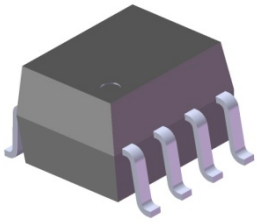
DATASHEET

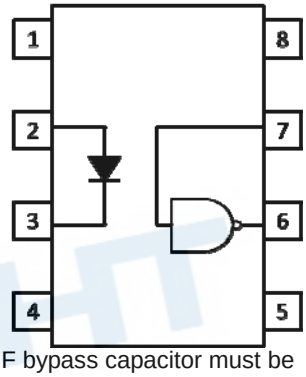
8 PIN SOP HIGH SPEED 10MBit/s LOGIC GATE PHOTOCOUPLER
EL06XX Series



Features

- Compliance Halogen Free
  (Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- High speed 10Mbit/s
- 10kV/μs minimum common mode transient immunity at VCM= 1KV (EL0611)
- Wide operating temperature range of -40°C to 100°C
- Logic gate output
- High isolation voltage between input and output (Viso=3750 Vrms)
- Compliance with EU REACH
- Pb free and RoHS compliant.
- UL and cUL approved
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

Schematic



A 0.1μF bypass capacitor must be connected between pins 8 and 5

Pin Configuration

1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. V_{out}
7. V_E
8. V_{CC}

Description

The EL0600, EL0601 and EL0611 devices each consists of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a strobable output.
The devices are packaged in an 8-pin small outline package which conforms to the standard SO8 footprint.

Applications

- Ground loop elimination
- LSTTL to TTL, LSTTL or 5 volt CMOS
- Line receiver, data transmission
- Data multiplexing
- Switching power supplies
- Pulse transformer replacement
- Computer peripheral interface
- High speed logic ground isolation

Truth Table (Positive Logic)

Input	Enable	Output
H	H	L
L	H	H
H	L	H
L	L	H
H	NC	L
L	NC	H

Absolute Maximum Ratings (T_A=25°C)*1

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	20	mA
	Enable input voltage Not exceed V_{CC} by more than 500mV	V_E	5.5	V
	Reverse voltage	V_R	5	V
	Power Dissipation	P_D	40	mW
Output	Power dissipation	P_C	85	mW
	Enable input current	I_E	5	mA
	Output current	I_O	50	mA
	Output voltage	V_O	7.0	V
Output Power Dissipation		P_O	100	mW
Isolation voltage*2		V_{ISO}	3750	V rms
Operating temperature		T_{OPR}	-40 ~ +100	°C
Storage temperature		T_{STG}	-55 ~ +125	°C
Soldering temperature*3		T_{SOL}	260	°C

Notes:
*1 Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability. The absolute maximum ratings are stress only T_A=25°C unless otherwise specified. Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum rating.
*2 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.
*3 For 10 seconds

Recommended Operating Conditions*4

Characteristics	Symbol	Min	Max	Unit
Input Current, High Level*5	I_{FH}	7	15	mA
Supply Voltage	V_{CC}	4.5	5.5	V
Operating Temperature	T_{opr}	-20	80	°C

Notes:
*4 The recommended operating conditions are given as a design guide necessary to obtain the intended performance of the device. Each parameter is an independent value. When creating a system design using this device, the electrical characteristics specified in this datasheet should also be considered. The V_{CC} supply must be bypassed by a 0.1μF capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins.
*5 The initial switching threshold is 5 mA or less. It is recommended that 7 mA to 10 mA be used for best performance and to permit at least a 20% LED degradation guardband.

Electrical Characteristics (T_A=25°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V_F	-	1.4	1.8	V	I_F = 10mA
Reverse voltage	V_R	5.0	-	-	V	I_R = 10μA
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	-	-1.8	-	mV/°C	I_F =10mA
Input capacitance	C_{IN}	-	60	-	pF	V_F=0, f=1MHz

Note: Reverse Voltage(V_R) Condition is applied to I_R test only The device is not designed for reverse operation

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High level supply current	I_{CCH}	-	-	10	mA	I_F=0mA, V_E=0.5V, V_{CC}=5.5V
Low level supply current	I_{CCL}	-	-	13	mA	I_F=10mA, V_E=0.5V, V_{CC}=5.5V
High level enable current	I_{EH}	-	-	-1.6	mA	V_E=2.0V, V_{CC}=5.5V
Low level enable current	I_{EL}	-	-	-1.6	mA	V_E=0.5V, V_{CC}=5.5V
High level enable voltage	V_{EH}	2.0	-	-	V	I_F=10mA, V_{CC}=5.5V
Low level enable voltage*6	V_{EL}	-	-	0.8	V	I_F=10mA, V_{CC}=5.5V

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
HIGH Level Output Current	I_{OH}	-	-	100	uA	V_{CC}=5.5V, V_O=5.5V, I_F=250μA, V_E=2.0V
LOW Level Output Current	V_{OL}	-	-	0.6	V	V_{CC} = 5.5V, I_F=5mA, V_E=2.0V,I_{CL}=13mA
Input Threshold Current	I_{FT}	-	-	5	mA	V_{CC}= 5.5V, V_O=0.6V, V_E =2.0V,I_{OL}=13mA

