

Clare voyance Chart

Surge Arrester

Product Type	Product Name	Breakdown Voltage		Maximum Holdover Voltage (VDC) (Per REA)	Test Current (mA)	Maximum Follow-On Current Peak Amperes (1/2 Cycle, 60Hz)	Typical Arc Voltage (I = 5A min)	Maximum Capacitance Between Electrodes (With Leads) @ 1MHz (pF)	Surge Life Test Condition
		DC (dV/dt = 500V/s)	Maximum Pulse (dV/dt = 100V/ μ s)						
COMGAP	CG	75 to 110	400 to 450	55 to 80	200	Not Applicable	10	1.00	500A (10/1000 μ s Pulse)
	CG2	145 to 470	500 to 850	90 to 150	200	20	15	1.00	500A (10/1000 μ s Pulse)
	CG3	600 to 1000	1000 to 1500	Not Applicable	Not Applicable	20	15	1.00	500A (10/1000 μ s Pulse)
		1500	2200	Not Applicable		300	30	1.00	0.002 μ F/100 Ohms
		7500	10,000	Not Applicable		300	30	1.00	0.002 μ F/100 Ohms
AC LINE PROTECTION	AC120	225 min.	700	Not Applicable	Not Applicable	300	20	1.00	Not applicable
	AC240	425 min.	800	Not Applicable	Not Applicable	300	20	1.00	Not applicable
THREE-ELECTRODE COMGAP	PMT3 (310)	250, 400	600 to 750	150	200	20	15	0.50 Line to Line	500A (10/1000 μ s Pulse)
FAIL SAFE	Fail safe option is possible: add suffix "F" after partnumber.								

Surge Protection: COMGAPS

Clare Comgaps are constructed of metal electrodes hermetically sealed in a gas-filled, rugged ceramic cylinder.

Unlike other protective components, such as avalanche diodes and varistors, Comgaps function as switches—dissipating a minimum amount of energy. The energy of the transient is dissipated in other resistive elements of the circuit, primarily in the external circuit wiring. Thus, Comgaps don't suffer the fate of other protective devices—overheating and failing when they handle peak surge currents beyond their ratings.

Clare Comgaps offer three distinctive performance characteristics not found in other protective devices:

- High insulation resistance
- Low capacitance
- High current capability

Depending on your requirements, a wide variety of protective characteristics is available.

CG/CG2 devices are recommended for low dc voltage capacitive discharge applications. They offer low dc breakdown ratings, good performance, and extremely low arc voltages.

CG2 devices are best used where microsecond transient rise times are expected. They provide fast response time, high holdover voltage, and high follow-on current capacity.

CG3 devices are best suited for applications where bias voltages or signal levels of several hundred volts are normally present. They are designed to handle breakdown voltages of 1.5 kV and 7.5 kV.

AC Line Protection Series

The AC series of surge protection devices has been designed

specifically for AC line protection applications. Packaged in the same rugged metal/ceramic package as the Comgap's product line, these devices provide the low impedance switching action and high peak current capabilities of traditional gas tube designs while optimizing the ability to extinguish in the presence of AC follow-on current. In most applications, there is no longer the need for a current limiting device to assume the turn off of the gas discharge tube. By taking advantage of the principles of a multi-stage (hybrid) surge protection circuit, it is now practical to design a surge protection circuit with sub-nanosecond response time, precise control of transient energy let-through and a peak surge current rating of >20,000 amps even for cost sensitive applications such as power supplies, home stereos, monitors and printers.

