FR Series



Overview	Applications
----------	--------------

embedded microprocessor systems with fash memory.

Benefits

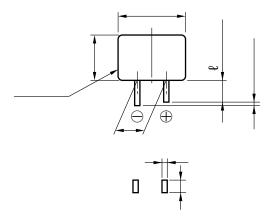
• Wide range of temperature from -40°C to +85°C

Part Number System

FR	ОН	104	Z	F
		signifcant fgures. Third digit specifes number of zeros.	Z =	



Dimensions - Millimeters



Part Number	ø D	Н	P	ę	d ₁	d ₂



Performance Characteristics

(several hundred $m\Omega$ to a hundred Ω) compared to aluminum electrolytic capacitors. Thus, its main use would be

	Secondar	y Battery	Capacitor			
Eco-hazard						
	−20 to +60°C	-20 to +50°C	−55 to +105°C	-40 to +85°C (FR, FT)		



Environmental Compliance



Table 1 – Ratings & Part Number Reference

Part Number	Maximum	Nominal Capacitance		Maximum ESR	Maximum Current at 30	Voltage Holding	
	Operating Voltage (VDC)			at 1 kHz (Ω)	Minutes (mA)		

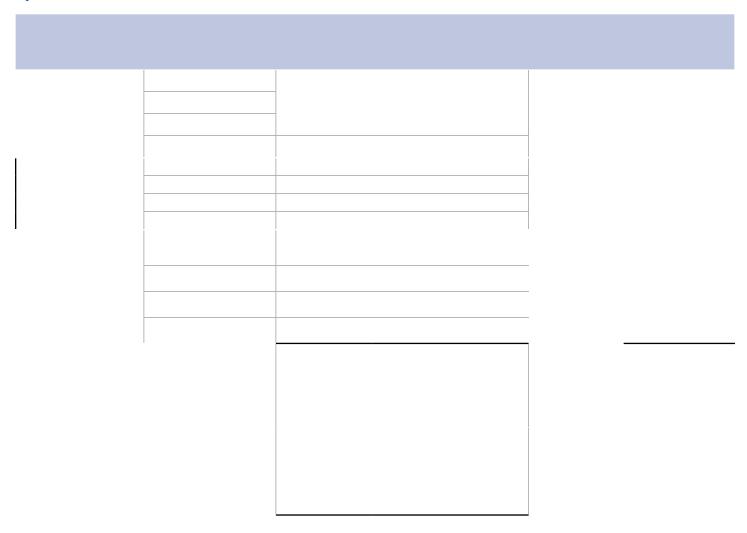


Specifications

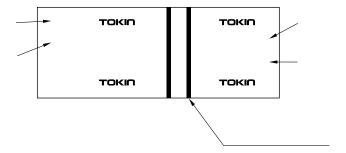
Item	FR Type	Test Conditions (conforming to JIS C 5160-1)
	-40°C to +85°C	
	+80%, -20%	
		Measured at 1 kHz, 10 mA; See also
	> 90% of initial ratings	
	≤ 120% of initial ratings	0.022 F 560 Ω 0.047 F 300 Ω 0.068 F 240 Ω
	≤ 120% of initial ratings	0.10 F 150 Ω 0.22 F 56 Ω 0.47 F 30 Ω 1.0 F 15 Ω
		0 Ω 70±2°C
	≥ 50% of initial value	+25±2°C
	≤ 400% of initial value ≥ 30% of initial value	-25±2°C -40±2°C
	≤ 700% of initial value	+25±2°C
	≤ 200% of initial value	+70±2°C +25±2°C
	≤ 1.5 CV (mA)	
	Within ±20% of initial value	2
		10 to 55 Hz
		+245±5°C
		+260±10°C



Specifications cont'd



Marking





Packaging Quantities

Part Number	Bulk Quantity per Box

List of Plating & Sleeve Type

- a. Iron + copper base + lead-free solder plating (Sn-1Cu)
- b. SUS nickel base + copper base + refow lead-free solder plating (100% Sn, refow processed)

Series	Part Number	Plating	Sleeve

Recommended Pb-free solder: Sn/3.5Ag/0.75Cu

Sn/3.0Ag/0.5Cu Sn/0.7Cu

Sn/2.5Ag/1.0Bi/0.5Cu

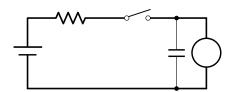


Measurement Conditions

Capacitance (Charge System)

Capacitance is calculated from expression (9) by measuring the charge time constant (τ) of the capacitor (C). Prior to

τ



τ: Time from start of charging until Vc becomes 0.632 Eo (V)

Rc: See table below (Ω) .

