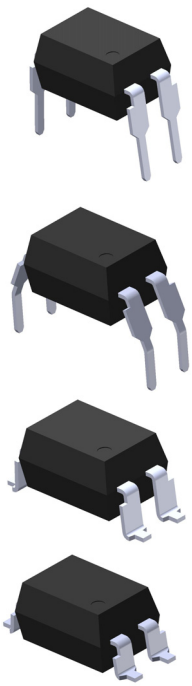
# 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

# EL2501-G Series

## Features:

- Halogens free.
- Current transfer ratio (CTR: 80~600% at $I_F$ =5mA, $V_{CE}$ =5V)
- High isolation voltage between input and output (Viso=5000 V rms )
- Creepage distance >7.62 mm
- Operating temperature up to +110°C
- Compact small outline package
- Pb free and RoHS compliant.
- UL approval
- VDE approval
- SEMKO approval
- NEMKO approval
- DEMKO approval
- FIMKO approval
- CSA approval



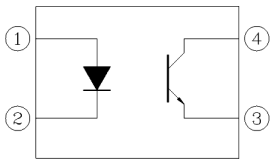
## Description

The EL2501-G series of devices each consist of an infrared emitting diodes, optically coupled to a phototransistor detector encapsulated with green compound..
They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

## 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

Schematic




Pin Configuration
1. Anode
2. Cathode
3. Emitter
4. Collector

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## Absolute Maximum Ratings ($T_a$=25°C)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 60 | mA |
| | Peak forward current (PW=100us,duty cycle = 1%) | $I_{FP}$ | 1 | A |
| | Reverse voltage | $V_R$ | 6 | V |
| | Power dissipation | $P_D$ | 100 | mW |
| | Derating factor ( above $T_a$ = 100°C) | | 5.8 | mW/°C |
| Output | Power dissipation | $P_C$ | 150 | mW |
| | Derating factor (above $T_a$ = 100°C) | | 5.8 | mW/°C |
| | Collector current | $I_C$ | 50 | mA |
| | Collector-Emitter voltage | $V_{CEO}$ | 80 | V |
| | Emitter-Collector voltage | $V_{ECO}$ | 7 | V |
| Total power dissipation | | $P_{TOT}$ | 200 | mW |
| Isolation voltage *1 | | $V_{ISO}$ | 5000 | V rms |
| Operating temperature | | $T_{OPR}$ | -55 ~ +110 | °C |
| Storage temperature | | $T_{STG}$ | -55 ~ +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 are shorted together, and pins 3 & 4 are shorted together.

*2 For 10 seconds.

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## Electrical Characteristics ($T_a$=25°C unless specified otherwise)

### Input

| Parameter | Symbol | Min. | Typ.* | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Forward voltage | $V_F$ | - | 1.2 | 1.4 | V | $I_F$ = 10mA |
| Reverse current | $I_R$ | - | - | 5 | μA | $V_R$ = 5V |
| Input capacitance | $C_{in}$ | - | 50 | 250 | pF | V = 0, f = 1MHz |

### Output

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

### Transfer Characteristics ($T_a$=25°C unless specified otherwise)

| Parameter | | Symbol | Min. | Typ.* | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Current Transfer ratio | EL2501N | CTR | 80 | - | 600 | % | $I_F$ = 5mA ,$V_{CE}$ = 5V |
| | EL2501H | | 80 | - | 160 | | |
| | EL2501W | | 130 | - | 260 | | |
| | EL2501L | | 200 | - | 400 | | |
| | EL2501K | | 300 | - | 600 | | |
| | EL2501Q | | 100 | - | 200 | | |
| | EL2501D | | 150 | - | 300 | | |
| Collector-Emitter saturation voltage | | $V_{CE(sat)}$ | - | 0.1 | 0.3 | V | $I_F$ = 10mA ,$I_C$ = 2mA |
| Isolation resistance | | $R_{IO}$ | $10^{11}$ | - | - | Ω | $V_{IO}$ = 1K Vdc, 40~60% R.H. |
| Floating capacitance | | $C_{IO}$ | - | 0.6 | 1.0 | pF | $V_{IO}$ = 0, f = 1MHz |
| Cut-off frequency | | fc | - | 80 | - | kHz | $V_{CE}$ = 5V, $I_C$ = 2mA $R_L$ = 100Ω, -3dB |
| Rise time | | $t_r$ | - | 3 | 18 | μs | $V_{CC}$ = 10V, $I_C$ = 2mA, $R_L$ = 100Ω |
| Fall time | | $t_f$ | - | 5 | 18 | μs | |

