

# COMPLIANCE ENGINEERING IRELAND LTD



## Compliance Engineering Ireland Ltd

Clonross Lane, Derrockstown, Dunshaughlin

Co. Meath, Ireland A85 XN59

Ph +353 1 8017000 , 8256722

<b>Project Num</b>	17E6742-2d
<b>Quotation</b>	Q17-0205-1b
<b>Prepared For</b>	Nordic ID Oy
<b>Company Address</b>	Myllyojakatku 2A FI-24100 Salo Finland
<b>Prepared By</b>	Compliance Engineering Ireland
<b>Test Lab Address</b>	Clonross Lane, Derrockstown, Dunshaughlin, Co. Meath, Ireland
<b>Tested By</b>	Michael Kirby
<b>Test Report By</b>	Michael Kirby
<b>FCC Site Registration</b>	92592
<b>IC Site Registration</b>	8517-A2, 8517-A1
<b>Date</b>	4 <sup>th</sup> Sept 2017
<b>IC Equipment Authorisation</b>	Test Report
<b>EUT Description</b>	RFID Module
<b>FCC ID</b>	SCCNUR21W
<b>IC ID</b>	5137A-NUR21W
<b>Authorised by</b>	John McAuley
<b>Authorised Signature :</b>	

## **RF Exposure Exhibit– Technical Report**

### **1.0 Overview**

This report contains an RF exposure evaluation against test exclusion limits for FCC and IC.

#### **1.1 Fixed / Mobile Application**

Manufacturer declaration

Type of antenna “4 patch antenna array”.

Max gain in forward direction = 6dBi

Type of antenna “Cross Dipole antenna”.

Max gain in forward direction = 5dBi

Max Rated power = 30dBm

## 2.0 Maximum Permissible Exposure FCC

47 CFR Sections 1.1307, 1.1310, 2.1091,

447498 D01 General RF Exposure Guidance v06

### 2.1.1 Antenna gain of 5dB General population /Un-controlled Environments (FCC)

where:

$$S = \frac{PG}{4\pi R^2}$$

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	5	dB
Time Averaging Factor	0	dB
EIRP Peak	35	dBm
EIRP Peak	3162	mW
<b>Prediction distance:</b>	<b>20.4</b>	<b>cm</b>
Prediction frequency:	915	MHz
MPE limit for Uncontrolled/General Population exposure at prediction frequency:	0.610	mW/cm^2
Power density at prediction frequency:	0.605	mW/cm^2
Power density at prediction frequency:	6.047	W/m^2
Test Result	Pass	
<b>Exempt from RF Exposure evaluation</b>		

### Notes

The table above shows that for a prediction distance of 20.4cm, RF exposure evaluation is not required.

At a prediction distance of 20cm the power density is 0.629 mW/cm^2 which is above the RF exposure evaluation limit (FCC)

### 2.1.2 Antenna gain of 5dB Occupational /Controlled Environments (FCC)

where:

$$S = \frac{PG}{4\pi R^2}$$

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	5	dB
Time Averaging Factor	0	dB
EIRP Peak	35	dBm
EIRP Peak	3162	mW
<b>Prediction distance:</b>	<b>20</b>	<b>cm</b>
Prediction frequency:	915	MHz
MPE limit for Controlled/Occupational exposure at prediction frequency:	3.050	mW/cm^2
Power density at prediction frequency:	0.629	mW/cm^2
Power density at prediction frequency:	6.291	W/m^2
Test Result	Pass	
<b>Exempt from RF Exposure evaluation</b>		

#### Notes

The table above shows that for a prediction distance of 20cm, RF exposure evaluation is not required.

### 2.2.1 Antenna gain of 6dB General population /Un-controlled Environments (FCC)

where:

$$S = \frac{PG}{4\pi R^2}$$

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	6	dB
Time Averaging Factor	0	dB
EIRP Peak	36	dBm
EIRP Peak	3981	mW
<b>Prediction distance:</b>	<b>22.8</b>	<b>cm</b>
Prediction frequency:	915	MHz
MPE limit for Uncontrolled/General Population exposure at prediction frequency:	0.610	mW/cm^2
Power density at prediction frequency:	0.609	mW/cm^2
Power density at prediction frequency:	6.094	W/m^2
Test Result	Pass	
<b>Exempt from RF Exposure evaluation</b>		

#### Notes

The table above shows that for a prediction distance of 22.8cm, RF exposure evaluation is not required.

