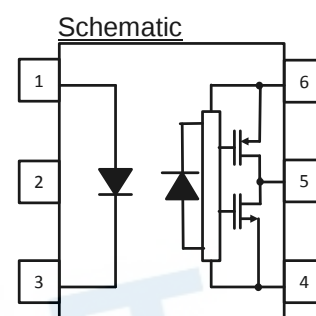
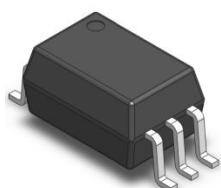


### 6 PIN SDIP IGBT/MOSFET 1.0A Output Current GATE DRIVER PHOTOCOUPLER ELS3150-G Series

Preliminary



#### Features:

- Compliance Halogens Free  
( Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Rail-to-rail output voltage
- Guaranteed performance from -40 to 110°C
- Peak Output Current :  $I_{OP} = 1A$  (max)
- Threshold Input Current:  $I_{FLH} = 5$  mA (max)
- High isolation voltage between input and output (Viso=5000 V rms )
- Pb free and RoHS compliant.
- UL and cUL approved
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

#### Pin Configuration

- 1, Anode
- 2, No Connection
- 3, Cathode
- 4,  $V_{EE}$
- 5,  $V_{OUT}$
- 6,  $V_{CC}$

Note A : 0.1 $\mu$ F bypass capacitor must be connected between pins 4 and 6

#### Description

The ELS3150-G consists of an infrared light emitting diodes coupled to an integrated circuit with a power output stage.

The photo coupler has an internal shield that provides guaranteed common-mode transient immunity of  $\pm 15$  kV/ $\mu$ s. It is suitable for direct gate driving circuit for IGBTs or power MOSFETs.

#### Applications

- Isolated IGBT/Power MOSFET Gate Drive
- Uninterruptible power supply
- Inverters
- Home appliances, such as fan heaters, etc.

### Absolute Maximum Ratings (Ta=25°C)

|        | Parameter                            | Symbol                           | Rating     | Unit  |
|--------|--------------------------------------|----------------------------------|------------|-------|
| Input  | Forward current                      | I <sub>F</sub>                   | 25         | mA    |
|        | Pulse Forward Current* <sup>1</sup>  | I <sub>FP</sub>                  | 1          | A     |
|        | Reverse voltage                      | V <sub>R</sub>                   | 5          | V     |
| Output | “H” Peak Output current              | I <sub>OPH</sub>                 | 1.0        | A     |
|        | “L” Peak Output Current              | I <sub>OPL</sub>                 | 1.0        | A     |
|        | Peak Output Voltage                  | V <sub>O</sub>                   | 30         | V     |
|        | Supply Voltage                       | V <sub>CC</sub> -V <sub>EE</sub> | 10 to 30   | V     |
|        | Operating frequency                  | f                                | 50         | kHz   |
|        | Isolation voltage * <sup>2</sup>     | V <sub>ISO</sub>                 | 5000       | V rms |
|        | Total Power Dissipation              | P <sub>T</sub>                   | 300        | mW    |
|        | Operating temperature                | T <sub>OPR</sub>                 | -40 ~ +110 | °C    |
|        | Storage temperature                  | T <sub>STG</sub>                 | -55 ~ +125 | °C    |
|        | Soldering temperature * <sup>3</sup> | T <sub>SOL</sub>                 | 260        | °C    |

Notes:

\*1 Pulse width ≤ 1μs, 300pps.

\*2 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1 to 3 are shorted together, and pins 4 to 6 are shorted together.

\*3 For 10 seconds.

## Electro-Optical Characteristics (T<sub>A</sub>=-40~110°C unless specified otherwise)

### Input

| Parameter       | Symbol         | Min. | Typ. | Max. | Unit | Condition             |
|-----------------|----------------|------|------|------|------|-----------------------|
| Forward Voltage | V <sub>F</sub> | -    | -    | 1.8  | V    | I <sub>F</sub> = 10mA |
| Reverse Current | V <sub>R</sub> | 5    | -    | -    | V    | I <sub>R</sub> = 10μA |

### Output

| Parameter                 | Symbol           | Min | Typ. | Max. | Unit | Condition                                                           |
|---------------------------|------------------|-----|------|------|------|---------------------------------------------------------------------|
| High level supply current | I <sub>CCH</sub> | -   | 1.4  | 3.2  | mA   | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V<br>V <sub>O</sub> = Open |
| Low level supply current  | I <sub>CCL</sub> | -   | 1.5  | 3.2  |      | I <sub>F</sub> =0mA, V <sub>CC</sub> =30V<br>V <sub>O</sub> = Open  |

