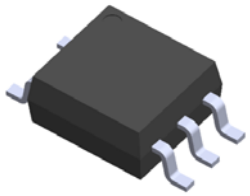
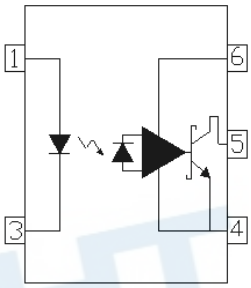
DATASHEET

5 PIN SOP HIGH SPEED 10MBit/s LOGIC GATE PHOTOCOUPLER ELM6XX Series



Schematic



Pin Configuration
1, Anode
3, Cathode
4, Gnd
5, Vout
6, V_{CC}

Features

- •Compliance Halogen Free .
  (Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- • High speed 10Mbit/s
- • Guaranteed performance from -40 to 85℃
- • Logic gate output
- • High isolation voltage between input and output (Viso=3750 V rms)
- • Compliance with EU REACH
- • Pb free and RoHS compliant.
- • UL and cUL approved(No. E214129)
- • VDE approved (No. 40028116)
- • SEMKO approved
- • NEMKO approved
- • DEMKO approved
- • FIMKO approved
- • CQC approved

Description

The ELM600, ELM601 and ELM611 are 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 a 5-pin small outline package which conforms to the standard 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

Truth Table

Input	Output
H	L
L	H

Absolute Maximum Ratings (T_A=25 °C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Reverse voltage	V_R	5	V
	Power dissipation	P_D	100	mW
Output	Power dissipation	P_C	85	mW
	Output current	I_O	50	mA
	Output voltage	V_O	7.0	V
	Supply voltage	V_{CC}	7.0	V
Output Power Dissipation		P_O	85	mW
Isolation Voltage*1		V_{ISO}	3750	V rms
Operating Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-55 ~ +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 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

*2 For 10 seconds

Electrical Characteristics (T_A=-40 to 85°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V_F	-	1.45	1.8	V	I_F = 10mA
Reverse voltage	V_R	5.0	-	-	V	I_R = 10μA, T_A=25°C
Temperature coefficient of forward voltage	V_F/T_A	-	-1.9	-	mV/°C	I_F =10mA
Input capacitance	C_{IN}	-	70	-	pF	V_F=0, f=1MHz

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

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High level supply current	I_{CCH}	-	6.0	9	mA	I_F=0mA, V_{CC}=5.5V
Low level supply current	I_{CCL}	-	7.5	10	mA	I_F=10mA, V_{CC}=5.5V

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High Level Output Current	I_{OH}	-	2.1	30	uA	V_{CC}=5.5V, V_O=5.5V, I_F=250uA
Low Level Output Current	V_{OL}	-	0.4	0.6	V	V_{CC} = 5.5V, I_F=5mA, I_{OL}(Sinking)=13mA
Input Threshold Current	I_{FT}	-	2.4	5	mA	V_{CC}= 5.5V, V_O=0.6V, I_{OL}(Sinking)=13mA

Switching Characteristics (T_A=-40 to 85°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*3 (Fig.10)		T_{PHL}	-	41	100	ns	C_L = 15pF, R_L=350Ω, TA=25°C
Propagation delay time to output Low level*3 (Fig.10)		T_{PLH}	-	50	100	ns	C_L = 15pF, R_L=350Ω, TA=25°C
Pulse width distortion		$\|T_{PHL} - T_{PLH}\|$	-	9	35	ns	C_L = 15pF, R_L=350Ω
Propagation Delay Skew*4		t_{PSK}	-	-	40	ns	C_L = 15pF, R_L=350Ω
Output rise time (Fig.10)		tr	-	40	-	ns	C_L = 15pF, R_L=350Ω
Output fall time (Fig.10)		tf	-	10	-	ns	C_L = 15pF, R_L=350Ω
Common Mode Transient Immunity at Logic High *6(Fig.11)	M600	CM_H	-	-	-	V/μS	I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, T_A=25°C V_{CM}=10Vp-p
	M601		5,000				I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, T_A=25°C V_{CM}=50Vp-p
	M611		20,000				I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, T_A=25°C V_{CM}=1000Vp-p
Common Mode Transient Immunity at Logic Low *7(Fig.11)	M600	CM_L	-	-	-	V/μS	I_F = 0mA , V_{OL}=0.8V, R_L=350Ω, T_A=25°C V_{CM}=10Vp-p
	M601		5,000				I_F = 0mA , V_{OL}=0.8V, R_L=350Ω, T_A=25°C V_{CM}=50Vp-p
	M611		20,000				I_F = 0mA , V_{OL}=0.8V, R_L=350Ω, T_A=25°C V_{CM}=1000Vp-p

