

Short Form Catalog



EV Series - Metal Oxide Varistors

VZ Series - Metal Oxide Varistors

TVZ Series - Thermally Protected Varistors

EVTD Series - Thermally Protected Varistors

WPGT Series - Gas Discharge Tubes

WPSPG Series - Spark Gap Protectors

Thyristors

TVS Diodes

Our Mission

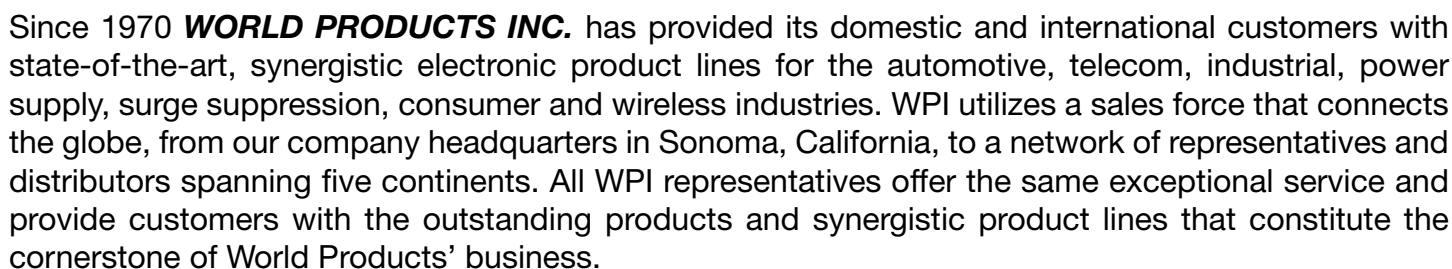
World Products Inc. is customer focused, progressive and capable of adapting to ever-changing market conditions.

We are an environmentally and socially responsible company providing high quality products to meet our customer's needs.

We endeavor to make it easy for our customers to do business with us.

World Products Inc. is an employee owned company.





EV Series Metal Oxide Varistors



Disk Diameter	Peak Current, 8/20μs Amps	AC RMS Voltages
5mm	125-800	11, 14, 17, 20, 25, 30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360
7mm	250-1750	11, 14, 17, 20, 25, 30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360, 420, 460, 485, 510
10mm	500-3500	11, 14, 17, 20, 25, 30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360, 390, 420, 460, 485, 510, 550, 625, 680
14mm	1000-7500	11, 14, 17, 20, 25, 30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360, 390, 420, 460, 485, 510, 550, 625, 680, 750, 1100
20mm	2000-13000	11, 14, 17, 20, 25, 30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360, 390, 420, 460, 485, 510, 550, 625, 680, 750, 1100
22mm	6000-25000	14, 17, 20, 25, 30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360, 390, 420, 460, 485, 510, 550, 575, 625, 680, 750, 850, 1000
34mm (Square Disk)	20000-60000	30, 35, 40, 50, 60, 75, 95, 120, 130, 140, 150, 180, 195, 210, 230, 250, 275, 300, 320, 360, 390, 420, 460, 485, 510, 550, 625, 680, 750, 850, 1000

Max. Continuous Rated Voltage		Varistor Volts	
AC RMS	DC Volts	Min.	Max.
11	14	16	20
14	18	20	24
17	22	24	30
20	26	30	36
25	31	35	43
30	38	42	52
35	45	50	62
40	56	61	75
50	65	74	90
60	85	90	110
75	100	108	132
95	125	135	165
120	150	162	198
130	170	185	225
140	180	198	242
150	200	216	264
180	225	243	297
195	250	270	330

Max. Continuous Rated Voltage		Varistor Volts	
AC RMS	DC Volts	Min.	Max.
210	275	297	363
230	300	324	396
250	320	351	429
275	350	387	473
300	385	423	517
320	415	459	561
360	460	504	616
390	505	558	682
420	560	612	748
460	620	675	825
485	640	702	858
510	675	738	902
550	745	819	1001
625	825	900	1100
680	895	990	1210
750	990	1080	1320
1100	1465	1620	1980

Ordering Information (Example)

EV **20** **D** **130** **K** **-J**
(1) (2) (3) (4) (5) (6) (7)

- (1) EV = Environmental Varistor
(All parts are RoHS certified and Halogen free)
- (2) Disk Diameter: 20 = 20mm
- (3) D = Standard
- (4) AC RMS Voltage Rating: 130 = 130VAC
- (5) Tolerance: J=5%, K = 10%
- (6) Lead option: Nil = Standard Lead
- (7) Surge Type: Nil = Standard Series,
J = High Energy Series,
H = Ultra High Energy Series

- Flame Retardant Coating available.
- Bare (uncoated) Disk available.
- Multiple Leadforming and Lead Frames available.
- Pin Type available so that discrete thermal fuse can be implemented.
- For taped parts please reference catalog.

Note: Copper electrode option available for specific disk sizes. Please contact your WPI rep for more information.





VZ Series Metal Oxide Varistors

Disk Diameter	Peak Current, 8/20µs Amps	Nominal Varistor Voltages
5mm	100-800	18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680
7mm	250-1750	18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680
10mm	500-3500	18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 1000, 1100
14mm	1000-6500	18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 1000, 1100
18mm	8000-12000	82, 180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 820
20mm	2000-15000	18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 1000, 1100
25mm*	20000, 22000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 1000, 1100
32mm(KW) Wire Lead	25000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200, 1500
32mm	30000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200
34mm Single (Square Disk)	40000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200
34mm Dual (Square Disk)	40000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200
40mm	40000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200
53mm	70000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200
60mm	80000	200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200, 1400, 1600

*Available in both round and rectangular disk types.

