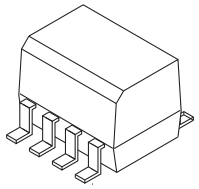
FAIRCHILD
SEMICONDUCTOR®

SMALL OUTLINE SURFACE MOUNT PHOTOTRANSISTOR OPTOCOUPLERS

MOC215-M MOC216-M MOC217-M

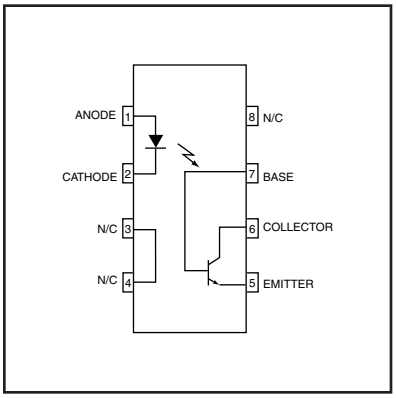
DESCRIPTION



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 #13616) (add option “V” for VDE approval, i.e., MOC215V-M)
- Convenient Plastic SOIC–8 Surface Mountable Package Style
- Low LED Input Current Required, for Easier Logic Interfacing
- 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 Vac (rms) Guaranteed



APPLICATIONS

- Low power Logic Circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications equipment
- Portable electronics

Marking Information:

- MOC215-M = 215
- MOC216-M = 216
- MOC217-M = 217

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
Collector-Base Voltage	V_{CBO}	70	V
Emitter-Collector Voltage	V_{ECO}	7.0	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] (60 Hz, 1 minute duration)	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 +125	°C

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ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified)

Characteristic		Symbol	Min	Typ**	Max	Unit
EMITTER						
Forward Voltage	(I_F = 1.0 mA)	V_F	—	1.07	1.3	V
Reverse Leakage Current	(V_R = 6.0 V)	I_R	—	0.001	100	µA
Capacitance		C	—	18	—	pF
DETECTOR						
Collector-Emitter Dark Current	(V_{CE} = 5.0 V, T_A = 25°C)	I_{CEO}	—	1.0	50	nA
	(V_{CE} = 5.0 V, T_A = 100°C)		—	1.0	—	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						
Output Collector Current[4] MOC215-M	(I_F = 1.0 mA, V_{CE} = 5.0 V)	CTR	20	—	—	%
MOC216-M			50	—	—	
MOC217-M			100	—	—	
Collector-Emitter Saturation Voltage	(I_C = 100µA, I_F = 1.0mA)	$V_{CE(sat)}$	—	—	0.4	V
Turn-On Time	(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω, fig. 10)	t_{on}	—	4.0	—	µs
Turn-Off Time	(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω, fig. 10)	t_{off}	—	4.0	—	µs
Rise Time	(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω, fig. 10)	t_r	—	3.0	—	µs
Fall Time	(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω, fig. 10)	t_f	—	3.0	—	µs
Input-Output Isolation Voltage[1,2,3]	(f = 60 Hz, t = 1.0 min.)	V_{ISO}	2500	—	—	Vac(rms)
Isolation Resistance[2]	(V_{I-O} = 500 V)	R_{ISO}	10^{11}	—	—	Ω
Isolation Capacitance[2]	(V_{I-O} = 0, f = 1.0 MHz)	C_{ISO}	—	0.2	—	pF

** Typical values at T_A = 25°C unless otherwise noted.

1. Input-Output 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 2,500 $V_{AC(RMS)}$ for t = 1 minute is equivalent to a rating of 3,000 $V_{AC(RMS)}$ for t = 1 second.
4. Current Transfer Ratio (CTR) = I_C/I_F x 100%.

