



TN22

Application Specific Discretes A.S.D.™

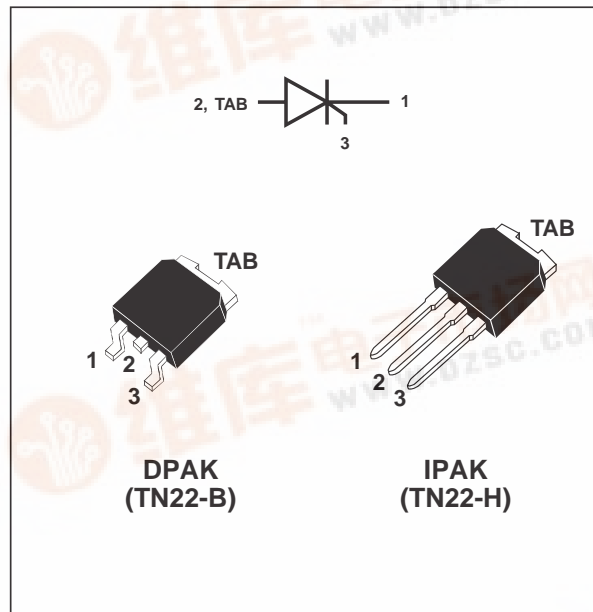
STARTLIGHT

FEATURES

- High clamping voltage structure (1200 - 1500V)
- Low gate triggering current for direct drive from line (< 1.5mA)
- High holding current (> 175mA), ensuring high striking energy.

DESCRIPTION

The TN22 has been specifically developed for use in electronic starter circuits. Use in conjunction with a sensitive SCR and a resistor, it provides high energy striking characteristics with low triggering power. Thanks to its electronic concept, this TN22 based starter offers high reliability levels and extended life time of the fluorescent tubelamps.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{DRM}	Repetitive peak off-state voltage	$T_j = 110^\circ\text{C}$	400	V
$I_{T(RMS)}$	RMS on-state current Full sine wave (180° conduction angle)	$T_c = 95^\circ\text{C}$	2	A
$I_{T(AV)}$	Mean on-state current Full sine wave (180° conduction angle)	$T_c = 95^\circ\text{C}$	1.8	A
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25°C)	$t_p = 8.3\text{ms}$	22	A
		$t_p = 10\text{ms}$	20	
I^2t	I^2t Value for fusing	$t_p = 10\text{ms}$	2	A^2s
di/dt	Critical rate of rise of on-state current $I_G = 5\text{mA}$ $di_G/dt = 70\text{mA}/\mu\text{s}$		50	$\text{A}/\mu\text{s}$
T_{stg} T_j	Storage and operating junction temperature range		- 40 to + 150 - 40 to + 110	$^\circ\text{C}$
TI	Maximum lead temperature for soldering during 10s at 4.5mm from case		260	$^\circ\text{C}$

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THERMAL RESISTANCES

Symbol	Parameters	Value	Unit
Rth(j-a)	Junction to ambient	100	°C/W
Rth(j-c)	Junction to case	3	°C/W

GATE CHARACTERISTICS (maximum values)

$P_{G(AV)} = 300 \text{ mW}$ $P_{GM} = 2 \text{ W}$ ($t_p = 20 \mu\text{s}$) $I_{FGM} = 1 \text{ A}$ ($t_p = 20 \mu\text{s}$) $V_{RGM} = 6 \text{ V}$