Max. Continuous Rated Voltage		Nominal Varistor Voltage	P/N Code Varistor Voltage	Varistor Volts	
AC RMS	DC Volts			Min.	Max.
11	14	18	180	16.2	19.8
14	18	22	220	20	24
17	22	27	270	24	30
20	26	33	330	30	36
25	31	39	390	35	43
30	38	47	470	42	52
35	45	56	560	50	62
40	56	68	680	61.2	74.8
50	66	82	820	74	90
60	85	100	101	90	110
75	102	120	121	108	132
95	127	150	151	135	165
120	160	180	181	170	207
130	175	200	201	184	224
140	180	220	221	198	242
150	200	240	241	216	264
180	230	270	271	255	311
195	250	300	301	270	330
210	275	330	331	297	363
230	300	360	361	324	396
250	330	390	391	351	429
275	370	430	431	387	473
300	385	470	471	423	517
320	420	510	511	459	561
360	470	560	561	522	638
390	505	620	621	558	682
420	560	680	681	612	748
460	615	750	751	675	825
485	640	780	781	702	858
510	675	820	821	738	902
550	745	910	911	819	1001
575	765	950	951	855	1045
625	825	1000	102	900	1100
680	895	1100	112	957.6	1170.4
750	970	1200	122	1062	1300
880	1150	1500	152	1350	1650

Ordering Information (Example)

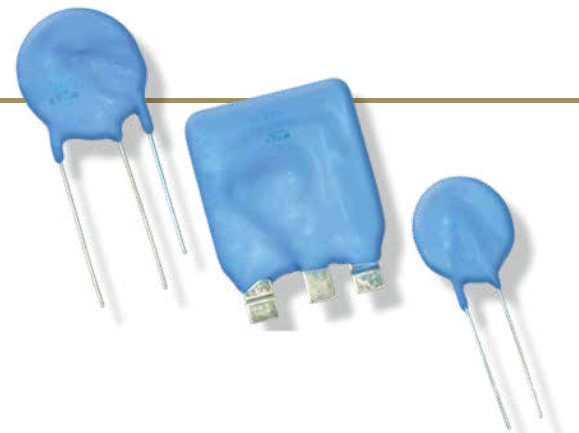
VZ **20** **E** **241** **K** **B** **S** **-** **N**
(1) (2) (3) (4) (5) (6) (7)

- (1) Disk Diameter: 20 = 20mm
- (2) Energy Types: D = Standard Energy, E = High Energy, R = 25mm (Rectangular) and 34mm Types only.
- (3) Varistor Voltage, Example: 241 = $24 \times 10^1 = 240(\text{DC V})$
- (4) Tolerance: J = 5%, K = 10%
- (5) Packaging: B = Bulk
For taped parts, please reference catalog.
- (6) Lead Configuration (For Bulk Parts): S = Straight, O = Outward Crimp, I = Inward Crimp, L = Inline Crimp, N = Bulk parts for 320V without standard inline crimp.
- (7) RoHS Compliance: Nil = Not compliant, -N = RoHS Compliant

Phenolic Coating available.
Bare uncoated disk available.



TVZ Series Thermally Protected Varistors



Disk Diameter	Peak Current, 8/20µs Amps	Nominal Varistor Voltages
14mm 2 & 3 leaded	6000	180, 200, 220, 240, 270, 310, 330, 360, 390, 430, 470, 510, 560, 620, 680
18mm 2 & 3 leaded	9000	180, 200, 220, 240, 270, 310, 360, 390, 430, 470, 510, 560, 620, 680, 750, 820, 910, 950, 1000, 1200
20mm 2 & 3 leaded	10000	180, 200, 220, 240, 270, 310, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200
25mm* 2 & 3 leaded	18000 and 22000	180, 200, 220, 240, 270, 300, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 1000, 1100, 1200
34mm (Square Disk) 2 & 3 leaded	40000	180, 200, 220, 240, 280, 320, 390, 430, 480, 510, 525, 560, 615, 670, 710, 745, 820, 850, 900, 970, 1050, 1080, 1200

*Available in both round and rectangular disk types.

Ordering Information (Example)

TVZ **14** **E** **B** **N** **241** **K** **B** **S**
(1) (2) (3) (4) (5) (6) (7) (8)

- (1) Disk Diameter: 14 = 14mm
- (2) Types: D = 25mm (Round), E = 14mm, 18mm and 20mm, R = 25mm (Rectangular) and 34mm
- (3) Fuse Location: Blank = 3-Leaded, Fuse Located on Third Lead (only available for 25mm disk size) B = 2-leaded, No Monitor Lead, C = 3-leaded, Fuse Located on Second Lead
- (4) "N" denotes RoHS Compliant series.
- (5) Varistor Voltage
Varistor Voltage for 14, 18, 20, & 25mm: 241 = $24 \times 10^1 = 240(\text{DC V})$
AC Voltage for 34mm: 151 = 150VAC
- (6) Tolerance: K = 10%
- (7) Packaging: B = Bulk
For taped parts, please reference catalog.
- (8) Lead Configuration (For Bulk Parts): S = Straight, L = Inline crimp, N = Bulk parts for 320V without standard inline crimp.

Max. Continuous Rated Voltage		Nominal Varistor Voltage	P/N Code Varistor Voltage (14, 18, 20, 25mm*)	Varistor Volts	
AC RMS	DC Volts			Min.	Max.
115	150	180	181	162	198
130	175	200	201	185	225
140	180	220	221	198	242
150	200	240	241	216	264
180	230	270	271	255	311
195	250	300	301	270	330
200	230	310	311	281	344
210	275	330	331	297	363
230	300	360	361	324	396
250	330	390	391	351	429
275	370	430	431	387	473
300	385	470	471	423	517
320	420	510	511	459	561
360	470	560	561	522	638
390	505	620	621	558	682
420	560	680	681	612	748
460	615	750	751	675	825
485	640	780	781	702	858
510	675	820	821	738	902
550	745	910	911	819	1001
575	785	950	951	856	1047
625	825	1000	102	900	1100
680	865	1100	112	962	1175
750	975	1200	122	1080	1320

*34mm: Please reference catalog.

Note: Above are typical ratings, please reference catalog.



EVTD Series Thermally Protected Varistors

- High energy handling capability
- Wide voltage range available: 50VAC – 550VAC
- Rated to 50 kA
- Multiple diagnostic options (micro-switch locations both on top & bottom, on top only or on bottom only)
- Industry standard footprint
- UL1449 and CUL 3rd Edition recognized. File #E321567*. All values presently recognized except EVTD34V300K and micro-switch location option “C” (in position (6) see below Ordering Information), which is pending.
- RoHS compliant
- Exceeds industry standard operating and storage temperatures for this type of device.
Rated at -40°C to +85°.
- U.S. Patent No.: US 9,165,702B2, except for option “C”. (See below in position (6) Ordering Information).



