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	$87/f^{.5}$	-	-	6
10 - 20	27.46	0.0728	2	6
20 - 48	$-58.07/f^{.25}$	$0.1540/f^{.25}$	$8.944/f^{.5}$	6
48 - 300	22.06	0.05852	1.291	6
300 - 6000	$3.142\ f^{.3417}$	$0.008335\ f^{.3417}$	$0.02619\ f^{.6834}$	6
6000 - 15000	61.4	0.163	10	6
15000 - 150000	61.4	0.163	10	$616000/f^{1.2}$
150000 - 300000	$0.158f^{.5}$	$4.21 \times 10^{-4} f^{.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

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)
Sourse 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)
Sourse 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,

Steve Hoke
Senior EMC Engineer