

# 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

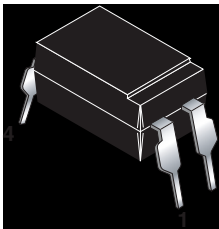
## Applications

- 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

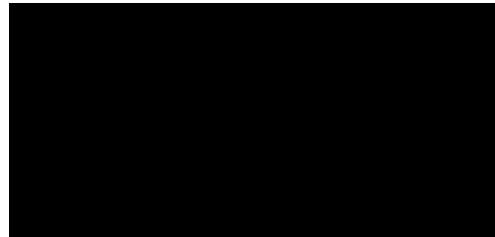
The H11AA814 consists of two gallium arsenide infrared emitting diodes, connected in inverse parallel, driving a silicon phototransistor output in a 4-pin dual in-line package. The H11A617/817 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 4-pin dual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

## Package

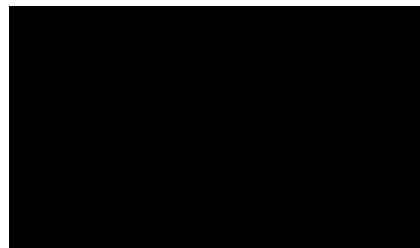


## Schematics

### H11AA814



### H11A617 & H11A817



**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

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

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

**Individual Component Characteristics**

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

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

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

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

**Isolation Characteristics**

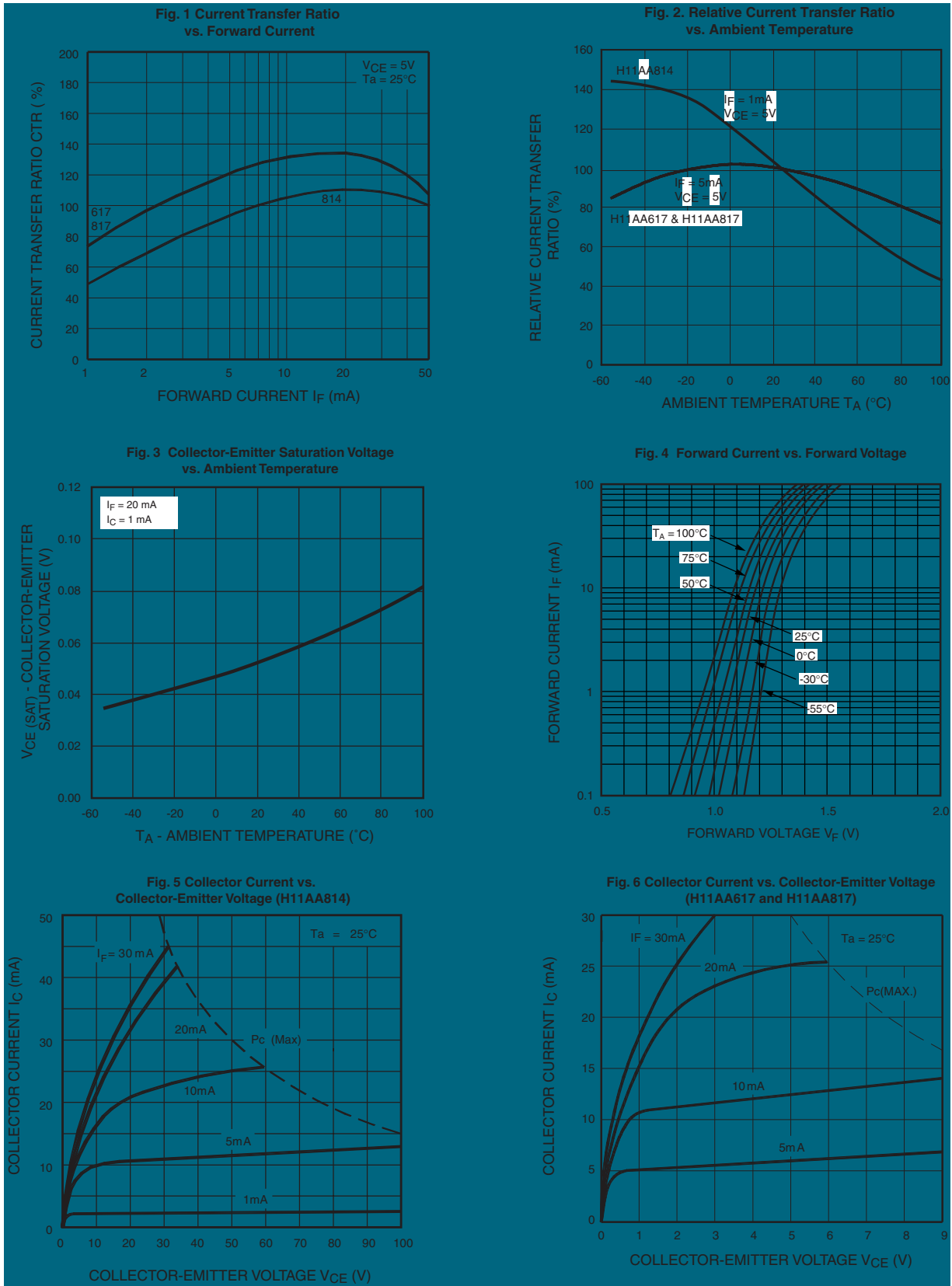
Symbol	Characteristic	Test Conditions	Min.	Typ.*	Max.	Units
$V_{ISO}$	Input-Output Isolation Voltage (note 3)	( $f = 60\text{Hz}, t = 1\text{min}$ ) ( $I_{I-O} \leq 2\mu\text{A}$ )	5000			Vac(rms)
$R_{ISO}$	Isolation Resistance	( $V_{I-O} = 500\text{VDC}$ )	$5 \times 10^{10}$	$10^{11}$		$\Omega$
$C_{ISO}$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

