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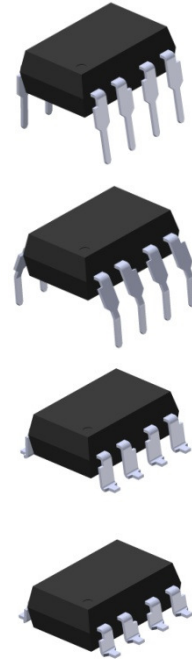


## 8 PIN DIP DUAL CHANNEL HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

EL253X 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 -40°C to 85°C
- Pb free and RoHS compliant
- UL approved (No. 214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved
- CQC approved



### Description

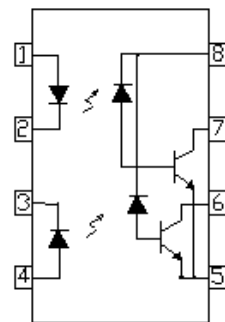
The EL2530 and EL2531 dual channel devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photodiode bias and output-transistor collector increase the speed by several orders of magnitude over conventional phototransistor 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

Schematic



Pin Configuration

1. Anode
2. Cathode
3. Cathode
4. Anode
5. Gnd
6. Vout2
7. Vout1
8. VCC

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#### Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

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 ( $\leq 1\mu\text{s}$ P.W, 300pps)	$I_{Ftrans}$	1	A
	Reverse voltage	$V_R$	5	V
	Power dissipation	$P_{IN}$	45	mW
Output	Power dissipation	$P_O$	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 <sup>*1</sup>		$V_{ISO}$	5000	V rms
Operating temperature		$T_{OPR}$	-40 ~ +100	$^\circ\text{C}$
Storage temperature		$T_{STG}$	-40 ~ +125	$^\circ\text{C}$
Soldering temperature <sup>*2</sup>		$T_{SOL}$	260	$^\circ\text{C}$

#### 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.

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

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#### Electrical Characteristics ( $T_A=0$ to $70^\circ\text{C}$ unless specified otherwise)

##### Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Conditions
Forward voltage	$V_F$	-	1.45	1.8	V	$I_F = 16\text{mA}$ , $T_A = 25^\circ\text{C}$
Reverse Voltage	$V_R$	5.0	-	-	V	$I_R = 10\mu\text{A}$
Temperature coefficient of forward voltage	$V_F/T_A$	-	-1.9	-	mV/ $^\circ\text{C}$	$I_F = 16\text{mA}$
Input Capacitance	$C_{IN}$	-	60	-	pF	$V_F = 0\text{V}$ , $f = 1\text{MHz}$

##### Output

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

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

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

### EL253X series

#### Transfer Characteristics (T<sub>A</sub>=0 to 70°C unless specified otherwise)

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Conditions
Current Transfer Ratio	EL2530	CTR	7	-	50	%	I <sub>F</sub> = 16mA, V <sub>O</sub> = 0.4V, V <sub>CC</sub> =4.5V, T <sub>A</sub> =25°C
	EL2531		19	-	50		
	EL2530		5	-	-		
	EL2531		15	-	-		
Logic Low Output Voltage	EL2530	V <sub>OL</sub>	-	0.18	0.5	V	I <sub>F</sub> = 16mA, I <sub>O</sub> = 1.1mA, V <sub>CC</sub> =4.5V, T <sub>A</sub> =25°C
	EL2531		-	0.25	0.5		
	EL2530		-	-	0.5		
	EL2531		-	-	0.5		

#### Switching Characteristics (T<sub>A</sub>=0 to 70°C unless specified otherwise, I<sub>F</sub>=16mA, V<sub>CC</sub>=5V)

