

Test report

24-0136RP29-009

Product / EUT: *Spray gun with remote control*
Type designation: *RE04*
Tested type: *RE140 VARIO CONTROL Spraygun*

EUT authorization: ☒ Certification
☐ Suppliers Declaration of Conformity

FCC ID: *2ALP8RE04B*

Part number: *RE04-500-1302-A*
Production level: *Prototype*
Firmware version: *N/A*
S/N: *N/A*

Manufacturer: *ANDREAS STIHL AG & Co. KG*
Andreas-Stihl-Str. 4
71336 Waiblingen / Germany

Test remit: 47 CFR Part 15 – Subpart C – Intentional radiators

in accordance with the procedures specified in
ANSI C63.10-2020+Cor.1-2023+C63.10a-2024
+ Errata to C63.10a-2024
ANSI C63.4a-2017

The standards were: ☒ Met
☐ Met, for the limited scope of testing
☐ Not met

Remark: ☒ Validation covered by the accredited scope
☐ Validation not covered by the accredited scope
according to: _____
☐ Validation of the EMC-requirements partly proceeded



Applicant: ANDREAS STIHL AG & Co. KG
Andreas-Stihl-Str. 4
71336 Waiblingen / Germany

EUT-
Date of arrival: 05/21/2025 06/21/2025
Test ID: 24-0136PR20-016 24-0136PR20-018
Date(s) of test: 06/13/2025 until 07/11/2025

Burgrieden, 02/21/2026

Released by:

Principal Engineer - Christian Vogelmann

Test laboratory: EMCE GmbH
Ingenieurbüro für EMV-Prüfungen und
Schaltungsentwicklung
Untere Wiesen 1 / 88483 Burgrieden / Germany

DAkS-Registration No: D-PL-12122-01-00
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Deutsche Akkreditierungsstelle GmbH



Deutsche
Akkreditierungsstelle
D-PL-12122-01-00



Scope:

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1 General Information

Project manager: M.Sc. S. Vogelmann

Inspector: M.Sc. S. Vogelmann

EMCE GmbH

Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contact person: Mr. Grohmann / ANDREAS STIHL AG & Ko. KG

Remarks: N/A

State of Revision:

Source document	New Document	Date / Reviser	Modifications

2 EUT Information

Sampling:

The device was selected and provided by the customer.
 EUT 24-0136PR20-016: Supplied with custom firmware supporting continuous transmission and configurable channel selection.
 EUT 24-0136PR20-018: PCB of the spray gun with standard firmware.

Description:

The EUT is a spray gun with an RF interface for regulating the water pressure of a connected high-pressure cleaner, serving as the companion device.

Voltage supply:

Internal battery, 2x 1.5 V

Frequency list:

Channel table

<i>Channel #</i>	<i>Frequency / MHz</i>	<i>Channel spacing / MHz</i>	<i>Remark(s)</i>
<i>1</i>	<i>915.4</i>	<i>0.2</i>	<i>Lowest channel</i>
<i>2</i>	<i>915.6</i>	<i>0.2</i>	
<i>3</i>	<i>915.8</i>	<i>0.2</i>	
<i>4</i>	<i>916.0</i>	<i>0.2</i>	
<i>5</i>	<i>916.2</i>	<i>0.2</i>	
<i>6</i>	<i>916.4</i>	<i>0.2</i>	
<i>7</i>	<i>916.6</i>	<i>0.2</i>	
<i>8</i>	<i>916.8</i>	<i>0.2</i>	
<i>9</i>	<i>917.0</i>	<i>0.2</i>	
<i>10</i>	<i>917.2</i>	<i>0.2</i>	
<i>11</i>	<i>917.4</i>	<i>0.2</i>	
<i>12</i>	<i>917.6</i>	<i>0.2</i>	
<i>13</i>	<i>917.8</i>	<i>0.2</i>	<i>Highest channel</i>

RF Power settings EUT: *9 dBm*

Max. clock frequency: *< 1 GHz*

Temperature range: *0 °C – 60 °C*

Dimension (mm): *460 x 200 x 50 (LxWxH)*

RF Applications:

Application	Frequency range	Architecture for application
Remote control for regulation of the water pressure.	Lowest channel: 915.4 MHz Highest channel: 917.8 MHz	☐ Receiver ☐ Transmitter ☒ Transceiver ☐ Tagging system (RFID)

Used antennas:

Antenna designation	Manufacturer	Connector / cable length	Gain (dBi) @ f / GHz
<i>Integral antenna</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

Used band filter:

Filter designation	Filter type	Manufacturer	Connector
<i>N/A</i>			

Supplied / used equipment:

Designation	Type	Manufacturer	S/N
<i>Main PCB of a high-pressure cleaner</i>	<i>RE 140.0 PLUS</i>	<i>STIHL</i>	<i>N/A</i>
<i>Adjustable nozzle</i>	<i>RE04-530-0710-A</i>	<i>STIHL</i>	<i>N/A</i>
<i>2x Battery</i>	<i>PC2400</i>	<i>Procell Constant</i>	

Configuration:



As-delivered condition



Modified

*

Cable designation	Type	Length	Remarks
<i>Trigger cable</i>	<i>4-core</i>	<i>0.20 m</i>	<i>Internal</i>

Software designation	Type	Manufacturer	Version
<i>N/A</i>			



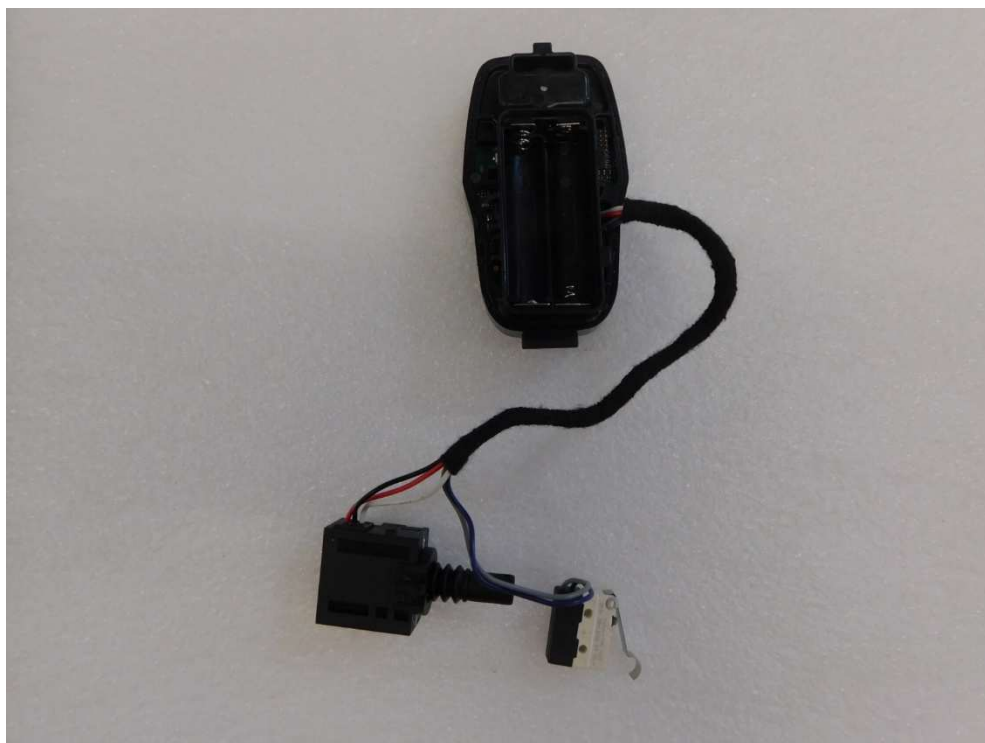
Pictures of the EUT







Pictures of the RF-Module

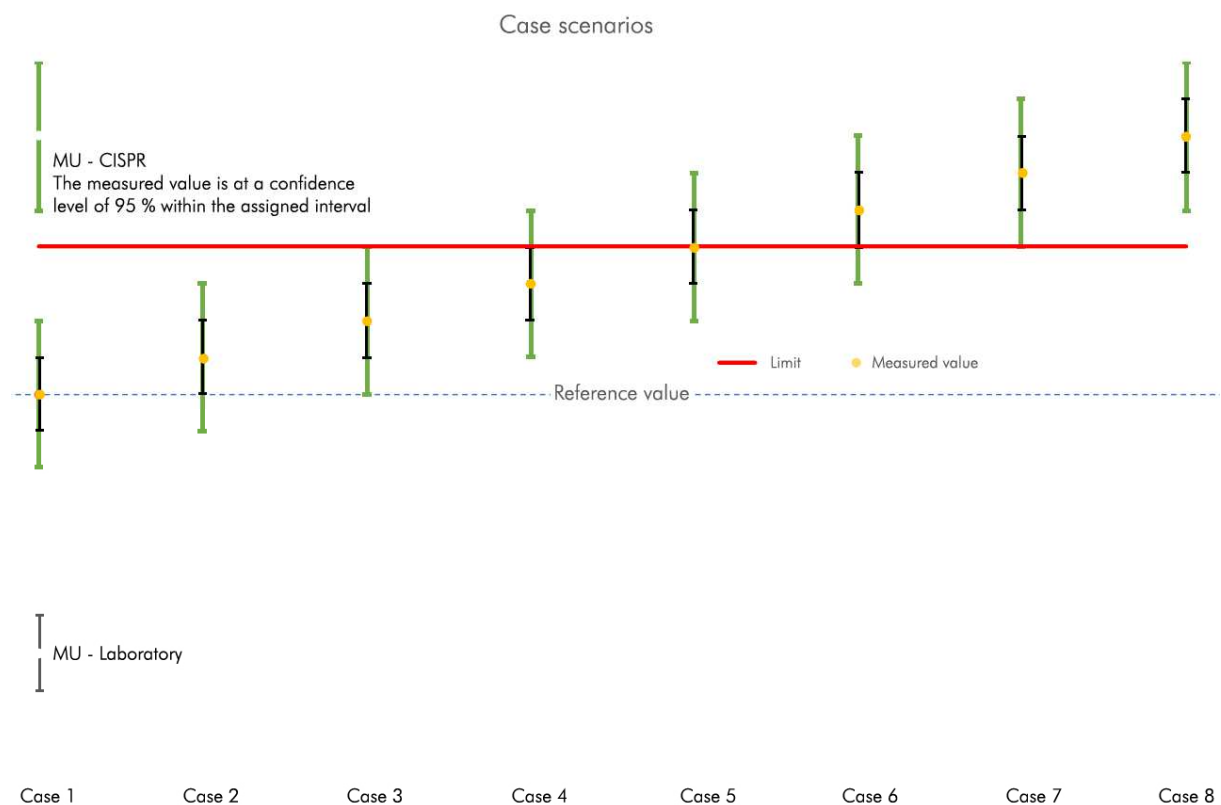


3 Decision Rules for Conformity Assessment

"Binary" decision rule - pass / fail

Unless otherwise stated in the test module, the following specifications apply:
Interference emission

No measurement uncertainties are taken into account for the statement of conformity. In the case of conducted and radiated interference emission, the measurement is considered passed if the measurement result is below the permitted limit value. The accepted measurement uncertainties for a direct statement of conformity, determined for the U_{Lab} laboratory, must be less than the U_{CISPR} values determined in the CISPR16-4-2 standard. The measurement uncertainties are stated with a confidence level of 95 %. In this case the uncertainty of measurement is not taken into account for the conformity statement.



The test is passed for case 1 - 5. A rejection is made in case 6 - 8.

The test is considered as passed if the evaluation criteria for immunity to interference and the limits of emitted interference of the specified standard are met. Measurement uncertainties are not considered.

4 Test Equipment List of EMCE GmbH

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
002	Passive probe	ESH2-Z3	Rohde & Schwarz		1 Year(s)/ 2026-01-31
003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007	1 Year(s)/ 2026-02-28
004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003	1 Year(s)/ 2026-02-28
007	Absorbing clamp	MDS 21	Schwarzbeck	942436	1 Year(s)/ 2026-01-31
008	Loop antenna 9kHz-30MHz	HFH2-Z2	Rohde & Schwarz	835776/0002	3 Year(s)/ 2026-02-28
011	Antenna 30-300MHz	VHBA9123 / BBA9106	Schwarzbeck	0403/94	3 Year(s)/ 2028-01-09
012	Antenna 250-1200MHz	UHALP 9108A	Schwarzbeck	166	3 Year(s)/ 2028-01-09
013	Antenna 9 kHz-30 MHz	Ø 1.5 m	EMCE GmbH		1 Year(s)/ 2026-01-31
014	OATS	Test site 3 m referred to ANSI C63.4a-2017	EMCE GmbH		3 Year(s)/ 2027-05-06
015	OATS	Test site 10 m referred to ANSI C63.4a-2017	EMCE GmbH		3 Year(s)/ 2027-05-06
041	Loop antenna shielded	HZ-10 0816.2511.02	Rohde & Schwarz	849788/0020	3 Year(s)/ 2026-01-10
042-2	AC-Source	EMV D 5000/PAS/SyCore	Spitzenberger & Spies	A274700 / 00501	3 Year(s)/ 2026-02-10
042-1	Analyzer Reference System	ARS 16/3	Spitzenberger & Spies	A274707 / 00501	3 Year(s)/ 2028-01-02
043	Receiver	3DH/E Field meter ESM-100	Maschek	971521	3 Year(s)/ 2026-09-11
059	Log.-per. antenna	HL050	Rohde & Schwarz	100006	3 Year(s)/ 2025-10-21
067	LISN	ESH2-Z5	Rohde & Schwarz	872460/043	1 Year(s)/ 2026-02-28
068	LISN	ESH2-Z5	Rohde & Schwarz	872460/042	1 Year(s)/ 2026-02-28
070	Pulse limiter + 10 dB Attenuator	ESH3-Z2	Rohde & Schwarz	N/A	1 Year(s)/ 2025-08-31
116	Vertical rod antenna	VAMP 9243	Schwarzbeck	9243-205	3 Year(s)/ 2026-05-19

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
117	LISN	ESH3-Z6	Rohde & Schwarz	100521	1 Year(s)/ 2026-02-28
174	LISN	ESH3-Z6	Rohde & Schwarz	101003	1 Year(s)/ 2026-02-28
175	EMI Test receiver	ESR7	Rohde & Schwarz	101108 Firmware: FW V3.46 SP3	1 Year(s)/ 2025-11-26
178	V-LISN 5 μ H	NNHV 8123-400	Schwarzbeck	018	1 Year(s)/ 2026-02-28
184	V-LISN 5 μ H	NNHV8123-400	Schwarzbeck	019	1 Year(s)/ 2026-02-28
222	Broadband Preamplifier 0.5-18 GHz	BBV 9718	Schwarzbeck	9718-316	1 Year(s)/ 2025-07-31
223	Broadband Preamplifier 12-28 GHz	BBV 9719	Schwarzbeck	9719-024	6 Month(s)/ 2025-07-31
225	Electric and Magnetic Field Probe-Analyzer	EHP-200A	Narda S.T.S. / PMM	170WX70205	3 Year(s)/ 2025-07-22
226	HL050 Log.-Per. Antenna 850 MHz to 26.5 GHz	HL050 4062.4063.02	Rohde & Schwarz	100829	3 Year(s)/ 2026-07-27
229	Test receiver	ESS 5 Hz - 1000 MHz	Rohde & Schwarz	845420/0005	1 Year(s)/ 2026-02-11
230	FSV40 Signal Analyzer 40 GHz	FSV40	Rohde & Schwarz	101717	2 Year(s)/ 2026-02-06
236	Broad-Band Horn Antenna 0.5-6 GHz	BBHA 9120 E	Schwarzbeck	00831	3 Year(s)/ 2027-06-25
237	Exposure Level Tester	ELT-400	Narda Safety Test Solutions	O-0028	3 Year(s)/ 2026-03-03
239	Broadband Horn Antenna 15-40 GHz	BBHA 9170	Schwarzbeck	00932	5 Year(s)/ 2029-05-23
253	Broadband Preamplifier 20-1000 MHz	ESV-Z3	Rohde & Schwarz	881 909/030	1 Year(s)/ 2025-08-31
257	Pulse limiter + 10 dB Attenuator	ESH3-Z2	Rohde & Schwarz	102769	1 Year(s)/ 2025-08-31
718	EMC-Software	BAT-EMC Vers. 3.18.0.19	Nexio	N/A	
997	EMC Software	EMC32 Vers. 10.60.20	Rohde & Schwarz	N/A	
1046	Environmental Simulation Chamber	MKF 115 (E3.1)	Binder GmbH	12-02215	3 Year(s)/ 2026-03-24

