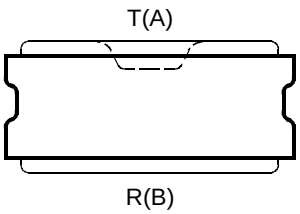
JANUARY 1994 - REVISED APRIL 1998

TELECOMMUNICATION SYSTEM PRIMARY PROTECTION

- **Ion-Implanted Breakdown Region**
  Precise and Stable Voltage
  Low Voltage Overshoot under Surge

DEVICE	$V_{(BR)}$ MINIMUM V	$V_{(BO)}$ MINIMUM V	$V_{(BO)}$ MAXIMUM V
9EL2	±245	±265	±400
9EL3		±200	±265

CELL PACKAGE
(SIDE VIEW)

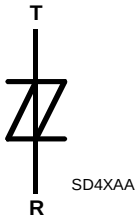


MD4XACA

- **Rated for International Surge Wave Shapes**

DEVICE	ITU-T K28 (10/700) I_{TSP} A	GR-974-CORE (10/1000) I_{TSP} A
9EL2	±200	±150
9EL3	±125	±100

device symbol



SD4XAA

Terminals T and R correspond to the alternative line designators of A and B

- **Gas Discharge Tube (GDT) Replacement**
- **Planar Passivated Junctions in a Protected Cell Construction**
  Low Off-State Current
  Extended Service Life
- **Soldered Copper Electrodes**
  High Current Capability
  Cell Construction Short Circuits Under Excessive Current Conditions

description

These devices are primary protector components for semiconductor arrester assemblies intended to meet the generic requirements of Bellcore GR-974-CORE (November 1994) or ITU-T Recommendation K28 (03/93). To conform to the specified environmental requirements, the 9ELx must be installed in a housing which maintains a stable microclimate during these tests (e.g. FIGURE I.1/K28).

The protector consists of a symmetrical voltage-triggered bidirectional thyristor. Overvoltages are initially clipped by breakdown clamping until the voltage rises to the breakover level, which causes the device to crowbar into a low-voltage on state. This low-voltage on state causes the current resulting from the overvoltage to be safely diverted through the device. The high crowbar holding current prevents d.c. latchup as the diverted current subsides. This 9ELx range consists of two voltage variants to meet various maximum system voltage levels. They are guaranteed to voltage limit and withstand the listed international lightning surges in both polarities.

These monolithic protection devices are constructed using two nickel plated copper electrodes soldered to each side of the silicon chip. This packaging approach allows heat to be removed from both sides of the silicon, resulting in the doubling of the devices thermal capacity, enabling a power line cross current capability of 10 A rms for 1 second. One of the 9ELx's copper electrodes is specially shaped to promote a progressive shorting action (at 50/60 Hz currents greater than 60 A). The assembly must hold the 9ELx in compression, so that the cell electrodes can be forced together during overstress testing. Under excessive power line cross conditions the 9ELx will fail short circuit, providing maximum protection to the equipment.

TEXAS INSTRUMENTS

absolute maximum ratings, T_A = 25°C (unless otherwise noted)

RATING			SYMBOL	VALUE	UNIT
Non-repetitive peak on-state pulse current (see Notes 1 and 2)					
5/310 µs (ITU-T K28, 10/700 µs voltage wave shape)	9EL2	-20°C to 65°C	I_{TSP}	200	A
	9EL3	0°C to 65°C		125	
10/1000 µs (GR-974-CORE, 10/1000 µs voltage wave shape)	9EL2	-20°C to 65°C		150	
	9EL3	0°C to 65°C		100	
Non-repetitive peak on-state current (see Note 1)					
full sine wave, 50/60 Hz, 1 s	9EL2	-40°C to 65°C	I_{TSM}	10	A rms
	9EL3	0°C to 65°C		10	
Junction temperature			T_J	-40 to +150	°C
Storage temperature range			T_{stg}	-40 to +150	°C

NOTES: 1. The surge may be repeated after the device has returned to thermal equilibrium.
2. Most PTT's quote an unloaded voltage waveform. In operation the 9ELx essentially shorts the generator output. The resulting loaded current waveform is specified.

