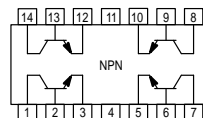


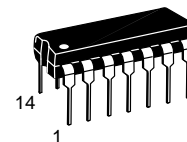
# Quad Core Driver Transistor

## NPN Silicon



**MPQ3725**

Motorola Preferred Device



CASE 646-06, STYLE 1  
TO-116

### MAXIMUM RATINGS

Rating	Symbol	Value		Unit
Collector–Emitter Voltage	$V_{CEO}$	40		Vdc
Collector–Emitter Voltage	$V_{CES}$	60		Vdc
Emitter–Base Voltage	$V_{EBO}$	5.0		Vdc
Collector Current — Continuous	$I_C$	1.0		Adc
		One Transistor	Four Transistors Equal Power	
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0	2.5 20	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150		$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max		Unit
		One Transistor	Effective For Four Transistors	
Thermal Resistance, Junction to Ambient <sup>(1)</sup>	$R_{\theta JA}$	125	50	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage <sup>(2)</sup> ( $I_C = 10 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	40	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 100 \mu\text{Adc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 40 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	0.5	$\mu\text{Adc}$

- $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.
- Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

Preferred devices are Motorola recommended choices for future use and best overall value.

## MPQ3725

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS(2)</b>					
DC Current Gain ( $I_C = 100\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 500\text{ mA}$ , $V_{CE} = 2.0\text{ Vdc}$ )	$h_{FE}$	35 25	75 45	200 —	—
Collector–Emitter Saturation Voltage ( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )	$V_{CE(sat)}$	—	0.32	0.45	Vdc
Base–Emitter Saturation Voltage ( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )	$V_{BE(sat)}$	0.8	0.9	1.1	Vdc

### SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ( $I_C = 50\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	250	275	—	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	—	5.1	10	pF
Input Capacitance ( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	—	62	80	pF

### SWITCHING CHARACTERISTICS

Turn–On Time ( $I_C = 500\text{ mA}$ , $I_{B1} = 50\text{ mA}$ $V_{BE(off)} = -3.8\text{ Vdc}$ )	$t_{on}$	—	20	35	ns
Turn–Off Time ( $I_C = 500\text{ mA}$ , $I_{B1} = I_{B2} = 50\text{ mA}$ )	$t_{off}$	—	50	60	ns

2. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

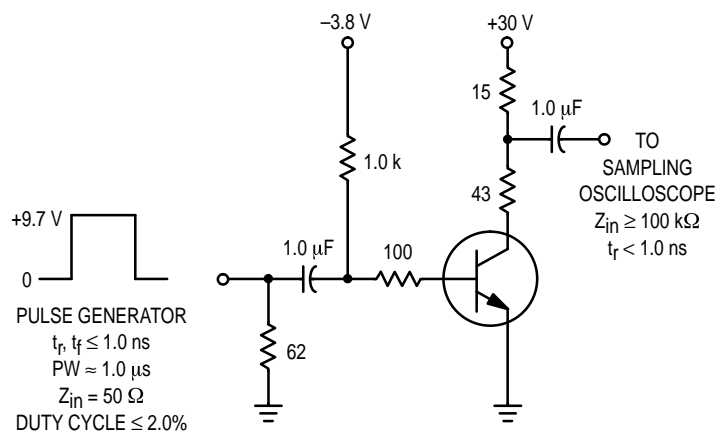


Figure 1. Switching Times Test Circuit

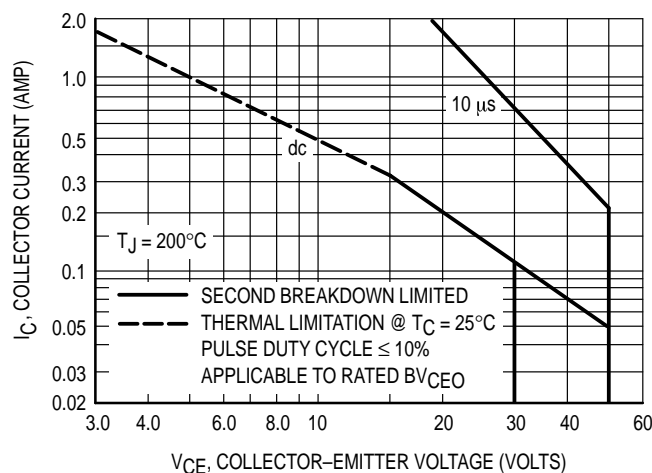


Figure 2. Active-Region Safe Operating Area

## TYPICAL DC CHARACTERISTICS

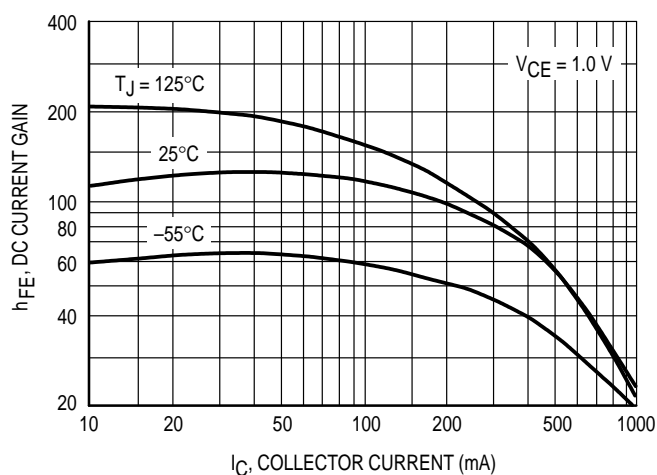


Figure 3. DC Current Gain

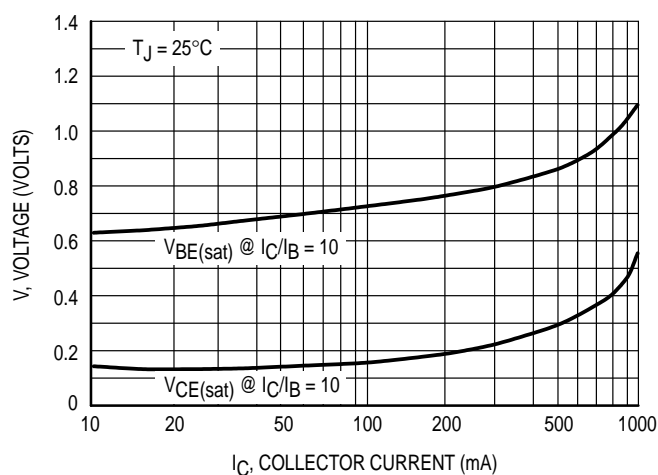


Figure 4. "ON" Voltages

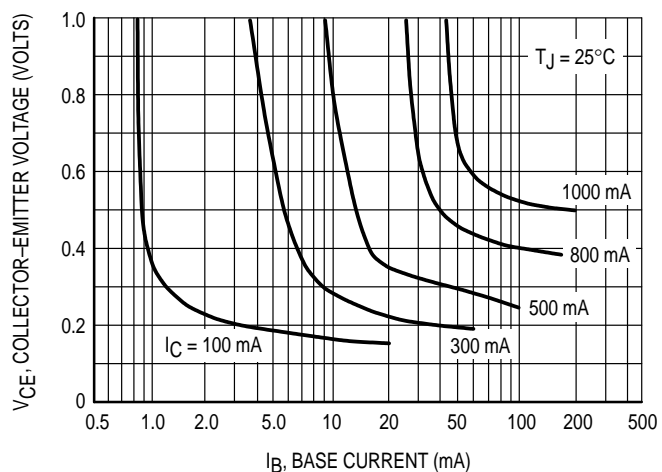


Figure 5. Collector Saturation Region

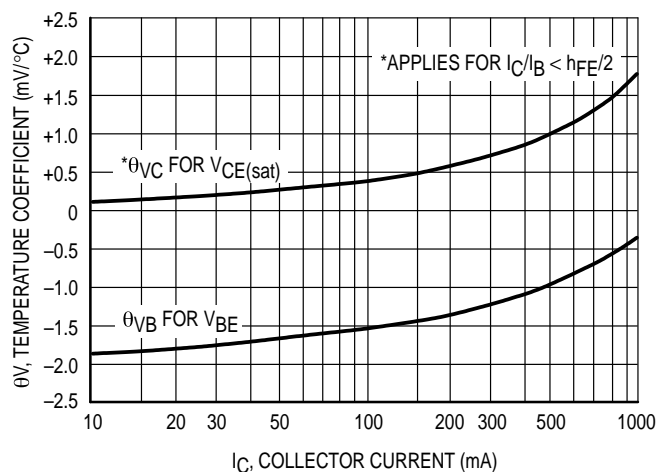


Figure 6. Temperature Coefficients

