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SEMICONDUCTOR®

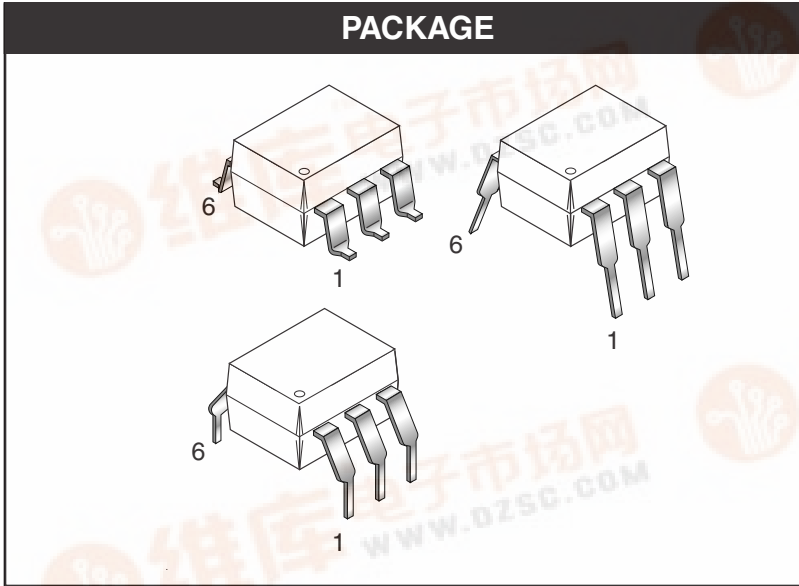
6-PIN DIP HIGH SPEED LOGIC OPTOCOUPLERS

H11N1-M

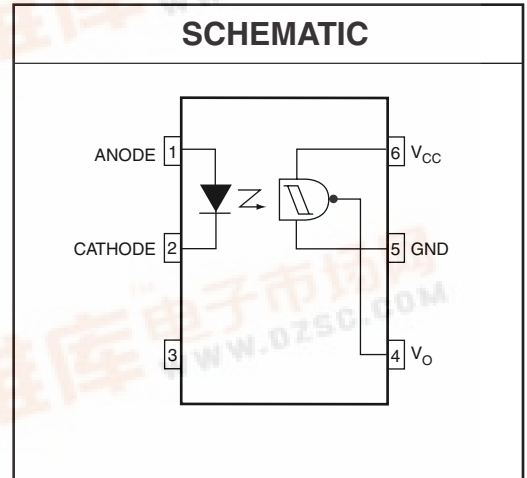
H11N2-M

H11N3-M

PACKAGE



SCHEMATIC



DESCRIPTION

The H11NX-M series has a high speed integrated circuit detector optically coupled to an AlGaAs 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, 5 MHz typical (NRZ)
- Free from latch up and oscillation throughout voltage and temperature ranges.
- Microprocessor compatible drive
- Logic compatible output sinks 16 mA at 0.5 V maximum
- Guaranteed on/off threshold hysteresis
- Wide supply voltage capability, compatible with all popular logic systems
- High common mode transient immunity, 2000 V/ μ s minimum
- Fast switching $t_r = 7.5$ ns typical, $t_f = 12$ ns typical
- Underwriter Laboratory (UL) recognized—file #E90700
- VDE recognized – File#102497 – Add option V (e.g., H11N1VM)

APPLICATIONS

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

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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 2.94	mW mW/°C
EMITTER				
Continuous Forward Current	I_F	All	30	mA
Reverse Voltage	V_R	All	6	V
Forward Current - Peak (1 μ s pulse, 300 pps)	$I_F(pk)$	All	1.0	A
LED Power Dissipation 25°C Ambient Derate Linearly From 25°C	P_D	All	120 1.41	mW mW/°C
DETECTOR				
Detector Power Dissipation @ 25°C Derate Linearly from 25°C	P_D	All	150 1.76	mW mW/°C
V_{45} Allowed Range	V_O	All	0 to 16	V
V_{65} Allowed Range	V_{CC}	All	0 to 16	V
I_4 Output Current	I_O	All	50	mA

