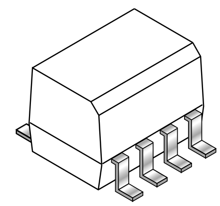
FAIRCHILD SEMICONDUCTOR®

SMALL OUTLINE OPTOCOUPLERS TRANSISTOR OUTPUT

MOC211-M MOC212-M MOC213-M

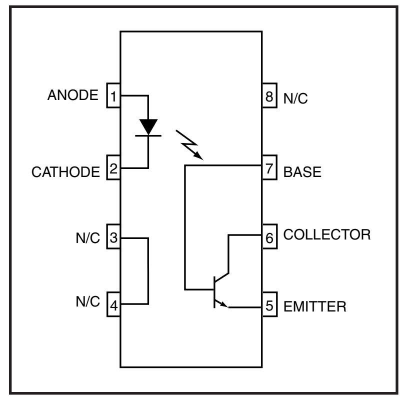
DESCRIPTION

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

- UL Recognized (File #E90700, volume 2)
- VDE Recognized (File #136616) (add option 'V' for VDE approval, e.g., MOC211V-M)
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- 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
- Minimum BV_{CEO} of 30V guaranteed



APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°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 (pk)	1.0	A
Reverse Voltage	V_R	6.0	V
LED Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	90 0.8	mW mW/°C
DETECTOR			
Collector-Emitter Voltage	V_{CEO}	30	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°C Derate above 25°C	P_D	150 1.76	mW mW/°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°C Derate above 25°C	P_D	250 2.94	mW mW/°C
Ambient Operating Temperature Range	T_A	-40 to +100	°C
Storage Temperature Range	T_{stg}	-40 to +150	°C
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	T_L	260	°C

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) (V_{CE} = 10 V, T_A = 100°C)	I_{CEO1} I_{CEO2}	— —	1.0 1.0	50 —	nA µA
Collector-Emitter Breakdown Voltage	(I_C = 100 µA)	BV_{CEO}	30	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] MOC211-M MOC212-M MOC213-M	(I_F = 10 mA, V_{CE} = 10 V)	CTR	20 50 100	— — —	— — —	%
Isolation Surge Voltage[1,2,3]	f = (60 Hz AC Peak, t = 1 min.)	V_{ISO}	2500	—	—	Vac(rms)
Isolation Resistance[2]	(V = 500 V)	R_{ISO}	10^{11}	—	—	Ω
Collector-Emitter Saturation Voltage	(I_C = 2.0 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%.

