

2N5151U3 & 2N5153U3

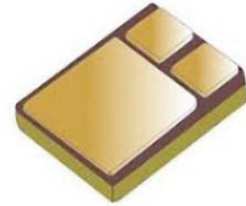


PNP Power Silicon Transistor

Rev. V5

Features

- Available in JAN, JANTX, JANTXV, JANS and JANSR per MIL-PRF-19500/545
- Lightweight & Low Power
- Ideal for Space, Military, and Other High Reliability Applications
- Surface Mount U3 Package



Electrical Characteristics ($T_C = +25^\circ\text{C}$ 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	$V_{EB} = -4.0 \text{ V dc}; I_C = 0$	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	$V_{CE} = -5.0 \text{ Vdc}; I_C = -50 \text{ mA dc}$ 2N5151U3	h_{FE}	-	20	—
	$V_{CE} = -5.0 \text{ Vdc}; I_C = -50 \text{ mA dc}$ 2N5153U3			50	—
	$V_{CE} = -5.0 \text{ Vdc}; I_C = -2.5 \text{ A dc}$ 2N5151U3			30	90
	$V_{CE} = -5.0 \text{ Vdc}; I_C = -2.5 \text{ A dc}$ 2N5153U3			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
Base - Emitter Voltage (Non-Saturated)	$V_{CE} = -5.0 \text{ V dc}; I_C = -2.5 \text{ A dc}$	V_{BE}	V dc	—	-1.45
Base - Emitter Saturation Voltage	$I_C = -2.5 \text{ A dc}; I_B = -250 \text{ mA dc}$	$V_{BE(sat)1}$	V dc	—	-1.45
	$I_C = -5.0 \text{ A dc}; I_B = -500 \text{ mA dc}$	$V_{BE(sat)2}$	V dc	—	-2.20
Magnitude of Common Emitter Small-Signal Short-Circuit, Forward Current, Transfer Ratio	$V_{CE} = -5.0 \text{ Vdc}; I_C = -500 \text{ mA dc}; f = 10 \text{ MHz}$ 2N5151U3 2N5153U3	$ h_{fe} $	-	6 7	—
Common-Emitter, Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = -5.0 \text{ V dc}; I_C = -100 \text{ mA dc}; f = 1 \text{ kHz}$ 2N5151U3 2N5153U3	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

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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
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	$T_C = -55^\circ\text{C}$ $V_{CE} = -5\text{ V dc}; I_C = -2.5\text{ A dc}$ 2N5151U3 2N5153U3	h_{FE4}	-	15 25	

Absolute Maximum Ratings ($T_C = +25^\circ\text{C}$ 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 Vdc
Collector Current	I_C	-2 A dc -10 A dc ⁽³⁾
Reverse Pulse Energy ⁽⁴⁾		15 mj
Total Power Dissipation ⁽¹⁾ @ $T_A = 25^\circ\text{C}$ @ $T_C = 25^\circ\text{C}$	P_T	1.16 W 100 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 ⁽²⁾	$R_{\theta JC}$	1.75°C/W
Thermal Resistance, Junction to Ambient ⁽²⁾	$R_{\theta JA}$	150°C/W ⁽⁵⁾

(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) The value applies for $p_w \leq 8.3\text{ ms}$, duty cycle ≤ 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.

(5) Mounted on an FR4 printed circuit board.

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

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
Turn-Off Time		t_{off}	μs	—	1.5
Storage Time		t_s	μs	—	1.4
Fall Time		t_f	μs	—	0.5

Safe Operating Area

DC Tests:	$T_C = +25^\circ\text{C}, 1 \text{ Cycle}, t_p = 1 \text{ s}$
Test 1:	$V_{CE} = -5.8 \text{ V dc}; I_C = -2 \text{ A dc}$
Test 2:	$V_{CE} = -32 \text{ Vdc}; I_C = -360 \text{ mA dc}$
Test 3:	$V_{CE} = -80 \text{ Vdc}; I_C = -14.5 \text{ mA dc}$

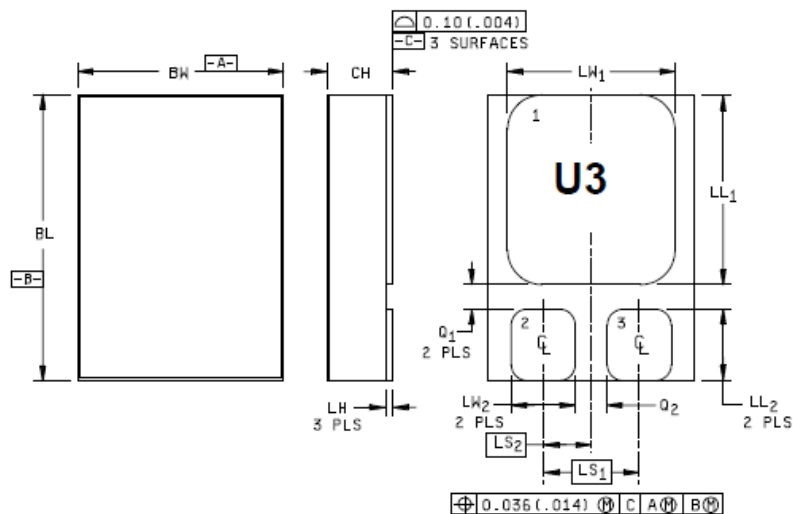
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Outline Drawing (U3)



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.395	.405	10.04	10.28
BW	.291	.301	7.40	7.64
CH	.1085	.1205	2.76	3.06
LH	.010	.020	0.25	0.51
LL1	.220	.230	5.59	5.84
LL2	.115	.125	2.93	3.17
LS1	.150 BSC		3.81 BSC	
LS2	.075 BSC		1.91 BSC	
LW1	.281	.291	7.14	7.39
LW2	.090	.100	2.29	2.54
Q1	.030		0.762	
Q2	.030		0.762	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Terminal 1 - collector, terminal 2 - base, terminal 3 - emitter.

SCHEMATIC

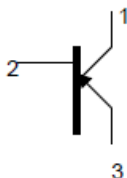


FIGURE 2. Physical dimensions and configuration for surface mount (U3).

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