

H11G1M, H11G2M, H11G3M High Voltage Photodarlington Optocouplers

Features

- High BV_{CEO}
 - Minimum 100V for H11G1M
 - Minimum 80V for H11G2M
 - Minimum 55V for H11G3M
- High sensitivity to low input current
(Min. 500% CTR at $I_F = 1\text{mA}$)
- Low leakage current at elevated temperature
(Max. $100\mu\text{A}$ at 80°C)
- Underwriters Laboratory (UL) recognized
File # E90700, Volume 2

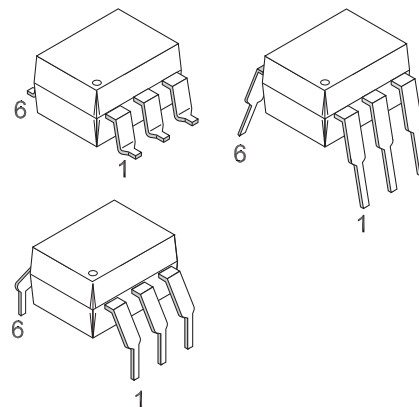
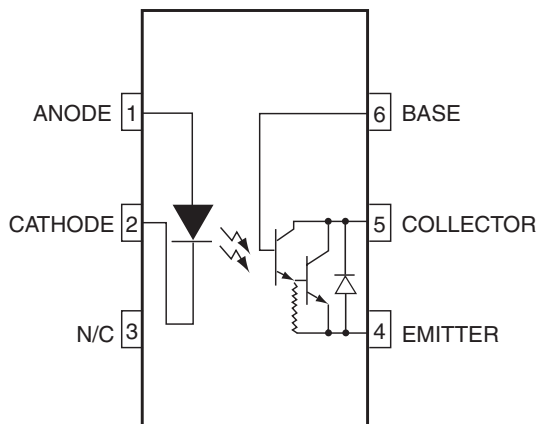
Applications

- CMOS logic interface
- Telephone ring detector
- Low input TTL interface
- Power supply isolation
- Replace pulse transformer

General Description

The H11GXM series are photodarlington-type optically coupled optocouplers. These devices have a gallium arsenide infrared emitting diode coupled with a silicon darlington connected phototransistor which has an integral base-emitter resistor to optimize elevated temperature characteristics.

Schematic



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.

Symbol	Parameter	Value	Units
TOTAL DEVICE			
T _{STG}	Storage Temperature	-55 to +150	°C
T _{OPR}	Operating Temperature	-40 to +100	°C
T _{SOL}	Lead Solder Temperature (Wave Solder)	260 for 10 sec	°C
P _D	Total Device Power Dissipation @ T _A = 25°C	260	mW
	Derate Above 25°C	3.5	mW/°C
EMITTER			
I _F	Forward Input Current	60	mA
V _R	Reverse Input Voltage	6.0	V
I _{F(pk)}	Forward Current – Peak (1µs pulse, 300pps)	3.0	A
P _D	LED Power Dissipation @ T _A = 25°C	100	mW
	Derate Above 25°C	1.8	mW/°C
DETECTOR			
V _{CEO}	Collector-Emitter Voltage		V
	H11G1M	100	
	H11G2M	80	
	H11G3M	55	
P _D	LED Power Dissipation @ T _A = 25°C	200	mW
	Derate Above 25°C	2.67	mW/°C

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise specified.)

