

H11L1M

H11L2M

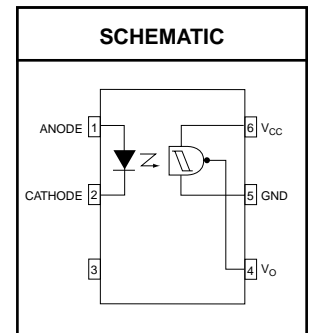
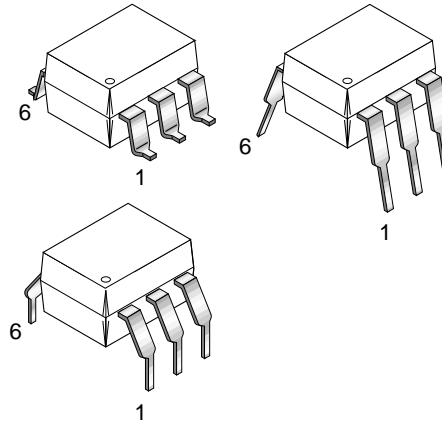
H11L3M

DESCRIPTION

The H11LX series has a high speed integrated circuit detector optically coupled to a gallium-arsenide infrared emitting diode. The output incorporates a Schmitt trigger, which provides hysteresis for noise immunity and pulse shaping. The detector circuit is optimized for simplicity of operation and utilizes an open collector output for maximum application flexibility.

FEATURES

- High data rate, 1 MHz typical (NRZ)
- Free from latch up and oscillation throughout voltage and temperature ranges.
- Microprocessor compatible drive
- Logic compatible output sinks 16 mA at 0.4 V maximum
- Guaranteed on/off threshold hysteresis
- Wide supply voltage capability, compatible with all popular logic systems
- Underwriter Laboratory (UL) recognized—file #E90700



APPLICATIONS

- Logic to logic isolator
- Programmable current level sensor
- Line receiver—eliminate noise and transient problems
- A.C. to TTL conversion—square wave shaping
- Digital programming of power supplies
- Interfaces computers with peripherals

ABSOLUTE MAXIMUM RATINGS

Parameters	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T _{STG}	All	-55 to +150	°C
Operating Temperature	T _{OPR}	All	-40 to +85	°C
Lead Solder Temperature	T _{SOL}	All	260 for 10 sec	°C
Total Device Power Dissipation @ 25°C Derate Above 25°C	P _D	All	250	mW
			2.94	mW/°C
EMITTER				
Continuous Forward Current	I _F	All	60	mA
Reverse Voltage	V _R	All	6	V
Forward Current - Peak (1 μs pulse, 300 pps)	I _{F(pk)}	All	3.0	A
LED Power Dissipation 25°C Ambient Derate Linearly From 25°C	P _D	All	120	mW
			1.41	mW/°C
DETECTOR				
Detector Power Dissipation @ 25°C Derate Linearly from 25°C	P _D	All	150	mW
			2.0	mW/°C
V ₄₅ Allowed Range	V _O	All	0 to 16	V
V ₆₅ Allowed Range	V _{CC}	All	3 to 16	V
I ₄ Output Current	I _O	All	50	mA

H11L1M

H11L2M

H11L3M

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameters	Test Conditions	Symbol	Device	Min	Typ	Max	Units
EMITTER							
Input Forward Voltage	$I_F = 10\text{ mA}$	V_F	All		1.2	1.5	V
	$I_F = 0.3\text{ mA}$			0.75	1.0		
Reverse Current	$V_R = 3\text{ V}$	I_R	All			10	μA
Capacitance	$V = 0, f = 1.0\text{ MHz}$	C_J	All			100	pF
DETECTOR							
Operating Voltage Range		V_{CC}	All	3		15	V
Supply Current	$I_F = 0, V_{CC} = 5\text{ V}$	$I_{CC(\text{off})}$	All		1.6	5.0	mA
Output Current, High	$I_F = 0, V_{CC} = V_O = 15\text{ V}$	I_{OH}	All			100	μA

ISOLATION CHARACTERISTICS

Parameters	Test Conditions	Symbol	Min	Typ	Max	Units
Input-Output Isolation Voltage	$t = 1\text{ sec.}$	V_{ISO}	7500			V_{PEAK}
Isolation Capacitance	$V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$	C_{ISO}		0.4	0.6	pF
Isolation Resistance	$V_{I-O} = \pm 500\text{ VDC}$	R_{ISO}	10^{11}			Ω

