



Test report No:
NIE: 65087REM.001

Test report

EN 61326-1 (2013): Electrical equipment for measurement, control and laboratory use - EMC requirements – Part 1: General requirements.

(*) Identification of item tested	Measure current consumption
(*) Trademark	Power Profiler Kit II
(*) Model and /or type reference	PCA63100
Other identification of the product	HW Version: 1.0.0 SW Version: 3.0.0-alpha13
(*) Features	Current measurement
Manufacturer	Nordic Semiconductor ASA Otto Nielsens veg 12, 7052 Trondheim, Norway.
Test method requested, standard	EN 61326-1 (2013)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager  RAFAEL LÓPEZ MARTÍN 2020.11.03 09:41:05 +01'00'
Date of issue	2020-10-21
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

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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 $I = \pm 5,0$ 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 model PCA63100 consist of a compact tool that profiles the current consumption of your low power equipment.

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, sample for emission test, is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
65087/001	Measure current consumption	PCA63100	---	2020-09-16

Auxiliary elements used with the sample S/01:

Control Nº	Description	Model	Serial Nº	Date of reception
65087/002	Measure current consumption (Backup)	Power Profiler Kit II	---	2020-09-16
65087/003	Measure current consumption (Backup)	Power Profiler Kit II	---	2020-09-16
65087/004	Cables	---	---	2020-09-16

Sample S/02, sample for immunity test, is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
65087/001				2020-09-16

Auxiliary elements used with the sample S/02:

Control Nº	Description	Model	Serial Nº	Date of reception
65087/002	Measure current consumption (Backup)	Power Profiler Kit II	---	2020-09-16
65087/003	Measure current consumption (Backup)	Power Profiler Kit II	---	2020-09-16
65087/004	Cables	---	---	2020-09-16

Test sample description

Ports..... :	Port name and description	Cable		
		Specified length [m]	Attached during test	Shielded
	USB POWER ONLY		☒	☐
	USB DATA/POWER		☒	☐
	DUT		☒	☐
	LOGIC PORT		☐	☐
	N/A		☐	☐
Supplementary information to the ports..... :	N/A			

Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 4.4 – 5.25Vdc (USB)					
	☒	DC: 4.4 – 5.25Vdc (USB)					
Rated Power	5W						
Clock frequencies	32kHz, 32MHz						
Other parameters.....	Not provided data						
Software version	Not provided data						
Hardware version.....	1.0.0						
Dimensions in mm (L x W x D) ...	8.61 x 0.71 x 5.45						
Mounting position.....	☒	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☐	Other:					
Modules/parts	Module/parts of test item		Type		Manufacturer		
	PCA63100		PCB		Nordic Semiconductor		
	Plastic casing		Casing		Nordic Semiconductor		
	Squid cables		Cable		Nordic Semiconductor		
	N/A						
Accessories (not part of the test item)	Description		Type		Manufacturer		
	N/A						
	N/A						
	N/A						
	N/A						
Documents as provided by the applicant.....	Description		File name		Issue date		
	Instructions for testing/operating the device		Test_instructions.		2020.09.16		
	Preliminary user guide		PPK_2_User_Guide		2020.09.16		
	N/A						
	N/A						

Identification of the client

Nordic Semiconductor ASA
Otto Nielsens veg 12, 7052 Trondheim, Norway

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-09-23
Date (finish)	2020-09-30

Document history

Report number	Date	Description
65087REM.001	2020-10-21	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. = 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: Antonio Ruiz, Lorena Oviedo & Carlos Haro.

Testing verdicts

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

Summary

Emission Test		
Requirement – Test case	Verdict	Remark
Radiated emission test	Pass	---
Conducted emission test	N/A	---
Discontinuous disturbance (clicks) on AC power leads	N/A	---
Harmonic current emissions	N/A	---
Voltage fluctuations and flicker	N/A	---
<u>Supplementary information and remarks:</u>		
N/A		

Immunity test		
Requirement – Test case	Verdict	Remark
Radio-frequency electromagnetic fields	Pass	---
Injected currents	N/A	---
Fast transients	N/A	---
Surges	N/A	---
Voltage dips and short interruptions	N/A	---
Power frequency magnetic fields	Pass	---
Electrostatic discharge	Pass	---
<u>Supplementary information and remarks:</u>		
N/A		

