



Test report No:  
 NIE: 59675REM.004

## Test report

### FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-16 Edition) & ICES-003 Issue 6 (Updated 2017-04)

Identification of item tested	IOT Module
Trademark	nRF91
Model and /or type reference	nRF9160
Other identification of the product	FCC ID: 2ANPO00NRF9160 IC: 24529-NRF9160 IMEI TAC: 35265610 HW Version: DEV2.1.6 SW Version: mfw_nrf9160_0.7.0-29.alpha
Features	LTE Cat-M1, LTE-NB1, GPS
Manufacturer	NORDIC SEMICONDUCTOR ASA Otto Nielsens Vei 12, 7052 Trondheim, Norway
Test method requested, standard	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition) & ICES-003 Issue 6 (Updated 2017-04)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Jose Manuel Gómez Industrial & Automotive EMC Lab. Manager
Date of issue	2019-05-22
Report template No	FDT08_21

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## Competences and guarantees

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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.

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## General conditions

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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.
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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

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

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is  $I = \pm 4,9$  dB for quasi-peak measurements,  $I = \pm 4,6$  dB for peak measurements ( $k = 2$ )

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 26 GHz is  $I = \pm 2,6$  dB for peaks and average measurements ( $k = 2$ )

## Data provided by the client

The sample is an IOT Module that has Application CPU, LTE Cat-M1, Cat-NB1 Radio and GPS Receiver.

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

## Usage of samples

Samples under test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
58741C/008	IOT Module	nRF9160	---	2019-01-15

## Test sample description

Ports..... :	Port name and description	Cable				
		Specified length [m]	Attached during test	Shielded		
	LTE RF	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
	GPS	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>		
Supplementary information to the ports..... :						
Rated power supply .....	Voltage and Frequency	Reference poles				
		L1	L2	L3	N	PE
<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	DC: 3.3 – 5.5Vdc.					
<input type="checkbox"/>	DC:					

Rated Power .....	1W		
Clock frequencies .....	32kHz, 32MHz		
Other parameters.....	---		
Software version .....	mfw_nrf9160_0.7.0-29.alpha		
Hardware version.....	DEV2.1.6		
Dimensions in cm (W x H x D).....	11x16x1.1mm		
Mounting position.....	<input type="checkbox"/>	Table top equipment	
	<input type="checkbox"/>	Wall/Ceiling mounted equipment	
	<input type="checkbox"/>	Floor standing equipment	
	<input type="checkbox"/>	Hand-held equipment	
	<input checked="" type="checkbox"/>	Other: SMD Module	
Modules/parts .....	Module/parts of test item	Type	Manufacturer
	N/A		
Accessories (not part of the test item) .....	Description	Type	Manufacturer
	N/A		
Documents as provided by the applicant.....	Description	File name	Issue date
	User manual	4418_1177-0.3.1-20180905-140910-nRF9160_Objective_Product_Spec	23-Oct-2018
	Cover markings	SiP marking	23-Oct-2018

Copy of marking plate:



## Identification of the client

Nordic Semiconductor ASA  
Otto Nielsens Vei 12, 7052 Trondheim, Norway.

## Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2019-01-16
Date (finish)	2019-01-16

## Document history

Report number	Date	Description
59675REM.004	2019-05-22	First release

## Environmental conditions

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

<b>Temperature</b>	Min. = 15 °C Max. = 35 °C
<b>Relative humidity</b>	Min. = 30 % Max. = 75 %
<b>Air pressure</b>	Min. = 860 mbar Max. = 1060 mbar

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

<b>Temperature</b>	Min. = 15 °C Max. = 35 °C
<b>Relative humidity</b>	Min. = 30 % Max. = 75 %
<b>Air pressure</b>	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

<b>Temperature</b>	Min. = 15 °C Max. = 35 °C
<b>Relative humidity</b>	Min. = 30 % Max. = 60 %
<b>Air pressure</b>	Min. = 860 mbar Max. = 1060 mbar

## Remarks and comments

The test have been performed by the technical personnel: Lorena Oviedo.

