INGERSOLL-RAND INDUSTRIAL U.S. INC.

SAR EXCLUSION TEST REPORT

SCOPE OF WORK
SAR EXCLUSION CALCUALTION on Model QX5PM

REPORT NUMBER
105295733BOX-012.1

ISSUE DATE
04/06/2023

[REVISED DATE]
Original issue

DOCUMENT CONTROL NUMBER
Non-Specific Radio Report Shell Rev. December 2017

SAR EXCLUSION TEST REPORT

(FULL COMPLIANCE)

Report Number: 105295733BOX-012.1
Project Number: G105295733

Report Issue Date: 04/06/2023

Model(s) Tested: QX5PM
Model(s) Partially Tested: None
Model(s) Not Tested but declared equivalent by the client: None

Standards:

FCC Part 1 Subpart I, April 2021
Procedures Implementing the National Environmental Policy Act of 1969
§1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

ISED RSS-102 Issue 5, March 19, 2015
Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

Tested by:
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Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. 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 tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
1	SAR Exclusion Evaluation (FCC §1.1310; ISED RSS-102 Issue 5)	Pass
2	Revision History	--

3 SAR Exclusion Evaluation

FCC SAR Test Exclusion Thresholds (FCC KDB Publication 447498 D01 v06):

For 100 MHz ≤ f ≤ 6 GHz and dmin ≤ 50 mm:

$$\frac{P_{max}}{d_{min}} \cdot [\sqrt{f_{(GHz)}}] \quad \leq 3.0 \quad \text{for 1-g SAR, and}$$
$$\leq 7.5 \quad \text{for 10-g extremity SAR}$$

where P_{max} = max. power of channel in mW
d_{min} = minimum test separation distance in mm
f = RF channel transmit frequency

Calculation:

BLE and IEC 802.15.4 transmitters do not transmit simultaneously.

Type of TX	Frequency, f (GHz)	Minimum Separation Distance, dmin (mm)	Power*, Pmax (dBm eirp)	Peak Antenna Gain (dBi)	Pmax (dBm cond.)	Pmax (mW cond.)	(Pmax/ dmin)* SQRT(f)	SAR Test Exclusion Threadhold (Extremity)	Result
BLE	2480	5	13.69	2	11.69	14.76	4.65	7.5	Compliant
802.15.4	2480	5	4.82	2	2.82	1.9	0.60	7.5	Compliant

*: data was taken from Intertek 105295733BOX-012 test report

Note: The separation distance between a radio's antenna structure to the user is more 15 mm.

Evaluation Results, FCC: Complies

ISED RSS-102 Issue 5 §2.5.2 Exemption:

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance[4,5]					
	Exemption Limits (mW)				
Frequency (MHz)	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

SAR evaluation is not required when the maximum of the conducted output power or EIRP is less than the exemption limits given in RSS-102 Issue 5 Table 1, above.

Type of TX	Frequency, f (GHz)	Minimum Separation Distance, dmin (mm)	Power*, Pmax (dBm eirp)	Peak Antenna Gain (dBi)	Pmax (dBm cond.)	Pmax (mW cond.)	SAR Test Exclusion Threadhold EIRP (mW)	Result
BLE	2480	15	13.69	2	--	--	16	Compliant
802.15.4	2480	15	4.82	2	--	--	16	Compliant

*: data was taken from Intertek 105295733BOX-012 test report

Note: The separation distance between a radio's antenna structure to the user is more 15mm.

Evaluation Results, RSS-102: Complies

4 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	04/06/2023	105295733BOX-012.1	VFV	KPS	Original Issue