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
1212	EMC Software	WMS32 Vers. 10.60.20	Rohde & Schwarz	N/A	
8004	Broadband Preamplifier 18-40 GHz	BLMA 1840-5G	BONN Elektronik GmbH	2113300	1 Year(s)/ 2025-07-31
8007	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	899	3 Year(s)/ 2027-10-30
8008	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900	3 Year(s)/ 2028-02-10
8009	Field Monitoring Loop	FESP 5134-1	Schwarzbeck	00078	3 Year(s)/ 2028-02-05
8033	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1808	3 Year(s)/ 2027-10-30
8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812	3 Year(s)/ 2028-02-10
8044	EMI Test Receiver	ESW44	Rohde & Schwarz	103371	1 Year(s)/ 2026-03-06



5 Testplan Provided by the Customer

- ☐ Test according to the test plan provided by the customer
- ☐ Deviation from the test plan authorized by the customer
- ☒ Test according to standard

Source document	Date / Reviser	Modifications



6 Radio Requirements According to 47 CFR Part 15 Subpart C - 02/19/2026

6.1 Requirements and Conformance Test Specifications

Standard

47 CFR Part 15 Subpart C

ANSI C63.10-2020+Cor.1-2023+C63.10a-2024 + Errata to C63.10a-2024

KDB N/A

Requirement		Regulation section
☒	Antenna requirement	§ 15.203
☒	Pulse train / DCCF	§15.35 (c)
☒	Restricted bands of operation	§ 15.205 (a), (b), (c)
☐	Terminal voltage on powerline	§ 15.207 (a)
☒	Radiated emissions, general requirements	§ 15.209 (a), (b), (c), (d), (e), (f) § 15.33 (a)
☒	Radiated emissions of intentional radiators	§ 15.249 (a), (c), (d), (e)
☒	20 dB Emission bandwidth	§ 15.215 (c)



6.2 Test(s)

6.2.1 Antenna Requirements

- ☒ No deviation from the standard
- ☐ Deviation from the standard
- ☐ Not tested

Note: N/A

Measurement Procedure

Rules and specification: 47 CFR Part 15, Section 15.203
Guide: N/A

Requirements

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

Antenna Characteristics

- Antenna type: ☒ Print antenna ☐ Internal antenna
☐ External antenna ☐ __-
- Antenna configuration: ☒ Single Antenna ☐ Antenna array
☐ MIMO ☐ __-
- Antenna connector: ☐ Without connector ☐ Permanent attached
☐ Unique coupling to the intentional radiator
☒ Temporarily fitted to facilitate testing
- Connector type: ☐ SMA ☒ UFL
☐ N/A



Test Result

Requirement:

☒ Met
☐ Not met

| Remarks: N/A



6.2.2 Pulse Train / DCCF

- ☒ No deviation from the standard*
- ☐ Deviation from the standard
- ☐ Not tested

Note: The test was performed with EUT 24-0136PR20-018.

Measurement Procedure:

Rules and specification: 47 CFR Part 15, Section 15.35 (c)
Guide: ANSI C63.10-2020, Section 7.5

When carrying out the radiated emissions for pulsed operation, where the limit values are expressed as an average value of the emission, a detailed analysis of the pulse train is required. For this purpose, a spectrum analyzer is used for a near-field measurement, whereby the pulse train sequence is analyzed in zero-span mode. The sweep time is adjusted so that a time span of at least 100 ms can be monitored in order to determine the maximum number of consecutive pulses.

By determining the maximum number of pulses and their respective duration, the correction factor is calculated from the sum of the individual ON times:

$$\text{DCCF (dB)} = 20 \cdot \log[(t_{p1}(\text{ms}) + t_{p2}(\text{ms}) + \dots + t_{pn}(\text{ms})) / T(\text{ms})]$$

DCCF = Duty cycle correction factor

t_{p1} = Duration of pulse 1 within the pulse train

t_{p2} = Duration of pulse 2 within the pulse train

t_{pn} = Duration of pulse n within the pulse train

T = Duration of the pulse train period, or 100 ms if the pulse train length is greater than 100 ms

Example:

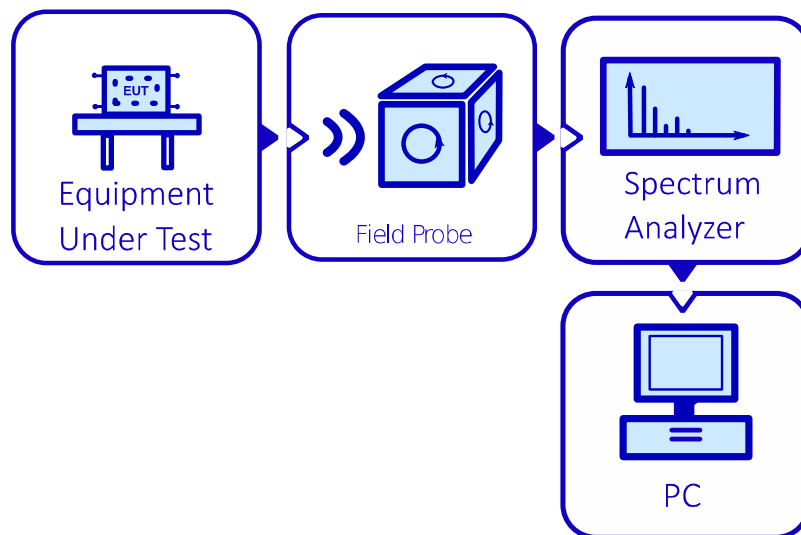
Pulse train period	3 s
Duration of pulse 1	4 ms
Duration of pulse 2	4 ms
Duration of pulse 3	20 ms

Calculated Duty cycle correction factor DCCF:

$$\text{DCCF} = 20 \cdot \log_{10}[(4 \text{ ms} + 4 \text{ ms} + 20 \text{ ms}) / 100 \text{ ms}] = -11.06 \text{ dB}$$

This correction factor is then used to adjust the measured peak emission values to the corresponding average values in order to put these into relation with the given limits.

Basic structure – Setup for radiated test





6.2.2.1 Test Setup

According to ANSI C63.10-2020



Test Location

Final Test					
☒	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
☒	0234	Regulatory Test System for Wireless Devices	TS8997	Rohde & Schwarz	

Used Test Equipment

Final Test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
	997	Software	EMC32	Rohde & Schwarz	N/A
☒	230	Signal Analyzer 40 GHz	FSV40	Rohde & Schwarz	101717
☒	233	OSP-B157W 8 PORT	OSP-B157W8	Rohde & Schwarz	100925
	8008	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900
	8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812
	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements



6.2.2.2 Test

Test Requirements

Section		Description
☒	15.35 (c)	When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

Test Frequencies

Test frequency #	Channel role	Nominal operation frequency / MHz	Channel width / MHz
1	Lowest channel	915.4	0.200
2	Highest channel	917.8	0.200

Rationale for selecting the EUT Test Setup

Equipment units:

PCB of the EUT as a stand-alone device.

Cabling:

- ☒ Standard cables
☐ Special cables provided by the manufacturer

Port #	Designation	Remarks
1	3 VDC supply	N/A

Operation Mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
 Power supply: ☐ 120 V/60 Hz ☒ 3 VDC
 Transmitter operated: ☐ manually ☒ automatically

The EUT was operated in two modes for the lowest and highest operating frequency:

1. Continuous transmission to a paired companion device.
2. Transmission in normal mode without a paired companion device.

Environmental Conditions

Temperature: 23.8 °C
 Relative humidity: 34 %

Test Result

Frequency / MHz	Pulse train / ms	DCCF / dB
915.4	1.102	-39.16*
917.8	1.102	-39.16*
*Worst case DCCF = $20 \cdot \log_{10} (1.102 \text{ ms} / 100 \text{ ms}) = -39.16 \text{ dB}$		

Requirement: ☐ Met
☐ Not met
☒ Not relevant

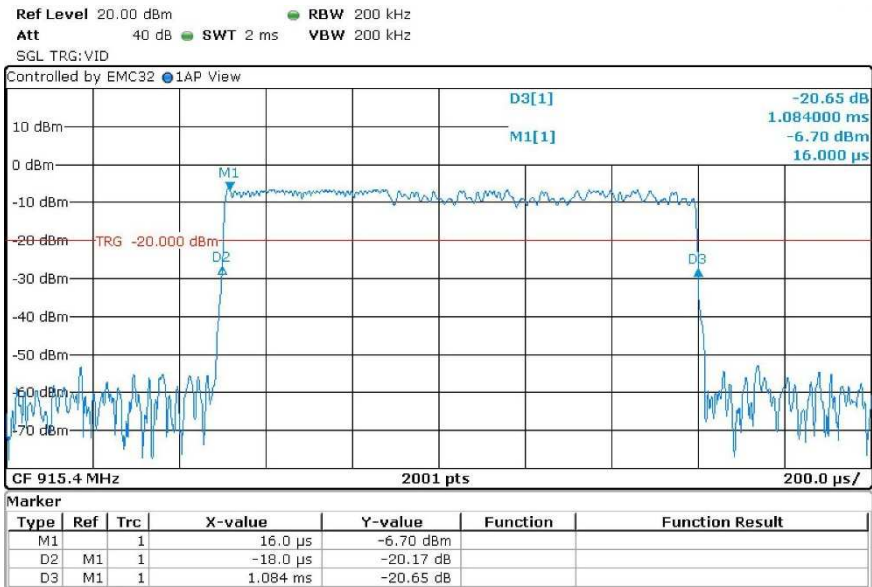
Remarks: N/A

Protocol Scope

☒ Readings
☒ Diagrams



Single pulse for $f_c = 915.4$ MHz (paired)

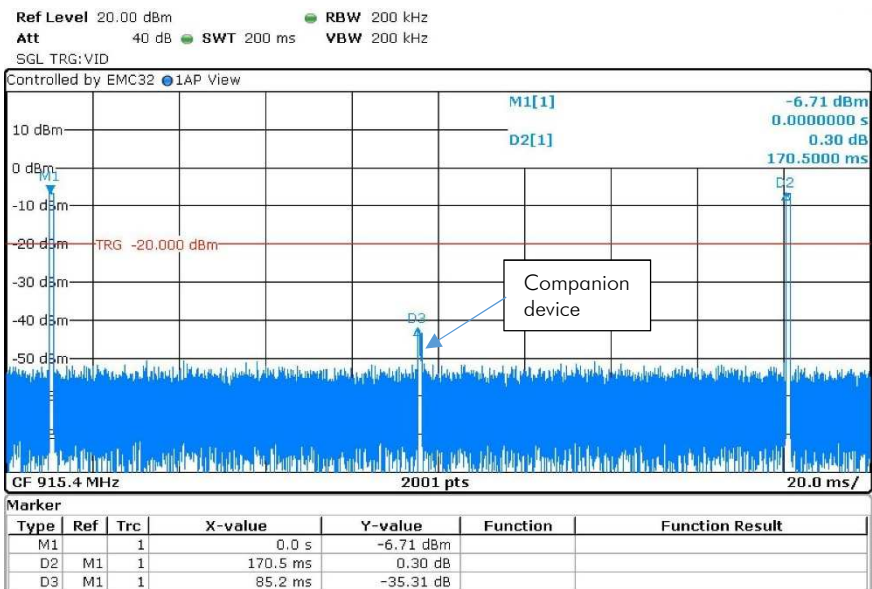


Pulse train

Measured

1.102 ms

Following pulses for $f_c = 915.4$ MHz (paired)

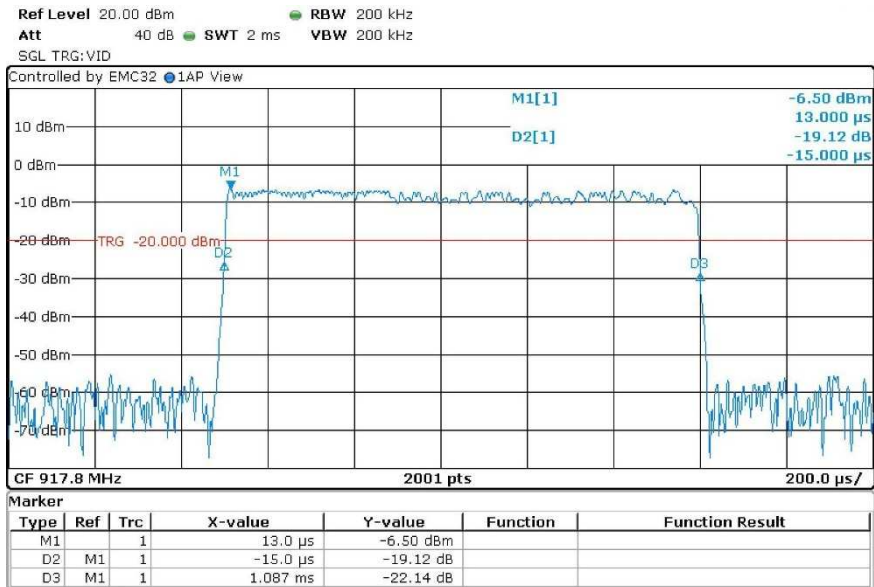


Silent period between transmissions

Measured

169.398 ms

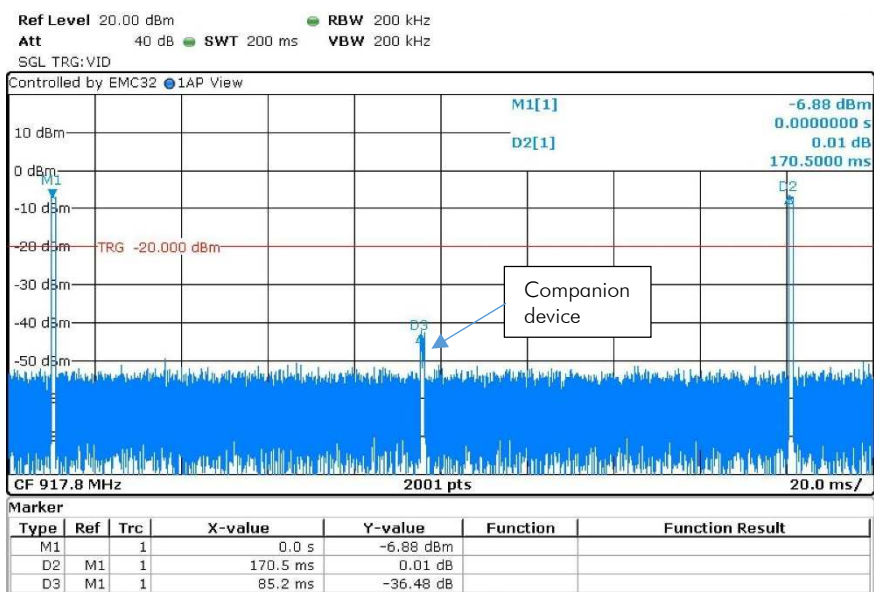
Single pulse for $f_c = 917.8$ MHz (paired)



Pulse train

Measured 1.102 ms

Following pulses for $f_c = 917.8$ MHz (paired)

