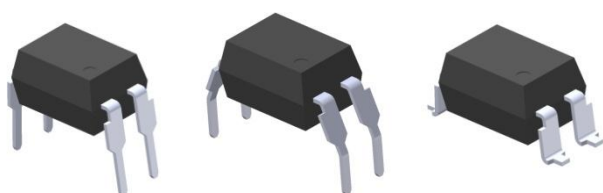
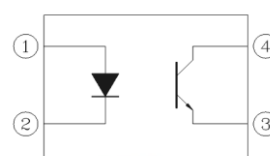


### 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER EL2501-G Series



Schematic



#### Features:

- Halogens free  
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Current transfer ratio  
(CTR: 80~600% at IF = 5mA, VCE = 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
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL approved (No. E214129)
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

#### Pin Configuration

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

#### Description

The EL2501-G series of devices each consist of an infrared emitting diodes, optically coupled to a phototransistor detector. 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

## Absolute Maximum Ratings (Ta=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	60	mA
	Peak forward current (1us, pulse)	$I_{FP}$	1	A
	Reverse voltage	$V_R$	6	V
	Power Dissipation	$P_D$	100 2.9	mW mW/°C
Output	Power Dissipation	$P_C$	150 5.8	mW 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* <sup>1</sup>	$V_{ISO}$	5000	Vrms
	Operating Temperature	$T_{OPR}$	-55 to 110	°C
	Storage Temperature	$T_{STG}$	-55 to 125	°C
	Soldering Temperature* <sup>2</sup>	$T_{SOL}$	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

**Electro-Optical Characteristics (Ta=25°C unless specified otherwise)**

**Input**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	$V_F$	-	1.2	1.4	V	$I_F = 10\text{mA}$
Reverse Current	$I_R$	-	-	5	$\mu\text{A}$	$V_R = 5\text{V}$
Input capacitance	$C_{in}$	-	50	250	pF	$V = 0, f = 1\text{kHz}$

**Output**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	$I_{CEO}$	-	-	100	nA	$V_{CE} = 80\text{V}, I_F = 0\text{mA}$
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**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	EL2501N	80	-	600	%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$
	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	$I_F = 10\text{mA}, I_C = 2\text{mA}$
Isolation resistance	$R_{IO}$	$10^{11}$	-	-	$\Omega$	$V_{IO} = 1\text{K Vdc}, 40\sim60\% \text{ R.H.}$
Floating capacitance	$C_{IO}$	-	0.6	1.0	pF	$V_{IO} = 0, f = 1\text{MHz}$
Cut-off frequency	$f_c$	-	80	-	kHz	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$
Rise time	$t_r$	-	3	18	$\mu\text{s}$	$V_{CE} = 10\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	$t_f$	-	5	18	$\mu\text{s}$	

