

**H11C1**

**H11C2**

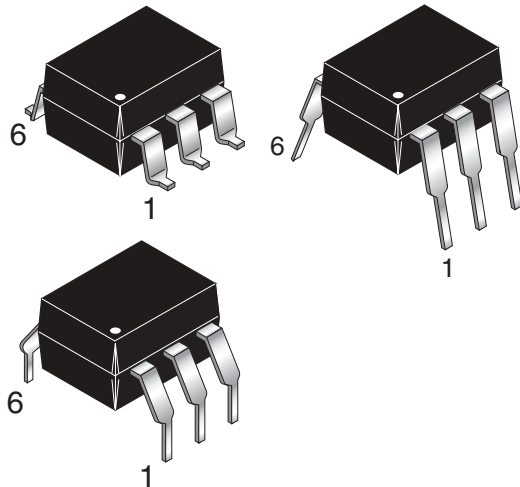
**H11C3**

**H11C4**

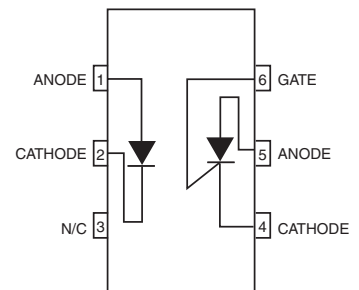
**H11C5**

**H11C6**

## PACKAGE



## SCHEMATIC



## DESCRIPTION

The H11C series consists of a gallium-arsenide infrared emitting diode optically coupled with a light activated silicon controlled rectifier in a dual-in-line package

## FEATURES

- High efficiency, low degradation, liquid epitaxial LED
- Underwriters Laboratory (UL) recognized fl File #E90700
- VDE recognized (File #94766) – ordering option .300. (e.g., H11C1.300)
- 200V/400V Peak blocking voltage
- High isolation voltage - 5300V AC (RMS)

## APPLICATIONS

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Solid state relays
- Interfacing coupling systems of different potentials and impedances.
- 10 A, T<sup>2</sup>L compatible, solid state relay
- 25 W logic indicator lamp driver
- 200 V symmetrical transistor coupler (H11C1, H11C2, H11C3)
- 400 V symmetrical transistor coupler (H11C4, H11C5, H11C6)

**H11C1**

**H11C2**

**H11C3**

**H11C4**

**H11C5**

**H11C6**

| Parameter                                                         | Symbol                  | Device              | Value          | Units |
|-------------------------------------------------------------------|-------------------------|---------------------|----------------|-------|
| TOTAL DEVICE                                                      |                         |                     |                |       |
| Storage Temperature                                               | T <sub>STG</sub>        | All                 | -55 to +150    | °C    |
| Operating Temperature                                             | T <sub>OPR</sub>        | All                 | -55 to +100    | °C    |
| Lead Solder Temperature                                           | T <sub>SOL</sub>        | All                 | 260 for 10 sec | °C    |
| EMITTER                                                           |                         |                     |                |       |
| Continuous Forward Current                                        | I <sub>F</sub>          | All                 | 60             | mA    |
| Reverse Voltage                                                   | V <sub>R</sub>          | All                 | 6              | V     |
| Forward Current - Peak (1 μs pulse, 300 pps)                      | I <sub>F(pk)</sub>      | All                 | 3.0            | A     |
| LED Power Dissipation<br>Derate above 25°C                        | P <sub>D</sub>          | All                 | 100            | mW    |
|                                                                   |                         |                     | 1.33           | mW/°C |
| DETECTOR                                                          |                         |                     |                |       |
| Power Dissipation (ambient)<br>Derate linearly above 25°C ambient | P <sub>D</sub>          | All                 | 400            | mW    |
|                                                                   |                         |                     | 5.3            | mW/°C |
| Power Dissipation (case)<br>Derate linearly above 25°C case       | P <sub>D</sub>          | All                 | 1              | W     |
|                                                                   |                         |                     | 13.3           | mW/°C |
| Peak Reverse Gate Voltage                                         | V <sub>GR</sub>         | All                 | 6              | V     |
| RMS On-State Current                                              | I <sub>DM (RMS)</sub>   | All                 | 300            | mA    |
| Peak On-State Current (100 μS, 1% duty cycle)                     | I <sub>DM (Peak)</sub>  | All                 | 10             | A     |
| Surge Current (10ms)                                              | I <sub>DM (Surge)</sub> | All                 | 5              | A     |
| Peak Forward Voltage                                              | V <sub>DM</sub>         | H11C1, H11C2, H11C3 | 200            | V     |
| Peak Forward Voltage                                              | V <sub>DM</sub>         | H11C4, H11C5, H11C6 | 400            | V     |