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
4573	REGISTRADOR TEMPERATURA Y HUMEDAD RELATIVA	HWg-STE	HW GROUP	2021-04-17
4574	ELECTROSTATIC DISCHARGE SIMULATOR (ESD)	ONYX	HAEFELY	2022-07-29
4583	PUNTA DE PISTOLA ESD	ONYX	HAEFELY	---
4584	PUNTA DE PISTOLA ESD	ONYX	HAEFELY	---
4628	ULTRA COMPACT SIMULATOR	UCS 500N5	EM TEST	2022-03-30
4640	CURRENT TRANSFORMER	MC 2630	EM TEST	---
4641	CURRENT TRANSFORMER	MC 26100	EM TEST	---
4643	MOTOR VARIAC	MV2616	EM TEST	2022-01-27
4757	MAGNETIC FIELD ANTENNA 2x2m	MS 200N	EM TEST	2022-10-08
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER III	SAC-3	Frankonia	---
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
6231	GENERADOR DE SEÑAL RF	SMB100A	ROHDE AND SCHWARZ	2021-11-04
6232	AVG POWER SENSOR 6 GHZ	NRP6A	ROHDE AND SCHWARZ	2020-10-23
6233	AVG POWER SENSOR 6 GHZ	NRP6A	ROHDE AND SCHWARZ	2020-10-23
6234	POWER METER	NRP2	ROHDE AND SCHWARZ	---
6236	POWER AMPLIFIER 250W/110W/100W 80MHz-1GHz/0,69GHz-3,2GHz/2,5GHz-6GHz	BBA150-BC250D110+E100	ROHDE AND SCHWARZ	---
6329	SHIELDED ROOM	---	FRANKONIA	---
6339	LOG-PERIODIC BROADBAND ANTENNA	STPL 9129	SCHWARZBECK MESS-ELEKTRONIK	---

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. Source meter mode actives. Equipment supplies auxilliary board and monitors the current. Logic port actived. Power supply: 5Vdc (USB/Data port) (worst case).
OM#02	EUT ON. Source meter mode actives. Power supply: 5Vdc (USB/Data port)
OM#03	EUT ON. Ampere meter mode actives. Power supply: 5Vdc (USB/Data port)

FAILS CRITERIA FOR IMMUNITY TEST

Fail Criteria A:

The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Fail Criteria B:

The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either or these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Fail Criteria C:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

MONITORING FOR IMMUNITY TEST

For every operation mode, the monitoring performed over the samples under test is shown in the following table:

OPERATION MODE	CONTINUOUS PHENOMENA MONITORING	TRANSIENT PHENOMENA MONITORING
OM#01	The communication of the logical port is checked using nRF Connect software, checking that the digital channels do not change status in the section "DIGITAL CHANNELS"	The communication of the logical port is checked using nRF Connect software, checking that the digital channels do not change status in the section "DIGITAL CHANNELS"
OM#02	By means of an auxiliary device (laptop) and "nRF connect" software, it is monitored that the level of the current remains constant (350uA) during and after the test. Also, it is monitored that led is blinking in red during and after the test.	By means of an auxiliary device (laptop) and "nRF connect" software, it is monitored that the level of the current remains constant (350uA) after the test. Also, it is monitored that led is blinking in red after the test.
OM#03	By means of an auxiliary device (laptop) and "nRF connect" software, it is monitored that the level of the current remains constant (15mA) during and after the test. Also, it is monitored that led is blinking in blue during and after the test.	By means of an auxiliary device (laptop) and "nRF connect" software, it is monitored that the level of the current remains constant (15mA) after the test. Also, it is monitored that led is blinking in blue after the test.