H11L1M

H11L2M

H11L3M

TRANSFER CHARACTERISTICS

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Supply Current	$I_F = 10\text{mA}, V_{CC} = 5\text{V}$	$I_{CC(on)}$	All		1.6	5.0	mA
Output Voltage, low	$R_L = 270\Omega, V_{CC} = 5\text{V}, I_F = I_{F(on)max}$	V_{OL}	All		0.2	0.4	V
Turn-On Threshold Current	$R_L = 270\Omega, V_{CC} = 5\text{V}$	$I_{F(on)}^*$	H11L1M			1.6	mA
			H11L2M			10.0	
			H11L3M			5.0	
Turn-Off Threshold Current	$R_L = 270\Omega, V_{CC} = 5\text{V}$	$I_{F(off)}$	All	0.3	1.0		mA
Hysteresis Ratio	$R_L = 270\Omega, V_{CC} = 5\text{V}$	$I_{F(off)}/I_{F(on)}$	All	0.50	0.75	0.90	
AC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
SWITCHING SPEED							
Turn-On time	$R_L = 270\Omega, V_{CC} = 5\text{V}, I_F = I_{F(on)}, T_A = 25^\circ\text{C}$	t_{on}	All		1.0		μs
					0.65		
						4	
Fall Time	$R_L = 270\Omega, V_{CC} = 5\text{V}, I_F = I_{F(on)}, T_A = 25^\circ\text{C}$	t_f	All		0.1		μs
					.05		
					0.1		
Turn-Off Time	$R_L = 270\Omega, V_{CC} = 5\text{V}, I_F = I_{F(on)}, T_A = 25^\circ\text{C}$	t_{off}	All		2.0		μs
					1.2		
						4	
Rise time	$R_L = 270\Omega, V_{CC} = 5\text{V}, I_F = I_{F(on)}, T_A = 25^\circ\text{C}$	t_r	All		0.1		μs
					0.07		
					0.1		
Data Rate			All		1.0		MHz

NOTE:

*Maximum $I_{F(ON)}$ is the maximum current required to trigger the output. For example, a 1.6mA maximum trigger current would require the LED to be driven at a current greater than 1.6mA to guarantee the device will turn on. A 10% guard band is recommended to account for degradation of the LED over its lifetime. The maximum allowable LED drive current is 60mA.

H11L1M

H11L2M

H11L3M

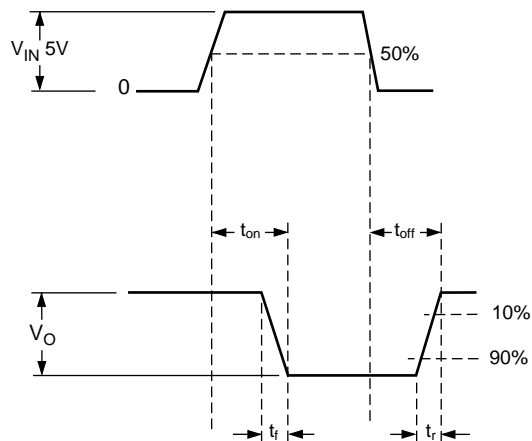
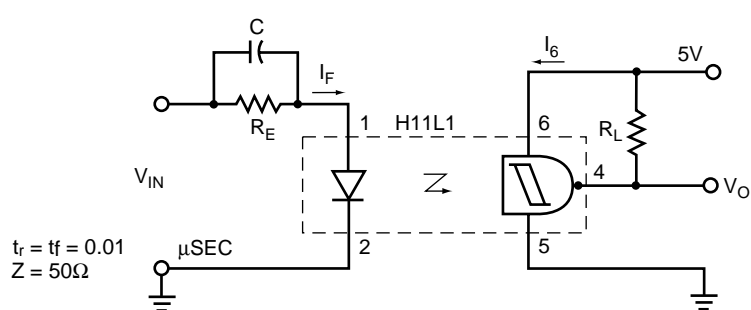


