

1 FCC § 1.1307 (b) (1) & § 2.1091-RF EXPOSURE

1.1 Applicable Standard

According to § 1.1310 and § 2.1091 (Mobile Devices) RF exposure is calculated. Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Power Density (mW/cm ²)
Limits for General Population/Uncontrolled Exposure	
0.3-1.34	*(100)
1.34-30	*(180/f ²)
30-300	0.2
300 - 1,500	f/1500
1,500 - 100,000	1

Note: f= frequency in MHz

*=Plane-wave equivalent power density

1.2 MPE Prediction

1.2.1 Calculation of MPE at 20 cm distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG / 4 \pi R^2$$

Where: S=power density

P=power input to antenna

G= maximum power gain of the antenna in the direction of interest relative to an isotropic radiator, subtract antenna's cable loss, (result is in numeric form)

R=distance to the center of radiation of the antenna (20cm in the following calculation)

1.2.2 Calculation formula of G (numeric)

$$G(\text{numeric}) = 10^{\frac{\{\text{Maximum Antenna Gain (dBi)} - \text{Cable Loss (dB)}\}}{10}}$$

Where: G (numeric) = Maximum power gain of the antenna in the direction of interest relative to an isotropic radiator, subtract antenna's cable loss, (result is converted from decibel into numeric form with above equation)

1.3 Test Result

1.3.1 Under the conditions of Vehicle Kit Component(Antenna KIT)

Vehicle Kit Component						
Outdoor Antenna KIT Antenna:CM200 Cable:CM174 -10FT 10Feet	Outdoor Antenna Gain			Outdoor Cable Loss		
	At 1900MHz(dBi)	At 800MHz(dBi)	At 700MHz(dBi)	At 1900MHz(dB)	At 800MHz(dB)	At 700MHz(dBi)
	5	3	3	8.8	4.3	3.8

Indoor Patch Antenna KIT Antenna:CM110W Cable: CM174 -10FT 10Feet	Indoor Antenna Gain			Indoor Cable Loss		
	At 1900MHz(dBi)	At 800MHz(dBi)	At 700MHz(dBi)	At 1900MHz(dB)	At 800MHz(dB)	At 700MHz(dBi)
	3	1.1	1.1	8.8	4.3	3.8

LTE-A Band UL:	
Maximum peak output power at antenna input terminal(dBm):	19.30
Maximum peak output power at antenna input terminal(mW):	85.11
Prediction distance(cm):	20
Prediction frequency(MHz):	705.20
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	3.8
G (numeric) :	0.83
Power density at predication frequency and distance(mW/cm ²):	0.0141
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.4701

LTE-A Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-5.60
Maximum peak output power at antenna input terminal(mW):	0.28
Prediction distance(cm):	20
Prediction frequency(MHz):	735.92
Maximum Antenna Gain (dBi):	1.1
Cable Loss(dB):	3.8
G (numeric) :	0.54
Power density at predication frequency and distance(mW/cm ²):	0.00003
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.4906

Cellular Band UL:	
Maximum peak output power at antenna input terminal(dBm):	20.90
Maximum peak output power at antenna input terminal(mW):	123.03
Prediction distance(cm):	20
Prediction frequency(MHz):	845.67
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	4.3
G (numeric) :	0.74
Power density at predication frequency and distance(mW/cm ²) :	0.0182
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²) :	0.5638

Cellular Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-5.50
Maximum peak output power at antenna input terminal(mW):	0.28
Prediction distance(cm):	20
Prediction frequency(MHz):	881.58
Maximum Antenna Gain (dBi):	1.1
Cable Loss(dB):	4.3
G (numeric) :	0.48
Power density at predication frequency and distance(mW/cm ²) :	0.00003
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²) :	0.5877

PCS Band UL:	
Maximum peak output power at antenna input terminal(dBm):	19.40
Maximum peak output power at antenna input terminal(mW):	87.10
Prediction distance(cm):	20
Prediction frequency(MHz):	1872.40
Maximum Antenna Gain (dBi):	5
Cable Loss(dB):	8.8
G (numeric) :	0.42
Power density at predication frequency and distance(mW/cm ²) :	0.0072
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²) :	1.0000

PCS Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-8.00
Maximum peak output power at antenna input terminal(mW):	0.16
Prediction distance(cm):	20
Prediction frequency(MHz):	1952.20
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	8.8
G (numeric) :	0.26
Power density at predication frequency and distance(mW/cm ²):	0.00001
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	1.0000

1.3.2 Under the conditions of Marine Kit Component Component (Antenna KIT)

Marine Kit Component						
Outdoor Antenna KIT	Outdoor Antenna Gain			Outdoor Cable Loss		
	At 1900MHz(dBi)	At 800MHz(dBi)	At 700MHz(dBi)	At 1900MHz(dB)	At 800MHz(dB)	At 700MHz(dBi)
Antenna:CM288W or Galaxy 5412-P Cable:CM240 -40FN 40Feet	4	3	3	6.52	3.98	3.52

Indoor Panel Antenna KIT	Indoor Antenna Gain			Indoor Cable Loss		
	At 1900MHz(dBi)	At 800MHz(dBi)	At 700MHz(dBi)	At 1900MHz(dB)	At 800MHz(dB)	At 700MHz(dBi)
Antenna:CM248W Cable:CM240 -20FN 20Feet	10	7	7	3.56	2.29	2.06