Switching Characteristics (T_A=25°C, V_{CC}=5V, I_F=7.5mA unless specified otherwise)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation delay time to output High level*7 (Fig.13)	T_{PHL}	-	35	75	ns	C_L = 15pF, R_L=350Ω, TA=25°C
Propagation delay time to output Low level*8 (Fig.13)	T_{PLH}	-	45	75	ns	C_L = 15pF, R_L=350Ω, TA=25°C
Pulse width distortion	|Tphl – Tplh|	-	10	35	ns	C_L = 15pF, R_L=350Ω
Output rise time*9 (Fig.13)	tr	-	30	40	ns	C_L = 15pF, R_L=350Ω
Output fall time*10 (Fig.13)	tf	-	10	20	ns	C_L = 15pF, R_L=350Ω

Switching Characteristics (T_A=25°C, V_{CC}=5V, I_F=7.5mA unless specified otherwise)

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Enable Propagation Delay Time to Output High Level*11(Fig.14)		t_{ELH}	-	30	40	ns	I_F = 7.5mA , V_{EH}=3V, C_L = 15pF, R_L=350Ω
Enable Propagation Delay Time to Output Low Level*12(Fig.14)		t_{EHL}	-	20	30	ns	I_F = 7.5mA , V_{EH}=3V, C_L = 15pF, R_L=350Ω
Common Mode Transient Immunity at Logic High *13	EL0600	CM_H	-	-	-	V/μS	I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C V_{CM}=10Vp-p (Fig.15)
	EL0601		5,000	-	-		I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C V_{CM}=50Vp-p (Fig.15)
	EL0611		10,000	-	-		I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C V_{CM}=400Vp-p (Fig.15)
	EL0611		15,000	-	-		I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C V_{CM}=400Vp-p (Fig.16)
Common Mode Transient Immunity at Logic Low *14	EL0600	CM_L	-	-	-	V/μS	I_F = 0mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C V_{CM}=10Vp-p (Fig.15)
	EL0601		5,000				I_F = 0mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C V_{CM}=50Vp-p (Fig.15)
	EL0611		10,000	-	-		I_F = 0mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C V_{CM}=400Vp-p (Fig.15)
	EL0611		15,000	-	-		I_F = 7.5mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C V_{CM}=400Vp-p (Fig.16)

