# **FG Series**

The FG series includes small-size electric double-layer capacitors with excellent voltage holding characteristics.

The FG series are ideal as long-time backup devices for minute-current loads in small and lightweight systems.

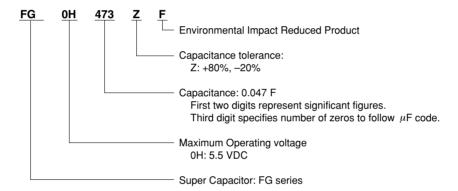
#### **Features**

- The volume of the products is approx. 1/2 that of the FYD type products. (0.22F~2.2F)
- · Added 4.7F/5.5V to series.
- Miniaturized 0.047F/5.5V and 0.10F/5.5V

#### **Applications**

- Backup of CMOS microprocessors, static RAMs, DTSs (digital tuning systems)
- · Memory backup of remote controllers and handy cassette player during battery exchange

#### **Part Number System**



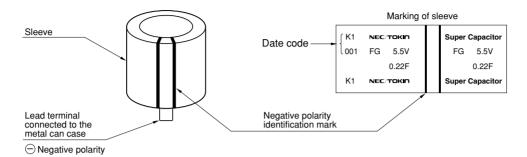


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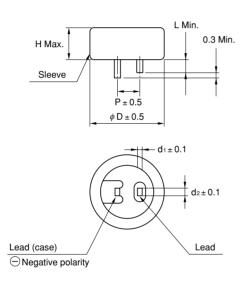
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## **Markings**



### **Dimensions**



				s mm (ir			
Part No.		Weight					
i ait ivo.	D	Н	Р	d <sub>1</sub>	d <sub>2</sub>	L	g (oz)
FG0H103ZF	11.0	5.5	5.08	0.2	1.2	2.7	0.9
	(0.43)	(0.215)	(0.200)	(0.016)	(0.047)	(0.106)	(0.032)
FG0H223ZF	11.0	5.5	5.08	0.2	1.2	2.7	1.0
	(0.43)	(0.215)	(0.200)	(0.016)	(0.047)	(0.106)	(0.035)
FG0H473ZF	11.0	5.5	5.08	0.2	1.2	2.7	1.0
	(0.43)	(0.215)	(0.200)	(0.016)	(0.047)	(0.106)	(0.035)
FG0H104ZF	11.0	6.5	5.08	0.2	1.2	2.7	1.3
	(0.43)	(0.256)	(0.200)	(0.016)	(0.047)	(0.106)	(0.046)
FG0H224ZF	13.0	9.0	5.08	0.4	1.2	2.2	2.5
	(0.512)	(0.355)	(0.200)	(0.016)	(0.047)	(0.087)	(0.088)
FG0H474ZF	14.5	18.0	5.08	0.4	1.2	2.4	5.1
	(0.571)	(0.709)	(0.200)	(0.016)	(0.047)	(0.095)	(0.180)
FG0H105ZF	16.5	19.0	5.08	0.4	1.2	2.7	7.0
	(0.65)	(0.749)	(0.200)	(0.016)	(0.047)	(0.106)	(0.247)
FG0H225ZF	21.5	19.0	7.62	0.6	1.2	3.0	12.1
	(0.85)	(0.749)	(0.300)	(0.024)	(0.047)	(0.118)	(0.427)
FG0H475ZF	28.5	22.0	10.16	0.6	1.4	6.1	27.3
	(1.122)	(0.867)	(0.400)	(0.024)	(0.055)	(0.240)	(0.964)
FG0V155ZF	16.5	14.0	5.08	0.4	1.2	3.1	5.2
	(0.65)	(0.551)	(0.200)	(0.016)	(0.047)	(0.122)	(0.185)

