2N3508
2N3509

CASE 26, STYLE 1
TO-46 (TO-206AB)

SWITCHING TRANSISTOR

NPN SILICON

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Emitter Voltage	V_{CES}	40	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current (10 μs pulse) (Peak)	I_C	500	mA
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.40 2.29	Watt mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	2.0 11.43	Watts mW/°C
Operating and Storage Temperature Temperature Range	T_J, T_{stg}	−65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.0875	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	0.438	°C/W

Refer to 2N2368 for graphs.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_B = 0)		$V_{(BR)CBO}$	40	—	Vdc
Collector-Emitter Breakdown Voltage (1) (I_C = 10 mAdc)		$V_{(BR)CEO}$	20	—	Vdc
Collector-Emitter Voltage (I_C = 10 μAdc, I_B = 0)		$V_{(BR)CES}$	40	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current (V_{CE} = 20 Vdc, $V_{EB(off)}$ = 3.0 Vdc)		I_{CEX}	—	0.2	μAdc
Collector Cutoff Current (V_{CB} = 20 Vdc) (V_{CB} = 20 Vdc, T_A = 150°C)	Both Types 2N3508 2N3509	I_{CBO}	— — —	0.2 30 50	μAdc
Base Cutoff Current (V_{CE} = 20 Vdc, $V_{EB(off)}$ = 3.0 Vdc)		I_{BL}	—	0.5	μAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 10 mAdc, V_{CE} = 1.0 Vdc) (I_C = 10 mAdc, V_{CE} = 1.0 Vdc, T_A = −55°C) (I_C = 100 mAdc, V_{CE} = 1.0 Vdc)	 2N3508 2N3509 2N3508 2N3509 2N3508 2N3509	h_{FE}	 40 100 20 40 20 30	 120 300 — — — —	—
Collector-Emitter Saturation Voltage (1) (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)		$V_{CE(sat)}$	 — —	 0.25 0.45	Vdc
Base-Emitter Saturation Voltage (1) (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)		$V_{BE(sat)}$	 0.70 0.8	 0.85 1.4	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 140 kHz)		C_{obo}	—	4.0	pF

ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
Input Capacitance (V_{BE} = 1.0 Vdc, I_C = 0, f = 140 kHz)		C_{ibo}	—	4.0	pF
Small-Signal Current Gain (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)		h_{fe}	5.0	—	—
SWITCHING CHARACTERISTICS					
Storage Time (I_C = I_{B1} = I_{B2} = 10 mA)		$t_s(\tau_s)$	—	13	ns
Turn-On Time (I_C = 10 mA, I_{B1} = 3.0 mA, V_{CC} = 3.0 V, V_{OB} = 1.5 V)		t_{on}	—	12	ns
Turn-Off Time (I_C = 10 mA, I_{B1} = 3.0 mA, I_{B2} = 1.5 mA, V_{CC} = 3.0 V)		t_{off}	—	18	ns
Total Control Charge (I_C = 10 mA, I_B = 1.0 mA, V_{CC} = 3.0 V)		Q_T	—	50	pC
Delay Time	V_{CC} = 10 V, V_{EB} = 2.0 V,	t_d	—	5.0	ns
Rise Time	I_C = 100 mA, I_{B1} = 10 mA	t_r	—	18	ns
Storage Time	V_{CC} = 10 V	t_s	—	13	ns
Fall Time	I_C = 100 mA, I_{B1} = I_{B2} = 10 mA	t_f	—	15	ns

(1) Pulse Test: PW = 300 μs, Duty Cycle ≤ 2.0%.