

## NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/394

### Devices

<b>2N4150</b>	<b>2N5237</b>	<b>2N5238</b>
<b>2N4150S</b>	<b>2N5237S</b>	<b>2N5238S</b>

### Qualified Level

**JAN**  
**JANTX**  
**JANTXV**

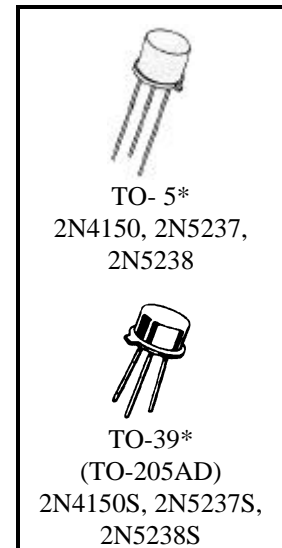
### MAXIMUM RATINGS

Ratings	Symbol	2N4150	2N5237	2N5238	Unit
		2N4150S	2N5237S	2N5238S	
Collector-Emitter Voltage	$V_{CEO}$	70	120	170	Vdc
Collector-Base Voltage	$V_{CBO}$	100	150	200	Vdc
Emitter-Base Voltage	$V_{EBO}$	10			Vdc
Collector Current	$I_C$	10			Adc
Total Power Dissipation @ $T_A = +25^{\circ}\text{C}^{(1)}$ @ $T_C = +100^{\circ}\text{C}^{(2)}$	$P_T$	1.0			W
		5.0			
Operating & Storage Junction Temp. Range	$T_J, T_{stg}$	-65 to +200			$^{\circ}\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.020	$^{\circ}\text{C}/\text{mW}$
Junction-to-Ambient	$R_{\theta JA}$	0.175	

- Derate linearly @ 5.7 mW/ $^{\circ}\text{C}$  for  $T_A > +25^{\circ}\text{C}$
- Derate linearly @ 50 mW/ $^{\circ}\text{C}$  for  $T_C > +25^{\circ}\text{C}$



\*See appendix A for package outline

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
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### OFF CHARACTERISTICS

Emitter-Base Breakdown Voltage $I_E = 10 \mu\text{Adc}$	$V_{(BR)EBO}$	7.0		Vdc
Collector-Emitter Breakdown Voltage $I_C = 0.1 \text{ Adc}$	$V_{(BR)CEO}$	70 120 170		Vdc
Collector-Emitter Cutoff Current $V_{EB} = 0.5 \text{ Vdc}, V_{CE} = 60 \text{ Vdc}$ $V_{EB} = 0.5 \text{ Vdc}, V_{CE} = 110 \text{ Vdc}$ $V_{EB} = 0.5 \text{ Vdc}, V_{CE} = 160 \text{ Vdc}$	$I_{CEX}$		10 10 10	$\mu\text{Adc}$

**2N4150, 2N4150S, 2N5237, 2N5237S, 2N5238, 2N5238S JAN SERIES**

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics		Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS (con't)</b>					
Collector-Base Cutoff Current V <sub>CE</sub> = 60 Vdc V <sub>CE</sub> = 110 Vdc V <sub>CE</sub> = 160 Vdc	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S	I <sub>CEO</sub>		10 10 10	μAdc
Emitter-Base Cutoff Current V <sub>BE</sub> = 7.0 Vdc V <sub>BE</sub> = 5.0 Vdc		I <sub>EBO</sub>		10 0.1	μAdc
Collector-Base Cutoff Current V <sub>CB</sub> = 100 Vdc V <sub>CB</sub> = 150 Vdc V <sub>CB</sub> = 200 Vdc V <sub>CB</sub> = 80 Vdc	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S All Types	I <sub>CBO</sub>		10 10 10 0.1	μAdc

**ON CHARACTERISTICS <sup>(3)</sup>**

Forward-Current Transfer Ratio I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 5.0 Vdc	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S	h <sub>FE</sub>	50 50 50	200 225 225	
I <sub>C</sub> = 5.0 Adc, V <sub>CE</sub> = 5.0 Vdc	All Types		40	120	
I <sub>C</sub> = 10 Adc, V <sub>CE</sub> = 5.0 Vdc	All Types		10	-	
Collector-Emitter Saturation Voltage I <sub>C</sub> = 5.0 Adc, I <sub>B</sub> = 0.5 Adc I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 1.0 Adc		V <sub>CE(sat)</sub>		0.6 2.5	Vdc
Base-Emitter Saturation Voltage I <sub>C</sub> = 5.0 Adc, I <sub>B</sub> = 0.5 Adc I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 1.0 Adc		V <sub>BE(sat)</sub>		1.5 25	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I <sub>C</sub> = 0.2 Adc, V <sub>CE</sub> = 10 Vdc, f = 10 MHz		h <sub>fe</sub>	1.5	7.5	
Forward Current Transfer Ratio I <sub>C</sub> = 50 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 1.0 kHz	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S	h <sub>fe</sub>	40 40 40	160 160 250	
Output Capacitance V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, 100 kHz ≤ f ≤ 1.0 MHz		C <sub>obo</sub>		350	pF

**SWITCHING CHARACTERISTICS**

Delay Time	V <sub>CC</sub> = 20 Vdc, V <sub>BB</sub> = 5.0 Vdc,	t <sub>d</sub>		50	μs
Rise Time	I <sub>C</sub> = 5.0 Adc, I <sub>B1</sub> = 0.5 Adc	t <sub>r</sub>		500	μs
Storage Time	V <sub>CC</sub> = 20 Vdc, V <sub>BB</sub> = 5.0 Vdc,	t <sub>s</sub>		1.5	μs
Fall Time	I <sub>C</sub> = 5.0 Adc, I <sub>B1</sub> = -I <sub>B2</sub> = 0.5 Adc	t <sub>f</sub>		500	μs

**SAFE OPERATING AREA**

<b>DC Tests</b>					
T <sub>C</sub> = +25°C, 1 Cycle, t = 1.0 s					
<b>Test 1</b>					
V <sub>CE</sub> = 40 Vdc, I <sub>C</sub> = 0.22 Adc					
<b>Test 2</b>					
V <sub>CE</sub> = 70 Vdc, I <sub>C</sub> = 90 mAdc					
<b>Test 3</b>					
V <sub>CE</sub> = 120 Vdc, I <sub>C</sub> = 15 mAdc		2N5237, 2N5237S			
V <sub>CE</sub> = 170 Vdc, I <sub>C</sub> = 3.5 mAdc		2N5238, 2N5238S			

(3) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.



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