## TYPICAL DYNAMIC CHARACTERISTICS

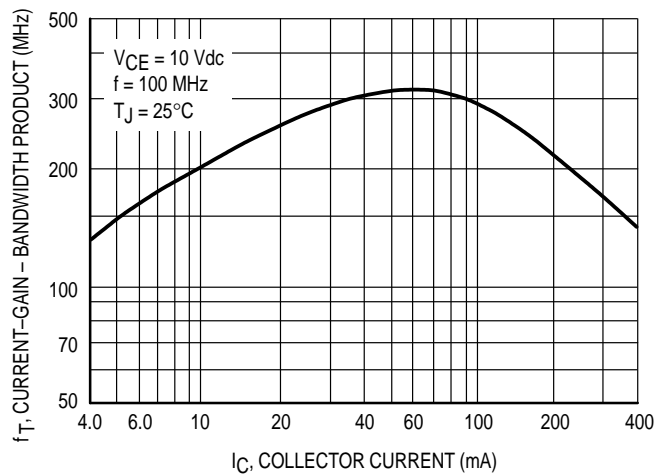


Figure 7. Current-Gain — Bandwidth Product

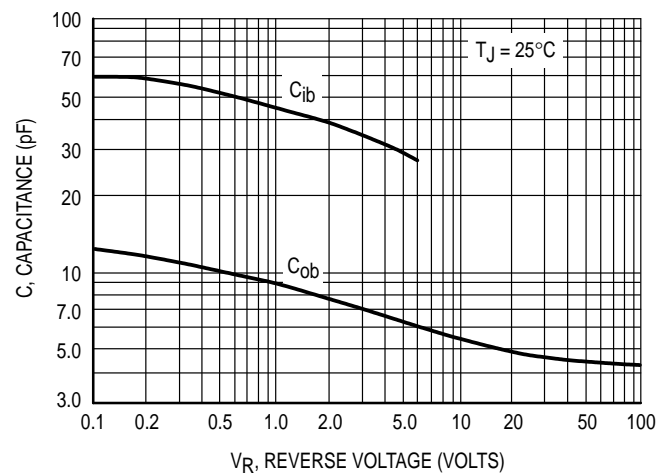


Figure 8. Capacitance

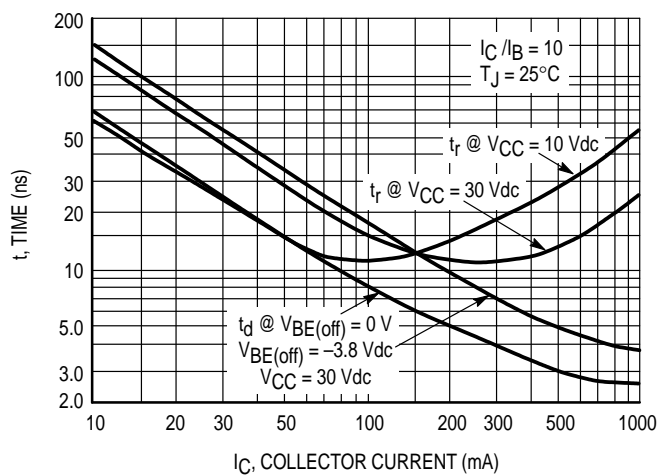


Figure 9. Turn-On Time

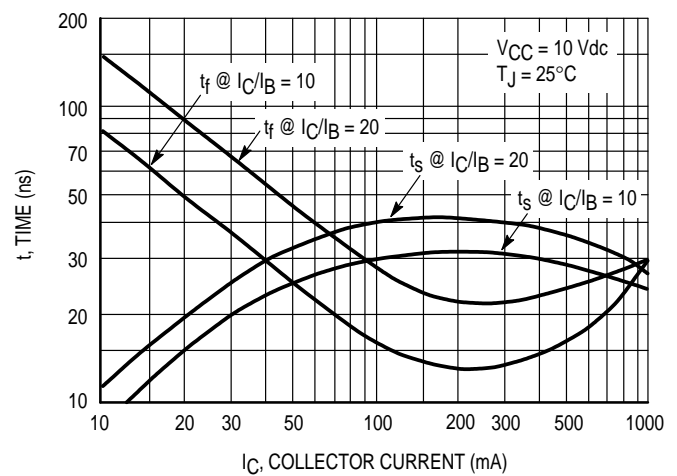


Figure 10. Turn-Off Time

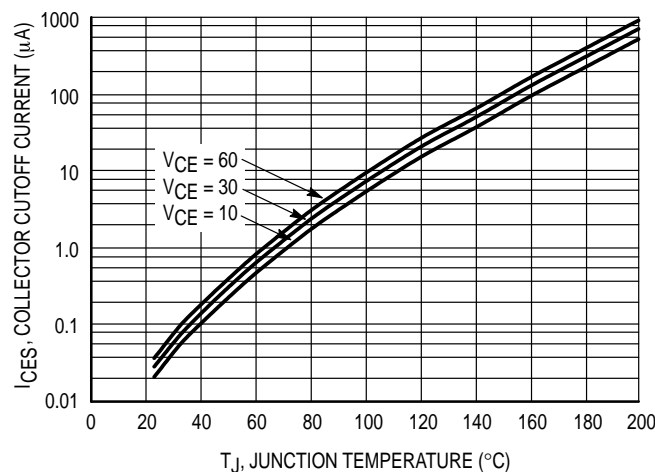
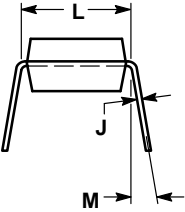
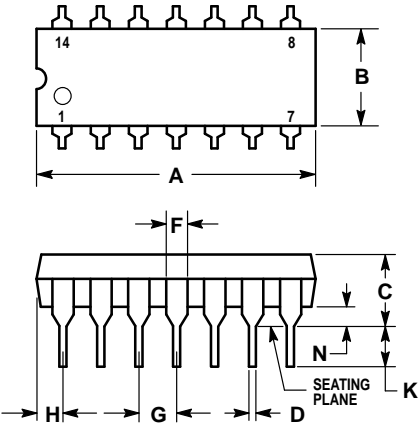


Figure 11. Collector Cutoff Current

PACKAGE DIMENSIONS




- STYLE 1:  
PIN 1. COLLECTOR  
2. BASE  
3. EMITTER  
4. NO CONNECTION  
5. EMITTER  
6. BASE  
7. COLLECTOR  
8. COLLECTOR  
9. BASE  
10. EMITTER  
11. NO CONNECTION  
12. EMITTER  
13. BASE  
14. COLLECTOR

- NOTES:  
1. LEADS WITHIN 0.13 (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.  
2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.  
3. DIMENSION B DOES NOT INCLUDE MOLD FLASH.  
4. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	19.56
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.300 BSC		7.62 BSC	
M	0°	10°	0°	10°
N	0.015	0.039	0.39	1.01

CASE 646-06  
TO-116  
ISSUE M

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