ELECTRICAL CHARACTERISTICS ($T_A = 0-70^\circ\text{C}$ 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		1.4	2	V
	$I_F = 0.3\text{ mA}$			0.75	1.25		
Reverse Current	$V_R = 5\text{ V}$	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	4		15	V
Supply Current	$I_F = 0, V_{CC} = 5\text{ V}$	$I_{CC(off)}$	All		6	10	mA
Output Current, High	$I_F = 0.3\text{ mA}, V_{CC} = V_O = 15\text{ V}$	I_{OH}	All			100	μA

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



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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		6.5	10	mA
Output Voltage, low	$R_L = 270\Omega, V_{CC} = 5\text{V}, I_F = I_{F(on)} \text{ max.}$	V_{OL}	All			0.5	V
Turn-On Threshold Current	$R_L = 270\Omega, V_{CC} = 5\text{V}$ note 1	$I_{F(on)}$	H11N1-M	0.8		3.2	mA
			H11N2-M	2.3		5	
			H11N3-M	4.1		10	
Turn-Off Threshold Current	$R_L = 270\Omega, V_{CC} = 5\text{V}$	$I_{F(off)}$	All	0.3			mA
Hysteresis Ratio	$R_L = 270\Omega, V_{CC} = 5\text{V}$	$I_{F(off)}/I_{F(on)}$	All	0.65		0.95	
AC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
SWITCHING SPEED							
Propagation delay time High to Low	$C = 120\text{pF}, t_p = 1\mu\text{s}, R_E$: Note 2 Fig. 1	t_{PHL}	All		100	330	ns
Rise Time	$C = 120\text{pF}, t_p = 1\mu\text{s}, R_E$: Note 2 Fig. 1	t_r	All		7.5		ns
Propagation delay time Low to High	$C = 120\text{pF}, t_p = 1\mu\text{s}, R_E$: Note 2 Fig. 1	t_{PLH}	All		150	330	ns
Fall time	$C = 120\text{pF}, t_p = 1\mu\text{s}, R_E$: Note 2 Fig. 1	t_f	All		12		ns
Data Rate			All		5		MHz

ISOLATION CHARACTERISTICS						
Parameters	Test Conditions	Symbol	Min	Typ*	Max	Units
Input-Output Isolation Voltage	$f = 60\text{ Hz}, t = 1\text{ sec.}$	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

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

NOTES:

- Maximum $I_{F(ON)}$ is the maximum current required to trigger the output. For example, a 3.2mA maximum trigger current would require the LED to be driven at a current greater than 3.2mA 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 30mA.
- H11N1: $R_E = 910\Omega$
H11N2: $R_E = 560\Omega$
H11N3: $R_E = 240\Omega$