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

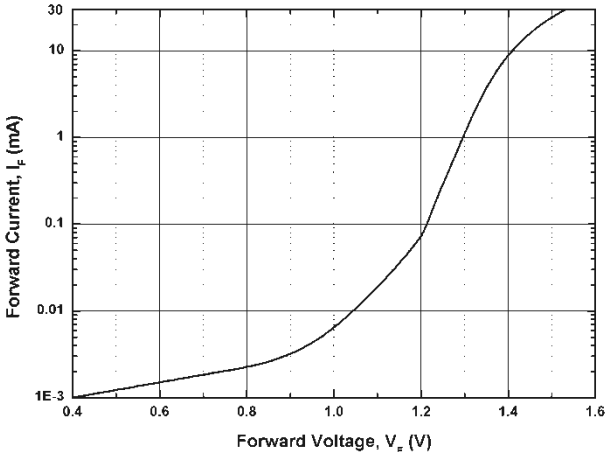


Figure 2. Low Level Output Voltage vs Ambient Temperature

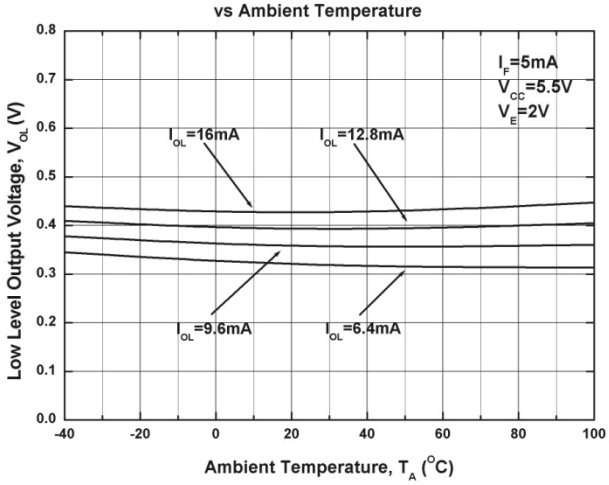


Figure 3. Low Level Output Current vs Ambient Temperature

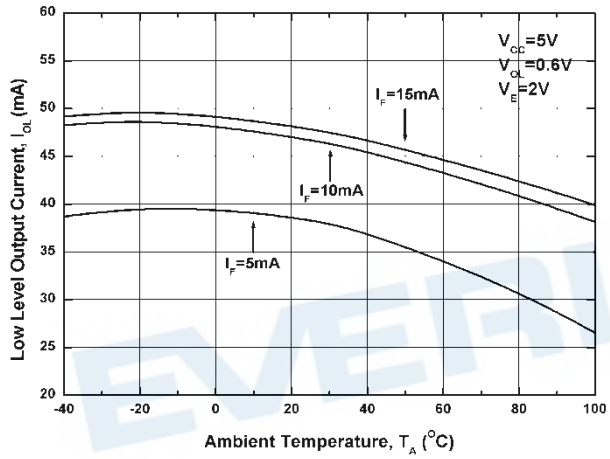


Figure 4. Input Threshold Current vs Ambient Temperature

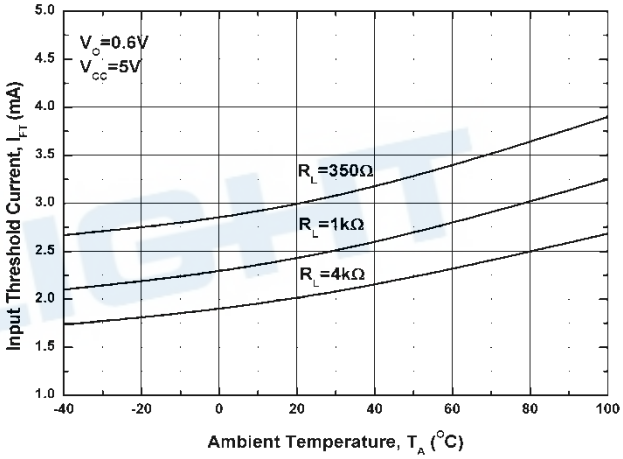


Figure 5. Input Current vs Output Voltage

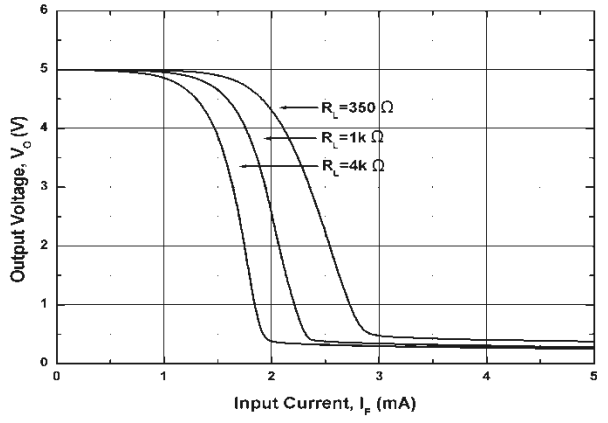


Figure 6. High Level Output Current vs Ambient Temperature

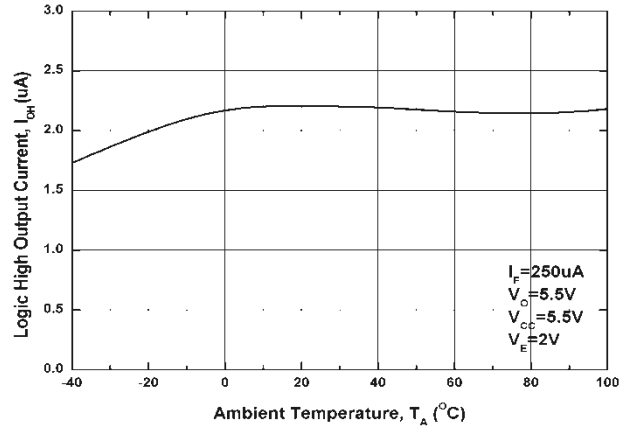


Figure 7. Propagation Delay vs. Forward Current

