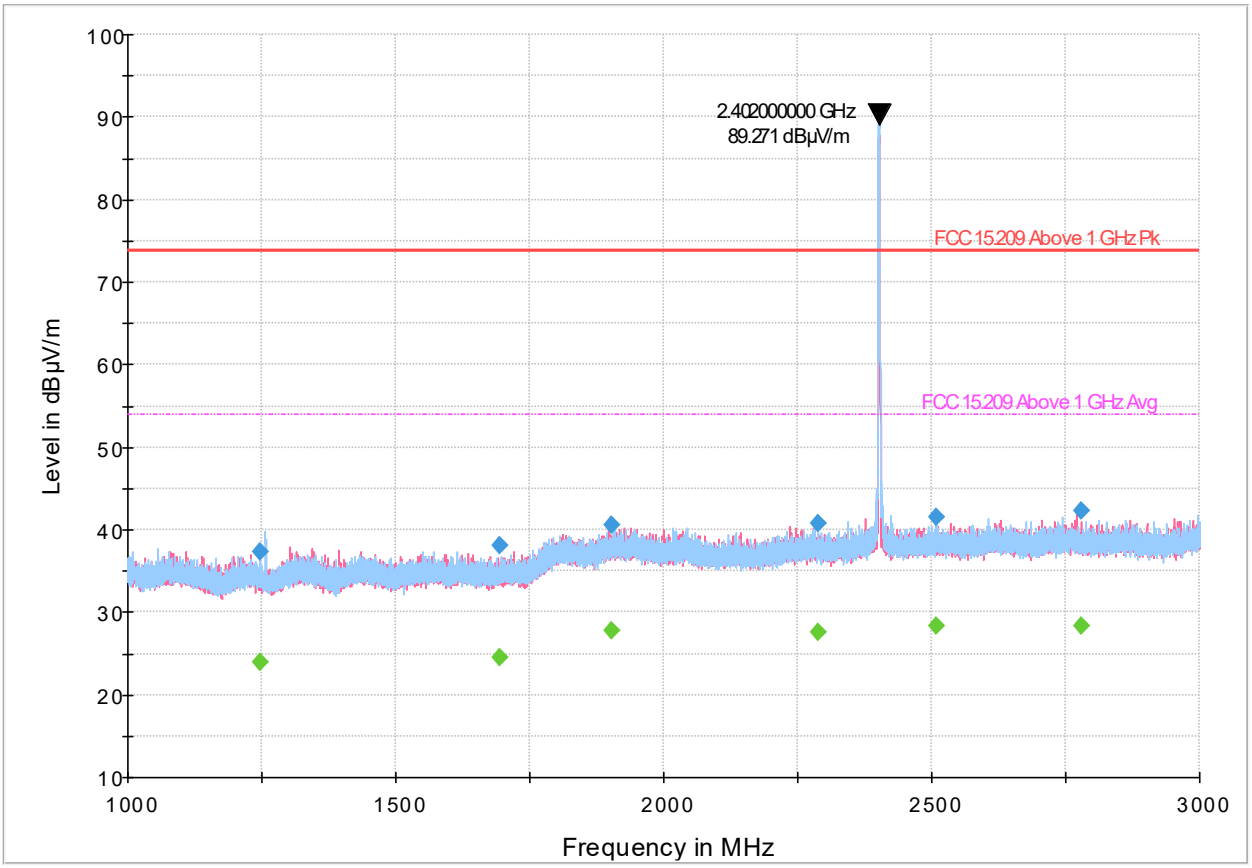


Figure 8.5-28: *Radiated emissions spectral plot (1 GHz - 3 GHz), 2402 MHz, 2 Mbps*

Table 8.5-20*: Radiated emissions results, 2402 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1247.800000	---	24.00	53.90	29.90	5000.0	1000.000	139.0	H	230.0	-11.4
1247.800000	37.28	---	73.90	36.62	5000.0	1000.000	139.0	H	230.0	-11.4
1693.900000	---	24.61	53.90	29.29	5000.0	1000.000	214.0	V	253.0	-10.4
1693.900000	38.15	---	73.90	35.75	5000.0	1000.000	214.0	V	253.0	-10.4
1901.900000	40.61	---	73.90	33.29	5000.0	1000.000	336.0	V	-1.0	-6.8
1901.900000	---	27.79	53.90	26.11	5000.0	1000.000	336.0	V	-1.0	-6.8
2288.600000	40.83	---	73.90	33.07	5000.0	1000.000	331.0	H	229.0	-6.1
2288.600000	---	27.58	53.90	26.32	5000.0	1000.000	331.0	H	229.0	-6.1
2508.400000	---	28.33	53.90	25.57	5000.0	1000.000	234.0	H	178.0	-5.0
2508.400000	41.52	---	73.90	32.38	5000.0	1000.000	234.0	H	178.0	-5.0
2779.200000	---	28.43	53.90	25.47	5000.0	1000.000	181.0	V	254.0	-4.2
2779.200000	42.28	---	73.90	31.62	5000.0	1000.000	181.0	V	254.0	-4.2

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

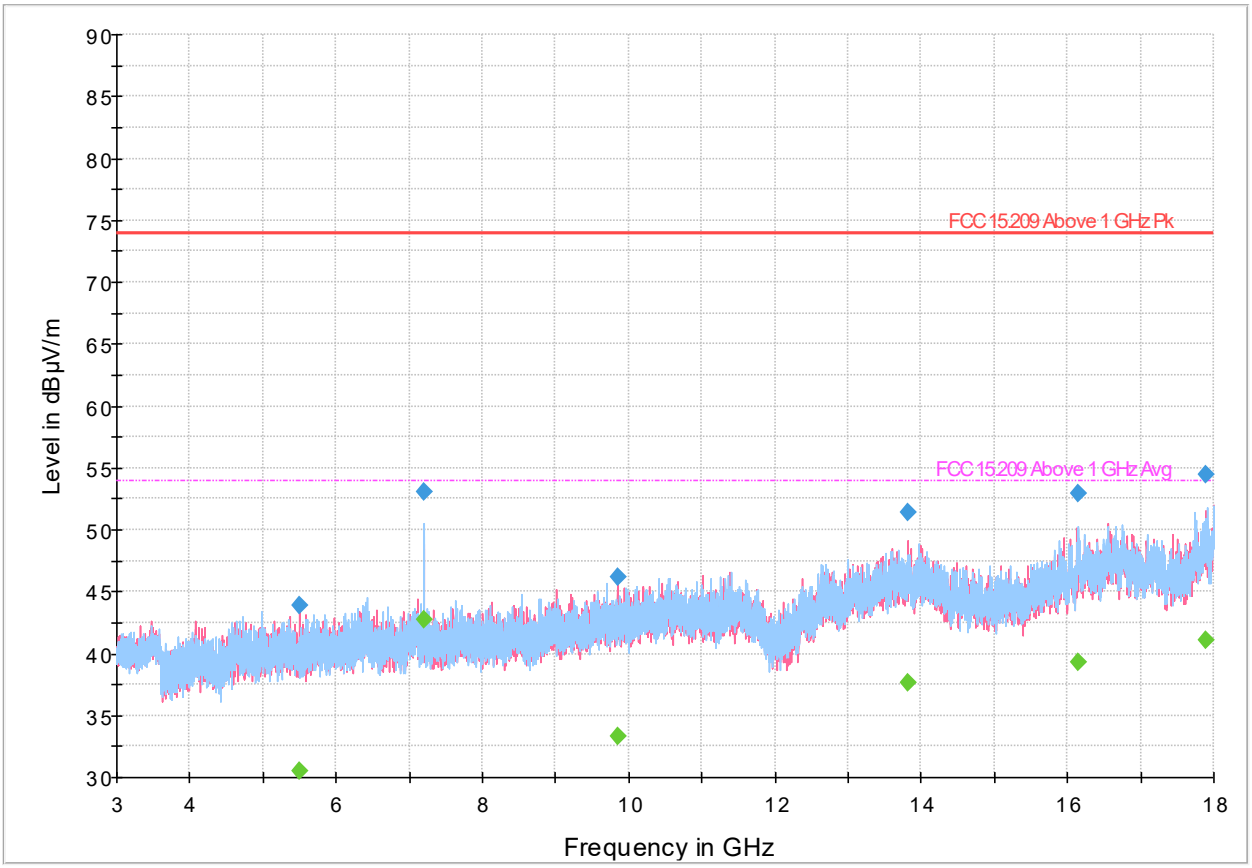


Figure 8.5-29: *Radiated emissions spectral plot (3 GHz - 18 GHz), 2402 MHz, 2 Mbps*

