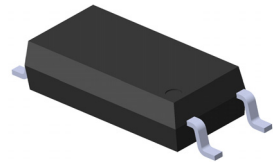


## 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

**EL111X-G Series**

### Features:

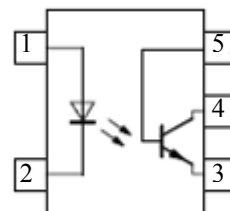
- Free halogens compliant
- Current transfer ratio  
(CTR: 50~600% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$ )  
(CTR: 63~320% at  $I_F = 10\text{mA}$ ,  $V_{CE} = 5\text{V}$ )
- High isolation voltage between input and output (Viso=5000 V rms )
- Compact 5 Pin SOP with a 2.0 mm profile
- 8mm long creepage distance
- Pb free and RoHS compliant.
- CUL approval (No. E214129)
- VDE approval (No. 40028391)
- SEMKO approved (pending)
- NEMKO approved (pending)
- DEMKO approved (pending)
- FIMKO approved (pending)



### Description

The EL111X-G series devices consist of an infrared emitting diode, optically coupled to a phototransistor detector. Compound use free halogens and  $\text{Sb}_2\text{O}_3$ . They are packaged in a 5-pin SOP package.

### Schematic



### Pin Configuration

1. Anode
2. Cathode
3. Emitter
4. Collector
5. Base

### Applications

- Programmable controllers
- System appliances, measuring instruments
- Telecommunication equipments
- Home appliances, such as fan heaters, etc.
- Signal transmission between circuits of different potentials and impedances



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## 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

**EL111X-G Series**

### Absolute Maximum Ratings ( $T_a=25^{\circ}\text{C}$ )

| Parameter                           |                                   | Symbol    | Rating     | Unit               |
|-------------------------------------|-----------------------------------|-----------|------------|--------------------|
| Input                               | Forward current                   | $I_F$     | 60         | mA                 |
|                                     | Peak forward current (1us, pulse) | $I_{FP}$  | 1.5        | A                  |
|                                     | Reverse voltage                   | $V_R$     | 6          | V                  |
|                                     | Power dissipation                 | $P_D$     | 100        | mW                 |
| Output                              | Power dissipation                 | $P_C$     | 150        | mW                 |
|                                     | Collector current                 | $I_C$     | 50         | mA                 |
|                                     | Collector-Emitter voltage         | $V_{CEO}$ | 80         | V                  |
|                                     | Emitter-Collector voltage         | $V_{ECO}$ | 7          | V                  |
| Total power dissipation             |                                   | $P_{TOT}$ | 250        | mW                 |
| Isolation voltage <sup>*1</sup>     |                                   | $V_{ISO}$ | 5000       | V rms              |
| Operating temperature               |                                   | $T_{OPR}$ | -55 ~ +110 | $^{\circ}\text{C}$ |
| Storage temperature                 |                                   | $T_{STG}$ | -55 ~ +125 | $^{\circ}\text{C}$ |
| Soldering temperature <sup>*2</sup> |                                   | $T_{SOL}$ | 260        | $^{\circ}\text{C}$ |

### Notes

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1 & 2 are shorted together, and pins 3 & 4 are shorted together.

\*2 For 10 seconds.

# 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

## EL111X-G Series

### Electrical Characteristics ( $T_a=25^{\circ}\text{C}$ unless specified otherwise)

#### Input

| Parameter         | Symbol   | Min. | Typ.* | Max. | Unit          | Condition                |
|-------------------|----------|------|-------|------|---------------|--------------------------|
| Forward voltage   | $V_F$    | -    | -     | 1.5  | V             | $I_F = 50\text{mA}$      |
| Reverse current   | $I_R$    | -    | -     | 10   | $\mu\text{A}$ | $V_R = 6\text{V}$        |
| Input capacitance | $C_{in}$ | -    | 50    | -    | pF            | $V = 0, f = 1\text{kHz}$ |

#### Output

| Parameter                           | Symbol     | Min. | Typ.* | Max. | Unit | Condition                               |
|-------------------------------------|------------|------|-------|------|------|-----------------------------------------|
| Collector-Emitter dark current      | $I_{CEO}$  | -    | -     | 100  | nA   | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ |
| Collector-Emitter breakdown voltage | $BV_{CEO}$ | 80   | -     | -    | V    | $I_C = 0.1\text{mA}$                    |
| Emitter-Collector breakdown voltage | $BV_{ECO}$ | 7    | -     | -    | V    | $I_E = 0.1\text{mA}$                    |

