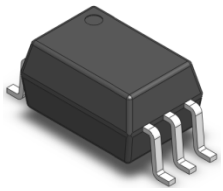
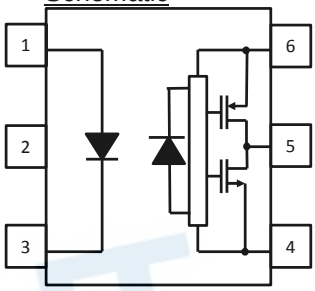
DATASHEET

6 PIN SDIP IGBT/MOSFET
1.0A Output Current GATE DRIVER PHOTOCOUPLER
ELS3150-G Series



Schematic



Pin Configuration
1, Anode
2, No Connection
3, Cathode
4. V_{EE}
5, V_{OUT}
6, V_{cc}

Note A : 0.1μF bypass capacitor must be connected between pins 4 and 6

Features:

- Compliance Halogens Free
  (Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Rail-to-rail output voltage
- Guaranteed performance from -40 to 110℃
- Peak Output Current : I_{OP} = 1A (max)
- Threshold Input Current: I_{FLH} = 5 mA (max)
- High isolation voltage between input and output (Viso=5000 V rms)
- Pb free and RoHS compliant.
- UL and cUL approved (Ongoing）
- VDE approved (Ongoing）
- SEMKO approved (Ongoing）
- NEMKO approved (Ongoing）
- DEMKO approved (Ongoing）
- FIMKO approved (Ongoing）
- CQC approved (Ongoing）

Description

The ELS3150-G consists of an infrared light emitting diodes coupled to an integrated circuit with a power output stage.
The photo coupler has an internal shield that provides guaranteed common-mode transient immunity of ±15 kV/μs. It is suitable for direct gate driving circuit for IGBTs or power MOSFETs.

Applications

- Isolated IGBT/Power MOSFET Gate Drive
- Uninterruptible power supply
- Inverters
- Home appliances, such as fan heaters, etc.

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	25	mA
	Pulse Forward Current*1	I_{FP}	1	A
	Reverse voltage	V_R	5	V
Output	"H" Peak Output current	I_{OPH}	1.0	A
	"L" Peak Output Current	I_{OPL}	1.0	A
	Pear Output Voltage	V_O	30	V
	Supply Voltage	V_{CC}	30	V
Isolation voltage *2		V_{ISO}	5000	V rms
Total Power Dissipation		P_T	300	mW
Operating temperature		T_{OPR}	-40 ~ +110	°C
Storage temperature		T_{STG}	-55 ~ +125	°C
Soldering temperature *3		T_{SOL}	260	°C

Notes:
*1 Pulse width ≤ 1μs, 300pps.
*2 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1 to 3 are shorted together, and pins 4 to 6 are shorted together.
*3 For 10 seconds.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	15	30	V
Input Current (ON)	$I_{F(ON)}$	7.5	12	mA

Electro-Optical Characteristics

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V_F	-	-	1.8	V	I_F = 10mA
Reverse Voltage	V_R	5	-	-	V	I_R = 10μA

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High level supply current	I_{CCH}	-	1.6	3.2	mA	I_F=10mA, V_{CC}=30V V_O= Open
Low level supply current	I_{CCL}	-	2.0	3.2		I_F=0mA, V_{CC}=30V V_O= Open

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High Level Output Current*4	I_{OH}		-	-0.2	A	I_F=10mA, V_{CC}=30V, V_O=V_{CC}-1V
		-	-	-1.0		I_F=10mA, V_{CC}=30V, V_O=V_{CC}-4V
Low Level Output Current*4	I_{OL}	0.2	-	-		I_F=0mA, V_{CC}=30V, V_O=V_{EE} +1V
		1.0	-	-		I_F=0mA, V_{CC}=30V, V_O=V_{EE} +4V
High Level Output Voltage	V_{OH}	V_{CC}-0.5	-	-	V	I_F=10mA, V_{CC}=30V, I_O=-100mA
Low Level Output Voltage	V_{OL}		-	V_{EE}+0.5	V	I_F=0mA, V_{CC}=30V, I_O=100mA
Input Threshold Current	I_{FLH}	-	-	5	mA	V_{CC}= 30V, V_O >5V
Input Threshold Voltage	V_{FHL}	0.8	-	-	V	V_{CC}= 30V, V_O <5V
Under Voltage Lockout Threshold	V_{UVLO+}	11.0	-	13.5	V	I_F=10mA, V_O >5V
Under Voltage Lockout Threshold	V_{UVLO-}	9.5	-	12.5	V	I_F=10mA, V_O <5V

