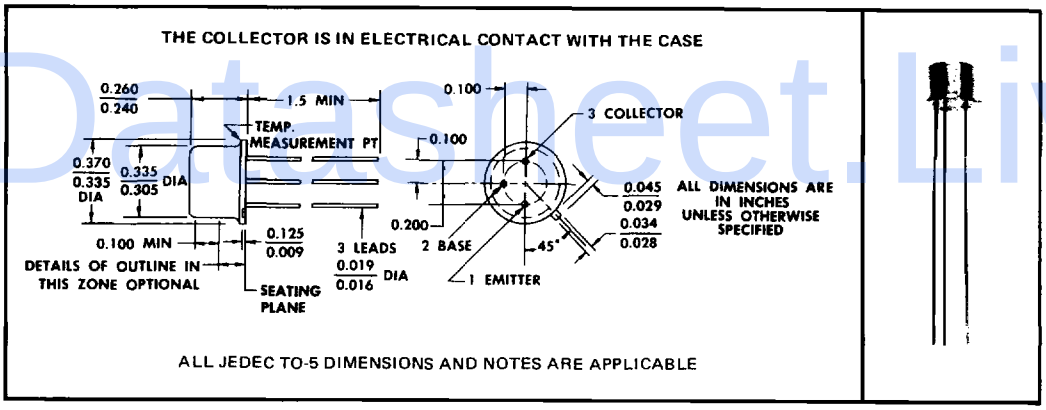
FOR POWER-AMPLIFIER AND HIGH-SPEED-SWITCHING APPLICATIONS
DESIGNED FOR COMPLEMENTARY USE WITH TIP501, TIP502

- Max t_{off} of 0.4 μs at I_C = 1 A
- 3-A Rated Continuous Collector Current
- 6 Watts at 25°C Case Temperature
- Min f_T of 60 MHz at 10 V, 0.5 A

*mechanical data



absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	2N3719	2N3720
*Collector-Base Voltage	−40 V	−60 V
*Collector-Emitter Voltage (See Note 1)	−40 V	−60 V
*Emitter-Base Voltage	−4 V	−4 V
*Continuous Collector Current	← −3 A →	
*Peak Collector Current (See Note 2)	← −10 A →	
*Continuous Base Current	← −0.5 A →	
*Safe Operating Areas at (or below) 25°C Case Temperature	See Figures 3 and 4	
*Continuous Device Dissipation at (or below) 25°C Case Temperature (See Note 3)	← 6 W →	
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 4)	← 1 W →	
*Operating Collector Junction Temperature Range	−65°C to 200°C	
*Storage Temperature Range	−65°C to 200°C	
*Lead Temperature 1/16 Inch from Case for 10 Seconds	← 300°C →	

NOTES: 1. These values apply when the base-emitter diode is open-circuited.
2. This value applies for $t_w \leq 0.5$ ms, duty cycle ≤ 10%.
3. Derate linearly to 200°C case temperature at the rate of 34.3 mW/°C or refer to Dissipation Derating Curve, Figure 5.
4. Derate linearly to 200°C free-air temperature at the rate of 5.71 mW/°C or refer to Dissipation Derating Curve, Figure 6.

*JEDEC registered data. This data sheet contains all applicable registered data in effect at the time of publication.

*electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS			2N3719 MIN	2N3719 MAX	2N3720 MIN	2N3720 MAX	UNIT
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = −20 mA,	I_B = 0,	See Note 5	−40		−60		V
I_{CEV}	Collector Cutoff Current	V_{CE} = −40 V,	V_{BE} = 2 V			−10			μA
		V_{CE} = −60 V,	V_{BE} = 2 V					−10	
		V_{CE} = −40 V,	V_{BE} = 2 V, T_C = 150°C			−1			mA
		V_{CE} = −60 V,	V_{BE} = 2 V, T_C = 150°C					−1	
I_{CBO}	Collector Cutoff Current	V_{CB} = −40 V,	I_E = 0			−10			μA
		V_{CB} = −60 V,	I_E = 0					−10	
I_{EBO}	Emitter Cutoff Current	V_{EB} = −4 V,	I_C = 0			−1		−1	mA
h_{FE}	Static Forward Current Transfer Ratio	V_{CE} = −1.5 V,	I_C = −0.5 A	See Notes 5 and 6	20		20		
		V_{CE} = −1.5 V,	I_C = −1 A		25	180	25	180	
		V_{CE} = −1.5 V,	I_C = −1 A, T_C = −40°C		15		15		
V_{BE}	Base-Emitter Voltage	I_B = −100 mA, T_C = −40°C to 100°C	I_C = −1 A,	See Notes 5 and 6		−1.5		−1.5	V
		I_B = −300 mA, T_C = −40°C to 100°C	I_C = −3 A,			−2.3		−2.3	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_B = −100 mA, T_C = −40°C to 100°C	I_C = −1 A,	See Notes 5 and 6		−0.75		−0.75	V
		I_B = −300 mA, T_C = −40°C to 100°C	I_C = −3 A,			−1.5		−1.5	
$\lvert h_{fe} \rvert$	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = −10 V,	I_C = −0.5 A, f = 30 MHz		2		2		
C_{obo}	Common-Base Open-Circuit Output Capacitance	V_{CB} = −10 V,	I_E = 0, f = 100 kHz			120		120	pF
C_{ibo}	Common-Base Open-Circuit Input Capacitance	V_{EB} = −0.5 V,	I_C = 0, f = 100 kHz			1000		1000	pF

NOTES: 5. These parameters must be measured using pulse techniques. t_w = 300 μs, duty cycle ≤ 2%.
6. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 0.125 inch from the device body.

*switching characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS†			MAX	UNIT
t_{on}	Turn-On Time	I_C = −1 A, R_L = 12 Ω,	$I_{B(1)}$ = −0.1 A, See Figure 1	$V_{BE(off)}$ = 4 V,	0.1	μs
t_{off}	Turn-Off Time	I_C = −1 A, R_L = 12 Ω,	$I_{B(1)}$ = −0.1 A, See Figure 2	$I_{B(2)}$ = 0.1 A,	0.4	

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

*JEDEC registered data

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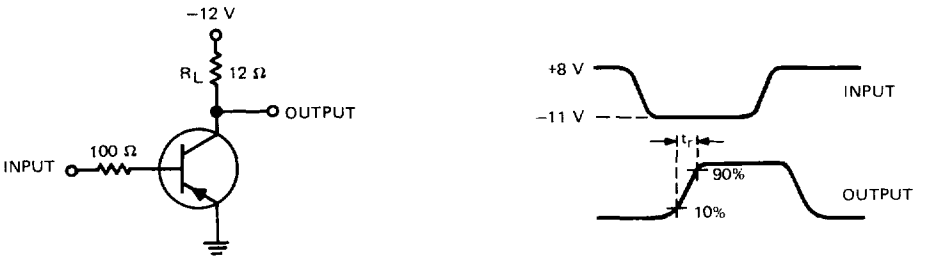
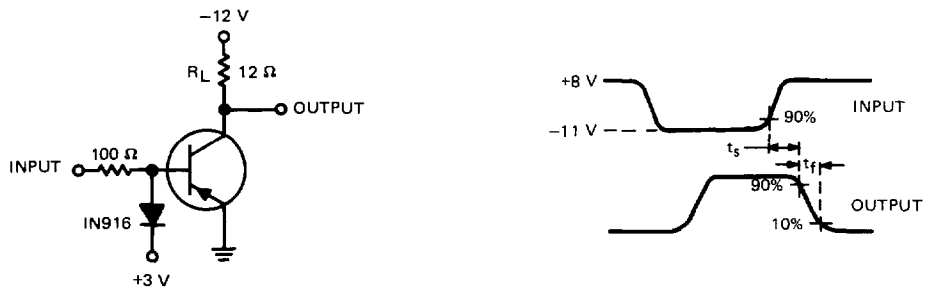
*PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT VOLTAGE WAVEFORMS

FIGURE 1—TURN-ON TIME

5



TEST CIRCUIT VOLTAGE WAVEFORMS

FIGURE 2—TURN-OFF TIME

NOTES: a. The input waveforms are supplied by a generator with the following characteristics: $t_r \leq 10$ ns, $t_f \leq 10$ ns, $Z_{out} = 50\ \Omega$, $t_w = 10\ \mu s$, duty cycle ≤ 2%.
b. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 5$ ns, $R_{in} \geq 10\ k\Omega$, $C_{in} \leq 11.5$ pF.
c. Resistors must be noninductive types.
d. *The d-c power supplies may require additional bypassing in order to minimize ringing.*