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

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

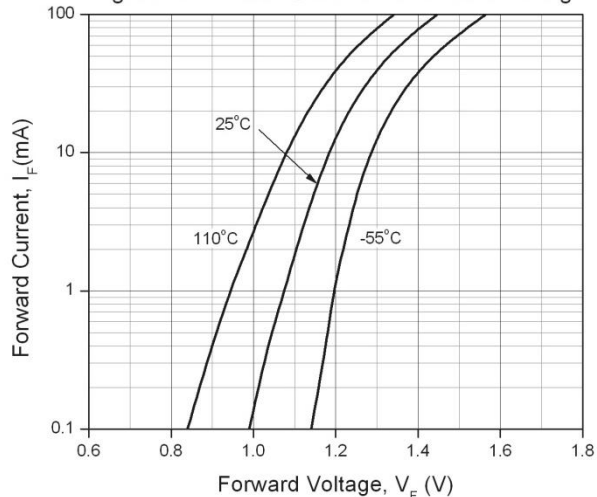


Figure 2. Normalized Current Transfer Ratio vs Forward Current

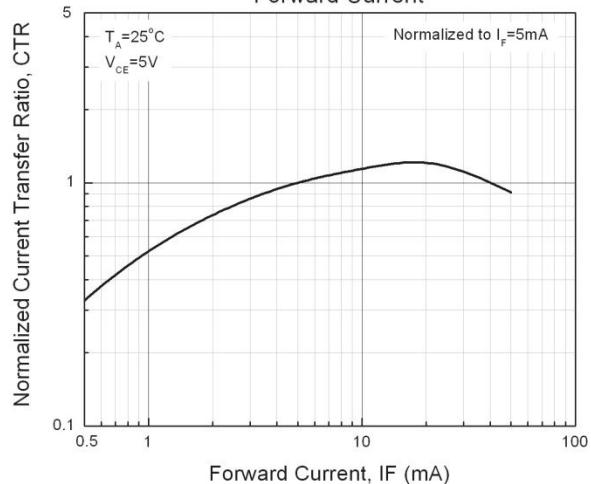


Figure 3. Current Transfer Ratio vs Ambient Temperature

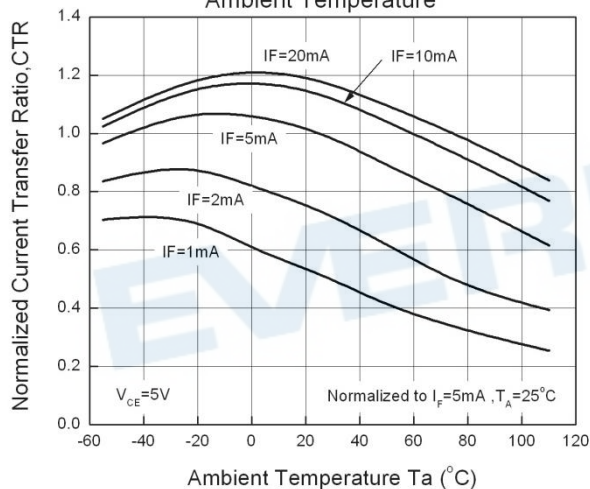


Figure 4. Dark Current vs Ambient Temperature

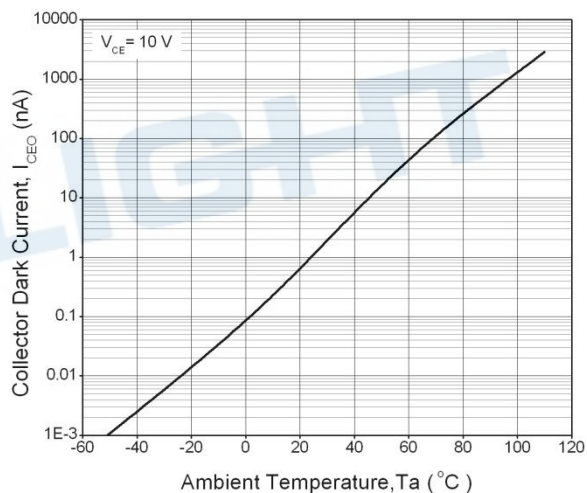


Figure 5. Collector-Emitter Saturation Voltage vs Collector Current

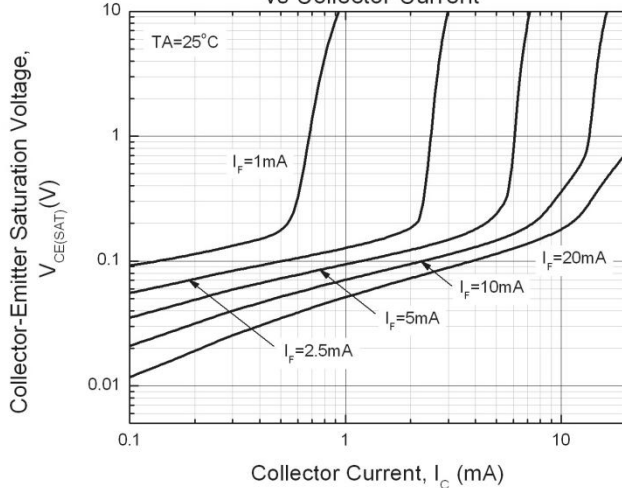
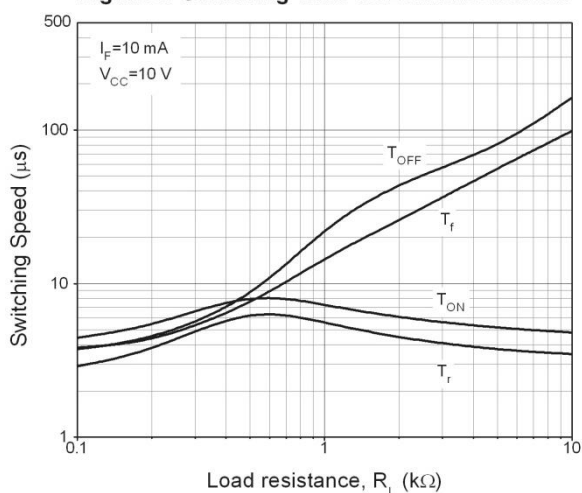


