SCP Series

PrizmaCap™

AVX's new PrizmaCap capacitors, or SCP Series, are prismatic EDLCs (supercapacitors). The SCP Series provides the lowest profile & widest operating temperature available in AVX SuperCapacitors. Used by themselves or in conjunction with primary or secondary batteries, they provide extended backup time, longer battery life, and provide instantaneous power pulses as needed. They are best used in applications requiring pulse power handling, energy storage, energy/power holdup, and battery assist.

FEATURES

- Larger capacitance in prismatic form factor
- Widest temperature rating
- Low profile as thin as 0.5mm
- Custom capabilities
- Made & shipped in the USA

APPLICATIONS

- Wearables
- Handhelds
- High Temp Industrial
- Bluetooth Keyboard
- Battery Assist
- Power Peripherals
- Tablet/E-Reader
- High Reliability
- Space Constrained Designs

HOW TO ORDER

SCP	A	11	A	105	P	N	A	xxxx
Style PrizmaCap™	**Size (mm)** A = 48 L X 40 W	**Max Thickness** Two digits represent maximum thickness in #.#mm format (Ex: 11 = 1.1mm)	**Voltage Code** A = 2.1V	**Capacitance** The first two digits express the significant figures, and the last digit is the number of zeroes to follow. This value would be µF. (Ex: 105 = 10×105 µF = 1 F)	**Tolerance** P = +100%/-0%	**Lead Format** N = SMT with fixed position terminals extending from same end	**Package Code** A = Label printed on the part with double-sided adhesive tape, and in tray packaging	**Custom Code** Available for custom designators

QUALITY INSPECTION

Parts are tested for Life Cycle, high temperature load life, temperature characteristics, vibration resistance, and humidity characteristics. See page 2 for more information.

TERMINATION

These supercapacitors are compatible with hand soldering as recommended on page 4.

OPERATING TEMPERATURE

-55°C to +65°C @ 2.1V

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

For RoHS compliant products, please select correct termination style.