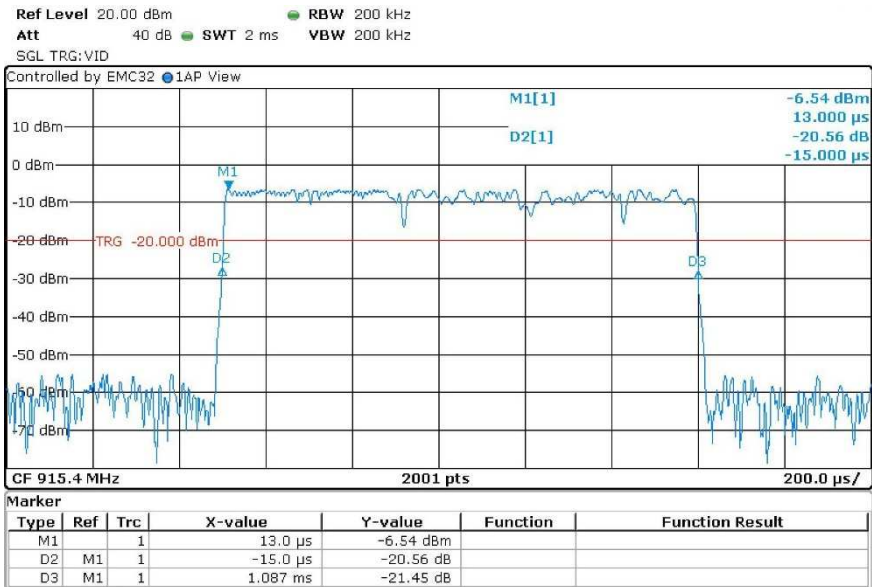


Silent period between transmissions

Measured 169.398 ms



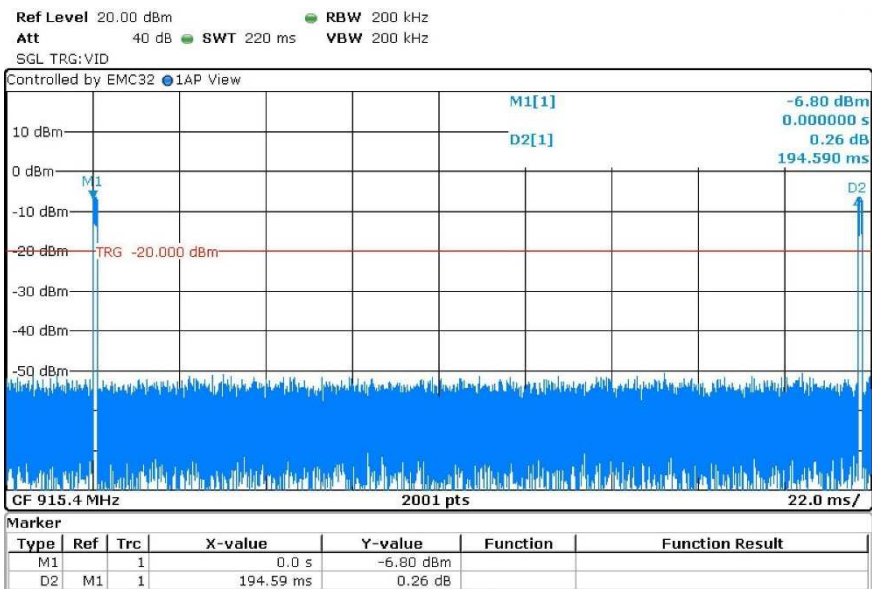
Single pulse for $f_c = 915.4$ MHz (unpaired)



Pulse train

Measured 1.102 ms

Following pulses for $f_c = 915.4$ MHz (unpaired)

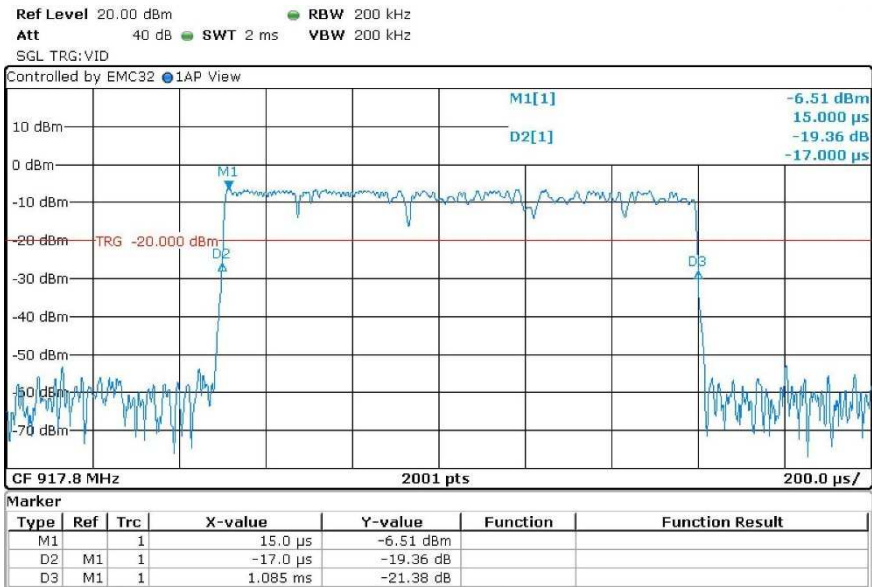


Silent period between transmissions

Measured 193.488 ms



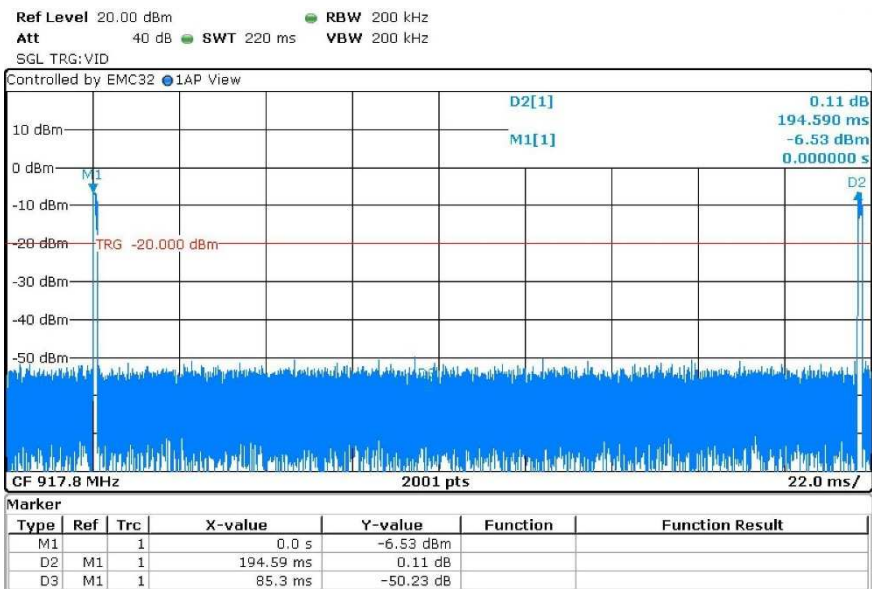
Single pulse for $f_c = 917.8$ MHz (unpaired)



Pulse train

Measured 1.102 ms

Following pulses for $f_c = 917.8$ MHz (unpaired)



Silent period between transmissions

Measured 193.488 ms

6.2.3 Restricted Bands of Operation

- ☒ No deviation from the standard
☐ Deviation from the standard
☐ Not tested

Note: The test was performed with EUT 24-0136PR20-016.

Measurement Procedure

Requirement: 47 CFR Part 15, Section 15.205 (a), (b), (c)
 Guide N/A

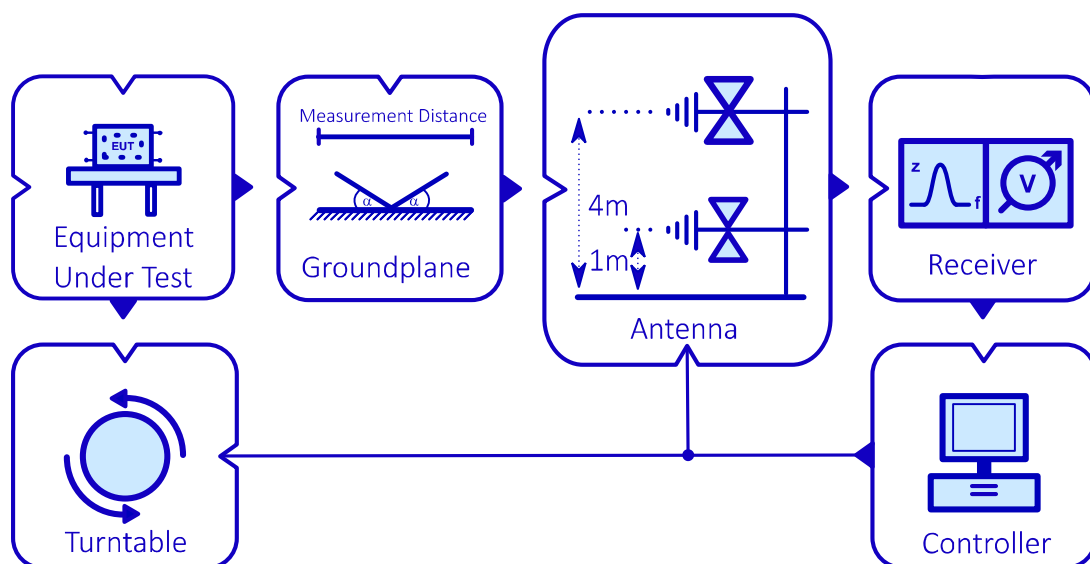
Restricted bands

f / MHz	f / MHz	f / MHz	f / GHz
0.090 - 0.110	12.57675 - 12.57725	322 - 335.4	4.500 - 5.150
0.495 - 0.505	13.36 - 13.41	399.9 - 410	5.350 - 5.460
2.1735 - 2.1905	16.42 - 16.423	608 - 614	7.250 - 7.750
4.125 - 4.128	16.69475 - 16.69525	960 - 1427	8.025 - 8.500
4.17725 - 4.17775	16.80425 - 16.80475	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	25.5 - 25.67	1645.5 - 1646.5	9.3 - 9.5
5.677 - 5.683	37.5 - 38.25	1660 - 1710	10.6 - 12.7
6.215 - 6.218	73 - 74.6	1718.8 - 1722.2	13.25 - 13.4
6.26775 - 6.26825	74.8 - 75.2	2200 - 2300	14.47 - 14.5
6.31175 - 6.31225	108 - 138	2310 - 2390	15.35 - 16.2
8.291 - 8.294	149.9 - 150.05	2483.5 - 2500	17.7 - 21.4
8.362 - 8.366	156.52475 - 156.52525	2655 - 2900	22.01 - 23.12
8.37625 - 8.38675	156.7 - 156.9	3260 - 3267	23.6 - 24.0
8.41425 - 8.41475	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.29 - 12.293	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.51975 - 12.52025	240 - 285	3500 - 4400	above 38.6

Only spurious emissions are permitted in any of the frequency bands listed before. The field strength of emissions appearing within these frequency bands shall not exceed the radiated emission limits; general requirements. At frequencies equal to or less than 1000 MHz, compliance with the radiated emission limits; general requirements shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions.

Basic structure - Setup

OATS / SAC

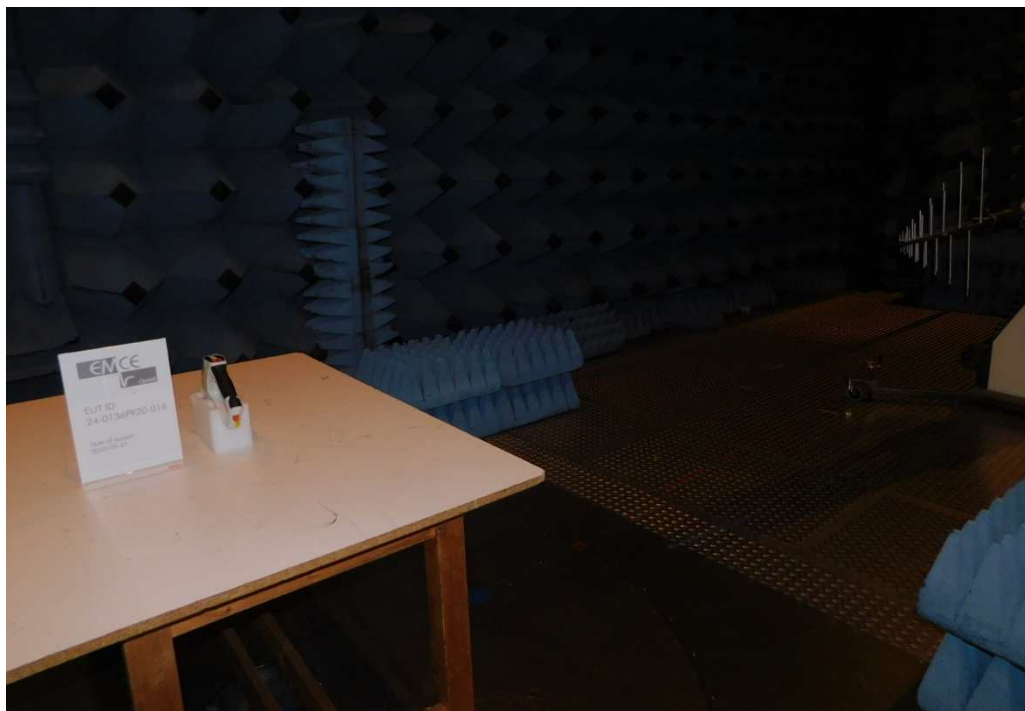




6.2.3.1 Test Setup

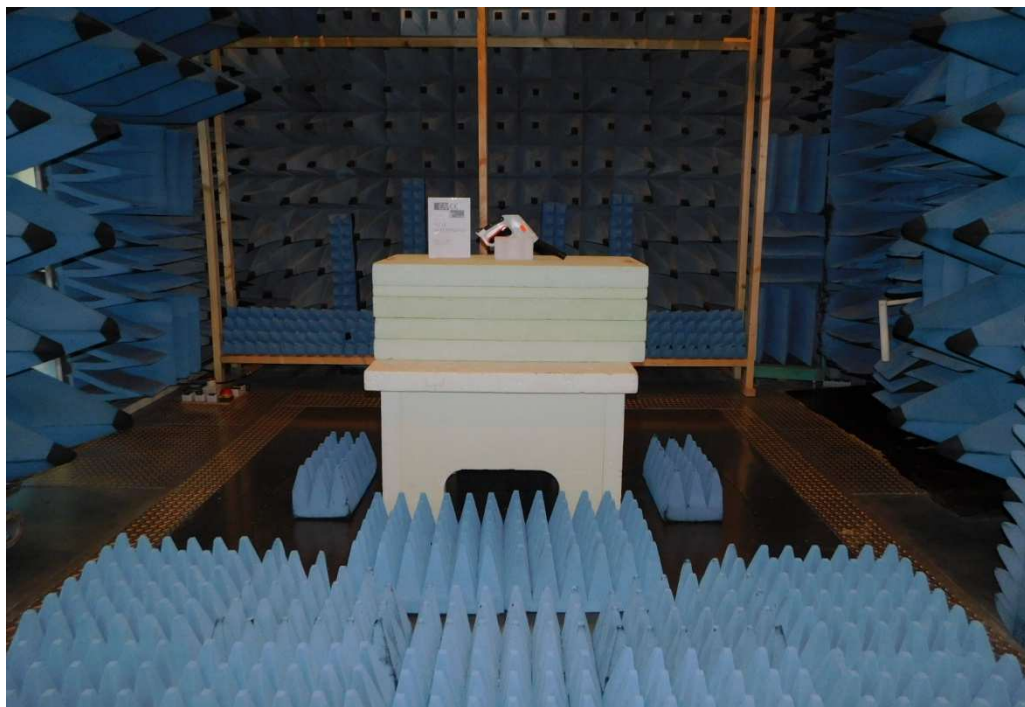
According to ANSI C63.4-2014

Test Setup – SAC [30 – 1000 MHz]





Test Setup – SAC [1 – 10 GHz]



Test Location

Final Test					
☒	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☒	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden Germany
	014	Open area test site	3 m	EMCE GmbH	
	015	Open area test site	10 m	EMCE GmbH	

Used Test Equipment

Final Test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
	059	LPDA	HL050	Rohde & Schwarz	100006
☒	222	Preamplifier 0.5-18 GHz	BBV 9718	Schwarzbeck	9718-316
☒	226	LPDA	HL050	Rohde & Schwarz	100829
	229	Test receiver	ESS	Rohde & Schwarz	845420/0005
	236	Broad-Band Horn Antenna 0.5-6 GHz	BBHA 9120 E	Schwarzbeck	00831
☒	997	Software	EMC32	Rohde & Schwarz	N/A
☒	8008	LPDA Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900
☒	8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812
☒	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements



Test-/Measurement Uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the radiated emission with an extended coverage factor of $k = 2$:

Frequency	Measurement uncertainty
30 MHz – 200 MHz	4.8 dB (valid for 10 m-OATS)
200 MHz – 1 GHz	4.9 dB (valid for 10 m-OATS)
30 MHz – 200 MHz	4.8 dB (valid for 3 m-OATS)
200 MHz – 1 GHz	6.2 dB (valid for 3 m-OATS)

6.2.3.2 Test

Test Requirements

Limits for radiated emissions in the restricted bands			
Detector	Frequency / MHz	Limit / dBμV/m	Measurement distance / m
AV	0.009 – 0.09	48.5 – 28.5	300
QP	0.09 – 0.110	28.5 – 26.8	300
AV	0.110 – 0.490	26.8 – 13.8	300
QP	0.490 – 1.705	33.8 – 23.0	30
QP	1.705 - 30	30	30
QP	30.0 – 88.0	40.0	3
QP	88.0 – 216.0	43.5	3
QP	216.0 – 960.0	46.0	3
QP	960.0 – 1000.0	54.0	3
AV	> 1000	54.0	3
PK	> 1000	74.0	3

The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

Nearest restricted band(s):

- ☒ 608 - 614 MHz
☒ 960 - 1427 MHz

Test Frequencies

Test frequency #	Channel role	Nominal operation frequency / MHz	Channel width / MHz
1	Lowest channel	915.4	0.200
2	Highest channel	917.8	0.200



Rationale for selecting the EUT Test Setup

Equipment units:

EUT as a stand-alone device with built-in battery.

