The Highest Level of Reliability

NTE capacitors are designed for both the most demanding applications and those not requiring tough characteristics. And most are available in axial or radial lead versions.

This broad line includes: Subminiature Aluminum Electrolytic · Subminiature Non-Polarized Aluminum Electrolytic · High Frequency Aluminum for Horizontal Deflection · Snap-in Mount Aluminum Electrolytic · 105°C Snap-in Mount Aluminum Electrolytic · Resin Dipped Solid Tantalum · 105°C Subminiature Aluminum Electrolytic · 50V Ceramic Disc · 1000V Ceramic Disc · Mylar/Polyester Film · Motor Run · Motor Start · Mounting Hardware · 2 Wire and 3 Wire for Ceiling Fans.

As with all NTE products, our capacitors are backed by a solid reputation of affordability, unsurpassed reliability, and immediate availability.

ALUMINUM ELECTROLYTIC

- Subminiature, 6.3V to 100V (NEV, NEH Series)
- Subminiature, HV, 160V to 450V (NEVH, NEHH Series)
- Non-Polarized (NPR, NPA Series)
- High Frequency for Horizontal Deflection (HD Series)
- High Temperature, 105°C (VHT Series)
- Snap-in (SI Series)
- Snap-in, High Temperature, 105°C (SIT Series)

SOLID TANTALUM

- Resin Dipped Radial (TD Series)
- Surface Mount (SCT Series)

CERAMIC DISC

- 50V (89000 Series)
- 1000V (90000 Series)
- Surface Mount (SMC Series)

MULTILAYER (MONOLITHIC) CERAMIC

- 50V & 100V (CML Series)
- Surface Mount 50V (SMC Series)

MYLAR/POLYESTER FILM

- MLR Series

MOTOR RUN

- MRC Series
- Mounting Hardware

MOTOR START

- MSC Series
- Mounting Hardware
- Accessories/Sockets

CEILING FAN

- CFC Series

PRE-PACKAGED CAPACITOR KIT

ALUMINUM ELECTROLYTIC 6.3V to 100V

NEV, NEH SERIES

SUBMINIATURE
(NEV: Radial Lead, NEH: Axial Leads)

The NEV and NEH series subminiature aluminum electrolytic capacitors are especially suitable for applications requiring high capacitance, low cost, and very small size. In fact, you'll find these capacitors in some of the most demanding applications, from precision medical electronics and automobiles to the newest personal computers and disk drives.

They operate over a broad temperature range and are available in either blister pack or bulk.

RATINGS

Capacitance Range: 0.1µf to 22,000µf

Tolerance: ±20%

Voltage Range: 6.3V to 100V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–40°C to +85°C (–40°F to +185°F)

Leakage Current: $I \leq 0.01CV + 3\mu A$ (measured after 3 minutes of applied voltage)

I = Leakage Current (µA)
C = Nominal Capacitance (µf)
V = Rated Voltage (V)

Capacitance Tolerance (M): ±20%
measured at +20°C (+68°F), $120H_Z$

Dissipation Factor: measured at +20°C (+68°F),$120H_Z$

Rated Voltage	6.3	10	16	25	35	50–80	100
0.1µf to 1000µf	0.24	0.2	0.17	0.15	0.12	0.10	0.08
1000µf to 22,000µf	Values above plus 0.02 for each 1000µf						

Impedance Ratio at Low Temperature: $120H_Z$

Comparison Z WV	6.3	10	16	25	35	50–100
Z @ –25°C (–13°F)/ Z @ +20°C (+68°F)	4	3	2	2	2	2
Z @ –40°C (–40°F)/ Z @ +20°C (+68°F)	8	6	4	4	4	4

Surge Voltage:

DC Rated Voltage	6.3	10	16	25	35	50	63	100
Surge Voltage	8	13	20	32	44	63	79	125

Load Life: 1000 ±12Hrs @ +85°C (+185°F), at rated voltage

Leakage Current: Within values specified above
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: See Table

Rated Voltage	Capacitance Change Max
6.3V to 16V	Within ±30% of the initial value
25V to 100V	Within ±20% of the initial value

Shelf Life: 1000 Hrs @ +85°C (+185°F), no voltage applied

Leakage Current: Within ±200% of specified value
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: Within ±20% of initial value

MECHANICAL SPECIFICATIONS

Lead Solderability:

Meets the requirements of MIL–STD 202, Method 208

Marking:

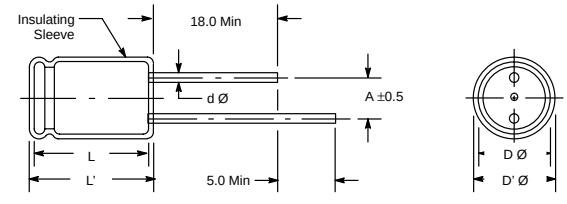
Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, vendor identification.

Recommended Cleaning Solvents:

Methanol, isopropanol ethanol, isobutanol, petroleum ether, propanol and/or commercial detergents. Halogenated hydrocarbon cleaning agents such as Freon (MF, TF, or TC), trichloroethylene, trichloroethane, or methylchloride are not recommended as they may damage the capacitor.

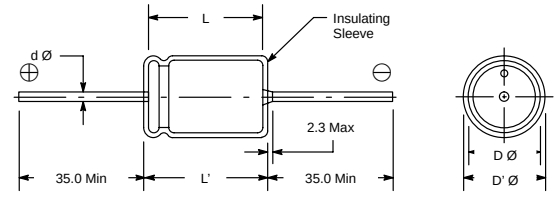
CASE SIZE AND DIMENSIONS:

NEV SERIES



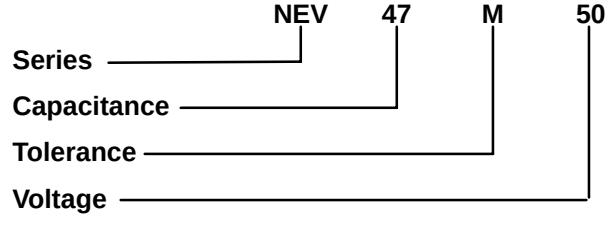
D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

NEH SERIES



D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

ORDERING INFORMATION



ALUMINUM ELECTROLYTIC 6.3V to 100V

NEV, NEH SERIES

NEV Series (Radial Type) Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (μf)	6.3	10	16	25	35	50	63	100
0.10						5 x 11	5 x 11	5 x 11
0.15								5 x 11
0.22						5 x 11	5 x 11	5 x 11
0.33						5 x 11	5 x 11	5 x 11
0.47						5 x 11	5 x 11	5 x 11
0.56						5 x 11	5 x 11	
0.68								5 x 11
1.0						5 x 11	5 x 11	5 x 11
1.5							5 x 11	5 x 11
2.2						5 x 11	5 x 11	5 x 11
3.3						5 x 11	5 x 11	5 x 11
4.7						5 x 11	5 x 11	5 x 11
6.8						5 x 11	5 x 11	6.3 x 11
10						5 x 11	5 x 11	6.3 x 11
15					5 x 11	5 x 11	6.3 x 11	8 x 11.5
22				5 x 11	5 x 11	5 x 11	6.3 x 11	8 x 11.5
33			5 x 11	5 x 11	5 x 11	6.3 x 11	6.3 x 11	10 x 12.5
47		5 x 11	5 x 11	5 x 11	6.3 x 11	6.3 x 11	8 x 11.5	10 x 16
68		6.3 x 11	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20
100		5 x 11	6.3 x 11	6.3 x 11	8 x 11	8 x 11	10 x 12.5	13 x 21
150	8 x 11.5	8 x 11.5	8.5 x 11	10 x 12	10 x 16	10 x 20	13 x 20	13 x 25
220	6.3 x 11	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20	16 x 25
330	6.3 x 11	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20	13 x 21	16 x 25
470	8 x 11	8 x 11.5	10 x 12.5	10 x 16	10 x 20	13 x 21	13 x 25	16 x 31.5
680	10 x 16	10 x 16	10 x 12.5	10 x 16	13 x 21	13 x 25	13 x 25	16 x 25
1000	10 x 12.5	10 x 16	10 x 20	13 x 21	13 x 25	16 x 25	16 x 31.5	18 x 40
1500	13 x 25	13 x 25	16 x 31.5	16 x 35.5	16 x 35.5			
2200	13 x 21	13 x 21	13 x 25	16 x 25	16 x 31.5	18 x 36	18 x 40	
3300	13 x 21	13 x 25	16 x 25	16 x 31.5	18 x 36	18 x 40	22 x 41	
4700	16 x 25	16 x 25	16 x 31.5	18 x 36	18 x 40	22 x 41		
6800	16 x 25	16 x 31.5	18 x 36	18 x 40	22 x 41			
10000	16 x 31.5	18 x 36	18 x 40	22 x 41				
22000		18 x 46						

* These dimensions are for reference only, please consult the factory for actual size.

NEV Series (Radial Type) Mechanical Specifications: mm

Outside Diameter (D Ø)	5	6.3	8	10	13	16	18	22
Lead Spacing (A)	2	2.5	3.5	5	5	7.5	7.5	10
Lead Diameter (d Ø)	0.5	0.6	0.6	0.6	0.6	0.8	0.8	1.0

* These dimensions are for reference only, please consult the factory for actual size.

ALUMINUM ELECTROLYTIC 6.3V to 100V

NEV, NEH SERIES

NEH Series (Axial Type) Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (μf)	6.3	10	16	25	35	50	63	100
0.10						5 x 12.5	5 x 12.5	5 x 12.5
0.22						5 x 12.5	5 x 12.5	5 x 12.5
0.33						5 x 12.5	5 x 12.5	5 x 12.5
0.47						5 x 12.5	5 x 12.5	5 x 12.5
0.68							5 x 12.5	
1.0						5 x 12.5	5 x 12.5	5 x 12.5
1.5							5 x 11	
2.2						5 x 12.5	5 x 12.5	5 x 12.5
3.3						5 x 12.5	5 x 12.5	5 x 12.5
4.7						5 x 12.5	5 x 12.5	5 x 12.5
6.8						5 x 11	6.3 x 11	
10				6.3 x 12.5	5 x 11	6.3 x 12.5	6.3 x 12.5	6.3 x 16
15			5 x 11	5 x 11	6.3 x 11	6.3 x 11	8 x 11.5	
22			5 x 11	6.3 x 12.5	6.3 x 12.5	6.3 x 16	8 x 16	8 x 20
33		5 x 12	6.3 x 12.5	6.3 x 12.5	6.3 x 16	8 x 16	8 x 16	8 x 20
47	5 x 11	6.3 x 12.5	6.3 x 12.5	6.3 x 16	8 x 16	8 x 16	8 x 20	10 x 20
68	6.3 x 11	6.3 x 11	8 x 11.5	8 x 16	8 x 16	10 x 12.5	10 x 16	
100	6.3 x 12.5	6.3 x 16	6.3 x 16	8 x 16	8 x 20	8 x 20	10 x 20	10 x 25
150	8 x 16	8 x 16	8 x 16	10 x 16	10 x 16	10 x 16	10 x 20	
220	8 x 16	8 x 16	8 x 16	8 x 20	10 x 20	10 x 20	10 x 25	13 x 25
330	8 x 16	8 x 16	8 x 20	10 x 20	10 x 20	13 x 25	13 x 25	13 x 35
470	8 x 16	8 x 20	10 x 20	10 x 20	10 x 25	13 x 25	13 x 30	16 x 30
680	10 x 16	10 x 20	10 x 20	10 x 25	13 x 25	13 x 30	16 x 30	16 x 30
1000	10 x 20	10 x 20	13 x 25	13 x 25	13 x 30	16 x 30	16 x 30	18 x 40
1500	13 x 25	13 x 25	13 x 20	16 x 31.5				
2200	10 x 25	13 x 25	13 x 30	16 x 25	16 x 30	18 x 40	22 x 40	
3300	13 x 25	13 x 30	16 x 30	16 x 30	16 x 40	22 x 40	22 x 50	
4700	16 x 30	16 x 30	16 x 40	18 x 40	22 x 40	22 x 50		
6800	16 x 30	16 x 40	18 x 40	22 x 40	22 x 50			
10000	16 x 30	18 x 40	22 x 40	22 x 50				
22000		25 x 50						

* These dimensions are for reference only, please consult the factory for actual size.

NEH Series (Axial Type) Mechanical Specifications: mm

Outside Diameter (D Ø)	5	6.3	8	10	13	16	18	22	25
Lead Diameter (d Ø)	0.6	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8

* These dimensions are for reference only, please consult the factory for actual size.

MULTILAYER (MONOLYTHIC) CERAMIC

CML SERIES

The CML Series is a range of radial lead conformally coated non–polarized multilayer ceramic capacitors. These flame retardant capacitors are most commonly used for filtering, coupling, and bypass applications.

