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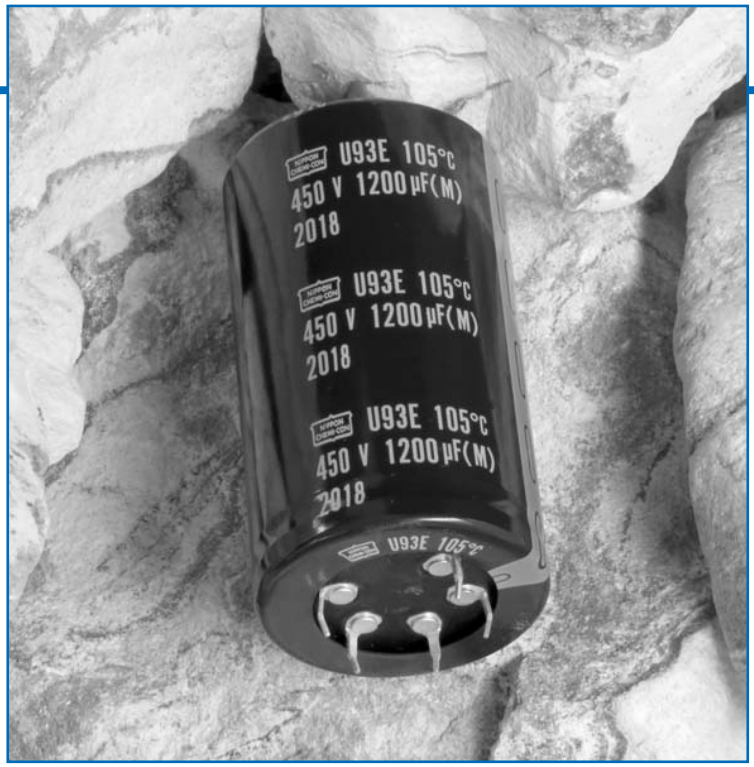
U93E Series NEW

UNITED CHEMI-CON



- Snap Mount
- Specific Design For Higher Ripple Current
- 350 to 550VDC Voltage Range
- RoHS Compliant
- +105°C Maximum Temperature
- 3,000 or 5,000 Hours Lifetime at +105°C

The U93E series is a high temperature snap-in series specifically designed for higher ripple current capability. The U93E capacitors have an endurance rating of 3,000 or 5,000 hours at +105°C with the appropriate rated ripple current applied. All the U93E series capacitors are RoHS compliant and offered in a variety of sizes, with or without a PPE end disk, and encased in a standard PVC sleeve or an optional PET sleeve. UL746C compliant exterior insulation material for sleeve and end disk is also available. Snap-in terminals (2, 4 or 5-pin configurations) are available as standard or optional styles depending on case size. Straight standoff terminals (5-pin configuration) are an option for the 40, 45 and 50mm can diameters.

Summary of Specifications

- **PC board snap-in or straight standoff terminals available as standard or optional styles depending on pin styles and case size.**
- **Capacitance range: 220 to 3,300µF.**
- **Voltage range: 350 to 550VDC.**
- **Category temperature range: −40°C to +105°C.**
- **Leakage current: $3\sqrt{CV}$ (µA) or 3mA, whichever is smaller, after 5 minutes at +25°C.**
- **Standard capacitance tolerance: ±20%**
- **Nominal case size (D×L): 35×50mm to 50×105mm.**
- **Rated lifetime: 3,000 or 5,000 hours at +105°C with the rated ripple current applied.**

