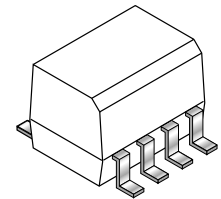


## MOC223-M

### DESCRIPTION

The MOC223-M consists of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector, in a surface mountable, small outline, plastic package. It is ideally suited for high density applications, and eliminates the need for through - the - board mounting.

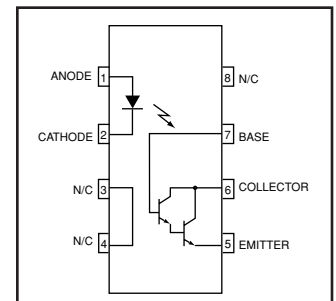


### FEATURES

- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #136616) (add option "V" for VDE approval, i.e, MOC223V-M)
- Industry Standard SOIC-8 Surface Mountable Package with 0.050" lead spacing
- High Current Transfer Ratio of 500% Minimum at  $I_F = 1 \text{ mA}$
- 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

- Low Power Logic Circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications equipment
- Portable electronics
- Solid state relays



| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)       |                  |             |                            |
|----------------------------------------------------------------------------------------------|------------------|-------------|----------------------------|
| Rating                                                                                       | Symbol           | Value       | Unit                       |
| <b>EMITTER</b>                                                                               |                  |             |                            |
| Forward Current - Continuous                                                                 | $I_F$            | 60          | mA                         |
| Forward Current - Peak (PW = 100 $\mu\text{s}$ , 120 pps)                                    | $I_F(\text{pk})$ | 1.0         | A                          |
| Reverse Voltage                                                                              | $V_R$            | 6.0         | V                          |
| LED Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$          | $P_D$            | 90<br>0.8   | mW<br>mW/ $^\circ\text{C}$ |
| <b>DETECTOR</b>                                                                              |                  |             |                            |
| Collector-Emitter Voltage                                                                    | $V_{CEO}$        | 30          | V                          |
| Emitter-Collector Voltage                                                                    | $V_{ECO}$        | 7.0         | V                          |
| Collector-Base Voltage                                                                       | $V_{CBO}$        | 70          | V                          |
| Collector Current-Continuous                                                                 | $I_C$            | 150         | mA                         |
| Detector Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$     | $P_D$            | 150<br>1.76 | mW<br>mW/ $^\circ\text{C}$ |
| <b>TOTAL DEVICE</b>                                                                          |                  |             |                            |
| Input-Output Isolation Voltage<br>(f = 60 Hz, t = 1 min.)                                    | $V_{ISO}$        | 2500        | Vac(rms)                   |
| Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$            | 250<br>2.94 | mW<br>mW/ $^\circ\text{C}$ |
| Ambient Operating Temperature Range                                                          | $T_A$            | -40 to +100 | $^\circ\text{C}$           |
| Storage Temperature Range                                                                    | $T_{stg}$        | -40 to +150 | $^\circ\text{C}$           |

**MOC223-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                                                                    | ( $I_F = 1.0\text{ mA}$ )                                                              | $V_F$         | —         | 1.08  | 1.3 | V             |
| Reverse Leakage Current                                                                  | ( $V_R = 6.0\text{ V}$ )                                                               | $I_R$         | —         | 0.001 | 100 | $\mu\text{A}$ |
| Input 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            |
|                                                                                          | ( $V_{CE} = 5.0\text{ V}$ , $T_A = 100^\circ\text{C}$ )                                | $I_{CEO2}$    | —         | 10    | —   | $\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage                                                      | ( $I_C = 100\text{ }\mu\text{A}$ )                                                     | $BV_{CEO}$    | 30        | 100   | —   | 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>                                                                           |                                                                                        |               |           |       |     |               |
| Current Transfer Ratio <sup>(3)</sup>                                                    | ( $I_F = 1.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )                                    | CTR           | 500       | 1000  | —   | %             |
| Isolation Surge Voltage <sup>(1,2)</sup>                                                 | ( $f = 60\text{ Hz AC Peak}$ , $t = 1\text{ min.}$ )                                   | $V_{ISO}$     | 2500      | —     | —   | Vac(rms)      |
| Isolation Resistance <sup>(2)</sup>                                                      | ( $V = 500\text{ V}$ )                                                                 | $R_{ISO}$     | $10^{11}$ | —     | —   | $\Omega$      |
| Collector-Emitter Saturation Voltage                                                     | ( $I_C = 500\text{ }\mu\text{A}$ , $I_F = 1.0\text{ mA}$ )                             | $V_{CE(sat)}$ | —         | —     | 1.0 | V             |
| Isolation Capacitance <sup>(2)</sup>                                                     | ( $V_{I-O} = 0\text{ V}$ , $f = 1\text{ MHz}$ )                                        | $C_{ISO}$     | —         | 0.2   | —   | pF            |
| Turn-On Time                                                                             | (fig. 6)( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\text{ }\Omega$ ) | $t_{on}$      | —         | 3.5   | —   | $\mu\text{s}$ |
| Turn-Off Time                                                                            | (fig. 6)( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\text{ }\Omega$ ) | $t_{off}$     | —         | 95    | —   | $\mu\text{s}$ |
| Rise Time                                                                                | (fig. 6)( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\text{ }\Omega$ ) | $t_r$         | —         | 1.0   | —   | $\mu\text{s}$ |
| Fall Time                                                                                | (fig. 6)( $I_F = 5.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\text{ }\Omega$ ) | $t_f$         | —         | 2.0   | —   | $\mu\text{s}$ |

