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DEKRA

ENAC
E N S A Y O S
Nº 51/LE147

Test report No:
NIE: 64610REM.001A1

Partial Test report

ETSI EN 301 908-13 V13.1.1 (2019-11): IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)

(*) 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 301 908-13 V13.1.1 (2019-11)
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager RAFAEL LÓPEZ MARTÍN 2020.08.25 14:10:34 +02'00'
Date of issue	2020-08-25
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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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 180 MHz to 1000 MHz is I = ± 2,9 dB for peak & average measurements.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1 GHz to 12.75 GHz is I = ± 2,9 dB for peak & average 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 undergoing 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	☒	☒
	GPS	2	☐	☐
	BTLE		☐	☐
Supplementary information to the ports…… :	*N/A*			

Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 3.0 – 5.5Vdc					
	☐	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 .....:	☐	Table top equipment	
	☐	Wall/Ceiling mounted equipment	
	☐	Floor standing equipment	
	☐	Hand-held equipment	
	☒	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)	2020-05-14
Date (finish)	2020-05-14

Document history

Report number	Date	Description
64610REM.001	2020-06-10	First release
64610REM.001A1	2020-08-25	First modification due to typos. This modification test report cancels and replaces the test report 64610REM.001

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
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 ºC Max. = 35 ºC
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 ºC Max. = 35 ºC
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

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
2942	EMI TEST RECEIVER 20Hz-40GHz	ESU40	ROHDE AND SCHWARZ	2021-09-17
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
6195	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2021-05-19
6329	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. MS in IDLE mode. M1 Band 1. Power supply: 3,8Vdc.
OM#02	EUT ON. MS in IDLE mode. M1 Band 3. Power supply: 3,8Vdc.
OM#03	EUT ON. MS in IDLE mode. M1 Band 8. Power supply: 3,8Vdc.
OM#04	EUT ON. MS in IDLE mode. M1 Band 20. Power supply: 3,8Vdc.
OM#05	EUT ON. MS in IDLE mode. M1 Band 28. Power supply: 3,8Vdc.
OM#06	EUT ON. MS in traffic mode. M1 Band 1. Power supply: 3,8Vdc.
OM#07	EUT ON. MS in traffic mode. M1 Band 3. Power supply: 3,8Vdc
OM#08	EUT ON. MS in traffic mode. M1 Band 8. Power supply: 3,8Vdc
OM#09	EUT ON. MS in traffic mode. M1 Band 20. Power supply: 3,8Vdc
OM#10	EUT ON. MS in traffic mode. M1 Band 28. Power supply: 3,8Vdc

RADIATED SPURIOUS EMISSIONS IDLE AND TRAFFIC MODE

LIMITS:	Product standard :	ETSI EN 301 908-13 V13.1.1 (2019-11)
	Test standard :	ETSI EN 301 908-13 V13.1.1 (2019-11)

LIMITS
Traffic mode spurious emission limits.
Bellow, the limits for the measurement are stated in dBm.

GENERAL SPURIOUS EMISSIONS REQUIREMENTS

Frequency bandwidth	Measurement bandwidth	Minimum requirement
30 MHz ≤ f < 1000 MHz	100 kHz	-36 dBm
1 GHz ≤ f < 12,75 GHz	1 MHz	-30 dBm

IDLE mode spurious emission limits
Bellow, the limits for the measurement are stated in dBm.

