

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 (No.716108 / No. 716109)
- NEMKO approved (No. P06206474)
- DEMKO approved (No. 313924)
- FIMKO approved (No. FI 22807)
- CSA approval (No.1969132)

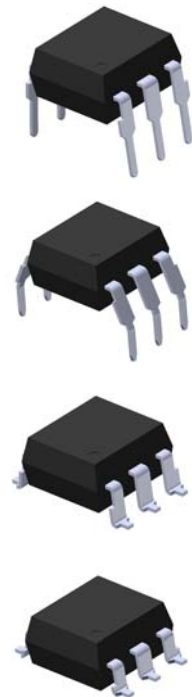
Description

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

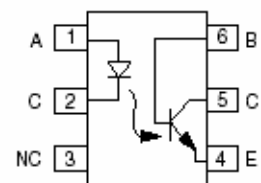
They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

Applications

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



Schematic



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

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**TIL11X Series
MCT2X Series**

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

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Peak forward current ($t = 10\mu\text{s}$)	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P_D	70	mW
	Derating factor (above 100°C)		3.8	mW/ $^{\circ}\text{C}$
Output	Collector power dissipation	P_C	150	mW
	Derating factor (above 100°C)		9.0	mW/ $^{\circ}\text{C}$
	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 ^{*2}		V_{iso}	5000	V _{rms}
Operating temperature		T_{opr}	-55~+110	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-55~+125	$^{\circ}\text{C}$
Soldering temperature ^{*3}		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 are shorted together, and pins 4, 5 & 6 are shorted together.

*2 For 10 seconds.

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Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless specified otherwise)

Input

Input

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	TIL111	V _F	-	1.22	1.4	V	I _F = 16mA
	TIL117		-	-	1.4		T _A =0-70℃, I _F = 16mA
			-	1.32	-		T _A = -55℃, I _F = 16mA
			-	1.1	-		T _A =110℃, I _F = 16mA
	MCT2 MCT2E		-	1.23	1.5		I _F = 20mA
Reverse current		I _R	-	-	10	μA	V _R = 6V

Output

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Base dark current		I_{CBO}	-	-	20	nA	$V_{CB} = 10\text{V}$
Collector-Emitter dark current	All	I_{CEO}	-	1	50	nA	$V_{CE} = 10\text{V}$, $I_F = 0\text{mA}$
	TIL117		-	0.2	50	μA	$V_{CE} = 30\text{V}$, $I_F = 0\text{mA}$, $T_A=70^{\circ}\text{C}$
Collector-Emitter breakdown voltage		BV_{CEO}	80	-	-	V	$I_C = 1\text{mA}$
Collector-Base breakdown voltage		BV_{CBO}	80	-	-	V	$I_C = 0.01\text{mA}$
Emitter-Collector breakdown voltage		BV_{ECO}	7	-	-	V	$I_E = 0.1\text{mA}$
Emitter-Base breakdown voltage		BV_{EBO}	7	-	-	V	$I_E = 0.1\text{mA}$

Transfer Characteristics

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector current (Phototransistor operation)	TIL111	$I_{C(ON)}$	2	-	-	mA	$I_F = 16\text{mA}$, $V_{CE} = 0.4\text{V}$
Collector current (Photodiode operation)			7	-	-	μA	$I_F = 16\text{mA}$, $V_{CB} = 0.4\text{V}$
Current Transfer Ratio	TIL117	CTR	50	-	-	%	$I_F = 10\text{mA}$, $V_{CE} = 10\text{V}$
	MCT2 MCT2E		20	-	-		$I_F = 10\text{mA}$, $V_{CE} = 10\text{V}$

