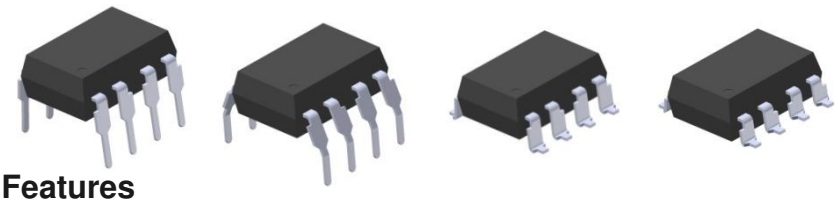
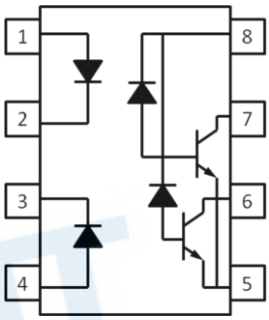
EVERLIGHT

DATASHEET

8 PIN DIP DUAL CHANNEL HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER
EL253X series



Schematic



Pin Configuration
1. Anode
2. Cathode
3. Cathode
4. Anode
5. Gnd
6. $V_{out\,2}$
7. $V_{out\,1}$
8. V_{CC}

Features

- High speed 1Mbit/s
- 10kV/μs min. common mode transient immunity (EL2611)
- Guaranteed performance from -40 to 85℃
- Logic gate output
- High isolation voltage between input and output (Viso=5000 V rms)
- Pb free and RoHS compliant.
- UL and cUL approved(No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

Description

The EL2530 and EL2531 dual channel 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 8-pin DIP package and available in wide-lead spacing and SMD option.

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

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℃)

	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 (≤1μs P.W,300pps)	I_{Ftrans}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P_{IN}	45	mW
Output	Power dissipation	P_O	35	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
Isolation voltage *1		V_{ISO}	5000	Vrms
Operating temperature		T_{OPR}	-40~+100	°C
Storage temperature		T_{STG}	-40~+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, T_A=25℃
Reverse voltage	V_R	5.0	-	-	V	I_R = 10μA
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	-	-1.9	-	mV/°C	I_F = 16mA
Input capacitance	C_{IN}	-	60	-	pF	V_F=0V, f=1MHz

Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Conditions
Logic High Output Current	I_{OH}	-	0.001	0.5	μA	I_F=0mA, V_O=V_{CC}=5.5V, T_A=25°C
		-	-	50		I_F=0mA, V_O=V_{CC}=15V T_A=25°C
Logic Low Supply Current	I_{CCL}	-	140	400	μA	I_{F1}=I_{F2}16mA, V_O=Open, V_{CC}=15V
Logic High Supply Current	I_{CCH}	-	0.01	1	μA	I_F=0mA, V_O=Open, V_{CC}=15V, T_A=25°C
		-	-	4		I_F=0mA, V_O=Open, V_{CC}=15V

* Typical values at T_A = 25°C

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

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Conditions
Current Transfer Ratio	EL2530	CTR	7	-	50	%	I_F = 16mA ,V_O = 0.4V, V_{CC}=4.5V, T_A=25°C
	EL2531		19	-	50		
	EL2530		5	-	-		I_F = 16mA ,V_O = 0.5V, V_{CC}=4.5V
	EL2531		15	-	-		
Logic Low Output Voltage	EL2530	V_{OL}	-	0.18	0.5	V	I_F = 16mA ,I_O = 1.1mA, V_{CC}=4.5V, T_A=25°C
	EL2531		-	0.25	0.5		I_F = 16mA ,I_O = 3mA, V_{CC}=4.5V, T_A=25°C
	EL2530		-	-	0.5		I_F = 16mA ,I_O = 0.8mA, V_{CC}=4.5V
	EL2531		-	-	0.5		I_F=16mA ,I_O=2.4mA, V_{CC}=4.5V

