

RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 2400 – 2483.5 MHz band	
Report Reference No	G0M-1903-8129-TFC247BL-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Andreas Stihl AG & Co. KG
Address	Badstraße 115 71336 Waiblingen Germany
Test Specification	According to FCC/ISED rules
Standard	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 1, 2019-03
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Bluetooth Module
Model(s)	ARL
Additional Model(s)	None
Brand Name(s)	STIHL
Hardware Version(s)	00.30
Software Version(s)	00.07
FCC-ID	2ALP8ARL
IC	23431-ARL
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 - 23 °C	
Test Lab Humidity	32 – 38 %	
Date of receipt of test item	2019-05-15	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2019-08-20	
Total number of pages	93	
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:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2019-08-20	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V _{NOM}	Nominal supply voltage

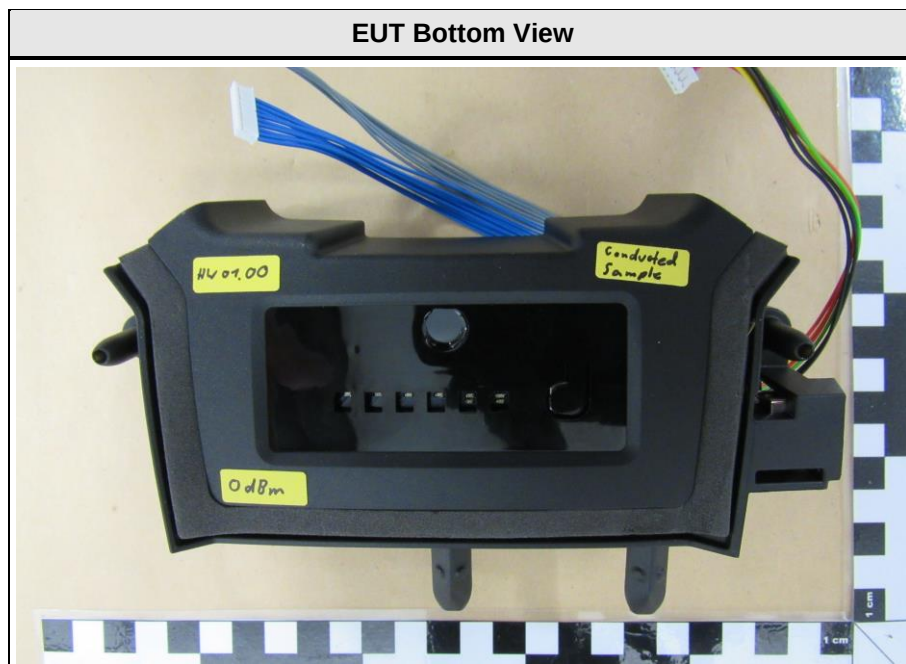
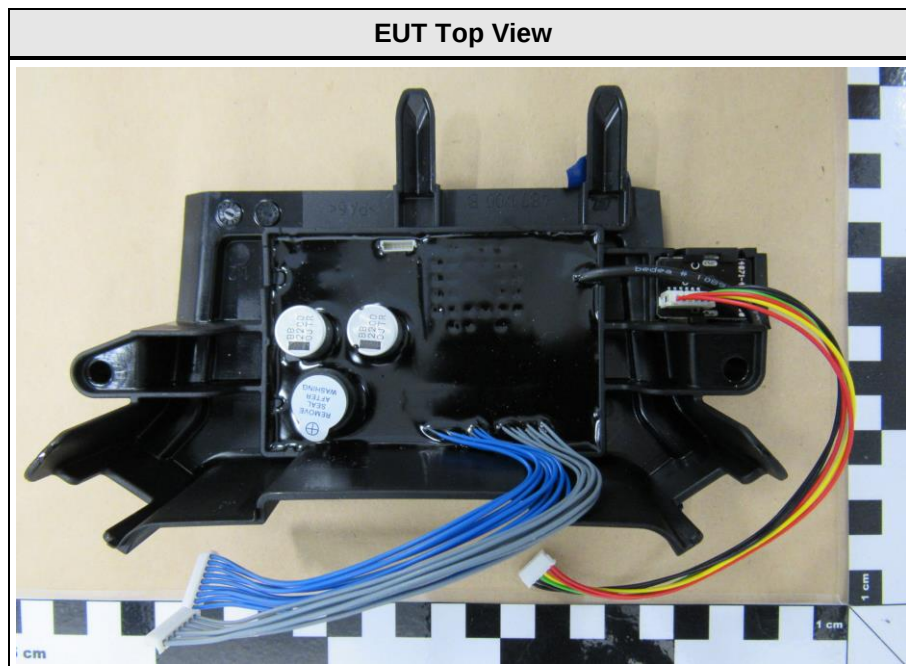
REPORT INDEX

1	Equipment (Test Item) Under Test.....	6
1.1	Photos – Equipment External	7
1.2	Photos – Equipment Internal	9
1.3	Photos – Test Setup.....	11
1.4	Support Equipment.....	12
1.5	Test Modes	13
1.6	Test Frequencies.....	14
1.7	Sample emission level calculation.....	15
2	Result Summary.....	16
3	Test Conditions and Results.....	17
3.1	Test Conditions and Results - Occupied bandwidth.....	17
3.2	Test Conditions and Results - 6 dB bandwidth.....	22
3.3	Test Conditions and Results - Maximum peak conducted output power	27
3.4	Test Conditions and Results - Power spectral density	29
3.5	Test Conditions and Results - AC powerline conducted emissions.....	34
3.6	Test Conditions and Results - Band-edge compliance.....	37
3.7	Test Conditions and Results - Conducted spurious emissions.....	41
3.8	Test Conditions and Results - Transmitter radiated emissions	46
3.9	Test Conditions and Results - Receiver radiated emissions	49
ANNEX A	Transmitter spurious emissions	52
ANNEX B	Receiver spurious emissions	84

1 Equipment (Test Item) Under Test

Description	Bluetooth Module	
Model	ARL	
Additional Model(s)	None	
Brand Name(s)	STIHL	
Serial Number(s)	None	
Hardware Version(s)	00.30	
Software Version(s)	00.07	
PMN	User Interface	
HVIN	ARL	
FVIN	n/a	
HMN	n/a	
FCC-ID	2ALP8ARL	
IC	23431-ARL	
Equipment type	Radio Module	
Radio type	Transceiver	
Assigned frequency bands	2400 - 2483.5 MHz	
Radio technology	Bluetooth LE	
Modulation	GFSK	
Number of antenna ports	1	
Antenna	Type	Integrated
	Model	Inverted F PCB
	Manufacturer	STIHL
	Gain	2 dBi (customer declaration)
Supply Voltage	V _{NOM}	3.3 VDC
Operating Temperature	T _{NOM}	25 °C
AC/DC-Adaptor	Model	None
	Vendor	None
	Input	None
	Output	None
Manufacturer	Andreas Stihl AG & Co. KG Badstraße 115 71336 Waiblingen Germany	

1.1 Photos – Equipment External

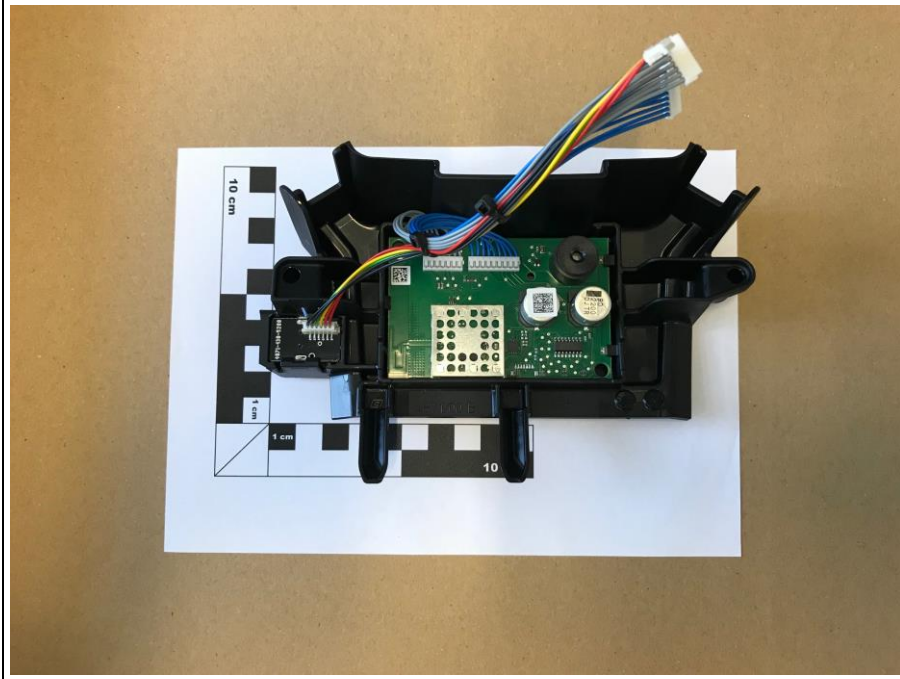


EUT Connector View

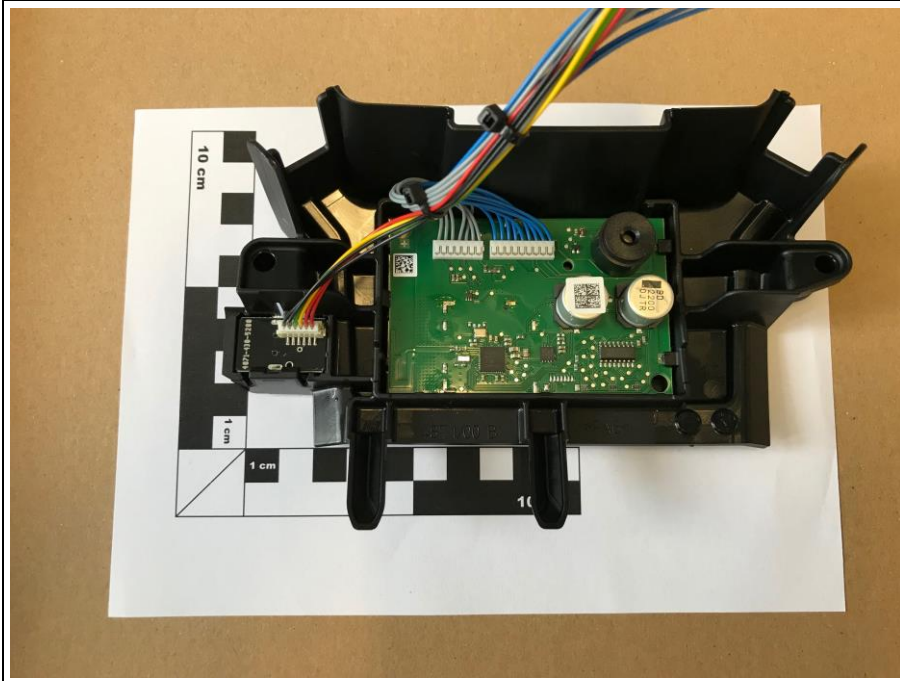


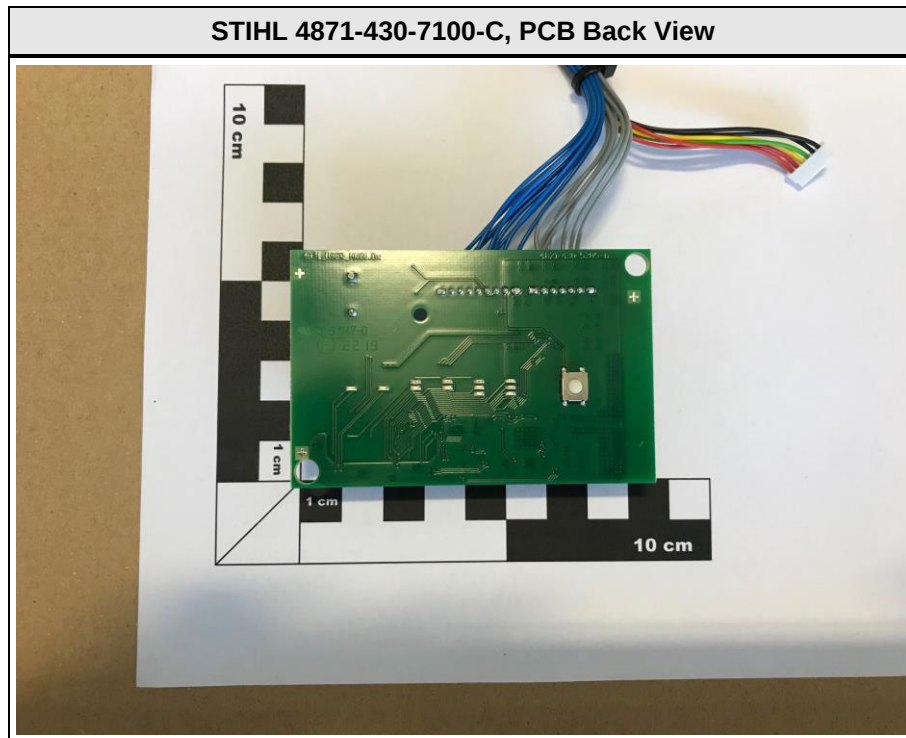
1.2 Photos – Equipment Internal

STIHL_4871-430-7100-C, Front View

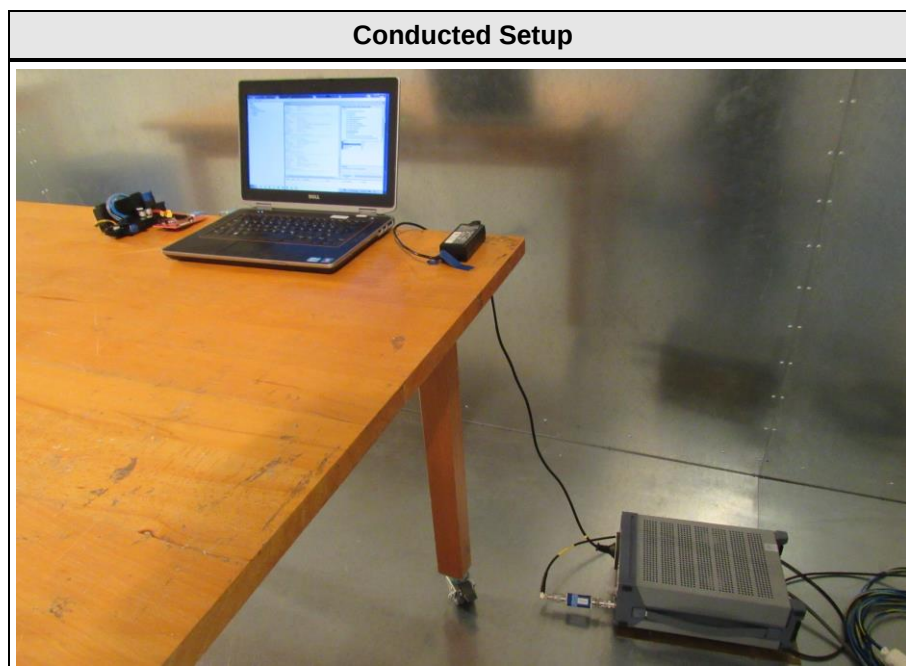


STIHL_4871-430-7100-C, No Shield





1.3 Photos – Test Setup



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	Dell	Latitude E6420	S/N HPJ4R1
AE	Power Supply	Dell	FA65NE0-00	S/N RX929
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 Duty cycle = 64%
Receive	Mode = Receive
Comment:	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	0	2402
F2	Tx / Rx	19	2440
F3	Tx / Rx	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:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

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:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

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, ISED RSS-247				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISED RSS-Gen, Issue 5 (section 6.6)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247, Issue 2 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(b)(1) ISED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.247(e) ISED RSS-247, Issue 2 (section 5.2)	Power spectral density	ANSI C63.10-2013	PASS	
FCC § 15.207 ISED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISED RSS-247, Issue 2 (section 3.1)	Receiver 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 - Occupied bandwidth

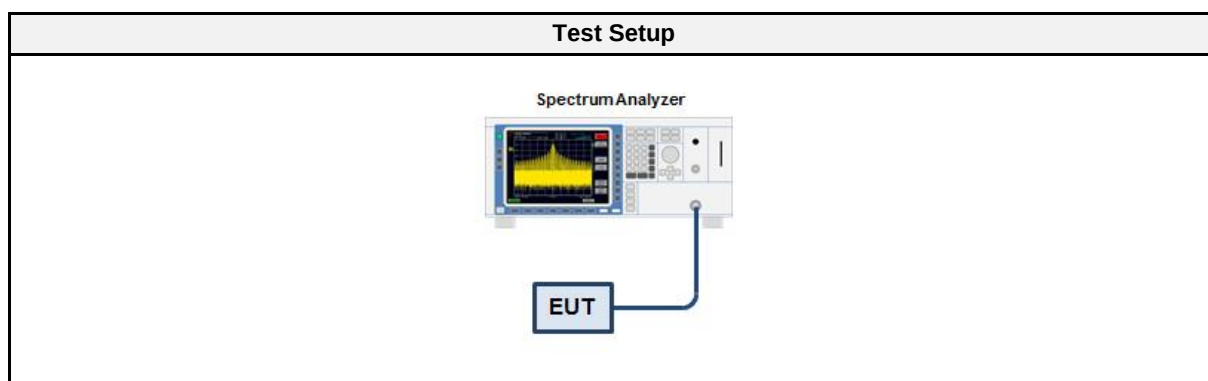
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 (section 6.6)
Measurement Method	ANSI C63.10 6.9.3
Operator	Wilfried Treffke
Date	2019-06-17

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.1.5 Procedure

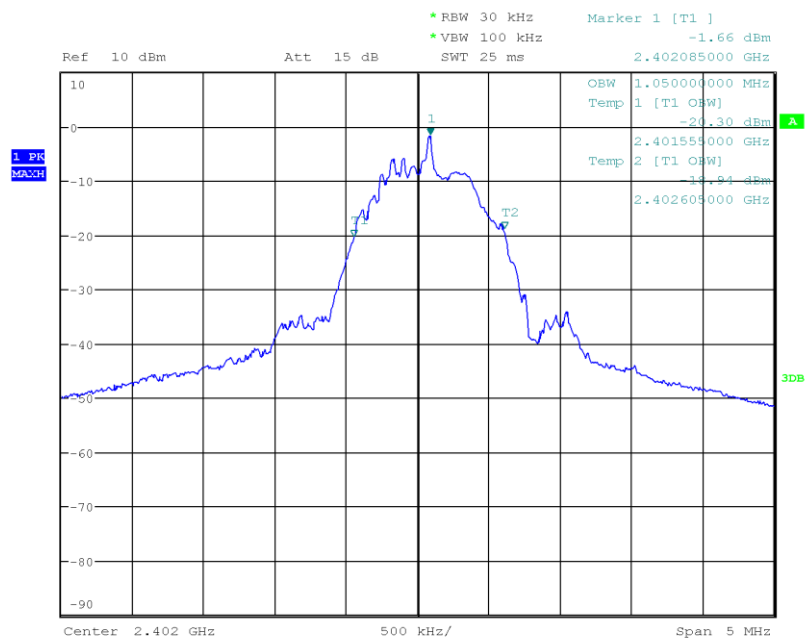
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.050
GFSK	2440	1.055
GFSK	2480	1.060

Occupied Bandwidth

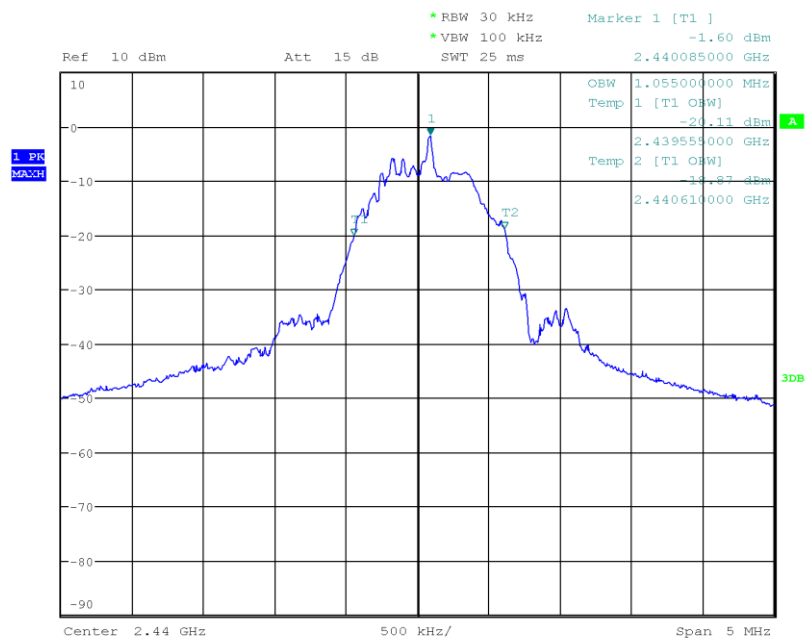
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Occupied Bandwidth [MHz]: 1.050



Date: 17.JUN.2019 04:48:18

Occupied Bandwidth

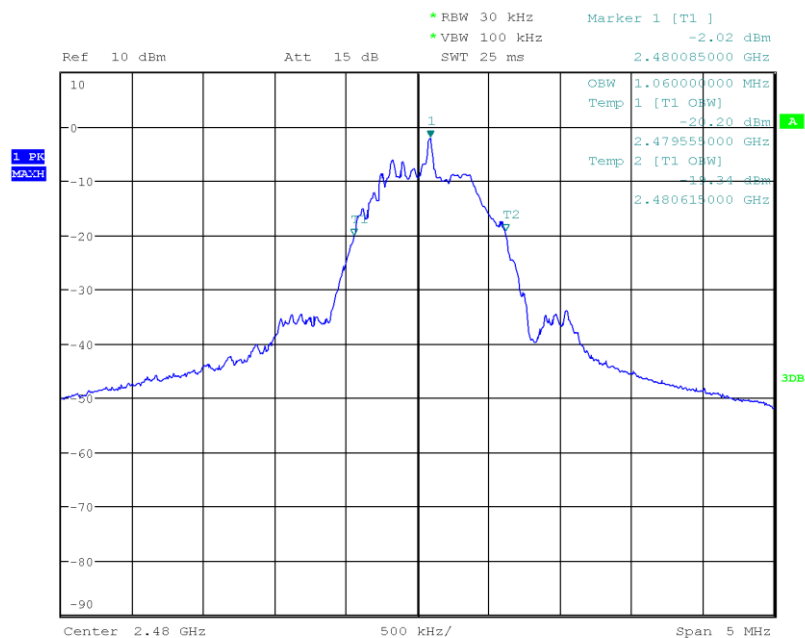
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Occupied Bandwidth [MHz]: 1.055



Date: 17.JUN.2019 04:56:29

Occupied Bandwidth

Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Occupied Bandwidth [MHz]: 1.060



Date: 17.JUN.2019 05:00:27

3.2 Test Conditions and Results - 6 dB bandwidth

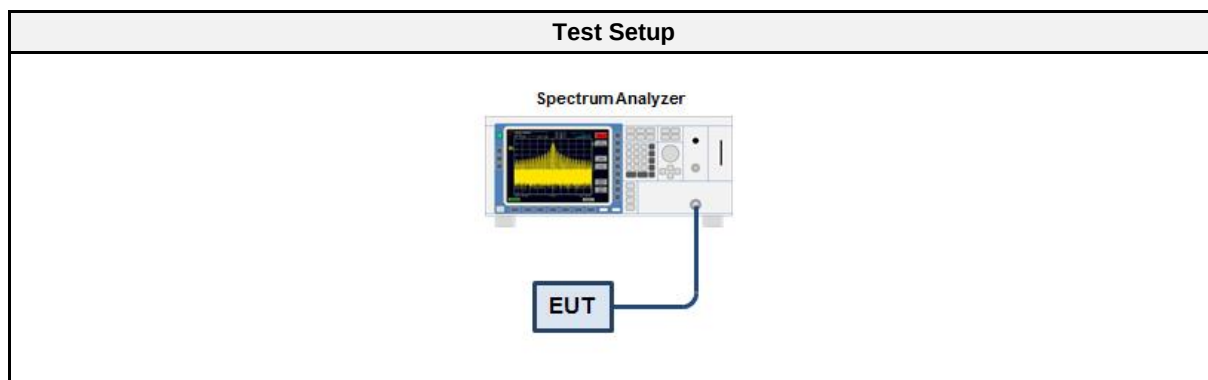
3.2.1 Information

Test Information	
Reference	FCC § 15.247(a)(2); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Operator	Wilfried Treffke
Date	2019-06-17

