



# Product Solutions Guide



# 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 needs.

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

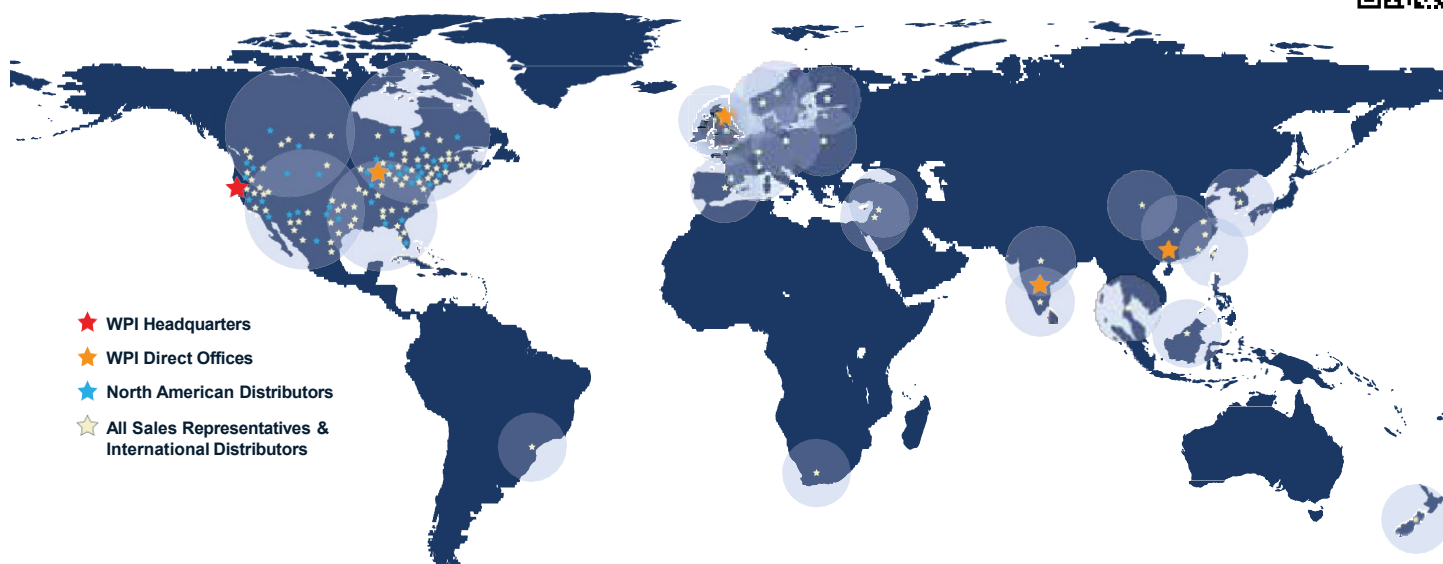
World Products Inc. is an employee owned company.



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# Global Electronic Component Solutions



**WORLD PRODUCTS INC.** (WPI) has provided its domestic and international customers with state-of-the-art synergistic electronic component solutions for 50 years. WPI utilizes a sales force that connects the globe, from our company headquarters in Sonoma, California, to a network of Direct Offices, representatives and distributors spanning five continents. All WPI representatives offer the same exceptional service and provide customers with the outstanding products and value added services that constitute the cornerstone of World Products' business.

## WPI Value

- We are a reliable supplier with 50 years serving the electronics marketplace.
- Synergistic state-of-the-art overvoltage protection components differentiating our products from the competition.
- Optimized antenna solutions using exclusive WPI intellectual property.
- Best in class components for the automotive market.
- Our products are fully supported by experienced WPI technical design and applications engineers.
- Complete test labs (located at our headquarters in Sonoma California) that are available to customers.
- Global supplier status to major CEM's.

## Core Competencies

- WPI Certified Quality of Products
- Synergistic Product Offering
- Commitment to Customer Service
- Worldwide Presence – Global Sales Representatives

## Focused Business Units

- OVS (Overvoltage & Switching Components) Business Unit
- Automotive Business Unit
- Wireless Business Unit

World Products Inc. is one of the first companies in the United States to receive full C-TPAT Certification.



# WPI Overvoltage Protection Components



Thermally  
Protected  
Varistors

## UL 1449/CUL 4th Edition Recognized and VDE Certified.

2 and 3 leaded configurations available in 14mm, 18mm, 20mm, 25mm (round and square types) and 34mm disk sizes and voltage values from 115 VAC - 750 VAC. Including diagnostic options. Industry standard footprint.



WPZ25S  
Thermally  
Protected  
Varistor

Alternative package option to meet limited competitor footprint.



EVTC  
Thermally  
Protected  
Varistor

**UL1449/CUL 4th Edition Type 1 Component Assemblies Recognized** (Meets SCCR 200KA rating). Values from 150VAC to 680VAC with multiple diagnostic options.



Metal Oxide  
Varistors  
EV Series

## UL1449/CUL 4th Edition Recognized, VDE Annex Q Certified.

Environmental Varistor Series - 5mm-34mm disk diameter types. 11 VAC - 1100 VAC values available. Halogen-free epoxy, fire-retardant coating option, High Energy series types, unique 22mm series (25kA) and 34mm series (60kA) ultra-high current type, unique "pin-type" for discrete thermal fusing.



Metal Oxide  
Varistors

## UL 1449/CUL 4th Edition Recognized and VDE Annex Q Certified.

5mm-60mm disk diameter types, 11VAC - 900 VAC values available.



WP Surface  
Mount  
Metal Oxide  
Varistor

## UL 1449/CUL 4th Edition Recognized.

Surface mount Metal Oxide Varistor Series, rated to 3500 amps.



Gas  
Discharge  
Tubes

## UL Recognized and VDE Certified.

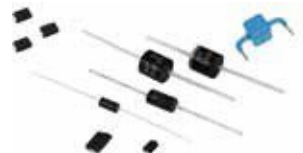
WPGT Series 2 and 3 element types (including SMD types) 70V-6000V (also fail safe types). 2 Electrode Extremely High Current Series (rated at up to 60kA). Symmetrical and Surface Mount Chip Series (4532 & 3216) sizes. AE Series: High Voltage/Extremely High Current (rated to 100kA) including screw types. Array and Follow Current types available.



Spark Gap  
Protectors

## UL Recognized.

Available in both through-hole and surface mount types. Fast responding, high current, low capacitance, zero leakage current, stable electrical characteristics, RoHS compliant and Halogen Free.