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

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Conditions
Propagation Delay Time to Logic Low (Fig.8)	EL2530	t_{PHL}	-	0.35	1.5	µs	R_L=4.1KΩ, T_A=25°C
			-	-	2.0		R_L=4.1KΩ
	EL2531		-	0.35	0.8		R_L=1.9KΩ, T_A=25°C
			-	-	1.0		R_L=1.9KΩ
Propagation Delay Time to Logic High (Fig.8)	EL2530	t_{PLH}	-	0.5	1.5	µs	R_L=4.1KΩ, T_A=25°C
			-	-	2.0		R_L=4.1KΩ
	EL2531		-	0.3	0.8		R_L=1.9KΩ, T_A=25°C
			-	-	1.0		R_L=1.9KΩ
Common Mode Transient Immunity at Logic High (Fig.9)*3	EL2530	CM_H	1,000	10,000	-	V/µs	I_F = 0mA , V_{CM}=10V_{p-p}, R_L=4.1KΩ, T_A =25°C
	EL2531		1,000	10,000	-		I_F = 0mA , V_{CM}=1000V_{p-p}, R_L=1.9KΩ, T_A =25°C
Common Mode Transient Immunity at Logic Low (Fig.9)*3	EL2530	CM_L	1,000	10,000	-	V/µs	I_F = 16mA , V_{CM}=10V_{p-p}, R_L=4.1KΩ, T_A =25°C
	EL2531		1,000	10,000	-		I_F = 16mA , V_{CM}=1000V_{p-p}, R_L=1.9KΩ, T_A=25°C

