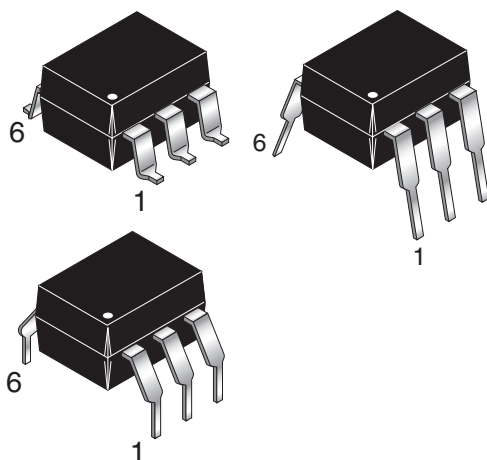


**MOC8111**

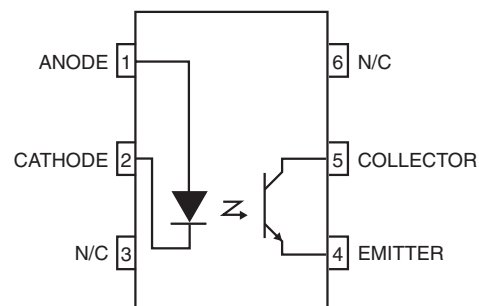
**MOC8112**

**MOC8113**

**PACKAGE**



**SCHEMATIC**



**DESCRIPTION**

The MOC811X series consists of a Gallium Arsenide IRED coupled with an NPN phototransistor. The base of the transistor is not bonded to an external pin for improved noise immunity

**FEATURES**

- High isolation voltage  
5300 VAC RMS—1 minute
- High  $BV_{CEO}$  minimum 70 Volts
- Current transfer ratio in selected groups:  
MOC8111: 20% min.  
MOC8112: 50% min.  
MOC8113: 100% min.
- Maximum switching time in saturation specified
- Underwriters Laboratory (UL) recognized (File #E90700)
- VDE recognized (File #94766)

**APPLICATIONS**

- Power Supply Regulators
- Digital Logic Inputs
- Microprocessor Inputs
- Appliance Sensor Systems
- Industrial Controls

# 6-PIN DIP OPTOCOUPLEDERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

**MOC8111**

**MOC8112**

**MOC8113**

| ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> =25°C Unless otherwise specified)  |                     |             |       |
|-----------------------------------------------------------------------------|---------------------|-------------|-------|
| Parameter                                                                   | Symbol              | Value       | Unit  |
| INPUT LED                                                                   |                     |             |       |
| Forward Current – Continuous                                                | I <sub>F</sub>      | 90          | mA    |
| Forward Current – Peak (PW = 1μs, 300pps)                                   | I <sub>F</sub> (pk) | 3           | A     |
| Reverse Voltage                                                             | V <sub>R</sub>      | 6           | Volts |
| LED Power Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C          | P <sub>D</sub>      | 135         | mW    |
|                                                                             |                     | 1.8         | mW/°C |
| OUTPUT TRANSISTOR                                                           |                     |             |       |
| Detector Power Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C     | P <sub>D</sub>      | 200         | mW    |
|                                                                             |                     | 2.67        | mW/°C |
| TOTAL DEVICE                                                                |                     |             |       |
| Total Device Power Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C | P <sub>D</sub>      | 260         | mW    |
|                                                                             |                     | 3.5         | mW/°C |
| Ambient Operating Temperature Range                                         | T <sub>OPR</sub>    | -55 to +100 | °C    |
| Storage Temperature Range                                                   | T <sub>STG</sub>    | -55 to +150 | °C    |
| Lead Soldering Temperature<br>(1/16” from case, 10 sec. duration)           | T <sub>SOL</sub>    | 260         | °C    |

