

11 FCC §1.1307(b) (1) & §2.1091 - RF EXPOSURE

11.1 Applicable Standard

According to §1.1310 and §2.1091 (Mobile Devices) 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

Note: f = frequency in MHz

* = Plane-wave equivalent power density

11.2 MPE Prediction

Predication 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

Test Result

Please see the following MPE calculation for details.

Cellular Band Fixed Outside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	824
Pout Watts	1.2420
Duty Cycle Percent	100.0%
Ant. Gain dBi	15.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	29.70
Min. Distance Centimeters	75.43
ERP (Watts)	23.9485
EIRP (Watts)	39.2755

REFERENCE DATA

Antenna Gain (non-log)	31.62
Coax loss (non-log)	1.00
Calculated Limit (mW/cm ²)	0.55
FCC Limit (mW/cm ²)	1/1500

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas (see #5).
- (5) Indoor building antenna criteria is the same as the criteria for mobile antennas (see #2 & #3).
- (6) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (see 24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	2B5225
Frequency Band (MHz)	800
Mobile or Fixed?	Fixed
Outside or Inside Antenna?	Outside
Antenna Type:	Any antenna whose gain less cable loss is less than 15 dBi
Safe Distance (Inches):	30 Inches
Signature:	<i>Richard M. Wilson</i>
Date:	8/18/2009

2B5225 MPE 800 Fixed Outside.xls

Cellular Band Mobile Outside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	824
Pout Watts	1.2420
Duty Cycle Percent	100.0%
Ant. Gain dBi	2.90
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	7.37
Min. Distance Centimeters	18.73
ERP (Watts)	1.4767
EIRP (Watts)	2.4217

REFERENCE DATA

Antenna Gain (non-log)	1.95
Coax loss (non-log)	1.00
Calculated Limit (mW/cm ²)	0.55
FCC Limit (mW/cm ²)	1/1500

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas (see #5).
- (5) Indoor building antenna criteria is the same as the criteria for mobile antennas (see #2 & #3).
- (6) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (see 24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	2B5225
Frequency Band (MHz)	800
Mobile or Fixed?	Mobile
Outside or Inside Antenna?	Outside
Antenna Type:	Any antenna whose gain less cable loss is less than 2.9 dBi
Safe Distance (Inches):	8 Inches
Signature:	<i>Richard M. Khan</i>
Date:	8/18/2009

2B5225 MPE 800 Mobile Outside.xls

Cellular Band Mobile & Fixed Inside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	869
Pout Watts	0.0011
Duty Cycle Percent	100.0%
Ant. Gain dBi	20.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	1.51
Min. Distance Centimeters	3.85
ERP (Watts)	0.0656
EIRP (Watts)	0.1077

REFERENCE DATA

Antenna Gain (non-log)	100.00
Coax loss (non-log)	1.00
Calculated limit (mW/cm ²)	0.58
FCC Limit (mW/cm ²)	1/1500

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- (3) Mobile antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas (see #5).
- (5) Indoor building antenna criteria is the same as the criteria for mobile antennas (see #2 & #3).
- (6) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (see 24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	2B5225
Frequency Band (MHz)	800
Mobile or Fixed?	Mobile and Fixed
Outside or Inside Antenna?	Inside
Antenna Type:	Any antenna whose gain less cable loss is less than 20 dBi
Safe Distance (Inches):	8 inches
Signature:	<i>Richard M. Yeh</i>
Date:	8/18/2009

2B5225 MPE 800 Mobile & Fixed Inside.xls

PCS Band Fixed Outside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1850
Pout Watts	1.8030
Duty Cycle Percent	100.0%
Ant. Gain dBi	15.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	26.52
Min. Distance Centimeters	67.36
ERP (Watts)	34.7658
EIRP (Watts)	57.0159

REFERENCE DATA

Antenna Gain (non-log)	31.62
Coax loss (non-log)	1.00
Calculated limit (mW/cm ²)	1.00
FCC Limit (mW/cm ²)	1.00

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas (see #5).
- (5) Indoor building antenna criteria is the same as the criteria for mobile antennas (see #2 & #3).
- (6) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (see 24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	2B5225
Frequency Band (MHz)	1900
Mobile or Fixed?	Fixed
Outside or Inside Antenna?	Outside
Antenna Type:	Any antenna whose gain less cable loss is less than 15 dBi
Safe Distance (Inches):	30 Inches
Signature:	<i>Richard M. Yeh</i>
Date:	8/18/2009

2B5225 MPE 1900 Fixed Outside.xls

PCS Band Mobile Outside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1850
Pout Watts	1.8030
Duty Cycle Percent	100.0%
Ant. Gain dBi	0.45
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	4.97
Min. Distance Centimeters	12.62
ERP (Watts)	1.2194
EIRP (Watts)	1.9998

REFERENCE DATA

Antenna Gain (non-log)	1.11
Coax loss (non-log)	1.00
Calculated Limit (mw/cm ²)	1.00
FCC Limit (mw/cm ²)	1.00

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
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- (5) Indoor building antenna criteria is the same as the criteria for mobile antennas (see #2 & #3).
- (6) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (see 24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	2B5225
Frequency Band (MHz)	1900
Mobile or Fixed?	Mobile
Outside or Inside Antenna?	Outside
Antenna Type:	Any antenna whose gain less cable loss is less than 0.45 dBi
Safe Distance (Inches):	8 inches
Signature:	<i>Richard M. Yeh</i>
Date:	8/18/2009

2B5225 MPE 1900 Mobile Outside.xls

PCS Band Mobile & Fixed Inside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1930
Pout Watts	0.0017
Duty Cycle Percent	100.0%
Ant. Gain dBi	20.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	1.45
Min. Distance Centimeters	3.67
ERP (Watts)	0.1033
EIRP (Watts)	0.1694

REFERENCE DATA

Antenna Gain (non-log)	100.00
Coax loss (non-log)	1.00
Calculated Limit (mW/cm ²)	1.00
FCC Limit (mW/cm ²)	1.00

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
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- (6) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (see 24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	2B5225
Frequency Band (MHz)	1900
Mobile or Fixed?	Mobile and Fixed
Outside or Inside Antenna?	Inside
Antenna Type:	Any antenna whose gain less cable loss is less than 20 dBi
Safe Distance (Inches):	8 Inches
Signature:	<i>Richard M. Yeh</i>
Date:	8/18/2009

2B5225 MPE 1900 Mobile & Fixed Inside.xls