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.2.5 Procedure

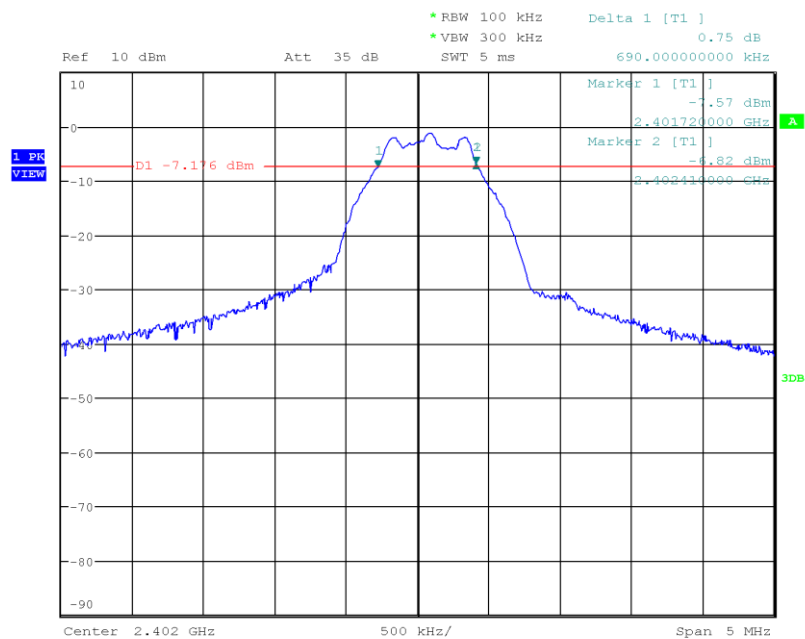
Test Procedure
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker 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

3.2.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
GFSK	2402	690	500	PASS
GFSK	2440	715	500	PASS
GFSK	2480	720	500	PASS

DTS (6 dB) Bandwidth

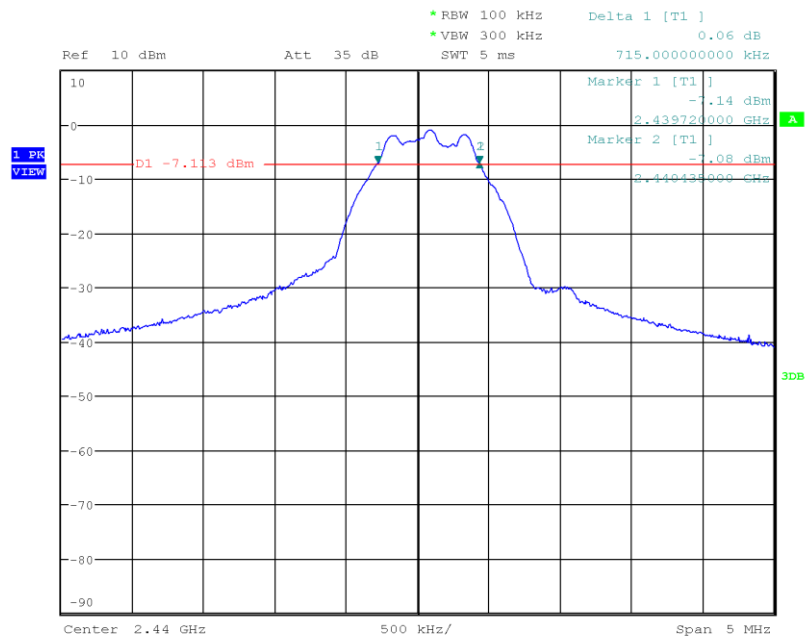
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Lower Frequency [MHz]: 2401.720
 Upper Frequency [MHz]: 2402.410
 6 dB Bandwidth [kHz]: 690



Date: 17.JUN.2019 05:11:01

DTS (6 dB) Bandwidth

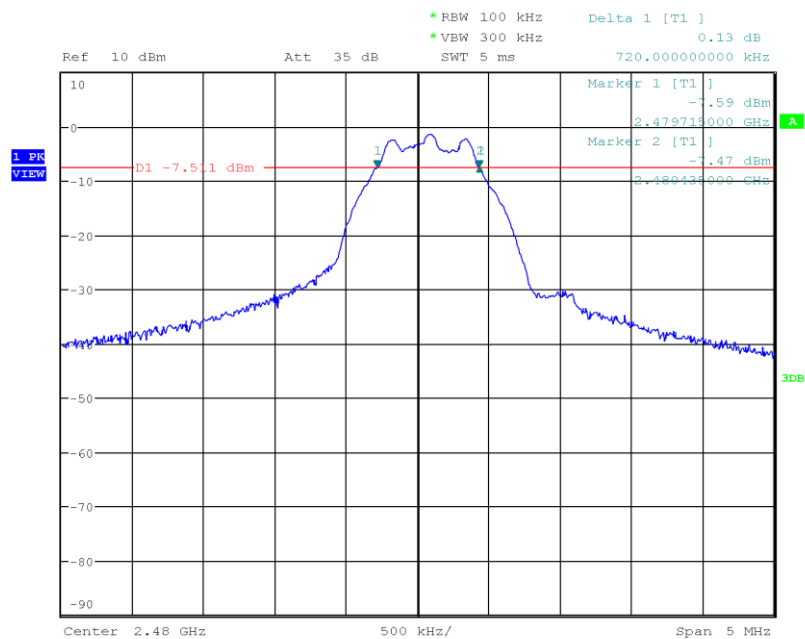
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Lower Frequency [MHz]: 2439.720
 Upper Frequency [MHz]: 2440.435
 6 dB Bandwidth [kHz]: 715



Date: 17.JUN.2019 05:07:41

DTS (6 dB) Bandwidth

Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 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: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Lower Frequency [MHz]: 2479.715
 Upper Frequency [MHz]: 2480.435
 6 dB Bandwidth [kHz]: 720



Date: 17.JUN.2019 05:02:47

3.3 Test Conditions and Results - Maximum peak conducted output power

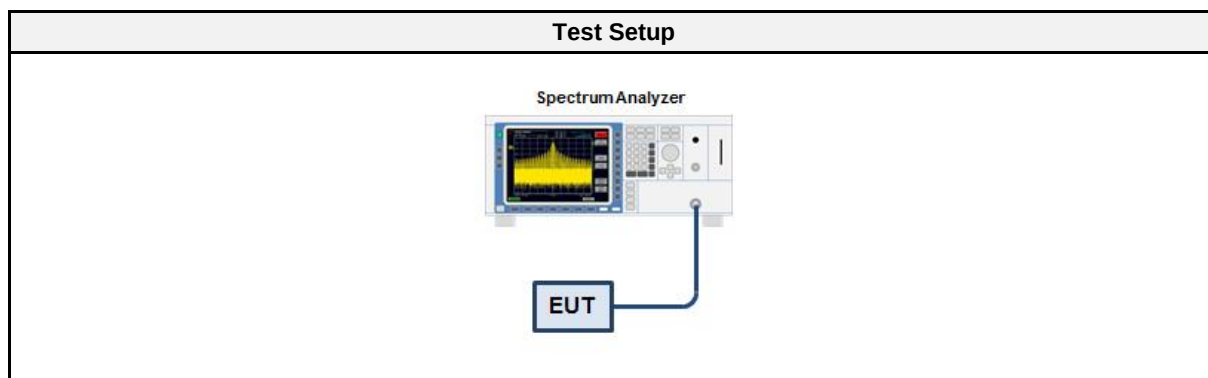
3.3.1 Information

Test Information	
Reference	FCC § 15.247(b)(1); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Operator	Wilfried Treffke
Date	2019-06-17

3.3.2 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.

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.3.5 Procedure

Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set $\geq$ 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

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	0.579	0.0011	1.0	PASS
2440	0.411	0.0011	1.0	PASS
2480	0.276	0.0011	1.0	PASS

3.4 Test Conditions and Results - Power spectral density

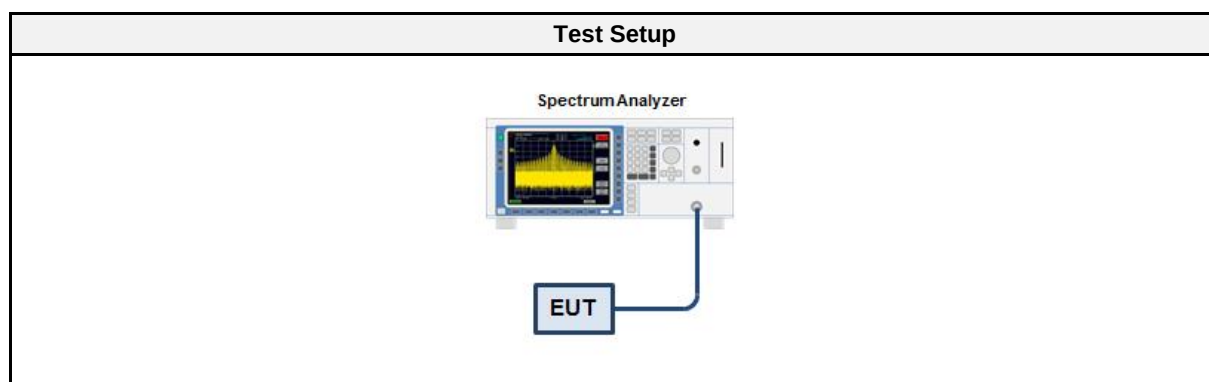
3.4.1 Information

Test Information	
Reference	FCC § 15.247(e); ISSED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Operator	Wilfried Treffke
Date	2019-06-17

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.4.5 Procedure

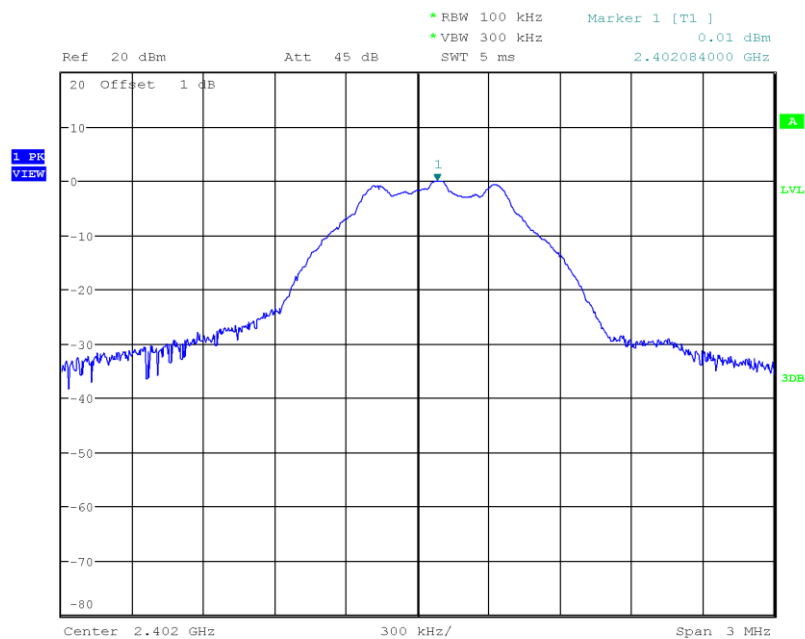
Test Procedure
1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW $\geq$ RBW and the detector is set to peak with max hold 4. After the trace has stabilized a marker is set to the envelope maximum 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

3.4.6 Results

Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2402	0.005	8.0	PASS
2440	-0.102	8.0	PASS
2480	-0.309	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

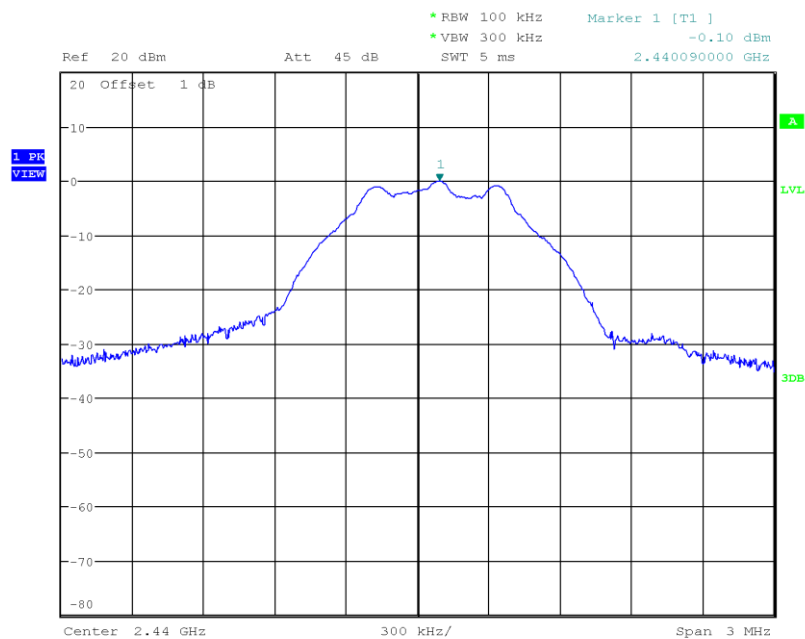
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Peak Frequency [MHz]: 2402.084
 Spectral Density [dBm/RBW]: 0.005
 Resolution Bandwidth [kHz]: 100 kHz



Date: 17.JUN.2019 05:29:46

Peak Power Spectral Density

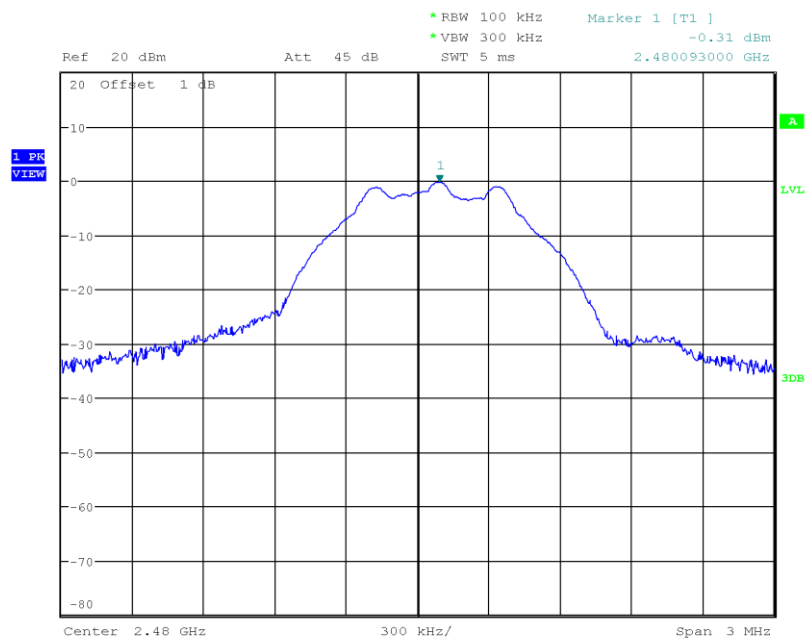
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Peak Frequency [MHz]: 2440.090
 Spectral Density [dBm/RBW]: -0.102
 Resolution Bandwidth [kHz]: 100 kHz



Date: 17.JUN.2019 05:27:49

Peak Power Spectral Density

Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 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: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Peak Frequency [MHz]: 2480.093
 Spectral Density [dBm/RBW]: -0.309
 Resolution Bandwidth [kHz]: 100 kHz



Date: 17.JUN.2019 05:25:58

3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

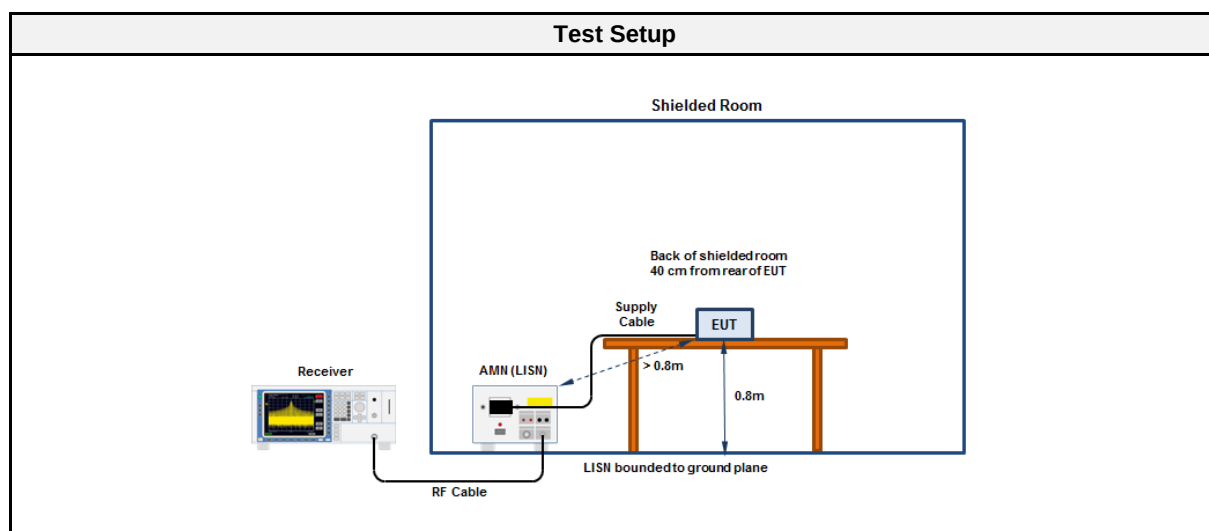
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Operator	Wilfried Treffke
Date	2019-06-17

3.5.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBμV]	Average [dBμV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Limit decreases linearly with the logarithm of the frequency

3.5.3 Setup



3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2016.1.10

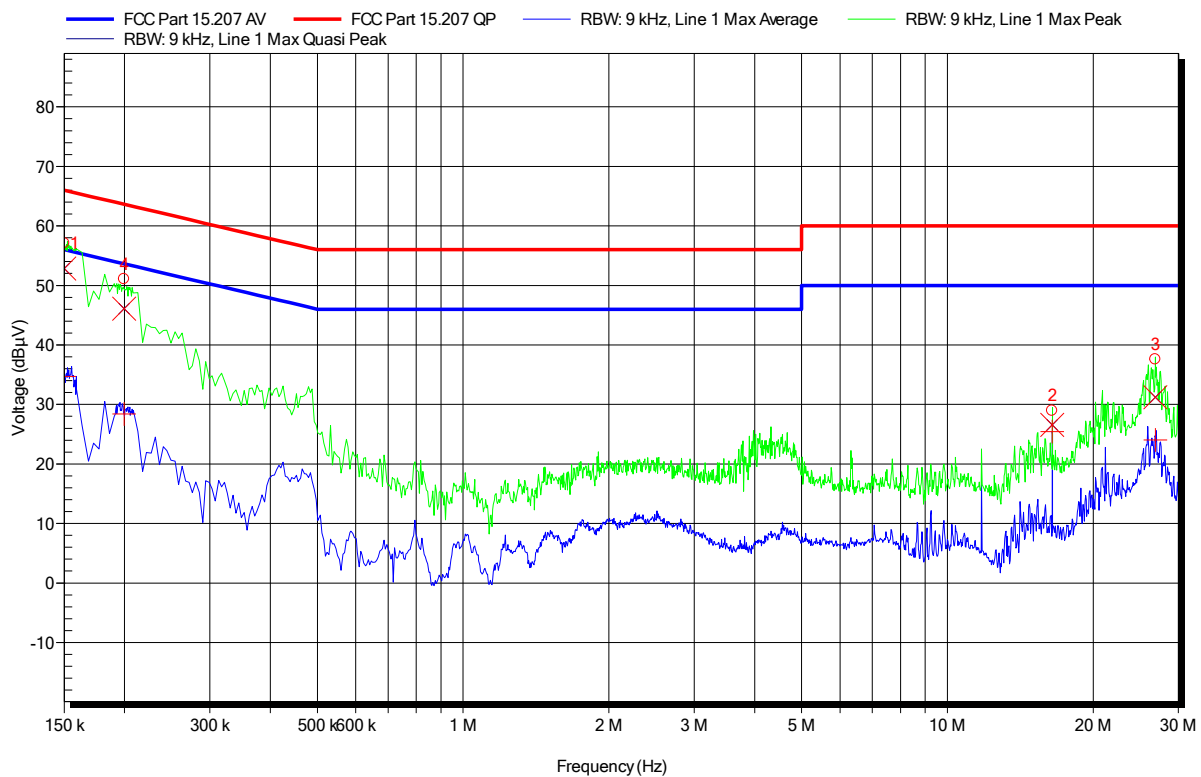
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	R&S	ESU 26	EF00241	2017-07	2019-07
LISN	R&S	ESH3-Z5	EF00036	2017-01	2019-07

EMI voltage test in the ac-mains according to FCC part 15 C

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Mr. Treffke
Test Conditions: Tnom: 24°C, Unom: 120 VAC
LISN: ESH3-Z5 (L)
Mode: BLE; 2440 MHz
Test Date: 2019-06-17
Note:

Index 77



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	150 kHz	52.85 dBμV	66 dBμV	-13.15 dB	Pass
2	16.465 MHz	26.56 dBμV	60 dBμV	-33.44 dB	Pass
3	26.871 MHz	31.2 dBμV	60 dBμV	-28.8 dB	Pass
4	199.5 kHz	46.1 dBμV	63.63 dBμV	-17.53 dB	Pass

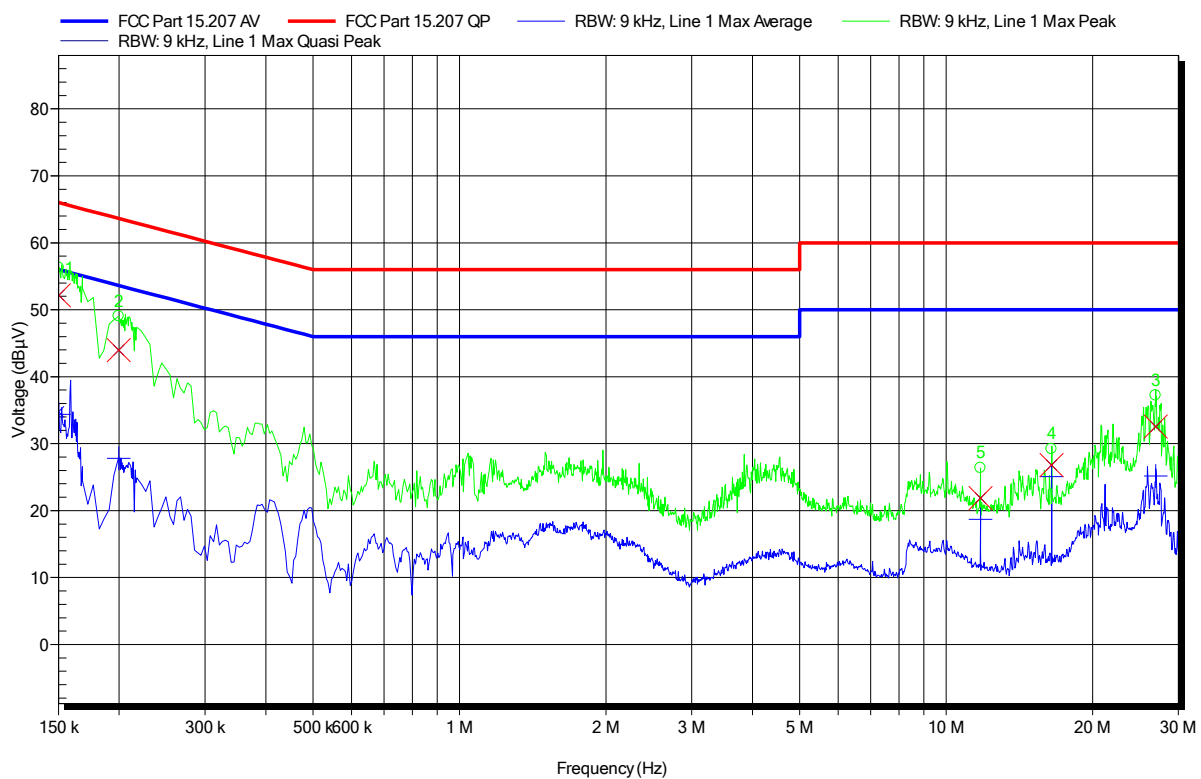
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	150 kHz	34.73 dBμV	56 dBμV	-21.27 dB	Pass
2	16.465 MHz	25.42 dBμV	50 dBμV	-24.58 dB	Pass
3	26.871 MHz	24.01 dBμV	50 dBμV	-25.99 dB	Pass
4	199.5 kHz	28.39 dBμV	53.63 dBμV	-25.24 dB	Pass

EMI voltage test in the ac-mains according to FCC part 15 C

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Mr. Handrik
Test Conditions: Tnom: 24°C, Unom: 120 VAC
LISN: ESH3-Z5 (N)
Mode: BLE; 2440 MHz
Test Date: 2019-06-17
Note:

Index 78



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	150.45 kHz	52.17 dBμV	65.98 dBμV	-13.8 dB	Pass
2	199.5 kHz	43.95 dBμV	63.63 dBμV	-19.68 dB	Pass
3	26.948 MHz	32.57 dBμV	60 dBμV	-27.43 dB	Pass
4	16.464 MHz	26.81 dBμV	60 dBμV	-33.19 dB	Pass
5	11.76 MHz	21.85 dBμV	60 dBμV	-38.15 dB	Pass

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	150.45 kHz	34.37 dBμV	55.98 dBμV	-21.6 dB	Pass
2	199.5 kHz	27.82 dBμV	53.63 dBμV	-25.81 dB	Pass
3	26.948 MHz	25.16 dBμV	50 dBμV	-24.84 dB	Pass
4	16.464 MHz	25.06 dBμV	50 dBμV	-24.94 dB	Pass
5	11.76 MHz	18.71 dBμV	50 dBμV	-31.29 dB	Pass

