

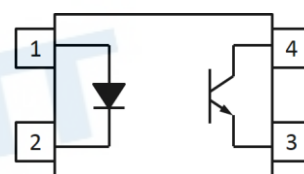
## 4 PIN SOP PHOTOTRANSISTOR PHOTOCOUPLER EL357NL-G Series



### Features:

- Halogens free  
(Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- Current transfer ratio  
(CTR: 50~200% at  $I_F = 0.1\text{mA}$ ,  $V_{CE} = 5\text{V}$ )
- High isolation voltage between input and output ( $V_{iso} = 3750\text{ V rms}$ )
- 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
- CQC approved

### Schematic



### Pin Configuration

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

### Description

The EL357NL-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 (Ta=25°C)**

	Parameter	Symbol	Rating	Unit
Input	Forward current	I <sub>F</sub>	30	mA
	Peak forward current (1us, pulse)	I <sub>FP</sub>	1	A
	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation	P <sub>D</sub>	70	mW
Output	Power dissipation	P <sub>C</sub>	150	mW
	Collector current	I <sub>C</sub>	50	mA
	Collector-Emitter voltage	V <sub>CEO</sub>	75	V
	Emitter-Collector voltage	V <sub>ECO</sub>	6	V
Total Power Dissipation		P <sub>TOT</sub>	200	mW
Isolation Voltage*1		V <sub>ISO</sub>	3750	V rms
Operating temperature		T <sub>OPR</sub>	-55 ~ +110	°C
Storage temperature		T <sub>STG</sub>	-55 ~ +125	°C
Soldering Temperature*2		T <sub>SOL</sub>	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	1.6	V	$I_F = 5\text{mA}$
Reverse current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 5\text{V}$
Input capacitance	$C_{in}$	-	30	250	pF	$V = 0, f = 1\text{kHz}$

**Output**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	$I_{CEO}$	-	-	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	75	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	6	-	-	V	$I_E = 0.01\text{mA}$

**Transfer Characteristics (Ta=25°C unless specified otherwise)**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	EL357NL CTR	50	-	200	%	$I_F = 0.1\text{mA}, V_{CE} = 5\text{V}$
Collector-Emitter saturation voltage	$V_{CE(sat)}$	-	-	0.4	V	$I_F = 1\text{mA}, I_C = 1\text{mA}$
Isolation resistance	$R_{IO}$	$5 \times 10^{10}$	-	-	$\Omega$	$V_{IO} = 500\text{Vdc}, 40\sim 60\% \text{ R.H.}$
Floating capacitance	$C_{IO}$	-	0.6	1.0	pF	$V_{IO} = 0, f = 1\text{MHz}$
Rise time	$t_r$	-	8	18	$\mu\text{s}$	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	$t_f$	-	12	18		