* Typical values at $T_a$ = 25°C

# 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

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## Typical Performance Curves

Figure 1. Forward Current vs Forward Voltage

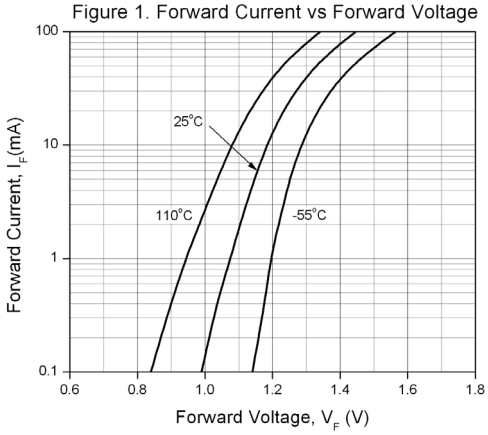



Figure 2. Normalized Current Transfer Ratio vs Forward Current

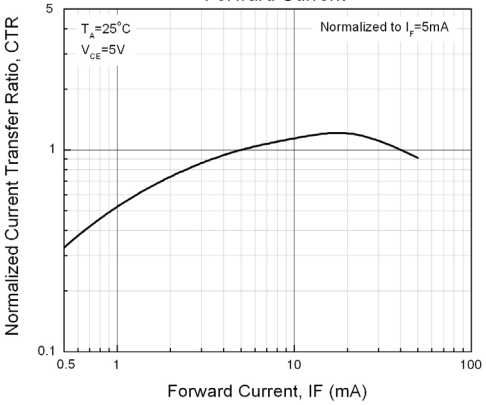



Figure 3. Current Transfer Ratio vs Ambient Temperature

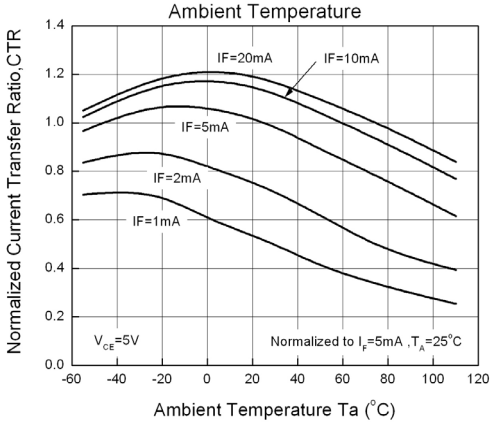



Figure 4. Dark Current vs Ambient Temperature

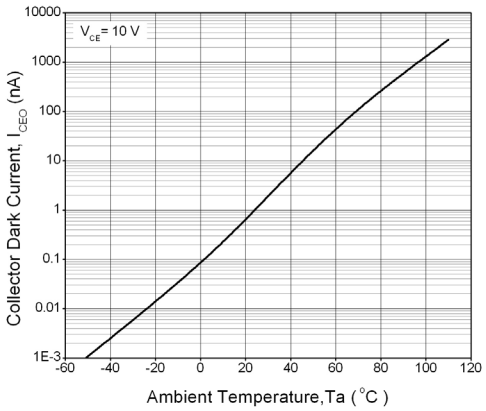



Figure 5. Collector-Emitter Saturation Voltage vs Collector Current

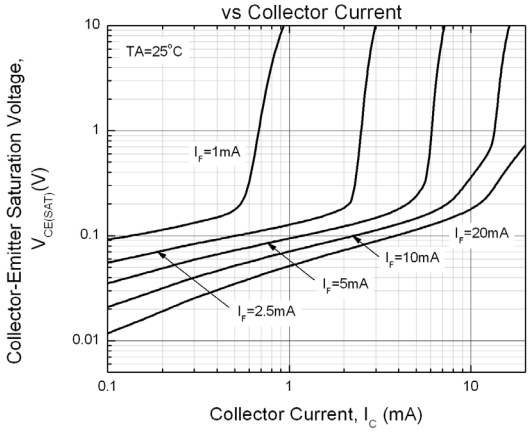
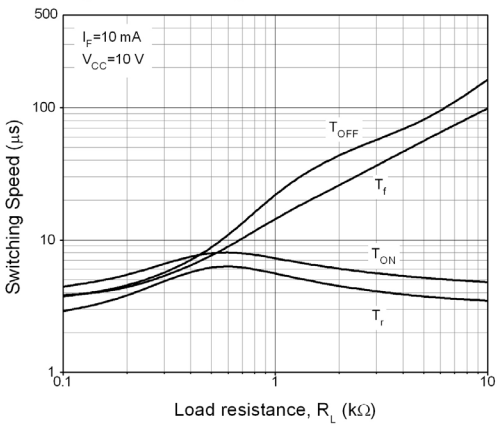



**Figure 6. Switching Time vs Load Resistance**



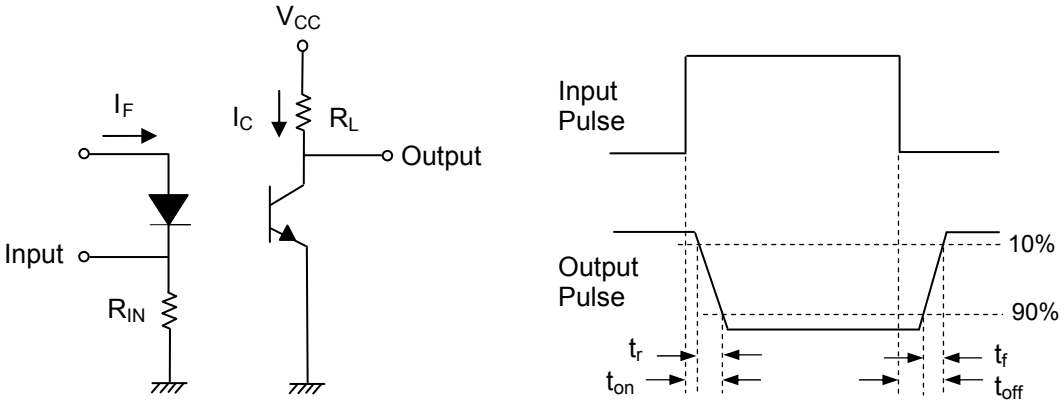



**Figure 7. Switching Time Test Circuit & Waveforms**

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# EL2501-G Series

## Order Information

### Part Number

# EL2501(X)(Y)(Z)-VG

**Note**

X = Lead form option (S, S1, S2, M or none)
Y = CTR Rank (N, H, K, L, W , Q or none)
Z = Tape and reel option (TA, TB, TU, TD or none).
V = VDE safety (optional).
G = Halogen free

| Option | Description | Packing quantity |
|---|---|---|
| None | Standard DIP-4 | 100 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 100 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 |
| S2 (TA) | Surface mount lead form (Gull-wing) + TA tape & reel option | 500 units per reel |
| S2 (TB) | Surface mount lead form (Gull-wing) + TB tape & reel option | 500 units per reel |
| S (TU) | Surface mount lead form + TU tape & reel option | 1500 units per reel |
| S (TD) | Surface mount lead form + TD tape & reel option | 1500 units per reel |
| S1 (TU) | Surface mount lead form (low profile) + TU tape & reel option | 1500 units per reel |
| S1 (TD) | Surface mount lead form (low profile) + TD tape & reel option | 1500 units per reel |

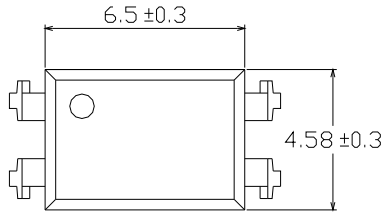
# 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

