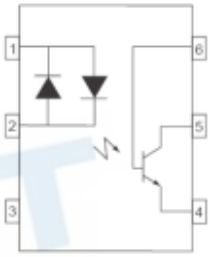
DATASHEET

# 6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER
# AC INPUT PHOTOCOUPLER
# H11AAX Series



Schematic




Pin Configuration
1. Anode / Cathode
2. Cathode / Anode
3. No Connection
4. Emitter
5. Collector
6. Base

## Features

- H11AAX series: H11AA1, H11AA2, H11AA3, H11AA4
- High isolation voltage between input and output
  Viso = 5000 Vrms
- Creepage distance >7.62 mm
- Compact dual-in-line package
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH
- UL and cUL approved(No. E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

## Description

The H11AAX series of devices each consist of two infrared emitting diode, connected in inverse parallel, optically coupled to a phototransistor detector.
They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

## Applications

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


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## Absolute Maximum Ratings (Ta=25℃)

| | Parameter | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 60 | mA |
| | Peak forward current (t = 10μs) | $I_{FM}$ | 1 | A |
| | Power dissipation (TA = 25°C) | $P_D$ | 120 | mW |
| | Derating factor (above 90°C) | | 3.8 | mW/°C |
| Output | Power dissipation ($T_A$ = 25°C) No derating up to 100°C | $P_C$ | 150 | mW |
| | Collector-Emitter voltage | $V_{CEO}$ | 80 | V |
| | Collector-Base voltage | $V_{CBO}$ | 80 | V |
| | Emitter-Collector voltage | $V_{ECO}$ | 7 | V |
| Total Power Dissipation | | $P_{TOT}$ | 200 | mW |
| Isolation Voltage*1 | | $V_{ISO}$ | 5000 | V rms |
| Operating Temperature | | $T_{OPR}$ | -55 to 100 | °C |
| Storage Temperature | | $T_{STG}$ | -55 to 125 | °C |
| Soldering Temperature*2 | | $T_{SOL}$ | 260 | °C |

Notes
*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.
*2 For 10 seconds


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## Electro-Optical Characteristics (Ta=25℃ unless specified otherwise)

### Input

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | - | 1.2 | 1.5 | V | $I_F$ = ±10mA |
| Input capacitance | $C_{in}$ | - | 80 | - | pF | V = 0, f = 1MHz |

### Output

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Collector-Emitter dark current | $I_{CEO}$ | - | - | 50 | nA | $V_{CE}$ = 10V, $I_F$ = 0mA |
| Collector-Emitter breakdown voltage | $BV_{CEO}$ | 80 | - | - | V | $I_C$ = 1mA |
| Collector-Base breakdown voltage | $BV_{CBO}$ | 80 | - | - | V | $I_C$ = 0.1mA |
| Emitter-Collector breakdown voltage | $BV_{ECO}$ | 7 | - | - | V | $I_E$ = 0.1mA |
| Collector-Emitter capacitance | $C_{CE}$ | - | 10 | - | pF | VCE = 0V, f = 1MHz |

### Transfer Characteristics

| Parameter | | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Current Transfer ratio | H11AA1 | CTR | 20 | - | - | % | $I_F$ = ±10mA ,$V_{CE}$ = 10V |
| | H11AA2 | | 10 | - | - | | |
| | H11AA3 | | 50 | - | - | | |
| | H11AA4 | | 100 | - | - | | |
| CTR Symmetry | | | 0.5 | - | 2.0 | | $I_F$ = ±10mA ,$V_{CE}$ = 10V |
| Collector-emitter saturation voltage | | $V_{CE(sat)}$ | - | - | 0.4 | V | $I_F$ = ±10mA , $I_C$ =0.5mA |
| Isolation resistance | | $R_{IO}$ | $10^{11}$ | - | - | Ω | $V_{IO}$ = 500Vdc, 40~60% R.H. |
| Input-output capacitance | | $C_{IO}$ | - | 0.7 | - | pF | $V_{IO}$ = 0, f = 1MHz |
| Turn-on time | | $T_{on}$ | - | - | 10 | μs | $V_{CC}$ = 10V, $I_C$ = 10mA, $R_L$ = 100Ω |
| Turn-off time | | $T_{off}$ | - | - | 10 | | |
| Rise time | | $T_r$ | - | - | 10 | | |
| Fall time | | $T_f$ | - | - | 10 | | |

