



**NEW ENGLAND SEMICONDUCTOR**

**2N5301  
2N5302  
2N5303**

## HIGH-POWER NPN SILICON TRANSISTORS

.....FOR USE IN POWER AMPLIFIER AND SWITCHING CIRCUITS APPLICATIONS.

- HIGH COLLECTOR-EMITTER SUSTAINING VOLTAGE -  
 $V_{CE(sus)} = 80 \text{ Vdc (Min) @ } I_C = 200 \text{ mAdc (2N5303)}$
- LOW COLLECTOR-EMITTER SATURATION VOLTAGE -  
 $V_{CE(sat)} = 0.75 \text{ Vdc (Max) @ } I_C = 10 \text{ Adc (2N5301, 2N5302)}$   
 $1.0 \text{ Vdc (Max) @ } I_C = 10 \text{ Adc (2N5303)}$
- EXCELLENT SAFE OPERATING AREA -  
200 Watt dc Power Rating to 30 Vdc (2N5303)
- COMPLEMENTS TO PNP 2N4398, 2N4399 AND 2N5745

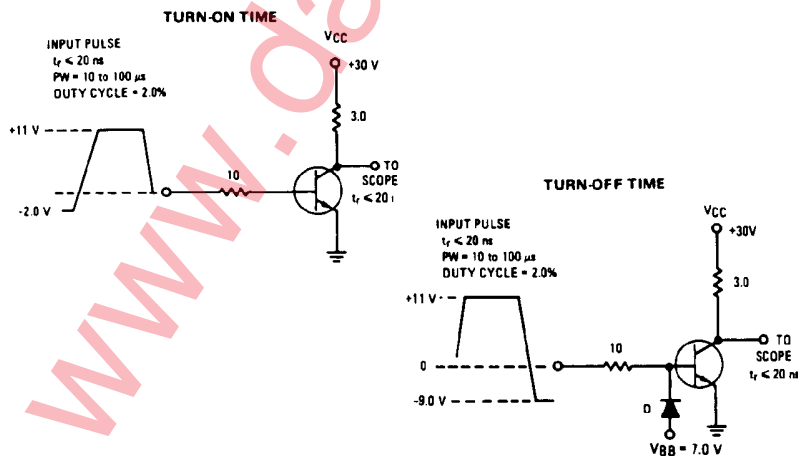
### MAXIMUM RATINGS

Rating	Symbol	2N5301	2N5302	2N5303	Unit
Collector-Emitter Voltage	$V_{CEO}$	40	60	80	Vdc
Collector-Base Voltage	$V_{CB}$	40	60	80	Vdc
Collector Current - Continuous	$I_C$	30	30	20	Adc
Base Current	$I_B$		7.5		Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$		200		Watts $\text{W}/^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$		-65 to +200		$^\circ\text{C}$

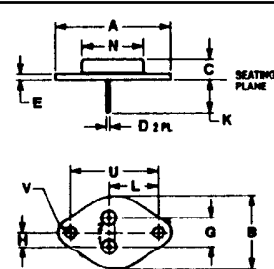
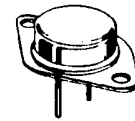
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	0.875	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$\theta_{CA}$	34	$^\circ\text{C}/\text{W}$

### SWITCHING TIME EQUIVALENT TEST CIRCUITS



20 and 30 AMPERE  
POWER TRANSISTORS  
NPN SILICON  
40-60-80 VOLTS  
200 WATTS

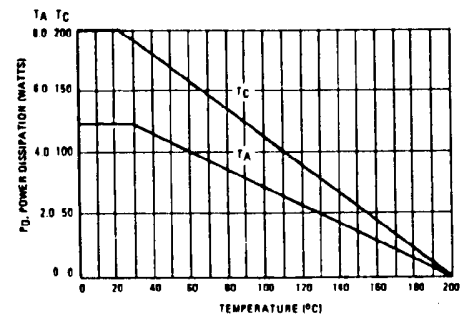


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	39.37 REF	1.550 REF		
B	—	28.17	—	1.050
C	0.25	0.51	0.250	0.325
D	0.97	1.09	0.038	0.043
E	1.40	1.77	0.055	0.070
G	10.82 BSC	—	0.430 BSC	—
H	5.48 BSC	—	0.215 BSC	—
K	11.18   12.19	—	0.440   0.480	—
L	18.80 BSC	—	0.665 BSC	—
N	—	21.09	—	0.830
Q	3.04	4.19	0.151	0.165
U	30.15 BSC	—	1.187 BSC	—
V	3.33	4.77	0.131	0.188

STYLE 1  
PN 1 BASE  
2 EMITTER  
CASE COLLECTOR

TO-3

### POWER TEMPERATURE DERATING CURVE



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1-800-446-1158 / (978) 794-1666 / FAX: (978) 689-0803

