



## HIGH VOLTAGE NPN POWER TRANSISTOR

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

### APPLICATIONS

- n 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 1: Package

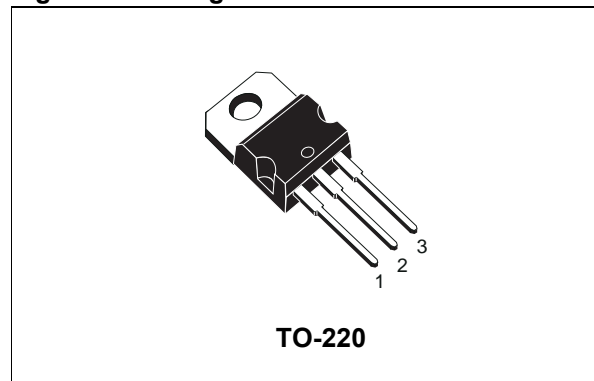


Figure 2: Internal Schematic Diagram

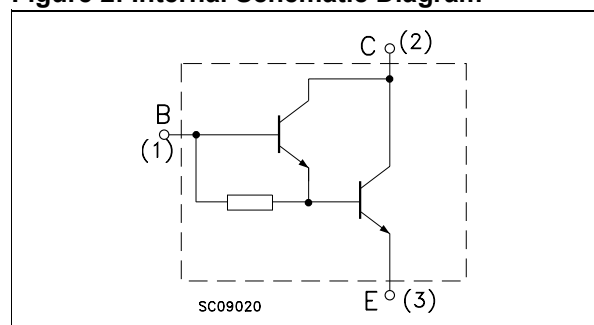


Table 1: Order Codes

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

Table 2: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	500	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	350	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	5	V
$I_C$	Collector Current	4	A
$I_{CM}$	Collector Peak Current ( $t_p < 5ms$ )	8	A
$I_B$	Base Current	0.5	A
$I_{BM}$	Base Peak Current ( $t_p < 5ms$ )	2.5	A
$P_{tot}$	Total Dissipation at $T_C = 25^\circ C$	100	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ C$
$T_J$	Max. Operating Junction Temperature	150	$^\circ C$

## 2ST501T

**Table 3: Thermal Data**

$R_{thj-case}$	Thermal Resistance Junction-Case	Max	1.25	$^{\circ}C/W$
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**Table 4: Electrical Characteristics ( $T_{case} = 25^{\circ}C$  unless otherwise specified)**

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$I_{CES}$	Collector Cut-off Current ( $I_E = 0$ )	$V_{CE} = 500 V$				100	$\mu A$
		$V_{CE} = 500 V$	$T_{case} = 125^{\circ}C$			500	$\mu A$
$I_{CEO}$	Collector Cut-off Current ( $I_B = 0$ )	$V_{CE} = 350 V$				100	$\mu A$
		$V_{CE} = 350 V$	$T_{case} = 125^{\circ}C$			500	$\mu A$
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 5 V$				10	$\mu A$
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 10 mA$	$L = 10 mH$	350			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 2 A$	$I_B = 2 mA$			1.5	V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 2 A$	$I_B = 2 mA$			2	V
$h_{FE}$	DC Current Gain	$I_C = 2 A$	$V_{CE} = 2 V$	2000			
$t_s$ $t_f$	INDUCTIVE LOAD	$V_{CC} = 12 V$	$V_{clamp} = 250 V$				
	Storage Time	$L = 4 mH$	$I_C = 2 A$		15		$\mu s$
	Fall Time	$I_B = 20 mA$	$V_{BE} = -3 V$		1.5		$\mu s$

