

EXHIBIT A  
Space Station Antenna Contours

Exhibit A

Space Station Antenna Contours

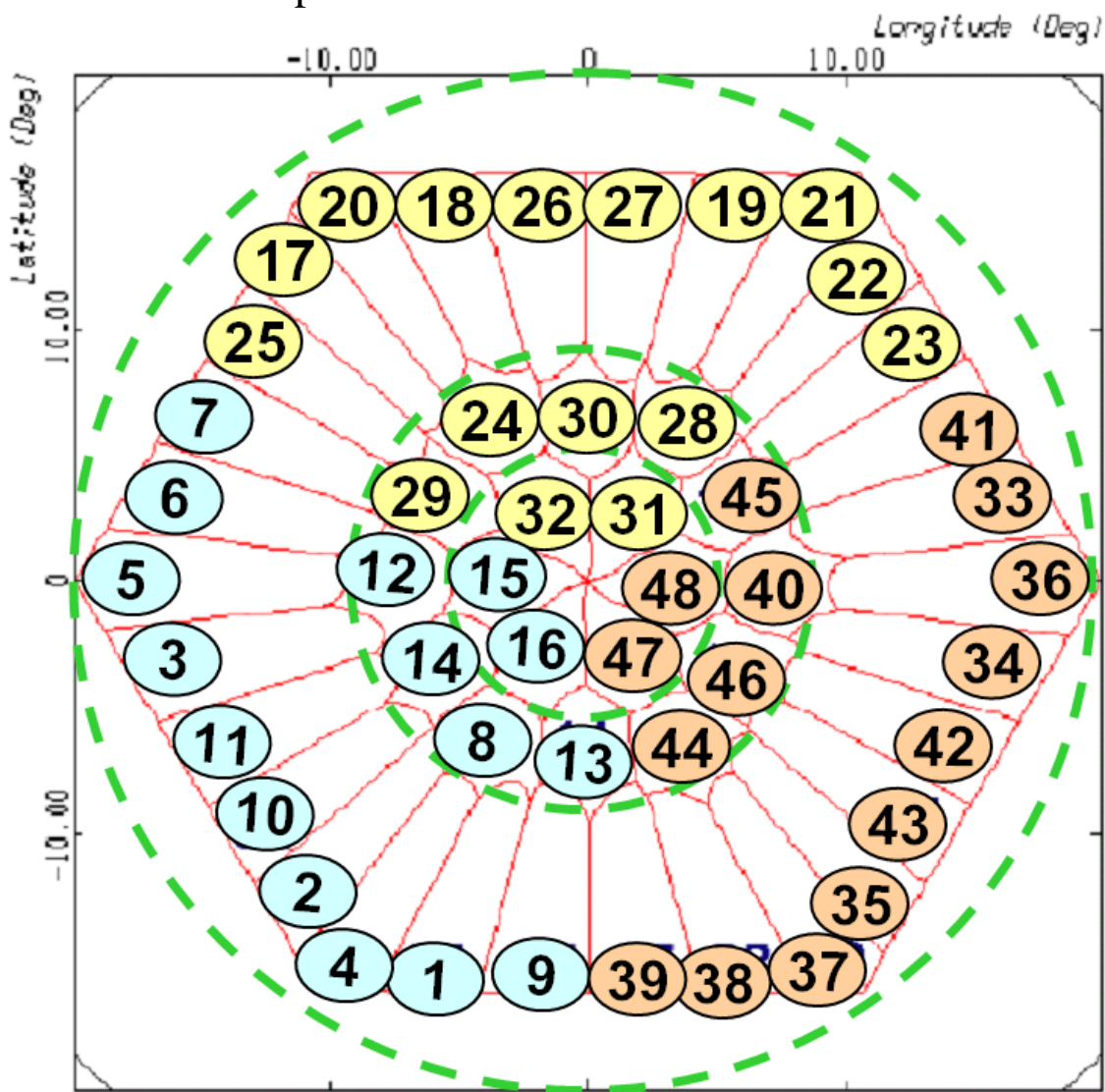


Figure A: Space Vehicle L Band Beam Layout and Numbering

**EXHIBIT A**  
**Space Station Antenna Contours**

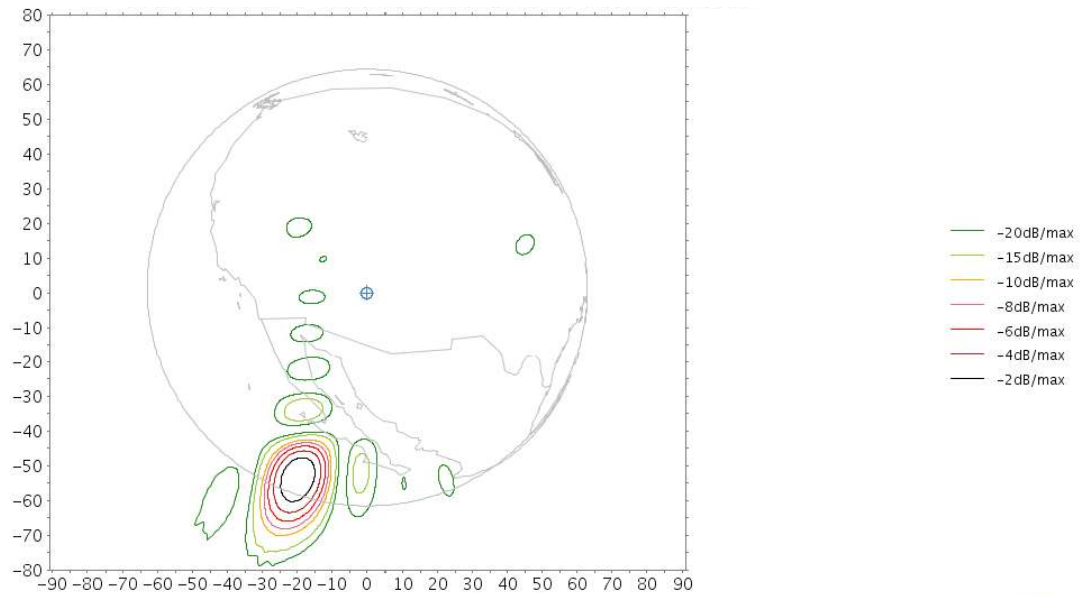


Figure 1 - Beams 1 (Tx) & 101 (Rx) - L band Co-pol Gain

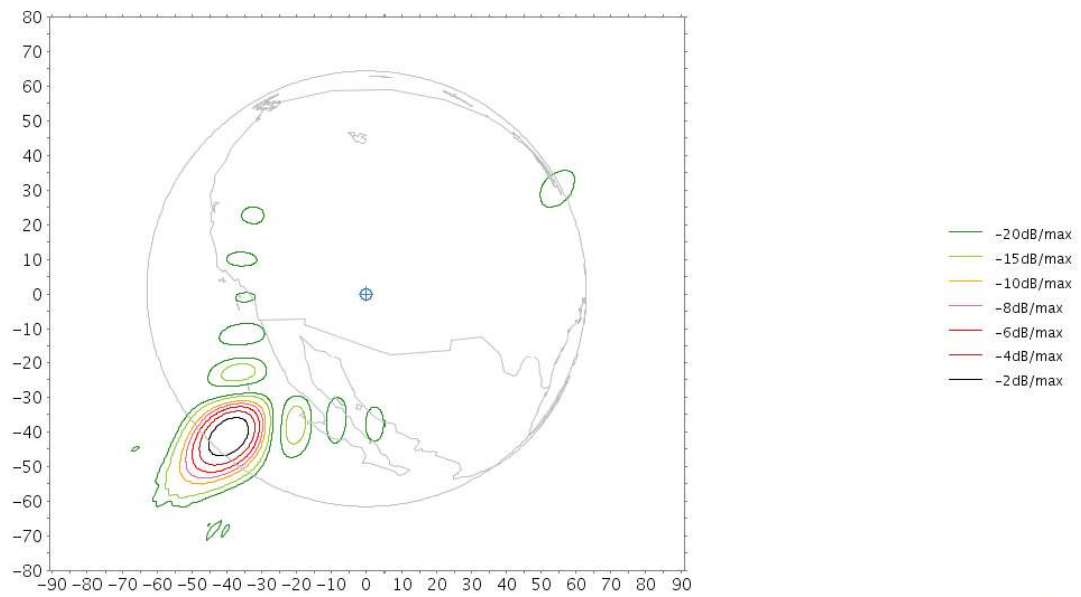


Figure 2 - Beams 2 (Tx) & 102 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

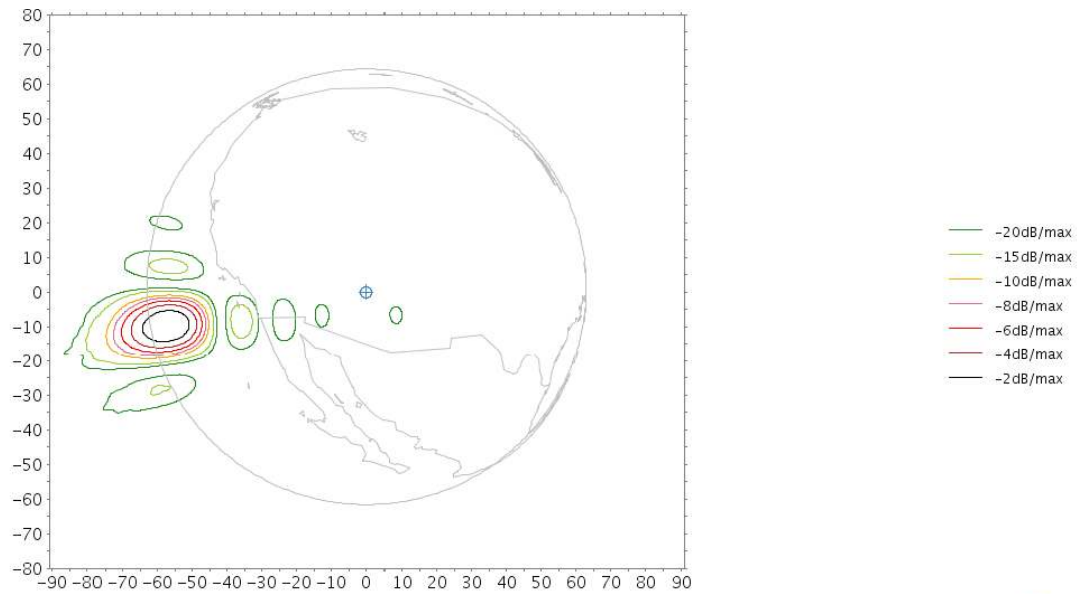


Figure 3 - Beams 3 (Tx) & 103 (Rx) - L band Co-pol Gain

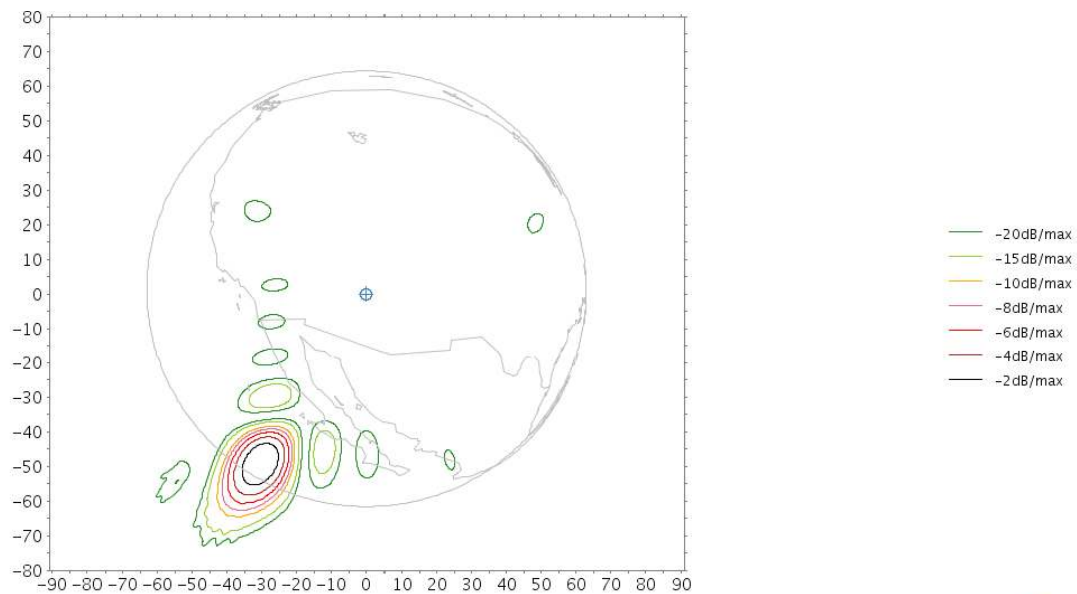


Figure 4 - Beams 4 (Tx) & 104 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

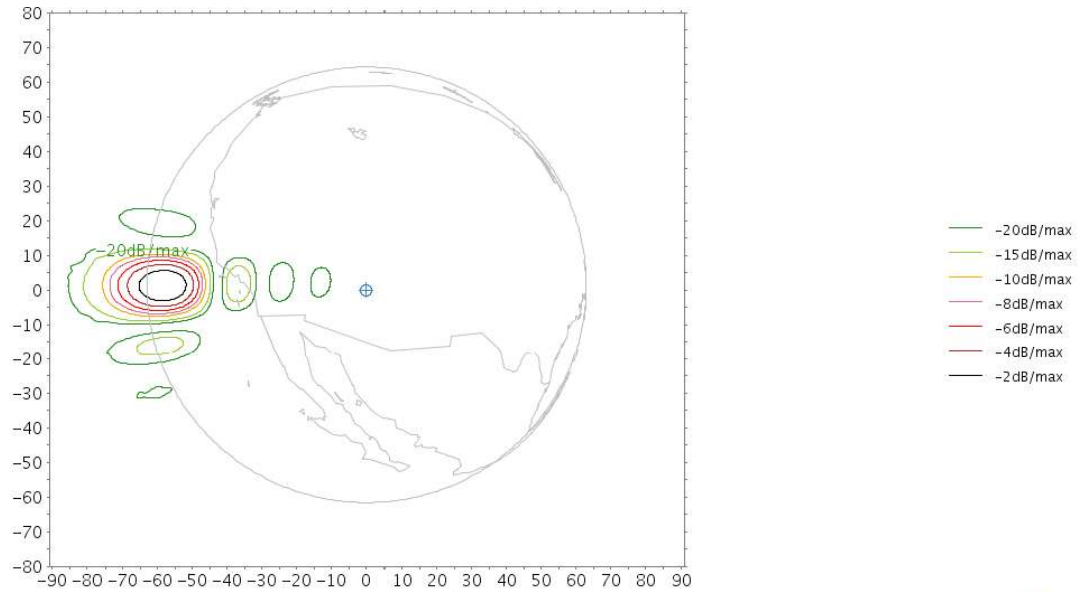


Figure 5 - Beams 5 (Tx) & 105 (Rx) - L band Co-pol Gain

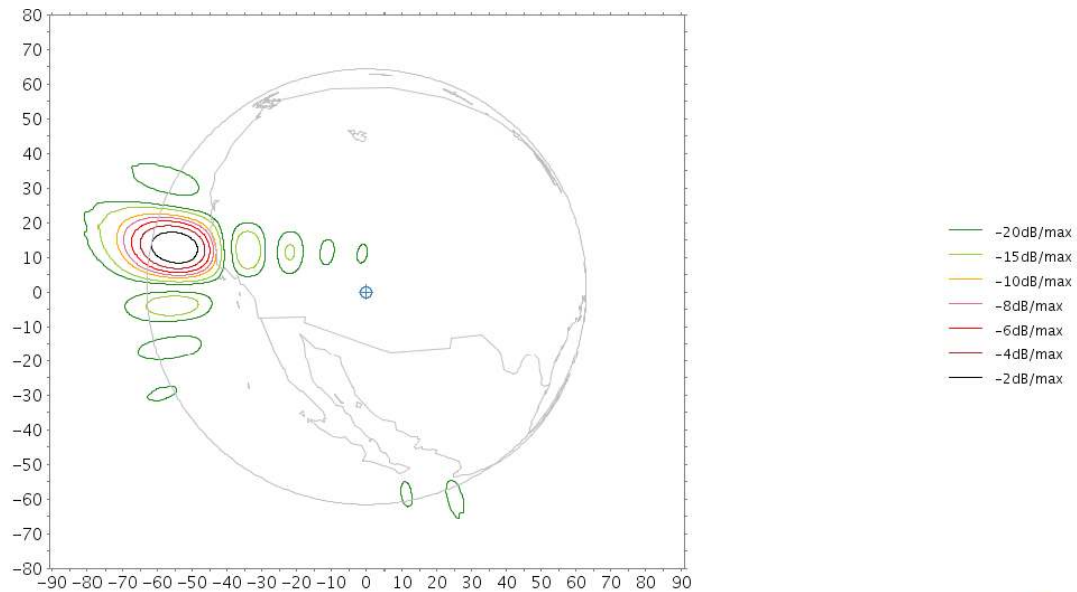
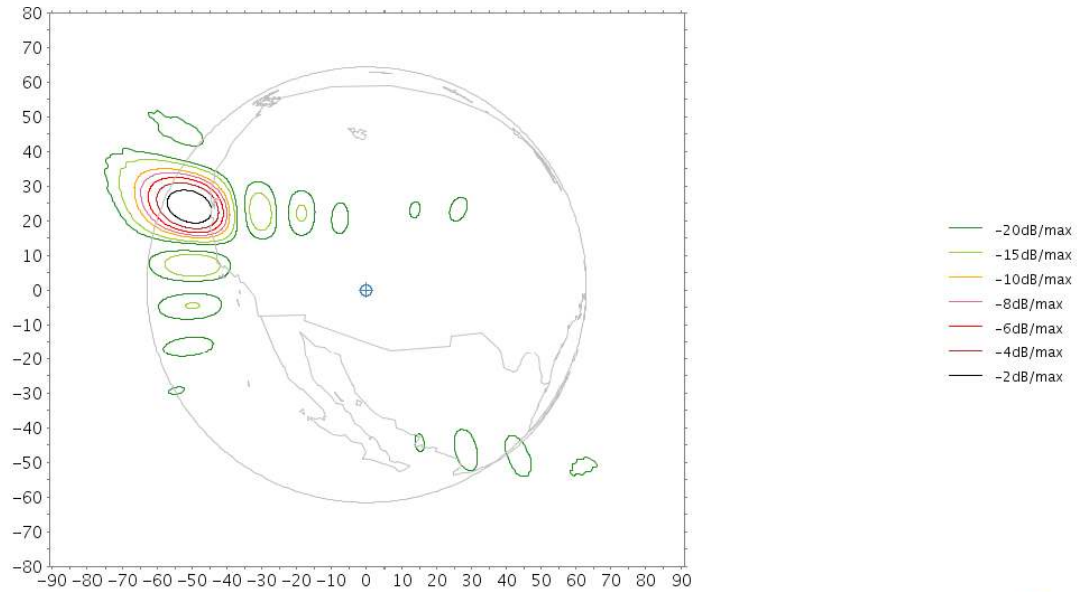
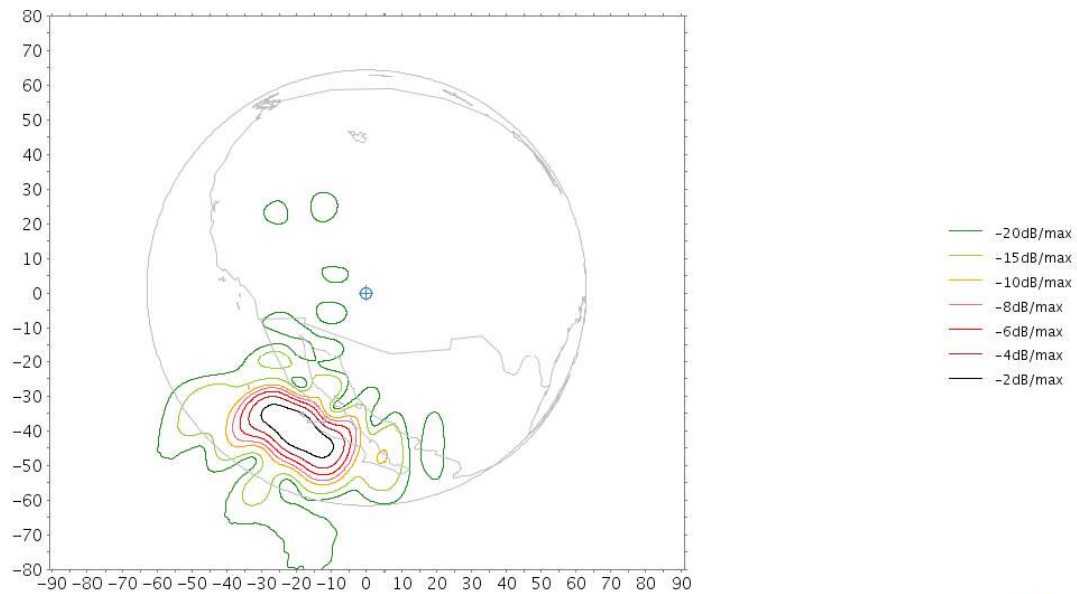


Figure 6 - Beams 6 (Tx) & 106 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**



**Figure 7 - Beams 7 (Tx) & 107 (Rx) - L band Co-pol Gain**



**Figure 8 - Beams 8 (Tx) & 108 (Rx) - L band Co-pol Gain**

**EXHIBIT A**  
**Space Station Antenna Contours**

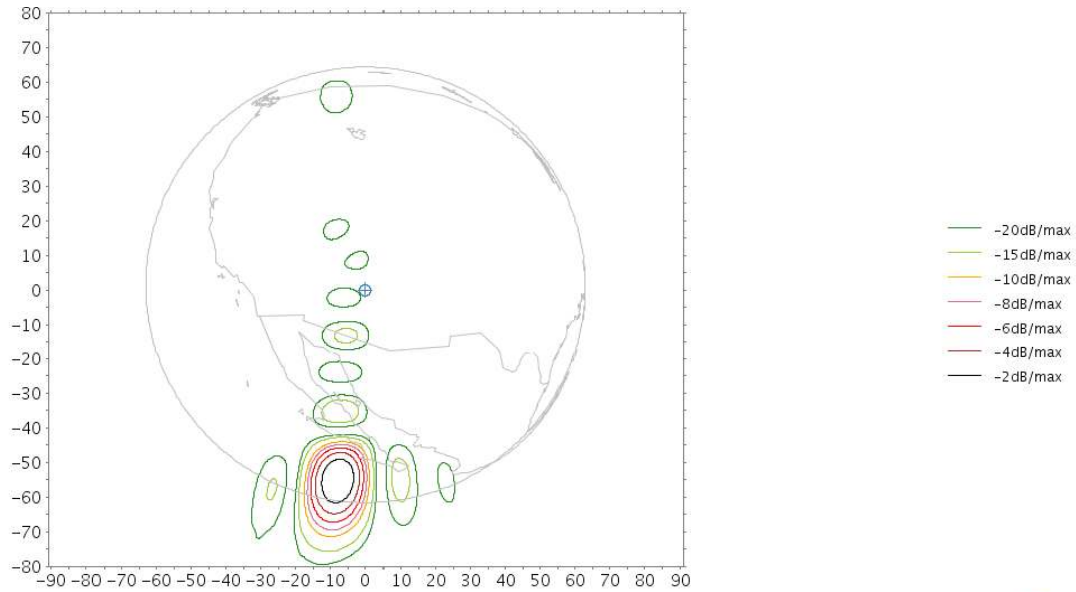


Figure 9 - Beams 9 (Tx) & 109 (Rx) - L band Co-pol Gain

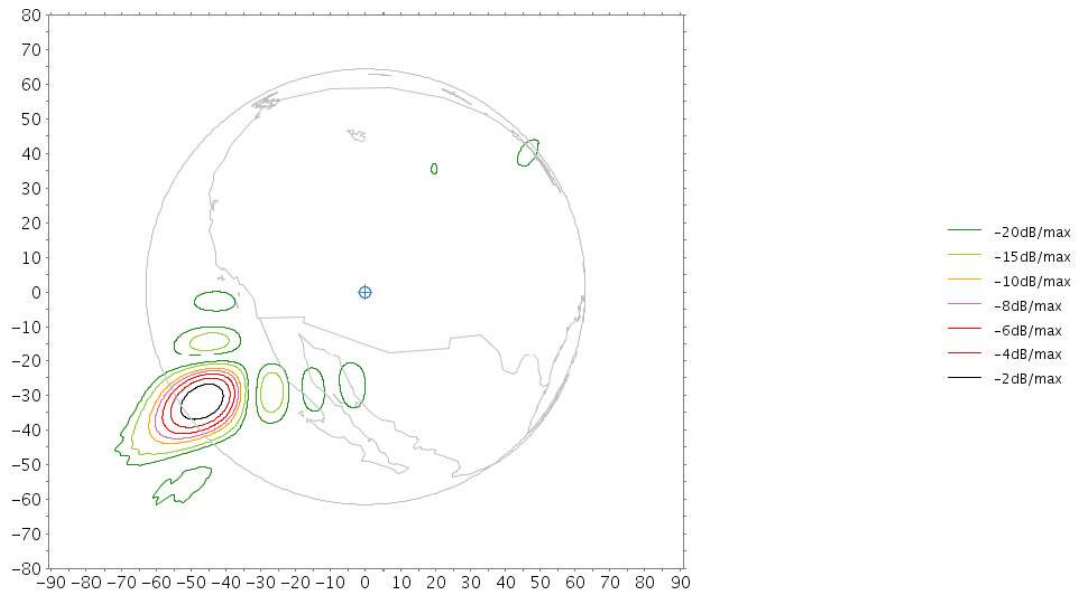


Figure 10 - Beams 10 (Tx) & 110 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

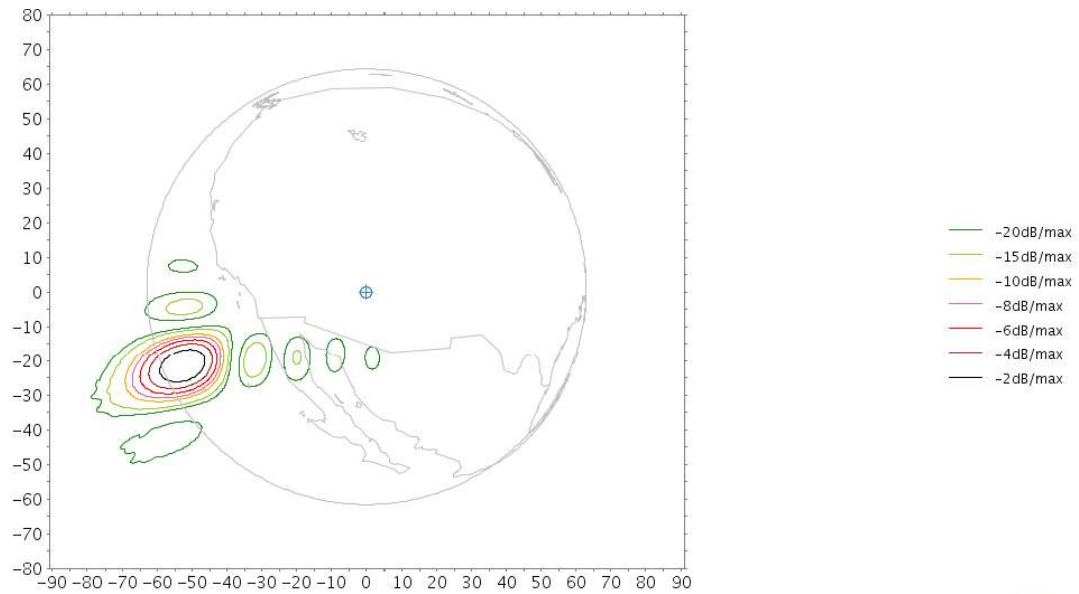


Figure 11 - Beams 11 (Tx) & 111 (Rx) - L band Co-pol Gain

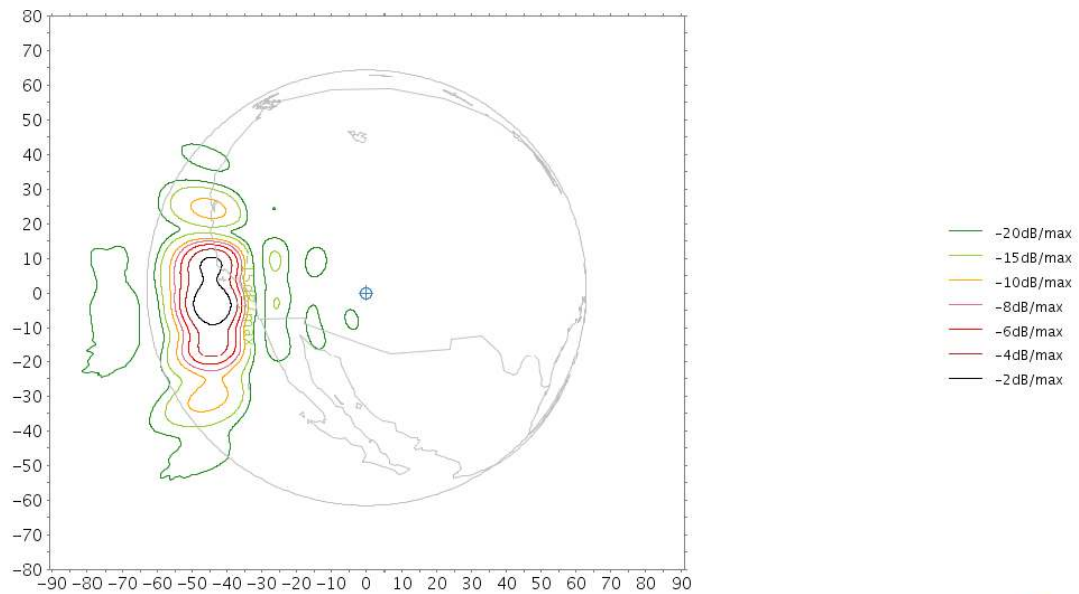


Figure 12 - Beams 12 (Tx) & 112 (Rx) - L band Co-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