## Testing verdicts

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

## Summary

Emission Test		
Requirement – Test case	Verdict	Remark
Radiated emission. Electromagnetic field measure (30 KHz – 1000 MHz)	P	---
Radiated emission. Electromagnetic field measure (1 GHz – 18 GHz)	P	---
Radiated emission. Electromagnetic field measure (18 GHz – 26 GHz)	P	---
Continuous conducted emission (150 KHz – 30 MHz)	N/A	See 1
<u>Supplementary information and remarks:</u> 1) Test Not applicable		



## Appendix A: Test results

## Appendix A Content

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## DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. The operation modes used by the samples to which the present report refers, are shown in the following table:

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. LTE cat. NB-IoT. IDLE Band 12. Power supply: 3.8Vdc. (worst case)
OM#02	EUT ON. LTE cat. NB-IoT. IDLE Band 2. Power supply: 3.8Vdc.
OM#03	EUT ON. LTE cat. NB-IoT. IDLE Band 4. Power supply: 3.8Vdc.
OM#04	EUT ON. LTE cat. NB-IoT. IDLE Band 5. Power supply: 3.8Vdc.
OM#05	EUT ON. LTE cat. NB-IoT. IDLE Band 13. Power supply: 3.8Vdc.
OM#06	EUT ON. LTE cat. NB-IoT. IDLE Band 17. Power supply: 3.8Vdc.
OM#07	EUT ON. LTE cat. NB-IoT. IDLE Band 25. Power supply: 3.8Vdc.
OM#08	EUT ON. LTE cat. NB-IoT. IDLE Band 26. Power supply: 3.8Vdc.
OM#09	EUT ON. LTE cat. NB-IoT. IDLE Band 66. Power supply: 3.8Vdc.
OM#10	EUT ON. LTE cat. M1. IDLE Band 12. Power supply: 3.8Vdc.
OM#11	EUT ON. LTE cat. M1. IDLE Band 2. Power supply: 3.8Vdc.
OM#12	EUT ON. LTE cat. M1. IDLE Band 4. Power supply: 3.8Vdc.
OM#13	EUT ON. LTE cat. M1. IDLE Band 5. Power supply: 3.8Vdc.
OM#14	EUT ON. LTE cat. M1. IDLE Band 13. Power supply: 3.8Vdc.
OM#15	EUT ON. LTE cat. M1. IDLE Band 17. Power supply: 3.8Vdc.
OM#16	EUT ON. LTE cat. M1. IDLE Band 25. Power supply: 3.8Vdc.
OM#17	EUT ON. LTE cat. M1. IDLE Band 26. Power supply: 3.8Vdc.
OM#18	EUT ON. LTE cat. M1. IDLE Band 66. Power supply: 3.8Vdc.

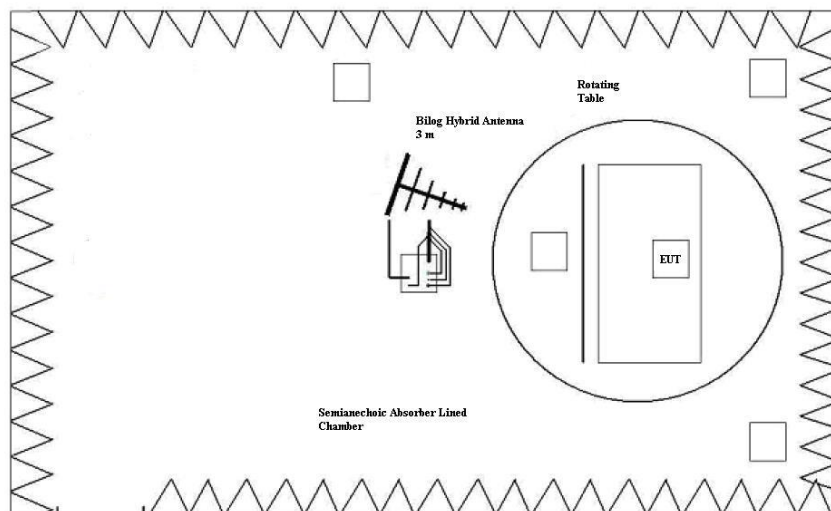
## RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

<b>LIMITS:</b>	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2017)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2017)