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Conditions
Propagation Delay Time to Logic Low (Fig.8)	EL2530	t <sub>PHL</sub>	-	0.35	1.5	μs	R <sub>L</sub> =4.1KΩ, T <sub>A</sub> =25°C
			-	-	2.0		R <sub>L</sub> =4.1KΩ
	EL2531		-	0.35	0.8		R <sub>L</sub> =1.9KΩ, T <sub>A</sub> =25°C
			-	-	1.0		R <sub>L</sub> =1.9KΩ
Propagation Delay Time to Logic High (Fig.8)	EL2530	t <sub>PLH</sub>	-	0.5	1.5	μs	R <sub>L</sub> =4.1KΩ, T <sub>A</sub> =25°C
			-	-	2.0		R <sub>L</sub> =4.1KΩ
	EL2531		-	0.3	0.8		R <sub>L</sub> =1.9KΩ, T <sub>A</sub> =25°C
			-	-	1.0		R <sub>L</sub> =1.9KΩ
Common Mode Transient Immunity at Logic High (Fig.9) <sup>*3</sup>	EL2530	CM <sub>H</sub>	1,000	10,000	-	V/μs	I <sub>F</sub> = 0mA, V <sub>CM</sub> =10Vp-p, R <sub>L</sub> =4.1KΩ, T <sub>A</sub> =25°C
	EL2531		1,000	10,000	-		I <sub>F</sub> = 0mA, V <sub>CM</sub> =1000Vp-p, R <sub>L</sub> =1.9KΩ, T <sub>A</sub> =25°C
Common Mode Transient Immunity at Logic Low (Fig.9) <sup>*3</sup>	EL2530	CM <sub>L</sub>	1,000	10,000	-	V/μs	I <sub>F</sub> = 16mA, V <sub>CM</sub> =10Vp-p, R <sub>L</sub> =4.1KΩ, T <sub>A</sub> =25°C
	EL2531		1,000	10,000	-		I <sub>F</sub> = 16mA, V <sub>CM</sub> =1000Vp-p, R <sub>L</sub> =1.9KΩ, T <sub>A</sub> =25°C

\* Typical values at T<sub>A</sub> = 25°C

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

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### Typical Performance Curves

