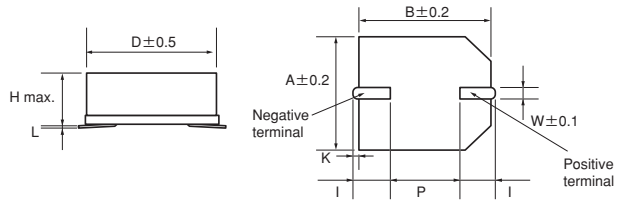
6. Rated Specifications

6.1 FC Series

Features

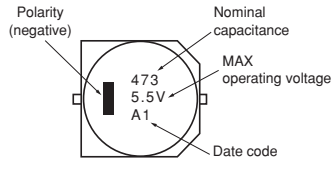
- Enables surface mounting.
- High rated voltage of 5.5V.
- High leakage reliability.

Dimensions

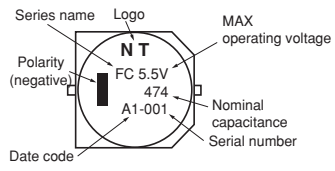


Markings

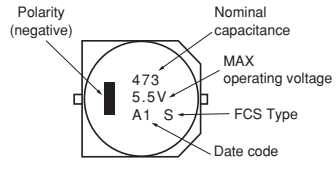
Displays nominal capacitance, MAX operating voltage serial number, polarity and etc.



FC0H473ZFTBR24
FC0H104ZFTBR24
FC0H224ZFTBR24
FC0V104ZFTBR24
FC0V224ZFTBR24
FC0V474ZFTBR24
FCH0V683ZFTBR16
FCH0V433ZFTBR16



FC0H474ZFTBR32-SS
FC0H105ZFTBR44-SS



FCS0H473ZFTBR24
FCS0H104ZFTBR24
FCS0H224ZFTBR24
FCS0V104ZFTBR24
FCS0V224ZFTBR24
FCS0V474ZFTBR24

Standard models

● FC Type

Part Number	Max. Operating Voltage (Vdc)	Nominal Capacitance Discharge system (F)	Max. ESR (at 1kHz) (Ω)	Max. current at 30 minutes (mA)	Voltage Holding Characteristic Min. (V)	Dimension (Unit:mm)									Weight (g)
						D	H	A	B	I	W	P	K	L	
FC0H473ZFTBR24	5.5	0.047	50	0.071	4.2	10.5	5.5	10.8	10.8	3.6±0.5	1.2	5.0	0.7±0.3	$0^{+0.3}_{-0.1}$	1.0
FC0H104ZFTBR24	5.5	0.10	25	0.15	4.2	10.5	5.5	10.8	10.8	3.6±0.5	1.2	5.0	0.7±0.3	$0^{+0.3}_{-0.1}$	1.0
FC0H224ZFTBR24	5.5	0.22	25	0.33	4.2	10.5	8.5	10.8	10.8	3.6±0.5	1.2	5.0	0.7±0.3	$0^{+0.3}_{-0.1}$	1.4
FC0H474ZFTBR32-SS	5.5	0.47	13	0.71	4.2	16.0	9.5	16.3	16.3	6.8±1.0	1.2	5.0	1.2±0.5	$0^{+0.5}_{-0.1}$	4.0
FC0H105ZFTBR44-SS	5.5	1.0	7	1.50	4.2	21.0	10.5	21.6	21.6	7.0±1.0	1.4	10.0	1.2±0.5	$0^{+0.5}_{-0.1}$	6.7
FC0V104ZFTBR24	3.5	0.10	50	0.09	—	10.5	5.5	10.8	10.8	3.6±0.5	1.2	5.0	0.7±0.3	$0^{+0.3}_{-0.1}$	1.0
FC0V224ZFTBR24	3.5	0.22	25	0.20	—	10.5	5.5	10.8	10.8	3.6±0.5	1.2	5.0	0.7±0.3	$0^{+0.3}_{-0.1}$	1.0
FC0V474ZFTBR24	3.5	0.47	25	0.42	—	10.5	8.5	10.8	10.8	3.6±0.5	1.2	5.0	0.7±0.3	$0^{+0.3}_{-0.1}$	1.4

