



Harbour

Power Handling Capability of Coaxial Cable

The power handling capability of coaxial cable is dependent either on its maximum voltage-withstanding capability for the transmission of peak power or on its thermal dissipation ability for average power transmission, which is the more common problem for RF applications. The thermal dissipation of cable depends upon its thermal resistance. For a cable in air, the thermal resistance of the surrounding air is related to the condition and radiation losses and dependent upon the surface area of the cable, the temperature of the surfaces, the ambient temperature, emissivity of the surface, and the flow of air.

The amount of heat which flows radially from the line will depend upon the composite thermal resistivity of the dielectric and insulating material of the cable, and the temperature gradients therein. The heat generated within a cable is given by the ratio of temperature rise between the inner conductor and the ambient temperature to its thermal resistance, which is equal to the difference of the input power and the output power in a matched system. The ratio of these powers is a function of the attenuation per unit length, which is directly proportional to the heat generated in the cable.

For any particular cable construction, the average power rating will depend on the permissible temperature rise above a stated ambient which is limited by the maximum operating temperature that the dielectric can withstand. The generally accepted maximum operating temperature for polyethylene is 80°C and for PTFE is 250°C. Simply stated, power handling of a coaxial cable is a function of attenuation and the temperature of the dielectric. The higher the operating frequency, the lower the power handling capability.

The chart references the maximum power handling capability at various frequencies for MIL-C-17 cables and Harbour's special cable constructions.

Maximum Power Handling Capability of Coaxial Cable (In Watts)

	Dielectric Diameter	Overall Diameter	@ Frequency				
			400MHz	1GHz	3Ghz	5GHz	10GHz
M17/RG178, CN178SC, CN178TC, RG196 A/U	.033"	.071"	123	78	41	28	14
M17/131-RG403	.033"	.116"	123	78	41	28	14
M17/113-RG316, CN316SC, CN316TC, RG188 A/U, SB316	.060"	.098"	240	160	80	57	30
M17/152-00001, CN316SCSC, CN316TCTC	.060"	.114"	240	160	80	57	30
M17/94-RG179, CN179SC, CN179TC, RG187 A/U	.063"	.100"	310	200	110	76	41
SS405	.064"	.104"	240	160	80	57	30
SS75086	.064"	.100"	240	160	80	57	30
LL120	.080"	.120"	720	460	250	190	140
M17/95-RG180, RG195 A/U	.102"	.141"	400	250	135	93	50
M17/60-RG142, CN142SCSC, CN142TCTC	.116"	.195"	1100	550	350	245	140
M17/111-RG303	.116"	.170"	1100	550	350	245	140
M17/128-RG400, SB400	.116"	.195"	1100	550	350	245	140
SS402	.117"	.163"	1100	550	350	245	140
SB142	.117"	.195"	1100	550	350	245	140
LL142	.145"	.195"	1200	720	400	310	220
LL235	.160"	.235"	1500	900	540	410	300
LL393-2	.185"	.270"	1900	1100	680	510	380
M17/112-RG304	.185"	.280"	1900	1100	680	510	380
SB304	.185"	.280"	1450	870	460	330	190
LL335	.250"	.335"	2900	1800	1050	850	600
M17/127-RG393, SB393	.285"	.390"	2800	1700	880	620	350
LL450	.360"	.450"	7250	4200	2200	1600	1015