

# HIGH VOLTAGE NPN POWER TRANSISTOR

- HIGH VOLTAGE SPECIAL DARLINGTON STRUCTURE
- n VERY RUGGED BIPOLAR TECHNOLOGY
- HIGH OPERATION JUNCTION TEMPERATURE
- n HIGH DC CURRENT GAIN

#### **APPLICATIONS**

DRIVER FOR SOLENOID, RELAY AND MOTOR

#### **DESCRIPTION**

The 2ST501T is a High Voltage NPN silicon transistor in monolithic special Darlington configuration mounted in Jedec TO-220 plastic package.

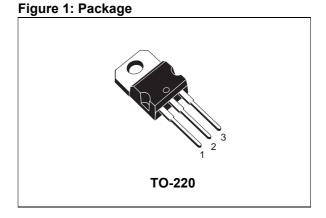
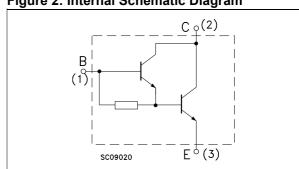


Figure 2: Internal Schematic Diagram



**Table 1: Order Codes** 

Part Number	Marking	Package	Packaging	
2ST501T	2ST501T	TO-220	TUBE	

**Table 2: Absolute Maximum Ratings** 

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>BE</sub> = 0)	500	V
V <sub>CEO</sub>	Collector-Emitter Voltage (I <sub>B</sub> = 0)	350	V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	5	V
I <sub>C</sub>	Collector Current	4	Α
I <sub>CM</sub>	Collector Peak Current (t <sub>p</sub> < 5ms)	8	Α
I <sub>B</sub>	Base Current	0.5	Α
I <sub>BM</sub>	Base Peak Current (t <sub>p</sub> < 5ms)	2.5	Α
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25 °C	100	W
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C
$T_J$	Max. Operating Junction Temperature	150	°C

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### **Table 3: Thermal Data**

R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	1.25	°C/W	
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Table 4: Electrical Characteristics (T<sub>case</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current	V <sub>CE</sub> = 500 V				100	$\mu$ A
	(I <sub>E</sub> = 0)	V <sub>CE</sub> = 500 V	T <sub>case</sub> = 125 °C			500	$\mu$ A
I <sub>CEO</sub>	Collector Cut-off Current	V <sub>CE</sub> = 350 V				100	$\mu$ A
	(I <sub>B</sub> = 0)	V <sub>CE</sub> = 350 V	T <sub>case</sub> = 125 °C			500	$\mu$ A
I <sub>EBO</sub>	Emitter Cut-off Current	V <sub>EB</sub> = 5 V				10	$\mu$ A
	$(I_C = 0)$						
V <sub>CEO(sus)</sub> *	Collector-Emitter Sustaining Voltage	I <sub>C</sub> = 10 mA	L = 10 mH	350			V
	(I <sub>B</sub> = 0 )						
V <sub>CE(sat)</sub> *	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 2 A	I <sub>B</sub> = 2 mA			1.5	V
V <sub>BE(sat)</sub> *	Base-Emitter Saturation Voltage	I <sub>C</sub> = 2 A	I <sub>B</sub> = 2 mA			2	V
h <sub>FE</sub>	DC Current Gain	I <sub>C</sub> = 2 A	V <sub>CE</sub> = 2 V	2000			
	INDUCTIVE LOAD	V <sub>CC</sub> = 12 V	V <sub>clamp</sub> = 250 V				
t <sub>s</sub>	Storage Time	L = 4 mH	I <sub>C</sub> = 2 A		15		$\mu$ s
t <sub>f</sub>	Fall Time	I <sub>B</sub> = 20 mA	$V_{BE} = -3 V$		1.5		$\mu$ s

<sup>\*</sup> Pulsed: Pulsed duration = 300  $\mu$ s, duty cycle  $\leq$  1.5 %.

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Figure 3: DC Current Gain

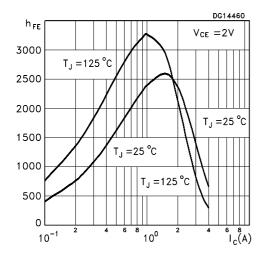


Figure 4: Collector-Source On Voltage

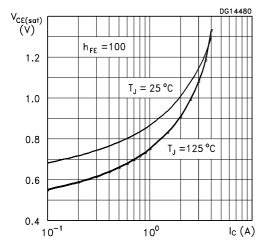


Figure 5: DC Current Gain

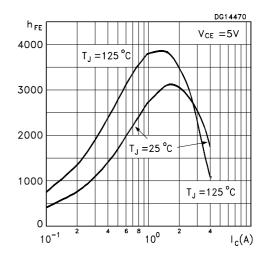
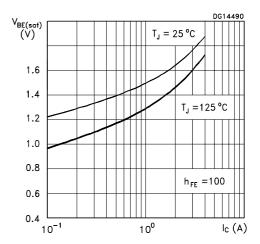
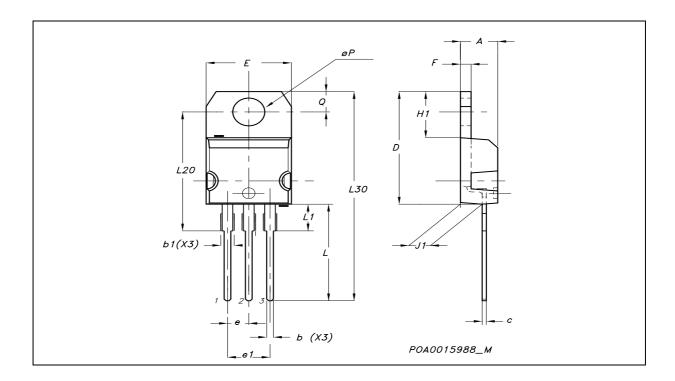


Figure 6: Base-Source On Voltage



### **TO-220 MECHANICAL DATA**

DIM.	mm.			inch			
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
Α	4.40		4.60	0.173		0.181	
b	0.61		0.88	0.024		0.034	
b1	1.15		1.70	0.045		0.066	
С	0.49		0.70	0.019		0.027	
D	15.25		15.75	0.60		0.620	
E	10		10.40	0.393		0.409	
е	2.40		2.70	0.094		0.106	
e1	4.95		5.15	0.194		0.202	
F	1.23		1.32	0.048		0.052	
H1	6.20		6.60	0.244		0.256	
J1	2.40		2.72	0.094		0.107	
L	13		14	0.511		0.551	
L1	3.50		3.93	0.137		0.154	
L20		16.40			0.645		
L30		28.90			1.137		
øΡ	3.75		3.85	0.147		0.151	
Q	2.65		2.95	0.104		0.116	



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## **Table 5: Revision History**

Version	Release Date	Change Designator
25-Feb-2005	1	First Release.



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