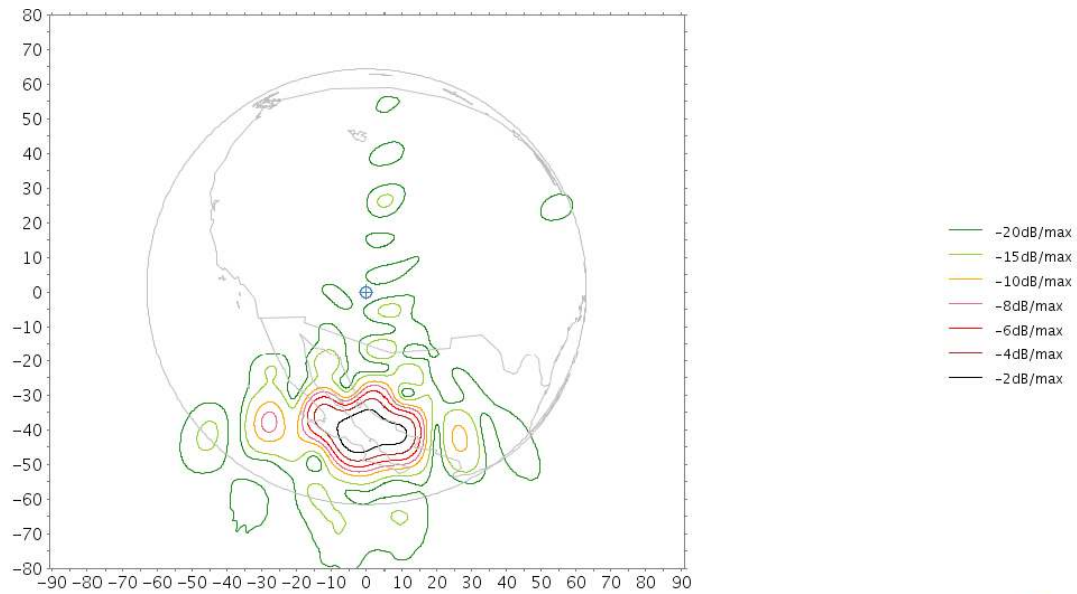


Figure 13 - Beams 13 (Tx) & 113 (Rx) - L band Co-pol Gain

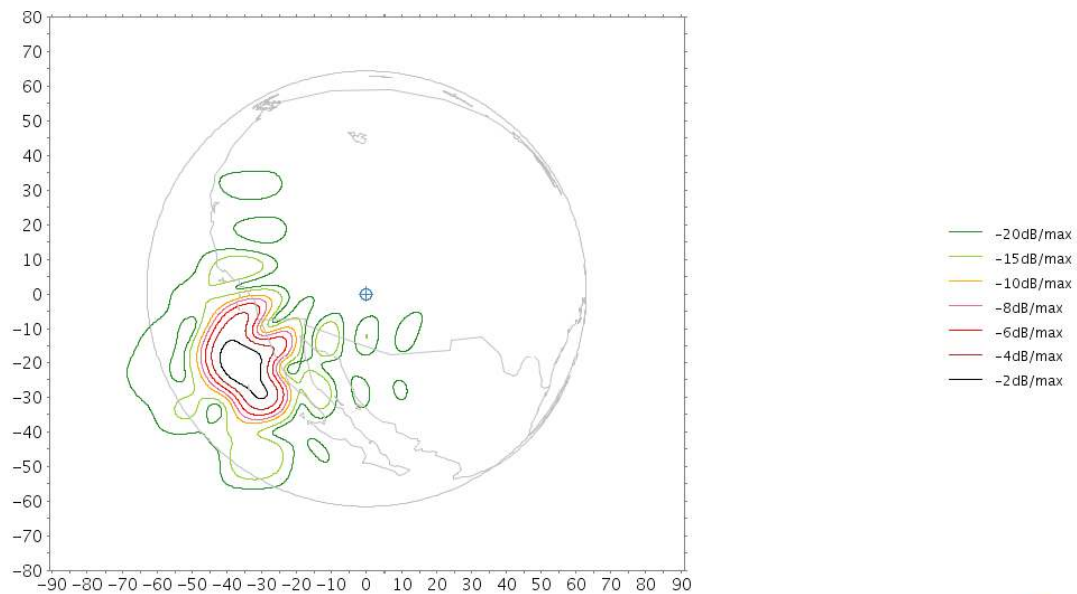


Figure 14 - Beams 14 (Tx) & 114 (Rx) - L band Co-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

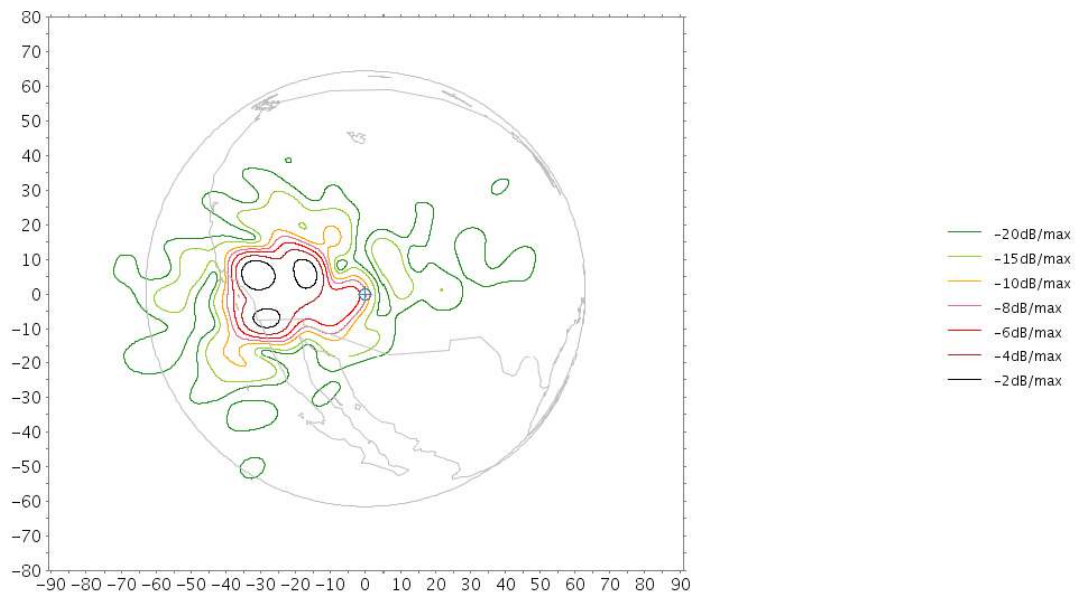


Figure 15 - Beams 15 (Tx) & 115 (Rx) - L band Co-pol Gain

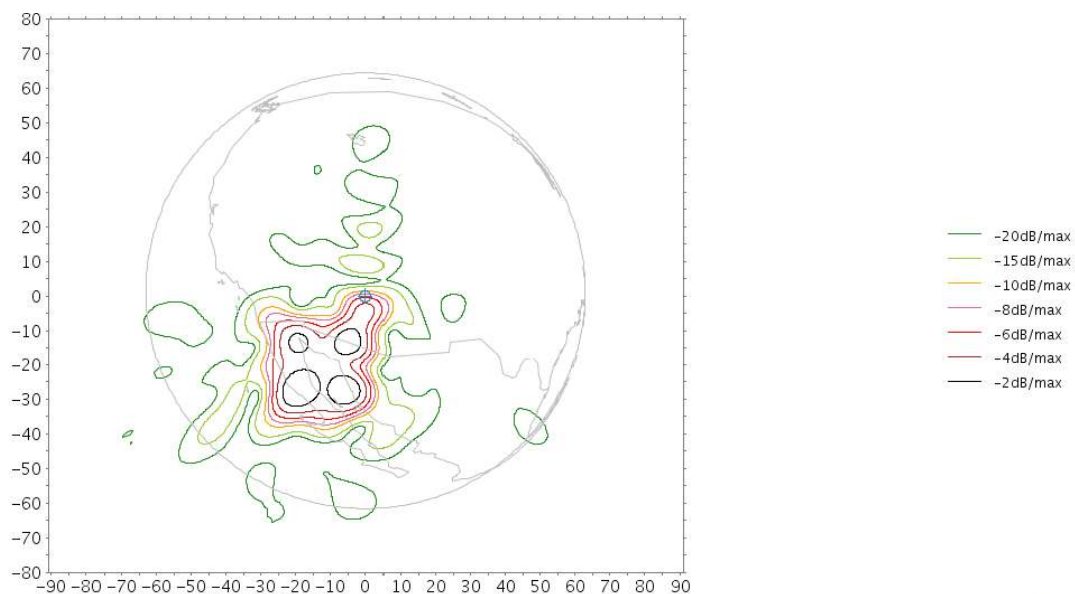


Figure 16 - Beams 16 (Tx) & 116 (Rx) - L band Co-pol Gain

# EXHIBIT A Space Station Antenna Contours

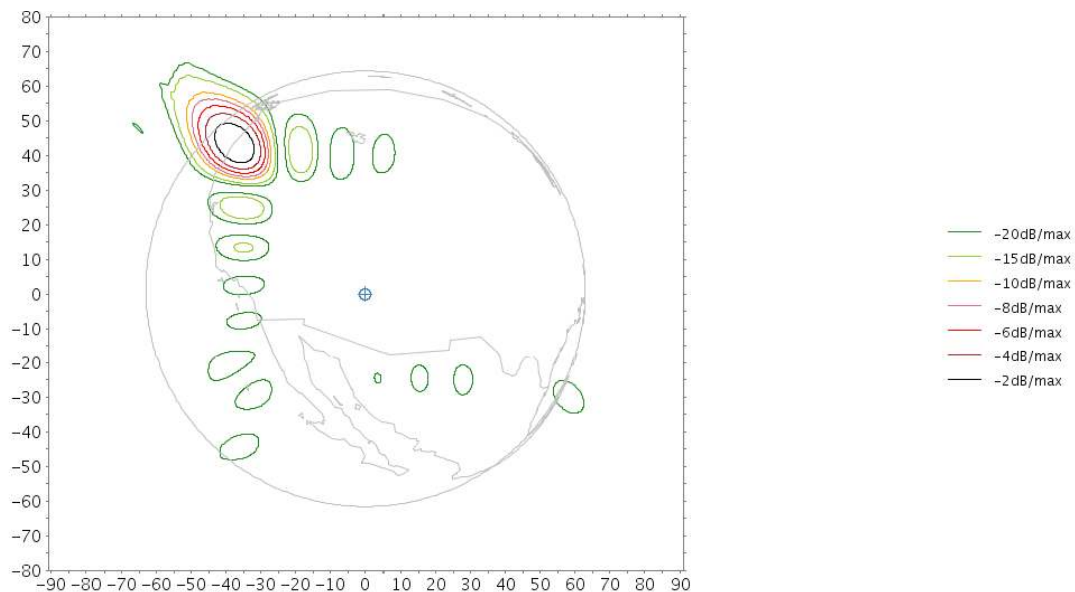


Figure 17 - Beams 17 (Tx) & 117 (Rx) - L band Co-pol Gain

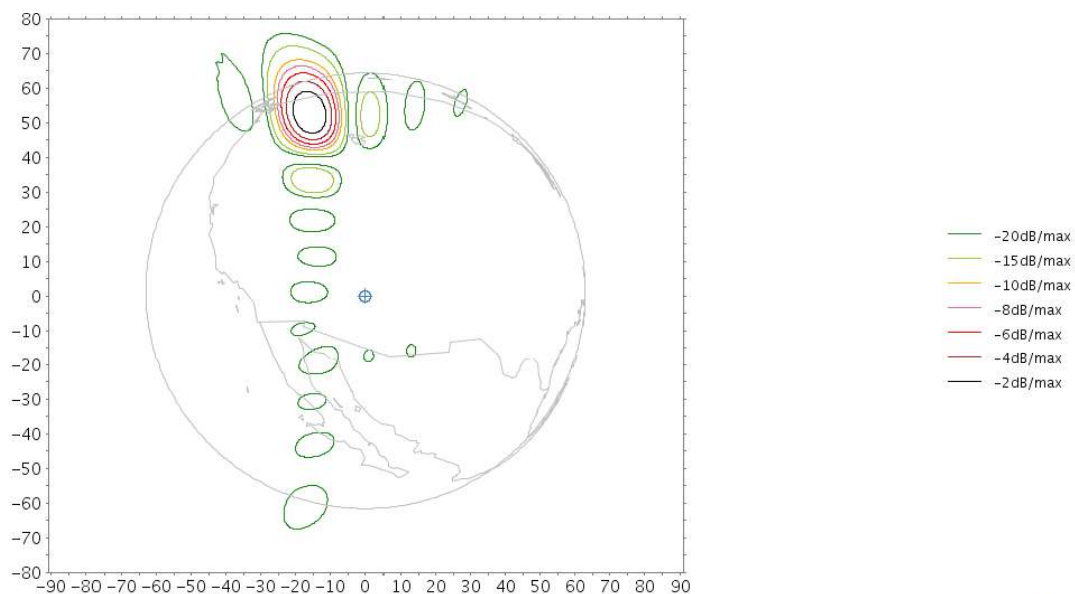


Figure 18 - Beams 18 (Tx) & 118 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

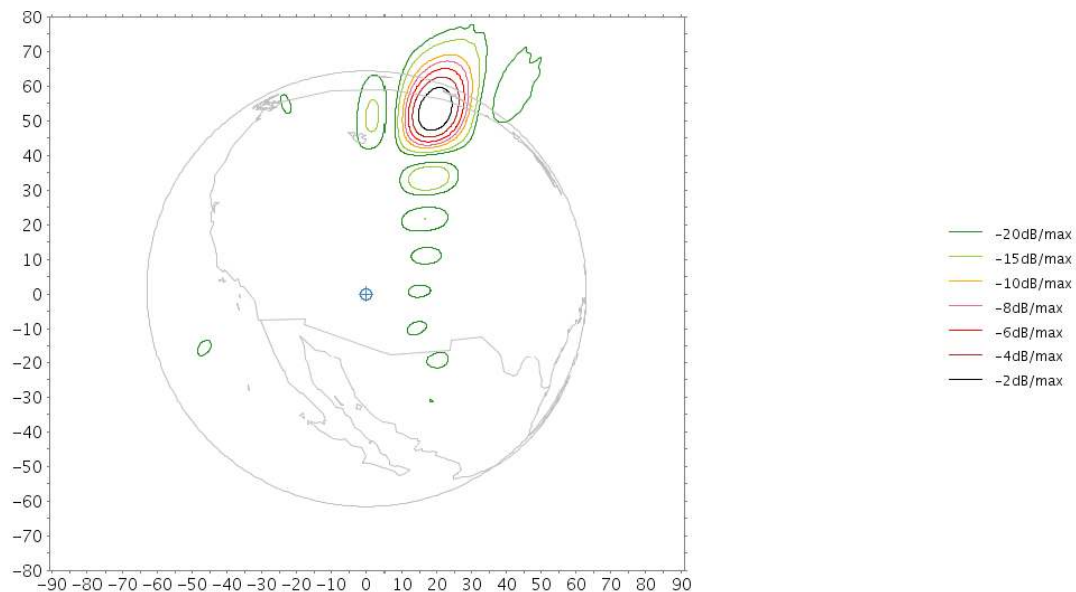


Figure 19 - Beams 19 (Tx) & 119 (Rx) - L band Co-pol Gain

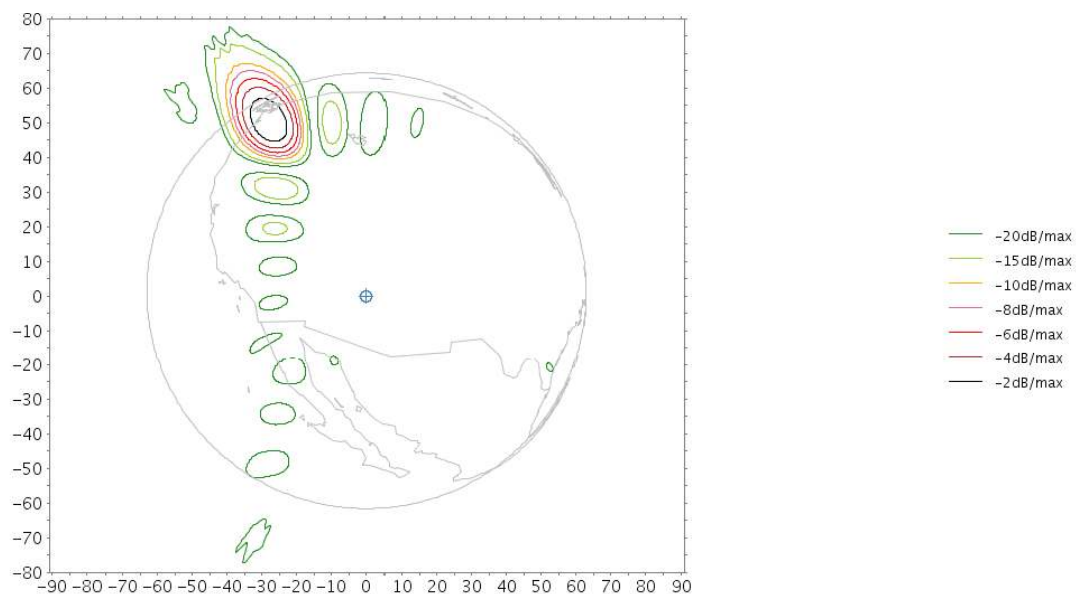


Figure 20 - Beams 20 (Tx) & 120 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

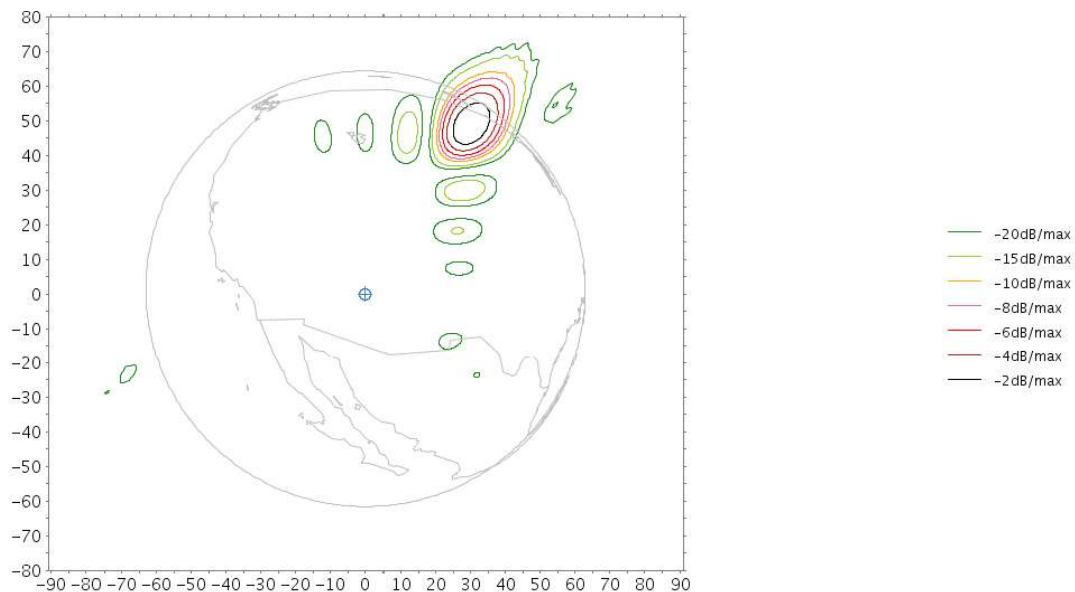


Figure 21 - Beams 21 (Tx) & 121 (Rx) - L band Co-pol Gain

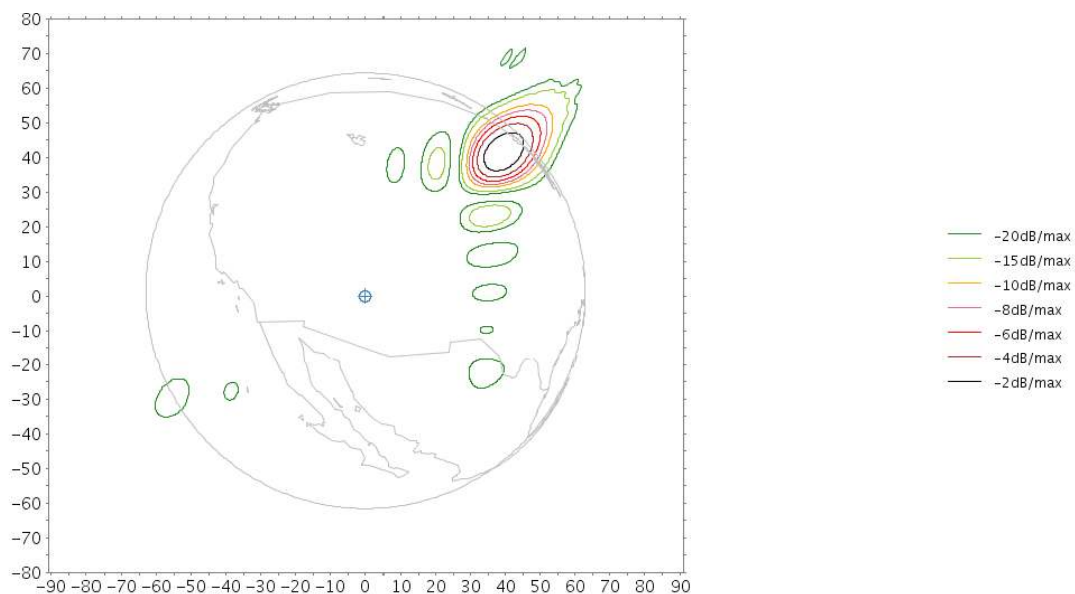


Figure 22 - Beams 22 (Tx) & 122 (Rx) - L band Co-pol Gain

# EXHIBIT A Space Station Antenna Contours

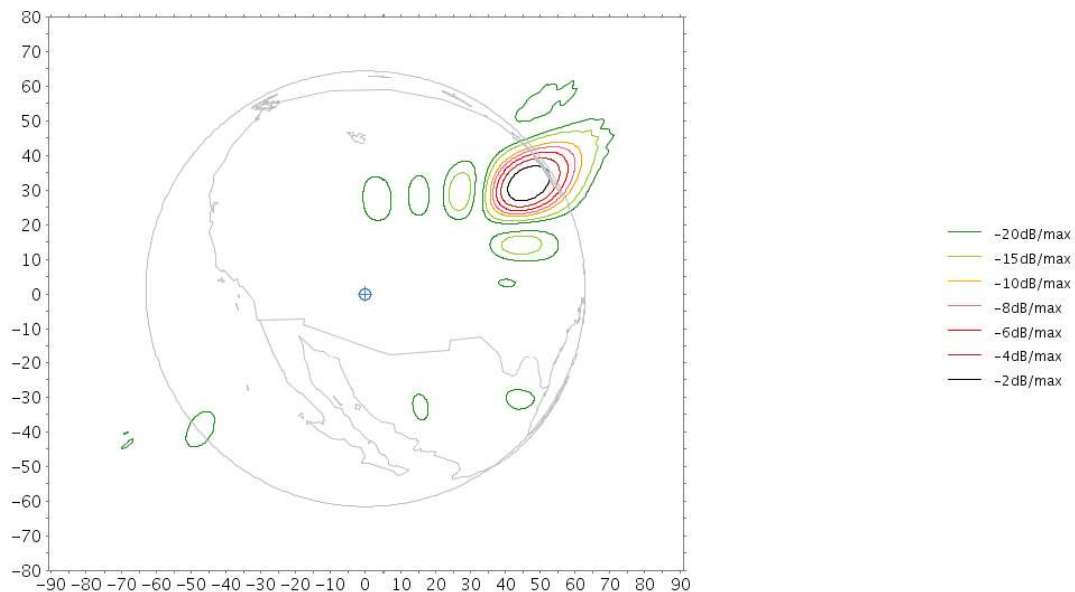


Figure 23 - Beams 23 (Tx) & 123 (Rx) - L band Co-pol Gain

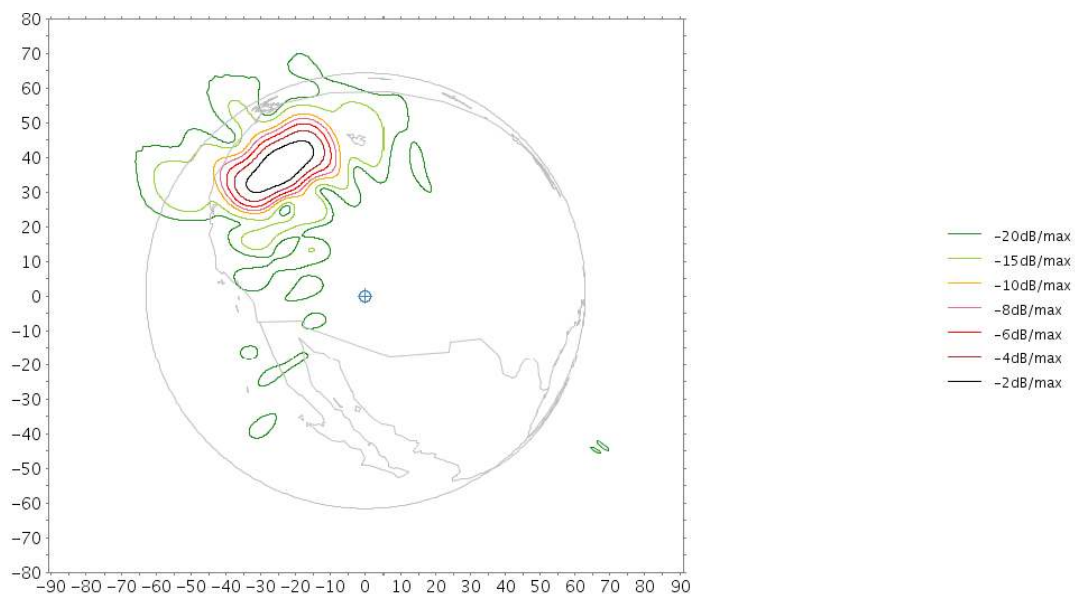


Figure 24 - Beams 24 (Tx) & 124 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