* Typical values at T_A = 25°C

Typical Electro-Optical Characteristics Curves

Fig.1 Forward Current vs. Forward Voltage

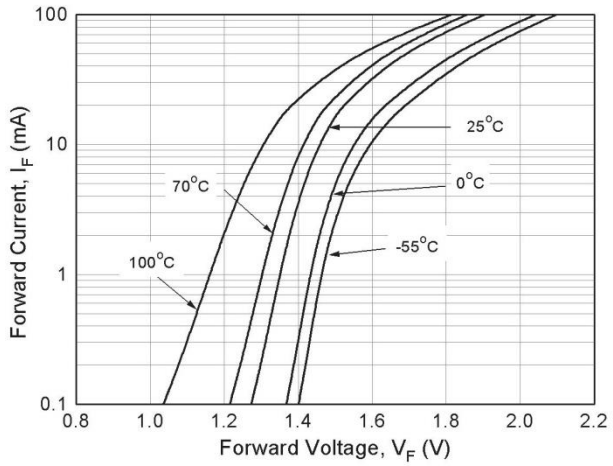


Fig.2 Normalized Current Transfer Ratio vs. Forward Current

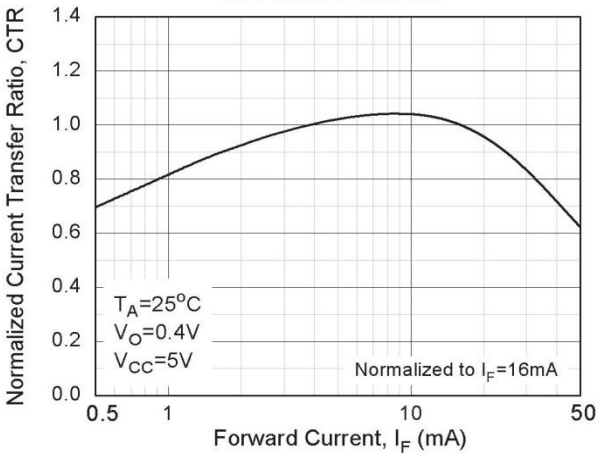


Fig.3 Normalized Current Transfer Ratio vs. Ambient Temperature

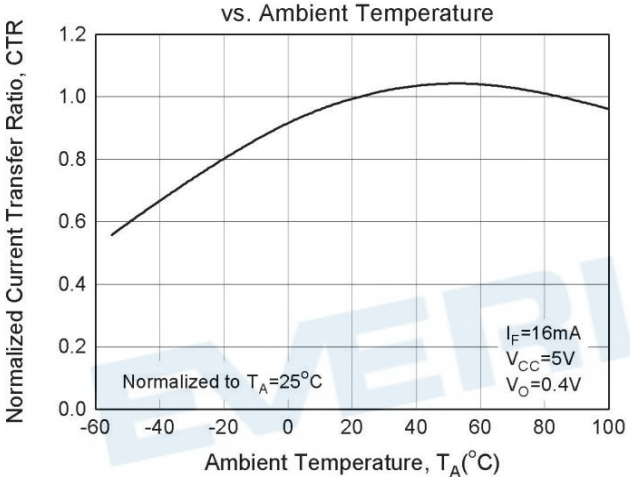


Fig.4 Output Current vs Output Voltage

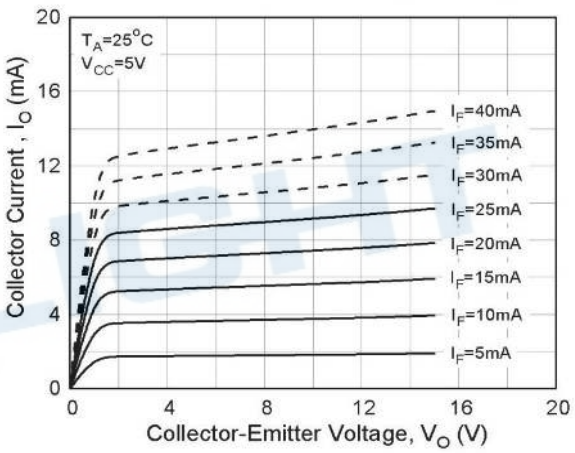


Fig.5 Logic High Output Current vs. Temperature

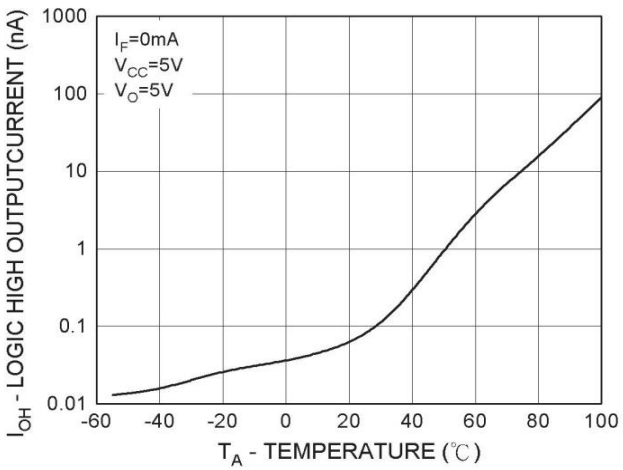


Fig.6 Propagation Delay vs. Load Resistance