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:

Product standard:

EN 61326-1 (2013)

Test standard:

EN 55011 (2016) / A1 (2017)

Limits for EN 55011 (2016) / A1 (2017) Class B:

Frequency range (MHz)	Measured field limit at 3 m (dB μ V/m) Quasi-Peak measurement
30 to 230	40
230 to 1000	47

TESTED SAMPLES:

S/01

TESTED OPERATION MODES:

OM#01

TEST RESULTS:

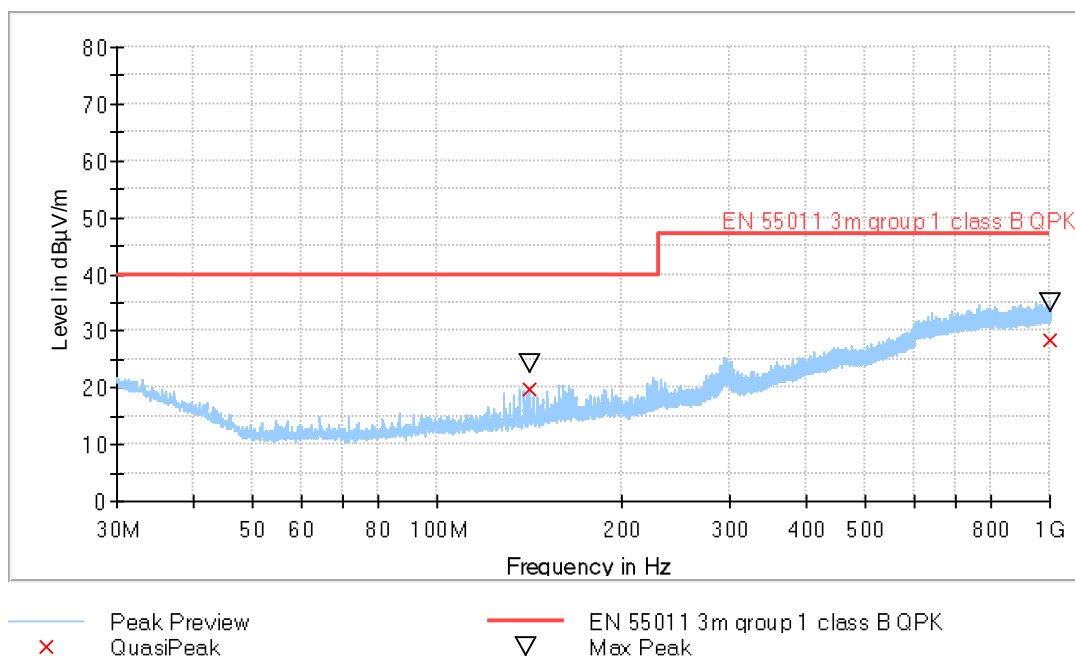
CRmmnn: CR, Radiated condition; mm: Sample number; nn:
Operation mode; RR: Measured range.

CRmmnnRR	DESCRIPTION	RESULT
CR0101LR	Range: 30 MHz - 1000 MHz. Class B. Worst case.	P

Radiated Emission: CR0101LR

Project: 65087REM.001
Company: NORDIC SEMICONDUCTOR ASA.
Sample: S/01
Operation mode: OM#01
Description: EUT ON. Source meter mode actives. Equipment supplies auxilliary board and monitors the current. Logic port activated. Power supply: 5Vdc (USB/Data port) (USB/Data port)

Full Spectrum



Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
140.925000	19.57	24.08	40.00	20.43	116.0	V	-18.0
998.150000	28.35	34.97	47.00	18.65	282.0	H	-15.0

RADIATED RF ELECTROMAGNETIC FIELD IMMUNITY TEST

LIMITS:	Product standard:	EN 61326-1 (2013)
	Test standard:	EN 61000-4-3 (2006) / A1 (2008) / A2 (2010)

RANGE	FREQUENCY	MODULATION	STEP	LEVEL
A	80-1000MHz	AM 1 kHz Prof: 80%	LOG 1%	3 V/m
B	1400-2000MHz	AM 1 kHz Prof: 80%	LOG 1%	3 V/m
C	2000-2700MHz	AM 1 kHz Prof: 80%	LOG 1%	1 V/m

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#01; OM#02 & OM#03
FAIL CRITERIA AND MONITORING:	A
ZONES/COUPLING CABLES (CPL):	

