

## 6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

## TIL11X Series MCT2X Series

### Features

- TIL11X series: TIL111, TIL117
- MCT2X series: MCT2, MCT2E
- High isolation voltage between input and output  
Viso = 5000 Vrms
- Creepage distance >7.6mm
- Compact dual-in-line package
- Operating temperature up to +110°C
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approval
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approval

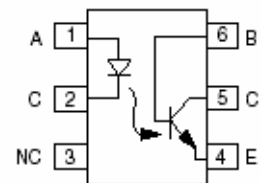


### Description

The TIL11X series and MCT2X series of devices each consist of an infrared emitting diode optically coupled to a phototransistor detector.

They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

### Schematic



1. Anode
2. Cathode
3. No Connection
4. Emitter
5. Collector
6. Base

### Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance system
- Industrial controls

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

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	50	mA
	Peak forward current (t = 10 $\mu$ s)	$I_{FM}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation	$P_D$	70	mW
	Derating factor (above 100 $^{\circ}$ C)		3.8	mW/ $^{\circ}$ C
Output	Collector power dissipation	$P_C$	150	mW
	Derating factor (above 100 $^{\circ}$ C)		9.0	mW/ $^{\circ}$ C
	Collector-Emitter voltage	$V_{CEO}$	80	V
	Collector-Base voltage	$V_{CBO}$	80	V
	Emitter-Collector voltage	$V_{ECO}$	7	V
Total power dissipation		$P_{tot}$	200	mW
Isolation voltage <sup>*2</sup>		$V_{iso}$	5000	V <sub>rms</sub>
Operating temperature		$T_{opr}$	-55~+110	$^{\circ}$ C
Storage temperature		$T_{stg}$	-55~+125	$^{\circ}$ C
Soldering temperature <sup>*3</sup>		$T_{sol}$	260	$^{\circ}$ C

### Notes

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

\*2 For 10 seconds.

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## Electrical Characteristics (T<sub>A</sub>=25°C unless specified otherwise)

### Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	TIL111	-	1.22	1.4	V	I <sub>F</sub> = 16mA
	TIL117	-	-	1.4		T <sub>A</sub> =0-70°C, I <sub>F</sub> = 16mA
		-	1.32	-		T <sub>A</sub> = -55°C, I <sub>F</sub> = 16mA
		-	1.1	-		T <sub>A</sub> =110°C, I <sub>F</sub> = 16mA
	MCT2 MCT2E	-	1.23	1.5		I <sub>F</sub> = 20mA
Reverse current	I <sub>R</sub>	-	-	10	μA	V <sub>R</sub> = 6V

### Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Base dark current	I <sub>CB0</sub>	-	-	20	nA	V <sub>CB</sub> = 10V
Collector-Emitter dark current	All	-	1	50	nA	V <sub>CE</sub> = 10V, I <sub>F</sub> = 0mA
	TIL117	-	0.2	50	nA	V <sub>CE</sub> = 30V, I <sub>F</sub> = 0mA, T <sub>A</sub> =70°C
Collector-Emitter breakdown voltage	BV <sub>CEO</sub>	80	-	-	V	I <sub>C</sub> = 1mA
Collector-Base breakdown voltage	BV <sub>CBO</sub>	80	-	-	V	I <sub>C</sub> = 0.01mA
Emitter-Collector breakdown voltage	BV <sub>ECO</sub>	7	-	-	V	I <sub>E</sub> = 0.1mA
Emitter-Base breakdown voltage	BV <sub>EBO</sub>	7	-	-	V	I <sub>E</sub> = 0.1mA

### Transfer Characteristics

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition	
Collector current (Phototransistor operation)	TIL111	I <sub>C(ON)</sub>	2	-	-	mA	I <sub>F</sub> = 16mA, V <sub>CE</sub> = 0.4V
Collector current (Photodiode operation)			7	-	-	μA	I <sub>F</sub> = 16mA, V <sub>CB</sub> = 0.4V
Current Transfer Ratio	TIL117	CTR	50	-	-	%	I <sub>F</sub> = 10mA, V <sub>CE</sub> = 10V
	MCT2 MCT2E		20	-	-		I <sub>F</sub> = 10mA, V <sub>CE</sub> = 10V