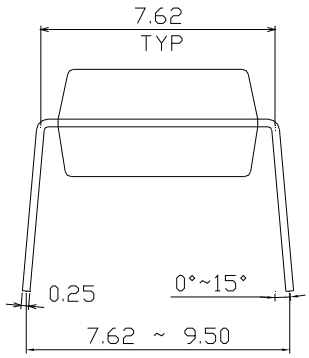
# EL2501-G Series

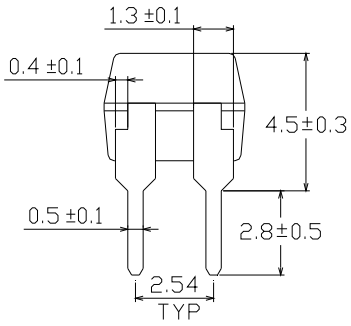
## Package Drawing

**(Dimensions in mm)**

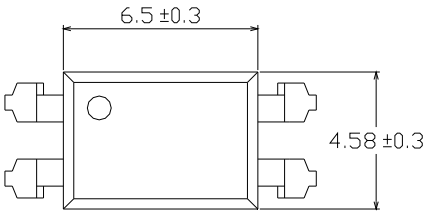
### Standard DIP Type

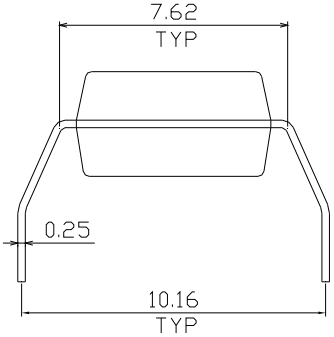


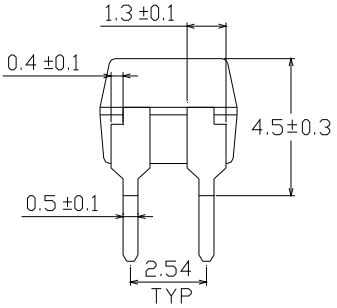




### Option M Type



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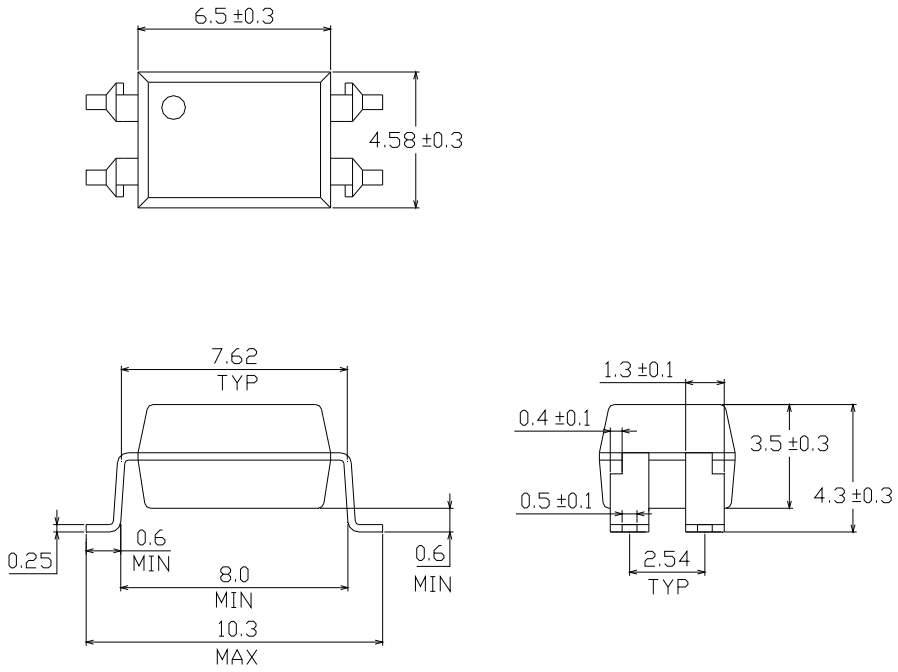
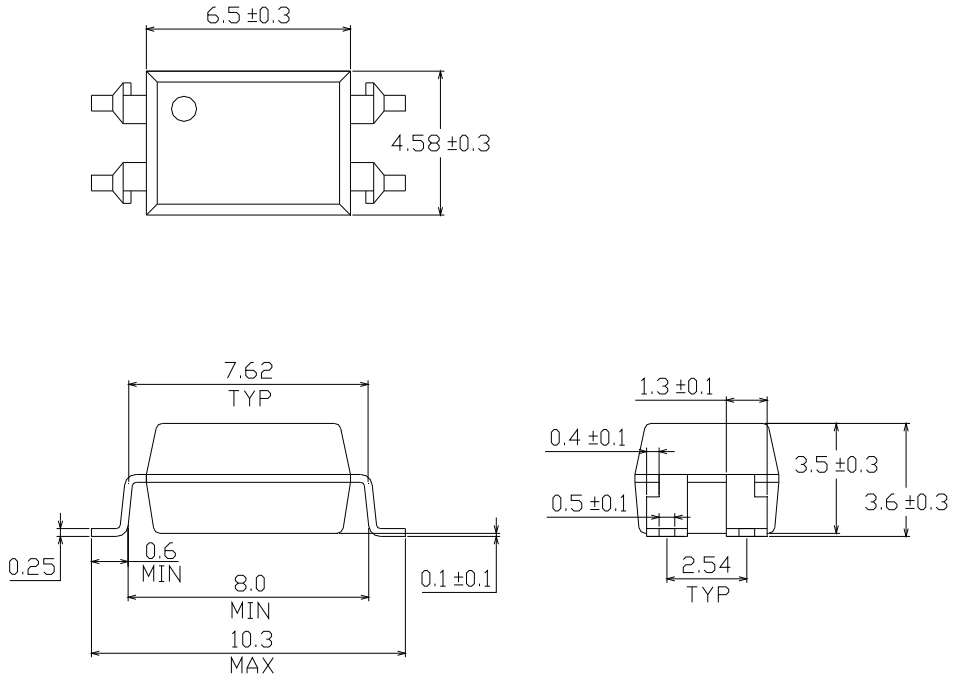
**Option S Type**




