RADIO REPORT

FCC 47 CFR Part 15C
Digital transmission systems operating within the 2400.0 MHz - 2483.5 MHz band

Report Reference No	G0M-2012-9520-TFC247BL-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Tharsus Limited
Address	Birmayne House Cowley Road NE24 5TF Blyth United Kingdom
Test Specification	47 CFR Part 15C
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	RF Proximity Module
Model(s)	BUMP-718-F
Additional Model(s)	None
Brand Name(s)	Tharsus
Hardware Version(s)	718-F
Software Version(s)	3
FCC ID	2AYMM-BUMP-718-F
Test Result	**PASSED**

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2021-01-04	
Report:		
Compiled by	Florian Voigt	
Tested by (+ signature) (Responsible for Test)	Florian Voigt	F. Voigt .....
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	T. J .....
Date of Issue	2021-03-25	
Total number of pages	80	
General Remarks:		
The test results presented in this report relate only to the object tested. **The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.** This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		
Transmitters will be disabled in charging mode		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-03-25	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

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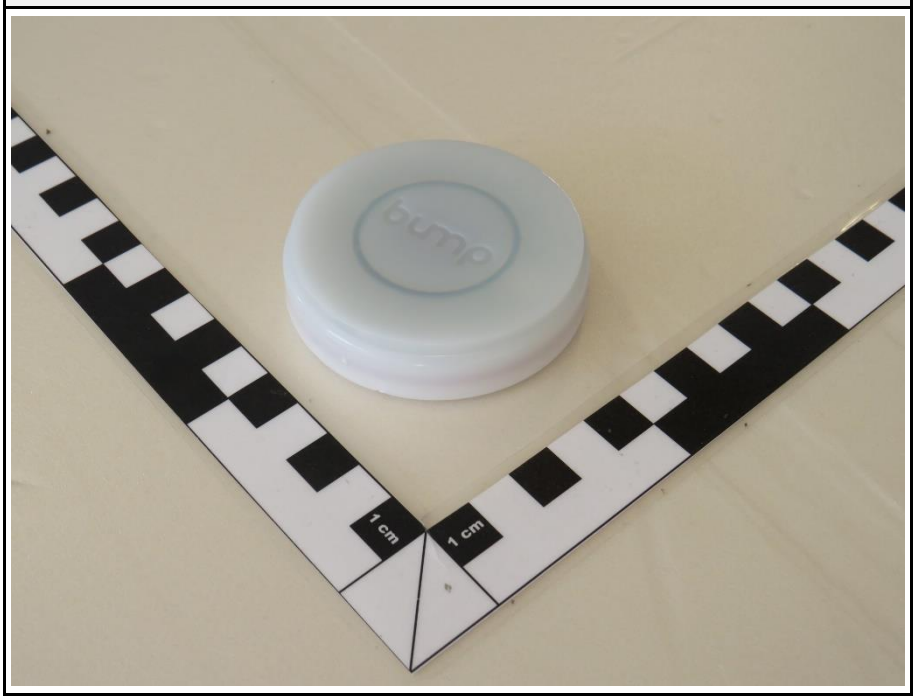
1 Equipment (Test Item) Under Test

Description	RF Proximity Module		
Model	BUMP-718-F		
Additional Model(s)	None		
Brand Name(s)	Tharsus		
Serial Number(s)	None		
Hardware Version(s)	718-F		
Software Version(s)	3		
FCC ID	2AYMM-BUMP-718-F		
Equipment type	End Product		
Radio type	Transceiver		
Assigned frequency bands	2400.0 MHz - 2483.5 MHz		
Radio technology	Bluetooth LE 5.0		
Bluetooth Specification	LE 1M PHY		Yes
	LE 2M PHY		No
	LE Coded PHY S=8 (125 kbit)		No
	LE Coded PHY S=2 (500 kbit)		No
	Stable Modulation Index - Transmitter		No
	Stable Modulation Index - Receiver		No
Modulation	GFSK		
Number of antenna ports	1		
Antenna	Type	Integrated antenna	
	Model	2450AT18D0100	
	Manufacturer	Johanson Technology	
	Gain	1.5 dBi	
Battery Supply Voltage	V_{NOM}	3.7 VDC	
USB Supply Voltage (Charging)	V_{NOM}	5.0 VDC	
Operating Temperature	T_{NOM}	20 °C	
AC/DC-Adaptor	None		
Manufacturer	Tharsus Limited Birmayne House Cowley Road NE24 5TF Blyth United Kingdom		

1.1 Photos – Equipment External

BUMP IN PERSPECTIVE I



BUMP IN PERSPECTIVE II

Note: EUT is placed with the flat side towards the ground. This represents horizontal EUT positioning

BUMP TOP SIDE

BUMP BOTTOM SIDE

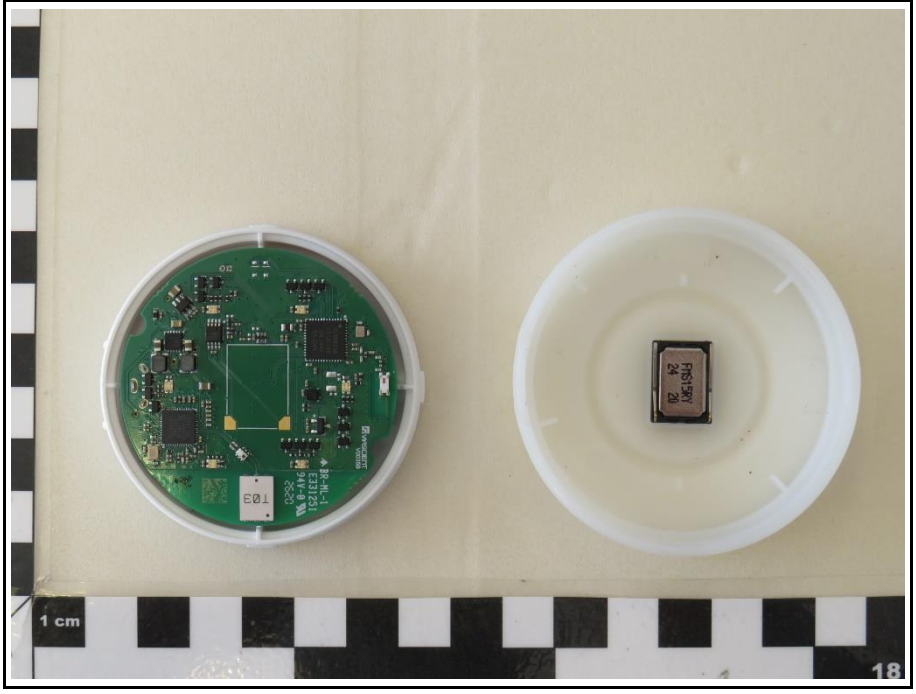
BUMP SIDE

Note: EUT is placed with the short side towards the ground. This represents vertical EUT positioning

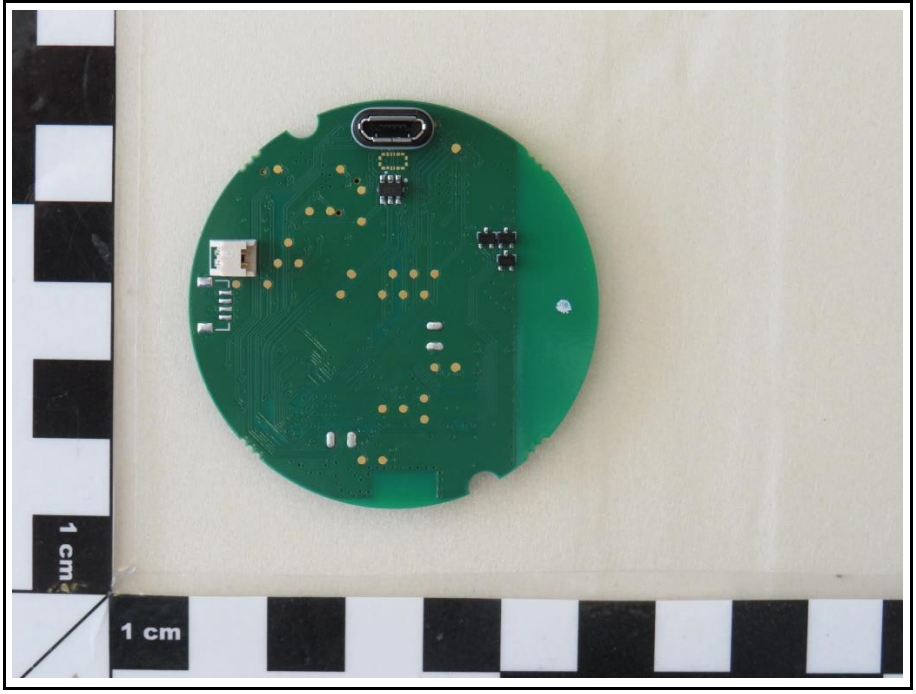
1.2 Photos – Equipment Internal

BUMP BOTTOM COVER

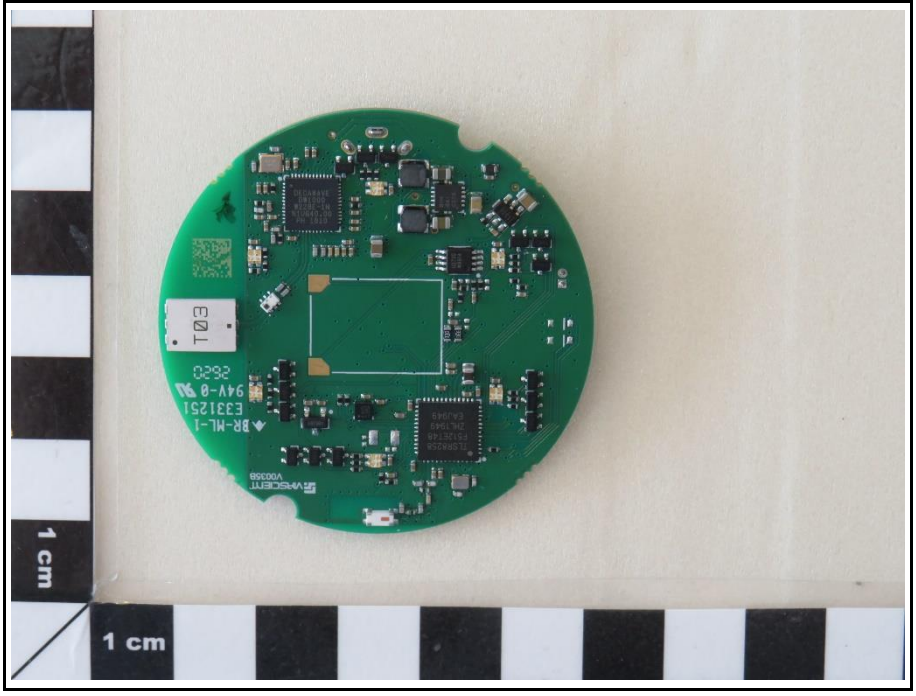
OPEN BUMP WITH TOP AND BOTTOM COVER



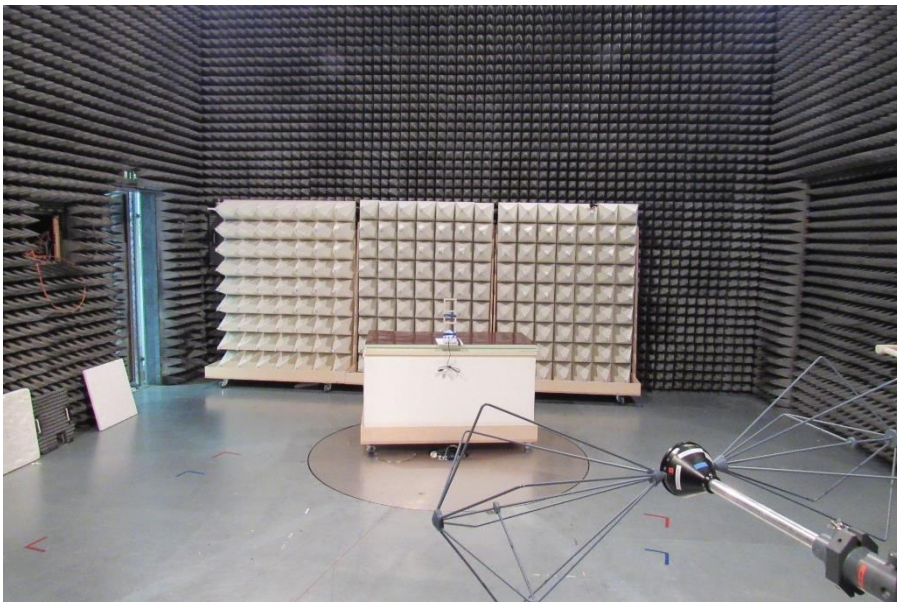
PCB BOTTOM SIDE

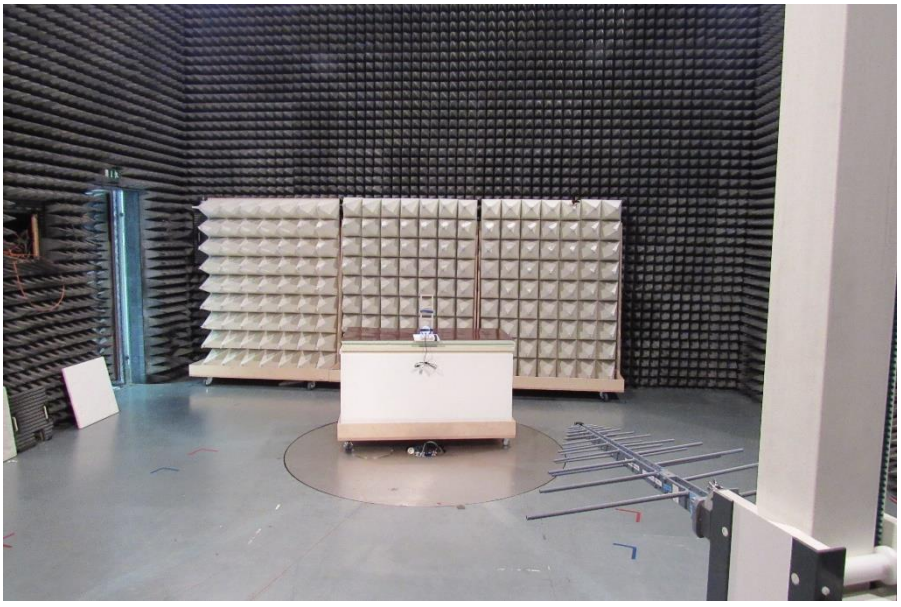


PCB TOP SIDE

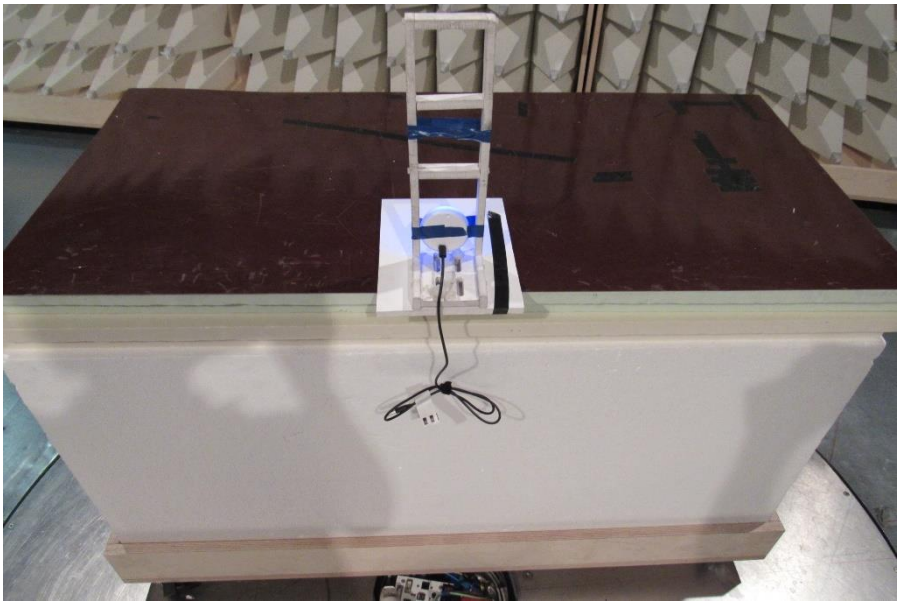


1.3 Photos – Test Setup

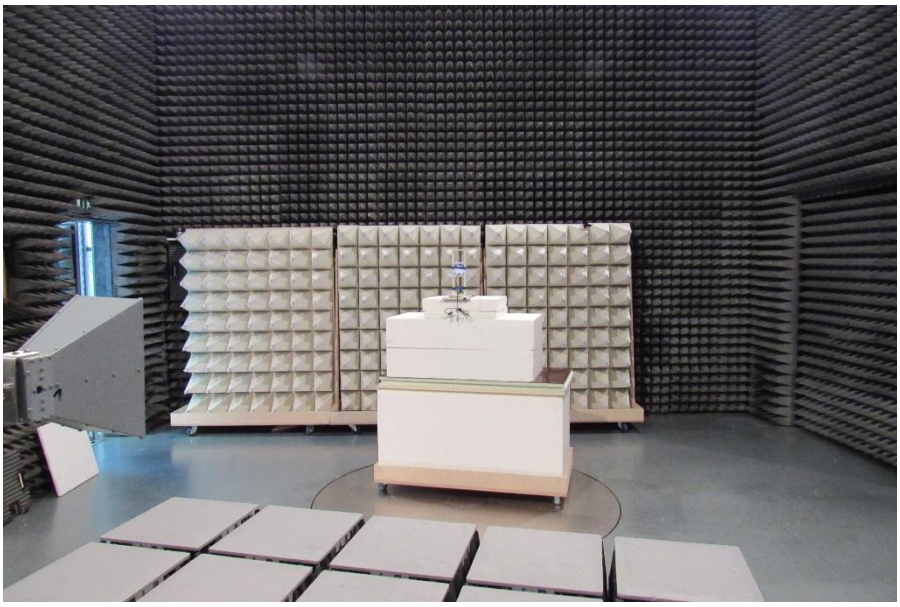
Test setup radiated emission below 200MHz


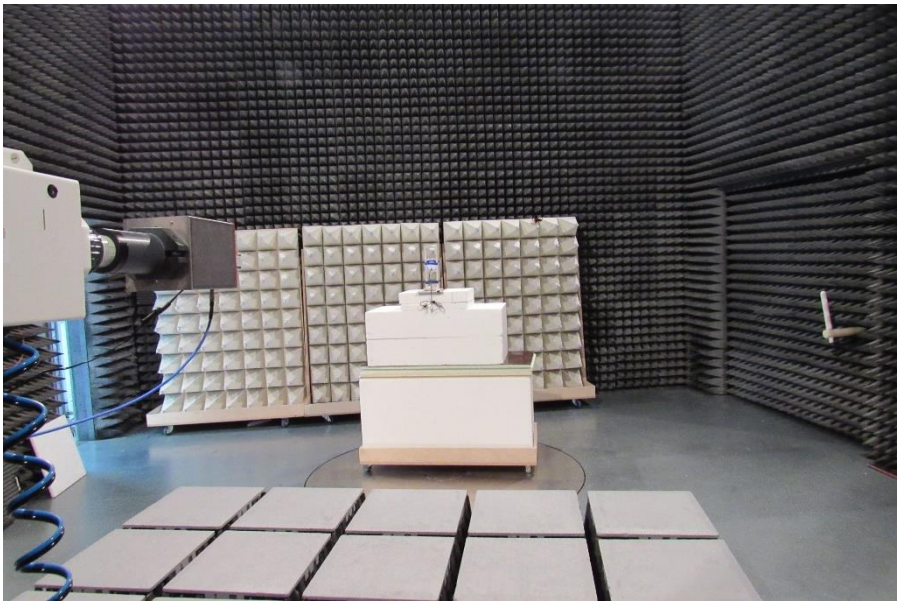
Test setup radiated emission 200 to 1000MHz


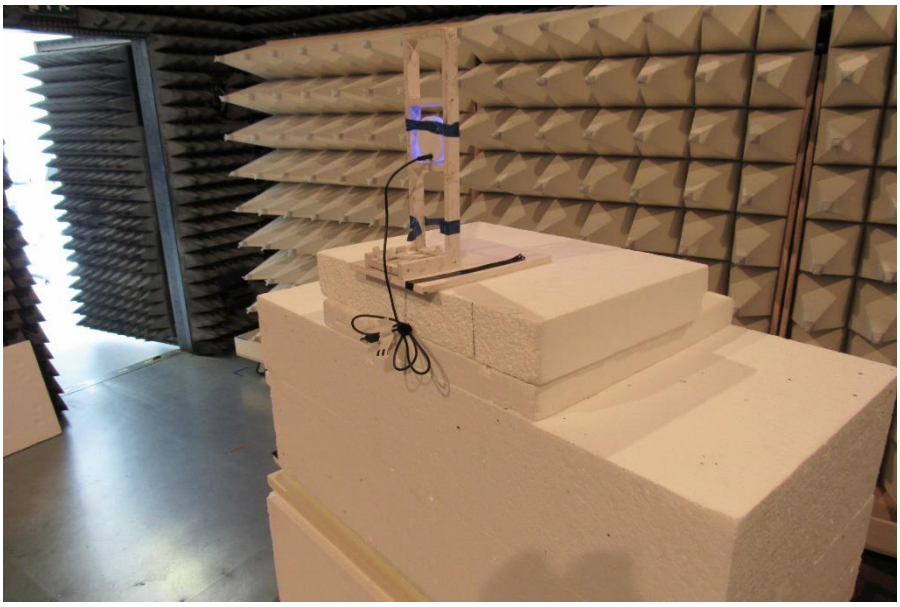
Test setup radiated emission EUT view 0.8m



Test setup radiated emissions 1 to 17GHz



Test setup radiated emission above 17GHz


Test setup radiated emissions EUT view 1.5m


1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
None				
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.5 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Powersetting = 3.0dBm (Software setting) Duty cycle = 100%
Comment:	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	0	2402
F2	Tx	19	2440
F3	Tx	39	2480

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyzer (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
FCC § 15.247(a)(2)	6 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(b)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.247(e)	Power spectral density	ANSI C63.10-2013	PASS	
FCC § 15.207	AC power line conducted emissions	ANSI C63.10-2013	N/R	EUT does not transmit in charging mode
FCC § 15.247(d)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - 6 dB bandwidth

3.1.1 Information

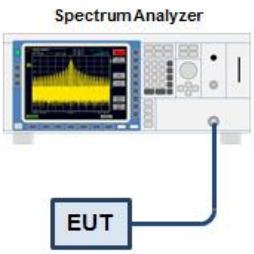
Test Information	
Reference	FCC § 15.247(a)(2)
Measurement Method	ANSI C63.10 11.8
Measurement Uncertainty	± 1.26 %
Operator	Florian Voigt
Date	2021-02-12