Individual Component Characteristics

Symbol	Characteristic	Test Conditions	Device	Min.	Typ.*	Max.	Unit
EMITTER							
V_F	Forward Voltage	$I_F = 10\text{mA}$	All		1.3	1.50	V
$\frac{\Delta V_F}{\Delta T_A}$	Forward Voltage Temp. Coefficient		All		-1.8		mV/°C
BV_R	Reverse Breakdown Voltage	$I_R = 10\mu\text{A}$	All	3.0	25		V
C_J	Junction Capacitance	$V_F = 0\text{V}, f = 1\text{MHz}$	All		50		pF
		$V_F = 1\text{V}, f = 1\text{MHz}$			65		
I_R	Reverse Leakage Current	$V_R = 3.0\text{V}$	All		0.001	10	μA
DETECTOR							
BV_{CEO}	Breakdown Voltage Collector to Emitter	$I_C = 1.0\text{mA}, I_F = 0$	H11G1M	100			V
			H11G2M	80			
			H11G3M	55			
BV_{CBO}	Collector to Base	$I_C = 100\mu\text{A}$	H11G1M	100			V
			H11G2M	80			
			H11G3M	55			
BV_{EBO}	Emitter to Base		All	7	10		V
I_{CEO}	Leakage Current Collector to Emitter	$V_{CE} = 80\text{V}, I_F = 0$	H11G1M			100	nA
		$V_{CE} = 60\text{V}, I_F = 0$	H11G2M				
		$V_{CE} = 30\text{V}, I_F = 0$	H11G3M				
		$V_{CE} = 80\text{V}, I_F = 0, T_A = 80^\circ\text{C}$	H11G1M			100	μA
		$V_{CE} = 60\text{V}, I_F = 0, T_A = 80^\circ\text{C}$	H11G2M				

Transfer Characteristics

Symbol	Characteristics	Test Conditions	Device	Min.	Typ.*	Max.	Units
EMITTER							
CTR	Current Transfer Ratio, Collector to Emitter	$I_F = 10\text{mA}, V_{CE} = 1\text{V}$	H11G1M/2M	100 (1000)			mA (%)
		$I_F = 1\text{mA}, V_{CE} = 5\text{V}$	H11G1M/2M	5 (500)			
			H11G3M	2 (200)			
$V_{CE(SAT)}$	Saturation Voltage	$I_F = 16\text{mA}, I_C = 50\text{mA}$	H11G1M/2M		0.85	1.0	V
		$I_F = 1\text{mA}, I_C = 1\text{mA}$	H11G1M/2M		0.75	1.0	
		$I_F = 20\text{mA}, I_C = 50\text{mA}$	H11G3M		0.85	1.2	
SWITCHING TIMES							
t_{ON}	Turn-on Time	$R_L = 100\Omega, I_F = 10\text{mA}, V_{CE} = 5\text{V}, f \leq 30\text{Hz}, \text{Pulse Width} \leq 300\mu\text{s}$	All		5		μs
t_{OFF}	Turn-off Time		All		100		μs

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Device	Min.	Typ.*	Max.	Units
V_{ISO}	Isolation Voltage	$f = 60\text{Hz}, t = 1 \text{ sec.}$	All	7500			V_{AC}^{PEAK}
R_{ISO}	Isolation Resistance	$V_{I-O} = 500 \text{ VDC}$	All	10^{11}			Ω
C_{ISO}	Isolation Capacitance	$f = 1\text{MHz}$	All		0.2		pF