ELECTRICAL CHARACTERISTICS

Symbol	Test conditions		Type	Value	Unit
I_{GT}	$V_D = 12 \text{ V (DC)}$ $R_L = 33 \Omega$	$T_j = 25^\circ\text{C}$	MAX	1.5	mA
V_{GT}	$V_D = 12 \text{ V (DC)}$ $R_L = 33 \Omega$ $R_{GK} = 1 \text{ K}\Omega$	$T_j = 25^\circ\text{C}$	MAX	3	V
I_H	$V_{GK} = 0 \text{ V}$	$T_j = 25^\circ\text{C}$	MIN	175	mA
V_{TM}	$I_{TM} = 2 \text{ A}$ $t_p = 380 \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX	3.1	V
I_{DRM}	V_{DRM} Rated	$T_j = 25^\circ\text{C}$	MAX	0.1	mA
dV/dt	Linear slope up to $V_D = 67\% V_{DRM}$ $V_{GK} = 0 \text{ V}$	$T_j = 110^\circ\text{C}$	MIN	500	V/ μs

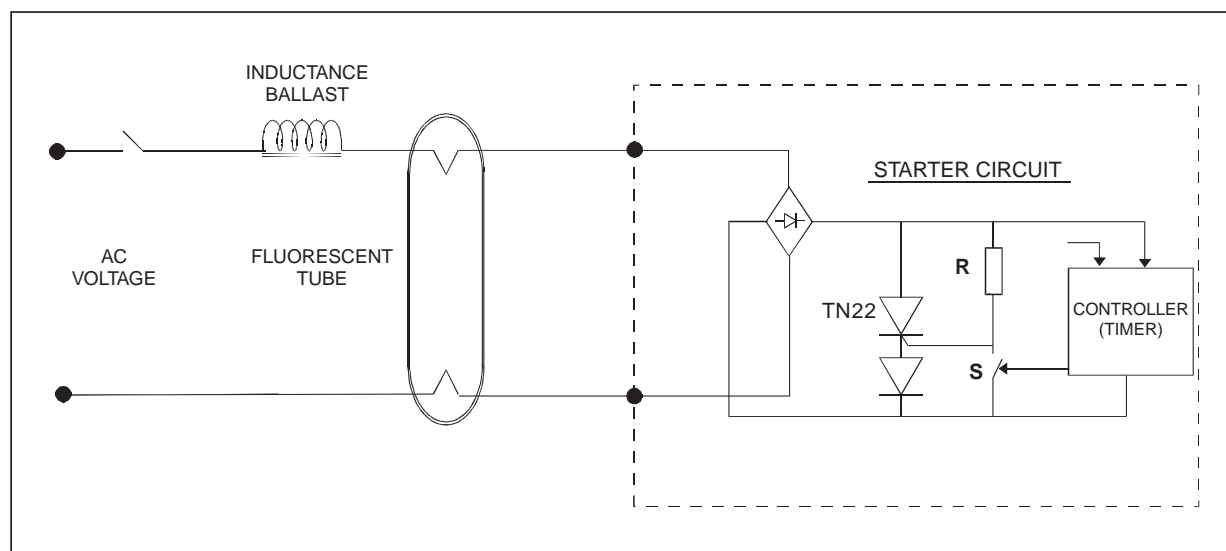
Symbol	Test conditions	Type	Value	Unit
			TN22-1500	
V_{BR}	$I_D = 5 \text{ mA}$ $V_{GK} = 0 \text{ V}$ $T_j = 25^\circ\text{C}$	MIN	1200	V
		MAX	1500	V

This thyristor has been designed for use as a fluorescent tube starter switch.

An electronic starter circuit provides :

- A pre-heating period during which a heating current is applied to the cathode heaters.
- One or several high voltage striking pulses across the lamp.

BASIC APPLICATION DIAGRAM



PRINCIPLE OF OPERATION

1/ Pre-heating

At rest the switch S is opened and when the mains voltage is applied across the circuit a full wave rectified current flows through the resistor R and the TN22 gate : at every half-cycle when this current reaches the gate triggering current (I_{GT}) the thyristor turns on.

When the device is turned on the heating current, limited by the ballast choke, flows through the tube heaters.

The pre-heating time is typically 2 or 3 seconds.

2/ Pulsing

At the end of the pre-heating phase the switch S is turned on. At this moment :

If the current through the devices is higher than the holding current (I_H) the thyristor remains on until the current falls below I_H . Then the thyristor turns off.