Switching Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation delay time to output High level	t_{PLH}	40	-	400	ns	I_F= 10mA , V_{CC}=30V C_g = 10nF, R_g=10Ω, f=10kHz, T_A=25°C Duty Cycle=50%,
Propagation delay time to output Low level	t_{PHL}	40	-	400	ns	
Pulse width distortion	$\lvert t_{PHL} - t_{PLH} \rvert$	-	-	150	ns	
Propagation Delay Skew*5	t_{PSK}	-	-	150	ns	
Output rise time	t_R	-	80	-	ns	
Output fall time	t_F	-	80	-	ns	
Common Mode Transient Immunity at Logic High*6	CM_H	15	-	-	kV/μS	I_F = 10mA , V_{CC}=30V, T_A=25°C V_{CM}=1500V
Common Mode Transient Immunity at Logic Low*7	CM_L	15	-	-	kV/μS	I_F = 0mA , V_{CC}=30V, T_A=25°C V_{CM}=1500V

Notes:

*4 Max. pulse width=10μS, max. duty cycle =1%

*5 Propagation delay skew is defined as the difference between the largest and smallest propagation delay times (i.e. t_{PHL} or t_{PLH}) of multiple samples. Evaluations of these samples are conducted under identical test conditions (supply voltage, input current, temperature, etc).

*6 Common mode transient immunity at output high is the maximum tolerable negative dv/dt on the trailing edge of the common mode impulse signal, V_{CM}, to assure that the output will remain high (i.e. V_O>10.0V)

*7 Common mode transient immunity at output low is the maximum tolerable positive dv/dt on the leading edge of the common mode pulse signal, V_{CM}, to assure that the output will remain low (i.e. V_O<1.0V)