### Transfer Characteristics

| Parameter                       | Symbol             | Min                  | Typ. | Max.                 | Unit | Condition                                                                          |
|---------------------------------|--------------------|----------------------|------|----------------------|------|------------------------------------------------------------------------------------|
| High Level Output Current*4     | I <sub>OH</sub>    |                      | -    | -0.2                 | A    | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V,<br>V <sub>O</sub> =V <sub>CC</sub> -1V |
|                                 |                    | -                    | -    | -1                   |      | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V,<br>V <sub>O</sub> =V <sub>CC</sub> -4V |
| Low Level Output Current*4      | I <sub>OL</sub>    | 0.2                  | -    | -                    |      | I <sub>F</sub> =0mA, V <sub>CC</sub> =30V,<br>V <sub>O</sub> =V <sub>EE</sub> +1V  |
|                                 |                    | 1.0                  | -    | -                    |      | I <sub>F</sub> =0mA, V <sub>CC</sub> =30V,<br>V <sub>O</sub> =V <sub>EE</sub> +4V  |
| High Level Output Voltage       | V <sub>OH</sub>    | V <sub>CC</sub> -4   | -    | -                    | V    | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V,<br>I <sub>O</sub> =-1A                 |
|                                 |                    | V <sub>CC</sub> -0.5 | -    | -                    | V    | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V,<br>I <sub>O</sub> =-100mA              |
| Low Level Output Voltage        | V <sub>OL</sub>    | -                    | -    | V <sub>EE</sub> +4   | V    | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V,<br>I <sub>O</sub> =1A                  |
|                                 |                    | -                    | -    | V <sub>EE</sub> +0.5 | V    | I <sub>F</sub> =10mA, V <sub>CC</sub> =30V,<br>I <sub>O</sub> =100mA               |
| Input Threshold Current         | I <sub>FLH</sub>   | -                    | -    | 5                    | mA   | V <sub>CC</sub> =10 or 30V, V <sub>O</sub> >5V                                     |
| Input Threshold Voltage         | V <sub>FHL</sub>   | 0.8                  | -    | -                    | V    | V <sub>CC</sub> =10 or 30V, V <sub>O</sub> <5V                                     |
| Under Voltage Lockout Threshold | V <sub>UVLO+</sub> | 6.5                  | 7.8  | 9                    | V    | I <sub>F</sub> =10mA,, V <sub>O</sub> >5V                                          |
| Under Voltage Lockout Threshold | V <sub>UVLO-</sub> | 5.5                  | 6.8  | 8                    | V    | I <sub>F</sub> =10mA,, V <sub>O</sub> <5V                                          |

## Switching Characteristics

| Parameter                                      | Symbol                | Min | Typ. | Max. | Unit              | Condition                                                                                                                                                                                 |
|------------------------------------------------|-----------------------|-----|------|------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Propagation delay time to output High level    | $t_{PLH}$             | 60  | 200  | 400  | ns                | $I_F = 7 \text{ to } 16\text{mA}$<br>$V_{CC} = 10 \text{ to } 30\text{V}$<br>$C_g = 10\text{nF}$ , $R_g = 10\Omega$ ,<br>$f = 10\text{kHz}$ , $T_A = 25^\circ\text{C}$<br>Duty Cycle=50%, |
| Propagation delay time to output Low level     | $t_{PHL}$             | 60  | 200  | 400  | ns                |                                                                                                                                                                                           |
| Pulse width distortion                         | $ t_{PHL} - t_{PLH} $ | -   | -    | 150  | ns                |                                                                                                                                                                                           |
| Propagation Delay Skew*5                       | $t_{PSK}$             | -   | -    | 150  | ns                |                                                                                                                                                                                           |
| Output rise time                               | $t_R$                 | -   | 80   | -    | ns                |                                                                                                                                                                                           |
| Output fall time                               | $t_F$                 | -   | 80   | -    | ns                |                                                                                                                                                                                           |
| Common Mode Transient Immunity at Logic High*6 | $CM_H$                | 15  | -    | -    | kV/ $\mu\text{S}$ | $I_F = 10\text{mA}$ , $V_{CC} = 30\text{V}$ ,<br>$T_A = 25^\circ\text{C}$ $V_{CM} = 1500\text{V}$                                                                                         |
| Common Mode Transient Immunity at Logic Low*7  | $CM_L$                | 15  | -    | -    | kV/ $\mu\text{S}$ | $I_F = 0\text{mA}$ , $V_{CC} = 30\text{V}$ ,<br>$T_A = 25^\circ\text{C}$ $V_{CM} = 1500\text{V}$                                                                                          |

### Notes:

\*4 Max. pulse width=10 $\mu\text{s}$ , max. duty cycle =1%

\*5 Propagation delay skew is defined as the difference between the largest and smallest propagation delay times (i.e.  $t_{PHL}$  or  $t_{PLH}$ ) of multiple samples. Evaluations of these samples are conducted under identical test conditions (supply voltage, input current, temperature, etc).

\*6 Common mode transient immunity at output high is the maximum tolerable negative dv/dt on the trailing edge of the common mode impulse signal,  $V_{CM}$ , to assure that the output will remain high (i.e.  $V_O > 10.0\text{V}$ )

\*7 Common mode transient immunity at output low is the maximum tolerable positive dv/dt on the leading edge of the common mode pulse signal,  $V_{CM}$ , to assure that the output will remain low (i.e.  $V_O < 1.0\text{V}$ )