Figure 1. Switching Test Circuit and Waveforms

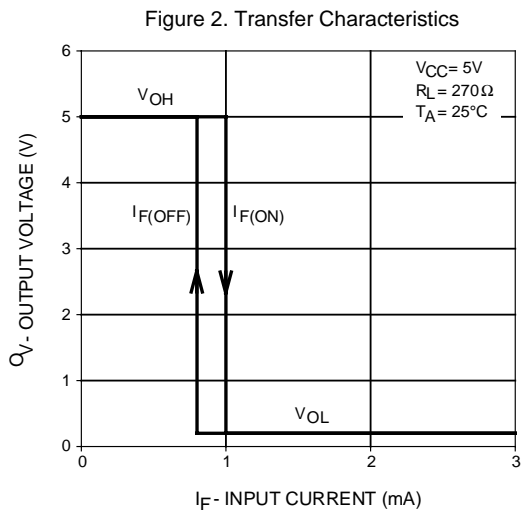


Figure 2. Transfer Characteristics

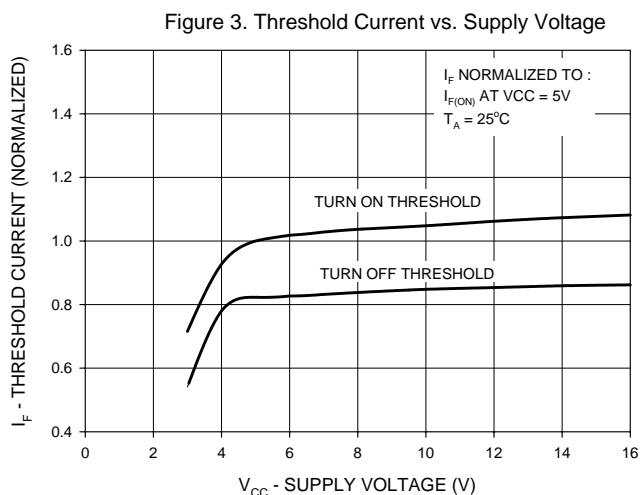


Figure 3. Threshold Current vs. Supply Voltage

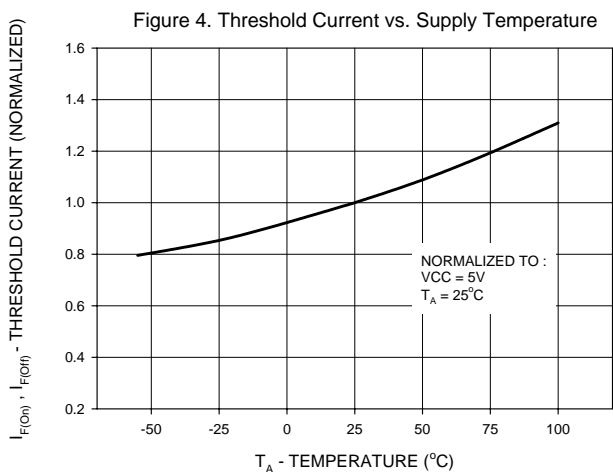


Figure 4. Threshold Current vs. Supply Temperature

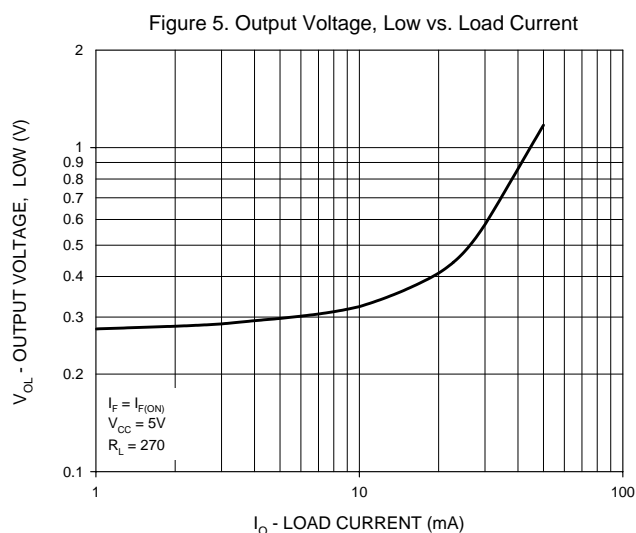


Figure 5. Output Voltage, Low vs. Load Current

H11L1M

H11L2M

H11L3M

Figure 6. Supply Current vs. Supply Voltage

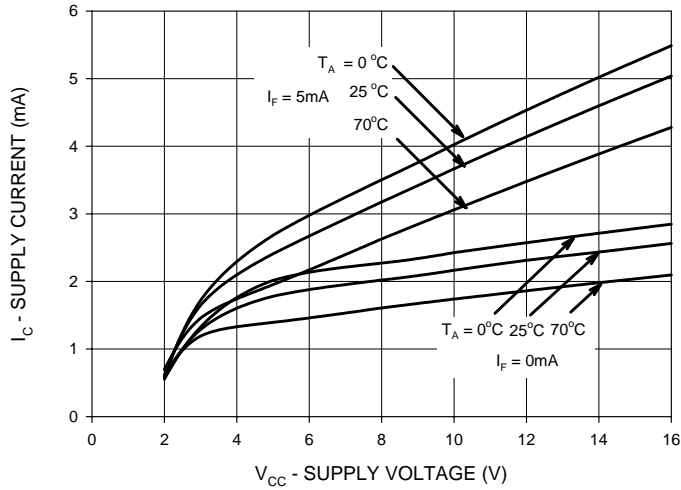
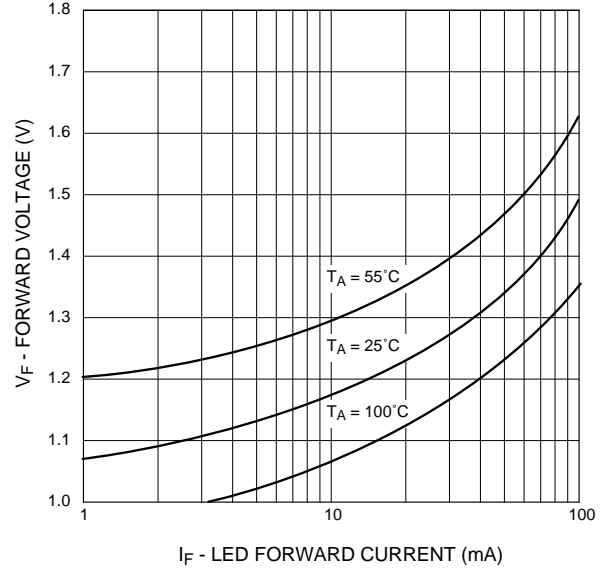


