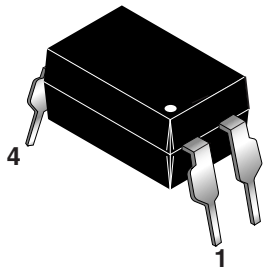
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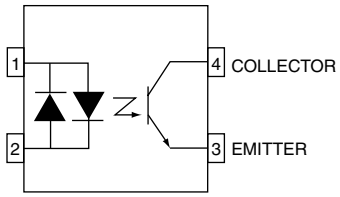
# 4-PIN PHOTOTRANSISTOR OPTOCOUPLERS

## H11AA814 SERIES H11A617 SERIES H11A817 SERIES

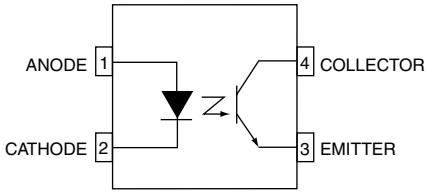
### PACKAGE




### H11AA814 SCHEMATIC




### H11A617 & H11A817 SCHEMATIC




## DESCRIPTION

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

The H11A617 and H11A817 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 4-pin dual in-line package.

## FEATURES

- Compact 4-pin 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% | | |

- 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

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| 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 | $I_F$ | All | 50 | mA |
| Reverse Voltage | $V_R$ | H11A617A/B/C/D<br>H11A817/A/B/C/D | 6<br>5 | V |
| Forward Current - Peak (1 µs pulse, 300 pps) | $I_F$(pk) | All | 1.0 | A |
| LED Power Dissipation (25°C ambient) | $P_D$ | All | 100 | mW |
| Derate above 25°C | | | 1.33 | mW/°C |
| **DETECTOR** | | | | |
| Collector-Emitter Voltage | $V_{CEO}$ | All | 70 | V |
| Emitter-Collector Voltage | $V_{ECO}$ | H11AA814/A<br>H11A617A/B/C/D<br>H11A817/A/B/C/D | 6<br>7<br>6 | V |
| Continuous Collector Current | $I_C$ | All | 50 | mA |
| Detector Power Dissipation (25°C ambient) | $P_D$ | All | 150 | mW |
| Derate above 25°C | | | 2.0 | mW/°C |

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C Unless otherwise specified.)

## INDIVIDUAL COMPONENT CHARACTERISTICS

| Parameter | Test Conditions | Symbol | Device | Min | Typ* | Max | Unit |
|---|---|---|---|---|---|---|---|
| **EMITTER** | ($I_F$ = 60 mA) | $V_F$ | H11A617A/B/C/D | | 1.35 | 1.65 | V |
| Input Forward Voltage | ($I_F$ = 20 mA) | | H11A817/A/B/C/D | | 1.2 | 1.5 | |
| | ($I_F$ = ±20 mA) | | H11AA814/A | | 1.2 | 1.5 | |
| Reverse Leakage Current | ($V_R$ = 6.0 V) | $I_R$ | H11A617A/B/C/D | | .001 | 10 | µA |
| | ($V_R$ = 5.0 V) | | H11A817/A/B/C/D | | | | |
| **DETECTOR**<br>Collector-Emitter Breakdown Voltage | ($I_C$ = 1.0 mA, $I_F$ = 0) | $BV_{CEO}$ | ALL | 70 | 100 | | V |
| Emitter-Collector Breakdown Voltage | ($I_E$ = 100 µA, $I_F$ = 0) | $BV_{ECO}$ | H11AA814/A | 6 | 10 | | V |
| | | | H11A617A/B/C/D | 7 | | | |
| | | | H11A817/A/B/C/D | 6 | | | |
| Collector-Emitter Dark Current | ($V_{CE}$ = 10V, $I_F$ = 0) | $I_{CEO}$ | H11AA814/A, H11A817/A/B/C/D, H11A617C/D | | 1 | 100 | nA |
| | | | H11A617A/B | | | 50 | |
| Collector-Emitter Capacitance | ($V_{CE}$ = 0 V, f = 1 MHz) | $C_{CE}$ | ALL | | 8 | | pF |

*Typical values at $T_A$ = 25°C.