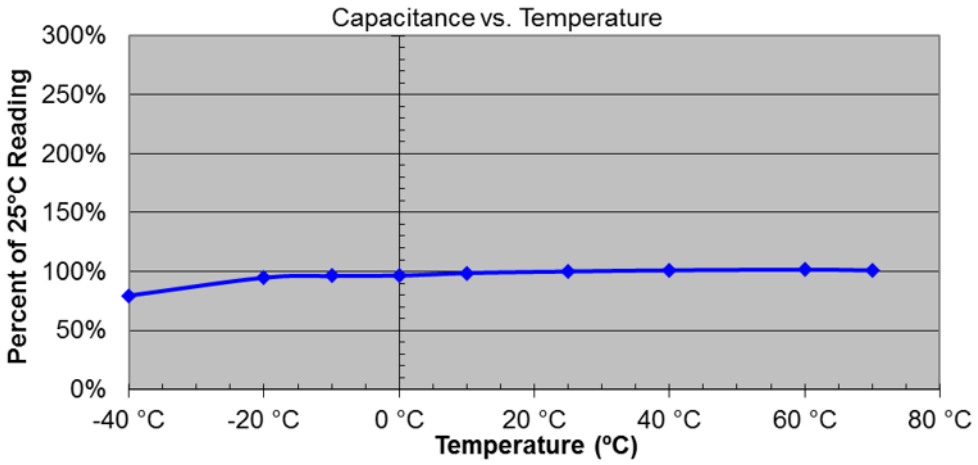
RATINGS & PART NUMBER REFERENCE

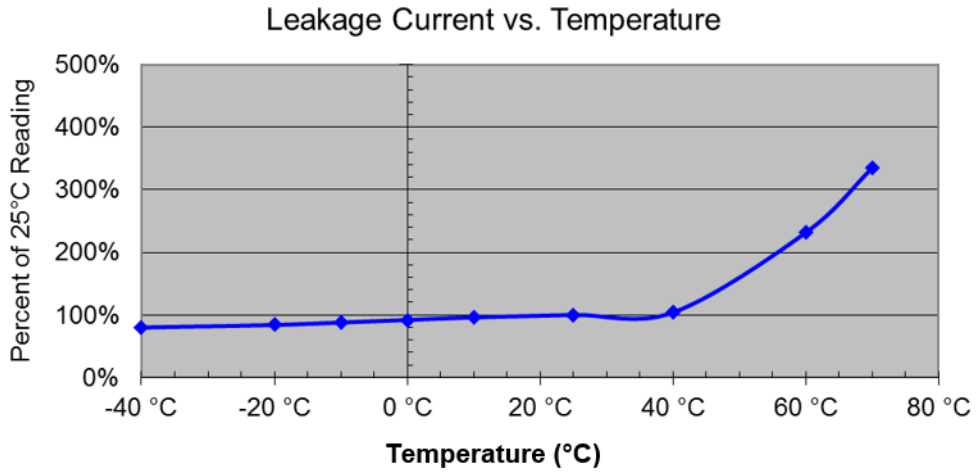
AVX Part Number	Length (mm)	Width (mm)	Max Thickness (mm)	Rated Capacitance (F)	Capacitance Tolerance	Rated Voltage (V)	Rated Temperature (°C)	DCL Max @ 72 Hrs (µA)	ESR Max @ 1000 Hz (MΩ)	ESR Max @ DC (mΩ)	Peak Current (A)	Power Density (W/kg)	Max Energy (Wh)	Energy Density (Wh/kg)
SCPA11A105PNA	48	40	1.1	1	+100%/-0%	2.1	65	70	180	485	0.71	535	0.0006	0.29
SCPA20A605PNA	48	40	2.0	6	+100%/-0%	2.1	65	100	37	79	4.27	2127	0.0037	1.17
SCPA32A116PNA	48	40	3.2	11	+100%/-0%	2.1	65	250	18	39	8.08	2804	0.0067	1.38

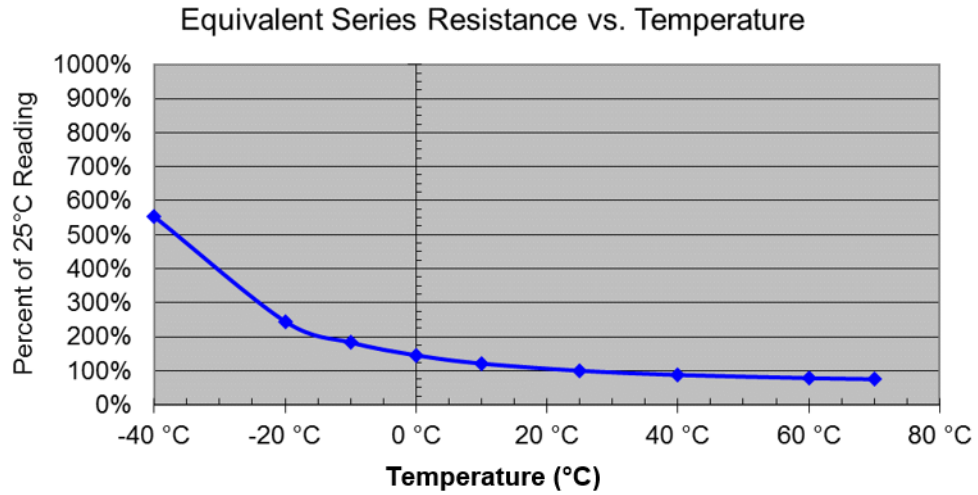
QUALIFICATION TEST SUMMARY

Test	Test Method	Parameter	Limits
Life Cycle	Capacitors are cycled between rated voltage and half-rated voltage under constant current at +25°C for 500,000 cycles	Capacitance Change ESR Appearance	≤30% of initial spec value ≤2 times initial spec value No remarkable defects
High Temperature Load Life	Temperature: +65°C Voltage: Rated Voltage Test Duration: 2,000 hours	Capacitance Change ESR Appearance	≤30% of initial spec value ≤2 times initial spec value No remarkable defects
Storage Temperature Characteristics	Storage Duration: 1 year No Load Temperature: +25°C	Capacitance Change ESR Appearance	≤30% of initial spec value ≤2 times initial spec value No remarkable defects
Vibration Resistance	Amplitude: 1.5mm Frequency: 10 ~ 55Hz Direction: X, Y, Z for 2 hours each	Capacitance Change ESR Appearance	≤30% of initial spec value ≤2 times initial spec value No remarkable defects
Humidity	Voltage: Rated Voltage RH: 90% Temperature: +60°C Test Duration: 1,500 hours	Capacitance Change ESR Appearance	≤30% of initial spec value ≤2 times initial spec value No remarkable defects