**H11C1**

**H11C2**

**H11C3**

**H11C4**

**H11C5**

**H11C6**

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

**INDIVIDUAL COMPONENT CHARACTERISTICS**

| Parameter               | Test Conditions                                                                                 | Symbol   | Device              | Min | Typ* | Max | Unit          |
|-------------------------|-------------------------------------------------------------------------------------------------|----------|---------------------|-----|------|-----|---------------|
| <b>EMITTER</b>          |                                                                                                 |          |                     |     |      |     |               |
| Input Forward Voltage   | $I_F = 10\text{ mA}$                                                                            | $V_F$    | All                 |     | 1.2  | 1.5 | V             |
| Reverse Leakage Current | $V_R = 3\text{ V}$                                                                              | $I_R$    | All                 |     |      | 10  | $\mu\text{A}$ |
| Capacitance             | $V_F = 0\text{ V}, f = 1.0\text{ MHz}$                                                          | $C_J$    | All                 |     | 50   |     | pF            |
| <b>DETECTOR</b>         |                                                                                                 |          |                     |     |      |     |               |
| Off-State Voltage       | $R_{GK} = 10\text{ k}\Omega, T_A = 100^\circ\text{C}, I_D = 50\mu\text{A}$                      | $V_{DM}$ | H11C1, H11C2, H11C3 | 200 |      |     | V             |
|                         | $R_{GK} = 10\text{ k}\Omega, T_A = 100^\circ\text{C}, I_D = 150\mu\text{A}$                     |          | H11C4, H11C5, H11C6 | 400 |      |     |               |
| Reverse Voltage         | $R_{GK} = 10\text{ k}\Omega, T_A = 100^\circ\text{C}, I_R = 50\mu\text{A}$                      | $V_{RM}$ | H11C1, H11C2, H11C3 | 200 |      |     | V             |
|                         | $R_{GK} = 10\text{ k}\Omega, T_A = 100^\circ\text{C}, I_R = 150\mu\text{A}$                     |          | H11C4, H11C5, H11C6 | 400 |      |     |               |
| On-State Voltage        | $I_{TM} = 300\text{ mA}$                                                                        | $V_{TM}$ | All                 |     | 1.2  | 1.3 | V             |
| Off-State Current       | $V_{DM} = 200\text{ V}, T_A = 100^\circ\text{C}, I_F = 0\text{ mA}, R_{GK} = 10\text{ k}\Omega$ | $I_{DM}$ | H11C1, H11C2, H11C3 |     |      | 50  | $\mu\text{A}$ |
|                         | $V_{DM} = 400\text{ V}, T_A = 100^\circ\text{C}, I_F = 0\text{ mA}, R_{GK} = 10\text{ k}\Omega$ |          | H11C4, H11C5, H11C6 |     |      | 150 |               |
| Reverse Current         | $V_{RM} = 200\text{ V}, T_A = 100^\circ\text{C}, I_F = 0\text{ mA}, R_{GK} = 10\text{ k}\Omega$ | $I_{RM}$ | H11C1, H11C2, H11C3 |     |      | 50  | $\mu\text{A}$ |
|                         | $V_{RM} = 400\text{ V}, T_A = 100^\circ\text{C}, I_F = 0\text{ mA}, R_{GK} = 10\text{ k}\Omega$ |          | H11C4, H11C5, H11C6 |     |      | 150 |               |

