

# FS Series

The FS series Super Capacitors are ideal as short-time (30 minutes max.) backup devices in small and lightweight systems. 5.5 VDC (0.022 F to 1.0 F), 11 VDC (0.47 F and 1.0 F only) and 12 VDC (1.0 F and 5.0 F only)

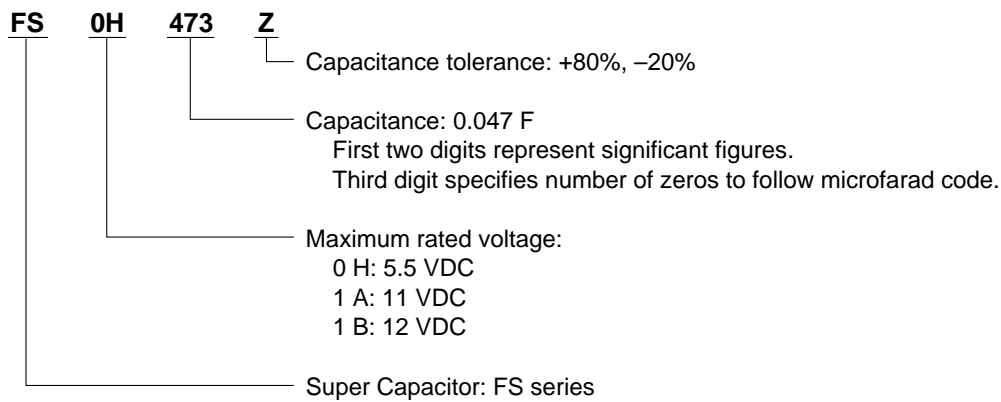
## Features

- Ideal for supplying current of several hundred  $\mu$ A to several mA for short time

## Applications

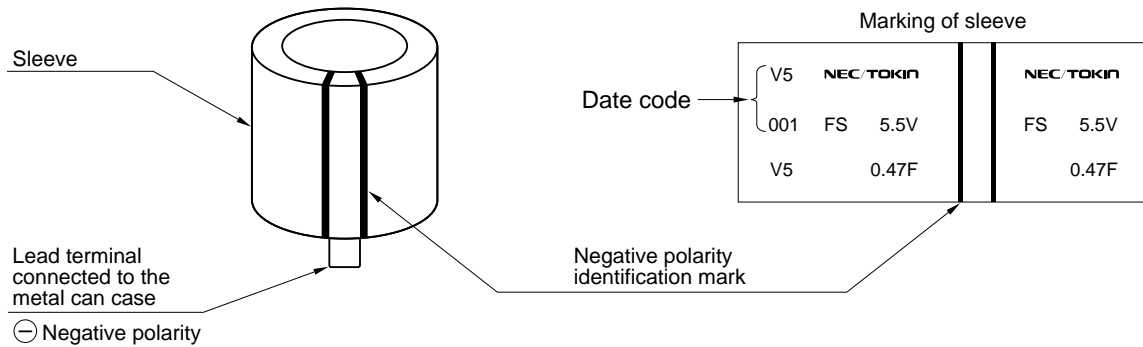
- Backup source for microcomputers and buffer for momentary high-current loads (for example, motors)

## Part Number System

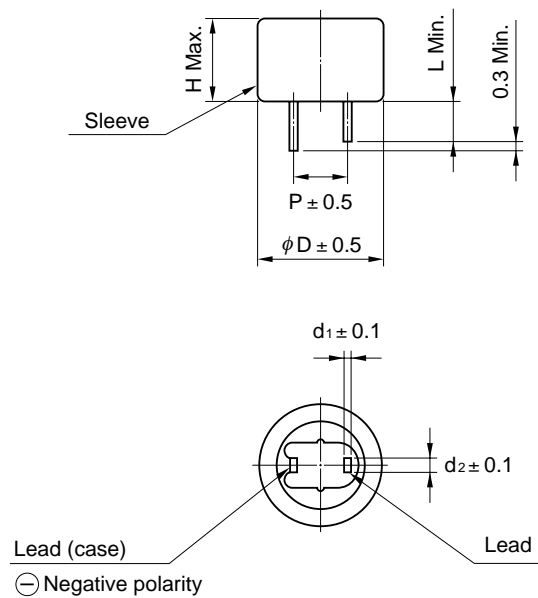


## Markings

Markings are made with black ink on the green sleeve.