Figure 7. LED Forward Voltage vs. Forward Current

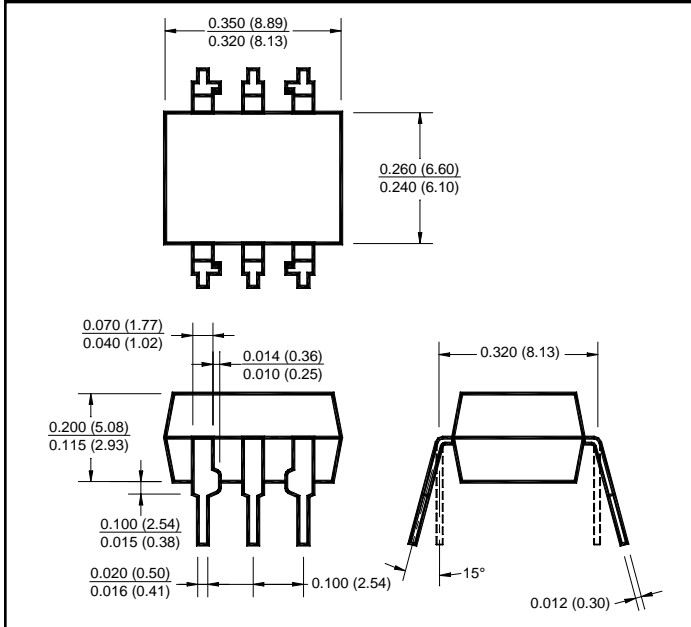


H11L1M

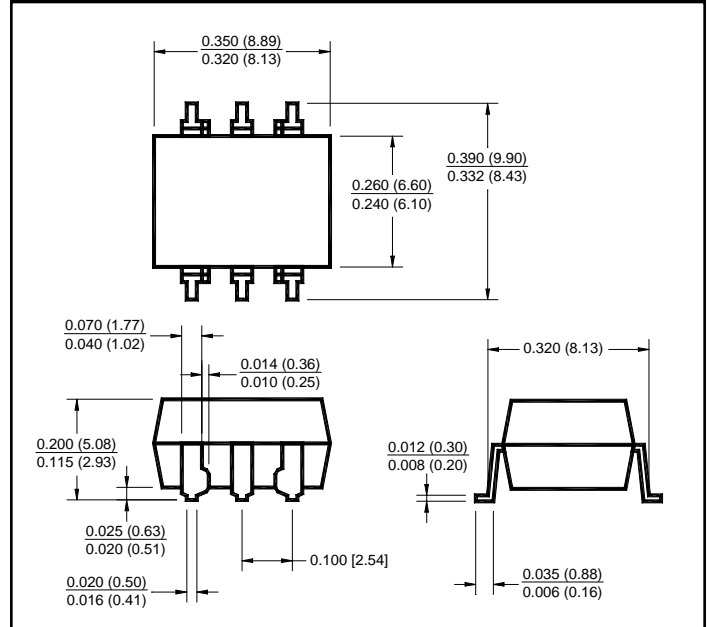
H11L2M

H11L3M

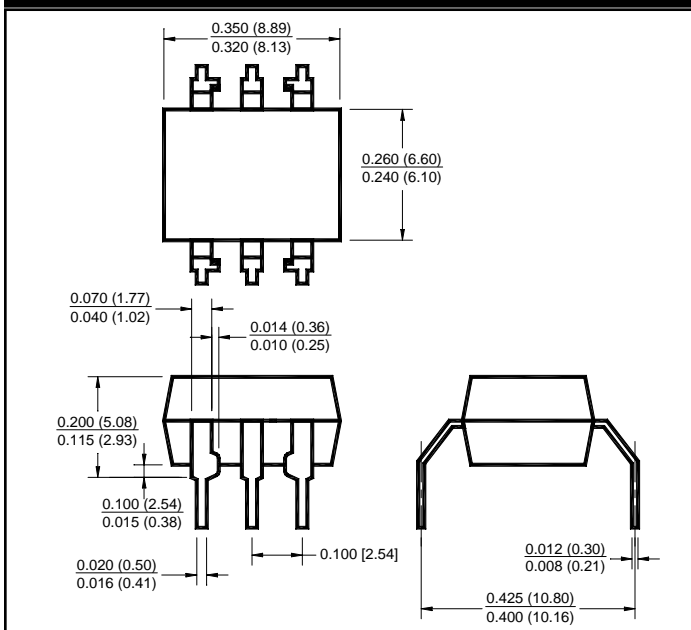
Package Dimensions (Through Hole)



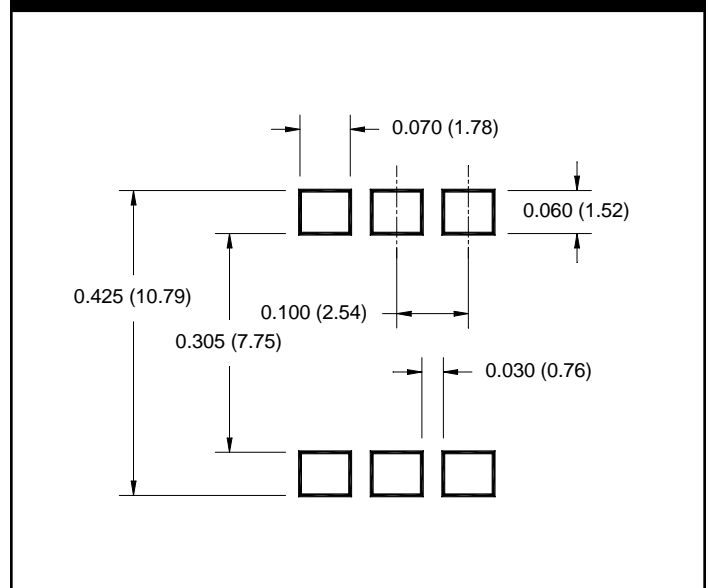
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

All dimensions are in inches (millimeters)

H11L1M

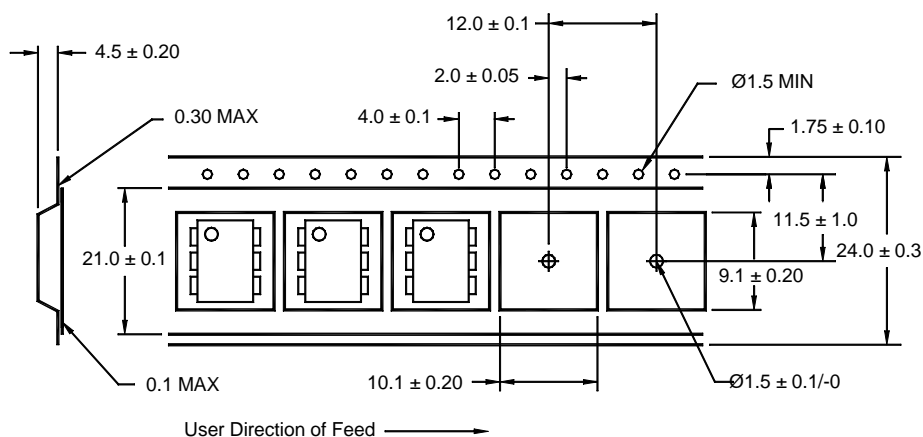
H11L2M

H11L3M

ORDERING INFORMATION

Option/Order Entry Identifier	Description
S	Surface Mount Lead Bend
SR2	Surface Mount; Tape and reel
T	0.4" Lead Spacing
V	VDE 0884
TV	VDE 0884, 0.4" Lead Spacing
5V	VDE 0884, Surface Mount
SR2V	VDE 0884, Surface Mount, Tape & Reel

Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in inches (millimeters)

H11L1M

H11L2M

H11L3M

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in labeling, can be reasonably expected to result in a significant injury of the user.
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.