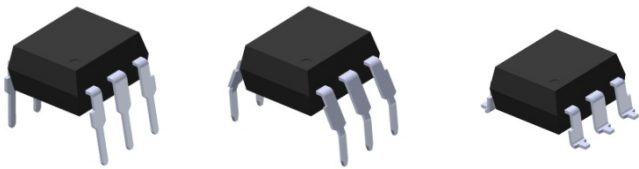


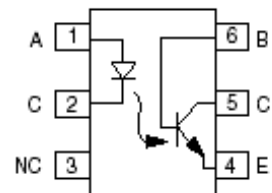
6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER TIL11X Series MCT2X Series



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 approved
- CQC approved

Schematic



Pin Configuration

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

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
		-	-	1.4		T _A =0-70°C, I _F = 16mA
	TIL117	-	1.32	-		T _A = -55°C, I _F = 16mA
		-	1.1	-		T _A =110°C, 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} = 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)					μA	I _F = 16mA, V _{CB} = 0.4V
Current Transfer Ratio	TIL117	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 1. Forward Current vs Forward Voltage

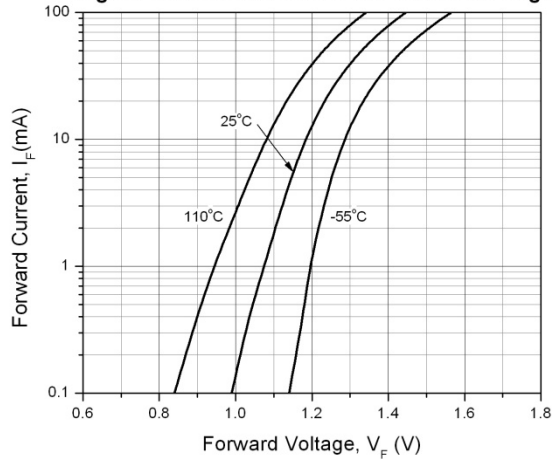


Figure 2. Current Transfer Ratio vs Forward Current

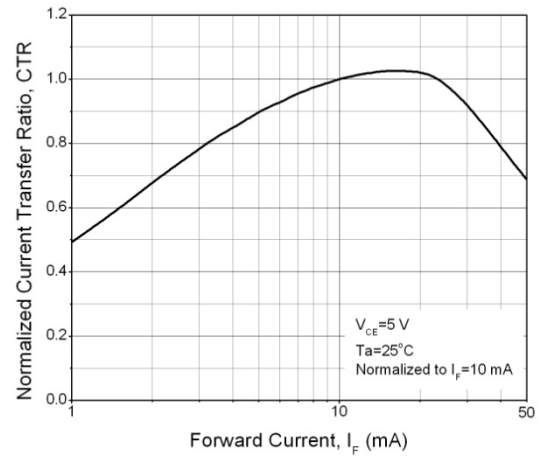


Figure 3. Current Transfer Ratio vs Ambient Temperature

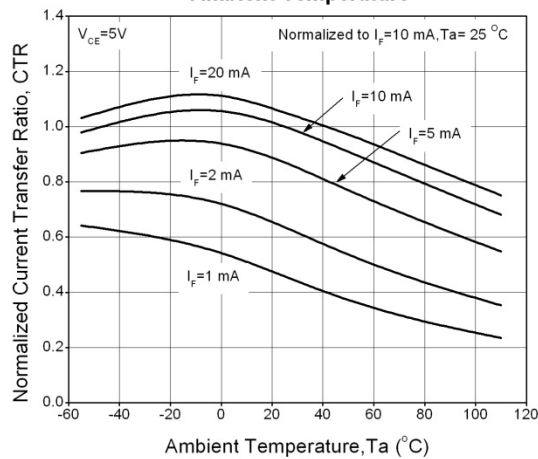


Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

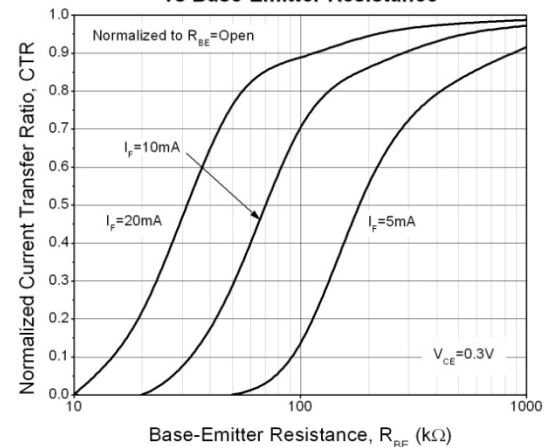


Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