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

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

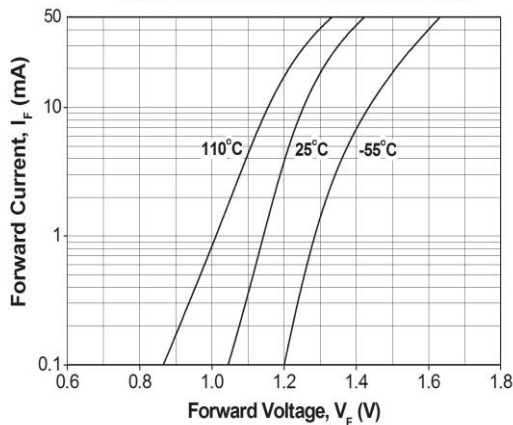


Figure 2. Normalized Current Transfer Ratio vs Forward Current

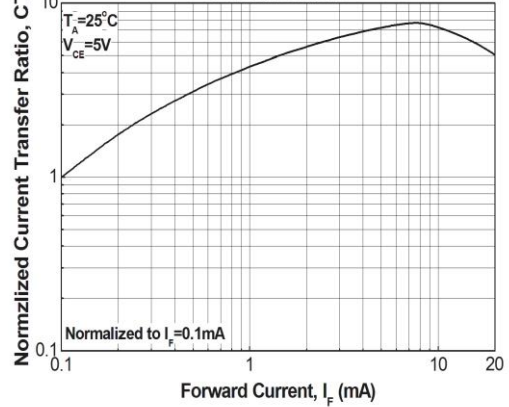


Figure 3. Current Transfer Ratio vs Ambient Temperature

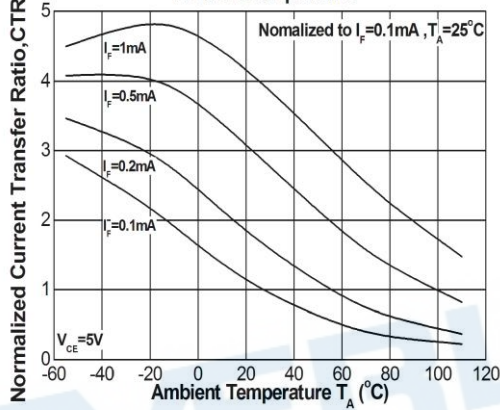


Figure 4. Dark Current vs Ambient Temperature

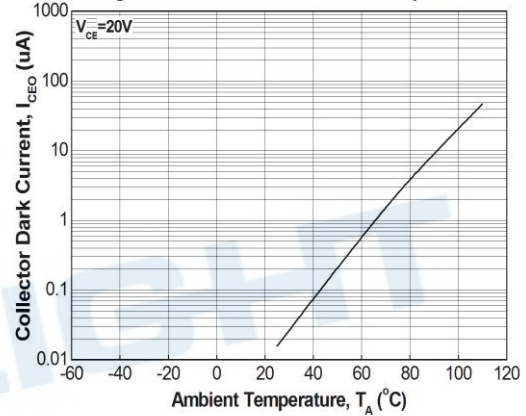


Figure 5. Collector-Emitter Saturation Voltage vs Collector Current

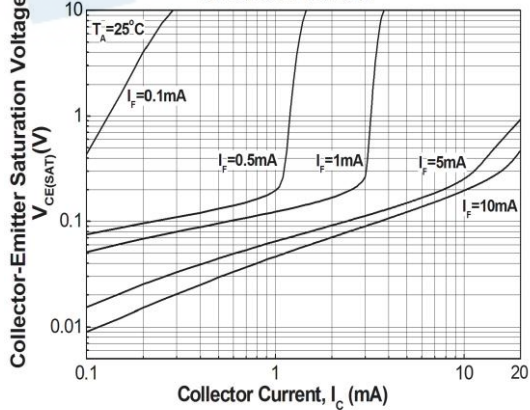
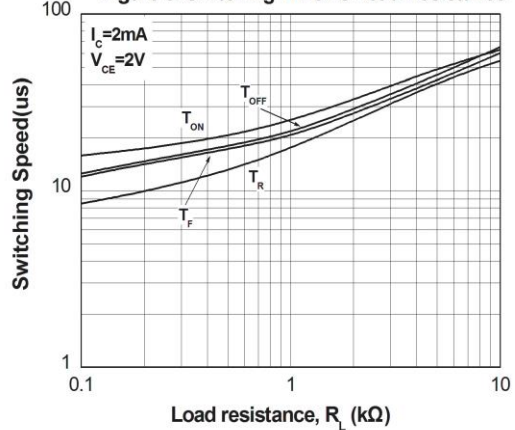