Fig.1 Forward Current vs. Forward Voltage

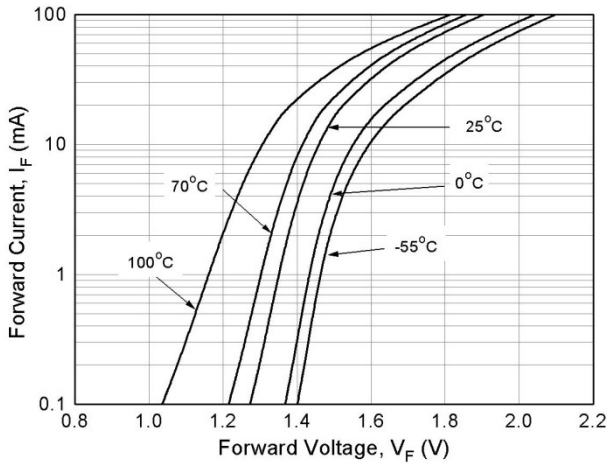


Fig.2 Normalized Current Transfer Ratio vs. Forward Current

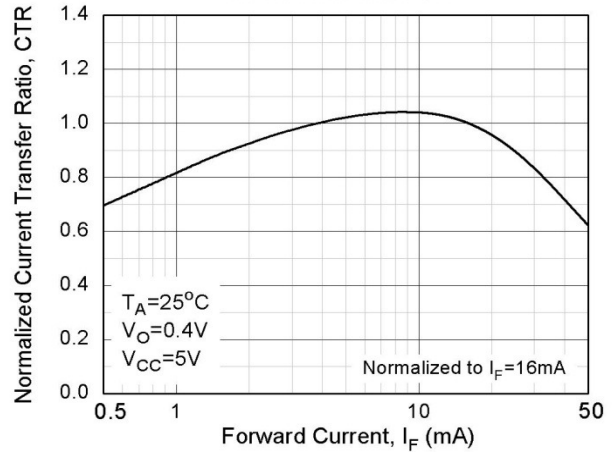


Fig.3 Normalized Current Transfer Ratio vs. Ambient Temperature

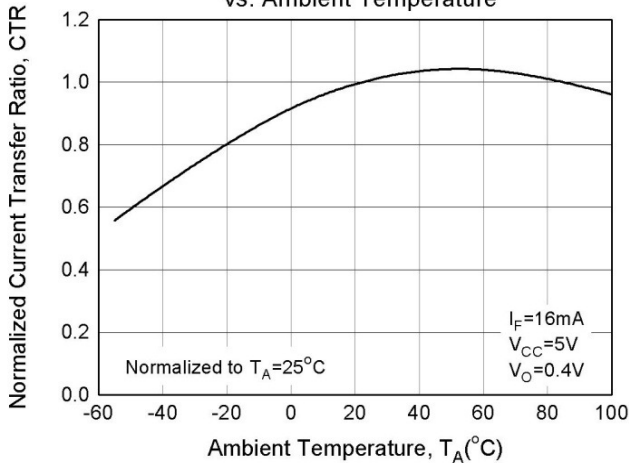


Fig.4 Output Current vs Output Voltage

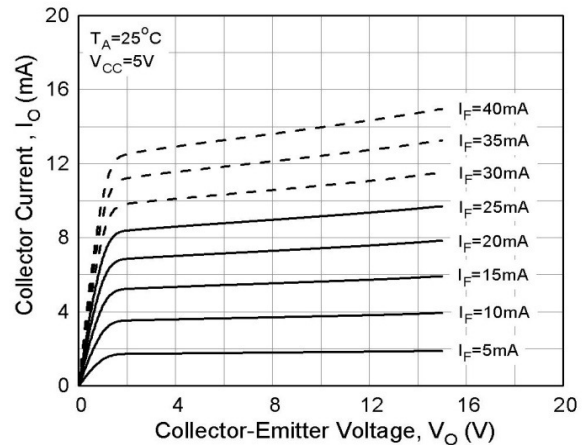


Fig.5 Logic High Output Current vs. Temperature

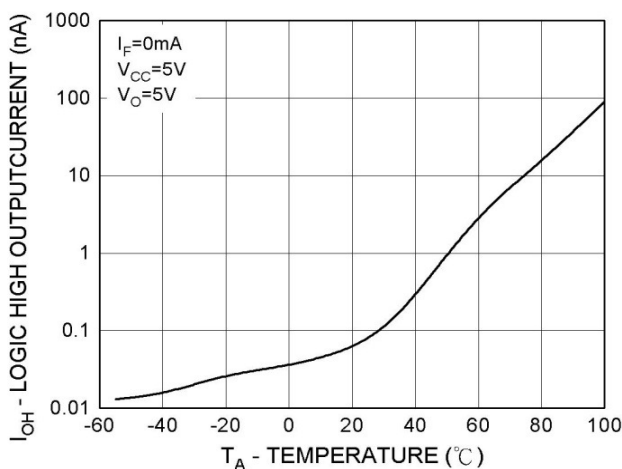
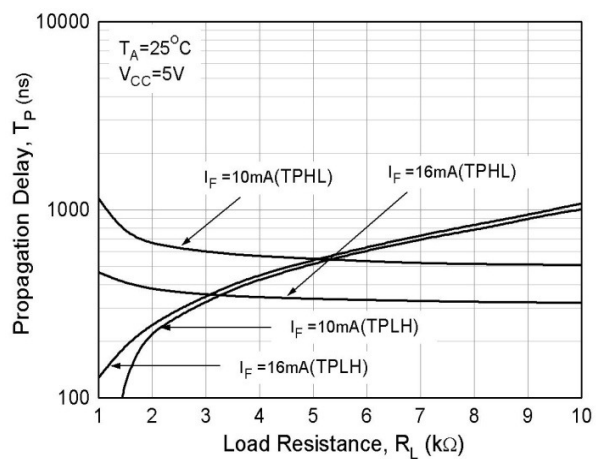