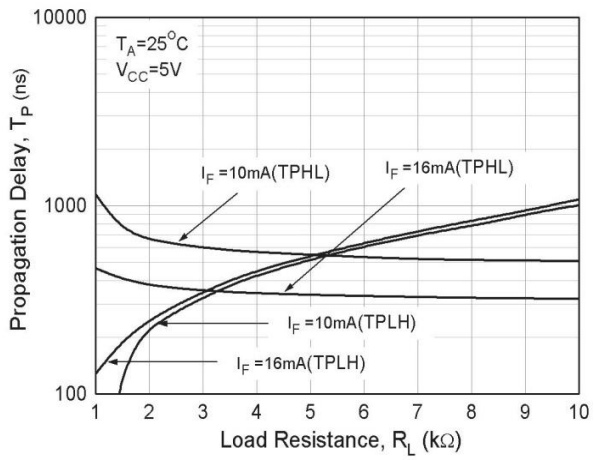


Fig. 8 Switching Time Test Circuit & Waveform

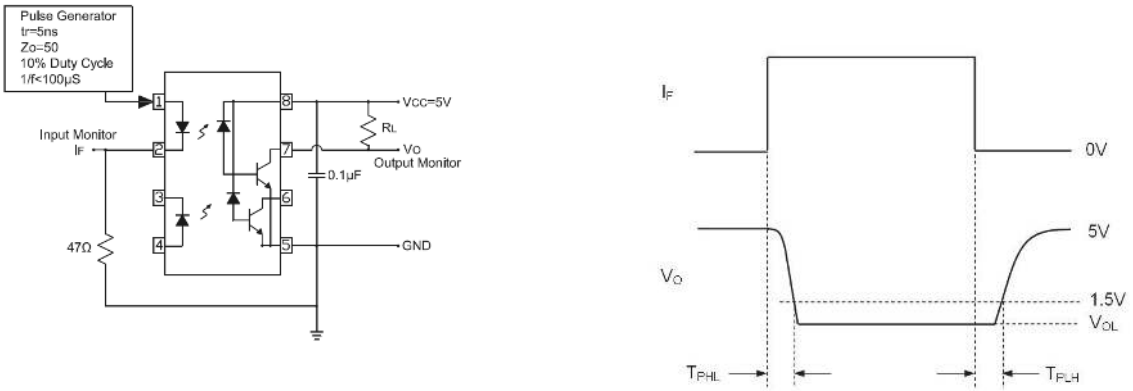
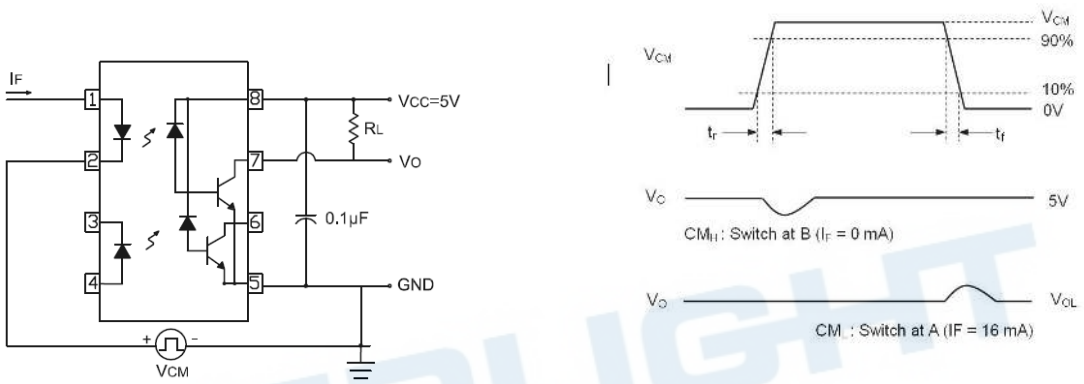


Fig. 9 Transient Immunity Test Circuit & Waveform



Note:

*3 Common mode transient immunity in logic high level is the maximum tolerable (positive) dVcm/dt on the leading edge of the common mode pulse signal VCM, 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) dVcm/dt on the trailing edge of the common mode pulse signal, VCM, to assure that the output will remain in a logic low state (i.e., V_O < 0.8V).