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

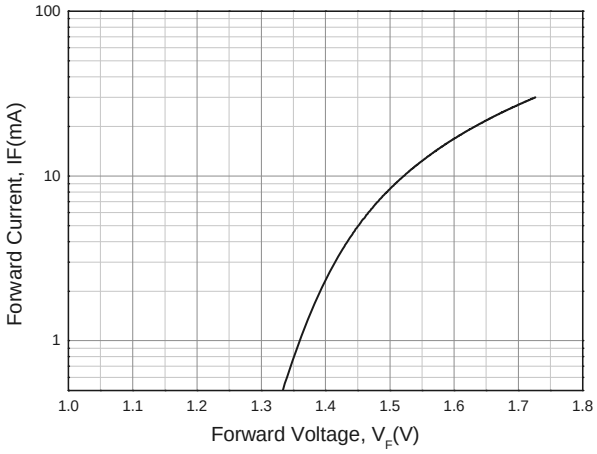


Figure 2. Threshold Input Current vs Ambient temperaturt

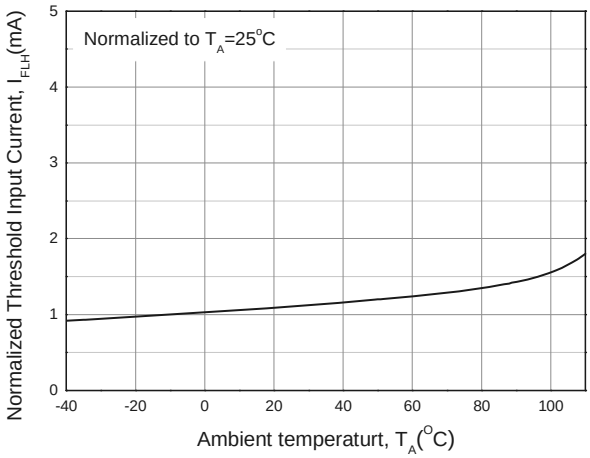


Figure 3. Low-level Supply Current vs Ambient temperaturt

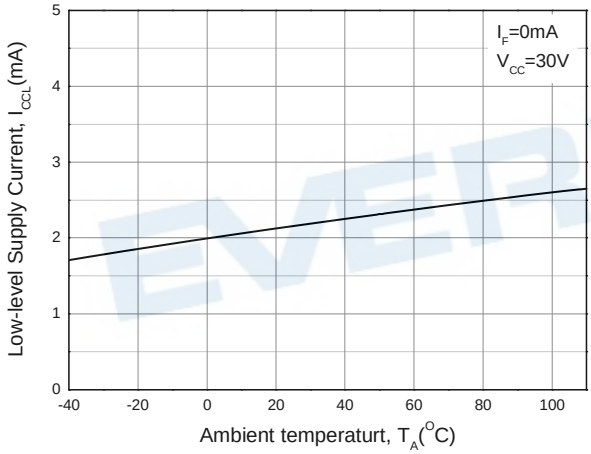


Figure 4. High-level Supply Current vs Ambient temperaturt

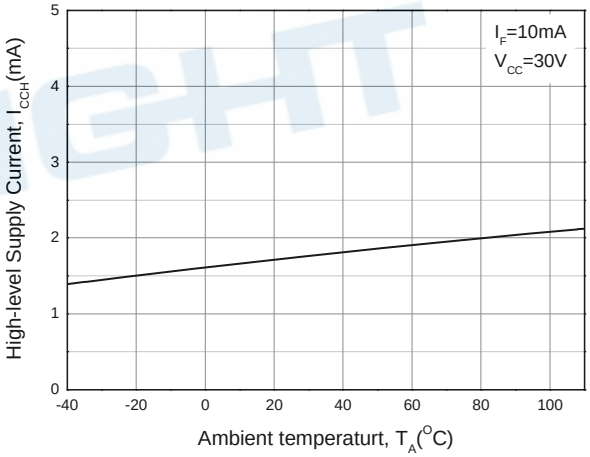


Figure 5. Low-level Output Voltage vs Ambient temperaturt

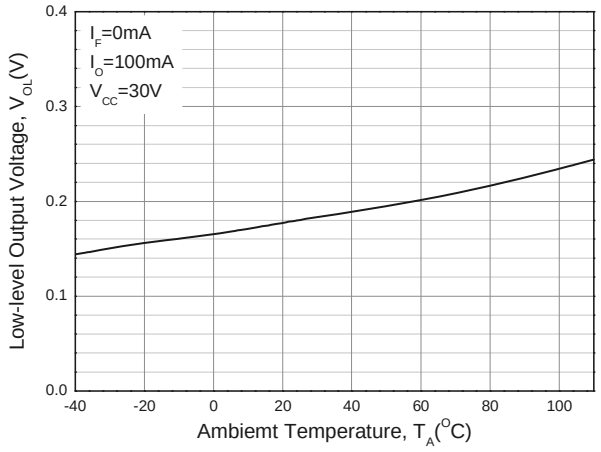