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## 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)<br>($I_C$ = 2.5 mA, $I_F$ = 10 mA)<br>($I_C$ = 1 mA, $I_F$ = 20 mA) | $V_{CE\ (SAT)}$ | H11AA814/A | | | 0.2 | V |
| | | | H11A617A/B/C/D | | | 0.4 | |
| | | | H11A817/A/B/C/D | | | 0.2 | |
| **AC Characteristic** | | | | | | | |
| Rise Time | ($I_C$ = 2 mA, $V_{CE}$ = 2 V, $R_L$ = 100V) (note 2) | $t_r$ | ALL | | 2.4 | 18 | µs |
| Fall Time | ($I_C$ = 2 mA, $V_{CE}$ = 2 V, $R_L$ = 100V) (note 2) | $t_f$ | ALL | | 2.4 | 18 | µs |

## ISOLATION CHARACTERISTICS

| Characteristic | Test Conditions | Symbol | Min | Typ* | Max | Units |
|---|---|---|---|---|---|---|
| Input-Output Isolation Voltage (note 3) | f = 60Hz, t = 1 min | $V_{ISO}$ | 5300 | | | Vac(rms) |
| Isolation Resistance | ($V_{I-O}$ = 500 VDC) | $R_{ISO}$ | $10^{11}$ | | | Ω |
| Isolation Capacitance | ($V_{I-O}$ = 0, f = 1 MHz) | $C_{ISO}$ | | 0.5 | | 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 8.
3. For this test, Pins 1 and 2 are common, and Pins 3 and 4 are common.

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**Fig. 1 Normalized CTR vs. Forward Current**