RATINGS

Capacitance Range: 10pf to 2.2uf

Voltage: 50VDC and 100VDC

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

Z5U +10°C to +85°C

X7R –55°C to 125°C

NPO –55°C to 125°C

Tolerance Range:

CML103M50 – CML225M50 ±20%

CML102K100 – CML105K100 ±10%

CML100J100 – CML473J100 ±5%

Temperature Coefficient:

CML103M50 – CML225M50 Z5U (+22%, -56%)

CML102K100 – CML105K100 X7R (±15%)

CML100J100 – CML473J100 NPO (Stable)

ORDERING INFORMATION

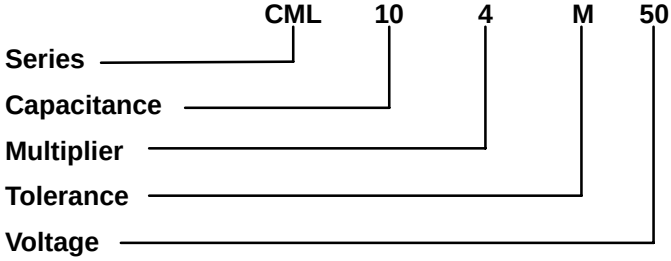
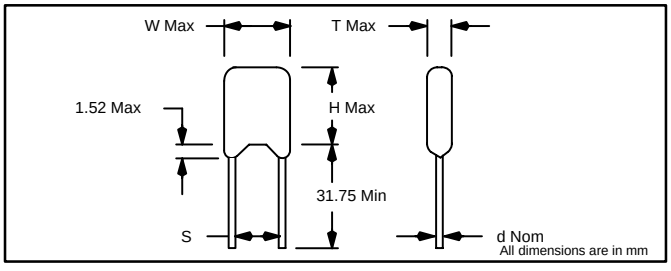


FIGURE 1



MECHANICAL SPECIFICATIONS (Figure 1)

50 Volt (Z5U) Series Dimensions (mm)

Cap µf	T	H	W	S	d
.01	3.175	5.08	5.08	2.54	.508
.015	3.175	5.08	5.08	2.54	.508
.022	3.175	5.08	5.08	2.54	.508
.033	3.175	5.08	5.08	2.54	.508
.047	3.175	5.08	5.08	2.54	.508
.068	3.175	5.08	5.08	2.54	.508
.10	3.175	5.08	5.08	2.54	.508
.15	3.175	5.08	5.08	2.54	.508
.22	3.175	5.08	5.08	2.54	.508
.33	3.175	5.08	5.08	2.54	.508
.47	3.175	5.08	5.08	2.54	.508
.68	3.810	7.62	7.62	5.08	.508
1.0	3.810	7.62	7.62	5.08	.508
1.5	3.810	7.62	7.62	5.08	.508
2.2	3.810	7.62	7.62	5.08	.508

100 Volt (X7R) Series Dimensions (mm)

Cap µf	T	H	W	S	d
.0010	3.175	5.08	5.08	2.54	.508
.0015	3.175	5.08	5.08	2.54	.508
.0022	3.175	5.08	5.08	2.54	.508
.0033	3.175	5.08	5.08	2.54	.508
.0047	3.175	5.08	5.08	2.54	.508
.0068	3.175	5.08	5.08	2.54	.508
.010	3.175	5.08	5.08	2.54	.508
.015	3.175	5.08	5.08	2.54	.508
.022	3.175	5.08	5.08	2.54	.508
.033	3.175	5.08	5.08	2.54	.508
.047	3.175	5.08	5.08	2.54	.508
.068	3.175	5.08	5.08	2.54	.508
.10	3.175	5.08	5.08	2.54	.508
.15	3.810	7.62	7.62	5.08	.508
.22	3.810	7.62	7.62	5.08	.508
.33	3.810	7.62	7.62	5.08	.508
.47	3.810	7.62	7.62	5.08	.508
.68	3.810	7.62	7.62	5.08	.508
1.0	3.810	7.62	7.62	5.08	.508

100 Volt (NPO) Series Dimensions (mm)

Cap pf	T	H	W	S	d
10.0	3.175	5.08	5.08	2.54	.508
15.0	3.175	5.08	5.08	2.54	.508
22.0	3.175	5.08	5.08	2.54	.508
33.0	3.175	5.08	5.08	2.54	.508
47.0	3.175	5.08	5.08	2.54	.508
68.0	3.175	5.08	5.08	2.54	.508
100.0	3.175	5.08	5.08	2.54	.508
150.0	3.175	5.08	5.08	2.54	.508
220.0	3.175	5.08	5.08	2.54	.508
330.0	3.175	5.08	5.08	2.54	.508
470.0	3.175	5.08	5.08	2.54	.508
680.0	3.175	5.08	5.08	2.54	.508
1000.0	3.175	5.08	5.08	2.54	.508
1500.0	3.175	5.08	5.08	2.54	.508
2200.0	3.175	5.08	5.08	2.54	.508
3300.0	3.175	5.08	5.08	2.54	.508
4700.0	3.175	5.08	5.08	2.54	.508
6800.0	3.810	7.62	7.62	5.08	.508
10000.0	3.810	7.62	7.62	5.08	.508
15000.0	3.810	7.62	7.62	5.08	.508
22000.0	3.810	7.62	7.62	5.08	.508
33000.0	3.810	7.62	7.62	5.08	.508
47000.0	3.810	7.62	7.62	5.08	.508

ALUMINUM ELECTROLYTIC 160V to 450V

NEVH, NEHH SERIES

SUBMINIATURE HIGH VOLTAGE (NEVH: Radial Lead, NEHH: Axial Leads)

The NEVH and NEHH series subminiature aluminum electrolytic capacitors are ideal for polarized capacitor applications requiring small size, high capacitance, high voltage, low cost, and dependability over broad temperature ranges.

RATINGS

Capacitance Range: 1.0µf to 470µf

Tolerance: –10%, +75%

Voltage Range: 160V to 450V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

- For 160V and 250V:
  –40°C to +85°C (–40°F to +185°F)
- For 350V and 450V:
  –25°C to +85°C (–13°F to +185°F)

Leakage Current: $I \leq 0.02CV + 100\mu A$ (measured after 3 minutes of applied voltage)

I = Leakage Current (µA)
C = Nominal Capacitance (µf)
V = Rated Voltage (V)

Capacitance Tolerance (M): at +20°C (+68°F), $120H_Z$

Capacitance Values through 4.7µf –10% to +75%
Capacitance Values above 4.7µf –10% to +50%

Dissipation Factor: at +20°C (+68°F),$120H_Z$

Rated Voltage	160, 250, and 350	450
1.0µf to 470µf	0.20	0.25

Impedance Ratio at Low Temperature: $120H_Z$

Comparison Z WV	160–250	350	450
Z @ –25°C (–13°F)/ Z @ +20°C (+68°F)	2	2	2
Z @ –40°C (–40°F)/ Z @ +20°C (+68°F)	4	–	–

Surge Voltage:

DC Rated Voltage	160	250	350	450
Surge Voltage	200	300	400	500

Load Life: 1000 ±12Hrs @ +85°C (+185°F), at rated voltage

Leakage Current: Within values specified above
Dissipation Factor: Within ±200% of specified value
Capacitance Change Max: See Table

Rated Voltage	Capacitance Change Max
160V to 450V	Within 20% of the initial value

Shelf Life: 1000 Hrs @ +85°C (+185°F), no voltage applied

Leakage Current: Within ±200% of specified value
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: Within ±20% of initial value

MECHANICAL SPECIFICATIONS

Lead Solderability:

Meets the requirements of MIL–STD 202, Method 208

Marking:

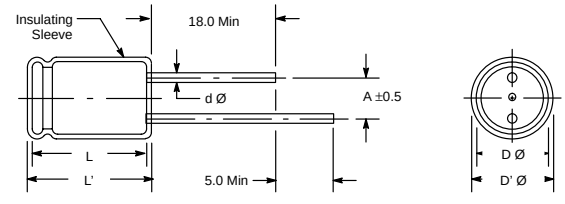
Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, vendor identification.

Recommended Cleaning Solvents:

Methanol, isopropanol ethanol, isobutanol, petroleum ether, propanol and/or commercial detergents. Halogenated hydrocarbon cleaning agents such as Freon (MF, TF, or TC), trichloroethylene, trichloroethane, or methylchloride are not recommended as they may damage the capacitor.

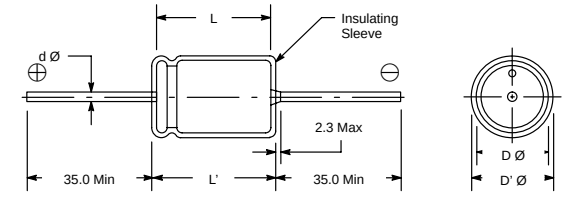
CASE SIZE AND DIMENSIONS:

NEVH SERIES



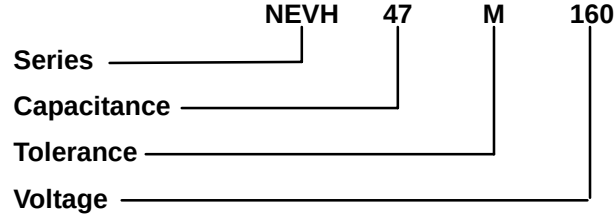
D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

NEHH SERIES



D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

ORDERING INFORMATION



ALUMINUM ELECTROLYTIC 160V to 450V

NEVH, NEHH SERIES

NEVH Series (Radial Type) Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (μf)	160	250	350	450
1.0	6.3 x 11	6.3 x 11	8 x 11.5	10 x 12.5
2.2	6.3 x 11	8 x 11.5	10 x 12.5	10 x 16
3.3	8 x 11.5	10 x 12.5	10 x 16	10 x 20
4.7	8 x 11.5	10 x 12.5	10 x 16	13 x 20
10	10 x 12.5	10 x 20	13 x 21	13 x 25
22	10 x 20	13 x 25	13 x 25	16 x 31.5
33	13 x 21	13 x 25	16 x 31.5	18 x 35.5
47	13 x 25	16 x 25	18 x 36	22 x 35
100	16 x 25	18 x 36	22 x 35	25 x 40
220	18 x 35			
330	22 x 35			
470	22 x 40			

* These dimensions are for reference only, please consult the factory for actual size.

NEVH Series (Radial Type) Mechanical Specifications: mm

Outside Diameter (D Ø)	6.3	8	10	13	16	18	22	25
Lead Spacing (A)	2.5	3.5	5	5	7.5	7.5	10	12.5
Lead Diameter (d Ø)	0.5	0.6	0.6	0.6	0.8	0.8	0.8	1.0

* These dimensions are for reference only, please consult the factory for actual size.

NEHH Series (Axial Type) Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (μf)	160	250	350	450
1.0	6.3 x 16	8 x 16	8 x 16	10 x 20
2.2	8 x 16	8 x 20	10 x 20	10 x 20
3.3	8 x 16	10 x 20	10 x 20	10 x 20
4.7	8 x 20	10 x 20	10 x 20	13 x 25
10	10 x 25	10 x 20	13 x 25	13 x 30
22	10 x 20	13 x 25	13 x 30	16 x 30
33	13 x 25	13 x 30	16 x 30	16 x 40
47	13 x 30	16 x 30	16 x 40	16 x 40
100	16 x 30	16 x 40	18 x 40	22 x 40
220	22 x 40			
330	25 x 52			
470	22 x 52			

* These dimensions are for reference only, please consult the factory for actual size.

NEHH Series (Axial Type) Mechanical Specifications: mm

Outside Diameter (D Ø)	6.3	8	10	13	16	18	22	25
Lead Diameter (d Ø)	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8

* These dimensions are for reference only, please consult the factory for actual size.

SURFACE MOUNT MULTILAYER CERAMIC

SMC (Surface Mount) SERIES

The SMC Series are ideally suited for thick–film hybrid circuit and automated surface mounting on any printed circuit board. The nickel barrier terminations consist of a nickel barrier layer over a silver metallization and then finished by an electroplated solder layer to ensure the terminations have good solderability.

RATINGS

Capacitance Range: 1.0pf to 1.0µf

Voltage: 50VDC

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

NPO – –55° to +125°C

X7R – –55° to +125°C

Z5U – +10° to +85°C

Y5V – –25° to +85°C

Tolerance Range:

C – ±0.25pF

J – ±5%

K – ±10%

Z – +80%, –20%

Temperature Coefficient:

NPO – Stable

X7R – ±15%

Z5U – +22%, –56%

Y5V – +22%, –82%

ORDERING INFORMATION

SMC	0805	K	82	3
Series	Case Type	Tolerance	Capacitance	Multiplier

CAPACITANCE RANGE:

Capacitance

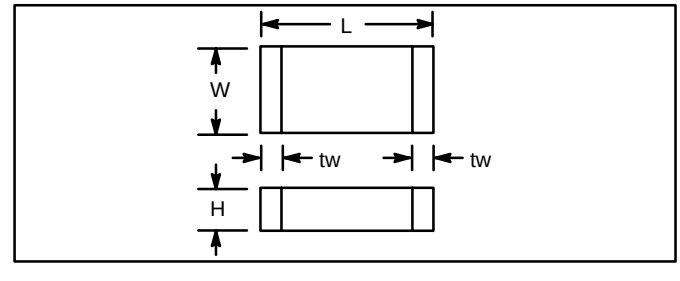
Cap	Temp. Coeff.	Cap	Temp. Coeff.	Cap	Temp. Coeff.
1.0pF	NPO	68.0pF	NPO	4700.0pF	X7R
1.2pF	NPO	82.0PF	NPO	5600.0pF	X7R
1.5pF	NPO	100.0pF	NPO	6800.0pF	X7R
1.8pF	NPO	120.0pF	NPO	8200.0pF	X7R
2.2pF	NPO	150.0pF	NPO	0.010µF	X7R
2.7pF	NPO	180.0pF	NPO	0.012µF	X7R
3.3pF	NPO	220.0pF	NPO	0.015µF	X7R
3.9pF	NPO	270.0pF	NPO	0.018µF	X7R
4.7pF	NPO	330.0pF	NPO	0.022µF	X7R
5.6pF	NPO	390.0pF	NPO	0.027µF	X7R
6.8pF	NPO	470.0pF	NPO	0.033µF	X7R
8.3pF	NPO	560.0pF	NPO	0.039µF	X7R
10.0pF	NPO	680.0pF	NPO	0.047µF	X7R
12.0pF	NPO	820.0pF	NPO	0.056µF	X7R
15.0pF	NPO	1000.0pF	NPO	0.068µF	X7R
18.0pF	NPO	1000.0pF	X7R	0.082µF	X7R
22.0pF	NPO	1200.0pF	X7R	0.1µF	X7R
27.0pF	NPO	1500.0pF	X7R	0.1µF	Z5U
30.0pF	NPO	1800.0pF	X7R	0.22µF	Z5U
33.0pF	NPO	2200.0pF	X7R	0.33µF	Y5V
39.0pF	NPO	2700.0pF	X7R	0.47µF	Y5V
47.0pF	NPO	3300.0pF	X7R	1.0µF	Y5V
56.0pF	NPO	3900.0pF	X7R	2.2µF	Y5V

MECHANICAL SPECIFICATIONS (Figure 1)

Dimensions in (mm)

Case	L	W	H	tw
0805	.080 (2.0)	.050 (1.2)	.051 (1.3)	.020 (0.5)
1206	.126 (3.2)	.063 (1.6)	.031 (0.8)	.020 (0.5)

FIGURE 1



NON–POLAR ALUMINUM ELECTROLYTIC

NPR, NPA (Non–Polarized) SERIES

SUBMINIATURE N0N–POLARIZED (NPR: Radial Leads, NPA: Axial Leads)

The NPR and NPA Series subminiature aluminum electrolytic capacitors are especially designed for use in circuits whose polarity is reversed or unknown or in crossover networks which do not require tough characteristic requirements.