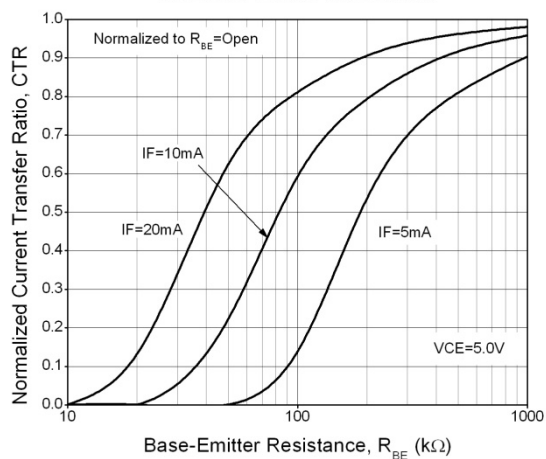


Figure 6. Dark Current vs Ambient Temperature

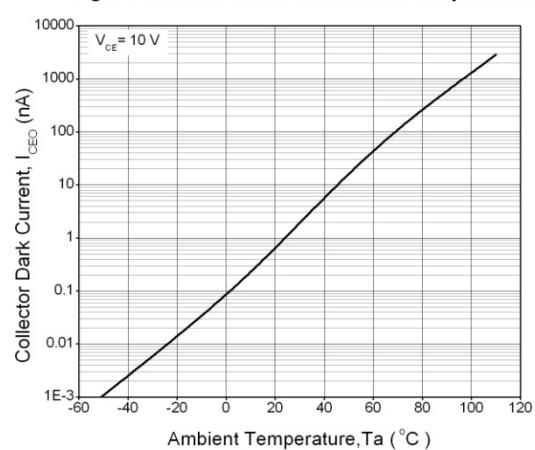


Figure 7. Collector-Emitter Saturation Voltage vs Collector Current

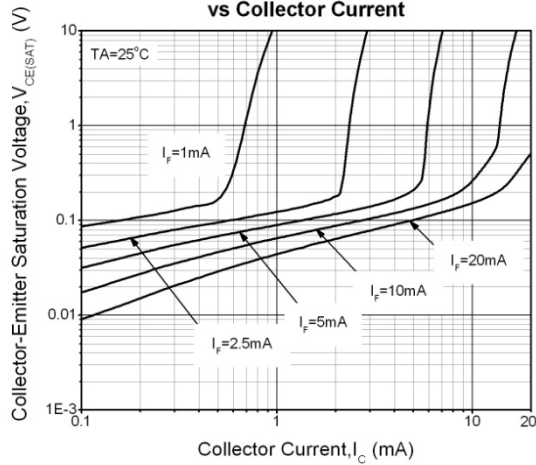


Figure 8. Switching Time vs Load Resistance

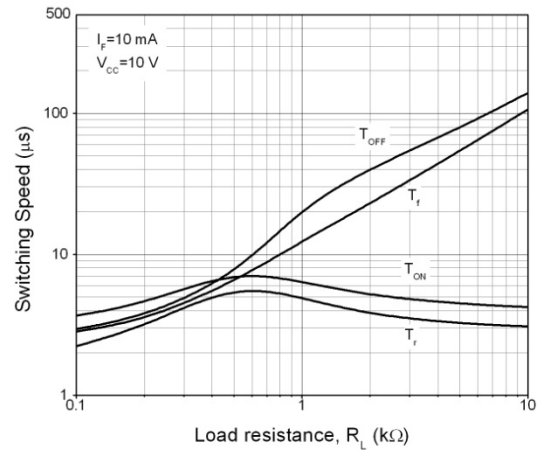


Figure 9. Turn-on Time vs Base-Emitter Resistance

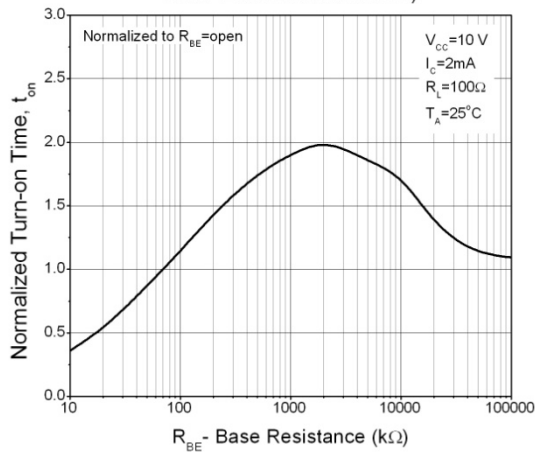


Figure 10. Turn-off Time vs Base-Emitter Resistance

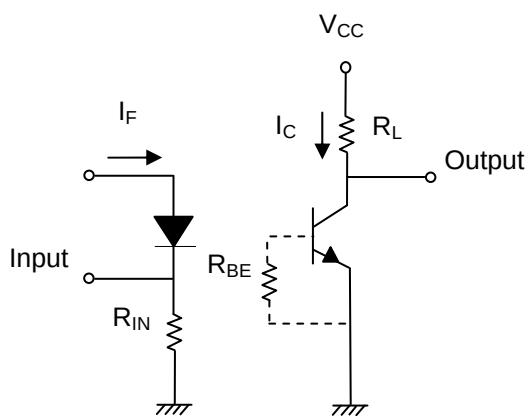
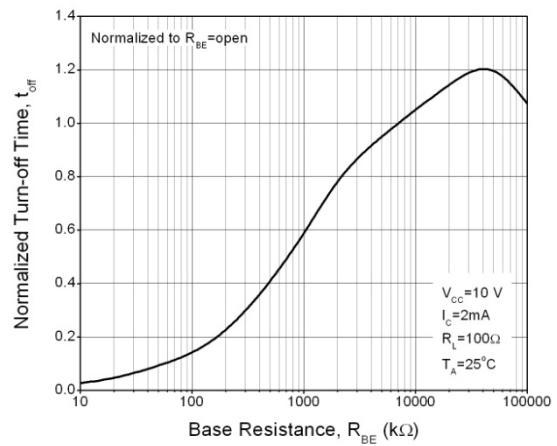


