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LP-009

Test report

Number:	**T251-0xxx/17**	Project file:	C20171221
		Date:	2017-06-22
		Pages:	49
Product:	**Nucleo expansion board**		
Type reference:	**X-NUCLEO-NFC05A1**		
Ratings:	USB: 5 VDC 5%/500 mA; Operating clock frequency: 13.56 MHz Protection class: III		
Trademark:	STMicroelectronics Austria GmbH		
Applicant:	**STMicroelectronics Austria GmbH** **Kratkystrasse 2, AT-8020 Graz, Austria**		
Manufacturer:	ASTRON Electronic GmbH Feistritz 333, AT-9613 Feistritz an der Gail, Austria		
Place of manufacture:	ASTRON Electronic GmbH Feistritz 333, AT-9613 Feistritz an der Gail, Austria		

Summary of testing

Testing method:	FCC 47 CFR Part 15, Subpart C RSS-210 Issue 9 (Annex B.6) RSS-Gen issue 4 (clause 6.6 and tables 3,4,5 and 6)
Testing location:	SIQ Ljubljana, Trpinčeva ulica 37 A, SI-1000 Ljubljana, Slovenia
Remarks:	Date of receipt of test items: 2017-04-04 Number of items tested: 2 Date of performance of tests: 2017-04-25 - 2017-05-23 The test results presented in this report relate only to the items tested. The product complies with the requirements of the testing methods. /

Tested by: Andrej Škof **Approved by:** Marjan Mak

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1 GENERAL

History sheet			
Date	Report No.	Change	Revision
2017-06-22	T251-0xxx/17	Initial Test Report issued.	--

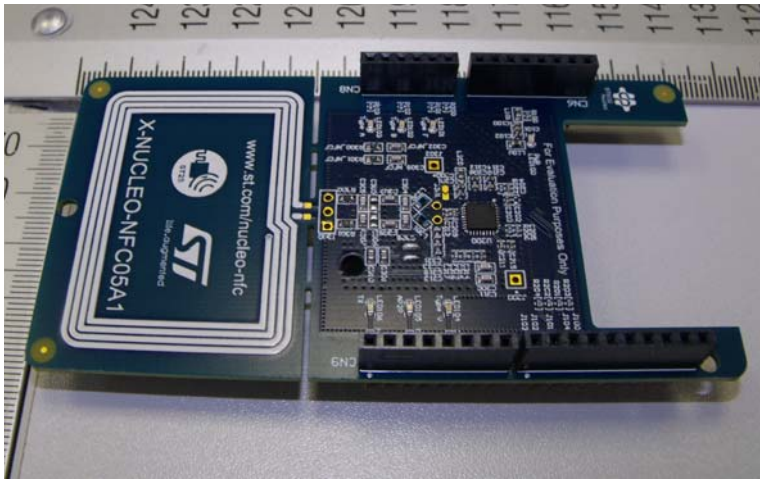
Environmental conditions:
Ambient temperature: 15°C to 35°C
Relative humidity: 30% to 60%
Atmospheric pressure: 860 mbar to 1060 mbar

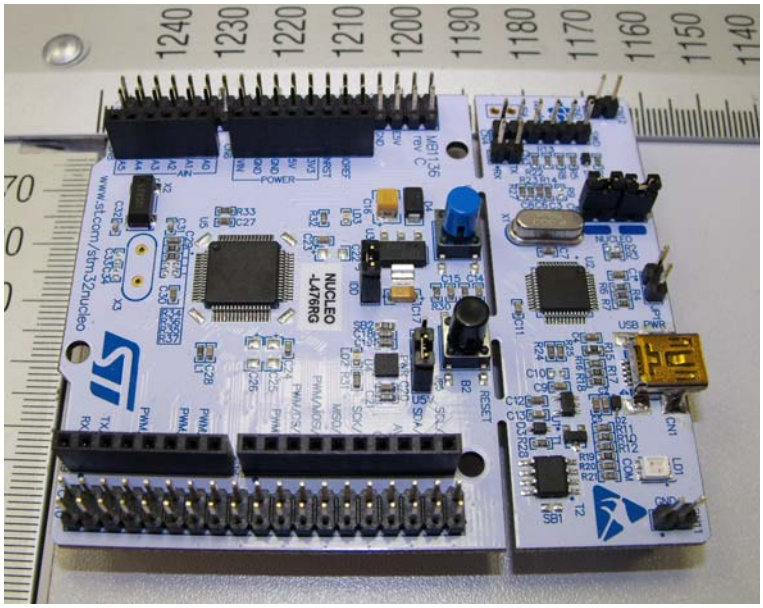
1.1 Equipment under test

Nucleo expansion board
Type: **X-NUCLEO-NFC05A1**
FCC ID: YCPNFC05A1

Tested SIQ sample number: S20172501 (original sample)
S20173104 (sample with dummy load)

Pictures of EUT:





1.1.1 General product information

Product	Reader Board HF NFC
Type / Model	ST25R3911B-DISCO
Supply voltage of transmitter	5 VDC via USB
Operating frequency	13,56 MHz (NFC tag)
Antenna type	PCB, 47 mm x 34 mm, four turns
Modulation type:	ISO14443A, ISO14443B, ISO15693 and FeliCa™
Hardware version:	NFC05A1
Software version:	X-CUBE-NFC5 V1.0.0
Card reading/Writing distance	From 0 to 40mm with CLOUD-ST25TA tag

1.1.2 Auxiliary equipment used during testing

- NUCLEO-L476RG mother board
- Laptop: Lenovo ThinkPad L560

2 TEST SUMMARY

STANDARD	Tested yes	Tested no	Sample pass	Sample not pass
FCC 47 CFR Part 15, Subpart C (§2.202, §15.203, §15.205, §15.207, §15.209, §15.215, §15.225 (a-d), §15.225 (e)) RSS-210 Issue 9 (Annex B.6) RSS-Gen issue 4 (clause 6.6 and tables 3,4,5 and 6)	☑	☐	☑	☐

Clause (FCC 47 CFR Part 15)	Clause (RSS-Gen issue 4)	Clause (RSS-210 issue 9)	Test description	Section within the report	Conclusion
§2.202	6.6		Occupied bandwidth	4.1	PASS
§15.203			Antenna requirements	4.2	PASS
§15.205	Table 6		Restricted bands of operation	4.3	PASS
§15.207	Table 3		Conducted emission	4.4	PASS
§15.209	Table 4 and 5		Radiated emission – general requirements	4.5	PASS
§15.215			20 dB Bandwidth	4.6	PASS
§15.225 (a-d)		Annex B.6	Operation within the band 13.110-14.010 MHz	4.7	PASS
§15.225 (e)			Carrier Frequency stability	4.8	PASS

2.1 Operating voltages/frequencies used for testing

Clause (FCC 47 CFR Part 15)	Clause (RSS-Gen issue 4)	Clause (RSS-210 issue 9)	Test description	Operating conditions
§2.202	6.6		Occupied bandwidth	5 VDC via USB
§15.203			Antenna requirements	/
§15.205	Table 6		Restricted bands of operation	5 VDC via USB
§15.207	Table 3		Conducted emission	5 VDC via USB
§15.209	Table 4 and 5		Radiated emission – general requirements	5 VDC via USB
§15.215			20 dB Bandwidth	5 VDC via USB
§15.225 (a-d)		Annex B.6	Operation within the band 13.110-14.010 MHz	5 VDC via USB
§15.225 (e)			Carrier Frequency stability	4.25 VDC - 5.75 VDC

3 CONVERSION FACTORS AND ALL OTHER FORMULAS

Unit	Conversion unit	Formula of conversion
dBμV	dBμV/m	dBμV/m = dBμV + AF
μV/m	dBμV/m	dBμV/m = 20log(X(μV/m)/1μV)

Test distance stated in standard	Test distance of measurement	Conversion factor
3 m	3 m	/
10 m	3 m	20dB/decade (over 30 MHz)
		40dB/decade (under 30 MHz)

4 EMISSION TESTS

4.1 Occupied bandwidth (§2.202 of FCC 47 CRF 15 and clause 6.6 of RSS-Gen Issue 4)

Requirement §2.202
The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. In some cases, for example multichannel frequency-division systems, the percentage of 0.5 percent may lead to certain difficulties in the practical application of the definitions of occupied and necessary bandwidth; in such cases a different percentage may prove useful.

The occupied bandwidth according to ANSI C63.10 is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier. The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 MHz to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

The video bandwidth shall be at least three times greater than the resolution bandwidth.

Conclusion:
PASS; Occupied bandwidth is 2,26 kHz

Requirement RSS-Gen Issue 4
If not specified in the applicable RSS the occupied bandwidth is measured as the 99% emission bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.
The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.

C20171222

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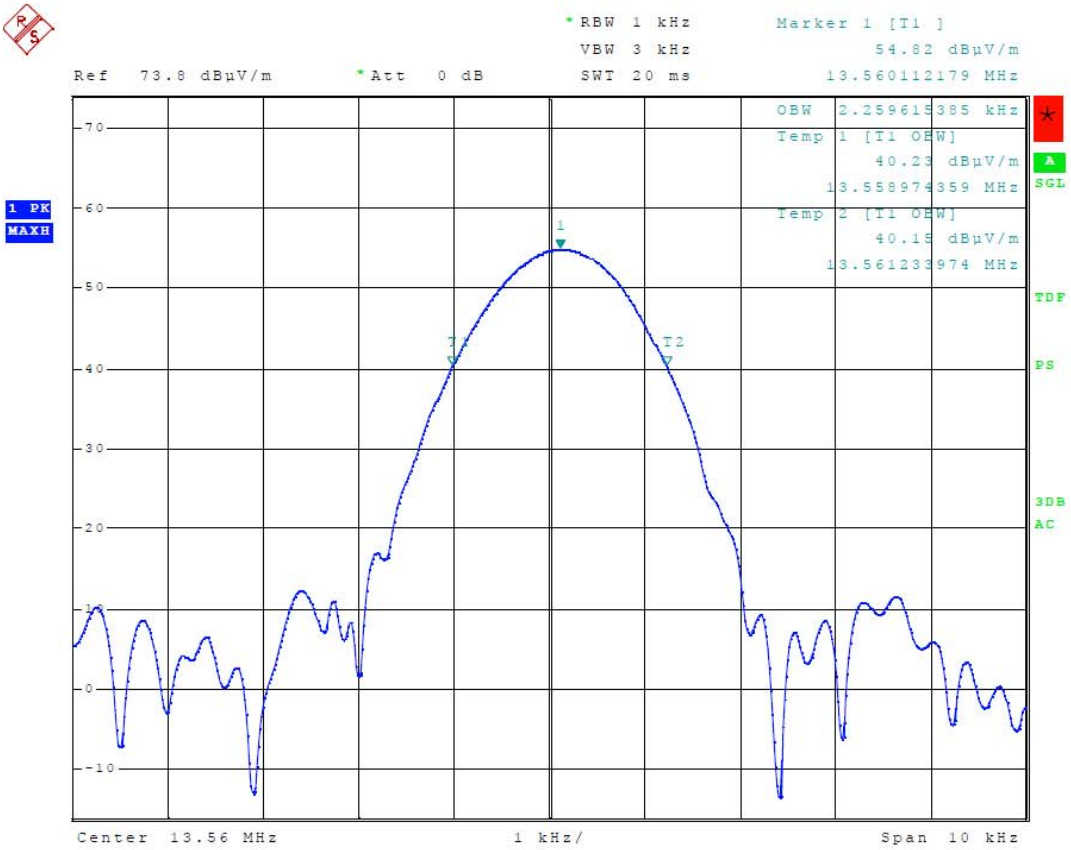
Meas Type	99% OCCUPIED BANDWIDTH
Equipment under Test	ST25R3911B-DISCO
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	Andrej Skof