## Dimensions and Standard Ratings



Part No.	Dimensions mm (inch)						Weight g (oz)
	D	H	P	d <sub>1</sub>	d <sub>2</sub>	L	
FS0H223Z	11.5 (0.453)	8.5 (0.335)	5.08 (0.200)	0.4 (0.016)	1.2 (0.047)	2.7 (0.106)	1.6 (0.057)
FS0H473Z	13.0 (0.512)	8.5 (0.335)	5.08 (0.200)	0.4 (0.016)	1.2 (0.047)	2.2 (0.087)	2.6 (0.092)
FS0H104Z	16.5 (0.650)	8.5 (0.335)	5.08 (0.200)	0.4 (0.016)	1.2 (0.047)	2.7 (0.106)	4.1 (0.145)
FS0H224Z	16.5 (0.650)	13.0 (0.512)	5.08 (0.200)	0.4 (0.016)	1.2 (0.047)	2.7 (0.106)	5.3 (0.187)
FS0H474Z	21.5 (0.846)	13.0 (0.512)	7.62 (0.300)	0.6 (0.024)	1.2 (0.047)	3.0 (0.118)	10 (0.353)
FS0H105Z	28.5 (1.122)	14.0 (0.551)	10.16 (0.400)	0.6 (0.024)	1.4 (0.055)	6.1 (0.240)	18 (0.635)
FS1A474Z	28.5 (1.122)	25.5 (1.004)	10.16 (0.400)	0.6 (0.024)	1.4 (0.055)	6.1 (0.240)	32.0 (1.129)
FS1A105Z	28.5 (1.122)	31.5 (1.240)	10.16 (0.400)	0.6 (0.024)	1.4 (0.055)	6.1 (0.240)	35.0 (1.235)
FS1B105Z	28.5 (1.122)	38.0 (1.496)	10.16 (0.400)	0.6 (0.024)	1.4 (0.055)	6.1 (0.240)	40 (1.411)
FS1B505Z	44.8 (1.764)	60.0 (2.361)	20.0 (0.787)	1.0 (0.040)	1.4 (0.055)	9.5 (0.240)	160 (5.644)

Note: Weight is typical.

Part Number	Max. Rated Voltage (V)	Nominal Capacitance		Max. ESR (at 1 kHz) (Ω)	Max. Current at 30 minutes (at 1 kHz) (mA)
		Charge System (F)	Discharge System (F)		
FS0H223Z	5.5	0.022	0.033	60	0.033
FS0H473Z	5.5	0.047	0.072	40	0.071
FS0H104Z	5.5	0.10	0.15	25	0.15
FS0H224Z	5.5	0.22	0.33	25	0.33
FS0H474Z	5.5	0.47	0.75	13	0.71
FS0H105Z	5.5	1.0	1.3	7	1.5
FS1A474Z	11.0	0.47	0.60	7	1.41
FS1A105Z	11.0	1.0	1.3	7	3.0
FS1B105Z	12.0	1.0	1.3	7.5	3.6
FS1B505Z	12.0	5.0	6.5	4.0	18.0