\*All typicals at  $T_A = 25^\circ\text{C}$

1. Isolation Surge Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
2. For this test, Pins 1 and 2 are common and Pins 5, 6 and 7 are common.
3. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

Fig. 1 LED Forward Voltage vs. Forward Current

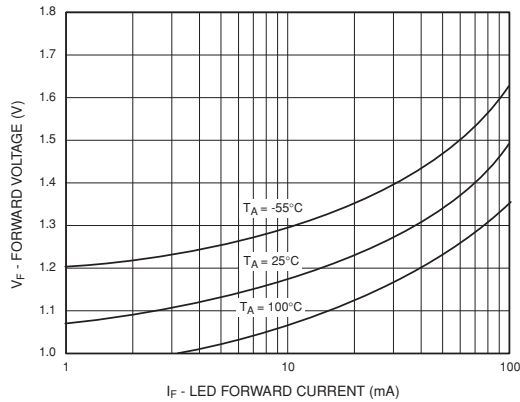


Fig. 2 Output Current vs. Input Current

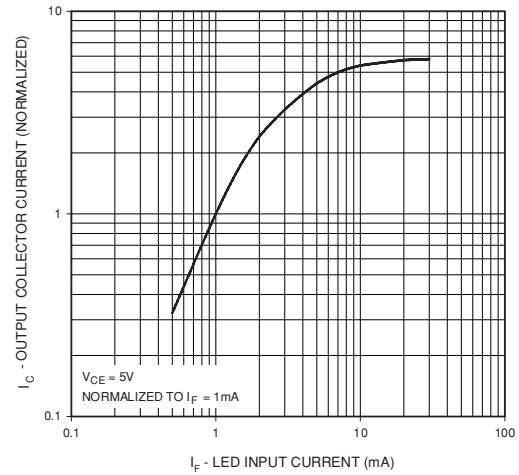


