

1. Introduction

Capacitor is electronic component constructed electronic circuit. There are a variety of capacitors which have various materials and construction. Typical classification of capacitors shows in Fig.1. This technical guide summarizes the outline and use technique of aluminum electrolytic capacitor which is increasing in accordance with miniaturization of electronic components.

The type of capacitors can be selected from the circuit characteristics. Generally, you can select it by capacitance and voltage in Table-1. About what each type have in common, reliability and price will be considered as well as performances such as frequency characteristics and temperature dependance, etc. shown in Table-2.

We have many types of capacitors trying to meet various customer's needs. Capacitors (especially aluminum electrolytic capacitors) are sensitive to operating condition.

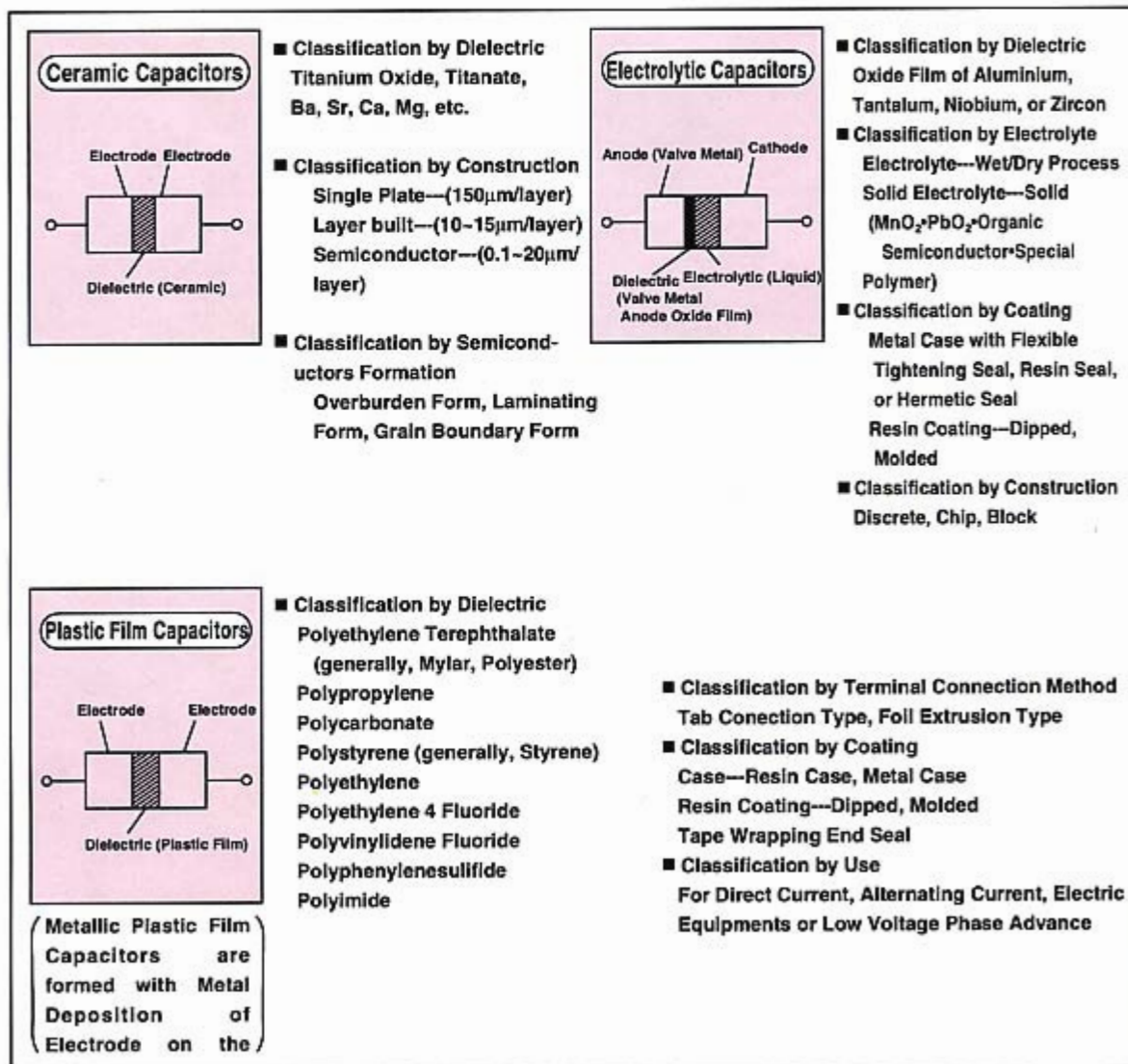
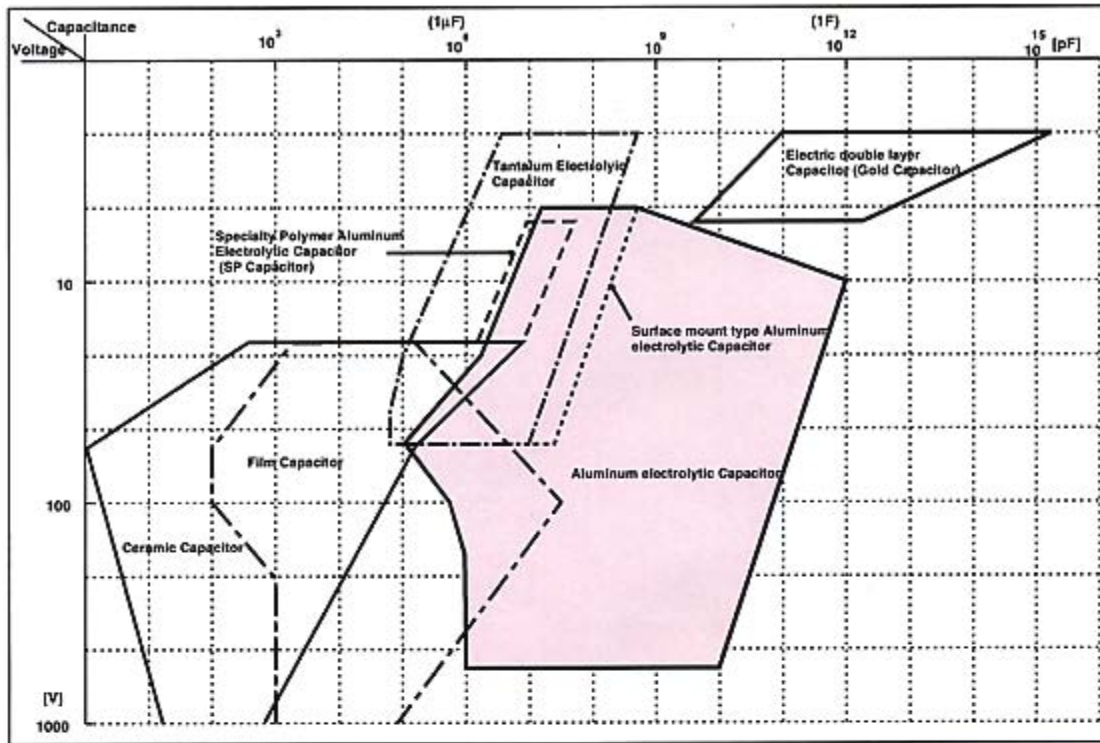


