TYPES 2N3494 THRU 2N3497
P-N-P SILICON TRANSISTORS

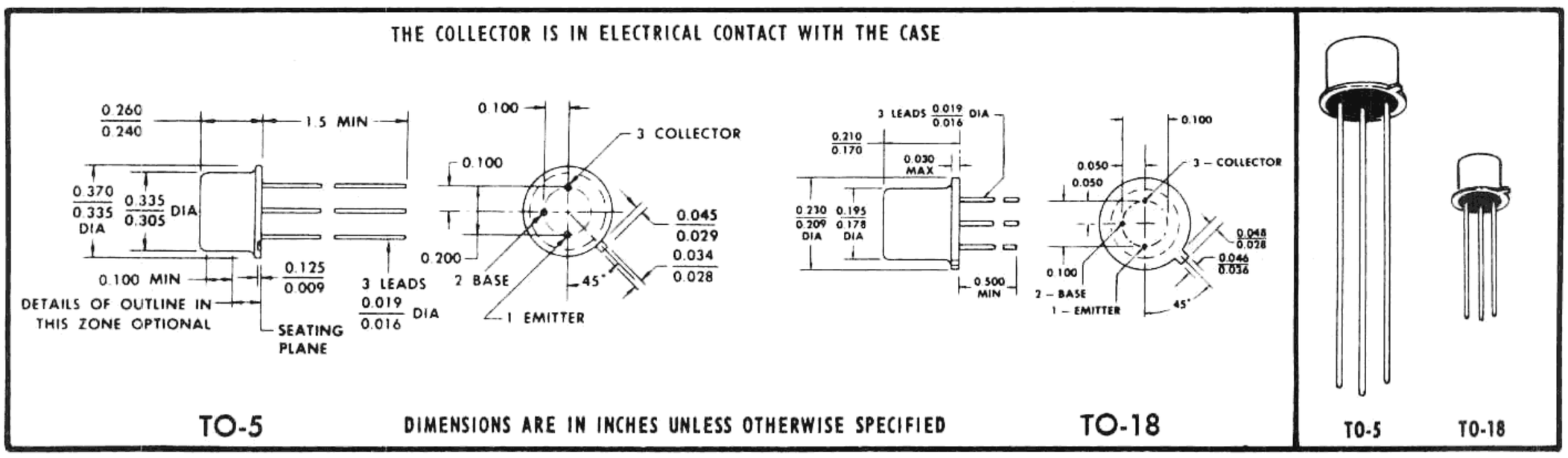
BULLETIN NO. DL-S 679668, MARCH 1967

HIGH-VOLTAGE TRANSISTORS
FULLY CHARACTERIZED FOR HIGH-SPEED, LOW-NOISE, MEDIUM-POWER SWITCHING AND GENERAL PURPOSE AMPLIFIER APPLICATIONS

- h_{FE} Guaranteed from 100 μA to 100 mA

*mechanical data

Device types 2N3494 and 2N3495 are in JEDEC TO-5 packages.
Device types 2N3496 and 2N3497 are in JEDEC TO-18 packages.



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

	2N3494	2N3495	2N3496	2N3497	UNIT
Collector-Base Voltage	–80	–120	–80	–120	V
Collector-Emitter Voltage (See Note 1)	–80	–120	–80	–120	V
Emitter-Base Voltage	–4.5	–4.5	–4.5	–4.5	V
Continuous Collector Current	–100	–100	–100	–100	mA
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Notes 2 and 3)	0.6	0.6	0.4	0.4	W
Storage Temperature Range	–65 to 200				°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	300				°C

NOTES: 1. These values apply between 0 and 100 mA collector current when the base-emitter diode is open-circuited.
2. Derate 2N3494 and 2N3495 linearly to 200°C free-air temperature at the rate of 3.43 mW/deg. See Figure 3.
3. Derate 2N3496 and 2N3497 linearly to 200°C free-air temperature at the rate of 2.28 mW/deg. See Figure 4.

