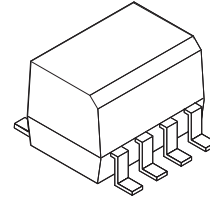


8-pin SOIC Darlington Output Optocouplers

MOC223M, MOCD223M



SOIC8
CASE 751DZ

Description

The MOC223M consists of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector, in a surface mountable, small outline, plastic package. The MOCD223M is a dual-channel version of the MOC223M. They are ideally suited for high density applications, and eliminates the need for through the board mounting.

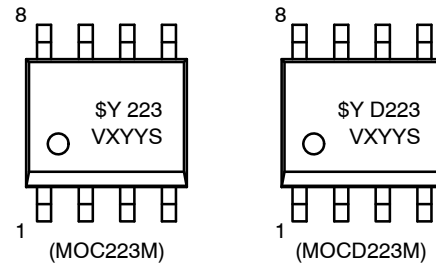
Features

- High Current Transfer Ratio of 500% Minimum at $I_F = 1 \text{ mA}$
- Minimum BV_{CEO} of 30 V Guaranteed
- Convenient Plastic SOIC-8 Surface Mountable Package Style, with 0.050" Lead Spacing
- Safety and Regulatory Approvals:
 - ◆ UL2688, 2,500 $V_{AC_{RMS}}$ for 1 Minute
 - ◆ DIN-EN/IEC60747-5-5, 565 V Peak Working Insulation Voltage
- These Devices are Pb-Free and Halogen Free

Applications

- Low Power Logic Circuits
- Interfacing and Coupling Systems of Different Potentials and Impedances
- Telecommunications Equipment
- Portable Electronics
- Solid State Relays

MARKING DIAGRAMS



- | | |
|----------|------------------------------|
| \$Y | = onsemi Logo |
| 223/D223 | = Specific Device Code |
| V | = DIN EN/IEC60747-5-5 Option |
| X | = One-Digit Year Code |
| YY | = Digit Work Week |
| S | = Assembly Package Code |

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

MOC223M, MOCD223M

SCHEMATICS

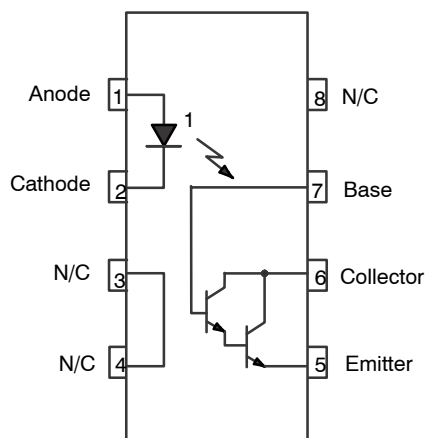


Figure 1. Schematic – MOC223M

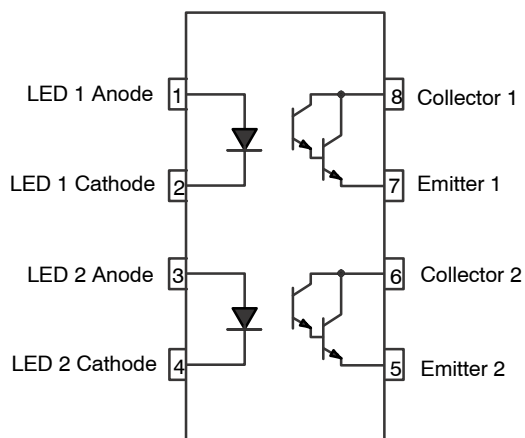


Figure 2. Schematic – MOCD223M

SAFETY AND INSULATION RATINGS

| Parameter | | Characteristics |
|---|------------------------|-----------------|
| Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage | < 150 V _{RMS} | I–IV |
| | < 300 V _{RMS} | I–III |
| Climatic Classification | | 55/100/21 |
| Pollution Degree (DIN VDE 0110/1.89) | | 2 |
| Comparative Tracking Index | | 175 |

