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-1711-7034-TFC247BL-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2
Applicant	ANDREAS STIHL AG & Co. KG
Address	Andreas-Stihl-Straße 4 71336 Waiblingen GERMANY
Test Specification	According to FCC/ISED rules
Standard	47 CFR Part 15C RSS-247, Issue 2, 2017-02
Non-Standard Test Method	None
Test Scope	Full compliance test
Equipment under Test (EUT):	
Product Description	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model(s)	SC
Additional Model(s)	None
Brand Name(s)	STIHL
Hardware Version(s)	HW:00.70
Software Version(s)	SW:01.00
FCC-ID	2ALP8SC
IC	23431-SC
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	2018-01-24	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	W. Treffke
Approved by (+ signature) (Head of Lab)	Christian Weber	C. Weber
Date of Issue	2018-01-30	
Total number of pages	76	
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	2018-01-30	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

Description	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A	
Model	SC	
Additional Model(s)	None	
Brand Name(s)	STIHL	
Serial Number(s)	None	
Hardware Version(s)	HW:00.70	
Software Version(s)	SW:01.00	
PMN	Smart Connector	
HVIN	SC	
FVIN	N/A	
HMN	N/A	
FCC-ID	2ALP8SC	
IC	23431-SC	
Equipment type	End Product	
Radio type	Transmitter, BLE Broadcaster	
Assigned frequency bands	2400 - 2483.5 MHz	
Radio technology	Bluetooth LE	
Modulation	GFSK	
Number of antenna ports	1	
Antenna	Type	Integrated antenna
	Model	Inverted F-antenna
	Manufacturer	Panasonic
	Gain	-1.8 dBi (3D antenna pattern measurement)
Supply Voltage	V_{NOM}	3.0 VDC
Operating Temperature	T_{NOM}	25 °C
AC/DC-Adaptor	Model	None
	Vendor	None
	Input	None
	Output	None
Manufacturer	ANDREAS STIHL AG & Co. KG Andreas-Stihl-Straße 4 71336 Waiblingen GERMANY	

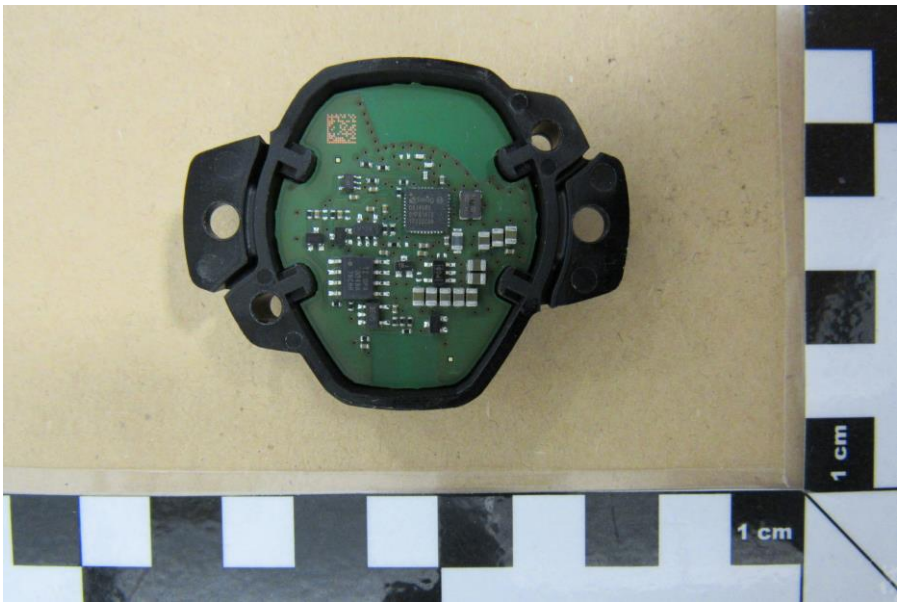
1.1 Photos – Equipment External

EUT

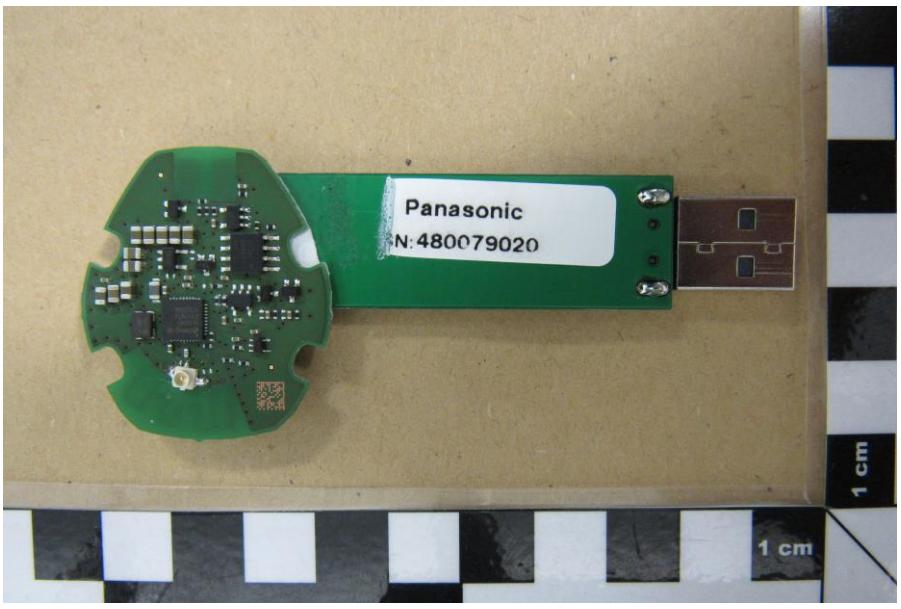

EUT Open, Battery Side

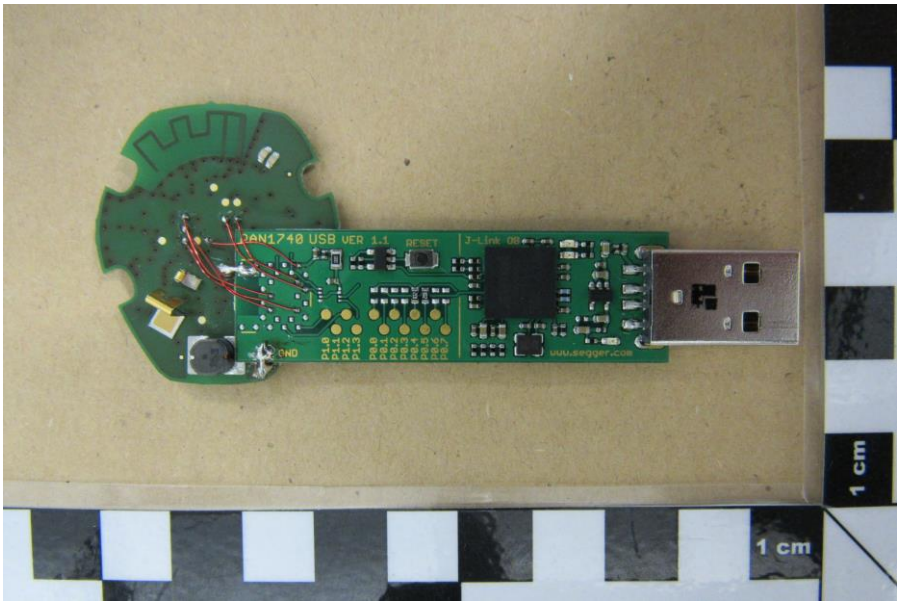

1.2 Photos – Equipment Internal

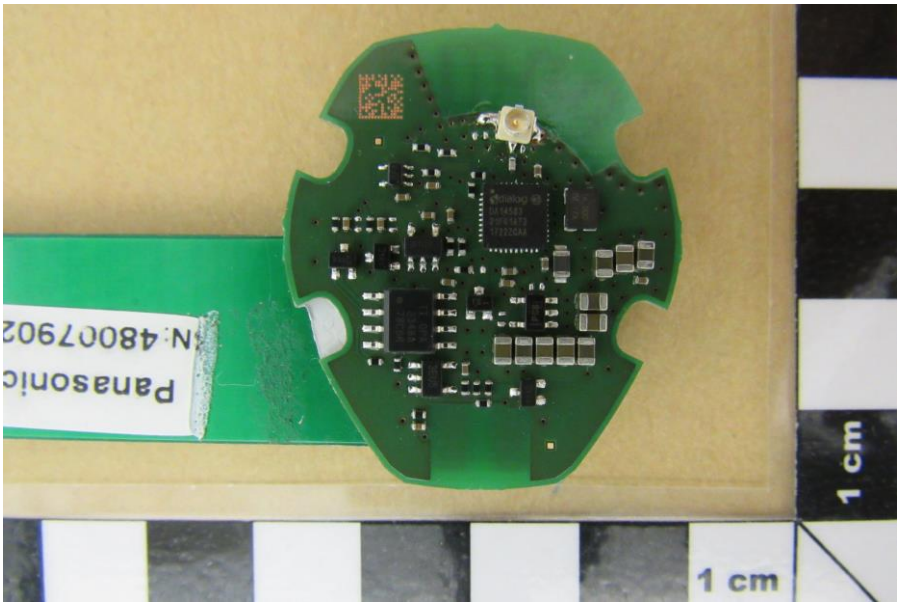
EUT Open, PCB Side



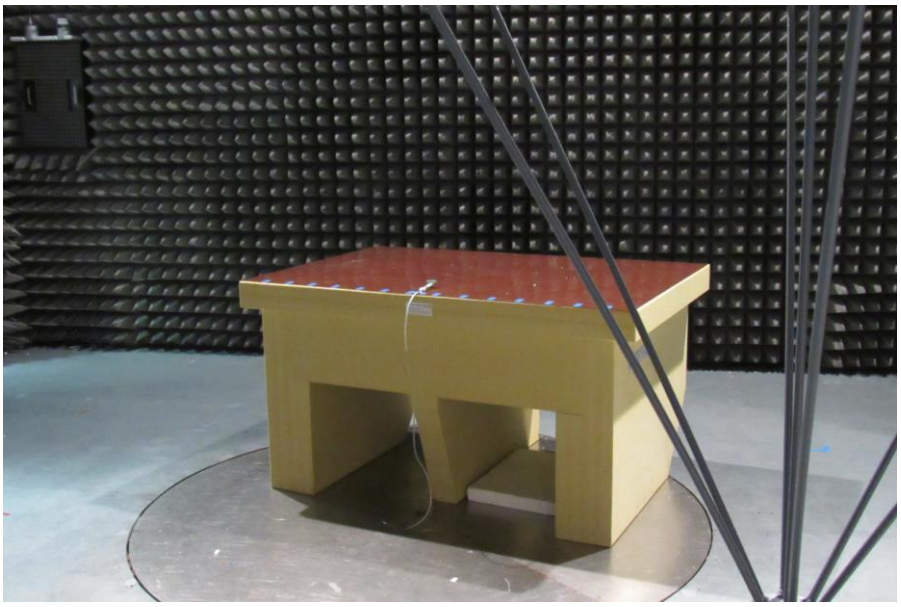
Conducted Sample Top

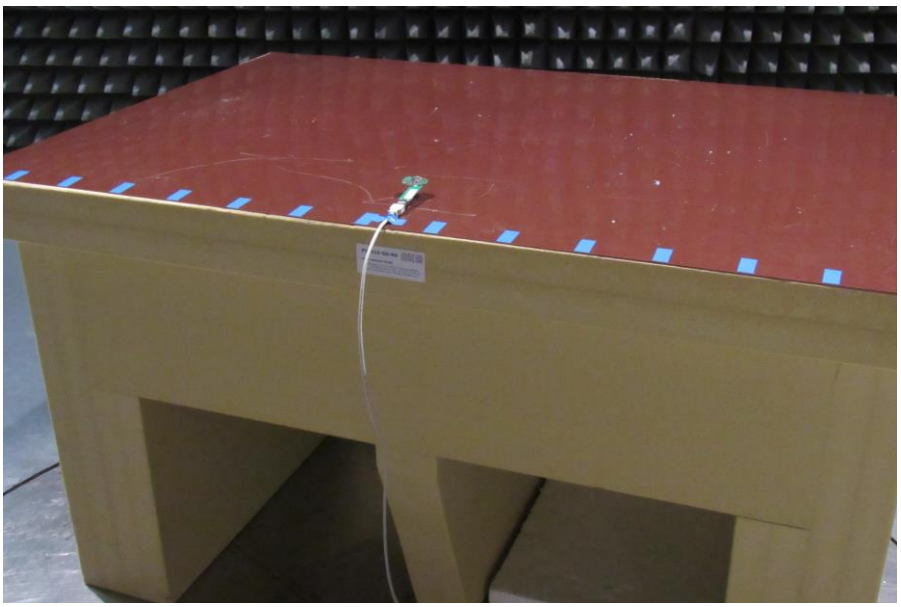


Conducted Sample Bottom


PCB Component Side


1.3 Photos – Test Setup

Radiated Setup


Radiated 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	Auxillary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

1.5 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 63%
Comment: BLE transmitter, Broadcaster	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	0	2402
F2	Tx	12	2426
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) = 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 = 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**
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247 § 5.2	6 dB Bandwidth	ANSI C63.10	PASS	
FCC § 15.247(b)(3) ISED RSS-247 § 5.4	Maximum peak conducted power	ANSI C63.10	PASS	
FCC § 15.247(e) ISED RSS-247 § 5.2	Power spectral density	ANSI C63.10	PASS	
FCC § 15.207 ISED RSS-247 § 3.1	AC power line conducted emissions	ANSI C63.10	N/R	No powered (directly or indirectly) via AC-Mains
FCC § 15.247(d) ISED RSS-247 § 5.5	Band edge compliance	ANSI C63.10	PASS	
FCC § 15.247(d) ISED RSS-247 § 5.5	Conducted spurious emissions	ANSI C63.10	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-GEN § 8.9	Transmitter radiated spurious emissions	ANSI C63.10	PASS	
ISED RSS-247 § 3.1	Receiver radiated spurious emissions	ANSI C63.10	N/R	BLE broadcaster, no receive mode
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

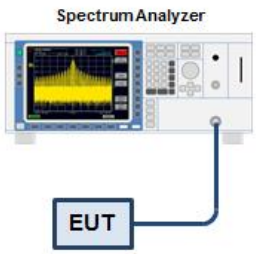
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen 6.6
Measurement Method	ANSI C63.10 6.9.3
Operator	Wilfried Treffke
Date	2018-01-26

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup


3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

3.1.5 Procedure

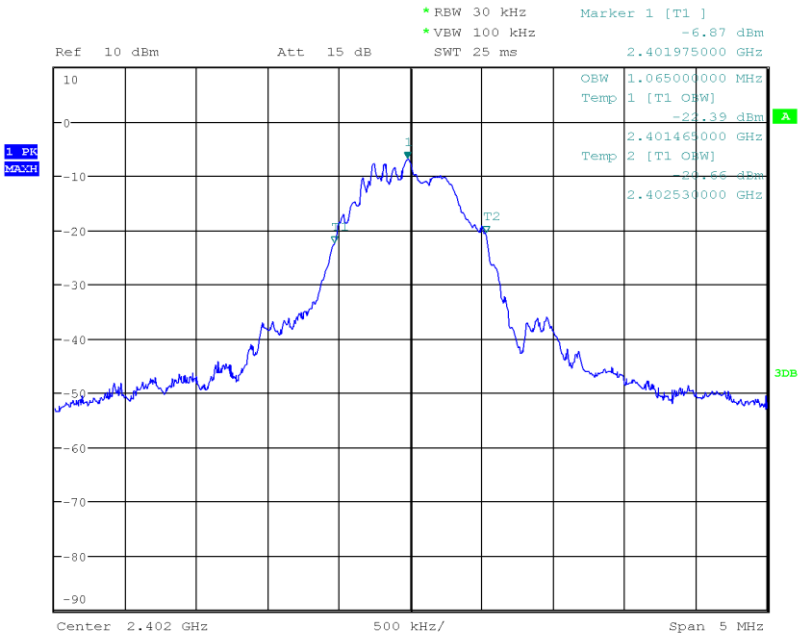
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to 1 % of the bandwidth 4. The occupied bandwidth is measured with the build-in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

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.065
GFSK	2426	1.075
GFSK	2480	1.080

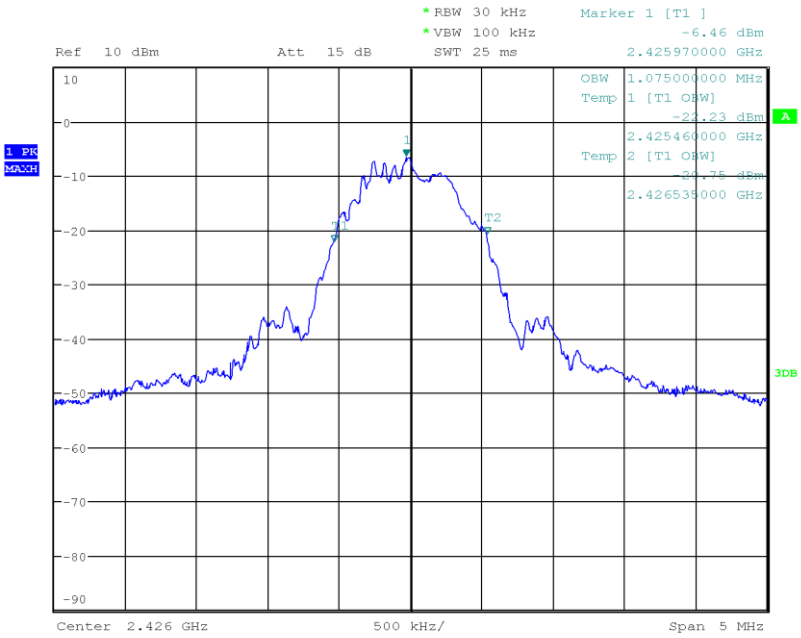
Occupied Bandwidth

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Occupied Bandwidth [MHz]:	1.065



