

## H11AA1, H11AA2, H11AA3, H11AA4

### DESCRIPTION

The H11AAx series optocoupler consists of two infrared emitting diodes connected in inverse parallel and optically coupled to an NPN silicon transistor in a standard 6 pin dual in line plastic package.



### FEATURES

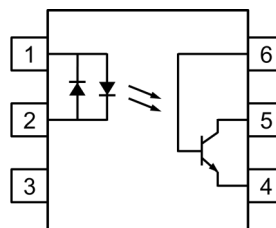
- High AC Isolation voltage 5000V<sub>RMS</sub>
- Wide Operating Temperature Range
- -40°C to 100°C
- RoHS Compliant
- UL Approval E91231 Model "GG"
- VDE Approval 40028086

### APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- AC Input Response
- Signal Transmission between Systems of Different Potentials and Impedances

### ORDER INFORMATION

- Add Suffix "X" for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel



- |   |           |
|---|-----------|
| 1 | Anode     |
| 2 | Cathode   |
| 3 | NC        |
| 4 | Emitter   |
| 5 | Collector |
| 6 | Base      |

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

#### Input

|                   |       |
|-------------------|-------|
| Forward Current   | ±50mA |
| Power Dissipation | 70mW  |

#### Output

|                                               |       |
|-----------------------------------------------|-------|
| Collector Current                             | 50mA  |
| Collector to Emitter Voltage V <sub>CEO</sub> | 35V   |
| Collector to Base Voltage V <sub>CBO</sub>    | 35V   |
| Emitter to Collector Voltage V <sub>ECO</sub> | 6V    |
| Emitter to Base Voltage V <sub>EBO</sub>      | 6V    |
| Power Dissipation                             | 150mW |

#### Total Package

|                                  |                      |
|----------------------------------|----------------------|
| Total Power Dissipation          | 200mW                |
| Isolation Voltage                | 5000V <sub>RMS</sub> |
| Operating Temperature            | -40 to 100°C         |
| Storage Temperature              | -55 to 125°C         |
| Junction Temperature             | 125°C                |
| Lead Soldering Temperature (10s) | 260°C                |

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## H11AA1, H11AA2, H11AA3, H11AA4

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

#### INPUT

| Parameter            | Symbol | Test Condition                        | Min | Typ. | Max | Unit |
|----------------------|--------|---------------------------------------|-----|------|-----|------|
| Forward Voltage      | $V_F$  | $I_F = \pm 20\text{mA}$               |     | 1.2  | 1.4 | V    |
| Terminal Capacitance | $C_t$  | $V_F = 0\text{V}$ , $f = 1\text{kHz}$ |     | 50   | 250 | pF   |

#### OUTPUT

| Parameter                           | Symbol     | Test Condition                             | Min | Typ. | Max | Unit |
|-------------------------------------|------------|--------------------------------------------|-----|------|-----|------|
| Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | $I_C = 0.1\text{mA}$ , $I_F = 0\text{mA}$  | 35  |      |     | V    |
| Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | $I_E = 10\mu\text{A}$ , $I_F = 0\text{mA}$ | 6   |      |     | V    |
| Collector Dark Current              | $I_{CEO}$  | $V_{CE} = 20\text{V}$ , $I_F = 0\text{mA}$ |     |      | 100 | nA   |