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

| Characteristics                           | Test Conditions                                     | Symbol   | Device                       | Min | Typ* | Max | Units      |
|-------------------------------------------|-----------------------------------------------------|----------|------------------------------|-----|------|-----|------------|
| Input Current to Trigger                  | $V_{AK} = 50\text{ V}, R_{GK} = 10\text{ k}\Omega$  | $I_{FT}$ | H11C1,H11C2,<br>H11C4, H11C5 |     |      | 20  | mA         |
|                                           |                                                     |          | H11C3, H11C6                 |     |      | 30  |            |
|                                           | $V_{AK} = 100\text{ V}, R_{GK} = 27\text{ k}\Omega$ |          | H11C1,H11C2,<br>H11C4, H11C5 |     |      | 11  |            |
|                                           |                                                     |          | H11C3, H11C6                 |     |      | 14  |            |
| Coupled dv/dt, input to output (figure 8) |                                                     | dv/dt    | ALL                          | 500 |      |     | V/ $\mu$ S |

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

**H11C1**

**H11C2**

**H11C3**

**H11C4**

**H11C5**

**H11C6**

## ISOLATION CHARACTERISTICS

| Characteristic        | Test Conditions                      | Symbol    | Min       | Typ* | Max | Units    |
|-----------------------|--------------------------------------|-----------|-----------|------|-----|----------|
| Isolation Voltage     | (t = 1 min.) (note 1)                | $V_{ISO}$ | 5300      |      |     | V        |
| Isolation Resistance  | (note 1) ( $V_{I-O} = 500$ VDC)      | $R_{ISO}$ | $10^{11}$ |      |     | $\Omega$ |
| Isolation Capacitance | (note 1) (f = 1 MHz, $V_{I-O} = 0$ ) | $C_{I-O}$ |           | 0.8  |     | pF       |