## Typical Electro-Optical Characteristics Curves

Fig.1 Forward Voltage vs. Ambient Temperature

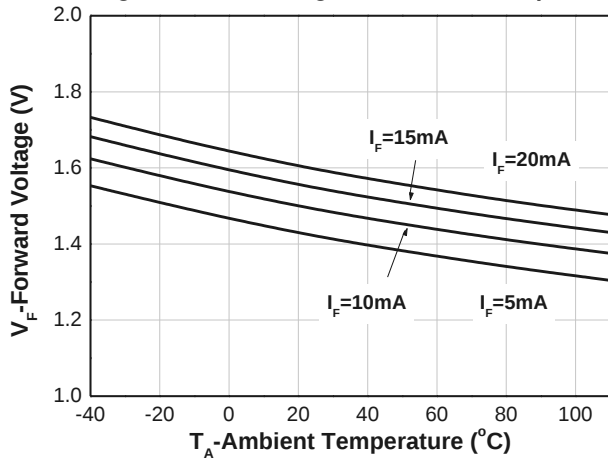


Fig.2 Output High Voltage vs. Output High Current

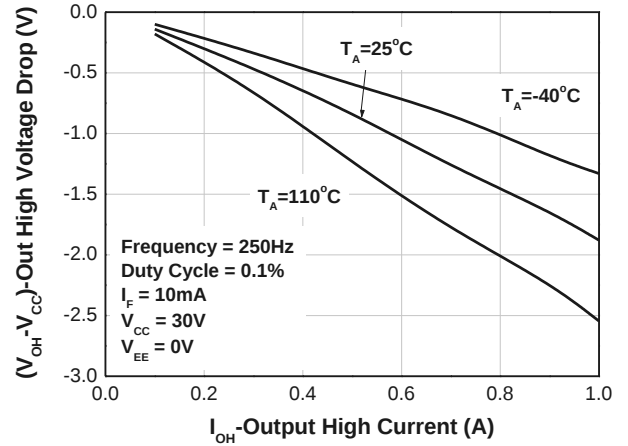


Fig. 3 Output High Voltage Drop vs. Ambient Temperature

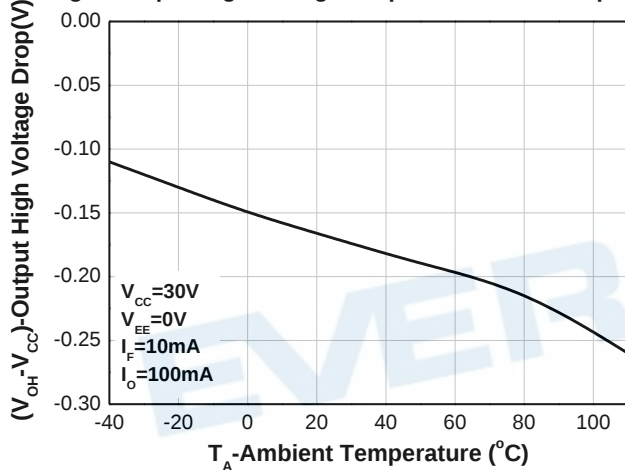


Fig.4 Output Low Voltage vs. Output Low Current

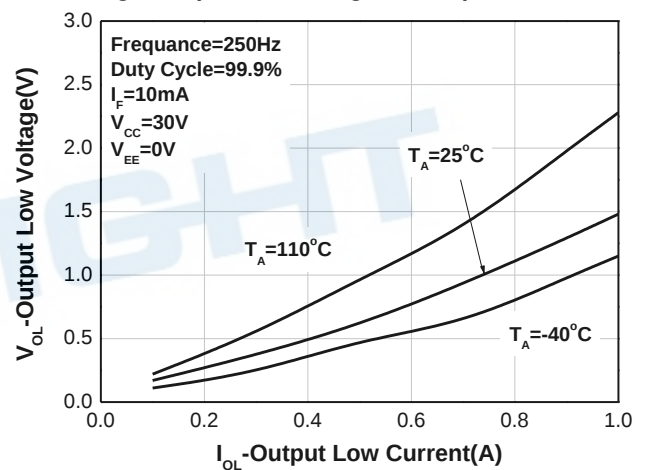


Fig. 5 Output Low Voltage vs. Ambient Temperature

