FAIRCHILD
SEMICONDUCTOR®

September 2007

MOC8111M, MOC8112M, MOC8113M
6-Pin DIP Optocoupler for Power Supply Applications (No Base Connection)

Features

- High isolation voltage
  7500 VAC Peak—1 second
- High BV_{CEO} minimum 70 Volts
- Current transfer ratio in selected groups:
  MOC8111M: 20% min.
  MOC8112M: 50% min.
  MOC8113M: 100% min.
- Maximum switching time in saturation specified
- Underwriters Laboratory (UL) recognized
  (File #E90700, Vol. 2)
- IEC60747-5-2 approved (ordering option V)

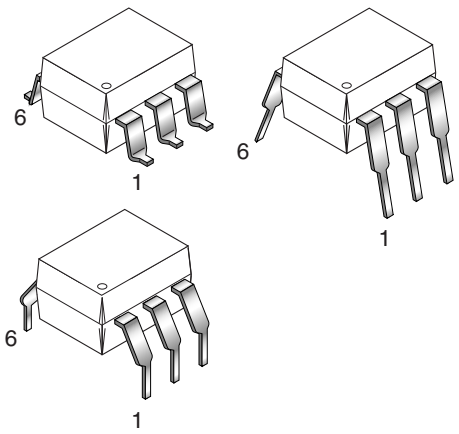
Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls

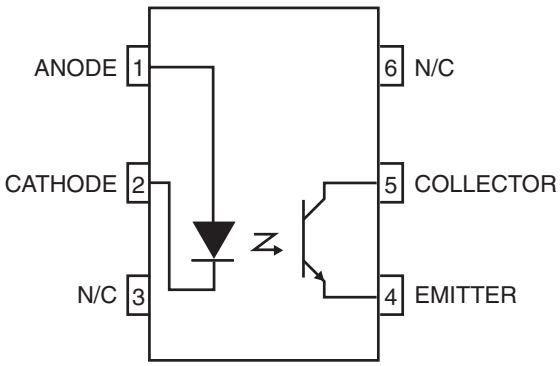
Description

The MOC811XM series consists of a Gallium Arsenide IRED coupled with an NPN phototransistor. The base of the transistor is not bonded to an external pin for improved noise immunity.

Packages



Schematic



Absolute Maximum Ratings (T_A = 25°C Unless otherwise specified.)

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.

Symbol	Parameter	Value	Unit
TOTAL DEVICE			
P_D	Total Device Power Dissipation @ T_A = 25°C	260	mW
	Derate above 25°C	3.5	mW/°C
T_{OPR}	Ambient Operating Temperature Range	-40 to +100	°C
T_{STG}	Storage Temperature Range	-40 to +150	°C
T_{SOL}	Lead Soldering Temperature (Wave Solder) (1/16" from case, 10 sec. duration)	260	°C
INPUT LED			
I_F	Forward Current – Continuous	90	mA
I_F(pk)	Forward Current – Peak (PW = 1μs, 300pps)	3	A
V_R	Reverse Voltage	6	V
P_D	LED Power Dissipation @ T_A = 25°C	135	mW
	Derate above 25°C	1.8	mW/°C
OUTPUT TRANSISTOR			
P_D	Detector Power Dissipation @ T_A = 25°C	200	mW
	Derate above 25°C	2.67	mW/°C

Electrical Characteristics (T_A = 25°C Unless otherwise specified.)