*All typicals at T_A = 25°C, VCC = 5 V

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

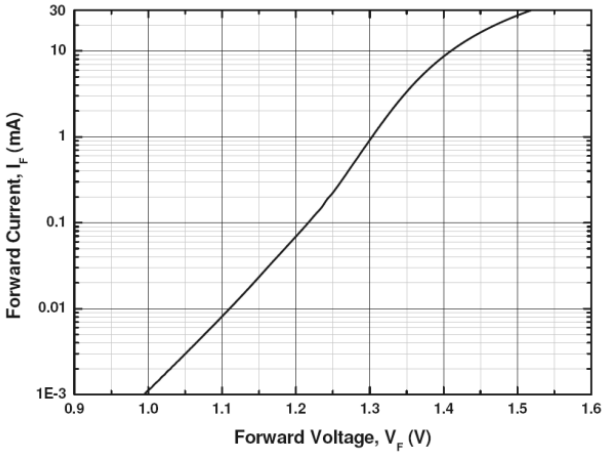


Figure 2. Low Level Output Voltage vs Ambient Temperature

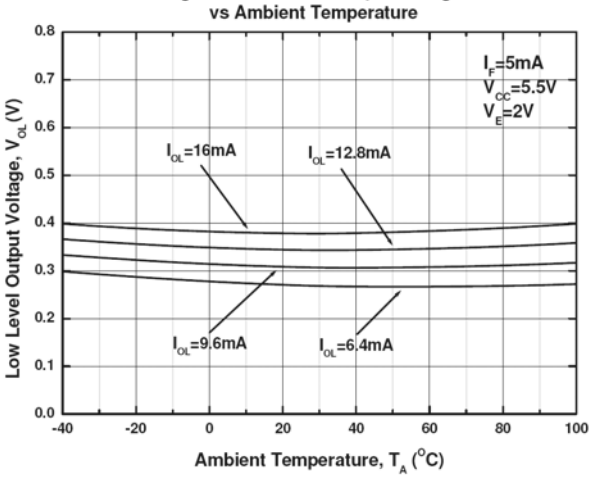


Figure 3. Low Level Output Current vs Ambient Temperature

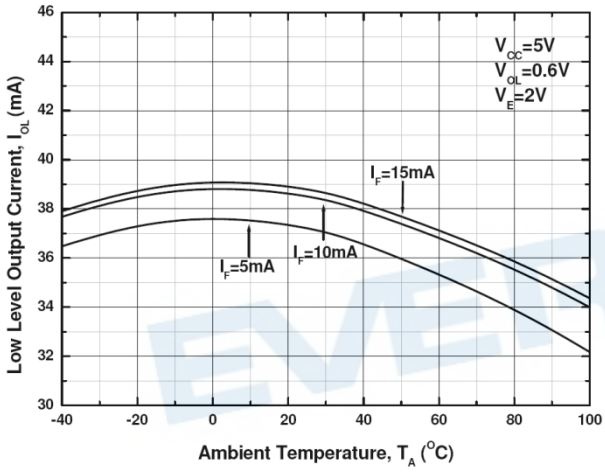


Figure 4. Input Threshold Current vs Ambient Temperature

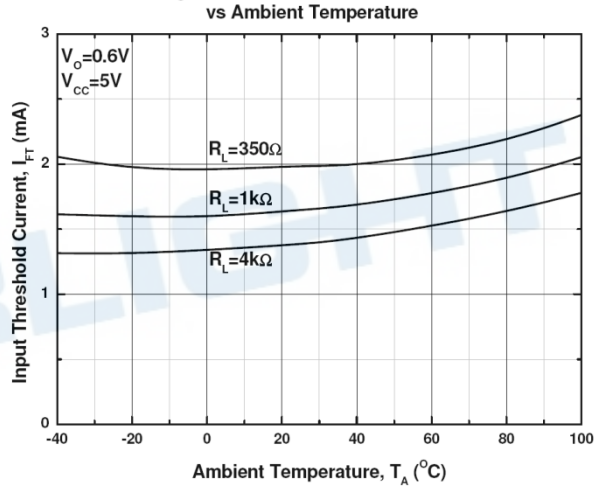