RATINGS

Capacitance Range: 0.47µf to 1000µf

Tolerance: ±20%

Voltage Range: 16V to 100V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–40°C to +85°C (–40°F to +185°F)

Leakage Current: $I \leq 0.002CV + 3\mu A$ (measured after 5 minutes of applied voltage)

I = Leakage Current (µA)
C = Nominal Capacitance (µf)
V = Rated Voltage (V)

Capacitance Tolerance (M): ±20%
measured at 20°C (68°F), 120Hz

Dissipation Factor: measured at +20°C (+68°F),120H_Z

Rated Voltage	16	25	50	63	100
0.1µf to 1000µf	0.16	0.12	0.08	0.06	0.06

Impedance Ratio at Low Temperature: 120H_Z

Comparison Z WV	16	25	50	63	100
Z @ –25°C (–13°F)/ Z @ +20°C (+68°F)	2	1.5	1.5	2	2
Z @ –40°C (–40°F)/ Z @ +20°C (+68°F)	3	2	2	4	4

Surge Voltage:

DC Rated Voltage	16	25	50	63	100
Surge Voltage	20	32	63	79	125

Load Life: 1000 ±12Hrs @ +85°C (+185°F), at rated voltage

Leakage Current: Within values specified above
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: ±15% of initial value

Rated Voltage	Capacitance Change Max
160V to 450V	Within 30% of the initial value

Shelf Life: 1000 Hrs @ +85°C (+185°F), no voltage applied

Leakage Current: Within values specified above
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: Within ±15% of initial value

MECHANICAL SPECIFICATIONS

Lead Solderability:

Meets the requirements of MIL–STD 202, Method 208

Marking:

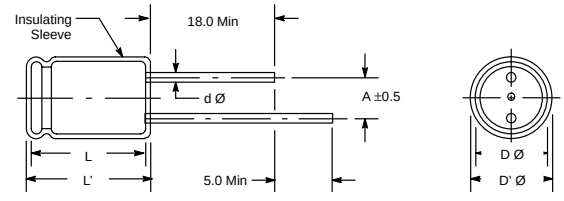
Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, vendor identification.

Recommended Cleaning Solvents:

Methanol, isopropanol ethanol, isobutanol, petroleum ether, propanol and/or commercial detergents. Halogenated hydrocarbon cleaning agents such as Freon (MF, TF, or TC), trichloroethylene, trichloroethane, or methylchloride are not recommended as they may damage the capacitor.

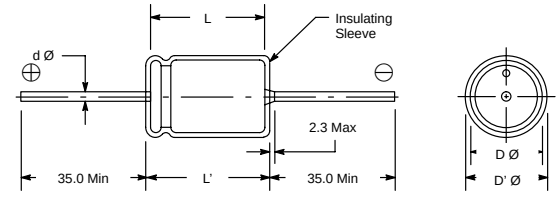
CASE SIZES AND DIMENSIONS:

NPR SERIES



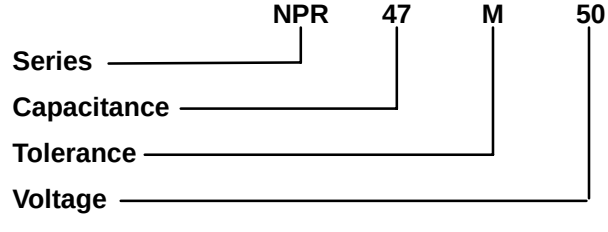
D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

NPA SERIES



D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

ORDERING INFORMATION



NON–POLAR ALUMINUM ELECTROLYTIC

NPR, NPA (Non–Polarized) SERIES

NPR Series (Radial Type) Dimensions: Diameter (D Ø) x Length (L): mm

Rated Voltage (WV)	16	25	50	63	100
Surge Voltage (V) / Cap (μf)	20	32	63	79	125
0.47			5 x 11		5 x 11
1.0			5 x 11	5 x 11	5 x 11
2.2			5 x 11	5 x 11	6 x 11
3.3			5 x 11	6 x 11	8 x 11.5
4.7		5 x 11	6 x 11	6 x 11	8 x 11.5
10	5 x 11	5 x 11	8 x 11.5	8 x 11.5	10 x 12.5
22	6 x 11	6 x 11	10 x 12.5	10 x 12.5	10 x 20
33	6 x 11	8 x 11.5	10 x 16	10 x 16	13 x 20
47	8 x 11.5	10 x 12.5	10 x 20	10 x 20	13 x 25
100	10 x 12.5	10 x 16	13 x 25	13 x 25	16 x 25
220	10 x 20	13 x 25	16 x 25	16 x 30	
330	13 x 20	13 x 25	16 x 30.5		
470	13 x 25	16 x 25			
1000	16 x 25	16 x 30.5			

* These dimensions are for reference only, please consult the factory for actual size.

NPR Series (Radial Type) Mechanical Specifications: mm

Outside Diameter (D Ø)	5	6	8	10	13	16
Lead Spacing (A)	2	2.5	3.5	5	5	7.5
Lead Diameter (d Ø)	0.5	0.6	0.6	0.6	0.6	0.8

* These dimensions are for reference only, please consult the factory for actual size.

NPA Series (Axial Type) Dimensions: Diameter (D Ø) x Length (L): mm

Rated Voltage (WV)	16	25	50	63	100
Surge Voltage (V) / Cap (μf)	20	32	63	79	125
0.47			6 x 15		6 x 15
1.0			6 x 15	6 x 15	6 x 15
2.2			6 x 15	6 x 15	6 x 15
3.3			6 x 15	6 x 15	6 x 19
4.7			6 x 15	6 x 15	8 x 19
10		6 x 15	6 x 19	8 x 19	10 x 21
22	6 x 15	6 x 19	10 x 21	10 x 21	10 x 25
33	6 x 19	8 x 19	10 x 21	10 x 25	13 x 30
47	8 x 19	8 x 19	10 x 25	10 x 25	13 x 30
100	10 x 21	10 x 25	13 x 30	13 x 30	16 x 30
220	10 x 25	13 x 30	16 x 30	16 x 30	
330	10 x 30	13 x 30	16 x 41	16 x 41	
470	13 x 30	16 x 30			
1000	16 x 30				

* These dimensions are for reference only, please consult the factory for actual size.

NPA Series (Axial Type) Mechanical Specifications: mm

Outside Diameter (D Ø)	6	8	10	13	16
Lead Diameter (d Ø)	0.6	0.6	0.6	0.8	0.8

* These dimensions are for reference only, please consult the factory for actual size.

HIGH–FREQ ALUMINUM ELECTROLYTIC

HD SERIES

SUBMINIATURE
(Radial Lead, Horizontal Deflection)

The NTE HD series of aluminum electrolytic non–polarized capacitors are designed specifically for horizontal deflection current correction where high frequency and high ripple current occur.

RATINGS

Capacitance Range: 1.0µf to 10µf

Tolerance: ±20%

Voltage Range: 25 Volts and 50 Volts

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–25°C to +85°C (–13°F to +185°F)

Leakage Current: I ≤ 0.2CV (measured after 5 minutes of applied rated voltage)

I = Leakage Current (µA)
C = Nominal Capacitance (µf)
V = Rated Voltage (V)

Capacitance Tolerance: ±20% (M)
measured at +20°C (+68°F), 1kH$_Z$

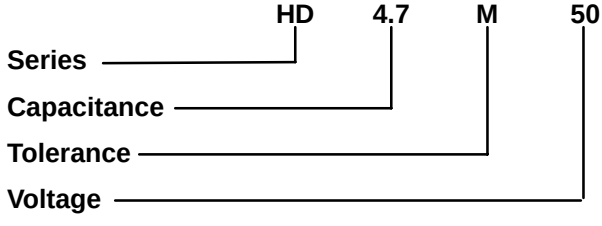
Load Life: 1000 Hrs @ 12V DC, +70°C (+158°F), at specified ripple current

Leakage Current: Initial specified value or less
Dissipation Factor: < 200% of specified value
Capacitance Change: Within ±15% of initial value

Shelf Life: 500 Hrs @ +85°C (+185°F), no voltage applied

Leakage Current: Initial specified value or less
Dissipation Factor: < 200% of specified value
Capacitance Change: Within ±15% of initial value

ORDERING INFORMATION



MECHANICAL SPECIFICATIONS

Lead Solderability:

Meets the requirements of MIL–STD 202, Method 208

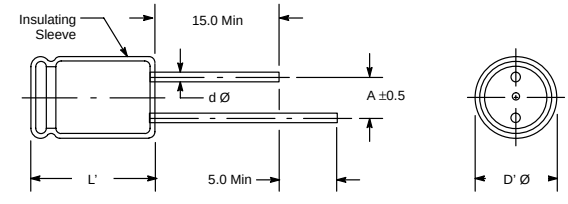
Marking:

Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, NTE identification.

Recommended Cleaning Solvents:

Methanol, isopropanol ethanol, isobutanol, petroleum ether, propanol and/or commercial detergents. Halogenated hydrocarbon cleaning agents such as Freon (MF, TF, or TC), trichloroethylene, trichloroethane, or methylchloride are not recommended as they may damage the capacitor.

CASE SIZE AND DIMENSIONS:



HD Series Dimensions:
Diameter (D Ø) x Length (L): mm

Capacitance (µf)	25V and 50V	Ripple Current* ($A_{p–p}$)
1.0	12.5 x 20	2.0
2.2	12.5 x 25	3.0
3.3	16 x 25	4.0
4.7	16 x 31.5	5.0
5.6	16 x 31.5	6.0
6.8	16 x 35.5	7.0
8.2	18 x 35.5	8.0
10.0	18 x 40	9.0

* Allowable ripple current @ 70°C, 12V DC, and 15.75kH$_Z$

HD Mechanical Specs: Dimensions (mm)

Outside Diameter (D Ø)	12.5	16	18
Lead Spacing (A)	5.0	7.5	7.5
Lead Wire (d Ø)	0.6	0.8	0.8

MYLAR/POLYESTER FILM

MLR SERIES

The MLR series is a range of radial lead non–polarized polyester film (Mylar) capacitors dipped in a hard epoxy coating material to provide excellent protection against moisture. These devices are intended for general purpose DC applications.

RATINGS

Capacitance Range: .001µf to 5.6µf

Voltage Range: 50V to 630V DC (35V to 250V AC)

Tolerance: ±10%

Withstand Voltage: 175%

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–55°C to +85°C (–67°F to +185°F)

Dissipation Factor: 1% Max

Capacitance Tolerance (K): ±10%
measured @ +25°C (+77°F), 1kH$_Z$, for values up to and including 1µf
measured @ +25°C (+77°F), 120H$_Z$, for values above 1µf

Insulation Resistance:

50V & 100V,	.001µf –	.1µf =	30,000MΩ Min
	.12µf –	2.2µf =	10,000MΩ Min
250V,	.01µf –	5.6µf =	10,000MΩ Min
400V,	.0047µf –	4.0µf =	10,000MΩ Min
630V,	.001µf –	.008µf =	100,000MΩ Min
	.01µf –	3.0µf =	10,000MΩ Min

Life Test: 1000Hrs @ +85°C (+185°F)
at 150% rated voltage

ORDERING INFORMATION

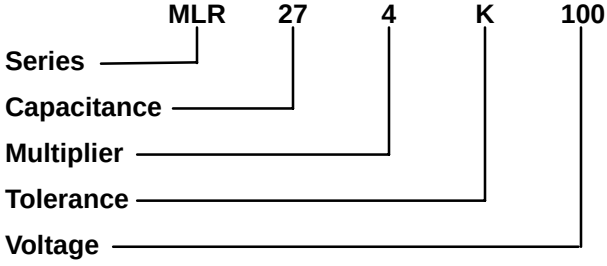
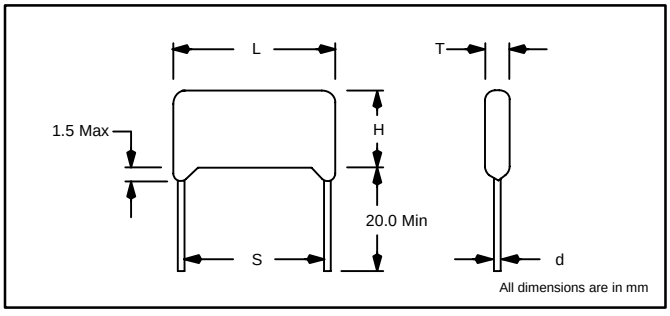