Cabling:

- ☐ Standard cables
☐ Special cables provided by the manufacturer

Port #	Designation	Remarks
N/A		

EUT Orientation

- ☒ X-Direction* ☐ Y-Direction ☐ Z-Direction

* Orientation of the EUT for the worst case emission

Operation Mode

- EUT arrangement: ☒ Tabletop ☐ Floor standing
Power supply: ☐ 120 V/60 Hz ☒ Internal battery

Facilitates near-continuous transmission at both frequency extremes, maintaining a duty cycle close to 100%. The tests were conducted consecutively for the lowest and highest operating frequency.

Environmental Conditions

Temperature [10 – 40 °C]: 30.4 °C
Relative humidity [10 – 90 %]: 42.2 %



Test Result

Used frequency range outside of restricted bands

☒ Met
☐ Not met

General emission limits for restricted frequency bands:

☒ Met
☐ Not met

Limits for next restricted frequency band:

☒ Met
☐ Not met

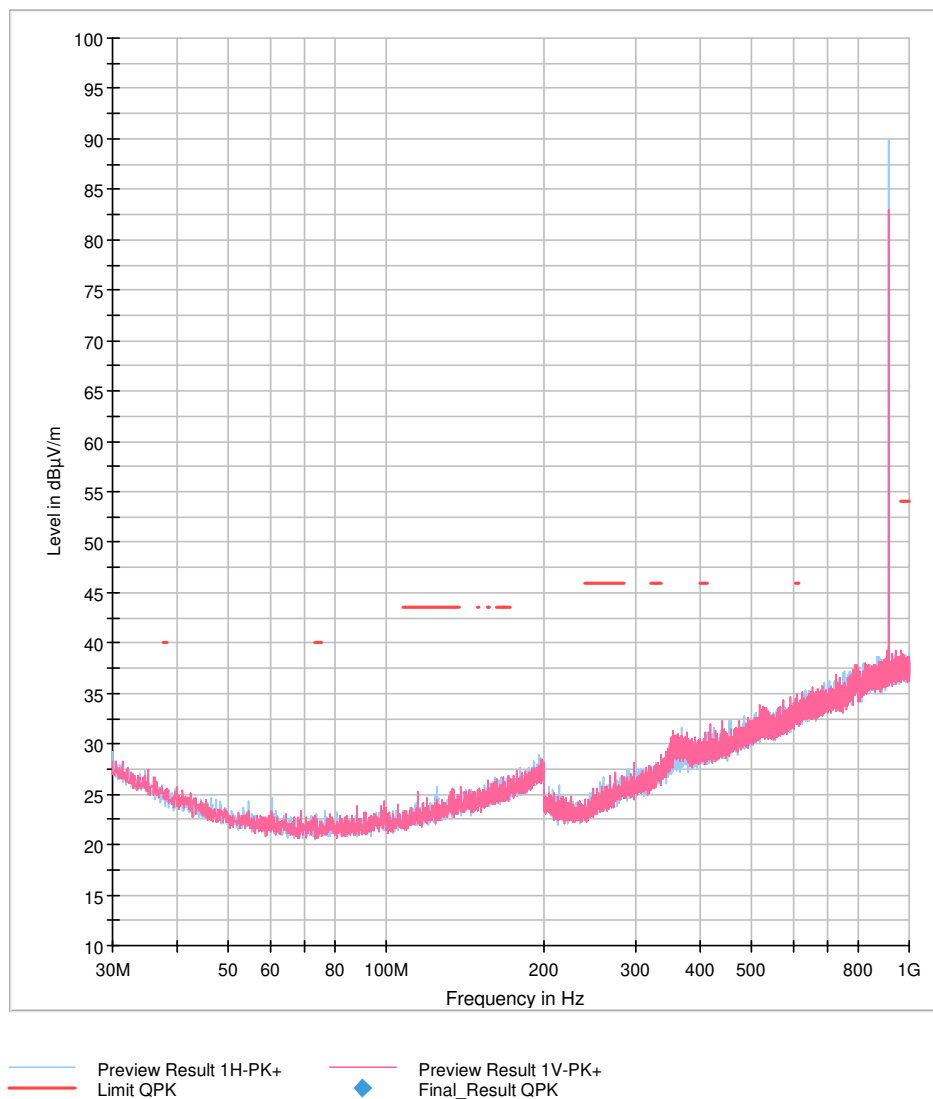
Remarks: N/A

Records

☒ Readings
☒ Diagram

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @915.4 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.205 - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-001
Comment #1:	
Comment #2:	





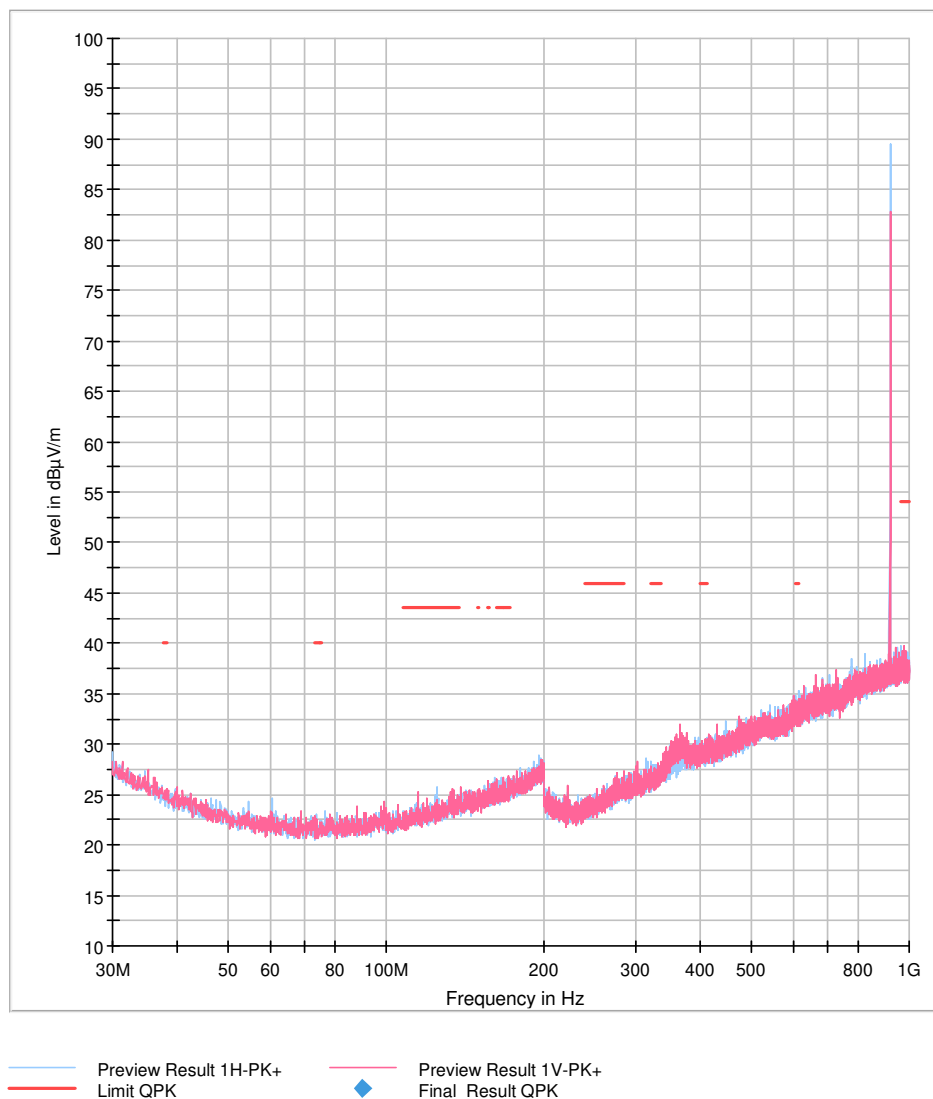
Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---		---	---

No results.

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @917.8 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.205 - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-004
Comment #1:	
Comment #2:	





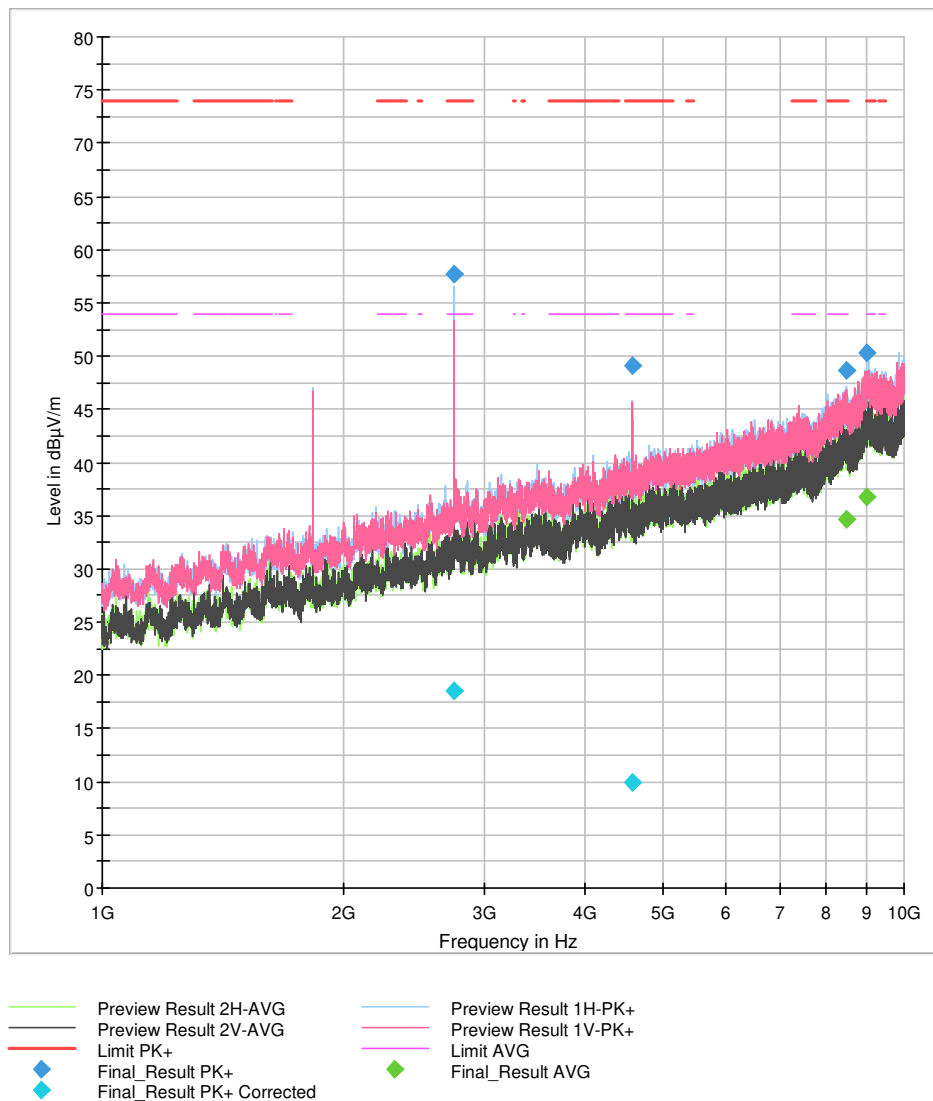
Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---		---	---

No results.

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @915.4 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.205 - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-008
Comment #1:	
Comment #2:	



Final Result

Harmonics

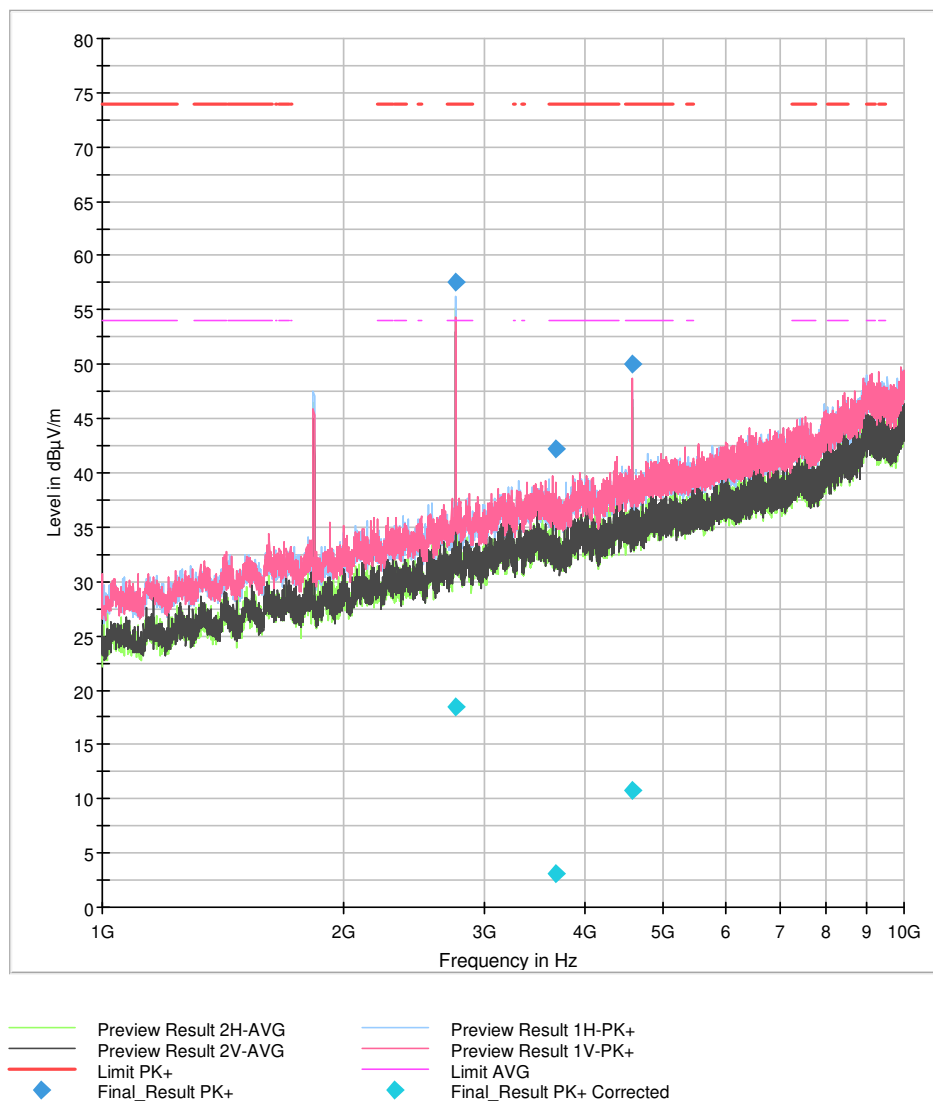
Frequency (MHz)	MaxPeak (dBμV/m)	Average / Corrected amplitude MaxPeak (dBμV/m)	Pulse train DCCF (dB)	Limit (dBμV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2746.343182	---	18.58	-39.16	54.00	35.42	15.0	1000.0	325.0	H	315.0	0.5
2746.343182	57.74	---	---	74.00	16.26	15.0	1000.0	325.0	H	315.0	0.5
4576.806818	49.01	---	---	74.00	24.96	15.0	1000.0	112.0	H	330.0	6.6
4576.806818	---	9.85	-39.16	54.00	44.15	15.0	1000.0	112.0	H	330.0	6.6

