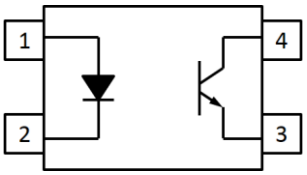
# 4 PIN SOP PHOTOTRANSISTOR PHOTOCOUPLER
# EL357NH-G Series

**Features:**

- Halogens free
  (Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- Current transfer ratio
  (CTR: 50~600% at $I_F$ =5mA, $V_{CE}$ =5V)
- Operating temperature -55°C~125°C
- High isolation voltage between input and output (Viso=3750 V rms )
- Compact 4 Pin SOP with a 2.0 mm profile
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL approved (No. E214129)
- VDE approved (NO.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

Schematic




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

## Description

The EL357NH-G series contains an infrared emitting diode, optically coupled to a phototransistor detector. The devices in a 4-pin small outline SMD package.

## Applications

- DC-DC Converters
- Programmable controllers
- Telecommunication equipments
- Signal transmission between circuits of different potentials and impedances

## Absolute Maximum Ratings ($T_a$=25℃)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 50 | mA |
| | Peak forward current (1us, pulse) | $I_{FP}$ | 1 | A |
| | Reverse voltage | $V_R$ | 5 | V |
| | Input power dissipation | $P_D$ | 70 | mW |
| Output | Collector-Emitter voltage | $V_{CEO}$ | 80 | V |
| | Emitter-Collector voltage | $V_{ECO}$ | 7 | V |
| | Collector current | $I_C$ | 50 | mA |
| | Collector power dissipation | $P_C$ | 150 | mW |
| Total power dissipation | | $P_{TOT}$ | 200 | mW |
| Isolation voltage*1 | | $V_{ISO}$ | 3750 | Vrms |
| Operating temperature | | $T_{OPR}$ | -55 ~ +125 | °C |
| Storage temperature | | $T_{STG}$ | -55 ~ +150 | °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

## Electro-Optical Characteristics (Ta=25℃ 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 | $I_R$ | - | - | 10 | μA | $V_R$ = 5V |
| Input capacitance | $C_{in}$ | - | 30 | 250 | pF | V = 0, f = 1kHz |

### Output

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Collector-Emitter dark current | $I_{CEO}$ | - | - | 200 | nA | $V_{CE}$ = 48V, $I_F$ = 0mA |
| Collector-Emitter breakdown voltage | $BV_{CEO}$ | 80 | - | - | V | $I_C$ = 0.1mA |
| Emitter-Collector breakdown voltage | $BV_{ECO}$ | 7 | - | - | V | $I_E$ = 0.01mA |

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

| Parameter | | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Current Transfer ratio | EL357NH | CTR | 50 | - | 600 | % | $I_F$ = 5mA ,$V_{CE}$ = 5V |
| | EL357NHA | | 80 | - | 160 | | |
| | EL357NHB | | 130 | - | 260 | | |
| | EL357NHC | | 200 | - | 400 | | |
| Collector-Emitter saturation voltage | | $V_{CE(sat)}$ | - | - | 0.3 | V | $I_F$ = 20mA ,$I_C$ = 1mA |
| Isolation resistance | | $R_{IO}$ | $5\times10^{10}$ | - | - | Ω | $V_{IO}$ = 500Vdc, 40~60% R.H. |
| Floating capacitance | | $C_{IO}$ | - | 0.6 | 1.0 | pF | $V_{IO}$ = 0, f = 1MHz |
| Rise time | | $t_r$ | - | 6 | 18 | μs | $V_{CE}$ = 2V, $I_C$ = 2mA, $R_L$ = 100Ω |
| Fall time | | $t_f$ | - | 8 | 18 | | |

