DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

2N3724(A)-2N3725(A)

NPN SILICON MEDIUM POWER TRANSISTORS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

Ratings	Symbol	2N3724	2N3724A	2N3725	2N3725A	Unit
Collector-base voltage	V_{CBO}	50		80		V
Collector-emitter voltage[1]	V_{CEO}	30		50		V
Emitter-base voltage	V_{EBO}	6		6		V
Continuous collector current	I_C	0.5	1.2	0.5	1.2	A
Peak collector current[2]	I_C	-	1.75	-	1.75	A
Continuous device dissipation at or below 25°C free air temperature[3]	P_D	0.8	1	0.8	1	W
Continuous device dissipation at or below 25°C case temperature[4]	P_D	3.5	5	3.5	5	W
Storage temperature range	T_{stg}	-65 to +200				°C
Lead temperature 1/16" from case for 60 s		300				°C

Note 1: Values apply between 0.01mA and 500mA collector current when the base-emitter diode is open-circuited.
Note 2: This value applies for square wave pulses, t_p = 300µs, duty cycle ≤ 2%.
Note 3: 2N3724-2N3725-derate linearly to 200°C free-air temperature at the rate of 4.57mW/°C.
2N3724A-2N3725A-derate linearly to 200°C case temperature at the rate of 5.71mW/°C.
Note 4: 2N3724-2N3725 derate linearly to 200°C case temperature at the rate of 20mW/°C.
2N3724A-2N3725A derate linearly to 200°C case temperature at the rate of 28.6mW/°C.

ELECTRICAL CHARACTERSITICS (T_A = 25°C unless otherwise specified)

Characteristics	Symbol	2N3724		2N3724A		2N3725		2N3725A		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
Collector- base breakdown voltage I_C = 10µA, I_E = 0	$V_{(BR)CBO}$	50	-	50	-	80	-	80	-	V
Collector-emitter breakdown voltage[5] I_C = 10mA, I_B = 0	$V_{(BR)CEO}$	30	-	30	-	50	-	50	-	V
Collector-emitter breakdown voltage I_C = 10µA, V_{BE} = 0	$V_{(BR)CES}$	50	-	50	-	80	-	80	-	V
Emitter- base breakdown voltage I_E = 10µA, I_C = 0	$V_{(BR)EBO}$	6	-	6	-	6	-	6	-	V
Collector cutoff current										
V_{CB} = 40V, I_E = 0	I_{CBO}	-	1.7	-	0.5	-	-	-	-	µA
V_{CB} = 40V, I_E = 0, T_A = 100°C		-	120	-	50	-	-	-	-	
V_{CB} = 60V, I_E = 0		-	-	-	-	-	1.7	-	0.5	
V_{CB} = 60V, I_E = 0, T_A = 100°C		-	-	-	-	-	120	-	50	
Collector cutoff current										
V_{CE} = 50V, V_{BE} = 0	I_{CES}	-	10	-	10	-	-	-	-	µA
V_{CE} = 80V, V_{BE} = 0		-	-	-	-	-	10	-	10	
Base current										
V_{CE} = 50V, V_{BE} = 0	I_B	-	-10	-	-10	-	-	-	-	µA
V_{CE} = 80V, V_{BE} = 0		-	-	-	-	-	-10	-	-10	

