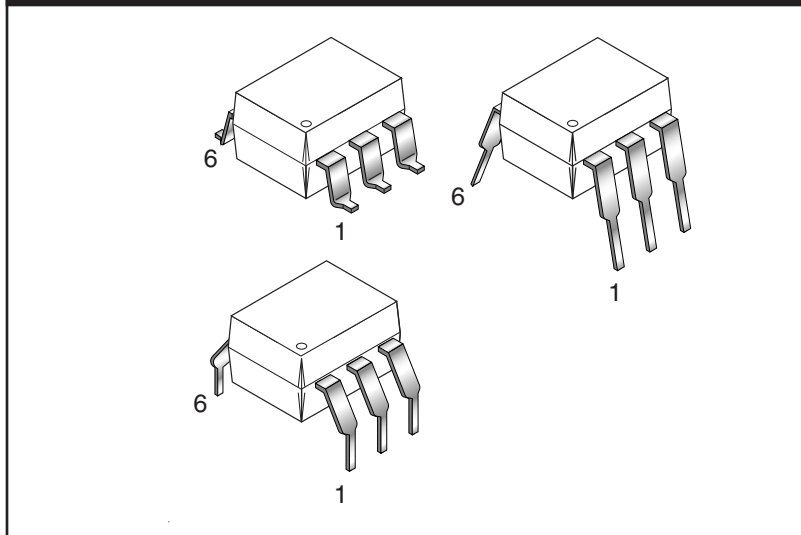


**H11L1M**

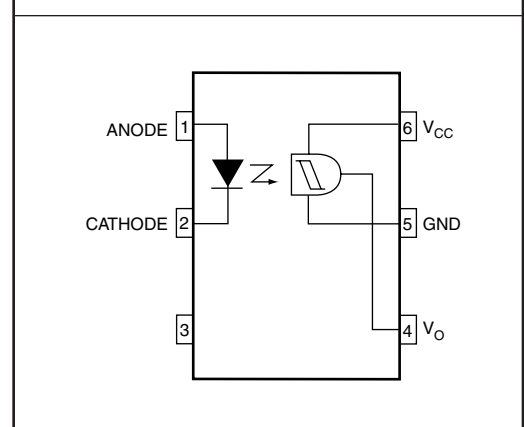
**H11L2M**

**H11L3M**

**PACKAGE**



**SCHEMATIC**



**DESCRIPTION**

The H11LXM 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.

**Truth Table**

Input	Output
H	L
L	H

**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
- Underwriters Laboratory (UL) recognized—file #E90700, Volume 2
- VDE recognized – File#102497 – Add option V (e.g., H11L1VM)

**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

**H11L1M**

**H11L2M**

**H11L3M**

**ABSOLUTE MAXIMUM RATINGS**

Parameters	Symbol	Device	Value	Units
<b>TOTAL DEVICE</b>				
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 2.94	mW mW/°C
<b>EMITTER</b>				
Continuous Forward Current	$I_F$	All	60	mA
Reverse Voltage	$V_R$	All	6	V
Forward Current - Peak (1 $\mu$ s 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 1.41	mW mW/°C
<b>DETECTOR</b>				
Detector Power Dissipation @ 25°C Derate Linearly from 25°C	$P_D$	All	150 2.0	mW 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

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

**INDIVIDUAL COMPONENT CHARACTERISTICS**

Parameters	Test Conditions	Symbol	Device	Min	Typ	Max	Units
<b>EMITTER</b>							
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	$\mu\text{A}$
Capacitance	$V = 0, f = 1.0\text{ MHz}$	$C_J$	All			100	pF
<b>DETECTOR</b>							
Operating Voltage Range		$V_{CC}$	All	3		15	V
Supply Current	$I_F = 0, V_{CC} = 5\text{ V}$	$I_{CC(off)}$	All		1.6	5.0	mA
Output Current, High	$I_F = 0, V_{CC} = V_O = 15\text{ V}$	$I_{OH}$	All			100	$\mu\text{A}$

