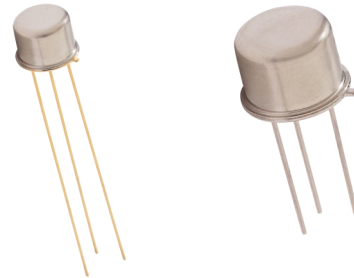


### Features

- Available in commercial, JAN, JANTX, JANTXV, JANS and JANSR 100K rads (Si) per MIL-PRF-19500/545
- TO-5 Package: 2N5151L, 2N5153L
- TO-39 (TO-205AD) Package: 2N5151, 2N5153



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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = -100 \text{ mA dc}, I_B = 0$	$V_{(BR)CEO}$	V dc	-80	—
Emitter - Base Cutoff Current	$V_{EB} = -4.0 \text{ V dc}, I_C = 0$	$I_{EBO1}$	$\mu\text{A dc}$	—	-1.0
	$V_{EB} = -5.5 \text{ V dc}, I_C = 0$	$I_{EBO2}$	mA dc	—	-1.0
Collector - Emitter Cutoff Current	$V_{CE} = -60 \text{ V dc}, V_{BE} = 0$	$I_{CES1}$	$\mu\text{A dc}$	—	-1.0
	$V_{CE} = -100 \text{ V dc}, V_{BE} = 0$	$I_{CES2}$	mA dc	—	-1.0
Collector - Emitter Cutoff Current	$V_{CE} = -40 \text{ V dc}, I_B = 0$	$I_{CEO}$	$\mu\text{A dc}$	—	-50
Forward Current Transfer Ratio	$V_{CE} = -5.0 \text{ V dc}, I_C = -50 \text{ mA dc}$ 2N5151, L 2N5153, L	$h_{FE}$	-	20	50
	$V_{CE} = -5.0 \text{ V dc}, I_C = -2.5 \text{ A dc}$ 2N5151, L 2N5153, L			30	90
	$V_{CE} = -5.0 \text{ V dc}, I_C = -5.0 \text{ A dc}$ 2N5151, L 2N5153, L			70	200
Collector - Emitter Saturation Voltage	$I_C = -2.5 \text{ A dc}, I_B = -250 \text{ mA dc}$	$V_{CE(sat)1}$	V dc	—	-0.75
	$I_C = -5.0 \text{ A dc}, I_B = -500 \text{ mA dc}$	$V_{CE(sat)2}$	V dc	—	-1.50
Emitter - Base Voltage Non-Saturation	$V_{CE} = -5.0 \text{ Vdc}, I_C = -2.5 \text{ A dc}$	$V_{BE}$	V dc	—	-1.45
Emitter - Base Saturation Voltage	$I_C = -2.5 \text{ A dc}, I_B = -250 \text{ mA dc}$	$V_{BE(sat)1}$	V dc	—	-1.45
	$I_C = -5.0 \text{ A dc}, I_B = -500 \text{ mA dc}$	$V_{BE(sat)1}$	V dc	—	-2.20
Collector—Emitter Cutoff Current	$T_C = +150^\circ\text{C}$ $V_{CE} = -60 \text{ V dc}, V_{BE} = +2 \text{ V dc}$	$I_{CEX}$	$\mu\text{A dc}$	—	-25
Forward - Current Transfer Ratio	$T_C = -55^\circ\text{C}$ $V_{CE} = -5 \text{ V dc}, I_C = -2.5 \text{ A dc}$ 2N5151, L 2N5153, L	$h_{FE4}$			15 25

(Continued next page)

## PNP Power Silicon Transistor

Rev. V5

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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
<b>Dynamic Characteristics</b>					
Magnitude of Common Emitter Small-Signal Short-Circuit, Forward-Current Transfer Ratio	$V_{CE} = -5.0\text{ V dc}$ , $I_C = -500\text{ mA dc}$ , $f = 10\text{ MHz}$ 2N5151 2N5153	$ h_{fe} $	-	6 7	
Common-Emitter, Small-Signal Short-Circuit, Forward-Current Transfer Ratio	$I_C = -100\text{ mA dc}$ , $V_{CE} = -5.0\text{ V dc}$ , $f = 1\text{ kHz}$ 2N5151 2N5153	$h_{fe}$	-	20 50	—
Open-Circuit Output Capacitance	$V_{CB} = -10\text{ V dc}$ , $I_E = 0$ , $f = 1\text{ MHz}$	$C_{obo}$	pF	—	250
Parameter	Test Conditions	Symbol	Units	Min.	Max.
<b>Switching Characteristics</b>					
Turn-On Time	$I_C = -5\text{ A dc}$ ; $I_{B1} = -500\text{ mA dc}$ , $R_L = 6\ \Omega$ , $I_{B2} = -500\text{ mA dc}$ , $V_{BE(off)} = -3.7\text{ V dc}$	$t_{on}$	$\mu\text{s}$	—	0.5
Turn-Off Time		$t_{off}$	$\mu\text{s}$	—	1.5
Storage Time		$t_s$	$\mu\text{s}$	—	1.4
Fall Time		$t_f$	$\mu\text{s}$	—	0.5
<b>Safe Operating Area</b>					
DC Tests:	$T_C = +25^\circ\text{C}$ , 1 Cycle, $t_p = 1\text{ s}$				
Test 1:	$V_{CE} = -5\text{ V dc}$ , $I_C = -2\text{ A dc}$				
Test 2:	$V_{CE} = -32\text{ V dc}$ , $I_C = -310\text{ mA dc}$				
Test 3:	$V_{CE} = -80\text{ V dc}$ , $I_C = -12.5\text{ mA dc}$				