**MOC8111**

**MOC8112**

**MOC8113**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

**INDIVIDUAL COMPONENT CHARACTERISTICS**

| Parameter                                 | Test Conditions                         | Symbol     | Device | Min | Typ  | Max  | Unit          |
|-------------------------------------------|-----------------------------------------|------------|--------|-----|------|------|---------------|
| <b>EMITTER</b>                            |                                         |            |        |     |      |      |               |
| Input Forward Voltage                     | $I_F = 60\text{ mA}$                    | $V_F$      | All    |     | 1.35 | 1.65 | V             |
|                                           | $I_F = 10\text{ mA}$                    |            |        |     | 1.15 | 1.50 |               |
| Reverse Voltage                           | $I_R = 10\text{ }\mu\text{A}$           | $V_R$      | All    | 6.0 | 15   |      | V             |
| Capacitance                               | $V_F = 0\text{ V}, f = 1.0\text{ MHz}$  | $C_J$      | All    |     | 50   |      | pF            |
|                                           | $V_F = 1\text{ V}, f = 1.0\text{ MHz}$  |            |        |     | 65   |      |               |
| Reverse Leakage Current                   | $V_R = 3.0\text{ V}$                    | $I_R$      | All    |     | .35  | 10   | $\mu\text{A}$ |
| <b>DETECTOR</b>                           |                                         |            |        |     |      |      |               |
| Breakdown Voltage<br>Collector to Emitter | $I_C = 1.0\text{ mA}, I_F = 0$          | $BV_{CEO}$ | All    | 70  |      |      | V             |
| Breakdown Voltage<br>Emitter to Collector | $I_E = 100\text{ }\mu\text{A}, I_F = 0$ | $BV_{ECO}$ | All    | 7   |      |      | V             |
| Leakage Current<br>Collector to Emitter   | $V_{CE} = 10\text{ V}, I_F = 0$         | $I_{CEO}$  | All    |     | 5    | 50   | V             |
| Capacitance<br>Collector to Emitter       | $V_{CE} = 0\text{ V}, f = 1\text{ MHz}$ | $C_{CE}$   | All    |     | 8    |      | pF            |

**ISOLATION CHARACTERISTICS**

| Characteristic                 | Test Conditions                       | Symbol    | Min       | Typ | Max | Units     |
|--------------------------------|---------------------------------------|-----------|-----------|-----|-----|-----------|
| Input-Output Isolation Voltage | $f = 60\text{ Hz}, t = 1\text{ min.}$ | $V_{ISO}$ | 5300      |     |     | $V_{RMS}$ |
| Isolation Resistance           | $V_{I-O} = 500\text{ VDC}$            | $R_{ISO}$ | $10^{11}$ |     |     | $\Omega$  |
| Isolation Capacitance          | $V_{I-O} = 0, f = 1\text{ MHz}$       | $C_{ISO}$ |           | 0.5 |     | pF        |

# 6-PIN DIP OPTOCOUPLEDERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

**MOC8111**

**MOC8112**

**MOC8113**

| <b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified) |                                                                                       |               |                 |     |      |     |               |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------|-----------------|-----|------|-----|---------------|
| DC CHARACTERISTICS                                                                     | Test Conditions                                                                       | Symbol        | Device          | Min | Typ  | Max | Units         |
| Output/Input Current Transfer Ratio                                                    | $I_F = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$                                          | CTR           | MOC8111         | 20  |      |     | %             |
