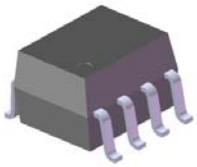
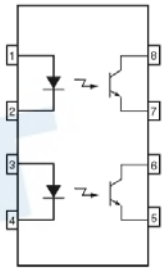
DATASHEET

# 8 PIN SOP PHOTOTRANSISTOR DUAL CHANNEL PHOTOCOUPLER
# ELD20X Series
# ELD21X Series



Schematic



Pin Configuration
1. Anode
2. Cathode
3. Anode
4. Cathode
5. Emitter
6. Collector
7. Emitter
8. Collector

**Features:**

- Dual channel coupler
- Current transfer ratios offered in narrow ranges
  - ELD205: 40-80%  ELD211: >20%
  - ELD206: 63-125%  ELD213: >100%
  - ELD207: 100-200%  ELD217: >100%
- High isolation voltage between input and output (Viso = 3750 Vrms)
- Operating temperature range of -55 to +110℃
- High BVceo of 80V
- Standard SO-8 footprint package
- Pb free and RoHS compliant.
- UL and cUL approved(No. E214129)
- VDE approval (No. 40028116)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

## Description

The ELD20X and ELD21X series contain two infrared emitting diodes optically coupled to two phototransistor detectors.
The devices are packaged in an 8-pin small outline package which conforms to the standard SO-8 footprint.

## Applications

- Feedback Control Circuits
- Interfacing and coupling systems of different potentials and impedances
- General Purpose Switching Circuits
- Monitor and Detection Circuits

## Absolute Maximum Ratings (Ta=25°C)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 60 | mA |
| | Peak forward current (t = 10μs) | $I_{FM}$ | 1 | A |
| | Reverse voltage | $V_R$ | 6 | V |
| | Power dissipation<br>No derating needed | $P_D$ | 90 | mW |
| Output | Collector power dissipation<br>No derating needed | $P_C$ | 150 | mW |
| | Collector-Emitter voltage | $V_{CEO}$ | 80 | V |
| | Collector-Base voltage | $V_{CBO}$ | 80 | V |
| | Emitter-Collector voltage | $V_{ECO}$ | 7 | V |
| | Collector Current | Ic | 50 | mA |
| Total Power Dissipation | | $P_{TOT}$ | 250 | mW |
| Isolation Voltage*1 | | $V_{ISO}$ | 3750 | V rms |
| Operating Temperature | | $T_{OPR}$ | -55 to 110 | °C |
| Storage Temperature | | $T_{STG}$ | -55 to 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, 3 & 4 are shorted together, and pins 5, 6, 7 & 8 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 | 1.5 | V | $I_F$ = 10mA |
| Reverse current | $I_R$ | - | 0.1 | 100 | μA | $V_R$ = 6V |
| Input capacitance | $C_{in}$ | - | 25 | - | pF | V = 0, f = 1MHz |

### Output

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Collector-Emitter dark current | $I_{CEO}$ | - | 5.0 | 50 | nA | $V_{CE}$ = 10V, $I_F$ = 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 |
| Collector-Emitter capacitance | $C_{CE}$ | - | 10 | - | pF | $V_{CE}$ = 0V, f = 1MHz |

### Transfer Characteristics

| Parameter | | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Current Transfer Ratio | ELD205 | CTR | 40 | - | 80 | % | $I_F$ = 10mA ,$V_{CE}$ = 5V |
| | ELD206 | | 63 | - | 125 | | |
| | ELD207 | | 100 | - | 200 | | |
| | ELD211 | | 20 | - | - | | |
| | ELD213 | | 100 | - | - | | |
| Current Transfer Ratio | ELD205 | CTR | 13 | 30 | - | % | $I_F$ = 1mA ,$V_{CE}$ = 5V |
| | ELD206 | | 22 | 45 | - | | |
| | ELD207 | | 34 | 70 | - | | |
| | ELD217 | | 100 | 120 | - | | |