Figure 6. High-level Output Voltage vs Ambient temperaturt

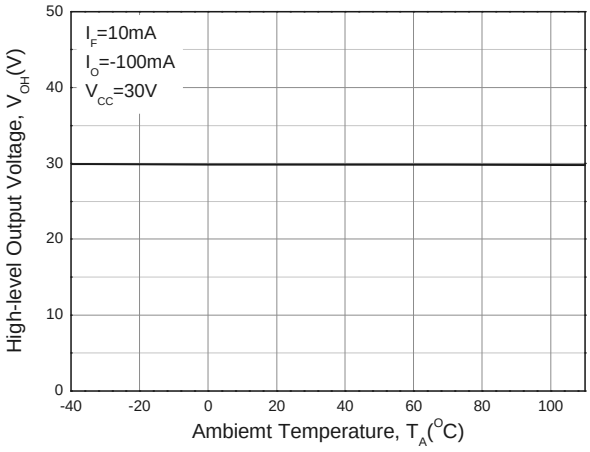


Figure 7. Low-level Output Voltage vs Peak low-level Output Current

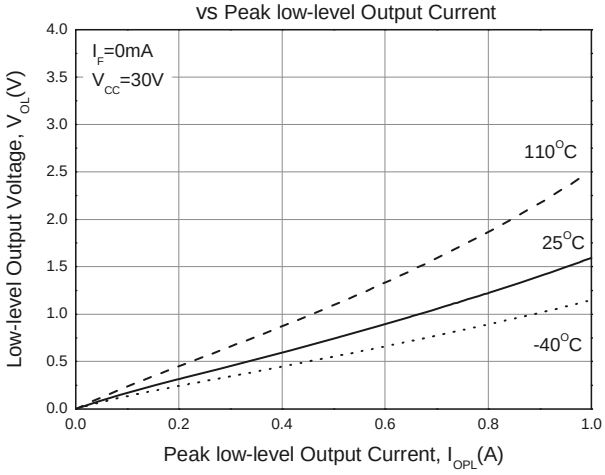


Figure 8. High-level Output Voltage Drop vs Peak low-level Output Current

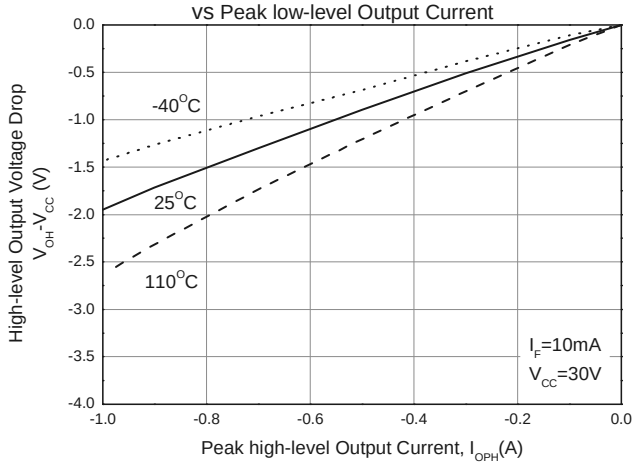


Figure 9. Propogation Delay Time vs Input Forward Current

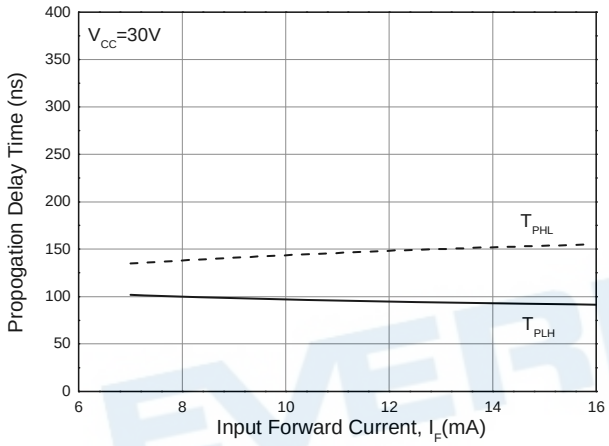


Figure 10. Propogation Delay Time vs Supply Voltage

