

SP-Cap/ Conductive Polymer Aluminum Capacitors

<p align="center">Standard</p>	<p align="center">Low ESR</p>	<p align="center">NEW High Voltage</p>
<p align="center">CD·CX (*UD·*UE)</p> <p>CD ESR : 18 mΩ (15 mΩ to 110 mΩ) 2 V to 16 V, 2.2 μF to 220 μF 1.8 mm Height</p> <p>CX ESR : 15 mΩ (12 mΩ to 15 mΩ) 2 V to 6.3 V, 100 μF to 560 μF 1.9 mm Height</p> <p>*UD ESR : 9 mΩ to 18 mΩ 2 V to 8 V, 68 μF to 470 μF 2.8 mm Height</p> <p>*UE ESR : 7 mΩ to 15 mΩ 4.2 mm Height</p>	<p align="center">SL·SX·GX</p> <p>SL ESR : 9 mΩ 2 V to 6.3 V, 56 μF to 220 μF 1.8 mm Height</p> <p>SX ESR : 4.5 mΩ to 9 mΩ 2 V to 6.3 V, 82 μF to 560 μF 1.9 mm Height</p> <p>GX ESR : 3 mΩ 2 V to 2.5 V, 330 μF to 560 μF 1.9 mm Height</p>	<p align="center">NEW CS·CT·CX</p> <p>CS ESR : 40 mΩ 10 V to 25 V, 10 μF to 47 μF 1.1 mm Height</p> <p>CT ESR : 40 mΩ 10 V to 25 V, 22 μF to 68 μF 1.4 mm Height</p> <p>CX ESR : 40 mΩ 10 V to 25 V, 15 μF to 100 μF 1.9 mm Height</p>
<p>Low ESL</p>		
<p align="center">Miniaturized</p>	<p align="center">LX</p>	<p align="center">GX-L</p>
<p align="center">MC</p> <p>MC ESR : 12 mΩ to 18 mΩ 2 V to 6.3 V, 47 μF to 120 μF 1.9 mm Height</p>	<p>LX ESR : 4.5 mΩ to 6 mΩ 2 V to 2.5 V, 330 μF to 470 μF 1.9 mm Height (ESL : 50% less than current)</p>	<p>GX-L ESR : 3 mΩ 2 V to 2.5 V, 470 μF to 560 μF 1.9 mm Height (ESL : 50% less than current)</p>
<p>Low Profile</p>		
<p align="center">Standard</p>	<p align="center">Low ESR</p>	<p align="center">Low ESL</p>
<p align="center">NEW CS·CT (*FD)</p> <p>CS 1.1 mm Height ESR : 15 mΩ 4 V to 6.3 V, 68 μF to 120 μF</p> <p>CT 1.4 mm Height ESR : 15 mΩ 4 V to 6.3 V, 100 μF to 180 μF</p> <p>*FD 1.1 mm Height ESR : 28 mΩ to 40 mΩ 2 V to 12.5 V, 15 μF to 68 μF</p>	<p align="center">NEW SS·ST</p> <p>SS 1.1 mm Height ESR : 6 mΩ 2 V to 2.5 V, 180 μF to 220 μF</p> <p>ST 1.4 mm Height ESR : 6 mΩ 2 V to 2.5 V, 270 μF to 330 μF</p>	<p align="center">NEW LS·LT</p> <p>LS 1.1 mm Height ESR : 6 mΩ 2 V to 2.5 V, 180 μF to 220 μF</p> <p>LT 1.4 mm Height ESR : 6 mΩ 2 V to 2.5 V, 270 μF to 330 μF (ESL : 50% less than current)</p>
<p>* Please contact us when the confirmation of details is necessary.</p>		

NEW**Panasonic**

SP-Cap/ Conductive Polymer Aluminum Capacitors (Specialty Polymer Aluminum Capacitors)

Surface Mount Type

SP-CapSeries: **CS, CT, CX**

(High Voltage Product)



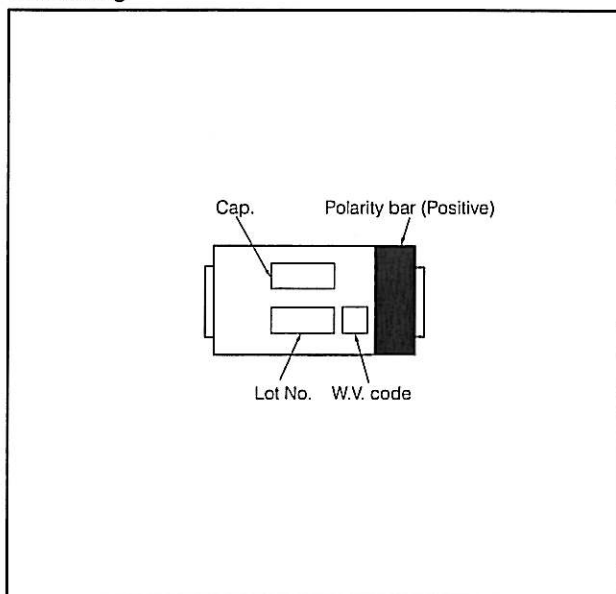
■ Features

- High voltage available using conductive specialty polymer.
- Low profile 1.1 mm, 1.4 mm, 1.9 mm
- High temperature reflow soldering applicable.
- RoHS directive compliant

■ Specifications

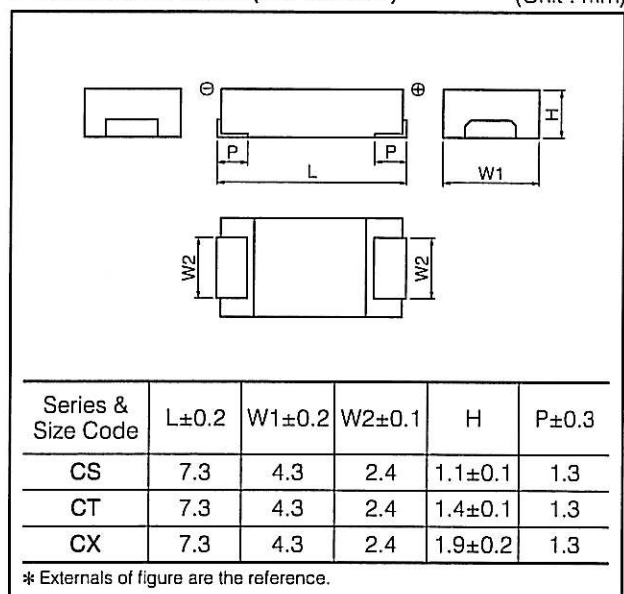
Series & Size Code	CS	CT	CX
Category Temp. Range	-40 °C to +105 °C		
Rated W.V.Range	10 V.DC to 25 V.DC		
Nominal Cap.Range	10 μF to 47 μF	22 μF to 68 μF	15 μF to 100 μF
Capacitance Tolerance	±20 % (120 Hz / + 20 °C)		
DC Leakage Current	I ≤ 0.3 CV (μA) 2minutes		
tan δ	≤ 0.06 (120 Hz/+20 °C)		
Surge Voltage	Rated Working Voltage × 1.25 [10 V.DC to 16 V.DC], × 1.15 [25 V.DC](15 °C to 35 °C)		
Endurance	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.		
	Capacitance change	±10% of initial measured value	
	tan δ	≤ Initial specified value	
	DC leakage current	≤ Initial specified value	
Moisture resistance	After storing for 500 hours at 60 °C, 90 %		
	Capacitance change of initial measured value	10 V.DC to 25 V.DC +60, -20 %	
	tan δ	≤ 200 % of initial specified value	
	DC leakage current	≤ 300 % of initial specified value	

■ Marking



■ Dimensions in mm(not to scale)

(Unit : mm)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

01 Jan. 2014



■ Standard Products

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20 %) (μF)	Case Size			Specification		Part number	Min. Packaging Qty (pcs)
			L (mm)	W (mm)	H (mm)	Ripple current ^{*1} (A.r.m.s.)	ESR ^{*2} (mΩ max.)		
CS	10	47	7.3	4.3	1.1	3.0	40	EEFCS1A470R	3500
	16	15	7.3	4.3	1.1	3.0	40	EEFCS1C150R	3500
		22	7.3	4.3	1.1	3.0	40	EEFCS1C220R	3500
		33	7.3	4.3	1.1	3.0	40	EEFCS1C330R	3500
	25	10	7.3	4.3	1.1	3.0	40	EEFCS1E100R	3500
		15	7.3	4.3	1.1	3.0	40	EEFCS1E150R	3500
CT	10	68	7.3	4.3	1.4	3.0	40	EEFCT1A680R	3500
	16	47	7.3	4.3	1.4	3.0	40	EEFCT1C470R	3500
	25	22	7.3	4.3	1.4	3.0	40	EEFCT1E220R	3500
CX	10	47	7.3	4.3	1.9	3.0	40	EEFCX1A470R	3500
		68	7.3	4.3	1.9	3.0	40	EEFCX1A680R	3500
		100	7.3	4.3	1.9	3.0	40	EEFCX1A101R	3500
	16	15	7.3	4.3	1.9	3.0	40	EEFCX1C150R	3500
		22	7.3	4.3	1.9	3.0	40	EEFCX1C220R	3500
		33	7.3	4.3	1.9	3.0	40	EEFCX1C330R	3500
		47	7.3	4.3	1.9	3.0	40	EEFCX1C470R	3500
		68	7.3	4.3	1.9	3.0	40	EEFCX1C680R	3500
	25	15	7.3	4.3	1.9	3.0	40	EEFCX1E150R	3500
		22	7.3	4.3	1.9	3.0	40	EEFCX1E220R	3500
		33	7.3	4.3	1.9	3.0	40	EEFCX1E330R	3500

*1: Ripple current (100 kHz/ +45°C), *2: ESR (100 kHz/+20 °C)

*3: Please refer to the page of "Mounting Specifications".