TVS  
Diodes

## UL Recognized.

400 WATT - 30K WATT (leaded and SMD types), WLCE "low capacitance" types, WFC stacked TVS Diodes rated to 20kA and WPA Automotive types.

# 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		Max. Continuous Rated Voltage		Varistor Volts	
AC RMS	DC Volts	Min.	Max.	AC RMS	DC Volts	Min.	Max.
11	14	16	20	210	275	297	363
14	18	20	24	230	300	324	396
17	22	24	30	250	320	351	429
20	26	30	36	275	350	387	473
25	31	35	43	300	385	423	517
30	38	42	52	320	415	459	561
35	45	50	62	360	460	504	616
40	56	61	75	390	505	558	682
50	65	74	90	420	560	612	748
60	85	90	110	460	620	675	825
75	100	108	132	485	640	702	858
95	125	135	165	510	675	738	902
120	150	162	198	550	745	819	1001
130	170	185	225	625	825	900	1100
140	180	198	242	680	895	990	1210
150	200	216	264	750	990	1080	1320
180	225	243	297	1000	1320	1550	1760
195	250	270	330	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, 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, 330, 360, 390, 430, 470, 510, 560, 620, 680, 750, 780, 820, 910, 950, 1000, 1100, 1200, 1500
32mm	30000	200, 220, 240, 270, 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

\*Available in both round and rectangular disk types.

### 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.

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



# TVZ Series

## Thermally Protected Varistors

Disk Diameter	Peak Current, 8/20µs Amps	Nominal Varistor Voltages
<b>14mm</b> 2 & 3 leaded	6000	180, 200, 220, 240, 270, 310, 330, 360, 390, 430, 470, 510, 560, 620, 680
<b>18mm</b> 2 & 3 leaded	9000	180, 200, 220, 240, 270, 310, 360, 390, 430, 470, 510, 560, 620, 680, 750, 820, 910, 950, 1000, 1200
<b>20mm</b> 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
<b>25mm*</b> 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
<b>34mm</b> (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: 14, 18, 20, & 25mm: 241 =  $24 \times 10^1 = 240$  (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

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.

**TVZ**  
THERMALLY PROTECTED VARISTORS  
SINCERA BRAND



# EVTC Series

## Thermally Protected Varistors

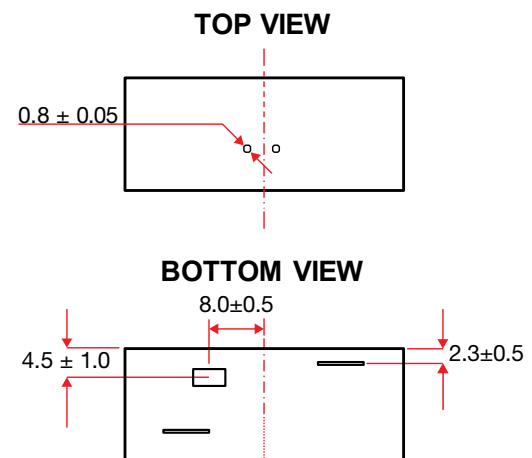
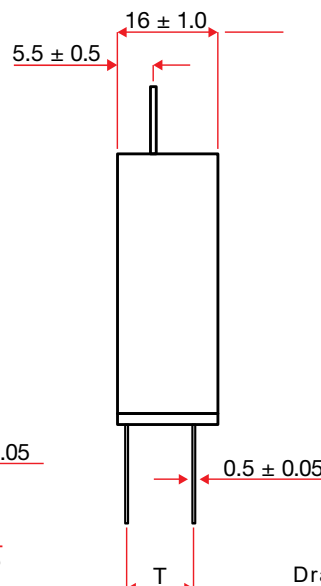
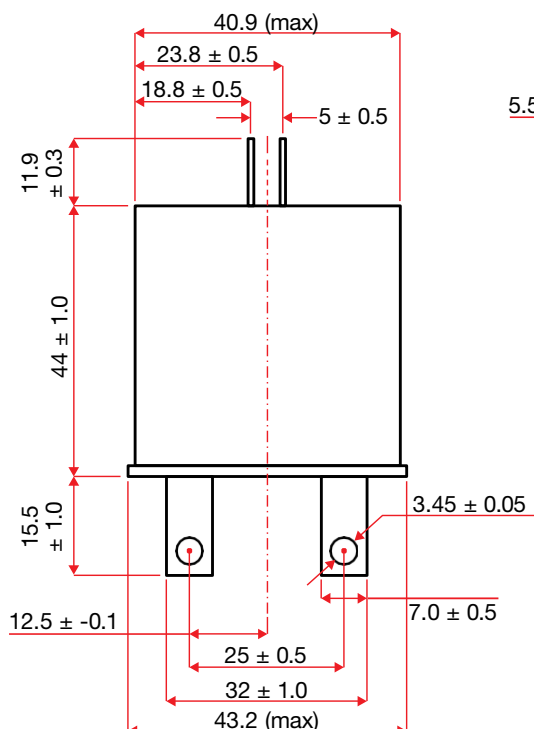
- High energy handling capability.
- Wide voltage range available: 150VAC – 680VAC.
- Industry standard footprint and wave solderable.
- UL1449 4th Edition and CUL Type 1 Component Assemblies recognized. File #E321567. (Meets SCCR 200KA rating).
- CE Certified.
- 75KA, 8/20 $\mu$ s peak surge current rating available
- RoHS compliant.
- Exceeds industry standard operating and storage temperatures for this type of device. Rated at -40°C to +85° (operating) and -40°C to +125°C (storage).
- Equipped with normally open or closed micro-switch providing diagnostics (if other micro-switch options are required, please contact WPI).
- Patents: USA, Germany, China and Taiwan.
- 94V-0 Enclosure Rating.



### Ordering Information (Example)

<b>EVTC</b>	<b>34</b>	<b>V</b>	<b>150</b>	<b>K</b>	<b>M</b>	<b>3.8</b>	<b>A</b>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

- (1) Series: EVTC = EV Series Varistor TC Thermal Disconnect
- (2) Disk Size: 34 = 34mm
- (3) Type: V = High Current EV Varistor Series
- (4) AC RMS Voltage Rating: 150 = 150VAC
- (5) Tolerance: K =  $\pm 10\%$
- (6) Micro Switch: 3 Lead Type (on top) = Nil, 2 Lead Type (on top) = M  
3 Lead Type (on bottom) = P
- (7) Micro Switch: (Special lead length  $\pm 1$ mm) 3.8 = 3.8mm
- (8) Tab Lead: (Special lead length  $\pm 1$ mm) A = 3.8 mm



Drawing for 2 lead with microswitch on top.