Figure 11. Switching Time Test Circuit & Waveforms

Order Information

Part Number

TIL11XY(Z)-V

or

MCT2XY(Z)-V

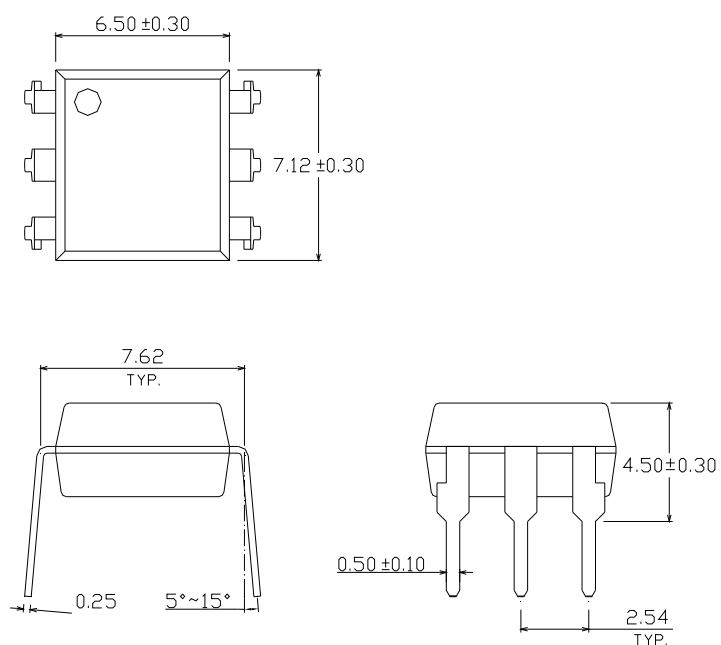
Note

- 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)

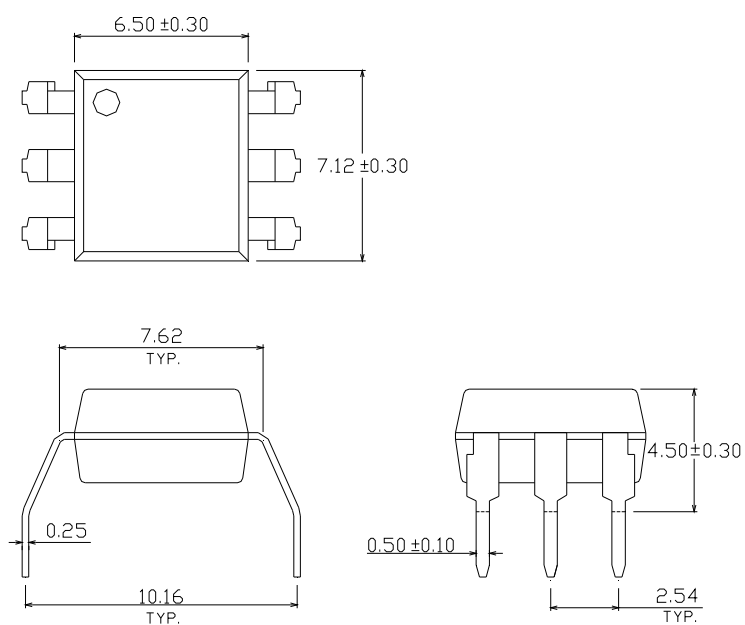
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