3.1.2 Limits

Limits
≥ 500kHz

3.1.3 Setup

Test Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSP30	EF00312	2020-07	2021-07

3.1.5 Procedure

Test Procedure

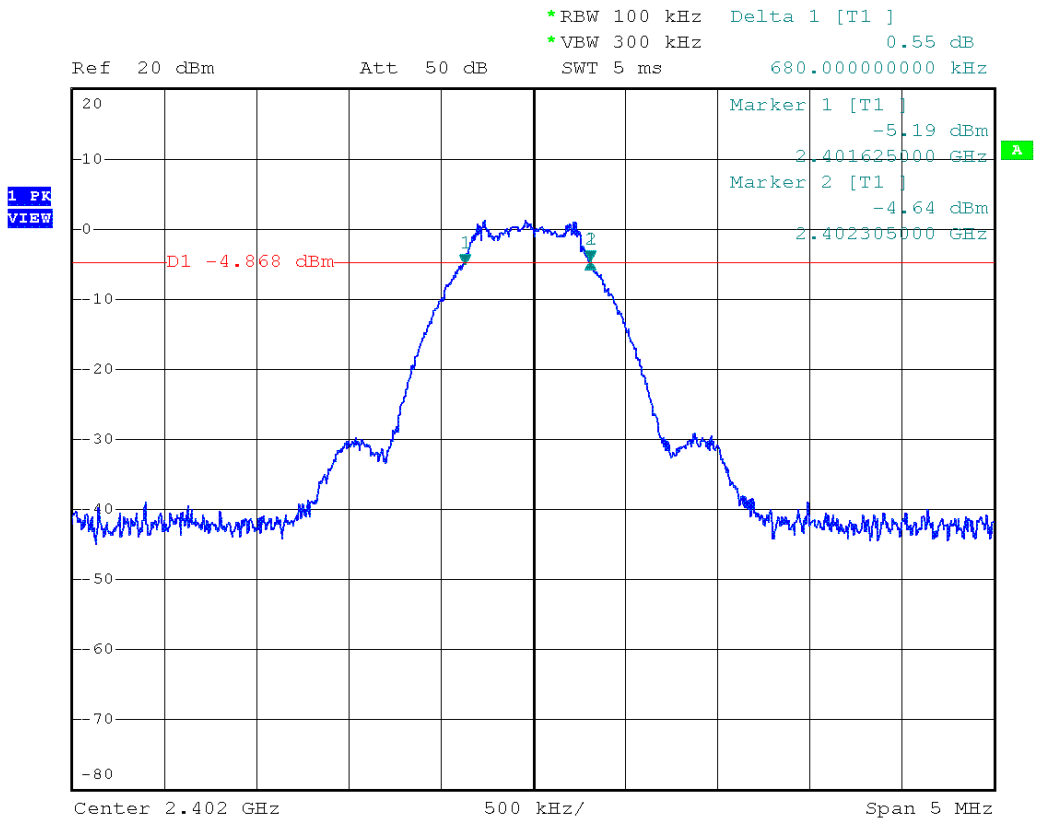
1. EUT set to test mode
2. Span set to at least twice the emission spectrum
3. Detector set to peak and max hold and RBW is set to 100 kHz
4. Envelope peak value of emission spectrum is selected
5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak
6. Marker on envelope of spectrum is set to level of -6 dB to the right of the peak
7. 6 dB Bandwidth is determined by marker frequency separation

3.1.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
GFSK	2402	680	500	PASS
GFSK	2440	685	500	PASS
GFSK	2480	670	500	PASS

DTS (6 dB) Bandwidth

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Lower Frequency [MHz]:	2401.625
Upper Frequency [MHz]:	2402.305
6 dB Bandwidth [kHz]:	680



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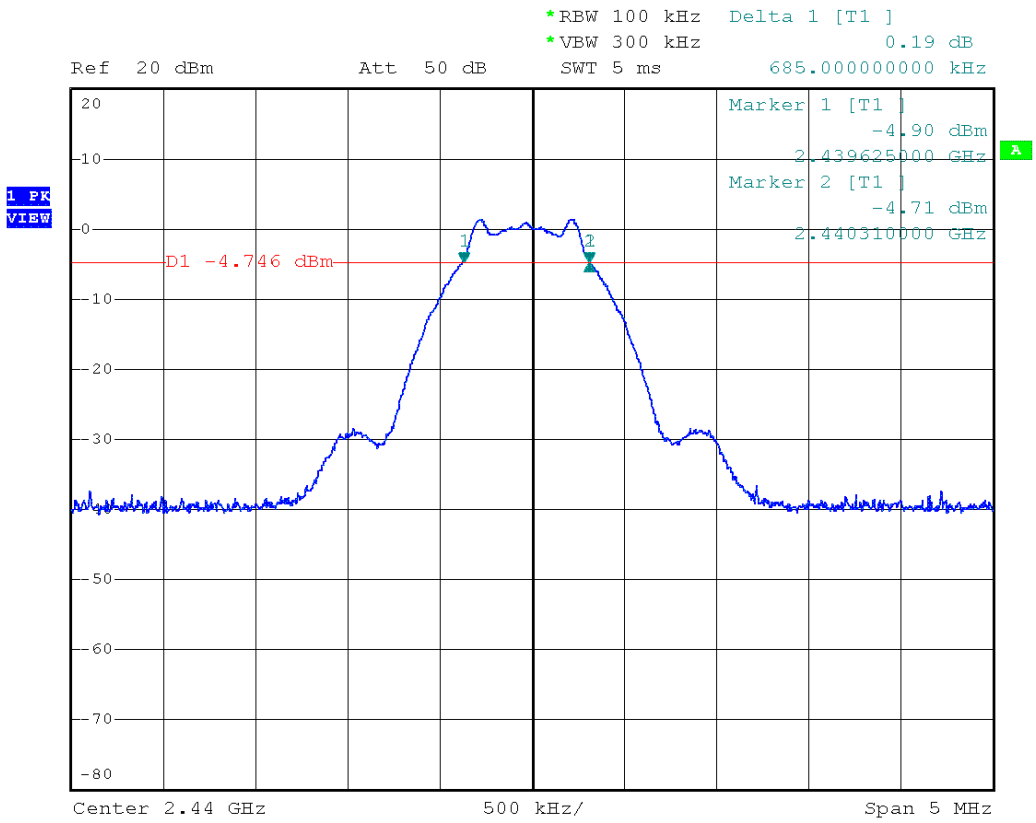
DTS (6 dB) Bandwidth

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Lower Frequency [MHz]:	2439.625
Upper Frequency [MHz]:	2440.310
6 dB Bandwidth [kHz]:	685



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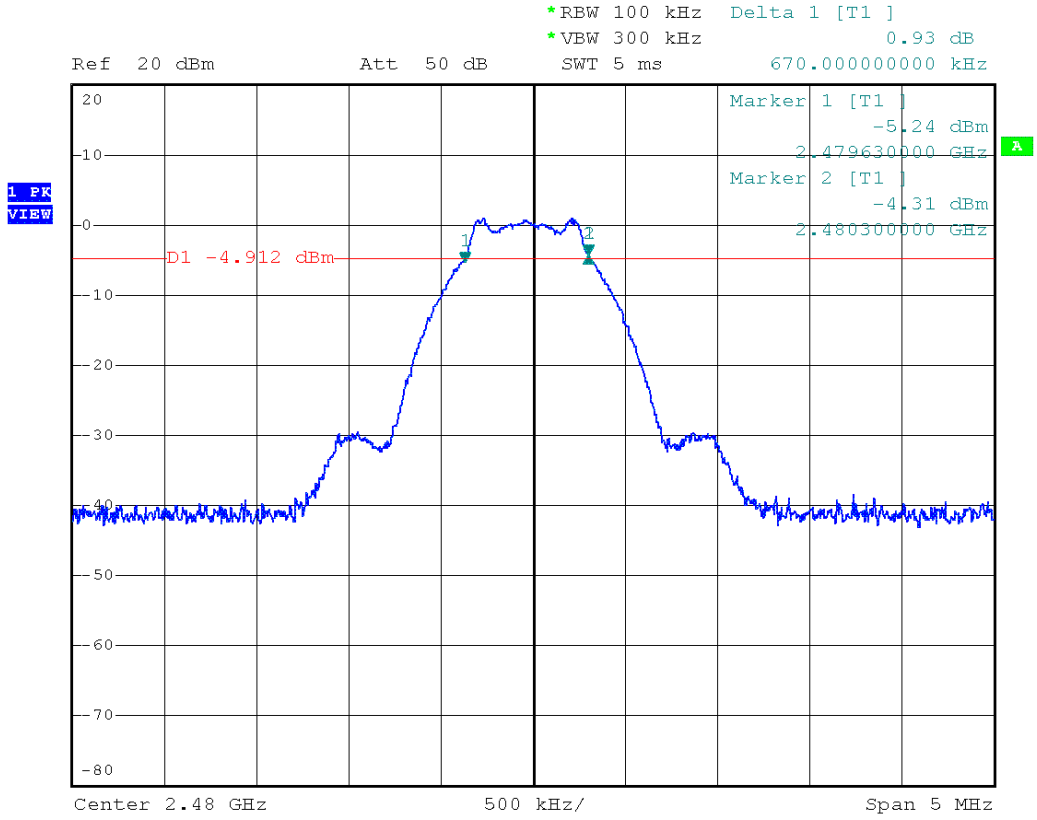
DTS (6 dB) Bandwidth

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Lower Frequency [MHz]:	2479.630
Upper Frequency [MHz]:	2480.300
6 dB Bandwidth [kHz]:	670



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3.2 Test Conditions and Results - Maximum peak conducted output power

3.2.1 Information

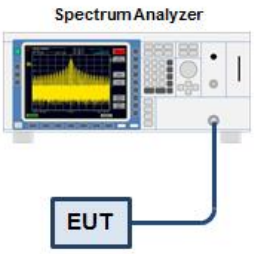
Test Information	
Reference	FCC § 15.247(b)
Measurement Method	ANSI C63.10 11.9.1
Measurement Uncertainty	± 2.86 dB
Operator	Florian Voigt
Date	2021-02-12

3.2.2 Limits

Limits
1 W (30 dBm)
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.3 Setup

Test Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSP30	EF00312	2020-07	2021-07

3.2.5 Procedure

Test Procedure

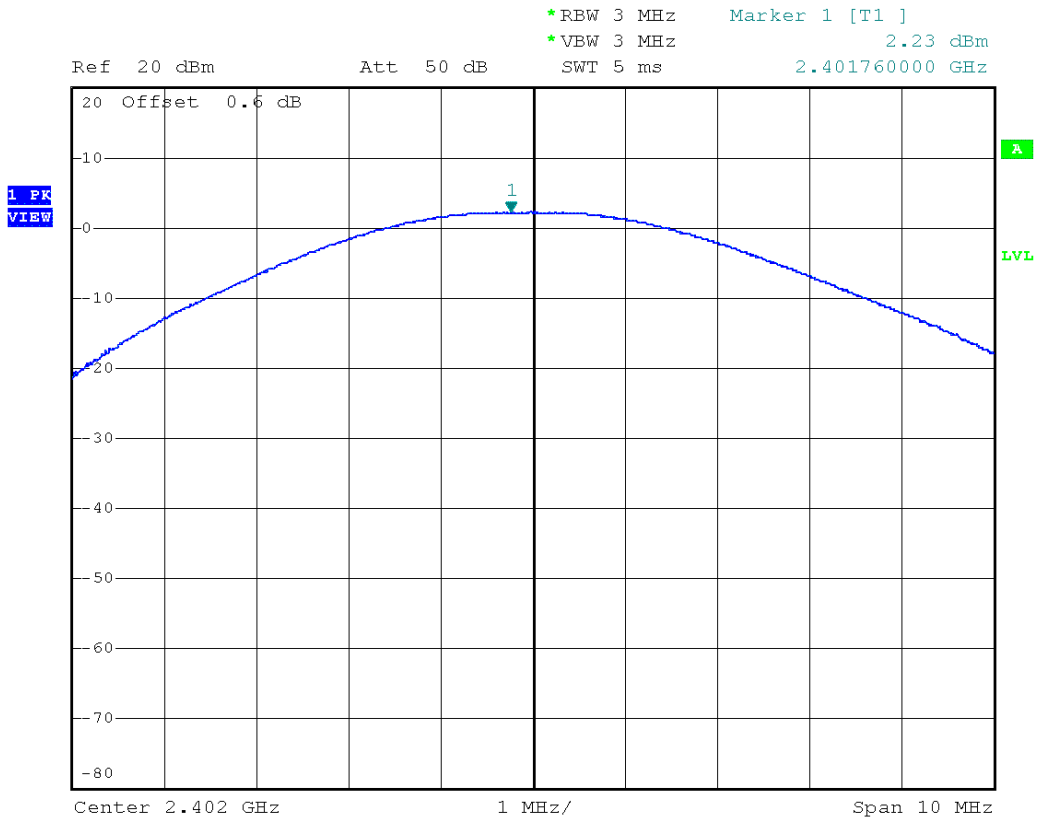
1. EUT set to test mode (Communication tester is used if needed)
2. Analyzer resolution bandwidth is set ≥ DTS bandwidth
3. Detector set to peak and max hold
4. Sweep time is set to auto
5. After the trace has stabilized a marker is set to peak of envelope

3.2.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	2.226	0.0017	1.0	PASS
2440	1.888	0.0015	1.0	PASS
2480	1.984	0.0016	1.0	PASS

Peak Conducted Output Power

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Peak Power [dBm]:	2.226
Peak Power [W]:	0.0017



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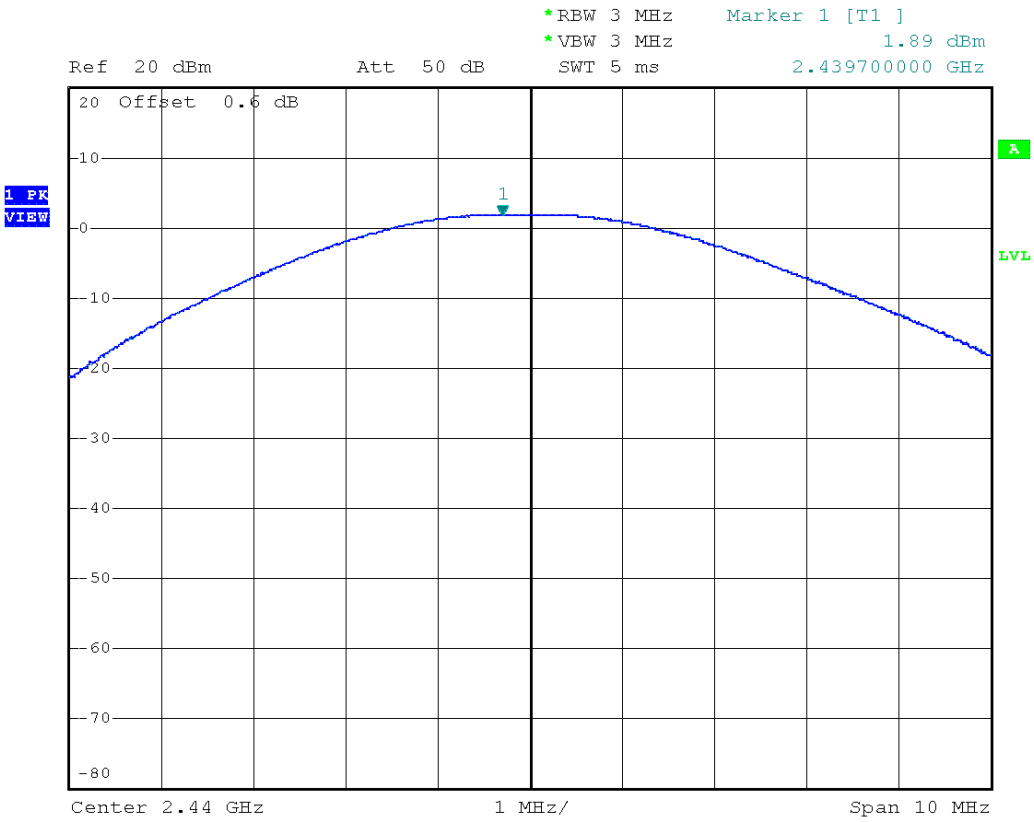
Peak Conducted Output Power

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Peak Power [dBm]:	1.888
Peak Power [W]:	0.0015



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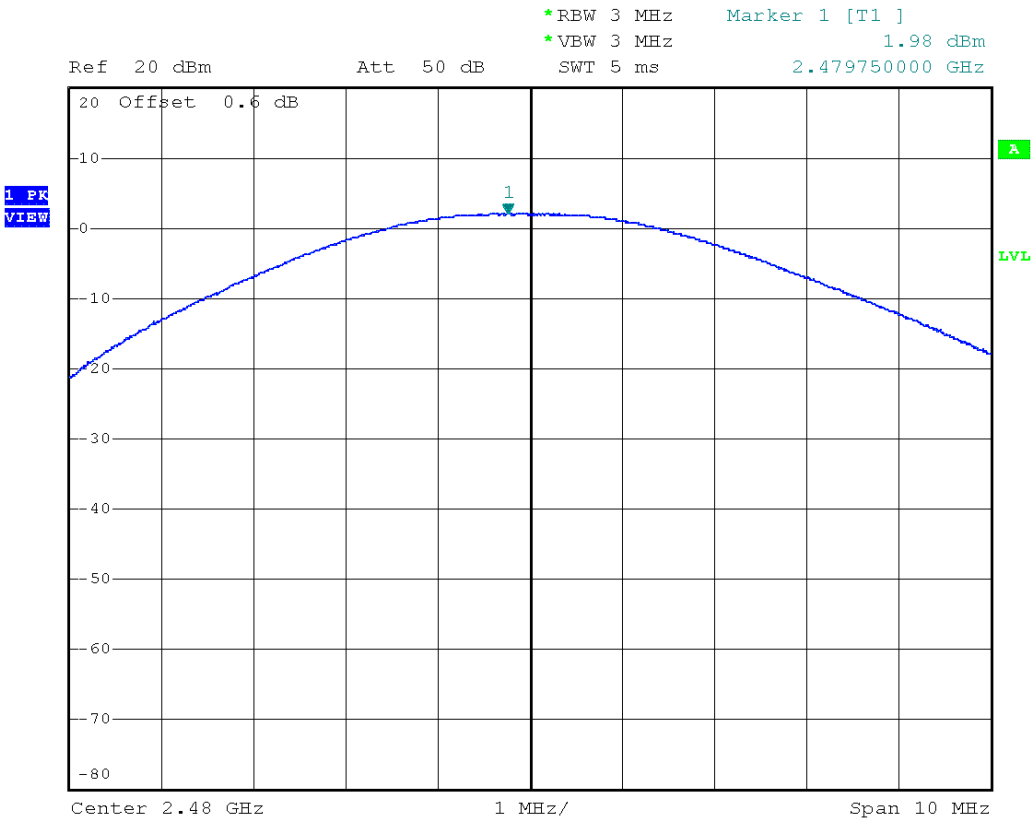
Peak Conducted Output Power

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Peak Power [dBm]:	1.984
Peak Power [W]:	0.0016



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3.3 Test Conditions and Results - Power spectral density

3.3.1 Information

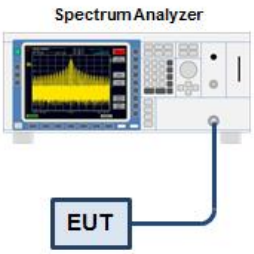
Test Information	
Reference	FCC § 15.247(e)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Measurement Uncertainty	± 2.86 dB
Operator	Florian Voigt
Date	2021-02-12

3.3.2 Limits

Limits
8 dBm / 3 kHz

3.3.3 Setup

Test Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSP30	EF00312	2020-07	2021-07

3.3.5 Procedure

Test Procedure

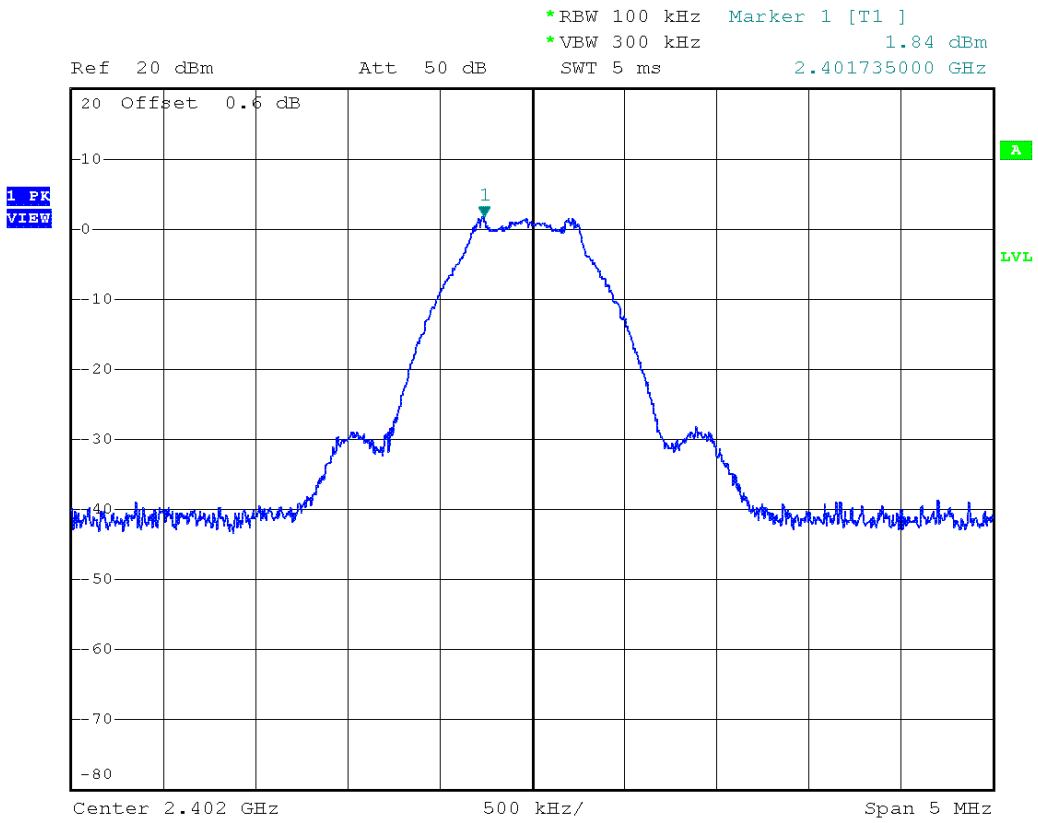
1. EUT set to test mode
2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth
3. The RBW is set to 100 kHz with VBW ≥ RBW and the detector is set to peak with max hold
4. After the trace has stabilized a marker is set to the envelope maximum
5. If the power spectral density is above the limit the RBW is reduced (not lower than 3 kHz) and the measurement is repeated
6. If the EUT has more than one transmit chain the procedure is repeated for each transmit chain

