



MPE/RF EXPOSURE EVALUATION

FCC CFR 47 Part 1.1310

Report No.: SAFR01-U6A Rev A FCC MPE

Company: Safran Passenger Innovations

Evaluation of: Rave Access Point



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FROM



Evaluation of: Safran Passenger Innovations Rave Access Point

To: FCC CFR 47 Part 1.1310

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Calculations for RF Exposure Evaluation

Power Density = P_d (W/m²) = $EIRP / (4 \cdot \pi \cdot d^2)$

$EIRP = P \cdot G$

P = Peak output power (W)

G = Antenna numeric gain (numeric)

d = Separation distance (m)

Numeric Gain = $10^{(G \text{ (dBi)}/10)}$

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0 mW/cm²

The Safran Passenger Innovations Rave AP contains the following pre certified radios modules that were assessed assuming simultaneous transmission. These calculations represent worst case in terms of the RF exposure levels. There are two TK4WLE200NX radio modules installed in the Rave AP meaning that there can be a total of up to 5 radios operating simultaneously.

Ref	FCC ID	Radio Type	MPE Report Issued by	Report Number	Date
(1)	TK4WLE200NX	WiFi	MRT Technology (Suzhou) Co., Ltd	1608RSU02004 V01	09-07-2016
(2)	TK4WLE1216V520	WiFi	Bureau Veritas (H.K.) Ltd	SA190807D08A	Nov 18 2019
(3)	SQGBT800	BT	International Certification Corp.	FA490301 Rev 01	Sept 19 2014

Freq. Band (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Power Density (mW/cm ²) @ 20cm	Power Density Limit (mW/cm ²)	Min Calculated safe distance for Limit (cm)
2400.0 - 2483.5 (802.15.4 (CabinLink))	5.50	3.55	6.42	4.39	0.003	1.00	1.11
2412 ~ 2462 (DTS) (1)	5.50	3.55	24.78	300.61	0.212	1.00	9.21
5745 ~ 5825 (1)	6.80	4.79	22.48	177.01	0.169	1.00	8.21
5150- 5825 (2)	7.00	5.01	25.68	369.83	0.369	1.00	12.15
2400.0 - 2483.5 (BT) (3)	5.50	3.55	7.91	6.18	0.004	1.00	1.32

Simultaneous Operation BLE + 802.15.4 (CabinLink) + 3 Wi-Fi radios Assessment

Assessment of worst case exposure conditions with the 5 radios transmitting simultaneously.

Freq. Band (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density Limit (mW/cm ²) E_{ref}	Power Density (mW/cm ²)	E_i/E_{ref}
2400.0 - 2483.5 (802.15.4 (CabinLink))	5.50	3.55	6.42	4.39	1.00	0.003	0.003
2412 ~ 2462 (DTS) (1)	5.50	3.55	24.78	300.61	1.00	0.212	0.212
5745 ~ 5825 (1)	6.80	4.79	22.48	177.01	1.00	0.169	0.169
5150- 5825 (2)	7.00	5.01	25.68	369.83	1.00	0.369	0.369
2400.0 - 2483.5 (BT) (3)	5.50	3.55	7.91	6.18	1.00	0.004	0.004
Summation of Ratio:							0.757

The Total Evaluation was calculated using the formula:

$$\sum_{i=1}^n \frac{E_i}{E_{ref}} \leq 1$$

Where

E_i : calculated E-field Strength for transmitter

E_{ref} : E-field strength related limit

Minimum Safe Distance = 0.20 m

Note: for mobile or fixed location transmitters the minimum separation distance is 0.20m, even if calculations indicate the MPE distance to be less.

Specification - RF Exposure Evaluation Limits

The Limit is defined in Table 1 of FCC §1.1310.

Specification - Maximum Permissible Exposure Limits

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)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) 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



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