RF EVALUATION TEST REPORT

Applicant……	:Schneider Electric IT Corporation
Address……...	:70 Mechanic Street Foxborough, MA 02035
Manufacturer……..	:Schneider Electric IT Corporation
Address……...	:70 Mechanic Street Foxborough, MA 02035
Product Name……	:WiFi Module
Brand Name……	:N/A
Model Name……...	:HY8K1NA1
FCC ID……..	:2AODL-HY8K1NA1
Measurement Standard…….	:47 CFR PART 2, Section 2.1091& 2.1093
Receipt Date of Samples….	:June 14, 2023
Date of Tested……	:June 14, 2023 to November 07, 2023
Date of Report……	:December 01, 2023

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by

Rose Hu / Project Engineer

Approved by

Iori Fan / Authorized Signatory

Table of Contents

Revision History

Report Number	Description	Issued Date
NTC2306196F01	Initial Issue	2023-12-01

1. General Description of EUT

Product Information	
Product name:	WiFi Module
Main Model Name:	HY8K1NA1
Additional Model Name:	N/A
Model Difference:	N/A
S/N:	2306-2924
Brand Name:	N/A
Hardware version:	V01
Software version:	V01
Rating:	DC 3.3V from host
Typical Arrangement:	Tabletop
I/O Port:	Refer to the user manual
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional information	
Note:	N/A
Remark:	1. The device is Test Grade 07 version, which does not support Bluetooth feature. 2. All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

Technical Specification (2.4G WLAN)	
Frequency Range:	2412-2462MHz for IEEE 802.11b/g/n(HT20) 2422-2452MHz for IEEE 802.11n(HT40)
Modulation Technology:	DSSS, OFDM
Modulation Type:	CCK, DQPSK, DBPSK, 64-QAM, 16-QAM, QPSK, BPSK
Number of Channel:	11 for IEEE 802.11b/g/n(HT20) 7 for IEEE 802.11n(HT40)
Channel Space:	5MHz
Antenna Type:	Refer to the following antenna information
Antenna Gain:	Refer to the following antenna information

Technical Specification (5G WLAN)	
Frequency Range:	5180-5240MHz 5260-5320MHz 5470-5725MHz 5725-5850MHz
Modulation Technology:	OFDM
Modulation Type:	BPSK, QPSK for 802.11a 64QAM, 16QAM, QPSK, BPSK for 802.11n
Antenna Type:	Refer to the following antenna information
Antenna Gain:	Refer to the following antenna information
Beamforming Gain:	Not support
Note:	N/A

Antenna Information			
Antenna Type	Brand	2.4GHz ~ 2.5GHz	4.9GHz ~ 5.8GHz
Dipole	RTANT	1.28dBi	2.95dBi
Chip	RainSun	3dBi	3dBi

2. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and Authorizations	:	The Laboratory has been assessed and proved to be in compliance with CNAS/CL01 Listed by CNAS, August 13, 2018 The Certificate Registration Number is L5795. The Certificate is valid until August 13, 2024 The Laboratory has been assessed and proved to be in compliance with ISO17025 Listed by A2LA, November 01, 2017 The Certificate Registration Number is 4429.01 Listed by FCC, November 06, 2017 Test Firm Registration Number: 907417 Listed by Industry Canada, June 08, 2017 The Certificate Registration Number. Is 46405-9743A
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

3. Applicable Standards and References

According to the specifications of the manufacturer, the EUT was integrated into the Inverter host (model name: HY8K1NA1) and co-located a certified cellular module (FCC ID: N7NHL78C) within the host platform, therefore, the EUT must comply with the requirements of the following standards:

Test Standards:

47 CFR Part 1, 1.1307

47 CFR Part 2, 2.1091 & 2.1093

KDB 447498 D04 v01

4. Maximum Permissible Exposure Limit

According to 47 CFR Part 1, 1.1307, for single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if: 47 CFR Part 1, 1.1307

(A) The available maximum time- averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time- averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where,

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

And,

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the minimum separation distance (cm) in any direction from any part of the device antenna(s) or radiating structure(s) to the body of the device user.