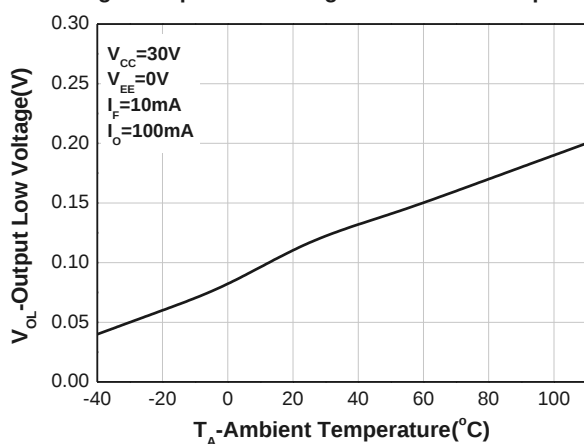


Fig.6 Supply Current vs. Ambient Temperature

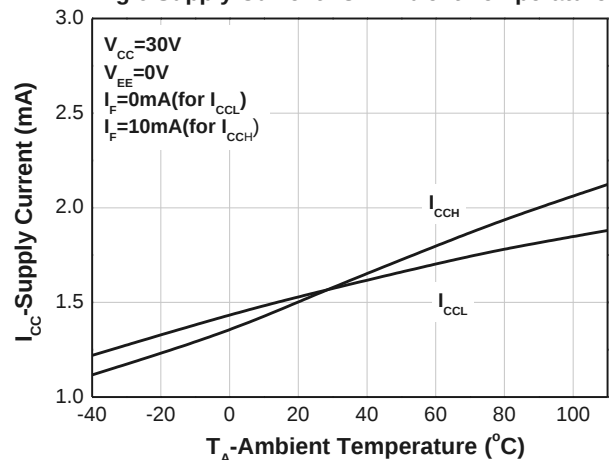


Fig.7 Supply Current vs Supply voltage

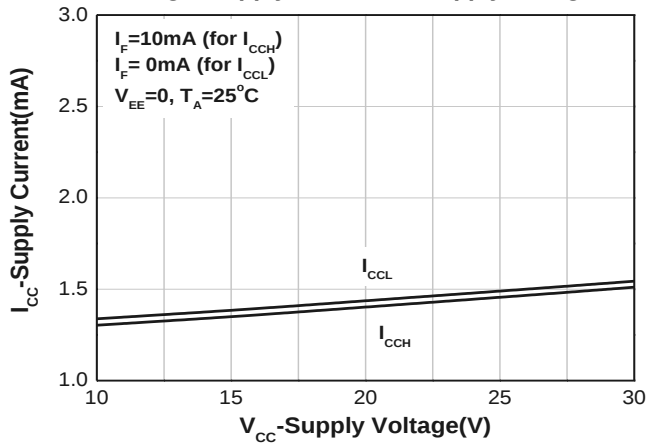


Fig.8 Threshold Input Current vs. Ambient Temperature

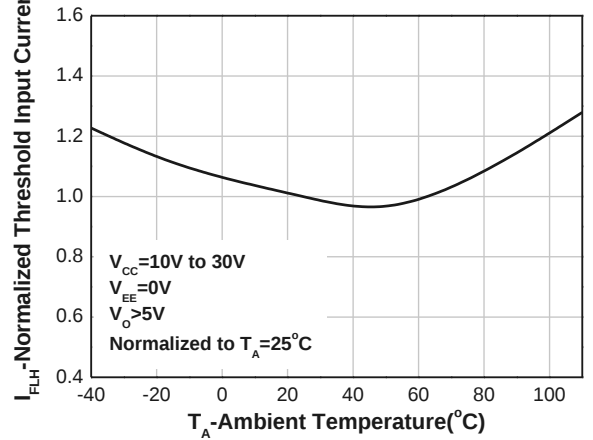


Fig.9. Under Voltage Lockout

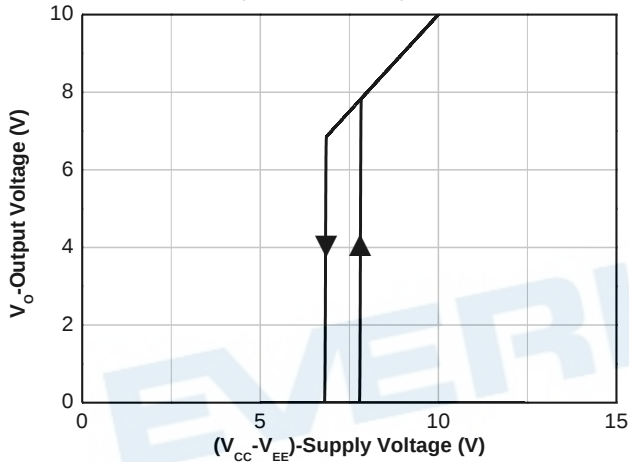


Fig.10 Propagation Delay vs Supply Voltage

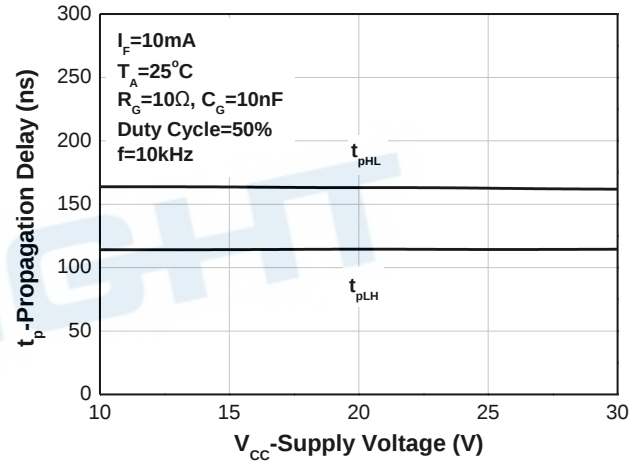


