

# 8-pin SOIC Dual-Channel Phototransistor Output Optocoupler

## MOCD207M, MOCD208M, MOCD211M, MOCD213M, MOCD217M

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

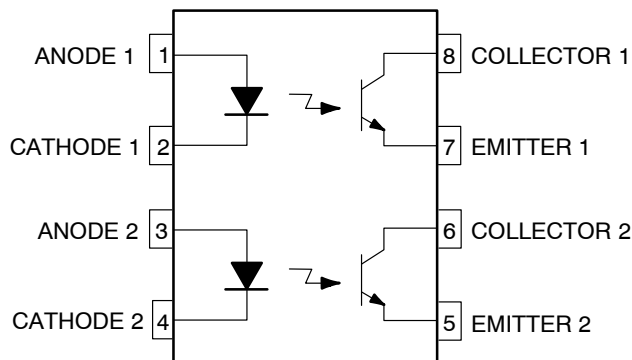
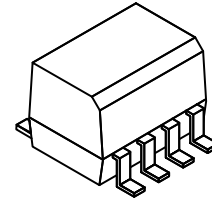
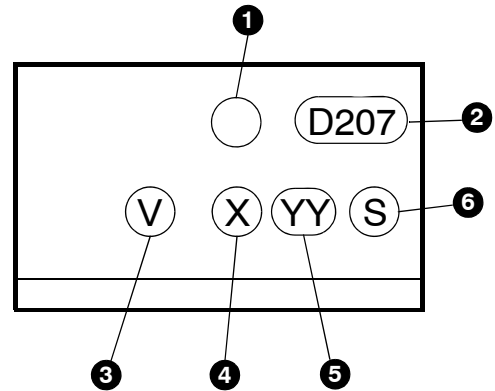


Figure 1. Schematic



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>IO<sub>RM</sub></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>IO<sub>RM</sub></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>IO<sub>RM</sub></sub>	Maximum Working Insulation Voltage	565	V <sub>peak</sub>
V <sub>IO<sub>TM</sub></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.

# MOCD207M, MOCD208M, MOCD211M, MOCD213M, MOCD217M

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

Symbol	Rating	Value	Unit
<b>TOTAL DEVICE</b>			
$T_{STG}$	Storage Temperature	-40 to +125	$^\circ\text{C}$
$T_A$	Ambient Operating Temperature	-40 to +100	$^\circ\text{C}$
$T_J$	Junction Temperature	-40 to +125	$^\circ\text{C}$
$T_{SOL}$	Lead Solder Temperature	260 for 10 seconds	$^\circ\text{C}$
$P_D$	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$	240	mW
	Derate Above $25^\circ\text{C}$	2.94	$\text{mW}/^\circ\text{C}$
<b>EMITTER</b>			
$I_F$	Continuous Forward Current	60	mA
$I_F$ (pk)	Forward Current – Peak ( $PW = 100 \mu\text{s}$ , 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 $25^\circ\text{C}$	0.8	$\text{mW}/^\circ\text{C}$
<b>DETECTOR</b>			
$I_C$	Continuous Collector Current	150	mA
$V_{CEO}$	Collector–Emitter Voltage – MOCD207M, MOCD208M, MOCD213M	70	V
	– MOCD211M, MOCD217M	30	V
$V_{ECO}$	Emitter–Collector Voltage	7	V
$P_D$	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$	150	mW
	Derate Above $25^\circ\text{C}$	1.76	$\text{mW}/^\circ\text{C}$

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, MOCD208M, 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, MOCD217M	$I_C = 100\text{ }\mu\text{A}$	30	100	–	V
		MOCD207M, MOCD208M, 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, MOCD208M, MOCD211M, 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