# WPGT Series

## Gas Discharge Tubes

2 Electrode (with or without leads)			
Series	DC Voltage (V)	Max. Impulse (KA)	Max. Capacitance (pF)
Thin Series (5D3)	75-600	5	1
Low Profile Mini (2RS)	75-600	8	0.5
Super Mini (2RN)	75-600	5	0.5
Ultra Super Mini (2RF)	90-470	2	0.5
Mini (2RM)	70-3600	3-10	1.0
High Current Mini (6D5)	75-600	12	1
Standard (2R)	70-900	15	1.5
High Voltage (2R)	600-7500	5-8	1.0-1.5
Follow Current (2R)	600-800	20	1.0
High Current (2N)	70-600	20	1.5
Ultra High Current (2R)	70-600	25	1.5
Switching (2T)	350-1000	N/A	1.0
AC Series (2RC)	280-7500	10	1.5
Extremely High Current (16D5)	150-800	40	N/A
Extremely High Current (20B)	150-1000	30-60	5.0
Extremely High Current (12D5)	90-600	40	4.0
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 - Thin Type (16D3)	75-600	20	1
Extremely High Current (16D5)	120-640	40	N/A
Extremely High Current (16D5-A)	400-960	40	N/A
Extremely High Current (18D7)	600-800	60	N/A
Extremely High Current (20D6)	150-1000	60	5.0
Extremely High Current (25D10W)	500-800	120	N/A
Extremely High Current (25D21)	500-800	160	4.0
Extremely High Current (30D12)	500-800	160	10.0
Standard/HighCurrent/ Ultra High Current (AE)	230-4500	10-100	2.0-5.0

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)	90-470	2	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

Array Series			
Series	DC Voltage (V)	Max. Impulse (KA)	Max. Capacitance (pF)
8D4	500-1400	20	1.0

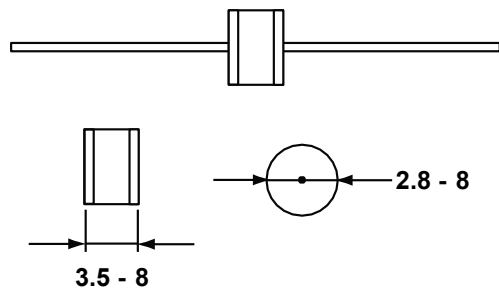
Ordering Information (Example)								
WPGDT	-	<u>2R</u>	<u>800</u>	<u>B</u>	<u>8</u>	<u>L</u>	<u>C</u>	<u>TA</u>
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Series Code								
(2) DC Breakdown Voltage								
(3) Diameter: B = 8mm								
(4) Length "T" Dimension: 8 = 8mm								
(5) Lead Type: L = Axial 0.8mm lead diameter								
(6) Low Capacitance: C = Low Capacitance								
(7) Taping Specification: TA = Ammo Box								
• Multiple configurations available please reference catalog.								



# WPGT Series

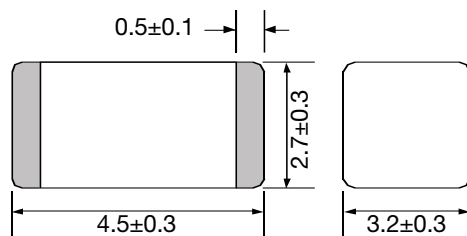
## Gas Discharge Tubes

5D3, 6D5, 2RS, 2RN, 2RF, 2RM, 2R,  
2N & 2T Series



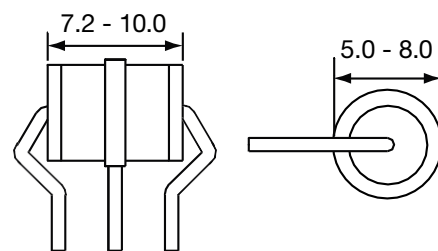
**Note:** Lead length, lead diameter and lead options, see catalog.

3216 & 4532 Series



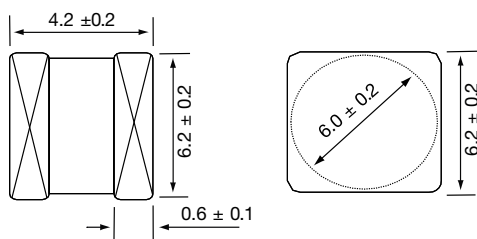
**Note:** Example of dimensions for 4532 Series.

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



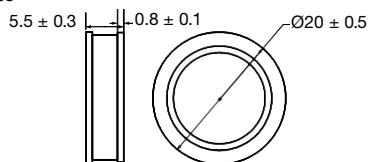
**Note:** 1) Lead length, lead diameter and lead options see catalog. 2) Failsafe types available.

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

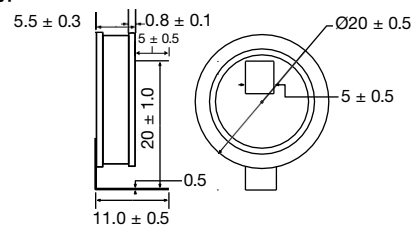


2B, 12D5, 12D8, 12D12, 12D17, 12D18, 16D3, 16D5, 16D5-A, 18D7, 20D6, 25D10W,  
25D21 and 30D12 Extremely High Current Series

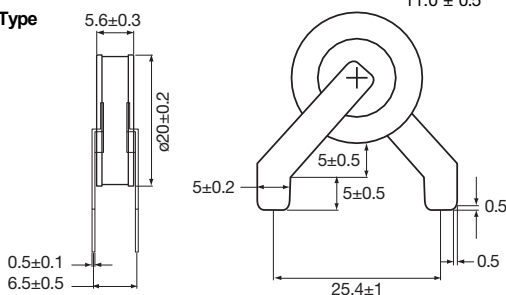
No Lead Type



Tab Type

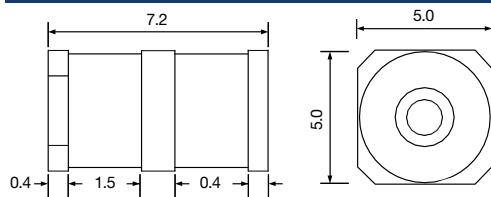


Radial Lead Type

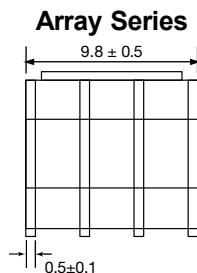


**Note:** Example of 20B shown here. Multiple lead frame, element sizes and configurations available, see catalog.

3SM & 3SSM Surface Mount Series



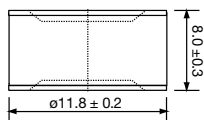
Array Series



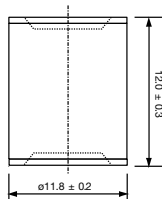
**Note:** Example of Array Series shown here. Other options available, see catalog.

