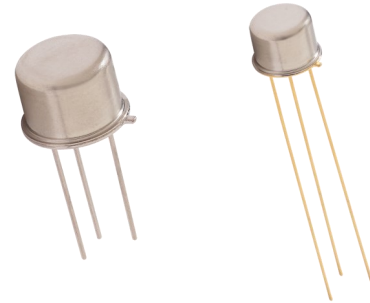


Features

- Available in commercial, JAN, JANTX, JANTXV, JANS and JANSR 100K rads (Si) per MIL-PRF-19500/544
- TO-5 Package: 2N5151L, 2N5153L
- TO-39 Package: 2N5151, 2N5153
- Ideal for High Current Switching Applications



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

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	$V_{EB} = 4.0 \text{ Vdc}, I_C = 0$	I_{EBO1}	$\mu\text{A dc}$	—	1.0
	$V_{EB} = 5.5 \text{ Vdc}, I_C = 0$	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	$V_{CE} = 40 \text{ Vdc}, I_B = 0$	I_{CEO}	$\mu\text{A dc}$	—	50
Forward Current Transfer Ratio	$I_C = 50 \text{ mA dc}, V_{CE} = 5.0 \text{ Vdc}$ 2N5152, 2N5152L 2N5154, 2N5154L	h_{FE1}		20 50	
	$I_C = 2.5 \text{ A dc}, V_{CE} = 5.0 \text{ Vdc}$ 2N5152, 2N5152L 2N5154, 2N5154L	h_{FE2}	-	30 70	90 200
	$I_C = 5.0 \text{ A dc}, V_{CE} = 5.0 \text{ Vdc}$ 2N5152, 2N5152L 2N5154, 2N5154L	h_{FE3}		20 40	
Collector - Emitter Saturation Voltage	$I_C = 2.5 \text{ Adc}, I_B = 250 \text{ mAdc}$	$V_{CE(SAT)1}$	V dc	—	0.75
	$I_C = 5.0 \text{ Adc}, I_B = 500 \text{ mAdc}$	$V_{CE(SAT)2}$			1.50
Base - Emitter Voltage (nonsaturated)	$I_C = 2.5 \text{ A dc}, V_{CE} = 5.0 \text{ Vdc}$	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
	$I_C = 5.0 \text{ A dc}, I_B = 500 \text{ mA dc}$	$V_{BE(SAT)2}$			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	$T_C = -55^\circ\text{C}$ $V_{CE} = 5 \text{ V dc}, I_C = 2.5 \text{ A dc}$ 2N5152, 2N5152L 2N5154, 2N5154L	h_{FE4}		15 25	

(Continued next page)

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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Dynamic Characteristics					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = 500 \text{ mA dc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 10 \text{ MHz}$ 2N5152, 2N5152L 2N5154, 2N5154L	$ h_{fe} $	-	6 7	—
Common-Emitter, Small-Signal, Short-Circuit, Forward-Current Transfer Ratio	$I_C = 100 \text{ mA dc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 1 \text{ kHz}$ 2N5152, 2N5152L 2N5154, 2N5154L	h_{FE}	-	20 50	—
Open-Circuit Output Capacitance	$V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1 \text{ MHz}$	C_{obo}	pF	—	250
Parameter	Test Conditions	Symbol	Units	Min.	Max.
Switching Characteristics					
Turn-On Time	$I_C = 5 \text{ A dc}$; $I_{B1} = 500 \text{ mA dc}$, $R_L = 6 \Omega$, $I_{B2} = -500 \text{ mA dc}$, $V_{BE(off)} = 3.7 \text{ Vdc}$	t_{on}	μs	—	0.5
Storage Time		t_s	μs	—	1.4
Fall Time		t_f	μs	—	0.5
Turn-Off Time		t_{off}	μs	—	1.5
Safe Operating Area					
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:	$V_{CE} = 80 \text{ V dc}$, $I_C = 12.5 \text{ mA dc}$				
(Unclamped inductive)	$T_C = +25^\circ\text{C}$, $R_{BB1} = 10\Omega$ $R_{BB2} = 100\Omega$, $L = 0.3 \text{ mH}$ $R_L = 0.1\Omega$, $V_{CC} = 10 \text{ V dc}$ $V_{BB1} = 10 \text{ V dc}$, $V_{BB2} = 4 \text{ V dc}$ $I_{CM} = 10 \text{ A dc}$ (see figure 15 of MIL-PRF-19500/544)				

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

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 ⁽¹⁾
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ @ $T_C = 25^\circ\text{C}$	P_T	1 W 10 W
Reverse Pulse Energy ⁽²⁾		15 mJ
Operating & Storage Temperature Range	T_J, T_{stg}	-65°C to $+200^\circ\text{C}$

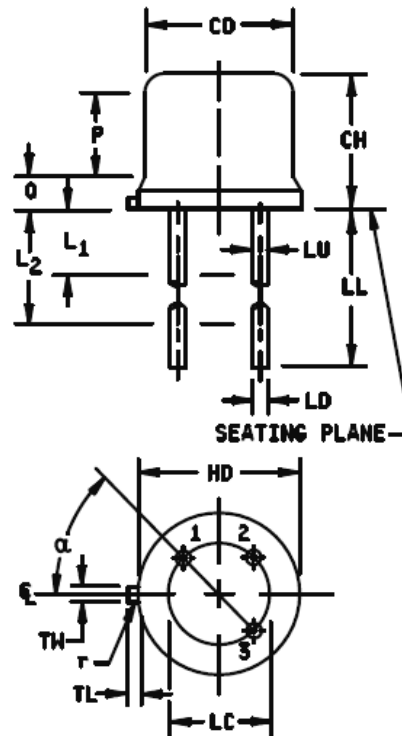
Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case ⁽⁴⁾	$R_{\theta JC}$	10°C/W
Thermal Resistance, Junction to Ambient ⁽⁴⁾	$R_{\theta JA}$	175°C/W

1. This value applies for $PW \leq 8.3$ ms, duty cycle $\leq 1\%$.
2. This rating is based on the capability of the transistors to operate safely in the unclamped inductive load energy test circuit.
3. For thermal impedance curves see figures 10, 11, and 12 of MIL-PRF-19500/544
4. For thermal impedance curves, see figures 10, 11, and 12 of MIL-PRF-19500/544

Outline Drawings (TO-5, TO-39)

Symbol	Dimensions				Note
	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	.019	0.41	0.48	8,9
LL	See note 14				
LU	.016	.019	0.41	0.48	8,9
L ₁		.050		1.27	8,9
L ₂	.250		6.35		8,9
P	.100		2.54		7
Q		.030		0.76	5
TL	.029	.045	0.74	1.14	3,4
TW	.028	.034	0.71	0.86	3
r		.010		0.25	10
α	45° TP		45° TP		7
	1, 2, 10, 12, 13, 14				



NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
- Dimension TL measured from maximum HD.
- Body contour optional within zone defined by HD, CD, and Q.
- CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 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. The device may be measured by direct methods or by gauging procedure.
- Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in and beyond LL minimum.
- All three leads.
- The collector shall be internally connected to the case.
- Dimension r (radius) applies to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.
- Lead 1 = emitter, lead 2 = base, lead 3 = collector.
- For L-suffix devices (TO-5), dimension LL = 1.5 inches (38.10 mm) min. and 1.75 inches (44.45 mm) max. For no suffix types (TO-39), dimension LL = .5 inch (12.70 mm) min. and .750 inch (19.05 mm) max.

FIGURE 1. Physical dimensions (similar to TO-5 and TO-39).

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