## **Panasonic**

### Surface Mount Type

## SP-Cap

Series: FD, CD, CX, UD, UE

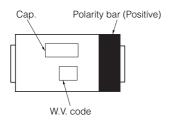


- Features
- Low ESR
- Excellent Noise-absorbent Characteristics
- RoHS directive compliant

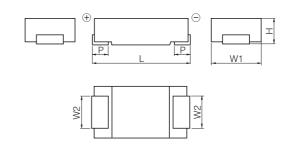
#### ■ Specifications

Series & Size Code	FD	CD	СХ	UD	UE				
Category Temp. Range			-40 °C to +105 °C						
Rated W.V.Range	2 V.DC to 12.5 V.DC	2 V.DC to 16 V.DC	2 V.DC to 6.3 V.DC	2 V.DC to 8 V.DC	2 V.DC to 8 V.DC				
Nominal Cap.Range	15 μF to 68 μF	2.2 μF to 220 μF	100 μF to 470 μF	68 μF to 470 μF	100 μF to 560 μF				
Capacitance Tolerance			±20 %						
DC Leakage Current	Reflow 240 °C : I ≤ 0.06 CV 2minutes (2 V.DC to 4 V.DC)  I ≤ 0.04 CV or 3 μA 2 minutes (6.3 V.DC to 16 V.DC) (Whichever is greater)								
	Reflow 260 °C : I ≤ 0.1 CV 2 minutes  ≤ 0.06 (120 Hz/+20 °C) ≤ 0.10 (120 Hz/+20 °C)								
tan $\delta$	≤ 0.06 (120 Hz/+20 °C) ≤0.10 (120 Hz/+20 °C)								
Surge Voltage	Rated Working Voltage × 1.25 (15 °C to 35 °C)								
	After applying rated working voltage for 1000 hours at 105 °C±2 °C, and then being stabilized at +20 °C, capacitor shall meet the following limits.								
Endurance	Capacitance change ±10% of initial measured value								
	tan $\delta$ $\leq$ Initial specified value								
	DC leakage current ≤ Initial specified value								
	After storing for 500 hours at 60 °C, 90 %								
	Capacitance change of initial measurd	2, 2.5 V.DC	4 V.DC	6.3 V.DC	8 V.DC to 16 V.DC				
Moisture resistance	value	+70, -20 %	+60, -20 %	+50, -20 %	+40, -20 %				
	tan $\delta$	≤ 200 % of initial spe	I specified value						
	DC leakage current	age current ≤ Initial specified value							

#### ■ Marking



#### ■ Dimensions in mm(not to scale)



					(mm)
Series & Size Code	L±0.2	W1±0.2	W2±0.1	Н	P±0.3
FD	7.3	4.3	2.4	1.1±0.1	1.3
CD	7.3	4.3	2.4	1.8±0.1	1.3
CX	7.3	4.3	2.4	1.9±0.2	1.3
UD	7.3	4.3	2.4	2.8±0.2	1.3
UE	7.3	4.3	2.4	4.2±0.1	1.3

