

RADIATION HARDENED PNP POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/545

DEVICES

2N5151	2N5153
2N5151L	2N5153L
2N5151U3	2N5153U3

LEVELS

JANSM – 3K Rads (Si)
JANSD – 10K Rads (Si)
JANSP – 30K Rads (Si)
JANSL – 50K Rads (Si)
JANSR – 100K Rads (Si)
JANSF – 300K Rads (Si)

ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

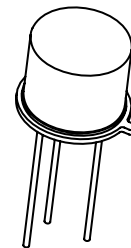
Parameters / Test Conditions	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	80	Vdc
Collector-Base Voltage	V_{CBO}	100	Vdc
Emitter-Base Voltage	V_{EBO}	5.5	Vdc
Collector Current	I_C	2.0	Adc
Total Power Dissipation 2N5151, 2N5153, L @ $T_A = +25^\circ\text{C}$ ⁽¹⁾ 2N5151, 2N5153, L @ $T_C = +25^\circ\text{C}$ ⁽²⁾ 2N5151U3, 2N5153U3 @ $T_A = +25^\circ\text{C}$ ⁽³⁾ 2N5151U3, 2N5153U3 @ $T_C = +25^\circ\text{C}$ ⁽⁴⁾	P_T	1.0 10 1.16 100	W
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$
Thermal Resistance, Junction-to Case	$R_{\theta JC}$	10 1.75 (U3)	$^\circ\text{C/W}$

Note:

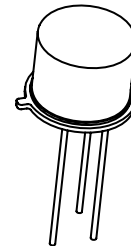
- 1) Derate linearly 5.7mW/ $^\circ\text{C}$ for $T_A > +25^\circ$
- 2) Derate linearly 66.7mW/ $^\circ\text{C}$ for $T_A > +25^\circ$
- 3) Derate linearly 6.63mW/ $^\circ\text{C}$ for $T_A > +25^\circ$
- 4) Derate linearly 571mW/ $^\circ\text{C}$ for $T_A > +25^\circ$

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted)

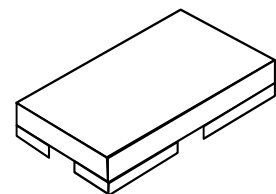
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 100\text{mAdc}, I_B = 0$	$V_{(BR)CEO}$	80		Vdc
Emitter-Base Cutoff Current $V_{EB} = 4.0\text{Vdc}, I_C = 0$ $V_{EB} = 5.5\text{Vdc}, I_C = 0$	I_{EBO}		1.0 1.0	μAdc mAdc
Collector-Emitter Cutoff Current $V_{CE} = 60\text{Vdc}, V_{BE} = 0$ $V_{CE} = 100\text{Vdc}, V_{BE} = 0$	I_{CES}		1.0 1.0	μAdc mAdc
Collector-Base Cutoff Current $V_{CE} = 40\text{Vdc}, I_B = 0$	I_{CEO}		50	μAdc



TO-5
 2N5151L, 2N5153L
 (See Figure 1)



TO-39 (TO-205AD)
 2N5151, 2N5153



U-3
 2N5151U3, 2N5153U3

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ELECTRICAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS				
Forward-Current Transfer Ratio $I_C = 50\text{mA}$, $V_{CE} = 5\text{Vdc}$		20		
2N5151		50		
2N5153				
$I_C = 2.5\text{A}$, $V_{CE} = 5\text{Vdc}$	h_{FE}	30	90	
2N5151		70	200	
2N5153				
$I_C = 5\text{A}$, $V_{CE} = 5\text{Vdc}$		20		
2N5151		40		
2N5153				
Collector-Emitter Saturation Voltage $I_C = 2.5\text{A}$, $I_B = 250\text{mA}$ $I_C = 5.0\text{A}$, $I_B = 500\text{mA}$	$V_{CE(sat)}$		0.75 1.5	Vdc
Base-Emitter Voltage Non-Saturation $I_C = 2.5\text{A}$, $V_{CE} = 5\text{Vdc}$	V_{BE}		1.45	Vdc
Base-Emitter Saturation Voltage $I_C = 2.5\text{A}$, $I_B = 250\text{mA}$ $I_C = 5.0\text{A}$, $I_B = 500\text{mA}$	$V_{BE(sat)}$		1.45 2.2	Vdc

DYNAMIC CHARACTERISTICS

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 500\text{mA}$, $V_{CE} = 5\text{Vdc}$, $f = 10\text{MHz}$				
2N5151	$ h_{fe} $	6		
2N5153		7		
Common-Emitter Small-Signal Short-Circuit. Forward-Current Transfer Ratio $I_C = 100\text{mA}$, $V_{CE} = 5\text{Vdc}$, $f = 1\text{kHz}$				
2N5151	h_{fe}	20		
2N5153		50		
Output Capacitance $V_{CB} = 10\text{Vdc}$, $I_E = 0$, $f = 1.0\text{MHz}$	C_{obo}		250	pF

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time $I_C = 5\text{A}$, $I_{B1} = 500\text{mA}$ $I_{B2} = -500\text{mA}$ $R_L = 6\Omega$ $V_{BE(OFF)} = 3.7\text{Vdc}$	t_{on}		0.5	μs
Turn-Off Time $I_C = 5\text{A}$, $I_{B1} = 500\text{mA}$ $I_{B2} = -500\text{mA}$ $R_L = 6\Omega$ $V_{BE(OFF)} = 3.7\text{Vdc}$	t_{off}		1.5	μs

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SWITCHING CHARACTERISTICS (cont.)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Storage Time $I_C = 5\text{Adc}$, $I_{B1} = 500\text{mAdc}$ $I_{B2} = -500\text{mAdc}$	t_s		1.4	μs
Fall Time $R_L = 6\Omega$ $V_{BE(OFF)} = 3.7\text{Vdc}$	t_f		0.5	μs

SAFE OPERATING AREA

DC Tests

$T_C = +25^\circ\text{C}$, 1 Cycle, $t_p = 1.0\text{s}$

Test 1

$V_{CE} = 5.0\text{Vdc}$, $I_C = 2.0\text{Adc}$

Test 2

$V_{CE} = 32\text{Vdc}$, $I_C = 310\text{mAdc}$

Test 3

$V_{CE} = 80\text{Vdc}$, $I_C = 14.5\text{mAdc}$

**FIGURE 1 (TO-5, TO-39)
 PACKAGE DIMENSIONS**

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
L1		.050		1.27	8, 9
L2	.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		