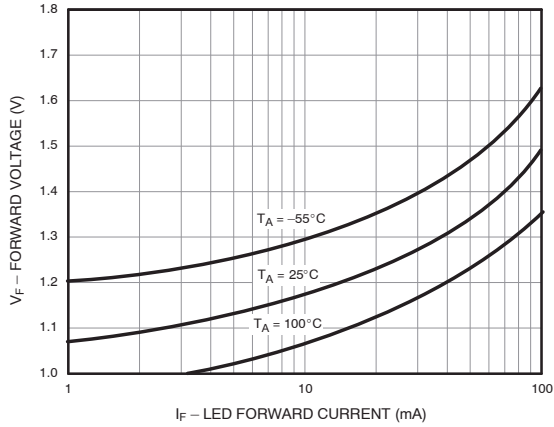


Figure 2. LED Forward Voltage vs. Forward Current

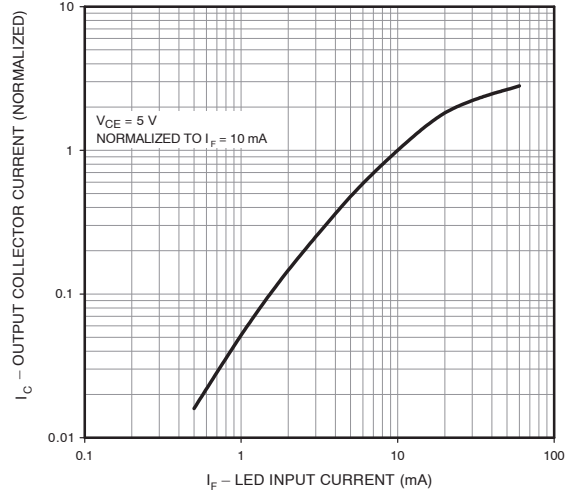


Figure 3. Output Current vs. Input Current

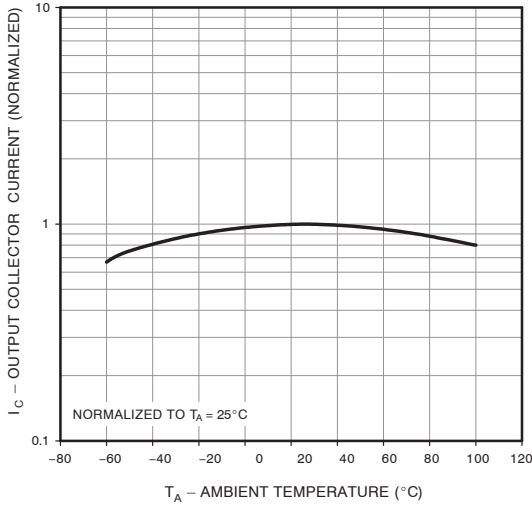


Figure 4. Output Current vs. Ambient Temperature

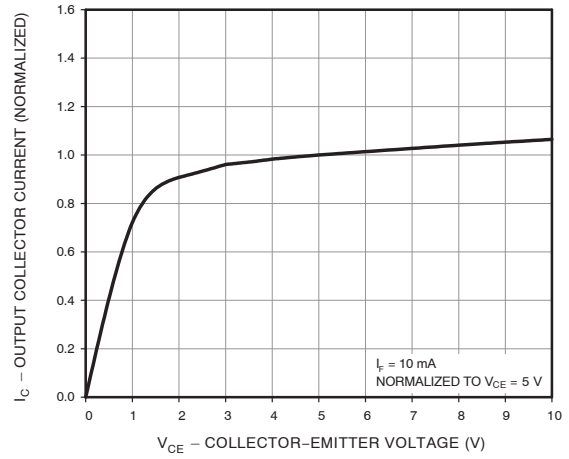


Figure 5. Output Current vs. Collector-Emitter Voltage

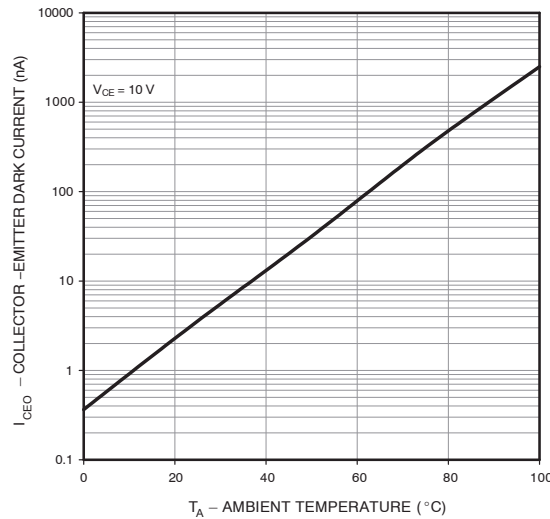


Figure 6. Dark Current vs. Ambient Temperature

SWITCHING TIME TEST CIRCUIT AND WAVEFORMS

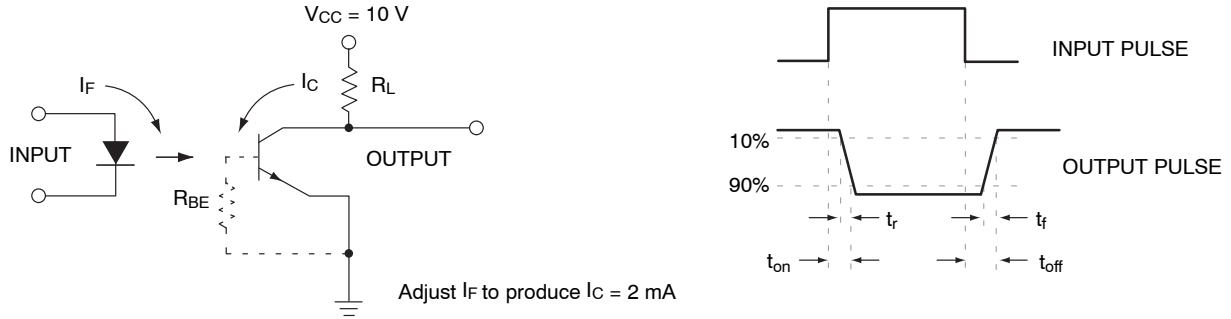


