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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–Emitter Sustaining Voltage:
  $V_{CEO(sus)}$ = 40V (Min) @ I_C = 200mA (2N5301)
  $V_{CEO(sus)}$ = 80V (Min) @ I_C = 200mA (2N5303)
- Low Collector–Emitter 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–Emitter 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°C), P_D 200W
- Derate Above 25°C . . . . . 1.14W/°C

Operating Junction Temperature Range, T_J . . . . . –65° to +200°C

Storage Temperature Range, T_{stg} . . . . . –65° to +200°C

Thermal Resistance, Junction–to–Case, R_{thJC} . . . . . 0.875°C/W

Thermal Resistance, Junction–to–Ambient, R_{thJA} . . . . . 34°C/W

Electrical Characteristics: (T_C =+25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
OFF Characteristics							
Collector−Emitter Sustaining Voltage 2N5301	$V_{CEO(sus)}$	I_C = 200mA, I_B = 0, Note 1		40	–	–	V
2N5303				80	–	–	V
Collector Cutoff Current 2N5301	I_{CEO}	V_{CE} = 40V	I_B = 0	–	–	5	mA
2N5303		V_{CE} = 80V		–	–	5	mA
2N5301	I_{CEX}	V_{CE} = 40V	$V_{EB(off)}$ = 1.5V	–	–	1	mA
2N5303		V_{CE} = 80V		–	–	1	mA
2N5301		V_{CE} = 40V	$V_{EB(off)}$ = 1.5V, T_C = +150°C	–	–	10	mA
2N5303		V_{CE} = 80V		–	–	10	mA
2N5301	I_{CBO}	V_{CB} = 40V	I_E = 0	–	–	1	mA
2N5303		V_{CB} = 80V		–	–	1	mA
Emitter−Base Cutoff Current	I_{EBO}	V_{BE} = 5V, I_C = 0		–	–	1.0	mA
ON Characteristics (Note 1)							
DC Current Gain All Types	h_{FE}	I_C = 1A	V_{CE} = 2V	40	–	–	
2N5303		I_C = 10A		15	–	60	
2N5301		I_C = 15A		15	–	60	
2N5303		I_C = 20A	V_{CE} = 4V	5	–	–	
2N5301		I_C = 30A		5	–	–	
Collector−Emitter Saturation Voltage 2N5301	$V_{CE(sat)}$	I_C = 10A, I_B = 1A		–	–	0.75	V
2N5303				–	–	1.0	V
2N5303		I_C = 15A, I_B = 1.5A		–	–	1.5	V
2N5301		I_C = 20A	I_B = 2A	–	–	2.0	V
2N5303			I_B = 4A	–	–	2.0	V
2N5301		I_C = 30A, I_B = 6A		–	–	3.0	V
Base−Emitter Saturation Voltage All Types	$V_{BE(sat)}$	I_C = 10A, I_B = 1A		–	–	1.7	V
2N5301		I_C = 15A, I_B = 1.5A		–	–	1.8	V
2N5303				–	–	2.0	V
2N5301		I_C = 20A	I_B = 2A	–	–	2.5	V
2N5303			I_B = 4A	–	–	2.5	V
Base−Emitter ON Voltage 2N5303	$V_{BE(on)}$	I_C = 10A	V_{CE} = 2V	–	–	1.5	V
2N5301		I_C = 15A		–	–	1.7	V
2N5303		I_C = 20A	V_{CE} = 4V	–	–	2.5	V
2N5301		I_C = 30A		–	–	3.0	V

Note 1. Pulse Test: Pulse Width ≤ 300μs. Duty Cycle ≤ 2%.

Electrical Characteristics (Cont'd): (T_C =+25°C unless otherwise specified)

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