**H11L1M**

**H11L2M**

**H11L3M**

**ISOLATION CHARACTERISTICS**

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

**TRANSFER CHARACTERISTICS**

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

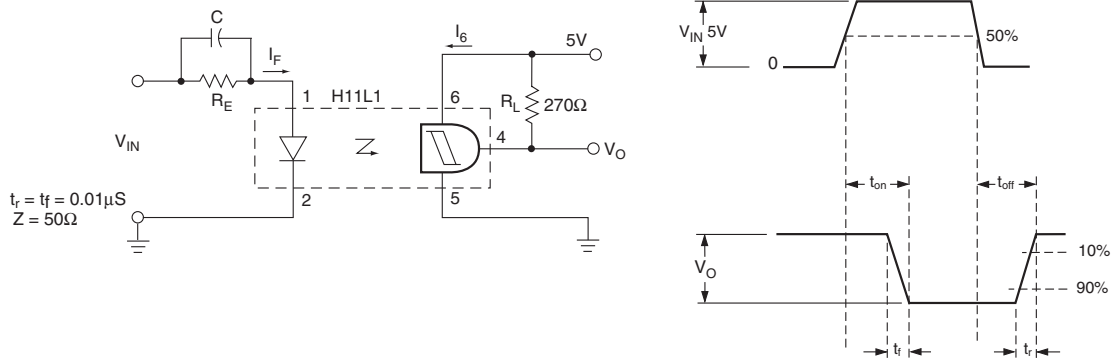


Figure 1. Switching Test Circuit and Waveforms

**TYPICAL PERFORMANCE CURVES**

Figure 2. Transfer Characteristics

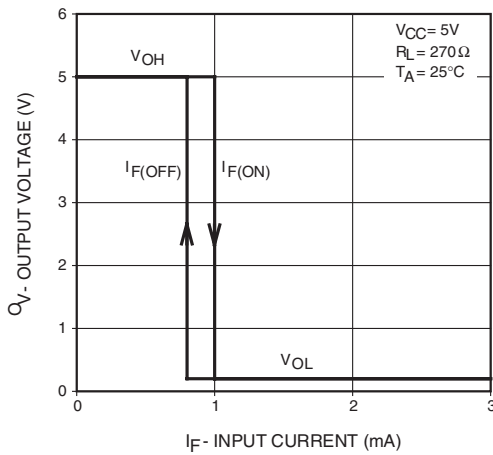


Figure 3. Threshold Current vs. Supply Voltage