|                                                                                        |                                                                                       |               | MOC8112         | 50  |      |     |               |
|                                                                                        |                                                                                       |               | MOC8113         | 100 |      |     |               |
| Collector-Emitter Saturation Voltage                                                   | $I_F = 10\text{ mA}$ , $I_C = 2.5\text{ mA}$                                          | $V_{CE(SAT)}$ | All             |     | 0.27 | 0.4 | V             |
| AC CHARACTERISTICS                                                                     | Test Conditions                                                                       | Symbol        | Device          | Min | Typ  | Max | Units         |
| <b>Non-Saturated Switching Times</b>                                                   | $R_L = 100\ \Omega$ , $I_C = 2\text{ mA}$ ,<br>$V_{CC} = 10\text{ V}$<br>See Figure 7 |               |                 |     |      |     |               |
| Turn-On Time                                                                           |                                                                                       | $t_{on}$      | All             |     | 6.0  | 10  | $\mu\text{S}$ |
| Turn-Off Time                                                                          |                                                                                       | $t_{off}$     | All             |     | 5.5  | 10  | $\mu\text{S}$ |
| <b>Saturated Switching Times</b>                                                       |                                                                                       |               |                 |     |      |     |               |
| Turn-On Time                                                                           | $I_F = 20\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        | $t_{on}$      | MOC8111         |     | 3.0  | 5.5 | $\mu\text{S}$ |
|                                                                                        | $I_F = 10\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        |               | MOC812, MOC8113 |     | 4.2  | 8.0 |               |
| Rise-Time                                                                              | $I_F = 20\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        | $t_r$         | MOC8111         |     | 2.0  | 4.0 | $\mu\text{S}$ |
|                                                                                        | $I_F = 10\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        |               | MOC812, MOC8113 |     | 3.0  | 6.0 |               |
| Turn-Off Time                                                                          | $I_F = 20\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        | $t_{off}$     | MOC8111         |     | 18   | 34  | $\mu\text{S}$ |
|                                                                                        | $I_F = 10\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        |               | MOC812, MOC8113 |     | 23   | 39  |               |
| Fall-Time                                                                              | $I_F = 20\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        | $t_f$         | MOC8111         |     | 11   | 20  | $\mu\text{S}$ |
|                                                                                        | $I_F = 10\text{ mA}$ , $V_{CE} = 0.4\text{ V}$                                        |               | MOC812, MOC8113 |     | 14   | 24  |               |