Fig. 1 LED Forward Voltage vs. Forward Current

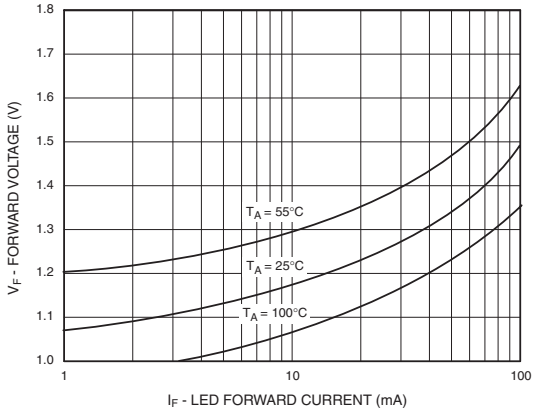


Fig. 2 Output Curent vs. Input Current

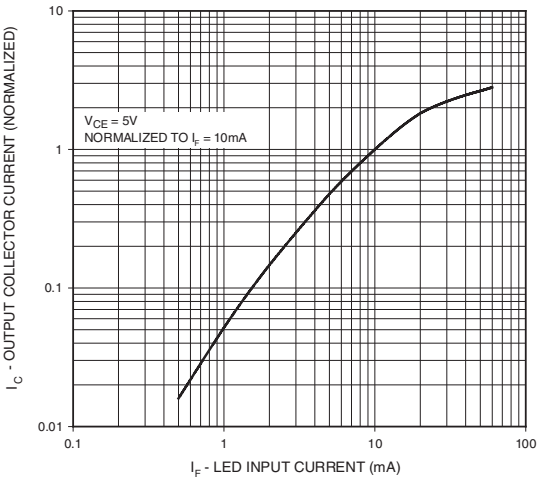


Fig. 3 Output Current vs. Ambient Temperature

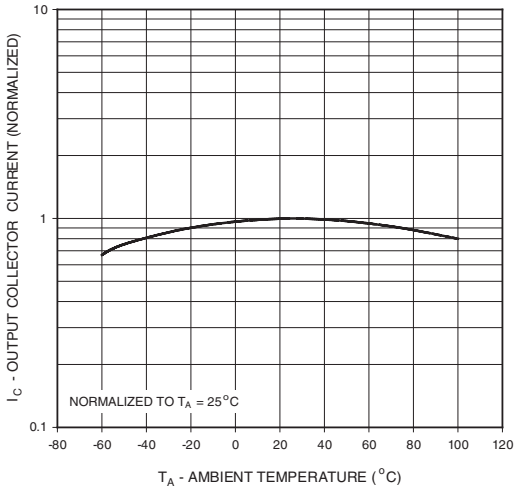


Fig. 4 Output Current vs. Collector - Emitter Voltage

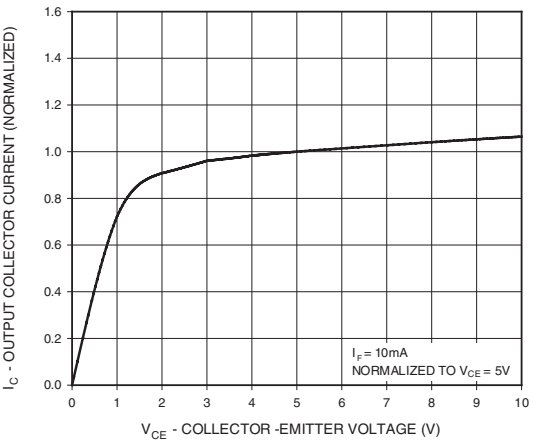