Fig. 1)

No. of Surges (Min.)	Maximum Surge Current			Maximum AC Current		Insulation Resistance		Page
	No. of Pulses	Test Condition	Rating (Amps)	Test Condition	Rating (Amps)	Test Condition (VDC)	Rating (MOhms)	
1000	5	8/20 μ s Pulse	20,000	60Hz, 1 sec, 10 times	20	50	10,000	60
1000	5	8/20 μ s Pulse	20,000	60Hz, 1 sec, 10 times	20	100	10,000	60
1000	10	8/20 μ s Pulse	10,000	60Hz, 1 sec, 10 times	10	100	10,000	
500	5	8/20 μ s Pulse	1,000			100	1,000	
500	5	8/20 μ s Pulse	1,000			100	1,000	60
Not applicable	4	8/20 μ s Pulse	10,000	Not Applicable	Not Applicable	100	10,000	60
Not applicable	4	8/20 μ s Pulse	10,000	Not Applicable	Not Applicable	100	10,000	60
400	10	8/20 μ s Pulse	10,000 per side	110VAC, 60Hz, 11 cycles	65 per side	100	10,000	60

Super-Fast PMT3(310) Series

The PMT3(310) series Comgaps® are 3 electrode, bipolar, heavy duty surge arresters designed to protect electronic equipment from damage due to excessive voltages and currents. They are rugged metal/ceramic miniature devices capable of high levels of transient energy protection. The PMT3(310) products have extremely fast response times characterized by the surge breakdown voltage, which describes their dynamic behavior. Typical surge breakdown voltage is below 1kV when the surge arrester is subjected to a transient having a frontal slope rising at the rate of 10kV per microsecond. DC holdover voltage of the arrester is high, thus making it possible for the device to be used where DC voltages are present. This series is available with a fail safe clip option.

Fig. 1

End-of-Life Characteristics/Failure Mode-CG/CG2/AC Line Family

Breakdown Voltage	Breakdown voltage less than 50% of minimal or greater than 150% of maximum shall be considered a failure.
IR	Less than 1 Megohm.
V Impulse	Impulse breakdown greater than 150% of maximum shall be considered a failure.
Short Circuit	IR less than 100 Ohm at .1 ampere.
(95% of units tested will not exceed the end-of-life limits upon completion of any test.)	

Clare

Surge Arrester Technology

Clare surge arresters protect personnel and equipment from damaging high-voltage surges from lightning, inductive switching, nuclear electromagnetic generation, or electrostatic discharge. Through ongoing research and engineering improvements, Clare has developed a family of surge arresters that offer impressive characteristics for a variety of applications. Three differentiating characteristics are found in every Clare surge arrester:

- High surge current rating
- Long life
- Fast response

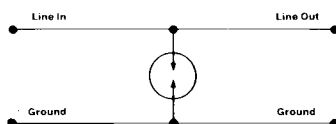
Standardized Surge Types and Solutions

The transient sources mentioned above carry varying levels of threat depending on a number of factors. To select the proper surge protective component, a set of quantitative requirements for measuring the surge arrester's perform-

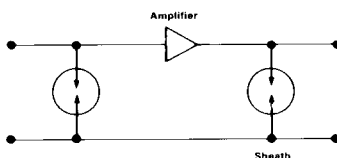
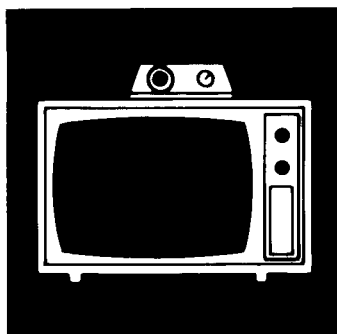
ance is essential. Some governmental and regulatory agencies have issued specifications which model the threat. Characteristics of the four transient sources are listed below, in terms of open circuit voltage and short circuit current waveforms, the names of the specifying agents (if available), and the Clare products which meet those requirements.