* Typical values at $T_a$ = 25°C


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## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

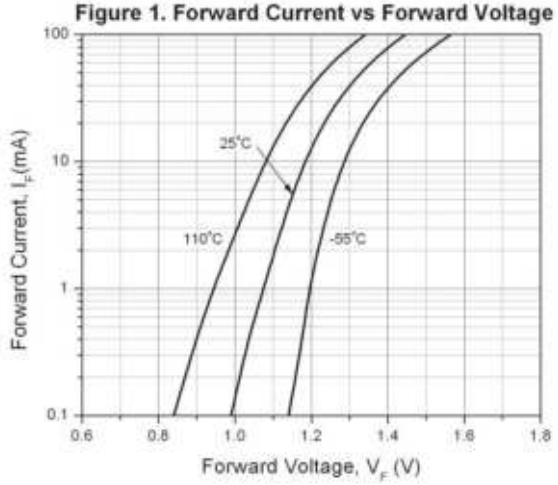



Figure 2. Current Tranfer Ratio vs Forward Current

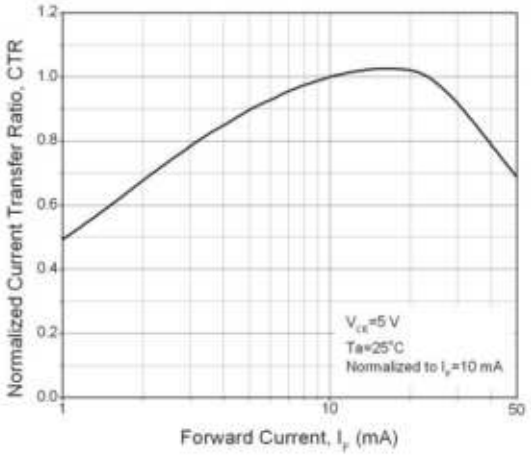



Figure 3. Current Tranfer Ratio vs Ambient Temperature

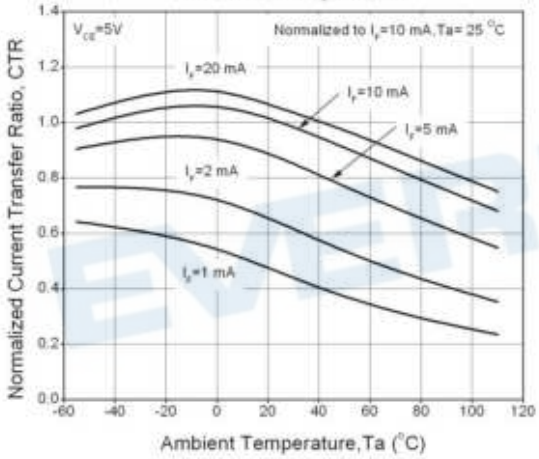



Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

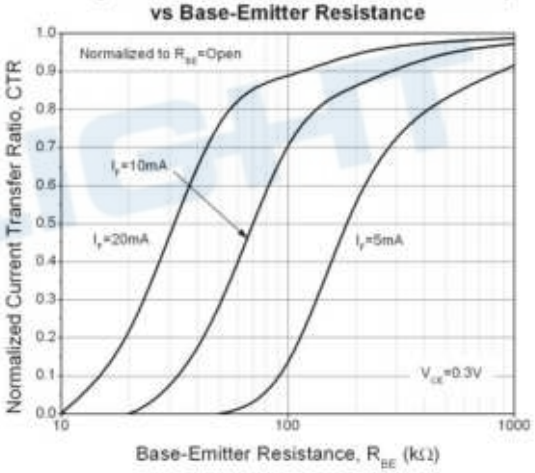



Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

