

# MOCD207M, MOCD208M

## Dual-channel Phototransistor Small Outline Surface Mount Optocouplers

### Features

- Dual Channel Optocoupler
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- Two Channels in One Compact Surface Mount Package
- Closely Matched Current Transfer Ratios to Minimize Unit-to-Unit Variation
- Minimum  $V_{(BR)CEO}$  of 70 V Guaranteed
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- High Input-Output Isolation of 2500  $V_{AC(rms)}$  Guaranteed
- Meets U.L. Regulatory Requirements, File #E90700, Volume 2

### Applications

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

### Description

The MOCD207M/MOCD208M consist of two silicon phototransistors optically coupled to two GaAs infrared LEDs. These devices are constructed in a small outline surface mount package which conforms to the standard SOIC-8 footprint.

### Schematic

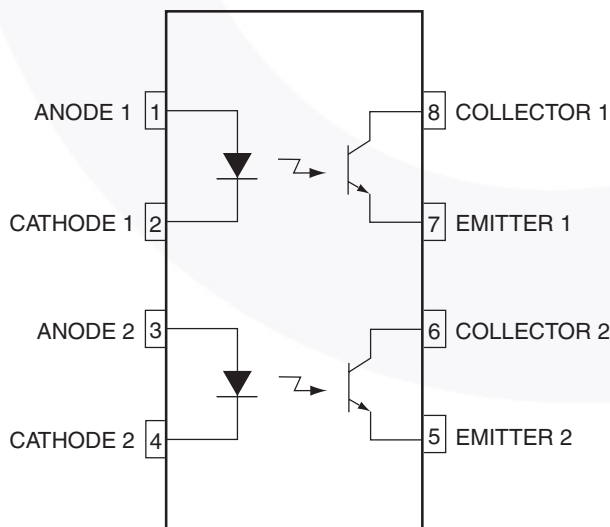


Figure 1. Schematic

### Package Outline

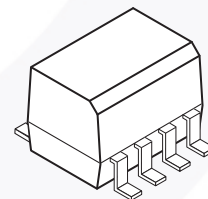


Figure 2. Package Outline

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.  $T_A = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Rating	Value	Unit
<b>Emitter</b>			
$I_F$	Forward Current – Continuous	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 @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	90 0.8	mW mW/ $^\circ\text{C}$
<b>Detector</b>			
$V_{CEO}$	Collector-Emitter Voltage	70	V
$V_{CBO}$	Collector-Base Voltage	70	V
$V_{ECO}$	Emitter-Collector Voltage	7.0	V
$I_C$	Collector Current-Continuous	150	mA
$P_D$	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	150 1.76	mW mW/ $^\circ\text{C}$
<b>Total Device</b>			
$V_{ISO}$	Input-Output Isolation Voltage <sup>(1, 2)</sup> (f = 60 Hz, t = 1 minute)	2500	Vac(rms)
$P_D$	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	250 2.94	mW mW/ $^\circ\text{C}$
$T_A$	Ambient Operating Temperature Range	-40 to +100	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
$T_L$	Lead Soldering Temperature (1/16" from case, 10 second duration)	260	$^\circ\text{C}$