electrical characteristics for the T and R terminals, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)}$	Breakdown Voltage	$I_{(BR)}$ = ±20 mA, (see Note 3)	9EL2	-40°C to 65°C	±245			V
$V_{(BO)}$	Breakover voltage	dv/dt = ±0.2 V/s, R_{SOURCE} > 200 Ω	9EL2	+15°C to 25°C	±265			V
				-40°C to 65°C			±400	
			9EL3	+15°C to 25°C	±200			
				0°C to 65°C			±265	
$V_{(BO)}$	Impulse breakover voltage	100 V/µs ≤ dv/dt ≤ ±1000 V/µs, di/dt ≤ 10 A/µs,	9EL2	-40°C to 65°C			±400	V
			9EL3	0°C to 65°C			±350	
	Impulse reset	Sources are 52.5 V O.C., 260 mA S.C. and 135 V O.C., 200 mA S.C. on-state current 25 A, 10/1000 µs impulse	9EL2	-40°C to 65°C			20	ms
			9EL3	0°C to 65°C			20	
I_D	Off-state current	V_D = ±50 V (see Note 4)	9EL2	-40°C to 65°C			±0.5	µA
			9EL3	0°C to 65°C			±0.5	
		V_D = ±200 V	9EL2	-40°C to 65°C			±10	
			9EL3	15°C to 25°C			±1	
C_{off}	Off-state capacitance	f = 1 MHz, V_d = 1 Vrms, V_D = 0,	9EL2	-40°C to 65°C			150	pF
			9EL3	0°C to 65°C			150	

NOTES: 3. Meets Bellcore GR-974-CORE Issue 1, November 1994 - Rated Voltage Test (4.7)
4. This device is sensitive to light. Suggest that this parameter be measured in a dark environment