3.6 Test Conditions and Results - Band-edge compliance

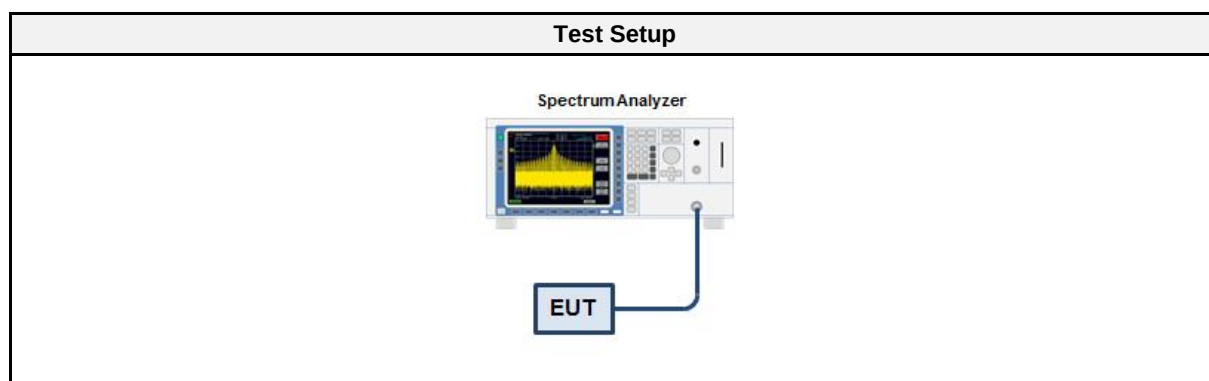
3.6.1 Information

Test Information	
Reference	FCC § 15.247(d); ISSED RSS-247, Issue 2 (section 5.5)
Measurement Method	ANSI C63.10 11.13
Operator	Wilfried Treffke
Date	2019-06-17

3.6.2 Limits

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

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.6.5 Procedure

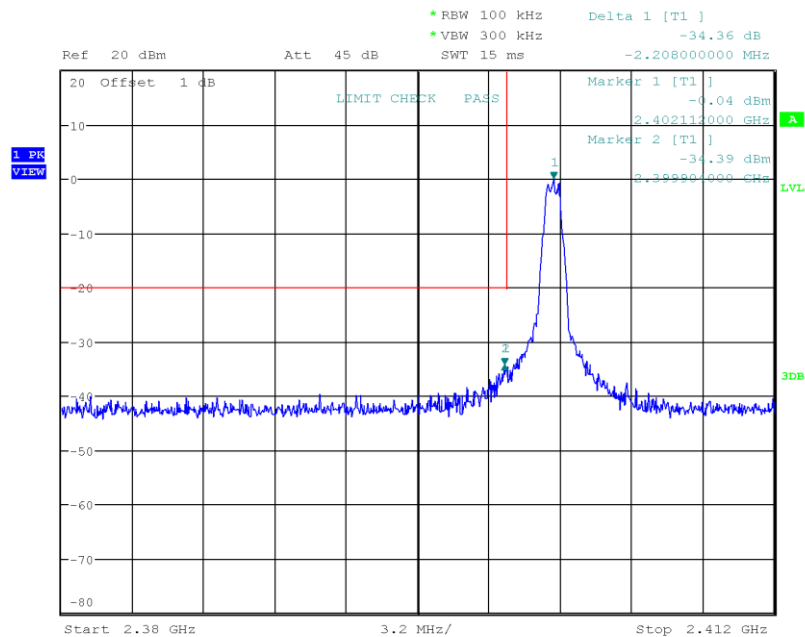
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge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

3.6.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK	2402	-34.35	-20	PASS
GFSK	2480	-37.85	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

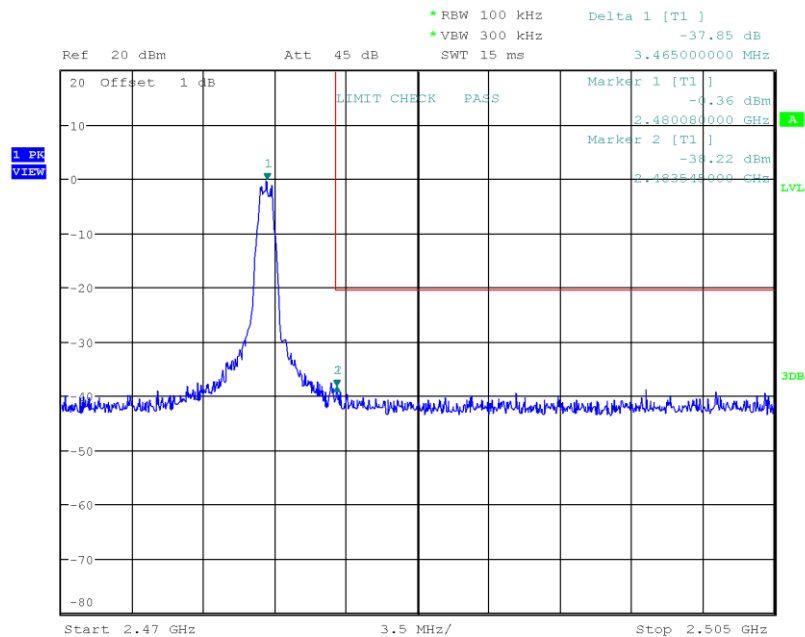
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 7.8.6, 6.10.4
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Band-edge: Lower
 In-band Frequency [MHz]: 2402.112
 Max. in-band Level [dBm/100 kHz]: -0.039
 Out-of-band Frequency [MHz]: 2399.904
 Max. out-of-band Level [dBm/100 kHz]: -34.394
 Attenuation [dB]: -34.35



Date: 17.JUN.2019 05:33:16

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 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: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Band-edge: Upper
 In-band Frequency [MHz]: 2480.08
 Max. in-band Level [dBm/100 kHz]: -0.364
 Out-of-band Frequency [MHz]: 2483.545
 Max. out-of-band Level [dBm/100 kHz]: -38.217
 Attenuation [dB]: -37.85



Date: 17.JUN.2019 05:46:33

3.7 Test Conditions and Results - Conducted spurious emissions

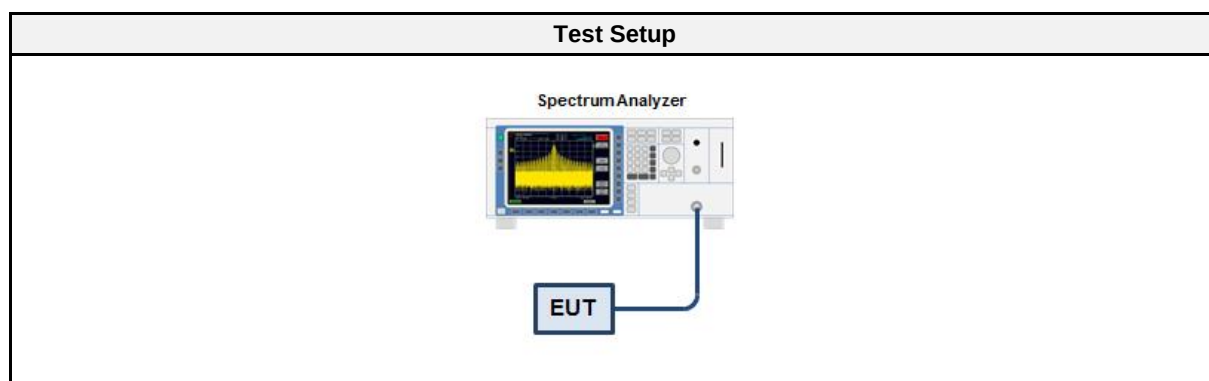
3.7.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2019-06-17

3.7.2 Limits

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

3.7.3 Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.7.5 Procedure

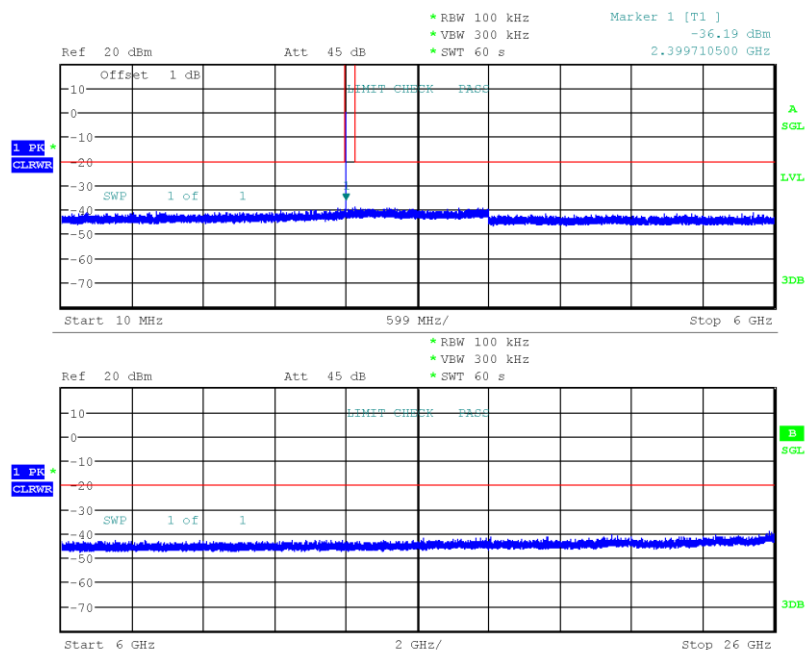
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge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

3.7.6 Results

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

Conducted Spurious Emissions

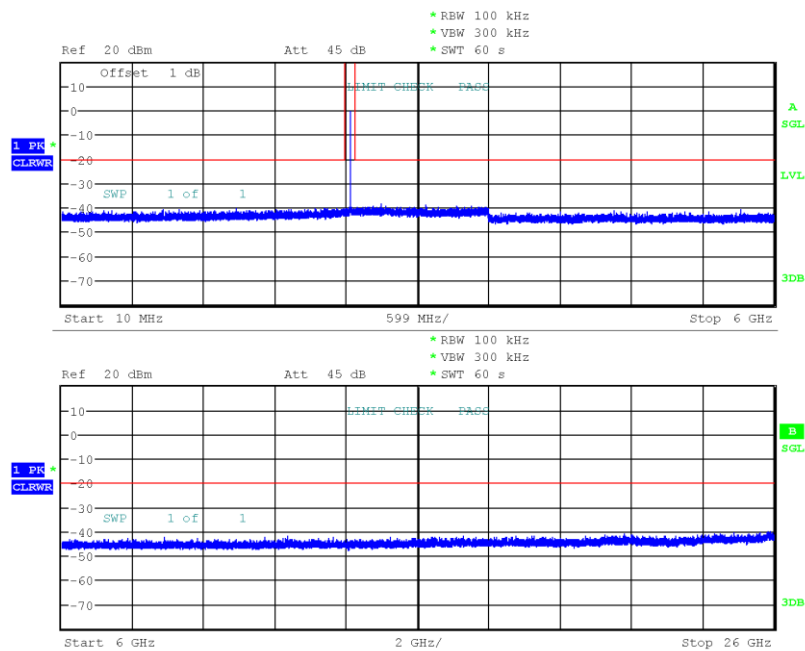
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Max. in-band Frequency [MHz]: 2402.1
 Max. in-band Level [dBm/100 kHz]: 0.1
 Out-of-band Limit [dBm/100 kHz]: -19.9



Date: 17.JUN.2019 06:44:54

Conducted Spurious Emissions

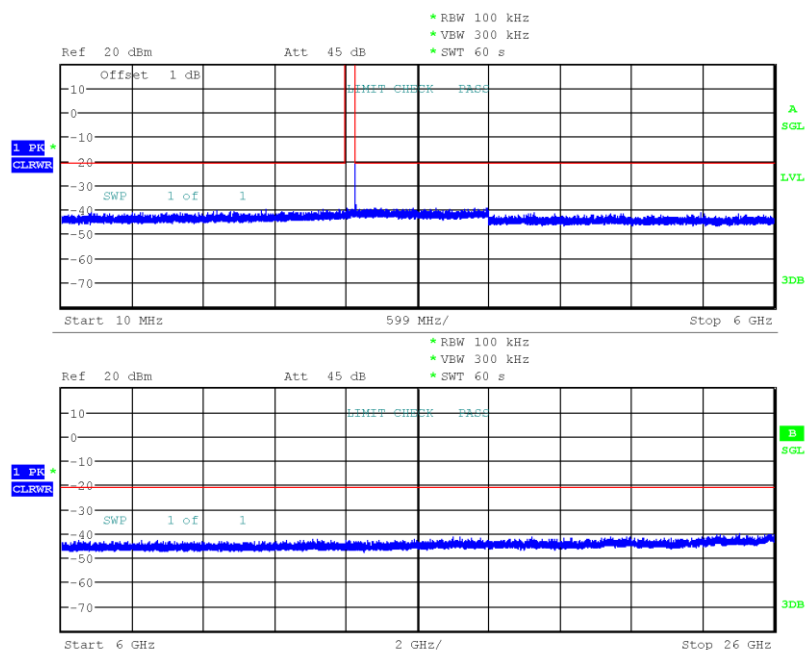
Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Max. in-band Frequency [MHz]: 2440.1
 Max. in-band Level [dBm/100 kHz]: -0.1
 Out-of-band Limit [dBm/100 kHz]: -20.1



Date: 17.JUN.2019 05:58:12

Conducted Spurious Emissions

Project Number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 Model Description: Bluetooth Module
 Model: ARL
 Test Sample ID: 23839
 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: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-17
 Max. in-band Frequency [MHz]: 2480.1
 Max. in-band Level [dBm/100 kHz]: -0.4
 Out-of-band Limit [dBm/100 kHz]: -20.4



Date: 17.JUN.2019 05:53:26

3.8 Test Conditions and Results - Transmitter radiated emissions

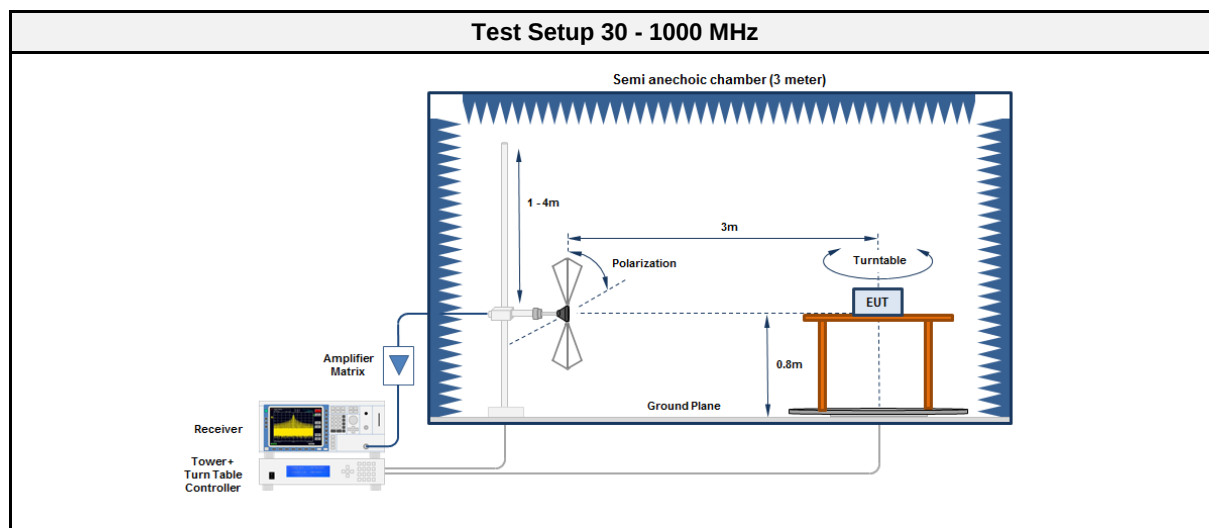
3.8.1 Information

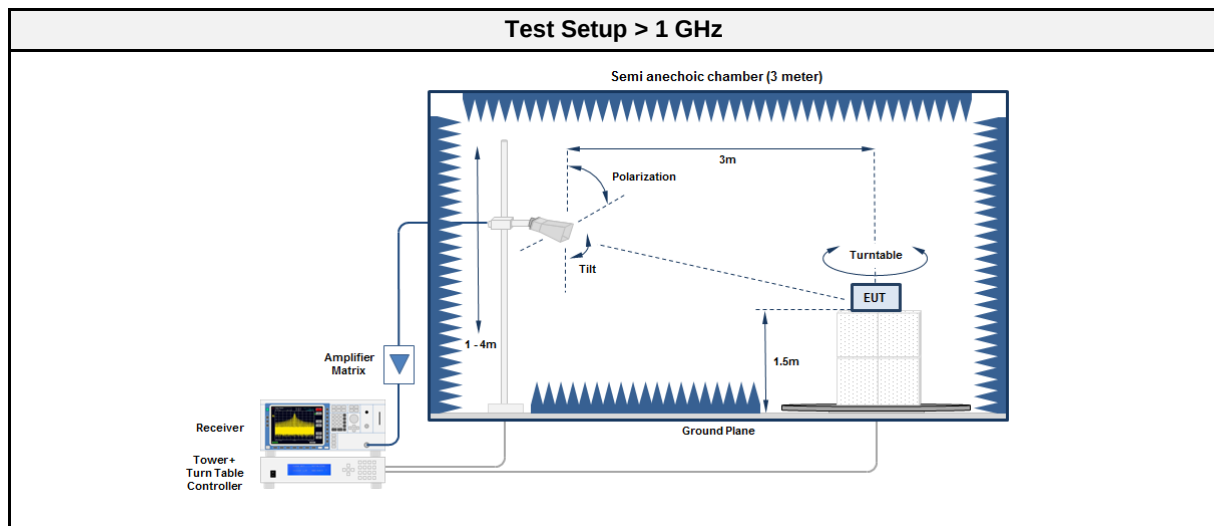
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISSED RSS-Gen, Issue 5 (section 6.13)
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2019-06-07

3.8.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [$\mu\text{V/m}$]	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

3.8.3 Setup





3.8.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMaton	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00013	2018-06	2020-06

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF01153	2018-09	2019-09
Antenna	Amplifier Research	AT4560	EF01152	2018-10	2019-10

3.8.5 Procedure

Test Procedure < 30 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 EUT is rotated through 360°
4.	The emissions are measured with peak detector and max hold
5.	All significant emissions are measured again using the corresponding final detector

Test Procedure 30 - 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

3.8.6 Results

Test Results

Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2402	37.899	32.39	qpk	ver	40.00	-07.61
2402	73.04	33.71	qpk	ver	40.00	-06.29
2402	2389.7	58.46	pk	hor	74.00	-15.54
2402	2389.7	38.59	RMS	hor	54.00	-15.41
2402	2389.9	55.14	pk	ver	74.00	-18.86
2402	2389.9	38.32	RMS	ver	54.00	-15.68
2440	2483.5	45.22	pk	hor	74.00	-28.78
2440	7319	58.12	pk	hor	74.00	-15.88
2440	7319	51.84	RMS	hor	54.00	-02.16
2440	7321	58.29	pk	ver	74.00	-15.71
2440	7321	51.51	RMS	ver	54.00	-02.49
2480	2483.5	68.11	pk	hor	74.00	-05.89
2480	2483.5	43.40	RMS	hor	54.00	-10.60
2480	2483.5	63.50	pk	ver	74.00	-10.50
2480	2483.5	41.05	RMS	ver	54.00	-12.95
2480	7441	58.79	pk	hor	74.00	-15.21
2480	7441	51.49	RMS	hor	54.00	-02.51
2480	7441	59.14	pk	ver	74.00	-14.86
2480	7441	52.04	RMS	ver	54.00	-01.96

3.9 Test Conditions and Results - Receiver radiated emissions

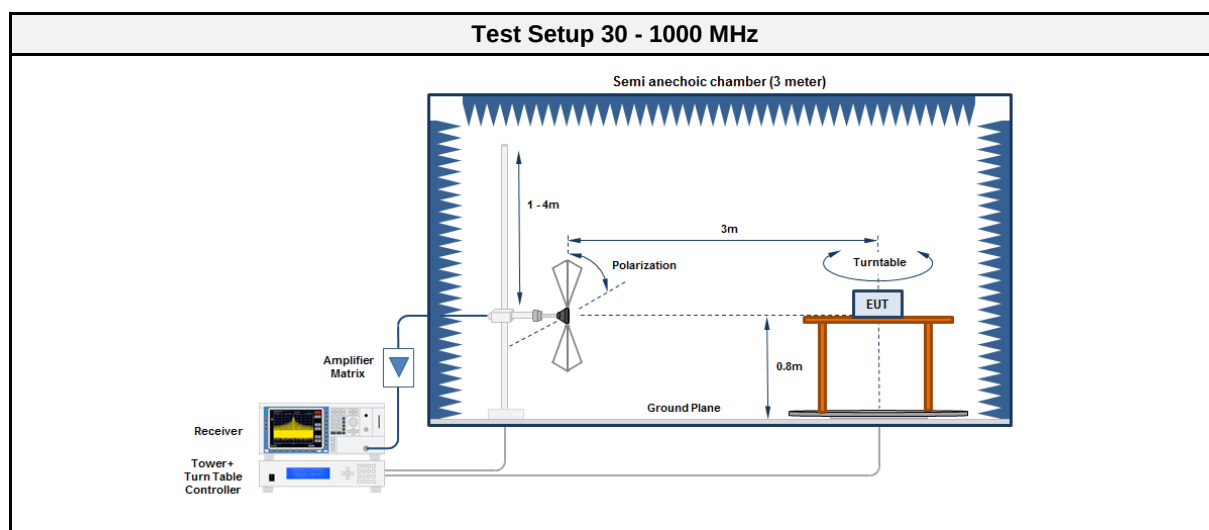
3.9.1 Information

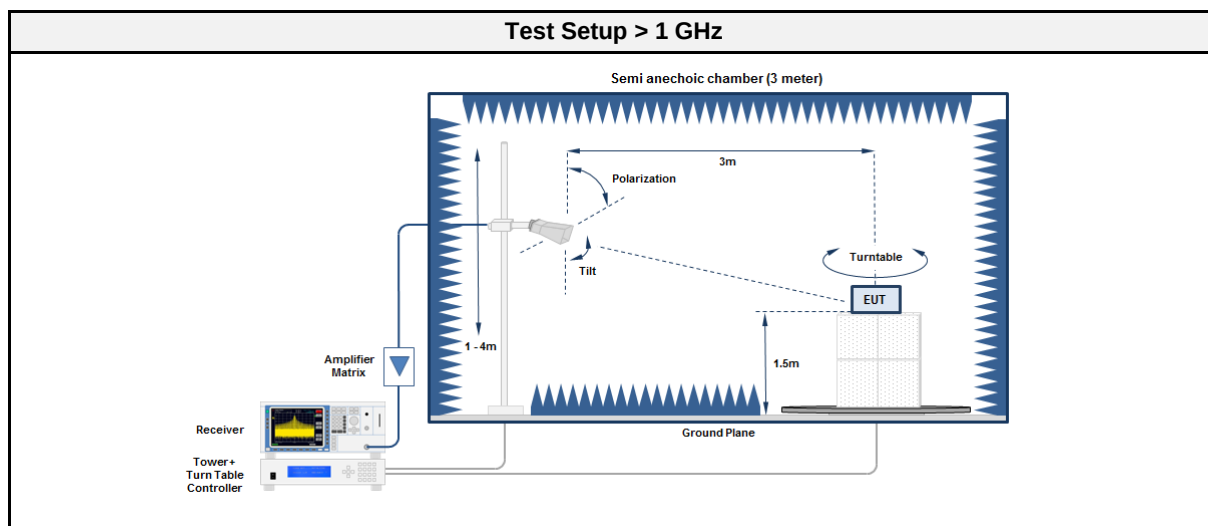
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2019-06-05

3.9.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dB μ V/m]	Measurement distance [m]
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

3.9.3 Setup





3.9.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00013	2018-06	2020-06

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF01153	2018-09	2019-09

3.9.5 Procedure

Test Procedure 30 - 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

3.9.6 Results

Test Results

Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2440	31.335	38.38	qpk	ver	40.00	-01.62
2440	31.358	38.04	qpk	hor	40.00	-01.96
2440	49.386	37.33	qpk	ver	40.00	-02.67
2440	54.095	35.73	qpk	ver	40.00	-04.27
2440	58.791	37.48	qpk	ver	40.00	-02.52
2440	63.511	37.92	qpk	ver	40.00	-02.08
2440	235.897	26.03	pk	hor	46.00	-19.97
2440	1827	29.84	pk	hor	53.98	-24.14
2440	4878	41.61	pk	hor	53.98	-12.37
2440	4878	43.06	pk	ver	53.98	-10.92