Table 8.5-21*: Radiated emissions results, 2402 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5497.600000	---	30.52	53.90	23.38	5000.0	1000.000	281.0	V	111.0	1.1
5497.600000	43.91	---	73.90	29.99	5000.0	1000.000	281.0	V	111.0	1.1
7207.550000	---	42.75	53.90	11.15	5000.0	1000.000	234.0	H	-1.0	3.1
7207.550000	53.09	---	73.90	20.81	5000.0	1000.000	234.0	H	-1.0	3.1
9851.200000	---	33.30	53.90	20.60	5000.0	1000.000	132.0	V	125.0	7.8
9851.200000	46.21	---	73.90	27.69	5000.0	1000.000	132.0	V	125.0	7.8
13824.450000	---	37.60	53.90	16.30	5000.0	1000.000	173.0	V	252.0	14.2
13824.450000	51.46	---	73.90	22.44	5000.0	1000.000	173.0	V	252.0	14.2
16153.750000	52.99	---	73.90	20.91	5000.0	1000.000	279.0	H	22.0	18.0
16153.750000	---	39.27	53.90	14.63	5000.0	1000.000	279.0	H	22.0	18.0
17897.800000	54.50	---	73.90	19.40	5000.0	1000.000	179.0	H	238.0	19.0
17897.800000	---	41.04	53.90	12.86	5000.0	1000.000	179.0	H	238.0	19.0

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

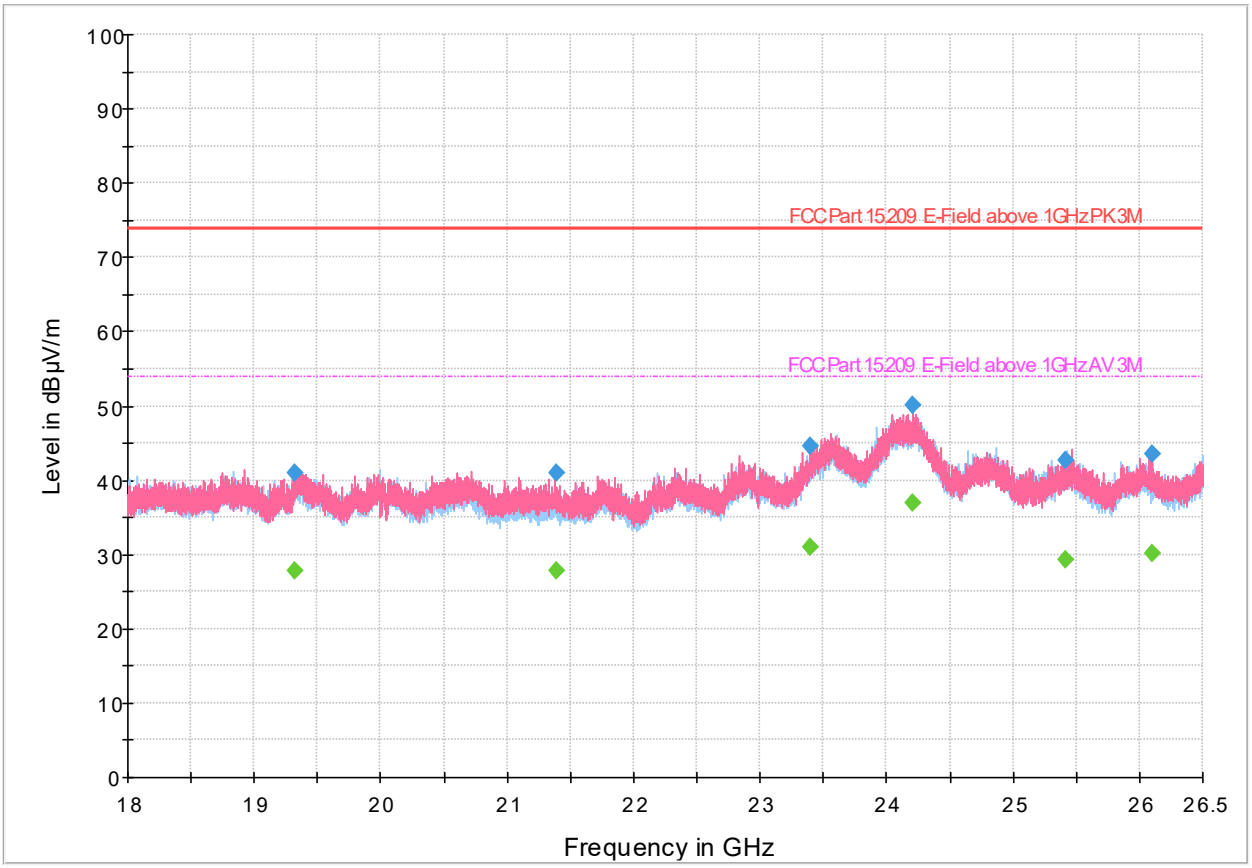


Figure 8.5-30: *Radiated emissions spectral plot (18 GHz - 26.5 GHz), 2402 MHz, 2 Mbps*

Table 8.5-22*: Radiated emissions results, 2402 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19325.318750	41.02	---	73.90	32.88	5000.0	1000.000	192.0	V	23.0	16.8
19325.318750	---	27.79	53.90	26.11	5000.0	1000.000	192.0	V	23.0	16.8
21385.400000	40.99	---	73.90	32.91	5000.0	1000.000	400.0	V	23.0	17.0
21385.400000	---	27.87	53.90	26.03	5000.0	1000.000	400.0	V	23.0	17.0
23393.531250	---	31.03	53.90	22.87	5000.0	1000.000	216.0	V	100.0	22.0
23393.531250	44.53	---	73.90	29.37	5000.0	1000.000	216.0	V	100.0	22.0
24210.737500	50.03	---	73.90	23.87	5000.0	1000.000	359.0	V	182.0	27.1
24210.737500	---	36.98	53.90	16.92	5000.0	1000.000	359.0	V	182.0	27.1
25419.025000	42.57	---	73.90	31.33	5000.0	1000.000	343.0	H	274.0	21.6
25419.025000	---	29.23	53.90	24.67	5000.0	1000.000	343.0	H	274.0	21.6
26098.850000	---	30.18	53.90	23.72	5000.0	1000.000	144.0	V	358.0	21.9
26098.850000	43.48	---	73.90	30.42	5000.0	1000.000	144.0	V	358.0	21.9