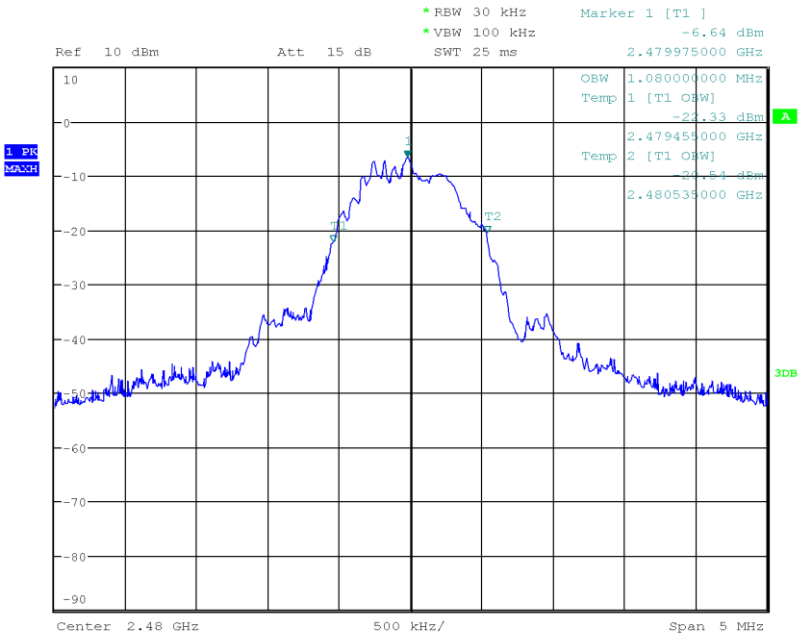
Occupied Bandwidth

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 12, 2426 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Occupied Bandwidth [MHz]:	1.075



Occupied Bandwidth

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Occupied Bandwidth [MHz]:	1.080



3.2 Test Conditions and Results - 6 dB bandwidth

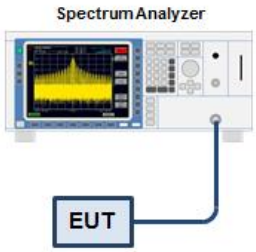
3.2.1 Information

Test Information	
Reference	FCC 15.247(a)(2) / ISED RSS-247 5.2
Measurement Method	ANSI C63.10 11.8
Operator	Wilfried Treffke
Date	2018-01-26

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup

Test Setup


3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

3.2.5 Procedure

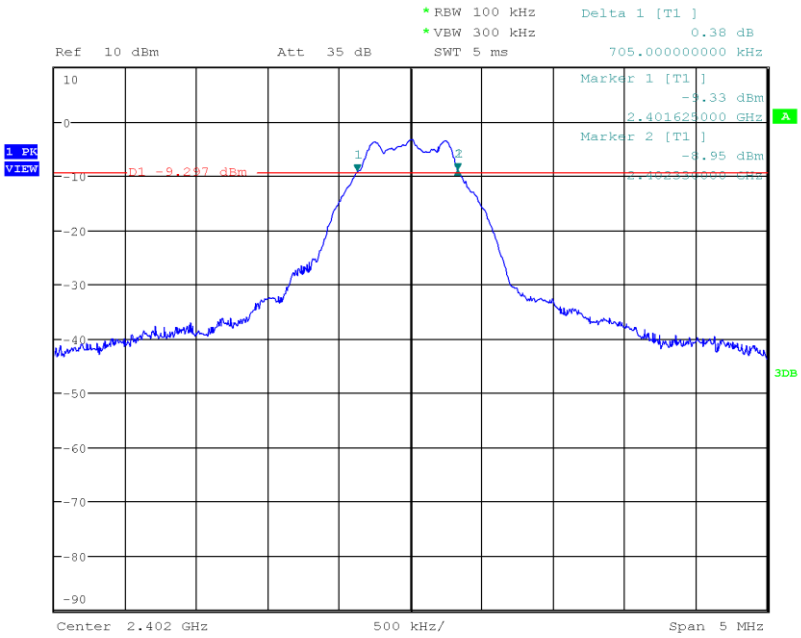
Test Procedure
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker 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	705	500	PASS
GFSK	2426	720	500	PASS
GFSK	2480	735	500	PASS

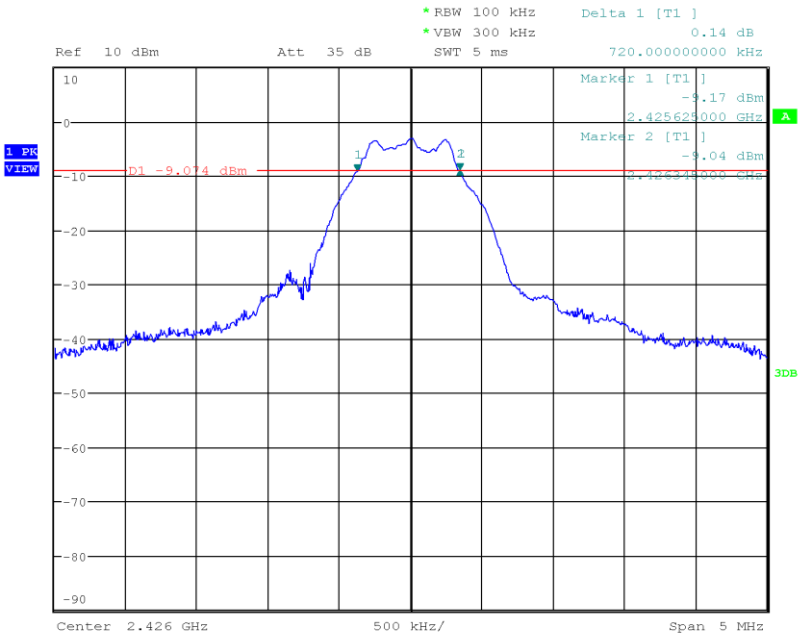
DTS (6 dB) Bandwidth

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Lower Frequency [MHz]:	2401.625
Upper Frequency [MHz]:	2402.330
6 dB Bandwidth [kHz]:	705



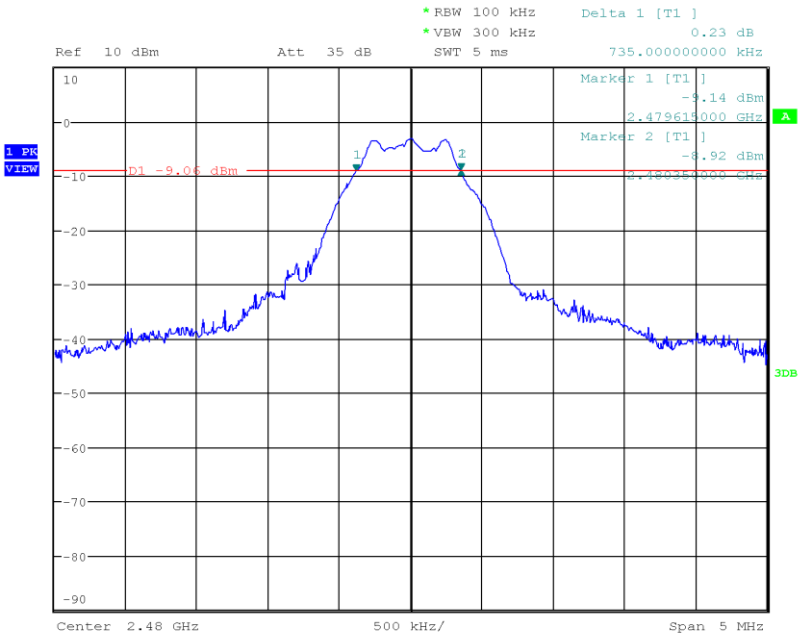
DTS (6 dB) Bandwidth

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 12, 2426 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Lower Frequency [MHz]:	2425.625
Upper Frequency [MHz]:	2426.345
6 dB Bandwidth [kHz]:	720



DTS (6 dB) Bandwidth

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Lower Frequency [MHz]:	2479.615
Upper Frequency [MHz]:	2480.350
6 dB Bandwidth [kHz]:	735



3.3 Test Conditions and Results - Maximum peak conducted output power

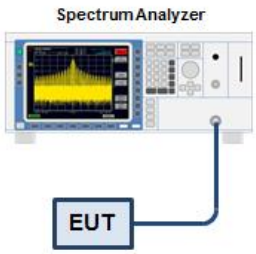
3.3.1 Information

Test Information	
Reference	FCC 15.247(b)(1) / ISED RSS-247 5.4
Measurement Method	ANSI C63.10 11.9.1
Operator	Wilfried Treffke
Date	2018-01-26

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

Test Setup


3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

3.3.5 Procedure

Test Procedure
1. EUT set to test hopping 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

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	-0.763	0.0008	1.0	PASS
2426	-0.393	0.0009	1.0	PASS
2480	-0.421	0.0009	1.0	PASS

3.4 Test Conditions and Results - Power spectral density

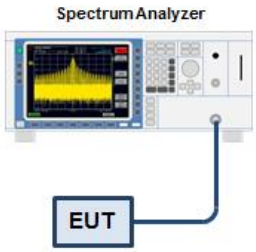
3.4.1 Information

Test Information	
Reference	FCC 15.247(e) / ISED RSS-247 5.2
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Operator	Wilfried Treffke
Date	2018-01-26

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup

Test Setup


3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

3.4.5 Procedure

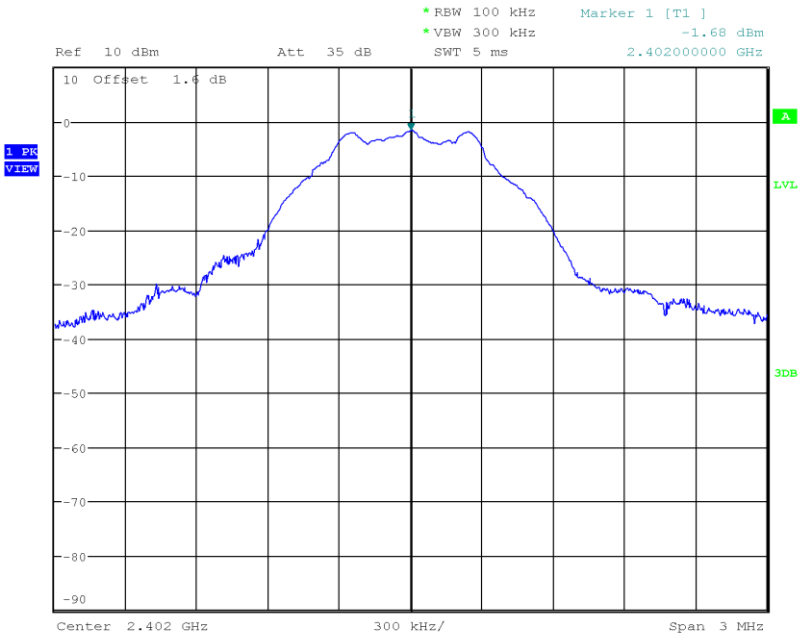
Test Procedure
1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW ≥ RBW and the detector is set to peak with max hold 4. After the trace has stabilized a marker is set to the envelope maximum 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	-1.683	8.0	PASS
2426	-1.469	8.0	PASS
2480	-1.479	8.0	PASS
RBW = 100 kHz			

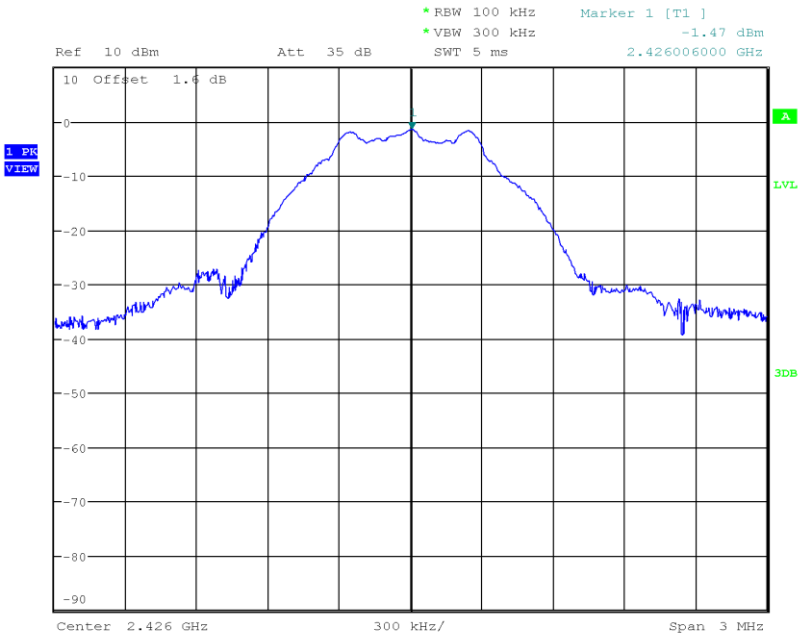
Peak Power Spectral Density

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Peak Frequency [MHz]:	2402.000
Spectral Density [dBm/RBW]:	-1.683
Resolution Bandwidth [kHz]:	100 kHz



Peak Power Spectral Density

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 12, 2426 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Peak Frequency [MHz]:	2426.006
Spectral Density [dBm/RBW]:	-1.469
Resolution Bandwidth [kHz]:	100 kHz



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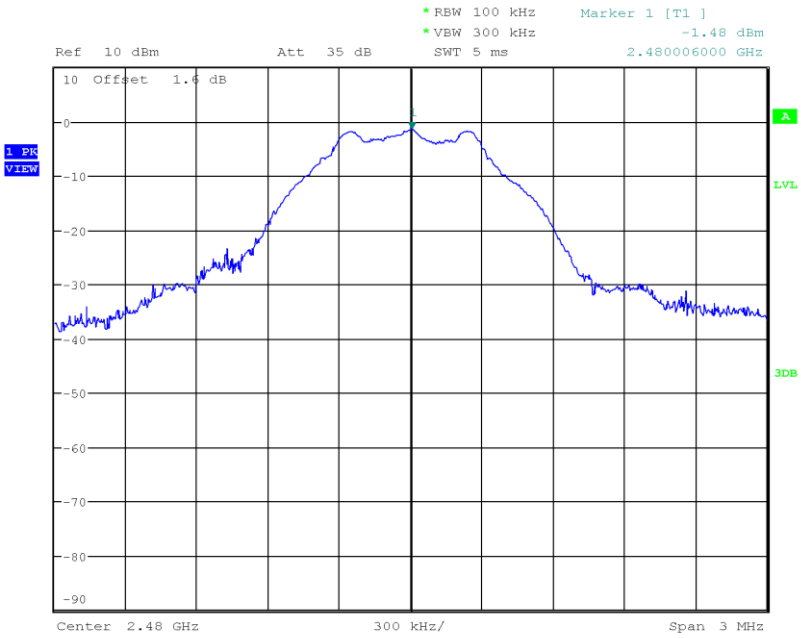
Peak Power Spectral Density

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Peak Frequency [MHz]:	2480.006
Spectral Density [dBm/RBW]:	-1.479
Resolution Bandwidth [kHz]:	100 kHz



Date: 26.JAN.2018 13:30:59

3.5 Test Conditions and Results - Band-edge compliance

3.5.1 Information

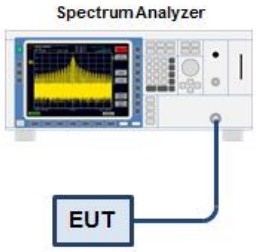
Test Information	
Reference	FCC 15.247(d) / ISED RSS-247 5.5
Measurement Method	ANSI C63.10 11.13
Operator	Wilfried Treffke
Date	2018-01-26

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	FSU 26	EF01003	2017-07	2018-07

3.5.5 Procedure

Test Procedure

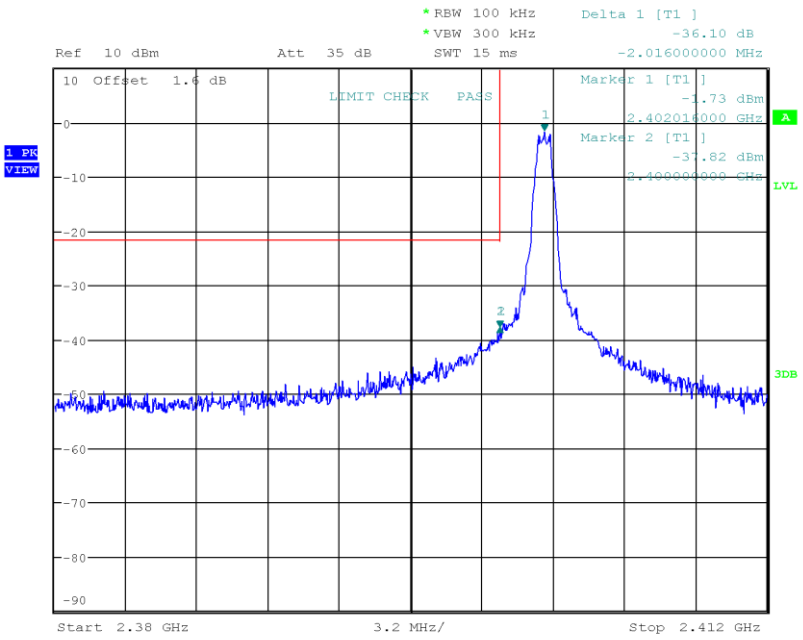
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is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

3.5.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK	2402	-36.09	-20	PASS
GFSK	2480	-36.49	-20	PASS