Temperature Compensation Multipliers for Ripple Current		
≤ 45 °C	45 °C < T ≤ 85 °C	85 °C < T ≤ 105 °C
1.00	0.83	0.53

NEW

Panasonic

SP-Cap/ Conductive Polymer Aluminum Capacitors (Specialty Polymer Aluminum Capacitors)

Surface Mount Type **SP-Cap**

Series: **SS, ST, LS, LT, CS, CT**



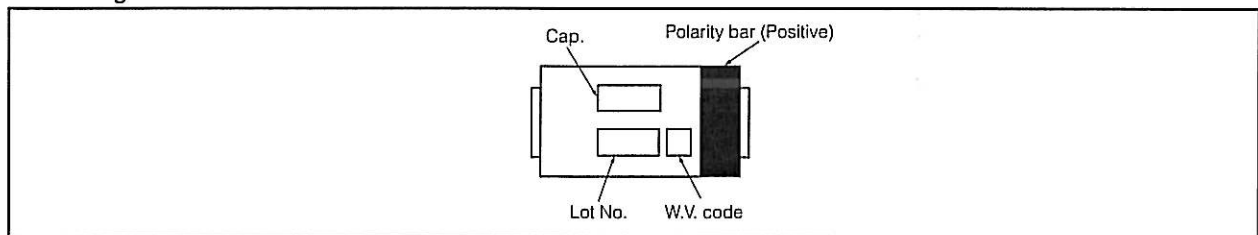
■ Features

- Low profile 1.1 mm, 1.4 mm
- Low ESR(6 mΩ), Large capacitance (SS, ST, LS, LT series)
- Low ESL by structure of SP-Cap 50% ESL of current products. (LS, LT series)
- High temperature reflow soldering applicable. (Peak : 260 °C 10s, main heating : 230 °C 40s)
- RoHS directive compliant

■ Specifications

Series & Size Code	SS	ST	LS	LT	CS	CT
Category Temp. Range	-40 °C to +105 °C					
Rated W.V.Range	2 V.DC to 2.5 V.DC				4 V.DC to 6.3 V.DC	
Nominal Cap.Range	180 μF to 220 μF	270 μF to 330 μF	180 μF to 220 μF	270 μF to 330 μF	68 μF to 120 μF	100 μF to 180 μF
Capacitance Tolerance	±20 % (120 Hz / + 20 °C)					
DC Leakage Current	I ≤ 0.1 CV (μA) 2minutes					
tan δ	≤ 0.06 (120 Hz/+20 °C)					
Surge Voltage	Rated Working Voltage × 1.25 (15 °C to 35 °C)					
Endurance	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.					
	Capacitance change	±10% of initial measured value				
	tan δ	≤ Initial specified value				
	DC leakage current	≤ Initial specified value				
Moisture resistance	After storing for 500 hours at 60 °C, 90 %					
	Capacitance change of initial measured value	2, 2.5 V.DC	4 V.DC	6.3 V.DC		
		+70, -20 %	+60, -20 %	+50, -20 %		
	tan δ	≤ 200 % of initial specified value				
	DC leakage current	≤ Initial specified value				

■ Marking



■ Dimensions in mm(not to scale)

(Unit : mm)

(Unit : mm)

SS, ST, CS, CT series

Series & Size Code	L±0.2	W1±0.2	W2±0.1	H±0.1	P±0.3
SS, CS	7.3	4.3	2.4	1.1	1.3
ST, CT	7.3	4.3	2.4	1.4	1.3

* Externals of figure are the reference.

LS, LT series

Series & Size Code	L±0.2	W1±0.2	W2±0.1	H±0.1	P1±0.3	P2±0.1	P3±0.2	P4±0.2
LS	7.3	4.3	2.4	1.1	1.3	1.1	0.7	1.4
LT	7.3	4.3	2.4	1.4	1.3	1.1	0.7	1.4

* Externals of figure are the reference.

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00 Nov. 2012



■ Standard Products

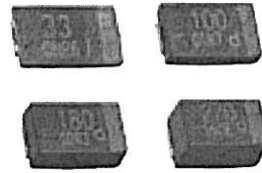
Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20 %) (μF)	Case Size			Specification		Part number	The number of terminals		Min. Packaging Q'ty (pcs)
			L (mm)	W (mm)	H (mm)	*1 Ripple current (Ar.m.s.)	*2 ESR (mΩ max)		*3 Reflow condition : 260 °C		
SS	2	220	7.3	4.3	1.1	3.5	6	EEFSS0D221R	○		3500
	2.5	180	7.3	4.3	1.1	3.5	6	EEFSS0E181R	○		3500
ST	2	330	7.3	4.3	1.4	3.5	6	EEFST0D331R	○		3500
	2.5	270	7.3	4.3	1.4	3.5	6	EEFST0E271R	○		3500
LS	2	220	7.3	4.3	1.1	3.5	6	EEFLS0D221R		○	3500
	2.5	180	7.3	4.3	1.1	3.5	6	EEFLS0E181R		○	3500
LT	2	330	7.3	4.3	1.4	3.5	6	EEFLT0D331R		○	3500
	2.5	270	7.3	4.3	1.4	3.5	6	EEFLT0E271R		○	3500
CS	4	120	7.3	4.3	1.1	2.7	15	EEFCS0G121R	○		3500
	6.3	68	7.3	4.3	1.1	2.7	15	EEFCS0J680R	○		3500
CT	4	180	7.3	4.3	1.4	2.7	15	EEFCT0G181R	○		3500
	6.3	100	7.3	4.3	1.4	2.7	15	EEFCT0J101R	○		3500

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

*3: Please refer to the page of "Mounting Specifications".

Surface Mount Type **SP-Cap**

Series: **FD, CD, CX, UD, UE**



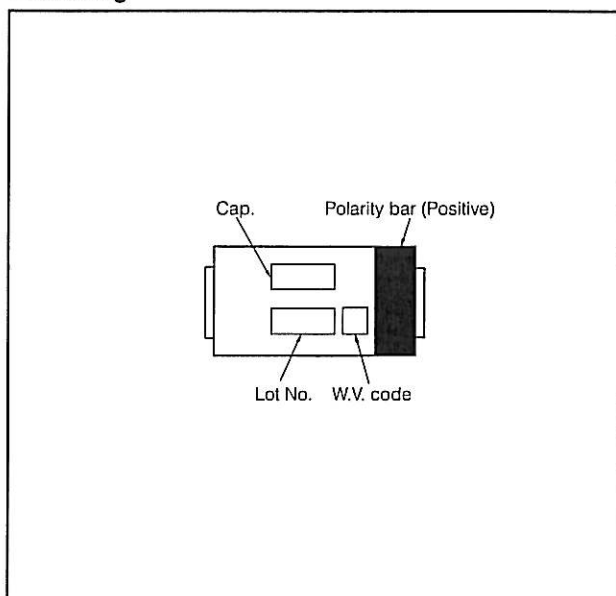
■ Features

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

■ Specifications

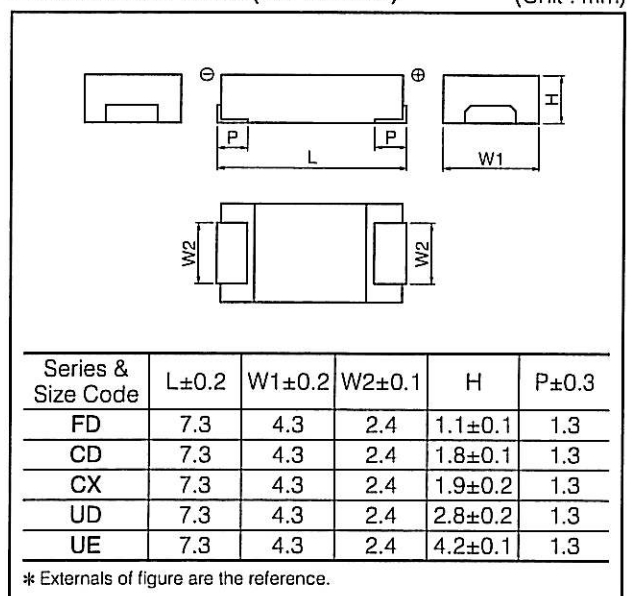
Series & Size Code	FD	CD	CX	UD	UE
Category Temp. Range	-40 °C to +105 °C				
Rated W.V.Range	2 V.DC to 12.5 V.DC	2 V.DC to 16 V.DC	2 V.DC to 6.3 V.DC	2 V.DC to 8 V.DC	2 V.DC to 8 V.DC
Nominal Cap.Range	15 μF to 68 μF	2.2 μF to 220 μF	100 μF to 560 μF	68 μF to 470 μF	100 μF to 560 μF
Capacitance Tolerance	±20 %				
DC Leakage Current	Reflow 240 °C : $I \leq 0.06 CV (\mu A) 2 \text{ minutes (2 V.DC to 4 V.DC)}$ $I \leq 0.04 CV \text{ or } 3 (\mu A) 2 \text{ minutes (6.3 V.DC to 16 V.DC)}$ (Whichever is greater) Reflow 260 °C : $I \leq 0.1 CV (\mu A) 2 \text{ minutes}$				
tan δ	$\leq 0.06 (120 \text{ Hz}/+20 \text{ °C})$			$\leq 0.10 (120 \text{ Hz}/+20 \text{ °C})$	
Surge Voltage	Rated Working Voltage $\times 1.25 (15 \text{ °C to } 35 \text{ °C})$				
Endurance	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.				
	Capacitance change	±10% of initial measured value			
	tan δ	≤ Initial specified value			
	DC leakage current	≤ Initial specified value			
Moisture resistance	After storing for 500 hours at 60 °C, 90 %				
	Capacitance change of initial measured value	2, 2.5 V.DC	4 V.DC	6.3 V.DC	8 V.DC to 16 V.DC
		+70, -20 %	+60, -20 %	+50, -20 %	+40, -20 %
	tan δ	≤ 200 % of initial specified value			
	DC leakage current	≤ Initial specified value			

■ Marking



■ Dimensions in mm(not to scale)

(Unit : mm)