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

Ratings	Symbol	Value
Collector - Emitter Voltage	$V_{CEO}$	-80 V dc
Collector - Base Voltage	$V_{CBO}$	-100 V dc
Emitter - Base Voltage	$V_{EBO}$	-5.5 V dc
Collector Current	$I_C$	-2 A dc -10 A dc <sup>(3)</sup>
Reverse Pulse Energy <sup>(4)</sup>		15 mj
Total Power Dissipation <sup>(1)</sup> @ $T_A = +25^\circ\text{C}$ @ $T_C = +25^\circ\text{C}$	$P_T$	1 W 10 W
Operating & Storage Temperature Range	$T_J, T_{STG}$	-65°C to +200°C

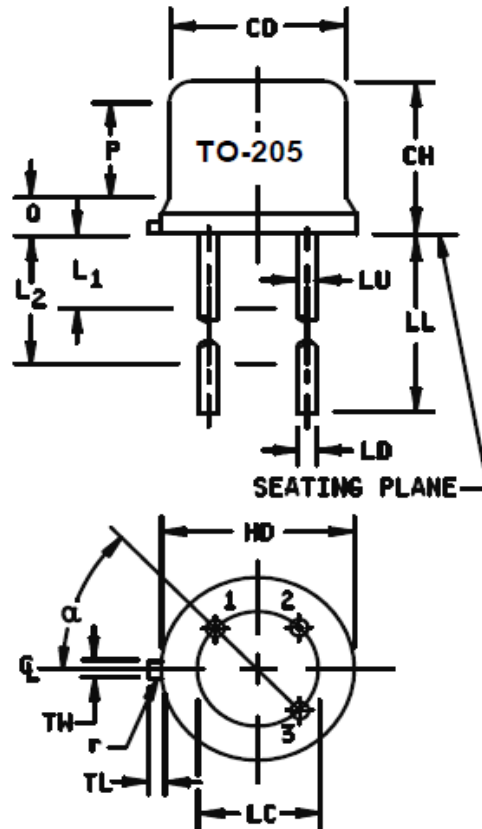
### Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$ <sup>(2)</sup>	10°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$ <sup>(2)</sup>	175°C/W

- (1) See figures 6, 7, 8 and 9 of MIL-PRF-19500/545 for temperature-power derating curves.
- (2) See figures 10, 11 and 12 of MIL-PRF-19500/545 for transient thermal impedance graph.
- (3) This value applies for  $P_W \leq 8.3$  ms, duty cycle  $\leq 1$  percent.
- (4) This rating is based on the capability of the transistors to operate safely in the unclamped inductive load energy test circuit, see subgroup 5 of the group A inspection table and figure 13 of MIL-PRF-19500/545.

### Outline Drawings (TO-5, TO-39)

Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	6
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
LC	.200 TP		5.08 TP		7
LD	.016	.021	0.41	0.53	8, 9
LL	See notes 8, 9, 12, 13				
LU	.016	.019	0.41	0.48	8, 9
L <sub>1</sub>		.050		1.27	8, 9
L <sub>2</sub>	.250		6.35		8, 9
Q		.050		1.27	6
TL	.029	.045	0.74	1.14	4, 5
TW	.028	.034	0.71	0.86	3
r		.010		0.25	11
α	45° TP		45° TP		7
P	.100		2.54		



**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TW shall be held for a minimum length of .011 inch (0.28 mm).
4. TL measured from maximum HD.
5. Outline in this zone is not controlled.
6. CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
7. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
8. LU applied between L<sub>1</sub> and L<sub>2</sub>. LD applies between LU L<sub>2</sub> and LL minimum. Diameter is uncontrolled in L<sub>1</sub> and beyond LL minimum.
9. All three leads.
10. The collector shall be electrically and mechanically connected to the case.
11. r (radius) applies to both inside corners of tab.
12. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.
13. For transistor types 2N5151 and 2N5153, LL is .5 inch (13 mm) minimum, and .75 inch (19 mm) maximum.
14. For transistor types 2N5151L and 2N5153L, LL is 1.5 inch (38 mm) minimum and 1.75 inch (44.4 mm) maximum.
15. Lead designation, depending on device type, shall be as follows: lead numbering; lead 1 = emitter, lead 2 = base, and lead 3 = collector.

FIGURE 1. Physical dimensions (TO-205).

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