

### Surface Mount Type

Series: **FC** Type : **V**  
**FC** High temperature Lead-Free reflow(suffix:A\*)

Country of Origin  
 Japan  
 Malaysia



- **Features** Endurance : 105°C 1000 h, 5.4mm height( ≤ φ6.3)  
 Low impedance (1/2 for HA series)  
 Vibration-proof product is available upon request.(φ8 ≤)  
 RoHS directive compliant

#### ■ Specifications

Category temp. range	-40 to +105°C							
Rated W.V. Range	6.3 to 50 V .DC							
Nominal Cap. Range	1 to 1500 μ F							
Capacitance Tolerance	±20 % (120Hz/+20°C)							
DC Leakage Current	I ≤ 0.01 CV or 3(μ A) after 2 minutes (Whichever is greater)							
tan δ	Please see the attached standard products lists							
Characteristics at Low Temperature	W.V. (V)	6.3	10	16	25	35	50	(Impedance ratio at 120 Hz)
	-25 / +20 °C	2	2	2	2	2	2	
	-40 / +20 °C	3	3	3	3	3	3	
Endurance	After applying rated working voltage for 1000 hours at +105±2°C and then being stabilized at +20°C, capacitors shall meet the following limits.							
	Capacitance change	±20% of initial measured value						
	tan δ	≤ 200 % of initial specified value						
	DC leakage current	≤ initial specified value						
Shelf Life	After storage for 1000 hours at +105±2°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet the limits specified in Endurance.(With voltage treatment)							
	After reflow soldering and then being stabilized at +20°C, capacitor shall meet the following limits.							
Resistance to Soldering Heat	After reflow soldering and then being stabilized at +20°C, capacitor shall meet the following limits.							
	Capacitance change	±10% of initial measured value						
	tan δ	≤ initial specified value						
	DC leakage current	≤ initial specified value						

#### ■ Marking

Example: 35V 1 μF (Polarized)  
 Lead-Free products

W.V. code

V	6.3	10	16	25	35	50
Code	j	A	C	E	V	H

#### ■ Dimensions in mm (not to scale)

E, F, G = L±0.3

Size code	D	L	A,B	H	I	W	P	K
B	4.0	5.4	4.3	5.5MAX	1.8	0.65±0.1	1.0	0.35 -0.20 to +0.15
C	5.0	5.4	5.3	6.5MAX	2.2	0.65±0.1	1.5	0.35 -0.20 to +0.15
D	6.3	5.4	6.6	7.8MAX	2.6	0.65±0.1	1.8	0.35 -0.20 to +0.15
E	8.0	6.2	8.3	9.5MAX	3.4	0.65±0.1	2.2	0.35 -0.20 to +0.15
F	8.0	10.2	8.3	10.0MAX	3.4	0.90±0.2	3.1	0.70 ±0.2
G	10.0	10.2	10.3	12.0MAX	3.5	0.90±0.2	4.6	0.70 ±0.2

#### ■ Case size

Cap. (μF)	W.V.(V)	6.3 (0J)	10 (1A)	16 (1C)	25 (1E)	35 (1V)	50(1H)
1 to 3.3						B*	B
4.7						B*	C
6.8					B*	C*	
10				B*		C*	D
22	B*			C*	D*	D*	E
33			C*		D*	E*	F
47	C*			D*	E*	E*	G
68	D*			E*	F*		
100	D*		E*	E*	F*	G*	G
150			E*				
220	E*			G*	G*	G*	G
330	F*			G*	G*	G*	
470			G*	G*	G*		
680				G*			
1000	G*		G*				
1500	G*						

#### ■ Impedance (Ω) (100kHz/+20°C)

(6.3 to 35W.V)

Size Code	B	C	D	E	F	G
Impedance	3.0	1.8	1.0	0.4	0.3	0.15

(50W.V)

Size Code	B	C	D	E	F	G
Impedance	5.0	3.0	2.0	0.7	0.6	0.3

\* High temperature Lead-Free products are available.  
 (AR or AP. See P/N list)