3.3.6 Results

Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2402	1.839	8.0	PASS
2440	1.824	8.0	PASS
2480	1.801	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Peak Frequency [MHz]:	2401.735
Spectral Density [dBm/RBW]:	1.839
Resolution Bandwidth [kHz]:	100 kHz



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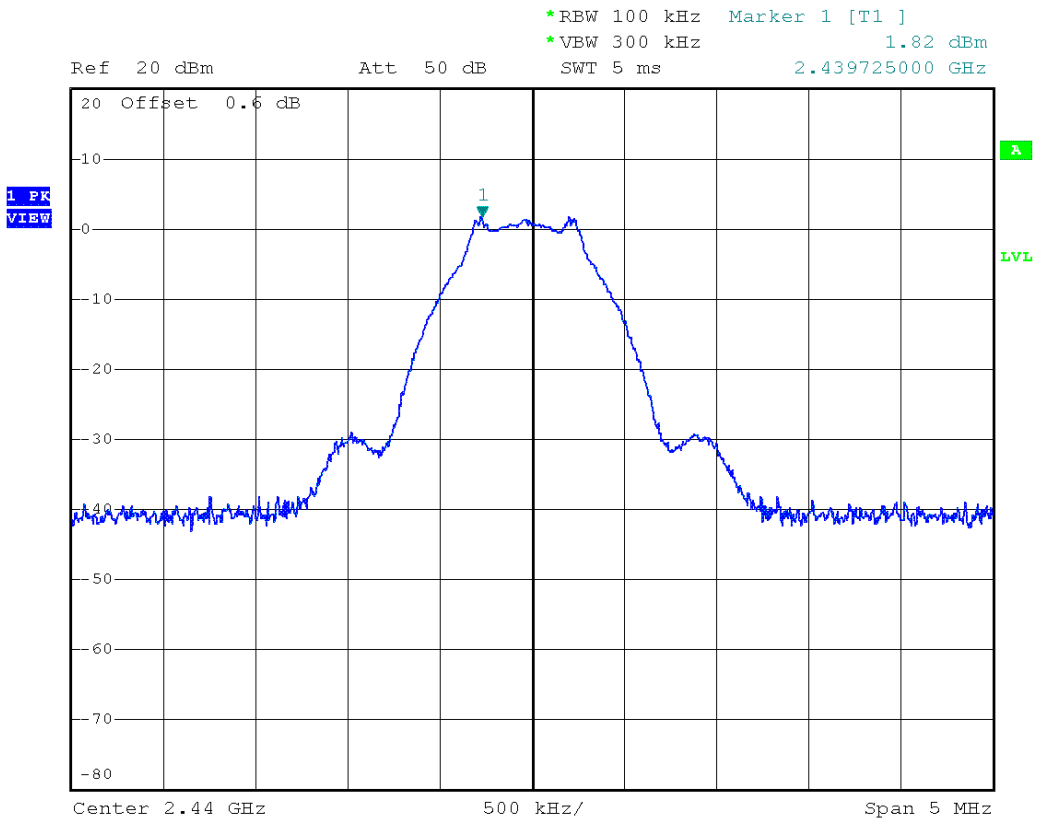
Peak Power Spectral Density

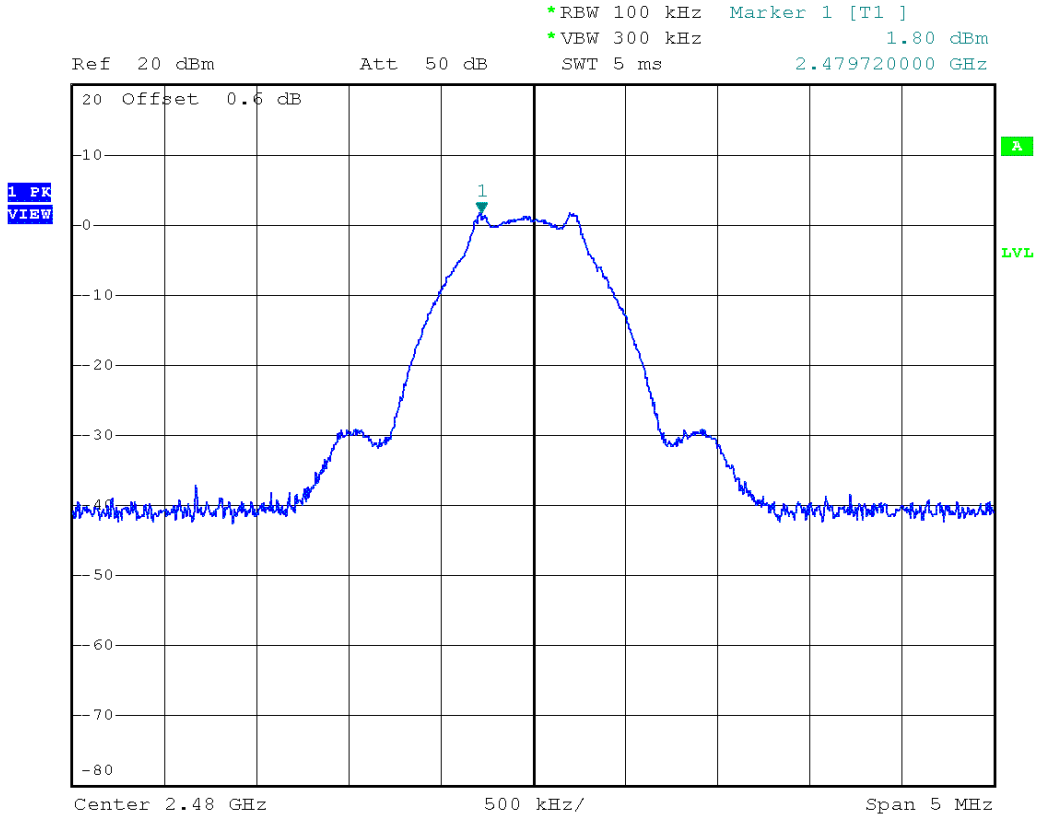
Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Peak Frequency [MHz]:	2439.725
Spectral Density [dBm/RBW]:	1.824
Resolution Bandwidth [kHz]:	100 kHz



Date: 12.FEB.2021 15:05:10

Peak Power Spectral Density

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Peak Frequency [MHz]:	2479.720
Spectral Density [dBm/RBW]:	1.801
Resolution Bandwidth [kHz]:	100 kHz



Date: 12.FEB.2021 15:06:07

3.4 Test Conditions and Results - Band-edge compliance

3.4.1 Information

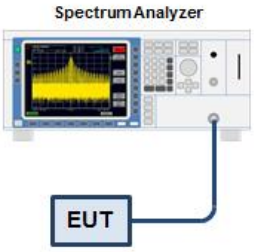
Test Information	
Reference	FCC § 15.247(d)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 11.13
Operator	Florian Voigt
Date	2021-02-12

3.4.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.4.3 Setup

Test Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSP30	EF00312	2020-07	2021-07

3.4.5 Procedure

Test Procedure

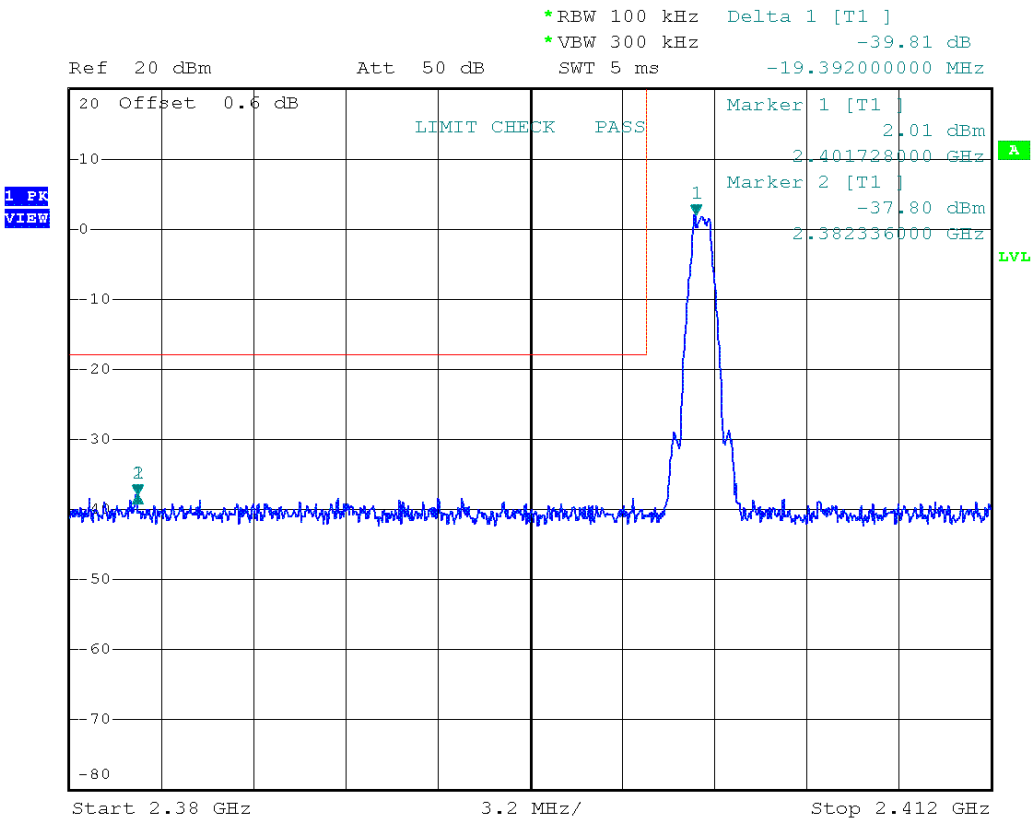
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

3.4.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK	2402	-39.81	-20	PASS
GFSK	2480	-39.10	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

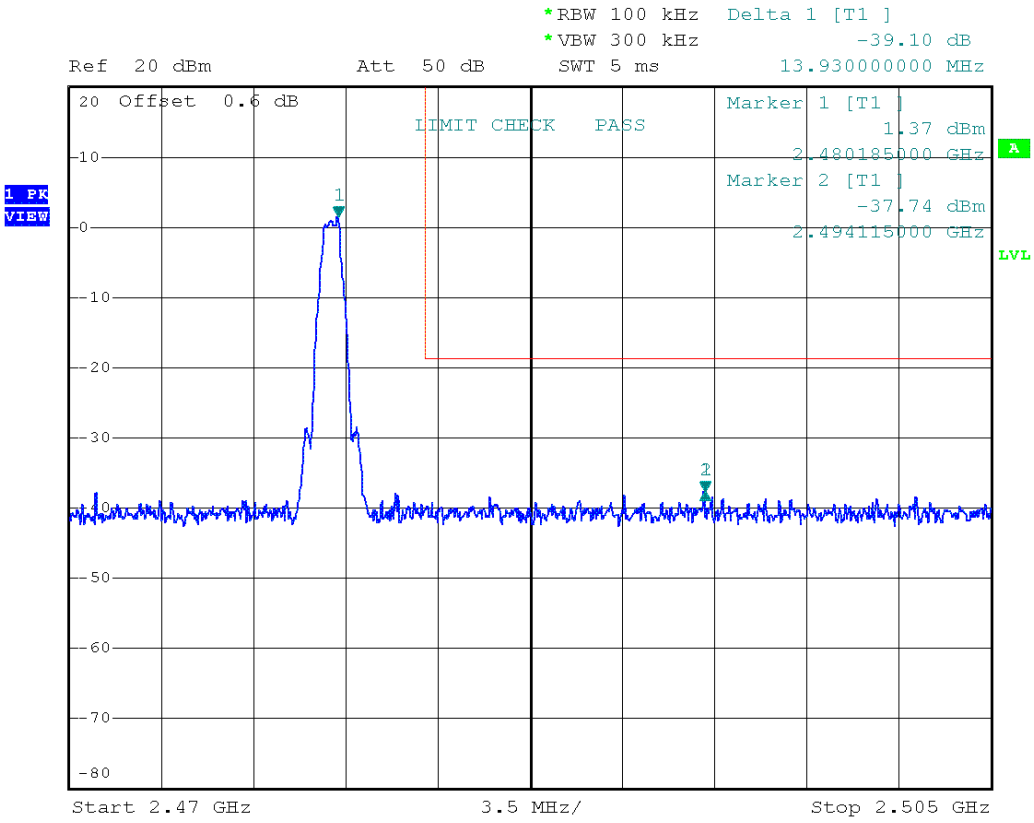
Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Band-edge	Lower
In-band Frequency [MHz]:	2401.728
Max. in-band Level [dBm/100 kHz]:	2.013
Out-of-band Frequency [MHz]:	2382.336
Max. out-of-band Level [dBm/100 kHz]:	-37.797
Attenuation [dB]:	-39.81



Date: 12.FEB.2021 15:14:25

Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Band-edge	Upper
In-band Frequency [MHz]:	2480.185
Max. in-band Level [dBm/100 kHz]:	1.366
Out-of-band Frequency [MHz]:	2494.115
Max. out-of-band Level [dBm/100 kHz]:	-37.738
Attenuation [dB]:	-39.1



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3.5 Test Conditions and Results - Conducted spurious emissions

3.5.1 Information

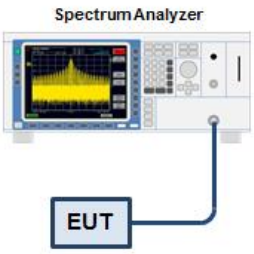
Test Information	
Reference	FCC § 15.247(d)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Operator	Florian Voigt
Date	2021-02-12

3.5.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.5.3 Setup

Test Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU26	EF01003	2020-07	2021-07

3.5.5 Procedure

Test Procedure

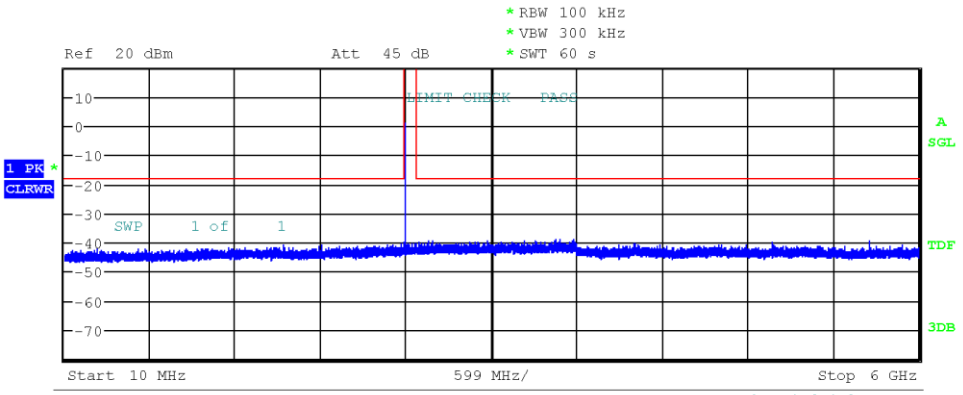
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels outside frequency band

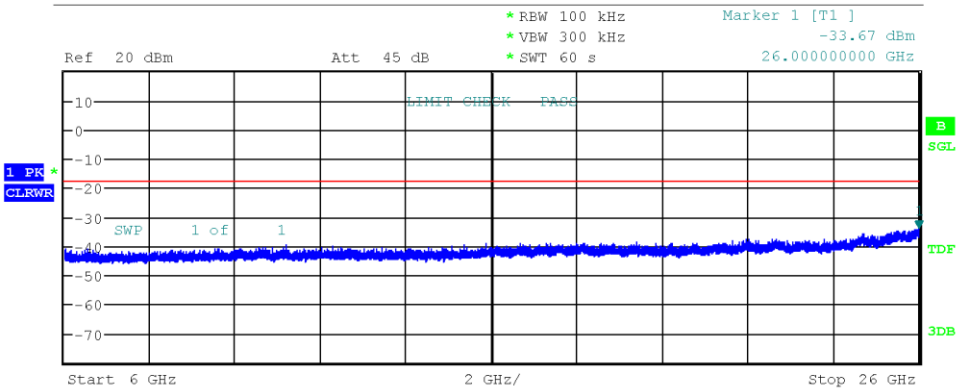
3.5.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
GFSK	2402	PASS
GFSK	2440	PASS
GFSK	2480	PASS

Conducted Spurious Emissions

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Max. in-band Frequency [MHz]:	2401.7
Max. in-band Level [dBm/100 kHz]:	2.3
Out-of-band Limit [dBm/100 kHz]:	-17.7

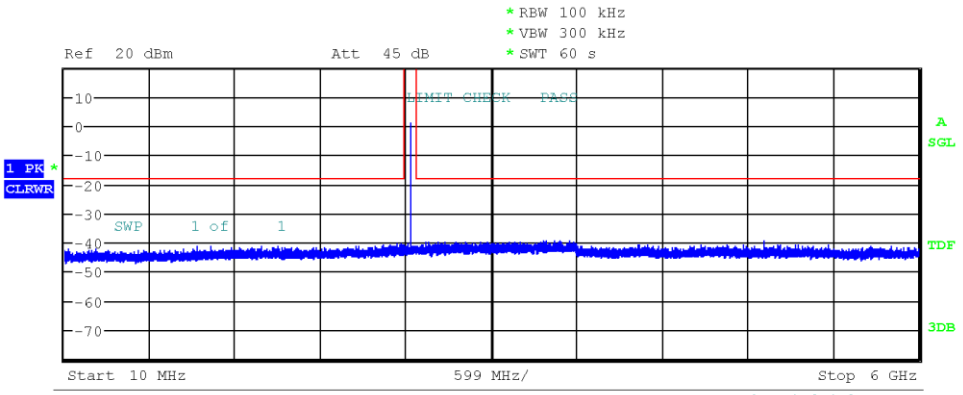


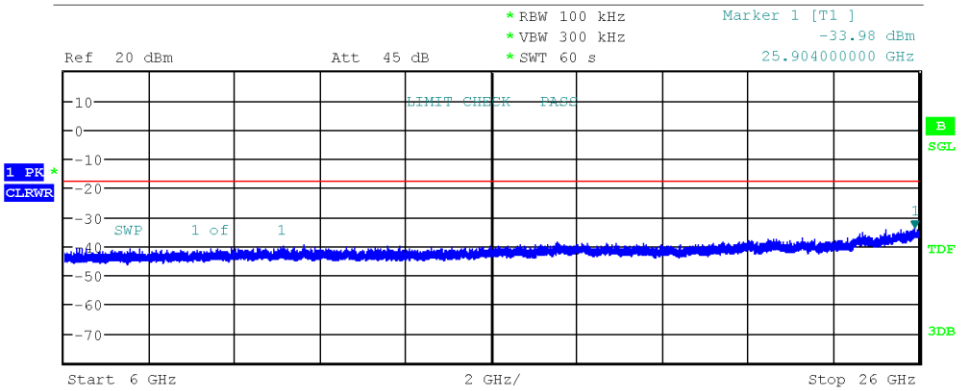


Date: 12.FEB.2021 16:05:33

Conducted Spurious Emissions

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Max. in-band Frequency [MHz]:	2440.2
Max. in-band Level [dBm/100 kHz]:	2.1
Out-of-band Limit [dBm/100 kHz]:	-17.9

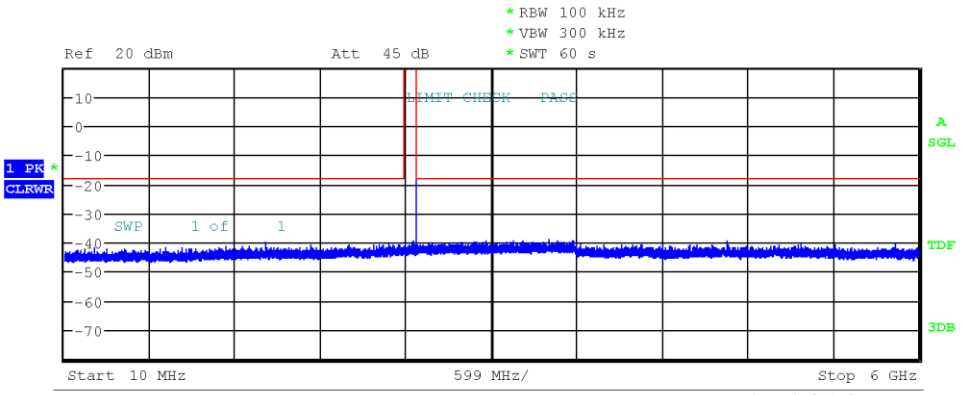


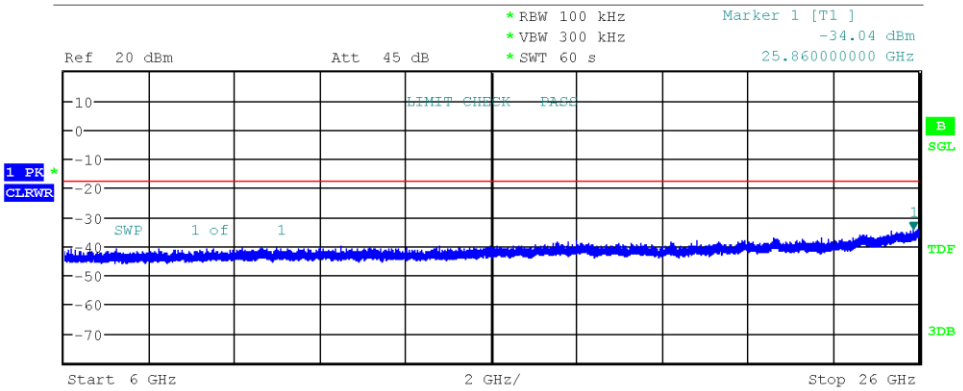


Date: 12.FEB.2021 16:10:14

Conducted Spurious Emissions

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32612
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-02-12
Max. in-band Frequency [MHz]:	2480.2
Max. in-band Level [dBm/100 kHz]:	2.0
Out-of-band Limit [dBm/100 kHz]:	-18.0





Date: 12.FEB.2021 16:13:59

3.6 Test Conditions and Results - Transmitter radiated emissions

3.6.1 Information

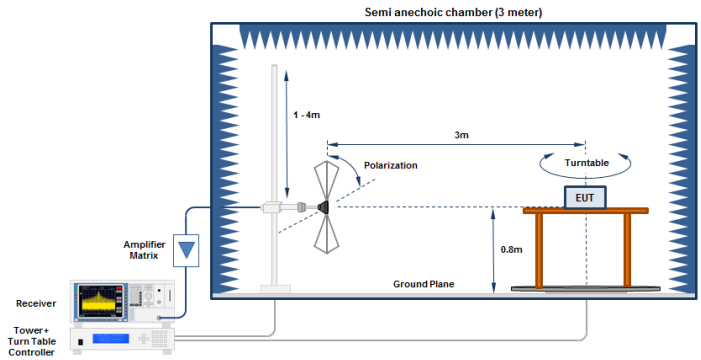
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Florian Voigt
Date	2021-02-12 + 2021-02-15 + 2021-03-08

