SILECT† TRANSISTORS‡
FOR HIGH-CURRENT, MEDIUM-SPEED SWITCHING APPLICATIONS

- High Collector Current . . . 500 mA
- Electrically Identical to 2N3638, 2N3638A (TO-105)
- High Dissipation Capability

mechanical data

These transistors are encapsulated in a plastic compound specifically designed for this purpose, using a highly mechanized process developed by Texas Instruments. The case will withstand soldering temperatures without deformation. These devices exhibit stable characteristics under high-humidity conditions and are capable of meeting MIL-STD-202C, Method 106B. The transistors are insensitive to light.

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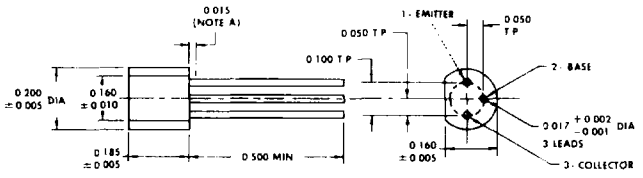

NOTES: A. Lead diameter is not controlled in this area.
B. Leads having maximum diameter (0.019) shall be within 0.007 of their true positions measured in the gaging plane 0.054 below the seating plane of the device relative to a maximum-diameter package.
C. All dimensions are in inches.

absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)

Collector-Base Voltage	−25 V
Collector-Emitter Voltage (See Note 1)	−25 V
Emitter-Base Voltage	−4 V
Continuous Collector Current	−500 mA
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 2)	625 mW
Continuous Device Dissipation at (or below) 25°C Lead Temperature (See Note 3)	1.25 W
Storage Temperature Range	−65°C to 150°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C

NOTES: 1. This value applies between 0.01 mA and 500 mA collector current when the base-emitter diode is open-circuited.
2. Derate linearly to 150°C free-air temperature at the rate of 5 mW/°C.
3. Derate linearly to 150°C lead temperature at the rate of 10 mW/°C. Lead temperature is measured on the collector lead 1/16 inch from the case.

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‡U.S. Patent No. 3,439,238

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electrical characteristics at 25°C free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		A5T3638		A5T3638A		UNIT
				MIN	MAX	MIN	MAX	
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -100\ \mu A$, $I_E = 0$		−25		−25		V
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = -10$ mA, $I_B = 0$,	See Note 4	−25		−25		V
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$I_C = -100\ \mu A$, $V_{BE} = 0$		−25		−25		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = -100\ \mu A$, $I_C = 0$		−4		−4		V
I_{CES}	Collector Cutoff Current	$V_{CE} = -15$ V, $V_{BE} = 0$			−35		−35	nA
		$V_{CE} = -15$ V, $V_{BE} = 0$,	$T_A = 65°C$		−2		−2	μA
I_B	Base Current	$V_{CE} = -15$ V, $V_{BE} = 0$			35		35	nA
h_{FE}	Static Forward Current Transfer Ratio	$V_{CE} = -10$ V, $I_C = -1$ mA	See Note 4			80		
		$V_{CE} = -10$ V, $I_C = -10$ mA		20		100		
		$V_{CE} = -1$ V, $I_C = -50$ mA		30		100		
		$V_{CE} = -2$ V, $I_C = -300$ mA		20		20		
V_{BE}	Base-Emitter Voltage	$I_B = -2.5$ mA, $I_C = -50$ mA	See Note 4		−1.1		−1.1	V
		$I_B = -30$ mA, $I_C = -300$ mA		−0.8	−2	−0.8	−2	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_B = -2.5$ mA, $I_C = -50$ mA	See Note 4		−0.25		−0.25	V
		$I_B = -30$ mA, $I_C = -300$ mA			−1		−1	
h_{ie}	Small-Signal Common-Emitter Input Impedance	$V_{CE} = -10$ V, $I_C = -10$ mA,	f = 1 kHz		2		2	kΩ
h_{fe}	Small-Signal Common-Emitter Forward Current Transfer Ratio			25		100		
h_{re}	Small-Signal Common-Emitter Reverse Voltage Transfer Ratio				26×10^{-4}		15×10^{-4}	
h_{oe}	Small-Signal Common-Emitter Output Admittance				1.2		1.2	mmho
$\lvert h_{fe} \rvert$	Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = -3$ V, $I_C = -50$ mA,	f = 100 MHz	1		1.5		
C_{obo}	Common-Base Open-Circuit Output Capacitance	$V_{CB} = -10$ V, $I_E = 0$,	f = 1 MHz		20		10	pF
C_{ibo}	Common-Base Open Circuit Input Capacitance	$V_{EB} = -0.5$ V, $I_C = 0$,	f = 1 MHz		65		35	pF

NOTE 4: These parameters must be measured using pulse techniques. $t_w = 300\ \mu s$, duty cycle ≤ 2%.

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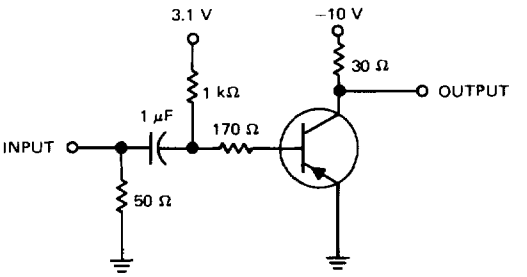
switching characteristics at 25°C free-air temperature

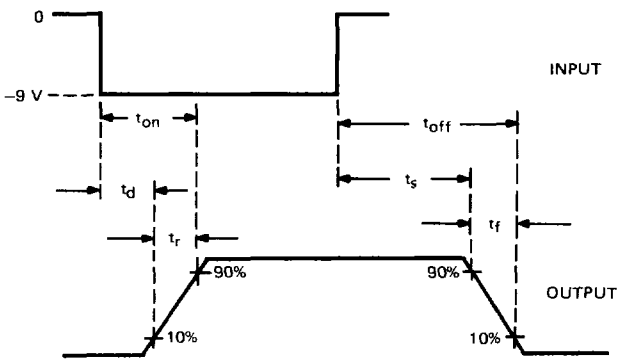
PARAMETER		TEST CONDITIONS†		MIN	MAX	UNIT
t_d	Delay Time	V_{CC} = −10 V,	I_C = −300 mA,		20	ns
t_r	Rise Time	$I_{B(1)}$ = −30 mA,	$V_{BE(off)}$ = 3.1 V,		70	ns
t_{on}	Turn-On Time	See Figure 1			75	ns
t_s	Storage Time	V_{CC} = −10 V,	I_C = −300 mA,		140	ns
t_f	Fall Time	$I_{B(1)}$ = −30 mA,	$I_{B(2)}$ = 30 mA,		70	ns
t_{off}	Turn-Off Time	See Figure 1			170	ns

†Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

FIGURE 1

NOTES: a. The input waveforms are supplied by a generator with the following characteristics: Z_{out} = 50 Ω, $t_r \leq 6$ ns, $t_f \leq 6$ ns, t_w = 500 ns, duty cycle ≤ 2%.
b. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 1$ ns, $R_{in} \geq 100$ kΩ, $C_{in} \leq 10$ pF.