High Power Capacitors

Calculation Form

DESIGN

Specification

Capacitance	C (µF)	
Working voltage	V_w (V)	
Rms current	I_{rms} (A_{rms})	
Frequency	F (Hz)	
Ripple voltage	V_r (V)	
Ambient temperature	θ_{amb} (°C)	
Lifetime @ V_w,I_{rms} and θ_{amb}	hours	
Parasitic inductance	L (nH)	
Cooling conditions		

Your Choice

PN		
Capacitance	C (µF)	
Nominal voltage	V_n (V)	
Serial resistance	Rs (mΩ)	
Thermal resistance between hot spot and case	Rth1 (°C/W)	
Thermal resistance between case and ambient air	Rth2 (°C/W)	

Calculations

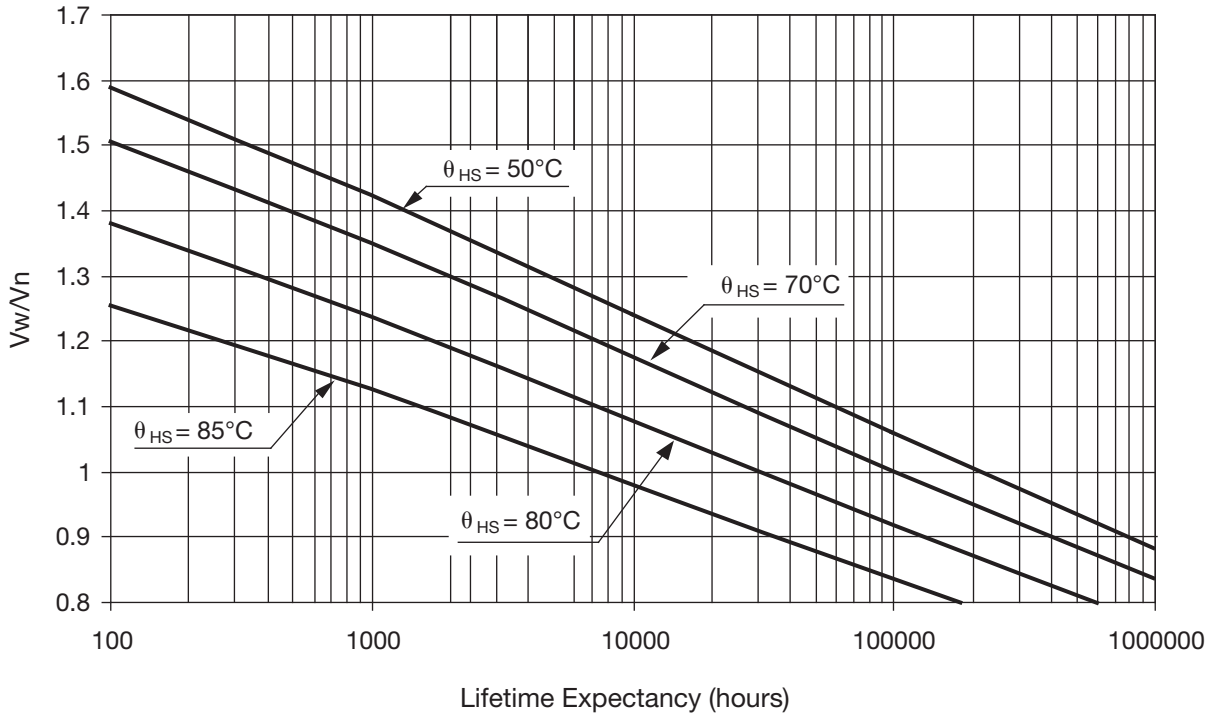
Maximum ripple voltage	V_{rmax}=0.45V_n	V_r =	V

The maximum ripple voltage must be in any case lower than the ripple voltage

Ratio V_w/V_n	$\rho = V_w/V_n$	ρ =	
Joule losses	$Pj = Rs \times I_{rms}^2$	Pj =	W
Dielectric losses	$Pd = Q \times tg\delta_0 = Q \times 3.10^{-4}$	Pd =	W
Hot spot temperature	$\theta_{HS} = \theta_{amb} + (Pj+Pd) \times (Rth1+Rth2)$	θ_{HS} =	°C

The hot spot temperature must be in any case lower than 85°C

LIFETIME EXPECTANCY VS HOT SPOT TEMPERATURE AND VOLTAGE



Expected lifetime at hot spot calculated and V = V_w	

DISFIM Products

For Energy Storage and Discharge Applications

Based on the CONTROLLED SELF HEALING technology, AVX offers impregnated capacitors, named DISFIM, which are ideal for discharge applications.

With the controlled self-healing technology, the capacitance of the DISFIM is divided into several million elementary capacitances. The weak points in the dielectric are insulated and the capacitor continues to work without any short-circuit or risk of explosion.

DISFIM capacitors may represent more than 10,000 square meters.

Only some square millimeters of active surface are lost for every self-healing action.

