

2N3724 2N3725

CASE 79-02, STYLE 1
TO-39 (TO-205AD)

SWITCHING TRANSISTOR

NPN SILICON

MAXIMUM RATINGS

Rating	Symbol	2N3724	2N3725	Unit
Collector-Emitter Voltage	V_{CE0}	30	50	Vdc
Collector-Base Voltage	V_{CBO}	50	80	Vdc
Emitter-Base Voltage	V_{EBO}	6.0		Vdc
Collector Current — Continuous	I_C	500		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	0.8	4.6	Watts mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	3.5	2.0	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(1) ($I_C = 10\text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	50 30	— —	— —	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}, V_{BE} = 0$)	$V_{(BR)CES}$	80 50	— —	— —	Vdc
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	80 50	— —	— —	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	6.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 60\text{ Vdc}, I_E = 0$) ($V_{CB} = 40\text{ Vdc}, I_E = 0$) ($V_{CB} = 60\text{ Vdc}, I_E = 0, T_A = 100^\circ\text{C}$) ($V_{CB} = 60\text{ Vdc}, I_E = 0, T_A = 100^\circ\text{C}$)	I_{CBO}	— — — —	0.12 0.12 — —	1.7 1.7 120 120	μAdc
Collector Cutoff Current ($V_{CE} = 80\text{ Vdc}, V_{EB} = 0$) ($V_{CE} = 50\text{ Vdc}, V_{EB} = 0$)	I_{CES}	— —	0.15 0.15	10 10	μAdc
Base Current ($V_{CE} = 50\text{ V}, V_{EB} = 0$) ($V_{CE} = 80\text{ V}, V_{EB} = 0$)	I_B	—	—	10	μAdc

ON CHARACTERISTICS(1)

DC Current Gain ($I_C = 10\text{ mAdc}, V_{CE} = 1.0\text{ Vdc}$) ($I_C = 100\text{ mAdc}, V_{CE} = 1.0\text{ Vdc}$) ($I_C = 100\text{ mAdc}, V_{CE} = 1.0\text{ Vdc}, T_A = -55^\circ\text{C}$) ($I_C = 300\text{ mAdc}, V_{CE} = 1.0\text{ Vdc}$) ($I_C = 500\text{ mAdc}, V_{CE} = 1.0\text{ Vdc}$) ($I_C = 500\text{ mAdc}, V_{CE} = 1.0\text{ Vdc}, T_A = -55^\circ\text{C}$) ($I_C = 800\text{ mAdc}, V_{CE} = 2.0\text{ Vdc}$) ($I_C = 1.0\text{ Adc}, V_{CE} = 5.0\text{ Vdc}$) ($I_C = 800\text{ mA}, V_{CE} = 2.0\text{ V}$) ($I_C = 1.0\text{ Adc}, V_{CE} = 5.0\text{ V}$)	h_{FE}	30 60 30 40 35 20 25 30 20 25	— — — — — — — — — —	— 150 — — — — — — — —	—
Collector-Emitter Saturation Voltage ($I_C = 10\text{ mAdc}, I_B = 1.0\text{ mAdc}$)	$V_{CE(sat)}$	— —	0.17 0.17	0.25 0.25	Vdc

2N3724, 2N3725

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

Characteristic		Symbol	Min	Typ	Max	Unit
(I _C = 100 mA, I _B = 10 mA)	2N3725		—	0.19	0.26	
	2N3724		—	0.19	0.20	
(I _C = 300 mA, I _B = 30 mA)	2N3725		—	0.25	0.40	
	2N3724		—	0.25	0.32	
(I _C = 500 mA, I _B = 50 mA)	2N3725		—	0.30	0.52	
	2N3724		—	0.30	0.42	
(I _C = 800 mA, I _B = 80 mA)	2N3725		—	0.43	0.80	
	2N3724		—	0.43	0.65	
(I _C = 1.0 A, I _B = 100 mA)	2N3725		—	0.55	0.95	
	2N3724		—	0.55	0.75	
Base-Emitter Saturation Voltage		V _{BE(sat)}				V _{dc}
(I _C = 10 mA, I _B = 1.0 mA)			—	—	0.76	
(I _C = 100 mA, I _B = 10 mA)			—	—	0.86	
(I _C = 300 mA, I _B = 30 mA)			—	—	1.1	
(I _C = 500 mA, I _B = 50 mA)			0.8	—	1.1	
(I _C = 800 mA, I _B = 80 mA)			—	—	1.5	
(I _C = 1.0 A, I _B = 100 mA)			—	—	1.7	