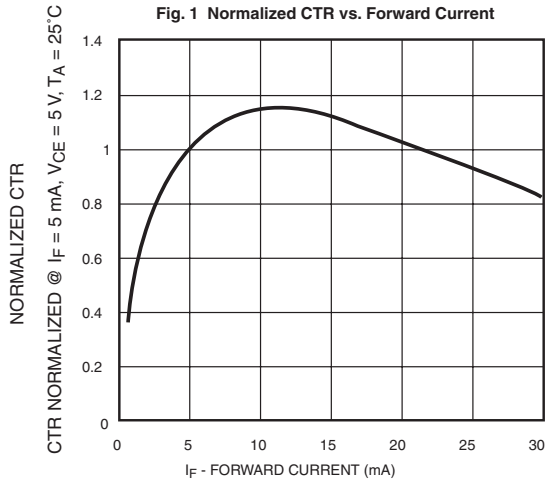



**Fig. 2 Normalized CTR vs. Ambient Temperature**

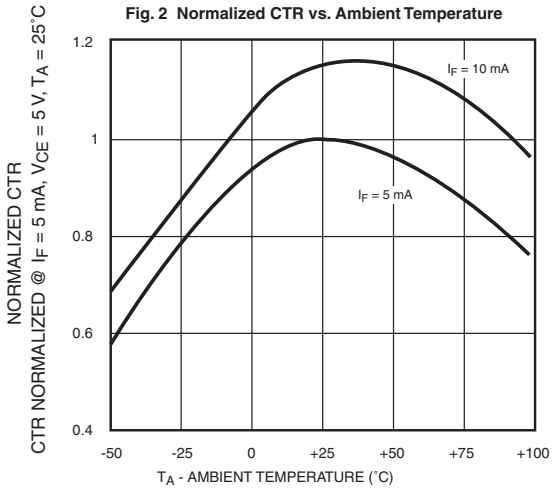



**Fig. 3 Collector-Emitter Saturation Voltage vs. Ambient Temperature**

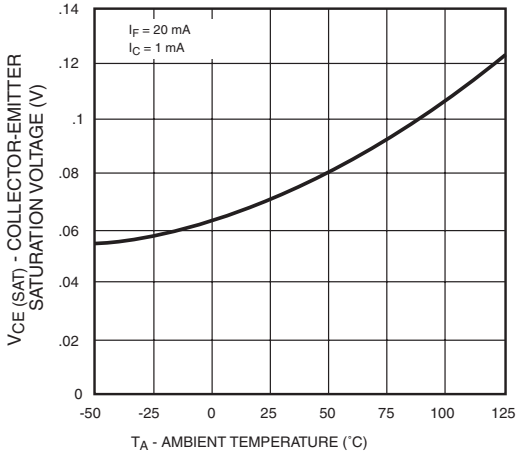



**Fig. 4 Forward Voltage vs. Forward Current**

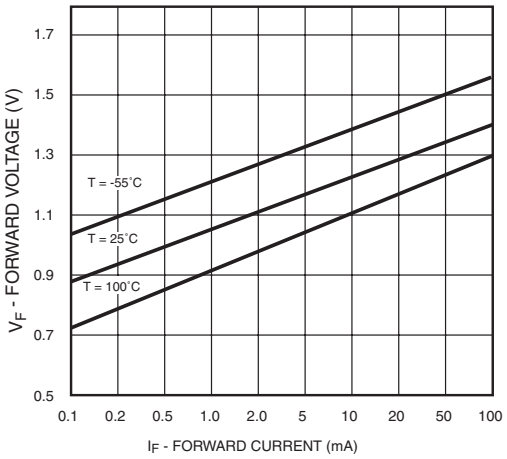
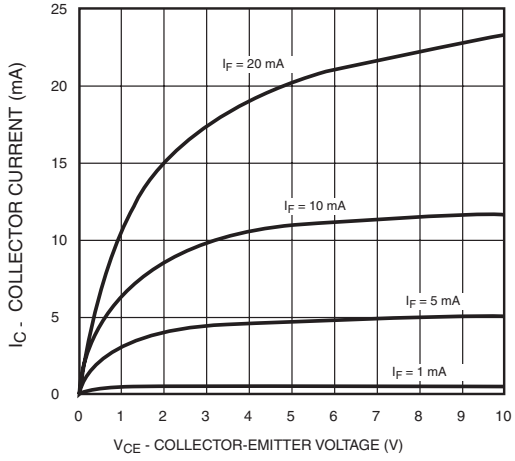



**Fig. 5 Collector Current vs. Collector-Emitter Voltage**




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**Fig. 6 Collector Leakage Current vs. Ambient Temperature**

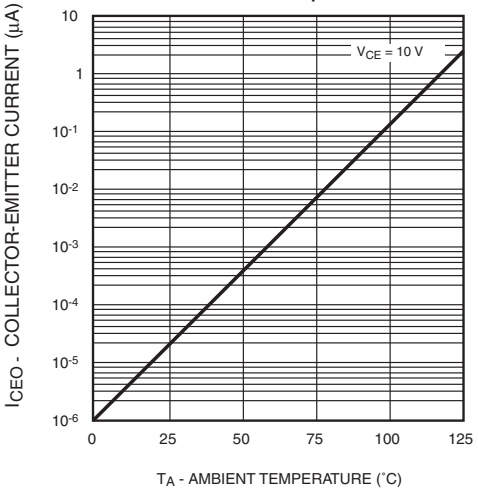



**Fig. 7 Rise and Fall Time vs. Load Resistor**

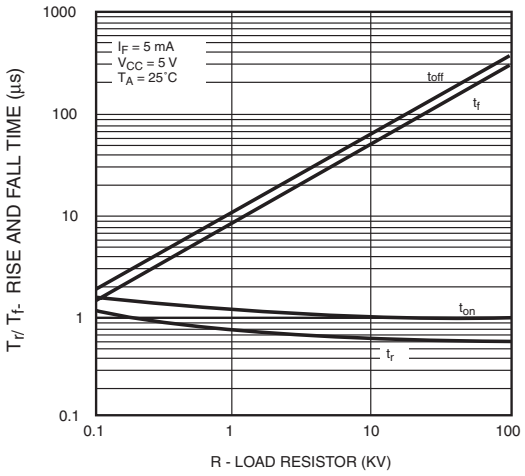
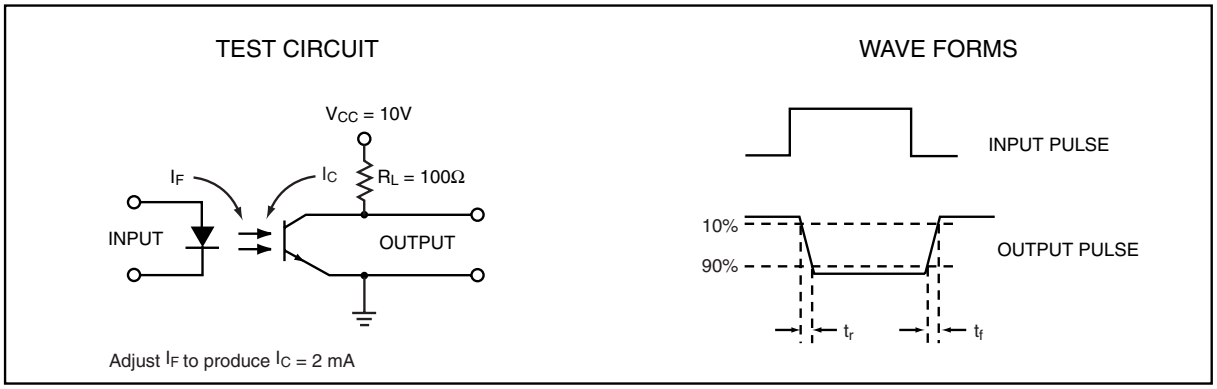
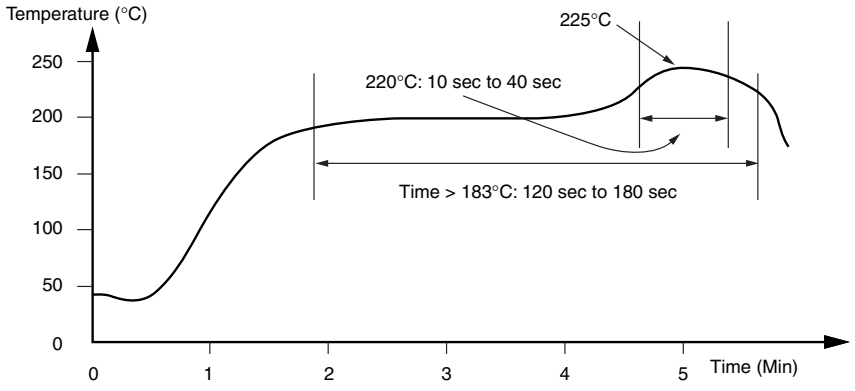