Fig.6 Propagation Delay vs. Load Resistance



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

### EL253X series

Fig.7 Propagation Delay vs. Temperature

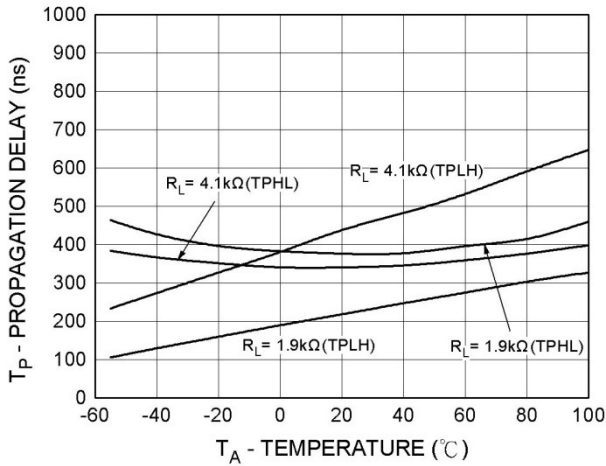


Figure 8 Switching Time Test Circuit & Waveform

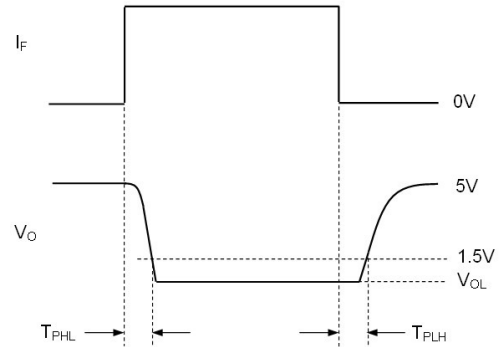
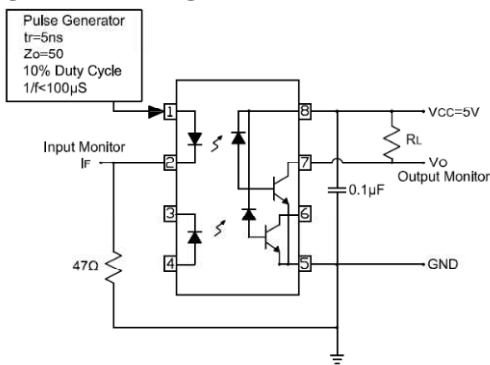
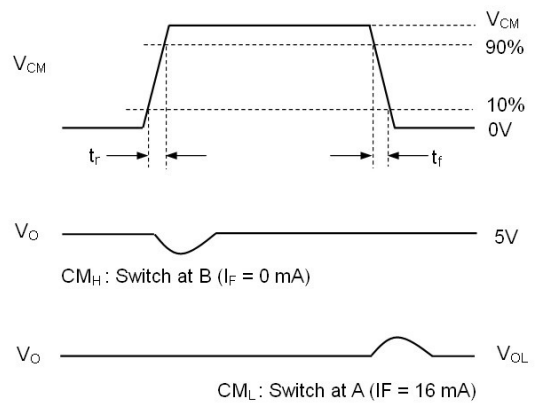
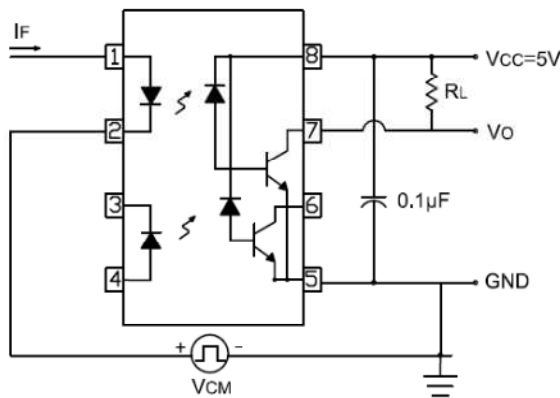


Figure 9 Transient Immunity Test Circuit & Waveform



**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.,  $V_O < 0.8V$ ).

**8 PIN DIP DUAL CHANNEL HIGH SPEED  
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**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)

