

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/394

Devices

2N4150	2N5237	2N5238
2N4150S	2N5237S	2N5238S

Qualified Level

JAN
JANTX
JANTXV

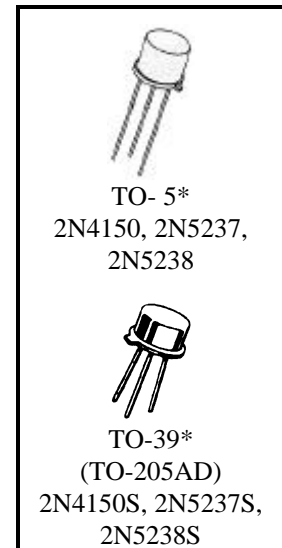
MAXIMUM RATINGS

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	μAdc

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

ELECTRICAL CHARACTERISTICS (con't)

Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS (con't)					
Collector-Base Cutoff Current					
$V_{CE} = 60 \text{ Vdc}$	2N4150, 2N4150S	I_{CEO}		10	μAdc
$V_{CE} = 110 \text{ Vdc}$	2N5237, 2N5237S			10	
$V_{CE} = 160 \text{ Vdc}$	2N5238, 2N5238S			10	
Emitter-Base Cutoff Current					
$V_{BE} = 7.0 \text{ Vdc}$		I_{EBO}		10	μAdc
$V_{BE} = 5.0 \text{ Vdc}$				0.1	
Collector-Base Cutoff Current					
$V_{CB} = 100 \text{ Vdc}$	2N4150, 2N4150S	I_{CBO}		10	μAdc
$V_{CB} = 150 \text{ Vdc}$	2N5237, 2N5237S			10	
$V_{CB} = 200 \text{ Vdc}$	2N5238, 2N5238S			10	
$V_{CB} = 80 \text{ Vdc}$	All Types			0.1	

ON CHARACTERISTICS ⁽³⁾

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

DYNAMIC CHARACTERISTICS

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

SWITCHING CHARACTERISTICS

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

SAFE OPERATING AREA

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

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