SPTR Link Calculations

KSAR Link

Description	Calc. Level (dBm)	Meas Level (dBm)		Comments
TWTA Output	43.00			20 Watt
Cable Loss, TWTA #1 to Switch	-0.23		1.00	FSJ1-50A @ 15.0034 GHz
WR-75 Switch Assembly	-0.20			WR-75 @ 15.0034 GHz
Line Coupler	-0.50			WR-75 @ 15.0034 GHz
W/G Loss	-0.30		10.00	EWP-132 @ 15.0034 GHz
Ku-Band Antenna Input Power	41.77			Feed Base
Ku-Band Antenna Gain	43.00			4 ft @ 55%, 15.0034 GHz
EIRP	84.77			@ South Pole
Free Space Loss	-208.45			15.0034 GHz @ 42,675.7 Km
Atmospheric Loss	-1.00			Beam diffraction/reflection/multipath
Pointing Loss	-0.50			Antenna Peaked
Radome Loss	-0.50			@ 15.0034 GHz
Power at Spacecraft (dBw)	-155.68			Calculated
Data Rate (dB)	70.00		1.00E+07	10 Mbps
Power required at Spacecraft (dBw)	-174.70			TDRS Spec 1e-5 BER DG2
Margin 1e-5 BER (dB)	19.02			
Margin 1e-8 BER (dB)	**16.02**			

Link Calculations

SSAR Link

Description	Calc. Level (dBm)	Meas Level (dBm)		Comments
S-Band PA Output	40.00			10 W
Cable Loss, PA to Diplexor	-0.37		10.00	LDF4-50A @ 2215 MHz
Diplexer loss	-0.30			Coaxial @ 2215 MHz
Adapter, Diplexor to Coupler	-0.50			N-N Adapter
Line Coupler	-0.50			Coaxial @ 2215 MHz
Cable Loss, Feed Port to Coupler	-0.37		10.00	LDF4-50A @ 2215 MHz
S-Band Antenna Input Power	37.95			Feed Base
Ant. Gain (dBI)	26.50			4 ft @ 55%, 2215 MHz
EIRP	64.45			@ South Pole
Space Loss	-192.01			2215 MHz @ 42,675.7 Km
Atmospheric Loss	-1.00			Beam diffraction/reflection/multipath
Pointing Loss	0.00			Antenna Peaked
Radome Loss	-0.50			
Power at Spacecraft (dBw)	-159.05			Calculated
Data Rate (dB)	60.10		1024000.00	Coded data @ 1.024 Mbps
Power required at Spacecraft (dBw)	-170.60			TDRS Spec for 1e-5 BER
Margin for 1e-5 BER (dBw)	11.54			
Margin for 1e-8 BER (dBw)	**8.54**			