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00 Nov. 2012

Standard Products

○ : available, — : not available

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20%) (μF)	Case Size			Specification		Part number	Reflow condition		Min. Packaging Q'ty (pcs)	
			L (mm)	W (mm)	H (mm)	*1 Ripple current (Ar.m.s.)	*2 ESR (mΩ max)		240 °C *3	260 °C *3		
FD	2	68	7.3	4.3	1.1	2.0	28	EEFFD0D680R *5	○	—	3500	
	2.5	56	7.3	4.3	1.1	2.0	28	EEFFD0E560R *5	○	—	3500	
	4	39	7.3	4.3	1.1	2.0	28	EEFFD0G390R *5	○	—	3500	
		47	7.3	4.3	1.1	2.0	28	EEFFD0G470R *5	○	—	3500	
	6.3	33	7.3	4.3	1.1	2.0	28	EEFFD0J330R *5	○	—	3500	
	8	22	7.3	4.3	1.1	2.0	28	EEFFD0K220R *5	○	—	3500	
CD	2	100	7.3	4.3	1.8	2.5	18	EEFCD0D101ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0D101XE	*4	○	3500	
	2	120	7.3	4.3	1.8	2.5	18	EEFCD0D121ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0D121XE	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0D151ER	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0D181ER	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0D221ER	*4	○	3500	
	2.5	82	7.3	4.3	1.8	2.5	18	EEFCD0E820ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0E820XE	*4	○	3500	
		100	7.3	4.3	1.8	2.5	18	EEFCD0E101ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0E101XE	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0E121ER	*4	○	3500	
		150	7.3	4.3	1.8	2.5	18	EEFCD0E151ER	*4	○	3500	
	7.3		4.3	1.8	2.5	18	EEFCD0G560ER	*4	○	3500		
	4	56	7.3	4.3	1.8	2.7	15	EEFCD0G560XE	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0G680ER	*4	○	3500	
		68	7.3	4.3	1.8	2.7	15	EEFCD0G680XE	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0G820ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0G820XE	*4	○	3500	
	100	7.3	4.3	1.8	2.5	18	EEFCD0G101ER	*4	○	3500		
	6.3	10	7.3	4.3	1.8	1.4	55	EEFCD0J100ER	*4	○	3500	
			7.3	4.3	1.8	1.6	40	EEFCD0J220ER	*4	○	3500	
		33	7.3	4.3	1.8	2.0	28	EEFCD0J330ER	*4	○	3500	
			7.3	4.3	1.8	2.5	18	EEFCD0J470ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0J470XE	*4	○	3500	
		68	7.3	4.3	1.8	2.5	18	EEFCD0J680ER	*4	○	3500	
			7.3	4.3	1.8	2.7	15	EEFCD0J680XE	*4	○	3500	
		8	8.2	7.3	4.3	1.8	1.4	55	EEFCD0K8R2ER	*4	○	3500
				7.3	4.3	1.8	1.6	40	EEFCD0K150ER	*4	○	3500
			22	7.3	4.3	1.8	2.0	28	EEFCD0K220ER	*4	○	3500
	7.3			4.3	1.8	2.5	18	EEFCD0K330ER	*4	○	3500	
	7.3			4.3	1.8	1.8	25	EEFCD0K470ER	*4	○	3500	
	10	27	7.3	4.3	1.8	1.6	30	EEFCD1A220ER	—	○	3500	
		33	7.3	4.3	1.8	1.8	25	EEFCD1A330ER	—	○	3500	
		39	7.3	4.3	1.8	1.8	25	EEFCD1A390ER	—	○	3500	
	12.5	4.7	7.3	4.3	1.8	1.0	80	EEFCD1B4R7R *5	○	—	3500	
		10	7.3	4.3	1.8	1.0	60	EEFCD1B100R *5	○	—	3500	
		15	7.3	4.3	1.8	1.3	50	EEFCD1B150R *5	○	—	3500	
		22	7.3	4.3	1.8	1.6	30	EEFCD1B220R *5	○	—	3500	
	16	2.2	7.3	4.3	1.8	1.0	110	EEFCD1C2R2R *5	○	—	3500	
		4.7	7.3	4.3	1.8	1.0	80	EEFCD1C4R7R *5	○	—	3500	
		6.8	7.3	4.3	1.8	1.0	70	EEFCD1C6R8R *5	○	—	3500	
		8.2	7.3	4.3	1.8	1.3	45	EEFCD1C8R2R *5	○	—	3500	
	CX	2	220	7.3	4.3	1.9	2.7	15	EEFCX0D221R	—	○	3500
			270	7.3	4.3	1.9	3.0	12	EEFCX0D271XR	—	○	3500
			330	7.3	4.3	1.9	2.7	15	EEFCX0D331R	—	○	3500
				7.3	4.3	1.9	3.0	12	EEFCX0D331XR	—	○	3500
			390	7.3	4.3	1.9	2.7	15	EEFCX0D391R	—	○	3500
			470	7.3	4.3	1.9	2.7	15	EEFCX0D471R	—	○	3500
		2.5	560	7.3	4.3	1.9	2.7	15	EEFCX0D561R	—	○	3500
			220	7.3	4.3	1.9	2.7	15	EEFCX0E221R	—	○	3500
			330	7.3	4.3	1.9	2.7	15	EEFCX0E331R	—	○	3500
		4	390	7.3	4.3	1.9	2.7	15	EEFCX0E391R	—	○	3500
			470	7.3	4.3	1.9	2.7	15	EEFCX0E471R	—	○	3500
			150	7.3	4.3	1.9	2.7	15	EEFCX0G151R	—	○	3500
				7.3	4.3	1.9	2.7	15	EEFCX0G181R	—	○	3500
			180	7.3	4.3	1.9	3.0	12	EEFCX0G181XR	—	○	3500
				7.3	4.3	1.9	2.7	15	EEFCX0G221R	—	○	3500
		6.3	220	7.3	4.3	1.9	3.0	12	EEFCX0G221XR	—	○	3500
				7.3	4.3	1.9	2.7	15	EEFCX0G271R	—	○	3500
			270	7.3	4.3	1.9	2.7	15	EEFCX0G271R	—	○	3500
			100	7.3	4.3	1.9	2.7	15	EEFCX0J101R	—	○	3500
			120	7.3	4.3	1.9	2.7	15	EEFCX0J121R	—	○	3500
			150	7.3	4.3	1.9	2.7	15	EEFCX0J151R	—	○	3500
				7.3	4.3	1.9	3.0	12	EEFCX0J151XR	—	○	3500
			180	7.3	4.3	1.9	2.7	15	EEFCX0J181R	—	○	3500

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

*3: Please refer to the page of "Mounting Specifications".

*4: Please use high temperature Lead-Free reflow (260 °C) for new design.

*5: In the case of new design please contact us.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Nov. 2012

Standard Products

○ : available, — : not available

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20%) (μF)	Case Size			Specification		Part number	Reflow condition		Min. Packaging Q'ty (pcs)		
			L (mm)	W (mm)	H (mm)	*1 Ripple current (Ar.m.s.)	*2 ESR (mΩ max)		240 °C *3	260 °C *3			
UD	2	330	7.3	4.3	2.8	3.0	15	EEFUD0D331ER *5	*4	○	2000		
			7.3	4.3	2.8	3.3	12	EEFUD0D331XE *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0D331LE *5	*4	○	2000		
		390	7.3	4.3	2.8	3.0	15	EEFUD0D391ER *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0D391LE *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0D471LE *5	*4	○	2000		
	2.5	220	7.3	4.3	2.8	3.0	15	EEFUD0E221ER *5	*4	○	2000		
			7.3	4.3	2.8	3.3	12	EEFUD0E221XE *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0E221LE *5	*4	○	2000		
		270	7.3	4.3	2.8	3.0	15	EEFUD0E271ER *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0E271LE *5	*4	○	2000		
			7.3	4.3	2.8	3.0	15	EEFUD0G121ER *5	*4	○	2000		
	4	120	7.3	4.3	2.8	3.4	12	EEFUD0G121XE *5	*4	○	2000		
			7.3	4.3	2.8	3.0	15	EEFUD0G151ER *5	*4	○	2000		
			7.3	4.3	2.8	3.3	12	EEFUD0G151XE *5	*4	○	2000		
		150	7.3	4.3	2.8	3.4	9	EEFUD0G151LE *5	*4	○	2000		
			7.3	4.3	2.8	2.5	18	EEFUD0G181ER *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0G181LE *5	*4	○	2000		
	6.3	100	7.3	4.3	2.8	3.0	15	EEFUD0J101ER *5	*4	○	2000		
			7.3	4.3	2.8	3.3	12	EEFUD0J101XE *5	*4	○	2000		
			7.3	4.3	2.8	3.0	15	EEFUD0J121ER *5	*4	○	2000		
		120	7.3	4.3	2.8	3.3	12	EEFUD0J121XE *5	*4	○	2000		
			7.3	4.3	2.8	3.4	9	EEFUD0J121LR *5	○	—	2000		
			7.3	4.3	2.8	2.5	18	EEFUD0J151ER *5	*4	○	2000		
	8	150	7.3	4.3	2.8	3.4	9	EEFUD0J151LR *5	○	—	2000		
			7.3	4.3	2.8	3.0	15	EEFUD0K680ER	*4	○	2000		
			7.3	4.3	2.8	2.5	18	EEFUD0K101ER	*4	○	2000		
		UE	2	270	7.3	4.3	4.2	3.3	12	EEFUE0D271ER *5	*4	○	2000
					7.3	4.3	4.2	3.5	10	EEFUE0D271XE *5	*4	○	2000
					7.3	4.3	4.2	3.3	12	EEFUE0D331ER *5	*4	○	2000
	330			7.3	4.3	4.2	3.5	10	EEFUE0D331XE *5	*4	○	2000	
				7.3	4.3	4.2	3.3	12	EEFUE0D391ER *5	*4	○	2000	
				7.3	4.3	4.2	3.5	10	EEFUE0D391XE *5	*4	○	2000	
	390			7.3	4.3	4.2	3.7	7	EEFUE0D391LE *5	*4	○	2000	
				7.3	4.3	4.2	3.3	12	EEFUE0D471ER *5	*4	○	2000	
				7.3	4.3	4.2	3.5	10	EEFUE0D471XE *5	*4	○	2000	
7.3				4.3	4.2	3.7	7	EEFUE0D471LE *5	*4	○	2000		
7.3				4.3	4.2	3.3	12	EEFUE0D561ER *5	*4	○	2000		
7.3				4.3	4.2	3.7	7	EEFUE0D561LE *5	*4	○	2000		
2.5	220		7.3	4.3	4.2	3.3	12	EEFUE0E221ER *5	*4	○	2000		
			7.3	4.3	4.2	3.5	10	EEFUE0E221XE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0E271ER *5	*4	○	2000		
	270		7.3	4.3	4.2	3.5	10	EEFUE0E271XE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0E331ER *5	*4	○	2000		
			7.3	4.3	4.2	3.5	10	EEFUE0E331XE *5	*4	○	2000		
	390		7.3	4.3	4.2	3.7	7	EEFUE0E331LE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0E391ER *5	*4	○	2000		
			7.3	4.3	4.2	3.7	7	EEFUE0E391LE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0E471ER *5	*4	○	2000		
			7.3	4.3	4.2	3.7	7	EEFUE0E471LE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0G181ER *5	*4	○	2000		
4	180		7.3	4.3	4.2	3.5	10	EEFUE0G181XE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0G221ER *5	*4	○	2000		
			7.3	4.3	4.2	3.5	10	EEFUE0G221XE *5	*4	○	2000		
	220		7.3	4.3	4.2	3.7	7	EEFUE0G221LE *5	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0G271ER *5	*4	○	2000		
			7.3	4.3	4.2	3.7	7	EEFUE0G271LE *5	*4	○	2000		
6.3	330		7.3	4.3	4.2	3.3	12	EEFUE0G331ER	*4	○	2000		
			7.3	4.3	4.2	3.3	12	EEFUE0J151ER *5	*4	○	2000		
			7.3	4.3	4.2	3.5	10	EEFUE0J151XE *5	*4	○	2000		
	180		7.3	4.3	4.2	3.3	12	EEFUE0J181ER *5	*4	○	2000		
			7.3	4.3	4.2	3.5	10	EEFUE0J181XE *5	*4	○	2000		
			7.3	4.3	4.2	3.7	7	EEFUE0J181LR *5	○	—	2000		
8	220	7.3	4.3	4.2	3.0	15	EEFUE0J221ER *5	*4	○	2000			
		7.3	4.3	4.2	3.7	7	EEFUE0J221LR *5	○	—	2000			
		7.3	4.3	4.2	3.3	12	EEFUE0K101ER *5	*4	○	2000			
	150	7.3	4.3	4.2	3.0	15	EEFUE0K151ER	*4	○	2000			

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

*3: Please refer to the page of "Mounting Specifications".

