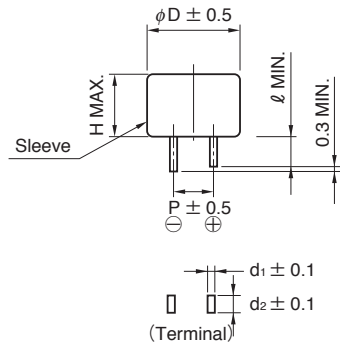
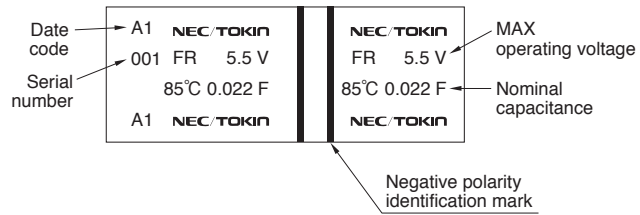


## 6.6 FR Series

### Dimensions



### Markings on sleeve



### Specifications

Part Number	MAX operating voltage (Vdc)	Nominal capacitance		MAX ESR (at 1 kHz) ( $\Omega$ )	MAX current at 30 min. (mA)	Voltage holding characteristics (V)	Dimension (unit:mm)						Weight (g)
		Charge system (F)	Discharge system (F)				$\phi D$	H	P	$\ell$	$d_1$	$d_2$	
FR0H223ZF	5.5	0.022	0.028	220	0.033	4.2	11.5	14.0	5.08	2.7	0.4	1.2	2.3
FR0H473ZF	5.5	0.047	0.060	110	0.071	4.2	14.5	14.0	5.08	2.4	0.4	1.2	3.9
FR0H104ZF	5.5	0.10	0.15	150	0.15	4.2	14.5	15.5	5.08	2.4	0.4	1.2	4.3
FR0H224ZF	5.5	0.22	0.33	180	0.33	4.2	14.5	21.0	5.08	2.4	0.4	1.2	5.3
FR0H474ZF	5.5	0.47	0.75	100	0.71	4.2	16.5	21.5	5.08	2.7	0.4	1.2	7.5
FR0H105ZF	5.5	1.0	1.6	60	1.5	4.2	21.5	22.0	7.62	3.0	0.6	1.2	13.3



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## Specifications

Series name		FR type		Test conditions (conforming to JIS C 5160-1)	
Item					
Category temperature range		-40℃ to +85℃			
MAX operating voltage		5.5Vdc			
Capacitance		0.022F to 1.0F		Refer to "Measurement Conditions"	
Capacitance allowance		+80 %, -20 %		Refer to "Measurement Conditions"	
ESR		Refer to standard ratings		Measured at 1kHz, 10mA ; See also "Measurement Conditions"	
Current (30-minutes value)		Refer to standard ratings		Refer to "Measurement Conditions"	
Surge	Capacitance	More than 90% of initial ratings		Surge voltage : 6.3V (5.5V type)	
	ESR	Not to exceed 120% of initial ratings		Charge : 30 sec.	
	Current (30 minutes value)	Not to exceed 120% of initial ratings		Discharge : 9min 30sec.	
	Appearance	No obvious abnormality		Number of cycles : 1000	
				Series resistance : 0.022F 560Ω	
: 0.047F 300Ω					
: 0.068F 240Ω					
: 0.10F 150Ω					
		: 0.22F 56Ω			
		: 0.47F 30Ω			
		: 1.0F 15Ω			
		Discharge resistance : 0Ω			
		Temperature : 70±2℃			
Characteristics in different temperature	Capacitance	Phase 2	50% or higher than initial value	Conforms to 4.17 Phase1 : +25±2℃ Phase2 : -25±2℃ Phase3 : -40±2℃ Phase4 : +25±2℃ Phase5 : +70±2℃ Phase6 : +25±2℃	
	ESR		400% or less than initial value		
	Capacitance	Phase 3	30% or higher than initial value		
	ESR		700% or less than initial value		
	Capacitance	Phase 5	200% or less than initial value		
	ESR		Satisfy initial ratings		
	Current (30 minutes value)	Phase 6	1.5CV (mA) or below		
	Capacitance		Within ±20% of initial value		
	ESR		Satisfy initial ratings		
Current (30 minutes value)	Satisfy initial ratings				
Lead strength (tensile)		No terminal damage		Conforms to 4.9	
Vibration resistance	Capacitance	Satisfy initial ratings		Conforms to 4.13 Frequency : 10 to 55 Hz Testing time : 6 hours	
	ESR				
	Current (30 minutes value)				
	Appearance				
Solderability		Over 3/4 of the terminal should be covered by the new solder		Conforms to 4.11 Solder temp : 245±5℃ Dipping time : 5±0.5 sec. 1.6mm from the bottom should be dipped.	
Solder heat resistance	Capacitance	Satisfy initial ratings		Conforms to 4.10 Solder temp : 260±10℃ Dipping time : 10±1 sec. 1.6mm from the bottom should be dipped.	
	ESR				
	Current (30 minutes value)				
	Appearance				
Temperature cycle	Capacitance	Satisfy initial ratings		Conforms to 4.12 Temperature condition : -40℃→Room temperature→+85℃→Room temperature Number of cycles : 5 Cycles	
	ESR				
	Current (30 minutes value)				
	Appearance				
High temp. and high humidity resistance	Capacitance	Within ±20% of initial value		Conforms to 4.14 Temperature : 40±2℃ Relative humidity : 90 to 95 %RH Testing time : 240±8 hours	
	ESR	Not to exceed 120% of initial ratings			
	Current (30 minutes value)	Not to exceed 120% of initial ratings			
	Appearance	No obvious abnormality			
High temperature load	Capacitance	Within ±30% of initial value		Conforms to 4.15 Temperature : 85±2℃ Voltage applied : MAX operating voltage Series protection resistance : 0Ω Testing time : 1000 <sup>±</sup> Hours	
	ESR	Below 200% of initial ratings			
	Current (30 minutes value)	Below 200% of initial ratings			
	Appearance	No obvious abnormality			
Self discharge characteristics (voltage holding characteristics)		Voltage between terminal leads higher than 4.2V		Charging condition	Voltage applied : 5.0Vdc (Terminal at the case's side be negative) Series resistance : 0Ω Charging time : 24 hours
				Storage	Let stand for 24 hours in condition described below with terminals opened. Ambient temperature : Lower than 25℃ Relative humidity : Lower than 70%RH



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