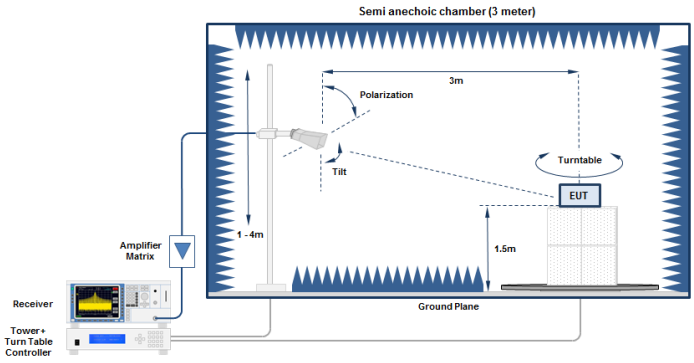
3.6.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.6.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz


3.6.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2020-06	2021-06
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Antenna	Schwarzbeck	BBHA 9120D	EF01561	2020-10	2021-10
Spectrum analyzer	R&S	FSU43	EF01631	2020-07	2021-07
Antenna	Amplifier Research	AT4560	EF00302	2019-05	2021-05

3.6.5 Procedure

Test Procedure 30 MHz - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

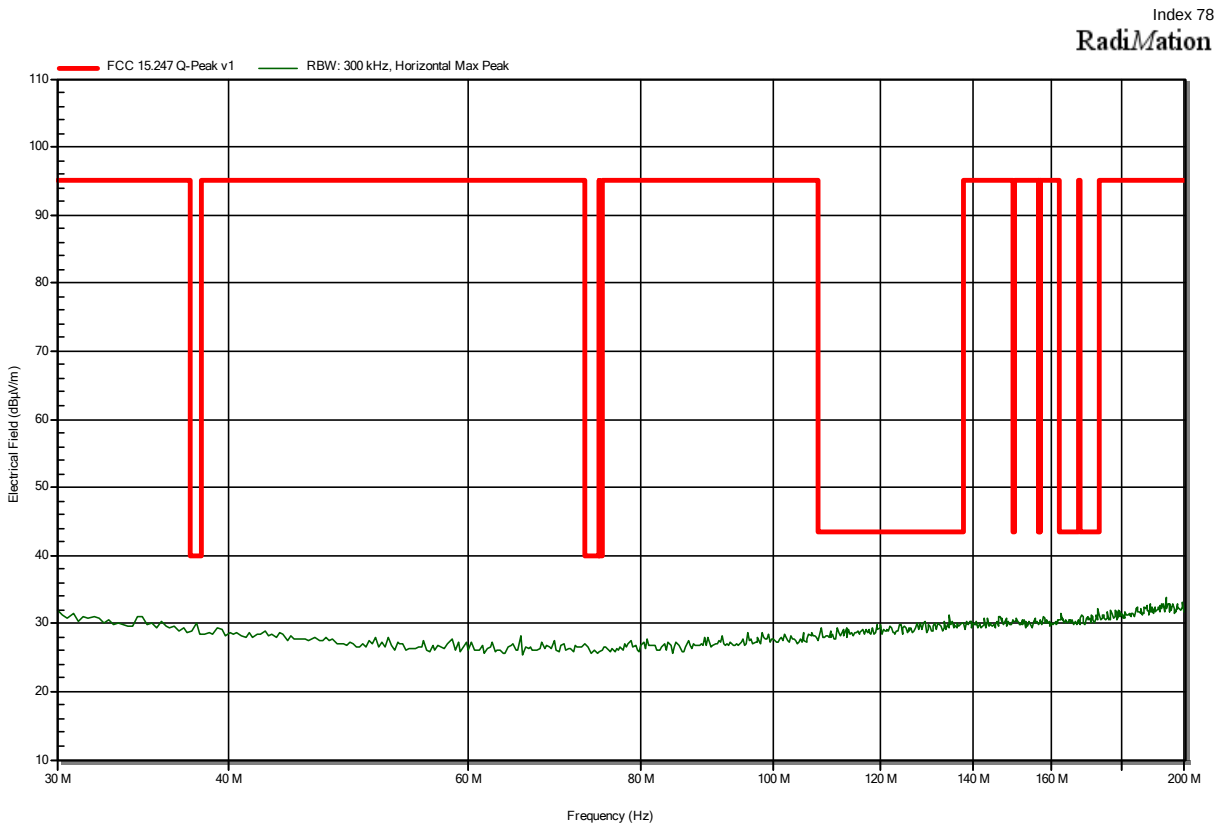
3.6.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2402	2388.1	57.05	pk	ver	74.00	-16.95
2402	2388.1	44.64	avg	ver	54.00	-09.36
2402	2389.1	57.40	pk	hor	74.00	-16.60
2402	2389.1	44.70	avg	hor	54.00	-09.30
2402	4801	41.91	pk	ver	74.00	-32.09
2402	12009	49.75	pk	ver	74.00	-24.25
2402	12009	40.83	avg	ver	54.00	-13.17
2402	12011	52.33	pk	hor	74.00	-21.67
2402	12011	45.37	avg	hor	54.00	-08.63
2440	12199	53.85	pk	ver	74.00	-20.15
2440	12199	45.10	avg	ver	54.00	-08.90
2480	113.256	20.29	qpk	ver	43.52	-23.23
2480	883.648	13.28	qpk	hor	95.00	-81.72
2480	2483.6	57.27	pk	ver	74.00	-16.73
2480	2483.6	45.00	avg	ver	54.00	-09.00
2480	2483.7	58.51	pk	hor	74.00	-15.49
2480	2483.7	45.11	avg	hor	54.00	-08.89
2480	7441	50.90	pk	hor	74.00	-23.10
2480	7441	40.55	avg	hor	54.00	-13.45
2480	7441	51.45	pk	ver	74.00	-22.55
2480	7441	41.01	avg	ver	54.00	-12.99
2480	12399	52.66	pk	ver	74.00	-21.34
2480	12399	43.07	avg	ver	54.00	-10.93

ANNEX A Transmitter spurious emissions

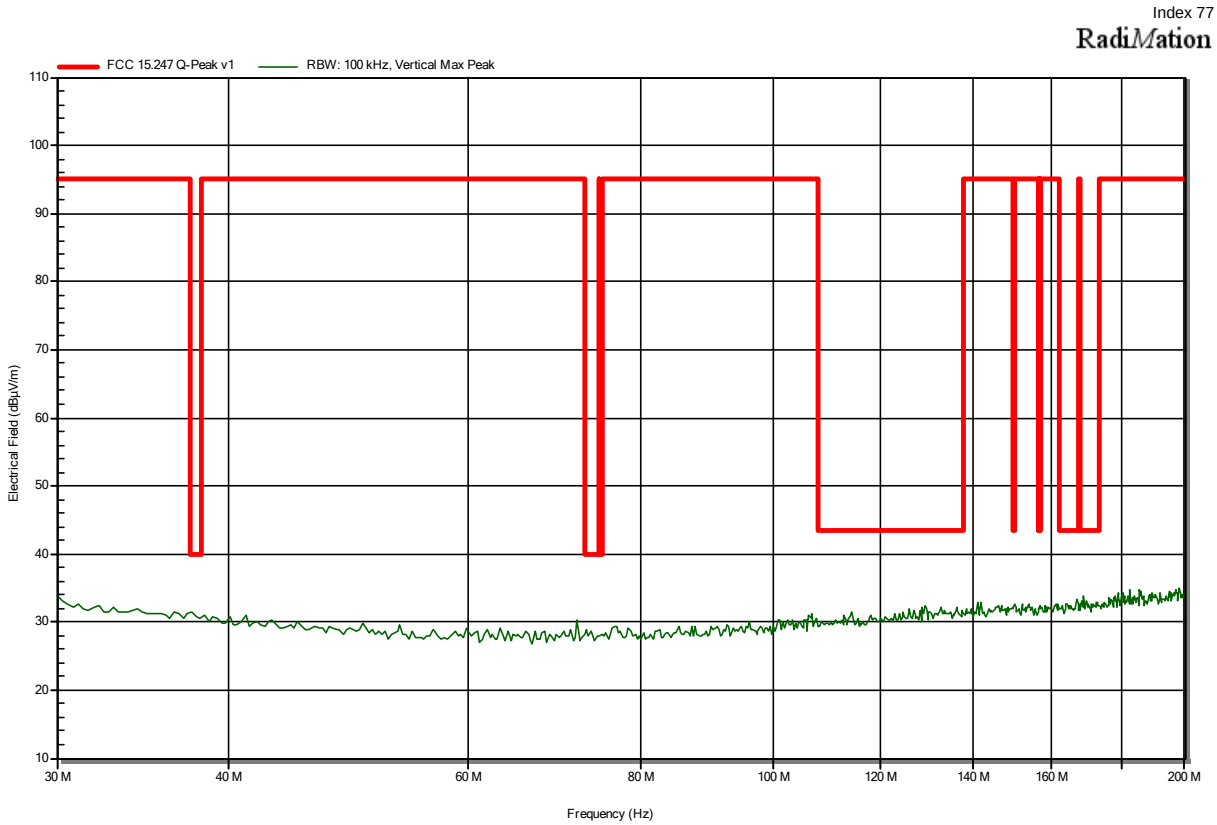
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



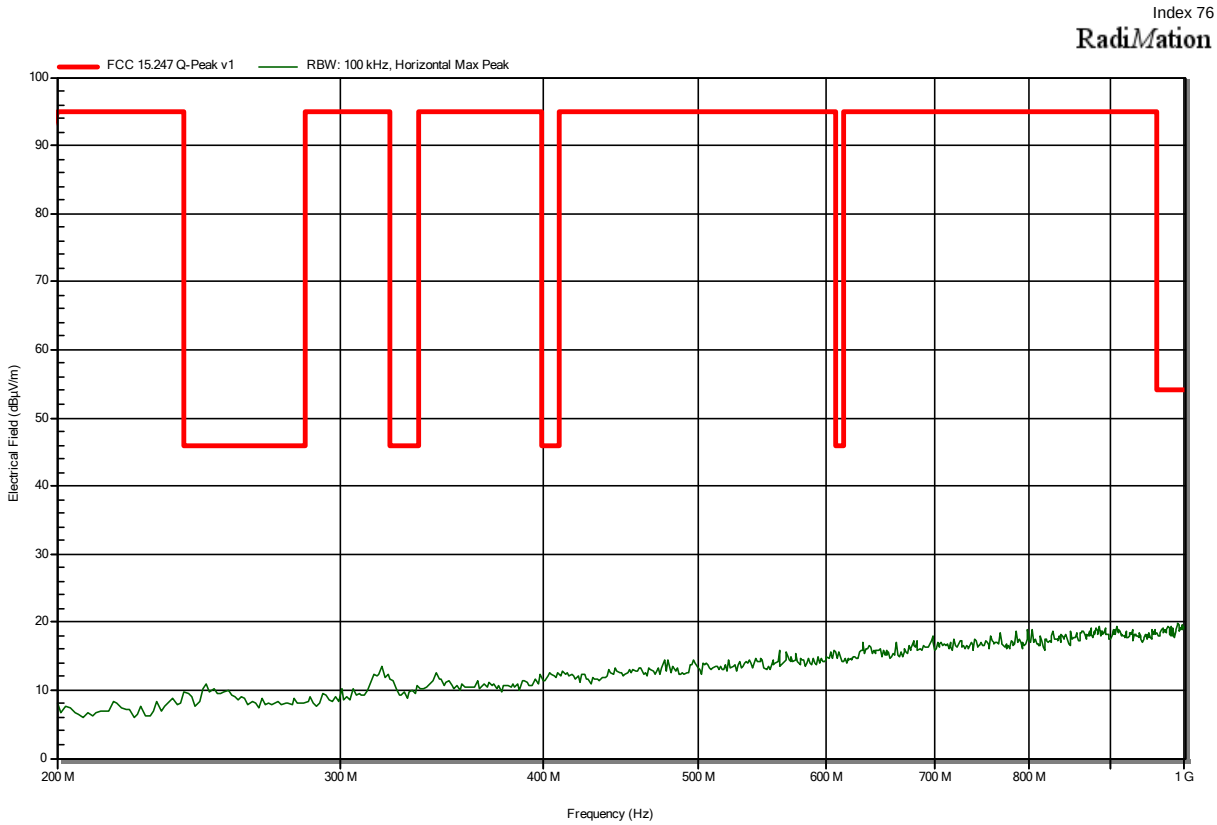
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



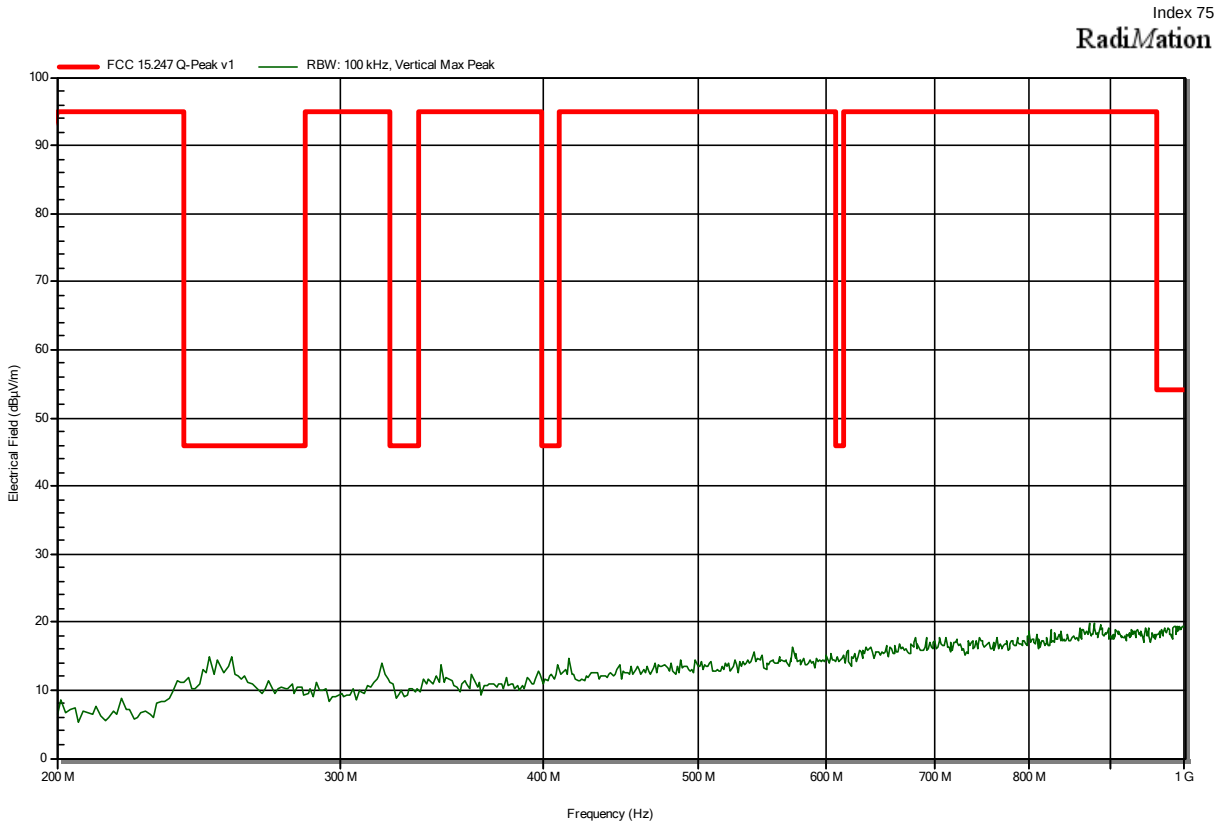
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



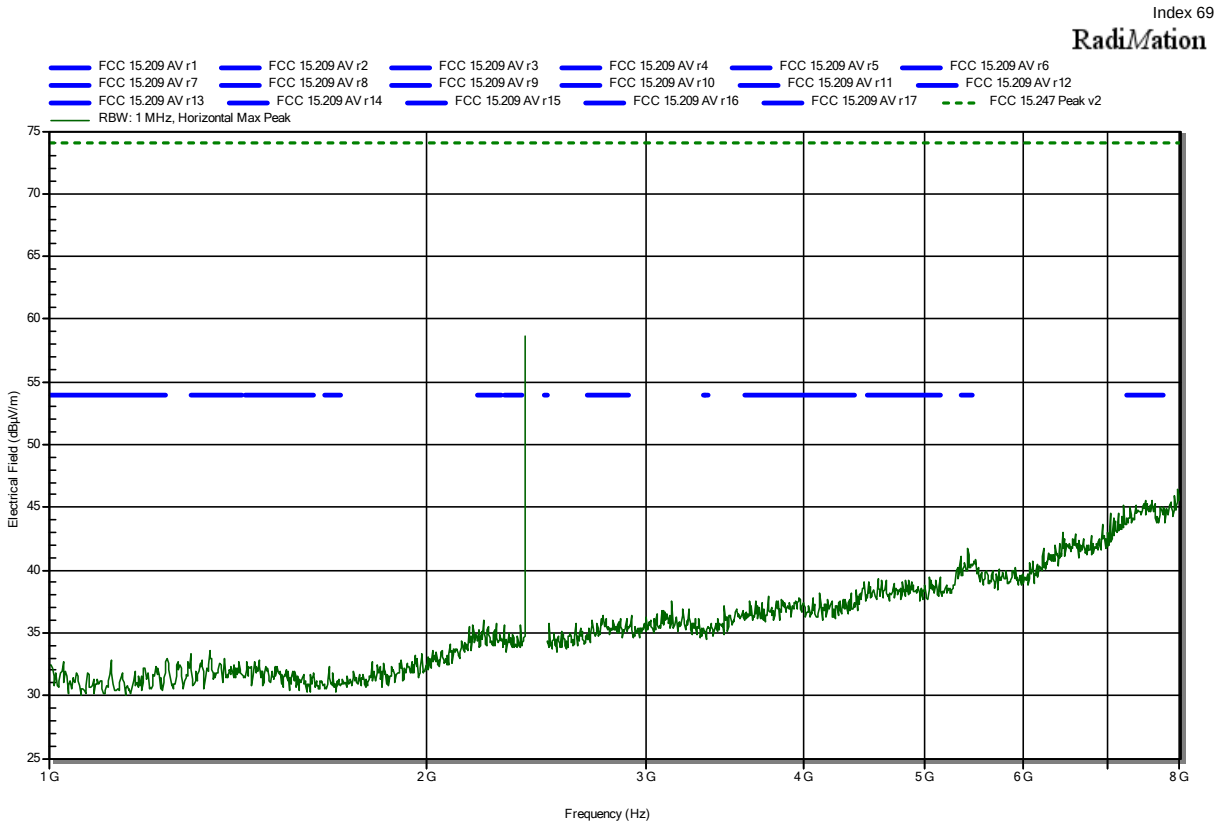
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



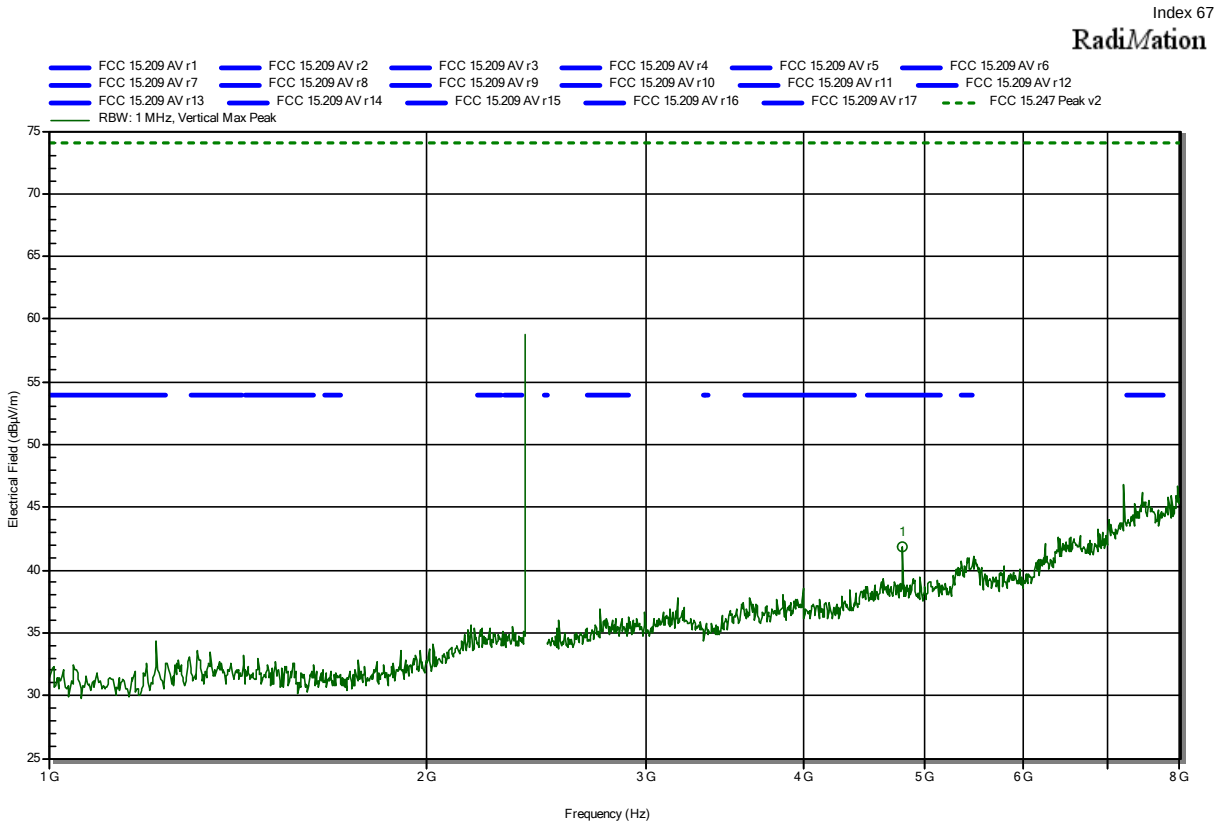
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