FIGURE 1



MECHANICAL SPECIFICATIONS (Figure 1)

50 Volt (35VAC) Series Dimensions (mm)

Cap µf	Code	T	H	L	S	d
.001	102	3.0	7.5	5.5	3.5 ±1.0	0.5
.0033	332	3.0	7.5	5.5	3.5 ±1.0	0.5
.01	103	3.0	7.5	6.0	3.5 ±1.0	0.5
.012	123	3.0	9.0	6.0	3.5 ±1.0	0.5
.018	183	3.5	9.0	6.5	3.5 ±1.0	0.5
.027	273	4.0	9.5	6.5	3.5 ±1.0	0.5
.033	333	4.0	9.5	6.5	3.5 ±1.0	0.5
.039	393	4.5	9.5	7.5	5.0 ±1.5	0.5
.047	473	4.5	9.5	7.5	5.0 ±1.5	0.5
.1	104	5.5	10.5	9.0	5.0 ±1.5	0.5
.15	154	6.0	10.0	14.0	10.0 ±1.5	0.6
.27	274	6.0	11.0	14.0	10.0 ±1.5	0.6
.33	334	6.0	12.0	14.0	10.0 ±1.5	0.6
1.0	105	9.0	15.0	18.0	15.0 ±1.5	0.6

100 Volt (65VAC) Series Dimensions (mm)

Cap µf	Code	T	H	L	S	d
.001	102	3.0	7.5	5.5	3.5 ±1.0	0.5
.0012	122	3.0	7.5	5.5	3.5 ±1.0	0.5
.0015	152	3.0	7.5	5.5	3.5 ±1.0	0.5
.0018	182	3.0	7.5	5.5	3.5 ±1.0	0.5
.002	202	3.0	7.5	5.5	3.5 ±1.0	0.5
.0022	222	3.0	7.5	5.5	3.5 ±1.0	0.5
.0027	272	3.0	7.5	5.5	3.5 ±1.0	0.5
.0033	332	3.0	7.5	5.5	3.5 ±1.0	0.5
.0039	392	3.0	7.5	5.5	3.5 ±1.0	0.5
.0047	472	3.0	7.5	5.5	3.5 ±1.0	0.5
.0056	562	3.0	7.5	5.5	3.5 ±1.0	0.5
.0068	682	3.0	7.5	5.5	3.5 ±1.0	0.5
.0082	822	3.0	7.5	6.0	3.5 ±1.0	0.5
.01	103	3.0	7.5	6.0	3.5 ±1.0	0.5
.012	123	3.0	9.0	6.0	3.5 ±1.0	0.5
.015	153	3.0	9.0	6.0	3.5 ±1.0	0.5
.018	183	3.5	9.0	6.5	3.5 ±1.0	0.5
.022	223	3.5	9.0	6.5	3.5 ±1.0	0.5
.027	273	4.0	9.5	6.5	3.5 ±1.0	0.5
.033	333	4.0	9.5	6.5	3.5 ±1.0	0.5
.039	393	4.5	9.5	7.5	5.0 ±1.5	0.5
.047	473	4.5	9.5	7.5	5.0 ±1.5	0.5
.056	563	4.5	10.5	8.0	5.0 ±1.5	0.5
.068	683	4.5	10.5	8.0	5.0 ±1.5	0.5
.082	823	5.5	10.5	9.0	5.0 ±1.5	0.5
.1	104	5.5	10.5	9.0	5.0 ±1.5	0.5
.12	124	6.0	12.0	14.0	10.0 ±1.5	0.6
.15	154	6.0	10.0	14.0	10.0 ±1.5	0.6
.18	184	6.0	10.0	14.0	10.0 ±1.5	0.6
.22	224	6.0	10.0	14.0	10.0 ±1.5	0.6
.27	274	6.0	11.0	14.0	10.0 ±1.5	0.6
.33	334	6.0	12.0	14.0	10.0 ±1.5	0.6
.39	394	6.0	12.0	18.0	15.0 ±1.5	0.6
.47	474	6.0	12.0	18.0	15.0 ±1.5	0.6
.56	564	7.0	14.0	18.0	15.0 ±1.5	0.6
.68	684	7.0	14.0	18.0	15.0 ±1.5	0.6
.82	824	9.0	15.0	18.0	15.0 ±1.5	0.6
1.0	105	9.0	15.0	18.0	15.0 ±1.5	0.6
2.2	225	11.0	20.0	24.0	20.0 ±1.5	0.8

MYLAR/POLYESTER FILM

MLR SERIES

250 Volt (125VAC) Series Dimensions (mm)

Cap µf	Code	T	H	L	S	d
.01	103	6.0	10.0	14.0	10 ±1.5	0.6
.015	153	6.0	10.0	14.0	10 ±1.5	0.6
.022	223	6.0	10.0	14.0	10 ±1.5	0.6
.027	273	6.0	10.0	14.0	10 ±1.5	0.6
.033	333	6.0	10.0	14.0	10 ±1.5	0.6
.047	473	6.0	10.0	14.0	10 ±1.5	0.6
.068	683	6.0	10.0	14.0	10 ±1.5	0.6
.082	823	7.0	10.0	14.0	10 ±1.5	0.6
.1	104	7.0	10.0	14.0	10 ±1.5	0.6
.12	124	7.0	11.0	14.0	10 ±1.5	0.6
.15	154	7.0	11.0	18.0	15 ±1.5	0.6
.18	184	7.0	12.0	18.0	15 ±1.5	0.6
.22	224	7.0	12.0	18.0	15 ±1.5	0.6
.27	274	7.0	13.0	18.0	15 ±1.5	0.6
.33	334	7.0	13.0	18.0	15 ±1.5	0.6
.39	394	8.0	15.0	18.0	15 ±1.5	0.8
.47	474	8.0	15.0	24.0	20 ±1.5	0.8
.56	564	9.0	15.5	24.0	20 ±1.5	0.8
.68	684	9.0	15.5	24.0	20 ±1.5	0.8
.82	824	10.0	17.0	24.0	20 ±1.5	0.8
1.0	105	10.0	17.0	24.0	20 ±1.5	0.8
1.2	125	10.0	19.5	24.0	20 ±1.5	0.8
1.5	155	10.0	19.5	31.0	27.5 ±1.5	0.8
1.8	185	11.0	20.0	31.0	27.5 ±1.5	0.8
2.2	225	13.0	22.0	31.0	27.5 ±1.5	0.8
3.3	335	16.0	26.0	31.0	27.5 ±1.5	0.8
4.7	475	16.0	26.0	35.0	27.5 ±1.5	0.8
5.6	565	16.0	26.0	35.0	27.5 ±1.5	0.8

400 Volt (200VAC) Series Dimensions (mm)

Cap µf	Code	T	H	L	S	d
.0047	472	6.0	10.0	14.0	10 ±1.5	0.6
.01	103	6.0	10.0	14.0	10 ±1.5	0.6
.015	153	6.0	10.0	14.0	10 ±1.5	0.6
.022	223	6.0	10.0	14.0	10 ±1.5	0.6
.033	333	6.0	10.0	14.0	10 ±1.5	0.6
.047	473	8.0	11.0	14.0	10 ±1.5	0.6
.056	563	8.0	13.0	14.0	10 ±1.5	0.6
.068	683	6.0	13.0	18.0	15 ±1.5	0.6
.082	823	6.0	13.0	18.0	15 ±1.5	0.6
.1	104	6.0	13.0	18.0	15 ±1.5	0.6
.12	124	7.0	14.0	18.0	15 ±1.5	0.6
.15	154	7.0	14.0	18.0	15 ±1.5	0.6
.18	184	8.0	16.0	18.0	15 ±1.5	0.8
.22	224	8.0	16.0	24.0	20 ±1.5	0.8
.27	274	9.0	16.0	24.0	20 ±1.5	0.8
.33	334	9.0	16.0	24.0	20 ±1.5	0.8
.39	394	9.5	17.0	24.0	20 ±1.5	0.8
.47	474	10.0	18.0	24.0	20 ±1.5	0.8
.56	564	10.5	18.0	30.0	27.5 ±1.5	0.8
.68	684	10.5	18.0	30.0	27.5 ±1.5	0.8
.82	824	12.0	22.0	30.0	27.5 ±1.5	0.8
1.0	105	12.0	22.0	30.0	27.5 ±1.5	0.8
1.5	155	15.0	24.5	30.0	26.5 ±1.5	0.8
2.0	205	18.0	26.5	30.0	26.5 ±1.5	0.8
3.0	305	19.0	28.5	37.0	31 ±1.5	0.8
4.0	405	23.5	32.0	37.0	31 ±1.5	0.8

630 Volt (250VAC) Series Dimensions (mm)

Cap µf	Code	T	H	L	S	d
.001	102	5.54	8.28	17.63	13.84 ±1.3	0.6
.0012	122	5.87	8.62	17.63	13.84 ±1.3	0.6
.0015	152	5.61	8.36	17.63	13.84 ±1.3	0.6
.0018	182	5.95	8.69	17.63	13.84 ±1.3	0.6
.0022	222	6.38	9.12	17.63	13.84 ±1.3	0.6
.0025	252	7.12	9.61	17.63	13.84 ±1.3	0.8
.0027	272	7.12	9.61	17.63	13.84 ±1.3	0.8
.003	302	6.38	9.55	17.63	13.84 ±1.3	0.8
.0033	332	6.38	9.55	17.63	13.84 ±1.3	0.8
.0039	392	6.76	9.94	17.63	13.84 ±1.3	0.8
.0047	472	7.20	10.39	17.63	13.84 ±1.3	0.8
.005	502	7.68	10.85	17.63	13.84 ±1.3	0.8
.0056	562	7.68	10.85	17.63	13.84 ±1.3	0.8
.0068	682	7.95	11.79	17.63	13.84 ±1.3	0.8
.0082	822	8.53	12.37	17.63	13.84 ±1.3	0.8
.01	103	6.00	10.00	14.00	10.00 ±1.5	0.6
.012	123	6.00	11.00	14.00	10.00 ±1.5	0.6
.015	153	6.50	11.50	14.00	10.00 ±1.5	0.6
.018	183	7.00	12.00	14.00	10.00 ±1.5	0.6
.022	223	7.00	12.50	14.00	10.00 ±1.5	0.6
.027	273	6.00	11.00	18.00	15.00 ±1.5	0.6
.033	333	7.00	12.00	18.00	15.00 ±1.5	0.6
.039	393	7.00	12.50	18.00	15.00 ±1.5	0.6
.047	473	7.50	12.50	18.00	15.00 ±1.5	0.6
.05	503	7.50	12.50	18.00	15.00 ±1.5	0.6
.056	563	8.50	14.50	18.00	15.00 ±1.5	0.6
.068	683	8.50	14.50	18.00	15.00 ±1.5	0.6
.082	823	9.00	15.50	18.00	15.00 ±1.5	0.8
.1	104	9.00	14.00	24.00	20.00 ±1.5	0.8
.12	124	10.00	17.00	24.00	20.00 ±1.5	0.8
.15	154	10.00	17.00	24.00	20.00 ±1.5	0.8
.18	184	11.00	20.00	24.00	20.00 ±1.5	0.8
.22	224	11.00	20.00	24.00	20.00 ±1.5	0.8
.25	254	11.00	20.00	24.00	20.00 ±1.5	0.8
.27	274	12.00	20.00	24.00	20.00 ±1.5	0.8
.33	334	11.00	20.00	24.00	27.50 ±1.5	0.8
.39	394	13.00	22.00	30.00	27.50 ±1.5	0.8
.47	474	13.00	22.00	30.00	27.50 ±1.5	0.8
.5	504	13.00	22.00	30.00	27.50 ±1.5	0.8
.56	564	14.00	23.00	31.00	27.50 ±1.5	0.8
.68	684	15.00	26.00	31.00	27.50 ±1.5	0.8
1.0	105	17.00	30.00	31.00	27.50 ±1.5	0.8
1.5	155	20.00	30.00	37.00	31.00 ±1.5	0.8
1.8	185	19.00	28.00	46.00	41.00 ±1.5	0.8
2.0	205	20.50	30.00	46.00	41.00 ±1.5	0.8
3.0	305	21.00	35.00	45.00	38.00 ±1.5	0.8

105°C ALUMINUM ELECTROLYTIC

VHT SERIES

SUBMINIATURE
(Radial Lead, 105°C Max)

The NTE VHT series of aluminum electrolytic capacitors are designed for use in automotive, commercial, and industrial applications. These high temperature, radial lead capacitors are especially suitable for applications that require extended life and higher temperature operation.

RATINGS

Capacitance Range: 0.1µf to 4700µf

Tolerance: ±20%

Voltage Range: 16 to 250 Volts

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–40°C to +105°C (–40°F to +220.9°F)

Leakage Current:

6.3V to 100V: ≤ 0.01CV (+3µA)

160V to 250V: ≤ 0.03CV (+15µA)

Capacitance Tolerance: ±20% (M)
measured at +20°C (+68°F), 120H_Z

High Temperature Load Test:

1000 Hrs @ +105°C (+220.9°F) and rated voltage

Ripple Current:

The ripple current multipliers (See Table) adjust the current to make the capacitors operating temperature the same for different ambient temperatures and ripple frequencies.