AE Series

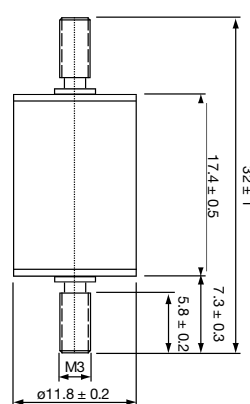
No Lead Standard Type  
AE Series



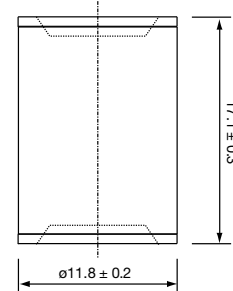
No Lead High Current Type  
AE Series



High Voltage  
Screw Lead Type



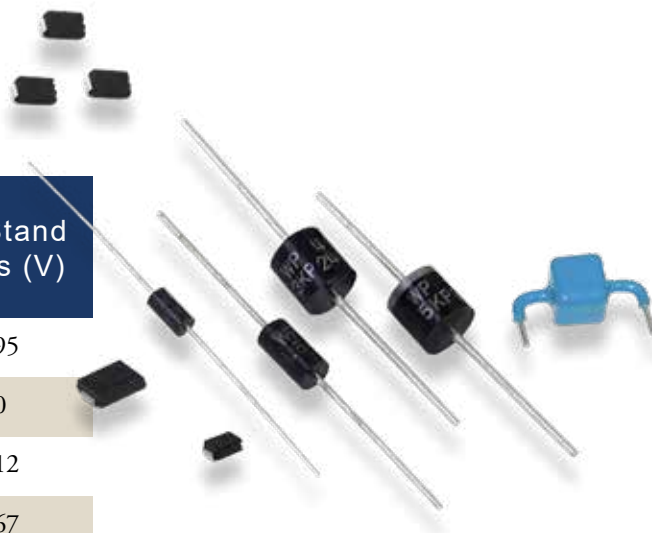
No Lead Ultra High Current Type  
AE Series



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



# 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
WPA	Automotive Type	Radial Lead	20-36
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
6.6SMEJ	6600	Surface Mount	20-48
PA4SMAJ	400	Surface Mount	5.8-495
PA6SMBJ	600	Surface Mount	5.8-495
1.5ASMCJ	1500	Surface Mount	5.8-495
P6SMAJ	600	Surface Mount	6.0-40

## Ordering Information (Example)

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

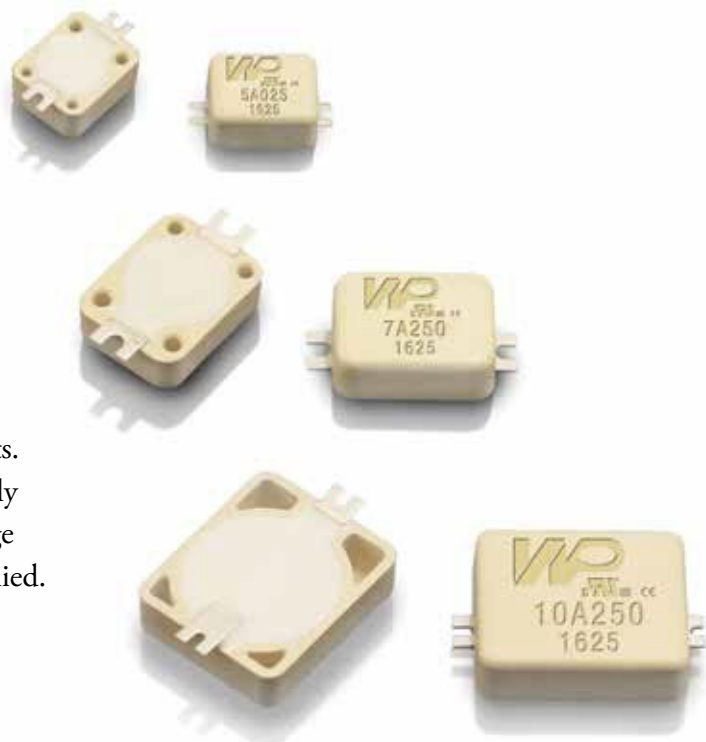
- (1) Series: P4KE = P4KE
- (2) Voltage, Example 20 = 20V  
Nominal Breakdown Voltage  
For P4KE, P6KE, 1.5KE  
Rated Standoff Voltage  
For SA, 3KP, 5KP, 15KP
- (3) Polarity: Blank = Unidirectional,  
C = Bidirectional
- (4) Tolerance: Blank = 10%, A = 5%
- (5) Packaging: Blank = Bulk, TR = Tape and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

AEC-Q101 qualified for specific types. Contact WPI sales for more information:  
[sales@worldproducts.com](mailto:sales@worldproducts.com).



# Surface Mount Varistor Series

- 5mm, 7mm and 10mm (14mm and 20mm pending)
- Wide range of voltages: 11VAC – 680VAC
- CE certified
- UL/CUL recognition
- Metal Oxide Varistors (MOVs) are surface mounted components. Manufactured mainly from sintered zinc oxides and schematically equivalent to two back-to back PN junctions, MOVs shunt surge currents by decreasing their resistance as transient voltage is applied.