### Transfer Characteristics ( $T_a=25^{\circ}\text{C}$ unless specified otherwise)

| Parameter                            | Symbol        | Min.               | Typ.* | Max. | Unit     | Condition                                          |
|--------------------------------------|---------------|--------------------|-------|------|----------|----------------------------------------------------|
| Current Transfer ratio               | EL1110        | 50                 | -     | 600  | %        | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$             |
|                                      | EL1116        | 100                | -     | 300  |          |                                                    |
|                                      | EL1117        | 80                 | -     | 160  |          |                                                    |
|                                      | EL1118        | 130                | -     | 260  |          |                                                    |
|                                      | EL1119        | 200                | -     | 400  |          |                                                    |
|                                      | EL1112        | 63                 | -     | 125  | %        | $I_F = 10\text{mA}, V_{CE} = 5\text{V}$            |
|                                      | EL1113        | 100                | -     | 200  |          |                                                    |
|                                      | EL1114        | 160                | -     | 320  |          |                                                    |
|                                      | EL1112        | 22                 | -     | -    |          | $I_F = 1\text{mA}, V_{CE} = 5\text{V}$             |
|                                      | EL1113        | 34                 | -     | -    |          |                                                    |
|                                      | EL1114        | 56                 | -     | -    |          |                                                    |
|                                      |               |                    |       |      |          |                                                    |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ | -                  | -     | 0.4  | V        | $I_F = 10\text{mA}, I_C = 1\text{mA}$              |
| Isolation resistance                 | $R_{IO}$      | $5 \times 10^{10}$ | -     | -    | $\Omega$ | $V_{IO} = 500\text{Vdc}, 40\sim 60\% \text{ R.H.}$ |
| Floating capacitance                 | $C_{IO}$      | -                  | -     | 1.0  | pF       | $V_{IO} = 0, f = 1\text{MHz}$                      |



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## 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

EL111X-G Series

Transfer Characteristics ( $T_a=25^{\circ}\text{C}$  unless specified otherwise)

|               |       |   |   |    |               |                                                              |
|---------------|-------|---|---|----|---------------|--------------------------------------------------------------|
| Turn on time  | Ton   | - | 4 | -  | $\mu\text{s}$ | $V_{CE} = 5\text{V}, I_C = 5\text{mA},$<br>$R_L = 100\Omega$ |
| Turn off time | Toff  | - | 3 | -  |               |                                                              |
| Rise time     | $t_r$ | - | 2 | 18 | $\mu\text{s}$ | $V_{CE} = 5\text{V}, I_C = 5\text{mA},$<br>$R_L = 100\Omega$ |
| Fall time     | $t_f$ | - | 3 | 18 | $\mu\text{s}$ |                                                              |

