

NPN HIGH POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/439

Devices

2N5038

2N5039

Qualified Level

JAN
JANTX
JANTXV

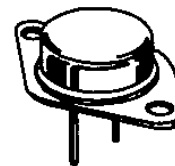
MAXIMUM RATINGS

Ratings	Symbol	2N5038	2N5039	Units
Collector-Emitter Voltage	V_{CEO}	90	75	Vdc
Collector-Base Voltage	V_{CBO}	150	125	Vdc
Emitter-Base Voltage	V_{EBO}	7.0		Vdc
Base Current	I_B	5.0		Adc
Collector Current	I_C	20		Adc
Total Power Dissipation @ $T_C = +25^{\circ}\text{C}$ ⁽¹⁾	P_T	140		W
Operating & Storage Temperature Range	T_{op}, T_{stg}	-65 to +200		$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.25	$^{\circ}\text{C/W}$

1) Derate linearly 800 mW/ $^{\circ}\text{C}$ for $T_C > +25^{\circ}\text{C}$



TO-3*
(TO-204AA)

*See appendix A for package outline

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

Characteristics	Symbol	Min.	Max.	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 200 \text{ mAdc}$	2N5038 2N5039	$V_{(BR)CEO}$	90 75	Vdc
Emitter-Base Breakdown Voltage $I_E = 25 \text{ mAdc}$		$V_{(BR)EBO}$	7.0	Vdc
Collector-Base Cutoff Current $V_{CE} = 150 \text{ Vdc}$ $V_{CE} = 125 \text{ Vdc}$	2N5038 2N5039	I_{CBO}	1.0 1.0	μAdc
Collector-Base Cutoff Current $V_{CE} = 70 \text{ Vdc}$ $V_{CE} = 55 \text{ Vdc}$	2N5038 2N5039	I_{CEO}	1.0 1.0	μAdc
Emitter-Base Cutoff Current $V_{EB} = 5.0 \text{ Vdc}$		I_{EBO}	1.0	μAdc
Collector-Emitter Cutoff Current $V_{BE} = -1.5 \text{ Vdc } V_{CE} = 100 \text{ Vdc}$ $V_{BE} = -1.5 \text{ Vdc } V_{CE} = 85 \text{ Vdc}$	2N5038 2N5039	I_{CEX}	5.0 5.0	μAdc

2N5038, 2N5039, JAN SERIES

ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽²⁾				
Forward-Current Transfer Ratio I _C = 0.5 Adc, V _{CE} = 5.0 Vdc	h _{FE}	50		
2N5038		30		
I _C = 2.0 Adc, V _{CE} = 5.0 Vdc		50	200	
2N5039		30	150	
I _C = 12 Adc, V _{CE} = 5.0 Vdc		15		
I _C = 10 Adc, V _{CE} = 5.0 Vdc		15		
Collector-Emitter Saturation Voltage I _C = 12 Adc, I _B = 1.2 Adc	V _{CE(sat)}		1.0	Vdc
2N5038			1.0	
I _C = 10 Adc, I _B = 1.0 Adc			2.5	
I _C = 20 Adc, I _B = 5.0 Adc	Both			
Base-Emitter Saturation Voltage I _C = 20 Adc, I _B = 5.0 Adc	V _{BE(sat)}		3.3	Vdc
Base-Emitter Voltage I _C = 12 Adc, V _{CE} = 5.0 Vdc	V _{BE}		1.8	Vdc
2N5038			1.8	
I _C = 10 Adc, V _{CE} = 5.0 Vdc	2N5039			

DYNAMIC CHARACTERISTICS

Forward Current Transfer Ratio I _C = 2.0 Adc, V _{CE} = 10 Vdc, f = 5.0 MHz	h _{FE}	12	48	
Output Capacitance V _{CB} = 10 Vdc, I _E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C _{obo}		500	pF

SWITCHING CHARACTERISTICS

Turn-On Time V _{CC} = 30 ± 2 Vdc; I _C = 12 Adc; I _{B1} = 1.2 Adc	t _{on}		0.5	μs
2N5038				
V _{CC} = 30 ± 2 Vdc; I _C = 10 Adc; I _{B1} = 1.0 Adc				
2N5039				
Turn-Off Time V _{CC} = 30 ± 2 Vdc; I _C = 12 Adc; I _{B1} = -I _{B2} = 1.2 Adc	t _{off}		2.0	μs
2N5038				
V _{CC} = 30 ± 2 Vdc; I _C = 10 Adc; I _{B1} = -I _{B2} = 1.0 Adc				
2N5039				

SAFE OPERATING AREA

DC Tests				
T _C = +25°C, 1 Cycle, t = 1.0 s				
Test 1				
V _{CE} = 28 Vdc, I _C = 5.0 Adc				
Test 2				
V _{CE} = 45 Vdc, I _C = 0.9 Adc				
Test 3				
V _{CE} = 7.0 Vdc, I _C = 20 Adc				
Test 4				
V _{CE} = 90 Vdc, I _C = 0.23 Adc		2N5038		
Test 4				
V _{CE} = 75 Vdc, I _C = 0.32 Adc		2N5039		

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