Figure 6. Switching Time vs Load Resistance



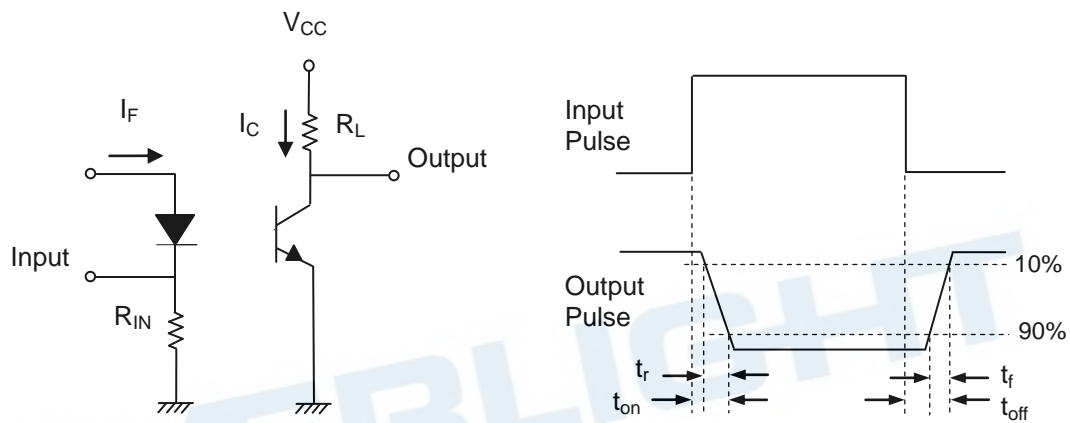
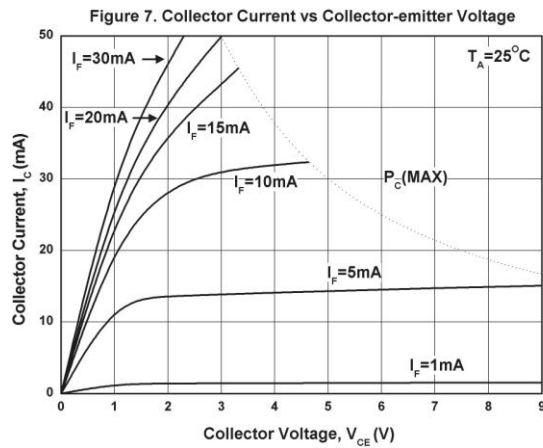


