SPECIFICATION FOR APPROVAL

File No.: Q/FRK 0.GS.E.C32E-D07

Product Name	Box-type Metallized polypropylene Film A.C. Capacitor for capacitive divider
Product Type	C32(E)
Product Code	
Customer	
Customer Code	
Issue Date	2016-4

SURGE COMPONENTS, INC.
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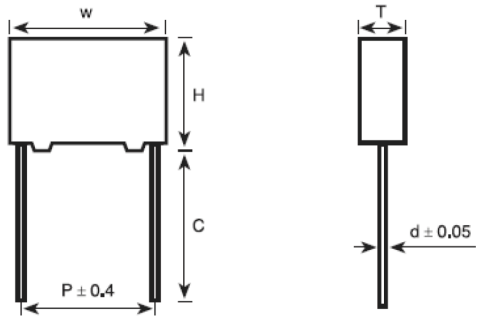
Metallized polypropylene film A.C. capacitor for capacitive divider

■ Outline Drawing



W ± 0.4, H ± 0.4, T ± 0.4

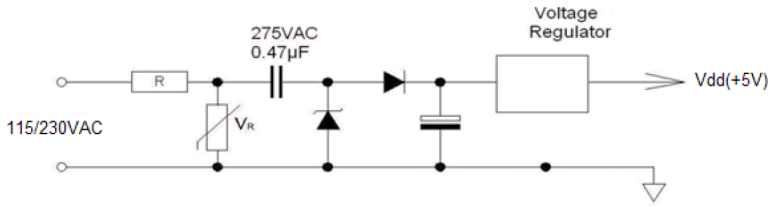
■ Features

- This is specifically designed for applications in serial with the main, i.e.: capacitive divider, for example, energy meter, LED driver etc.
- Metallized polypropylene structure
- Good self-healing properties, withstanding overvoltage stressing
- Long stability of capacitance
- Good properties in damp environment
- Excellent passive flame resistant abilities, （UL94/V-0 Plastic case，Epoxy resin sealing）

■ Specifications

Reference Standard	GB/T 14579 (IEC 60384-17)		
Climatic Category	55/105/56		
Rated temperature	85℃		
Operating temperature	-55℃~105℃ (+85℃ to +105℃: decreasing factor 1.25% per ℃ for U_R)		
Rated Voltage	230Vac, 50/60Hz	250Vac, 50/60Hz	300Vac, 50/60Hz
Maximum continuous DC voltage	400Vdc	560Vdc	630Vdc
Capacitance Range	0.033μF~4.7μF	0.010μF~4.0μF	0.010μF~2.2μF
Voltage Proof (Between Terminals)	640Vdc(2s)	900Vdc(2s)	1 500Vdc(2s)
Capacitance Tolerance	±5%(J), ±10% (K), ±20% (M)		
Insulation Resistance	$R \geq 15\,000M\Omega$, $C_N \leq 0.33\mu F$ $RC_N \geq 5\,000s$, $C_N > 0.33\mu F$	(20℃, 100V ,1min)	
Dissipation Factor	$\leq 10\times10^{-4}$(1kHz,20℃)	$\leq 20\times10^{-4}$(10kHz,20℃)	

■ Typical circuit（0.47μF）



■ Part number system

The 18 digits part number is formed as follow:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
C	3	2								**E**							

Digit 1 to 3 Series code

C32

Digit 4 to 5 A.C. rated voltage

P5=230V E2=250V P2=275V Q1=300V

Digit 6 to 8 Rated capacitance value

For example : 103=10×10^3 pF= 0.01μF

Digit 9 Capacitance tolerance

J=±5%,±10%, M=±20%

Digit 10 Pitch

3=7.5mm 4=10mm 6=15.0mm 9=22.5mm B=27.5mm F=37.5mm

Digit 11 Internal use

Digit 12 to 15 Lead form and packaging code

Digit 16 to 18 Internal use

Table 1 Lead form and packaging code

<table>
<tr><th colspan="2">Digit 12</th><th colspan="2">Digit 13</th><th colspan="2">Digit 14</th><th colspan="2">Digit 15</th></tr>
<tr><td>code</td><td>explanation</td><td>code</td><td>explanation</td><td>code</td><td>explanation</td><td>code</td><td>explanation</td></tr>
<tr><td>A</td><td>ammo-pack</td><td>3
4
6</td><td>F=7.5mm
F=10.0mm
F=15.0mm</td><td>0</td><td>straight</td><td>1