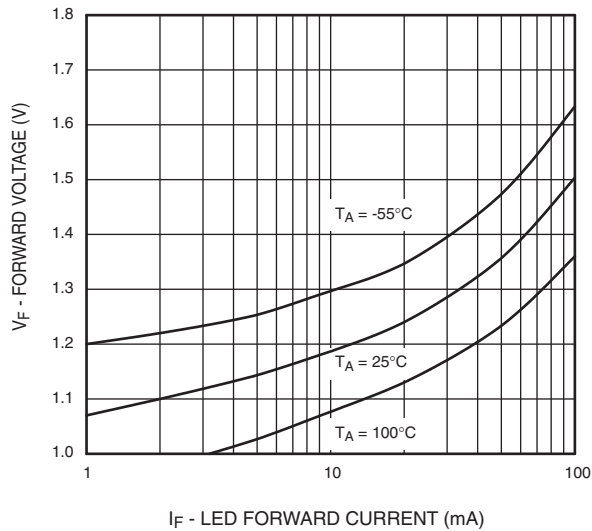
**MOC8111**

**MOC8112**

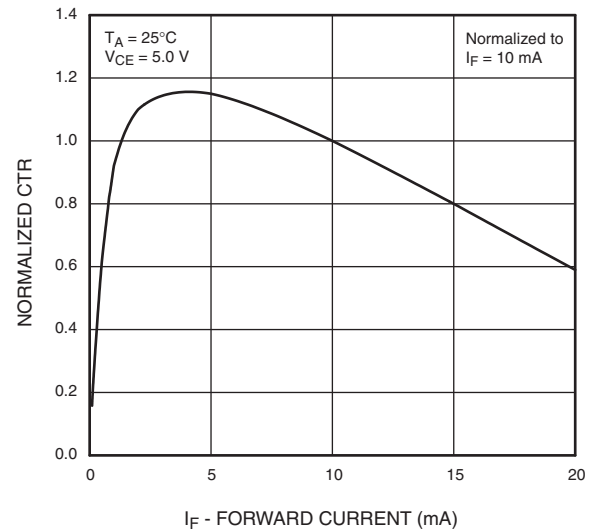
**MOC8113**

**TYPICAL PERFORMANCE CURVES**

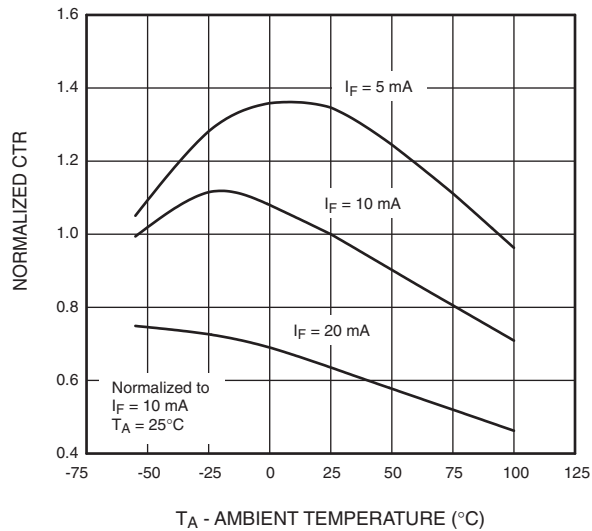
**Fig. 1 LED Forward Voltage vs. Forward Current**



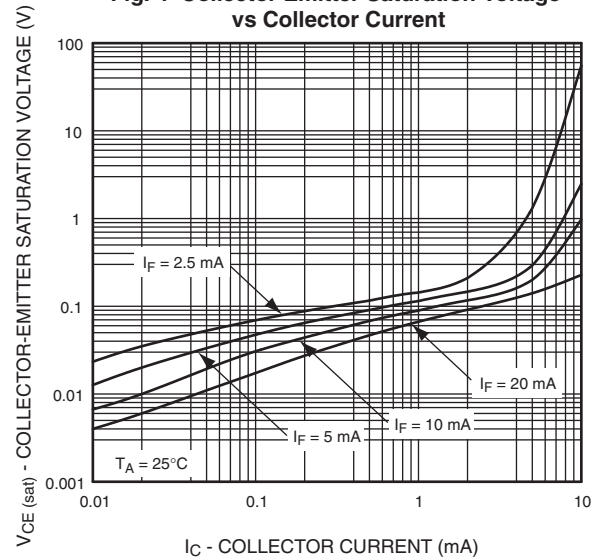
**Fig. 2 Normalized CTR vs. Forward Current**