Figure 5. Input Current vs Output Voltage

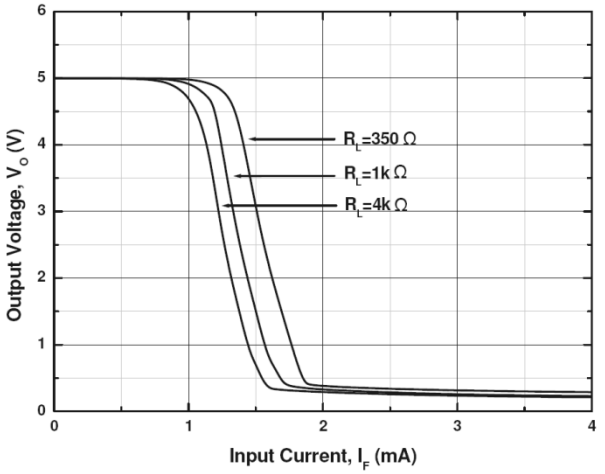


Figure 6. High Level Output Current vs Ambient Temperature

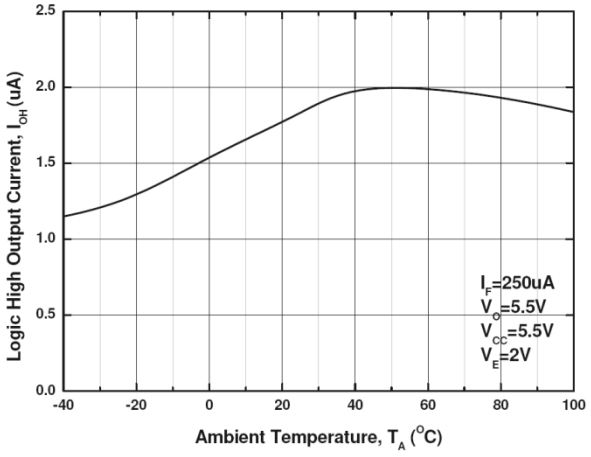


Figure 7. Propagation Delay vs. Temperature

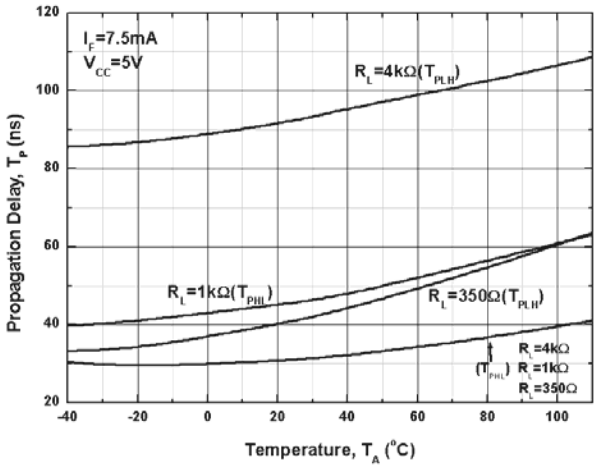


Figure 8. Pulse Width Distortion vs. Temperature

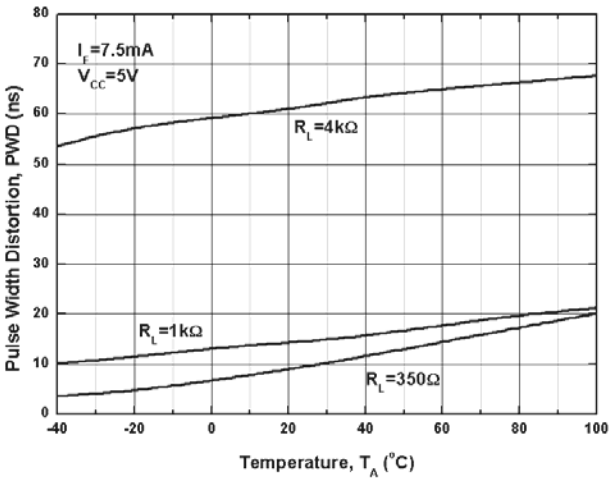
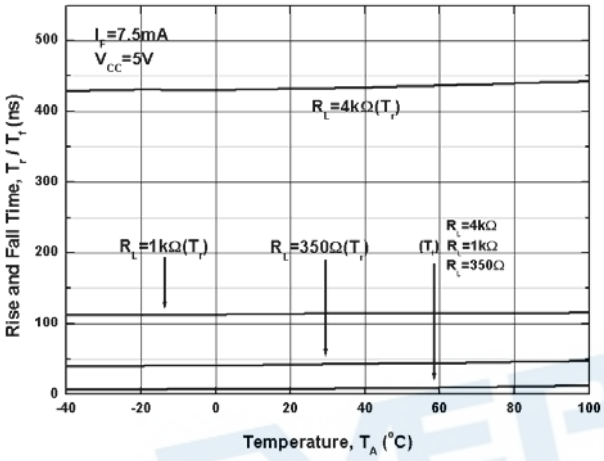