## Specifications

Item		Standard		Test Conditions Conforming to JIS C 5102-1994							
Operating Temperature Range		-25°C to +70°C									
Maximum Operating Voltage		5.5 VDC, 11 VDC, 12 VDC									
Nominal Capacitance Range		0.022 to 1.0 F (5.5 V products), 0.47 F to 1.0 F (11 V products), 1.0 F to 5.0 F (12 V products)		See characteristics measuring method.							
Capacitance Allowance		+80%, -20%									
Equivalent Series Resistance		See standard list		See characteristics measuring method.							
Current (30-minutes value)		See standard list		See characteristics measuring method.							
Surge Voltage		Capacitance	More than 90% of initial requirement	Conforms to 7.14 Surge voltage: 6.3 V (5.5 V products) 12.6 V (11 V products) 13.6 V (12 V products) Temperature: 70 ± 2°C Charge: 30 seconds Discharge: 9 min. 30 sec. Number of cycles 1000 cycles. Series resistance: 0.022 F 560 Ω 0.047 F 300 Ω 0.1 F 150 Ω 0.22 F 56 Ω 0.47 F 30 Ω 1 F 15 Ω 5 F 10 Ω Discharge resistance: 0 Ω							
		Equivalent series resistance	Not to exceed 120% of initial requirement								
		Current (30-minute value)	Not to exceed 120% of initial requirement								
		Appearance	No obvious abnormality								
Temperature Variation of Characteristics	Phase 2	Capacitance	50% or higher of initial value	Conforms to 7.12 Phase 1: +25 ± 2°C Phase 2: -25 ± 2°C Phase 3: -40 ± 2°C Phase 4: +25 ± 2°C Phase 5: +70 ± 2°C Phase 6: +25 ± 2°C							
		Equivalent series resistance	3 or less times initial value								
	Phase 5	Capacitance	150% or below of initial value								
		Equivalent series resistance	Satisfy initial standard value								
		Current (30-minute value)	1.5 CV (mA) or below								
	Phase 6	Capacitance	Within ± 20% of initial value								
		Equivalent series resistance	Satisfy initial standard value								
		Current (30-minute value)	Satisfy initial standard value								
Lead Strength (Tensile)		No loosening nor permanent damage of the leads		Conforms to 8.1.2 (1) <table border="1" style="margin-left: 20px;"> <tr> <td rowspan="2">5.5 VDC</td> <td>0.022 F to 0.22 F: 1 kg 10 sec</td> </tr> <tr> <td>0.47 F to 1.0 F: 2.5 kg 10 sec</td> </tr> <tr> <td>11 VDC</td> <td>2.5 kg 10 sec</td> </tr> <tr> <td>12 VDC</td> <td>2.5 kg 10 sec</td> </tr> </table>	5.5 VDC	0.022 F to 0.22 F: 1 kg 10 sec	0.47 F to 1.0 F: 2.5 kg 10 sec	11 VDC	2.5 kg 10 sec	12 VDC	2.5 kg 10 sec
5.5 VDC	0.022 F to 0.22 F: 1 kg 10 sec										
	0.47 F to 1.0 F: 2.5 kg 10 sec										
11 VDC	2.5 kg 10 sec										
12 VDC	2.5 kg 10 sec										
Vibration Resistance		Capacitance	Satisfy initial standard value	Conforms to 8.2.3 Frequency: 10 to 55 Hz Test duration: 6 hours							
		Equivalent series resistance									
		Current (30-minute value)									
		Appearance			No obvious abnormality						
Solderability		3/4 or more of the pin surface should be covered with new solder		Conforms to 8.4 Solder temperature: 230 ± 5°C Dipping duration: 5 ± 0.5 sec. Should be dipped up to 1.6 mm from the lower end of the capacitor.							
Soldering Heat Resistance		Capacitance	Satisfy initial standard value	Conforms to 8.5 Solder temperature: 260 ± 10°C Dipping duration: 10 ± 1 sec. Dipped up to 1.6 mm from the lower end of the capacitor.							
		Equivalent series resistance									
		Current (30-minute value)									
		Appearance			No obvious abnormality						
Temperature Cycle		Capacitance	Satisfy initial standard value	Conforms to 9.3 Temperature condition: -25°C → normal temperature → +70°C → normal temperature Number of cycles: 5 cycles							
		Equivalent series resistance									
		Current (30-minute value)									
		Appearance			No obvious abnormality						
Humidity Resistance		Capacitance	90% or higher of initial standard value (5.5 V products) Within 20% of initial value (11 V, 12 V products)	Conforms to 9.5 Temperature: 40 ± 2°C Relative humidity: 90 to 95% RH Test duration: 240 ± 8 hours							
		Equivalent series resistance	1.2 or less times initial standard value								
		Current (30-minute value)	1.2 or less times initial standard value								
		Appearance	No obvious abnormality								
High Temperature Load		Capacitance	85% or higher of initial standard value (5.5 V products) Within ±30% of initial value (11 V, 12 V products)	Conforms to 9.10 Temperature: 70 ± 2°C Voltage applied: Maximum operating voltage Series protection resistance: 0 Ω Test duration: 1000 <sup>+48</sup> <sub>0</sub> hours							
		Equivalent series resistance	Twice or less times initial standard value								
		Current (30-minute value)	Twice or less times initial standard value								
		Appearance	No obvious abnormality								

# 3.5 V, 6.5 V Rated Voltage Series FSH Type, FYD Type

These 3.5 V and, 6.5 V rated voltage are suitable for use in portable or battery-driven equipment. These capacitors are especially ideal as backup devices for cameras, remote controllers, headphone and stereos.