*JEDEC registered data

MAXIMUM SAFE OPERATING AREAS

2N3719

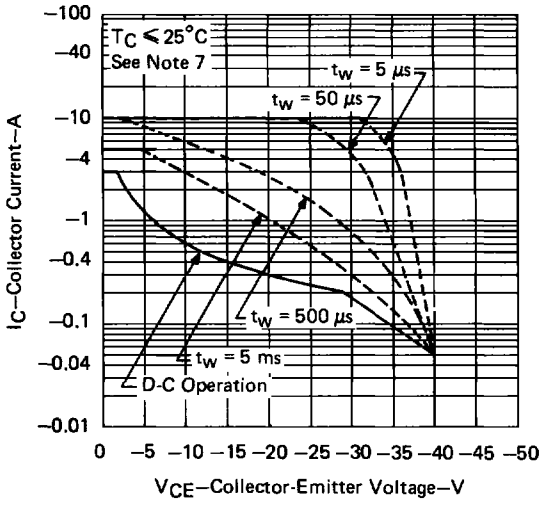


FIGURE 3

2N3720

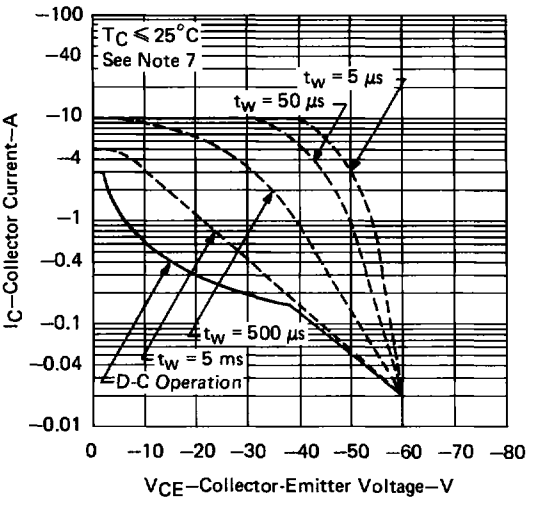


FIGURE 4

NOTE 7: Areas defined by dashed lines apply for nonrepetitive-pulse operation. The pulse may be repeated after the device has regained thermal equilibrium.

THERMAL INFORMATION

CASE TEMPERATURE
DISSIPATION DERATING CURVE

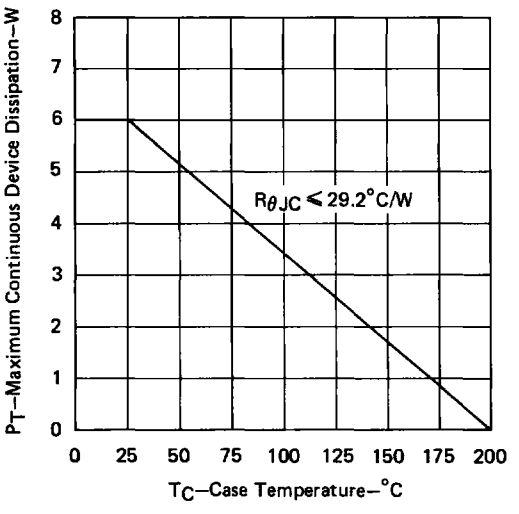


FIGURE 5

FREE-AIR TEMPERATURE
DISSIPATION DERATING CURVE

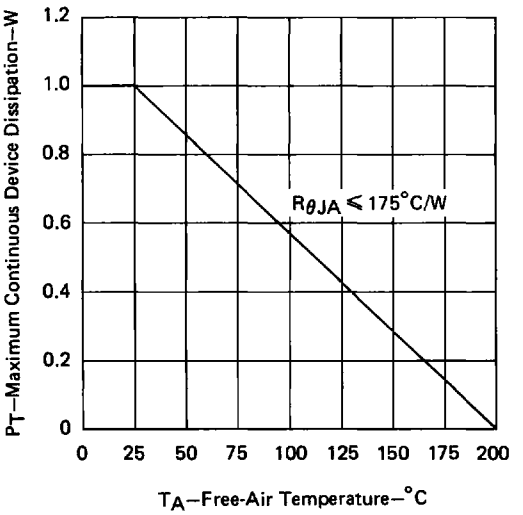


FIGURE 6

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