Figure 9. Rise and Fall Time vs. Temperature



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

Fig. 10 Test circuit and waveforms for tPHL, tPLH, tr, and tf

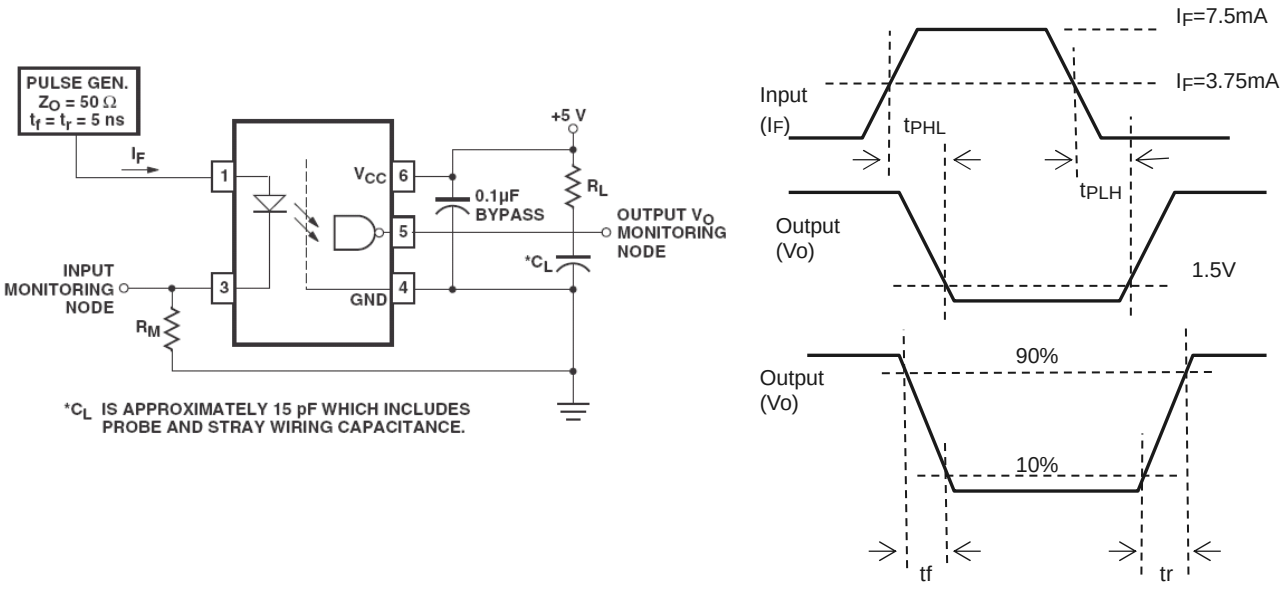
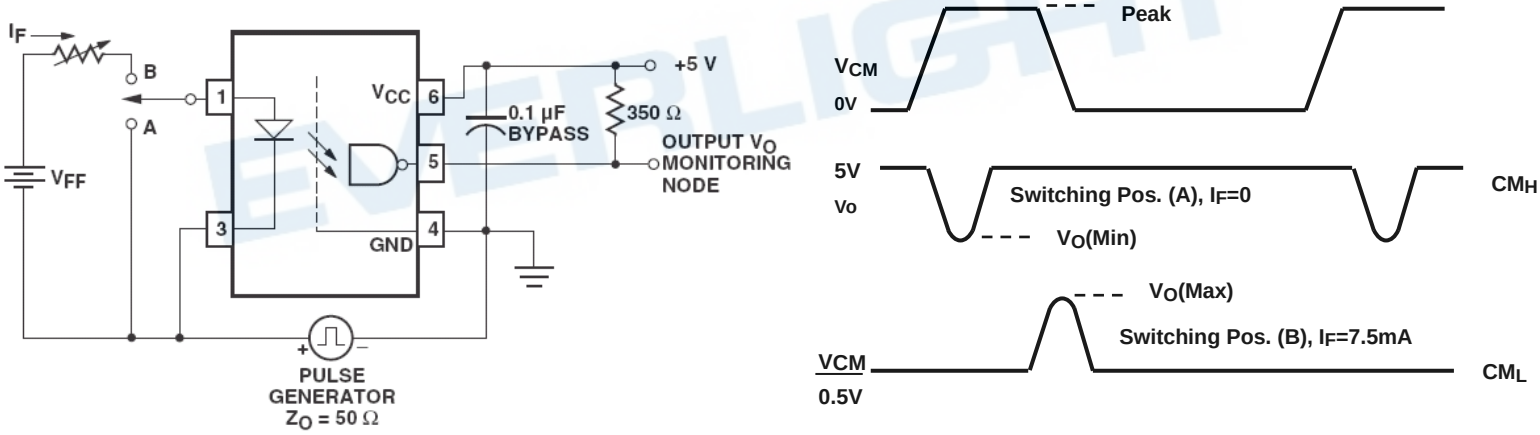