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
EMITTER						
V_F	Input Forward Voltage	I_F = 60mA		1.35	1.65	V
		I_F = 10mA		1.15	1.50	
V_R	Reverse Voltage	I_R = 10μA	6.0	15		V
C_J	Capacitance	V_F = 0V, f = 1.0MHz		50		pF
		V_F = 1V, f = 1.0MHz		65		
I_R	Reverse Leakage Current	V_R = 3.0V		.35	10	μA
DETECTOR						
BV_{CEO}	Breakdow Voltage, Collector to Emitter	I_C = 1.0mA, I_F = 0	70			V
BV_{ECO}	Breakdow Voltage, Emitter to Collector	I_E = 100μA, I_F = 0	7			V
I_{CEO}	Leakage Current, Collector to Emitter	V_{CE} = 10V, I_F = 0		5	50	V
C_{CE}	Capacitance, Collector to Emitter	V_{CE} = 0 V, f = 1MHz		8		pF

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
V_{ISO}	Input-Output Isolation Voltage	f = 60Hz, t = 1 sec.	7500			$V_{AC(PK)}$
C_{ISO}	Isolation Capacitance	V_{I-O} = 0, f = 1MHz		0.5		pF

Transfer Characteristic

Symbol	Characteristics	Test Conditions	Device	Min.	Typ.	Max.	Units
DC CHARACTERISTICS							
CTR	Output/Input Current Transfer Ratio	I_F = 10mA, V_{CE} = 5V	MOC8111M	20			%
			MOC8112M	50			
			MOC8113M	100			
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	I_F = 10mA, I_C = 2.5mA	All		0.27	0.4	V
AC CHARACTERISTICS							
Non-Saturated Switching Times							
t_{on}	Turn-On Time	R_L = 100Ω, I_C = 2mA, V_{CC} = 10V, See Figure 7	All		6.0	10	μs
t_{off}	Turn-Off Time		All		5.5	10	μs
Saturated Switching Times							
t_{on}	Turn-On Time	I_F = 20mA, V_{CE} = 0.4V	MOC8111M		3.0	5.5	μs
		I_F = 10mA, V_{CE} = 0.4V	MOC812M/3M		4.2	8.0	
t_r	Rise-Time	I_F = 20mA, V_{CE} = 0.4V	MOC8111M		2.0	4.0	μs
		I_F = 10mA, V_{CE} = 0.4V	MOC812M/3M		3.0	6.0	
t_{off}	Turn-Off Time	I_F = 20mA, V_{CE} = 0.4V	MOC8111M		18	34	μs
		I_F = 10mA, V_{CE} = 0.4V	MOC812M/3M		23	39	
t_f	Fall-Time	I_F = 20mA, V_{CE} = 0.4V	MOC8111M		11	20	μs
		I_F = 10mA, V_{CE} = 0.4V	MOC812M/3M		14	24	