● FCH Type

Part Number	Max. Operating Voltage (Vdc)	Nominal Capacitance Discharge system (F)	Max. ESR (at 1kHz) (Ω)	Max. current at 30 minutes (mA)	Voltage Holding Characteristic Min. (V)	Dimension (Unit:mm)									Weight (g)
						D	H	A	B	I	W	P	K	L	
FCH0V683ZFTBR16	3.6	0.068	40	0.062	—	6.8	3.7	6.8	6.8	2.9±0.5	0.7	2.5	0.7±0.3	$0^{+0.3}_{-0.1}$	0.3
FCH0H433ZFTBR16	5.5	0.043	50	0.065	—	6.8	5.0	6.8	6.8	2.9±0.5	0.7	2.5	0.7±0.3	$0^{+0.3}_{-0.1}$	0.4

● FCS Type

Part Number	Max. Operating Voltage (Vdc)	Nominal Capacitance Discharge system (F)	Max. ESR (at 1kHz) (Ω)	Max. current at 30 minutes (mA)	Voltage Holding Characteristic Min. (V)	Dimension (Unit:mm)									Weight (g)
						D	H	A	B	I	W	P	K	L	
FCS0H473ZFTBR24	5.5	0.047	100	0.071	4.2	10.7	5.5	10.8	10.8	3.9±0.5	1.2	5.0	0.9±0.3	$0^{+0.3}_{-0.1}$	1.0
FCS0H104ZFTBR24	5.5	0.10	50	0.15	4.2	10.7	5.5	10.8	10.8	3.9±0.5	1.2	5.0	0.9±0.3	$0^{+0.3}_{-0.1}$	1.0
FCS0H224ZFTBR24	5.5	0.22	50	0.33	4.2	10.7	8.5	10.8	10.8	3.9±0.5	1.2	5.0	0.9±0.3	$0^{+0.3}_{-0.1}$	1.4
FCS0V104ZFTBR24	3.5	0.10	100	0.09	—	10.7	5.5	10.8	10.8	3.9±0.5	1.2	5.0	0.9±0.3	$0^{+0.3}_{-0.1}$	1.0
FCS0V224ZFTBR24	3.5	0.22	50	0.20	—	10.7	5.5	10.8	10.8	3.9±0.5	1.2	5.0	0.9±0.3	$0^{+0.3}_{-0.1}$	1.0
FCS0V474ZFTBR24	3.5	0.47	50	0.42	—	10.7	8.5	10.8	10.8	3.9±0.5	1.2	5.0	0.9±0.3	$0^{+0.3}_{-0.1}$	1.4

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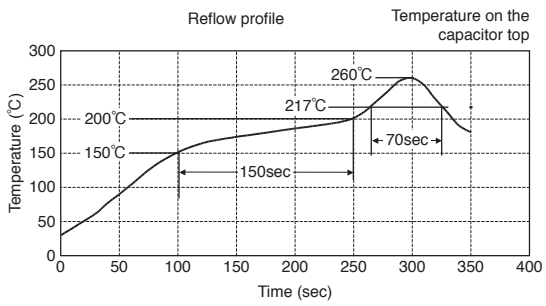
Precautions for use

- This series is exclusively for reflow soldering. It is designed for thermal conduction system such as combination use of infrared ray and heat blow. Consult with NEC TOKIN before applying other methods.
- The reflow condition must be kept within reflow profile graphs shown below.
- Applying reflow soldering is limited to 2 times. After the first reflow, cool down the capacitor thoroughly to 5-35℃ before the second reflow.

Always consult with NEC TOKIN when applying reflow soldering in a more severe condition than the condition described here.

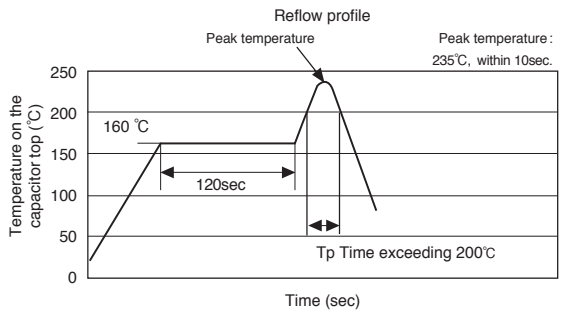
・FCS Type

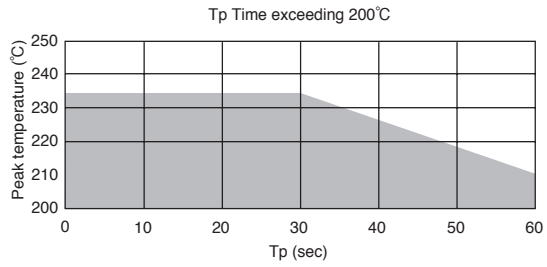


・Above "Reflow Profile" graph indicates temperature at the terminals and capacitor top.

