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

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	8.33	0.00680	1
Mid	7.68	0.00585	1
High	7.46	0.00557	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:	8.33	(dBm)
Maximum output power at antenna input terminal:	6.807693587	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	8.570378452	(mW)
Antenna gain (typical):	2.2	(dBi)
Maximum antenna gain:	1.659586907	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0028311	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is 0.0028311 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)
BLE 4.0	2402	4.150	0.00	4.15	30.00
	2442	3.687	0.00	3.69	30.00
	2480	2.897	0.00	2.90	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:	4.15	(dBm)
Maximum output power at antenna input terminal:	2.600159563	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	3.273406949	(mW)
Antenna gain (typical):	2.2	(dBi)
Maximum antenna gain:	1.659586907	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0010813	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is 0.0010813 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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	24.06				0.00	24.06	30.00
	2437	24.10				0.00	24.10	30.00
	2462	24.19				0.00	24.19	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:	24.19	(dBm)
Maximum output power at antenna input terminal:	262.4218543	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	330.369541	(mW)
Antenna gain (typical):	2.2	(dBi)
Maximum antenna gain:	1.659586907	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.1091316	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is 0.1091316 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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	16.36				0.16	**16.52**	23.98
		5200	16.12				0.16	16.28	23.98
		5240	16.29				0.16	16.45	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:	16.52	(dBm)
Maximum output power at antenna input terminal:	44.87453899	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	56.49369748	(mW)
Antenna gain (typical):	4.93	(dBi)
Maximum antenna gain:	3.111716337	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0349905	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0349905 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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	11a	5260	15.96				0.16	16.12	23.98
		5300	16.03				0.16	16.19	23.98
		5320	16.21				0.16	16.37	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:	16.37	(dBm)
Maximum output power at antenna input terminal:	43.35108784	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	54.57578611	(mW)
Antenna gain (typical):	4.93	(dBi)
Maximum antenna gain:	3.111716337	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0338026	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0338026 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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	11a	5500	14.88				0.16	15.04	23.98
		5580	14.8				0.16	14.96	23.98
		5700	15.63				0.16	15.79	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:	15.79	(dBm)
Maximum output power at antenna input terminal:	37.9314985	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	47.75292737	(mW)
Antenna gain (typical):	4.57	(dBi)
Maximum antenna gain:	2.86417797	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0272239	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0272239mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

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	VHT40	5755	15.31				0.43	15.74	30.00
		5795	15.52				0.43	15.95	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:	15.95	(dBm)
Maximum output power at antenna input terminal:	39.35500755	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	49.54501908	(mW)
Antenna gain (typical):	4.66	(dBi)
Maximum antenna gain:	2.924152378	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0288370	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0288370mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

~ End of Report ~