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H11N2-M

H11N3-M

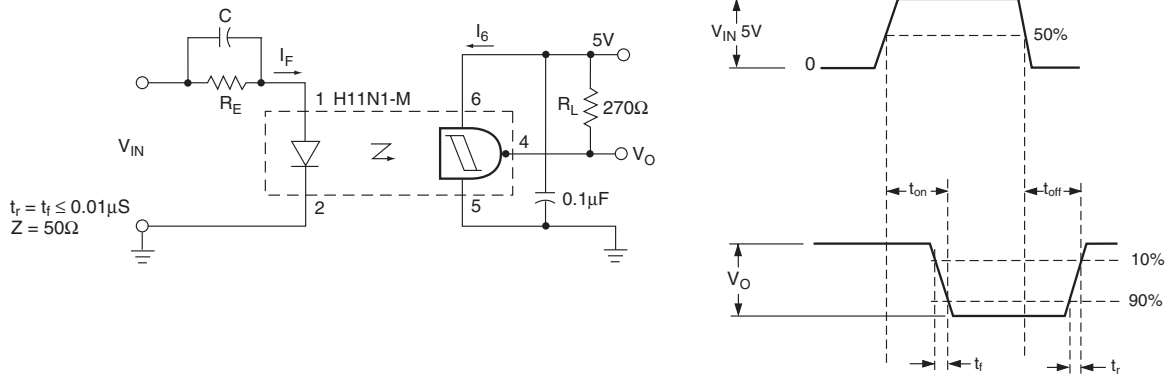


Figure 1. Switching Test Circuit and Waveforms

Figure 2. Transfer Characteristics

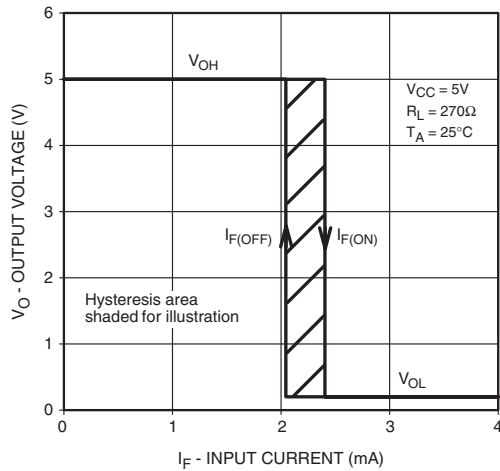


Figure 3. Threshold Current vs. Supply Voltage

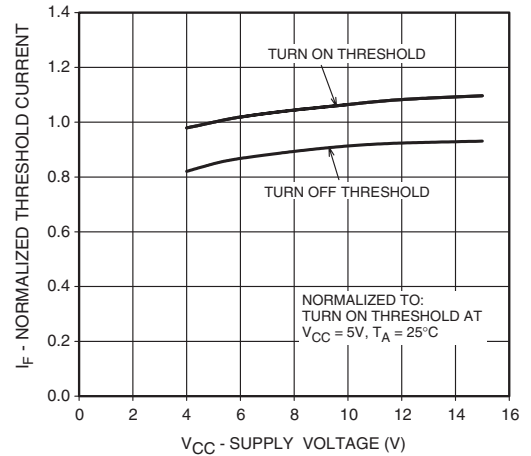


Figure 4. Threshold Current vs. Temperature

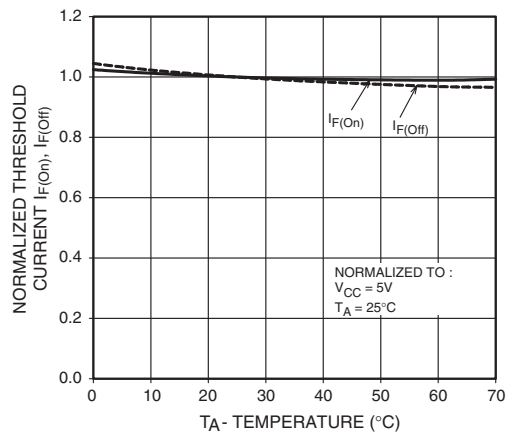
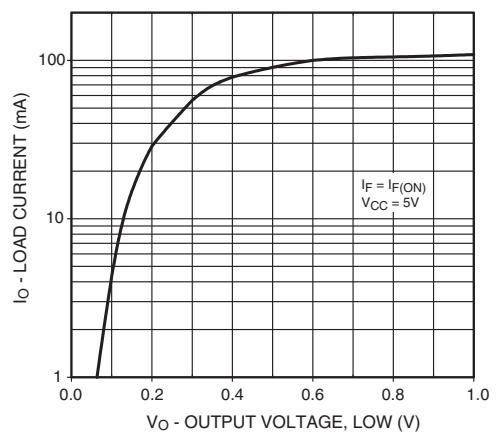


Figure 5. Load Current vs. Output Voltage



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Figure 6. Supply Current vs. Supply Voltage