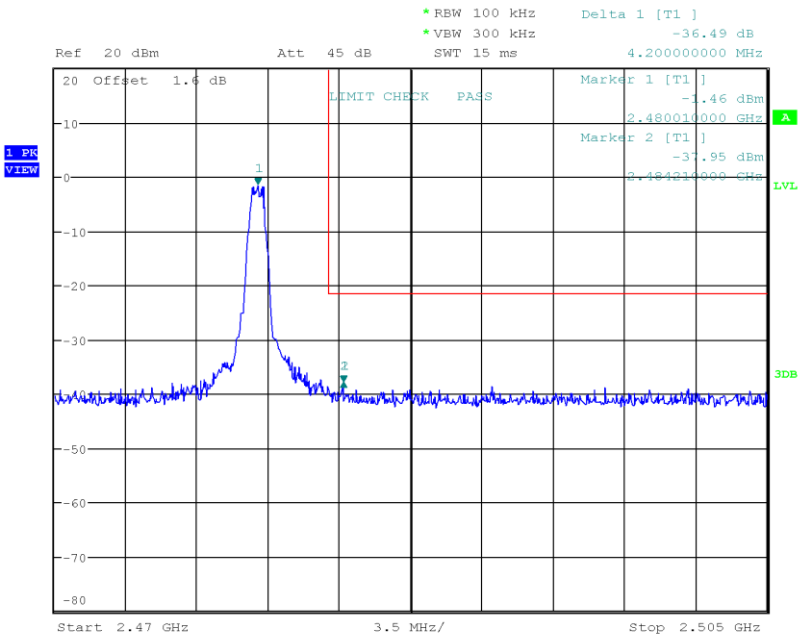
Band-edge Compliance

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Band-edge	Lower
In-band Frequency [MHz]:	2402.016
Max. in-band Level [dBm/100 kHz]:	-1.726
Out-of-band Frequency [MHz]:	2400.0
Max. out-of-band Level [dBm/100 kHz]:	-37.821
Attenuation [dB]:	-36.09



Band-edge Compliance

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Channel: 78, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Band-edge	Upper
In-band Frequency [MHz]:	2480.01
Max. in-band Level [dBm/100 kHz]:	-1.461
Out-of-band Frequency [MHz]:	2484.21
Max. out-of-band Level [dBm/100 kHz]:	-37.948
Attenuation [dB]:	-36.49



3.6 Test Conditions and Results - Conducted spurious emissions

3.6.1 Information

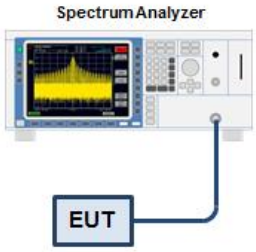
Test Information	
Reference	FCC 15.247(d) / ISED RSS-247 5.5
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2018-01-26

3.6.2 Limits

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

3.6.3 Setup

Test Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

3.6.5 Procedure

Test Procedure

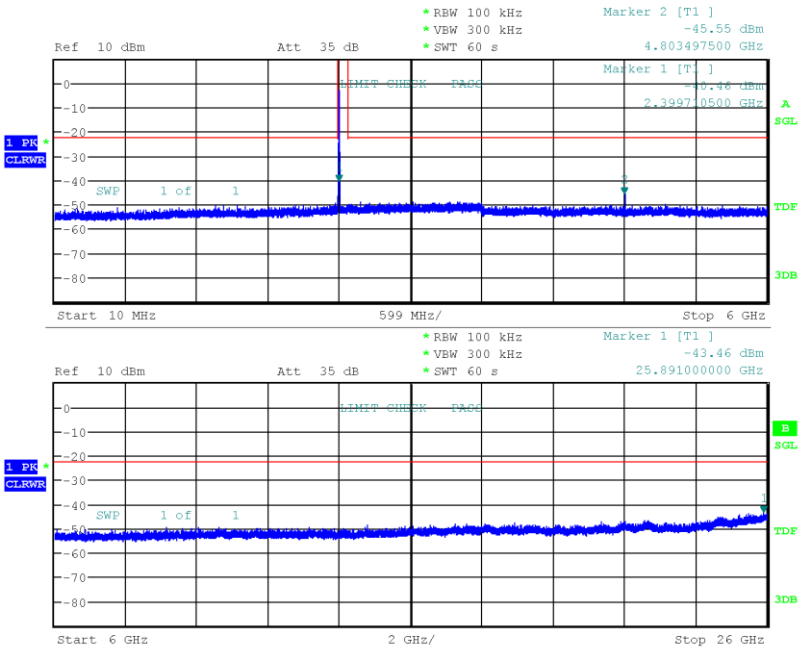
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is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

3.6.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
GFSK	2402	PASS
GFSK	2426	PASS
GFSK	2480	PASS

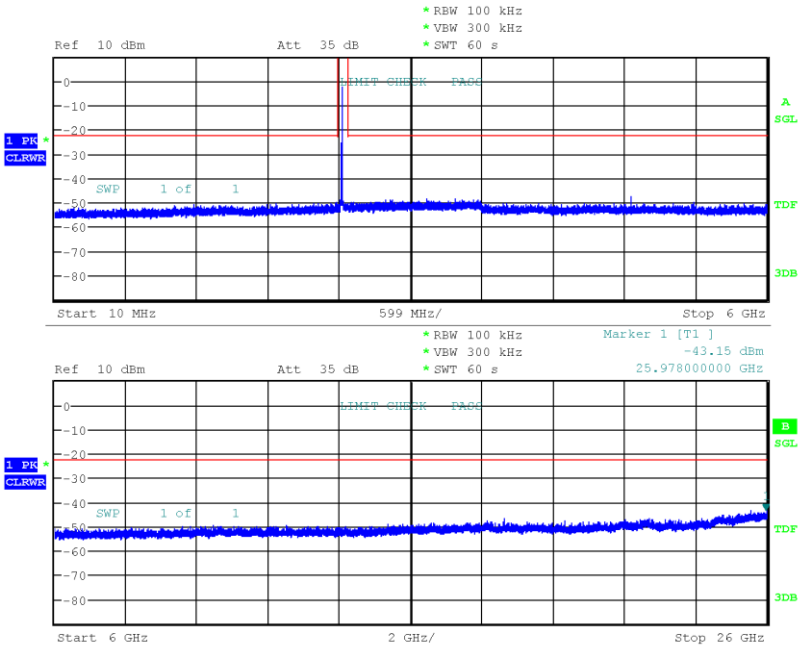
Conducted Spurious Emissions

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Max. in-band Frequency [MHz]:	2402.0
Max. in-band Level [dBm/100 kHz]:	-2.6
Out-of-band Limit [dBm/100 kHz]:	-22.6



Conducted Spurious Emissions

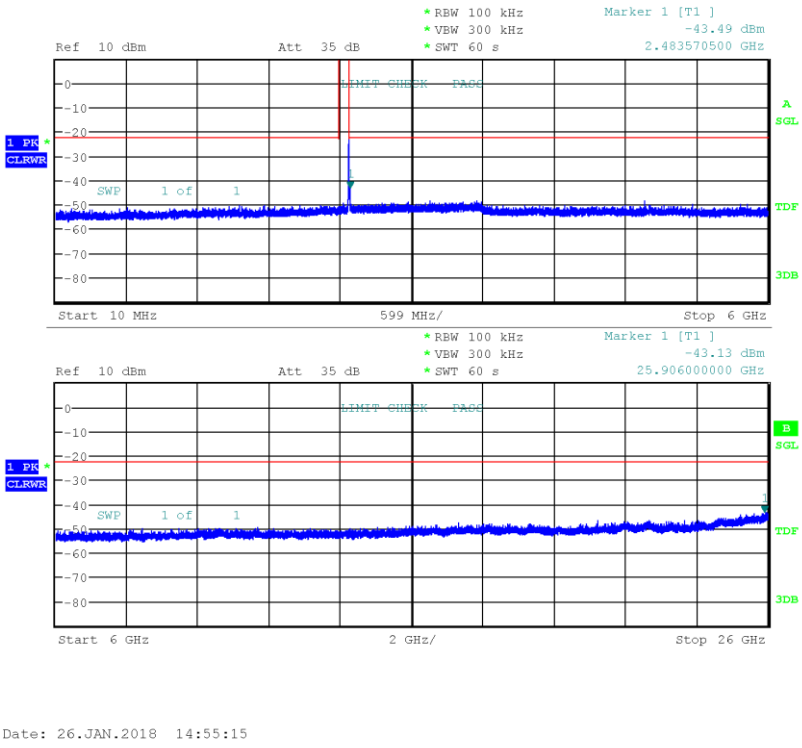
Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 12, 2426 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Max. in-band Frequency [MHz]:	2426.0
Max. in-band Level [dBm/100 kHz]:	-2.3
Out-of-band Limit [dBm/100 kHz]:	-22.3



Date: 26.JAN.2018 14:51:39

Conducted Spurious Emissions

Project Number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
Model Description:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Sample ID:	16975
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:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-01-26
Max. in-band Frequency [MHz]:	2480.0
Max. in-band Level [dBm/100 kHz]:	-2.4
Out-of-band Limit [dBm/100 kHz]:	-22.4



3.7 Test Conditions and Results - Transmitter radiated emissions

3.7.1 Information

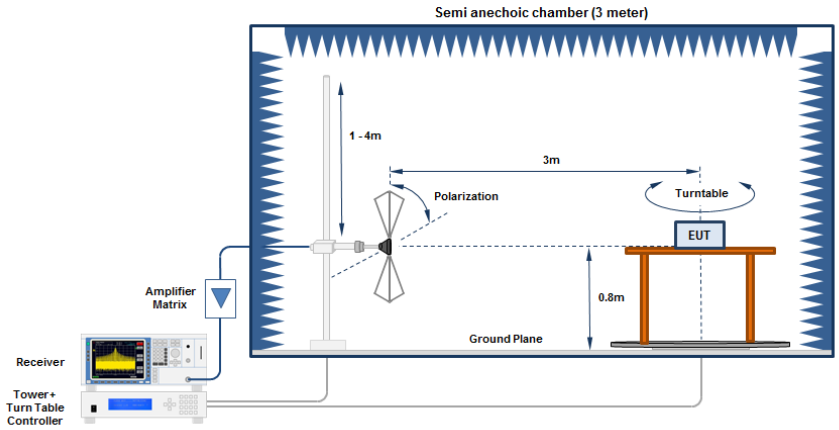
Test Information	
Reference	FCC 15.247(d) / ISED RSS-GEN 8.9
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2018-01-26

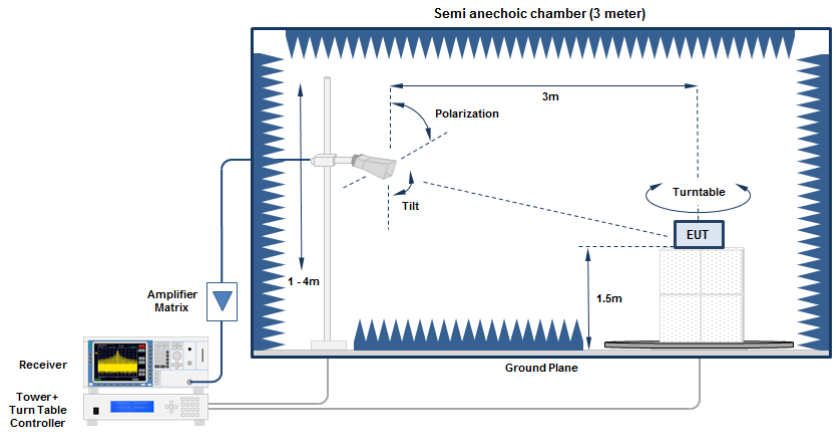
3.7.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dBµV/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

3.7.3 Setup

Test Setup 30 - 1000 MHz



Test Setup > 1 GHz


3.7.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2017-02	2020-02
Measurement Receiver	R&S	ESU 26	EF00887	2017-07	2018-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	VULB 9162	EF00978	2016-11	2019-11
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00212	2016-04	2019-04

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2017-02	2020-02
Measurement Receiver	R&S	ESU 26	EF00887	2017-07	2018-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF00302	2017-03	2018-03

3.7.5 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

3.7.6 Results

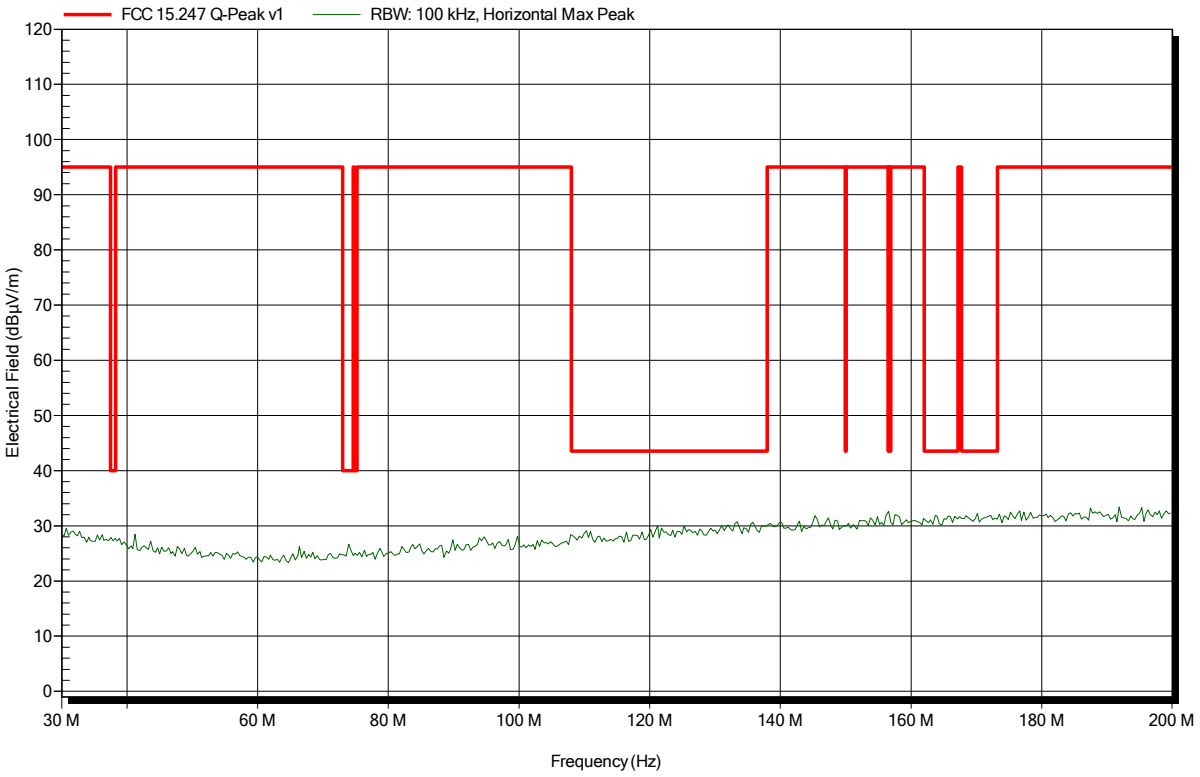
Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2402	240	28.87	pk	hor	46.00	-17.13
2402	2390	58.87	pk	hor	74.00	-15.13
2402	2390	38.94	RMS	hor	54.00	-15.06
2402	4800	38.92	pk	hor	74.00	-35.08
2426	2389.3	46.93	pk	hor	74.00	-27.07
2426	2389.3	30.33	RMS	hor	54.00	-23.67
2480	2483.5	72.96	pk	hor	74.00	-01.04
2480	2483.5	47.55	RMS	hor	54.00	-06.45
2480	2483.6	59.16	pk	ver	74.00	-14.84
2480	2483.6	40.00	RMS	ver	54.00	-14.00
2480	4955	39.73	pk	hor	74.00	-34.27

