



# Photocoupler

## Product Data Sheet

### LTV-2X5-G SERIES

Spec No.: DS70-2013-0042

Effective Date: 01/08/2014

Revision: A

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

## Photocouplers LTV-215-G / LTV-245-G Series

### 1. DESCRIPTION

#### 1.1 Features

- Current transfer ratio (CTR) : 2000% TYP. at  $I_F = 1\text{mA}$ ,  $V_{CE} = 2\text{V}$
- High input-output isolation voltage. (Viso=3,750Vrms)
- Employs double transfer mold technology
- Safety approval: UL&cUL, VDE pending
- RoHS Compliance: All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- G: Halogen Free
- ESD pass HBM 8000V/MM2000V
- MSL class1

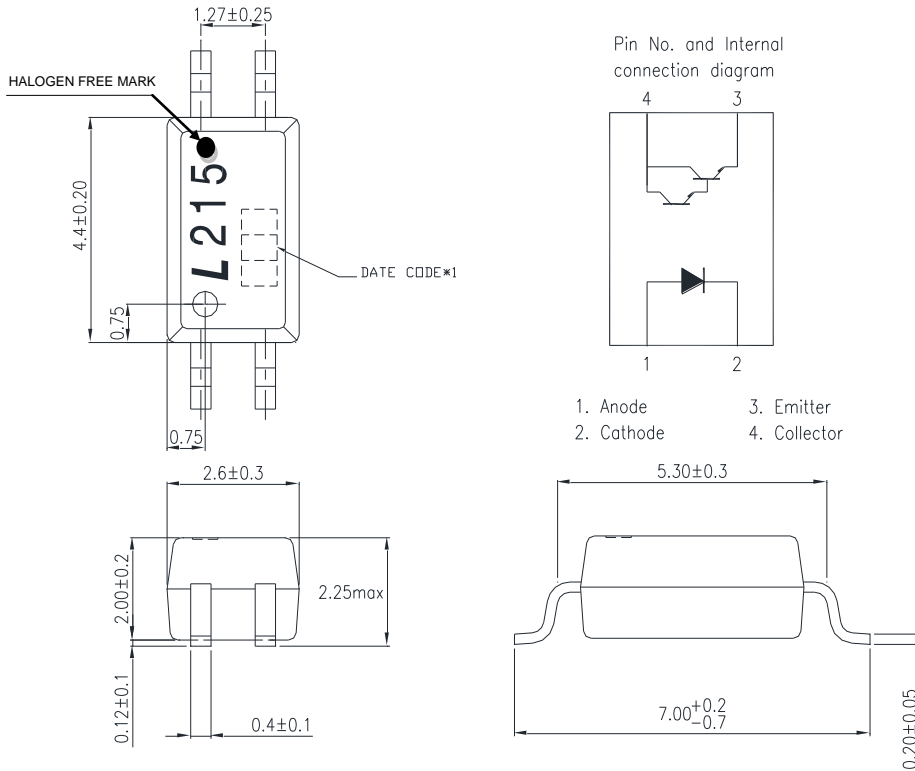
#### 1.2 Applications

- Hybrid substrates that require high density mounting.
- Programmable controllers

# Photocouplers LTV-215-G / LTV-245-G Series

## 2. PACKAGE DIMENSIONS

### 2.1 LTV-215-G

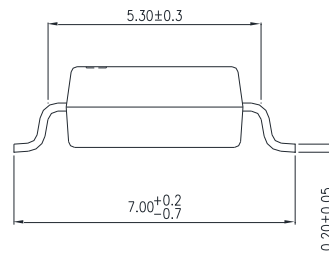
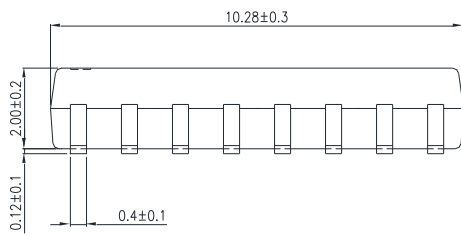
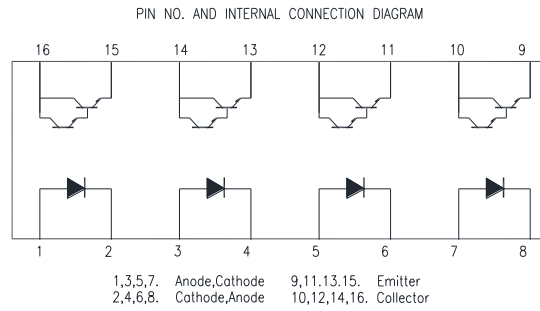
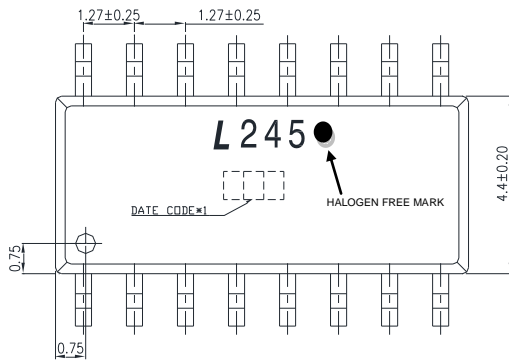


