

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

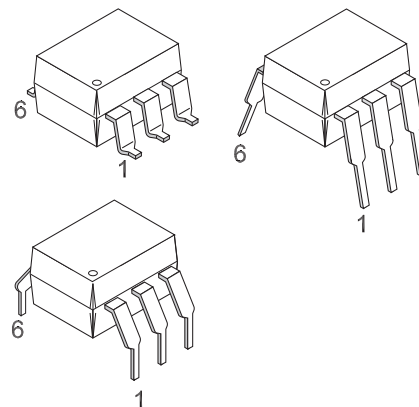
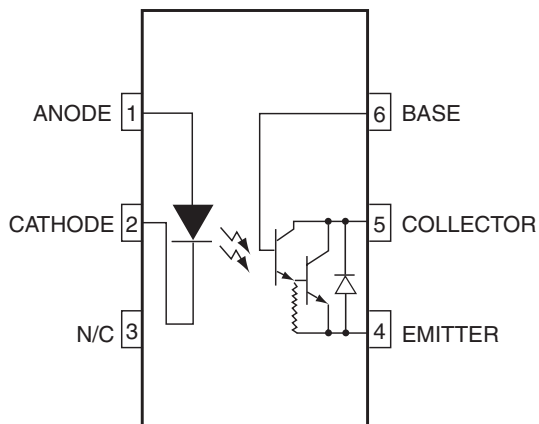
Applications

- 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°C unless otherwise specified.)

Individual Component Characteristics

| Symbol | Characteristic | Test Conditions | Device | Min. | Typ.* | Max. | Unit |
|---------------------------------|--|--|--------|------|-------|------|-------|
| EMITTER | | | | | | | |
| V _F | Forward Voltage | I _F = 10mA | 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 = 10μA | All | 3.0 | 25 | | V |
| C _J | Junction Capacitance | V _F = 0V, f = 1MHz | All | | 50 | | pF |
| | | V _F = 1V, f = 1MHz | | | 65 | | |
| I _R | Reverse Leakage Current | V _R = 3.0V | All | | 0.001 | 10 | μA |
| DETECTOR | | | | | | | |
| BV _{CEO} | Breakdown Voltage Collector to Emitter | I _C = 1.0mA, I _F = 0 | H11G1M | 100 | | | V |
| | | | H11G2M | 80 | | | |
| | | | H11G3M | 55 | | | |
| BV _{CBO} | Collector to Base | I _C = 100μA | 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} = 80V, I _F = 0 | H11G1M | | | 100 | nA |
| | | V _{CE} = 60V, I _F = 0 | H11G2M | | | | |
| | | V _{CE} = 30V, I _F = 0 | H11G3M | | | | |
| | | V _{CE} = 80V, I _F = 0, T _A = 80°C | H11G1M | | | 100 | μA |
| | | V _{CE} = 60V, I _F = 0, T _A = 80°C | H11G2M | | | | |

Transfer Characteristics

| Symbol | Characteristics | Test Conditions | Device | Min. | Typ.* | Max. | Units |
|------------------------|--|--|-----------|------------|-------|------|--------|
| EMITTER | | | | | | | |
| CTR | Current Transfer Ratio, Collector to Emitter | I _F = 10mA, V _{CE} = 1V | H11G1M/2M | 100 (1000) | | | mA (%) |
| | | I _F = 1mA, V _{CE} = 5V | H11G1M/2M | 5 (500) | | | |
| | | | H11G3M | 2 (200) | | | |
| V _{CE(SAT)} | Saturation Voltage | I _F = 16mA, I _C = 50mA | H11G1M/2M | | 0.85 | 1.0 | V |
| | | I _F = 1mA, I _C = 1mA | H11G1M/2M | | 0.75 | 1.0 | |
| | | I _F = 20mA, I _C = 50mA | H11G3M | | 0.85 | 1.2 | |
| SWITCHING TIMES | | | | | | | |
| t _{ON} | Turn-on Time | R _L = 100Ω, I _F = 10mA, | All | | 5 | | μs |
| t _{OFF} | Turn-off Time | V _{CE} = 5V, f ≤ 30Hz, Pulse Width ≤ 300μs | All | | 100 | | μs |

Isolation Characteristics

| Symbol | Characteristic | Test Conditions | Device | Min. | Typ.* | Max. | Units |
|------------------|-----------------------|----------------------------|--------|------------------|-------|------|----------------------|
| V _{ISO} | Isolation Voltage | f = 60Hz, t = 1 sec. | All | 7500 | | | V _{AC} PEAK |
| R _{ISO} | Isolation Resistance | V _{I-O} = 500 VDC | All | 10 ¹¹ | | | Ω |
| C _{ISO} | Isolation Capacitance | f = 1MHz | All | | 0.2 | | pF |