ANNEX A Transmitter spurious emissions

Spurious emissions according to FCC 15.247

Project number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

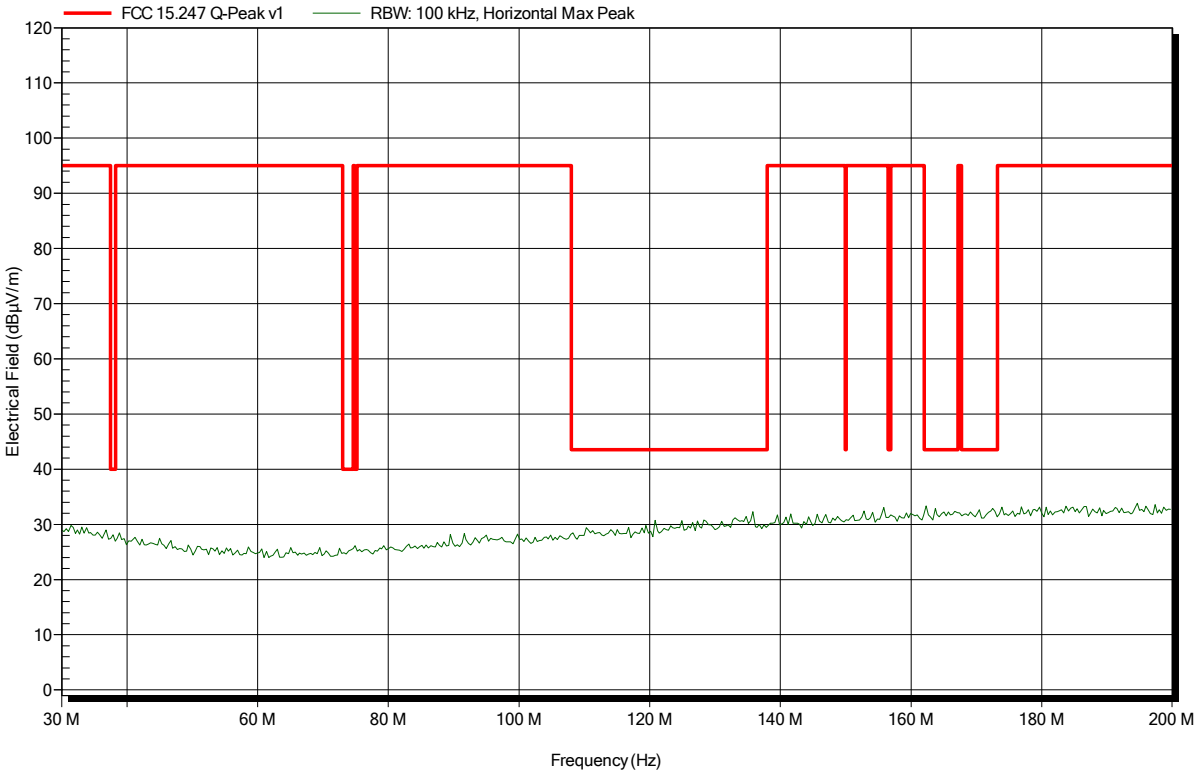
Index 1



Spurious emissions according to FCC 15.247

Project number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

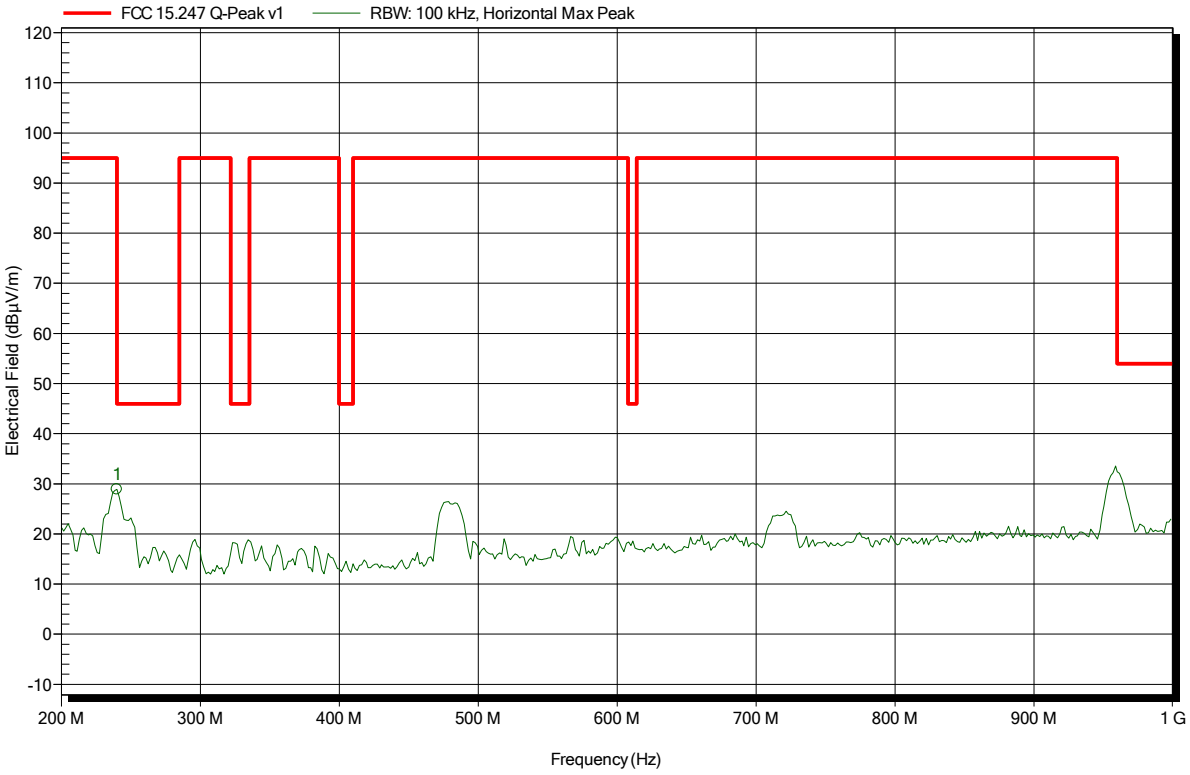
Index 2



Spurious emissions according to FCC 15.247

Project number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

Index 3

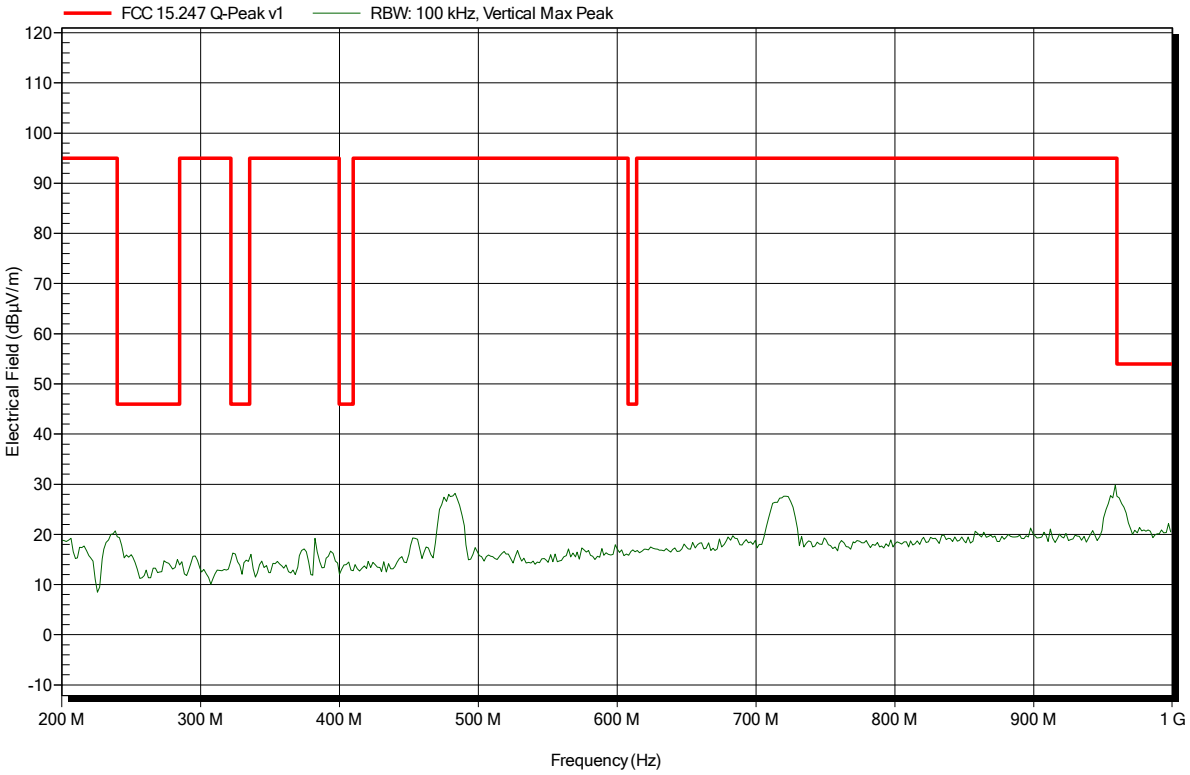


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
240 MHz	28.87 dBµV/m	46 dBµV/m	-17.13 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1711-7034
Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

Index 4



Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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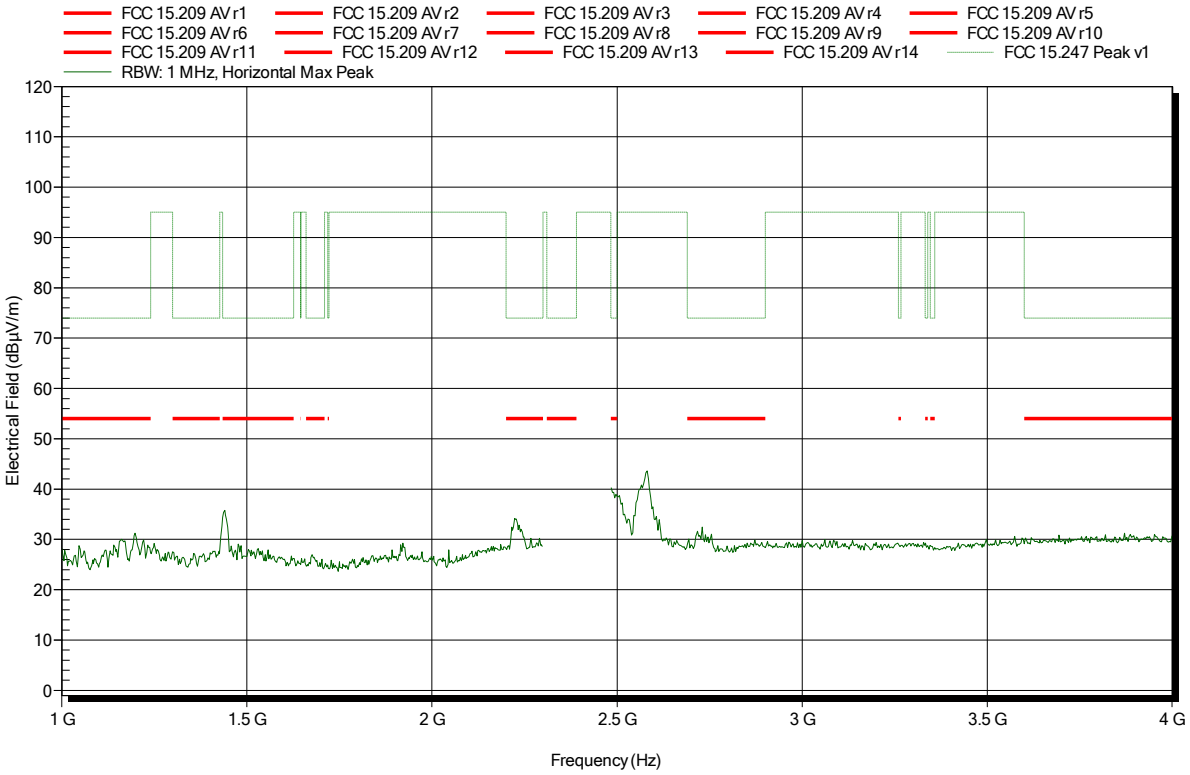

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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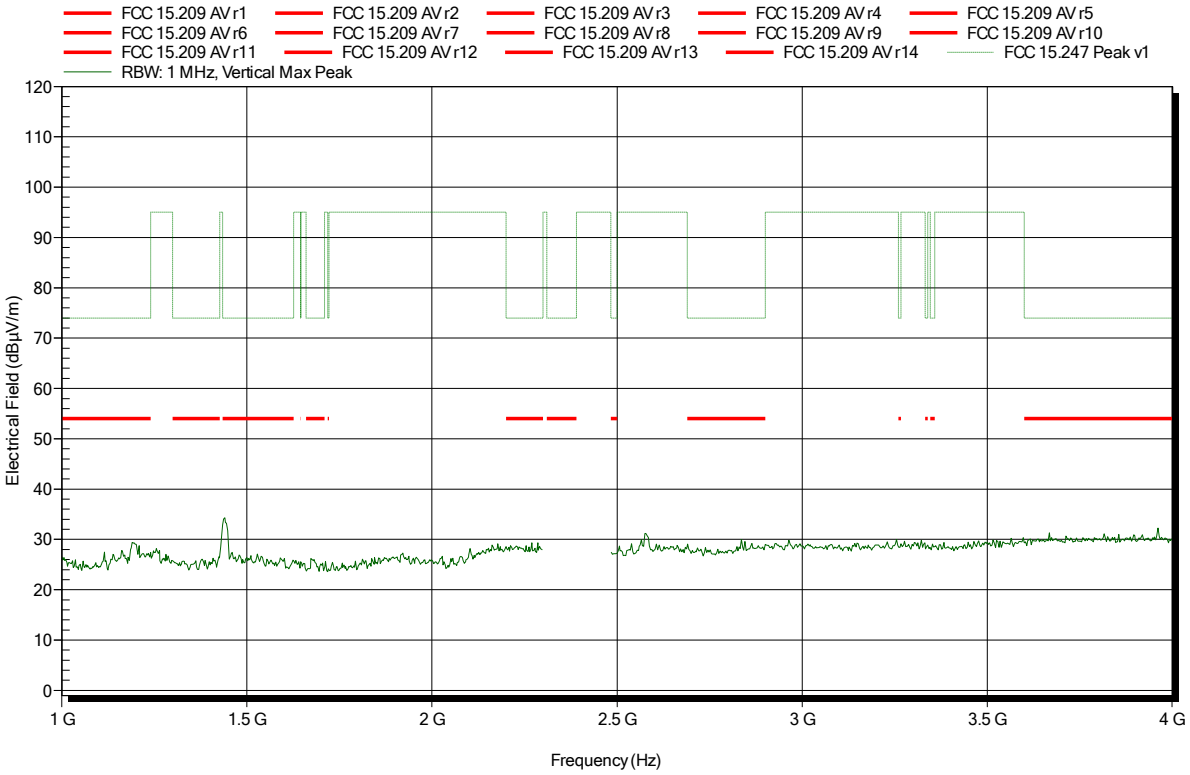

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	lower bandedge

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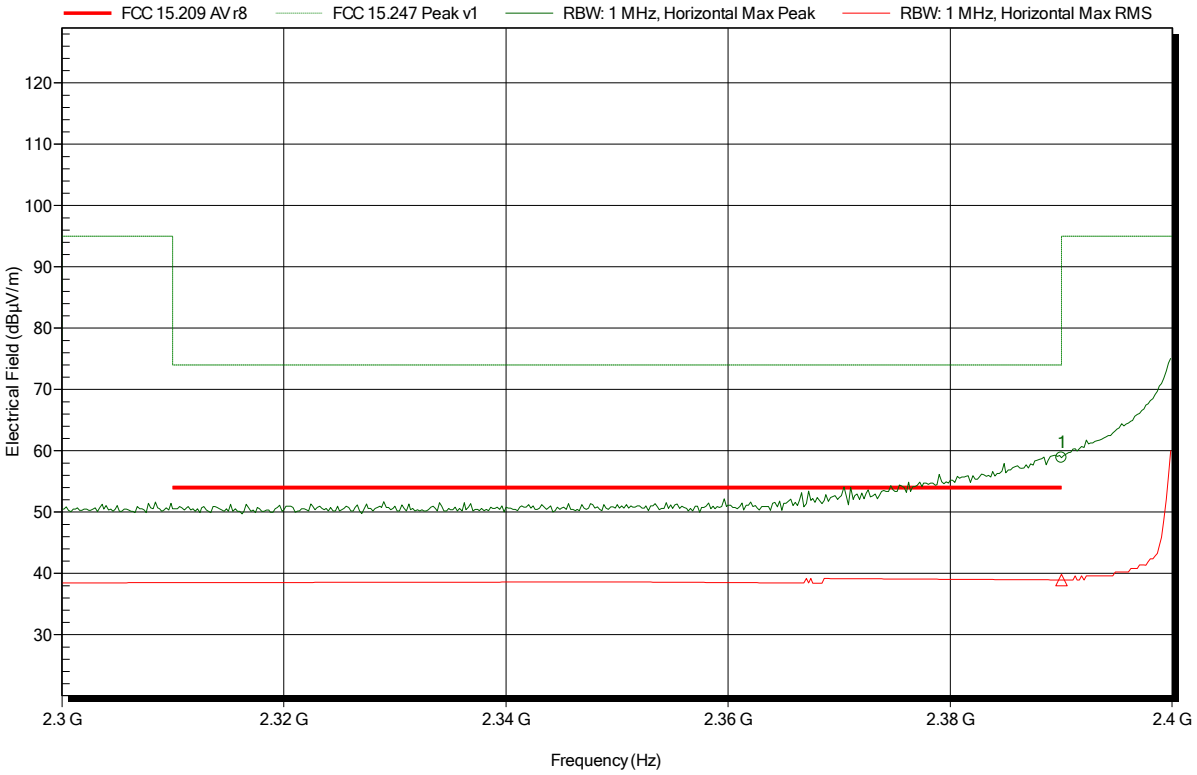

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	58.87 dBµV/m	74 dBµV/m	-15.13 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.39 GHz	38.94 dBµV/m	54 dBµV/m	-15.06 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	lower bandedge

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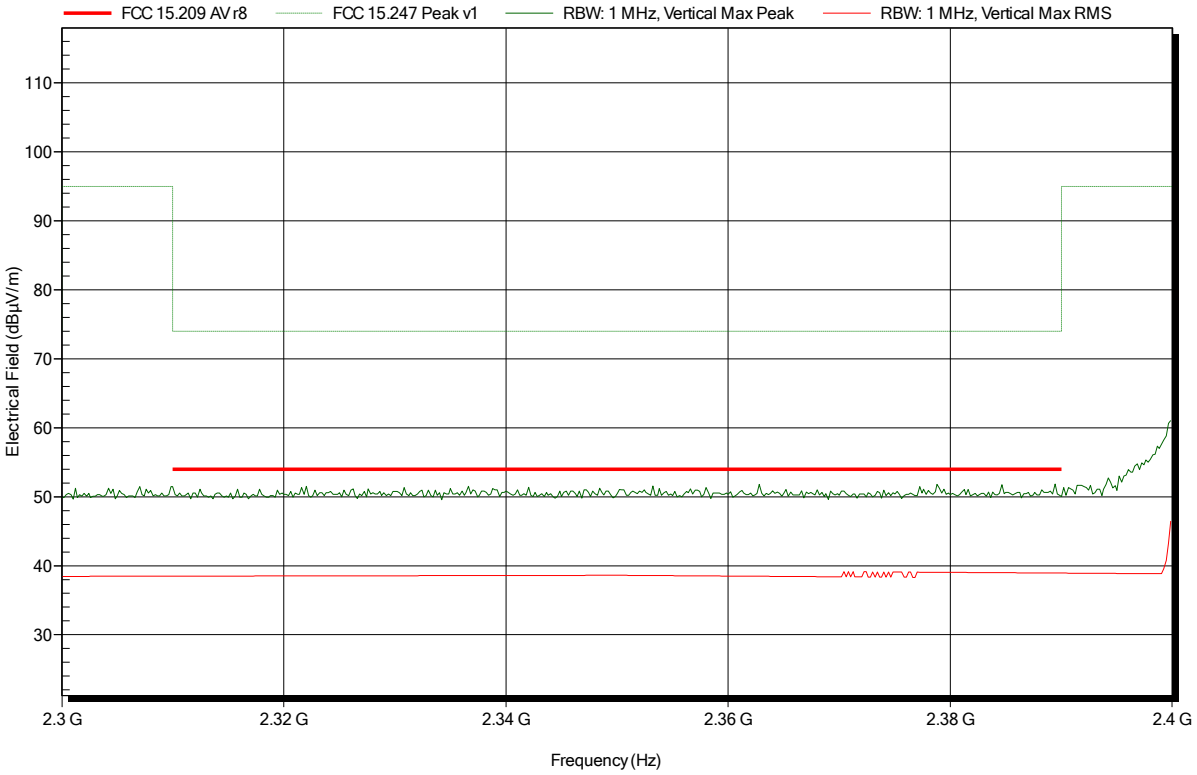