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

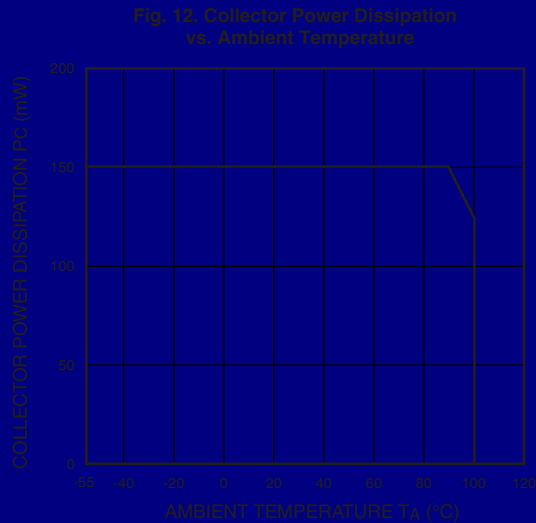
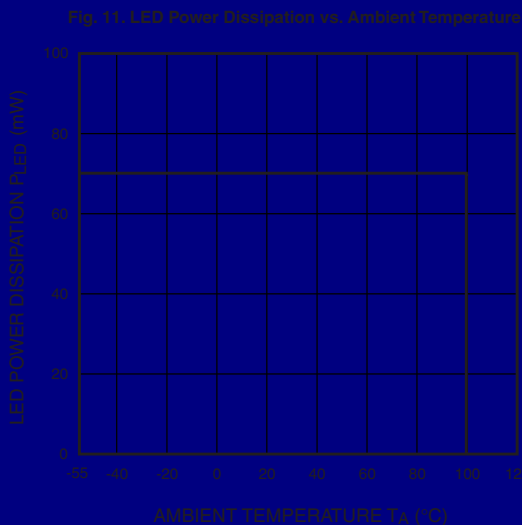
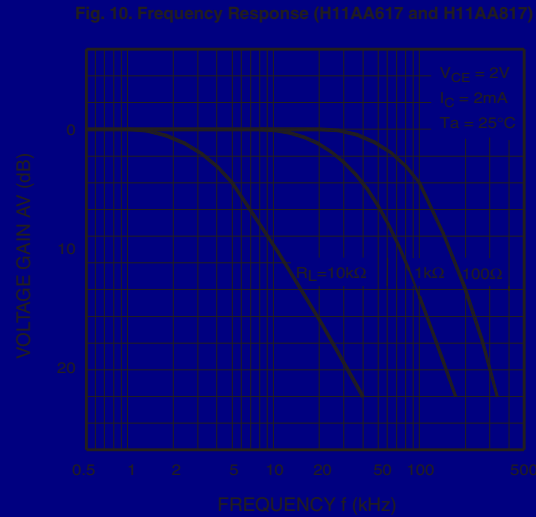
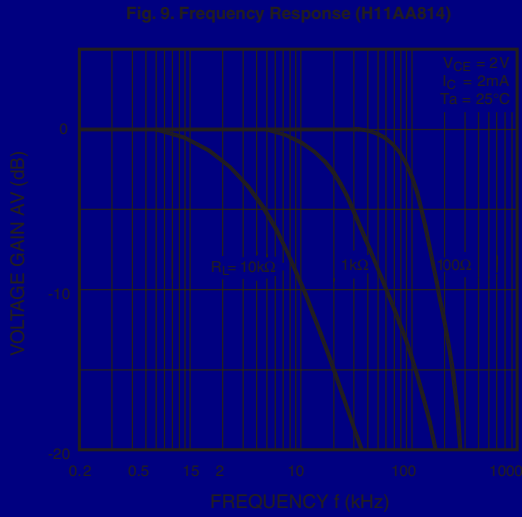
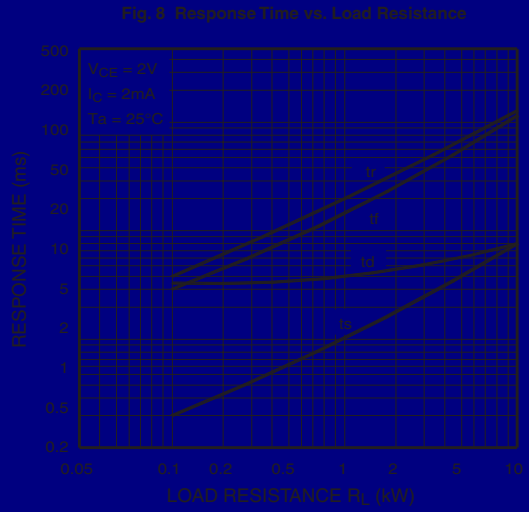
