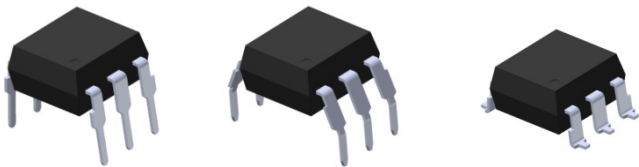




**THE DATASHEET OF
TIL111S1(TA)**



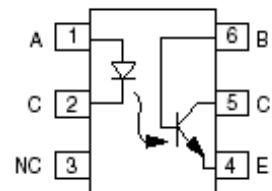
6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER TIL11X Series MCT2X Series



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	$I_F = 16\text{mA}$
	TIL117	-	-	1.4		$T_A = 0\text{-}70^\circ\text{C}$, $I_F = 16\text{mA}$
		-	1.32	-		$T_A = -55^\circ\text{C}$, $I_F = 16\text{mA}$
	MCT2 MCT2E	-	1.1	-		$T_A = 110^\circ\text{C}$, $I_F = 16\text{mA}$
Reverse current	I_R	-	-	10	μA	$V_R = 6\text{V}$

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	-	1	50	nA	$V_{CE} = 10\text{V}$, $I_F = 0\text{mA}$
	TIL117	-	0.2	50		$V_{CE} = 30\text{V}$, $I_F = 0\text{mA}$, $T_A = 70^\circ\text{C}$
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	$I_E = 0.1\text{mA}$