At a prediction distance of 20cm the power density is 0.792 mW/cm^2, which is above the RF exposure evaluation limit (FCC)

## 2.2.2 Antenna gain of 6dB Occupational /Controlled Environments (FCC)

where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	6	dB
Time Averaging Factor	0	dB
EIRP Peak	36	dBm
EIRP Peak	3981	mW
<b>Prediction distance:</b>	<b>20</b>	<b>cm</b>
Prediction frequency:	915	MHz
MPE limit for Controlled/Occupational exposure at prediction frequency:	3.050	mW/cm^2
Power density at prediction frequency:	0.792	mW/cm^2
Power density at prediction frequency:	7.920	W/m^2
Test Result	Pass	
<b>Exempt from RF Exposure evaluation</b>		

### Notes

The table above shows that for a prediction distance of 20cm, RF exposure evaluation is not required.

### 3.0 Maximum Permissible Exposure IC

Limits for Routine Evaluation — RF Exposure Evaluation

#### Limits as per RSS 102 Table 6

##### 3.1.1 Antenna Gain 5dBi General population /Un-controlled Environments (IC)

where:

$$S = \frac{PG}{4\pi R^2}$$

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	5	dB
EIRP Peak	35	dBm
Time Averaging Factor	0.00	dB
Tune up factor	0	dB
EIRP Peak	35.00	dBm
EIRP Peak	3.16	W
<b>Prediction distance:</b>	<b>30.2</b>	<b>cm</b>
Prediction frequency:	915	MHz
Power density at prediction frequency:	2.76	W/m^2
Power Density Limit for Uncontrolled/General Population exposure at prediction frequency:	2.77	W/m^2
<b>Exempt from RF Exposure Evaluation</b>		

#### Notes

The table above shows that for a prediction distance of 30.2cm, RF exposure evaluation is not required.

At a prediction distance of 20cm the power density is 6.29 W/m^2 which is above the RF exposure evaluation limit (IC)

### 3.1.2 Antenna gain of 5dB Occupational /Controlled Environments (IC)

where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	5	dB
EIRP Peak	35	dBm
Time Averaging Factor	0.00	dB
Tune up factor	0	dB
EIRP Peak	35.00	dBm
EIRP Peak	3.16	W
<b>Prediction distance:</b>	<b>20</b>	<b>cm</b>
Prediction frequency:	915	MHz
Power density at prediction frequency:	6.29	W/m^2
Power Density limit for Controlled/Occupational exposure at prediction frequency:	19.53	W/m^2
<b><u>Exempt from RF Exposure Evaluation</u></b>		

#### Notes

The table above shows that for a prediction distance of 20cm, RF exposure evaluation is not required.

**3.2.1 Antenna gain of 6dB General population /Un-controlled Environments (IC)**

where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	6	dB
EIRP Peak	36	dBm
Time Averaging Factor	0.00	dB
Tune up factor	0	dB
EIRP Peak	36.000	dBm
EIRP Peak	3.98	W
<b>Prediction distance:</b>	<b>33.9</b>	<b>cm</b>
Prediction frequency:	915	MHz
Power density at prediction frequency:	2.76	W/m^2
Power Density Limit for Uncontrolled/General Population exposure at prediction frequency:	2.77	W/m^2
<b><u>Exempt from RF Exposure Evaluation</u></b>		

Notes

The table above shows that for a prediction distance of 33.9cm, RF exposure evaluation is not required.

At a prediction distance of 20cm the power density is 7.92 W/m^2, which is above the RF exposure evaluation limit (IC)

### 3.2.2 Antenna gain of 6dB Occupational /Controlled Environments (IC)

where:

$$S = \frac{PG}{4\pi R^2}$$

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Conducted Output Power	30	dBm
Antenna Gain	6	dB
EIRP Peak	36	dBm
Time Averaging Factor	0.00	dB
Tune up factor	0	dB
EIRP Peak	36.00	dBm
EIRP Peak	3.98	W
<b>Prediction distance:</b>	<b>20</b>	<b>cm</b>
Prediction frequency:	915	MHz
Power density at prediction frequency:	7.92	W/m^2
Power Density limit for Controlled/Occupational exposure at prediction frequency:	19.53	W/m^2
<b>Exempt from RF Exposure Evaluation</b>		

### Notes

The table above shows that for a prediction distance of 20cm, RF exposure evaluation is not required.

### End of Report