If the current is equal or lower than the holding current the thyristor turns off instantaneously.

When the thyristor turns off the current flowing through the ballast choke generates a high voltage

pulse. This overvoltage is clamped by the thyristor avalanche characteristic (V_{BR}).

If the lamp is not struck after the first pulse, the system starts a new ignition sequence again.

3/ Steady state

When the lamp is on the running voltage is about 150V and the starter switch is in the off-state.

IMPLEMENTATION

The resistor R must be chosen to ensure a proper triggering in the worst case (minimum operating temperature) according to the specified gate triggering current and the peak line voltage.

Switch S : This function can be realized with a gate sensitive SCR type : P0130AA 1EA3

This component is a low voltage device ($< 50V$) and the maximum current sunk through this switch can reach the level of the thyristor holding current.

The pre-heating period can be determined by the time constant of a capacitor-resistor circuit charged by the voltage drop of diodes used in series in the thyristor cathode.

Fig.1 : Maximum average power dissipation versus average on-state current (rectified full sine wave).

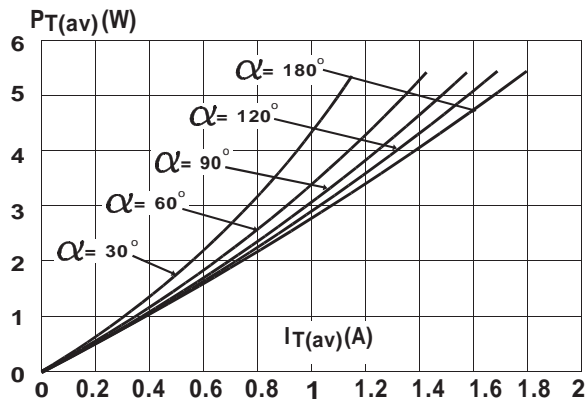


Fig.2 : Correlation between maximum average power dissipation and maximum allowable temperature (T_{amb} and T_{case}) for different thermal resistances heatsink + contact.

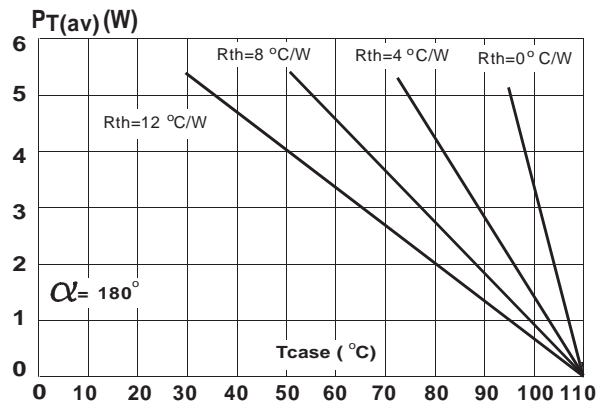


Fig.3 : Average on-state current versus case temperature (rectified full sine wave).

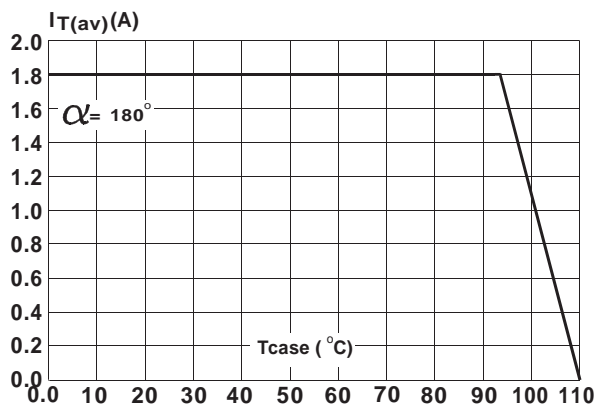


Fig.4 : Thermal transient impedance junction to ambient versus pulse duration.

