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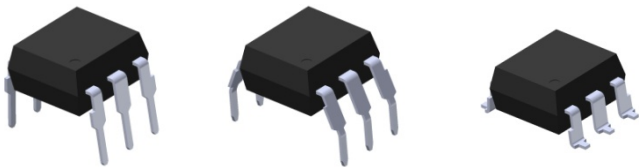
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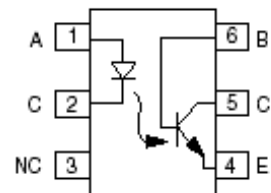
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6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER TIL11X Series MCT2X Series



Schematic



Pin Configuration

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

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 approved
- CQC approved

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

Absolute Maximum Ratings (Ta=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	60	mA
	Peak forward current (t = 10μs)	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P_D	100	mW
	Derating factor (above 100°C)		3.8	mW/°C
Output	Collector-Emitter voltage	V_{CEO}	80	V
	Collector-Base voltage	V_{CBO}	80	V
	Emitter-Collector voltage	V_{ECO}	7	V
	Power dissipation	P_C	150	mW
	Derating factor (above 100°C)		9.0	mW/°C
	Total Power Dissipation	P_{TOT}	200	mW
	Isolation Voltage*1	V_{ISO}	5000	V rms
	Operating Temperature	T_{OPR}	-55 to 110	°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 are shorted together, and pins 4, 5 & 6 are shorted together.

*2 For 10 seconds

Electro-Optical Characteristics (Ta=25°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	TIL111	-	1.22	1.4	V	I _F = 16mA
	TIL117	-	-	1.4		T _A =0-70°C, I _F = 16mA
		-	1.32	-		T _A = -55°C, I _F = 16mA
	MCT2 MCT2E	-	1.1	-		T _A =110°C, I _F = 16mA
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} = 10V
Collector-Emitter dark current	All	-	1	50	nA	V _{CE} = 10V, I _F =0mA
	TIL117	-	0.2	50		V _{CE} = 30V, I _F = 0mA, T _A =70°C
Collector-Emitter breakdown voltage	BV _{CEO}	80	-	-	V	I _C =1mA
Collector-Base breakdown voltage	BV _{CBO}	80	-	-	V	I _C =0.01mA
Emitter-Collector breakdown voltage	BV _{ECO}	7	-	-	V	I _E =0.1mA
Emitter-Base breakdown voltage	BV _{EBO}	7	-	-	V	I _E =0.1mA

