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December 29, 2016  
Subject: Antenna Kitting  
Re: FCC ID: PWO460019  
To Whom It May Concern:

The antenna kitting options for model 460019 signal booster were done for 52 Outside Antenna kit options. The order of the attached calculations is as follows:

Outside Antenna Kit Options:

Fixed

1. Kit 314411-40075
2. Kit 314411-5825
3. Kit 314475-0630
4. Kit 301111-0675
5. Kit 301111-5850
6. Kit 311203-40020
7. Kit 314453-5825
8. Kit 311203-5820
9. Kit 311201-0620
10. Kit 301126
11. Kit 301111-11140
12. Kit 311201-1120
13. Kit 314453-40075
14. Kit 314473-0640
15. Kit 311141-0620

Mobile

- |                       |                        |
|-----------------------|------------------------|
| 16. Kit 311124-1180   | 4. Kit 311114          |
| 17. Kit 311141-1120   | 5. Kit 311102          |
| 18. Kit 314473-1175   | 6. Kit 311104-5810     |
| 19. Kit 314475-1175   | 7. Kit 311701          |
| 20. Kit 301111-400170 | 8. Kit 311119          |
| 21. Kit 304421-1120   | 9. Kit 311133          |
| 22. Kit 304421-17410  | 10. Kit 311104-17410   |
| 23. Kit 304421-0610   | 11. Kit 301113         |
| 24. Kit 304421-5810   | 12. Kit 311112-5810    |
| 25. Kit 304422-40020  | 13. Kit 314203-5810    |
| 26. Kit 304422-5810   | 14. Kit 311112-17410   |
| 27. Kit 304422-1120   | 15. Kit 314203-17410   |
|                       | 16. Kit 311101         |
|                       | 17. Kit 304414, 304415 |
|                       | 18. Kit 304416         |
|                       | 19. Kit 304420         |

All equivalent or lesser antennas and cables are suitable for use with 460019 signal booster.

Sincerely,

Patrick L. Cook  
Chief Technology Officer



## Fixed Outside Antenna Kit Options

FCC ID: PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**1 Wide Band Directional Antenna With 75' LMR 400** 314411-40075

Antenna Gains (dBi)	7.3	7.2	7.8	7.9	9.1
Coax Loss (dB)	2.8	3.0	3.6	4.4	5.4
Final Gain less Loss (dB)	4.5	4.2	4.2	3.5	3.7
Output Power plus Final Gain (dBm EIRP)	29.1	29.3	28.1	27.4	27.2

**2 Wide Band Directional Antenna With 25' RG-58** 314411-5825

Antenna Gains (dBi)	7.3	7.2	7.8	7.9	9.1
Coax Loss (dB)	2.9	3.1	3.2	5.1	5.4
Final Gain less Loss (dB)	4.4	4.1	4.6	2.8	3.7
Output Power plus Final Gain (dBm EIRP)	29.0	29.2	28.5	26.7	27.2

**3 Wide Band Directional Antenna With 30' RG-6** 314475-0630

Antenna Gains (dBi)	7.3	7.2	7.8	7.9	9.1
Coax Loss (dB)	3.0	3.2	3.4	5.1	5.3
Final Gain less Loss (dB)	4.3	4	4.4	2.8	3.8
Output Power plus Final Gain (dBm EIRP)	28.9	29.1	28.3	26.7	27.3

**4 Yagi Antenna 301111 With 75' RG-6** 301111-0675

Antenna Gains (dBi)	10.0	10.0	10.8	-6.8	-13.8
Coax Loss (dB)	5.7	6.075	6.3	9.525	9.975
Final Gain less Loss (dB)	4.3	3.925	4.5	-16.325	-23.775
Output Power plus Final Gain (dBm EIRP)	28.9	29.0	28.4	7.6	-0.3

**5 Yagi Antenna 301111 With 50' RG-58** 301111-5850

Antenna Gains (dBi)	10.0	10.0	10.8	-6.8	-13.8
Coax Loss (dB)	5.8	6.2	6.5	10.3	10.7
Final Gain less Loss (dB)	4.2	3.8	4.3	-17.1	-24.5
Output Power plus Final Gain (dBm EIRP)	28.8	28.9	28.2	6.8	-1.0

**6 Omni Directional Antenna (311203) With 20' LMR 400** 311203-40020

Antenna Gains (dBi)	-1.5	-0.24	0.57	-2.51	5.09
Coax Loss (dB)	0.7	0.7	0.7	1.1	1.1
Final Gain less Loss (dB)	-2.2	-0.94	-0.13	-3.61	4.0
Output Power plus Final Gain (dBm EIRP)	22.4	24.2	23.8	20.3	27.5