*All Typical values at T_A = 25°C

Typical Performance Curves

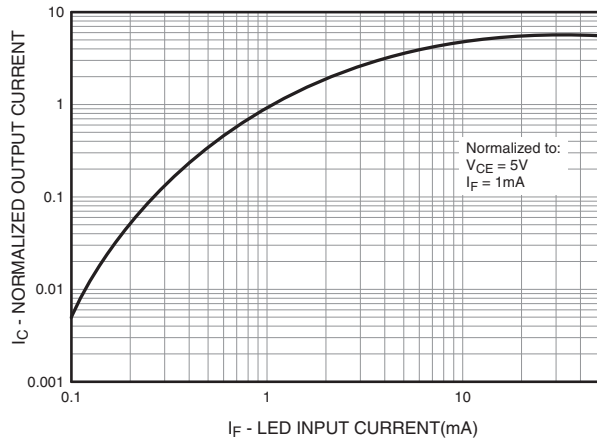


Fig. 1 Output Current vs. Input Current

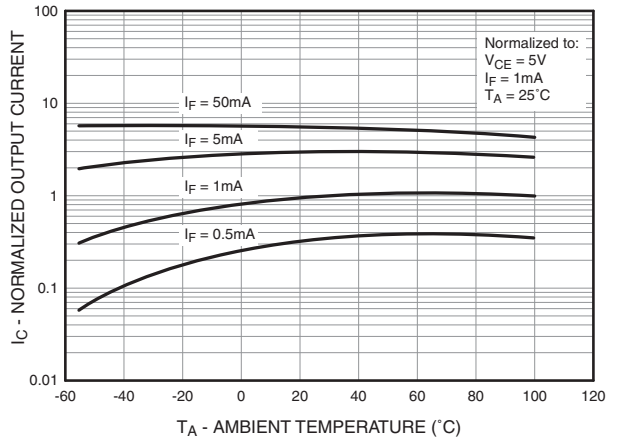


Fig. 2 Normalized Output Current vs. Temperature

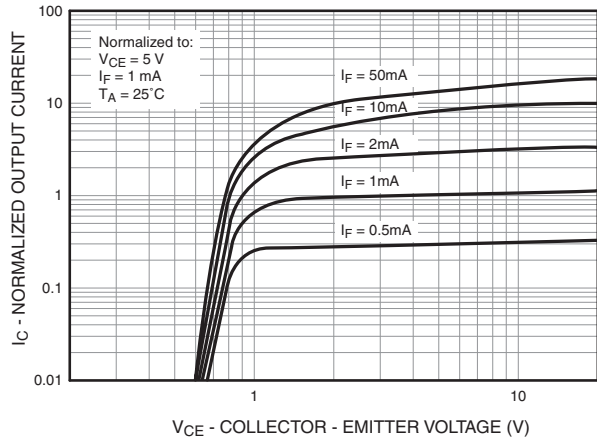


Fig. 3 Output Current vs. Collector - Emitter Voltage