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

### Note

1. For this test, LED pins 1 and 2 are common, and SCR pins 4, 5 and 6 are common.

H11C1

H11C2

H11C3

H11C4

H11C5

H11C6

Figure 1. LED Forward Current vs. Forward Voltage

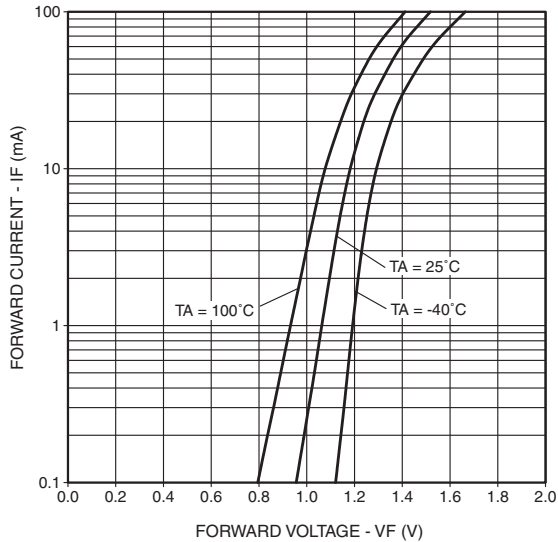


Figure 2. Trigger Current vs. Anode-Cathode Voltage

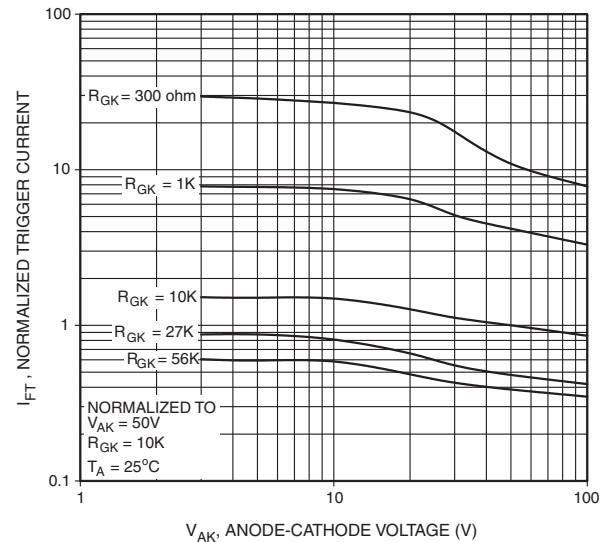


Figure 3. Input Trigger Current vs. Temperature

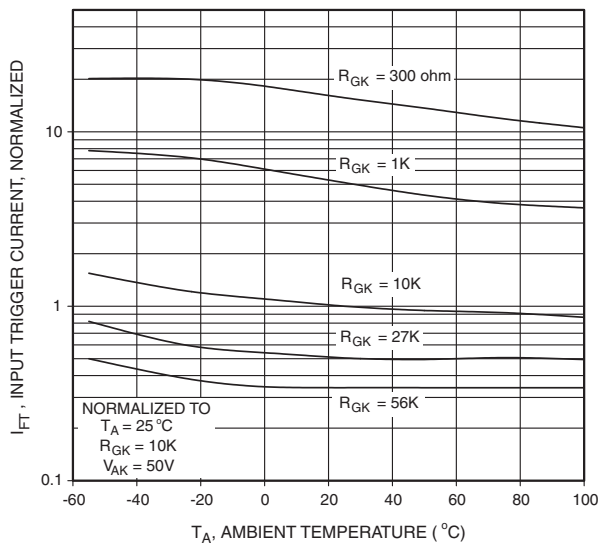
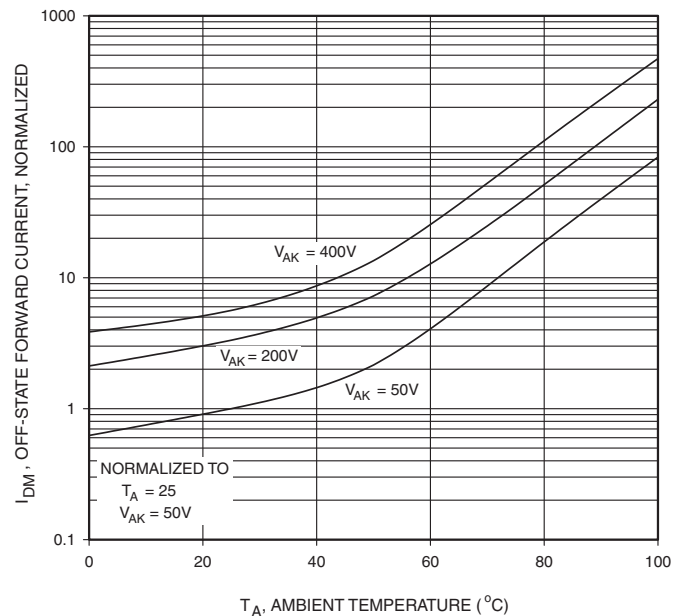