Figure 7. Switching Time Test Circuit and Waveforms

REFLOW PROFILE

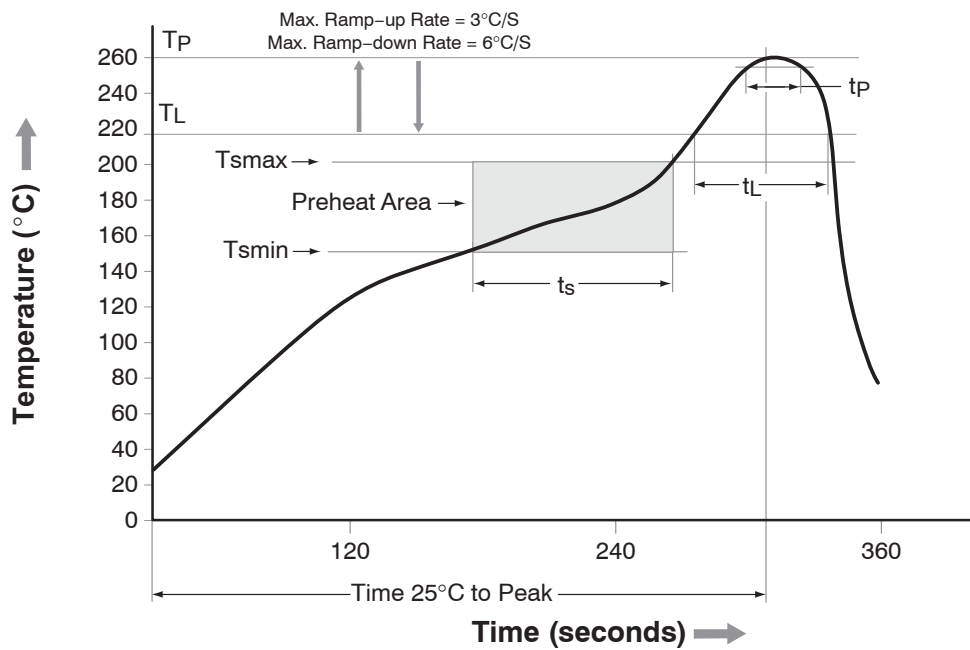


Figure 8. Reflow Profile

Profile Feature	Pb-Free Assembly Profile
Temperature Minimum (T <sub>smin</sub> )	150°C
Temperature Maximum (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60 – 120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>p</sub> )	3°C/second maximum
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t <sub>p</sub> ) within 5°C of 260°C	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second maximum
Time 25°C to Peak Temperature	8 minutes maximum