Fig. 3 Output Current vs. Ambient Temperature

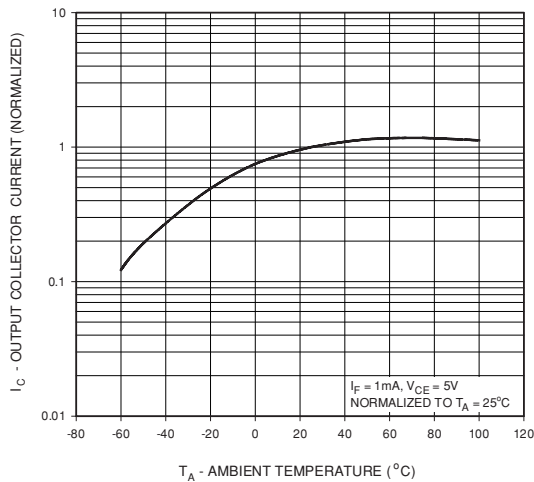


Fig. 4 Output Current vs. Collector - Emitter Voltage

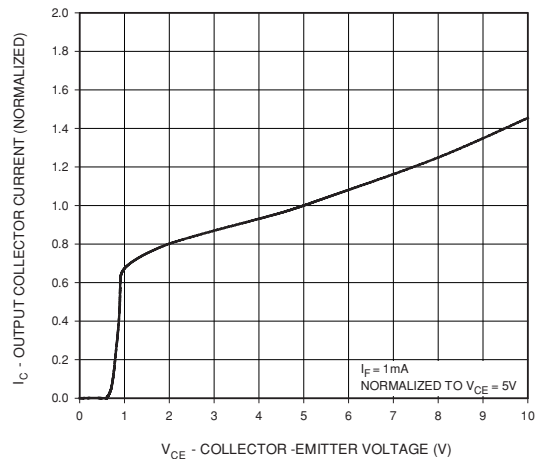
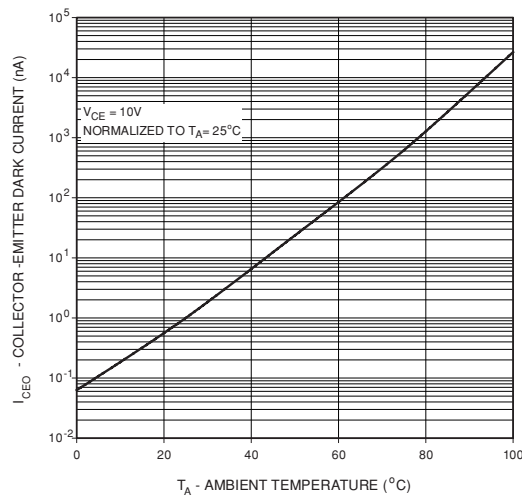
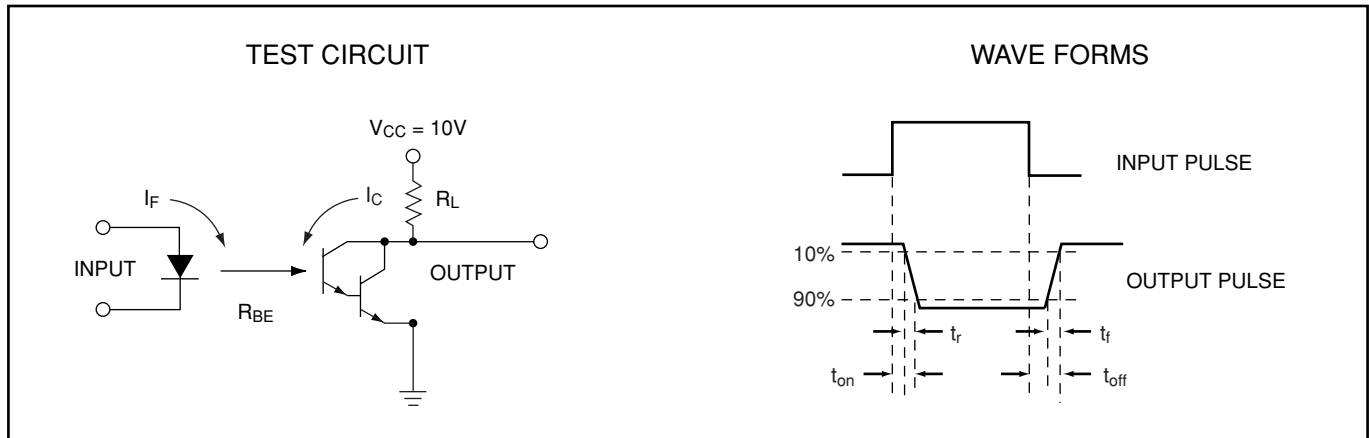


Fig. 5 Dark Current vs. Ambient Temperature

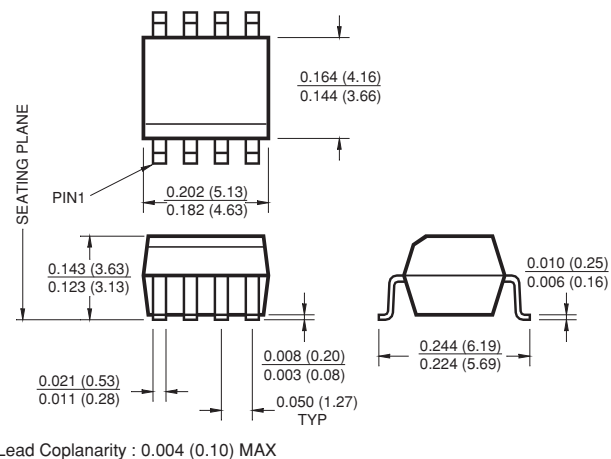




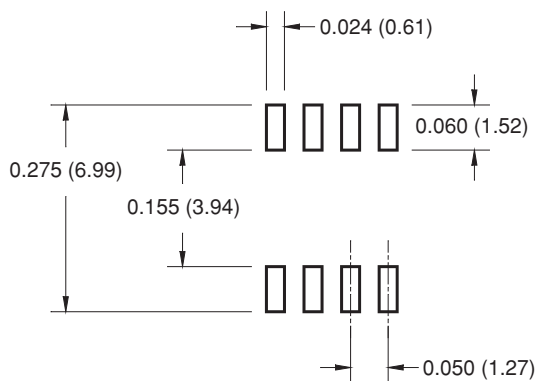
**Figure 6. Switching Time Test Circuit and Waveforms**