* Typical values at T_a = 25°C

Transfer Characteristics

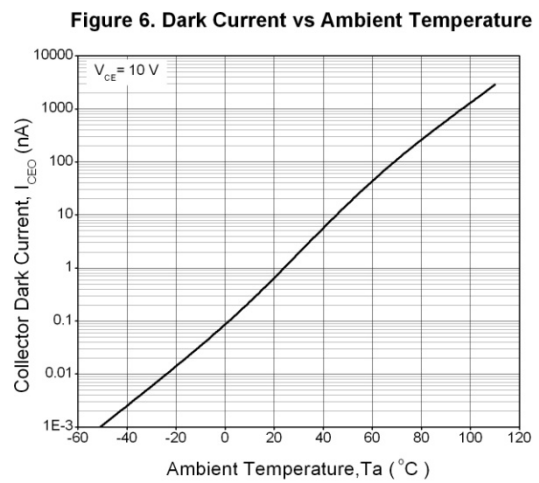
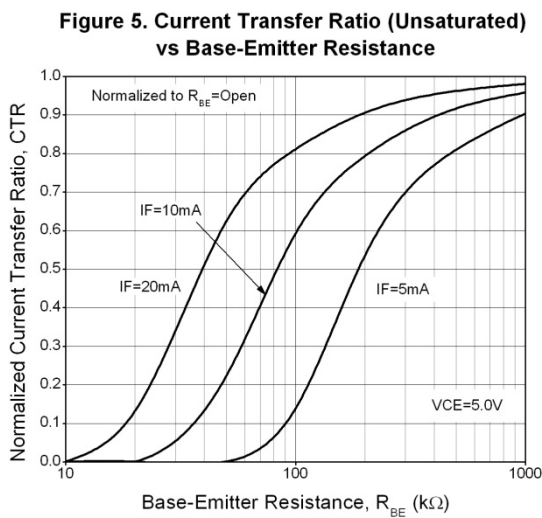
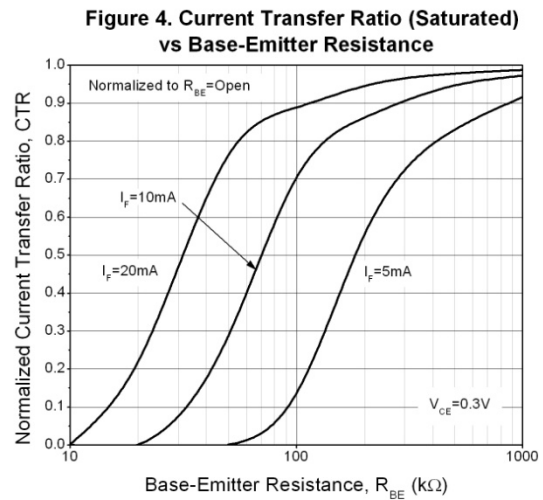
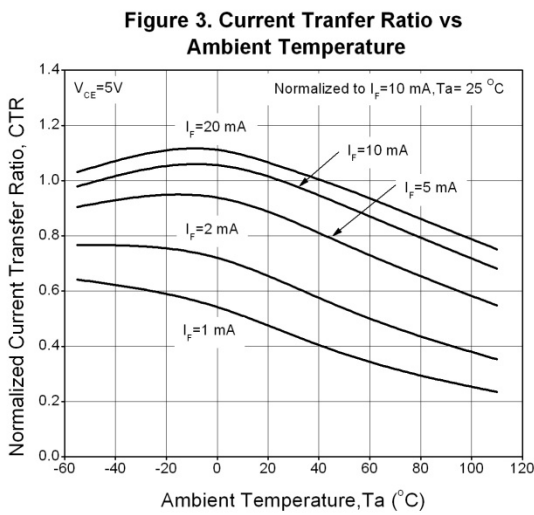
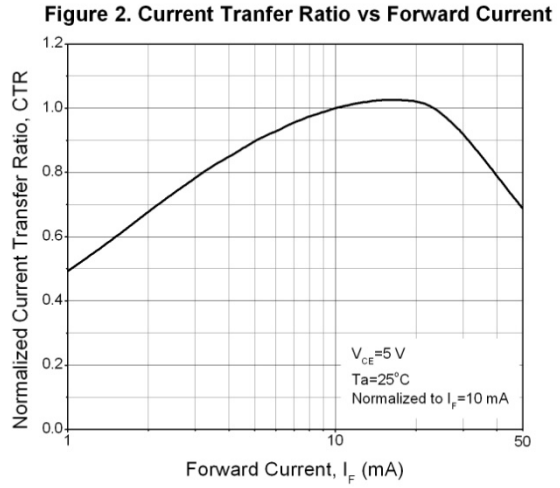
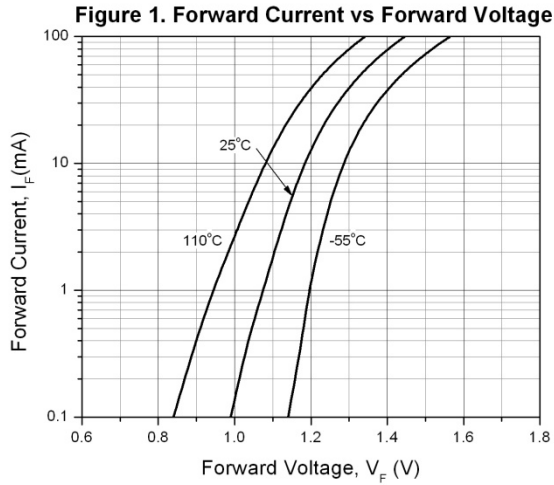
Parameter	Symbol	Min	Typ.	Max.	Unit	Condition	
Collector current (Phototransistor operation)	TIL111	I _{C(ON)}	2	-	-	mA	I _F = 16mA, V _{CE} = 0.4V
Collector current (Photodiode operation)			7	-	-	μA	I _F = 16mA, V _{CB} = 0.4V
Current Transfer Ratio	TIL117	CTR	50	-	-	%	I _F = 10mA, V _{CE} = 10V
	MCT2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

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 Electro-Optical Characteristics Curves