## WPZ25S Thermally Protected Varistor Series

- Rated to 25KA
- Wide range of voltages: 17VAC – 750VAC
- Available with remote signal function micro-switch
- RoHS Compliant
- UL/CUL Recognition
- TVSS Products
- AC Panel Protection Modules
- AC Line Power Supplies
- Surge Protected Strip Connectors
- AC Power Meters
- Relocatable AC Power Taps
- UPS (Uninterruptible Power Supply)
- White Goods
- GFGCI (Ground Fault Current Interrupter)
- Plug-in TVSS
- Inverters
- AC/DC Power Supplies



# 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	140-5000	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

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

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

### Ordering Information (Example)

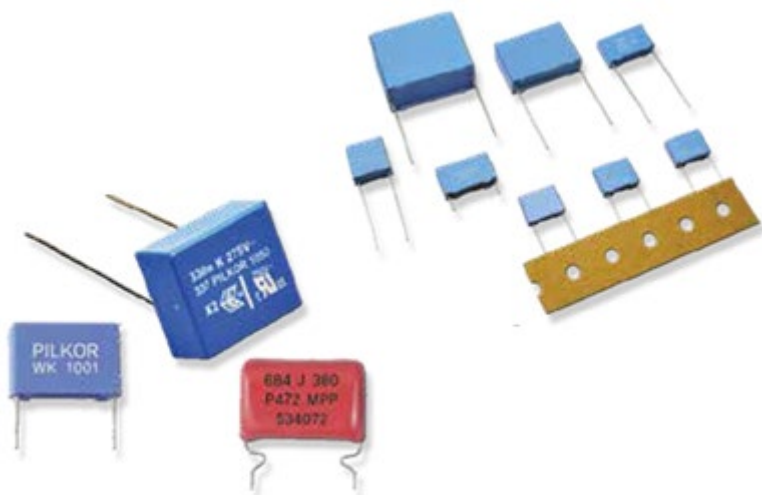
**WPSCDS**   **058**   **C**  
(1)                      (2)                      (3)

- (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





# Metallized Film Capacitors



Pilkor capacitors have applicable world-wide safety approval certification.

- 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
- High Temperature Capacitors
- DC-Link Capacitors (Customized Designs)
- IGBT Snubber Capacitors



## Ebusbar®

WORLD PRODUCTS INC.® is the Exclusive Agent in North America for Ebusbar® High Voltage High Current Relays



Flexible Busbars



## HV HC Relays

- Fully sealed H<sub>2</sub> gas filled ceramic chambers
- Encased within a laser welded metal structure
- Incorporated high energy blowout magnets
- Low energy coil consumption
- Maintain high contact reliability
- Consistent load performance and long life



Components for Power Distribution Units

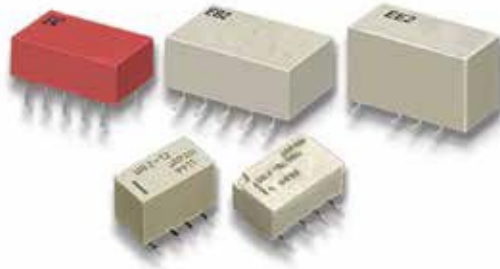
# NEXEM

FORMERLY NEC/TOKIN

## Miniature Signal Relays



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



## 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
- RoHS Compliance



# WRG

## Industrial Relays

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



# Adler Elektrotechnik

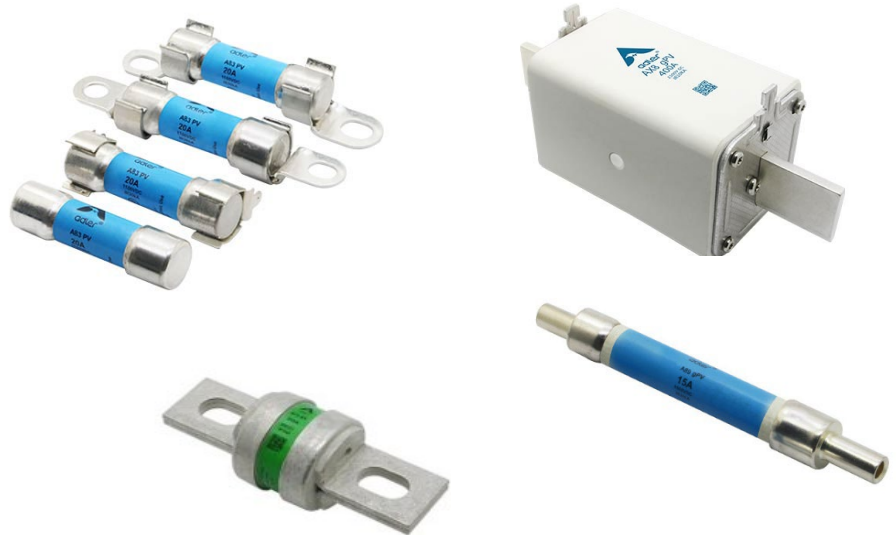
## PV and EV Fuses



**WORLD PRODUCTS INC.**® is the Exclusive Agent in North America for ADLER® Fuses

### Applications

- PV String Combiners
- PV Inverters
- DC Disconnects, MCBs, MCCBs
- Electric Vehicle Applications
- Battery Powered Utility
- DC Charging Stations
- Energy Storage Systems
- Battery Pack



### Photovoltaic Fuses

- Low Voltage Fuses
- NH Blade Fuses
- Small and Medium Fuse Links
- Fuse Holders and Mounts
- 100V – 1500V coverage
- 1A – 400A coverage
- UL Certified 248-19
- IEC 60269-6



### Electric Vehicle Fuses

- 150V – 1000VDC
- AC types available
- Melamine glass fiber body
- Low Temperature Derating
- Faster reaction time
- UL 248-20
- ISO 8820-8
- JASO D622



# WPI Antenna Solutions



AMI/AMR  
Antennas  
& Isolation  
Couplers

High performance wrap-around antennas and isolation couplers for electric, gas and water meters. Available in different styles. WPI engineering team specializes in optimizing antenna integration to help achieve TRP/TIS and FCC requirements.



Low Profile  
Body Mount

High performance and low profile body mount, industrial grade antennas. Available in multiple RF Bands. They are extremely efficient for their compact size. Can be configured with different cable/connector styles & lengths.



Body Mount /  
Mag Mount  
Vandal  
Resistant

Extremely durable and conformal multi band antennas that are vandal resistant. Available in both body mount and mag mount styles. IK rated. Flat types available



Miniaturized  
Multi-band  
Embedded

Available in Flex, Stamped Metal, Plastic and Chip styles. These are an excellent choice for applications with very tight space constraints and where low cost solutions are desired.



Stubby  
Whips &  
Dipoles

Stubby Antennas built on the framework of Whips and Dipoles. The gains of these antennas have been optimized for delivering optimal efficiency.



5G/4G/LTE/ISM  
Embedded  
SMD Style

SMD style ultra wide-band antenna covering frequencies from 600 to 2700 MHz. This patented Micro-Hepta design is specifically designed for M2M applications to reduce the antenna design and integration effort on the clients' part.



