



June 01, 2015

TUV SUD BABT
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Attention: Director of Certification

RE: Analysis of RF Exposure for Portable and Mobile according to FCC 2.1091 and RSS-102 Issue 5 March 2015.

FCC ID: PKRNVWSA1100
IC: 3229A-SA1100

1. Mobile MPE Calculation Summary using a 20cm separation distance:

Mode	Output Power (dBm)	Power Density (mW/cm ²)
GSM 850	31.86	0.3844
GSM 1900	29.16	0.2599
WCDMA Band II	23.07	0.0639
WCDMA Band V	23.43	0.0552
802.11b	20.36	0.0497
802.11g	22.13	0.0748
802.11n	21.04	0.0582
Z-Wave	93.6 dB μ V/m @ 3 meters	0.00014

2. Co-Located Transmitters transmission table:

Transmitter type	Transmitter type that can transmit at the same time
GSM	WCDMA, WiFi and Z-Wave
WCDMA	GSM, WiFi and Z-Wave
WiFi	GSM, WCDMA and Z-Wave
Z-Wave	GSM, WCDMA and WiFi



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3. Simultaneous Transmission MPE:

Transmitter type	MPE (mw/cm²)	Limit (mW/cm²)	MPE ratio (MPE/Limit)
GSM	0.3844	0.549	0.700
WCDMA	0.0639	1.0	0.0639
WiFi (802.11g)	0.0748	1.0	0.0748
Z-Wave	0.00014	0.61	0.000295
Sum of the ratios (should be <1.0)			0.839



4. Mobile MPE Calculation using a 20cm separation distance (GSM850):

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:	31.86	(dBm)
Maximum peak output power at antenna input terminal:	1534.62	(mW)
Antenna gain(typical):	1	(dBi)
Maximum antenna gain:	1.259	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	824.2	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	0.549	(mW/cm ²)
Power density at prediction frequency:	0.3844	(mW/cm ²)
Power density at prediction frequency:	3.844	(W/m ²)
Margin of Compliance:	-1.55	(dB)

5. Mobile MPE Calculation using a 20cm separation distance (GSM1900):

Maximum peak output power at antenna input terminal:	29.16	(dBm)
Maximum peak output power at antenna input terminal:	824.14	(mW)
Antenna gain(typical):	2	(dBi)
Maximum antenna gain:	1.585	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1850.2	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1.000	(mW/cm ²)
Power density at prediction frequency:	0.2599	(mW/cm ²)
Power density at prediction frequency:	2.599	(W/m ²)
Margin of Compliance:	-5.85	(dB)



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6. Mobile MPE Calculation using a 20cm separation distance (WCDMA Band II):

Maximum peak output power at antenna input terminal:	23.07	(dBm)
Maximum peak output power at antenna input terminal:	202.77	(mW)
Antenna gain(typical):	2	(dBi)
Maximum antenna gain:	1.585	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	1852.4	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1.000	(mW/cm ²)
Power density at prediction frequency:	0.0639	(mW/cm ²)
Power density at prediction frequency:	0.639	(W/m ²)
Margin of Compliance:	-11.94	(dB)

7. Mobile MPE Calculation using a 20cm separation distance (WCDMA Band V):

Maximum peak output power at antenna input terminal:	23.43	(dBm)
Maximum peak output power at antenna input terminal:	22.29	(mW)
Antenna gain(typical):	1	(dBi)
Maximum antenna gain:	1.259	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	826.4	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	0.551	(mW/cm ²)
Power density at prediction frequency:	0.0552	(mW/cm ²)
Power density at prediction frequency:	0.552	(W/m ²)
Margin of Compliance:	-9.99	(dB)

8. Mobile MPE Calculation using a 20cm separation distance (802.11b):

Maximum peak output power at antenna input terminal:	20.36	(dBm)
Maximum peak output power at antenna input terminal:	108.64	(mW)
Antenna gain(typical):	3.62	(dBi)
Maximum antenna gain:	2.301	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2412	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1.000	(mW/cm ²)
Power density at prediction frequency:	0.0497	(mW/cm ²)
Power density at prediction frequency:	0.497	(W/m ²)
Margin of Compliance:	-13.03	(dB)



9. Mobile MPE Calculation using a 20cm separation distance (802.11g):

Maximum peak output power at antenna input terminal:	22.13	(dBm)
Maximum peak output power at antenna input terminal:	163.31	(mW)
Antenna gain(typical):	3.62	(dBi)
Maximum antenna gain:	2.301	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm ²)
Power density at prediction frequency:	0.0748	(mW/cm ²)
Power density at prediction frequency:	0.748	(W/m ²)
Margin of Compliance:	-11.26	(dB)

10. Mobile MPE Calculation using a 20cm separation distance (802.11n):

Maximum peak output power at antenna input terminal:	21.04	(dBm)
Maximum peak output power at antenna input terminal:	127.06	(mW)
Antenna gain(typical):	3.62	(dBi)
Maximum antenna gain:	2.301	(numeric)
Prediction distance:	20	(cm)
Source Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm ²)
Power density at prediction frequency:	0.0582	(mW/cm ²)
Power density at prediction frequency:	0.582	(W/m ²)
Margin of Compliance:	-12.35	(dB)



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11. Mobile MPE Calculation using a 20cm separation distance (Z-Wave):

Maximum peak output power at antenna input terminal:	93.6	(dBm)
Maximum peak output power at antenna input terminal:	0.906	(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:	908.4	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	0.61	(mW/cm ²)
Power density at prediction frequency:	0.00013673	(mW/cm ²)
Power density at prediction frequency:	0.0013673	(W/m ²)
Margin of Compliance:	-36.46	(dB)

Sincerely,

Xiaoying Zhang

Name

Authorized Signatory

Title: EMC/Wireless Test Engineer