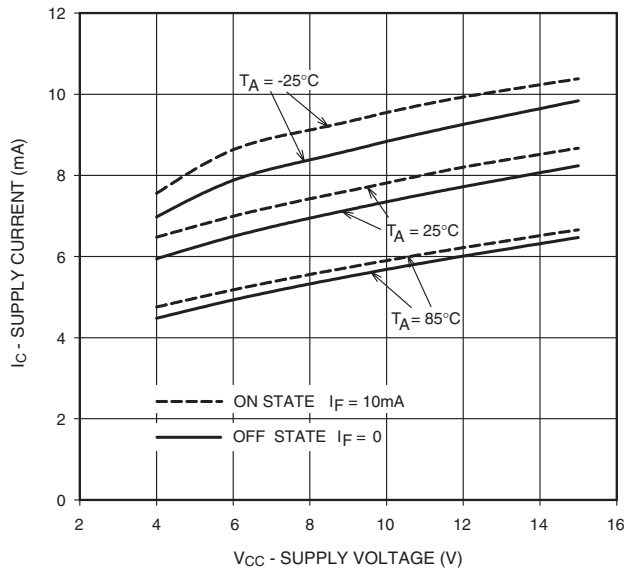
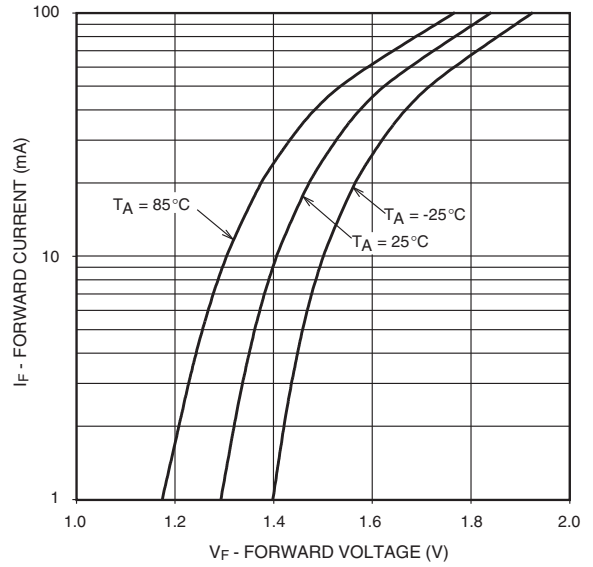


