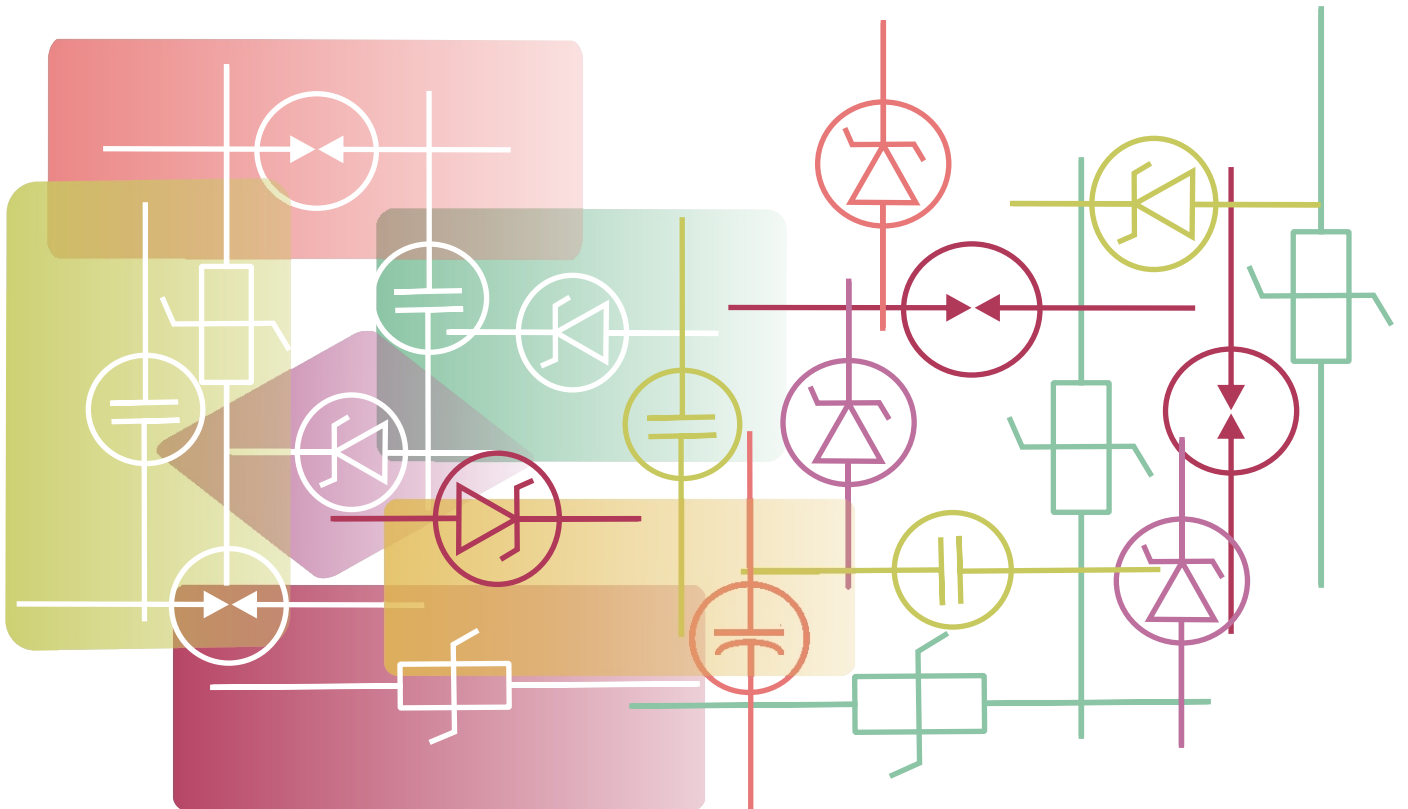


Aluminum Electrolytic Capacitors
Surge Protective Devices
Zener Diodes



Quick Reference Chart - Aluminum Electrolytic Capacitors

S. No.	Series	Description	Terminals	Features			Working Voltage Range	Capacitance Range	Operating Temperature Range	Leakage Current	Load Life (hours)	Page
				General Purpose	Miniaturized	Long Life						
1	PSS	General Purpose, 85°C	Snap-in	■			16 V – 500V	100 µF – 22000 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 85° C	10
2	P2S	General Purpose, 85°C, Reduced Size	Snap-in	■	■		160 V – 450V	47 µF – 2200 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 85° C	12
3	P3S	General Purpose, 85°C Low Height	Snap-in	■	■		160 V – 450V	47 µF – 470 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 85° C	14
4	PS4	General Purpose, 85°C 4 pin Snap-in	Snap-in	■			16 V – 450V	220 µF – 68000 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 85° C	16
5	PLG	General Purpose, 85°C Lug Terminal	Lug	■			16 V – 450V	220 µF – 68000 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 85° C	18
6	PSX	General Purpose, 105°C	Snap-in		■	■	16 V – 450V	47 µF – 22000 µF	-25° C ~ 105° C	0.02CV or 5mA	1000 @ 105° C	20
7	P2X	Long Life, 105°C	Snap-in			■	16 V – 450V	47 µF – 22000 µF	-25° C ~ 105° C	0.02CV or 5mA	2000 @ 105° C	22
8	PCC	General Purpose, Screw Terminal	Screw	■			160 V – 450V	270 µF – 33000 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 85° C	24
9	PCX	Long Life, Screw Terminal	Screw			■	160 V – 450V	180 µF – 22000 µF	-25° C ~ 85° C	0.02CV or 5mA	2000 @ 105° C	25
10	PAC	AC Motor Start	Wired			■	230 Vrms	200 µF – 250 µF	-25° C ~ 70° C	-	-	28

Quick Reference Chart - Surge Protective Devices

S. No.	Series	Description	Package	Applications				Voltage Range	Capacitance	Insulation Resistance	Surge Current Capacity	Page
				Telecom Equipment	CRT and TV	Automotive	Power Supplies					
1	PTA	Low-Voltage Spark Gap	DO-35	■	■	■		150-300V	< 1pF	> 100 MΩ	500A, 3 times	36
2	PTB	High Surge Current Capability Spark Gap	DO-41	■	■	■		250-500V	< 1pF	> 100 MΩ	1000A, 3 times	37
3	PTC	Very High Surge Current Capability Spark Gap	DO-15	■	■	■	■	300-500V	< 1pF	> 100 MΩ	1500A, 3 times	38
4	PTHC	High Voltage Ceramic Spark Gaps	DO-41, DO-15	■	■			1000-3600V	< 1pF	> 100 MΩ	500A, 1 time	39
5	PLM BZR	Hybrid Module for AC lines	ABS Case	■	■	■	■	500-1000V	< 2 pF	> 100 MΩ	2000A, 3 times	40
6	PLM CZR	Hybrid Module for AC lines	ABS Case	■	■			500-700V	< 2 pF	> 100 MΩ	1000A, 3 times	41
7	PLM DZR	Hybrid Module for AC lines	ABS Case				■	500-700V	< 2 pF	> 100 MΩ	500A, 3 times	42
8	PLM BXT	Hybrid Module for Swells on AC and DC lines	ABS Case	■			■	450-1000V	< 10pF	> 100 MΩ	3000A, 3 times	43
9	HVM CZR	Hybrid Module for Grounding	ABS Case	■	■		■	1000-3600V	< 5pF	> 100 MΩ	500A, 3 times	44
10	HVM BZR	Hybrid Module for Grounding	ABS Case	■			■	1000-3600V	< 5 pF	> 100 MΩ	1000A, 3 times	45

Note:

The following Series are UL recognized under standard UL 1449 vide file No E300611

- i) PLM BZR
- ii) PTHC
- iii) PLM BXT
- iv) HVM BZR

Quick Reference Chart - Zener Diodes and TVSS

S. No.	Series	Description	Terminals	Application			Voltage Range	Forward Voltage	Junction Temperature	Tolerance	Power Rating	Page
				Sharp Reverse Characteristic	High Stability	High Power Dissipation						
1	BZX 55	General Purpose	DO-35	■	■		2.0 V - 36.0 V	1.5 V	175°C	2%, 5%	0.5W	46
2	1N52	Voltage Stabilization	DO-35		■		2.4 V - 56.0 V	1.1 V	200°C	5%	0.5W	48
3	1N47	Voltage Regulation	DO-41		■	■	3.0 V - 100 V	1.2 V	200°C	2%, 5%	1W	50

SECTION I

Product Codification – Aluminum Electrolytic Capacitors	5
Lot Numbering System	5
Packing	6
Application Guidelines	7
PSS Series – General Purpose, 85°C	10
P2S Series – General Purpose, Reduced Size	12
P3S Series – Low Profile, General Purpose, 85°C	14
PS4 Series – 4 Terminal Snap-in, General Purpose, 85°C	16
PLG Series – Lug Terminal, General Purpose, 85°C	18
PSX Series – General Purpose, 105°C	20
P2X Series – Long Life, 105°C	22
PCC Series – Screw Terminal, 85°C	24
PCX Series – Screw Terminal, 85°C	26
PAC Series – AC Motor Start Capacitors	28

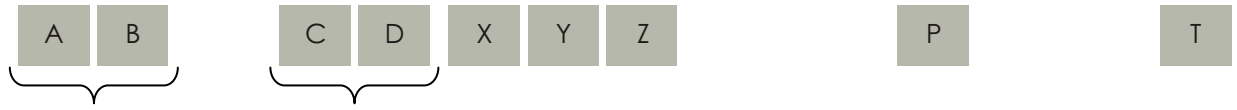
SECTION II

Introduction – Surge Absorbers	29
Applications – Surge Absorbers	30
Product Codification and Ordering – Surge Absorbers	33
Lot Numbering System – Surge Absorbers	33
Packing – Surge Absorbers	34
PTA Series – Low Voltage Surge Absorbers	36
PTB Series – Middle Voltage Surge Absorbers	37
PTC Series – Low Voltage Surge Absorbers	38
PTHC Series – High Voltage Ceramic Surge Absorbers	39
PLM BZR Series – General Purpose Hybrid Protection Modules for Appliances	40
PLM CZR Series – General Purpose Protection for Small Appliances	41
PLM DZR Series – General Purpose Protection for Small Appliances	42
PLM BXT Series – For AC and DC swells	43
HVM CZR Series – High Voltage Modules for Small Appliances	44
HVM BZR Series – High Performance High Voltage Modules	45

SECTION III

BZX 55 Series - Small Signal Zener Diodes	46
1N 52 Series - Small Signal Zener Diodes	48
1N 47 Series - Small Signal Zener Diodes	50

Product Codification – Aluminum Electrolytic Capacitors



Series	Code		WV	Code		Capacitance	Packing	Code	Tolerance	Code
	A	B		C	D			P		T
PSS	S	S	16	1	C	Number of significant digits before decimal	Bulk	B	± 5%	J
P2S	2	S	25	1	E				± 10%	K
P3S	3	S	35	1	V				-10% to +20%	L
PS4	S	4	50	1	H		X		± 20%	M
PSX	S	X	63	1	J				-10% to +30%	N
P2X	2	X	100	2	A	First two digits of value			-10% to +50%	O
PLG	L	G	160	2	C		YZ		-10% to +75%	P
PCC	C	C	200	2	D				-20% to +100%	D
PCX	C	X	250	2	E				-20% to +30%	R
PAC	A	C	350	2	V					
			400	2	G					
			450	2	W					
			500	2	H					

Notes:

- i) Please mention product code while ordering
- ii) If no tolerance is specified it will be assumed to be + 20%
- iii) No mounting clamp will be provided unless specified at the time of ordering.

Lot Numbering System

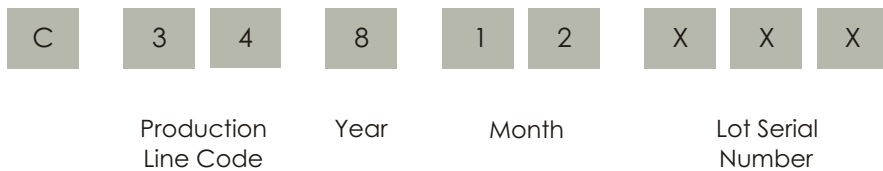
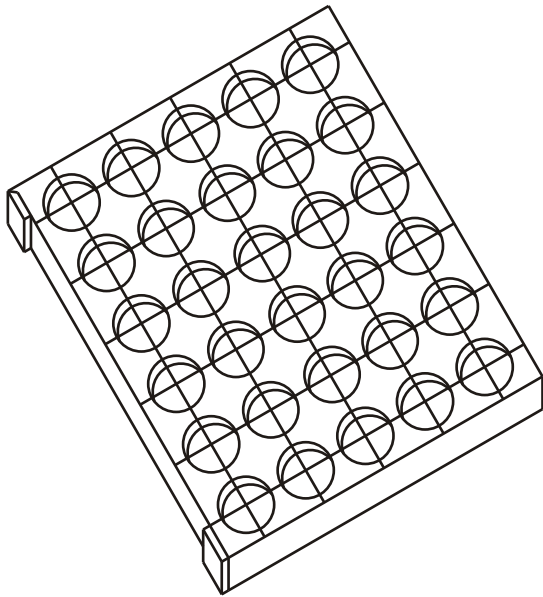


Illustration: Lot Number: C05801102 implies:-

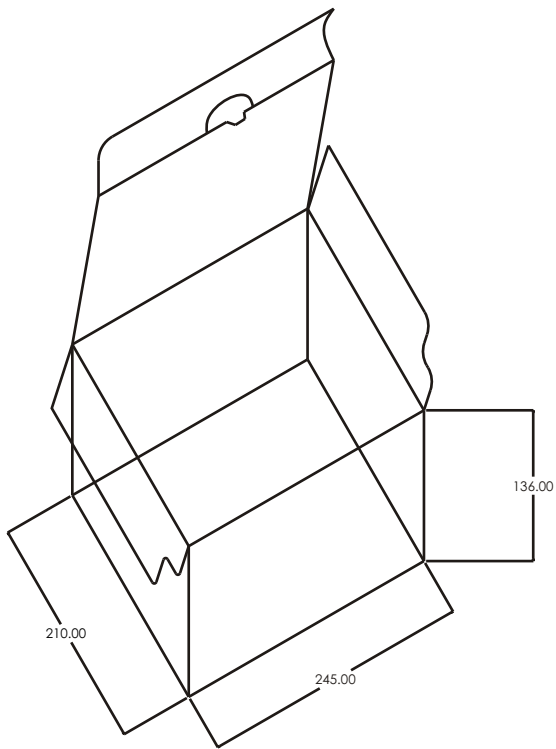
Production Line Code	Year of Manufacture	Month of Manufacture	Lot serial Number
05	2008	01 – (January)	102

Packing

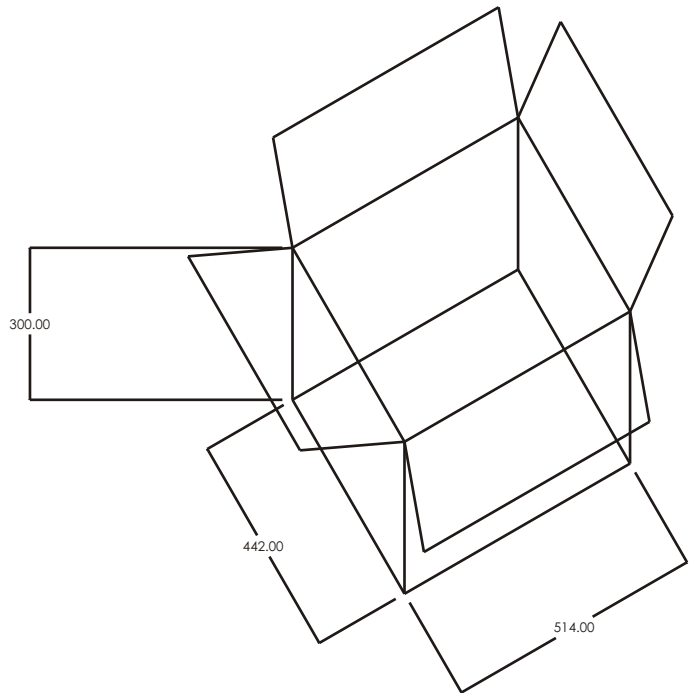


Packing Tray

Sr. No.	Capacitor Size	No. of Pieces per Tray	No. of Pieces in Inner Box	No. of Pieces in Outer Box
1	22 x 22	55	220	880
2	22 x 25	55	165	660
3	22 x 30	55	165	660
4	22 x 40	55	110	440
5	22 x 50	55	110	440
6	25 x 20	40	160	640
7	25 x 30	40	120	480
8	25 x 40	40	80	320
9	25 x 50	40	80	320
10	30 x 20	30	120	480
11	30 x 30	30	90	360
12	30 x 35	30	60	240
13	30 x 40	30	60	240
14	30 x 50	30	60	240
15	35 x 20	20	80	320
16	35 x 35	20	60	240
17	35 x 40	20	40	160
18	35 x 50	20	40	160
19	35 x 56	20	40	160



Inner Box



Outer Carton

Application Guidelines

General

Circuit designers must select the Aluminum Electrolytic Capacitor (AEC) with care to ensure that the specified performance limits of the AEC are not exceeded even in the most extreme operating scenario. Special attention must be paid to the following design considerations :-

- i) Specified operating (ambient) temperature range should not be exceeded.
- ii) Only specified PCB Cleaning Agents must be used (please see page 9)
- iii) Line voltage for the AEC must always be applied per the marked polarity on the AEC.
- iv) Applied voltage must not exceed the maximum Rated Voltage
- v) High Ripple and Rapid Charge/Discharge cycles demand Special Purpose Capacitor and must be chosen carefully.
- vi) The AEC must be protected from mechanical shock and vibration and should be mounted with specified accessories.

An improperly chosen AEC risks premature failure of the capacitor itself and of the circuit/equipment where it is being used.