Access Point  
Infrastructure

For Access Points and Repeater type applications requiring a True-Omnidirectional coverage pattern with ample Peak Gain and Radiation Efficiency. Available in different connector and mounting styles.



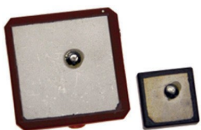
MIMO  
Antennas

2X2 and 3X3 MIMO antennas with Pattern & Polarization Diversity for both terminal units and repeater systems. These are industrial grade and designed to withstand harsh environments.



Wall and  
Ceiling  
Mount

Broadband wall and ceiling mount antennas that are surface independent. These can be mounted to metallic or non-metallic surfaces without altering the performance. These work at LTE, 4G, 3G, ISM, GPS, Wi-Fi & WiMAX bands.



GPS/GLONASS  
Patches and  
Active Modules

High Performance GPS/GLONASS Patch antennas and GPS/GLONASS + LNAs + Saw Filter/Patch antenna modules in a variety of size options ranging from 10X10mm to 25X25mm.



High Gain  
Omni  
Directional

High Gain Pole Mount Access Point antennas for Smart City and Infrastructure applications.

# Cables and Connectors

## WPI Cable and Connector Assemblies

- SMA Male / Female
- RP SMA Male / Female
- Type N Male / Female
- LMR 100 / 200 / 300 / 400 cable types available
- Adaptors available



Cable and connector assemblies available for many of our antenna products. Custom cable and connector assemblies available to meet your application, performance, and cost requirements.

## Range Extender Kits

Used for Energy Meters where signal is poor. This can be caused by being located in a basement, underground parking structure, remote locations, or vaults. Available in all major meter bandwidths: UHF, LoRA/ISM, LTE. Requires no power shutoff for install and fixes signal issue immediately.

### Coupler Antenna



### Cable and Connector



### External Antenna

- Separate connector types tailored to Energy Meter band.
- Adhesive backing for ease of installation on Energy Meter

- Cable and connector assemblies ensure best fit with external antenna options
- Adaptors available for best connection to external antenna

- Wide variety of external antennas to fit customer requirement
- Omni-directional and directional high gain types available



# On-Site Laboratories

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 Liaison) to IEC and UL Standard Technical Panel member.

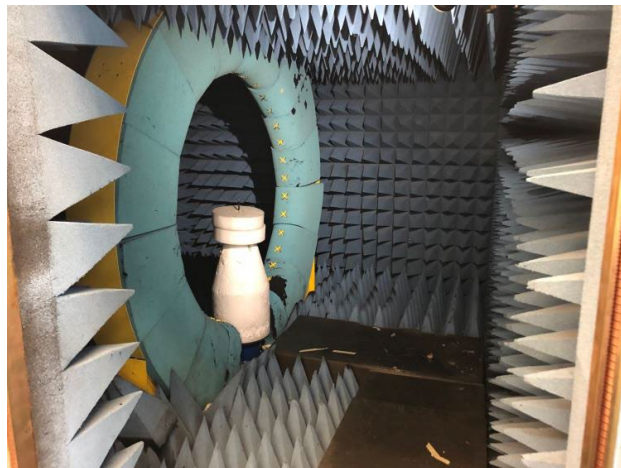
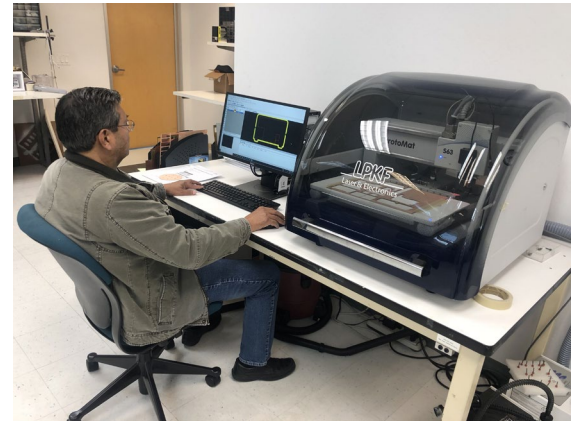
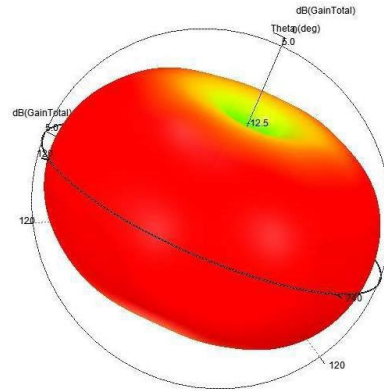
We are also able to characterize the performance of components under both normal operational and harsh environmental conditions. Surge testing waveforms can be saved with our TDS 3014B Digital Storage Oscilloscope and reports can be sent to customers via email.

## Laboratory 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 1000VAC applied
  - I(n) Nominal Discharge Current testing up to 40kA at 1000VAC
  - (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 3014B

## Antenna Research & Development Laboratory

- Onsite Antenna Engineering Laboratory with technically advanced RF/Microwave Test and Measurement equipment.
- 3D Near-field and far-field. Superfast and fully automated antenna radiation characterization electromagnetic systems.
- Experienced engineering staff that have designed antennas for various applications ranging from military to consumer wireless.
- Precise mechanical tools that aid in designing and manufacturing antennas in various manufacturing technologies, such as, Ceramics, Stamped Metals, Plastics, LTCC, Flex PCB and more.
- Antennas and antenna systems that operate in several frequency bands such as: 5G, 4G/LTE, 3G, LoRa, ISM band, Wi-Fi, Zigbee, Bluetooth, RFID, NFC, GPS, GLONASS, and UWB can be designed and tested.
- Regulatory testing capability that ensures that the antennas designed comply with safety and performance standards set by FCC, PTCRB and others.