Order Information

Part Number

EL253XY(Z)-V

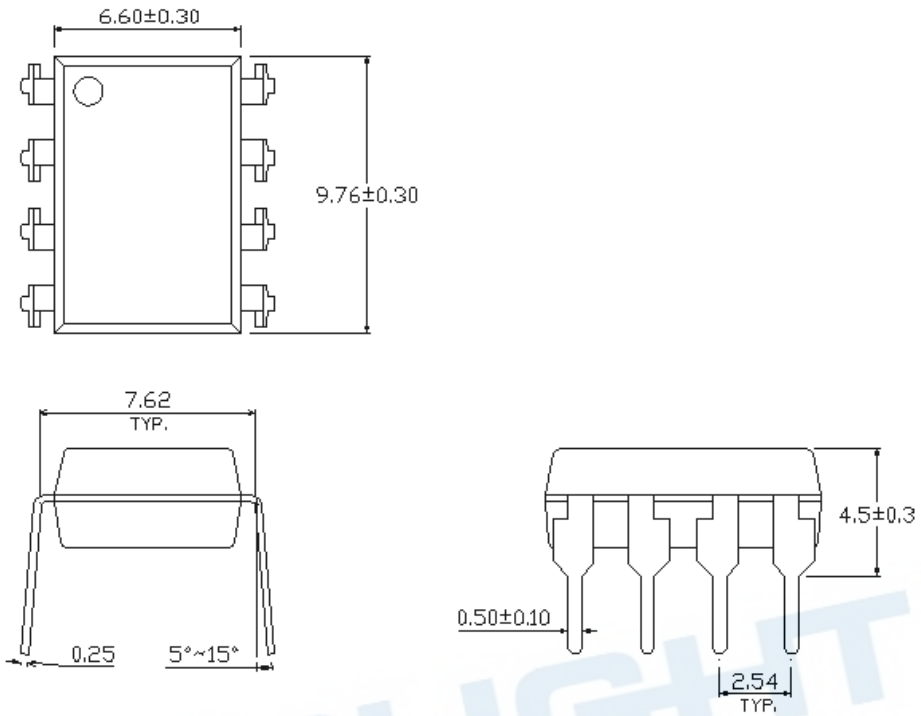
Note

X = Part no. (0 or 1)
Y = Lead form option (S, S1, M or none)
Z = Tape and reel option (TA, TB or none)
V = VDE (optional)

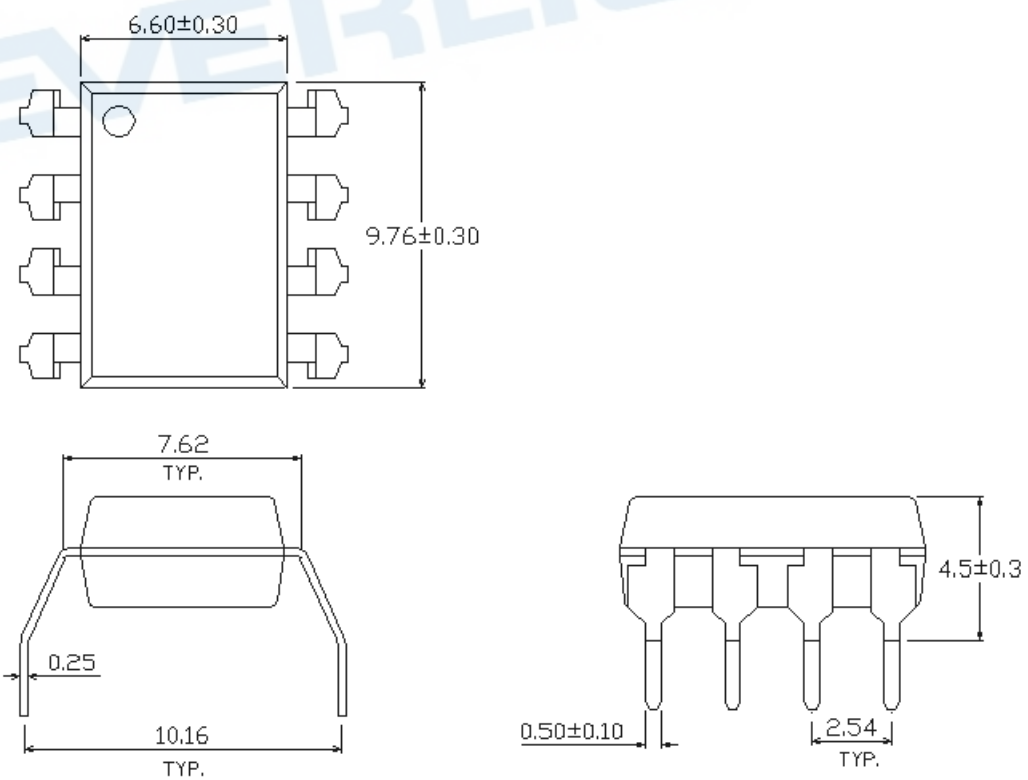
Option	Description	Packing quantity
None	Standard DIP-8	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
S1 (TB)	Surface mount lead form (low profile) + TB tape & reel option	1000 units per reel