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Transfer Characteristics

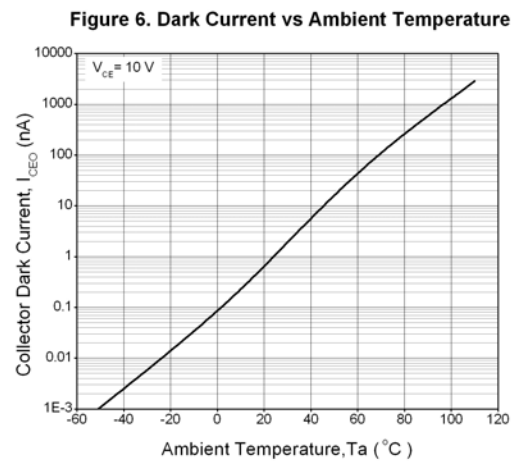
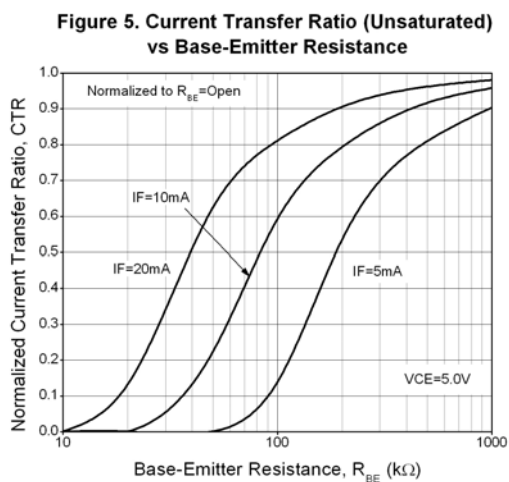
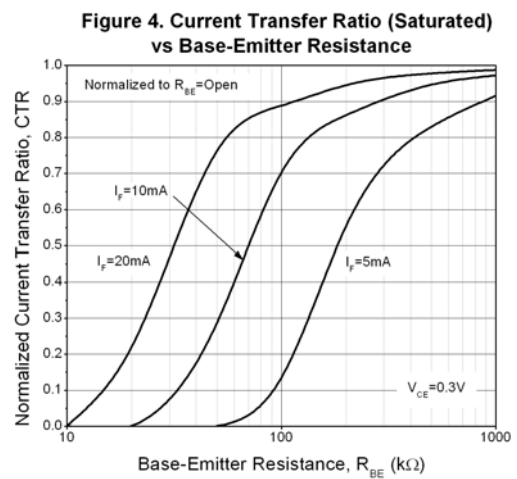
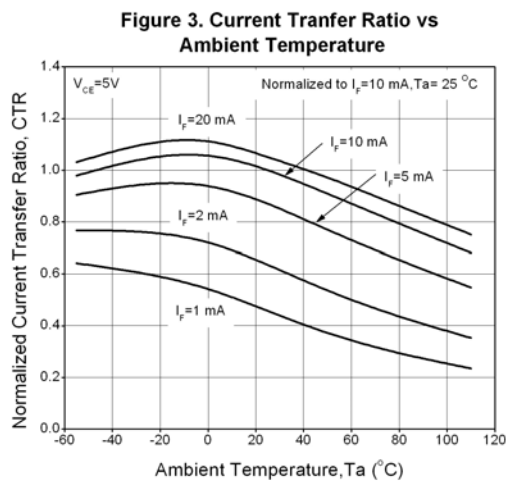
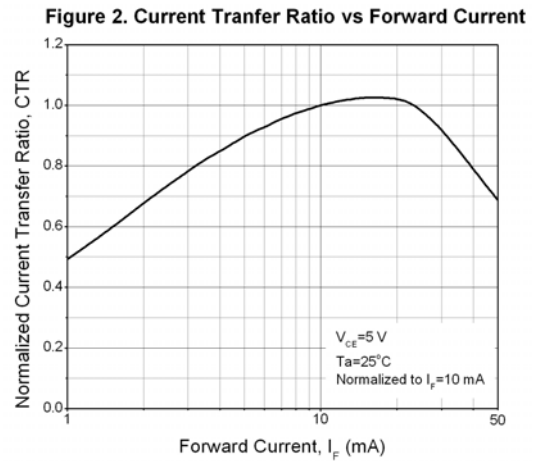
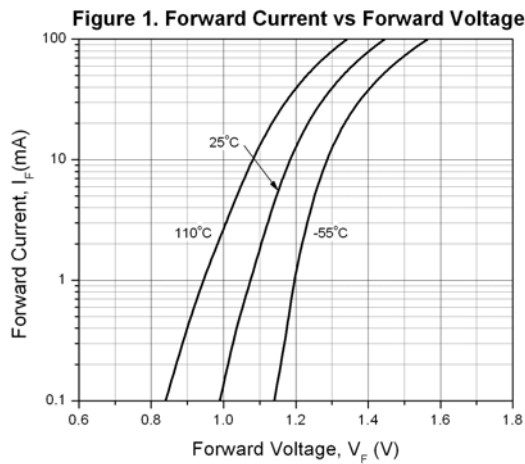
Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Emitter saturation voltage	All	$V_{CE(sat)}$	-	-	0.4	V	$I_F = 16mA, I_C = 2mA$
	TIL117		-	-	0.4		$I_F = 10mA, I_C = 0.5mA$
Isolation resistance		R_{IO}	10^{11}	-	-	Ω	$V_{IO} = 500Vdc$
Input-output capacitance		C_{IO}	-	-	2	pF	$V_{IO} = 0, f = 1MHz$
Turn-on time	TIL117	T_{on}	-	10	12	μs	$V_{CC} = 10V,$ $I_C = 2mA, R_L = 100\Omega$
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	μs	$V_{CC} = 10V,$ $I_F = 10mA, R_L = 100\Omega$
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 $T_a = 25^\circ C$

