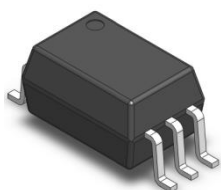


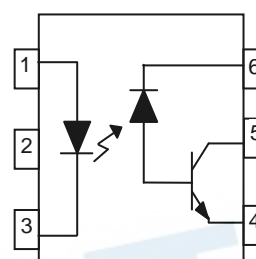
6 PIN SDIP HIGH SPEED 1MBit/s TRANSISTOR PHOTOCOUPLER ELS511 series



Features

- High speed 1Mbit/s
- High isolation voltage between input and output (Viso=5000 Vrms)
- Guaranteed performance from 0°C to 70°C
- Wide operating temperature range of -55°C to 100°C
- Pb free and RoHS compliant

Schematic



Pin Configuration

- 1, Anode
- 2, No Connection
- 3, Cathode
- 4, Gnd
- 5, Vout
- 6, VCC

Description

The ELS511 serie devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photodiode bias and output-transistor collector increase the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance of the input transistor. The devices are packaged in an 6-pin small DIP package .

Applications

- Line receivers
- Telecommunication equipments
- Power transistor isolation in motor drives
- Replacement for low speed phototransistor photo couplers
- Feedback loop in switch-mode power supplies
- Home appliances
- High speed logic ground isolation

Absolute Maximum Ratings (Ta=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	25	mA
	Peak forward current (50% duty, 1ms P.W)	I_{FP}	50	mA
	Peak transient current ($\leq 1\mu s$ P.W, 300pps)	I_{Ftrans}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P_{IN}	45	mW
Output	Power dissipation	P_O	100	mW
	Average Output current	$I_{O(AVG)}$	8	mA
	Peak Output current	$I_{O(PK)}$	16	mA
	Output voltage	V_O	-0.5 to 20	V
	Supply voltage	V_{CC}	-0.5 to 30	V
Total Power Dissipation		P_{TOT}	200	mW
Isolation Voltage*1		V_{ISO}	5000	Vrms
Operating Temperature		T_{OPR}	-55 to 100	°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

Electrical Characteristics (T_A=0 to 70°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V _F	-	1.45	1.8	V	I _F = 16mA
Reverse Voltage	V _R	5.0	-	-	V	I _R = 10μA
Temperature coefficient of forward voltage	ΔV _F /ΔT _A	-	-1.9	-	mV/°C	I _F = 16mA

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
High Level Output Current	I _{OH}	-	0.001	0.5	μA	I _F =0mA, V _O =V _{CC} =5.5V, T _A =25°C
		-	0.01	5		I _F =0mA, V _O =20V, V _{CC} =30V, T _A =25°C
		-	-	50		I _F =0mA, V _O =20V, V _{CC} =30V, T _A =70°C
High Level Supply Current	I _{CCH}	-	0.01	1	μA	I _F =0mA, V _O =Open, V _{CC} =30V, T _A =25°C

Transfer Characteristics (T_A=0 to 70°C unless specified otherwise)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer Ratio	CTR	20	-	-	%	I _F = 16mA, V _O = 0.4V, V _{CC} =4.5V, T _A =25°C
Low Level output Voltage	V _{OL}	-	0.18	0.4	V	I _F = 16mA, I _O = 2.4mA, V _{CC} =4.5V, T _A =25°C

Switching Characteristics ($T_A=0$ to 70°C unless specified otherwise, $I_F=16\text{mA}$, $V_{CC}=5\text{V}$)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation Delay Time to Logic Low (Fig.8)	TPHL	-	0.35	1.5	μs	$R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
Propagation Delay Time to Logic High (Fig.8)	TPLH	-	0.5	1.5	μs	$R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
Common Mode Transient Immunity at Logic High (Fig.9) ^{*3}	CM _H	10000	20000	-	V/ μs	$I_F=0\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
Common Mode Transient Immunity at Logic Low (Fig.9) ^{*3}	CM _L	10000	20000	-	V/ μs	$I_F=0\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$

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

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Typical Electro-Optical Characteristics Curves