Temperature	45°C	55°C	65°C	75°C	85°C	95°C	105°C
Multiplier	1.5	1.46	1.32	1.17	1.0	0.79	0.5

Load Life: 1000 Hrs @ +105°C (+220.9°F), no voltage applied

Shelf Life: 1000 Hrs @ +105°C (+220.9°F), no voltage applied

MECHANICAL SPECIFICATIONS

Lead Solderability:

Meets the requirements of MIL–STD 202, Method 208

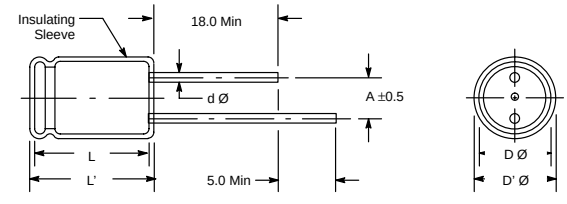
Marking:

Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, vendor identification.

Recommended Cleaning Solvents:

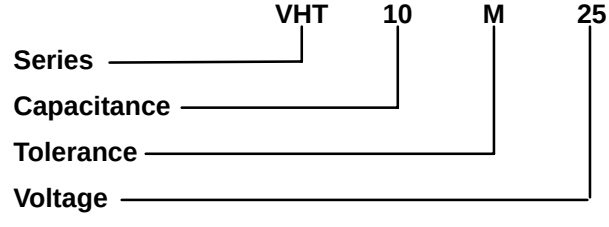
Methanol, isopropanol ethanol, isobutanol, petroleum ether, propanol and/or commercial detergents. Halogenated hydrocarbon cleaning agents such as Freon (MF, TF, or TC), trichloroethylene, trichloroethane, or methylchloride are not recommended as they may damage the capacitor.

CASE SIZE AND DIMENSIONS:



D' Ø = D Ø + 0.5 Max L' = L + 1.0 Max at D Ø ≤ 8.0 L' = L + 2.0 Max at D Ø ≥ 10.0

ORDERING INFORMATION



105°C ALUMINUM ELECTROLYTIC

VHT SERIES

VHT Series Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (μf)	16	25	35	50	63	160	250
0.1				5 x 11			
0.22				5 x 11			
0.33				5 x 11			
0.47				5 x 11	5 x 11		
1.0				5 x 11	5 x 11	6 x 11	6 x 11
2.2				5 x 11	5 x 11	6 x 11	8 x 11.5
3.3				5 x 11	5 x 11	8 x 11.5	10 x 12.5
4.7		5 x 11	5 x 11	5 x 11	5 x 11	8 x 11.5	10 x 12.5
10	5 x 11	5 x 11	5 x 11	5 x 11	6 x 11	10 x 12.5	10 x 20
22	5 x 11	5 x 11	6 x 11	6 x 11	8 x 11.5	10 x 20	13 x 25
33	5 x 11	6 x 11	6 x 11	8 x 11.5	8 x 11.5	13 x 21	13 x 25
47	6 x 11	6 x 11	8 x 11.5	8 x 11.5	10 x 12.5	13 x 25	16 x 25
100	8 x 11.5	8 x 11.5	10 x 12.5	10 x 16	10 x 20	16 x 25	18 x 36
220	10 x 12.5	10 x 16	10 x 20	13 x 20	13 x 20		
330	10 x 16	10 x 20	13 x 20	13 x 20	13 x 25		
470	10 x 20	13 x 20	13 x 25	16 x 25	16 x 25		
1000	13 x 25	16 x 25	16 x 25	16 x 25	18 x 31.5		
2200	16 x 25	16 x 31.5	18 x 31.5				
3300	16 x 31.5	18 x 31.5					
4700	18 x 31.5						

* These dimensions are for reference only, please consult the factory for actual size.

VHT Mechanical Specs: Dimensions (mm)

Outside Diameter	D Ø	5.0	6.0	8.0	10.0	13.0	16.0	18.0
Lead Spacing	A	2.0	2.5	3.5	5.0		7.5	
Lead Wire	d Ø	0.5			0.6		0.65	0.8

* These dimensions are for reference only, please consult the factory for actual size.

SNAP–IN MOUNT ALUMINUM ELECTROLYTIC

SI SERIES

SUBMINIATURE
(SI: Snap–in)

The SI Snap–in series subminiature aluminum electrolytic capacitors are especially suitable for applications requiring high capacitance, low cost, and very small size. In fact, you'll find these capacitors in some of the most demanding applications, from precision medical electronics and automobiles to the newest personal computers and disk drives.

They operate over a broad temperature range and are available in either blister pack or bulk.

RATINGS

Capacitance Range: 47µf to 33,000µf

Tolerance: ±20%

Voltage Range: 16V to 450V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–40°C to +85°C (–40°F to +185°F)

Leakage Current: $I \leq 3 \times \sqrt{CV}$ (measured after 5 minutes @ rated voltage and +20°C (+68°F)

I = Leakage Current (µA)
C = Nominal Capacitance (µf)
V = Rated Voltage (V)

Capacitance Tolerance (M): ±20%
measured at +20°C (+68°F), 120H_Z

Surge Voltage:

DC Rated Voltage	16	25	35	50	63	80
Surge Voltage	20	32	44	63	79	100

DC Rated Voltage	100	160	200	250	450
Surge Voltage	125	200	250	300	500

Load Life: 2000 ±12Hrs @ Max rated temperature and rated voltage

Leakage Current: Within values specified above
Dissipation Factor: Within ±150% of specified value

Shelf Life: 1000 ±6Hrs @ Max rated temperature, no voltage applied

Leakage Current: Within ±200% of specified value
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: Within ±20% of initial value

MECHANICAL SPECIFICATIONS

Marking:

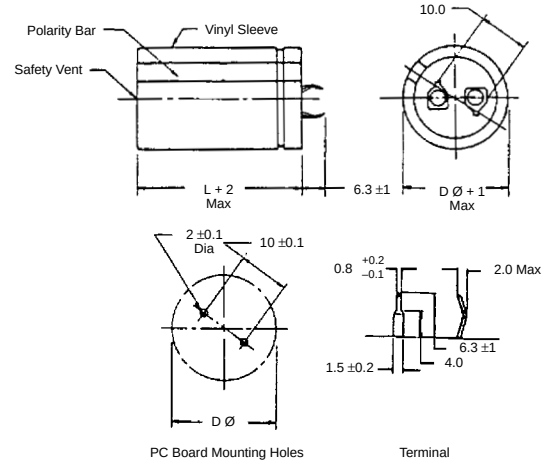
Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, vendor identification.

Recommended Cleaning Solvents:

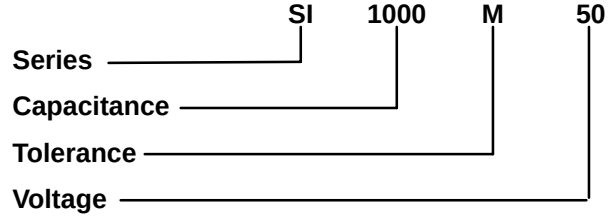
Chlorofluorocarbon solvents used to remove flux from printed circuit boards can penetrate the capacitor end–seals, cause corrosion when voltage is applied and capacitor failure. Avoid halogenated solvents and consider these alternatives: Clean the capacitors with water/detergent or cleaning solvents free of halogen groups such as alcohol or terpene solution, or mount the capacitor after board cleaning.

CASE SIZE AND DIMENSIONS:

SI SERIES



ORDERING INFORMATION



SNAP–IN MOUNT ALUMINUM ELECTROLYTIC

SI SERIES

SI Series Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (µf)	16	25	35	50	63	80	100	160	200	250	450
47											22 x 30
56											22 x 25
68											22 x 50
82											22 x 30
100									22 x 20	25 x 20	22 x 35
120											22 x 40
150									22 x 25	22 x 30	22 x 50
180											25 x 45
220								22 x 20	22 x 30	22 x 40	25 x 50
270									22 x 25		30 x 45
330								22 x 25	22 x 30	22 x 35	30 x 50
390									22 x 30		35 x 45
470								22 x 30	22 x 35	22 x 45	35 x 50
560								25 x 40	22 x 40	25 x 45	35 x 60
680								22 x 40	22 x 45	30 x 50	35 x 70
820								22 x 45	25 x 45	30 x 45	
1000			22 x 30	22 x 20		22 x 30	22 x 40	25 x 45	25 x 50	30 x 50	
1500						22 x 40	22 x 50		30 x 50		
2200		22 x 25	22 x 25	22 x 30	22 x 40	22 x 50	22 x 50				
2700				20 x 30		22 x 45					
3300	22 x 20	22 x 25	22 x 30	22 x 40	22 x 50	25 x 50	25 x 50				
3900		20 x 30		20 x 40		25 x 45					
4700	22 x 25	22 x 30	22 x 40	22 x 50	22 x 50	25 x 35	30 x 50				
5600		20 x 30		25 x 35		30 x 45	35 x 45				
6800	22 x 30	22 x 40	22 x 50	25 x 50	25 x 50	30 x 50					
8200		22 x 30		25 x 45		35 x 50					
10000	20 x 35	22 x 50	25 x 50	30 x 50	35 x 40	35 x 70					
12000				30 x 45	35 x 50						
15000	22 x 50	25 x 50		30 x 50							
18000				35 x 45							
22000	22 x 45	30 x 50	30 x 50								
33000	25 x 50										

* These dimensions are for reference only, please consult the factory for actual size.

105°C SNAP–IN ALUMINUM ELECTROLYTIC

SIT SERIES

SUBMINIATURE
(SIT: High Temperature Snap–in)

The SIT Snap–in series subminiature aluminum electrolytic capacitors are especially suitable for applications requiring high capacitance, low cost, and very small size. In fact, you'll find these capacitors in some of the most demanding applications, from precision medical electronics and automobiles to the newest personal computers and disk drives.

They operate over a broad temperature range and are available in either blister pack or bulk.

RATINGS

Capacitance Range: 100µf to 10,000µf

Tolerance: ±20%

Voltage Range: 50V to 250V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–40°C to +105°C (–40°F to +221°F)

Leakage Current: $I \leq 3 \times \sqrt{CV}$ (measured after 5 minutes @ rated voltage and +20°C (+68°F)

I = Leakage Current (µA)
C = Nominal Capacitance (µf)
V = Rated Voltage (V)

Capacitance Tolerance (M): ±20% measured at +20°C (+68°F), 120H_Z

Surge Voltage:

DC Rated Voltage	50	200	250
Surge Voltage	63	250	300

Load Life: 2000 ±12Hrs @ Max rated temperature and rated voltage

Leakage Current: Within values specified above
Dissipation Factor: Within ±150% of specified value

Shelf Life: 1000 ±6Hrs @ Max rated temperature, no voltage applied

Leakage Current: Within ±200% of specified value
Dissipation Factor: Within ±150% of specified value
Capacitance Change Max: Within ±20% of initial value

MECHANICAL SPECIFICATIONS

Marking:

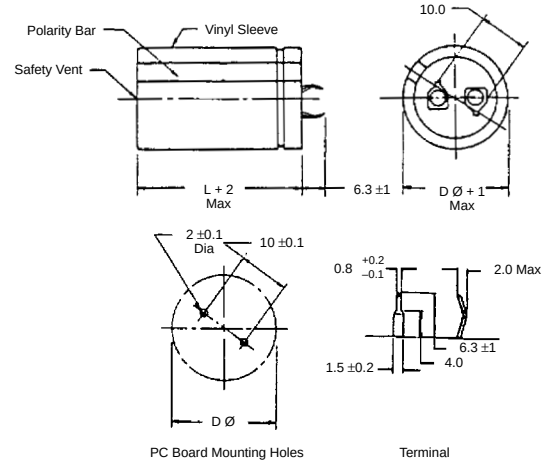
Consists of series type, nominal capacitance, rated voltage, temperature range, anode and/or cathode identification, vendor identification.

Recommended Cleaning Solvents:

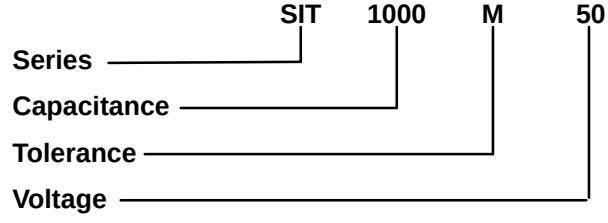
Chlorofluorocarbon solvents used to remove flux from printed circuit boards can penetrate the capacitor end–seals, cause corrosion when voltage is applied and capacitor failure. Avoid halogenated solvents and consider these alternatives: Clean the capacitors with water/detergent or cleaning solvents free of halogen groups such as alcohol or terpene solution, or mount the capacitor after board cleaning.

CASE SIZE AND DIMENSIONS:

SIT SERIES



ORDERING INFORMATION



105°C SNAP–IN ALUMINUM ELECTROLYTIC

SIT SERIES

SIT Series Dimensions: Diameter (D Ø) x Length (L): mm

WV / Cap (μf)	50	200	250
100		22 x 20	22 x 30
150		22 x 30	22 x 40
220		22 x 40	22 x 50
330		22 x 50	22 x 40
470		22 x 40	30 x 35
560		22 x 45	25 x 50
680		22 x 45	30 x 45
820		25 x 50	30 x 50
1000	22 x 25	30 x 45	35 x 45
1500		35 x 50	
2200	22 x 40		
3300	22 x 50		
4700	22 x 45		
6800	30 x 50		
8200	30 x 45		
10000	30 x 50		

* These dimensions are for reference only, please consult the factory for actual size.

MOTOR RUN AC METALLIZED

MRC SERIES

The MRC series is a range of AC metallized capacitors. These capacitors are most often used in motor run, HVAC, lighting, and power supply applications.