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## Transfer Characteristics

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Emitter saturation voltage	All	$V_{CE(sat)}$	-	-	0.4	V	$I_F = 16mA, I_C = 2mA$
	TIL117		-	-	0.4		$I_F = 10mA, I_C = 0.5mA$
Isolation resistance		$R_{IO}$	$10^{11}$	-	-	$\Omega$	$V_{IO} = 500Vdc$
Input-output capacitance		$C_{IO}$	-	-	2	pF	$V_{IO} = 0, f = 1MHz$
Turn-on time	TIL117	$T_{on}$	-	10	12	$\mu s$	$V_{CC} = 10V, I_C = 2mA, R_L = 100\Omega$
Turn-off time	TIL117	$T_{off}$	-	9	12		
Rise time	TIL117 TIL111	$t_r$	-	6	10		
Fall time	TIL117 TIL111	$t_f$	-	8	10		
Turn-on time	MCT2 MCT2E	$T_{on}$	-	3	10	$\mu s$	$V_{CC} = 10V, I_F = 10mA, R_L = 100\Omega$
Turn-off time	MCT2 MCT2E	$T_{off}$	-	3	10		
Rise time	MCT2 MCT2E	$t_r$	-	3	10		
Fall time	MCT2 MCT2E	$t_f$	-	3	10		

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

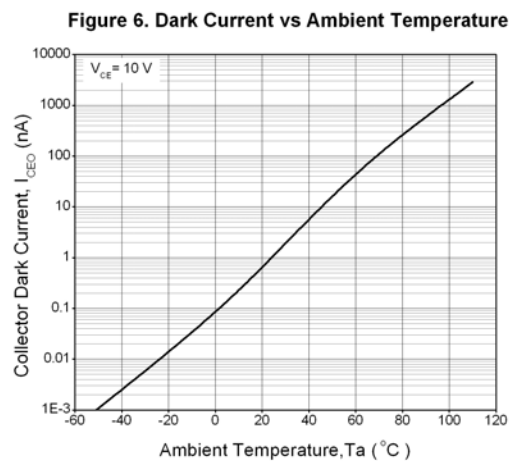
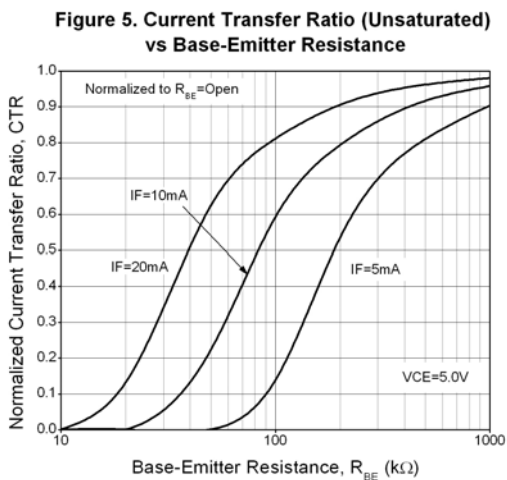
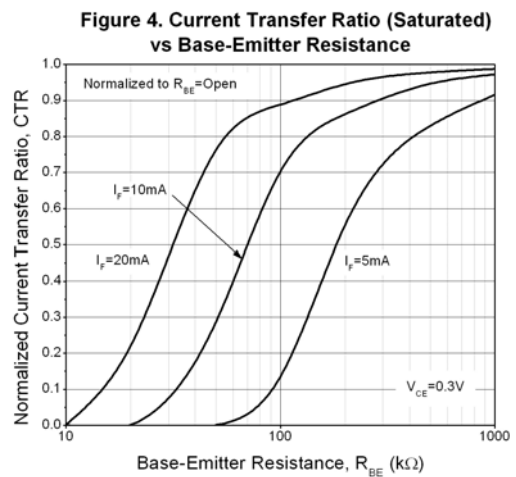
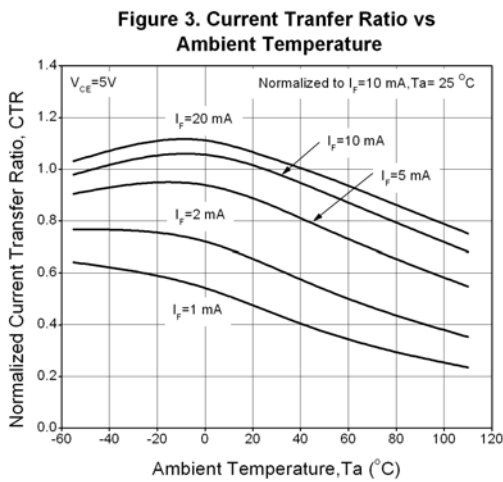
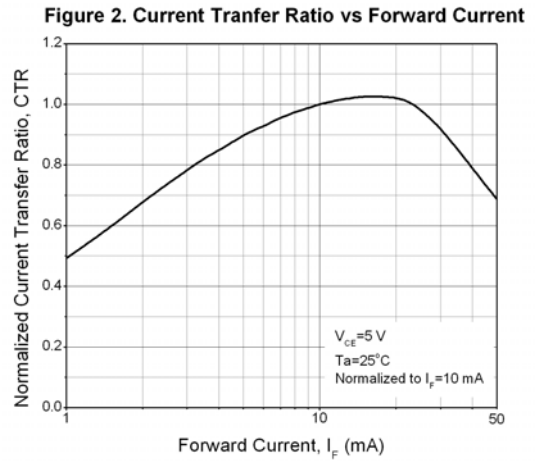
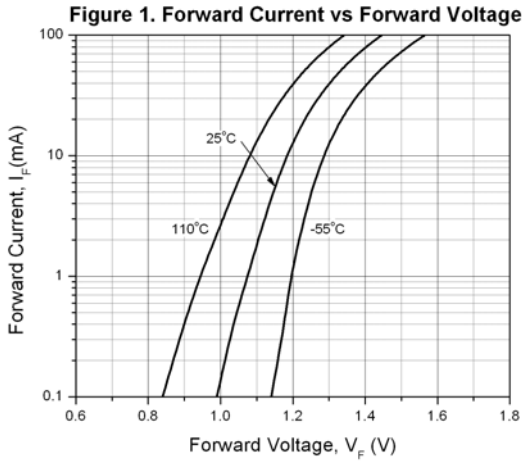