**Fig. 3 Normalized CTR vs. Ambient Temperature**



**Fig. 4 Collector Emitter Saturation Voltage vs Collector Current**



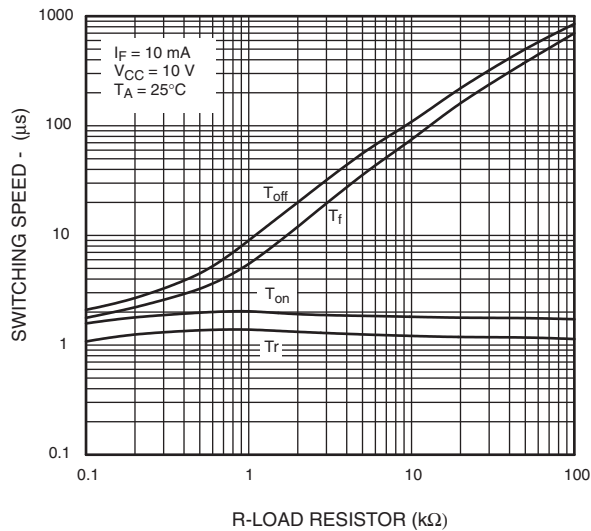
**MOC8111**

**MOC8112**

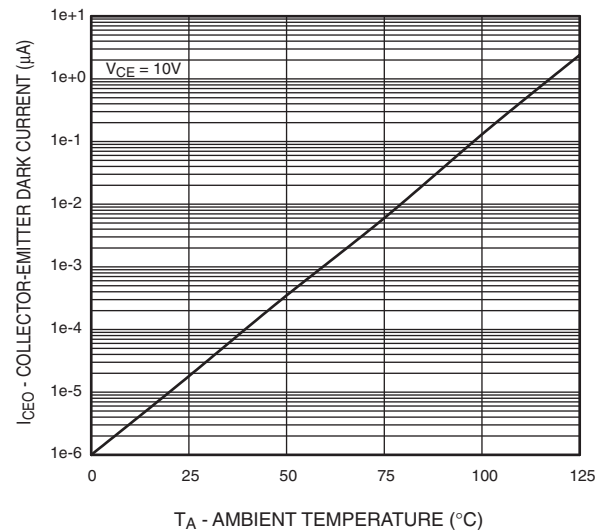
**MOC8113**

**TYPICAL PERFORMANCE CURVES (continued)**

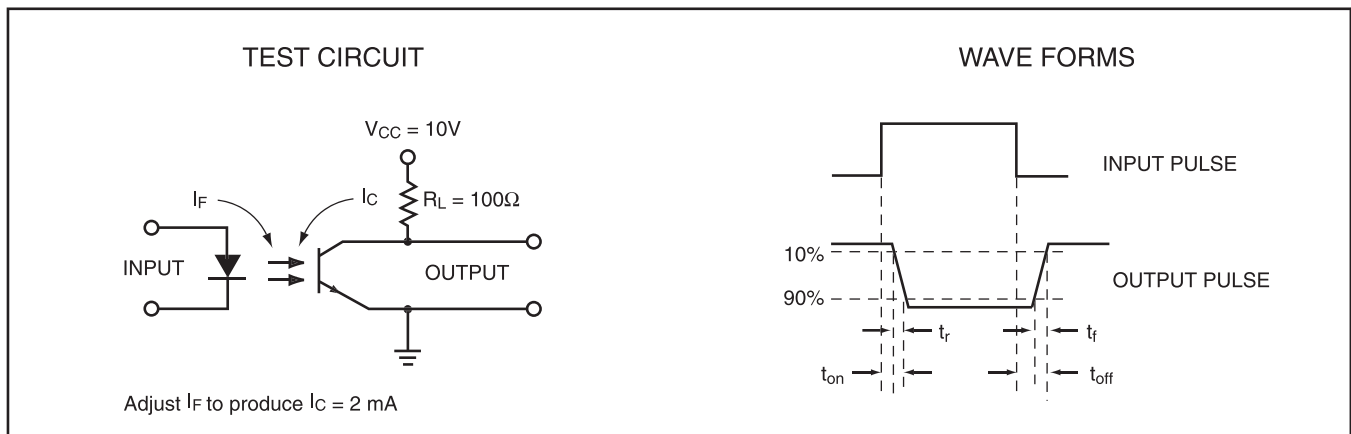
**Fig. 5 Switching Speed vs. Load Resistor**



