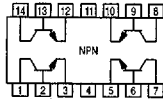


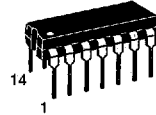
# Quad Core Driver Transistor

## 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<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.0<br>8.0     | 2.5<br>20                    | Watts<br>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                             | $^\circ\text{C}/\text{W}$ |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

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

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.

**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<br>( $I_C = 100 \text{ mAdc}$ , $V_{CE} = 1.0 \text{ Vdc}$ )<br>( $I_C = 500 \text{ mAdc}$ , $V_{CE} = 2.0 \text{ Vdc}$ ) | $h_{FE}$      | 35<br>25 | 75<br>45 | 200<br>— | —    |
| Collector-Emitter Saturation Voltage<br>( $I_C = 500 \text{ mAdc}$ , $I_B = 50 \text{ mAdc}$ )  | $V_{CE(sat)}$ | —        | 0.32     | 0.45     | Vdc  |
| Base-Emitter Saturation Voltage<br>( $I_C = 500 \text{ mAdc}$ , $I_B = 50 \text{ mAdc}$ )   | $V_{BE(sat)}$ | 0.8      | 0.9      | 1.1      | Vdc  |

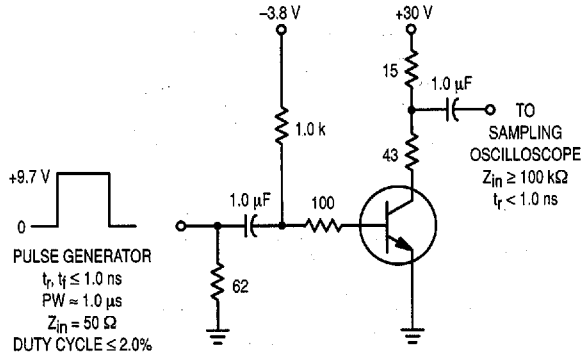
**SMALL-SIGNAL CHARACTERISTICS**

|   |           |     |     |    |     |
|---|-----------|-----|-----|----|-----|
| Current-Gain — Bandwidth Product<br>( $I_C = 50 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 100 \text{ MHz}$ ) | $f_T$     | 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<br>( $I_C = 500 \text{ mAdc}$ , $I_{B1} = 50 \text{ mAdc}$<br>$V_{BE(off)} = -3.8 \text{ Vdc}$ ) | $t_{on}$  | — | 20 | 35 | ns |
| Turn-Off Time<br>( $I_C = 500 \text{ mAdc}$ , $I_{B1} = I_{B2} = 50 \text{ mAdc}$ )                           | $t_{off}$ | — | 50 | 60 | ns |