* Typical values at $T_a$ = 25°C

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

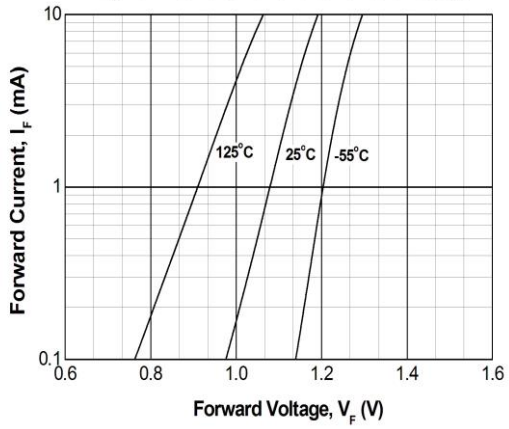



Figure 2. Normalized Current Transfer Ratio vs Forward Current

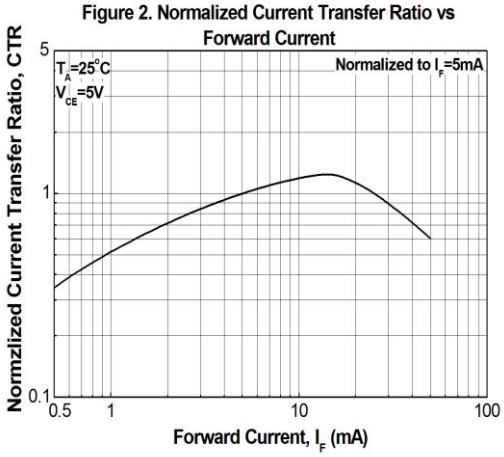



Figure 3. Current Transfer Ratio vs Ambient Temperature

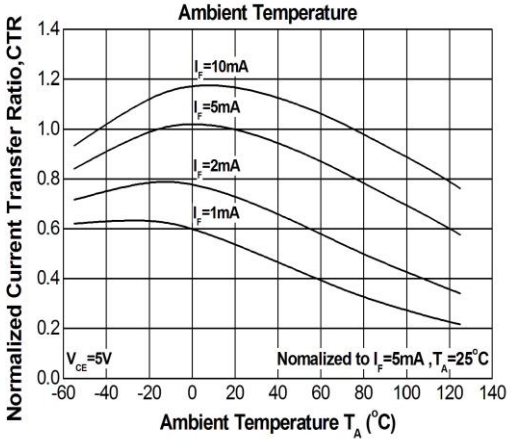



Figure 4. Dark Current vs Ambient Temperature

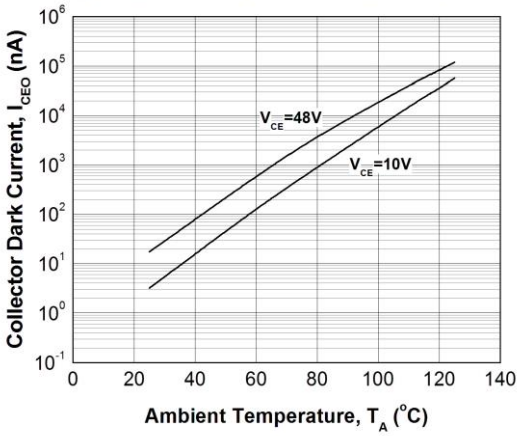



Figure 5. Collector-Emitter Saturation Voltage vs Collector Current

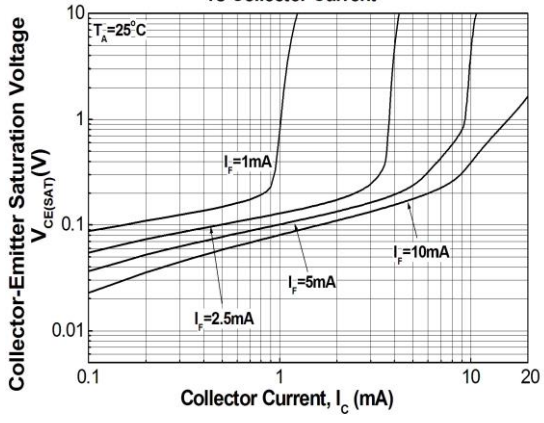
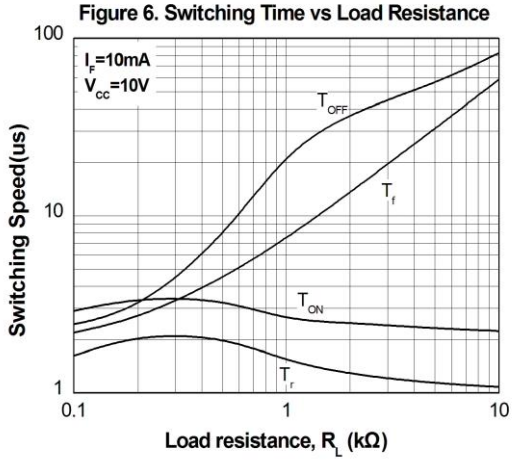



