

## MAXIMUM RATINGS

| Rating                                                                                | Symbol         | Value               |                        | Unit                 |
|---------------------------------------------------------------------------------------|----------------|---------------------|------------------------|----------------------|
| Collector-Emitter Voltage                                                             | $V_{CEO}$      | 40                  |                        | Vdc                  |
| Collector-Base Voltage                                                                | $V_{CBO}$      | 65                  |                        | Vdc                  |
| Emitter-Base Voltage                                                                  | $V_{EBO}$      | 6.0                 |                        | Vdc                  |
| Collector Current — Continuous                                                        | $I_C$          | 1.0                 |                        | Adc                  |
|                                                                                       |                | One Die             | All Die<br>Equal Power |                      |
| Total Device Dissipation<br>@ $T_A = 25^\circ\text{C}$<br>MD3725<br>MD3725F<br>MQ3725 | $P_D$          | 600<br>350<br>400   | 650<br>400<br>600      | mW                   |
| Derate above $25^\circ\text{C}$<br>MD3725<br>MD3725F<br>MQ3725                        |                | 3.42<br>2.0<br>2.28 | 3.7<br>2.28<br>3.42    | mW/ $^\circ\text{C}$ |
| Total Device Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>MD3725<br>MD3725F<br>MQ3725 | $P_D$          | 2.1<br>1.25<br>1.0  | 3.0<br>2.5<br>4.0      | Watts                |
| Derate above $25^\circ\text{C}$<br>MD3725<br>MD3725F<br>MQ3725                        |                | 12<br>7.15<br>5.71  | 17.2<br>14.3<br>22.8   | mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{stg}$ | -65 to +200         |                        | $^\circ\text{C}$     |

**MD3725,F**  
**MQ3725**

**MD3725**  
**CASE 654-07, STYLE 1**

**MD3725F**  
**CASE 610A-04, STYLE 1**

**MQ3725**  
**CASE 607-04, STYLE 1**

**DUAL**  
**AMPLIFIER TRANSISTOR**

**NPN SILICON**

5

## THERMAL CHARACTERISTICS

| Characteristic                                                           | Symbol             | One Die                | All Die<br>Equal Power | Unit               |
|--------------------------------------------------------------------------|--------------------|------------------------|------------------------|--------------------|
| Thermal Resistance, Junction to Case<br>MD3725<br>MD3725F<br>MQ3725      | $R_{\theta JC}$    | 83.3<br>140<br>175     | 58.3<br>70<br>43.8     | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Ambient<br>MD3725<br>MD3725F<br>MQ3725   | $R_{\theta JA}(1)$ | 292<br>500<br>433      | 270<br>438<br>292      | $^\circ\text{C/W}$ |
|                                                                          |                    | Junction to<br>Ambient | Junction to<br>Case    |                    |
| Coupling Factor<br>MD3725<br>MD3725F<br>MQ3725 (Q1-Q2)<br>(Q1-Q3, Q1-Q4) |                    | 85<br>75<br>57<br>55   | 40<br>0<br>0<br>0      | %                  |

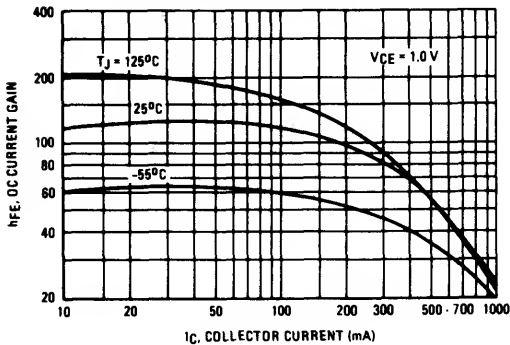
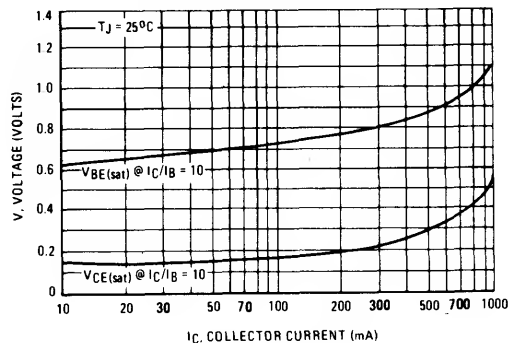
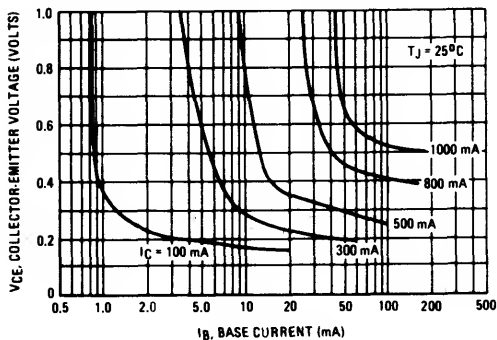
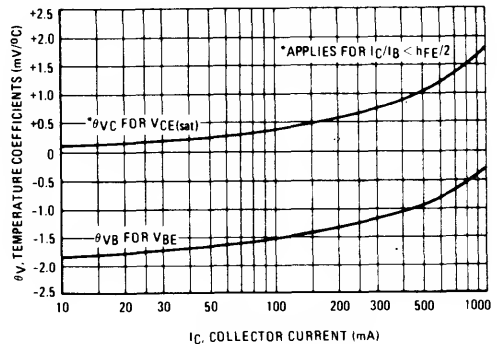
(1)  $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.

