

# MOCD207M, MOCD208M, MOCD211M, MOCD213M, MOCD217M

## 8-pin SOIC Dual-Channel Phototransistor Output Optocoupler

These devices consist of two gallium arsenide infrared emitting diodes optically coupled to two monolithic silicon phototransistor detectors, in a surface mountable, small outline, plastic package. They are ideally suited for high-density applications, and eliminate the need for through-the-board mounting.

### Features

- Closely Matched Current Transfer Ratios
- Minimum  $BV_{CEO}$  of 70 V Guaranteed  
– MOCD207M, MOCD208M, MOCD213M
- Minimum  $BV_{CEO}$  of 30 V Guaranteed  
– MOCD211M, MOCD217M
- Low LED Input Current Required for Easier Logic Interfacing  
– MOCD217M
- Convenient Plastic SOIC–8 Surface Mountable Package Style, with 0.050" Lead Spacing
- Safety and Regulatory Approvals:
  - UL1577, 2,500 VAC<sub>RMS</sub> for 1 Minute
  - DIN-EN/IEC60747-5-5, 565 V Peak Working Insulation Voltage
- These are Pb-Free Devices

### Applications

- Feedback Control Circuits
- Interfacing and Coupling Systems of Different Potentials and Impedances
- General Purpose Switching Circuits
- Monitor and Detection Circuits

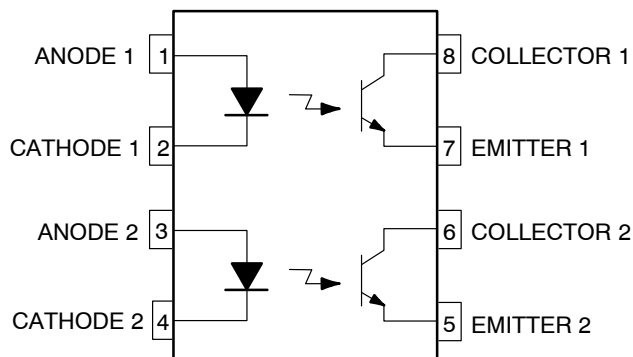
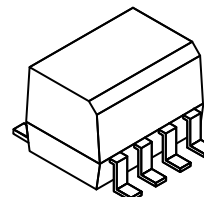


Figure 1. Schematic



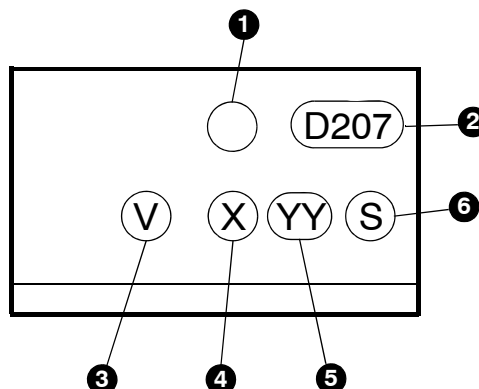
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SOIC8  
M SUFFIX  
CASE 751DZ

### MARKING DIAGRAM



- 1 – Logo
- 2 – Device Number
- 3 – DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option)
- 4 – One-Digit Year Code, e.g., "4"
- 5 – Digit Work Week, Ranging from "01" to "53"
- 6 – Assembly Package Code

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

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## Safety and Insulation Ratings

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.

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

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

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

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## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

| Symbol | Rating | Value | Unit |
|--------|--------|-------|------|
|--------|--------|-------|------|

### TOTAL DEVICE

|                  |                                                        |                    |       |
|------------------|--------------------------------------------------------|--------------------|-------|
| T <sub>STG</sub> | Storage Temperature                                    | -40 to +125        | °C    |
| T <sub>A</sub>   | Ambient Operating Temperature                          | -40 to +100        | °C    |
| T <sub>J</sub>   | Junction Temperature                                   | -40 to +125        | °C    |
| T <sub>SOL</sub> | Lead Solder Temperature                                | 260 for 10 seconds | °C    |
| P <sub>D</sub>   | Total Device Power Dissipation @ T <sub>A</sub> = 25°C | 240                | mW    |
|                  | Derate Above 25°C                                      | 2.94               | mW/°C |