Radiated Spurious Emissions according to FCC CFR Part 15.247

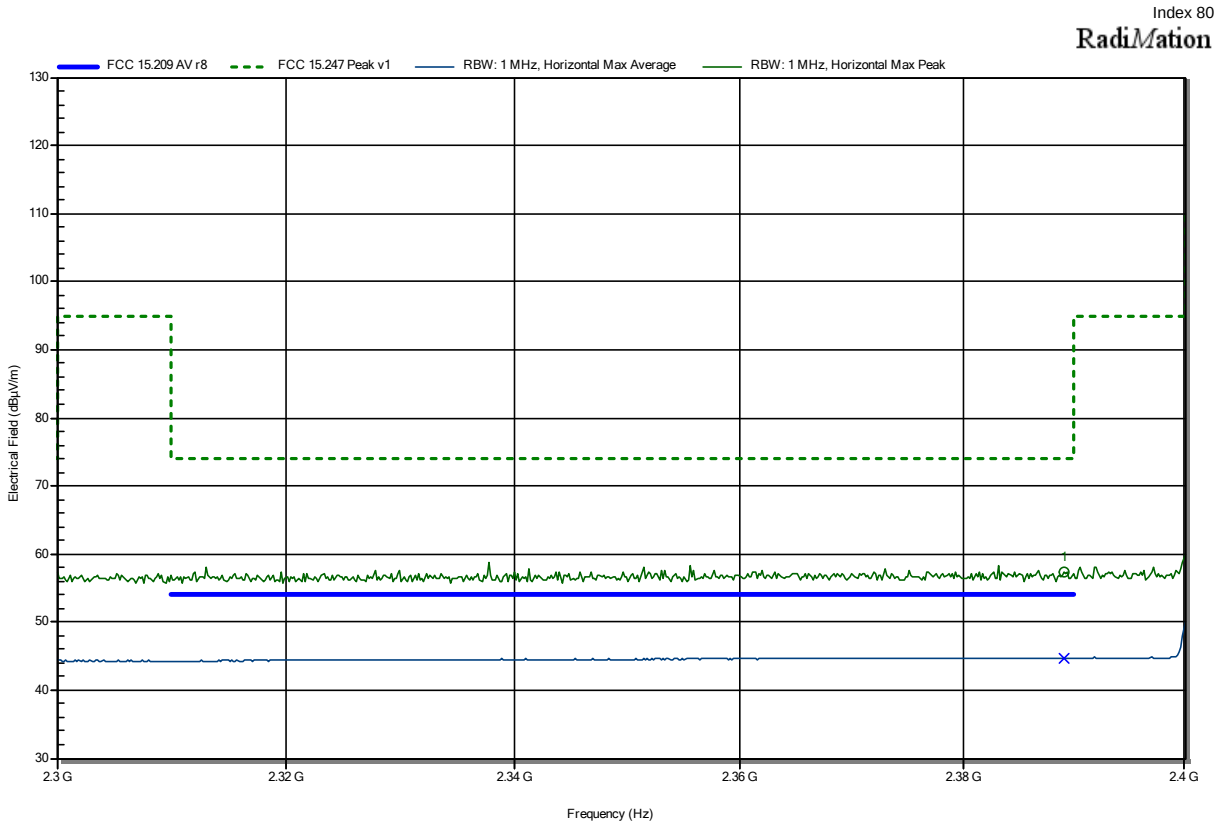
Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.801 GHz	41.91 dBµV/m	74 dBµV/m	-32.09 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	lower bandedge

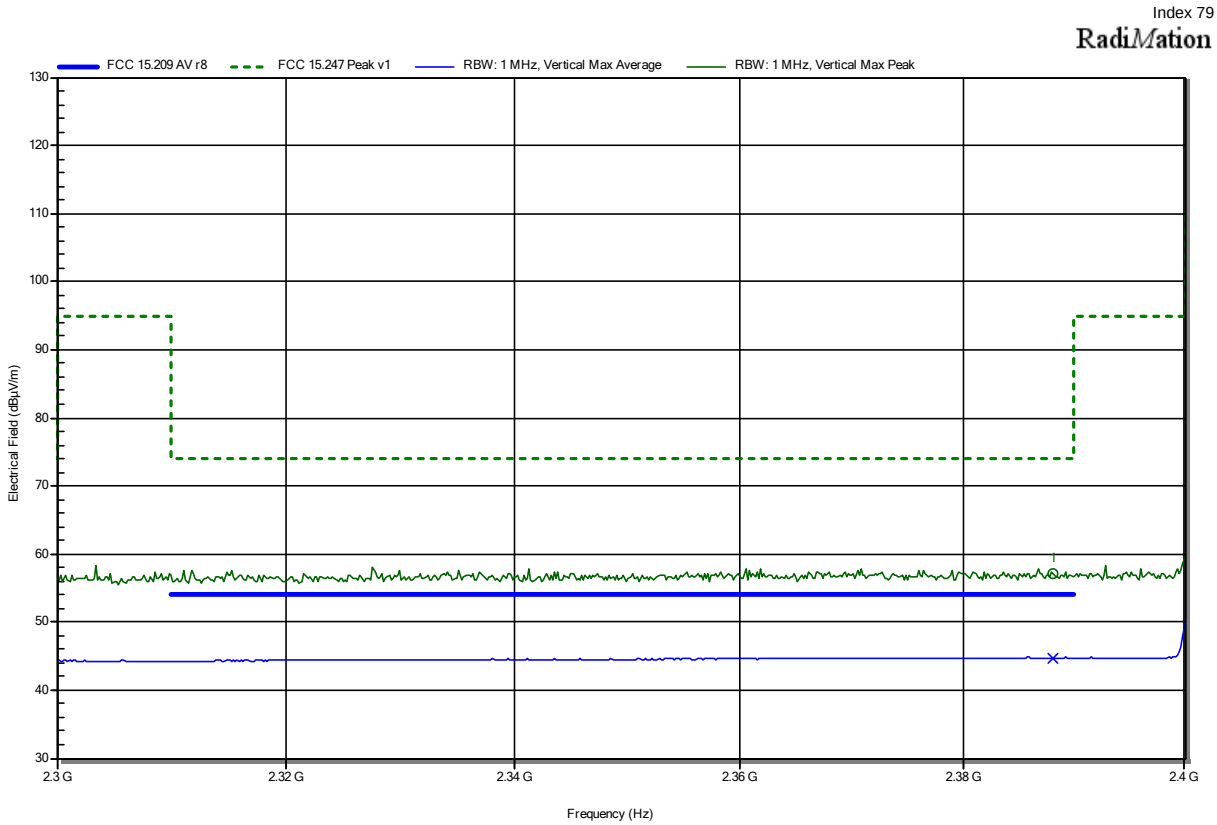


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3891 GHz	57.4 dBµV/m	74 dBµV/m	-16.6 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.3891 GHz	44.7 dBµV/m	54 dBµV/m	-9.3 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	lower bandedge

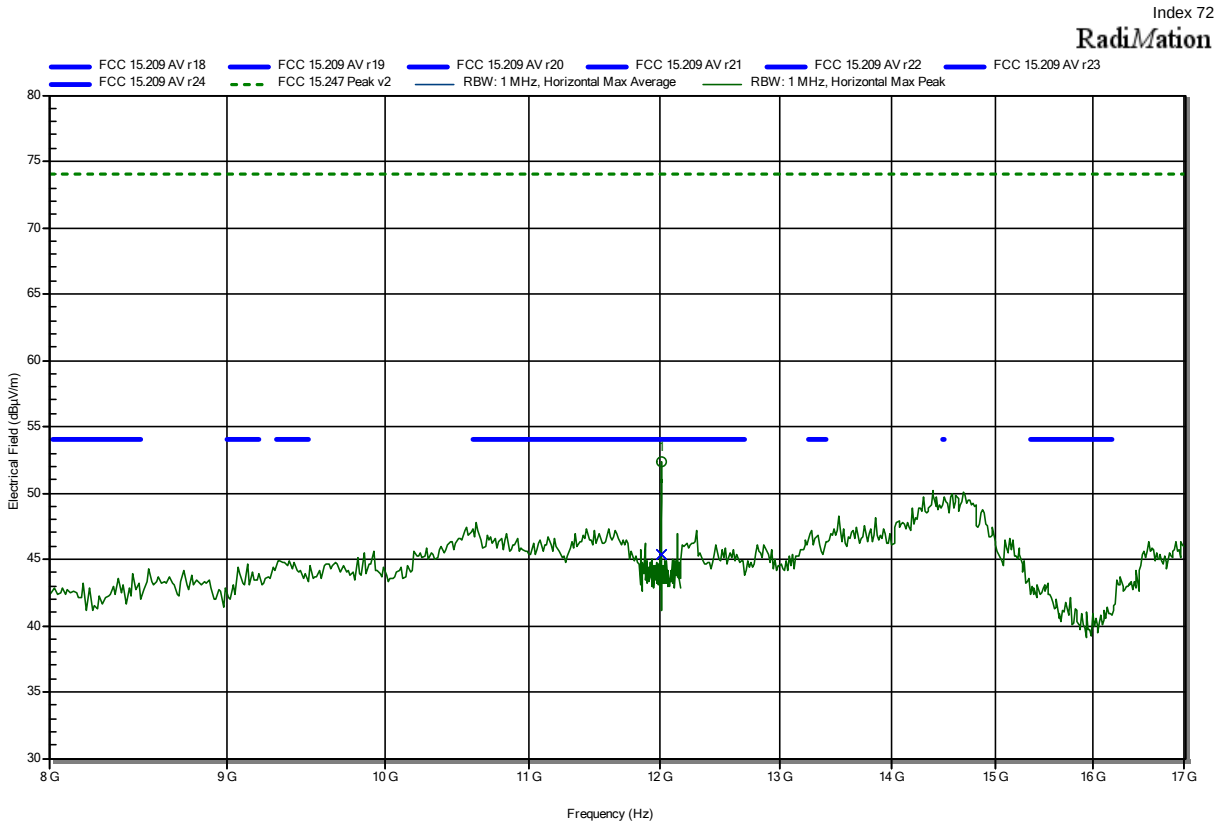


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3881 GHz	57.05 dBµV/m	74 dBµV/m	-16.95 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.3881 GHz	44.64 dBµV/m	54 dBµV/m	-9.36 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	

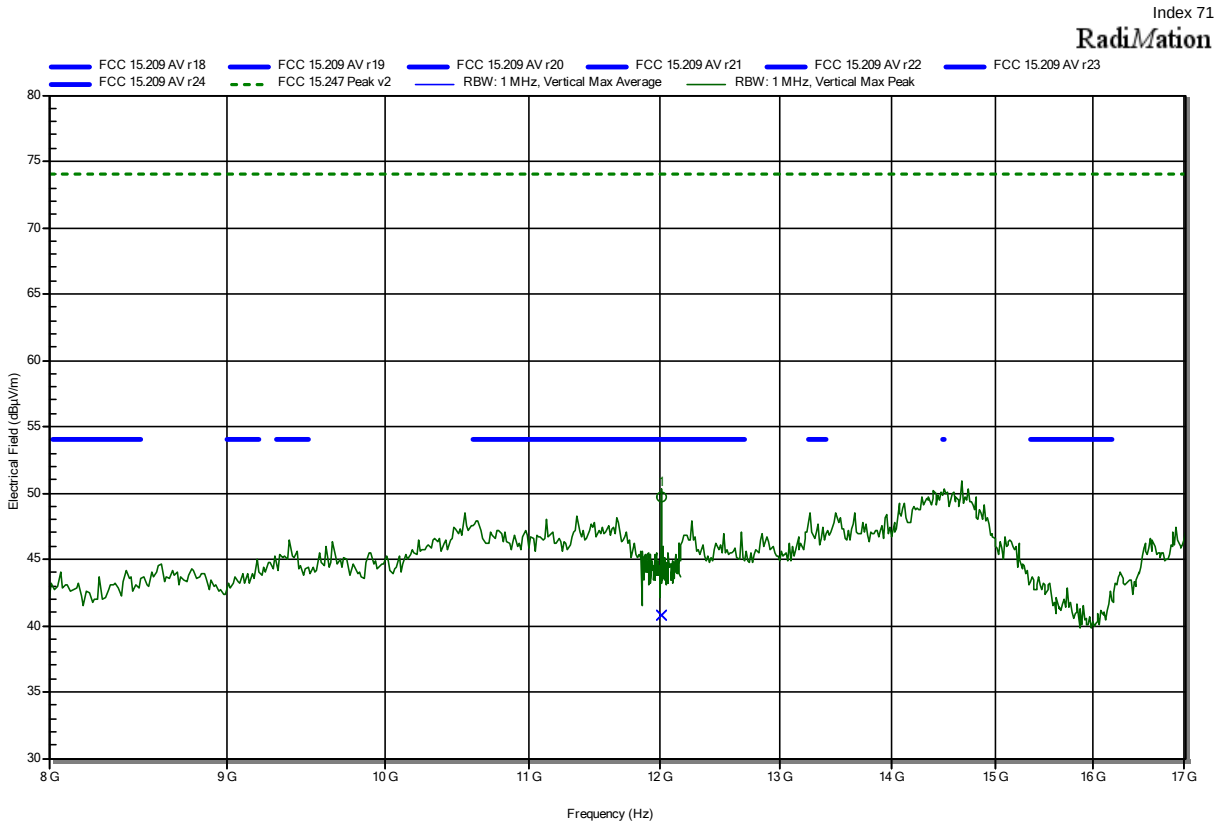


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
12.011 GHz	52.33 dBµV/m	74 dBµV/m	-21.67 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
12.011 GHz	45.37 dBµV/m	54 dBµV/m	-8.63 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	

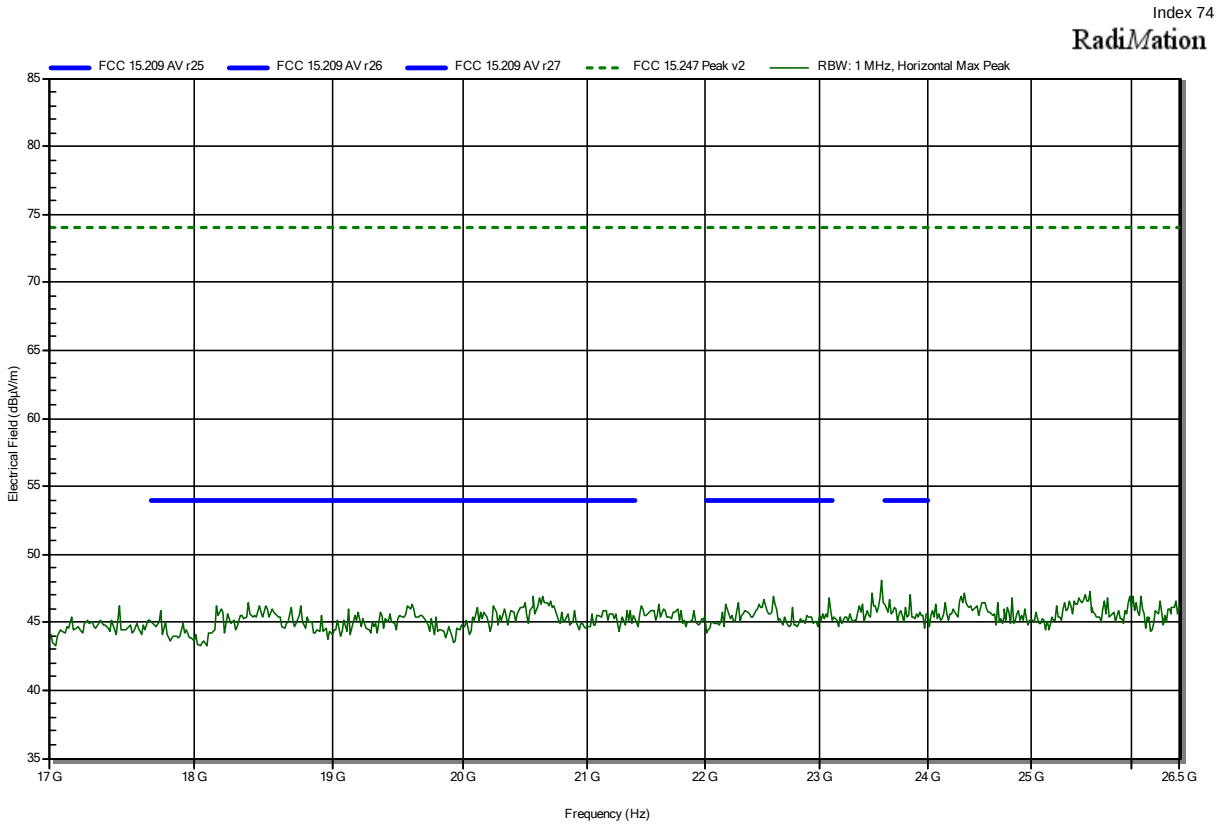


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
12.009 GHz	49.75 dBµV/m	74 dBµV/m	-24.25 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
12.009 GHz	40.83 dBµV/m	54 dBµV/m	-13.17 dB	Pass

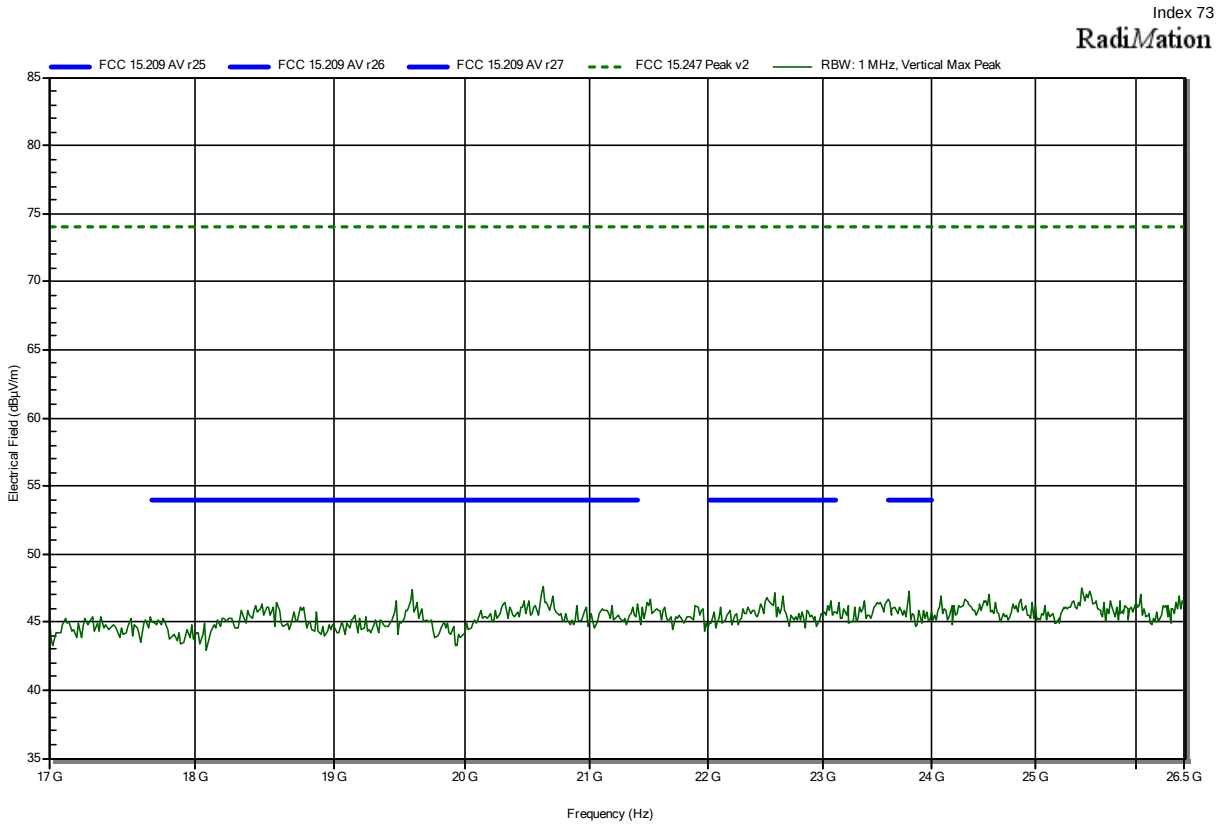
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



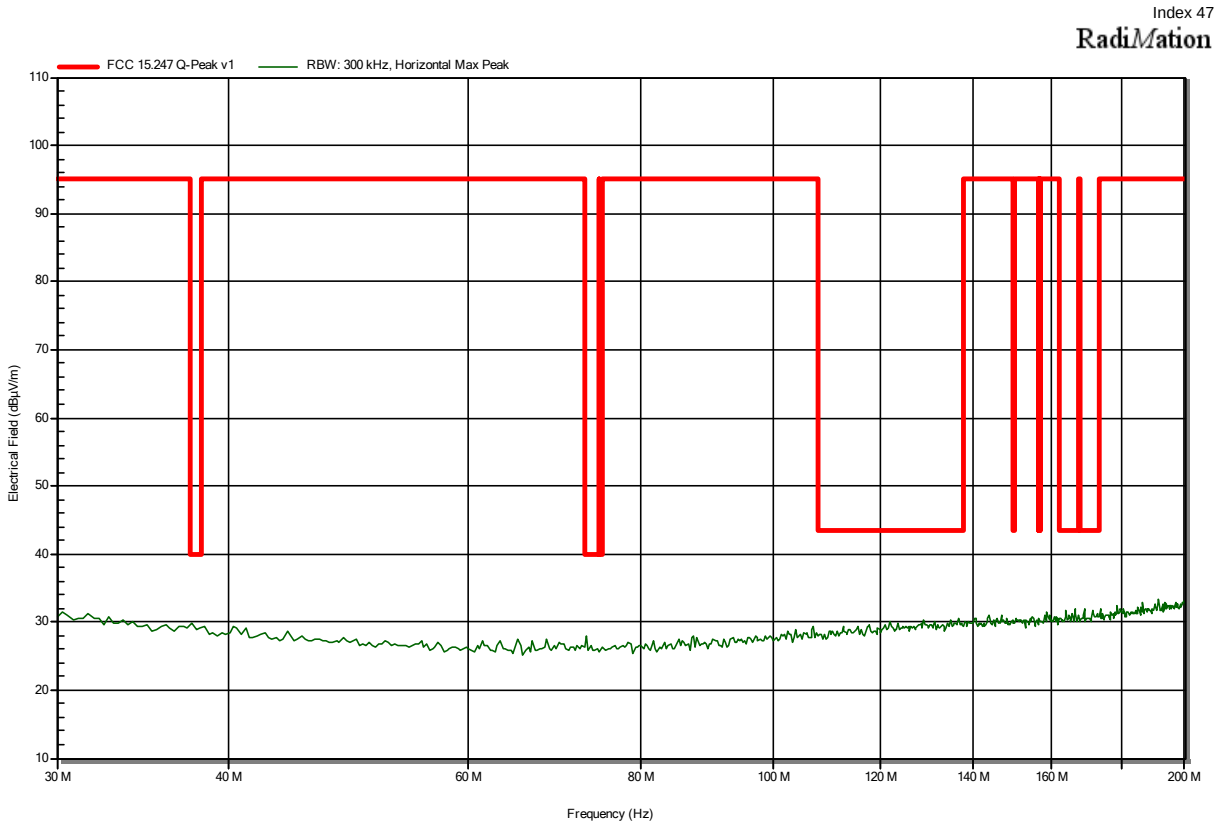
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2402MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-03-08
Note:	



