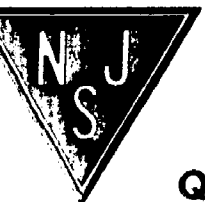


2N5004

Silicon NPN Transistor

Absolute Maximum Ratings		$T_C = 25^\circ\text{C}$ unless otherwise specified	
Parameter	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CE0}	80	Volts
Collector-Base Voltage	V_{CB0}	100	Volts
Emitter-Base Voltage	V_{EB0}	5.5	Volts
Collector Current, Continuous	I_C	5	A
Power Dissipation, $T_A = 25^\circ\text{C}$ Derate linearly above 25°C	P_T	2 11.4	W mW/ $^\circ\text{C}$
Power Dissipation, $T_C = 25^\circ\text{C}$ Derate linearly above 25°C	P_T	58 331	W mW/ $^\circ\text{C}$
Thermal Resistance	$R_{\theta JA}$	88	$^\circ\text{C}/\text{W}$
	$R_{\theta JC}$	3	
Operating Junction Temperature	T_J	-65 to +200	$^\circ\text{C}$
Storage Temperature	T_{STG}	-65 to +200	$^\circ\text{C}$



NJ Semi-Conductors reserves the right to change test conditions, parameters limits and package dimensions without notice information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

Quality Semi-Conductors

ELECTRICAL CHARACTERISTICS

characteristics specified at $T_A = 25^\circ\text{C}$

Off Characteristics						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 100\text{ mA}$	80			Volts
Collector-Emitter Cutoff Current	I_{CEO}	$V_{CE} = 40\text{ Volts}$			50	μA
Collector-Emitter Cutoff Current	I_{CEX}	$V_{CE} = 60\text{ Volts}, V_{EB} = 2\text{ Volts}, T_A = 150^\circ\text{C}$			500	μA
Collector-Emitter Cutoff Current	I_{CES1}	$V_{CE} = 60\text{ Volts}$			1	μA
	I_{CES2}	$V_{CE} = 100\text{ Volts}$			1	mA
Emitter-Base Cutoff Current	I_{EBO1}	$V_{EB} = 4\text{ Volts}$			1	mA
	I_{EBO2}	$V_{EB} = 5.5\text{ Volts}$			1	mA
Thermal Impedance	θ_{JC}				10	$^\circ\text{C/W}$

On Characteristics						
Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
DC Current Gain	h_{FE1}	$I_C = 50\text{ mA}, V_{CE} = 5\text{ Volts}$	50		200	
	h_{FE2}	$I_C = 2.5\text{ A}, V_{CE} = 5\text{ Volts}$	70			
	h_{FE3}	$I_C = 5\text{ A}, V_{CE} = 5\text{ Volts}$	40			
	h_{FE4}	$I_C = 2.5\text{ A}, V_{CE} = 5\text{ Volts}, T_A = -55^\circ\text{C}$	25			
Base-Emitter Voltage	V_{BE}	$V_{CE} = 5\text{ Volts}, I_C = 2.5\text{ A}$			1.45	Volts
Base-Emitter Saturation Voltage	V_{BEsat1}	$I_C = 2.5\text{ A}, I_B = 250\text{ mA}$			1.45	Volts
	V_{BEsat2}	$I_C = 5\text{ A}, I_B = 500\text{ mA}$			2.20	Volts
Collector-Emitter Saturation Voltage	V_{CEsat1}	$I_C = 2.5\text{ A}, I_B = 250\text{ mA}$			0.75	Volts
	V_{CEsat2}	$I_C = 5\text{ A}, I_B = 500\text{ mA}$			1.50	Volts

Small Signal Characteristics						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Magnitude -- Common Emitter, Short Circuit Forward Current Transfer Ratio	$ h_{FE} $	$V_{CE} = 5\text{ Volts}, I_C = 500\text{ mA}, f = 10\text{ MHz}$	7			
Small Signal Short Circuit Forward Current Transfer Ratio	h_{FE}	$V_{CE} = 5\text{ Volts}, I_C = 100\text{ mA}, f = 1\text{ kHz}$	50			
Open Circuit Output Capacitance	C_{OBO}	$V_{CB} = 10\text{ Volts}, I_E = 0\text{ mA}, 100\text{ kHz} < f < 1\text{ MHz}$			250	pF

Switching Characteristics						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Saturated Turn-On Time	t_{ON}				0.5	μs
Rise Time	t_r	$I_C = 5\text{ A}, I_{B1} = I_{B2} = 500\text{ mA},$			1.4	
Fall Time	t_f	$V_{BE} = 3.7\text{ Volts}, R_L = 6\ \Omega$			0.5	
Saturated Turn-Off Time	t_{OFF}				1.5	