Figure 8. Switching Time Test Circuit & Waveforms

## Order Information

### Part Number

**EL2501X(Y)(Z)-VG**

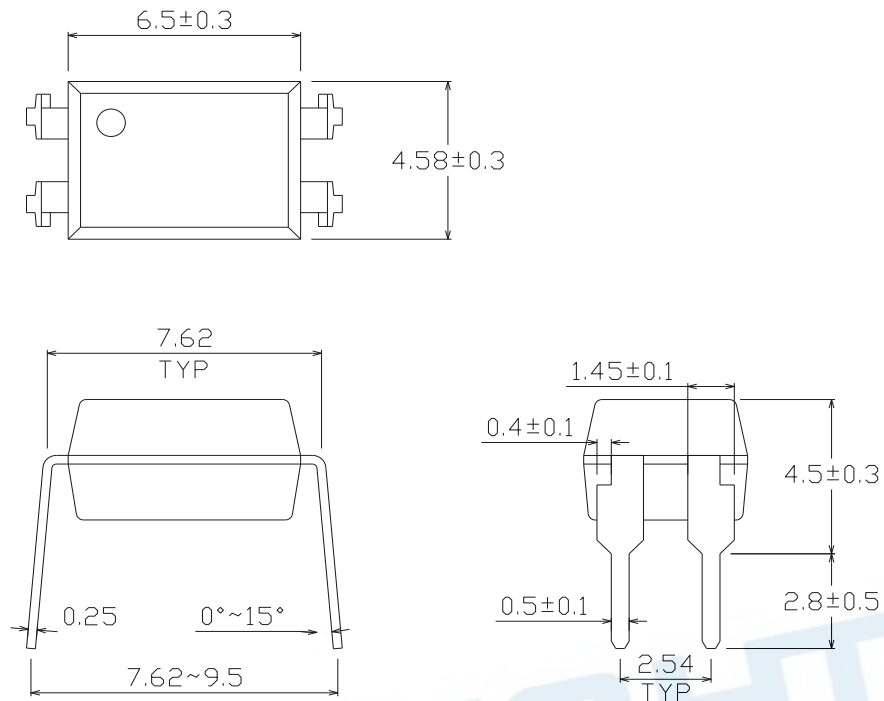
### Note

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

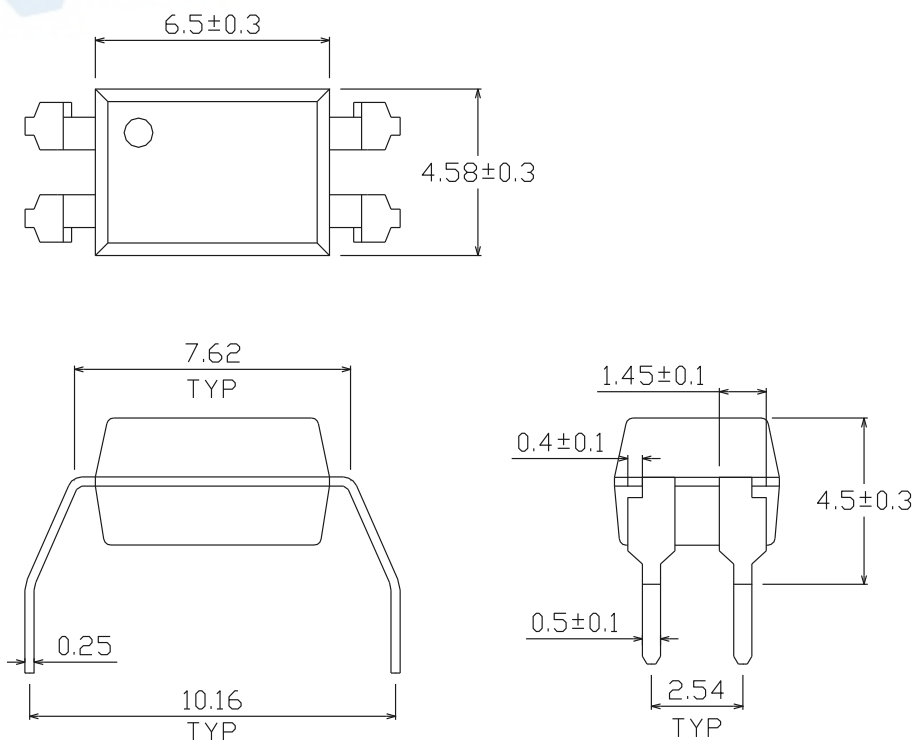
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount 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
S2 (TU)	Surface mount lead form (low profile) + TU tape & reel option	2000 units per reel