QUALITY AND RELIABILITY

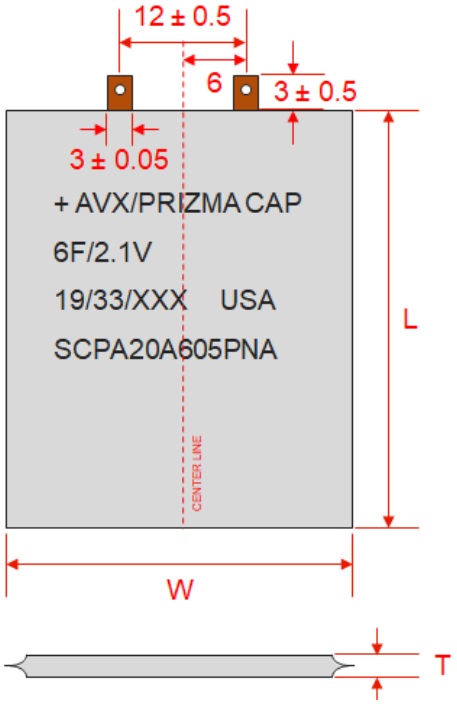






RATINGS & PART NUMBER REFERENCE

Note: All units in millimeters



Style	L	W
A	48	40

T = Max Thickness (mm) defined in part number table on page 2

SOLDERING RECOMMENDATIONS

When soldering supercapacitors to a PCB, the temperature & time that the body of the supercapacitor sees during soldering can have a negative effect on performance. We advise following these guidelines:

- Do not immerse the supercapacitors in solder. Only the leads should come in contact with the solder.

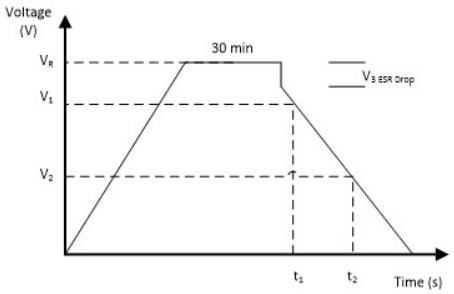
HAND SOLDERING

Keep some distance between the supercapacitor body and the tip of the soldering iron; contact between supercapacitor body and soldering iron will cause extensive damage to the supercapacitor. It is recommended that the soldering iron temperature should be less than 350°C, and contact time should be limited to no more than 4 seconds. Too much exposure to terminal heat during soldering can cause heat to transfer to the body of the supercapacitor, potentially damaging the supercapacitor.

TEST METHODS

IEC Capacitance Test Method

- Capacitance is measured using a Keithley 2400 or 2602 Meter
- Procedure
  - Charge Capacitor to Rated Voltage at room temperature
  - Disconnect parts from voltage to remove charging effects
  - Discharge cells with a constant current I determined by 4 * C * V_R
  - Noting V_1, t_1, V_2, t_2 and performing the calculation for C



I – Discharge Current, 4 * C * VR
VR – Rated Voltage
V1 – Initial Test Voltage, 80% of VR
V2 – Final Test Voltage, 40% of VR
t1 – Initial Test time
t2 – Final Test time

C = I * (t2 – t1) / (V1 – V2)

DCL Measurement @ 25°C

- DCL is measured using a Multimeter with high internal impedance across a resistor
  - Charge Capacitor to Rated Voltage at room temperature for 72 Hours
  - Disconnect parts from Voltage by opening switch 1 (Stabilize for 10 Min)
  - Measure Voltage across a known Valued Resistor (1K Ohm)
  - Calculate DCL = V/R

