

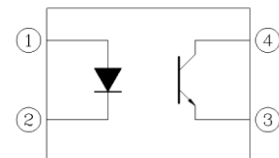
# 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER EL816(SG)(BY)-G Series

## Preliminary



This is a preliminary specification  
Intended for design purposes and  
Subject to change without prior  
notice.

### Schematic



### Features:

- Compliance Halogens Free  
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- High isolation voltage between input and output (Viso=5000 V rms)
- Creepage distance >7.62 mm
- Operating temperature up to +110°C
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH
- UL and cUL approved(No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved
- State Grid approved
- MSL1

### Pin Configuration

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

### Description

The EL816(SG)(BY)-G series of devices each consist of an infrared emitting diodes, optically coupled to a phototransistor detector.

### 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 <sub>F</sub>	60	mA
	Reverse voltage	V <sub>R</sub>	6	V
	Power Dissipation	P <sub>D</sub>	100	mW
	Power dissipation	P <sub>C</sub>	150	mW
Output	Collector current	I <sub>C</sub>	50	mA
	Collector-Emitter voltage	V <sub>CEO</sub>	80	V
	Emitter-Collector voltage	V <sub>ECO</sub>	7	V
	Total Power Dissipation	P <sub>TOT</sub>	200	mW
	Isolation Voltage* <sup>1</sup>	V <sub>ISO</sub>	5000	V <sub>rms</sub>
	Operating Temperature	T <sub>OPR</sub>	-55 to 110	°C
	Storage Temperature	T <sub>STG</sub>	-55 to 110	°C
	Soldering Temperature* <sup>2</sup>	T <sub>SOL</sub>	260	°C
	Operating humidity	H <sub>OPR</sub>	<75	%R.H.

### 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	$V_F$	1.01	-	1.29	V	$I_F = 10\text{mA}$
Reverse Current	$I_R$	-	-	9.9	$\mu\text{A}$	$V_R = 5\text{V}$

### Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	$I_{CEO}$	-	-	20	nA	$V_{CE} = 5\text{V}, I_F = 0\text{mA}$
		-	-	100	nA	$V_{CE} = 24\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	80.1	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	7.01	-	-	V	$I_E = 0.1\text{mA}$

### Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	D	300	-	600	%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$
		200	-	500		$I_F = 2\text{mA}, V_{CE} = 5\text{V}$
	D1	300	-	470		$I_F = 5\text{mA}, V_{CE} = 5\text{V}$
		140	-	-		$I_F = 1\text{mA}, V_{CE} = 5\text{V}$
Collector-Emitter saturation voltage	$V_{CE(sat)}$	-	-	0.39	V	$I_F = 1\text{mA}, I_C = 1\text{mA}$
Isolation resistance	$R_{IO}$	$1.01 \times 10^{12}$	-	-	$\Omega$	$V_{IO} = 500\text{Vdc}$ , 40~60% R.H.
Rise time	$t_r$	-	-	12	$\mu\text{s}$	$V_{CC} = 10\text{V}, I_C = 2\text{mA}$ , $R_L = 100\Omega$
Fall time	$t_f$	-	-	12	$\mu\text{s}$	
Turn on time	$t_{on}$	-	-	12	$\mu\text{s}$	
Turn off time	$t_{off}$	-	-	12	$\mu\text{s}$	