# Surge Generator

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

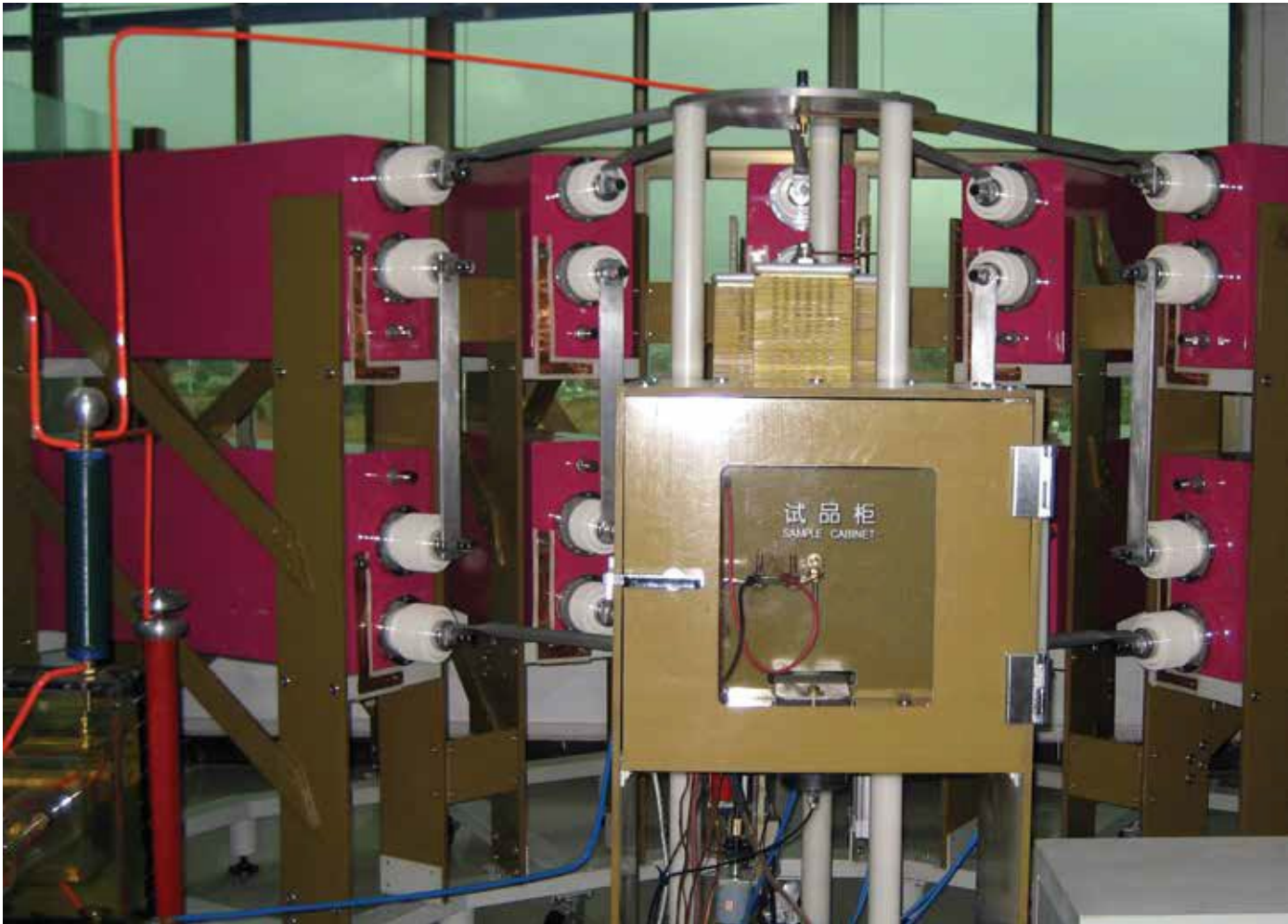
- IEC 61000 4-5 – Combination Waveform
- UL 1449 4th Edition
- IEEE/ANSI 62.41 Categories B and C
- IEC 61643-11

## Features:

- I(n) sequence up to 40,000 amps 8/20 $\mu$ s at 1000VAC and VPR at 6kV/3kA- 1000VAC 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.

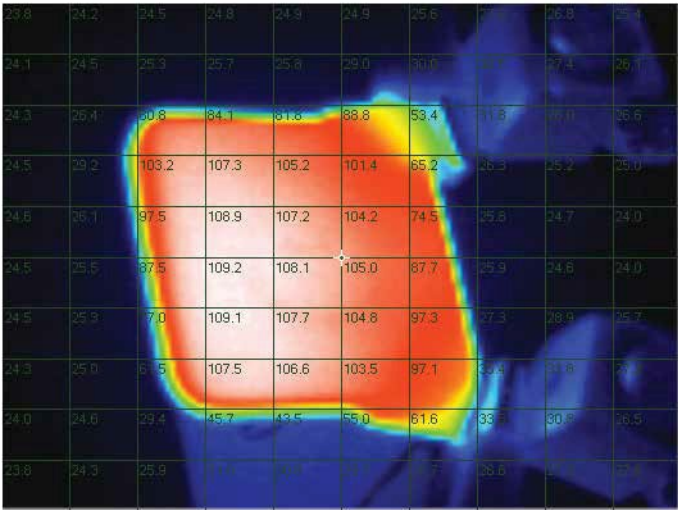


# Surge Generator - Located in Our Factory

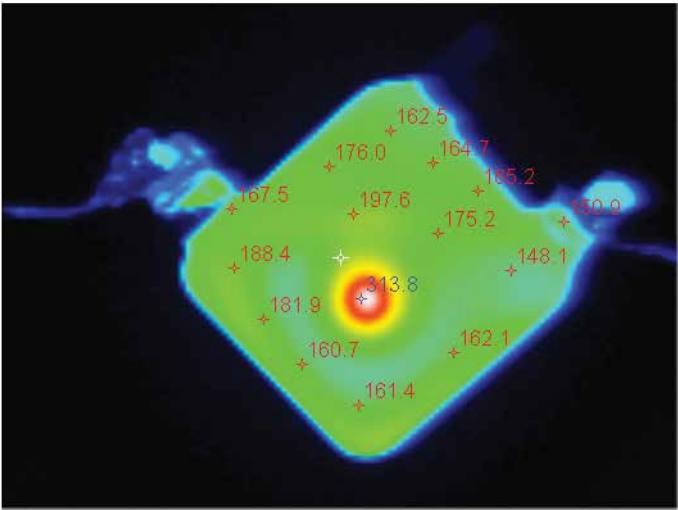


8/20ms : 200,000 Amps, 10/350ms : 30,000 Amps

## Heat Transfer Characteristics



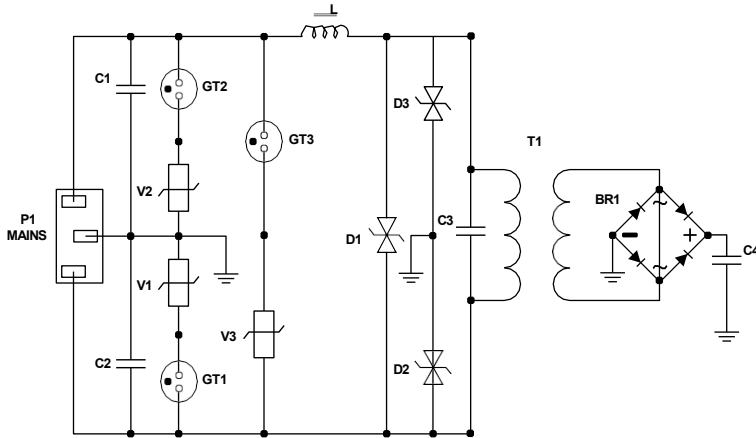
(EV Series 34mm)