Peak temperature	Below 260℃
Over 255℃	Within 10sec.
Over 230℃	Within 45sec.
Over 220℃	Within 60sec.
Over 217℃	Within 70sec.
Time between 150℃ to 200℃ (temperature zone over 170℃ =within 50sec.)	150sec.

・FC, FCH Type





・Above "Reflow Profile" graph indicates temperature at the terminals and capacitor top.

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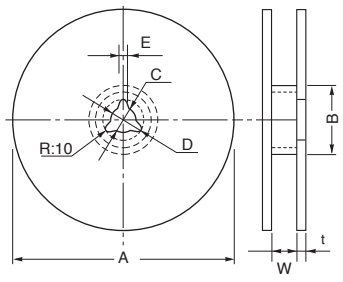
Tape and Reel Dimensions

[Reel Dimensions]

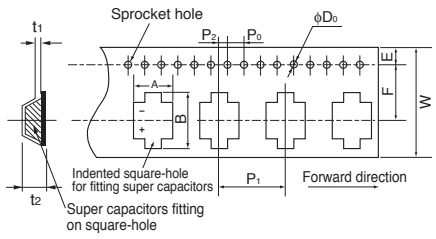


(mm)

Mark	TBR16	TBR24		TBR32	TBR44
A	380±2	380±2		330±2	380±2
B	80±1	Product height 5.5mm	80±1	100±1	100±1
		Product height 8.5mm	100±1		
C	13±0.5	13±0.5		13±0.5	13±0.5
D	21±0.8	21±0.8		21±0.8	21±0.8
E	2±0.5	2±0.5		2±0.5	2±0.5
W	17.5±1.0	Product height 5.5mm	25.5±0.5	33.5±1.0	45.5±1.0
		Product height 8.5mm	25.5±1.0		
t	2.0	2.0		2.0	2.0

Dimensions of indented [square-hole plastic tape]

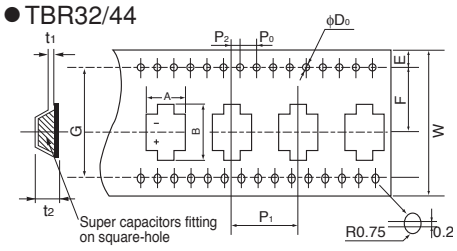
● TBR16/24



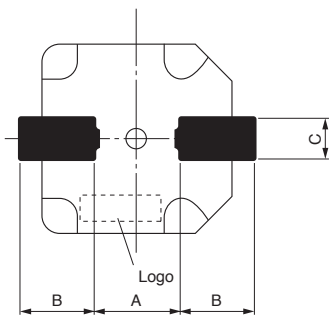
(mm)

Mark	TBR16	TBR24		TBR32	TBR44
W	16.0	24.0		32.0	44.0
A	7.2	11.4		18.0	23.0
B	9.0	13.0		20.0	25.0
P_0	4.0	4.0		4.0	4.0
P_1	12.0	16.0		24.0	32.0
P_2	2.0	2.0		2.0	2.0
F	7.5	11.5		14.2	20.2
ϕD_0	1.55	1.55		1.55	1.55
t_1	0.4	0.4		0.5	0.5
E	1.75	1.75		1.75	1.75
t_2	5.0	Product height 5.5mm	6.0	10.0	12.0
		Product height 8.5mm	8.4		
G	–	–		28.4	40.4

● TBR32/44



Recommended land pattern



Land pattern

(mm)

