FAIRCHILD SEMICONDUCTOR®

December 2005

H11AA814 Series, H11A617 Series, H11A817 Series 4-Pin Phototransistor Optocouplers

Features

- AC input response (H11AA814 only)
- Compatible to Pb-free IR reflow soldering
- Compact 4-pin dual in-line package
- Current transfer ratio in selected groups:

H11AA814:	20-300%	H11A817:	50-600%
H11AA814A:	50-150%	H11A817A:	80-160%
H11A617A:	40%-80%	H11A817B:	130-260%
H11A617B:	63%-125%	H11A817C:	200-400%
H11A617C:	100%-200%	H11A817D:	300-600%
H11A617D:	160%-320%		

- C-UL, UL and VDE approved
- High input-output isolation voltage of 5000Vrms
- Minimum BV_{CEO} of 70V guaranteed

Applications

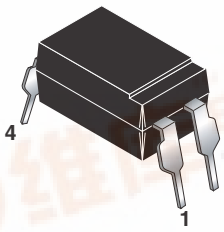
H11AA814 Series
- AC line monitor
- Unknown polarity DC sensor
- Telephone line interface

H11A617 and H11A817 Series
- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

Description

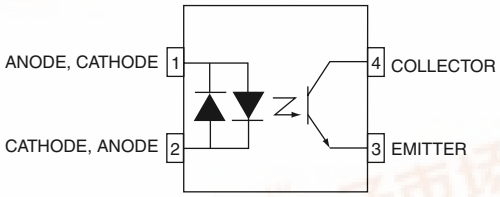
The H11AA814 consists of two gallium arsenide infrared emitting diodes, connected in inverse parallel, driving a silicon phototransistor output in a 4-pin dual in-line package. The H11A617/817 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 4-pin dual in-line package.

Package

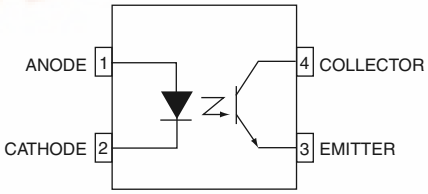


Schematics

H11AA814



H11A617 & H11A817



Absolute Maximum Ratings (T_A = 25°C Unless otherwise specified.)

Parameter	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T_{STG}	All	-55 to +150	°C
Operating Temperature	T_{OPR}	All	-55 to +100	°C
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	°C
Total Device Power Dissipation (-55°C to 50°C)	P_D	All	200	mW
EMITTER				
Continuous Forward Current	I_F	814 Series 617, 817 Series	±50 50	mA
Reverse Voltage	V_R	617 Series 817 Series	6 6	V
LED Power Dissipation (25°C ambient) No derating up to 100°C	P_D	All	70	mW
DETECTOR				
Collector-Emitter Voltage	V_{CEO}	All	70	V
Emitter-Collector Voltage	V_{ECO}	814, 817 Series 617 Series	6 7	V
Continuous Collector Current	I_C	All	50	mA
Detector Power Dissipation (25°C ambient)	P_D	All	150	mW
Derate above 90°C			2.9	mW/°C

Electrical Characteristics (T_A = 25°C Unless otherwise specified.)

Individual Component Characteristics

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
EMITTER							
Input Forward Voltage	(I_F = 60 mA)	V_F	617 Series		1.35	1.65	V
	(I_F = 20 mA)		817 Series		1.2	1.5	
	(I_F = ±20 mA)		814 Series		1.2	1.5	
Reverse Leakage Current	(V_R = 6.0 V)	I_R	617 Series		.001	10	µA
	(V_R = 5.0 V)		817 Series				
DETECTOR							
Collector-Emitter Breakdown Voltage	(I_C = 0.1 mA, I_F = 0)	BV_{CEO}	ALL	70	100		V
Emitter-Collector Breakdown Voltage	(I_E = 10 µA, I_F = 0)	BV_{ECO}	814, 817 Series 617 Series	6 7	10 10		V
Collector-Emitter Dark Current	(V_{CE} = 10V, I_F = 0)	I_{CEO}	H11AA814/A, 817 Series, H11A617C/D		1	100	nA
			H11A617A/B			50	

*Typical values at T_A=25°C

Transfer Characteristics (T_A = 25°C Unless otherwise specified.)