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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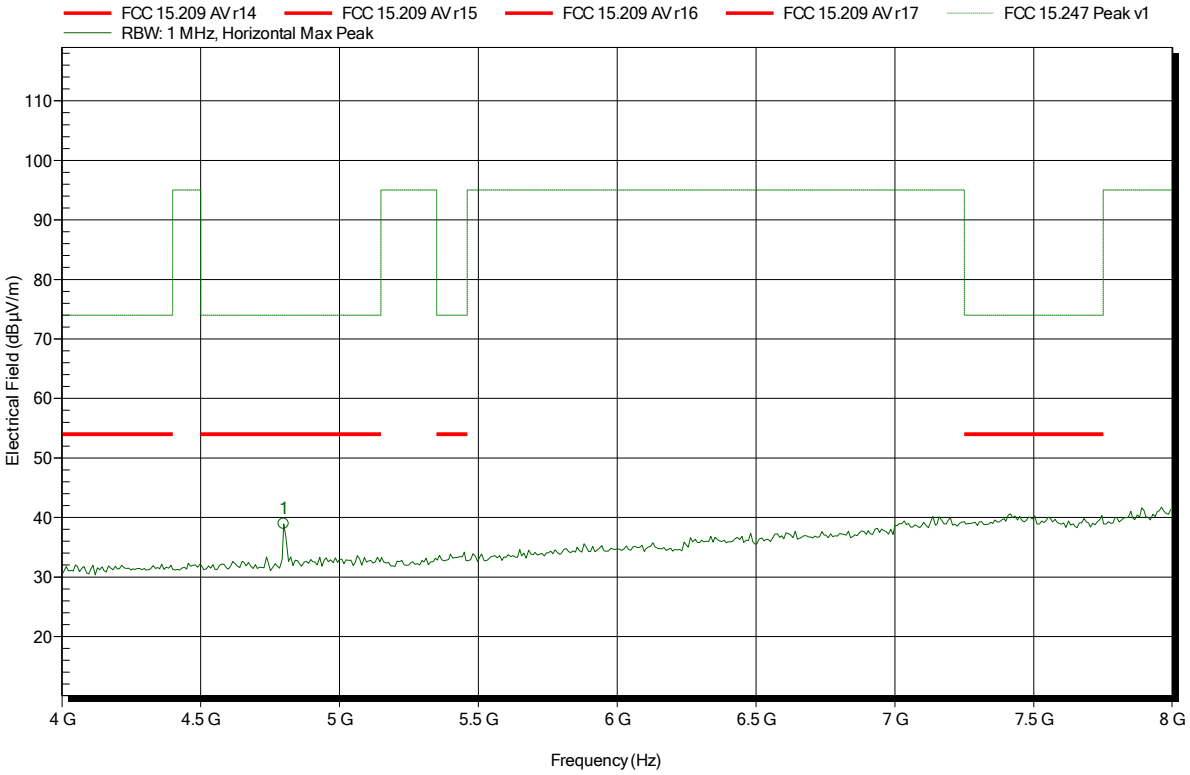

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.8 GHz	38.92 dBµV/m	74 dBµV/m	-35.08 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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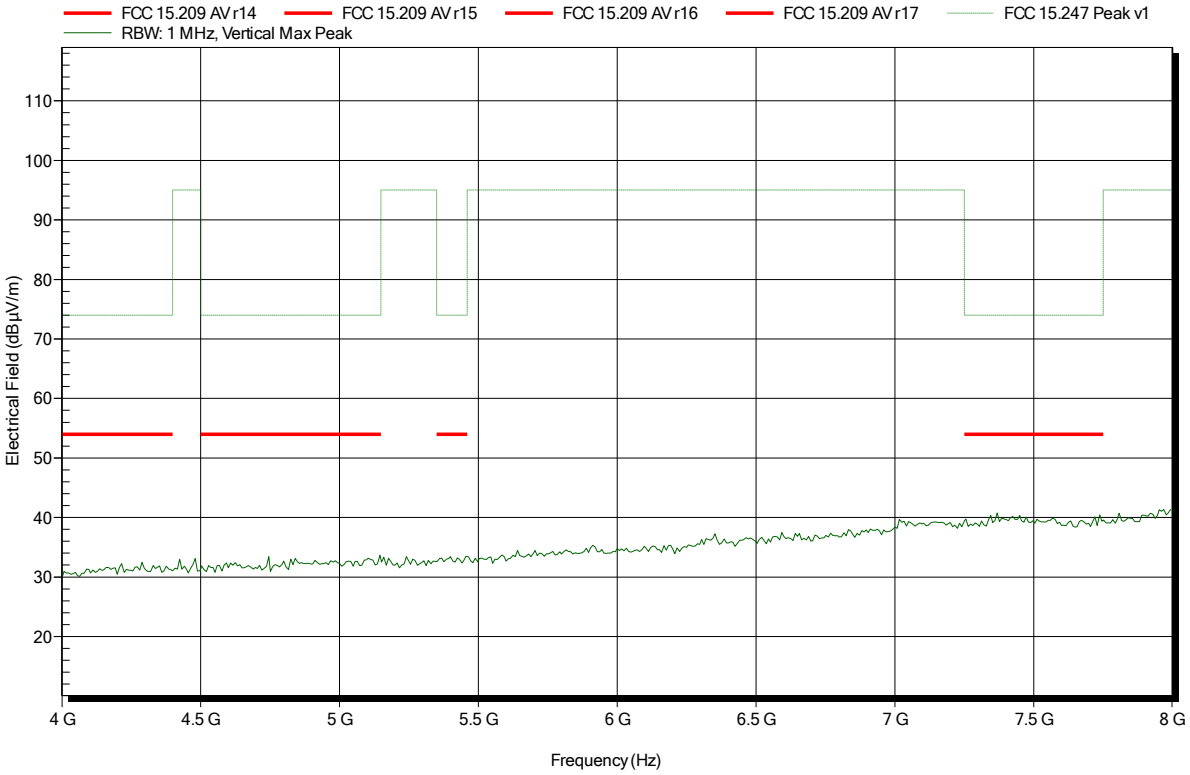

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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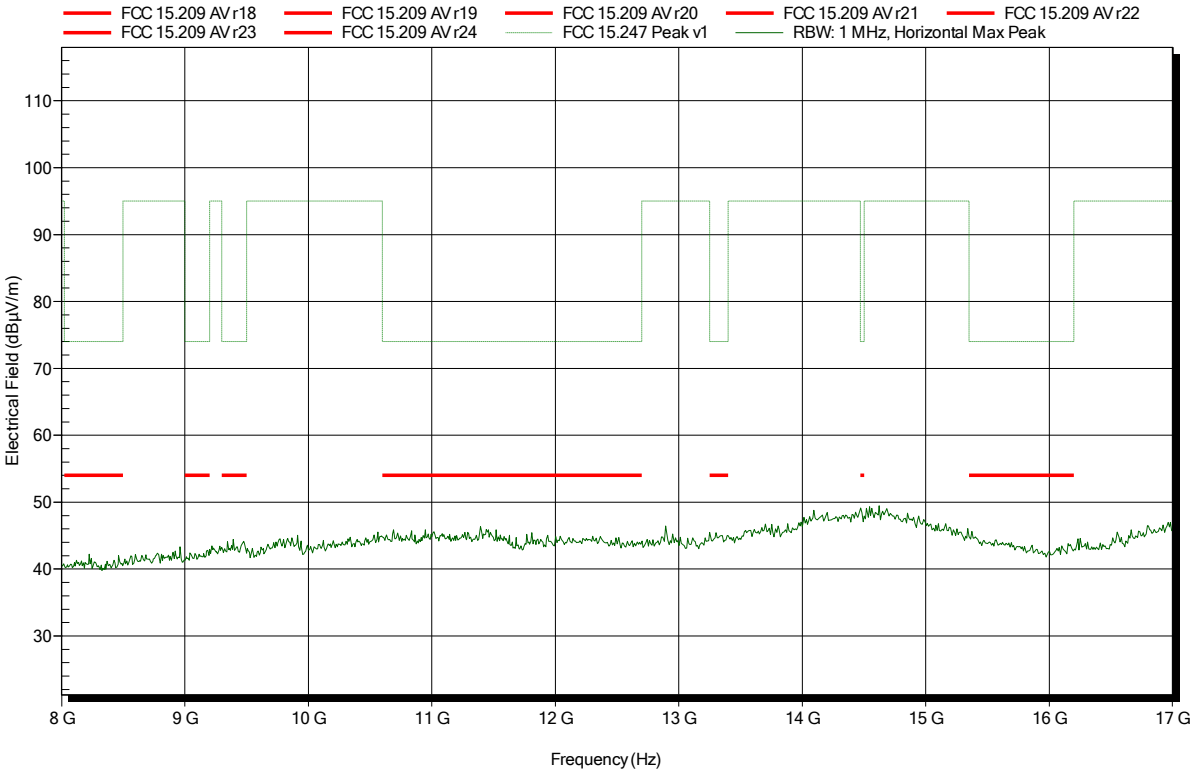

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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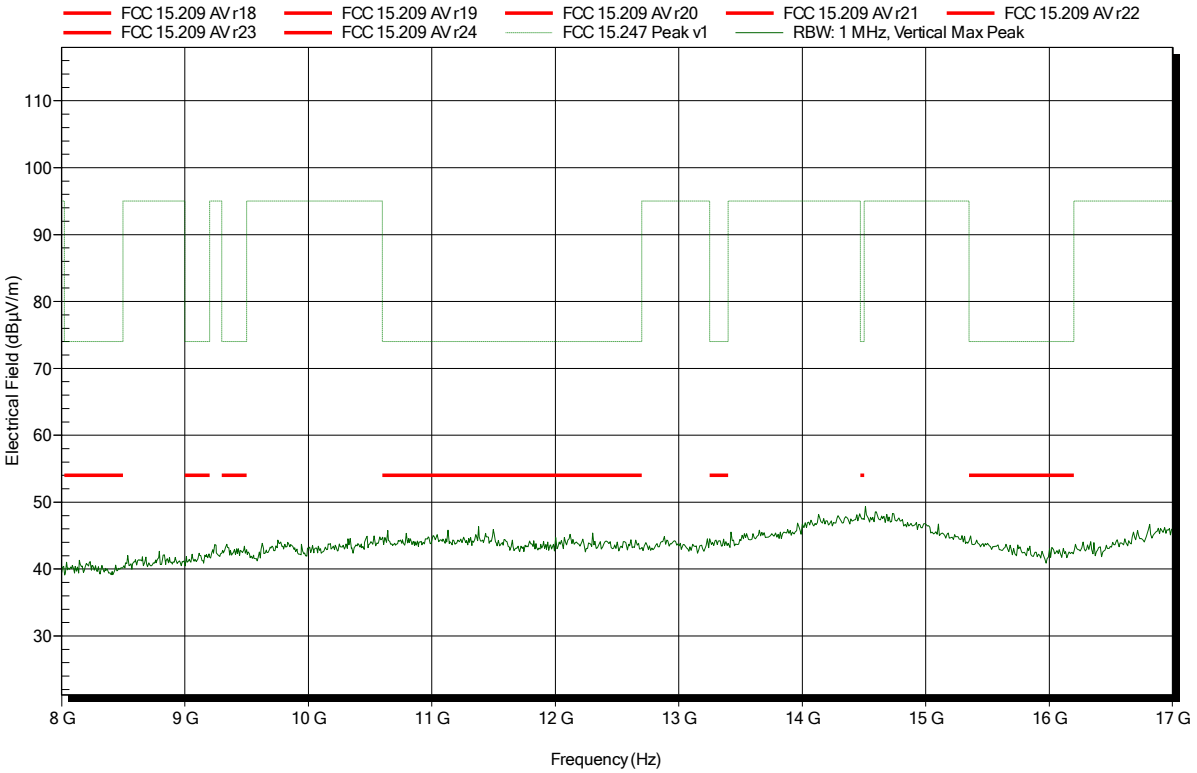

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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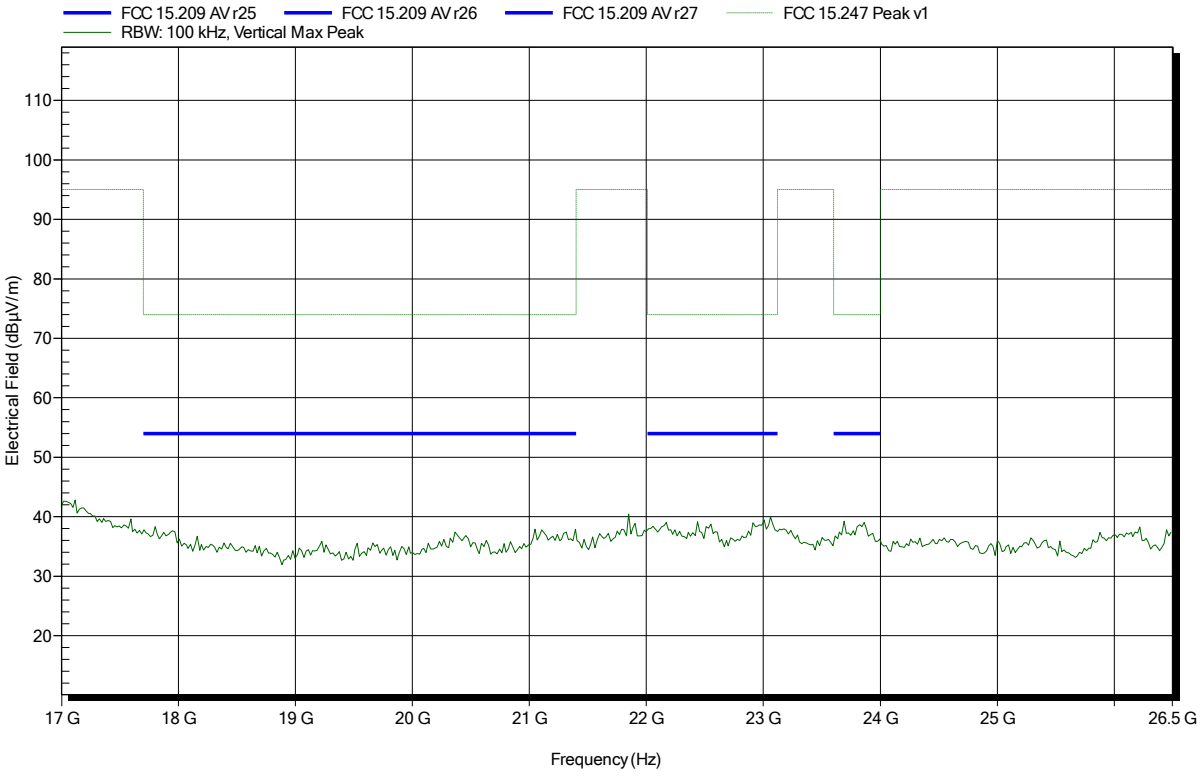

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Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2018-01-26
Note:	