## **Panasonic**

#### ■ Standard Products

■ Stand	dard Pro	aucts								
		0	(	Case Size	Э	Specif	ication	Part n	umber	N 4:
Carias	Rated	Capaci-				*1				Min.
Series &	\\/\\/	tance	1	W	Н	Ripple	ESR*2	*3	*3	
Size Code	(V.DC)	(±20 %)	(mm)	(mm)	(mm)	current		Reflow condition : 240 °C	Reflow condition : 260 °C	Q'ty
	\ - /	(μF)	()	()	( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	(Ar.m.s.)	$(\Omega)$		[Proposal]	(pcs)
-	2	68	7.3	4.3	1.1	2.0	0.028	EEFFD0D680R		3500
	2.5	56	7.3	4.3	1.1	2.0	0.028	EEFFD0E560R		3500
	2.5	39	7.3	4.3	1.1	2.0	0.028	EEFFD0E300R		3500
FD	4	47	7.3							
FD	6.3			4.3	1.1	2.0	0.028	EEFFD0G470R	_	3500
		33	7.3	4.3	1.1	2.0	0.028	EEFFD0J330R	<del>-</del>	3500
		22	7.3	4.3	1.1	2.0	0.028	EEFFD0K220R	_	3500
	12.5	15	7.3	4.3	1.1	1.4	0.040	EEFFD1B150R		3500
		100	7.3	4.3	1.8	2.5	0.018	EEFCD0D101R	EEFCD0D101ER	3500
		100	7.3	4.3	1.8	2.7	0.015	EEFCD0D101XR	EEFCD0D101XE	3500
		120	7.3	4.3	1.8	2.5	0.018	EEFCD0D121R	EEFCD0D121ER	3500
	2		7.3	4.3	1.8	2.7	0.015	EEFCD0D121XR	EEFCD0D121XE	3500
		150	7.3	4.3	1.8	2.5	0.018	EEFCD0D151R	EEFCD0D151ER	3500
		180	7.3	4.3	1.8	2.5	0.018	EEFCD0D181R	EEFCD0D181ER	3500
		220	7.3	4.3	1.8	2.5	0.018	EEFCD0D221R	EEFCD0D221ER	3500
		82	7.3	4.3	1.8	2.5	0.018	EEFCD0E820R	EEFCD0E820ER	3500
		82	7.3	4.3	1.8	2.7	0.015	EEFCD0E820XR	EEFCD0E820XE	3500
		100	7.3	4.3	1.8	2.5	0.018	EEFCD0E101R	EEFCD0E101ER	3500
	2.5	100	7.3	4.3	1.8	2.7	0.015	EEFCD0E101XR	EEFCD0E101XE	3500
		120	7.3	4.3	1.8	2.5	0.018	EEFCD0E121R	EEFCD0E121ER	3500
		150	7.3	4.3	1.8	2.5	0.018	EEFCD0E151R	EEFCD0E151ER	3500
			7.3	4.3	1.8	2.5	0.018	EEFCD0G560R	EEFCD0G560ER	3500
		56	7.3	4.3	1.8	2.7	0.015	EEFCD0G560XR	EEFCD0G560XE	3500
			7.3	4.3	1.8	2.5	0.013	EEFCD0G680R	EEFCD0G680ER	3500
	1	68	7.3	4.3	1.8	2.7	0.016			3500
	4							EEFCD0G680XR	EEFCD0G680XE	
		82	7.3	4.3	1.8	2.5	0.018	EEFCD0G820R	EEFCD0G820ER	3500
			7.3	4.3	1.8	2.7	0.015	EEFCD0G820XR	EEFCD0G820XE	3500
		100	7.3	4.3	1.8	2.5	0.018	EEFCD0G101R	EEFCD0G101ER	3500
		10	7.3	4.3	1.8	1.4	0.055	EEFCD0J100R	EEFCD0J100ER	3500