Charge Resistor Selection Guide

Сар	БА		F0	FY		FM, FME	FNAC	FG	FOLL		FO FOO			
	FA	FE	FS	FYD	FYH	FYL	FR	FMR, FML	FMC	FGR	FGH	FT	FC, FCS	HV
						5,000 Ω		5,000 Ω		5,000 Ω				
	1,000 Ω		1,000 Ω	2,000 Ω	2,000 Ω	2,000 Ω	2,000 Ω	2,000 Ω		2,000 Ω				
	1 000 0	1 000 0	1 000 0	2 000 0	1 000 0	2 000 0	1,000 Ω	2000 Ω	1,000 Ω	2,000 Ω				
	510 Ω	510 Ω	_	1,000 Ω		2,000 12	1,000 Ω	1000 Ω	1,000 Ω	1,000 Ω		510 Ω		
	310 32						1,000 32	1000 32	1,000 32			310 32		
	200 Ω	200 Ω	200 Ω	510 Ω	510 Ω		510 Ω	0V: 1000 Ω		1,000 Ω		200 Ω		
	100 Ω	100 Ω	100 Ω	200 Ω	200 Ω		200 Ω			1,000 Ω		100 Ω		
		_		-								+		
	51 Ω	51 Ω	100 Ω	100 Ω 200 Ω	100 Ω		100 Ω			510 Ω		100 Ω		
		51 Ω		200 12						510 Ω				
				100 Ω						200 Ω		51 Ω		
												51 Ω		
										100 Ω				
			100 Ω											
												20 Ω		

^{*}Capacitance values according to the constant current discharge method.

^{*}HV Series capacitance is measured by discharge system



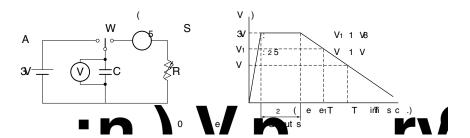
Measurement Conditions cont'd

Capacitance (Discharge System)

Note: The current value is 1 mA discharged per 1 F.

Capacitance (Discharge System - 3.5 V)

$$(\mathring{F}_{2} \quad C = \frac{\times \quad \mp \quad _{1}T}{V_{1} - \bigvee } \quad 5 \quad)$$



Capacitance (Discharge System - HV Series)

$$(\overset{2}{F}_{2} \quad C = \frac{\times \quad \mp \quad _{1}T}{V_{1} - \overset{1}{V}}) \qquad)$$

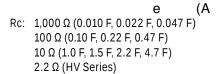




Measurement Conditions cont'd

Equivalent Series Resistance (ESR)

Current (at 30 minutes after charging)





Self-Discharge Characteristic (0H - 5.5 V Products)

The self-discharge characteristic is measured by charging a voltage of 5.0 VDC (charge protection resistance: 0 Ω)

pin voltage. The test should be carried out in an environment with an ambient temperature of 25° C or below and relative humidity of 70% RH or below.

4. Dismantling

the electrolyte will cause burning. This product should be treated as industrial waste and not is not to be disposed of by fre.



No	otes on Using Supercapacitors or Electric Double-Layer Capacitors (EDLCs)
۱.	Circuitry Design
	1.2 Fail rate in the feld
	Based on feld data, the fail rate is calculated at approximately 0.006 Fit. We estimate that unreported failures are ten
	Useful life of the supercapacitor will be significantly affected if used near heat emitting items (coils, power transistors
	coordinate of the caparaupacitor will be eight called an account accounting from a (concerpond) than order



Notes on Using Supercapacitors or Electric Double-Layer Capacitors (EDLCs) cont'd

2. Mounting 2.1 Mounting onto a refow furnace Except for the FC series, it is not possible to mount this capacitor onto an IR / VPS refow furnace. Do not immerse the
See Recommended Refow Curves in Section – Precautions for Use
iron under 400°C and soldering time to within 3 seconds. Always make sure that the temperature of the tip is controlled.
3. Storage
Make sure that the supercapacitor is stored according to the following conditions: Temperature: 5 – 35°C (Standard 25°C), Humidity: 20 – 70% (Standard: 50%). Do not allow the build up of condensation through sudden temperature
felds.



KEMET Electronic Corporation Sales Offices

For a complete list of our global sales offces, please visit www.kemet.com/sales.

				•		
D	C	Cl	a	im	PI	

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for

applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use.