Fig. 1 LED Forward Voltage vs. Forward Current

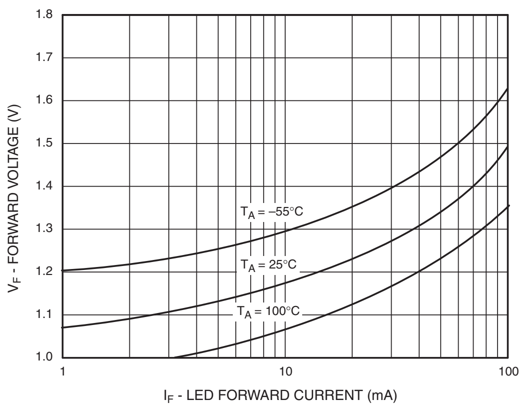


Fig. 2 Output Curent vs. Input Current

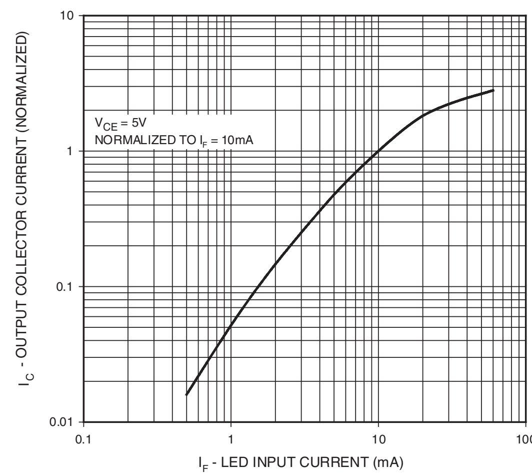


Fig. 3 Output Current vs. Ambient Temperature

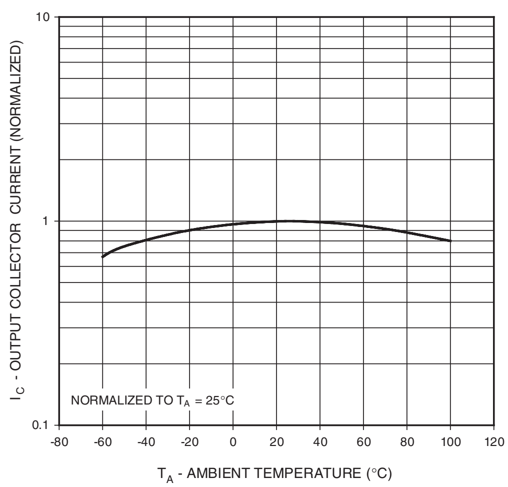


Fig. 4 Output Current vs. Collector - Emitter Voltage

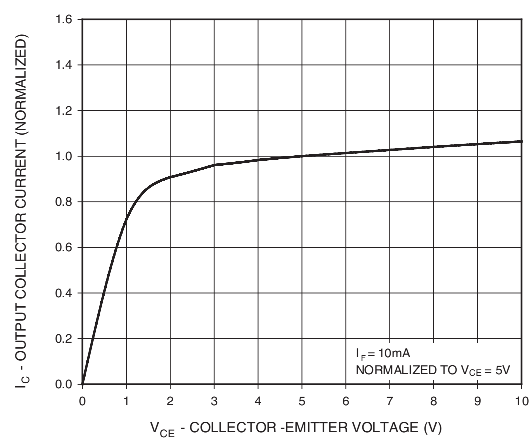


Fig. 5 Dark Current vs. Ambient Temperature

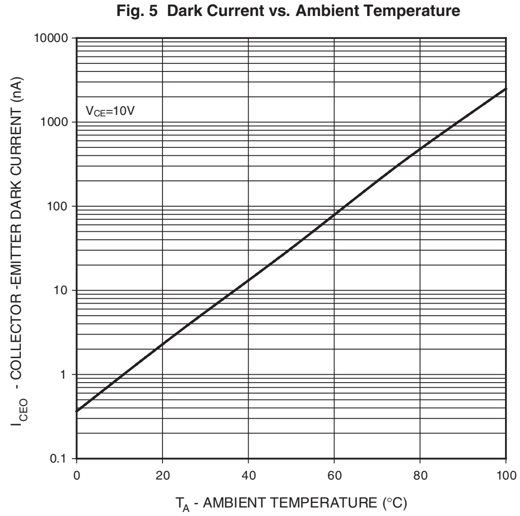


Fig. 6 CTR vs. R_{BE} (Unsaturated)

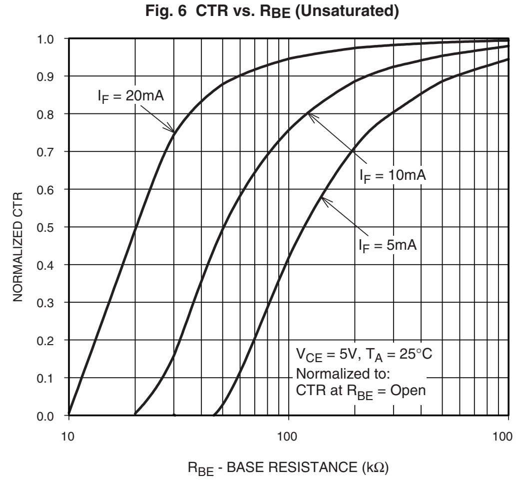


Fig. 7 CTR vs. R_{BE} (Saturated)