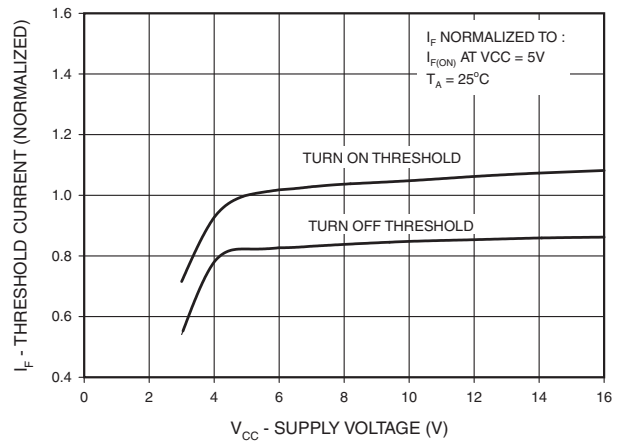


Figure 4. Threshold Current vs. Supply Temperature

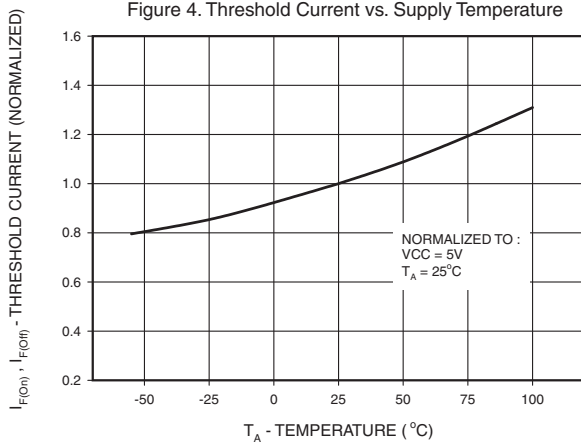
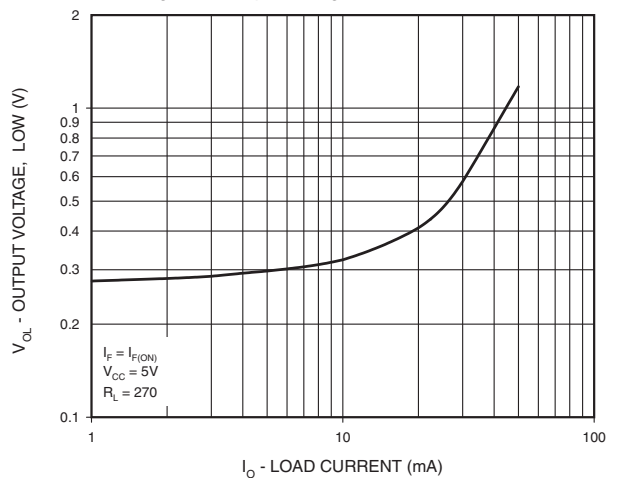


Figure 5. Output Voltage, Low vs. Load Current



H11L1M

H11L2M

H11L3M

**TYPICAL PERFORMANCE CURVES**

Figure 6. Supply Current vs. Supply Voltage

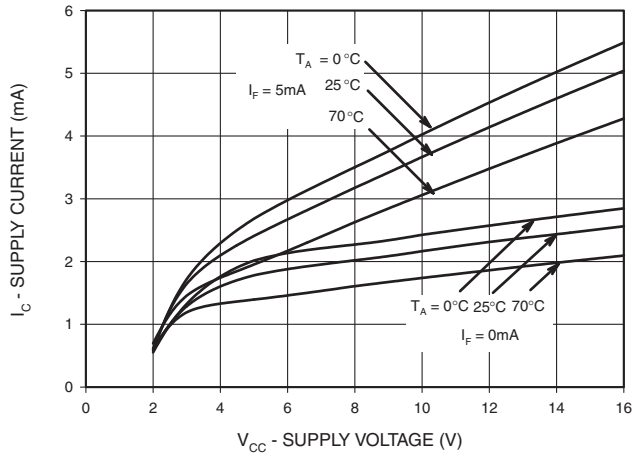
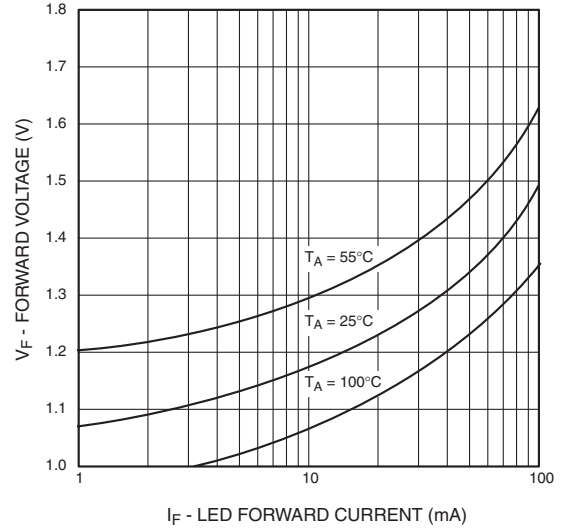