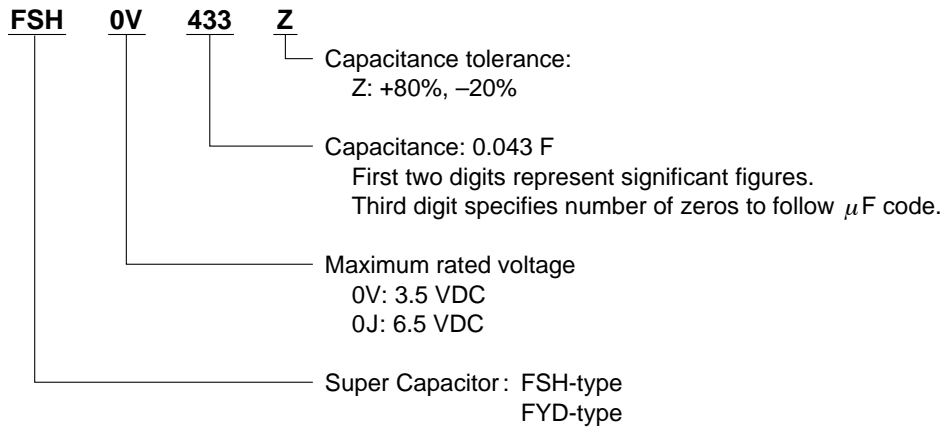
## Features

- The FSH-type is ideal for supplying several hundred  $\mu\text{A}$  to several mA for a short time. The FYD type is ideal for backup of 1  $\mu\text{A}$  to several hundred  $\mu\text{A}$  for a long time.
- Smaller than existing series (25% less than FS series in C•V per volume)

## Applications

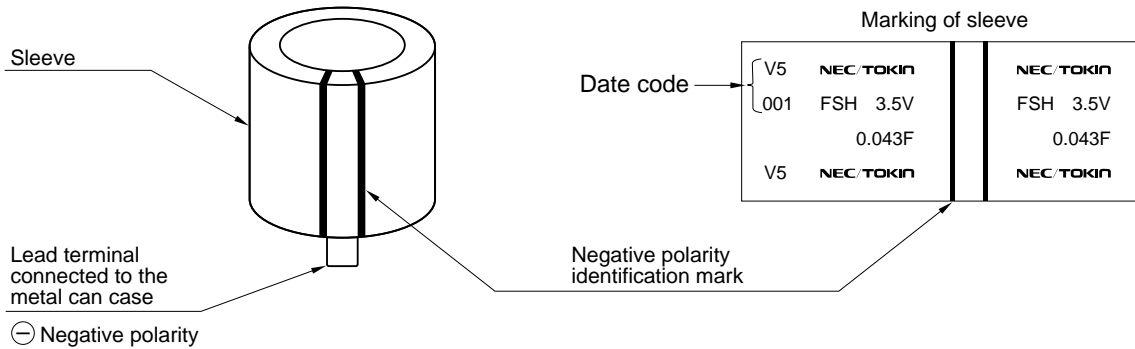
- Secondary backup power supply for cameras to charge an electronic flash (FSH type)
- Secondary backup power supply for motors (FSH-type)
- Backup of CMOS microprocessors, SRAMs, DTS ICs to charge the battery

## Part Number System

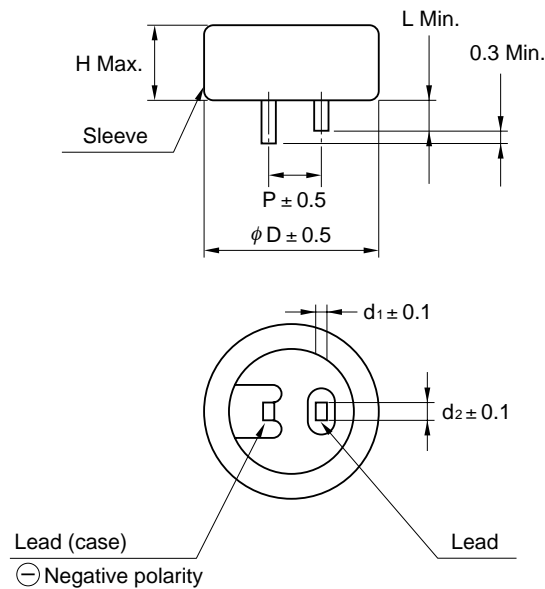


## Markings

Markings are made with black ink on the green sleeve.



## Dimensions and Standard Ratings



Part No.	Dimensions mm (inch)						Weight g (oz)
	D	H	P	d <sub>1</sub>	d <sub>2</sub>	L	
FSH0V433Z	11.0 (0.413)	5.2 (0.205)	5.08 (0.2)	0.2 (0.008)	1.2 (0.047)	2.7 (0.106)	1.0 (0.035)
FYD0V563Z	11.0 (0.413)	5.2 (0.205)	5.08 (0.2)	0.2 (0.008)	1.2 (0.047)	2.7 (0.106)	1.0 (0.035)
FSH0J223Z	11.5 (0.453)	8.5 (0.355)	5.08 (0.2)	0.4 (0.016)	1.2 (0.047)	2.7 (0.106)	1.7 (0.060)
FYD0J273Z	11.5 (0.453)	8.5 (0.355)	5.08 (0.2)	0.4 (0.016)	1.2 (0.047)	2.7 (0.106)	1.6 (0.056)

Note: The weight values are typical.