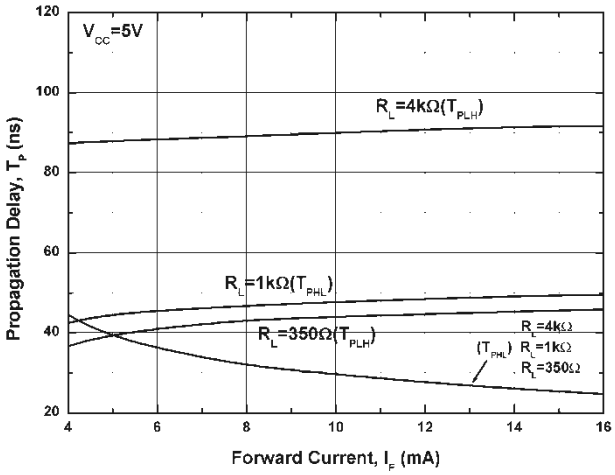


Figure 8. Propagation Delay vs. Temperature

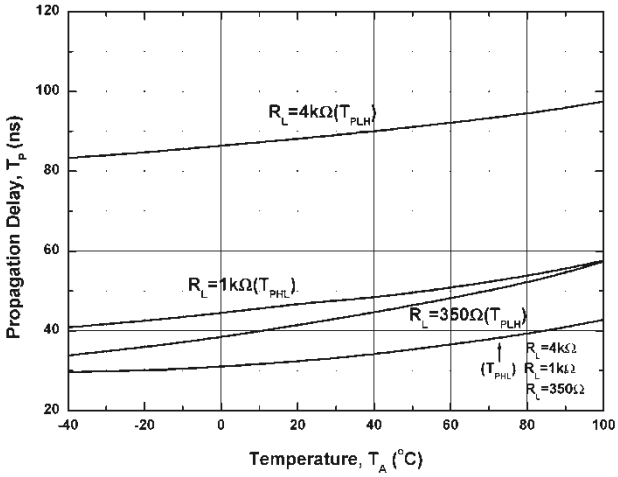


Figure 9. Pulse Width Distortion vs. Temperature

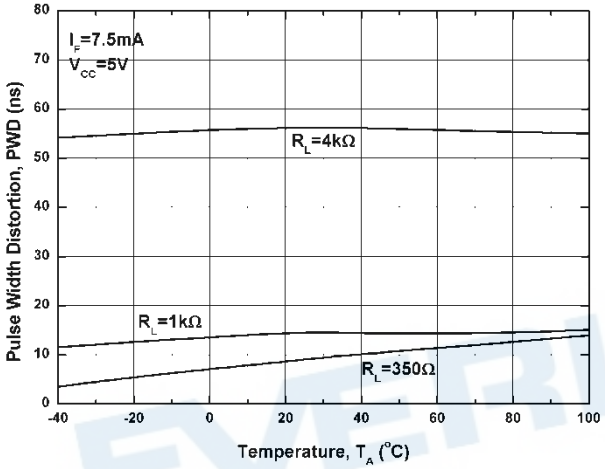


Figure 10. Rise and Fall Time vs. Temperature

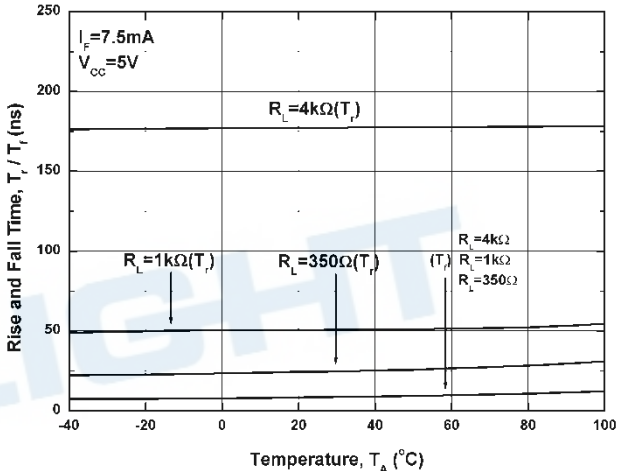


Figure 11. Enable Propagation Delay vs. Temperature

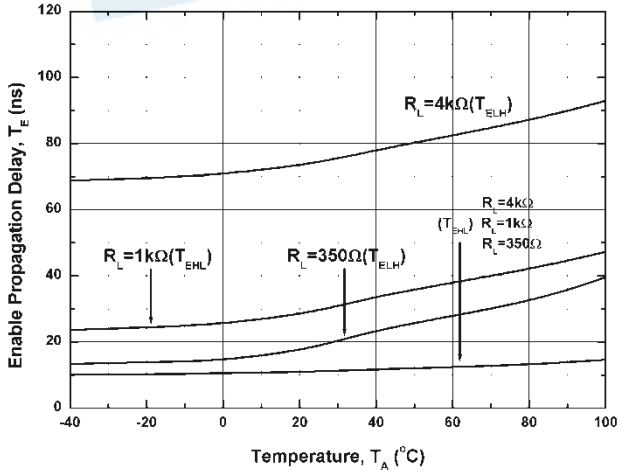
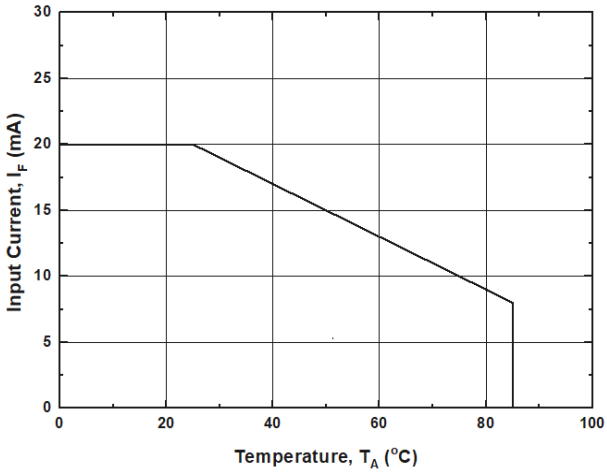


Figure 12. Input Current vs Temperature



Note：The graphs shown in this datasheet are representing typical data only and do not show guaranteed values