CD		22	7.3	4.3	1.8	1.6	0.040	EEFCD0J220R	EEFCD0J220ER	3500
	6.3	33	7.3	4.3	1.8	2.0	0.028	EEFCD0J330R	EEFCD0J330ER	3500
		47	7.3	4.3	1.8	2.5	0.018	EEFCD0J470R	EEFCD0J470ER	3500
		47	7.3	4.3	1.8	2.7	0.015	EEFCD0J470XR	EEFCD0J470XE	3500
		68	7.3	4.3	1.8	2.5	0.018	EEFCD0J680R	EEFCD0J680ER	3500
			7.3	4.3	1.8	2.7	0.015	EEFCD0J680XR	EEFCD0J680XE	3500
		8.2	7.3	4.3	1.8	1.4	0.055	EEFCD0K8R2R	EEFCD0K8R2ER	3500
	8	15	7.3	4.3	1.8	1.6	0.040	EEFCD0K150R	EEFCD0K150ER	3500
		22	7.3	4.3	1.8	1.8	0.028	EEFCD0K220R	EEFCD0K220ER	3500
		33	7.3	4.3	1.8	2.5	0.018	EEFCD0K330R	EEFCD0K330ER	3500
		47	7.3	4.3	1.8	1.8	0.025	EEFCD0K470R	EEFCD0K470ER	3500
	10	22	7.3	4.3	1.8	1.6	0.030		EEFCD1A220ER	3500
		33	7.3	4.3	1.8	1.8	0.025	_	EEFCD1A330ER	3500
		39	7.3	4.3	1.8	1.8	0.025	<u>_</u>	EEFCD1A390ER	3500
		4.7	7.3	4.3	1.8	1.0	0.080	EEFCD1B4R7R		3500
		10	7.3	4.3				EEFCD1B100R		3500
	12.5	15			1.8	1.0	0.060		_	
			7.3	4.3	1.8	1.3	0.050	EEFCD1B150R	_	3500
		22	7.3	4.3	1.8	1.6	0.030	EEFCD1B220R	_	3500
		2.2	7.3	4.3	1.8	1.0	0.110	EEFCD1C2R2R	_	3500
	16	4.7	7.3	4.3	1.8	1.0	0.080	EEFCD1C4R7R	_	3500
		6.8	7.3	4.3	1.8	1.0	0.070	EEFCD1C6R8R	_	3500
		8.2	7.3	4.3	1.8	1.3	0.045	EEFCD1C8R2R		3500
		220	7.3	4.3	1.9	2.7	0.015	_	EEFCX0D221R	3500
		270	7.3	4.3	1.9	3.0	0.012	_	EEFCX0D271XR	3500
	2	330	7.3	4.3	1.9	2.7	0.015	_	EEFCX0D331R	3500
			7.3	4.3	1.9	3.0	0.012	_	EEFCX0D331XR	3500
		390	7.3	4.3	1.9	2.7	0.015	_	EEFCX0D391R	3500
		470	7.3	4.3	1.9	2.7	0.015	_	EEFCX0D471R	3500
	2.5	220	7.3	4.3	1.9	2.7	0.015	_	EEFCX0E221R	3500
СХ		330	7.3	4.3	1.9	2.7	0.015	_	EEFCX0E331R	3500
		390	7.3	4.3	1.9	2.7	0.015	_	EEFCX0E391R	3500
		150	7.3	4.3	1.9	2.7	0.015	_	EEFCX0G151R	3500
			7.3	4.3	1.9	2.7	0.015	_	EEFCX0G181R	3500
		180	7.3	4.3	1.9	3.0	0.013		EEFCX0G181XR	3500
			7.3	4.3	1.9	2.7	0.012	_ _	EEFCX0G221R	3500
		220							EEFCX0G221K EEFCX0G221XR	
		100	7.3	4.3	1.9	3.0	0.012	_		3500
			7.3	4.3	1.9	2.7	0.015	_	EEFCX0J101R	3500
	6.3	120	7.3	4.3	1.9	2.7	0.015	_	EEFCX0J121R	3500
		150	7.3	4.3	1.9	2.7	0.015	_	EEFCX0J151R	3500
			7.3	4.3	1.9	3.0	0.012	_	EEFCX0J151XR	3500