* Typical values at $T_a$ = 25°C

**Transfer Characteristics**

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | - | - | 0.4 | V | $I_F$ = 10mA , $I_C$ = 2.5mA |
| Isolation resistance | $R_{IO}$ | - | $10^{11}$ | - | Ω | $V_{IO}$ = 500Vdc |
| Input-output capacitance | $C_{IO}$ | - | 0.5 | - | pF | $V_{IO}$ = 0, f = 1MHz |
| Turn-on time | $T_{on}$ | - | 5.0 | - | μs | $V_{CC}$ = 10V, $I_C$ = 2mA, $R_L$ = 100Ω |
| Turn-off time | $T_{off}$ | - | 4.0 | - | | |
| Rise time | $T_r$ | - | 1.6 | - | | |
| Fall time | $T_f$ | - | 2.2 | - | | |

* Typical values at $T_a$ = 25°C

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

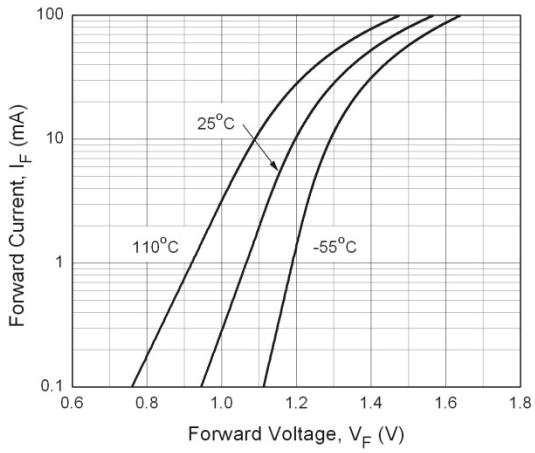



Figure 2. Normalized Collector Current vs. Forward Current

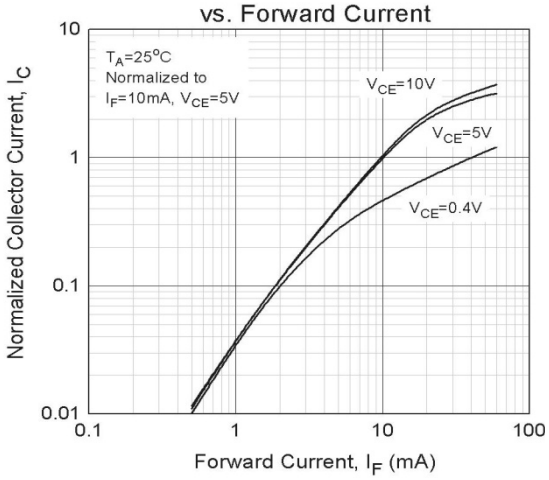



Figure 3. Normalized Collector Current vs Ambient Temperature

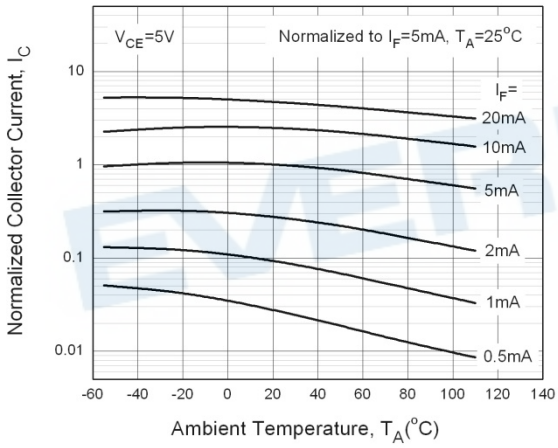



Figure 4. Collector Dark Current vs Ambient Temperature

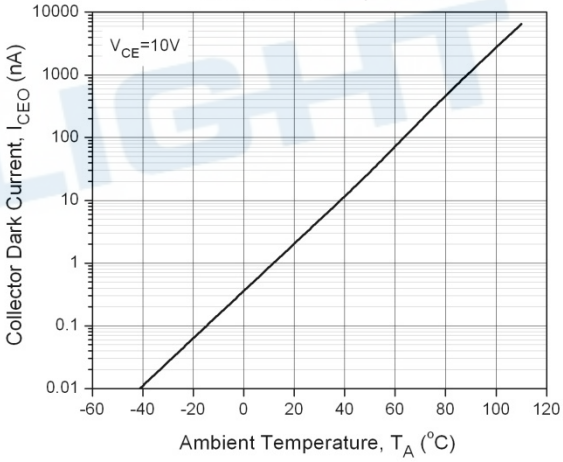



Figure 5. Collector Current vs Collector-Emitter Voltage

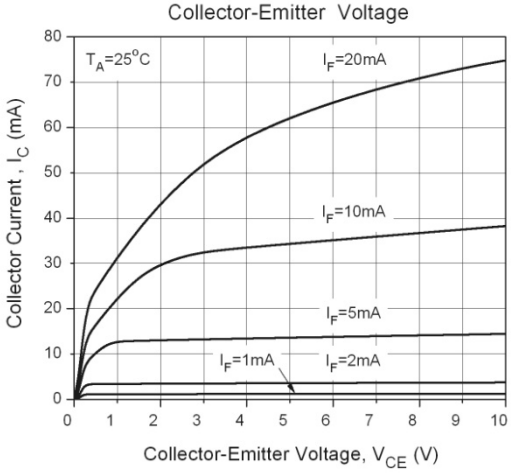



Figure 6. Collector Current vs Collector-Emitter Voltage

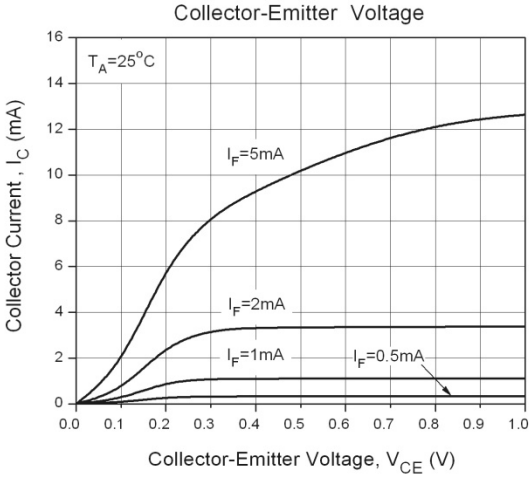
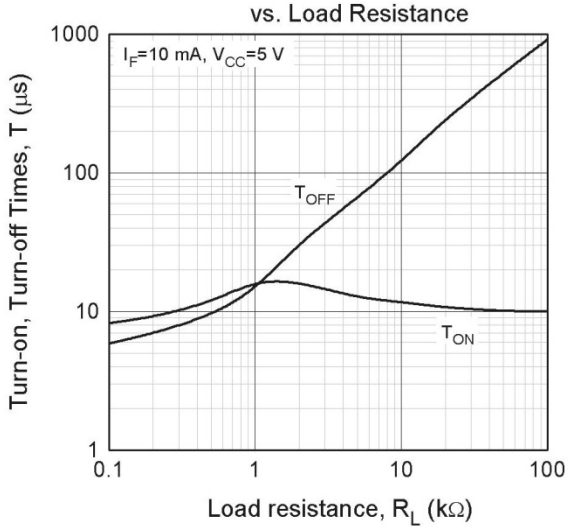


