



March 29, 2018

TUV SUD BAPT  
 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: L2V-SATF12  
 IC: 8989A-ATF12

**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 <sup>2</sup> )	Averaging Time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/f <sup>2</sup> )	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 <sup>2</sup> )	Reference Period (minutes)
0.003 - 10 <sup>21</sup>	83	90	-	Instantaneous
0.1 - 10	-	0.73/f	-	6**
1.1 - 10	87/f <sup>0.5</sup>	-	-	6**
10 - 20	27.46	0.0728	2	6
20 - 48	-58.07/f <sup>0.25</sup>	0.1540/f <sup>0.25</sup>	8.944/f <sup>0.5</sup>	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	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

*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:**

Mode	Output Power	Power Density (mW/cm <sup>2</sup> )
L-Band Mobile Satellite Service	1.17dBW EIRP	0.23428
WLAN (802.11 b)	14.4 dBm	0.00909

**3. Co-Located Transmitters transmission table:**

Transmitter type	Transmitter type that can transmit at the same time
L-Band Mobile Satellite Service	WLAN
WLAN	L-Band Mobile Satellite Service

**4. Simultaneous Transmission MPE:**

Transmitter type	MPE (mw/cm <sup>2</sup> )	FCC Limit (mW/cm <sup>2</sup> )	IC Limit (mW/cm <sup>2</sup> )	FCC MPE ratio (MPE/Limit)	ISED MPE ratio (MPE/Limit)
Mobile Satellite Service	0.23428	1.0	0.40848	0.23428	0.57354
WLAN	0.00909	1.0	0.53660	0.00909	0.01694
Sum of the ratios (should be <1.0)				0.24337	0.59047

**5. Mobile MPE Calculation using a 20cm separation distance (L-Band Mobile Satellite Service):**

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:	<b>27.41</b>	(dBm)
Maximum peak output power at antenna input terminal:	<b>550.81</b>	(mW)
Antenna gain(typical):	<b>3.3</b>	(dBi)
Maximum antenna gain:	<b>2.138</b>	(numeric)
Prediction distance:	<b>20</b>	(cm)
Source Based Time Average Duty Cycle:	<b>100</b>	(%)
Prediction frequency:	<b>1618.11</b>	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	<b>1.000</b>	(mW/cm <sup>2</sup> )
ISED MPE limit for uncontrolled exposure at prediction frequency:	<b>0.40848</b>	(mW/cm <sup>2</sup> )
Power density at prediction frequency:	<b>0.23428</b>	(mW/cm <sup>2</sup> )
Power density at prediction frequency:	<b>2.343</b>	(W/m <sup>2</sup> )
FCC Margin of Compliance:	<b>-6.30</b>	(dB)
ISED Margin of Compliance:	<b>-2.41</b>	(dB)

#### **6. Mobile MPE Calculation using a 20cm separation distance (WLAN 802.1 b):**

Maximum peak output power at antenna input terminal:	<b>14.40</b>	(dBm)
Maximum peak output power at antenna input terminal:	<b>27.54</b>	(mW)
Antenna gain(typical):	<b>2.2</b>	(dBi)
Maximum antenna gain:	<b>1.660</b>	(numeric)
Prediction distance:	<b>20</b>	(cm)
Source Based Time Average Duty Cycle:	<b>100</b>	(%)
Prediction frequency:	<b>2412</b>	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	<b>1.000</b>	(mW/cm <sup>2</sup> )
ISED MPE limit for uncontrolled exposure at prediction frequency:	<b>0.53660</b>	(mW/cm <sup>2</sup> )
Power density at prediction frequency:	<b>0.00909</b>	(mW/cm <sup>2</sup> )
Power density at prediction frequency:	<b>0.091</b>	(W/m <sup>2</sup> )
FCC Margin of Compliance:	<b>-20.41</b>	(dB)
ISED Margin of Compliance:	<b>-17.71</b>	(dB)



America

Sincerely,

A handwritten signature in black ink, appearing to read 'Ferdie S. Custodio', written over a horizontal line.

Ferdie S. Custodio

Name

Authorized Signatory

Title: Senior EMC Test Engineer /Wireless Team Lead