### EMITTER

|                     |                                               |     |       |
|---------------------|-----------------------------------------------|-----|-------|
| I <sub>F</sub>      | Continuous Forward Current                    | 60  | mA    |
| I <sub>F</sub> (pk) | Forward Current – Peak (PW = 100 μs, 120 pps) | 1.0 | A     |
| V <sub>R</sub>      | Reverse Voltage                               | 6.0 | V     |
| P <sub>D</sub>      | LED Power Dissipation @ T <sub>A</sub> = 25°C | 90  | mW    |
|                     | Derate Above 25°C                             | 0.8 | mW/°C |

### DETECTOR

|                  |                                                             |      |       |
|------------------|-------------------------------------------------------------|------|-------|
| I <sub>C</sub>   | Continuous Collector Current                                | 150  | mA    |
| V <sub>CEO</sub> | Collector–Emitter Voltage<br>– MOCD207M, MOCD208M, MOCD213M | 70   | V     |
|                  | – MOCD211M, MOCD217M                                        | 30   | V     |
| V <sub>ECO</sub> | Emitter–Collector Voltage                                   | 7    | V     |
| P <sub>D</sub>   | Detector Power Dissipation @ T <sub>A</sub> = 25°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.

# MOCD207M, MOCD208M, MOCD211M, MOCD213M, MOCD217M

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

| Symbol         | Parameter               | Device                             | Test Conditions      | Min | Typ   | Max | Unit          |
|----------------|-------------------------|------------------------------------|----------------------|-----|-------|-----|---------------|
| <b>EMITTER</b> |                         |                                    |                      |     |       |     |               |
| $V_F$          | Input Forward Voltage   | MOCD217M                           | $I_F = 1\text{ mA}$  | –   | 1.05  | 1.3 | V             |
|                |                         | MOCD213M                           | $I_F = 10\text{ mA}$ | –   | 1.15  | 1.5 | V             |
|                |                         | MOCD207M,<br>MOCD208M,<br>MOCD211M | $I_F = 30\text{ mA}$ | –   | 1.25  | 1.5 | V             |
| $I_R$          | Reverse Leakage Current | All                                | $V_R = 6\text{ V}$   | –   | 0.001 | 100 | $\mu\text{A}$ |
| $C_{IN}$       | Input Capacitance       | All                                |                      | –   | 18    | –   | pF            |

## DETECTOR

|            |                                     |                                    |                                                 |    |     |    |               |
|------------|-------------------------------------|------------------------------------|-------------------------------------------------|----|-----|----|---------------|
| $I_{CEO}$  | Collector–Emitter Dark Current      | All                                | $V_{CE} = 10\text{ V}, T_A = 25^\circ\text{C}$  | –  | 1.0 | 50 | nA            |
|            |                                     |                                    | $V_{CE} = 10\text{ V}, T_A = 100^\circ\text{C}$ | –  | 1.0 | –  | $\mu\text{A}$ |
| $BV_{CEO}$ | Collector–Emitter Breakdown Voltage | MOCD211M,<br>MOCD217M              | $I_C = 100\text{ }\mu\text{A}$                  | 30 | 100 | –  | V             |
|            |                                     | MOCD207M,<br>MOCD208M,<br>MOCD213M | $I_C = 100\text{ }\mu\text{A}$                  | 70 | 100 | –  | V             |
| $BV_{ECO}$ | Emitter–Collector Breakdown Voltage | All                                | $I_E = 100\text{ }\mu\text{A}$                  | 7  | 10  | –  | V             |
| $C_{CE}$   | Collector–Emitter Capacitance       | All                                | $f = 1.0\text{ MHz}, V_{CE} = 0$                | –  | 7   | –  | pF            |