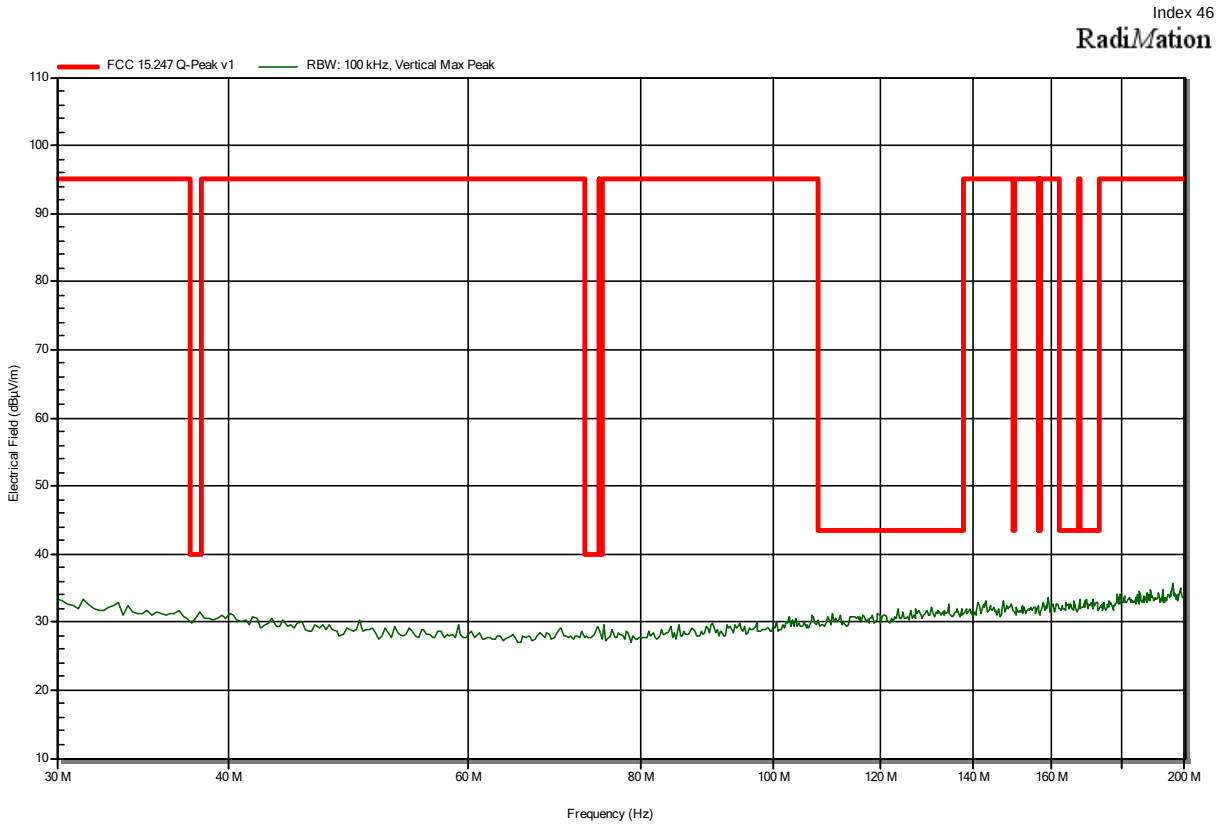
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



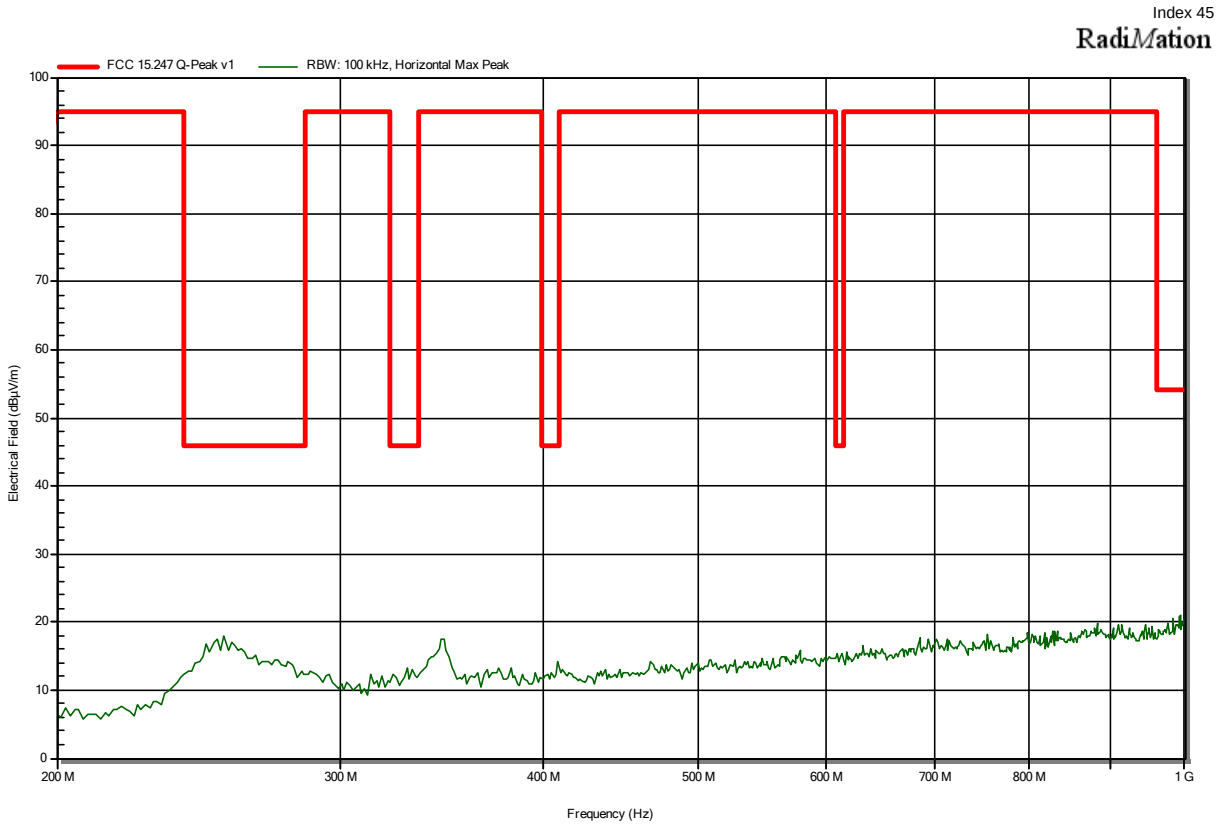
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



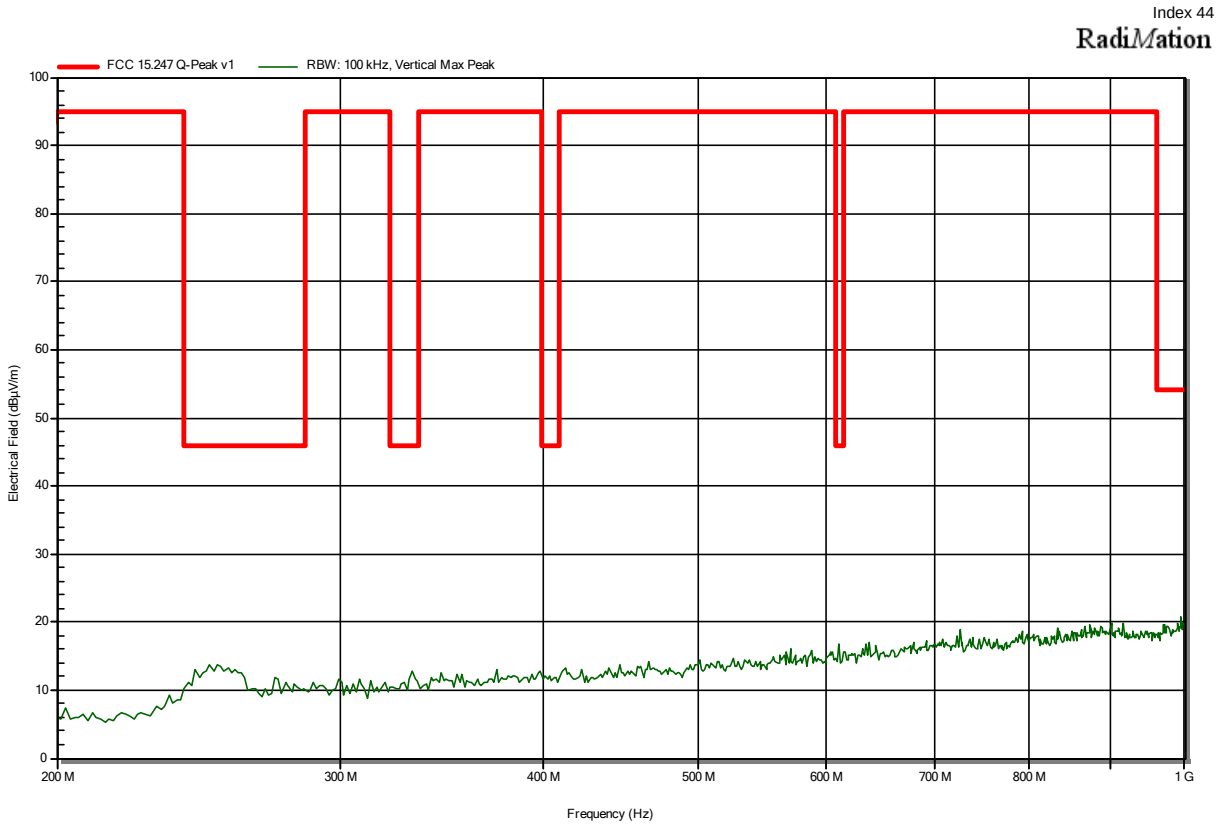
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



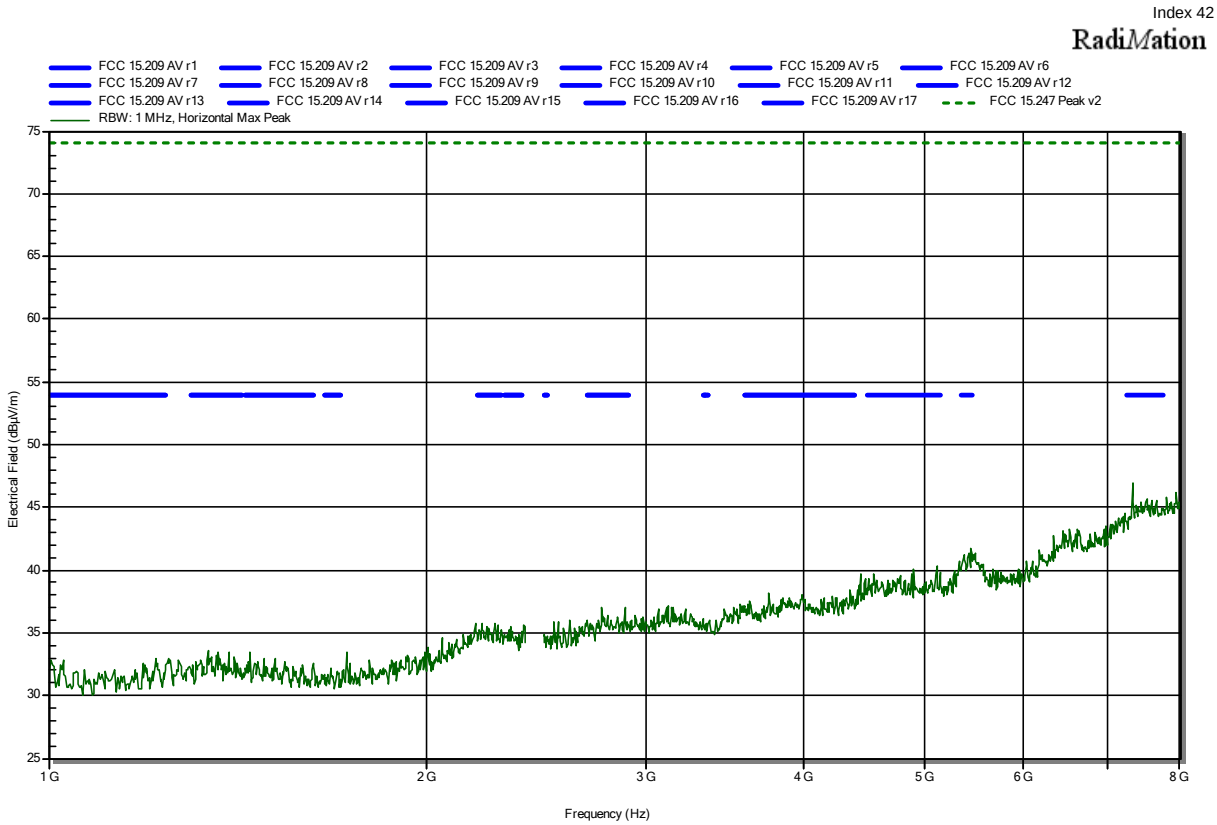
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



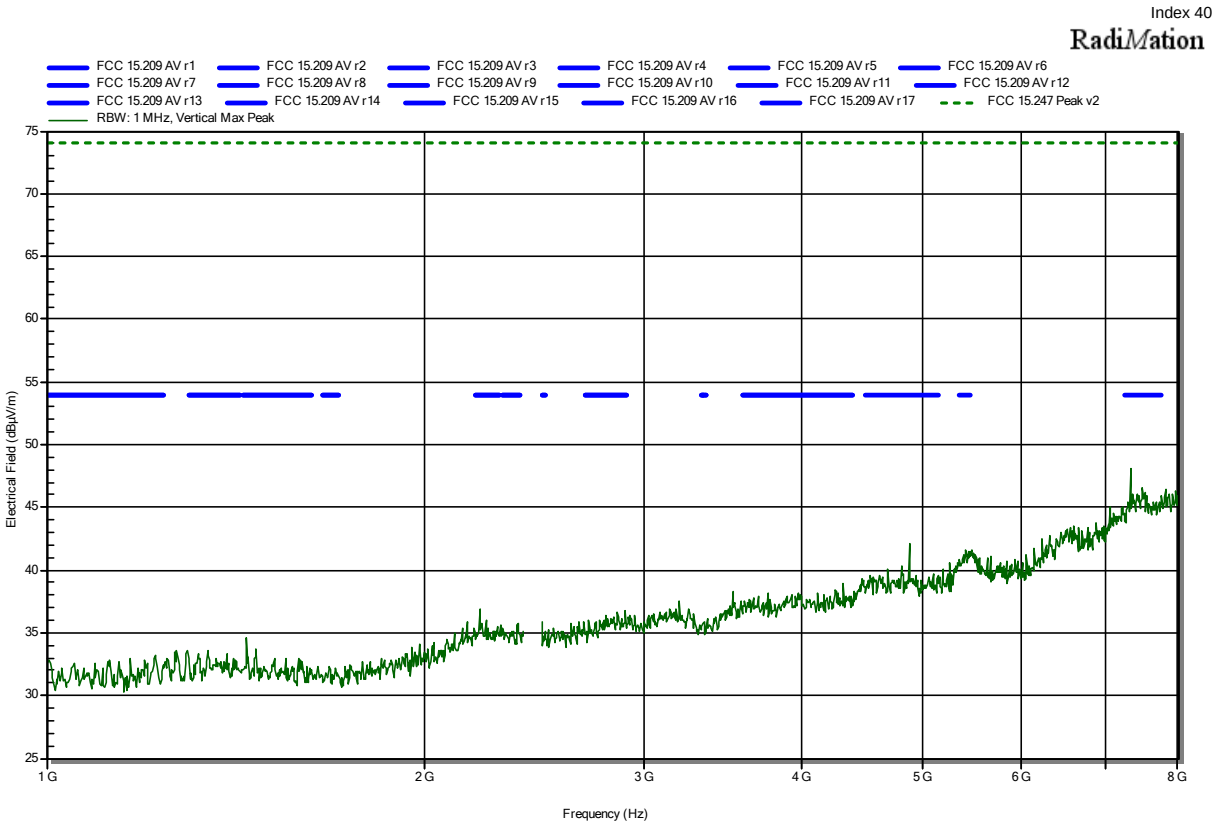
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



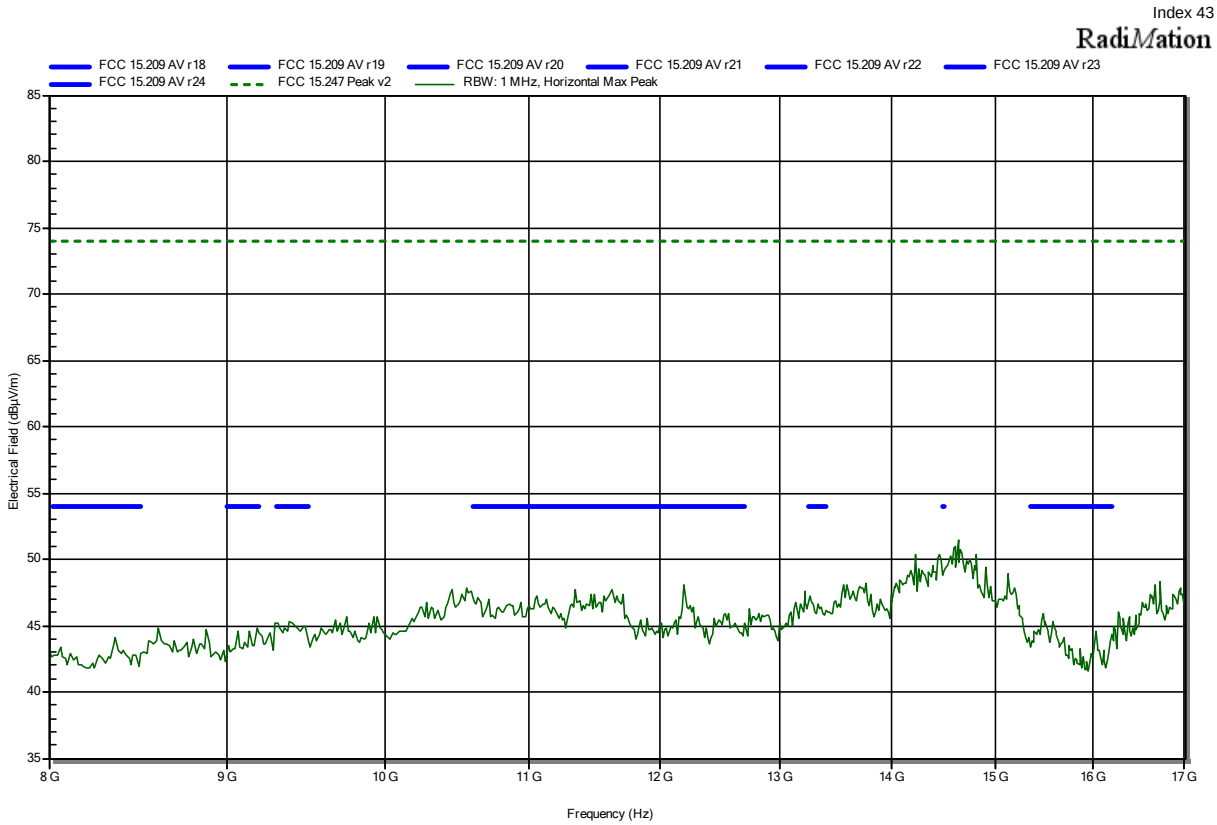
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-12
Note:	



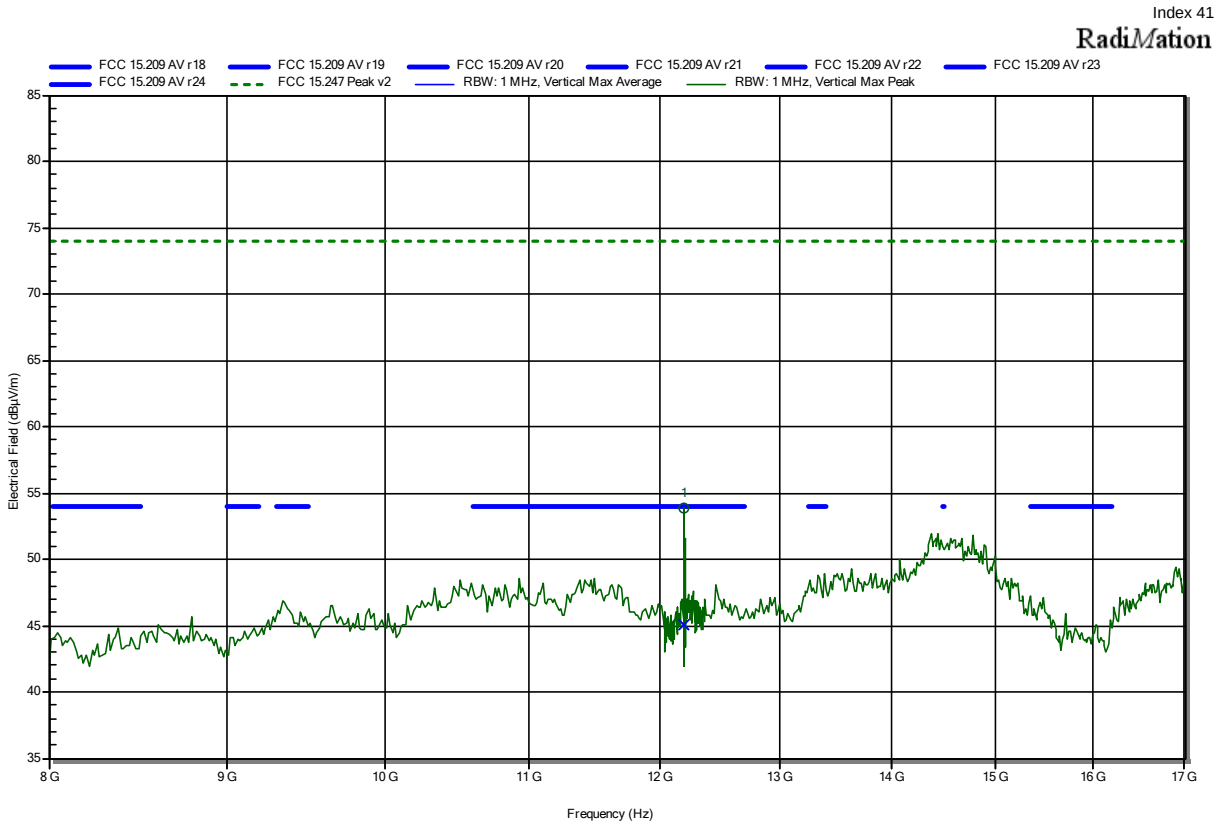
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-12
Note:	