(EV Series 34mm)

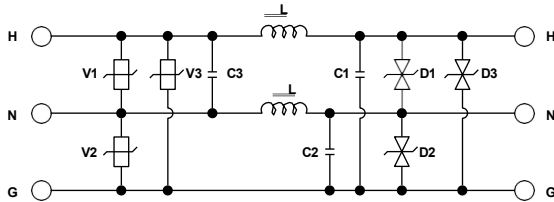
# Circuit Examples

## AC Mains Protection with Potentially Large Follow Current.

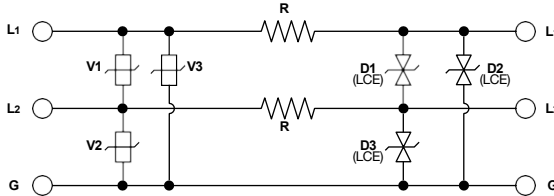


When a Surge is introduced at the A-C input, Gas Tubes turn on slowly (1μsec) which can produce a large “leading edge” remnant downstream. TVS Diodes D1, D2, and D3 will suppress the remnant. Varistors V1, V2 and V3 prevent follow current from Gas Tubes.

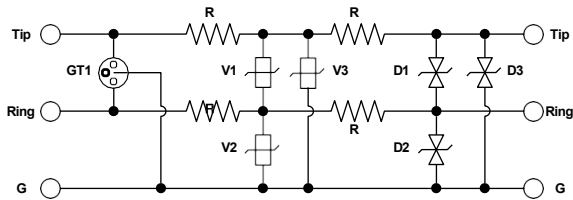
## AC Line Protection



## Data Line Protection



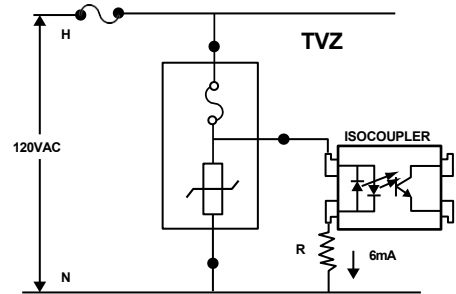
## Telecom Circuit Protection



## KEY TO ABBREVIATIONS

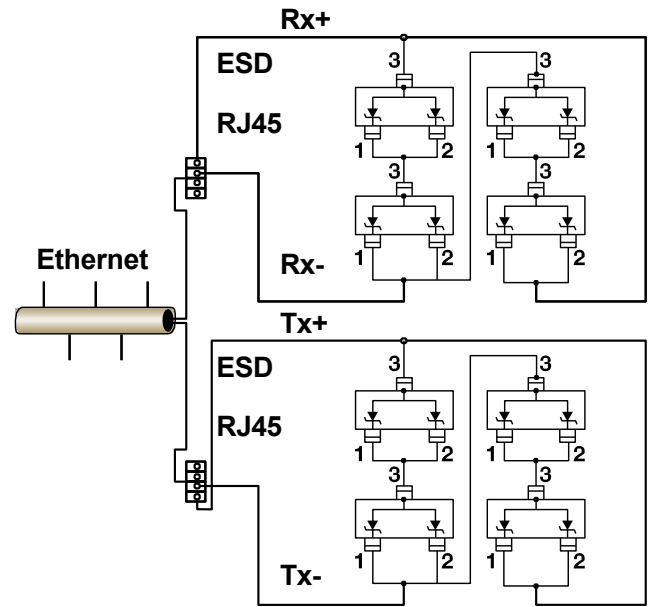
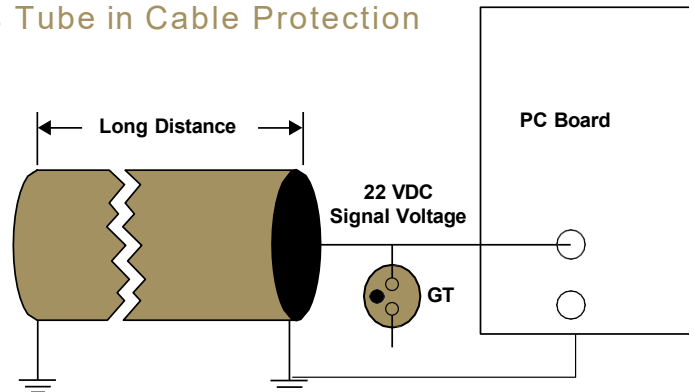
<b>C1, C2</b> = Safety Caps	<b>T1</b> = Step Down Transformer
<b>V1,V2,V3</b> = MOV	<b>LCE</b> = Low Capacitance Series TVS Diode
<b>GT1, GT2, GT3</b> = Gas Tubes	<b>R</b> = Resistor
<b>D1, D2, D3</b> = TVS Diodes	<b>L</b> = Inductor
<b>C3</b> = X Safety Cap	<b>TVZ</b> = Thermally Protected Varistor
<b>BR1</b> = Bridge Rectifier	<b>ESD</b> = ESD Array
<b>C4</b> = Filter Cap	

## 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



**DISCLAIMER:** The names of the products and the specifications in this catalog are subject to change without notice for the sake of improvement. World Products Inc.\* also reserves the right to discontinue any of these products. The products in this catalog are intended for use in ordinary electronic products. If any of these products are to be used in special applications requiring extremely high reliability, where product defects might pose a safety risk, please consult World Products Inc.\* Though World Products Inc.\* has taken all possible precautions to ensure the quality and reliability of its products, improper use of products may result in bodily injury, fire, or similar accident. If you have any questions regarding the use of the products in question, please consult World Products Inc.\* Please be advised that World Products Inc.\* accepts no responsibility for any infraction by users of World Products Inc.\* products on third party patents or industrial copyrights.



**CELEBRATING  
FIFTY YEARS  
OF EXCELLENCE**

World Products Inc.® is an Employee Owned Company (ESOP)

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[www.worldproducts.com](http://www.worldproducts.com)

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