Ordering Information (Example)

EVTD **34** **V** **50** **K** **A** **S** **C**
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Series: **EVTD** = EV Series Varistor TD Thermal Disconnect

(2) Disk Size: **34** = 34mm

(3) Type: **V** = High Current EV Varistor Series

(4) AC RMS Voltage Rating

50 = 50VAC

(5) Tolerance: **K** = ±10%

(6) Micro-switch Location Option

Nil = Top and Bottom

A = Top only

B = Bottom only

C = Top center only

(7) Micro-switch Lead Length Option
(for “C” location only)

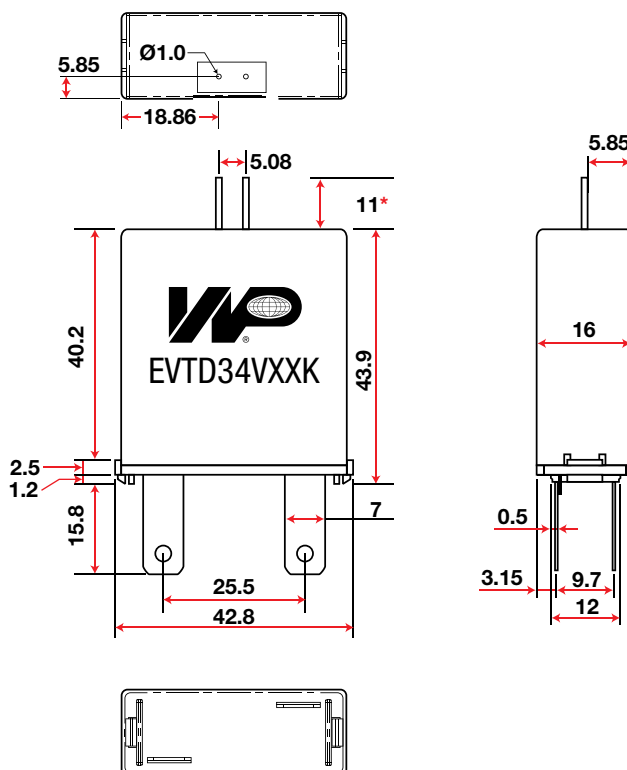
Nil = Standard Long Lead (11mm ± 1mm)

S = Short Lead (5mm ± 0.5mm)

(8) Micro-switch Function Option

Nil = Normally Open

C = Normally Closed

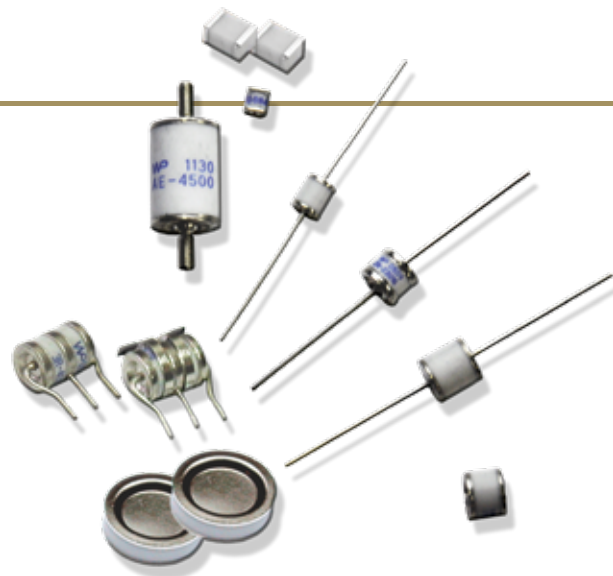


NOTE: Recognized and Approved to UL1449 as a type 4 surge protective device component assembly.

NOTE: Example drawing is for option “C” only. Various configurations available for micro-switch (see catalog).



WPGT Series Gas Discharge Tubes



2 Electrode (with or without leads)

Series	DC Voltage (V)	Max. Impulse (KA)	Max. Capacitance (pF)
Low Profile Mini (2RS)	75-600	8	0.5
Super Mini (2RN)	75-600	5	0.5
Ultra Super Mini (2RF)	90-400	3	0.5
Mini (2RM)	70-3600	3-10	1.0
Standard (2R)	70-900	10-15	1.5
High Voltage (2R)	600-6000	5-10	1.0-1.5
High Current (2N)	70-600	20	1.5
Switching (2T)	350-1000	N/A	1.0
Extremely High Current (16D5)	600-800	40	N/A
Extremely High Current (20B)	150-1000	30-60	5
Extremely High Current (12D8)	90-800	40	N/A
Extremely High Current (12D12)	90-800	40	N/A
Extremely High Current (12D17)	90-800	60	N/A
Extremely High Current (12D18)	90-800	80	N/A
Extremely High Current (18D7)	600-800	60	N/A
Extremely High Current (20D6)	150-1000	60	5
Extremely High Current (25D10W)	500-800	120	N/A
Extremely High Current (25D21)	500-800	160	4
Extremely High Current (30D12)	600	160	4
Standard/HighCurrent/Ultra High Current (AE)	230-4500	10-100	2-5

3 Electrode (with or without leads)

Series	DC Voltage (V)	Max. Impulse (KA)	Max. Capacitance (pF)
Ultra Mini (3RSM)	75-600	20	2.0
Symmetrical (3RSSM)	230-600	10	2.0
Mini (3RM)	90-600	10-15	1.5
Standard (3R)	75-600	40	1.5

2 Electrode (Surface Mount)

Series	DC Voltage (V)	Max. Impulse (KA)	Max. Capacitance (pF)
Ultra Super Mini (2SF)	90-400	3	0.5
Super Mini (2SN)	75-600	5	0.5
Mini (2SM)	75-600	5	0.5
Mini Square (2SS)	75-600	5	0.5
Standard Low Profile (2SR)	75-600	10	0.5
Standard (2S)	75-3000	5-8	0.8-1.0
Chip (3216)	120-600	0.5*	0.3
Chip (4532)	75-600	2*	0.5

3 Electrode (Surface Mount)

Series	DC Voltage (V)	Max. Impulse (KA)	Max. Capacitance (pF)
Mini (3SM)	75-1100	10-20	2.0
Symmetrical (3SSM)	230-1100	10	2.0

*10 times

Ordering Information (Example)

WPGT-2R 800 B 8 L C TA
(1) (2) (3) (4) (5) (6) (7)

- (1) Series Code
- (2) DC Breakdown Voltage
- (3) Diameter: B = 8mm
- (4) Length "T" Dimension: 8 = 8mm
- (5) Lead Type: L = Axial Lead 0.8mm lead diameter
- (6) Low Capacitance: C = Low Capacitance
- (7) Taping Specifications: TA = Ammo Box

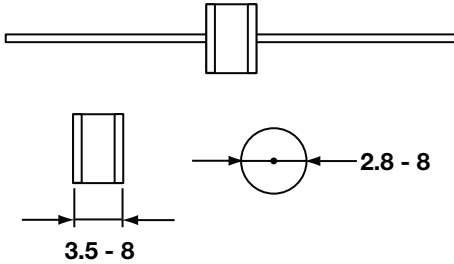
Multiple configurations available please reference catalog.