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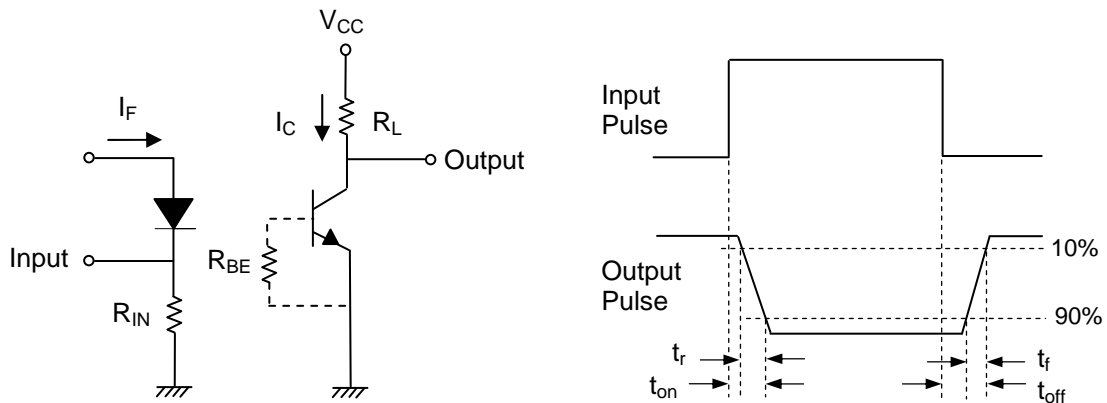
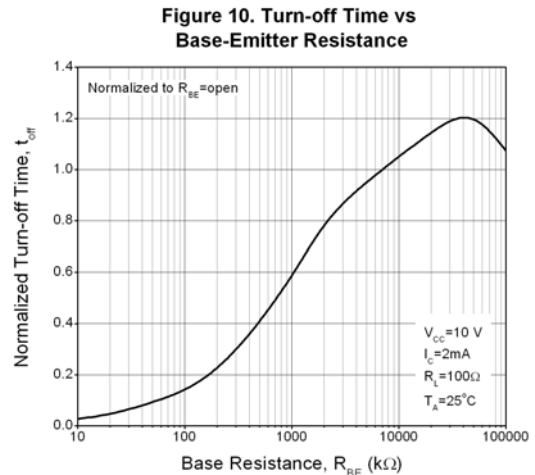
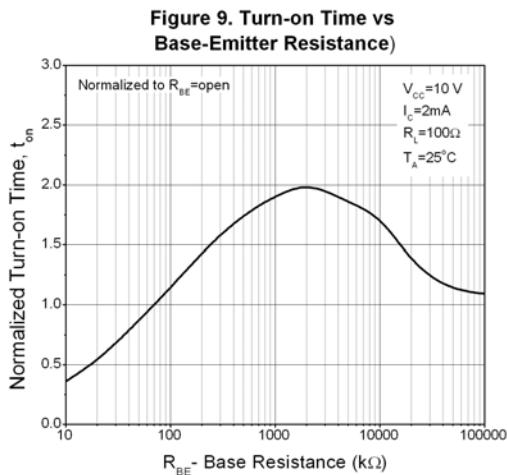
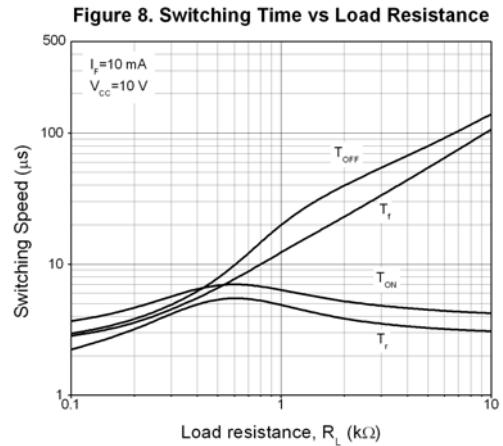
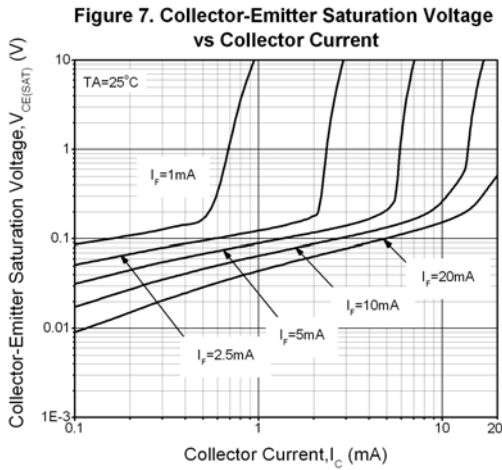
# TIL11X Series MCT2X Series