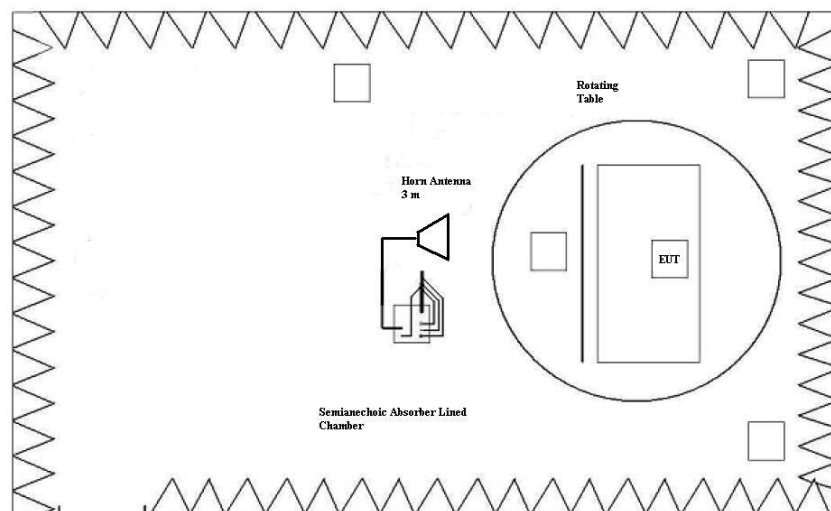
### Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-16 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2017) in the frequency range 30 MHz to 26 GHz for class B equipments.

Frequency range (MHz)	QP Limit for 3 m		PK Limit for 3 m
	( $\mu\text{V/m}$ )	( $\text{dB}\mu\text{V/m}$ )	( $\text{dB}\mu\text{V/m}$ )
30 to 88	100	40	---
88 to 216	150	43.5	---
216 to 960	200	46	---
Above 960	500	54	74



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

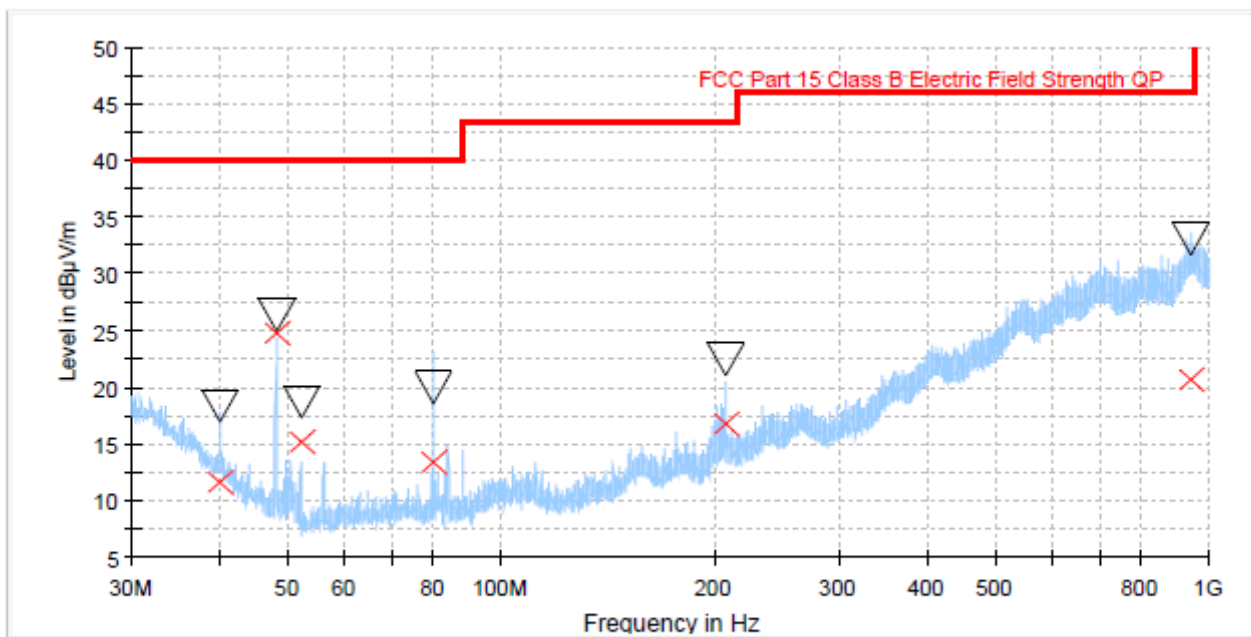
<b>TESTED SAMPLE:</b>	S/01
<b>TESTED OPERATION MODES:</b>	OM#01
<b>TEST RESULTS:</b>	CRmmnnRRPP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR1_PH	Range: 1 GHz - 18 GHz. Horizontal Polarization.	P
CR0101HR1_PV	Range: 1 GHz - 18 GHz. Vertical Polarization.	P
CR0101HR2_PH	Range: 18 GHz - 26 GHz. Horizontal Polarization.	P
CR0101HR2_PV	Range: 18 GHz - 26 GHz. Vertical Polarization.	P