5</td><td>each cap. among two consecutive holes
P3=12.7mm,H=18.5mm (For pitch=5.0/7.5mm)

P3=25.4mm;H=18.5mm (For pitch=10/15mm)</td></tr>
<tr><td rowspan="3">C</td><td rowspan="3">straight lead “C” in the figure above</td><td>code</td><td colspan="3">explanation</td><td rowspan="3">0</td><td rowspan="3">Length tolerance ±0.5mm
Or standard length</td></tr>
<tr><td>00</td><td colspan="3">standard lead length
(18mm~26mm)</td></tr>
<tr><td>45
32</td><td colspan="3">lead length 4.5mm
lead length 3.2mm</td></tr>
</table>

■ Dimensions (mm)

230Vac						
C_N (μF)	W ±0.4	H ±0.4	T ±0.4	P ±0.4	d	Part number
0.033	10.5	11.0	5.0	7.5	0.6	C32P5333-3E****+++
0.047	10.5	12.0	6.0	7.5	0.6	C32P5473-3E****+++
0.033	13.0	9.0	4.0	10.0	0.6	C32P5333-4E****+++
0.047	13.0	11.0	5.0	10.0	0.6	C32P5473-4E****+++
0.068	13.0	12.0	6.0	10.0	0.6	C32P5683-4E****+++
0.10	13.0	12.0	6.0	10.0	0.6	C32P5104-4E****+++
0.10	17.5	11.0	5.0	15.0	0.6	C32P5104-6E****+++
0.15	17.5	12.0	6.0	15.0	0.6	C32P5154-6E****+++
0.22	17.5	13.5	7.5	15.0	0.6	C32P5224-6E****+++
0.33	17.5	14.5	8.5	15.0	0.6	C32P5334-6E****+++
0.47	17.5	16.0	10.0	15.0	0.8	C32P5474-6E****+++
0.33	26.5	15.0	6.0	22.5	0.8	C32P5334-9E****+++
0.47	26.5	16.0	7.0	22.5	0.8	C32P5474-9E****+++
0.56	26.5	17.0	8.5	22.5	0.8	C32P5564-9E****+++
0.68	26.5	17.0	8.5	22.5	0.8	C32P5684-9E****+++
0.82	26.5	18.5	10.0	22.5	0.8	C32P5824-9E****+++
1.0	26.5	20.0	11.0	22.5	0.8	C32P5105-9E****+++
1.2	26.5	20.0	11.0	22.5	0.8	C32P5125-9E****+++
1.5	26.5	22.0	12.0	22.5	0.8	C32P5155-9E****+++
0.47	32.0	18.0	9.0	27.5	0.8	C32P5474-BE****+++
0.56	32.0	18.0	9.0	27.5	0.8	C32P5564-BE****+++
0.68	32.0	18.0	9.0	27.5	0.8	C32P5684-BE****+++
1.0	32.0	18.0	9.0	27.5	0.8	C32P5105-BE****+++
1.2	32.0	20.0	11.0	27.5	0.8	C32P5125-BE****+++
1.5	32.0	20.0	11.0	27.5	0.8	C32P5155-BE****+++
2.0	32.0	22.0	13.0	27.5	0.8	C32P5205-BE****+++
2.2	32.0	24.5	15.0	27.5	0.8	C32P5225-BE****+++
3.0	32.0	33.0	18.0	27.5	0.8	C32P5305-BE****+++
3.3	32.0	33.0	18.0	27.5	0.8	C32P5335-BE****+++
4.0	32.0	33.0	18.0	27.5	0.8	C32P5405-BE****+++
4.7	32.0	37.0	22.0	27.5	0.8	C32P5475-BE****+++