**Fig. 6 Dark current vs. Ambient Temperature.**



**Figure 7. Switching Time Test Circuit and Waveforms**

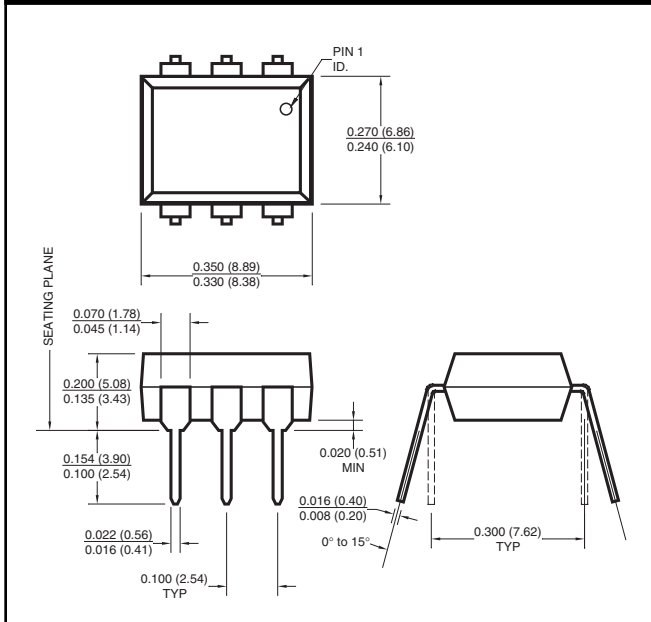


**MOC8111**

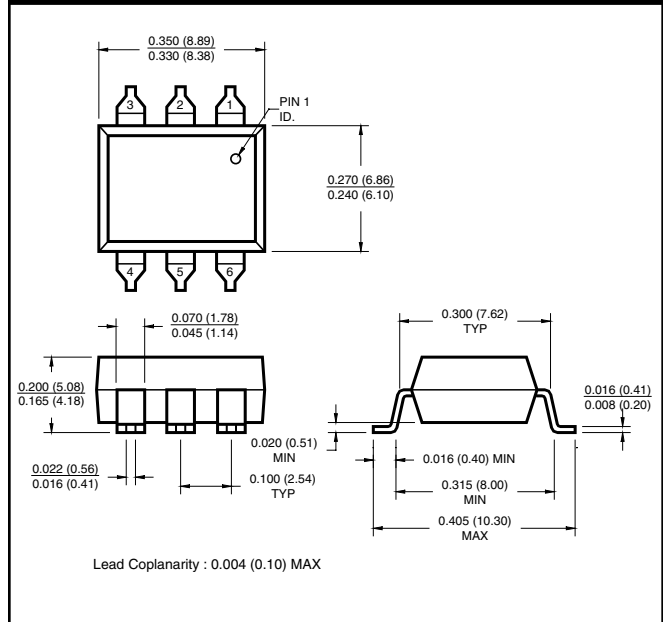
**MOC8112**

**MOC8113**

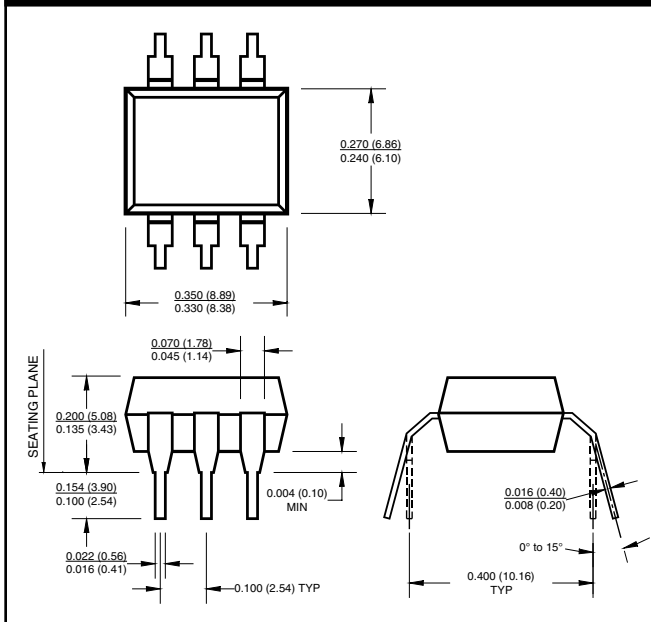
**Package Dimensions (Through Hole)**



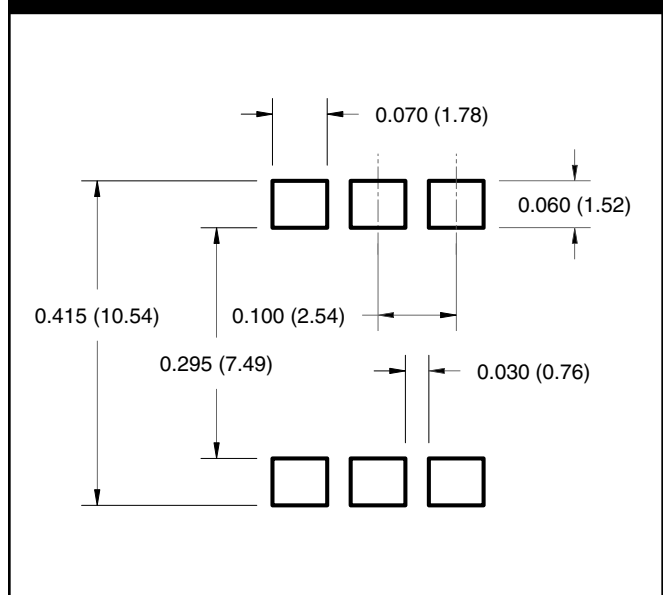
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for  
Surface Mount Leadform**



**NOTE**

All dimensions are in inches (millimeters)