Test Spec
Antenna: 340 deg, Sample: 20 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	73.800 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	10.000000 kHz	Ref Position	100.000 %
Start Frequency	13.555000 MHz	Level Range	90.000 dB
Stop Frequency	13.565000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	20.00 ms	Y-Axis	LOG



C20171222

02.Jun 17 23:40

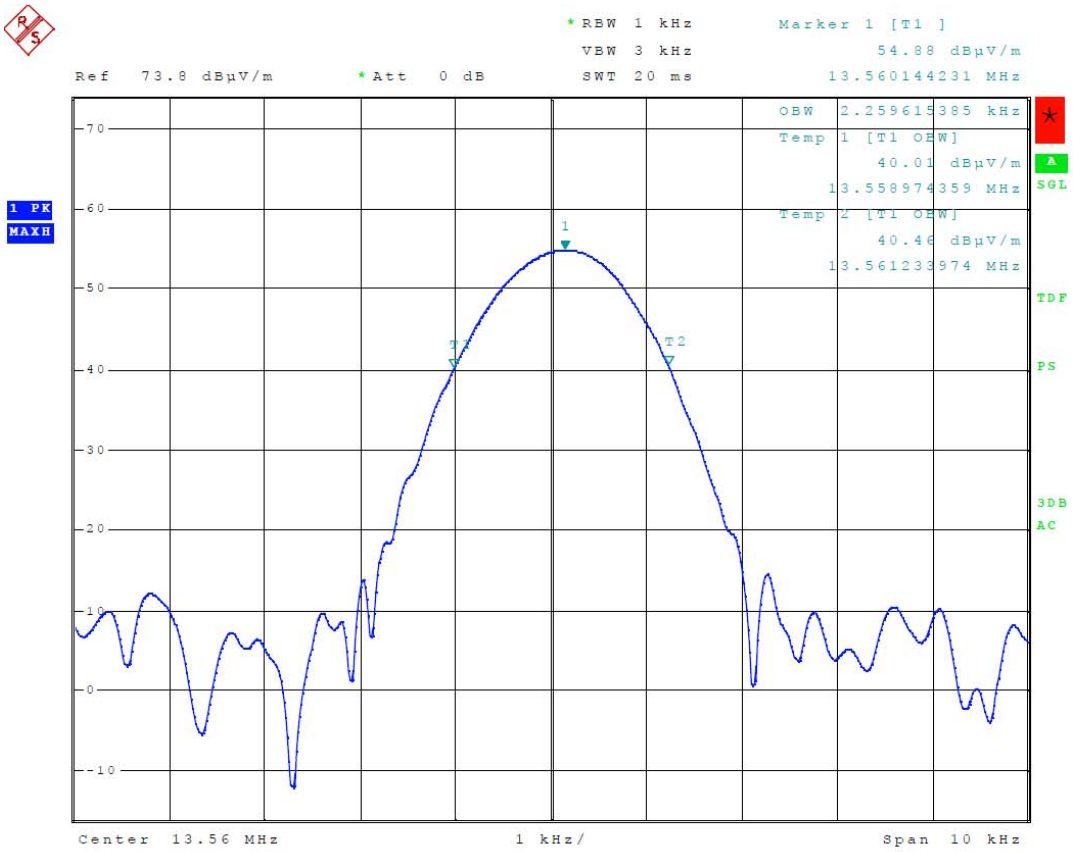
Meas Type	99% OCCUPIED BANDWIDTH
Equipment under Test	ST25R3911B-DISCO
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	Andrej Skof

Test Spec

Antenna: 340 deg, Sample: 20 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	73.800 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	10.000000 kHz	Ref Position	100.000 %
Start Frequency	13.555000 MHz	Level Range	90.000 dB
Stop Frequency	13.565000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	20.00 ms	Y-Axis	LOG



4.2 Antenna requirements (§15.203)

Requirement
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 sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Conclusion:
PASS; EUT has PCB antenna which is not detachable

4.3 Restricted bands of operation (§15.205 of FCC 47 CRF 15 and Table 6 of RSS-Gen Issue 4)

4.3.1 Requirement

Except as shown in paragraph (d) of §15.205 only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6

4.3.2 Test results

See Radiated emission results under 4.4 Radiated emission and 4.6 Spectrum mask.

4.4 Conducted emission measurement (§15.207 of FCC 47 CRF 15 and Table 3 of RSS-Gen Issue 4)

4.4.1 Requirement

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 – 56*	56 – 46*
0.5 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

The shown limits in table shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.
- Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as appropriate.

4.4.2 Test procedure

- As per clause 6.2 from ANSI C63.10-2013.
- The EUT is placed on a non-conductive 0.8 meters high table, 0.4 meters from the vertical conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). LISN provide 50 Ohm / 50 µH + 5 Ohm of coupling impedance for the measuring instrument.
- Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
- AC power lines of EUT are checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz is searched using PEAK, QUASI-PEAK and AVERAGE function of the receiver to determine compliance with Section 15.207 limits outside the transmitter's fundamental emission band. Bandwidth is set to 9 kHz.
- Measurement is repeated with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band.

4.4.3 Test results

Device passed the requirements stated

C20171221

Meas Type	CONDUCTED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz, READING
Operator	ANDREJ SKOF

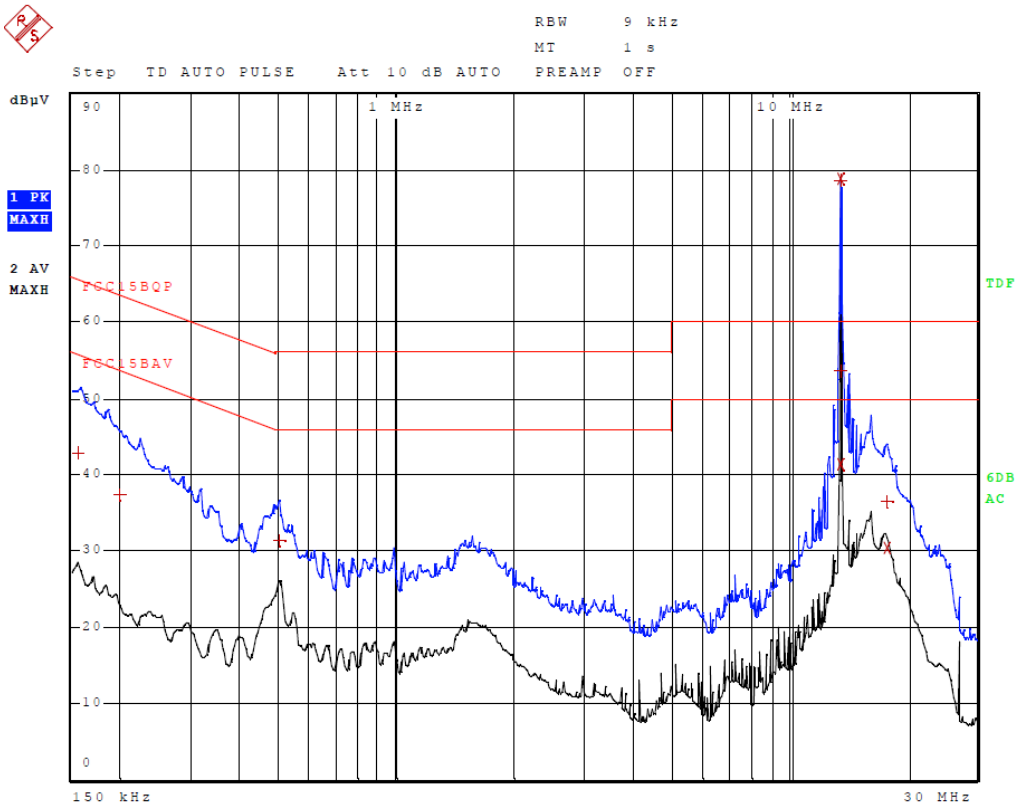
Test Spec

PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



C20171221

Meas Type CONDUCTED EMISSION
Equipment under Test X-NUCLEO-NFC05A1
Manufacturer STMicroelectronics Austria GmbH
OP Condition Uin: 120 V, 60 Hz, READING
Operator ANDREJ SKOF
Test Spec
PHASE

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	78.75	CISPR Averag	28.75
1	13.560000000 MHz	78.65	Quasi Peak	18.65
1	13.533000000 MHz	53.60	Quasi Peak	-6.40
2	13.548750000 MHz	41.22	CISPR Averag	-8.78
2	17.695500000 MHz	30.31	CISPR Averag	-19.69
1	156.750000000 kHz	42.82	Quasi Peak	-22.81
1	17.682000000 MHz	36.34	Quasi Peak	-23.66
1	503.250000000 kHz	31.22	Quasi Peak	-24.78
1	197.250000000 kHz	37.25	Quasi Peak	-26.48

