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1.0 Maximum Permissible Exposure Evaluation (Supplements the test report.)

The measured power is considered for the intended use of the device and resulting RF exposure to the user.

1.2 Criteria

Section Reference	Date
447498 D01 General RF Exposure Guidance v06 // RSS-102 Issue 5	26 Aug 2021

1.3 Procedure

Using measurement of peak power and considering the intended application, determine the permissible exposure level, applicability of exclusion, or whether additional exposure tests (SAR) are indicated. When applicable justify conclusion for selected exposure level and separation distance.

This device is a space heater designed to be mounted to a wall. It is not held during operation. The user normally makes operating adjustment by pressing 1 of 4 buttons in about 5 minutes or less. Nearest button to the antenna is 5 mm distance through PCB, gap between PCB and enclosure, and thickness of the enclosure plastic.

Adjustment is infrequent and are usually done by using the intended wireless feature remotely from a smartphone with no contact with the heater panel.

This device does not stream video or audio so the transmit duty cycle over any six minute period would be expected to be low. Duty Cycle was measured on the device using a continuous packet transmission mode (worst-case), which resulted in a Duty Cycle correction factor of -3.2 dB.

Duty Cycle Correction Factor Measurement:

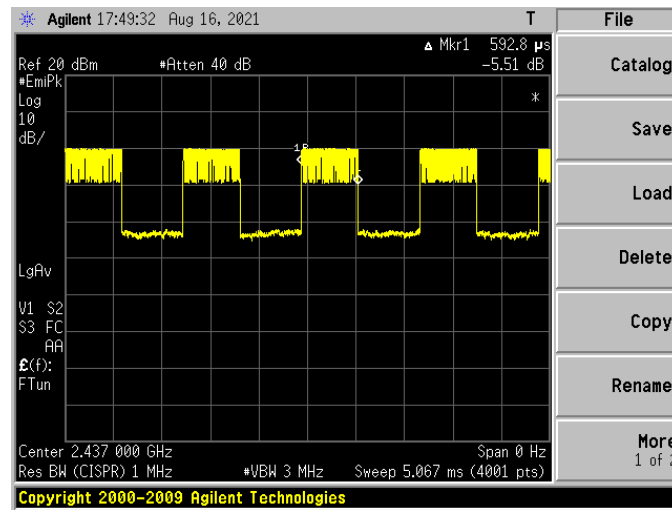
Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

Continuous packet transmission mode was used for the duty cycle measurement, which would represent a worst-case operating scenario. Duty Cycle measurement was performed on 25 Aug, 2021.

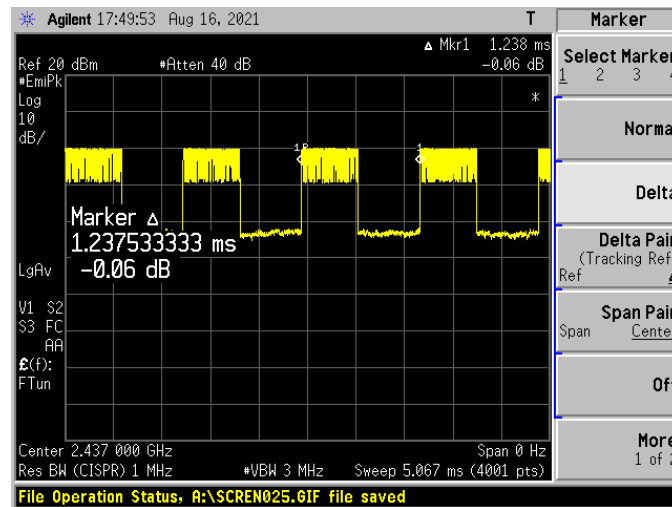
Transmitter on time: 592.8µs
Transmitter interval: 1.238ms

$$\text{Duty Cycle} = 592.9 / 1238 = 0.48$$

$$\text{Duty Cycle Correction Factor (dB)} = 10\text{Log}(\text{On Time} / \text{Interval}) = 10\text{Log}(592.9/1238) = -3.2\text{dB}$$



Transmitter On Time Measurement



Transmitter Interval Measurement

1.4 Power to Exposure Calculation

For 2.4 GHz radio power is determined by conducted measurement. Safe exposure distance was calculated for the allowed maximum uncontrolled public exposure limit.

Table 1.4.1 Power Calculation for Exposure, 2.4 GHz Radio (Highest frequency 2.480 GHz)				
Measured Conducted Peak Power dBm	Source Duty Cycle Factor dB	Antenna Gain dBi	Calculated EIRP dBm	EIRP In Linear Terms mW
8.7	-3.2	0.5	6.0	3.98

1.5 SAR Exemption Calculation – FCC

Applicable requirement: KDB 447498 Clause 4.3.1 Section 1

Calculated power (max power including tune up tolerance = 3.98 mW):

$$[(3.98 \text{ mW})/(5 \text{ mm})] \cdot [\sqrt{2.4 \text{ (GHz)}}] = 1.23$$

$$1.23 \leq 6.0 \text{ (Limb exposure)}$$

$$1.23 \leq 3.0 \text{ (Non-Limb exposure)}$$

1.6 SAR Exemption Calculation – IC

Applying Table 1 of clause 2.5.1 applying 0.5 cm or 5 mm spacing column and row 2450 MHz. The exemption limit is 4 mW.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance ^{4,5}					
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

$$3.98 \text{ mW} < 4 \text{ mW}$$

1.7 Conclusion

The exposure limit is satisfied.

Signed:



Larry Finn