Figure 7. Turn-on, Turn-off Times vs. Load Resistance



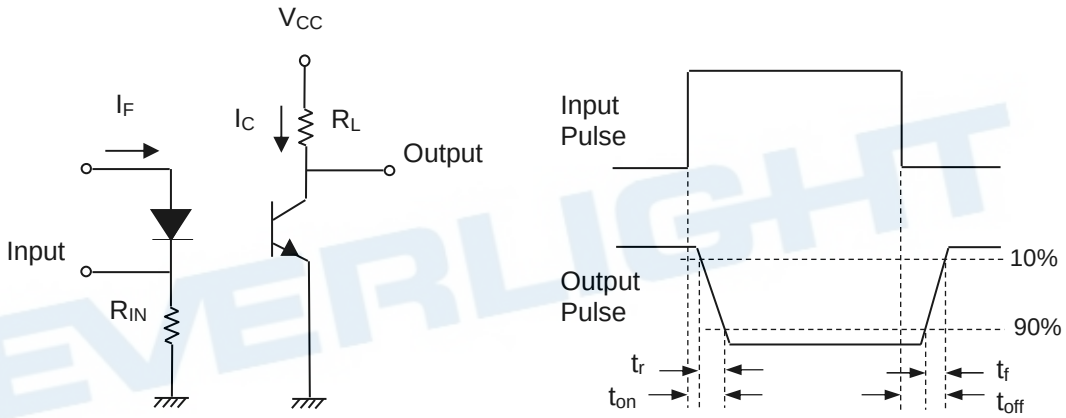




**Figure 8. Switching Time Test Circuit & Waveforms**

## Order Information

### Part Number

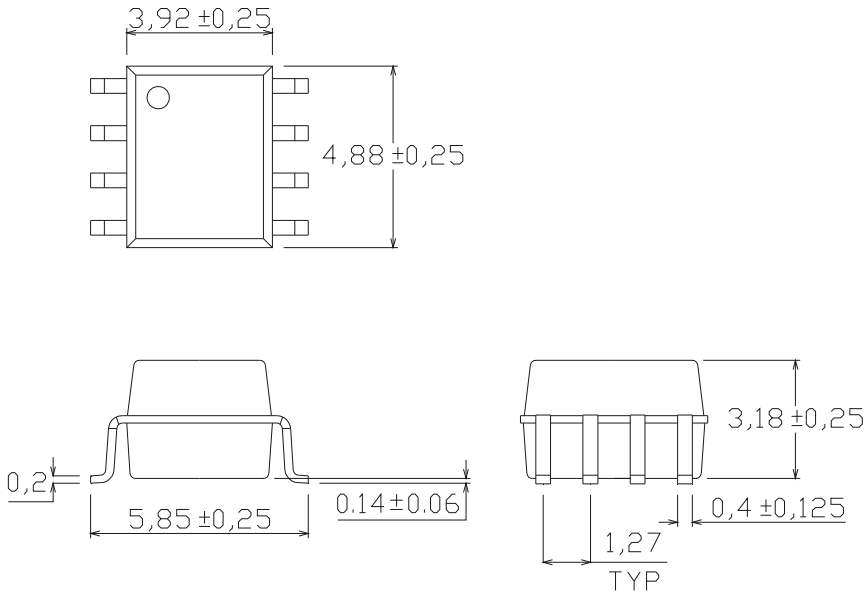
# ELD2XX(Y)-V

Note

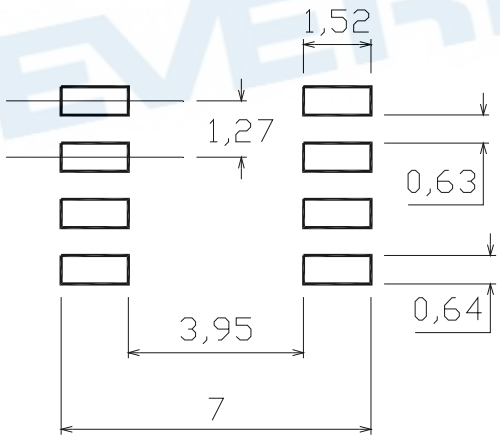
XX = Part no. (05, 06, 07, 11, 13, or 17)
Y = Tape and reel option (TA, TB or none).
V = VDE safety (Optional)

| Option | Description | Packing quantity |
|---|---|---|
| None | Standard | 100 units per tube |
| -V | Standard + VDE | 100 units per tube |
| (TA) | TA tape & reel option | 2000 units per reel |
| (TB) | TB tape & reel option | 2000 units per reel |
| (TA)-V | TA tape & reel option + VDE | 2000 units per reel |
| (TB)-V | TB tape & reel option + VDE | 2000 units per reel |

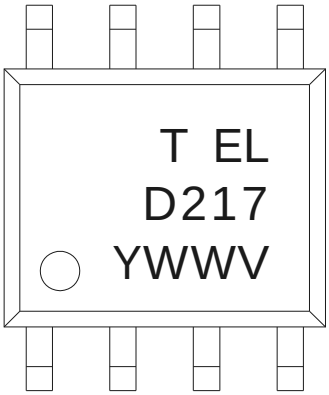
## Package Dimension (Dimensions in mm)




## Recommended pad layout for surface mount leadform



## Device Marking

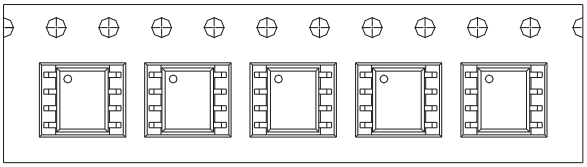



**Notes**

| | |
|---|---|
| T | denotes Factory<br>No code made in Chian<br>T:made in Taiwan |
| EL | denotes Everlight |
| D217 | denotes Part Number |
| Y | denotes 1 digit Year code |
| WW | denotes 2 digit Week code |