C20171221

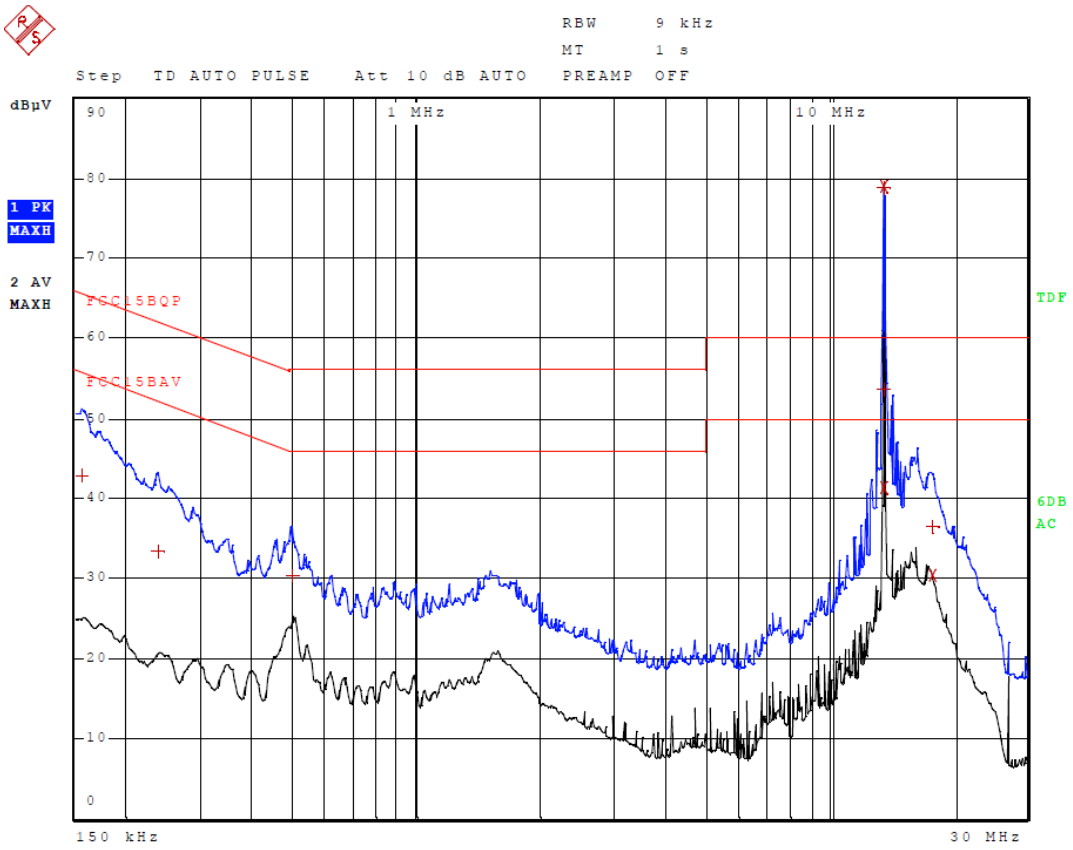
Meas Type	CONDUCTED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz, READING
Operator	ANDREJ SKOF
Test Spec	

NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



C20171221

Meas Type	CONDUCTED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz, READING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	78.85	CISPR Averag	28.85
1	13.560000000 MHz	78.76	Quasi Peak	18.76
1	13.533000000 MHz	53.69	Quasi Peak	-6.31
2	13.548750000 MHz	41.37	CISPR Averag	-8.63
2	17.704500000 MHz	30.38	CISPR Averag	-19.62
1	154.500000000 kHz	42.82	Quasi Peak	-22.93
1	17.702250000 MHz	36.38	Quasi Peak	-23.62
1	496.500000000 kHz	30.43	Quasi Peak	-25.62
1	235.500000000 kHz	33.29	Quasi Peak	-28.97

C20171221

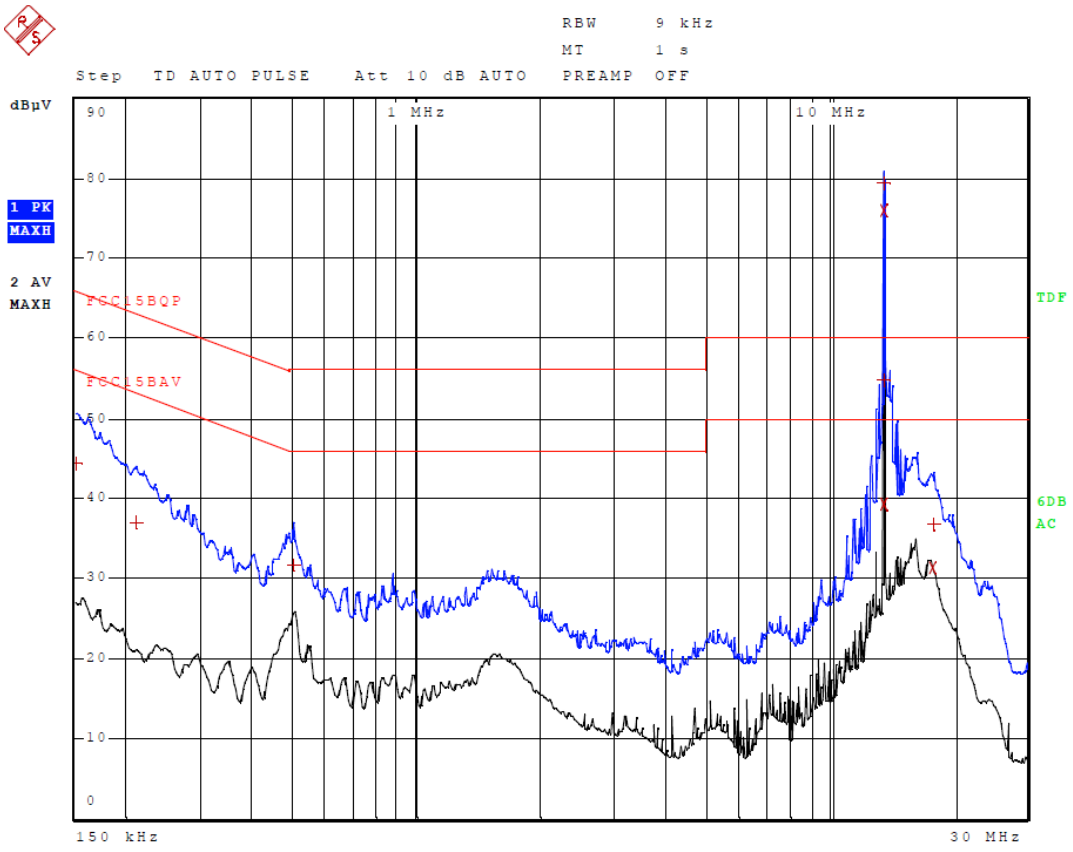
Meas Type	CONDUCTED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz, WAITING
Operator	ANDREJ SKOF
Test Spec	

PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



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Meas Type	CONDUCTED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz, WAITING
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	75.97	CISPR Averag	25.97
1	13.560000000 MHz	79.25	Quasi Peak	19.25
1	13.548750000 MHz	54.79	Quasi Peak	-5.21
2	13.548750000 MHz	39.30	CISPR Averag	-10.70
2	17.704500000 MHz	31.38	CISPR Averag	-18.62
1	150.000000000 kHz	44.41	Quasi Peak	-21.59
1	17.796750000 MHz	36.78	Quasi Peak	-23.22
1	501.000000000 kHz	31.63	Quasi Peak	-24.37
1	208.500000000 kHz	37.00	Quasi Peak	-26.27

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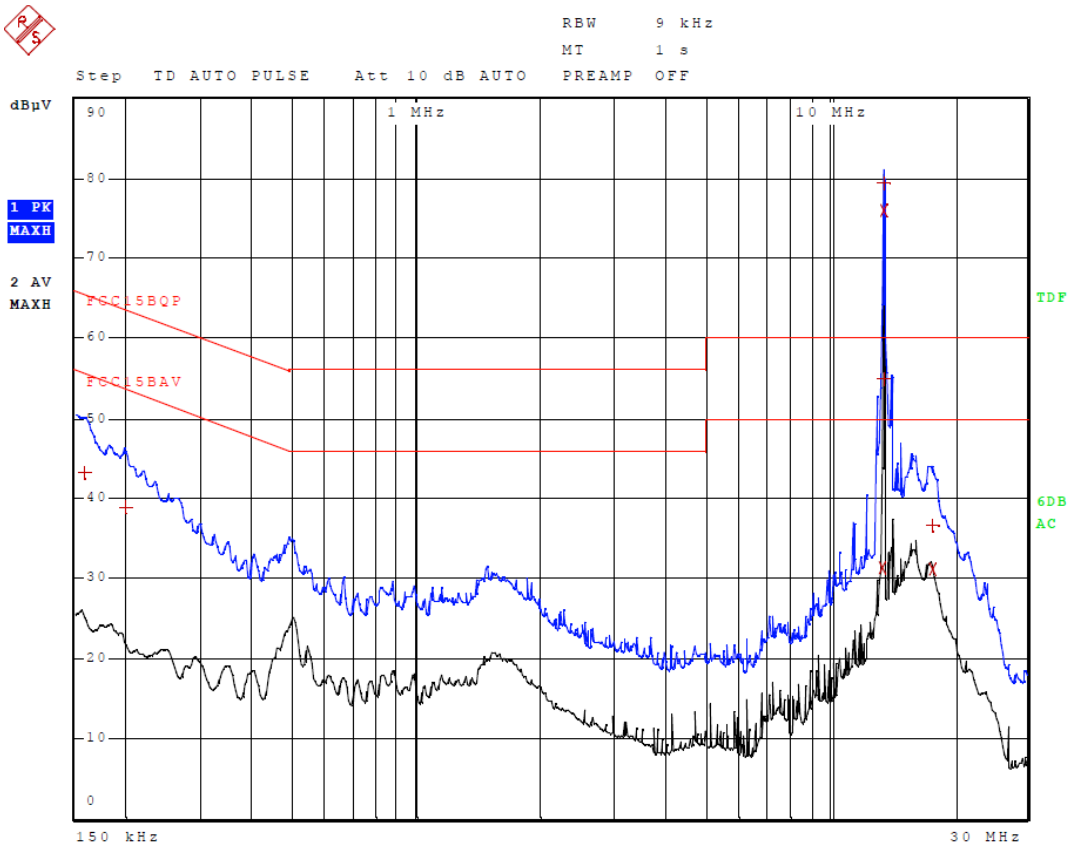
Operator	ANDREJ SKOF
Test Spec	

NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



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Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz, WAITING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	76.00	CISPR Averag	26.00
1	13.560000000 MHz	79.38	Quasi Peak	19.38
1	13.548750000 MHz	54.91	Quasi Peak	-5.09
2	13.348500000 MHz	31.24	CISPR Averag	-18.76
2	17.704500000 MHz	31.03	CISPR Averag	-18.97
1	159.000000000 kHz	43.12	Quasi Peak	-22.39
1	17.720250000 MHz	36.64	Quasi Peak	-23.36
1	197.250000000 kHz	38.77	Quasi Peak	-24.95

Measurement with a dummy load in lieu of the antenna:

ROHDE&SCHWARZ

C20171221

16.May 17 10:31

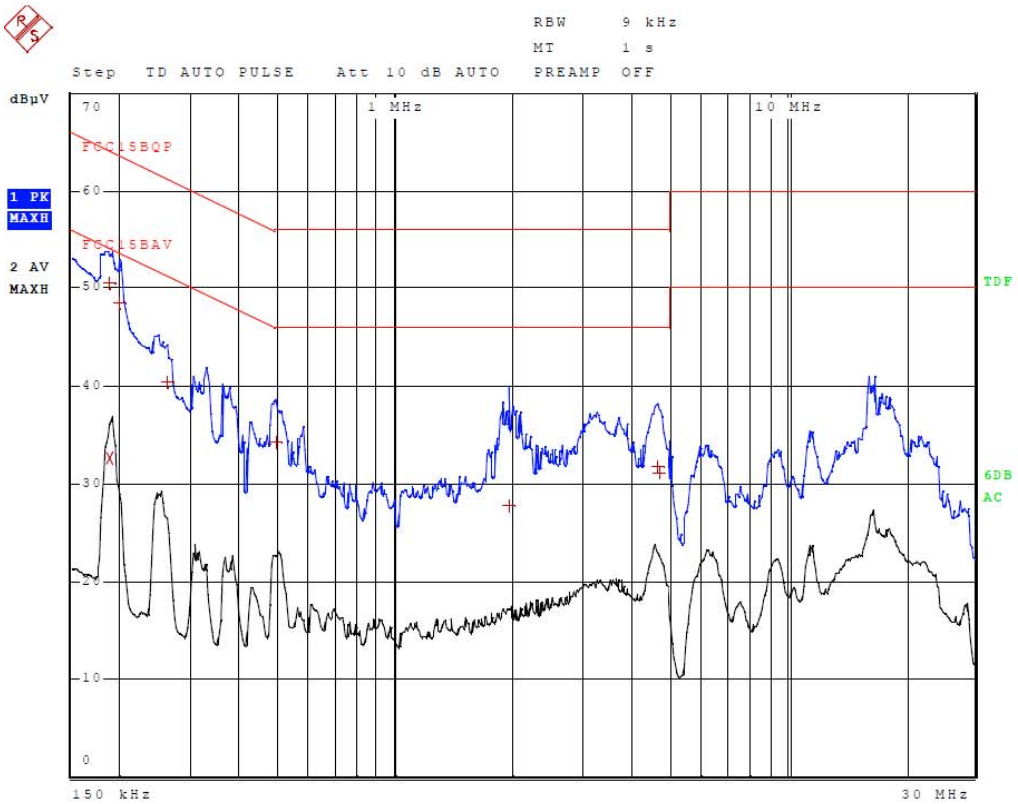
Meas Type	CONDUCTED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz; with Dummy load
Operator	ANDREJ SKOF

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	20 ms	Auto	0 dB	INPUT2



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Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz; with Dummy load
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time:	1 s
Margin:	18 dB
Subranges:	8

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	188.250000000 kHz	50.58	Quasi Peak	-13.53
1	197.250000000 kHz	48.51	Quasi Peak	-15.21
1	260.250000000 kHz	40.37	Quasi Peak	-21.05
2	188.250000000 kHz	32.55	CISPR Averag	-21.57
1	494.250000000 kHz	34.26	Quasi Peak	-21.84
1	4.665750000 MHz	31.67	Quasi Peak	-24.33
1	4.715250000 MHz	31.12	Quasi Peak	-24.88
1	1.943250000 MHz	27.70	Quasi Peak	-28.30

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C20171221

16.May 17 10:24

Meas Type	CONDUCTED EMISSION
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OP Condition	Uin: 120 V, 60 Hz; with Dummy load
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
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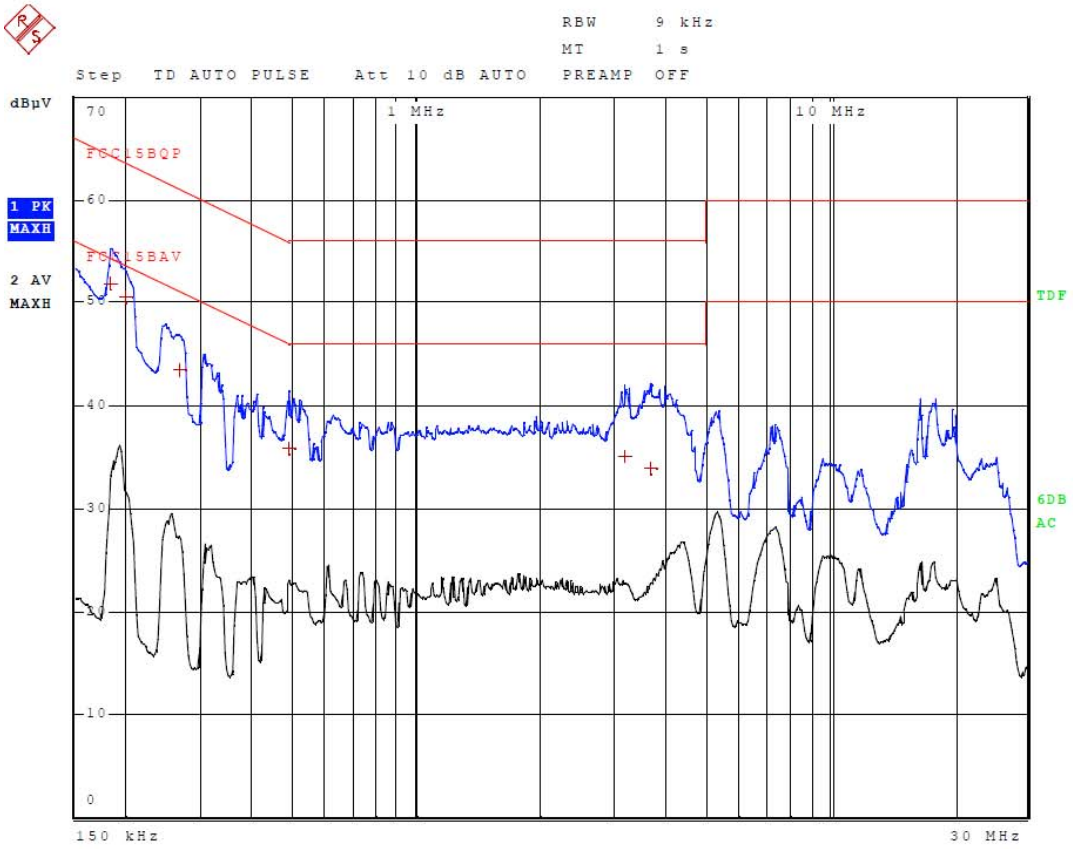
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	20 ms	Auto	0 dB	INPUT2



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Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	Uin: 120 V, 60 Hz; with Dummy load
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Final Measurement

Meas Time:	1 s
Margin:	15 dB
Subranges:	6

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	181.500000000 kHz	51.82	Quasi Peak	-12.60
1	197.250000000 kHz	50.49	Quasi Peak	-13.23
1	264.750000000 kHz	43.39	Quasi Peak	-17.89
1	489.750000000 kHz	35.75	Quasi Peak	-20.42
1	3.192000000 MHz	35.00	Quasi Peak	-21.00
1	3.696000000 MHz	33.93	Quasi Peak	-22.07

4.5 Radiated emission measurement (§15.209 of FCC 47 CRF 15 and Tables 4 and 5 of RSS-Gen Issue 4)

4.5.1 Requirement

Frequency Range (MHz)	Limits (dBµV/m)	Test distance (m)
0.009 to 0.490	20*log(2400/F(kHz))	300
0.490 to 1.705	20*log(24000/F(kHz))	30
1.705 to 30.0	30	30
30 to 88	40**	3
88 to 216	43.5**	3
216 to 960	46**	3
Above 960	54	3

** Except as provided in paragraph below, fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications

4.5.2 Test procedure

Measurements from 9 kHz to 30 MHz

1. As per clause 6.4 from ANSI C63.10-2013
2. Radiated emission in the frequency range 9 kHz to 30 MHz are measured Active loop Antenna.
3. First preliminary measurements were performed in Semi-anechoic chamber at a distance of 3 m using active loop antenna.
4. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table and antenna was rotated 360 degrees to determine the position of the highest radiation.
5. Final measurements were done at a distance of 10 m at Open Area Test Site due to low emissions measured during preliminary measurements acc. to the clauses from Part 15, Sections 15.31(d) and 15.31(f)(2). Test results were extrapolated by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Measurements from 30 MHz to 1 GHz

6. As per clause 6.5 from ANSI C63.10-2013
7. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
8. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
9. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
10. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
11. The test-receiver system was set to PEAK and QUAS-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
12. The highest points would be re-tested one by one using the quasi-peak method.

4.5.3 Test results

Device passed the requirements stated
Preliminary measurements at 3 m:

ROHDE&SCHWARZ

C20171221

03.May 17 13:00

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

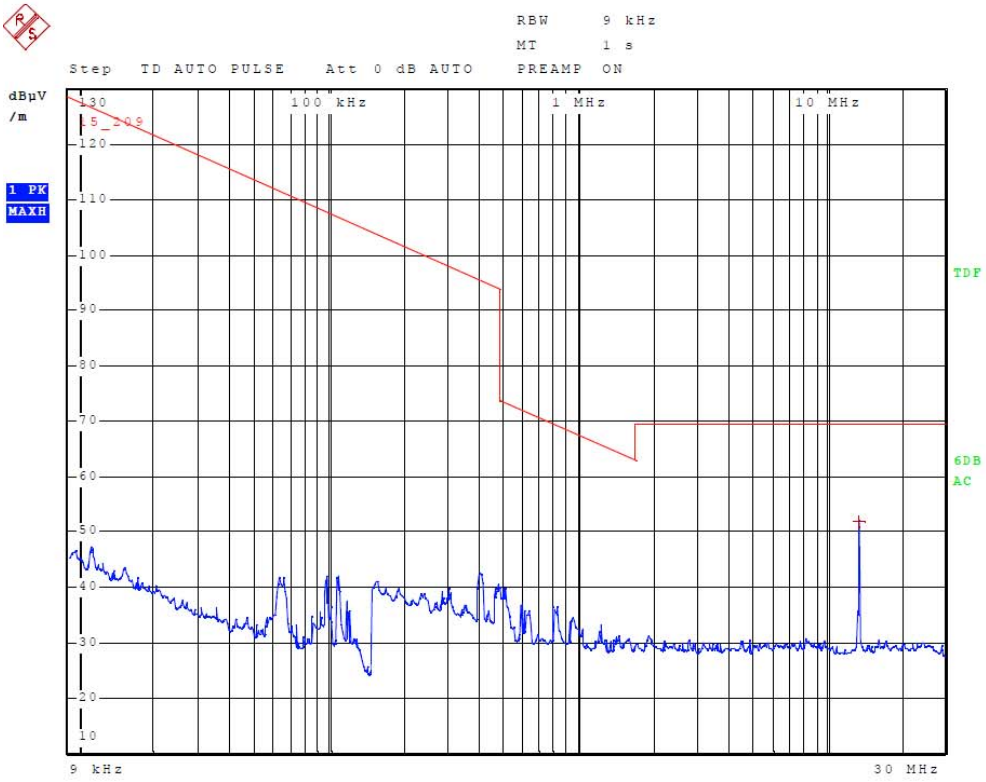
Test Spec

Antenna: 350 deg, Sample: 10 deg

Time Domain Scan (2 Ranges)

Scan Start: 9 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
9.000000 kHz	149.950000 kHz	50.00 Hz	200.00 Hz	300 ms	Auto	20 dB	INPUT2
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20171221

03.May 17 13:00

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

Test Spec

Antenna: 350 deg, Sample: 10 deg

Final Measurement

Meas Time:	1 s
Margin:	20 dB
Subranges:	1

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	13.560000000 MHz	51.63	Quasi Peak	-17.87