* JEDEC registered data

USES CHIP P17

TYPES 2N3494 THRU 2N3497
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***electrical characteristics at 25°C free-air temperature**

PARAMETER		TEST CONDITIONS		TO-5 → / TO-18 →	2N3494 / 2N3496 MIN	2N3494 / 2N3496 MAX	2N3495 / 2N3497 MIN	2N3495 / 2N3497 MAX	UNIT
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -10\ \mu A$, $I_E = 0$			−80		−120		V
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = -10$ mA, $I_B = 0$,	See Note 4		−80		−120		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = -10\ \mu A$, $I_C = 0$			−4.5		−4.5		V
I_{CBO}	Collector Cutoff Current	$V_{CB} = -50$ V, $I_E = 0$				−0.1			μA
		$V_{CB} = -90$ V, $I_E = 0$						−0.1	μA
I_{EBO}	Emitter Cutoff Current	$V_{EB} = -3$ V, $I_C = 0$				−25		−25	nA
h_{FE}	Static Forward Current Transfer Ratio	$V_{CE} = -10$ V, $I_C = -100\ \mu A$	See Note 4		35		35		
		$V_{CE} = -10$ V, $I_C = -1$ mA			40		40		
		$V_{CE} = -10$ V, $I_C = -10$ mA			40		40		
		$V_{CE} = -10$ V, $I_C = -50$ mA			40		40		
		$V_{CE} = -10$ V, $I_C = -100$ mA			35				
V_{BE}	Base-Emitter Voltage	$I_B = -1$ mA, $I_C = -10$ mA,	See Note 4		−0.6	−0.9	−0.6	−0.9	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_B = -1$ mA, $I_C = -10$ mA,	See Note 4			−0.3		−0.35	V
h_{ie}	Small-Signal Common-Emitter Input Impedance	$V_{CE} = -10$ V, $I_C = -10$ mA, f = 1 kHz			0.1	1.2	0.1	1.2	kΩ
h_{fe}	Small-Signal Common-Emitter Forward Current Transfer Ratio				40	300	40	300	
h_{re}	Small-Signal Common-Emitter Reverse Voltage Transfer Ratio					2×10^{-4}		2×10^{-4}	
h_{oe}	Small-Signal Common-Emitter Output Admittance					300		300	μmho
$\lvert h_{fe}\rvert$	Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = -10$ V, $I_C = -20$ mA, f = 100 MHz			2		1.5		
C_{obo}	Common-Base Open-Circuit Output Capacitance	$V_{CB} = -10$ V, $I_E = 0$, f = 100 kHz				7		6	pF
C_{ibo}	Common-Base Open-Circuit Input Capacitance	$V_{EB} = -2$ V, $I_C = 0$, f = 100 kHz				30		30	pF
$Re(h_{ie})$	Small-Signal Common-Emitter Input Resistance	$V_{CE} = -10$ V, $I_C = -20$ mA, f = 300 MHz				30		30	Ω

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

***switching characteristics at 25°C free-air temperature**

PARAMETER		TEST CONDITIONS†	MAX	UNIT
t_{on}	Turn-On Time	$I_C = -10$ mA, $I_{B(1)} = -1$ mA, $V_{BE(off)} = 0$, $R_L = 3$ kΩ, See Figure 1	300	ns
t_{off}	Turn-Off Time	$I_C = -10$ mA, $I_{B(1)} = -1$ mA, $I_{B(2)} = 1$ mA, $R_L = 3$ kΩ, See Figure 2	1	μs

*JEDEC registered data

†Voltage and current values shown are nominal; exact values vary slightly with transistor parameters. Nominal base current for turn-on time is calculated using a minimum value of V_{BE}. Nominal base currents for turn-off times are calculated using the maximum value of V_{BE}.