Figure 4. Off-State Current vs. Temperature



**H11C1**

**H11C2**

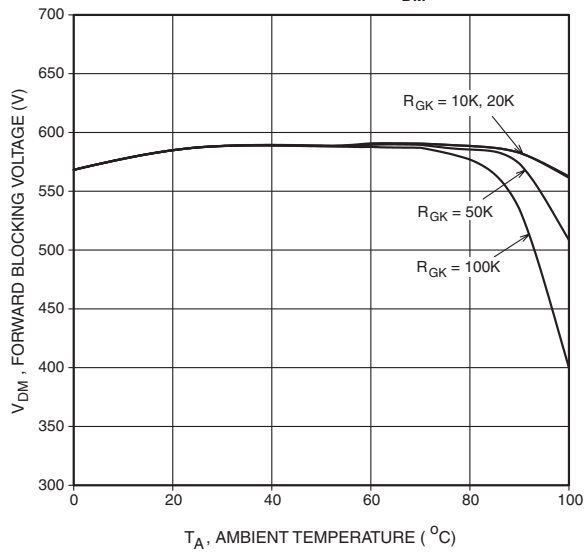
**H11C3**

**H11C4**

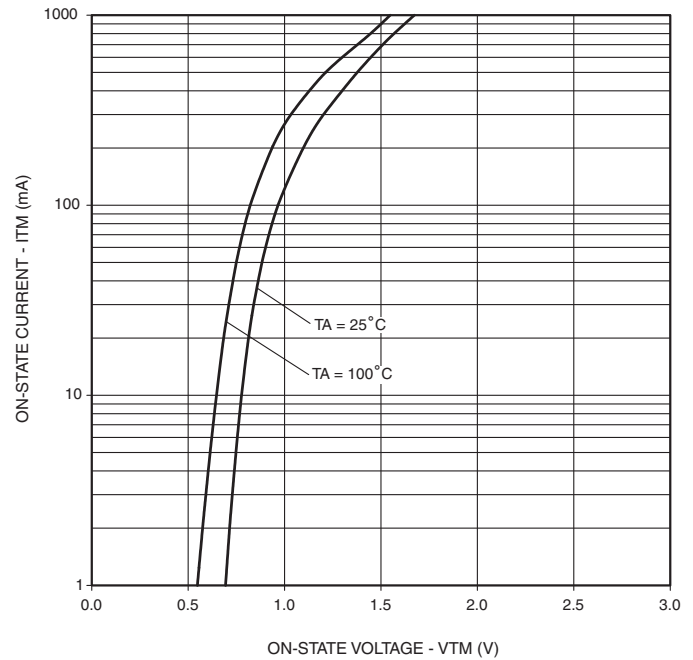
**H11C5**

**H11C6**

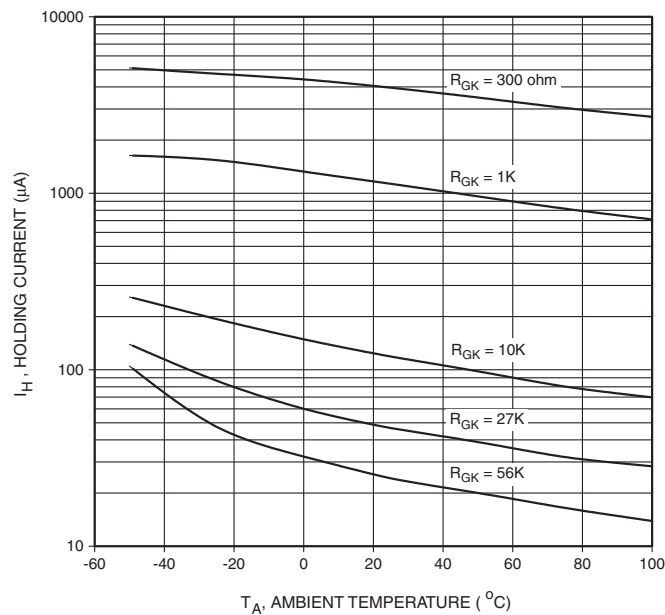
**Figure 5. Forward Blocking Voltage,  $V_{DM}$  vs. Temperature**



**Figure 6. On-State Characteristics**



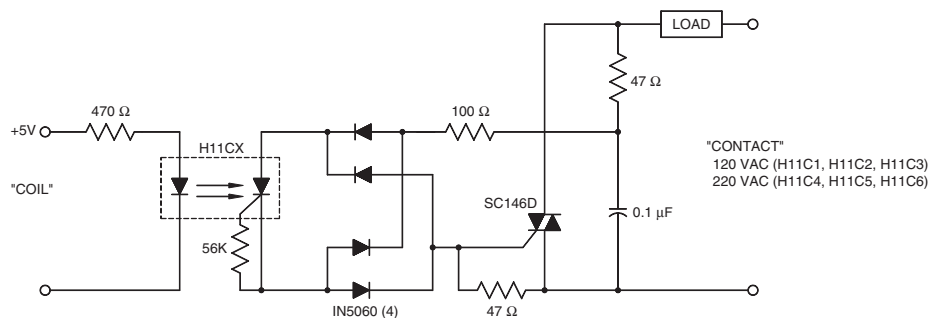
**Figure 7. Holding Current,  $I_H$  vs. Temperature**