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Characteristics		Symbol	2N3724		2N3724A		2N3725		2N3725A		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
Static forward current transfer ratio [5]		h_{FE}									
I_C = 10mA, V_{CE} = 1.0 V			30	-	30	-	30	-	30	-	
I_C = 100mA, V_{CE} = 1.0 V			60	150	60	150	60	150	60	150	
I_C = 100mA, V_{CE} = 1.0 V, T_A = -55°C			30	-	30	-	30	-	30	-	
I_C = 300mA, V_{CE} = 1.0 V			40	-	40	-	40	-	40	-	
I_C = 500mA, V_{CE} = 1.0 V			35	-	35	-	35	-	35	-	
I_C = 500mA, V_{CE} = 1.0 V, T_A = -55°C			20	-	20	-	20	-	20	-	
I_C = 800mA, V_{CE} = 2.0 V			25	-	30	-	20	-	25	-	
I_C = 1.0mA, V_{CE} = 5.0 V			30	-	30	-	25	-	25	-	
I_C = 1.5A, V_{CE} = 5.0 V			-	-	25	-	-	-	20	-	
Base emitter voltage [5]		V_{BE}									V
I_B = 1mA, I_C = 10mA			-	0.76	-	0.76	-	0.76	-	0.76	
I_B = 10mA, I_C = 100mA			-	0.86	-	0.86	-	0.86	-	0.86	
I_B = 30mA, I_C = 300mA			-	1.1	-	1	-	1.1	-	1	
I_B = 50mA, I_C = 500mA			0.8	1.1	0.8	1.1	0.8	1.1	0.8	1.1	
I_B = 80mA, I_C = 800mA			-	1.5	-	1.3	-	1.5	-	1.3	
I_B = 100mA, I_C = 1A			-	1.7	0.9	1.4	-	1.7	0.9	1.4	
Collector emitter saturation voltage [5]		$V_{CE(sat)}$									V
I_B = 1mA, I_C = 10mA			-	0.25	-	0.25	-	0.25	-	0.25	
I_B = 10mA, I_C = 100mA			-	0.2	-	0.2	-	0.26	-	0.26	
I_B = 30mA, I_C = 300mA			-	0.32	-	0.32	-	0.4	-	0.4	
I_B = 50mA, I_C = 500mA			-	0.42	-	0.42	-	0.52	-	0.52	
I_B = 80mA, I_C = 800mA			-	0.65	-	0.65	-	0.8	-	0.8	
I_B = 100mA, I_C = 1A			-	0.75	-	0.75	-	0.95	-	0.9	
Small signal common emitter forward current transfer ratio **I_C = 50mA, V_{CE} = 10V, f = 100 MHz**		$\|h_{fe}\|$	3	-	3	-	3	-	3	-	-
Common base open circuit output capacitance **V_{CB} = 10V, I_E = 0, f = 1MHz**		C_{obo}	-	12	-	12	-	10	-	10	pF
Common base open circuit input capacitance **V_{EB} = 0.5V, I_C = 0, f = 1MHz**		C_{ibo}	-	55	-	55	-	55	-	55	pF
SWITCHING CHARACTERISTICS											
Delay time	I_C = 500mA< $I_{B(1)}$ = 50mA, $V_{BE(off)}$ = -3.8V, R_L = 58Ω	t_d	-	10	-	10	-	10	-	10	ns
Rise time		t_r	-	30	-	30	-	30	-	30	ns
Turn on time		t_{on}	-	35	-	35	-	35	-	35	ns
Storage time	I_C = 500mA< $I_{B(1)}$ = 50mA, $I_{B(2)}$ = -50mA, R_L = 58Ω	t_s	-	50	-	50	-	50	-	50	ns
Fall time		t_f	-	25	-	25	-	30	-	30	ns
Turn off time		t_{off}	-	60	-	60	-	60	-	60	ns
Turn on time	I_C = 1A, $I_{B(1)}$ = 100mA, $V_{BE(off)}$ = -2V, R_L = 30Ω	t_{on}	-	-	-	30	-	-	-	30	ns
Turn off time	I_C = 1A, $I_{B(1)}$ = 100mA, $I_{B(2)}$ = -100mA, RL = 30Ω	t_{off}	-	-	-	50	-	-	-	50	ns

Note 5: These parameters must be measured using pulse techniques t_p = 300μs, duty cycle ≤ 1%.

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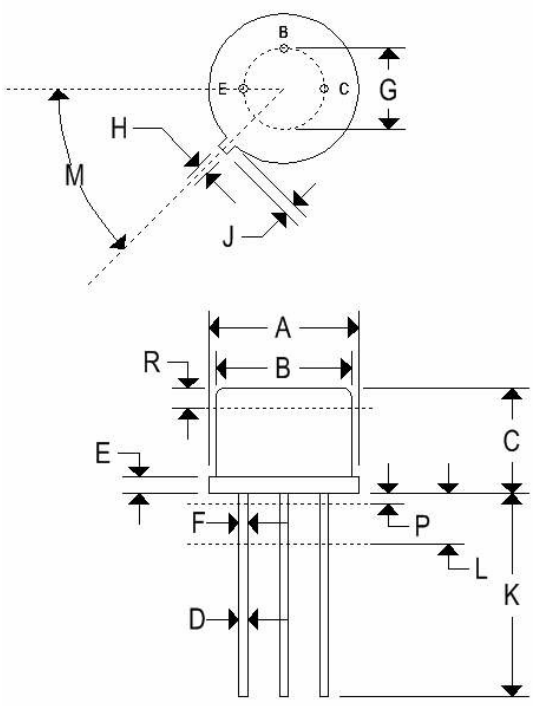
MECHANICAL CHARACTERISTICS