**Radiated Emission. CR0101LR**

Project: 59675REM.004  
 Company: NORDIC SEMICONDUCTOR OY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. LTE cat. NB-IoT. IDLE Band 12. Power supply: 3.8Vdc.

**ER FCC Part 15 Subpart B 30-1000 MHz Class B**



▽ Peak Preview MaxPeak     
 — FCC Part 15 Class B Electric Field Strength QP  
× QuasiPeak

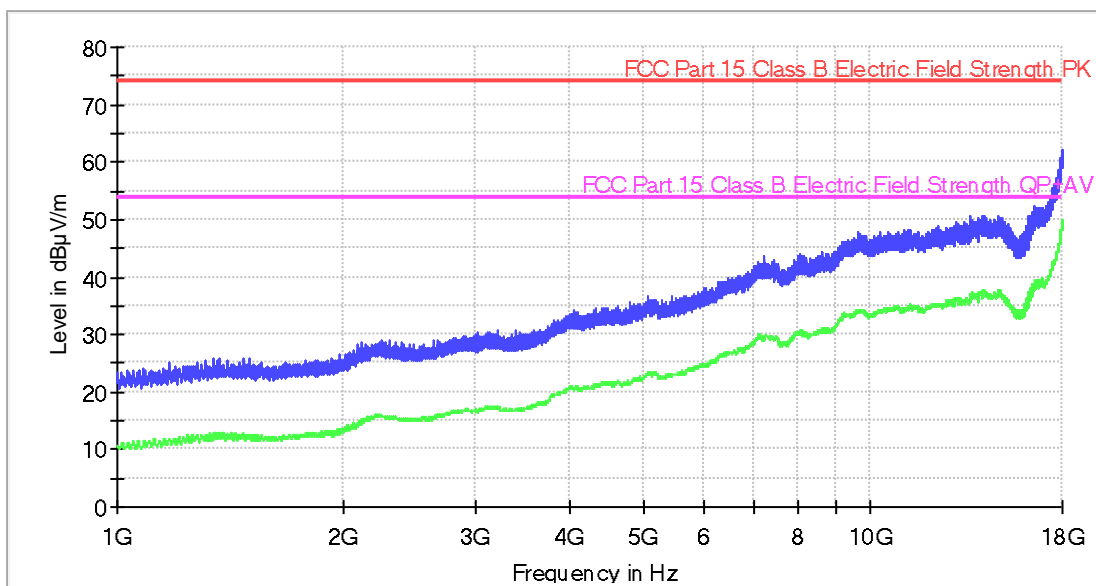
**Maximizations**

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
39.980000	18.37	11.63	166.0	V	154.0
48.001000	26.40	24.82	100.0	V	134.0
52.001000	18.68	15.11	102.0	V	180.0
80.043000	19.98	13.42	147.0	V	35.0
207.999000	22.46	16.77	259.0	V	29.0
940.231000	33.06	20.62	282.0	H	63.0

**Radiated Emission. CR0101HR1\_PH**

Project: 59675REM.004  
 Company: NORDIC SEMICONDUCTOR OY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. LTE cat. NB-IoT. IDLE Band 12. Power supply: 3.8Vdc.  
 Horizontal Polarization

**ER FCC Part 15 Subpart B 1-18 GHz Class B**



- Average Scan
- Peak Scan
- FCC Part 15 Class B Electric Field Strength PK
- FCC Part 15 Class B Electric Field Strength QP+AV