Part Number	A	B	C
FC0H473ZFTBR24	5.0	4.6	2.5
FC0H104ZFTBR24	5.0	4.6	2.5
FC0H224ZFTBR24	5.0	4.6	2.5
FC0H474ZFTBR32-SS	5.0	10.0	2.5
FC0H105ZFTBR44-SS	10.0	10.5	3.5
FC0V104ZFTBR24	5.0	4.6	2.5
FC0V224ZFTBR24	5.0	4.6	2.5
FC0V474ZFTBR24	5.0	4.6	2.5
FCH0V683ZFTBR16	2.5	4.0	1.4
FCH0H433ZFTBR16	2.5	4.0	1.4
FCS0H473ZFTBR24	5.0	4.9	2.5
FCS0H104ZFTBR24	5.0	4.9	2.5
FCS0H224ZFTBR24	5.0	4.9	2.5
FCS0V104ZFTBR24	5.0	4.9	2.5
FCS0V224ZFTBR24	5.0	4.9	2.5
FCS0V474ZFTBR24	5.0	4.9	2.5

Lead terminal

(mm)

Part Number	A	B	C
FC0H473ZFTBR24	5.0	3.6	1.2
FC0H104ZFTBR24	5.0	3.6	1.2
FC0H224ZFTBR24	5.0	3.6	1.2
FC0H474ZFTBR32-SS	5.0	6.8	1.2
FC0H105ZFTBR44-SS	10.0	7.0	1.4
FC0V104ZFTBR24	5.0	3.6	1.2
FC0V224ZFTBR24	5.0	3.6	1.2
FC0V474ZFTBR24	5.0	3.6	1.2
FCH0V683ZFTBR16	2.5	2.9	0.7
FCH0H433ZFTBR16	2.5	2.9	0.7
FCS0H473ZFTBR24	5.0	3.9	1.2
FCS0H104ZFTBR24	5.0	3.9	1.2
FCS0H224ZFTBR24	5.0	3.9	1.2
FCS0V104ZFTBR24	5.0	3.9	1.2
FCS0V224ZFTBR24	5.0	3.9	1.2
FCS0V474ZFTBR24	5.0	3.9	1.2

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Specifications

Item \ Series name		FC		Test conditions (conforming to JIS C 5160-1)
		5.5V type, 3.5V type		
Category temperature range		−25℃ to +70℃		
MAX operating voltage		5.5Vdc, 3.5Vdc		
Capacitance		Refer to standard ratings		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：4.0V (3.5V type, 3.6V type) ：6.3V (5.5V type) Charge：30 sec. Discharge：9min 30sec. Number of cycles：1000 Series resistance：0.043F, 0.047F 300Ω ：0.068F 240Ω ：0.10F 150Ω ：0.22F 56Ω ：0.47F 30Ω ：1.0F 15Ω Discharge resistance：0Ω Temperature：70±2℃
	ESR	Not to exceed 120% of initial ratings		
	Current (30 minutes value)	Not to exceed 120% of initial ratings		
	Appearance	No obvious abnormality		
* Characteristics in different temperature	Capacitance	Phase 2	50% higher than initial value	Conforms to 4.17 Phase1：+25±2℃ Phase2：−25±2℃ Phase4：+25±2℃ Phase5：+70±2℃ Phase6：+25±2℃
	ESR		400% or less than initial value	
	Capacitance	Phase 3		
	ESR			
	Capacitance	Phase 5	200% or less than initial value	
	ESR		Satisfy initial ratings	
	Current (30 minutes value)		1.5CV (mA) or below	
	Capacitance	Phase 6	Within ±20% of initial value	
	ESR		Satisfy initial ratings	
	Current (30 minutes value)		Satisfy initial ratings	
* 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	No obvious abnormality		
* Solder heat resistance	Capacitance	Satisfy initial ratings		Cooled down to ambient temperature after reflow soldering, then the product must fulfill the condition stated left. (See page 10 for reflow condition)
	ESR			
	Current (30 minutes value)			
	Appearance	No obvious abnormality		
* Temperature cycle	Capacitance	Satisfy initial ratings		Conforms to 4.12 Temperature condition：−25℃→Room temperature→+70℃→Room temperature Number of cycles：5 Cycles
	ESR			
	Current (30 minutes value)			
	Appearance	No obvious abnormality		
* 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 Voltage applied：MAX operating voltage Series protection resistance：0Ω Testing time：1000^{+48}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)		5.5V type: Voltage between terminal leads higher than 4.2V 3.5V type: Not specified		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

As for items with “*” , it must fulfill the above condition after the reflow soldering. (See page 10 for reflow conditions)

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