U93E Series

U93E Specifications - Snap Mount

Item	Characteristics
Category Temperature Range	−40 to +105°C
Rated Voltage Range	350 to 550VDC
Capacitance Range	220 to 3,300μF at +25°C, 120Hz
Capacitance Tolerance	±20% (M) at +25°C, 120Hz
Leakage Current	$I = 3\sqrt{CV}$ (μA) or 3mA, whichever is smaller, after 5 minutes at +25°C. Where I = Max. leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (V)
Dissipation Factor (Tan δ)	At +25°C, 120Hz Rated Voltage (V): 350-400 | 450-550 Tan δ (DF) Max.: 0.15 | 0.20
Low Temperature Characteristics	At 120Hz, impedance (Z) ratio between the −40°C value and +25°C value shall not exceed the values given below. Rated Voltage (V): 350-400 | 450-550 Z(−40°C)/Z(+25°C): 4 | 8
Rated Ripple Current Multipliers	Ambient Temperature (°C) +65°C: 2.82 | +85°C: 1.73 | +105°C: 1.00 Frequency (Hz) DC Rated Voltage: 50Hz: 0.77 | 120Hz: 1.00 | 300Hz: 1.16 | 1kHz: 1.30 | 10kHz: 1.41 | 100kHz: 1.43 500-550V: 0.70 | 1.00 | 1.16 | 1.30 | 1.41 | 1.43
Endurance (Load Life)	The following specifications shall be satisfied when the capacitors are restored to +25°C after subjecting them to DC voltage for 3,000 or 5,000 hours at +105°C with the appropriate rated ripple current applied. The sum of the DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors. Capacitance change: ≤ ±20% of initial measured value Tan δ (DF) : ≤ 200% of initial specified value Leakage current : ≤ initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to +25°C after exposing them for 1,000 hours at +105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change: ≤ ±20% of initial measured value Tan δ (DF) : ≤ 150% of initial specified value Leakage current : ≤ initial specified value
Custom Designs	Custom CV values per case size and termination type may be available upon request. Contact appropriate representative with specific requirements.

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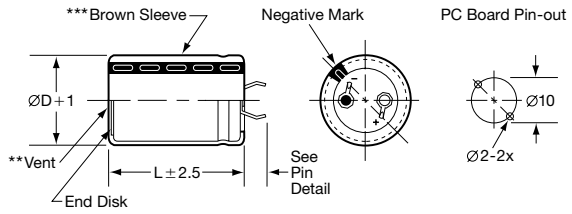
Diagram of Dimensions - Snap Mount

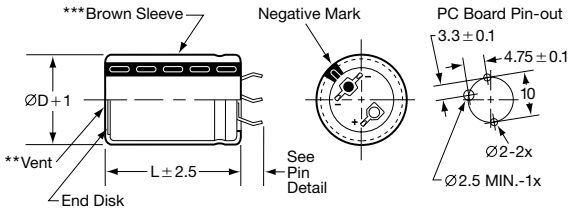
Snap Mount

Unit: mm

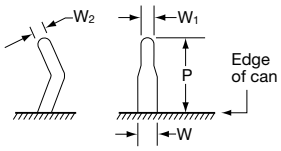
VSN Snap-in Ø35 standard
VNN Snap-in Ø35 optional



VEN Snap-in Ø35 optional



VS, VE & VN Snap-in Pin Dimensions



Type	P	W	W1	W2
VSN Ø35	3.5±0.5	1.5±0.2	0.8±0.1	0.8±0.1
VNN Ø35	5.8±1.0			
VEN Ø35	4.0±0.5			
VSD Ø35-Ø40	3.5±1.0			
VND Ø35-Ø45	5.8±1.0			
VNT Ø45-Ø50	5.8±1.0			

CAUTION:

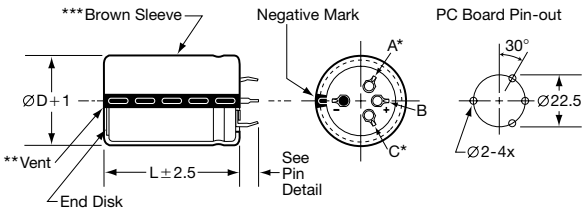
*Use the blank terminals for mechanical support only. The blank terminals must not be connected to a solder trace on the PC board but be electrically isolated from the negative and positive terminals.

**The vent may be located either on the bottom or side of the can.

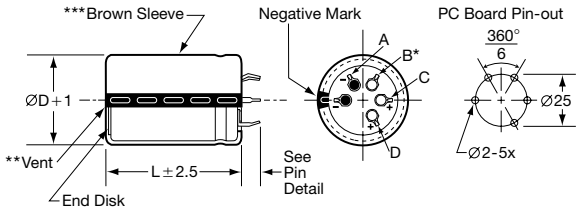
***The brown sleeve with gray stripe negative pin indicator is standard. Also note in some cases, the sleeve color may change slightly due to the operating conditions, however, the discoloration will not impair capacitor function.