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

# Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

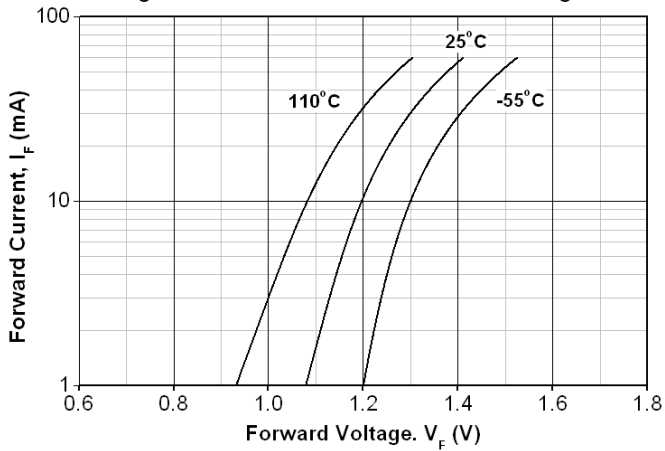


Figure 2. Normalized Current Transfer Ratio vs Forward Current

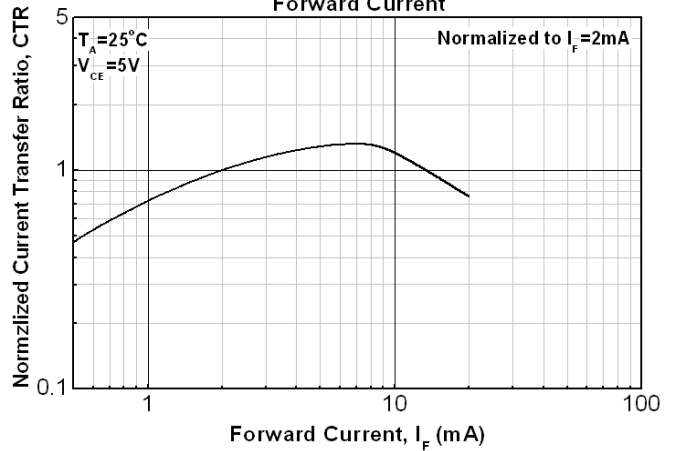


Figure 3. Current Transfer Ratio vs Ambient Temperature

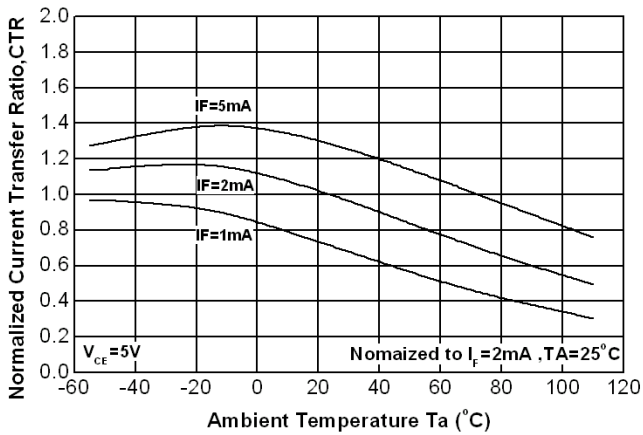


Figure 4. Dark Current vs Ambient Temperature

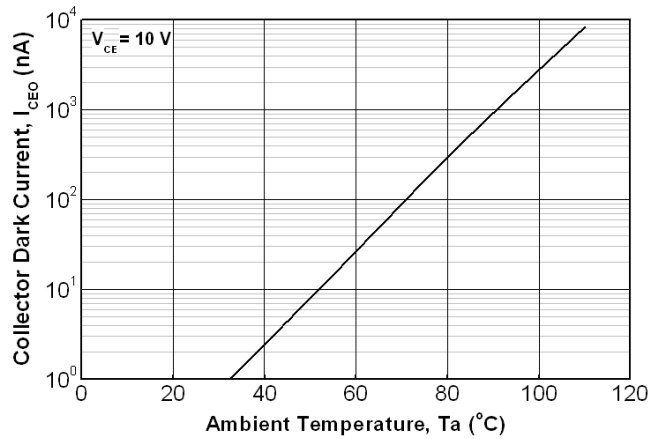


Figure 5. Collector-Emitter Saturation Voltage vs Collector Current

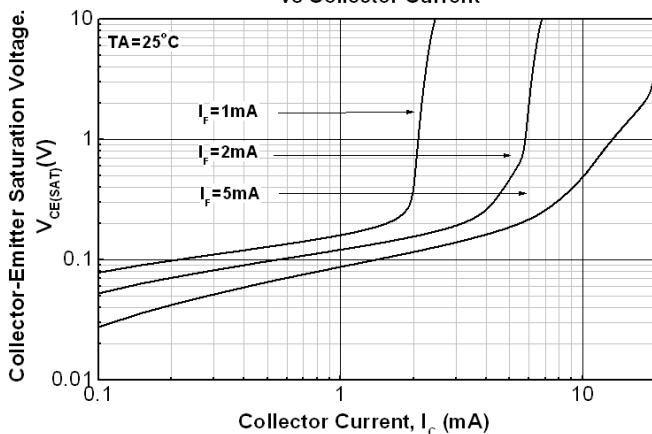
