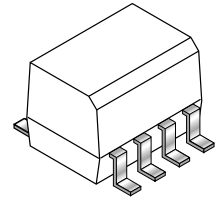


## MOCD223-M

### DESCRIPTION

The MOCD223-M consist of two gallium arsenide infrared emitting diodes optically coupled to two monolithic silicon phototransistor darlington detectors, in a surface mountable, small outline plastic package. It is ideally suited for high density applications that require low input current and eliminates the need for through-the-board mounting.

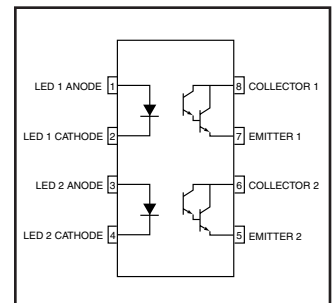


### FEATURES

- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #13616) (add option "V" for VDE approval, i.e, MOCD223V-M)
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- High Current Transfer Ratio of 500% Minimum at  $I_F = 1 \text{ mA}$
- Minimum  $BV_{CEO}$  of 30 Volts Guaranteed
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation Voltage of 2500  $V_{AC(rms)}$  Guaranteed

### APPLICATIONS

- Interfacing and coupling systems of different potentials and impedances
- General purpose switching circuits
- Monitor and detection circuits



### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)

| Rating                                                                                | Symbol              | Value       | Unit     |
|---------------------------------------------------------------------------------------|---------------------|-------------|----------|
| <b>EMITTER</b>                                                                        |                     |             |          |
| Forward Current - Continuous                                                          | I <sub>F</sub>      | 60          | mA       |
| Forward Current - Peak (PW = 100 μs, 120 pps)                                         | I <sub>F</sub> (pk) | 1.0         | A        |
| Reverse Voltage                                                                       | V <sub>R</sub>      | 6.0         | V        |
| LED Power Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C                    | P <sub>D</sub>      | 90          | mW       |
|                                                                                       |                     | 0.8         | mW/°C    |
| <b>DETECTOR</b>                                                                       |                     |             |          |
| Collector-Emitter Voltage                                                             | V <sub>CEO</sub>    | 30          | V        |
| Collector-Base Voltage                                                                | V <sub>CBO</sub>    | 70          | V        |
| Emitter-Collector Voltage                                                             | V <sub>ECO</sub>    | 7.0         | V        |
| Collector Current-Continuous                                                          | I <sub>C</sub>      | 150         | mA       |
| Detector Power Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C               | P <sub>D</sub>      | 150         | mW       |
|                                                                                       |                     | 1.76        | mW/°C    |
| <b>TOTAL DEVICE</b>                                                                   |                     |             |          |
| Input-Output Isolation Voltage <sup>(1,2,3)</sup><br>(f = 60 Hz, t = 1 min. Duration) | V <sub>ISO</sub>    | 2500        | Vac(rms) |
| Total Device Power Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C           | P <sub>D</sub>      | 250         | mW       |
|                                                                                       |                     | 2.94        | mW/°C    |
| Ambient Operating Temperature Range                                                   | T <sub>A</sub>      | -40 to +100 | °C       |
| Storage Temperature Range                                                             | T <sub>stg</sub>    | -40 to +150 | °C       |
| Lead Soldering Temperature<br>(1/16" from case, 10 sec. duration)                     | T <sub>L</sub>      | 260         | °C       |