Typical Performance Curves

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Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

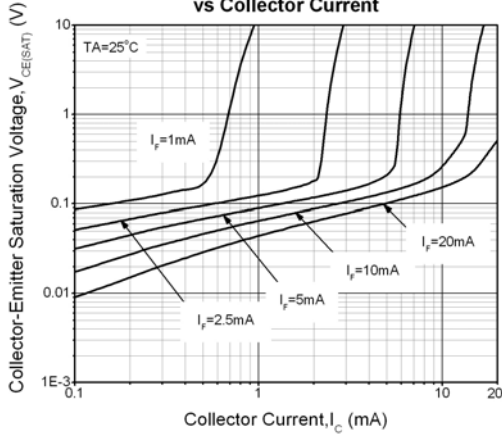


Figure 8. Switching Time vs Load Resistance

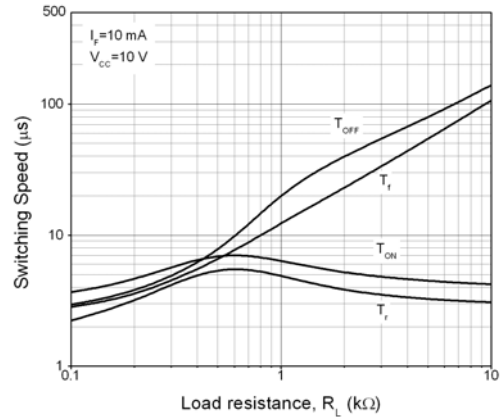


Figure 9. Turn-on Time vs Base-Emitter Resistance

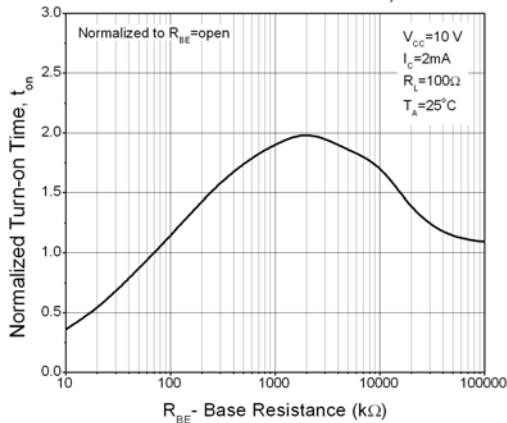


Figure 10. Turn-off Time vs Base-Emitter Resistance

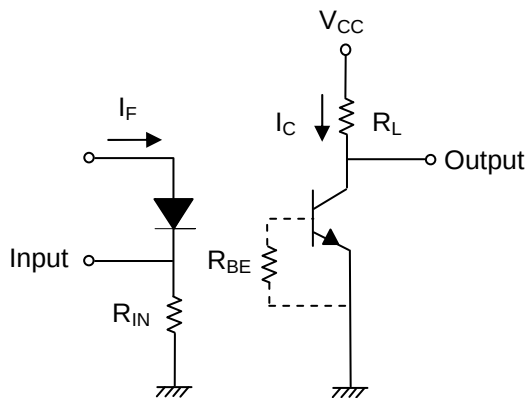
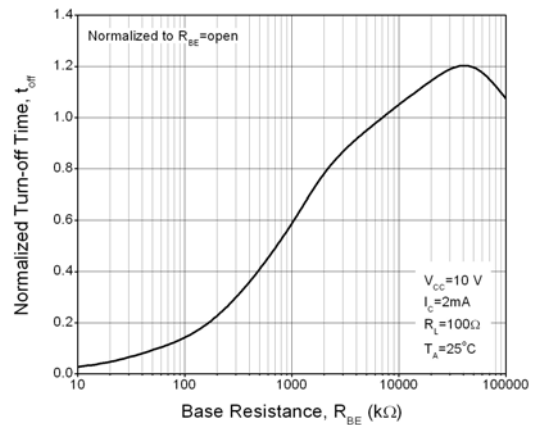