Surge Source	Specifying Agents	Application	Open Circuit Voltage Waves	Short-Circuit Currents	Solutions
Lightning (for communication lines)	FCC Part 68	Telephone Line Common Mode	1500V, 10 x 160 μ s	200A	PMT3 (310) 40010 (Common Mode and Normal Mode)
		Telephone Line Normal Mode	800V, 10 x 560 μ s	100A	CG2-350L (Normal Mode Only)
	REA PE-80	Trunk Carrier Systems	1kV, 100V/ μ s	500A, 10 x 1000 μ s	PMT3 (310) 40010
	CCITT K17	Repeaters	5kV, 100 x 700 μ s	150-2400A	PMT3 (310) 40010
Lightning (for power lines)	IEEE 587	Long Branch Circuits (AC Wall Outlet)	6kV, .5 μ s, 100KHz (Ring Wave)	200A	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> AC120 (117 VAC line) AC240 (220 VAC line) AC480 (480 AC line) </div> <div style="font-size: 2em;">}</div> </div>
		Short Branch Circuits (At Breaker Box, Computers, Ovens, Industrial Lighting, etc.)	(a) 6kV, .5 μ s, 100KHz (b) 6kV, 1.2 x 50 μ s	500A 3kA, 8 x 20 μ s	
		Exterior Circuits (Submersible Pumps, etc.)	10kV, 1.2 x 50 μ s	10kA, 8 x 20 μ s	
Inductive Switching	MIL-STD-1399	—	2.5kV, 1.5 x 40 μ s	100A	CG/CG2 SERIES (Depending on application)
Nuclear Electromagnetic Pulse	—	—	1kV, 10 x 150ns	100A	CG/CG2 SERIES (For use in hybrid circuits)
Electrostatic Discharge	—	—	5kV, 10 x 100ns	80A	CG/CG2 SERIES (Depending on application)

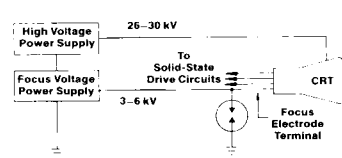
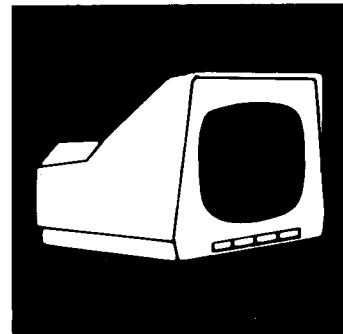
Signal Line
CG75L/CG90L



Cable TV
CG2-145L



CRT Focus Circuit
CG2-800L/CG3-7.5L

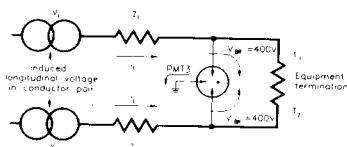


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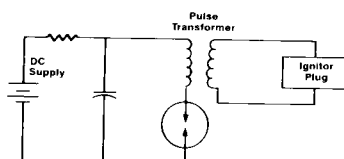
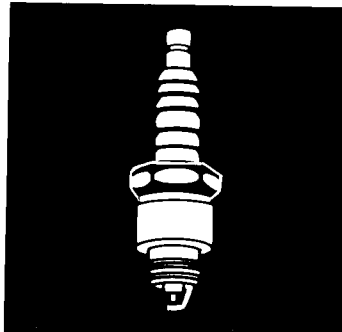
Surge Arrester Applications

Application	Protected Equipment	CLARE PART NUMBER
CATV	Trunk Amplifier Cable Extender Splitter Grounding Block Converter Box 30, 60VAC Power Supply	CG2-145L, CG2-230L
AC Line Protection	All AC Loads	AC120 (117VAC LINE) AC240 (220VAC LINE)
Communication	Modem	CG2-350L PMT3 (310) 40010
Test Equipment	Antenna Connected Equipment Meter Inputs	CG2-145L CG90L, & CG2-230L CG75L, CG2-300L
Power Supplies	Voltage Doubler Capacitors, Voltage Regulator, Rectifier Diodes	CG2-230L, CG2-470L
Computer	Data Lines	CG90L, CG2-230L, PMT3 (310) 40010
CRT Terminal	Focus Electrode	CG2-800L, CG3-7.5L
Capacitive Discharge	Ignition Circuit Components Pulse Generator Components	CG2-230L, CG2-350L
Signal Lines (single ended)	Alarm Circuits	CG75L
Signal Lines (balanced)	Alarm Circuits Paging Systems	PMT3 (310) 40010 PMT3 (310) 25010
Telephone Line (simultaneous common mode & normal mode protection)	Telephone Interface Cards Telephone Line Cards Repeaters In-Line & Remote Phone Line Test Equipment Central Office Protector Modules	PMT3 (310) 40010
Medical Electronics	Defibrillator	CG2-800L, CG75L
Process Control (24MA Signal Loop)	Instrumentation Circuits	CG75L, CG90L