**MOCD223-M**

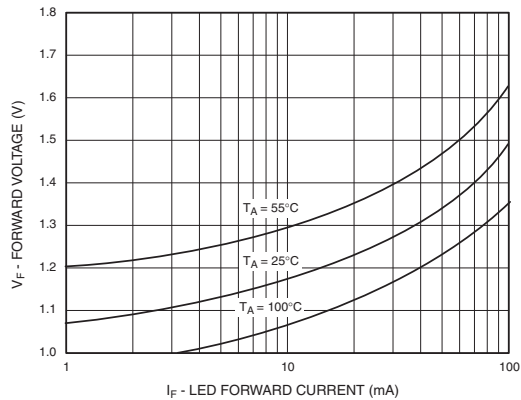
| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise specified) |                                                                                           |               |           |       |     |               |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------|-----------|-------|-----|---------------|
| Parameter                                                                                | Test Conditions                                                                           | Symbol        | Min       | Typ** | Max | Unit          |
| <b>EMITTER</b>                                                                           |                                                                                           |               |           |       |     |               |
| Input Forward Voltage                                                                    | ( $I_F = 1.0\text{ mA}$ )                                                                 | $V_F$         | —         | 1.25  | 1.3 | V             |
| Reverse Leakage Current                                                                  | ( $V_R = 6.0\text{ V}$ )                                                                  | $I_R$         | —         | 0.001 | 100 | $\mu\text{A}$ |
| Capacitance                                                                              |                                                                                           | $C_{IN}$      | —         | 18    | —   | pF            |
| <b>DETECTOR</b>                                                                          |                                                                                           |               |           |       |     |               |
| Collector-Emitter Dark Current                                                           | ( $V_{CE} = 5.0\text{ V}$ , $T_A = 25^\circ\text{C}$ )                                    | $I_{CEO1}$    | —         | 1.0   | 50  | nA            |
|                                                                                          | ( $V_{CE} = 5.0\text{ V}$ , $T_A = 100^\circ\text{C}$ )                                   | $I_{CEO2}$    | —         | 1.0   | —   | $\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage                                                      | ( $I_C = 100\text{ }\mu\text{A}$ )                                                        | $BV_{CEO}$    | 30        | 90    | —   | V             |
| Emitter-Collector Breakdown Voltage                                                      | ( $I_E = 100\text{ }\mu\text{A}$ )                                                        | $BV_{ECO}$    | 7.0       | 10    | —   | V             |
| Collector-Emitter Capacitance                                                            | ( $f = 1.0\text{ MHz}$ , $V_{CE} = 0$ )                                                   | $C_{CE}$      | —         | 5.5   | —   | pF            |
| <b>COUPLED</b>                                                                           |                                                                                           |               |           |       |     |               |
| Collector-Output Current <sup>(4)</sup>                                                  | ( $I_F = 1.0\text{ mA}$ , $V_{CE} = 5\text{ V}$ )                                         | CTR           | 500       | 1000  | —   | %             |
| Collector-Emitter Saturation Voltage                                                     | ( $I_C = 500\text{ }\mu\text{A}$ , $I_F = 1.0\text{ mA}$ )                                | $V_{CE(sat)}$ | —         | —     | 1.0 | V             |
| Turn-On Time                                                                             | ( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ ,<br>$R_L = 100\text{ }\Omega$ )(fig 6.) | $t_{on}$      | —         | 3.5   | —   | $\mu\text{s}$ |
| Turn-Off Time                                                                            | ( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ ,<br>$R_L = 100\text{ }\Omega$ )(fig 6.) | $t_{off}$     | —         | 95    | —   | $\mu\text{s}$ |
| Rise Time                                                                                | ( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ ,<br>$R_L = 100\text{ }\Omega$ )(fig 6.) | $t_r$         | —         | 1.0   | —   | $\mu\text{s}$ |
| Fall Time                                                                                | ( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ ,<br>$R_L = 100\text{ }\Omega$ )(fig 6.) | $t_f$         | —         | 2.0   | —   | $\mu\text{s}$ |
| Isolation Surge Voltage <sup>(1,2,3)</sup>                                               | $f = 60\text{ Hz}$ , $t = 1\text{ min.}$                                                  | $V_{ISO}$     | 2500      | —     | —   | Vac(rms)      |
| Isolation Resistance <sup>(2)</sup>                                                      | $V_{I-O} = 500\text{ V}$                                                                  | $R_{ISO}$     | $10^{11}$ | —     | —   | $\Omega$      |
| Isolation Capacitance <sup>(2)</sup>                                                     | $V_{I-O} = 0\text{ V}$ , $f = 1\text{ MHz}$                                               | $C_{ISO}$     | —         | 0.2   | —   | pF            |

