

INGERSOLL RAND, INDUSTRIAL U.S., INC. **RF EXPOSURE REPORT**

SCOPE OF WORK

RF EXPOSURE CALCULATIONS – 802.15.4 RADIO MODULE (TA-ICX-499-154RAD)

REPORT NUMBER

106326393ATL-004

ISSUE DATE

03 October 2025

REVISION DATE

[N/A]

PAGES

8



DOCUMENT CONTROL NUMBER

Non-Specific Radio Report Shell Rev. December 2017
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RF EXPOSURE REPORT

Report Number: 106326393ATL-004

Project Number: G106326393

Report Issue Date: 03 October 2025

Model / HVIN: TA-ICX-499-154RAD

FCC ID: 2ATB3-ICXSTM32WB

IC: 25117-ICXSTM32WB

Standards: FCC Title 47 CFR Parts 1.1310
RSS-102, Issue 6

Test Location

Intertek
1950 Evergreen Blvd., Suite 100
Duluth, GA 30096 USA
FCC Designation: US1046
CAB Designator: US0128

Client

Ingersoll-Rand Industrial U.S.Inc.
53 Frontage Rd Ste 250
Hampton, NJ 08827-4032 USA

Report prepared by



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Report reviewed by



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1 Introduction and Conclusion

RF Exposure calculations were performed on the product constructed as described in Section 4. Information provided by the client including maximum output power, antenna gain(s), and minimum separation distance(s) was used to determine if the product under evaluation was exempt from routine evaluation. Any change in these stated values may invalidate these results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product under evaluation is exempt from routine evaluation for each of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

2 Evaluation Summary

Section	Test full name	Result
5	Maximum Permissible Exposure (FCC Title 47 CFR Part 1.1310)	Compliant
6	ISED Routine Evaluation Exemption Criteria (RSS-102 Issue 6)	Compliant

3 Client Information

This evaluation was performed at the request of:

Client: Ingersoll-Rand Industrial U.S.Inc.
53 Frontage Rd Ste 250
Hampton, NJ 08827-4032 USA

Contact: Andres Cruz

Email: andres.cruz@irco.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Ingersoll-Rand Industrial U.S.Inc.
53 Frontage Rd Ste 250
Hampton, NJ 08827-4032 USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
802.15.4 Radio Module	Ingersoll-Rand	TA-ICX-499-154RAD	QC1

Receive Date:	05 September 2025
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)

The DUT was an 802.15.4 radio module utilizing channels 11 through 25.

Radio/Receiver Characteristics	
Frequency Range / Number of Channels	2405-2475MHz / 15 Channels
Data Rate / Modulation Type(s)	GFSK
Channel Separation:	5MHz
Maximum Conducted Output Power:	6.6dBm (4.57mW)
Equipment Type	Mobile – 20cm Separation Distance
Antenna Type and Gain	PIFA: +2.0 dBi (Ezurio, P/N: EFG2401A3S-10MHF1) PIFA: +2.0 dBi (Ezurio, P/N: 001-0014) Dipole: +2.0dBi (Raspberry Pi, P/N: SC0480) (Intertek takes no responsibility for the accuracy of this information.)

5 Maximum Permissible Exposure Criteria

§ 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (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 TO § 1.1310(e)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)				
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* (100)	≥6
3.0-30	1842/f	4.89/f	* (900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	<30
1.34-30	824/f	2.19/f	* (180/f ²)	<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. * = Plane-wave equivalent power density.

5.1 Calculations

Channel (MHz)	Measured Conducted Power		Antenna Gain		Separation Distance (m)	Result (mW/cm ²)	Limit (mW/cm ²)	% of Limit
	(dBm)	(W)	(dBi)	Numeric				
2405	6.6	0.005	2	1.5849	0.2	0.0015	1.000	0.15%

$$\text{Minimum Safe Distance} = \text{SQRT}(8.6 / 4\pi) = 0.83 \text{ cm}$$

6 ISED Routine Evaluation Exemption Criteria

RSS-102 Issue 6 § 5.3.2: RF Exposure limits

The electric and magnetic field strength reference levels, power density reference levels, and associated reference period for devices employed by the general public (uncontrolled environment) and controlled-use devices (controlled environment) are specified in table 7 and table 8. Note that the power density limits specified in these tables apply to whole body exposure conditions.

Table 7: RF field strength and power density limits for devices used by the general public (uncontrolled environment)

Frequency range (MHz)	Electric field (V _{RMS} /m)	Magnetic field (A _{RMS} /m)	Power density (W/m ²)	Reference period (minutes)
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	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000 / f^{1.2}$

6.1 Calculations

Channel (MHz)	Measured Conducted Power		Antenna Gain		Separation Distance (m)	Result (W/m ²)	Limit (W/m ²)	% of Limit
	(dBm)	(W)	(dBi)	Numeric				
2405	6.6	0.005	2	1.5849	0.2	0.0145	5.3554	0.27%

7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	03 October 2025	106326393ATL-004	JOP	MC	Original Issue