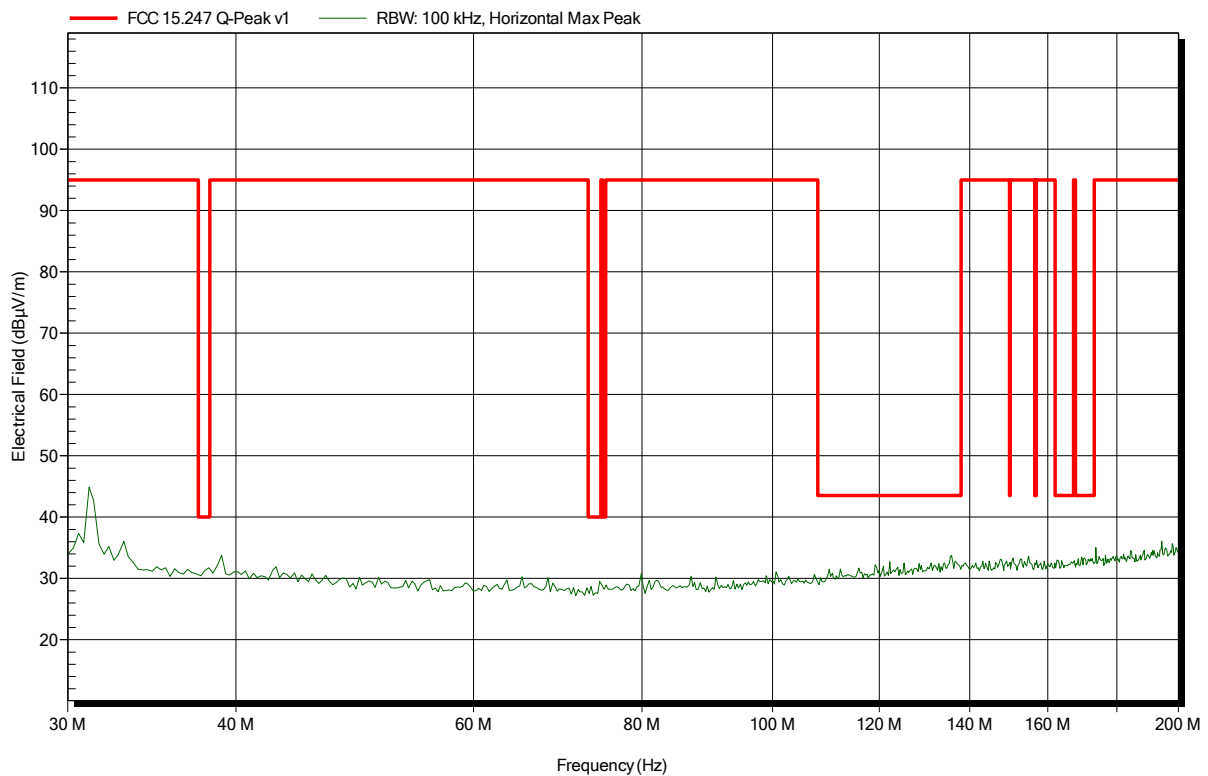
ANNEX A Transmitter spurious emissions

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2402 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 62

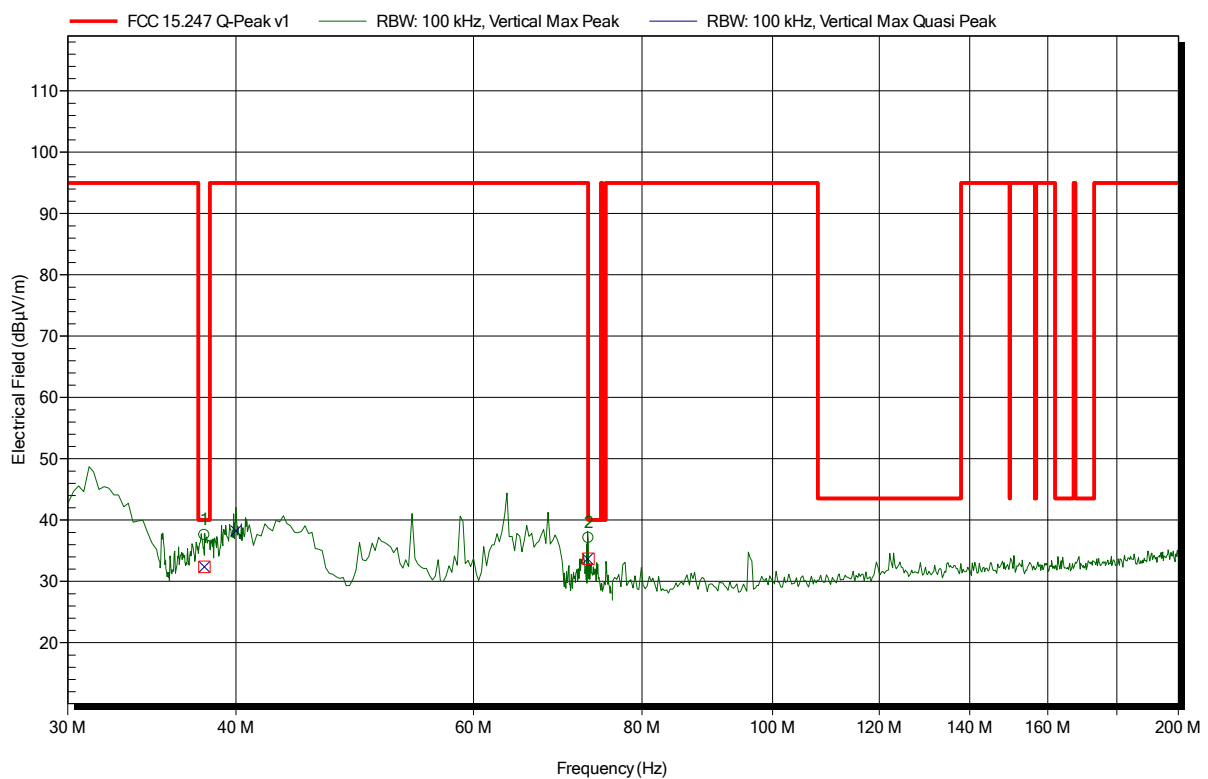


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; BLE; 2402 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 63



Frequency	Peak	Peak Limit	Peak Difference	Status
37.899 MHz	37.55 dBµV/m	-	-	-
73.04 MHz	37.1 dBµV/m	-	-	-

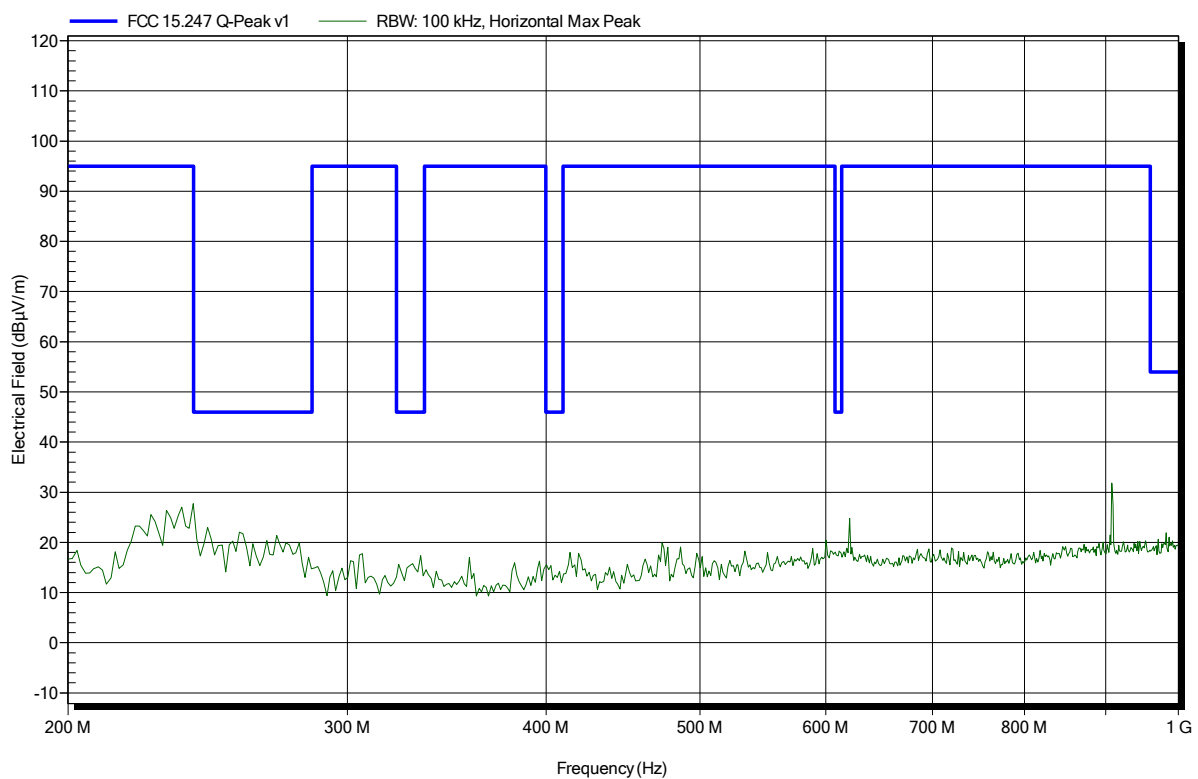
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
37.899 MHz	32.39 dBµV/m	40 dBµV/m	-7.61 dB	Pass
73.04 MHz	33.71 dBµV/m	40 dBµV/m	-6.29 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 64

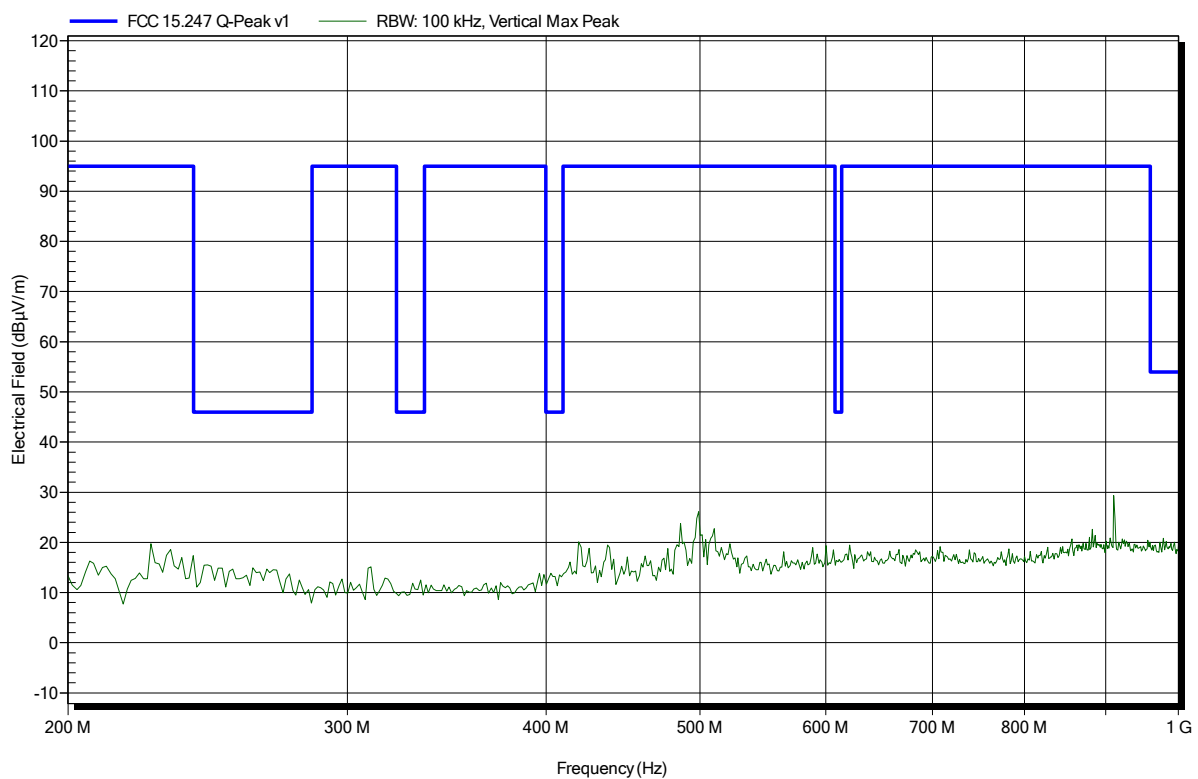


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 65

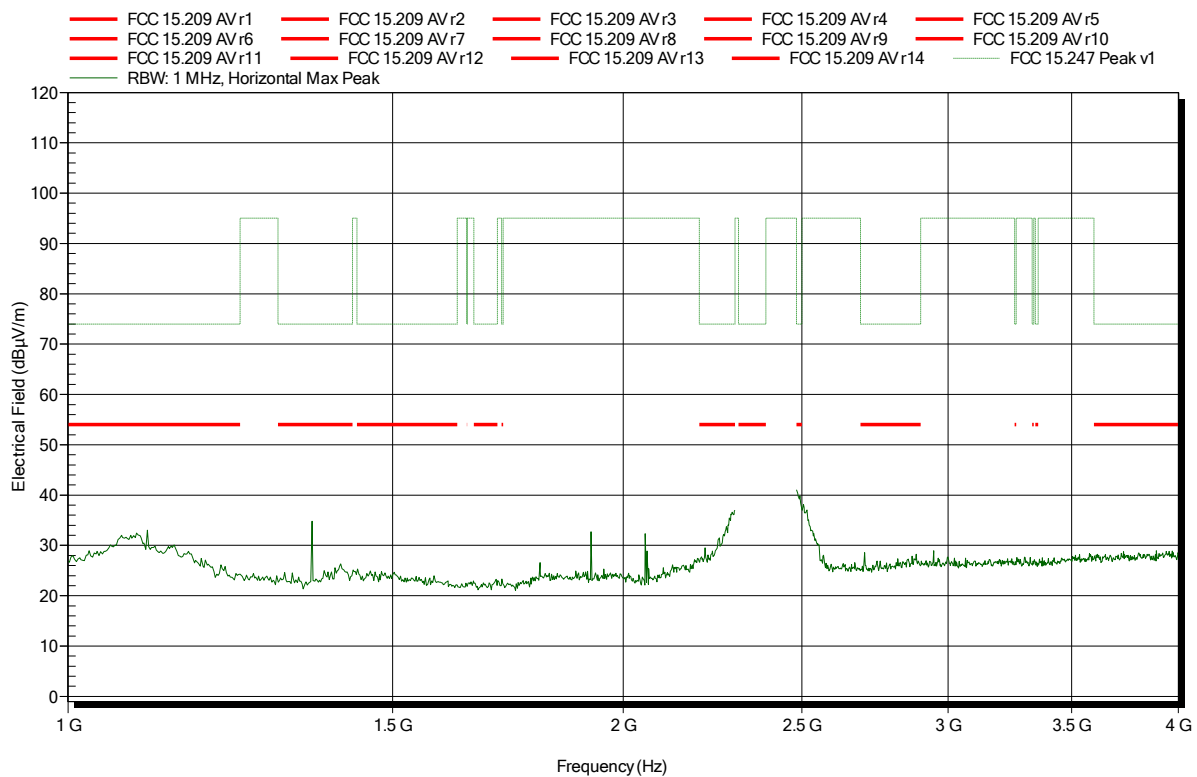


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 38

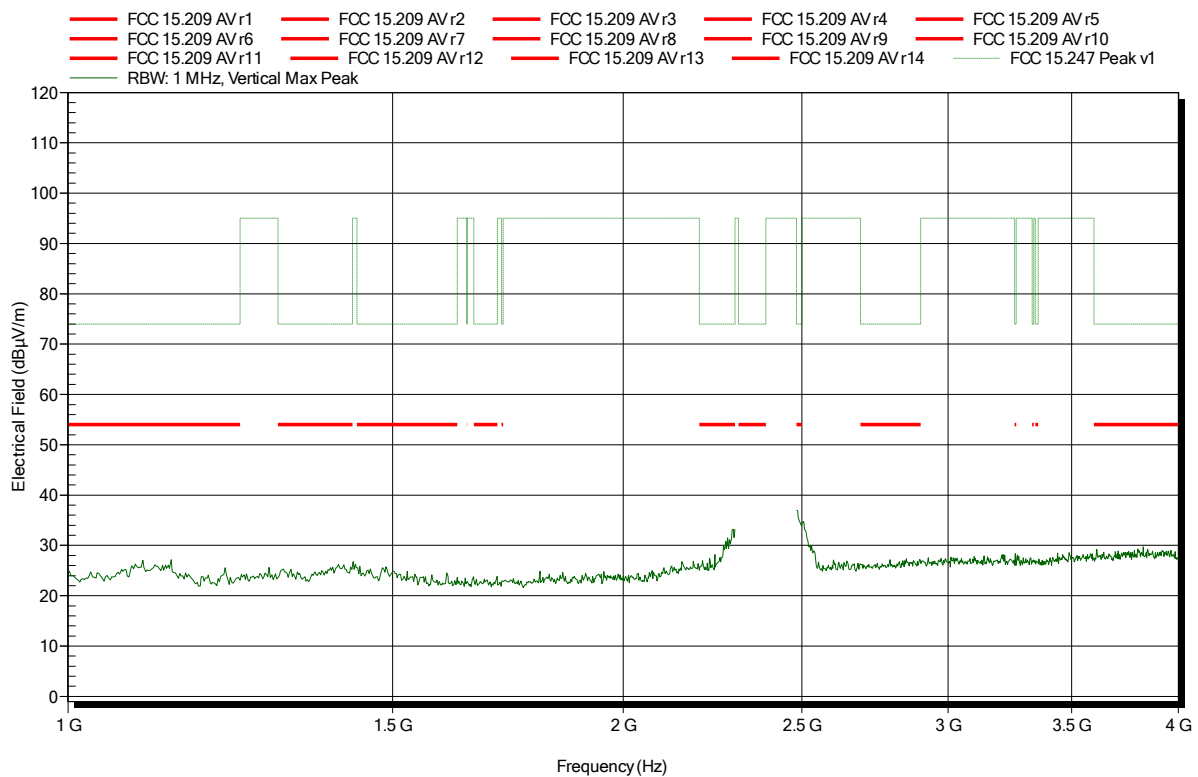


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 43

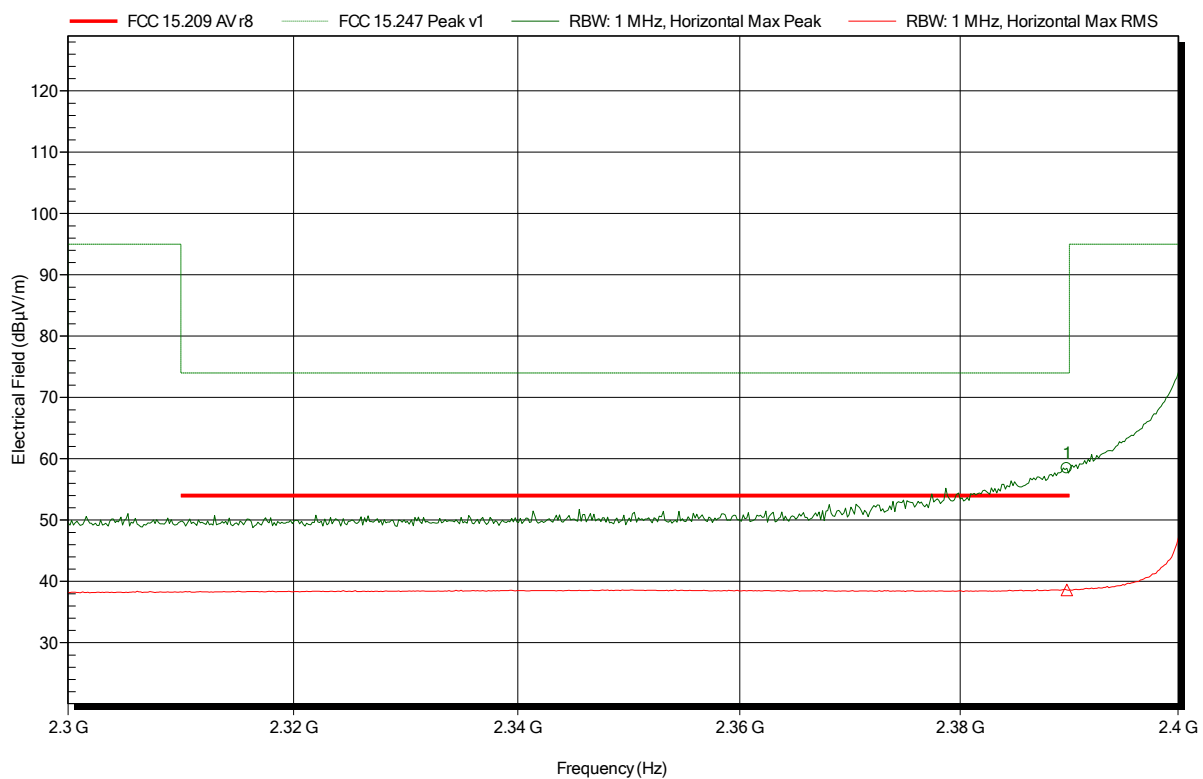


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz; 0dBm
 Test Date: 2019-06-05
 Note: lower bandedge

Index 39



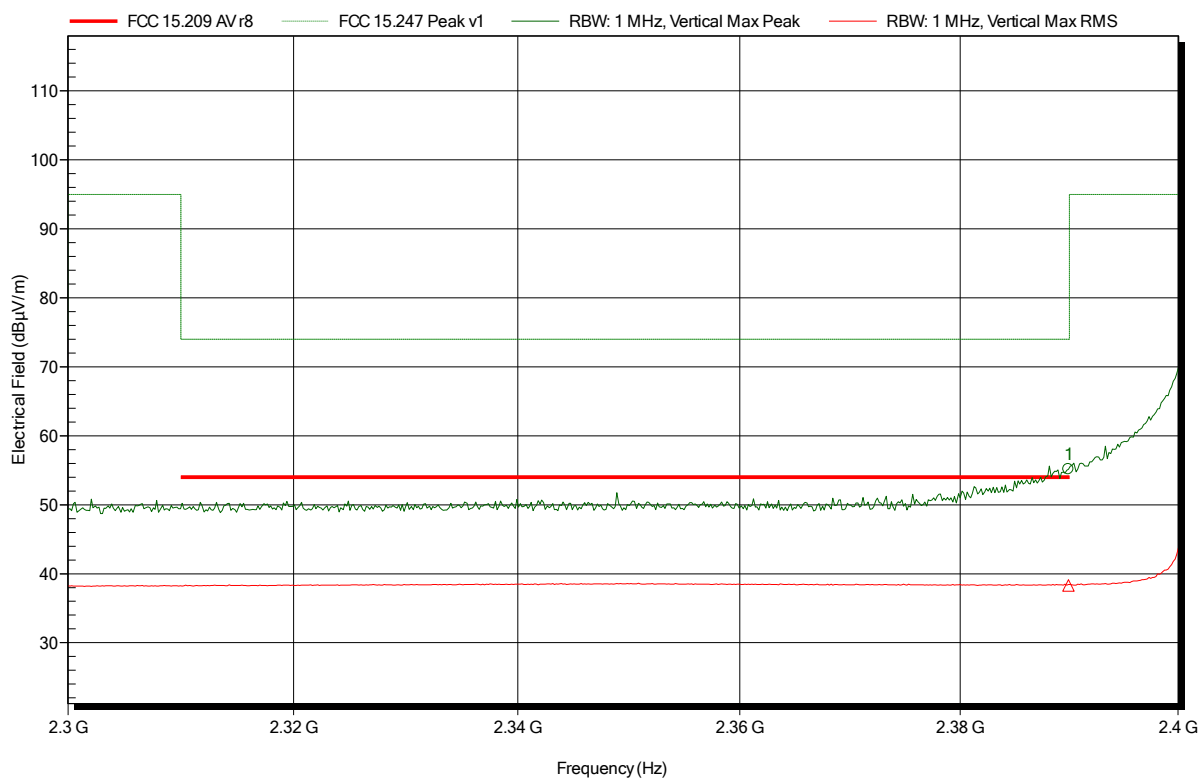
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3897 GHz	58.46 dBµV/m	74 dBµV/m	-15.54 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3897 GHz	38.59 dBµV/m	54 dBµV/m	-15.41 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note: lower bandedge