DC Characteristic	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Current Transfer Ratio	(I_F = ±1 mA, V_{CE} = 5 V) (note 1)	CTR	H11AA814	20		300	%
	(I_F = ±1 mA, V_{CE} = 5 V) (note 1)		H11AA814A	50		150	%
	(I_F = 10 mA, V_{CE} = 5 V) (note 1)		H11A617A	40		80	%
			H11A617B	63		125	%
			H11A617C	100		200	%
			H11A617D	160		320	%
	(I_F = 5 mA, V_{CE} = 5 V) (note 1)		H11A817	50		600	%
			H11A817A	80		160	%
			H11A817B	130		260	%
			H11A817C	200		400	%
			H11A817D	300		600	%
	(I_F = 1 mA, V_{CE} = 5 V) (note 1)		H11A617A	13			%
			H11A617B	22			%
			H11A617C	34			%
			H11A617D	56			%
Collector-Emitter Saturation Voltage	(I_C = 1 mA, I_F = ±20 mA) (I_C = 2.5 mA, I_F = 10 mA) (I_C = 1 mA, I_F = 20 mA)	$V_{CE\ (SAT)}$	814 series			0.2	V
			617 series			0.4	
			817 series			0.2	
AC Characteristic							
Rise Time	(I_C = 2 mA, V_{CE} = 2 V, R_L = 100Ω) (note 2)	t_r	ALL		4	18	µs
Fall Time	(I_C = 2 mA, V_{CE} = 2 V, R_L = 100Ω) (note 2)	t_f	ALL		3	18	µs

Isolation Characteristics

Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units
Input-Output Isolation Voltage (note 3)	(f = 60Hz, t = 1 min) ($I_{I-O} \leq 2\mu A$)	V_{ISO}	5000			Vac(rms)
Isolation Resistance	(V_{I-O} = 500 VDC)	R_{ISO}	$5x10^{10}$	10^{11}		Ω
Isolation Capacitance	(V_{I-O} = 0, f = 1 MHz)	C_{ISO}		0.6	1.0	pf

*Typical values at T_A = 25°C.

NOTES

1. Current Transfer Ratio (CTR) = I_C/I_F x 100%.
2. For test circuit setup and waveforms, refer to Figure 13.
3. For this test, Pins 1 and 2 are common, and Pins 3 and 4 are common.