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

# 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

**EL111X-G Series**

## Typical Performance Curves

Figure 1. Forward Current vs. Forward Voltage

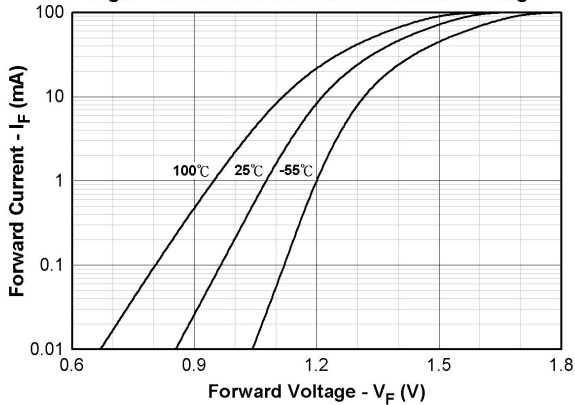


Figure.2 Collector Dark Current vs. Ambient Temperature

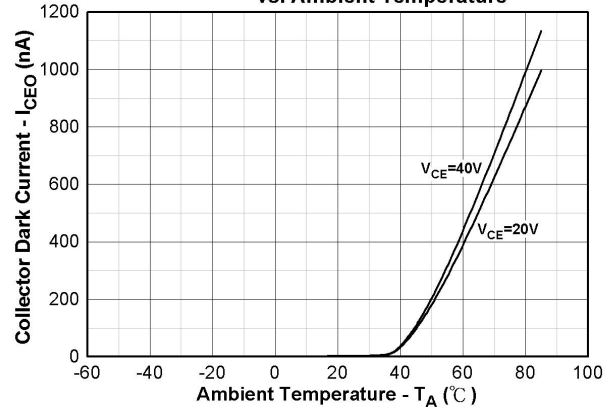


Figure 3. Collector Current vs. Collector Emitter Voltage

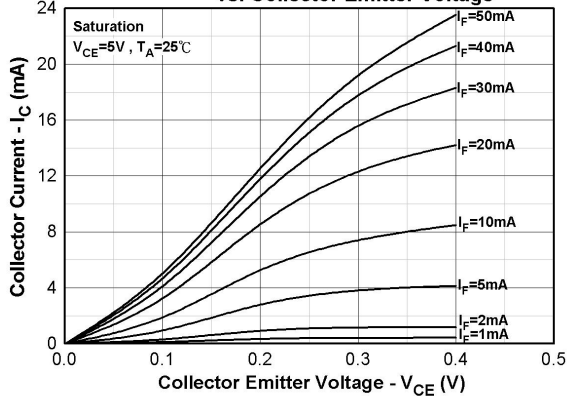


Figure 4. Collector Current vs. Collector Emitter Voltage

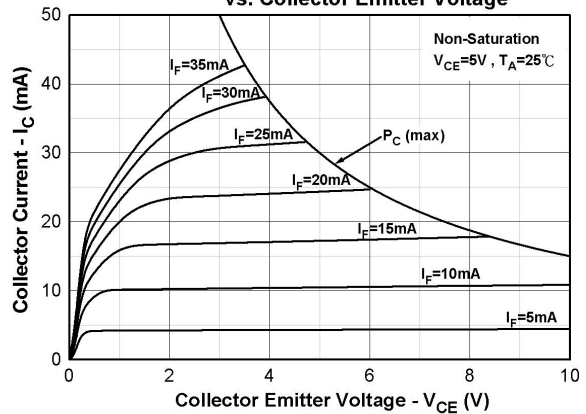


Figure 5. Normalized Collector Current vs. Forward Current

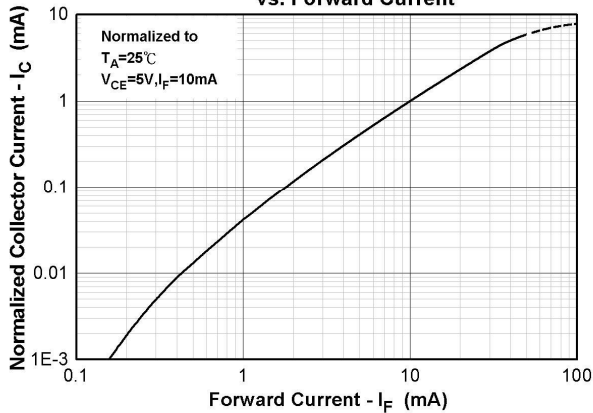
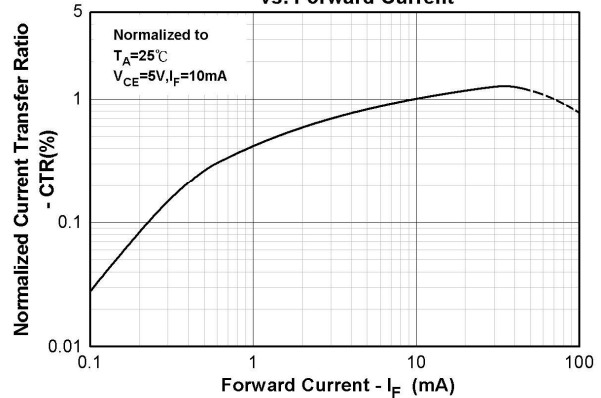