Package Dimension
(Dimensions in mm)

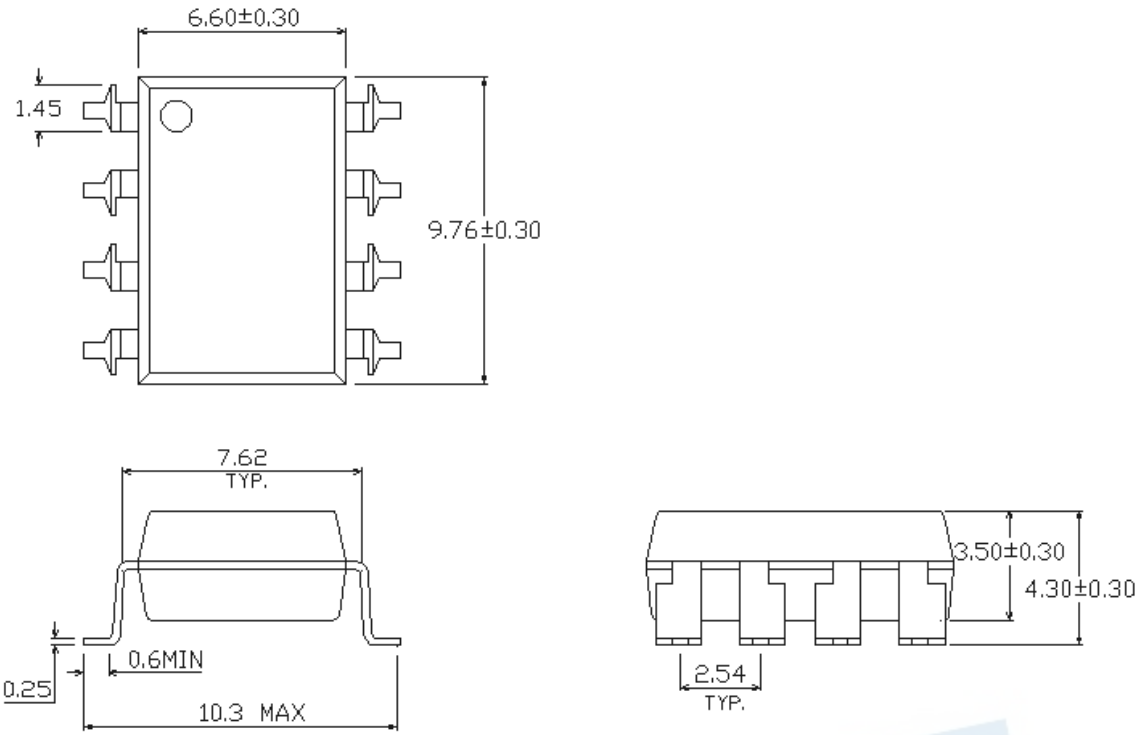
Standard DIP Type



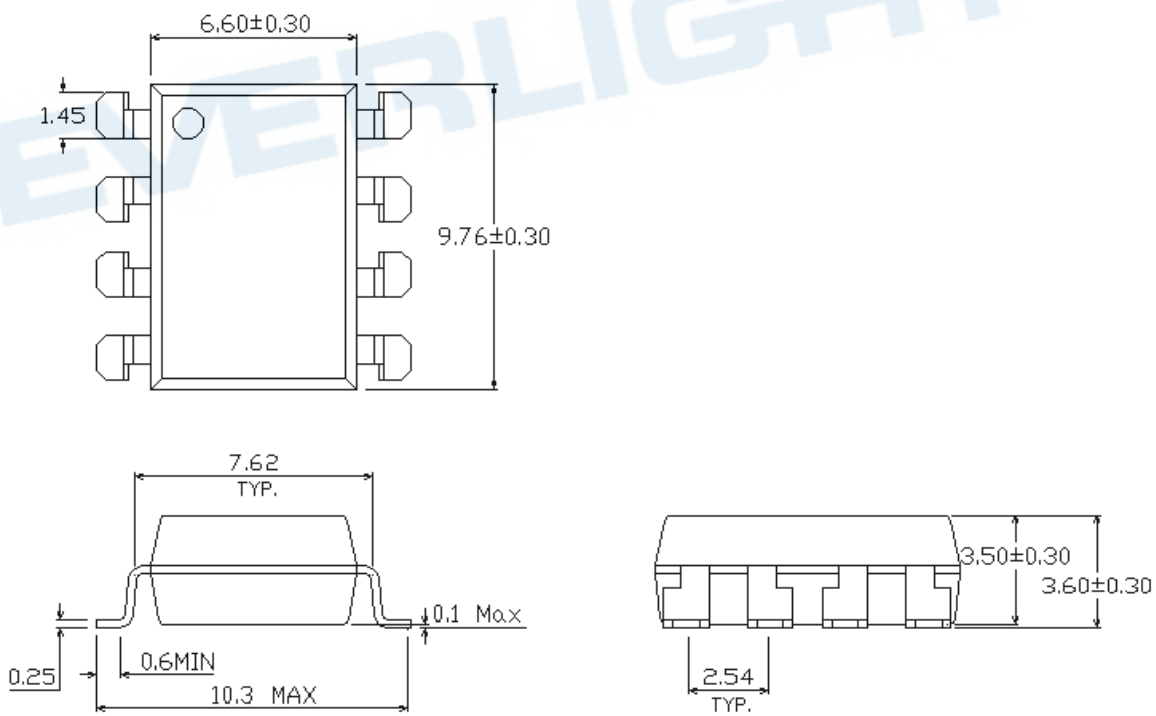
Option M Type



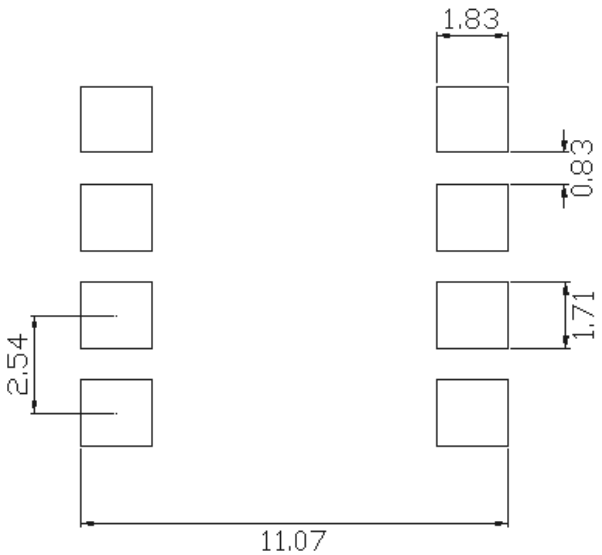
Option S Type



Option S1 Type

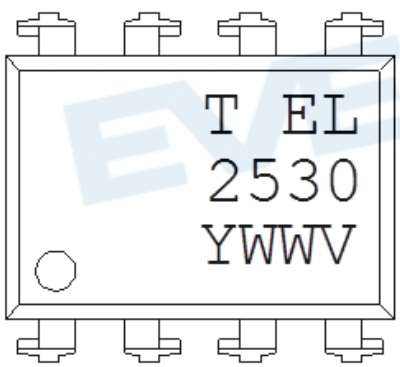


Recommended pad layout for surface mount leadform



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

Device Marking

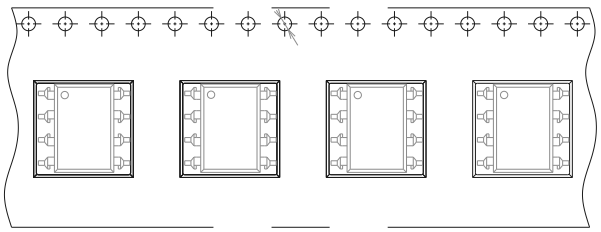


Notes

T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes EVERLIGHT
2530	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

