

FAIRCHILD
SEMICONDUCTOR®

SMALL OUTLINE OPTOCOUPLERS TRANSISTOR OUTPUT

MOC205-M

MOC206-M

MOC207-M

MOC208-M

DESCRIPTION

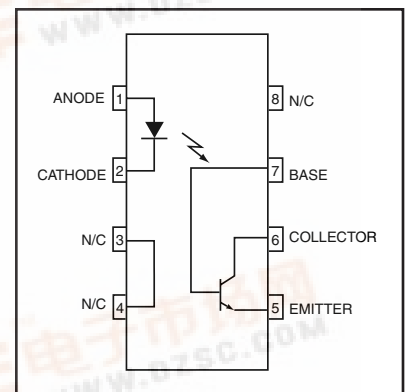
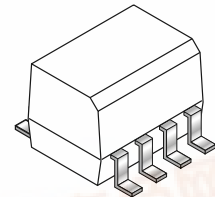
These devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector, in a surface mountable, small outline, plastic package. They are ideally suited for high density applications, and eliminate the need for through - the - board mounting.

FEATURES

- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #136616) (add option "V" for VDE approval, i.e., MOC205V-M)
- Closely Matched Current Transfer Ratios
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- Minimum BV_{CEO} of 70 Volts Guaranteed
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation of 2500 $V_{AC(rms)}$ Guaranteed

APPLICATIONS

- Feedback Control Circuits
- Interfacing and coupling systems of different potentials and impedances
- General Purpose Switching Circuits
- Monitor and Detection Circuits



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ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Unless otherwise specified)			
Rating	Symbol	Value	Unit
EMITTER			
Forward Current - Continuous	I_F	60	mA
Forward Current - Peak (PW = 100 μs , 120 pps)	$I_F(\text{pk})$	1.0	A
Reverse Voltage	V_R	6.0	V
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	90 0.8	mW mW/ $^\circ\text{C}$
DETECTOR			
Collector-Emitter Voltage	V_{CEO}	70	V
Emitter-Collector Voltage	V_{ECO}	7.0	V
Collector-Base Voltage	V_{CBO}	70	V
Collector Current-Continuous	I_C	150	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	150 1.76	mW mW/ $^\circ\text{C}$
TOTAL DEVICE			
Input-Output Isolation Voltage (1,2,3) (f = 60 Hz, t = 1 min.)	V_{ISO}	2500	Vac(rms)
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	250 2.94	mW mW/ $^\circ\text{C}$
Ambient Operating Temperature Range	T_A	-40 to +100	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +150	$^\circ\text{C}$

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)						
Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit
EMITTER						
Input Forward Voltage	(I _F = 10 mA)	V _F	—	1.15	1.5	V
Reverse Leakage Current	(V _R = 6.0 V)	I _R	—	0.001	100	μA
Input Capacitance		C _{IN}	—	18	—	pF
DETECTOR						
Collector-Emitter Dark Current	(V _{CE} = 10 V, T _A = 25°C)	I _{CEO1}	—	1.0	50	nA
	(V _{CE} = 10 V, T _A = 100°C)	I _{CEO2}	—	1.0	—	μA
Collector-Emitter Breakdown Voltage	(I _C = 100 μA)	BV _{CEO}	70	100	—	V
Emitter-Collector Breakdown Voltage	(I _E = 100 μA)	BV _{ECO}	7.0	10	—	V
Collector-Emitter Capacitance	(f = 1.0 MHz, V _{CE} = 0)	C _{CE}	—	7.0	—	pF
COUPLED						
Collector-Output Current ⁽⁴⁾	MOC205-M MOC206-M MOC207-M MOC208-M (I _F = 10 mA, V _{CE} = 10 V)	CTR	40 63 100 40	— — — —	80 125 200 125	%
Isolation Surge Voltage ^(1,2,3)	(f = 60 Hz AC Peak, t = 1 min.)	V _{ISO}	2500	—	—	V _{ac(rms)}
Isolation Resistance ⁽²⁾	(V = 500 V)	R _{ISO}	10 ¹¹	—	—	Ω
Collector-Emitter Saturation Voltage	(I _C = 2 mA, I _F = 10 mA)	V _{CE(sat)}	—	—	0.4	V
Isolation Capacitance ⁽²⁾	(V = 0 V, f = 1 MHz)	C _{ISO}	—	0.2	—	pF
Turn-On Time	(I _C = 2.0 mA, V _{CC} = 10 V, R _L = 100 Ω) (Fig. 6)	t _{on}	—	7.5	—	μs
Turn-Off Time	(I _C = 2.0 mA, V _{CC} = 10 V, R _L = 100 Ω) (Fig. 6)	t _{off}	—	5.7	—	μs
Rise Time	(I _C = 2.0 mA, V _{CC} = 10 V, R _L = 100 Ω) (Fig. 6)	t _r	—	3.2	—	μs
Fall Time	(I _C = 2.0 mA, V _{CC} = 10 V, R _L = 100 Ω) (Fig. 6)	t _f	—	4.7	—	μs