ROHDE&SCHWARZ

C20171221

03.May 17 13:02

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

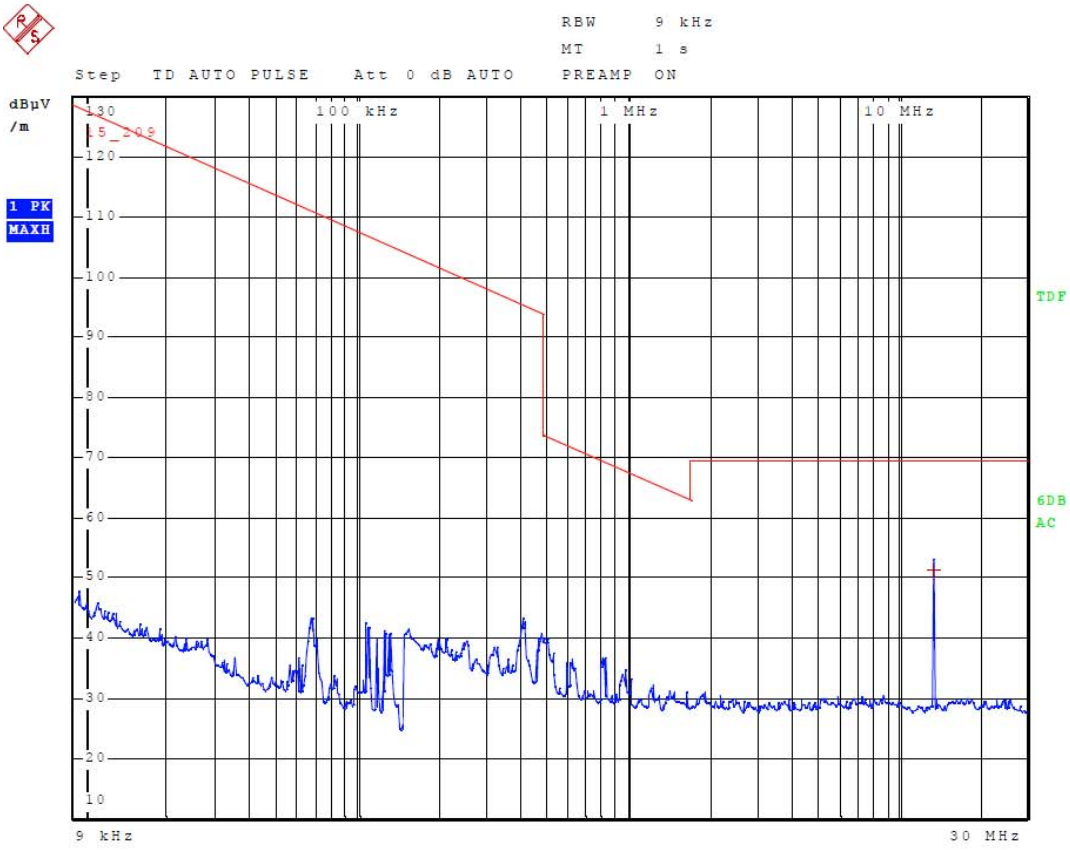
Test Spec

Antenna: 350 deg, Sample: 10 deg

Time Domain Scan (2 Ranges)

Scan Start: 9 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
9.000000 kHz	149.950000 kHz	50.00 Hz	200.00 Hz	300 ms	Auto	20 dB	INPUT2
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20171221

03.May 17 13:02

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

Test Spec

Antenna: 350 deg, Sample: 10 deg

Final Measurement

Meas Time:	1 s
Margin:	20 dB
Subranges:	1

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	13.560000000 MHz	51.28	Quasi Peak	-18.22

Final measurement at 10 m on OATS

Results with measuring distance of 10 m				
Mode	**Frequency (MHz)**	**Measured value (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
Reading	13.56	33.93	104.00	70.07
Waiting	13.56	33.86	104.00	70.14

Calculated value from 10 m to 30 m						
Mode	**Frequency (MHz)**	**Measured value at 10 m (dBµV/m)**	**Correction factor from 10 m to 30 m (dB)**	**Calculated value at 30 m (dBµV/m)**	**Limit at 30 m (dBµV/m)**	**Margin (dB)**
Reading	13.56	33.93	20	13.93	84.00	70.07
Waiting	13.56	33.86	20	13.86	84.00	70.14

NOTE: Antenna factor and cable loss are included in measurement correction.

Final measurements from 30 MHz to 1 GHz

C20171221

26.Apr 17 06:34

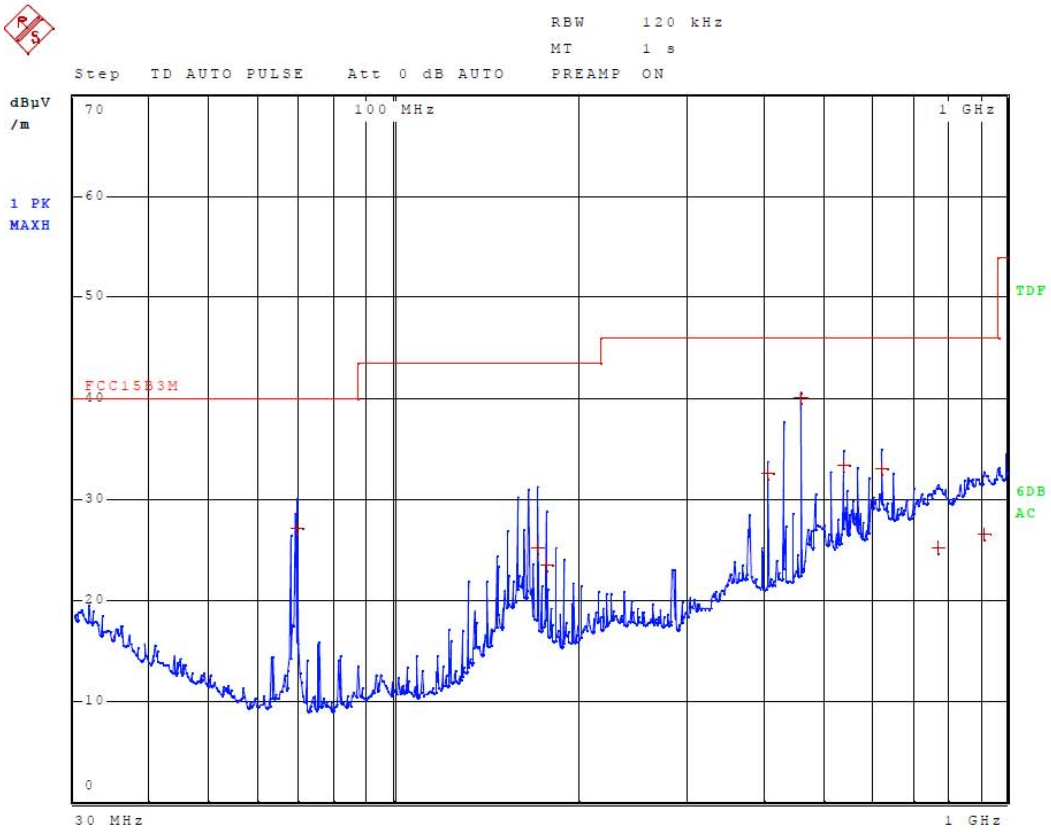
Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF
Test Spec	

VERTICAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B-3M

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	5 ms	Auto	20 dB	INPUT2



C20171221

26.Apr 17 06:34

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

Test Spec
VERTICAL 100 cm, 0 deg

Final Measurement

Meas Time: 1 s
Margin: 15 dB
Subranges: 9

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	461.040000000 MHz	40.08	Quasi Peak	-5.92
1	542.400000000 MHz	33.27	Quasi Peak	-12.73
1	69.150000000 MHz	27.10	Quasi Peak	-12.90
1	623.760000000 MHz	33.08	Quasi Peak	-12.92
1	406.800000000 MHz	32.60	Quasi Peak	-13.40
1	171.270000000 MHz	25.27	Quasi Peak	-18.23
1	921.240000000 MHz	26.60	Quasi Peak	-19.40
1	177.330000000 MHz	23.50	Quasi Peak	-20.00
1	773.310000000 MHz	25.28	Quasi Peak	-20.72

C20171221

26.Apr 17 06:41

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

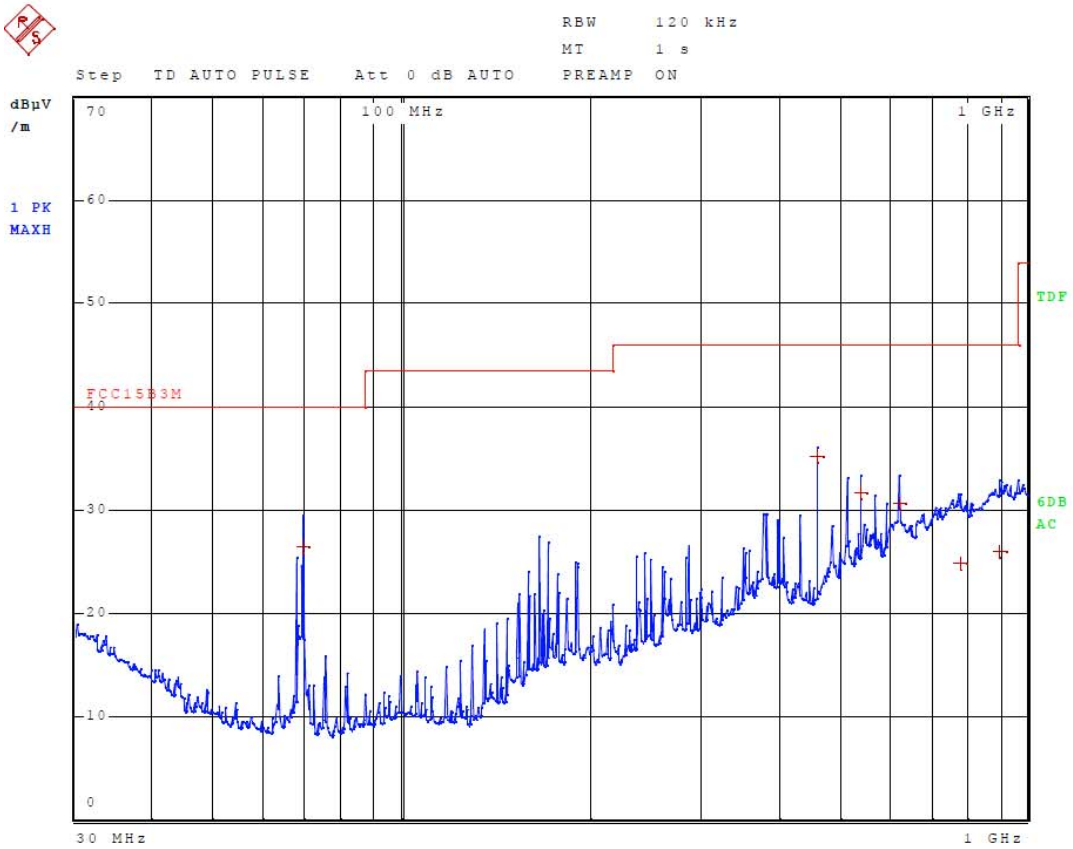
Test Spec

HORIZONTAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start:	30 MHz
Scan Stop:	1 GHz
Detector:	Trace 1: MAX PEAK
Transducer:	3142B-3M

