

 		ISED LISTED REGISTRATION NUMBER 4621A-2 & 4621A-4	Test report No: NIE: 55234RRF.007
Partial Test report USA FCC Part 15.209 CANADA RSS-Gen Issue 5			
Identification of item tested	Electronic Reader Series including all mechanical variants.		
Trademark	XS4 Wall Reader 2.0.		
Model and /or type reference	WRD0S (type reference: P1619).		
Other identification of the product	HW version: 1.0. SW version: 0130 (Control Firmware). FCC ID: UKCWRD0B. IC: 10088A-WRD0B.		
Features	Contains a certified Bluetooth module (DirectKey).		
Applicant	SALTO Systems, S.L. Arkotz 9, Polígono Lanbarren 20180, Oiartzun, Gipuzkoa, SPAIN		
Test method requested, standard	USA FCC Part 15.209 (10–1–17 Edition): Radiated emission limits, general requirements. CANADA RSS-Gen Issue 5 (April 2018). General Requirements for Compliance of Radio Apparatus. -Transmitter out of band radiated emissions with simultaneous transmissions. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.		
Summary	IN COMPLIANCE		
Approved by (name / position & signature)	A. Llamas RF Lab. Manager  Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2019.05.06 12:42:58 +02'00'		
Date of issue	2019-05-06		
Report template No	FDT08_21		

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Competences and guarantees

DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: ISED 4621A-2 & 4621A-4.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The sample consists of a XS4 Wall Reader 2.0, with Bluetooth Smart (DirectKey module) and ISO14443A & ISO15693 standard based technology – Mifare.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Reception
55234C/011	Electronic Reader	WRD0S (type reference: P1619)	--	2018/01/11
55234C/001	AC/DC Adaptor	6A-181WP12	--	2018/01/10
55234C/002	Control Unit	CU42E0	--	2018/01/10

Sample S/01 has undergone the following test(s): All tests indicated in Appendix A.

Test sample description

Ports..... :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
			☐	☐	☐	
Supplementary information to the ports..... :						
Rated power supply	Voltage and Frequency		Reference poles			
			L1	L2	L3	N
	☒	DC: 12 Vdc from CU42xx.				
Rated Power	1.8 W (max)					
Clock frequencies	27,12 MHz					
Other parameters..... :	RS-485 bus					
Software version	0130 (Control Firmware)					
Hardware version..... :	1.0					
Dimensions in cm (W x H x D).... :	9,6 x 13,9 x 2,6 cm					
Mounting position..... :	☒	Wall/Ceiling mounted equipment				

Modules/parts	Module/parts of test item	Type	Manufacturer
	DirectKey	BLE Module	Supra
Accessories (not part of the test item)	Description	Type	Manufacturer
Documents as provided by the applicant.....	Description	File name	Issue date
	User manual		
	FW explanation document		

(3) Only for Medical Equipment

Identification of the client

SALTO Systems, S.L.
Arkotz 9, Polígono Lanbarren
20180, Oiartzun, Gipuzkoa, SPAIN

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2018-01-11
Date (finish)	2018-11-06

Document history

Report number	Date	Description
55234RRF.007	2019-05-06	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

Remarks and comments

The tests have been performed by the technical personnel: Miguel Angel Torres, José Alberto Aranda

Used instrumentation:

Radiated measurements:

	Last Calibration	Due Calibration
1. Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2. EMI Receiver ROHDE AND SCHWARZ ESU40	2018/06	2020/06
3. Active Loop Antenna HEWLETT PACKARD 11966A	2018/06	2020/06
4. RF Pre-amplifier, 38 dB, 30 MHz-6 GHz BONN ELEKTRONIK BLNA 0360-01N	2018/07	2019/07
5. Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2017/04	2020/04
6. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40	2017/07	2019/07
7. RF Pre-amplifier, 40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2018/03	2019/03
8. Low Noise Amplifier G>30dB, 18 - 40 GHz BONN ELEKTRONIK BLMA 1840-1M	2018/02	2020/02
9. Broadband Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2016/11	2019/11
10. Broadband Horn antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2018/07	2021/07
11. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2017/08	2019/08
12. Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2018/07	2021/07
13. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV 40	2018/02	2020/02
14. RF Pre-amplifier G>30dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-3A	2018/03	2019/03
15. RF Pre-amplifier, G>48dB, 18-40GHz NARDA JS44- 18004000-33-8P	2018/02	2020/02
16. Broadband Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2018/01	2021/01

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

FCC PART 15 / RSS-Gen PARAGRAPH		
Requirement – Test case	Verdict	Remark
15.209 Subclause (a) / RSS-Gen Clause 8.9. Transmitter emission limits	P	
<u>Supplementary information and remarks:</u>		
None.		

Appendix A: Test results.

TEST CONDITIONS	10
Section 15.209 Subclause (a) / RSS-Gen Clause 8.9. Transmitter emission limits	13

TEST CONDITIONS

POWER SUPPLY (V):

Vn: 12 Vdc (*)

Type of Power Supply: From CU42xx. (*)

NFC:

Type of Antenna: Integral, PCB. (*)

Bluetooth Low Energy:

Type of Antenna: Integral, Chip. (*)

(*): Declared by applicant.

TEST FREQUENCIES:

NFC:

Nominal Operating Frequency: 13.56 MHz

Bluetooth:

Low Channel: 2402 MHz

Middle Channel: 2440 MHz

High Channel: 2480 MHz

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna) for the range between 9 kHz to 30 MHz is situated at a distance of 3 m and the measurement antenna (Bilog antenna) for the range between 30 MHz to 1000 MHz is situated at a distance of 3 m and at a distance of 1m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

In the range between 9 kHz and 30 MHz the measurements were made in the three different orientation planes of the loop antenna to determine the maximum received field.

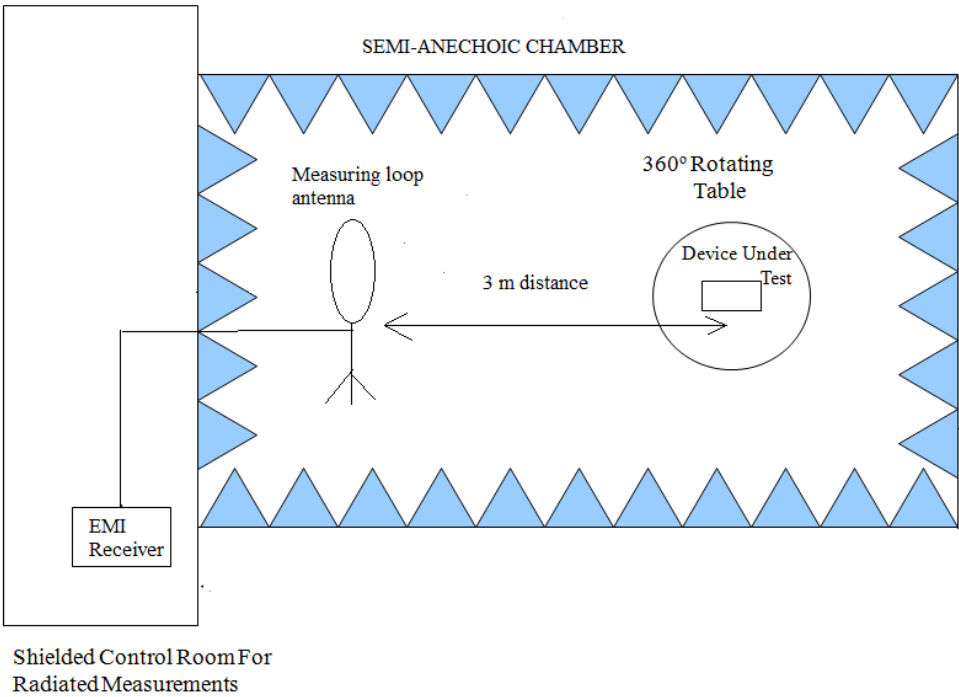
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