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

Transfer Characteristics

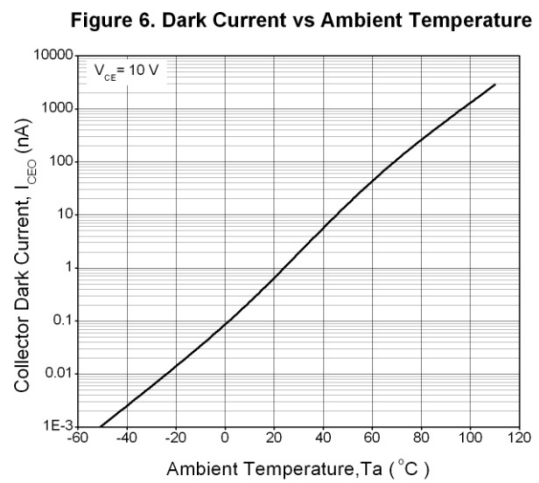
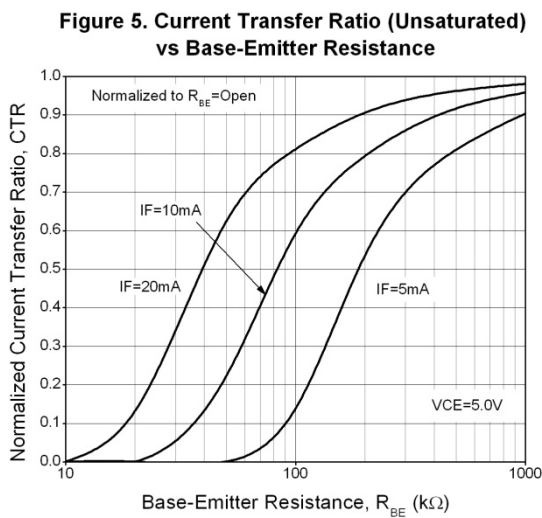
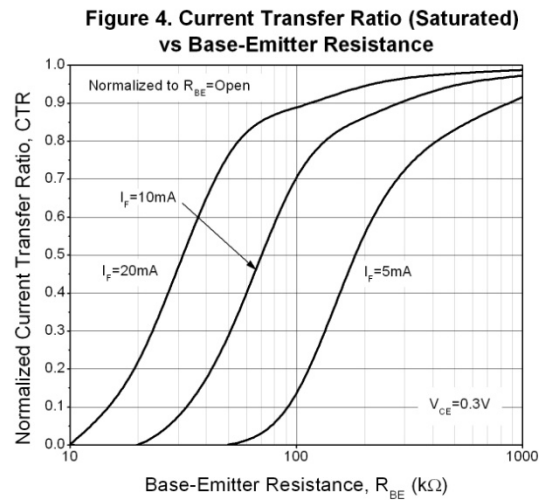
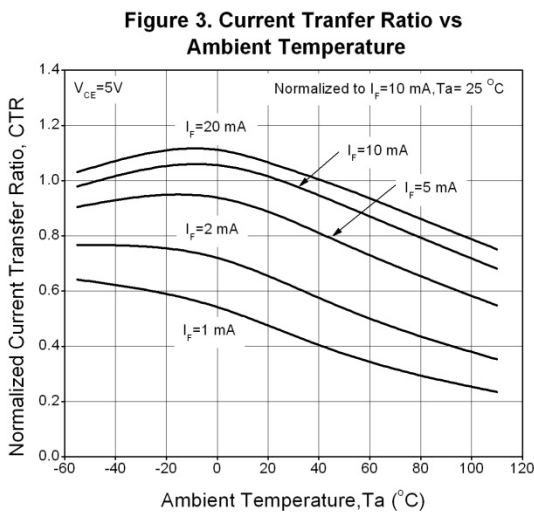
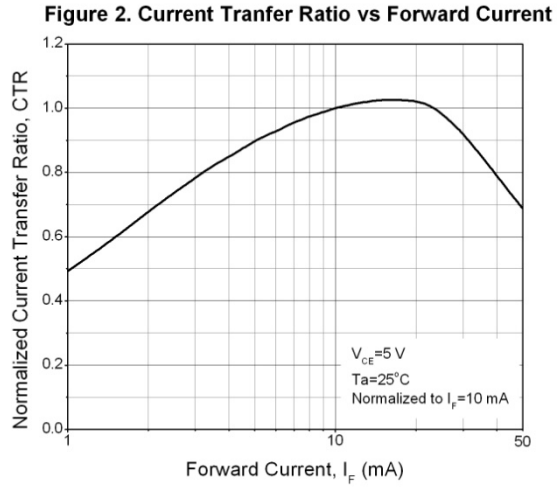
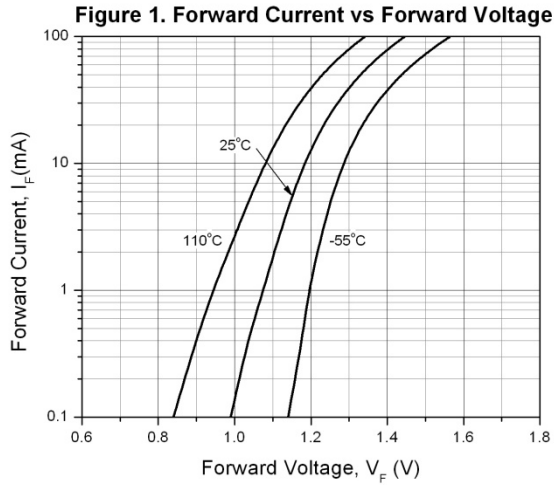
Parameter	Symbol	Min	Typ.	Max.	Unit	Condition	
Collector current (Phototransistor operation)	TIL111	$I_{C(ON)}$	2	-	-	mA	$I_F = 16\text{mA}$, $V_{CE} = 0.4\text{V}$
Collector current (Photodiode operation)			7	-	-	μA	$I_F = 16\text{mA}$, $V_{CB} = 0.4\text{V}$
Current Transfer Ratio	TIL117	CTR	50	-	-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

