

## 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**

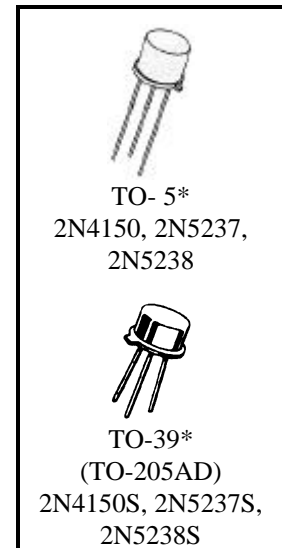
### MAXIMUM RATINGS

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	

- 1) Derate linearly @  $5.7 \text{ mW}/^{\circ}\text{C}$  for  $T_A > +25^{\circ}\text{C}$
- 2) Derate linearly @  $50 \text{ mW}/^{\circ}\text{C}$  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					
$V_{CE} = 60$ Vdc	2N4150, 2N4150S	$I_{CEO}$		10	$\mu$ Adc
$V_{CE} = 110$ Vdc	2N5237, 2N5237S			10	
$V_{CE} = 160$ Vdc	2N5238, 2N5238S			10	
Emitter-Base Cutoff Current					
$V_{BE} = 7.0$ Vdc		$I_{EBO}$		10	$\mu$ Adc
$V_{BE} = 5.0$ Vdc				0.1	
Collector-Base Cutoff Current					
$V_{CB} = 100$ Vdc	2N4150, 2N4150S	$I_{CBO}$		10	$\mu$ Adc
$V_{CB} = 150$ Vdc	2N5237, 2N5237S			10	
$V_{CB} = 200$ Vdc	2N5238, 2N5238S			10	
$V_{CB} = 80$ Vdc	All Types			0.1	

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

Forward-Current Transfer Ratio					
$I_C = 1.0$ Adc, $V_{CE} = 5.0$ Vdc	2N4150, 2N4150S	$h_{FE}$	50	200	
	2N5237, 2N5237S		50	225	
	2N5238, 2N5238S		50	225	
$I_C = 5.0$ Adc, $V_{CE} = 5.0$ Vdc	All Types		40	120	
$I_C = 10$ Adc, $V_{CE} = 5.0$ Vdc	All Types		10	-	
Collector-Emitter Saturation Voltage					
$I_C = 5.0$ Adc, $I_B = 0.5$ Adc		$V_{CE(sat)}$		0.6	Vdc
$I_C = 10$ Adc, $I_B = 1.0$ Adc				2.5	
Base-Emitter Saturation Voltage					
$I_C = 5.0$ Adc, $I_B = 0.5$ Adc		$V_{BE(sat)}$		1.5	Vdc
$I_C = 10$ Adc, $I_B = 1.0$ Adc				25	

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio					
$I_C = 0.2$ Adc, $V_{CE} = 10$ Vdc, $f = 10$ MHz		$ h_{fe} $	1.5	7.5	
Forward Current Transfer Ratio					
$I_C = 50$ mAdc, $V_{CE} = 5.0$ Vdc, $f = 1.0$ kHz	2N4150, 2N4150S	$h_{fe}$	40	160	
	2N5237, 2N5237S		40	160	
	2N5238, 2N5238S		40	250	
Output Capacitance					
$V_{CB} = 10$ Vdc, $I_E = 0$ , $100$ kHz $\leq f \leq 1.0$ MHz		$C_{obo}$		350	pF

**SWITCHING CHARACTERISTICS**

Delay Time	$V_{CC} = 20$ Vdc, $V_{BB} = 5.0$ Vdc,	$t_d$		50	$\mu$ s
Rise Time	$I_C = 5.0$ Adc, $I_{B1} = 0.5$ Adc	$t_r$		500	$\mu$ s
Storage Time	$V_{CC} = 20$ Vdc, $V_{BB} = 5.0$ Vdc,	$t_s$		1.5	$\mu$ s
Fall Time	$I_C = 5.0$ Adc, $I_{B1} = -I_{B2} = 0.5$ Adc	$t_f$		500	$\mu$ s

**SAFE OPERATING AREA**

<b>DC Tests</b>					
$T_C = +25^{\circ}$ C, 1 Cycle, $t = 1.0$ s					
<b>Test 1</b>					
$V_{CE} = 40$ Vdc, $I_C = 0.22$ Adc					
<b>Test 2</b>					
$V_{CE} = 70$ Vdc, $I_C = 90$ mAdc					
<b>Test 3</b>					
$V_{CE} = 120$ Vdc, $I_C = 15$ mAdc	2N5237, 2N5237S				
$V_{CE} = 170$ Vdc, $I_C = 3.5$ mAdc	2N5238, 2N5238S				

(3) Pulse Test: Pulse Width = 300 $\mu$ s, Duty Cycle  $\leq 2.0\%$ .

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Datasheets for electronics components.