Rated Voltage

The AEC is likely to malfunction if a voltage exceeding the Rated Voltage is applied to it. If the line voltage applied to the AEC is likely to have a Ripple component, the designer must make sure that the peak of the Ripple voltage does not exceed the Rated Voltage of AEC. The application of a higher than Rated Voltage causes an increase in Leakage Current and in turn causes higher heat dissipation which results in premature AEC failure.

Operating Temperature Range

Each AEC is designed for a specific Operating Temperature Range. In case, the operating environment in the application exceeds the specified range the operation of the AEC will be affected adversely. For ambient temperatures lower than the lower limit of the AEC – the capacitance of the AEC will

reduce and the dissipation factor will increase – the frequency characteristics are also likely to be affected. For temperatures higher than the maximum permissible range – the capacitor is likely suffer premature failure due to evaporation of the electrolyte.

Surge Voltage

The Surge Voltage Ratings for Punsumi's AECs are specified in the table below:-

WV (dc)	16 - 200 V	250 V	350 - 500 V
SV (dc)	1.25 WV	1.2 WV	1.1 WV
T _{on}	30 sec	30 sec	30 sec
T _{off}	4 min-30 sec	4 min-30 sec	4 min-30 sec
# of Cycles	1000	1000	1000

The designer must ensure that the Surge Voltage levels for the AEC are not breached even for the short durations mentioned in the table above. Application of higher voltage (than the Surge Voltage) causes stresses on the anode film in the AEC and eventually leads to premature failure of the AEC.

Ripple Current

The capacitance value of AEC must be chosen to ensure that the ensuing Ripple Current in the application circuit does not exceed the specified Maximum Ripple Current. Drawing excessive Ripple Current causes heating in the AEC and leads to premature failure. Also ensure that allowable Ripple Currents superimposed on low DC voltages do not cause reverse voltage conditions.

Charge/Discharge Cycle

A High Charge/Discharge Duty Cycle causes stresses inside the AEC due to reverse potential across the Cathode. A General Purpose AEC will exhibit a sharp reduction in Capacitance under a heavy Charge/Discharge cycle and specially designed AEC should be preferred. Subjecting an AEC to heavy Charge/Discharge cycles is similar to drawing a heavy Ripple current from the AEC in that both cause heating of the AEC element and can cause the safety vent to

operate thereby allowing faster loss of electrolyte and Thermal Runaway.

Polarity

Most AECs are polarized unless specified otherwise – AECs will fail quickly and catastrophically and can explode (burst) if a Reverse Polarity Voltage or AC voltage is applied.

Insulation

AECs are normally covered in a PVC/PET sleeve. The purpose of this sleeve is to provide a base for Marking. If insulated elements are required special designs are available and should be used.

PCB and Capacitor Cleaning

AEC mounted PCBs can be immersed and ultrasonically cleaned using suitable solvents (see below) for upto 5 minutes and upto 60°C maximum temperature. The boards should be thoroughly rinsed and dried.

Recommended cleaning solvents include: Pine Alpha ST100S, Sunelec B12, DK BeClear CW 5790, Aqua Cleaner 210SEP, Cold Cleaner P3-375, TELPEN Cleaner EC-7R, Clean Thru 750H, Clean Thru 750L, Clean Thru, 710M, Techno Cleaner 219, Techno Care FRW-17, Techno Care FRW-1, Techno Care FRV-1, IPA (isopropyl alcohol)

- the use of Ozone Depleting solvents or cleaning agents should be discouraged in the interest of protecting the environment.

Avoid using the following Cleaning Solvents:-

- a) Halogenated Solvents – such solvents can permeate the seals and cause internal capacitor failure.
- b) Alkali solvents – these solvents can attack and dissolve the aluminum case
- c) Petroleum based solvents – can attack and damage the rubber on seals.
- d) Xylene – can lead to deterioration of rubber on seals
- e) Acetone – can cause removal of markings on PVC/PET sleeve.

Capacitor Mounting

- a) PCB Footprint – the soldering pads and PCB holes for the AEC should be as per specified size

and pitch to prevent undue stress on the leads.

- b) Use of Clamps – for large size AECs, specified clamps should be used to prevent damage to the capacitor and to the PCB due to vibrations or rough handling of equipment.
- c) PCB wiring patterns under AEC – generally PCB wiring under AECs should be avoided as any leakage of electrolyte can cause an electrical short.
- d) Wiring near Pressure Vents – avoid wiring of High Voltage or High current lines near the Pressure Vents.
- e) Double Sided PCBs – avoid wiring runs under the AEC and specially between the AEC terminals as during soldering, excess solder may collect under the AEC and short the anode and the cathode.

Soldering

- Observe temperature and time soldering specifications. Do not exceed a temperature of 350°C for 3 seconds or more.
- Avoid contact of PVC/PET Sleeve with molten solder or soldering iron
- Do not allow any other component or Lead to touch the Capacitor during soldering
- Do not insert the capacitor body into the solder bath.

If the capacitor needs to be removed after soldering, ensure that the Leads/Terminals do not experience excessive stress (tensile, pulling or bending).

Role of the Pressure Relief Vent

As the name suggest the Pressure Relief Vent serves to relieve vapor pressure built up inside the capacitor due to stressed operating conditions. During mounting of the AEC care must be taken to ensure that adequate clearances are provided to allow the vent to operate. For Can Mounted Vents a clearance of at-least 3 mm for can diameter less than 35 mm and at-least 5 mm for can diameter more than 40 mm, should be provided. For Seal mounted Vents – a hole in the PCB directly under the Vent should be provided to allow proper release of pressure.

Protection from Vibration

Proper mounting on the PCB or in the application is essential. Generally, the terminals of the AEC are designed in accordance with the expected weight of

the AEC. However vibration limits must be adhered to. Whereever specified, use Clamps to hold the capacitor in place and prevent damage from vibrations.

Conformal Coatings

When using conformal coatings – avoid using halogenated solvents or chloroprene based polymers. Also ensure that the coatings dry thoroughly and ensure that no coating remains trapped between the capacitor and PCB.

Emergency Action

In case the AEC safety vent operates :-

- a) Immediately switch off the Equipment and disconnect from Power Source. This will minimize likely damage caused by leaking or vaporizing electrolyte.
- b) Avoid contact with any escaping gas or electrolyte.
- c) In case of exposure to:-
 - i). Eyes: Immediately wash eyes with tap water
 - ii). Mouth: if ingested, gargle with water and spit
 - iii). Skin: wash with soap and water.

Conditions for Storage

The Leakage Current of an AEC increases with long storage times. If an AEC that has been lying unused for a long time is applied in a circuit without reconditioning, and abnormally high current will be required to restore the damaged oxide film on the anode and this current might lead to circuit failure or to the failure of the capacitor itself. Such capacitors should be reconditioned by application of the Rated Voltage in series with a 1000 Ohm current limiting resistor for a period of 30 minutes, before use.

In addition, for effective storage the AEC should not be exposed to the following conditions:-

- a) Temperature exposure above 35° C or below 15°C.
- b) Direct contact with saline/sweet water or oil.
- c) High humidity conditions where water can

condense on the AEC.

- d) Exposure to toxic chemicals/gases such as Hydrogen Sulfide, Sulphuric Acid, Nitric Acid, Chlorine or Ammonia.
- e) Exposure to Ozone, Radiation or Ultraviolet rays
- f) Vibration and Shock conditions exceeding specified limits.

Disposing and Destroying Capacitors

When disposing off capacitors, use one of the following methods and always follow local laws and environmental protection guidelines.

- a) Incinerate the capacitors at high temperatures after puncturing the can wall and crushing the capacitor. The puncturing is necessary to release any gases that might build up during incineration.
- b) Dispose off as SOLID WASTE.

PSS SERIES - General Purpose, 85°C

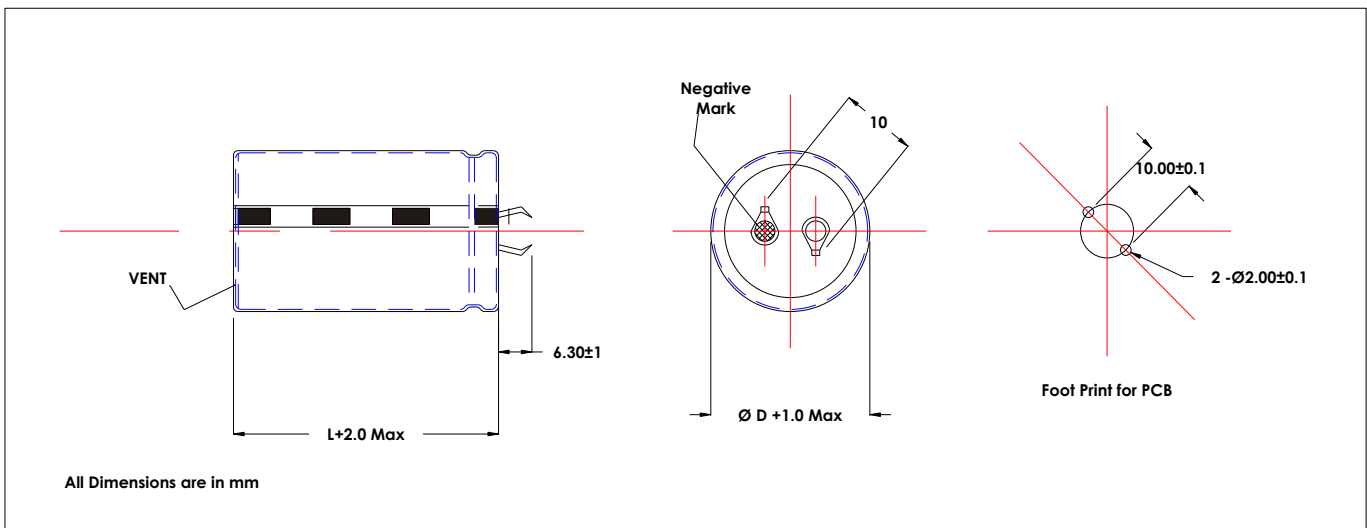
- Minimum Continuous Load Life: 2000 hours at 85°C
- For Power Supplies, Inverters, SMPS
- Snap-in Terminals
- Top Vent (in Aluminum Can) for Safety



SPECIFICATIONS

Parameter		Performance					
1	Operating Temperature Range	-25°C ~ 85°C					
2	Rated Voltage Range	16 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (% , max at 100 Hz)	Vdc	16	25-35	50-100	160-400	450
		Max Rating (%)	35	30	20	20	20
6	Temperature Characteristics Impedance Ratio (max)	Vdc	16	25-35	50-100	160-400	450
		Z _{-25°C} / Z _{20°C}	4	3	2	4	8
7	Endurance	After 2000 Hours Life at 85°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within + 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 85°C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within + 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND PCB FOOTPRINT



PSS Series Selection Guide: Can Sizes and Ripple Current Ratings

Vdc μF	16V		25V		35V		50V		63V		100V		160V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
47														
100														
150														
220														
330														
470													22x30	1.70
1000											22x25	1.85	22x50	2.80
1500											25x30	2.40	25x50	3.70
2200											25x40	3.10	35x50	4.85
3300					22x25	2.10	22x30	2.35	22x30	2.55	25x50	4.05		
4700			22x25	2.05	22x30	2.40	22x40	3.00	22x50	3.40	30x50	5.10		
6800			22x30	2.35	22x40	2.80	22x50	3.80	25x50	4.25	35x50	6.45		
10000	22x25	2.75	22x40	3.05	22x50	3.55	30x50	5.00	30x50	5.45	35x56	6.75		
15000	22x40	3.25	25x40	3.95	25x50	4.55	35x50	6.45	35x56	6.65				
22000	22x50	4.35	25x50	4.95	30x50	5.35								
33000														
47000														

Vdc μF	200V		250V		315V		350V		400V		450V		500V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
47											22x25	0.60	22x40	0.65
100					22x25	0.85	22x25	0.80	22x30	0.80	22x40	0.90	25x40	0.95
150					22x30	1.10	22x40	1.15	22x40	1.05	22x50	1.05	25x50	1.10
220			22x25	1.10	22x40	1.40	22x50	1.45	25x40	1.35	25x50	1.50	30x50	1.60
330	22x30	1.45	25x30	1.50	22x50	1.75	25x50	1.80	25x50	1.75	30x50	1.90	35x50	2.05
470	22x40	1.75	25x40	1.85	25x50	2.15	30x50	2.35	30x50	2.30	35x50	2.40		
1000	25x50	2.90	30x50	3.30	35x50	3.65								
1500	30x50	3.80	35x50	4.00										
2200	35x50	4.90												
3300														
4700														
6800														
10000														
15000														
22000														
33000														
47000														

Multpliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter of Aluminum Case in mm, L: Length of Aluminum Case in mm
 Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Maximum Operating Voltage

P2S SERIES – General Purpose, 85°C, Reduced Size

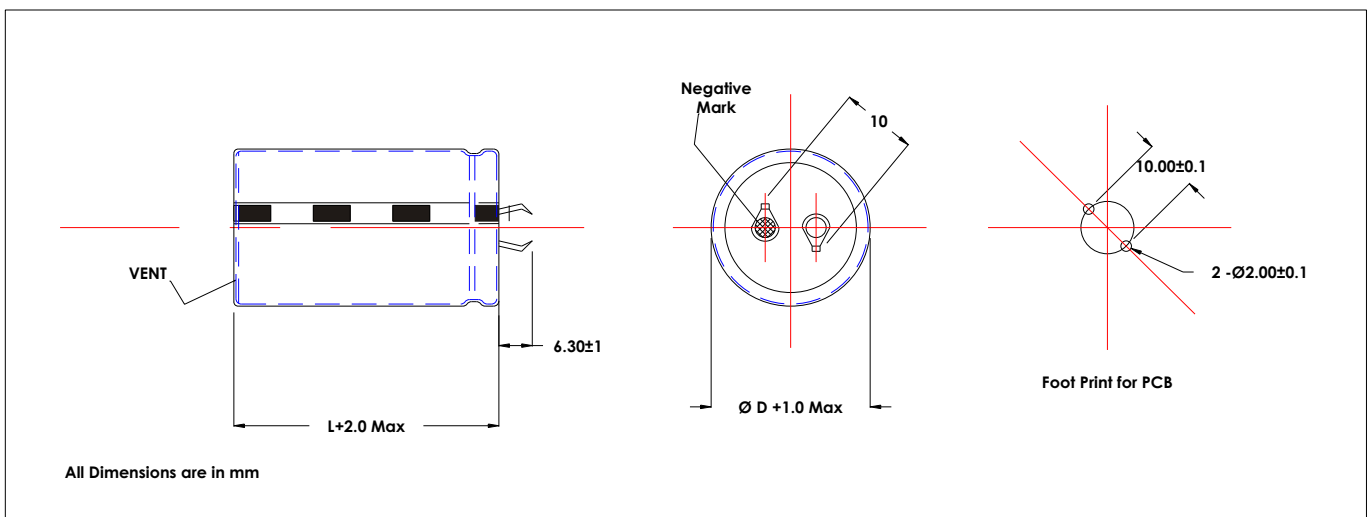
- Minimum Continuous Load Life: 2000 hours at 85°C
- For Power Supplies, Inverters, SMPS
- Snap-in Terminals
- Top Vent for Safety



SPECIFICATIONS

Parameter		Performance					
1	Operating Temperature Range	-25°C ~ 85°C					
2	Rated Voltage Range	160 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (% , max at 100 Hz)	Vdc	160-200	250	350	400	450
		Max Rating	15	15	15	15	20
6	Temperature Characteristics Impedance Ratio (max)	Vdc	160-200	250	350	400	450
		Z _{-25°C} / Z _{20°C}	4	4	4	4	8
7	Endurance	After 2000 Hours Life at 85°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 85°C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND PCB FOOTPRINT



P2S Series Selection Guide: Can Sizes and Ripple Current Ratings

Vdc μF	160V		200V		250V		350V		400V		450V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
47												
100									22x25	0.75	22x30	0.80
150							22x30	1.05	22x30	0.95	22x40	0.95
220							22x40	1.30	22x40	1.25	25x40	1.30
330					22x30	1.35	22x50	1.60	25x40	1.60	30x40	1.65
470	22x25	1.60	22x30	1.60	22x40	1.70	25x50	1.75	30x40	2.05	35x40	2.15
1000	22x40	2.65	25x40	2.75	30x45	3.15						
1500	30x35	3.50	30x45	3.60	35x45	3.80						
2200	35x35	4.25	35x45	4.75								

Multpliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter of Aluminum Case in mm, L: Length of Aluminum Case in mm

Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Maximum Operating Voltage

P3S SERIES - Low Profile, General Purpose, 85°C

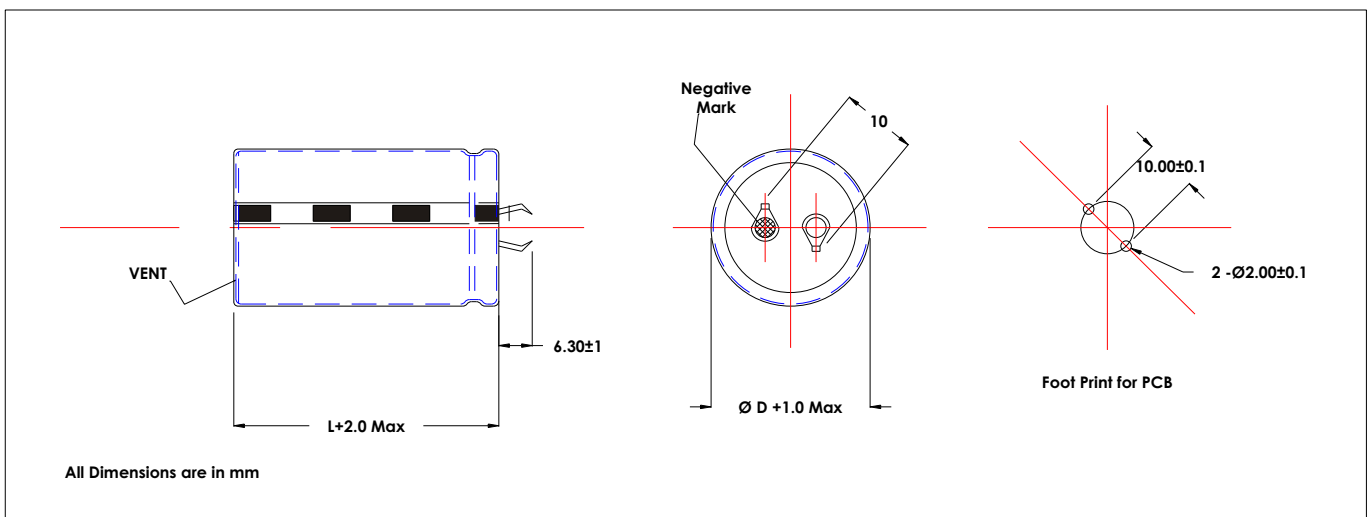
- Low profile: Aluminum Can Height of 20mm
- Minimum Continuous Load Life: 2000 hours at 85°C
- For Power Supplies, Inverters, SMPS
- Snap-in Terminals
- Top Vent for Safety



SPECIFICATIONS

Parameter		Performance					
1	Operating Temperature Range	-25°C ~ 85°C					
2	Rated Voltage Range	160 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (% , max at 100 Hz)	Vdc	160-200	250	350	400	450
		Max Rating	15	15	15	15	20
6	Temperature Characteristics Impedance Ratio (max)	Vdc	160-200	250	350	400	450
		Z _{-25°C} / Z _{20°C}	4	4	4	4	8
7	Endurance	After 2000 Hours Life at 85°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 85° C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND PCB FOOTPRINT



P3S Series Selection Guide: Can Sizes and Ripple Current Ratings

Vdc μF	160V		200V		250V		350V		400V		450V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
47							22x20	0.35	22x20	0.30	25x20	0.35
100			22x20	0.50	22x20	0.45	30x20	0.55	30x20	0.55	35x20	0.65
150			22x20	0.65	25x20	0.70	30x20	0.70	35x20	0.75		
220	22x20	0.63	25x20	0.80	30x20	0.85						
330	25x20	0.90	30x20	1.00	35x20	1.00						
470	30x20	1.15	35x20	1.30								
1000												
1500												
2200												

Multippliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter of Aluminum Case in mm, L: Length of Aluminum Case in mm

Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Maximum Operating Voltage

PS4 SERIES - Four Terminal, General Purpose, 85°C

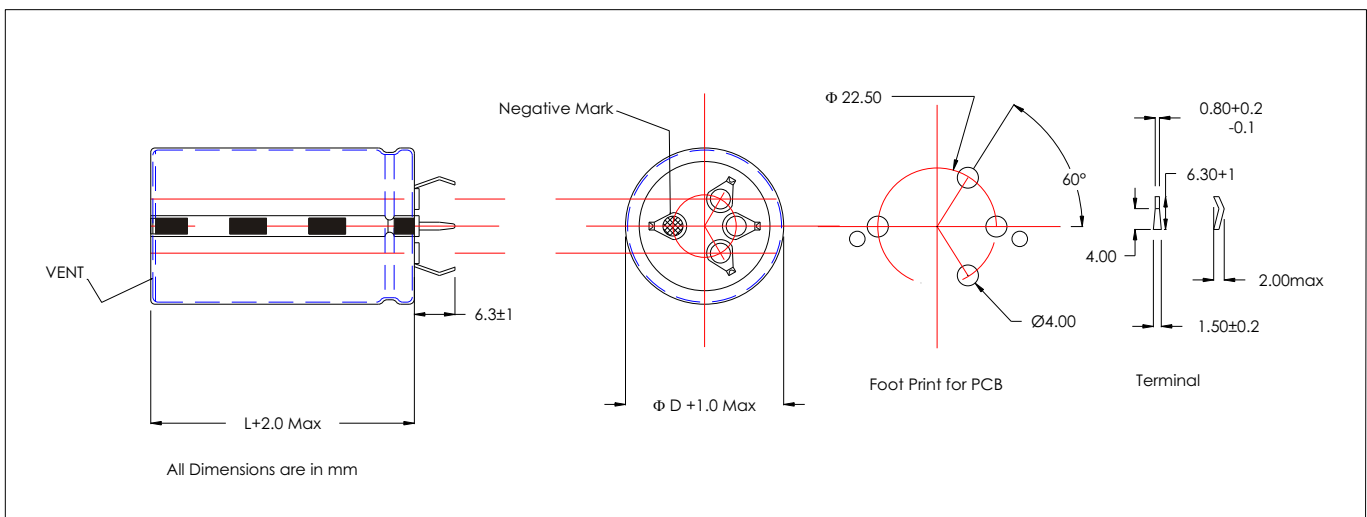
- Minimum Continuous Load Life: 2000 hours at 85°C
- For Power Supplies, Inverters, SMPS
- Snap-in Terminals
- Top Vent for Safety



SPECIFICATIONS

Parameter	Performance					
1 Operating Temperature Range	- 25° C ~ 85° C					
2 Rated Voltage Range	160 V to 450 V					
3 Capacitance Tolerance	± 20%					
4 Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5 Dissipation Factor (% , max at 100 Hz)	Vdc	160-200	250	350	400	450
	Max Rating	15	15	15	15	20
6 Temperature Characteristics Impedance Ratio (max)	Vdc	160-200	250	350	400	450
	Z-25°C / Z20°C	4	4	4	4	8
7 Endurance	After 2000 Hours Life at 85°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
	Capacitance Change	Within ± 20% of initial value				
	Leakage Current	Less than the specified value				
	Dissipation Factor	Less than 200% of specified value				
8 Shelf Life	After 1000 Hours Shelf Life at 85°C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
	Capacitance Change	Within ± 20% of initial value				
	Leakage Current	Less than the specified value				
	Dissipation Factor	Less than 200% of specified value				
9 Other Details	As per IEC 384-4					

DIMENSIONS AND PCB FOOTPRINT



PS4 Series Selection Guide: Can Sizes and Ripple Current Ratings

Vdc μF	16V		25V		35V		50V		63V		100V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
220												
330												
470												
680												
1000												
1500												
2200												
3300											30x50	2.7
4700											35x50	3.1
6800									30x50	3.2	40x60	3.6
10000							30x50	3.8	35x50	4.0		
15000					30x50	4.2	35x50	4.2	35x50	4.5		
22000			30x50	4.4	35x50	4.5	40x60	4.8				
33000	30x50	4.7	35x50	5.0	35x50	5.4						
47000	35x50	5.2	40x60	6.0								
56000	35x50	5.6										
68000	40x60	6.0										

Vdc μF	200V		250V		350V		400V		450V			
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple		
220									30x50	0.95		
330							30x50	1.0	35x50	1.1		
470					30x50	1.4	35x50	1.2	40x60	1.3		
680			30x50	1.7	35x50	1.6	40x60	1.5				
1000	30x50	2.0	35x50	2.3	40x60	1.8						
1500	35x50	2.2	40x60	2.5								
2200	40x60	2.5										
3300												
4700												
6800												
10000												
15000												
22000												
33000												
47000												
56000												
68000												

Multpliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter of Aluminum Case in mm, L: Length of Aluminum Case in mm
 Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Maximum Operating Voltage

PLG SERIES - Lug Terminal, General Purpose, 85°C

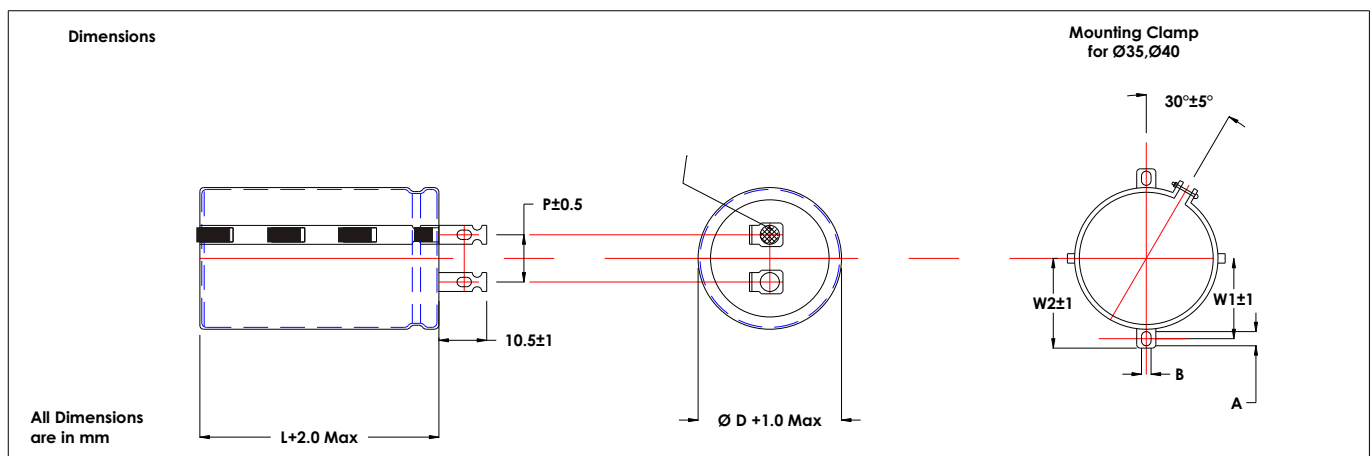
- Minimum Continuous Load Life: 2000 hours at 85°C
- For Power Supplies, Inverters, SMPS
- Lug Terminals
- Bottom Vent for Safety



SPECIFICATIONS

	Parameter	Performance					
1	Operating Temperature Range	- 25° C ~ 85° C					
2	Rated Voltage Range	16 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (% , max at 100 Hz)	µF	Vdc	16-25	35-63	100-250	350-450
		220-330				20	25
		470-3300			20	20	
		4700-6800		30	30	25	
		10000-22000		35	30		
		33000-68000		75	50		
6	Temperature Characteristics Impedance Ratio (max)	Vdc	160-200	250	350	400	450
		Z _{-25°C} / Z _{20°C}	4	4	4	4	8
7	Endurance	After 2000 Hours Life at 85°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within + 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 85° C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within + 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND CLAMP DETAILS



PLG Series Selection Guide: Can Sizes and Ripple Current Ratings

Vdc μF	16V		25V		35V		50V		63V		100V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
220												
330												
470												
680												
1000												
1500												
2200												
3300											30x50	2.7
4700											35x50	3.1
6800									30x50	3.2	40x60	3.6
10000							30x50	3.8	35x50	4.0	40x80	4.5
15000					30x50	4.2	35x50	4.2	35x80	4.5		
22000			30x50	4.4	35x50	4.5	40x60	4.8				
33000	30x50	4.7	35x50	5.0	35x50	5.4						
47000	35x50	5.2	40x60	6.0								
56000	35x50	5.6										
68000	40x60	6.0										

Vdc μF	200V		250V		350V		400V		450V			
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple		
220									30x50	0.95		
330							30x50	1.0	35x50	1.1		
470					30x50	1.4	35x50	1.2	40x60	1.3		
680			30x50	1.7	35x50	1.6	40x60	1.5				
1000	30x50	2.0	35x50	2.3	40x60	1.8						
1500	35x50	2.2	40x60	2.5								
2200	40x60	2.5										
3300												
4700												
6800												
10000												
15000												
22000												
33000												
47000												
56000												
68000												

Multpliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter in mm, L: Length of Aluminum Case in mm
 Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Maximum Operating Voltage

PSX SERIES - General Purpose, 105°C

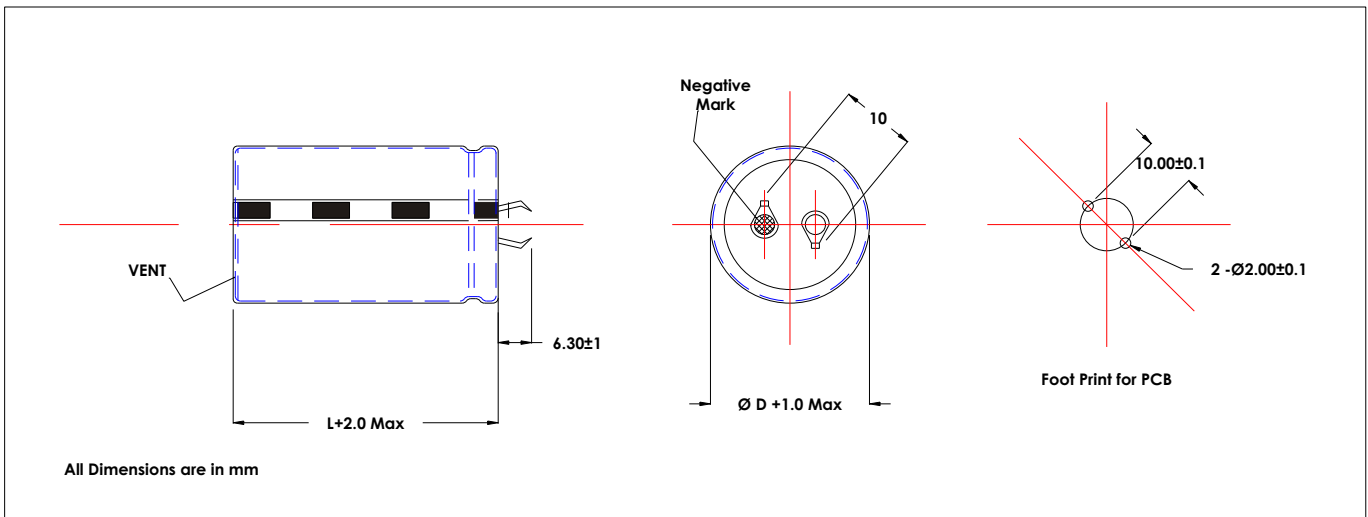
- Minimum Continuous Load Life: 1000 hours at 105°C
- For Power Supplies, Inverters, SMPS
- Snap-in Terminals
- Top Vent for Safety



SPECIFICATIONS

Parameter		Performance					
1	Operating Temperature Range	- 25° C ~ 105° C					
2	Rated Voltage Range	16 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (%. max at 100 Hz)	Vdc	16	25-35	50-100	160-400	450
		Max Rating	40	30	20	15	20
6	Temperature Characteristics Impedance Ratio (max)	Vdc	16	25-35	50-100	160-400	450
		Z-25°C / Z20°C	4	3	2	4	8
7	Endurance	After 1000 Hours Life at 105°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 105° C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND PCB FOOTPRINT



PSX Series Selection Guide: Can Sizes and Ripple Current Ratings

Vdc μF	16V		25V		35V		50V		63V		100V		160V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
47														
100														
150														
220														
330													22x30	1.15
470											22x25	0.80	22x40	1.30
1000											22x40	1.45	25x50	2.10
1500											22x50	1.90	30x50	2.70
2200											25x50	3.10	35x50	3.65
3300					22x30	1.35	22x40	1.90	22x50	2.20	30x50	4.00		
4700			22x30	1.50	22x40	1.70	22x50	2.35	25x50	2.80	35x50	5.10		
6800			22x40	1.90	22x50	2.15	25x50	3.20	30x50	3.55	35x56	5.60		
10000	22x30	1.90	22x50	2.35	25x50	2.85	30x50	3.95	35x50	4.40	35x60	6.10		
15000	22x40	2.50	25x50	3.10	30x50	3.70	35x56	4.75	35x60	5.05				
22000	25x40	3.25	30x50	4.00	35x50	4.85								
33000														
47000														

Vdc μF	200V		250V		315V		350V		400V		450V			
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple		
47											22x30	0.35		
100					22x30	0.60	22x30	0.60	22x40	0.65	22x40	0.60		
150					22x40	0.75	22x40	0.75	22x50	0.80	22x50	0.70		
220	22x30	0.75	22x30	0.85	22x50	0.95	25x40	1.00	25x50	1.05	25x50	0.90		
330	22x30	1.10	22x40	1.20	25x50	1.20	30x50	1.20	30x50	1.25	30x50	1.25		
470	22x40	1.30	22x50	1.50	30x50	1.60	35x50	1.65	35x50	1.70	35x50	1.55		
1000	30x50	2.00	35x50	2.15	35x56	2.10								
1500	30x50	3.80												
2200	35x56	3.65												
3300														
4700														
6800														
10000														
15000														
22000														
33000														
47000														

Multpliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter in mm, L: Length of Aluminum Case in mm
 Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Operating Voltage