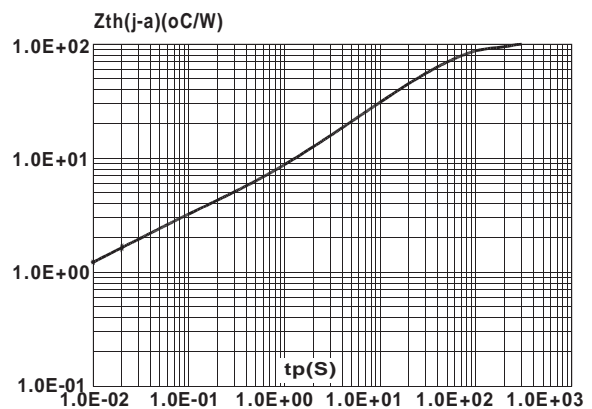


Fig.5 : Relative variation of gate trigger current and holding current versus junction temperature.

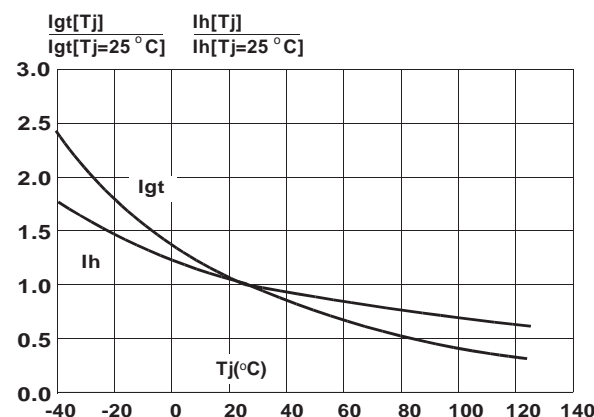


Fig.6 : Non repetitive surge peak on-state current versus number of cycles.

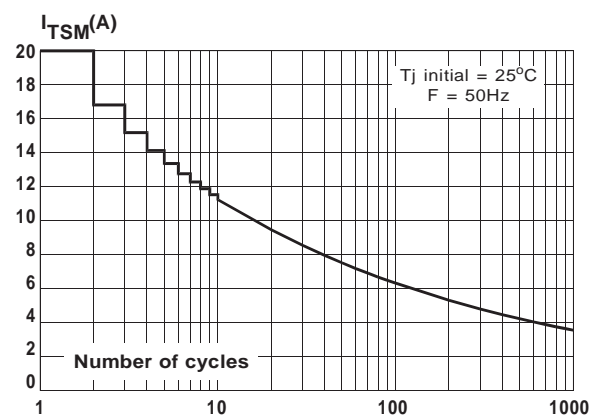


Fig.7 : Non repetitive surge peak on-state current for a sinusoidal pulse with width : $t_p = 10\text{ms}$, and corresponding value of I^2t .

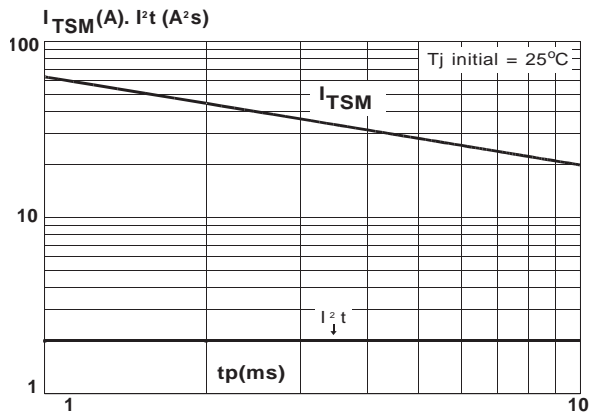


Fig.8 : On-state characteristics (maximum values).