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### ■ Standard Products

Endurance : 105°C 1000h

W.V. (V)	Cap. (±20%) (μF)	Case size			Specification			Part No. (RoHS:compliant)	Min. Packaging Q'ty	
		Dia. (mm)	Length (mm)	Size Code	Ripple current (100kHz) (+105°C) (mA)	tan δ (120Hz) (+20°C)	Impe- dance (100kHz) (+20°C) (Ω)		Reflow	Taping (pcs)
6.3	22	4	5.4	B	60	0.26	3.00	EEEF0J220R	(1)	2000
	47	5	5.4	C	95	0.26	1.80	EEEF0J470R	(1)	1000
	68	6.3	5.4	D	140	0.26	1.00	EEEF0J680P	(1)	1000
	100	6.3	5.4	D	140	0.26	1.00	EEEF0J101P	(1)	1000
	220	8	6.2	E	230	0.26	0.40	EEEF0J221P	(2)	1000
	330	8	10.2	F	450	0.26	0.30	EEEF0J331P	(2)	500
	1000	10	10.2	G	670	0.26	0.15	EEEF0J102P	(2)	500
	1500	10	10.2	G	670	0.26	0.15	EEEF0J152P	(2)	500
10	33	5	5.4	C	95	0.19	1.80	EEEF1A330R	(1)	1000
	100	8	6.2	E	230	0.19	0.40	EEEF1A101P	(2)	1000
	150	8	6.2	E	230	0.19	0.40	EEEF1A151P	(2)	1000
	220	8	10.2	F	450	0.19	0.30	EEEF1A221P	(2)	500
	470	10	10.2	G	670	0.19	0.15	EEEF1A471P	(2)	500
	1000	10	10.2	G	670	0.19	0.15	EEEF1A102P	(2)	500
16	10	4	5.4	B	60	0.16	3.00	EEEF1C100R	(1)	2000
	22	5	5.4	C	95	0.16	1.80	EEEF1C220R	(1)	1000
	47	6.3	5.4	D	140	0.16	1.00	EEEF1C470P	(1)	1000
	68	8	6.2	E	230	0.16	0.40	EEEF1C680P	(2)	1000
	100	8	6.2	E	230	0.16	0.40	EEEF1C101P	(2)	1000
	220	10	10.2	G	670	0.16	0.15	EEEF1C221P	(2)	500
	330	10	10.2	G	670	0.16	0.15	EEEF1C331P	(2)	500
	470	10	10.2	G	670	0.16	0.15	EEEF1C471P	(2)	500
	680	10	10.2	G	670	0.16	0.15	EEEF1C681P	(2)	500
25	6.8	4	5.4	B	60	0.14	3.00	EEEF1E6R8R	(1)	2000
	22	6.3	5.4	D	140	0.14	1.00	EEEF1E220P	(1)	1000
	33	6.3	5.4	D	140	0.14	1.00	EEEF1E330P	(1)	1000
	47	8	6.2	E	230	0.14	0.40	EEEF1E470P	(2)	1000
	68	8	10.2	F	450	0.14	0.30	EEEF1E680P	(2)	500
	100	8	10.2	F	450	0.14	0.30	EEEF1E101P	(2)	500
	220	10	10.2	G	670	0.14	0.15	EEEF1E221P	(2)	500
	330	10	10.2	G	670	0.14	0.15	EEEF1E331P	(2)	500
	470	10	10.2	G	670	0.14	0.15	EEEF1E471P	(2)	500
35	1	4	5.4	B	60	0.12	3.00	EEEF1V1R0R	(1)	2000
	2.2	4	5.4	B	60	0.12	3.00	EEEF1V2R2R	(1)	2000
	3.3	4	5.4	B	60	0.12	3.00	EEEF1V3R3R	(1)	2000
	4.7	4	5.4	B	60	0.12	3.00	EEEF1V4R7R	(1)	2000
	6.8	5	5.4	C	95	0.12	1.80	EEEF1V6R8R	(1)	1000
	10	5	5.4	C	95	0.12	1.80	EEEF1V100R	(1)	1000
	22	6.3	5.4	D	140	0.12	1.00	EEEF1V220P	(1)	1000
	33	8	6.2	E	230	0.12	0.40	EEEF1V330P	(2)	1000
	47	8	6.2	E	230	0.12	0.40	EEEF1V470P	(2)	1000
	100	10	10.2	G	670	0.12	0.15	EEEF1V101P	(2)	500
220	10	10.2	G	670	0.12	0.15	EEEF1V221P	(2)	500	

The taping dimensions are explained on p.195 of our Catalog.

Please use it as a reference guide.

Reflow Profile(Fig-1 to Fig-6) listed on last page of our Catalog.