Fig. 5 Dark Current vs. Ambient Temperature

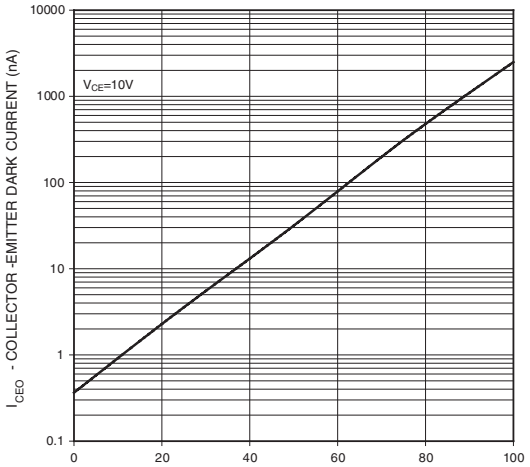


Fig. 6 Normalized t_{on} vs. R_{BE}

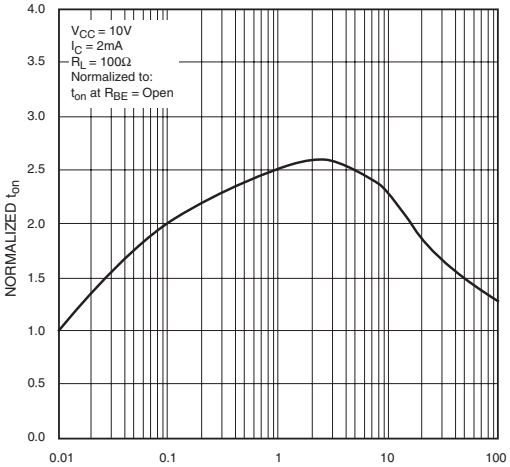


Fig. 7 Normalized t_{off} vs. R_{BE}

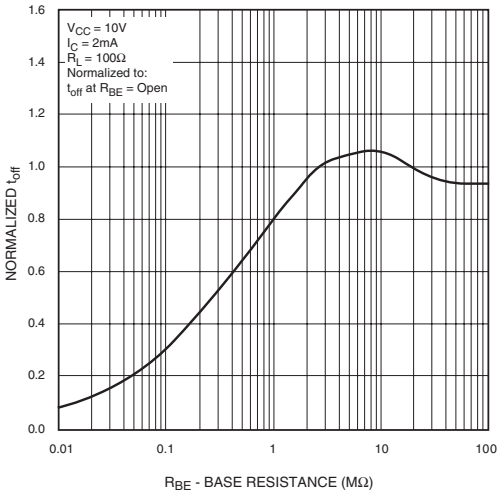


Fig. 8 CTR vs. R_{BE} (Saturated)

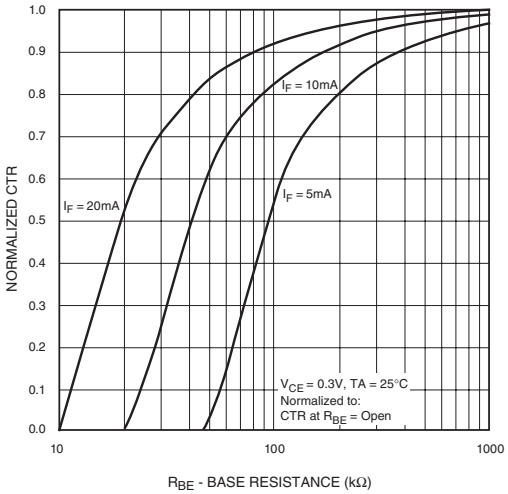
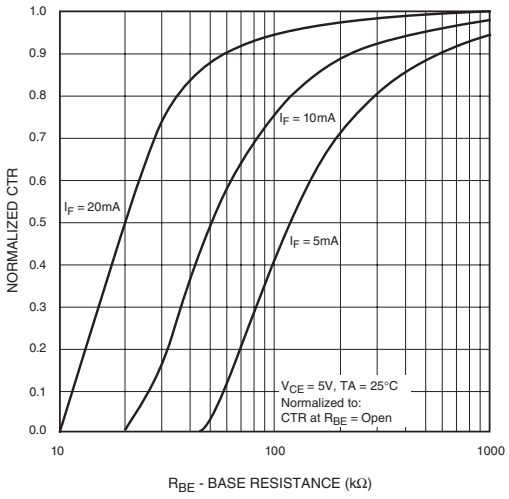