*4: Please use high temperature Lead-Free reflow (260 °C) for new design.

*5: In the case of new design please contact us.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Nov. 2012

Low ESR Products

○ : available, — : not available

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20%) (μF)	Case Size			Specification		Part number	Reflow condition		Min. Packaging Q'ty (pcs)		
			L (mm)	W (mm)	H (mm)	*1 Ripple current (Ar.m.s.)	*2 ESR (mΩ max)		240 °C *3	260 °C *3			
SL	2	100	7.3	4.3	1.8	3.0	9	EEFSL0D101ER	*4	○	3500		
		120	7.3	4.3	1.8	3.0	9	EEFSL0D121ER	*4	○	3500		
		150	7.3	4.3	1.8	3.0	9	EEFSL0D151ER	*4	○	3500		
		180	7.3	4.3	1.8	3.0	9	EEFSL0D181ER	*4	○	3500		
		220	7.3	4.3	1.8	3.0	9	EEFSL0D221ER	*4	○	3500		
	2.5	100	7.3	4.3	1.8	3.0	9	EEFSL0E101ER	*4	○	3500		
		120	7.3	4.3	1.8	3.0	9	EEFSL0E121ER	*4	○	3500		
		150	7.3	4.3	1.8	3.0	9	EEFSL0E151ER	*4	○	3500		
	4	82	7.3	4.3	1.8	3.0	9	EEFSL0G820ER	*4	○	3500		
	6.3	56	7.3	4.3	1.8	3.0	9	EEFSL0J560R *5	○	—	3500		
	SX	2	180	7.3	4.3	1.9	3.0	9	EEFSX0D181ER	*4	○	3500	
			220	7.3	4.3	1.9	3.0	9	EEFSX0D221ER	*4	○	3500	
270			7.3	4.3	1.9	3.0	9	EEFSX0D271ER	*4	○	3500		
			7.3	4.3	1.9	3.5	6	EEFSX0D271XE	*4	○	3500		
330			7.3	4.3	1.9	3.8	4.5	EEFSX0D271E4	—	○	3500		
			7.3	4.3	1.9	3.0	9	EEFSX0D331ER	*4	○	3500		
			7.3	4.3	1.9	3.5	6	EEFSX0D331XE	*4	○	3500		
390			7.3	4.3	1.9	3.8	4.5	EEFSX0D331E4	—	○	3500		
			7.3	4.3	1.9	3.0	9	EEFSX0D391ER	*4	○	3500		
			7.3	4.3	1.9	3.5	6	EEFSX0D391XE	*4	○	3500		
470			7.3	4.3	1.9	4.0	4.5	EEFSX0D391E4	—	○	3500		
			7.3	4.3	1.9	3.0	9	EEFSX0D471ER	*4	○	3500		
			7.3	4.3	1.9	3.5	6	EEFSX0D471XE	*4	○	3500		
2.5			330	7.3	4.3	1.9	4.0	4.5	EEFSX0D471E4	—	○	3500	
				7.3	4.3	1.9	3.0	9	EEFSX0D561E4	—	○	3500	
				150	7.3	4.3	1.9	3.0	9	EEFSX0E151ER	*4	○	3500
			390	180	7.3	4.3	1.9	3.0	9	EEFSX0E181ER	*4	○	3500
				220	7.3	4.3	1.9	3.0	9	EEFSX0E221ER	*4	○	3500
		7.3		4.3	1.9	3.5	7	EEFSX0E221E7	—	○	3500		
		470	270	7.3	4.3	1.9	3.5	7	EEFSX0E271E7	—	○	3500	
			7.3	4.3	1.9	3.0	9	EEFSX0E331ER	*4	○	3500		
			7.3	4.3	1.9	3.5	6	EEFSX0E331XE	*4	○	3500		
		4	390	7.3	4.3	1.9	4.0	4.5	EEFSX0E331E4	—	○	3500	
				7.3	4.3	1.9	3.0	9	EEFSX0E391ER	*4	○	3500	
				7.3	4.3	1.9	3.5	6	EEFSX0E391XE	*4	○	3500	
			470	7.3	4.3	1.9	4.0	4.5	EEFSX0E391E4	—	○	3500	
				7.3	4.3	1.9	3.0	9	EEFSX0E471ER	—	○	3500	
7.3				4.3	1.9	3.5	6	EEFSX0E471XE	—	○	3500		
6.3		150	7.3	4.3	1.9	3.8	4.5	EEFSX0E471E4	—	○	3500		
			82	7.3	4.3	1.9	3.0	9	EEFSX0G820ER	*4	○	3500	
			100	7.3	4.3	1.9	3.0	9	EEFSX0G101ER	*4	○	3500	
		220	7.3	4.3	1.9	3.0	9	EEFSX0G151ER	—	○	3500		
			7.3	4.3	1.9	3.5	7	EEFSX0G151E7	—	○	3500		
		180	7.3	4.3	1.9	3.0	9	EEFSX0G181ER	—	○	3500		
			7.3	4.3	1.9	3.0	9	EEFSX0G221ER	—	○	3500		
120		7.3	4.3	1.9	3.5	7	EEFSX0J121E7	—	○	3500			
		7.3	4.3	1.9	3.0	9	EEFSX0J151ER	—	○	3500			

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

*3: Please refer to the page of "Mounting Specifications".

*4: Please use high temperature Lead-Free reflow (260 °C) for new design.

*5: In the case of new design please contact us.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Nov. 2012

Surface Mount Type **SP-Cap**

Series: **G**



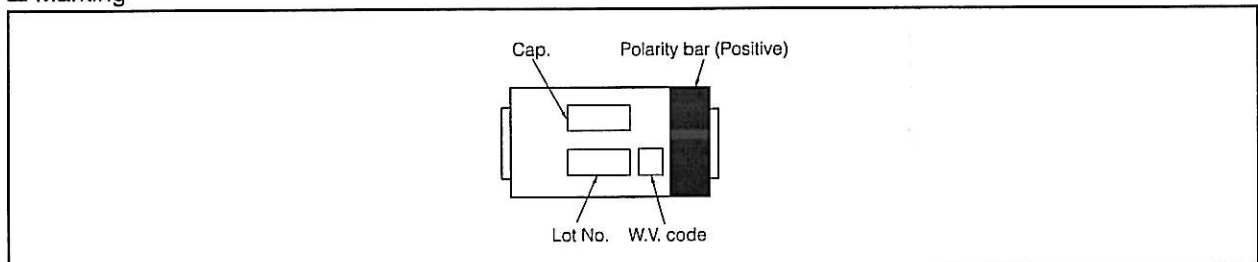
■ Features

- Super Low-ESR (3 mΩ)
- High temperature reflow soldering applicable
(Peak : 260 °C 10s, main heating : 230 °C 40s)
- RoHS directive compliant

■ Specifications

Category Temp. Range	-40 °C to +105 °C	
Rated W.V.Range	2 V.DC to 2.5 V.DC	
Nominal Cap.Range	330 μF to 560 μF	
Capacitance Tolerance	±20 % (120 Hz/+20 °C)	
DC Leakage Current	I ≤ 0.1 CV (μA) 2 minutes	
tan δ	≤ 0.06 (120 Hz/+20 °C)	
Surge Voltage	Rated Working Voltage × 1.25 (15 °C to 35 °C)	
Endurance	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.	
	Capacitance change	±10% of initial measured value
	tan δ	≤ Initial specified value
	DC leakage current	≤ Initial specified value
Moisture resistance	After storing for 500 hours at 60 °C, 90 %	
	Capacitance change of initial measured value	2 V.DC
		+70, -20 %
	tan δ	≤ 200 % of initial specified value
	DC leakage current	≤ Initial specified value

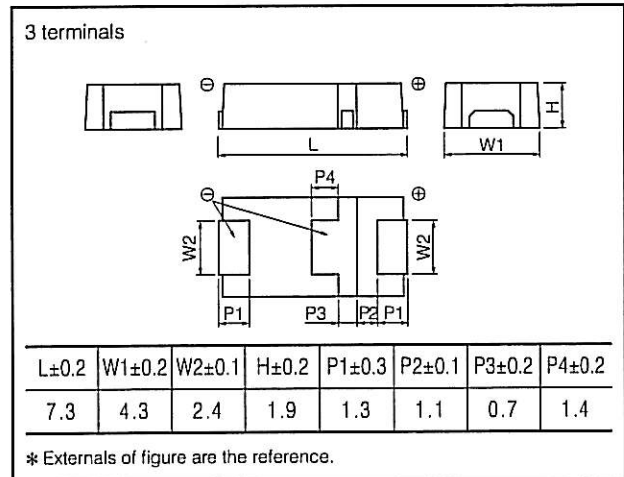
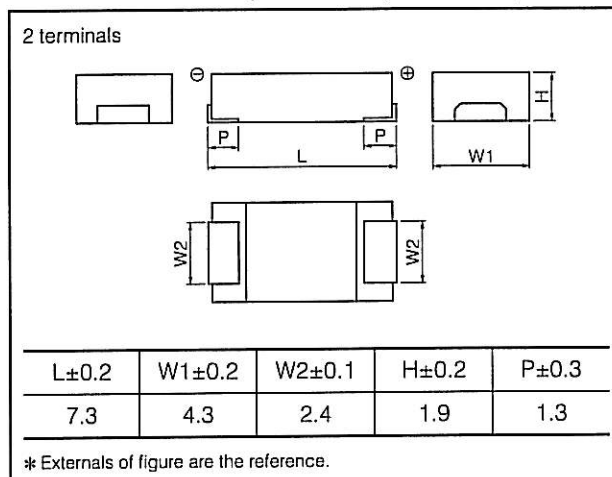
■ Marking



■ Dimensions in mm(not to scale)

(Unit : mm)

(Unit : mm)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

01 Oct. 2013

■ Standard Products

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20 %) (μF)	Case Size			Specification		Part number *3 Reflow condition : 260 °C [Proposal]	The number of terminals		Min. Packaging Q'ty (pcs)
			L (mm)	W (mm)	H (mm)	*1 Ripple current (Ar.m.s.)	*2 ESR (Ω max)		2	3	
GX	2	330	7.3	4.3	1.9	4.0	0.003	EEFGX0D331R	○		3500
		470	7.3	4.3	1.9	4.0	0.003	EEFGX0D471R	○		3500
		470	7.3	4.3	1.9	4.0	0.003	EEFGX0D471L		○	3500
		560	7.3	4.3	1.9	4.0	0.003	EEFGX0D561R	○		3500
		560	7.3	4.3	1.9	4.0	0.003	EEFGX0D561L		○	3500
	2.5	470	7.3	4.3	1.9	4.0	0.003	EEFGX0E471R	○		3500
		470	7.3	4.3	1.9	4.0	0.003	EEFGX0E471L		○	3500

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

*3: Please refer to the page of "Mounting Specifications".