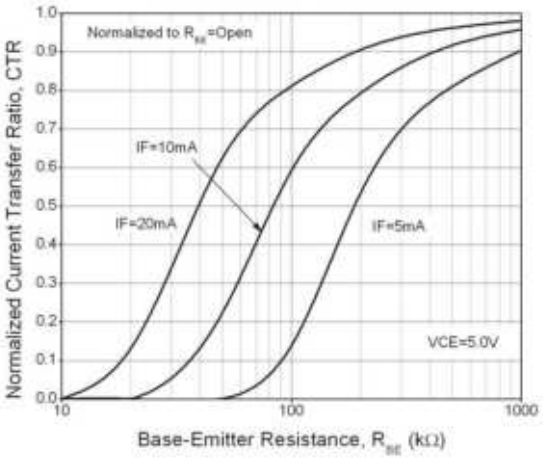
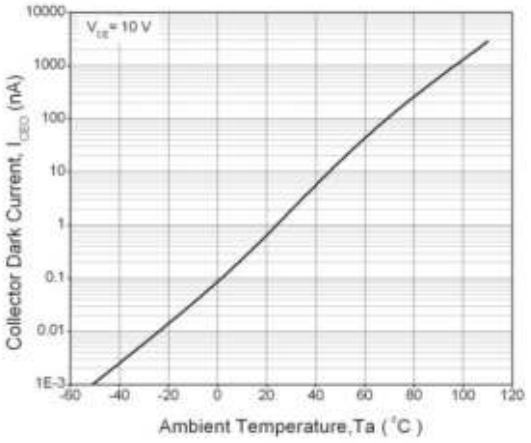



Figure 6. Dark Current vs Ambient Temperature





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Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

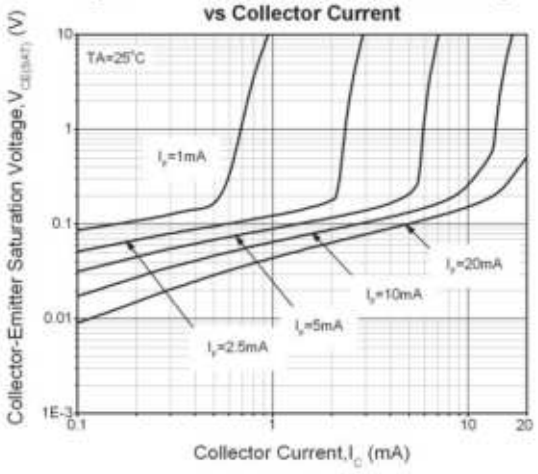



Figure 8. Switching Time vs Load Resistance

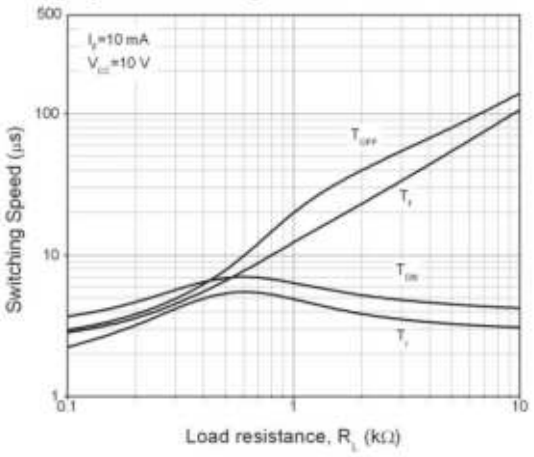



Figure 9. Turn-on Time vs Base-Emitter Resistance)

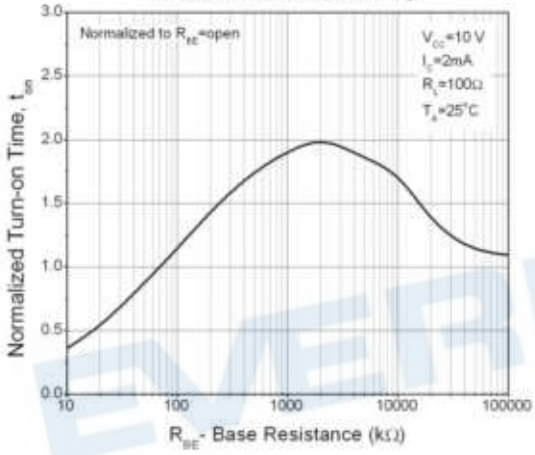
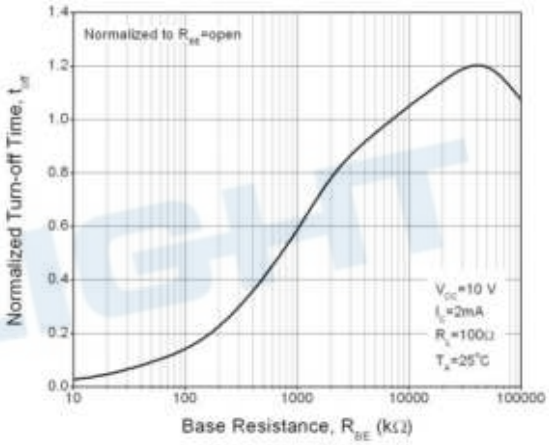