250Vac						
C_N (μF)	W ±0.4	H ±0.4	T ±0.4	P ±0.4	d	Part number
0.010	13.0	9.0	4.0	10.0	0.6	C32E2103-4E****+++
0.015	13.0	9.0	4.0	10.0	0.6	C32E2153-4E****+++
0.022	13.0	9.0	4.0	10.0	0.6	C32E2223-4E****+++
0.033	13.0	11.0	5.0	10.0	0.6	C32E2333-4E****+++
0.047	13.0	11.0	5.0	10.0	0.6	C32E2473-4E****+++
0.068	13.0	12.0	6.0	10.0	0.6	C32E2683-4E****+++
0.068	17.5	11.0	5.0	15.0	0.6	C32E2683-6E****+++
0.10	17.5	12.0	6.0	15.0	0.6	C32E2104-6E****+++
0.15	17.5	13.5	7.5	15.0	0.6	C32E2154-6E****+++
0.22	17.5	14.5	8.5	15.0	0.6	C32E2224-6E****+++
0.33	17.5	16.0	10.0	15.0	0.8	C32E2334-6E****+++
0.22	26.5	15.0	6.0	22.5	0.8	C32E2224-9E****+++
0.33	26.5	16.0	7.0	22.5	0.8	C32E2334-9E****+++
0.39	26.5	17.0	8.5	22.5	0.8	C32E2394-9E****+++
0.47	26.5	17.0	8.5	22.5	0.8	C32E2474-9E****+++
0.56	26.5	18.5	10.0	22.5	0.8	C32E2564-9E****+++
0.68	26.5	18.5	10.0	22.5	0.8	C32E2684-9E****+++
0.82	26.5	20.0	11.0	22.5	0.8	C32E2824-9E****+++
1.0	26.5	22.0	12.0	22.5	0.8	C32E2105-9E****+++
1.2	26.5	24.5	15.5	22.5	0.8	C32E2125-9E****+++
1.5	26.5	24.5	15.5	22.5	0.8	C32E2155-9E****+++
0.47	32.0	18.0	9.0	27.5	0.8	C32E2474-BE****+++
0.56	32.0	18.0	9.0	27.5	0.8	C32E2564-BE****+++
0.68	32.0	18.0	9.0	27.5	0.8	C32E2684-BE****+++
1.0	32.0	20.0	11.0	27.5	0.8	C32E2105-BE****+++
1.2	32.0	22.0	13.0	27.5	0.8	C32E2125-BE****+++
1.5	32.0	25.0	13.0	27.5	0.8	C32E2155-BE****+++
2.0	32.0	33.0	18.0	27.5	0.8	C32E2205-BE****+++
2.2	32.0	33.0	18.0	27.5	0.8	C32E2225-BE****+++
3.0	32.0	33.0	18.0	27.5	0.8	C32E2305-BE****+++
3.3	32.0	33.0	18.0	27.5	0.8	C32E2335-BE****+++
4.0	32.0	37.0	22.0	27.5	0.8	C32E2405-BE****+++

