

2N5683, 2N5684



PNP High Power Silicon Transistor

Rev. V2

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/466
- TO-3 (TO-204AA) Package
- Designed for Use in High Power Amplifier and Switching Circuit Applications



Electrical Characteristics ($T_A = +25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = 200 \text{ mA dc}$, 2N5683 $I_C = 200 \text{ mA dc}$, 2N5684	$V_{(BR)CEO}$	V dc	-60 -80	—
Collector - Base Cutoff Current	$V_{CB} = -60 \text{ Vdc}$, 2N5683 $V_{CB} = -80 \text{ Vdc}$, 2N5684	I_{CBO}	$\mu\text{A dc}$	—	-5.0
Emitter - Base Cutoff Current	$V_{EB} = -5 \text{ Vdc}$, $I_C = 0$	I_{EBO}	$\mu\text{A dc}$	—	-5.0
Collector - Emitter Cutoff Current	$V_{CE} = -60 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N5683 $V_{CE} = -80 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N5684	I_{CEX1}	$\mu\text{A dc}$	—	-5.0
Collector - Emitter Cutoff Current	$V_{CE} = -30 \text{ V dc}$, 2N5683 $V_{CE} = -40 \text{ V dc}$, 2N5683	I_{CEO}	$\mu\text{A dc}$	—	-5.0
Forward Current Transfer Ratio	$I_C = -5.0 \text{ A dc}$, $V_{CE} = -2.0 \text{ V dc}$	h_{FE1}		30	60
	$I_C = -25 \text{ A dc}$, $V_{CE} = -2.0 \text{ V dc}$	h_{FE2}		15	
	$I_C = -50 \text{ A dc}$, $V_{CE} = -5.0 \text{ V dc}$	h_{FE3}		5	
Collector - Emitter Saturation Voltage	$I_C = -25 \text{ A dc}$, $I_B = -2.5 \text{ A dc}$ $I_C = -50 \text{ A dc}$, $I_B = -10 \text{ A dc}$	$V_{CE(SAT)1}$ $V_{CE(SAT)2}$	V dc	—	-1.0 -5.0
Base - Emitter Saturation Voltage	$I_C = -25 \text{ A dc}$, $I_B = -2.5 \text{ A dc}$	$V_{BE(sat)}$	V dc		-2.0
Base - Emitter Voltage	$V_{CE} = -2 \text{ V dc}$, $I_C = -25 \text{ A dc}$	V_{BE}	V dc		-2.0

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Electrical Characteristics ($T_A = +25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = -60\text{ V dc}, V_{BE} = +1.5\text{ V dc}, 2\text{N}5683$ $V_{CE} = -80\text{ V dc}, V_{BE} = +1.5\text{ V dc}, 2\text{N}5684$	I_{CEX2}	$\mu\text{A dc}$	—	-50
Forward Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $I_C = -25\text{ A dc}, V_{CE} = -2.0\text{ V dc}$	h_{FE4}	-	7	
Dynamic Characteristics					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = -10\text{ V dc}, I_C = -5\text{ A dc}, f = 1.0\text{ MHz}$	$ h_{fe} $		2.0	20
Small-Signal Short-Circuit Forward-Current Transfer Ratio	$V_{CE} = -5\text{ V dc}, I_C = -10\text{ A dc}, f = 1.0\text{ kHz}$	h_{fe}	-	15	
Output Capacitance	$V_{CB} = -10\text{ V dc}, I_E = 0,$ $0.1\text{ MHz} \leq f \leq 1.0\text{ MHz}$	C_{obo}	pF	—	2,000

Switching Characteristics

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Turn-On Time	$V_{CC} = -30\text{ V dc}, I_C = -25\text{ A dc}, I_{B1} = -2.5\text{ A dc}$	t_{on}	μs	—	1.5
Turn-Off Time	$V_{CC} = -30\text{ V dc}, I_C = -25\text{ A dc}; I_{B1} = I_{B2} = -2.5\text{ A dc}$	t_{off}	μs	—	3.0
Storage Time	$V_{CC} = -30\text{ V dc}, I_C = -25\text{ A dc}; I_{B1} = I_{B2} = -2.5\text{ A dc}$	t_s	μs	—	2.0