Index 44



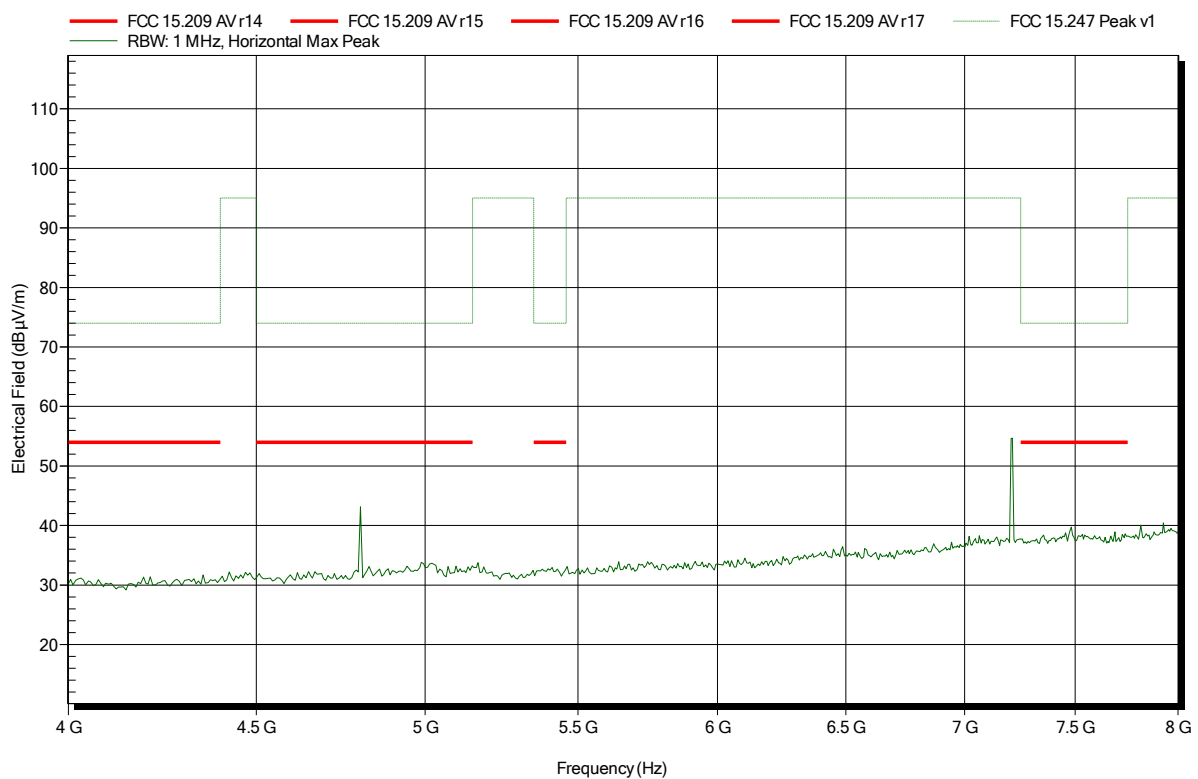
Frequency 2.3899 GHz	Peak 55.14 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -18.86 dB	Peak Status Pass
Frequency 2.3899 GHz	RMS 38.32 dBµV/m	RMS Limit 54 dBµV/m	RMS Difference -15.68 dB	RMS Status Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 40

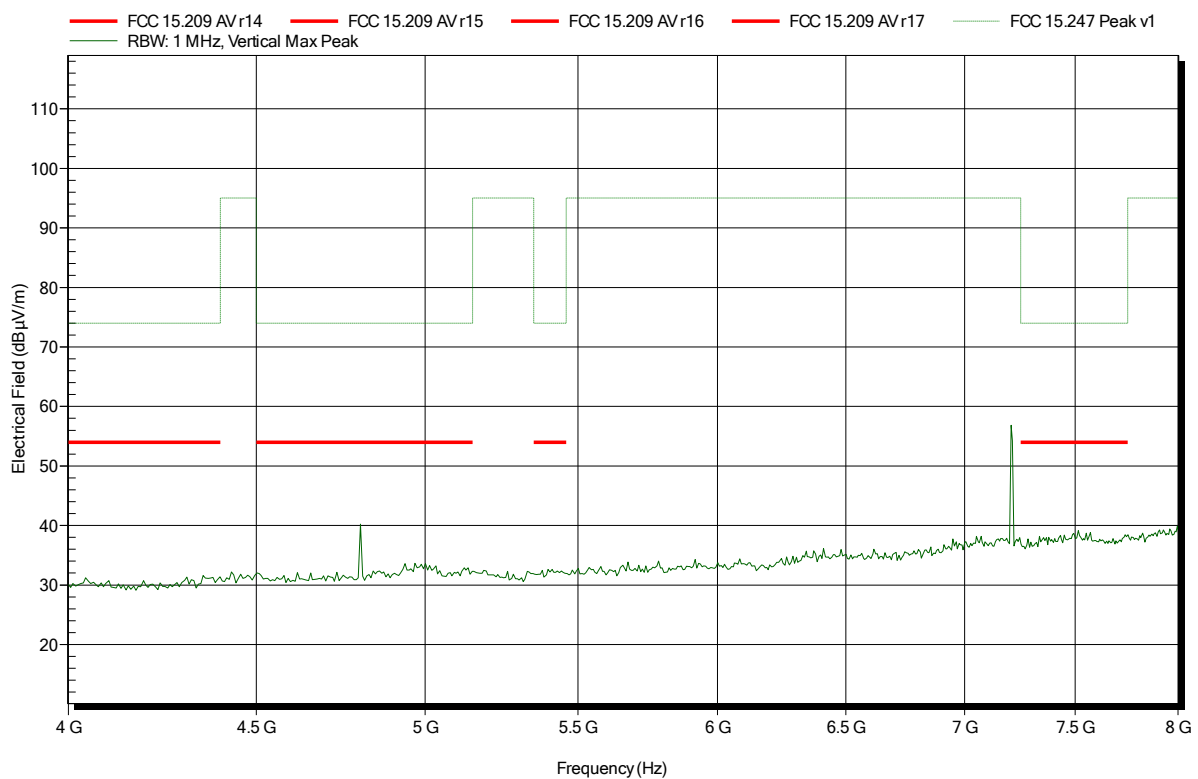


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 45

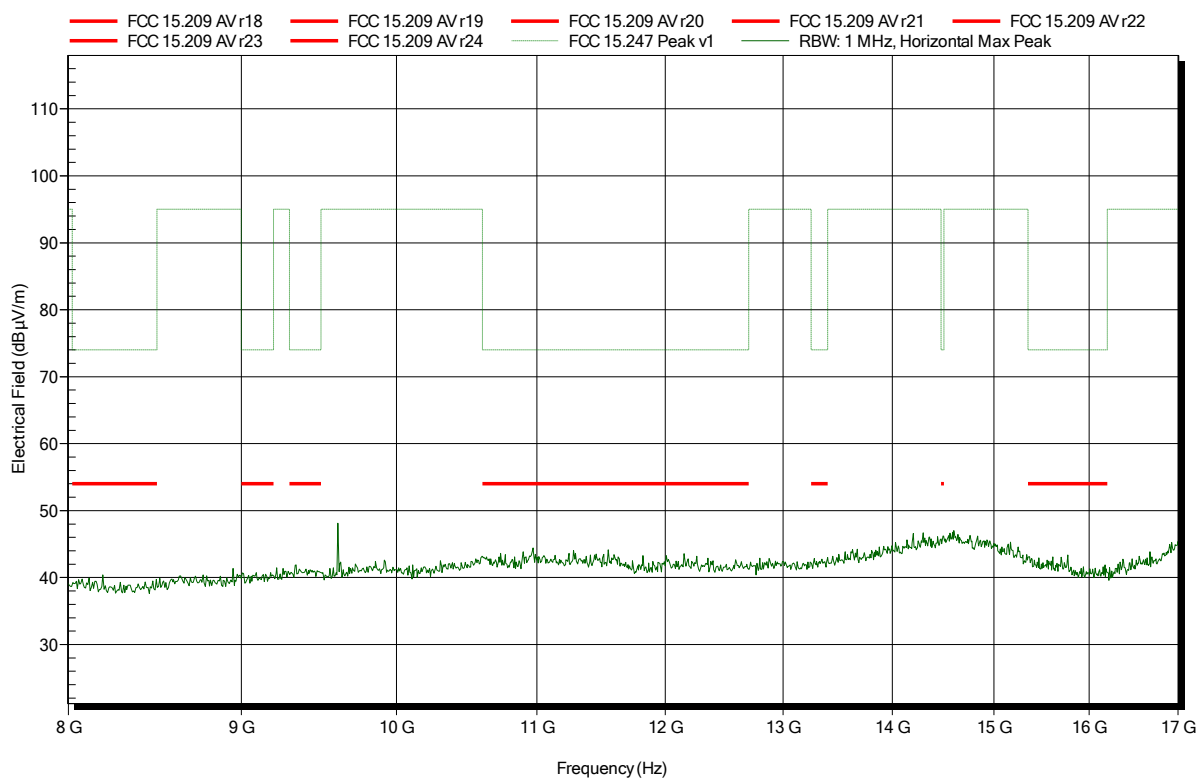


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 41

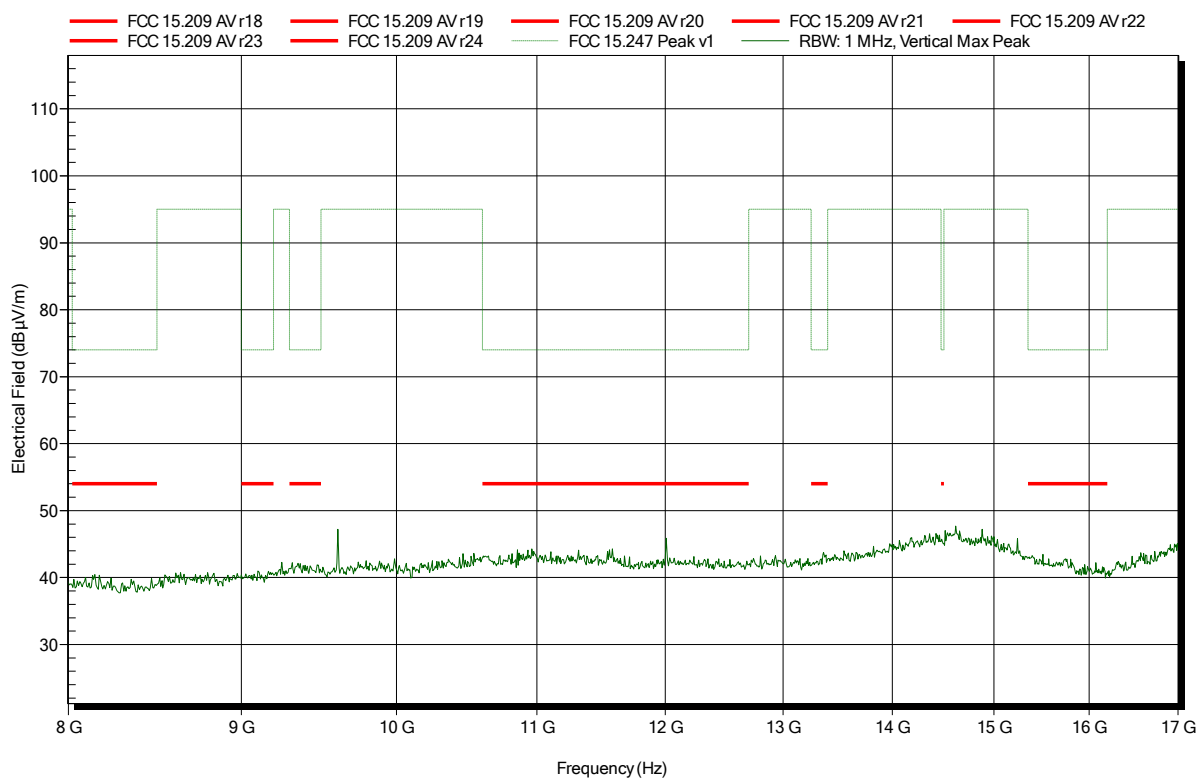


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 46

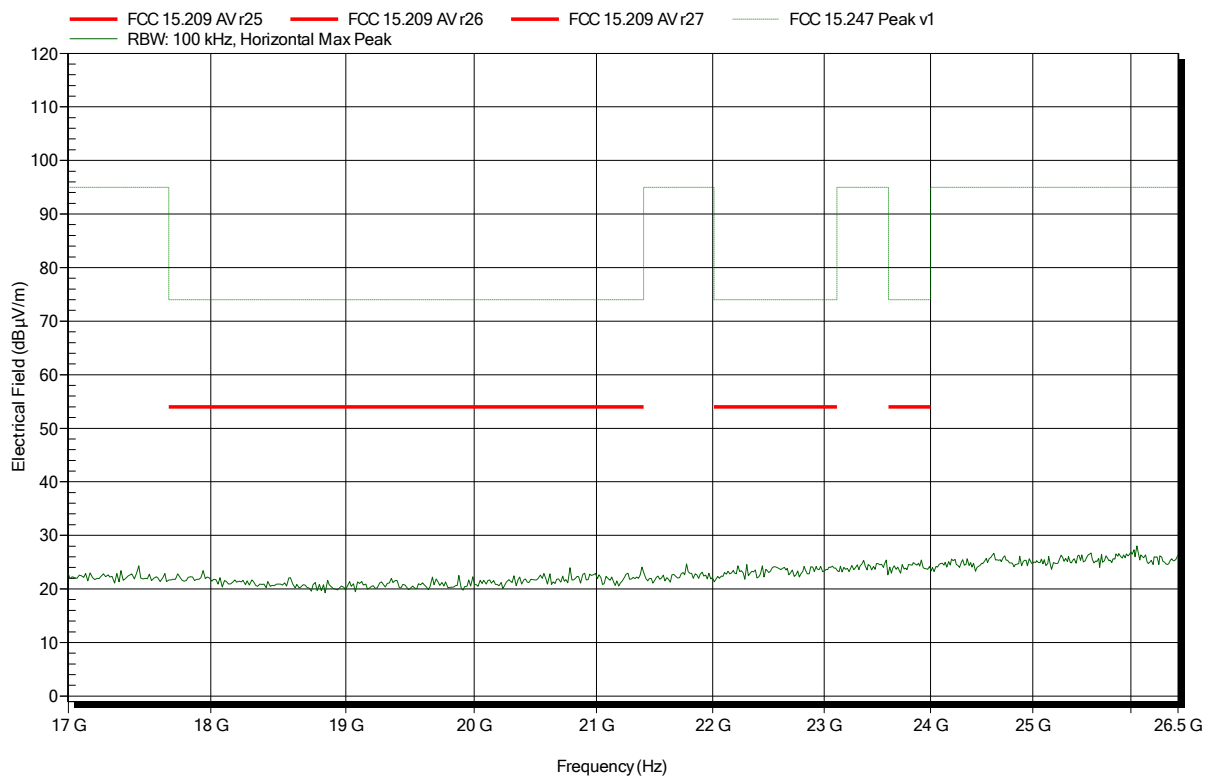


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Amplifier Research AT4560, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 42

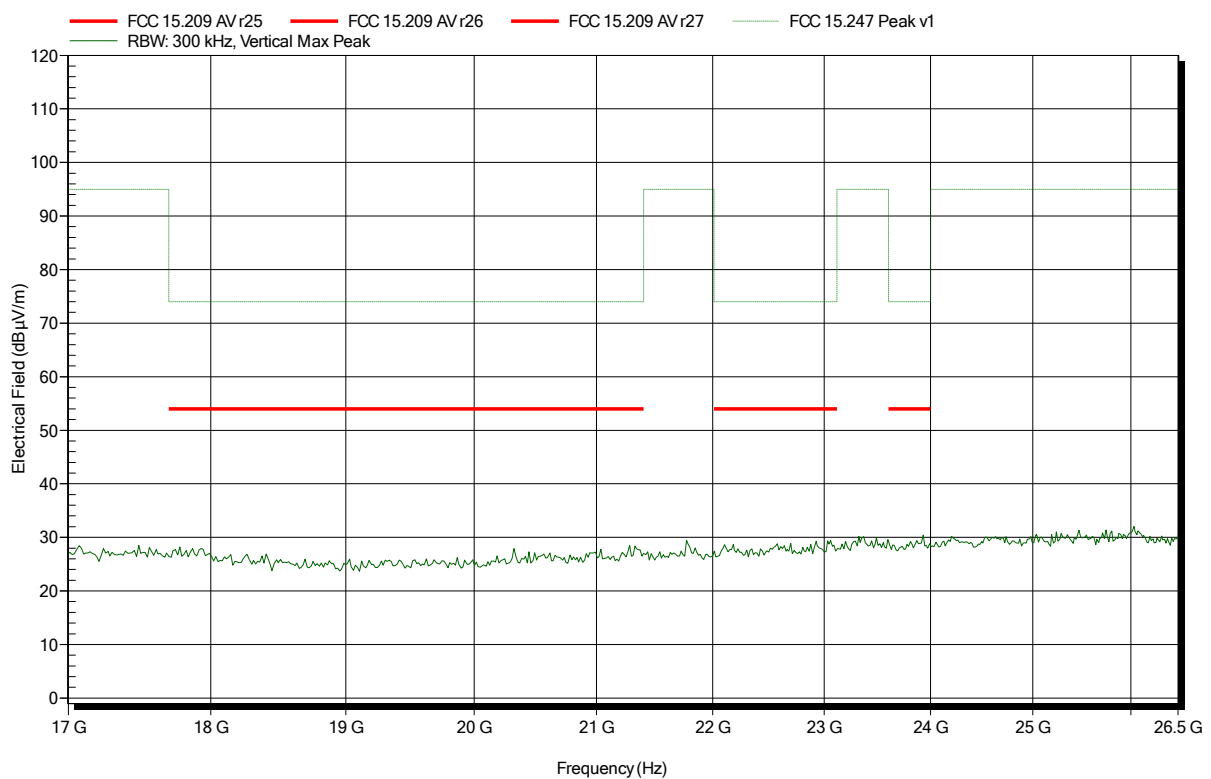


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Amplifier Research AT4560, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2402 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 47

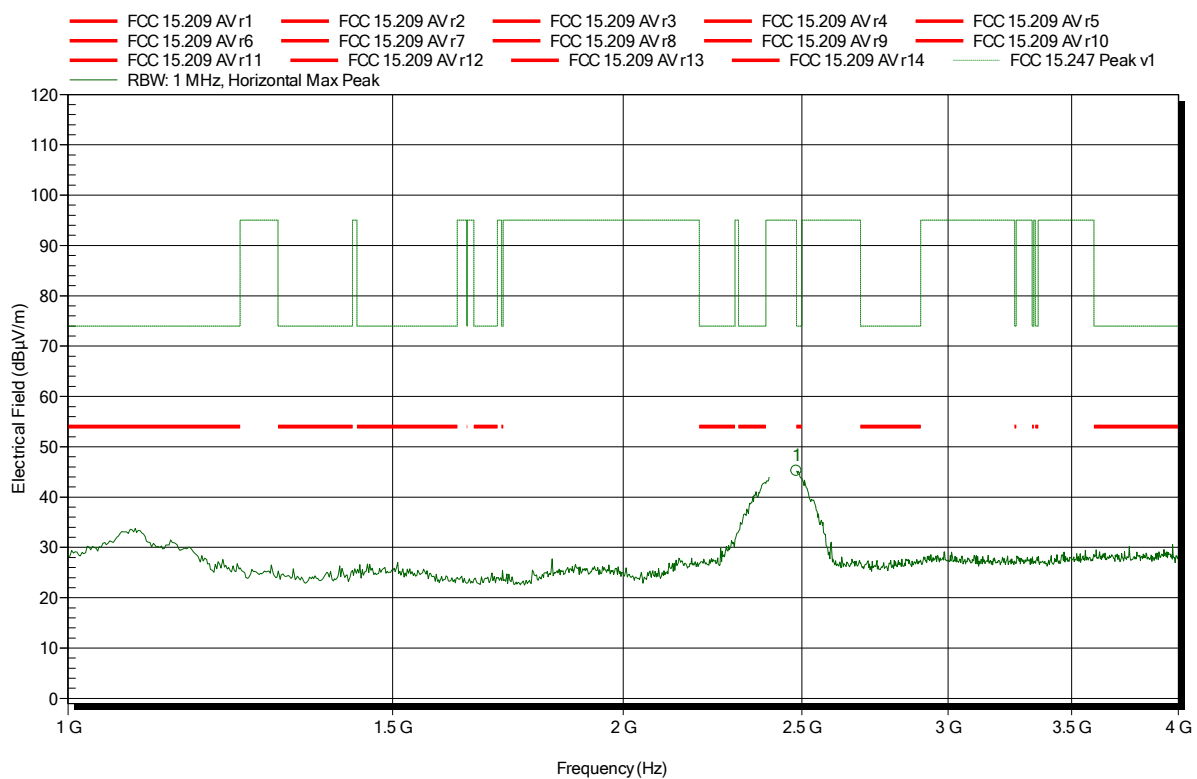


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 48



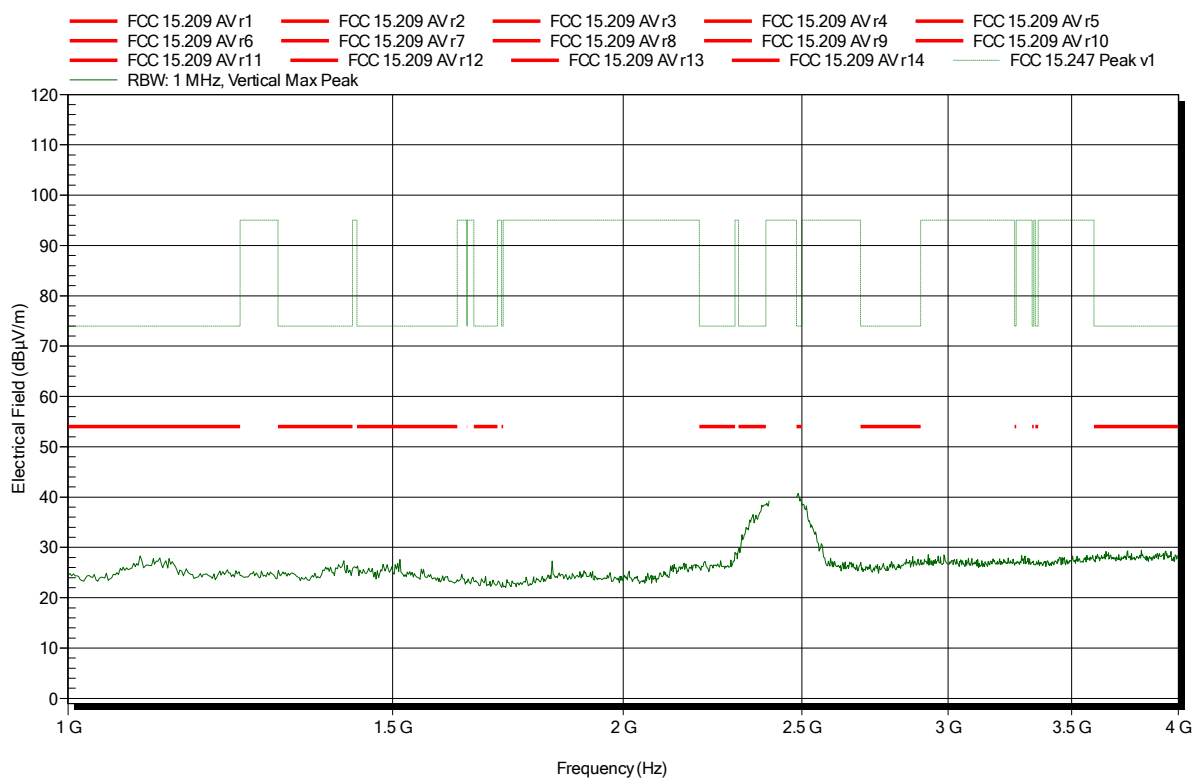
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	45.22 dBµV/m	74 dBµV/m	-28.78 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2440 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 51

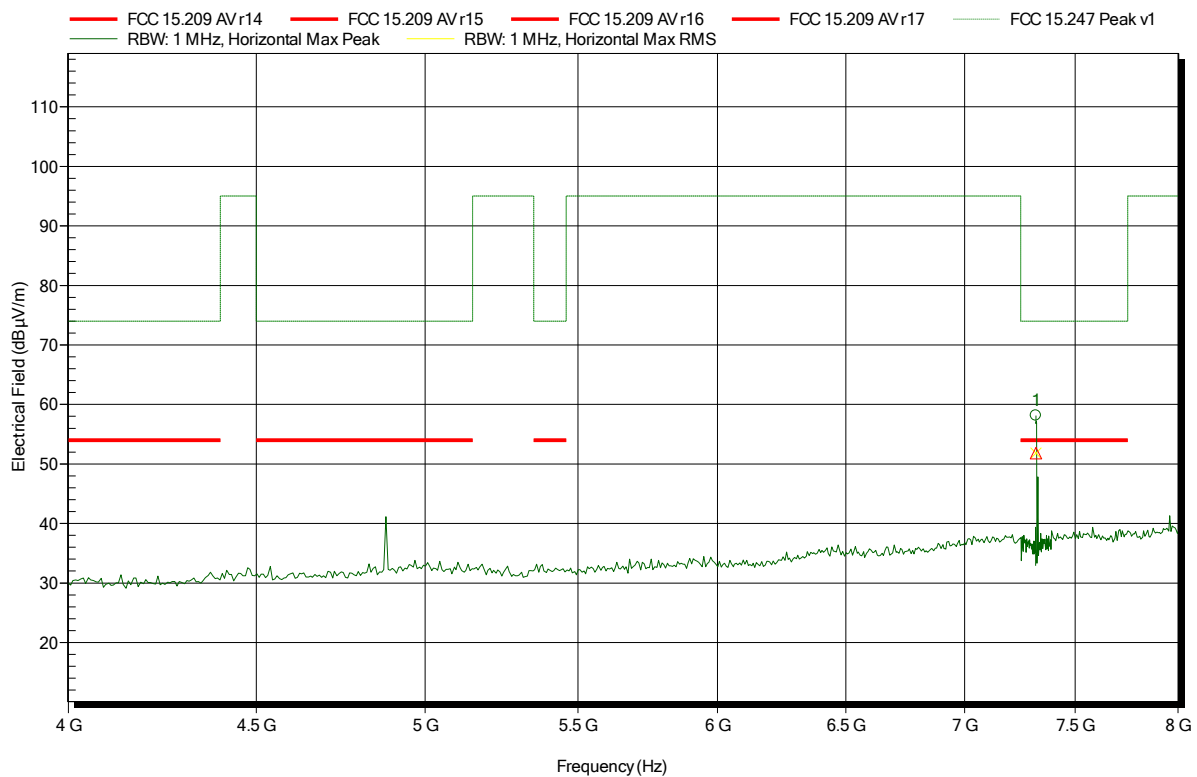


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2440 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 35