Snap Mount

VND Snap-in Ø35 and Ø40 standard; Ø45 optional
VSD Snap-in Ø35 and Ø40 optional

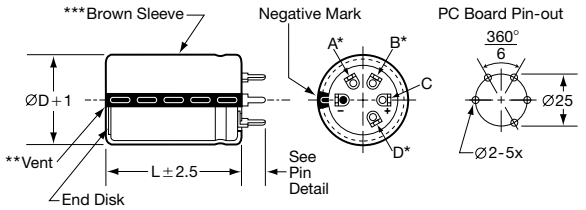


VNT Snap-in Ø45 and Ø50 standard

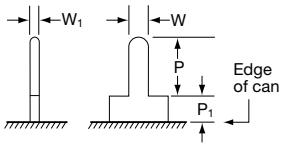


Straight Pin Mount

VQT Straight Standoff Ø40, Ø45 and Ø50 optional



VQ Straight Standoff Pin Dimensions

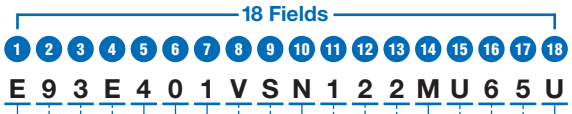


Type	P	P1	W	W1
Standoff Pin (VQ)	3.75±1.0	2.0 max.	1.5±0.1	0.7±0.2

U93E Series

Part Numbering System for U93E Series

When ordering, always specify complete 18-field global part number.



9 Supplement Code. Field 18.
All construction options listed have Sn100% terminal plating.
U = PVC sleeve with PPE end disk.
M = PVC sleeve without end disk.
4 = UL746C compliant insulation for sleeve with end disk.
Other sleeve materials available as options upon request.

8 Case Size. Fields 15, 16 and 17.
The single letter diameter code is inserted in field 15.
A = Ø35mm
B = Ø40mm
U = Ø45mm
C = Ø50mm

The double digit length code is inserted in fields 16 and 17.
50 = 50mm
65 = 65mm
80 = 80mm
A0 = 100mm
A5 = 105mm

7 Capacitance Tolerance. Field 14.
M = ±20%

6 Capacitance. Fields 11, 12 and 13.
Expressed in Microfarads. The first two digits are significant figures inserted in fields 11 and 12, and the third digit inserted in field 13 indicates the number of zeros for capacitance of 10μF or more. R indicates the decimal point for capacitance less than 10μF (e.g. 1R2 = 1.2μF; 120 = 12μF; 121 = 120μF; 122 = 1,200μF; 123 = 12,000μF).

5 Dummy Terminals. Field 10.
N = No dummy terminals.
D = 2 dummy terminals.
T = 3 dummy terminals.

4 Terminal Type. Fields 8 and 9.
VS = Snap-in pins, 3.5mm in length (Ø35 VSN); Ø35 or Ø40 VSD).
VN = Snap-in pins, 5.8mm in length.
VE = Snap-in pins, polarized, Ø30 or Ø35 option.
VQ = Straight standoff pins.

3 DC Rated Voltage. Fields 5, 6 and 7.
Expressed in Volts. The first two digits are significant figures inserted in fields 5 and 6, and the third digit inserted in field 7 indicates the number of zeros for rated voltage of 10VDC or more. R indicates the decimal point for rated voltage less than 10VDC (e.g. 4R0 = 4.0VDC; 400 = 40VDC; 401 = 400VDC).

2 Series Name. Fields 2, 3 and 4.
Enter the 3-letter/digit series name in fields 2, 3 and 4. If the series name is only 2 letters/digits, place a dash in field 4. For a series name with more than 3 letters/digits, refer to the individual series for the appropriate 3-field series name.