Figure 8 Switching Time Test Circuit & Waveform

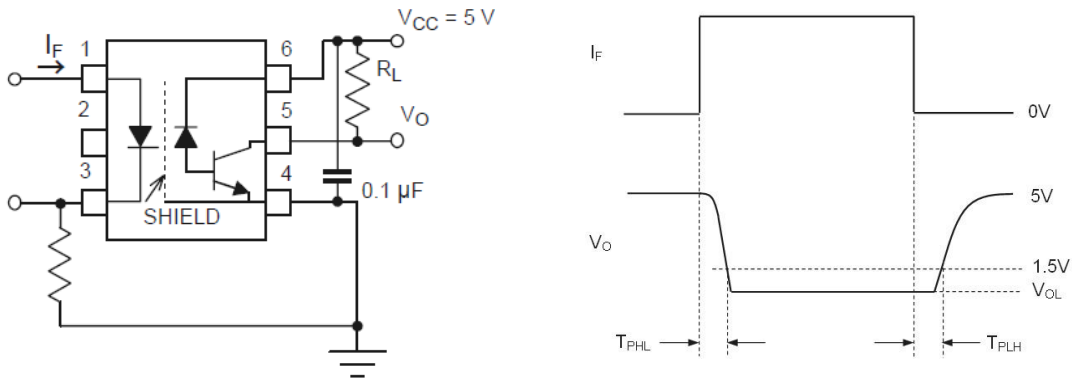
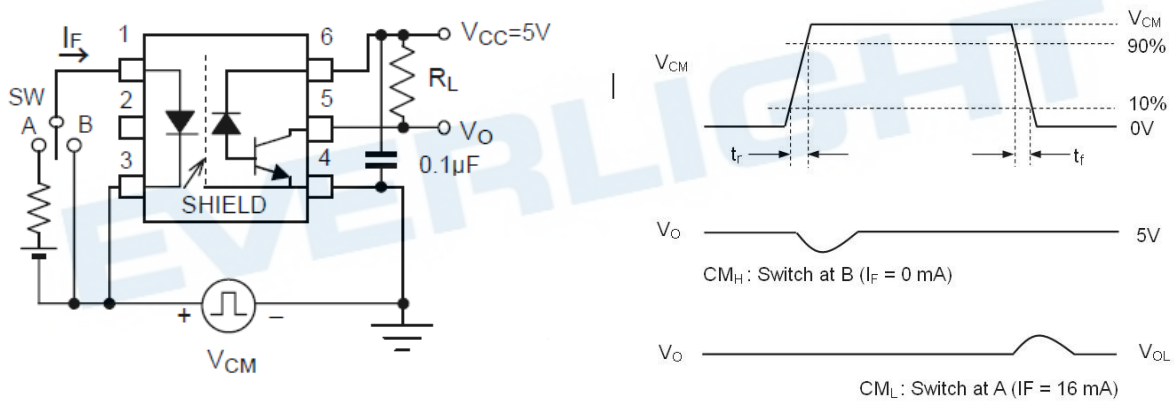


Figure 9 Transient Immunity Test Circuit & Waveform



Note:

*3 Common mode transient immunity in logic high level is the maximum tolerable (positive) dV_{CM}/dt on the leading edge of the common mode pulse signal V_{CM} , to assure that the output will remain in a logic high state (i.e., $V_O > 2.0V$).

Common mode transient immunity in logic low level is the maximum tolerable (negative) dV_{CM}/dt on the trailing edge of the common mode pulse signal, V_{CM} , to assure that the output will remain in a logic low state (i.e., $V_O < 0.8V$).