Transfer Characteristics

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

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

Typical Electro-Optical Characteristics Curves



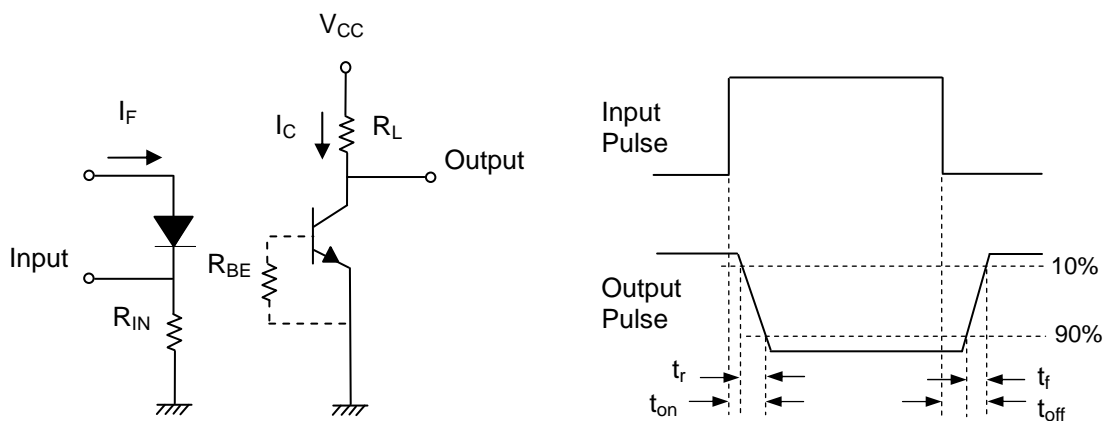
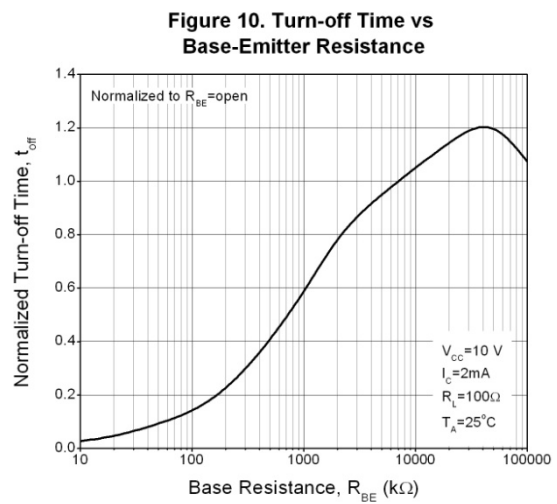
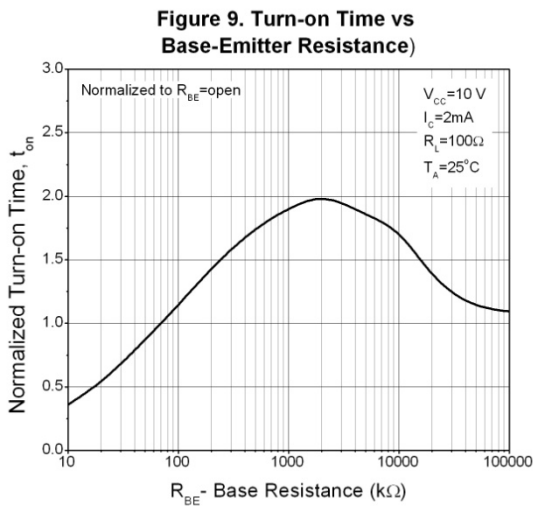
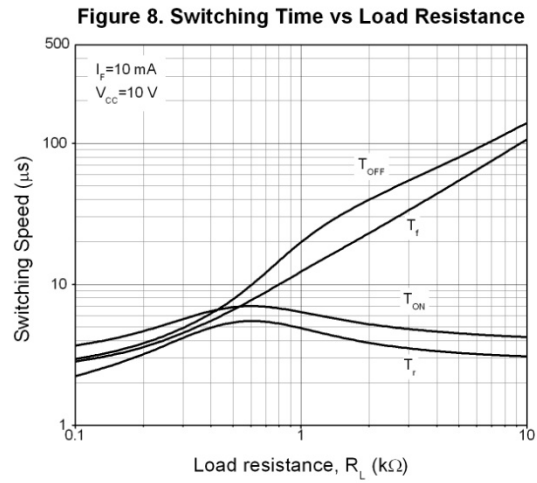
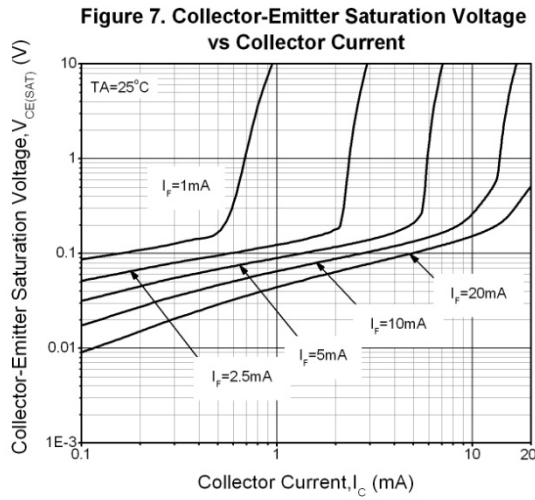