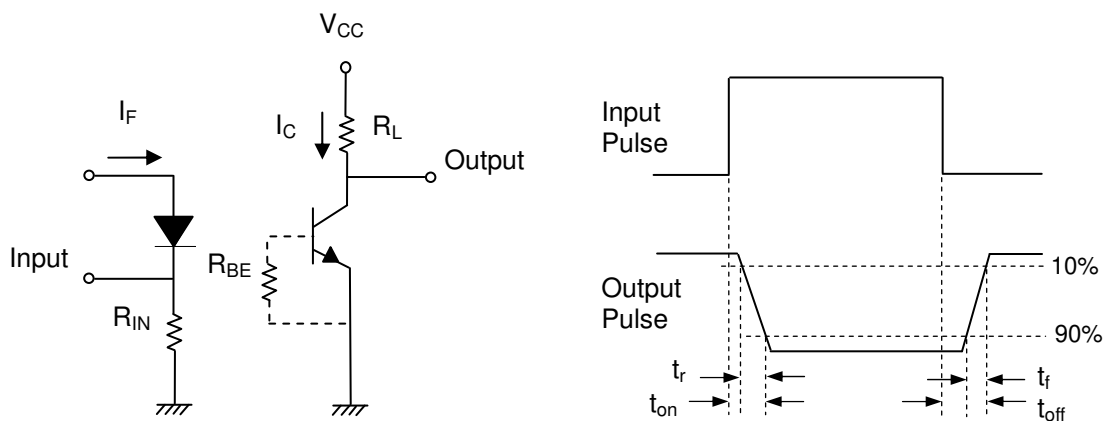
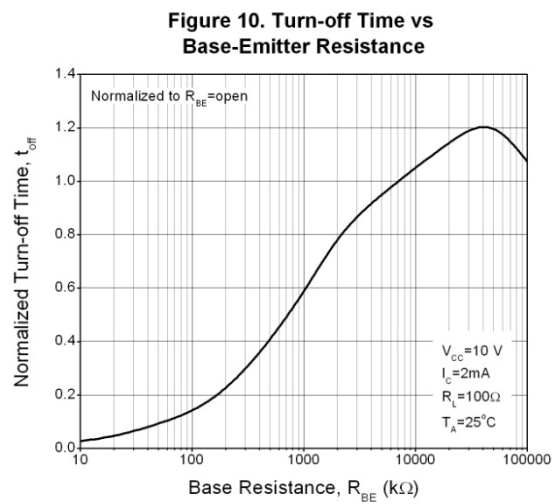
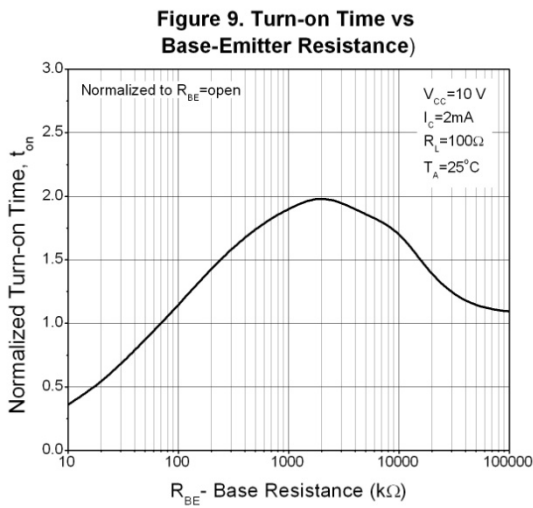
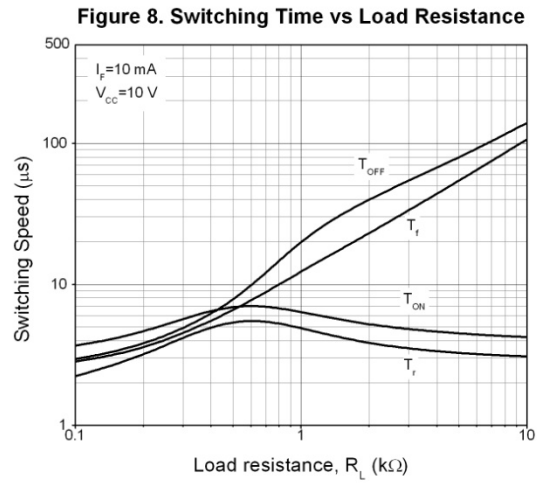
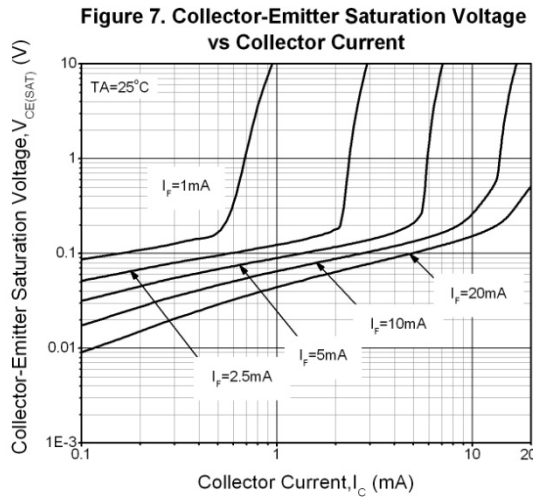


