

MPE Calculation : BT, BT LE

RF function or Mode	Frequency range (MHz)			Max Target Power (dBm)	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm ²)	Requiriment (mW/cm ²)
BDR(1Mbps)	2402.00	~	2480.00	0.00	1.924	1.924	1.557	0.0004	1.000
EDR(2, 3Mbps)	2402.00	~	2480.00	-1.00	1.924	0.924	1.237	0.0003	1.000
BT LE	2402.00	~	2480.00	0.00	1.924	1.924	1.557	0.0004	1.000
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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 sample calculation for this exposure is shown below.

▪ $S = \frac{EIRP}{4 R^2 \pi}$

= 1.5574 / (4 X 20² X π)

= 0.0004 mW/cm²

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averageing 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

Conclusion : The exposure condition of this device is compliant with FCC

MPE Calculation : WLAN

RF function or Mode	Frequency range (MHz)			Max Target Power (dBm)	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm ²)	Requiriment (mW/cm ²)
802.11b	2412.00	~	2462.00	16.00	1.924	17.924	62.001	0.0124	1.000
802.11g	2412.00	~	2462.00	15.00	1.924	16.924	49.249	0.0098	1.000
802.11n(HT20)	2412.00	~	2462.00	11.00	1.924	12.924	19.607	0.0040	1.000
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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 sample calculation for this exposure is shown below.

▪ $S = \text{EIRP} / (4 R^2 \pi)$
= 62.0012 / (4 X 20² X π)
= 0.0124 mW/cm²

- Note
S= Maximum power density(mW/cm²)
EIRP= Equivalent Isotropic Radiated Power(mW)
R= Distance to the center of the radiation of the antenna(20cm)

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averageing 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

Conclusion : The exposure condition of this device is compliant with FCC

Test mode : GPRS, WCDMA, LTE

RF function or Mode	Frequency range (MHz)			Nominal. Target Power (dBm)	Tolerance	Max. Target Power (dBm)	Conducted Power (dBm)
GPRS850(GPRS 1TX)	824.20	~	848.80	23.47	± 1.0	24.47	24.33
GPRS850(GPRS 2TX)	824.20	~	848.80	26.48	± 1.0	27.48	27.23
GPRS850(GPRS 3TX)	824.20	~	848.80	28.24	± 1.0	29.24	28.80
GPRS850(GPRS 4TX)	824.20	~	848.80	29.49	± 1.0	30.49	29.92
EDGE850(EGPRS 1TX)	824.20	~	848.80	18.97	± 1.0	19.97	19.00
EDGE850(EGPRS 2TX)	824.20	~	848.80	21.98	± 1.0	22.98	21.86
EDGE850(EGPRS 3TX)	824.20	~	848.80	23.74	± 1.0	24.74	23.61
EDGE850(EGPRS 4TX)	824.20	~	848.80	24.99	± 1.0	25.99	24.90
GPRS1900(GPRS 1TX)	1850.20	~	1909.80	19.97	± 1.0	20.97	20.33
GPRS1900(GPRS 2TX)	1850.20	~	1909.80	22.98	± 1.0	23.98	23.24
GPRS1900(GPRS 3TX)	1850.20	~	1909.80	24.74	± 1.0	25.74	24.93
GPRS1900(GPRS 4TX)	1850.20	~	1909.80	25.99	± 1.0	26.99	26.01
EDGE1900(EGPRS 1TX)	1850.20	~	1909.80	15.97	± 1.0	16.97	16.83
EDGE1900(EGPRS 2TX)	1850.20	~	1909.80	18.98	± 1.0	19.98	19.86
EDGE1900(EGPRS 3TX)	1850.20	~	1909.80	20.74	± 1.0	21.74	21.70
EDGE1900(EGPRS 4TX)	1850.20	~	1909.80	21.99	± 1.0	22.99	22.45
UMTS850(WCDMA)	826.40	~	846.60	22.50	± 1.0	23.50	23.24
UMTS850(HSDPA)	826.40	~	846.60	22.50	± 1.0	21.96	21.96
UMTS850(HSUPA)	826.40	~	846.60	21.50	± 1.0	22.05	22.05
UMTS1900(WCDMA)	1852.40	~	1907.60	22.50	± 1.0	23.50	23.33
UMTS1900(HSDPA)	1852.40	~	1907.60	22.50	± 1.0	23.50	22.57
UTS1900(HSUPA)	1852.40	~	1907.60	21.50	± 1.0	22.50	22.39
LTE Band 5	824.70	~	848.30	22.50	± 1.0	23.50	22.89
LTE Band 4	1710.70	~	1754.30	23.00	± 1.0	24.00	23.49
LTE Band 2	1850.70	~	1909.30	23.50	± 1.0	24.50	23.09

Note1 : The power of GPRS mode was based on the time-average power.