** Typical values at T_A = 25°C

1. Isolation Surge Voltage, V_{ISO}, is an internal device dielectric breakdown rating.

2. For this test, Pins 1 and 2 are common and Pins 5, 6 and 7 are common.

3. V_{ISO} rating of 2500 V_{AC(rms)} for t = 1 min. is equivalent to a rating of 3,000 V_{AC(rms)} for t = 1 sec.

4. Current Transfer Ratio (CTR) = I_C/I_F x 100%.

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Fig. 1 LED Forward Voltage vs. Forward Current

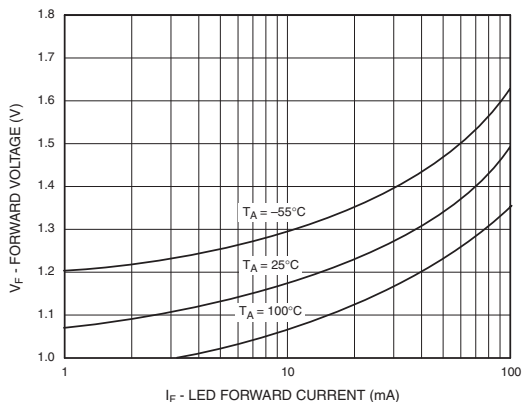


Fig. 2 Output Current vs. Input Current

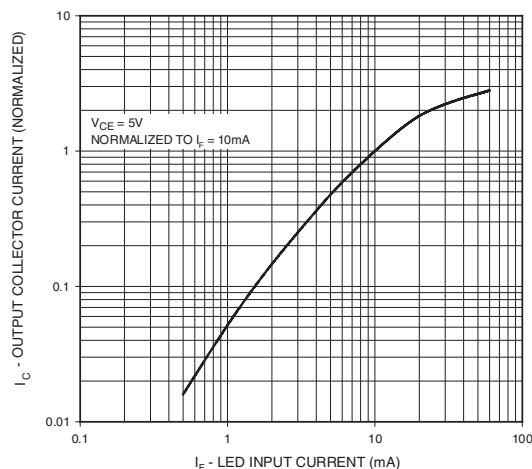