Figure 10. Turn-off Time vs Base-Emitter Resistance



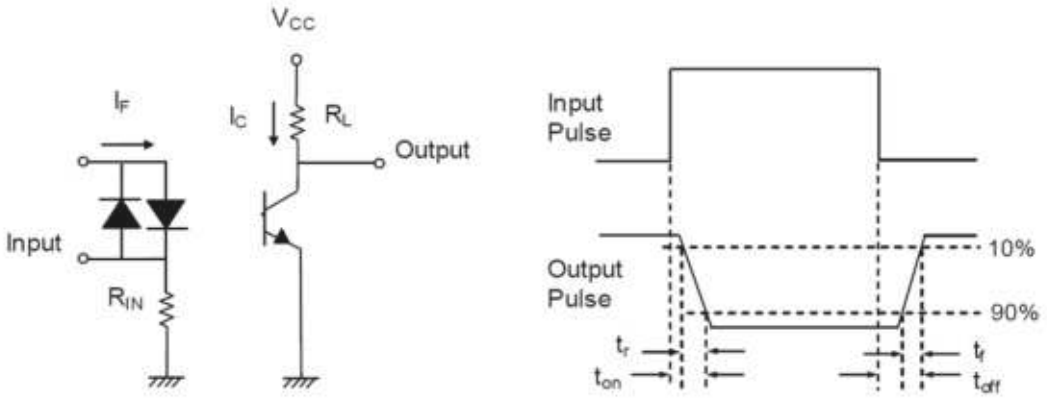




**Figure 11. Switching Time Test Circuit & Waveforms**


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## Order Information

### Part Number

# H11AAXY(Z)-V

**Notes**

X = CTR Rank (1, 2, 3, or 4)
Y = Lead form option (S, S1, M or none)
Z = Tape and reel option (TA, TB, or none).
V = VDE safety (optional).

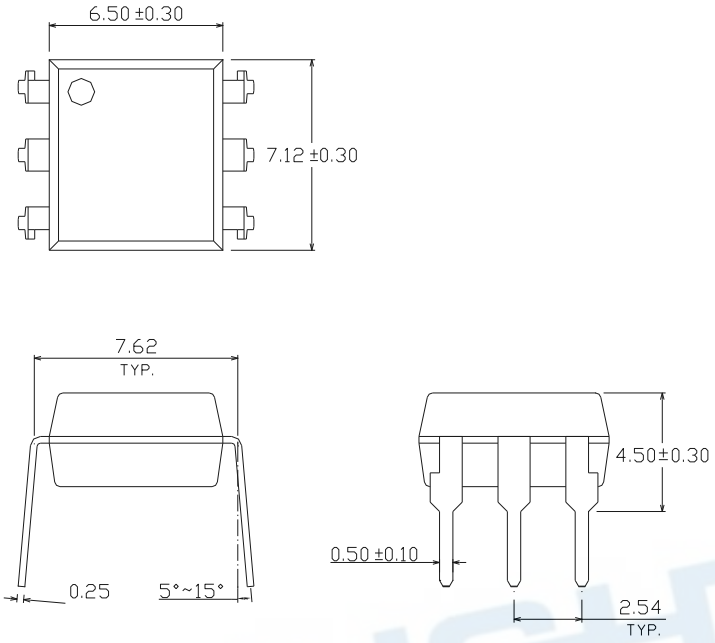
| Option | Description | Packing quantity |
|---|---|---|
| None | Standard DIP-6 | 65 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 65 units per tube |
| S (TA) | Surface mount lead form + TA tape & reel option | 1000 units per reel |
| S (TB) | Surface mount lead form + TB tape & reel option | 1000 units per reel |
| S1 (TA) | Surface mount lead form (low profile) + TA tape & reel option | 1000 units per reel |
| S1 (TB) | Surface mount lead form (low profile) + TB tape & reel option | 1000 units per reel |