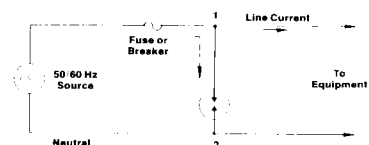
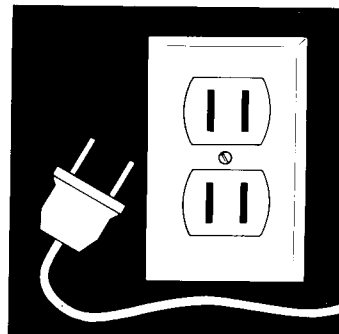
Telephone Line
PMT3 (310) 25010
PMT3 (310) 40010



Pulse Generator
Ignition Circuits/Capacitive Discharge
CG2-230L
CG2-350L

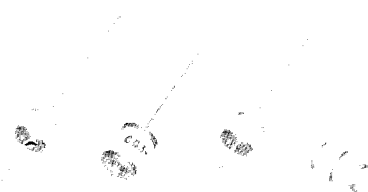


AC Power Line
117V Line: AC120
220V Line: AC240



Surge Arresters

Series CG, CG2, CG3, AC, PMT3(310)



Engineering Specifications	CG/CG2	CG3	AC	PMT3 (310)
Surge Life (No. of Operations)				
10A 10/1000 surge life	2500	N/A	N/A	N/A
100A 10/1000 surge life	N/A	N/A	N/A	N/A
500A 10/1000 surge life	1000	N/A	N/A	400
Surge Current				
8/20 (kA)	20**	10	10	20
AC Current				
10 operations 60Hz for 1 sec, with 3 minute intervals	20.0**	N/A	N/A	N/A
11 cycles 60Hz (A)	20.0	N/A	N/A	130.0
Insulation Resistance				
100VDC, except 50VDC for units with DC breakdown less than 150V (MOhms)	10000	10000	10000	10000
Temperature—Stabilize at temp for 1 hour then measure DC, IR, impulse				
Minimum operating temp	- 65°C	- 65°C	- 65°C	- 65°C
Maximum operating temp	+ 125°C	+ 125°C	+ 125°C	+ 125°C
Weight	2.0g	2.0g	2.0g	3.5g

Features:

- Fastest surge arresting response.
- High peak surge current capability.
- Lowest interelectrode capacitance.
- Rugged ceramic construction.
- Available on tape and reel for automatic insertion for some product types.
- Hermetically sealed.
- Meets the requirements of REA PE-80, IEEE 587, CCITT K12 (pending).
- UL recognition on some products.

Mechanical Dimensions

All dimensions are measured in millimeters (inches).