## Typical Performance Curves



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**Figure 11. Switching Time Test Circuit & Waveforms**



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MCT2X Series

## Order Information

### Part Number

**TIL11XY(Z)-V**

or

**MCT2XY(Z)-V**

### Note

- X = Part no. for MCT2X series (E or none)  
= Part no. for TIL11X series (1 or 7)
- 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-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 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



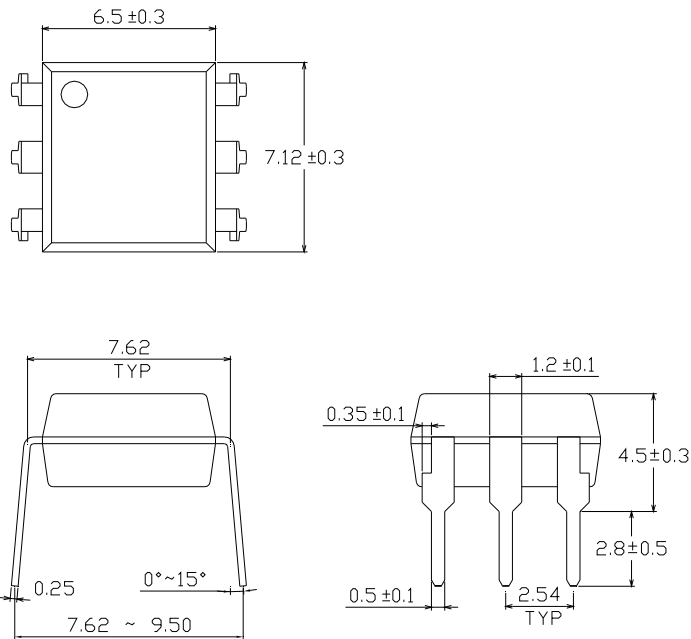
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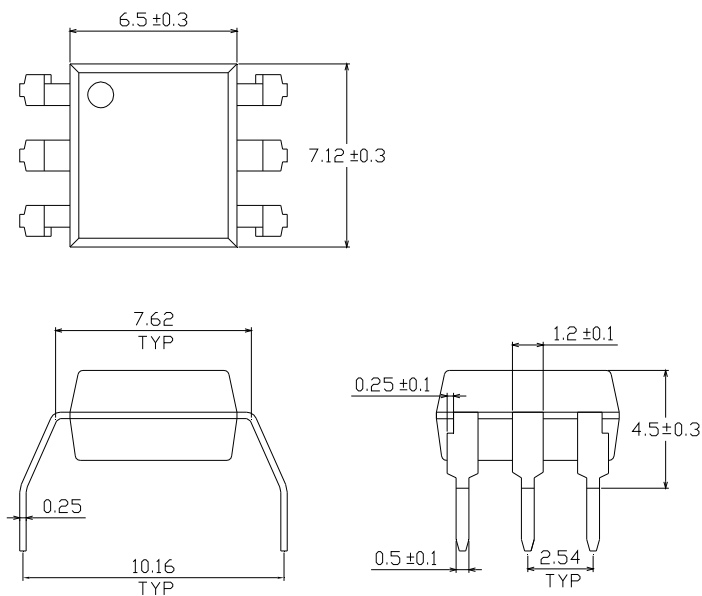
## TIL11X Series MCT2X Series

