

RF Exposure Report

FCC ID: 2AJYU-8VC0001

RF Exposure Measurement

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

Limits for Maximum Permissible Exposure (MPE)

F= Frequency in MHz

Friss Formula

Friss Transmission Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

EUT Operation condition

EUT was enabled to transmit and receive at lowest, middle and highest channels.

Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as Mobile device.

GSM

Mode	850: 824 MHz ~ 849MHz 1900: 1850 MHz ~ 1910MHz
824 MHz ~ 849MHz	29±1dBm
1850 MHz ~ 1910MHz	29±1dBm

ANT Gain (G)

Antenna gain : Antenna gain : GSM 850: 2dBi (gain of antenna in linear scale=1.58)

PCS 1900:3dBi (gain of antenna in linear scale=2)

Protocol	ANT Gain(gain of antenna in linear scale)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
GSM 850	1.58	848.80	30.00	1000.00	0.31	0.57
GSM 1900	2.00	1909.80	30.00	1000.00	0.40	1.00

LTE(CAT-M)

Mode	LTE Band 2:1850~1910MHz LTE Band 4:1710~1755MHz LTE Band 12:699~716MHz LTE Band 13:777~787MHz LTE Band 25:1850~1915MHz LTE Band 26:814~849MHz
Band 2	23±1dBm
Band 4	22±1dBm
Band 12	23±1dBm
Band 13	22±1dBm
Band 25	23±1dBm
Band 26	24±1dBm
Band 26(Part 90)	23±1dBm

ANT Gain (G)

Antenna gain : B2 / B4 / B25 : 3 dBi (gain of antenna in linear scale=2)

B12 / B13 / B26 : 2dBi (gain of antenna in linear scale=1.58)

Protocol	ANT Gain(gain of antenna in linear scale)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Band2	2	1910	24	251.19	0.10	1.00
Band4	2	1755	23	199.53	0.08	1.00
Band12	1.58	716	24	251.19	0.08	0.48
Band13	1.58	787	23	199.53	0.06	0.52
Band25	2	1915	24	251.19	0.10	1.00
Band26	1.58	849	25	316.23	0.10	0.57
Band26(Part90)	1.58	849	24	251.19	0.08	0.57

LTE(NB-IOT)

Mode	NB-IOT Band 2:1850~1910MHz NB-IOT Band 4:1710~1755MHz NB-IOT Band 5:824~849MHz NB-IOT Band 12:699~716MHz NB-IOT Band 13:777~787MHz NB-IOT Band 71:663~698MHz
LTE Band 2	20±1dBm
LTE Band 4	20±1dBm
LTE Band 5	20±1dBm
LTE Band 12	20±1dBm
LTE Band 13	20±1dBm
LTE Band 71	21±1dBm

ANT Gain (G)

Antenna gain : B2 / B4 : 3 dBi (gain of antenna in linear scale=2)

B5 / B12 / B13 / B71 : 2dBi (gain of antenna in linear scale=1.58)

Protocol	ANT Gain(gain of antenna in linear scale)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Band2	2	1850	21	125.89	0.05	1.00
Band4	2	1710	21	125.89	0.05	1.00
Band5	1.58	824	21	125.89	0.04	0.55
Band12	1.58	699	21	125.89	0.04	0.47
Band13	1.58	777	21	125.89	0.04	0.52
Band71	1.58	663	22	158.49	0.05	0.44