WPGT Series Gas Discharge Tubes

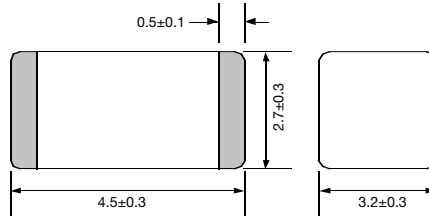
Dimensions (units: mm)

2RS, 2RN, 2RF, 2RM, 2R, 2N & 2T Series



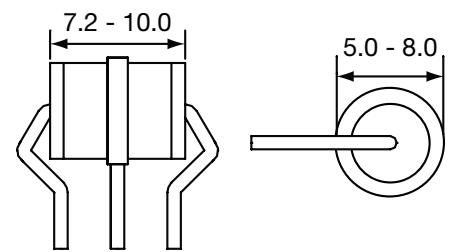
Note: Lead length, lead diameter and lead options, see catalog.

3216 & 4532 Series



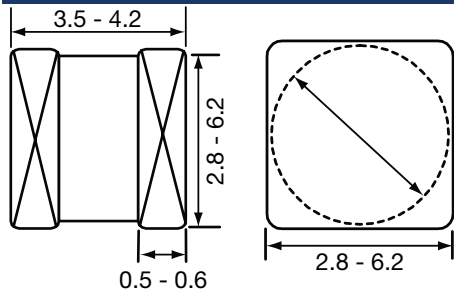
Note: Example of dimensions for 4532 Series.

3RSM, 3RSSM, 3RM & 3R Series

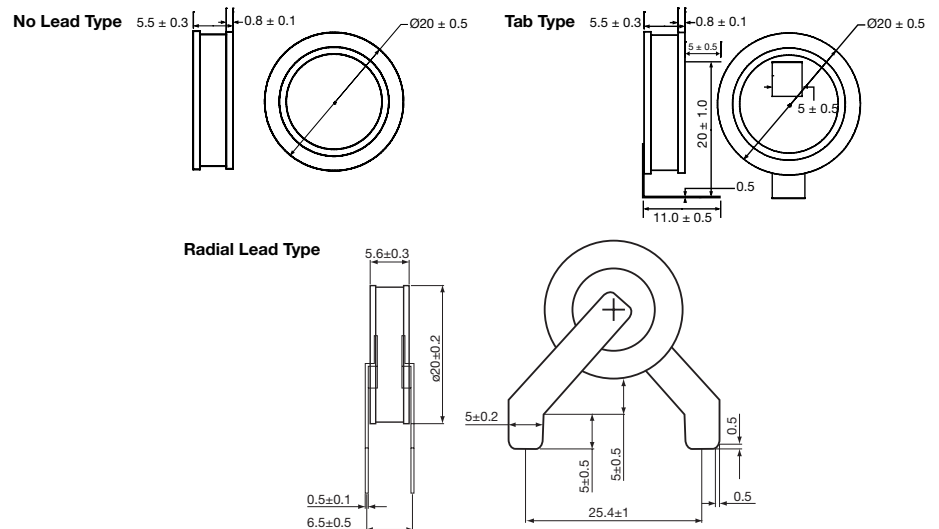


Note: 1) Lead length, lead diameter and lead options see catalog. 2) Failsafe types available.

2SF, 2SN, 2SR, 2SM, 2SS, & 2S Surface Mount Series

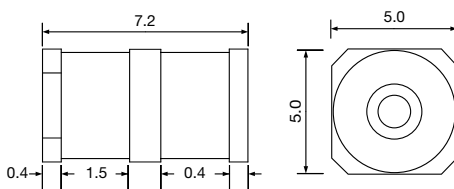


2B, 12D8, 12D12, 12D17, 12D18, 16D5, 18D7, 20D6, 25D10W, 25D21 and 30D12 Extremely High Current Series



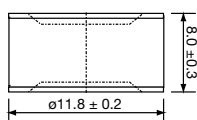
Note: Example of 20B shown here. Multiple lead frame, element sizes and configurations available, see catalog.

3SM & 3SSM Surface Mount Series

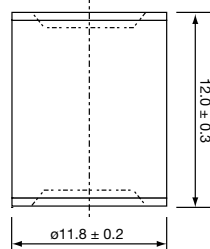


AE Series

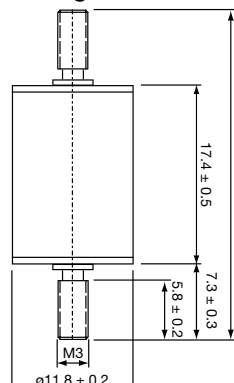
No Lead Standard Type AE Series



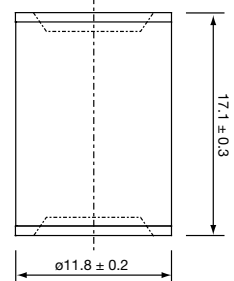
No Lead High Current Type AE Series



High Voltage Screw Lead Type AE Series



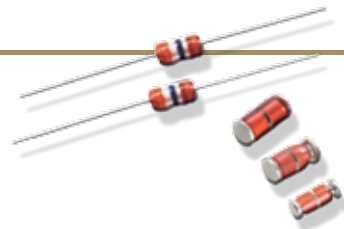
No Lead Ultra High Current Type AE Series



Note: Example of Standard AE shown here. Other options available, see catalog.



WPSPG Series Spark Gap Protectors



Series	Package	DC Spark-Over Voltage (V)	Surge Current (A)	Max. Capacitance (pF)
L	Axial	140-1500	>500	0.8
M	Axial	140-1500	>1000	0.8
H	Axial	140-700	>3000	0.8
HX	Axial	1000-5000	3000	1.0
LLS	Surface Mount	140-300	300	0.8
LS	Surface Mount	140-1000	500	0.8
MS	Surface Mount	140-1000	1000	0.8
HS	Surface Mount	140-1000	3000	0.8
HSS	Surface Mount	140-1000	3000	0.8
HG	Surface Mount	1000-5000	3000	1.0



Thyristors



Series	On-State Voltage Max.	Repetitive Peak Off-State Current Max.	Breakover Current Max.	Holding Current Min.
WPSCDS SMB SMA	3.5V	5mA	800mA	150mA

Ordering Information (Example)

WPSCDS **058** **C**
(1) (2) (3)

- (1) Thyristor series
(2) Rated Repetitive Peak Off-State Voltage: Example 058 = 58V
(3) Current Rating Code: C, D, E. Please see table for values.