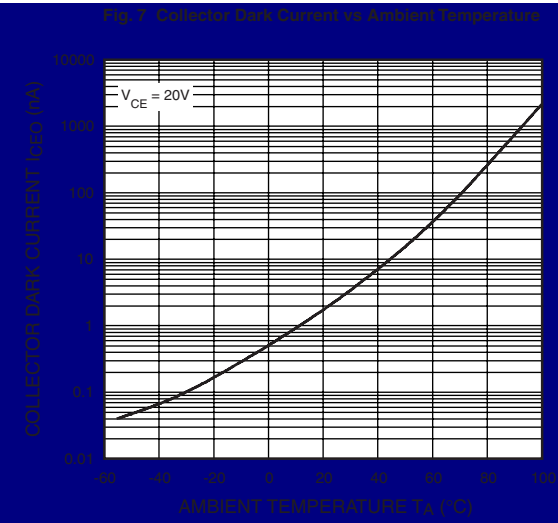
**Notes:**

1. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .
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

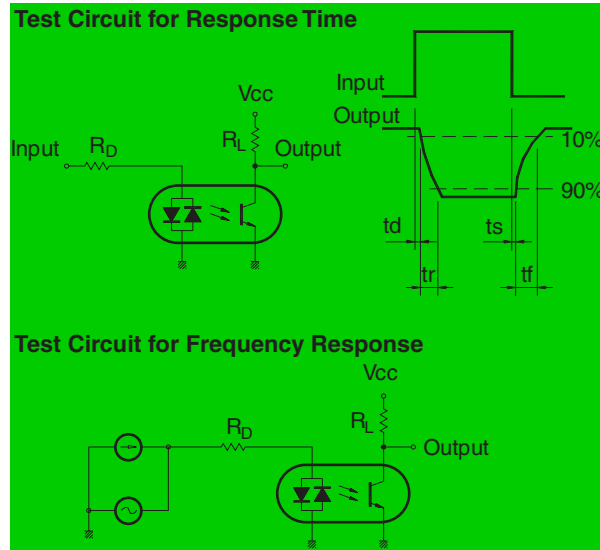


Typical Performance Curves (Continued)