Figure 11. Switching Time Test Circuit & Waveforms

Order Information

Part Number

TIL11XY(Z)-V

or

MCT2XY(Z)-V

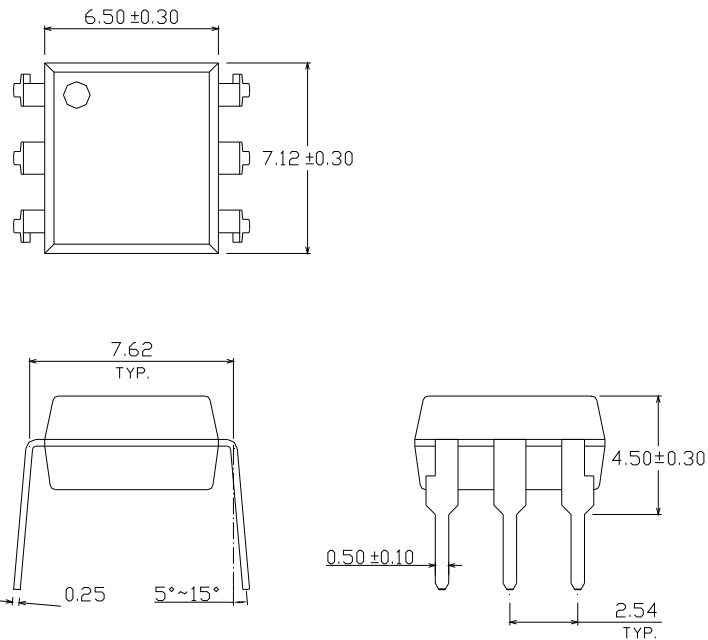
Note

- 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)

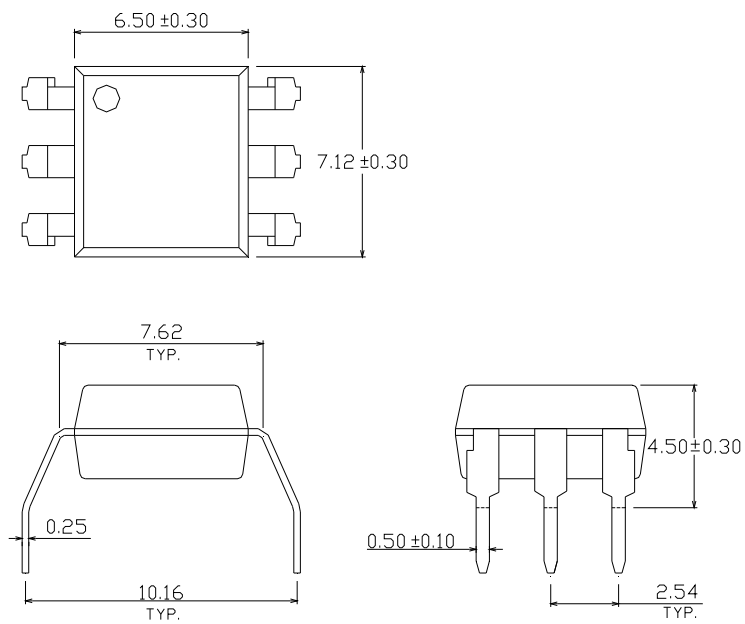
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

