

Table 3 Link budgets for 7 typical Ku-band carriers

Parameter	Digital TV MCPC 40 MBPS QPSK ¾ RS	Digital TV MCPC 40 MBPS QPSK ¾ RS	Digital TV SCPC QPSK ¾ RS	Digital TV SCPC QPSK ¾ RS
Digital MOD ID	A_Ku	B_Ku	C_Ku	D_Ku
Carrier designation	36M0G7W	27M0G7W	6M95G1W	5M00G1W
Throughput rate, Mbps	40	32	8	6
Symbol rate, MHz	28.8	22.9	5.7	4.2
Uplinks:				
Transmit Power (dBW)	20	20	8.9	8.9
Transmit Loss (dB)	-1	-1	-1	-1
Antenna diameter	6.1	6.1	3.7	3.7
Antenna Gain (dBi)	57.2	57.2	52.9	52.9
Ground Station EIRP (dBW)	76.2	76.2	60.8	60.8
Uplink Rain Loss (dB)	-2	-2	-2	-2
Free Space Loss (dB)	-207.5	-207.5	-207.5	-207.5
Satellite G/T (dB/K)	3	3	3	3
Data Rate (dB-Hz)	76	75	69	67.6
Boltzmann's Constant (dBW/K-Hz)	-228.6	-228.6	-228.6	-228.6
Eb/No (dB)	22.3	23.3	13.9	15.3
Eb/Io (dB)	18	18	16	16
Total Eb/(No + Io) (dB) For 10 ⁻⁷	16.6	16.9	11.8	12.6
Downlinks:				
Satellite Carrier EIRP (dBW)	48.7	48.7	35.7	34.3
Downlink Rain Loss (dB)	-3	-3	-3	-3
Free Space Loss (dB)	-206.3	-206.3	-206.3	-206.3
Ground station antenna dia, m	0.9	0.9	2.4	2.4
Ground Station G/T (dB/K)	17.1	17.1	25.6	25.6
Eb/No (dB)	9.1	10.1	11.6	11.6
C/IM			18	18
Eb/IModB			16.6	16.6
C/I(dB)	15	15	15	15
Eb/Io(ASI)	13.6	13.6	13.6	13.6
Eb/Io (dB)	13.6	13.6	11.8	11.8
Eb/(No + Io) (dB)	7.8	8.5	8.7	8.7
Total UP/DOWN Eb/(No+Io)(dB)	7.2	7.9	7	7.2
Required (dB)	5.4	5.4	5.4	5.4
Margin (dB)	1.8	2.5	1.6	1.8

Table 4 Link budgets for TV/FM in Ku-band

Parameter	Typical TV/FM link
Carrier designation	36M0F3F
Uplinks:	
Transmit Power (dBW)	22
Transmit Loss (dB)	-1
Antenna diameter	6.1
Antenna Gain (dBi)	57.2
Ground Station EIRP (dBW)	78.2
Uplink Rain Loss (dB)	-2
Free Space Loss (dB)	-207.5
Satellite G/T (dB/K)	3
Bandwidth (dB-Hz)	75.6
Boltzmann's Constant (dBW/K-Hz)	-228.6
C/N, uplink(dB)	24.7
Downlinks:	
Satellite Carrier EIRP (dBW)	48.7
Downlink Rain Loss (dB)	-3
Free Space Loss (dB)	-206.3
Ground station antenna dia, m	1.2
Ground Station G/T (dB/K)	19.6
C/N, DL (dB)	12
C/I ASI (dB)	18
C/Ntot, dB	10.9
Required(dB)	10.5
Margin(dB)	0.4

56Kbps QPSK 3/4 RS	1.544 MBPS QPSK 3/4	Digital TV MCPC 50 MBPS 8PSK 2/3 RS
E_Ku	F_Ku	G_Ku
100KG1W	1M60G1W	36M0G7W
0.0562	1.544	50
0.0407	1.1	27.1
-5	8	20
-1	-1	-1
1.8	1.8	6.1
46.6	46.6	57.2
40.6	53.6	76.2
-2	-2	-2
-207.5	-207.5	-207.5
3	3	3
47.5	61.9	76
-228.6	-228.6	-228.6
15.2	13.8	21.3
16	16	18
12.6	11.8	16.3
18.5	28.5	48.7
-3	-3	-3
-206.3	-206.3	-206.3
1.2	2.4	2.4
19.6	25.6	25.6
9.9	11.5	16.6
18	18	
16.6	16.6	
15	15	15
13.6	13.6	12.3
11.8	11.8	12.3
7.7	8.7	11
6.5	6.9	9.9
5.4	5.4	7.2
1.1	1.5	2.7