Figure 11. Switching Time Test Circuit & Waveforms

Order Information

Part Number

TIL11XY(Z)-V

or

MCT2XY(Z)-V

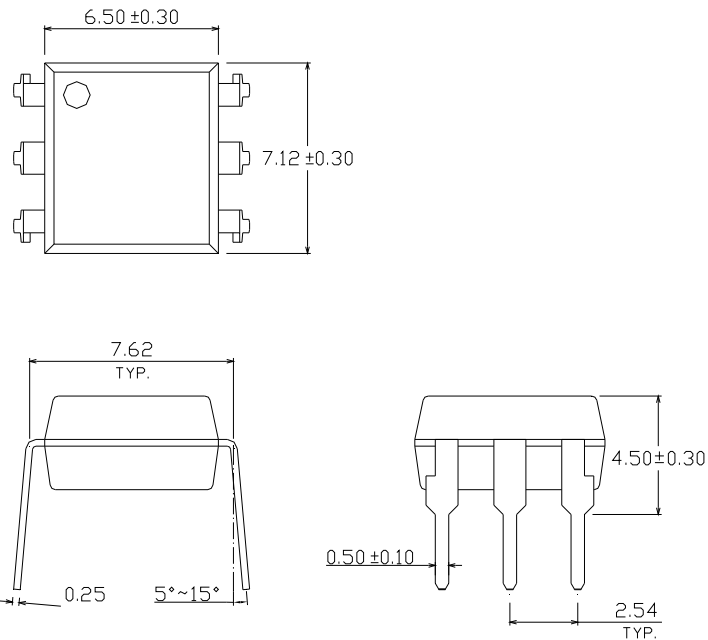
Note

- 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 safety (optional)

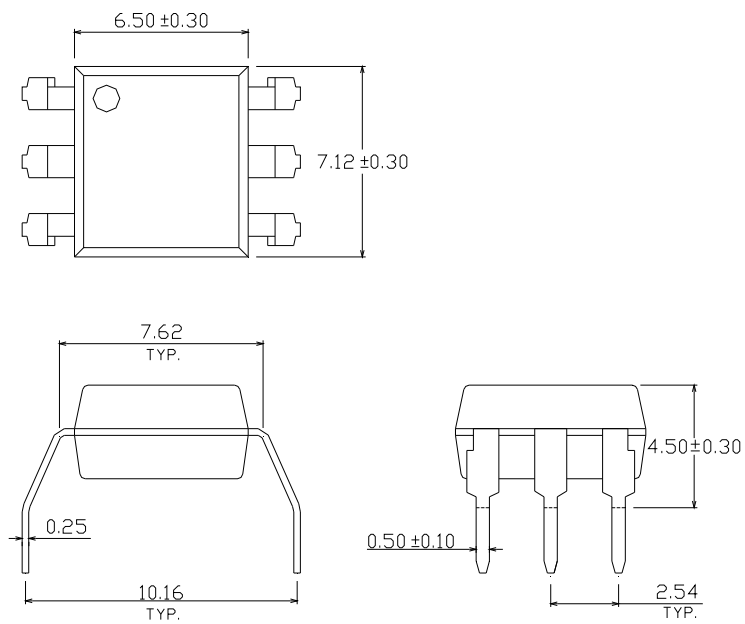
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

Package Dimension (Dimensions in mm)

