SAR & RF Exposure Exemption Technical Brief

Application Information

APPLICANT	Alula
DATE	12/24/2018
PROD DESC	Wireless Door/Window Sensor
PMN	RE207 Door/Window Sensor, RE207T Door/Window Sensor
HVIN	RE207, RE207T
FVIN	75-0082-02, 75-0082-04, 75-0086-03, 75-0086-08
IC	8310A-RE207

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) + 20log(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 x 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
345.0	94.5	-20.8	28.5	-49.3	PASS
690.0	63.7	-51.6	30.6	-82.1	PASS
1035.0	47.4	-67.9	31.8	-99.6	PASS
1380.0	49.7	-65.6	32.6	-98.2	PASS
1725.0	51.3	-64.0	33.3	-97.3	PASS
2070.0	48.5	-66.8	33.8	-100.6	PASS
2415.0	50.4	-64.9	34.3	-99.1	PASS
2760.0	54.1	-61.2	34.7	-95.8	PASS
3105.0	55.0	-60.3	35.0	-95.3	PASS
3450.0	53.4	-61.9	35.4	-97.2	PASS

RF Exposure Limits (FCC 1.1310)

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

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

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

Power Density Limit (dBmW/m²): $\frac{dBmW}{m^2} = 10\log_{10}(\frac{f}{1500} * 10000)$

*where f remains 1500 above frequencies of 1500 MHz

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
345.0	94.5	-21.3	33.6	-54.9	PASS
690.0	63.7	-52.1	36.6	-88.7	PASS
1035.0	47.4	-68.4	38.4	-106.8	PASS
1380.0	49.7	-66.1	39.6	-105.7	PASS
1725.0	51.3	-64.5	40.0	-104.5	PASS
2070.0	48.5	-67.3	40.0	-107.3	PASS
2415.0	50.4	-65.4	40.0	-105.4	PASS
2760.0	54.1	-61.7	40.0	-101.7	PASS
3105.0	55.0	-60.8	40.0	-100.8	PASS
3450.0	53.4	-62.4	40.0	-102.4	PASS

Sincerely,

Paul Saldin
Vice President
Alula