Figure 7. LED Forward Voltage vs. Forward Current

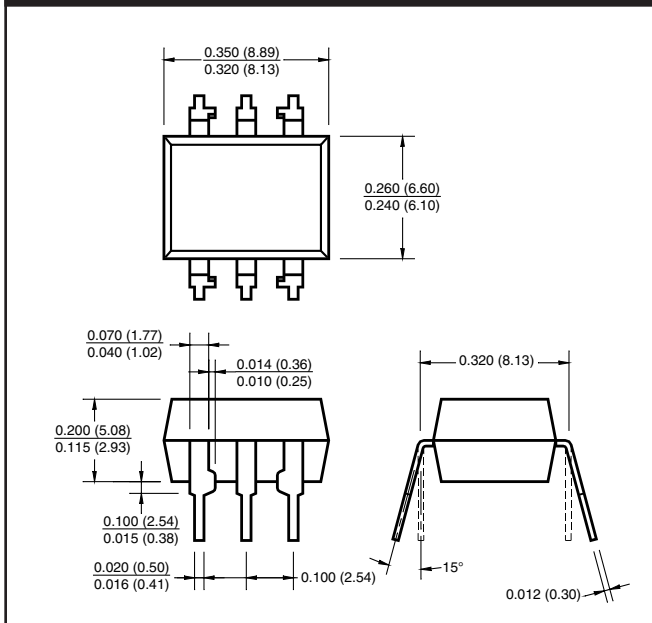


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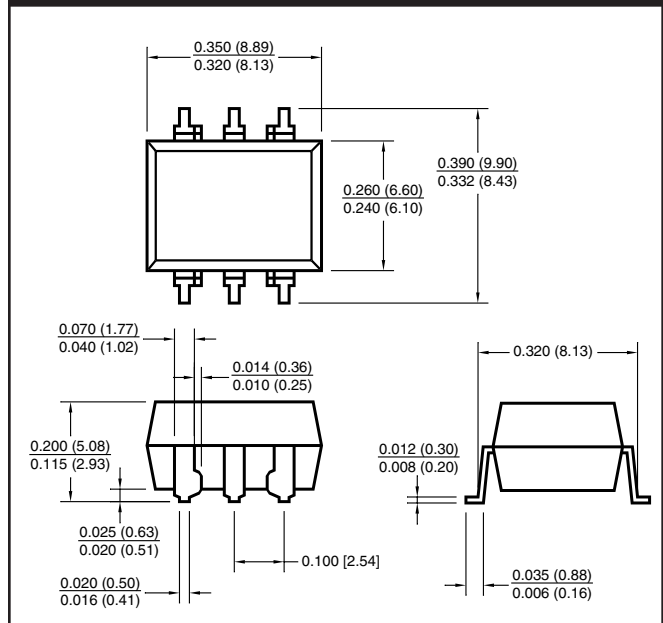
H11N2-M

H11N3-M

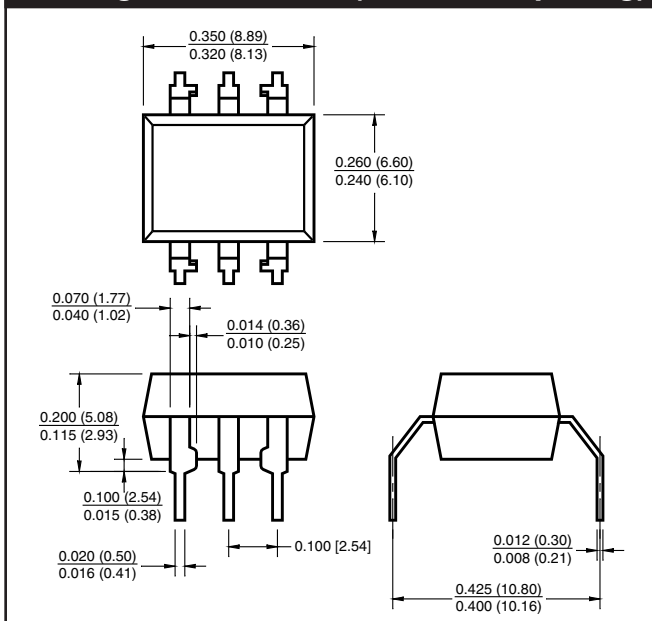
Package Dimensions (Through Hole)



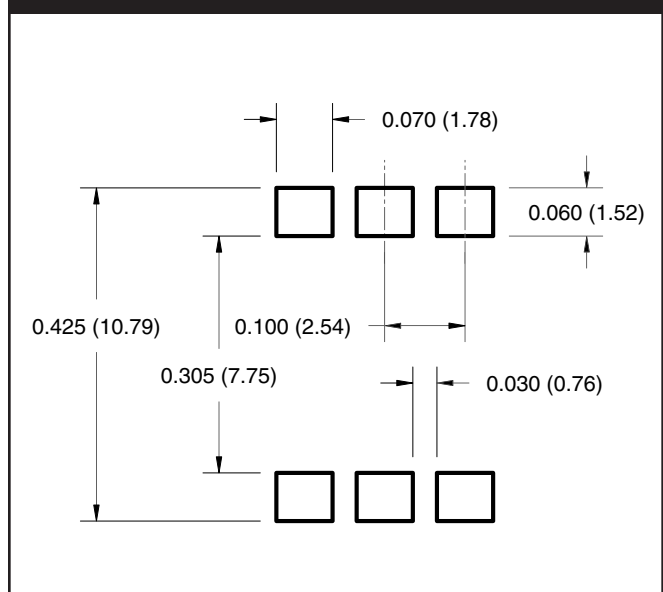
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



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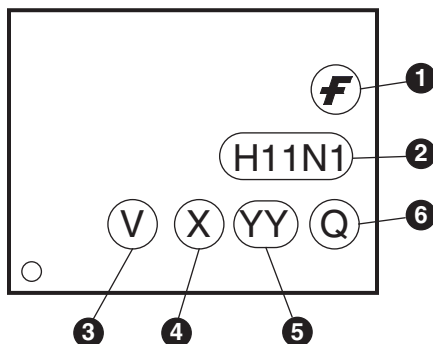
H11N2-M

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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 – Parts that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in portrait format.