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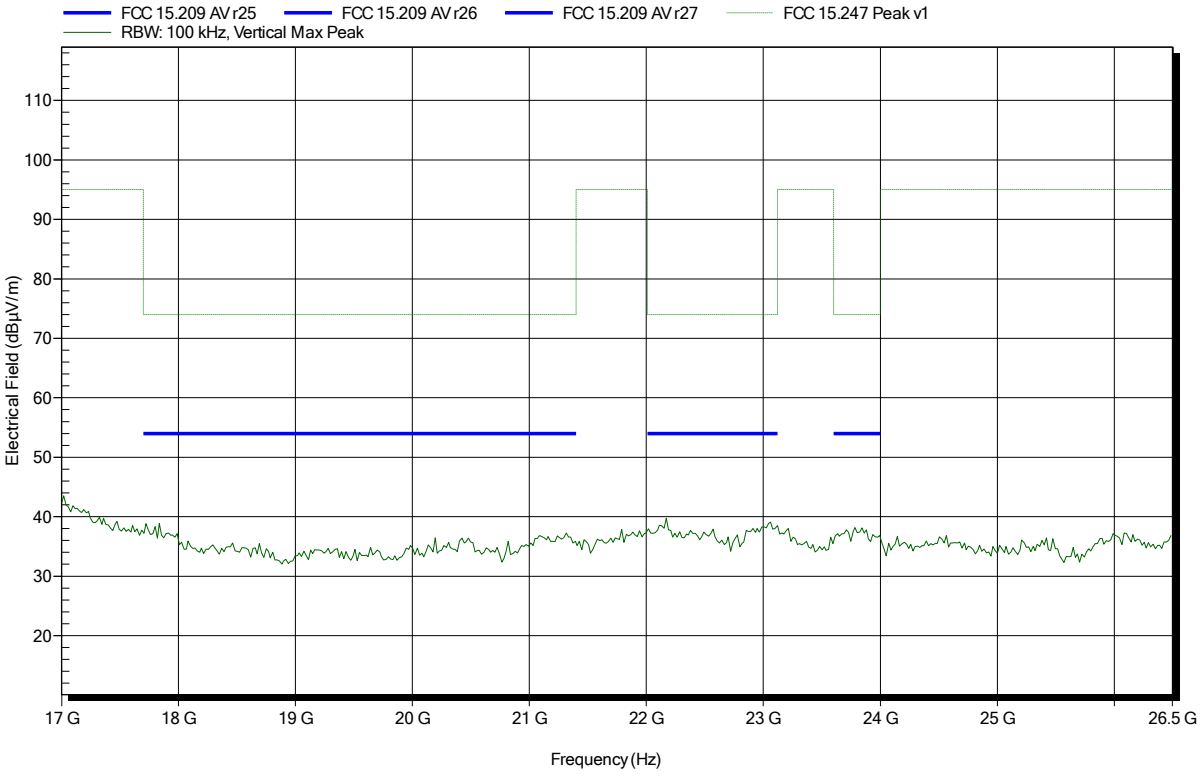

Spurious emissions according to FCC 15.247

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EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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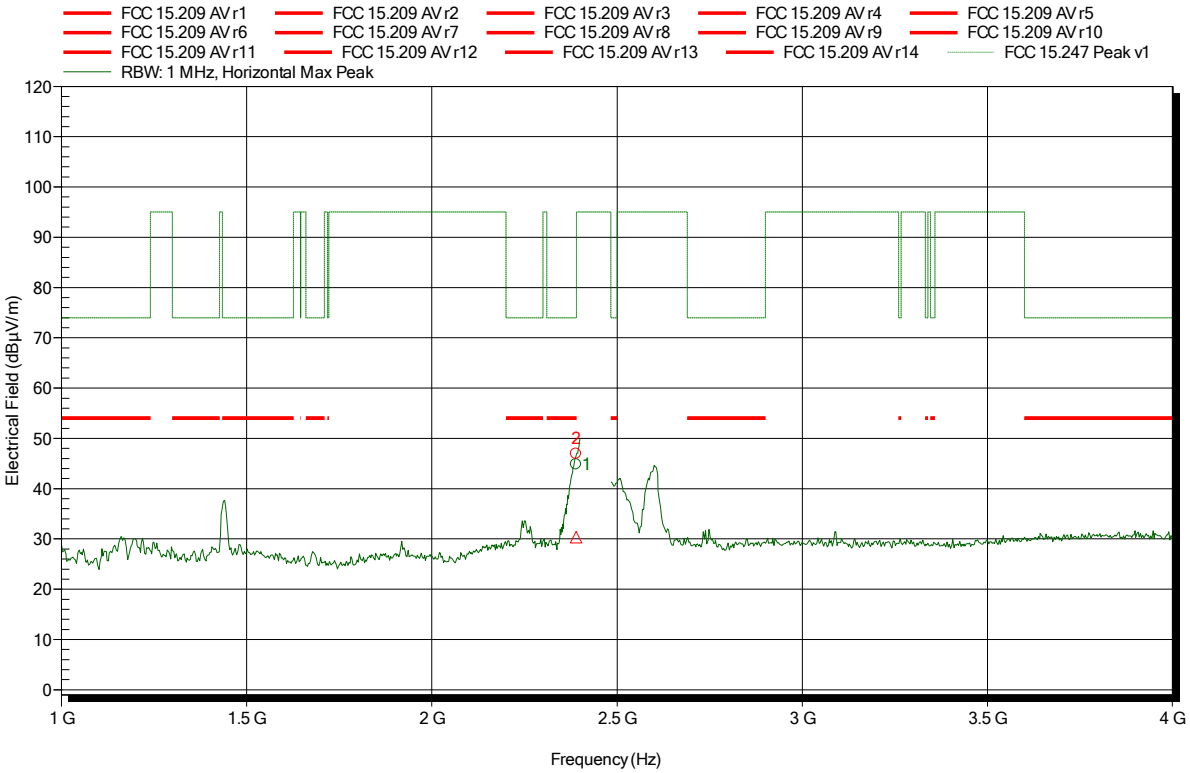

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3893 GHz	46.93 dBµV/m	74 dBµV/m	-27.07 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3893 GHz	30.33 dBµV/m	54 dBµV/m	-23.67 dB	Pass

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Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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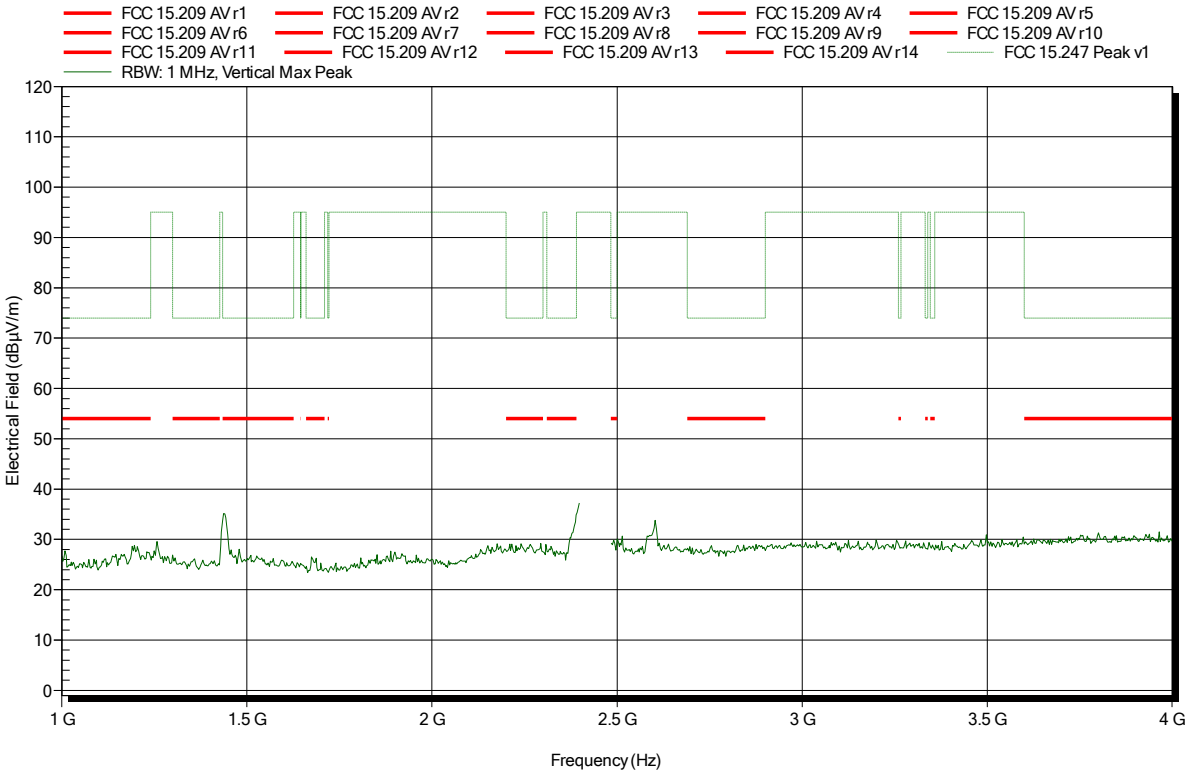

Spurious emissions according to FCC 15.247

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Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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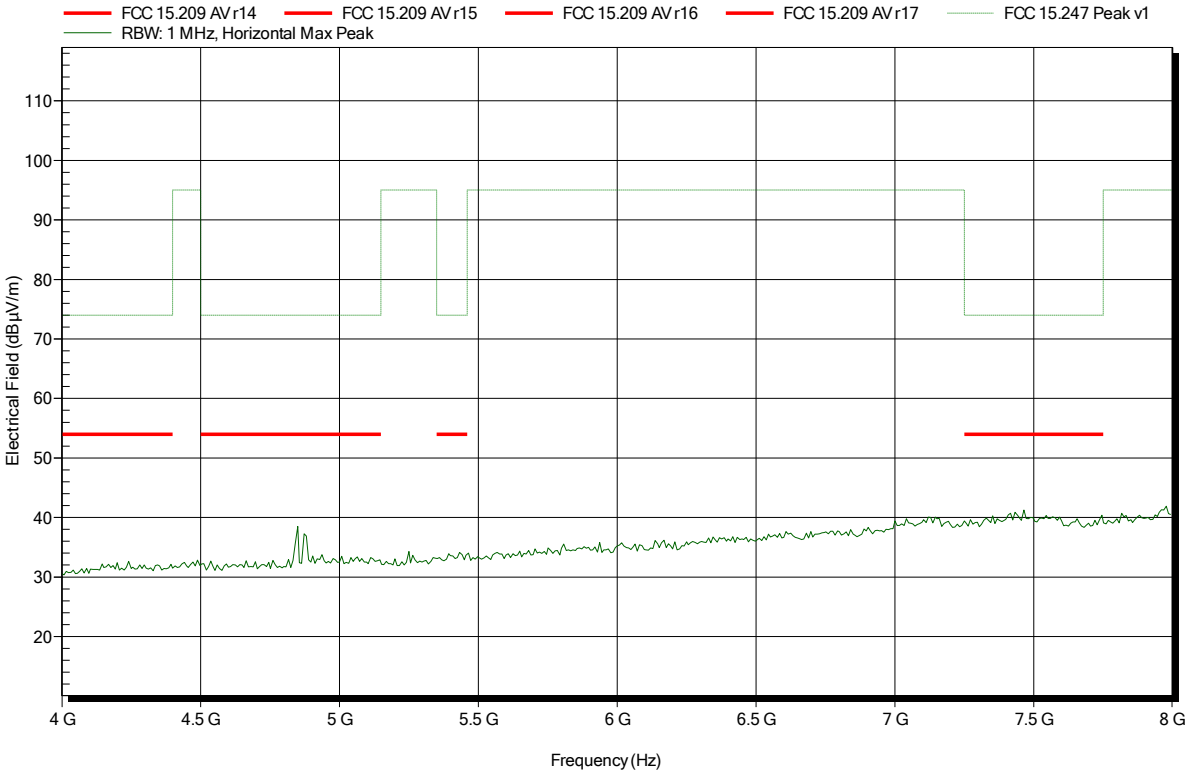

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Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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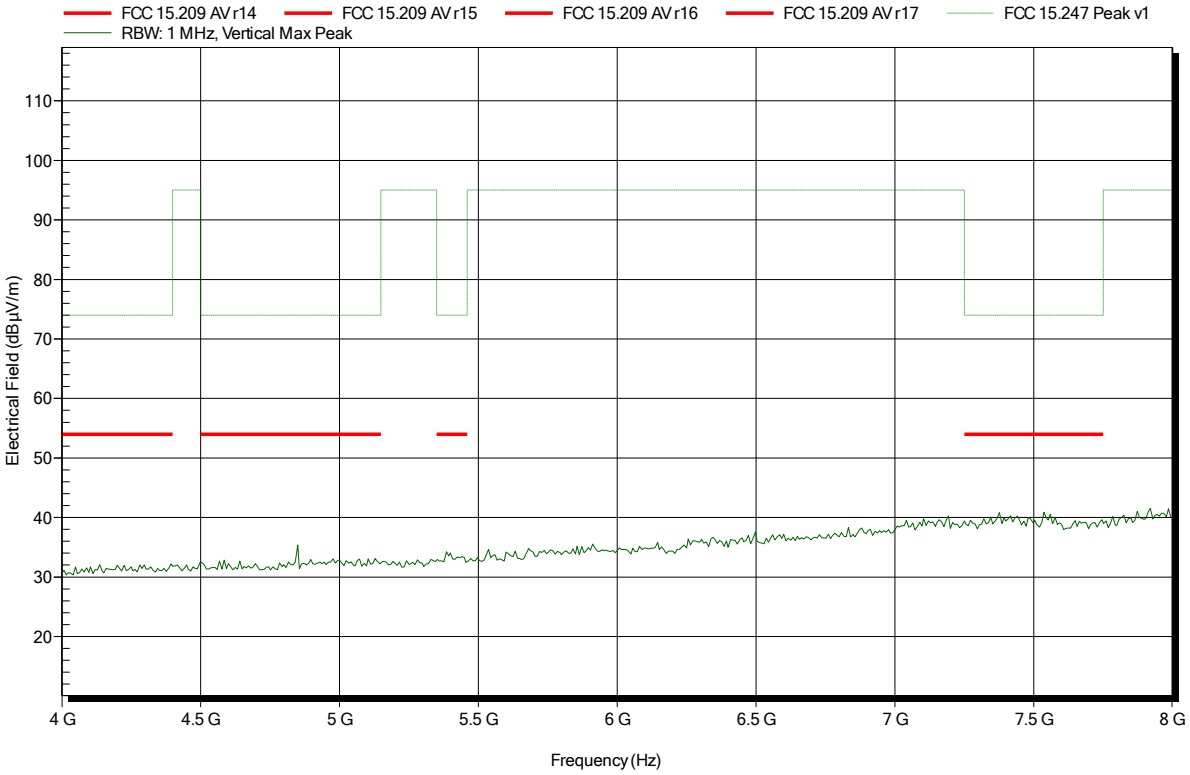

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Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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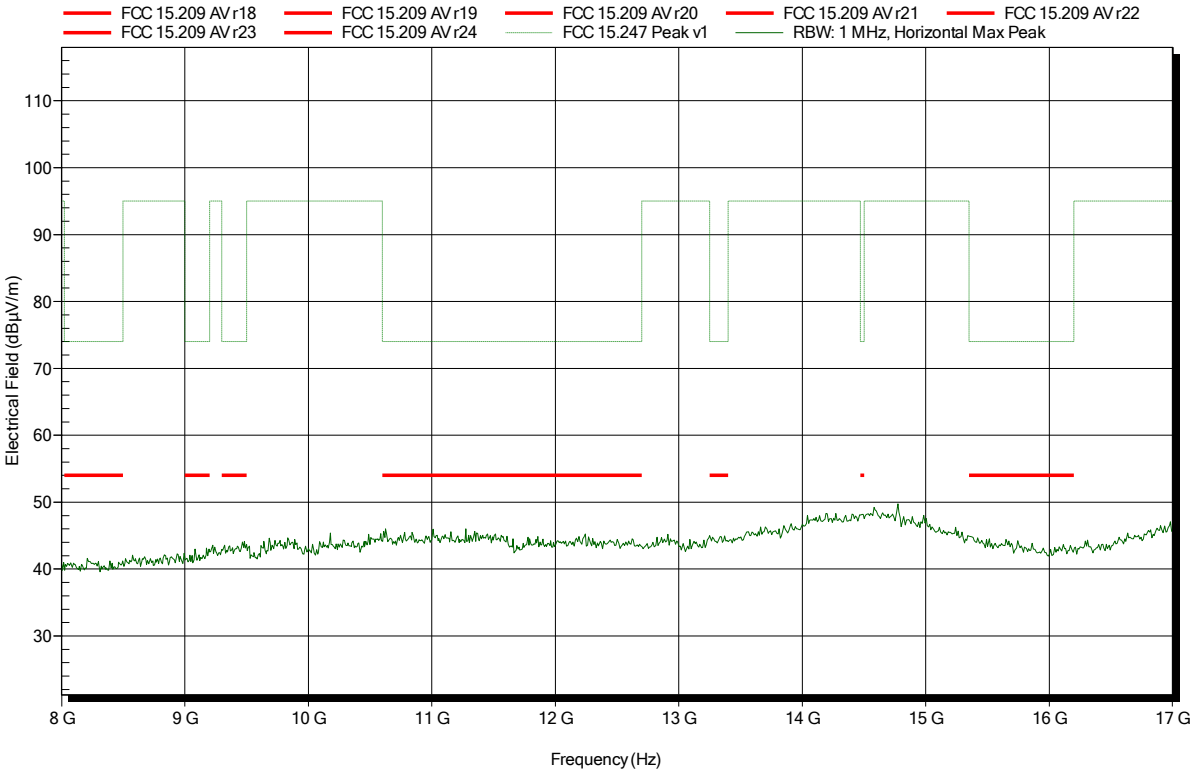