Fig. 13 Test circuit and waveforms for tPHL, tPLH, tr, and tf

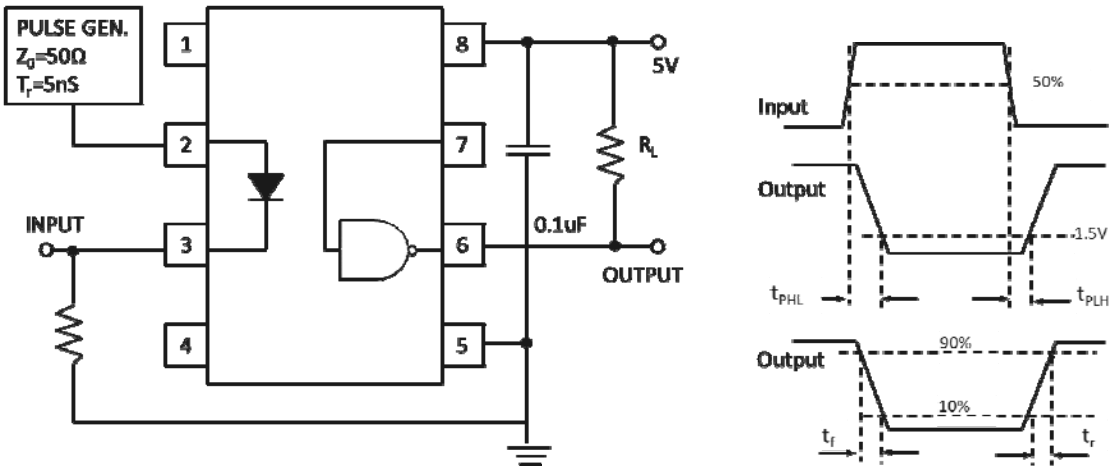


Fig. 14 Test circuit and waveform for t_{EHL} and t_{ELH}

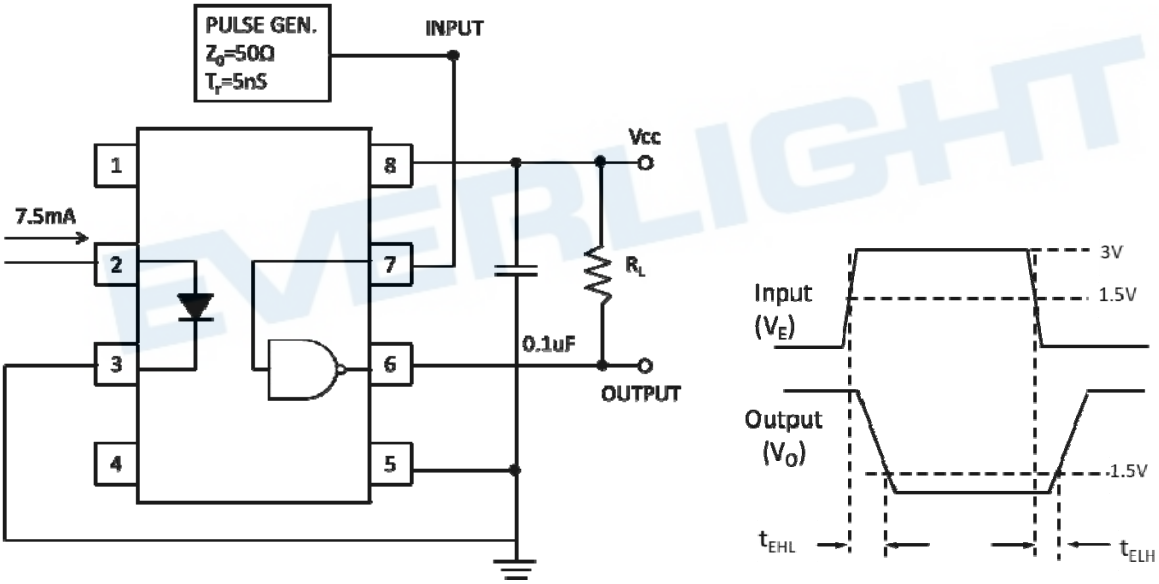


Fig. 15 Test circuit Common mode Transient Immunity

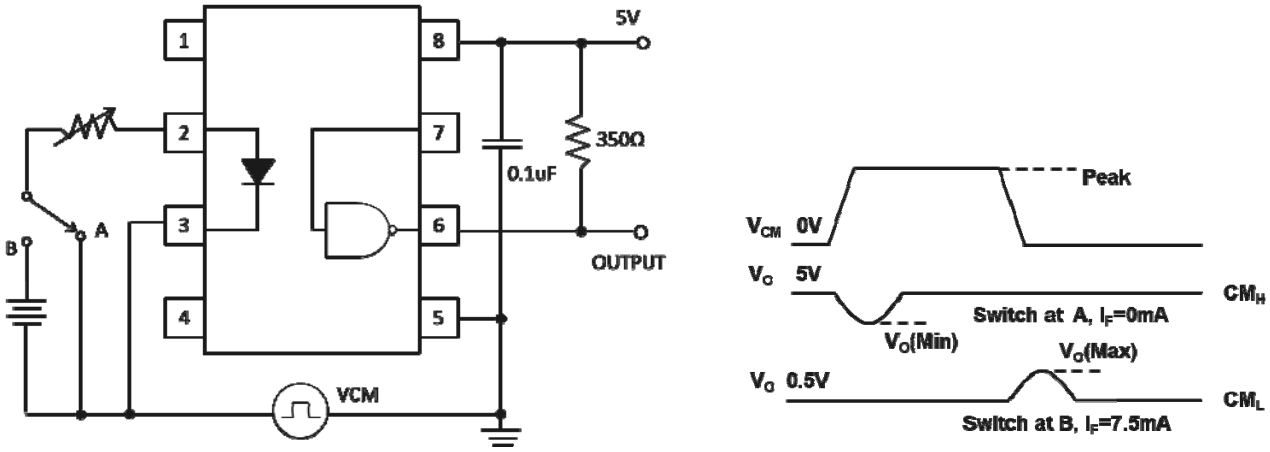
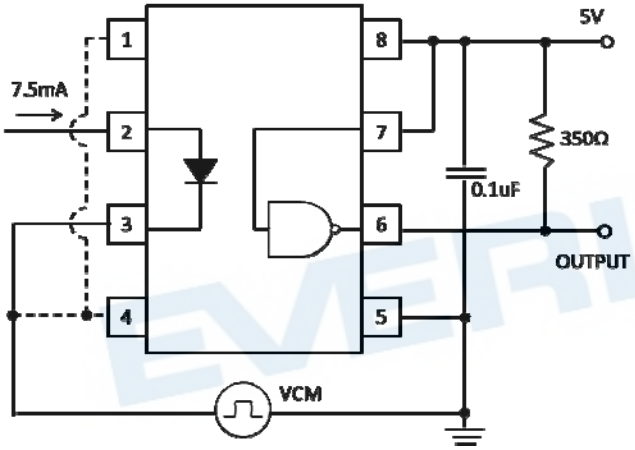


Fig. 16 Recommended drive circuit for EL0611 families for high-CMR



Notes:

*6 Enable Input – No pull up resistor required as the device has an internal pull up resistor.