#### Notes :

1. 3-digit date code. (Y: Year code, WW: Week code)

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### 2.2 LTV-245-G



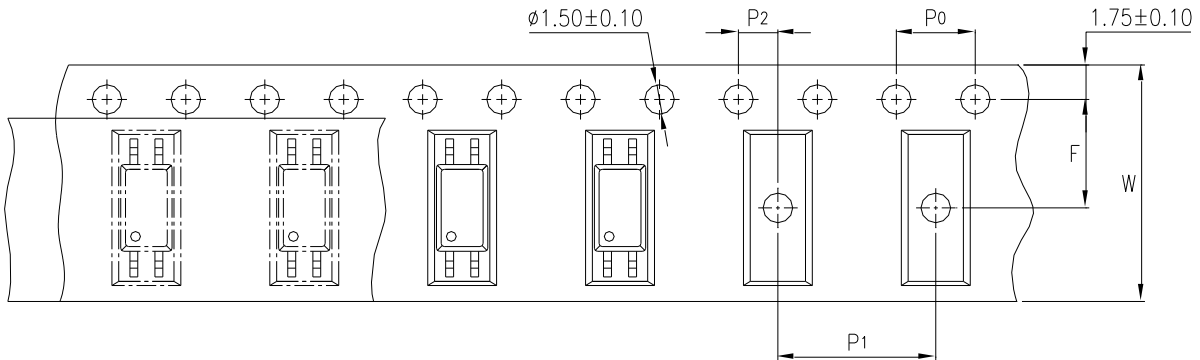
#### Notes :

1. 3-digit date code. (Y: Year code, WW: Week code)

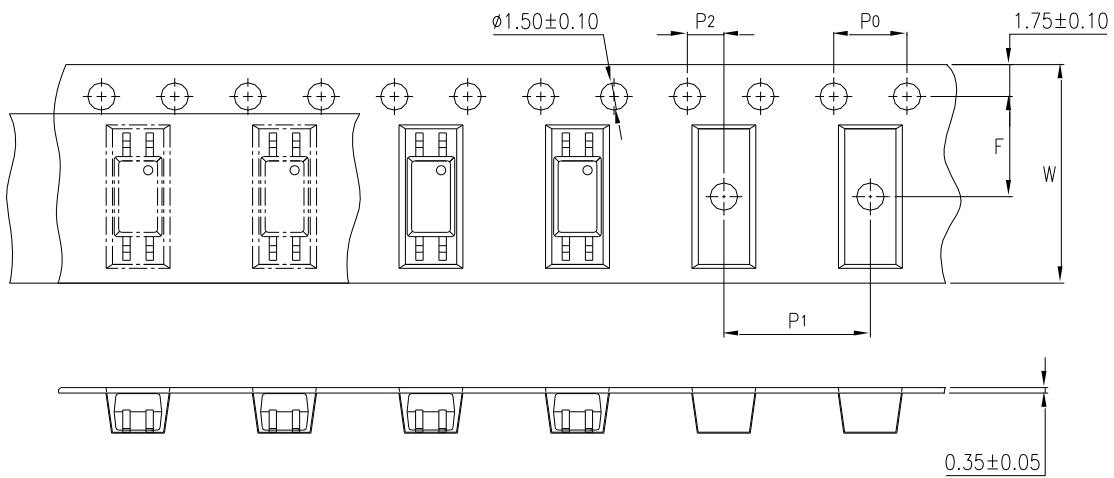
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## 3. TAPING DIMENSIONS