P/N Code / Voltage		Breakover Voltage	Current Rating (2/10ms)		
			C	D	E
058	58V	77	200A	300A	500A
065	65V	88	200A	300A	500A
075	75V	98	200A	300A	500A
090	90V	130	200A	300A	500A
120	120V	160	200A	300A	500A
140	140V	180	200A	300A	500A
160	160V	220	200A	300A	500A
190	190V	265	200A	300A	500A
220	220V	300	200A	300A	500A
275	275V	350	200A	300A	500A
320	320V	400	200A	300A	500A
360	360V	450	200A	300A	500A



TVS Diodes

Series	Rating (watts)	Package	Rated Stand Off Volts (V)
P4KE	400	Axial (DO-41)	5.5-495
SA	500	Axial (DO-15)	5-170
P6KE	600	Axial (DO-15)	5.5-512
1.5KE	1500	Axial (DO-201)	5.5-467
3KP	3000	Axial (P600/R6)	5-220
5KP	5000	Axial (P600/R6)	5-250
15KP	15000	Axial (P600/R6)	17-280
20KP	20000	Axial (P600/R6)	20-300
30KP	30000	Axial (P600/R6)	28-288
WLCE (Low Capacitance Series)	1500	Axial (DO-201)	6.5-28
WFC	500-20000 (amps)	with & without leads	12-1200
P4SMAJ	400	Surface Mount	5-440
P6SMBJ	600	Surface Mount	5-440
1.5SMCJ	1500	Surface Mount	5-440
3.0SMCJ	3000	Surface Mount	5-220
5.0SMCJ	5000	Surface Mount	11-170
8SMEJ	8000	Surface Mount	10-48
PA4SMAJ	400	Surface Mount	5.8-495
PA6SMBJ	600	Surface Mount	5.8-495
1.5ASMCJ	1500	Surface Mount	5.8-495

AEC-Q101 qualified for specific types. Contact WPI sales for more information: sales@worldproducts.com.



Ordering Information (Example)

P4KE **20** **C** **A** **TR**
 (1) (2) (3) (4) (5)

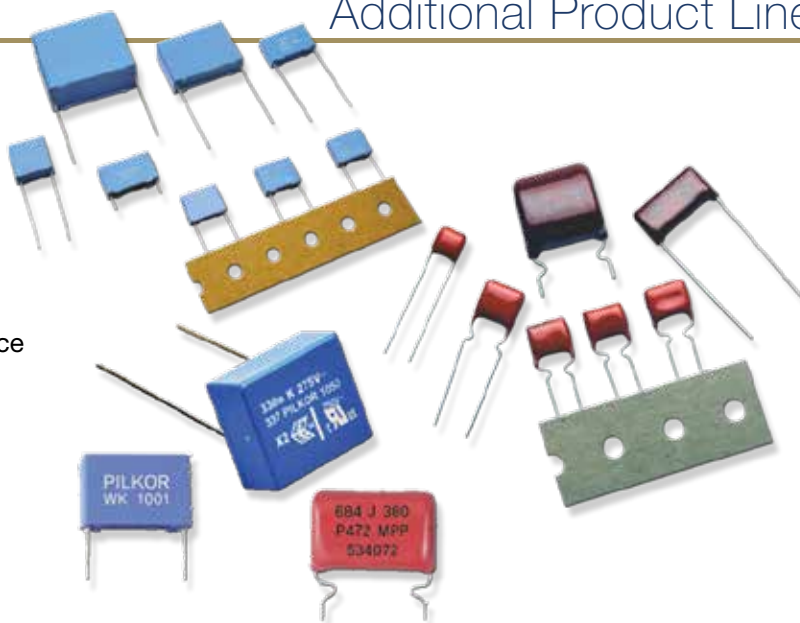
- (1) Series: P4KE = P4KE
- (2) Voltage, Example 20 = 20V
Nominal Breakdown Voltage
For P4KE, P6KE, 1.5KE
Rated Standoff Voltage
For SA, 3KP, 5KP, 15KP
- (3) Polarity: Blank = Unidirectional,
C = Bidirectional
- (4) Tolerance: Blank = 10%, A = 5%
- (5) Packaging: Blank = Bulk,
TR = Tape and Reel





Metalized Film Capacitors

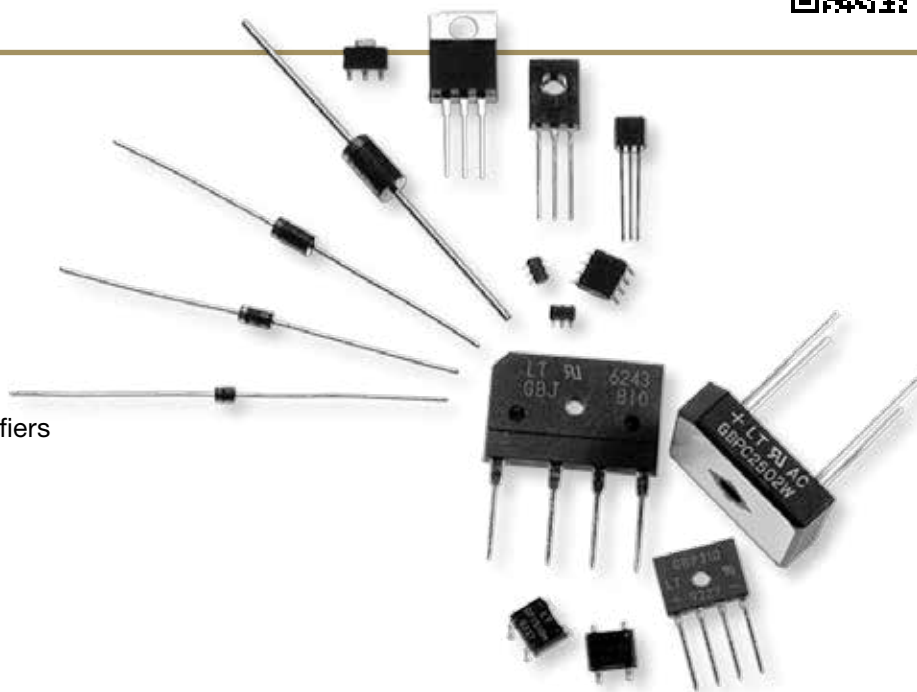
- EMI Suppression Capacitors
- EMI Suppression Capacitors with Series Impedance
- PCX2347 series (with series impedance) to meet 85°C, 85% RH requirements
- Noise Suppression & Spark Quenching
- PFC Input Capacitors
- AC Motor Running Capacitors
- Power Electric Capacitors
- Low DC Film Capacitors
- General Purpose Capacitors
- High Temperature Capacitors
- DC-Link Capacitors (Customized Designs)
- Power Electronic Capacitors (DC-Link Aluminum Case)
- IGBT Snubber Capacitors



Pilkor capacitors have applicable world-wide safety approval certifications.