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	5 ms	Auto	20 dB	INPUT2



C20171221

26.Apr 17 06:41

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

Test Spec

HORIZONTAL 100 cm, 0 deg

Final Measurement

Meas Time:	1 s
Margin:	15 dB
Subranges:	6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	461.040000000 MHz	35.23	Quasi Peak	-10.77
1	69.180000000 MHz	26.46	Quasi Peak	-13.54
1	542.400000000 MHz	31.64	Quasi Peak	-14.36
1	623.760000000 MHz	30.61	Quasi Peak	-15.39
1	905.010000000 MHz	25.90	Quasi Peak	-20.10
1	781.020000000 MHz	24.83	Quasi Peak	-21.17

C20171221

26.Apr 17 06:45

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

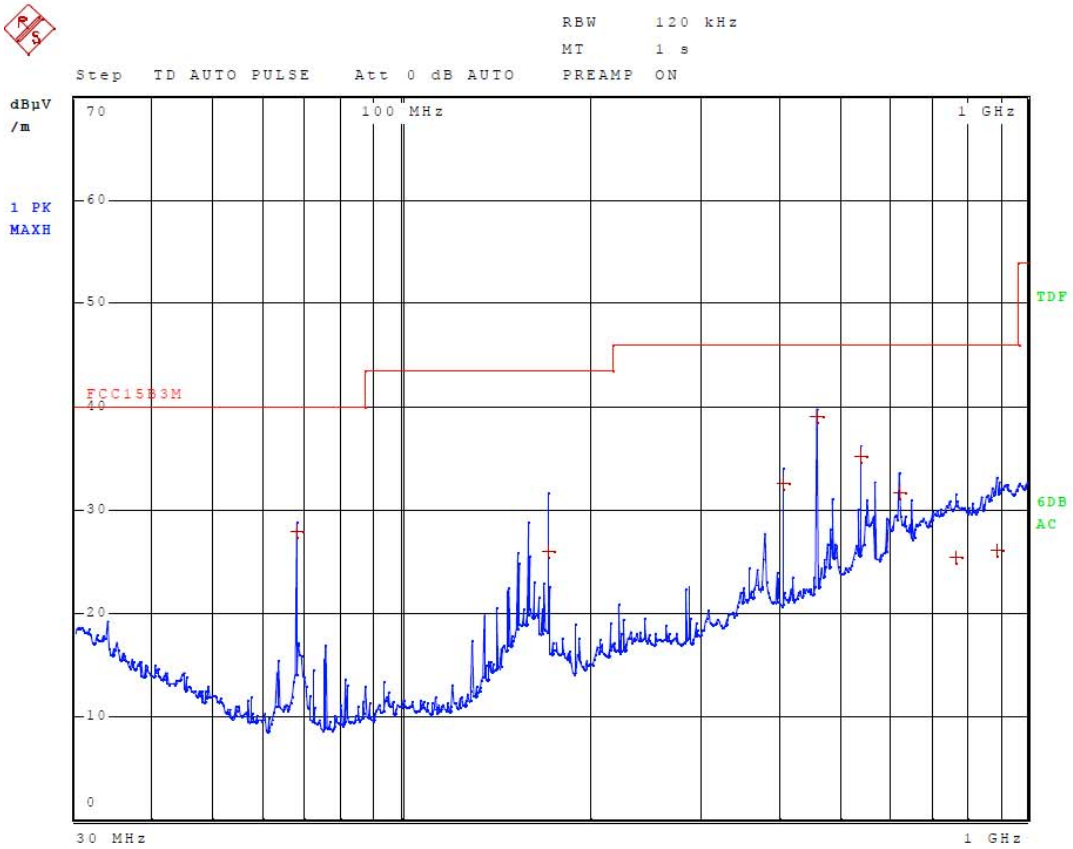
Test Spec

VERTICAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start:	30 MHz
Scan Stop:	1 GHz
Detector:	Trace 1: MAX PEAK
Transducer:	3142B-3M

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	5 ms	Auto	20 dB	INPUT2



C20171221

26.Apr 17 06:45

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

Test Spec
VERTICAL 100 cm, 0 deg

Final Measurement

Meas Time:	1 s
Margin:	15 dB
Subranges:	8

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	461.040000000 MHz	39.09	Quasi Peak	-6.91
1	542.400000000 MHz	35.25	Quasi Peak	-10.75
1	67.800000000 MHz	27.85	Quasi Peak	-12.15
1	406.800000000 MHz	32.65	Quasi Peak	-13.35
1	623.760000000 MHz	31.67	Quasi Peak	-14.33
1	171.510000000 MHz	25.89	Quasi Peak	-17.61
1	893.160000000 MHz	26.03	Quasi Peak	-19.97
1	767.970000000 MHz	25.31	Quasi Peak	-20.69

C20171221

26.Apr 17 06:43

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

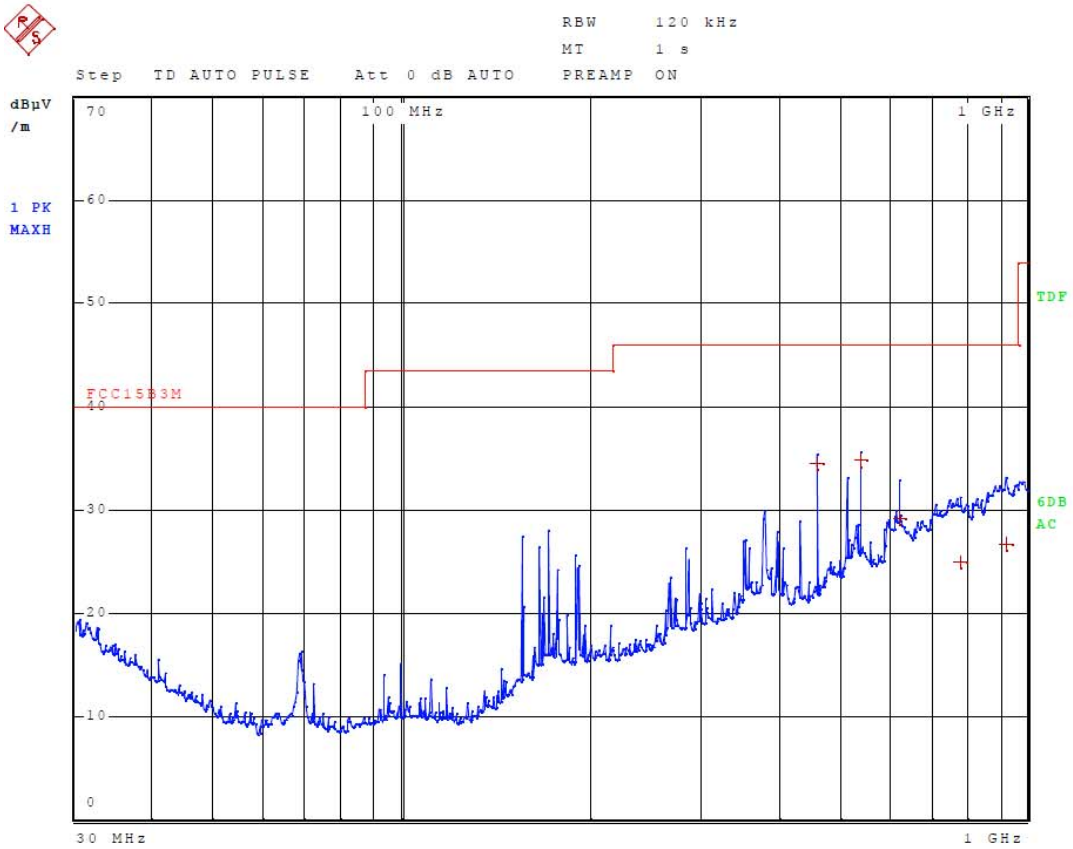
Test Spec

HORIZONTAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B-3M

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	5 ms	Auto	20 dB	INPUT2



C20171221

26.Apr 17 06:43

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

Test Spec

HORIZONTAL 100 cm, 0 deg

Final Measurement

Meas Time:	1 s
Margin:	15 dB
Subranges:	5

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	542.400000000 MHz	34.77	Quasi Peak	-11.23
1	461.040000000 MHz	34.51	Quasi Peak	-11.49
1	623.790000000 MHz	29.20	Quasi Peak	-16.80
1	922.890000000 MHz	26.64	Quasi Peak	-19.36
1	780.360000000 MHz	24.89	Quasi Peak	-21.11

Worst case measurement:

C20171221

26.Apr 17 07:14

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

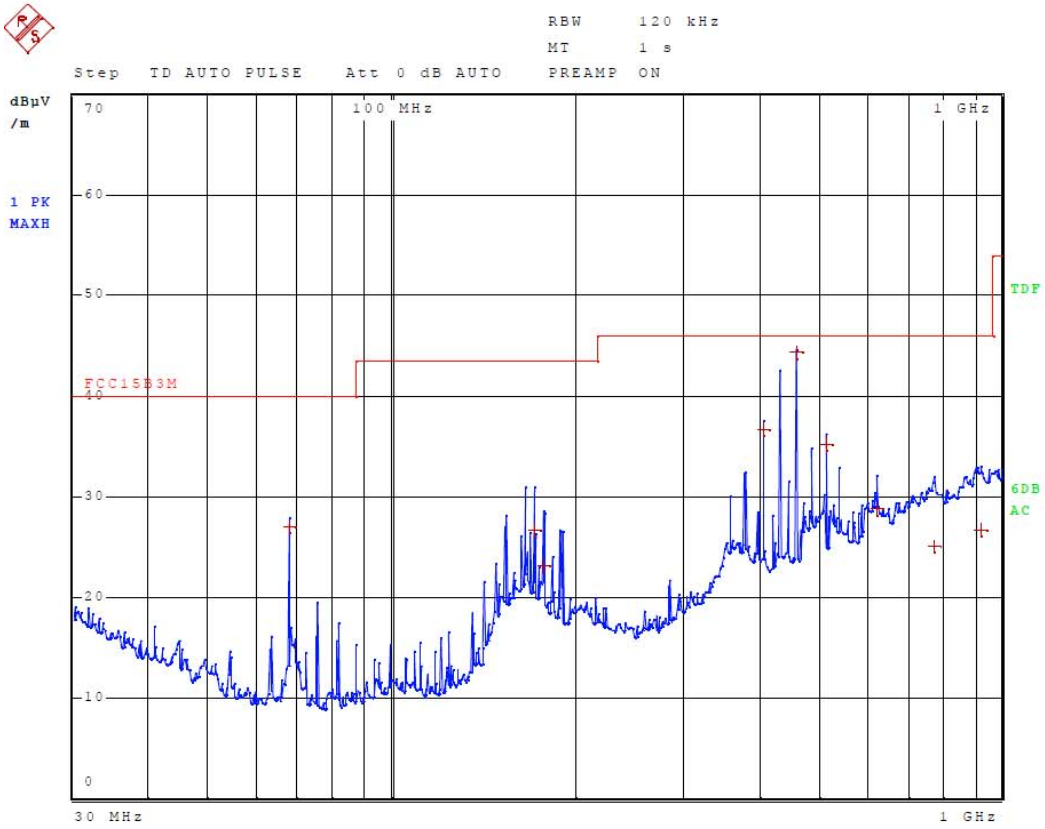
Test Spec

VERTICAL 100 cm, 170 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B-3M

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	5 ms	Auto	20 dB	INPUT2



C20171221

26.Apr 17 07:14

Meas Type	RADIATED EMISSION
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

