

MPE Calculations

The exposure condition of this device is compliant with FCC Rule.

Specification: Part 2.1091, Part 1.1310

Table 1—Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure				
Frequency range (MHz)	Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averageing time (minutes)
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	-	-	5.0	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	-	-	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

● EUT Description

FCC ID : BEJTM12ANNAGM0
EUT Type : Module

Capabilities

850/1900 WCDMA/HSUPA, LTE Single transmitting for band 2/4/5/12, LTE up-link carrier aggregation for band 2 + 12 / band 4 + 12. And the supporting UL-CA combination are as below.

Inter band UL CA	Band	Band width(MHz)					
		1.4	3	5	10	15	20
Band 2 + Band 12	2	-	-	O	O	O	O
	12	-	O	O	O	-	-
Band 4 + Band 12	4	O	O	O	O	O	O
	12	-	-	O	O	-	-
	4	-	-	O	O	O	O
	12	-	O	O	O	-	-

● MPE Calculation

The MPE calculation for this exposure is shown below.

$$S = \text{EIRP} / (4\pi R^2)$$

Where,

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

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

Note: The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user.

● Result

Transmitting Configuration	Band	Mode	Frequency range (MHz)	Measured EIRP(dBm)	Distance (Cm)	Power density (mW/cm ²)	Requirement (mW/cm ²)	MPE ratio (Power Density/ Requirement)
Single transmission	WCDMA850	RMC	826.4 ~ 846.6	22.69	20.00	0.037	0.550	0.067
	WCDMA1900	RMC	1852.4 ~ 1907.6	23.78	20.00	0.048	1.000	0.048
	LTE Band 12	QPSK	699.7 ~ 715.3	22.93	20.00	0.039	0.466	0.084
	LTE Band 12	16QAM	699.7 ~ 715.3	21.81	20.00	0.030	0.466	0.065
	LTE Band 5	QPSK	824.7 ~ 848.3	21.28	20.00	0.027	0.549	0.049
	LTE Band 5	16QAM	824.7 ~ 848.3	20.43	20.00	0.022	0.549	0.040
	LTE Band 4	QPSK	1710.7 ~ 1754.3	21.64	20.00	0.029	1.000	0.029
	LTE Band 4	16QAM	1710.7 ~ 1754.3	20.94	20.00	0.025	1.000	0.025
	LTE Band 2	QPSK	1850.7 ~ 1909.3	20.91	20.00	0.025	1.000	0.025
	LTE Band 2	16QAM	1850.7 ~ 1909.3	19.97	20.00	0.020	1.000	0.020
Carrier Aggregation	LTE Band 2(PCC)	QPSK	1852.5 ~ 1907.5	16.55	20.00	0.009	1.000	0.009
	LTE Band 12(SCC)	QPSK	699.7 ~ 715.3	19.76	20.00	0.019	0.466	0.041
Carrier Aggregation	LTE Band 2(PCC)	16QAM	1852.5 ~ 1907.5	16.79	20.00	0.010	1.000	0.010
	LTE Band 12(SCC)	16QAM	699.7 ~ 715.3	19.90	20.00	0.020	0.466	0.042
Carrier Aggregation	LTE Band 12(PCC)	QPSK	699.7 ~ 715.3	19.50	20.00	0.018	0.466	0.038
	LTE Band 2(SCC)	QPSK	1880.0 ~ 1880.0	16.79	20.00	0.010	1.000	0.010
Carrier Aggregation	LTE Band 12(PCC)	16QAM	699.7 ~ 715.3	19.26	20.00	0.017	0.466	0.036
	LTE Band 2(SCC)	16QAM	1880.0 ~ 1880.0	16.81	20.00	0.010	1.000	0.010
Carrier Aggregation	LTE Band 4(PCC)	QPSK	1712.5 ~ 1752.5	18.87	20.00	0.015	1.000	0.015
	LTE Band 12(SCC)	QPSK	699.7 ~ 715.3	19.93	20.00	0.020	0.466	0.042
Carrier Aggregation	LTE Band 4(PCC)	16QAM	1712.5 ~ 1752.5	19.01	20.00	0.016	1.000	0.016
	LTE Band 12(SCC)	16QAM	699.7 ~ 715.3	19.96	20.00	0.020	0.466	0.042
Carrier Aggregation	LTE Band 12(PCC)	QPSK	699.7 ~ 715.3	19.28	20.00	0.017	0.466	0.036
	LTE Band 4(SCC)	QPSK	1732.5 ~ 1732.5	17.83	20.00	0.012	1.000	0.012
Carrier Aggregation	LTE Band 12(PCC)	16QAM	699.7 ~ 715.3	19.50	20.00	0.018	0.466	0.038
	LTE Band 4(SCC)	16QAM	1732.5 ~ 1732.5	16.96	20.00	0.010	1.000	0.010

● Result (simultaneous operations)

Case of Simultaneous operations	Transmitting Configuration	Band	Mode	Frequency range (MHz)	MPE ratio (Power Density/ Requirement)	Σ of MPE ratios	Requirement (Σ of MPE ratios ≤ 1)
1	Carrier Aggregation	LTE Band 2(PCC)	QPSK	1852.5 ~ 1907.5	0.009	0.050	1.000
		LTE Band 12(SCC)	QPSK	699.7 ~ 715.3	0.041		
2	Carrier Aggregation	LTE Band 2(PCC)	16QAM	1852.5 ~ 1907.5	0.010	0.052	1.000
		LTE Band 12(SCC)	16QAM	699.7 ~ 715.3	0.042		
3	Carrier Aggregation	LTE Band 12(PCC)	QPSK	699.7 ~ 715.3	0.038	0.048	1.000
		LTE Band 2(SCC)	QPSK	1880.0 ~ 1880.0	0.010		
4	Carrier Aggregation	LTE Band 12(PCC)	16QAM	699.7 ~ 715.3	0.036	0.046	1.000
		LTE Band 2(SCC)	16QAM	1880.0 ~ 1880.0	0.010		
5	Carrier Aggregation	LTE Band 4(PCC)	QPSK	1712.5 ~ 1752.5	0.015	0.057	1.000
		LTE Band 12(SCC)	QPSK	699.7 ~ 715.3	0.042		
6	Carrier Aggregation	LTE Band 4(PCC)	16QAM	1712.5 ~ 1752.5	0.016	0.058	1.000
		LTE Band 12(SCC)	16QAM	699.7 ~ 715.3	0.042		
7	Carrier Aggregation	LTE Band 12(PCC)	QPSK	699.7 ~ 715.3	0.036	0.048	1.000
		LTE Band 4(SCC)	QPSK	1732.5 ~ 1732.5	0.012		
8	Carrier Aggregation	LTE Band 12(PCC)	16QAM	699.7 ~ 715.3	0.038	0.048	1.000
		LTE Band 4(SCC)	16QAM	1732.5 ~ 1732.5	0.010		

Note: Sample calculation for simultaneous operations
Σ of MPE ratios of Case 1: LTE Band 2(PCC/QPSK) + LTE Band 12(SCC/QPSK)
= 0.009 + 0.041 = 0.050