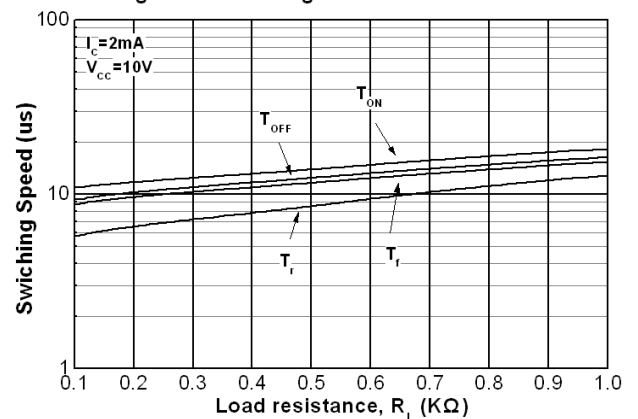
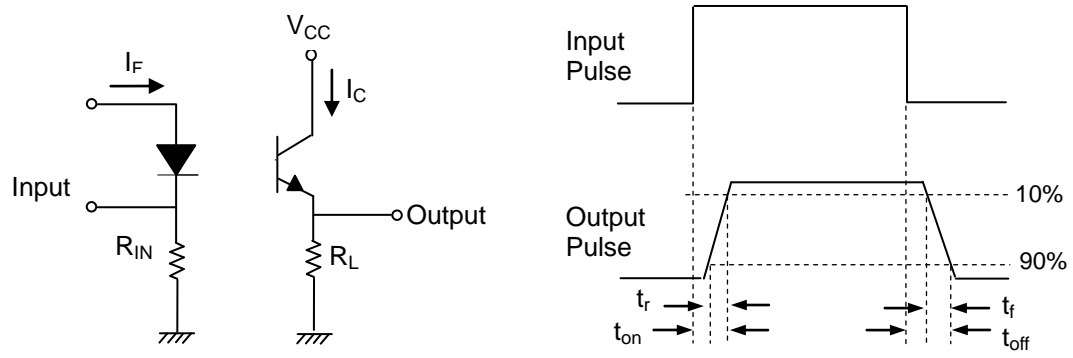


Figure 6. Switching Time vs Load Resistance





**Switching Time Test Circuit & Waveforms**

## Order Information

### Part Number

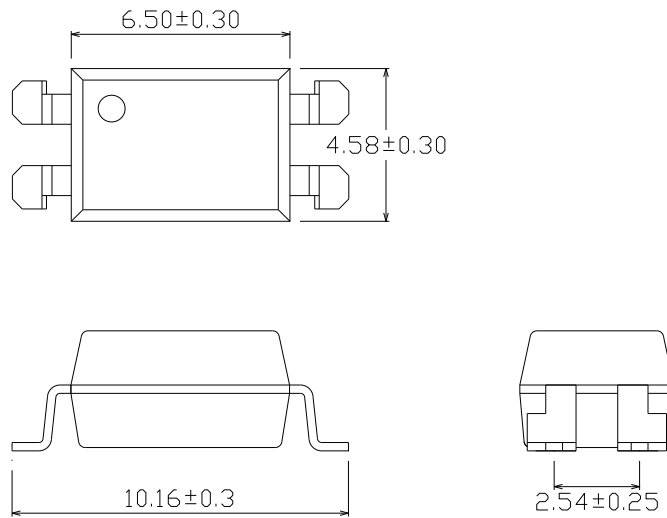
# EL816S1(Y)(Z)(SG)(BY)-VG

### Note

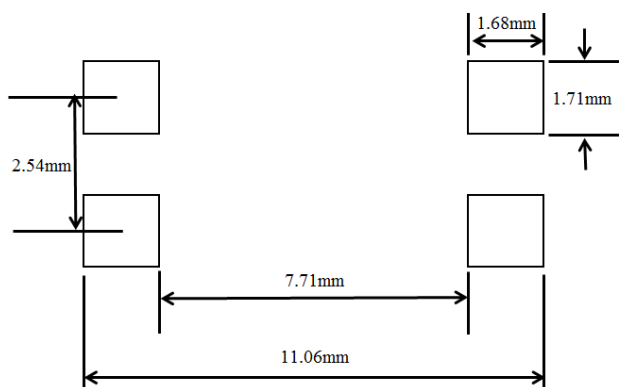
- S1 = Lead form option
- Y = CTR Rank
- Z = Tape and reel option (TU, TD).
- V = VDE safety (optional).
- G = Halogens free

Option	Description	Packing quantity
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