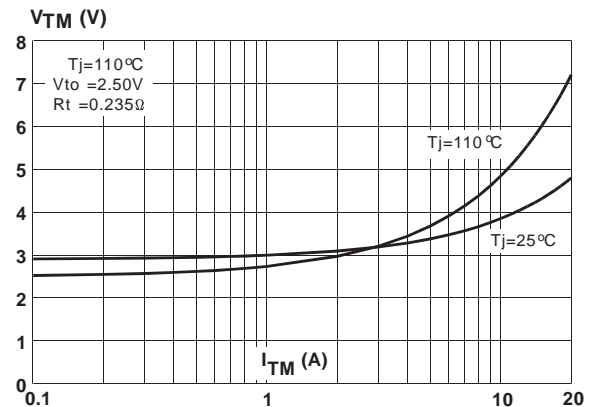


Fig.9 : Relative variation of holding current versus gate-cathode resistance (typical values).

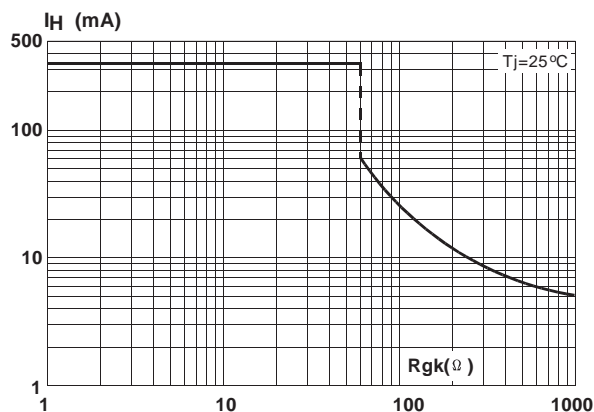
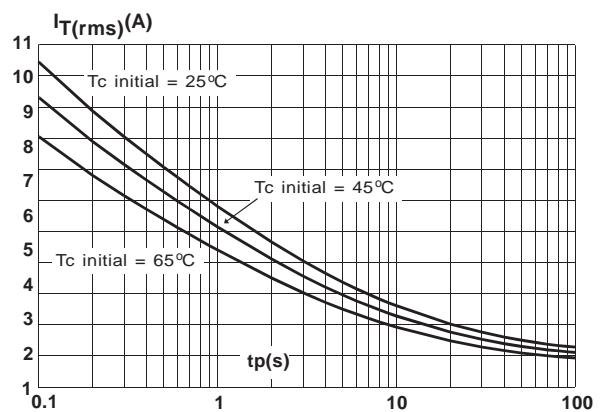
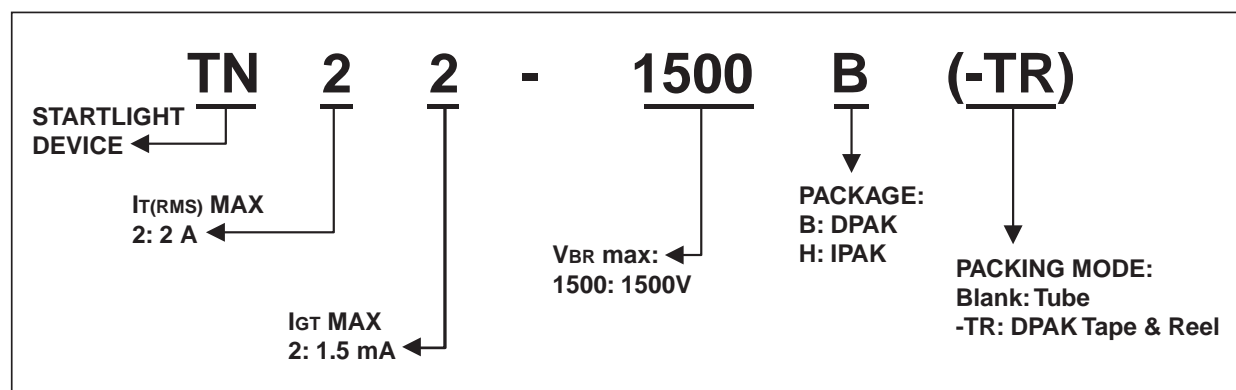