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

Figure 3: DC Current Gain

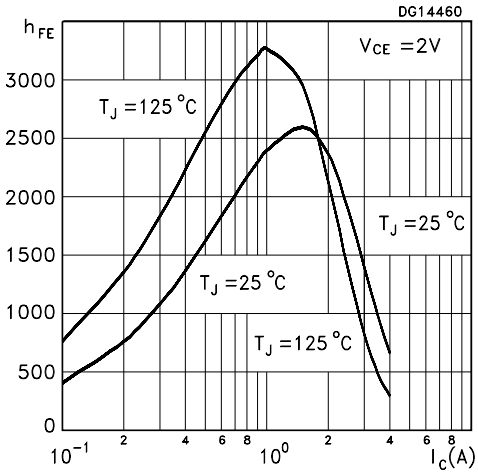


Figure 4: Collector-Source On Voltage

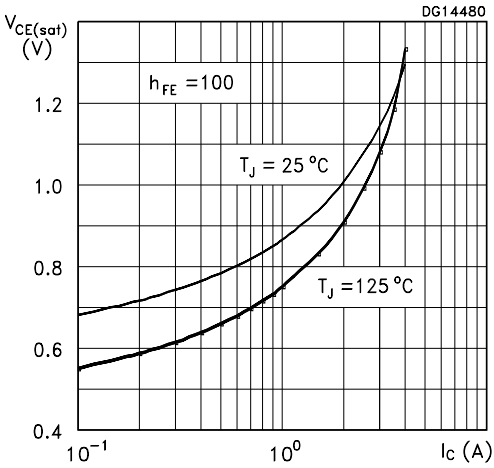


Figure 5: DC Current Gain

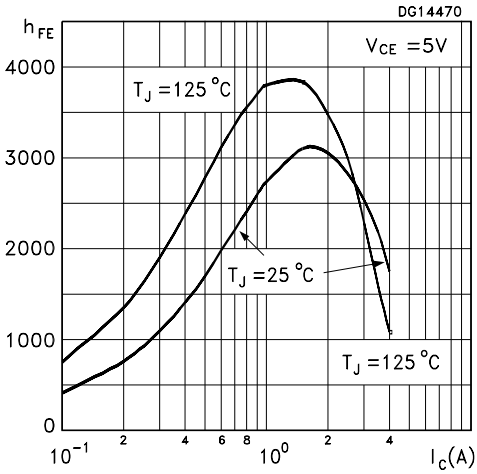
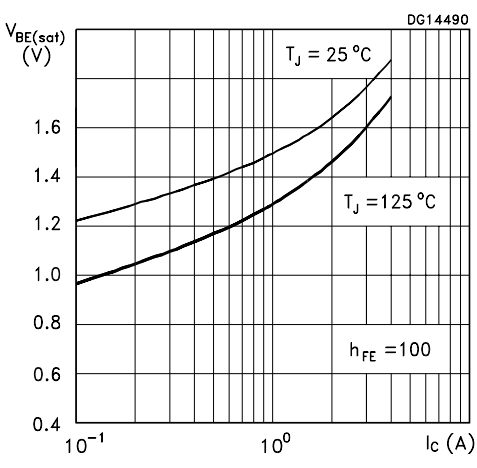
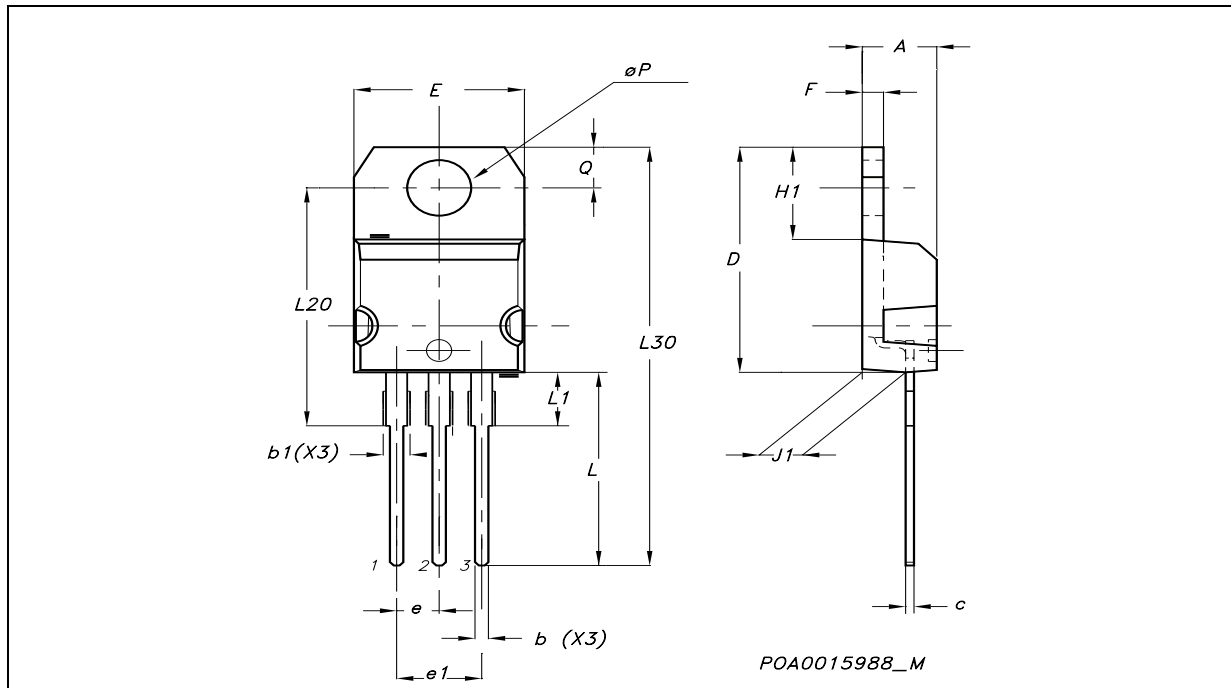


Figure 6: Base-Source On Voltage



**TO-220 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	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
c	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
e	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	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



**Table 5: Revision History**

<b>Version</b>	<b>Release Date</b>	<b>Change Designator</b>
25-Feb-2005	1	First Release.

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