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

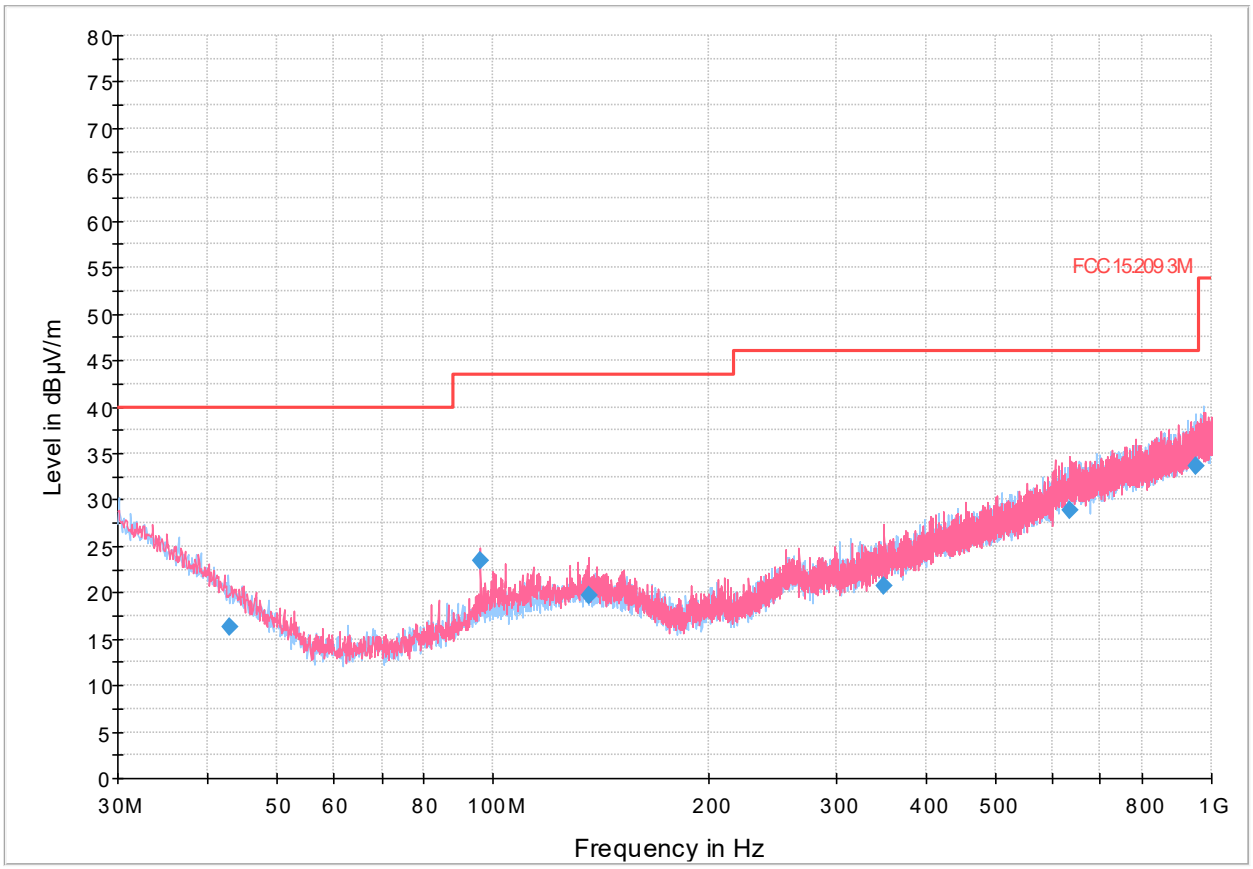


Figure 8.5-31: *Radiated emissions spectral plot (30 MHz - 1 GHz), 2440 MHz, 2 Mbps*

Table 8.5-23*: Radiated emissions results, 2440 MHz, 2 Mbps*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.864000	16.28	40.00	23.72	5000.0	120.000	154.0	H	230.0	19.6
96.020000	23.41	43.50	20.09	5000.0	120.000	312.0	V	124.0	17.1
136.024000	19.73	43.50	23.77	5000.0	120.000	401.0	V	20.0	19.5
350.034000	20.78	46.00	25.22	5000.0	120.000	350.0	V	8.0	23.5
635.648000	28.87	46.00	17.13	5000.0	120.000	340.0	V	323.0	29.3
951.035000	33.67	46.00	12.33	5000.0	120.000	386.0	H	114.0	34.1

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

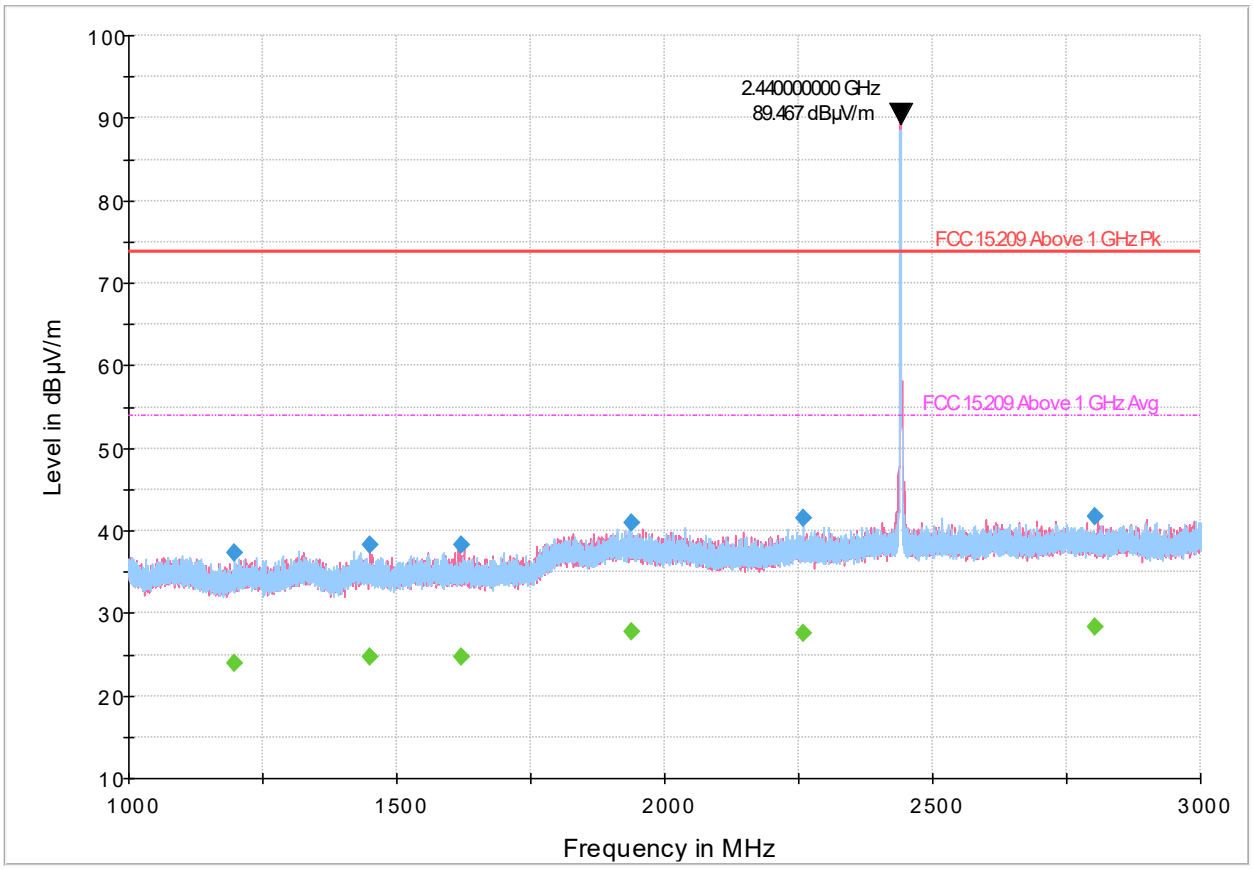


Figure 8.5-32: *Radiated emissions spectral plot (1 GHz - 3 GHz), 2440 MHz, 2 Mbps*

