1. Maximum Permissible Exposure (MPE)

Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

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
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

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Maximum Permissible Exposure (MPE) Evaluation

2.4GHz mode:

The worst case: refer to FCC test report for detail measurement date.

Power measurement:

BDR mode

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
Low	0.55	0.00114	1
Mid	0.70	0.00118	1
High	0.82	0.00121	1

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	0.82	(dBm)
Maximum output power at antenna input terminal:	1.207813835	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	1.52054753	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0001959	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is 0.0001959 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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Mode	Freq. (MHz)	Output Power (dBm)	Total Output Power (dBm)	Output Power Limit (dBm)
BLE 5.0	2402	1.352	1.35	30.00
	2442	2.509	2.51	30.00
	2480	2	2.00	30.00

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	2.509	(dBm)
Maximum output power at antenna input terminal:	1.781968407	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	2.24336531	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0002890	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is 0.0002890 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3			
802.11g	2412	22.67				0.00	22.67	30.00
	2437	23.57				0.00	23.57	30.00
	2462	23.13				0.00	23.13	30.00

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	23.67	(dBm)
Maximum output power at antenna input terminal:	232.8091258	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	293.0893245	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0377529	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is 0.0377529 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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5180MHz – 5240MHz Mode:

The worst case of Average power a mode: refer to FCC test report for detail measurement date.

Power measurement:

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-1	11a	5180	16.43				0.18	16.61	23.98
		5200	17.72				0.18	17.90	23.98
		5240	16.93				0.18	17.11	23.98

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	17.9	(dBm)
Maximum output power at antenna input terminal:	61.65950019	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	77.62471166	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0099989	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0099989 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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5260MHz – 5320MHz Mode:

The worst case of Average power a mode: refer to FCC test report for detail measurement date.

Power measurement:

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-2A	HT40	5270	16.97				0.50	17.47	23.98
		5310	16.74				0.50	17.24	23.98

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	17.47	(dBm)
Maximum output power at antenna input terminal:	55.84701947	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	70.30723199	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0090563	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0090563 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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5470MHz – 5725MHz Mode:

The worst case of Average power a mode: refer to FCC test report for detail measurement date.

Power measurement:

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-2C	VHT20	5500	16.38				0.15	16.53	23.98
		5580	16.16				0.15	16.31	23.98
		5700	16.85				0.15	17.00	23.98

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	17	(dBm)
Maximum output power at antenna input terminal:	50.11872336	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	63.09573445	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0081274	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0081274mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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5725MHz – 5850MHz Mode:

The worst case of Average power a mode: refer to FCC test report for detail measurement date.

Power measurement:

Band	Mode	Freq. (MHz)	Output Power (dBm)				Duty Factor (dB)	Total Output Power (dBm)	Output Power Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
UNII-3	11a	5745	16.94				0.18	17.12	30.00
		5785	16.76				0.18	16.94	30.00
		5825	16.6				0.18	16.78	30.00

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum output power at antenna input terminal:	17.12	(dBm)
Maximum output power at antenna input terminal:	51.52286446	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	64.86344335	(mW)
Antenna gain (typical):	-1.89	(dBi)
Maximum antenna gain:	0.647142616	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0083551	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0083551mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

~ End of Report ~

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