

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

Rating	Symbol	2N5301	2N5302	2N5303	Unit
Collector emitter voltage	$V_{CEV}$	40	60	80	V
Collector base voltage	$V_{CBO}$	40	60	80	V
Emitter base voltage	$V_{EBO}$	5.0			V
Collector current	$I_C$	30	30	20	A
Base current	$I_B$	7.5			A
Total power dissipation @ $T_A = 25^\circ\text{C}$ <sup>(1)</sup>	$P_T$	5.0			W
Total power dissipation @ $T_C = 100^\circ\text{C}$ <sup>(2)</sup>	$P_T$	115			W/°C
Operating & storage junction temperature range	$T_J, T_{stg}$	-65 – 200			°C
Maximum thermal resistance junction to case	$R_{\theta JC}$	0.875			°C/W

1) Derate linearly 28.57 mW/°C for  $T_A = 25^\circ\text{C}$

2) Derate linearly 1.14 W/°C for  $T_C = 100^\circ\text{C}$

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector emitter breakdown current $I_C = 200\text{mA}, I_B = 0$	2N5301 2N5302 2N5303	$V_{(BR)CEO}$	40 60 80	- - - V
Collector emitter cutoff current $V_{CE} = 40\text{V}, I_B = 0$ $V_{CE} = 60\text{V}, I_B = 0$ $V_{CE} = 80\text{V}, I_B = 0$	2N5301 2N5302 2N5303	$I_{CEO}$	- - -	5.0 5.0 5.0 mA
Emitter base cutoff current $V_{EB} = 5.0\text{V}, I_C = 0$		$I_{EBO}$	-	5.0 mA
Collector emitter cutoff current $V_{BE} = 1.5\text{V}, V_{CE} = 40\text{V}$ $V_{BE} = 1.5\text{V}, V_{CE} = 60\text{V}$ $V_{BE} = 1.5\text{V}, V_{CE} = 80\text{V}$	2N5301 2N5302 2N5303	$I_{CEX}$	- - -	1.0 1.0 1.0 mA
Collector emitter cutoff current $V_{CE} = 60\text{V}, I_E = 0$ $V_{CE} = 60\text{V}, I_E = 0$ $V_{CE} = 80\text{V}, I_E = 0$	2N5301 2N5302 2N5303	$I_{CBO}$	- - -	1.0 1.0 1.0 mA
<b>ON CHARACTERISTICS</b>				
DC current gain $I_C = 1.0\text{A}, V_{CE} = 2.0\text{V}$ $I_C = 10\text{A}, V_{CE} = 2.0\text{V}$ $I_C = 15\text{A}, V_{CE} = 2.0\text{V}$ $I_C = 20\text{A}, V_{CE} = 2.0\text{V}$ $I_C = 30\text{A}, V_{CE} = 4.0\text{V}$	All types 2N5303 2N5301, 2N5302 2N5303 2N5301, 2N5302	$h_{FE}$	40 15 15 5.0 5.0	- 60 60 - - -

# 2N5301-2N5303

## NPN HIGH POWER SILICON TRANSISTORS

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise specified)