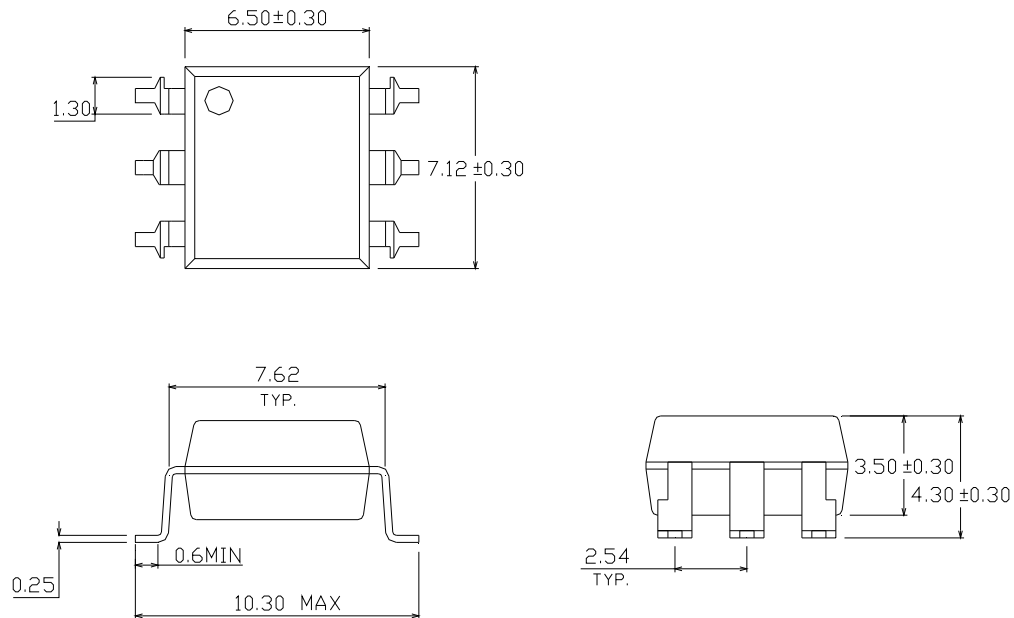
Standard DIP Type



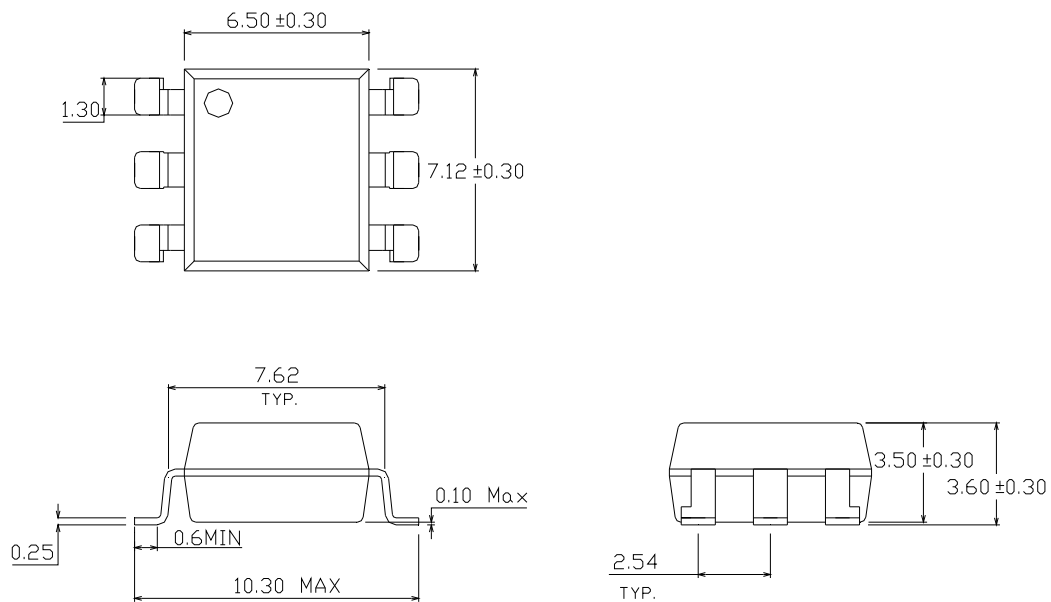
Option M Type



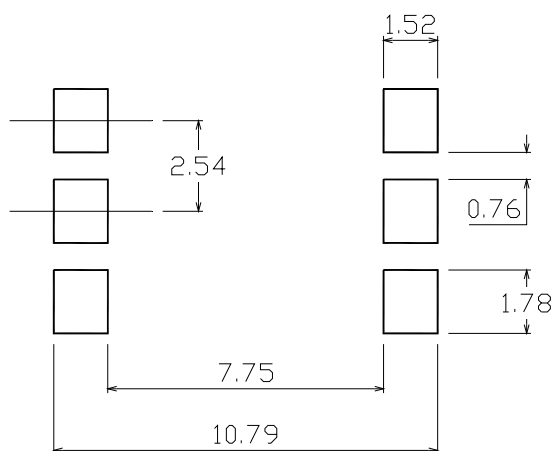
Option S Type



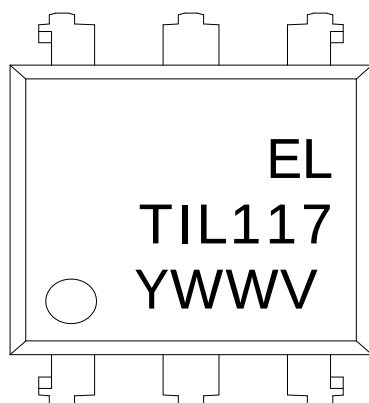
Option S1 Type



Recommended pad layout for surface mount leadform



Device Marking

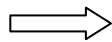
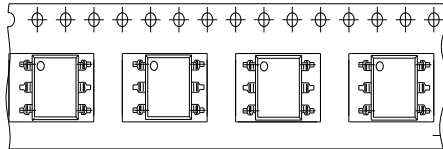


