

DEKRA Testing and Certification S.A.U.TCB

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RF exposure analysis for the equipment – Maximum Antenna Gain

Model: 3G9080

FCC ID: F53173G9080

IC: 160A-3G9080

The device 3G9080 is a module designed to be installed in other devices. This device is to be used only for fixed and mobile applications. If the final product after integration is intended for portable use, new applications and FCC and ISED are required.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter except as under the conditions described KDB 447498 D01 General RF Exposure Guidance.

MPE exposure limits

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 – 100.000	1,0	30

The table below is excerpted from RSS-102, Issue 5, 4, titled “Table 4: RF Field Strength Limits for Devices Used by the General Public”:

Frequency Range (MHz)	Power density (W/m ²)	Averaging time (minutes)
300 – 6000	$0.02619 \cdot f^{0.6834}$	6

EIRP limits

Band	Frequency (MHz) (Lowest Frequency)	FCC MPE limit (mW/cm ²)	ISED MPE limit (mW/cm ²)	FCC/ISED MPE limit (mW/cm ²)	FCC EIRP limit per §27.50 (W)	ISED EIRP limit per RSS-130 and RSS-139 (W)
GSM 850	824,0	0,549	0,258	0,25756	11,48	11,50
EGPRS850	824,0	0,549	0,258	0,25756	11,48	11,50
DCS 1900	1850,0	1,000	0,448	0,44763	2,00	2,00
EGPRS1900	1850,0	1,000	0,448	0,44763	2,00	2,00
WCDMA Band 2	1850,0	1,000	0,448	0,44763	2,00	2,00
WCDMA Band 5	820,0	0,547	0,257	0,25671	11,48	11,50

Using the equation $S = \frac{PG}{4\pi R^2}$ to calculate the exposure to electromagnetic fields

where: S = power density (in appropriate units, e.g. mW/cm²)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The maximum antenna gain that can be used in the 3G9080 is shown in the following table:

Band	Frequency (MHz) (Lowest Frequency)	Maximum conducted output power (per tune-up) (dBm)	Duty cycle (%)	FCC MPE limit (mW/cm ²)	IC MPE limit (mW/cm ²)	FCC/IC MPE limit (mW/cm ²)	FCC EIRP limit (W)	IC EIRP limit (W)	Evaluation distance for compliance with MPE limits (cm)	Antenna gain to meet FCC/IC MPE limit (dBi)	Antenna gain to meet FCC EIRP limit (dBi)	Antenna gain to meet IC EIRP limit (dBi)	Maximun antenna gain to meet all the limits (dBi)	Maximun antenna gain to meet all the limits per frequency band (dBi)
GSM 850	824,0	33,50	25,0%	0,549	0,258	0,25756	11,48	11,50	20	3,64	7,09	7,10	3,64	3,64
EGPRS850	824,0	33,50	25,0%	0,549	0,258	0,25756	11,48	11,50	20	3,64	7,09	7,10	3,64	
WCDMA Band V	820,0	24,00	100,0%	0,547	0,257	0,25671	11,48	11,50	20	7,10	16,59	16,60	7,10	
DCS 1900	1850,0	30,50	25,0%	1,000	0,448	0,44763	2,00	2,00	20	9,04	2,51	2,51	2,51	2,51
EGPRS1900	1850,0	30,50	25,0%	1,000	0,448	0,44763	2,00	2,00	20	9,04	2,51	2,51	2,51	
WCDMA Band II	1850,0	24,00	100,0%	1,000	0,448	0,44763	2,00	2,00	20	9,52	9,01	9,01	9,01	

Band	Frequency (MHz) (Lowest Frequency)	Maximum conducted output power (per tune-up) (dBm)	Duty cycle (%)	Antenna gain (dBi)	FCC/IC MPE limit (mW/cm ²)	FCC EIRP limit (W)	IC EIRP limit (W)	FCC/IC EIRP limit (W)	Evaluation distance for compliance with MPE limits (cm)	$S = \frac{PG}{4\pi R^2}$ (mW/cm ²)	MPE Ratio (S/MPE limit)
GSM 850	824,0	33,50	25,0%	3,64	0,25756	11,48	11,50	11,48	20	0,25744	0,99952
EGPRS850	824,0	33,50	25,0%	3,64	0,25756	11,48	11,50	11,48	20	0,25744	0,99952
WCDMA Band V	820,0	24,00	100,0%	3,64	0,25671	11,48	11,50	11,48	20	0,11554	0,45008
DCS 1900	1850,0	30,50	25,0%	2,51	0,44763	2,00	2,00	2,00	20	0,09946	0,22220
EGPRS1900	1850,0	30,50	25,0%	2,51	0,44763	2,00	2,00	2,00	20	0,09946	0,22220
WCDMA Band II	1850,0	24,00	100,0%	2,51	0,44763	2,00	2,00	2,00	20	0,08907	0,19898

Yours sincerely,
P.A.

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