P2X SERIES - Long Life, 105°C

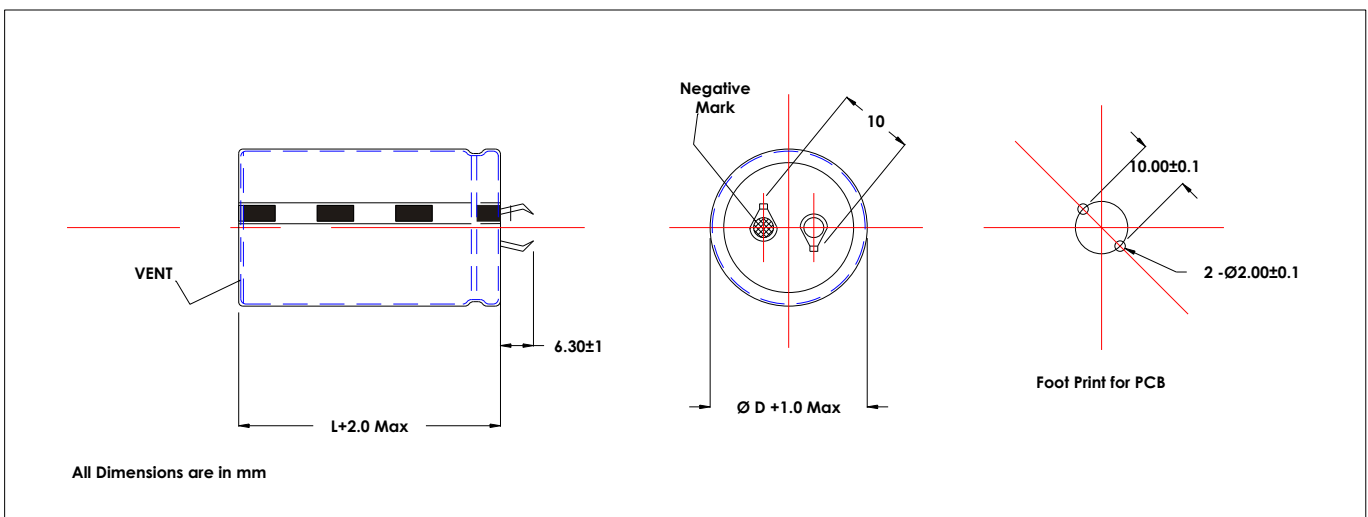
- Minimum Continuous Load Life: 2000 hours at 105°C
- For Power Supplies, Inverters, SMPS
- Snap-in Terminals
- Top Vent for Safety



SPECIFICATIONS

Parameter		Performance						
1	Operating Temperature Range	- 25° C ~ 105° C						
2	Rated Voltage Range	160 V to 450 V						
3	Capacitance Tolerance	± 20%						
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller						
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage						
5	Dissipation Factor (% , max at 100 Hz)	Vdc	160	200	250	350	400	450
		Max Rating			0.15			0.20
6	Temperature Characteristics Impedance Ratio (max)	Vdc	160	200	250	350	400	450
		Z _{-25°C} / Z _{20°C}		4			8	
7	Endurance	After 2000 Hours Life at 105°C with Rated Voltage and Ripple Current the DUT will meet the following conditions						
		Capacitance Change	Within + 20% of initial value					
		Leakage Current	Less than the specified value					
		Dissipation Factor	Less than 200% of specified value					
8	Shelf Life	After 1000 Hours Shelf Life at 105°C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions						
		Capacitance Change	Within + 20% of initial value					
		Leakage Current	Less than the specified value					
		Dissipation Factor	Less than 200% of specified value					
9	Other Details	As per IEC 384-4						

DIMENSIONS AND PCB FOOTPRINT



P2X Series Selection Guide: Can Sizes and Ripple Current Ratings

μF \ Vdc	160V		200V		250V		350V		400V		450V	
	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple	DxL	Ripple
47												
100							22x30	0.69	22x30	0.70	22x40	0.70
150							22x40	0.85	22x40	0.85	22x50	0.85
220			22x30	1.00	22x30	1.00	22x50	1.05	22x50	1.10	25x50	1.10
330	22x30	1.20	22x30	1.20	25x30	1.30	25x50	1.30	25x50	1.45	30x50	1.45
470	22x30	1.55	22x40	1.50	25x40	1.65	30x50	1.65	30x50	1.90	35x50	1.85
560	22x40	1.65	22x40	1.65	25x40	1.80	30x50	1.85	35x50	2.10		
680	22x40	1.80	22x50	1.80	25x50	2.00	35x50	2.00				
1000	22x50	2.25	25x50	2.30	30x50	2.45						
1500					35x50	3.00						
2200												

Multippliers Table for Ripple Current Specification

Parameter	50 Hz	100 Hz	1K Hz	10K Hz	105°C	85°C	65°C
Coefficient	0.8	1.0	1.3	1.5	1.0	1.7	2.1

Abbreviations Used:- D: Diameter of Aluminum Case in mm, L: Length of Aluminum Case in mm
 Ripple Current: Maximum Rating, in Amperes at rated Operating Temperature and rated Maximum Operating Voltage

PCC SERIES - Screw Terminal, General Purpose, 85°C

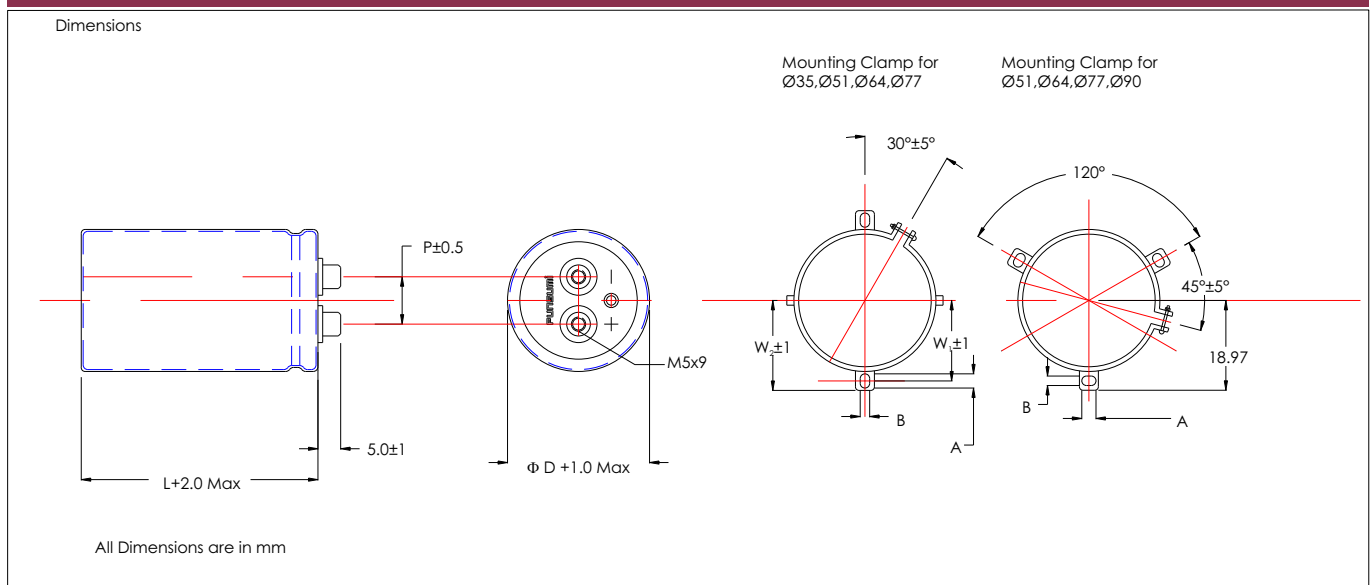
- Minimum Continuous Load Life: 2000 hours at 85°C
- For Inverters
- Screw Terminals



SPECIFICATIONS

	Parameter	Performance					
1	Operating Temperature Range	- 25°C ~ 85°C					
2	Rated Voltage Range	16 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (%, max at 100Hz)	Please See Tables On Next Page					
6	Temperature Characteristics Impedance Ratio (max)	Vdc	16	25-35	50-100	160-400	450
		Z-25°C / Z20°C	4	3	2	4	8
7	Endurance	After 2000 Hours Life at 85°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 85°C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within ± 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND CLAMP DETAILS



PCC Series Selection Guide: Can Sizes, Ripple Current Ratings and Dissipation Factor

μF \ Vdc	160V			200V			250V		
	DxL	Ripple	D.F.	DxL	Ripple	D.F.	DxL	Ripple	D.F.
560							35x50	1.30	0.15
820				35x50	1.60	0.15	35x50	1.40	0.15
1000				35x50	1.70	0.15	35x80	1.50	0.15
1200	35x50	2.00	0.15				35x80	2.30	0.15
1500							51x80	3.00	0.15
1800				35x80	2.80	0.15	51x80	3.30	0.15
2200	35x80	3.40	0.15	51x80	3.70	0.15	51x80	3.50	0.15
2700	51x80	3.70	0.32	51x80	4.00	0.15			
3300	51x80	4.50	0.15	51x80	4.50	0.15	51x100	5.10	0.15
3900							51x115	5.90	0.15
4700	51x80	5.60	0.20	51x100	7.10	0.20	64x100	7.30	0.20
5600	51x100	6.30	0.20	51x115	8.20	0.20	64x100	7.90	0.20
6800	51x100	7.50	0.20				64x115	8.70	0.20
8200	51x115	8.10	0.20	64x100	10.00	0.20			
10000	64x100	9.80	0.20	64x115	11.00	0.20	77x115	11.10	0.20
12000	64x115	10.80	0.20	77x100	11.50	0.20	77x130	13.00	0.20
15000	77x100	12.70	0.20	77x115	12.80	0.20	90x130	14.90	0.20
18000	77x115	14.00	0.20	77x130	15.00	0.20			
22000	77x130	16.60	0.20	90x130	17.00	0.25			
33000	90x130	18.90	0.25						

μF \ Vdc	350V			400V			450V		
	DxL	Ripple	D.F.	DxL	Ripple	D.F.	DxL	Ripple	D.F.
270							35x50	1.6	0.25
330				35x50	1.7	0.25			
470							35x80	2.4	0.25
560				35x80	2.7	0.25			
680	35x80	2.9	0.25			0.25	51x80	3.1	0.25
820			0.25	51x80	3.4	0.25	51x80	3.5	0.25
1000	51x80	4.2	0.25	51x80	4	0.25	51x80	3.9	0.25
1200	51x80	4.5	0.25	51x80	4.2	0.25	51x100	4.7	0.25
1500	51x80	4.7	0.25	51x100	5.3	0.25	51x115	5.6	0.25
1800				51x100	5.7	0.25	51x130	6.5	0.25
2200	51x100	6.3	0.25	51x130	7.2	0.25	64x100	7.2	0.25
2700				64x100	7.9	0.25	64x115	8.6	0.25
3300	64x100	8.8	0.25	64x115	9.5	0.25	77x100	9.8	0.25
3900	64x115	10.3	0.25	77x100	10.6	0.25	77x115	11.5	0.25
4700	77x100	11.7	0.25	77x115	12	0.25	77x130	13.3	0.25
5600	77x115	12.6	0.25	77x130	14.5	0.25	77x155	15.7	0.25
6800	77x130	15.9	0.25	77x155	17.3	0.25	90x130	17	0.25
8200	77x155	19	0.25	90x130	19	0.25	90x155	18.6	0.25
10000	90x130	21.5	0.25	90x155	20.5	0.25			0.25
12000	90x155	22.5	0.25						

Abbreviations Used:- D: Diameter in mm, L: Length of Aluminum Case in mm
 Ripple Current: in Amperes at rated Operating Temperature and rated Operating Voltage

PCX SERIES - Screw Terminal, Long Life, 105°C

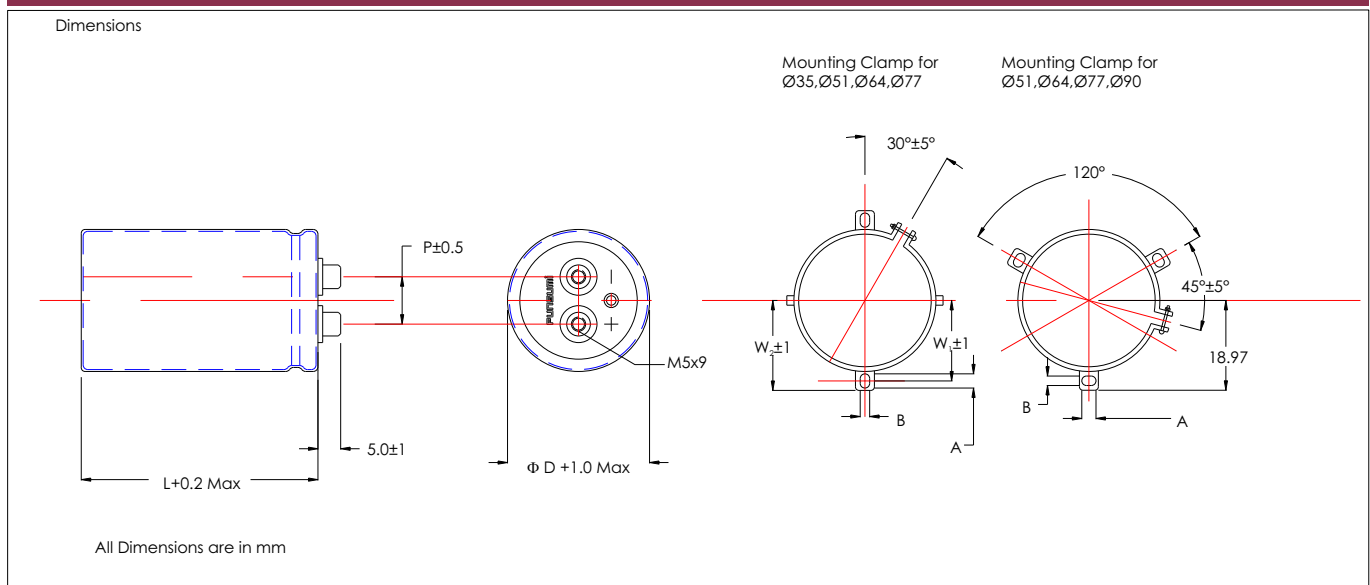
- Minimum Continuous Load Life: 2000 hours at 105°C
- For Inverters
- Screw Terminals



SPECIFICATIONS

Parameter		Performance					
1	Operating Temperature Range	- 25° C ~ 105° C					
2	Rated Voltage Range	16 V to 450 V					
3	Capacitance Tolerance	± 20%					
4	Leakage Current (Max) - Apply Rated Voltage for 5 minutes before test	I = 0.02 CV or 5 mA, whichever is smaller					
		I = Leakage Current; C= Rated Capacitance; V = Rated Working Voltage					
5	Dissipation Factor (%, max at 100Hz)	Please See Tables on Next Page					
6	Temperature Characteristics Impedance Ratio (max)	Vdc	16	25-35	50-100	160-400	450
		Z-25°C / Z20°C	4	3	2	4	8
7	Endurance	After 2000 Hours Life at 105°C with Rated Voltage and Ripple Current the DUT will meet the following conditions					
		Capacitance Change	Within + 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
8	Shelf Life	After 1000 Hours Shelf Life at 105°C and thereafter pre-treatment as per IEC 384-1 the DUT will meet the following conditions					
		Capacitance Change	Within + 20% of initial value				
		Leakage Current	Less than the specified value				
		Dissipation Factor	Less than 200% of specified value				
9	Other Details	As per IEC 384-4					

DIMENSIONS AND CLAMP DETAILS



PCX Series Selection Guide: Can Sizes, Ripple Current Ratings and Dissipation Factor

Vdc μF	160V			200V			250V		
	DxL	Ripple	D.F.	DxL	Ripple	D.F.	DxL	Ripple	D.F.
330				36x50	0.8	0.15	36x50	0.80	0.15
470				36x50	1.1	0.15	36x50	1.00	0.15
560	36x50	1.1	0.15	36x50	1.2	0.15	36x50	1.10	0.15
680	36x50	1.2	0.15	36x50	1.20	0.15	36x80	1.30	0.15
820	36x50	1.3	0.15	36x50	1.30	0.15	36x80	1.50	0.15
1000	36x50	1.5	0.15	36x80	1.50	0.15	36x80	1.50	0.20
1200	36x50	1.70	0.15	36x80	1.70	0.15	36x80	1.60	0.20
1500	36x80	1.90	0.15	36x80	2.10	0.15	51x80	1.90	0.20
1800	36x80	2.30	0.15	36x80	2.30	0.15	51x80	2.30	0.20
2200	36x80	2.50	0.15	51x80	2.70	0.15	51x80	2.60	0.20
2700	51x80	3.00	0.15	51x80	3.30	0.15	51x100	3.20	0.20
3300	51x80	3.50	0.15	51x80	3.70	0.15	51x115	3.80	0.20
3900	51x80	3.50	0.20	51x100	4.50	0.15	51x115	4.20	0.20
4700	51x100	4.20	0.20	64x100	4.80	0.20	64x115	5.20	0.20
5600	51x100	4.60	0.20	64x100	5.30	0.20	64x115	5.70	0.20
6800	51x115	5.60	0.20	64x115	6.30	0.20	77x115	7.00	0.20
8200	64x100	6.40	0.20	64x115	6.90	0.20	77x115	7.60	0.20
10000	64x115	7.60	0.20	77x115	8.50	0.20	77x130	9.10	0.20
12000	77x100	8.60	0.20	77x115	9.30	0.20	90x130	10.80	0.20
15000	77x115	10.30	0.20	77x130	11.10	0.20			
18000	77x130	12.20	0.20	90x130	11.90	0.25			
22000	90x130	13.20	0.25						

WV μF	350V			400V			450V		
	DxL	Ripple	D.F.	DxL	Ripple	D.F.	DxL	Ripple	D.F.
180	36x50	0.7	0.10	36x50	0.7	0.10	36x50	0.7	0.15
220	36x50	0.8	0.10	36x50	0.8	0.10	36x60	0.8	0.15
270	36x50	0.9	0.10	36x50	0.9	0.10	36x60	0.9	0.15
330	36x50	1.0	0.10	36x50	1.1	0.10	36x80	1.0	0.15
390	36x50	1.2	0.10	36x80	1.2	0.10	36x80	1.1	0.15
470	36x80	1.3	0.10	36x80	1.3	0.10	51x80	1.2	0.15
560	36x80	1.5	0.10	36x80	1.3	0.15	51x80	1.2	0.20
680	36x80	1.5	0.15	51x80	1.5	0.15	51x80	1.4	0.20
820	51x80	1.6	0.15	51x80	1.8	0.15	51x80	1.7	0.20
1000	51x80	2.0	0.15	51x80	2.0	0.15	51x100	1.9	0.20
1200	51x80	2.2	0.15	51x100	2.5	0.15	51x115	2.4	0.20
1500	51x100	2.7	0.15	51x115	3.0	0.15	64x100	2.9	0.20
1800	51x115	3.3	0.15	51x115	3.2	0.15	64x100	3.0	0.20
2200	51x115	3.6	0.15	64x100	3.8	0.15	64x115	3.6	0.20
2700	64x100	4.2	0.15	64x100	4.2	0.15	77x115	4.0	0.20
3300	64x100	5.2	0.15	64x115	5.0	0.15	77x130	4.8	0.20
3900	77x115	6.1	0.15	77x130	5.8	0.15	77x130	5.6	0.20
4700	77x115	7.2	0.15	77x130	6.9	0.15	77x155	6.6	0.20
5600	77x130	7.6	0.15	77x130	8.6	0.15	90x130	9.0	0.20
6800	77x130	8.6	0.15	90x130	9.5	0.15			
8200	90x130	10.0	0.15						

