

# RF Exposure Report

## 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 <sup>2</sup> )
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/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 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.

## LTE

Mode	LTE Band 2:1850~1910MHz LTE Band 4:1710~1755MHz LTE Band 5:824~849MHz LTE Band 12:699~716MHz LTE Band 13:777~787MHz LTE Band 14:788~798MHz LTE Band 25:1850~1915MHz LTE Band 26:814~849MHz LTE Band 41:2496~2690MHz LTE Band 66:1710~1780MHz LTE Band 71:663~698MHz (Note: Band 2 falls completely within the working range of Band 25, Band 4 falls completely within the working range of Band 66, Band 5 falls completely within the working range of Band 26, no separate test required.)
Detector	PEAK
Band 12	23±1dBm
Band 13	22±1dBm
Band 14	21±1dBm

Band 25	22±1dBm
Band 26	24±1dBm
Band 26(Part 90)	24±1dBm
Band 41	24±1dBm
Band 66	22±1dBm
Band 71	21±1dBm

#### ANT Gain (G)

Antenna gain :

**B12 : 0.95 dBi (gain of antenna in linear scale=1.24)**

**B13 : 2.23 dBi (gain of antenna in linear scale=1.67)**

**B14 : 2.18 dBi (gain of antenna in linear scale=1.65)**

**B25 : 1.87 dBi (gain of antenna in linear scale=1.54)**

**B26 : 1.40 dBi (gain of antenna in linear scale=1.38)**

**B41 : 3.20 dBi (gain of antenna in linear scale=2.09)**

**B66 : 3.12 dBi (gain of antenna in linear scale=2.05)**

**B71 : -0.48 dBi (gain of antenna in linear scale=0.90)**

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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
Band12	1.24	716	24	251.19	0.06	0.48
Band13	1.67	787	23	199.53	0.05	0.52
Band14	1.65	798	22	158.49	0.05	1.00
Band25	1.54	1915	23	199.53	0.06	1.00
Band26	1.38	849	25	316.23	0.10	0.57
Band26(Part90)	1.38	849	25	316.23	0.10	0.57
Band41	2.09	2690	25	316.23	0.13	1.00
Band66	2.05	1780	23	199.53	0.08	1.00
Band71	0.90	698	22	158.49	0.03	1.00