PARAMETER MEASUREMENT INFORMATION

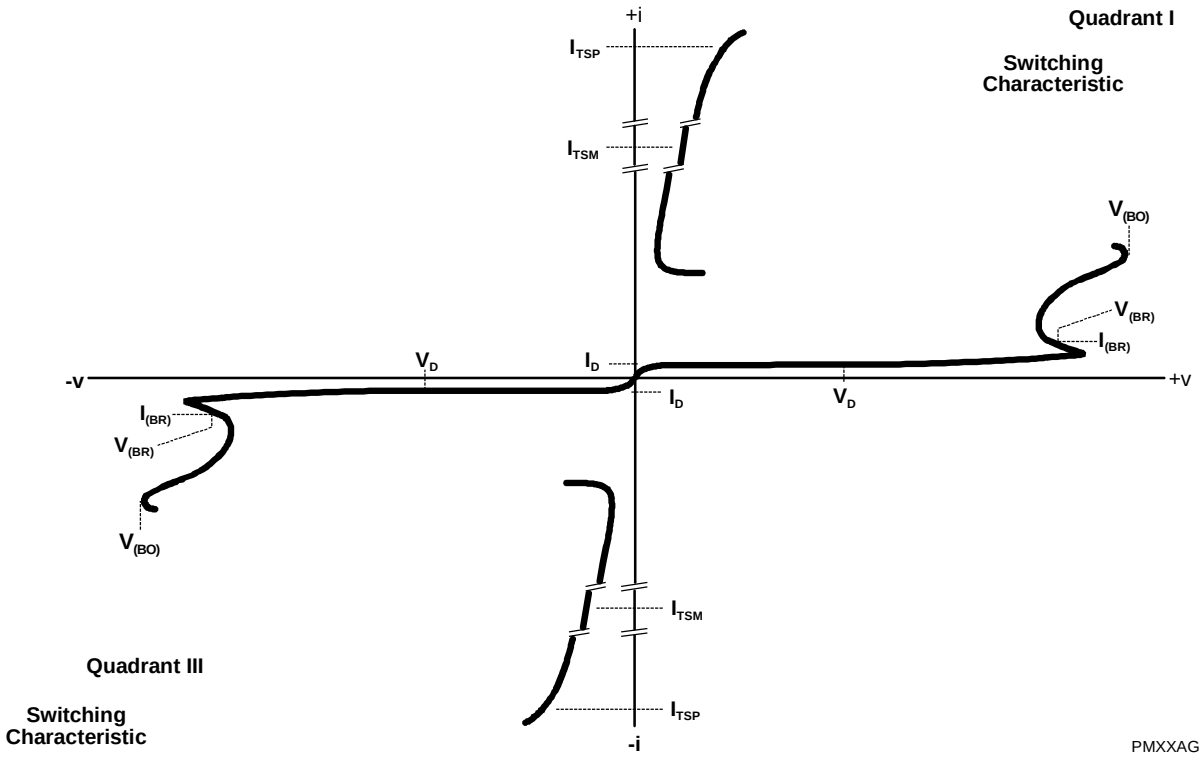
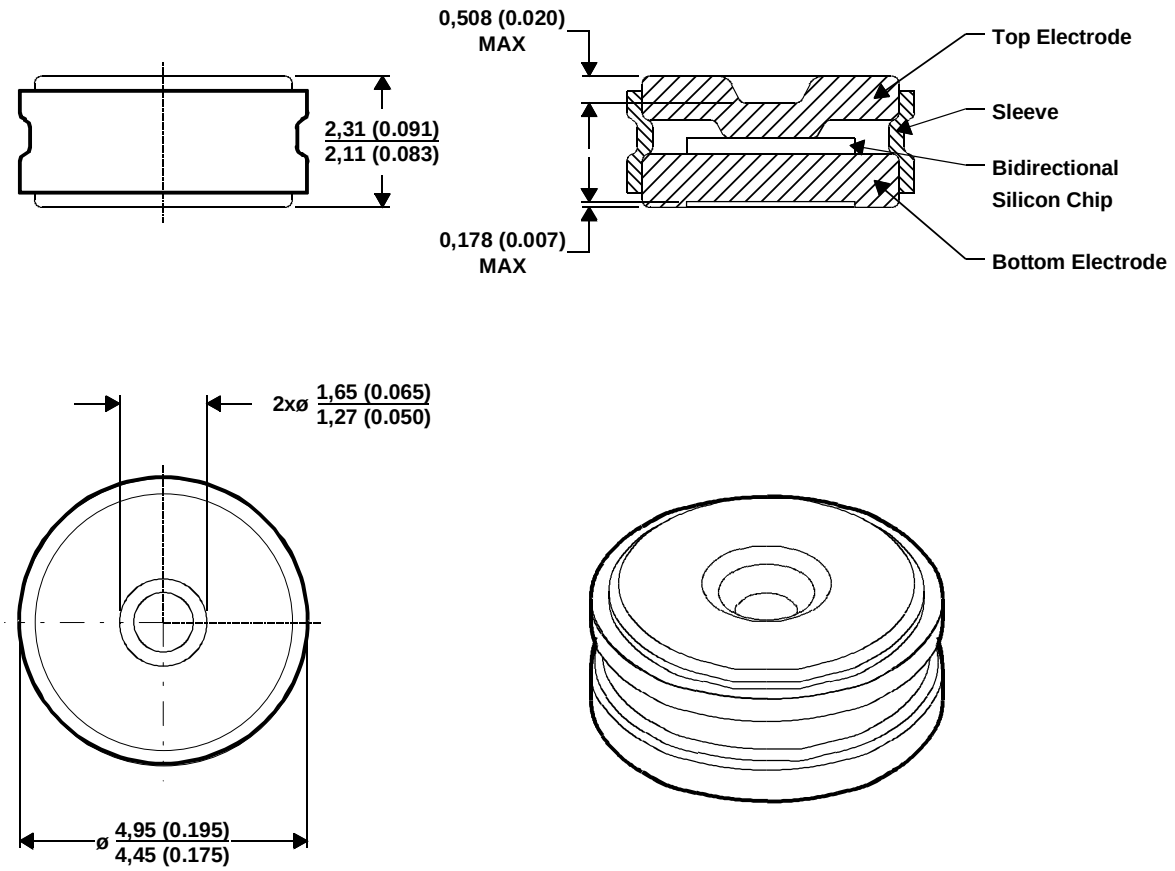


Figure 1. VOLTAGE-CURRENT CHARACTERISTIC FOR T AND R TERMINALS
ALL MEASUREMENTS ARE REFERENCED TO THE R TERMINAL

MECHANICAL DATA

cell package

BUTTON CELL 9ELx



ALL LINEAR DIMENSIONS IN MILLIMETERS AND PARENTHETICALLY IN INCHES

MDXXAVA

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