

**2N3501**

**Features**

- Meets MIL-S-19500/366
- Collector-Base Voltage 150V
- Collector Current: 500 mA
- Fast Switching 1265 nS

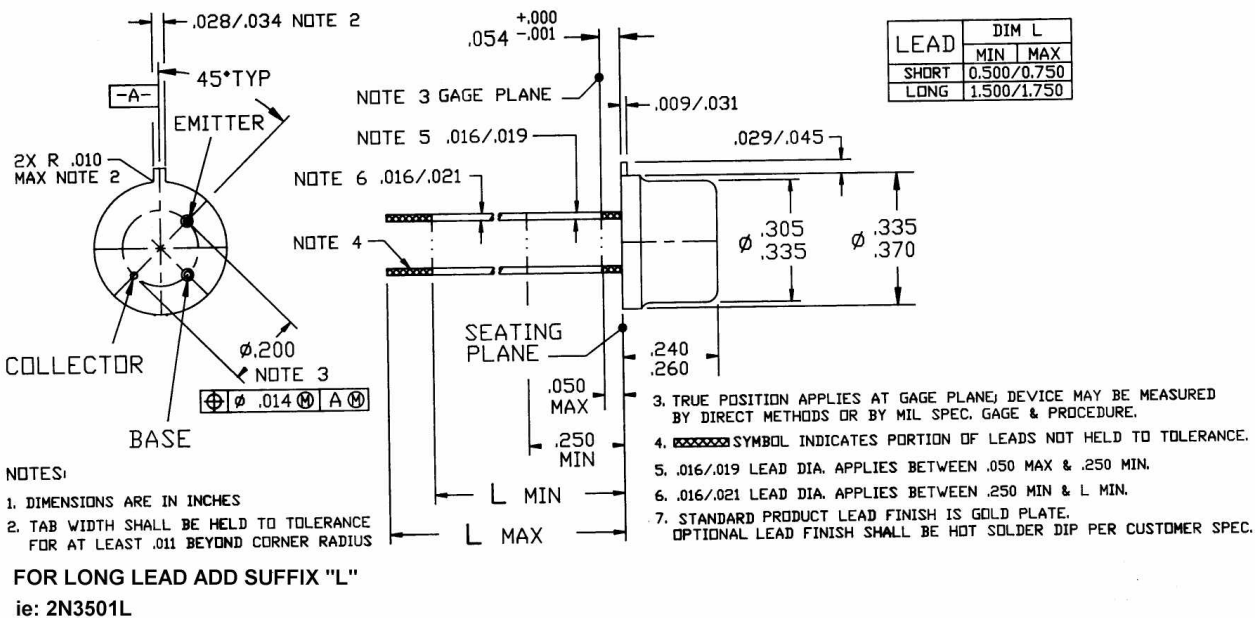
**150 Volts  
500mAmps**

**NPN  
BIPOLAR  
TRANSISTOR**

**Maximum Ratings**

RATING	SYMBOL	MAX.	UNIT
Collector-Emitter Voltage	$V_{CEO}$	150	Vdc
Collector-Base Voltage	$V_{CBO}$	150	Vdc
Emitter-Base Voltage	$V_{EBO}$	6.0	Vdc
Collector Current—Continuous	$I_C$	300	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 5.71	Watt mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	5.0 28.6	Watts mW/ $^\circ\text{C}$
Operating Temperature Range	$T_J$	-55 to +200	$^\circ\text{C}$
Storage Temperature Range	$T_s$	-55 to +200	$^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	175	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	35	$^\circ\text{C/W}$