Spurious emissions

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
8476.461364	48.62	---	74.00	25.38	15.0	1000.0	305.0	H	282.0	15.5
8476.461364	---	34.62	54.00	19.38	15.0	1000.0	305.0	H	282.0	15.5
9001.895454	---	36.78	54.00	17.22	15.0	1000.0	124.0	H	174.0	18.3
9001.895454	50.39	---	74.00	23.61	15.0	1000.0	124.0	H	174.0	18.3

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @917.8 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.205 - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-007
Comment #1:	
Comment #2:	





Final Result

Harmonics

Frequency (MHz)	MaxPeak (dBµV/m)	Average / Corrected amplitude MaxPeak (dBµV/m)	Pulse train DCCF (dB)	Limit (dBµV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2753.420454	---	18.45	-39.16	54.00	35.55	15.0	1000.0	324.0	H	314.0	0.5
2753.420454	57.61	---	---	74.00	16.39	15.0	1000.0	324.0	H	314.0	0.5
3671.388636	42.21	---	---	74.00	31.79	15.0	1000.0	132.0	V	103.0	3.1
3671.388636	---	3.05	-39.16	54.00	50.95	15.0	1000.0	132.0	V	103.0	3.1
4589.090909	---	10.82	-39.16	54.00	43.18	15.0	1000.0	135.0	V	49.0	6.5
4589.090909	49.98	---	---	74.00	24.02	15.0	1000.0	135.0	V	49.0	6.5



6.2.4 Terminal Voltage on Powerline

- ☐ No deviation from the standard
- ☐ Deviation from the standard
- ☒ Not tested

Note: The EUT has no external leads and is not intended for operation on the AC mains.



6.2.5 Radiated Emissions of Intentional Radiators

- ☒ No deviation from the standard
- ☐ Deviation from the standard
- ☐ Not tested

Note: Test was performed with EUT 24-0136PR20-016.

Measurement Procedure

Rules and specification: 47 CFR Part 15, Section 15.209 (a), (b), (c), (d), (e), (f)
47 CFR Part 15, Section 15.249 (a), (c), (d), (e)

Guide: ANSI C63.10-2020+Cor.1-2023+C63.10a-2024
+ Errata to C63.10a-2024

The radiated interference emission is measured on an alternative open area test site OATS in the frequency range 30 - 1000 MHz. The measurement distance is 3 m or 10 m, depending on the standard. Above 1 GHz, the measurement is performed in a 3 m semi-anechoic chamber with floor absorber to reduce ground reflections. For the measurement of the field strength a biconical antenna up to 200 MHz, a logperiodic antenna from 200 MHz to 1 GHz and horn antennas or double stacked logperiodic antenna above 1 GHz are used. All antennas are linearly polarized. External low-noise preamplifiers are used in the range above 1 GHz to improve measurement sensitivity. Special measures, such as filters or attenuators, are taken to avoid overloading the amplifiers. The antenna height is varied between 1 m and 4 m as required. The elevation angle of the antenna can be corrected via the antenna mast to ensure that the main lobe of the antenna is always directed at the EUT. A turntable allows the alignment of the EUT towards the antenna to maximize the radiated emission. The test sites are located above a metallic ground plane. Table-top devices are placed on a non-conductive wooden table. Hand-held, body-worn, or ceiling-mounted devices are examined in 3 orthogonal axis orientations to determine the maximum emission level. Floor-standing devices are placed directly on the grounded metal turntable/reference insulated from ground plane by an insulating material < 12 mm.

During an initial automated pre-test run in a semi-anechoic chamber, the desired frequency range is measured. The receiver is operated as an analyzer and the frequency ranges are run sequentially depending on the antenna. For the measurement, the turntable is continuously rotated from 0° - 360° and back, and the antenna height is changed in 0.5 m increments after each complete turntable cycle. The antenna position is then changed from 1.0 m to 4.0 m in 0.5 m steps for vertical polarization and back for horizontal polarization. During a cycle, the frequency range is continuously swept with peak detector and max hold function. Depending on the test specification, an average detector is also used if required. For each discrete antenna polarization over all positions, the maximum peak values are recorded with frequency, level, turntable position, antenna height and antenna polarization.



Significant peaks or clock frequencies are marked and re-measured with increased frequency accuracy. The recordings are used to determine the exact frequency and to optimize the interference level. At the predefined position, the turntable position is fine-adjusted in the range of $\pm 20^\circ$ and then the antenna height is varied by ± 0.3 m. At the maximized position, the emission is measured with quasi-peak or average detector and listed. The six highest emissions are selected for final measurement in the OATS.

In a final test run, an open area test site measurement is made at selected frequencies determined by the previous test procedure. For each selected frequency, the frequency setting is optimized again in the OATS and the field strength value is maximized, rotating the EUT 360° at an antenna height of 1.0 m for vertical antenna polarization and 2.0 m for horizontal antenna polarization. At the azimuth position of the EUT for the highest radiation, the antenna height is varied within 1.0 m and 4.0 m until the highest interference level is reached. To maximize the interference level at the determined position, the turntable azimuth is fine-adjusted by $\pm 45^\circ$ and the antenna height is fine-adjusted by ± 0.3 m. The setup of the instrument and the cables are manipulated within the range to produce the highest emission.

Final measurement is made using a receiver conforming to CISPR 16 guidelines with a quasi-peak and average detector.

The identified frequency and amplitude of the six highest radiated emissions relative to the limit lines are listed. If fewer than six emission frequencies are within 20 dB of the limit, the noise level of the instrument at representative frequencies is reported.

For documentation of final testing below 1 GHz on the OATS the plots recorded in den SAC are indicated as pre-compliance.

In case the regulation requires testing at different distances, the result is extrapolated by an extrapolation factor 20 dB / decade to the required distance.

Additional investigations were conducted in the frequency range below 30 MHz starting at the lowest frequency signal generated within the device, but without going below 9 kHz.

The reported test results are calculated using the following formula to normalize the results to the requested test distance:

$$\text{Result (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + 20 \cdot (D_T/D_R) \text{ (dB)}$$

AF = Correction factor for the antenna

CF = Correction factor for the cable loss

D_T = Test distance

D_R = Reference distance for the limit defined in the standard

Example:

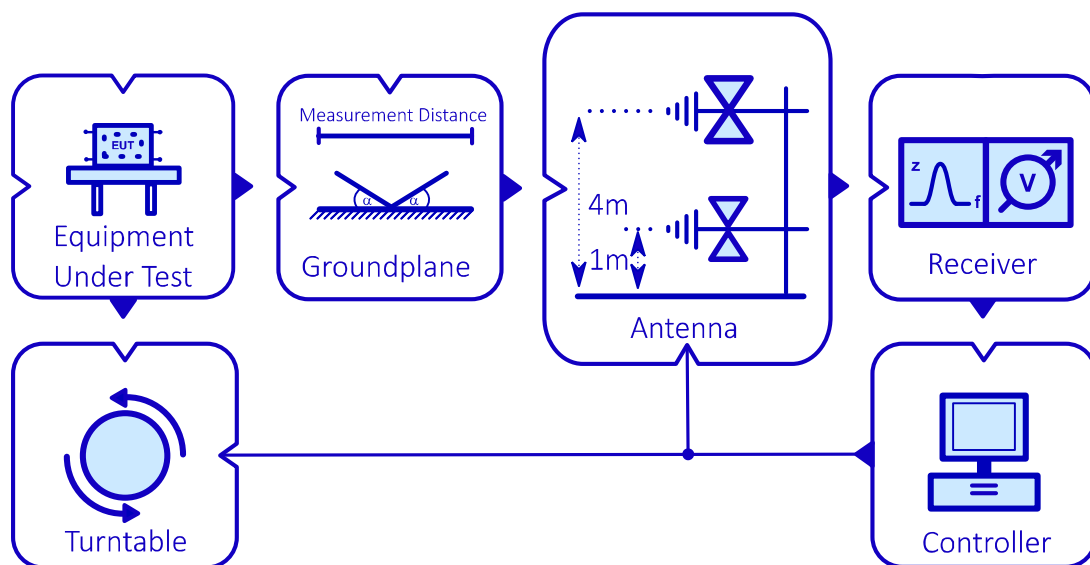
Test frequency	500.00 MHz
Reading	12.3 dB μ V
AF _(500.00 MHz)	17.1 dB/m
CF _(500.00 MHz)	1.4 dB
DT =	3 m
DR =	3 m

Calculated final result for the electrical field strength E(f):

$$E_{(500.00 \text{ MHz})} = 12.3 \text{ dB}\mu\text{V} + 17.1 \text{ dB/m} + 1.4 \text{ dB} + 0 \text{ dB} = 30.8 \text{ dB}\mu\text{V/m}$$

Basic structure - Setup

OATS / SAC





6.2.5.1 Test Setup

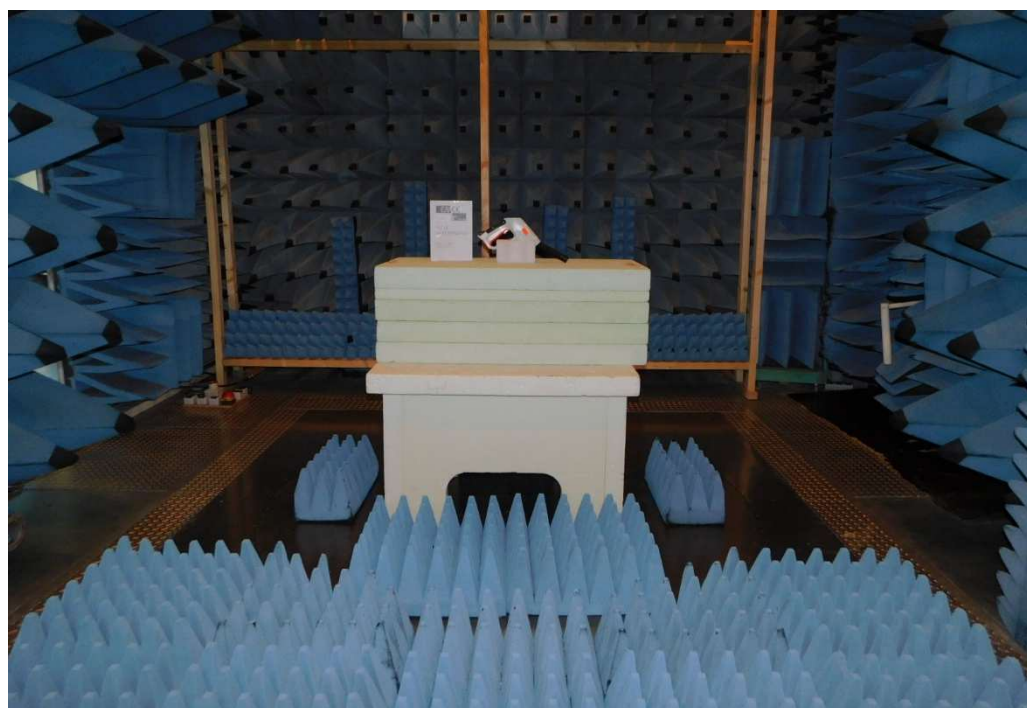
According to ANSI C63.10-2020

Final Test Setup – OATS [30 – 1000 MHz]



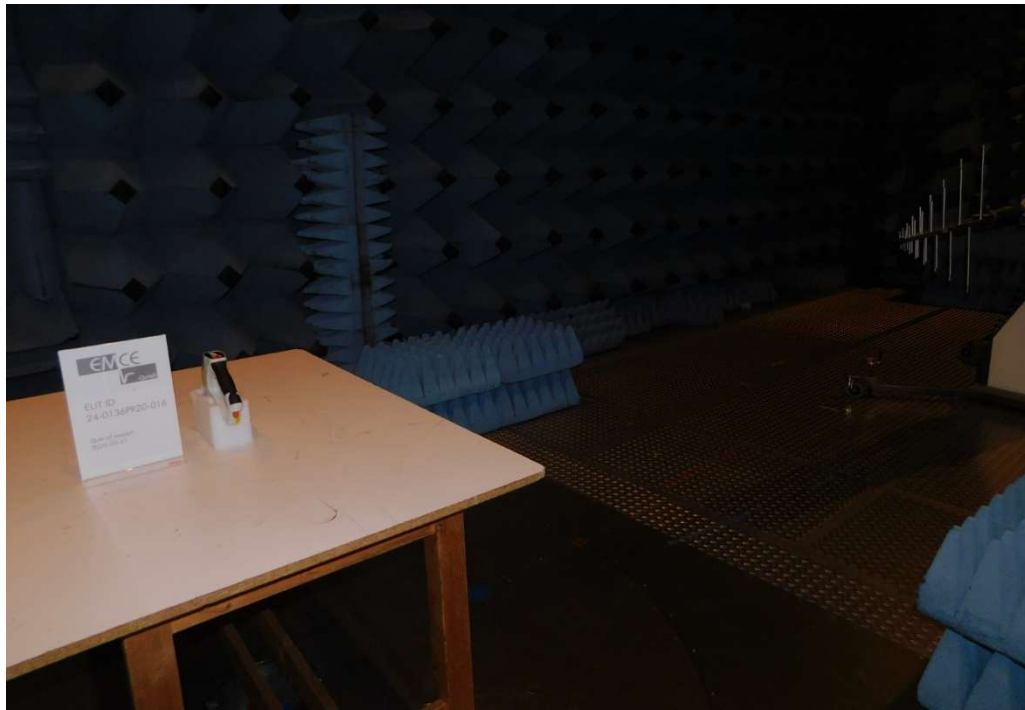


Final Test Setup – SAC [1 – 10 GHz]





Pre-Test Setup – SAC [30 – 1000 MHz]



Test Location

Pre-Test					
☒	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☒	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden Germany

Final Test					
☒	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☒	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden Germany
☒	014	Open area test site	3 m	EMCE GmbH	
	015	Open area test site	10 m	EMCE GmbH	

Used Test Equipment

Pre-Test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
☒	997	Software	EMC32	Rohde & Schwarz	N/A
☒	8008	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900
☒	8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812
☒	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

Final Test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
	059	LPDA	HL050	Rohde & Schwarz	100006
☒	222	Preamplifier 0.5-18 GHz	BBV 9718	Schwarzbeck	9718-316
☒	226	LPDA	HL050	Rohde & Schwarz	100829
	229	Test receiver	ESS	Rohde & Schwarz	845420/0005
	236	Broad-Band Horn Antenna 0.5-6 GHz	BBHA 9120 E	Schwarzbeck	00831
☒	997	Software	EMC32	Rohde & Schwarz	N/A
☒	8007	LPDA Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	899
☒	8033	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1808
☒	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements



Test-/Measurement Uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the radiated emission with an extended coverage factor of $k = 2$:

Frequency	Measurement uncertainty
30 MHz – 225 MHz	4.8 dB (valid for 10 m-OATS)
225 MHz – 1 GHz	4.9 dB (valid for 10 m-OATS)
30 MHz – 225 MHz	4.8 dB (valid for 3 m-OATS)
225 MHz – 1 GHz	6.2 dB (valid for 3 m-OATS)



6.2.5.2 Test

Rules and specification: 47 CFR Part 15, Section 15.249 (a), (c), (d), (e)
47 CFR Part 15, Section 15.209 (a), (b), (c), (d), (e), (f)
47 CFR Part 15, Section 15.33 (a)

Lowest radio frequency signal generated in the device

☒ 24 MHz

Start frequency of measurement without going below 9 kHz

☒ 24 MHz

Highest frequency generated or used in the device or on which the device operates or tunes:

☒ <10 GHz

☐ 10 GHz – 30 GHz

☐ 30 GHz – 95 GHz

☐ ≥95 GHz

Upper frequency of measurement:

☒ 10th harmonic of the highest frequency or 40 GHz, whichever is lower

☐ 5th harmonic of the highest frequency or 100 GHz, whichever is lower

☐ 5th harmonic of the highest frequency or 200 GHz, whichever is lower

☐ 3rd harmonic of the highest frequency or 750 GHz, whichever is lower

Frequency range:

☒ 24 – 30 MHz (Investigated Frequency Range)

☒ 30 – 1000 MHz

☐ 10 – 15 GHz

☐ 18 – 26 GHz

☒ 1 – 10 GHz

☐ 15 – 18 GHz

☐ 26 – 40 GHz

Limits for the Intentional Radiators according to §15.249

Technical Requirements			
Frequency / GHz	Field strength @3 m of fundamental / dB μ V/m	Field strength @3m of harmonics / dB μ V/m	Field strength results are based on Quasi-Peak- / Peak- / Average-detector
0.902 – 0.928	94	54	QP or Peak
2.400 - 2.4835	94 114	54 74	AV Peak
5.725 – 5.875	94 114	54 74	AV Peak
24.000 – 24.250	108 128	68 88	AV Peak

The field strength limits for harmonic emissions specified in the table are referenced to the fundamental frequency of the intentional radiator. Radiated emissions outside the specified operating frequency bands, other than harmonics, shall be attenuated by at least 50 dB below the level of the fundamental emission or shall comply with the general radiated emission limits specified in § 15.209, whichever requirement results in the less stringent attenuation. In accordance with 47 CFR §15.33 (a), peak measurements may be used as an alternative to CISPR quasi-peak measurements below 1000 MHz, provided the same bandwidth is employed.

General Limits for Radiated Emissions according to §15.209

Technical Requirements			
Detector	Frequency / MHz	Limit / dB μ V/m	Measurement distance / m
AV	0.009 – 0.09	48.5 – 28.5	300
QP	0.09 – 0.110	28.5 – 26.8	300
AV	0.110 – 0.490	26.8 – 13.8	300
QP	0.490 – 1.705	33.8 – 23.0	30
QP	1.705 - 30	30	30
QP	30.0 – 88.0	40.0	3
QP	88.0 – 216.0	43.5	3
QP	216.0 – 960.0	46.0	3
QP	960.0 – 1000.0	54.0	3
AV	> 1000	54.0	3
PK	> 1000	74.0	3

The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.



Test Frequencies

Test frequency #	Channel role	Nominal operation frequency / MHz	Channel width / MHz
1	Lowest channel	915.4	0.200
2	Highest channel	917.8	0.200

Rationale for selecting the EUT Test Setup

Equipment units:

EUT as a stand-alone device with built-in battery.

EUT Orientation

☒ X-Direction ☐ Y-Direction ☐ Z-Direction

Operation mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
Power supply: ☐ 120 V/60 Hz ☒ Internal battery

Facilitates near-continuous transmission at both frequency extremes, maintaining a duty cycle close to 100%. The tests were conducted consecutively for the lowest and highest operating frequency.

Environmental Conditions - SAC

Temperature [10 – 40 °C]: 30.4 °C
Relative humidity [10 – 90 %]: 42.2 %

Environmental Conditions - OATS

Temperature [10 – 40 °C]: 27.8 °C
Relative humidity [10 – 90 %]: 38.6 %



Test Result

Limits for fundamental according to §15.249:

☒ Met
☐ Not met

Limits for harmonics according to §15.249:

☒ Met
☐ Not met

General limits for unwanted emissions from an intentional radiator:

☒ Met
☐ Not met

General limits for unwanted emissions in the additional investigated lower frequency range according to §15.33 (a):

☐ Met
☐ Not met
☒ No notable emissions observed

| Remarks: N/A

Records

Pre-Test measurement

☒ Readings
☒ Diagram

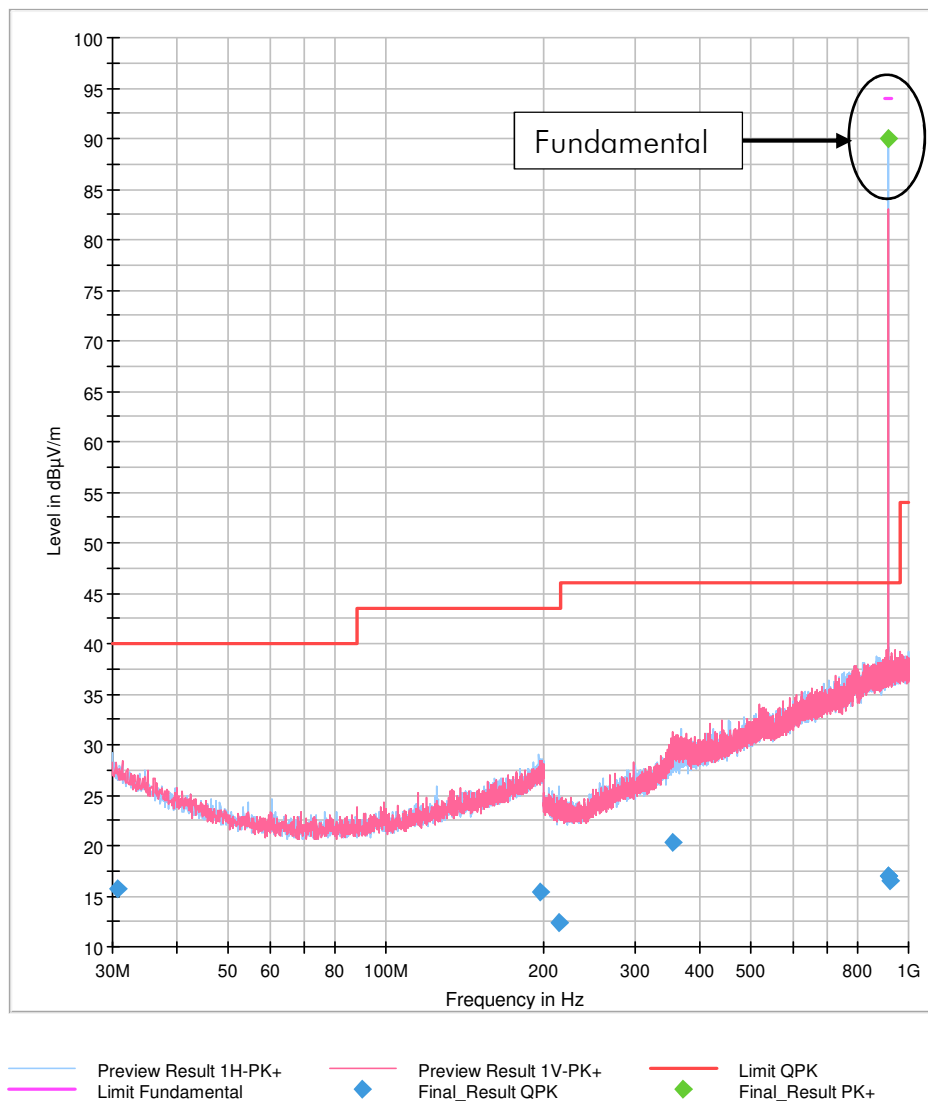
Final measurement

☒ Readings
☒ Diagram

Pre-Test measurement

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @915.4 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.209 - SAC @3 m 47 CFR Part 15, Section 15.249 (a) - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-001
Comment #1:	
Comment #2:	



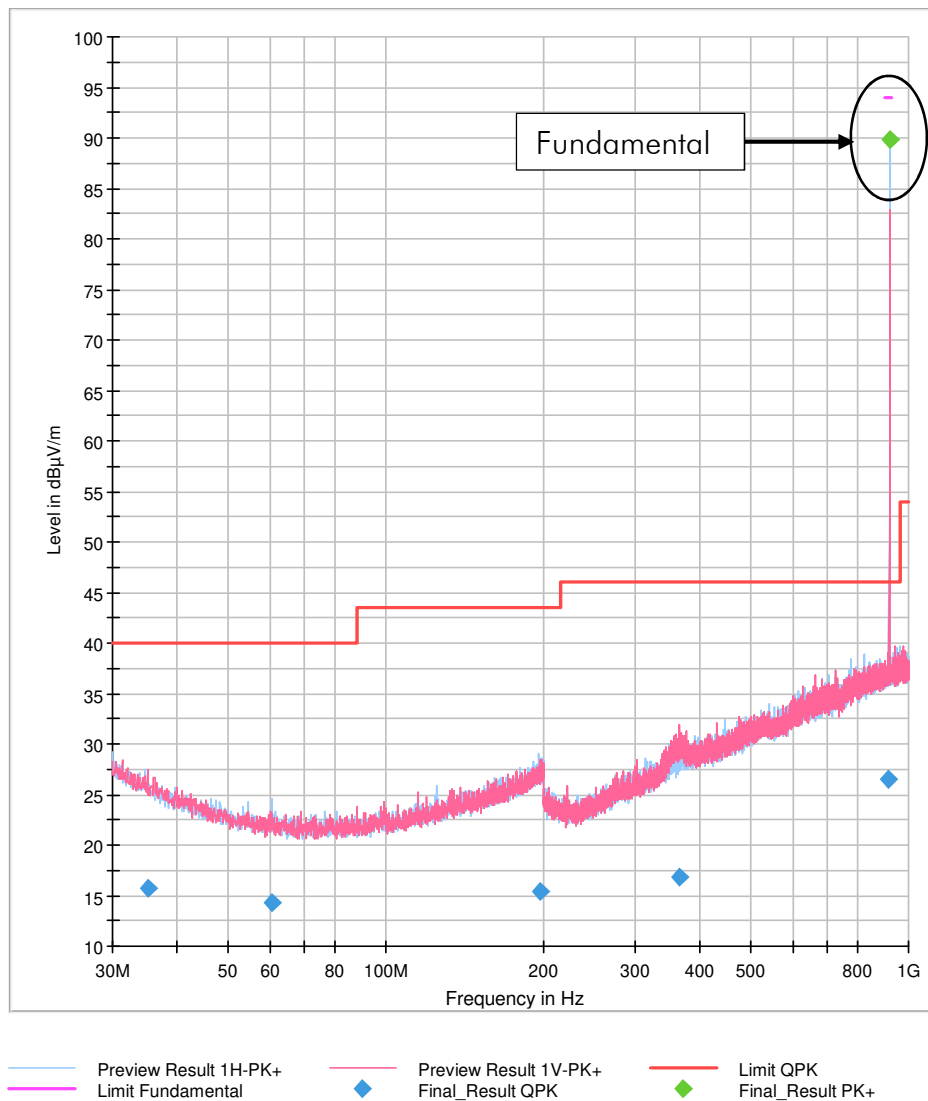


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azi. (deg)	Corr. (dB/m)
30.772545	15.76	---	40.00	24.24	15.0	120.0	335.0	V	216.0	13.8
197.173637	15.36	---	43.50	28.14	15.0	120.0	114.0	H	121.0	15.3
213.975027	12.35	---	43.50	31.15	15.0	120.0	205.0	H	40.0	12.2
354.055243	20.34	---	46.00	25.66	15.0	120.0	163.0	V	10.0	15.7
911.223135	17.00	---	46.00	29.00	15.0	120.0	235.0	H	126.0	24.9
915.391351	---	90.07	94.00	3.93	15.0	120.0	260.0	H	193.0	24.9
916.878702	17.01	---	46.00	28.99	15.0	120.0	261.0	V	63.0	24.9
919.248216	16.43	---	46.00	29.57	15.0	120.0	315.0	V	321.0	24.8

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @917.8 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.209 - SAC @3 m 47 CFR Part 15, Section 15.249 (a) - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-004
Comment #1:	
Comment #2:	





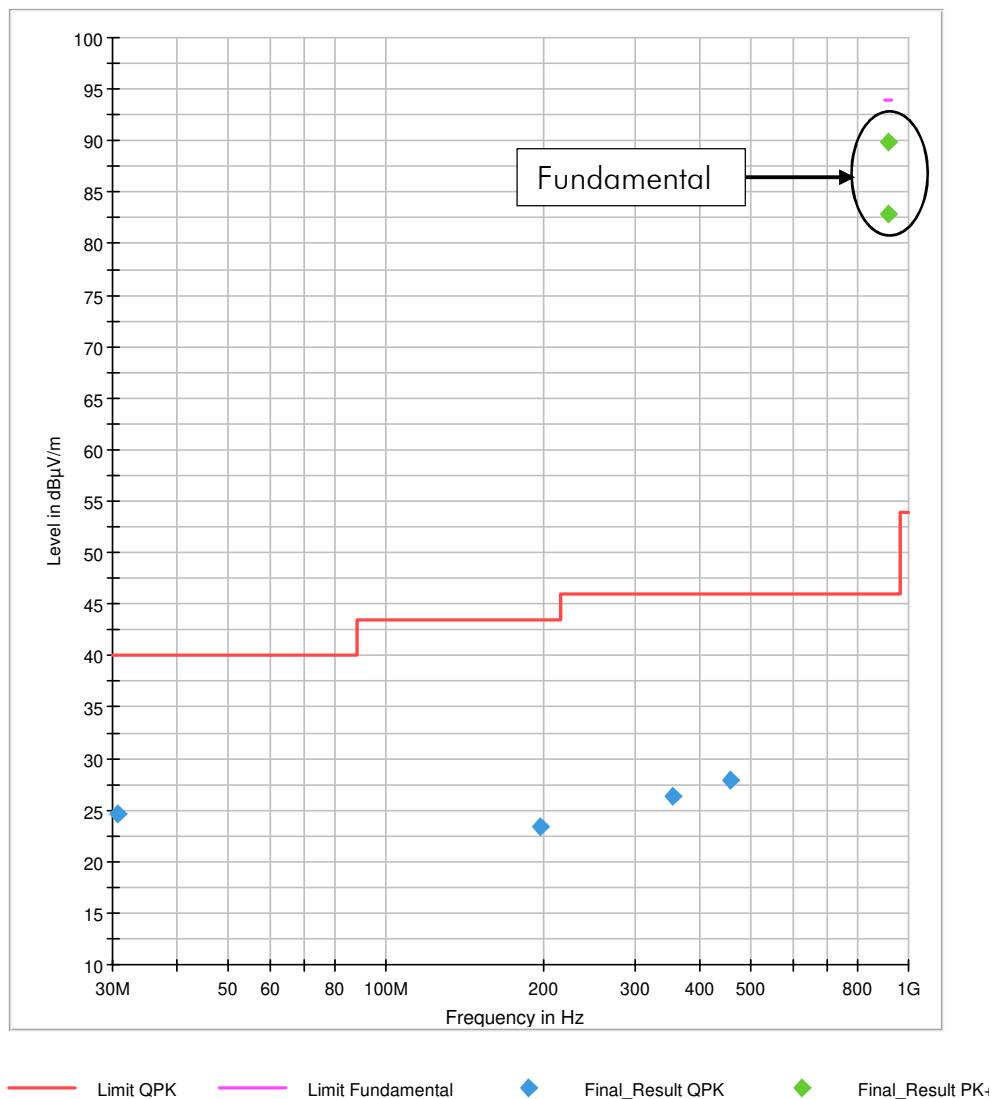
Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azi. (deg)	Corr. (dB/m)
35.023545	15.76	---	40.00	24.24	15.0	120.0	120.0	V	272.0	12.8
60.677273	14.22	---	40.00	25.78	15.0	120.0	220.0	V	168.0	9.9
197.173637	15.36	---	43.50	28.14	15.0	120.0	114.0	H	121.0	15.3
365.108108	16.89	---	46.00	29.11	15.0	120.0	170.0	V	255.0	15.7
915.210919	26.55	---	46.00	19.45	15.0	120.0	135.0	V	169.0	24.9
917.794054	---	89.88	94.00	4.12	15.0	120.0	260.0	H	13.0	24.9