Link Calculations

SSAF Link

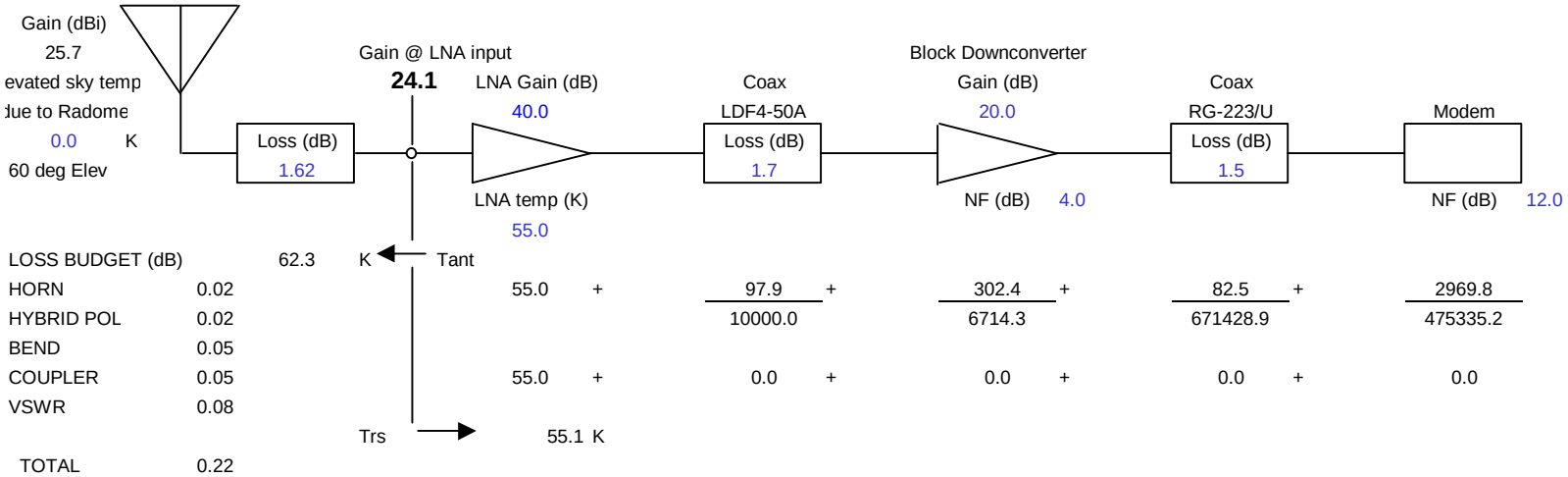
Description	Calc. Level			Comments
Antenna Gain	25.70			
Cable Loss, Feed Port to Coupler	0.22	10.00	feet	LDF4-50A @ 2039 MHz (2
Line Coupler	0.50			Coaxial @ 2039 MHz
Adapter loss	0.30			N-N Adapter
Diplexer loss	0.30			Coaxial @ 2039 MHz
Adapter loss	0.30			N-N Adapter
Total Passive Loss (dB)	1.62			
Effective Antenna Gain (dB)	24.09	24.09		
Ambient Temperature (K)	200.00			
Antenna Temperature (K)	62.11			Calculated
LNA Noise Temp (K)	54.67	0.75	NF	@ 100K (0.75 dB NF)
Total System Temperature(K)	116.78	20.67		
System Noise Density (dB-Hz)		-177.93		
G/T (dB)		3.41		
S/C EIRP (dBW)	40.00			SSAF TDRS EIRP
Space loss (dB)	-191.29			2039 @ 42,675.7 Km
Antenna Pointing loss	0.00			
Power Received (dBm)	-121.29			
System G/T	3.41			
Received C/No	80.72			
Modulation Loss	0.00			
Data Rate	60.10		1.024E+06	Coded data @ 1.024
Received Eb/No	20.62			
Required Eb/No	7.50			1E-8 BER
Margin	**13.12**			

Description	Calc. Level (dBm)	Meas Level (dBm)		Comments
Power Received (dBm)	-121.29			See above
Effective Antenna Gain	24.09			See above
Other losses (dB)	0.00			
LNA Input (dBm)	-97.20			
LNA Gain (dB)	40.00			Fixed Gain
LNA output (dBm)	-57.20			
Cable Loss, LNA to D/C (dB)	0.22		10.00	LDF4-50A @ 2039 MHz
D/C input (dBm)	-57.42		1.00	
D/C gain (dB)	20.00			
D/C output (dBm)	-37.42		1.00	
Cable Loss, D/C to Modem	1.50		6.00	RG-223 @ 70 MHz
Modem input (dBm)	-38.92			

S-Band System

Transmit Capability

UNITS 1-ft, 2-m	REFLECTOR DIAMETER	FREQUENCY (MHz)	AMBIENT TEMP (K)	ANTENNA EFF (%)	ANTENNA BEAMWIDTH (°)	ANTENNA FAR-FIELD
1	4.00 feet	2039.0	200.0	55.0	8.14	66.4 feet



Tsys = Tant + Trs = 117.3 K = 20.7 dB

G/T = 3.41 dB/K **G/T = 3.41 dB/K** **After subreflector loss**

Gain Loss from Radome 0.0 dB Gain Loss from Dichroic Subreflector 0.00 dB

G/T= 3.41 dB/K **After radome & subreflector losses**