LTE-A Band UL:	
Maximum peak output power at antenna input terminal(dBm):	19.30
Maximum peak output power at antenna input terminal(mW):	85.11
Prediction distance(cm):	20
Prediction frequency(MHz):	705.20
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	3.52
G (numeric) :	0.89
Power density at predication frequency and distance(mW/cm ²):	0.0150
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.4701

LTE-A Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-5.60
Maximum peak output power at antenna input terminal(mW):	0.28
Prediction distance(cm):	20
Prediction frequency(MHz):	735.92
Maximum Antenna Gain (dBi):	7
Cable Loss(dB):	2.06
G (numeric) :	3.12
Power density at predication frequency and distance(mW/cm ²):	0.00017
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.4906

Cellular Band UL:	
Maximum peak output power at antenna input terminal(dBm):	20.90
Maximum peak output power at antenna input terminal(mW):	123.03
Prediction distance(cm):	20
Prediction frequency(MHz):	845.67
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	3.98
G (numeric) :	0.80
Power density at predication frequency and distance(mW/cm ²):	0.0195
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.5638

Cellular Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-5.50
Maximum peak output power at antenna input terminal(mW):	0.28
Prediction distance(cm):	20
Prediction frequency(MHz):	881.58
Maximum Antenna Gain (dBi):	7
Cable Loss(dB):	2.29
G (numeric) :	2.96
Power density at predication frequency and distance(mW/cm ²):	0.00017
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.5877

PCS Band UL:	
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Maximum peak output power at antenna input terminal(dBm):	19.40
Maximum peak output power at antenna input terminal(mW):	87.10
Prediction distance(cm):	20
Prediction frequency(MHz):	1872.40
Maximum Antenna Gain (dBi):	4
Cable Loss(dB):	6.52
G (numeric) :	0.56
Power density at predication frequency and distance(mW/cm ²) :	0.0097
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²) :	1.0000

PCS Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-8.00
Maximum peak output power at antenna input terminal(mW):	0.16
Prediction distance(cm):	20
Prediction frequency(MHz):	1952.20
Maximum Antenna Gain (dBi):	10
Cable Loss(dB):	3.56
G (numeric) :	4.41
Power density at predication frequency and distance(mW/cm ²) :	0.00014
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²) :	1.0000

1.3.3 Under the conditions of Desk top/RV Kit Component (Antenna KIT)

Desk top/RV Kit Component						
Outdoor Antenna KIT Antenna:CM288W Cable:CM240 -40FN 40Feet	Outdoor Antenna Gain			Outdoor Cable Loss		
	At 1900MHz(dBi)	At 800MHz(dBi)	At 700MHz(dBi)	At 1900MHz(dB)	At 800MHz(dB)	At 700MHz(dBi)
	4	3	3	6.52	3.98	3.52

Indoor Right Angle Antenna KIT Antenna:CM120W Cable: NO	Indoor Antenna Gain			Indoor Cable Loss(Connector IL)		
	At 1900MHz(dBi)	At 800MHz(dBi)	At 700MHz(dBi)	At 1900MHz(dB)	At 800MHz(dB)	At 700MHz(dBi)
	3	1.2	1.2	0.3	0.3	0.3

LTE-A Band UL:	
Maximum peak output power at antenna input terminal(dBm):	19.30
Maximum peak output power at antenna input terminal(mW):	85.11
Prediction distance(cm):	20
Prediction frequency(MHz):	705.20
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	3.52
G (numeric) :	0.89
Power density at predication frequency and distance(mW/cm ²):	0.0150
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.4701

LTE-A Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-5.60
Maximum peak output power at antenna input terminal(mW):	0.28
Prediction distance(cm):	20
Prediction frequency(MHz):	735.92
Maximum Antenna Gain (dBi):	1.2
Cable Loss(dB):	0.3
G (numeric) :	1.23
Power density at predication frequency and distance(mW/cm ²):	0.00007
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.4906

Cellular Band UL:	
Maximum peak output power at antenna input terminal(dBm):	20.90
Maximum peak output power at antenna input terminal(mW):	123.03
Prediction distance(cm):	20
Prediction frequency(MHz):	845.67
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	3.98
G (numeric) :	0.80
Power density at predication frequency and distance(mW/cm ²):	0.0195
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.5638

Cellular Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-5.50
Maximum peak output power at antenna input terminal(mW):	0.28
Prediction distance(cm):	20
Prediction frequency(MHz):	881.58
Maximum Antenna Gain (dBi):	1.2
Cable Loss(dB):	0.3
G (numeric) :	1.23
Power density at predication frequency and distance(mW/cm ²):	0.00007
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	0.5877

PCS Band UL:	
Maximum peak output power at antenna input terminal(dBm):	19.40
Maximum peak output power at antenna input terminal(mW):	87.10
Prediction distance(cm):	20
Prediction frequency(MHz):	1872.40
Maximum Antenna Gain (dBi):	4
Cable Loss(dB):	6.52
G (numeric) :	0.56
Power density at predication frequency and distance(mW/cm ²):	0.0097
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	1.0000

PCS Band DL:	
Maximum peak output power at antenna input terminal(dBm):	-8.00
Maximum peak output power at antenna input terminal(mW):	0.16
Prediction distance(cm):	20
Prediction frequency(MHz):	1952.20
Maximum Antenna Gain (dBi):	3
Cable Loss(dB):	0.3
G (numeric) :	1.86
Power density at predication frequency and distance(mW/cm ²):	0.00006
MPE limit for uncontrolled exposure at predication frequency(mW/cm ²):	1.0000