Table 8.5-24*: Radiated emissions results, 2440 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1196.600000	---	23.98	53.90	29.92	5000.0	1000.000	149.0	H	112.0	-12.1
1196.600000	37.27	---	73.90	36.63	5000.0	1000.000	149.0	H	112.0	-12.1
1448.700000	---	24.76	53.90	29.14	5000.0	1000.000	293.0	V	224.0	-10.7
1448.700000	38.21	---	73.90	35.69	5000.0	1000.000	293.0	V	224.0	-10.7
1622.000000	---	24.80	53.90	29.10	5000.0	1000.000	310.0	V	110.0	-10.2
1622.000000	38.36	---	73.90	35.54	5000.0	1000.000	310.0	V	110.0	-10.2
1939.100000	40.93	---	73.90	32.97	5000.0	1000.000	159.0	H	22.0	-6.5
1939.100000	---	27.75	53.90	26.15	5000.0	1000.000	159.0	H	22.0	-6.5
2259.600000	---	27.61	53.90	26.29	5000.0	1000.000	292.0	H	227.0	-6.1
2259.600000	41.50	---	73.90	32.40	5000.0	1000.000	292.0	H	227.0	-6.1
2802.000000	41.70	---	73.90	32.20	5000.0	1000.000	401.0	V	252.0	-4.1
2802.000000	---	28.34	53.90	25.56	5000.0	1000.000	401.0	V	252.0	-4.1

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

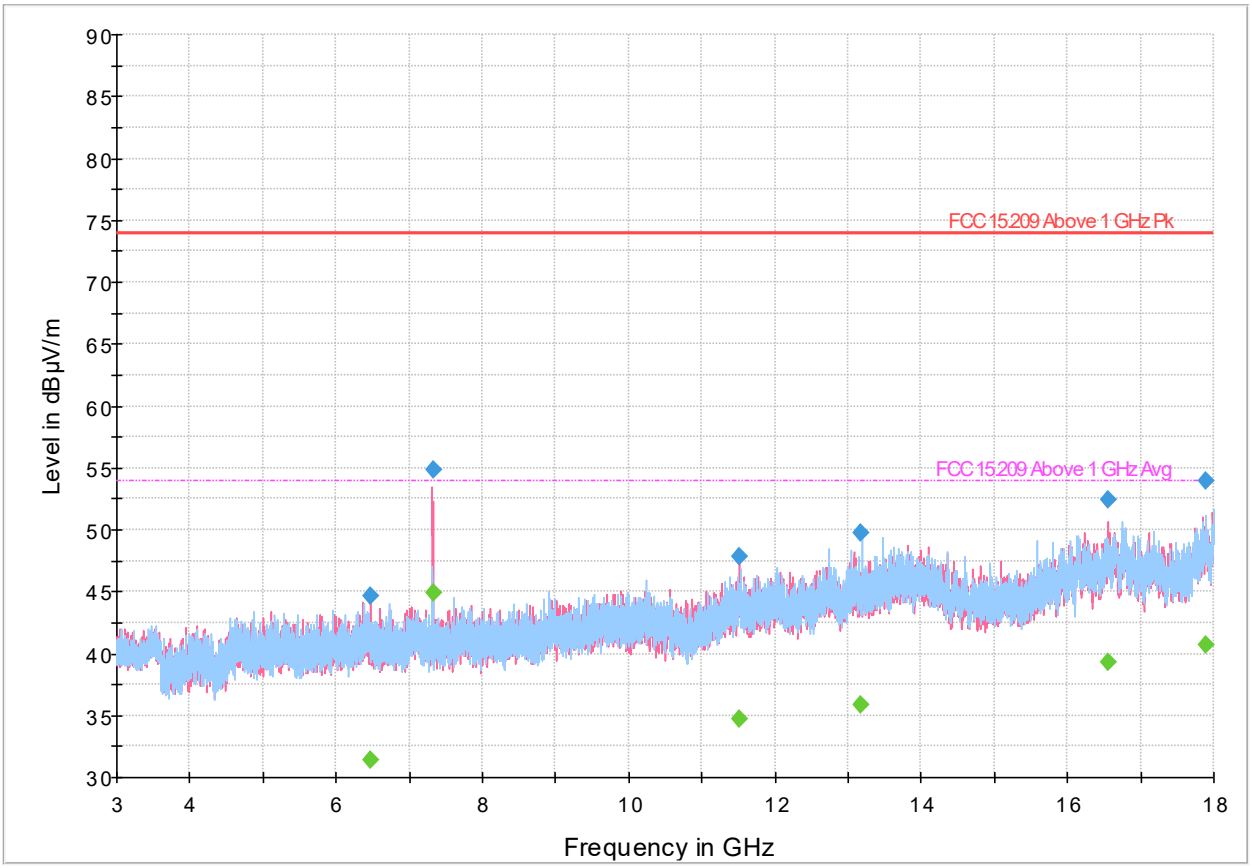


Figure 8.5-33: *Radiated emissions spectral plot (3 GHz - 18 GHz), 2440 MHz, 2 Mbps*

Table 8.5-25*: Radiated emissions results, 2440 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6460.400000	44.61	---	73.90	29.29	5000.0	1000.000	139.0	V	61.0	2.4
6460.400000	---	31.43	53.90	22.47	5000.0	1000.000	139.0	V	61.0	2.4
7321.550000	54.89	---	73.90	19.01	5000.0	1000.000	189.0	V	0.0	3.1
7321.550000	---	44.87	53.90	9.03	5000.0	1000.000	189.0	V	0.0	3.1
11519.750000	---	34.68	53.90	19.22	5000.0	1000.000	260.0	V	84.0	10.4
11519.750000	47.85	---	73.90	26.05	5000.0	1000.000	260.0	V	84.0	10.4
13180.250000	---	35.90	53.90	18.00	5000.0	1000.000	401.0	H	72.0	12.3
13180.250000	49.73	---	73.90	24.17	5000.0	1000.000	401.0	H	72.0	12.3
16563.500000	---	39.36	53.90	14.54	5000.0	1000.000	291.0	V	242.0	17.7
16563.500000	52.47	---	73.90	21.43	5000.0	1000.000	291.0	V	242.0	17.7
17892.000000	---	40.73	53.90	13.17	5000.0	1000.000	212.0	H	177.0	18.9
17892.000000	53.91	---	73.90	19.99	5000.0	1000.000	212.0	H	177.0	18.9

