

Project Name: TRISAT Project
Satellite name: TRISAT
Version: 1.0
Date of Last Revision: 23.5.2019
Changes:

Uplink budget calculation

Parameters	Values	Units
Frequency:	145.9	MHz
Emission type:	F1D	
Modulation:	GMSK	
Data rate:	9600	bps
Protocol:	CCSDS	

Ground Station:

Transmitter Power Output:	1.3	watts
In dBW:	10.0	dBW
In dBm:	40.0	dBm
Transmission Line Losses:	-1	dB
Connector, Filter or In-Line Switch Losses:	-1.0	dB
Antenna Gain:	13.4	dBiC
Ground Station EIRP:	12.4	dBW

Path losses:

Ground Station Antenna Pointing Loss:	-1.0	dB
Antenna Polarization Losses:	-4.0	dB
Path Loss:	-134.8	dB
Atmospheric Losses:	-3.0	dB
Ionospheric Losses:	-1.0	dB
Rain Losses:	0.0	dB
Isotropic Signal Level at Ground Station:	-131.4	dBW

Spacecraft:

----- Eb/No Method -----

Spacecraft Antenna Pointing Loss:	-2.0	dB
Spacecraft Antenna Gain:	0.0	dBiC
Spacecraft Transmission Line Losses:	-1.0	dB
Spacecraft LNA Noise Temperature:	150	K
Spacecraft Transmission Line Temp.:	270	K
Spacecraft Sky Temperature:	290	K
S/C Transmission Line Coefficient:	0.7943	
Spacecraft Effective Noise Temperature:	436	K
Spacecraft Figure of Merit (G/T):	-27.4	dB/K
S/C Signal-to-Noise Power Density (S/No):	67.8	dBHz
System Desired Data Rate:	9600	bps
In dBHz:	40.0	dBHz
Telemetry System Eb/No:	27.8	dB
Telemetry System Required Bit Error Rate:	1.00E-06	
Telemetry System Required Eb/No:	18.0	dB
System Link Margin:	9.8	dB

Downlink Budget Calculation

Parameters	Values	Units
Frequency:	436.5	MHz
Emission type:	F1D	
Modulation:	GMSK	
Data rate:	9600	bps
Protocol:	CCSDS	

Spacecraft:

Spacecraft Transmitter Power Output:	1.0	watts
	In dBW:	0.0 dBW
	In dBm:	30.0 dBm
Spacecraft Transmission Line Losses:	-1.0	dB
S/C Connector, Filter or In-Line Switch Losses:	0.0	dB
Spacecraft Antenna Gain:	0.0	dBiC
Spacecraft EIRP:	-1.000	dBW

Path losses:

Spacecraft Antenna Pointing Loss:	-1.0	dB
Antenna Polarization Loss:	-1.5	dB
Path Loss:	-144.4	dB
Atmospheric Loss:	-2.2	dB
Ionospheric Loss:	-0.2	dB
Rain Loss:	0.0	dB
Isotropic Signal Level at Ground Station:	-150.3	dBW
Ground Station:		

----- Eb/No Method -----

Ground Station Antenna Pointing Loss:	-2.0	dB
Ground Station Antenna Gain:	16.2	dBiC
Ground Station Transmission Line Losses:	-1	dB
Ground Station LNA Noise Temperature:	50	K
Ground Station Transmission Line Temp.:	100	K
Ground Station Sky Temperature:	450	K
G.S. Transmission Line Coefficient:	0.7943	
Ground Station Effective Noise Temperature:	428	K
Ground Station Figure of Merit (G/T):	-11.1	dB/K
G.S. Signal-to-Noise Power Density (S/No):	65.2	dBHz
System Desired Data Rate:	9600	bps
	In dBHz:	40.0 dBHz
Telemetry System Eb/No:	25.2	dB
Telemetry System Required Bit Error Rate:	1.00E-06	
Telemetry System Required Eb/No:	18	dB
System Link Margin:	7.2	dB