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

| Characteristic                                                                                                                        | Symbol        | Min    | Typ       | Max        | Unit                               |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-----------|------------|------------------------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                            |               |        |           |            |                                    |
| Collector-Emitter Breakdown Voltage(2)<br>( $I_C = 10 \text{ mAdc}, I_B = 0$ )                                                        | $V_{(BR)CEO}$ | 40     | —         | —          | Vdc                                |
| Collector-Emitter Breakdown Voltage<br>( $I_C = 10 \text{ } \mu\text{Adc}, V_{BE} = 0$ )<br>MD3725F                                   | $V_{(BR)CES}$ | 65     | —         | —          | Vdc                                |
| Collector-Base Breakdown Voltage<br>( $I_C = 100 \text{ } \mu\text{Adc}, I_E = 0$ )                                                   | $V_{(BR)CBO}$ | 65     | —         | —          | Vdc                                |
| Emitter-Base Breakdown Voltage<br>( $I_E = 10 \text{ } \mu\text{Adc}, I_C = 0$ )                                                      | $V_{(BR)EBO}$ | 6.0    | —         | —          | Vdc                                |
| Collector Cutoff Current<br>( $V_{CB} = 40 \text{ Vdc}, I_E = 0$ )<br>( $V_{CB} = 40 \text{ Vdc}, I_E = 0, T_A = 100^\circ\text{C}$ ) | $I_{CBO}$     | —<br>— | 0.12<br>— | 1.7<br>120 | $\mu\text{Adc}$<br>$\mu\text{Adc}$ |

**MD3765,F, MQ3725****ELECTRICAL CHARACTERISTICS** (continued) ( $T_A = 25^\circ\text{C}$  unless otherwise noted.)

| Characteristic                                                                                                                               | Symbol        | Min       | Typ          | Max          | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------|--------------|--------------|------|
| <b>ON CHARACTERISTICS(2)</b>                                                                                                                 |               |           |              |              |      |
| DC Current Gain<br>( $I_C = 100\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ )<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 2.0\text{ Vdc}$ )            | $h_{FE}$      | 50<br>30  | —<br>—       | 150<br>—     | —    |
| Collector-Emitter Saturation Voltage<br>( $I_C = 100\text{ mA}$ , $I_B = 10\text{ mA}$ )<br>( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ ) | $V_{CE(sat)}$ | —<br>—    | 0.19<br>0.30 | 0.26<br>0.45 | Vdc  |
| Base-Emitter Saturation Voltage<br>( $I_C = 100\text{ mA}$ , $I_B = 10\text{ mA}$ )<br>( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )      | $V_{BE(sat)}$ | —<br>0.80 | —<br>—       | 0.86<br>1.2  | Vdc  |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>                                                                                                          |               |           |              |              |      |
| Current-Gain — Bandwidth Product<br>( $I_C = 50\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )                               | $f_T$         | 200       | —            | —            | MHz  |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 100\text{ kHz}$ )                                                        | $C_{obo}$     | —         | —            | 10           | pF   |
| Input Capacitance<br>( $V_{BE} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 100\text{ kHz}$ )                                                        | $C_{ibo}$     | —         | —            | 65           | pF   |
| <b>SWITCHING CHARACTERISTICS</b>                                                                                                             |               |           |              |              |      |
| Turn-On Time<br>( $V_{CC} = 30\text{ Vdc}$ , $I_C = 500\text{ mA}$ , $I_{B1} = 50\text{ mA}$ , $V_{BE(off)} = 3.8\text{ Vdc}$ )              | $t_{on}$      | —         | 20           | 45           | ns   |
| Turn-Off Time<br>( $V_{CC} = 30\text{ Vdc}$ , $I_C = 500\text{ mA}$ , $I_{B1} = I_{B2} = 50\text{ mA}$ )                                     | $t_{off}$     | —         | 50           | 75           | ns   |

