

# INGERSOLL-RAND INDUSTRIAL U.S. INC. SAR EXCLUSION TEST REPORT

**SCOPE OF WORK**

SAR EXCLUSION CALCUALTION on Model QX5PM

**REPORT NUMBER**

105295733BOX-012.1

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**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)

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## 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<br>(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  $100 \text{ MHz} \leq f \leq 6 \text{ GHz}$  and  $d_{\min} \leq 50 \text{ mm}$ :

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

$$\leq 7.5 \quad \text{for 10-g extremity SAR}$$

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, $d_{\min}$ (mm) | Power*, $P_{\max}$ (dBm eirp) | Peak Antenna Gain (dBi) | $P_{\max}$ (dBm cond.) | $P_{\max}$ (mW cond.) | $(P_{\max}/d_{\min})^*$ SQRT(f) | SAR Test Exclusion Threshold (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<sup>4,5</sup>**

| Frequency (MHz) | Exemption Limits (mW)           |                                 |                                 |                                 |                                 |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                 | 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 Threshold 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 <i>VFV</i> | KPS <i>KPS</i> | Original Issue |
|                |            |                    |                |                |                |
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