300Vac#						
C_N (μF)	W ±0.4	H ±0.4	T ±0.4	P ±0.4	d	Part number
0.010	13.0	9.0	4.0	10.0	0.6	C32Q1103-4E****+++
0.015	13.0	11.0	5.0	10.0	0.6	C32Q1153-4E****+++
0.022	13.0	12.0	6.0	10.0	0.6	C32Q1223-4E****+++
0.033	13.0	12.0	6.0	10.0	0.6	C32Q1333-4E****+++
0.010	17.5	11.0	5.0	15.0	0.6	C32Q1103-6E****+++
0.015	17.5	11.0	5.0	15.0	0.6	C32Q1153-6E****+++
0.022	17.5	11.0	5.0	15.0	0.6	C32Q1223-6E****+++
0.033	17.5	11.0	5.0	15.0	0.6	C32Q1333-6E****+++
0.047	17.5	12.0	6.0	15.0	0.6	C32Q1473-6E****+++
0.068	17.5	13.5	7.5	15.0	0.6	C32Q1683-6E****+++
0.10	17.5	14.5	8.5	15.0	0.6	C32Q1104-6E****+++
0.15	17.5	16.0	10.0	15.0	0.8	C32Q1154-6E****+++
0.22	17.5	19.0	11.0	15.0	0.8	C32Q1224-6E****+++
0.068	26.5	15.0	6.0	22.5	0.8	C32Q1683-9E****+++
0.10	26.5	15.0	6.0	22.5	0.8	C32Q1104-9E****+++
0.15	26.5	16.0	7.0	22.5	0.8	C32Q1154-9E****+++
0.22	26.5	17.0	8.5	22.5	0.8	C32Q1224-9E****+++
0.33	26.5	18.5	10.0	22.5	0.8	C32Q1334-9E****+++
0.39	26.5	20.0	11.0	22.5	0.8	C32Q1394-9E****+++
0.47	26.5	22.0	12.0	22.5	0.8	C32Q1474-9E****+++
0.22	32.0	18.0	9.0	27.5	0.8	C32Q1224-BE****+++
0.33	32.0	18.0	9.0	27.5	0.8	C32Q1334-BE****+++
0.47	32.0	20.0	11.0	27.5	0.8	C32Q1474-BE****+++
0.56	32.0	22.0	13.0	27.5	0.8	C32Q1564-BE****+++
0.68	32.0	22.0	13.0	27.5	0.8	C32Q1684-BE****+++
1.0	32.0	28.0	14.0	27.5	0.8	C32Q1105-BE****+++
1.5	32.0	33.0	18.0	27.5	0.8	C32Q1155-BE****+++
2.2	32.0	37.0	22.0	27.5	0.8	C32Q1225-BE****+++

Note: 1. "-"=capacitance tolerance code, M=±20%,K=±10%,J=±5%,

2. "****"=lead form and packing mode code (refer to table 1)

3. "#"when the rated voltage is 275Vac,the digit 4~5 is P2.

■ Test Method And Performance

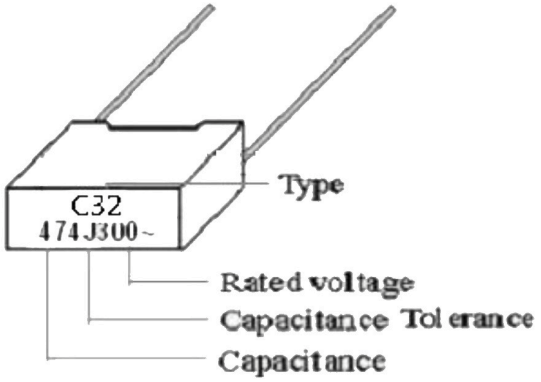
No.	Item		Performance	Test method(IEC 60384-17)
1	Solderability		Good quality of tinning	Solder temperature:245°C±5°C Immersion time: 2.0s±0.5s
2	Initial measurement		Capacitance Tgδ:1kHz，C>1.0μF 10kHz，C≤1.0μF	
	Terminal strength		There shall be no visible damage	Tension: 0.6≤ϕd≤0.8mm，10N ϕd=1.0mm，20N Bend: 0.6≤ϕd≤0.8mm，5N ϕd=1.0mm，10N The terminals shall be bent 2 times in each direction.
	Resistance to solder heat		There shall be no visible damage	Solder temperature:260°C±5°C Immersion time: 10s±1s
	Final measurement		ΔC/C ≤±3%(relative to the initial value) Increase of tgδ: ≤0.003 (10kHz,C≤1.0μF) ≤0.002 (1kHz,C>1.0μF)	
3	Initial measurement		Capacitance Tgδ:1kHz, C>1.0μF 10kHz, C≤1.0μF	
	Rapid change of tempe rature		There shall be no evidence of deterioration.	θ_A=-55°C, θ_B =+105°C 5 cycles, Duration: t=30min
3	Vibration		There shall be no evidence of deterioration.	Amplitude 0.75mm or acceleration 100m/s^2 (whichever is the smaller severity), f: 10Hz to 500Hz.Three directions, 2h for each direction, total 6h.
	Bump		There shall be no evidence of deterioration.	4 000 times, Acceleration: 400m/s^2,Pulse duration, 6ms
	Final measurement		ΔC/C ≤±3%(relative to the initial value) Increase of tgδ: ≤0.003 (10kHz, C≤1.0μF) ≤0.002 (1kHz, C>1.0μF) IR: ≥ 50% of the rated value	
4	climate sequence	Initial measurement	Capacitance Tgδ:1kHz, C>1.0μF 10kHz, C≤1.0μF	
		Dry heat		+105℃, 16h
		Damp heat, Cyclic		Test Db, Severity: b, the first cycle
		Cold		-55℃, 2h
		Low air pressure	There shall be no permanent breakdown, flashover or other harmful deformation	15℃~35℃, 8.5kPa, 1h, Applying U_R during the last 5 min.