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

Typical Performance Curves

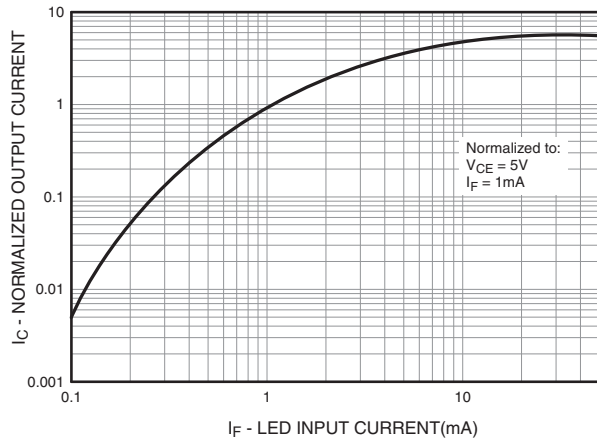


Fig. 1 Output Current vs. Input Current

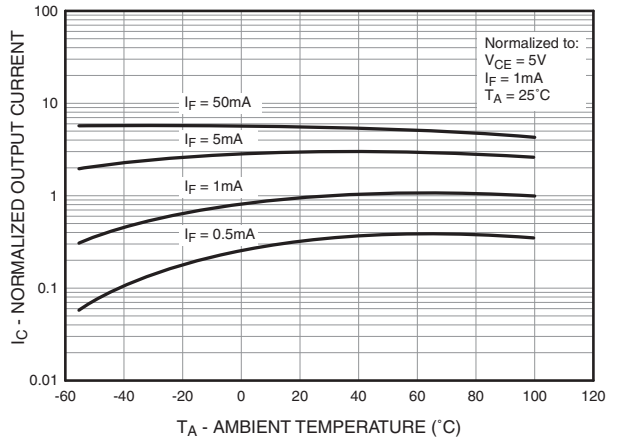


Fig. 2 Normalized Output Current vs. Temperature

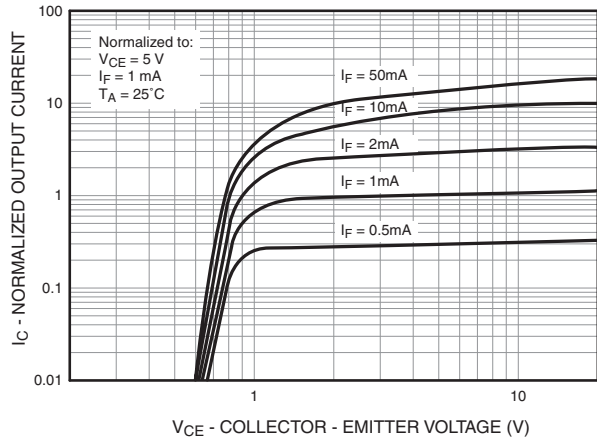


Fig. 3 Output Current vs. Collector - Emitter Voltage

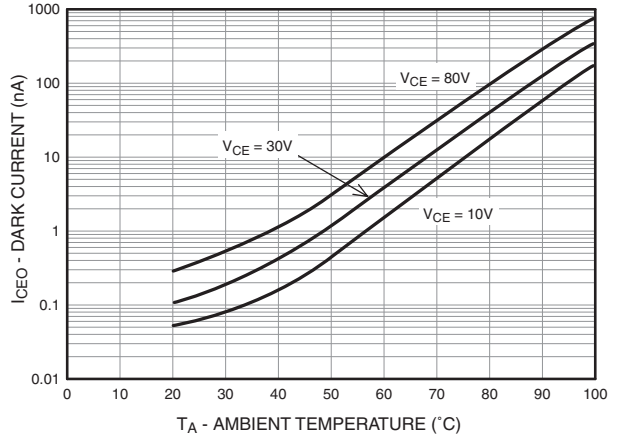


Fig. 4 Collector-Emitter Dark Current vs. Ambient Temperature

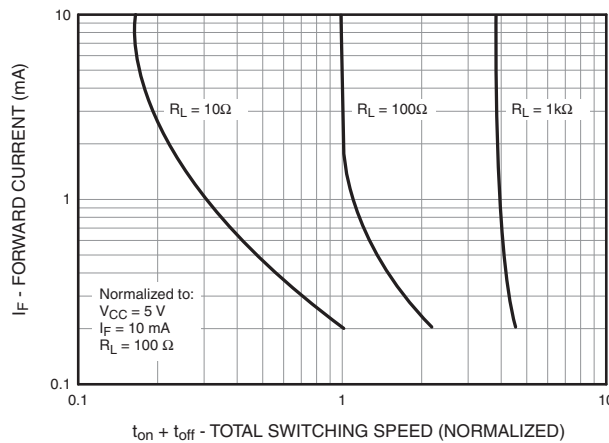
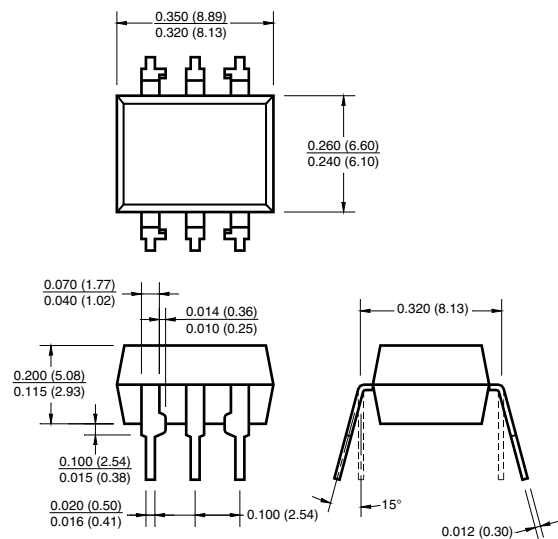