Typical Performance Curves

Fig. 1 Current Transfer Ratio vs. Forward Current

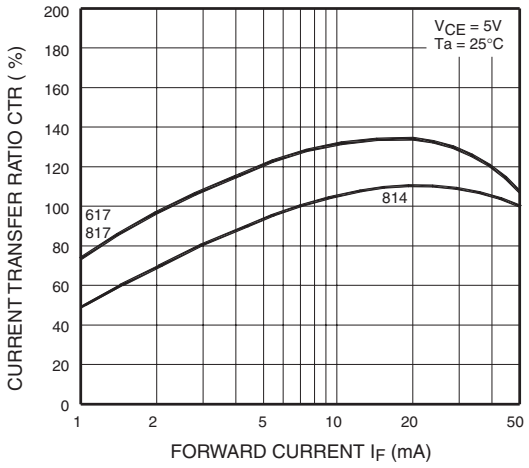


Fig. 2. Relative Current Transfer Ratio vs. Ambient Temperature

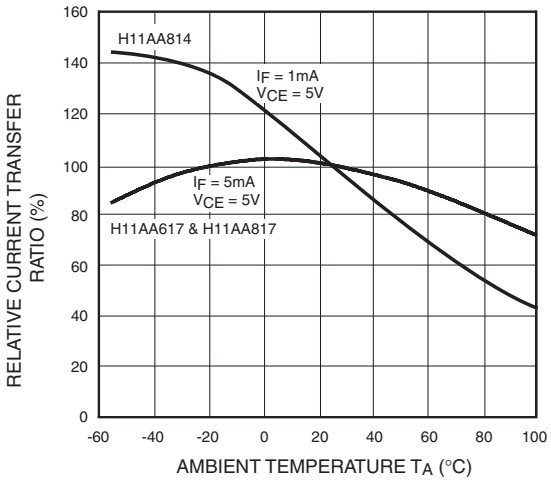


Fig. 3 Collector-Emitter Saturation Voltage vs. Ambient Temperature

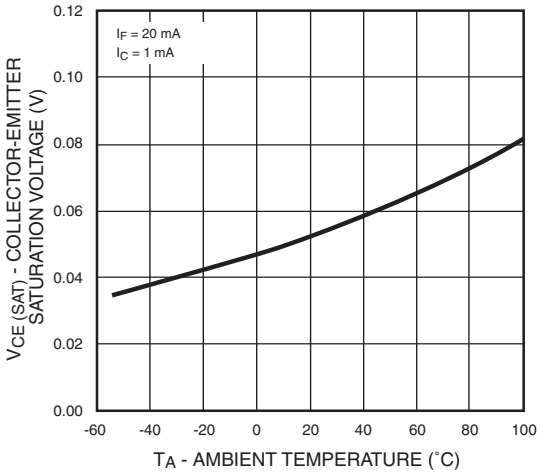


Fig. 4 Forward Current vs. Forward Voltage

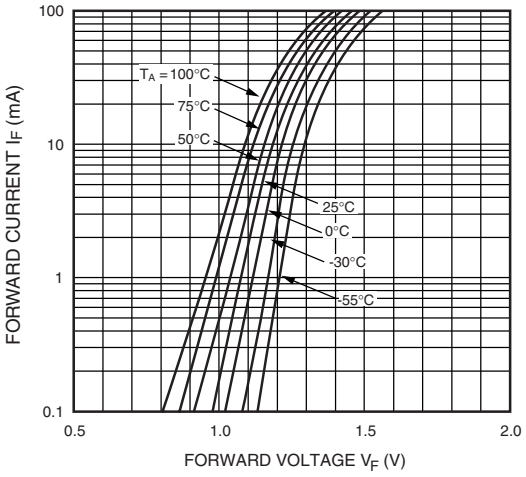


Fig. 5 Collector Current vs. Collector-Emitter Voltage (H11AA814)

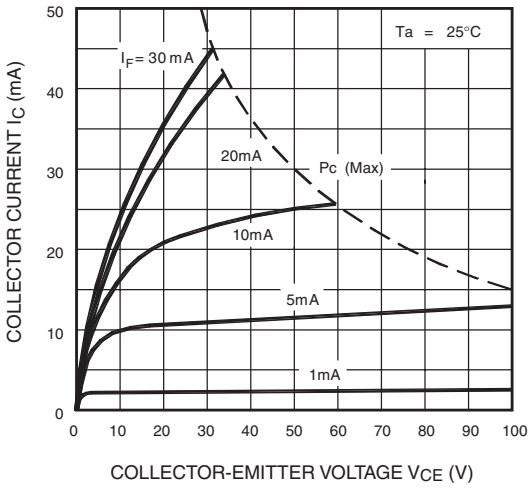
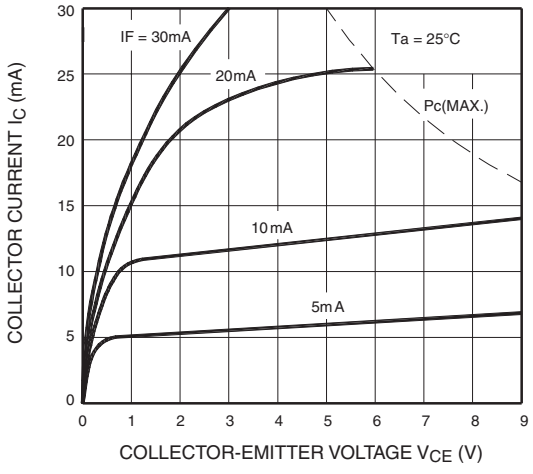