Final measurement

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @915.4 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.209 - OATS @3 m 47 CFR Part 15, Section 15.249 (a) - OATS @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-009
Comment #1:	
Comment #2:	



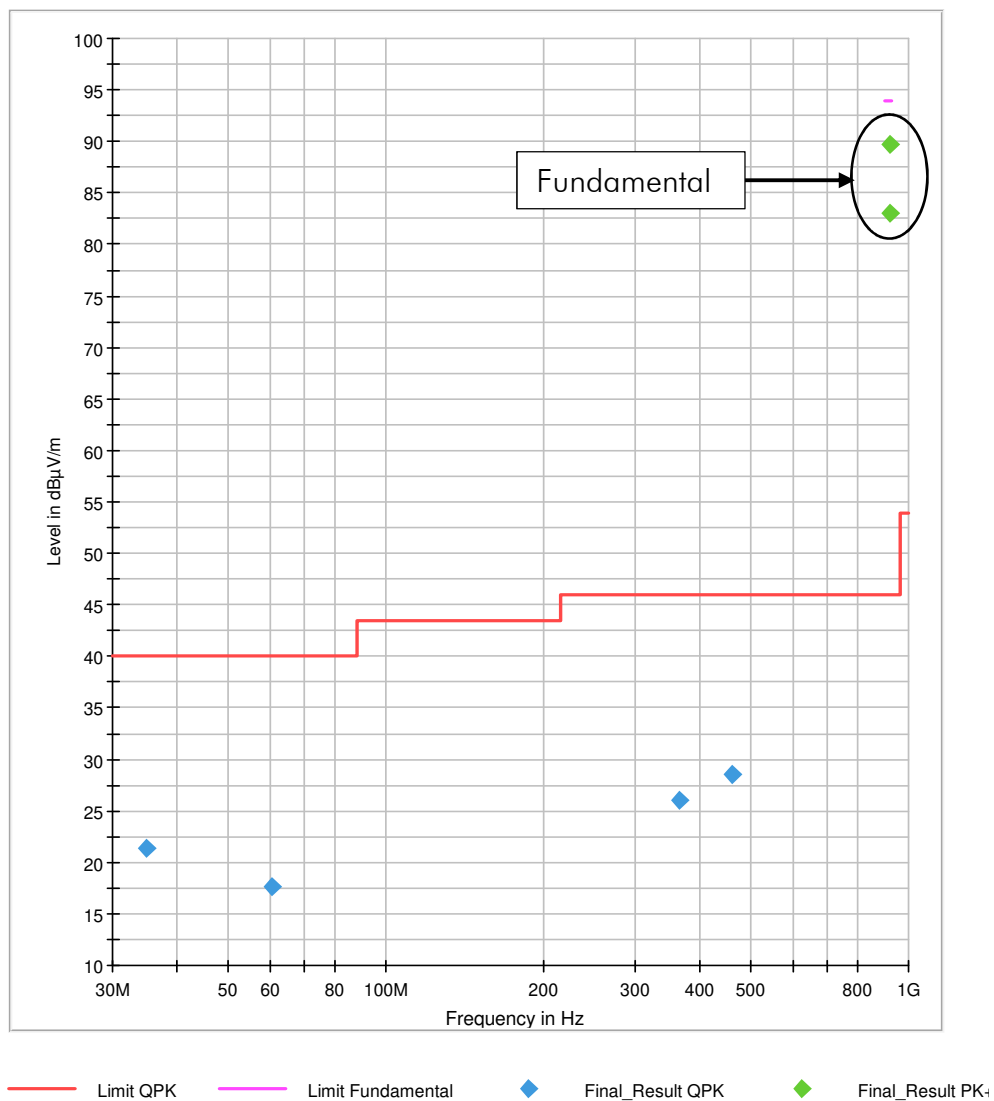


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azi. (deg)	Corr. (dB/m)
30.772545	24.69	---	40.00	15.31	15.0	120.0	100.0	V	90.0	14.1
196.774000	23.35	---	43.50	20.15	15.0	120.0	100.0	H	0.0	16.0
354.055243	26.34	---	46.00	19.66	15.0	120.0	123.0	V	270.0	16.5
457.700000	27.87	---	46.00	18.13	15.0	120.0	193.0	H	10.0	19.4
915.391351	---	82.85	94.00	11.15	15.0	120.0	104.0	V	90.0	26.5
915.396400	---	89.90	94.00	4.10	15.0	120.0	193.0	H	10.0	26.5

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @917.8 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.209 - OATS @3 m 47 CFR Part 15, Section 15.249 (a) - OATS @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-010
Comment #1:	
Comment #2:	



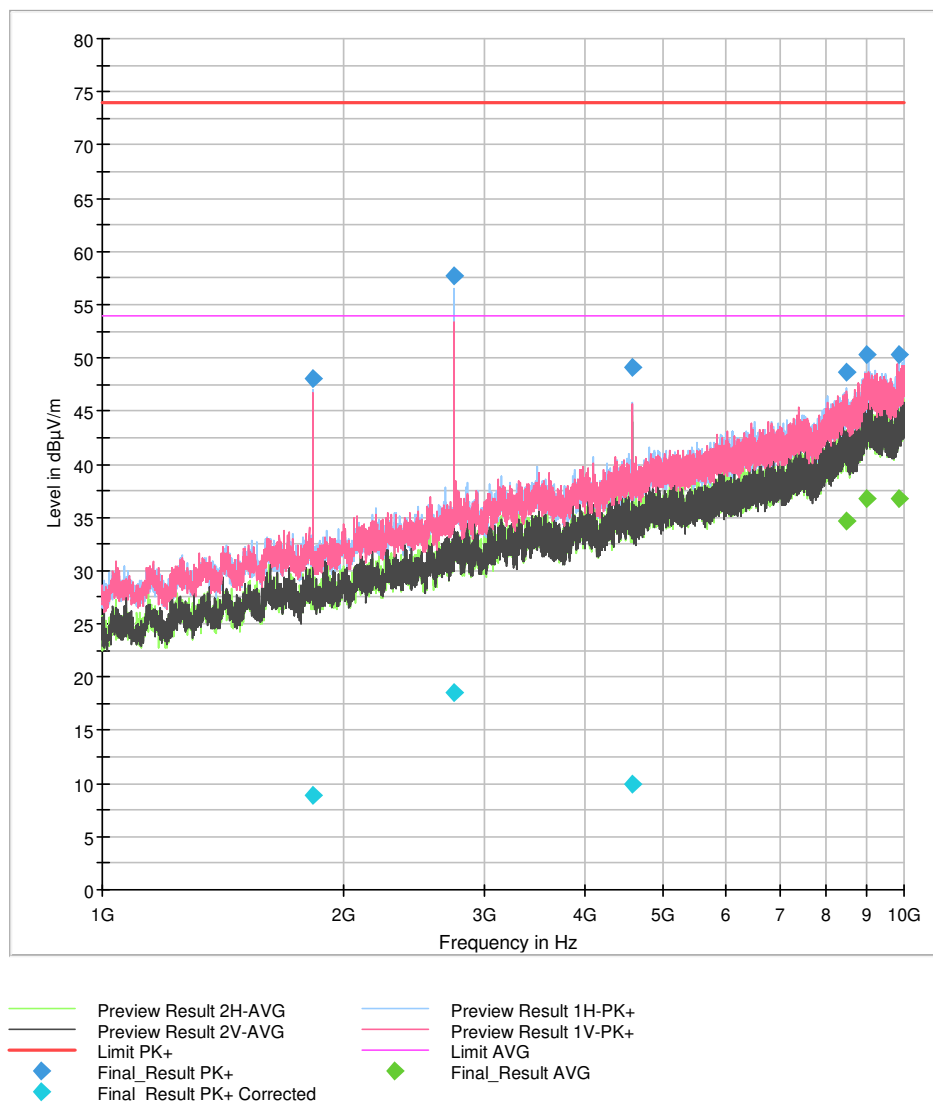


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azi. (deg)	Corr. (dB/m)
34.829000	21.36	---	40.00	18.64	15.0	120.0	100.0	V	290.0	13.2
60.677000	17.58	---	40.00	22.42	15.0	120.0	120.0	H	0.0	10.2
365.189189	26.05	---	46.00	19.95	15.0	120.0	121.0	V	270.0	16.8
458.896550	28.50	---	46.00	17.50	15.0	120.0	192.0	H	350.0	19.4
917.793100	---	89.67	94.00	4.33	15.0	120.0	192.0	H	350.0	26.5
917.793100	---	83.07	94.00	10.93	15.0	120.0	112.0	V	90.0	26.5

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @915.4 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.209 - SAC @3 m 47 CFR Part 15, Section 15.249 (a) - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-008
Comment #1:	
Comment #2:	



Final Result

Harmonics

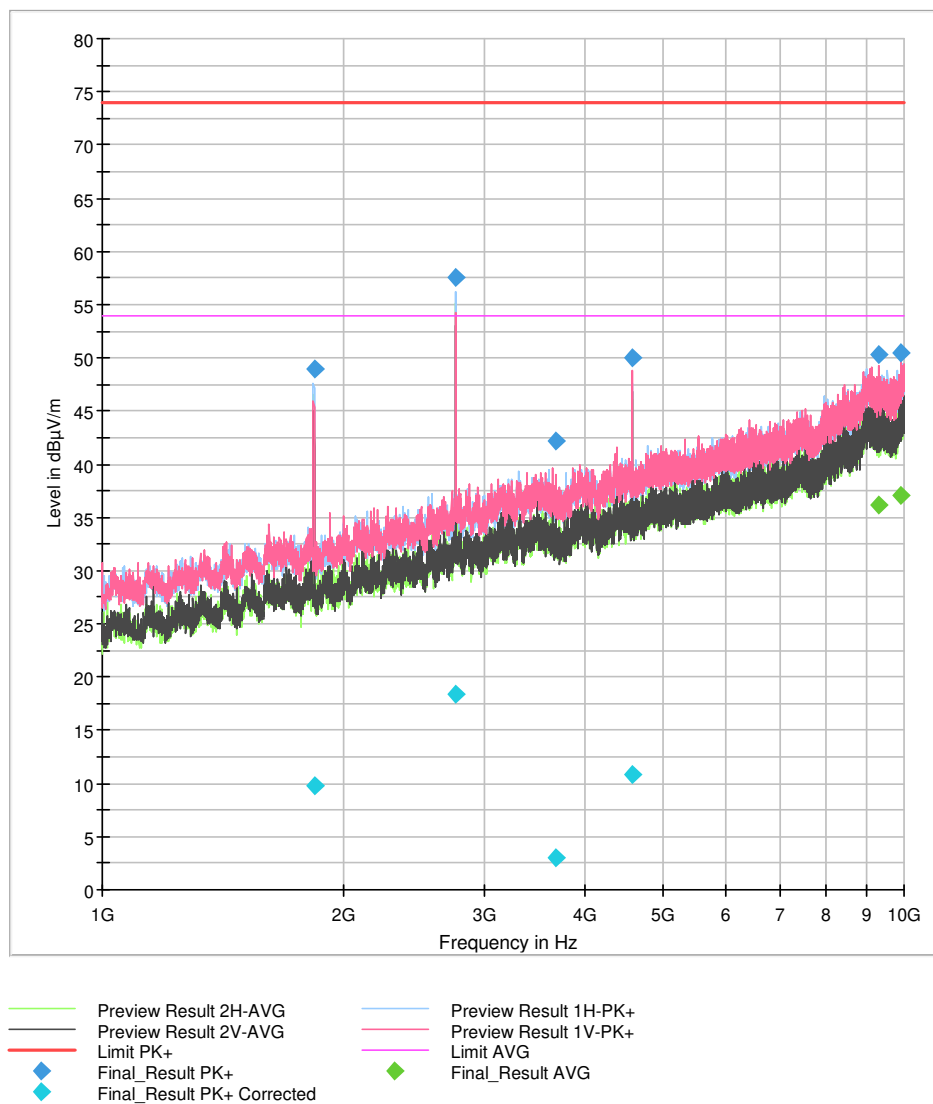
Frequency (MHz)	MaxPeak (dBμV/m)	Average / Corrected amplitude MaxPeak (dBμV/m)	Pulse train DCCF (dB)	Limit (dBμV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.911364	---	8.95	-39.16	54.00	45.05	15.0	1000.0	271.0	H	315.0	-3.9
1830.911364	48.11	---	---	74.00	25.89	15.0	1000.0	271.0	H	315.0	-3.9
2746.343182	57.74	---	---	74.00	16.26	15.0	1000.0	325.0	H	315.0	0.5
2746.343182	---	18.58	-39.16	54.00	35.42	15.0	1000.0	325.0	H	315.0	0.5
4576.806818	---	9.88	-39.16	54.00	44.12	15.0	1000.0	112.0	H	330.0	6.6
4576.806818	49.04	---	---	74.00	24.96	15.0	1000.0	112.0	H	330.0	6.6

Spurious emissions

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
8476.461364	---	34.62	54.00	19.38	15.0	1000.0	305.0	H	282.0	15.5
8476.461364	48.62	---	74.00	25.38	15.0	1000.0	305.0	H	282.0	15.5
9001.895454	50.39	---	74.00	23.61	15.0	1000.0	124.0	H	174.0	18.3
9001.895454	---	36.78	54.00	17.22	15.0	1000.0	124.0	H	174.0	18.3
9870.311364	---	36.69	54.00	17.31	15.0	1000.0	213.0	H	-8.0	17.4
9870.311364	50.36	---	74.00	23.64	15.0	1000.0	213.0	H	-8.0	17.4

EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @917.8 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.209 - SAC @3 m 47 CFR Part 15, Section 15.249 (a) - SAC @3 m
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-007
Comment #1:	
Comment #2:	



Final Result

Harmonics

Frequency (MHz)	MaxPeak (dBμV/m)	Average / Corrected amplitude MaxPeak (dBμV/m)	Pulse train DCCF (dB)	Limit (dBμV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1835.718182	49.01	---	---	74.00	24.99	15.0	1000.0	224.0	H	305.0	-3.9
1835.718182	---	9.85	-39.16	54.00	44.15	15.0	1000.0	224.0	H	305.0	-3.9
2753.420454	57.61	---	---	74.00	16.39	15.0	1000.0	324.0	H	314.0	0.5
2753.420454	---	18.45	-39.16	54.00	35.55	15.0	1000.0	324.0	H	314.0	0.5
3671.388636	---	3.05	-39.16	54.00	50.95	15.0	1000.0	132.0	V	103.0	3.1
3671.388636	42.21	---	---	74.00	31.79	15.0	1000.0	132.0	V	103.0	3.1
4589.090909	49.98	---	---	74.00	24.02	15.0	1000.0	135.0	V	49.0	6.5
4589.090909	---	10.82	-39.16	54.00	43.18	15.0	1000.0	135.0	V	49.0	6.5

Spurious emissions

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (s)	RBW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9278.002273	---	36.15	54.00	17.85	15.0	1000.0	312.0	V	2.0	16.8
9278.002273	50.29	---	74.00	23.71	15.0	1000.0	312.0	V	2.0	16.8
9893.138636	50.40	---	74.00	23.60	15.0	1000.0	135.0	V	97.0	17.7
9893.138636	---	36.99	54.00	17.01	15.0	1000.0	135.0	V	97.0	17.7



6.2.6 20 dB Emission Bandwidth

- ☒ No deviation from the standard
- ☐ Deviation from the standard
- ☐ Not tested

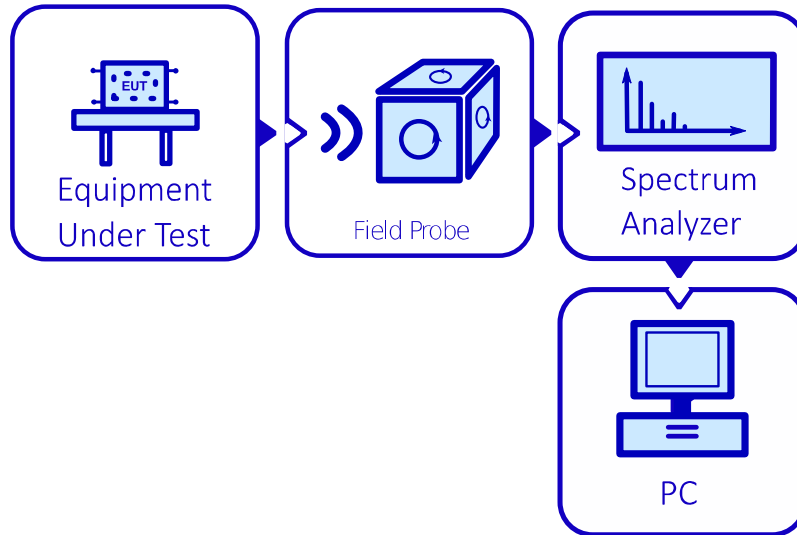
Note: Test was performed with EUT 24-0136PR20-016.

