FCC ID : I4L-MSNDA101

1. RF EXPOSURE EVALUATION

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

Limits for Maximum Permissible Exposure (MPE).

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	**--**	**--**	**F/300**	**6**
1500-100000	**--**	**--**	**5**	**6**
(B) Limits for General Population/Uncontrol Exposures				
300-1500	**--**	**--**	**F/1500**	**6**
1500-100000	**--**	**--**	**1**	**30**

Friis transmission formula: $Pd= (Pout*G)\ (4*pi*R^2)$

Where

Pd= Power density in mW/cm^2.

Pout=output power to antenna in mW.

G= Numeric gain of the antenna relative to isotropic antenna.

Pi=3.1416.

R= distance between observation point and center of the radiator in 20cm.

Pd the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the nd total. power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2. EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product	Tablet
Model Number	MS-NDA1

IEEE 802.11 WLAN Mode Supported	802.11b 802.11g 802.11n(20MHz channel bandwidth) 802.11n(40MHz channel bandwidth)
Modulation	DSSS with DBPSK/DQPSK/CCK for 802.11b OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n
Operating Frequency Range	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11b/g/n(HT40)
Number of Channels	11 channels for 802.11b/g/n(HT20) 7 Channels for 802.11n(HT40)
Antenna Type	FPC Antenna
Antenna Gain	Ant1: 2.43 dBi, Ant2: 3.98 dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

Wifi Type	UNII-1: 5150MHz-5250MHz Band UNII-2A: with 5250MHz-5350MHz Band UNII-2C: with 5470MHz-5725MHz Band UNII-3: with 5725MHz-5850MHz Band
WLAN Supported	802.11a 802.11n(20MHz channel bandwidth) 802.11n(40MHz channel bandwidth) 802.11ac(20MHz channel bandwidth) 802.11ac(40MHz channel bandwidth) 802.11ac(80MHz channel bandwidth)
Modulation	OFDM
Frequency Range	UNII-1: 5150MHz-5250MHz Band
	5180-5240MHz for 802.11a 5180-5240MHz for 802.11n(HT20) 5180-5240MHz for 802.11ac(HT20) 5190-5230MHz for 802.11n(HT40) 5190-5230MHz for 802.11ac(HT40) 5210MHz for 802.11ac(HT80)
	UNII-2A: with 5250MHz-5350MHz Band
	5260-5320MHz for 802.11a 5260-5320MHz for 802.11n(HT20) 5260-5320MHz for 802.11ac(HT20) 5270-5310MHz for 802.11n(HT40) 5270-5310MHz for 802.11ac(HT40) 5290MHz for 802.11ac(HT80)
	UNII-2C: with 5470MHz-5725MHz Band

	5500-5700MHz for 802.11a 5500-5700MHz for 802.11n(HT20) 5500-5700MHz for 802.11ac(HT20) 5510-5670MHz for 802.11n(HT40) 5510-5670MHz for 802.11ac(HT40) 5530-5610MHz for 802.11ac(HT80)
	UNII-3 with 5725MHz-5850MHz Band
	5745-5825MHz for 802.11a 5745-5825MHz for 802.11n(HT20) 5745-5825MHz for 802.11ac(HT20) 5755-5795MHz for 802.11n(HT40) 5755-5795MHz for 802.11ac(HT40) 5775MHz for 802.11ac(HT80)
TPC Function	Applicable
Antenna Type	FPC Antenna
Antenna Gain	B1: 5150-5250MHz：Ant1: 2.86 dBi, Ant2: 2.65 dBi B2: 5250-5350MHz：Ant1: 2.86 dBi, Ant2: 2.65 dBi B3: 5470-5725MHz：Ant1: 3.21 dBi, Ant2: 2.98 dBi B4: 5725-5850MHz：Ant1: 3.34 dBi, Ant2: 3.12 dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

