

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)

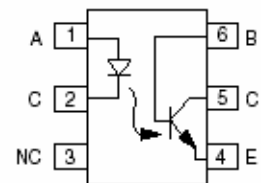


Description

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.

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 ($t = 10\mu\text{s}$) | 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

| Parameter | Symbol | Min. | Typ.* | Max. | Unit | Condition |
|-----------------|---------------|------|-------|------|---------------|---|
| Forward voltage | TIL111 | - | 1.22 | 1.4 | V | $I_F = 16\text{mA}$ |
| | TIL117 | - | - | 1.4 | | $T_A = 0-70^{\circ}\text{C}, I_F = 16\text{mA}$ |
| | | - | 1.32 | - | | $T_A = -55^{\circ}\text{C}, I_F = 16\text{mA}$ |
| | | - | 1.1 | - | | $T_A = 110^{\circ}\text{C}, I_F = 16\text{mA}$ |
| | MCT2 MCT2E | - | 1.23 | 1.5 | | $I_F = 20\text{mA}$ |
| 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 | 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

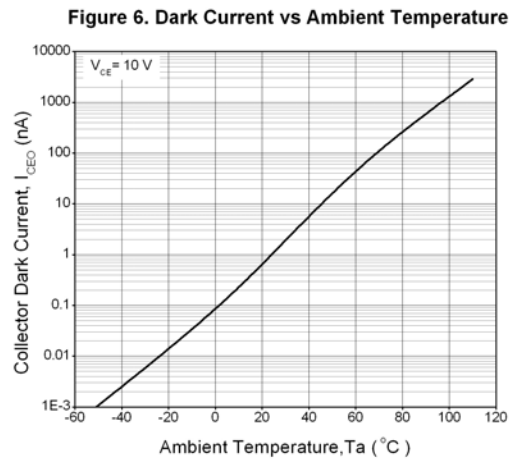
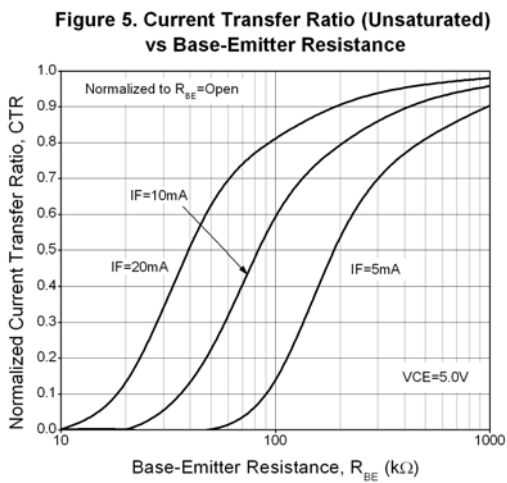
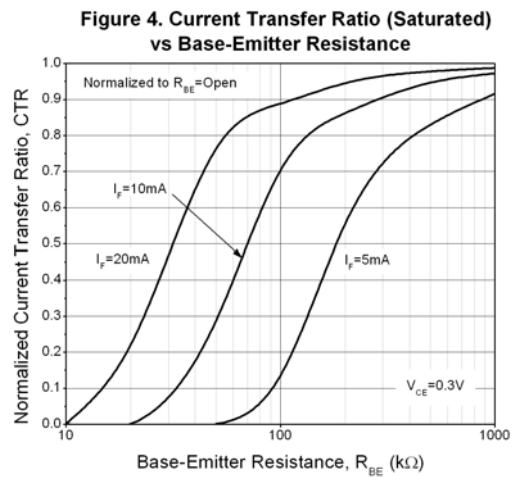
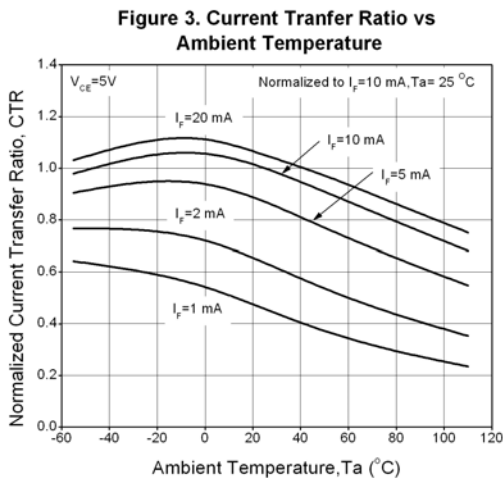
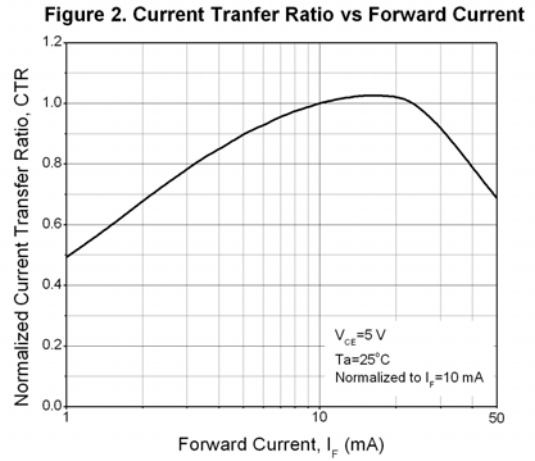
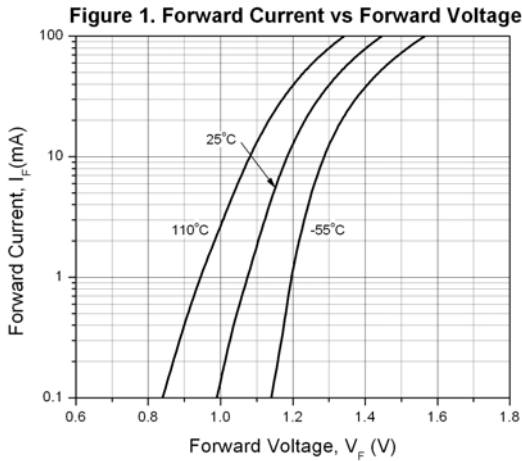
| Parameter | | Symbol | Min. | Typ.* | Max. | Unit | Condition |