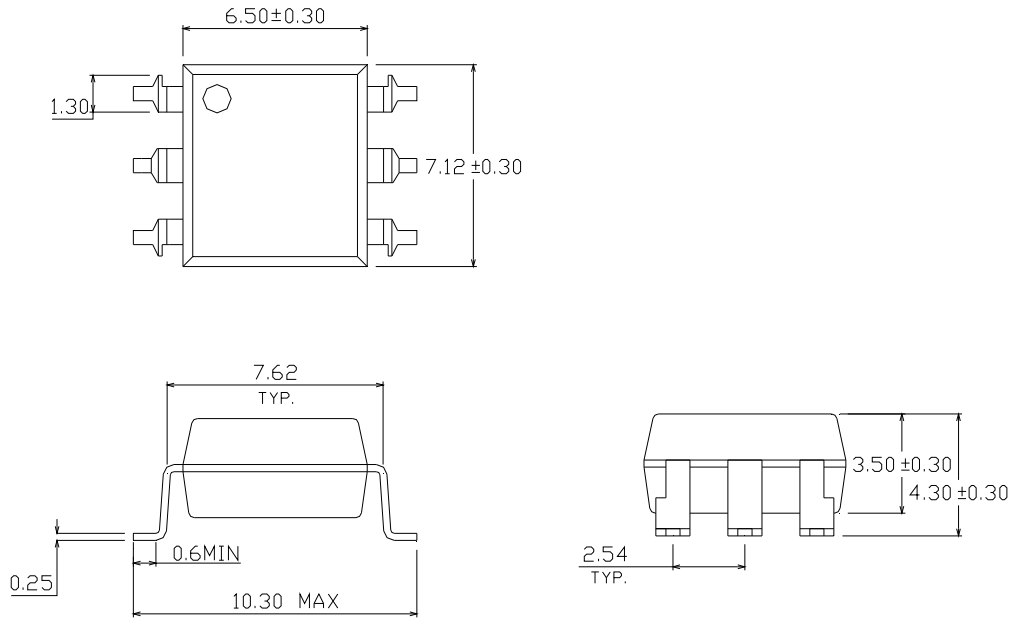
Standard DIP Type



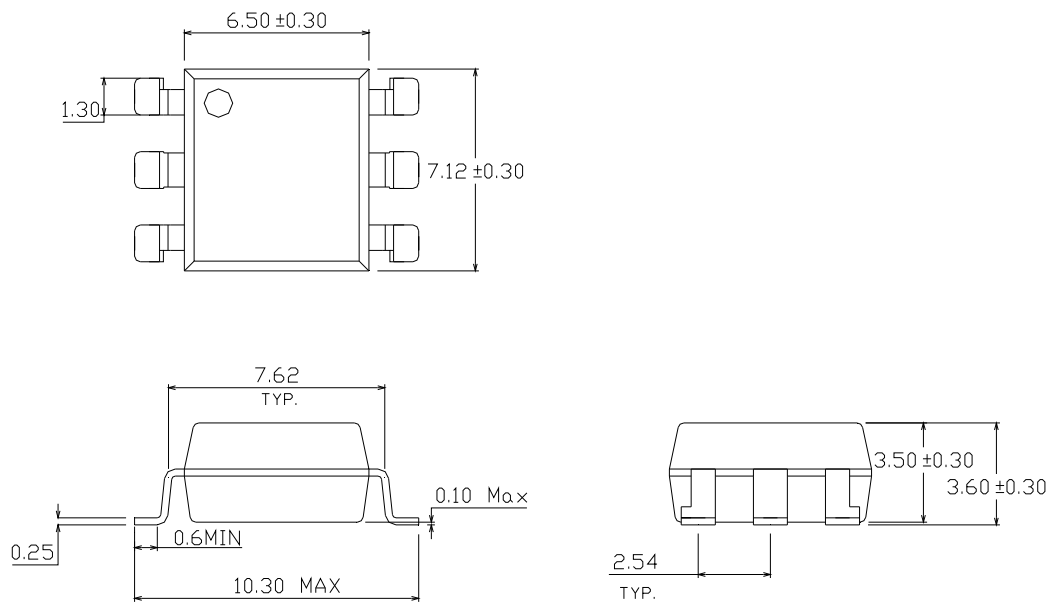
Option M Type



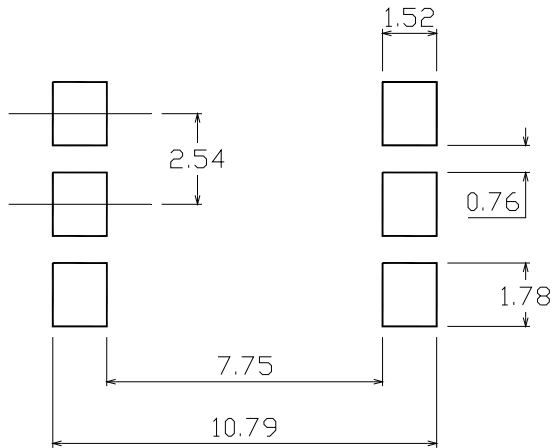
Option S Type



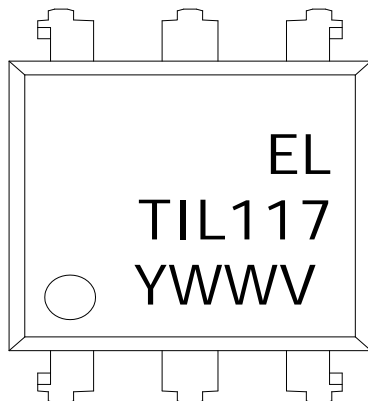
Option S1 Type



Recommended pad layout for surface mount leadform



Device Marking

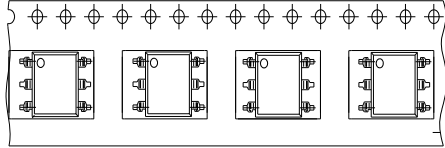


Notes

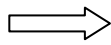
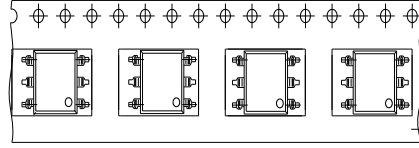
- EL denotes Everlight