Abbreviations Used:- D: Diameter in mm, L: Length of Aluminum Case in mm
 Ripple Current: in Amperes at rated Operating Temperature and rated Operating Voltage

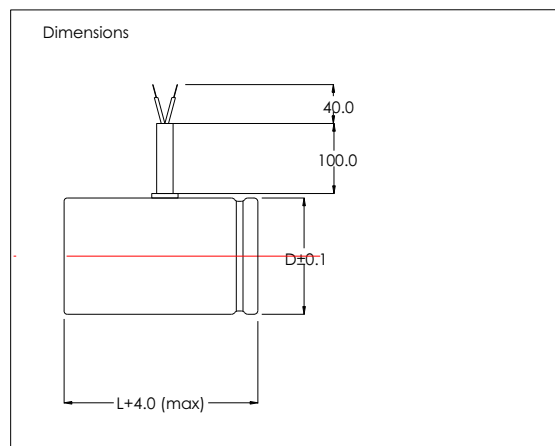
PAC SERIES – AC Motor Start Capacitors

- Vibration Resistant Design
- For Fractional HP Motors
- Screw Terminal Heavy duty load series also available



SPECIFICATIONS

	Parameter	Performance
1	Operating Temperature Range	- 25°C ~ 70°C
2	Rated Voltage Range	230 Vrms
3	Surge Voltage	275 Vrms
4	Duty Cycle	Maximum of 20 starts per hour, each start not more than 3 seconds duration at rated voltage
5	Shelf Life	One Year
7	Power Factor at 230Vrms, 50 Hz, 25oC	10% max.
	Insulation Voltage	Can withstand 2000Vrms for one minute between termination and outer case.
8	Polarity	None
9	Other Details	As per IS 2993



Capacitance Value	Motor Rating	Case Size	
		PAC	PA2
µF	HP		
20-25	1/8	35x80	30x50
30-40	1/6	40x80	35x60
40-60	1/4	40x80	35x60
60-80	1/3	40x80	35x60
80-100	1/2	40x100	35x80
100-120	2/3	40x100	35x80
120-150	1	40x100	40x80
150-200	5/4	45x125	40x100
200-250	5/4	45x125	40x100

Introduction – Surge Protective Devices

Punsumi's range of Surge Protective Devices, include micro-gap Spark Gaps and hybrid modules, to cover a wide range of applications from protection against surges and spikes on low voltage circuits, Communication Systems and Power Supply Circuits.

The heart of Punsumi's low-voltage SPD range is a specially designed Silicon Chip which controls the separation of electrodes in low-voltage Spark Gaps and also facilitates a rapid response to provide low Impulse Breakdown Voltage and a flat V-t Curve.

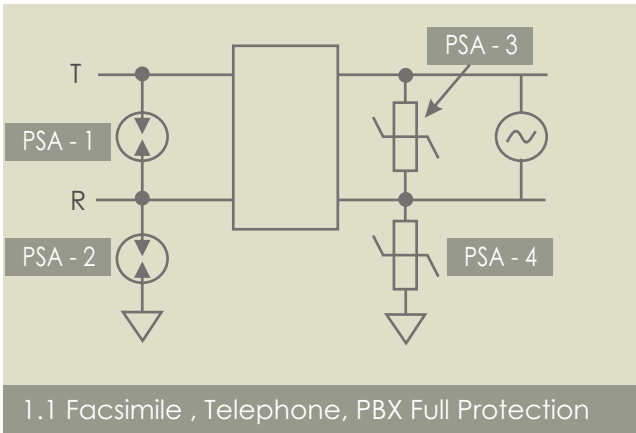
For the High Voltage SPD range, a precision ceramic tube with nano-structures is used to ensure stable Spark-over Voltage Range and provide a high Surge Current Capacity.

Both Low-Voltage and High Voltage Spark Gaps form the underlying basis of the Hybrid Protection Modules namely the Power Line Module (PLM) and the High Voltage Module (HVM). Both Modules use the benefits of Spark Gaps to provide a low Clamping Voltage and Long Surge Life.

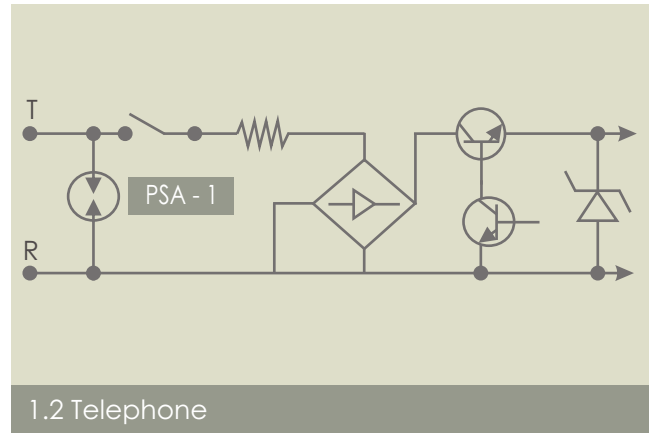
Salient Features		Patents	
Spark Gaps (PTA, PTB, PTC, PTHC)	Hybrid Modules (PLM & HVM)	USA	No. 5,436.608
		Taiwan	No. 67,998
▪ Low Impulse Breakdown Voltage	▪ Low Clamping Voltage	Japan	No. 100,295
▪ High Surge Current Capacity	▪ High Surge Current Capacity	Korea	No. 93/23092
▪ Long Surge Life	▪ No Thermal Runaway	China	No. 93/105683.7
▪ Fast Response	▪ Long Surge Life	India	No. 93/8923
▪ Low Capacitance	▪ Applications for DC and AC Lines	Germany	No. 4337928
▪ High Insulation Resistance	▪ Low Capacitance	Punsumi Surge Absorbers were designed by Mr K Tachibana. Now a free-lance scientist, Mr Tachibana served as a design engineer at Mitsubishi Corpn., Japan for over 29 years. Today, he holds many patents for different Discharge Glow Elements.	
▪ Small Size	▪ High Insulation Resistance		
▪ No Radio-Active Substances	▪ No Radio-Active Substances		

Applications – Surge Protective Devices

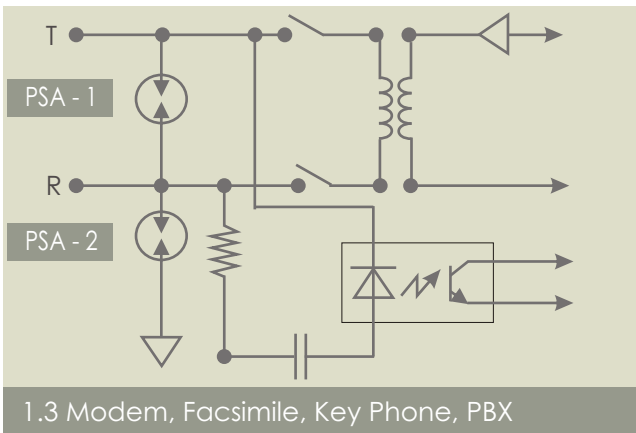
1 - Telecommunication Equipments



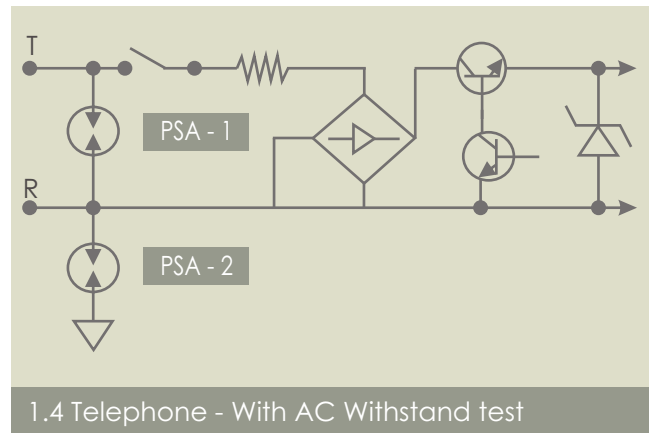
1.1 Facsimile , Telephone, PBX Full Protection



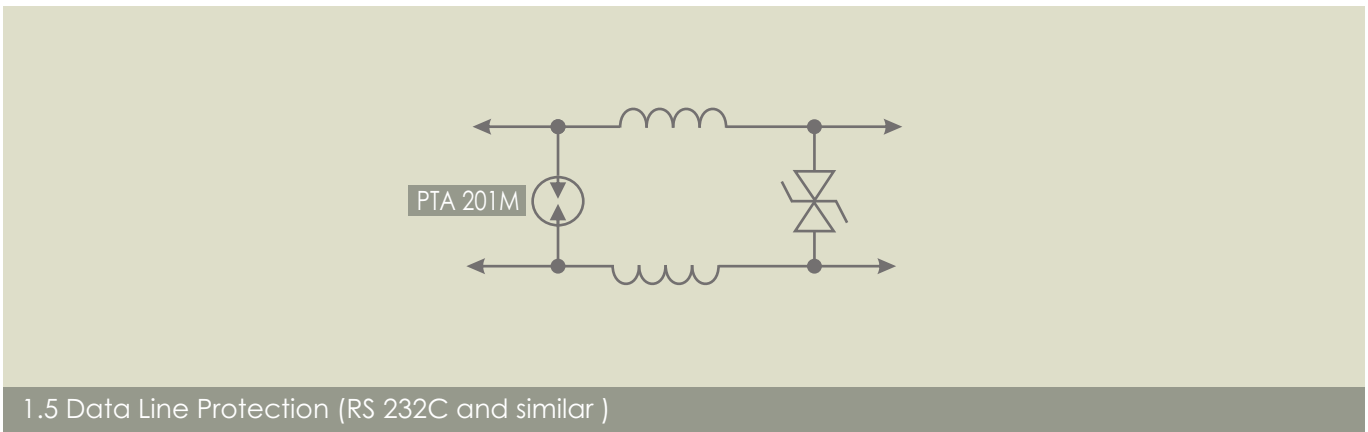
1.2 Telephone



1.3 Modem, Facsimile, Key Phone, PBX



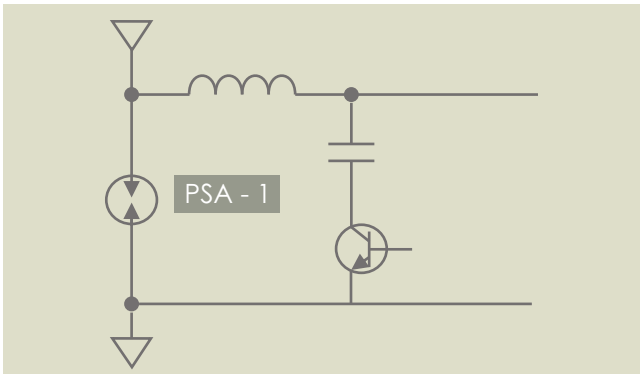
1.4 Telephone - With AC Withstand test



1.5 Data Line Protection (RS 232C and similar)

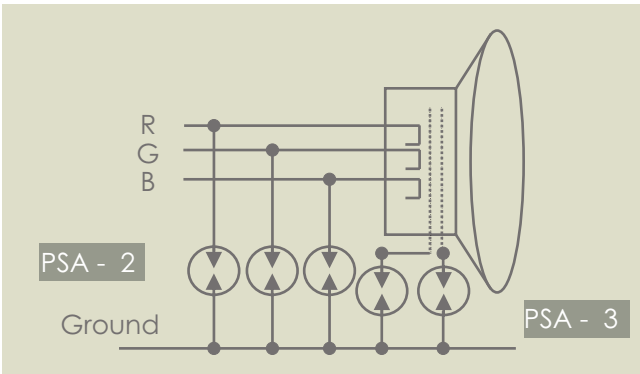
Section 1	Telecom Section			Power Supply Section	
	Common Mode		Differential Mode	AC 125V	AC 250V
	Without AC Withstand test	With AC Withstand test			
PSA1	PTA 301L	PTA 301L	PTA 301L		
PSA2	PTA 301L	PTHCB 302M			
PSA3				PLM CZR 501M	PLM CZR 701M
PSA4				HVM CZR 242M	HVM CZR 302M

2 - Automotive Electronics



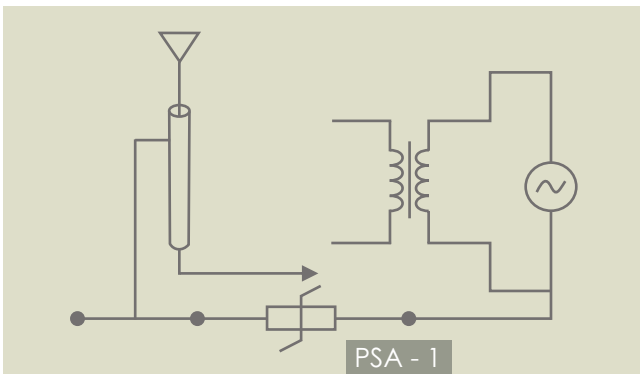
2.1 Car Stereo

RGB Amplifier Protection for CRT

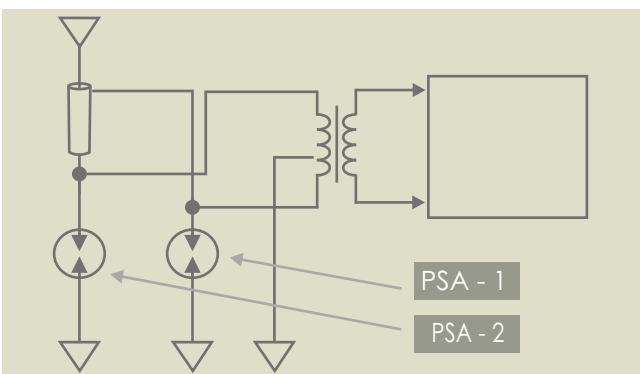


3.2 CRT Protection

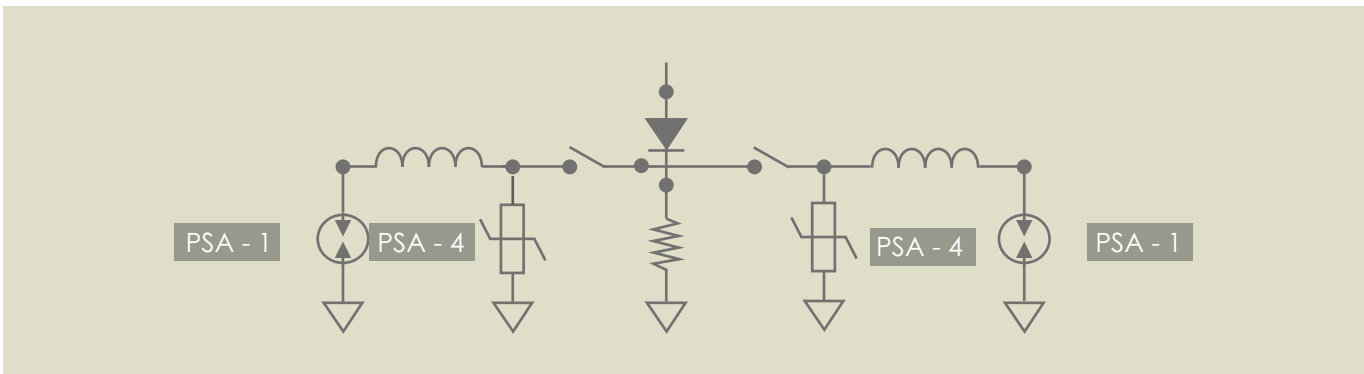
3 - Television and Allied Equipment



3.1 TV Antenna



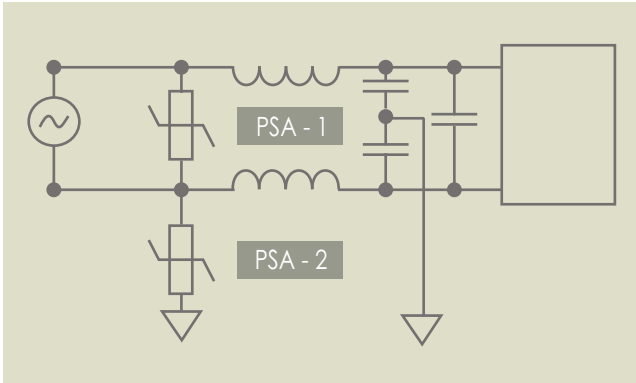
3.3 Satellite Set Top Box



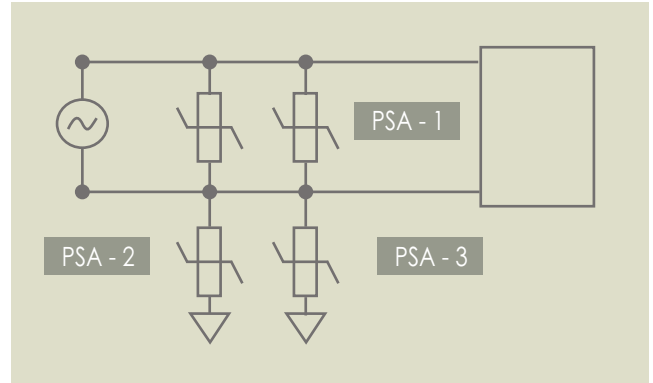
3.4 Cable TV Booster / Repeater

Section 1	Telecom Section			Power Supply Section	
	Common Mode		Differential Mode		
	Without AC Withstand test	With AC Withstand test		AC 125V	AC 250V
PSA-1	PTA 201M	PTA 201M	PTA 201M		
PSA-2	PTB 301M	PTB 301M	PTB 301M		
PSA-3	PTHC 102M	PTHC 102M	PTHC 102M		
PSA-4				HVM BZR 302M	HVM BZR 362M