Over the life of the capacitor, the capacitance gradually decreases.

The capacitor is usually designed to lose less than 5% of its initial capacitance during its whole lifetime.

Example of design with 2 epoxide flat terminals

APPLICATIONS

Power laser
High voltage supplies
Cable failure detection
Electromagnetic and ETC guns
Marx generators
Welding machine

Custom design is the rule as applications and operating conditions are various.

Feel free to send your request to your local AVX representative.

Use guide for customer's specific requirement.

CHARACTERISTICS

Voltage range from 2kV to 75kV
Maximum energy per can 150kJ
Specific energy up to 2000J/l
Lifetime up to several tens millions shots
Stray inductance from 50nH to 500nH

CONSTRUCTION

Metal case unit
Epoxide flat terminals or ceramic terminals

High Power Capacitors

Guide for Customer's Specific Requirements

This questionnaire lists the information we require to prepare an offer according to your exact requirements

Company / Name / Email	Project / Quantity

Applications	DC Filtering		Discharge*		Protection*		Tuning
Capacitance (µF)							
Tolerance (%)							
Operating Voltage	Vpeak		Vch		Vpeak	Vdc	Vrms
Ripple Voltage (peak to peak)	V						
Working Frequency (Hz)							
Operating Current	Arms		Apeak		Arms		Arms
Maximum Current/Duration	Arms	s			Apeak		
Discharge			Aperiodic	Oscillatory			
Pulse Duration (5% Ipeak)							
Time to Ipeak (µs)							
Ringing Frequency (Hz)							
Reversal Voltage (%)							
Repetition Rate			shots/min/hour/day		Hz		
Hold Time @ Full Voltage (s)							
Fault Peak Current / nb shots	Apeak	shots	Apeak	shots			
Fault Reversal Voltage (%)							
Lifetime Expectancy	hours		shots		hours		hours
Maximum Inductance (nH)							
Test Voltage between Terminals (V)							
Test Voltage between Shorted Terminals and Case (V)							
Maximum Surge Voltage (MSV)							
MSV Duration / Frequency	s	/year			s	/year	

*Due to the particularities of varying waveforms in such application, more information on the exact nature of waveform is generally required for a full analysis.

Description			
Dimensions (mm) / Shape	**Operating Position**	**Terminals**	
Section: Height: rectangular, cylindrical	vertical, horizontal inclined, upside down	type	quantity

Thermal Characteristics					
Storage Temperature (°C)		**Operating Temperature (°C)**		**Cooling Method**	
min.		min.		Natural Convection	
average		average		Forced Air (m/s)	
max.		max.		Water	

Remarks

AVX Products Listing

PASSIVES

Capacitors
- Multilayer Ceramic
- Film
- Glass
- Niobium Oxide* - OxiCap®
- Pulse Supercapacitors
- Tantalum

Circuit Protection
- Thermistors
- Fuses - Thin Film
- Transient Voltage Suppressors
- Varistors - Zinc Oxide

Directional Couplers
- Thin-Film

Filters
- Ceramic
- EMI
- Noise
- SAW
- Low Pass - Thin Film

Inductors
- Thin-Film

Integrated Passive Components
- PMC - Thin-Film Networks
- Capacitor Arrays
- Feedthru Arrays
- Low Inductance Decoupling Arrays

Piezo Acoustic Generators
- Ceramic

Resistors
- Arrays
- Miniature Axials

Timing Devices
- Clock Oscillators
- MHz Quartz Crystal
- Resonators
- VCO
- TCXO

CONNECTORS

Automotive
- Standard, Custom

Board to Board
- SMD (0.4, 0.5, 1.0mm), BGA, Thru-Hole

Card Edge

DIN41612
- Standard, Inverse, High Temperature

FFC/FPC
- 0.3, 0.5, 1.0mm

Hand Held, Cellular
- Battery, I/O, SIMcard, RF shield clips

2mm Hard Metric
- Standard, Reduced Cross-Talk

IDC Wire to Board
- Headers, Plugs, Assemblies

Memory
- PCMCIA, Compact Flash, Secure Digital, MMC, Smartcard, SODIMM

Military
- H Government, DIN41612

Polytect™
- Soft Molding

Rack and Panel
- Varicon™

For more information please visit our website at http://www.avx.com

BUREAU VERITAS
Certification

C E R T I F I C A T E

awarded to

AVX TPC SA
Avenue colonel Prat
21850 Saint Apollinaire
France

BUREAU VERITAS CERTIFICATION

confirms, as an IRIS approved certification body, that the Management System of the above organization has been assessed and found to be in accordance with the

International Railway Industry Standard (IRIS)
Revision 01, November 2007

for the product category

Auxiliary systems

Scope of supply

Design, development and manufacturing of power capacitors

Conception, développement et fabrication de condensateurs de puissance

Date of the audit: 17.10.2008
Date of issue of the certificate: 13.01.2009 Certificate valid until: 12.01.2012

Current date: 13.01.2009
Certificate-Register-No.: FRA-IF-000 006