#### COUPLED

| Parameter                            | Symbol        | Test Condition                                                                 | Min | Typ. | Max | Unit          |
|--------------------------------------|---------------|--------------------------------------------------------------------------------|-----|------|-----|---------------|
| Current transfer ratio               | CTR           | $I_F = \pm 10\text{mA}$ , $V_{CE} = 10\text{V}$                                |     |      |     | %             |
|                                      |               | H11AA1                                                                         | 20  |      |     |               |
|                                      |               | H11AA2                                                                         | 10  |      |     |               |
|                                      |               | H11AA3                                                                         | 50  |      |     |               |
|                                      |               | H11AA4                                                                         | 100 |      |     |               |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F = \pm 20\text{mA}$ , $I_C = 1\text{mA}$                                   |     |      | 0.2 | V             |
| Floating Capacitance                 | $C_f$         | $V_{IO} = 0\text{V}$ , $f = 1\text{MHz}$                                       |     | 0.6  | 1   | pF            |
| Cut-Off Frequency                    | $f_c$         | $V_{CE} = 5\text{V}$ , $I_C = 2\text{mA}$<br>$R_L = 100\Omega$ , $-3\text{dB}$ | 15  | 80   |     | kHz           |
| Output Rise Time                     | $t_r$         | $V_{CE} = 2\text{V}$ , $I_C = 2\text{mA}$<br>$R_L = 100\Omega$                 |     | 4    | 18  | $\mu\text{s}$ |
| Output Fall Time                     | $t_f$         |                                                                                |     | 3    | 18  | $\mu\text{s}$ |

## H11AA1, H11AA2, H11AA3, H11AA4

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

#### ISOLATION

| Parameter            | Symbol           | Test Condition                                                  | Min                | Typ.               | Max | Unit             |
|----------------------|------------------|-----------------------------------------------------------------|--------------------|--------------------|-----|------------------|
| Isolation Voltage    | $V_{\text{ISO}}$ | R.H. = 40% to 60%, $t = 1 \text{ min}$<br>Note 1                | 5000               |                    |     | $V_{\text{RMS}}$ |
| Isolation Resistance | $R_{\text{I-O}}$ | $V_{\text{I-O}} = 500\text{VDC}$<br>R.H. = 40% to 60%<br>Note 1 | $5 \times 10^{10}$ | $1 \times 10^{11}$ |     | $\Omega$         |

Note 1 : Measured with input leads shorted together and output leads shorted together.

