SAR & RF Exposure Exemption Technical Brief

Application Information

APPLICANT	Alula
DATE	12/26/2018
PROD DESC	Wireless Door/Window Sensor
PMN	RE307 Door/Window Sensor, RE607 Door/Window Sensor
HVIN	RE307, RE607
FVIN	75-0082-03, 75-0082-08, 75-0086-03, 75-0086-08
IC	8310A-RE307

SAR Evaluation Exemption (RSS-102, Section 2.5.1)

From RSS-102, Section 2.5.1 Exemption Limits for Routine Evaluation – SAR 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."*

This device is meant to be mounted to the wall or ceiling of a residence. As such, it will always be at least 20cm from the user, and is thus exempt from SAR evaluation.

RF Exposure Exemption (RSS-102, Section 2.5.2)

Field strength measurements were taken at 3 meters. Because of the low duty cycle of this device, the 20dB duty cycle correction is allowed. Using the standard conversion from field strength, EIRP is calculated as follows:

EIRP (dBm) $= (E - 20) + 20\log(3) - 104.8$

From RSS-102, Section 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

> *"RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:*
>
> - *At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} \, f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz."*

Thus, the EIRP limit for exemption from RF exposure evaluation is calculated as follows:

EIRP Limit (dBm) $= 10\log(1.31 \times 10^{-2} \, f^{0.6834}) + 30$

The table that follows will show that the device is exempt from RF exposure evaluation.

Frequency (MHz)	Peak Level (dBuV/m)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Test Result
433.92	94.2	-21.1	29.2	-50.3	PASS
867.84	72.7	-42.6	31.3	-73.8	PASS
1301.76	54.0	-61.3	32.5	-93.7	PASS
1735.68	54.2	-61.1	33.3	-94.4	PASS
2169.60	53.5	-61.8	34.0	-95.7	PASS
2603.52	51.8	-63.5	34.5	-98.0	PASS
3037.44	49.2	-66.1	35.0	-101.0	PASS
3471.36	53.7	-61.6	35.4	-96.9	PASS
3905.28	48.3	-67.0	35.7	-102.7	PASS
4339.20	42.1	-73.2	36.0	-109.2	PASS

RF Exposure Limits (FCC 1.1310)

From FCC **§1.1310,** the allowable field strength exposure limits for 300-1500 MHz is calculated as follows:

Power Density Limit: $\dfrac{f}{1500}$ (mW/cm^2) where f = frequency in MHz

For frequencies above 1500 MHz, the limit is 1mW/cm^2.

$$\text{Power Density Limit (dBmW/m}^2\text{): } \frac{dBmW}{m^2} = 10 \log_{10}\left(\frac{f}{1500} * 10000\right)$$

*where f remains 1500 above frequencies of 1500 MHz

$$\text{Peak Level to Power Conversion: } \frac{dBmW}{m^2} = \frac{dBuV}{m} - 115.8$$

Frequency (MHz)	Peak Level (dBuV/m)	Peak Level (dBmW/m^2)	Power Limit (dBmW/m^2)	Margin (dB)	Test Result
433.92	94.2	-21.6	34.6	-56.2	PASS
867.84	72.7	-43.1	37.6	-80.7	PASS
1301.76	54.0	-61.8	39.4	-101.2	PASS
1735.68	54.2	-61.6	40.0	-101.6	PASS
2169.60	53.5	-62.3	40.0	-102.3	PASS
2603.52	51.8	-64.0	40.0	-104.0	PASS
3037.44	49.2	-66.6	40.0	-106.6	PASS
3471.36	53.7	-62.1	40.0	-102.1	PASS
3905.28	48.3	-67.5	40.0	-107.5	PASS
4339.20	42.1	-73.7	40.0	-113.7	PASS

Sincerely,

Paul Saldin
Vice President
Alula