## COUPLED

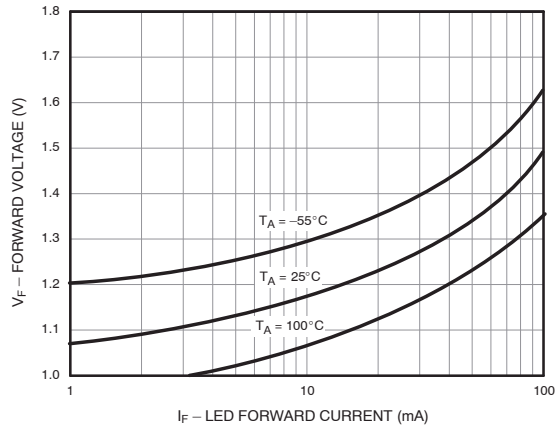
|               |                                      |                                                 |                                                                               |     |     |     |               |
|---------------|--------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------|-----|-----|-----|---------------|
| CTR           | Collector–Output Current             | MOCD207M                                        | $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$                                     | 100 | –   | 200 | %             |
|               |                                      | MOCD208M                                        | $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$                                     | 40  | –   | 125 | %             |
|               |                                      | MOCD211M                                        | $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$                                     | 20  | –   | –   | %             |
|               |                                      | MOCD213M                                        | $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$                                     | 100 | –   | –   | %             |
|               |                                      | MOCD217M                                        | $I_F = 1\text{ mA}, V_{CE} = 5\text{ V}$                                      | 100 | –   | –   | %             |
| $V_{CE(SAT)}$ | Collector–Emitter Saturation Voltage | MOCD207M,<br>MOCD208M,<br>MOCD211M,<br>MOCD213M | $I_C = 2\text{ mA}, I_F = 10\text{ mA}$                                       | –   | –   | 0.4 | V             |
|               |                                      | MOCD217M                                        | $I_C = 100\text{ }\mu\text{A}, I_F = 1\text{ mA}$                             | –   | –   | 0.4 | V             |
| $t_{on}$      | Turn–On Time                         | All                                             | $I_C = 2\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\text{ }\Omega$ (Figure 7) | –   | 7.5 | –   | $\mu\text{s}$ |
| $t_{off}$     | Turn–Off Time                        | All                                             | $I_C = 2\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\text{ }\Omega$ (Figure 7) | –   | 5.7 | –   | $\mu\text{s}$ |
| $t_r$         | Rise Time                            | All                                             | $I_C = 2\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\text{ }\Omega$ (Figure 7) | –   | 3.2 | –   | $\mu\text{s}$ |
| $t_f$         | Fall Time                            | All                                             | $I_C = 2\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\text{ }\Omega$ (Figure 7) | –   | 4.7 | –   | $\mu\text{s}$ |

## ISOLATION

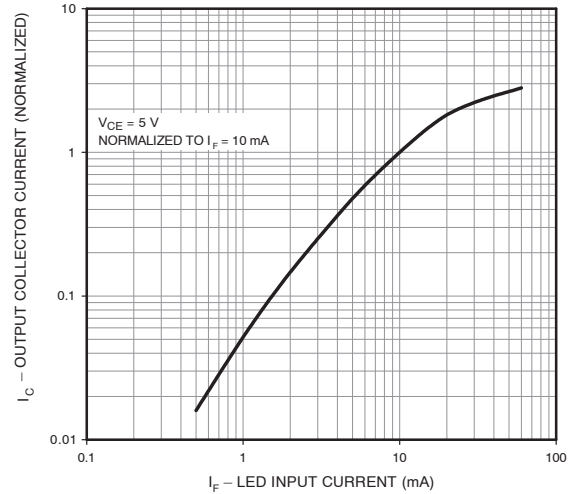
|           |                                |     |                                                        |           |     |   |               |
|-----------|--------------------------------|-----|--------------------------------------------------------|-----------|-----|---|---------------|
| $V_{ISO}$ | Input–Output Isolation Voltage | All | $t = 1\text{ Minute}$                                  | 2500      | –   | – | $V_{AC(RMS)}$ |
| $C_{ISO}$ | Isolation Capacitance          | All | $V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$               | –         | 0.2 | – | pF            |
| $R_{ISO}$ | Isolation Resistance           | All | $V_{I-O} = \pm 500\text{ VDC}, T_A = 25^\circ\text{C}$ | $10^{11}$ | –   | – | $\Omega$      |

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.