Fig.1 Typical Classification of Fixed Capacitors

Table-1 Capacitance • Voltage range of various capacitors



Note) It shows general, there are other products with capacitance and voltage.

Table-2 Characteristics of various capacitors

Representative Fixed Capacitors	Dielectric Constant ϵ_s	Thickness of Dielectric d (μm)	Working Voltage V (V.D.C)	Product Pressure Capacitance Stability			Characteristics	
				Temperature Dependency α ($-40^\circ C/+85^\circ C$)	Bias Dependency	Frequency Dependency		
Electrolytic Capacitors	Aluminum Electrolytic Capacitors (Dry Process)	8-10	0.03-0.7	-450	-20--10 +8 --+15	Medium	High	Compact and large Capacitance ; Inexpensive per Capacitance. Temperature/Frequency Dependency is high.
	Tantalum Electrolytic Capacitors (Wet Process)	23-27	0.04-0.5	-150 (500)	-8--4 +3 --+5	Medium	High	Compact and relatively large capacitance with high reliability. Temperature/Frequency Dependency is high. Sensitive to reverse voltage, and
	Tantalum Electrolytic Capacitors (Solid)	23-27	0.04-0.5	- 50 (125)	-4--2 +4 --+7	Medium	Medium	Compact and relatively large capacitance with high reliability. Temperature Dependency is low. Relatively expensive
Ceramic Capacitors	Ceramic Capacitors of High Dielectric Constant Ceramic Series	11000 ~18500 (40000)	Single Plate, 170- Layer Built, 10-20	Single Plate, 15k-40k Layer Built, 16-3.15k	-50--40 -80--60	High	Low	Superior in Frequency Feature but Bias/Temperature Dependency is High. Inexpensive with High Reliability.
	Ceramic Capacitors for Temperature Compensation	-150	Semiconductor 0.1-20	Semiconductor 16-50	Temperature Dependency at option	Low	Low	Both Frequency Feature and Bias Dependency are good. Capacitance is small.
Plastic Film Capacitors	Polyethylene Terephthalate Film Capacitors	3.0-3.3	1.5-25	35-500	-5 --3 +2.5--4	Low	Low	Best Workability among Films, despite of small size, large Capacitance is obtainable, but inferior in Characteristics. Most popular
	Polycarbonate Film Capacitors	2.6-3.2	2-30	50-250	-2.5--1.5 Around+1	Low	Low	Small Dielectric Loss Tangent with superior Temperature Dependency. Relatively special, and difficult to produce
	Polypropylene Film Capacitors	2.1-2.2	4-22	50-600	+1.5--2.5 Around+1	Low	Low	Suitable for high Frequency large Current with superior Dielectric Loss Tangent and Voltage Resistance. Relatively inferior in Film Productivity
	Polyphenylene Sulfide Film Capacitors	2.8-3.4	2-30	25-500	Around+1 Around-1	Low	Low	Superior in both Heat Resistance and Feature. Coefficient of Water Absorption and Temperature Dependency are also low with gradual

* Temperature Dependency is Indicated In Rate of Change at +20