## H11AA1, H11AA2, H11AA3, H11AA4

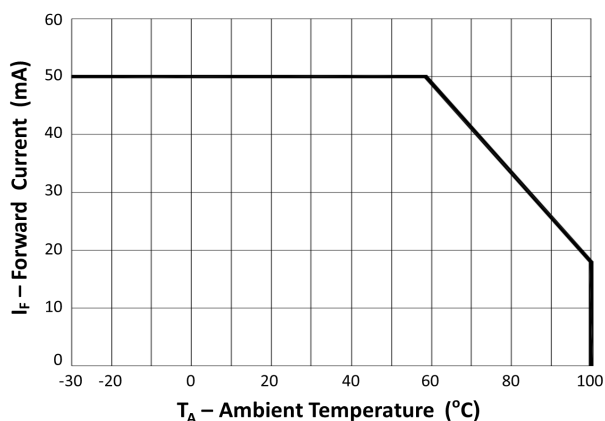


**Fig 1 Forward Current vs Ambient Temperature**

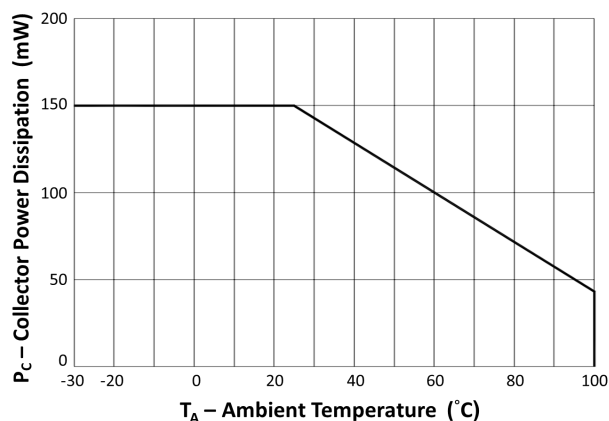


**Fig 2 Collector Power Dissipation vs Ambient Temperature**

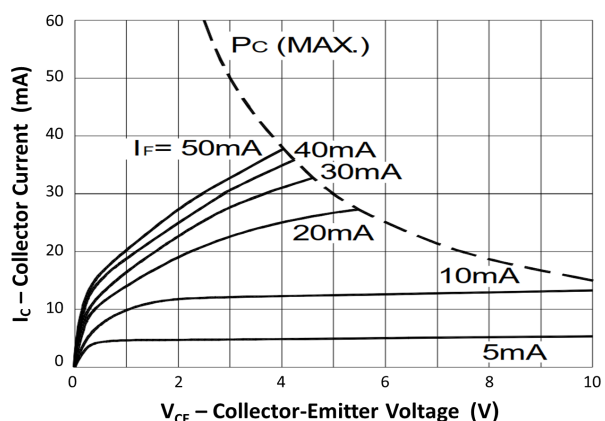


**Fig 3 Collector Current vs Collector-Emitter Voltage**

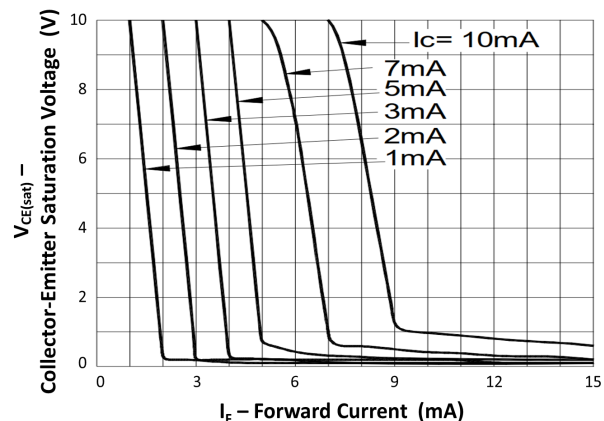


**Fig 4 Collector-Emitter Saturation Voltage vs Forward Current**

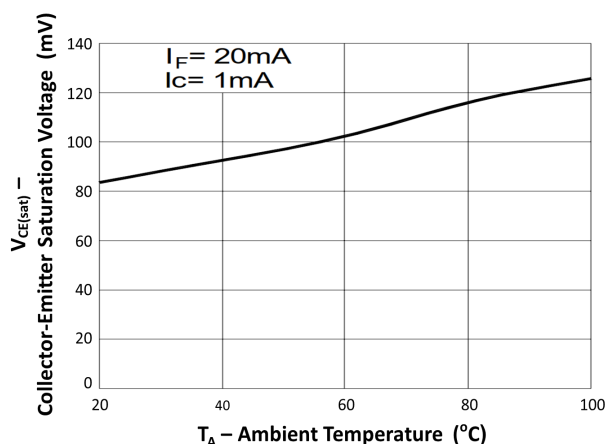


**Fig 5 Collector-Emitter Saturation Voltage vs Ambient Temperature**

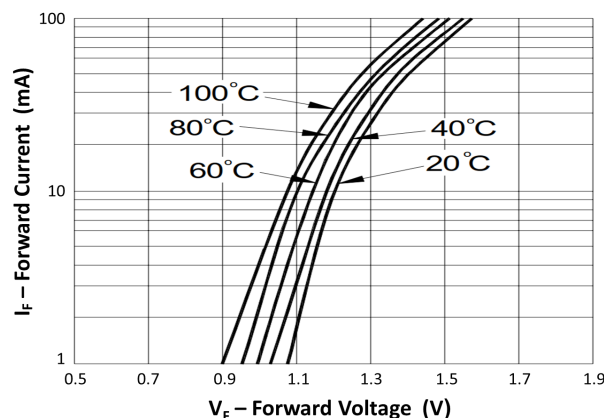


**Fig 6 Forward Current vs Forward Voltage**



## H11AA1, H11AA2, H11AA3, H11AA4

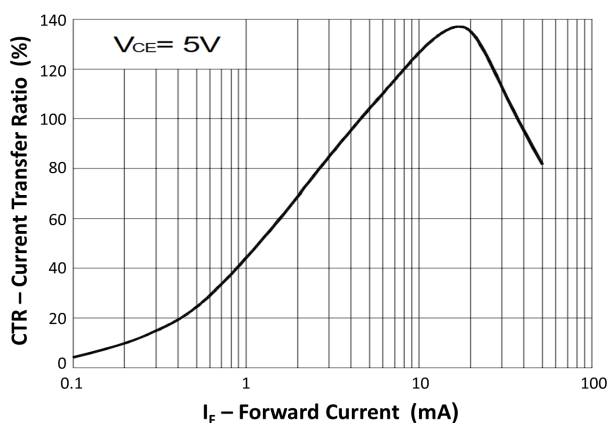


Fig 7 Current Transfer Ratio vs Forward Current

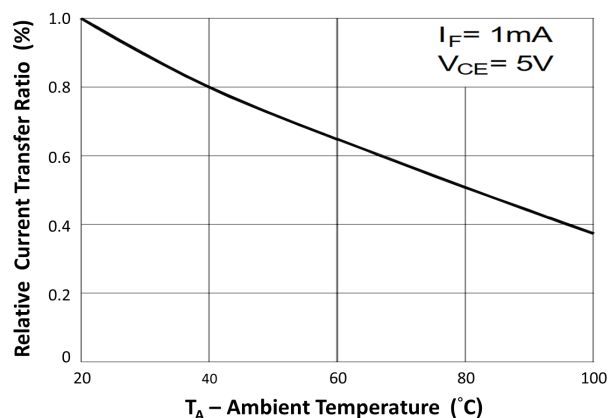