Measurement Procedure:

- Rules and specification: 47 CFR Part 15, Section 15.215 (c)
- Guide: ☒ ANSI C63.10-2020, Section 6.9.2 – 20 dB Bandwidth
☐ ANSI C63.10-2020, Section 6.9.3 – 99 % Bandwidth

The emission bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by 20 dB. The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. The test is performed in a semi anechoic chamber while the EUT is positioned to a receiving antenna for maximum output power. The modulated signal is recorded with an analyzer. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. After the trace of the spectrum analyzer is stabilized the envelope of the signal the amplitude -20 dB below the reference value is determined. The occupied bandwidth is the calculated value between both specific -20 dB frequency positions.

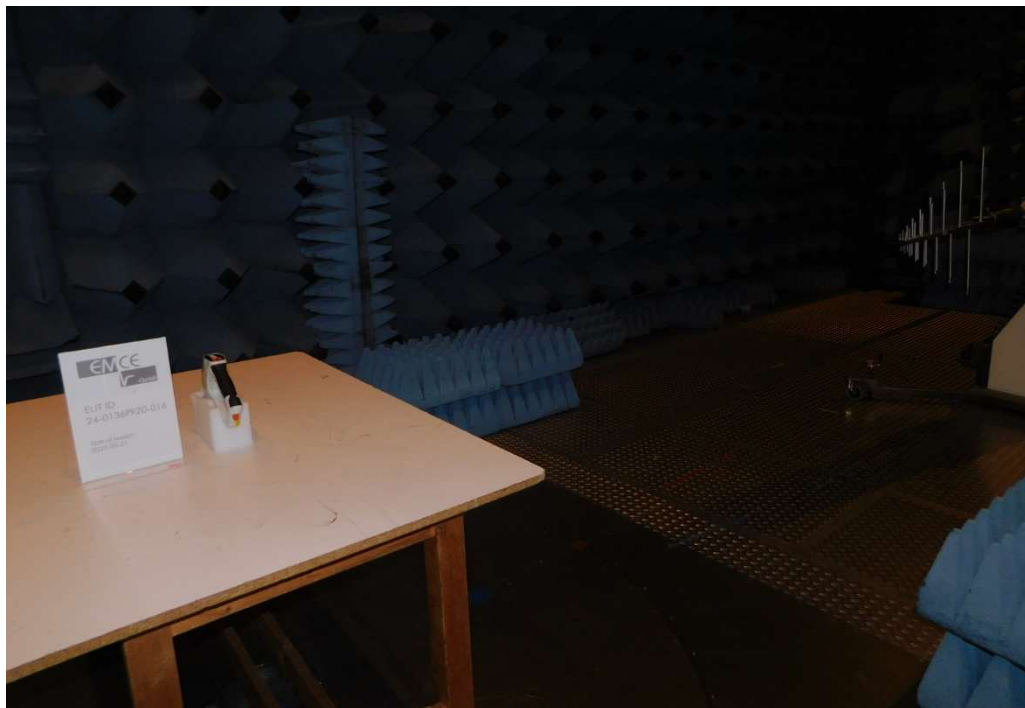
Basic structure – Setup for radiated test





6.2.6.1 Test Setup

According to ANSI C63.10-2020



Test Location

Final Test					
☒	Inv.-No.	Designation	Type (L x W x H)	Manufacturer	Location
☒	062	Semi anechoic chamber # 2	13.5 x 6.1 x 5.5 m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden

Used Test Equipment

Final Test					
☒	Inv.-No.	Designation	Type	Manufacturer	S/N
	042	AC-Source / Analyzer / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
☒	997	Software	EMC32	Rohde & Schwarz	N/A
☒	8008	LPDA Broadband Antenna 180 - 1500 MHz	VULP 9118A	Schwarzbeck	900
	8034	Antenna 30-300 MHz	VHBB9124 / BBA9106	Schwarzbeck	1812
☒	8044	Test receiver	ESW 44	Rohde & Schwarz	103371

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements



6.2.6.2 Test

Test Requirements

Emission bandwidth limit
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Frequency range / MHz	Frequency band lower limit / MHz	Frequency band upper limit / MHz
902-928 MHz	902	928
2400-2483.5 MHz	2400	2483.5
5725-5875 MHz	5725	5875
24.0-24.25 GHz	24.0	24.25

Test Frequencies

Test frequency #	Channel role	Nominal operation frequency / MHz	Channel width / MHz
1	Lowest channel	915.4	0.200
2	Highest channel	917.8	0.200

Rationale for selecting the EUT Test Setup

Equipment units:

EUT as a stand-alone device with built-in battery.

Cabling:

☐ Standard cables
☐ Special cables provided by the manufacturer

Port #	Designation	Remarks
N/A		

Operation Mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
 Power supply: ☐ 120 V/60 Hz ☒ Internal battery

Facilitates near-continuous transmission at both frequency extremes, maintaining a duty cycle close to 100%. The tests were conducted consecutively for the lowest and highest operating frequency.

Environmental Conditions - SAC

Temperature [10 – 40 °C]: 29.4 °C
 Relative humidity [10 – 90 %]: 44.0 %

Test Result

Nominal Frequency / MHz	Frequency band lower frequency / MHz	Channel Lower edge / MHz	Channel Upper edge / MHz	Frequency band upper frequency / MHz
915.4	902	915.393	915.397	928
917.8	902	917.794	917.798	928

Limit for Emissions Bandwidth (20 dB) ☒ Met ☐ Not met ☐ Not relevant

Limit for Emissions Bandwidth (99 %): ☐ Met ☐ Not met ☒ Not relevant

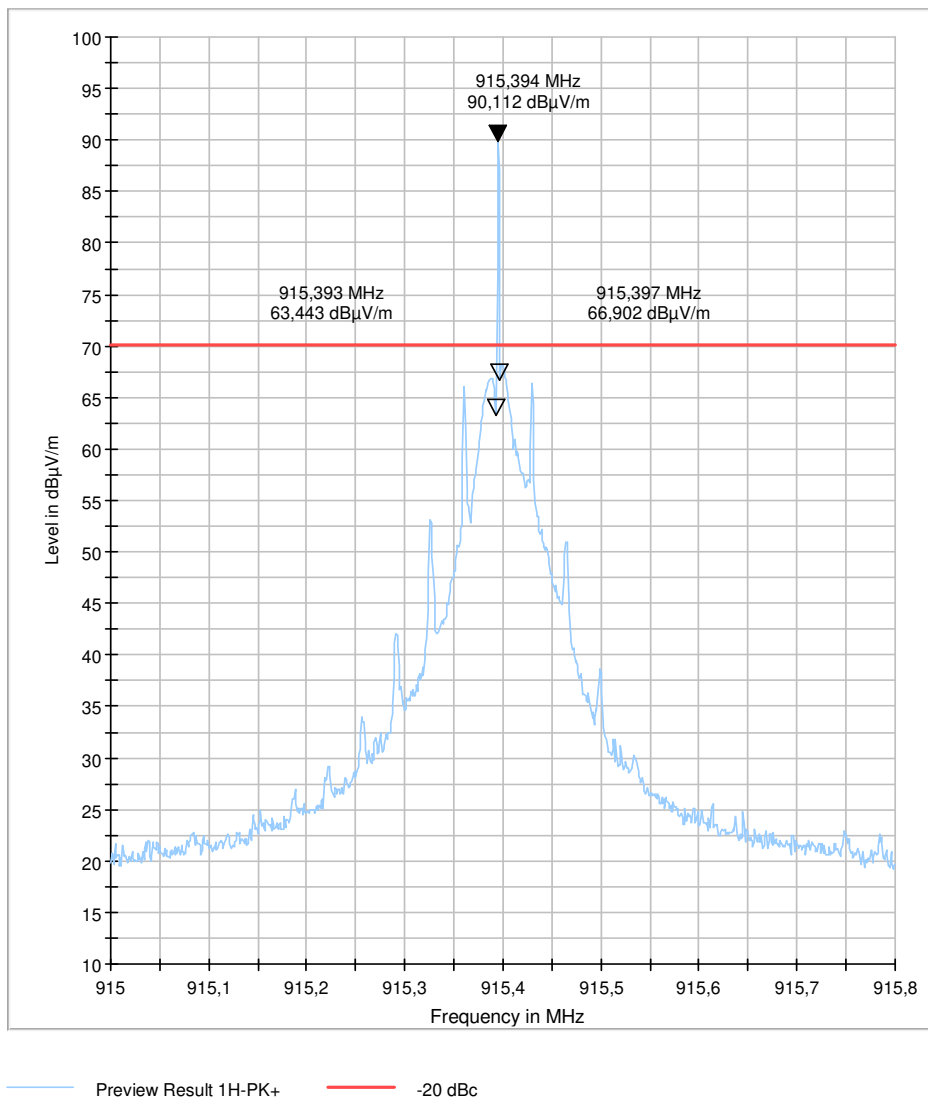
Remarks: N/A

Records

☒ Diagrams
☒ Readings

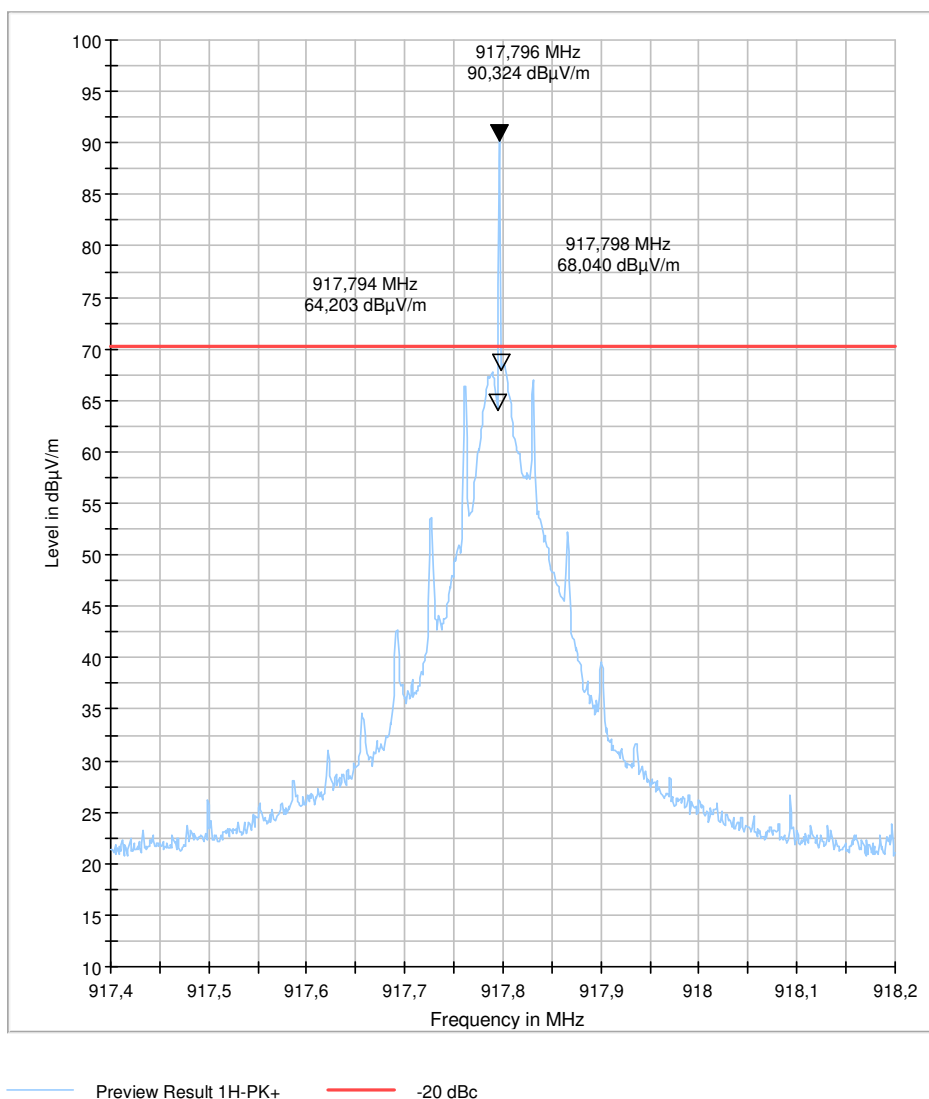
EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @915.4 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.215 (c)
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-003
Comment #1:	
Comment #2:	



EUT Information

EUT Name:	Spray gun
Test ID:	24-0136PR20-016
Customer:	ANDREAS STIHL AG & Co. KG
Operational condition:	Continuous transmission @917.8 MHz, duty cycle of approx. 100%
Test specification:	47 CFR Part 15, Section 15.215 (c)
Antenna information:	Distance EUT-Ant.: 3.0 m / Polarization: H/V / Ant.Height: 1.0-4.0 m.
Operator:	S. Vogelmann
File #:	24-0136RC24-016-006
Comment #1:	
Comment #2:	





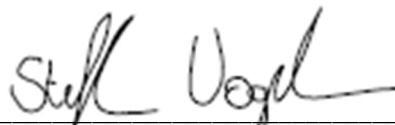
7 Summary

47 CFR Part 15 Subpart C

Requirement	Regulation section	Result	Remark(s)
Antenna requirement	§ 15.203	Pass	N/A
Pulse train / DCCF	§15.35 (c)	N/A	N/A
Restricted bands of operation	§ 15.205 (a), (b), (c)	Pass	N/A
Terminal voltage on powerline	§ 15.207 (a)	Not tested	N/A
Radiated emissions, general requirements	§ 15.209 (a), (b), (c), (d), (e), (f) § 15.33 (a)	Pass	N/A
Radiated emissions of intentional radiators	§ 15.249 (a), (c), (d), (e)	Pass	N/A
20 dB Emission bandwidth	§ 15.215 (c)	Pass	N/A

Burgrieden, 02/21/2026

Responsible inspector:



Project manager – Steffen Vogelmann

- End of Test Report -