Notes

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

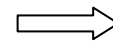
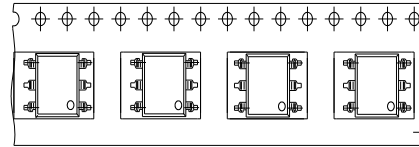
Tape & Reel Packing Specifications

Option TA



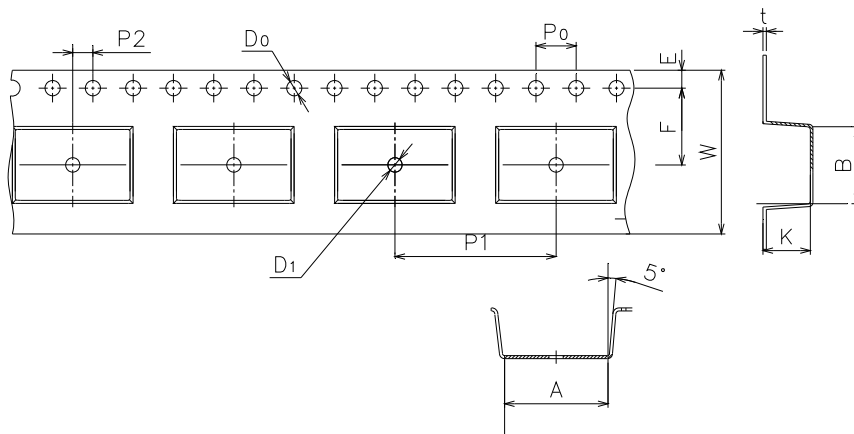
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

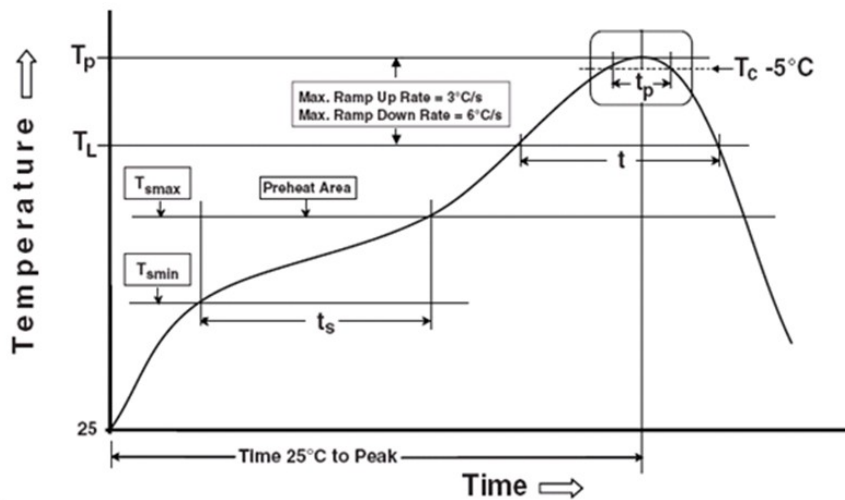


Dimension No.	A	B	D0	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	P0	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

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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[MCT2ES1\(TA\)-V](#) [MCT2ES1\(TB\)](#) [MCT2ES1\(TB\)-V](#) [MCT2E-V](#) [MCT2M](#) [MCT2S\(TA\)](#) [MCT2S\(TA\)-V](#) [MCT2S\(TB\)](#)
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[TIL111S1\(TB\)-V](#) [TIL111-V](#) [TIL117](#) [TIL117M](#) [TIL117M-V](#) [TIL117S\(TA\)](#) [TIL117S\(TA\)-V](#) [TIL117S\(TB\)](#) [TIL117S\(TB\)-V](#)
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