

# FCC Part 1 Subpart I FCC Part 2 Subpart J INDUSTRY CANADA RSS 102 ISSUE 5

# RF EXPOSURE REPORT

**FOR** 

**Occupancy and Daylight Sensor Lighting Control** 

**MODEL NUMBER: SNS210 MC** 

FCC ID: 2AF2N-SSMC IC: 20659-SSMC

**REPORT NUMBER: 13092227C** 

**ISSUE DATE: 2019-12-06** 

Prepared for

Signify North America Corporation O'Hare International Center 10275 W. Higgins Rd. Rosemont, IL 60018

Prepared by
UL LLC
333 Pfingsten Rd.
Northbrook, IL 60062, USA
TEL: (847) 272-8800



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# **Revision History**

Rev.	Issue Date	Revisions	Revised By
V1	2019-12-06	Initial Issue	B. Mucha

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Signify North America Corporation

O'Hare International Center 10275 W. Higgins Rd. Rosemont, IL 60018

**EUT DESCRIPTION:** Occupancy and Daylight Sensor Lighting Control

MODEL: SNS210 MC

**SERIAL NUMBER:** 5139650168 (Antenna Port Sample)

**DATE TESTED**: 2019-10-31 TO 2019-11-04

#### **APPLICABLE STANDARDS**

STANDARD TEST RESULTS

FCC PART 1 SUBPART I & PART 2 SUBPART J Complies
INDUSTRY CANADA RSS 102 ISSUE 5 Complies

UL LLC calculated the RF Exposure of the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released For UL Verification Services Inc. By:

Prepared By:

Jeff Moser

CONSUMER TECHNOLOGY DIVISION

Mores

PROJECT LEAD

**UL LLC** 

Bart Mucha

CONSUMER TECHNOLOGY DIVISION

Mhuh

Staff Engineer

**UL LLC** 

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# 2. TEST METHODOLOGY

All calculations were made in accordance with FCC OET Bulletin 65 Edition 97-01 and IC Safety Code 6.

# 3. REFERENCES

All measurements were made as documented in test report UL LLC, Report No. 12137351A and 12137351B for operation in the 2.4GHz band.

Output power and Duty cycle data is excerpted from the above referenced test report.

Antenna gain data is excerpted from product documentation provided by the applicant.

# 4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, Illinois, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 1004141-0. The full scope of accreditation can be viewed at <a href="http://ts.nist.gov">http://ts.nist.gov</a>.

# 5. MAXIMUM PERMISSIBLE RF EXPOSURE

#### 5.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)				
(A) Limits for Occupational/Controlled Exposure								
0.3-3.0	614	1.63	*100	6				
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6				
30-300	61.4	0.163	1.0	6				
300-1,500			f/300	6				
1,500-100,000			5	6				
	(B) Limits for Genera	l Population/Uncontrolle	d Exposure					
0.3-1.34	614	1.63	*100	30				
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	30				
30-300	27.5	0.073	0.2	30				
300-1,500			f/1500	30				
1,500-100,000			1.0	30				

f = frequency in MHz

#### Notes:

- (1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
- (2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

<sup>\* =</sup> Plane-wave equivalent power density

# 5.2. IC RULES

IC Safety Code 6 (2015), Section 2.2.2: To ensure compliance with the basic restrictions outlined in Section 2.1, at frequencies between 10 MHz and 300 GHz, the reference levels for electric- and magnetic-field strength and power density must be complied with.

**TABLE 4:** Reference Levels for Electric Field Strength, Magnetic Field Strength and Power Density in Uncontrolled Environments

Frequency Range	Electric Field	Magnetic Field	<b>Power Density</b>	Reference Period
(MHz)	(V/m rms)	(A/m rms)	$(W/m^2)$	(minutes)
$0.003 \text{-} 10^{21}$	83	90	-	Instantaneous*
0.1-10	-	0.73/f	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	6.67 x 10 <sup>-5</sup> f	616000/ f <sup>1.2</sup>

**Note:** *f* is frequency in MHz.

**TABLE65:** Reference Levels for Electric Field Strength, Magnetic Field Strength and Power Density in Controlled Environments

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m²)	Reference Period (minutes)
$0.003 - 10^{23}$	170	180	-	Instantaneous*
1-10	-	1.6/ f	-	6**
1.29-10	$193/f^{0.5}$	-	-	6**
10-20	61.4	0.163	10	6
20-48	$129.8/f^{0.25}$	$0.3444/f^{0.25}$	$44.72/f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	$616000/f^{1.2}$
150000-300000	$0.354 f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	$616000/f^{1.2}$

**Note:** *f* is frequency in MHz.

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<sup>\*</sup>Based on nerve stimulation (NS).

<sup>\*\*</sup> Based on specific absorption rate (SAR).

<sup>\*</sup>Based on nerve stimulation (NS).

<sup>\*\*</sup> Based on specific absorption rate (SAR).

# 5.3. EQUATIONS

#### **POWER DENSITY**

Power density is given by:

 $S = EIRP / (4 * Pi * D^2)$ 

Where

S = Power density in mW/cm^2 EIRP = Equivalent Isotropic Radiated Power in mW D = Separation distance in cm

Power density in units of mW/cm<sup>2</sup> is converted to units of W/m<sup>2</sup> by multiplying by 10.

#### **DISTANCE**

Distance is given by:

D = SQRT (EIRP / (4 \* Pi \* S))

Where

D = Separation distance in cm EIRP = Equivalent Isotropic Radiated Power in mW S = Power density in mW/cm^2

# **SOURCE-BASED DUTY CYCLE**

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

Source-based time-averaged EIRP = (DC / 100) \* EIRP

Where

DC = Duty Cycle in %, as applicable EIRP = Equivalent Isotropic Radiated Power in W DATE: 2019-12-06

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### 5.4. IC EXEMPTION

#### **INDUSTRY CANADA EXEMPTION**

RSS-102 Clause 2.5.2 RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10-2 f0.6834 W (adjusted for tune-up tolerance), where f is in MHz;

# 6. RF EXPOSURE RESULTS

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

(Single chain transmitters, no colocation, 20 cm MPE distance)

Single Chain and non-colocated transmitters								
Band	Mode	Separatio n Distance (cm)	Output Peak Power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	EIRP (mW)	FCC Power  Density (mW/cm^2)	Power Density
2.4 GHz	BTLE	20	6.664	-2.00	100.0	2.9	0.001	0.01
2.4 GHz	ZigBee	20	6.660	-2.00	100.0	2.9	0.001	0.01

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x  $10^{-2}$   $f^{0.6834}$  W (adjusted for tune-up tolerance), where f is in MHz; therefore, the device is exempted from routine RF exposure evaluation.

# **END OF REPORT**