## MOCD207M, MOCD208M, MOCD211M, MOCD213M, MOCD217M

### ORDERING INFORMATION

Part Number	Package	Shipping
MOCD207M	Small Outline 8-Pin	50 Units / Tube
MOCD207R2M	Small Outline 8-Pin	2500 Units / Tape & Reel
MOCD207VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOCD207R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape & Reel
MOCD208M	Small Outline 8-Pin	50 Units / Tube
MOCD208R2M	Small Outline 8-Pin	2500 Units / Tape & Reel
MOCD208VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOCD208R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape & Reel
MOCD211M	Small Outline 8-Pin	50 Units / Tube
MOCD211R2M	Small Outline 8-Pin	2500 Units / Tape & Reel
MOCD211VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOCD211R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape & Reel
MOCD213M	Small Outline 8-Pin	50 Units / Tube
MOCD213R2M	Small Outline 8-Pin	2500 Units / Tape & Reel
MOCD213VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOCD213R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape & Reel
MOCD217M	Small Outline 8-Pin	50 Units / Tube
MOCD217R2M	Small Outline 8-Pin	2500 Units / Tape & Reel
MOCD217VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOCD217R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape & Reel

# MECHANICAL CASE OUTLINE

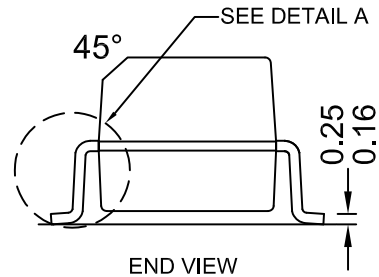
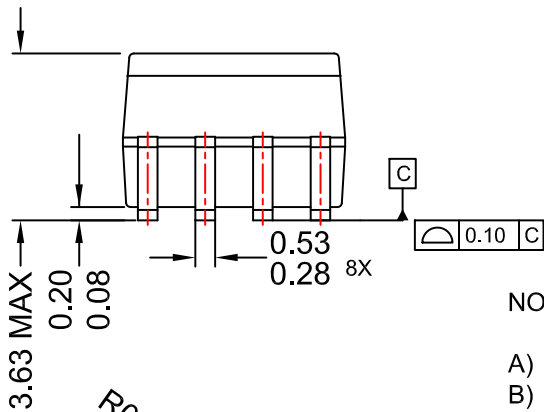
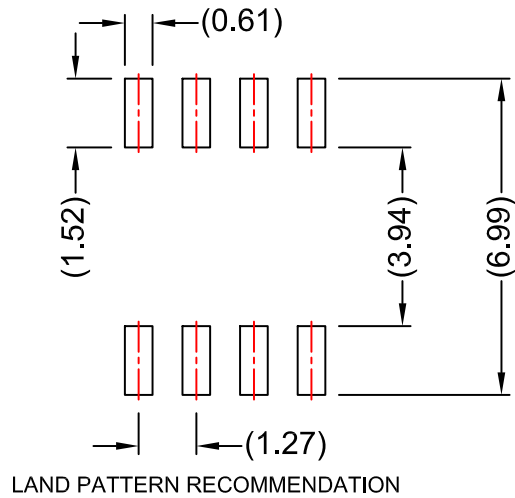
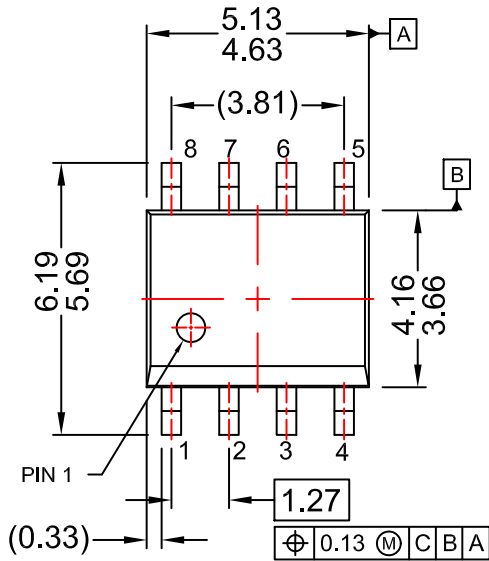
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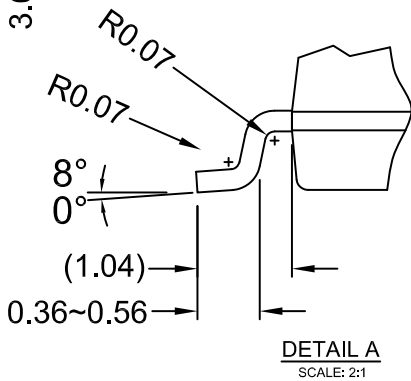
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- A) NO STANDARD APPLIES TO THIS PACKAGE
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) LANDPATTERN STANDARD: SOIC127P600X175-8M.



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