## Fixed Outside Antenna Kit Options

FCC ID: PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**7 Panel Antenna With 25' RG-58** 314453-5825

Antenna Gains (dBi)	3.84	3.63	4.4	8.21	10.04
Coax Loss (dB)	2.9	3.1	3.2	5.1	5.4
Final Gain less Loss (dB)	0.9	0.5	1.2	3.1	4.6
Output Power plus Final Gain (dBm EIRP)	25.5	25.6	25.1	27.0	28.1

**8 Omni Directional Antenna (311203) With 20' RG-58** 311203-5820

Antenna Gains (dBi)	-1.5	-0.24	0.57	-2.51	5.09
Coax Loss (dB)	2.3	2.5	2.6	4.1	4.3
Final Gain less Loss (dB)	-3.8	-2.74	-2.03	-6.61	0.79
Output Power plus Final Gain (dBm EIRP)	20.8	22.4	21.9	17.3	24.3

**9 Omni Directional Antenna (311201) With 20' RG-6** 311201-0620

Antenna Gains (dBi)	-1.5	-0.24	0.57	-2.51	5.09
Coax Loss (dB)	1.5	1.6	1.7	2.5	2.7
Final Gain less Loss (dB)	-3	-1.84	-1.13	-5.01	2.39
Output Power plus Final Gain (dBm EIRP)	21.6	23.3	22.8	18.9	25.9

**10 Mini-Mag Antenna With 12.5' RG-174** 301126

Antenna Gains (dBi)	-1.42	-1.69	-1.4	-0.59	0.42
Coax Loss (dB)	2.8	3.0	3.7	4.5	4.7
Final Gain less Loss (dB)	-4.22	-4.69	-5.1	-5.09	-4.28
Output Power plus Final Gain (dBm EIRP)	20.4	20.4	18.8	18.8	19.2

**11 Yagi 301111 With 140' RG-11** 301111-11140

Antenna Gains (dBi)	10	10	10.8	-6.8	-14.9
Coax Loss (dB)	5.76	6.17	6.43	10.36	10.94
Final Gain less Loss (dB)	4.24	3.83	4.37	-17.16	-25.84
Output Power plus Final Gain (dBm EIRP)	28.8	28.9	28.3	6.7	-2.3

**12 Omni Directional Antenna 311201 With 20' RG-11** 311201-1120

Antenna Gains (dBi)	-1.5	-0.2	0.6	-2.5	5.1
Coax Loss (dB)	0.8	0.9	0.9	1.5	1.6
Final Gain less Loss (dB)	-2.32	-1.12	-0.34	-3.99	3.53
Output Power plus Final Gain (dBm EIRP)	22.3	24.0	23.6	19.9	27.0



## Fixed Outside Antenna Kit Options

FCC ID: PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**13 Panel Antenna With 75' LMR 400** 314453-40075

Antenna Gains (dBi)	3.84	3.63	4.4	8.21	10.04
Coax Loss (dB)	2.8	3.0	3.6	4.4	5.4
Final Gain less Loss (dB)	1.04	0.63	0.8	3.81	4.64
Output Power plus Final Gain (dBm EIRP)	25.6	25.7	24.7	27.7	28.1

**14 Panel Antenna With 40' RG-6** 314473-0640

Antenna Gains (dBi)	3.84	3.63	4.4	8.21	10.04
Coax Loss (dB)	3.0	3.2	3.4	5.1	5.3
Final Gain less Loss (dB)	0.84	0.43	1.0	3.11	4.74
Output Power plus Final Gain (dBm EIRP)	25.4	25.5	24.9	27.0	28.2

**15 Grey Brick w/20' RG-6** 311141-0620

Antenna Gains (dBi)	-2.9	-0.6	1.2	-0.4	5.5
Coax Loss (dB)	1.5	1.6	1.7	2.5	2.7
Final Gain less Loss (dB)	-4.4	-2.2	-0.5	-2.9	2.8
Output Power plus Final Gain (dBm EIRP)	20.2	22.9	23.4	21	26.3

**16 Grey Panel With 20' RG-11** 311141-1120

Antenna Gains (dBi)	-2.9	-0.6	1.2	-0.4	5.5
Coax Loss (dB)	0.9	0.9	1.0	1.5	1.6
Final Gain less Loss (dB)	-3.75	-1.48	0.25	-1.88	3.94
Output Power plus Final Gain (dBm EIRP)	20.9	23.6	24.2	22.0	27.4