PARAMETER MEASUREMENT INFORMATION

FIGURE 1 — TURN-ON TIME

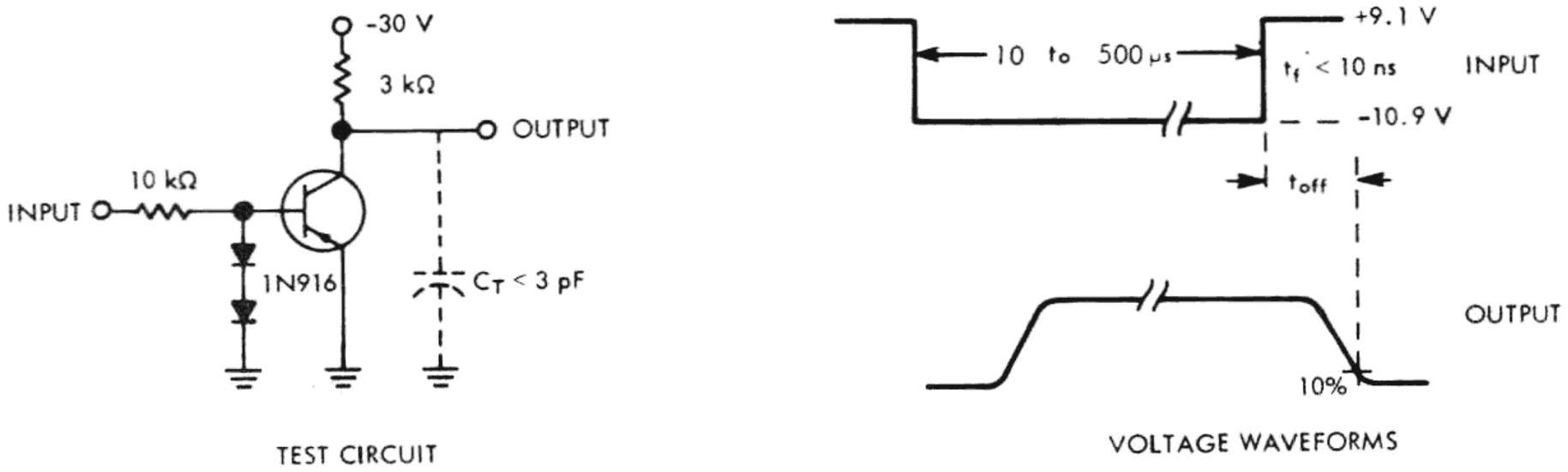

FIGURE 2 — TURN-OFF TIME

NOTES: a. The input waveforms are supplied by a generator with $Z_{out} = 50\ \Omega$.
b. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 10$ ns, $R_{in} \geq 100$ kΩ.