Order Information

Part Number

ELS511X(Y)-V

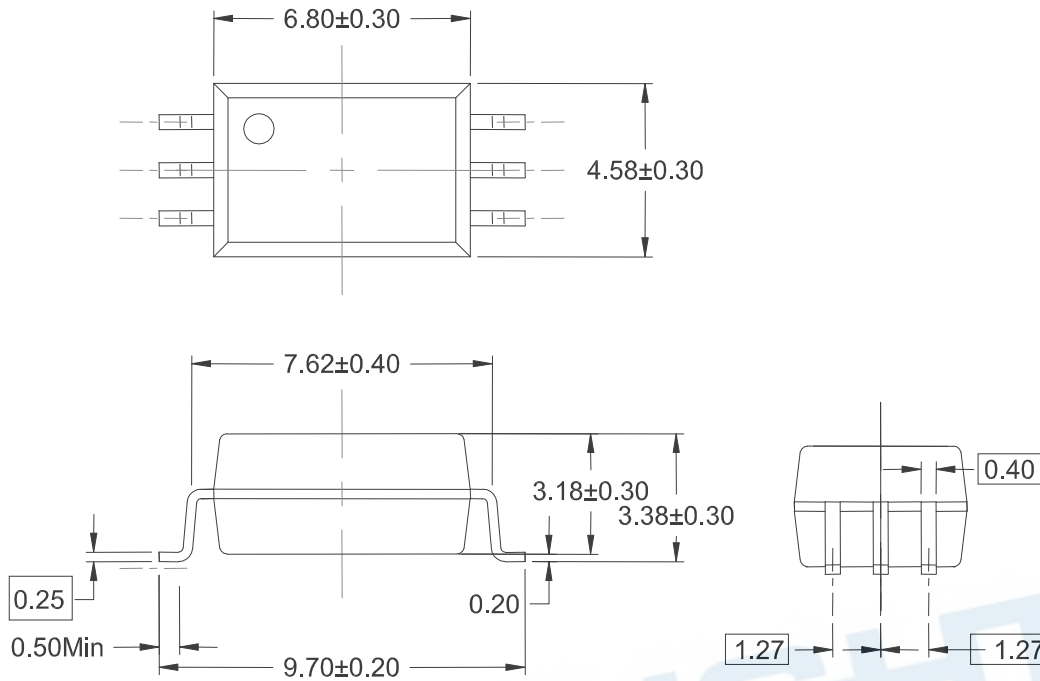
Note

EL = denotes EVERLIGHT
S511 = part no.
X = lead type(P, W)
Y = Tape and reel option (TA, TB or none).
V = VDE (optional)

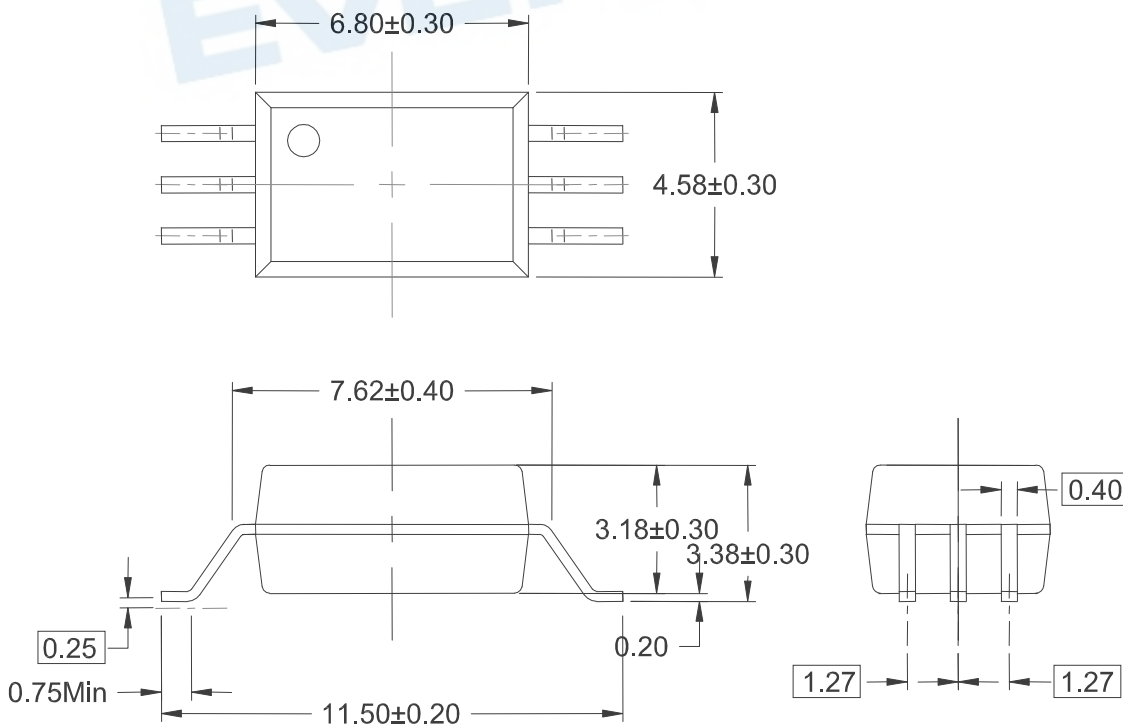
Option	Description	Packing quantity
None	Surface mount lead form	45 units per tube
P(TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
W(TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
P(TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
W(TB)	Surface mount lead form + TB tape & reel option	1000 units per reel