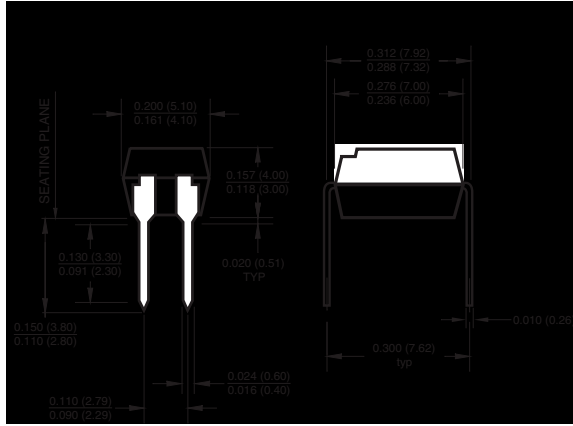
# Test Circuit

Figure 13. Test Circuit

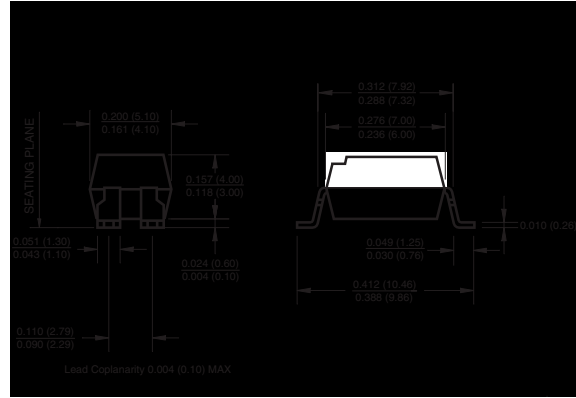


## Package Dimensions

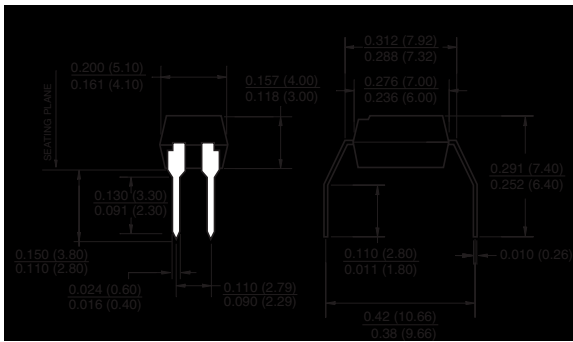
### Through Hole



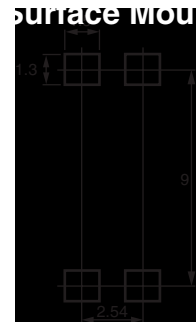
### Surface Mount



### 0.4" Lead Spacing



### Footprint Dimensions (Surface Mount)



### Note:

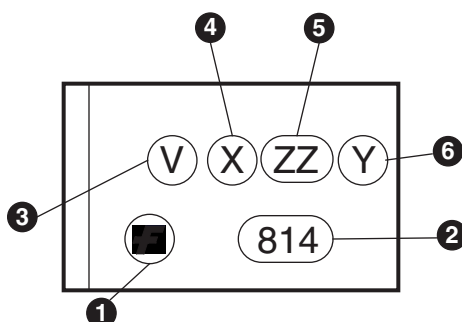
All dimensions are in inches (millimeters)

## Ordering Information

Part Number Example	Description
H11AA814S	Surface Mount Lead Bend
H11AA814SD	Surface Mount; Tape and reel
H11AA814W	0.4" Lead Spacing
H11AA814300	VDE Approved
H11AA814300W	VDE Approved, 0.4" Lead Spacing
H11AA8143S	VDE Approved, Surface Mount
H11AA8143SD	VDE Approved, Surface Mount, Tape & Reel

\*To specify the new construction version which needs 260°C max reflow peak temperature rating: add "NF098" to the end of the part number. The non-NF098 version is rated for 260°C peak reflow temperature only for parts marked with date code 0550 and later.

