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## 2N5301 & 2N5303 Silicon NPN Transistor High Power Audio Amplifier TO-3 Type Package

**Description:**

The 2N5301 and 2N5303 are silicon NPN transistors in a TO-3 type case designed for use in power amplifier and switching circuits applications..

**Features:**

- High Collector-Emmitter Sustaining Voltage:  
 $V_{CE(sus)} = 40V$  (Min) @  $I_C = 200mA$  (2N5301)  
 $V_{CE(sus)} = 80V$  (Min) @  $I_C = 200mA$  (2N5303)
- Low Collector-Emmitter Saturation Voltage:  
 $V_{CE(sat)} = 0.75V$  (Max) @  $I_C = 10A$  (2N5301)  
 $V_{CE(sat)} = 1.0V$  (Max) @  $I_C = 10A$  (2N5303)
- Excellent Safe Operating Area:  
 200W Power Rating to 30V (2N5303)

**Absolute Maximum Ratings:**

Collector-Emmitter Voltage, $V_{CEO}$	
2N5301 .....	40V
2N5303 .....	80V
Collector-Base Voltage, $V_{CB}$	
2N5301 .....	40V
2N5303 .....	80V
Continuous Collector Current, $I_C$	
2N5301 .....	30A
2N5303 .....	20A
Base Current, $I_B$ .....	7.5A
Total Device Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	200W
Derate Above $25^\circ C$ .....	1.14W/ $^\circ C$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+200^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+200^\circ C$
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	0.875 $^\circ C/W$
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ .....	34 $^\circ C/W$