Package Dimension (Dimensions in mm)

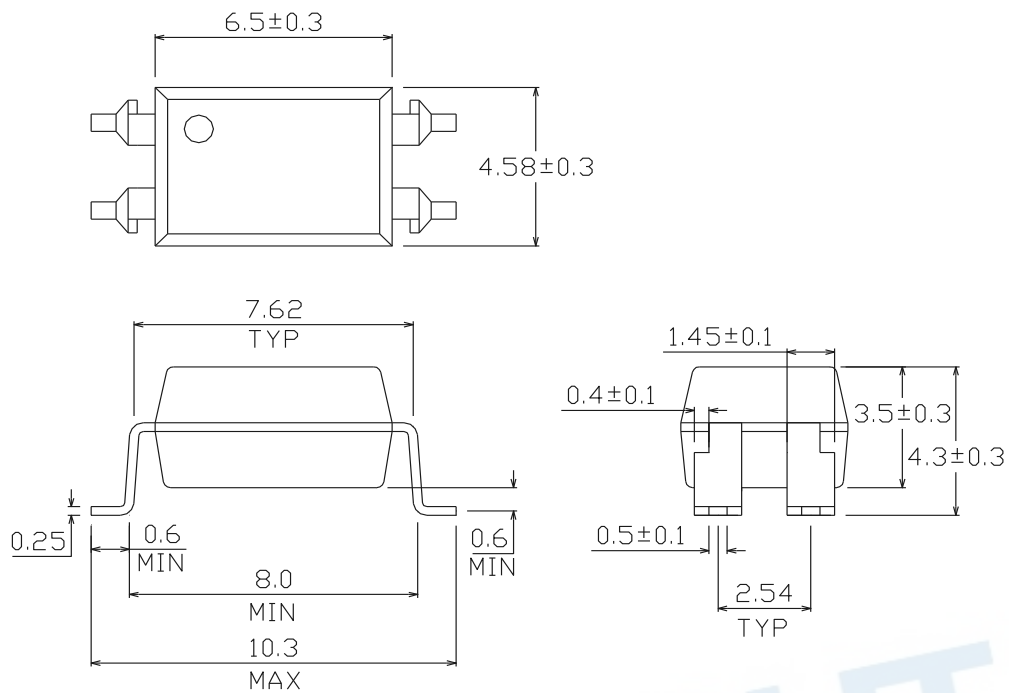
Standard DIP Type



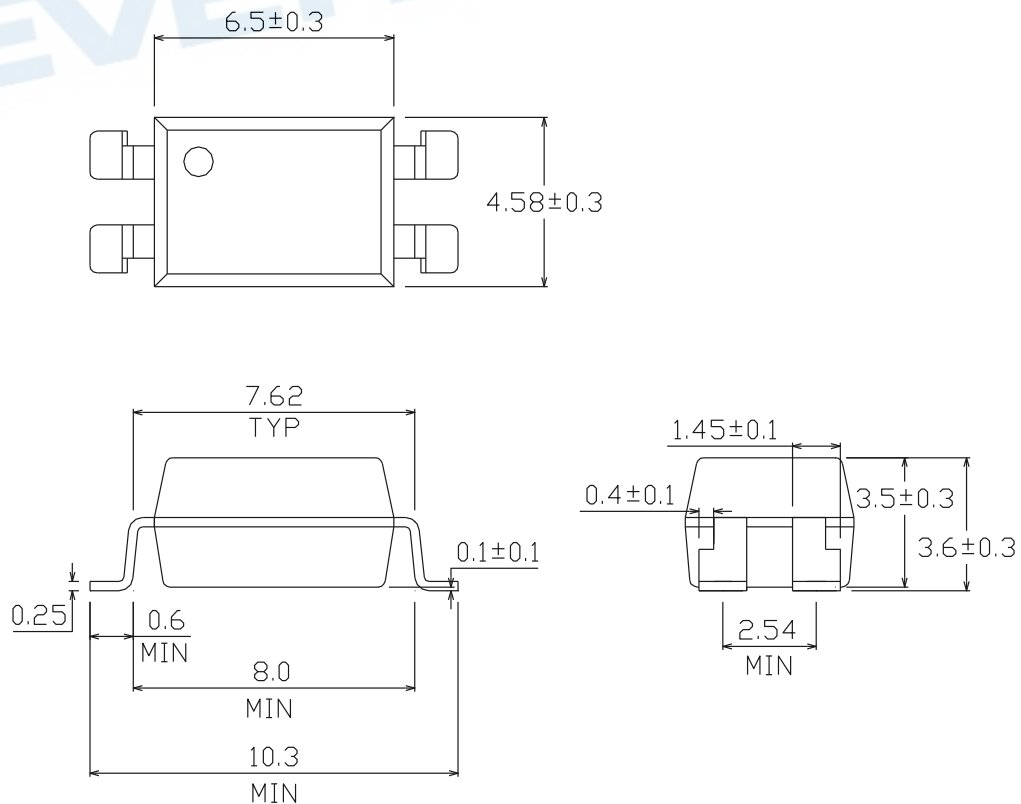
Option M Type



Option S Type

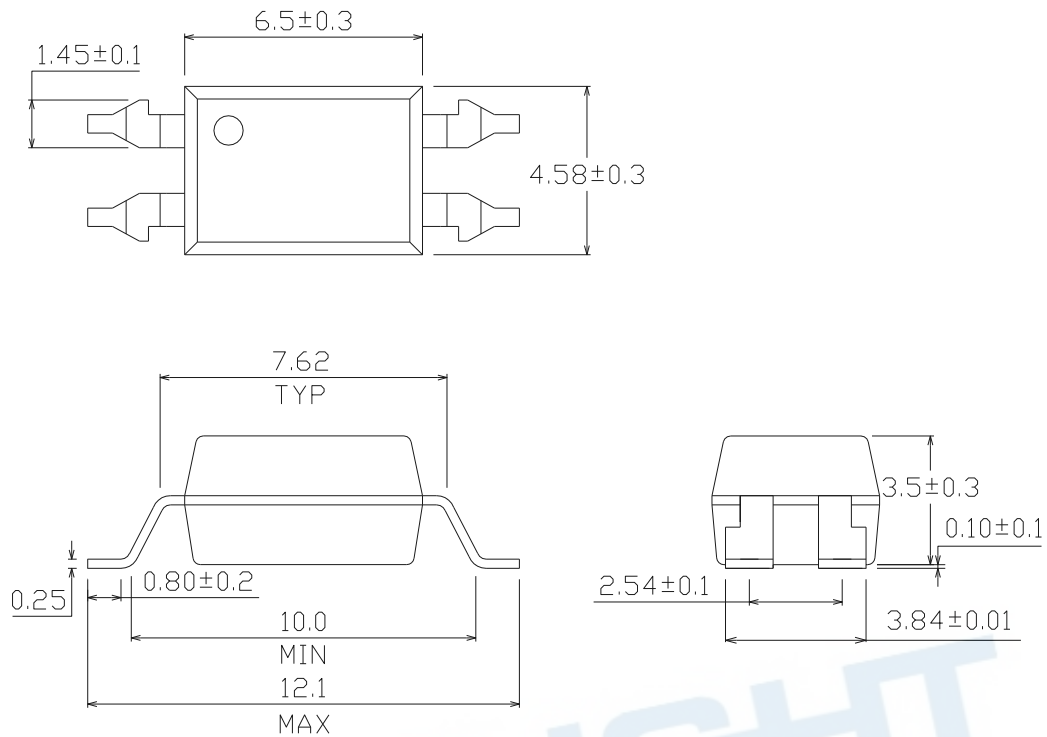


Option S1 Type



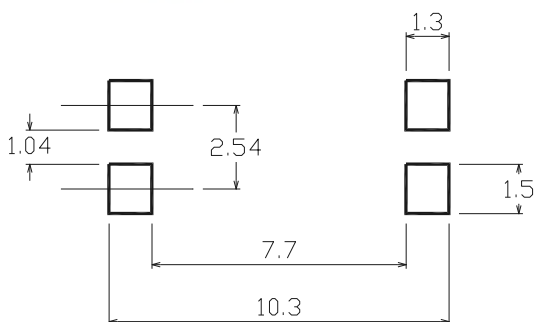


