

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Certification/ RSS 210
2AV7F-FDMX1
26036-FDMX1
20-0153
May 11, 2020
Aria Lights
FDMX1

MPE/SAR exclusion/RF Exposure Evaluation

Maximum Permissible Exposure to RF (MPE) CFR 15.247 (i), CFR 1.1310 (e)

The maximum exposure level to the public from the RF power of the EUT shall not exceed a power density, **S** as per the respective limits in Table 1 below, at a distance, **d**, of 5 cm (Mobile condition) from the EUT.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

Therefore, for:

MPE for 902 MHz – 928 MHz:

Limit: 0.61 mW/cm²

Peak Power (dBm) = 8.2 dBm

Peak Power (Watts) = 0.007 W

Gain of Transmit Antenna = +2.2 dBi = 1.66 numeric

d = Distance = 5 cm = 0.05 m

$$\begin{aligned} S &= (PG/4\pi d^2) = \text{EIRP}/4A = 0.007 (1.66)/4*\pi*0.05^2 \\ &= 0.0116/0.0314 = 0.3701 \text{ W/m}^2 \\ &= (0.3701 \text{ W/m}^2) (1\text{m}^2/\text{W}) (0.1 \text{ mW/cm}^2) \\ &= 0.03701 \text{ mW/cm}^2 \end{aligned}$$

which is << less than S = 0.61 mW/cm²

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SAR Exclusion:

General SAR test exclusion per KDB 447498 D01 V06 section 4.3

Test exclusion conditions are based on source-based time averaged maximum conducted output power of the RF channel, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power of channel mW}) / (\text{min. test separation distance, mm})] * [(\sqrt{f_{\text{GHz}}})]$$

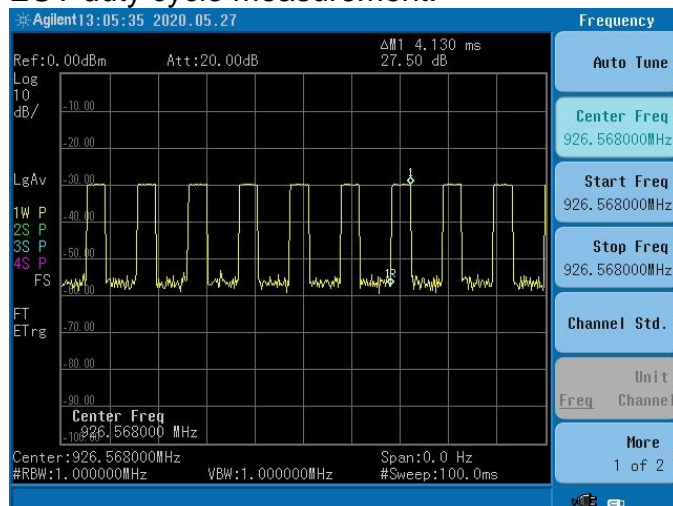
Where the result must be ≤ 3.0 for 1-g SAR and ≤ 7.0 for 10-g SAR

EUT source based time averaged (SBTA) = (output power + antenna gain * duty cycle)

$$\text{SBTA} = 8.2 \text{ dBm} + 2.2 \text{ dBm} * (0.37) = 3.85 \text{ dBm} = 2.42 \text{ mW}$$

$$2.42 \text{ mW}/50 \text{ mm} * (\sqrt{0.915 \text{ GHz}}) = 0.046 \ll 3.0 \text{ for 1-g SAR and } \leq 7.0 \text{ for 10-g SAR}$$

EUT duty cycle measurement:



$$\text{DC} = 4.13 \text{ mSec} * 9 = 37.17 = 37.2 \%$$

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RSS-102, 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 levels presented in Table 1 below.

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

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p) source-based time averaged (SBTA) output power.

In this case the maximum conducted output power = 6.60mW and SBTA = 2.42 mW therefore the maximum conducted output power is higher.

The maximum conducted output power is less than 17mW @ 835 MHz and 7mW @ 1900 MHz and is considered to be exempt from routine evaluations.

All calculations performed by:
Test Engineer: George Yang

Date: May 27, 2020

Signature: 