Fig. 3 Output Current vs. Ambient Temperature

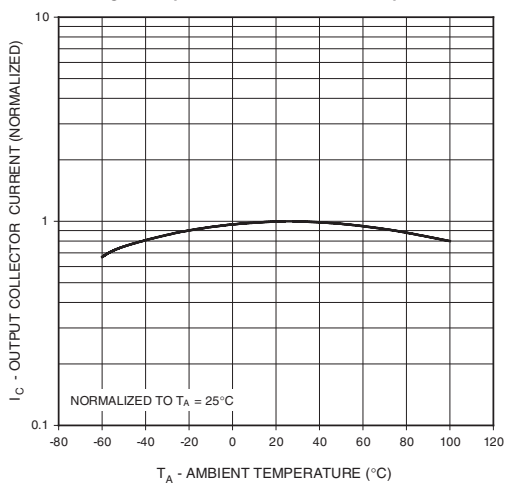


Fig. 4 Output Current vs. Collector - Emitter Voltage

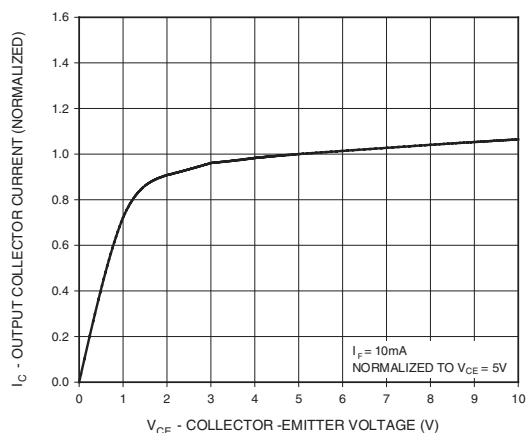


Fig. 5 Dark Current vs. Ambient Temperature

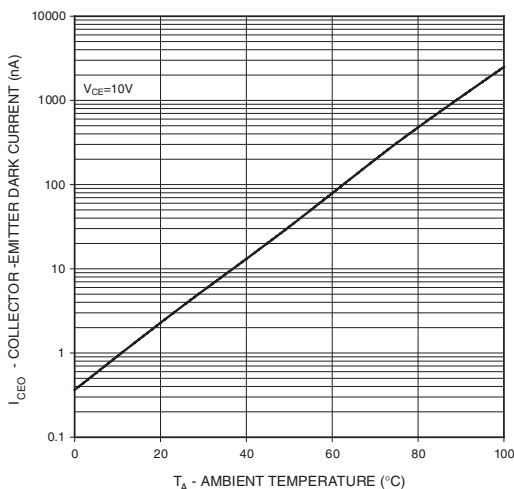
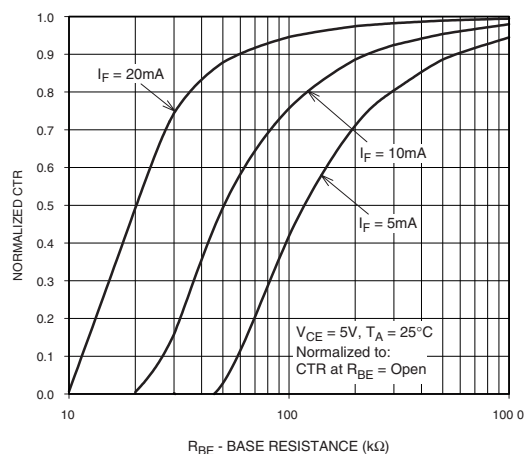


Fig. 6 CTR vs. R_BE (Unsaturated)



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Fig. 7 CTR vs. R_{BE} (Saturated)

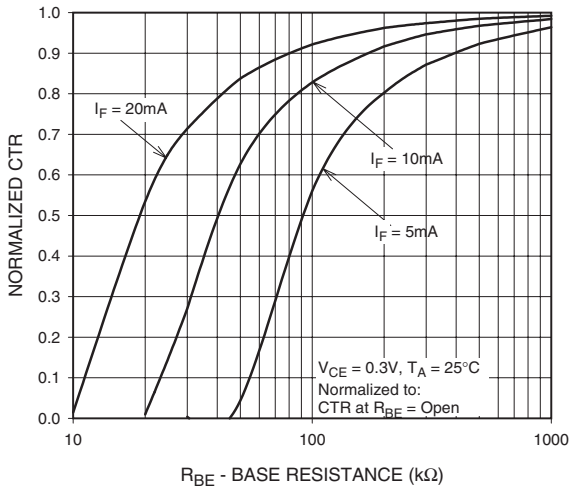


Fig. 8 Normalized t_{on} vs. R_{BE}

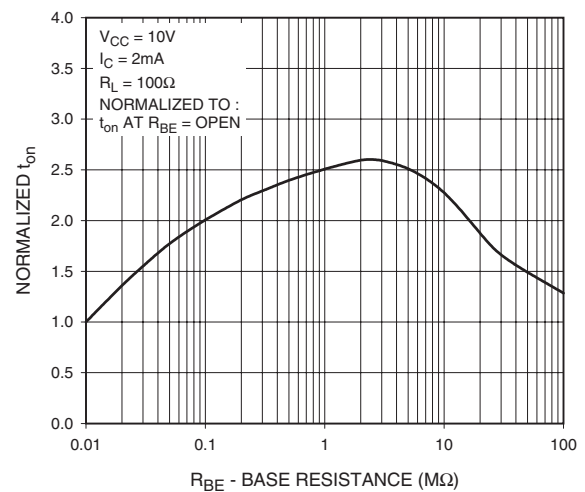
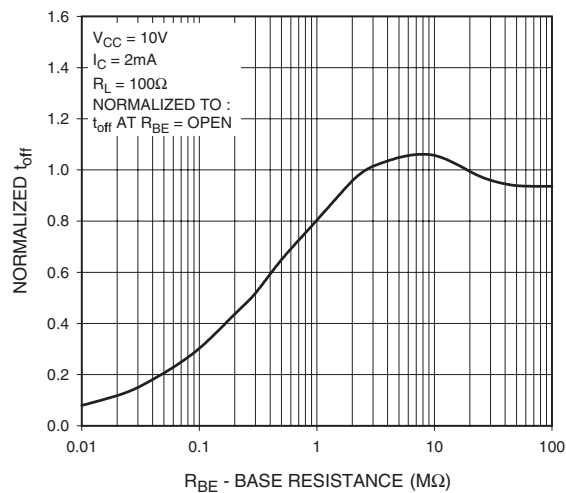