| Symbol | Parameter | Value | Unit |
|-----------------------|--|-------------------|-------------------|
| V _{PR} | Input-to-Output Test Voltage, Method A, V _{IORM} × 1.6 = V _{PR} , Type and Sample Test with t _m = 10 s, Partial Discharge < 5 pC | 904 | V _{peak} |
| | Input-to-Output Test Voltage, Method B, V _{IORM} × 1.875 = V _{PR} , 100% Production Test with t _m = 1 s, Partial Discharge < 5 pC | 1060 | |
| V _{IORM} | Maximum Working Insulation Voltage | 565 | |
| V _{IOTM} | Highest Allowable Over-Voltage | 4000 | |
| | External Creepage | ≥ 4 | mm |
| | External Clearance | ≥ 4 | |
| DTI | Distance Through Insulation (Insulation Thickness) | ≥ 0.4 | |
| T _S | Case Temperature (Note 1) | 150 | °C |
| I _{S,INPUT} | Input Current (Note 1) | 200 | mA |
| P _{S,OUTPUT} | Output Power (Note 1) | 300 | mW |
| R _{IO} | Insulation Resistance at T _S , V _{IO} = 500 V (Note 1) | > 10 ⁹ | Ω |

As per DIN EN/IEC 60747-5-5, this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

1. Safety limit values – maximum values allowed in the event of a failure.

MOC223M, MOCD223M

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Value | Unit |
|---------------------|---|--------------|-------|
| TOTAL DEVICE | | | |
| T_{STG} | Storage Temperature | -40 to +125 | °C |
| T_A | Ambient Operating Temperature | -40 to +100 | |
| T_J | Junction Temperature | -40 to +125 | |
| T_{SOL} | Lead Solder Temperature | 260 for 10 s | |
| P_D | Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ | 240 | mW |
| | Derate Above 25°C | 2.94 | mW/°C |

EMITTER

| | | | |
|------------|---|-----|-------|
| I_F | Continuous Forward Current | 60 | mA |
| I_F (pk) | Forward Current – Peak (PW = 100 μs , 120 pps) | 1.0 | A |
| V_R | Reverse Voltage | 6.0 | V |
| P_D | LED Power Dissipation @ $T_A = 25^\circ\text{C}$ | 90 | mW |
| | Derate Above 25°C | 0.8 | mW/°C |

DETECTOR

| | | | |
|-----------|---|------|-------|
| I_C | Continuous Collector Current | 150 | mA |
| V_{CEO} | Collector–Emitter Voltage | 30 | V |
| V_{CBO} | Collector–Base Voltage, MOC223M | 70 | |
| V_{ECO} | Emitter–Collector Voltage | 7 | |
| P_D | Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ | 150 | mW |
| | Derate Above 25°C | 1.76 | mW/°C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

EMITTER

| | | | | | | |
|----------|-------------------------|-----------------------|---|-------|-----|---------------|
| V_F | Input Forward Voltage | $I_F = 1.0\text{ mA}$ | – | 1.08 | 1.3 | V |
| I_R | Reverse Leakage Current | $V_R = 6.0\text{ V}$ | – | 0.001 | 100 | μA |
| C_{IN} | Input Capacitance | | – | 18 | – | pF |

DETECTOR

| | | | | | | |
|------------|-------------------------------------|--|----|-----|----|---------------|
| I_{CEO1} | Collector–Emitter Dark Current | $V_{CE} = 5.0\text{ V}, T_A = 25^\circ\text{C}$ | – | 1.0 | 50 | nA |
| I_{CEO2} | | $V_{CE} = 5.0\text{ V}, T_A = 100^\circ\text{C}$ | – | 1.0 | – | μA |
| BV_{CEO} | Collector–Emitter Breakdown Voltage | $I_C = 100\ \mu\text{A}$ | 30 | 100 | – | V |
| BV_{CBO} | Collector–Base Breakdown Voltage | $I_C = 100\ \mu\text{A}$ | 70 | 120 | – | |
| BV_{ECO} | Emitter–Collector Breakdown Voltage | $I_E = 100\ \mu\text{A}$ | 7 | 10 | – | |
| C_{CE} | Collector–Emitter Capacitance | $f = 1.0\text{ MHz}, V_{CE} = 0$ | – | 5.5 | – | pF |