### Option S2 Type

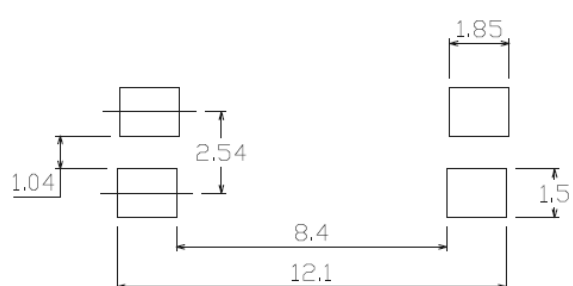


### Recommended pad layout for surface mount leadform

#### For S and S1 option



#### For S2 option



## Device Marking



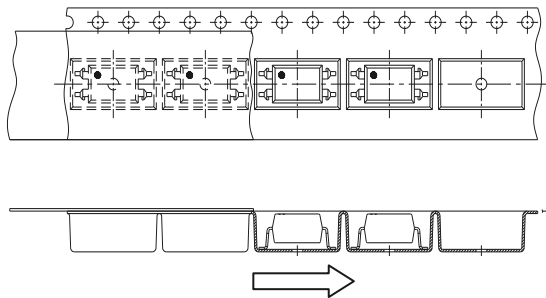
## Notes

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

EVERLIGHT