### **Standard Ratings**

Part Number	Max. Operating Voltage (V)	Nominal Capacitance Charge System (F)	Discharge System (F)	Max. ESR (at 1 kHz) (Ω)	Max. Current at 30 minutes (mA)	Voltage Holding Characteristic Min.(V)
FG0H103ZF	5.5	0.01	0.013	300	0.015	4.2
FG0H223ZF	5.5	0.022	0.028	200	0.033	4.2
FG0H473ZF	5.5	0.047	0.060	200	0.071	4.2
FG0H104ZF	5.5	0.10	0.13	100	0.15	4.2
FG0H224ZF	5.5	0.22	0.28	100	0.33	4.2
FG0H474ZF	5.5	0.47	0.60	120	0.71	4.2
FG0H105ZF	5.5	1.0	1.3	65	1.5	4.2
FG0H225ZF	5.5	2.2	2.8	35	3.3	4.2
FG0H475ZF	5.5	4.7	6.0	35	7.1	4.2
FG0V155ZF	3.5	1.5	2.2	65	1.5	_

Note: Weight is typical.

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# **Specifications: FG Series**

		<u>a series</u>		Тос	st Conditions		
Items			Specifications	Conforming to JIS C 5102 <sup>-1994</sup>			
Operating Tempera	ature Range	–25°C to +70°C					
Maximum Operati	ng Voltage.	5.5 Vdc, 3.5 Vdc					
Nominal Capacitance Range		Refer to standard rating	s	Refer to characteristics measuring metho			
Capacitance Allowance		+80 %, -20 %		Refer to characte	eristics measuring method		
Equivalent Series	Resistance	Refer to standard rating	s	Refer to characteristics measuring metho			
Current (30-minut	te value)	Refer to standard rating	S	Refer to characte	eristics measuring metho		
		Capacitance	More than 90% of initial requirement	Conforms to 7.			
Surge Voltage		Equivalent series resistance	Not to exceed 120% of initial requirement	Surge voltage:	6.3V(5.5V products),		
		Current at 30 min.	Not to exceed 120% of initial requirement	Temperature: 7	4.0V(3.5V products)		
		Appearance	No obvious abnormality	Temperature: $70\pm2^{\circ}\text{C}$ Charge: 30 sec. Discharge: 9 min 30 sec. Number of cycles: $1000$ cycles Series resistance: $0.010\text{F}$ : $1500 \Omega$ $0.47\text{F}$ : $30 \Omega$ $0.022\text{F}$ : $560 \Omega$ $1.0\text{F}$ : $15 \Omega$ $0.047\text{F}$ : $300 \Omega$ $1.5\text{F}$ : $15 \Omega$ $0.10\text{F}$ : $150 \Omega$ $2.2\text{F}$ : $100 \Omega$ $0.22\text{F}$ : $100 \Omega$ $100 \Omega$ Discharge resistance: $100 \Omega$			
		Capacitance	50% or higher of initial value	Conforms to 7.12			
Temperature	Phase 2	Equivalent series resistance	4 or less times initial value	Phase 1: +25	±2°C		
Variation of		Capacitance	200% or below of initial value	Phase 2: -25	±2°C		
Characteristics	Phase 5	Equivalent series resistance	Satisfy initial standard value	Phase 4: +25	±2°C		
Onaractorictics		Current at 30 min.	1.5 CV (mA) or below	Phase 5: +70	±2°C		
		Capacitance	Within ±20% of initial value	Phase 6: +25	±2°C		
	Phase 6	Equivalent series resistance	Satisfy initial standard value				
		Current at 30 min.	Satisfy initial standard value				
Lead Strength (Te	ensile)		nanent damage of the leads	Conforms to 8.	1 2 (1)		
	,,,,,,,	Capacitance	iditorit damage of the loads	0011011113 to 0.11.2 (1)			
Vibration Resistance		Equivalent series resistance	Satisfy initial standard value	Conforms to 8.	2.3 (1)		
1.5.4		Current at 30 min.	Salisty willar startdard value	Frequency: 10	to 55 Hz		
		Appearance	No obvious abnormality	Test duration: 6 hours			
Solderability		3 / 4 or more of the pin surface should be covered with new solder		Conforms to 8.4  Solder temperature: 245±5°C  Dipping duration: 5±0.5 sec.  Should be dipped up to 1.6mm from the lower end of the capacitor			
		Capacitance		Conforms to 8.5			
Soldering Heat Re	esistance	Equivalent series resistance	s resistance Satisfy initial standard value		Solder temperature: 260±10°C Dipping duration: 10±1 sec.		
		Current at 30 min.		Should be dipped up to 1.6mm from			
		Appearance	No obvious abnormality		of the capacitor		
		Capacitance		Conforms to 9.			
Temperature Cycl	le	Equivalent series resistance	Satisfy initial standard value	Temperature: -25	5°C → normal temperature		
		Current at 30 min.		→ +70°C → normal temperatur			
		Appearance	No obvious abnormality	Number of cyc	les: 5 cycles		
		Capacitance	Within ±20% of initial value	Conforms to 9.	5		
Humidity Resistar	nce	Equivalent series resistance	1.2 or less times initial standard value	Temperature: 4	10±2°C		
		Current at 30 min.	1.2 or less times initial standard value	Relative humic	lity: 90 to 95% RH		
		Appearance	No obvious abnormality	Test duration: 2	240 ±8hours		
High Temperature Load		Capacitance	Within ±30% of initial value	Conforms to 9.10 Temperature: 70±2°C Voltage applied: MAX. Operating Volta Series protection resistance: 0Ω Test duration: 1000 <sup>16</sup> / <sub>1</sub> hours			
		Equivalent series resistance	Twice or less times initial standard value				
		Current at 30 min.	Twice or less times initial standard value				
		Appearance	No obvious abnormality				
Voltage Holding Characteristics (Self Discharge)			al leads higher than 4.2V	Charging Condition	Voltage applied: 5.0VD (with case side terminal negative Series resistance: 0:0 Charging time: 24 hours		
					Temperature: Lower than 25°C Humidity: Lower than 70%F		