FEATURES:

- .25" 4–Way Quick Connect terminals
- Pressure activated circuit interrupter
- Self healing of shorts due to dielectric breakdown
- Non–PCB dielectric fluid
- Low dissipation factor
- Leak–proof terminals

RATINGS

Capacitance Range:

370 Volts – 2µF to 50µF

440 Volts – 2µF to 60µF

Tolerance: ±10%

PERFORMANCE SPECIFICATIONS

Operating Temperature Range: –55°C to +70°C

Capacitance Change Due To Temp: +5% to–7%

Dissipation Factor: 0.2%

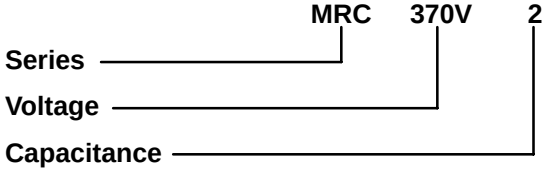
Service Life: *150,000 hours (at Max Rating)
94% survival

Impregnant: Dykanol XK

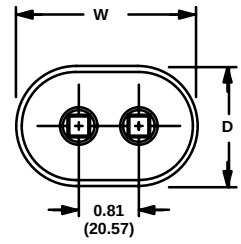
CAPACITOR CONSTRUCTION

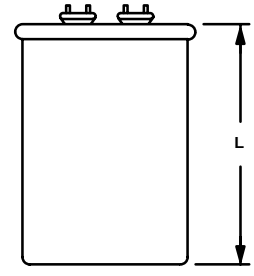
Metallized electrodes on both sides of paper substrate are wound with polypropylene film as a dielectric. During vacuum fluid processing the paper acts as a wick for thorough fluid impregnation to SUPPRESS CORONA and to promote long life.

ORDERING INFORMATION

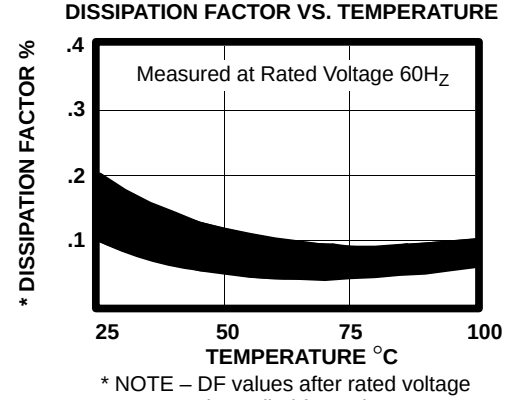


* EIA Standard is 60,000 hours

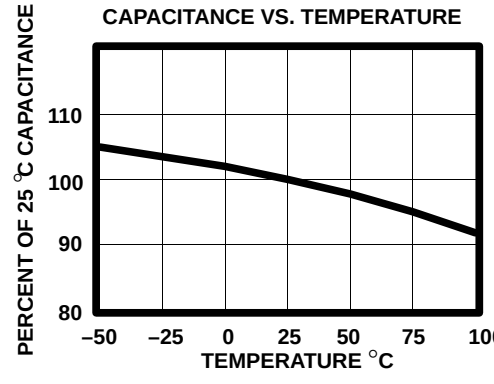




TERMINAL TYPE
Standard terminal 0.25 (6.35) wide x 0.032 (0.85) four blade quick disconnect universal type lugs of tin plated silicon bronze or brass (MRC440V20 may be received in two blade type).
NOTE: All dimensions ±0.06 (0.152)



* NOTE – DF values after rated voltage is applied for 24 hours.



MOTOR RUN AC METALLIZED

MRC SERIES

370VAC Ratings and Dimensions @ 70° Case Temp.

NTE Type Number	Capacitance	Case Dimensions – Inch (mm)			Case Style
	μF	W	D	L	
MRC370V2	2	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC370V3	3	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC370V4	4	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC370V5	5	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC370V6	6	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC370V7R5	7.5	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC370V10	10	2.16 (54.86)	1.31 (33.27)	2.69 (68.33)	A
MRC370V12R5	12.5	2.16 (54.86)	1.31 (33.27)	3.13 (79.50)	A
MRC370V15	15	2.16 (54.86)	1.31 (33.27)	3.88 (98.55)	A
MRC370V17R5	17.5	2.91 (73.91)	1.91 (46.51)	2.69 (68.33)	B
MRC370V20	20	2.91 (73.91)	1.91 (48.51)	2.69 (68.33)	B
MRC370V25	25	2.91 (73.91)	1.91 (48.51)	2.69 (68.33)	B
MRC370V30	30	2.91 (73.91)	1.91 (48.51)	3.13 (79.50)	B
MRC370V35	35	2.91 (73.91)	1.91 (48.51)	3.13 (79.50)	B
MRC370V40	40	3.66 (92.96)	1.91 (48.51)	3.88 (98.55)	B
MRC370V45	45	3.66 (92.96)	1.97 (50.04)	3.88 (98.55)	C
MRC370V50	50	3.66 (92.96)	1.97 (50.04)	3.88 (98.55)	C

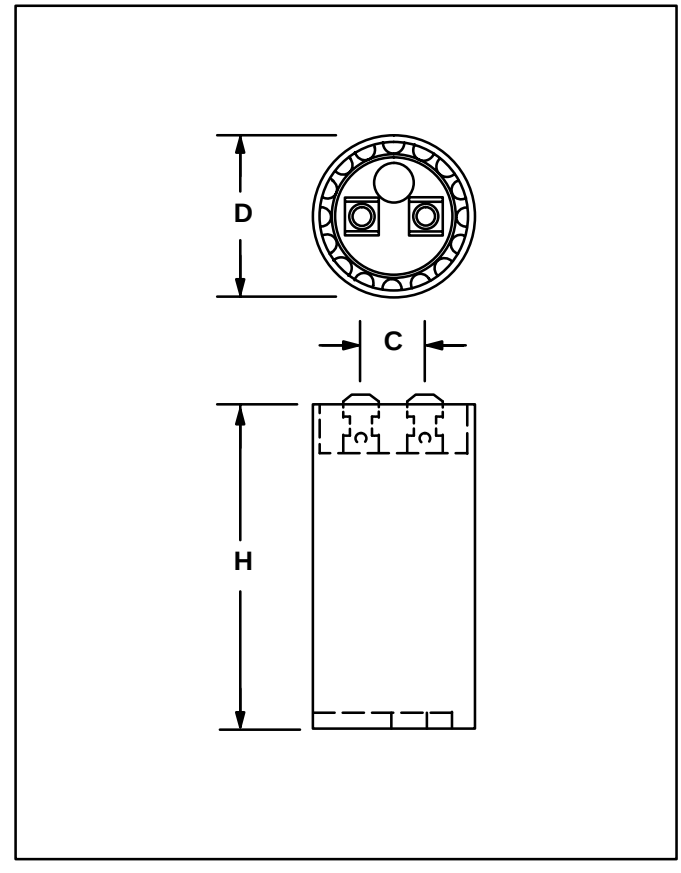
440VAC Ratings and Dimensions @ 70° Case Temp.

NTE Type Number	Capacitance	Case Dimensions – Inch (mm)			Case Style
	μF	W	D	L	
MRC440V2	2	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC440V3	3	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC440V4	4	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC440V5	5	2.16 (54.86)	1.31 (33.27)	2.19 (55.63)	A
MRC440V6	6	2.16 (54.86)	1.31 (33.27)	2.69 (68.33)	A
MRC440V7R5	7.5	2.16 (54.86)	1.31 (33.27)	3.13 (79.50)	A
MRC440V10	10	2.16 (54.86)	1.31 (33.27)	3.88 (98.55)	A
MRC440V12R5	12.5	2.16 (54.86)	1.91 (48.51)	2.69 (68.33)	B
MRC440V15	15	2.16 (54.86)	1.91 (48.51)	3.88 (98.55)	B
MRC440V17R5	17.5	2.16 (54.86)	1.91 (48.51)	3.88 (98.55)	B
MRC440V20	20	2.91 (73.91)	1.91 (48.51)	3.88 (98.55)	B
MRC440V25	25	2.91 (73.91)	1.91 (48.51)	3.88 (98.55)	B
MRC440V30	30	2.91 (73.91)	1.91 (48.51)	3.88 (98.55)	B
MRC440V35	35	2.91 (73.91)	1.97 (50.04)	3.88 (98.55)	C
MRC440V40	40	3.66 (92.96)	1.97 (50.04)	3.88 (98.55)	C
MRC440V45	45	3.66 (92.96)	1.97 (50.04)	3.88 (98.55)	C
MRC440V50	50	3.66 (92.96)	1.97 (50.04)	3.88 (98.55)	C
MRC440V55	55	3.66 (92.96)	1.97 (50.04)	4.25 (107.95)	C
MRC440V60	60	3.66 (92.96)	1.97 (50.04)	4.25 (107.95)	C

MOTOR START AC ELECTROLYTIC

MSC SERIES

The MSC Series is a range of AC electrolytic capacitors. These capacitors are most often used to provide the torque necessary to start AC motors and in other intermittent AC applications.



FEATURES:

- Two .25” Quick Connect terminals
- Round moisture and oil resistant plastic case
- 110VAC to 330VAC
- Quick disconnect terminals
- Recessed terminals
- Long life and high reliability

RATINGS

Capacitance Range:

110/125 Volts – 21µF to 1200µF

220/250 Volts – 21µF to 324µF

330 Volts – 21µF to 259µF

PERFORMANCE SPECIFICATIONS

Operating Temperature Range: –40°C to +65°C

Power Factor: 10% Max.; 12% ≤30µF

Operating Frequency: 47 – 60H_Z

MOUNTING

Vertical mounting of the capacitor with the terminals up is recommended. However, horizontal mounting is acceptable providing the vent is located in the up position. Vertical mounting with the terminals down is not recommended because the capacitor life may be reduced and the operation of the pressure relief vent impaired.

CLEANING

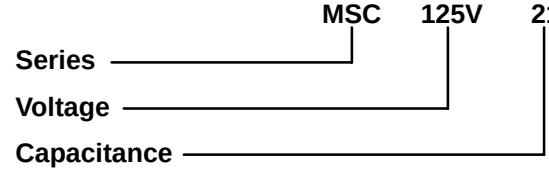
Solvent residues on the capacitors after cleaning may penetrate the seal and cause internal corrosion resulting in shortened life. Alcohol or water detergent cleaning is not usually harmful but halogenated cleaning solvents are not recommended and should be avoided.

SAFETY

Because the watt–second value of these capacitors is high, precautions should be taken during the testing of these devices.

Discharge resistors should be specified when there is a possibility of a residual charge left on the capacitor or to protect contacts. Mis–application, such as exceeding design limits or applying continuous AC voltage, may result in destruction or explosion of capacitors.

ORDERING INFORMATION



MOTOR START AC ELECTROLYTIC

MSC SERIES

110/125VAC Ratings and Dimensions

NTE Type Number	Capacitance	Case Dimensions – Inch (mm)			Case Style
	μF	D	H	C	
MSC125V21	21–25	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V25	25–30	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V30	30–36	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V36	36–43	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V43	43–52	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V53	53–64	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V72	72–86	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V88	88–106	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V108	108–130	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V124	124–149	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V145	145–174	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V161	161–193	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V189	189–227	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC125V216	216–259	1.438 (36.53)	3.38 (85.85)	0.50 (12.70)	F
MSC125V233	233–280	1.438 (36.53)	3.38 (85.85)	0.50 (12.70)	F
MSC125V270	270–324	1.438 (36.53)	3.38 (85.85)	0.50 (12.70)	F
MSC125V324	324–389	1.438 (36.53)	4.38 (111.25)	0.50 (12.70)	G
MSC125V340	340–408	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC125V378	378–454	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC125V400	400–480	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC125V460	460–552	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC125V540	540–648	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC125V590	590–708	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC125V829	829–995	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC125V1000	1000–1200	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K

220/250VAC Ratings and Dimensions

NTE Type Number	Capacitance	Case Dimensions – Inch (mm)			Case Style
	μF	D	H	C	
MSC250V21	21–25	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC250V25	25–30	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC250V30	30–36	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC250V36	36–43	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC250V43	43–52	1.810 (45.97)	3.38 (85.85)	0.50 (12.70)	F
MSC250V53	53–64	1.810 (45.97)	3.38 (85.85)	0.50 (12.70)	F
MSC250V72	72–86	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC250V88	88–106	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC250V108	108–130	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC250V124	124–149	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC250V130	130–156	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC250V145	145–174	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC250V161	161–193	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K
MSC250V189	189–227	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K
MSC250V216	216–259	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K
MSC250V233	233–280	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K
MSC250V270	270–324	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K

MOTOR START AC ELECTROLYTIC

MSC SERIES

330VAC Ratings and Dimensions

NTE Type Number	Capacitance	Case Dimensions – Inch (mm)			Case Style
	μF	D	H	C	
MSC330V21	21–25	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	E
MSC330V25	25–30	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	F
MSC330V30	30–36	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	F
MSC330V36	36–43	1.438 (36.53)	2.75 (69.85)	0.50 (12.70)	F
MSC330V43	43–52	1.438 (36.53)	3.38 (85.85)	0.50 (12.70)	F
MSC330V53	53–64	1.810 (45.97)	3.38 (85.85)	0.63 (16.00)	H
MSC330V72	72–86	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC330V88	88–106	1.810 (45.97)	4.38 (111.25)	0.63 (16.00)	J
MSC330V108	108–130	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K
MSC330V124	124–149	2.560 (65.02)	4.38 (111.25)	0.88 (22.35)	K
MSC330V145	145–174	2.060 (52.32)	4.38 (111.25)	0.88 (22.35)	K
MSC330V161	161–193	2.560 (65.02)	4.38 (111.25)	0.88 (22.35)	L
MSC330V189	189–227	2.560 (65.02)	4.38 (111.25)	0.88 (22.35)	L
MSC330V216	216–259	2.560 (65.02)	4.38 (111.25)	0.88 (22.35)	L

SOLID TANTALUM

TD (Resin Dipped Radial) SERIES

SOLID TANTALUM

The TD series is a range of resin dipped tantalum capacitors designed for entertainment, commercial, and industrial equipment. They have sintered anodes and solid electrolyte. The epoxy resin housing is flame retardent with a limiting oxygen index in excess of 30 (ASTM–D–2863).