Package Dimension
(Dimensions in mm)

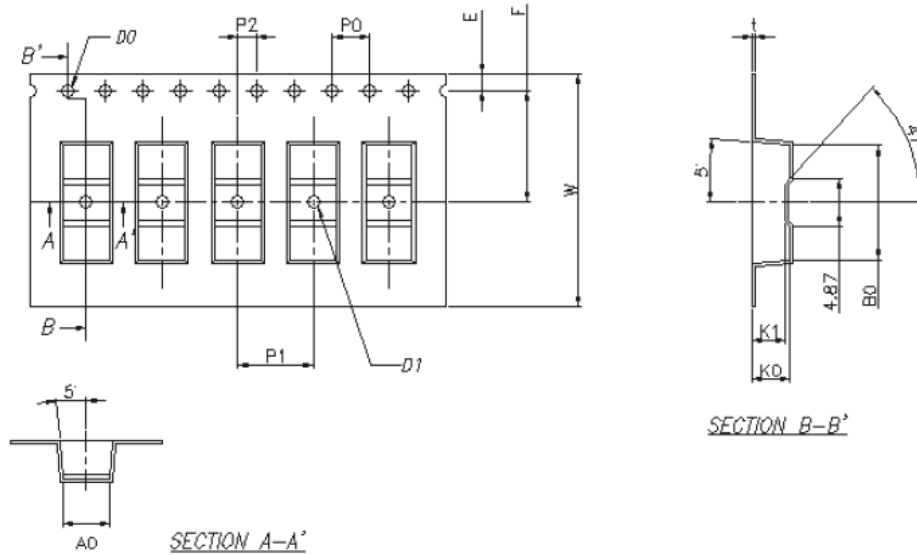
Standard P Type



Option W Type



Tape dimensions

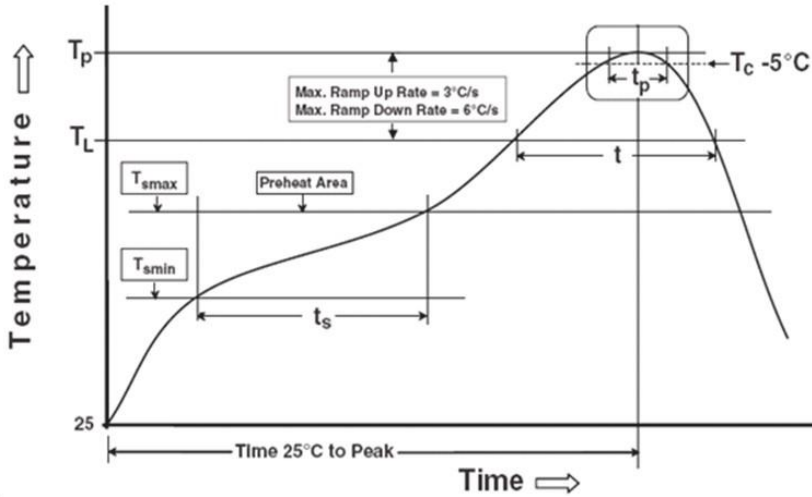


Dimension No.	A	B	Do	D1	E	F
P type Dimension(mm)	4.9± 0.10	10± 0.10	1.5+0.1/0	1.5+0.1/0	1.75± 0.10	11.5± 0.10
W type Dimension(mm)	4.9± 0.10	11.8± 0.10				
Dimension No.	Po	P1	P2	t	W	K
P/W type Dimension(mm)	4± 0.10	8± 0.10	2± 0.10	0.35± 0.05	24± 0.30	3.98± 0.10

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

DISCLAIMER

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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.
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