For radiated emissions in the range 1 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

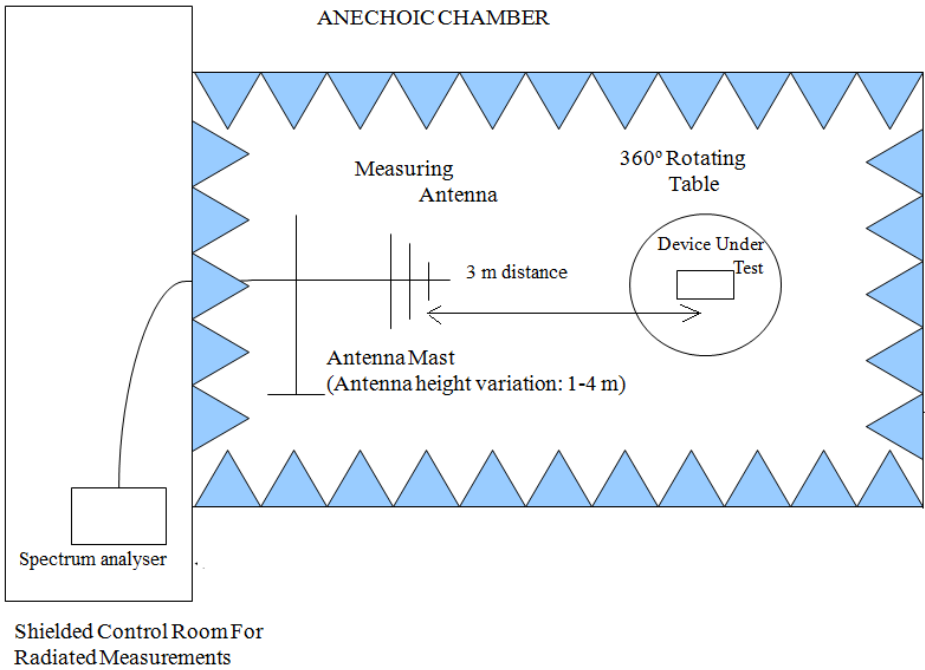
Measurements were made in both horizontal and vertical planes of polarization.

The test was performed with the equipment transmitting simultaneously with the 13.56 MHz radio and with the Bluetooth Low Energy 2.4 GHz radio to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

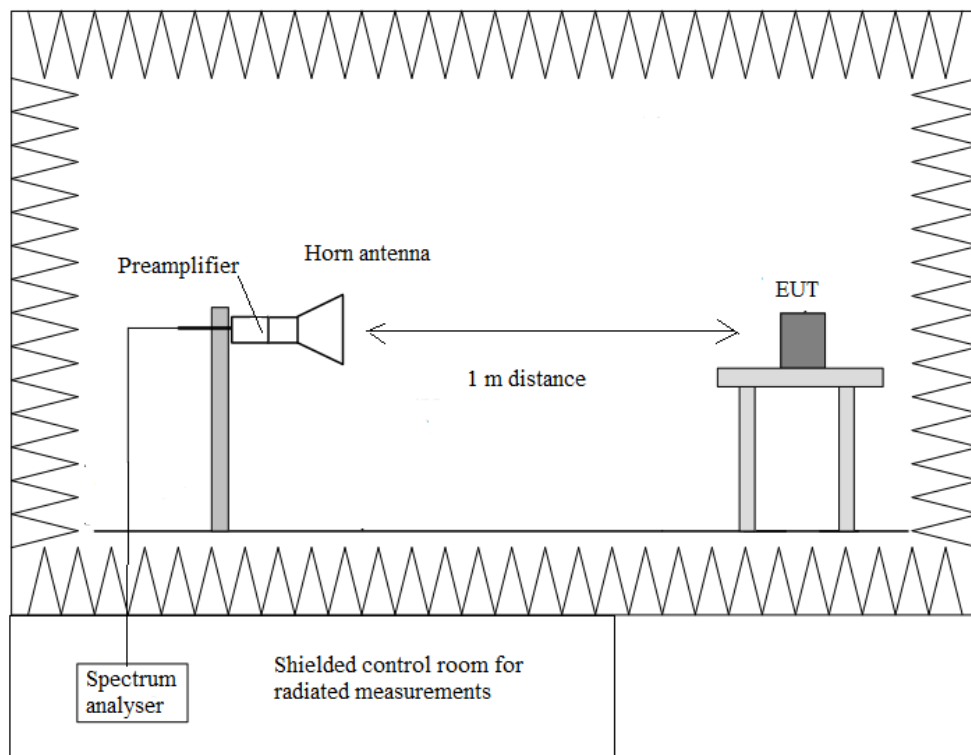
Radiated measurements setup 9 kHz to 30 MHz.



Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup $f > 1$ GHz:



Section 15.209 Subclause (a) / RSS-Gen Clause 8.9. Transmitter emission limits

SPECIFICATION:

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

RESULTS:

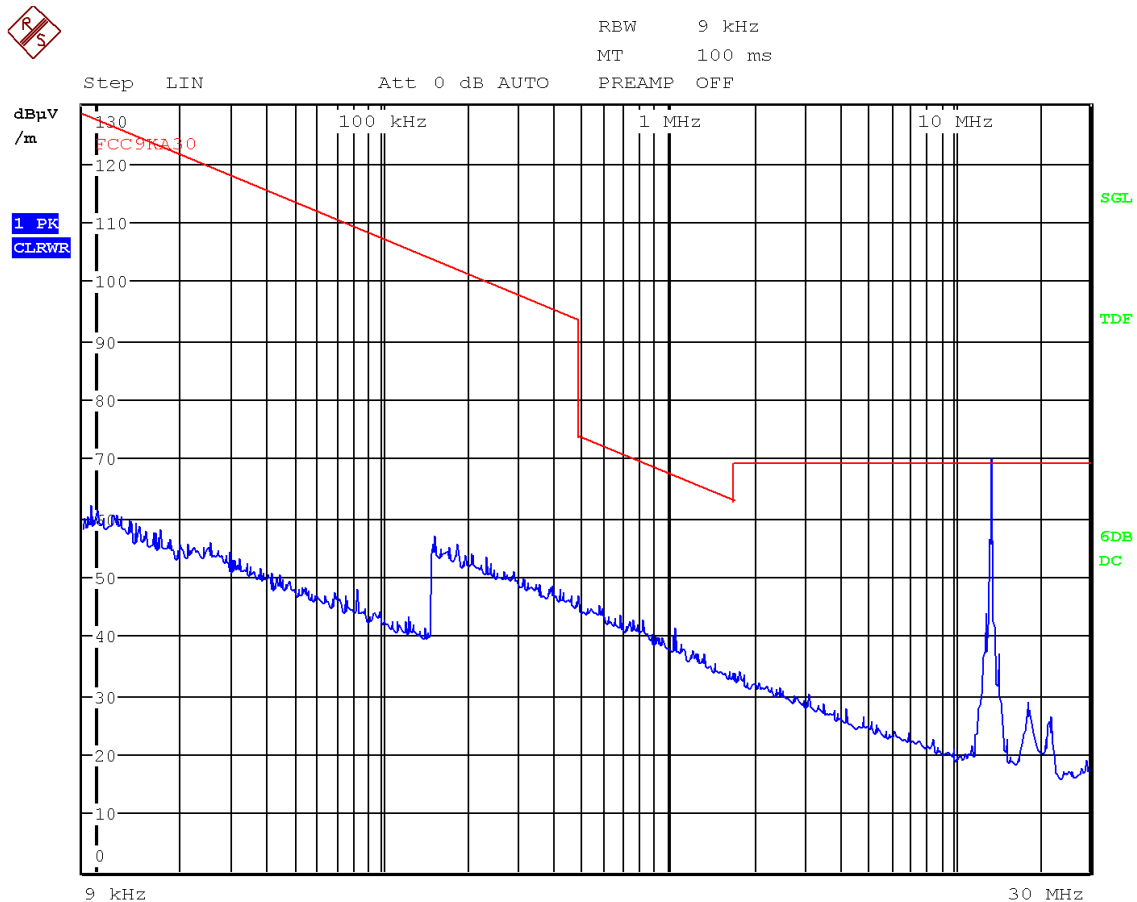
The spectrum was inspected from 9 kHz to 26 GHz searching for spurious signals.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifier gain.

- FREQUENCY RANGE 9 kHz – 30 MHz:

- **NFC mode ISO 14443A with Bluetooth Low Energy**

No spurious frequencies at less than 20 dB below the limit.



The highest peak corresponds to the NFC mode ISO 14443A carrier level.

Resolution bandwidth:

200 Hz for $9 \text{ kHz} \leq f \leq 150 \text{ kHz}$

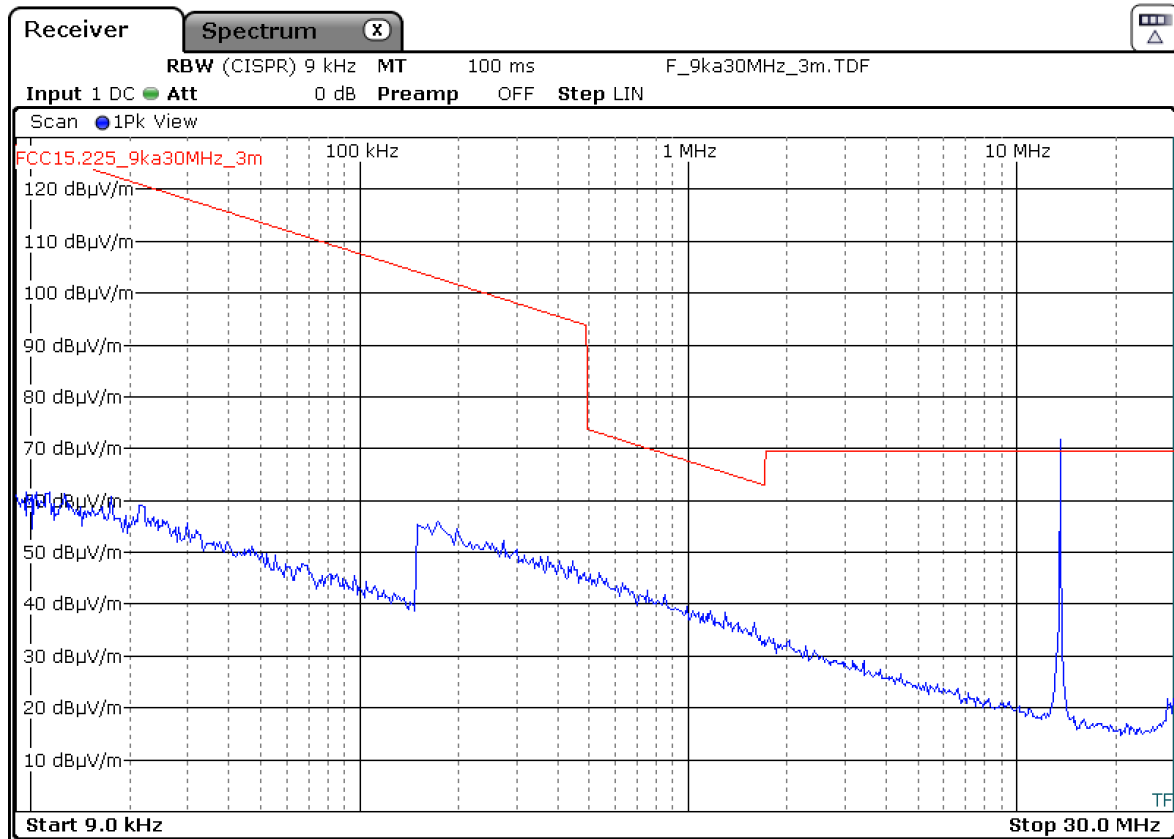
9 kHz for $150 \text{ kHz} \leq f \leq 30 \text{ MHz}$

The scan is performed with the peak detector.

The limits shown in the above plot are extrapolated to 3 meters.

- **NFC mode ISO 15693 with Bluetooth Low Energy**

No spurious frequencies at less than 20 dB below the limit.



The highest peak corresponds to the NFC mode ISO 15693 carrier level.

Resolution bandwidth:

200 Hz for $9 \text{ kHz} \leq f \leq 150 \text{ kHz}$

9 kHz for $150 \text{ kHz} \leq f \leq 30 \text{ MHz}$

The scan is performed with the peak detector.