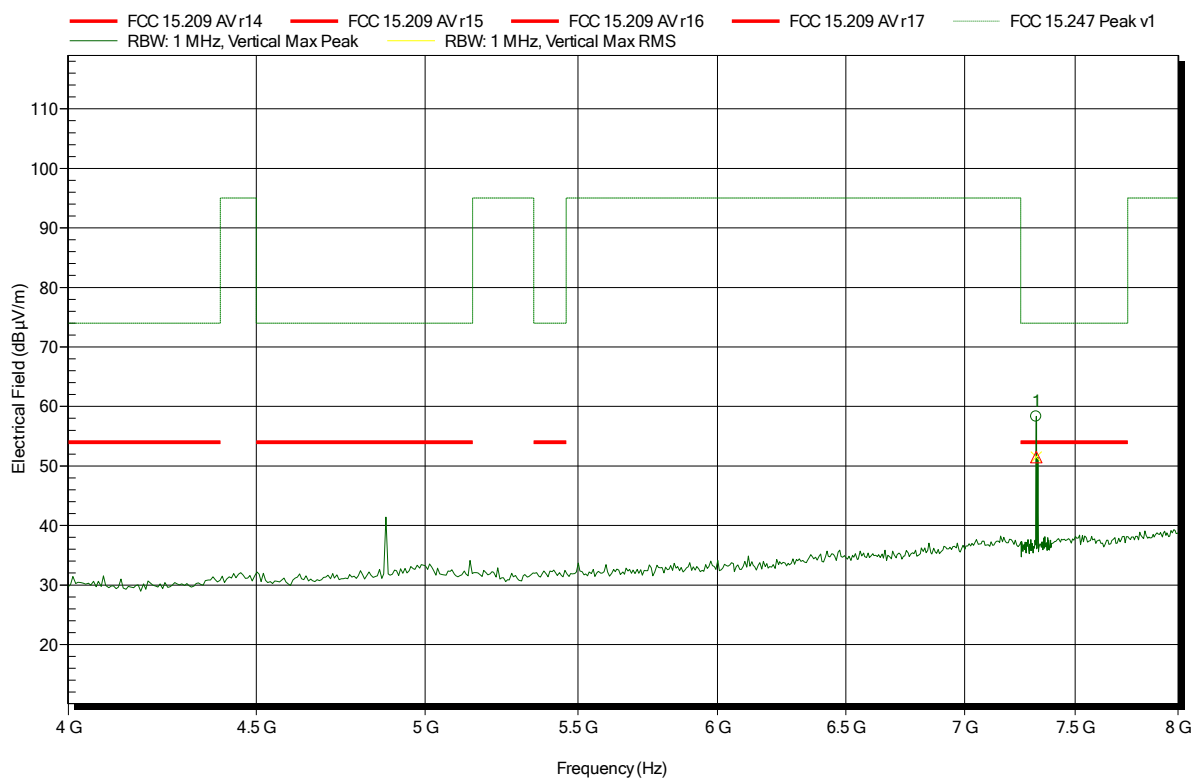
Frequency 7.319 GHz	Peak 58.12 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -15.88 dB	Peak Status Pass
Frequency 7.319 GHz	RMS 51.84 dBµV/m	RMS Limit 54 dBµV/m	RMS Difference -2.16 dB	RMS Status Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 33



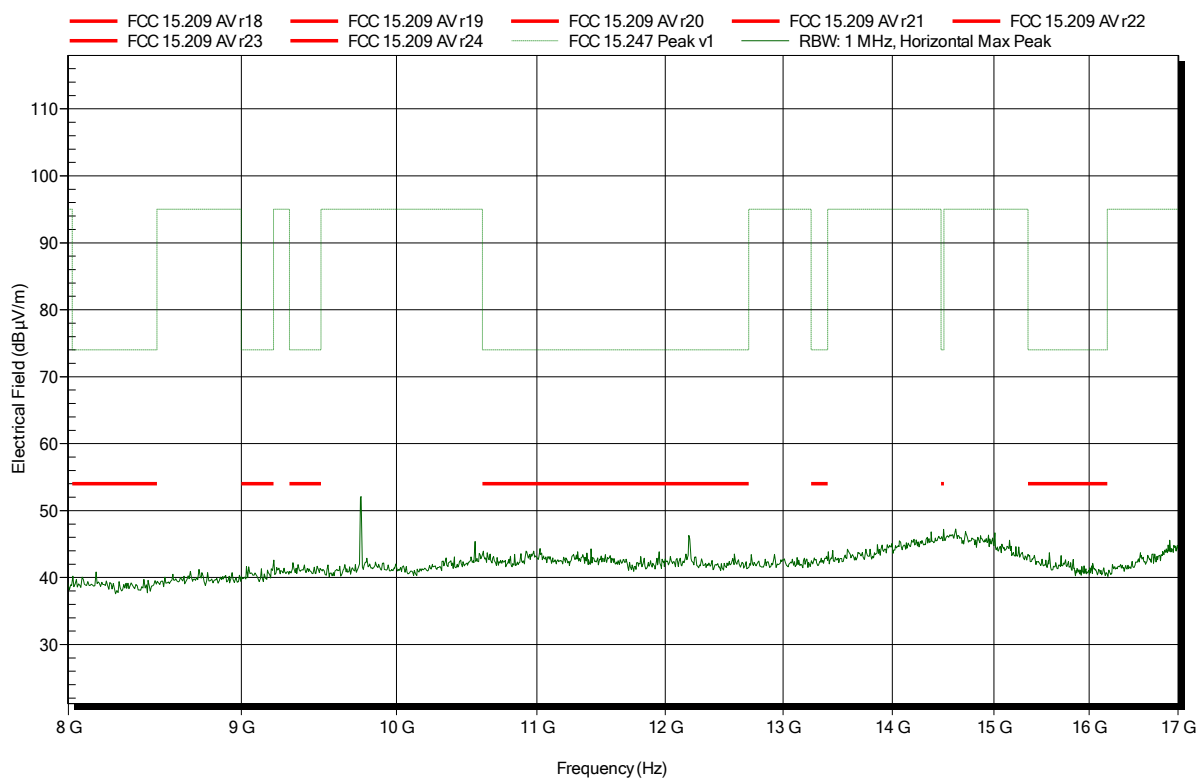
Frequency 7.321 GHz	Peak 58.29 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -15.71 dB	Peak Status Pass
Frequency 7.321 GHz	RMS 51.51 dBµV/m	RMS Limit 54 dBµV/m	RMS Difference -2.49 dB	RMS Status Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2440 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 49

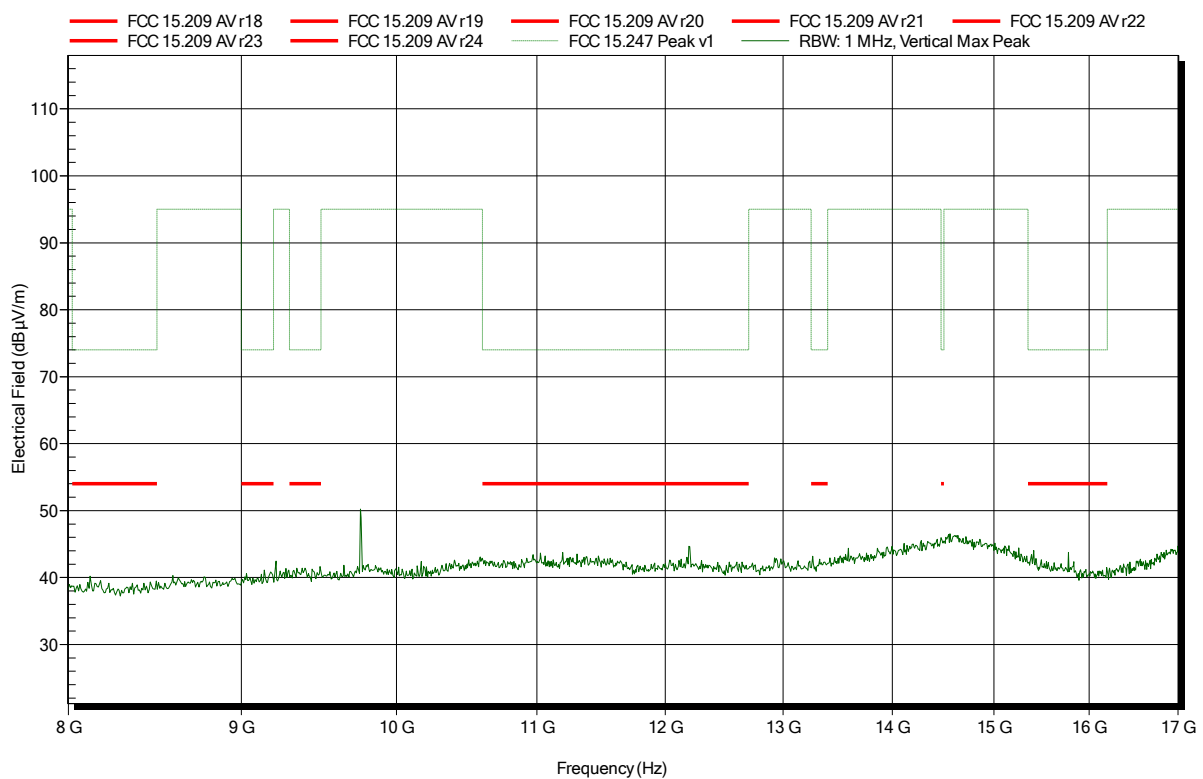


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 52

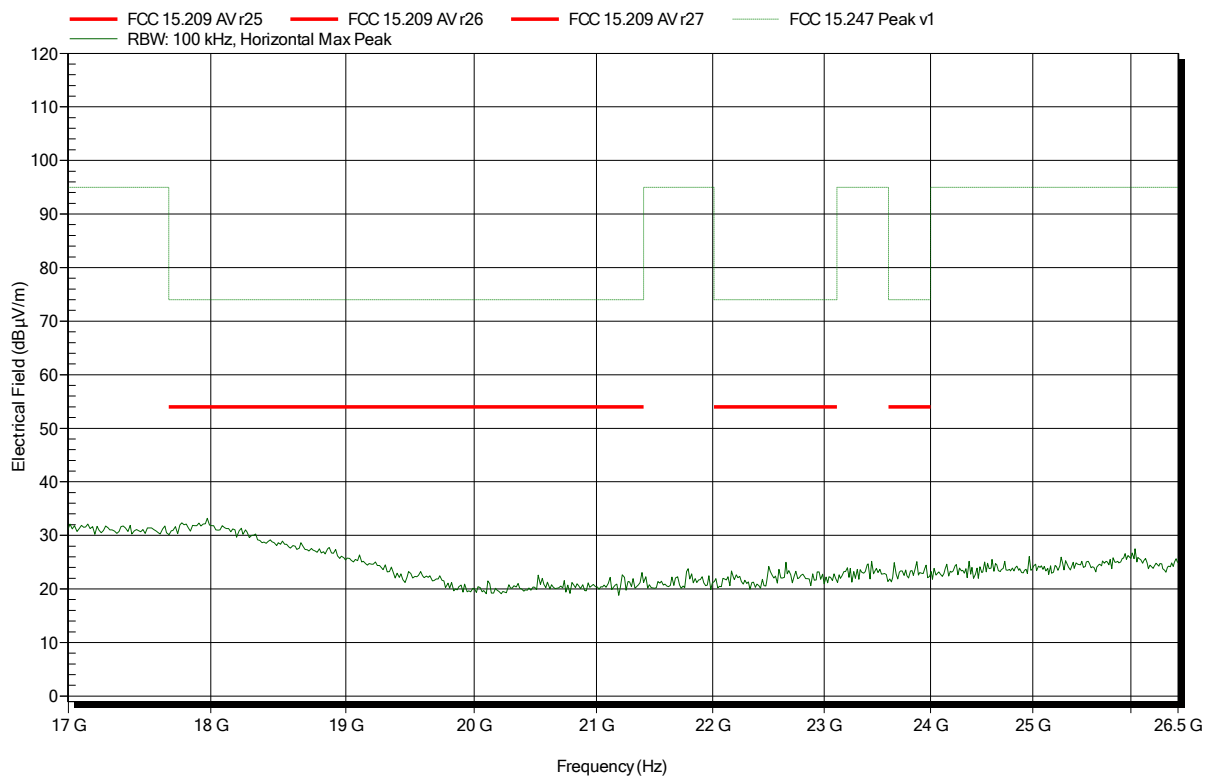


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Amplifier Research AT4560, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2440 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 50

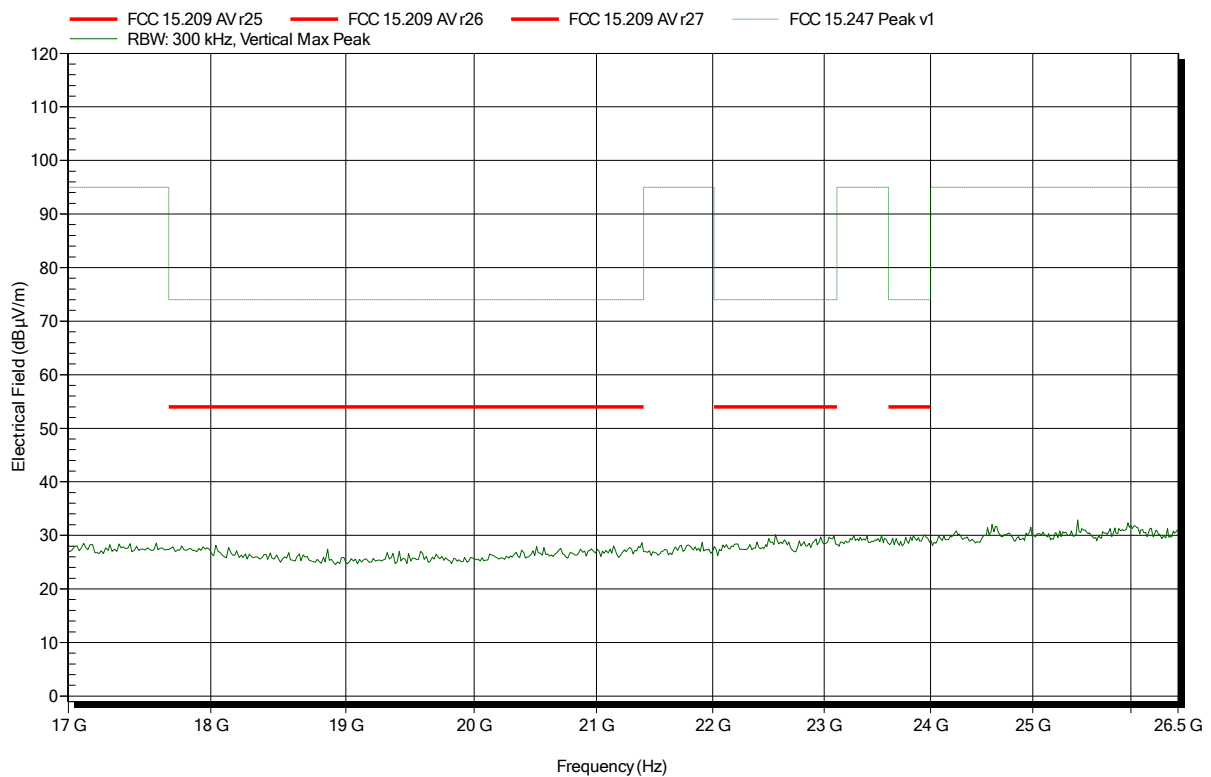


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Amplifier Research AT4560, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2440 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 53

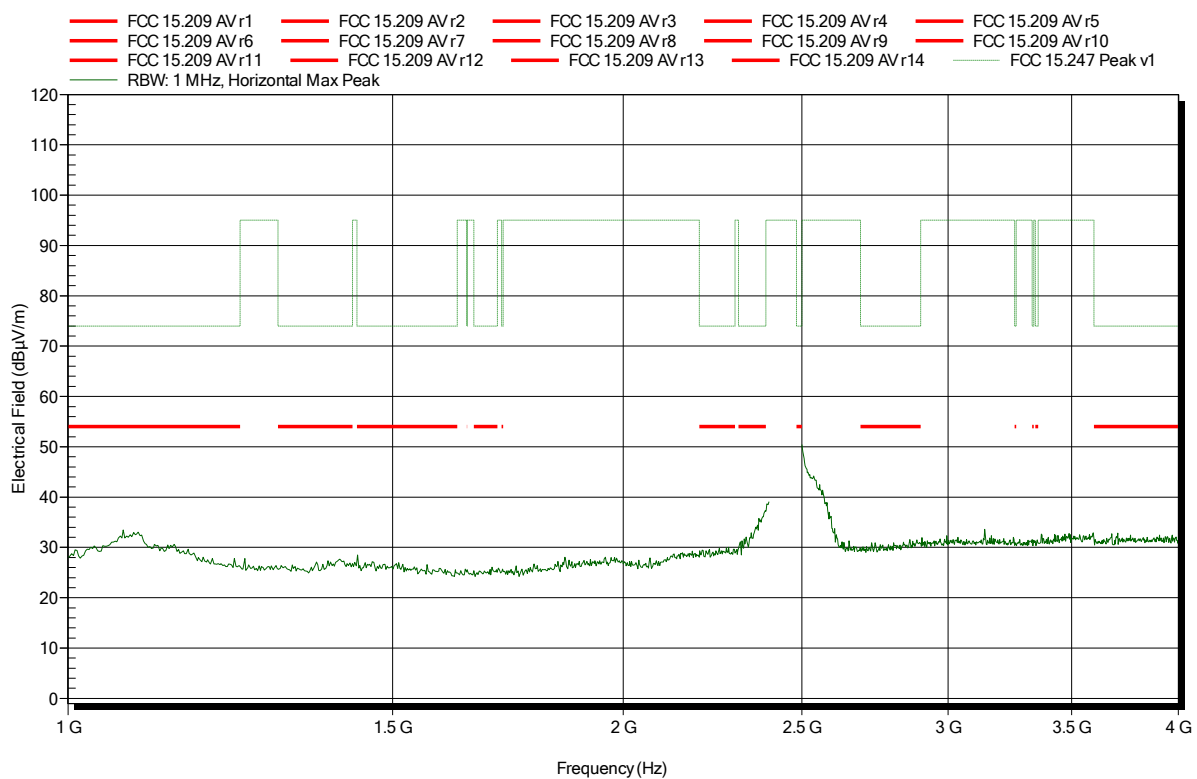


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 54

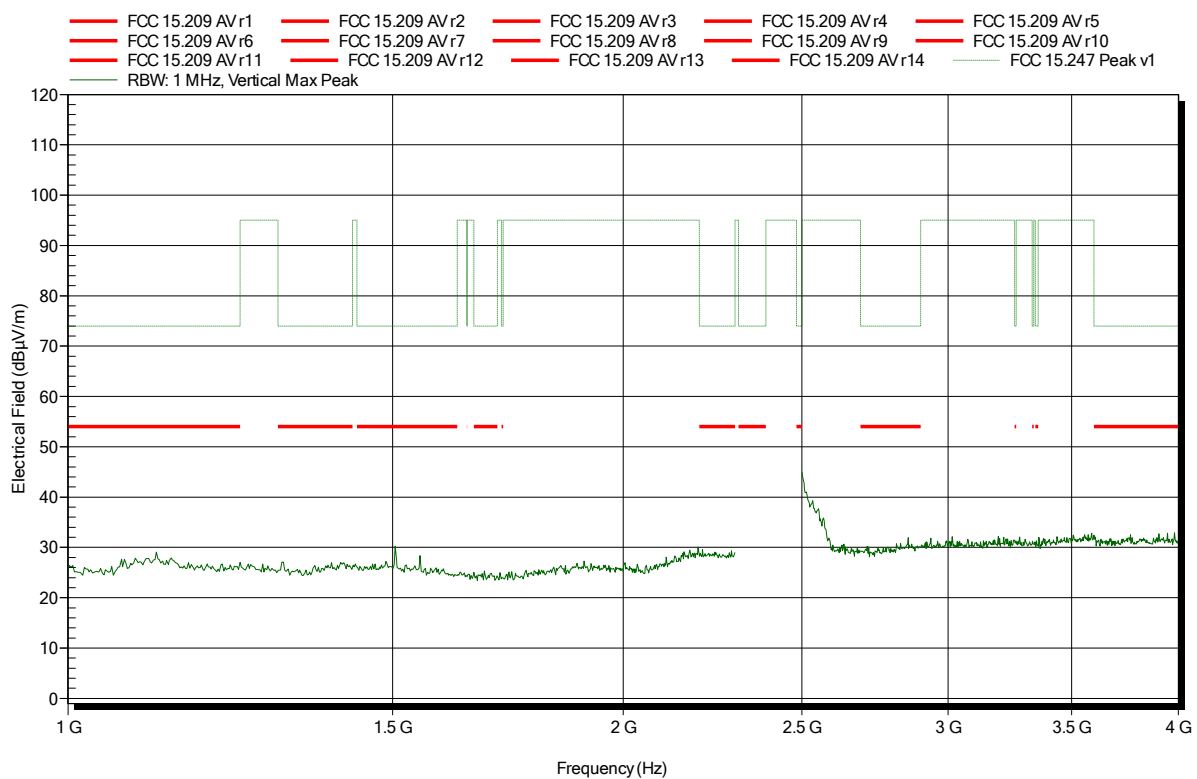


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 58

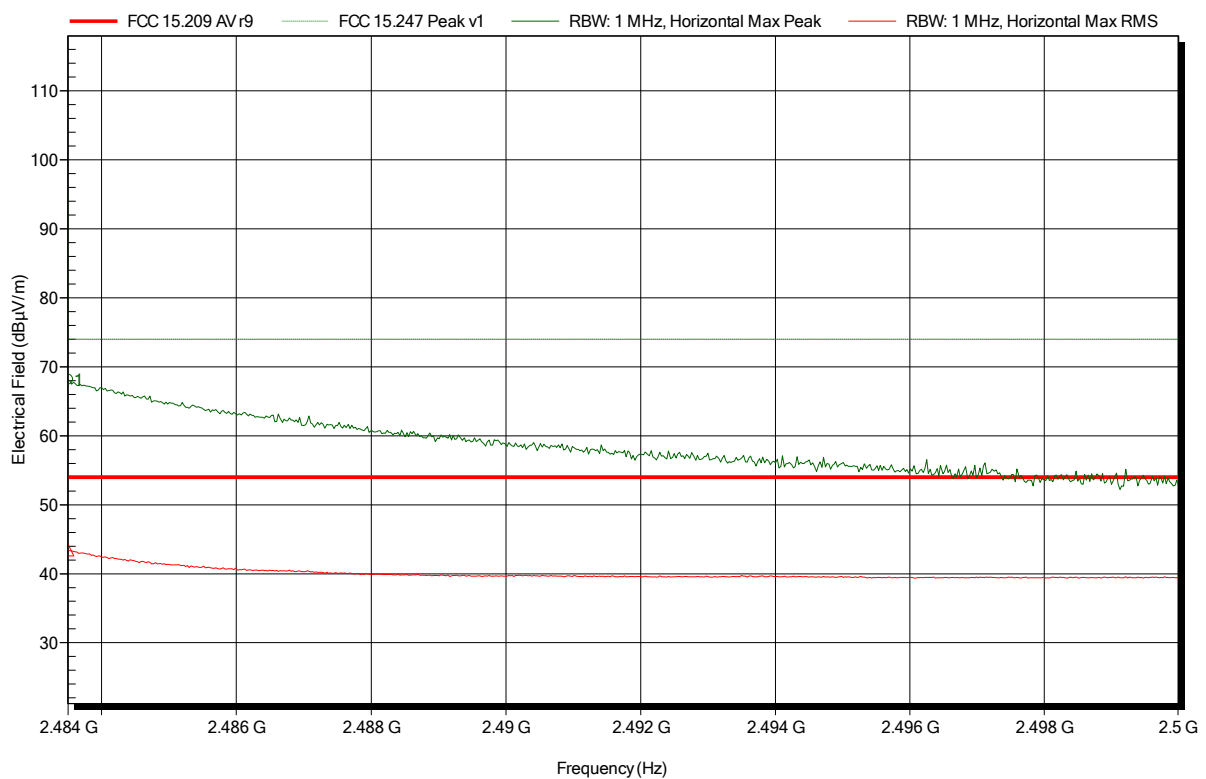


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz; 0dBm
 Test Date: 2019-06-05
 Note: upper bandedge