## TYPICAL APPLICATIONS

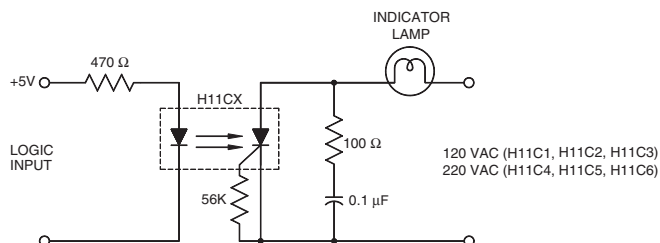
## 10A, T<sup>2</sup>L COMPATIBLE, SOLID STATE RELAY

Use of the H11C4 for high sensitivity, 5300 V isolation capability, provides this highly reliable solid state relay design. This design is compatible with 74, 74S and 74H series T<sup>2</sup>L logic systems inputs and 120V AC (H11C1, H11C2, H11C3) or 220V AC (H11C4, H11C5, H11C6) loads up to 10A.



## 25W, LOGIC INDICATOR LAMP DRIVER

The high surge capability and non-reactive input characteristics of the H11C allow it to directly couple, without buffers, T<sup>2</sup>L and DTL logic to indicator alarm devices, without danger of introducing noise and logic glitches.



## 200V/400V SYMMETRICAL TRANSISTOR COUPLER

Use of the high voltage PNP portion of the H11C provides a 400V transistor capable of conducting positive and negative signals with current transfer ratios of over 1%. This function is useful in remote instrumentation, high voltage power supplies and test equipment. Care should be taken not to exceed the H11C 400mW power dissipation rating when used at high voltages.

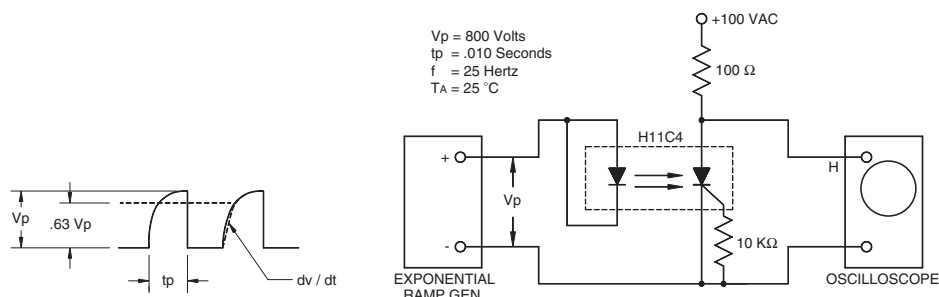
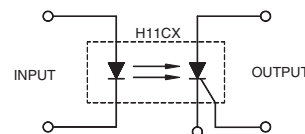