Fig. 9 CTR vs. R_{BE} (Unsaturated)



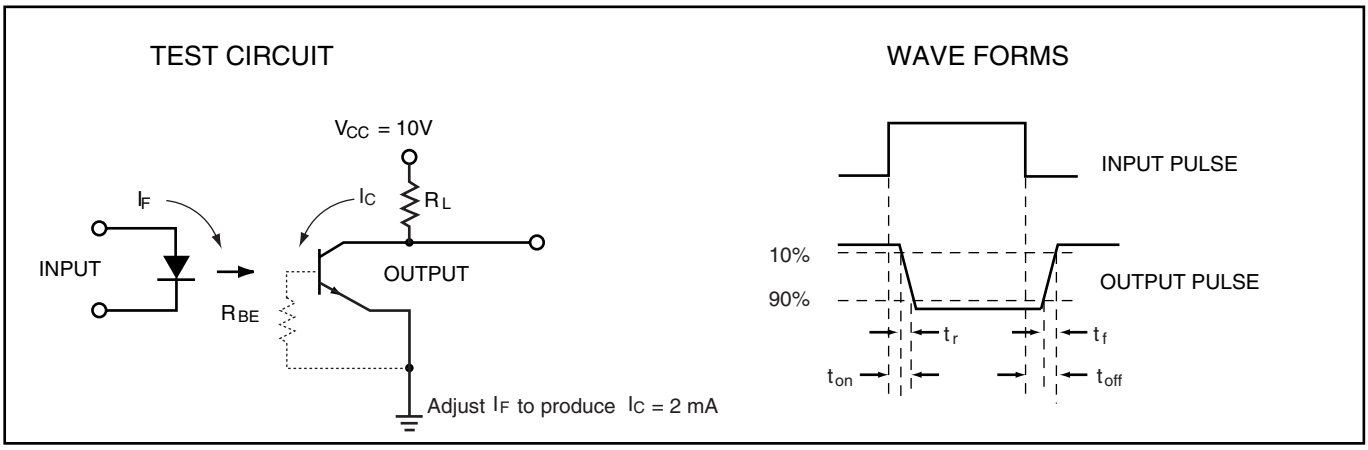
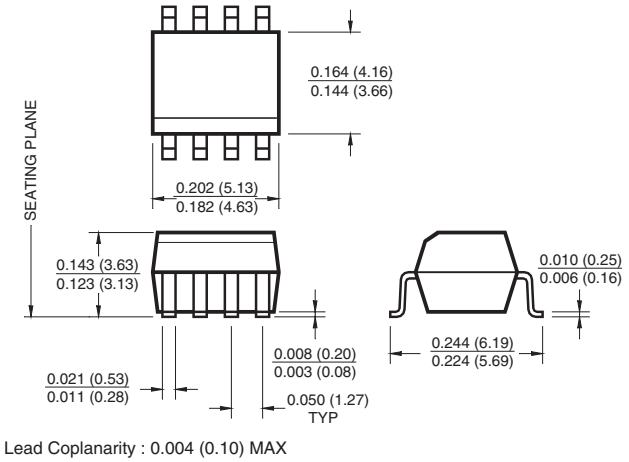


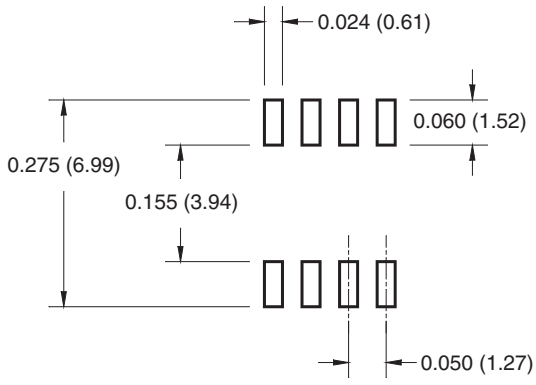
Figure 10. Switching Time Test Circuit and Waveforms