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Mar. 2006

### ■ Standard Products

Endurance : 105°C 1000h

W.V. (V)	Cap. (±20%) (μF)	Case size			Specification			Part No. (RoHS:compliant)	Reflow	Min. Packaging Q'ty
		Dia. (mm)	Length (mm)	Size Code	Ripple current (100kHz) (+105°C) (mA)	tan δ (120Hz) (+20°C)	Impe- dance (100kHz) (+20°C) (Ω)			Taping (pcs)
35	330	10	10.2	G	670	0.12	0.15	EEEFC1V331P	(2)	500
50	1	4	5.4	B	30	0.12	5.00	EEEFC1H1R0R	(1)	2000
	2.2	4	5.4	B	30	0.12	5.00	EEEFC1H2R2R	(1)	2000
	3.3	4	5.4	B	30	0.12	5.00	EEEFC1H3R3R	(1)	2000
	4.7	5	5.4	C	50	0.12	3.00	EEEFC1H4R7R	(1)	1000
	10	6.3	5.4	D	70	0.12	2.00	EEEFC1H100P	(1)	1000
	22	8	6.2	E	120	0.12	0.70	EEEFC1H220P	(2)	1000
	33	8	10.2	F	300	0.12	0.60	EEEFC1H330P	(2)	500
	47	10	10.2	G	500	0.12	0.30	EEEFC1H470P	(2)	500
	100	10	10.2	G	500	0.12	0.30	EEEFC1H101P	(2)	500
220	10	10.2	G	500	0.12	0.30	EEEFC1H221P	(2)	500	

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■ High temperature Lead-Free reflow products

Endurance:105°C 1000h

W.V. (V)	Cap. (±20%) (μF)	Case size			Specification			Part No. (RoHS:compliant)	Reflow	Min. Packaging Q'ty  Taping (pcs)
		Dia. (mm)	Length (mm)	Size Code	Ripple current (100kHz) (+105°C) (mA)	tan δ (120Hz) (+20°C)	Impe- dance (100kHz) (+20°C) (Ω)			
6.3	22	4	5.4	B	60	0.26	3.00	EEEF0J220AR	(5)	2000
	47	5	5.4	C	95	0.26	1.80	EEEF0J470AR	(5)	1000
	68	6.3	5.4	D	140	0.26	1.00	EEEF0J680AP	(5)	1000
	100	6.3	5.4	D	140	0.26	1.00	EEEF0J101AP	(5)	1000
	220	8	6.2	E	230	0.26	0.40	EEEF0J221AP	(6)	1000
	330	8	10.2	F	450	0.26	0.30	EEEF0J331AP	(5)	500
	1000	10	10.2	G	670	0.26	0.15	EEEF0J102AP	(6)	500
	1500	10	10.2	G	670	0.26	0.15	EEEF0J152AP	(6)	500
10	33	5	5.4	C	95	0.19	1.80	EEEF1A330AR	(5)	1000
	100	8	6.2	E	230	0.19	0.40	EEEF1A101AP	(6)	1000
	150	8	6.2	E	230	0.19	0.40	EEEF1A151AP	(6)	1000
	220	8	10.2	F	450	0.19	0.30	EEEF1A221AP	(5)	500
	470	10	10.2	G	670	0.19	0.15	EEEF1A471AP	(6)	500
	1000	10	10.2	G	670	0.19	0.15	EEEF1A102AP	(6)	500
16	10	4	5.4	B	60	0.16	3.00	EEEF1C100AR	(5)	2000
	22	5	5.4	C	95	0.16	1.80	EEEF1C220AR	(5)	1000
	47	6.3	5.4	D	140	0.16	1.00	EEEF1C470AP	(5)	1000
	68	8	6.2	E	230	0.16	0.40	EEEF1C680AP	(6)	1000
	100	8	6.2	E	230	0.16	0.40	EEEF1C101AP	(6)	1000
	220	10	10.2	G	670	0.16	0.15	EEEF1C221AP	(6)	500
	330	10	10.2	G	670	0.16	0.15	EEEF1C331AP	(6)	500
	470	10	10.2	G	670	0.16	0.15	EEEF1C471AP	(6)	500
	680	10	10.2	G	670	0.16	0.15	EEEF1C681AP	(6)	500
25	6.8	4	5.4	B	60	0.14	3.00	EEEF1E6R8AR	(5)	2000
	22	6.3	5.4	D	140	0.14	1.00	EEEF1E220AP	(5)	1000
	33	6.3	5.4	D	140	0.14	1.00	EEEF1E330AP	(5)	1000
	47	8	6.2	E	230	0.14	0.40	EEEF1E470AP	(6)	1000
	68	8	10.2	F	450	0.14	0.30	EEEF1E680AP	(5)	500
	100	8	10.2	F	450	0.14	0.30	EEEF1E101AP	(5)	500
	220	10	10.2	G	670	0.14	0.15	EEEF1E221AP	(6)	500
	330	10	10.2	G	670	0.14	0.15	EEEF1E331AP	(6)	500
	470	10	10.2	G	670	0.14	0.15	EEEF1E471AP	(6)	500
35	1	4	5.4	B	60	0.12	3.00	EEEF1V1R0AR	(5)	2000
	2.2	4	5.4	B	60	0.12	3.00	EEEF1V2R2AR	(5)	2000
	3.3	4	5.4	B	60	0.12	3.00	EEEF1V3R3AR	(5)	2000
	4.7	4	5.4	B	60	0.12	3.00	EEEF1V4R7AR	(5)	2000
	6.8	5	5.4	C	95	0.12	1.80	EEEF1V6R8AR	(5)	1000
	10	5	5.4	C	95	0.12	1.80	EEEF1V100AR	(5)	1000
	22	6.3	5.4	D	140	0.12	1.00	EEEF1V220AP	(5)	1000
	33	8	6.2	E	230	0.12	0.40	EEEF1V330AP	(6)	1000
	47	8	6.2	E	230	0.12	0.40	EEEF1V470AP	(6)	1000
	100	10	10.2	G	670	0.12	0.15	EEEF1V101AP	(6)	500
	220	10	10.2	G	670	0.12	0.15	EEEF1V221AP	(6)	500
330	10	10.2	G	670	0.12	0.15	EEEF1V331AP	(6)	500	