Test Spec

VERTICAL 100 cm, 170 deg

Final Measurement

Meas Time:	1 s
Margin:	18 dB
Subranges:	9

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	461.040000000 MHz	44.34	Quasi Peak	-1.66
1	406.800000000 MHz	36.69	Quasi Peak	-9.31
1	515.280000000 MHz	35.16	Quasi Peak	-10.84
1	67.800000000 MHz	27.06	Quasi Peak	-12.94
1	171.480000000 MHz	26.64	Quasi Peak	-16.86
1	623.790000000 MHz	28.79	Quasi Peak	-17.21
1	926.460000000 MHz	26.64	Quasi Peak	-19.36
1	177.600000000 MHz	23.18	Quasi Peak	-20.32
1	778.410000000 MHz	25.05	Quasi Peak	-20.95

4.6 Bandwidth of the emission (§15.215)

4.6.1 Requirements

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 FCC Part 15, 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.

4.6.2 Test procedure

1. As per Clause 6.9.2 from ANSI C63.10-2013
2. The EUT is placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
3. The EUT is set 3 m away from the interference-receiving antenna.
4. Resolution bandwidth is set to a value greater than 5% of the allowed bandwidth.

4.6.3 Test results

Device passed the requirements stated

ROHDE&SCHWARZ

C20171221

03.May 17 13:24

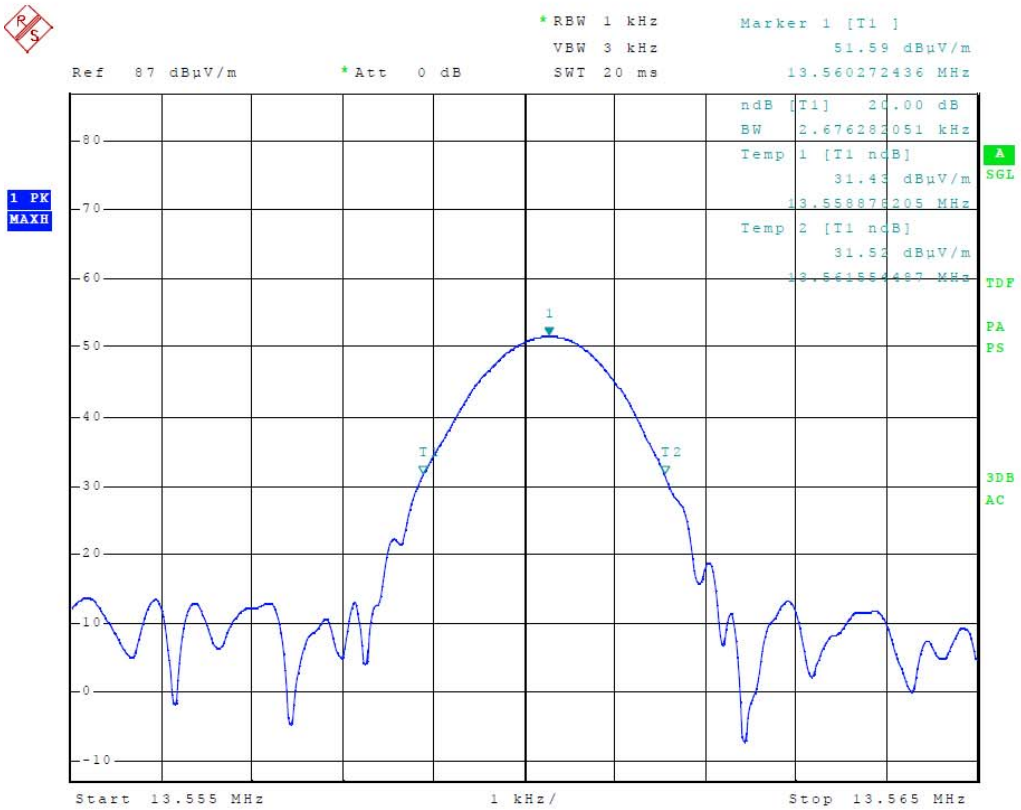
Meas Type	OCCUPIED BANDWIDTH
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

Test Spec

Antenna: 350 deg, Sample: 10 deg

Sweep Settings **Screen A**

Center Frequency	13.560000 MHz	Ref Level	87.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	10.000000 kHz	Ref Position	100.000 %
Start Frequency	13.555000 MHz	Level Range	100.000 dB
Stop Frequency	13.565000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	20.00 ms	Y-Axis	LOG



ROHDE&SCHWARZ

C20171221

03.May 17 13:23

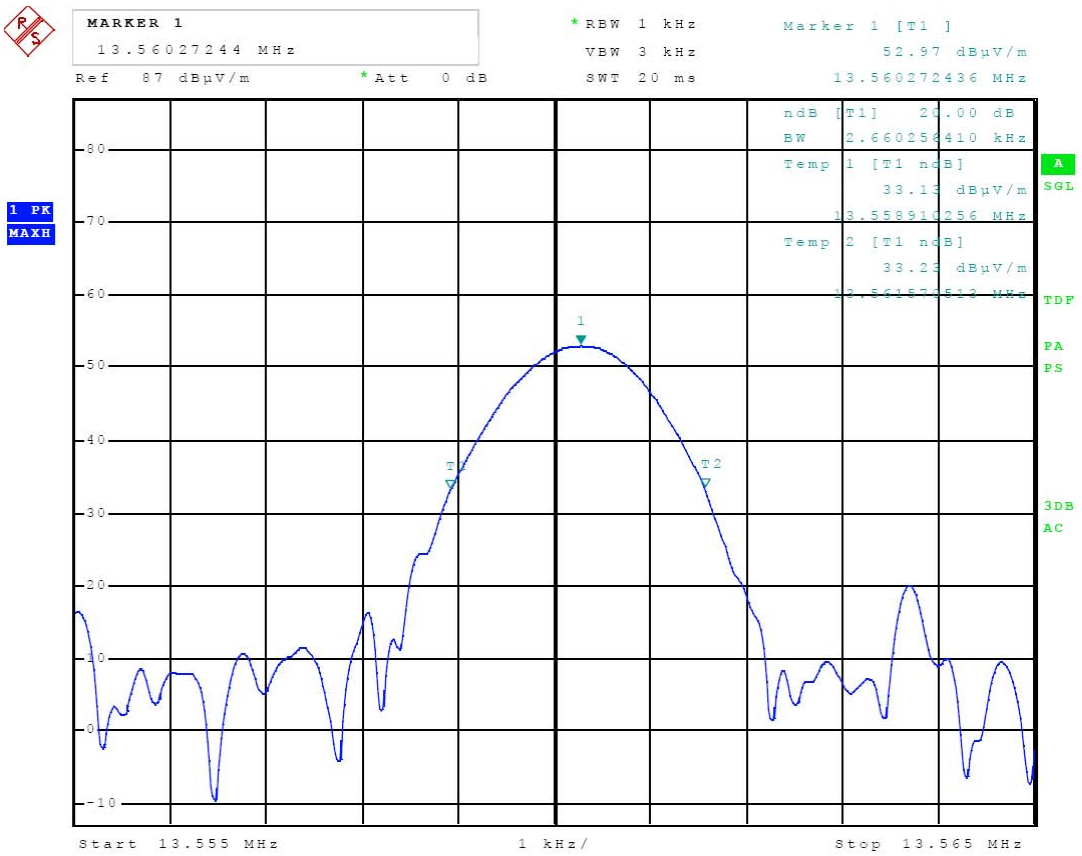
Meas Type	OCCUPIED BANDWIDTH
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

Test Spec

Antenna: 350 deg, Sample: 10 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	87.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	10.000000 kHz	Ref Position	100.000 %
Start Frequency	13.555000 MHz	Level Range	100.000 dB
Stop Frequency	13.565000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	20.00 ms	Y-Axis	LOG



Frequency (MHz)	Permitted frequency band (MHz)	20 dB bandwidth (kHz)	PASS/FAIL
13.56	13.110 – 14.010	2.68	PASS

4.7 Spectrum mask (§15.225 (a)-(d) of FCC 47 CRF 15 and Annex B.6 of RSS-210 issue 9)

4.7.1 Requirements

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters. The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

4.7.2 Test procedure

1. As per clause 6.4 from ANSI C63.10-2013
2. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
3. The EUT was set 3 m away from the interference-receiving antenna.
4. Frequencies with maximum emission were retested on OATS.
5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

4.7.3 Test results

Device passed the requirements stated

ROHDE&SCHWARZ

C20171221

03.May 17 13:30

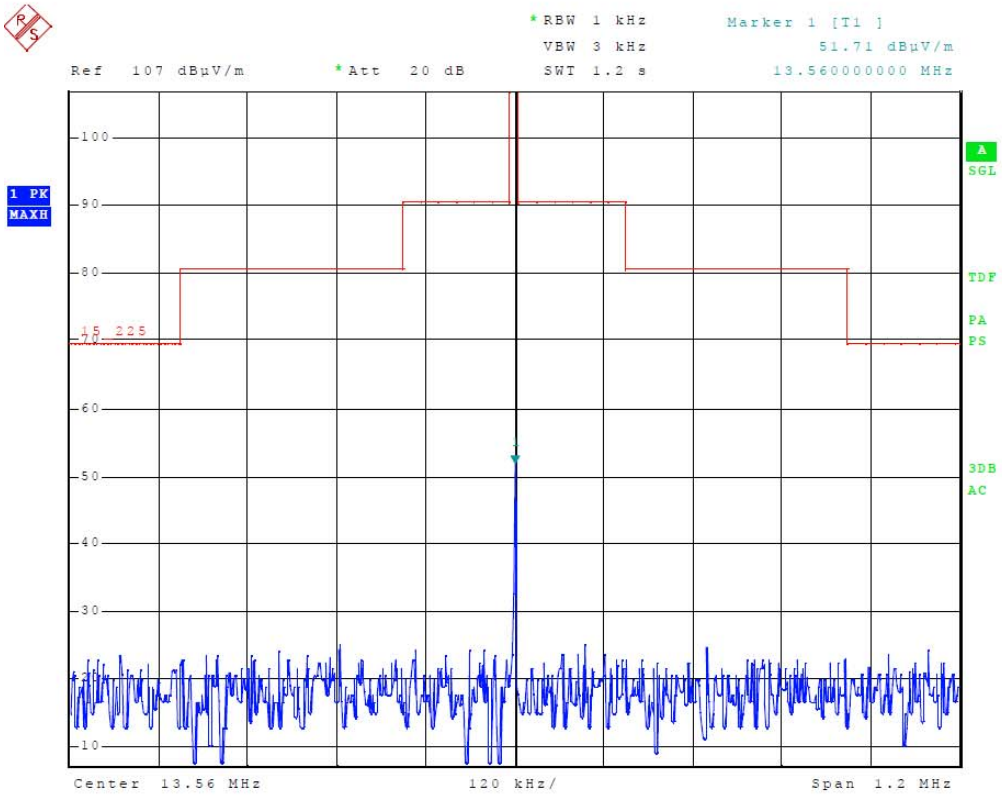
Meas Type	SPECTRUM MASK
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	READING
Operator	ANDREJ SKOF