Fig.11 Propagation Delay vs LED Forward Current

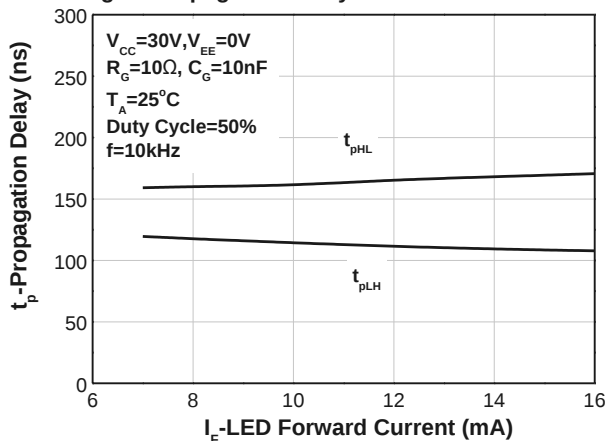


Fig.12 Propagation Delay vs. Ambient Temperature

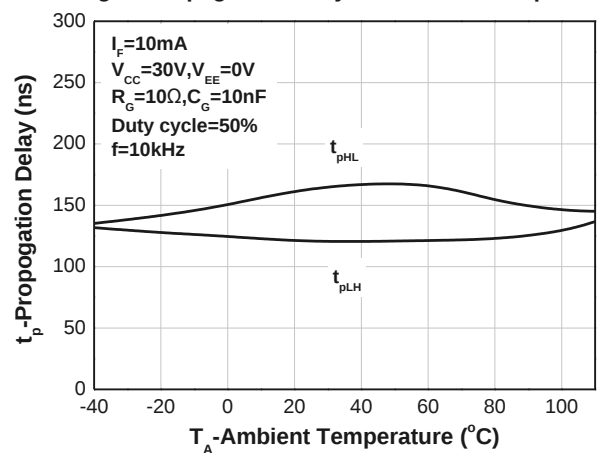


Fig.13 Propagation Delay vs. Serise Load Resistance

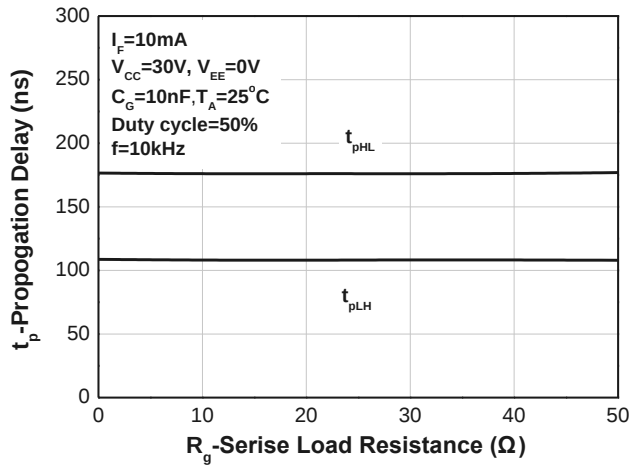


Fig.14 Propagation Delay vs. Load Capacitance

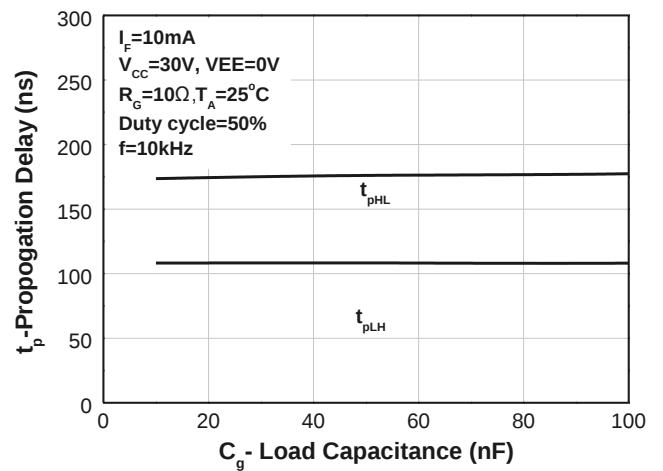


Fig. 15  $I_{OH}$  Test circuit

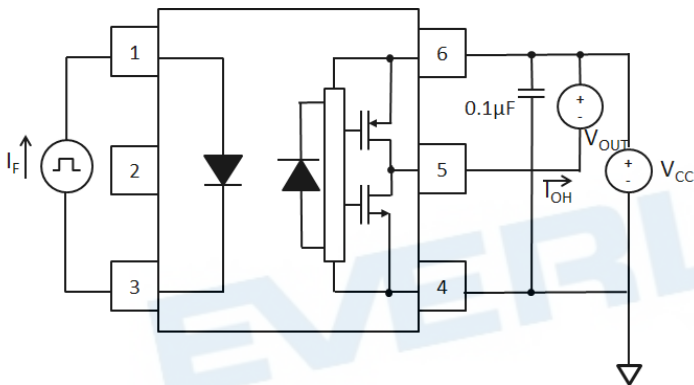


Fig. 16  $I_{OL}$  Test circuit