### 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

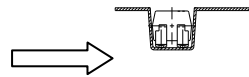
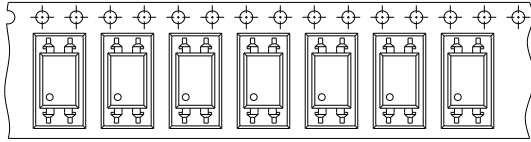


### Notes

EL denotes EVERLIGHT  
816 denotes Device Number  
F denotes Factory Code (G: China and Green part)  
R denotes CTR Rank  
Y denotes 1 digit Year code  
WW denotes 2 digit Week code  
V denotes VDE(optional)

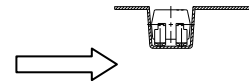
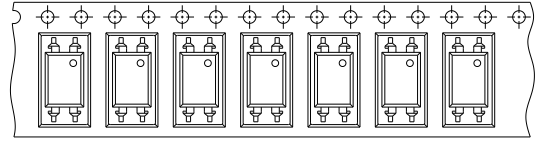
## Tape & Reel Packing Specifications

### Option TD



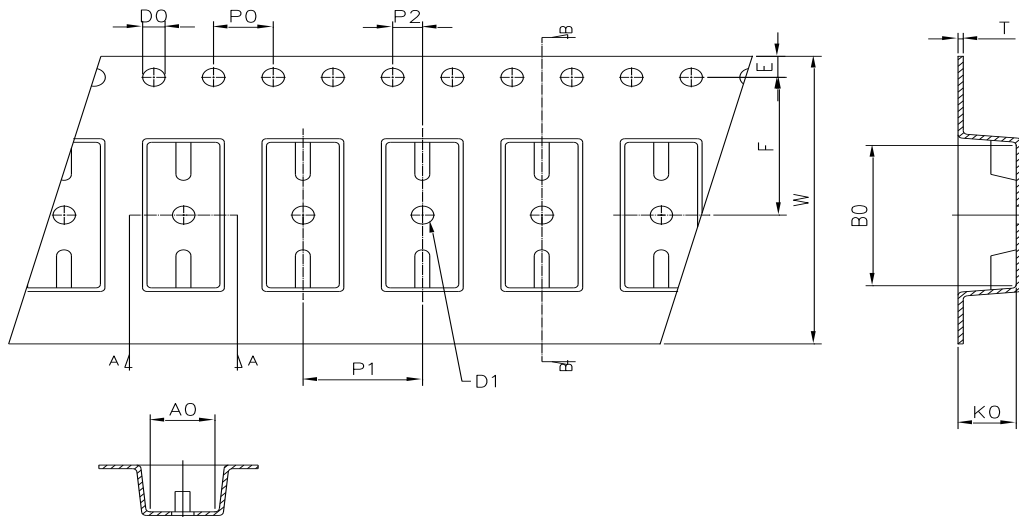
Direction of feed from reel

### Option TU



Direction of feed from reel

### Tape dimensions



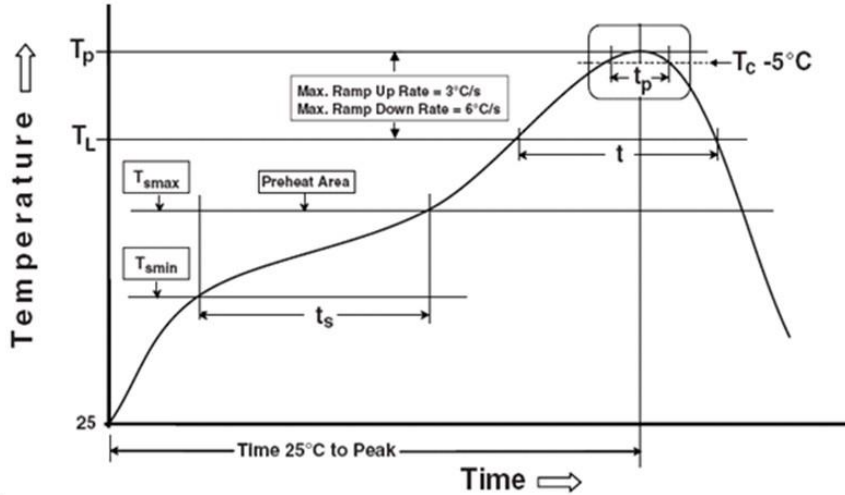
Dimension No.	<b>Ao</b>	<b>Bo</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm) S1	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>Ko</b>
Dimension (mm) S1	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	16.00±0.3	4.60±0.1



## 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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