Test Spec

Antenna: 350 deg, Sample: 10 deg

Sweep Settings **Screen A**

Center Frequency	13.560000 MHz	Ref Level	107.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	1.200000 MHz	Ref Position	100.000 %
Start Frequency	12.960000 MHz	Level Range	100.000 dB
Stop Frequency	14.160000 MHz	RF Att	20.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	1.20 s	Y-Axis	LOG



ROHDE&SCHWARZ

C20171221

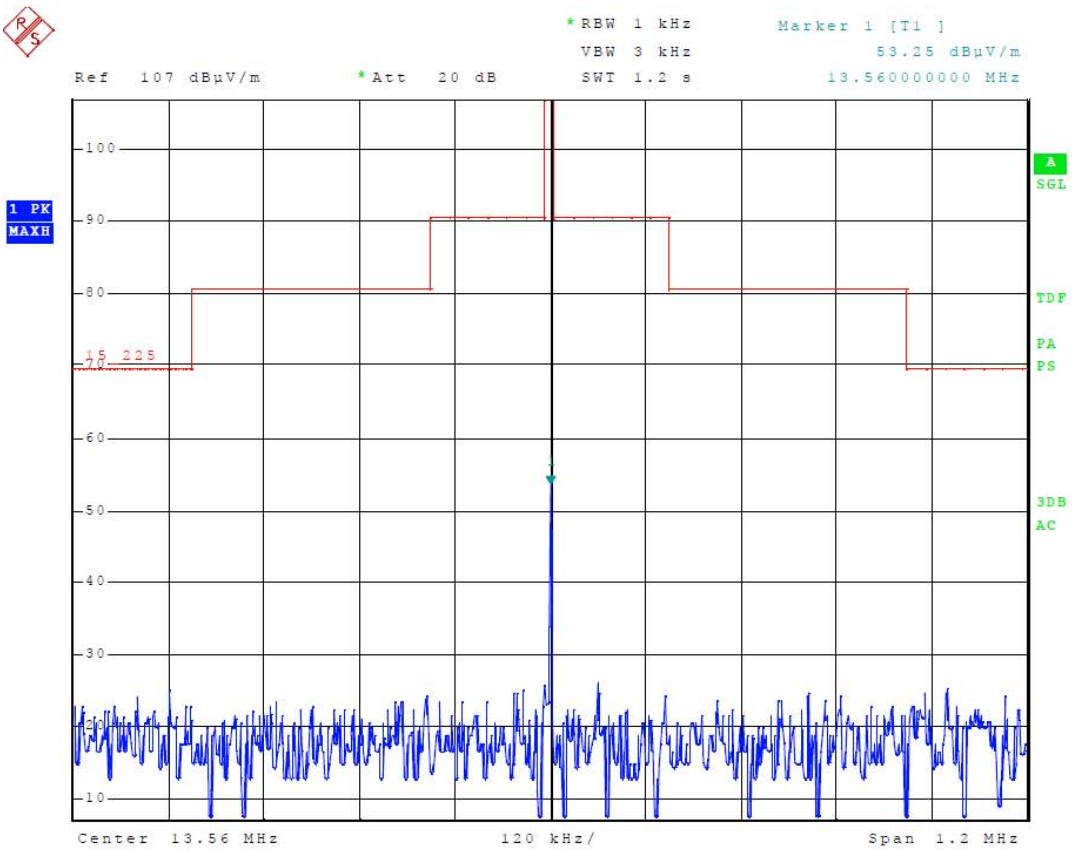
03.May 17 13:31

Meas Type	SPECTRUM MASK
Equipment under Test	X-NUCLEO-NFC05A1
Manufacturer	STMicroelectronics Austria GmbH
OP Condition	WAITING
Operator	ANDREJ SKOF

Test Spec
Antenna: 350 deg, Sample: 10 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	107.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	1.200000 MHz	Ref Position	100.000 %
Start Frequency	12.960000 MHz	Level Range	100.000 dB
Stop Frequency	14.160000 MHz	RF Att	20.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	1.20 s	Y-Axis	LOG



4.8 Frequency tolerance of the carrier signal (§15.225 (e))

4.8.1 Requirement

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.8.2 Test procedure

1. As per clause 6.8 from ANSI C63.10-2013.
2. The frequency tolerance of the carrier signal is measured over a temperature variation of -20 °C to +50 °C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 °C.
3. If the EUT provides an antenna connector the spectrum analyzer is connected to this port. In cases where the EUT does not provide an antenna connector a test fixture is used.
4. The peak detector of the spectrum analyzer is selected and the resolution bandwidth as well as the video bandwidth is set to values appropriate to the shape of the spectrum of the EUT.
5. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized.

4.8.3 Test results

Device passed the requirements stated

Temperature (°C)	Supply voltage (V DC)	Minutes after switch on	Measured Frequency (MHz)	Allowed tolerance (kHz)	Measured tolerance (kHz)	RESULT
50	5,00	0	13,560224700	Fref±1.356 kHz	-0,054	PASS
50	5,00	2	13,560222700	Fref±1.356 kHz	-0,056	PASS
50	5,00	5	13,560224700	Fref±1.356 kHz	-0,054	PASS
50	5,00	10	13,560224700	Fref±1.356 kHz	-0,054	PASS
40	5,00	0	13,560233700	Fref±1.356 kHz	-0,045	PASS
40	5,00	2	13,560227700	Fref±1.356 kHz	-0,051	PASS
40	5,00	5	13,560228700	Fref±1.356 kHz	-0,050	PASS
40	5,00	10	13,560229700	Fref±1.356 kHz	-0,049	PASS
30	5,00	0	13,560258600	Fref±1.356 kHz	-0,020	PASS
30	5,00	2	13,560246700	Fref±1.356 kHz	-0,032	PASS
30	5,00	5	13,560245700	Fref±1.356 kHz	-0,033	PASS
30	5,00	10	13,560247700	Fref±1.356 kHz	-0,031	PASS
20	4,25	0	13,560286700	Fref±1.356 kHz	0,008	PASS
20	4,25	2	13,560276700	Fref±1.356 kHz	-0,002	PASS
20	4,25	5	13,560274700	Fref±1.356 kHz	-0,004	PASS
20	4,25	10	13,560273700	Fref±1.356 kHz	-0,005	PASS
20	5,00	0	13,560297700	Fref±1.356 kHz	0,019	PASS
20	5,00	2	13,560280700	Fref±1.356 kHz	0,002	PASS
20	5,00	5	13,560278700	Fref±1.356 kHz	0,000	PASS
20	5,00	**10**	13,560278700	**Fref**	0,000	PASS
20	5,75	0	13,560305700	Fref±1.356 kHz	0,027	PASS
20	5,75	2	13,560282700	Fref±1.356 kHz	0,004	PASS
20	5,75	5	13,560281700	Fref±1.356 kHz	0,003	PASS
20	5,75	10	13,560282700	Fref±1.356 kHz	0,004	PASS
10	5,00	0	13,560331731	Fref±1.356 kHz	0,053	PASS
10	5,00	2	13,560329327	Fref±1.356 kHz	0,051	PASS
10	5,00	5	13,560315705	Fref±1.356 kHz	0,037	PASS
10	5,00	10	13,560321314	Fref±1.356 kHz	0,043	PASS
0	5,00	0	13,560346955	Fref±1.356 kHz	0,068	PASS
0	5,00	2	13,560344551	Fref±1.356 kHz	0,066	PASS
0	5,00	5	13,560346955	Fref±1.356 kHz	0,068	PASS
0	5,00	10	13,560342147	Fref±1.356 kHz	0,063	PASS
-10	5,00	0	13,560345353	Fref±1.356 kHz	0,067	PASS
-10	5,00	2	13,560343750	Fref±1.356 kHz	0,065	PASS
-10	5,00	5	13,560348558	Fref±1.356 kHz	0,070	PASS
-10	5,00	10	13,560350160	Fref±1.356 kHz	0,071	PASS
-20	5,00	0	13,560308936	Fref±1.356 kHz	0,030	PASS
-20	5,00	2	13,560324160	Fref±1.356 kHz	0,045	PASS
-20	5,00	5	13,560323359	Fref±1.356 kHz	0,045	PASS
-20	5,00	10	13,560324962	Fref±1.356 kHz	0,046	PASS

5 TEST EQUIPMENT

Manufacturer & Description	Model No.	SIQ No.	Last Calibration	Next Calibration	Used
ETS, Anechoic chamber	RFD-F/A-100	103949	2015-11	2017-11	X
Rohde & Schwarz, RFI test receiver	ESU8	105187	2015-11	2017-11	X
Rohde & Schwarz, RFI receiver	ESU26	106897	2016-02	2018-02	/
EMCO, Antenna	3142B	104351	2015-09	2017-09	X
EMCO, Antenna	3115	103002	2015-09	2017-09	/
Rohde & Schwarz, Test Probe Antenna	HFH2-Z4	SN:879743/12	N/A	NA	X
Rohde & Schwarz, Loop Antenna	HFH2-Z2	SN: 879605/15	2015-09	2017-09	X
Heinrich Deisel, Turn table	DS 420.00	103337	N/A	NA	X
ETS, Antenna tower	2175	/	N/A	NA	X
ETS, Controller for turn table and antenna tower	2090	/	N/A	NA	X
Rohde & Schwarz, Artificial main network	ESH 2-Z5	106899	2015-05	2017-05	X
Rohde & Schwarz, Artificial main network	ENV216	106765	2016-09	2018-09	/
Rohde & Schwarz, Current probe	EZ-17	106862	2016-11	2018-11	/
Schwarzbeck, High voltage probe	TK 9420	106898	2015-05	2017-05	/
Kambič, Temperature chamber	I-190 CK	107298	N/A	NA	X
Iskra, DC power source	MA 4181	IKM 1790	N/A	NA	X
Fluke, Digital Multimeter	179	2839652	2016-11	2018-11	X
Fluke, Digital Multimeter	179	2839648	2016-11	2018-11	X