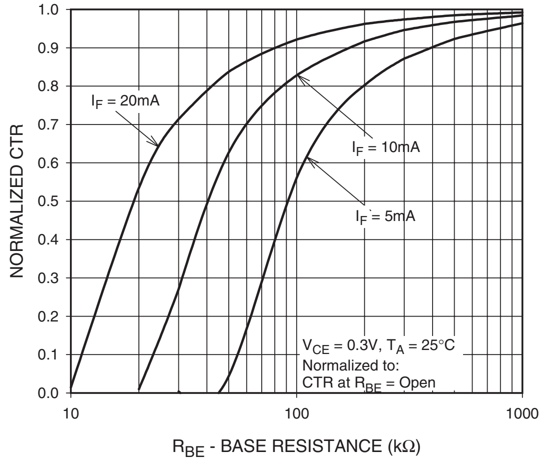


Fig. 8 Normalized t_{on} vs. R_{BE}

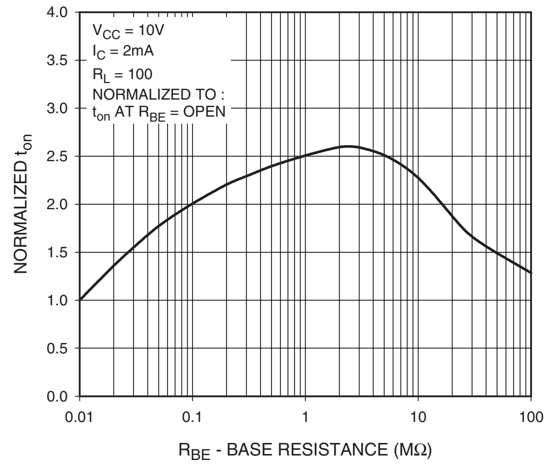
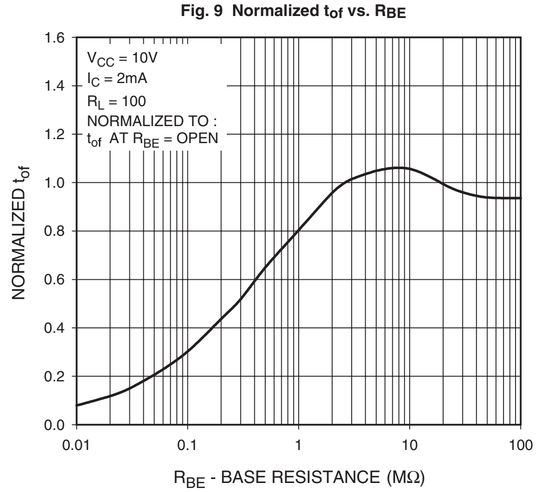


Fig. 9 Normalized t_{of} vs. R_{BE}



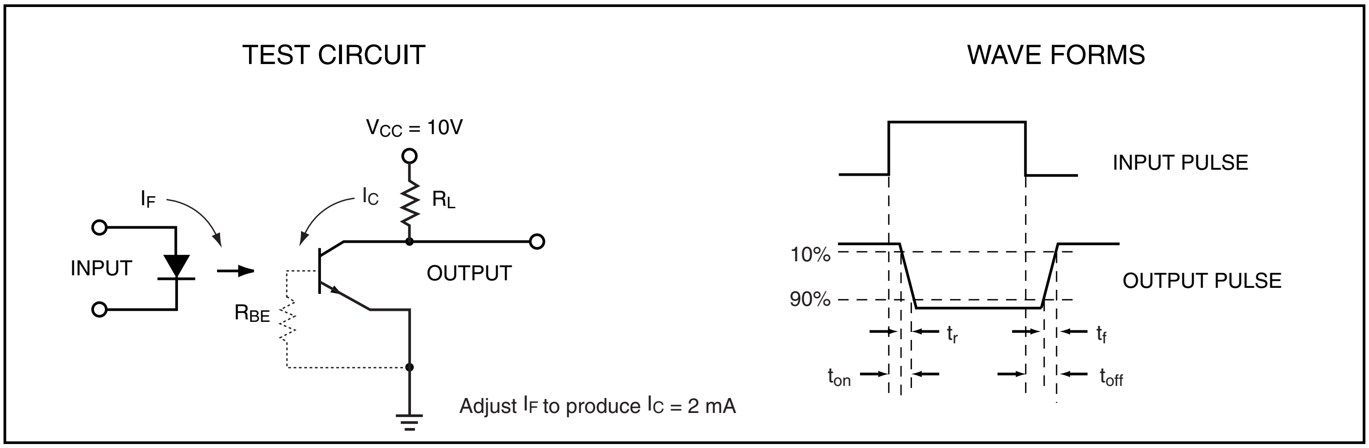
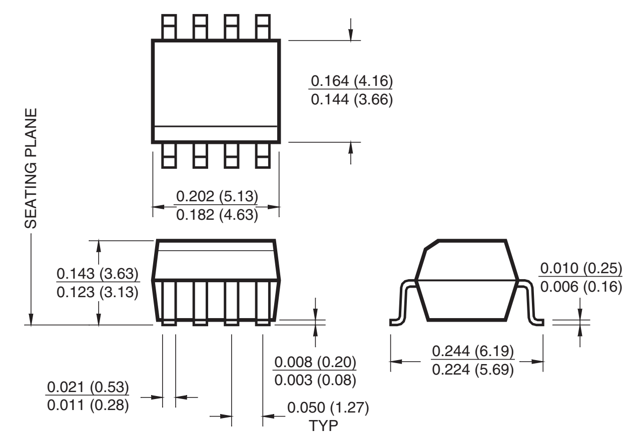


Figure 6. Switching Time Test Circuit and Waveforms

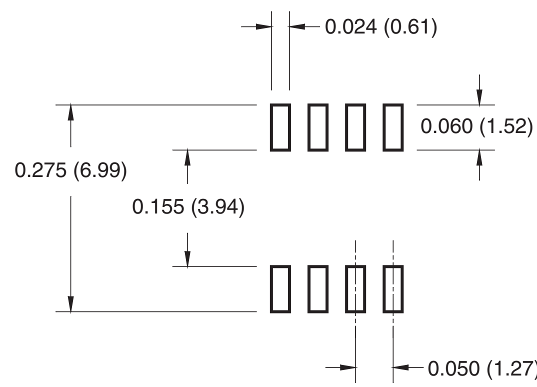
MOC211-M MOC212-M MOC213-M

Package Dimensions (Surface Mount)