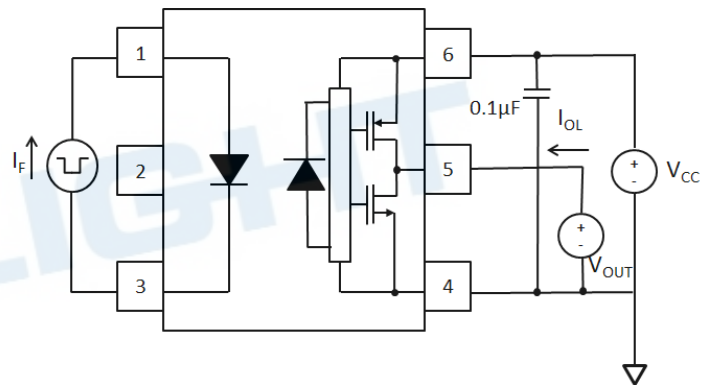


Fig. 17  $V_{OH}$  Test circuit

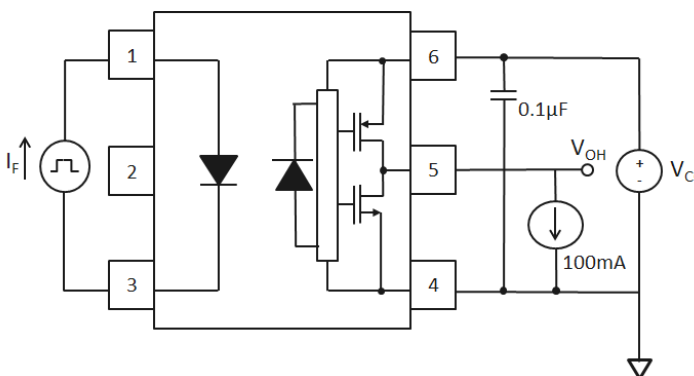


Fig. 18  $V_{OL}$  Test circuit

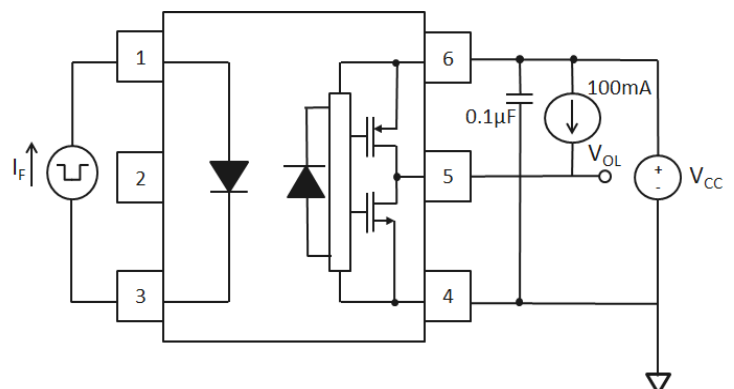


Fig. 19  $I_{FHL}$  Test circuit

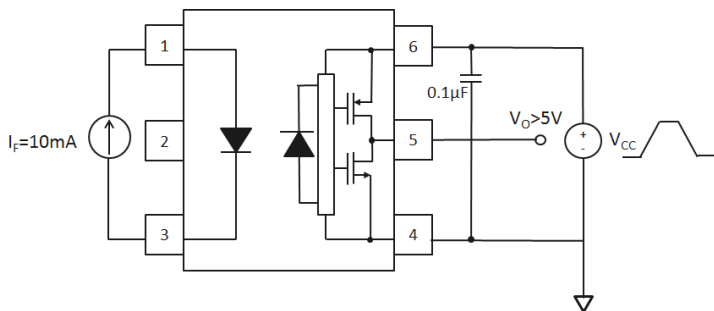


Fig. 20 UVLO Test circuit

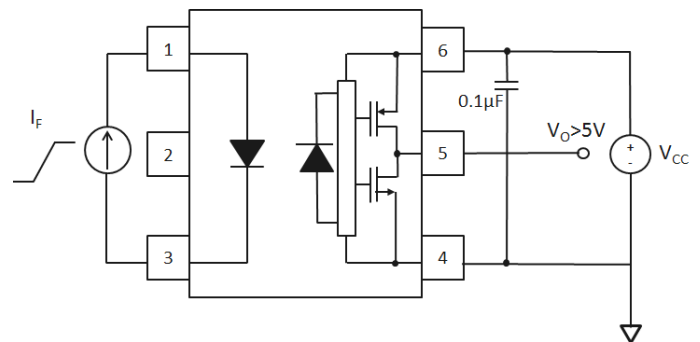


Fig. 21 Switching Time Test circuit

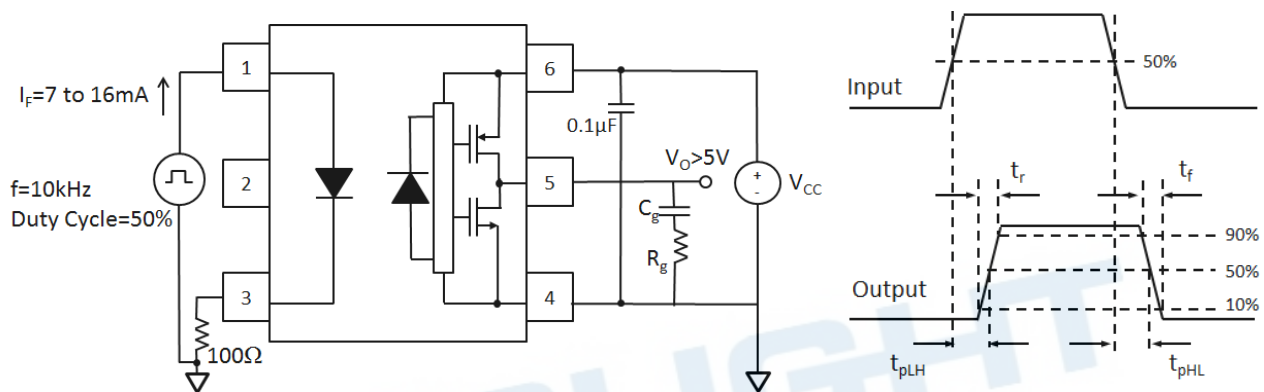
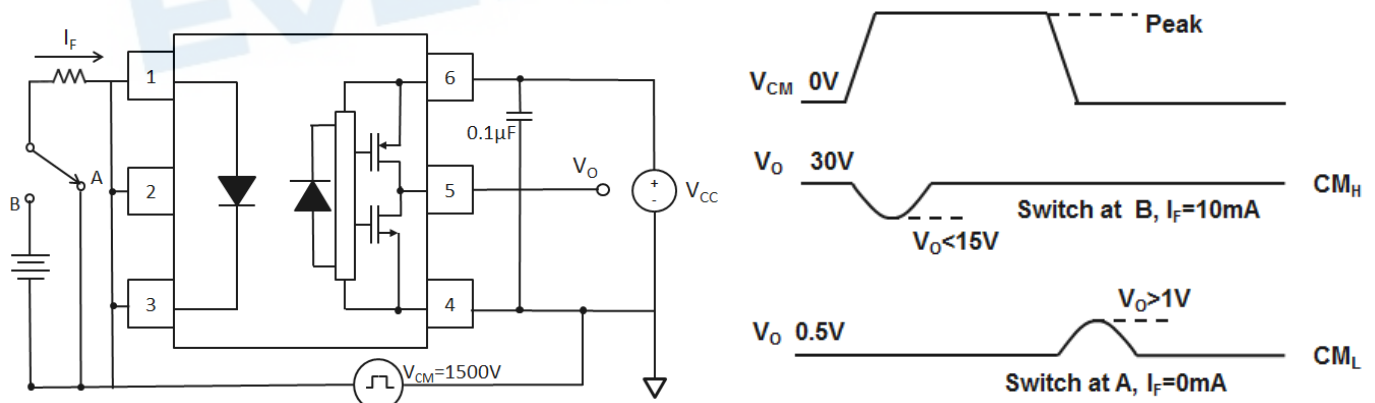