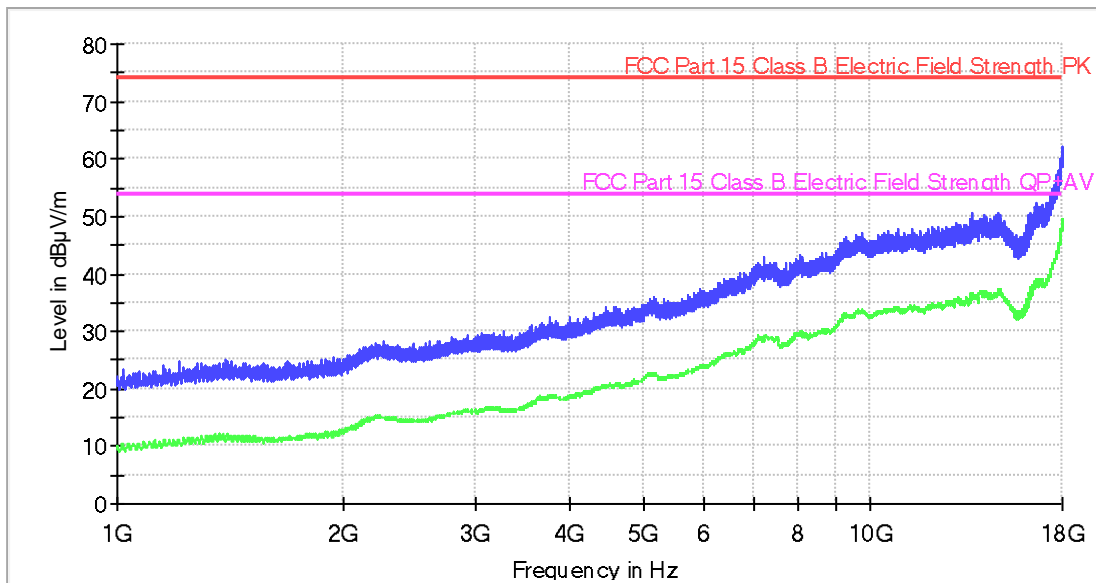
**Subrange Maxima**

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
3833.200000	32.0	19.6
6666.400000	38.2	26.9
9500.000000	44.5	33.3
12333.200000	46.7	35.1
15166.400000	47.5	36.0
18000.000000	61.7	49.9

**Radiated Emission. CR0101HR1\_PV**

Project: 59675REM.004  
 Company: NORDIC SEMICONDUCTOR OY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. LTE cat. NB-IoT. IDLE Band 12. Power supply: 3.8Vdc. Vertical Polarization

**ER FCC Part 15 Subpart B 1-18 GHz Class B**



- Average Scan
- Peak Scan
- FCC Part 15 Class B Electric Field Strength PK
- FCC Part 15 Class B Electric Field Strength QP+AV

**Subrange Maxima**

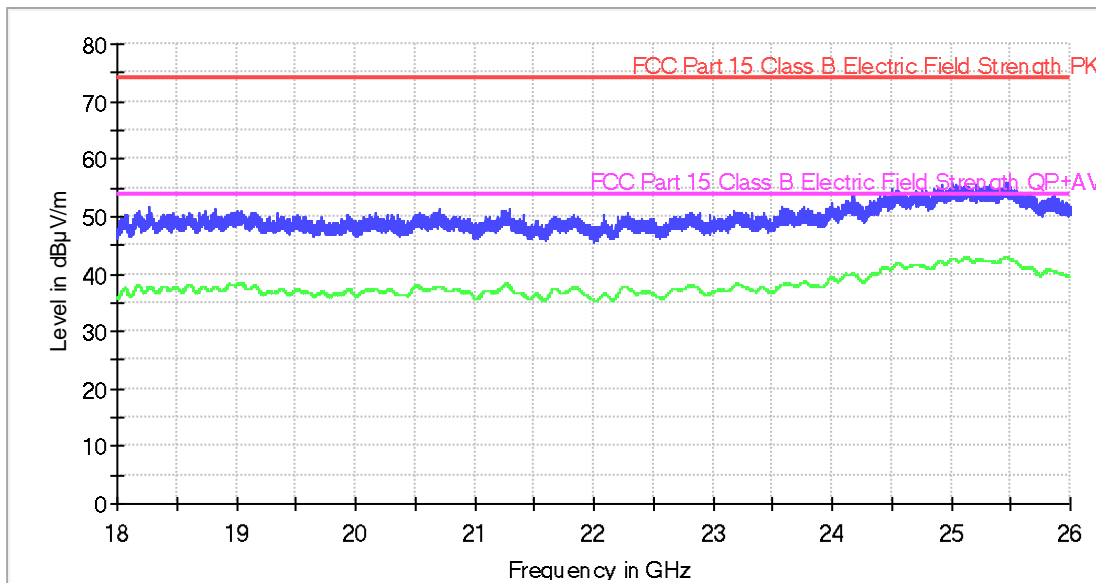
Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
3745.200000	32.4	18.7
6596.400000	39.3	26.1
9313.200000	46.3	32.8
12278.000000	48.2	34.6
13652.400000	50.7	36.3
17998.400000	62.2	49.4



