



May 25, 2018

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 v05r02 and RSS-102 Issue 5 March 2015.

FCC ID: 2AH4HATD300S
IC Number: 21385-ATD300S

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)	Magnetic 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 (Worst Case)	Output Power	Power Density (mW/cm ²)
BT LE	0.0022 watt	0.0022
LTE Band 13	0.21 watt	0.0522

3. Co-Located Transmitters transmission table:

Transmitter type	Transmitter type that can transmit at the same time		
BT LE	LTE Band 13	-	-
LTE Band 13	BT LE	-	-

4. Simultaneous Transmission MPE:

Transmitter type	MPE (mw/cm ²)	FCC Limit (mW/cm ²)	IC Limit (W/m ²)	FCC MPE ratio (MPE/Limit)	ISED MPE ratio (MPE/Limit)
BT LE	0.0022	1	5.35	0.0022	0.0041
LTE Band 13	0.0522	0.52	2.48	0.1	0.21
Sum of the ratios (should be <1.0)				0.1022	0.2141



5. Mobile MPE Calculation using a 20cm separation distance (BT LE):

Using Power Density formula:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to isotropic

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	3.35	(dBm)
Maximum peak output power at antenna input terminal:	2.16	(mW)
Antenna gain(typical):	7.0	(dBi)
Maximum antenna gain:	5.012	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2402	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.000	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	5.35	(W/m ²)
Power density at prediction frequency:	0.0022	(mW/cm ²)
Power density at prediction frequency:	0.022	(W/m ²)
FCC Margin of Compliance:	-26.66	(dB)
ISED Margin of Compliance:	-23.95	(dB)

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

Maximum peak output power at antenna input terminal:	23.3	(dBm)
Maximum peak output power at antenna input terminal:	213.8	(mW)
Antenna gain(typical):	1.0	(dBi)
Maximum antenna gain:	1.259	(numeric)
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:	1.000	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	4.24	(W/m ²)
Power density at prediction frequency:	0.0535	(mW/cm ²)
Power density at prediction frequency:	0.535	(W/m ²)
FCC Margin of Compliance:	-12.71	(dB)
ISED Margin of Compliance:	-8.99	(dB)



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

Maximum peak output power at antenna input terminal:	23.19	(dBm)
Maximum peak output power at antenna input terminal:	208.45	(mW)
Antenna gain(typical):	1.0	(dBi)
Maximum antenna gain:	1.259	(numeric)
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:	0.52	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.47972	(W/m ²)
Power density at prediction frequency:	0.0522	(mW/cm ²)
Power density at prediction frequency:	0.522	(W/m ²)
FCC Margin of Compliance:	-9.98	(dB)
ISED Margin of Compliance:	-6.77	(dB)

Sincerely,

A handwritten signature in blue ink that reads 'Xiaoying Zhang'. The signature is written in a cursive, flowing style.

Xiaoying Zhang

Name

Authorized Signatory

Title: EMC/Wireless Test Engineer