COUPLED

| | | | | | | |
|---------------|--------------------------------------|---|-----|------|-----|---------------|
| CTR | Current Transfer Ratio | $I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}$ | 500 | 1000 | – | % |
| $V_{CE(sat)}$ | Collector–Emitter Saturation Voltage | $I_C = 500\ \mu\text{A}, I_F = 1.0\text{ mA}$ | – | – | 1.0 | V |
| t_{on} | Turn–On Time | $I_F = 5.0\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\ \Omega$ (Figure 8) | – | 10 | – | μs |
| t_{off} | Turn–Off Time | | – | 55 | – | |
| t_r | Rise Time | | – | 8 | – | |
| t_f | Fall Time | | – | 45 | – | |

MOC223M, MOCD223M

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

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|----------------------------------|--------------------------------|--|-----------|-----|-----|----------------|
| ISOLATION CHARACTERISTICS | | | | | | |
| V_{ISO} | Input-Output Isolation Voltage | $t = 1 \text{ min}$ | 2500 | - | - | $V_{AC_{RMS}}$ |
| C_{ISO} | Isolation Capacitance | $V_{I-O} = 0, f = 1 \text{ MHz}$ | - | 0.2 | - | pF |
| R_{ISO} | Isolation Resistance | $V_{I-O} = \pm 500 V_{DC}, T_A = 25^\circ\text{C}$ | 10^{11} | - | - | Ω |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CURVES