Fig. 22 CMR Test circuit



## Order Information

### Part Number

**ELS3150P(Z)-VG**

#### Note

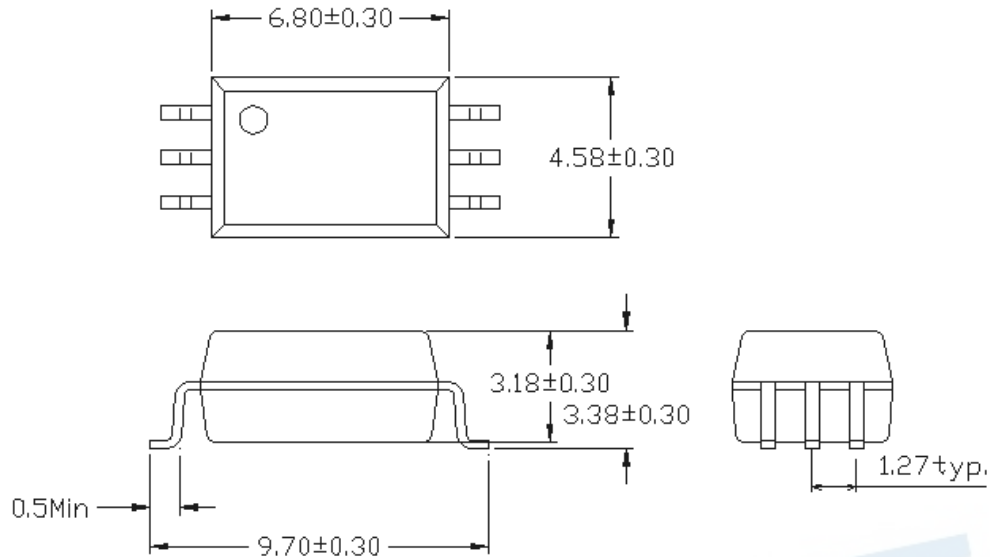
Y = Lead form option (P)  
Z = Tape and reel option (TA, TB).  
V = VDE safety (optional).  
G = Halogens Free

| Option | Description                                     | Packing quantity    |
|--------|-------------------------------------------------|---------------------|
| (TA)   | Surface mount lead form + TA tape & reel option | 1000 units per reel |
| (TB)   | Surface mount lead form + TB tape & reel option | 1000 units per reel |

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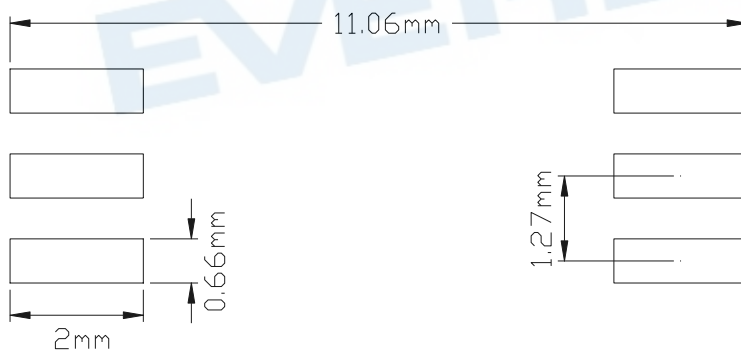
## Package Dimension (Dimensions in mm)