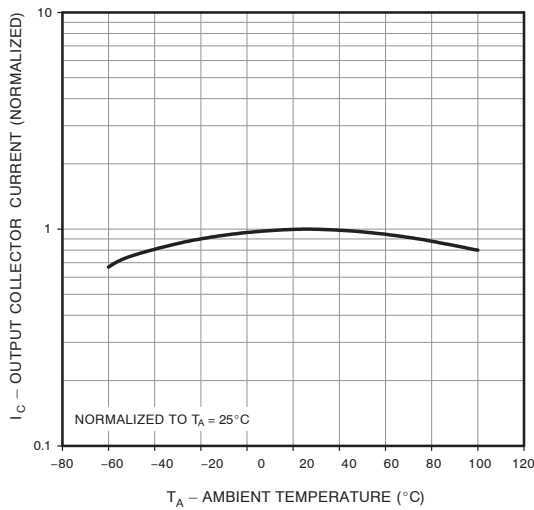
## TYPICAL CHARACTERISTICS



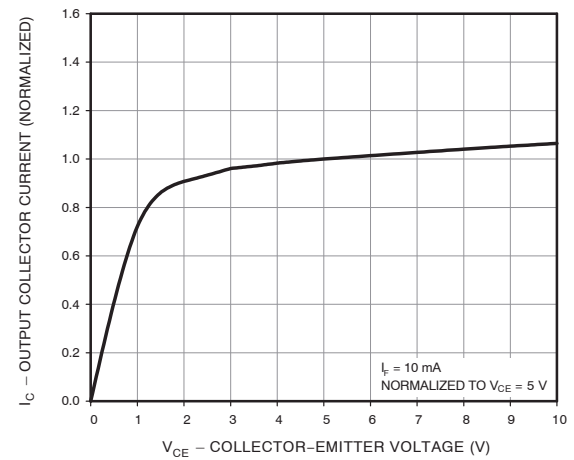
**Figure 2. LED Forward Voltage vs. Forward Current**



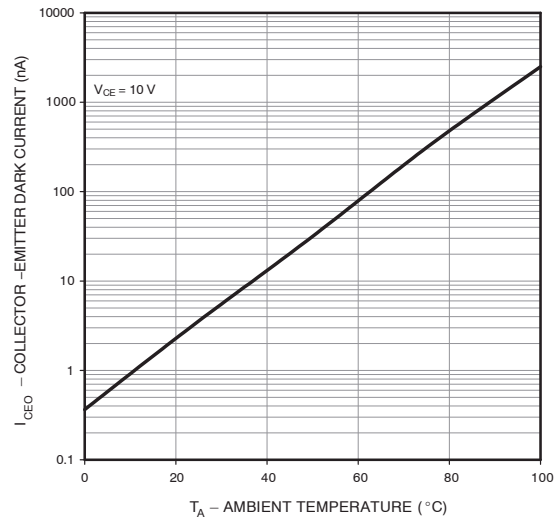
**Figure 3. Output Current vs. Input Current**



**Figure 4. Output Current vs. Ambient Temperature**



**Figure 5. Output Current vs. Collector-Emitter Voltage**



**Figure 6. Dark Current vs. Ambient Temperature**

## SWITCHING TIME TEST CIRCUIT AND WAVEFORMS

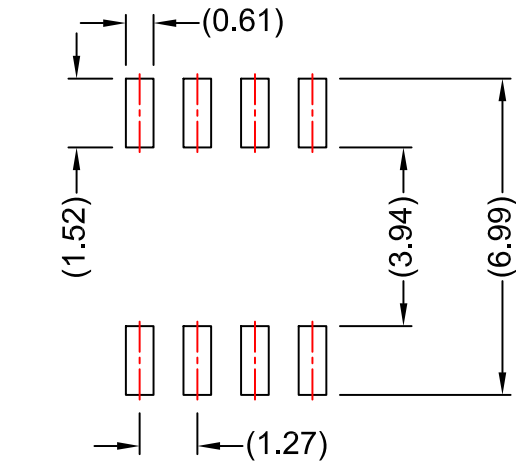
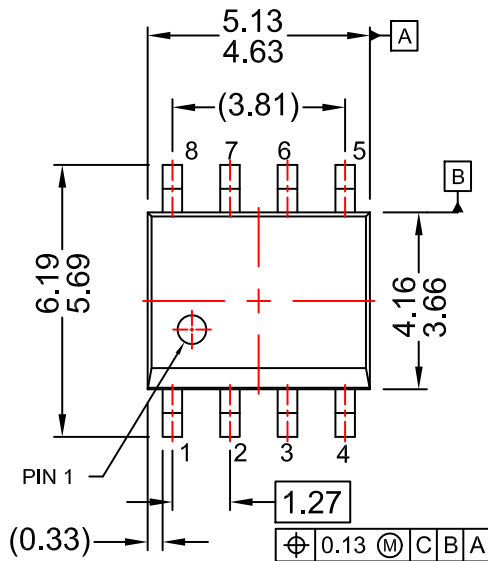
## MOCD207M, MOCD208M, MOCD211M, MOCD213M, MOCD217M