Surface Mount Type

SP-Cap

Series: **L**



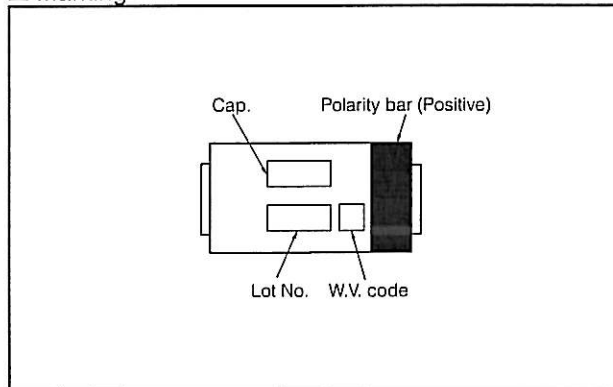
■ Features

- Low ESL by structure of SP-Cap 50% ESL of current products
- Super Low-ESR (4.5 mΩ)
- High temperature reflow soldering applicable
(Peak : 260 °C 10s, main heating : 230 °C 40s)
- RoHS directive compliant

■ Specifications

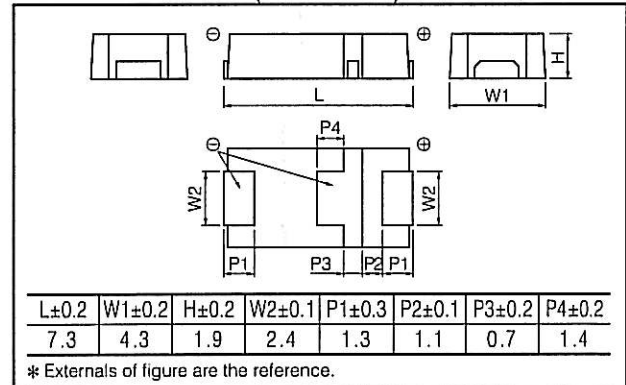
Category Temp. Range	-40 °C to +105 °C	
Rated W.V.Range	2 to 2.5 V.DC	
Nominal Cap.Range	330 μF to 560 μF	
Capacitance Tolerance	±20 % (120 Hz/+20 °C)	
DC Leakage Current	I ≤ 0.1 CV (μA) 2 minutes	
tan δ	≤ 0.06 (120 Hz/+20 °C)	
Surge Voltage	Rated Working Voltage × 1.25 (15 °C to 35 °C)	
Endurance	After 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.	
	Capacitance change	±10% of initial measured value
	tan δ	≤ Initial specified value
	DC leakage current	≤ Initial specified value
Moisture resistance	After storing for 500 hours at 60 °C, 90 %	
	Capacitance change of initial measured value	2 to 2.5 V.DC
		+70, -20 %
	tan δ	≤ 200 % of initial specified value
	DC leakage current	≤ Initial specified value

■ Marking



■ Dimensions in mm(not to scale)

(Unit : mm)



■ Standard Products

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20 %) (μF)	Case Size			Specification		Part number	Min. Packaging Qty (pcs)
			L (mm)	W (mm)	H (mm)	Ripple current (*1) (Ar.m.s.)	ESR (*2) (mΩ max)		
LX	2	330	7.3	4.3	1.9	3.5	6	EEFLX0D331R	3500
			7.3	4.3	1.9	3.8	4.5	EEFLX0D331R4	3500
		470	7.3	4.3	1.9	3.5	6	EEFLX0D471R	3500
			7.3	4.3	1.9	3.8	4.5	EEFLX0D471R4	3500
		560	7.3	4.3	1.9	3.5	6	EEFLX0D561R	3500
			7.3	4.3	1.9	3.8	4.5	EEFLX0D561R4	3500
	2.5	330	7.3	4.3	1.9	3.5	6	EEFLX0E331R	3500
			7.3	4.3	1.9	3.8	4.5	EEFLX0E331R4	3500
		470	7.3	4.3	1.9	3.5	6	EEFLX0E471R	3500
			7.3	4.3	1.9	3.8	4.5	EEFLX0E471R4	3500

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

*3: Please refer to the page of "Mounting Specifications".

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

01 Oct. 2013

Surface Mount Type **SP-Cap**

Series: **M**



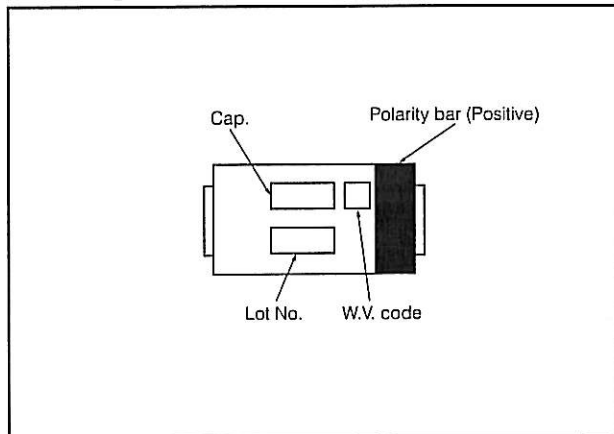
■ Features

- Achieved 40 % miniaturization on together with ultra low ESR of SP-Cap for further design flexibility.
- RoHS directive compliant
- High temperature reflow soldering applicable.
(Peak : 260 °C 10 s, main heating : 230 °C 40 s)

■ Specifications

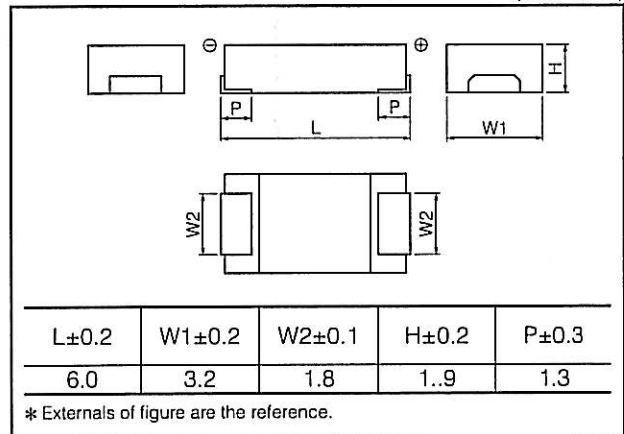
Category Temp. Range	-40 °C to +105 °C			
Rated W.V.Range	2 V.DC to 6.3 V.DC			
Nominal Cap.Range	47 μF to 120 μF			
Capacitance Tolerance	±20 % (120 Hz/+20 °C)			
DC Leakage Current	I ≤ 0.1 CV (μA) 2 minutes			
tan δ	≤ 0.06 (120 Hz/+20 °C)			
Surge Voltage	Rated Working Voltage × 1.25 (15 °C to 35 °C)			
Endurance	After applying rated working voltage for 1000 hours at 105 °C±2 °C and then being atabilized at +20 °C, Capacitor shall			
	Capacitance change	±10% of initial measured value		
	tan δ	≤ Initial specified value		
	DC leakage current	≤ Initial specified value		
Moisture resistance	After storing for 500 hours at 60 °C, 90 %			
	Capacitance change of initial measurd value	2, 2.5 V.DC	4 V.DC	6.3 V.DC
		+70, -20 %	+60, -20 %	+50, -20 %
	tan δ	≤ 200 % of initial specified value		
	DC leakage current	≤ Initial specified value		

■ Marking



■ Dimensions in mm(not to scale)

(Unit : mm)



■ Standard Products

Series & Size Code	Rated W.V. (V.DC)	Capacitance (±20 %) (μF)	Case Size			Specification		Part number	Min. Packaging Q'ty (pcs)
			L (mm)	W (mm)	H (mm)	Ripple current (Ar.m.s.) ^{*1}	ESR (mΩ max.) ^{*2}		
MC	2	120	6.0	3.2	1.9	2.7	12	EEFMC0D121R	3000
	2.5	100	6.0	3.2	1.9	2.7	12	EEFMC0E101R	3000
	4	82	6.0	3.2	1.9	2.2	18	EEFMC0G820R	3000
	6.3	47	6.0	3.2	1.9	2.2	18	EEFMC0J470R	3000

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

*3: Please refer to the page of "Mounting Specifications".

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Nov. 2012

Notices

■ Applicable laws and regulations

- This product satisfies the requirements of the RoHS Directive (2011/65/UC) (related to the specified hazardous substances contained in electrical and electronic equipment).
- The ozone-depleting chemicals regulated by the Montreal Protocol are not intentionally used in the materials used in our manufacturing processes.
PBDEs (Poly-Brominated Biphenyls) / PBDEs (Poly-Brominated Diphenyl ethers)
The above specified brominated flame retardants are not intentionally used.
- The materials used in this product are all referred to as existing chemicals by the Law Concerning Examination and Regulation of Manufacture and Handling of Chemical Substances.
- When exporting this product, observe the export procedures specified in export control laws such as the Foreign Exchange and Foreign Trade Control Law.

■ Limited applications

- This product is intended to be used for general-purpose standard applications for general electronic equipment (such as AV equipment, household appliances, business or office equipment, information or communications equipment, etc.)
- If this product is being examined for possible use in applications where higher reliability or safety is required, in cases where a malfunction of this product may endanger life or property, then the delivery specifications meeting the application requirements must be agreed to and exchanged.