Figure 6. Switching Time vs Load Resistance



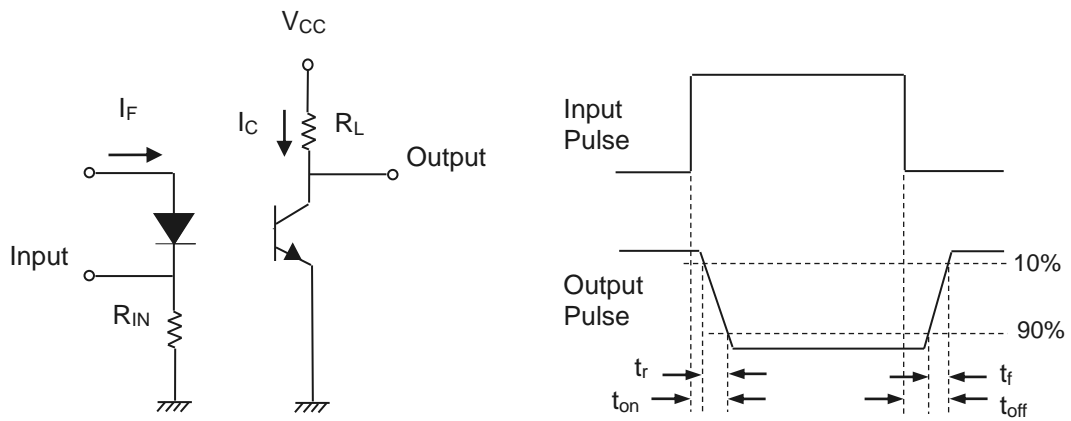


Figure 7. Switching Time Test Circuit & Waveforms

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## Order Information

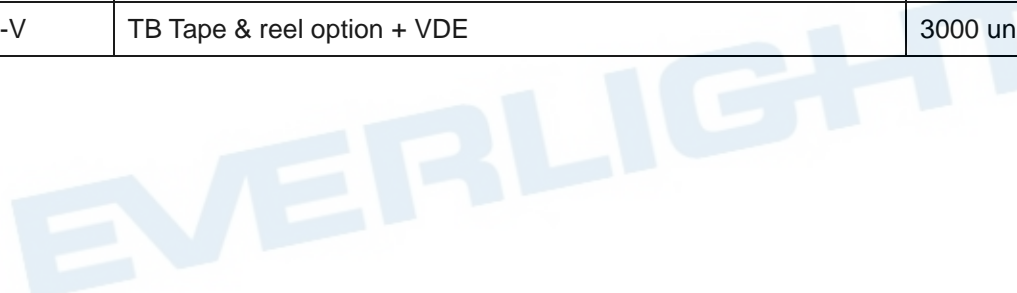
### Part Number

**EL357NL(X)-VG**

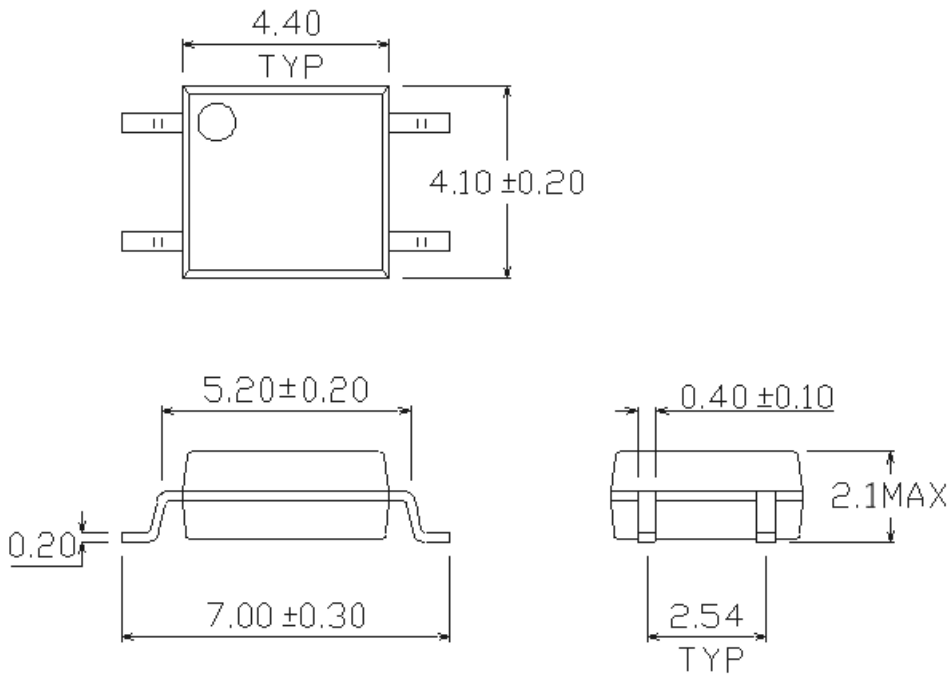
### Note

- L = Operating at low current
- X = Tape and reel option (TA, TB or none)
- V = VDE (option)
- G = Halogen free

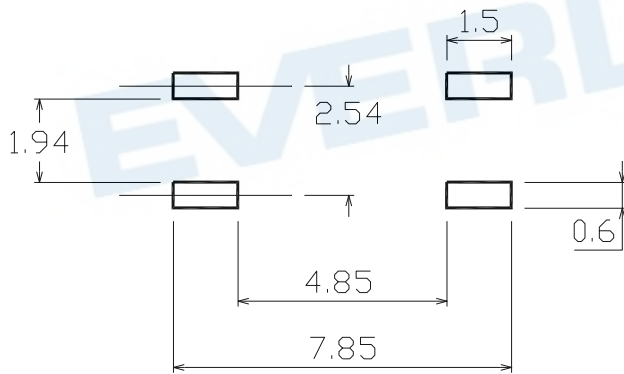
Option	Description	Packing quantity
None	Standard SMD option	100 units per tube