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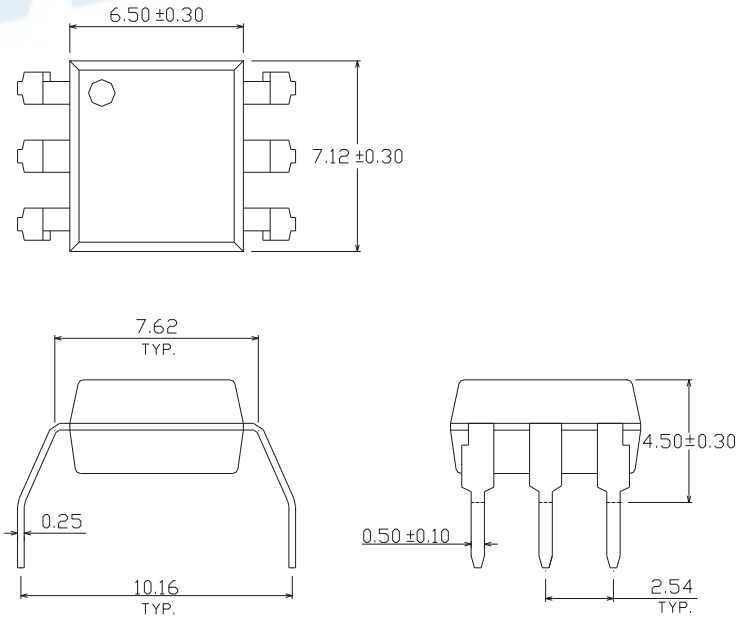
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## Package Dimension (Dimensions in mm)