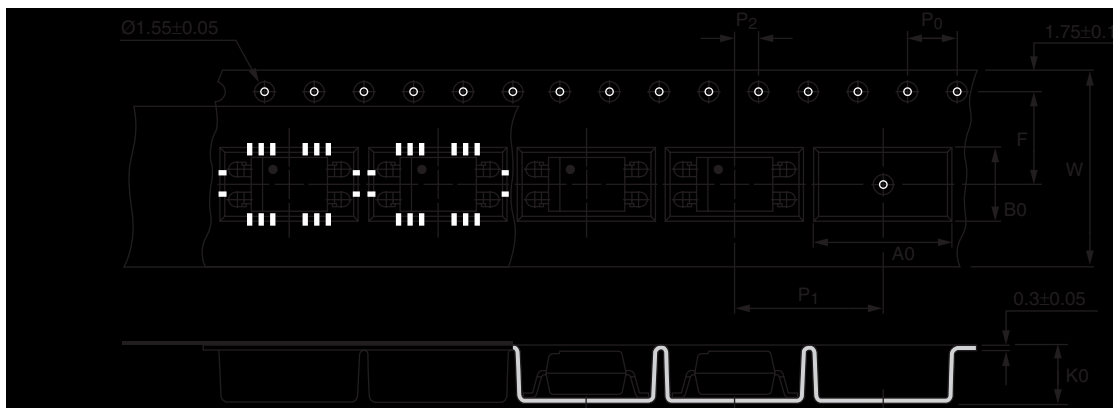
## Marking Information



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

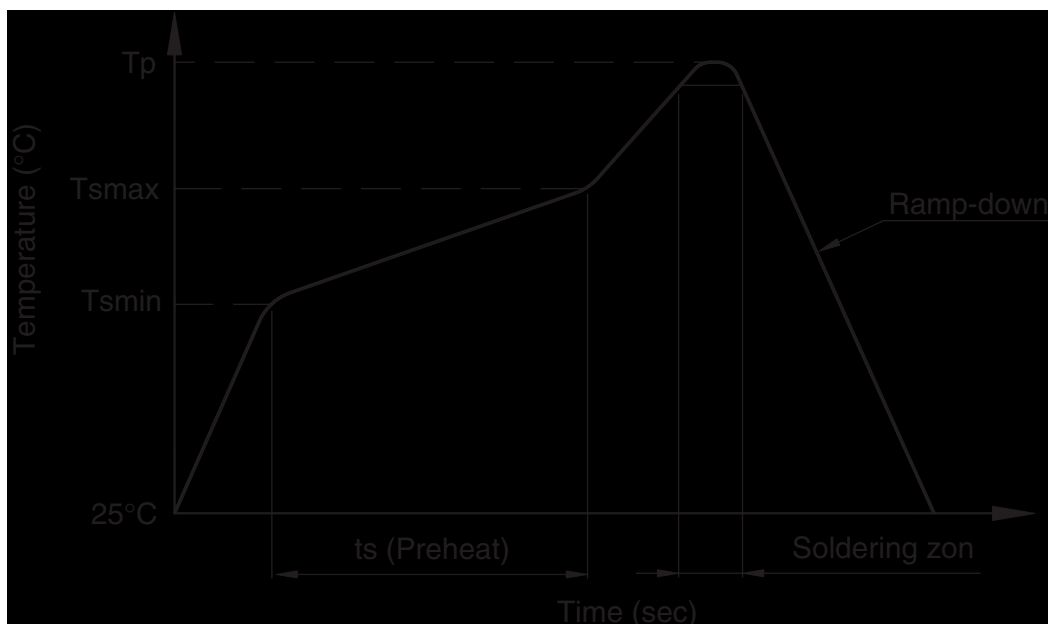


**Note:**

All dimensions are in millimeters

Description	Symbol	Dimensions in mm (inches)
Tape wide	W	$16 \pm 0.3$ (.63)
Pitch of sprocket holes	$P_0$	$4 \pm 0.1$ (.15)
Distance of compartment	F	$7.5 \pm 0.1$ (.295)
Distance of compartment to compartment	$P_1$	$2 \pm 0.1$ (.079)
Compartment	$A_0$	$12 \pm 0.1$ (.472)
	$B_0$	$10.45 \pm 0.1$ (.411)
	$K_0$	$5.30 \pm 0.1$ (.209)
		$4.25 \pm 0.1$ (.167)

### Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmín-Tsmáx / 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