(2) Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .**TYPICAL DC CHARACTERISTICS****FIGURE 1 — DC CURRENT GAIN****FIGURE 2 — "ON" VOLTAGES****FIGURE 3 — COLLECTOR SATURATION REGION****FIGURE 4 — TEMPERATURE COEFFICIENTS**

TYPICAL DYNAMIC CHARACTERISTICS

FIGURE 5 – CURRENT-GAIN – BANDWIDTH PRODUCT

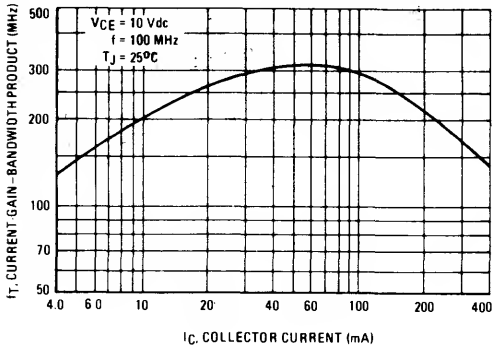


FIGURE 6 – CAPACITANCE

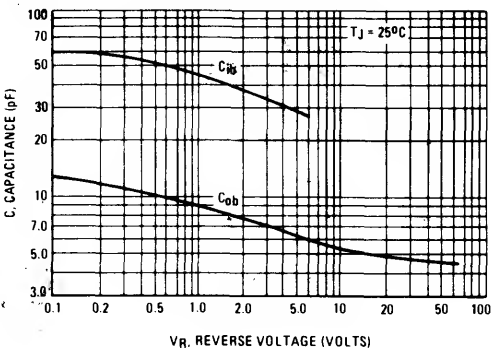


FIGURE 7 – TURN-ON TIME

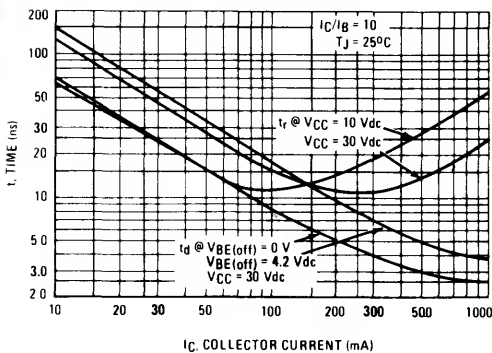


FIGURE 8 – TURN-OFF TIME

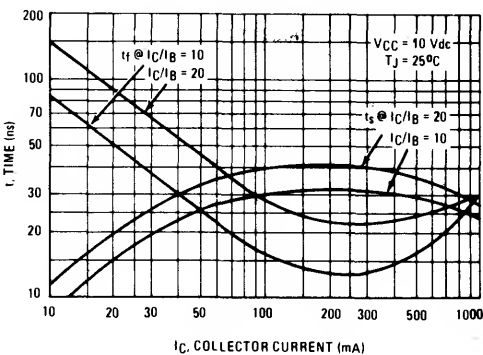


FIGURE 9 – SWITCHING TIME TEST CIRCUIT

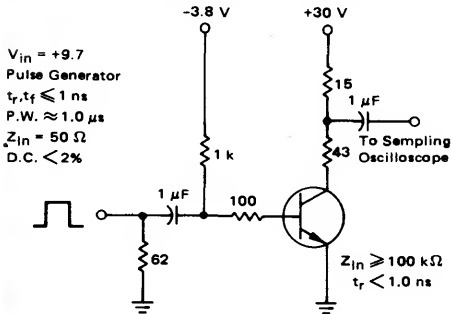


FIGURE 10 – COLLECTOR CUTOFF CURRENT