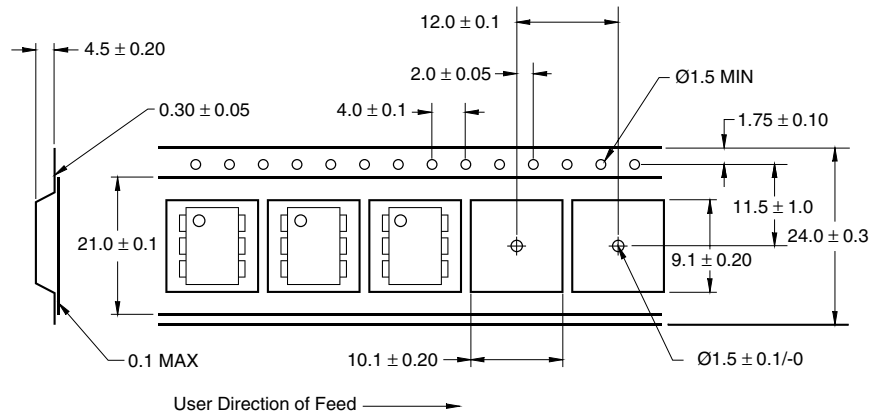


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H11N3-M

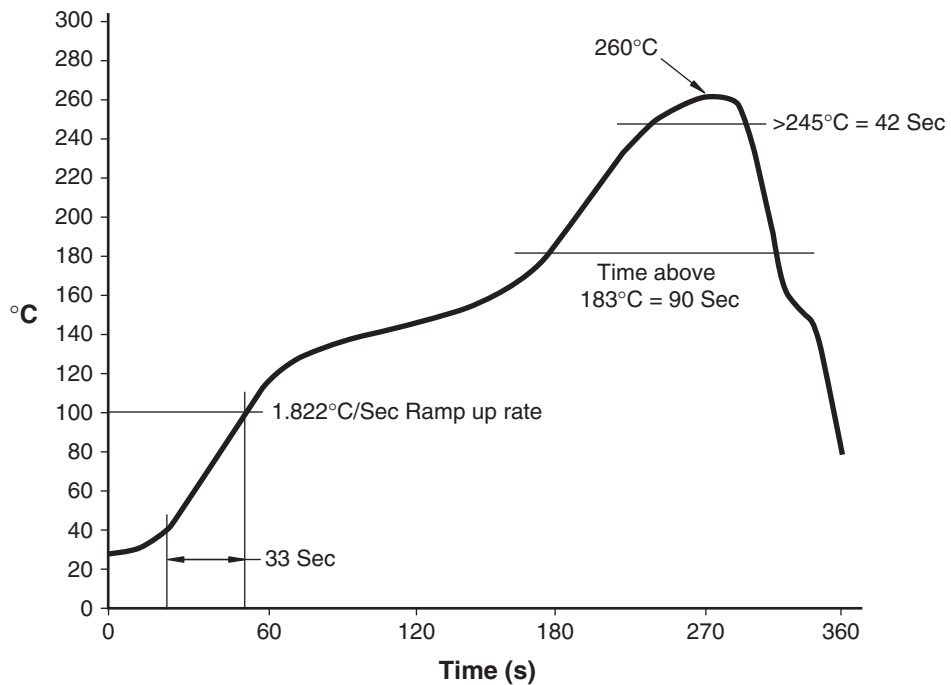
Carrier Tape Specifications



NOTE

All dimensions are in inches (millimeters)

Reflow Profile (White Package, -M Suffix)



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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.