Typical Performance Characteristics

Fig. 1 LED Forward Voltage vs. Forward Current

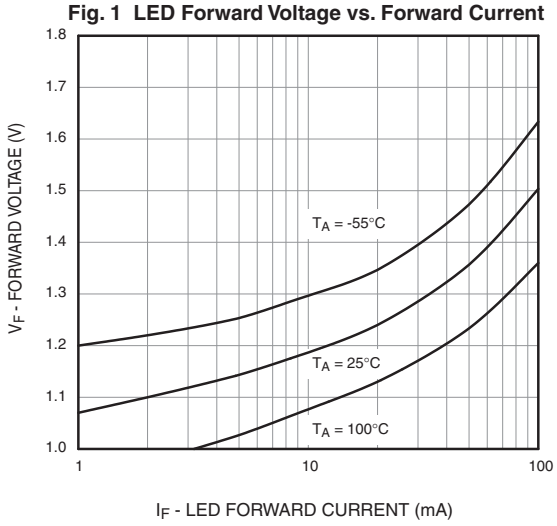


Fig. 2 Normalized CTR vs. Forward Current

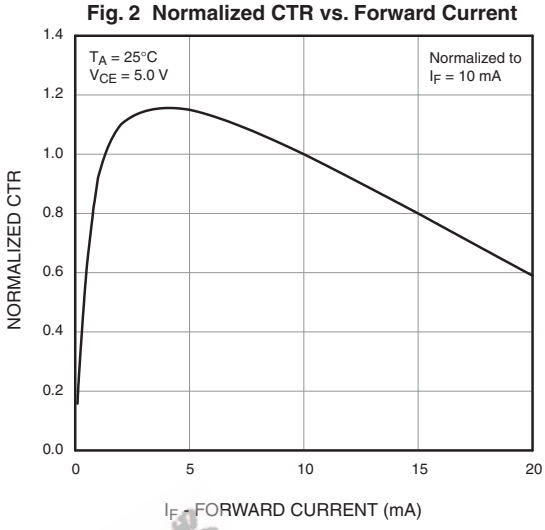


Fig. 3 Normalized CTR vs. Ambient Temperature

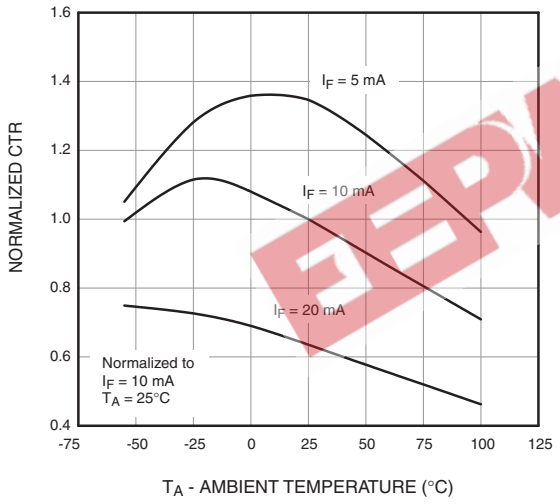


Fig. 4 Collector Emitter Saturation Voltage vs Collector Current

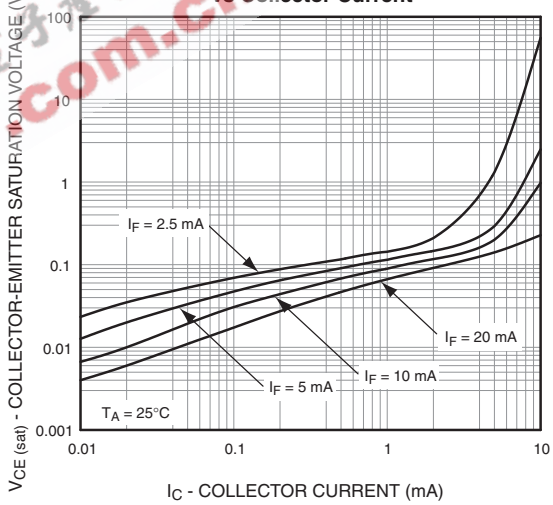


Fig. 5 Switching Speed vs. Load Resistor

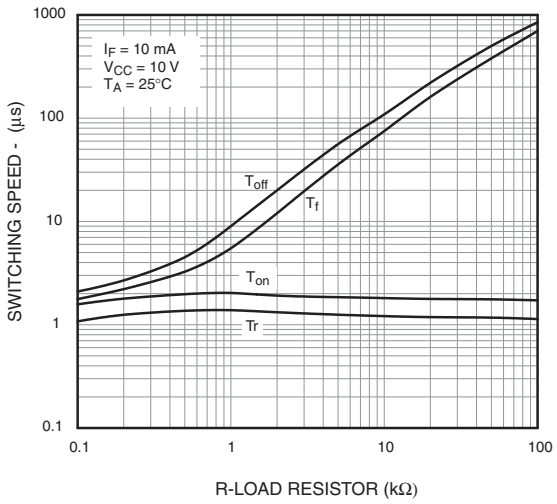
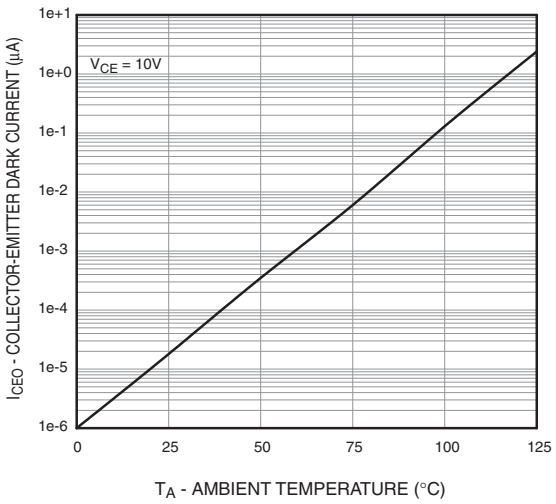