SMALL SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product(2) (I _C = 50 mA, V _{CE} = 10 V, f = 100 MHz)		f _T	300	—	—	MHz
Output Capacitance (V _{CB} = 10 V, I _E = 0, f = 1.0 MHz)	2N3725 2N3724	C _{obo}	—	—	10 12	pF
Input Capacitance (V _{EB} = 0.5 V, I _C = 0, f = 1.0 MHz)		C _{ibo}	—	—	55	pF

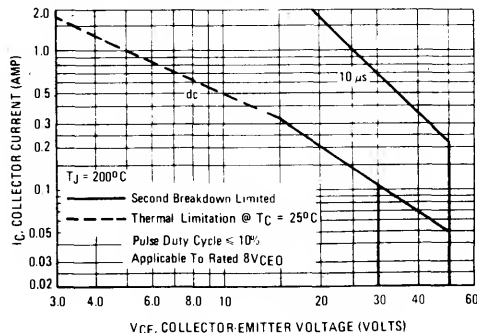
(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle = 1.0%.

(2) f_T = |h_{fe}| • f_{test}.

SWITCHING CHARACTERISTICS

Delay Time	(V _{CC} = 30 V, V _{BE(off)} = 3.8 V, I _C = 500 mA, I _{B1} = 50 mA) (Figures 8, 10)	t _d	—	5.0	10	ns
Rise Time		t _r	—	15	30	ns
Turn-On Time		t _{on}	—	20	35	ns
Storage Time	(V _{CC} = 30 V, I _C = 500 mA, I _{B1} = I _{B2} = 50 mA) (Figures 9, 10)	t _s	—	35	50	ns
Fall Time		t _f	—	20	25	ns
Turn-Off Time		t _{off}	—	50	60	ns