- Bridge Rectifiers
- ESD Diodes & Diode Arrays
- Schottky Rectifiers
- Super-Fast & Ultra-Fast Recovery Rectifiers
- Small Signal Switching Diodes
- Zener Diodes
- TRIAC
- SCR
- MOSFET



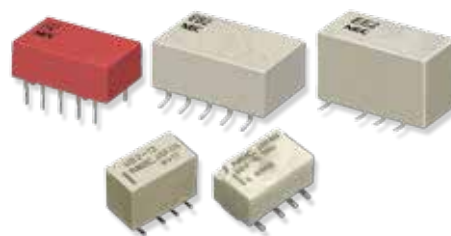
LiteOn is a certified SONY Green Partner.



NEC/TOKIN

Miniature Signal Relays

- Compact & Lightweight for dense mounting
- Low Power Consumption
- Plastic-Sealed Package
- High Withstand Voltage
- Surface Mount Product Line-up



Miniature Power Relays (Automotive Grade)

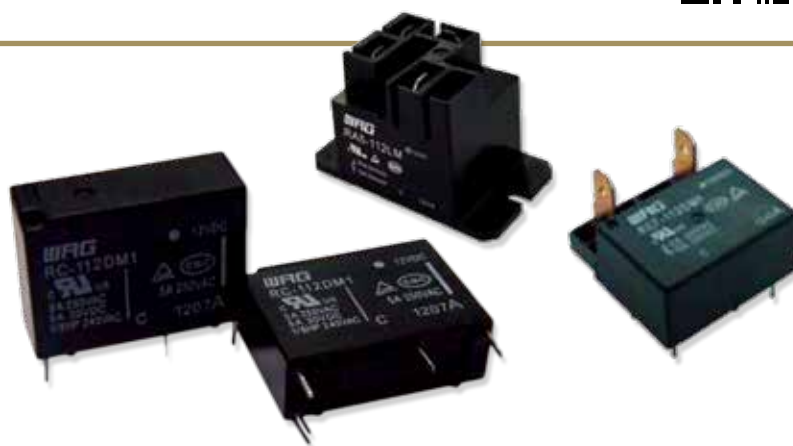
- High Power Switching Capability
- Compact & Lightweight with Twin Relay Structure
- Flux Tight Housing
- Washable with Plastic-Sealed Package
- Semi-Custom Made Product Available
- Reflow Soldering Type Available



WRG

Industrial Relays

- Current Ratings 0.5A - 400A
- Contact Forms: 1A, 1B, 1C, 2C, 3C & 4C
- Industry Standard Footprints



Laboratory

World Products Inc. has a complete applications and component testing laboratory in Sonoma, CA for use by our customers. At our facility we can offer you technical assistance with circuit protection, international testing specifications and electromagnetic compatibility. Our expertise and equipment are available for customer projects and to find answers to your critical design considerations. World Products is an active IEEE contributing member, USA Delegate (IEEE Liasion) to IEC and UL Standard Technical Panel member.

We are also able to characterize the performance of components under both normal operational and harsh environmental conditions. Surge testing waveforms can be saved with our TDS 3012B Digital Storage Oscilloscope and reports can be sent to customers via email.

Test Capabilities:

- DC Breakdown Voltage
- Leakage Current
- Clamping Voltage and Surge Current
- UL Testing
 - (UL1449 4th Edition) Surge Test to 40kA
 - VPR Testing at 6kV/3kA with up to 600VAC applied
 - I(n) Nominal Discharge Current testing up to 40kA at 600VAC
 - (UL 60691) thermal ageing, dielectric and Insulation Resistance testing and functional temperature T(f)
- Dielectric and Insulation Resistance testing to 5kV
- Impedance Measurement
- Capacitance up to 1MHz
- Insulation Resistance up to 2000 Gohms
- Surge Combination C62.41 up to 20kV/10kA waveform
- IEC 61643-11
- HP Infinium 54825A DSO
- TDS 3012B



Surge Generator

Our Surge Generator, located in Sonoma, CA, meets the levels and requirements in accordance with the following national and international standards:

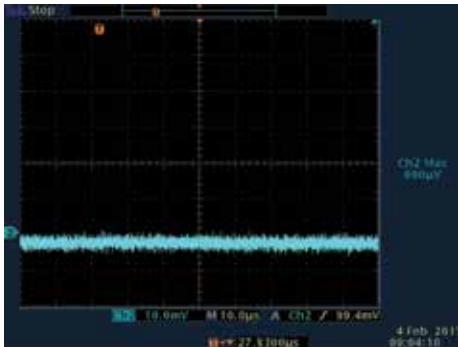
- IEC 61000 4-5 – Combination Waveform
- UL 1449 4th Edition
- IEEE/ANSI 62.41 Categories B and C
- IEC 61643-11

FEATURES:

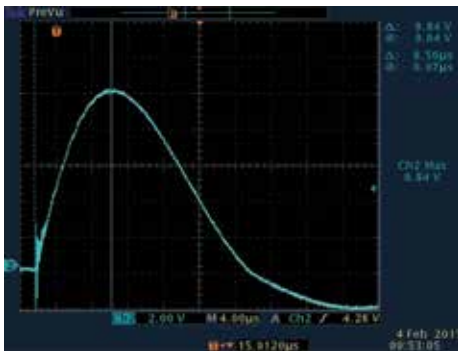
- I(n) sequence up to 40,000 amps 8/20 μ s at 600VAC and VPR at 6kV/3kA- 600VAC in accordance with UL 1449 4th Edition.
- Applies the surge with respect to the AC sinewave from 0 to 360 degrees.
- Includes a back filter that protects the input 220VAC from surges going upstream and damaging other equipment.
- Programmable to surge as many times as needed with selectable time duration between surges.
- Test data can be measured, stored and queried at any time. Test reports can also be provided.