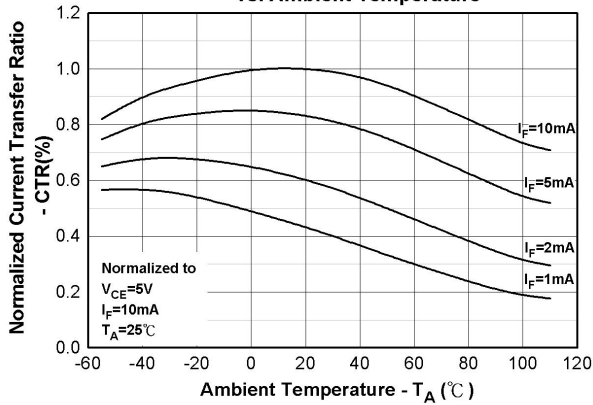
Figure 6. Normalized Current Transfer Ratio vs. Forward Current



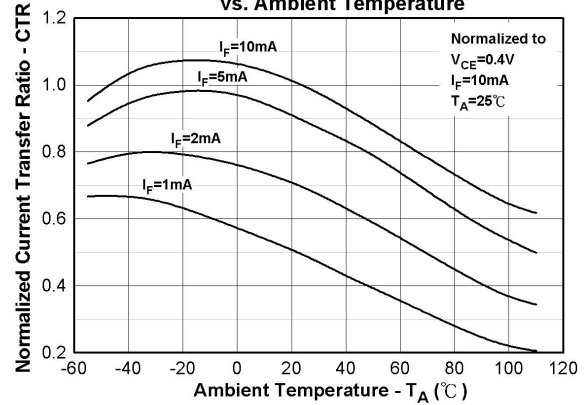
# 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

**EL111X-G Series**

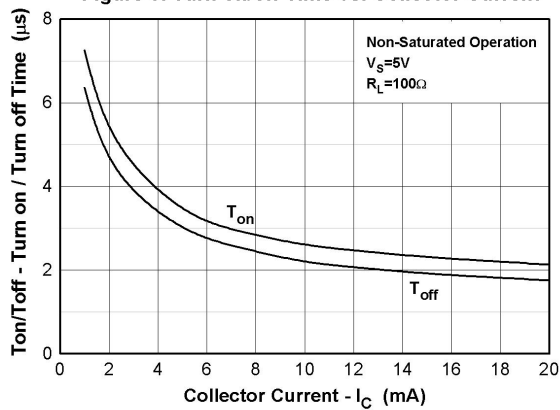
**Figure 7. Normalized Current Transfer Ratio  
vs. Ambient Temperature**



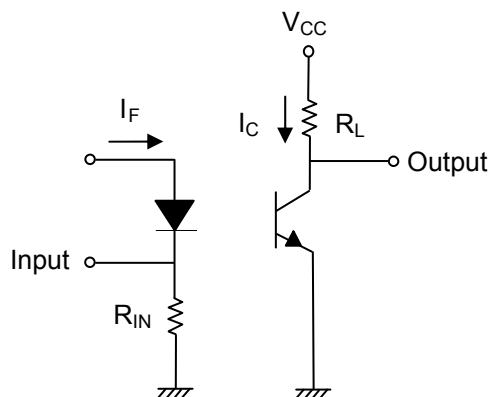
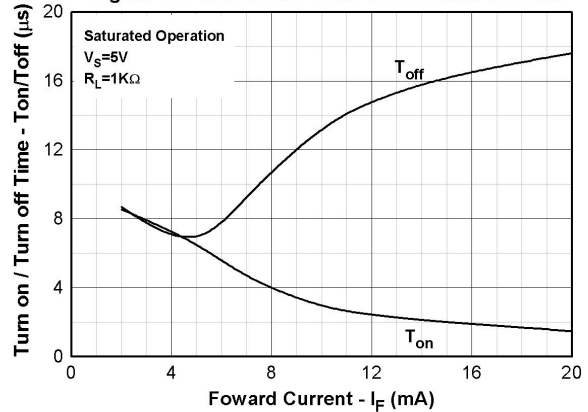
**Figure 8. Normalized Current Transfer Ratio  
vs. Ambient Temperature**



**Figure 9. Turn on/off Time vs. Collector Current**



**Figure 10. Turn on/off Time vs. Forward Current**



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



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## 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

**EL111X-G Series**

### Order Information

#### Part Number

**EL111X(Y)-VG**

#### Note

EL111 = Part No.