Fig 8 Relative Current Transfer Ratio vs Ambient Temperature

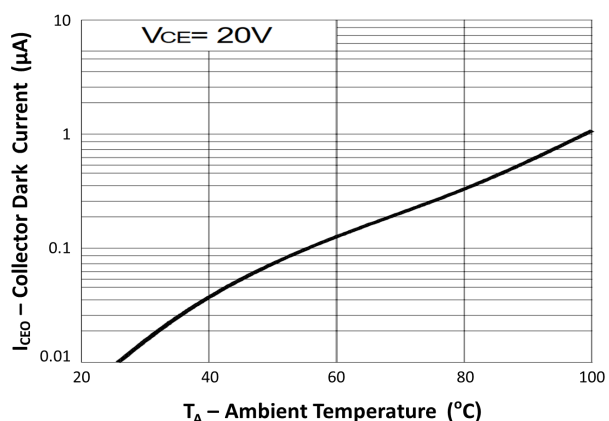


Fig 9 Collector Dark Current vs Ambient Temperature

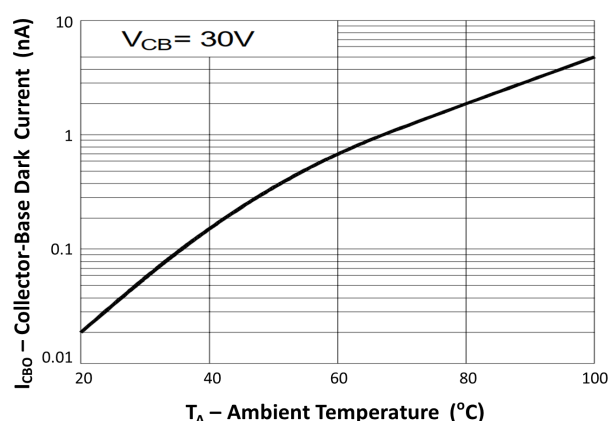


Fig 10 Collector-Base Dark Current vs Ambient Temperature

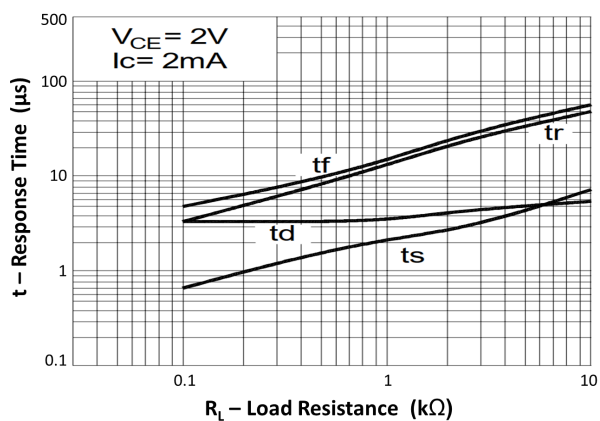


Fig 11 Response Time vs Load Resistance

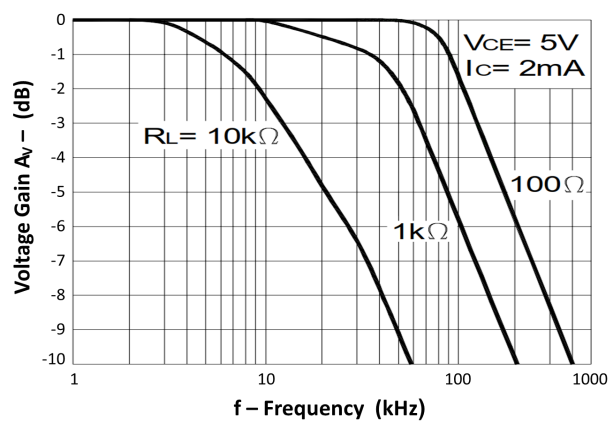


Fig 12 Frequency Response

**H11AA1, H11AA2, H11AA3, H11AA4****ORDER INFORMATION**

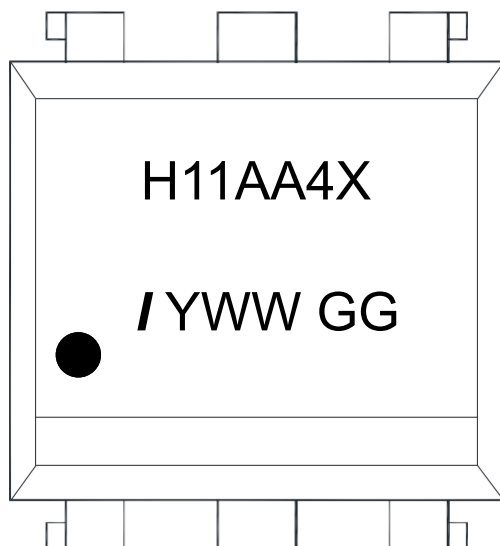
| <b>H11AA1, H11AA2, H11AA3, H11AA4 (UL Approval)</b> |                                                      |                                |                         |
|-----------------------------------------------------|------------------------------------------------------|--------------------------------|-------------------------|
| <b>After PN</b>                                     | <b>PN</b>                                            | <b>Description</b>             | <b>Packing quantity</b> |
| None                                                | H11AA1, H11AA2, H11AA3, H11AA4                       | Standard DIP6                  | 65 pcs per tube         |
| G                                                   | H11AA1G, H11AA2G<br>H11AA3G, H11AA4G                 | 10mm Lead Spacing              | 65 pcs per tube         |
| SM                                                  | H11AA1SM, H11AA2SM<br>H11AA3SM, H11AA4SM             | Surface Mount                  | 65 pcs per tube         |
| SMT&R                                               | H11AA1SMT&R, H11AA2SMT&R<br>H11AA3SMT&R, H11AA4SMT&R | Surface Mount<br>Tape and Reel | 1000 pcs per reel       |