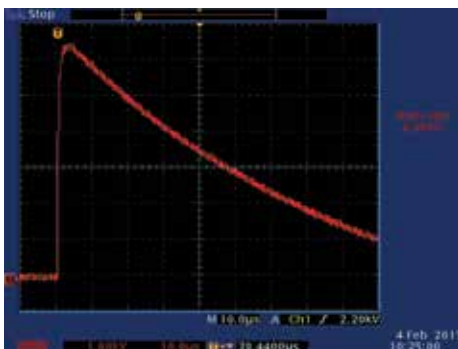
Test Reports



Short Circuit Current Noise



Short Circuit Current Peak



Open Circuit Peak



WPI Surge Generator – Screen Capture

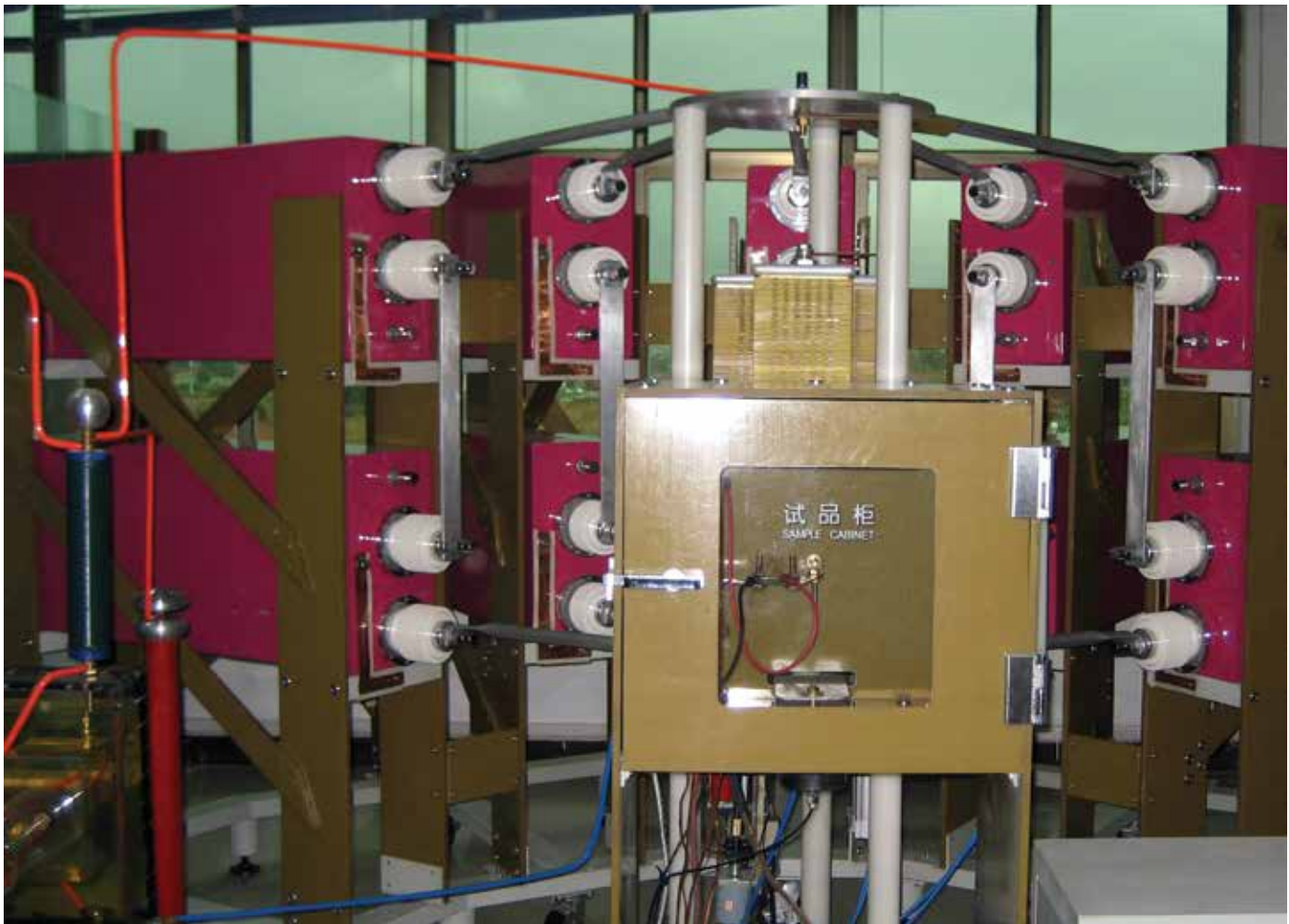


Leonard Drewes, WPI Engineering Manager, industry titles:

- IEEE Liaison to IEC
- Convener of IEC 37B MT2
- Member of IEC 37B MT1
- Member IEC 37A/37B TAG Committee
- UL 1449 Standards Technical Panel Member
- Member IEEE Power and Energy Society

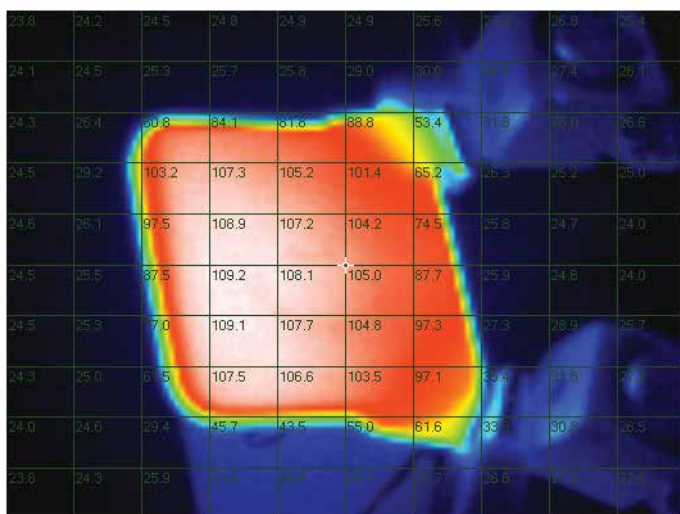


Surge Generator - Located in our factory.