Fig.10 : Maximum allowable RMS current versus time conduction and initial case temperature. Note : Calculation made for T_j max = 135°C (the failure mode will be short circuit)

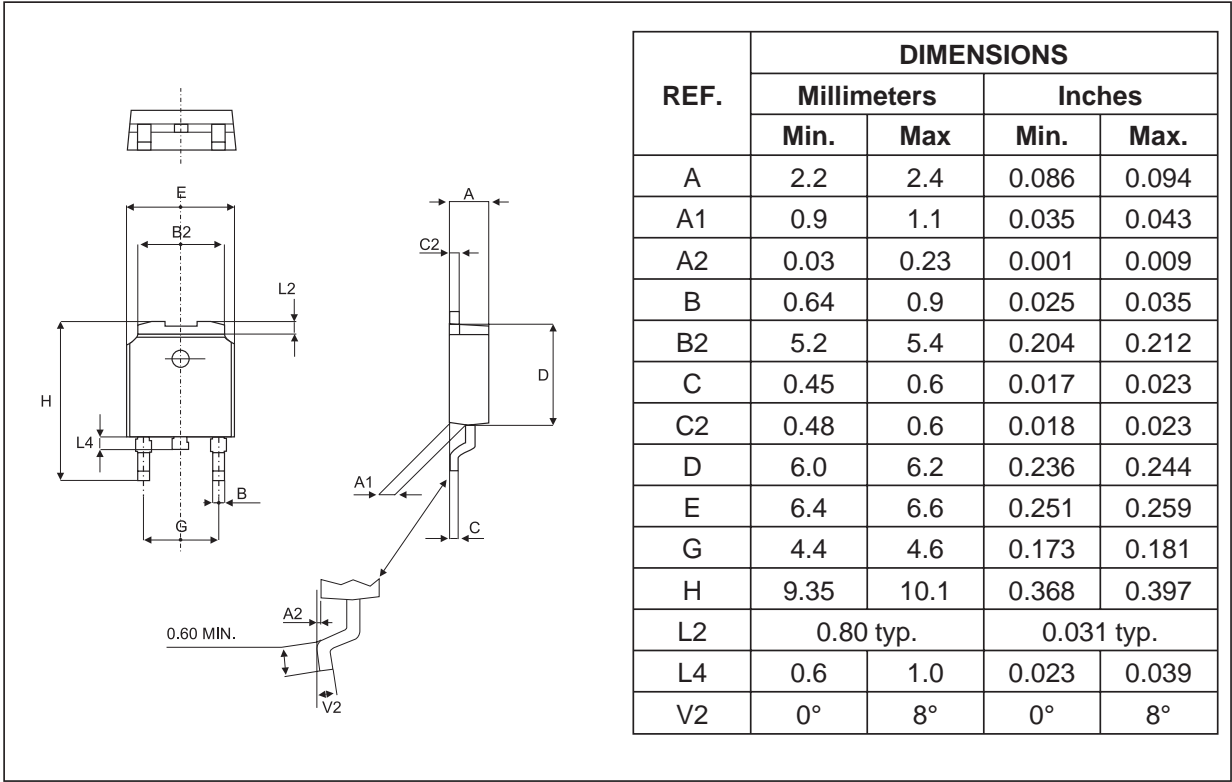


ORDERING INFORMATION

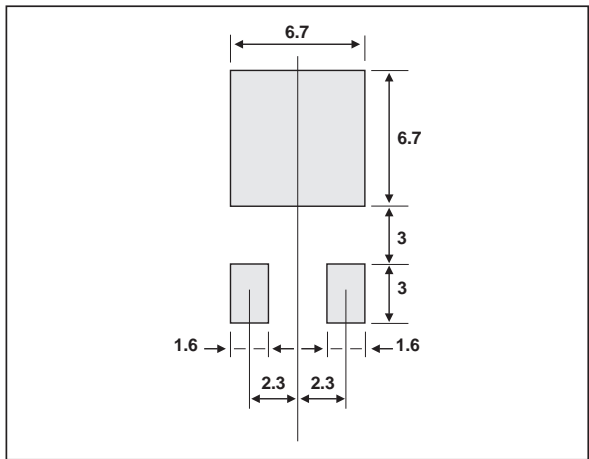


TN22

PACKAGE MECHANICAL DATA
DPAK