Figure 6. Switching Time vs Load Resistance



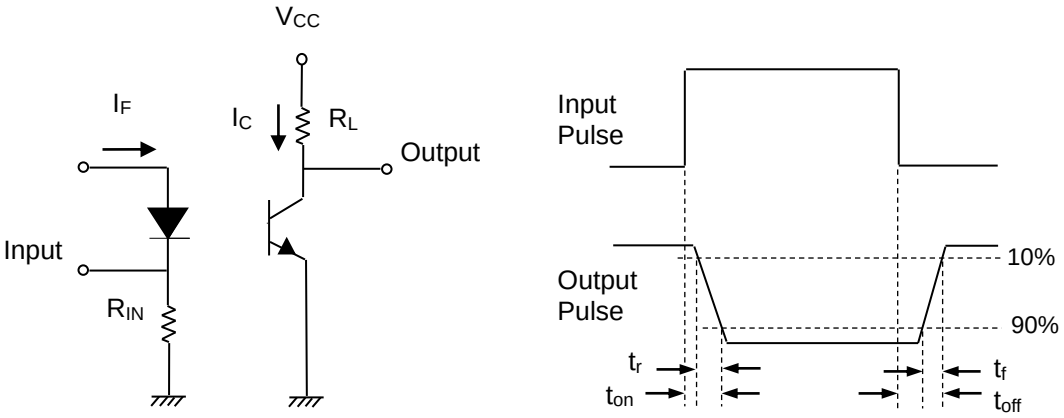



**Figure 7. Switching Time Test Circuit & Waveforms**

## Order Information

### Part Number

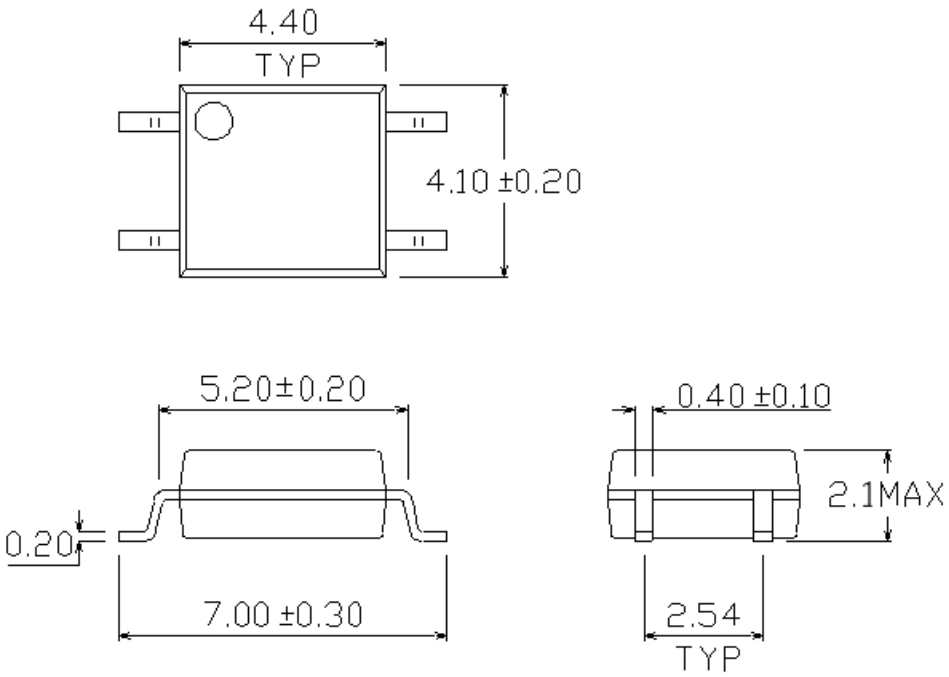
# EL357NH(X)(Y)-VG

**Note**

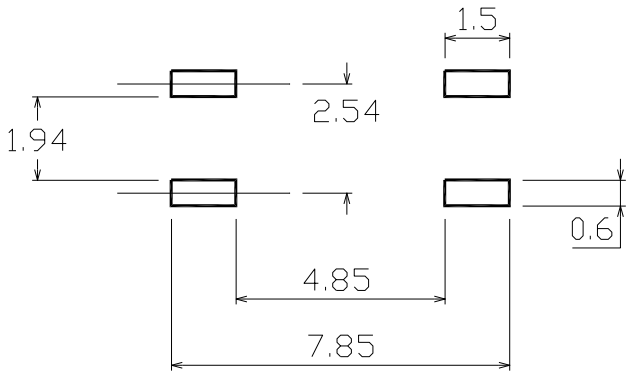
H = High operating temperature
X = CTR rank (A,B,C,D or none)
Y = Tape and reel option (TA, TB or none).
V = VDE (option)
G = Halogen free

| 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 | 3000 units per reel |
| (TB) | TB Tape & reel option | 3000 units per reel |