RATINGS

Capacitance Range: 0.1µf to 680µf
Tolerance: ±20%
Voltage Range: 6.3V to 50V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:
–55°C to +85°C (–67°F to +185°F)

Capacitance Tolerance (M): ±20%
measured at +20°C (+68°F), 120H_Z

Dissipation Factor: measured at +20°C (+68°F),120H_Z

Capacitance Range µf	0.1 – 1.5	2.2 – 6.8	10 – 68	100 – 680
	≤ **0.04**	≤ **0.06**	≤ **0.08**	≤ 0.10

Surge Voltage:

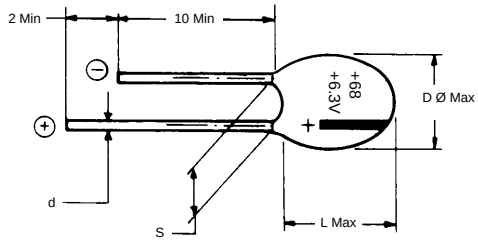
DC Rated Voltage	6.3	10	16	20	25	35	50
Surge Voltage	8	13	20	26	33	46	65

MECHANICAL SPECIFICATIONS

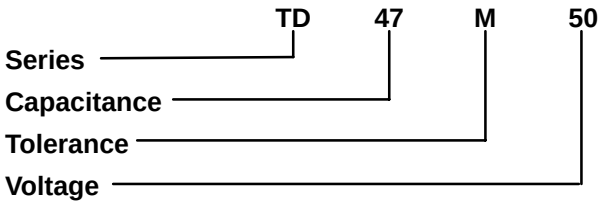
Lead Solderability:
Meets the requirements of MIL–STD 202, Method 208

Marking:
Consists of capacitance, DC voltage, and polarity.

Recommended Cleaning Solvents:
Methanol, isopropanol ethanol, isobutanol, petroleum ether, propanol and/or commercial detergents. Halogenated hydrocarbon cleaning agents such as Freon (MF, TF, or TC), trichloroethylene, trichloroethane, or methylchloride are not recommended as they may damage the capacitor.



ORDERING INFORMATION



CAPACITANCE RANGE:

(Number denotes case size)

Rated Voltage (WV)	6.3	10	16	20	25	35	50
Surge Voltage (V) / Cap (µf)	8	13	20	26	33	46	65
0.10						1	1
0.15						1	1
0.22						1	1
0.33						1	2
0.47						1	2
0.68						1	2
1.0				1	1	1	4
1.5			1	1	1	2	5
2.2		1	1	2	2	3	5
3.3	1	1	2	3	3	4	7
4.7	1	2	3	4	4	5	8
6.8	2	3	4	5	5	6	8
10.0	3	4	5	6	6	7	9
15.0	4	5	6	7	7	9	10
22.0	5	6	7	8	9	10	13
33.0	6	7	8	9	10	12	
47.0	7	8	10	11	12	14	
68.0	8	9	11	13	13		
100.0	9	11	13	13			
150.0	11	13	15				
220.0	12	14	15				
330.0	14	15					
470.0	15						
680.0	15						

TD Series Dimensions: mm

Diameter (D Ø) x Length (L)

Case Size	Diameter (D Ø)	Length (L)	Lead Wire (d)	Spacing (S)
1	4.50	8.50	0.50	2.54 ±0.51
2	4.50	9.00	0.50	
3	5.00	10.00	0.50	
4	5.00	10.50	0.50	
5	5.50	10.50	0.50	
6	6.00	11.50	0.50	
7	6.50	11.50	0.50	
8	7.00	12.00	0.40	
9	8.00	13.00	0.50	5.08 ±0.51
10	8.50	14.00	0.50	
11	9.00	14.00	0.50	
12	9.00	14.50	0.50	
13	9.00	16.00	0.50	
14	10.00	17.00	0.50	
15	10.00	18.50	0.50	

SURFACE MOUNT TANTALUM

SCT (Surface Mount) SERIES

SURFACE MOUNT TANTALUM

The SCT series is a molded solid tantalum chip capacitor designed to meet specifications worldwide. The SCT series includes EIA standard case sizes and ratings. These capacitors incorporate state–of–the–art construction allowing the use of modern high temperature soldering techniques.

FEATURES:

- Precision molded case with flat surface for vacuum pick–up
- Laser marking and bold videcon – readable polarity stripe
- Glue pad on underside for bonding to circuit board prior to soldering
- Encapsulate material satisfies the UL 94 VO flammability classification

RATINGS

Capacitance Range: 0.1µf to 150µf
Tolerance: ±10%
Voltage Range: 6.3V to 50V

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:
–55°C to +85°C (–67°F to +185°F)
Capacitance Tolerance (K): ±10%

MECHANICAL SPECIFICATIONS

Lead Solderability:
Meets the requirements of MIL–STD 202, Method 208
Marking:
Consists of capacitance, DC voltage, and polarity.
Resistance to Board Cleaning:
The use of high acidity fluxes must be avoided. The encapsulation and termination materials are resistant to immersion in boiling solvents such as: Freon TMS and TMC, Trichloroethane, Methylene Chloride, Isopropyl alcohol (IPA), etc., up to +50°C. If ultrasonic cleaning is to be applied in the final wash stages the application time should be less than 5 minutes with a maximum power density of 9mW/cc to avoid damage to terminations.

ORDERING INFORMATION

SCT A 10 4 K 35

Series
Case
Capacitance
Multiplier
Tolerance
Voltage

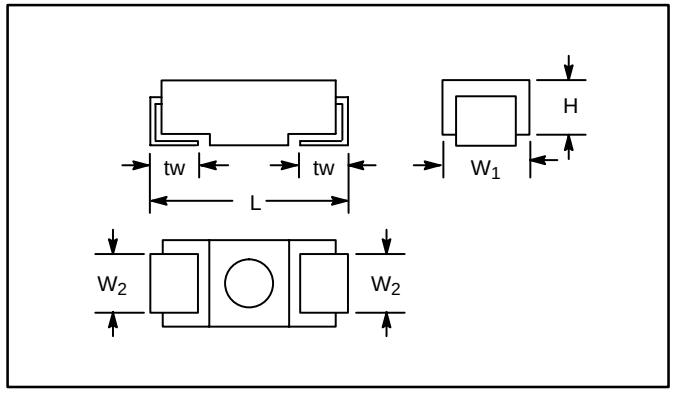
CAPACITANCE RANGE:

(Letter denotes case size)

Rated Voltage (WV)	6.3	10	16	20	25	35	50
Surge Voltage (V) / Cap (µf)	8	13	20	26	32	46	65
0.10						A	
0.47					A		
1.0			A			B	C
1.5			A		B		
2.2		A	A	B		C	D
3.3	A		B				
4.7		A, B	B		C	D	
6.8	B		C	C		D	
10.0		B, C	B, C		D	D	
15.0		C	C	D	D		
22.0		C	D		D	H	
33.0	C		D		H		
47.0	C	D	D	H			
68.0	D			H			
100.0	D		H				
150.0	D	H					

SCT Series Dimensions: in (mm)

Case Size	**L** ±0.2 (±0.008)	**W_1** ±0.2 (±0.008)	**W_2** ±0.1 (±0.004)	**H** ±0.2 (±0.008)	**tw** ±0.3 (±0.012)
A	.126 (3.2)	.063 (1.6)	.047 (1.2)	.063 (1.6)	.031 (0.8)
B	.138 (3.5)	.110 (2.8)	.087 (2.2)	.075 (1.9)	.031 (0.8)
C	.236 (6.0)	.126 (3.2)	.087 (2.2)	.102 (2.6)	.051 (1.3)
D	.287 (7.3)	.169 (4.3)	.094 (2.4)	.114 (2.9)	.051 (1.3)
H	.287 (7.3)	.169 (4.3)	.094 (2.4)	.162 (4.1)	.051 (1.3)



50V CERAMIC DISC

89000 SERIES

The 89000 series is a range of insulated disc, monolythic fixed ceramic capacitors. They are most commonly used in consumer electronics and telecommunication equipment.

RATINGS

Capacitance Range: 1.0pf to 0.10µf (100,000pf)

Voltage: 50 Volts DC

Withstand Voltage: 150 Volts DC

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–25°C to +85°C (–13°F to +185°F)

Tolerance Range:

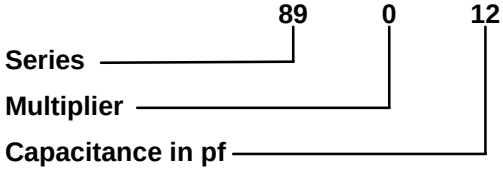
8901D0–89010	±0.5pf
89012–89312	±10%
89315	±20%
89322–89410	+80%, –20%

Temperature Coefficient:

8901D0–89110	–	NPO (Stable)
89112–89310	–	YSP (±10%)
89312–89315	–	Y5R (±15%)
89322–89410	–	Y5V (+30% – 80%)

Insulation Resistance: 10,000MΩ Min, but, 5,000MΩ Min for capacitance over 0.020µf

ORDERING INFORMATION

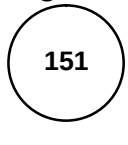


Example: 8901D5 = 1.5pf
89012 = 12pf
89112 = 120pf

MARKING EXAMPLE

Example: 150pf = 151
1500pf = 152
0.015µf = 153

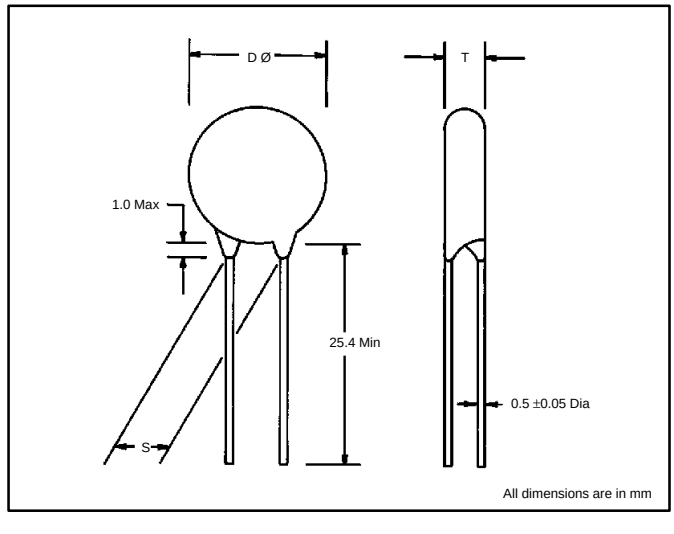
Figure 1



89000 Series Dimensions (Figure 2)

Cap pf	DØ mm	T mm	S mm	Cap pf	DØ mm	T mm	S mm
1.0pf	4	4	2.5	220pf	4	4	2.5
1.5pf	4	4	2.5	330pf	4	4	2.5
2.0pf	4	4	2.5	470pf	4	4	2.5
3.0pf	4	4	2.5	680pf	4	4	2.5
5.0pf	4	4	2.5	820pf	5	4	2.5
6.0pf	4	4	2.5	1000pf	5	4	2.5
7.0pf	4	4	2.5	1200pf	5	4	2.5
8.0pf	4	4	2.5	1500pf	5	4	2.5
10pf	4	4	2.5	2200pf	5	4	2.5
12pf	4	4	2.5	3300pf	8	4	5.1
15pf	4	4	2.5	4700pf	8	4	5.1
18pf	5	4	2.5	5600pf	9.5	4	5.1
22pf	5	4	2.5	6800pf	9.5	4	5.1
33pf	5	4	2.5	8200pf	10.5	3	5.1
39pf	6.3	4	5.1	0.01µf	12.5	3	5.1
47pf	6.3	4	5.1	0.012µf	6.3	4	5.1
56pf	6.3	4	5.1	0.015µf	6.3	4	5.1
68pf	8	4	5.1	0.022µf	8	4	5.1
82pf	8	4	5.1	0.047µf	12.5	4	5.1
100pf	8	4	5.1	0.068µf	12.25	3.25	7.5
120pf	4	4	2.5	0.10µf	7.3	3.25	4.5

Figure 2



1000V CERAMIC DISC

90000 SERIES

The 90000 series is a range of insulated disc, monolythic fixed ceramic capacitors. They are most commonly used in consumer electronics and telecommunication equipment.