No.	Item		Performance	Test method(IEC 60384-17)
4	climate sequence (continue)	Damp heat, cyclic other		Test Db, Severity b, the other cycles, Applying U_R for 1 min within 15 min after the test finished.
		Final measurement	There shall be no evidence of deterioration and the marking shall be legible. ΔC/C ≤±5%(relative to the initial value) Increase of tgδ: ≤0.003 (10kHz, C≤1.0μF) ≤0.002(1kHz, C>1.0μF) IR: ≥ 50% of the rated value	
5	Damp heat steady state		There shall be no evidence of deterioration and the marking shall be legible. ΔC/C ≤ ±5%(relative to the initial value) Increase of tgδ ≤0.002 IR: ≥50% of the rated value	Temperature:40˚C ±2˚C Humidity: 93^{+2}_{-3} %RH Duration: 56 days Applying U_R for 1 min Within 15 min after the test finished.
6	Endurance		ΔC/C ≤±5%(relative to the initial value) Increase of tgδ: ≤0.003 (10kHz, C≤1.0μF) ≤0.002 (1kHz, C>1.0μF) IR: ≥ 50% of the rated value	Rate Temperature: +85℃ Voltage: 1.25×U_R(50Hz) Duration: 1 000h
7	Temperature characteristic		Measuring capacitance at test point b, d, f: Characteristic at lower category temperature -55˚C: $0 \le (C_b-C_d)/C_d \le +3.75\%$ Characteristic at upper category temperature +100˚C: $-4\% \le (C_f-C_d)/C_d \le 0$	Static method: The capacitors should be kept at the following temperature in turn: a.(+20±2) ˚C， b.(–55±3) ˚C，d.(20±2) ˚C，f.(+100±2) ˚C，g.(+20±2) ˚C
8	Charging and discharging		ΔC/C ≤±5%(relative to the initial value) Increase of tgδ: ≤0.003(10kHz, C≤1.0μF) ≤0.002 (1kHz, C>1.0μF) IR: ≥ 50% of the rated value	Times: 10 000 Duration of charging: 0.5s Duration of discharging: 0.5s Charging voltage: rated voltage Charging resistance: $220/C_N(\Omega)$ Discharging resistance: $R=10/C_N(\Omega)$ or 20Ω(whichever is the greater) C_N: rated capacitance (μF)

■ **Quality ensuring test (before shipment):**

Inspection item（each batch）	Inspection level （GB 2828）	
	IL	AQL
Appearance inspection	II	1.5%
Dimensions		
Capacitance	II	0.65%
Tangent of the loss angle		
Dielectric strength		
Insulation resistance		
Solderability	S-3	2.5%