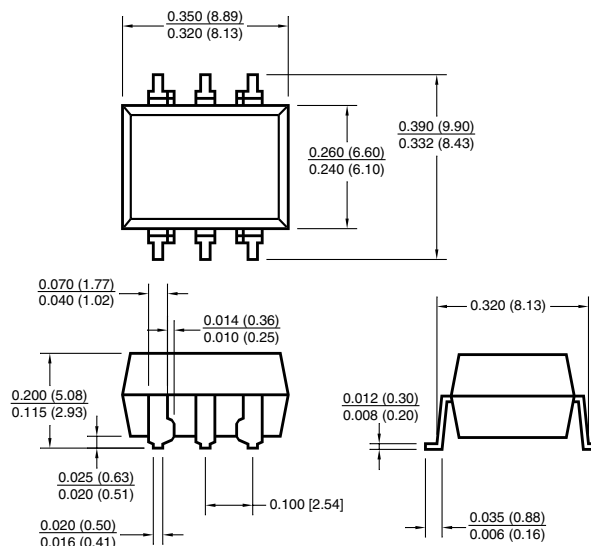
Fig. 5 Input Current vs. Total Switching Speed (Typical Values)

Package Dimensions

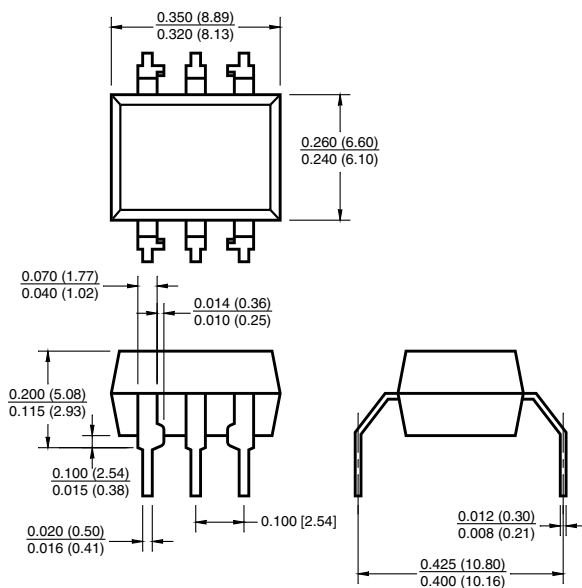
Through Hole



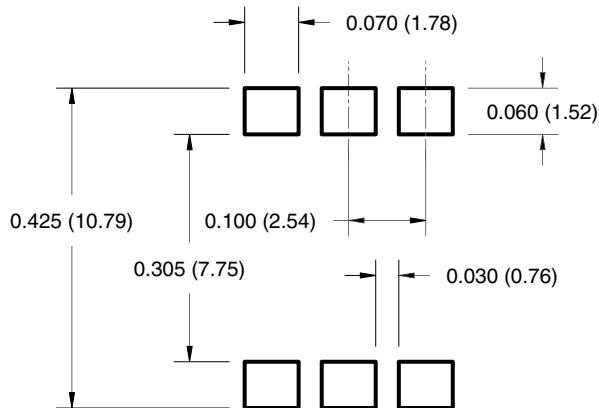
Surface Mount



0.4" Lead Spacing



Recommended Pad Layout for Surface Mount Leadform



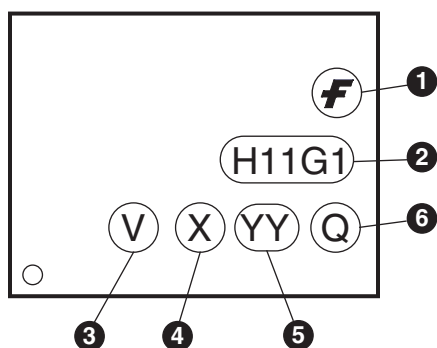
Note:

All dimensions are in inches (millimeters).