### Package Drawings (Dimensions in mm)

#### Standard DIP Type



#### Option M Type





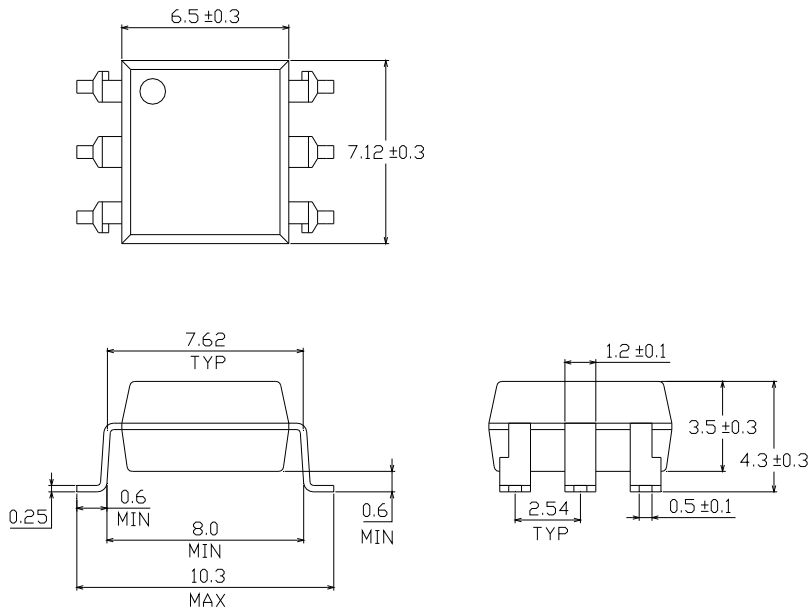


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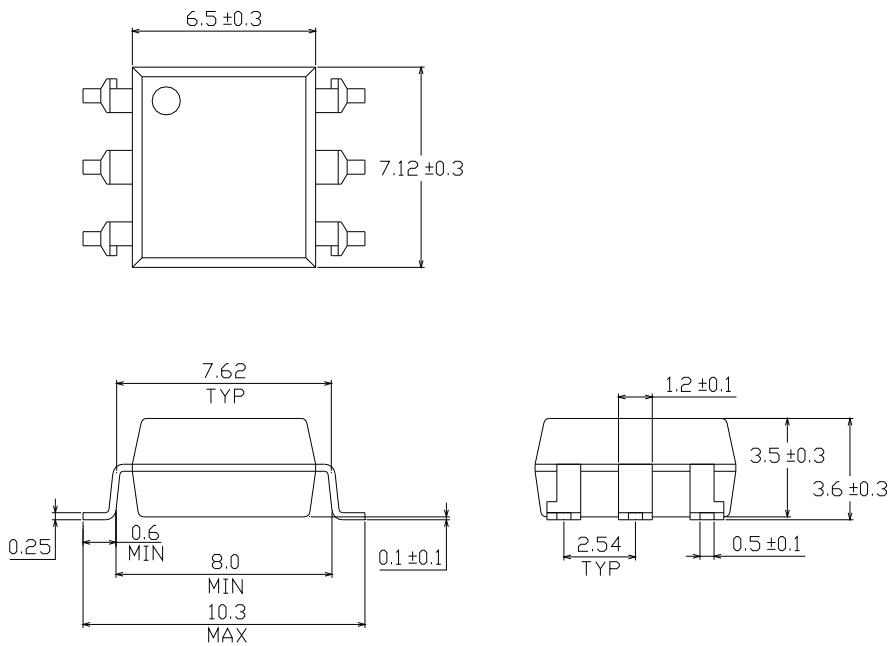
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### Option S Type



### Option S1 Type



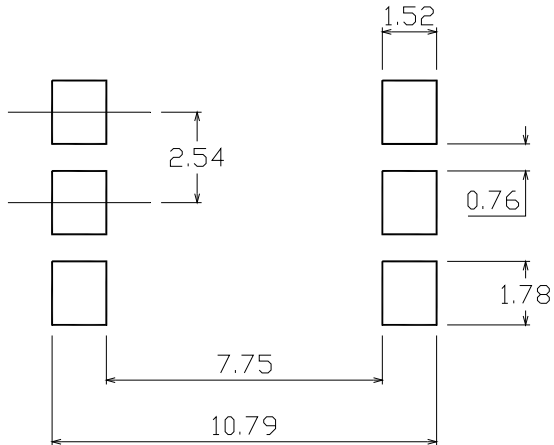


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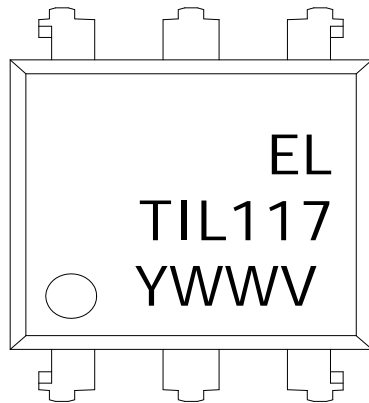
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## Recommended pad layout for surface mount leadform



## Device Marking



## Notes

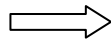
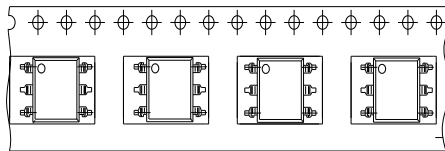
- EL denotes Everlight
- TIL117 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE optional

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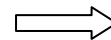
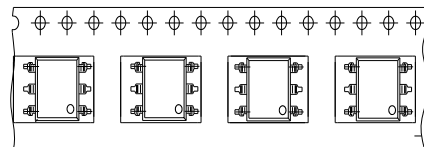
## Tape & Reel Packing Specifications

