RF exposure statement

According to §1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.
Limits for General Population/Uncontrolled Exposure

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm^2]	Averaging Time [minute]
Limits for General Population/Uncontrolled Exposure				
0.3 – 1.34	614	1.63	100	30
1.34 – 30	824/f	2.19/f	180/f^2	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	-	-	f/1500	30
1500 – 100 000	-	-	1.0	30

※f = frequency in MHz

1. Friis transmission formula

$$P_d = (P_{out} \times G) / (4\pi r^2)$$

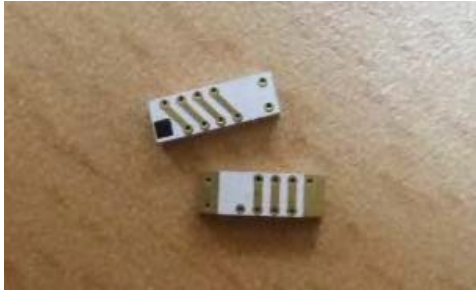P_d = Power density

P_{out} = power input to antenna

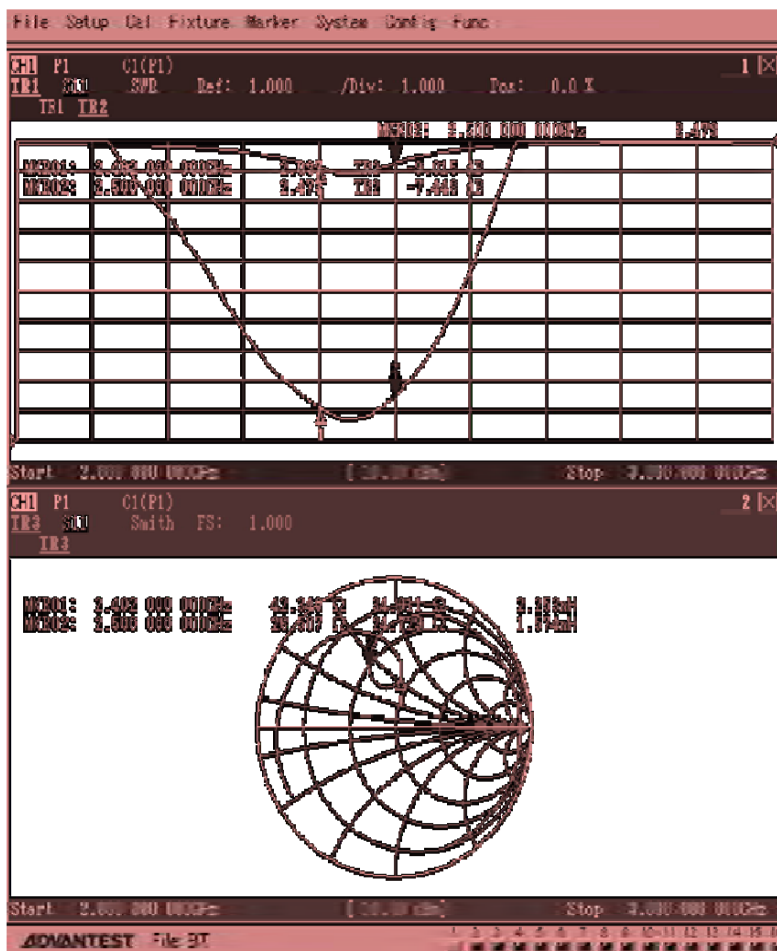G = power gain

r = distance to the center of radiation of the antenna

2. Information of Antenna
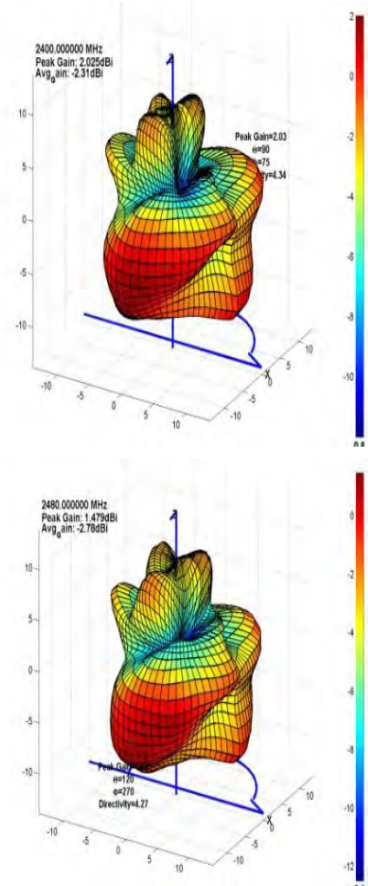
- ### Model Name : ABM6020B2

Item	Specification				
Frequency range	2 400 – 2483.5 GHz				
VSWR	1.5 : 1				
Polarization	Linear				
Radiation	Omni-directional				
Impedance	50 Ω				
Frequency [MHz]	2 400	2 420	2 440	2 460	2 480
Gain [dBi] Peak	2.0	3.1	2.7	2.2	1.5
Gain [dBi] Average	-2.3	-1.4	-1.6	-2.2	-2.8
Efficiency [%]	58.7	72.4	69.6	60.8	52.7

VSWR & SMITH CHART	3D RADIATION PATTERN

3. Calculation of MPE at 20 cm

Band	Frequency [MHz]	Output power [dBm]	Antenna gain [dBi]	EIRP		Power density at 20 cm [mW/cm^2]	Limit [mW/cm^2]
				[dBm]	[mW]		
Wireless LAN	2 412	10.62	2.0	12.62	18.28	0.003 639	1.0
	2 442	**10.34**	**2.7**	**13.04**	**20.14**	**0.004 008**	**1.0**
	2 472	10.87	1.5	12.37	17.26	0.003 435	1.0
Bluetooth	2 402	5.68	2.0	7.68	5.86	0.001 167	1.0
	2 442	**5.50**	**2.7**	**8.20**	**6.61**	**0.001 315**	**1.0**