## Electrical Characteristics

$T_A = 25^\circ\text{C}$  unless otherwise specified<sup>(3)</sup>

Symbol	Parameter	Test Conditions	Device	Min.	Typ.*	Max.	Unit
<b>Emitter</b>							
$V_F$	Input Forward Voltage	$I_F = 30\text{ mA}$	All		1.25	1.55	V
$I_R$	Reverse Leakage Current	$V_R = 6.0\text{ V}$	All		0.001	100	$\mu\text{A}$
C	Capacitance		All		18		pF
<b>Detector</b>							
$I_{CEO}$	Collector-Emitter Dark Current	$V_{CE} = 10\text{ V}, T_A = 25^\circ\text{C}$	All		1.0	50	nA
$I_{CEO}$		$V_{CE} = 10\text{ V}, T_A = 100^\circ\text{C}$	All		1.0		$\mu\text{A}$
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 100\ \mu\text{A}$	All	70	100		V
$V_{(BR)CEO}$	Emitter-Collector Breakdown Voltage	$I_E = 100\ \mu\text{A}$	All	7.0	10		V
$C_{CE}$	Collector-Emitter Capacitance	$f = 1.0\text{ MHz}, V_{CE} = 0\text{ V}$	All		7.0		pF
<b>Coupled</b>							
CTR	Current Transfer Ratio, Collector to Emitter <sup>(4)</sup>	$I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$	MOCD207M	100		200	%
			MOCD208M	40		125	
		$I_F = 1\text{ mA}, V_{CE} = 5\text{ V}$	MOCD207M	34			
			MOCD208M	13			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 2.0\text{ mA}, I_F = 10\text{ mA}$	All			0.4	V
$t_{on}$	Turn-On Time	$I_C = 2.0\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\ \Omega$	All		3.0		$\mu\text{s}$
$t_{off}$	Turn-Off Time	$I_C = 2.0\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\ \Omega$	All		2.8		$\mu\text{s}$
$t_r$	Rise Time	$I_C = 2.0\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\ \Omega$	All		1.6		$\mu\text{s}$
$t_f$	Fall Time	$I_C = 2.0\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\ \Omega$	All		2.2		$\mu\text{s}$
$V_{ISO}$	Isolation Surge Voltage <sup>(1)(2)</sup>	$f = 60\text{ Hz}, t = 1\text{ minute}, I_{I-O} \leq 2\ \mu\text{A}$	All	2500			Vac(rms)
$R_{ISO}$	Isolation Resistance <sup>(2)</sup>	$V_{I-O} = 500\text{ V}$	All	$10^{11}$			$\Omega$
$C_{ISO}$	Isolation Capacitance <sup>(2)</sup>	$V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$	All		0.2		pF

\*Typical values at  $T_A = 25^\circ\text{C}$

### Notes:

1. Input-Output Isolation Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
2. For this test, pins 1, 2, 3 and 4 are common and pins 5, 6, 7 and 8 are common.
3. Always design to the specified minimum/maximum electrical limits (where applicable).
4. Current Transfer Ratio (CTR) =  $I_C / I_F \times 100\%$ .