**Figure 8. Switching Time Test Circuit and Waveforms**

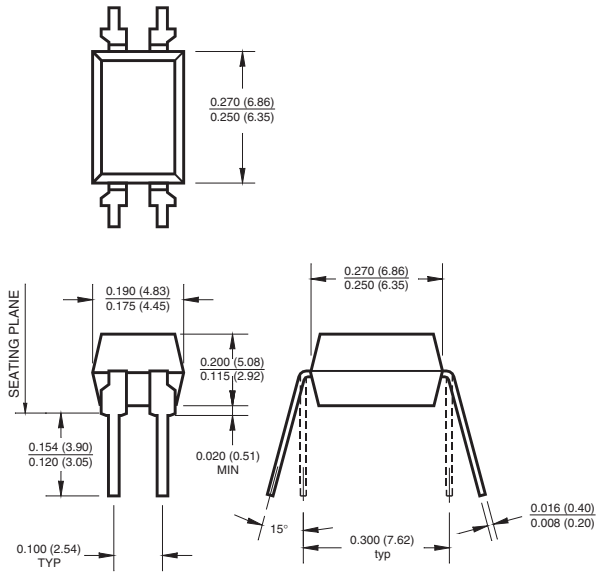



**Recommended Thermal Reflow Profile for Surface Mount DIP Package**

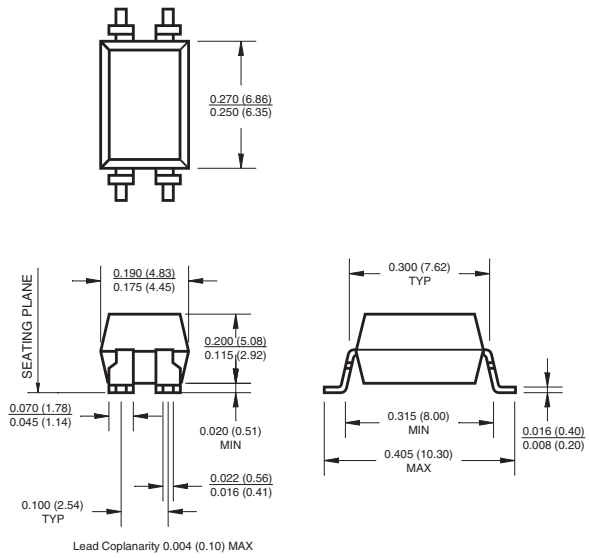



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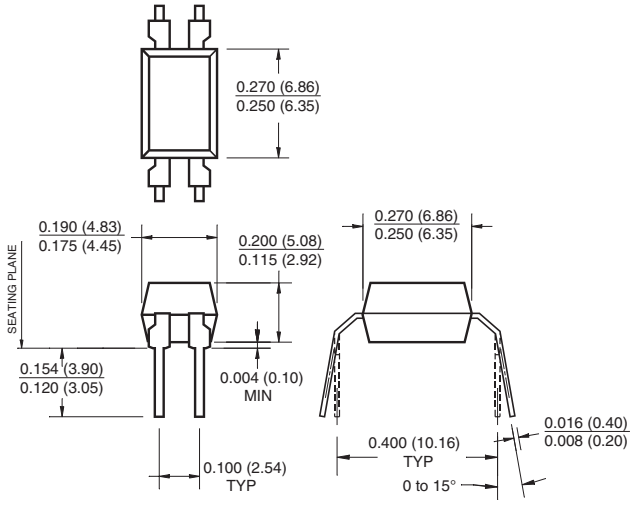
## Package Dimensions (Through Hole)