■ Marking



■ Taping specification for box-type capacitors

▲ Outline Drawing

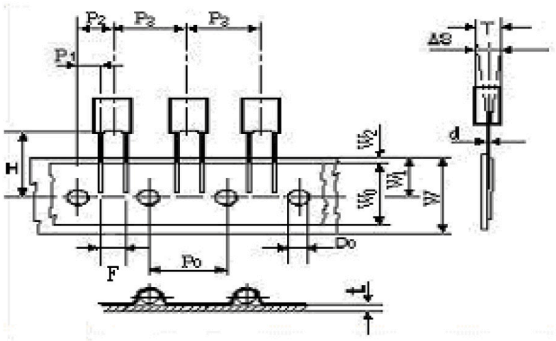


Fig.1 P=5.0/7.5mm

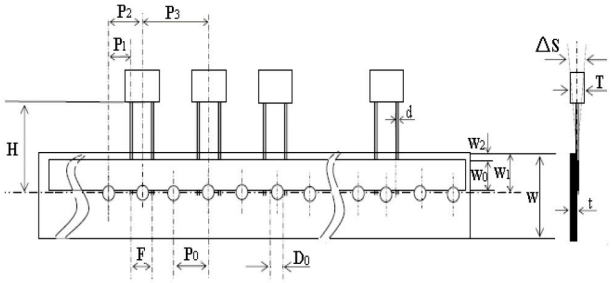


Fig.2 P=10.0/15.0mm

▲ Taping Dimensions(mm)

Technology index title	Code	Dimensions				
		P=5.0	P=7.5	P=10.0	P=15.0	Tolerance
Taping type	—	Fig 1	Fig 1	Fig2	Fig 2	——
Part number Digit12-15	Ammo-pack	A201	A301	A405	A605	
Taping pitch	P_3	12.7	12.7	25.4	25.4	±1.0
Feed hole pitch	P_0	12.7	12.7	12.7	12.7	±0.3
Center of wire	P_1	3.85	2.6	7.7	5.2	±0.7
Center of body	P_2	6.35	6.35	12.7	12.7	±1.3
Pitch of taping wire	F**	5.0	7.5	10.0	15.0	+0.6 -0.1
Component alignment	△S	0	0	0	0	±2.0
Height of component from tape center	H***	18.5	18.5	18.5	18.5	±0.5
Carrier tape width	W	18.0	18.0	18.0	18.0	+1.0 -0.5
Hold down tape width	W_0	6min	10min	10min	10min	——
Hole position	W_1	9.0	9.0	9.0	9.0	±0.5
Hold down tape sition	W_2	3max	3max	3max	3max	——
Feed hole dia.	D_0	4.0	4.0	4.0	4.0	±0.2
Tape thickness	t	0.7	0.7	0.7	0.7	±0.2

▲ Packing Quantity

Pitch (mm)	Box thinkness T(mm)	Ammo-pack (pcs/box)	
		Domestic	Export
5.0	2.5	2500	2 000
	3.5	1 700	1 500
	4.5	1 400	1 300
	5.0	1 200	1 000
	6.0	1 000	800
7.5	3.5	1 700	1 500
	4.0	1 500	1 350
	5.0	1 200	1 050
	6.0	1 000	850
10.0/ 15.0	4.0	750	650
	5.0	600	500
	6.0	500	450
15.0	7.5	400	350
	8.5	350	300
	10.0	300	250
	11.0	250	220

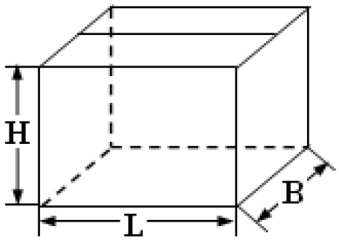
Note: * P_0=15mm is also available;

**F can be other lead spacing;

***H=16.5mm is available;

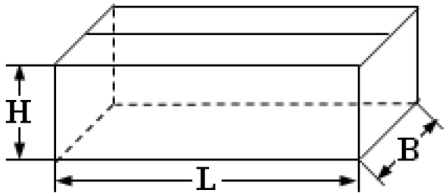
■ Packing box sizes(mm)

1. Out packing box for bulk



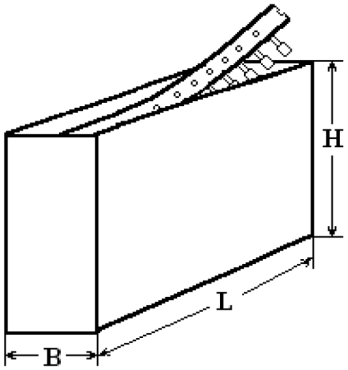
L:375±5
B:375±5
H:265±5

2. Inner packing box for bulk



L:355±3
B:175±3
H:118±3

3. Box sizes for Ammo-pack



L:330±3
B:48±3
H:260±3