

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
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 5.0			W
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 mW/ $^{\circ}\text{C}$ for $T_A > +25^{\circ}\text{C}$

2) Derate linearly @ 50 mW/ $^{\circ}\text{C}$ for $T_C > +25^{\circ}\text{C}$



TO-5*
2N4150, 2N5237,
2N5238



TO-39*
(TO-205AD)
2N4150S, 2N5237S,
2N5238S

*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 Vdc V _{CE} = 110 Vdc V _{CE} = 160 Vdc	I _{CEO}		10 10 10	μAdc
Emitter-Base Cutoff Current V _{BE} = 7.0 Vdc V _{BE} = 5.0 Vdc	I _{EBO}		10 0.1	μAdc
Collector-Base Cutoff Current V _{CB} = 100 Vdc V _{CB} = 150 Vdc V _{CB} = 200 Vdc V _{CB} = 80 Vdc	I _{CBO}		10 10 10 0.1	μAdc

ON CHARACTERISTICS ⁽³⁾

Forward-Current Transfer Ratio I _C = 1.0 Adc, V _{CE} = 5.0 Vdc	h _{FE}	50	200	
		50	225	
		50	225	
		40	120	
I _C = 5.0 Adc, V _{CE} = 5.0 Vdc		10	-	
I _C = 10 Adc, V _{CE} = 5.0 Vdc				
Collector-Emitter Saturation Voltage I _C = 5.0 Adc, I _B = 0.5 Adc I _C = 10 Adc, I _B = 1.0 Adc	V _{CE(sat)}		0.6 2.5	Vdc
Base-Emitter Saturation Voltage I _C = 5.0 Adc, I _B = 0.5 Adc I _C = 10 Adc, I _B = 1.0 Adc	V _{BE(sat)}		1.5 25	Vdc

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	h _{fe}	40	160	
		40	160	
		40	250	
Output Capacitance V _{CB} = 10 Vdc, I _E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C _{obo}		350	pF

SWITCHING CHARACTERISTICS

Delay Time	V _{CC} = 20 Vdc, V _{BB} = 5.0 Vdc,	t _d		50	μs
Rise Time	I _C = 5.0 Adc, I _{B1} = 0.5 Adc	t _r		500	μs
Storage Time	V _{CC} = 20 Vdc, V _{BB} = 5.0 Vdc,	t _s		1.5	μs
Fall Time	I _C = 5.0 Adc, I _{B1} = -I _{B2} = 0.5 Adc	t _f		500	μs

SAFE OPERATING AREA

DC Tests					
T _C = +25°C, 1 Cycle, t = 1.0 s					
Test 1					
V _{CE} = 40 Vdc, I _C = 0.22 Adc					
Test 2					
V _{CE} = 70 Vdc, I _C = 90 mAdc					
Test 3					
V _{CE} = 120 Vdc, I _C = 15 mAdc					
V _{CE} = 170 Vdc, I _C = 3.5 mAdc					

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