**17 Panel Antenna With 75' RG-11** 314473-1175

Antenna Gains (dBi)	3.8	3.6	4.4	8.2	10
Coax Loss (dB)	3.0	3.3	3.4	5.5	5.8
Final Gain less Loss (dB)	0.77	0.34	0.98	2.66	4.18
Output Power plus Final Gain (dBm EIRP)	25.4	25.4	24.9	26.6	27.7

**18 Wide Band Directional Antenna With 75' RG-11** 314475-1175

Antenna Gains (dBi)	7.3	7.2	7.8	7.9	9.1
Coax Loss (dB)	3.07	3.3	3.42	5.55	5.9
Final Gain less Loss (dB)	4.23	3.91	4.38	2.35	3.24
Output Power plus Final Gain (dBm EIRP)	28.8	29.0	28.3	26.3	26.7



## Fixed Outside Antenna Kit Options

FCC ID: PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**19 Yagi Antenna 301111 With 170' LMR 400** 301111-400170

Antenna Gains (dBi)	10.0	10.0	10.8	-6.8	-13.8
Coax Loss (dB)	5.8	6.1	6.3	9.4	9.8
Final Gain less Loss (dB)	4.2	3.9	4.5	-16.2	-23.6
Output Power plus Final Gain (dBm EIRP)	28.8	29.0	28.4	7.7	-0.1

**20 Yagi Antenna 311124 With 30' RG-58** 311124-5830

Antenna Gains (dBi)	-18.7	-18.7	-23.4	9.1	10.9
Coax Loss (dB)	3.5	3.7	3.9	6.2	6.4
Final Gain less Loss (dB)	-22.2	-22.4	-27.3	2.9	4.5
Output Power plus Final Gain (dBm EIRP)	-22.2	-22.4	-27.3	2.9	4.5

**21 Omni Consumer 304421 With 20' RG-11** 304421-1120

Antenna Gains (dBi)	1.9	0.0	1.16	5.11	3.81
Coax Loss (dB)	0	0	0.0	1.3	0
Final Gain less Loss (dB)	1.9	0.02	1.16	3.81	3.81
Output Power plus Final Gain (dBm EIRP)	26.5	25.1	25.1	27.7	27.3

**22 Omni Consumer 304421 With 10' RG-174** 304421-17410

Antenna Gains (dBi)	1.9	0.0	1.16	5.11	3.81
Coax Loss (dB)	0	0	0.0	1.3	0
Final Gain less Loss (dB)	1.9	0.02	1.16	3.81	3.81
Output Power plus Final Gain (dBm EIRP)	26.5	25.1	25.1	27.7	27.3

**23 Omni Consumer 304421 With 10' RG-6** 304421-0610

Antenna Gains (dBi)	1.9	0.0	1.16	5.11	3.81
Coax Loss (dB)	0	0	0.0	1.3	0
Final Gain less Loss (dB)	1.9	0.02	1.16	3.81	3.81
Output Power plus Final Gain (dBm EIRP)	26.5	25.1	25.1	27.7	27.3

**24 Omni Consumer 304421 With 10' RG-58** 304421-5810

Antenna Gains (dBi)	1.9	0.0	1.16	5.11	3.81
Coax Loss (dB)	0	0	0.0	1.3	0
Final Gain less Loss (dB)	1.9	0.02	1.16	3.81	3.81
Output Power plus Final Gain (dBm EIRP)	26.5	25.1	25.1	27.7	27.3



## Fixed Outside Antenna Kit Options

FCC ID:

PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**25** Omni Enterprise 304422 With 20' LMR 400 304422-40020

Antenna Gains (dBi)	1.33	1.02	1.34	4.76	4.65
Coax Loss (dB)	0.0	0.0	0.0	1.0	0.0
Final Gain less Loss (dB)	1.3	1.0	1.3	3.81	4.7
Output Power plus Final Gain (dBm EIRP)	25.9	26.1	25.2	27.7	28.2

Omni Enterprise 304422 With 10' RG-58 304422-5810

**26**

Antenna Gains (dBi)	1.33	1.02	1.34	4.76	4.65
Coax Loss (dB)	0.0	0.0	0.0	1.0	0.0
Final Gain less Loss (dB)	1.3	1.0	1.3	3.81	4.7
Output Power plus Final Gain (dBm EIRP)	25.9	26.1	25.2	27.7	28.2