**Option S1 Type**



# 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

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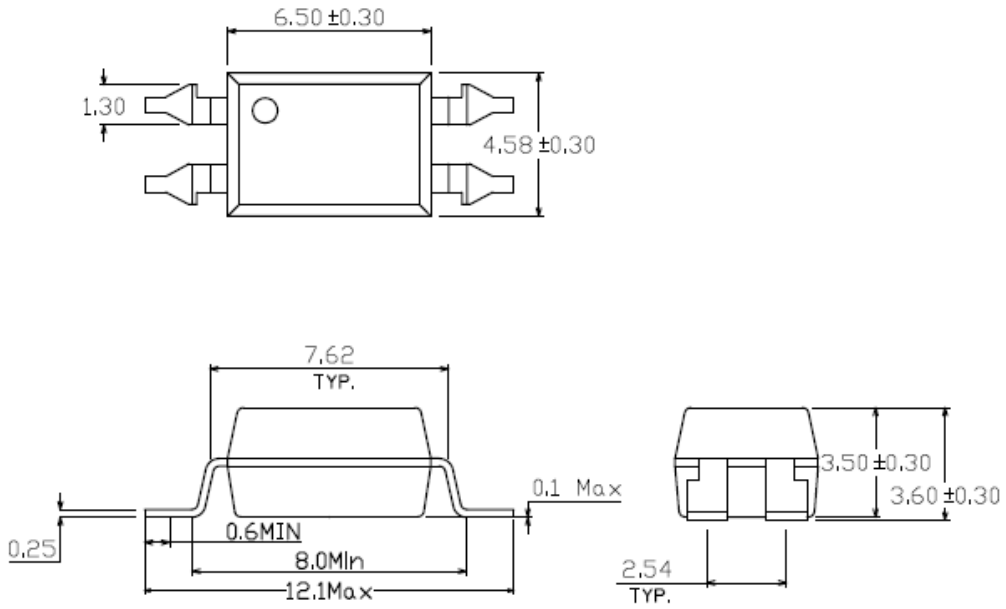
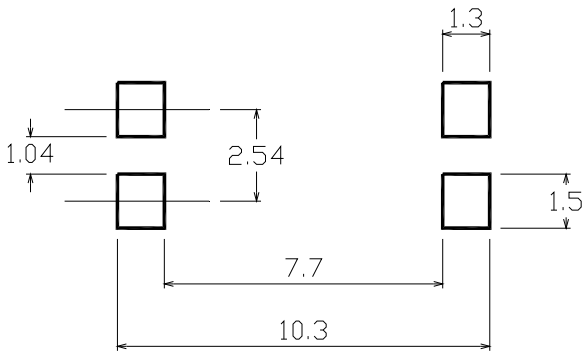
**Option S2 Type**