**MOC223-M**

**Package Dimensions (Surface Mount)**



**8-Pin Small Outline**

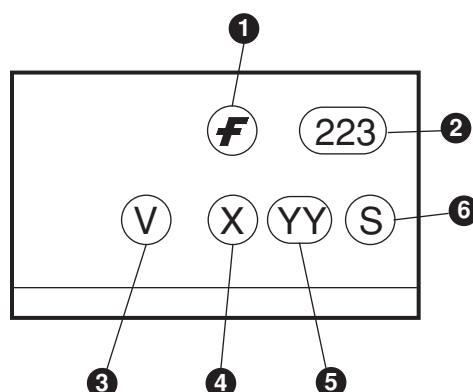


## MOC223-M

### 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

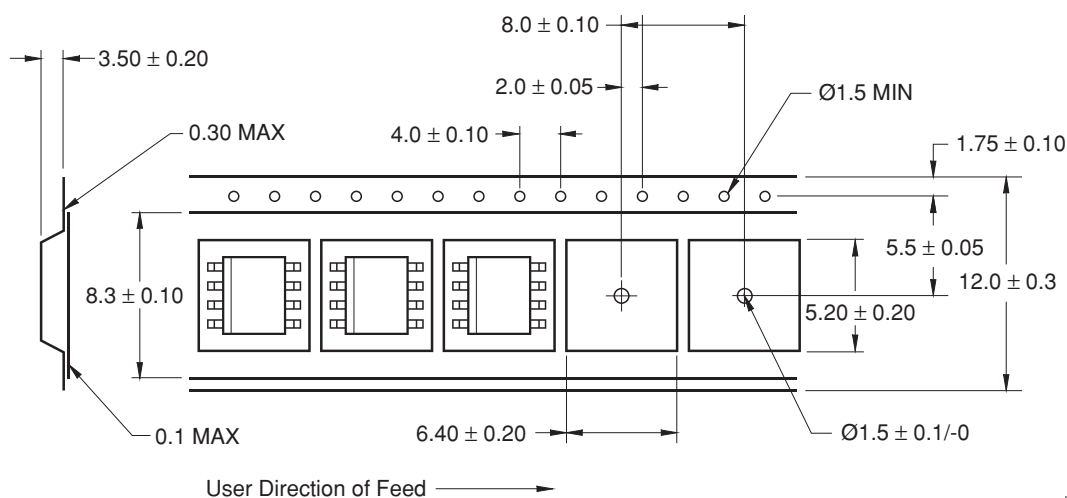


| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                                         |
| 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                                                                  |

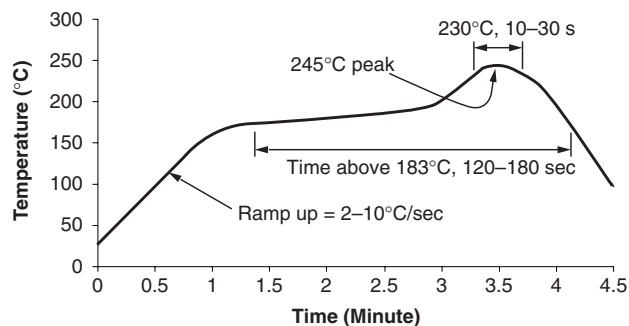
\*Note – 'V' option parts marked with date code '325' or earlier are marked in portrait format.

**MOC223-M**

**Carrier Tape Specifications**



**Reflow Profile**



- Peak reflow temperature: 245°C (package surface temperature)
- Time of temperature higher than 183°C for 120-180 seconds
- One time soldering reflow is recommended

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| ActiveArray™                         | FASTr™              | LittleFET™    | PowerEdge™          | SuperFET™       |
| Bottomless™                          | FPS™                | MICROCOUPLER™ | PowerSaver™         | SuperSOT™-3     |
| CoolFET™                             | FRFET™              | MicroFET™     | PowerTrench®        | SuperSOT™-6     |
| CROSSVOLT™                           | GlobalOptoisolator™ | MicroPak™     | QFET®               | SuperSOT™-8     |
| DOME™                                | GTO™                | MICROWIRE™    | QS™                 | SyncFET™        |
| EcoSPARK™                            | HiSeC™              | MSX™          | QT Optoelectronics™ | TinyLogic®      |
| E <sup>2</sup> CMOS™                 | I <sup>2</sup> C™   | MSXPro™       | Quiet Series™       | TINYOPTO™       |
| EnSigna™                             | i-Lo™               | OCX™          | RapidConfigure™     | TruTranslation™ |
| FACT™                                | ImpliedDisconnect™  | OCXPro™       | RapidConnect™       | UHC™            |
| FACT Quiet Series™                   |                     | OPTOLOGIC®    | µSerDes™            | UltraFET®       |
| Across the board. Around the world.™ |                     | OPTOPLANAR™   | SILENT SWITCHER®    | VCX™            |
| The Power Franchise®                 |                     | PACMAN™       | SMART START™        |                 |
| Programmable Active Droop™           |                     | POP™          | SPM™                |                 |

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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

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|--------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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