Index 55



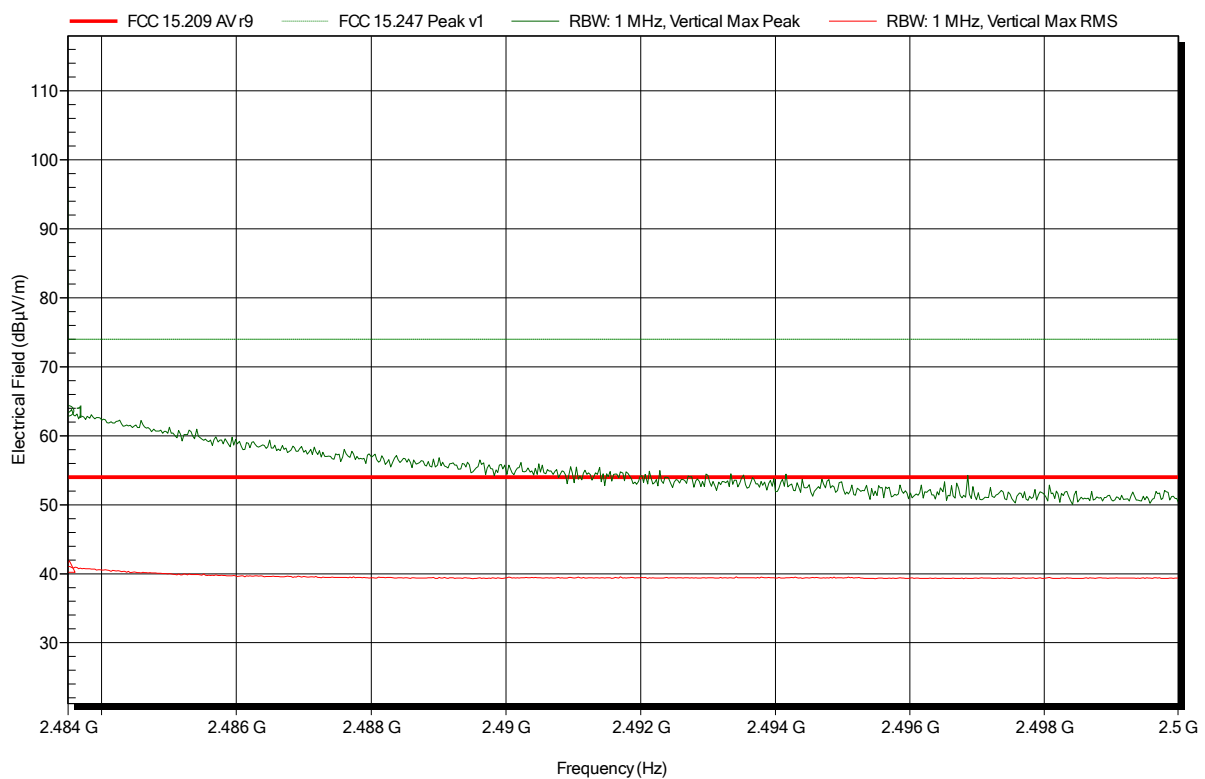
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	68.11 dBµV/m	74 dBµV/m	-5.89 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	43.4 dBµV/m	54 dBµV/m	-10.6 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note: upper bandedge

Index 59



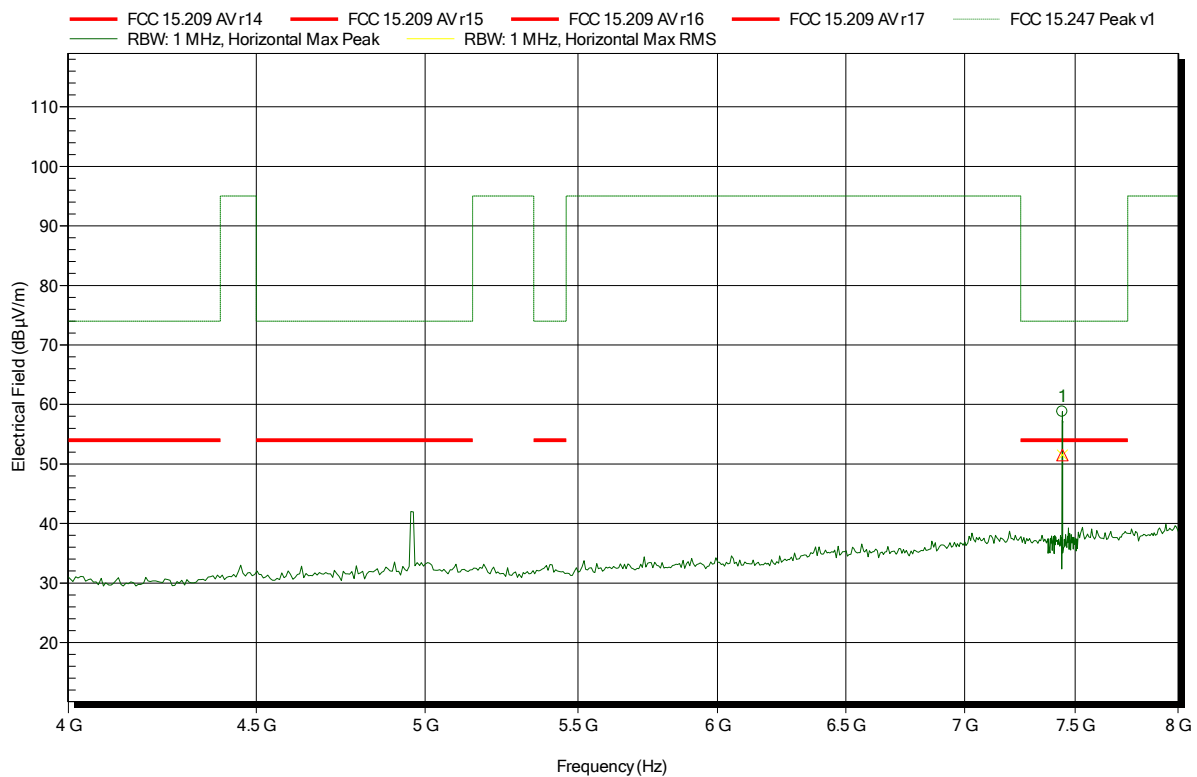
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	63.5 dBµV/m	74 dBµV/m	-10.5 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	41.05 dBµV/m	54 dBµV/m	-12.95 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 36



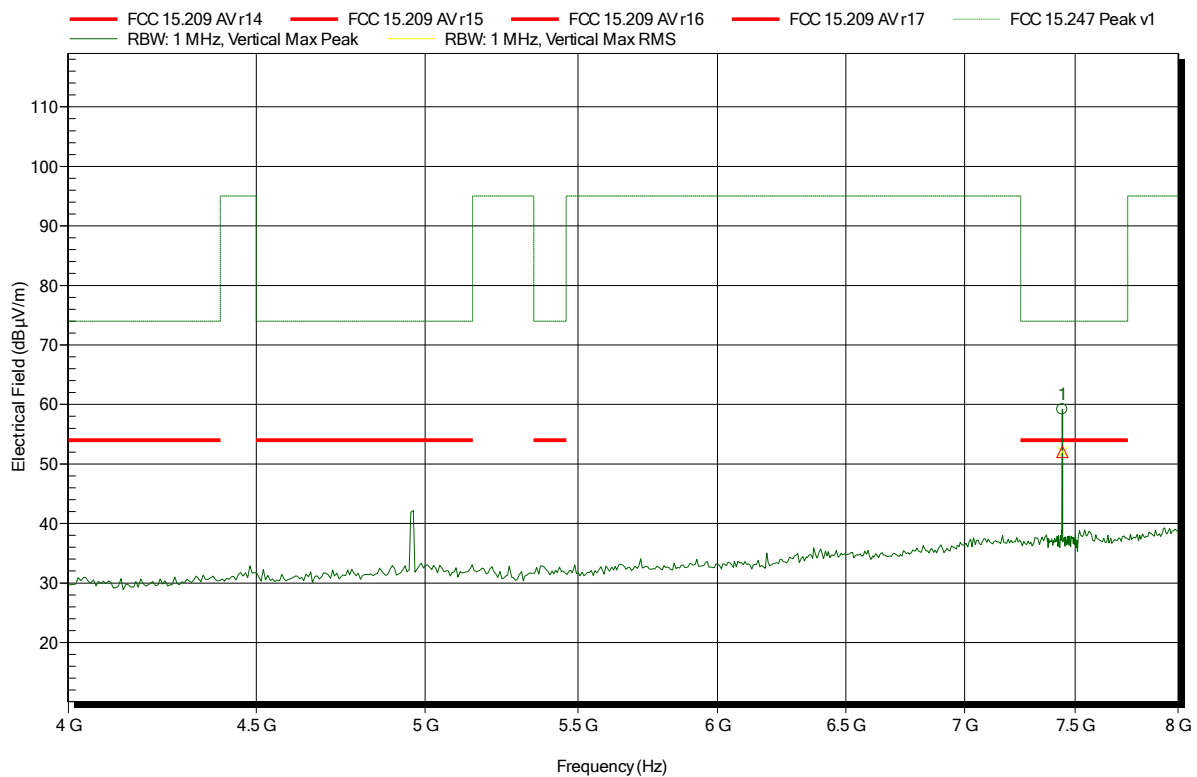
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.441 GHz	58.79 dBµV/m	74 dBµV/m	-15.21 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
7.441 GHz	51.49 dBµV/m	54 dBµV/m	-2.51 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz; 0dBm
 Test Date: 2019-06-05
 Note:

Index 37



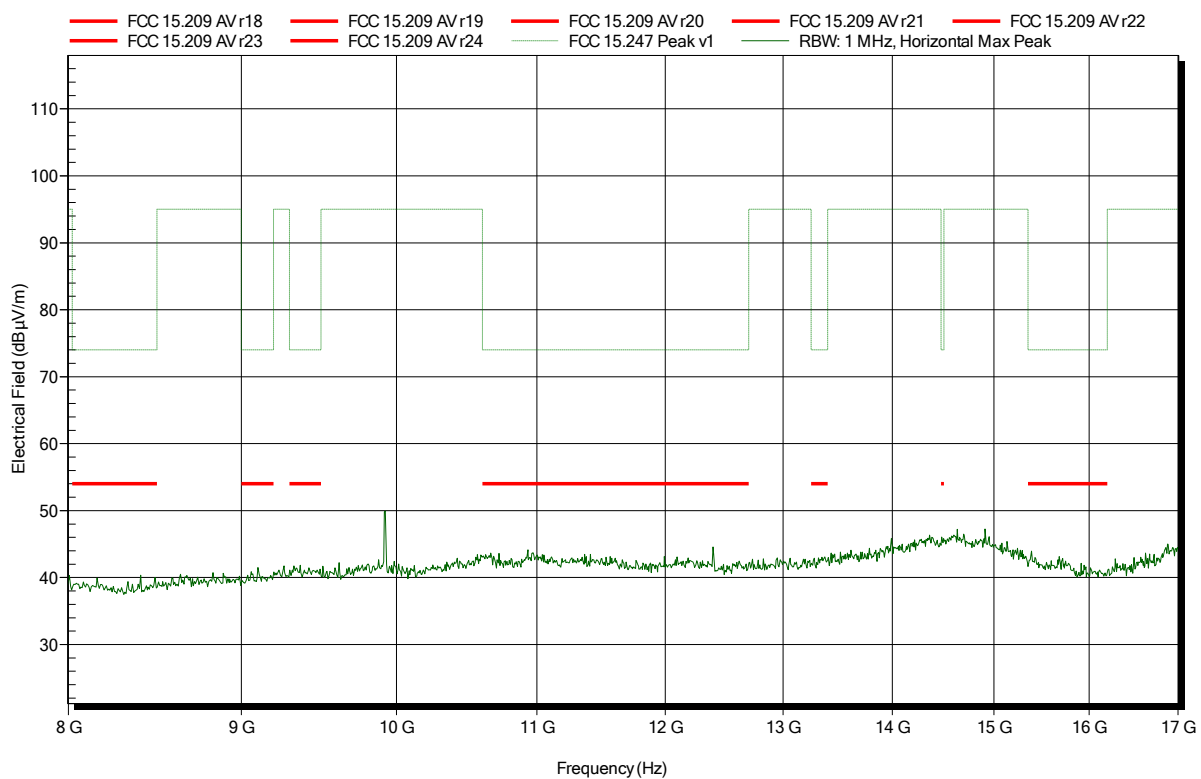
Frequency 7.441 GHz	Peak 59.14 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -14.86 dB	Peak Status Pass
Frequency 7.441 GHz	RMS 52.04 dBµV/m	RMS Limit 54 dBµV/m	RMS Difference -1.96 dB	RMS Status Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 56

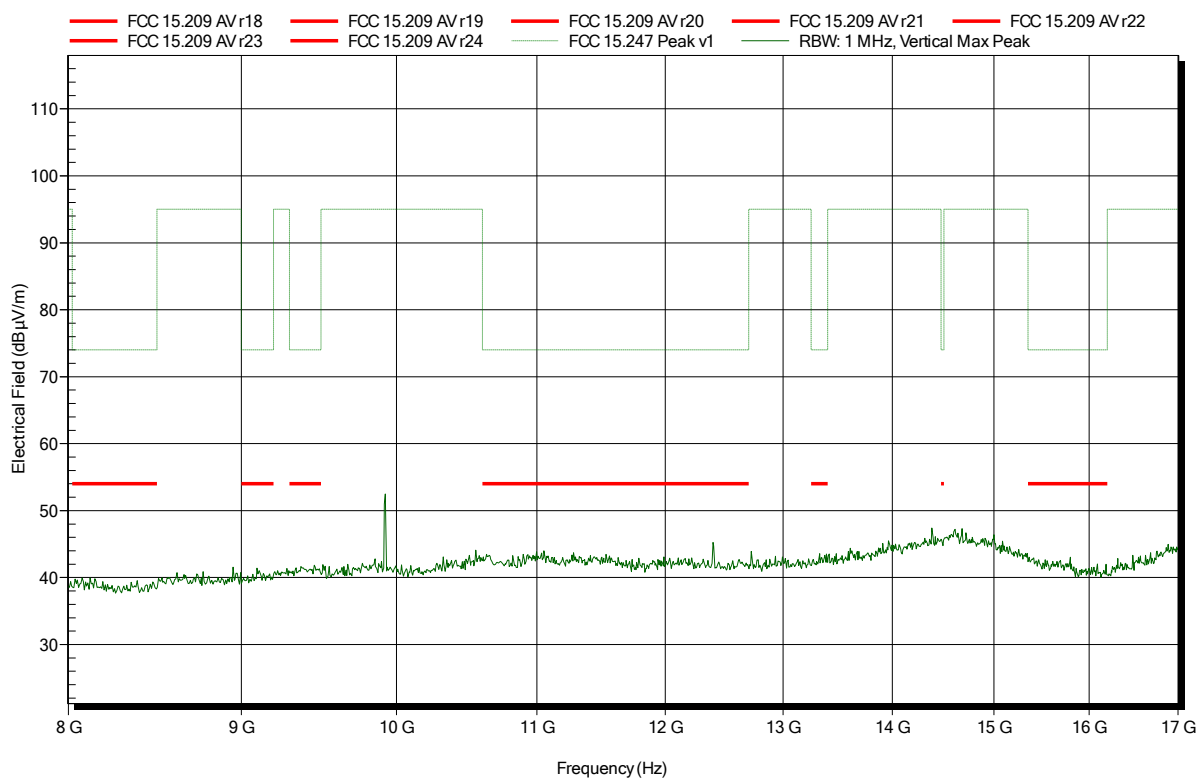


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 60

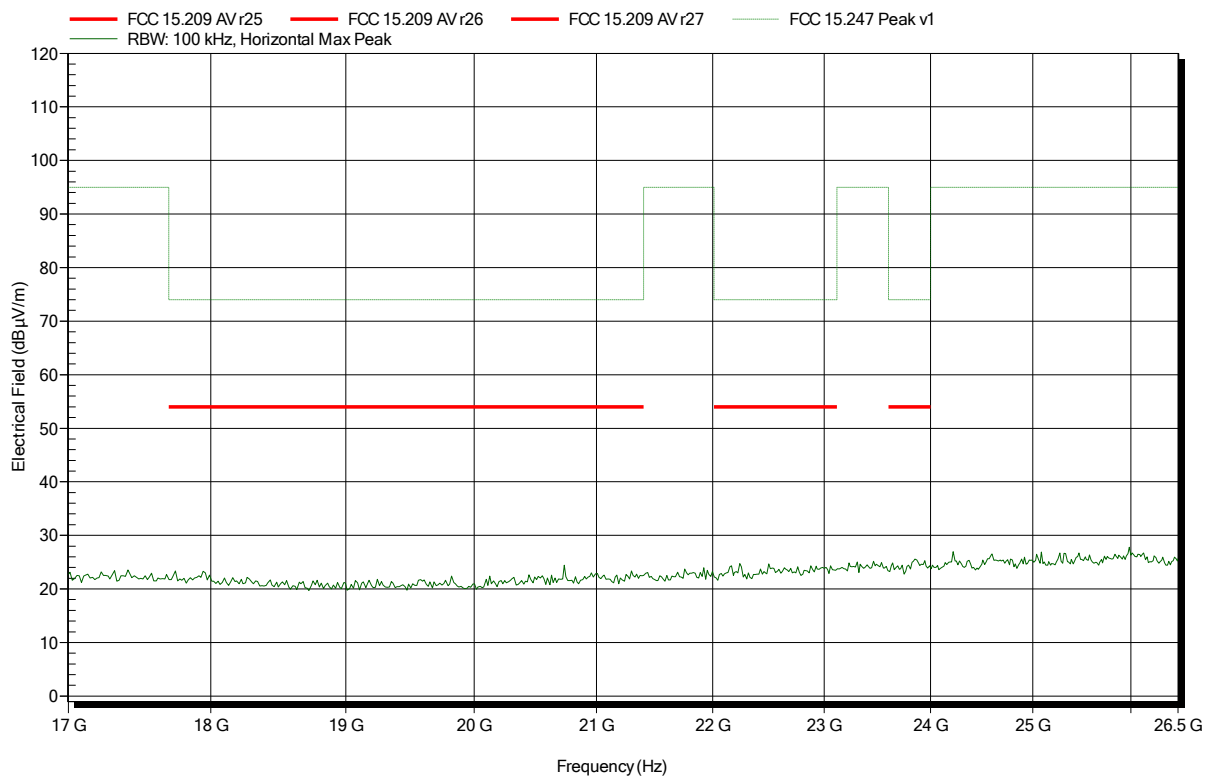


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Amplifier Research AT4560, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 57

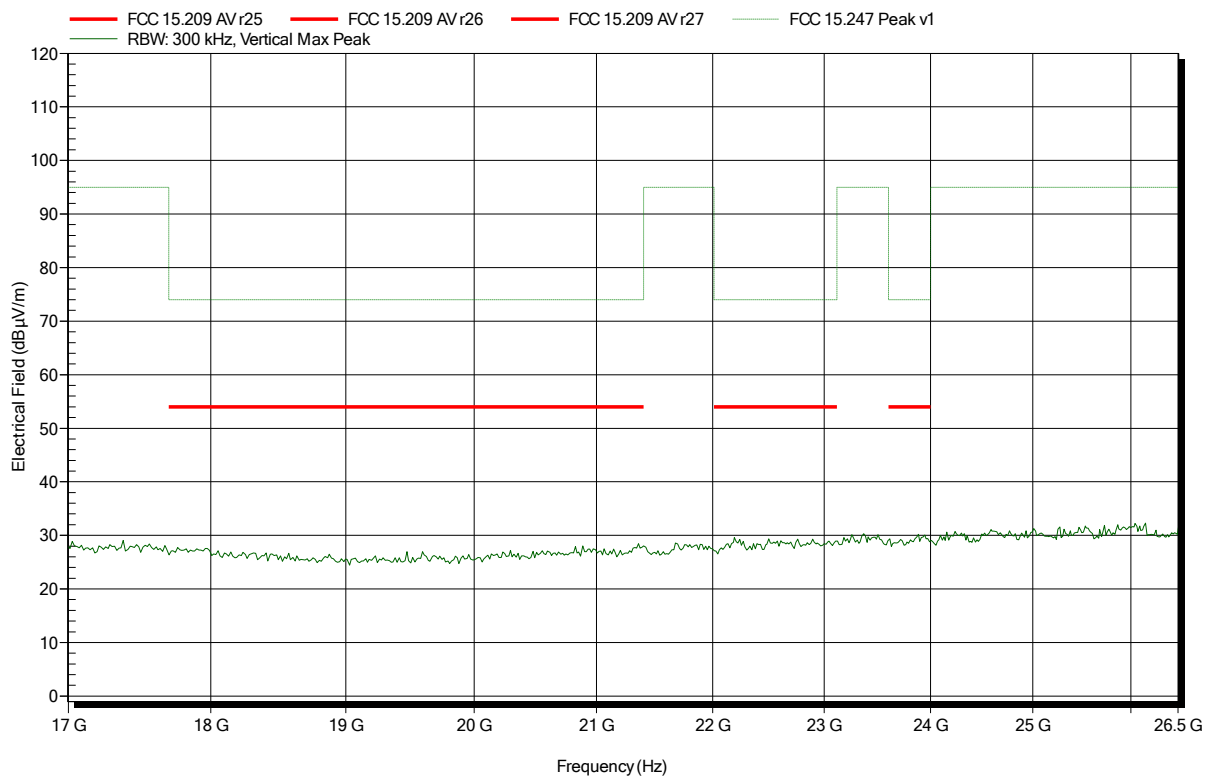


Spurious emissions according to FCC 47 e-CFR §15.247

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Amplifier Research AT4560, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; BLE; 2480 MHz; 0dBm
Test Date: 2019-06-05
Note:

Index 61



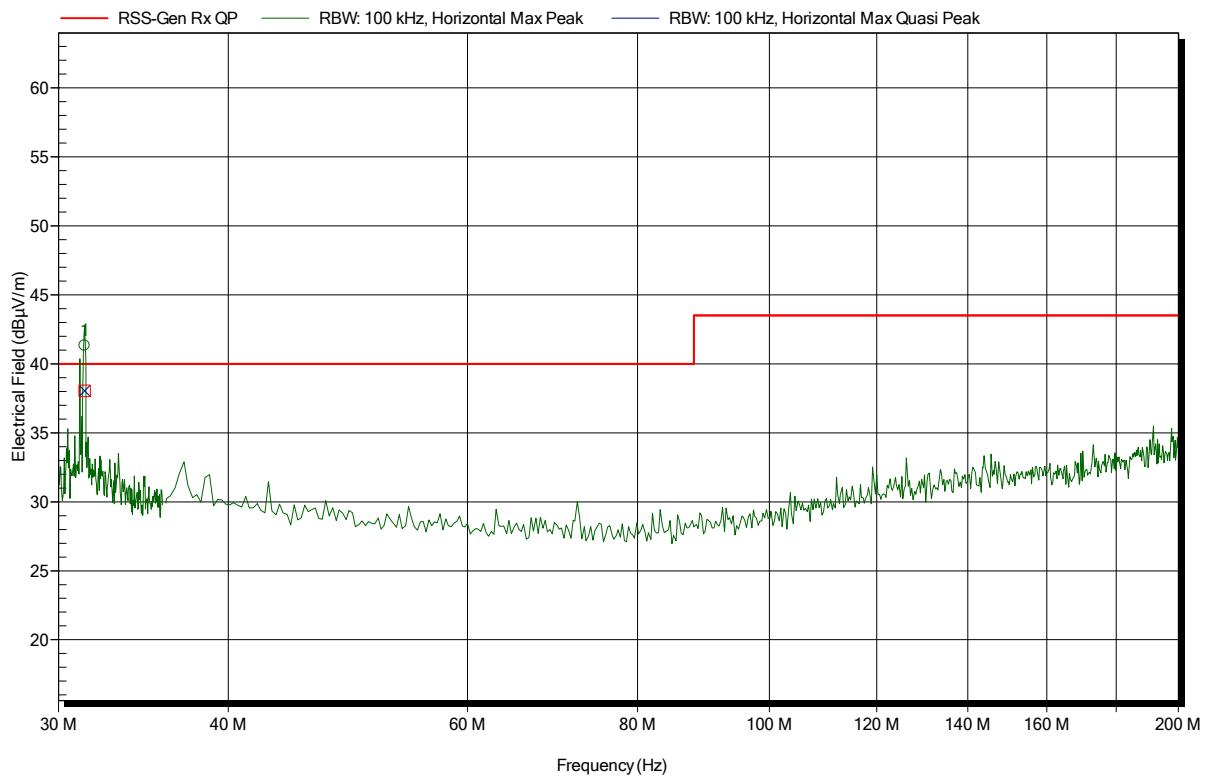
ANNEX B Receiver spurious emissions

Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 69



Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
31.358 MHz	41.32 dBµV/m	-	-	-	174 Degree	1.2 m