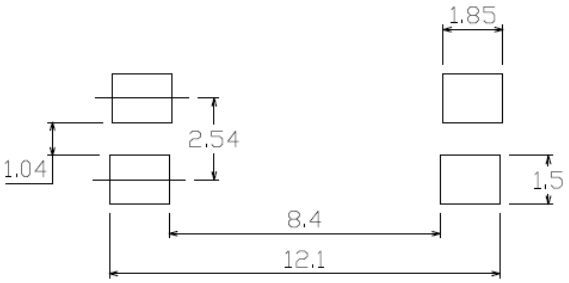



**Recommended pad layout for surface mount leadform**

**For S and S1 option**




**For S2 option**



# 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

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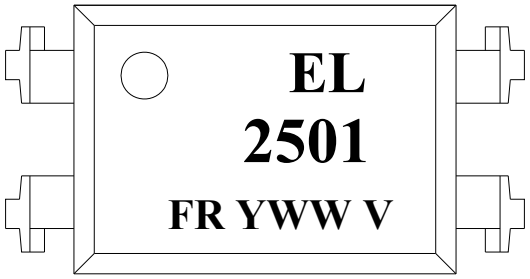
## Device Marking




**Notes**

| | |
|---|---|
| EL | denotes EVERLIGHT |
| 2501 | denotes Device Number |
| F | denotes Factory Code (G: China and Green part) |
| R | denotes CTR Rank (N, L, K, Q or none) |
| Y | denotes 1 digit Year code |
| WW | denotes 2 digit Week code |
| V | denotes VDE (optional) |

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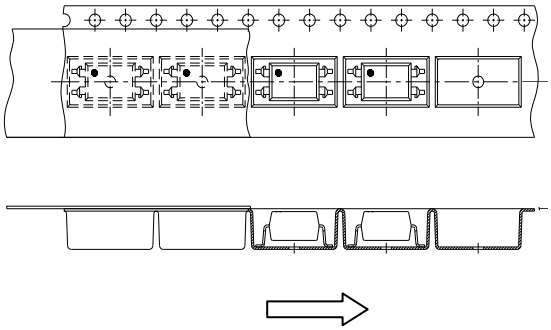
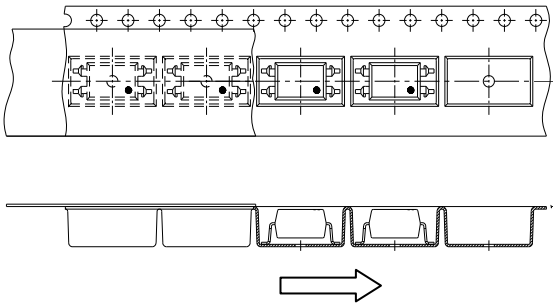
## Tape & Reel Packing Specifications