Ordering Information

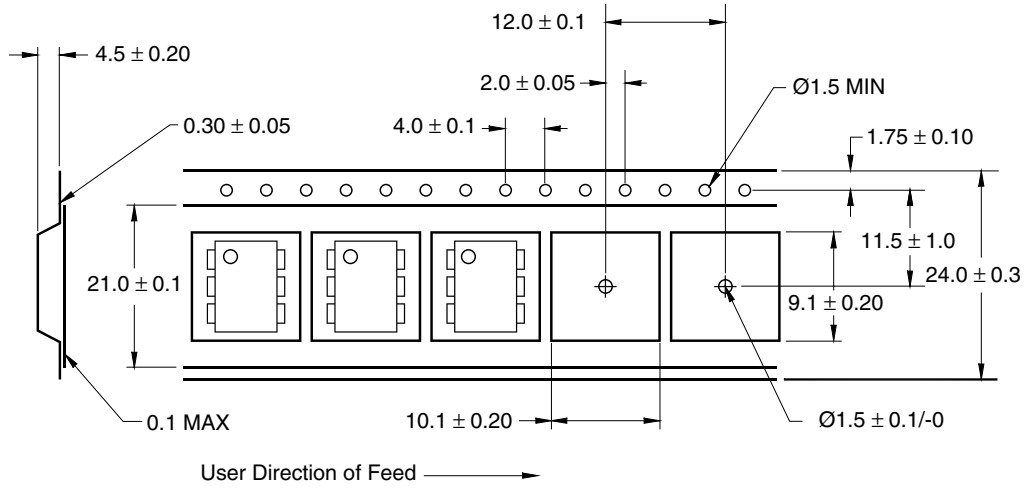
Option	Order Entry Identifier (Example)	Description
No option	H11G1M	Standard Through Hole Device
S	H11G1SM	Surface Mount Lead Bend
SR2	H11G1SR2M	Surface Mount; Tape and Reel
T	H11G1TM	0.4" Lead Spacing
V	H11G1VM	VDE 0884
TV	H11G1TVM	VDE 0884, 0.4" Lead Spacing
SV	H11G1SVM	VDE 0884, Surface Mount
SR2V	H11G1SR2VM	VDE 0884, Surface Mount, Tape and Reel

Marking Information

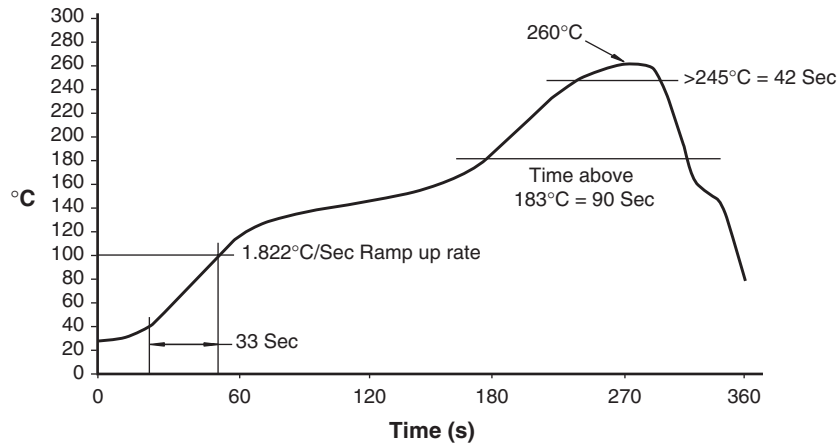


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '7'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Carrier Tape Specifications




Reflow Profile





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Definition of Terms

Datasheet Identification	Product Status	Definition
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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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