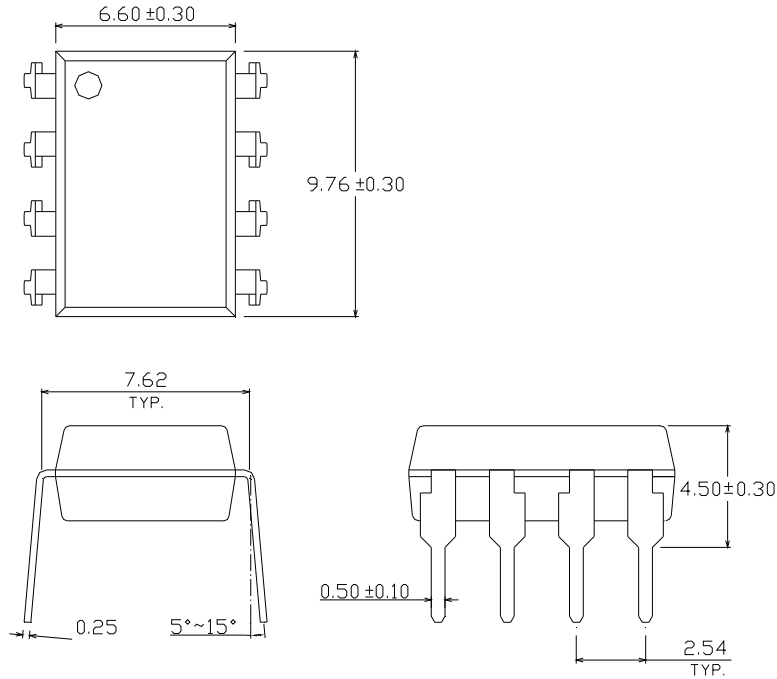
Option	Description	Packing quantity
None	Standard DIP-8	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

