

9EL2
SYMMETRICAL TRANSIENT
VOLTAGE SUPPRESSORS

SLPSE42 - JANUARY 1994 - REVISED SEPTEMBER 1994

SOLID STATE REPLACEMENT FOR GAS DISCHARGE TUBES

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

$V_{(BO) \text{ min}}$	265 V @ 250 V/ms
$V_{(BO) \text{ max}}$	400 V @ 250 V/ms

- **Planar Passivated Junctions**
Low Off-State Current < 0.5 μ A
Extended Service Life
- **Rated for International Surge Wave Shapes**

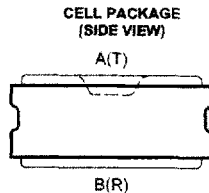
WAVE SHAPE	STANDARD	I_{TSP}
10/700 μ s	CCITT IX K17	5 kV
10/1000 μ s	Bellcore	100 A

- **Fast Response to Transients Gives**
Low Let Through Voltage
< 400 V @ 1000 V/ μ s
- **Sealed Cell Construction**
High Current Capability
- **Soldered Copper Electrodes for**
High Strength
- **Fails Short Circuit Under Excessive**
Current Conditions

description

The 9EL2 Primary Protector is designed specifically for applications that require adherence to Bellcore TR-NWT-000974 (Issue 1). This device consists of a bidirectional suppressor element connecting the A and B terminals. Typically, the 9EL2 is used as a replacement for conventional gas discharge tubes (GDT's) which are utilized to protect telephone exchange equipment from lightning and transients induced by ac power lines.

High level transients are initially clipped by breakdown clamping until the voltage rises to the *breakover level*, which causes the device to crowbar. The high crowbar holding current prevents dc latchup as the transient subsides.



MD4XAC

device symbol



These monolithic protection devices are constructed using two nickel plated 4.95 mm (0.195") diameter 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. This improves the power line cross current capability enabling conformance to international requirements such as 10 A for 1 second. One of the 9EL2's copper electrodes is specially shaped to promote a progressive shorting action (@ 50/60 Hz currents greater than 60 A) when mounted under compression inside a protection module. Under excessive power line cross conditions the 9EL2 will fail short circuit, providing maximum protection to the equipment.

For added environmental and physical protection, the 9EL2 utilizes a green plastic sleeve which shrouds the entire silicon chip.

ADVANCE INFORMATION

9EL2

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absolute maximum ratings at specified temperature

RATING	SYMBOL	TEMPERATURE T_J INITIAL	VALUE	UNIT
Non-repetitive peak on-state pulse current (see Notes 1 and 2) 5/310 μ s (CCITT IX K17, open-circuit voltage wave shape 8 kV, 10/700 μ s) 10/1000 μ s (Bellcore, open-circuit voltage wave shape 1.5 kV, 10/1000 μ s)	I_{TSP}	-20 to +65°C -20 to +65°C	200 150	A
50/60 Hz rms on-state current 1 s, (see Note 1)	I_{TSM}	-40 to +65°C	10	A rms
Junction temperature	T_J		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 9EL essentially shorts the generator output. The resulting loaded current waveform is specified.

electrical characteristics at specified temperature

PARAMETER	TEST CONDITIONS	TEMPERATURE T_J INITIAL	MIN	TYP	MAX	UNIT
$V_{(BR)}$ Breakdown voltage	$I_{(BR)} = 20$ mA (see Note 3)	-40 to +65°C	± 245			V
$V_{(BO)}$ Breakover voltage	≤ 250 V/ms, ≤ 1 A/ms	+15 to +25°C	± 265			V
	≤ 250 V/ms, ≤ 1 A/ms	-40 to +65°C			± 400	V
	≤ 100 V/ μ s, ≤ 10 A/ μ s	-40 to +65°C			± 400	V
	≤ 1 kV/ μ s, ≤ 10 A/ μ s	-40 to +65°C			± 400	V
Impulse reset	52.5 V, 260 mA S.C., dc 135 V, 200 mA S.C., dc 1000 V, 25 A S.C., 10/1000 μ s	-40 to +65°C			20	ms
I_D Off-state current	$V_D = \pm 50$ V (see Note 4)	-40 to +65°C			± 0.5	μ A
	$V_D = \pm 200$ V	-40 to +65°C			± 10	μ A
C_{off} Off-state capacitance	1 Vrms, 1 MHz, $V_D = 0$ Vdc bias	-40 to +65°C			150	pF

NOTES: 3. Meets Bellcore TR-NWT-000974 Issue 1 - DC Limiting Voltage Test (4.4).

4. This device can be sensitive to light. Suggest this parameter be measured in a dark environment.

PARAMETER MEASUREMENT INFORMATION

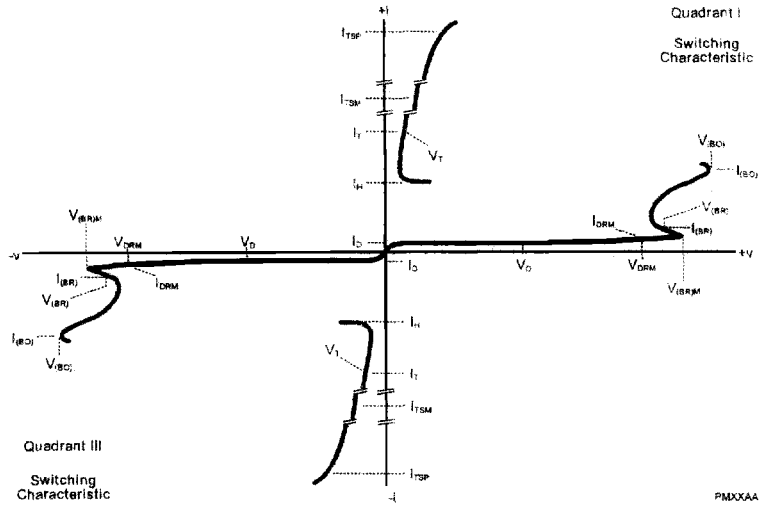


Figure 1. VOLTAGE-CURRENT CHARACTERISTICS