*7 T_{PLH}– Propagation delay is measured from the 3.75mA level on the HIGH to LOW transition of the input current pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse.

*8 T_{PHL}– Propagation delay is measured from the 3.75mA level on the LOW to HIGH transition of the input current pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.

*9 tr– Rise time is measured from the 10% to the 90% levels on the LOW to HIGH transition of the output pulse.

*10 tf– Fall time is measured from the 90% to the 10% levels on the HIGH to LOW transition of the output pulse.

*11 T_{ELH}– Enable input propagation delay is measured from the 1.5V level on the HIGH to LOW transition of the input voltage pulse to the 1.5V level on the LOW to HIGH transition of the output voltage pulse.

*12 T_{EHL}– Enable input propagation delay is measured from the 1.5V level on the LOW to HIGH transition of the input voltage pulse to the 1.5V level on the HIGH to LOW transition of the output voltage pulse.

*13 CM_H– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the HIGH state (i.e., V_{OUT} > 2.0V).

*14 CM_L– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the LOW output state (i.e., V_{OUT} < 0.8V).

Order Information

Part Number

EL06XX(Z)-V

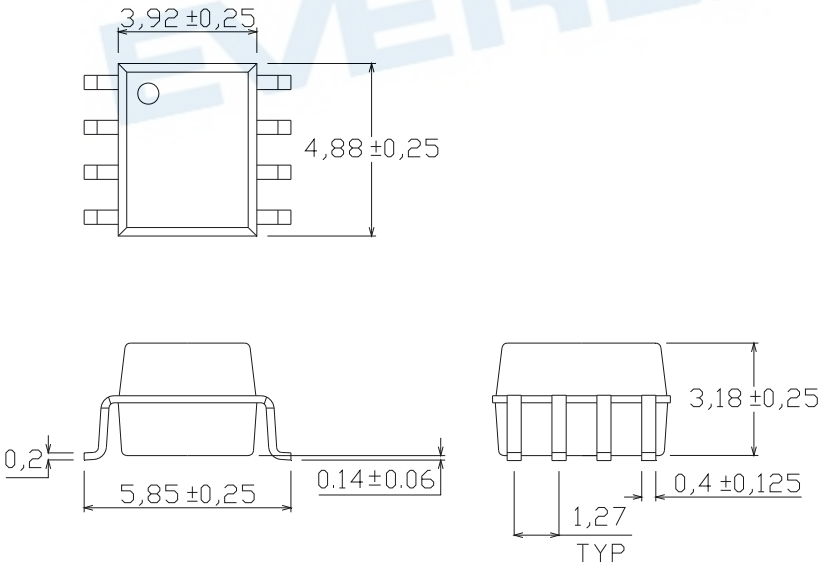
Note

X = Part no. (X = 00, 01 or 11)
Z = Tape and reel option (TA, TB).
V = VDE (optional)

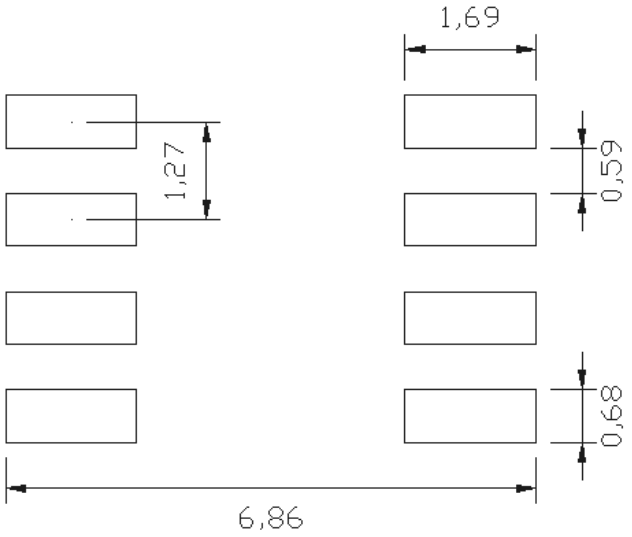
Option	Description	Packing quantity
(TA)	TA tape & reel option	2000 units per reel
(TB)	TB tape & reel option	2000 units per reel
(TA)-V	TA tape & reel option + VDE	2000 units per reel
(TB)-V	TB tape & reel option + VDE	2000 units per reel

Package Dimension

(Dimensions in mm)