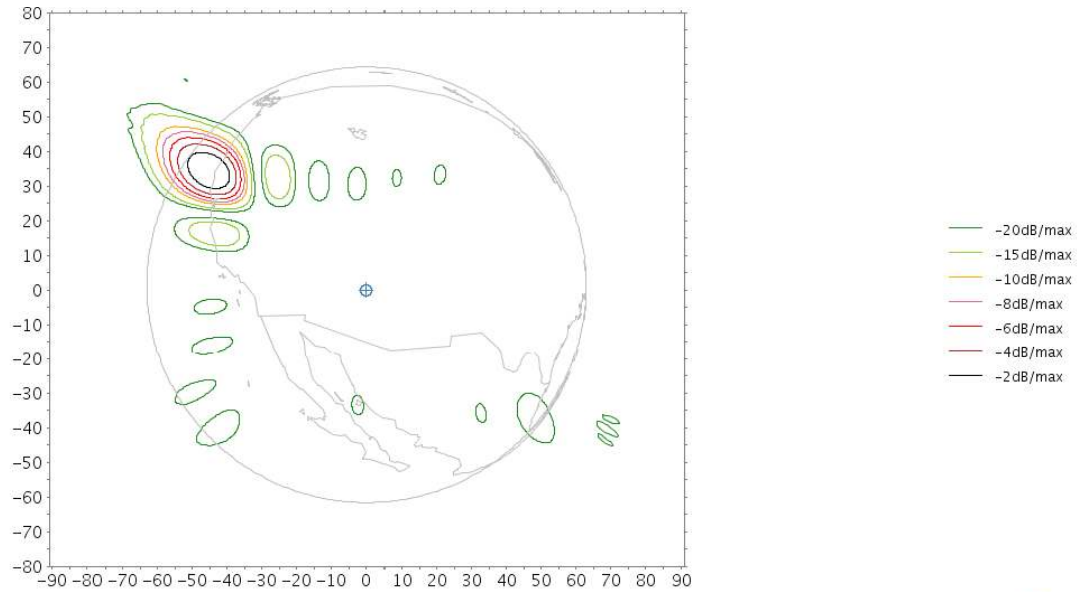


Figure 25 - Beams 25 (Tx) & 125 (Rx) - L band Co-pol Gain

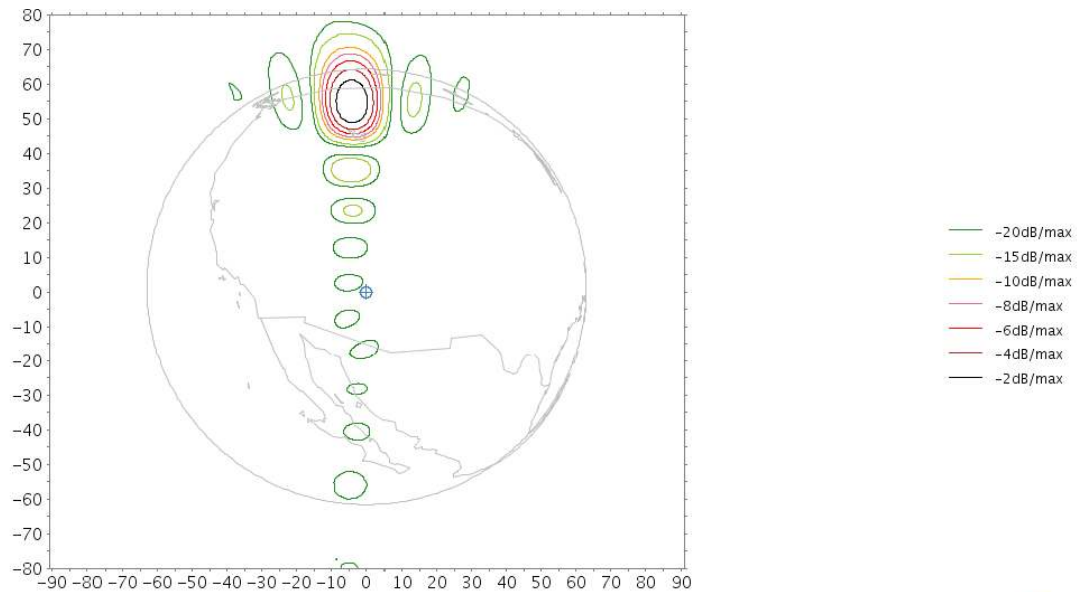


Figure 26 - Beams 26 (Tx) & 126 (Rx) - L band Co-pol Gain

EXHIBIT A  
Space Station Antenna Contours

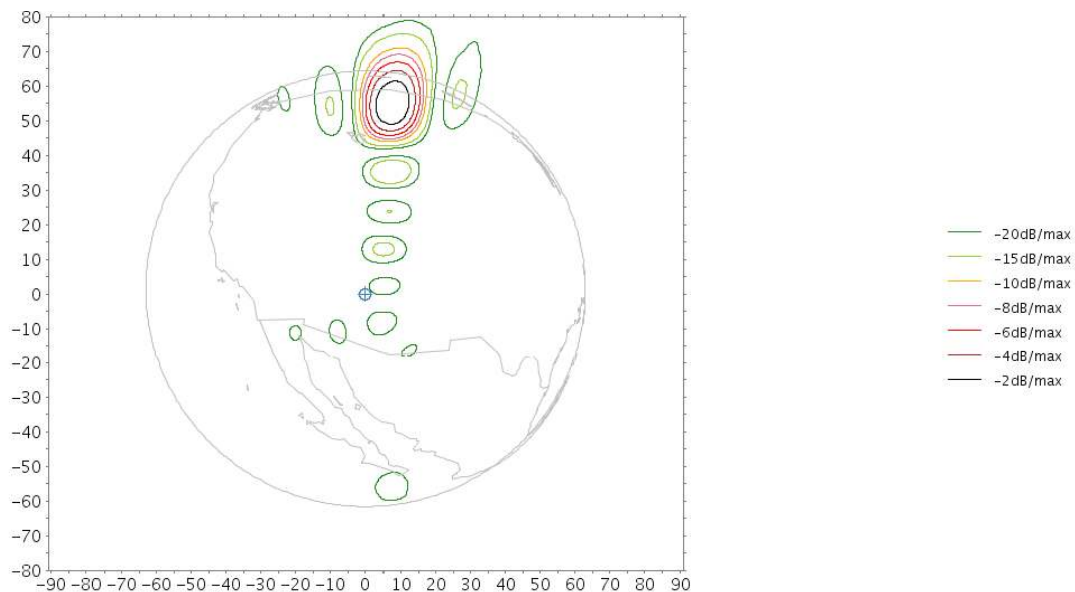


Figure 27 - Beams 27 (Tx) & 127 (Rx) - L band Co-pol Gain

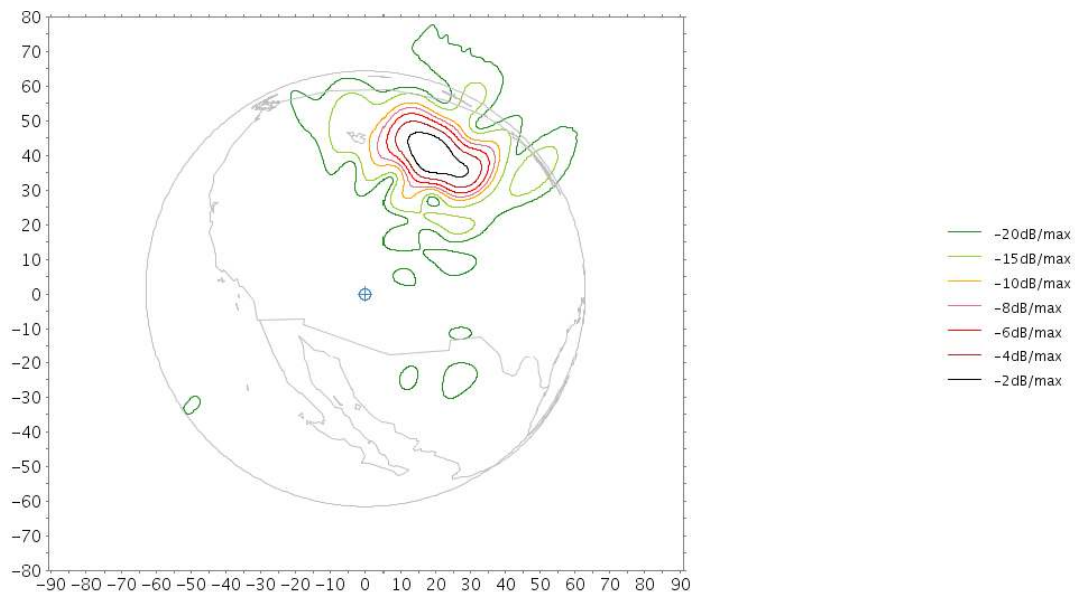


Figure 28 - Beams 28 (Tx) & 128 (Rx) - L band Co-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

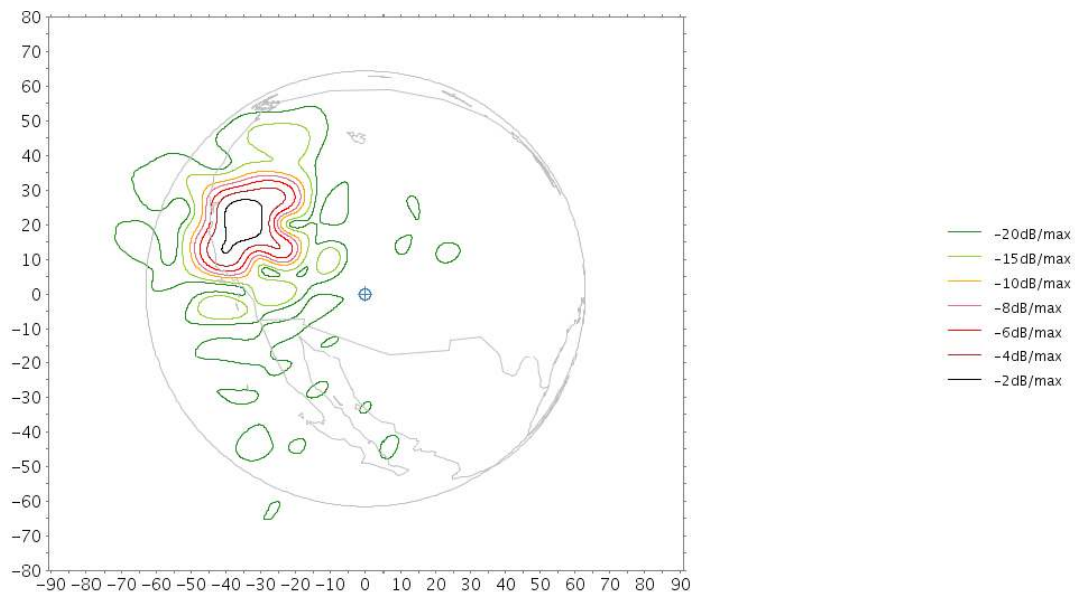


Figure 29 - Beams 29 (Tx) & 129 (Rx) - L band Co-pol Gain

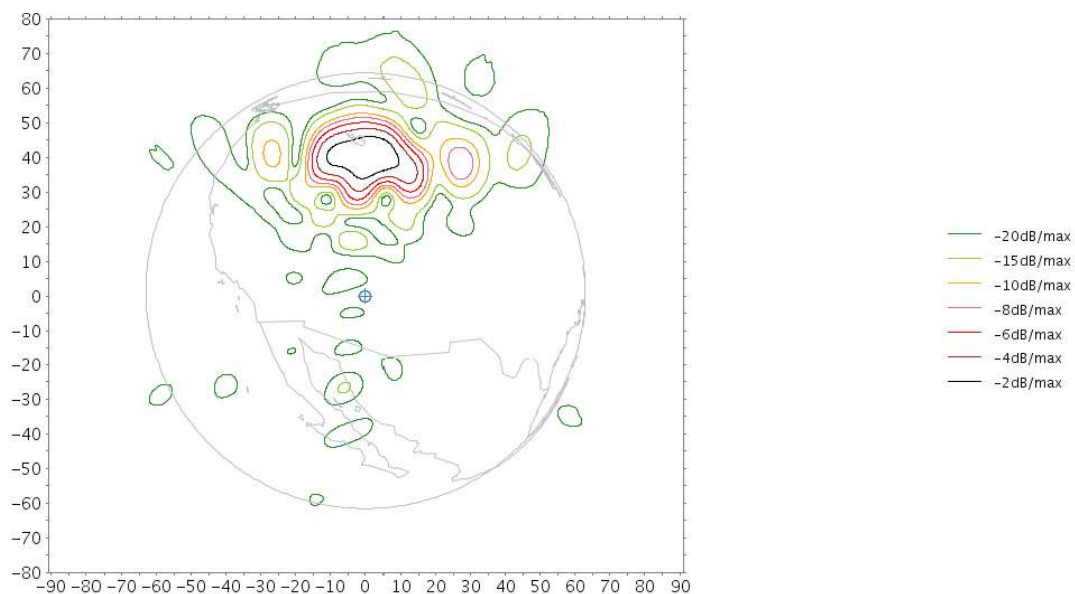


Figure 30 - Beams 30 (Tx) & 130 (Rx) - L band Co-pol Gain

EXHIBIT A  
Space Station Antenna Contours

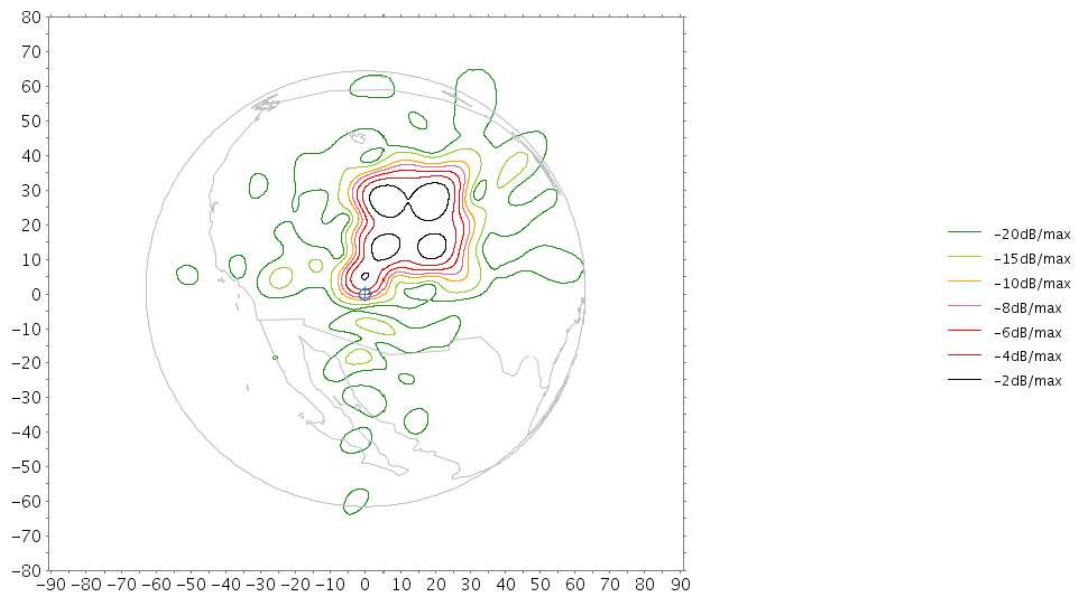


Figure 31 - Beams 31 (Tx) & 131 (Rx) - L band Co-pol Gain

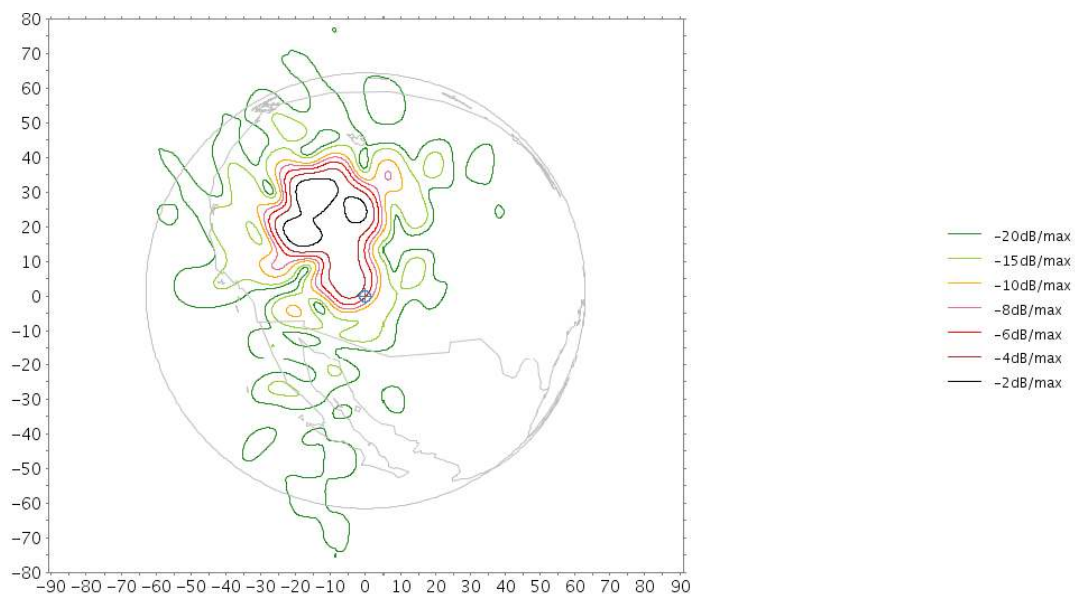


Figure 32 - Beams 32 (Tx) & 132 (Rx) - L band Co-pol Gain

# EXHIBIT A Space Station Antenna Contours

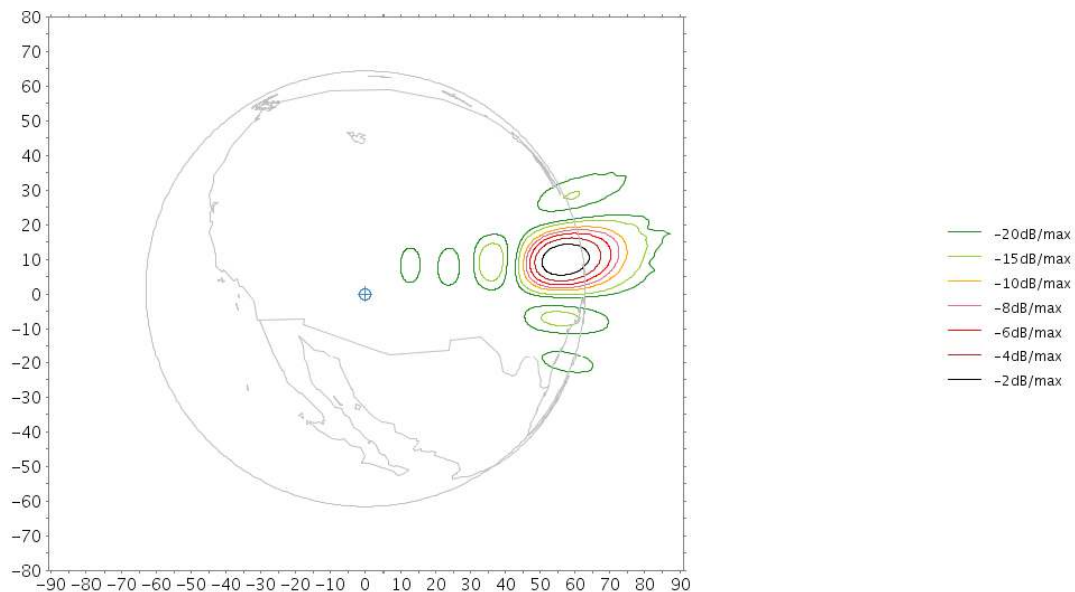


Figure 33 - Beams 33 (Tx) & 133 (Rx) - L band Co-pol Gain

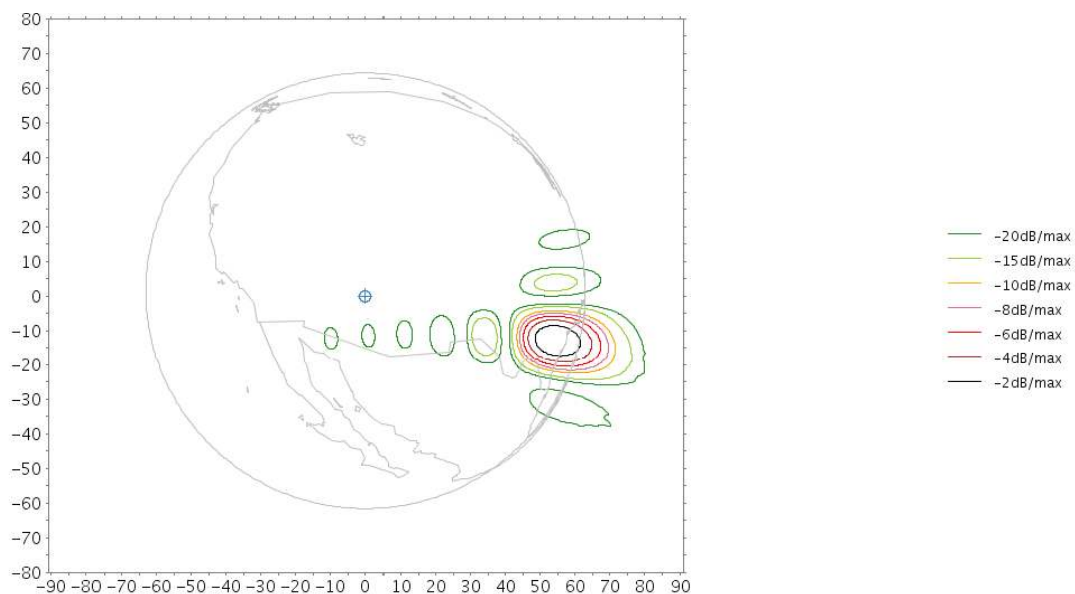


Figure 34 - Beams 34 (Tx) & 134 (Rx) - L band Co-pol Gain

# EXHIBIT A Space Station Antenna Contours

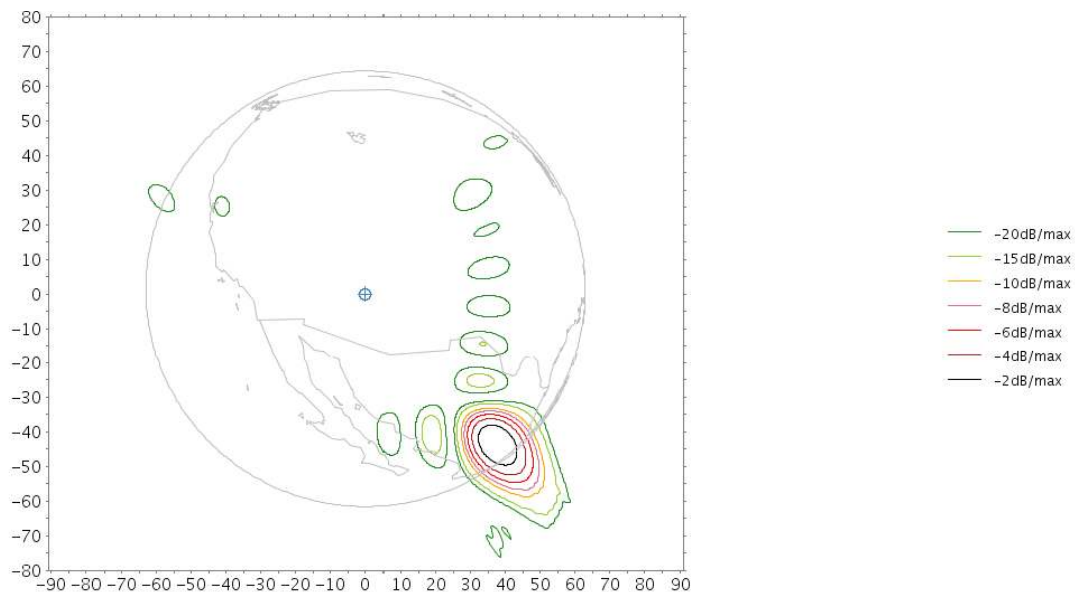


Figure 35 - Beams 35 (Tx) & 135 (Rx) - L band Co-pol Gain

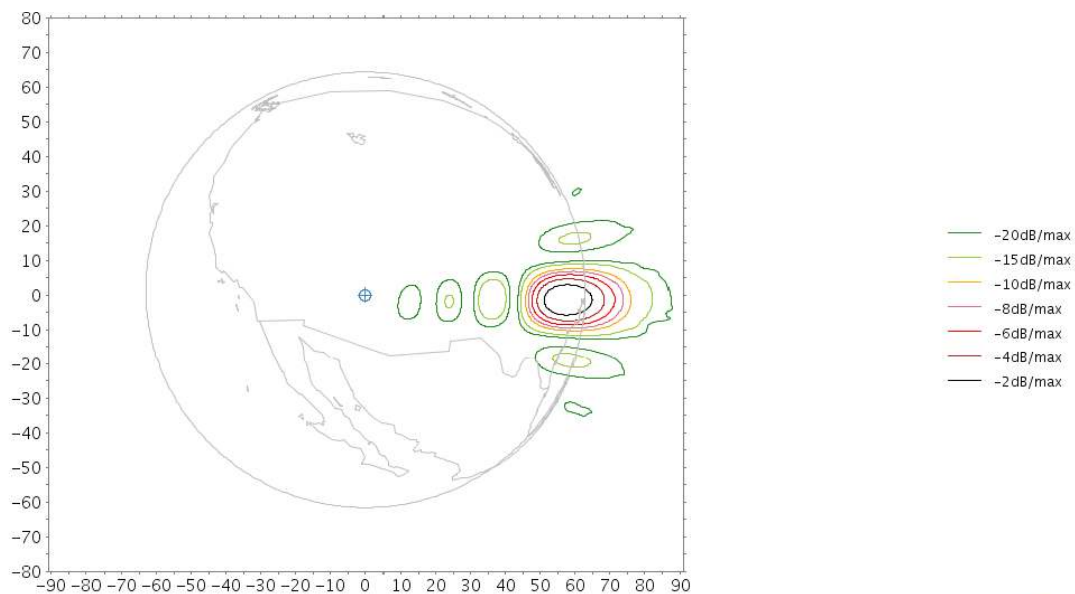


Figure 36 - Beams 36 (Tx) & 136 (Rx) - L band Co-pol Gain

# **EXHIBIT A** **Space Station Antenna Contours**

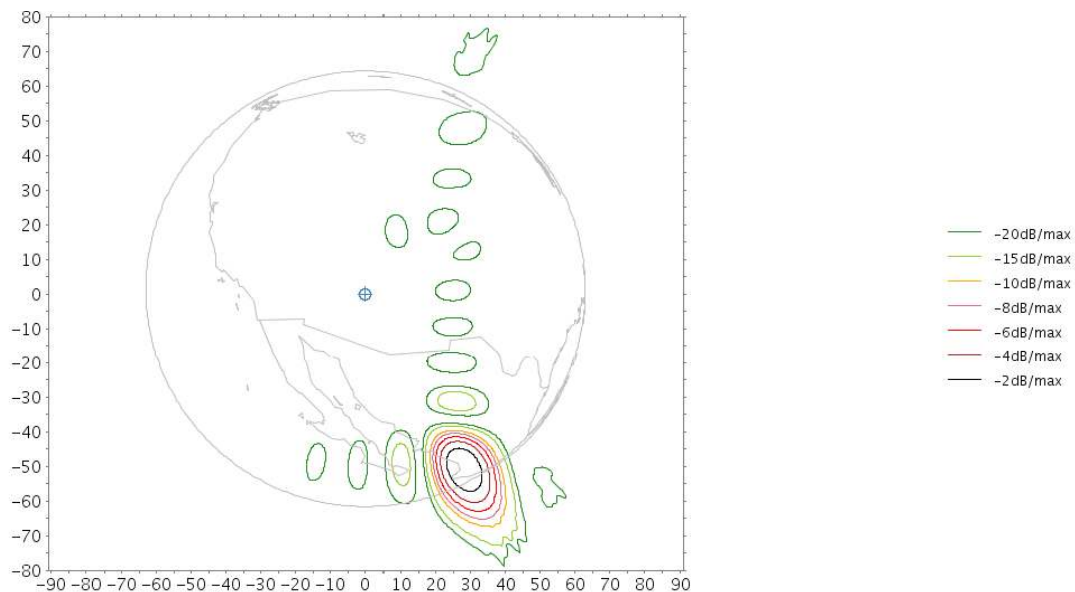


Figure 37 - Beams 37 (Tx) & 137 (Rx) - L band Co-pol Gain

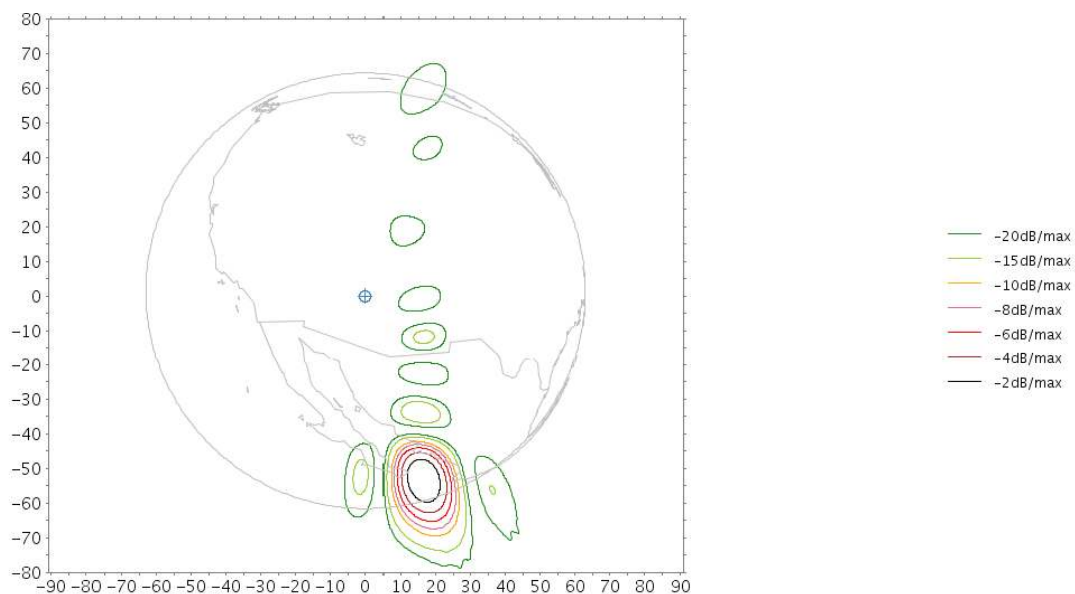


Figure 38 - Beams 38 (Tx) & 138 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