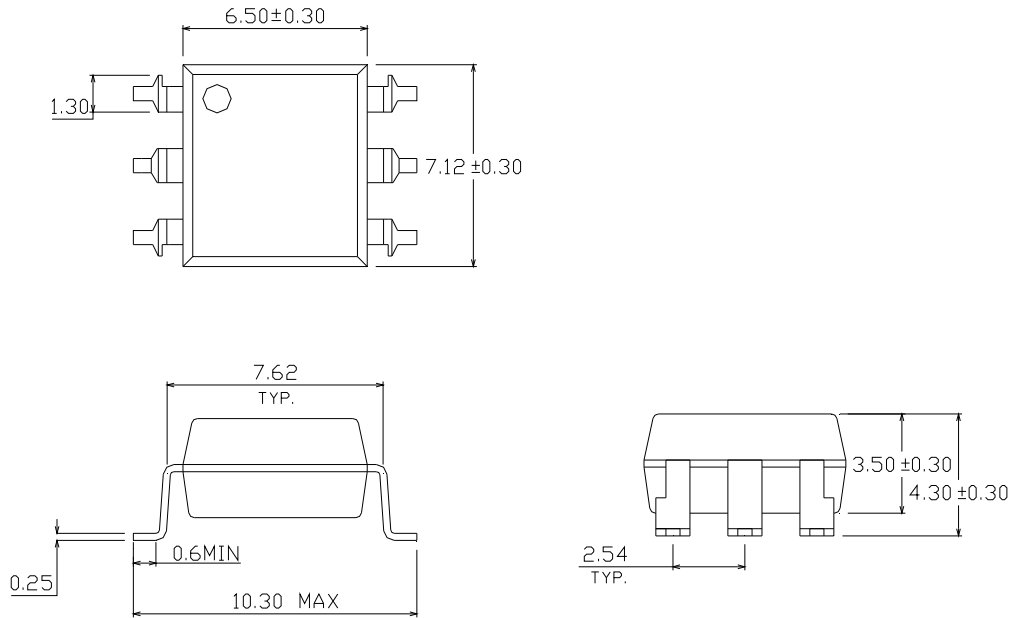
Standard DIP Type



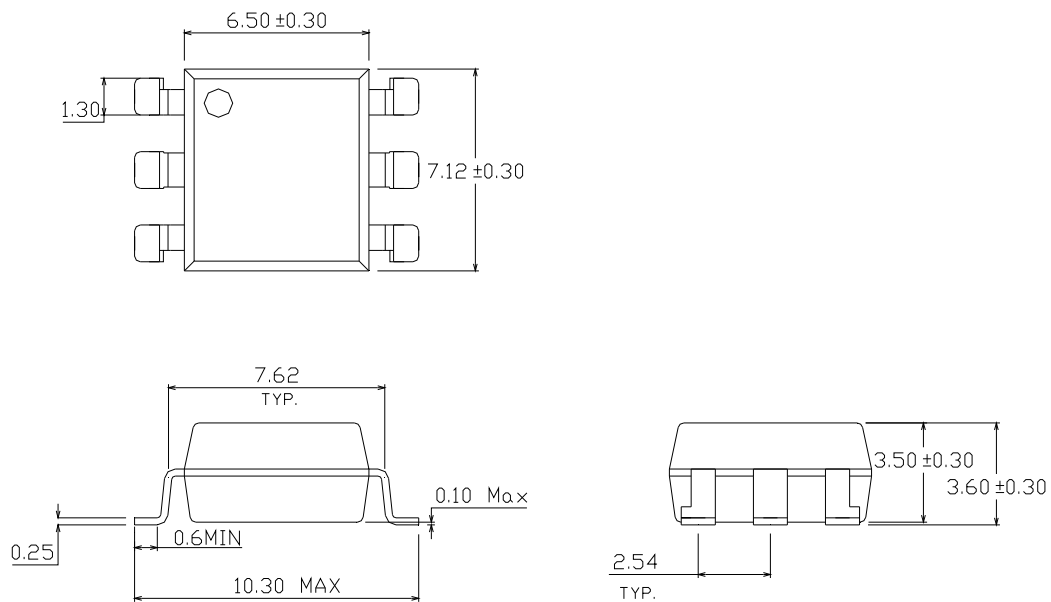
Option M Type



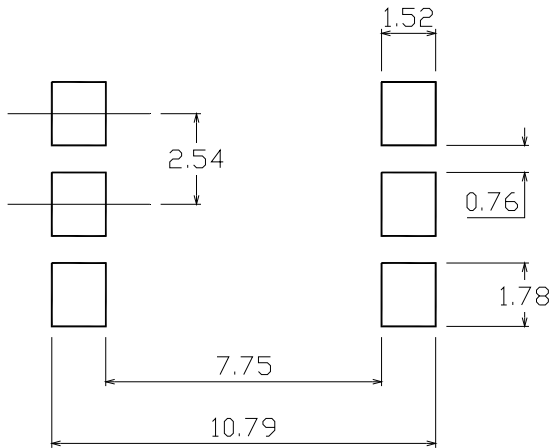
Option S Type



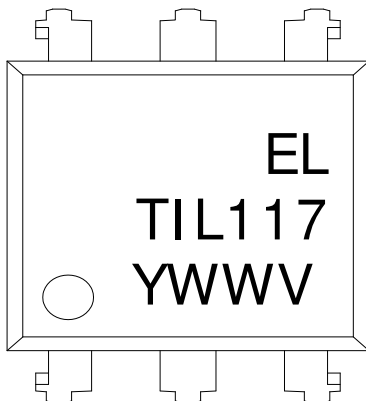
Option S1 Type



Recommended pad layout for surface mount leadform



Device Marking

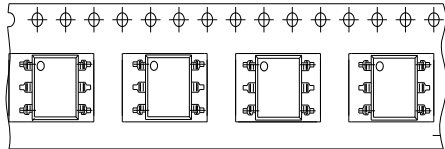


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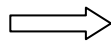
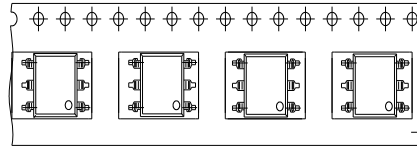
- EL denotes Everlight