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



**Figure 1. Switching Times Test Circuit**

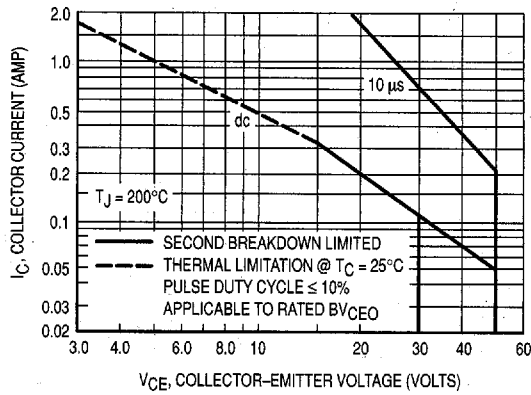


Figure 2. Active-Region Safe Operating Area

TYPICAL DC CHARACTERISTICS

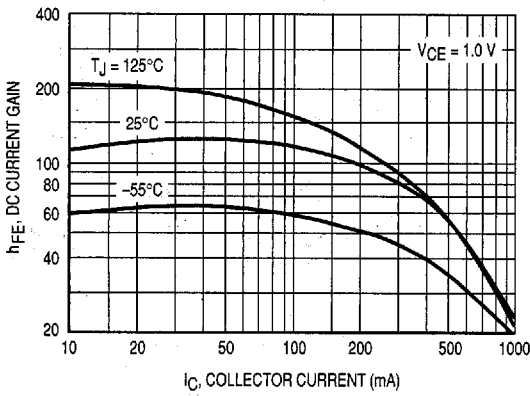


Figure 3. DC Current Gain

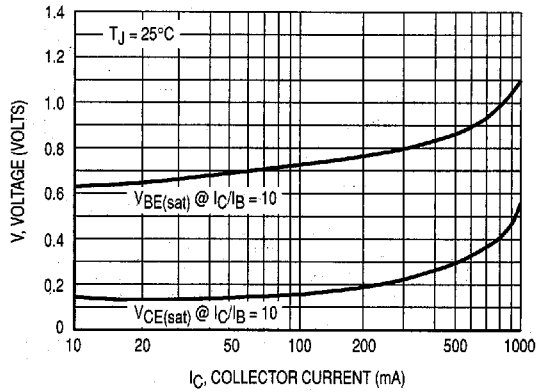


Figure 4. "ON" Voltages

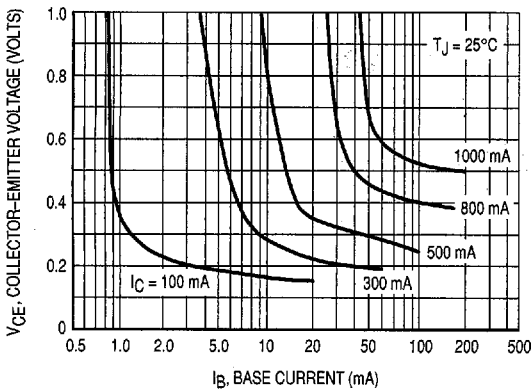


Figure 5. Collector Saturation Region

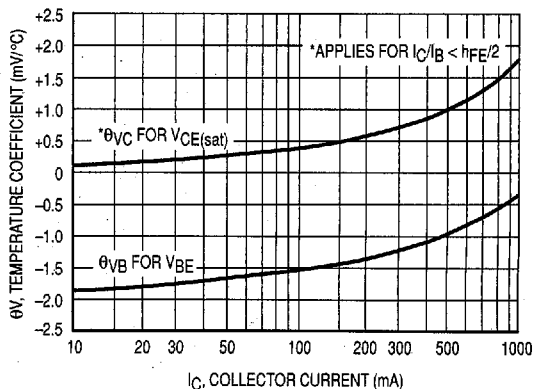


Figure 6. Temperature Coefficients

TYPICAL DYNAMIC CHARACTERISTICS

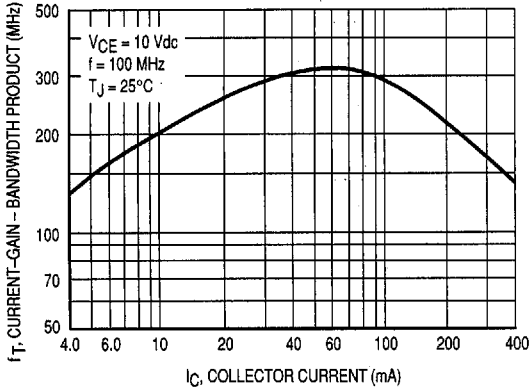


Figure 7. Current-Gain — Bandwidth Product

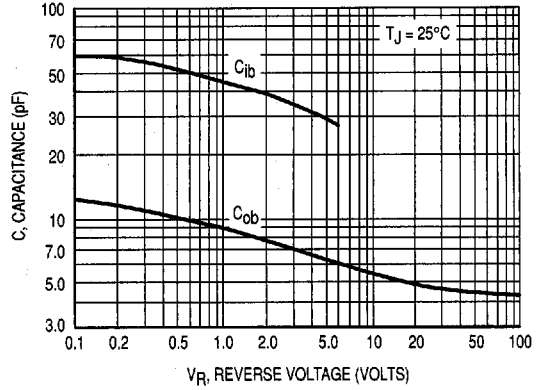


Figure 8. Capacitance

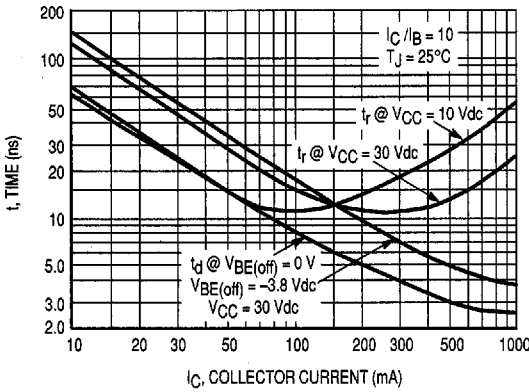


Figure 9. Turn-On Time

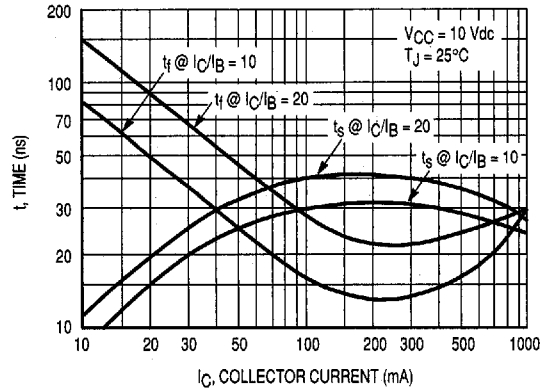


Figure 10. Turn-Off Time

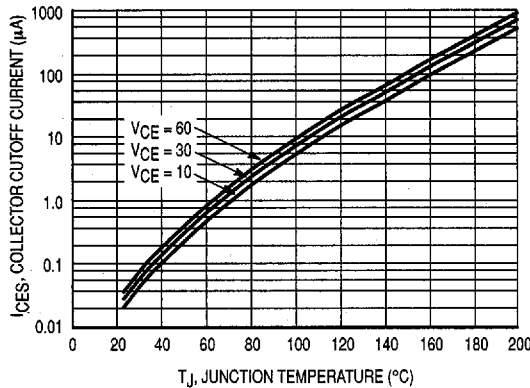


Figure 11. Collector Cutoff Current