CPL	DESCRIPTION
1	EUT frontal
2	EUT rear side
3	EUT left side
4	EUT right side

TEST RESULTS :	
-----------------------	--

CPL	SI	OM#	RANGE	POL	COMMENTS	RESULT
1 2 3 4	02	01	A	H, V	Ok, no fails detected.	P
1 2 3 4	02	01	B	H, V	Ok, no fails detected.	P
1 2 3 4	02	01	C	H, V	Ok, no fails detected.	P
1 2 3 4	02	02	A	H, V	Ok, no fails detected.	P
1 2 3 4	02	02	B	H, V	Ok, no fails detected.	P
1 2 3 4	02	02	C	H, V	Ok, no fails detected.	P
1 2 3 4	02	03	A	H, V	Ok, no fails detected.	P
1 2 3 4	02	03	B	H, V	Ok, no fails detected.	P
1 2 3 4	02	03	C	H, V	Ok, no fails detected.	P

ELECTROSTATIC DISCHARGE IMMUNITY TEST

LIMITS:	Product standard:	EN 61326-1 (2013)								
	Test standard:	EN 61000-4-2 (2009)								
<table><tr><th>COUPLING</th><th>LEVEL</th></tr><tr><td>Direct contact discharge:</td><td>±4kV</td></tr><tr><td>Indirect contact discharge:</td><td>±4kV</td></tr><tr><td>Air discharge:</td><td>±2kV, ±4kV, ±8kV</td></tr></table>			COUPLING	LEVEL	Direct contact discharge:	±4kV	Indirect contact discharge:	±4kV	Air discharge:	±2kV, ±4kV, ±8kV
COUPLING	LEVEL									
Direct contact discharge:	±4kV									
Indirect contact discharge:	±4kV									
Air discharge:	±2kV, ±4kV, ±8kV									
TESTED SAMPLES:	S/02									
TESTED OPERATION MODES:	OM#01; OM#02 & OM#03									
NUMBER OF DISCHARGES FOR POINT:	10									
MONITORING AND FAIL CRITERIA:	B									

CPL	DESCRIPTION	COUPLING TYPE			
		ICH	ICV	DC	DA
1	EUT frontal	X	X		
2	EUT right side	X	X		
3	EUT rear side	X	X		
4	EUT left side	X	X		
5	Enclosure				X

COUPLING RESUME : ICH (Indirect by contact on horizontal plane)
ICV (Indirect by contact on vertical plane), DC (Direct by contact), DA (Direct by air)

TEST RESULTS:	
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CPL	SI	OM#	COMMENTS	RESULT
1	02	01	Ok, no fails detected.	P
2	02	01	Ok, no fails detected.	P
3	02	01	Ok, no fails detected.	P
4	02	01	Ok, no fails detected.	P
5	02	01	Ok, no fails detected.	P
1	02	02	Ok, no fails detected.	P
2	02	02	Ok, no fails detected.	P
3	02	02	Ok, no fails detected.	P
4	02	02	Ok, no fails detected.	P
5	02	02	Ok, no fails detected.	P
1	02	03	Ok, no fails detected.	P
2	02	03	Ok, no fails detected.	P
3	02	03	Ok, no fails detected.	P
4	02	03	Ok, no fails detected.	P
5	02	03	Ok, no fails detected.	P

H FIELDS IMMUNITY TEST

LIMITS:

Product standard:

EN 61326-1 (2013)

Test standard:

EN 61000-4-8 (2010)

FREQUENCY

50Hz

LEVEL

3A/m

TESTED SAMPLES:

S/02

TESTED OPERATION MODES:

OM#01; OM#02 & OM#03

FAIL CRITERIA AND MONITORING:

A

CPL

DESCRIPTION

1	Field strength level on axis X
2	Field strength level on axis Y
3	Field strength level on axis Z

TEST RESULTS:

CPL	SI	OM#	COMMENTS	RESULTS
1	02	01	No fails detected	P
2	02	01	No fails detected	P
3	02	01	No fails detected	P
1	02	02	No fails detected	P
2	02	02	No fails detected	P
3	02	02	No fails detected	P
1	02	03	No fails detected	P
2	02	03	No fails detected	P
3	02	03	No fails detected	P

Appendix B: Photographs