T4-4.8-860-326 REV: --



**NES**  
NEW ENGLAND SEMICONDUCTOR

**2N5301**  
**2N5302**  
**2N5303**

**ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)**

Characteristics	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
<b>Collector-Emitter Sustaining Voltage (1)</b> I <sub>C</sub> = 200 mA, I <sub>B</sub> = 0	V <sub>CE(SUS)</sub>	40		Vdc
2N5301		60		
2N5302		80		
2N5303				
<b>Collector Cutoff Current</b> V <sub>CE</sub> = 40 Vdc, I <sub>B</sub> = 0	I <sub>CEO</sub>		5.0	mA
2N5301			5.0	
V <sub>CE</sub> = 60 Vdc, I <sub>B</sub> = 0			5.0	
2N5302			5.0	
V <sub>CE</sub> = 80 Vdc, I <sub>B</sub> = 0			5.0	
2N5303			5.0	
<b>Collector Cutoff Current</b> V <sub>CE</sub> = 40 Vdc, V <sub>EB(off)</sub> = 1.5 Vdc	I <sub>CEX</sub>		1.0	mA
2N5301			1.0	
V <sub>CE</sub> = 60 Vdc, V <sub>EB(off)</sub> = 1.5 Vdc			1.0	
2N5302			1.0	
V <sub>CE</sub> = 80 Vdc, V <sub>EB(off)</sub> = 1.5 Vdc			1.0	
2N5303			1.0	
<b>Collector Cutoff Current</b> V <sub>CE</sub> = 40 Vdc, V <sub>EB(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 150°C	I <sub>CEX</sub>		10	mA
2N5301			10	
V <sub>CE</sub> = 60 Vdc, V <sub>EB(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 150°C			10	
2N5302			10	
V <sub>CE</sub> = 80 Vdc, V <sub>EB(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 150°C			10	
2N5303			10	
<b>Collector Cutoff Current</b> V <sub>CB</sub> = 40 Vdc, I <sub>E</sub> = 0	I <sub>CBO</sub>		1.0	mA
2N5301			1.0	
V <sub>CB</sub> = 60 Vdc, I <sub>E</sub> = 0			1.0	
2N5302			1.0	
V <sub>CB</sub> = 80 Vdc, I <sub>E</sub> = 0			1.0	
2N5303			1.0	
<b>Emitter Cutoff Current</b> V <sub>BE</sub> = 5.0 Vdc, I <sub>C</sub> = 0	I <sub>EBO</sub>		5.0	mA
<b>ON CHARACTERISTICS</b>				
<b>DC Current Gain (1)</b> I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 2.0 Vdc	h <sub>FE</sub>	40	-	
2N5303		15	60	
I <sub>C</sub> = 10 A, V <sub>CE</sub> = 2.0 Vdc				
2N5303				
I <sub>C</sub> = 15 A, V <sub>CE</sub> = 2.0 Vdc				
2N5301, 2N5302				
I <sub>C</sub> = 20 A, V <sub>CE</sub> = 4.0 Vdc				
2N5303				
I <sub>C</sub> = 30 A, V <sub>CE</sub> = 4.0 Vdc				
2N5301, 2N5302				
<b>Collector-Emitter Saturation Voltage(1)</b> I <sub>C</sub> = 10 A, I <sub>B</sub> = 1.0 A	V <sub>CE(sat)</sub>		0.75	Vdc
2N5301, 2N5302			1.0	
I <sub>C</sub> = 10 A, I <sub>B</sub> = 1.0 A			1.5	
2N5303			2.0	
I <sub>C</sub> = 15 A, I <sub>B</sub> = 1.5 A			2.0	
2N5301, 2N5302			2.0	
I <sub>C</sub> = 20 A, I <sub>B</sub> = 2.0 A			2.0	
2N5303			3.0	
I <sub>C</sub> = 20 A, I <sub>B</sub> = 4.0 A			3.0	
2N5303			3.0	
I <sub>C</sub> = 30 A, I <sub>B</sub> = 6.0 A			3.0	
2N5301, 2N5302			3.0	
<b>Base-Emitter Saturation Voltage(1)</b> I <sub>C</sub> = 10 A, I <sub>B</sub> = 1.0 A	V <sub>BE(sat)</sub>		1.7	Vdc
2N5301, 2N5302			1.8	
I <sub>C</sub> = 15 A, I <sub>B</sub> = 1.5 A			2.0	
2N5303			2.5	
I <sub>C</sub> = 15 A, I <sub>B</sub> = 1.5 A			2.5	
2N5301, 2N5302			2.5	
I <sub>C</sub> = 20 A, I <sub>B</sub> = 2.0 A			2.5	
2N5303			2.5	
I <sub>C</sub> = 20 A, I <sub>B</sub> = 4.0 A			2.5	
2N5303			2.5	
<b>Base-Emitter On Voltage(1)</b> I <sub>C</sub> = 10 A, I <sub>B</sub> = 2.0 A	V <sub>BE(on)</sub>		1.5	Vdc
2N5303			1.7	
I <sub>C</sub> = 15 A, I <sub>B</sub> = 2.0 A			2.5	
2N5301, 2N5302			3.0	
I <sub>C</sub> = 20 A, I <sub>B</sub> = 4.0 A			3.0	
2N5303			3.0	
I <sub>C</sub> = 30 A, I <sub>B</sub> = 4.0 A			3.0	
2N5301, 2N5302			3.0	
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
<b>Current-Gain-Bandwidth Product</b> I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 10 Vdc, f = 1.0 Mhz	f <sub>T</sub>	2.0		MHz
<b>Small-Signal Current Gain</b> I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 10 Vdc, f = 1.0 kHz	h <sub>fe</sub>	40		
<b>SWITCHING CHARACTERISTICS</b>				
Rise Time	V <sub>CC</sub> = 30 Vdc, I <sub>C</sub> = 10 A, I <sub>B1</sub> = I <sub>B2</sub> = 1.0 A	t <sub>r</sub>	1.0	μs
Storage Time		t <sub>s</sub>	2.0	μs
Fall Time		t <sub>f</sub>	1.0	μs

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

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