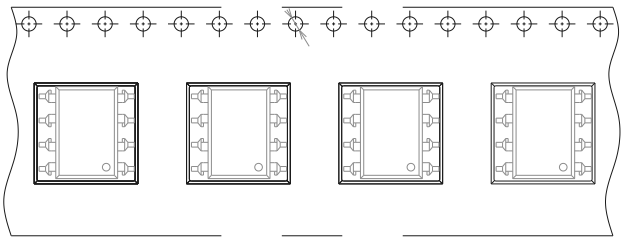
Tape & Reel Packing Specifications

Option TA



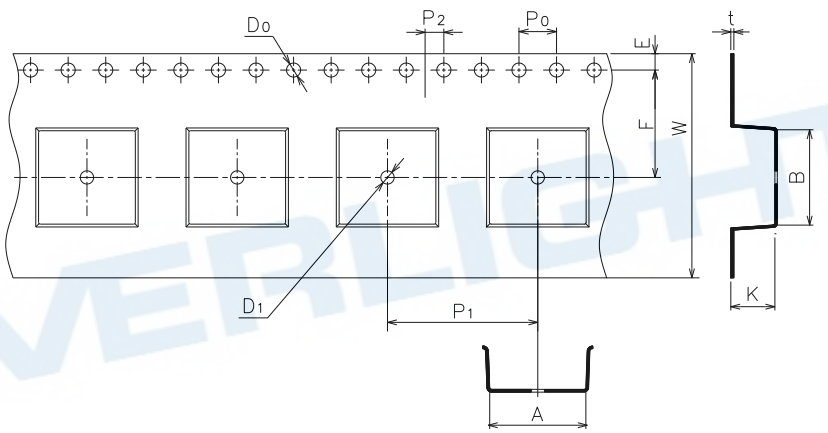
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimension

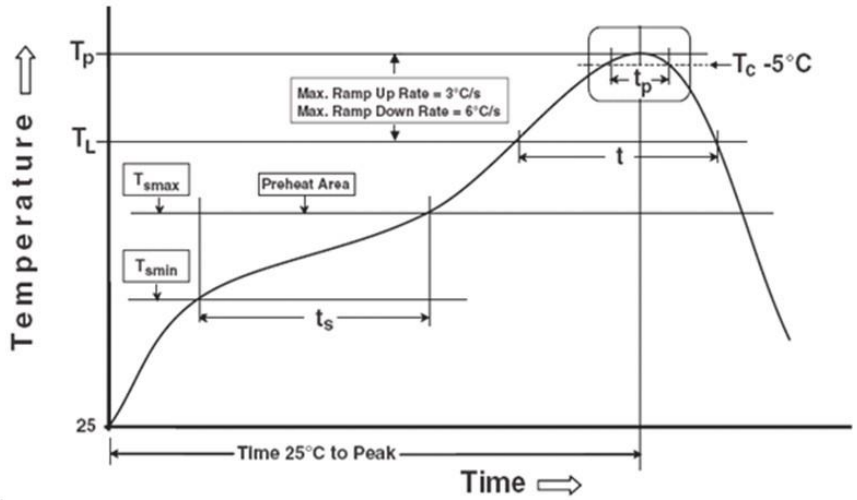


Dimension No.	**A**	**B**	**Do**	**D1**	**E**	**F**
Dimension(mm)	10.4±0.1	10.0±0.1	1.5+0.1/-0	1.5±0.25	1.75±0.1	7.5±0.1
Dimension No.	**Po**	**P1**	**P2**	**t**	**W**	**K**
Dimension(mm)	4.0±0.1	12.0±0.1	2.0±0.05	0.4±0.05	16.0±0.3	4.5±0.1

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

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.
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