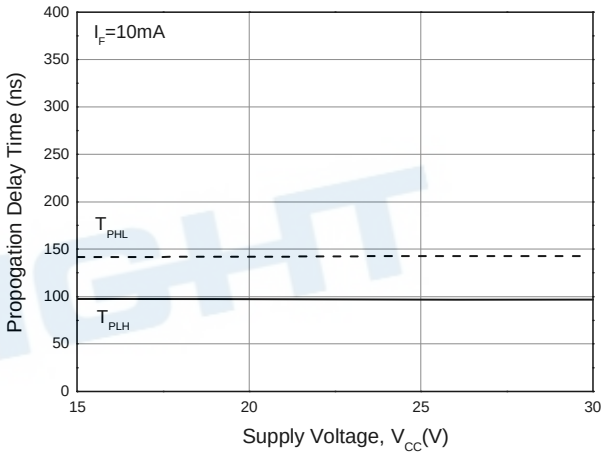


Figure 11. Propogation Delay Time vs Ambient Temperature

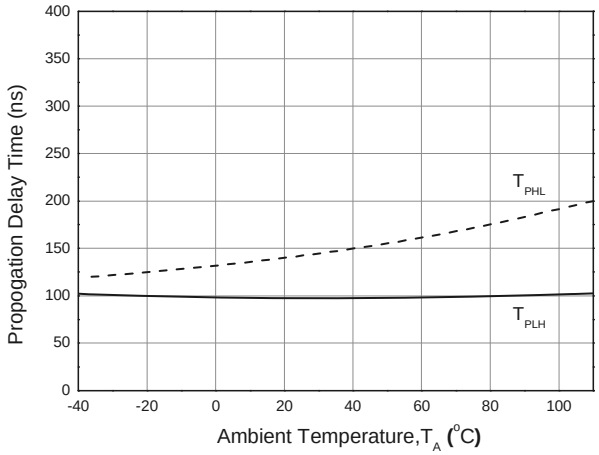


Fig. 12 I_{OH} Test circuit

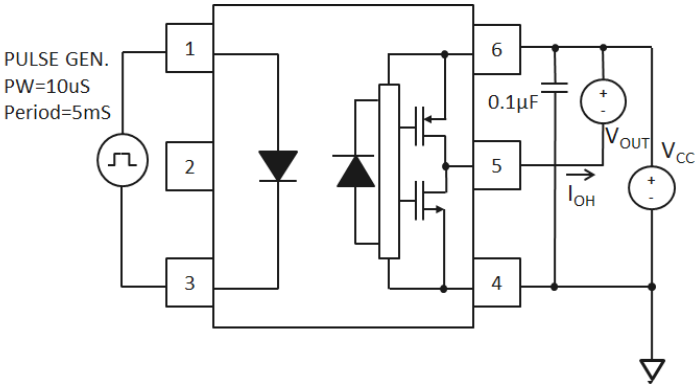


Fig. 13 I_{OL} Test circuit

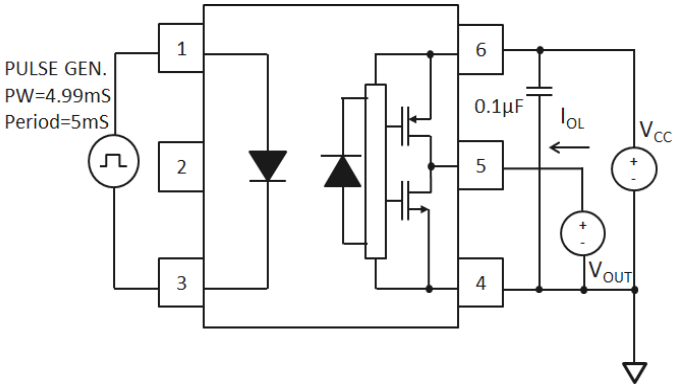


Fig. 14 V_{OH} Test circuit

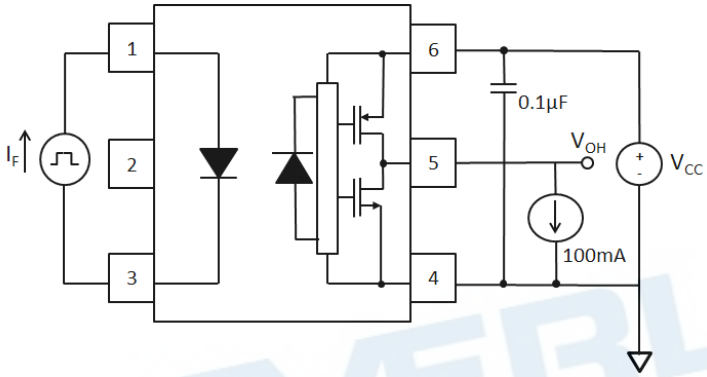


Fig. 15 V_{OL} Test circuit

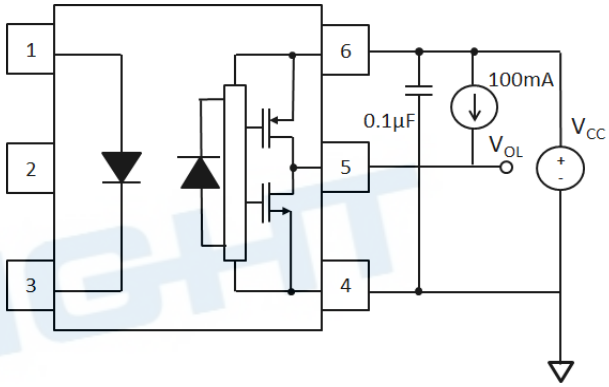


Fig. 16 I_{FHL} Test circuit

