

**CTK Co., Ltd.**

(Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17142, Korea
Tel: +82-31-339-9970 Fax: +82-31-624-9501

RF EXPOSURE EVALUATION

Applicant	SOLUM CO.,LTD.
Applicant Address	7F, 2354, Yonggu-daero, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
Product Description	Auto Tag
FCC ID	2AFWN-CD01HFS01X
RF power	Wi-Fi HaLow : 17.0 dBm (Conducted) *Declared power
	UWB: -8.9 dBm/50MHz(Peak EIRP)
Antenna type	Wi-Fi HaLow : LDS Antenna UWB : LDS Antenna
Antenna Gain	Wi-Fi HaLow : 3.00 dBi UWB : 5.38 dBi
Frequency Range	Wi-Fi HaLow : 1M Bandwidth : 903.5 MHz - 926.5 MHz 2M Bandwidth : 905 MHz - 925 MHz 4M Bandwidth : 906 MHz - 922 MHz UWB : 6 489.6 MHz
Number of channels	Wi-Fi HaLow : 1M Bandwidth : 24 Channels 2M Bandwidth : 11 Channels 4M Bandwidth : 5 Channels UWB : 1

Standard Requirement

The following RF exposure procedures are applicable :

- FCC Rules
 Part 1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

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			<u>1.0</u>	30

f = frequency in MHz

* = Plane-wave equivalent power density



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MPE Calculations

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user. The MPE calculation for this exposure is shown below.

The peak radiated output power (EIRP) is calculated as follows:

$$\text{EIRP} = P + G$$

Where,

P = Power input to the antenna (mW)

G = Power gain of the antenna (dBi)

The numeric gain(G) of the antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain} / 10)$$

Power density at the specific separation:

$$S = PG / (4R^2\pi)$$

Where,

S = Maximum power density (mW/cm²)

P = Power input to the antenna (mW)

G = Numeric power gain of the antenna

R = Distance to the center of the radiation of the antenna

(20cm = limit for MPE)

Estimated safe separation:

$$R = \sqrt{(PG / 4\pi)}$$

Where,

P = Power input to the antenna (mW)

G = Numeric power gain of the antenna

R = Distance to the center of the radiation of the antenna

(20cm = limit for MPE)



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RF Exposure Results

Mode	Measured Max Output Power (dBm)	G (dBi)	Power tolerance (dB)	P (dBm)	P (mW)	Power Density (mW/cm ²)	Limit (mW/ cm ²)	R (cm)
Wi-Fi HaLow	17.0	3.0	+1.0	21.0	125.9	0.025	1.0	20.0
UWB	-8.9	-	+1.0	-7.9	0.162	0.000 03		

* Note : The measured maximum output power of UWB is EIRP.

Simultaneous transmitter

Mode	MPE ratios	Limit
Wi-Fi HaLow	0.025	-
UWB	0.000 03	
Combined	0.025 03	1.0

*MPE ratios = MPE/MPE limit at each frequency

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