1 Capacitor Type. Field 1.
Aluminum Electrolytic Capacitor (Polar).

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U93E Series

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (µF)	Global Part Number†	Nominal Case Size* D×L (mm)	Case Size Code	Maximum ESR (Ω) at +25°C, 120Hz	Rated Ripple Current (A rms) at +105°C, 120Hz	
						3k Hours	5k Hours
350 Volts 400 Volts Surge	680	E93E351VSN681MA50U	35×50	A50	0.135	2.9	1.5
	1,000	E93E351VSN102MA65U	35×65	A65	0.092	3.8	1.9
	1,200	E93E351VND122MA80U	35×80	A80	0.076	4.5	2.3
	1,800	E93E351VND182MAA0U	35×100	AA0	0.051	6.1	3.1
	820	E93E351VND821MB50U	40×50	B50	0.121	3.3	1.6
	1,200	E93E351VND122MB65U	40×65	B65	0.083	4.3	2.1
	1,500	E93E351VND152MB80U	40×80	B80	0.066	5.1	2.6
	1,800	E93E351VND182MBA0U	40×100	BA0	0.055	6.1	3.1
	1,000	E93E351VNT102MU50U	45×50	U50	0.107	3.7	1.8
	1,500	E93E351VNT152MU65U	45×65	U65	0.072	4.9	2.4
	1,800	E93E351VNT182MU80U	45×80	U80	0.060	5.8	2.9
	2,200	E93E351VNT222MUA5U	45×105	UA5	0.049	7.1	3.6
	1,200	E93E351VNT122MC50U	50×50	C50	0.092	4.1	2.1
	1,800	E93E351VNT182MC65U	50×65	C65	0.066	5.2	2.6
	2,200	E93E351VNT222MC80U	50×80	C80	0.054	6.3	3.2
	3,300	E93E351VNT332MCA5U	50×105	CA5	0.036	8.7	4.4
400 Volts 450 Volts Surge	560	E93E401VSN561MA50U	35×50	A50	0.156	2.7	1.4
	820	E93E401VSN821MA65U	35×65	A65	0.107	3.6	1.8
	1,000	E93E401VND102MA80U	35×80	A80	0.088	4.2	2.1
	1,500	E93E401VND152MAA0U	35×100	AA0	0.058	5.7	2.8
	680	E93E401VND681MB50U	40×50	B50	0.135	3.1	1.5
	1,000	E93E401VND102MB65U	40×65	B65	0.092	4.1	2.0
	1,200	E93E401VND122MB80U	40×80	B80	0.076	4.8	2.4
	1,800	E93E401VND182MBA0U	40×100	BA0	0.051	6.4	3.2
	820	E93E401VNT821MU50U	45×50	U50	0.121	3.5	1.7
	1,200	E93E401VNT122MU65U	45×65	U65	0.083	4.5	2.3
	1,500	E93E401VNT152MU80U	45×80	U80	0.066	5.5	2.7
	2,200	E93E401VNT222MUA5U	45×105	UA5	0.045	7.4	3.7
	1,000	E93E401VNT102MC50U	50×50	C50	0.101	3.9	2.0
	1,500	E93E401VNT152MC65U	50×65	C65	0.074	5.0	2.5
	2,000	E93E401VNT202MC80U	50×80	C80	0.056	6.3	3.1
	2,700	E93E401VNT272MCA5U	50×105	CA5	0.041	8.2	4.1
450 Volts 500 Volts Surge	470	E93E451VSN471MA50U	35×50	A50	0.178	2.6	1.3
	680	E93E451VSN681MA65U	35×65	A65	0.123	3.3	1.7
	1,000	E93E451VND102MA80U	35×80	A80	0.084	4.3	2.2
	1,200	E93E451VND122MAA0U	35×100	AA0	0.070	5.2	2.6
	560	E93E451VND561MB50U	40×50	B50	0.164	2.8	1.4
	820	E93E451VND821MB65U	40×65	B65	0.112	3.7	1.8
	1,000	E93E451VND102MB80U	40×80	B80	0.092	4.4	2.2
	1,200	E93E451VND122MBA0U	40×100	BA0	0.076	5.2	2.6
	680	E93E451VNT681MU50U	45×50	U50	0.135	3.3	1.6
	1,000	E93E451VNT102MU65U	45×65	U65	0.092	4.3	2.2
	1,200	E93E451VNT122MU80U	45×80	U80	0.076	5.1	2.6
	1,800	E93E451VNT182MUA5U	45×105	UA5	0.051	7.0	3.5
	820	E93E451VNT821MC50U	50×50	C50	0.121	3.6	1.8
	1,200	E93E451VNT122MC65U	50×65	C65	0.083	4.7	2.3
	1,500	E93E451VNT152MC80U	50×80	C80	0.066	5.7	2.9
	2,200	E93E451VNT222MCA5U	50×105	CA5	0.045	7.8	3.9
500 Volts 550 Volts Surge	330	E93E501VSN331MA50U	35×50	A50	0.241	2.2	1.1
	470	E93E501VSN471MA65U	35×65	A65	0.169	2.8	1.4
	560	E93E501VND561MA80U	35×80	A80	0.142	3.3	1.6
	820	E93E501VND821MAA0U	35×100	AA0	0.097	4.4	2.2
	390	E93E501VND391MB50U	40×50	B50	0.214	2.5	1.2
	560	E93E501VND561MB65U	40×65	B65	0.149	3.2	1.6
	820	E93E501VND821MB80U	40×80	B80	0.102	4.1	2.1
	1,000	E93E501VND102MBA0U	40×100	BA0	0.084	5.0	2.5

