TEST REPORT

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Report Number :	RA240320-14269E-RF-22B

Test Standard (s)

EN 62479:2010, EN 50663:2017

Sample Description

Product Type:	Wireless Module
Model No.:	RF2401F20
Trade Mark:	G-NiceRF®
Date Received:	2024-03-20
Report Date:	2024-04-16

Test Result:	The EUT complied with the standards above.

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ATC
APPROVED

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
Rev.00	RA240320-14269E-RF-22B	Original Report	2024-04-16

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Wireless Module
Tested Model	RF2401F20
Radio Type	SRD
Frequency Range	2402-2480MHz
Data Rate	250Kbps, 1Mbps, 2Mbps
Antenna Specification#	3dBi (It is provided by the manufacturer.)
Voltage Range#	DC 3.3V
Sample serial number	2IX4-1 (RF Conducted Test) (Assigned by ATC, Shenzhen)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with EN 62479: 2010 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz); EN 50663:2017 Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz).

The objective is to determine the compliance of EUT with EN 62479: 2010, EN 50663:2017.

Test Methodology

All measurements contained in this report were conducted with EN 62479: 2010.

RF Exposure Measurement

1. Introduction

This generic standard applies to low power electronic and electrical apparatus for which no dedicated product – or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 10 MHz to 300 GHz.

The object of this standard is to demonstrate the compliance of such apparatus with the basic restrictions on exposure of the general public to electric, magnetic and electromagnetic fields and contact current.

2. Compliance Criteria

2.1 General considerations

Compliance of electromagnetic emissions from electronic and electrical equipment with the basic restrictions usually is determined by measurements and, in some cases, calculation of the exposure level. If the electrical power used by or radiated by the equipment is sufficiently low, the electromagnetic fields emitted will be incapable of producing exposures that exceed the basic restrictions. This standard provides simple EMF assessment procedures for this low power equipment.

Any relevant compliance assessment procedure which is consistent with the state of the art, reproducible and gives valid results can be used.

For transmitters intended for use with more than one antenna configuration option, the combination of transmitter and antenna(s) which generates the highest available antenna power and/or average total radiated power shall be assessed.

Four routes, which as described as follows, can be used to demonstrate compliance with this standard:

A Typical usage, installation and the physical characteristics of equipment make it inherently compliant with the applicable EMF exposure levels such as those listed in the bibliography. This low-power equipment includes unintentional (or non-intentional) radiators, for example incandescent light bulbs and audio/visual (A/V) equipment, information technology equipment (ITE) and multimedia equipment (MME) that does not contain radio transmitters. NOTE Equipment is described as A/V equipment, ITE or MME if its main use is playback/recording of music, voice or images, or processing of digital information.

B The input power level to electrical or electronic components that are capable of radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined in 2.2.

C The available antenna power and/or the average total radiated power are limited by product standards for transmitters to levels below the low-power exclusion level defined in 2.2.

D Measurements or calculations show that the available antenna power and/or the average total radiated power are below the low-power exclusion level defined in 2.2.

If none of these routes can be used, then the equipment is deemed to be out of the scope of this standard and EMF assessment for conformity assessment purposes shall be made according to other standards, such as IEC 62311 or other EMF product standards.

2.2 Low-power exclusion level (Pmax)

Low-power electronic and electrical equipment is deemed to comply with the provisions of this standard if it can be demonstrated using routes B, C or D that the available antenna power and/or the average total radiated power is less than or equal to the applicable low-power exclusion level Pmax.

Annex A contains example values for Pmax derived from existing exposure limits listed in the bibliography, such as the ICNIRP guidelines [1], IEEE Std C95.1-1999 [2], and IEEE Std C95.1-2005 [3].

For wireless devices operated close to a person's body with available antenna powers and/or average total radiated powers higher than the Pmax values given in Annex A, the alternative Pmax values (called Pmax′), described in Annex B can also be used.

For low power equipment using pulsed signals, other limits may apply in addition to those considered in Annex A and Annex B. Both ICNIRP guidelines [1] and IEEE standards [2], [3] have specific restrictions on exposures to pulsed fields, and the requirements of those standards with respect to exposure to pulses shall be met. Annex C discusses this topic further.

2.3 Exposure to multiple transmitting sources

If equipment under test (EUT) is equipped with multiple intentional radiators, the overall conformity assessment might require more than just the assessment of conformity of each one of the radiators separately. The effect of multiple intentional radiators should be considered in the conformity assessment process.

Technical Report IEC 62630 [8] provides generic guidance on how to assess the EMFs generated by multiple intentional radiators.

3. Limit

3.1 Annex A

Table A.1 – Example values of SAR-based P_{max} for some cases described by ICNIRP, IEEE Std C95.1-1999 and IEEE Std C95.1-2005

Guideline / Standard	SAR limit, SAR_{max} W/kg	Averaging mass, m g	P_{max} mW	Exposure tier[a]	Region of body[a]
ICNIRP [1]	2	10	20	General public	Head and trunk
	4	10	40	General public	Limbs
	10	10	100	Occupational	Head and trunk
	20	10	200	Occupational	Limbs
IEEE Std C95.1-1999 [2]	1,6	1	1,6	Uncontrolled environment	Head, trunk, arms, legs
	4	10	40	Uncontrolled environment	Hands, wrists, feet and ankles
	8	1	8	Controlled environment	Head, trunk, arms, legs
	20	10	200	Controlled environment	Hands, wrists, feet and ankles
IEEE Std C95.1-2005 [3]	2	10	20	Action level	Body except extremities and pinnae
	4	10	40	Action level	Extremities and pinnae
	10	10	100	Controlled environment	Body except extremities and pinnae
	20	10	200	Controlled environment	Extremities and pinnae
[a] Consult the appropriate standard for more information and definitions of terms.					

3.2 Annex B

$$P_{max}' = \exp\left[As + Bs^2 + C\ln(BW) + D\right] \quad \text{(B.1)}$$

For compliance with the SAR limit of SAR_{max} = 2 W/kg averaged over m = 10 g in ICNIRP Guidelines [1] and IEEE Std C95.1-2005 [3], use Equations (B.2) to (B5) in Equation (B.1):

$$A = \left(-0{,}4588f^3 + 4{,}407f^2 - 6{,}112f + 2{,}497\right)/100 \quad \text{(B.2)}$$

$$B = \left(0{,}1160f^3 - 1{,}402f^2 + 3{,}504f - 0{,}4367\right)/1000 \quad \text{(B.3)}$$

$$C = \left(-0{,}1333f^3 + 11{,}89f^2 - 110{,}8\text{f} + 301{,}4\right)/1000 \quad \text{(B.4)}$$

$$D = -0{,}03540f^3 + 0{,}5023f^2 - 2{,}297f + 6{,}104 \quad \text{(B.5)}$$

§4.1 & §4.2-MAXIMUM EMITTED AVERAGE POWER

Test Procedure

Refer to EN 62479:2010 §4.1 & §4.2

Test Data

For worst case:

Mode	Frequency Range (MHz)	Maximum EIRP (dBm)	Maximum Tune Up EIRP		Limit (mW)	Result
			(dBm)	(mW)		
2.4G SRD	2402-2480	7.78	8.0	6.31	20	Pass

Note1: The Maximum EIRP was from the report: RA240320-14269E-RF-22A.
Note2: The tune up power was provided by manufacturer.

Conclusion: The maximum output power is below the limit of 20mW stated in EN 50663/EN62479, which is compliant to the RF Exposure to human body or head.

EXHIBIT A – EUT PHOTOGRAPHS

Please refer to the Attachment of RA240320-14269E EUT Photographs

******* END OF REPORT *******