<sup>\*1:</sup> Ripple current (100 kHz/ +20 to +105 °C ), \*2: ESR (100 kHz/+20 °C)

<sup>\*3:</sup> Please confirm EE23 in detail of the Mouting Specifications.

# **Panasonic**

#### ■ Standard Products

Series & Size Code	Rated W.V. (V.DC)	Capaci- tance (±20 %) (µF)	Case Size			Specification		Part number		Min.
			L (mm)	W (mm)	H (mm)	Ripple current (Ar.m.s.)	ESR $(\Omega)$	*3 Reflow condition : 240 °C	*3 Reflow condition : 260 °C [Proposal]	Packaging Q'ty (pcs)
			7.3	4.3	2.8	3.0	0.015	EEFUD0D331R*4	EEFUD0D331ER*4	2000
		330	7.3	4.3	2.8	3.3	0.012	EEFUD0D331XR*4	EEFUD0D331XE*4	2000
	2		7.3	4.3	2.8	3.4	0.009	EEFUD0D331LR*4	EEFUD0D331LE*4	2000
		390	7.3 7.3	4.3 4.3	2.8 2.8	3.0	0.015	EEFUD0D391R*4 EEFUD0D391LR*4	EEFUD0D391ER*4 EEFUD0D391LE*4	2000 2000
		470	7.3	4.3	2.8	3.4	0.009	EEFUD0D391LR*4	EEFUD0D391LE*4	2000
		470	7.3	4.3	2.8	3.0	0.005	EEFUD0E221R*4	EEFUD0E221ER*4	2000
		220	7.3	4.3	2.8	3.3	0.012	EEFUD0E221XR*4	EEFUD0E221XE*4	2000
	2.5		7.3	4.3	2.8	3.4	0.009	EEFUD0E221LR*4	EEFUD0E221LE*4	2000
		270	7.3	4.3	2.8	3.0	0.015	EEFUD0E271R*4	EEFUD0E271ER*4	2000
		270	7.3	4.3	2.8	3.4	0.009	EEFUD0E271LR*4	EEFUD0E271LE*4	2000
		120	7.3	4.3	2.8	3.0	0.015	EEFUD0G121R*4	EEFUD0G121ER*4	2000
UD			7.3	4.3	2.8	3.4	0.012 0.015	EEFUD0G121XR*4 EEFUD0G151R*4	EEFUD0G121XE*4	2000 2000
טט	4	150	7.3 7.3	4.3 4.3	2.8	3.0	0.015	EEFUDOG151K**	EEFUD0G151ER*4 EEFUD0G151XE*4	2000
	4	130	7.3	4.3	2.8	3.4	0.012	EEFUD0G151KR	EEFUD0G151LE*4	2000
			7.3	4.3	2.8	2.5	0.003	EEFUD0G181R*4	EEFUD0G181ER*4	2000
		180	7.3	4.3	2.8	3.4	0.009	EEFUD0G181LR*4	EEFUD0G181LE*4	2000
		100	7.3	4.3	2.8	3.0	0.015	EEFUD0J101R*4	EEFUD0J101ER*4	2000
		100	7.3	4.3	2.8	3.3	0.012	EEFUD0J101XR*4	EEFUD0J101XE*4	2000
			7.3	4.3	2.8	3.0	0.015	EEFUD0J121R*4	EEFUD0J121ER*4	2000
	6.3	120	7.3	4.3	2.8	3.3	0.012	EEFUD0J121XR*4	EEFUD0J121XE*4	2000
			7.3	4.3	2.8	3.4	0.009	EEFUD0J121LR*4	<u> </u>	2000
		150	7.3	4.3	2.8	2.5	0.018	EEFUD0J151R*4	EEFUD0J151ER*4	2000
			7.3	4.3	2.8	3.4	0.009	EEFUD0J151LR*4	—	2000
	8	68 100	7.3 7.3	4.3 4.3	2.8 2.8	3.0 2.5	0.015 0.018	EEFUD0K680R EEFUD0K101R	EEFUD0K680ER EEFUD0K101ER	2000 2000
		270	7.3	4.3	4.2	3.3	0.018	EEFUE0D271R*4	EEFUE0D271ER*4	2000
			7.3	4.3	4.2	3.5	0.012	EEFUE0D271XR*4	EEFUE0D271XE*4	2000
			7.3	4.3	4.2	3.3	0.012	EEFUE0D331R*4	EEFUE0D331ER*4	2000
		330	7.3	4.3	4.2	3.5	0.010	EEFUE0D331XR*4	EEFUE0D331XE*4	2000
		390	7.3	4.3	4.2	3.3	0.012	EEFUE0D391R*4	EEFUE0D391ER*4	2000