Fig. 9 Normalized t_{off} vs. R_{BE}



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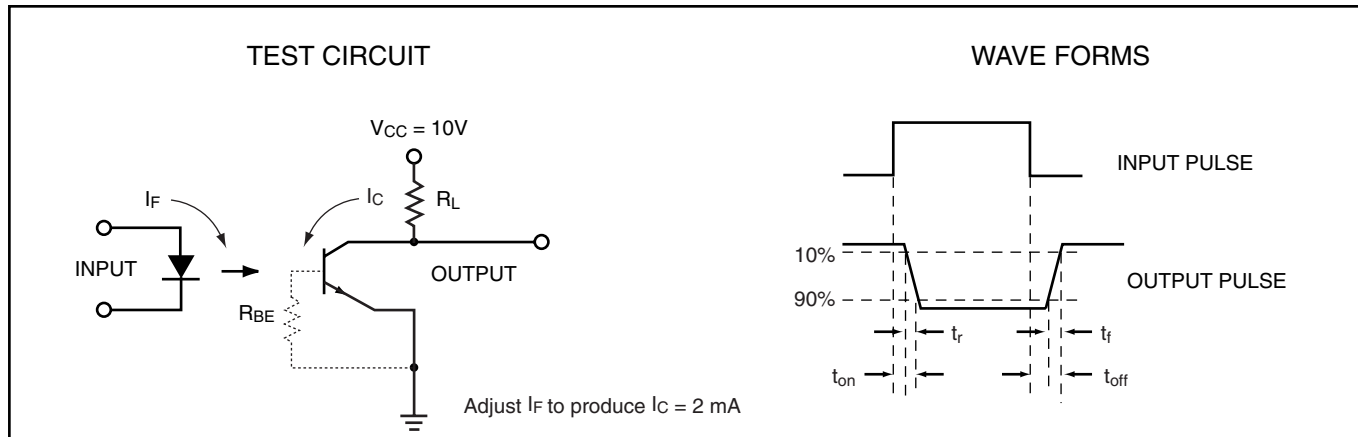


Figure 6. Switching Time Test Circuit and Waveforms

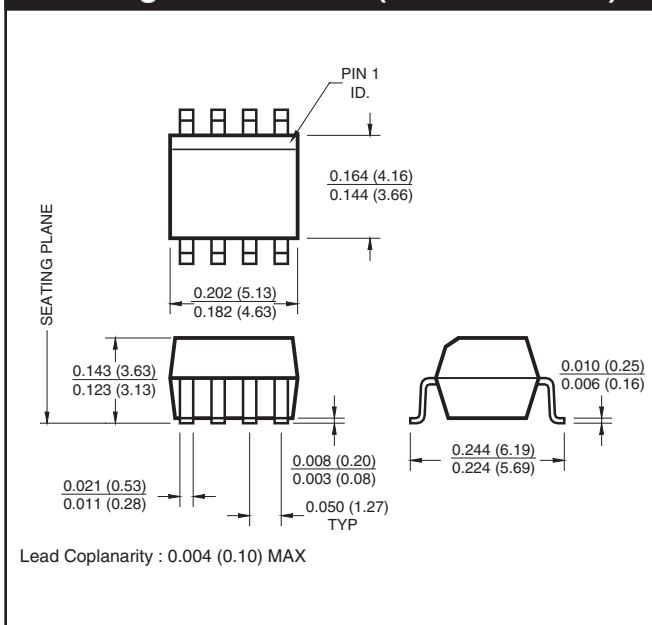
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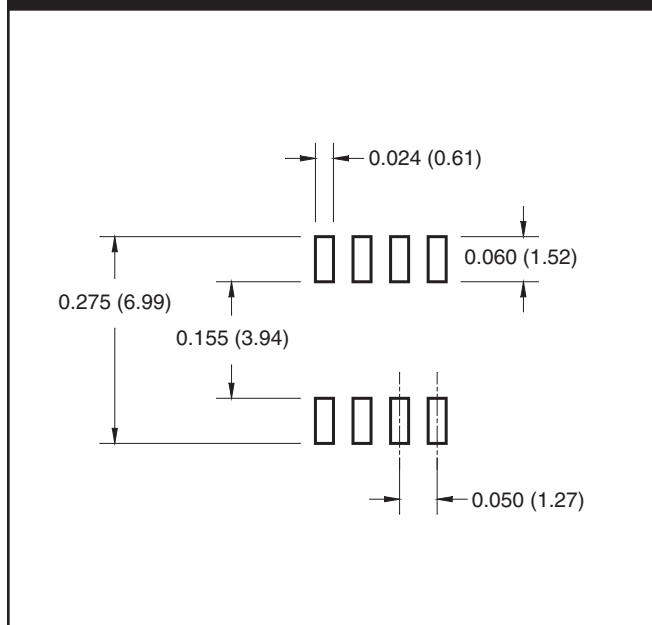
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Package Dimensions (Surface Mount)