**Option TA**



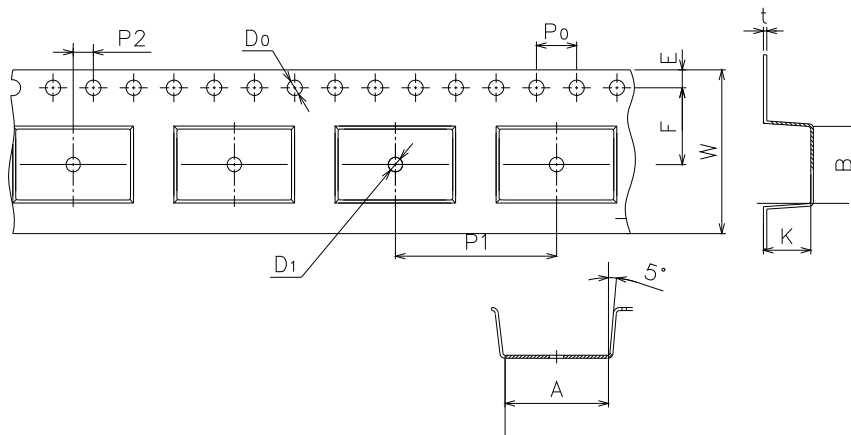
Direction of feed from reel

**Option TB**



Direction of feed from reel

## Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.52±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	16.0±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

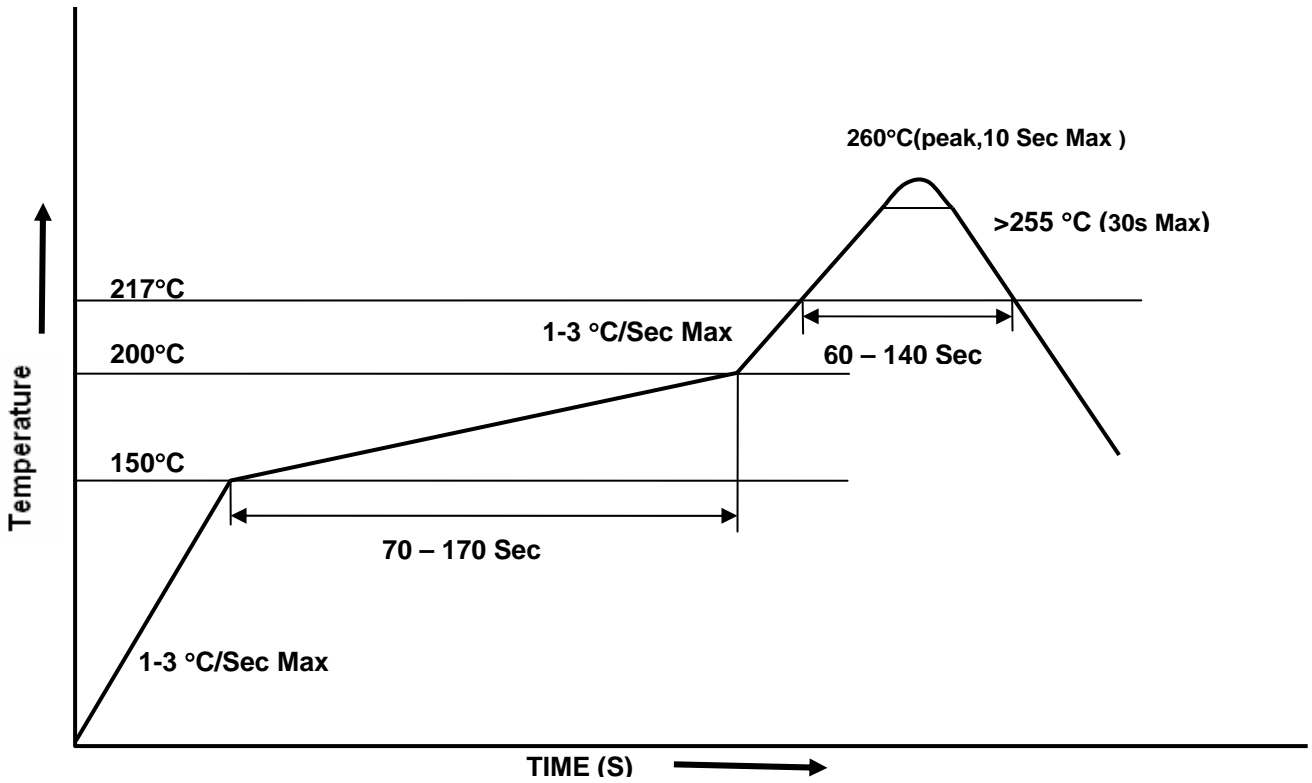


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## TIL11X Series MCT2X Series

### Solder Reflow Temperature Profile





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