**Option TA**



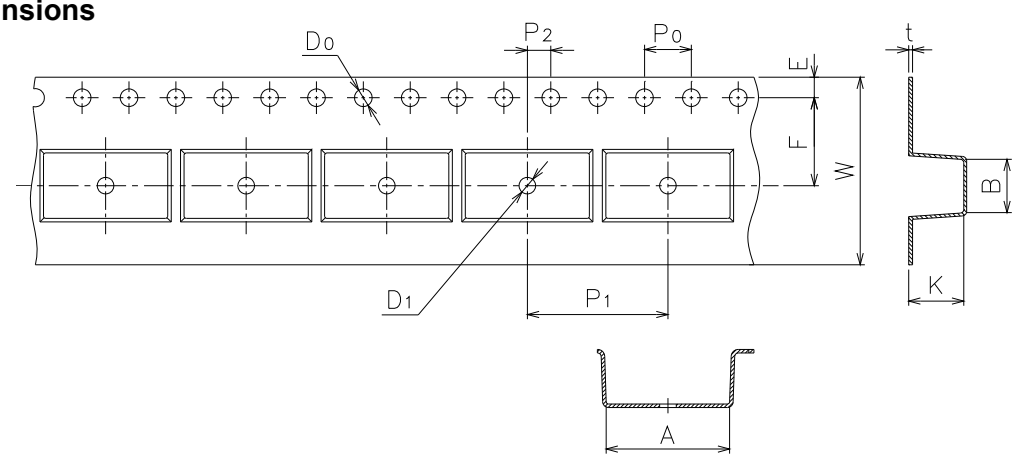
Direction of feed from reel

**Option TB**



Direction of feed from reel

## Tape dimensions




| Dimension No. | A | B | Do | D1 | E | F |
|---|---|---|---|---|---|---|
| For S2 type Dimension(mm) | 12.15±0.1 | 4.65±0.1 | 1.55±0.1 | 1.5±0.05 | 1.75±0.1 | 7.5±0.1 |
| Dimension(mm) | 10.4±0.1 | 4.55±0.1 | 1.5±0.1 | 1.5±0.05 | 1.75±0.1 | 7.5±0.1 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **K** |
| For S2 type Dimension(mm) | 4.0±0.1 | 16.0±0.1 | 2.0±0.1 | 0.35±0.1 | 16.0+0.3/ -0.1 | 4.55±0.1 |
| Dimension(mm) | 4.0±0.1 | 12.0±0.1 | 2.0±0.1 | 0.33±0.1 | 16.0+0.3/ -0.1 | 4.55±0.1 |

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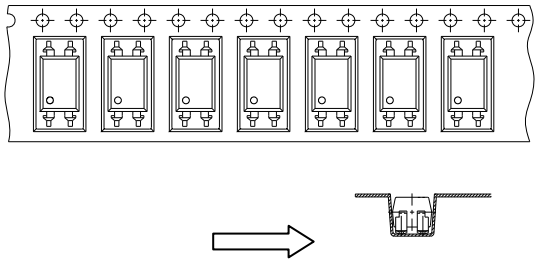
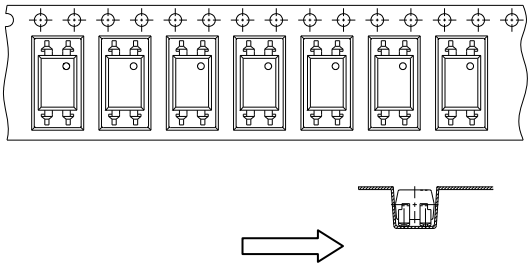
**Option TD**