RATINGS

Capacitance Range: 1.0pf to 0.10µf (100,000pf)

Voltage: 1000 Volts DC

Withstand Voltage: 2500 Volts DC

PERFORMANCE SPECIFICATIONS

Operating Temperature Range:

–25°C to +85°C (–13°F to +185°F)

Tolerance Range:

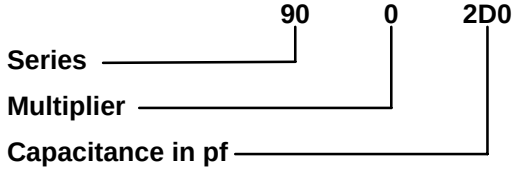
9001D0–9009D0	±0.5pf
90010–90210	±10%
90212–90220	+80%, –20%
90222	±20%
90227–90410	+80%, –20%

Temperature Coefficient:

9001D0–90091	–	SL
90110–90118	–	Y5F
90122–90210	–	Y5P
90212–90220	–	Z5V
90222	–	Z5U
90227–90410	–	Z5V

Insulation Resistance: 7500MΩ Min
measured after 1 Minute at rated voltage

ORDERING INFORMATION

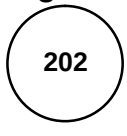


Example: 9002D0 = 2.0pf
90220 = 2000pf
90347 = 0.047µf

MARKING EXAMPLE

Figure 1

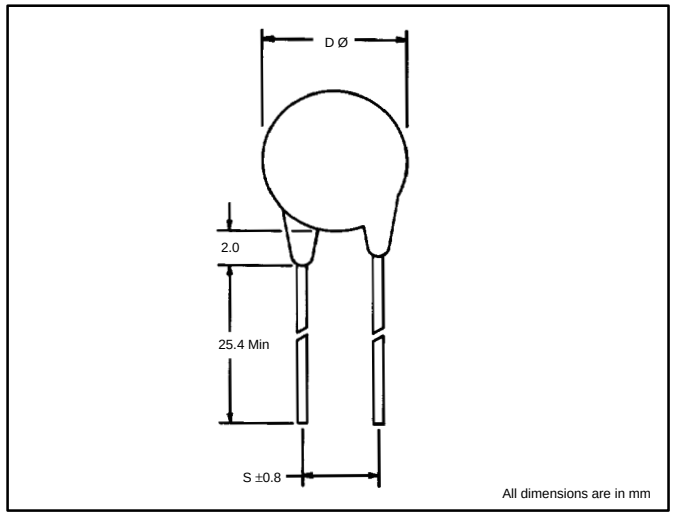
Example: 2pf = 2
2000pf = 202
0.047µf = 473



90000 Series Dimensions (Figure 2)

Cap pf	D Ø mm	S mm	Cap pf	D Ø mm	S mm	Cap pf	D Ø mm	S mm
1.0pf	5	7.5	39pf	5	7.5	1500pf	5	7.5
2.0pf	6	7.5	47pf	5	7.5	1800pf	6	7.5
2.2pf	5	7.5	56pf	5	7.5	2000pf	6	7.5
2.7pf	5	7.5	62pf	5	7.5	2200pf	6	7.5
3.0pf	5	7.5	68pf	6	7.5	2700pf	7	7.5
3.3pf	6	7.5	75pf	6	7.5	3000pf	7	7.5
4.0pf	5	7.5	82pf	6	7.5	3300pf	7	7.5
4.7pf	5	7.5	91pf	6	7.5	3900pf	7	7.5
5.0pf	5	7.5	100pf	5	7.5	4300pf	7	7.5
5.6pf	5	7.5	120pf	5	7.5	4700pf	8	7.5
6.2pf	5	7.5	150pf	5	7.5	5000pf	8	7.5
6.8pf	5	7.5	180pf	5	7.5	5600pf	8.5	7.5
7.5pf	5	7.5	220pf	5	7.5	6800pf	10.5	7.5
8.0pf	6	7.5	270pf	6	7.5	7500pf	10.5	7.5
9.0pf	5	7.5	330pf	6	7.5	8200pf	10.5	7.5
10pf	5	7.5	390pf	6	7.5	0.01µf	10.5	7.5
12pf	5	7.5	430pf	6	7.5	0.015µf	10.5	7.5
13pf	5	7.5	470pf	5	7.5	0.020µf	11.0	7.5
15pf	5	7.5	500pf	6	7.5	0.022µf	13.5	8.5
18pf	5	7.5	560pf	6	7.5	0.030µf	13.5	8.5
20pf	5	7.5	680pf	6	7.5	0.033µf	13.5	8.5
22pf	5	7.5	750pf	6	7.5	0.036µf	13.5	8.5
24pf	6	7.5	820pf	6	7.5	0.047µf	16.5	10.5
27pf	5	7.5	910pf	6	7.5	0.050µf	16.5	10.5
30pf	5	7.5	1000pf	5	7.5	0.10µf	20.0	10.5
33pf	5	7.5	1200pf	5	7.5			

Figure 2



CEILING FAN SINGLE & DUAL VERSIONS

CFC SERIES

The CFC series is a range of metallized polyester film capacitors designed expressly for ceiling fan use. They are a self–healing flat capacitor winding with polyester film dielectric. They are mounted in a flame retardent plastic case with an epoxy resin end–seal. The CFC series are also used in other electric fans and in fluorescent lamps.

The NTE CFC series is available in 2 wire (single) and 3 wire (dual) capacitor versions.

FEATURES:

- Small size/light weight
- High Insulation resistance
- Small dissipation factor

RATINGS

Capacitance Range:

2 wire 125/250VAC – 1µfd to 6µfd

3 wire 125/250VAC – 2/4µfd to 6/14µfd

PERFORMANCE SPECIFICATIONS

Operating Temperature Range: –25°C to +70°C

Insulation Resistance (at 20°C)**:**

Between Terminals: ≥ 1000MΩ

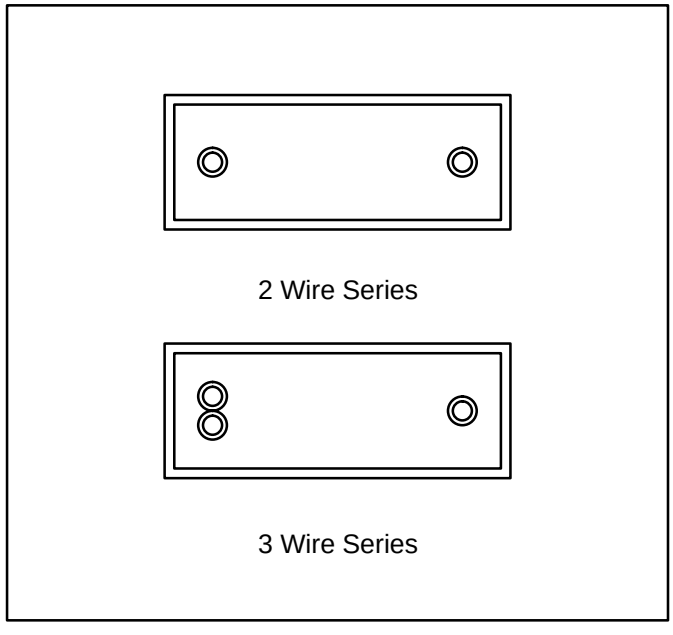
Between Terminals and Case: ≥ 2000MΩ

2 WIRE SERIES

NTE Type No.	Cap µf	Case Dimensions – inch (mm)		
		W	H	T
CFC–1	1.0	1.260 (32)	.826 (21)	.413 (10.5)
CFC–2	2.0	1.260 (32)	.826 (21)	.413 (10.5)
CFC–3	3.0	1.260 (32)	.905 (23)	.512 (13)
CFC–4	4.0	1.535 (39)	.905 (23)	.512 (13)
CFC–5	5.0	1.535 (39)	.945 (24)	.590 (15)
CFC–6	6.0	1.535 (39)	1.020 (26)	.669 (17)

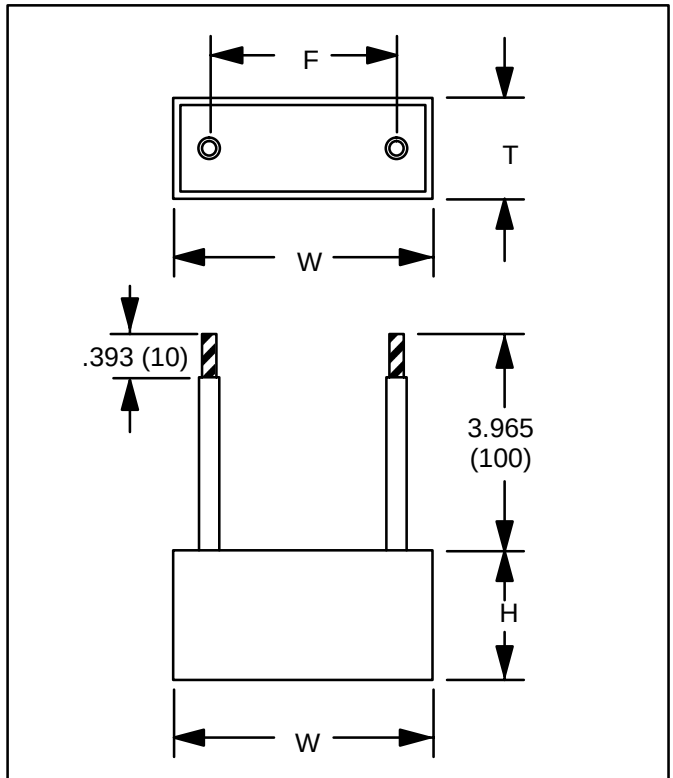
3 WIRE SERIES

NTE Type No.	Cap µf	Case Dimensions – inch (mm)		
		W	H	T
CFC–2/4	2.0/4.0	1.535 (39)	1.141 (29)	.748 (19)
CFC–2/5.5	2.0/5.5	1.978 (50)	1.180 (30)	.787 (20)
CFC–3/6.5	3.0/6.5	2.017 (51)	1.258 (32)	.866 (22)
CFC–3.5/1.5	3.5/1.5	1.535 (39)	1.141 (29)	.748 (19)
CFC–5/8.2	5.0/8.2	2.017 (51)	1.574 (40)	1.180 (30)
CFC–6/14	6.0/14	2.017 (51)	1.574 (40)	1.180 (30)



2 Wire Series

3 Wire Series



NOTE: F (lead space) = W – .196 (5.0) ±.039 (1.0)

PRE–PACKAGED CAPACITOR KITS

CAPACITOR KITS

CK–01 –Aluminum Electrolytic
CK–02 –High Voltage Aluminum Electrolytic
CK–03 –Non–Polarized Aluminum Electrolytic
CK–04 –Tantalum
CK–05 – 50V Ceramic Disc
CK–06 – 1000V Ceramic Disc
CK–07 – Mylar/Film

Features:

- **Each Kit Contains the Top 30 most popular resistors or capacitors for group specified**
- **Cabinets stack together to build a component storage center**
- **One piece frame is lightweight and virtually unbreakable**
- **Keyhole slots for wall mounting**
- **Frame measures 9 1/8”W x 7 1/2”H x 6 1/2”D**
- **Contains 15 drawers, each divided in half**

The following pages list the values contained in each kit:

PRE–PACKAGED CAPACITOR KITS

CK–01 Aluminum Electrolytic Capacitors (Contains 2 of each)
(All values are Radial Lead except where noted)

µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts
100/10*	47/25*	1000/25*	100/35*	0.33/50	2.2/50*	10/50*	100/50*	1000/50*	100/63*
220/16*	100/25*	10/35*	0.1/50	0.47/50	3.3/50*	22/50*	220/50*	22/63*	1000/63*
22/25*	220/25*	47/35*	0.22/50	1.0/50*	4.7/50*	47/50*	470/50*	47/63*	10/100*

* Denotes Axial Leads

CK–02 High Voltage Aluminum Electrolytic Capacitors (Contains 1 of each)
(All values are Radial Lead except where noted)

µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts
1.0/160	4.7/160	33/160	100/160*	3.3/250	22/250	1.0/350	4.7/350*	47/350	4.7/450
2.2/160	10/160	47/160	1.0/250	4.7/250	33/250	2.2/350	10/350	100/350	10/450
3.3/160	22/160	100/160	2.2/250	10/250	47/250	3.3/350	33/350	1.0/450	10/450*

* Denotes Axial Leads

CK–03 Non–Polarized Aluminum Electrolytic Capacitors (Contains 2 of each)
(All values are Radial Lead except where noted)

µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts
4.7/25	1.0/50*	3.3/50	4.7/50*	22/50	47/50*	2.2/100*	4.7/100	10/100*	33/100*
10/25	2.2/50	3.3/50*	10/50	22/50*	1.0/100*	3.3/100	4.7/100*	22/100*	47/100*
1.0/50	2.2/50*	4.7/50	10/50*	47/50	2.2/100	3.3/100*	10/100	33/100	100/100*

* Denotes Axial Leads

CK–04 Tantalum Capacitors (Contains 2 of each)
(All values are Radial Lead)

µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts
10/10	10/16	1.0/25	10/25	0.22/35	1.0/35	4.7/35	22/35	0.33/50	2.2/50
2.2/16	22/16	2.2/25	22/25	0.47/35	2.2/35	6.8/35	0.1/50	0.47/50	4.7/50
4.7/16	10/20	4.7/25	0.1/35	0.68/35	3.3/35	10/35	0.22/50	1.0/50	10/50

CK–05 50V Ceramic Disc Capacitors (Contains 4 of each)
(All values are Radial Lead)

pf	pf	pf	pf	pf	pf	pf	pf	pf	pf
1.0	6.0	15	33	56	100	470	1200	3300	22,000
2.0	10	18	39	68	120	680	1500	4700	47,000
5.0	12	22	47	82	330	1000	2200	10,000	100,000

CK–06 1000V Ceramic Disc Capacitors (Contains 4 of each)
(All values are Radial Lead)

pf	pf	pf	pf	pf	pf	pf	pf	pf	pf
3.3	10	20	47	100	220	500	1000	4700	47,000
5.0	15	22	56	150	330	560	1500	5000	50,000
6.8	18	39	68	180	470	680	2200	10,000	100,000

CK–07 Mylar/Film Capacitors (Contains 1 of each)
(All values are Radial Lead)

µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts	µf/Volts
.01/50	.01/100	.047/100	.47/100	.33/250	.01/400	.0033/630	.015/630	.05/630	.15/630
.1/50	.022/100	.1/100	.047/250	1.0/250	.1/400	.0047/630	.022/630	.068/630	.22/630
.001/100	.033/100	.22/100	.1/250	1.5/250	.001/630	.01/630	.047/630	.1/630	.47/630