\*\* Typical values at  $T_A = 25^\circ\text{C}$

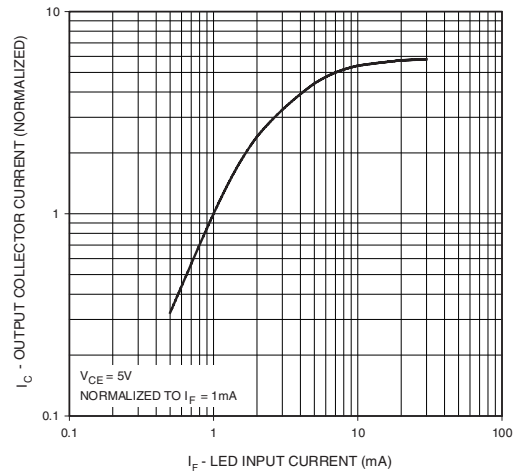
**NOTE:**

1. Isolation Surge Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
2. For this test, Pins 1, 2, 3 and 4 are common and Pins 5, 6, 7 and 8 are common.
3.  $V_{ISO}$  rating of  $2500\text{ V}_{AC(rms)}$  for  $t = 1\text{ min.}$  is equivalent to a rating of  $3,000\text{ V}_{AC(rms)}$  for  $t = 1\text{ sec.}$
4. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

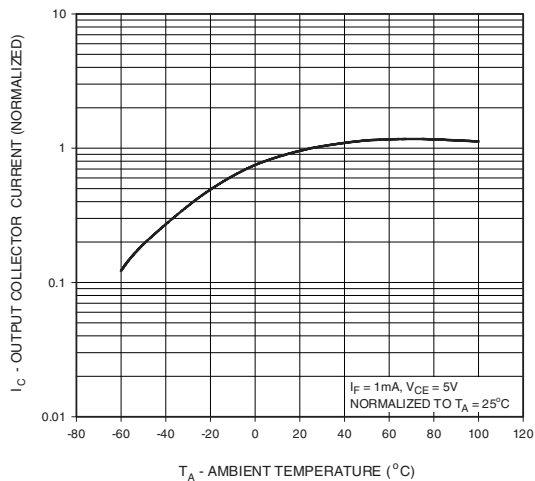
**Fig. 1 LED Forward Voltage vs. Forward Current**



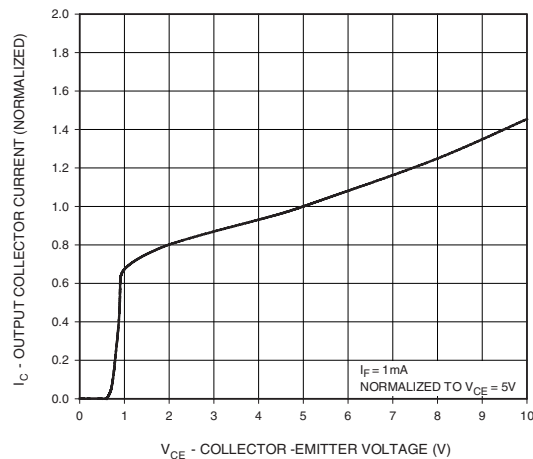
**Fig. 2 Output Current vs. Input Current**



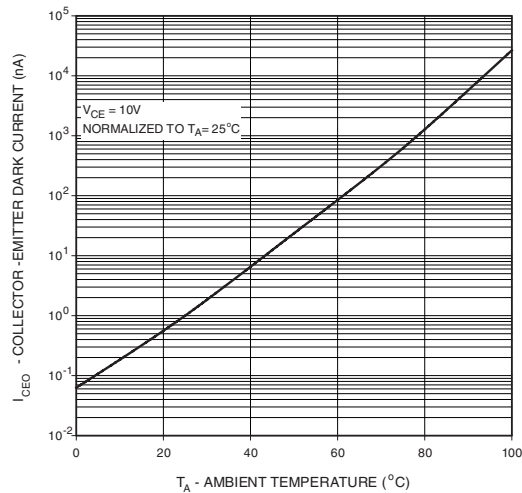
**Fig. 3 Output Current vs. Ambient Temperature**

