

### Link Analysis for

#### Command Uplink @ 15 degrees, 95% availability 55 deg ant offboresight

Item	Symbol	Value	Unit	Source
Frequency	f	29.0885	GHz	
HPA size		500	W	
Antenna diam		7.3	m	
Antenna gain		65.0	dBi	
Uplink EIRP	EIRP	85.1	dBW	
Propagation Path Length	S	11410	km	15° Elevation Angle
Space Loss	Ls	-202.9	dB	$L_s = -92.44 - 20\log(S) - 20\log(f)$
Atmospheric & Rain Loss		-11.3	dB	95% availability
Flux Density		-79.3	dBW/m <sup>2</sup>	
Grnd Antenna tracking loss		-1.0	dB	
"multipath" loss		-3.2	dB	
Receive Antenna Gain	Grp	1.0	dB	gain at 55 deg
S/C Passive Loss		-5.5	dB	
Power at S/C Receiver		-107.8	dBm	
<b>Command Channel Performance</b>				
Minimum Carrier acquisition power		-110	dBm	10 <sup>-6</sup> BER sensitivity
Carrier Acquisition Margin		2.2	dB	