**27** Omni Enterprise 304422 With 20' RG-11 304422-1120

Antenna Gains (dBi)	1.33	1.02	1.34	4.76	4.65
Coax Loss (dB)	0.0	0.0	0.0	1.0	0.0
Final Gain less Loss (dB)	1.3	1.0	1.3	3.81	4.7
Output Power plus Final Gain (dBm EIRP)	25.9	26.1	25.2	27.7	28.2



## Mobile Outside Antenna Kit Options

FCC ID:

PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

### 1 Magnet Mount w/12.5' RG-174 311703

Antenna Gains (dBi)	-15.07	-4.23	0.69	-1.99	1.13
Coax Loss (dB)	2.8	3.0	3.7	4.5	4.7
Final Gain less Loss (dB)	-17.9	-7.2	-3.0	-6.5	-3.6
Output Power plus Final Gain (dBm EIRP)	6.7	17.9	20.9	17.4	19.9

### 2 Magnet Mount w/12.5' RG-174 314202 311125 311128

Antenna Gains (dBi)	-4.88	0.09	1.97	-6.99	2.51
Coax Loss (dB)	2.8	3.0	3.7	4.5	4.7
Final Gain less Loss (dB)	-7.7	-2.9	-1.7	-11.5	-2.2
Output Power plus Final Gain (dBm EIRP)	16.9	22.2	22.2	12.41	21.3

### 3 Marine Antenna w/10' RG-58 311130-5810

Antenna Gains (dBi)	-1.0	-1.6	0.65	-1.68	3.57
Coax Loss (dB)	1.2	1.2	1.3	2.1	2.1
Final Gain less Loss (dB)	-2.2	-2.9	-0.6	-3.7	1.4
Output Power plus Final Gain (dBm EIRP)	22.5	22.2	23.3	20.2	24.9

### 4 Glass Mount w/14' RG-58 311102

Antenna Gains (dBi)	-3.68	-2.54	-0.86	2.19	3.39
Coax Loss (dB)	1.6	1.7	1.8	2.9	3.0
Final Gain less Loss (dB)	-5.3	-4.2	-2.7	-0.7	0.4
Output Power plus Final Gain (dBm EIRP)	19.3	20.9	21.2	23.2	23.9

### 5 NMO Antenna w/10' RG-58 311104-5810

Antenna Gains (dBi)	-4.1	-0.9	2.48	-3.51	1.8
Coax Loss (dB)	1.2	1.2	1.3	2.1	2.1
Final Gain less Loss (dB)	-5.3	-2.1	1.2	-5.6	-0.3
Output Power plus Final Gain (dBm EIRP)	19.3	23.0	25.1	18.3	23.2

### 6 Trucker Antenna w/10.5' RG-58 311701

Antenna Gains (dBi)	-14.11	-0.71	2.18	-0.15	2.66
Coax Loss (dB)	1.2	1.3	1.4	2.2	2.3
Final Gain less Loss (dB)	-15.3	-2.0	0.8	-2.4	0.4
Output Power plus Final Gain (dBm EIRP)	9.3	23.1	24.7	21.6	23.9



## Mobile Outside Antenna Kit Options

FCC ID:

PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

### 7 Trucker Antenna w/13.5' RG-58 311119

Antenna Gains (dBi)	-1.36	0.36	1.21	-2.3	3.57
Coax Loss (dB)	1.6	1.7	1.7	2.8	2.9
Final Gain less Loss (dB)	-3.0	-1.3	-0.5	-5.1	0.7
Output Power plus Final Gain (dBm EIRP)	21.6	23.8	23.4	18.8	24.2

### 8 Trucker Antenna w/13.5' RG-58 311133

Antenna Gains (dBi)	-3.3	0.2	1.15	-4.75	4.22
Coax Loss (dB)	1.6	1.7	1.7	2.8	2.9
Final Gain less Loss (dB)	-4.9	-1.6	-0.6	-7.6	1.3
Output Power plus Final Gain (dBm EIRP)	19.8	23.6	23.4	16.4	24.8

### 9 NMO Antenna 10' RG-174 311104-17410

Antenna Gains (dBi)	-4.1	-0.9	2.48	-3.51	1.8
Coax Loss (dB)	2.3	2.4	3.0	3.6	3.8
Final Gain less Loss (dB)	-6.4	-3.3	-0.5	-7.1	-2.0
Output Power plus Final Gain (dBm EIRP)	18.2	21.8	23.4	16.8	21.5

### 10 Mini-Mag Mount w/12.5' RG-174 301126 301113

Antenna Gains (dBi)	-1.4	-1.7	-1.4	-0.6	0.4
Coax Loss (dB)	2.8	3	3.7	4.5	4.7
Final Gain less Loss (dB)	-4.2	-4.7	-5.1	-5.1	-4.3
Output Power plus Final Gain (dBm EIRP)	20.4	20.4	18.8	18.8	19.2

### 11 Marine Antenna w/20' RG-58 304415 304420

Antenna Gains (dBi)	2.86	1.2	1.69	2.78	5.01
Coax Loss (dB)	2.4	2.4	2.7	4.2	4.6
Final Gain less Loss (dB)	0.5	-1.2	-1.0	-1.4	0.4
Output Power plus Final Gain (dBm EIRP)	25.1	23.9	22.9	22.5	23.9

### 12 NMO Antenna w/10' RG-58 311112-5810

Antenna Gains (dBi)	-3.16	-0.45	2.47	-2.6	-0.65
Coax Loss (dB)	1.2	1.2	1.3	2.1	2.1
Final Gain less Loss (dB)	-4.4	-1.7	1.2	-4.7	-2.8
Output Power plus Final Gain (dBm EIRP)	20.2	23.5	25.1	19.2	20.8



## Mobile Outside Antenna Kit Options

FCC ID:

PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**13 NMO Antenna w/10' RG-58** 314203-5810

Antenna Gains (dBi)	-1.57	0.48	1.82	-5.74	0.75
Coax Loss (dB)	1.2	1.2	1.3	2.1	2.1
Final Gain less Loss (dB)	-2.8	-0.7	0.5	-7.8	-1.4
Output Power plus Final Gain (dBm EIRP)	21.8	24.4	24.4	16.1	22.2

**14 NMO Antenna 10' RG-174** 311112-17410

Antenna Gains (dBi)	-3.16	-0.45	2.47	-2.6	-0.65
Coax Loss (dB)	2.3	2.4	3.0	3.6	3.8
Final Gain less Loss (dB)	-5.5	-2.9	-0.5	-6.2	-4.5
Output Power plus Final Gain (dBm EIRP)	19.1	22.3	23.4	17.7	19.1

**15 NMO Antenna 10' RG-174** 314203-17410

Antenna Gains (dBi)	-1.57	0.48	1.82	-5.74	0.75
Coax Loss (dB)	2.3	2.4	3.0	3.6	3.8
Final Gain less Loss (dB)	-3.9	-1.9	-1.2	-9.3	-3.1
Output Power plus Final Gain (dBm EIRP)	20.7	23.2	22.7	14.6	20.5

**16 Trucker Antenna w/10.5' RG-58** 311101

Antenna Gains (dBi)	-4.51	0.4	1.72	-3.62	6.12
Coax Loss (dB)	1.2	1.3	1.4	2.2	2.3
Final Gain less Loss (dB)	-5.7	-0.9	0.3	-5.8	3.8
Output Power plus Final Gain (dBm EIRP)	18.9	24.2	24.2	18.1	27.3



## Mobile Outside Antenna Kit Options

FCC ID:

PWO460019

Final Output Power Limited to 30 dBm EIRP in all frequency bands

Uplink Frequency (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	24.6	25.1	23.9	23.9	23.5

**17 Trucker Antenna w/15' RG-58** 304414 304415

Antenna Gains (dBi)	2.86	1.2	1.69	2.78	5.01
Coax Loss (dB)	1.8	1.8	2.0	3.2	3.5
Final Gain less Loss (dB)	1.1	-0.6	-0.3	-0.4	1.6
Output Power plus Final Gain (dBm EIRP)	25.7	24.5	23.6	23.5	25.1

**18 Marine Antenna 304416 w/20' L-195** 304416

Antenna Gains (dBi)	2.9	1.2	1.7	2.8	5
Coax Loss (dB)	2.4	2.4	2.7	4.2	4.6
Final Gain less Loss (dB)	0.5	-1.2	-1.0	-1.4	0.4
Output Power plus Final Gain (dBm EIRP)	24.6	25.1	23.9	23.9	23.5

**19 Marine Antenna 304420 w/20' L-195** 304420

Antenna Gains (dBi)	2.9	1.2	1.7	2.8	5
Coax Loss (dB)	2.4	2.4	2.7	4.2	4.6
Final Gain less Loss (dB)	0.5	-1.2	-1.0	-1.4	0.4
Output Power plus Final Gain (dBm EIRP)	25.7	24.5	23.6	23.5	25.1