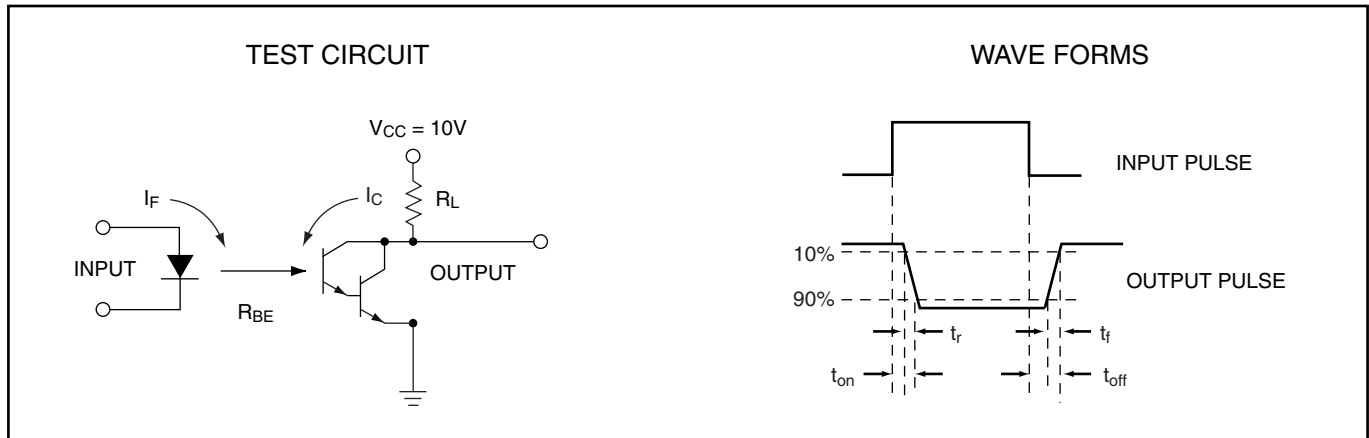


**Fig. 4 Output Current vs. Collector - Emitter Voltage**



**Fig. 5 Dark Current vs. Ambient Temperature**

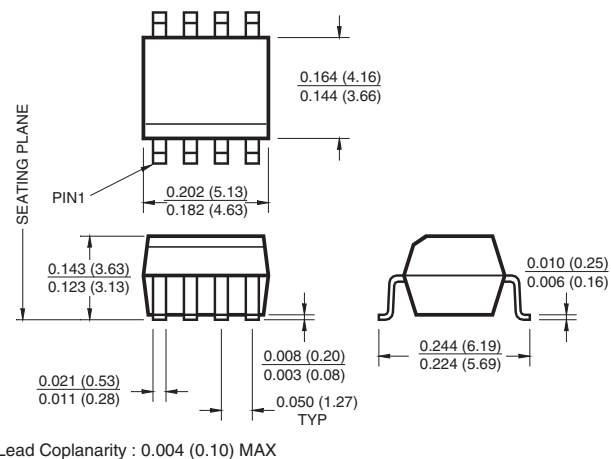




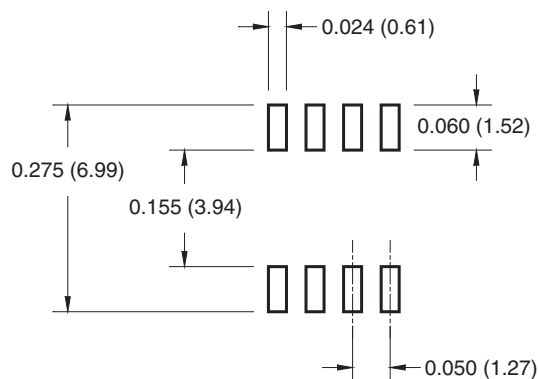
**Figure 6. Switching Time Test Circuit and Waveforms**