Figure 11. Switching Time Test Circuit & Waveforms

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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

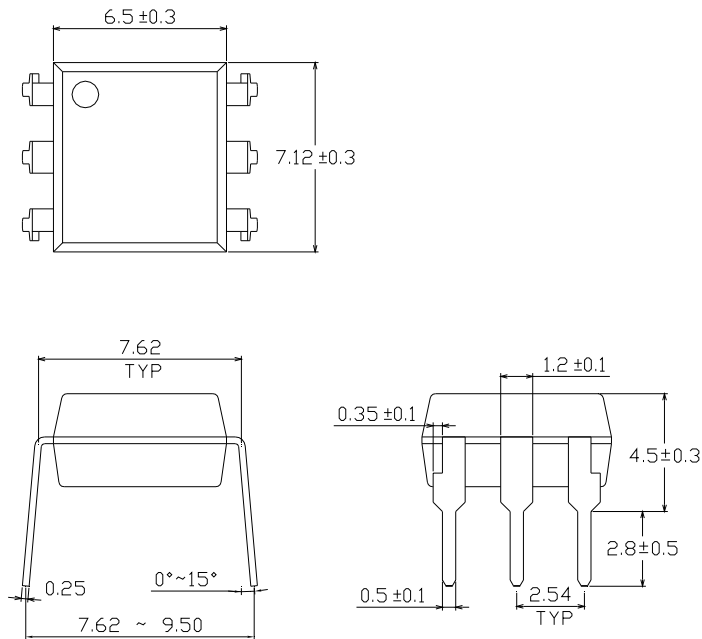
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead 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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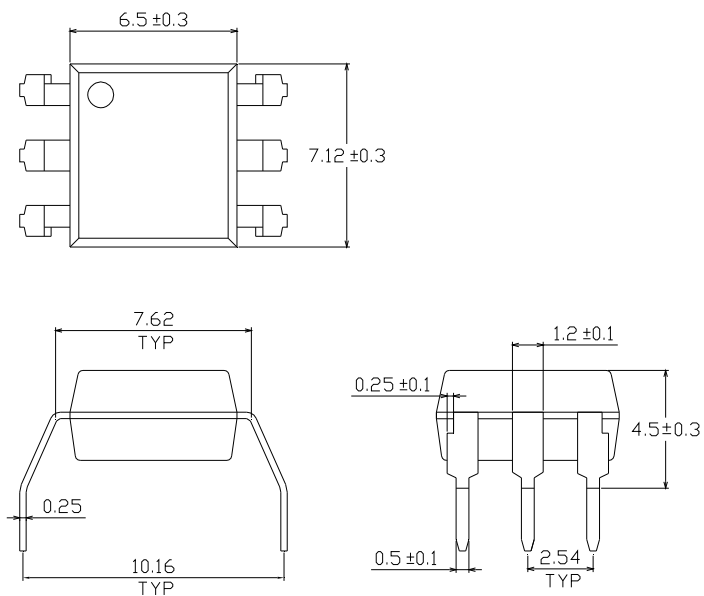
**TIL11X Series
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Package Drawings (Dimensions in mm)