FIGURE 1 — ACTIVE-REGION SAFE-OPERATING AREA



TYPICAL DC CHARACTERISTICS

FIGURE 2 – DC CURRENT GAIN

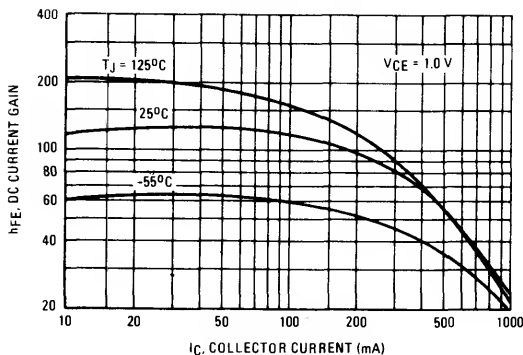


FIGURE 3 – "ON" VOLTAGES

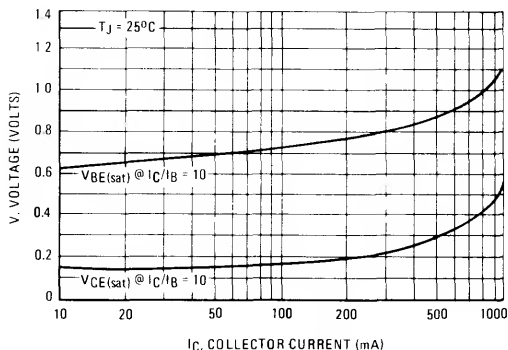


FIGURE 4 – COLLECTOR SATURATION REGION

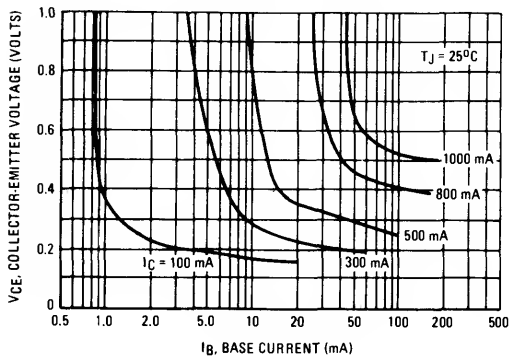
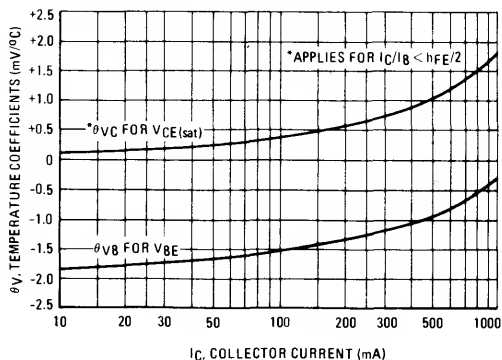


FIGURE 5 – TEMPERATURE COEFFICIENTS



TYPICAL DYNAMIC CHARACTERISTICS

FIGURE 6 – CURRENT-GAIN – BANDWIDTH PRODUCT

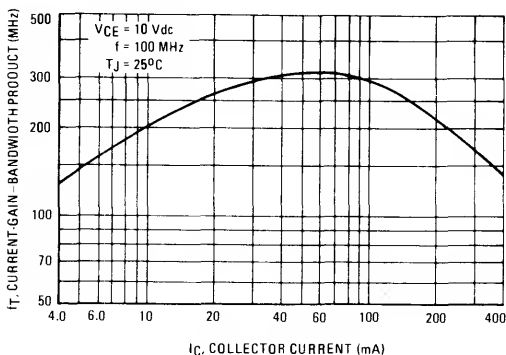


FIGURE 7 – CAPACITANCE

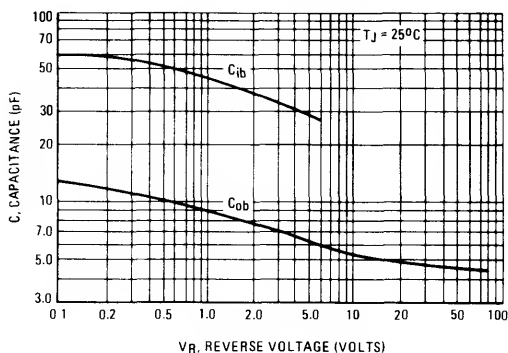


FIGURE 8 – TURN-ON TIME

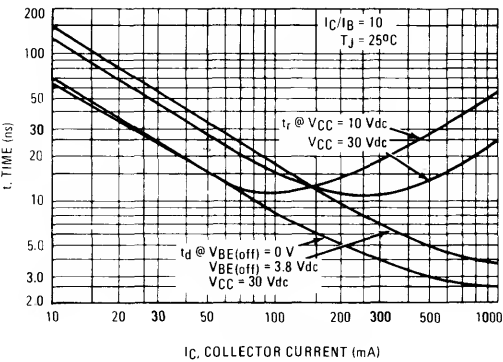
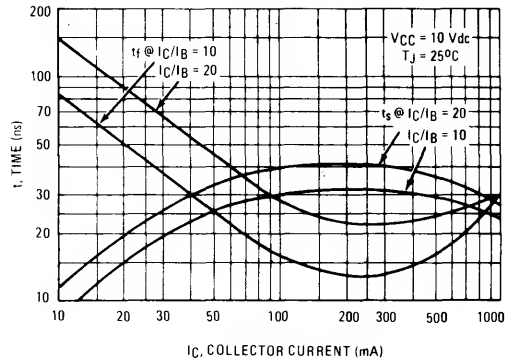


FIGURE 9 – TURN-OFF TIME



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FIGURE 10 – SWITCHING TIME TEST CIRCUIT

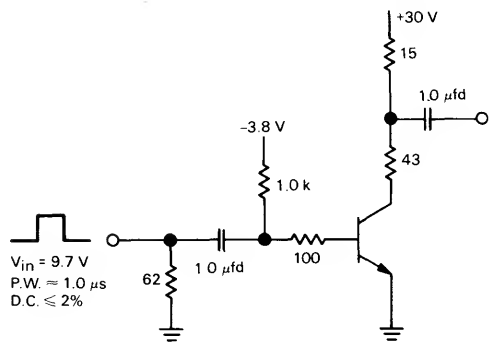


FIGURE 11 – COLLECTOR CUTOFF CURRENT