### P Type



### Recommended pad layout for surface mount leadform

#### For P Type:



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

## Device Marking

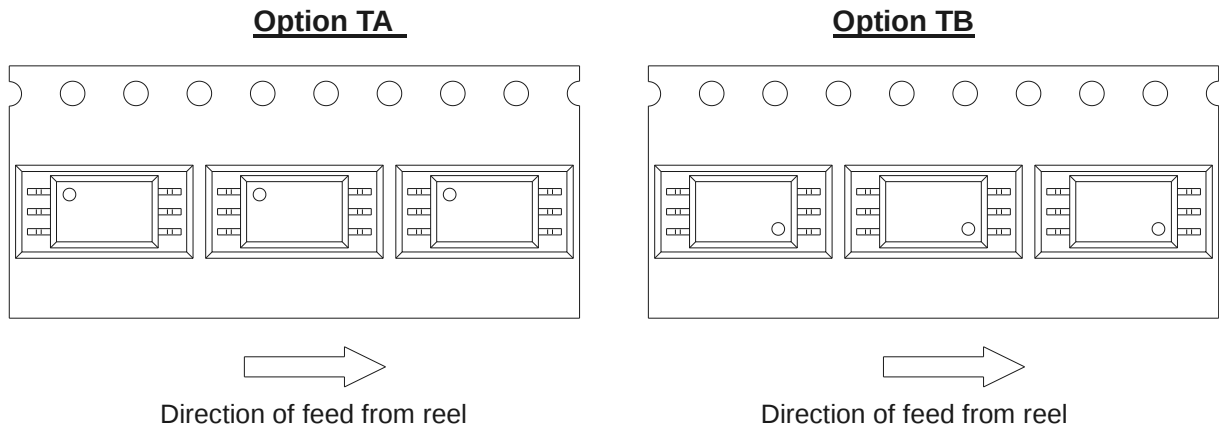


## Notes

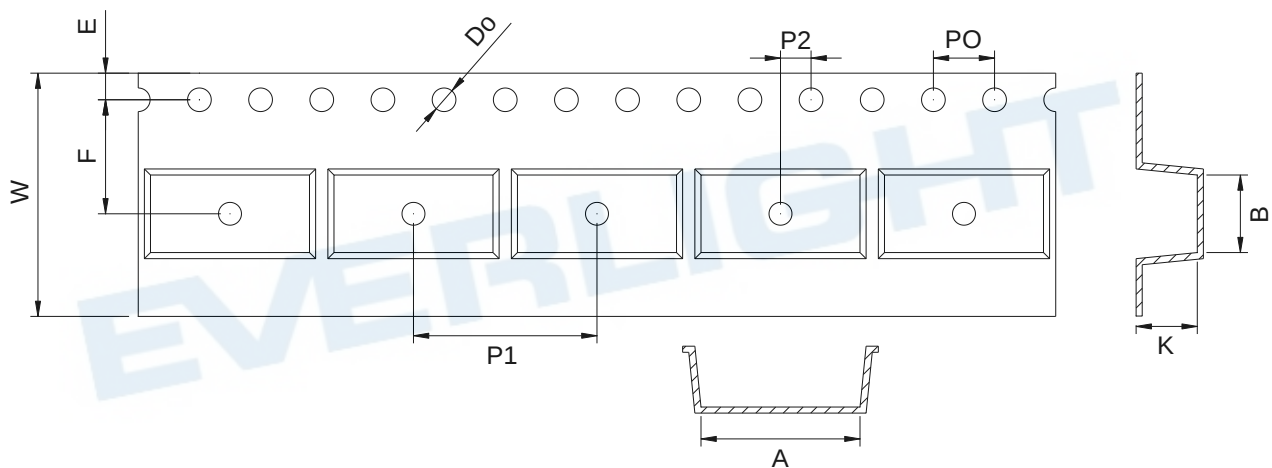
|       |                                       |
|-------|---------------------------------------|
| T     | denotes Factory<br>T : made in Taiwan |
| EL    | denotes EVERLIGHT                     |
| S3150 | denotes Device Number                 |
| Y     | denotes 1 digit Year code             |
| WW    | denotes 2 digit Week code             |
| V     | denotes VDE (optional)                |

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## Tape & Reel Packing Specifications



## Tape dimension

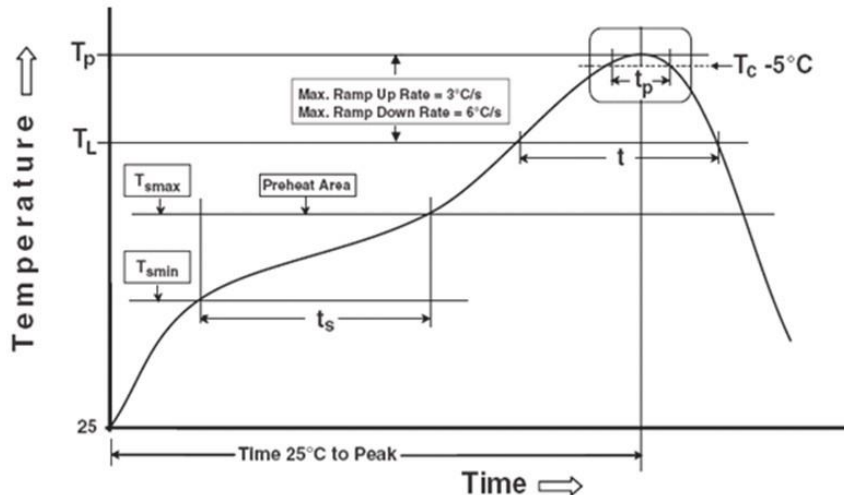


| Dimension No.      | <b>A</b>   | <b>B</b>   | <b>Do</b>  | <b>E</b>   | <b>F</b>  | <b>t</b>  |
|--------------------|------------|------------|------------|------------|-----------|-----------|
| Dimension(mm)<br>P | 10.4 ± 0.1 | 5.1 ± 0.1  | 1.55 ± 0.1 | 1.75 ± 0.1 | 7.5 ± 0.1 | 0.4 ± 0.1 |
| Dimension No.      | <b>PO</b>  | <b>P1</b>  | <b>P2</b>  | <b>W</b>   | <b>K</b>  |           |
| Dimension(mm)<br>P | 4.0 ± 0.1  | 12.0 ± 0.1 | 2.0 ± 0.1  | 16.0 ± 0.3 | 4.0 ± 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: $T_p - 5^\circ\text{C}$ | 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          |

## DISCLAIMER

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2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
3. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
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