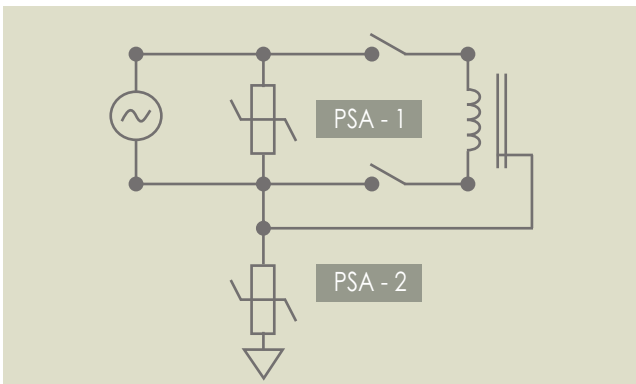
4 - Power Supply Protection



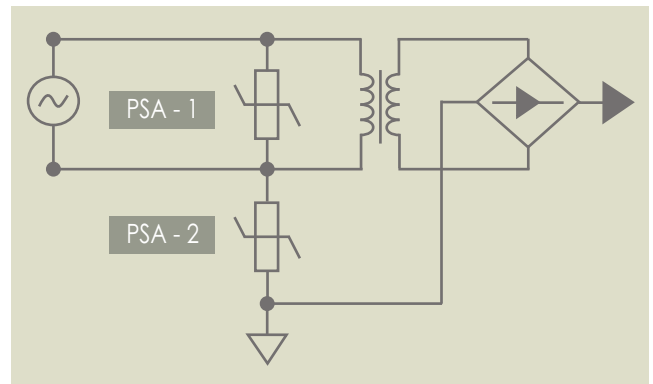
4.1 SMPS Protection



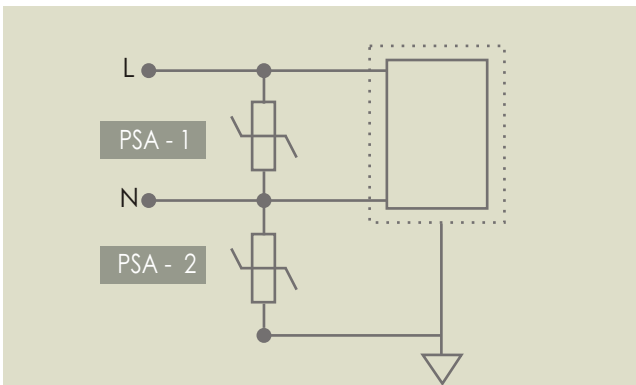
4.2 PC Printer Protection



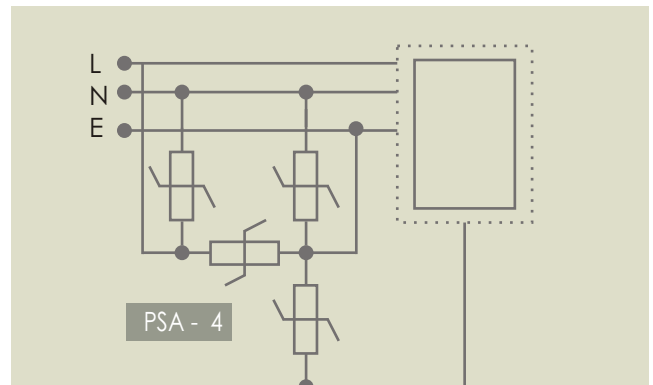
4.3 Microwave Protection



4.4 Water Heater Controller Unit



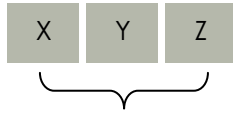
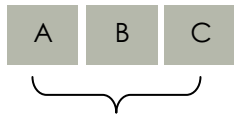
4.5 Equipment requiring AC Withstand Voltage Test



4.6 Equipment using 3-Phase power supply

Section 4	Telecom Section			Power Supply Section	
	Common Mode		Differential Mode	AC 125V	AC 250V
	Without AC Withstand test	With AC Withstand test			
PSA1			PLM BZR 501M	PLM BZR 701M	
PSA2			HVM BZR 302M	HVM BZR 362M	
PSA3			HVM BZR 302M	HVM BZR 362M	
PSA4			PLM BZR 701M	PLM BZR 102M	

Product Codification and Ordering – Surge Protective Devices



Series	Code		
	A	B	C
PTA	P	T	A
PTB	P	T	B
PTC	P	T	C
PTHCA	H	C	A
PTHCB	H	C	B
PLM BZR	P	L	B
PLM CZR	P	L	C
PLM DZR	P	L	D
PLM BXT	P	L	X
HVM BZR	H	V	B
HVM CZR	H	V	C

DC Breakdown Voltage	Code		
	X	Y	Z
200	2	0	1
300	3	0	1
400	4	0	1
500	5	0	1
1000	1	0	2
1200	1	2	2
1500	1	5	2
1800	1	8	2
2000	2	0	2
2400	2	4	2
3000	3	0	2
3600	3	6	2

Packing	Code
	P
Bulk	B
Axial Taped	A
Radial Taped	R

Tolerance	Code
	T
L	+ 15%
M	+ 20%
N	+ 30%

Notes:

- i) Please mention product code while ordering
- ii) If no tolerance is specified it will be assumed to be + 20%
- iii) If no Packing is specified it will be assumed to be Axial Taped for Surge Absorbers and Bulk for Power Line Modules and High Voltage Modules
- iv) Please See Next page for MOQ and Standard Packing Quantity.

Lot Numbering System – Surge Protective Devices

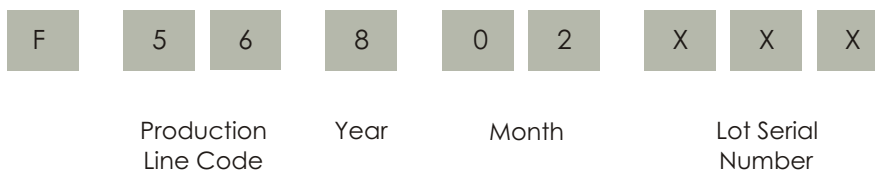
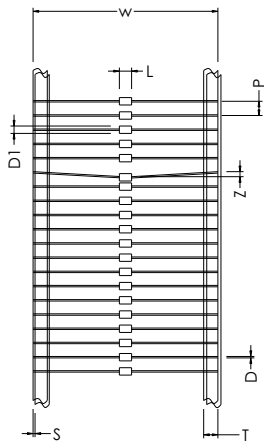


Illustration: Lot Number: F06802102 implies:-

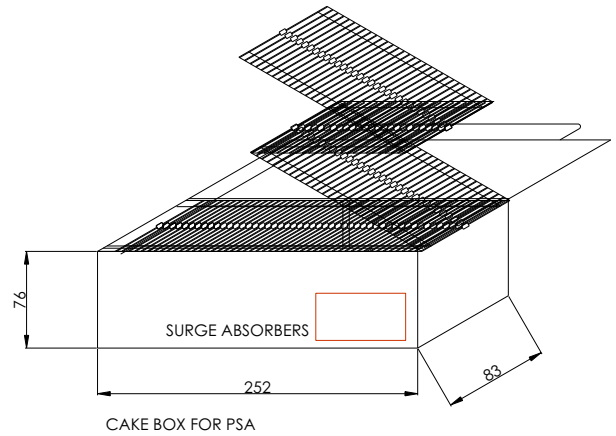
Production Line Code	Year of Manufacture	Month of Manufacture	Lot serial Number
06	2008	02 – (February)	102

Packing – Surge Protective Devices

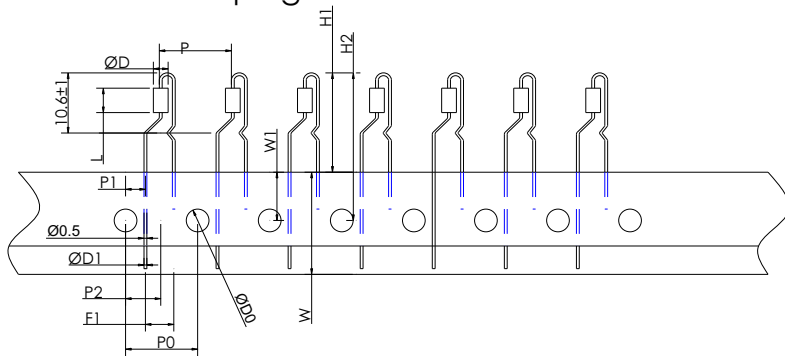
Axial Taping



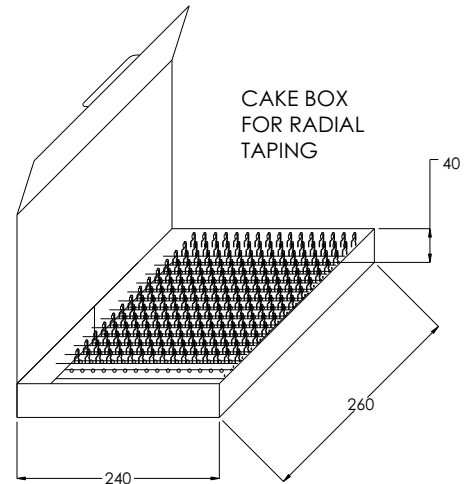
W	65
P	5.0+0.5
T	6.0±1.0
Z	1.2 max
S	0.8 max
D	φ 0.5±0.05
D1	φ 2.6 ± 0.4
L	4.0 ± 0.3
All Dimensions in mm	



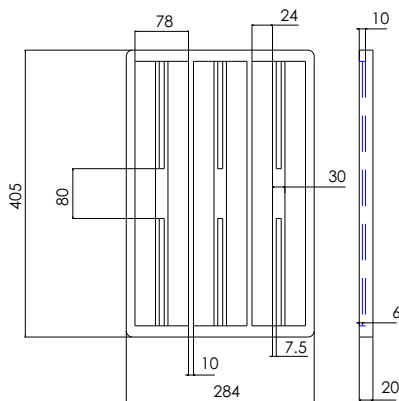
Radial Taping



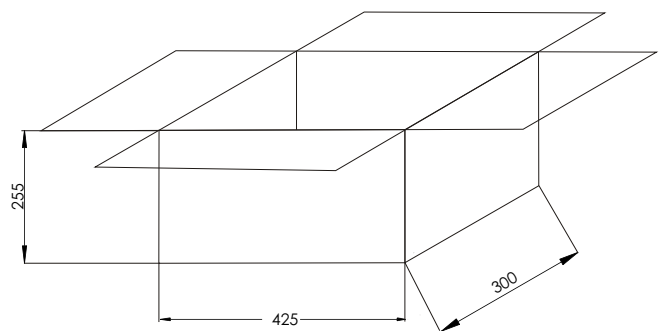
P	P0	P1	P	F1	W	W1	H1	H2	D	D0	D1	L
12.7±1.0	12.7±0.5	3.5±0.5	6.35±0.5	5.0±1.0	18.0±1.0	8.5±0.5	17.5±1.0	29 max	2.6±0.2	4.0±0.3	0.5±0.05	4.3±0.3



Packing - PLM and HVM



OUTER CARTON FOR PSA, PLM AND HVM



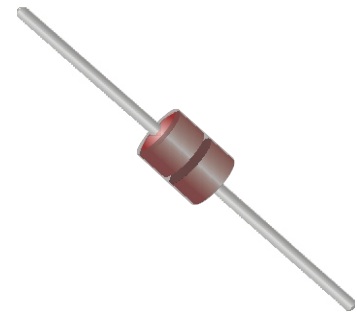
INTERNAL DIMENSION IN MM

Standard Packing Quantities and MOQ

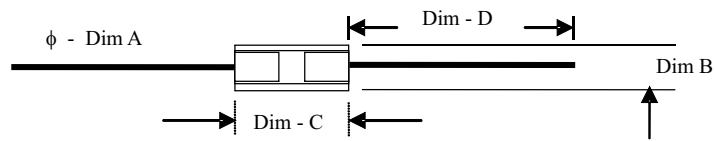
Series	Packing type	Qty in Pouches No.s	Qty in Cake Boxes No.s	Qty in Trays No.s	No of Pouches per cake box	Qty in Cartons			MOQ No.s
						No of Cake Boxes	No of trays	Total Qty No.s	
PTA	Bulk	500	5000		10	15		75000	75000
PTA	Axial		5000			15		75000	75000
PTA	Radial		5000			10		50000	50000
PTB	Bulk	300	3000		10	15		45000	45000
PTB	Axial		3000			15		45000	45000
PTB	Radial		3000			10		30000	30000
PTC	Bulk	300	3000		10	15		45000	45000
PTC	Axial		3000			15		45000	45000
PTC	Radial		3000			10		30000	30000
PTHCA	Bulk	200	2000		10	15		30000	30000
PTHCA	Axial		2000			15		45000	30000
PTHCA	Radial		2000			10		20000	20000
PTHCB	Bulk	300	3000		10	15		45000	45000
PTHCB	Axial		3000			15		45000	45000
PTHCB	Radial		3000			10		30000	30000
PLM BZR	Bulk			100			10	1000	1000
PLM CZR	Bulk	100			25			2500	2500
PLM DZR	Bulk	100			30			3000	3000
PLM BXT	Bulk			100			10	1000	1000
HVM BZR	Bulk			100			10	1000	1000
HVM CZR	Bulk	100			25			2500	2500

PTA Series – Low Voltage Surge Absorbers

- Low Impulse Breakdown Voltage
- Fast Response
- Long Surge Life
- Low Capacitance
- High Insulation Resistance
- DO-35 Glass Package



Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
PTA	DO-35	0.5	1.78	3.8	28.0

Printing



Example: Code for 102M

		Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White
Band1	First Digit	0	1	2	3	4	5	6	7	8	9
Band2	Second Digit	0	1	2	3	4	5	6	7	8	9
Band3	Third Digit	0	1	2	3	4	5	6	7	8	9

Product Selection Guide

Model	DC Spark-over Voltage Vs (V)	Insulation Resistance	Capacitance	Surge Life test	Surge Current Capacity
PTA	201M	160-240	> 100 MΩ @ 100VDC	8x20μ s, 100A, 1 min. interval, 50 times	8x20μs, 500A 3 times, 5min. interval
	251M	200-300			
	301L	255-345			
	301LS	270-360			
	301M	240-360			

Packing

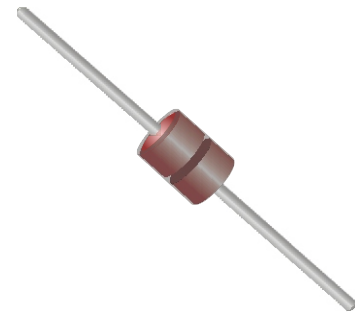
Available in Bulk, Radial and Axial Taping. Qty: 3000 Pcs./box (Bulk: 10 pouches/box, 300pcs/pouch)

Applications

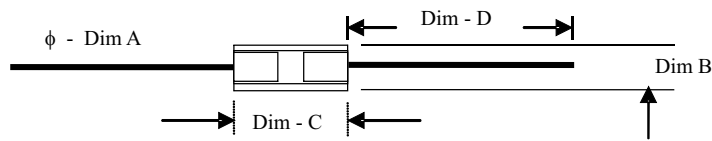
Please Refer to Page 31 & 32

PTB Series – Middle Voltage Surge Absorbers

- Low Impulse Breakdown Voltage
- Fast Response
- High Surge Current Capacity
- Long Surge Life
- Low Capacitance
- High Insulation Resistance
- DO-41 Glass Package



Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
PTB	DO-41	0.5	2.6	4.3	28.0

Printing



Example: Code for 102M

		Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White
Band1	First Digit	0	1	2	3	4	5	6	7	8	9
Band2	Second Digit	0	1	2	3	4	5	6	7	8	9
Band3	Third Digit	0	1	2	3	4	5	6	7	8	9

Product Selection Guide

Model	DC Spark-over Voltage Vs (V)	Insulation Resistance	Capacitance	Surge Life test	Surge Current Capacity
PTB	251M	> 100 MΩ @ 100VDC	< 1pF	8X20μs, 100A, 30 sec interval, 300 times	8x20μ s, 1.5 kA, 3 times, 5min. interval
	301L				
	301LS				
	301M				
	301MS	> 100 MΩ @ 250VDC			
	401M				
	501M				

Packing

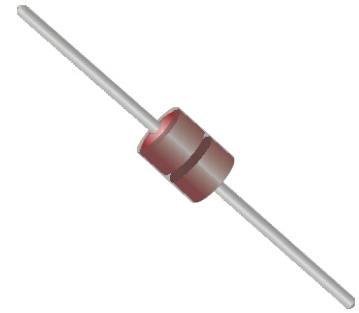
Available in Bulk, Radial and Axial Taping. Qty: 3000 Pcs./box (Bulk: 10 pouches/box, 300pcs/pouch)

Applications

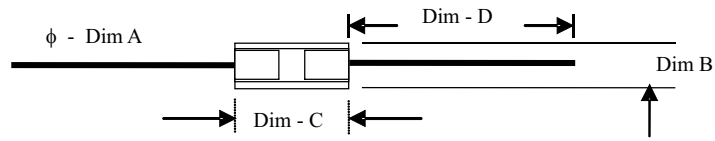
Please Refer to Page 31 & 32

PTC SERIES – LOW VOLTAGE SURGE ABSORBERS

- Low Impulse Breakdown Voltage
- Fast Response
- Very High Surge Current Capacity
- Long Surge Life
- Low Capacitance
- High Insulation Resistance
- DO-41L Glass Package



Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
PTC	DO-41L	0.5	3.2	7.5	28.0

Printing



Example: Code for 102M

		Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White
Band1	First Digit	0	1	2	3	4	5	6	7	8	9
Band2	Second Digit	0	1	2	3	4	5	6	7	8	9
Band3	Third Digit	0	1	2	3	4	5	6	7	8	9

Product Selection Guide

Model	DC Spark-over Voltage Vs (V)	Insulation Resistance	Capacitance	Surge Life test	Surge Current Capacity
PTC	201M	160-240	> 100 MΩ @ 100VDC	< 1pF	8x20μs, 100A, 1 min. interval, 50 times
	251M	200-300			
	301L	255-345			
	301LS	270-360			
	501M	240-360			
					8x20μs, 500A 3 times, 5min. interval

Packing

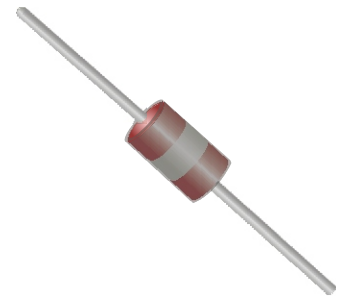
Available in Bulk, Radial and Axial Taping. Qty: 3000 Pcs./box (Bulk: 10 pouches/box, 300pcs/pouch)

Applications

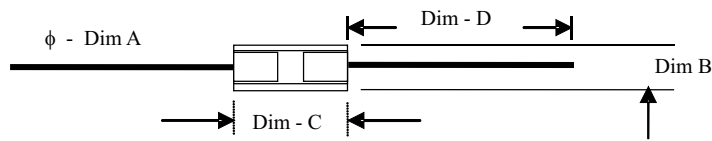
Please Refer to Page 31 & 32

PTHC SERIES – HIGH VOLTAGE CERAMIC SPARK GAPS

- Low Impulse Breakdown Voltage
- Fast Response
- High Surge Current Capacity
- Long Surge Life
- Low Capacitance
- High Insulation Resistance
- DO-41L Glass Package



Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
PTHC - A	DSS	0.5	3.1	7.5	28.0
PTHC - B	DO-41	0.5	2.6	4.3	28.0

Marking : Printing



Example: Code for 102M

		Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White
Band1	First Digit	0	1	2	3	4	5	6	7	8	9
Band2	Second Digit	0	1	2	3	4	5	6	7	8	9
Band3	Third Digit	0	1	2	3	4	5	6	7	8	9

Product Selection Guide

Model		DC Spark-over Voltage Vs (V)	Insulation Resistance	Capacitance	Surge Life test		Surge Current Capacity	
PTHC B	102M	800-1200	> 100 MΩ @ 250VDC	< 2pF	PTHC A	PTHC B	8x20μs, 750A, 24 times, 2 min interval in series with 80 Ohm resistor	
	152M	1200-1800			8x20μs, 100A, 1 min. interval, 50 times			
PTHC A	242M	1900-2900						
	302M	2400-3600						
	362M	2800-4300						

Packing

Available in Bulk, Radial and Axial Taping. Qty: 3000 Pcs./box (Bulk: 10 pouches/box, 300pcs/pouch)

Applications

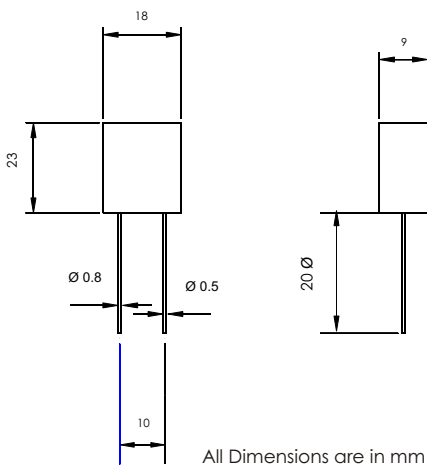
Please Refer to Page 31 & 32

PLM BZR SERIES – GENERAL PURPOSE PROTECTION FOR SURGES ON AC LINES

The PLM BZR series has been designed, for application on AC lines, as a direct replacement of the 14mm diameter Metal Oxide Varistor (MOV). Against a comparably rated MOV the PLM BZR offers:-

- HIGH SURGE CURRENT CAPACITY
- WIDE VOLTAGE RANGE
- LONG SURGE LIFE
- LOW CLAMPING VOLTAGE
- FAST RESPONSE
- LOW CAPACITANCE
- HIGH INSULATION RESISTANCE
- NO THERMAL RUNAWAY
- UL RECOGNISED – E300611

Mechanical Dimensions



Product Selection Guide

Model	DC Spark-over Voltage Vs (V)	Insulation Resistance	Clamping Voltage @ 50A	Surge Life Test	Surge Current Capacity	AC withstand voltage	Capacitance
PLM BZR	301L	255-345	275 V	8x20µs, 100A, 30sec, 500 times	8x20µs, 5 min. 3kA, 3 times	140 V	<2pF
	401M	320-480	275 V			175 V	
	501M	400-600	500 V			250 V	
	601M	480-720	600 V			275 V	
	701M	560-840	750 V			330 V	
	102M	800-1200	850 V			500 V	
	701M	560-840	750 V			330 V	

Packing

Available in Bulk Packing Qty: 100 Pcs./tray (Bulk: 10 trays/carton)

Applications

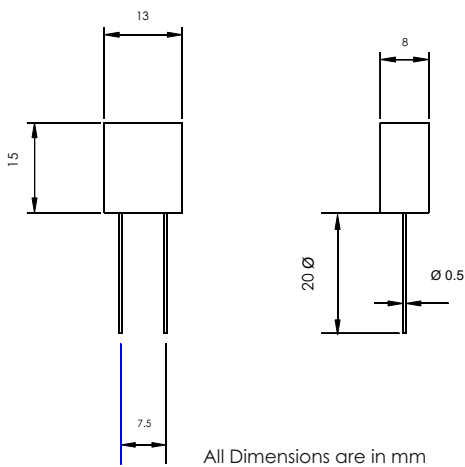
Please Refer to Page 31, 32, 33

PLM CZR SERIES – GENERAL PURPOSE PROTECTION FOR SMALL APPLIANCES

The PLM CZR series has been designed, for application in small AC powered appliances, as a direct replacement of the 10mm diameter Metal Oxide Varistor (MOV). Against a comparably rated MOV the PLM CZR offers:-

- HIGH SURGE CURRENT CAPACITY
- WIDE VOLTAGE RANGE
- LONG SURGE LIFE
- LOW CLAMPING VOLTAGE
- FAST RESPONSE
- LOW CAPACITANCE
- HIGH INSULATION RESISTANCE
- NO THERMAL RUNAWAY

Mechanical Dimensions



Product Selection Guide

Model		DC Spark-over Voltage Vs (V)	Insulation Resistance	Clamping Voltage @ 50A	Surge Life test	Surge Current Capacity	withstand voltage	Capacitance
PLM CZR	501M	400-600	> 100 MΩ @ 100VDC	500 V	8x20μs, 100A, 30sec, 300 times	8x20μs, 5 min. 2kA, 3 times	275 V	<2pF
	701M	560-840	> 100 MΩ @ 250VDC	750 V			330 V	

Packing

Available in Bulk Packing Qty: 100 Pcs./tray (Bulk: 25 pouches/carton)

Applications

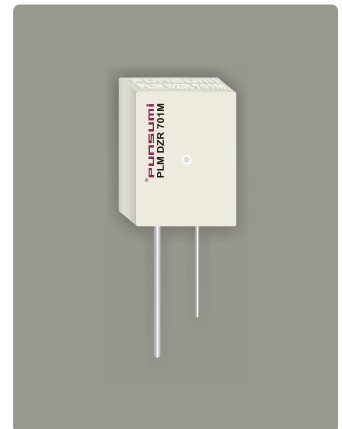
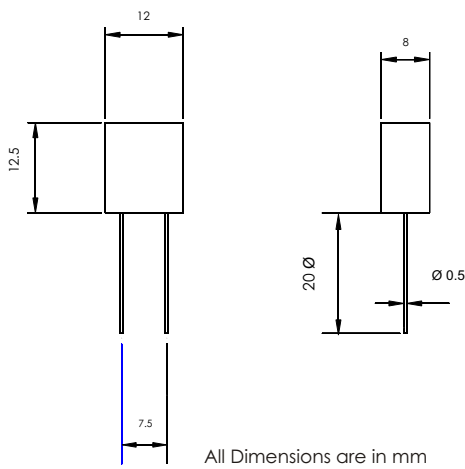
Please Refer to Page 31, 32, 33

PLM DZR SERIES – GENERAL PURPOSE PROTECTION FOR SMALL APPLIANCES

The PLM DZR series has been designed, for application in small AC powered appliances such as CFL or Mobile phone chargers, as a direct replacement of the 7mm diameter Metal Oxide Varistor (MOV). Against a comparably rated MOV the PLM DZR offers:-

- LONG SURGE LIFE
- LOW CLAMPING VOLTAGE
- FAST RESPONSE
- LOW CAPACITANCE
- HIGH INSULATION RESISTANCE
- NO THERMAL RUNAWAY

Mechanical Dimensions



Product Selection Guide

Model	DC Spark-over Voltage Vs (V)	Insulation Resistance	Clamping Voltage @ 50A	Surge Life test	Surge Current Capacity	withstand voltage	Capacitance
PLM DZR	501M	400-600	> 100 MΩ @ 100VDC	500 V	8x20μs, 100A, 30sec, 300 times	8x20μs, 5 min. 1kA, 3 times	<2pf
	701M	560-840	> 100 MΩ @ 250VDC	750 V			
						330 V	

Packing

Available in Bulk Packing Qty: 100 Pcs./tray (Bulk: 25 pouches/carton)

Applications

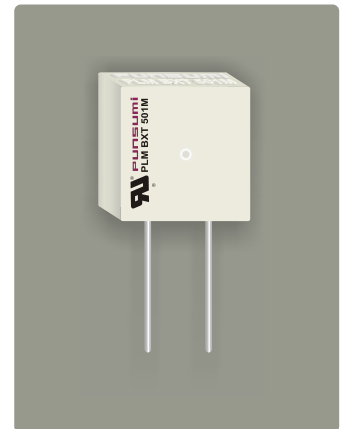
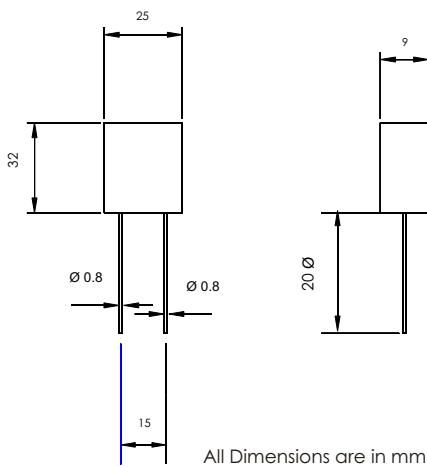
Please Refer to Page 31, 32, 33

PLM BXT SERIES – FOR SWELLS ON AC AND DC LINES

The PLM BXT is a high performance Hybrid Surge Protection Module designed for application on AC or DC lines which tend to encounter frequent voltage swells. The PLM BXT protects the equipment until the line fuse blows out and disconnects the power supply to the equipment.

- VERY HIGH SURGE CURRENT CAPACITY
- LONG SURGE LIFE
- LOW CLAMPING VOLTAGE
- FAST RESPONSE
- LOW CAPACITANCE
- HIGH INSULATION RESISTANCE
- NO THERMAL RUNAWAY
- UL RECOGNISED – FILE E300611

Mechanical Dimensions



Product Selection Guide

Model	Spark-over Voltage Vs (in Volts)	Insulation Resistance	Max Clamping Voltage	Surge Life test	Pulse Withstand Capability	Capacitance @ 1 K Hz
PLM BXT	451M	360-540	100 MΩ @ 250VDC	500V	8x20"s, 100A, 30sec, 300 times	< 5pF
	501M	500-600	> 100 MΩ @ 250VDC	560 V		
	102M	800-600	100 MΩ @ 500 VDC	750V		

Note: Pulse Withstand Capability for 451M and 501M models is 650Vrms, 100ms pulses @ 1 min interval, 50 times in application. For 102M model it is 750Vrms, 100ms pulses @ 1 min interval, 50 times in application.

Packing

Available in Bulk Packing Qty: 100 Pcs./tray (Bulk: 25 pouches/carton)

Applications

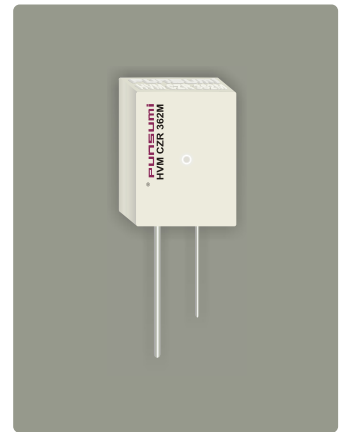
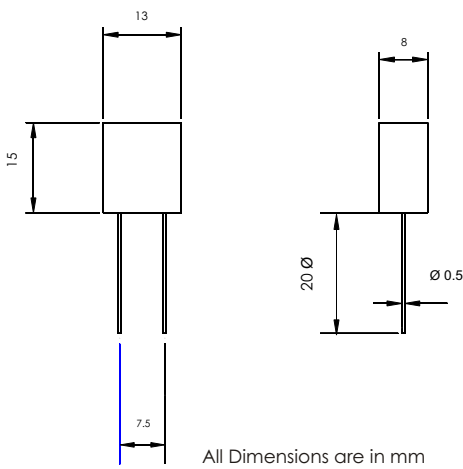
Please Refer to Page 31, 32, 33

HVM CZR SERIES – HIGH VOLTAGE MODULES FOR SMALL APPLIANCES

The HVM CZR is cost-effective, high performance solution for primary-secondary ground separation as well as protection of components from surges and spikes on communication lines. Cable Set-top boxes, Fax Machines and Key Telephones are ideal applications for the HVM CZR.

- WIDE VOLTAGE RANGE
- LONG SURGE LIFE
- LOW CLAMPING VOLTAGE
- FAST RESPONSE
- LOW CAPACITANCE
- HIGH INSULATION RESISTANCE
- NO THERMAL RUNAWAY

Mechanical Dimensions



Product Selection Guide

Model	DC Spark-over Voltage Vs (in Volts)	Insulation Resistance	Typical Clamping Voltage @ 50A	Surge Life test	Surge Current Capacity	AC withstand voltage (See footnote)	Capacitance 1KHz 6V max
HVM CZR	102M	800 – 1200	> 100 MΩ @ 500VDC	8x20μs, 100A, 30sec, 300 times	8x20μs, 2kA	1200 V 1200 V 1500 V 1800 V	< 2pF
	152M	1200 – 1800					
	242M	1920 – 2880	750 V				
	272M	2160 – 3240	850 V				
	302M	2400 – 3600					
	362M	2880 – 4320	> 100 MΩ @ 1000VDC				

Packing

Available in Bulk Packing Qty: 100 Pcs./tray (Bulk: 25 pouches/carton)

Applications

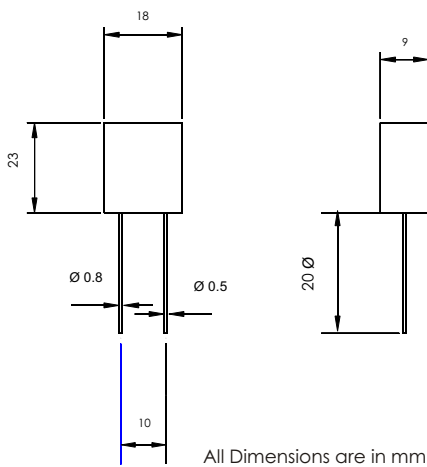
Please Refer to Page 31, 32, 33

HVM BZR – HIGH PERFORMANCE HIGH VOLTAGE MODULES

The HVM BZR is cost-effective, high performance solution for primary-secondary ground separation as well as protection of components from surges and spikes on communication lines. Photocopiers, Laser Printers, Medical Equipment are ideal applications for the HVM BZR.