| <b>H11AA1X, H11AA2X, H11AA3X, H11AA4X (UL and VDE Approvals)</b> |                                                              |                                |                         |
|------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------|-------------------------|
| <b>After PN</b>                                                  | <b>PN</b>                                                    | <b>Description</b>             | <b>Packing quantity</b> |
| None                                                             | H11AA1X, H11AA2X<br>H11AA3X, H11AA4X                         | Standard DIP6                  | 65 pcs per tube         |
| G                                                                | H11AA1XG, H11AA2XG<br>H11AA3XG, H11AA4XG                     | 10mm Lead Spacing              | 65 pcs per tube         |
| SM                                                               | H11AA1XSM, H11AA2XSM<br>H11AA3XSM, H11AA4XSM                 | Surface Mount                  | 65 pcs per tube         |
| SMT&R                                                            | H11AA1XSMT&R<br>H11AA2XSMT&R<br>H11AA3XSMT&R<br>H11AA4XSMT&R | Surface Mount<br>Tape and Reel | 1000 pcs per reel       |

## H11AA1, H11AA2, H11AA3, H11AA4

### DEVICE MARKING

Example : H11AA4X



|         |                            |
|---------|----------------------------|
| H11AA4X | denotes Device Part Number |
| /       | denotes Isocom             |
| Y       | denotes 1 digit Year code  |
| WW      | denotes 2 digit Week code  |

