

MPE Calculation

Applicant:	Signify (China) Investment Co., Ltd.
Address:	Building no.9, Lane 888, Tianlin Road, Minhang District Shanghai, 200233 China
Product:	LED light
FCC ID:	2AGBW9290031345X, 2AGBW9290031347X
Model No.:	9290031345, 9290031347
Reference RF report #	709502203709-00A, 709502203709-00B

According to subpart 15.247(i), KDB 447498 D01 General RF Exposure Guidance v06 and subpart §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4 \pi R^2$ = 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 (appropriate units, e.g., cm);

Calculated Data: Integral PCB Antenna for Bluetooth 5.0 LE and Zigbee, there only one Antenna ports, so it is not necessary consider simultaneous transmission.

For Bluetooth 5.0 LE

Maximum peak output power at antenna input terminal (dBm):	9.52
Maximum peak output power at antenna input terminal (mW):	8.95
tune-up conducted power(dBm):	10.52
tune-up conducted power(mW):	11.27
Prediction distance (cm):	20
Antenna Gain, typical (dBi):	0.76
Maximum Antenna Gain (numeric):	1.19
The worst case is power density at predication frequency at 20 cm (mW/cm ²):	0.003
MPE limit for general population exposure at prediction frequency (mW/cm ²):	1.0

Note: The tune-up tolerance is 1dB was declared by the manufacturer.

The max power density 0.003 (mW/cm²) < 1.0 (mW/cm²)

Result: Compliant

For Zigbee

Maximum peak output power at antenna input terminal (dBm):	9.46
Maximum peak output power at antenna input terminal (mW):	8.83
tune-up conducted power(dBm):	10.46
tune-up conducted power(mW):	11.12
Prediction distance (cm):	20
Antenna Gain, typical (dBi):	0.76
Maximum Antenna Gain (numeric):	1.19
The worst case is power density at predication frequency at 20 cm (mW/cm ²):	0.003
MPE limit for general population exposure at prediction frequency (mW/cm ²):	1.0

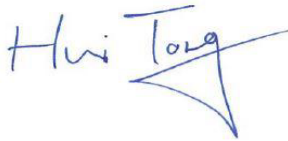
Note: The tune-up tolerance is 1dB was declared by the manufacturer.
The max power density 0.003 (mW/cm²) < 1.0 (mW/cm²)
Result: Compliant

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

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