X = CTR Rank (0, 2, 3, 4, 7, 8 or 9)

Y = Tape and reel option (TA, TB or none).

V = VDE safety (optional)

G = Halogens free

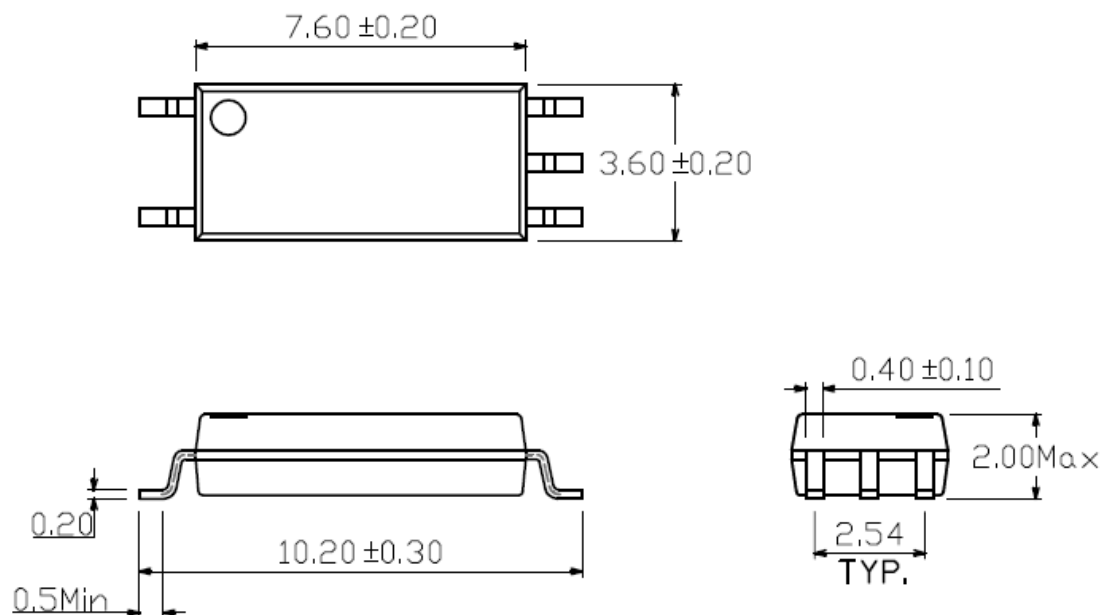
| Option | Description                 | Packing quantity    |
|--------|-----------------------------|---------------------|
| None   | Standard SMD option         | 100 units per tube  |
| -V     | Standard SMD option + VDE   | 100 units per tube  |
| (TA)   | TA Tape & reel option       | 2000 units per reel |
| (TB)   | TB Tape & reel option       | 2000 units per reel |
| (TA)-V | TA Tape & reel option + VDE | 2000 units per reel |
| (TB)-V | TB Tape & reel option + VDE | 2000 units per reel |

# 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

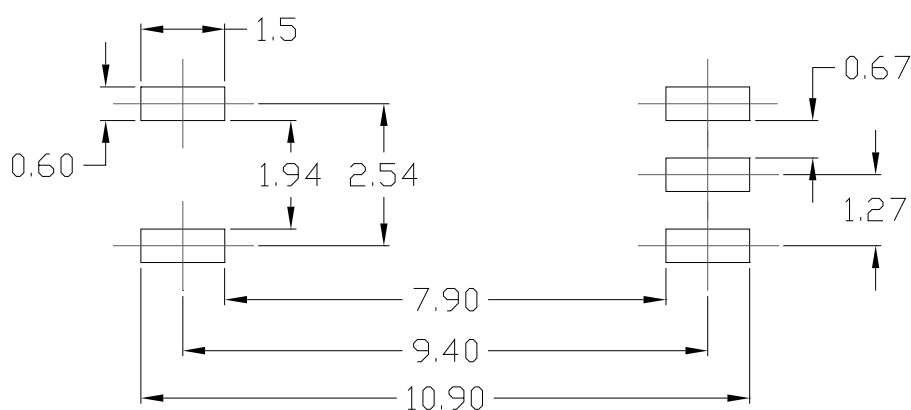
**EL111X-G Series**

## Package Drawing

(Dimensions in mm)