Fig. 8 Coupled  $dv/dt$  - Test Circuit

## H11C1

## H11C2

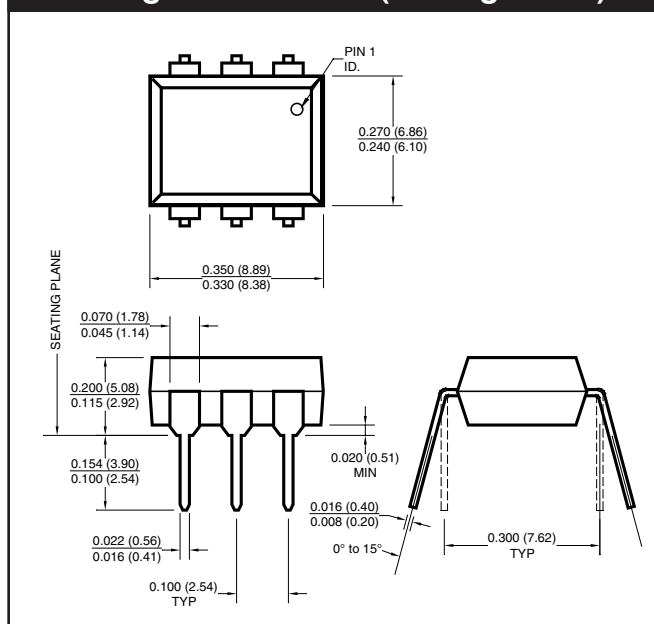
## H11C3

## H11C4

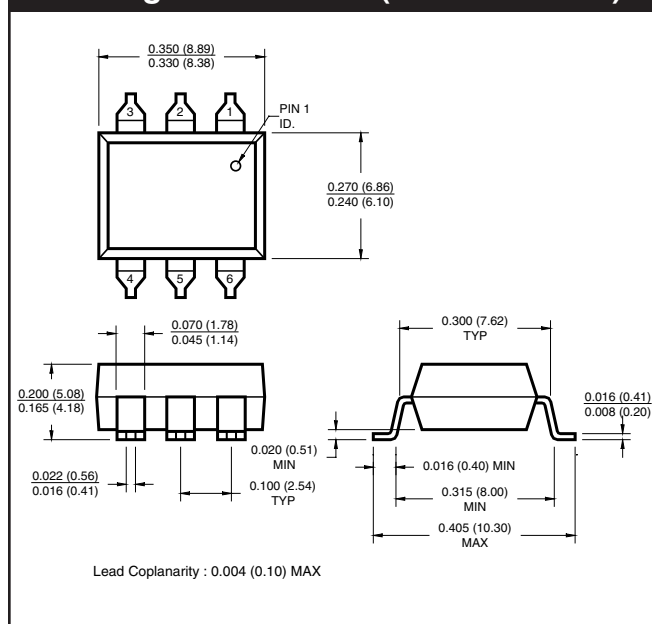
## H11C5

## H11C6

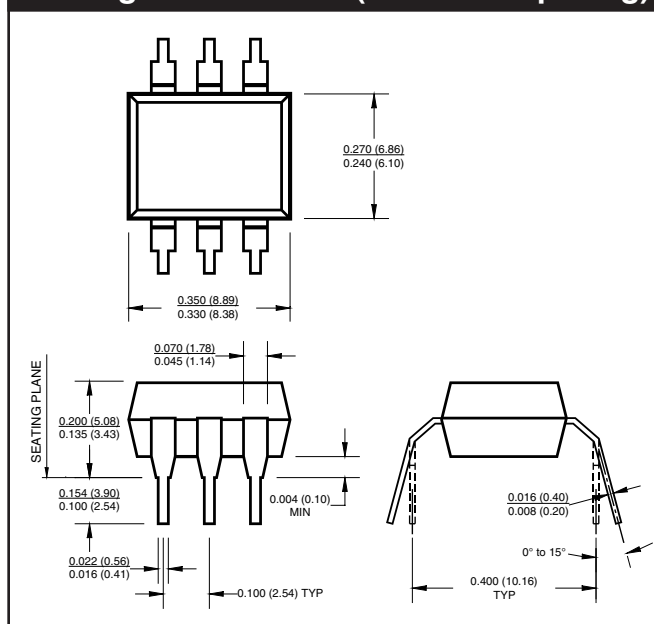
## Package Dimensions (Through Hole)