### 3.1 P/N : LTV-215 series



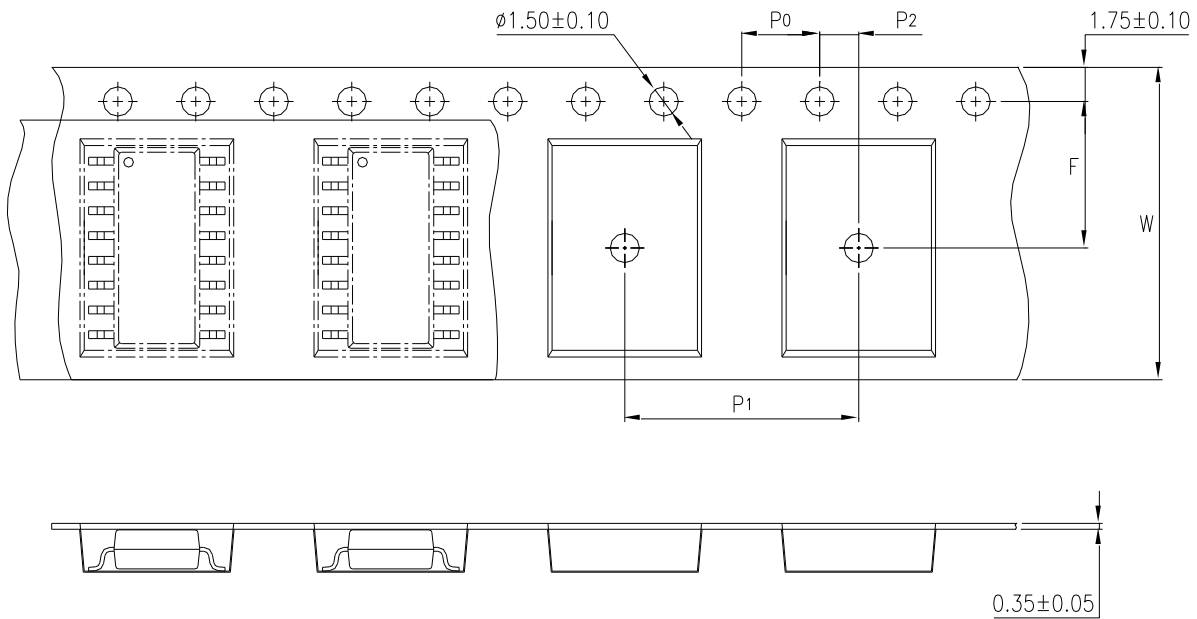
### 3.2 P/N : LTV-215-TP1 series



| Description                            | Symbol | Dimension in mm (inch) |
|--|--------|------------------------|
| Tape wide                              | W      | 12±0.3 (0.47)          |
| Pitch of sprocket holes                | $P_0$  | 4±0.1 (0.15)           |
| Distance of compartment                | F      | 5.5±0.1 (0.217)        |
|  | $P_2$  | 2±0.1 (0.079)          |
| Distance of compartment to compartment | $P_1$  | 8±0.1 (0.315)          |

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### 3.3 P/N : LTV-245 series



| Description                            | Symbol         | Dimension in mm (inch) |
|--|----------------|------------------------|
| Tape wide                              | W              | 16±0.3 (0.47)          |
| Pitch of sprocket holes                | P <sub>0</sub> | 4±0.1 (0.15)           |
| Distance of compartment                | F              | 7.5±0.1 (0.217)        |
|  | P <sub>2</sub> | 2±0.1 (0.079)          |
| Distance of compartment to compartment | P <sub>1</sub> | 12±0.1 (0.315)         |

### 3.5 Quantities per Reel

| Package Type     | LTV-215 | LTV-245 |
|------------------|---------|---------|
| Quantities (pcs) | 3000    | 2000    |

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### 4. RATING AND CHARACTERISTICS

#### 4.1 Absolute Maximum Ratings at Ta=25°C

|        | Parameter                   | Symbol    | Rating     |     | Unit      |
|--------|-----------------------------|-----------|------------|-----|-----------|
|        |                             |           | 215        | 245 |           |
| Input  | Forward Current             | $I_F$     | 50         |     | mA        |
|        | Reverse Voltage             | $V_R$     | 6          |     | V         |
|        | Power Dissipation           | P         | 60         | 80  | mW        |
| Output | Collector - Emitter Voltage | $V_{CEO}$ | 40         |     | V         |
|        | Emitter - Collector Voltage | $V_{ECO}$ | 6          |     | V         |
|        | Collector Current           | $I_C$     | 90         | 100 | mA        |
|        | Collector Power Dissipation | $P_C$     | 150        | 100 | mW        |
| 1.     | Isolation Voltage           | $V_{iso}$ | 3750       |     | $V_{rms}$ |
|        | Operating Temperature       | $T_{opr}$ | -55 ~ +100 |     | °C        |
|        | Storage Temperature         | $T_{stg}$ | -55 ~ +150 |     | °C        |
| 2.     | Soldering Temperature       | $T_{sol}$ | 260        |     | °C        |

1. AC For 1 Minute, R.H. = 40 ~ 60%

Isolation voltage shall be measured using the following method.

- (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
- (2) The isolation voltage tester with zero-cross circuit shall be used.
- (3) The waveform of applied voltage shall be a sine wave.