Figure 7. LED Forward Voltage vs. Forward Current

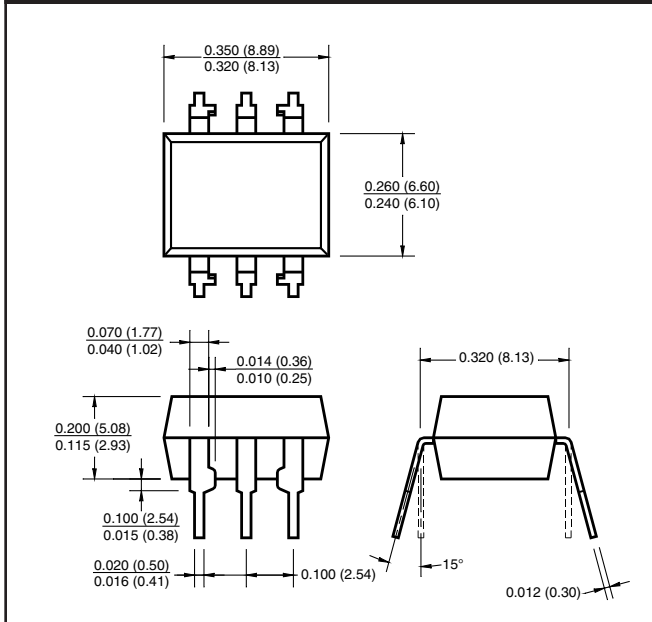


**H11L1M**

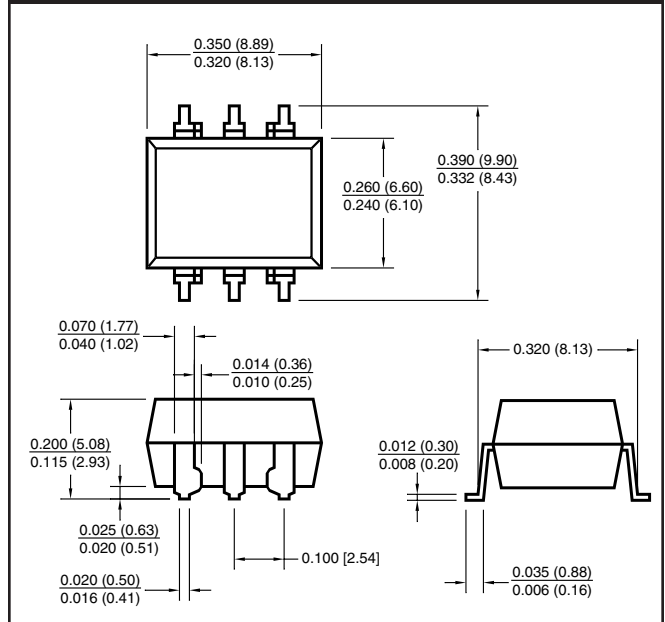
**H11L2M**

**H11L3M**

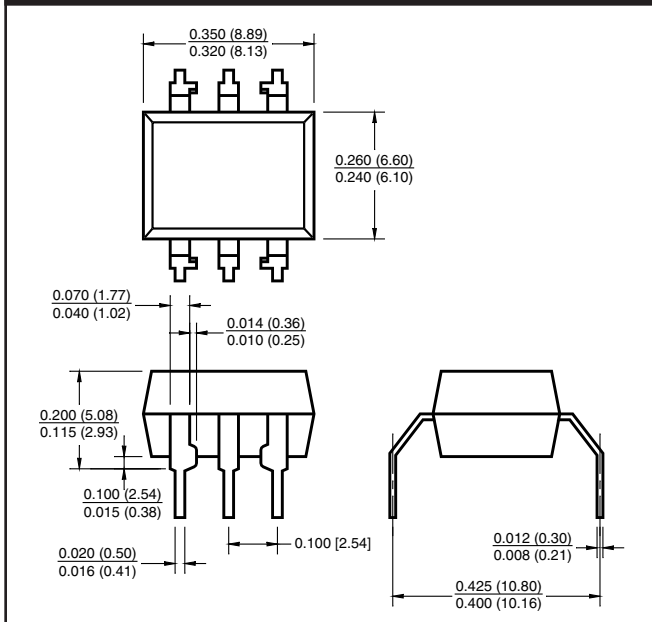
**Package Dimensions (Through Hole)**



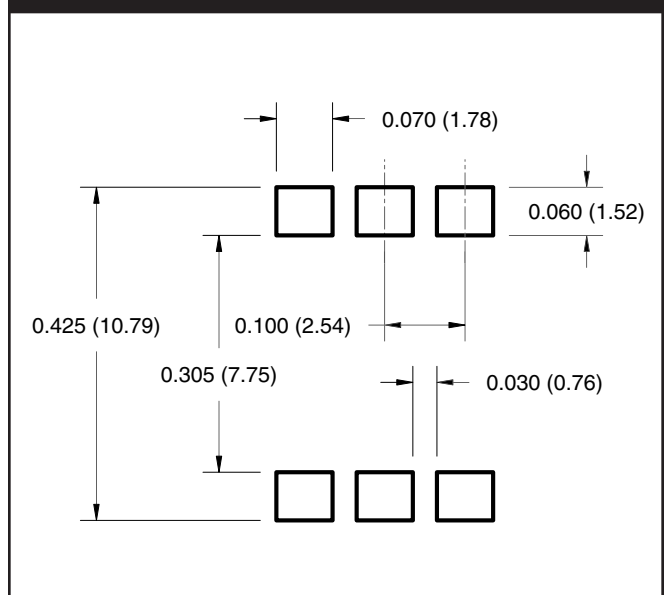
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for Surface Mount Leadform**



**NOTE**

All dimensions are in inches (millimeters)

**H11L1M**

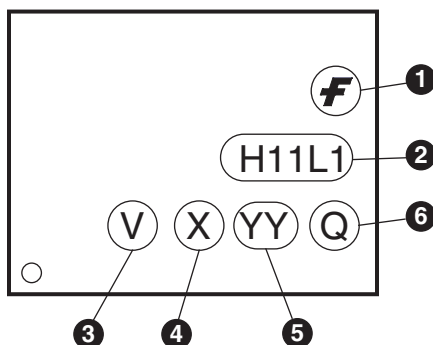
**H11L2M**

**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
SV	VDE 0884, Surface Mount