### Typical Performance Curves

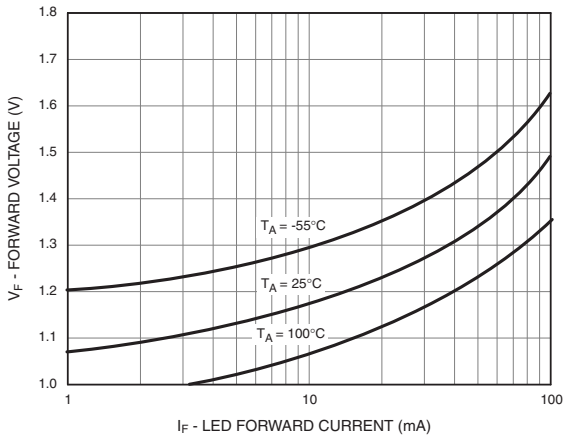


Figure 3. LED Forward Voltage vs. Forward Current

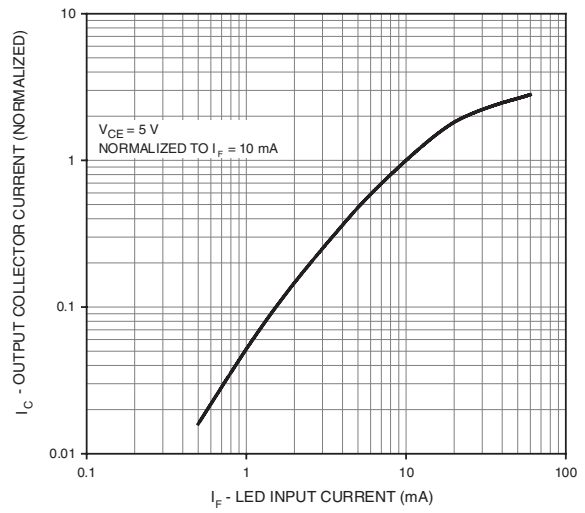


Figure 4. Output Current vs. Input Current

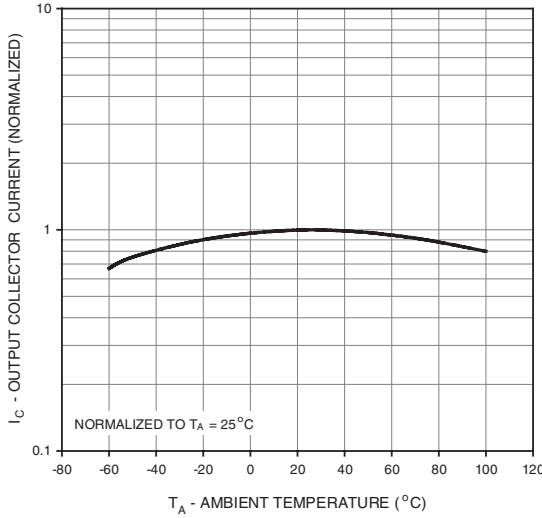


Figure 5. Output Current vs. Ambient Temperature

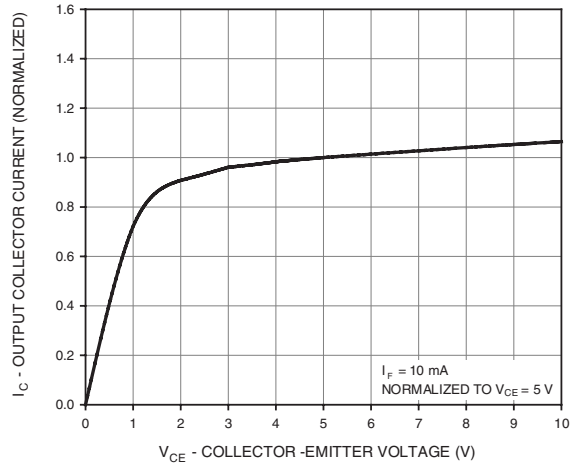


Figure 6. Output Current vs. Collector-Emitter Voltage

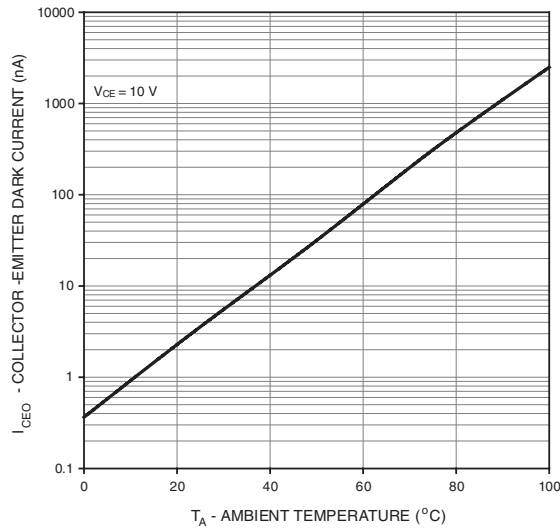
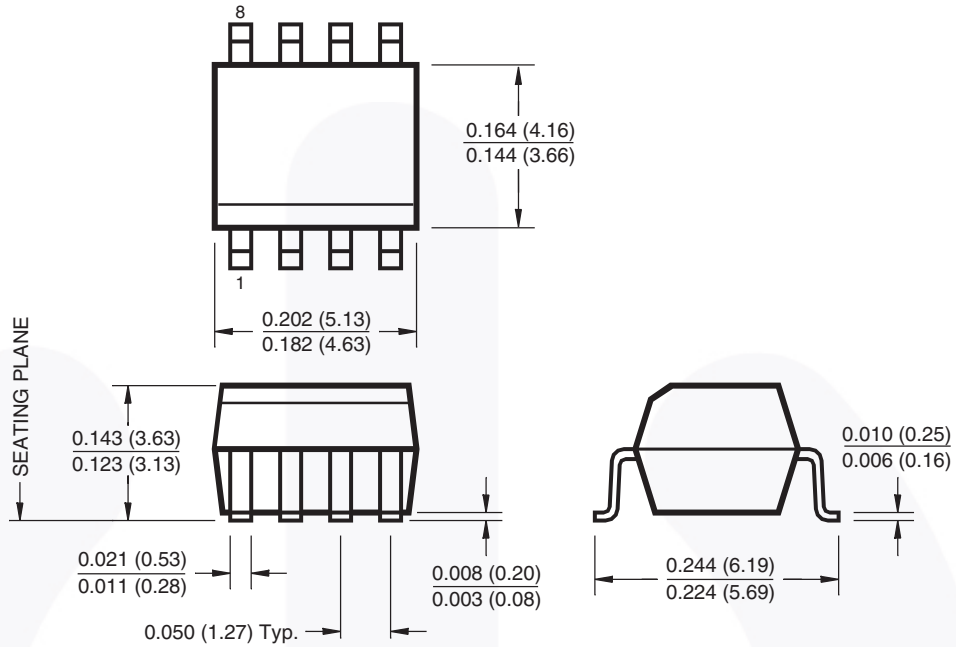