Fig. 11 Test circuit Common mode Transient Immunity



Notes:

*3 The t_{PLH} propagation delay is measured from 3.75 mA point on the falling edge of the input pulse to the 1.5V point on the rising edge of the output pulse.

*4 The t_{PHL} propagation delay is measured from 3.75 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output pulse

*5 t_{PSK} is equal to the magnitude of the worst case difference in t_{PHL} and/or t_{PLH} that will be seen between units at any given temperature within the worst case operating condition range.

*6 CMH– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the HIGH state (i.e., VOUT > 2.0V).

*7 CML– The maximum tolerable rate of fall of the common mode voltage to ensure the output will remain in the LOW output state (i.e., VOUT < 0.8V).

Order Information

Part Number

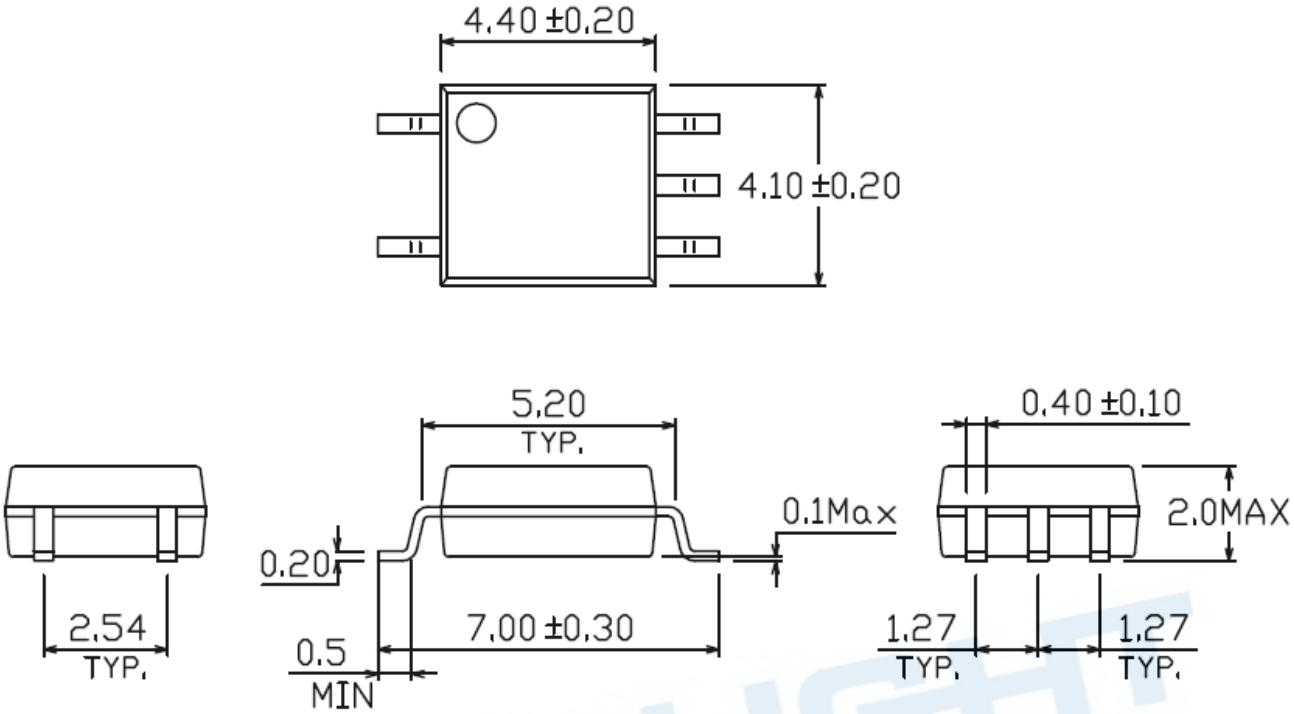
ELM6XX(Z)-V

Note
XX = Part no.(00, 01 or 11)
Z = Tape and reel option (TA, TB or none).
V = VDE (optional)

