



May 15, 2017

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 General RF Exposure Guidance v06 and RSS-102 Issue 5 March 2015.

FCC ID: SAK25609702

IC: 7145A-25609702

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	-	6**
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 per FCC 2.1091::

Mode (Worst Case)	Output Power (dBm)	Power Density (mW/cm ²)
319.5 MHz radio	0.7	0.00023
925 MHz radio	8.9	0.00154

1. Mobile MPE Calculation Summary using a 20cm separation distance per RSS-102 Issue 5:

Mode (Worst Case)	Output Power (dBm)	Power Density (W/m ²)
319.5 MHz radio	0.7	0.002
925 MHz radio	8.9	0.0154

2. Co-Located Transmitters transmission table:

Transmitter type	Transmitter type that can transmit at the same time
915 Proprietary	319.5 OOK



5. Simultaneous Transmission MPE:

Transmitter type	MPE (mW/cm ²)	FCC Limit (mW/cm ²)	FCC MPE ratio (MPE/Limit)
319.5 MHz radio	0.00023	0.213	0.00012
925 MHz radio	0.00154	0.617	0.00259
Sum of the ratios (should be <1.0)			0.00271

Transmitter type	MPE (W/m ²)	ISED Limit (W/m ²)	Margin (dB)
319.5 MHz radio	0.0023	1.348	-27.63
925 MHz radio	0.016	2.787	-22.56
Sum of MPE (Should be <min. limit)	0.0183	1.348	-18.80

6. Mobile MPE Calculation using a 20cm separation distance (319.5 MHz radio):

Using Power Density formula:

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

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:	0.68	(dBm)
Maximum peak output power at antenna input terminal:	1.17	(mW)
Antenna gain(typical):	0	(dBi)
Maximum antenna gain:	1	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	319.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.213	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	1.348	(W/m ²)
Power density at prediction frequency:	0.0002	(mW/cm ²)
Power density at prediction frequency:	0.0023	(W/m ²)
FCC Margin of Compliance:	29.62	(dB)
ISED Margin of Compliance:	27.63	(dB)



7. Mobile MPE Calculation using a 20cm separation distance (925 MHz radio):

Maximum peak output power at antenna input terminal:	8.9	(dBm)
Maximum peak output power at antenna input terminal:	7.76	(mW)
Antenna gain(typical):	0	(dBi)
Maximum antenna gain:	1.0	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	925	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.617	(mW/cm ²)
ISED MPE limit for uncontrolled exposure at prediction frequency:	2.787	(W/m ²)
Power density at prediction frequency:	0.0016	(mW/cm ²)
Power density at prediction frequency:	0.016	(W/m ²)
FCC Margin of Compliance:	26.02	(dB)
ISED Margin of Compliance:	22.56	(dB)

Sincerely,

A handwritten signature in black ink that reads "Steve Hoke". The signature is written in a cursive, flowing style.

Steve Hoke
Senior EMC Engineer