- TIL117 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE optional

Tape & Reel Packing Specifications

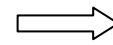
Option TA



Option TB

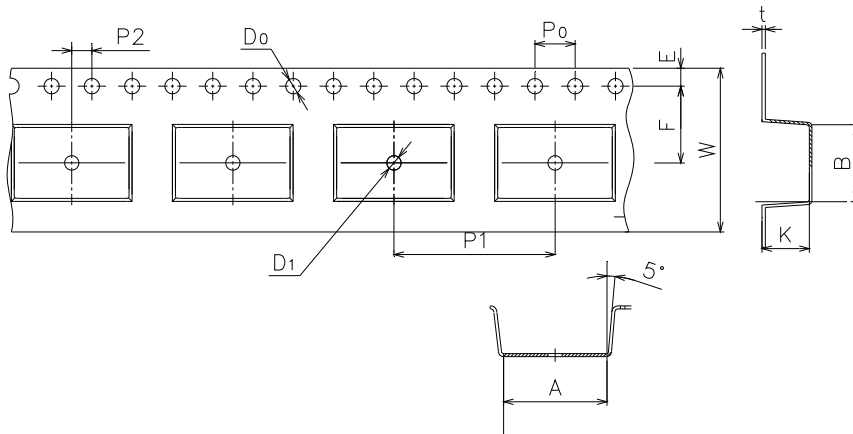


Direction of feed from reel



Direction of feed from reel

Tape dimensions

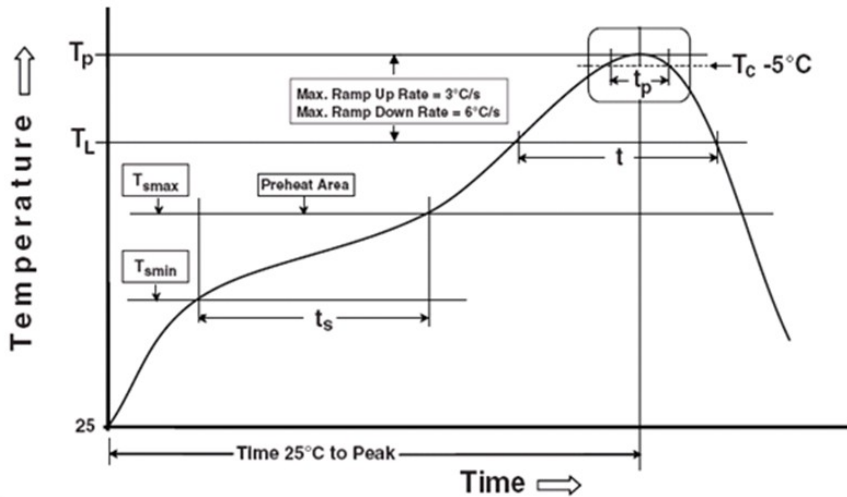


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

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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