### ORDERING INFORMATION

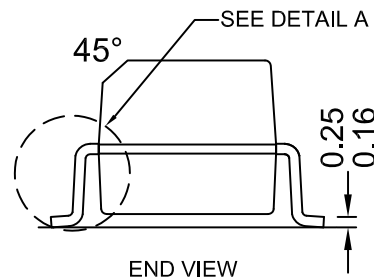
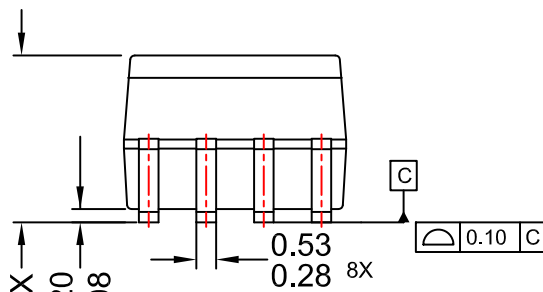
| Part Number | Package                                         | Shipping                 |
|-------------|-------------------------------------------------|--------------------------|
| MOCD207M    | Small Outline 8-Pin                             | 100 Units / Tube         |
| MOCD207R2M  | Small Outline 8-Pin                             | 2500 Units / Tape & Reel |
| MOCD207VM   | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 100 Units / Tube         |
| MOCD207R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape & Reel |
| MOCD208M    | Small Outline 8-Pin                             | 100 Units / Tube         |
| MOCD208R2M  | Small Outline 8-Pin                             | 2500 Units / Tape & Reel |
| MOCD208VM   | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 100 Units / Tube         |
| MOCD208R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape & Reel |
| MOCD211M    | Small Outline 8-Pin                             | 100 Units / Tube         |
| MOCD211R2M  | Small Outline 8-Pin                             | 2500 Units / Tape & Reel |
| MOCD211VM   | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 100 Units / Tube         |
| MOCD211R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape & Reel |
| MOCD213M    | Small Outline 8-Pin                             | 100 Units / Tube         |
| MOCD213R2M  | Small Outline 8-Pin                             | 2500 Units / Tape & Reel |
| MOCD213VM   | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 100 Units / Tube         |
| MOCD213R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape & Reel |
| MOCD217M    | Small Outline 8-Pin                             | 100 Units / Tube         |
| MOCD217R2M  | Small Outline 8-Pin                             | 2500 Units / Tape & Reel |
| MOCD217VM   | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 100 Units / Tube         |
| MOCD217R2VM | Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option | 2500 Units / Tape & Reel |

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DATE 30 SEP 2016



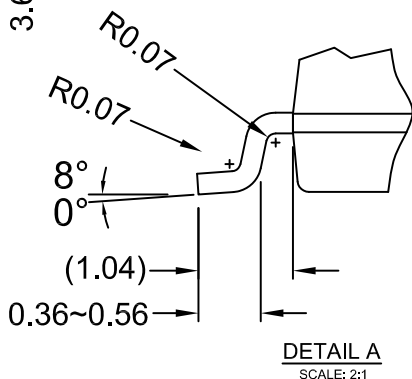
LAND PATTERN RECOMMENDATION



END VIEW

#### 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.



DETAIL A  
SCALE: 2:1

|                  |             |                                                                                                                                                                                  |
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