Standard DIP Type



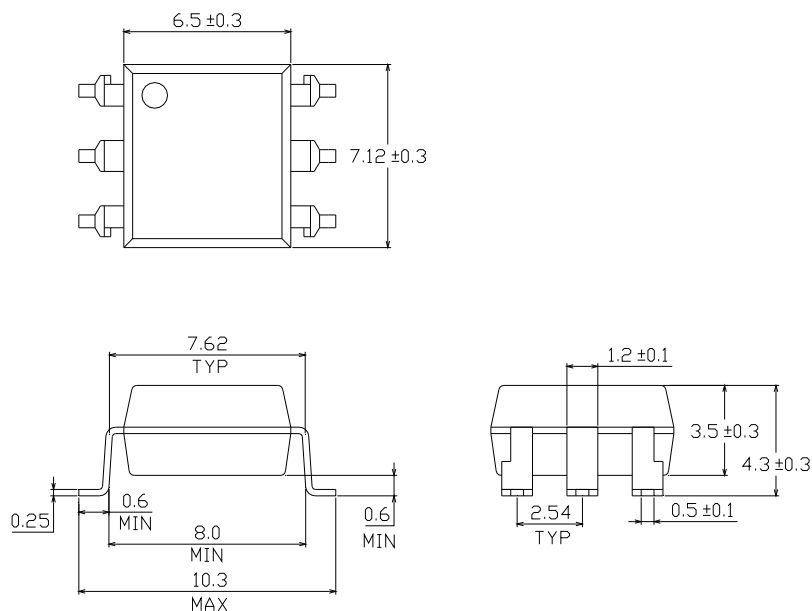
Option M Type



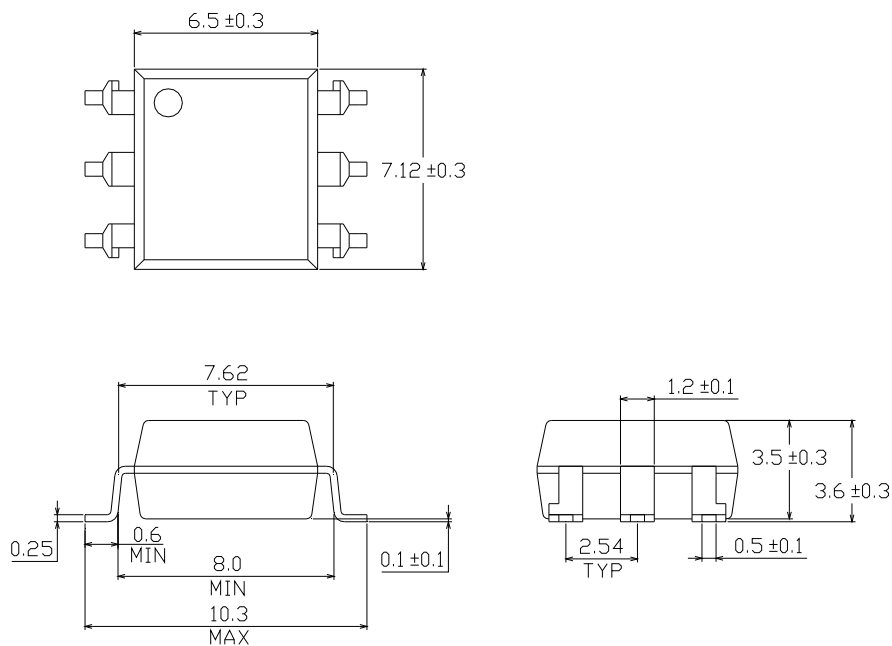
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Option S Type