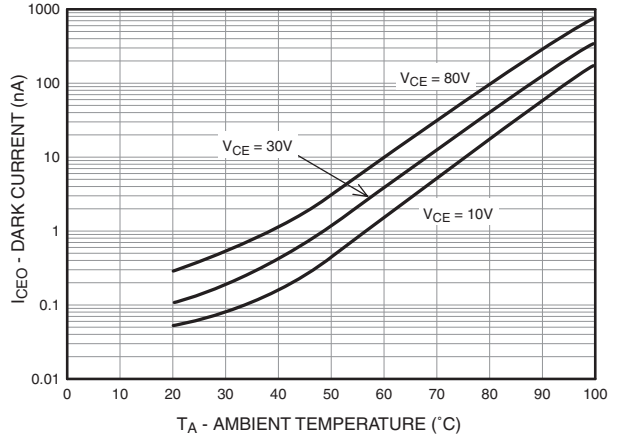


Fig. 4 Collector-Emitter Dark Current vs. Ambient Temperature

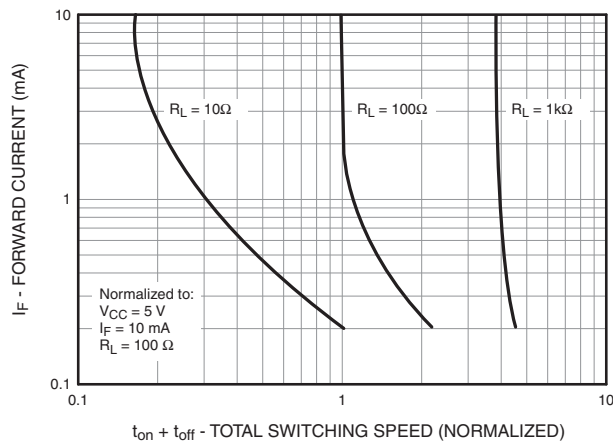
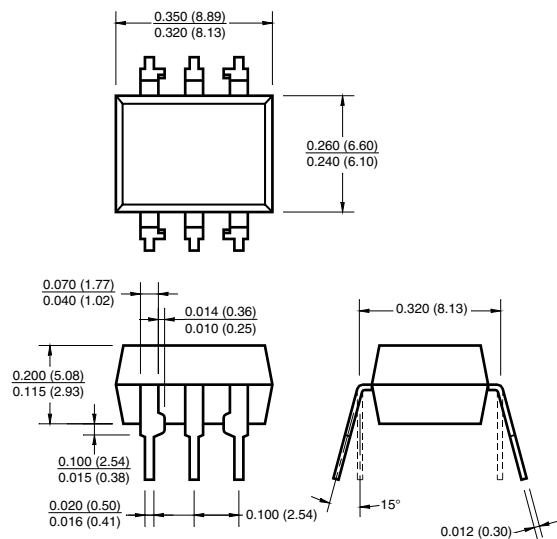


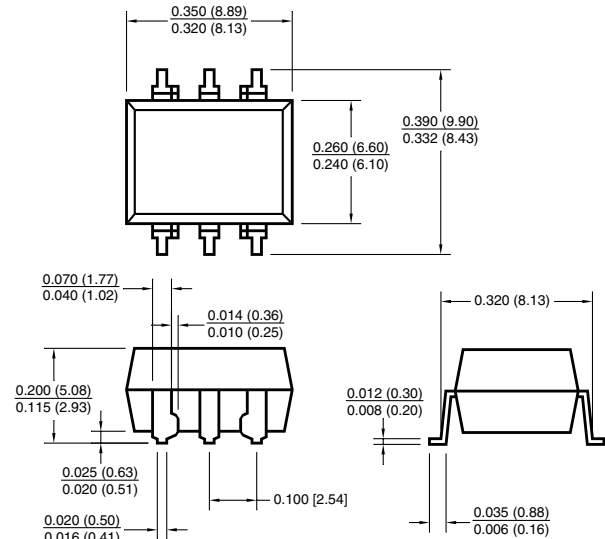
Fig. 5 Input Current vs. Total Switching Speed (Typical Values)