Figure 7. Dark Current vs. Ambient Temperature

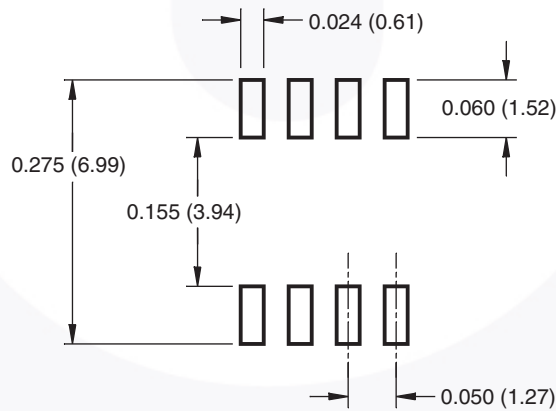
## Package Dimensions

### 8-pin SOIC Surface Mount



Lead Coplanarity: 0.004 (0.10) MAX

### Recommended Pad Layout



Dimensions in inches (mm).

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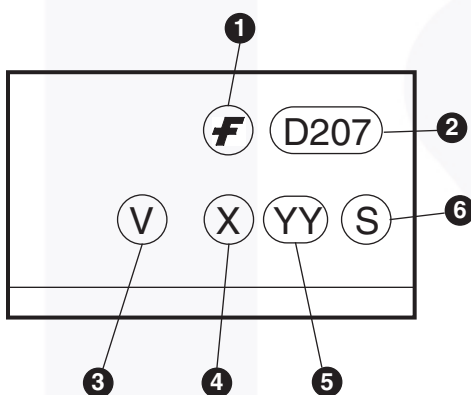
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

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## Ordering Information

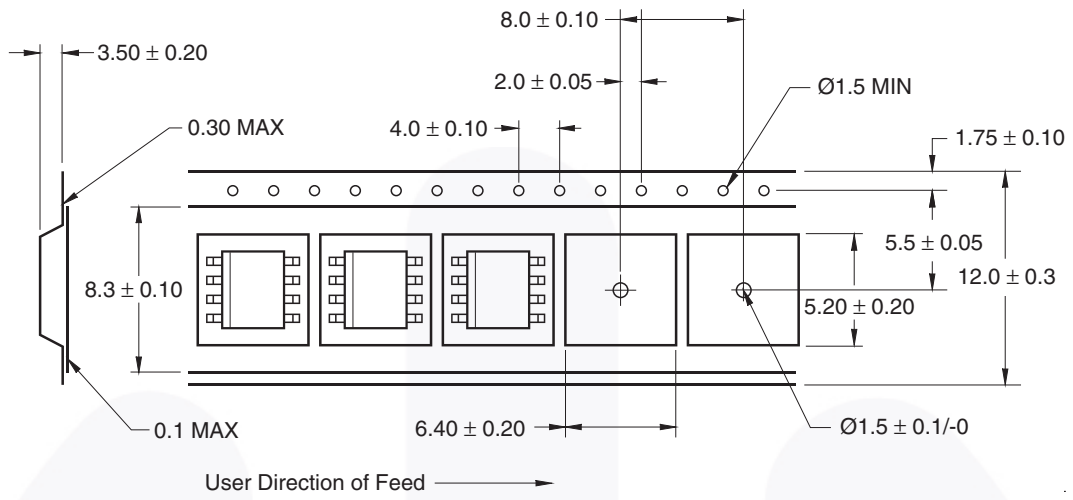
Option	Order Entry Identifier	Description
V	V	VDE Approved
D1	D1	Tape and Reel (500 units per reel), 16 mm Width Carrier Tape
D1V	D1V	VDE Approved, Tape and Reel (500 units per reel), 16 mm Width Carrier Tape
D2	D2	Tape and Reel (2500 units per reel), 16 mm Width Carrier Tape
D2V	D2V	VDE Approved, Tape and Reel (2500 units per reel), 16 mm Width Carrier Tape
R2	R2	Tape and Reel (2500 units per reel), 12 mm Width Carrier Tape
R2V	R2V	VDE Approved, Tape and Reel (2500 units per reel), 12 mm Width Carrier Tape