SR2V	VDE 0884, Surface Mount, Tape & 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

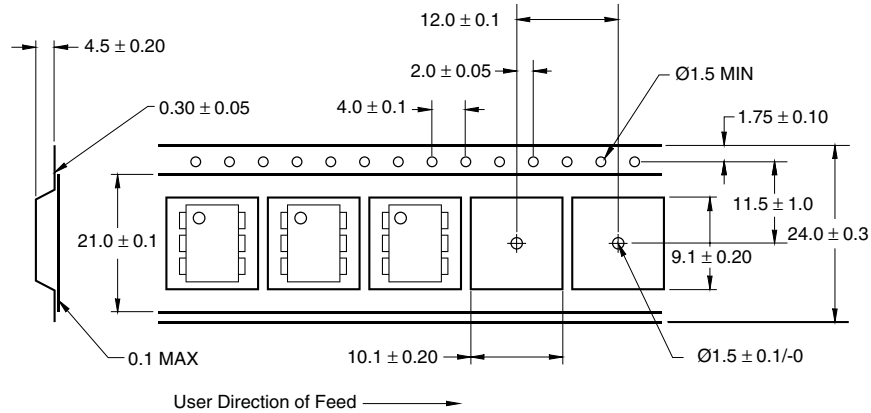
\*Note – 'V' option parts marked with date code '325' or earlier are marked in portrait format.

H11L1M

H11L2M

H11L3M

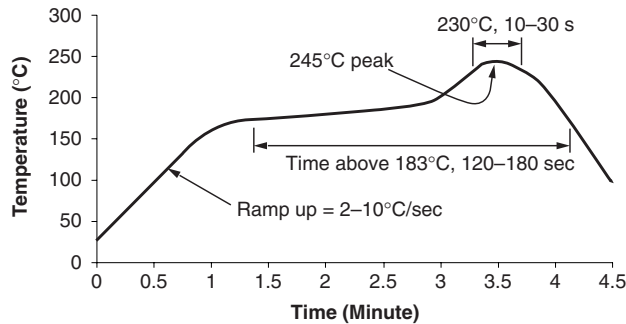
**Carrier Tape Specifications**



**NOTE**

All dimensions are in inches (millimeters)

**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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**H11L1M**

**H11L2M**

**H11L3M**

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