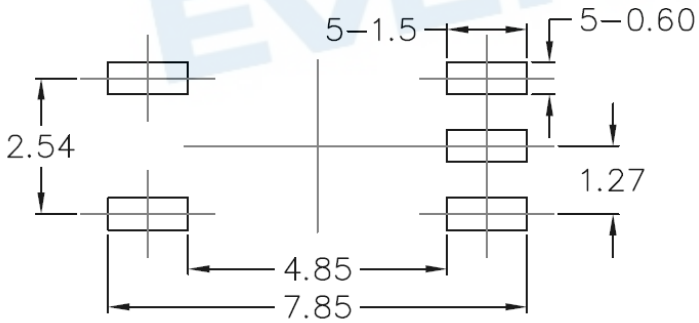
Option	Description	Packing quantity
None	Standard SMD option	100 units per tube
(TA)	Surface mount lead form + TA tape & reel option	3500 units per reel
(TB)	Surface mount lead form + TB tape & reel option	3500 units per reel

Package Dimension

(Dimensions in mm)



Recommended pad layout for surface mount leadform

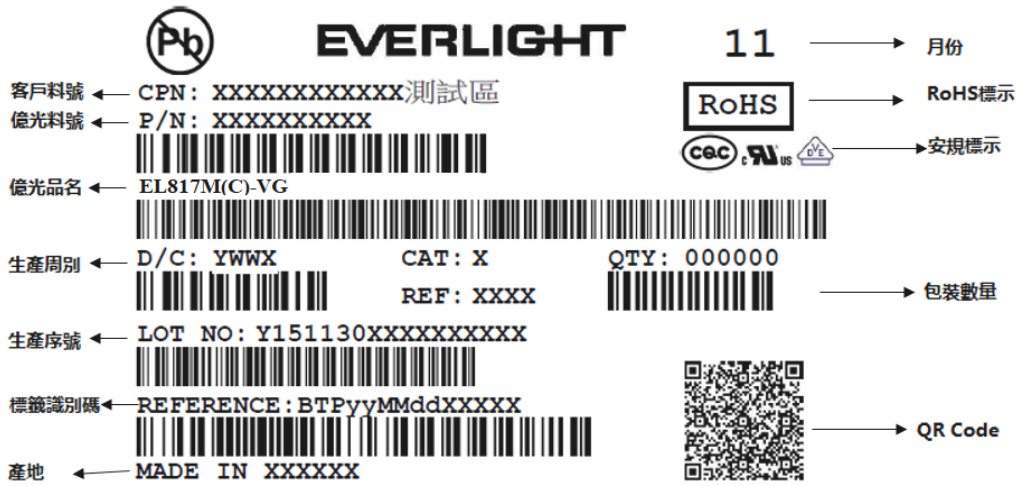


Device Marking

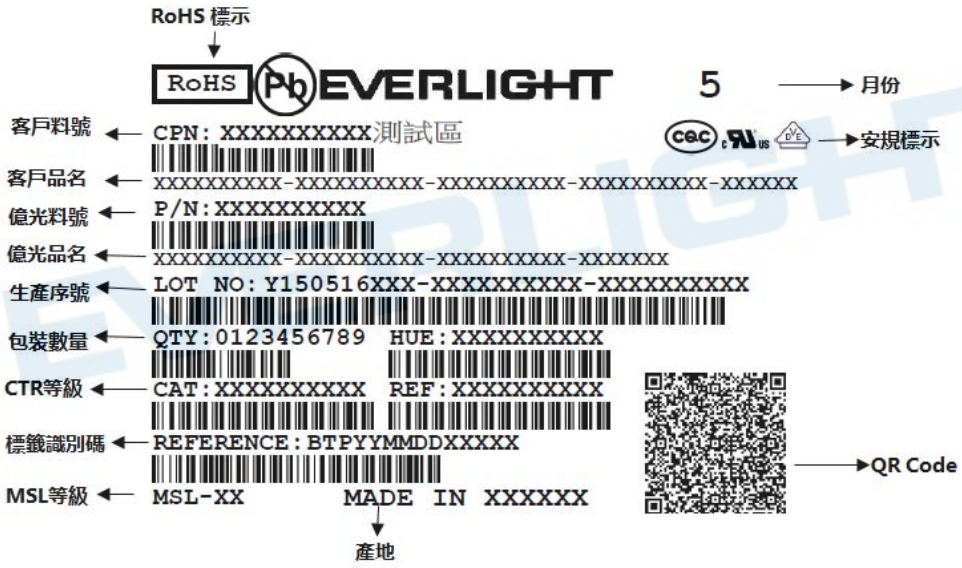
Notes

EL	denotes EVERLIGHT