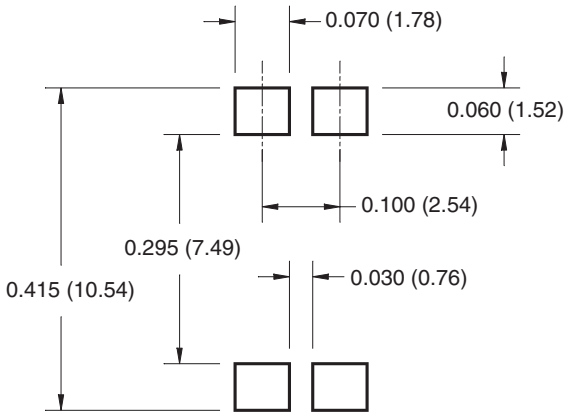

## Package Dimensions (Surface Mount)




## Package Dimensions (0.4” Lead Spacing)




## Footprint Dimensions (Surface Mount)



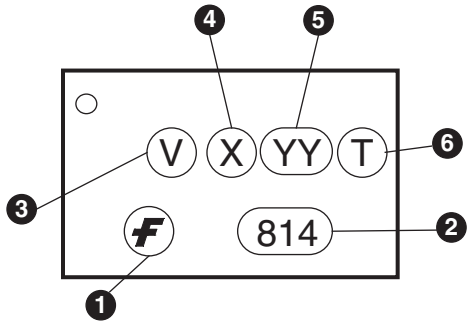

**NOTE**
All dimensions are in inches (millimeters)

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## ORDERING INFORMATION

| Option | Order Entry Identifier | Description |
|---|---|---|
| S | .S | Surface Mount Lead Bend |
| SD | .SD | Surface Mount; Tape and reel |
| W | .W | 0.4" Lead Spacing |
| 300 | .300 | VDE 0884 |
| 300W | .300W | VDE 0884, 0.4" Lead Spacing |
| 3S | .3S | VDE 0884, Surface Mount |
| 3SD | .3SD | VDE 0884, Surface Mount, Tape & Reel |

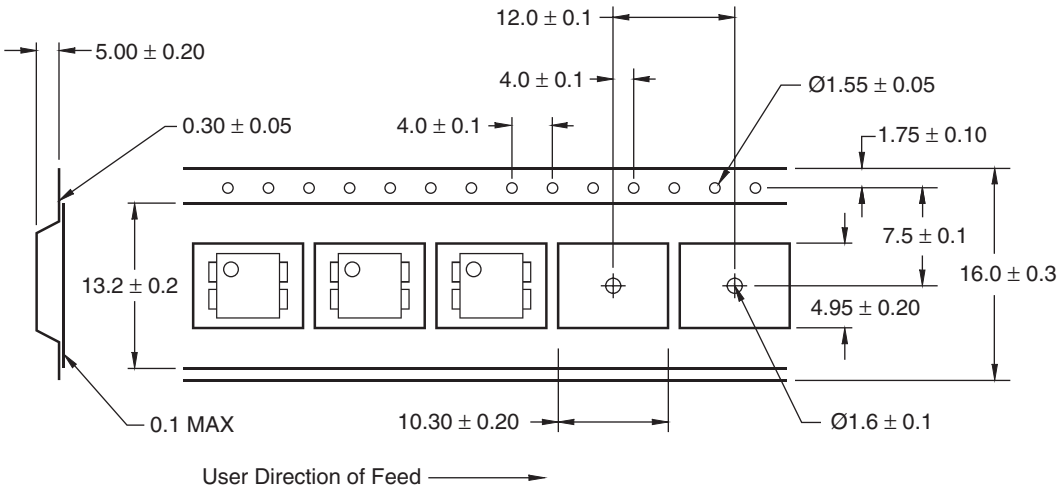
## MARKING INFORMATION




| 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 |
| 5 | Two digit work week ranging from ‘01’ to ‘53’ |
| 6 | Assembly package code |

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## Carrier Tape Specifications




**NOTE**
All dimensions are in millimeters

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