### Standard DIP Type



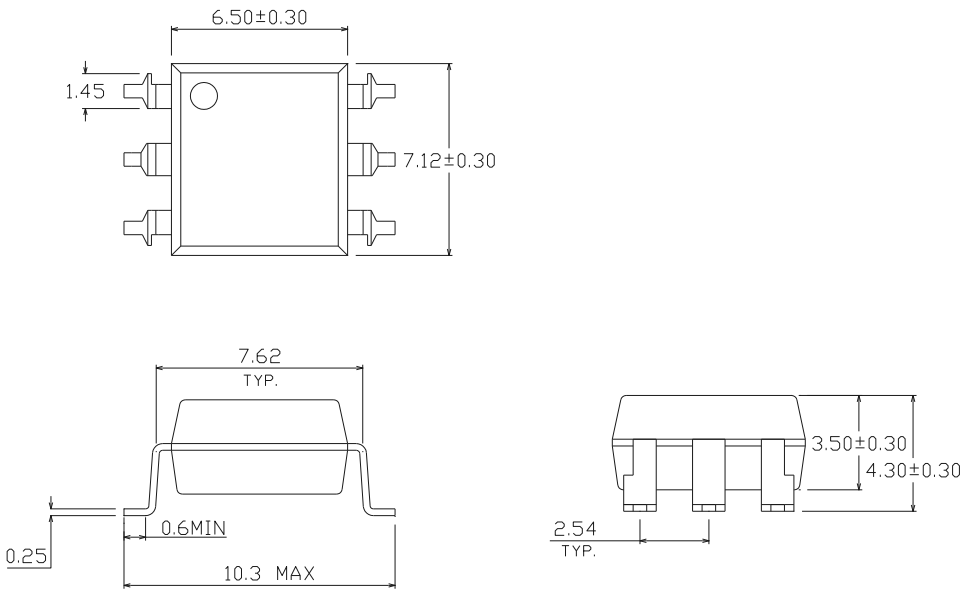

### Option M Type



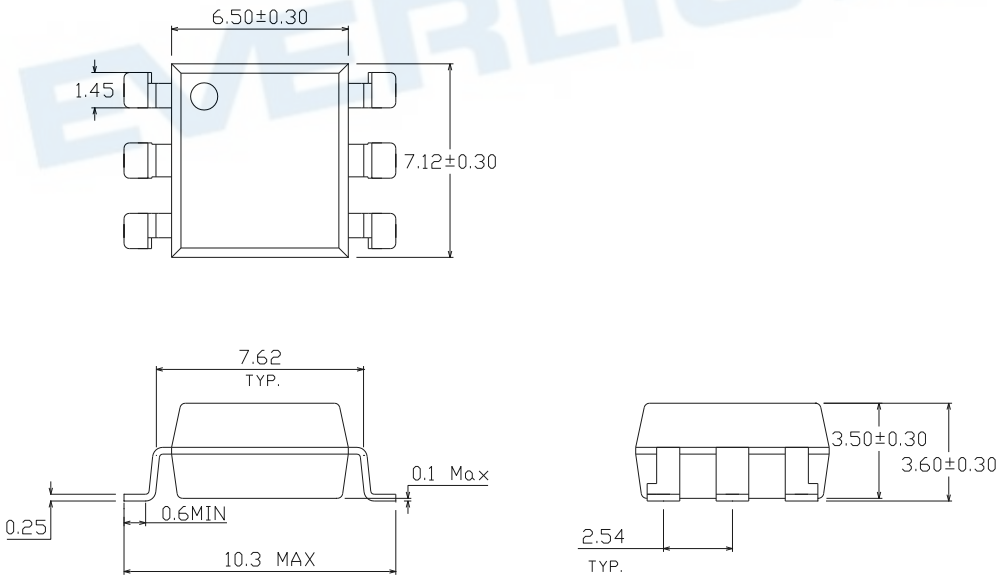


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## Option S Type



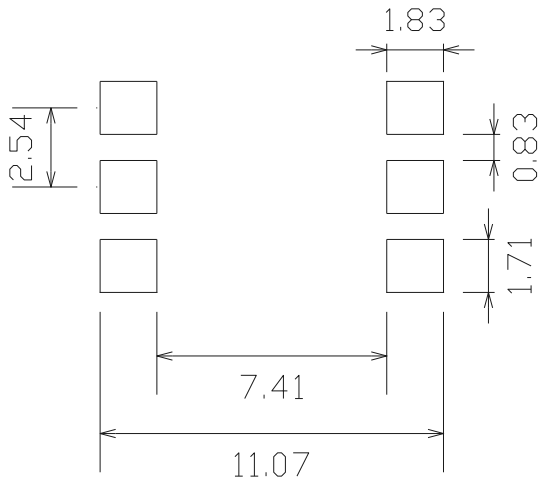

## Option S1 Type





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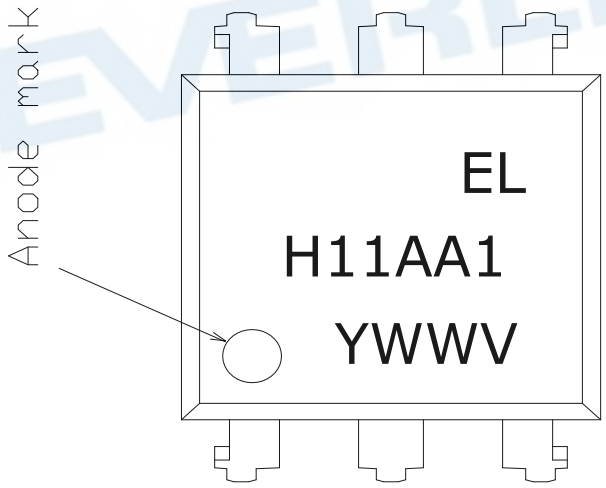
## Recommended pad layout for surface mount leadform




**Notes**

Suggested pad dimension is just for reference only.
Please modify the pad dimension based on individual need.

## Device Marking




**Notes**

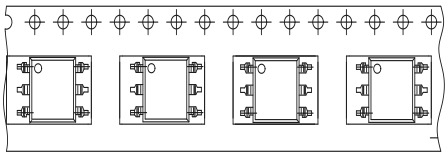
| | |
|---|---|
| EL | denotes Everlight |
| H11AA1 | denotes Part Number |
| Y | denotes 1 digit Year code |
| WW | denotes 2 digit Week code |
| V | denotes VDE safety (optional) |


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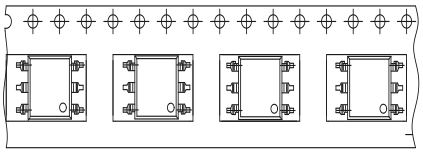
## Tape & Reel Packing Specifications

