

FCC §1.1307& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart § 2.1051 and subpart §1.1310, 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/cm²)	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
300-1500	/	/	f/1500	30
1500-100,000	/	/	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:

Mode	Frequency	Antenna Gain		Output Power		Evaluation Distance	Power Density	MPE Limit
	(MHz)	(dBi)	(numeric)	(dBm)	(mW)	(cm)	(mW/cm ²)	(mW/cm ²)
802.11b	2412-2462	0.0	1.00	16.00	39.81	20	0.0079	1.00
802.11g	2412-2462	0.0	1.00	15.00	31.62	20	0.0063	1.00
802.11n HT20	2412-2462	0.0	1.00	15.00	31.62	20	0.0063	1.00
BT	2402-2480	0.0	1.00	10.00	10.00	20	0.0020	1.00
EGPRS 850	824.2-848.8	0.0	1.00	21.00	125.89	20	0.0251	0.55
EGPRS 1900	1850.2-1909.8	0.0	1.00	21.00	125.89	20	0.0251	1.00
GPRS 850	824.2-848.8	0.0	1.00	27.00	501.19	20	0.0998	0.55
GPRS 1900	1850.2-1909.8	0.0	1.00	24.00	251.19	20	0.0500	1.00
WCDMA (Band II)	1852.4-1907.6	0.0	1.00	24.00	251.19	20	0.0500	1.00
WCDMA (Band IV)	1712.4-1752.6	0.0	1.00	24.00	251.19	20	0.0500	1.00
WCDMA (Band V)	826.4-846.6	0.0	1.00	24.00	251.19	20	0.0500	0.55
UHF	403.05-472.95	0.0	1.00	30.50	1122.02	20	0.2233	0.27

Number of Time slot	1	2	3	4
Duty Cycle	1:8.3	1:4.15	1:2.77	1:2.08
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Note: (1) The target output power:

802.11b: 15.5 ± 0.5 dBm,

802.11g: 14.5 ± 0.5 dBm,

802.11n(HT20): 14.5 ± 0.5 dBm

BT: 8.5 ± 1.5 dBm

EGPRS 850: 1 slot 27 ± 2 dBm, 2slot 25 ± 2 dBm max average power 21dBm

EGPRS 1900: 1 slot 26 ± 2 dBm, 2slot 25 ± 2 dBm max average power 21dBm

GPRS 850: 1 slot 32 ± 2 dBm, 2slot 31 ± 2 dBm max average power 27dBm

GPRS 1900: 1 slot 29 ± 2 dBm, 2slot 28 ± 2 dBm max average power 24dBm

WCDMA (Band II): 22 ± 2 dBm

WCDMA (Band IV): 22 ± 2 dBm

WCDMA (Band V): 22 ± 2 dBm

UHF: Low power 21.5 ± 0.5 dBm, High power 30 ± 0.5 dBm

which declared by the Manufacturer.

(2) The EUT has the BT, 2.4GHz WIFI, UHF, GSM and WCDMA functions, they can transmitting simultaneously. According to KDB 447498 D01 General RF Exposure Guidance v06 and test data, the 2.4G Wi-Fi(802.11b), GSM/WCDMA(GPRS 850), UHF (Digital) model is the worst case, their sum of MPE ratio is 0.9347, which is less than 1.0, so the collocation exposure exclusion applies.

Result: The device meet FCC MPE at 20 cm distance.