Operation Band:	WCDMA Band 2 WCDMA Band 4 WCDMA Band 5
Modulation:	QPSK for WCDMA/HSUPA/HSDPA
Operating Frequency Range(s):	WCDMA Band 2: Tx: 1850~1910MHz/ Rx: 1930~1990MHz WCDMA Band 4: Tx:1710~1755MHz/ Rx: 2110~2155MHz WCDMA Band 5: Tx: 824~849MHz/ Rx: 869~894MHz
Supported Channel Bandwidth:	5 MHz
Antenna Type:	FPC Antenna
Antenna Gain:	WCDMA B2: 1.23 dBi WCDMA B4: 1.56 dBi WCDMA B5: 1.56 dBi

Operation Band:	LTE Band 2 LTE Band 4 LTE Band 5 LTE Band 7 LTE Band 12 LTE Band 13 LTE Band 25 LTE Band 26 LTE Band 30 LTE Band 41 LTE Band 66
Modulation:	QPSK, 16QAM

Operating Frequency Range(s):	LTE Band 2: Tx: 1850~1910MHz/ Rx: 1930~1990MHz LTE Band 4: Tx:1710~1755MHz/ Rx: 2110~2155MHz LTE Band 5: Tx: 824~849MHz/ Rx: 869~894MHz LTE Band 7: Tx: 2500~2570MHz/ Rx: 2620~2690MHz LTE Band 12: Tx: 699~716MHz/ Rx: 729~746MHz LTE Band 13: Tx: 777~787MHz/ Rx: 746~756MHz LTE Band 25: Tx: 1850~1915MHz/ Rx: 1930~1995MHz LTE Band 26: Tx: 814~824MHz/ Rx: 859~869MHz LTE Band 26: Tx: 824~849MHz/ Rx: 869~894MHz LTE Band 30: Tx: 2305~2315MHz/ Rx: 2350~2360MHz LTE Band 41: Tx/Rx: 2535～2655MHz LTE Band 66: Tx/Rx: 1710~1780MHz
Antenna Type:	FPC Antenna
Antenna Gain:	LTE Band 2: 1.56dBi LTE Band 4: 1.56dBi LTE Band 5: 1.23dBi LTE Band 7: 2.06dBi LTE Band 12: 0.89dBi LTE Band 13: 0.89dBi LTE Band 25: 1.56dBi LTE Band 26: 1.23dBi LTE Band 30: 2.27dBi LTE Band 41: 2.06dBi LTE Band 66: 1.56dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

3. Measurement Result

Mode	Frequency (MHz)	Max Conducted Power (dBm)	Antenna gain (dBi)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2.4G WIFI	2412	18.14	3.98	2.50	20	0.032	1.00
5G WIFI	5180	18.94	3.34	2.16	20	0.034	1.00
WCDMA B2	1852.4	22.00	1.23	1.33	20	0.042	1.00
WCDMA B4	1712.4	21.69	1.56	1.43	20	0.042	1.00
WCDMA B5	826.4	22.39	1.56	1.43	20	0.050	0.55
LTE B2	1860	21.92	1.56	1.43	20	0.044	1.00
LTE B4	1720	22.12	1.56	1.43	20	0.046	1.00
LTE B5	829	22.41	1.23	1.33	20	0.046	0.55
LTE B7	2510	21.97	2.06	1.61	20	0.050	1.00
LTE B12	699.7	22.44	0.89	1.23	20	0.043	0.47
LTE B13	779.5	22.68	0.89	1.23	20	0.045	0.52
LTE B25	1850.7	22.29	1.56	1.43	20	0.048	1.00
LTE B26	814.7	22.26	1.23	1.33	20	0.044	0.54
LTE B30	2310	21.28	2.27	1.69	20	0.045	1.00
LTE B41	2580	22.91	2.06	1.61	20	0.062	1.00
LTE B66	2535	22.53	1.56	1.43	20	0.051	1.00

Note: All the modes are tested, only the worst data are described in the table.

Conclusion of simultaneous transmitter:
Transmitting simultaneously, the formula of calculated the MPE is:

CPD1/LPD1+CPD2/LPD2+……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Therefore the worst-case situation is 0.034/1+ 0.062/1= 0.096, which is less than 1, this confirmed that the device comply with FCC 1.1310 MPE limit.

----- The End -----