8-Pin Small Outline



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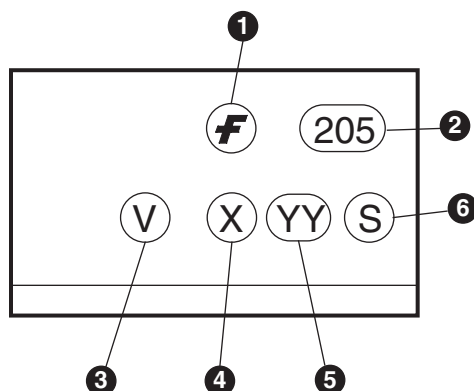
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ORDERING INFORMATION

Option	Order Entry Identifier	Description
V	V	VDE 0884
R1	R1	Tape and reel (500 units per reel)
R1V	R1V	VDE 0884, Tape and reel (500 units per reel)
R2	R2	Tape and reel (2500 units per reel)
R2V	R2V	VDE 0884, Tape and reel (2500 units per 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	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

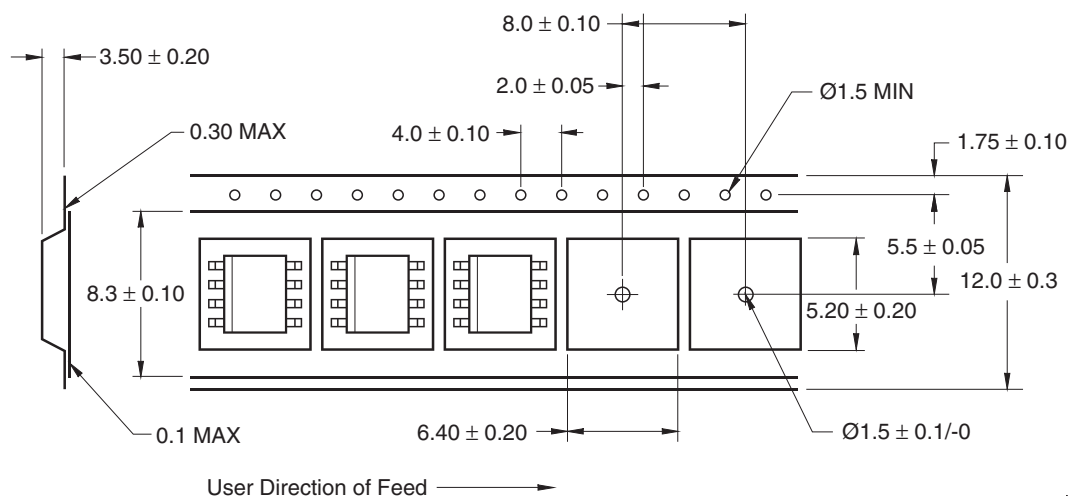
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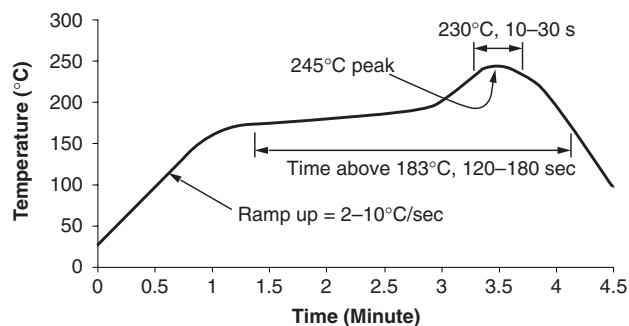
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Carrier Tape Specifications



Reflow Profile



- Peak reflow temperature: 245°C (package surface temperature)
- Time of temperature higher than 183°C for $120-180 \text{ seconds}$
- One time soldering reflow is recommended



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