Parameter		Symbol	Min	Max	Unit
<b>Collector emitter saturation voltage</b>					
I <sub>C</sub> = 10A, I <sub>B</sub> = 1.0A	2N5301, 2N5302	V <sub>CE(sat)</sub>	-	0.75	V
I <sub>C</sub> = 10A, I <sub>B</sub> = 1.0A	2N5303		-	1.0	
I <sub>C</sub> = 15A, I <sub>B</sub> = 1.5A	2N5303		-	1.5	
I <sub>C</sub> = 20A, I <sub>B</sub> = 2.0A	2N5301, 2N5302		-	2.0	
I <sub>C</sub> = 20A, I <sub>B</sub> = 4.0A	2N5303		-	2.0	
I <sub>C</sub> = 30A, I <sub>B</sub> = 6.0A	2N5301, 2N5302		-	3.0	
<b>Base emitter saturation voltage</b>					
I <sub>C</sub> = 10A, I <sub>B</sub> = 1.0A	All types	V <sub>BE(sat)</sub>	-	1.7	V
I <sub>C</sub> = 15A, I <sub>B</sub> = 1.5A	2N5301, 2N5302		-	1.8	
I <sub>C</sub> = 15A, I <sub>B</sub> = 1.5A	2N5303		-	2.0	
I <sub>C</sub> = 20A, I <sub>B</sub> = 2.0A	2N5301, 2N5302		-	2.5	
I <sub>C</sub> = 20A, I <sub>B</sub> = 4.0A	2N5303		-	2.5	
<b>Base emitter on-voltage</b>					
V <sub>CE</sub> = 2.0V, I <sub>C</sub> = 10A	2N5303	V <sub>BE(on)</sub>	-	1.5	V
V <sub>CE</sub> = 2.0V, I <sub>C</sub> = 15A	2N5301, 2N5302		-	1.7	
V <sub>CE</sub> = 4.0V, I <sub>C</sub> = 20A	2N5303		-	25	
V <sub>CE</sub> = 4.0V, I <sub>C</sub> = 30A	2N5301, 2N5302		-	3.0	
<b>DYNAMIC CHARACTERISTICS</b>					
<b>Magnitude of small signal short circuit forward current transfer ratio</b>					
I <sub>C</sub> = 1.0A, V <sub>CE</sub> = 10V, f = 1.0MHz		h <sub>fe</sub>	2.0	40	-
<b>Output capacitance</b>					
V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, 100kHz ≤ f ≤ 1.0MHz		C <sub>obo</sub>	-	800	pF
<b>SWITCHING CHARACTERISTICS</b>					
<b>Delay time</b>	V <sub>CC</sub> = 30V, I <sub>C</sub> = 10A, I <sub>B</sub> = 1.0A	t <sub>d</sub>	-	0.2	μs
<b>Rise time</b>		t <sub>r</sub>	-	0.9	μs
<b>Storage time</b>		t <sub>s</sub>	-	2.0	μs
<b>Fall time</b>		t <sub>f</sub>	-	1.0	μs
<b>SAFE OPERATING AREA</b>					
<b>DC Tests: TC = 25°, 1 cycle, t ≥ 1.0s</b>					
<b>Test 1</b>	2N5302 2N5303	V <sub>CE</sub> = 6.67V, I <sub>C</sub> = 30A			
		V <sub>CE</sub> = 10V, I <sub>C</sub> = 20A			
<b>Test 2</b>		V <sub>CE</sub> = 20V, I <sub>C</sub> = 10A			
		2N5302, 2N5303			
<b>Test 3</b>	2N5302, 2N5303	V <sub>CE</sub> = 40V, I <sub>C</sub> = 3.0A			
<b>Test 4</b>		V <sub>CE</sub> = 50V, I <sub>C</sub> = 600mA			
	V <sub>CE</sub> = 60V, I <sub>C</sub> = 600mA				

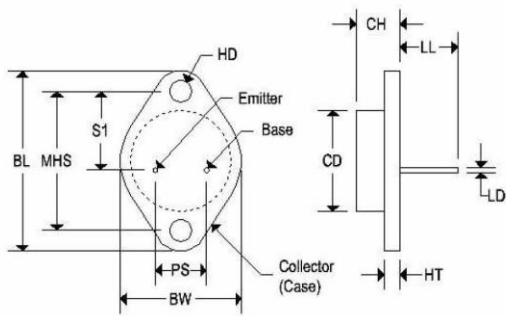
# 2N5301-2N5303

## NPN HIGH POWER SILICON TRANSISTORS

<b>Clamped switching: <math>T_A = 25^\circ</math>, <math>V_{CE} = 15V</math></b>	
Clamp voltage: 60V, $I_C = 30A$	2N5302
Clamp voltage: 80V, $I_C = 20A$	2N5303

### MECHANICAL CHARACTERISTICS

<b>Case</b>	TO-3
<b>Marking</b>	Alpha numeric
<b>Polarity</b>	See below



	TO-3			
	Inches		Millimeters	
	Min	Max	Min	Max
CD	-	0.875	-	22.220
CH	0.250	0.380	6.860	9.650
HT	0.060	0.135	1.520	3.430
BW	-	1.050	-	26.670
HD	0.131	0.188	3.330	4.780
LD	0.038	0.043	0.970	1.090
LL	0.312	0.500	7.920	12.700
BL	1.550 REF		39.370 REF	
MHS	1.177	1.197	29.900	30.400
PS	0.420	0.440	10.670	11.180
S1	0.655	0.675	16.640	17.150