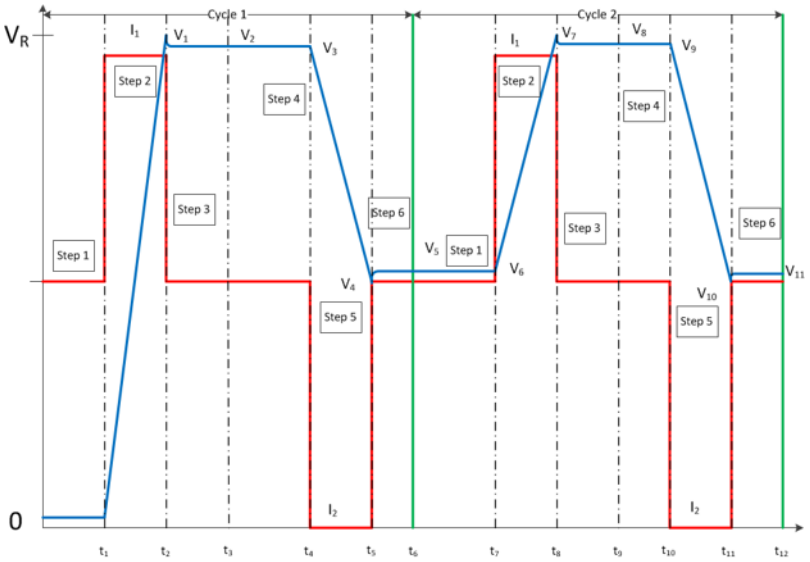
Initial ESR Measurement @ 25°C

- Using an Agilent 4263B LCR Meter and a Kelvin connection
  - Measure at frequency of 1000 Hz
  - Measurement Voltage of 10mV

DC ESR Measurement

- Six steps capacity and ESRDC Test Method is used as illustrated in the figure right.
- Tests are carried out by charging and discharging the capacitor for two cycles at rated voltage and half rated voltage
  - C = (CDC1+CDC2) / 2
  - ESRDC = (ESRDC1 + ESRDC2) / 2

Where: CDC1= I2*(t5-t4)/(V3-V4)
CDC2=I2*(t11-t10)/V9-V10)
ESRDC1=(V5-V4)/I2
ESRDC2=(V11-V10)/I2
I1 = I2 = 75mA/F



TEST METHODS

Maximum Operating Current

- This is the maximum current when capacitor temperature rise of the capacitor during its operation is less than 15°C

Maximum Peak Current

- This is the maximum current in less than 1 sec

Watt Density

- Watt Density = $(0.12 * V^2 / RDC) / mass$

Energy density

- Energy density = $(½ CV^2) / (3600 * mass)$

POLARITY / REVERSE VOLTAGE

For product consistency and optimum performance, it is recommended that the capacitor be connected with polarity indicated. Reversing polarity could result in permanent damage to the circuit including much higher leakage current for a short duration of time and the life time of the supercapacitors will be reduced.