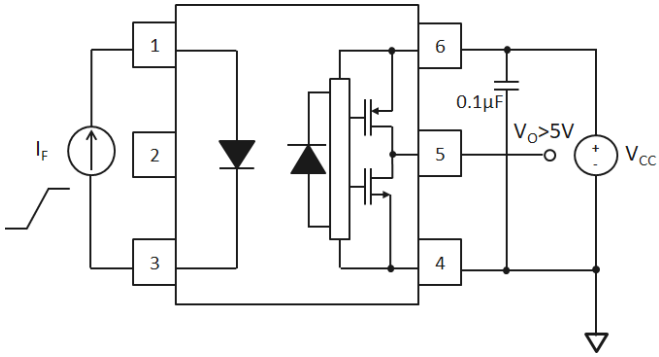


Fig. 17 UVLO Test circuit

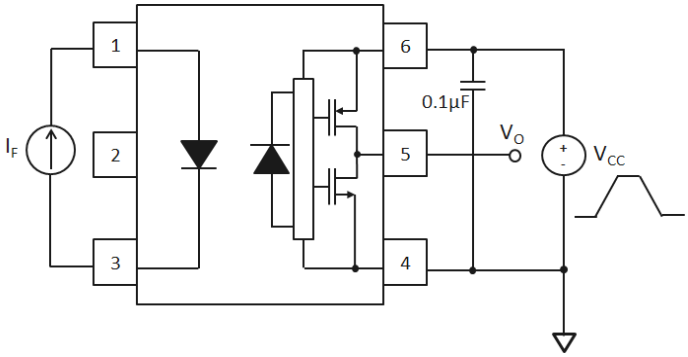


Fig. 18 Switching Time Test circuit

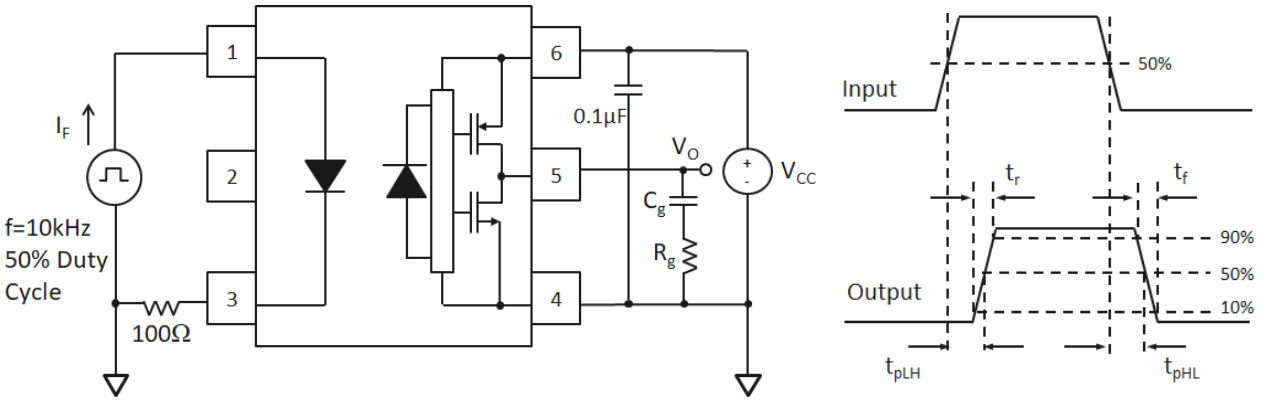
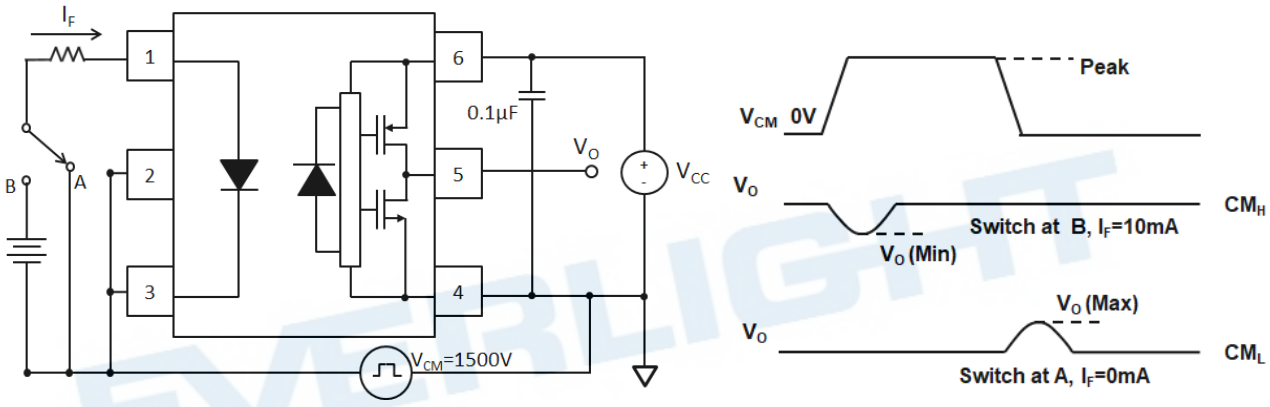


Fig. 19 CMR Test circuit



Order Information

Part Number

ELS3150X(Y)-VG

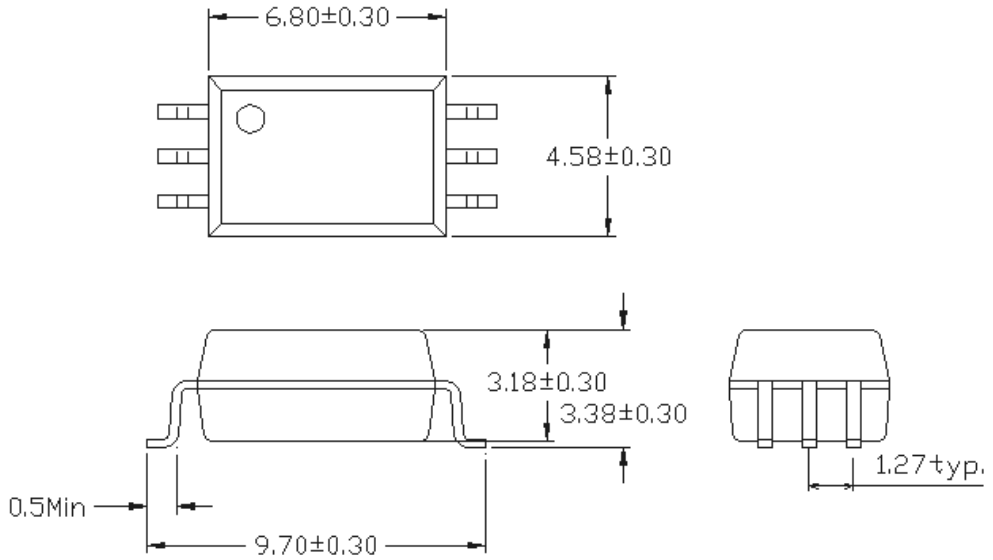
Note

EL = denotes EVERLIGHT
S3150 = part no.
X = lead type(P,W)
Y = Tape and reel option (TA, TB)
V = VDE (optional)
G = Halogens free