MPE Calculation : GPRS, WCDMA, LTE

RF function or Mode	Frequency range (MHz)			Max. Target Power (dBm)	Conducted Power (dBm)	EIRP (dBm)	Adjusted EIRP to Tune up Max (dBm)	Adjusted EIRP to Tune up Max (mW)	Maximum power density (mW/cm ²)	Requiriment (mW/cm ²)
GPRS850 ^{Note1}	824.20	~	848.80	30.49	29.85	29.62	30.26	1061.70	0.2113	0.5494
GPRS1900 ^{Note1}	1850.20	~	1909.80	26.99	26.01	26.46	27.44	554.63	0.1104	1.0000
WCDMA850	826.40	~	846.60	23.50	23.24	22.11	22.37	172.58	0.0344	0.5509
WCDMA1900	1852.40	~	1907.60	23.50	22.97	18.79	19.32	85.51	0.0171	1.0000
LTE Band 5	824.70	~	848.30	23.50	22.89	23.52	24.13	258.82	0.0515	0.5498
LTE Band 4	1710.70	~	1754.30	24.00	23.49	25.89	26.40	436.52	0.0869	1.0000
LTE Band 2	1850.70	~	1909.30	24.50	23.09	26.03	27.44	554.63	0.1104	1.0000
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Note1 : The power of GPRS mode was based on the time-average power.

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 sample calculation for this exposure is shown below.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 30.26 / (4 \times 20^2 \times \pi) \\
 &= 0.2113 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averageing 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

Conclusion : The exposure condition of this device is compliant with FCC

RF Exposure Compliance for simultaneous operations

- **Configuration 1:** Bluetooth + (GPRS or LTE or WCDMA)

- **Configuration 2:** WLAN + (GPRS or LTE or WCDMA)

- **Configuration 3:** NA

Note: Above configuration was declared from applicant.

RF function or mode	Band	Power Density (mW/cm ²)	Requirement (mW/cm ²)	MPE ratio (Power Density/ Requirement)	Configuration 1(MPE ratio)						
BT	2.4GHz	0.0004	1.0000	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
WLAN	2.4GHz	0.0124	1.0000	0.0124	-	-	-	-	-	-	-
GPRS	5(850)	0.2113	0.5494	0.3846	0.3846	-	-	-	-	-	-
GPRS	2(1900)	0.1104	1.0000	0.1104	-	0.1104	-	-	-	-	-
WCDMA	5(850)	0.0344	0.5509	0.0624	-	-	0.0624	-	-	-	-
WCDMA	2(1900)	0.0171	1.0000	0.0171	-	-	-	0.0171	-	-	-
LTE	2	0.0515	0.5498	0.0937	-	-	-	-	0.0937	-	-
LTE	4	0.0869	1.0000	0.0869	-	-	-	-	-	0.0869	-
LTE	5	0.1104	1.0000	0.1104	-	-	-	-	-	-	0.1104
NA	-	-	-	-	-	-	-	-	-	-	-
Σ of MPE ratios					0.3850	0.1108	0.0628	0.0175	0.0941	0.0873	0.1108

RF function or mode	Band	Power Density (mW/cm ²)	Requirement (mW/cm ²)	MPE ratio (Power Density/ Requirement)	Configuration 2(MPE ratio)						
BT	2.4GHz	0.0004	1.0000	0.0004	-	-	-	-	-	-	-
WLAN	2.4GHz	0.0124	1.0000	0.0124	0.0124	0.0124	0.0124	0.0124	0.0124	0.0124	0.0124
GPRS	5(850)	0.2113	0.5494	0.3846	0.3846	-	-	-	-	-	-
GPRS	2(1900)	0.1104	1.0000	0.1104	-	0.1104	-	-	-	-	-
WCDMA	5(850)	0.0344	0.5509	0.0624	-	-	0.0624	-	-	-	-
WCDMA	2(1900)	0.0171	1.0000	0.0171	-	-	-	0.0171	-	-	-
LTE	2	0.0515	0.5498	0.0937	-	-	-	-	0.0937	-	-
LTE	4	0.0869	1.0000	0.0869	-	-	-	-	-	0.0869	-
LTE	5	0.1104	1.0000	0.1104	-	-	-	-	-	-	0.1104
NA	-	-	-	-	-	-	-	-	-	-	-
Σ of MPE ratios					0.3970	0.1228	0.0748	0.0295	0.1061	0.0993	0.1228

▪ Requirement = Σ of MPE ratios ≤ 1

▪ Conclusion : The exposure condition of this device is compliant with FCC rules.