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

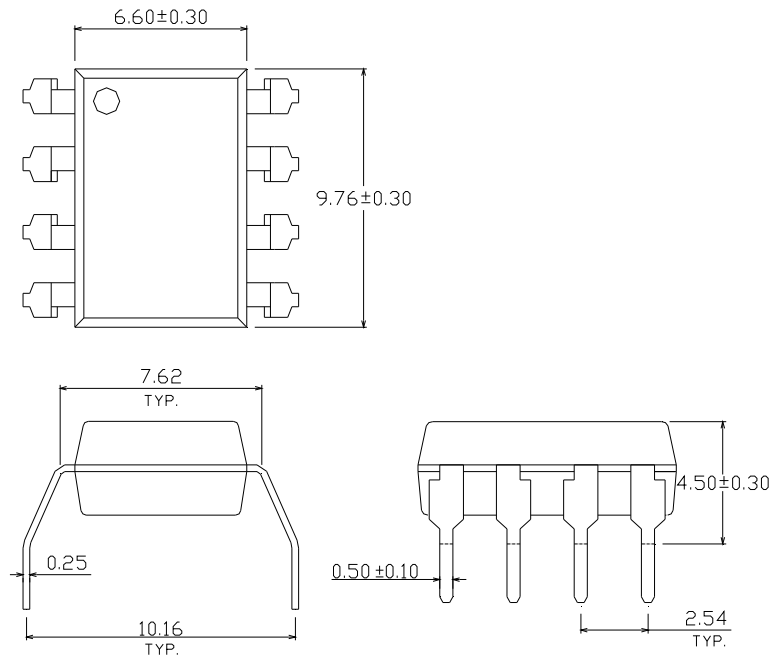
EL253X series

### Package Drawing (Dimensions in mm)

#### Standard DIP Type



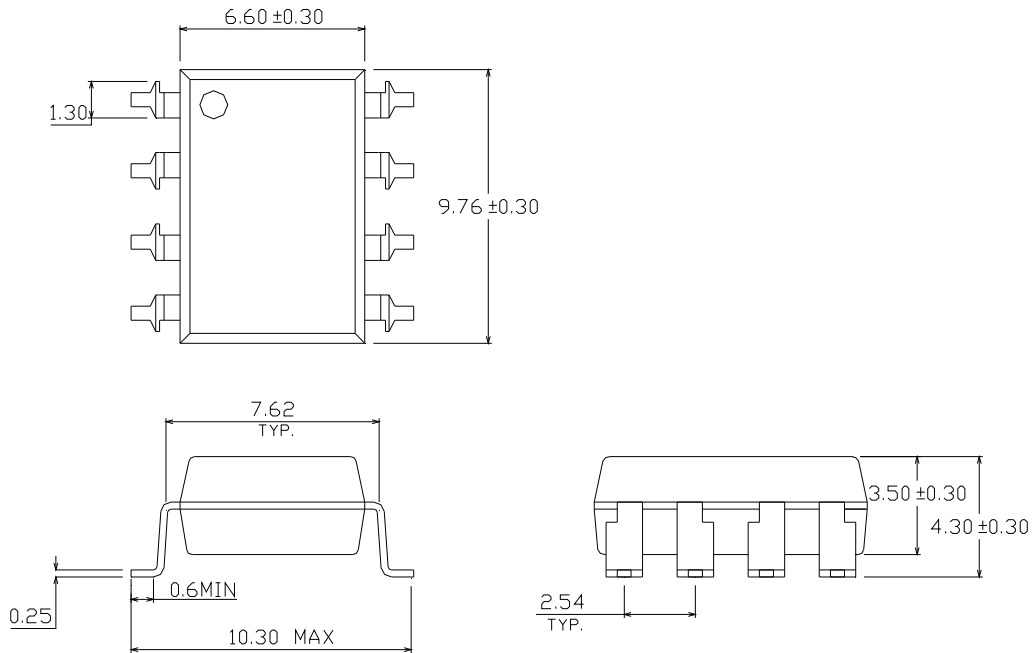
#### Option M Type



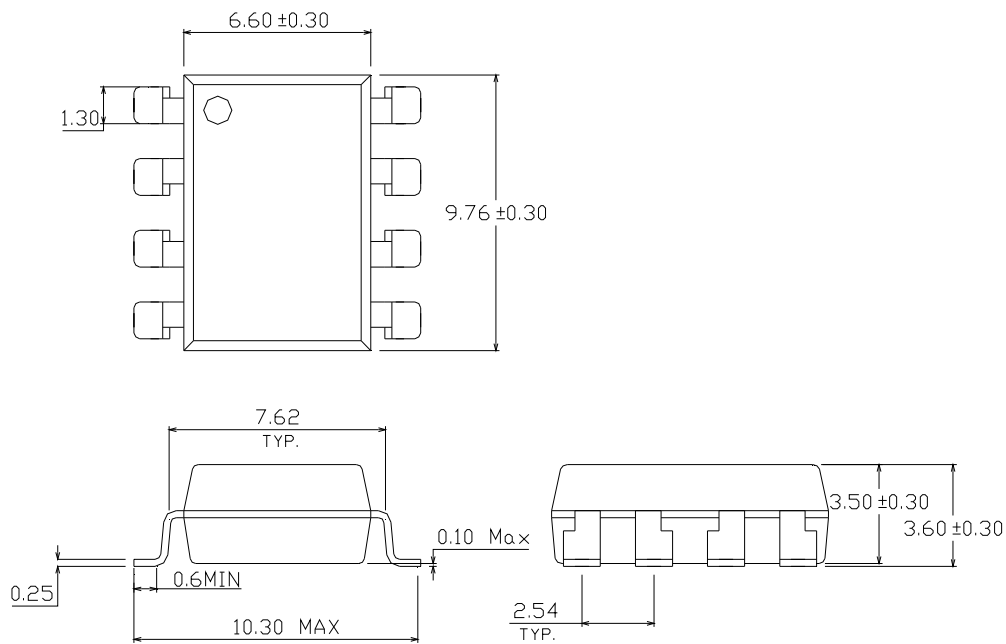
## 8 PIN DIP DUAL CHANNEL HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