**MOC8111**

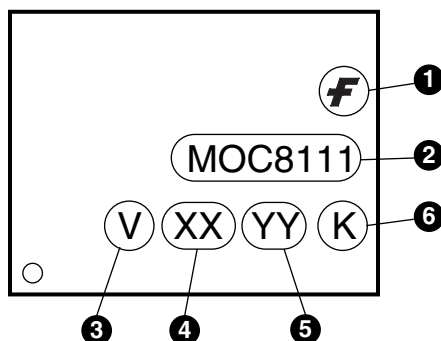
**MOC8112**

**MOC8113**

**ORDERING INFORMATION1**

| Option    | Example Part Number | Description                            |
|-----------|---------------------|----------------------------------------|
| No Suffix | MOC8111             | Through Hole                           |
| S         | MOC8111S            | Surface Mount Lead Bend                |
| SD        | MOC8111SD           | Surface Mount; Tape and Reel           |
| W         | MOC8111W            | 0.4" Lead Spacing                      |
| 300       | MOC8111300          | VDE 0884                               |
| 300W      | MOC8111300W         | VDE 0884, 0.4" Lead Spacing            |
| 3S        | MOC81113S           | VDE 0884, Surface Mount                |
| 3SD       | MOC81113SD          | VDE 0884, Surface Mount, Tape and Reel |

**MARKING INFORMATION**



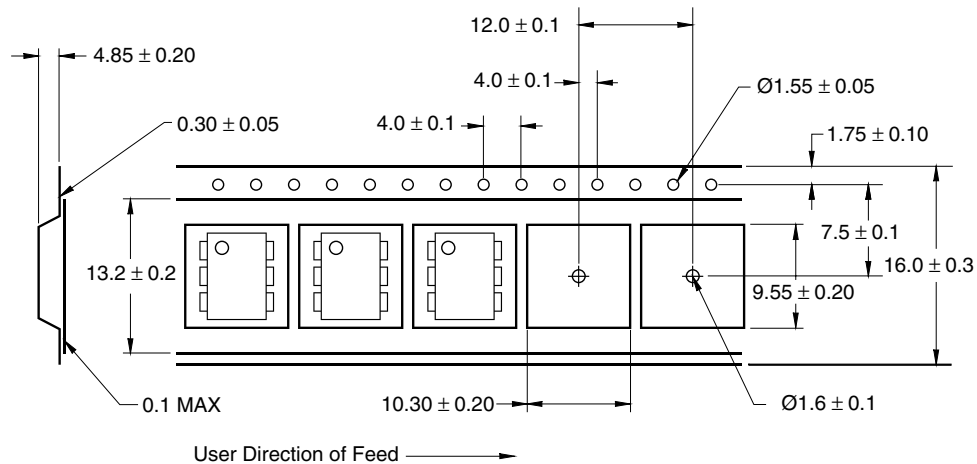
| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                                         |
| 2           | Device number                                                                          |
| 3           | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4           | Two digit year code, e.g., '03'                                                        |
| 5           | Two digit work week ranging from '01' to '53'                                          |
| 6           | Assembly package code                                                                  |

**MOC8111**

**MOC8112**

**MOC8113**

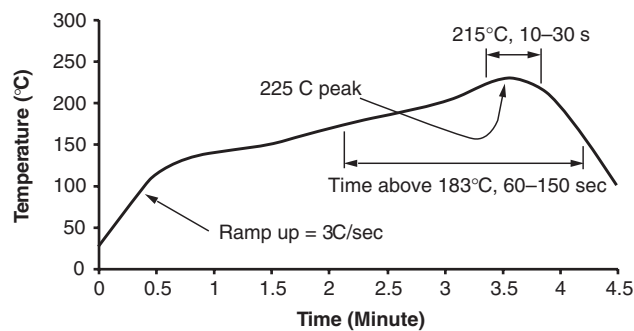
**Carrier Tape Specifications**



**NOTE**

All dimensions are in inches (millimeters)

**Reflow Profile (Black Package, No Suffix)**



- Peak reflow temperature: 225°C (package surface temperature)
- Time of temperature higher than 183°C for 60-150 seconds
- One time soldering reflow is recommended

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**MOC8111**

**MOC8112**

**MOC8113**

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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.