



December 20, 2019

TUV SUD BABT
Octagon House, Concorde Way
Segensworth Rd N, Fareham
PO15 5RL

Attention: Director of Certification

RE: Analysis of RF Exposure for Portable and Mobile use per KDB 447498 D01 Mobile Portable RF Exposure v06 and RSS-102 Issue 5 March 2015.

FCC ID: PKRISGMD8000
IC: 3229A-MD8000

1. Limits

Limits for General Population/Uncontrolled Exposure (Title 47 Subpart J §2.1091 and KDB 447498 D01 referring to limits under §1.1310)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Electric Field Strength (H) (A/m)	Power Density (S) (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 – 1500	-	-	f/1500	30
1500 – 100,000	-	-	1.0	30

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

Limits for Devices Used by the General Public (Uncontrolled Environment (RSS-102 Issue 5 March 2015)

Frequency Range (MHz)	Electric Field Strength (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003 – 10 ²¹	83	90	-	Instantaneous
0.1 – 10	-	0.73/f	-	6**
1.1 – 10	87/f ^{0.5}	-	-	6**
10 – 20	27.46	0.0728	2	6
20 – 48	-58.07/f ^{0.25}	0.1540/f ^{0.25}	8.944/f ^{0.5}	6
48 – 300	22.06	0.05852	1.291	6
300 – 6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000 – 15000	61.4	0.163	10	6
15000 – 150000	61.4	0.163	10	616000/f ^{1.2}
150000 – 300000	0.158f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}

f is frequency in MHz *Based on nerve stimulation (NS)

** Based on specific absorption rate (SAR)



2. Mobile MPE Calculation Summary using a 20cm separation distance:

Mode	Output Power (dBm/mW)	FCC Power Density Limit (mW/cm ²)	ISED Power Density Limit (W/m ²)	FCC Maximum Allowed Antenna Gain (dBi)	ISED Maximum Allowed Antenna Gain (dBi)
WCDMA Band 2	24.0 / 251.19	1.0	4.480	13.012	9.525
WCDMA Band 4	24.0 / 251.19	1.0	4.246	13.012	9.292
WCDMA Band 5	24.0 / 251.19	0.551	2.580	10.423	7.130
LTE Band 2	24.0 / 251.19	1.0	4.477	13.012	9.523
LTE Band 4	24.0 / 251.19	1.0	4.243	13.012	9.289
LTE Band 5	24.0 / 251.19	0.549	2.577	10.414	7.124
LTE Band 7	24.0 / 251.19	1.0	5.502	13.012	10.418
LTE Band 12	24.0 / 251.19	0.466	2.303	9.70	6.636
LTE Band 13	24.0 / 251.19	0.520	2.480	10.169	6.956
LTE Band 14	24.0 / 251.19	0.527	2.503	10.23	6.998
LTE Band 17	24.0 / 251.19	0.471	2.318	9.742	6.664
LTE Band 25	24.0 / 251.19	1.0	4.477	13.012	9.523
LTE Band 26	24.0 / 251.19	0.543	2.556	10.361	7.087
LTE Band 30	24.0 / 251.19	1.0	5.206	13.012	10.177
LTE Band 38	24.0 / 251.19	1.0	5.607	13.012	10.50
LTE Band 40	24.0 / 251.19	1.0	5.206	13.012	10.177
LTE Band 41	24.0 / 251.19	1.0	5.497	13.012	10.413
LTE Band 42	24.0 / 251.19	1.0	6.992	13.012	11.458
LTE Band 48	24.0 / 251.19	1.0	6.991	13.012	11.458
LTE Band 66	24.0 / 251.19	1.0	4.243	13.012	9.289



3. Mobile MPE Calculation using a 20cm separation distance (WCDMA Band 2):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1852.4	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.480	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	9.525	(dBi)

4. Mobile MPE Calculation using a 20cm separation distance (WCDMA Band 4):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1712.4	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.246	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	9.292	(dBi)

5. Mobile MPE Calculation using a 20cm separation distance (WCDMA Band 5):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	826.4	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.551	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.580	(W/m ²)
FCC Maximum Antenna gain:	10.423	(dBi)
ISED Maximum Antenna gain:	7.130	(dBi)



6. Mobile MPE Calculation using a 20cm separation distance (LTE Band 2):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1850.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.477	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	9.523	(dBi)

7. Mobile MPE Calculation using a 20cm separation distance (LTE Band 4):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1710.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.243	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	9.289	(dBi)

8. Mobile MPE Calculation using a 20cm separation distance (LTE Band 5):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	824.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.549	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.577	(W/m ²)
FCC Maximum Antenna gain:	10.414	(dBi)
ISED Maximum Antenna gain:	7.124	(dBi)

9. Mobile MPE Calculation using a 20cm separation distance (LTE Band 7):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
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Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2502.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	5.502	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	10.418	(dBi)

10. Mobile MPE Calculation using a 20cm separation distance (LTE Band 12):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	699.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.466	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.303	(W/m ²)
FCC Maximum Antenna gain:	9.70	(dBi)
ISED Maximum Antenna gain:	6.636	(dBi)

11. Mobile MPE Calculation using a 20cm separation distance (LTE Band 13):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	779.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.520	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.480	(W/m ²)
FCC Maximum Antenna gain:	10.169	(dBi)
ISED Maximum Antenna gain:	6.956	(dBi)



12. Mobile MPE Calculation using a 20cm separation distance (LTE Band 14):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	790.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.527	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.503	(W/m ²)
FCC Maximum Antenna gain:	10.23	(dBi)
ISED Maximum Antenna gain:	6.998	(dBi)

13. Mobile MPE Calculation using a 20cm separation distance (LTE Band 17):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	706.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.471	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.318	(W/m ²)
FCC Maximum Antenna gain:	9.742	(dBi)
ISED Maximum Antenna gain:	6.664	(dBi)

14. Mobile MPE Calculation using a 20cm separation distance (LTE Band 25):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1850.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.477	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	9.523	(dBi)



15. Mobile MPE Calculation using a 20cm separation distance (LTE Band 26):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	814.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.543	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.556	(W/m ²)
FCC Maximum Antenna gain:	10.361	(dBi)
ISED Maximum Antenna gain:	7.087	(dBi)

16. Mobile MPE Calculation using a 20cm separation distance (LTE Band 30):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2307.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	5.206	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	10.177	(dBi)

17. Mobile MPE Calculation using a 20cm separation distance (LTE Band 38):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2572.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	5.607	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	10.50	(dBi)



18. Mobile MPE Calculation using a 20cm separation distance (LTE Band 40):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2307.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	5.206	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	10.177	(dBi)

19. Mobile MPE Calculation using a 20cm separation distance (LTE Band 41):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2498.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	5.497	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	10.413	(dBi)

20. Mobile MPE Calculation using a 20cm separation distance (LTE Band 42):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	3552.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	6.992	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	11.458	(dBi)



21. Mobile MPE Calculation using a 20cm separation distance (LTE Band 48):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	3552.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	6.992	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	11.458	(dBi)

22. Mobile MPE Calculation using a 20cm separation distance (LTE Band 66):

Maximum peak output power at antenna input terminal:	24.0	(dBm)
Maximum peak output power at antenna input terminal:	251.19	(mW)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1710.7	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.243	(W/m ²)
FCC Maximum Antenna gain:	13.012	(dBi)
ISED Maximum Antenna gain:	9.289	(dBi)

Sincerely,

A handwritten signature in blue ink, appearing to read 'Xiaoying Zhang', written over a horizontal line.

Xiaoying Zhang

Name

Authorized Signatory

Title: EMC/Wireless Test Engineer