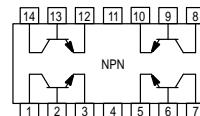


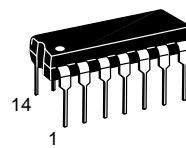
## Quad Core Driver Transistor

### 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(1)	$R_{\theta JA}$	125	50	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					

Collector-Emitter Breakdown Voltage(2) ( $I_C = 10 \text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	40	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 100 \mu\text{A}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 40 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	0.5	$\mu\text{A}$

1.  $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.

2. 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.

REV 3

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

**SMALL-SIGNAL CHARACTERISTICS**

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

**SWITCHING CHARACTERISTICS**

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

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

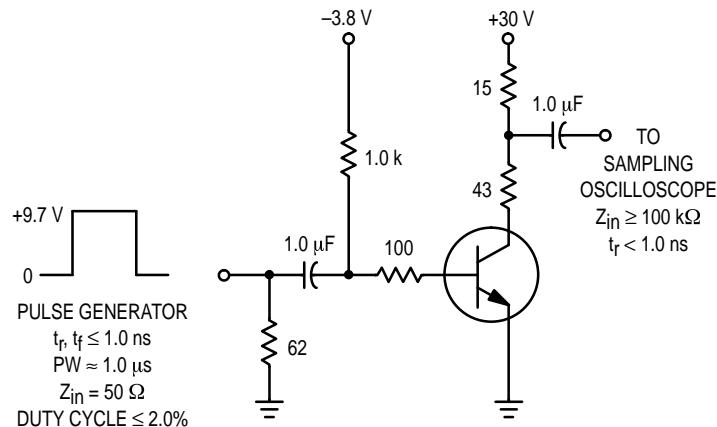


Figure 1. Switching Times Test Circuit

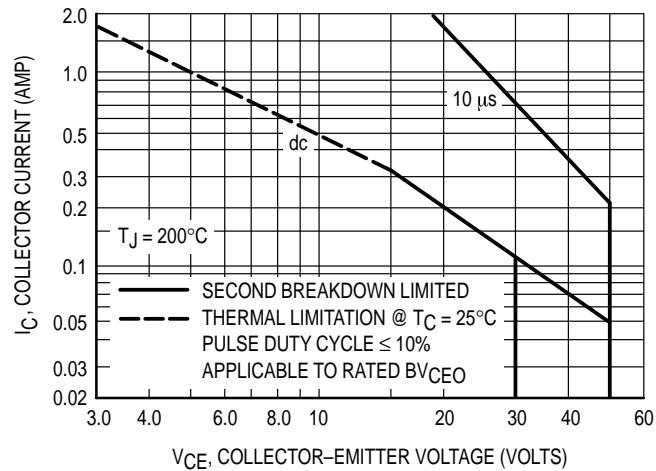
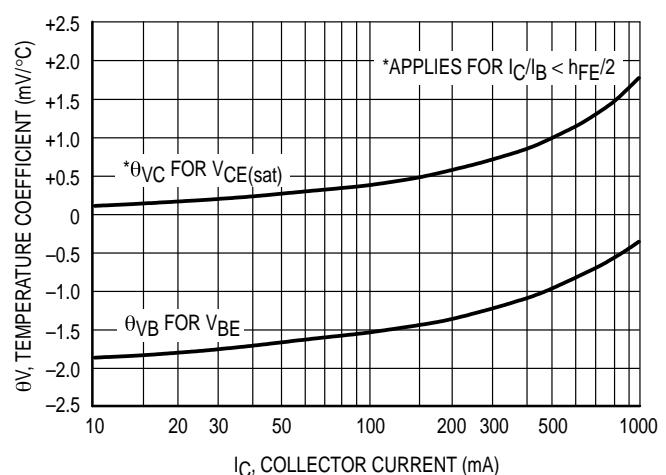
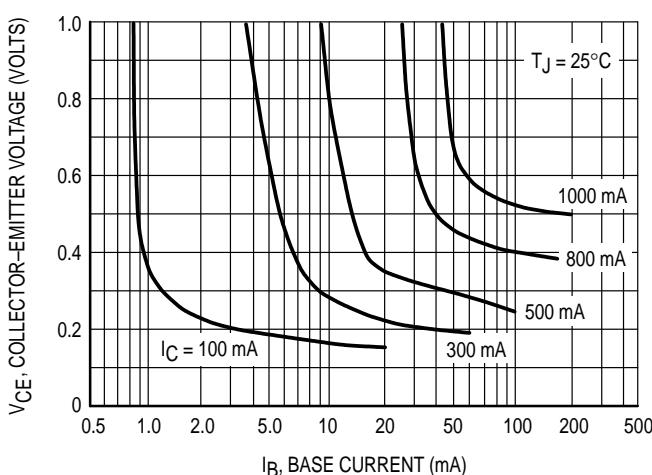
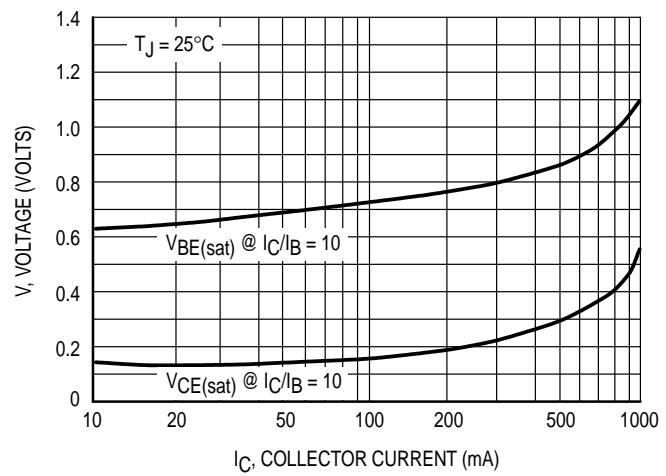
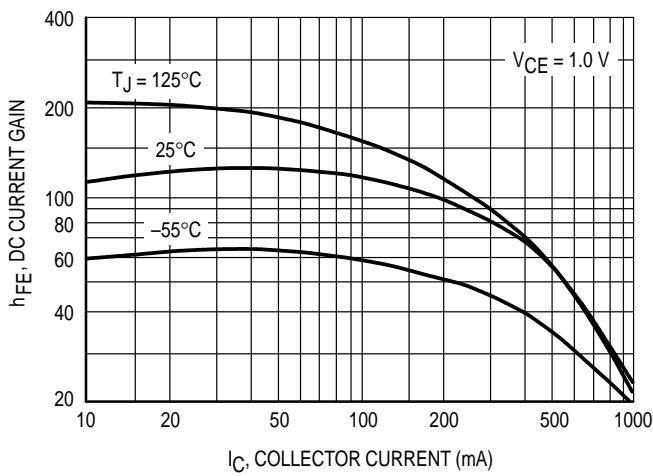


