

The 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-DTL-17 cables and Harbour's special cable constructions at 25°C temp and sea level.

Power Handling Capability of Coaxial Cable (Watt)

Cable Type	400 MHz	1 GHz	3 GHz	5 GHz	10 GHz	12 GHz	18 GHz
LLEF120	720	460	250	190	140	120	95
LLEF160	850	540	330	250	190	145	120
LLEF142	1200	720	400	310	220	180	140
LLEF235	1500	900	540	410	300	220	180
LLEF335i	2900	1800	1050	850	600	480	400
LLEF162STR	850	540	330	250	190	145	120
LLEF142STR	1100	680	350	300	200	180	140
LLEF270STR	1500	900	540	410	300	245	220
LLEF450STR	7250	4200	2200	1600	1015	850	N/A
LLEF480STR	8000	4500	2500	1800	1250	1000	N/A
SFLEF402	880	440	280	200	110	90	67
SFLEF405	200	130	65	45	30	23	20
SSEF402	1100	550	350	245	140	120	80
SSEF405	240	160	80	57	35	25	22
HF47	15	12	7	5	5	3	3
HF86	150	120	100	80	50	45	40
HF141	250	220	200	180	150	130	100
HF250	500	450	380	300	220	180	120