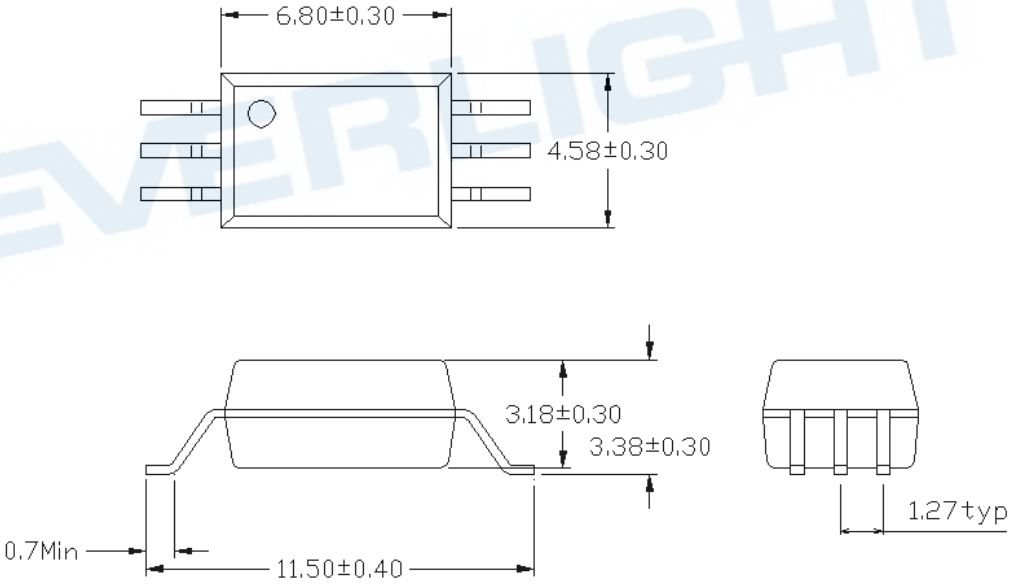
Option	Description	Packing quantity
P(TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
P(TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
W(TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
W(TB)	Surface mount lead form + TB tape & reel option	1000 units per reel

Package Dimension
(Dimensions in mm)

P Type

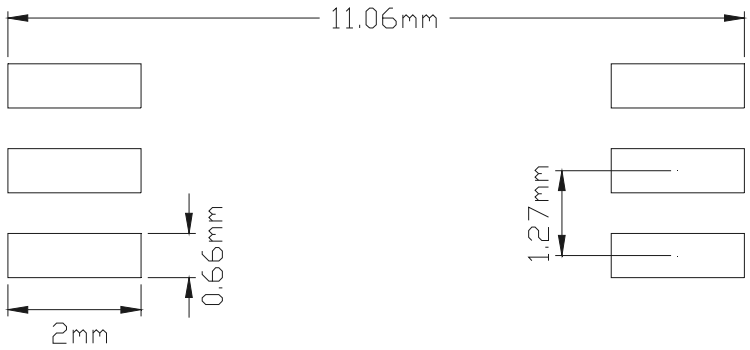


W Type



Recommended pad layout for surface mount leadform

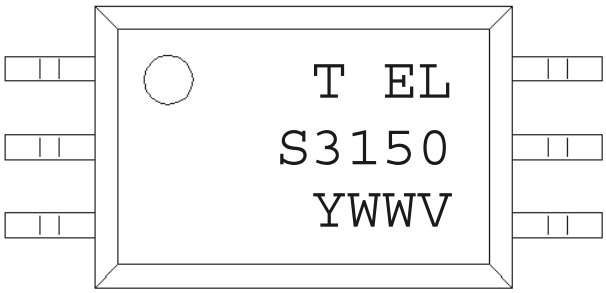
For P Type:



For W Type:

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

Device Marking

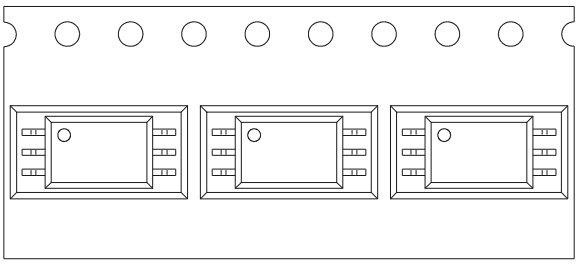


Notes

T	denotes Factory T : made in Taiwan
EL	denotes EVERLIGHT
S3150	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

