



Panasonic

Film Capacitor Overview



Panasonic Capacitors

Brian Donovan
Product Engineer

Capacitors • Electromechanical • Wireless Connectivity • Resistors • Inductors • Relays • Connectors • Storage Media • Sensors • Industrial Automation • Semiconductors • Circuit Protection • Thermal Management

Today I'd like to provide an overview or refresher course on the entire lineup of Panasonic film capacitors.

Types of Films Offered (pt.1)

Surface Mount (SMD)					
Construction	Series Name	Voltage Rating	Temp	Capacitance Range	Purpose
	ECHU(X)	Up to 100 VDC	-55C to +125C	Up to 0.22 uF	High Performance, high temp
	ECWU(X)	Up to 100 VDC	-55C to +105C	Up to 0.010uF	General purpose
	ECWU(C)	Up to 630 VDC	-55C to +125C	Up to 1.0uF	General purpose
	ECWU(V16)	Up to 250 VDC	-55C to +85C	Up to 0.12uF	DC Blocking
	ECPU(A)	Up to 16 VDC	-40C to +85C	Up to 1.0uF	Large capacitance relative to small size



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First I'll start by reviewing the different types of Surface Mount film caps that we offer

The first type is the stacked metallized polyphenylene sulfide chip capacitor. We have one series offered, which is called the ECHUX series. These have a rating up to 100 Volts DC. Temperature rating up to 125 degrees C. And a capacitance range up to 0.22 microfarad. Their purpose is high performance under high temperature due to their 125C rating.

The second type is the stacked metallized polyethylene naphthalate chip capacitor. There are various series that make up this construction, but the maximum voltage rating for these are 630 Volts DC. They operate up to 125 degrees C, and have capacitance up to 1.0 microfarad. Typically, these are used as more general purpose caps and are lower on the cost spectrum.


The third type is the stacked metallized plastic film, which has a single series called ECPUA. These handle up to 16 VDC, up to +85 degrees C and up to 1.0 microfarad. As you can see, their capacitance is pretty high relative to how small these devices are.

Types of Films Offered (pt. 2)

Radial (THT)					
Construction	Series Name	Voltage Rating	Temp	Capacitance Range	Purpose
 Metallized Polyester Film	ECQE(B)	Up to 250 VDC Up to 125 VAC	-40C to +105C	Up to 4.7uF	General purpose
	ECQE(F)	Up to 1250 VDC Up to 250 VAC	-40C to +105C	Up to 10 uF	General purpose
	ECQE(T)		-40C to +105C	Up to 10 uF	High humidity
	ECQE		-40C to +130C	Up to 4.7uF	Automotive noise suppression
  Metallized Polypropylene Film	ECWH(V)	Up to 2000 VDC	-40C to +105C	Up to 0.1 uF	High frequency/ high current
	ECWH(A)	Up to 1600 VDC	-40C to +105C	Up to 0.047 uF	High frequency/ high current
	ECWH(C)	Up to 3000 VDC	-40C to +105C	Up to 0.33 uF	Resonance circuit
	ECWF(L)	Up to 630 VDC	-40C to +105C	Up to 2.4 uF	High frequency/ high current
	ECWF(A)	Up to 630 VDC	-40C to +105C	Up to 6.8 uF	Active filtering
	ECWF(D)	Up to 630 VDC	-40C to +105C	Up to 4.7 uF	Active filtering
	ECWF(E)	Up to 630 VDC	-40C to +105C	Up to 4.7 uF	Active filtering
	ECWF(G)	Up to 1100 VDC	-40C to +110C	Up to 12 uF	EV charging
	EZPE	Up to 1300 VDC	-40C to +85C	Up to 110 uF	EV charging/PV system
	EZPV	Up to 1100 VDC	-40C to +105C	Up to 110 uF	EV charging/PV system

The breadth of Panasonic's film capacitor lineup is the radial or through hole type. These are typically capable of handling higher voltages than surface mount types. In some cases they can support up to 3000 volts DC as with the ECWHC series. Most of these are generally going to be used for EMI suppression, high frequency circuitry, in areas where humidity is a concern, and automotive applications. EV Charging is one of our target markets, and we typically push the ECWFG, EZPE, and EZPV series for those applications due to their high DC voltage ratings as well its ability to support high capacitance.