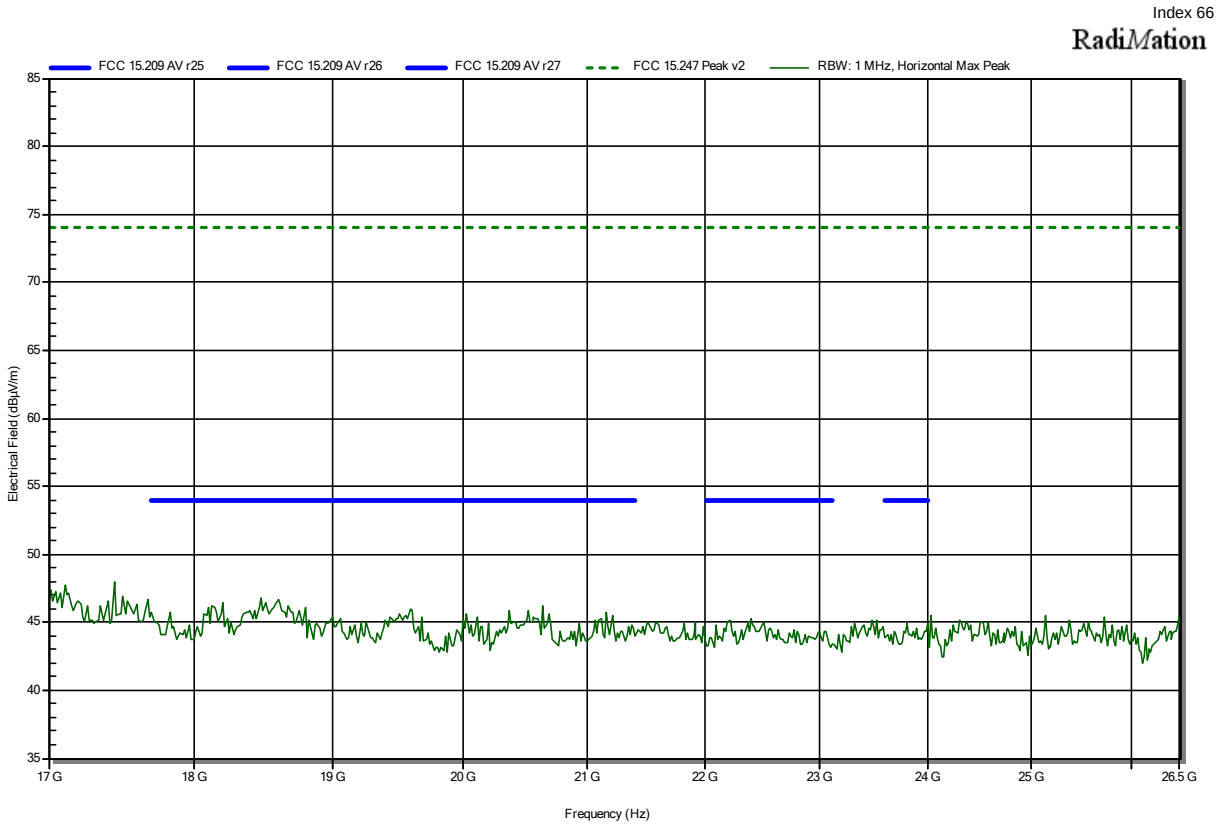


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
12.199 GHz	53.85 dBµV/m	74 dBµV/m	-20.15 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
12.199 GHz	45.1 dBµV/m	54 dBµV/m	-8.9 dB	Pass

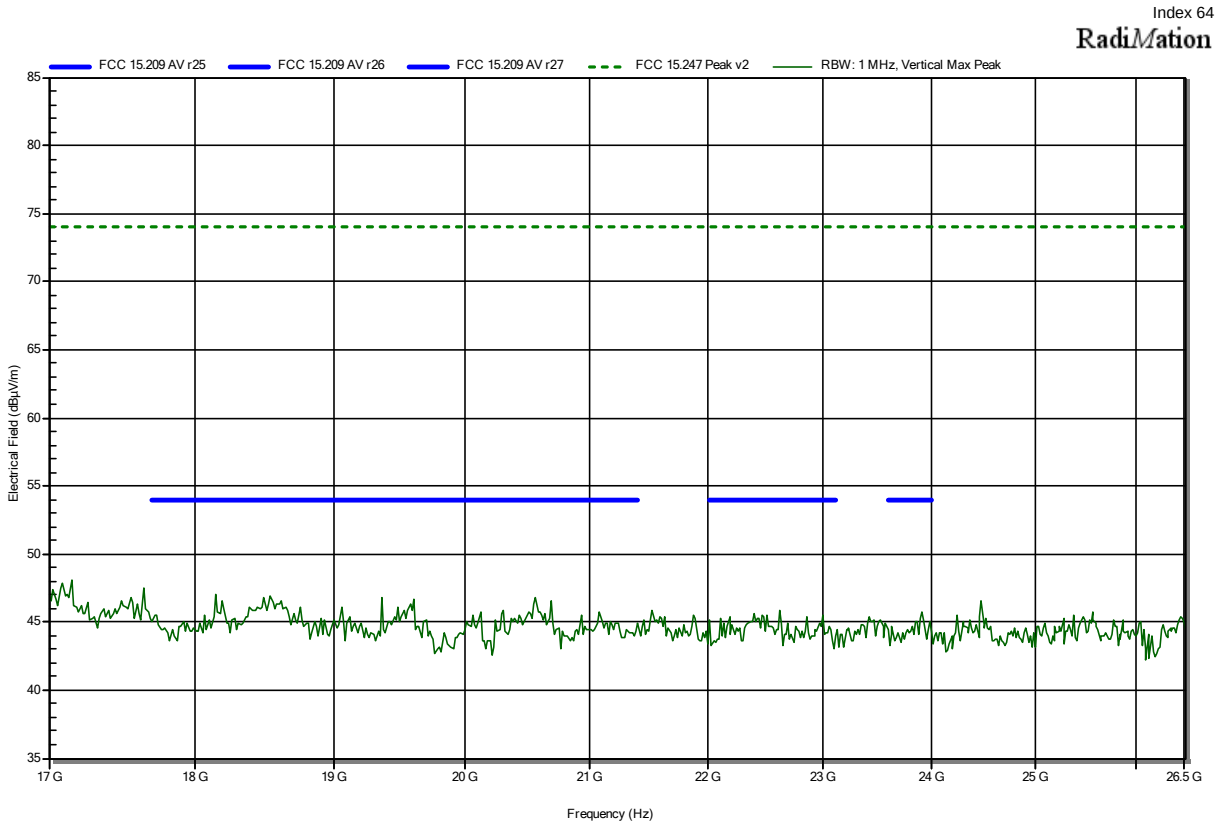
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



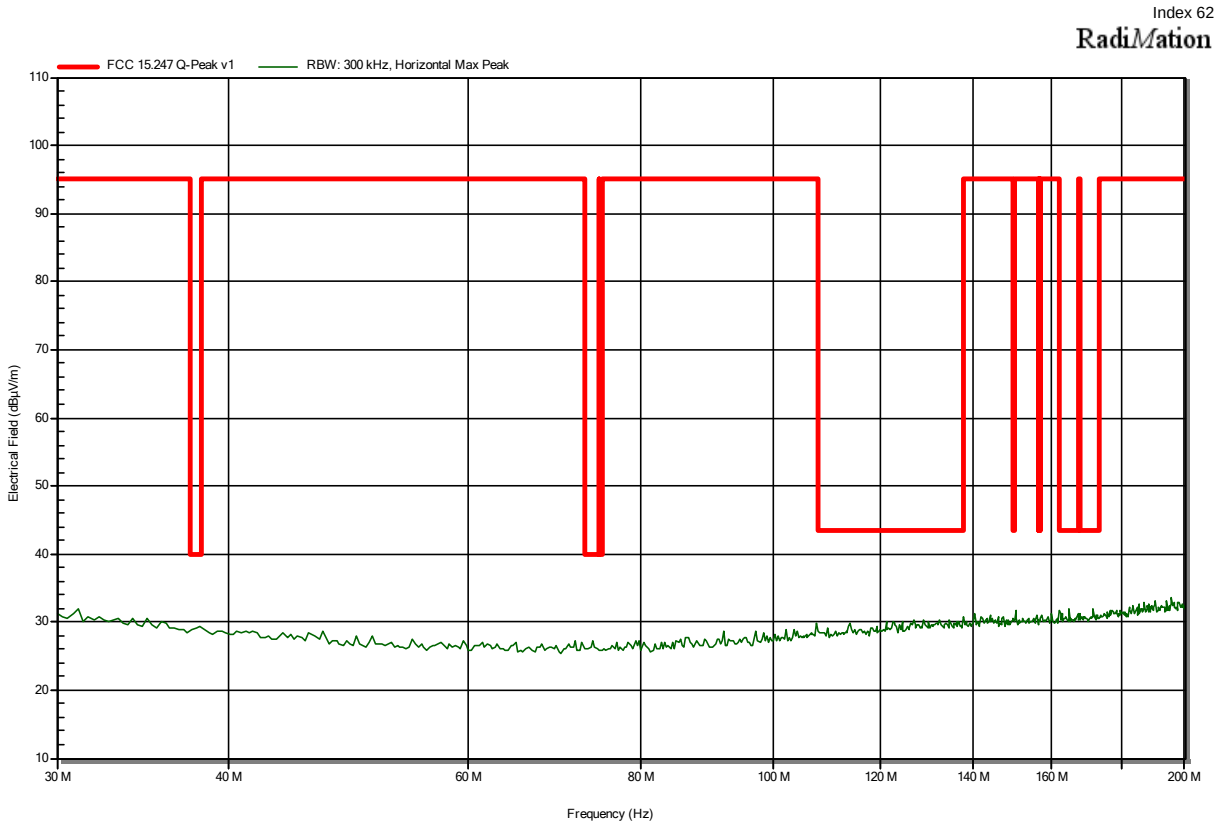
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2440MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



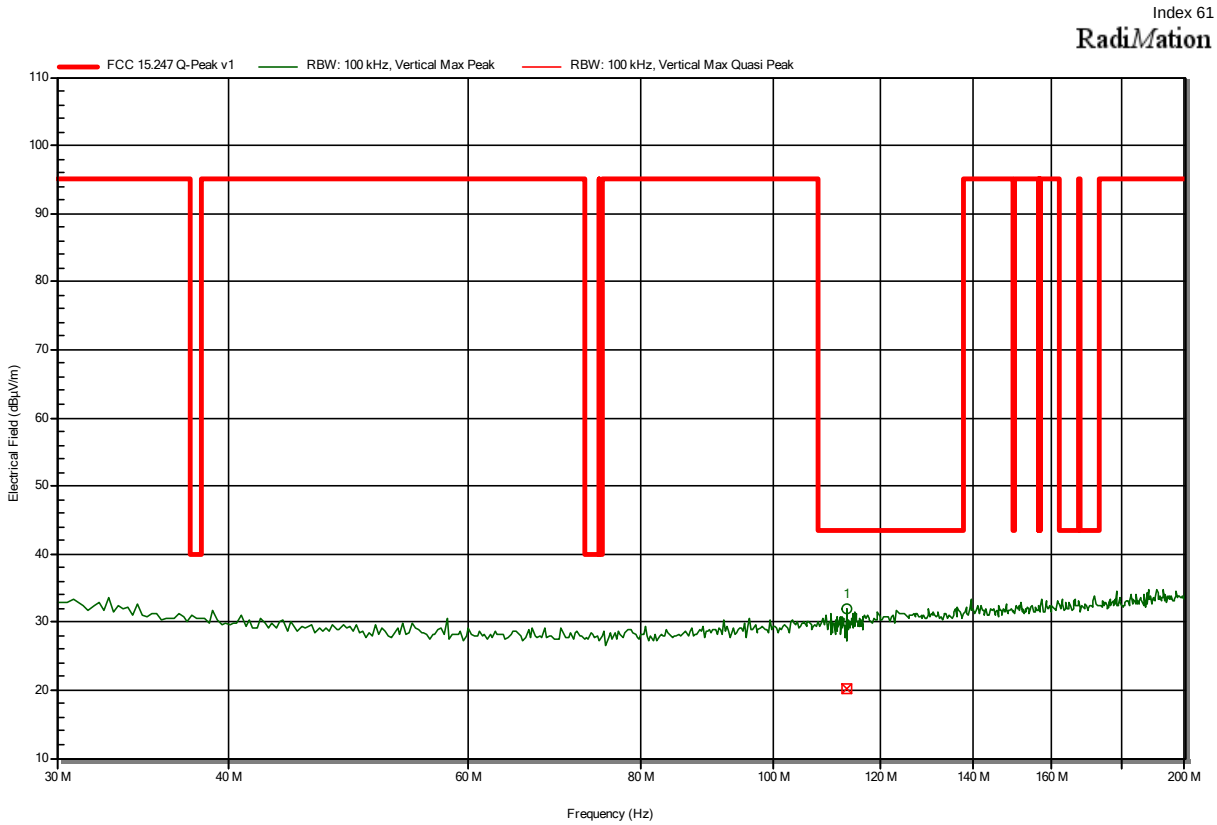
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Radiated Spurious Emissions according to FCC CFR Part 15.247

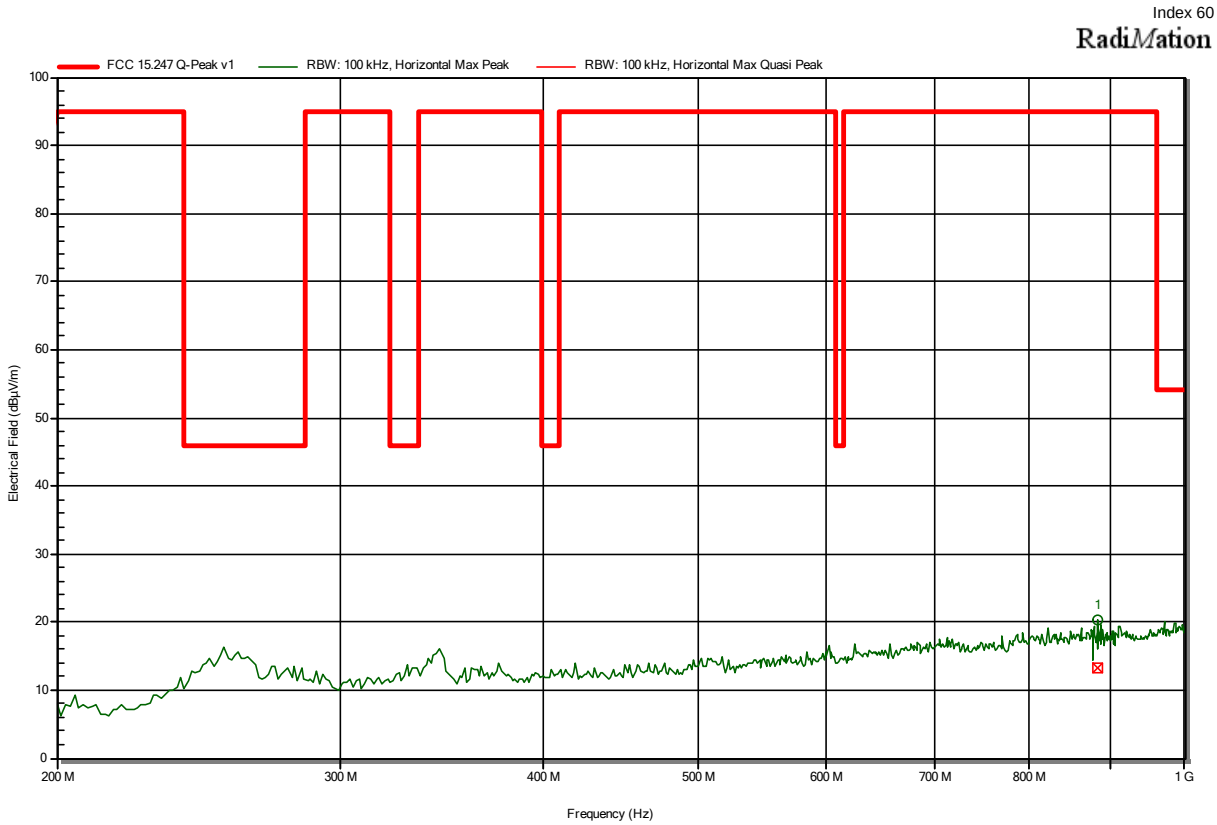
Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
113.256 MHz	20.29 dBµV/m	43.52 dBµV/m	-23.23 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

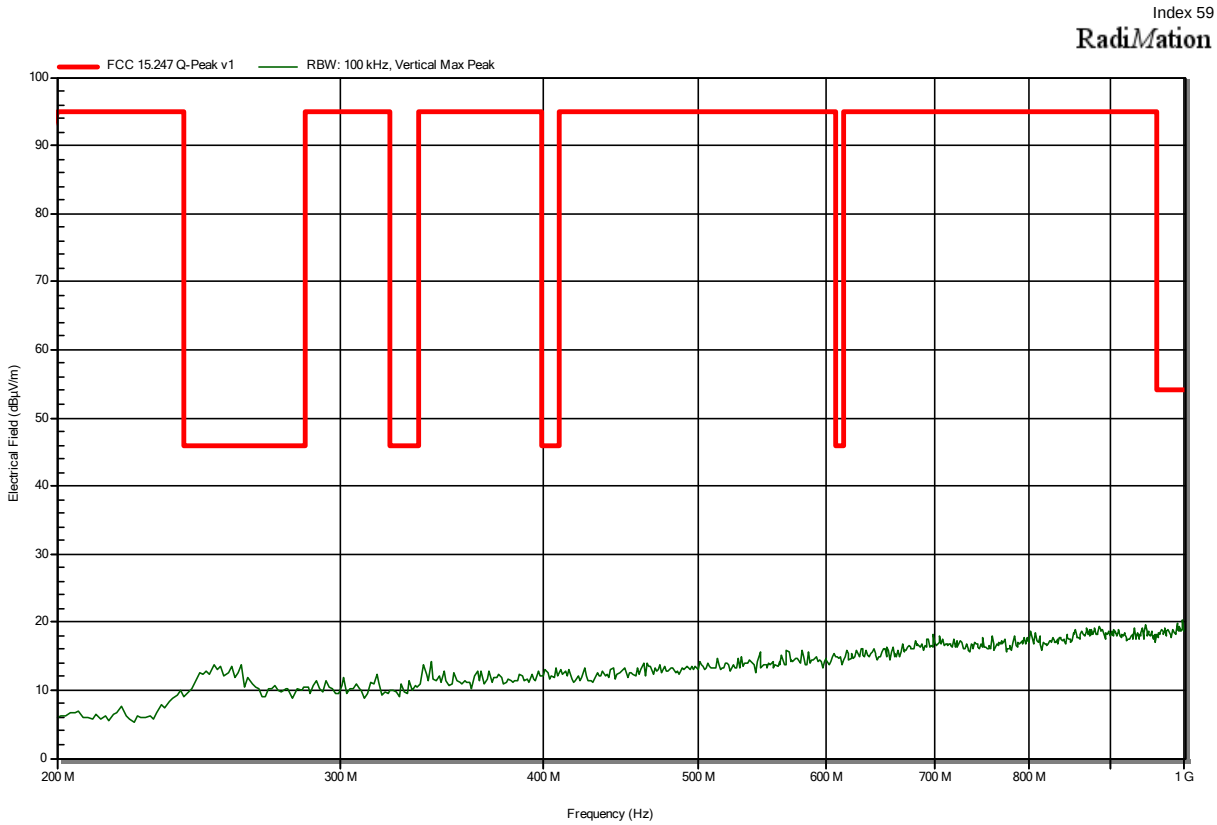
Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
883.648 MHz	13.28 dBµV/m	95 dBµV/m	-81.72 dB	Pass

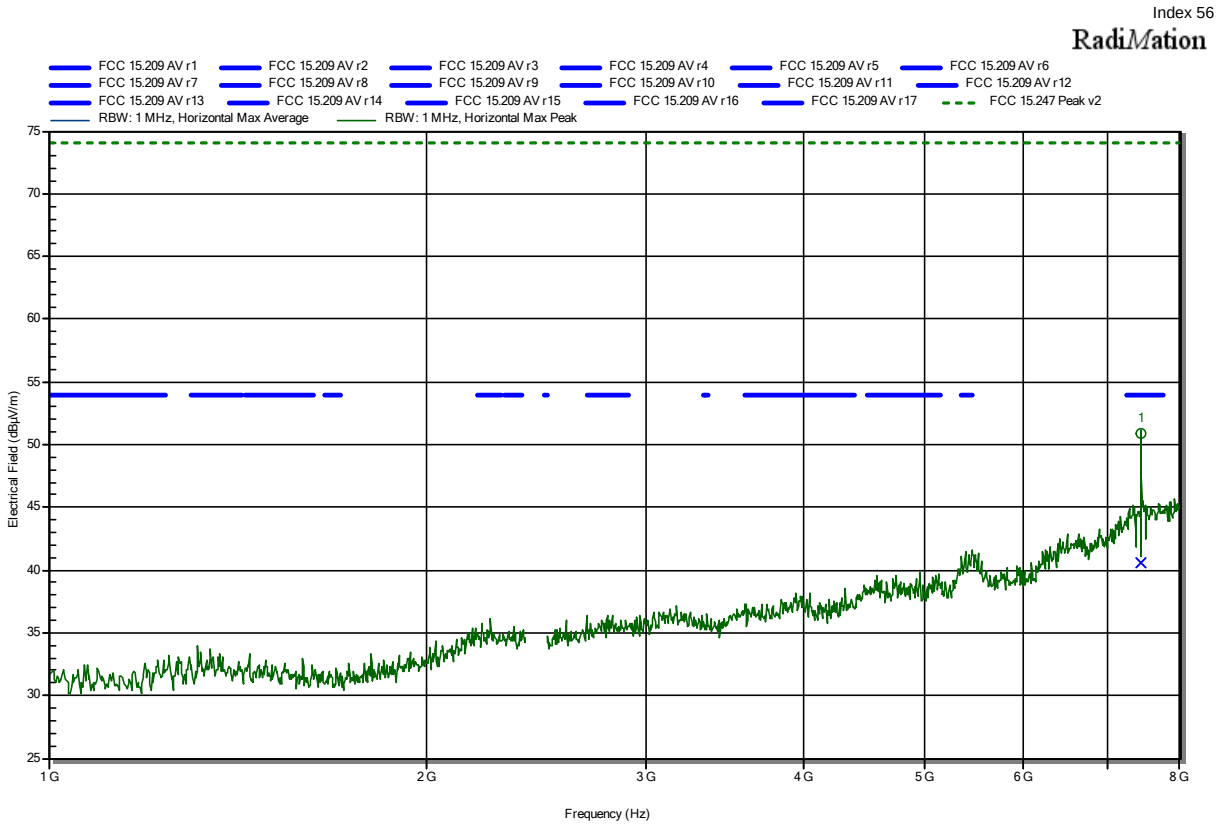
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	