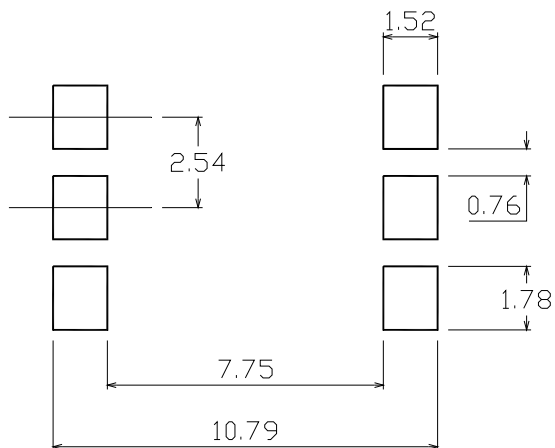
Option S1 Type



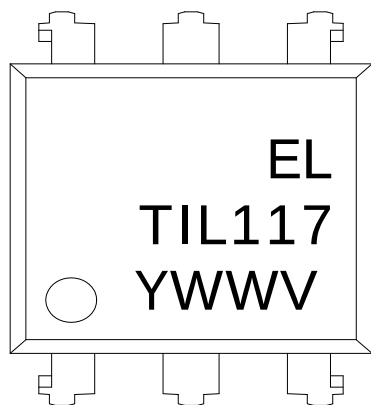
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Recommended pad layout for surface mount leadform



Device Marking



Notes

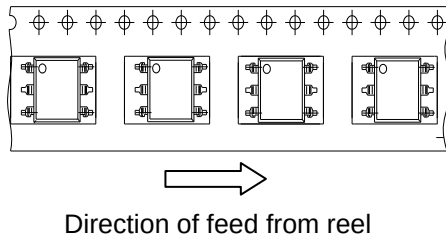
EL denotes Everlight
TIL117 denotes Device Number
Y denotes 1 digit Year code
WW denotes 2 digit Week code
V denotes VDE optional

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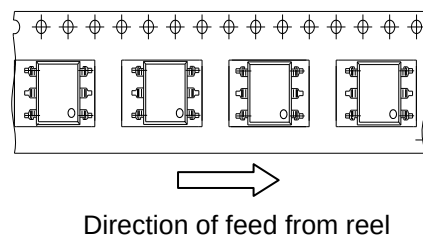
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Tape & Reel Packing Specifications