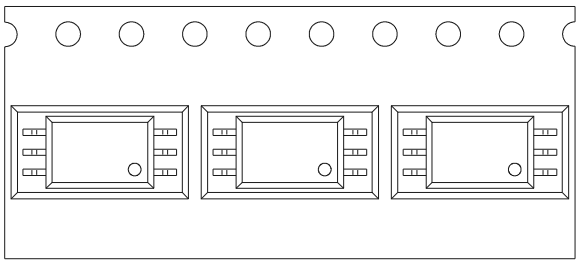
Tape & Reel Packing Specifications

Option TA



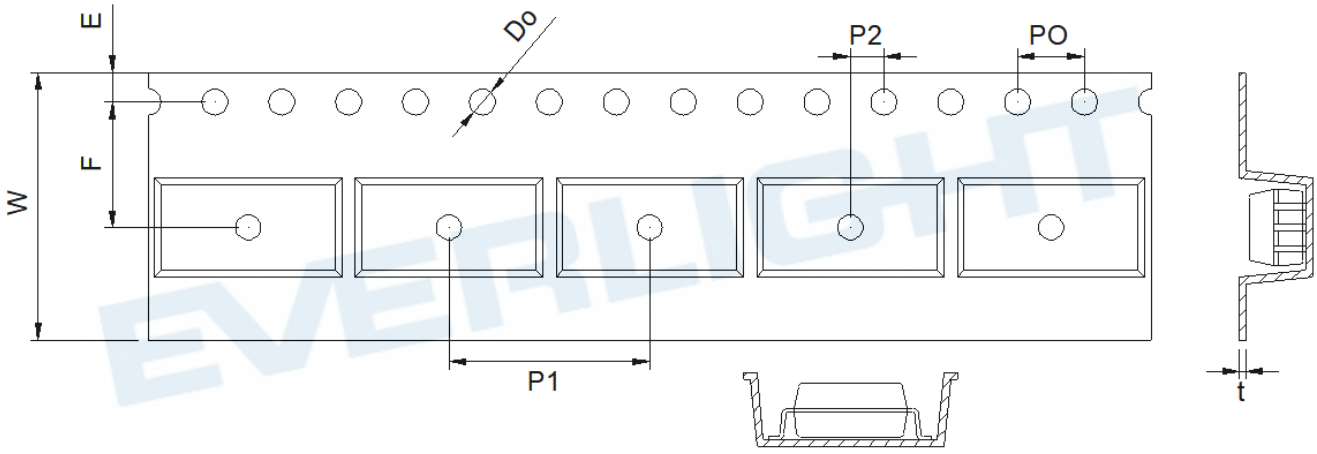
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimension

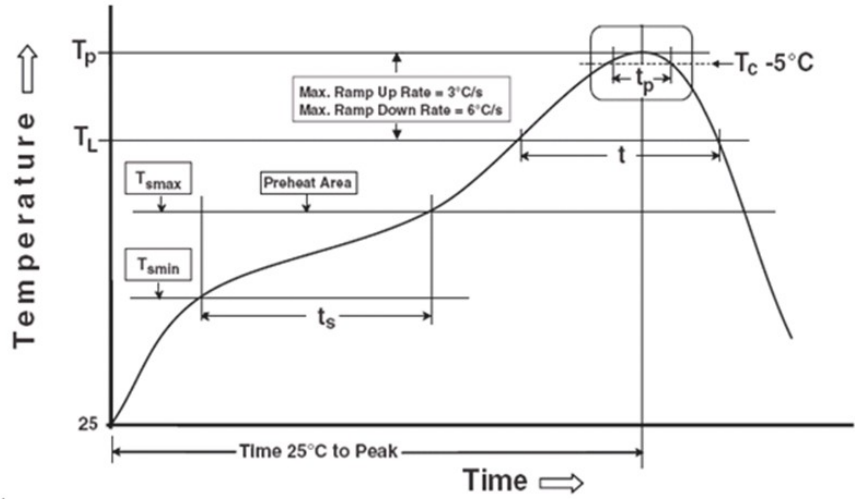


Dimension No.	**W**	**E**	**F**	**Do**
Dimension(mm) P	16.0 ± 0.3	1.75 ± 0.1	7.5 ± 0.1	1.5 ± 0.1
Dimension(mm) W	16.0 ± 0.3	1.75 ± 0.1	7.5 ± 0.1	1.5 ± 0.1
Dimension No.	**PO**	**P1**	**P2**	**t**
Dimension(mm) P	4.0 ± 0.1	12.0 ± 0.1	2.0 ± 0.1	0.4 ± 0.1
Dimension(mm) W	4.0 ± 0.1	16.0 ± 0.1	2.0 ± 0.1	0.4 ± 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°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

EN-60747-5-5 Insulation Related Characteristics

Description	Symbol	Rating	Unit
Climatic Classification	-	40/110/21	-
Pollution Degree	-	2	-
Maximum Working Insulation Voltage	V_{IORM}	1060	V_{peak}
Input to Output Test Voltage, Method A $V_{IORM} \times 1.6 = V_{PR}$, Type and Sample Test, t_m = 10s, Partial Discharge < 5 pC	V_{PR}	1696	V_{peak}
Input to Output Test Voltage, Method B $V_{IORM} \times 1.875 = V_{PR}$, 100% Production Test with tm = 1s, Partial Discharge < 5 pC	V_{PR}	1987.5	V_{peak}
Highest Allowable Overvoltage (Transient Overvoltage, t_{ini} = 60s)	V_{IOTM}	6000	V_{peak}
Safety Limiting Values (max. allowable ratings in case of fault, also refer to thermal derating curve)			
Temperature	T_S	125	°C
Input Current	$I_{S,INPUT}$	400	mA
Output Power	$P_{S,OUTPUT}$	600	mW
Insulation Resistance at T_S, V_{IO} = 500 V	R_S	10^9	Ω

Insulation and Safety Related Specification

Description	Symbol	Rating	Unit
Minimum Creepage Distance	Cr	7.8	mm
Minimum Clearance	Cl	7.8	mm
Minimum Insulation Distance	T_I	0.4	mm
Comparative Tracking Index	CTI	175	-

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.