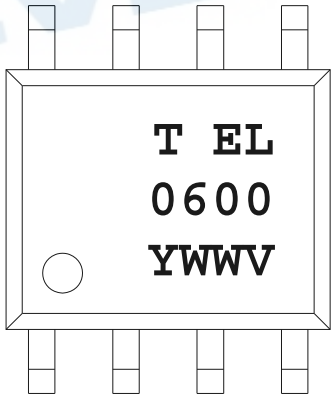


Recommended pad layout for surface mount leadform



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

Device Marking

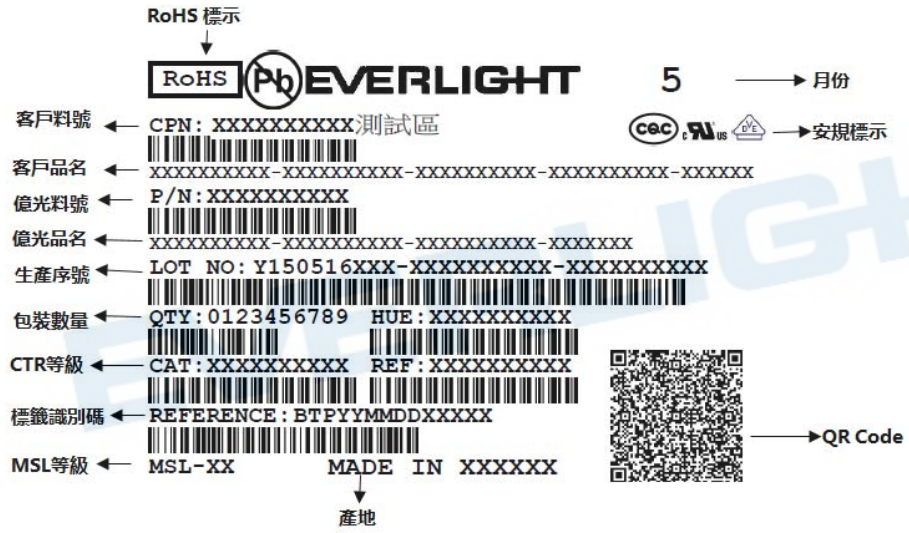


Notes

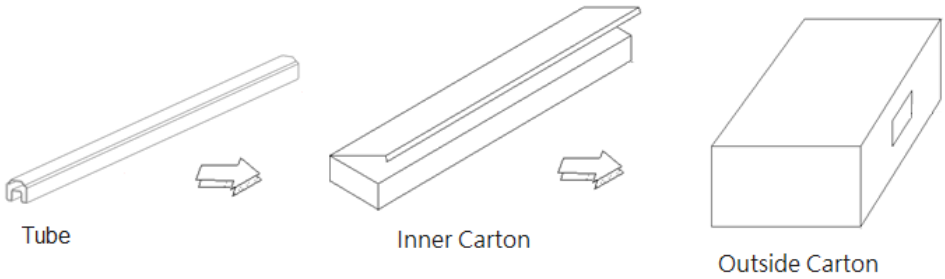
T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes EVERLIGHT
0600	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