Spurious emissions according to FCC 15.247

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Operator:	Wilfried Treffke
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Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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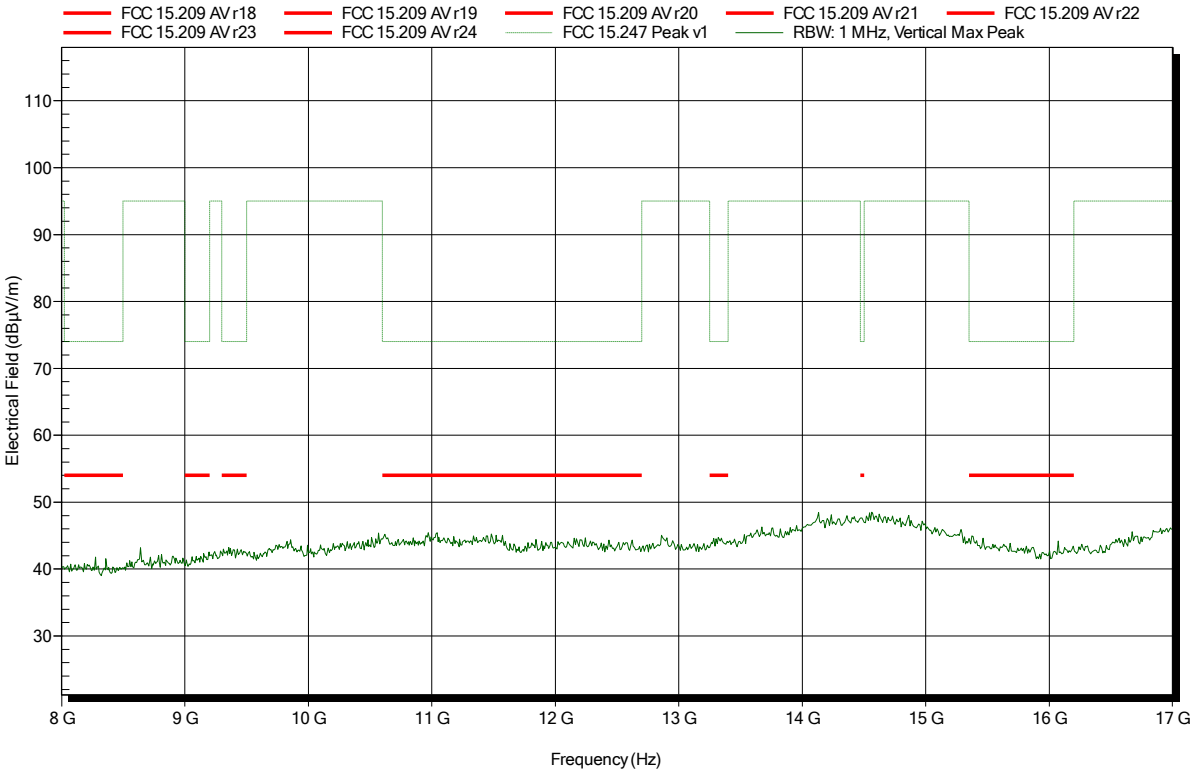

Spurious emissions according to FCC 15.247

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EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
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Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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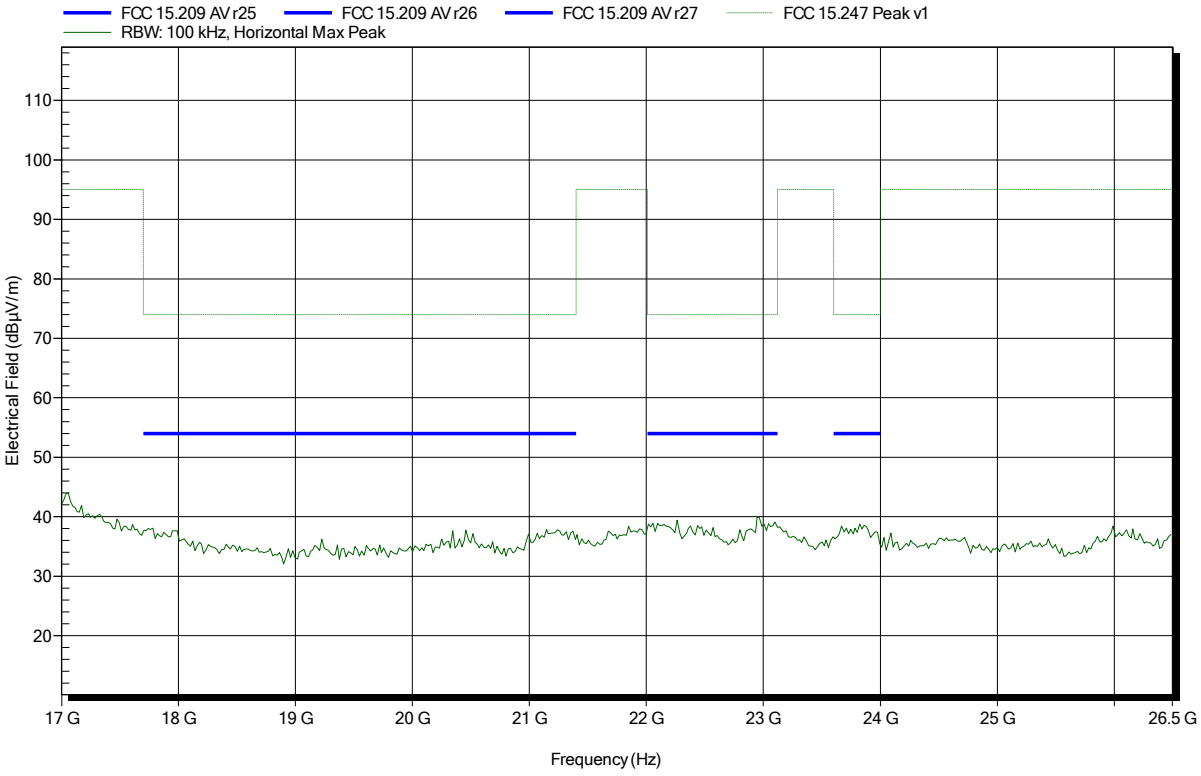

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
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Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2426 MHz
Test Date:	2018-01-29
Note:	

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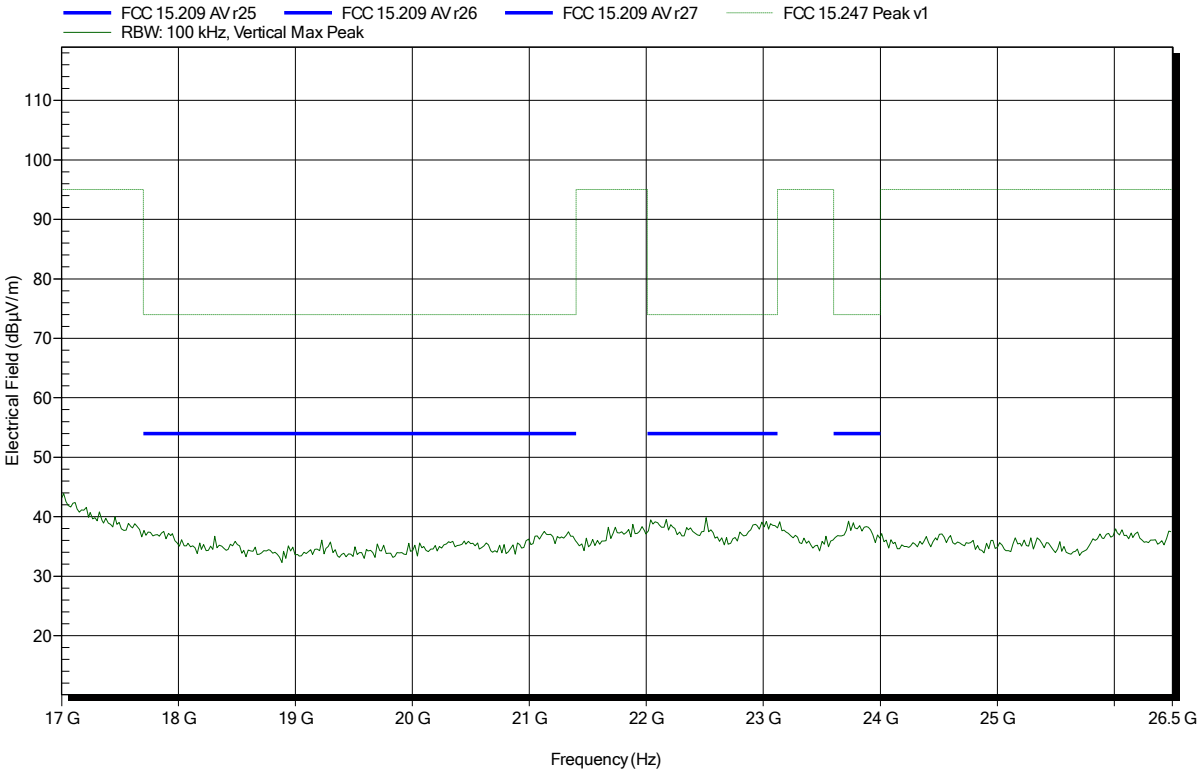

Spurious emissions according to FCC 15.247

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Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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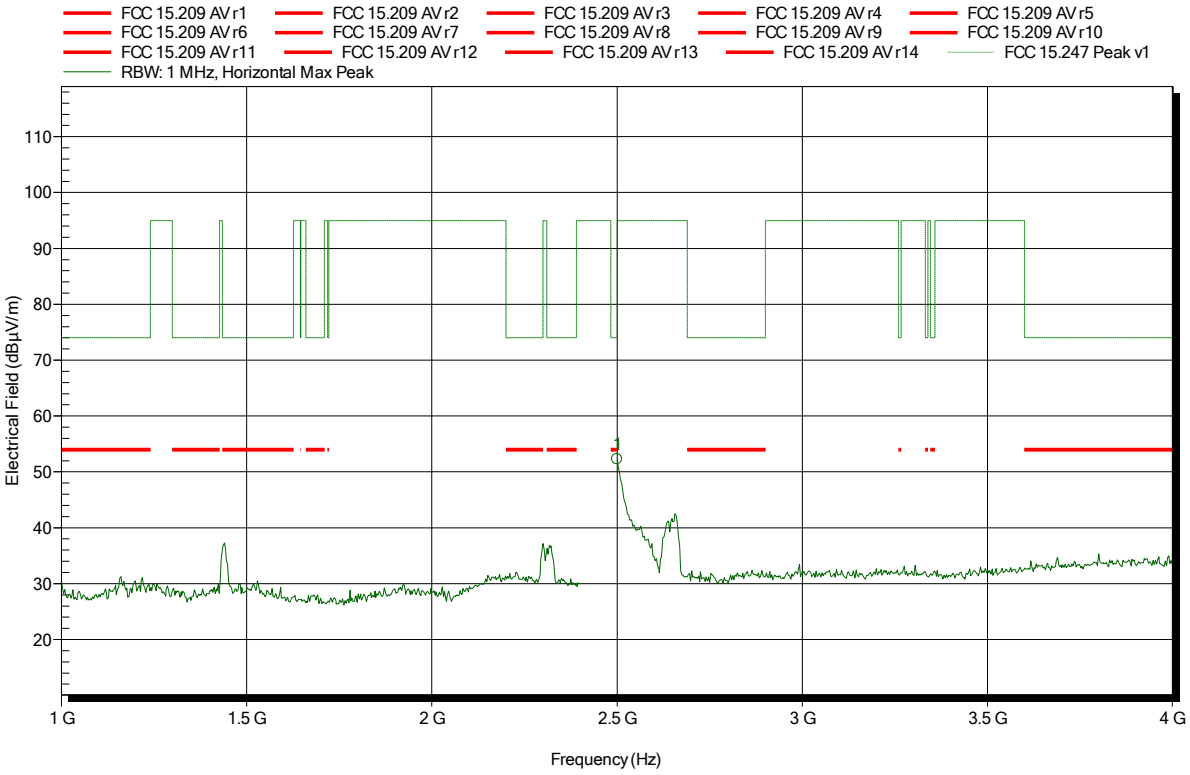

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.501 GHz	52.26 dBµV/m	95 dBµV/m	-42.74 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

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Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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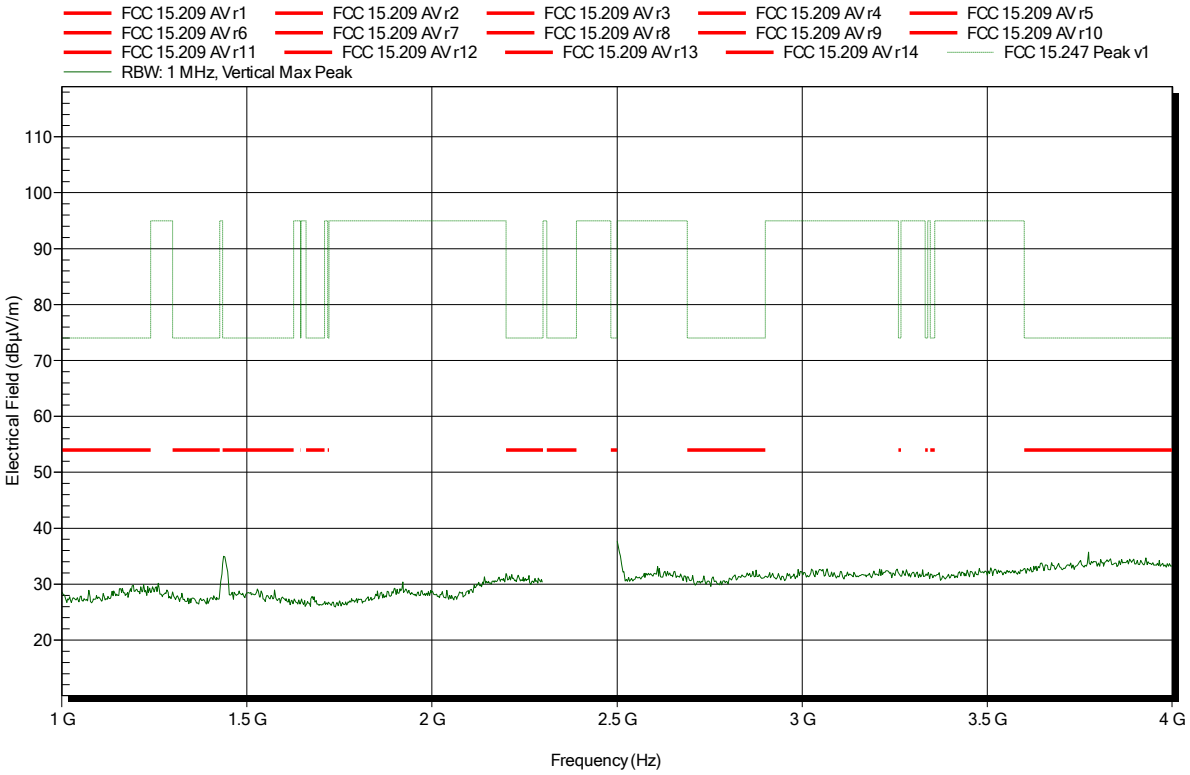

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

Applicant:	ANDREAS STIHL AG & Co. KG
EUT Name:	STIHL Smart Connector / STIHL Part No. 0000-400-4900-A
Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	upper bandedge

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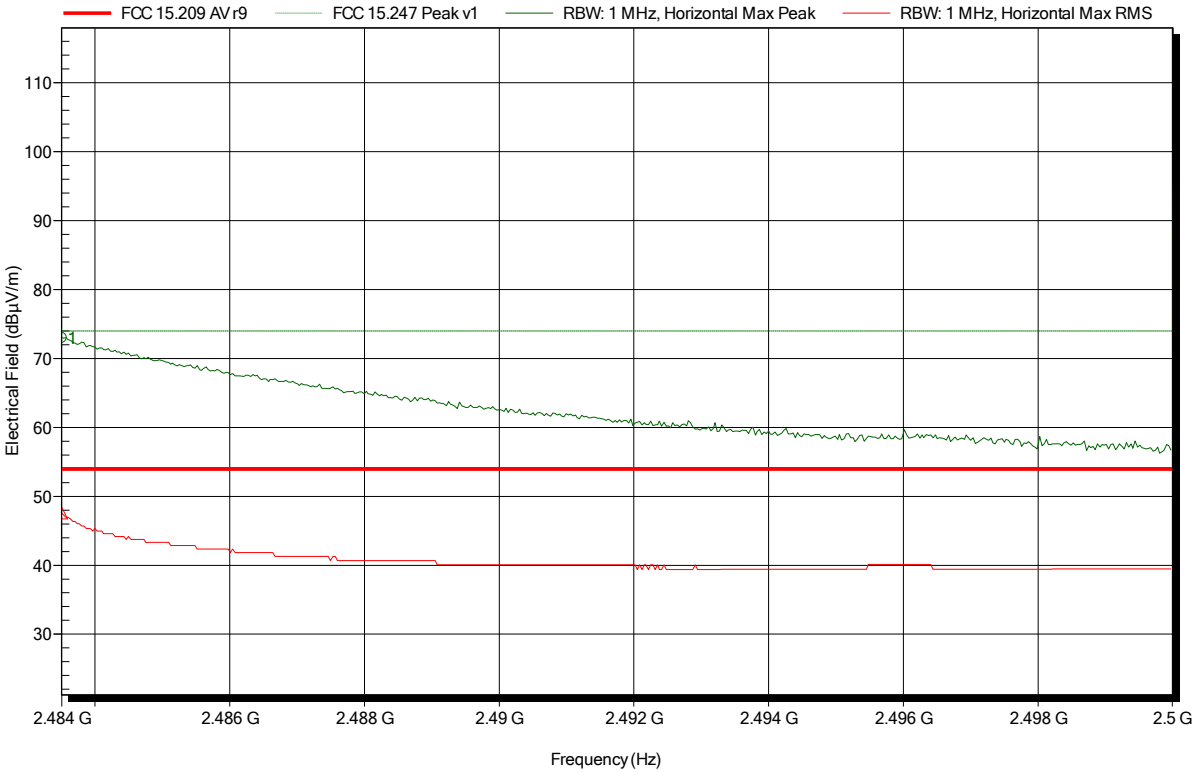

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	72.96 dBµV/m	74 dBµV/m	-1.04 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	47.55 dBµV/m	54 dBµV/m	-6.45 dB	Pass

Spurious emissions according to FCC 15.247

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Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	upper bandedge