## Marking Information

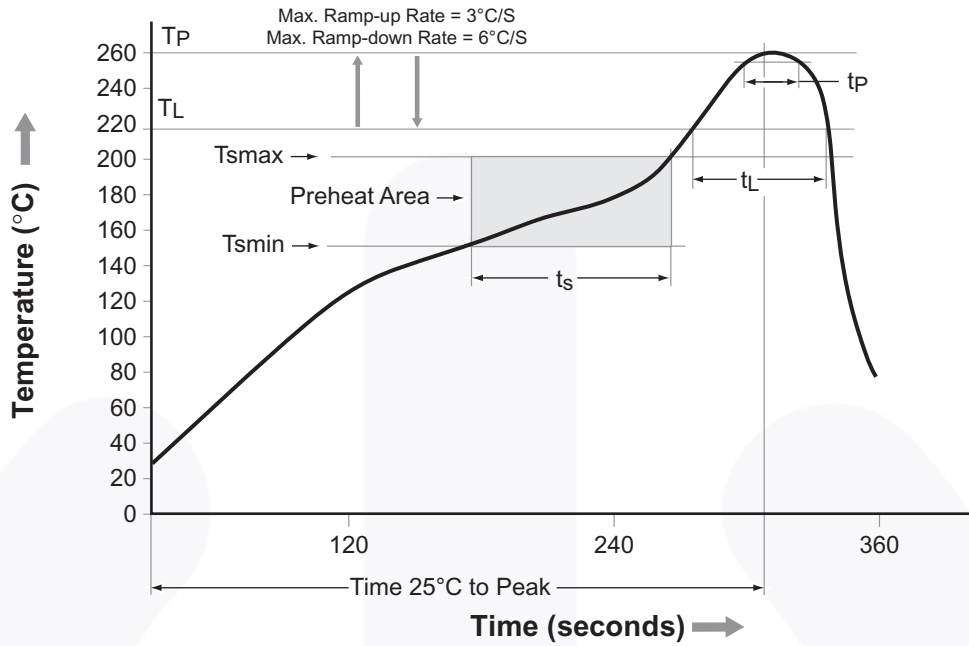


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

### Carrier Tape Specifications



**Reflow Profile**








Profile Feature	Pb-Free Assembly Profile
Temperature Minimum ( $T_{smin}$ )	150°C
Temperature Maximum ( $T_{smax}$ )	200°C
Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60–120 seconds
Ramp-up Rate ( $t_L$ to $t_p$ )	3°C/second maximum
Liquidous Temperature ( $T_L$ )	217°C
Time ( $t_L$ ) Maintained Above ( $T_L$ )	60–150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time ( $t_p$ ) within 5°C of 260°C	30 seconds
Ramp-down Rate ( $T_P$ to $T_L$ )	6°C/second maximum
Time 25°C to Peak Temperature	8 minutes maximum





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Rev. I64