Fig. 1

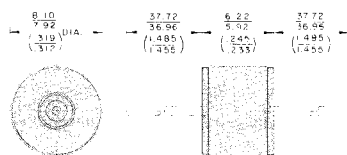


Fig. 2

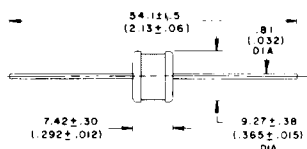
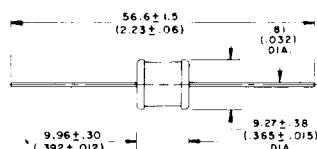
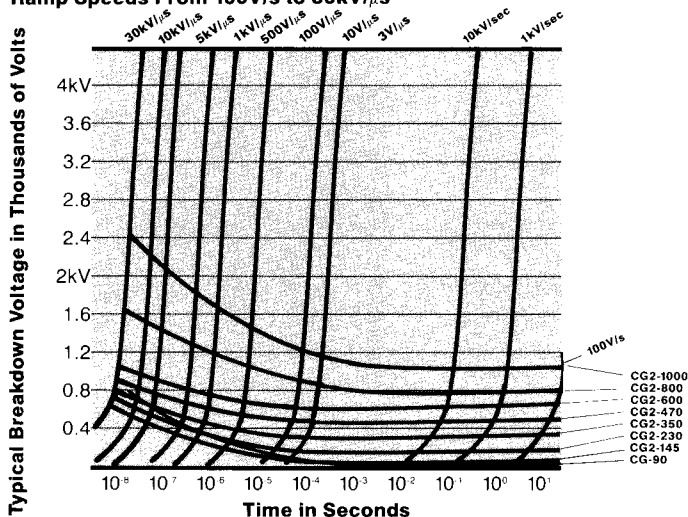


Fig. 3



Voltage Breakdown Characteristics for CG and CG2 Series

Ramp Speeds From 100V/s to 30kV/μs

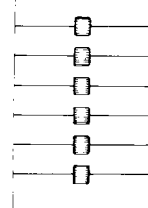


Tape & Reel

Besides the standard packing, we offer also "TAPE & REEL", according to EIA standard RS-296-D. The standard patch is .394 inches. Inside tape spacing is 2.87 inches. The standard packing unit for TAPE & REEL is 1000 pcs.

Ordering Code: Add "TR" to the part number, i.e. CG90LTR

Fig. 5

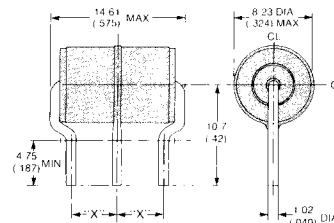


PIN LAYOUT - PMT3

PMT3(310)250.XX	X PIN CENTERS
XX suffix : 10	DIM. X: 4.75 mm (.187")
XX suffix : 04	DIM. X: 4.40 mm (.173")
XX suffix : 06	DIM. X: 6.35 mm (.250")

Fig. 4

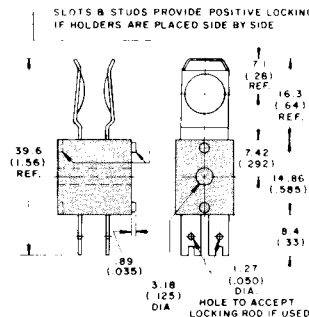
PMT3 (310) Series



"X" = head centers of either 4.39 (.173), 4.75 (.187), or 6.35 (.250). Each is available in the PMT3 (310) series.

Fig. 6

CGH1



All characteristics at 25°C.

Clare

Operating Characteristics

Part Number	Fig. No.	DC Breakdown Voltage			Impulse Breakdown @ 100V/ μ s (Maximum Voltage)	Maximum Capacitance Between Electrodes @ 1MHz (pF)
		Nominal Voltage (VDC)	Min. Volts	Max. Volts		
CG75L*	1	75	60	90	400	1.0
CG90L*	1	90	72	108	400	1.0
CG110L*	1	110	88	132	450	1.0
CG2-145L*	1	145	116	174	500	1.0
CG2-230L*	1	230	195	265	600	1.0
CG2-300L*	1	300	255	345	700	1.0
CG2-350L*	1	350	297	403	750	1.0
CG2-470L*	1	470	400	540	850	1.0
CG2-600L**	1	600	510	690	1000	1.0
CG2-800L**	1	800	680	920	1200	1.0
CG2-1000L**	1	1000	850	1150	1500	1.0
CG3-1.5L*	2	1500	1275	1725	2200	1.0
CG3-7.5L*	3	7500	6375	8625	10000	1.0
CGH1	5	Holder For Unleaded Device				
PMT3(310)25010*	4	250	200	300	600	1.0
PMT3(310)35010*	4	350	300	400	750	1.0
PMT3(310)40010*	4	400	300	500	750	1.0