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Absolute Maximum Ratings ($T_A = +25^\circ\text{C}$ unless otherwise noted)

Ratings	Symbol	Value
Collector - Emitter Voltage 2N5683 2N5684	V_{CEO}	-60 V dc -80 V dc
Collector - Base Voltage 2N5683 2N5684	V_{CBO}	-60 V dc -80 V dc
Emitter - Base Voltage	V_{EBO}	-5.0 V dc
Base Current	I_B	-15 A dc
Collector Current	I_C	-50 A dc
Total Power Dissipation ⁽¹⁾ @ $T_C = +25^\circ\text{C}$ @ $T_C = +100^\circ\text{C}$	P_T	300 W 171 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to $+200^\circ\text{C}$

(1) Between $T_C = +25^\circ\text{C}$ and $T_C = +200^\circ\text{C}$, linear derating factor (average) = 1.715 W/ $^\circ\text{C}$

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.584 $^\circ\text{C/W}$

Safe Operating Area

DC Tests:	$T_C = +25^\circ\text{C}$, 1Cycle, $t = 1.0$ s	
Test 1:	$V_{CE} = -6.0$ V dc, $I_C = -50$ A dc	Both
Test 2:	$V_{CE} = -30$ V dc, $I_C = -10$ A dc	Both
Test 3:	$V_{CE} = -50$ V dc, $I_C = -560$ mA dc,	2N5683
Test 3:	$V_{CE} = -60$ V dc, $I_C = -640$ mA dc,	2N5684

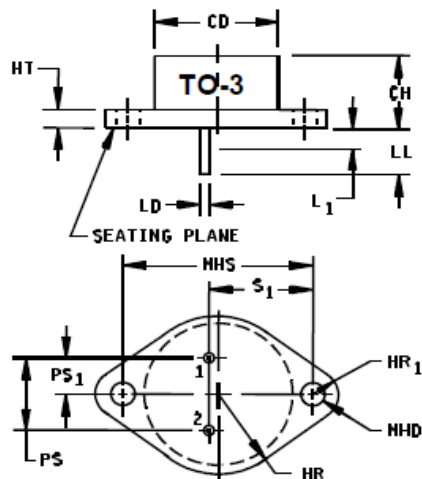
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Outline Drawing



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.22	3
CH	.250	.328	6.35	8.33	
HR	.495	.525	12.57	13.34	
HR ₁	.131	.188	3.33	4.78	6
HT	.060	.135	1.52	3.43	
LD	.057	.063	1.45	1.60	4, 5, 9
LL	.312	.500	7.92	12.70	4, 5, 9
L ₁		.050		1.27	5, 9
MHD	.151	.161	3.84	4.09	7
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	
PS ₁	.205	.225	5.21	5.72	5
S ₁	.655	.675	16.64	17.15	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Body contour is optional within zone defined by CD.
4. These dimensions shall be measured at points .050 inch (1.27 mm) to .055 inch (1.40 mm) below seating plane. When gauge is not used, measurement shall be made at seating plane.
5. Both terminals.
6. At both ends.
7. Two holes.
8. Terminal 1 is the emitter, terminal 2 is base. The collector shall be electrically connected to the case.
9. LD applies between L₁ and LL. Lead diameter shall not exceed twice LD within L₁.
10. In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.
11. The seating plane of the header shall be flat within .001 inch (0.03 mm) concave to .004 inch (0.10 mm) convex inside a .930 inch (23.62 mm) diameter circle on the center of the header and flat within .001 inch (0.03 mm) concave to 0.006 inch (0.15 mm) convex overall.

FIGURE 1. Physical dimensions, TO-3.

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