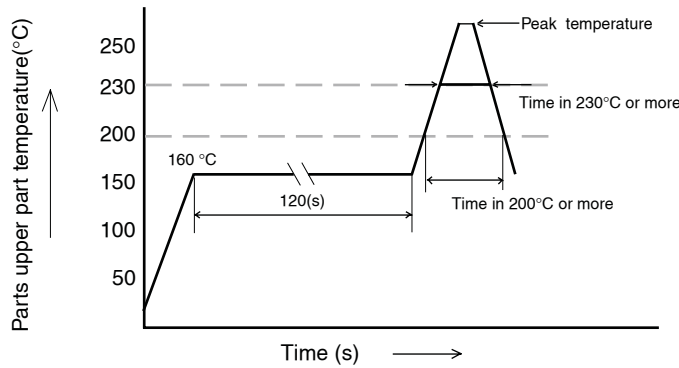
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Reflow Profile(Fig-1 to Fig-6) listed on last page of our Catalog.

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Mar. 2006

■ Reflow guaranteed condition

● RoHS compliant



Lead-Free reflow

Reflow No	Fig.(1)	Fig.(2)	Fig.(3)	Fig.(4)
Category	φ 3 to φ 6.3	φ 8 to φ 10	φ 12.5 to φ 18	EB series only (φ 10 to φ 18)
Peak temperature	250°C	235°C	230°C (220°C)	230°C
Time in peak temperature	5s	5s	5s (s)	5s
Time in 200°C or more	60s	60s	20s (30s)	20s
Time of reflow	1 time	1 time	1 time	1 time

High temperature Lead-Free reflow

Reflow No.	Fig.(5)	Fig.(6)	
		Condition 1	Condition 2
Category	φ4 to φ6.3, φ8x10.2, (B, C, D, D8, F)	φ8x6.2, φ10x10.2 (E, G)	φ8x6.2, φ10x10.2 (E, G)
Peak Temperature	260°C	260°C	245°C
Time around Peak Temperature	5s in 255°C or more	5s in 255°C or more	10s in 240°C or more
Time in 230°C or more	60s	60s	30s
Reflow Amount	Twice	Once	Twice

● RoHS not compliant

Category	Dia. φ3 to φ 6.3 EEV- , ECEV- Part No.	Dia. φ8 to φ 10 EEV- , ECEV- Part No.
Reflow condition	<p>Peak temperature/ Time in 200°C or more</p>	<p>Peak temperature/ Time in 200°C or more</p>

- ※ For reflow, use athermal condition system such as infrared radiation(IR) or hot blast.
- ※ Vapor heat transfer systems(VPS) are not recommended.