Fig. 6 Dark current vs. Ambient Temperature.



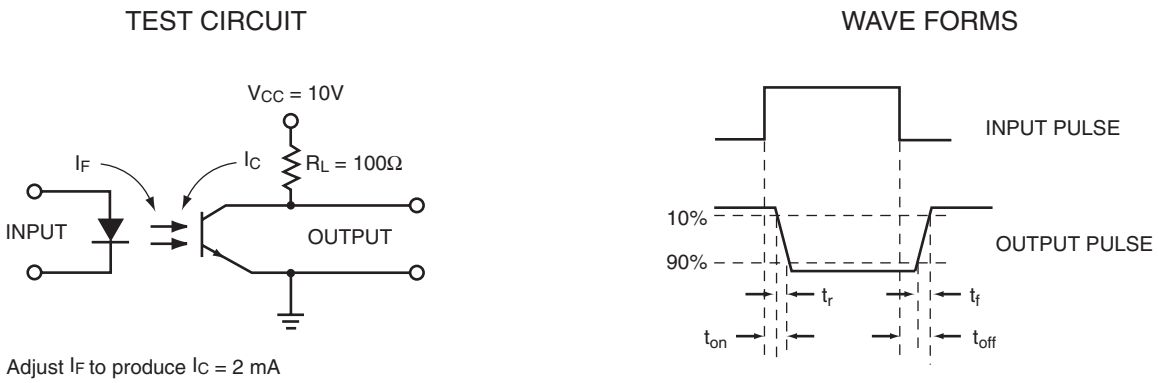
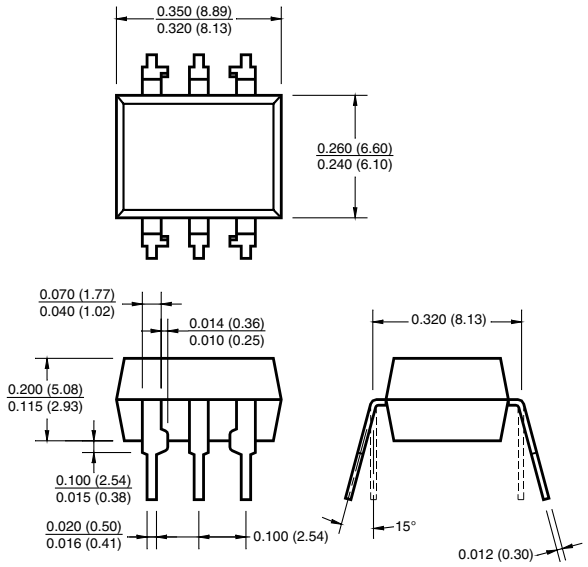


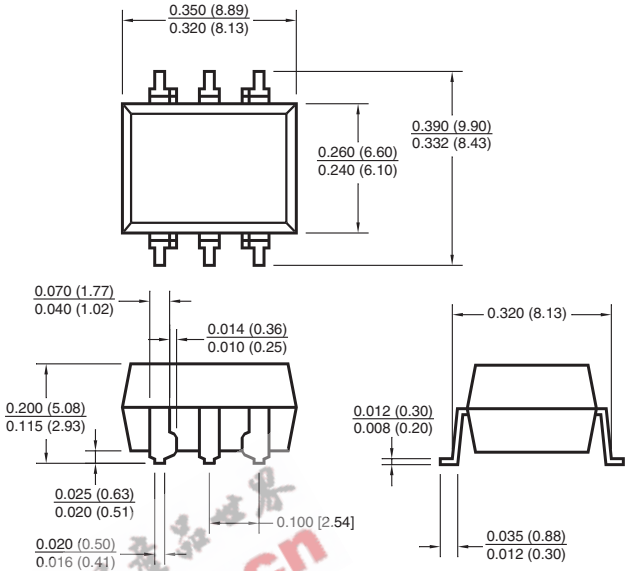
Figure 7. Switching Time Test Circuit and Waveforms