Fig. 6 Collector Current vs. Collector-Emitter Voltage (H11AA617 and H11AA817)



Typical Performance Curves (continued)

Fig. 7 Collector Dark Current vs Ambient Temperature

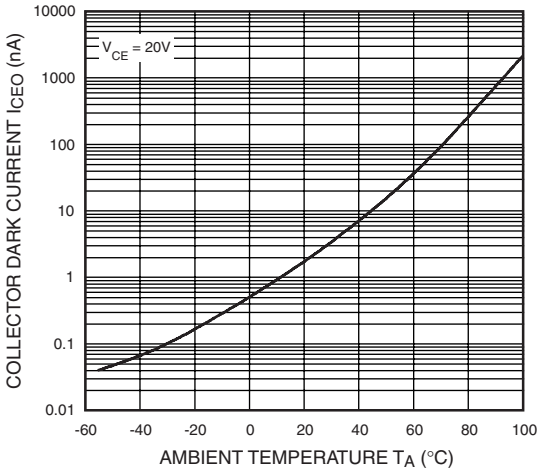


Fig. 8 Response Time vs. Load Resistance

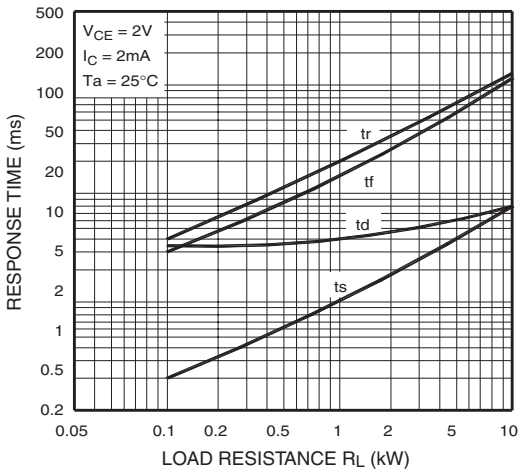


Fig. 9. Frequency Response (H11AA814)

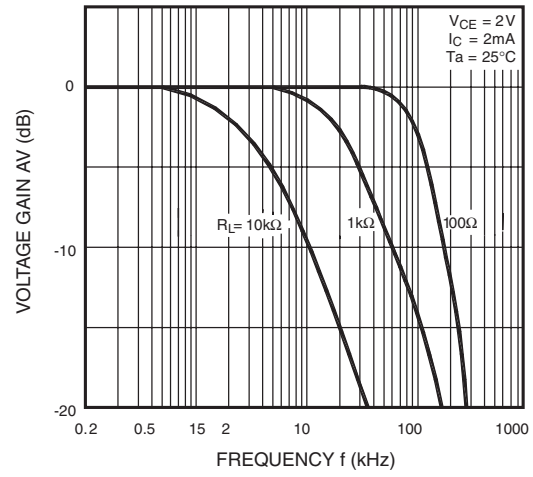


Fig. 10. Frequency Response (H11AA617 and H11AA817)