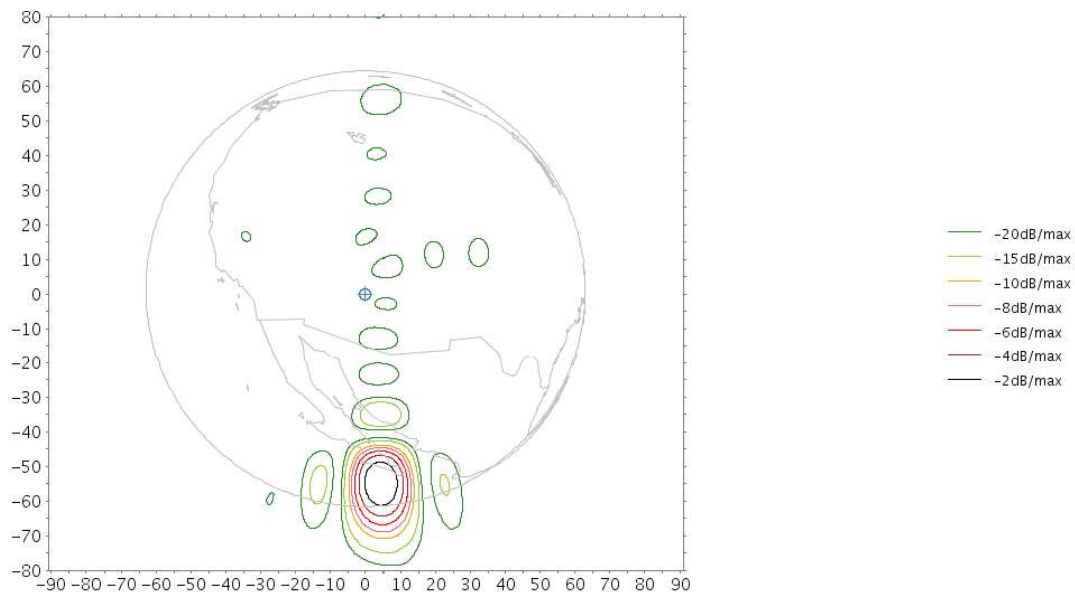


Figure 39 - Beams 39 (Tx) & 139 (Rx) - L band Co-pol Gain

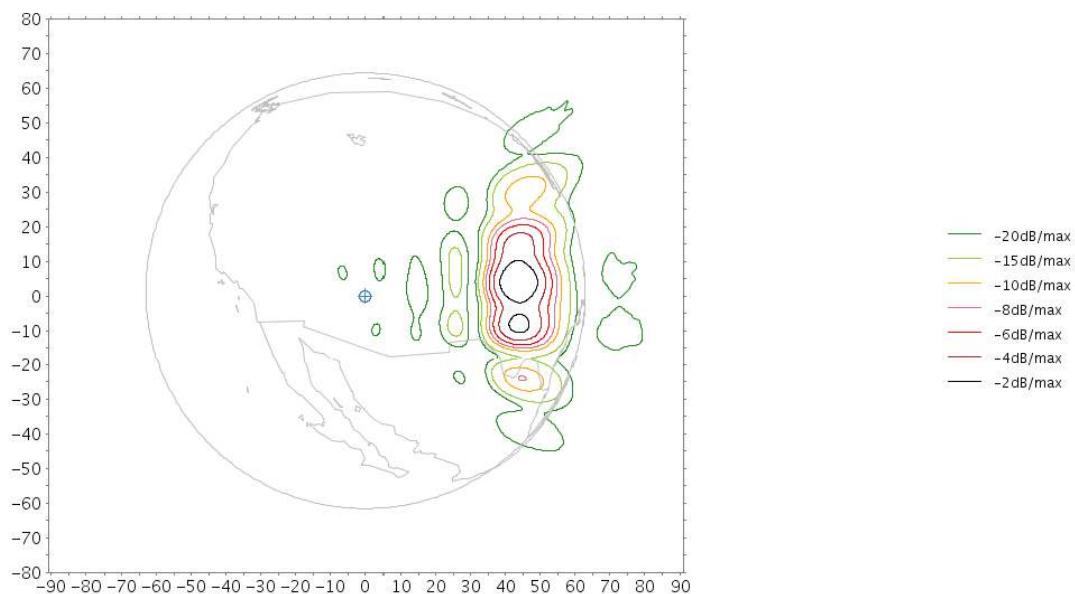
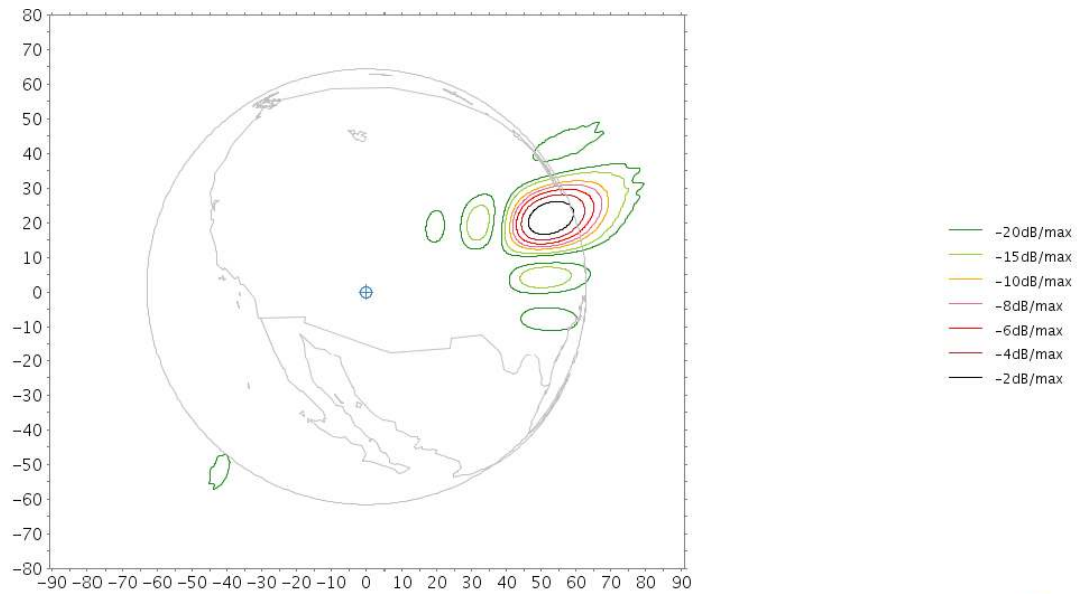
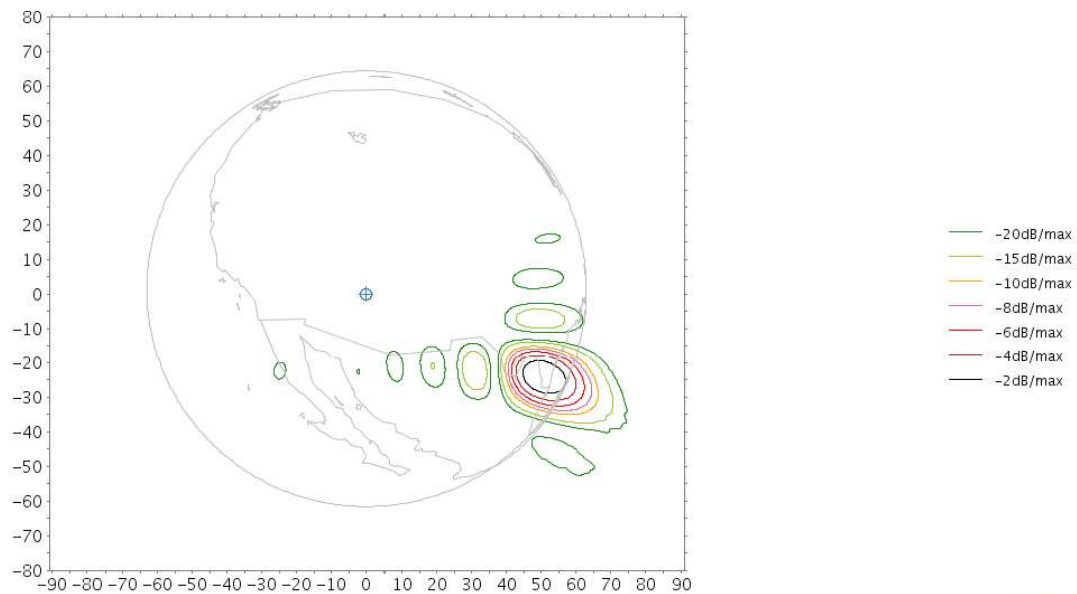


Figure 40 - Beams 40 (Tx) & 140 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**



**Figure 41 - Beams 41 (Tx) & 141 (Rx) - L band Co-pol Gain**



**Figure 42 - Beams 42 (Tx) & 142 (Rx) - L band Co-pol Gain**



# EXHIBIT A Space Station Antenna Contours

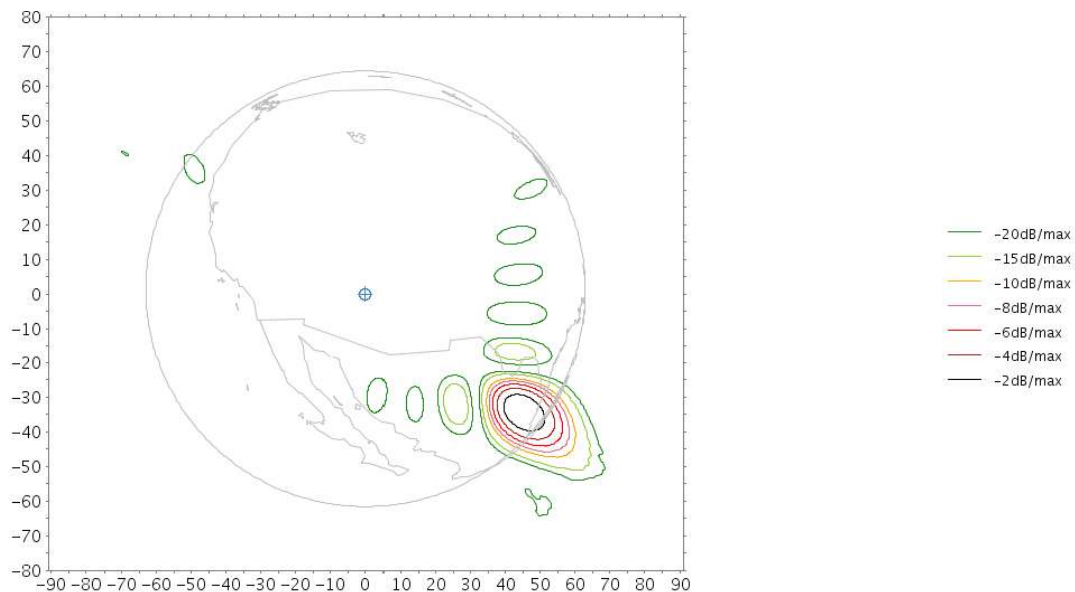


Figure 43 - Beams 43 (Tx) & 143 (Rx) - L band Co-pol Gain

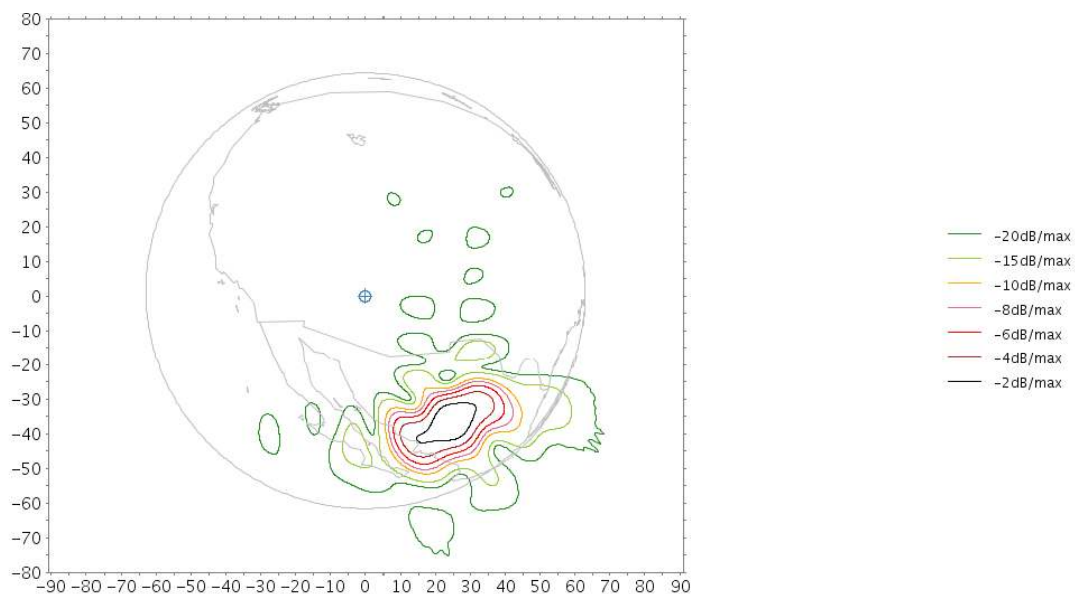


Figure 44 - Beams 44 (Tx) & 144 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

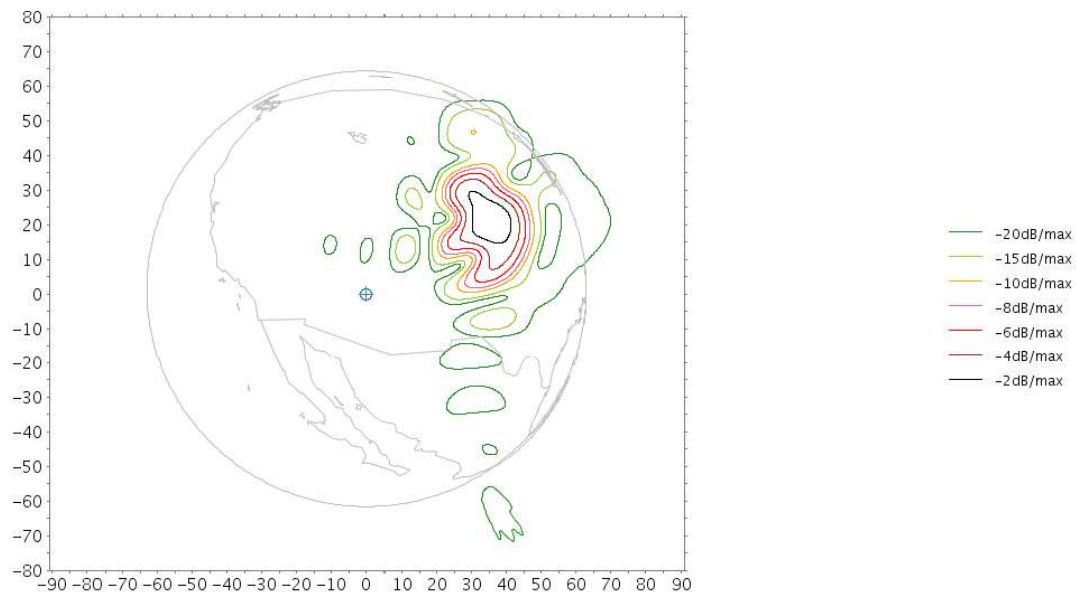


Figure 45 - Beams 45 (Tx) & 145 (Rx) - L band Co-pol Gain

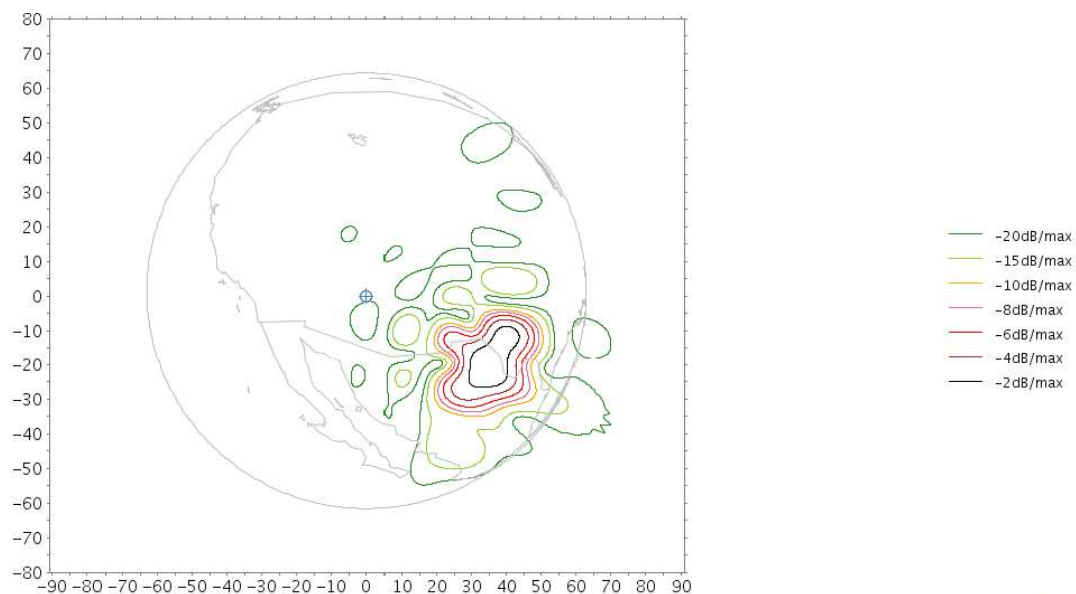


Figure 46 - Beams 46 (Tx) & 146 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

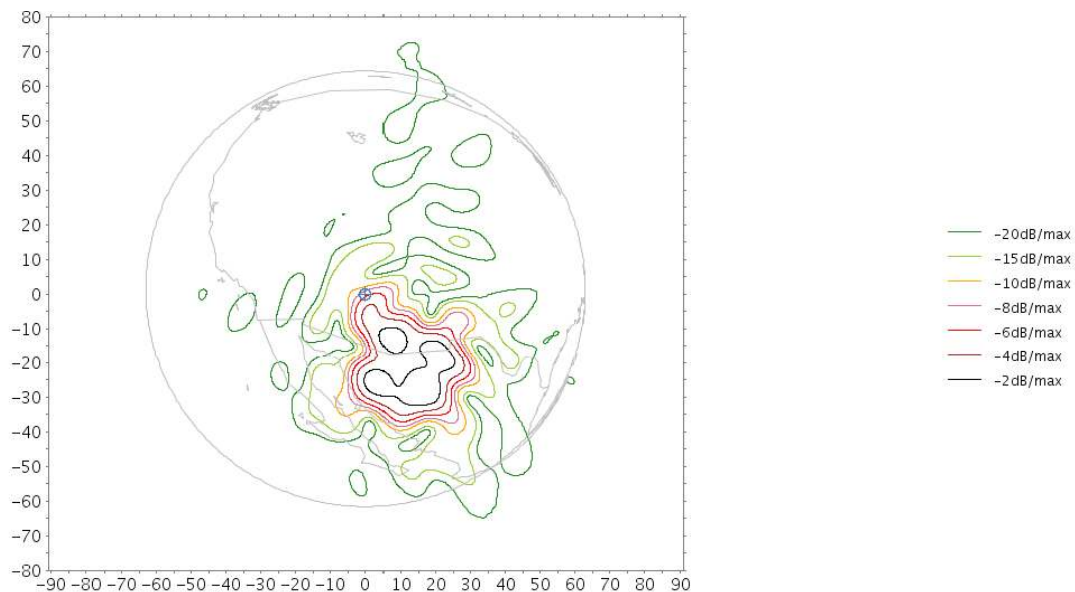


Figure 47 - Beams 47 (Tx) & 147 (Rx) - L band Co-pol Gain

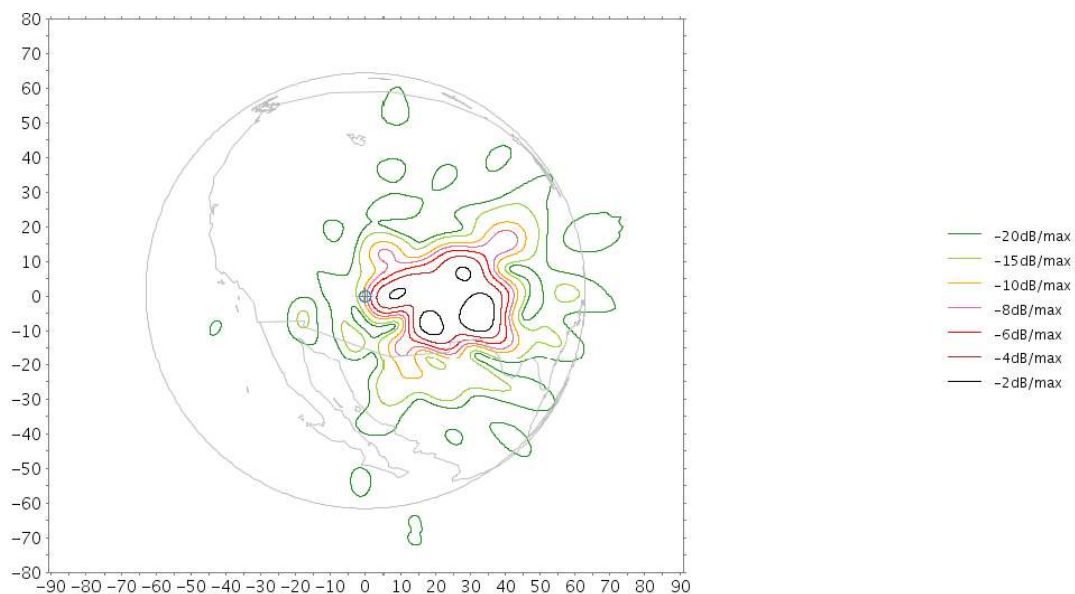


Figure 48 - Beams 48 (Tx) & 148 (Rx) - L band Co-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

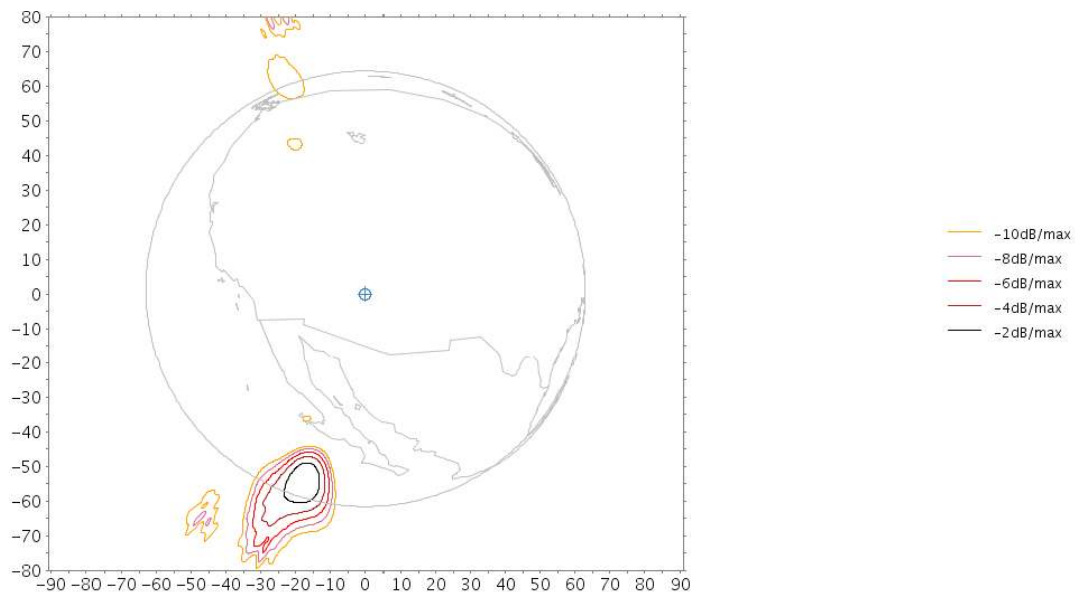


Figure 49 - Beams 1 (Tx) & 101 (Rx) - L band Cross-pol Gain

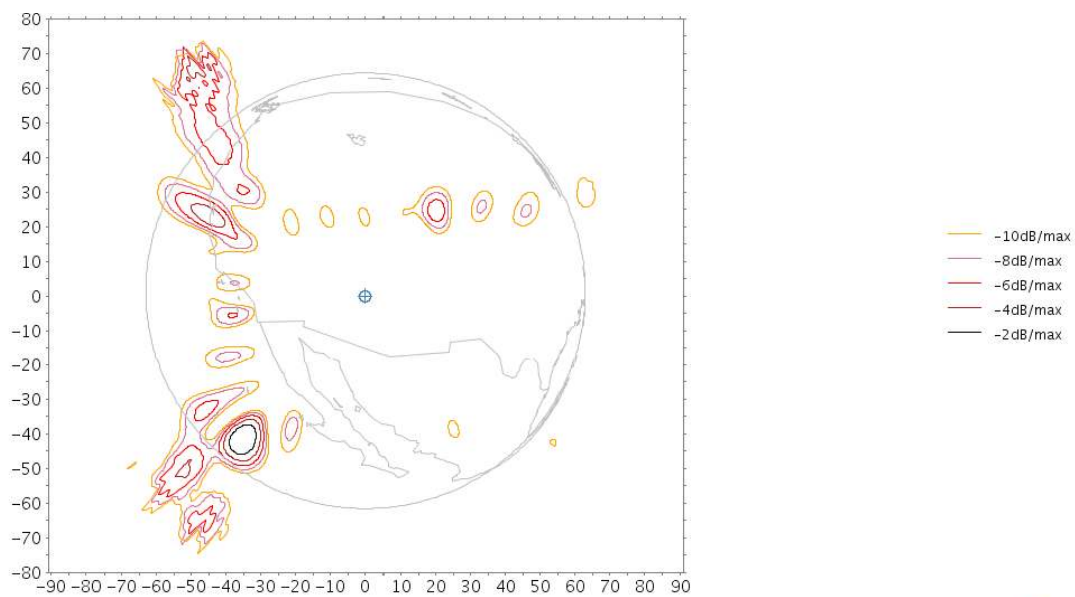


Figure 50 - Beams 2 (Tx) & 102 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

