



Test report No:
NIE: 64610REM.003A1

Partial Test Report

ETSI EN 301 489-1 V2.2.3 (2019-11): Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements ;

Draft ETSI EN 301 489-52 V1.1.0 (2016-11): Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment. &

ETSI EN 301 489-19 V2.1.1 (2019-04): Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation and timing data

(*) Identification of item tested	nRF9160 IOT Module
(*) Trademark	nRF91
(*) Model and /or type reference	nRF9160
Other identification of the product	HW Version: nRF9160-SICA-B1A SW Version: mfw_nrf9160_1.1.2-148 IMEI TAC: 35265610
(*) Features	LTE Cat-M1, LTE-NB1, GPS
Manufacturer	NORDIC SEMICONDUCTOR ASA Otto Nielsens Vel 12, 7052 Trondheim, Norway.
Test method requested, standard	ETSI EN 301 489-1 V2.2.3 (2019-11); Draft ETSI EN 301 489-52 V1.1.0 (2016-11) & ETSI EN 301 489-19 V2.1.1 (2019-04)
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager
Date of issue	2020-09-15
Report template No	FDT08_22 (*) "Data provided by the client"

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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.

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

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Uncertainty

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 $I = \pm 5$ dB for quasi-peak measurements, $I = \pm 4,7$ dB for peak measurements ($k = 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1 to 6 GHz is $I = \pm 4,8$ dB for average and $I = \pm 4,2$ dB for peak measurements ($k = 2$).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of an IOT Module that has Application CPU, LTE Cat-M1 Radio and GPS Receiver.

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 under test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
64610/002	nRF9160 IOT Module	nRF9160	352656102628230	2020-04-14

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 type="checkbox"/>		<input type="checkbox"/>	
	BTLE			<input type="checkbox"/>		<input type="checkbox"/>	
				<input type="checkbox"/>		<input type="checkbox"/>	
Supplementary information to the ports..... :	N/A						
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: 3.0 – 5.5Vdc					
	<input type="checkbox"/>	DC:					
Rated Power	1W						
Clock frequencies	32kHz, 32MHz.						
Other parameters.....	Not provided data.						
Software version	mfw_nrf9160_1.1.2-148						
Hardware version.....	nRF9160-SICA-B1A						
Dimensions in cm (L x W 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_1315-v1.2 /2020-04-30- nRF9160_Objective_ Product_Spec	30-Apr-2020
	Cover markings		nRF9160_SiP marking	15-Jun-2020

Identification of the client

NORDIC SEMICONDUCTOR ASA
Otto Nielsens Vel 12,
7052 Trondheim, Norway.

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-05-13
Date (finish)	2020-05-13

Document history

Report number	Date	Description
64610REM.003	2020-06-10	First release
64610REM.003A1	2020-09-15	First modification due to typos. This modification test report cancels and replaces the test report 64610REM.003

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. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

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

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

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

Remarks and comments

The tests have been performed by the technical personnel: Daniel Mejías.

Testing verdicts

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

Summary

Emission test		
Requirement – Test case	Verdict	Remark
Radio-frequency electromagnetic fields Emissions	Pass	---
Conducted emission test	N/A	Note 2
Harmonic Current Emissions	N/A	Note 1
Voltage Fluctuations and Flicker	N/A	Note 1
<u>Additional information and comments:</u> Note 1: Partial testing. Test not required by the client. Note 2: Cable length <3m. Test not required according to ETSI EN 301489-1, paragraph.8.3.1		

Immunity test		
Requirement – Test case	Verdict	Remark
Radio-frequency electromagnetic fields	N/A	Note 1
Transients and surges	N/A	Note 1
Injected currents (radio-frequency common mode)	N/A	Note 1
Fast transients	N/A	Note 1
Electrostatic discharge	N/A	Note 1
Surges	N/A	Note 1
Voltage Dips, Interruptions, and variations	N/A	Note 1
<u>Additional information and comments:</u> Note 1: Partial testing. Test not required by the client.		

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
4523	EMI TEST RECEIVER 20Hz-26.5GHz	ESU26	ROHDE AND SCHWARZ	2022-05-27
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	Frankonia	---
6121	PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	---
6126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-17
6132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-20
6330	SHIELDED ROOM	---	FRANKONIA	---

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. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

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. Equipment in stand alone basis mode. Power supply: 3,8Vdc

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	ETSI EN 301 489-1 V2.2.3 (2019-11) , Draft ETSI EN 301 489-52 V1.1.0 (2016-11) & ETSI EN 301 489-19 V2.1.1 (2019-04):
	Test standard:	EN 55032 (2015) / AC (2016-07)

Limits for EN 55032 (2015) / AC (2016-07) Class B:

FREQUENCY RANGE (MHz)	MEASURED FIELD LIMIT TO 3 m (dB μ V/m) QUASI-PEAK MEASUREMENT
30 to 230	40
230 to 1000	47

FREQUENCY RANGE (GHz)	MEASURED FIELD LIMIT TO 3 m (dB μ V/m)	
	AVERAGE	QUASI-PEAK
1 to 3	50	70
3 to 6	54	74

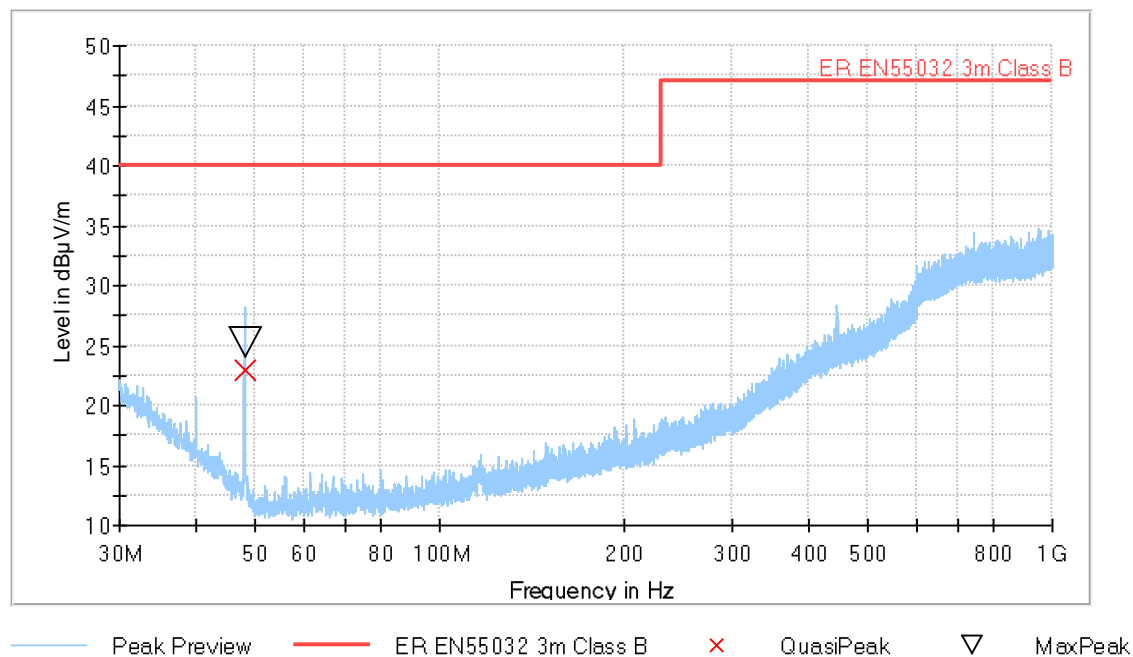
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnn: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Measured range.

CRmmnnRR	DESCRIPTION	RESULT
CR0101LR	Range: 30 MHz - 1000 MHz	P
CR0101HR	Range: 1 GHz - 6 GHz	P

Radiated Emission: CR0101LR

Project: 64610REM.003
Company: NORDIC SEMICONDUCTOR
Sample: S/01
Operation mode: OM#1
Description: EUT ON. Equipment in stand alone basis mode.
Power supply: 3,8Vdc.

Full Spectrum



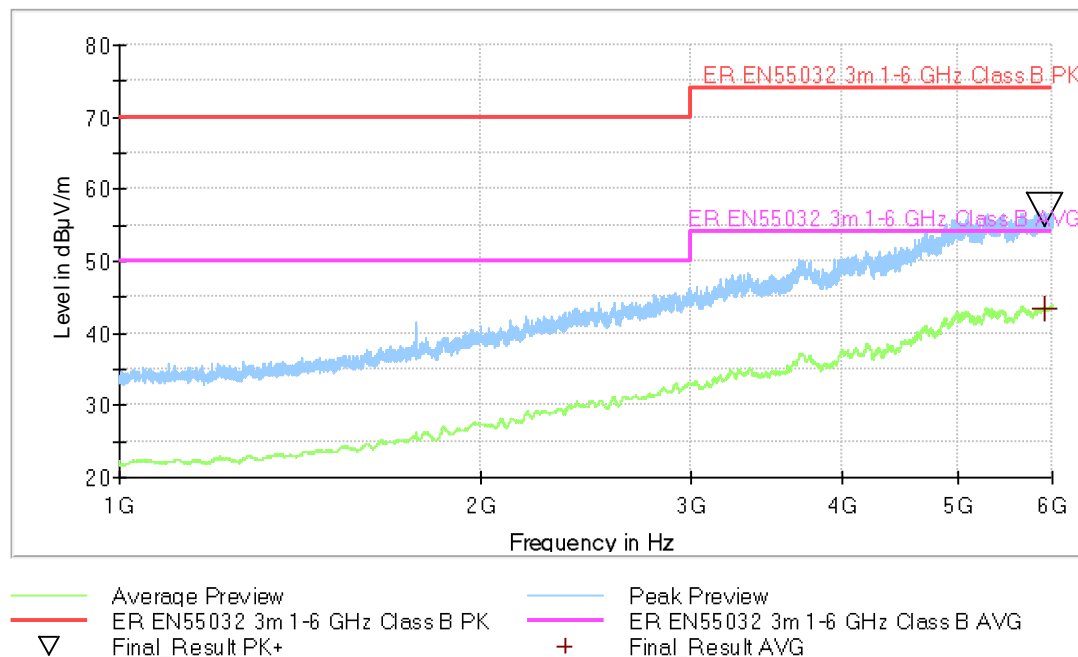
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
47.962000	23.03	25.19	40.00	16.97	V	-57.0

Radiated Emission: CR0101HR

Project: 64610REM.003
Company: NORDIC SEMICONDUCTOR
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Equipment in stand alone basis mode.
Power supply: 3,8Vdc.

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Pol	Azimuth (deg)
5916.110000	---	43.58	54.00	10.42	15000.0	H	-119.0
5916.110000	57.19	---	74.00	16.81	15000.0	H	-119.0

Appendix B: Photographs

