

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: IoT Security Group, SL
Address of applicant: Calle Pez Dorado, 27, local 2 29620 Torremolinos Malaga, Spain

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General Description of EUT:

Product Name: MSR-W6
Brand Name: /
Model No.: MSR-W6-V1
Adding Model(s): /
Rated Voltage: AC120V
Power Adapter 1#: MODEL: DSA-18PFCA-09, INPUT:AC100-240V~50/60Hz 0.6A
OUTPUT:DC12V,1.5A
Power Adapter 2#: MODEL:AMS200-1201500F, INPUT:AC100-240V~50/60Hz 0.8A
OUTPUT:DC12V,1.5A
FCC ID: 2A7LU-MSR-W6-V1
Equipment Type: Mobile device

Technical Characteristics of EUT:	
Wi-Fi 2.4GHz	
Support Standards:	802.11a, 802.11n(HT20), 802.11n-HT40, 802.11ax-HE20, 802.11ax-HE40
Frequency Range:	2412-2462MHz for 802.11b/g/n/ax(HT20), 2422-2452MHz for 802.11n/ax(HT40)
RF Output Power:	Antenna 0: 15.04dBm (Conducted), Antenna 1: 15.21dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Quantity of Channels:	11 for 802.11b/g/n(HT20); 11 for 802.11ax(HT20) 7 for 802.11n(HT40); 7 for 802.11ax(HT40)
Channel Separation:	5MHz
Type of Antenna:	External Antenna
Antenna Gain:	5dBi
Wi-Fi 5GHz	
Support Standards:	802.11a, 802.11n(HT20), 802.11n-HT40, 802.11ax-HE20, 802.11ax-HE40,802.11ac-VHT80, 802.11ax-HE80
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	5150-5250MHz: Antenna 0 : 14.70dBm (Conducted), Antenna 1 : 15.87dBm (Conducted) 5725-5850MHz: Antenna 0 : 15.44dBm (Conducted),Antenna 1 : 16.56dBm (Conducted)

Type of Modulation:	QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Type of Antenna:	External Antenna
Antenna Gain:	5dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

1.3 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,
the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

Wi-Fi 2.4GHz

Maximum Tune-Up output power: 15.5(dBm)

Maximum peak output power at antenna input terminal: 35.48(mW)

Prediction distance: >20(cm)

Prediction frequency: 2437 (MHz)

Antenna gain: 5.0(dBi)

Directional gain (numeric gain): 3.16

The worst case is power density at prediction frequency at 20cm: 0.0223(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Wi-Fi 5GHz

Maximum Tune-Up output power: 17.0(dBm)

Maximum peak output power at antenna input terminal: 50.12(mW)

Prediction distance: >20(cm)

Prediction frequency: 5785 (MHz)

Antenna gain: 5.0(dBi)

Directional gain (numeric gain): 3.16

The worst case is power density at prediction frequency at 20cm: 0.0315(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Mode for Simultaneous Multi-band Transmission

Wi-Fi 2.4GHz+ Wi-Fi 5GHz

Evaluation Result: $0.0223/1+0.0315/1=0.0538$

Limit: 1

Result: Pass