Lead Coplanarity : 0.004 (0.10) MAX

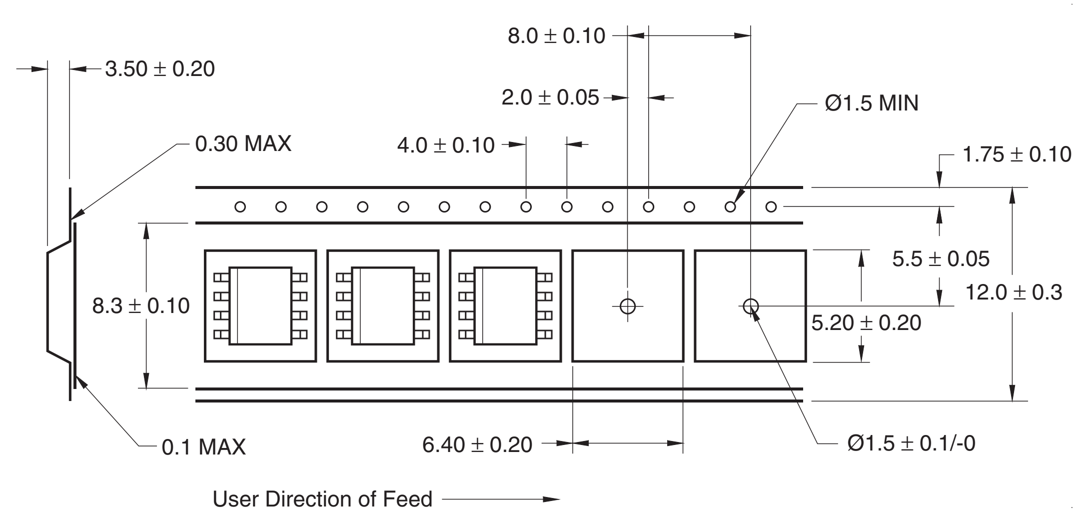
8-Pin Small Outline



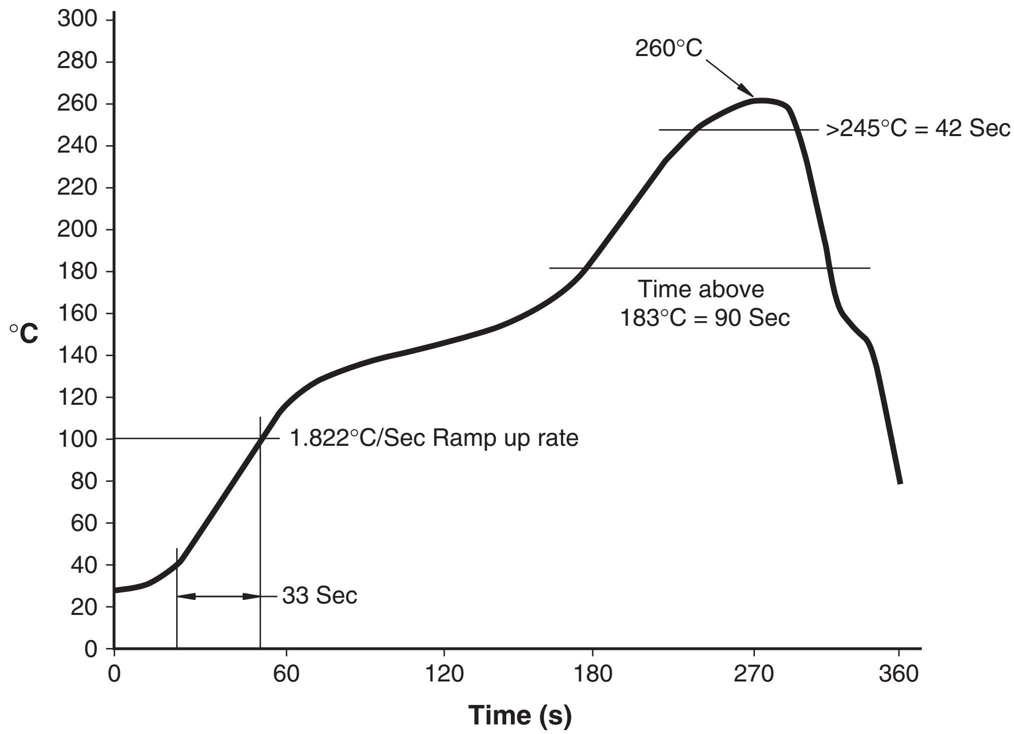
ORDERING INFORMATION

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)

QT Carrier Tape Specifications



Reflow Profile



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