**Option TA**



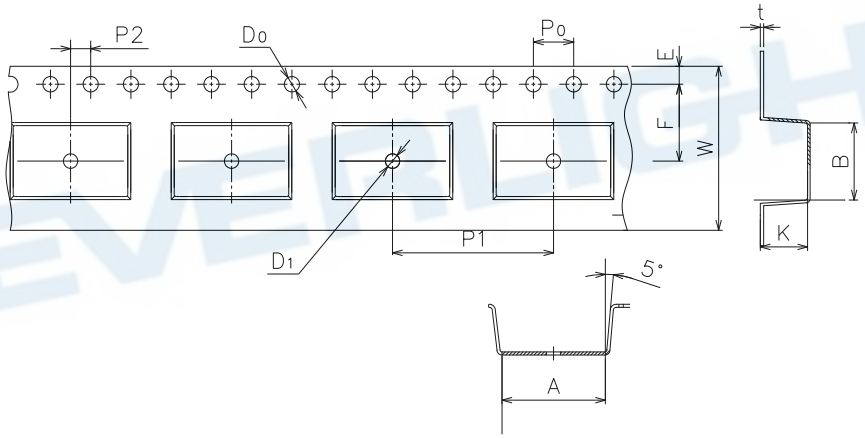
Direction of feed from reel

**Option TB**



Direction of feed from reel

### Tape dimensions



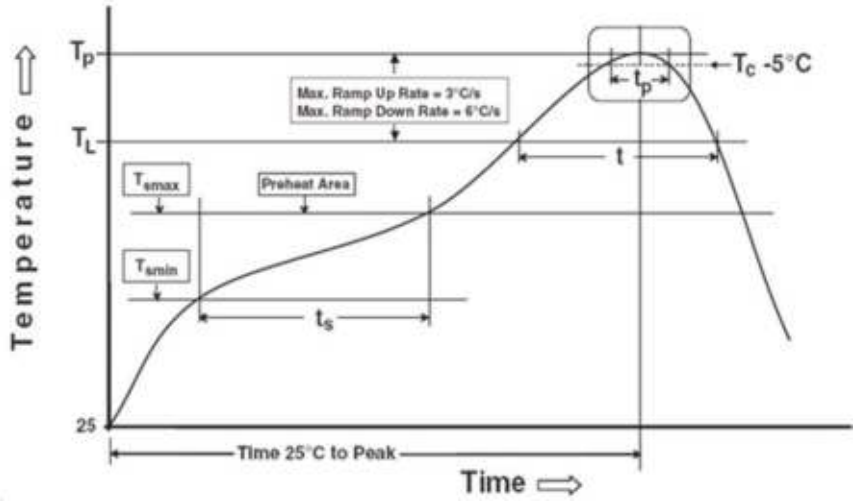

| Dimension No. | A | B | Do | D1 | E | F |
|---|---|---|---|---|---|---|
| Dimension (mm) | 10.8±0.1 | 7.55±0.1 | 1.5±0.1 | 1.5+0.1/-0 | 1.75±0.1 | 7.5±0.1 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **K** |
| Dimension (mm) | 4.0±0.15 | 12±0.1 | 2.0±0.1 | 0.35±0.03 | 16.0±0.2 | 4.5±0.1 |


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## Precautions for Use

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile




| Notes | Reference: IPC/JEDEC J-STD-020D |
|---|---|
| **Preheat** | |
| Temperature min ($T_{smin}$) | 150 °C |
| Temperature max ($T_{smax}$) | 200°C |
| Time ($T_{smin}$ to $T_{smax}$) ($t_s$) | 60-120 seconds |
| Average ramp-up rate ($T_{smax}$ to $T_p$) | 3 °C/second max |
| **Other** | |
| Liquidus Temperature ($T_L$) | 217 °C |
| Time above Liquidus Temperature ($t_L$) | 60-100 sec |
| Peak Temperature ($T_P$) | 260°C |
| Time within 5 °C of Actual Peak Temperature: $T_P$ - 5°C | 30 s |
| Ramp- Down Rate from Peak Temperature | 6°C /second max. |
| Time 25°C to peak temperature | 8 minutes max. |
| Reflow times | 3 times |

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