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

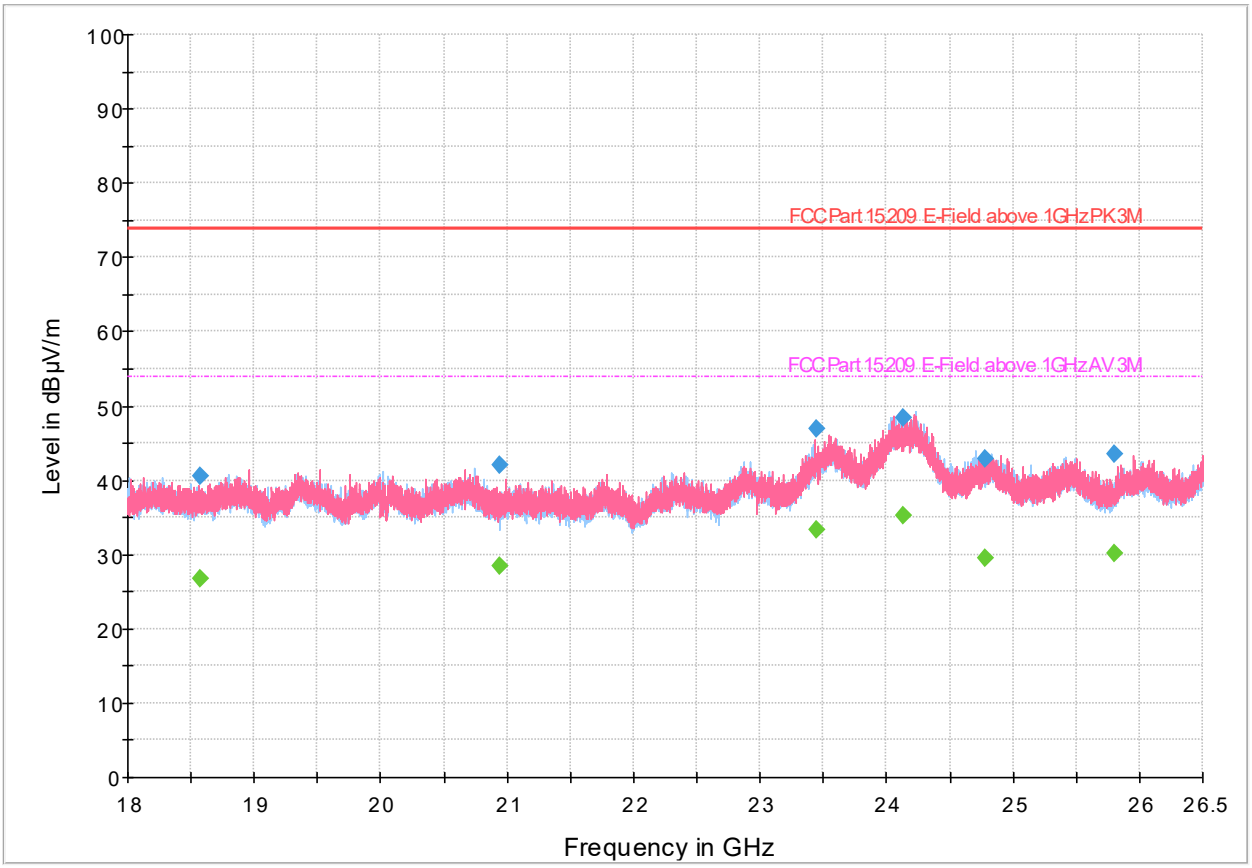


Figure 8.5-34: *Radiated emissions spectral plot (18 GHz - 26.5 GHz), 2440 MHz, 2 Mbps*

Table 8.5-26*: Radiated emissions results, 2440 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18575.300000	---	26.82	53.90	27.08	5000.0	1000.000	271.0	H	356.0	15.9
18575.300000	40.50	---	73.90	33.40	5000.0	1000.000	271.0	H	356.0	15.9
20935.778000	42.00	---	73.90	31.90	5000.0	1000.000	335.0	H	120.0	18.1
20935.778000	---	28.54	53.90	25.36	5000.0	1000.000	335.0	H	120.0	18.1
23445.310000	46.86	---	73.90	27.04	5000.0	1000.000	334.0	V	200.0	23.6
23445.310000	---	33.35	53.90	20.55	5000.0	1000.000	334.0	V	200.0	23.6
24138.062750	48.47	---	73.90	25.43	5000.0	1000.000	123.0	H	0.0	27.0
24138.062750	---	35.27	53.90	18.63	5000.0	1000.000	123.0	H	0.0	27.0
24778.423750	---	29.41	53.90	24.49	5000.0	1000.000	259.0	H	0.0	22.4
24778.423750	42.88	---	73.90	31.02	5000.0	1000.000	259.0	H	0.0	22.4
25799.381250	43.63	---	73.90	30.27	5000.0	1000.000	375.0	V	89.0	21.7
25799.381250	---	30.12	53.90	23.78	5000.0	1000.000	375.0	V	89.0	21.7

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

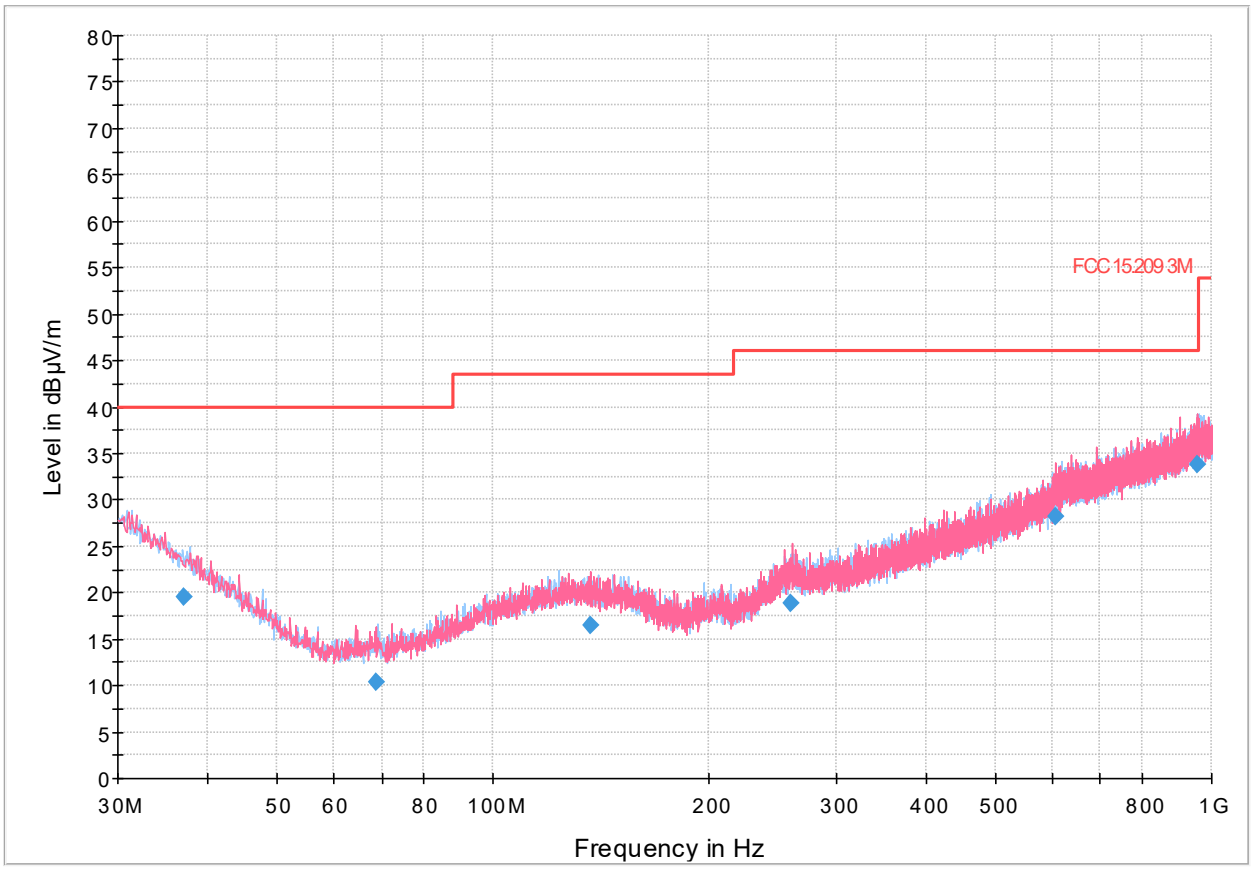


Figure 8.5-35: *Radiated emissions spectral plot (30 MHz - 1 GHz), 2480 MHz, 2 Mbps*