|--------------------------------------|------------------|---------------|-----------|-------|------|----------|---|
| Collector-Emitter saturation voltage | All | $V_{CE(sat)}$ | - | - | 0.4 | V | $I_F = 16mA, I_C = 2mA$ |
| | TIL117 | | - | - | 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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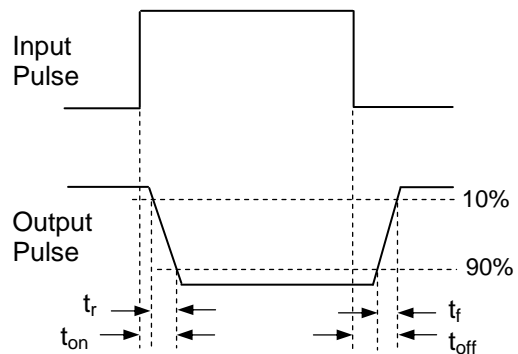
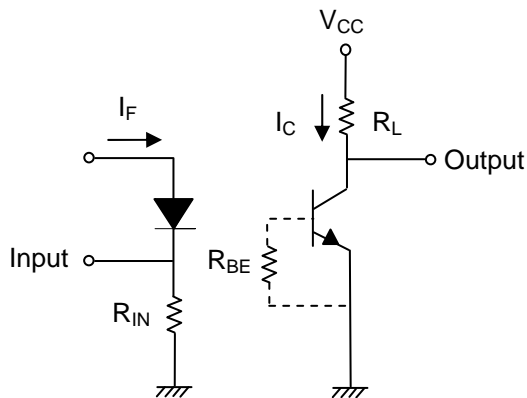
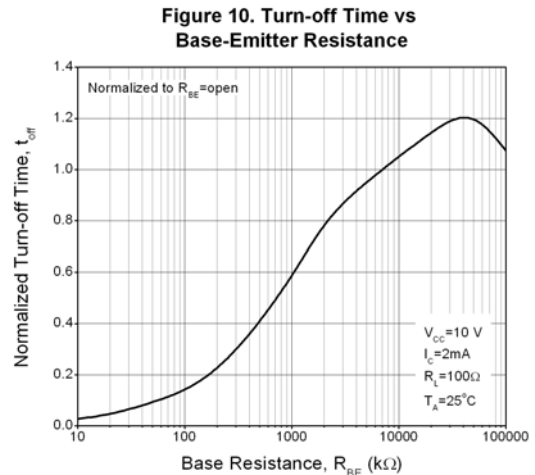
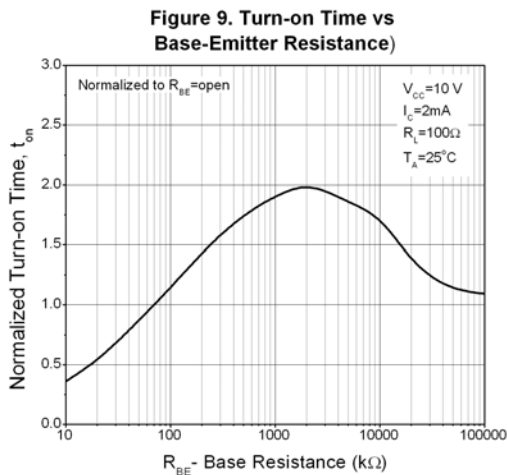
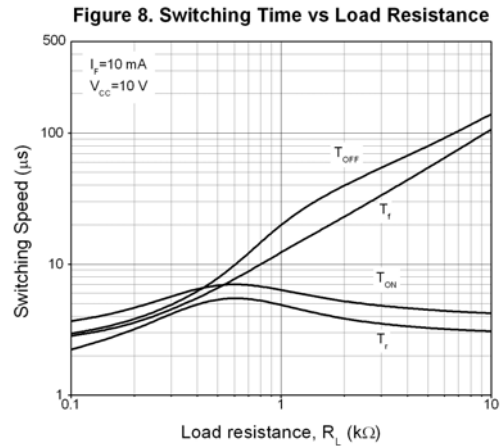
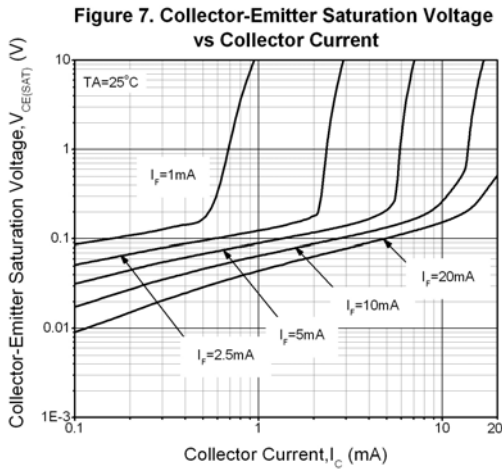