Items to be observed

- <1> The purpose of these specifications is to ensure the quality of components as individual components. Before use, check and evaluate their operation when mounted on your products.
- <2> Do not use our components outside of the corresponding specifications.

■ When using this capacitor in a product where safety is critical

We take great care in the quality of this product. However, performance may deteriorate and short-circuiting or open-circuiting may occur if it will be used in transportation equipment (e.g. trains, cars, traffic lights), medical equipment airborne equipment, aerospace equipment, electric heating appliances, combustion/gas equipment, rotating equipment, disaster/crime prevention equipment, or other equipment where a defect in this component may cause the loss of human life or other significant damage. Ensure that the target equipment has a failsafe design and is provided with the following systems to guarantee adequate safety.

- (1) * Ensure the safety of the whole system by installing a protection circuit and a protection device.
- (2) Redundant circuits, etc. to maintain the safety of the entire system so that a single independent failure will not lead to unsafe conditions.

■ Conditions of use:

This product is intended to be used in electronic equipment for general-purpose standard applications and is not designed for use in any special environments.
When this capacitor is used in a special environment or under special conditions, its performance may be affected.
Before use, verify the performance and reliability of the capacitor

△ Application Guidelines**1. Circuit design****1-1 Prohibited circuits for use**

Polymer Aluminum capacitors (SP-Cap) are expected to malfunction in the following circuits. Therefore, their use is prohibited.

- (1) Time constant circuits
- (2) Coupling circuits
- (3) Capacitors connected in series
- (4) Circuits significantly affected by leakage current
- (5) High-impedance voltage retention circuits

1.2 Polarity and voltage The SP-Cap has polarities.

Do not apply a reversed or alternating-current voltage.

If the polarity is reversed, then a leakage current may occur, leading to short-circuiting or capacitor breakdown.

Do not apply an excessive voltage (a voltage exceeding the rating).

"Applied voltage" refers to a voltage containing a peak transient instantaneous voltage and a peak ripple voltage. It does not only refer to a stationary line voltage. Design circuits so that peak voltages do not exceed the specified voltage.

1.3 Ripple current

Observe the allowable ripple current.

If an excessive ripple current passes through the SP-Cap, then self-generated heat may cause a current leak or a short-circuit. While observing the allowable ripple current, do not apply a ripple voltage as described in paragraph 1.2.

1.4 Leakage current

The leakage current may increase even if the following usage environment is within the specified requirements.

However, even if the leakage current increases, the capacitor's self-repairing function will reduce the leakage current in most cases when a voltage is applied.

- (1) After reflow soldering
- (2) Unloading conditions such as unloading at a high temperature, high temperature and humidity, rapid temperature change, etc.

1.5 Temperature

Use capacitors within the specified temperature range. If they are used outside the specified temperature range, then the electrical characteristics may vary or deteriorate significantly, leading to failure.

The temperature referred to here includes the ambient temperature including heat produced by heat generating devices (power transistors, resistors, etc.), self-heating due to ripple currents, etc.

Take these factors into consideration when checking the capacitor temperature.

1.6 Failure rate

Most failure modes are "short-circuits" and "leakage current increase". The main causes of failure include thermal stress due to reflow soldering, the temperature of the environment they are being used in, and/or electrical or mechanical stress. Using lower temperatures and voltages even within the specified range enables the defect rate to be reduced. Therefore, provide such allowances during design.

[Estimated defect rate] (Reference)

- (1) Data in our reliability tests/46 Fits or less
(Estimation with a rated voltage being applied at 105 °C)
- (2) Estimated defect rate in the market/0.13 Fits or less
(c=0, estimation with a reliability level of 60 %)

1.7 Mounting area consideration

Isolate the surface of PCB under the mounted capacitor.

2. Mounting**2.1 When mounting**

- (1) Check the capacitor ratings (capacitance and voltage) before mounting.
- (2) Check the capacitor polarity before mounting.
- (3) Check the land size for the capacitor before mounting.
- (4) When using a mounter, if the pressure for mounting is too high, then the current leak may increase, short-circuiting may occur, or the capacitor may break down or come off.

2.2 Soldering (reflow soldering)

(1) The SP-Cap is to be used exclusively for reflow soldering. When reflow soldering, use an ambient heat conduction system such as the simultaneous use of infrared and hot-air and not a steam heat conduction system (VPS).

* This capacitor cannot be used for flow or dip soldering.

(2) Solder capacitors under these soldering conditions (pre-heating, main-heating temperatures and time) described in the specifications.

(3) Reflow-solder up to twice.

(4) Do not reuse the mounted SP-Cap.

(5) When modifying or correcting by using a soldering iron, etc.:

Use a soldering iron of 30 W or less, whose iron tip temperature is 350 °C or less. Total soldering time should be no longer than 10 seconds. Do not apply excessive force to the capacitor.

2.3 Circuit board cleaning

Apply the following conditions for flux cleaning after soldering.

Temperature: 60 °C or less, duration: Five minutes or less

However, rinse sufficiently and dry the boards (at 100 °C for 20 minutes or less).

[Applicable solvents]

Pine Alpha ST-100S

Clean-thru 750H, 750L, or 710M

Aqua Cleaner 210SEP

Sunelec B-12, DK

Beclear CW-5790

Techno Cleaner 219

Cold Cleaner P3-375

Telpene Cleaner EC-7R

Technocare FRW-17, FRW-1, or FRV-1

AXREL 32

Remarks 1: If you wish to use solvents other than the above or Deionized water, please contact us.

2: Please do not use ozone-depleting chemicals in order to protect the environment.

3: In the case of using ultrasonic cleaning, the terminals may be broken. Therefore, please test before using in mass production.

2.4 Capacitor handling after soldering

(1) Do not apply an excessive force to the capacitor.

Deformed electrode terminals can affect mounting. Short-circuiting, wire breaking, leakage current increase, or damage to the exterior may be caused.

After mounting the capacitor, do not hold its body or apply a force to it.

3. Precautions for using equipment

3.1 Avoid using equipment to which capacitors are fitted in the following environments.

<1> Capacitors are directly exposed to water, salt water, or oil.

<2> Capacitors are exposed to direct sunlight.

<3> Capacitors are exposed to high temperature and humidity and the capacitor surface is condensed.

<4> Capacitors are exposed to various active gases.

<5> Acidic or alkaline environments

<6> Capacitors are subject to high-frequency induction.

<7> Capacitors are subject to excessive vibrations or shocks.

4. Emergency procedures

If the capacitors generate heat, smoke may come out of the exterior resin. If this is the case, then turn off the equipment immediately and stop using it.

Do not place your face or hands close to the capacitor. Otherwise, burns may be caused.

5. Storage

This product must be stored in an environment with controlled moisture protection.

This product must be stored as follows before and after moisture-protection packing is applied.

(If these requirements are not met, then thermal stress caused by moisture absorption of the package may damage the exterior or the internal elements.)

[Storage environment]

Temperature: 5 to 30 °C, humidity: 70 % or less

Storage period before opening the moisture protection seal: 2 years after manufacturing

Storage period after opening the moisture protection seal: 7 days*

* The capacitors for reflow 240 °C soldering except FD and CD (12.5 V and 16 V) products must be used within 14 days

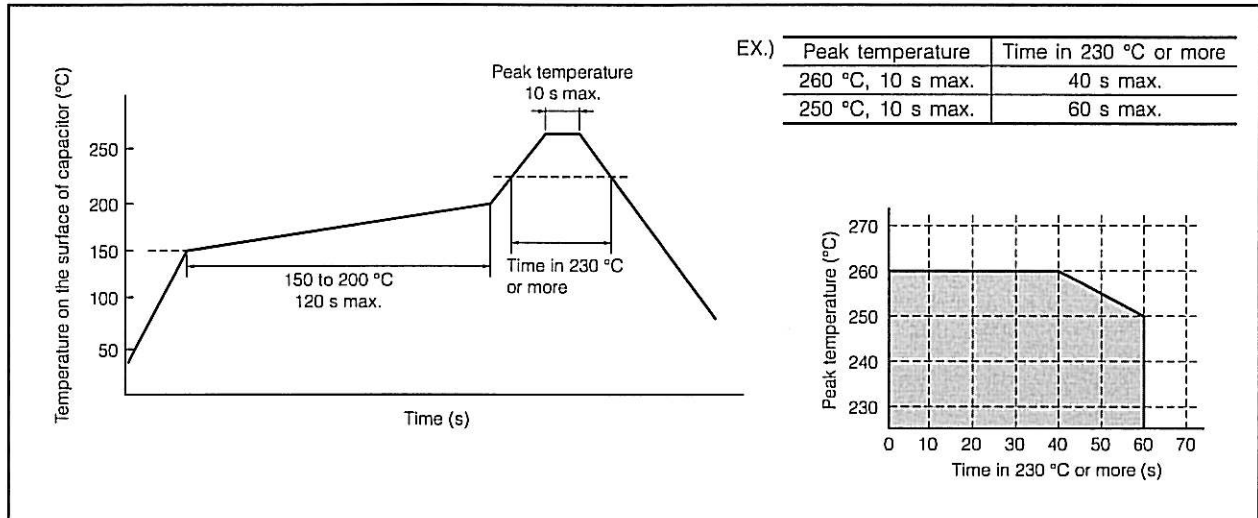
6. Discarding

Dispose of capacitors as industrial waste because they consist of various metals and resin.