Package Dimensions

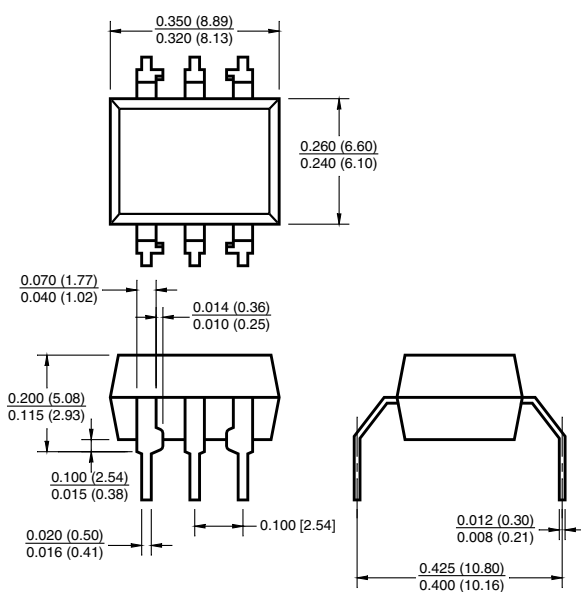
Through Hole



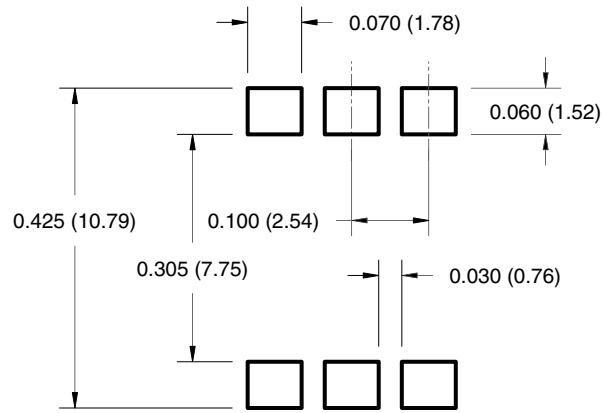
Surface Mount



0.4" Lead Spacing



Recommended Pad Layout for Surface Mount Leadform

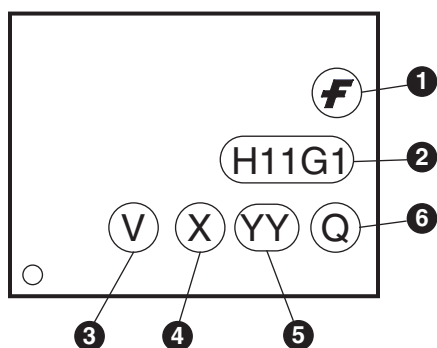


Note:
All dimensions are in inches (millimeters).

Ordering Information

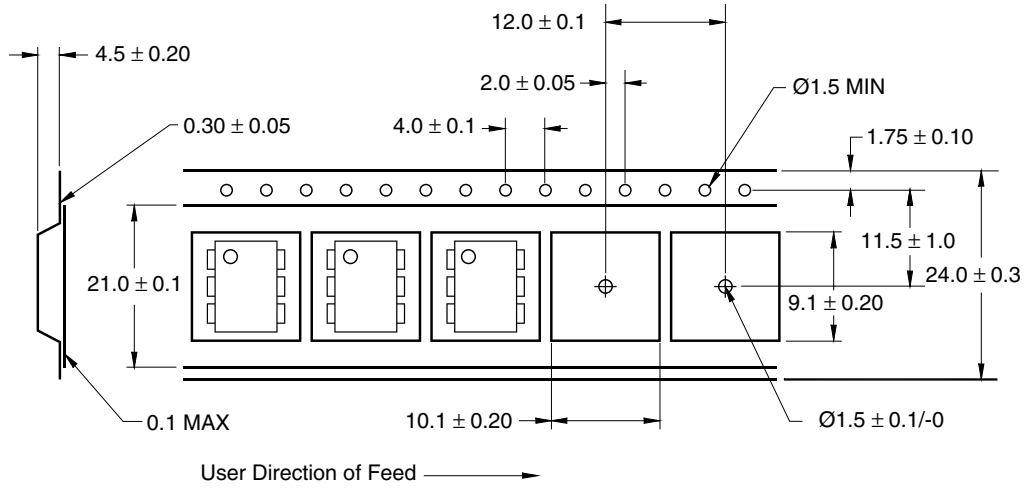
| Option | Order Entry Identifier (Example) | Description |
|-----------|----------------------------------|--|
| No option | H11G1M | Standard Through Hole Device |
| S | H11G1SM | Surface Mount Lead Bend |
| SR2 | H11G1SR2M | Surface Mount; Tape and Reel |
| T | H11G1TM | 0.4" Lead Spacing |
| V | 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

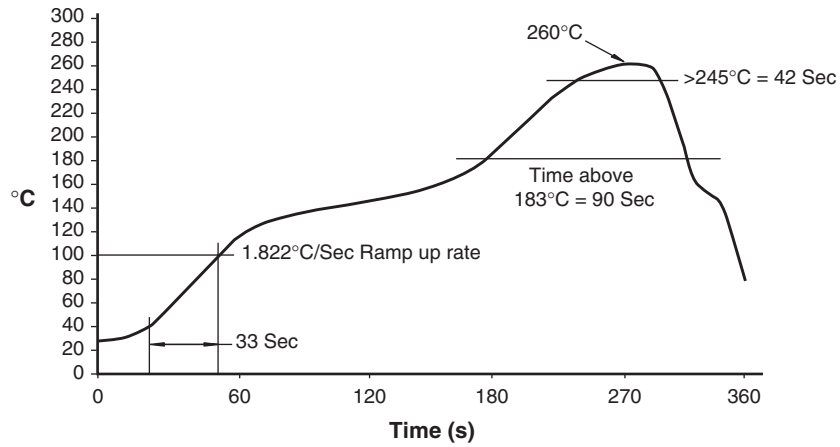


| Definitions | |
|-------------|--|
| 1 | Fairchild logo |
| 2 | Device number |
| 3 | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4 | One digit year code, e.g., '7' |
| 5 | Two digit work week ranging from '01' to '53' |
| 6 | Assembly package code |

Carrier Tape Specifications




Reflow Profile





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