M611	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

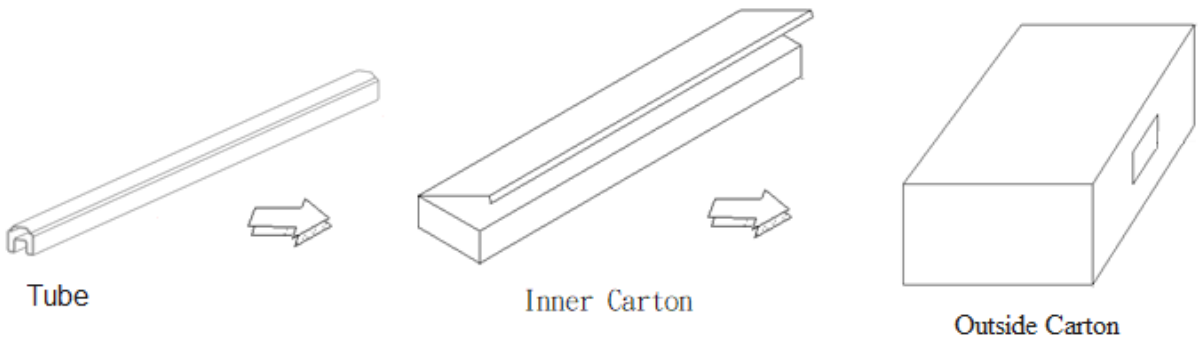
Label form



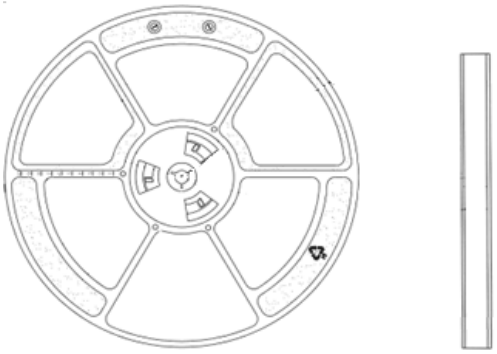
or



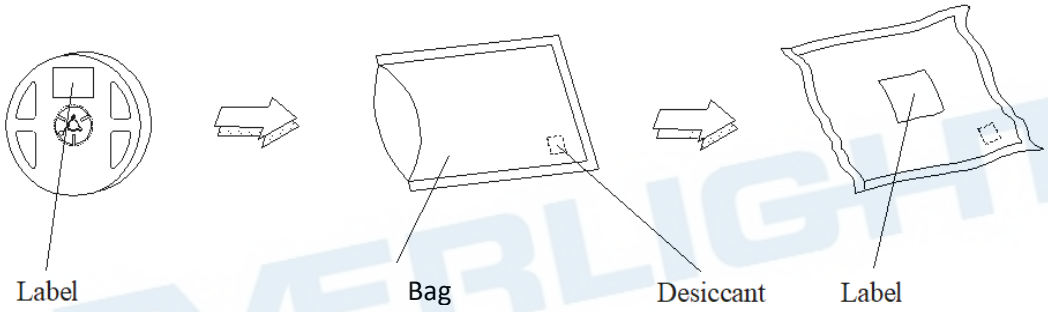
TUBE Dimension

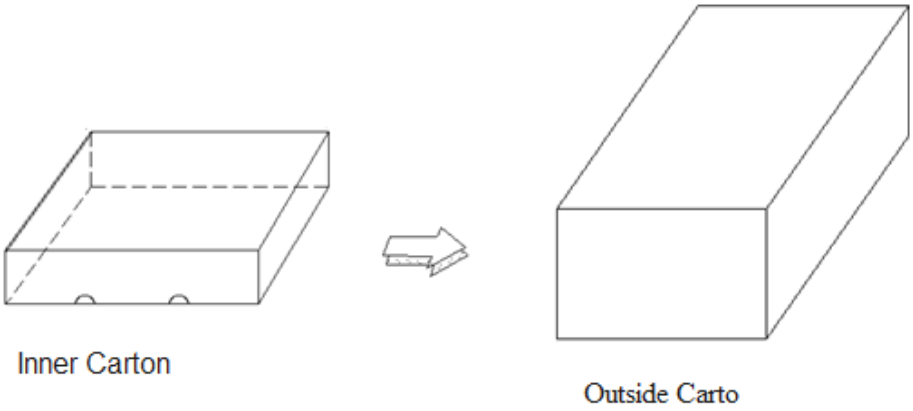


Reel Dimension



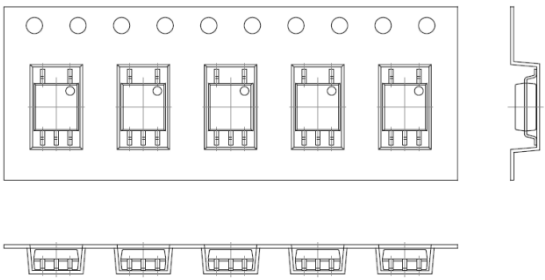
Moisture Resistant Packaging

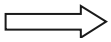




Tape & Reel Packing Specifications

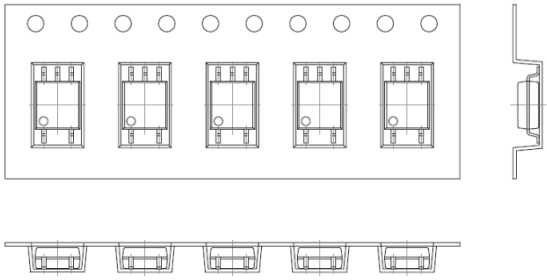
Option TA

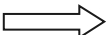




Direction of feed from reel