GENERAL RECEIVER SPURIOUS EMISSIONS REQUIREMENTS

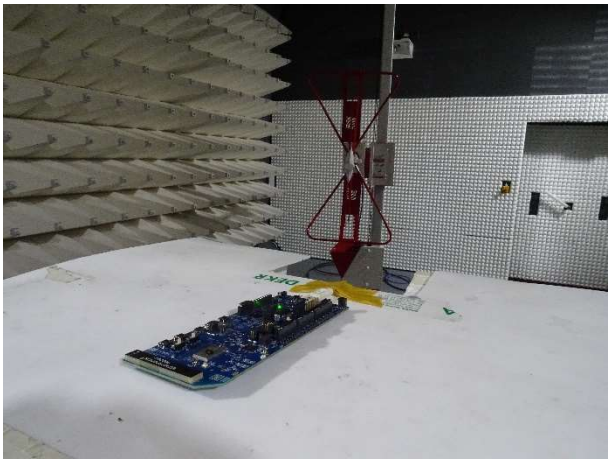
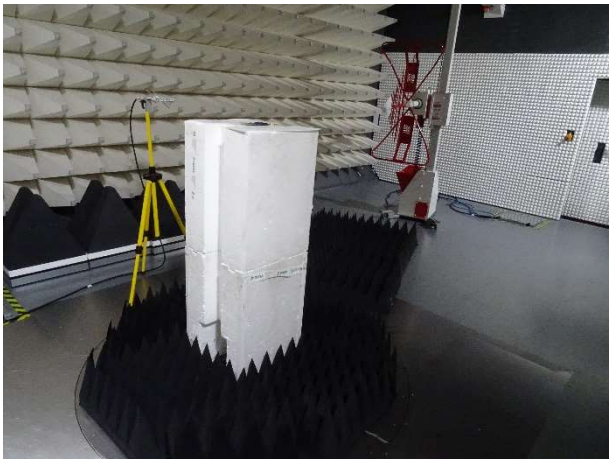
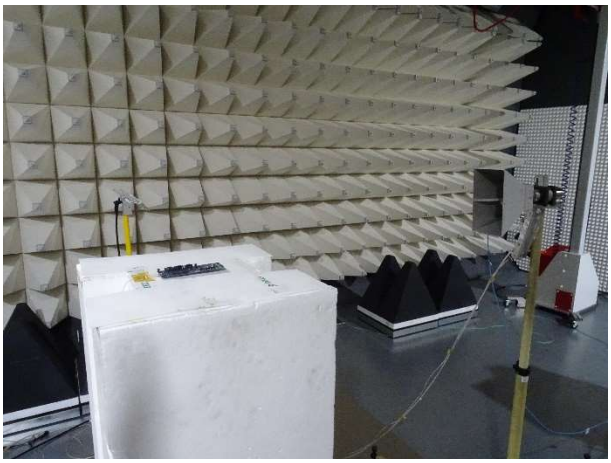
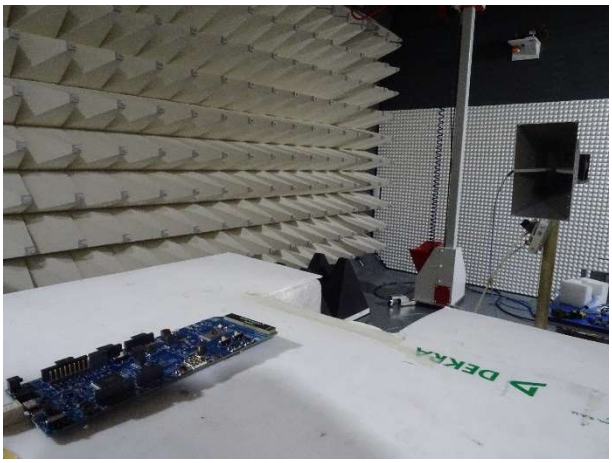
Frequency band	Measurement bandwidth	Maximum level
30 MHz ≤ f < 1 GHz	100 kHz	-57 dBm
1 GHz ≤ f < 12,75 GHz	1 MHz	-47 dBm

TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01 to OM#10
TEST RESULTS :	**CR**mmnn: CR, Radiation Condition; mm: Sample number; nn: Operation mode.

CRmmnn	Description	Result
CR0101LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0101LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0102LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0102LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0103LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0103LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0104LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0104LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0105LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0105LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0106LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0106LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0107LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0107LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0108LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0108LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0109LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0109LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P
CR0110LR_PH	Range 30 - 1000 MHz. Horizontal Polarization.	P
CR0110LR_PV	Range 30 - 1000 MHz. Vertical Polarization.	P

TEST RESULTS :	(Cont)

CRmmnn	Description	Result
CR0101HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0101HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0102HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0102HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0103HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0103HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0104HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0104HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0105HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0105HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0106HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0106HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0107HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0107HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0108HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0108HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0109HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0109HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0110HR_PH	Range 1 – 12,75 GHz. Horizontal Polarization.	P
CR0110HR_PV	Range 1 – 12,75 GHz. Horizontal Polarization.	P

Appendix B: Photographs

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