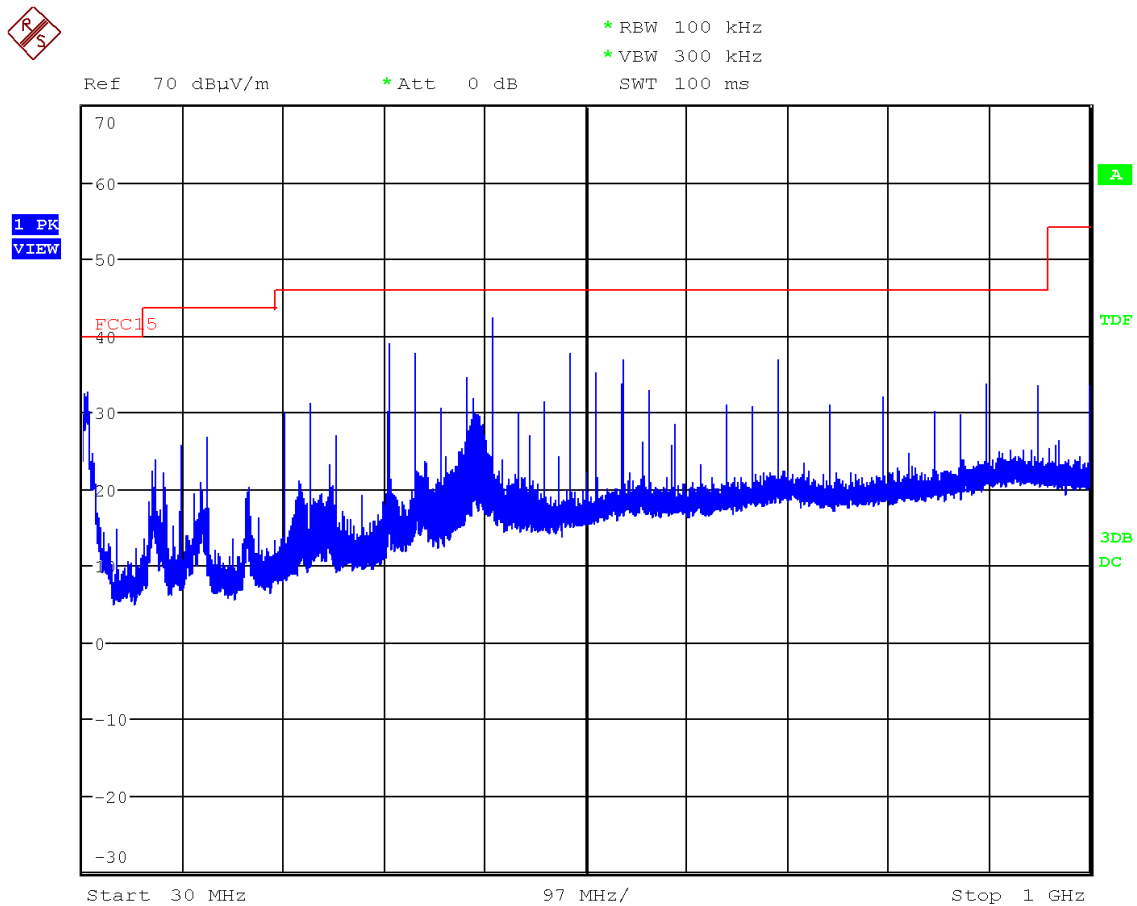
The limits shown in the above plot are extrapolated to 3 meters.

- FREQUENCY RANGE 30 MHz – 1 GHz

- NFC mode ISO 14443A with Bluetooth Low Energy

Spurious at less than 20 dB of the limit:

Spurious frequency (MHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
324.977	Quasi peak	37.3	V	< $\pm$ 3.88
350.003	Quasi peak	30.6	V	< $\pm$ 3.88
424.984	Quasi peak	40.6	V	< $\pm$ 3.88
500.013	Quasi peak	33.9	V	< $\pm$ 3.88
524.991	Quasi peak	33.5	V	< $\pm$ 3.88
550.017	Quasi peak	30.4	V	< $\pm$ 3.88
699.979	Quasi peak	34.0	V	< $\pm$ 3.88
800.034	Quasi peak	34.5	H	< $\pm$ 3.88
900.041	Quasi peak	35.4	H	< $\pm$ 3.88
950.045	Quasi peak	29.7	H	< $\pm$ 3.88



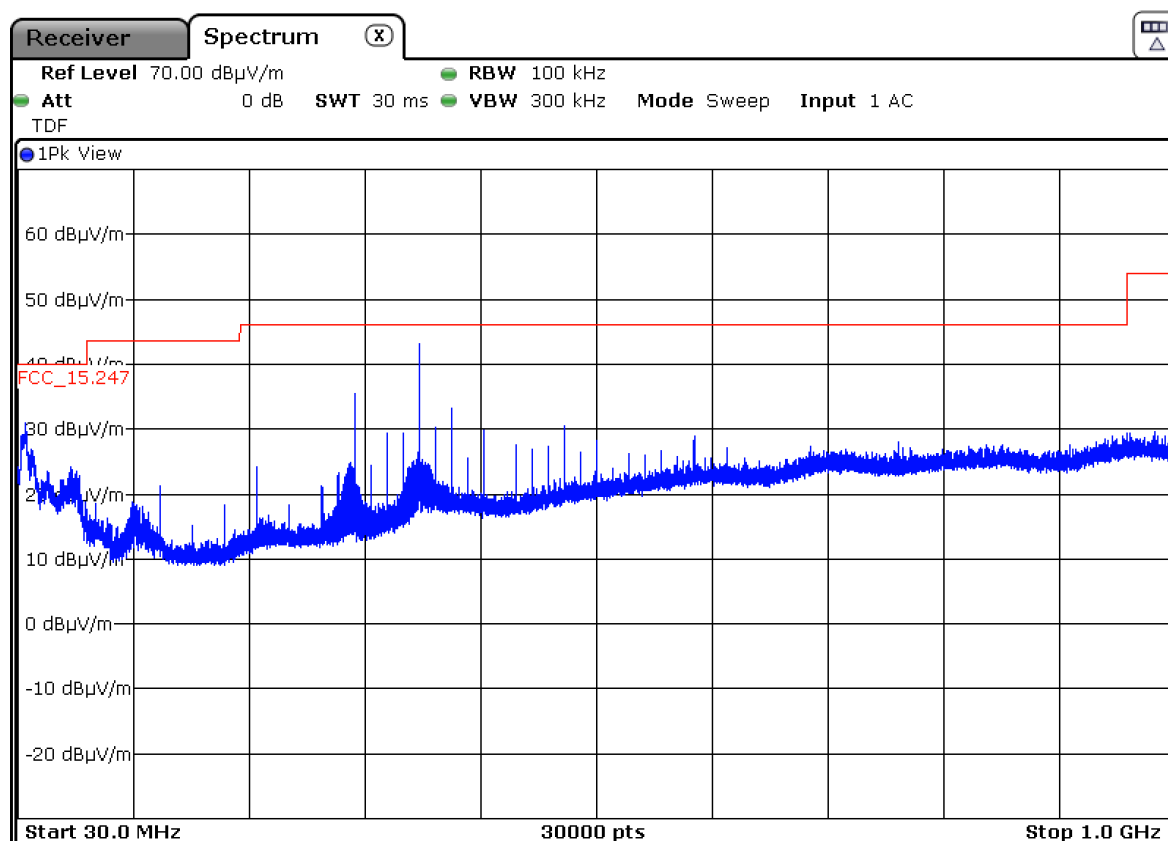
The above plot shows the results of the scan using peak detector.