Figure 2. Active-Region Safe Operating Area

## TYPICAL DC CHARACTERISTICS



## TYPICAL DYNAMIC CHARACTERISTICS

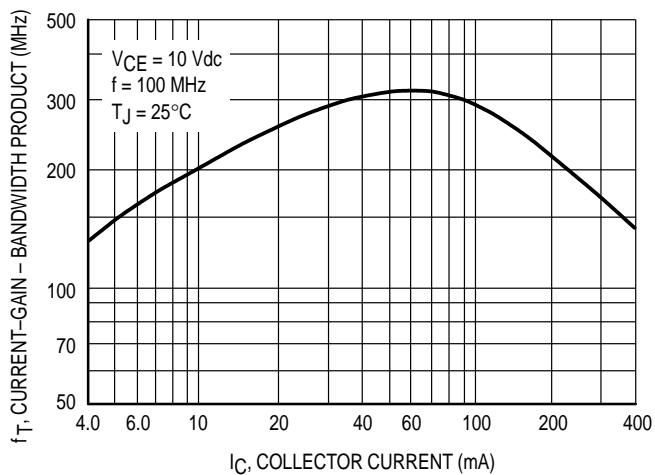


Figure 7. Current-Gain — Bandwidth Product

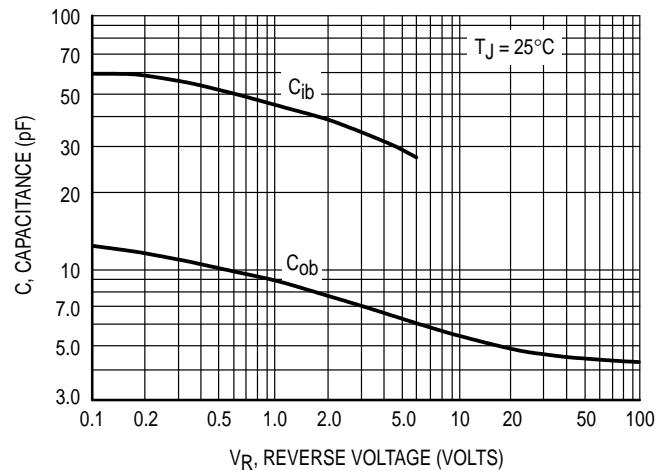


Figure 8. Capacitance

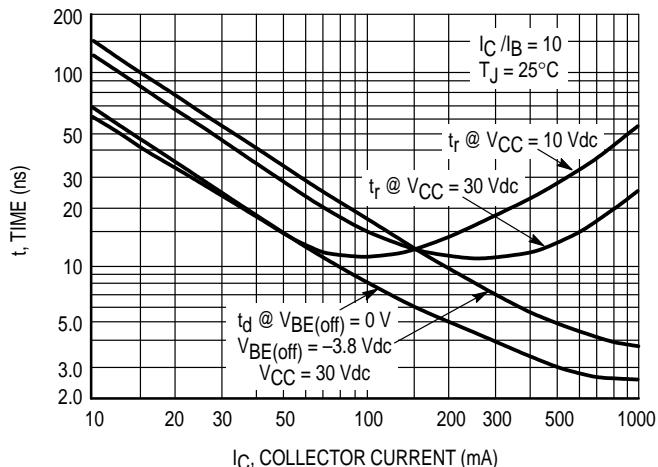


Figure 9. Turn-On Time

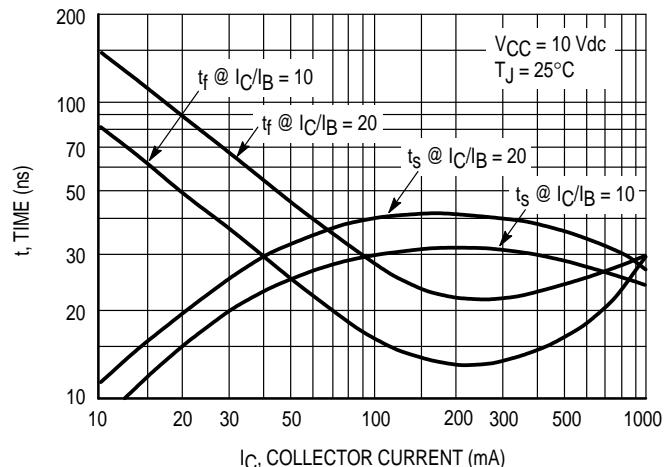


Figure 10. Turn-Off Time

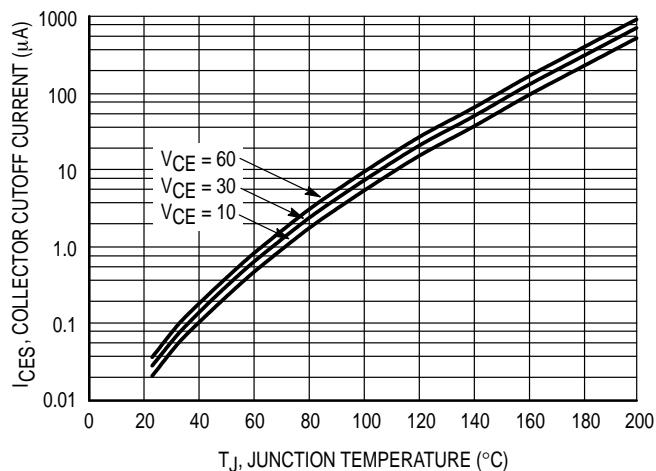
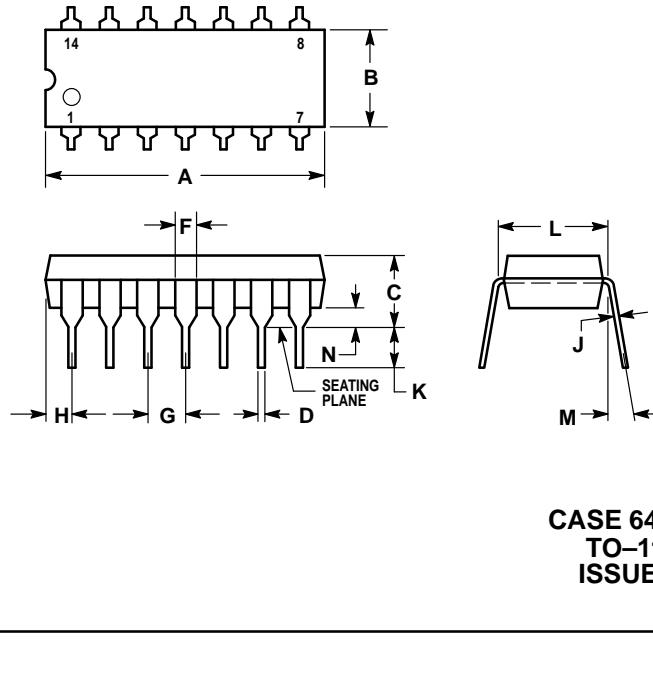


Figure 11. Collector Cutoff Current

## PACKAGE DIMENSIONS



## 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**

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.: SPD, Strategic Planning Office, 4-32-1,  
Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan. 81-3-5487-8488

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
– US & Canada ONLY 1-800-774-1848

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

**INTERNET:** <http://motorola.com/sps>