Label form

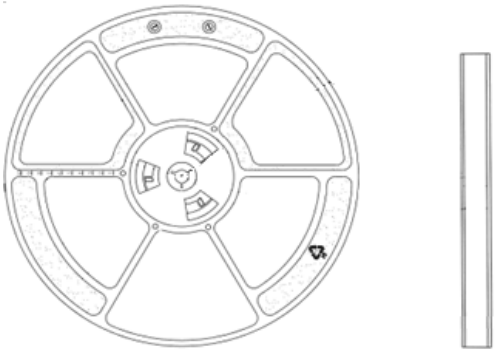
or



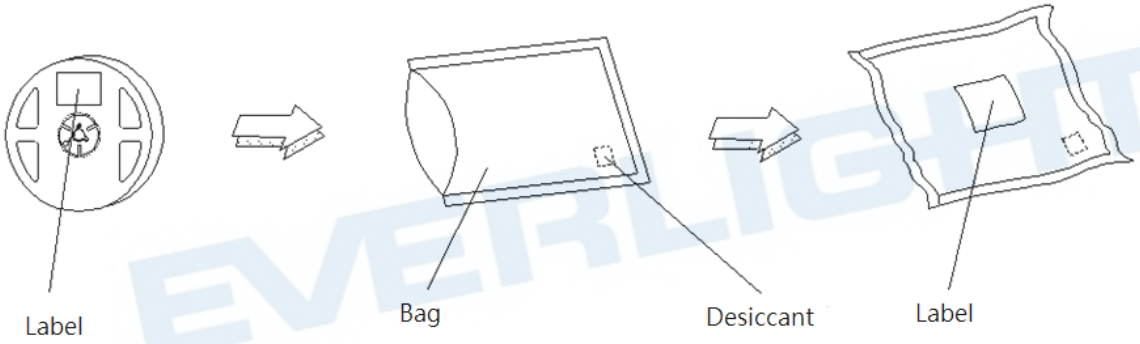
TUBE Dimension

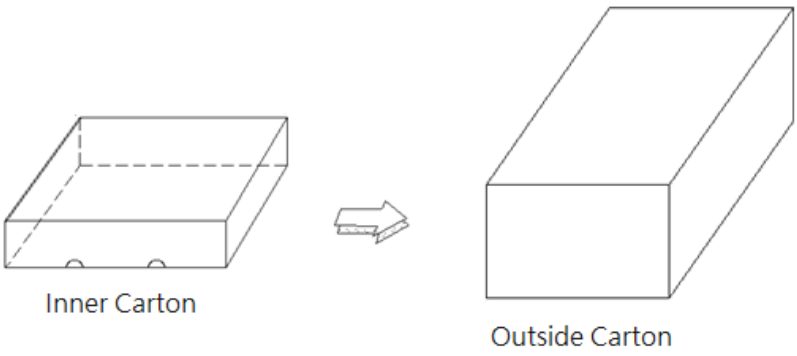


Reel Dimension



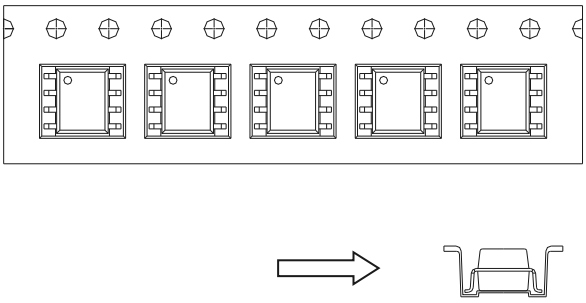
Moisture Resistant Packaging





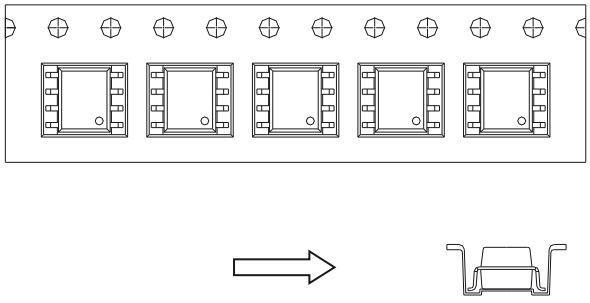
Tape & Reel Packing Specifications

Option TA



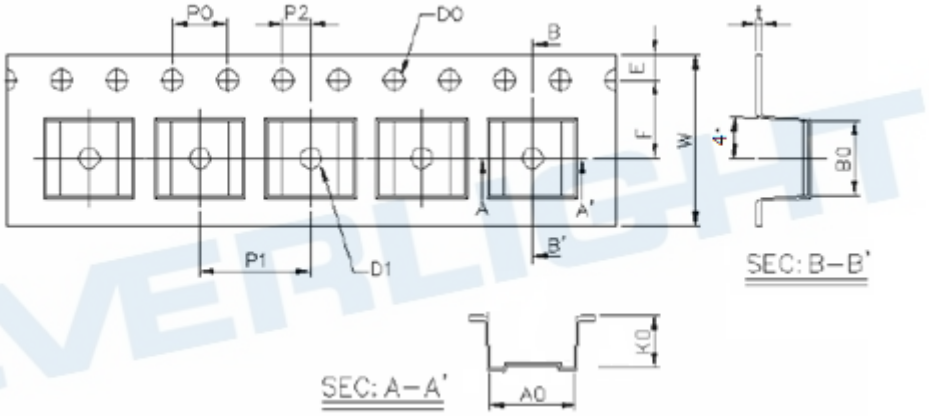
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimension

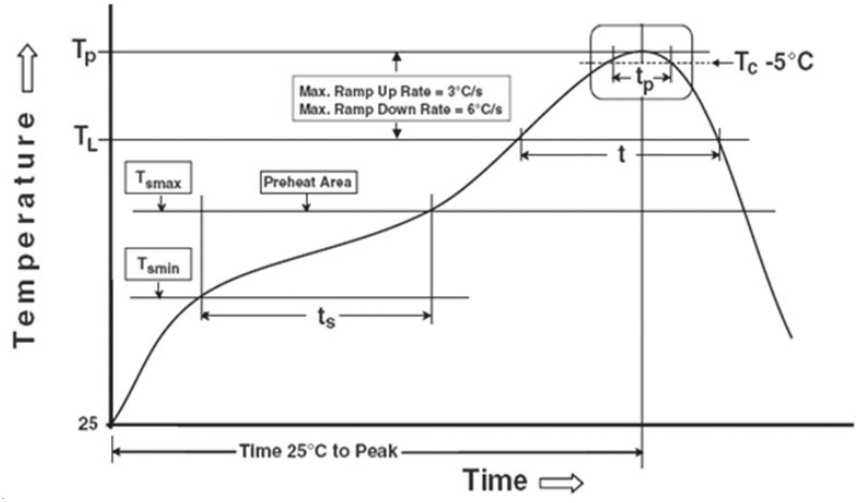


Dimension No.	**A0**	**B0**	**D0**	**D1**	**E**	**F**
Dimension(mm)	6.2±0.1	5.26±0.1	1.5±0.1	1.5±0.3	1.75±0.1	5.5±0.1
Dimension No.	**Po**	**P1**	**P2**	**t**	**W**	**K0**
Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.25±0.1	12.0+0.3/ -0.1	3.75±0.1

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

Precautions for General Storage

- Avoid storage locations where devices may be exposed to moisture or direct sunlight.
- Follow the precautions printed on the packing label of the device for transportation and storage.
- Keep the storage location temperature and humidity within a range of 5°C to 35°C and 20 % to 60 %, respectively.
- Do not store the products in locations with poisonous gases (especially corrosive gases) or in dusty conditions.
- Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of the leads.
- When restoring devices after removal from their packing, use anti-static containers.
- Do not allow loads to be applied directly to devices while they are in storage.
- If devices have been stored for more than two years under normal storage conditions, it is recommended that you check the leads for ease of soldering prior to use

DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
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