

FCC ID: RI7UL865N3G
 IC: 5131A-UL865N3G
 Model: UL865-N3G V2



Prediction of the maximum antenna gain based on MPE limit at given distance

The table below is excerpted from Table 1B of **47 CFR 1.1310** titled "Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure"

Frequency Range (MHz)	Power Density (mW/cm ²)	Averaging Time (minutes)
300 -1500	f (MHz) / 1500	30
1500 - 100000	1.0	30

Based on the above table the limits are:

For 850 MHz frequency band device: 0.55 mW/cm²
 For 1700 /1900 MHz frequency band device: 1 mW/cm²

FCC § 2.1091 / IC RSS102, section 2.5.2

The limit for 850 MHz mobile operations where no routine evaluation is required is: 1.5W ERP
 The limit for 1900 MHz mobile operations where no routine evaluation is required is: 3W EIRP

Max permissive power according to **§24.232 and RSS133**: 2W EIRP
 Max permissive power according to **§22.913(a) and RSS132**: 7W ERP

Prediction UMTS band 2:

P	Maximum power input to the antenna:	251	mW
R	Distance:	20	cm
S	MPE limit for uncontrolled exposure:	1.00	mW/cm ²
G ₁	Antenna gain (dBi) to comply with MPE limits:	13.01	dBi

ERP power limit according to §2.1091:		3.00	W EIRP
G ₂	Antenna gain (dBi) to comply with ERP limits:	12.91	dBi
(ERP = Maximum conducted output power x Antenna gain / 1,64)			

ERP power limit according to §24.232:		2.00	W EIRP
G ₃	Antenna gain (dBi) to comply with ERP limits:	9.01	dBi
(ERP = Maximum conducted output power x Antenna gain / 1,64)			

G_{1900 MHz band}	Min (G₁, G₂, G₃)	9.01	dBi
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Therefore the maximum antenna gain for mobile operation to comply with MPE and EIRP limits shall not exceed: **9.01 dBi**

Prediction UMTS band 5:

P	Maximum power input to the antenna:	251	mW
R	Distance:	20	cm
S	MPE limit for uncontrolled exposure:	0.55	mW/cm ²
G ₁	Antenna gain (dBi) to comply with MPE limits:	10.42	dBi

ERP power limit according to §2.1091:		1.50	W ERP
G ₂	Antenna gain (dBi) to comply with ERP limits:	9.90	dBi
(ERP = Maximum conducted output power x Antenna gain / 1,64)			

ERP power limit according to §22.913:		7.00	W ERP
G ₃	Antenna gain (dBi) to comply with ERP limits:	16.59	dBi
(ERP = Maximum conducted output power x Antenna gain / 1,64)			

G_{850 MHz band}	Min (G₁, G₂, G₃)	9.90	dBi
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Therefore the maximum antenna gain for mobile operation to comply with MPE and ERP limits shall not exceed: **7.76 dBd**

According the calculation above the maximum antenna gain for 850 MHz band shall not exceed 7.76 dBd and the maximum antenna gain for the 1900 MHz band shall not exceed 9.01 dBi



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