



Key Features

Self-Healing

- During a fault condition, the affected area of the capacitor is “cleared”, isolating the fault and allowing the capacitor to continue to operate as normal
- Mechanically flexible, CTE match to FR4, no susceptibility to piezoelectric effect, surge cracking

Stable: no de-rate required

- Zero DC-bias derating vs. ~40% cap drop at 100 VDC for X7R ceramic
- Permissible use at full rated voltage due to self-healing characteristic
- Positive temperature coefficient, 20+ year life expectancy without significant cap degradation

Lightweight: <20% of MLCC

- Weight is <25% of equivalent X7R multilayer ceramic capacitor

High frequency operation: ultra-low ESR

- High DV/DT, Similar frequency response to MLCC, higher than typical “wound” film capacitors

Wide operating temperature range:

- -55°C to +125°C, vs polypropylene [-55°C to 85°C [105°C]]: stable parameters across this range

Standard values

- 0.1 uF–20 uF, 50 V–500 V (1000 V–1200 V Pending), corresponding to the needs of power supply engineers
- Custom values available

Lead times 8–10 weeks, less in some cases

Manufactured in the USA

Application Sheet

High-Reliability Capacitors for SMPS Circuits

Design Challenge

SMPS circuits have become ubiquitous in modern technology due to their ability to efficiently convert and regulate electrical power. They are suitable for a wide range of applications in a variety of markets including aerospace and defense, medical devices, renewable energy systems, industrial manufacturing, consumer electronics, and the automotive industry. A power engineer needs to select an SMPS circuit energy storage solution that is SWaP-optimized with high reliability and meets the required criteria including mechanical robustness, ability to both operate in a wide range of temperatures, and withstand high shock and vibration.

Our Solution

Quantic® Paktron offers a range of capacitors designed to address the following design challenges presented in SMPS Circuits: input filtering, PFC stages, buck/boost conversion stages, and output filtering. See Table 1 (next page) for the specific solutions our capacitors offer.

Quantic™ Paktron

About Quantic® Paktron—Quantic® Paktron is one of the oldest capacitor manufacturers in the U.S., a technological leader in multilayer polymer film (MLP) capacitors. Its innovative portfolio addresses mission-critical, “cannot-fail” performance in demanding markets from automotive and commercial to military, space, and telecom. Its branded capacitor products include Capstick® Capacitor (lead-frame capacitor), Surfilm® Capacitor (surface mount chip capacitor), Quencharc® Capacitor (RC network snubber capacitor), and the Angstor® Capacitor line.

SMPS Circuit Diagram

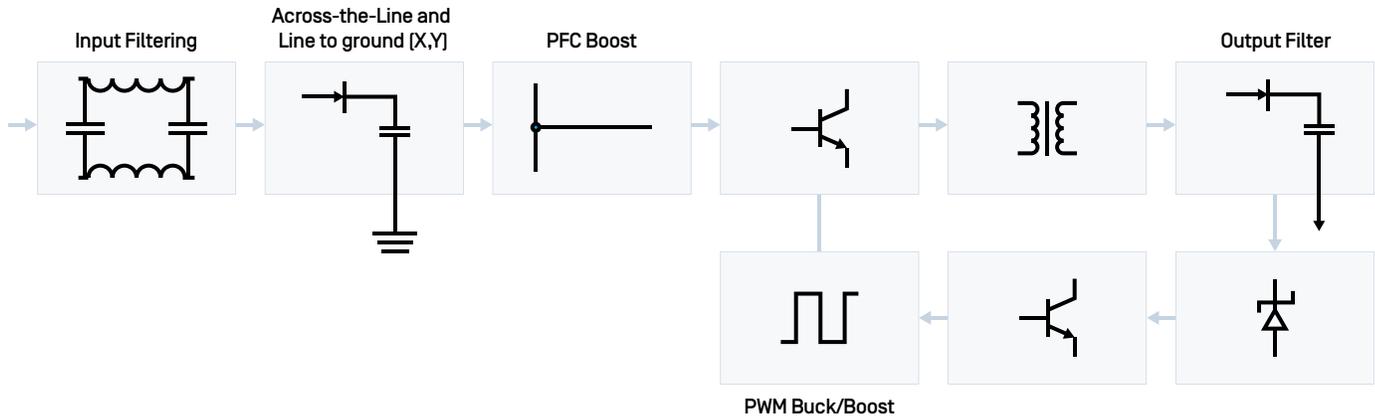


Table 1: Quantic Paktron Solutions to SMPS Circuits

SMPS Circuit	Paktron Solution	Image	Features
Input Filtering	Quencharc® Series [Q]		<ul style="list-style-type: none"> UL, CSA recognized for use across the line, meets UL, IEC, CE safety needs for X, Y filtering All in one solution where R-C filtering is needed
	Capstick® Series [CS, CB], Angstor® Series [RA]		<ul style="list-style-type: none"> High DV/DT for suppression of reflected switching noise Excellent choice for PI filter, L-C filter topologies Can filter fast switching transients from active rectification circuits Suggested for DC-DC topologies
PFC Stage Buck/Boost Conversion Stage	Capstick® Series [CS, CB], Angstor® Series [RA]		<ul style="list-style-type: none"> Ultra-low ESL, ESR: both series provide excellent DVIDT for fast switching topologies 150 KHz up to 1 MHz Excellent ripple current, surge current handling capability, no issues with cracking from pulse discharge Thru-hole and SMD options for different footprint or board constraints
Output Filtering	Capstick® Series [CS, CB], Angstor® Series [RA]		<ul style="list-style-type: none"> No DC bias derating: unlike MLCC, you get the full CAP value in the circuit, X7R MLCC drops CAP value -20% at 48 VDC, 40% at 100 VDC Excellent ripple current handling capability, can suppress 120 Hz ripple and fast switching transients with one solution Excellent for suppressing fast switching transients from active output rectification circuits Thru-hole and SMD options for different footprint or board constraints
	Quencharc® Series [Q]		<ul style="list-style-type: none"> End-stage filtering: back EMF, reverse voltage protection of power circuit from the output load without significant losses or heat generation (unlike blocking diodes), these conditions can otherwise harm power supply feedback loops or cause adverse operation of the control loop and output regulation

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