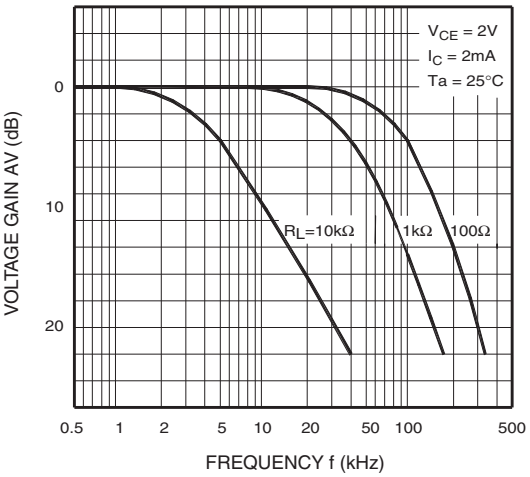


Fig. 11. LED Power Dissipation vs. Ambient Temperature

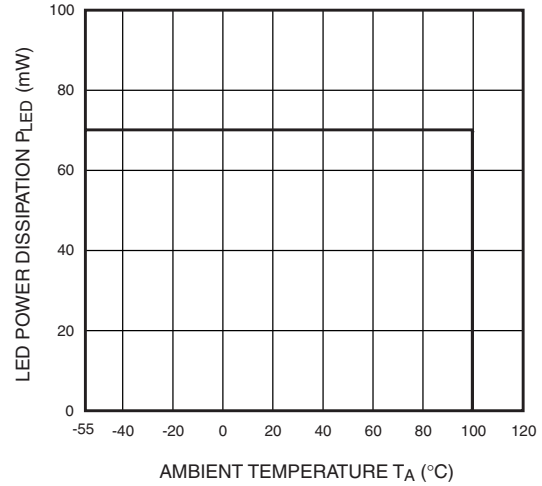
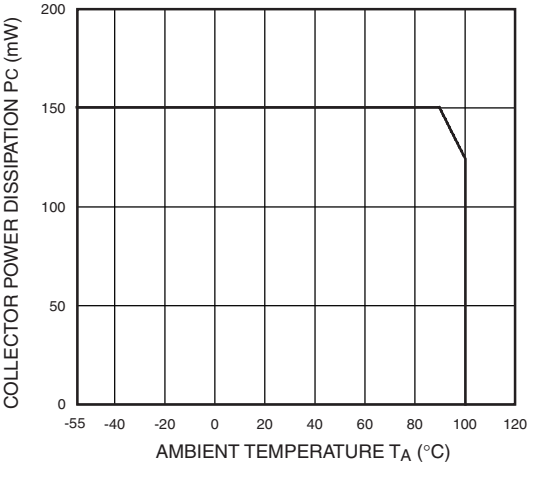


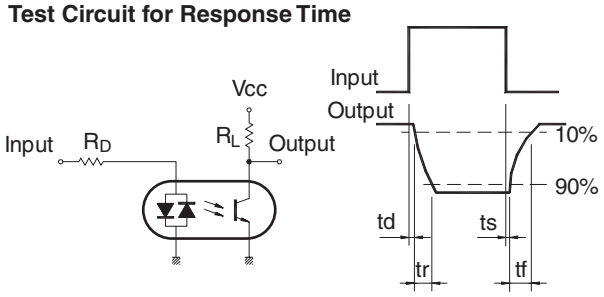
Fig. 12. Collector Power Dissipation vs. Ambient Temperature