Part Number	Max. Rated Voltage (V)	Nominal Capacitance		Max. ESR (at 1 kHz) (Ω)	Max. Current at 30 minutes (mA)
		ChargeSystem (F)	DischargeSystem (F)		
FSH0V433Z	3.5	0.043	0.055	50	0.039
FYD0V563Z	3.5	0.056	0.070	150	0.050
FSH0J223Z	6.5	0.022	0.033	60	0.040
FYD0J273Z	6.5	0.027	0.040	200	0.049

## Specifications

Items		Specifications		Test Conditions Conforming to JIS C 5102-1994
Operating Temperature Range		-25°C to +70°C		
Maximum Rated Voltage		3.5 VDC, 6.5 VDC		
Nominal Capacitance Range		See standard ratings		
Capacitance Allowance		+80 %, -20 %		See characteristics measuring conditions
Equivalent Series Resistance		See standard list		See characteristics measuring conditions
Current (30-minutes value)		See standard list		See characteristics measuring conditions
Surge Voltage		Capacitance	More than 90 % of initial requirement	Conforms to 7.14 Surge voltage: 4.0 V (3.5 VDC), 7.4 V (6.5 VDC) rated part      rated part Temperature:      70±2°C Charging for 30 seconds Discharging for 9 min 30 sec. Number of cycles: 1 000 cycles Charge resistance: 0.022 F 560 Ω 0.027 F 560 Ω 0.043 F 300 Ω 0.056 F 240 Ω No discharge resistance
		Equivalent Series Resistance	Less than 200% of initial requirement	
		Current 30 minutes	Less than 120% of initial requirement	
		Appearance	No obvious abnormality	
Temperature Variation of Characteristics	Phase 2	Capacitance	More than 50 % of initial value	Conforms to 7.12 Phase 1: +25 ±2°C Phase 2: -25 ±2°C Phase 3: -40 ±2°C Phase 4: +25 ±2°C Phase 5: +70 ±2°C Phase 6: +25 ±2°C
		Equivalent Series Resistance	Less than 400% of initial value	
	Phase 5	Capacitance	Less than 200% of initial value	
		Equivalent Series Resistance	Initial requirement	
		Current 30 minutes	Less than 1.5 CV (mA)	
	Phase 6	Capacitance	Within ±20% of initial value	
		Equivalent Series Resistance	Initial requirement	
		Current 30 minutes	Initial requirement	
	Vibration Resistance		Capacitance	
Equivalent Series Resistance				
Current 30 minutes				
Appearance			No obvious abnormality	
Solderability		3/4 or more of the pin surface should be covered with new solder		Conforms to 8.4 Temperature of solder: 230 ±5°C Time of immersion: 5 ±0.5 seconds To immerse capacitors up to 1.6 mm from the bottom
Soldering Heat Resistance		Capacitance	Shall meet initial requirements	Conforms to 8.5 Temperature of solder: 260 ±10°C Time of immersion: 10 ±1 seconds To immerse capacitors up to 1.6 mm from the bottom
		Equivalent Series Resistance		
		Current 30 minutes		
		Appearance	No obvious abnormality	
Temperature Cycle		Capacitance	Shall meet initial requirements	Conforms to 9.3 Temperature condition: -25°C → normal temperature → +70°C → normal temperature Number of cycles: 5 cycles
		Equivalent Series Resistance		
		Current 30 minutes		
		Appearance	No obvious abnormality	
Humidity Resistance		Capacitance	Within ±20% of initial value	Conforms to 9.5 Temperature: 40 ±2°C Humidity: 90 to 95% RH Time of test: 240 ± 8 hours
		Equivalent Series Resistance	Less than 200% of initial requirement	
		Current 30 minutes	Less than 120% of initial requirement	
		Appearance	No obvious abnormality	
High Temperature Load		Capacitance	Within ±30% of initial requirement	Conforms to 9.10 Temperature: 70 ±2°C Series resistance: 0 Ω Applied voltage: 3.5 VDC, 6.5 VDC Time of test: 1000 <sup>+48</sup> <sub>-0</sub> hours
		Equivalent Series Resistance	Less than 300% of initial requirement	
		Current 30 minutes	Less than 200% of initial requirement	
		Appearance	No obvious abnormality	