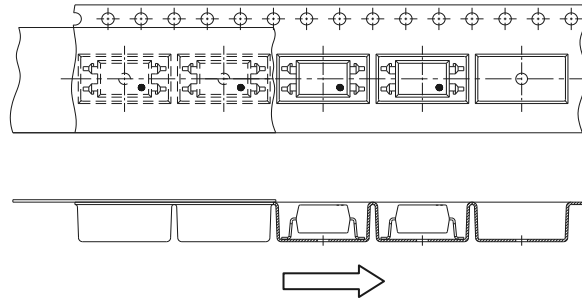
## Tape & Reel Packing Specifications

**Option TA**



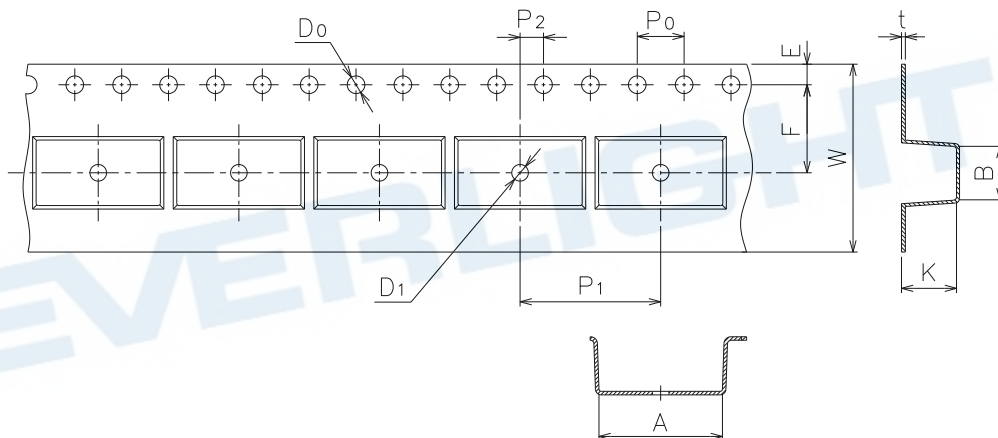
Direction of feed from reel

**Option TB**



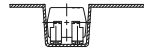
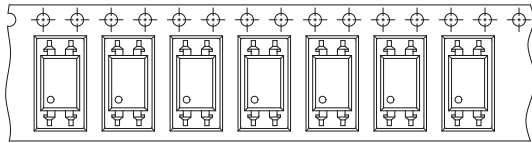
Direction of feed from reel