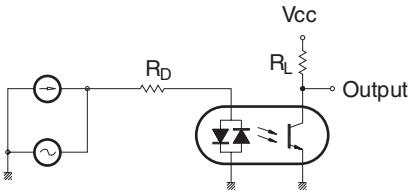
Test Circuit

Figure 13. Test Circuit

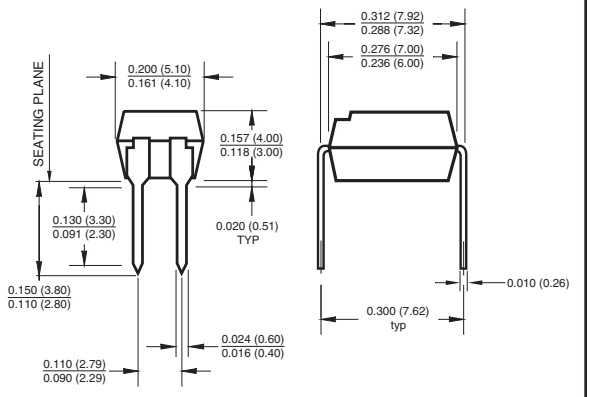
Test Circuit for Response Time



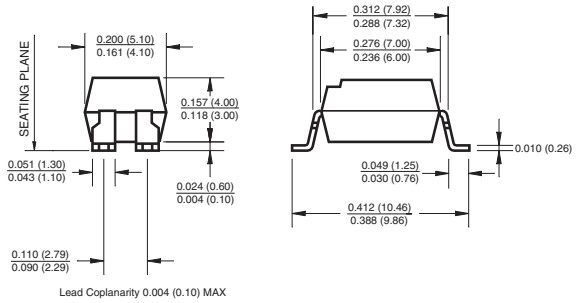
Test Circuit for Frequency Response



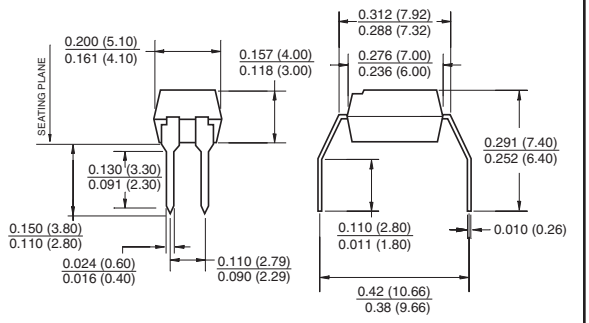
Package Dimensions (Through Hole)



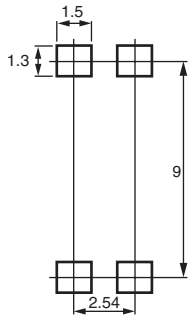
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Footprint Dimensions (Surface Mount)

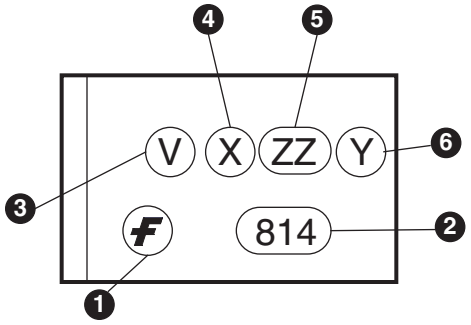


NOTE
All dimensions are in inches (millimeters)

Ordering Information

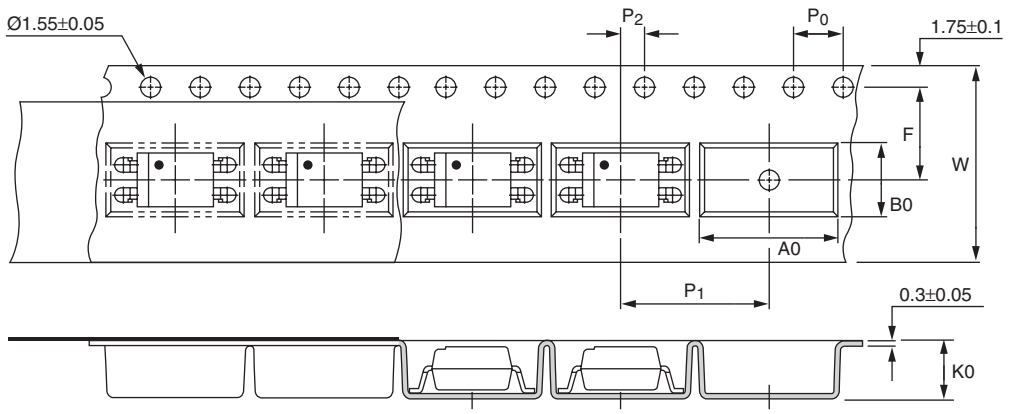
Part Number Example	Description
H11AA814S_NF098	Surface Mount Lead Bend
H11AA814SD_NF098	Surface Mount; Tape and reel
H11AA814W_NF098	0.4" Lead Spacing
H11AA814300_NF098	VDE Approved
H11AA814300W_NF098	VDE Approved, 0.4" Lead Spacing
H11AA8143S_NF098	VDE Approved, Surface Mount
H11AA8143SD_NF098	VDE Approved, 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
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