Figure 11. Switching Time Test Circuit & Waveforms



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TIL11X Series
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 |



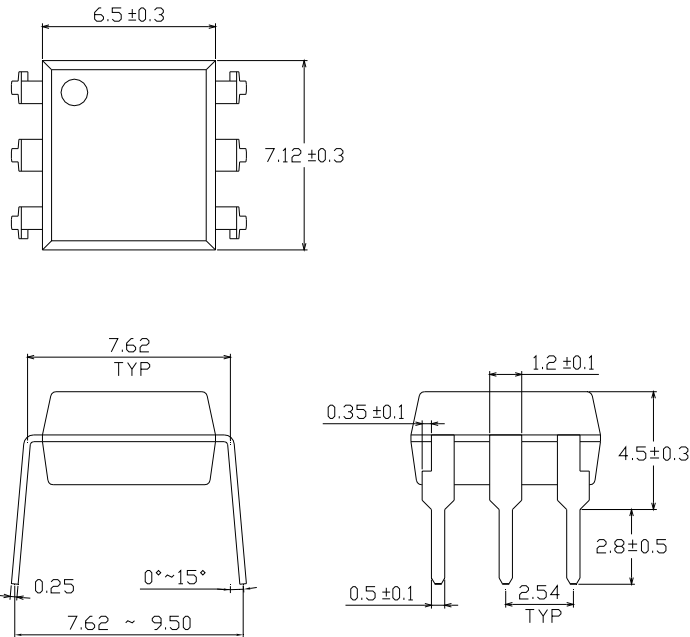
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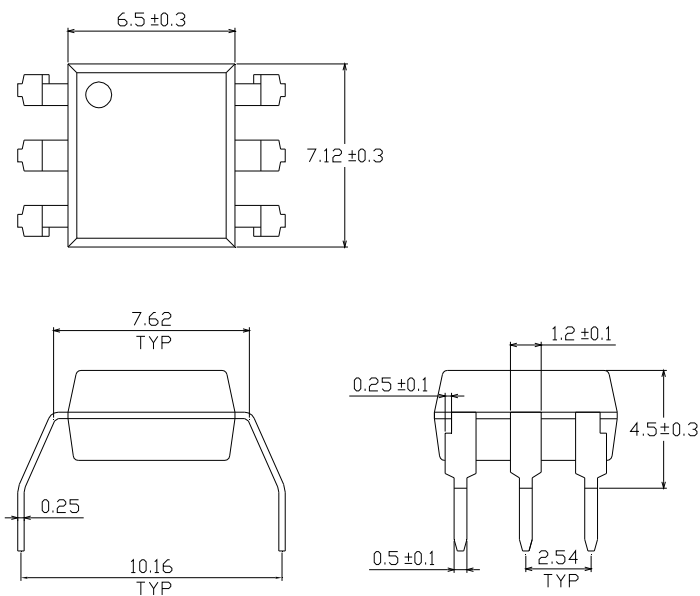
TIL11X Series MCT2X Series

Package Drawings (Dimensions in mm)