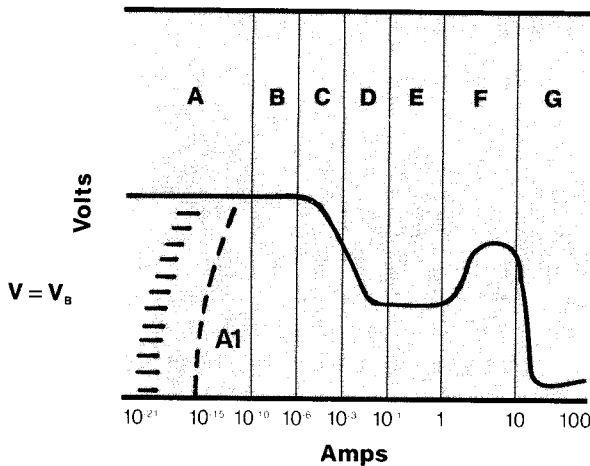
ADD "F" Suffix to part number for fail safe clip.

AC120*	1	N/A	225	N/A	700	1.0
AC240*	1	N/A	425	N/A	800	1.0

* Designates standard stocking item for authorized Clare distributors.

** For CG2-600L, CG2-800L, CG2-1000L see pages 56 and 57 for specifications.

Operating Characteristics of a Typical Clare Plasma Arrester



Schematic form of V-I relationship of a plasma device.

A. For low values of voltage, gas provides a good insulator. Also, low currents result from ionization by external agents, such as cosmic rays, high energy photons, etc. As a result, the current is subject to statistical fluctuations in this region.

A1. In this region, the current is higher due to the supplementary sources of electrons, such as photoemission.

B. In this region, the discharge is self-sustained—meaning that if the external agents are removed, we still get the same current. This is known as the breakdown voltage of the device.

C. The transition region.

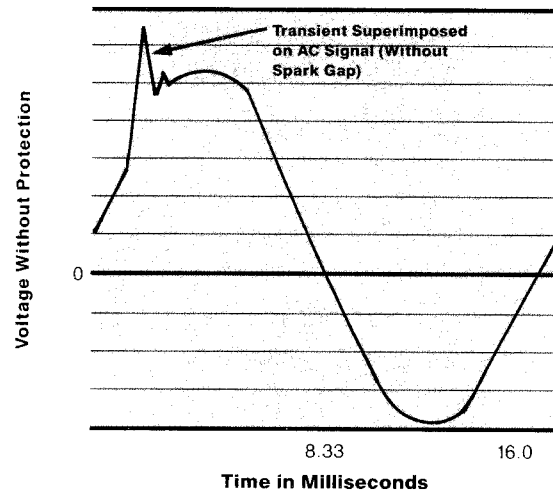
D. The glow region.

E. The abnormal glow region.

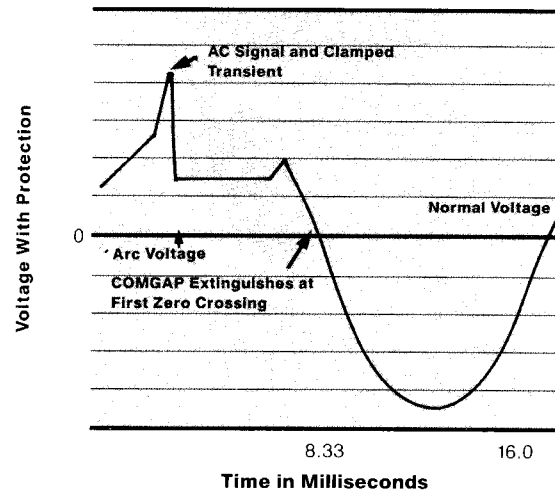
F. The transition region.