## Recommended pad layout for surface mount leadform







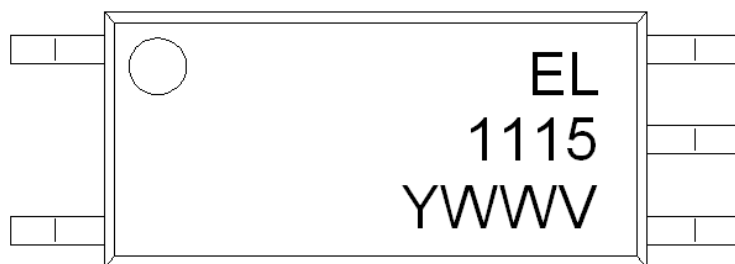
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## 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

EL111X-G Series

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### Device Marking



### Notes

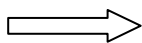
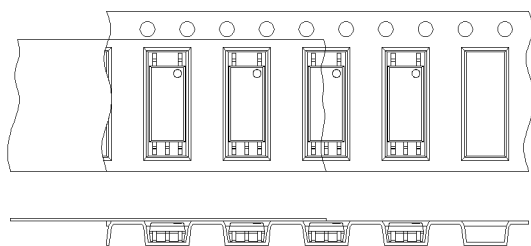
|      |                           |
|------|---------------------------|
| EL   | denotes Everlight         |
| 1115 | denotes Device Number     |
| Y    | denotes 1 digit Year code |
| WW   | denotes 2 digit Week code |
| V    | denotes VDE (optional)    |

# 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

EL111X-G Series

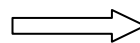
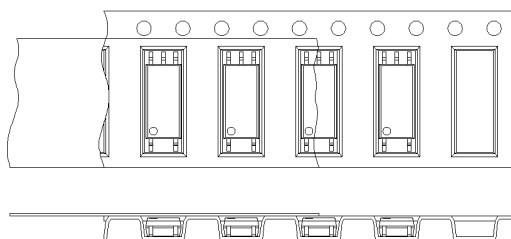
## Tape & Reel Packing Specifications

**Option TA**



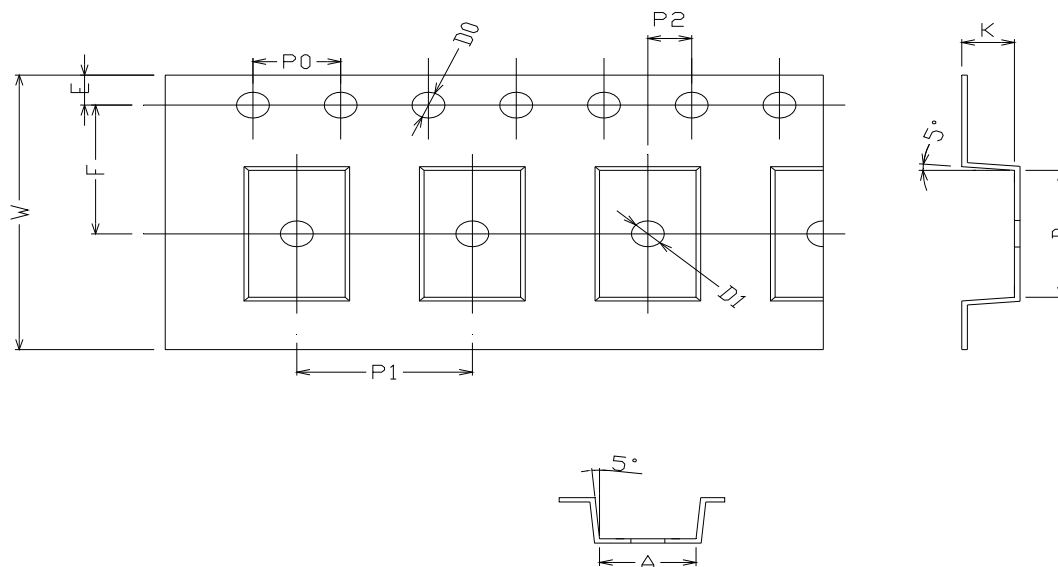
Direction of feed from reel

**Option TB**



Direction of feed from reel

## Tape dimensions



| Dimension No.  | A         | B          | Do           | D1        | E          | F         |
|----------------|-----------|------------|--------------|-----------|------------|-----------|
| Dimension (mm) | 4.4 ± 0.1 | 10.5 ± 0.1 | 1.5 + 0.1/-0 | 1.5 ± 0.1 | 1.7 5± 0.1 | 7.5 ± 0.1 |