Standard DIP Type



Option M Type



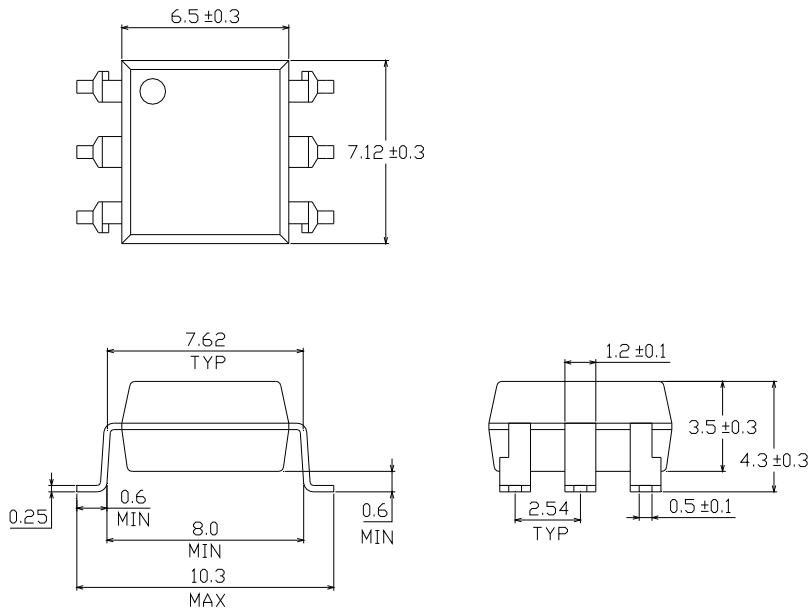


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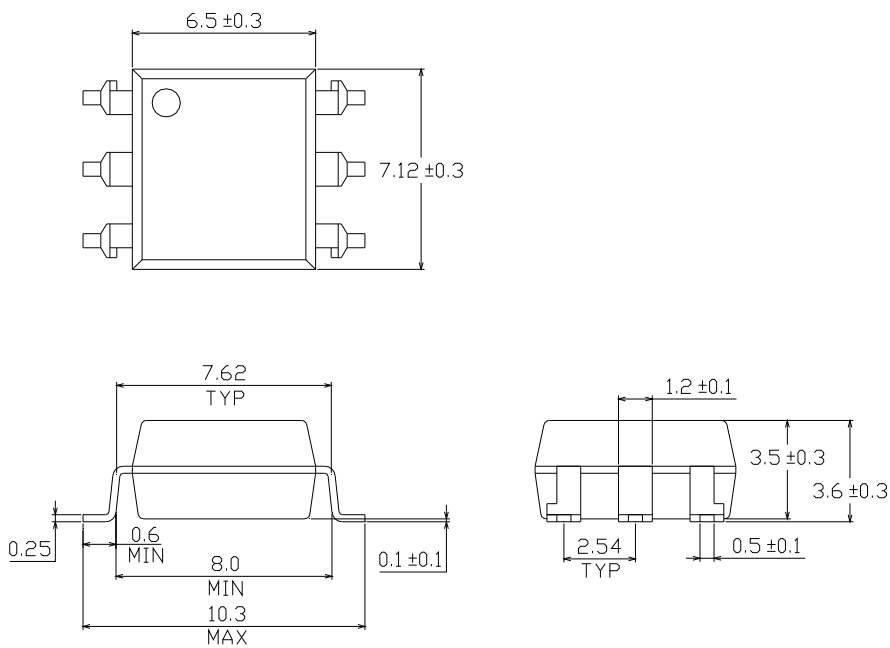
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Option S Type



Option S1 Type



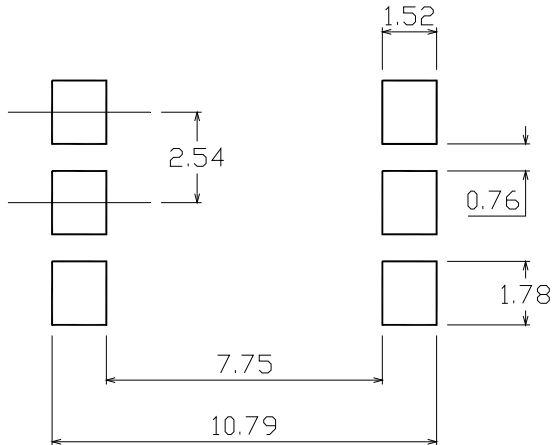


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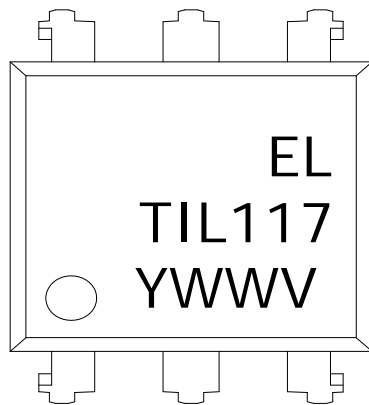
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Recommended pad layout for surface mount leadform



Device Marking



Notes

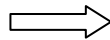
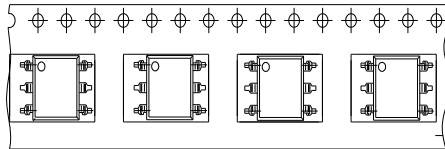
- EL denotes Everlight
- TIL117 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE optional

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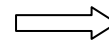
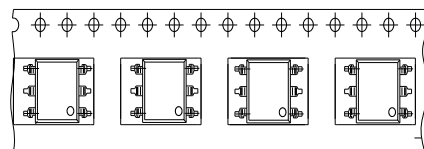
Tape & Reel Packing Specifications