G. The arc.

Line Voltage - No Protection

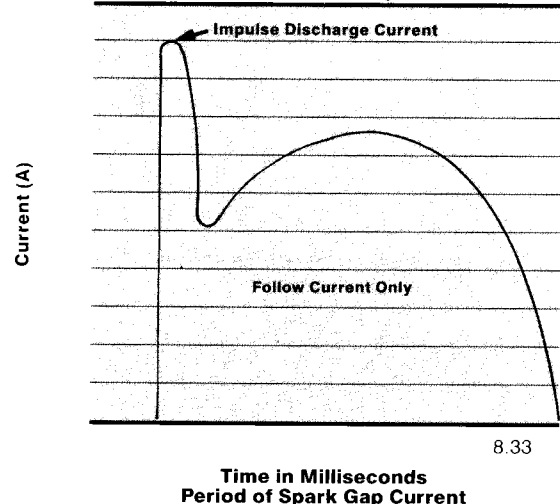


Line Voltage - With Protection



Follow-On Current Characteristics

Peak Current thru gap must be limited to follow Current Rating

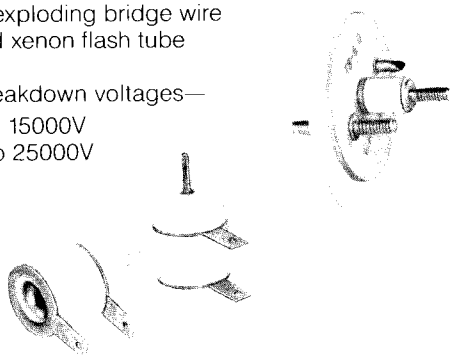


Surge Arresters

Other Clare Product Offerings

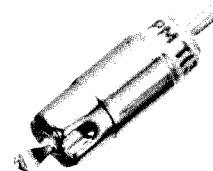
TA, TB

- Triggerable spark gaps.
- Command energy switching in crowbars, exploding bridge wire system and xenon flash tube trigger.
- Self DC breakdown voltages—
TA: 1000 to 15000V
TB: 2500 to 25000V



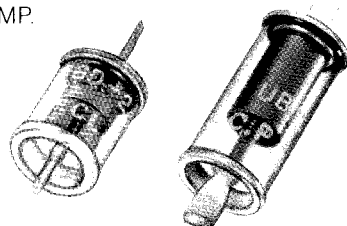
PMT (301)

- Surge protection against fast rising transients.
- Ideal for avionics and military applications.
- Currently used in the B-1B and F-15 air force programs.
- DC breakdown voltages 350 to 3500V.



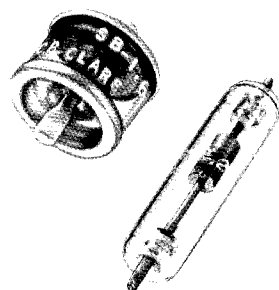
UBD, UBT

- Protects against nuclear EMP.
- Fastest response time.
- DC breakdown voltages—
UBD: 550 to 4000V
UBT: 4000 to 20000V



SB, SG

- Overvoltage protection in high voltage circuits.
- High energy switching in pulse generating circuits.
- DC breakdown voltages—
SB: 400 to 5000V
SG: 2000 to 40000V



TD, TN

- Used in microwave and radar systems to provide "white noise" in frequency range of 0.5 - 220.0GHz.
- Solid state, current regulated power supplies also available.
- TD series available in L, S, C, X, KU, K, and KA bands.

