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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

16. Kit 311124-1180
17. Kit 311141-1120
18. Kit 314473-1175
19. Kit 314475-1175
20. Kit 301111-400170
21. Kit 304421-1120
22. Kit 304421-17410
23. Kit 304421-0610
24. Kit 304421-5810
25. Kit 304422-40020
26. Kit 304422-5810
27. Kit 304422-1120

Mobile

1. Kit 311703
2. Kits 311103, 311125,
311128, 314202
3. Kit 311130-5810

4. Kit 311114
5. Kit 311102
6. Kit 311104-5810
7. Kit 311701
8. Kit 311119
9. Kit 311133
10. Kit 311104-17410
11. Kit 301113
12. Kit 311112-5810
13. Kit 314203-5810
14. Kit 311112-17410
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