| (TA)-V | TA Tape & reel option + VDE | 3000 units per reel |
| (TB)-V | TB Tape & reel option + VDE | 3000 units per reel |

## Package Dimension (Dimensions in mm)




## 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.

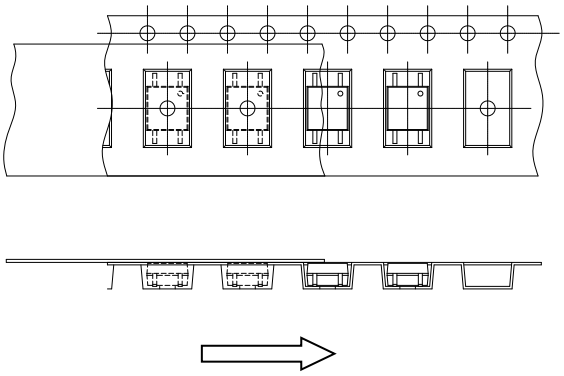
## Device Marking


**Notes**

| | |
|---|---|
| EL | denotes Everlight |
| 357N | denotes Device Number |
| H | denotes High operating temperature |
| R | denotes CTR Rank |
| Y | denotes 1 digit Year code |
| WW | denotes 2 digit Week code |
| V | denotes VDE approved (optional) |