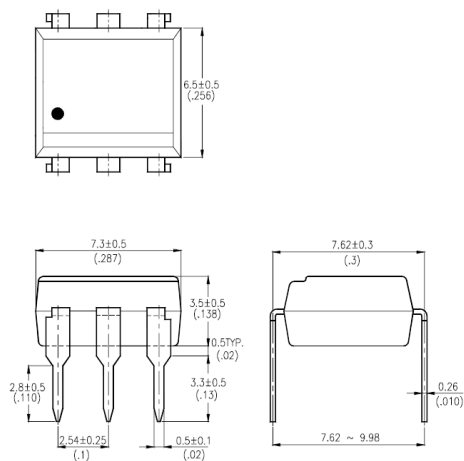


**ISOCOM**  
COMPONENTS

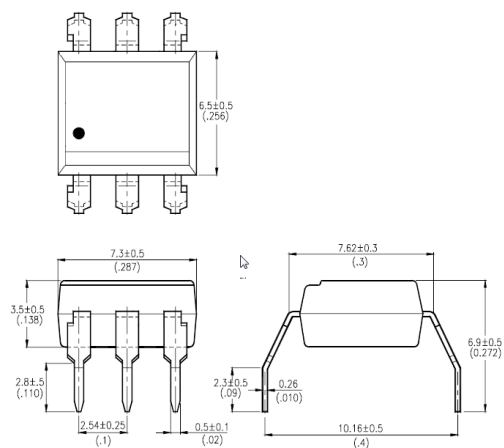
## H11AA1, H11AA2, H11AA3, H11AA4

### PACKAGE DIMENSIONS (mm)

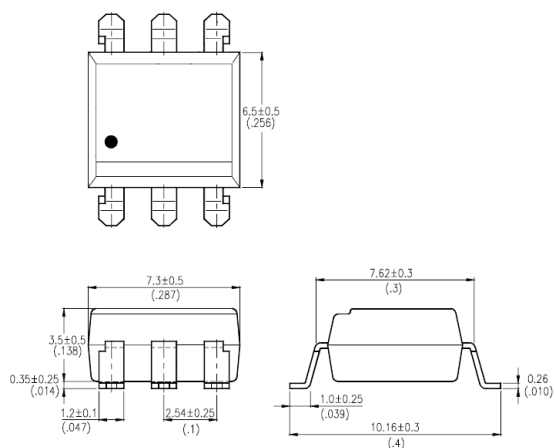
#### DIP



#### G Form

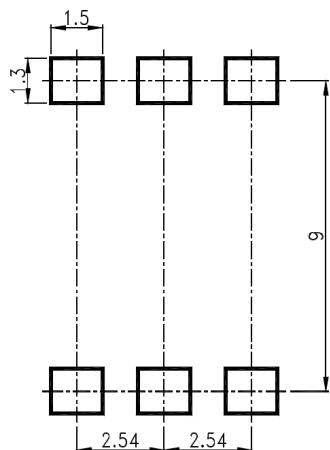


#### Surface Mount

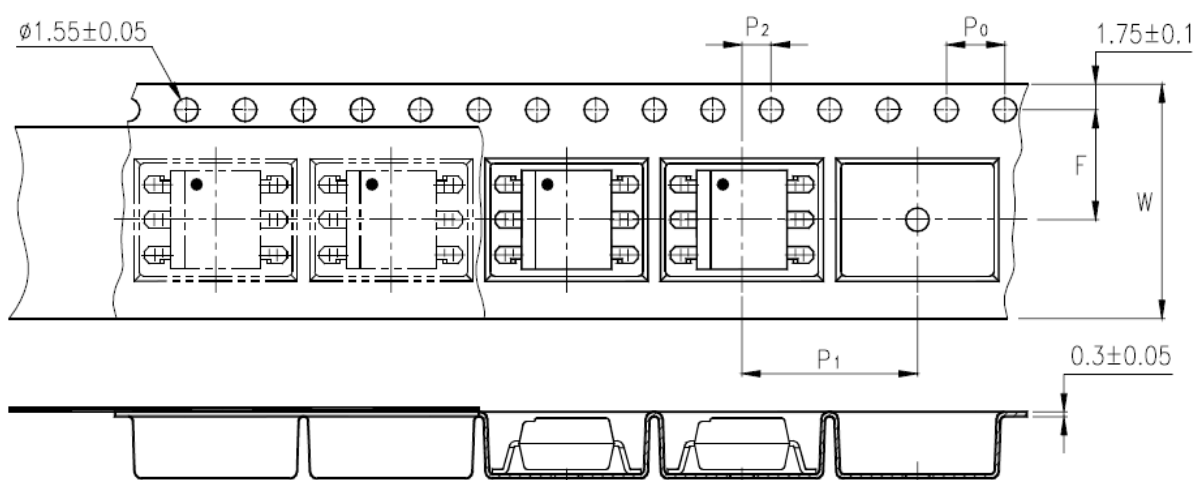


## H11AA1, H11AA2, H11AA3, H11AA4

### RECOMMENDED PAD LAYOUT FOR SMD (MM)



### TAPE AND REEL PACKAGING



| Description                               | Symbol         | Dimension<br>mm (inch) |
|-------------------------------------------|----------------|------------------------|
| Tape Width                                | W              | 16 ± 0.3 (0.63)        |
| Pitch of Sprocket Holes                   | P <sub>0</sub> | 4 ± 0.1 (0.15)         |
| Distance of Compartment to Sprocket Holes | F              | 7.5 ± 0.1 (0.295)      |
|                                           | P <sub>2</sub> | 2 ± 0.1 (0.079)        |
| Distance of Compartment to Compartment    | P <sub>1</sub> | 12 ± 0.1 (0.472)       |