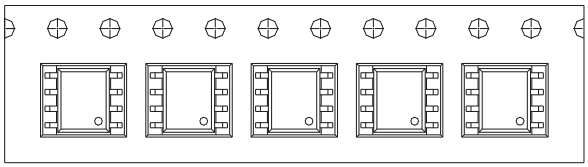
## Tape & Reel Packing Specifications

**Option TA**



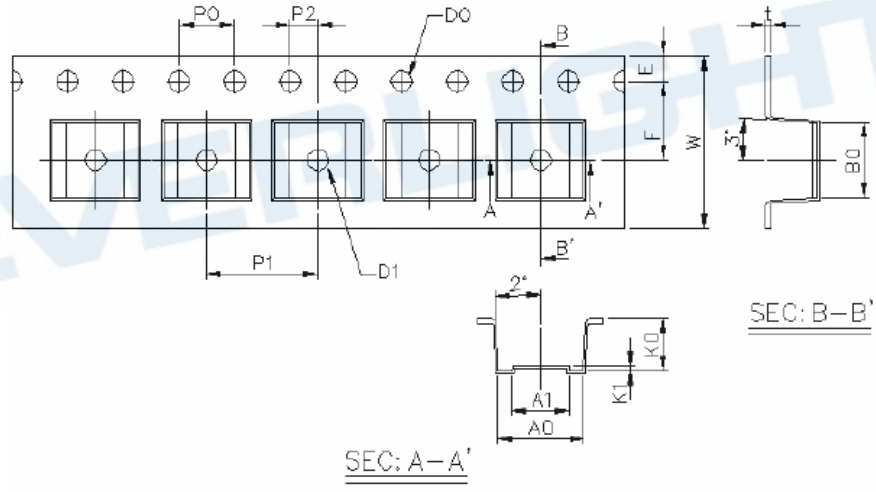
Direction of feed from reel

**Option TB**



Direction of feed from reel

## Tape dimensions

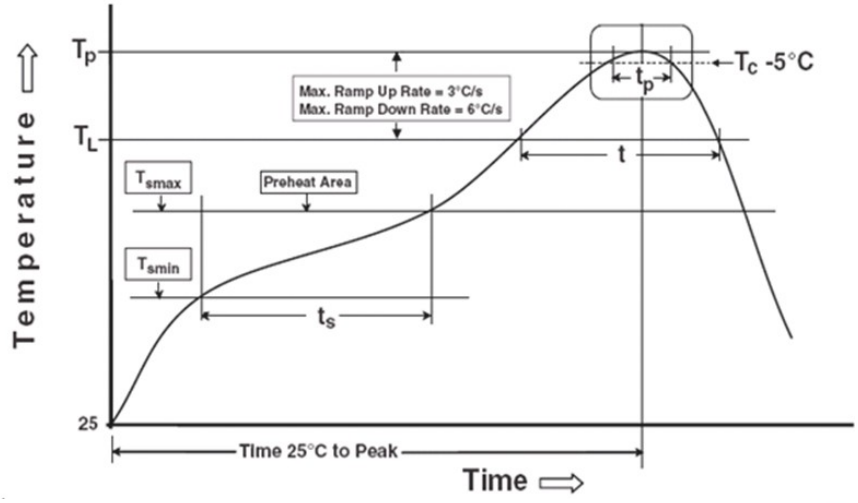



| Dimension No. | **A0** | **A1** | **B0** | **D0** | **D1** | **E** | **F** |
|---|---|---|---|---|---|---|---|
| Dimension (mm) | 6.2±0.1 | 4.1±0.1 | 5.28±0.1 | 1.5±0.1 | 1.5±0.3 | 1.75±0.1 | 5.5±0.1 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **K0** | **K1** |
| Dimension (mm) | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 | 0.4±0.1 | 12.0+0.3/ -0.1 | 3.7±0.1 | 0.3±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. When using this product, please observe the absolute maximum ratings and the instructions for using 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.
3. These specification sheets include materials protected under copyright of EVERLIGHT corporation. Please don't reproduce or cause anyone to reproduce them without EVERLIGHT's consent.
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.