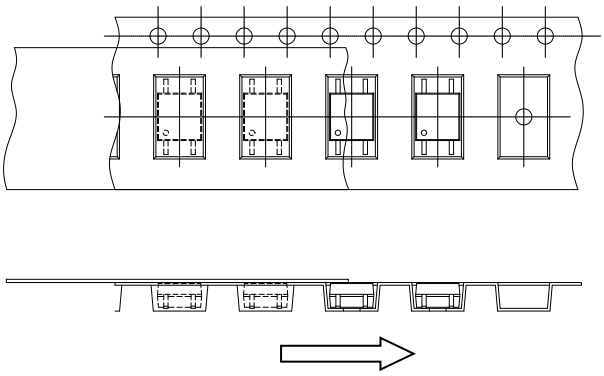
## Tape & Reel Packing Specifications

**Option TA**



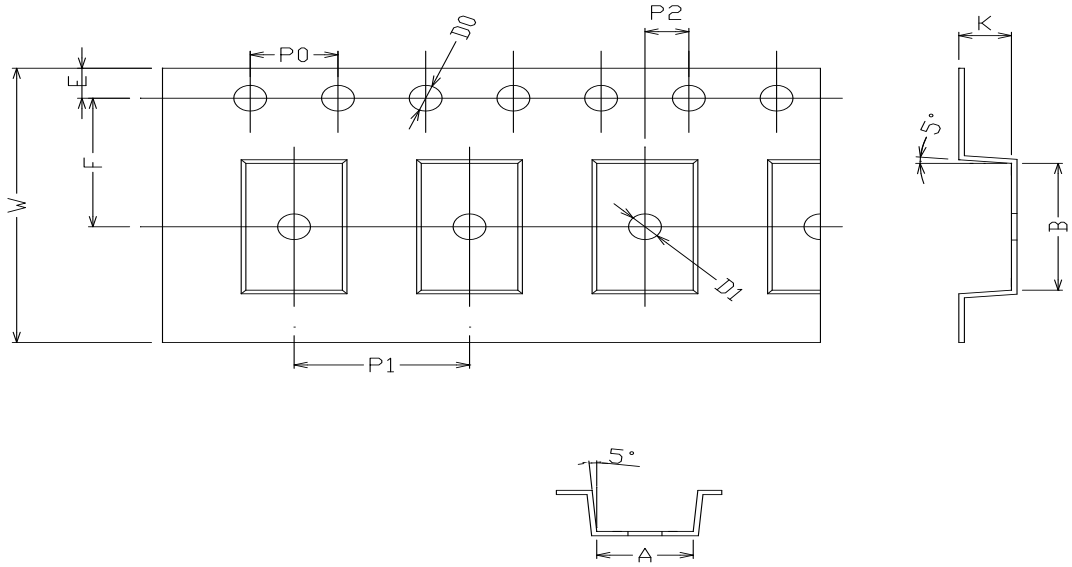
Direction of feed from reel

**Option TB**



Direction of feed from reel

## Tape dimensions

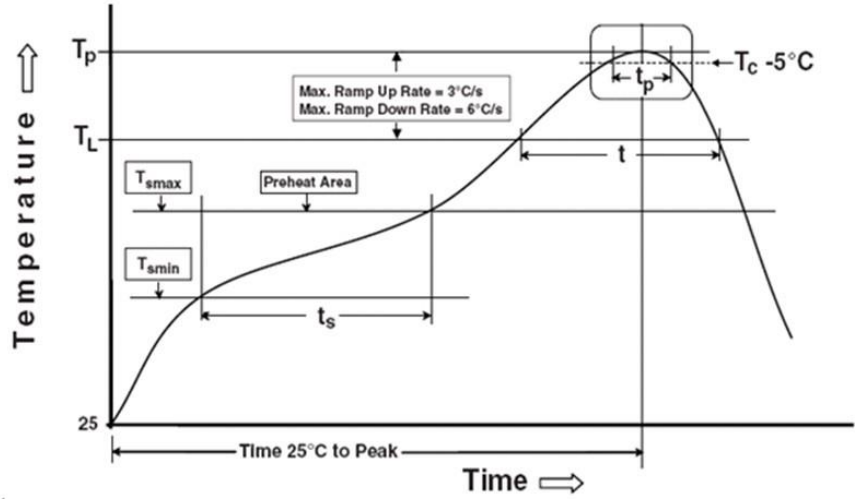



| Dimension No. | A | B | Do | D1 | E | F |
|---|---|---|---|---|---|---|
| Dimension (mm) | 4.4 ± 0.1 | 7.4 ± 0.1 | 1.5 + 0.1/-0 | 1.5 ± 0.1 | 1.75± 0.1 | 7.5 ± 0.05 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **K** |
| Dimension (mm) | 4.0 ± 0.15 | 8.0 ± 0.1 | 2.0 ± 0.1 | 0.25 ± 0.03 | 16.0 ± 0.2 | 2.4± 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°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

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
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.
4. These specification sheets include materials protected under copyright of EVERLIGHT. Reproduction in any form is prohibited without the specific consent of EVERLIGHT.
5. This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or life saving applications or any other application which can result in human injury or death. Please contact authorized Everlight sales agent for special application request.
6. Statements regarding the suitability of products for certain types of applications are based on Everlight's knowledge of typical requirements that are often placed on Everlight products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Everlight's terms and conditions of purchase, including but not limited to the warranty expressed therein.