	2		7.3	4.3	4.2	3.5	0.010	EEFUE0D391XR*4	EEFUE0D391XE*4	2000
	_		7.3	4.3	4.2	3.7	0.007	EEFUE0D391LR*4	EEFUE0D391LE*4	2000
		470	7.3	4.3	4.2	3.3	0.012	EEFUE0D471R*4	EEFUE0D471ER*4	2000
		470	7.3	4.3	4.2	3.5	0.010	EEFUE0D471XR*4 EEFUE0D471LR*4	EEFUE0D471XE*4 EEFUE0D471LE*4	2000 2000
		560	7.3 7.3	4.3 4.3	4.2 4.2	3.7	0.007	EEFUE0D561R	EEFUE0D561ER	2000
			7.3	4.3	4.2	3.7	0.012	EEFUE0D561LR	EEFUE0D561LE	2000
			7.3	4.3	4.2	3.3	0.012	EEFUE0E221R*4	EEFUE0E221ER*4	2000
		220	7.3	4.3	4.2	3.5	0.010	EEFUE0E221XR*4	EEFUE0E221XE*4	2000
	2.5	270	7.3	4.3	4.2	3.3	0.012	EEFUE0E271R*4	EEFUE0E271ER*4	2000
		270	7.3	4.3	4.2	3.5	0.010	EEFUE0E271XR*4	EEFUE0E271XE*4	2000
		330	7.3	4.3	4.2	3.3	0.012	EEFUE0E331R*4	EEFUE0E331ER*4	2000
			7.3	4.3	4.2	3.5	0.010	EEFUE0E331XR*4	EEFUE0E331XE*4	2000
			7.3	4.3	4.2	3.7	0.007	EEFUE0E331LR*4	EEFUE0E331LE*4	2000
UE		390	7.3 7.3	4.3 4.3	4.2 4.2	3.3	0.012	EEFUE0E391R*4 EEFUE0E391LR*4	EEFUE0E391ER*4 EEFUE0E391LE*4	2000 2000
			7.3	4.3	4.2	3.3	0.007	EEFUE0E471R	EEFUE0E471ER	2000
		470	7.3	4.3	4.2	3.7	0.007	EEFUE0E471LR	EEFUE0E471LE	2000
		400	7.3	4.3	4.2	3.3	0.012	EEFUE0G181R*4	EEFUE0G181ER*4	2000
		180	7.3	4.3	4.2	3.5	0.010	EEFUE0G181XR*4	EEFUE0G181XE*4	2000
			7.3	4.3	4.2	3.3	0.012	EEFUE0G221R*4	EEFUE0G221ER*4	2000
	4	220	7.3	4.3	4.2	3.5	0.010	EEFUE0G221XR*4	EEFUE0G221XE*4	2000
			7.3	4.3	4.2	3.7	0.007	EEFUE0G221LR*4	EEFUE0G221LE*4	2000
		270	7.3	4.3	4.2	3.3	0.012	EEFUE0G271R	EEFUE0G271ER	2000
		330	7.3 7.3	4.3 4.3	4.2 4.2	3.7	0.007 0.012	EEFUE0G271LR EEFUE0G331R	EEFUE0G271LE EEFUE0G331ER	2000 2000
			7.3	4.3	4.2	3.3	0.012	EEFUE0J151R*4	EEFUE0G331ER EEFUE0J151ER*4	2000
		150	7.3	4.3	4.2	3.5	0.012	EEFUE0J151XR*4	EEFUE0J151XE*4	2000
			7.3	4.3	4.2	3.3	0.010	EEFUE0J181R	EEFUE0J181ER	2000
	6.3	3 180	7.3	4.3	4.2	3.5	0.012	EEFUE0J181XR	EEFUE0J181XE	2000
	0.5		7.3	4.3	4.2	3.7	0.007	EEFUE0J181LR	_	2000
		220	7.3	4.3	4.2	3.0	0.015	EEFUE0J221R	EEFUE0J221ER	2000
			7.3	4.3	4.2	3.7	0.007	EEFUE0J221LR	_	2000
	8	100	7.3	4.3	4.2	3.3	0.012	EEFUE0K101R*4	EEFUE0K101ER*4	2000
		150	7.3	4.3	4.2	3.0	0.015	EEFUE0K151R	EEFUE0K151ER	2000

**<sup>\*1</sup>**: Ripple current (100 kHz/ +20 to +105 °C ), **\*2**: ESR (100 kHz/+20 °C)

 $<sup>\</sup>ensuremath{\bigstar} 3$ : Please confirm EE23 in detail of the Mouting Specifications.

<sup>\*4:</sup> Please use proposal part number of EE12, 13 when examining it.