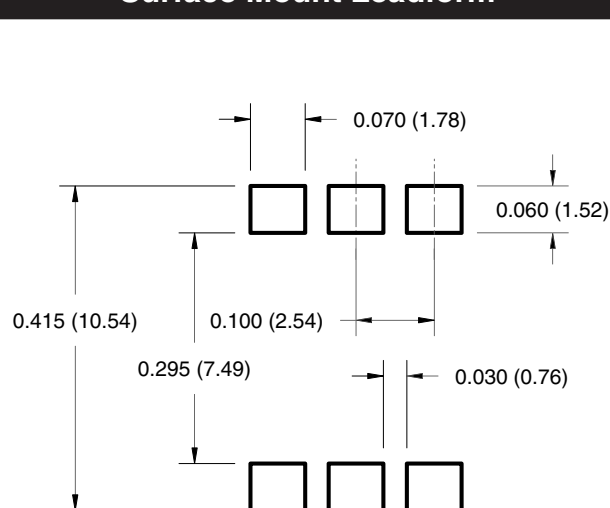
### Package Dimensions (Surface Mount)



### Package Dimensions (0.4" Lead Spacing)



## Recommended Pad Layout for Surface Mount Leadform



### Note

All dimensions are in inches (millimeters)

H11C1

H11C2

H11C3

H11C4

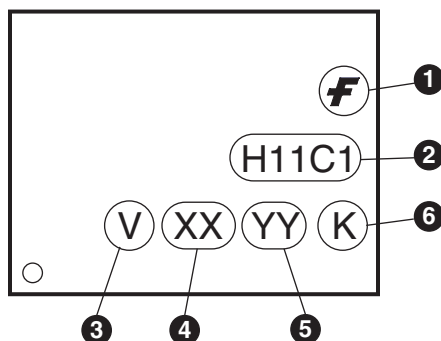
H11C5

H11C6

## 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 and 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           | Two digit year code, e.g., '03'                                                        |
| 5           | Two digit work week ranging from '01' to '53'                                          |
| 6           | Assembly package code                                                                  |

H11C1

H11C2

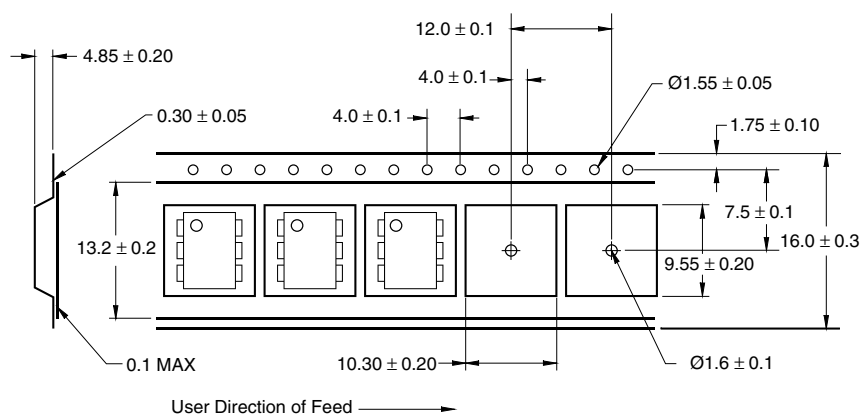
H11C3

H11C4

H11C5

H11C6

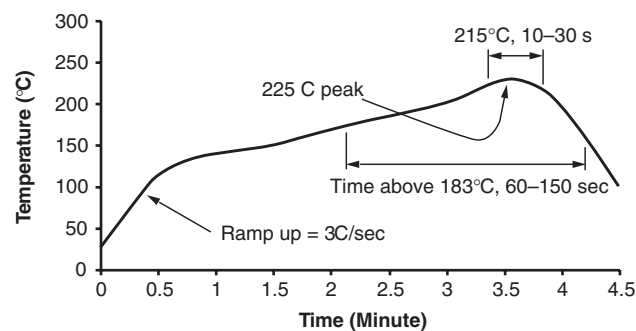
## Carrier Tape Specifications



### NOTE

All dimensions are in inches (millimeters)

## Reflow Profile (Black Package, No Suffix)



- Peak reflow temperature:  $225^\circ\text{C}$  (package surface temperature)
- Time of temperature higher than  $183^\circ\text{C}$  for 60–150 seconds
- One time soldering reflow is recommended

**H11C1**

**H11C2**

**H11C3**

**H11C4**

**H11C5**

**H11C6**

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