## Tape dimensions

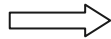


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.5±0.1	4.65±0.1	1.50±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S2	12.15±0.1	4.65±0.1	1.50±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.35±0.1	16.0±0.3	4.75±0.1
Dimension (mm) S2	4.0±0.1	16.0±0.1	2.0±0.1	0.35±0.1	16.0±0.3	3.90±0.1

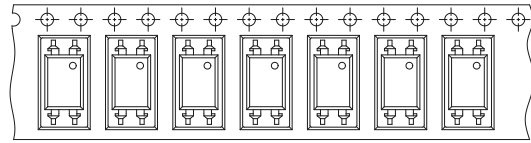
**Option TD**



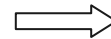
Direction of feed from reel



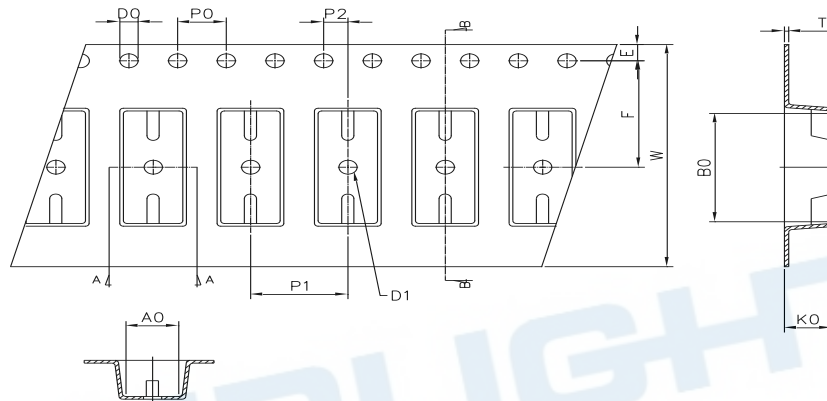
**Option TU**



Direction of feed from reel



**Tape dimensions**

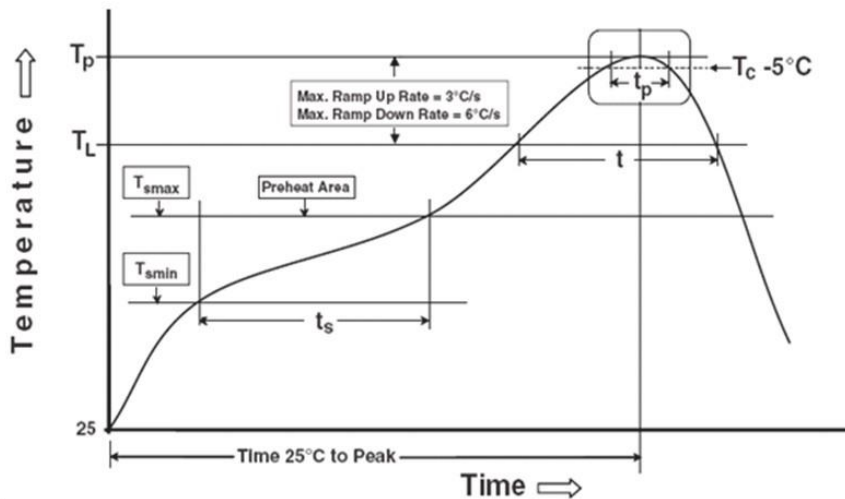


Dimension No.	<b>Ao</b>	<b>Bo</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm) S.S1	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension (mm) S2	4.88±0.1	12.55±0.1	1.5±0.1	1.50±0.1	1.75±0.1	11.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>Ko</b>
Dimension (mm) S.S1	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	16.00±0.3	4.60±0.1
Dimension (mm) S2	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	24.00±0.3	4.00±0.1

## Precautions for Use

### 1. Soldering Condition

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



Note:

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: $T_p - 5^\circ C$	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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