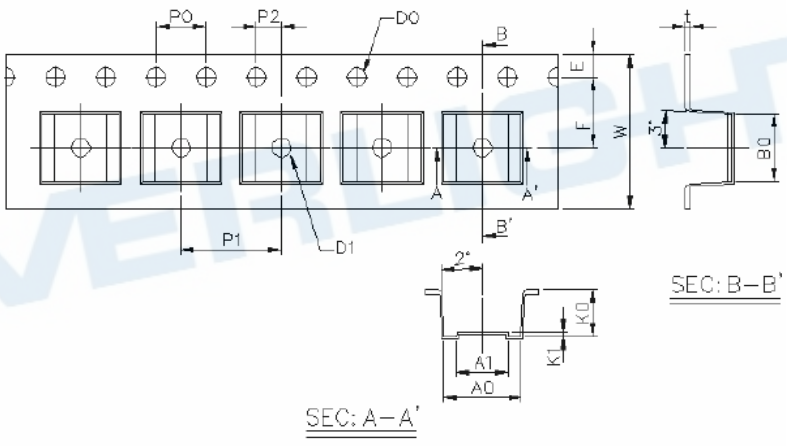
Option TB





Direction of feed from reel

Tape dimensions

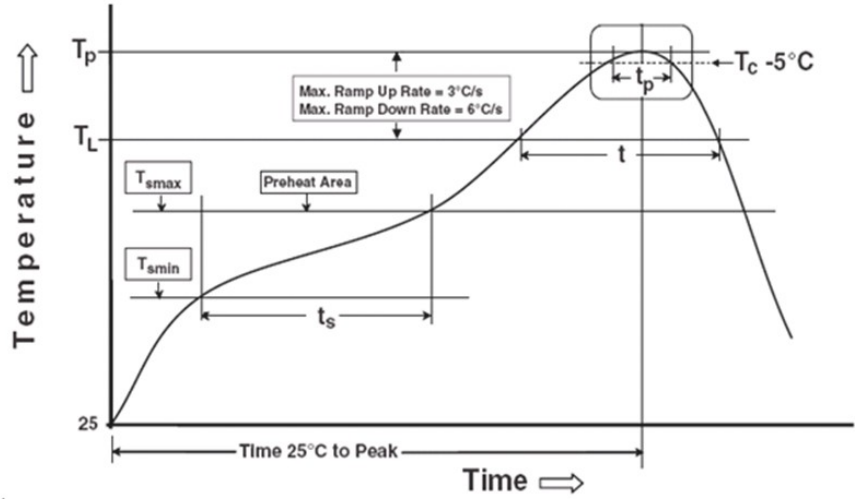


Dimension No.	A	B	Do	D1	E	F
Dimension(mm)	10.4±0.1	10.0±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
Dimension No.	**Po**	**P1**	**P2**	**t**	**W**	**K**
Dimension(mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0+0.3/ -0.1	4.5±0.1

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.
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.