-V	Standard SMD option + VDE	100 units per tube
(TA)	TA Tape & reel option	3000 units per reel
(TB)	TB Tape & reel option	3000 units per reel
(TA)-V	TA Tape & reel option + VDE	3000 units per reel
(TB)-V	TB Tape & reel option + VDE	3000 units per reel



Package Dimension (Dimensions in mm)



Recommended pad layout for surface mount leadform



### Device Marking



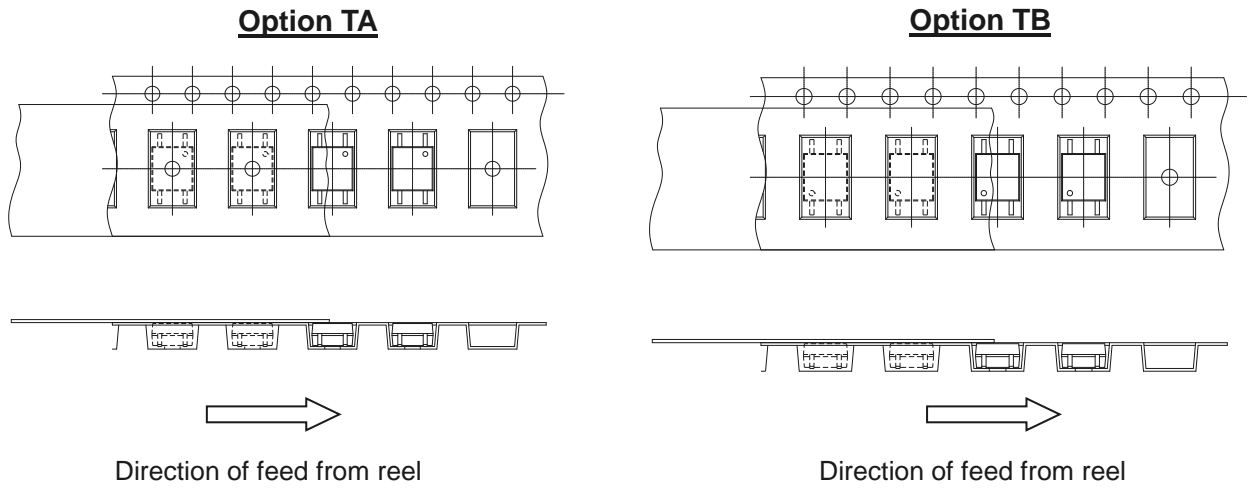
### Notes

EL	denotes Everlight
357N	denotes Device Number
L	denotes Operating at low current
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE approved (optional)