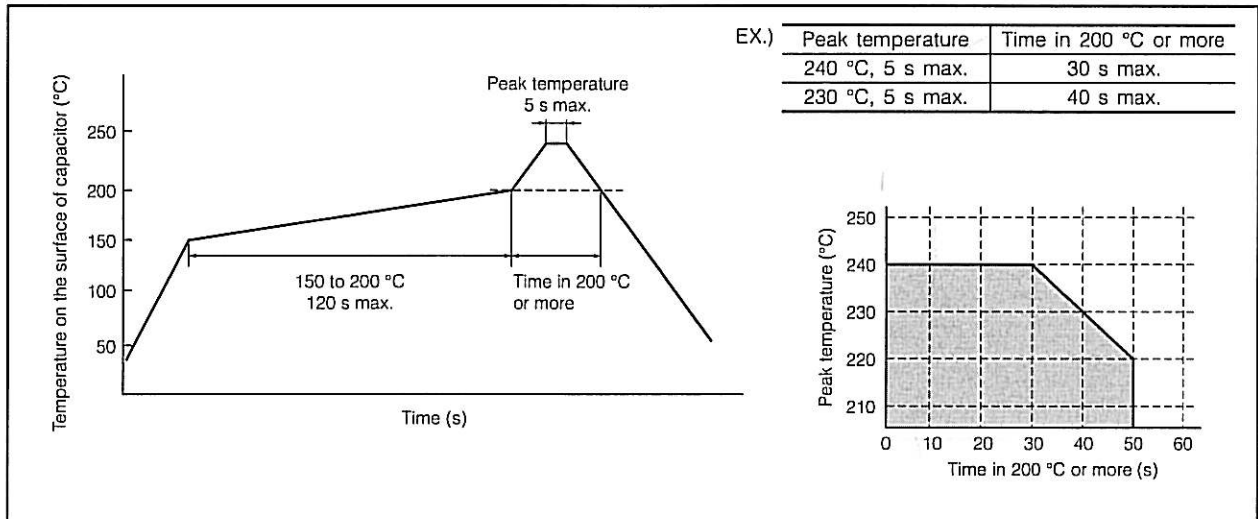
The precautions for the use of functional polymer aluminum electrolytic capacitors follow the "Precautionary guidelines for the use of fixed aluminum electrolytic capacitors for electronic equipment", RCR- 2367B issued by EIAJ in March 2002. Please refer to the above guidelines for details.

■ Mounting Specifications.

- Recommendable reflow soldering temperature 260 °C

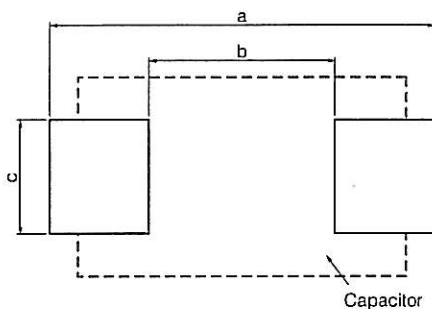


- Recommendable reflow soldering temperature 240 °C



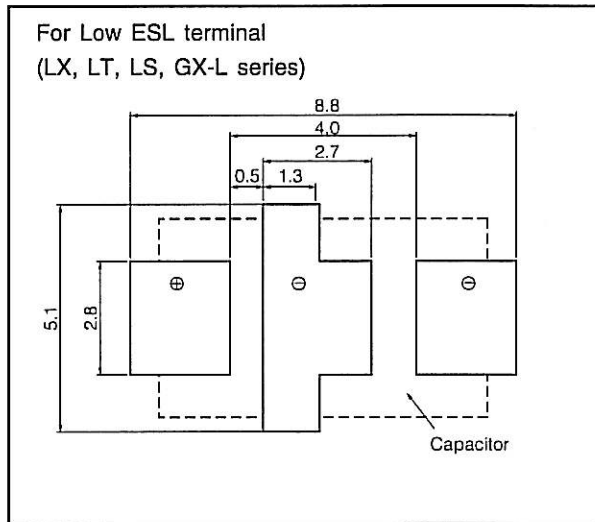
- Typical land pattern (mm)

For standard terminal
(CS, CT, FD, CD, CX, UD, UE, S, G, M series)

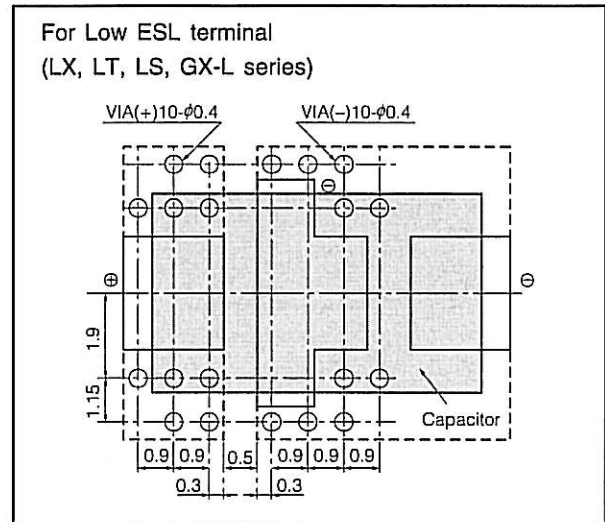


Series	a	b	c
CS, CT, FD, CD, CX, UD, UE, S, G	8.8	4.0	2.8
M (C size)	7.2	2.6	2.2

● Typical land pattern (mm)

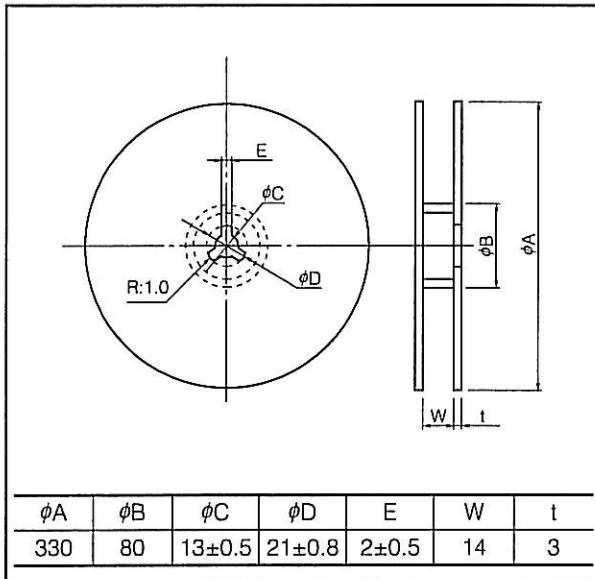


● VIA (mm)

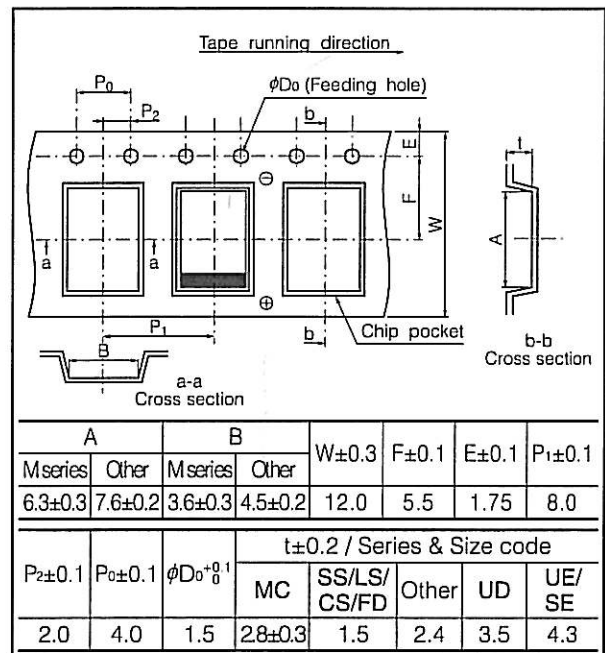


■ Packaging Specifications

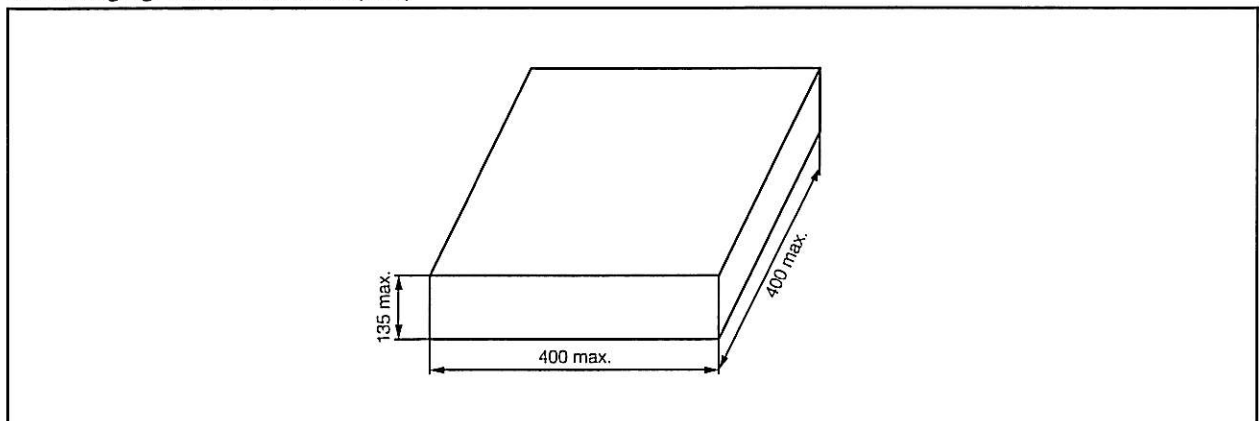
● Reel Dimensions (mm)



● Embossed Taping (mm)



■ Packaging Box Dimensions (mm)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

Replacement Proposal Table of SP-Cap

■ Replacement from SD/SE Series to proposal series (SX)

	2 V (OD)		2.5 V (OE)		4 V (OG)		6.3 V (OJ)	
	SD/SE Series	Proposal Series	SD/SE Series	Proposal Series	SD/SE Series	Proposal Series	SD/SE Series	Proposal Series
120 μ F (121)							EEFSD0J121R SD(7 m Ω /3.5 A)	EEFSX0J121E7 SX(7 m Ω /3.5 A)
150 μ F (151)					EEFSD0G151R/ER SD(7 m Ω /3.5 A)	EEFSX0G151E7 SX(7 m Ω /3.5 A)		
180 μ F (181)							EEFSE0J181R SE(5 m Ω /4.0 A)	EEFSX0J151ER SX(9 m Ω /3.0 A)
220 μ F (221)			EEFSD0E221R/ER SD(7 m Ω /3.5 A)	EEFSX0E221E7 SX(7 m Ω /3.5 A)	EEFSE0G221R/ER SE(5 m Ω /4.0 A)	EEFSX0G221ER SX(9 m Ω /3.0 A)		
270 μ F (271)	EEFSD0D271R/ER SD(7 m Ω /3.5 A)	EEFSX0D271XE SX(6 m Ω /3.5 A)	EEFSD0E271R/ER SD(7 m Ω /3.5 A)	EEFSX0E271E7 SX(7 m Ω /3.5 A)				
330 μ F (331)	EEFSD0D331R/ER SD(7 m Ω /3.5 A)	EEFSX0D331XE SX(6 m Ω /3.5 A)	EEFSE0E331R/ER SE(5 m Ω /4.0 A)	EEFSX0E331E4 SX(4.5 m Ω /4.0 A)				
390 μ F (391)	EEFSD0D391R/ER SD(7 m Ω /3.5 A) EEFSE0D391R/ER SE(5 m Ω /4.0 A)	EEFSX0D391XE SX(6 m Ω /3.5 A) EEFSX0D391E4 SX(4.5 m Ω /4.0 A)	EEFSE0E391R/ER SE(5 m Ω /4.0 A)	EEFSX0E391E4 SX(4.5 m Ω /4.0 A)				
470 μ F (471)	EEFSE0D471R/ER SE(5 m Ω /4.0 A)	EEFSX0D471E4 SX(4.5 m Ω /4.0 A)						
560 μ F (561)	EEFSE0D561R/ER SE(5 m Ω /4.0 A)	EEFSX0D561E4 SX(4.5 m Ω /4.0 A)						