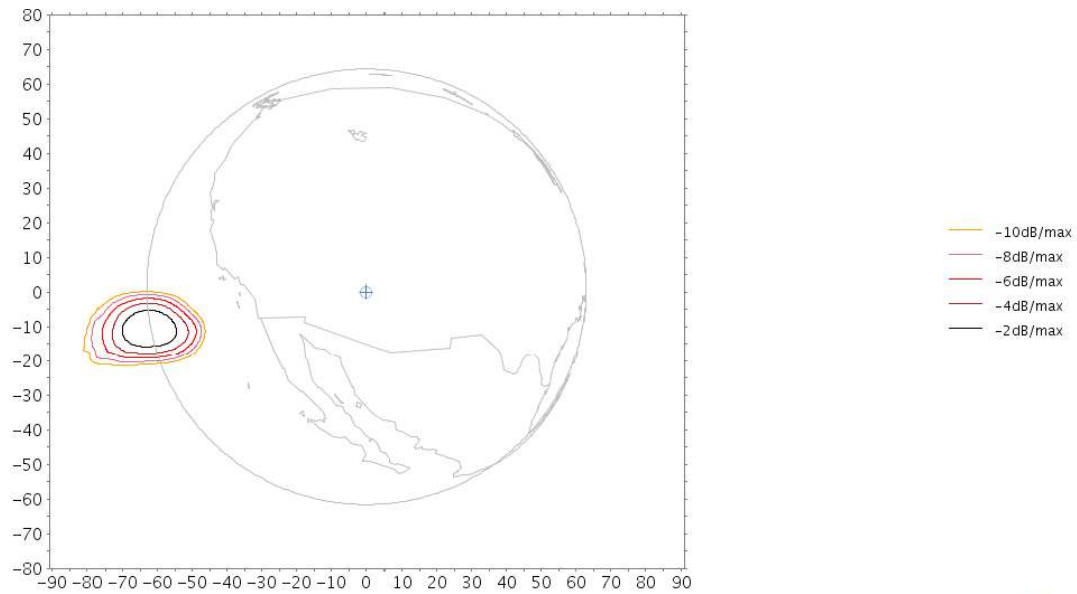


Figure 51 - Beams 3 (Tx) & 103 (Rx) - L band Cross-pol Gain

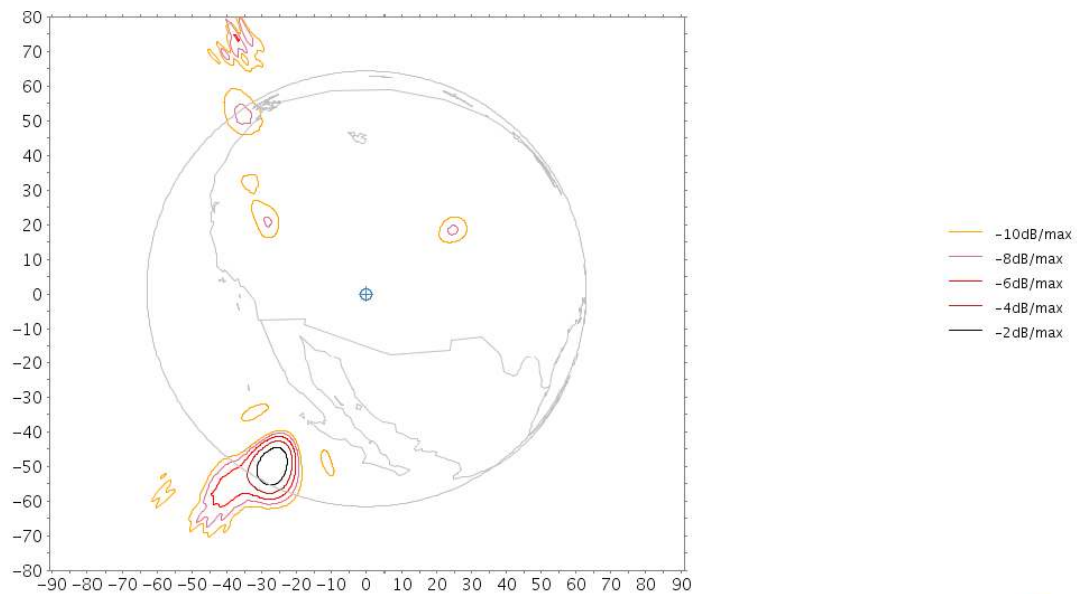


Figure 52 - Beams 4 (Tx) & 104 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

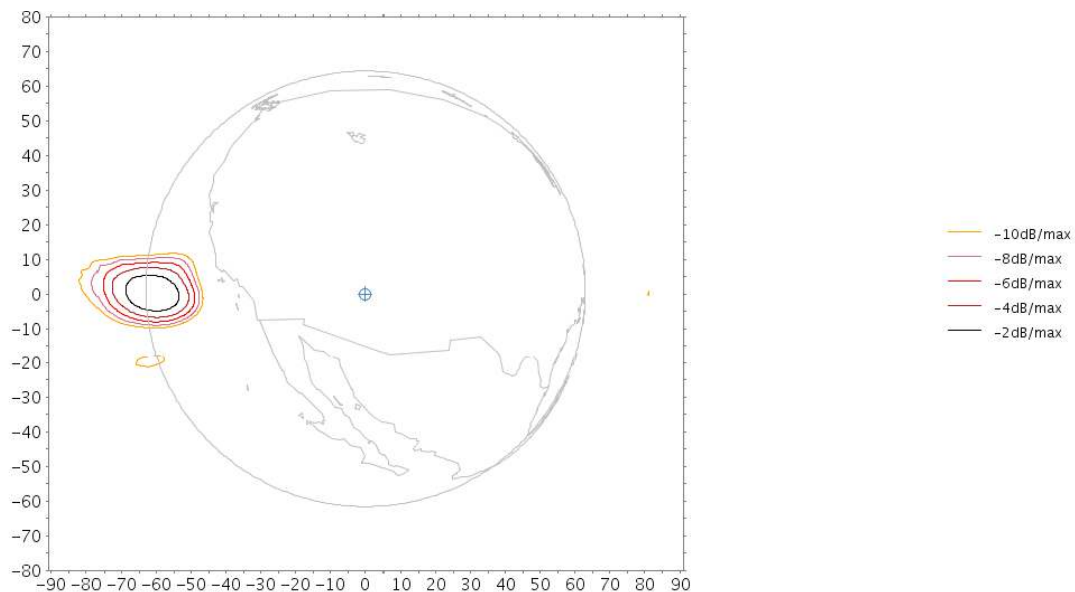


Figure 53 - Beams 5 (Tx) & 105 (Rx) - L band Cross-pol Gain

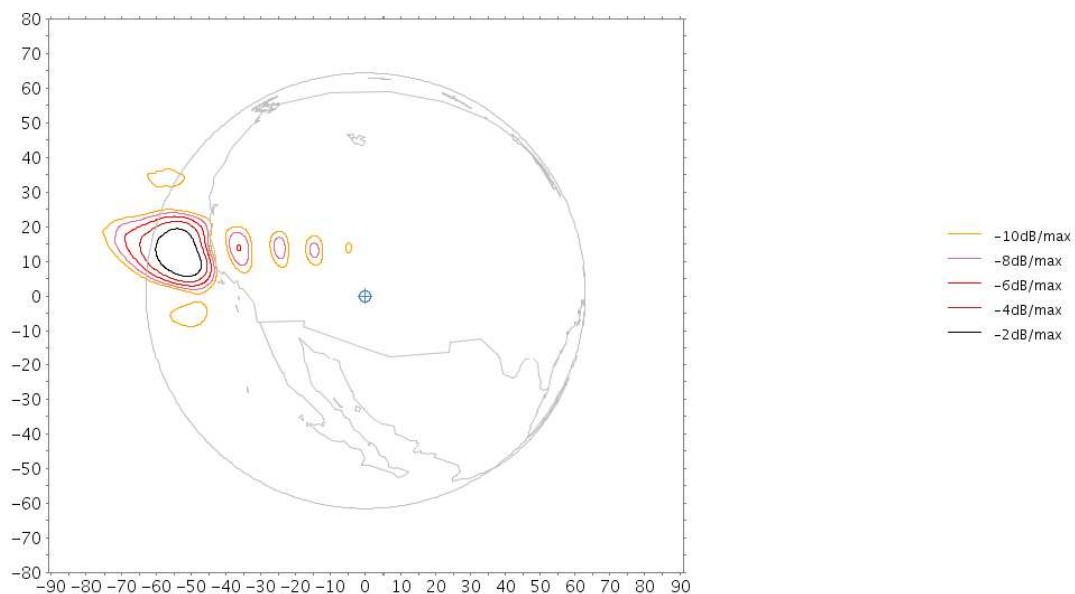


Figure 54 - Beams 6 (Tx) & 106 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

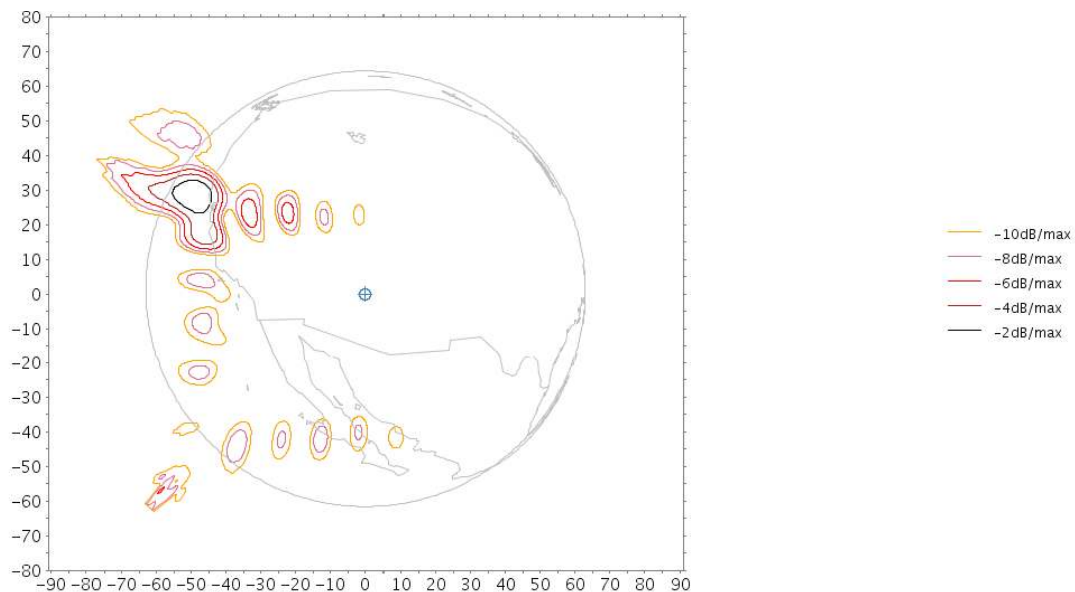


Figure 55 - Beams 7 (Tx) & 107 (Rx) - L band Cross-pol Gain

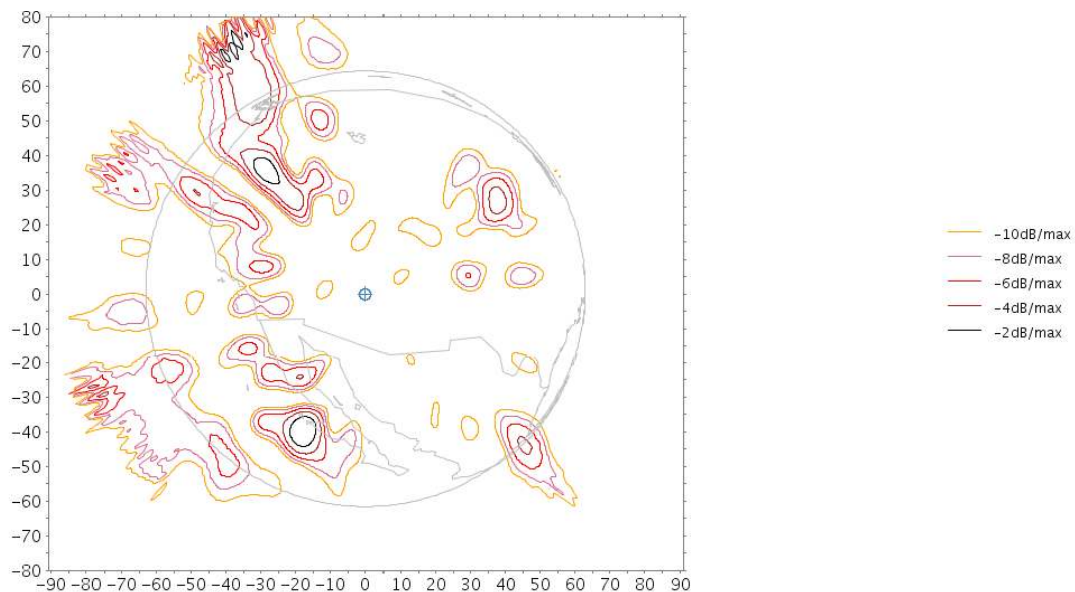


Figure 56 - Beams 8 (Tx) & 108 (Rx) - L band Cross-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

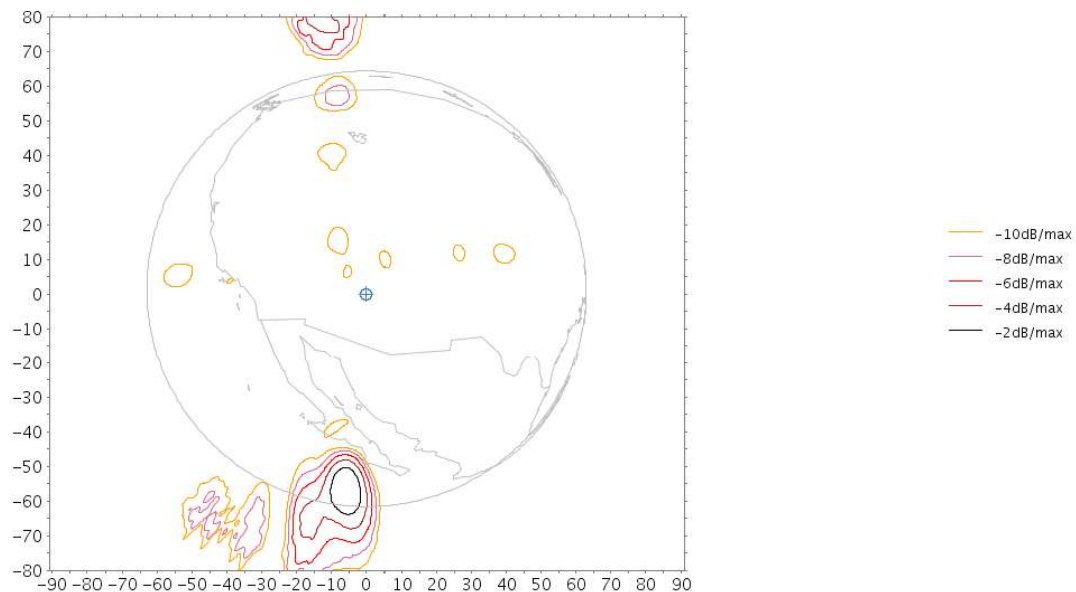


Figure 57 - Beams 9 (Tx) & 109 (Rx) - L band Cross-pol Gain

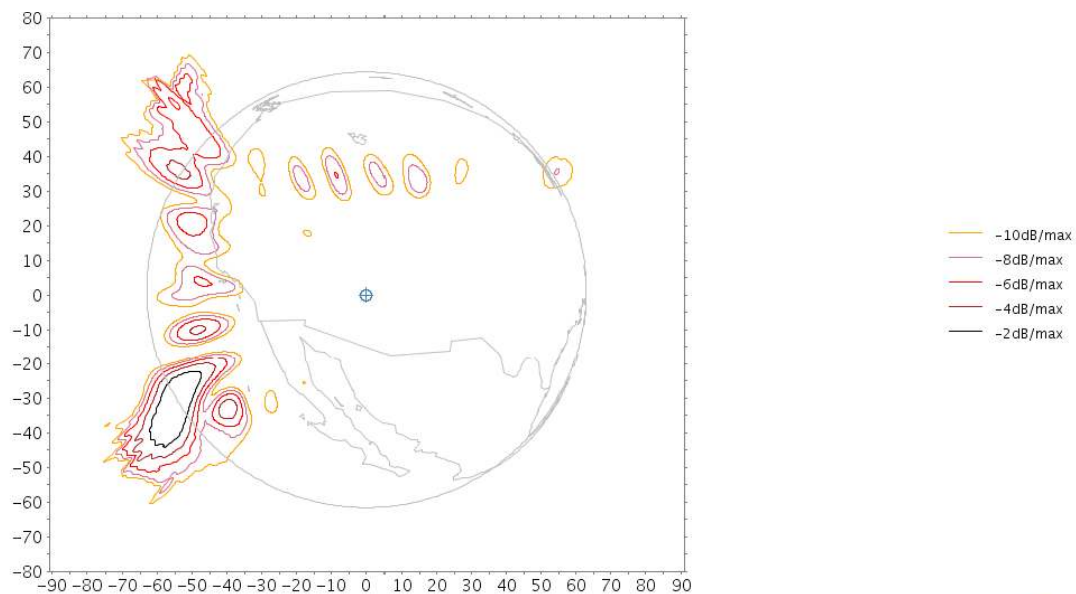


Figure 58 - Beams 10 (Tx) & 110 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

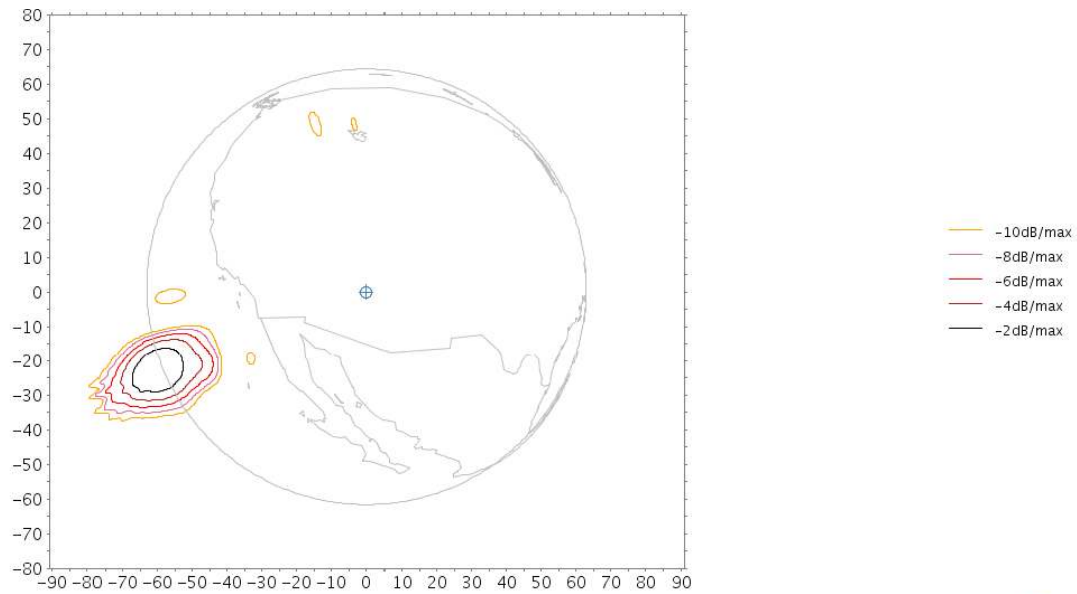


Figure 59 - Beams 11 (Tx) & 111 (Rx) - L band Cross-pol Gain

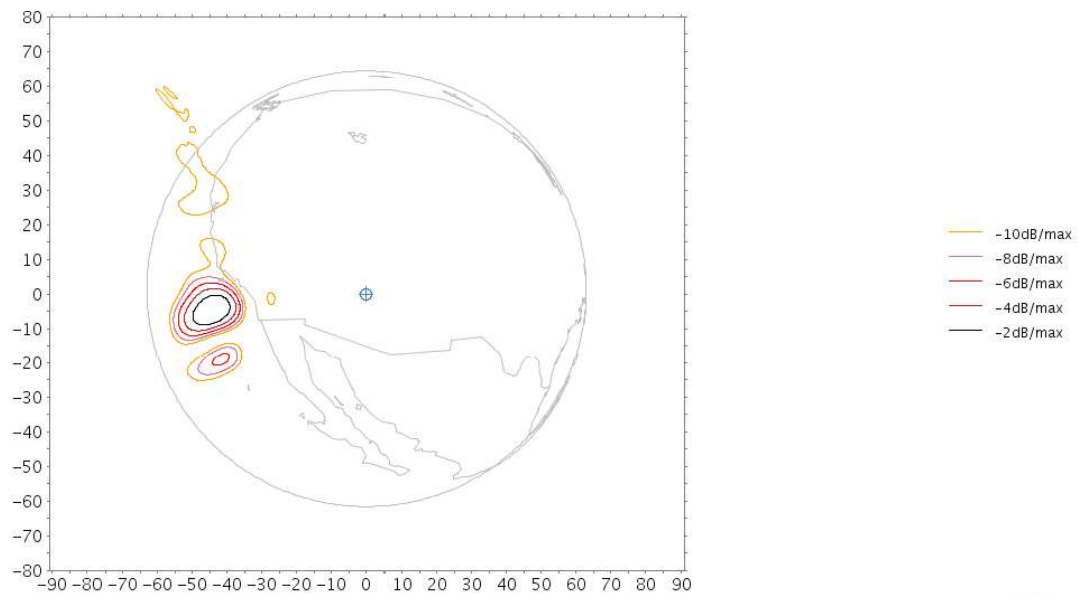


Figure 60 - Beams 12 (Tx) & 112 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

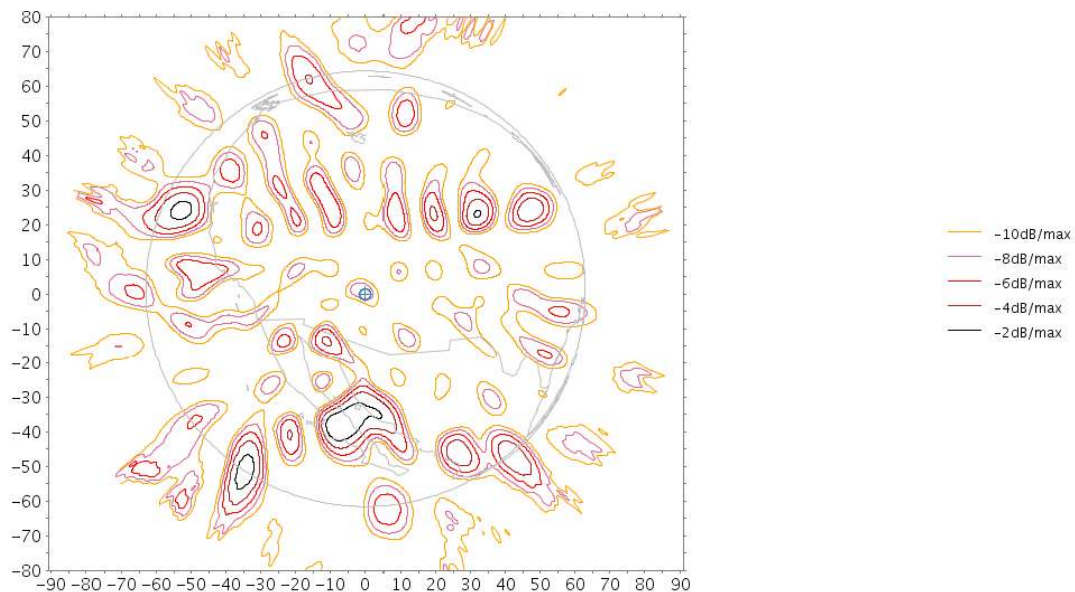


Figure 61 - Beams 13 (Tx) & 113 (Rx) - L band Cross-pol Gain

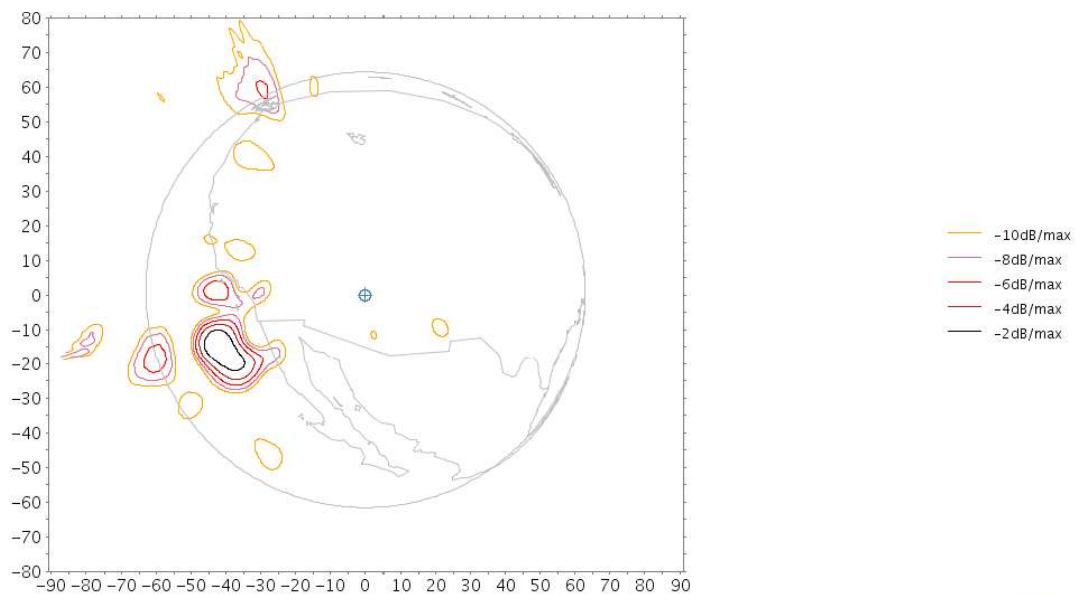


Figure 62 - Beams 14 (Tx) & 114 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

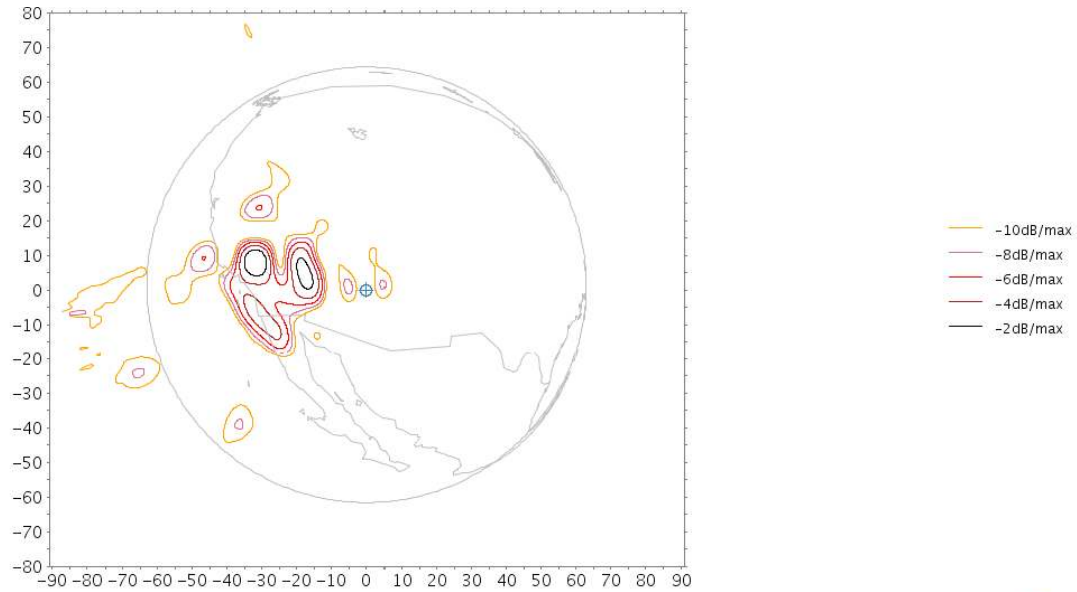


Figure 63 - Beams 15 (Tx) & 115 (Rx) - L band Cross-pol Gain

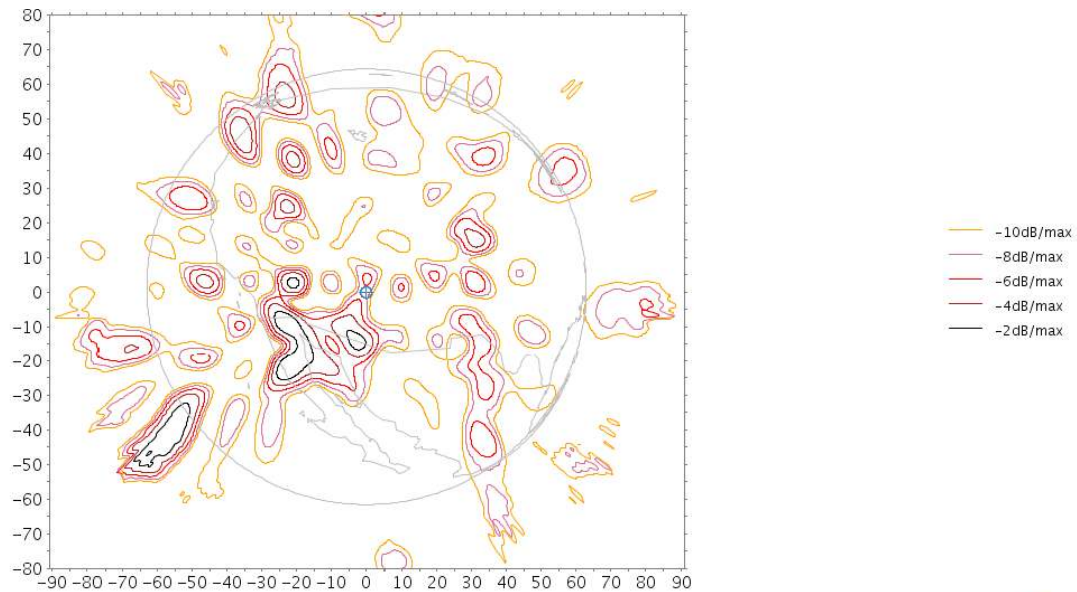


Figure 64 - Beams 16 (Tx) & 116 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

