![TÜV SÜD America logo]

June 03, 2016

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: NU: YETD32-21366NU
CU: YETDd32-21366cu

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/cm²)	Averaging Time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/f²)	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/m²)	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	$0.158f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000/f^{1.2}$

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:**

	Downlink (CU)				
Mode	Output Power (dBm)*	Power Density (mW/cm²)	Power Density (W/m²)	FCC Limit (mW/cm²)	ISED Limit (W/m²)
LTE Band 2	15.30	0.01068	0.1068	1	4.624
LTE Band 13	10.67	0.003679	0.03679	0.499	2.412
LTE Band 4	15.17	0.0103688	0.103688	1	4.913
2.4G BLE	-4.31	0.000037	0.00037	1	5.351
5G HB	21.21	0.0262863	0.262863	1	9.455

	Uplink (NU)				
Mode	Output Power (dBm)*	Power Density (mW/cm²)	Power Density (W/m²)	FCC Limit (mW/cm²)	ISED Limit (W/m²)
LTE Band 2	21.76	0.04729	0.4729	1	4.559
LTE Band 13	22.82	0.060357	0.60357	0.52	2.48
LTE Band 4	21.73	0.04696	0.4696	1	4.259
5G LB	21.45	0.03497	0.3497	1	9.059

*Since the IC limit is related to the frequency, so the Output Power of the lowest frequency was selcted as the worst case.

3. Co-Located Transmitters transmission table:

Downlink	
Transmitter type	**Transmitter type that can transmit at the same time**
LTE B2	2.4G BLE, 5G HB
LTE B13	2.4G BLE, 5G HB
LTE B4	2.4G BLE, 5G HB
2.4G BLE	LTE B2/B13/B4
5G HB	LTE B2/B13/B4

Uplink	
Transmitter type	**Transmitter type that can transmit at the same time**
LTE B2	5G LB
LTE B13	5G LB
LTE B4	5G LB
5G LB	LTE B2/B13/B4

4. *Simultaneous Transmission MPE:*

Downlink					
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)**
LTE Band 2	0.01068	1	4.624	0.01068	0.023096
2.4G BLE	0.000037	1	5.351	0.000037	0.000069
5G HB	0.0262863	1	9.455	0.0262863	0.0278
Sum of the ratios (should be <1.0)				0.037	0.051

Uplink					
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)**
LTE Band 13	0.060357	0.52	2.48	0.116	0.2434
5G LB	0.03497	1	9.4059	0.03497	0.0372
Sum of the ratios (should be <1.0)					0.2806

5. Mobile MPE Calculation using a 20cm separation distance

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

LTE Band 2 Downlink:

Maximum peak output power at antenna input terminal:	15.30	(dBm)
Maximum peak output power at antenna input terminal:	33.88	(mW)
Antenna gain(typical):	2.0	(dBi)
Maximum antenna gain:	1.585	(numeric)
Prediction distance:	20	(cm)
Sourse Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1940	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	4.624	(W/m^2)
Power density at prediction frequency:	0.0106839	(mW/cm^2)
Power density at prediction frequency:	0.106839	(W/m^2)
FCC Margin of Compliance:	-19.71	(dB)
IC Margin of Compliance:	-16.36	(dB)

LTE Band 13 Downlink:

Maximum peak output power at antenna input terminal:	10.67	(dBm)
Maximum peak output power at antenna input terminal:	11.67	(mW)
Antenna gain(typical):	2.0	(dBi)
Maximum antenna gain:	1.585	(numeric)
Prediction distance:	20	(cm)
Sourse Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	748.5	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	0.499	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	2.412	(W/m^2)
Power density at prediction frequency:	0.003679	(mW/cm^2)
Power density at prediction frequency:	0.03679	(W/m^2)
FCC Margin of Compliance:	-21.32	(dB)
IC Margin of Compliance:	-18.17	(dB)

LTE Band 4 Downlink:

Maximum peak output power at antenna input terminal:	15.17	(dBm)
Maximum peak output power at antenna input terminal:	32.89	(mW)
Antenna gain(typical):	2.0	(dBi)
Maximum antenna gain:	1.585	(numeric)
Prediction distance:	20	(cm)
Sourse Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2120	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	4.913	(W/m^2)
Power density at prediction frequency:	0.0103688	(mW/cm^2)
Power density at prediction frequency:	0.103688	(W/m^2)
FCC Margin of Compliance:	-19.84	(dB)
IC Margin of Compliance:	-16.76	(dB)

2.4GHz BLE:

Maximum peak output power at antenna input terminal:	-4.31	(dBm)
Maximum peak output power at antenna input terminal:	0.37	(mW)
Antenna gain(typical):	-3.0	(dBi)
Maximum antenna gain:	0.501	(numeric)
Prediction distance:	20	(cm)
Sourse Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2402	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	5.351	(W/m^2)
Power density at prediction frequency:	0.000037	(mW/cm^2)
Power density at prediction frequency:	0.00037	(W/m^2)
FCC Margin of Compliance:	-44.32	(dB)
IC Margin of Compliance:	-41.64	(dB)

5GHzUNII High Band

Maximum peak output power at antenna input terminal:	**21.21**	(dBm)
Maximum peak output power at antenna input terminal:	**132.13**	(mW)
Antenna gain(typical):	**0**	(dBi)
Maximum antenna gain:	**1.00**	(numeric)
Prediction distance:	**20**	(cm)
Sourse Based Time Average Duty Cycle:	**100**	(%)
Prediction frequency:	**5525**	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	**1.00**	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	**9.455**	(W/m^2)
Power density at prediction frequency:	**0.0262863**	(mW/cm^2)
Power density at prediction frequency:	**0.262863**	(W/m^2)
FCC Margin of Compliance:	**-15.8**	(dB)
IC Margin of Compliance:	**-15.56**	(dB)

LTE Band 2 Uplink:

Maximum peak output power at antenna input terminal:	**21.76**	(dBm)
Maximum peak output power at antenna input terminal:	**149.97**	(mW)
Antenna gain(typical):	**2.0**	(dBi)
Maximum antenna gain:	**1.585**	(numeric)
Prediction distance:	**20**	(cm)
Sourse Based Time Average Duty Cycle:	**100**	(%)
Prediction frequency:	**1900**	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	**1.00**	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	**4.559**	(W/m^2)
Power density at prediction frequency:	**0.0472857**	(mW/cm^2)
Power density at prediction frequency:	**0.472857**	(W/m^2)
FCC Margin of Compliance:	**-13.25**	(dB)
IC Margin of Compliance:	**-9.84**	(dB)

LTE Band 13 Uplink:

Maximum peak output power at antenna input terminal:	**22.82**	(dBm)
Maximum peak output power at antenna input terminal:	**191.43**	(mW)
Antenna gain(typical):	**2.0**	(dBi)
Maximum antenna gain:	**1.585**	(numeric)
Prediction distance:	**20**	(cm)
Sourse 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 MPElimit for uncontrolled exposure at prediction frequency:	**2.48**	(W/m^2)
Power density at prediction frequency:	**0.0603573**	(mW/cm^2)
Power density at prediction frequency:	**0.603573**	(W/m^2)
FCC Margin of Compliance:	**-9.35**	(dB)
IC Margin of Compliance:	**-6.14**	(dB)

LTE Band 4 Uplink:

Maximum peak output power at antenna input terminal:	**21.73**	(dBm)
Maximum peak output power at antenna input terminal:	**148.94**	(mW)
Antenna gain(typical):	**2.0**	(dBi)
Maximum antenna gain:	**1.585**	(numeric)
Prediction distance:	**20**	(cm)
Sourse Based Time Average Duty Cycle:	**100**	(%)
Prediction frequency:	**1720**	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	**1.00**	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	**4.259**	(W/m^2)
Power density at prediction frequency:	**0.0469602**	(mW/cm^2)
Power density at prediction frequency:	**0.469602**	(W/m^2)
FCC Margin of Compliance:	**-13.28**	(dB)
IC Margin of Compliance:	**-9.58**	(dB)

America

5GHz UNII Low Band:

Maximum peak output power at antenna input terminal:	**21.45**	(dBm)
Maximum peak output power at antenna input terminal:	**139.64**	(mW)
Antenna gain(typical):	**1**	(dBi)
Maximum antenna gain:	**1.259**	(numeric)
Prediction distance:	**20**	(cm)
Sourse Based Time Average Duty Cycle:	**100**	(%)
Prediction frequency:	**5190**	(MHz)
FCC MPE limit for uncontrolled exposure at prediction frequency:	**1.00**	(mW/cm^2)
ISED MPElimit for uncontrolled exposure at prediction frequency:	**9.059**	(W/m^2)
Power density at prediction frequency:	**0.0349728**	(mW/cm^2)
Power density at prediction frequency:	**0.349728**	(W/m^2)
FCC Margin of Compliance:	**-14.56**	(dB)
IC Margin of Compliance:	**-14.13**	(dB)

Sincerely,

Xiaoying Zhang

Name
Authorized Signatory
Title: EMC/Wireless Test Engineer