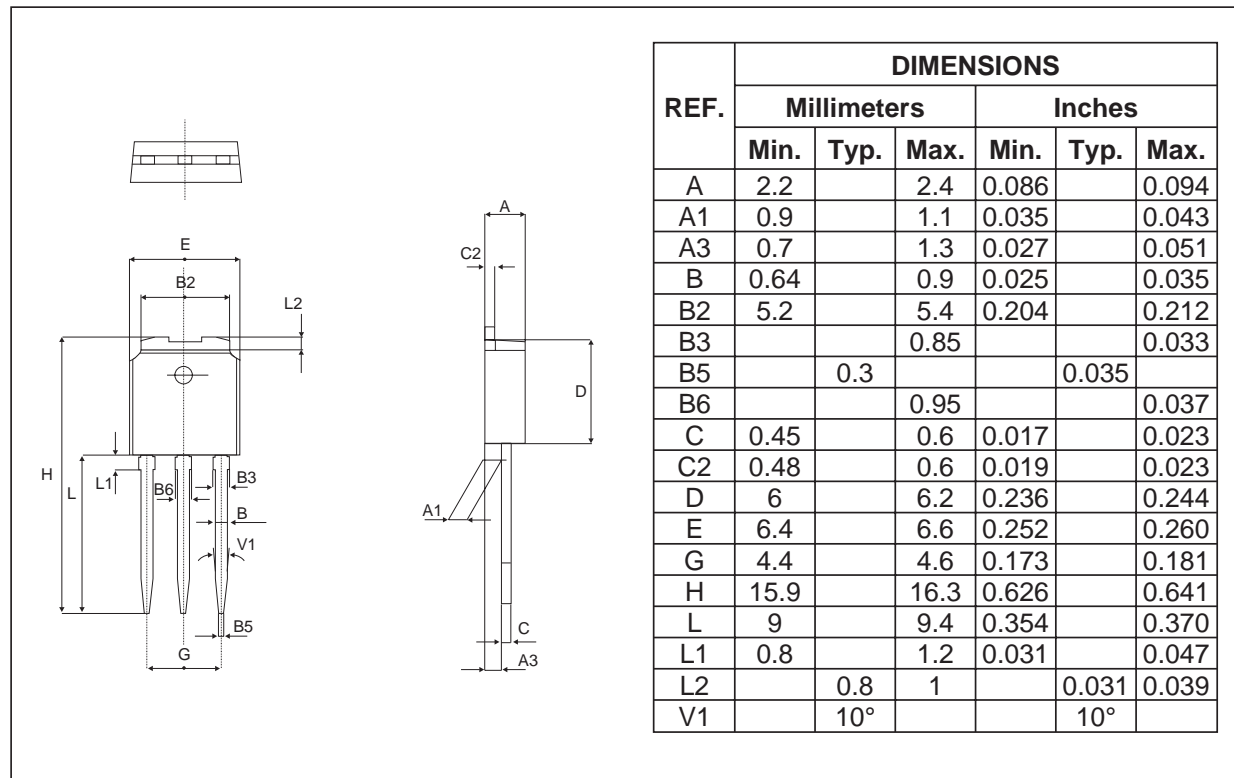


FOOTPRINT



PACKAGE MECHANICAL DATA

IPAK



OTHER INFORMATION

Type	Marking	Package	Weight	Base Qty	Delivery mode
TN22-1500B	TN221500	DPAK	0.3 g	75	Tube
TN22-1500B-TR	TN221500	DPAK	0.3 g	2500	Tape & Reel
TN22-1500H	TN221500	IPAK	0.4 g	75	Tube

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