**MOCD223-M**

**Package Dimensions (Surface Mount)**



**8-Pin Small Outline**

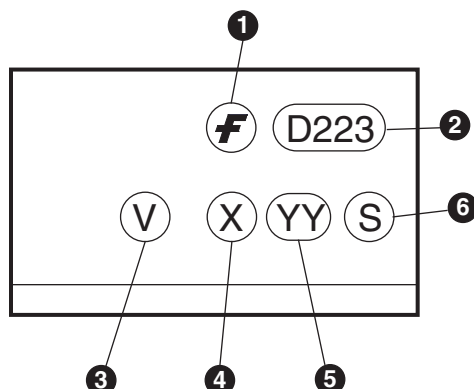


## MOCD223-M

### ORDERING INFORMATION

| Option | Order Entry Identifier | Description                                   |
|--------|------------------------|-----------------------------------------------|
| V      | V                      | VDE 0884                                      |
| R1     | R1                     | Tape and reel (500 units per reel)            |
| R1V    | R1V                    | VDE 0884, Tape and reel (500 units per reel)  |
| R2     | R2                     | Tape and reel (2500 units per reel)           |
| R2V    | R2V                    | VDE 0884, Tape and reel (2500 units per reel) |

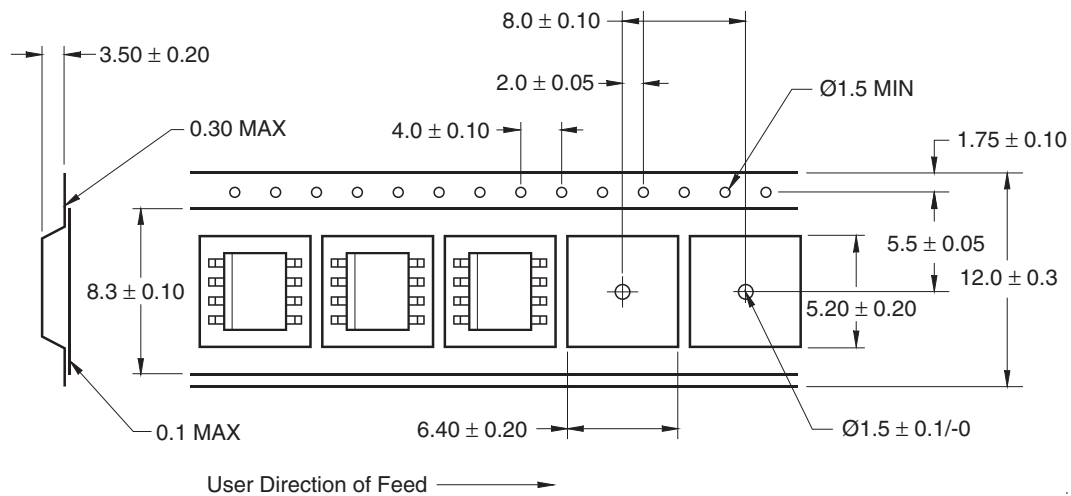
### MARKING INFORMATION



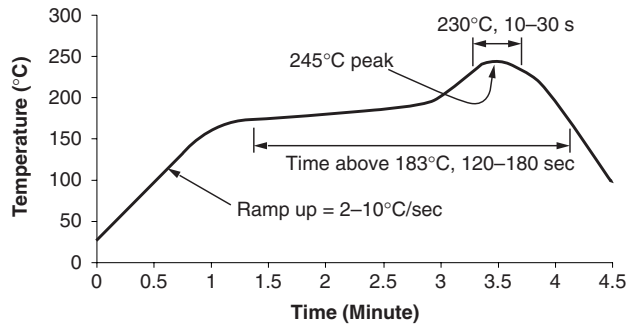
| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                                         |
| 2           | Device number                                                                          |
| 3           | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4           | One digit year code, e.g., '3'                                                         |
| 5           | Two digit work week ranging from '01' to '53'                                          |
| 6           | Assembly package code                                                                  |

**MOCD223-M**

**QT Carrier Tape Specifications**



**Reflow Profile**



- Peak reflow temperature:  $245^\circ\text{C}$  (package surface temperature)
- Time of temperature higher than  $183^\circ\text{C}$  for  $120-180 \text{ seconds}$
- One time soldering reflow is recommended

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.