Case	TO-39
Marking	Alpha-numeric
Polarity	See below



	TO-39			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.350	0.370	8.890	9.400
B	0.315	0.335	8.000	8.510
C	0.240	0.260	6.10	6.60
D	0.016	0.021	0.406	0.533
E	0.009	0.125	0.2269	3.180
F	0.016	0.019	0.406	0.533
G	0.190	0.210	4.830	5.33
H	0.028	0.034	0.711	0.864
J	0.029	0.040	0.737	1.020
K	0.500	-	12.700	-
L	0.250	-	6.350	-
M	45° NOM		45° NOM	
P	-	0.050	-	1.270
Q	90° NOM		90° NOM	
R	0.100	-	2.540	-

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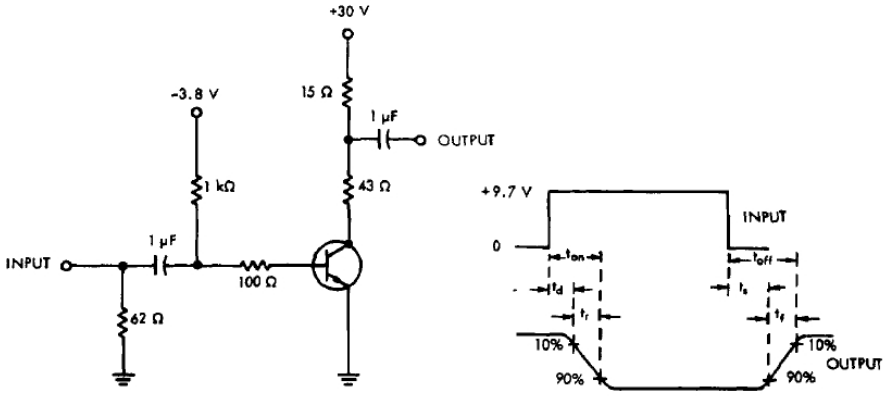
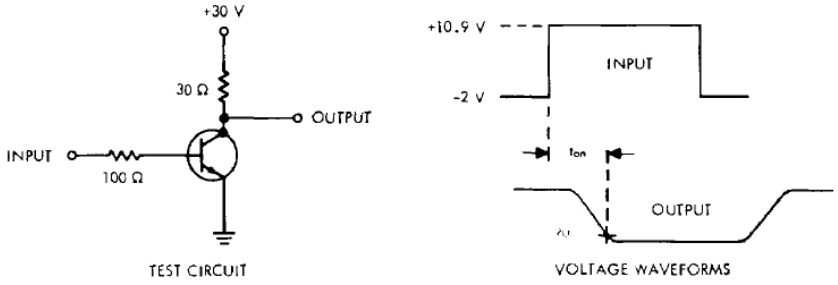


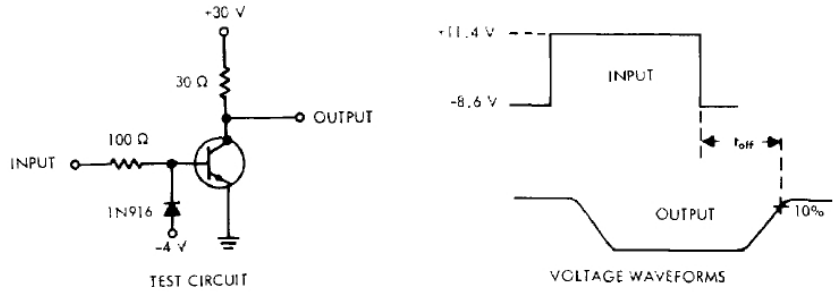
TEST CIRCUIT VOLTAGE WAVEFORMS

Note a: The input waveforms are supplied by a generator with the following characteristics: Z_{out} = 50Ω, $t_r \leq$ 1ns, $t_f \leq$ 1ns, $t_p \approx$ 1μs, duty cycle ≤ 2%.
Note b: The waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq$ 1ns, $R_{in} \geq$ 100kΩ, $C_{in} \leq$ 7pF.



TEST CIRCUIT VOLTAGE WAVEFORMS

FIGURE 2 — 1-AMPERE TURN-ON TIME (2N3724A AND 2N3725A)



TEST CIRCUIT VOLTAGE WAVEFORMS

Note a: The input waveforms have the following characteristics:
For measuring turn-on time: $t_r \leq$ 2ns, t_p = 200ns, duty cycle ≤ 2%.
For measuring turn-off time: $t_f \leq$ 3ns, t_p = 200ns to 10μs, duty cycle ≤ 2%.
Note b: The output waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq$ 1ns, $R_{in} \geq$ 100kΩ, $C_{in} \leq$ 7pF.

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