**Radiated Emission. CR0101HR2\_PH**

Project: 59675REM.004  
 Company: NORDIC SEMICONDUCTOR OY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. LTE cat. NB-IoT. IDLE Band 12. Power supply: 3.8Vdc.  
 Horizontal Polarization

**ER FCC Part 15 Subpart B 18-26 GHz Class B**



- Average Scan
- Peak Scan
- FCC Part 15 Class B Electric Field Strength PK
- FCC Part 15 Class B Electric Field Strength QP+AV

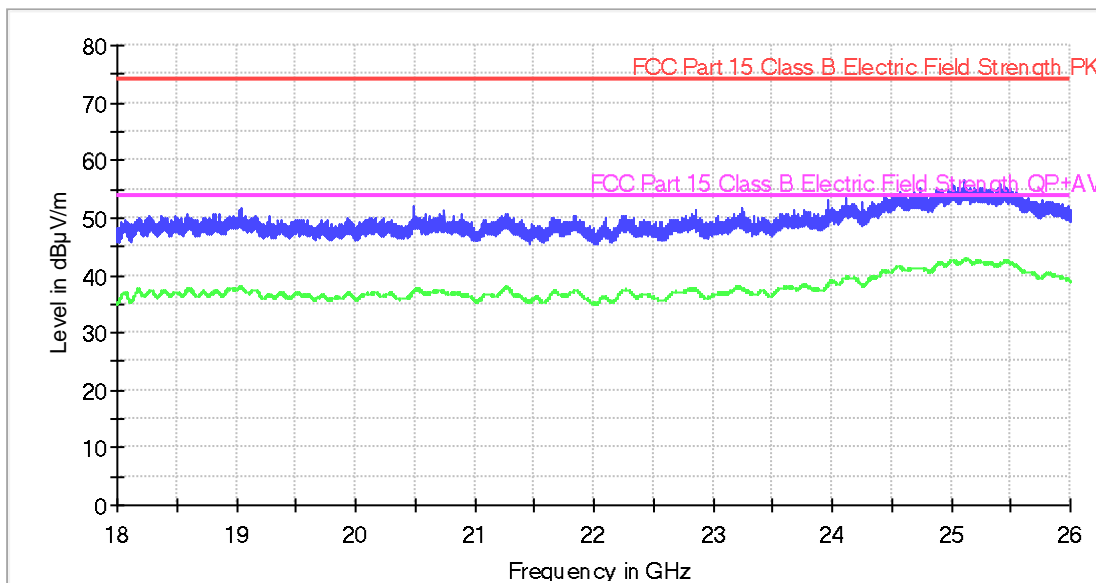
**Subrange Maxima**

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
18276.800000	51.6	37.8
20535.600000	50.7	37.7
20699.200000	51.5	37.8
23178.400000	50.9	38.0
24506.000000	55.0	41.0
25455.200000	56.0	43.0

**Radiated Emission. CR0101HR2\_PV**

Project: 59675REM.004  
 Company: NORDIC SEMICONDUCTOR OY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. LTE cat. NB-IoT. IDLE Band 12. Power supply: 3.8Vdc. Vertical Polarization

**ER FCC Part 15 Subpart B 18-26 GHz Class B**



- Average Scan
- Peak Scan
- FCC Part 15 Class B Electric Field Strength PK
- FCC Part 15 Class B Electric Field Strength QP+AV

**Subrange Maxima**

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
19048.400000	51.7	37.8
20493.600000	52.0	37.3
20747.600000	51.2	37.1
23243.600000	51.7	37.6
24566.400000	54.5	41.5
25102.400000	56.5	42.6