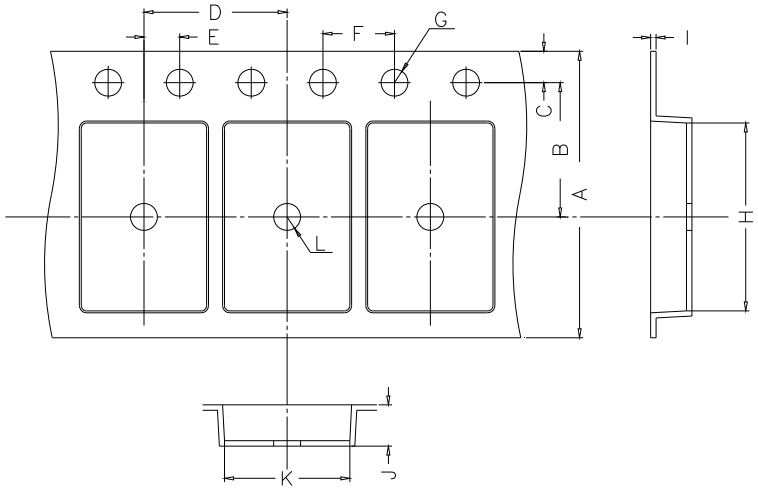
Direction of feed from reel

**Option TU**



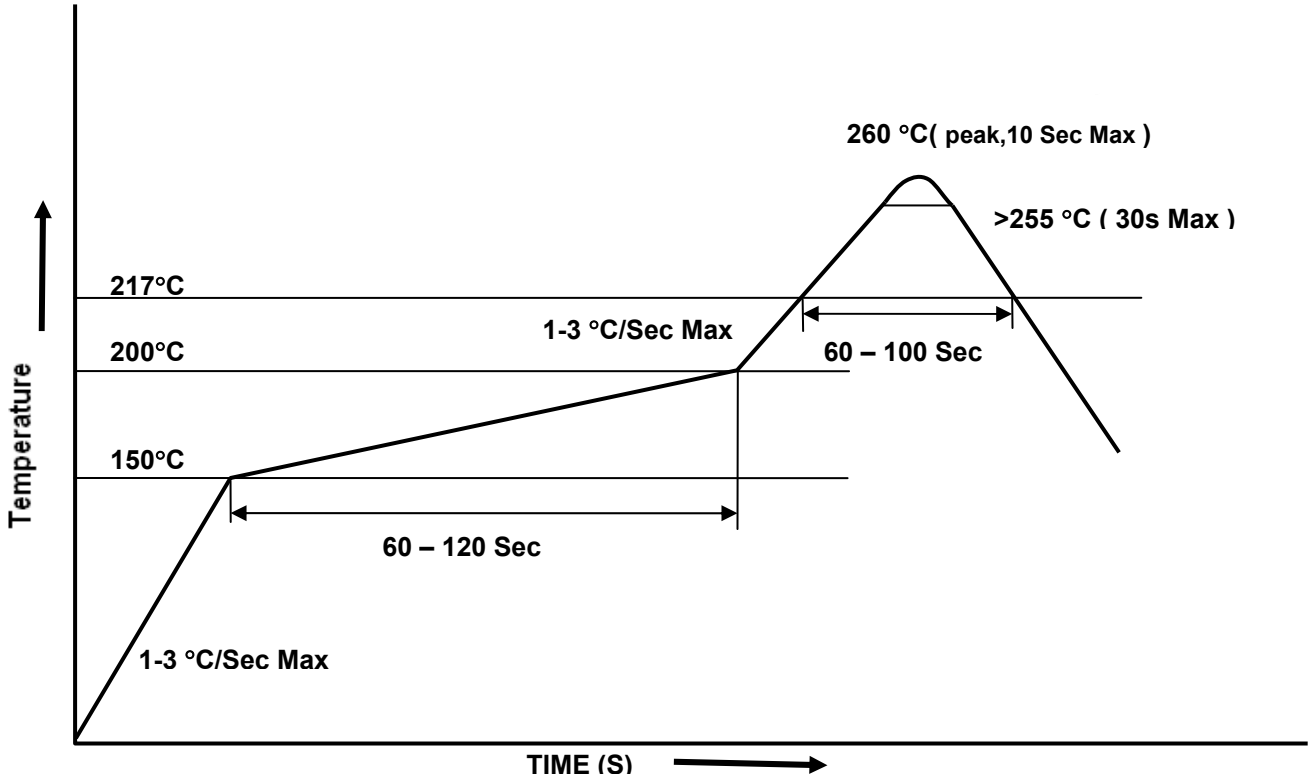
Direction of feed from reel

## Tape dimensions




| Dimension No. | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Dimension(mm) | 16.00±0.3 | 7.5±0.1 | 1.75±0.1 | 8.0±0.1 | 2.0±0.1 | 4.0±0.1 |
| Dimension No. | G | H | I | J | K | L |
| Dimension(mm) | 1.5+0.1/-0 | 10.4±0.1 | 0.4±0.05 | 4.55±0.1 | 5.1±0.1 | 1.5±0.05 |

## Solder Reflow Temperature Profile



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