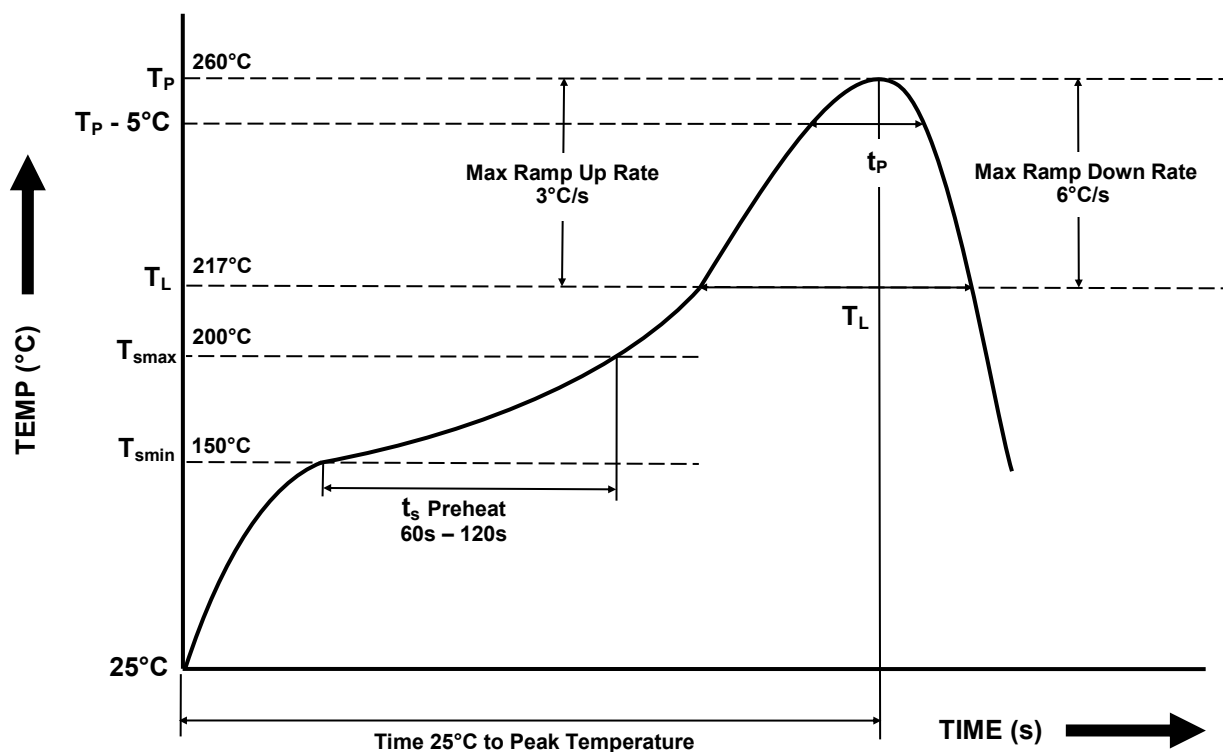


## H11AA1, H11AA2, H11AA3, H11AA4

### IR REFLOW SOLDERING TEMPERATURE PROFILE

One Time Reflow Soldering is Recommended.

Do not immerse device body in solder paste.



| Profile Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Conditions                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Preheat</b> <ul style="list-style-type: none"><li>- Min Temperature (<math>T_{SMIN}</math>)</li><li>- Max Temperature (<math>T_{SMAX}</math>)</li><li>- Time <math>T_{SMIN}</math> to <math>T_{SMAX}</math> (<math>t_s</math>)</li></ul>                                                                                                                                                                                                                                                   | 150°C<br>200°C<br>60s - 120s                                                 |
| <b>Soldering Zone</b> <ul style="list-style-type: none"><li>- Peak Temperature (<math>T_P</math>)</li><li>- Time at Peak Temperature</li><li>- Liquidous Temperature (<math>T_L</math>)</li><li>- Time within 5°C of Actual Peak Temperature (<math>T_P - 5^\circ\text{C}</math>)</li><li>- Time maintained above <math>T_L</math> (<math>t_L</math>)</li><li>- Ramp Up Rate (<math>T_L</math> to <math>T_P</math>)</li><li>- Ramp Down Rate (<math>T_P</math> to <math>T_L</math>)</li></ul> | 260°C<br>10s max<br>217°C<br>30s max<br>60s - 100s<br>3°C/s max<br>6°C/s max |
| Average Ramp Up Rate ( $T_{smax}$ to $T_P$ )                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3°C/s max                                                                    |
| Time 25°C to Peak Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 8 minutes max                                                                |

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