**Mechanical Outline**



## Electrical Parameters (T<sub>A</sub> @ 25°C unless otherwise specified)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>Off Characteristics</b>					
Collector-Emitter Breakdown Voltage(1) (I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>E</sub> = 0)	<b>BV<sub>CEO</sub></b>	150	--	--	V <sub>dc</sub>
Collector-Base Breakdown Voltage (I <sub>C</sub> = 10 μA <sub>dc</sub> , I <sub>E</sub> = 0)	<b>BV<sub>CBO</sub></b>	150	--	--	V <sub>dc</sub>
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 μA <sub>dc</sub> , I <sub>C</sub> = 0)	<b>BV<sub>EBO</sub></b>	6.0	--	--	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 75 V <sub>dc</sub> , I <sub>E</sub> = 0) (V <sub>CB</sub> = 75 V <sub>dc</sub> , I <sub>E</sub> = 0, T <sub>A</sub> = 150°C)	<b>I<sub>CBO</sub></b>	--	--	0.05 50	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB(off)</sub> = 4.0 V <sub>dc</sub> , I <sub>C</sub> = 0)	<b>I<sub>EBO</sub></b>	--	--	25	nA <sub>dc</sub>
D.C. Current Gain (I <sub>C</sub> = 0.1 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> ) (I <sub>C</sub> = 1.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> ) (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )(1) (I <sub>C</sub> = 150 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )(1) (I <sub>C</sub> = 150 mA <sub>dc</sub> , V <sub>CE</sub> = 10V <sub>dc</sub> ) @ 55C (I <sub>C</sub> = 300 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )(1)	<b>h<sub>FE</sub></b>	35 50 75 100 45 20	-- -- -- -- -- --	-- -- -- 300 -- --	--
Collector-Emitter Saturation Voltage(1) (I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 1.0 mA <sub>dc</sub> ) (I <sub>C</sub> = 150 mA <sub>dc</sub> , I <sub>B</sub> = 15 mA <sub>dc</sub> )	<b>V<sub>CE(Sat)</sub></b>	-- --	-- --	0.2 0.4	V <sub>dc</sub>
Base-Emitter Saturation Voltage(1) (I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 1.0 mA <sub>dc</sub> ) (I <sub>C</sub> = 150 mA <sub>dc</sub> , I <sub>B</sub> = 15 mA <sub>dc</sub> )	<b>V<sub>BE(Sat)</sub></b>	-- --	-- --	0.8 1.2	V <sub>dc</sub>
Magnitude of common emitter small-signal short-circuit forward current transfer ratio (V <sub>CE</sub> = 20 V <sub>dc</sub> , I <sub>C</sub> = 20 mA <sub>dc</sub> , f = 100 MHz)	<b> h<sub>fe</sub> </b>	1.5	--	8 --	
Output Capacitance (V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, 100kHz ≤ f ≤ 1MHz)	<b>C<sub>OBO</sub></b>	--	--	8.0	pf
Input Capacitance (V <sub>EB</sub> = 0.5 V <sub>dc</sub> , I <sub>C</sub> = 0, 100kHz ≤ f ≤ 100MHz)	<b>C<sub>IBo</sub></b>	--	--	80	pf
Small -signal Current Gain (I <sub>C</sub> = 10mA <sub>dc</sub> , V <sub>CE</sub> = 10V <sub>dc</sub> , f = 1.0 kHz)	<b>h<sub>fe</sub></b>	75	--	300	
Noise figure (V <sub>CE</sub> = 10V <sub>dc</sub> , I <sub>C</sub> = 0.5mA <sub>dc</sub> ; R <sub>g</sub> = 1kohms, f = 1MHz)	<b>NF</b>			16	dB
Noise figure (V <sub>CE</sub> = 10V <sub>dc</sub> , I <sub>C</sub> = 0.5mA <sub>dc</sub> ; R <sub>g</sub> = 1kohms, f = 1MHz)	<b>NF</b>			6	dB
Turn - on time (V <sub>EB</sub> = 12V <sub>dc</sub> , I <sub>C</sub> = 150mA <sub>dc</sub> , I <sub>B1</sub> = 15mA <sub>dc</sub> )	<b>t<sub>on</sub></b>			115	nS
Turn - off time (I <sub>C</sub> = 150mA <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = -15mA <sub>dc</sub> )	<b>t<sub>off</sub></b>			1150	nS

(1) Pulse Test: Pulse Width ≤ 300 ms, Duty Cycle ≤ 2.0%