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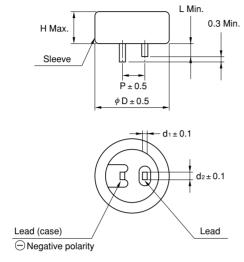
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#### • FGH Type

#### **Dimensions**



Dt N-		Weight					
Part No.	D	Н	Р	d <sub>1</sub>	<b>d</b> 2	L	g
FGH0H104ZF	11.0	5.5	5.08	0.2	1.2	2.7	1.0
FGH0H224ZF	11.0	7.0	5.08	0.2	1.2	2.7	1.3
FGH0H474ZF	16.5	8.0	5.08	0.4	1.2	2.7	4.1
FGH0H105ZF	21.5	9.5	7.62	0.6	1.2	3.0	7.2

Note: Weight is typical.

# **Standard Ratings**

Part Number	Max. Operating Voltage (V)	Charge System (F)	Nominal Capacitance Discharge System (F)	$\begin{array}{c} \text{Max. ESR} \\ (\text{at 1 kHz}) \\ (\Omega) \end{array}$	Max. Current at 30 minutes (mA)	Voltage Holding Characteristic Min.(V)
FGH0H104ZF	5.5	_	0.10	100	0.15	4.2
FGH0H224ZF	5.5	_	0.22	100	0.33	4.2
FGH0H474ZF	5.5	_	0.47	65	0.71	4.2
FGH0H105ZF	5.5	_	1.0	35	1.5	4.2

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# Specifications: FG Series FGH Type