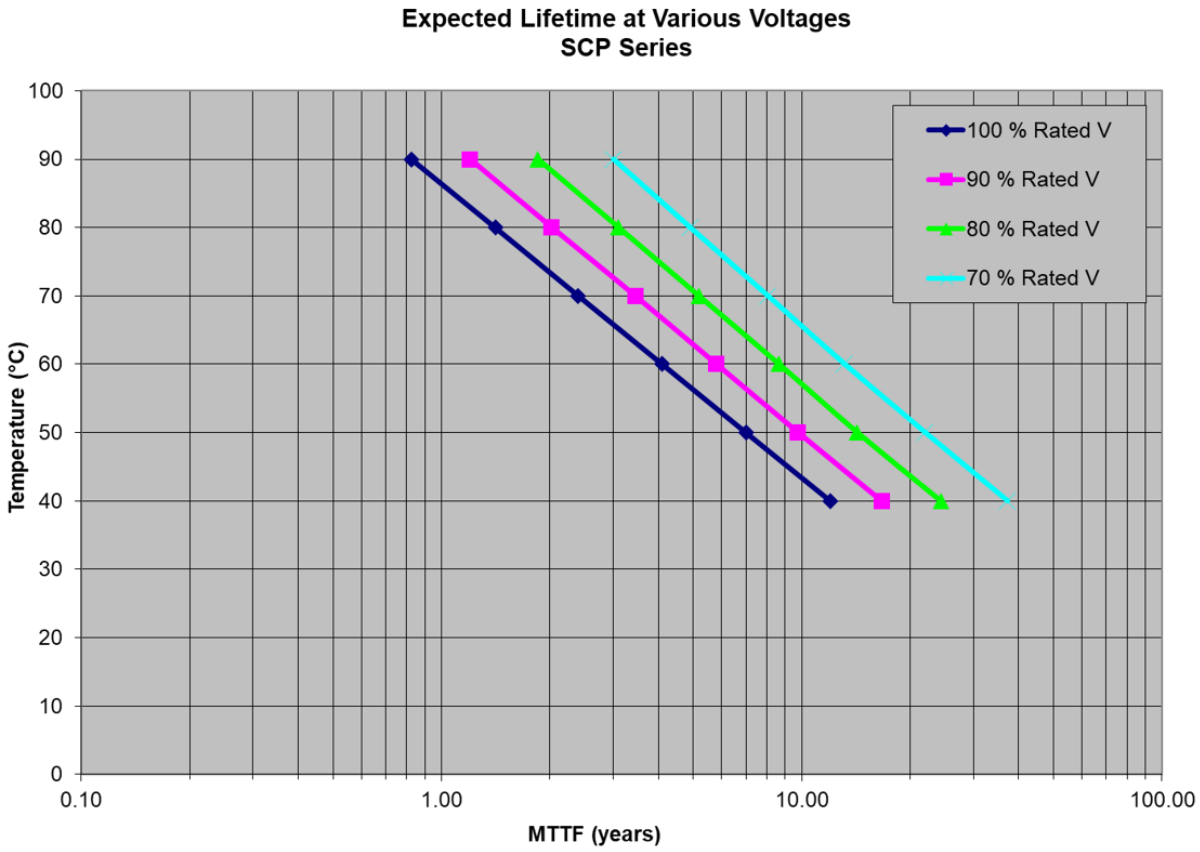
LIFE TIME AND TEMPERATURE PERFORMANCE

The life of a supercapacitor is impacted by a combination of operating voltage and the operating temperature according to the following equation:

time to failure, $t \propto V^n * \exp(-Q / k*T)$ ……………………………………..(1)

where V is the voltage of operation, Q is the activation energy in electron volts (eV), k is the Boltzmann's constant in eV and T is the operating temperature in °K (where K is in degrees Kelvin). Typical values for the voltage exponent, n, is between 2.5 - 3.5, and Q is between 1.0 - 1.2 eV in the normal operating temperature range of 40° to 65°C. The industry standard for super-capacitor end of life is when the equivalent series resistance, ESR, increases to 200% of the original value and the capacitance drops by 30%. Typically a super-capacitance shows an initial change in the ESR value and then levels off. If the capacitors are exposed to excessive temperatures the ESR will show a continuous degradation. In the extreme case, if the temperatures or voltages are substantially higher, than the rated voltage, this will lead to cell leakage or gas leakage and the product will show a faster change in the ESR which may increase to many times the original value.

LIFE TIME AND TEMPERATURE PERFORMANCE



SAFETY RECOMMENDATIONS

Warnings

- To Avoid Short Circuit, after usage or test, Super Capacitor voltage needs to discharge to ≤ 0.1V
- Do not Apply Overvoltage, Reverse Charge, Burn or Heat Higher than 120°C, heat seal may break open
- Do not Press, Damage or disassemble the Super Capacitor, packaging could heat to high temperature causing Burns
- If you observe Overheating or Burning Smell from the capacitor disconnect Power immediately, and do not touch

Emergency Applications

- If Housing is Leaking:
    - Skin Contact: Use soap and water thoroughly to wash the area of the skin
    - Eye Contact: Flush with flowing water or saline, and immediately seek medical treatment
    - Ingestion: Immediately wash with water and seek medical treatment

Transportation

Not subjected to US DOT or IATA regulations
UN3499, <10Wh, Non-Hazardous Goods
International shipping description – “Electronic Products – Capacitor”

Regulatory

- RoHS Compliant
- Reach Compliant / Halogen Free

Storage

- Capacitors may be stored within the operating temperature range of the capacitor
- Lower storage temperature is preferred as it extends the shelf life of the capacitor
- Do Not Store the Super Capacitors in the following Environments:
    - High Temperature / High Humidity environments >40°C / 70% RH
    - Direct Sunlight
    - In direct contact with water, salt oil or other chemicals
    - In direct contact with corrosive materials, acids, alkalis, or toxic gases
    - Dusty environment
    - In environment with shock and vibration conditions

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