Table 8.5-27*: Radiated emissions results, 2480 MHz, 2 Mbps*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.180000	19.56	40.00	20.44	5000.0	120.000	117.0	H	209.0	22.6
68.677000	10.38	40.00	29.62	5000.0	120.000	248.0	H	275.0	13.3
136.720000	16.44	43.50	27.06	5000.0	120.000	259.0	V	336.0	19.5
259.915000	18.91	46.00	27.09	5000.0	120.000	136.0	V	307.0	21.9
605.983000	28.21	46.00	17.79	5000.0	120.000	312.0	V	65.0	28.5
955.286000	33.76	46.00	12.24	5000.0	120.000	381.0	V	67.0	34.2

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

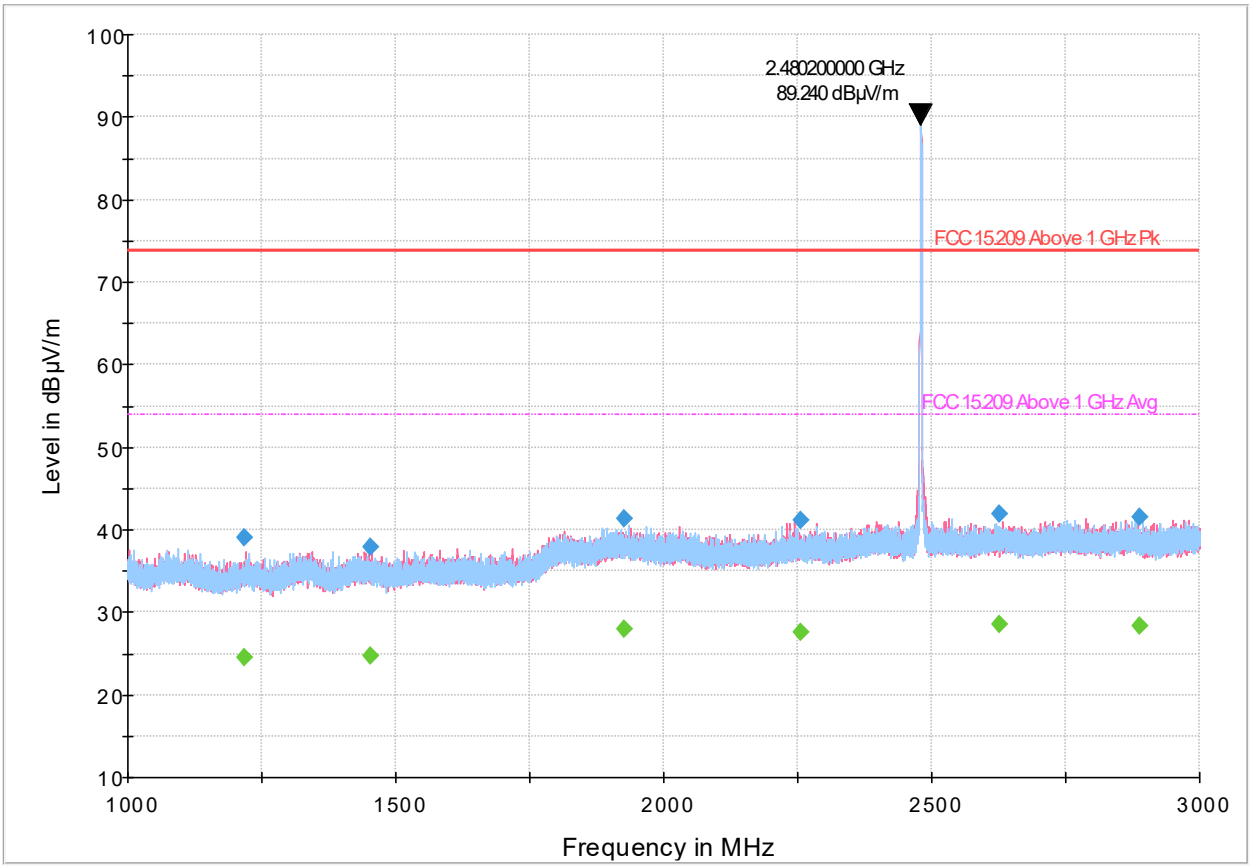


Figure 8.5-36: *Radiated emissions spectral plot (1 GHz - 3 GHz), 2480 MHz, 2 Mbps*

Table 8.5-28*: Radiated emissions results, 2480 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1217.400000	39.06	---	73.90	34.84	5000.0	1000.000	149.0	V	239.0	-11.7
1217.400000	---	24.48	53.90	29.42	5000.0	1000.000	149.0	V	239.0	-11.7
1452.200000	---	24.77	53.90	29.13	5000.0	1000.000	351.0	V	0.0	-10.6
1452.200000	37.88	---	73.90	36.02	5000.0	1000.000	351.0	V	0.0	-10.6
1925.000000	41.36	---	73.90	32.54	5000.0	1000.000	308.0	H	249.0	-6.7
1925.000000	---	27.89	53.90	26.01	5000.0	1000.000	308.0	H	249.0	-6.7
2255.600000	---	27.67	53.90	26.23	5000.0	1000.000	320.0	V	20.0	-6.2
2255.600000	41.10	---	73.90	32.80	5000.0	1000.000	320.0	V	20.0	-6.2
2625.800000	41.82	---	73.90	32.08	5000.0	1000.000	118.0	H	11.0	-4.6
2625.800000	---	28.55	53.90	25.35	5000.0	1000.000	118.0	H	11.0	-4.6
2887.600000	41.62	---	73.90	32.28	5000.0	1000.000	177.0	H	-1.0	-4.1
2887.600000	---	28.35	53.90	25.55	5000.0	1000.000	177.0	H	-1.0	-4.1