Package Dimensions

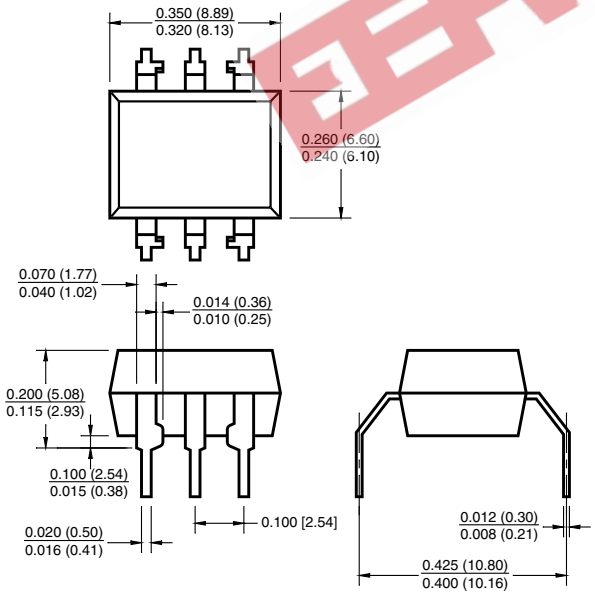
Through Hole



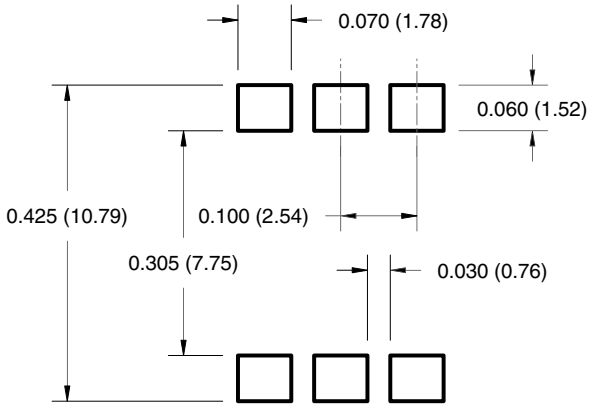
Surface Mount



0.4" Lead Spacing



Recommend Pad Layout for Surface Mount Leadform

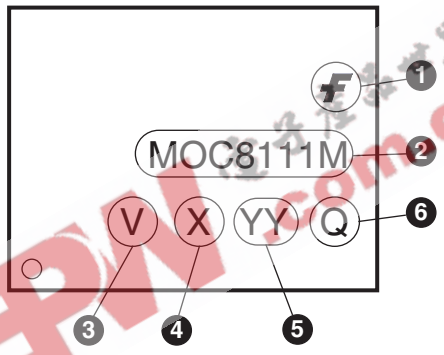


Note:
All dimensions are in inches (millimeters).