(ESR / Rated ripple current)

Replacement Proposal Table of SP-Cap

■ Replacement from UD/UE Series to proposal series (CD, SL, SX, CX, others)

	2 V (0D)		2.5 V (0E)		4 V (0G)		6.3 V (0J)		8 V (0K)	
	UD/UE Series	Proposal Series	UD/UE Series	Proposal Series	UD/UE Series	Proposal Series	UD/UE Series	Proposal Series	UD/UE Series	Proposal Series
68 μ F (680)									EEFUD0K680R UD(15 m Ω /3.0 A)	EEFUD0K680ER UD(15 m Ω /3.0 A)
100 μ F (101)							EEFUD0J101R/ER UD(15 m Ω /3.0 A) EEFUD0J101XR/XE UD(12 m Ω /3.3 A)	EEFCX0J101R CX(15 m Ω /2.7 A)	EEFUD0K101R UD(18 m Ω /2.5 A) EEFUE0K101R UE(12 m Ω /3.3 A)	EEFUD0K101ER UD(18 m Ω /2.5 A)
120 μ F (121)					EEFUD0G121R/ER UD(15 m Ω /3.0 A) EEFUD0G121XR/XE UD(12 m Ω /3.3 A)	EEFCX0G151R CX(15 m Ω /2.7 A) EEFSX0G151ER SX(9 m Ω /3.0 A) Please integrate into 150 μ F	EEFUD0J121R/ER UD(15 m Ω /3.0 A) EEFUD0J121XR/XE UD(12 m Ω /3.3 A)	EEFCX0J121R CX(15 m Ω /2.7 A) EEFSX0J121E7 SX(7 m Ω /3.5 A)		
150 μ F (151)			EEFUD0E151R/ER UD(15 m Ω /3.0 A) EEFUD0E151XR/XE UD(12 m Ω /3.3 A)	EEFCDOE151ER CD(18 m Ω /2.5 A) EEFCX0G151R CX-4W(15 m Ω /2.7 A) EEFSLOE151ER SL(9 m Ω /3.0 A)	EEFUD0G151R/ER UD(15 m Ω /3.0 A) EEFUD0G151XR/XE UD(12 m Ω /3.3 A) EEFUD0G151LR/LE UD-(9 m Ω /3.4 A)	EEFCX0G151R CX(15 m Ω /2.7 A) EEFSX0G151ER SX(9 m Ω /3.0 A)	EEFUD0J151R/ER UD(18 m Ω /2.5 A) EEFUD0J151LR UD-(9 m Ω /3.4 A) EEFUE0J151R/ER UE(12 m Ω /3.3 A) EEFUE0J151XR/XE UE(10 m Ω /3.5 A)	EEFCX0J151R CX(15 m Ω /2.7 A) EEFSX0J151ER SX(9 m Ω /3.0 A)	EEFUE0K151R UE(15 m Ω /3.0 A)	EEFUE0K151ER UE(15 m Ω /3.0 A)
180 μ F (181)	EEFUD0D181R/ER UD(15 m Ω /3.0 A) EEFUD0D181XR/XE UD(12 m Ω /3.3 A)	EEFCDD0181ER CD(18 m Ω /2.5 A) EEFSLOD181ER SL(9 m Ω /3.0 A)	EEFUD0E181R/ER UD(15 m Ω /3.0 A) EEFUD0E181XR/XE UD(12 m Ω /3.3 A)	EEFSX0E181ER SX(9 m Ω /3.0 A)	EEFUD0G181R/ER UD(18 m Ω /2.5 A) EEFUD0G181LR/LE UD-(9 m Ω /3.4 A) EEFUE0G181R/ER UE(12 m Ω /3.3 A) EEFUE0G181XR/XE UE(10 m Ω /3.5 A)	EEFCX0G181R CX(15 m Ω /2.7 A) EEFSX0G181ER SX(9 m Ω /3.0 A)	EEFUE0J181R UE(12 m Ω /3.3 A) EEFUE0J181XR UE(10 m Ω /3.5 A)	EEFCX0J181R CX(15 m Ω /2.7 A) EEFUE0J181XE UE(10 m Ω /3.5 A)		
220 μ F (221)	EEFUD0D221R/ER UD(15 m Ω /3.0 A) EEFUD0D221XR/XE UD(12 m Ω /3.3 A)	EEFCXD0221R CX(15 m Ω /2.7 A) EEFSLOD221ER SL(9 m Ω /3.0 A)	EEFUD0E221R/ER UD(15 m Ω /3.0 A) EEFUD0E221XR/XE UD(12 m Ω /3.3 A) EEFUD0E221LR/LE UD-(9 m Ω /3.4 A) EEFUE0E221R/ER UE(12 m Ω /3.3 A) EEFUE0E221XR/XE UE(10 m Ω /3.5 A)	EEFCX0E221R CX(15 m Ω /2.7 A) EEFSX0E221ER SX(9 m Ω /3.0 A)	EEFUE0G221R/ER UE(12 m Ω /3.3 A) EEFUE0G221XR/XE UE(10 m Ω /3.5 A) EEFUE0G221LR/LE UE-(7 m Ω /3.7 A)	EEFCX0G221R (15 m Ω /2.7 A) EEFSX0G221ER SX(9 m Ω /3.0 A)	EEFUE0J221R UE(15 m Ω /3.0 A)	EEFCX0J181R CX(15 m Ω /2.7 A) EEFUE0J221ER UE(15 m Ω /3.0 A)		
270 μ F (271)	EEFUD0D271R/ER UD(15 m Ω /3.0 A) EEFUD0D271XR/XE UD(12 m Ω /3.3 A) EEFUD0D271LR/LE UD-(9 m Ω /3.4 A) EEFUE0D271R/ER UE(12 m Ω /3.3 A) EEFUE0D271XR/XE UE(10 m Ω /3.5 A)	EEFSXD0271ER SX(9 m Ω /3.0 A) EEFCXD0331R CX(15 m Ω /2.7 A) EEFSX0D331ER SX(9 m Ω /3.0 A) Please integrate into 330 μ F	EEFUD0E271R/ER UD(15 m Ω /3.0 A) EEFUD0E271LR/LE UD-(9 m Ω /3.4 A) EEFUE0E271R/ER UE(12 m Ω /3.3 A) EEFUE0E271XR/XE UE(10 m Ω /3.5 A)	EEFCX0E331R CX(15 m Ω /2.7 A) EEFSX0E331ER SX(9 m Ω /3.0 A) Please integrate into 330 μ F	EEFUE0G271R UE(12 m Ω /3.3 A) EEFUE0G271LR UE-(7 m Ω /3.7 A)	EEFCX0G271R CX(15 m Ω /2.7 A) EEFUE0G271LE UE-(7 m Ω /3.7 A)				
330 μ F (331)	EEFUD0D331R/ER UD(15 m Ω /3.0 A) EEFUD0D331XR/XE UD(12 m Ω /3.3 A) EEFUD0D331LR/LE UD-(9 m Ω /3.4 A) EEFUE0D331R/ER UE(12 m Ω /3.3 A) EEFUE0D331XR/XE UE(10 m Ω /3.5 A)	EEFCXD0331R CX(15 m Ω /2.7 A) EEFSX0D331ER SX(9 m Ω /3.0 A) EEFSX0D331XE SX(6 m Ω /3.5 A)	EEFUE0E331R/ER UE(12 m Ω /3.3 A) EEFUE0E331XR/XE UE(10 m Ω /3.5 A) EEFUE0E331LR/LE UE-(7 m Ω /3.7 A)	EEFCX0E331R CX(15 m Ω /2.7 A) EEFSX0E331ER SX(9 m Ω /3.0 A) EEFSX0E331XE SX(6 m Ω /3.5 A)	EEFUE0G331R UE(12 m Ω /3.3 A)	EEFCX0G271R CX(15 m Ω /2.7 A) EEFUE0G331ER UE(12 m Ω /3.3 A)				
390 μ F (391)	EEFUD0D391R/ER UD(15 m Ω /3.0 A) EEFUD0D391LR/LE UD-(9 m Ω /3.4 A) EEFUE0D391R/ER UE(12 m Ω /3.3 A) EEFUE0D391XR/XE UE(10 m Ω /3.5 A) EEFUE0D391LR/LE UE-(7 m Ω /3.7 A)	EEFCXD0391R CX(15 m Ω /2.7 A) EEFSX0D391ER SX(9 m Ω /3.0 A) EEFSX0D391XE SX(6 m Ω /3.5 A)	EEFUE0E391R/ER UE(12 m Ω /3.3 A) EEFUE0E391LR/LE UE-(7 m Ω /3.7 A)	EEFCX0E391R CX(15 m Ω /2.7 A) EEFSX0E391ER SX(9 m Ω /3.0 A) EEFSX0E391XE SX(6 m Ω /3.5 A)						
470 μ F (471)	EEFUD0D471LR/LE UD-(9 m Ω /3.4 A) EEFUE0D471R/ER UE(12 m Ω /3.3 A) EEFUE0D471XR/XE UE(10 m Ω /3.5 A) EEFUE0D471LR/LE UE-(7 m Ω /3.7 A)	EEFCXD0471R CX(15 m Ω /2.7 A) EEFSX0D471ER SX(9 m Ω /3.0 A) EEFSX0D471XE SX(6 m Ω /3.5 A)	EEFUE0E471R UE(12 m Ω /3.3 A) EEFUE0E471LR UE-(7 m Ω /3.7 A)	EEFCX0E471R CX(15 m Ω /2.7 A) EEFSX0E471ER SX(9 m Ω /3.0 A) EEFSX0E471XE SX(6 m Ω /3.5 A)						
560 μ F (561)	EEFUE0D561R/ER UE(12 m Ω /3.3 A) EEFUE0D561LR/LE UE-(7 m Ω /3.7 A)	EEFSX0D561E4 SX(4.5 m Ω /3.8 A)								

(ESR / Rated ripple current)