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

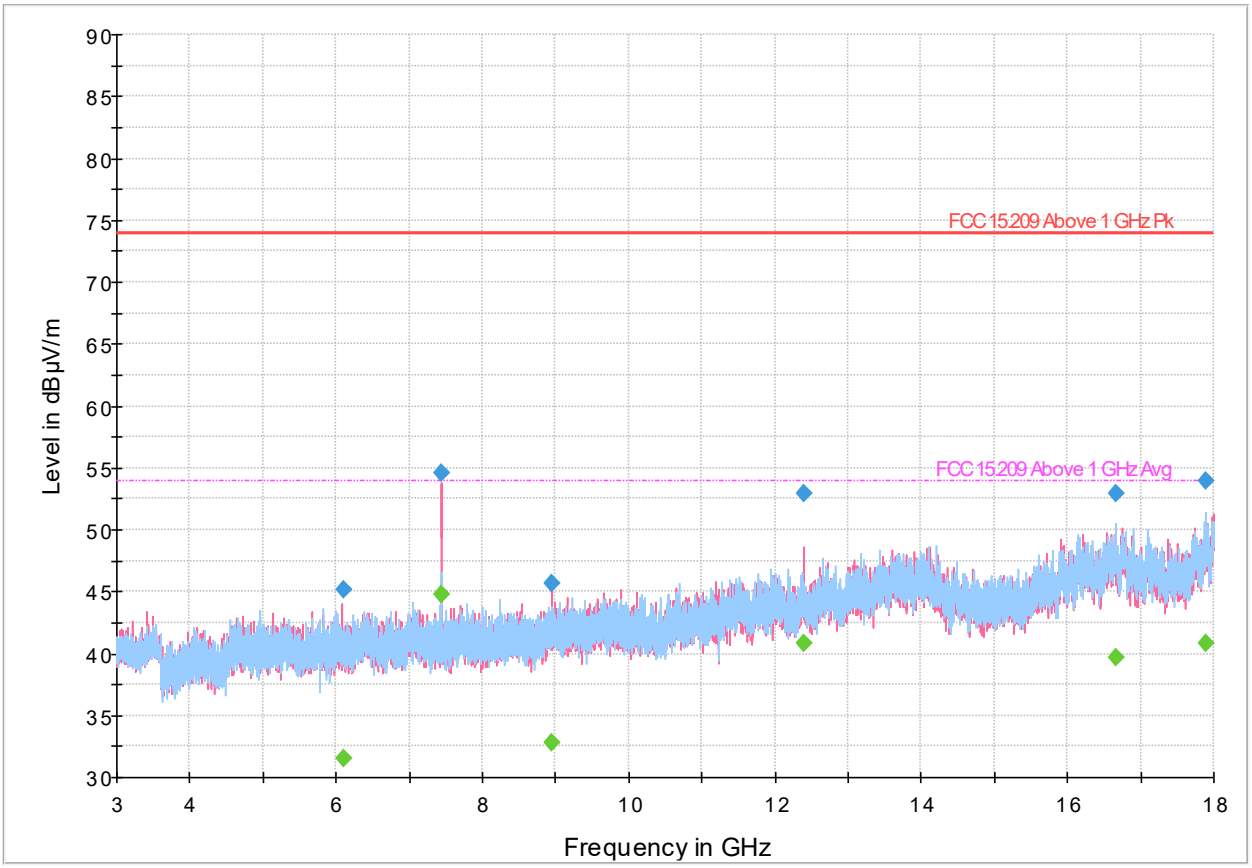


Figure 8.5-37: *Radiated emissions spectral plot (3 GHz - 18 GHz), 2480 MHz, 2 Mbps*

Table 8.5-29*: Radiated emissions results, 2480 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6099.150000	---	31.55	53.90	22.35	5000.0	1000.000	239.0	V	338.0	2.1
6099.150000	45.13	---	73.90	28.77	5000.0	1000.000	239.0	V	338.0	2.1
7441.550000	---	44.73	53.90	9.17	5000.0	1000.000	199.0	V	317.0	3.1
7441.550000	54.64	---	73.90	19.26	5000.0	1000.000	199.0	V	317.0	3.1
8954.500000	45.73	---	73.90	28.17	5000.0	1000.000	198.0	V	274.0	5.1
8954.500000	---	32.74	53.90	21.16	5000.0	1000.000	198.0	V	274.0	5.1
12397.700000	52.98	---	73.90	20.92	5000.0	1000.000	199.0	V	353.0	11.6
12397.700000	---	40.81	53.90	13.09	5000.0	1000.000	199.0	V	353.0	11.6
16661.900000	52.94	---	73.90	20.96	5000.0	1000.000	218.0	H	299.0	18.3
16661.900000	---	39.73	53.90	14.17	5000.0	1000.000	218.0	H	299.0	18.3
17890.850000	53.97	---	73.90	19.93	5000.0	1000.000	119.0	H	11.0	18.9
17890.850000	---	40.88	53.90	13.02	5000.0	1000.000	119.0	H	11.0	18.9

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

Full Spectrum

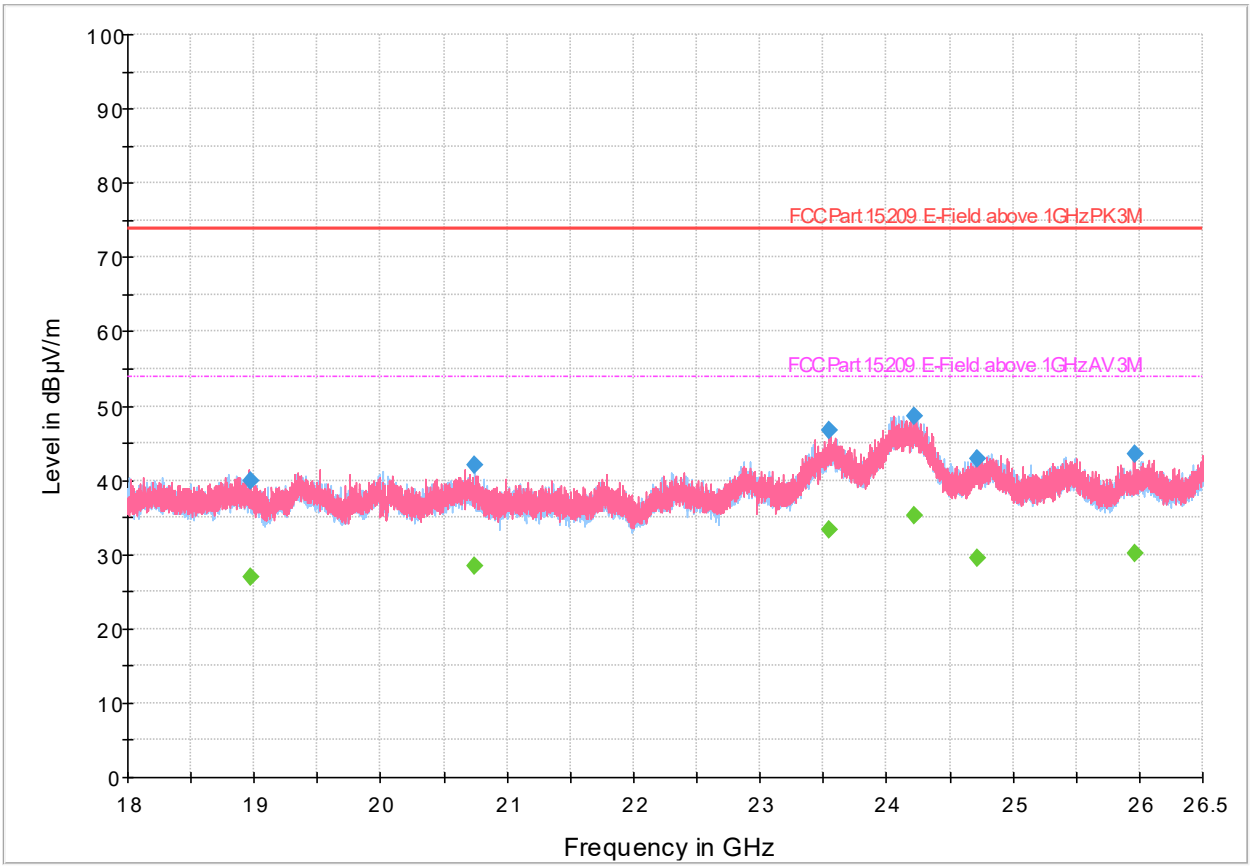


Figure 8.5-38: *Radiated emissions spectral plot (18 GHz - 26.5 GHz), 2480 MHz, 2 Mbps*

Table 8.5-30*: Radiated emissions results, 2480 MHz, 2 Mbps*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18971.200000	---	26.91	53.90	26.99	5000.0	1000.000	272.0	H	355.0	15.9
18971.200000	40.00	---	73.90	33.90	5000.0	1000.000	272.0	H	355.0	15.9
20744.575000	41.97	---	73.90	31.93	5000.0	1000.000	332.0	H	120.0	18.1
20744.575000	---	28.49	53.90	25.41	5000.0	1000.000	332.0	H	120.0	18.1
23551.187500	46.66	---	73.90	27.24	5000.0	1000.000	336.0	V	199.0	23.6
23551.187500	---	33.37	53.90	20.53	5000.0	1000.000	336.0	V	199.0	23.6
24221.868750	48.67	---	73.90	25.23	5000.0	1000.000	125.0	H	0.0	27.0
24221.868750	---	35.25	53.90	18.65	5000.0	1000.000	125.0	H	0.0	27.0
24714.393750	---	29.43	53.90	24.47	5000.0	1000.000	258.0	H	0.0	22.4
24714.393750	42.90	---	73.90	31.00	5000.0	1000.000	258.0	H	0.0	22.4
25958.881250	43.61	---	73.90	30.29	5000.0	1000.000	377.0	V	87.0	21.7
25958.881250	---	30.16	53.90	23.74	5000.0	1000.000	377.0	V	87.0	21.7

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

8.6 Power spectral density

8.6.1 References and limits

- FCC 47 CFR Part 15, Subpart C: §15.247(e)
- Test method: ANSI C63.10-2020 §11.10.2.1 (Method PKPSD)

§15.247:

(e) 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.