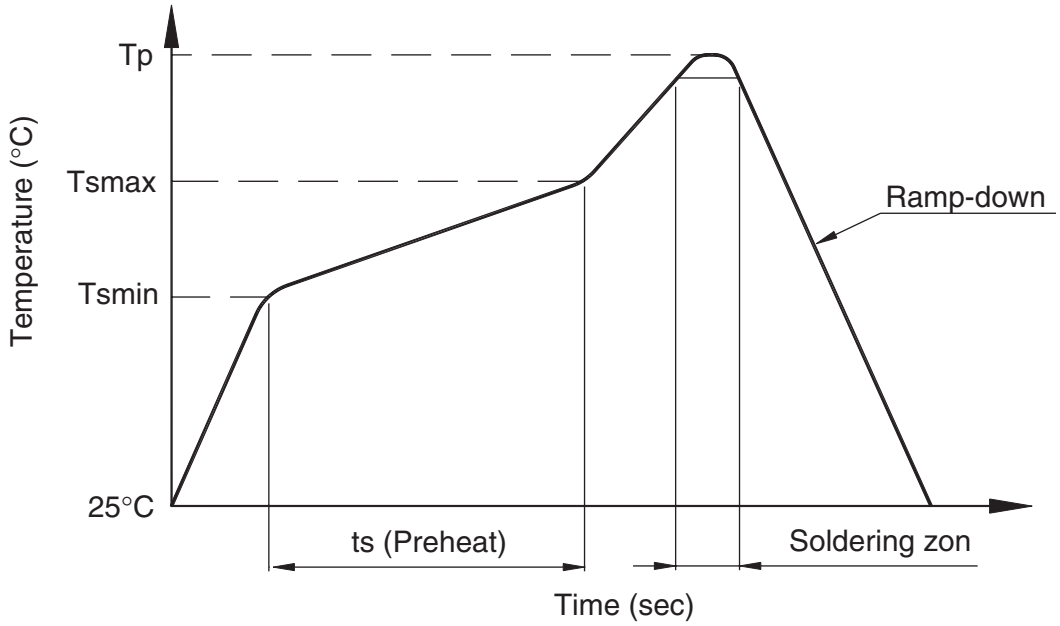
Carrier Tape Specifications



NOTE
All dimensions are in millimeters

Description	Symbol	Dimensions in mm (inches)
Tape wide	W	16 ± 0.3 (.63)
Pitch of sprocket holes	P_0	4 ± 0.1 (.15)
Distance of compartment	F P_2	7.5 ± 0.1 (.295) 2 ± 0.1 (.079)
Distance of compartment to compartment	P_1	12 ± 0.1 (.472)
Compartment	A0	10.45 ± 0.1 (.411)
	B0	5.30 ± 0.1 (.209)
	K0	4.25 ± 0.1 (.167)

Lead Free recommended IR Reflow condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmin-Tsmax / ts)	100°C ~ 150°C 60 ~ 120 sec	150°C ~ 200°C 60 ~120 sec
Melt soldering zone	183°C 60 ~ 120 sec	217°C 30 ~ 90 sec
Peak temperature (Tp)	240 +0/-5°C	260 +0/-5°C
Ramp-down rate	6°C/sec max.	6°C/sec max.

Recommended Wave Soldering condition

Profile Feature	For all solder assembly
Peak temperature (Tp)	Max 260°C for 10 sec

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2. A critical component is 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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

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