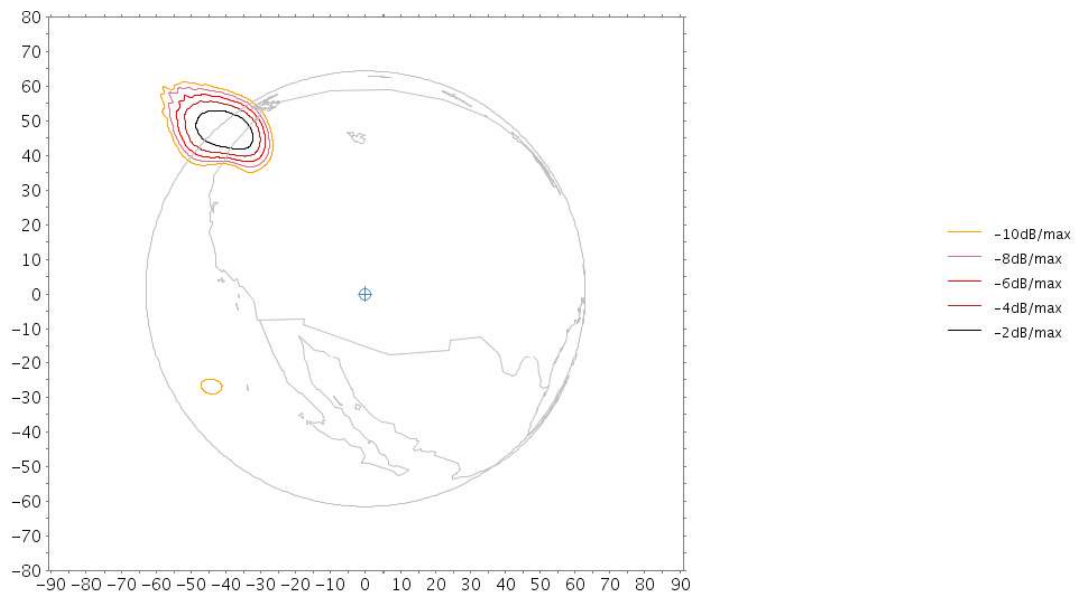


Figure 65 - Beams 17 (Tx) & 117 (Rx) - L band Cross-pol Gain

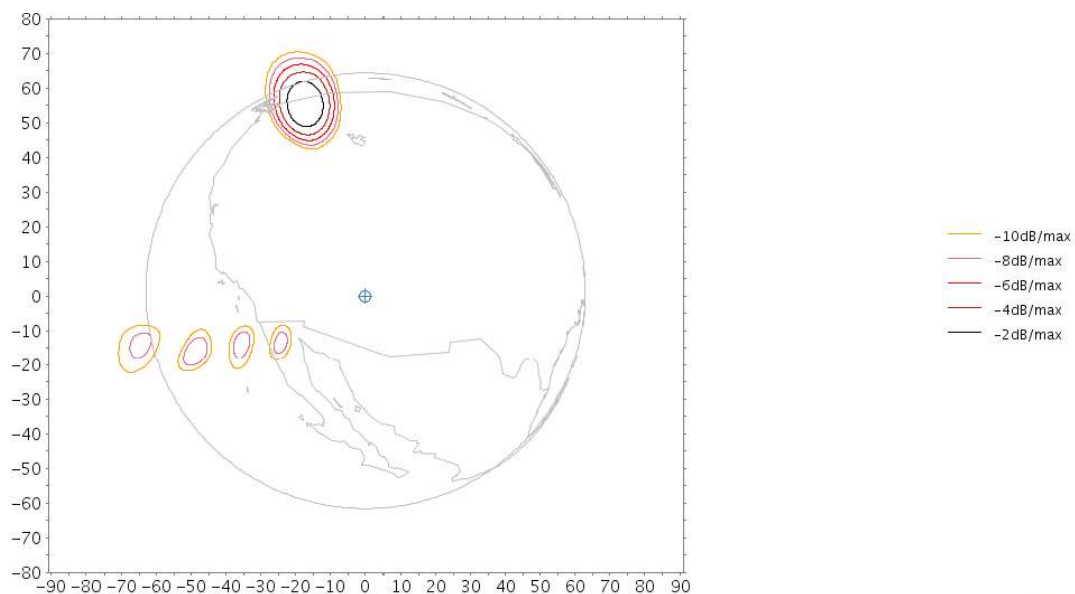


Figure 66 - Beams 18 (Tx) & 118 (Rx) - L band Cross-pol Gain

# EXHIBIT A Space Station Antenna Contours

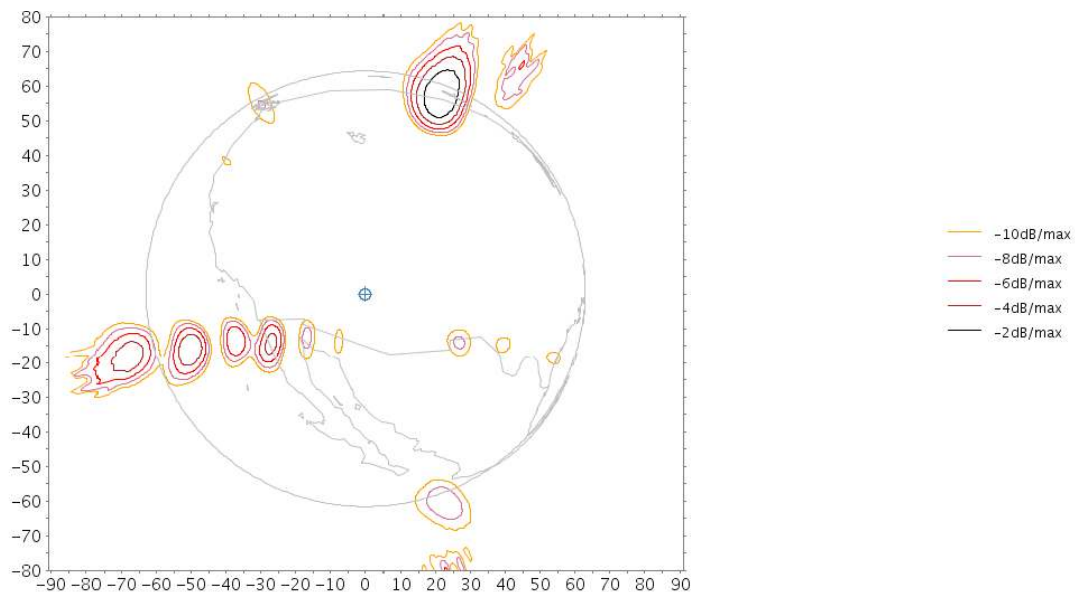


Figure 67 - Beams 19 (Tx) & 119 (Rx) - L band Cross-pol Gain

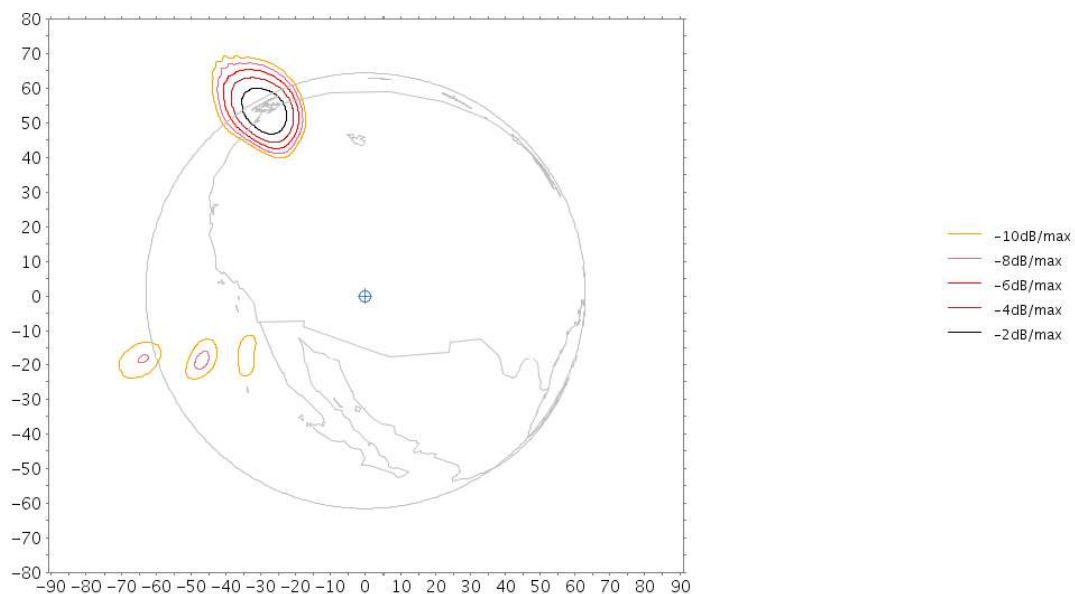


Figure 68 - Beams 20 (Tx) & 120 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

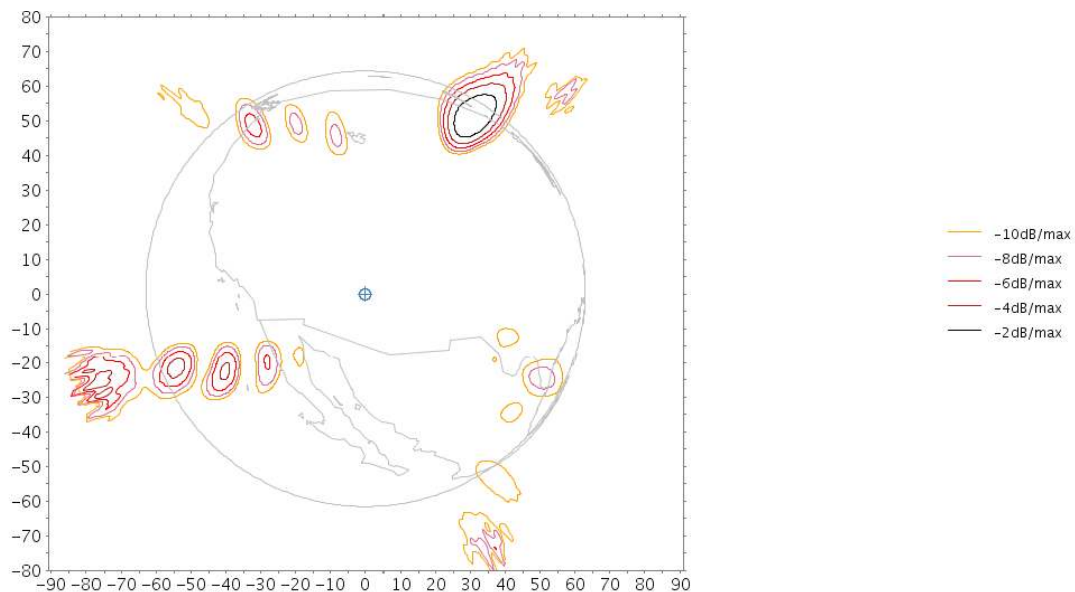


Figure 69 - Beams 21 (Tx) & 121 (Rx) - L band Cross-pol Gain

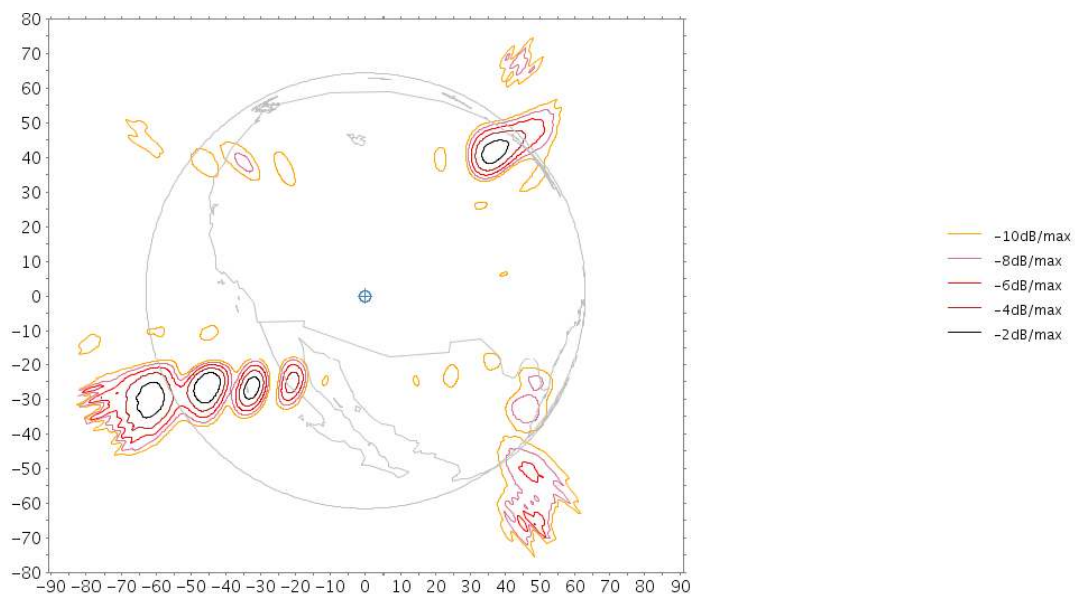


Figure 70 - Beams 22 (Tx) & 122 (Rx) - L band Cross-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

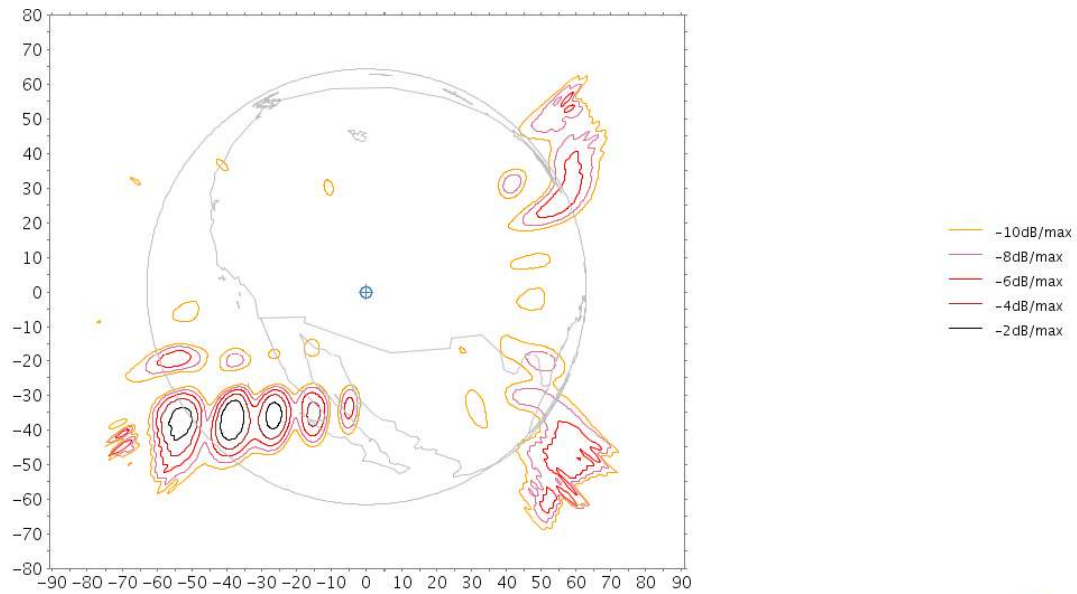


Figure 71 - Beams 23 (Tx) & 123 (Rx) - L band Cross-pol Gain

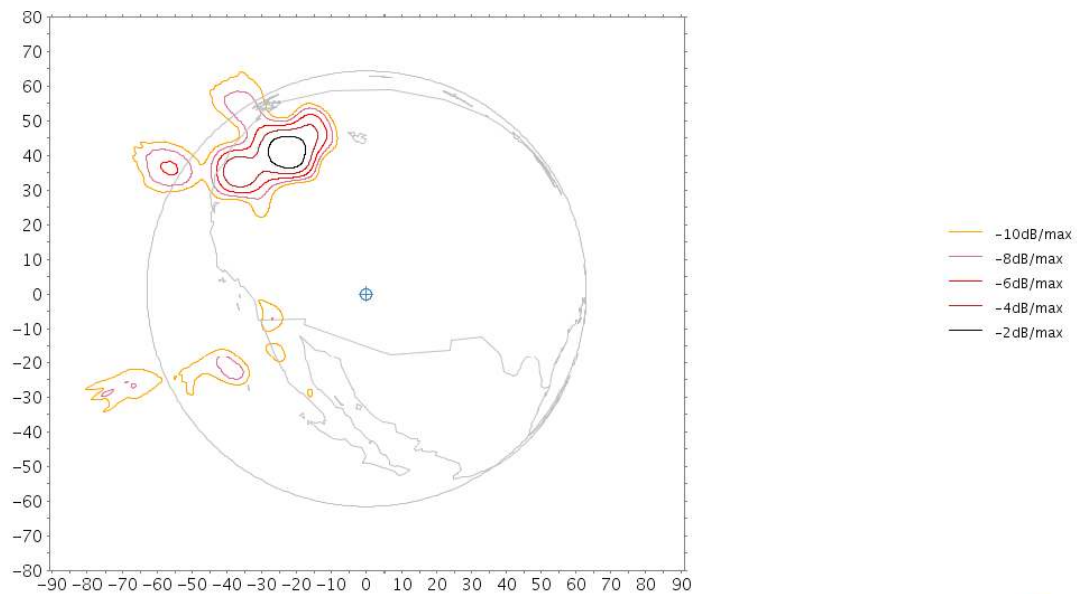


Figure 72 - Beams 24 (Tx) & 124 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

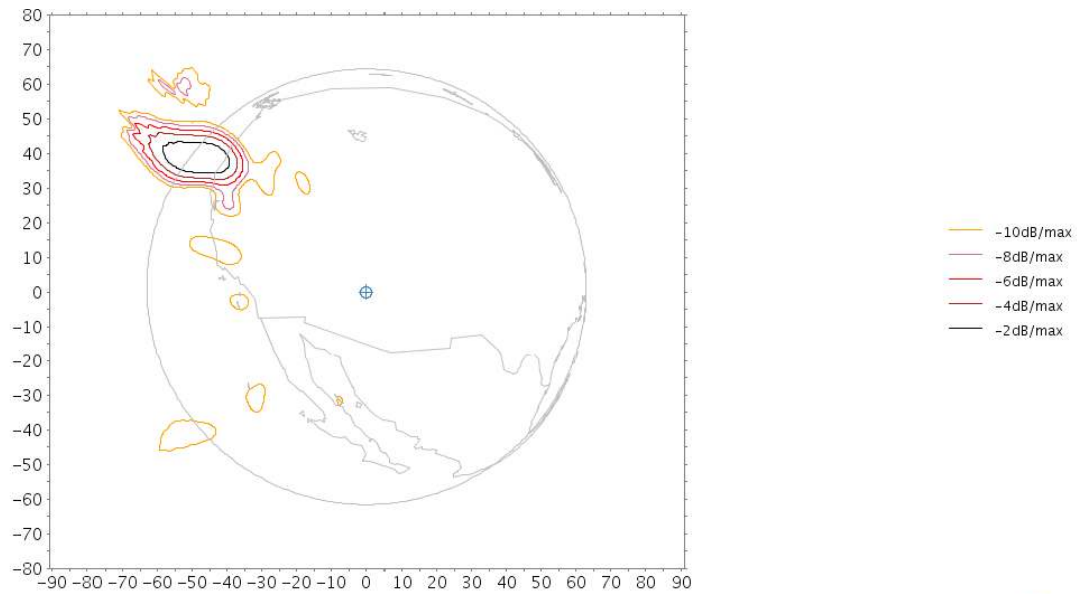


Figure 73 - Beams 25 (Tx) & 125 (Rx) - L band Cross-pol Gain

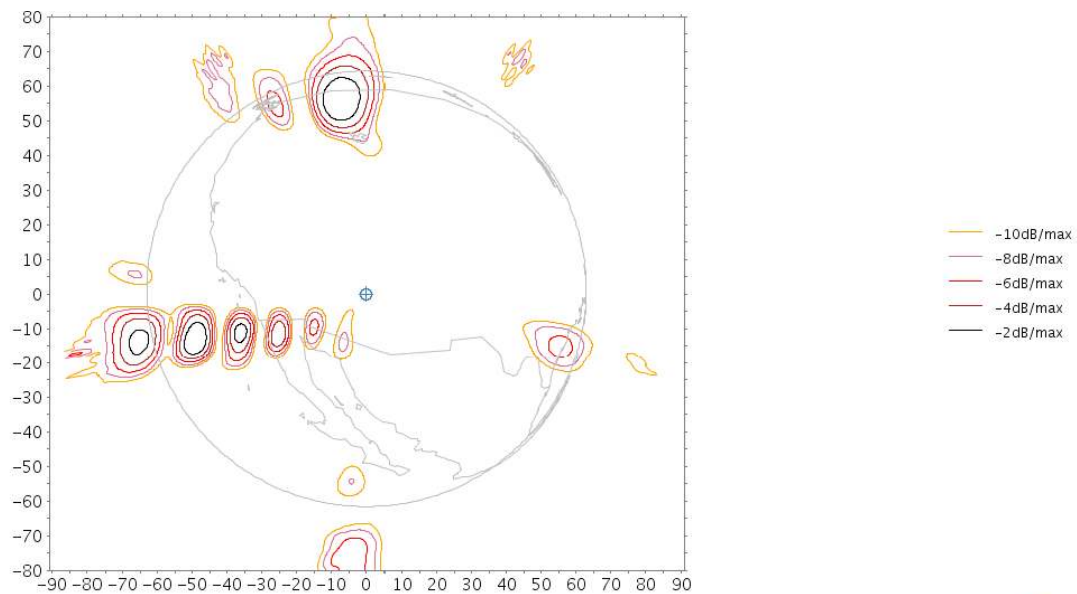


Figure 74 - Beams 26 (Tx) & 126 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

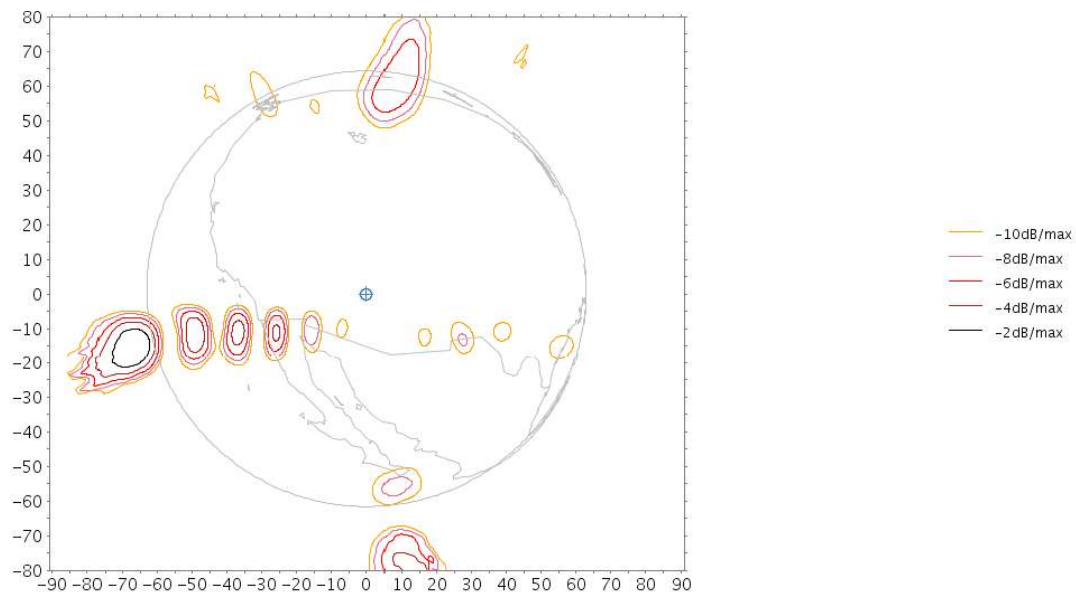


Figure 75 - Beams 27 (Tx) & 127 (Rx) - L band Cross-pol Gain

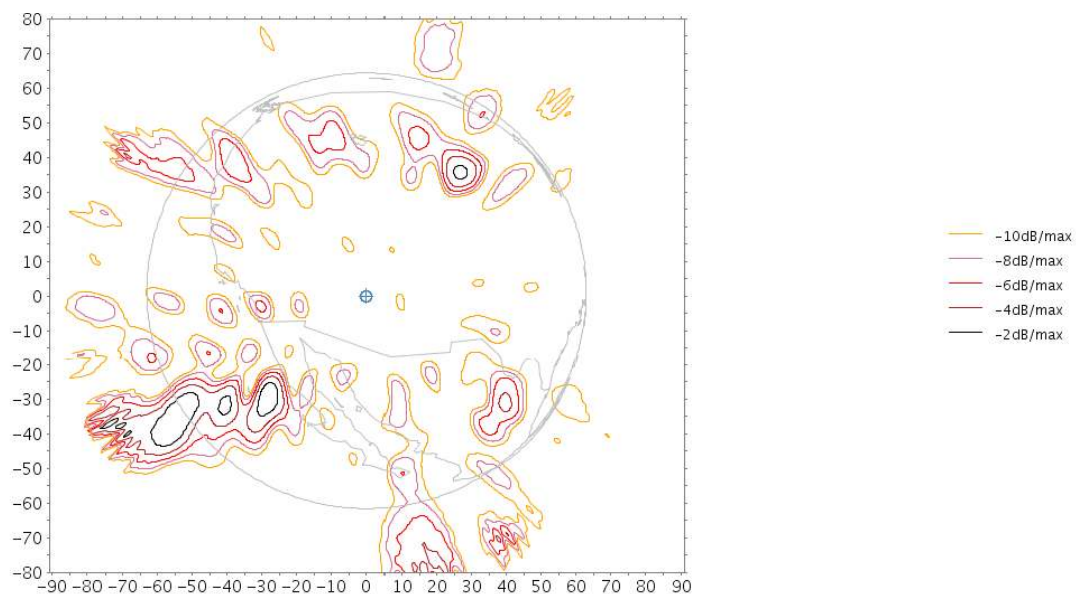


Figure 76 - Beams 28 (Tx) & 128 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