Types of Films Offered (pt. 3)

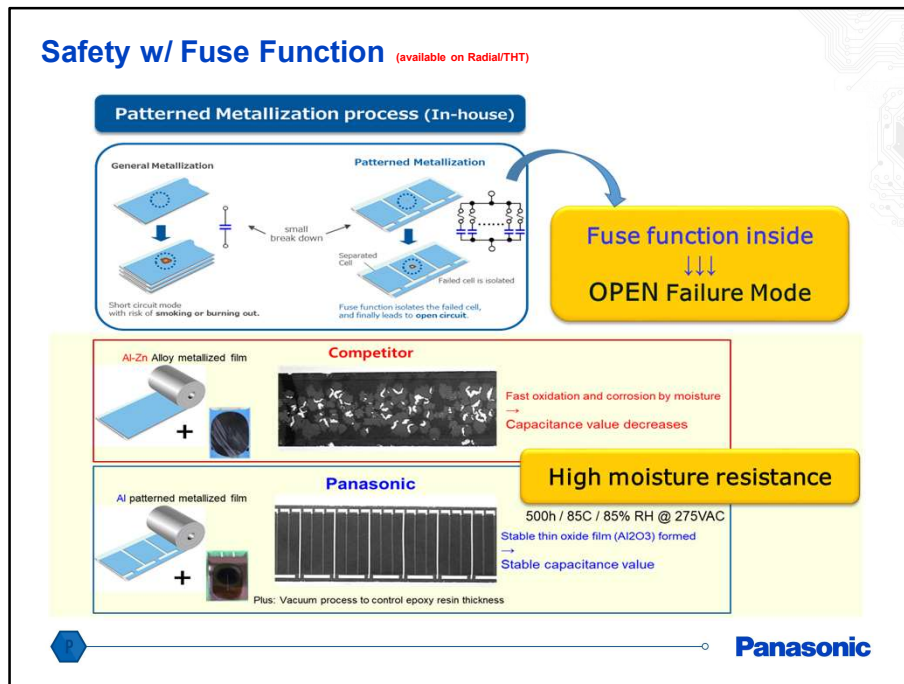
Radial (THT)					
Construction	Series Name	Voltage Rating	Temp	Capacitance Range	Purpose
Metallized Polypropylene Film 	ECQU(A)	Up to 310 VAC	-40C to +110C	Up to 10 uF	Noise suppression/X2 safety rating/High humidity
	ECQU(B)	Up to 300 VAC	-40C to +110C	Up to 1 uF	Noise suppression/ Y2 and X1 safety rating/High humidity

Safety Standard Approved (X1/X2/Y2 Ratings)



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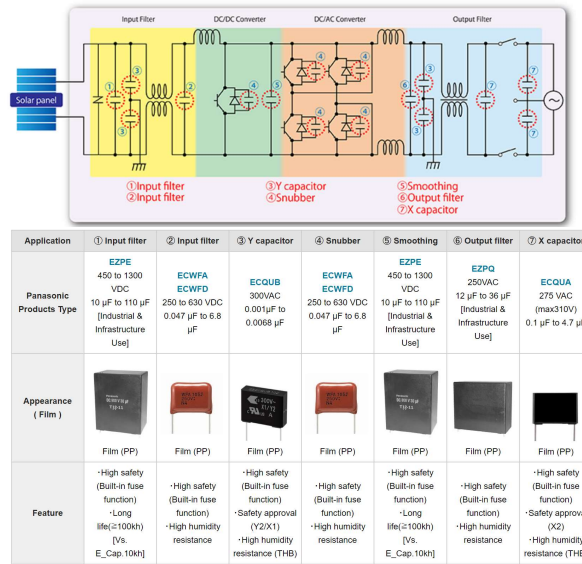
The last of the radial type film caps I'd like to mention are the ECQUA and ECQUB series, which are metallized polypropylene film. These are both typically used in AC line filtering. What's unique about these are that they are X1, X2 or Y2 safety rated (depending upon part number). X1, X2, and Y2 are IEC Safety Standards that are meant to define what peak surge voltages that the capacitors can withstand before failing. In the case of over-voltage, the ECQUA and ECQUB caps will fail as an open circuit instead of a short circuit. This will eliminate any shock hazard to the human body.



A unique feature of Panasonic radial film caps is that they include a fuse function inside of each cell. In a case of over-voltage, many of our competitors parts will fail as a short circuit which in turn causes the cap to burn or smoke rapidly. Panasonic's film caps will fail as an open circuit due to this fuse function, and the failed cell within the capacitor will be isolated.

It's also important to mention that many of our radial type films have high moisture resistance. Many of our caps are rated for 500 hours at 85C with 85% relative humidity. This ensures that our products can perform great in any temperature environment.

Application Example: Solar (PV) Inverter



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Here is an application example that uses several different types of radial or through hole films at different points in a circuit. In this case, we are looking at a solar inverter that of course has several stages.

For the input filtering side, you can see that we recommend the EZPE, ECWFA, and ECWFD polypropylene types. For the DC to DC conversion stage, we recommend utilizing a Y rated safety cap such as ECQUB. And then the smoothing and output filtering stages can make good use of the EZPE and also EZPQ box-type devices.



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Thank You!

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If any questions, please contact Brian Donovan:
brian.donovan@us.panasonic.com

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Thank you for participating in this training, and please feel free to send me any questions related to my presentation materials.