- WIDE VOLTAGE RANGE
- HIGH SURGE CURRENT CAPACITY
- LONG SURGE LIFE
- LOW CLAMPING VOLTAGE
- LOW CAPACITANCE
- HIGH INSULATION RESISTANCE
- NO THERMAL RUNAWAY
- UL RECOGNIZED - FILE E300611

Mechanical Dimensions



Product Selection Guide

Model	DC Spark-over Voltage Vs (in Volts)	Insulation Resistance	Typical Clamping Voltage @ 50A	Surge Life test	Surge Current Capacity	AC withstand voltage (see footnote)	Capacitance 1KHz 6V max
HVM BZR	102M	800 – 1200	275 V	8x20µs, 100A, 30sec, 500 times	8x20µs, 3kA	1200 V 1200 V 1500 V 1800 V	< 2pF
	152M	1200 – 1800	275 V				
	242M	1920 – 2880	500 V				
	272M	2160 – 3240	600 V				
	302M	2400 – 3600	750 V				
	362M	2880 – 4320	850 V				

Packing

Available in Bulk Packing Qty: 100 Pcs./tray (Bulk: 25 pouches/carton)

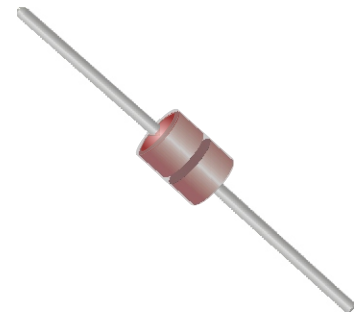
Applications

Please Refer to Page 31, 32, 33

Small Signal Zener Diodes - BZX55 Series

Features

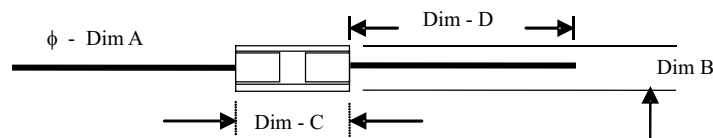
- Sharp Reverse characteristics
- Low Reverse Current Level
- High Reliability
- 5% Tolerances
-



Applications

- Voltage Stabilization

Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
BZX55 Series	DO-35	0.5	1.78	3.8	28.0

Absolute Maximum Ratings

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Power Dissipation	T _L = 25°C	P _V	500	mW
Z-Current		I _Z	P _V /V _V	mA
Junction Temperature		T _J	175	°C
Storage Temperature Range		T _{STG}	-65 to + 200	°C

Thermal Characteristics

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Junction Ambient	l=4mm, T _L = constant	R _{trjA}	300	K/W

Electrical Characteristics

T_{amb} = 25°C, unless otherwise specified

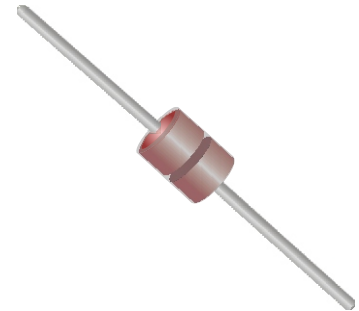
Parameter	Test Conditions	Symbol	Max Value	Unit
Forward Voltage	I _F = 200 mA	V _F	1.5	V

Measuring Condition Parameter Abbreviation	Working Voltage				Dynamic Resistance		Forward Voltage at $I_F=100\text{mA}$	Temp. Coefficient at I_Z	Diode Capacitance at $F=1\text{MHz}$	Reverse Leakage Current		Non-repetitive Peak Reverse Current
	at $I_Z=5\text{mA}$		at $I_R=1\text{mA}$		at $I_T=5\text{mA}$					at V_R		
	Nominal	V min	V max	$Z_{DK}(\Omega)$	$Z_{BK}(\Omega)$	$Z_{TK}(\Omega)$	$V_F(\text{V})$	at I_Z	at $F=1\text{MHz}$	$I_R(\text{mA})$	at V_R	$I_{RMV}(\text{A})$
BZX55	C2V0	2.0	1.90	2.10	600	85	1.0	Typical	max	max	100	6.0
BZX55	C2V2	2.2	2.09	2.31	600	85	1.0	-1.6	450	75	1.0	6.0
BZX55	C2V4	2.4	2.28	2.52	600	85	1.0	-1.8	450	50	1.0	6.0
BZX55	C2V7	2.7	2.57	2.84	600	85	1.0	-1.9	450	10	1.0	6.0
BZX55	C3V0	3.0	2.85	3.15	600	85	1.0	-2.1	450	4	1.0	6.0
BZX55	C3V3	3.3	3.14	3.47	600	85	1.0	-2.2	450	2	1.0	6.0
BZX55	C3V6	3.6	3.42	3.78	600	85	1.0	-2.4	450	2	1.0	6.0
BZX55	C3V9	3.9	3.71	4.10	600	85	1.0	-2.4	450	2	1.0	6.0
BZX55	C4V3	4.3	4.09	4.52	600	80	1.0	-2.4	450	1	1.0	6.0
BZX55	C4V7	4.7	4.47	4.94	600	70	1.0	1.4	300	0.5	1.0	6.0
BZX55	C5V1	5.1	4.85	5.36	550	50	1.0	-0.8	300	0.1	1.0	6.0
BZX55	C5V6	5.6	5.32	5.88	450	30	1.0	1.6	300	0.1	1.0	6.0
BZX55	C6V2	6.2	5.89	6.51	200	10	1.0	2.2	200	0.1	2.0	6.0
BZX55	C6V8	6.8	6.46	7.14	150	8	1.0	3.0	200	0.1	3.0	6.0
BZX55	C7V5	7.5	7.13	7.88	50	7	1.0	3.8	150	0.1	5.0	4.0
BZX55	C8V2	8.2	7.79	8.61	50	7	1.0	4.5	150	0.1	6.1	4.0
BZX55	C9V1	9.1	8.65	9.56	50	10	1.0	5.5	150	0.1	6.8	3.0
BZX55	C10V	10.0	9.50	10.50	70	15	1.0	6.5	90	0.1	7.5	3.0
BZX55	C11V	11.0	10.45	11.55	70	20	1.0	7.7	85	0.1	8.2	2.5
BZX55	C12V	12.0	11.40	12.60	90	20	1.0	8.4	85	0.1	9.1	2.5
BZX55	C13V	13.0	12.35	13.65	110	26	1.0	9.8	80	0.1	9.7	2.5
BZX55	C15V	15.0	14.25	15.75	110	30	1.0	11.3	75	0.1	11.0	2.0
BZX55	C16V	16.0	15.20	16.80	170	40	1.0	12.8	75	0.1	12.0	1.5
BZX55	C18V	18.0	17.10	18.90	170	50	1.0	14.4	70	0.1	14.0	1.5
BZX55	C20V	20.0	19.00	21.00	220	55	1.0	16.0	60	0.1	15.0	1.5
BZX55	C22V	22.0	20.90	23.10	220	55	1.0	18.7	60	0.1	17.0	1.3
BZX55	C24V	24.0	22.80	25.20	220	80	1.0	20.4	55	0.1	18.0	1.3
BZX55	C27V	27.0	25.65	28.35	220	80	1.0	22.9	50	0.1	20.0	1.0
BZX55	C30V	30.0	28.50	31.50	220	80	1.0	27.0	50	0.1	22.0	1.0
BZX55	C33V	33.0	31.35	34.65	220	80	1.0	29.7	45	0.1	24.0	0.9
BZX55	C36V	36.0	34.20	37.80	220	80	1.0	32.4	45	0.1	27.0	0.8

1N52 Series

Features

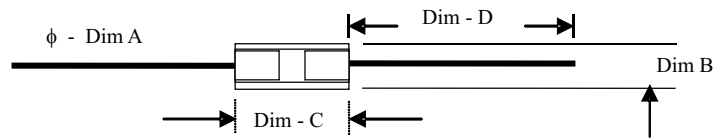
- Sharp Reverse characteristics
- Low Reverse Current Level
- High Reliability
- 5% Tolerances



Applications

- Voltage Stabilization

Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
BZX55 Series	DO-35	0.5	1.78	3.8	28.0

Absolute Maximum Ratings

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Power Dissipation	T _L = 25°C	P _V	500	mW
Z-Current		I _Z	P _V /V _V	mA
Junction Temperature		T _J	200	°C
Storage Temperature Range		T _{STG}	-40 to + 200	°C

Thermal Characteristics

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Junction Ambient	l=4mm, T _L = constant	R _{thjA}	300	K/W

Electrical Characteristics

T_{amb} = 25°C, unless otherwise specified

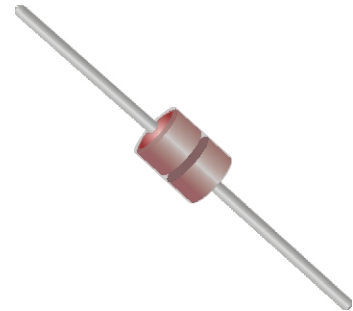
Parameter	Test Conditions	Symbol	Max Value	Unit
Forward Voltage	I _F = 200 mA	V _F	1.1	V

Measuring Condition		Working Voltage			Dynamic Resistance				Reverse Leakage Current		Max. Regulator Current
		at I_{zT}									
Parameter Abbreviation		V_z (V)			Z_{zk}	I_{zk}	Z_{zt} (Ω)	I_{zT}	I_R	V_r	I_{zm}
Device Nomenclature		Nom.	V min	V max	Ω	mA	Ω	mA	μA	V	mA
1N52	21B	2.4	2.3	2.5	1200	0.25	30	20	100	1.0	191
1N52	22B	2.5	2.4	2.6	1250	0.25	30	20	100	1.0	182
1N52	23B	2.7	2.6	2.8	1300	0.25	30	20	75	1.0	168
1N52	24B	2.8	2.7	2.9	1400	0.25	30	20	75	1.0	162
1N52	25B	3	2.9	3.2	1600	0.25	29	20	50	1.0	151
1N52	26B	3.3	3.1	3.5	1600	0.25	28	20	25	1.0	138
1N52	27B	3.6	3.4	3.8	1700	0.25	24	20	15	1.0	126
1N52	28B	3.9	3.7	4.1	1900	0.25	23	20	10	1.0	115
1N52	29B	4.3	4.1	4.5	2000	0.25	22	20	5.0	1.0	106
1N52	30B	4.7	4.5	4.9	1900	0.25	19	20	5.0	2.0	97
1N52	31B	5.1	4.8	5.4	1600	0.25	17	20	5.0	2.0	89
1N52	32B	5.6	5.3	5.9	1600	0.25	11	20	5.0	3.0	81
1N52	33B	6	5.7	6.3	1600	0.25	7	20	5.0	3.5	76
1N52	34B	6.2	5.9	6.5	1000	0.25	7	20	5.0	4.0	73
1N52	35B	6.8	6.5	7.1	750	0.25	5	20	3.0	5.0	67
1N52	36B	7.5	7.1	7.9	500	0.25	6	20	3.0	6.0	61
1N52	37B	8.2	7.8	8.6	500	0.25	8	20	3.0	6.5	55
1N52	38B	8.7	8.3	9.1	600	0.25	8	20	3.0	6.5	52
1N52	39B	9.1	8.6	9.6	600	0.25	10	20	3.0	7.0	50
1N52	40B	10	9.5	10.5	600	0.25	17	20	3.0	8.0	45
1N52	41B	11	10.5	11.6	600	0.25	22	20	2.0	8.4	41
1N52	42B	12	11.4	12.6	600	0.25	30	20	1.0	9.1	38
1N52	43B	13	12.4	13.7	600	0.25	13	9.5	0.5	9.9	35
1N52	44B	14	13.3	14.7	600	0.25	15	9.0	0.1	10	32
1N52	45B	15	14.3	15.8	600	0.25	16	8.5	0.1	11	30
1N52	46B	16	15.2	16.8	600	0.25	17	7.8	0.1	12	28
1N52	47B	17	16.2	17.9	600	0.25	19	7.4	0.1	13	27
1N52	48B	18	17.1	18.9	600	0.25	21	7.0	0.1	14	25
1N52	49B	19	18.1	20	600	0.25	23	6.6	0.1	14	24
1N52	50B	20	19	21	600	0.25	25	6.2	0.1	15	23
1N52	51B	22	20.9	23.1	600	0.25	29	5.6	0.1	17	21.2
1N52	52B	24	22.8	25.2	600	0.25	33	5.2	0.1	18	19.1
1N52	53B	25	23.8	26.3	600	0.25	35	5.0	0.1	19	18.2
1N52	54B	27	25.7	28.4	600	0.25	41	4.6	0.1	21	16.8
1N52	55B	28	26.6	29.4	600	0.25	44	4.5	0.1	21	16.2
1N52	56B	30	28.5	31.5	600	0.25	49	4.2	0.1	23	15.1
1N52	57B	33	31.4	34.7	700	0.25	58	3.8	0.1	25	13.8
1N52	58B	36	34.2	37.8	700	0.25	70	3.4	0.1	27	12.6
1N52	59B	39	37.1	41	800	0.25	80	3.2	0.1	30	11.5
1N52	60B	43	40.9	45.2	900	0.25	93	3.0	0.1	33	10.6
1N52	61B	47	44.7	49.4	1000	0.25	150	2.7	0.1	36	9.7
1N52	62B	51	48.5	53.6	1100	0.25	125	2.5	0.1	39	8.9
1N52	63B	56	53.2	58.8	1300	0.25	150	2.2	0.1	43	8.1

1N47 Series

Features

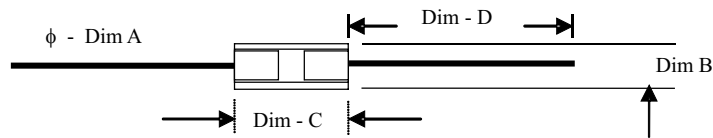
- Sharp Reverse characteristics
- Low Reverse Current Level
- High Reliability
- 5% Tolerance



Applications

- Voltage Stabilization

Mechanical Dimensions



	Package	A ± 0.05mm	B ± 0.3mm	C ± 0.3mm	D ± 3.0mm
BZX55 Series	DO-41	0.5	2.6	4.3	28.0

Absolute Maximum Ratings

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Power Dissipation	T _L = 25°C	P _V	500	mW
Z-Current		I _Z	P _V /V _V	mA
Junction Temperature		T _J	200	°C
Storage Temperature Range		T _{STG}	-65 to + 200	°C

Thermal Characteristics

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Junction Ambient	l=4mm, T _L = constant	R _{thjA}	170	K/W

Electrical Characteristics

T_{amb} = 25°C, unless otherwise specified

Parameter	Test Conditions	Symbol	Max Value	Unit
Forward Voltage	I _F = 200 mA	V _F	1.2	V

Measuring Condition		Working Voltage			Dynamic Resistance				Reverse Leakage Current		Max. Surge Current	Max. Regulator Current
		at I_{ZT}										
Parameter Abbreviation		V_z (V)			Z_{zk} (Ω)	I_{zk}	Z_{zT} (Ω)	I_{zT}	I_R	V_r	$I_R @ 25^\circ C$	I_{zm}
Device Nomenclature		Nom.	V min	V max	max	mA	max	mA	(μA)	(V)	mA	mA
1N47	28A	3.3	3.15	3.45	400	1.00	10.0	76	100	1.0	1380	276
1N47	29A	3.6	3.45	3.75	400	1.00	10.0	69	100	1.0	1260	252
1N47	30A	3.9	3.7	4.1	400	1.00	9.0	64.0	50	1.0	1170	234
1N47	31A	4.3	4.1	4.5	400	1.00	9.0	58.0	10	1.0	1085	217
1N47	32A	4.7	4.5	4.9	500	1.00	8.0	53.0	10	1.0	965	193
1N47	33A	5.1	4.8	5.4	550	1.00	7.0	49.0	10	1.0	890	178
1N47	34A	5.6	5.3	5.9	600	1.00	5.0	45.0	10	2.0	810	162
1N47	35A	6.2	5.9	6.5	700	1.00	2.0	41.0	10	3.0	730	146
1N47	36A	6.8	6.5	7.1	700	1.00	3.5	37.0	10	4.0	660	133
1N47	37A	7.5	7.1	7.9	700	0.50	4.0	34.0	10	5.0	605	121
1N47	38A	8.2	7.8	8.6	700	0.50	4.5	31.0	10	6.0	550	110
1N47	39A	9.1	8.6	9.6	700	0.50	5.0	28.0	10	7.0	500	100
1N47	40A	10	9.5	10.5	700	0.25	7.0	25.0	10	7.6	454	91
1N47	41A	11	10.5	11.6	700	0.25	8.0	23.0	5	8.4	414	83
1N47	42A	12	11.4	12.6	700	0.25	9.0	21.0	5	9.1	380	76
1N47	43A	13	12.4	13.7	700	0.25	10	19.0	5	9.9	344	69
1N47	44A	15	14.3	15.8	700	0.25	14	17.0	5	11.4	304	61
1N47	45A	16	15.2	16.8	700	0.25	16	15.5	5	12.2	285	57
1N47	46A	18	17.1	18.9	750	0.25	20	14.0	5	13.7	250	50
1N47	47A	20	19	21	750	0.25	22	12.5	5	15.2	225	45
1N47	48A	22	20.9	23.1	750	0.25	23	11.5	5	16.7	205	41
1N47	49A	24	22.8	25.2	750	0.25	25	10.5	5	18.2	190	38
1N47	50A	27	25.7	28.4	750	0.25	35	9.5	5	20.6	170	34
1N47	51A	30	28.5	31.5	1000	0.25	40	8.5	5	22.8	150	30
1N47	52A	33	31.4	34.7	1000	0.25	45	7.5	5	25.1	135	27
1N47	53A	36	34.2	37.8	1000	0.25	50	7.0	5	27.4	125	25
1N47	54A	39	37.1	41	1000	0.25	60	6.5	5	29.7	115	23
1N47	55A	43	40.9	45.2	1500	0.25	70	6.0	5	32.7	110	22
1N47	56A	47	44.7	49.4	1500	0.25	80	5.5	5	35.8	95	19
1N47	57A	51	48.5	53.6	1500	0.25	85	5.0	5	38.8	90	18
1N47	58A	56	53.2	58.8	2000	0.25	110	4.5	5	42.6	80	16
1N47	59A	62	58.9	65.1	2000	0.25	125	4.0	5	47.1	70	14
1N47	60A	68	64.6	71.4	2000	0.25	150	3.7	5	51.7	65	13
1N47	61A	75	71.3	78.7	2000	0.25	175	3.3	5	56.0	60	12
1N47	62A	82	77.9	86.1	3000	0.25	200	3.0	5	62.2	55	11
1N47	63A	91	86.4	95.5	3000	0.25	250	2.8	5	69.2	50	10
1N47	64A	100	95	105	3000	0.25	350	2.5	5	76.0	45	9



Transient Voltage Protection Systems Pvt Ltd

Office: D-16 Meera Marg, Bani Park, Jaipur 302016, Rajasthan, INDIA
Tel: (91) 141 220 0284, 220 1824
Fax: (91) 141 220 1115
Email: info@punsumi.com

Works: 325 Nangal Jaisa Bohra, Niwaru Road, Jhotwara, Jaipur 302012, Rajasthan, INDIA
Tel: (91) 141 246 9041, 246 9051

PUNSUMI
www.punsumi.com