8.6.2 Test summary

Verdict	Pass		
Test date	November 27, 2023	Temperature	19 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	☒ Wireless bench ☐ Other:	Relative humidity	53 %

8.6.3 Notes

Testing was performed with the transmitter operating on a fixed channel (lowest, middle, and highest) at maximum output power.

The spectral plots within this section have been corrected with all relevant transducer factors.

8.6.4 Setup details

EUT power input during test	3.2 V DC
EUT setup configuration	☒ Table-top ☐ Floor standing ☐ Other:

Spectrum analyzer settings:

Resolution bandwidth	3 kHz
Video bandwidth	10 kHz
Detector mode	Peak
Trace mode	Max Hold
Measurement time	Long enough for trace to stabilize

8.6.5 Test data

Table 8.6-1: *Power spectral density test data*

Test Frequency (MHz)	Modulation	Power Density (dBm/3 kHz)	Limit (dBm)
2402	GFSK, 1 Mbps	-6.47	≤ 8
2440	GFSK, 1 Mbps	-5.49	≤ 8
2480	GFSK, 1 Mbps	-5.29	≤ 8
2402	GFSK, 2 Mbps	-8.37	≤ 8
2440	GFSK, 2 Mbps	-10.14	≤ 8
2480	GFSK, 2 Mbps	-9.85	≤ 8

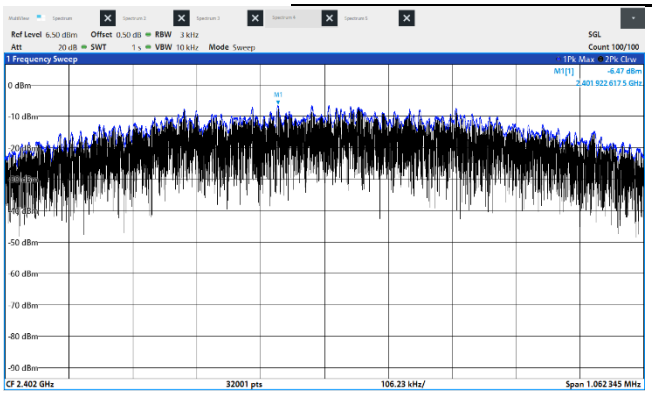


Figure 8.6-1: *Power spectral density, GFSK, 1 Mbps, 2402 MHz*

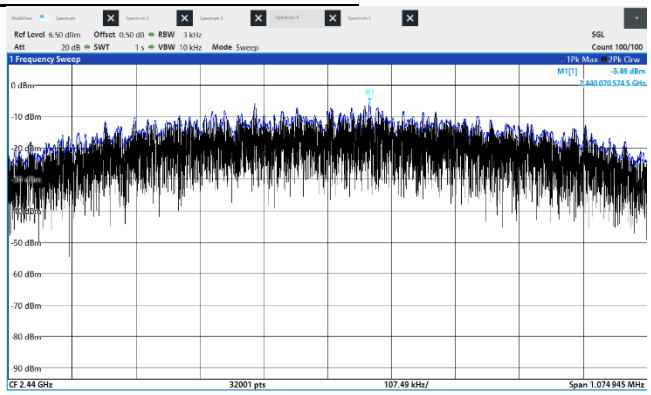


Figure 8.6-2: *Power spectral density, GFSK, 1 Mbps, 2440 MHz*

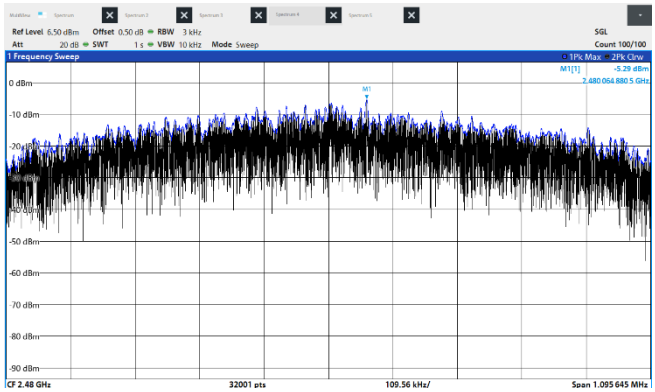


Figure 8.6-3: *Power spectral density, GFSK, 1 Mbps, 2480 MHz*

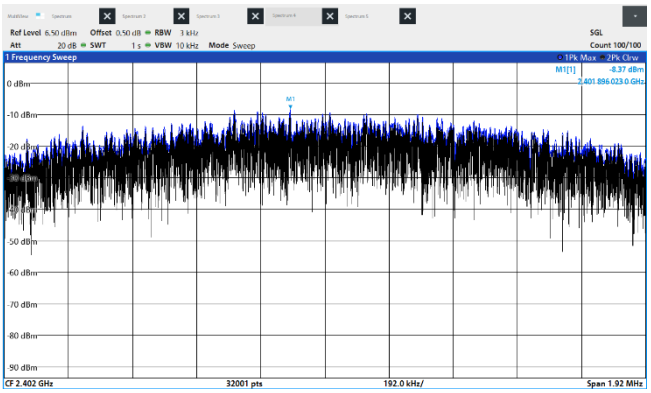


Figure 8.6-4: *Power spectral density, GFSK, 2 Mbps, 2402 MHz*

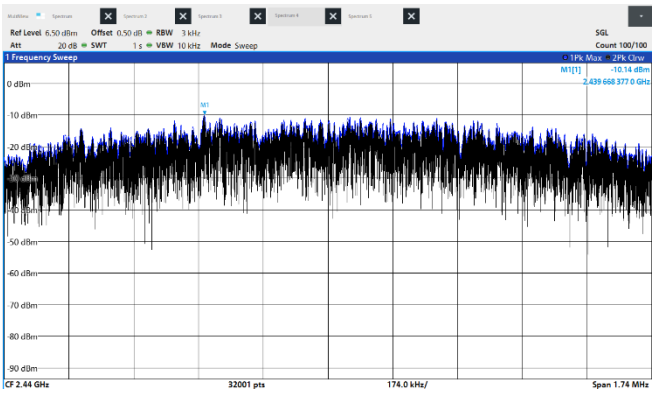


Figure 8.6-5: *Power spectral density, GFSK, 2 Mbps, 2440 MHz*

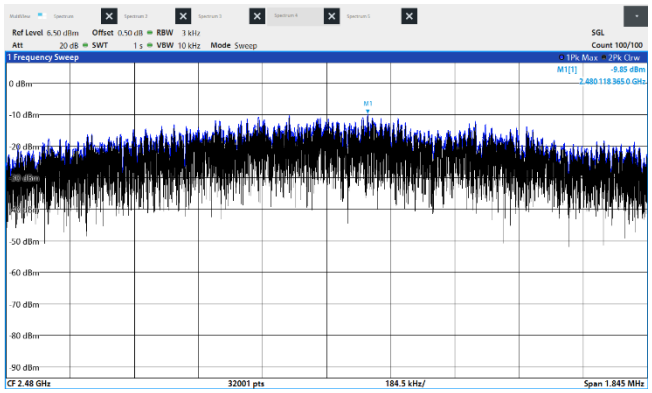


Figure 8.6-6: *Power spectral density, GFSK, 2 Mbps, 2480 MHz*

End of test report