- TIL117 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE optional

Tape & Reel Packing Specifications

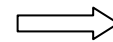
Option TA



Option TB

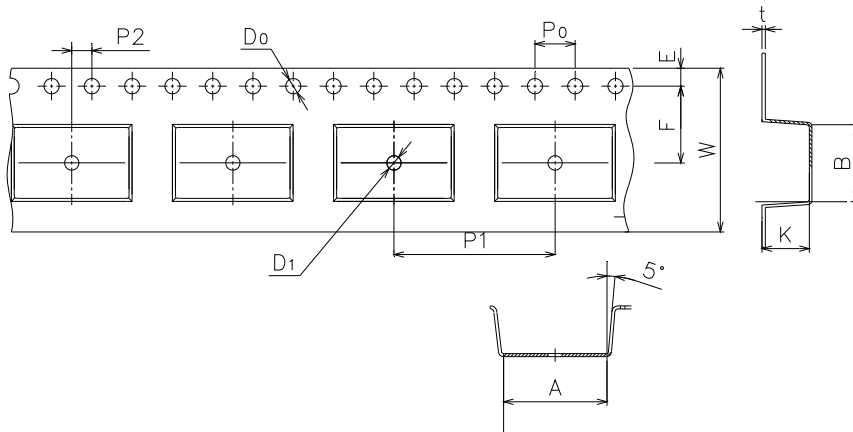


Direction of feed from reel



Direction of feed from reel

Tape dimensions

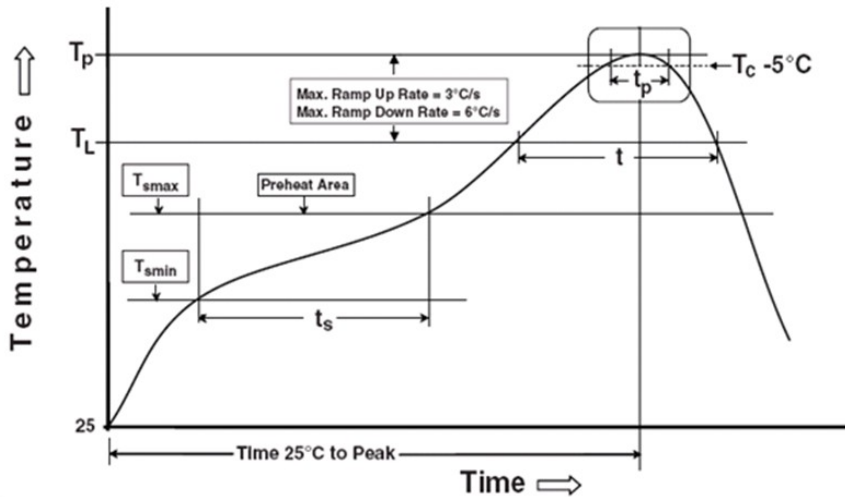


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

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: $T_P - 5^\circ\text{C}$	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

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