Verdict: PASS

- **NFC mode ISO 15693 with Bluetooth Low Energy**

Spurious at less than 20 dB of the limit:

Spurious frequency (MHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
36.515	Quasi peak	25.8	V	< $\pm$ 3.88
230.548	Quasi peak	29.6	H	< $\pm$ 3.88
311.898	Quasi peak	35.7	H	< $\pm$ 3.88
366.121	Quasi peak	42.6	V	< $\pm$ 3.88
393.240	Quasi peak	33.0	V	< $\pm$ 3.88
488.180	Quasi peak	28.9	V	< $\pm$ 3.88



The above plot shows the results of the scan using peak detector.

Verdict: PASS

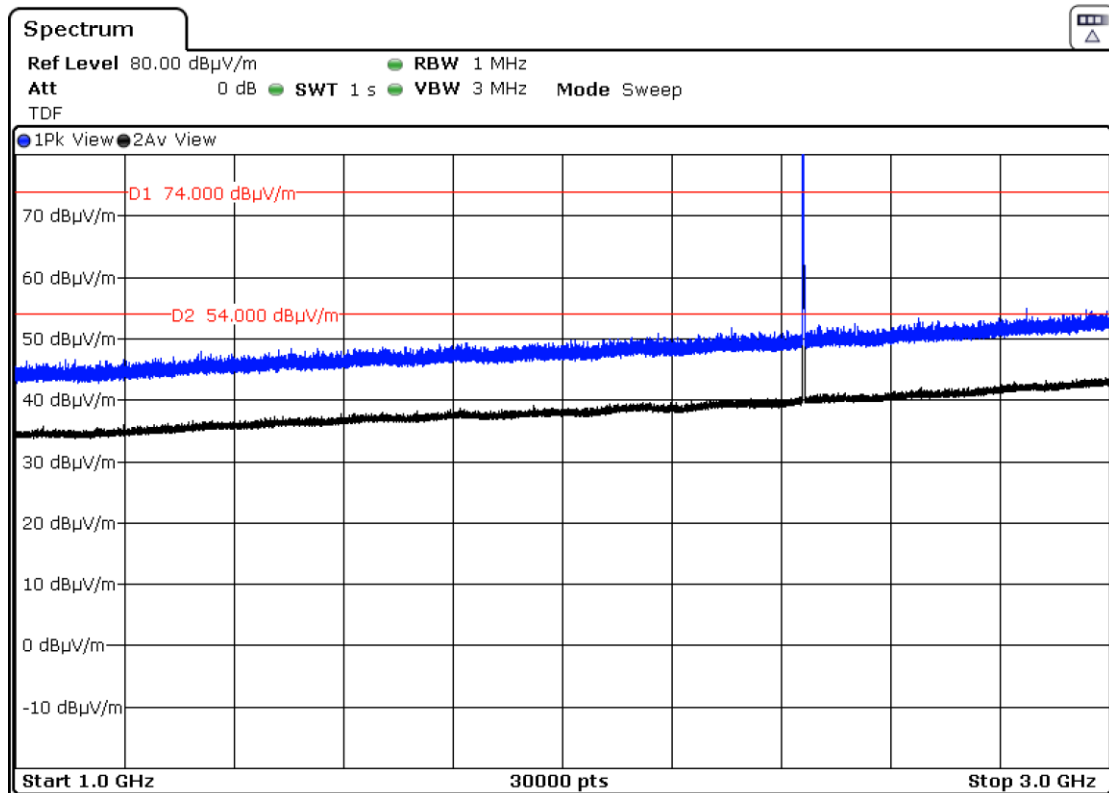
- FREQUENCY RANGE 1 – 26 GHz

- **NFC mode ISO 14443A with Bluetooth Low Energy**

No spurious emissions at less than 20 dB below the limit.

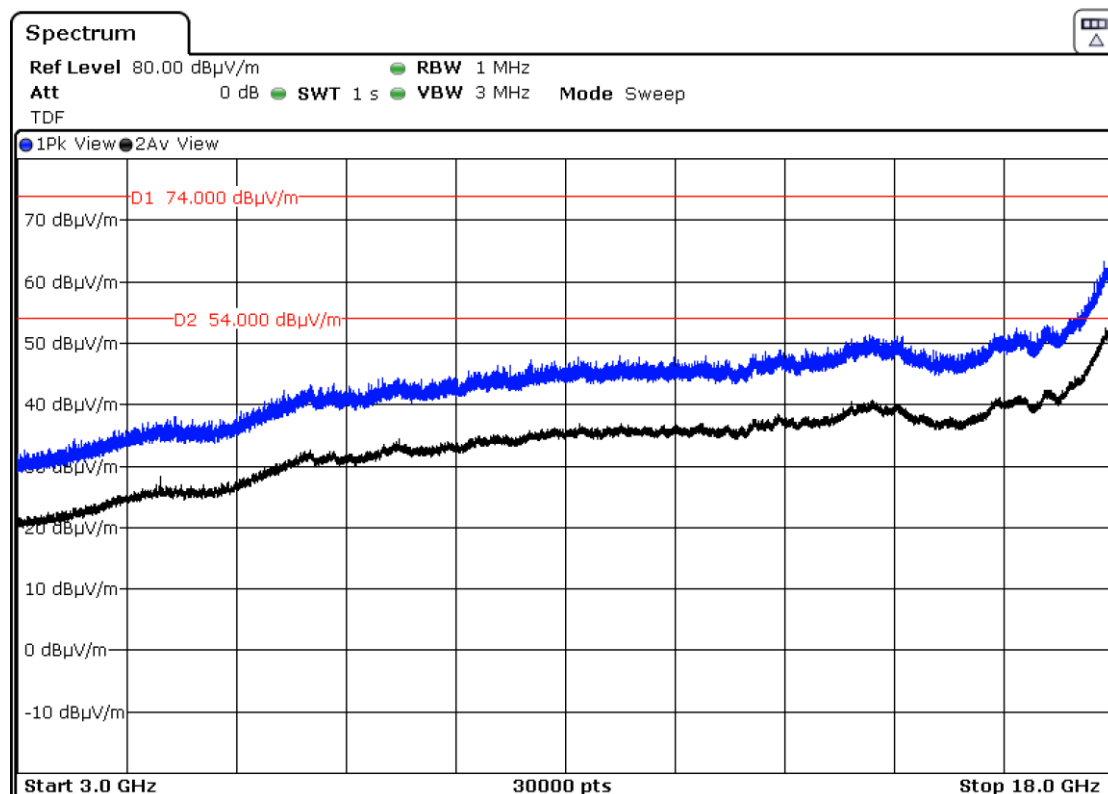
Verdict: PASS

FREQUENCY RANGE 1 - 3 GHz:



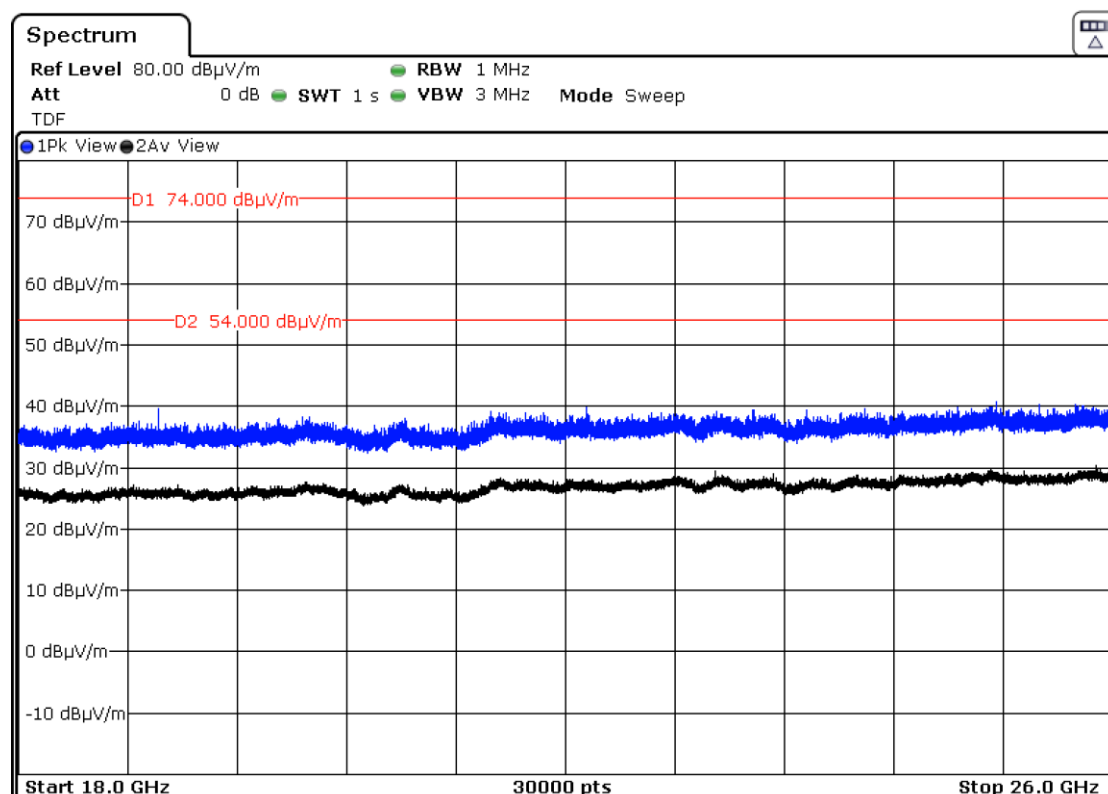
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

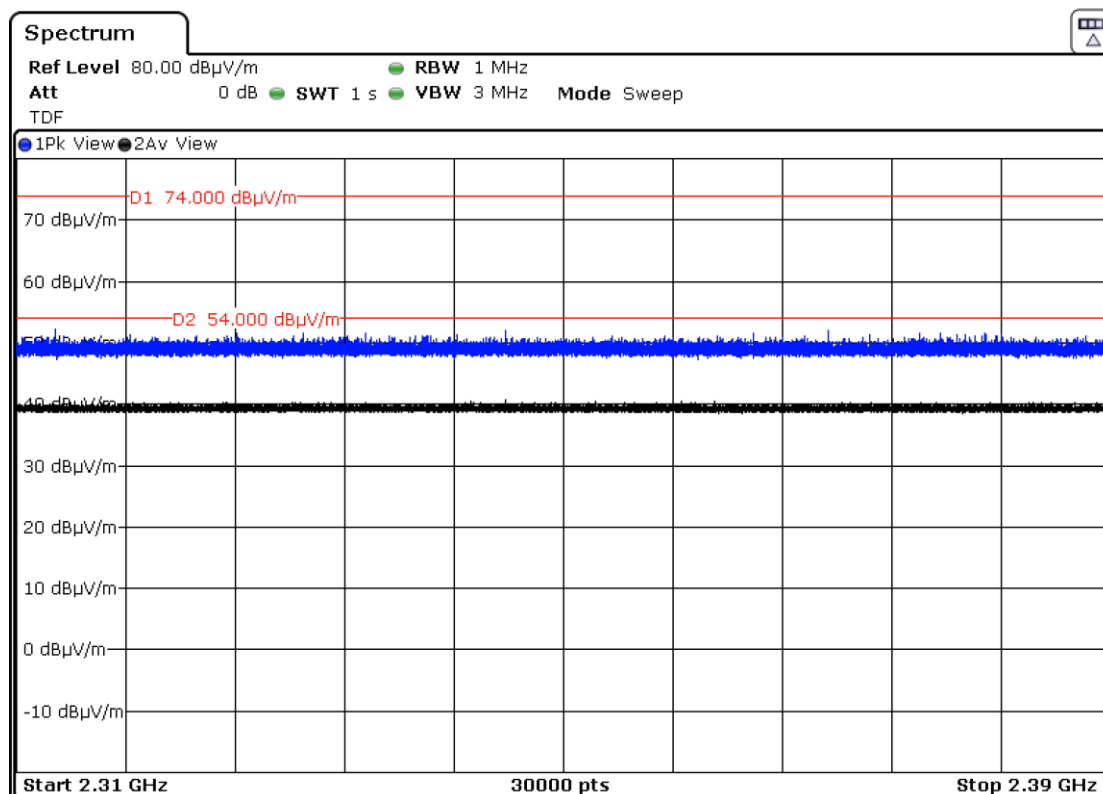


FREQUENCY RANGE 17 - 26 GHz:

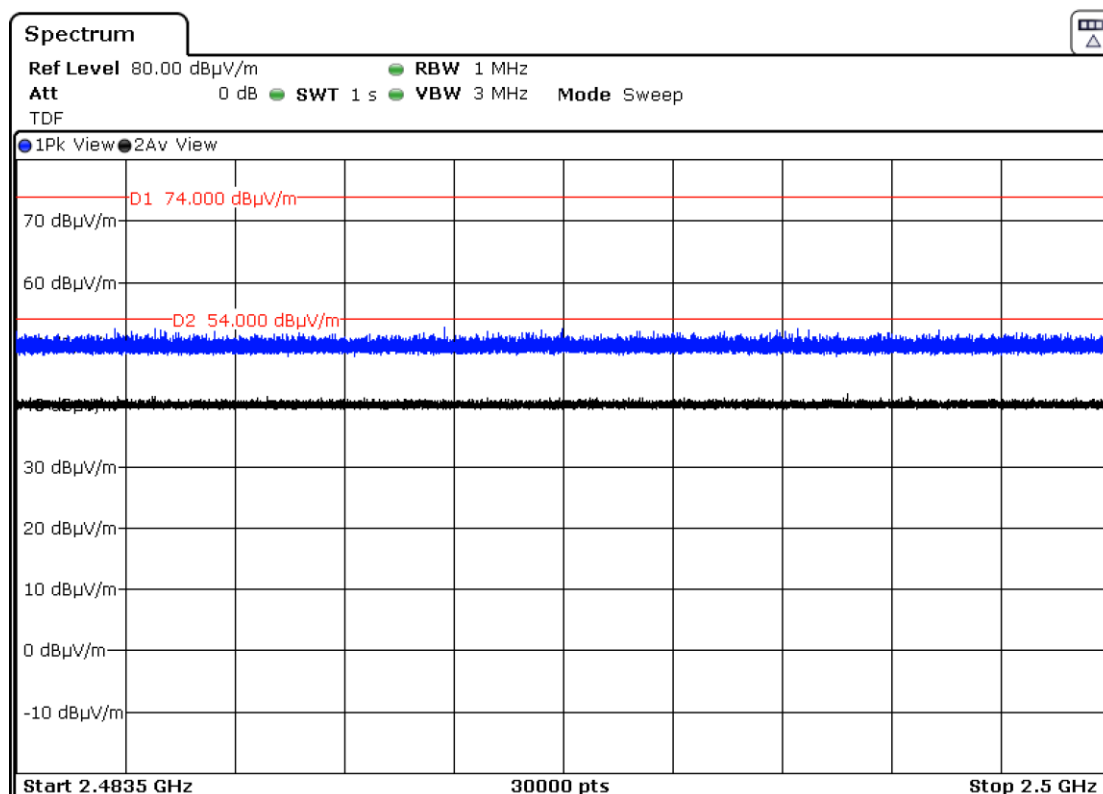
The spurious signals detected do not depend on the operating channel.



FREQUENCY RANGE 2.31-2.39 GHz (Restricted Band 1):



FREQUENCY RANGE 2.4835-2.5 GHz (Restricted Band 2):



- **NFC mode ISO 15693 with Bluetooth Low Energy**

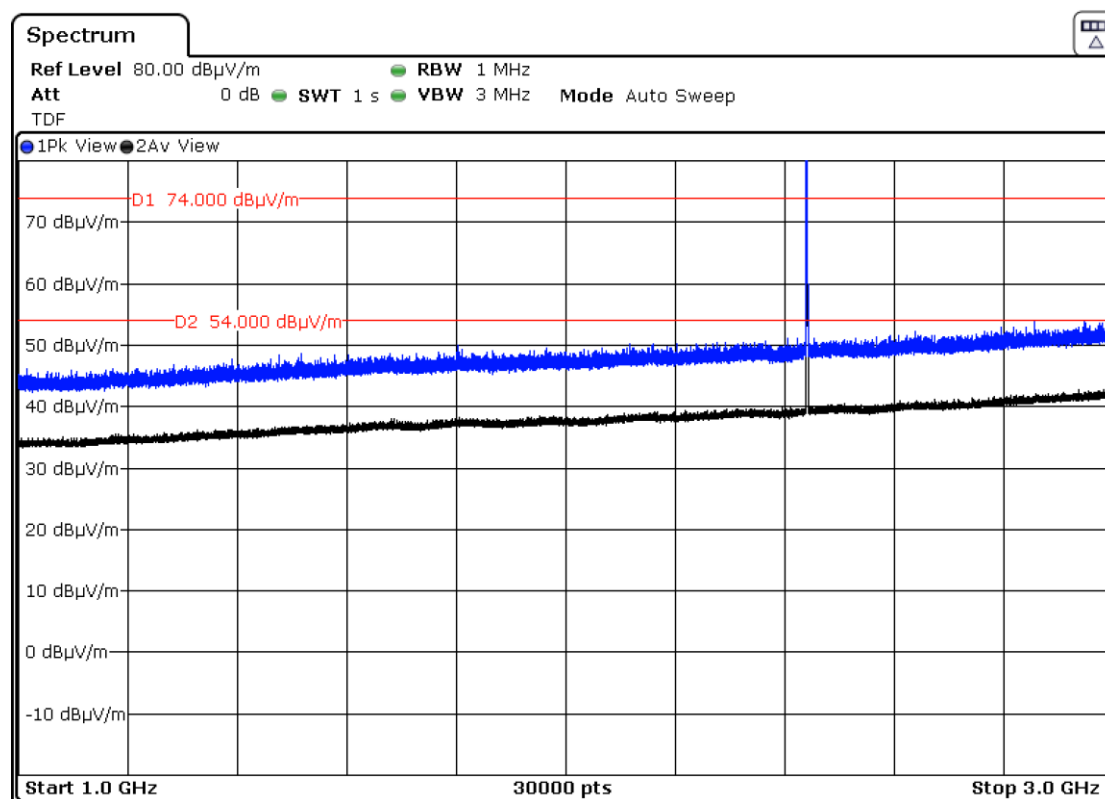
The spurious frequencies do not depend on the operating channel.

Spurious at less than 20 dB of the limit:

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
4.8795	Peak	39.17	V	< $\pm$ 3.70
12.1987	Peak	50.09	H	< $\pm$ 3.70

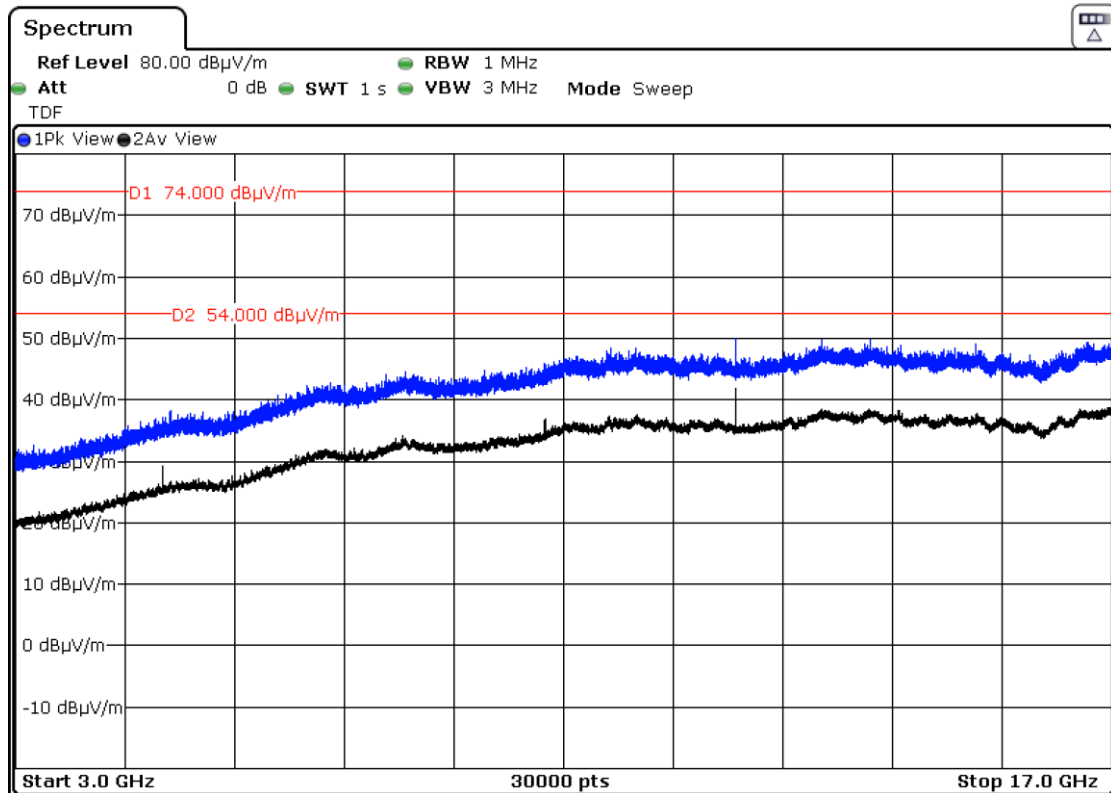
Verdict: PASS

FREQUENCY RANGE 1 - 3 GHz:



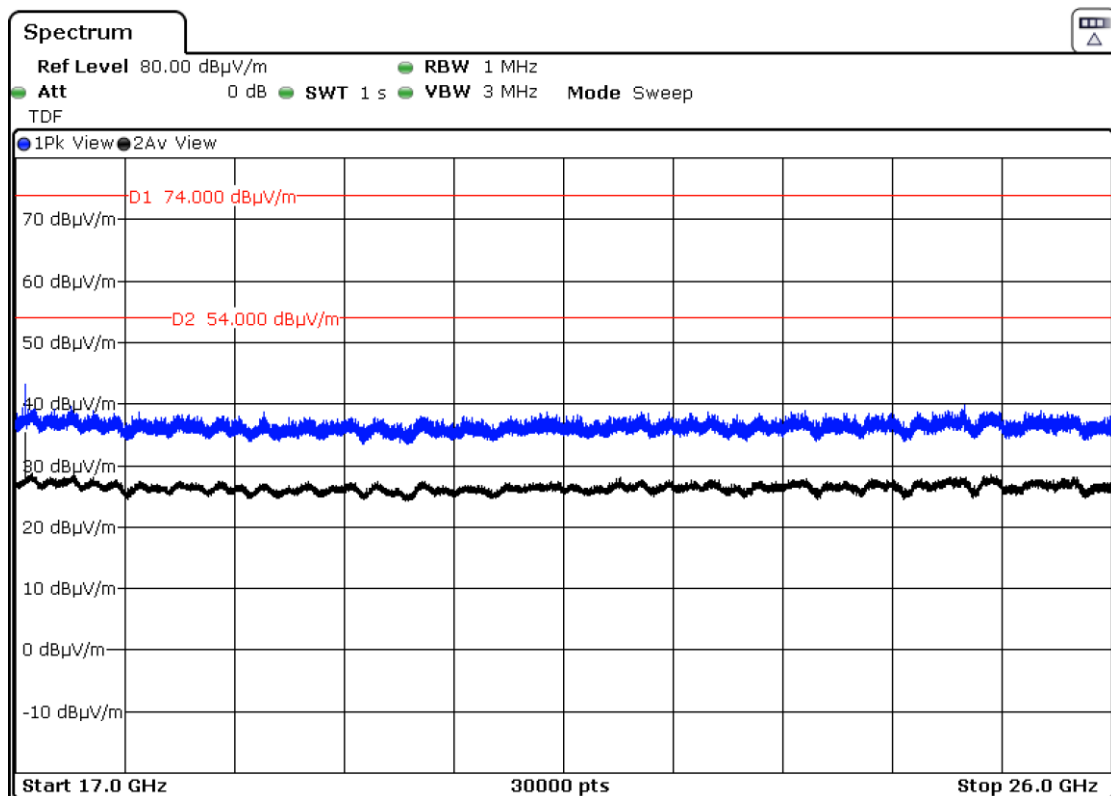
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

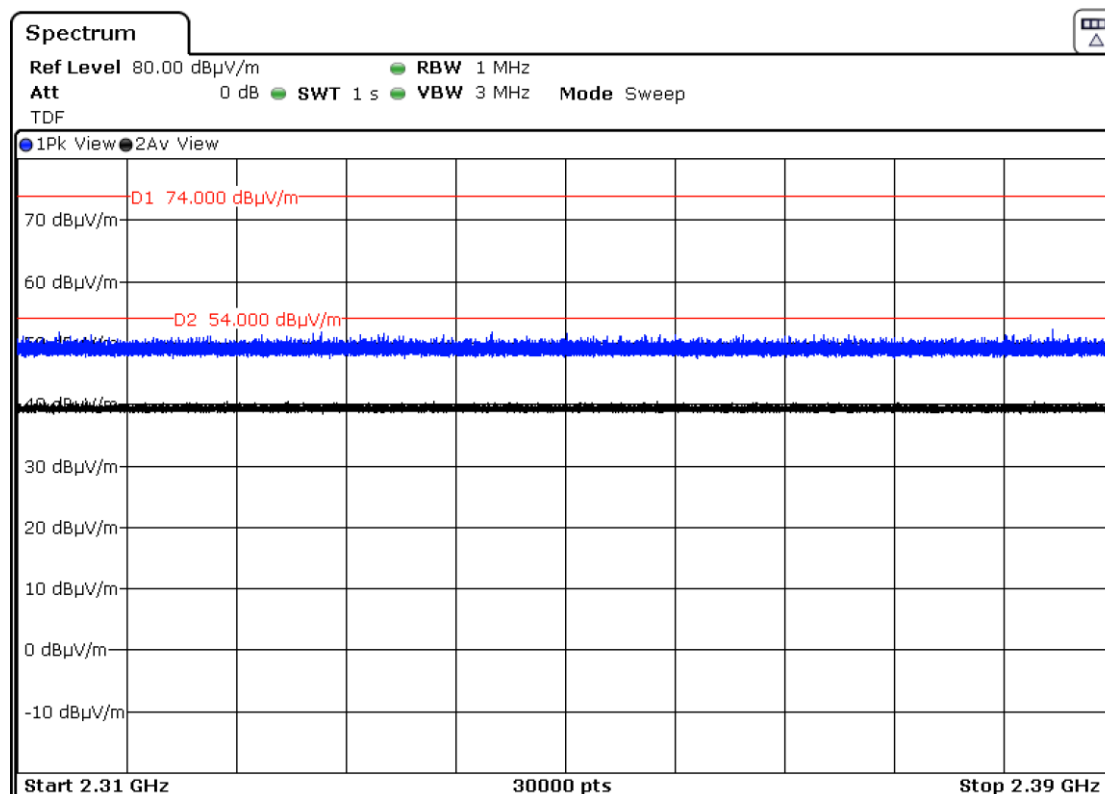


FREQUENCY RANGE 17 - 26 GHz:

The spurious signals detected do not depend on the operating channel.



FREQUENCY RANGE 2.31-2.39 GHz (Restricted Band 1):



FREQUENCY RANGE 2.4835-2.5 GHz (Restricted Band 2):