| Dimension No.  | Po        | P1        | P2        | t         | W          | K          |
|----------------|-----------|-----------|-----------|-----------|------------|------------|
| Dimension (mm) | 3.8 ± 0.1 | 8.0 ± 0.1 | 2.0 ± 0.1 | 0.3± 0.05 | 16.0 ± 0.3 | 2.14 ± 0.1 |

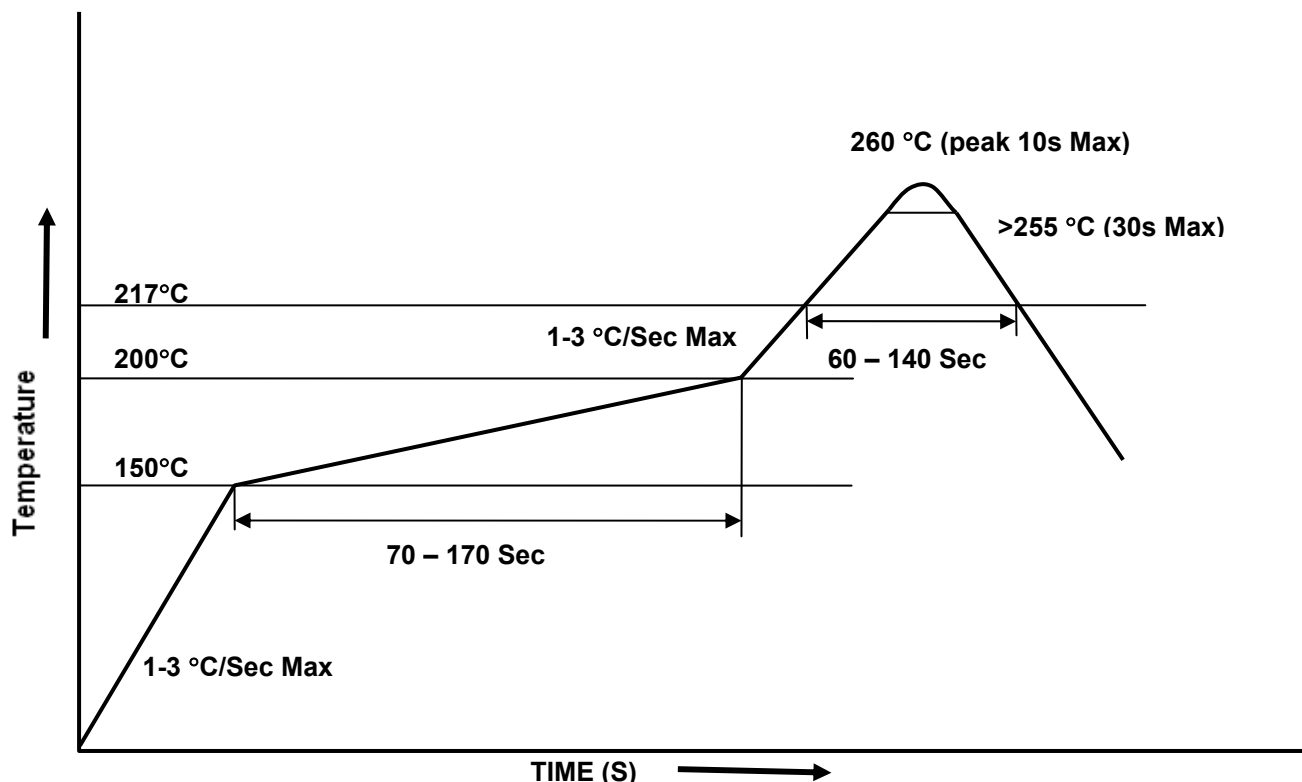


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## 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER

EL111X-G Series

### Solder Reflow Temperature Profile



## **5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER**

**EL111X-G Series**

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