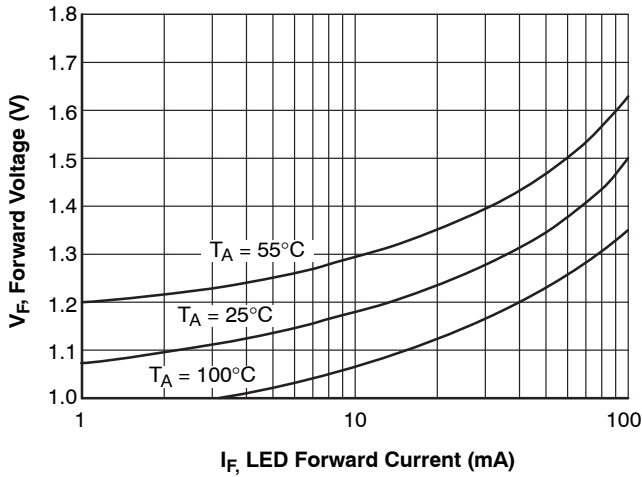


Figure 3. LED Forward Voltage vs. Forward Current

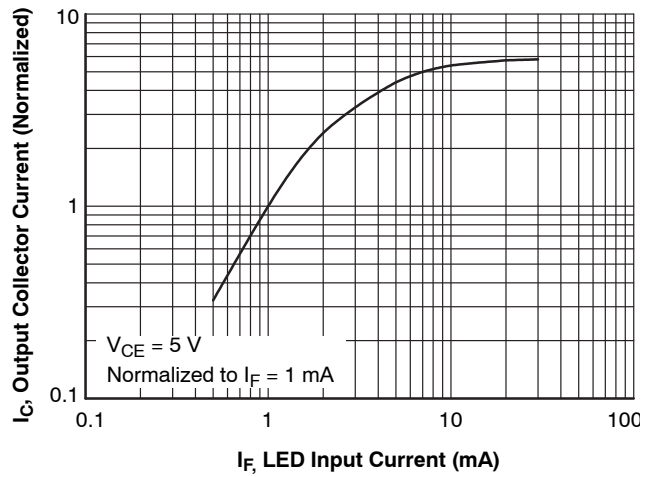


Figure 4. Output Current vs. Input Current

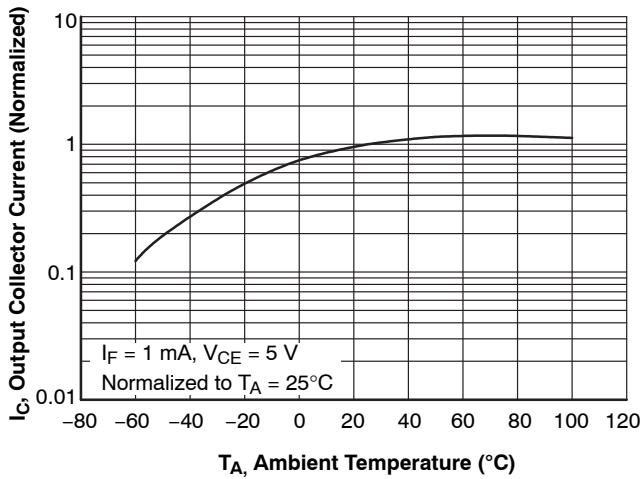


Figure 5. LED Forward Voltage vs. Forward Current

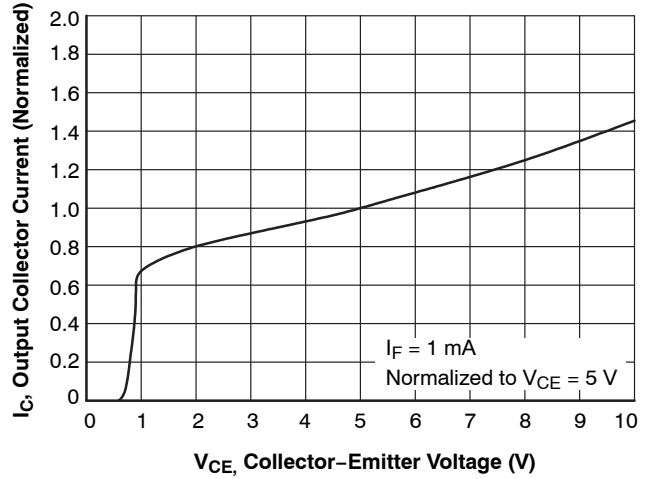


Figure 6. Output Current vs. Collector-Emitter Voltage

MOC223M, MOCD223M

TYPICAL PERFORMANCE CURVES

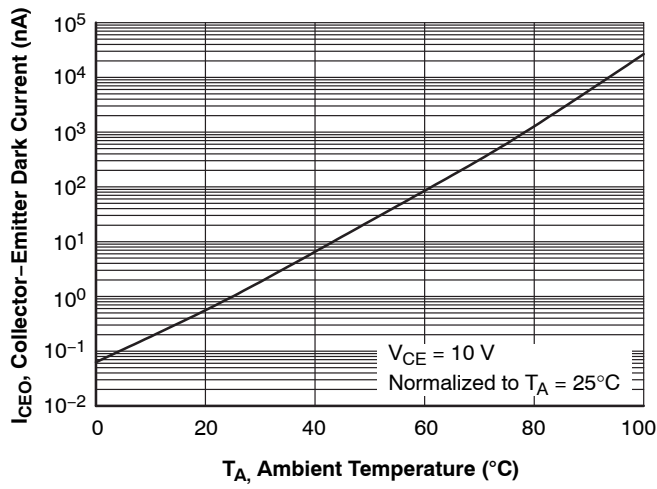


Figure 7. Dark Current vs. Ambient Temperature

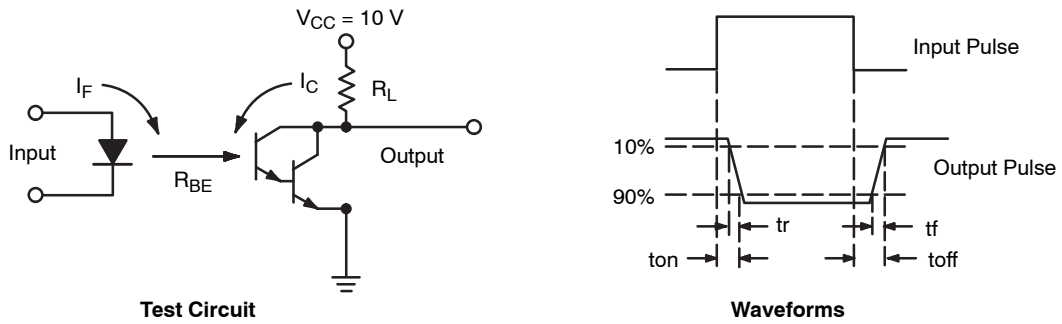


Figure 8. Switching Time Test Circuit and Waveforms

MOC223M, MOCD223M

REFLOW PROFILE

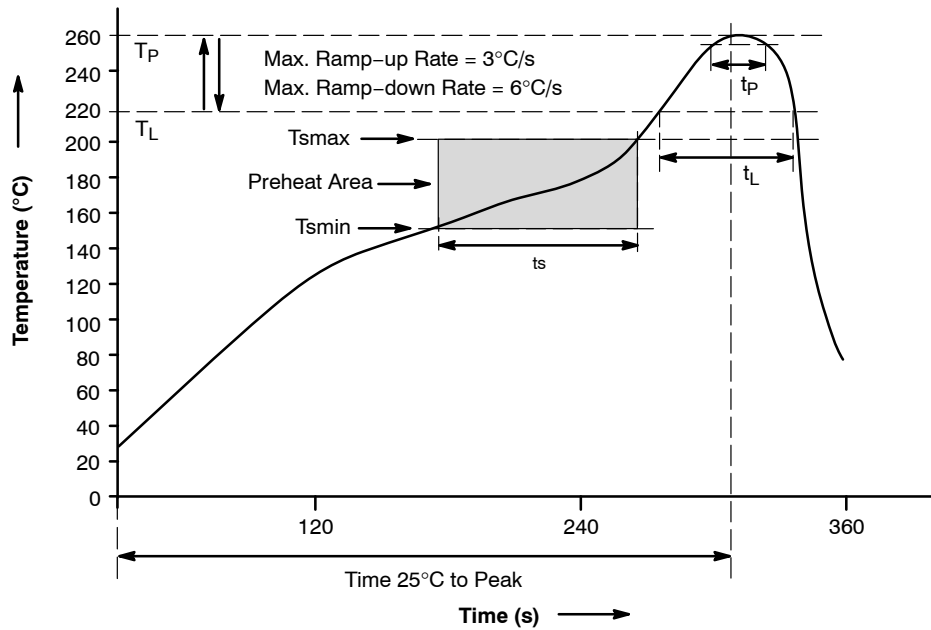


Figure 9. Reflow Profile

REFLOW PROFILE

| Profile Feature | Pb-Free Assembly Profile |
|-----------------------------------|--------------------------|
| Temperature Min. (Tsmmin) | 150°C |
| Temperature Max. (Tsmmax) | 200°C |
| Time (ts) from (Tsmmin to Tsmmax) | 60-120 s |
| Ramp-up Rate (tL to tp) | 3°C/s max. |
| Liquidous Temperature (TL) | 217°C |
| Time (tL) Maintained Above (TL) | 60-150 s |
| Peak Body Package Temperature | 260°C +0°C / -5°C |
| Time (tp) within 5°C of 260°C | 30 s |
| Ramp-down Rate (TP to TL) | 6°C/s max. |
| Time 25°C to Peak Temperature | 8 min max. |

MOC223M, MOCD223M

ORDERING INFORMATION

| Part Number | Package | Shipping† |
|-------------|---|----------------------------|
| MOC223M | Small Outline 8-Pin | 50 Units / Tube |
| MOC223R2M | Small Outline 8-Pin | 2500 Units / Tape and Reel |
| MOC223VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 50 Units / Tube |
| MOC223R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape and Reel |
| MOCD223M | Small Outline 8-Pin | 50 Units / Tube |
| MOCD223R2M | Small Outline 8-Pin | 2500 Units / Tape and Reel |
| MOCD223VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 50 Units / Tube |
| MOCD223R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape and Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE

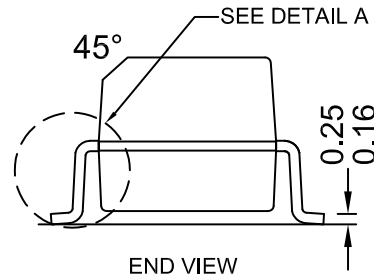
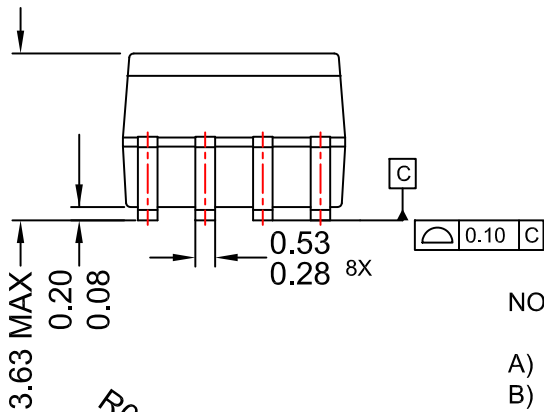
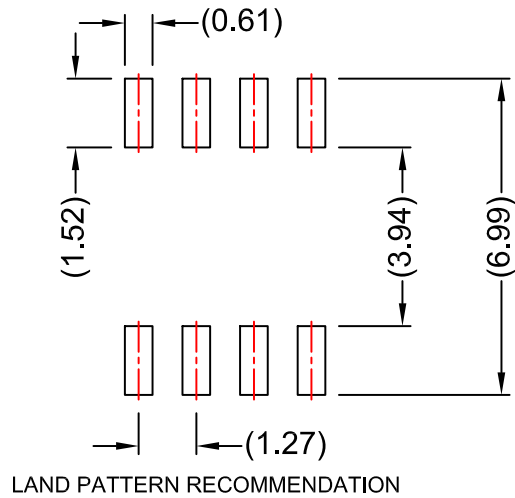
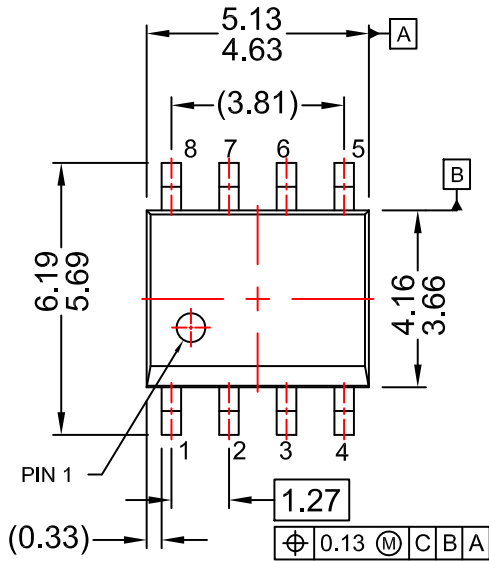
PACKAGE DIMENSIONS

ON Semiconductor®



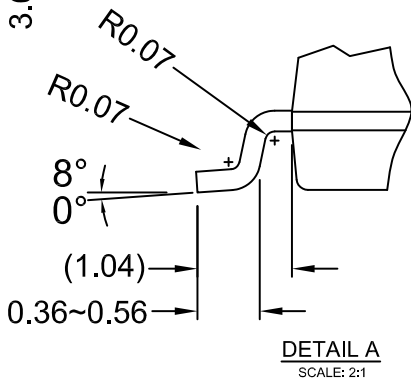
SOIC8
CASE 751DZ
ISSUE O

DATE 30 SEP 2016



NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) LANDPATTERN STANDARD: SOIC127P600X175-8M.



| | | |
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