

Project Name: BIRDS-2 PROJECT
Satellite Name: BHUTAN-1/MAYA-1/ UiTMSAT-1
Link Budget for: APRS-DP and S&F User Uplink
Version: 2.0
Date of Last Revision: 2017-05-22

PARAMETERS	VALUES	UNITS
Frequency:	within 146-148 MHz	MHz
Emission Type:	F2D	
Modulation:	AFSK/FM	
Data Rate:	1200	bps
Protocol:	AX.25	

HANDHELD RADIO

Ground Station Transmitter Power Output:	5	watts
In dBW:	6.989700043	dBW
In dBm:	36.98970004	dBm
Ground Stn. Total Transmission Line Losses:	0.3	dB
Antenna Gain:	12	dBi
Ground Station EIRP:	18.68970004	dBW
Ground Station Antenna Pointing Loss:	1.8	dB
Gnd-to-S/C Antenna Polarization Losses:	3.0	dB

PATH

Orbit Altitude:	400	km
Elevation Angle:	30	°
Slant Range:	739.4	km
Path Loss:	133.1173033	dB
Atmospheric Losses:	0.4	dB
Ionospheric Losses:	0.7	dB
Rain Losses:	0	dB
Isotropic Signal Level at Spacecraft:	-120.3377295	dBW

SPACECRAFT (SNR Method)

Spacecraft Antenna Pointing Loss:	1.5	dB
Spacecraft Antenna Gain:	1.5	dBi
Spacecraft Total Transmission Line Losses:	1.63	dB
Spacecraft Effective Noise Temperature:	605.9714596	K
Spacecraft Figure of Merit (G/T):	-28.0	dB/K
Signal Power at Spacecraft LNA Input:	-121.9728795	dBW
Spacecraft Receiver Bandwidth:	12000	Hz
Spacecraft Receiver Noise Power (Pn = kTB)	-159.9836658	dBW
Signal-to-Noise Power Ratio at G.S. Rcvr:	38.01078634	dB
Analog or Digital System Required S/N:	21	dB

System Link Margin **17.0** **dB**

Project Name: BIRDS-2 PROJECT
Satellite Name: BHUTAN-1/MAYA-1/ UiTMSAT-1
Link Budget for: APRS-DP and S&F User Downlink
Version: 2.0
Date of Last Revision: 2017-05-22

PARAMETERS	VALUES	UNITS
Frequency:	within 146-148 MHz	MHz
Emission Type:	F2D	
Modulation:	AFSK/FM	
Data Rate:	1200	bps
Protocol:	AX.25	

SPACECRAFT

Spacecraft Transmitter Power Output:	0.5	watts
In dBW:	-3.010299957	dBW
In dBm:	26.98970004	dBm
Spacecraft Total Transmission Line Losses:	0.5	dB
Spacecraft Antenna Gain:	1.5	dBi
Spacecraft EIRP:	-2.040299957	dBW
Spacecraft Antenna Pointing Loss:	1.505149978	dB
S/C-to-Ground Antenna Polarization Loss:	3.010126246	dB

PATH

Orbit Altitude:	400	km
Elevation Angle:	30	°
Slant Range:	739.4	km
Path Loss:	133.1173033	dB
Atmospheric Losses:	0.4	dB
Ionospheric Losses:	0.7	dB
Rain Losses:	0	dB
Isotropic Signal Level at Ground Station:	-140.7728795	dBW

HANDHELD RADIO (SNR Method)

Ground Station Antenna Pointing Loss:	1.8	dB
Ground Station Antenna Gain:	12	dBi
Ground Station Total Transmission Line Losses:	0.5	dB
Ground Station Effective Noise Temperature:	511.1089969	K
Ground Station Figure of Merit (G/T):	-15.58513526	dB/K
Signal Power at Ground Station LNA Input:	-131.0728795	dBW
Ground Station Receiver Bandwidth (B):	12000	Hz
G.S. Receiver Noise Power (Pn = kTB)	-160.7230523	dBW
Signal-to-Noise Power Ratio at G.S. Rcvr:	29.65017278	dB
Analog or Digital System Required S/N:	21	dB

System Link Margin **8.650172782** **dB**

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