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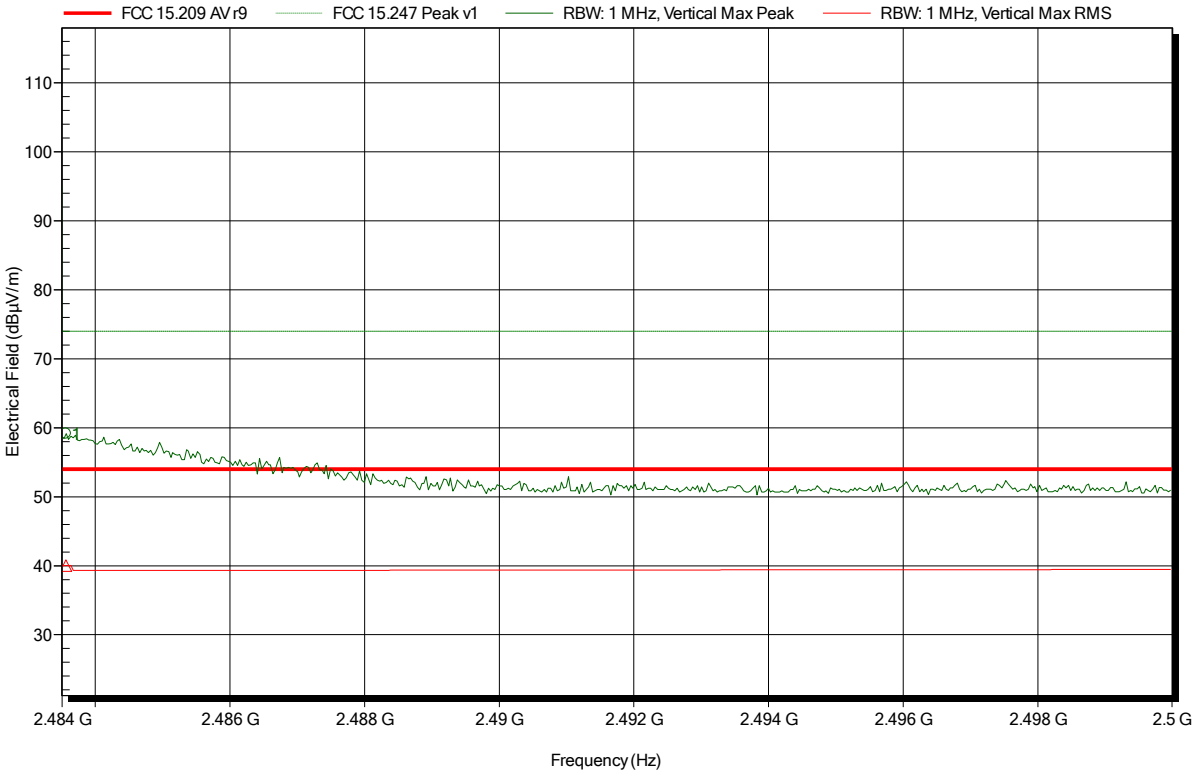

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	59.16 dBµV/m	74 dBµV/m	-14.84 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4836 GHz	40 dBµV/m	54 dBµV/m	-14 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

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Model:	SC
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 22.5°C, Vnom: 3.0V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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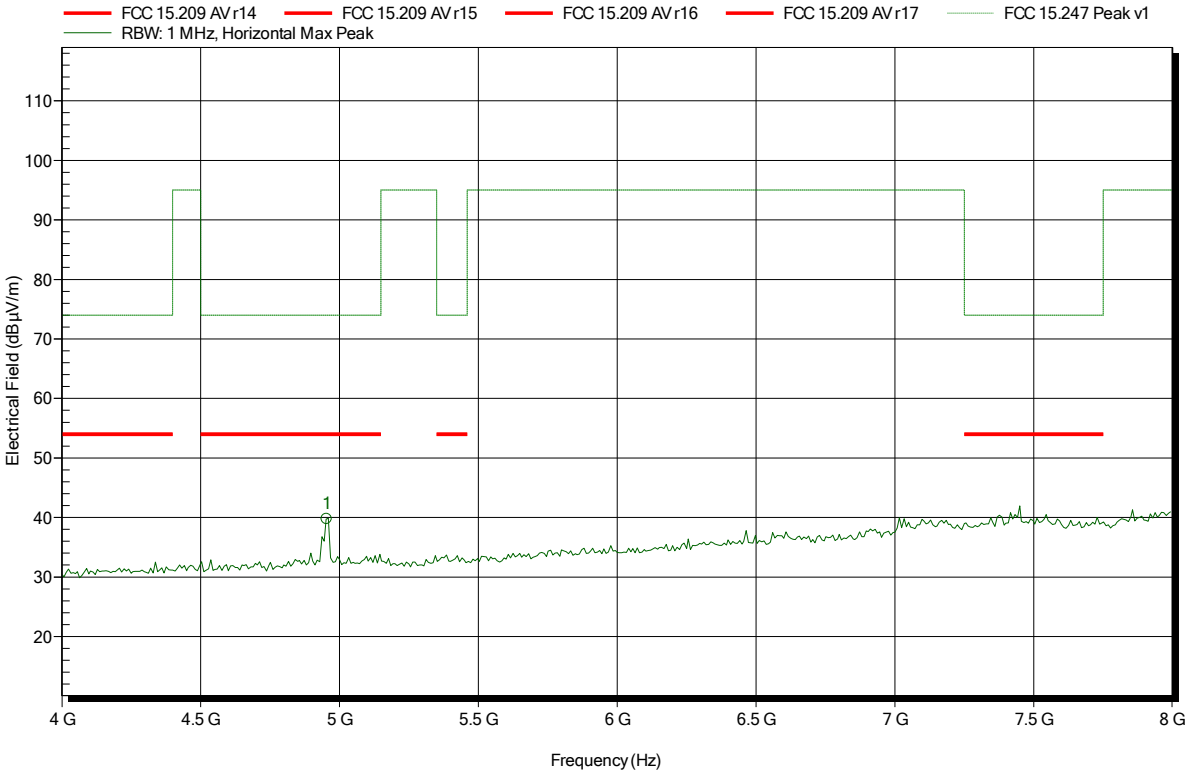

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.955 GHz	39.73 dBµV/m	74 dBµV/m	-34.27 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1711-7034

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Test Site:	Eurofins Product Service GmbH
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Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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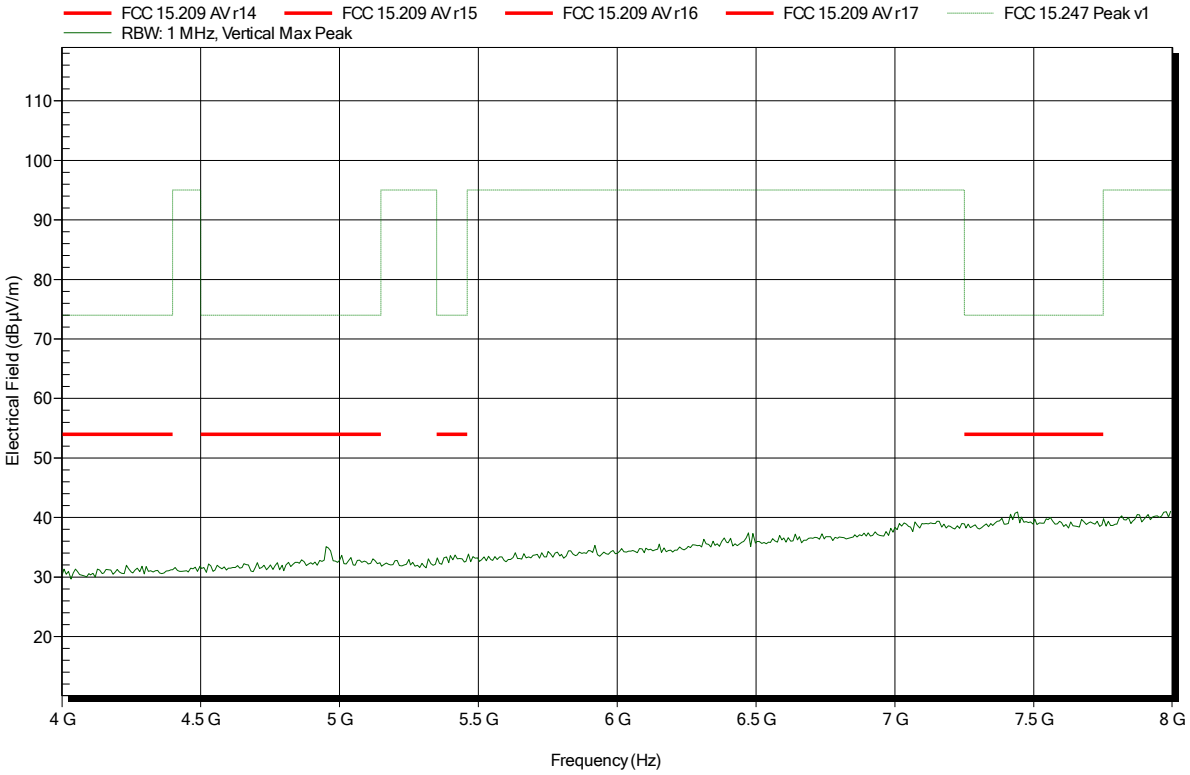

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Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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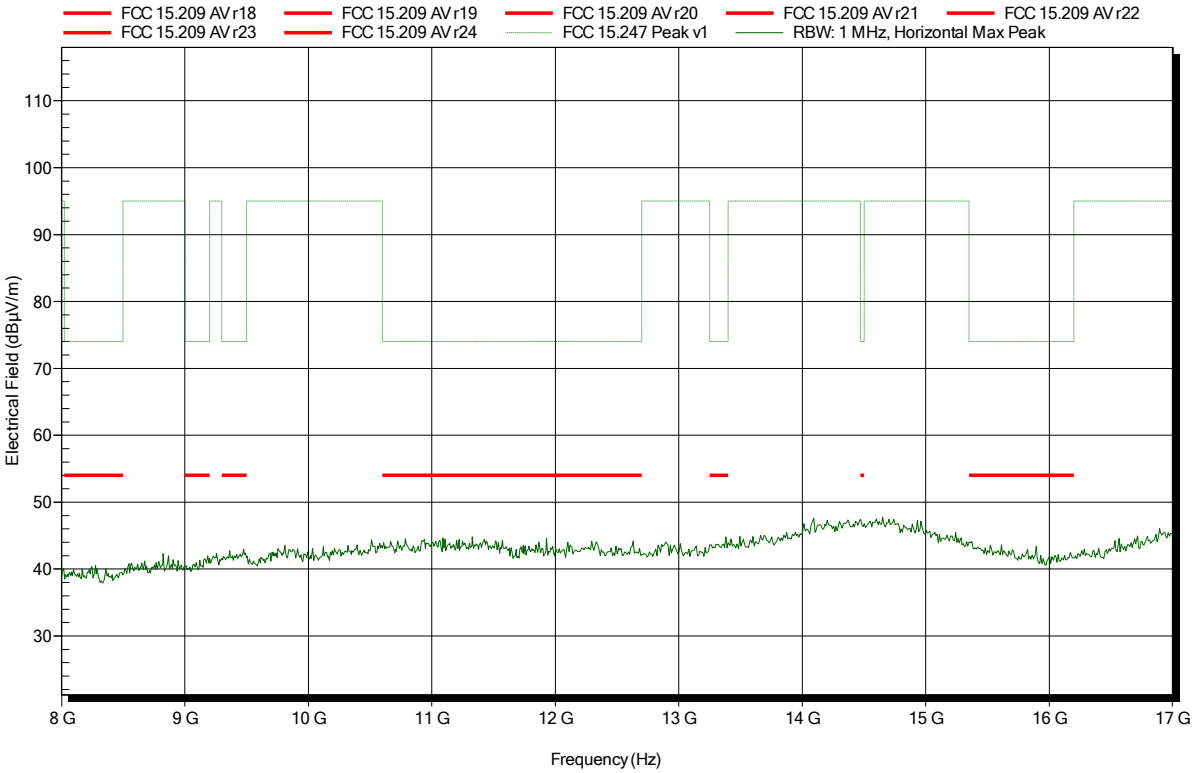

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Antenna:	Schwarzbeck BBHA 9120D, Vertical
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Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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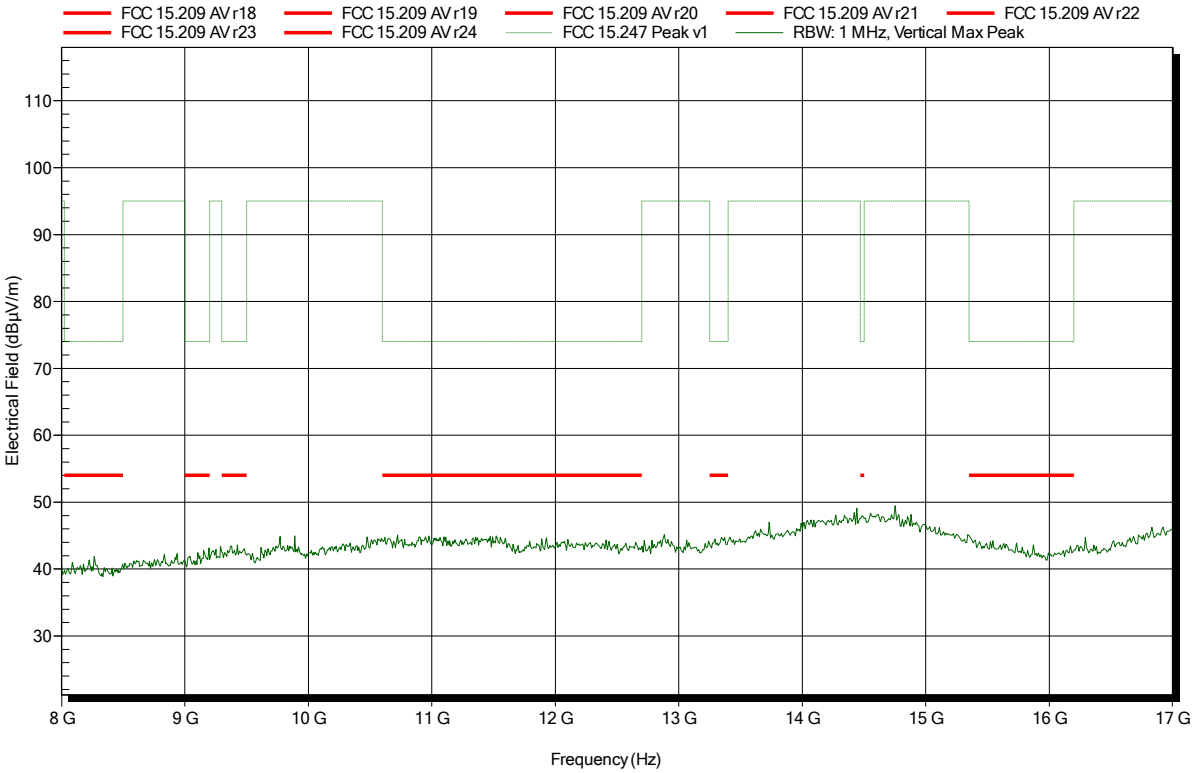

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Mode:	TX; BLE; 2480 MHz
Test Date:	2018-01-29
Note:	

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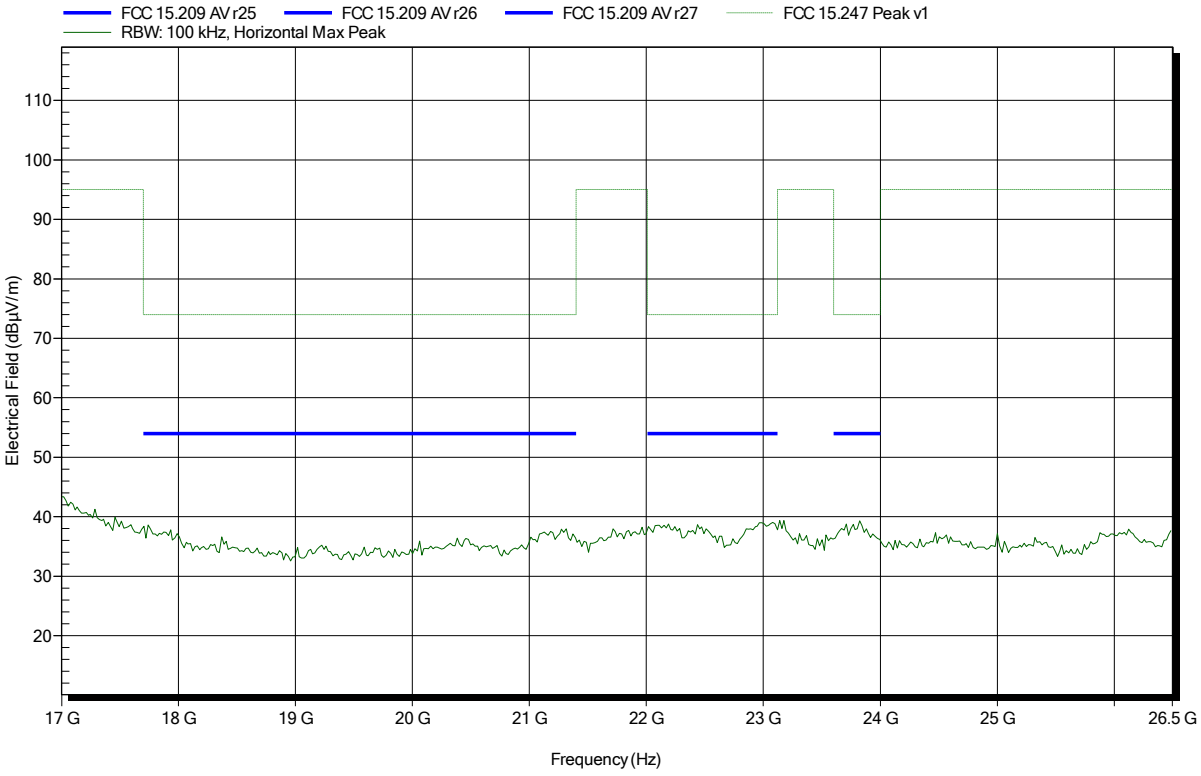

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Note:	

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