Package Dimensions (Surface Mount)



Lead Coplanarity : 0.004 (0.10) MAX

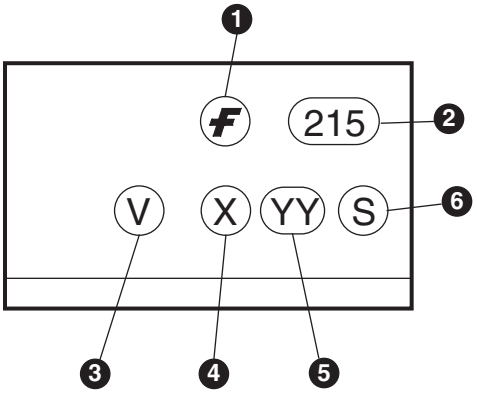
8-Pin Small Outline



ORDERING INFORMATION

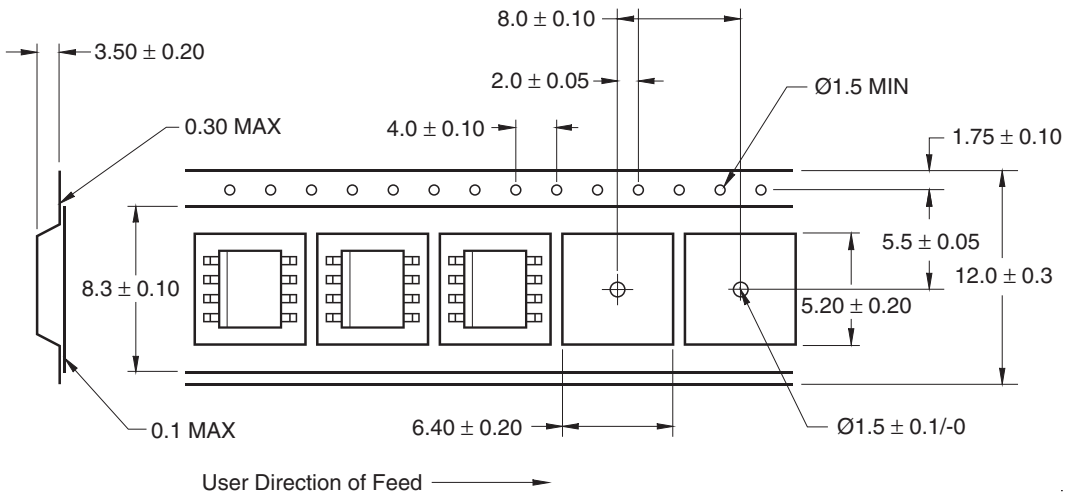
Option	Order Entry Identifier	Description
V	V	VDE 0084
R1	R1	Tape and reel (500 units per reel)
R1V	R1V	VDE 0884, Tape and reel (500 units per reel)
R2	R2	Tape and reel (2500 units per reel)
R2V	R2V	VDE 0884, Tape and reel (2500 units per reel)

MARKING INFORMATION

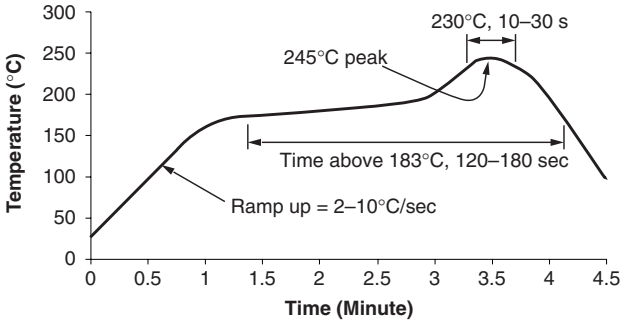


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., ‘3’
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

Carrier Tape Specifications



Reflow Profile



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

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.