Ordering Information

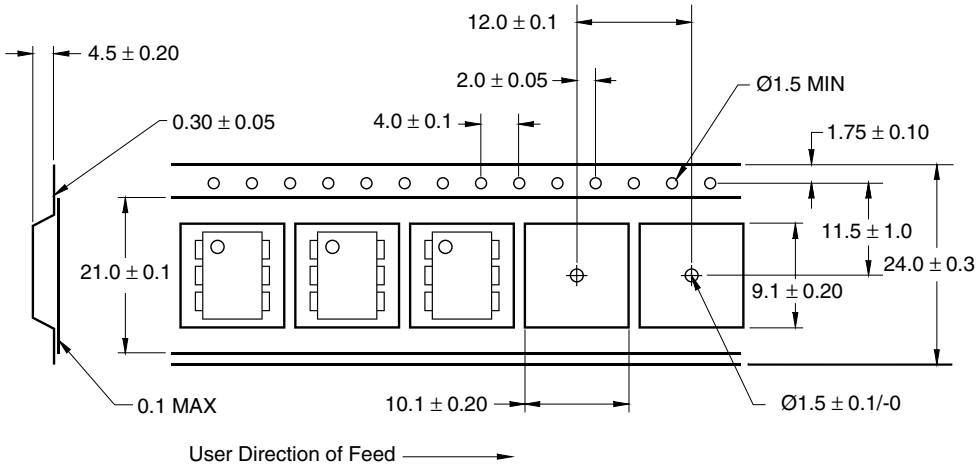
Option	Example Part Number	Description
No Suffix	MOC8111M	Through Hole
S	MOC8111SM	Surface Mount Lead Bend
SR2	MOC8111SR2M	Surface Mount; Tape and Reel
T	MOC8111TM	0.4" Lead Spacing
V	MOC8111VM	VDE 0884
TV	MOC8111TVM	IEC60747-5-2 (VDE), 0.4" Lead Spacing
SV	MOC8111SVM	IEC60747-5-2 (VDE), Surface Mount
SR2V	MOC8111SR2VM	IEC60747-5-2 (VDE), Surface Mount, Tape and Reel

Marking Information



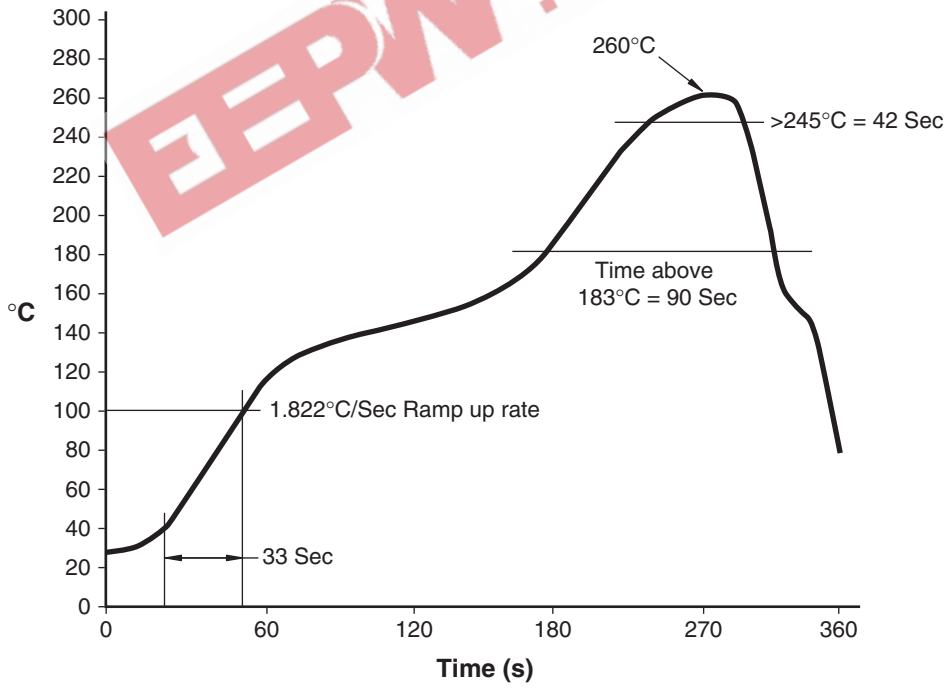
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '7'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Tape Dimensions



Note:
All dimensions are in millimeters.

Reflow Profile



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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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