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time- averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters be-tween any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Where,

a = number of fixed, mobile, or portable RF sources claiming exemption using para-graph (b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using para-graph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or port-able RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i= the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$= the exemption threshold power (Pth) ac-cording to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j= the ERP of fixed, mobile, or portable RF source j.

$ERP_{th,j}$= exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluated$_k$= the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit$_k$= either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.

5. Maximum RF Output Power of the EUT

Mode	Band	TX Frequency (MHz)		Maximum RF Output Power with Tune-up tolerance (dBm)
GSM 850	GPRS 850	824	849	33.5
GSM 1900	GPRS 1900	1850	1910	30.5
LTE	Band 2	1850	1910	24.5
	Band 4	1710	1755	24.5
	Band 5	824	849	24.5
	Band 8	897.5	900.5	24.5
	Band 12	699	716	24.5
	Band 13	777	787	24.5
	Band 25	1850	1915	24.5
	Band 26	814	849	24.5
	Band 66	1710	1780	24.5
	Band 85	698	716	24.5
WLAN	2.4G	2412	2462	21.0
	5G	5180	5850	20.0

Note: The maximum RF output power values are based on the original test reports of the WIFI and Cellular module, and the reports are:

Cellular Module's FCC ID report: 2230599R-RFUSOTHV13-B and 2230599R-RFNAOTHV02-B that issued by DEKRA Testing and Certification Co., Ltd.

The original FCC ID reports of the WIFI Module: FR4O0971C, FR4O0971D and FR4O0971E that issued by SPORTON INTERNATIONAL INC.

6. RF Exposure Evaluation Results

Single RF Source									
Mode	**Frequency (MHz)**	**Max. Conducted Power (dBm)**	**Antenna Gain (dBi)**	**Max. EIRP (dBm)**	**Max. ERP (dBm)**	**Max. ERP (mW)**	**Separation Distance (cm)**	**Part 1.1307 Option P_{th} (mW) (B)**	**P/Pth Ratio**
GSM 850	824	33.5	5	38.500	27.32	539.51	20	1680.96	0.32
GSM 1900	1850	30.5	5	35.500	24.32	270.40	20	3060.00	0.09
LTE Band 2	1850	24.5	5	29.500	27.350	543.25	20	3060.00	0.18
LTE Band 4	1710	24.5	5	29.500	27.350	543.25	20	3060.00	0.18
LTE Band 5	824	24.5	5	29.500	27.350	543.25	20	1680.96	0.32
LTE Band 8	897.5	24.5	5	29.500	27.350	543.25	20	1830.90	0.30
LTE Band 12	699	24.5	5	29.500	27.350	543.25	20	1425.96	0.38
LTE Band 13	777	24.5	5	29.500	27.350	543.25	20	1585.08	0.34
LTE Band 25	1850	24.5	5	29.500	27.350	543.25	20	3060.00	0.18
LTE Band 26	814	24.5	5	29.500	27.350	543.25	20	1660.56	0.33
LTE Band 66	1710	24.5	5	29.500	27.350	543.25	20	3060.00	0.18
LTE Band 85	698	24.5	5	29.500	27.350	543.25	20	1423.92	0.38
WIFI 2.4G	2412	21.0	3	24.000	21.850	153.11	20	3060.00	0.05
WIFI 5G	5180	20.0	3	23.000	20.850	121.62	20	3060.00	0.04

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.

2. Max ERP for GSM = Max EIRP -2.15 + Time Average Factor

Time Average factor: - 9.03dB (1 slot) / Time Average factor: - 6.02dB (2 slot)

Time Average factor: - 4.26dB (3 slot) / Time Average factor: - 3.01dB (4 slot)

Multiple RF Source (Simultaneous Transmission)				
5G WLAN (P/Pth Ratio)	**2.4G WLAN (P/Pth Ratio)**	**GSM / LTE (P/Pth Ratio)**	**Total Ratio**	**Limit**
0.04	0.05	0.38	0.4700	1.0

Note: The evaluation results are based on both the WIFI and cellular modules integrated into the Inverter host (Model name: HY8K1NA1), and the maximum antenna gains supported by the host are used for evaluation.

Conclusion:

According to 47 CFR §1.1307 (b)(3)(i)(B), the RF exposure analysis concludes that the product is compliant with the FCC RF exposure requirements in mobile exposure condition.

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