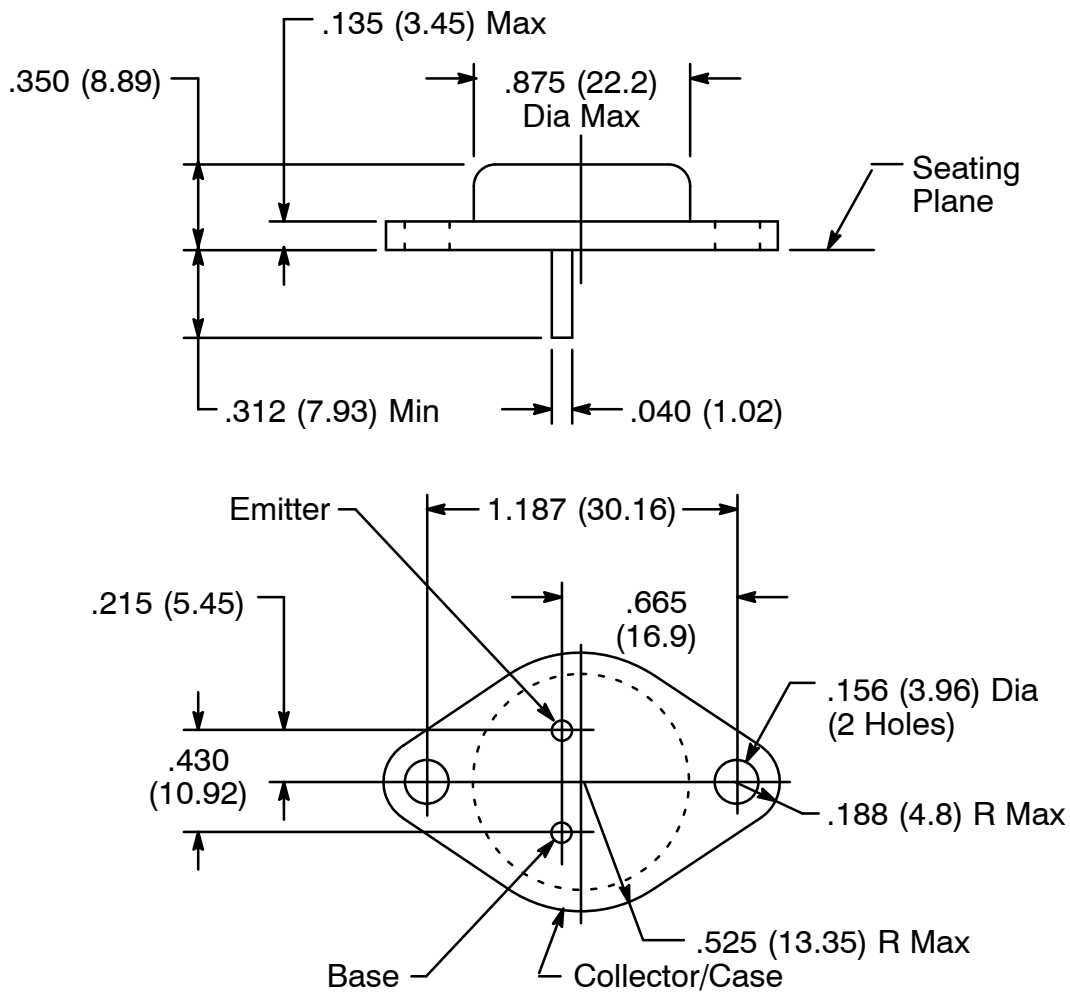
**Electrical Characteristics:** ( $T_C = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
<b>OFF Characteristics</b>							
Collector–Emitter Sustaining Voltage 2N5301	$V_{CE(sus)}$	$I_C = 200\text{mA}, I_B = 0, \text{Note 1}$		40	–	–	V
2N5303				80	–	–	V
Collector Cutoff Current 2N5301	$I_{CEO}$	$V_{CE} = 40\text{V}$	$I_B = 0$	–	–	5	mA
2N5303		$V_{CE} = 80\text{V}$		–	–	5	mA
2N5301	$I_{CEX}$	$V_{CE} = 40\text{V}$	$V_{EB(off)} = 1.5\text{V}$	–	–	1	mA
2N5303		$V_{CE} = 80\text{V}$		–	–	1	mA
2N5301		$V_{CE} = 40\text{V}$	$V_{EB(off)} = 1.5\text{V},$ $T_C = +150^\circ\text{C}$	–	–	10	mA
2N5303		$V_{CE} = 80\text{V}$		–	–	10	mA
2N5301	$I_{CBO}$	$V_{CB} = 40\text{V}$	$I_E = 0$	–	–	1	mA
2N5303		$V_{CB} = 80\text{V}$		–	–	1	mA
Emitter–Base Cutoff Current	$I_{EBO}$	$V_{BE} = 5\text{V}, I_C = 0$		–	–	1.0	mA
<b>ON Characteristics (Note 1)</b>							
DC Current Gain All Types	$h_{FE}$	$I_C = 1\text{A}$	$V_{CE} = 2\text{V}$	40	–	–	
2N5303		$I_C = 10\text{A}$		15	–	60	
2N5301		$I_C = 15\text{A}$		15	–	60	
2N5303		$I_C = 20\text{A}$	$V_{CE} = 4\text{V}$	5	–	–	
2N5301		$I_C = 30\text{A}$		5	–	–	
Collector–Emitter Saturation Voltage 2N5301	$V_{CE(sat)}$	$I_C = 10\text{A}, I_B = 1\text{A}$		–	–	0.75	V
2N5303				–	–	1.0	V
2N5303		$I_C = 15\text{A}, I_B = 1.5\text{A}$		–	–	1.5	V
2N5301				$I_C = 20\text{A}$	$I_B = 2\text{A}$	–	–
2N5303			$I_B = 4\text{A}$	–	–	2.0	V
2N5301		$I_C = 30\text{A}, I_B = 6\text{A}$		–	–	3.0	V
Base–Emitter Saturation Voltage All Types	$V_{BE(sat)}$	$I_C = 10\text{A}, I_B = 1\text{A}$		–	–	1.7	V
2N5301				$I_C = 15\text{A}, I_B = 1.5\text{A}$		–	–
2N5303		–	–			2.0	V
2N5301		$I_C = 20\text{A}$	$I_B = 2\text{A}$	–	–	2.5	V
2N5303			$I_B = 4\text{A}$	–	–	2.5	V
Base–Emitter ON Voltage 2N5303	$V_{BE(on)}$	$I_C = 10\text{A}$	$V_{CE} = 2\text{V}$	–	–	1.5	V
2N5301		$I_C = 15\text{A}$		–	–	1.7	V
2N5303		$I_C = 20\text{A}$	$V_{CE} = 4\text{V}$	–	–	2.5	V
2N5301		$I_C = 30\text{A}$		–	–	3.0	V

Note 1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ . Duty Cycle  $\leq 2\%$ .


**Electrical Characteristics (Cont'd):** ( $T_C = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Dynamic Characteristics</b>						
Current Gain–Bandwidth Product	$f_T$	$I_C = 1\text{A}, V_{CE} = 10\text{V}, f = 1\text{MHz}$	2.0	–	–	MHz
Small–Signal Current Gain	$h_{fe}$	$I_C = 1\text{A}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	40	–	–	
<b>Switching Characteristics</b>						
Rise Time	$t_r$	$V_{CC} = 30\text{V}, I_C = 10\text{A},$ $I_{B1} = I_{B2} = 1\text{A}$	–	–	1	$\mu\text{s}$
Storage Time	$t_s$		–	–	2	$\mu\text{s}$
Fall Time	$t_f$		–	–	1	$\mu\text{s}$



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