Option TA



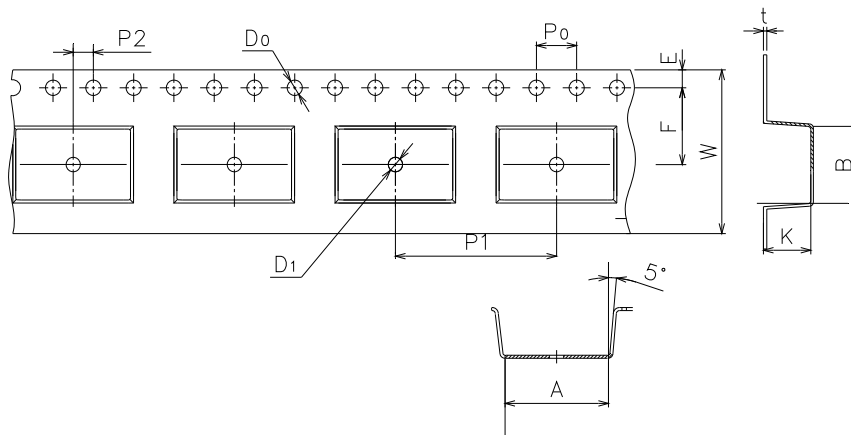
Direction of feed from reel

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 |

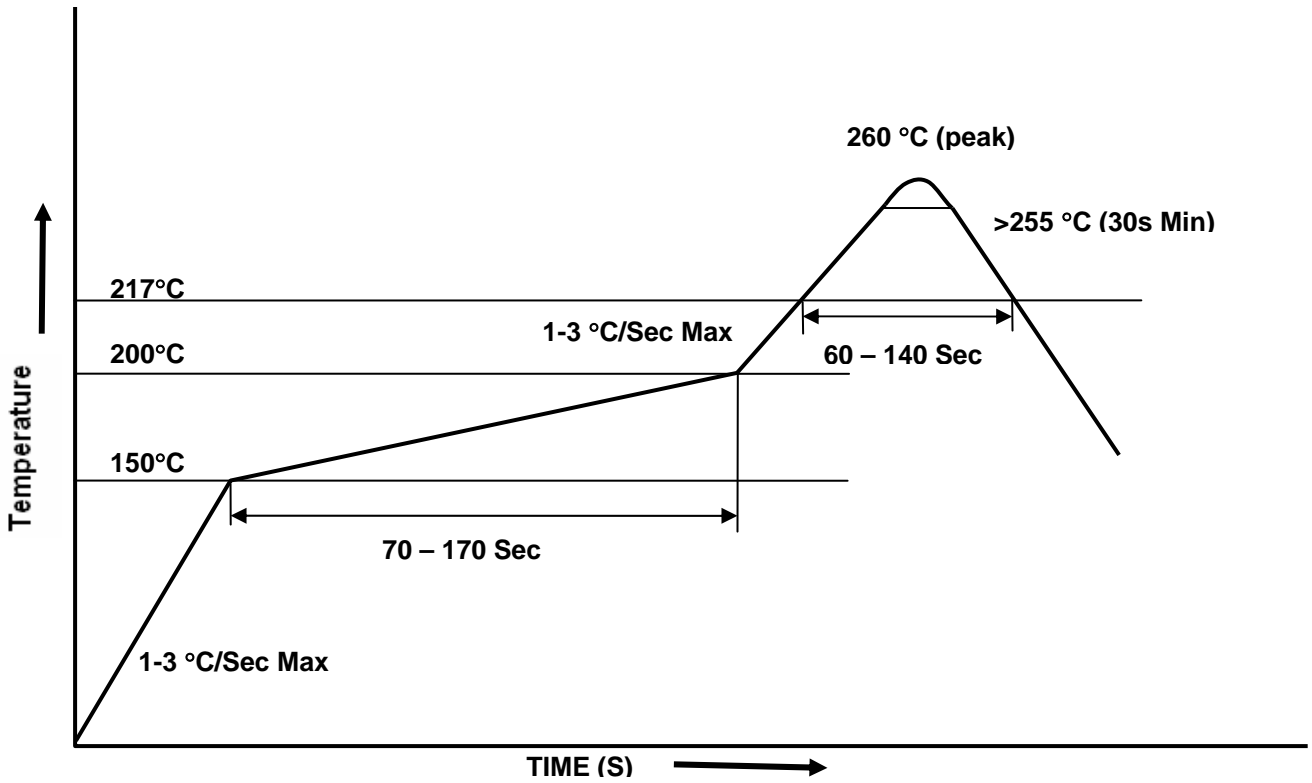


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Solder Reflow Temperature Profile





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TIL11X Series
MCT2X Series

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