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November 25, 2014

Subject: Antenna Kitting

Re: FCC ID: PWO460022

To Whom It May Concern:

The antenna kitting options for model 460022 signal booster were done for 46 Outside Antenna kit. 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 311129-400100
8. Kit 311129-5840
9. Kit 311129-0660
10. Kit 311124-0650
11. Kit 311124-400100
12. Kit 314453-5825
13. Kit 311203-5820
14. Kit 311201-0620
15. Kit 301126
16. Kit 301111-11140
17. Kit 311201-1120

18. Kit 311129-11110

19. Kit 314453-40075

20. Kit 314473-0640

21. Kit 311141-0620

22. Kit 311124-1180

23. Kit 311141-1120

24. Kit 314473-1175

25. Kit 314475-1175

26. Kit 301111-400170

27. Kit 311124-5830

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

Sincerely,

A handwritten signature in blue ink, appearing to read 'Patrick L. Cook'.

Patrick L. Cook

Chief Technology Officer



Fixed Outside Antenna Kit Options

FCC ID:

PWO460022

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)	24.28	24.35	24.44	25.14	24.25

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)	28.78	28.55	28.64	28.64	28.0

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)	28.7	28.5	29.0	27.9	28.0

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)	28.58	28.4	28.84	27.94	28.1

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)	28.58	28.3	28.94	8.8	0.5

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)	28.5	28.1	28.8	8.1	-0.3

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)	22.1	23.4	24.3	21.5	28.2



Fixed Outside Antenna Kit Options

FCC ID:

PWO460022

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)	24.28	24.35	24.44	25.14	24.25

7 Yagi Antenna 311129 With 100' LMR 400 311129-400100

Antenna Gains (dBi)	1.95	7.18	9.64	-6.67	-11.97
Coax Loss (dB)	3.7	3.9	4.7	5.8	7.1
Final Gain less Loss (dB)	-1.75	3.28	4.9	-12.47	-19.07
Output Power plus Final Gain (dBm EIRP)	22.5	27.6	29.3	12.7	5.2

8 Yagi Antenna 311129 With 40' RG-58 311129-5840

Antenna Gains (dBi)	1.95	7.18	9.64	-6.67	-11.97
Coax Loss (dB)	4.6	5.0	5.2	8.2	8.6
Final Gain less Loss (dB)	-2.7	2.2	4.4	-14.9	-20.6
Output Power plus Final Gain (dBm EIRP)	21.6	26.5	28.9	10.3	3.7

9 Yagi Antenna 311129 With 60' RG-6 311129-0660

Antenna Gains (dBi)	1.95	7.18	9.64	-6.67	-11.97
Coax Loss (dB)	4.56	4.86	5.0	7.6	8.0
Final Gain less Loss (dB)	-2.61	2.32	4.64	-14.29	-19.95
Output Power plus Final Gain (dBm EIRP)	21.7	26.7	29.1	10.9	4.3

10 Yagi Antenna 311124 With 50' RG-6 311124-0650

Antenna Gains (dBi)	-18.7	-18.7	-23.4	9.1	10.9
Coax Loss (dB)	3.8	4.05	4.2	6.4	6.7
Final Gain less Loss (dB)	-22.50	-22.75	-27.60	2.75	4.25
Output Power plus Final Gain (dBm EIRP)	1.8	1.6	-3.2	27.9	28.5

11 Yagi Antenna 311124 With 100' LMR 400 311124-400100

Antenna Gains (dBi)	-18.7	-18.7	-23.4	9.1	10.9
Coax Loss (dB)	3.7	3.9	4.7	5.8	7.1
Final Gain less Loss (dB)	-22.4	-22.6	-28.1	3.3	3.8
Output Power plus Final Gain (dBm EIRP)	1.88	1.75	-3.66	28.44	28.05

12 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)	25.2	24.9	25.6	28.3	28.9



Fixed Outside Antenna Kit Options

FCC ID:

PWO460022

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)	24.28	24.35	24.44	25.14	24.25

13 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)	20.48	21.6	22.4	18.5	25.0

14 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)	21.3	22.5	23.3	20.1	26.6

15 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)	20.1	19.7	19.3	20.1	20.0

16 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)	28.5	28.2	28.8	8.0	-1.6

17 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)	22.0	23.2	24.1	21.2	27.8

18 Yagi 311129 With 110' RG-11 311129-11110

Antenna Gains (dBi)	2	7.2	9.6	-6.7	-12
Coax Loss (dB)	4.6	4.8	5.0	8.1	8.6
Final Gain less Loss (dB)	-2.55	2.36	4.63	-14.81	-20.57
Output Power plus Final Gain (dBm EIRP)	21.7	26.7	29.1	10.3	3.7



Fixed Outside Antenna Kit Options

FCC ID:

PWO460022

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)	24.28	24.35	24.44	25.14	24.25

19 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)	25.3	25.0	25.2	29.0	28.9

20 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)	25.1	24.8	25.4	28.3	29.0

21 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)	19.88	22.15	23.94	22.24	27.1

22 Yagi 311124 With 80' RG-11 311124-1180

Antenna Gains (dBi)	-18.7	-18.7	-23.4	9.1	10.9
Coax Loss (dB)	3.3	3.5	3.6	5.9	6.3
Final Gain less Loss (dB)	-21.97	-22.20	-27.00	3.18	4.65
Output Power plus Final Gain (dBm EIRP)	2.31	2.15	-2.6	28.3	28.9

23 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)	20.5	22.9	24.7	23.3	28.2

24 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)	25.1	24.7	25.4	27.8	28.4



Fixed Outside Antenna Kit Options

FCC ID:

PWO460022

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)	24.28	24.35	24.44	25.14	24.25

25 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)	28.5	28.3	28.8	27.5	27.5

Yagi Antenna 301111 With 170' LMR 400

301111-400170

26 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)	28.48	28.3	28.9	8.94	0.6

27 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)	2.1	1.9	-2.8	28.1	28.7



Mobile Outside Antenna Kit Options

FCC ID:

PWO460022

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)	24.28	24.35	24.44	25.14	24.25

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)	6.41	17.12	21.43	18.7	20.68

2 Magnet Mount w/12.5' RG-174

314202

311103

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)	16.6	21.44	22.71	13.65	22.1

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)	22.13	21.5	23.8	21.4	25.7

4 Mini-Glass Mount w/14' RG-58

311114

Antenna Gains (dBi)	-7.53	-6.11	-5.39	2.57	1.44
Coax Loss (dB)	1.6	1.7	1.8	2.9	3.0
Final Gain less Loss (dB)	-9.1	-7.8	-7.2	-0.3	-1.6
Output Power plus Final Gain (dBm EIRP)	15.2	16.5	17.3	24.8	22.7

5 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	20.11	21.78	24.43	24.6

6 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)	19.01	22.22	25.62	19.53	23.95



Mobile Outside Antenna Kit Options

FCC ID:

PWO460022

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

Uplink Frequency (MHz)	704-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	25	25	25	25	25

7 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)	8.97	22.34	25.22	22.79	24.6

8 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)	21.3	23.01	23.95	20.1	24.92

9 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)	19.4	22.8	23.9	17.6	25.6

10 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)	17.91	21.02	23.92	18.03	22.3

11 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)	20.08	19.65	19.34	20.04	20.0



Mobile Outside Antenna Kit Options

FCC ID:

PWO460022

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

Uplink Frequency (MHz)	704-716	777-787	824-849	1710-1755	1850-1915
Uplink Output Power (dBm)	25	25	25	25	25

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)	19.92	22.7	25.61	20.44	21.5

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)	21.5	23.6	25.0	17.3	22.9

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)	18.82	21.5	23.91	18.94	19.8

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)	20.4	22.4	23.3	15.8	21.2

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)	18.6	23.4	24.8	19.3	28.1