### EL253X series

#### Option S Type



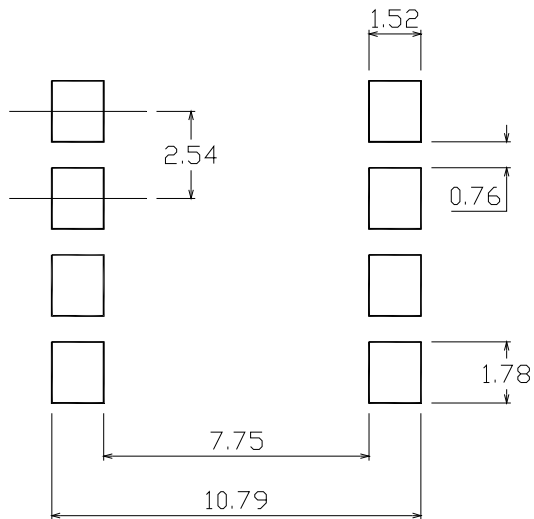
#### Option S1 Type



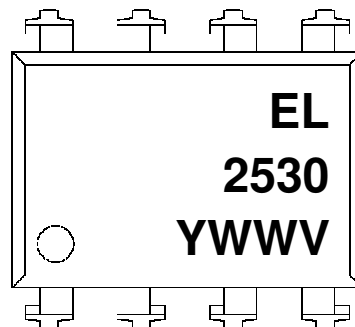
## 8 PIN DIP DUAL CHANNEL HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

EL253X series

### Recommended pad layout for surface mount leadform



### Device Marking



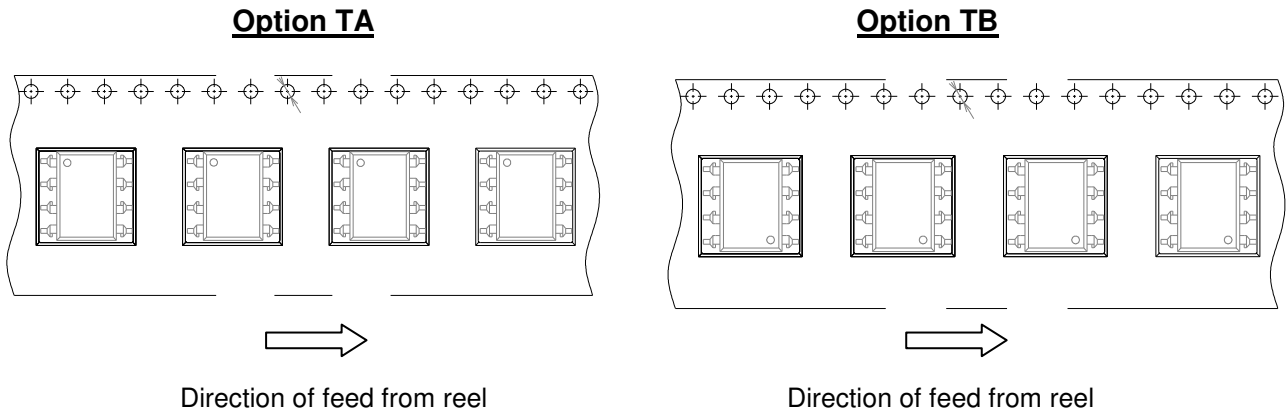
### Notes

- 2530 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

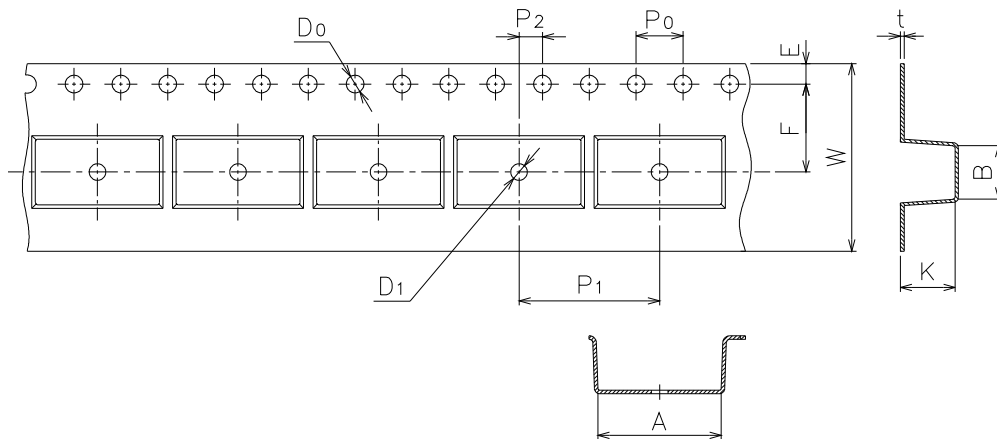
## 8 PIN DIP DUAL CHANNEL HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