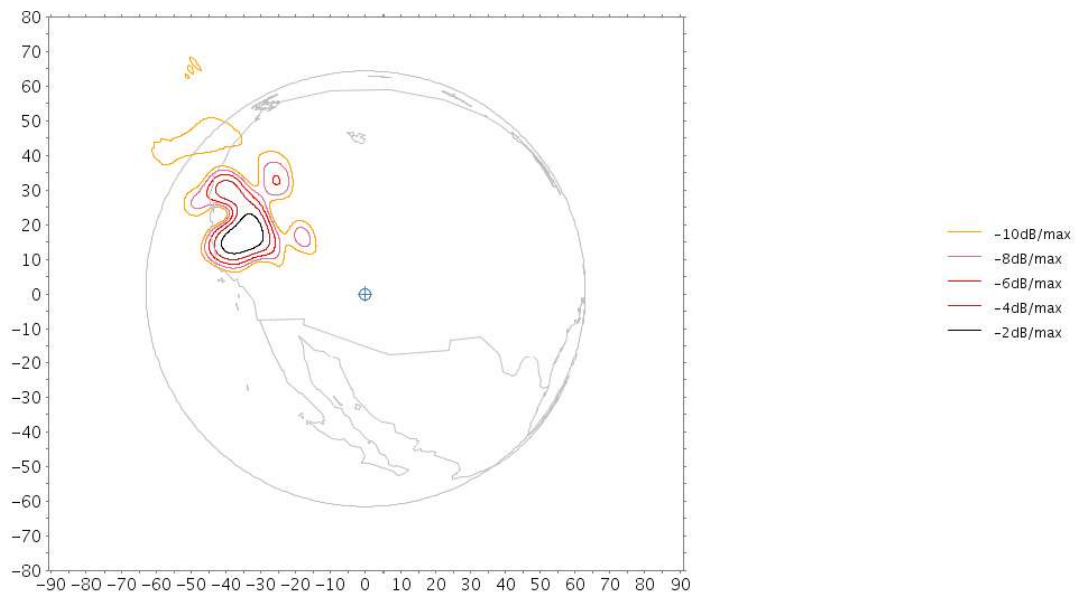


Figure 77 - Beams 29 (Tx) & 129 (Rx) - L band Cross-pol Gain

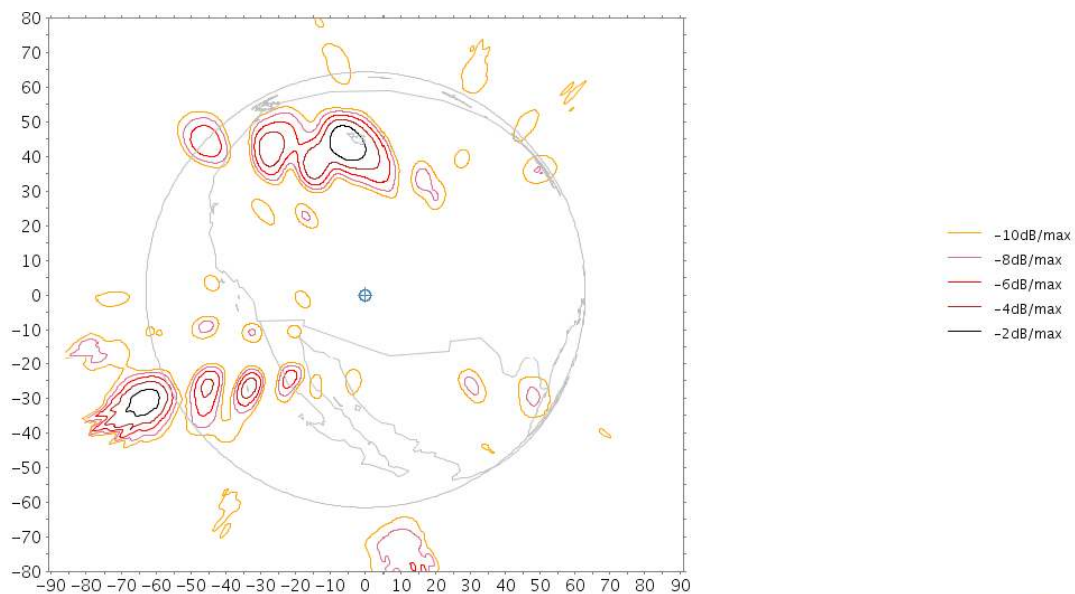


Figure 78 - Beams 30 (Tx) & 130 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

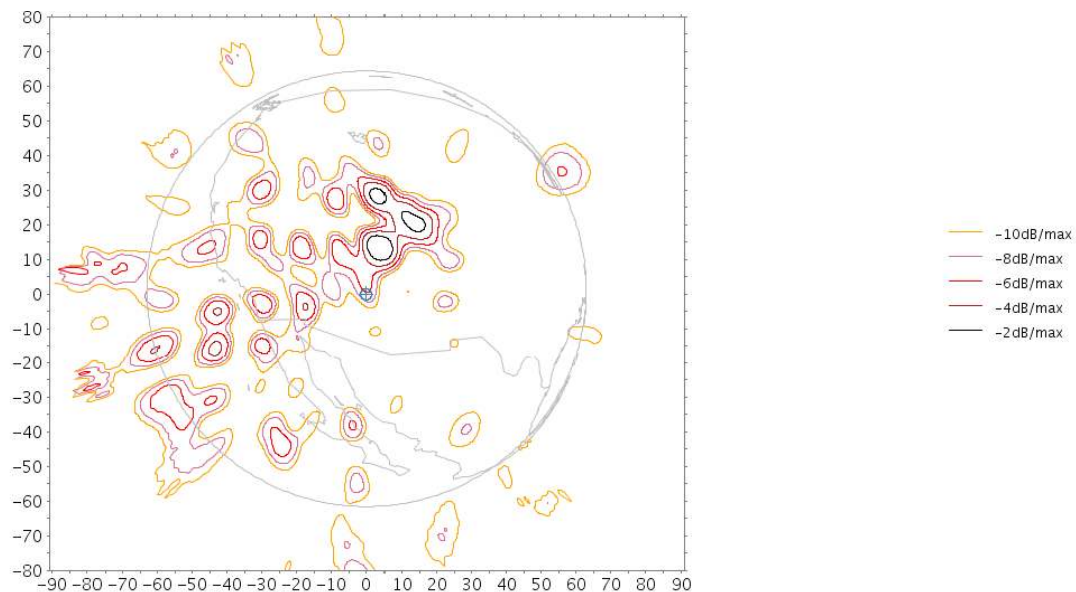


Figure 79 - Beams 31 (Tx) & 131 (Rx) - L band Cross-pol Gain

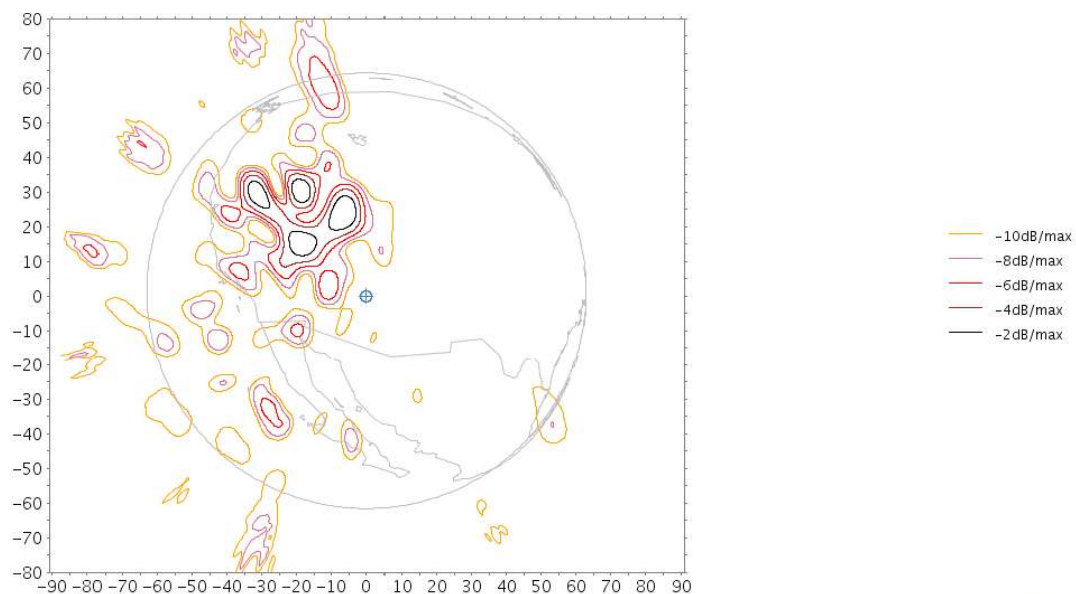


Figure 80 - Beams 32 (Tx) & 132 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

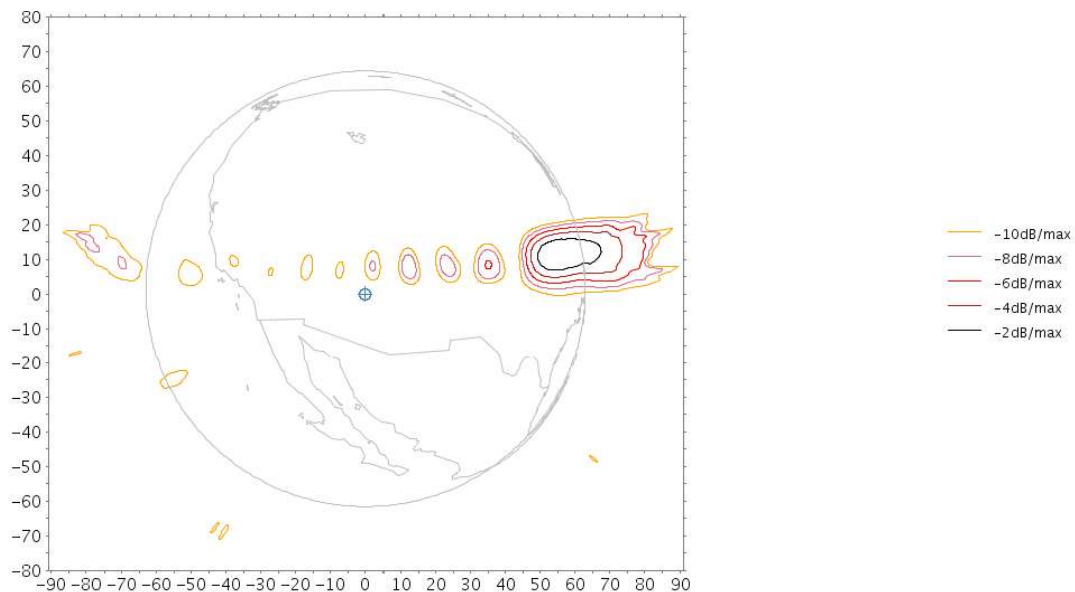


Figure 81 - Beams 33 (Tx) & 133 (Rx) - L band Cross-pol Gain

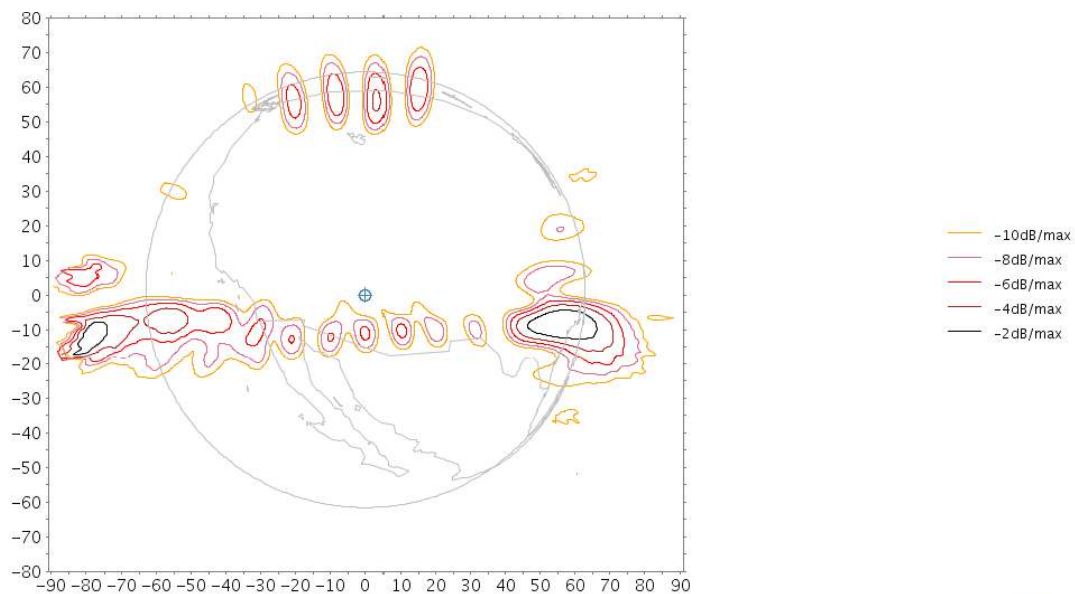


Figure 82 - Beams 34 (Tx) & 134 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

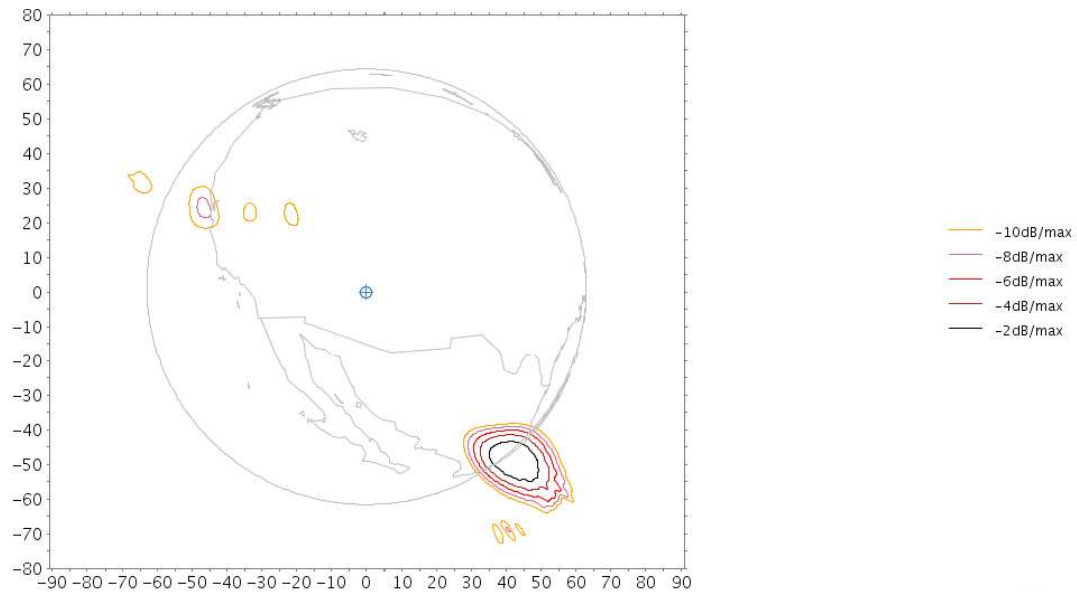


Figure 83 - Beams 35 (Tx) & 135 (Rx) - L band Cross-pol Gain

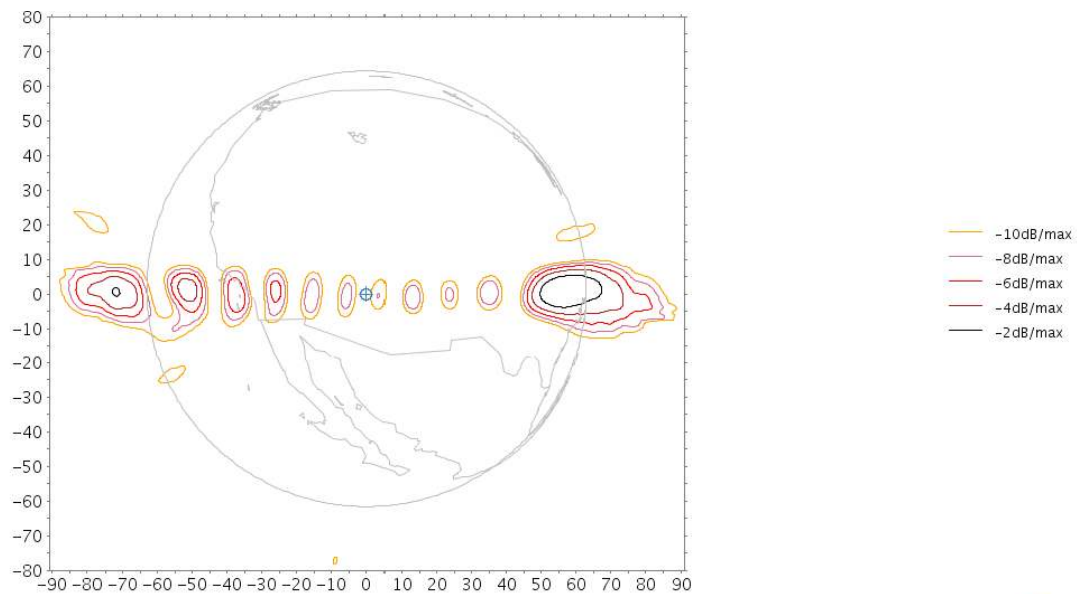


Figure 84 - Beams 36 (Tx) & 136 (Rx) - L band Cross-pol Gain



# **EXHIBIT A** **Space Station Antenna Contours**

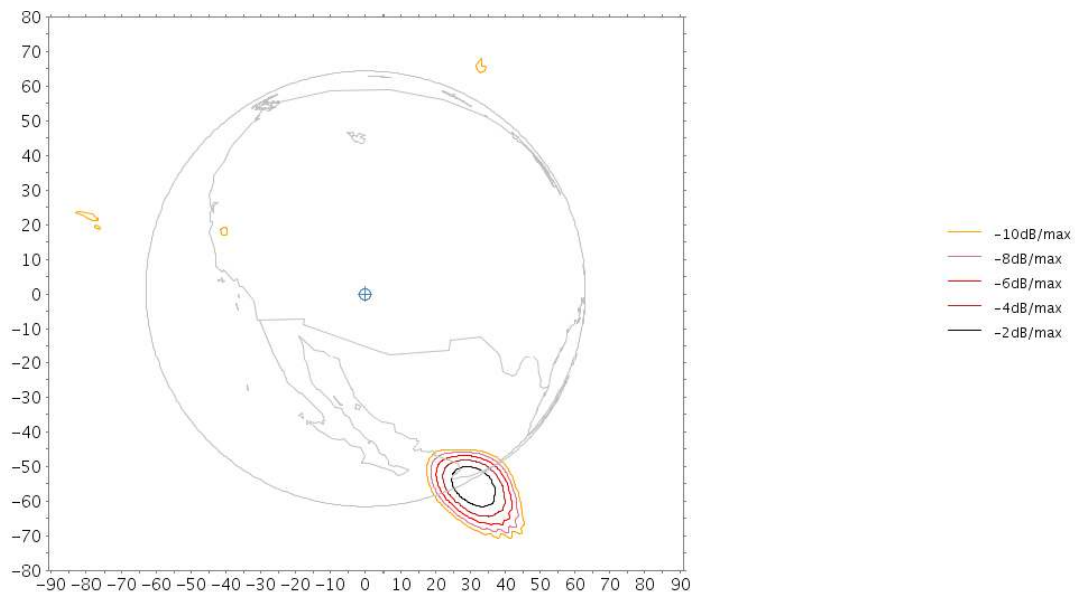


Figure 85 - Beams 37 (Tx) & 137 (Rx) - L band Cross-pol Gain

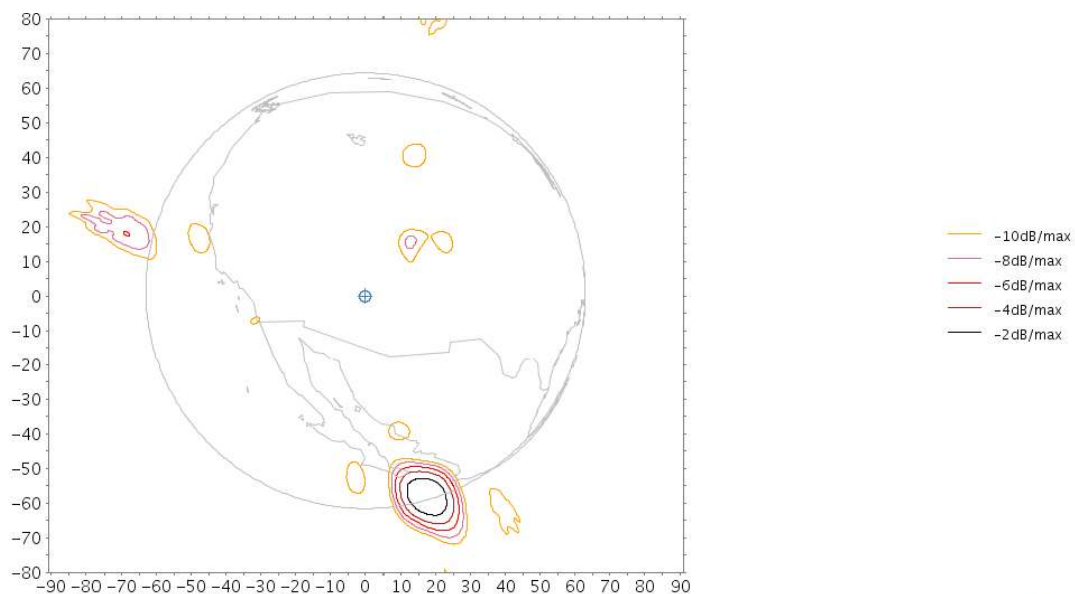


Figure 86 - Beams 38 (Tx) & 138 (Rx) - L band Cross-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

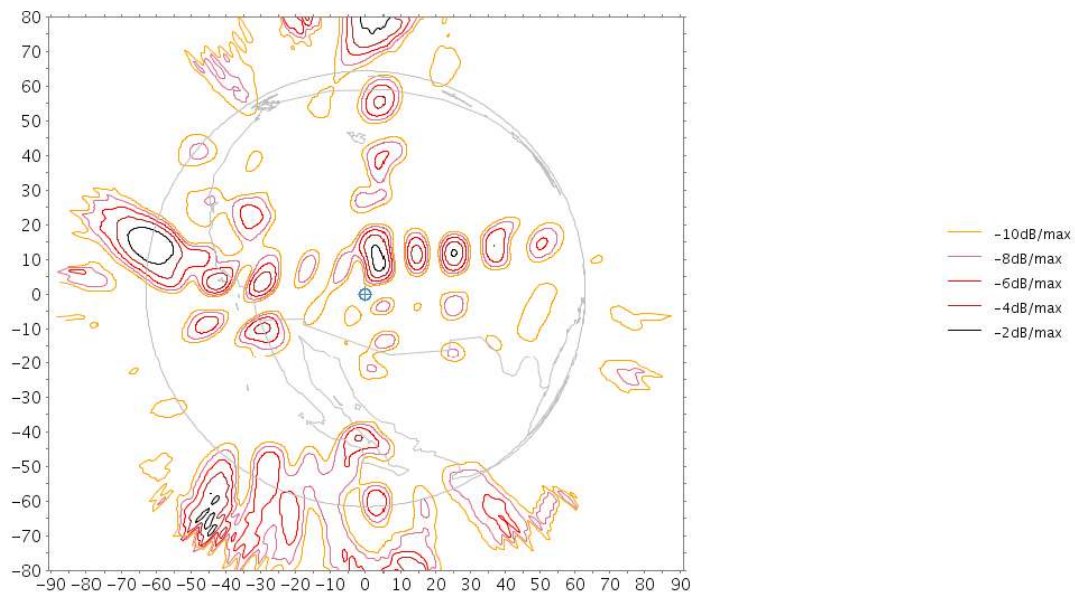


Figure 87 - Beams 39 (Tx) & 139 (Rx) - L band Cross-pol Gain

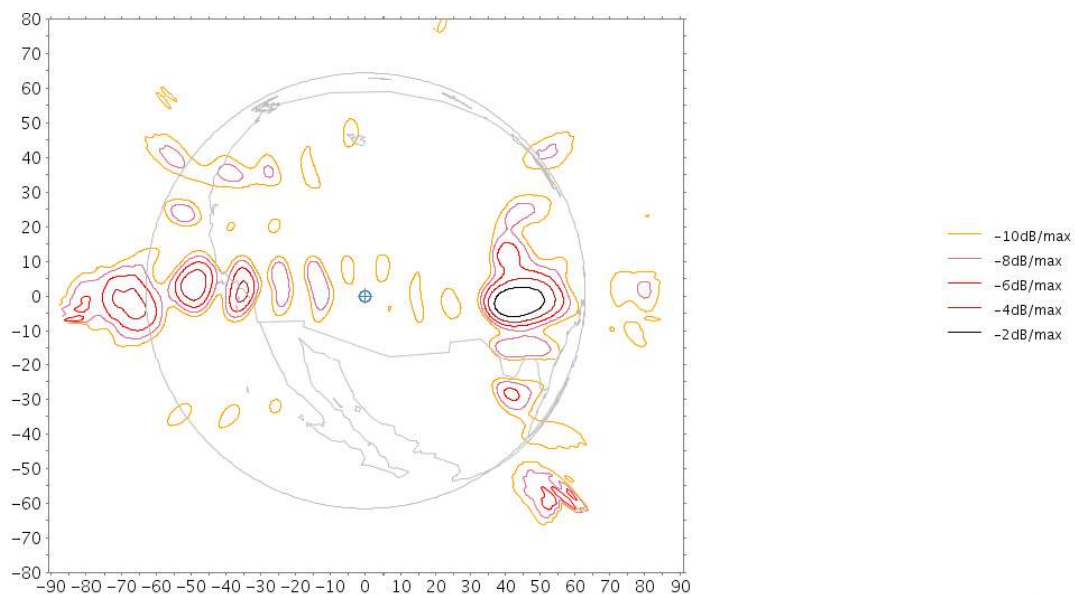


Figure 88 - Beams 40 (Tx) & 140 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

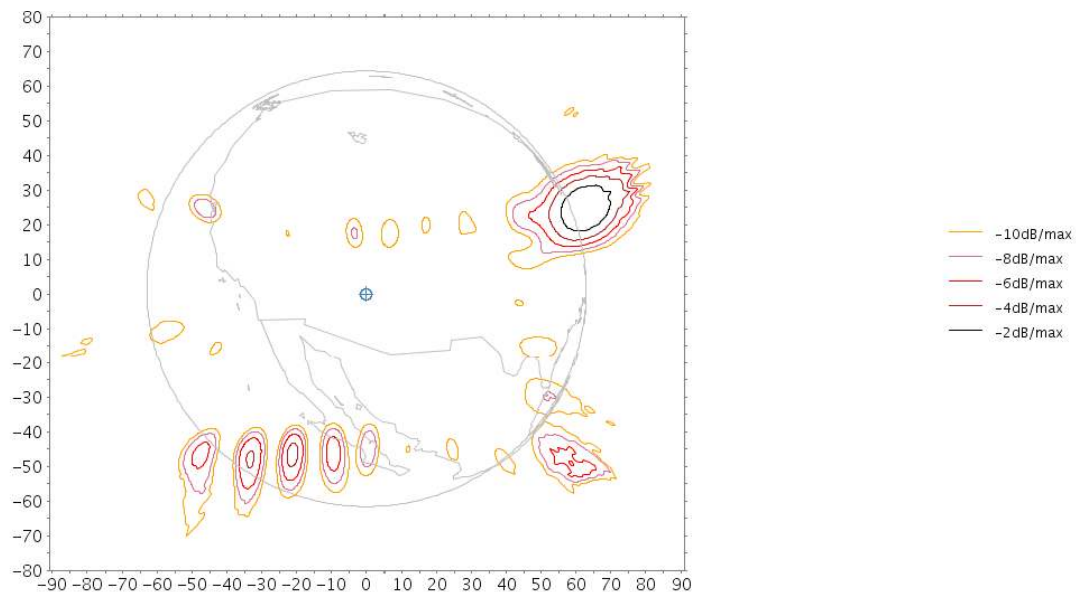


Figure 89 - Beams 41 (Tx) & 141 (Rx) - L band Cross-pol Gain

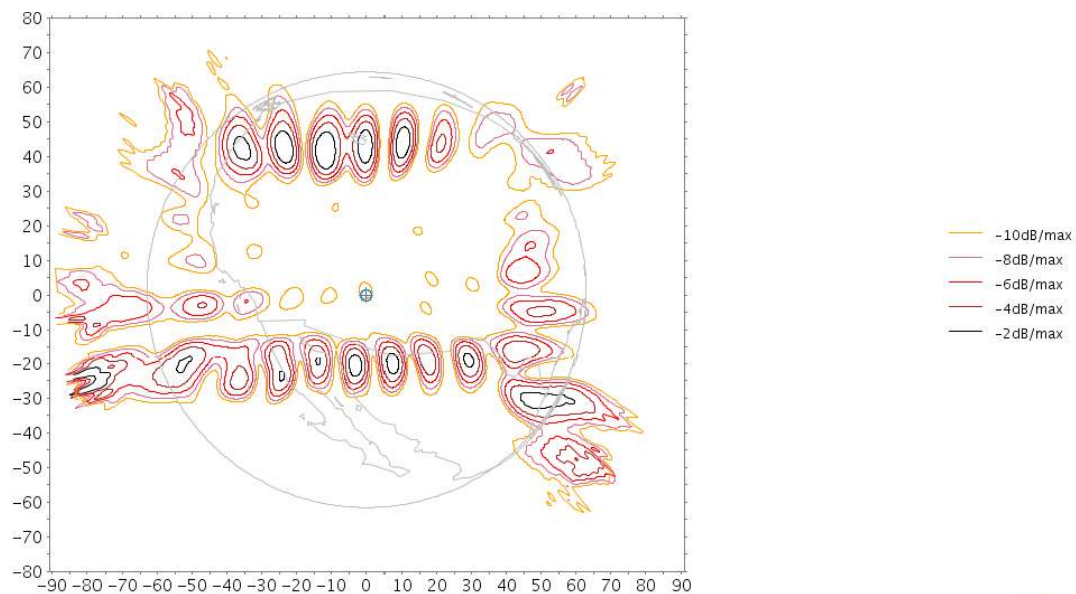


Figure 90 - Beams 42 (Tx) & 142 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