†For construction and terminal options, refer to the part numbering system for descriptions and codes.
*** Refer to diagram of dimensions for detailed case size specifications.**

U93E Series

Standard Voltage Ratings - Snap Mount

Rated Voltage (WVDC)	Capacitance (µF)	Global Part Number†	Nominal Case Size* D×L (mm)	Case Size Code	Maximum ESR (Ω) at +25°C, 120Hz	Rated Ripple Current (A rms) at +105°C, 120Hz	
						3k Hours	5k Hours
500 Volts 550 Volts Surge	560	E93E501VNT561MU50U	45×50	U50	0.156	3.0	1.5
	820	E93E501VNT821MU65U	45×65	U65	0.107	4.0	2.0
	1,000	E93E501VNT102MU80U	45×80	U80	0.088	4.8	2.4
	1,200	E93E501VNT122MUA5U	45×105	UA5	0.073	5.8	2.9
	680	E93E501VNT681MC50U	50×50	C50	0.135	3.4	1.7
	1,000	E93E501VNT102MC65U	50×65	C65	0.092	4.5	2.2
	1,200	E93E501VNT122MC80U	50×80	C80	0.076	5.3	2.7
	1,500	E93E501VNT152MCA5U	50×105	CA5	0.061	6.7	3.4
550 Volts 600 Volts Surge	220	E93E501VSN221MA50U	35×50	A50	0.398	1.7	0.9
	330	E93E501VSN331MA65U	35×65	A65	0.265	2.3	1.1
	390	E93E501VND391MA80U	35×80	A80	0.225	2.6	1.3
	560	E93E501VND561MAA0U	35×100	AA0	0.156	3.5	1.7
	220	E93E501VND221MB50U	40×50	B50	0.416	1.8	0.9
	390	E93E501VND391MB65U	40×65	B65	0.235	2.5	1.3
	560	E93E501VND561MB80U	40×80	B80	0.164	3.3	1.6
	680	E93E501VND681MBA0U	40×100	BA0	0.135	3.9	2.0
	390	E93E501VNT391MU50U	45×50	U50	0.245	2.4	1.2
	470	E93E501VNT471MU65U	45×65	U65	0.203	2.9	1.4
	560	E93E501VNT561MU80U	45×80	U80	0.171	3.4	1.7
	820	E93E501VNT821MUA5U	45×105	UA5	0.117	4.6	2.3
	470	E93E501VNT471MC50U	50×50	C50	0.212	2.7	1.4
	560	E93E501VNT561MC65U	50×65	C65	0.178	3.2	1.6
	820	E93E501VNT821MC80U	50×80	C80	0.121	4.2	2.1
	1,000	E93E501VNT102MCA5U	50×105	CA5	0.100	5.3	2.6

†For construction and terminal options, refer to the part numbering system for descriptions and codes.
*Refer to diagram of dimensions for detailed case size specifications.