Items			Specifications	Test Conditions Conforming to JIS C 5102 <sup>-1994</sup>			
Operating Temperature Range		-25°C to +70°C			.9		
Maximum Operating Voltage.		5.5 Vdc					
Nominal Capacitance Range		Refer to standard ratin	as	Refer to charact	eristics measuring method.		
Capacitance Allowance		+80 %, -20 %	90	Refer to characteristics measuring method.			
Equivalent Series		Refer to standard ratin	as		eristics measuring method.		
Current (30-minut		Refer to standard ratin	<u> </u>		eristics measuring method.		
Carroni (co mina	to value)	Capacitance	More than 90% of initial requirement	Conforms to 7			
		Equivalent series resistance	· · · · · · · · · · · · · · · · · · ·	Surge voltage:			
		Current at 30 min.	Not to exceed 120% of inital requirement	Temperature:			
		Ourient at 30 min.	Not to exceed 120% of illital requirement	Charge: 30 se			
Surge Voltage				Discharge: 9 min 30 sec. Number of cycles: 1000 cycles Series resistance: 0.10F: 150 $\Omega$ 0.22F: 56 $\Omega$ 0.47F: 30 $\Omega$ 1.0F: 15 $\Omega$ Discharge resistance: 0 $\Omega$			
	Dhasa 0	Capacitance	50% or higher of initial value	Conforms to 7	.12		
	Phase 2	Equivalent series resistance	4 or less times initial value	Phase 1: +25	±2°C		
Temperature		Capacitance	200% or below of initial value	Phase 2: -25	±2°C		
Variation of	Phase 5	Equivalent series resistance	Satisfy initial standard value	Phase 4: +25	±2°C		
Characteristics		Current at 30 min.	1.5 CV (mA) or below	Phase 5: +70	±2°C		
		Capacitance	Within ±20% of initial value	Phase 6: +25	±2°C		
	Phase 6	Equivalent series resistance	Satisfy initial standard value				
		Current at 30 min.	Satisfy initial standard value				
Lead Strength (Te	ensile)		nanent damage of the leads	Conforms to 8	1.2 (1)		
<u> </u>	,	Capacitance					
Vibration Resistar	nce	Equivalent series resistance Current at 30 min.  Meet initial standard value		Conforms to 8			
				Frequency: 10	to 55 Hz		
		Appearance	No obvious abnormality	Test duration:	6 hours		
		7.6504.4.100	The deviced definitions	Conforms to 8	1		
				Solder temperature: 245±5°C			
Solderability		3 / 4 or more of the pin	surface should be covered with new solder				
o o i do i do i i i i				Dipping duration: 5±0.5 sec.			
				Should be dipped up to 1.6mm from the lower end of the capacitor			
		Capacitance		Conforms to 8			
Solder Heat Resis	ctanco	<u> </u>	Chould natiofy initial atandard value	Solder temperature: 260±10°C			
Solder Heat Hesis	stance	· .	should satisfy initial standard value		Dipping duration: 10±1 sec.		
		Current at 30 min.	NI - de	Should be dipped up to 1.6mm from			
		Appearance	No obvious abnormality	the lower end	of the capacitor		
Tomporeture O	lo.	Capacitance	Cation, initial atomicand colors	Conforms to 9			
Temperature Cyc	ie	Equivalent series resistance	Satisfy initial standard value	Temperature: –25°C → normal temperature			
		Current at 30 min.		→ +/0 Number of cyc	0°C → normal temperature		
		Appearance	No obvious abnormality	·			
		Capacitance	Within ±20% of initial value	Conforms to 9	-		
Humidity Resistar	nce	Equivalent series resistance	1.2 or less times initial standard value	Temperature: 4			
		Current at 30 min.	1.2 or less times initial standard value	Relative humic	lity: 90 to 95% RH		
		Appearance	No obvious abnormality	Test duration:	240 ±8hours		
High Temperature Load		Capacitance	Within ±30% of initial value	Conforms to 9.			
		Equivalent series resistance Twice or less times initial standard value		Temperature: 70±2°C Voltage applied: 5.5Vdc			
		Current at 30 min.	Twice or less times initial standard value	Series protecti	on resistance: 0Ω		
		Appearance	No obvious abnormality	Test duration:	1000 <sup>+48</sup> hours		
					Voltage applied: 5.0VDC		
				Charging	(with case side terminal negative)		
Voltage Holding C	haracteristics	Voltage between terminal leads higher than 4.2V		Condition	Series resistance: 0Ω Charging time: 24 hours		
(Self Discharge)					Time: 24 hours		
(				Storage	Temperature: Lower than 25°C		

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