

## SAR EXEMPTION CALCULATIONS

**1.0 APPLICANT:**

|                    |                              |
|--------------------|------------------------------|
| DATE:              | 03/27/2015                   |
| NAME OF APPLICANT: | HONEYWELL INTERNATIONAL INC. |
| FCC ID:            | CFS8DLRF6FOB                 |
| IC:                | 573F-RF6FOB                  |

**2.0 FCC AND IC RULES CONCERNING SAR EXEMPTION:****From: KDB447498, §4.2.3. Extremity Exposure Conditions:**

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation.<sup>21</sup> When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Test Exclusion Thresholds in section 4.3 should be applied to determine SAR test requirements.

**From: RSS-102, §2.5.1. SAR Exemption Limits For Routine Evaluation:**

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1...

**3.0 SAR EXEMPTION CALCULATIONS:****FCC LIMITS:****MAX CHANNEL POWER**

The maximum channel power per Exhibit 5-4C is -0.46 dBm, or 0.9mW.

**1-g BODY EXEMPTION LIMIT CALCULATIONS:**

From KDB447498, §4.3.1 (1), and RSS-102 §2.5.1: When the minimum test separation distance is < 5 mm, a distance of 5 mm can be applied to determine SAR test exclusion ...

1-g SAR test exclusion is allowed if the (max channel power, mW) / (min test sep distance, mm)\*sqrt(f(GHz)) <= 3.0

**10-g BODY EXEMPTION LIMIT CALCULATIONS:**

From KDB447498, §4.3.1 (1): When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion ...

10-g SAR test exclusion is allowed if the (max channel power, mW) / (min test sep distance, mm)\*sqrt(f(GHz)) <= 7.5

**IC LIMIT:**

Per RSS-102, §2.5.1, Table 1, the worst case of the conducted output power and calculated radiated power at 5.0mm must be compared to the exemption limit taken from the Table 1. The extrapolated limit from the table for 2.475 GHz operation is **3.95mW**.

**RF DEVICE ANTENNA POWER AND GAIN:**

The measured for Antenna Port Input Power is -0.46 dBm at 2.475 GHz (Exhibit 5-4C).

The efficiency of the antenna is -6.9 dB (20.4%)

The gain of the antenna is -2.32 dBi.

The calculated radiated power from the antenna is thus -0.46 dBm - 6.9 dB = -7.36 dBm which is 0.184mW.

For purposes of RSS-102, §2.5.1, the calculated e.i.r.p. is less than the conducted power due to the negative antenna gain.

Therefore the conducted power (higher value) of -0.46 dBm, or **0.90mW** should be used.

**SAR EXEMPTION COMPARISON:****FCC:**

For SAR exemption, the 1-g and 10-g formulas for test exclusion are applied. The max channel power is rounded to the nearest mW:

1-g:  $1 / (5 * \sqrt{2.475}) = 0.13$ ,  $0.13 \leq 3.0 \implies$  therefore  $1 / (5 * \sqrt{2.475}) = 0.1 \leq 3.0 \implies$  TRUE, therefore exempt.

10-g:  $1 / (5 * \sqrt{2.475}) = 0.13$ ,  $0.13 \leq 7.5 \implies$  therefore  $1 / (5 * \sqrt{2.475}) = 0.1 \leq 7.5 \implies$  TRUE, therefore exempt.

**IC:**

For purposes of RSS-102, §2.5.1, the calculated e.i.r.p. is less than the max conducted power due to the negative antenna gain. Therefore the max conducted power (higher value) of 0.90mW should be used.

For SAR exemption, the calculated radiated power is compared to the IC limit from RSS-102 §2.5.1, Table 1:

Result: The max conducted power of **0.90 mW** is less than lowest SAR limit of **3.95mW**. Therefore, exempt.

**4.0 RESULTS:**

TEST RESULT: PASS

The calculations above show that the EUT is exempt from SAR testing for the limits set by both the FCC and IC regulations.