RF Exposure Report

FCCID: 2AX54-Z83II

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: Pd= (Pout * G) / (4*pi*r²)

Where
Pd = power density in mW/cm²
Pout = 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.

ANT Gain (G)
Antenna gain: 1.44dBi (gain of antenna in linear scale=1.393)

2.4G WIFI

Mode	802.11b/g/n20:2412-2462MHz 802.11n40:2422-2452MHz
Detector	AVG
802.11b	14±1dBm
802.11g	19±1dBm
802.11n20	18±1dBm
802.11n40	18±1dBm

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/cm²)	Limit (mW/cm²)
802.11b	1.393	2412	15	31.6228	0.00877	1
802.11g	1.393	2462	20	100.0000	0.02773	1
802.11n20	1.393	2462	19	79.4328	0.02202	1
802.11n40	1.393	2422	19	79.4328	0.02202	1

5G WIFI

Antenna gain: 1.44dBi (gain of antenna in linear scale=1.393)

Mode	IEEE 802.11a/ n(HT20)/ac(VHT20): 5.180GHz-5.240GHz IEEE 802.11n(HT40)/ac(VHT40): 5.190GHz-5.230GHz
Detector	AVG
IEEE 802.11a/ n(HT20)/ac(VHT20):	9±1dBm
IEEE 802.11n(HT40)/ac(VHT40):	8±1dBm

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/cm²)	Limit (mW/cm²)
802.11a/n/ac(HT20)	1.393	5180	10	10.0000	0.00277	1
802.11a/n/ac(HT40)	1.393	5190	9	7.9433	0.00220	1

5G WIFI

Antenna gain: 1.44dBi (gain of antenna in linear scale=1.393)

Mode	IEEE 802.11a/ n/ac(HT20) 5.260GHz-5.300GHz IEEE 802.11n/ac(HT40) 5.270GHz-5.310GHz
Detector	AVG
IEEE 802.11a/ n(HT20)/ac(VHT20):	8.5±1dBm
IEEE 802.11n(HT40)/ac(VHT40):	7±1dBm

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/cm²)	Limit (mW/cm²)
802.11a/n/ac(HT20)	1.393	5260	9.5	8.9125	0.00247	1
802.11a/n/ac(HT40)	1.393	5270	8	6.3096	0.00175	1

5G WIFI

Antenna gain: 1.44dBi (gain of antenna in linear scale=1.393)

ANT Gain (G)

Mode	IEEE 802.11a/ n/ac(HT20) 5.500GHz-5.700GHz IEEE 802.11n/ac(HT40) 5.510GHz-5.6700GHz
Detector	AVG
IEEE 802.11a/ n(HT20)/ac(VHT20):	8.5±1dBm
IEEE 802.11n(HT40)/ac(VHT40):	8±1dBm

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)
802.11a/n/ac(HT 20)	1.393	5580	9.5	8.9125	0.00247	1
802.11a/n/ac(HT 40)	1.393	5670	8	6.3096	0.00175	1

5G WIFI

ANT Gain (G)

Mode	IEEE 802.11a/ n/ac(HT20) 5.745GHz-5.825GHz IEEE 802.11n/ac(HT40) 5.755GHz-5.795GHz
Detector	AVG
IEEE 802.11a/ n(HT20)/ac(VHT20):	8.5±1dBm
IEEE 802.11n(HT40)/ac(VHT40):	8±1dBm

Antenna gain: 1.44dBi (gain of antenna in linear scale=1.393)

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)
802.11a/n/ac(HT20)	1.393	5825	9.5	8.9125	0.00247	1
802.11a/n/ac(HT40)	1.393	5755	9	7.9433	0.00220	1

According to the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know max MPE value 0.02773 at distance 20cm. This is less than the limit 1.So SAR testing is not required.