	2 480	4.92	1.5	6.42	4.39	0.000 873	1.0
Wireless Audio	**2 405**	**6.62**	**2.0**	**8.62**	**7.28**	**0.001 448**	**1.0**
	2 440	5.59	2.7	8.29	6.75	0.001 342	1.0
	2 475	5.87	1.5	7.37	5.46	0.001 086	1.0

• Wireless LAN

The maximum conducted power is 10.34 dBm; antenna is fix-mounted with a maximum gain of 2.7 dBi gain.
Therefore, to comply with RF Exposure Requirement, the MPE is calculated.
The maximum Peak EIRP calculated is 13.04 dBm.
The Power Density can be calculated using the formula.

It is considered that 20 cm is the minimum distance that a user can go closer to the EUT.
At 0.2 m, S = 0.0040 mW/cm^2, which is below the MPE Limit of 1 mW/cm^2

• Bluetooth

The maximum conducted power is 5.50 dBm; antenna is fix-mounted with a maximum gain of 2.7 dBi gain.
Therefore, to comply with RF Exposure Requirement, the MPE is calculated.
The maximum Peak EIRP calculated is 8.20 dBm.

It is considered that 20 cm is the minimum distance that a user can go closer to the EUT.
At 0.2 m, S = 0.0013 mW/cm^2, which is below the MPE Limit of 1.00 mW/cm^2

• Wireless Audio

The maximum conducted power is 7.21 dBm; antenna is fix-mounted with a maximum gain of 2.7 dBi gain.
Therefore, to comply with RF Exposure Requirement, the MPE is calculated.
The maximum Peak EIRP calculated is 8.62 dBm.

It is considered that 20 cm is the minimum distance that a user can go closer to the EUT.
At 0.2 m, S = 0.0014 mW/cm^2, which is below the MPE Limit of 1.00 mW/cm^2

• Wireless LAN + Bluetooth + Wireless Audio

= 0.0040 + 0.0013 + 0.0014

= 0.0067 mW/cm^2

so combined they are still well below 100 % of the limit.