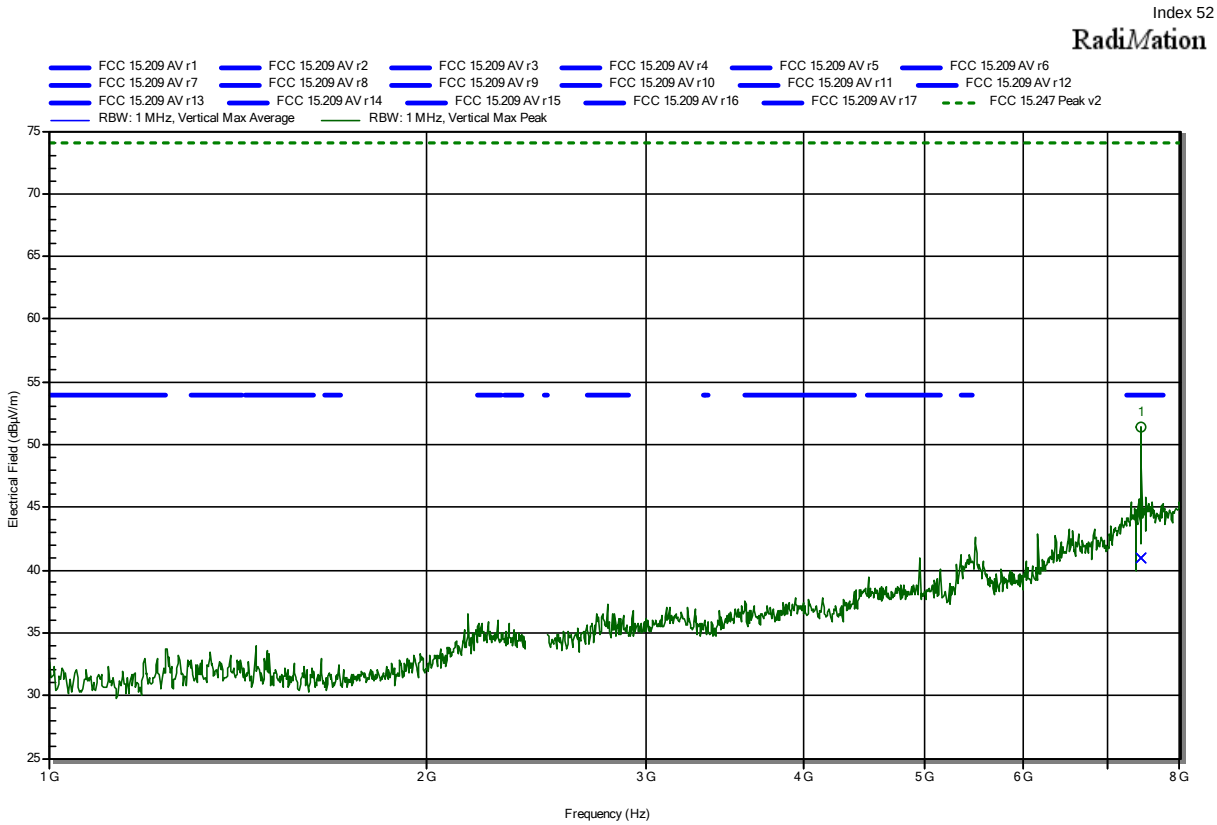


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.441 GHz	50.9 dBµV/m	74 dBµV/m	-23.1 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
7.441 GHz	40.55 dBµV/m	54 dBµV/m	-13.45 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	

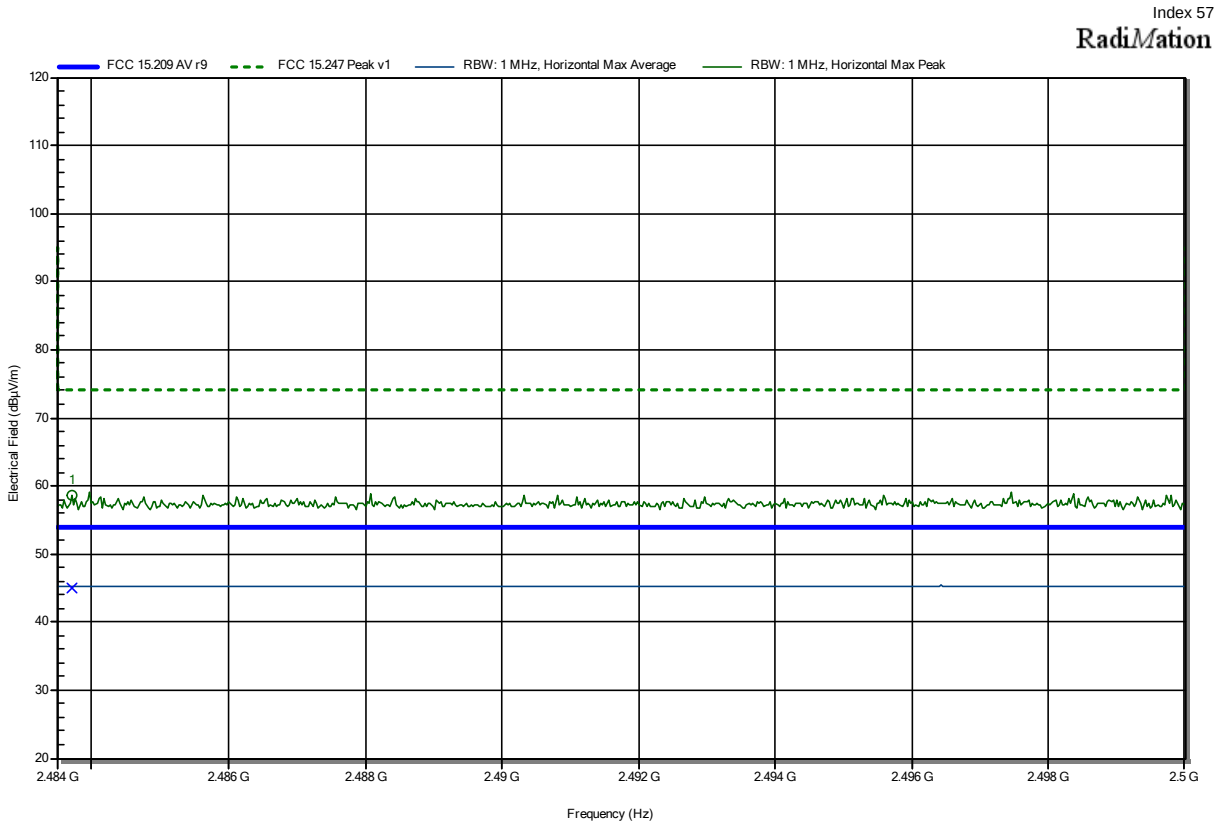


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.441 GHz	51.45 dBµV/m	74 dBµV/m	-22.55 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
7.441 GHz	41.01 dBµV/m	54 dBµV/m	-12.99 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	upper bandedge

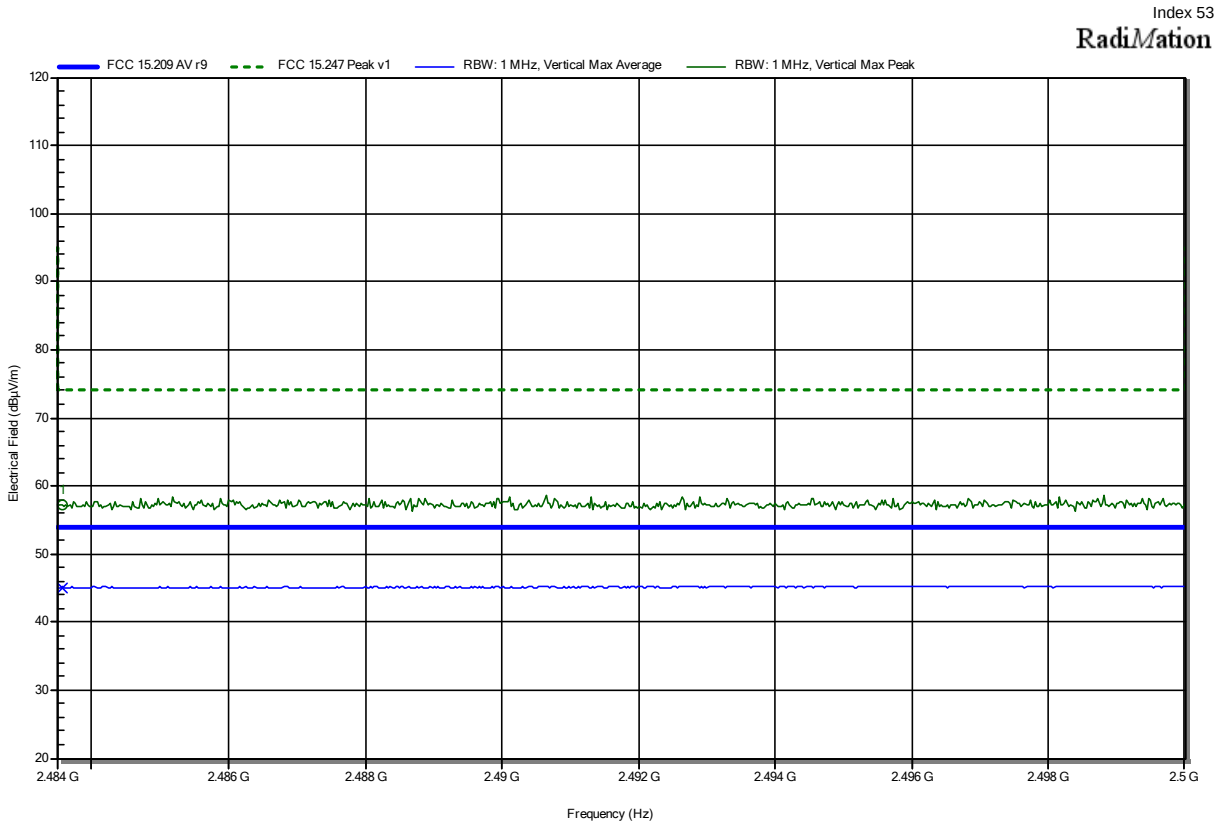


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4837 GHz	58.51 dBµV/m	74 dBµV/m	-15.49 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.4837 GHz	45.11 dBµV/m	54 dBµV/m	-8.89 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	upper bandedge

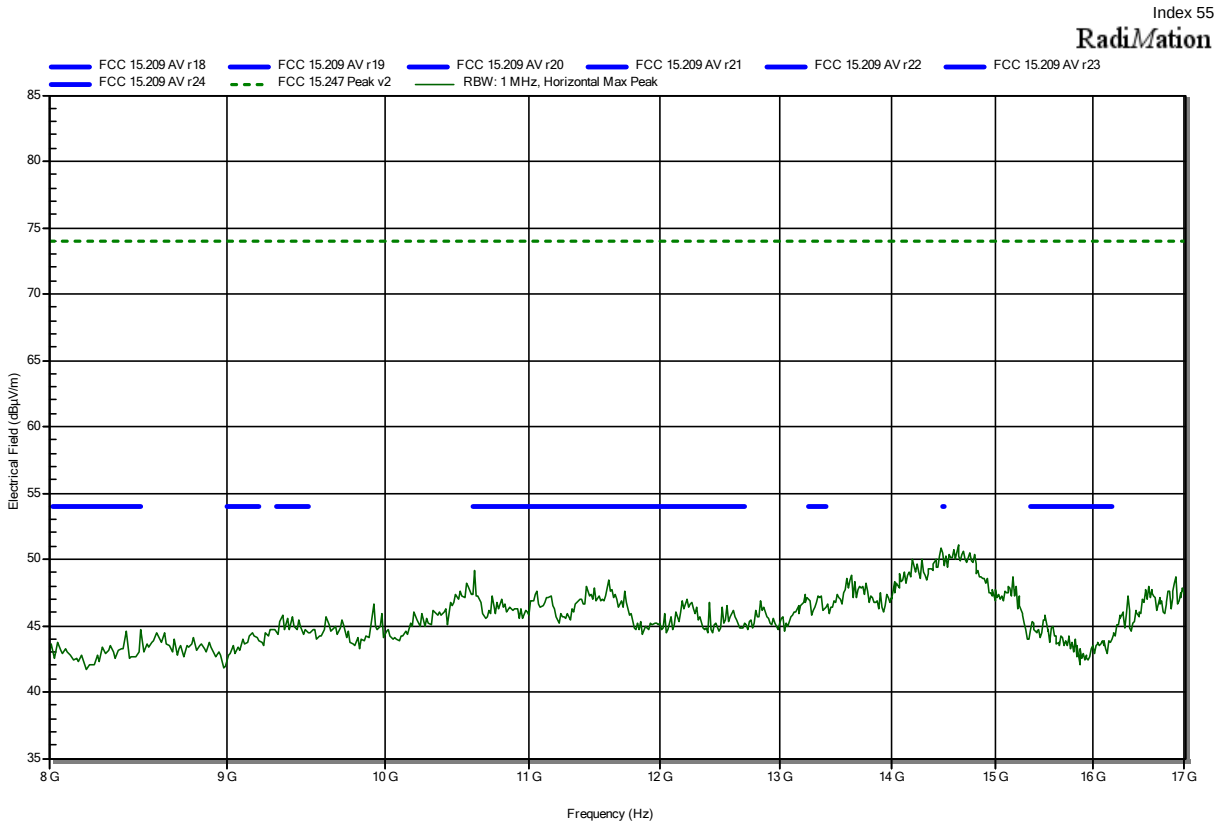


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	57.27 dBµV/m	74 dBµV/m	-16.73 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.4836 GHz	45 dBµV/m	54 dBµV/m	-9 dB	Pass

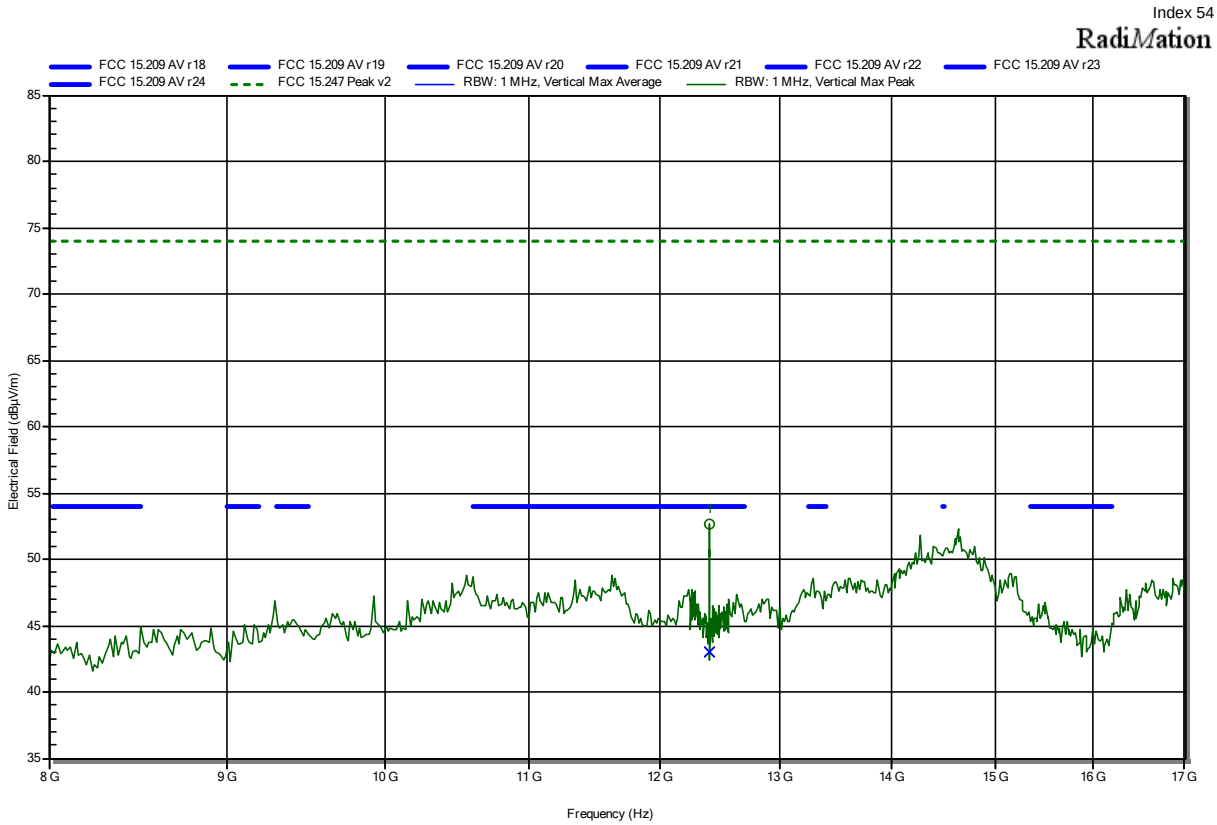
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	

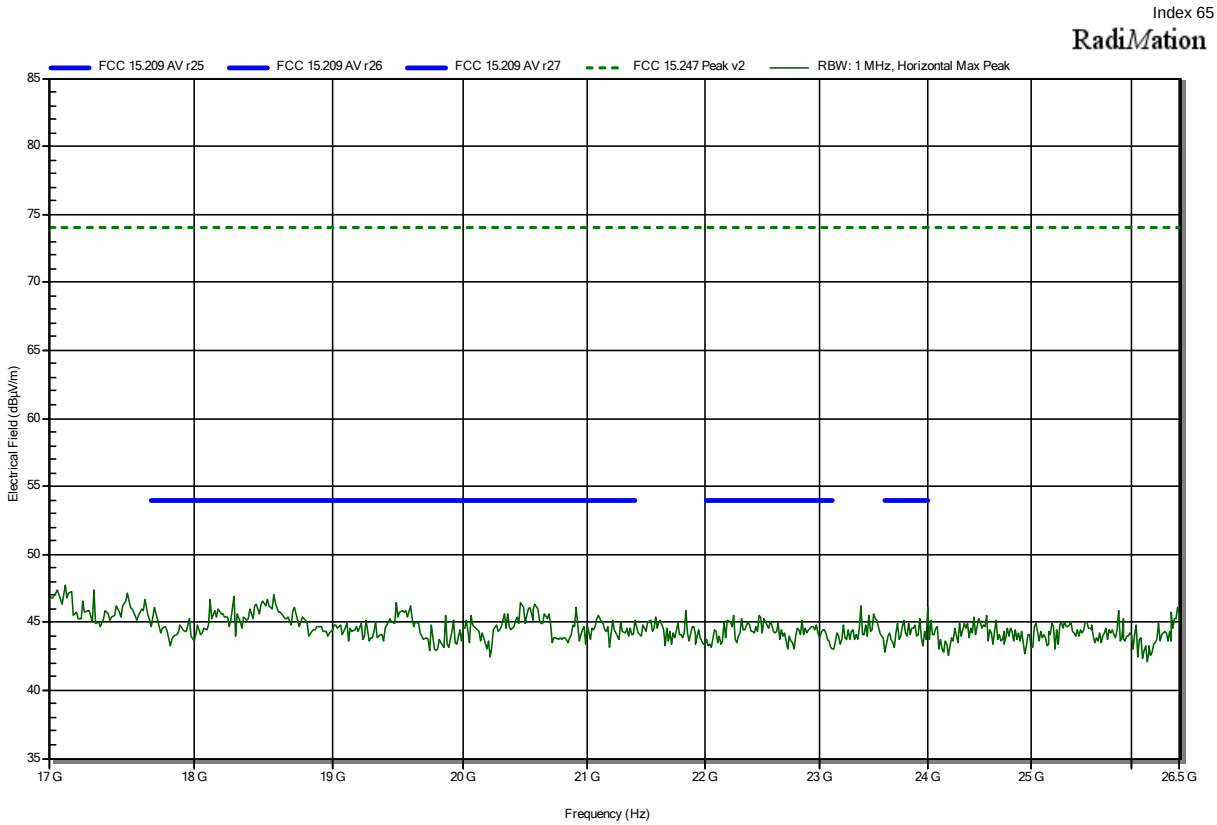


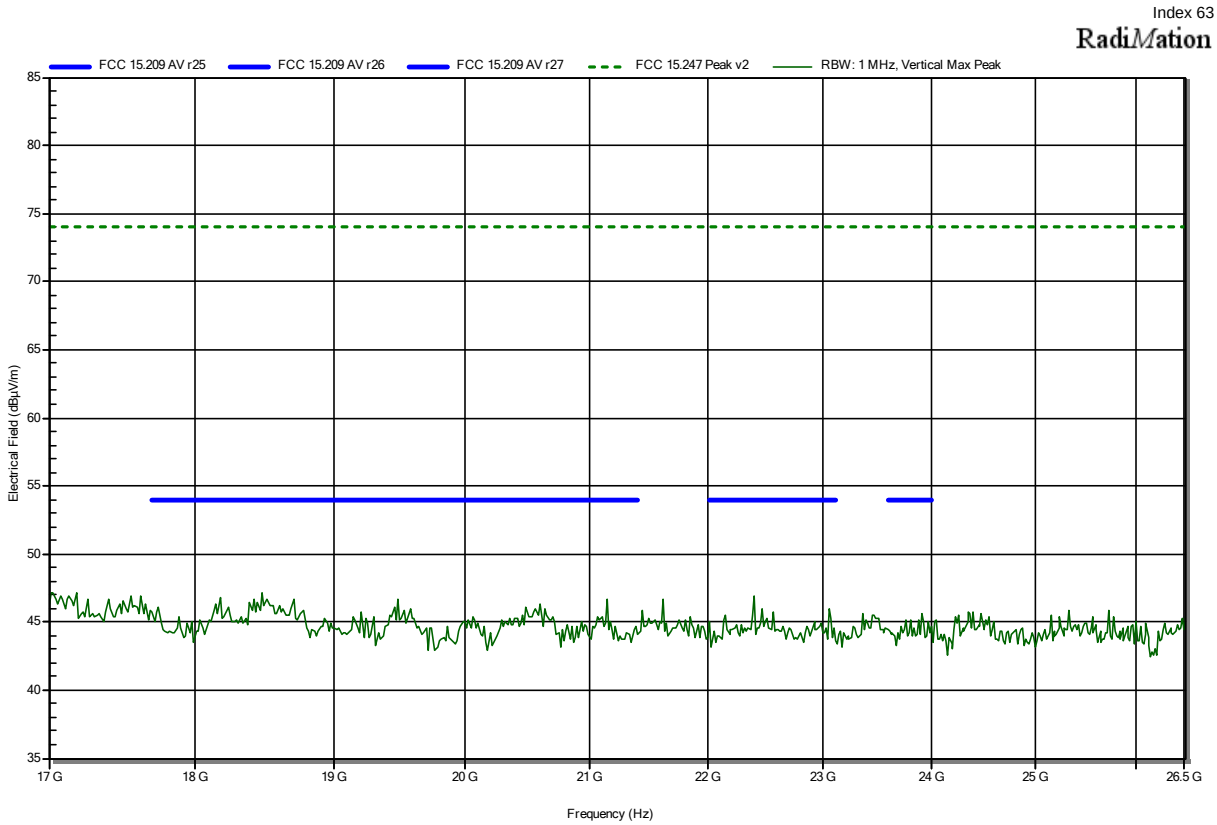
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
12.399 GHz	52.66 dBµV/m	74 dBµV/m	-21.34 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
12.399 GHz	43.07 dBµV/m	54 dBµV/m	-10.93 dB	Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note:	



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number:	G0M-2012-9520
Applicant:	Tharsus Limited
Model Description:	RF Proximity Module
Model:	BUMP-718-F
Test Sample ID:	32620
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Voigt
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	3 m
Mode:	Tx; LE, 2480MHz, 3 dBm, 1 Mbps, EUT ver
Test Date:	2021-02-15
Note: