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June 14, 2017

Subject: Antenna Kitting

Re: FCC ID: PWO460030

To Whom It May Concern:

The antenna kitting options for model 460030 signal booster were done for 26 Outside Antenna kit options and 14 Inside Antenna kit options. The order of the attached calculations is as follows:

Outside Antenna Kit Options:

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 311141-1120

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

Inside Antenna Kit Options:

1. Kit 311135-400150
2. Kit 311135-5840
3. Kit 311155-0670
4. Kit 309900-50N40090
5. Kit 309902-75F0650
6. Kit 309903-75F1180
7. Kit 309904-75F5830
8. Kit 309905-50N17420
9. Kit 311155-11120
10. Kit 304412-400100
11. Kit 304412-5830
12. Kit 304419-1175
13. Kit 304419-17450
14. Kit 304419-0650

All equivalent antennas, cables, and accessories are suitable for use with 460030 signal booster.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Patrick L. Cook', written in a cursive style.

Patrick L. Cook
Chief Technology Officer



Fixed Outside Antenna Kit Options

FCC ID:

PWO460030

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)	24.7	24.7	24.5	25.1	24.5

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)	29.2	28.9	28.7	28.6	28.2

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)	29.1	28.8	29.1	27.9	28.2

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)	29	28.7	28.9	27.9	28.3

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)	29	28.6	29	8.8	0.7

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)	28.9	28.5	28.8	8.0	0.0

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)	22.5	23.8	24.4	21.5	28.5



Fixed Outside Antenna Kit Options

FCC ID:

PWO460030

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)	24.7	24.7	24.5	25.1	24.5

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)	25.6	25.2	25.7	28.2	29.1

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)	20.9	22.0	22.5	18.5	25.3

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)	21.7	22.9	23.4	20.1	26.9

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)	20.5	20.0	19.4	20.0	20.2

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)	28.9	28.5	28.9	7.9	-1.3

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)	22.4	23.6	24.2	21.1	28.0



Fixed Outside Antenna Kit Options

FCC ID:

PWO460030

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)	24.7	24.7	24.5	25.1	24.5

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)	25.7	25.3	25.3	28.9	29.1

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)	25.5	25.1	25.5	28.2	29.2

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)	20.3	22.5	24	22.2	27.3

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)	21.0	23.2	24.8	23.2	28.4

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)	25.5	25.0	25.5	27.8	28.7

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)	28.9	28.6	28.9	27.5	27.7



Fixed Outside Antenna Kit Options

FCC ID:

PWO460030

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)	24.7	24.7	24.5	25.1	24.5

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)	28.9	28.6	29.0	8.9	0.9

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)	26.6	24.7	25.7	28.9	28.3

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)	26.6	24.7	25.7	28.9	28.3

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)	26.6	24.7	25.7	28.9	28.3

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)	26.6	24.7	25.7	28.9	28.3



Fixed Outside Antenna Kit Options

FCC ID:

PWO460030

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)	24.7	24.7	24.5	25.1	24.5

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)	26.0	25.7	25.8	28.9	29.2

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)	26.0	25.7	25.8	28.9	29.2

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)	26.0	25.7	25.8	28.9	29.2



FCC ID: PWO460030

Uplink Frequency Band (MHz)	698-716	777-787	824-849	1710-1755	1850-1915
Measured Uplink Gain (dB)	62.3	60.60	60.90	67.90	68.70
Measured RSSI Shutoff (dBm/MHz)	-47.10	-47.10	-51.30	-57.80	-61.00
MSCL Minimum (dB)	38.20	39.50	38.60	44.10	41.70
6' Separation Distance Path Loss (dB)	34.70	35.57	36.16	42.48	43.21
Polarity Loss	3.0	3.0	3.0	3.0	3.0
Max Antenna Gain Less Cable Loss (dB)	-0.50	-0.93	0.56	1.38	2.00

1 Inside Antenna Kit 311135-400150: Panel w/150' LMR 400

Antenna Gain Less Cable Loss (dB)	-1.35	-1.85	-2.36	-0.01	-0.14
	okay	okay	okay	okay	okay
Margin (dB)	-0.85	-0.92	-2.92	-1.39	-2.14

2 Inside Antenna Kit 311135-5840: Panel w/40' RG-58

Antenna Gain Less Cable Loss (dB)	-0.80	-1.35	-0.77	-0.02	1.47
	okay	okay	okay	okay	okay
Margin (dB)	-0.30	-0.42	-1.33	-1.40	-0.53

3 Inside Antenna Kit 311155-0670: Panel w/70' RG-6

Antenna Gain Less Cable Loss (dB)	-1.48	-2.04	-1.48	-0.68	0.75
	okay	okay	okay	okay	okay
Margin (dB)	-0.98	-1.11	-2.04	-2.06	-1.25

4 Inside Antenna Kit 309900-50N: 2 Panel Antennas and a 50 Ohm 3-Way Splitter - 90' LMR400

Antenna Gain Less Cable/Splitter Loss (dB)	-1.17	-1.37	-2.97	-0.11	1.09
	okay	okay	okay	okay	okay
Margin (dB)	-0.67	-0.44	-3.53	-1.49	-0.91

5 Inside Antenna Kit 309902-75F: 2 Panel Antennas and a 75 Ohm 3-Way Splitter - 50' RG-6

Antenna Gain Less Cable/Splitter Loss (dB)	-1.67	-1.97	-2.87	-1.31	0.79
	okay	okay	okay	okay	okay
Margin (dB)	-1.17	-1.04	-3.43	-2.69	-1.21

6 Inside Antenna Kit 309903-75F: 3 Panel Antennas and three 75 Ohm 2-Way Splitter - 80' RG-11

Antenna Gain Less Cable/Splitter Loss (dB)	-1.17	-1.37	-2.27	-0.81	1.19
	okay	okay	okay	okay	okay
Margin (dB)	-0.67	-0.44	-2.83	-2.19	-0.81

7 Inside Antenna Kit 309904-75F: 1 Panel Antenna and a 75 Ohm 2-Way Splitter - 30' RG-58

Antenna Gain Less Cable/Splitter Loss (dB)	-1.37	-1.57	-2.57	-1.11	1.09
	okay	okay	okay	okay	okay
Margin (dB)	-0.87	-0.64	-3.13	-2.49	-0.91

8 Inside Antenna Kit 309905-50N: 3 Panel Antennas and three 50 Ohm 2-Way Splitter - 20' RG-174

Antenna Gain Less Cable/Splitter Loss (dB)	-2.37	-2.67	-4.57	-2.21	-0.11
	okay	okay	okay	okay	okay
Margin (dB)	-1.87	-1.74	-5.13	-3.59	-2.11

9 Inside Antenna Kit 311155-11120: Panel w/120' RG-11

Antenna Gain Less Cable Loss (dB)	-1.07	-1.63	-1.07	-0.67	0.66
	okay	okay	okay	okay	okay
Margin (dB)	-0.57	-0.70	-1.63	-2.05	-1.34

10 Inside Antenna Kit 304412-400100: Dome w/100' LMR 400

Antenna Gain Less Cable Loss (dB)	-2.43	-1.69	-3.09	-0.33	-1.29
	okay	okay	okay	okay	okay
Margin (dB)	-1.93	-0.76	-3.65	-1.71	-3.29

11 Inside Antenna Kit 304412-5830: Dome Antenna w/30' RG-58

Antenna Gain Less Cable Loss (dB)	-2.25	-1.57	-2.23	-0.75	-0.62
	okay	okay	okay	okay	okay
Margin (dB)	-1.75	-0.64	-2.79	-2.13	-2.62

12 Inside Antenna Kit 304419-1175: Dome w/75' RG-11

Antenna Gain Less Cable Loss (dB)	-1.84	-1.12	-1.77	-0.13	-0.05
	okay	okay	okay	okay	okay
Margin (dB)	-1.34	-0.19	-2.33	-1.51	-2.05

13 Inside Antenna Kit 304419-17450: Dome Antenna w/50' RG-174

Antenna Gain Less Cable Loss (dB)	-10.12	-9.82	-13.20	-12.73	-13.12
	okay	okay	okay	okay	okay
Margin (dB)	-9.62	-8.89	-13.76	-14.11	-15.12

14 Inside Antenna Kit 304419-0650: Dome Antenna w/50' RG-6

Antenna Gain Less Cable Loss (dB)	-2.57	-1.88	-2.55	-0.93	-0.84
	okay	okay	okay	okay	okay
Margin (dB)	-2.07	-0.95	-3.11	-2.31	-2.84