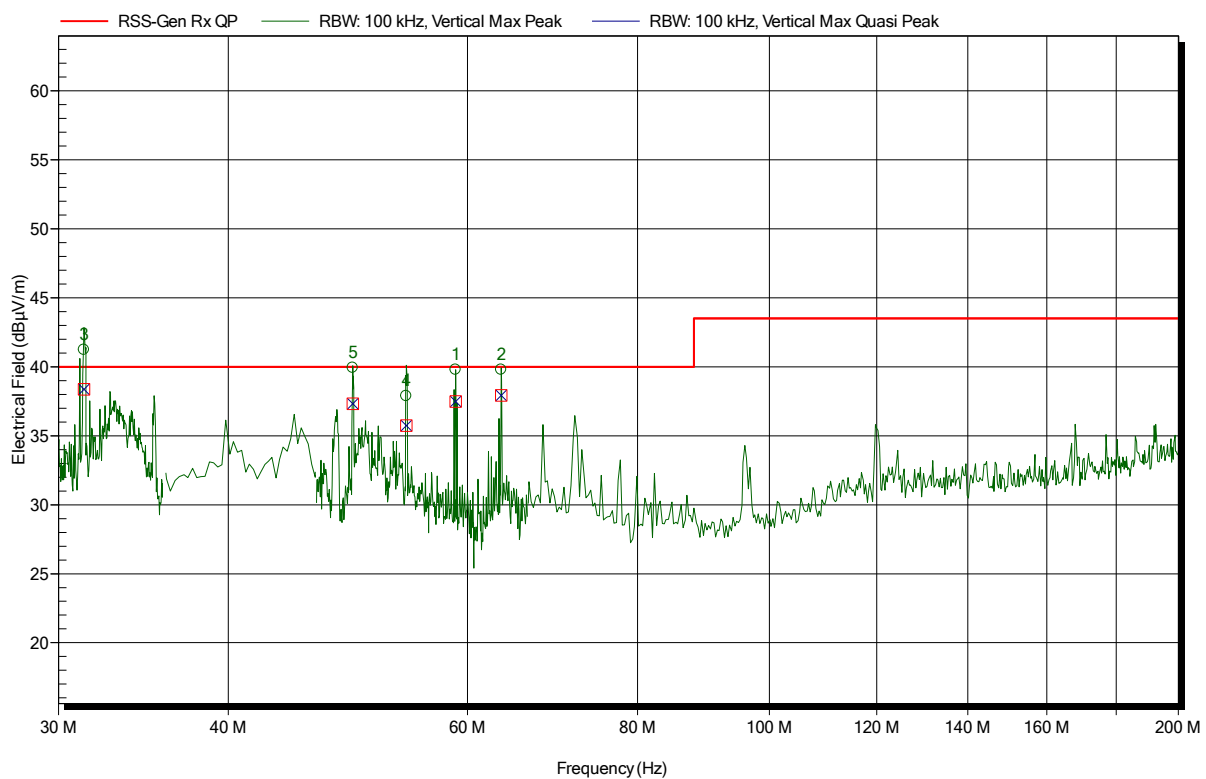
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
31.358 MHz	38.04 dBµV/m	40 dBµV/m	-1.96 dB	Pass	174 Degree	1.2 m

Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 70



Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
31.335 MHz	41.23 dBµV/m	-	-	-	174 Degree	1.2 m
49.386 MHz	39.94 dBµV/m	-	-	-	120 Degree	1.2 m
54.095 MHz	37.87 dBµV/m	-	-	-	239 Degree	1.2 m
58.791 MHz	39.78 dBµV/m	-	-	-	67 Degree	1.2 m
63.511 MHz	39.78 dBµV/m	-	-	-	66 Degree	1.2 m

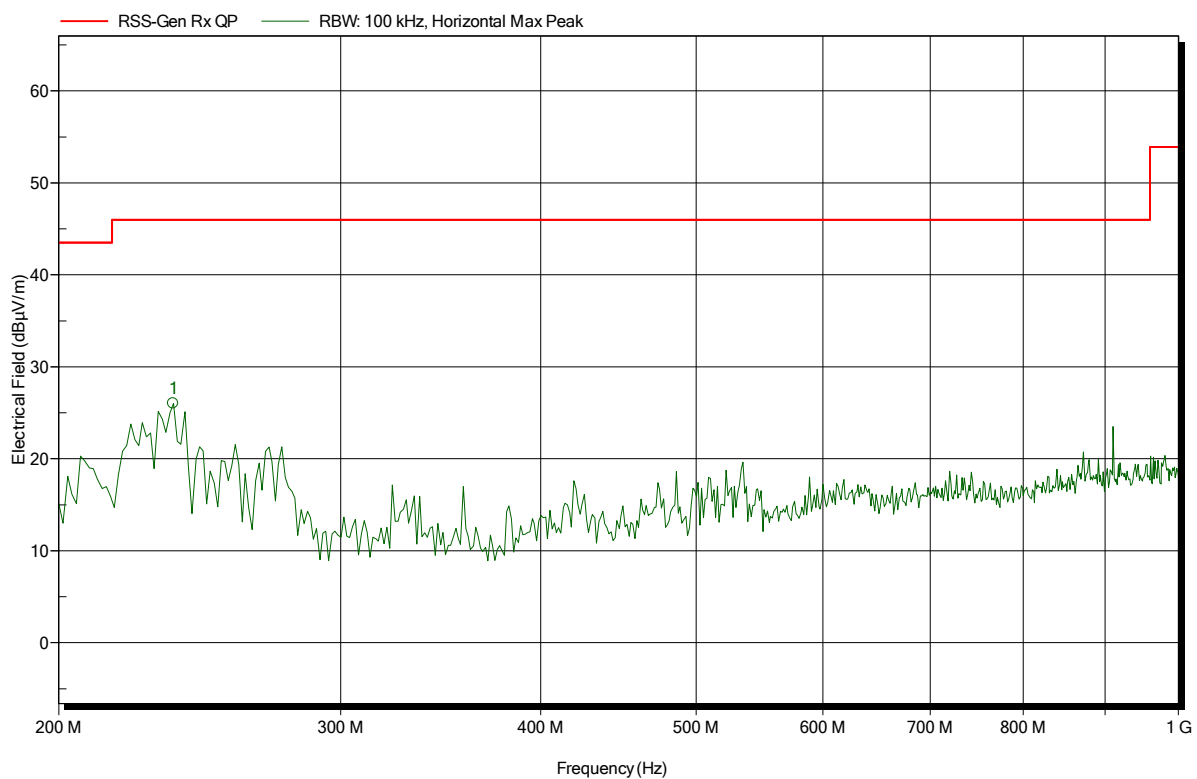
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
31.335 MHz	38.38 dBµV/m	40 dBµV/m	-1.62 dB	Pass	174 Degree	1.2 m
49.386 MHz	37.33 dBµV/m	40 dBµV/m	-2.67 dB	Pass	120 Degree	1.2 m
54.095 MHz	35.73 dBµV/m	40 dBµV/m	-4.27 dB	Pass	239 Degree	1.2 m
58.791 MHz	37.48 dBµV/m	40 dBµV/m	-2.52 dB	Pass	67 Degree	1.2 m
63.511 MHz	37.92 dBµV/m	40 dBµV/m	-2.08 dB	Pass	66 Degree	1.2 m

Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 67

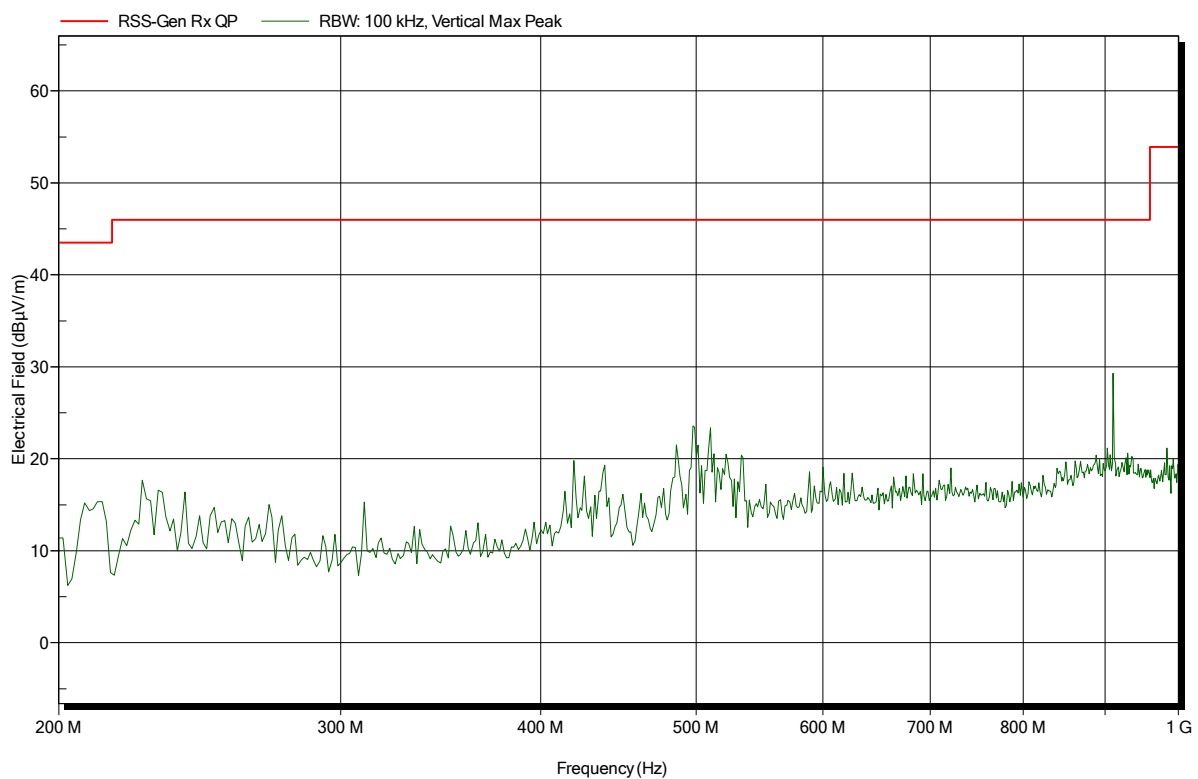


Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
235.897 MHz	26.03 dBµV/m	46 dBµV/m	-19.97 dB	Pass	-1 Degree	1.2 m

Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129
 Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 66

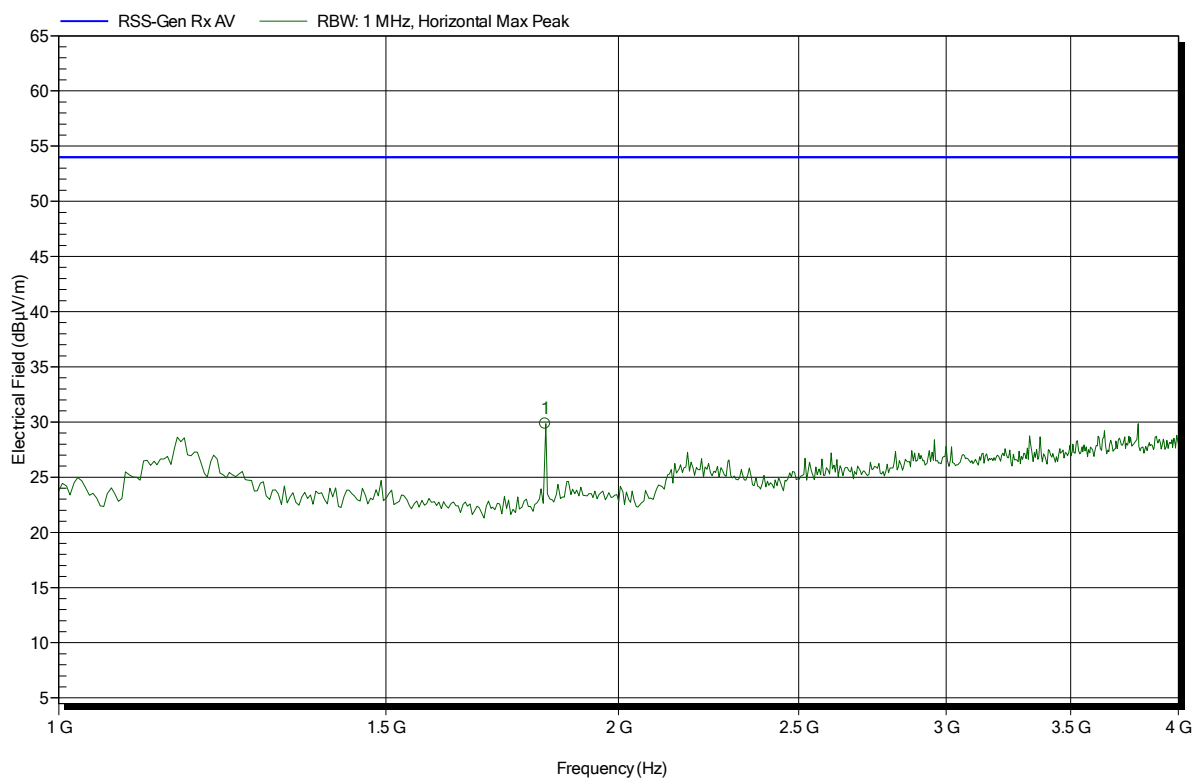


Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m
Mode: RX; BLE; 2440 MHz
Test Date: 2019-06-05
Note:

Index 71



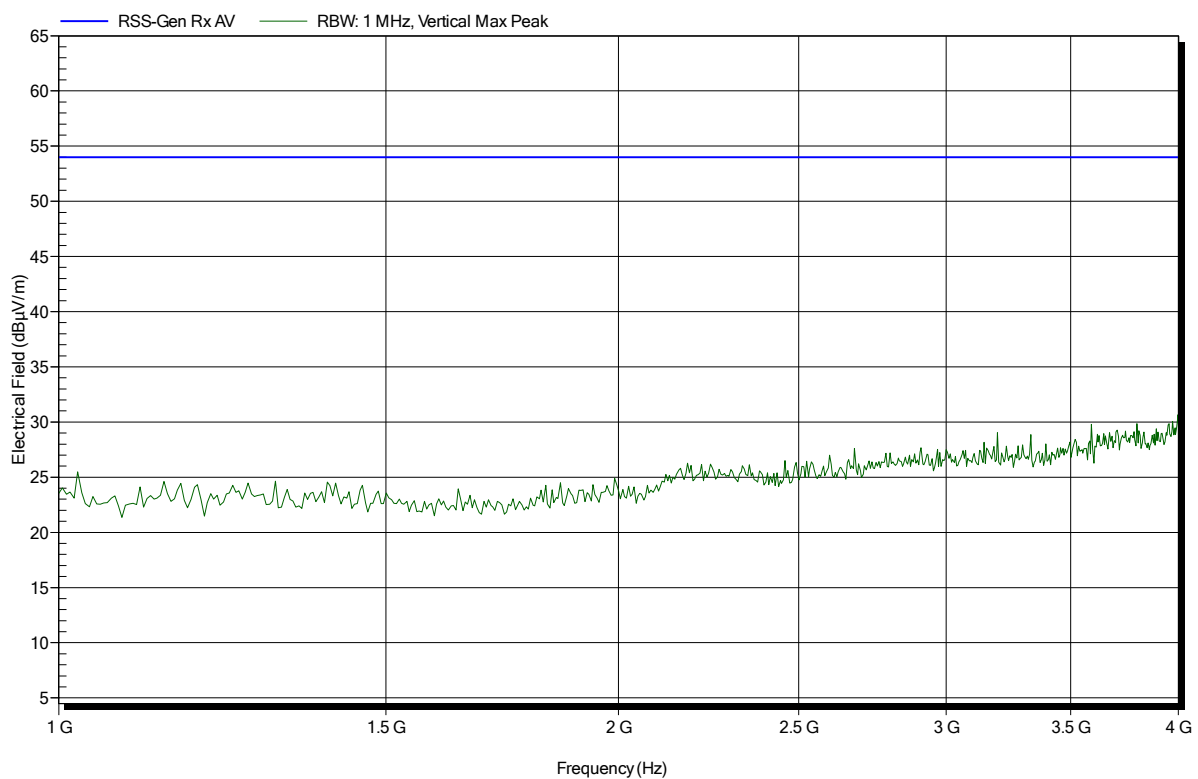
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.827 GHz	29.84 dBµV/m	53.98 dBµV/m	-24.14 dB	Pass

Spurious emissions according to ISCED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m
Mode: RX; BLE; 2440 MHz
Test Date: 2019-06-05
Note:

Index 74

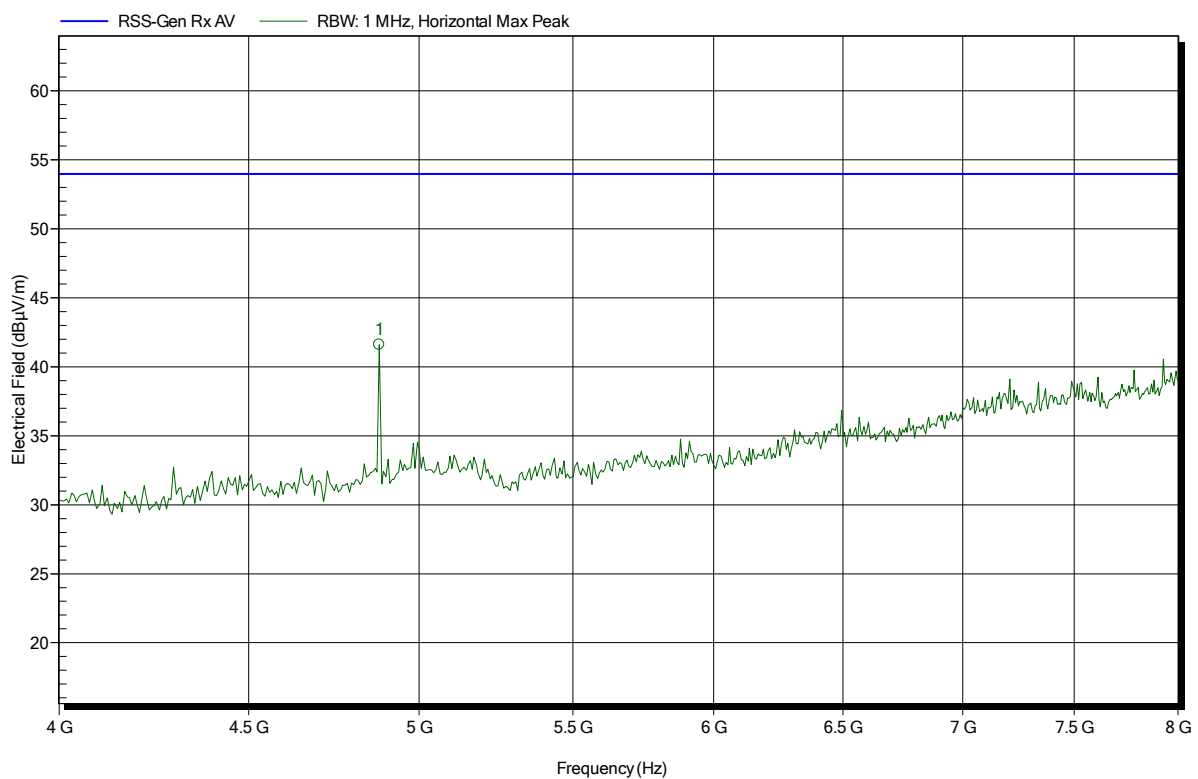


Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
EUT Name: Bluetooth Module
Model: ARL
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m
Mode: RX; BLE; 2440 MHz
Test Date: 2019-06-05
Note:

Index 72



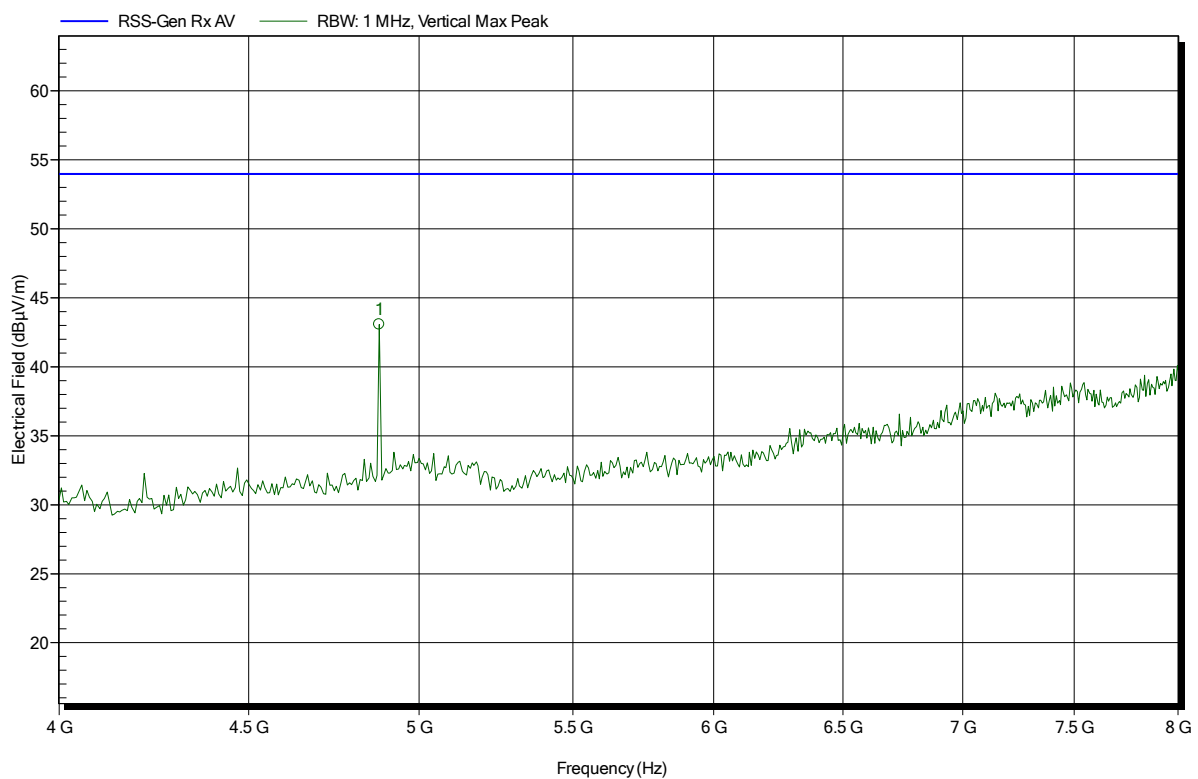
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	41.61 dBµV/m	53.98 dBµV/m	-12.37 dB	Pass

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 75



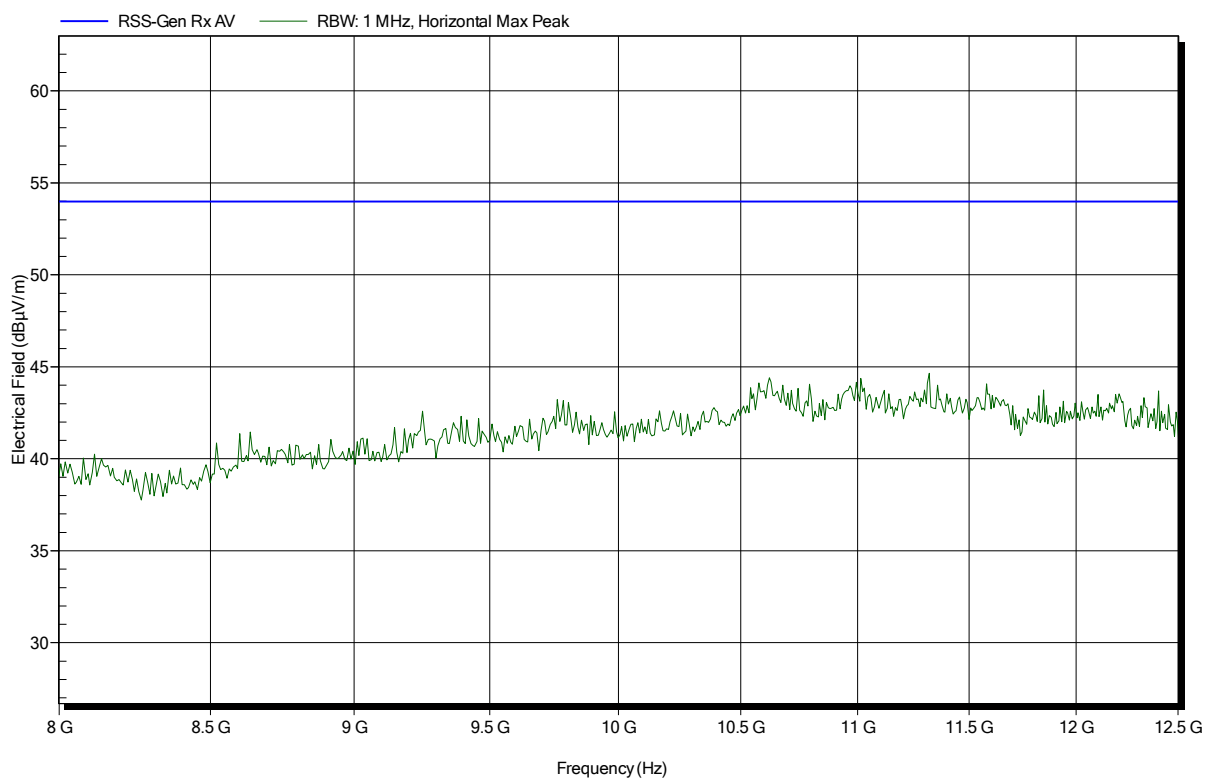
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	43.06 dBµV/m	53.98 dBµV/m	-10.92 dB	Pass

Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 73



Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1903-8129

Applicant: ANDREAS STIHL AG & Co. KG
 EUT Name: Bluetooth Module
 Model: ARL
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 3.3 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2019-06-05
 Note:

Index 76