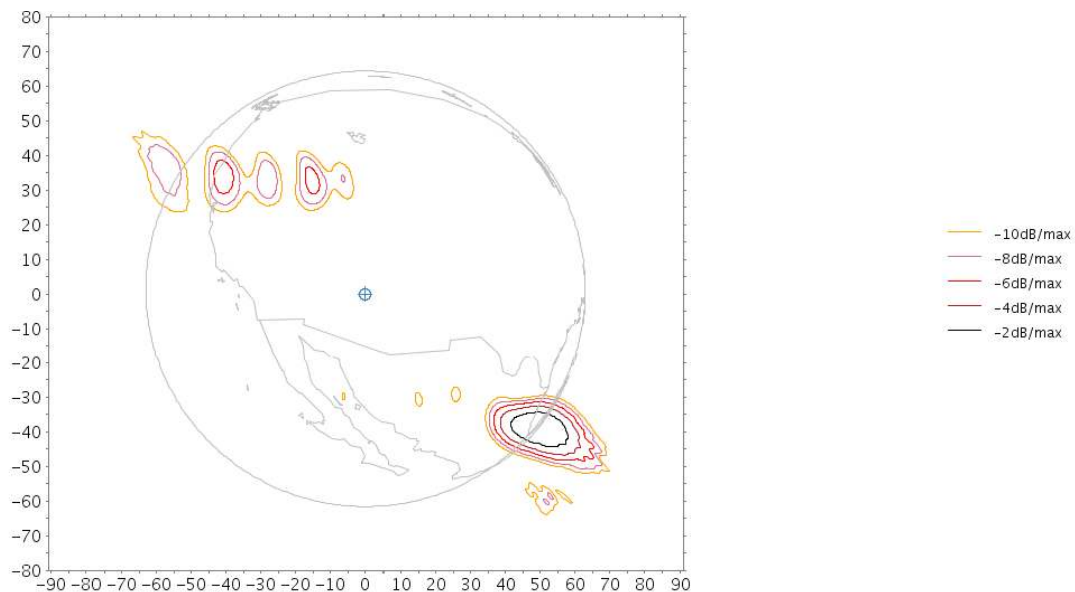


Figure 91 - Beams 43 (Tx) & 143 (Rx) - L band Cross-pol Gain

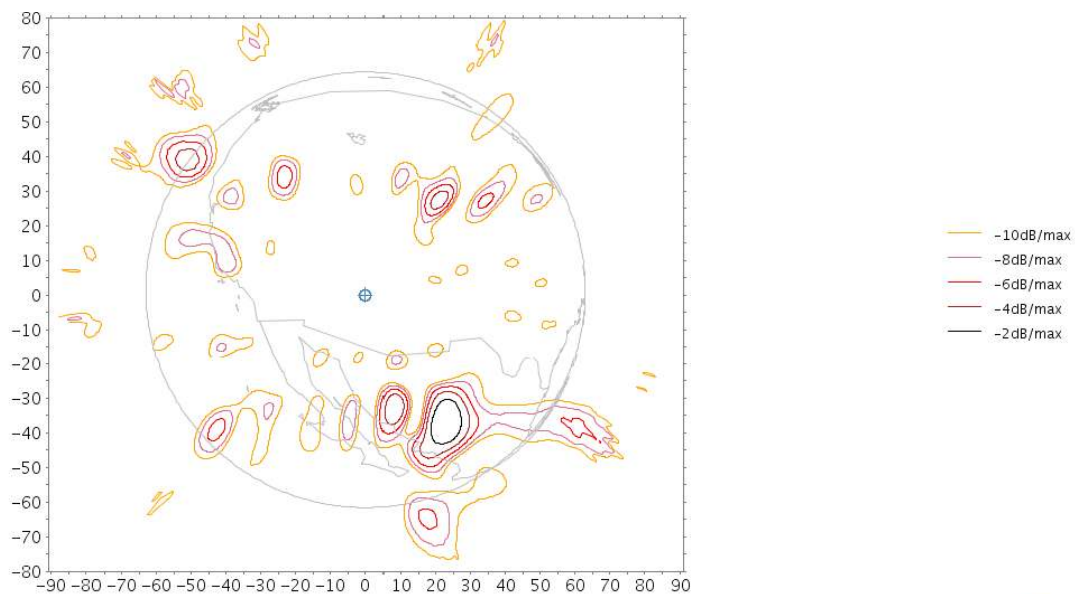


Figure 92 - Beams 44 (Tx) & 144 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

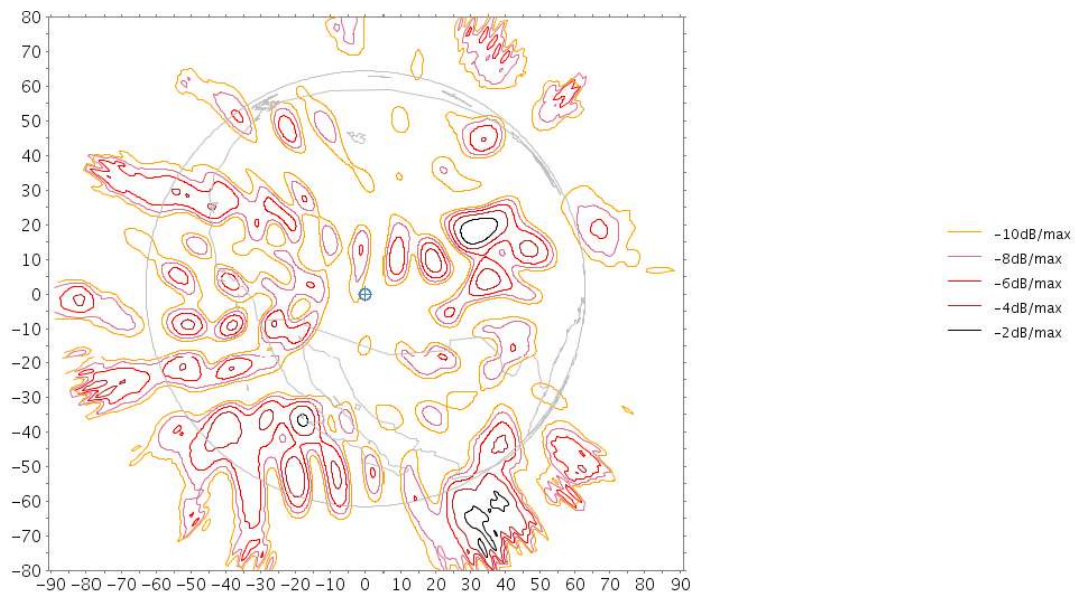


Figure 93 - Beams 45 (Tx) & 145 (Rx) - L band Cross-pol Gain

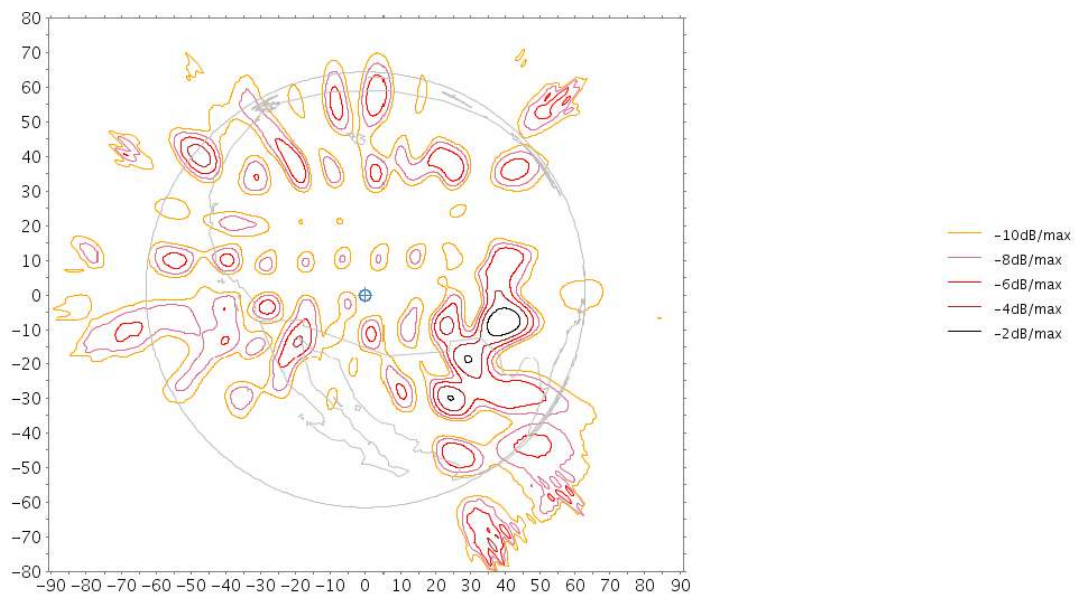


Figure 94 - Beams 46 (Tx) & 146 (Rx) - L band Cross-pol Gain

**EXHIBIT A**  
**Space Station Antenna Contours**

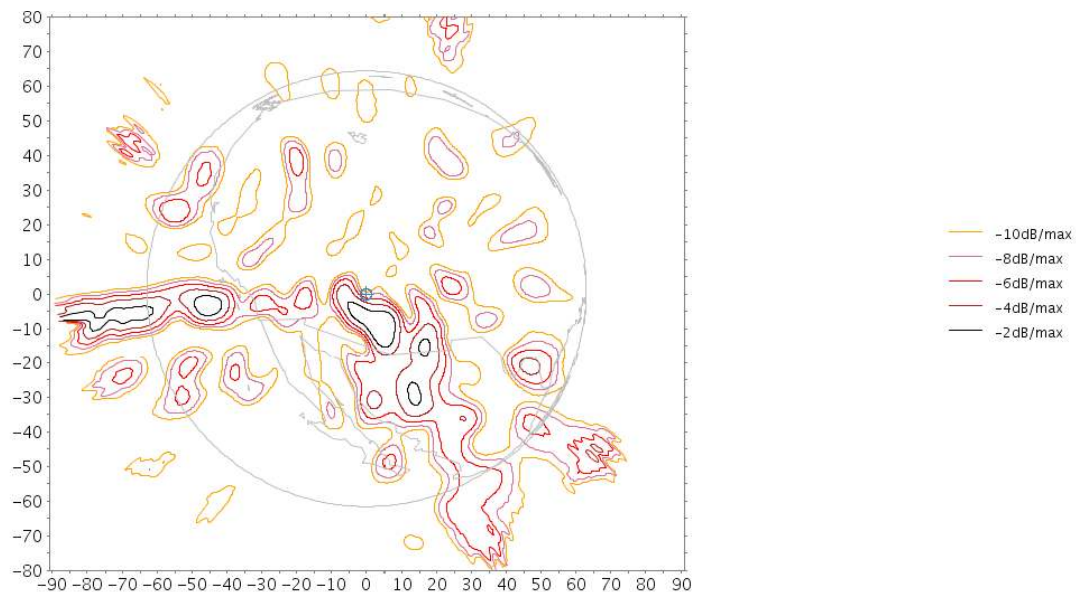


Figure 95 - Beams 47 (Tx) & 147 (Rx) - L band Cross-pol Gain

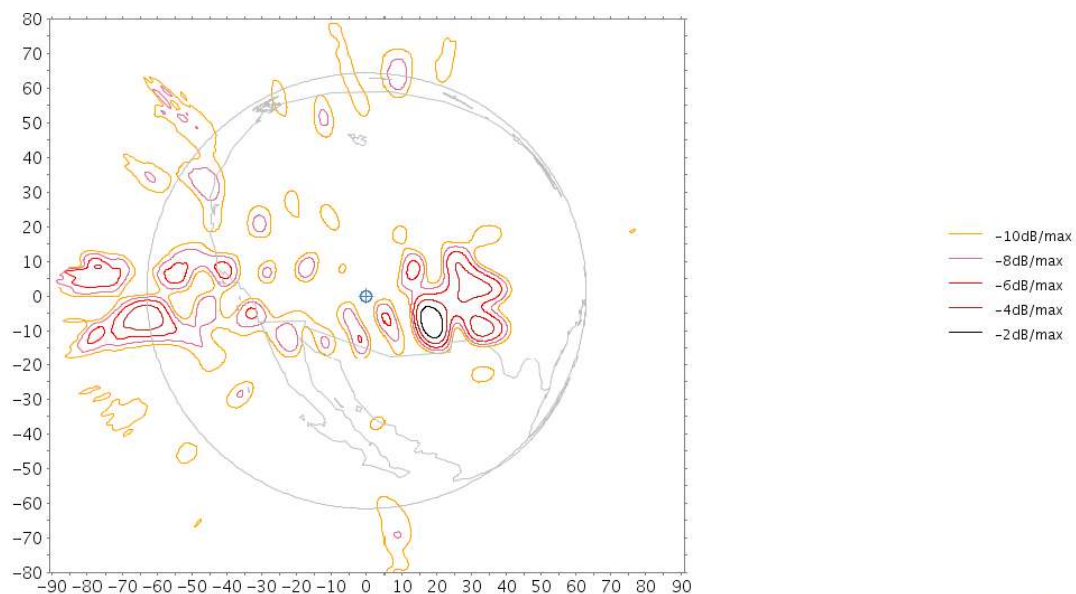


Figure 96 - Beams 48 (Tx) & 148 (Rx) - L band Cross-pol Gain



**EXHIBIT A**  
**Space Station Antenna Contours**

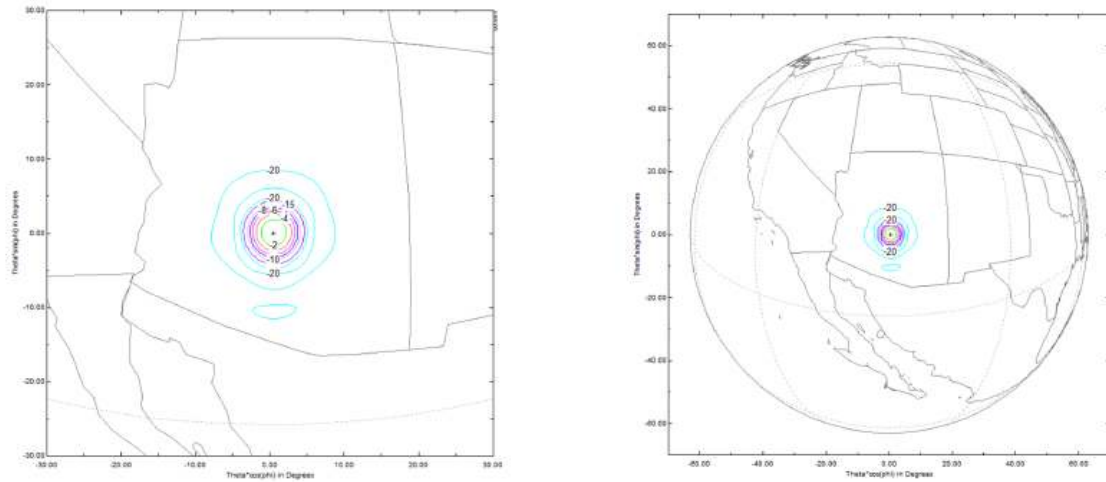


Figure 97 – Beam FT (Feeder Transmit) – Co-pol Gain

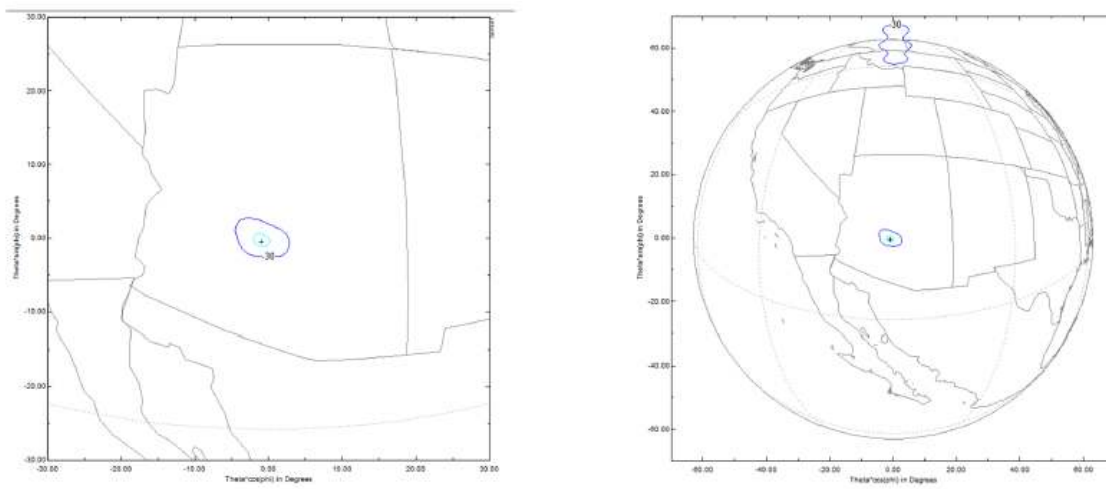


Figure 98 – Beam FT (Feeder Transmit) – Cross-pol Gain contours relative to max co-pol gain.

# EXHIBIT A Space Station Antenna Contours

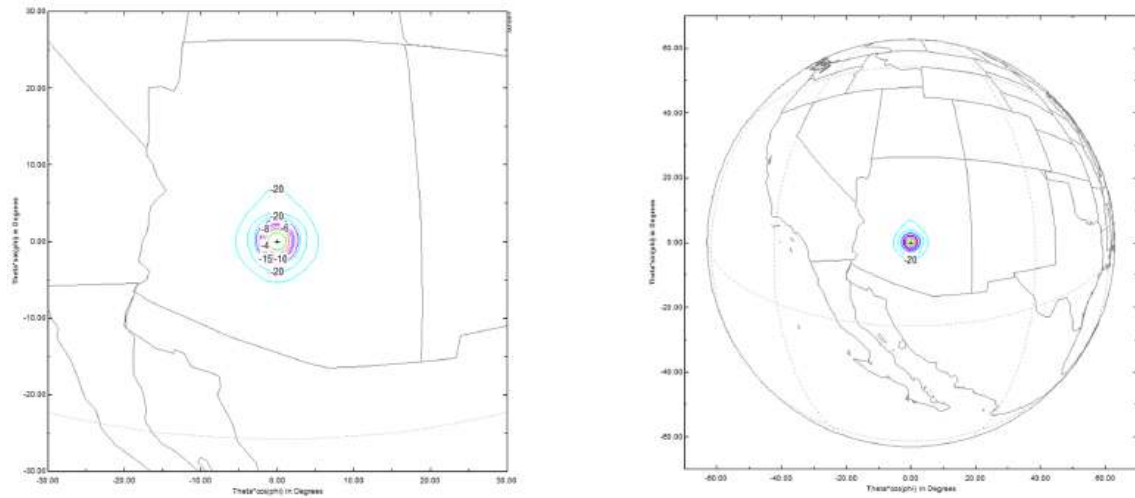


Figure 99 – Beam FR (Feeder Receive) – Co-pol Gain

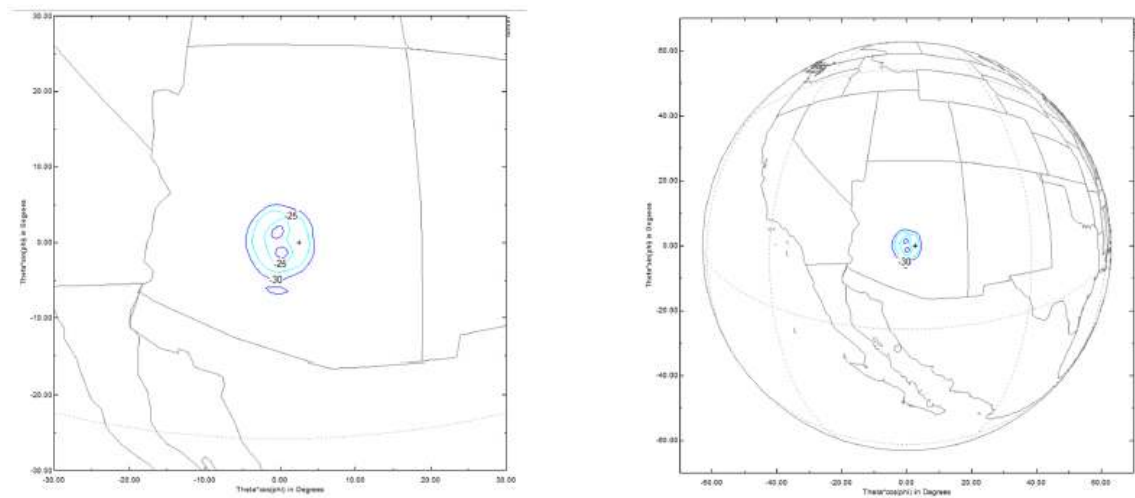


Figure 100 – Beam FR (Feeder Receive) – Cross-pol Gain relative to max co-pol gain.



EXHIBIT A  
Space Station Antenna Contours

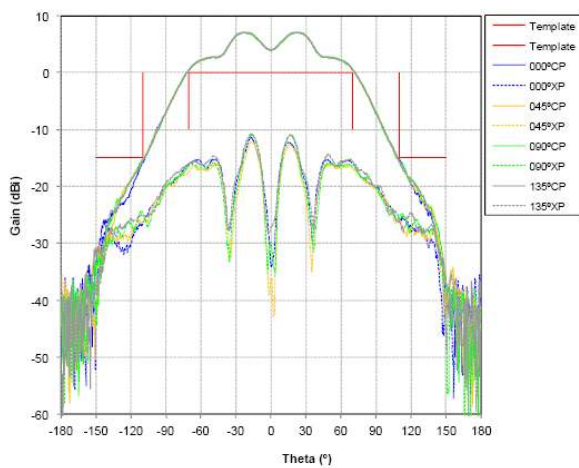


Figure 101 – Beam ST (Telemetry) – Co-pol & Cross-pol Gain vs antenna off-axis angle

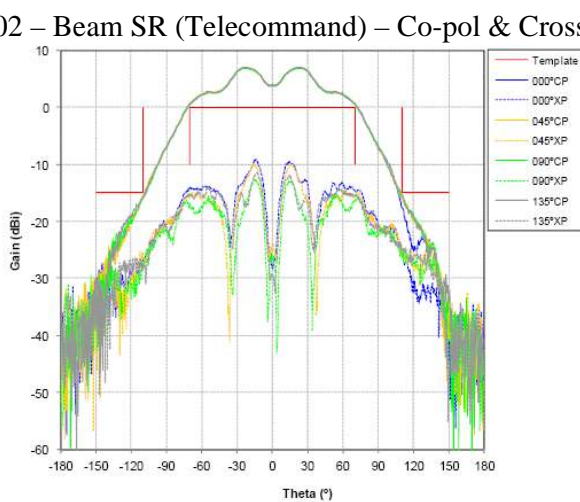


Figure 102 – Beam SR (Telecommand) – Co-pol & Cross-pol Gain vs antenna off-axis angle

# EXHIBIT A Space Station Antenna Contours

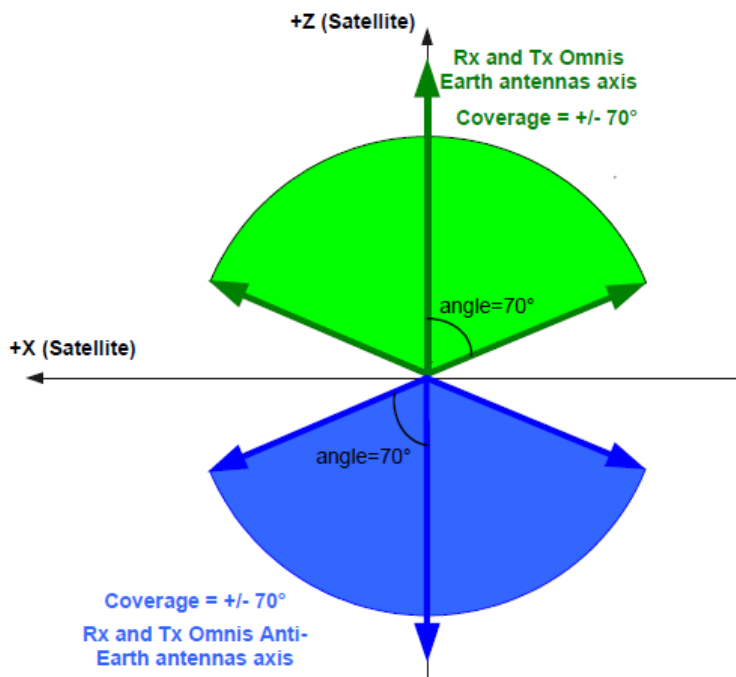


FIGURE 102 A- BEAMS SR And ST Coverage

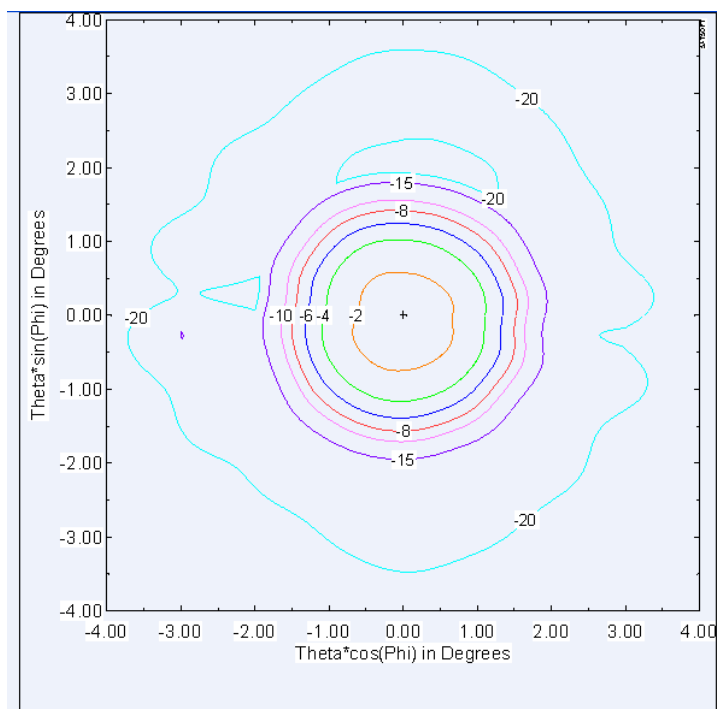


Figure 103 – Beams XFT, XFR, XAT, XAR, XLT, XLR, XRT, XRR (Intersatellite links) – Co-pol Gain

# EXHIBIT A Space Station Antenna Contours

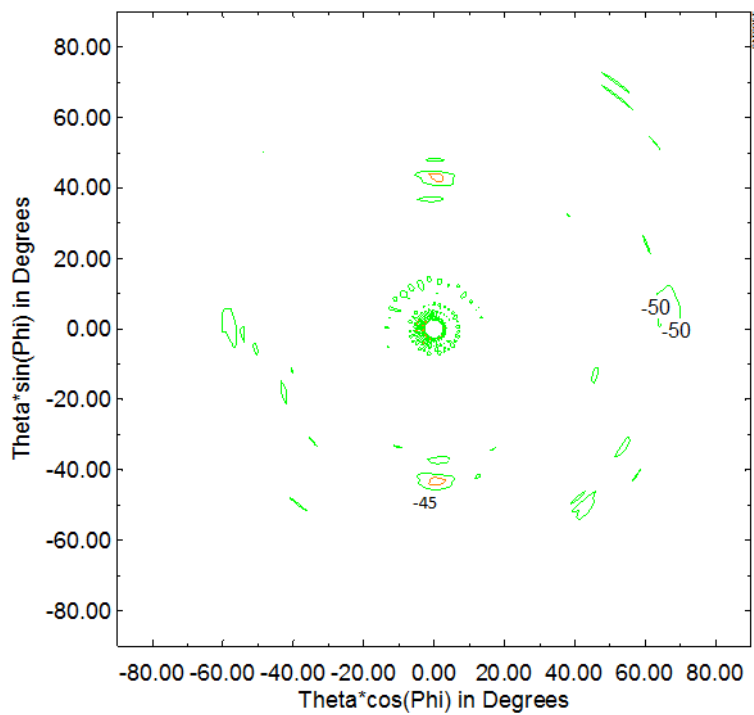


Figure 104 – Beams XFT, XFR, XAT, XAR, XLT, XLR, XRT, XRR (Intersatellite links) – Cross-pol Gain relative to max co-pol gain.