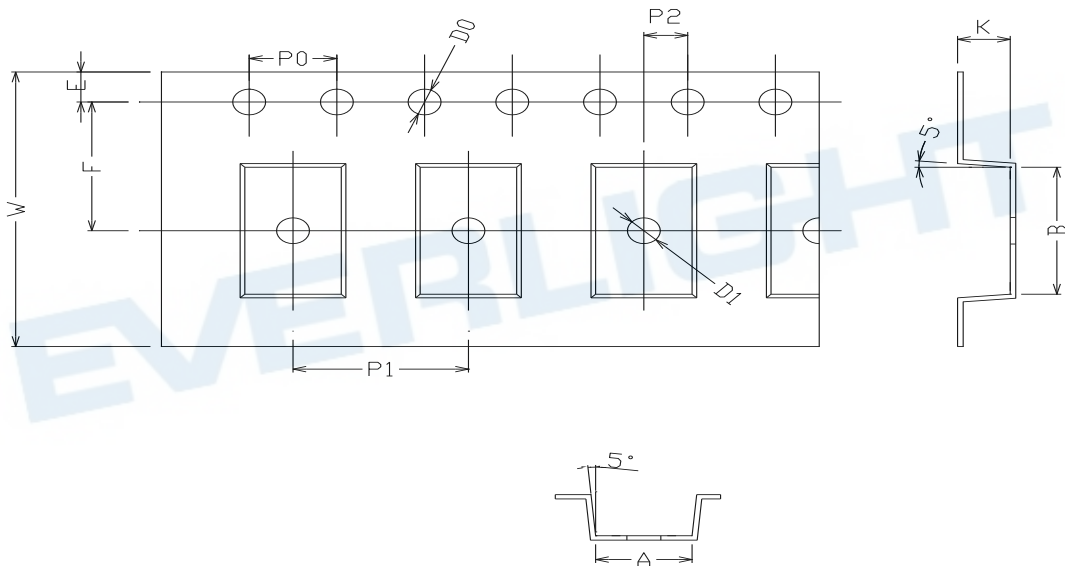
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**Tape & Reel Packing Specifications**



**Tape dimensions**

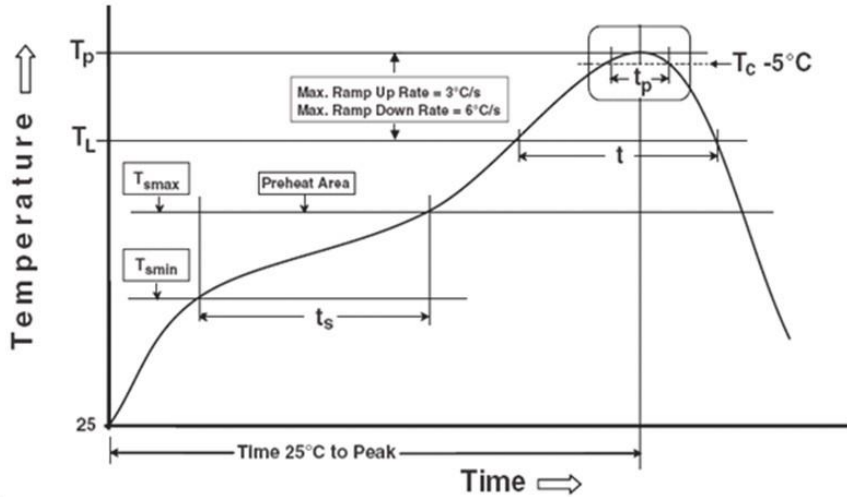


Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	1.5 + 0.1/-0	1.5 ± 0.1	1.75 ± 0.1	7.5 ± 0.05
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4 ± 0.1

## 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: $T_p - 5^\circ\text{C}$	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

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