* JEDEC registered data

THERMAL INFORMATION

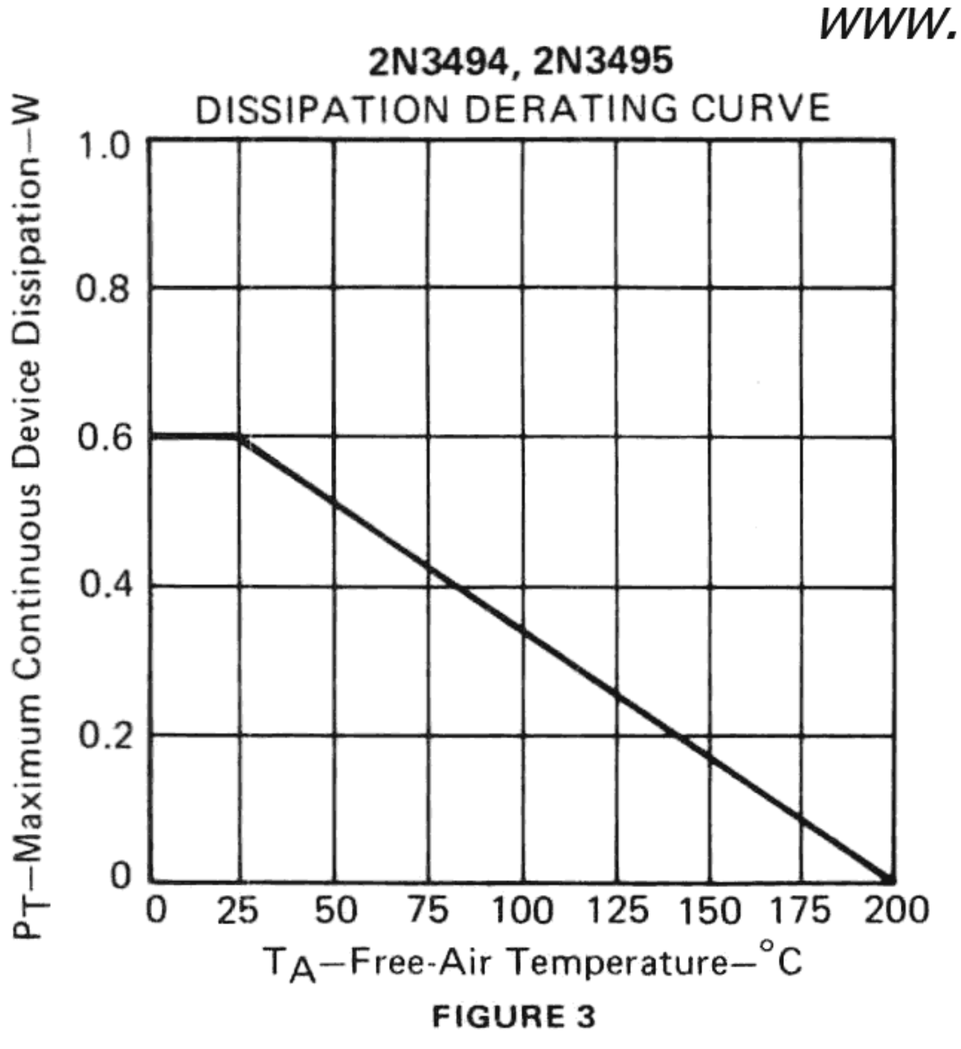

FIGURE 3

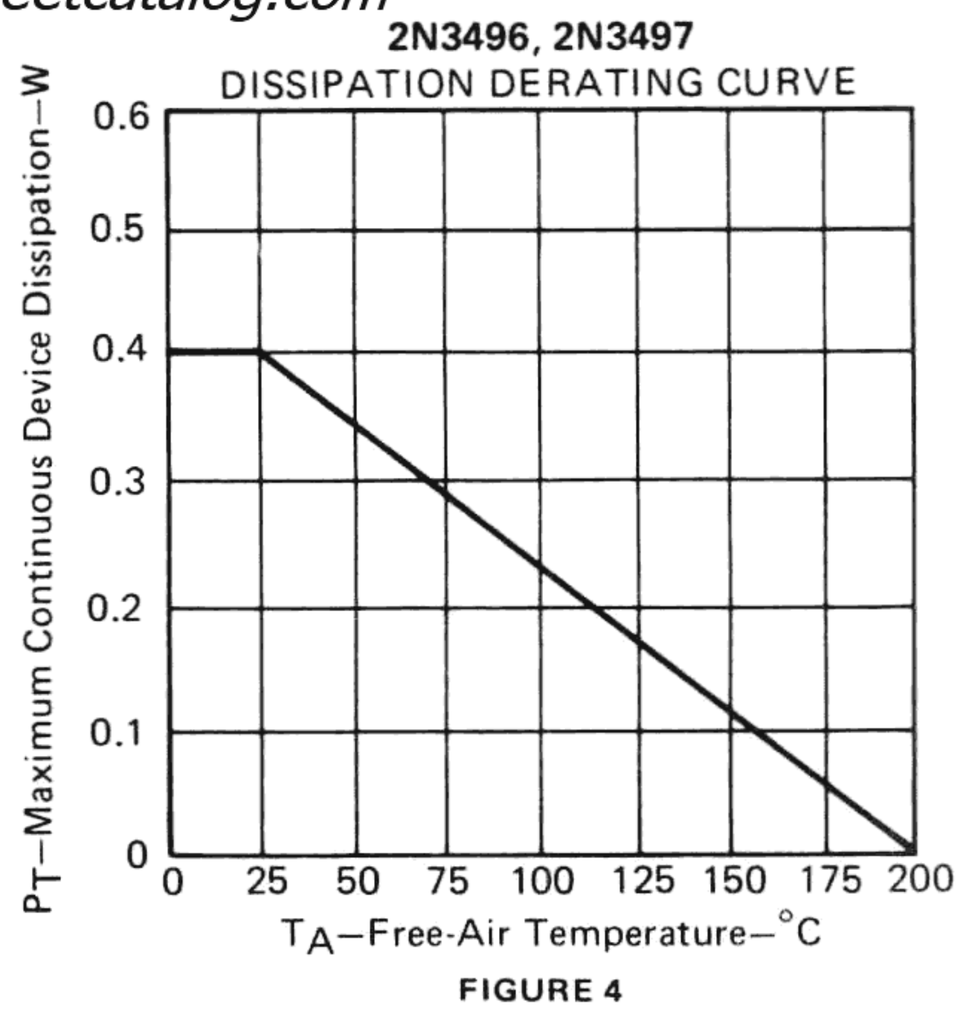

FIGURE 4