

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/534

DEVICES

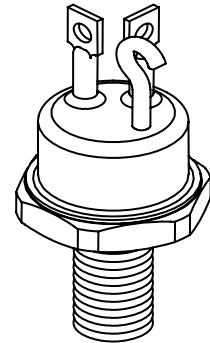
2N5002 2N5004

LEVELS

**JAN
 JANTX
 JANTXV
 JANS**

ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	80	V
Collector-Base Voltage	V_{CBO}	100	V
Emitter-Base Voltage	V_{EBO}	5.5	V
Collector Current	$I_C^{(3)}$	5.0 10	A
Total Power Dissipation @ $T_A = +25^\circ\text{C}^{(1)}$ @ $T_C = +25^\circ\text{C}^{(2)}$	P_T	2.0 58	W
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$
Thermal Resistance, Junction-to Case	$R_{\theta JC}$	3.0	$^\circ\text{C/W}$
Thermal Resistance, Junction-to Ambient	$R_{\theta JA}$	88	$^\circ\text{C/W}$



TO-59

Note:

- 1) Derate linearly 11.4 mW/ $^\circ\text{C}$ for $T_A > +25^\circ\text{C}$
- 2) Derate linearly 331 mW/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$
- 3) This value applies for $P_W \leq 8.3$ ms, duty cycle $\leq 1\%$

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 100\text{mA dc}$	$V_{(BR)CEO}$	80		Vdc
Collector-Emitter Cutoff Current $V_{CE} = 40\text{Vdc}, I_B = 0$	I_{CEO}		50	$\mu\text{A dc}$
Collector-Emitter Cutoff Current $V_{CE} = 60\text{Vdc}, V_{BE} = 0\text{Vdc}$ $V_{CE} = 100\text{Vdc}, V_{BE} = 0\text{Vdc}$	I_{CES}		1.0 1.0	$\mu\text{A dc}$ mA dc
Emitter-Base Cutoff Current $V_{BE} = 4.0\text{Vdc}, I_C = 0$ $V_{BE} = 5.5\text{Vdc}, I_C = 0$	I_{EBO}		1.0 1.0	mA dc

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DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Forward-Current Transfer Ratio $I_C = 50\text{mA}$, $V_{CE} = 5.0\text{Vdc}$ $I_C = 2.5\text{A}$, $V_{CE} = 5.0\text{Vdc}$ $I_C = 5.0\text{A}$, $V_{CE} = 5.0\text{Vdc}$	h_{FE}	20	---	
2N5002		30	90	
2N5004		20	---	
$I_C = 50\text{mA}$, $V_{CE} = 5.0\text{Vdc}$ $I_C = 2.5\text{A}$, $V_{CE} = 5.0\text{Vdc}$ $I_C = 5.0\text{A}$, $V_{CE} = 5.0\text{Vdc}$	h_{FE}	50	---	
2N5002		70	200	
2N5004		40	---	
Base-Emitter Voltage Non-Saturated $V_{CE} = 5.0\text{Vdc}$, $I_C = 2.5\text{A}$	V_{BE}		1.45	Vdc
Collector-Emitter Saturation Voltage $I_C = 2.5\text{A}$, $I_B = 250\text{mA}$ $I_C = 5.0\text{A}$, $I_B = 500\text{mA}$	$V_{CE(sat)}$		0.75 1.5	Vdc
Base-Emitter Saturation Voltage $I_C = 2.5\text{A}$, $I_B = 250\text{mA}$ $I_C = 5.0\text{A}$, $I_B = 500\text{mA}$	$V_{BE(sat)}$		1.45 2.2	Vdc

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 500\text{mA}$, $V_{CE} = 5.0\text{Vdc}$, $f = 10\text{MHz}$	$ h_{fe} $	6.0		
2N5002 2N5004		7.0		
Output Capacitance $V_{CB} = 10\text{Vdc}$	C_{obo}		250	pF

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time $I_C = 5\text{A}$; $I_{B1} = 500\text{mA}$	t_{on}		0.5	μs
Storage Time $I_{B2} = -500\text{mA}$	t_s		1.4	μs
Fall Time $V_{BE(OFF)} = 3.7\text{Vdc}$	t_f		0.5	μs
Turn-Off Time $R_L = 6\Omega$	t_{off}		1.5	μs

SAFE OPERATING AREA

DC Tests $T_C = +25^\circ\text{C}$, $V_{CE} = 0$, $t_p = 1\text{s}$, 1 Cycle Test 1 $V_{CE} = 12\text{Vdc}$, $I_C = 5.0\text{A}$ Test 2 $V_{CE} = 32\text{Vdc}$, $I_C = 1.7\text{A}$ Test 3 $V_{CE} = 80\text{Vdc}$, $I_C = 100\text{mA}$
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