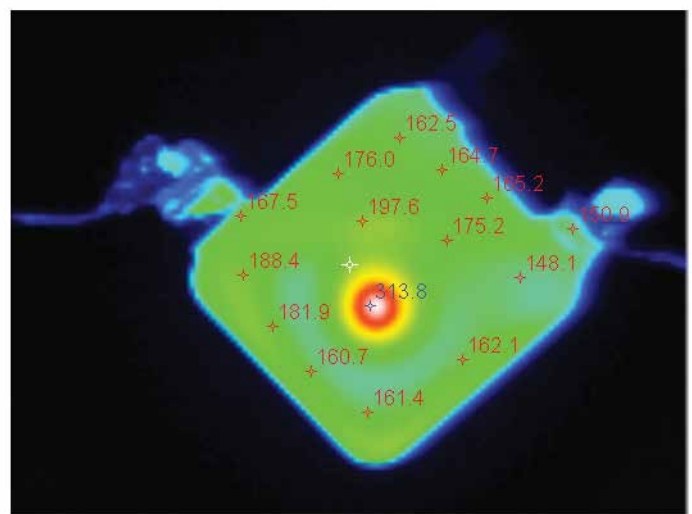


8/20 μ s : 200,000 Amps, 10/350 μ s : 30,000 Amps

Heat Transfer Characteristics



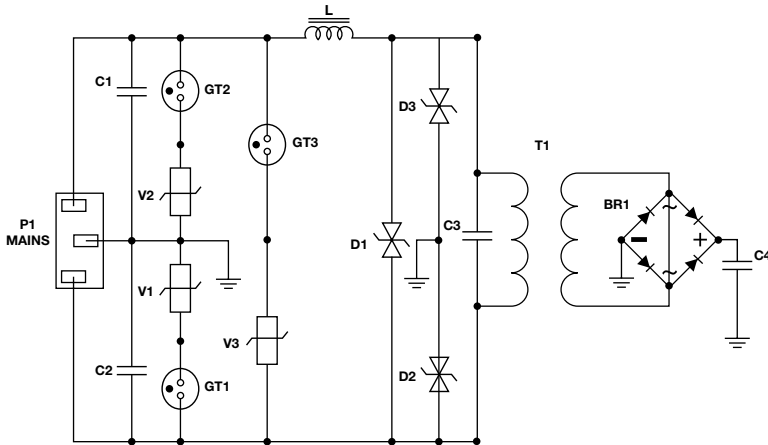
(EV Series 34mm)



(EV Series 34mm)

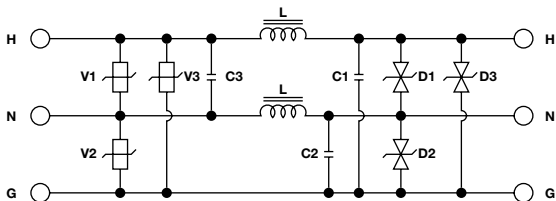
Circuit Samples

AC Mains Protection with potentially large follow current.

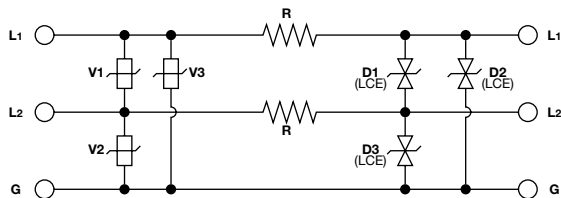


When a Surge is introduced at the A-C input, Gas Tubes turn on slowly (1µsec) which can produce a large "leading edge" remnant downstream. TVS Diodes D1, D2, and D3 will suppress the remnant. Varistors V1, V2 and V3 prevent follow current from Gas Tubes.

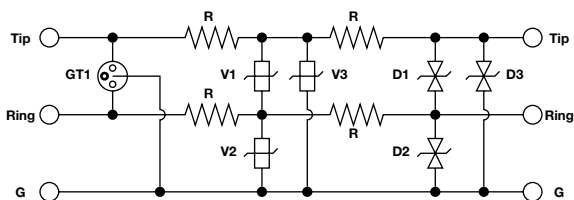
AC Line Protection



Data Line Protection



Telecom Circuit Protection



KEY TO ABBREVIATIONS

C1, C2 = Safety Caps

V1, V2, V3 = MOV

GT1, GT2, GT3 = Gas Tubes

D1, D2, D3 = TVS Diodes

C3 = X Safety Cap

BR1 = Bridge Rectifier

C4 = Filter Cap

T1 = Step Down Transformer

LCE = Low Capacitance Series TVS Diode

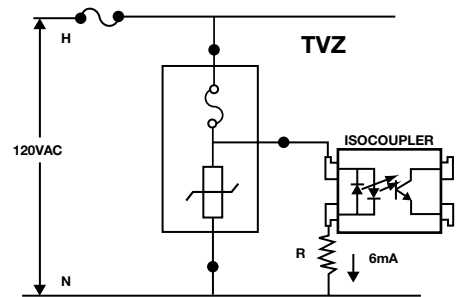
R = Resistor

L = Inductor

TVZ = Thermally Protected Varistor

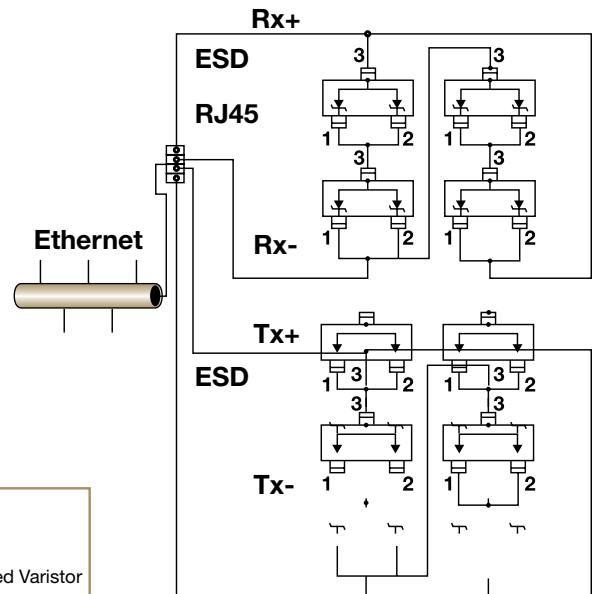
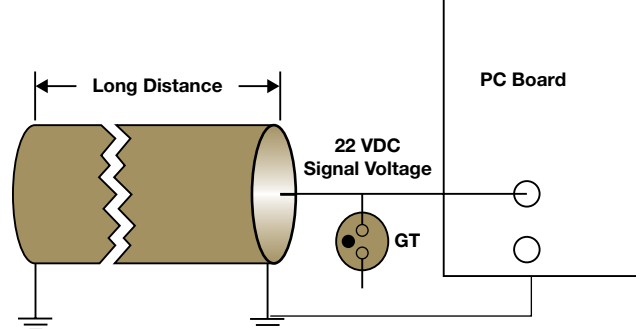
ESD = ESD Array

AC Line Protection with Thermally Protected MOV



Thermally protected varistors are surge protective component assemblies. The configuration can be either a two or three leaded component. One lead of this component is connected to a thermal link, which may open when the varistor is subjected to prolonged overvoltage conditions in both AC and DC applications, thereby preventing failure mode of the varistor. This component (in the three leaded configuration) further provides for diagnostic capabilities in the customers circuit.

Gas Tube in Cable Protection



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