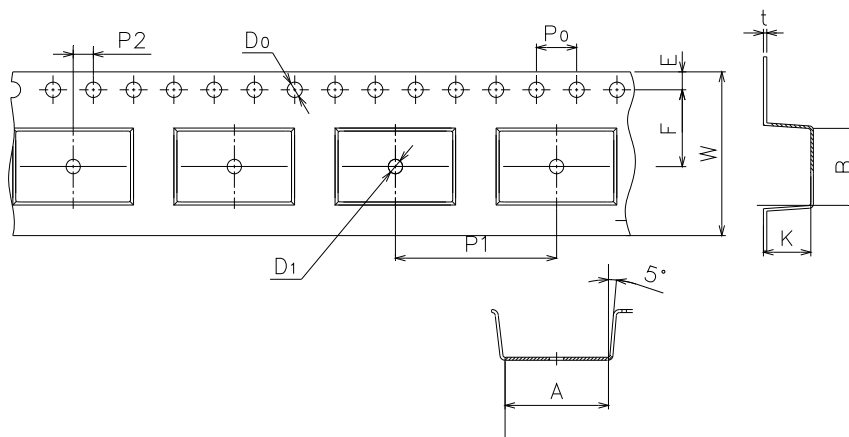
Option TA



Option TB



Tape dimensions



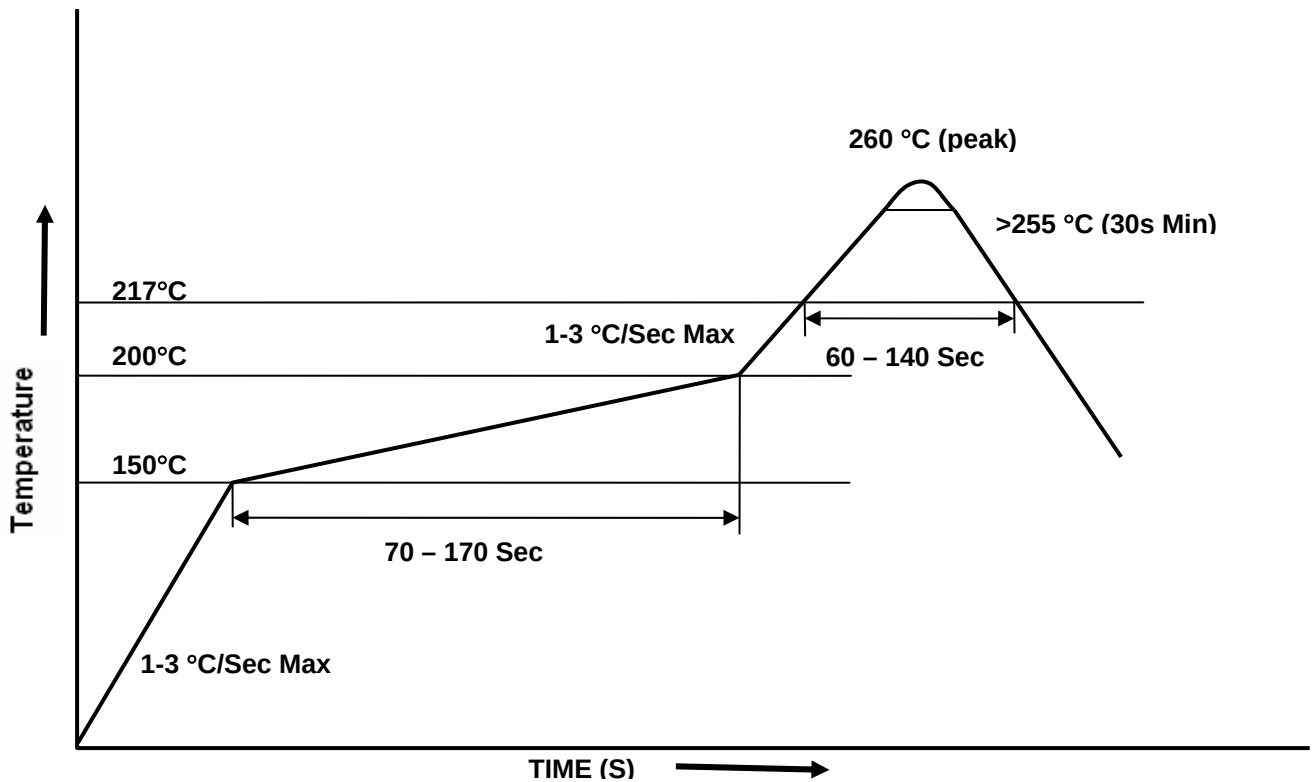
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.52±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

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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Solder Reflow Temperature Profile



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