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### Tape & Reel Packing Specifications



### Tape dimensions

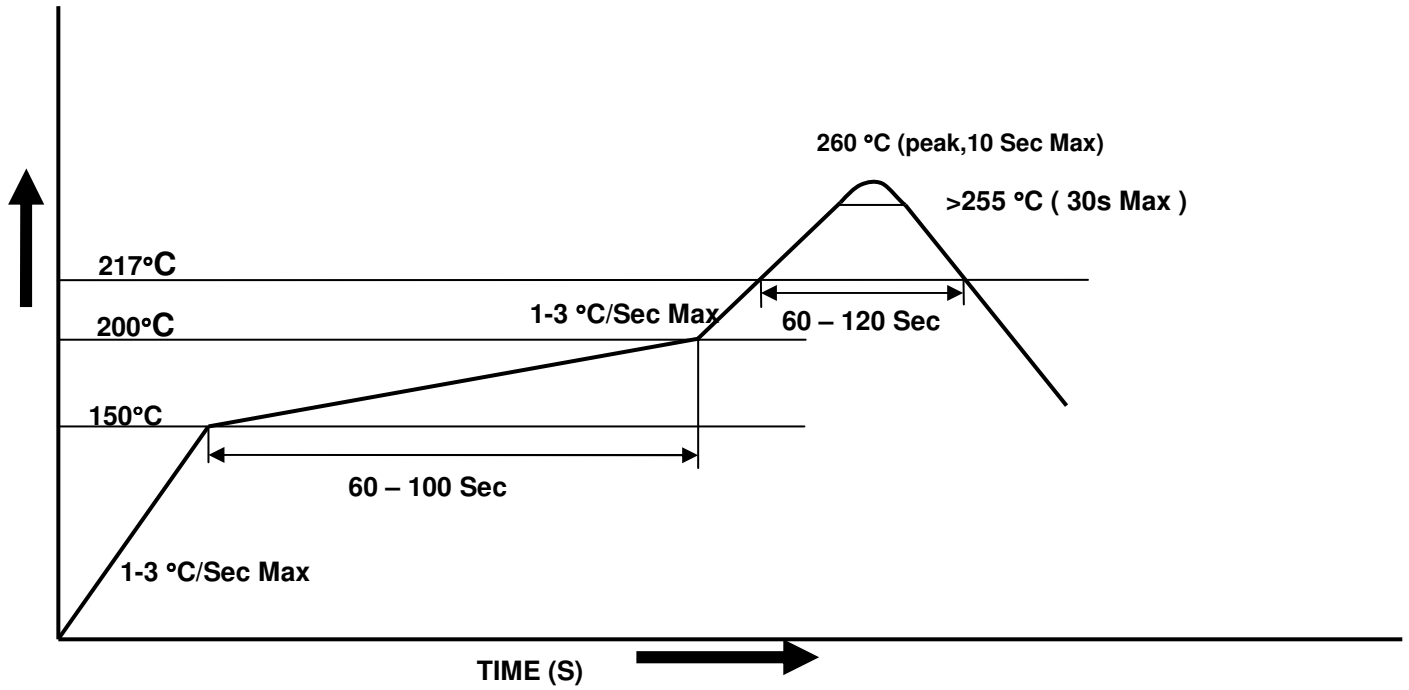


Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension(mm)	10.4±0.1	10.0±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension(mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0+0.3/ -0.1	4.5±0.1

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

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### Solder Reflow Temperature Profile



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

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