2. For 10 Seconds

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### 4.2 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

| Parameter                |                                      | Symbol        | Min.               | Typ.               | Max. | Unit          | Test Condition                           |
|--------------------------|--------------------------------------|---------------|--------------------|--------------------|------|---------------|--|
| Input                    | Forward Voltage                      | $V_F$         | —                  | 1.1                | 1.4  | V             | $I_F = 5\text{mA}$                       |
|                          | Reverse Current                      | $I_R$         | —                  | —                  | 10   | $\mu\text{A}$ | $V_R = 5\text{V}$                        |
|                          | Terminal Capacitance                 | $C_t$         | —                  | 30                 | 250  | pF            | $V = 0, f = 1\text{KHz}$                 |
| Output                   | Collector Dark Current               | $I_{CEO}$     | —                  | —                  | 400  | nA            | $V_{CE} = 40\text{V}, I_F = 0$           |
|                          | Collector-Emitter Breakdown Voltage  | $BV_{CEO}$    | 40                 | —                  | —    | V             | $I_C = 0.1\text{mA}, I_F = 0$            |
|                          | Emitter-Collector Breakdown Voltage  | $BV_{ECO}$    | 6                  | —                  | —    | V             | $I_E = 10\mu\text{A}, I_F = 0$           |
| TRANSFER CHARACTERISTICS | Collector Current                    | $I_C$         | 2                  | 20                 | —    | mA            | $I_F = 1\text{mA}$                       |
|                          | 1. Current Transfer Ratio            | CTR           | 200                | 2000               | —    | %             | $V_{CE} = 2\text{V}$                     |
|                          | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —                  | —                  | 1.0  | V             | $I_F = 1\text{mA}$<br>$I_C = 2\text{mA}$ |
|                          | Isolation Resistance                 | $R_{iso}$     | $5 \times 10^{10}$ | $1 \times 10^{11}$ | —    | $\Omega$      | DC500V,<br>40 ~ 60% R.H.                 |
|                          | Floating Capacitance                 | $C_f$         | —                  | 0.6                | 1    | pF            | $V = 0, f = 1\text{MHz}$                 |
|                          | Response Time (Rise)                 | $t_r$         | —                  | 200                | —    | $\mu\text{s}$ | $V_{CC} = 5\text{V}, I_C = 2\text{mA},$  |
|                          | Response Time (Fall)                 | $t_f$         | —                  | 200                | —    | $\mu\text{s}$ | $R_L = 100\Omega$                        |

$$1. \text{ CTR} = \frac{I_C}{I_F} \times 100\%$$

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**5. RANK TABLE OF CURRENT TRANSFER RATIO CTR**

| MODEL NO.          | Min | Max | Condition  |
|--------------------|-----|-----|--|
| LTV-215<br>LTV-245 | 200 | —   | $I_F=1\text{mA}$ , $V_{CE}=2\text{V}$ , $T_a=25^\circ\text{C}$ |

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## 6. CHARACTERISTICS CURVES

Figure 1. Diode Power Dissipation vs. Ambient Temperature

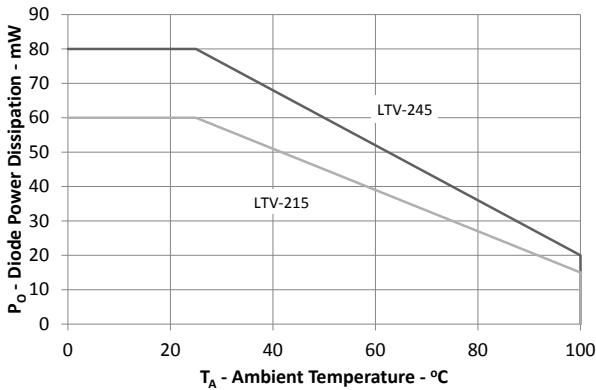


Figure 2. Transistor Power Dissipation vs. Ambient Temperature

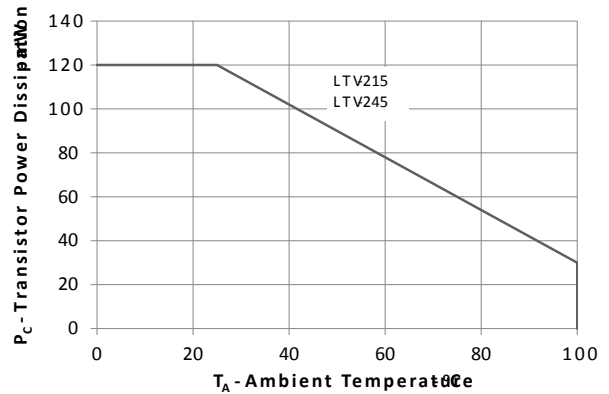


Figure 3. Forward Current vs. Forward Voltage

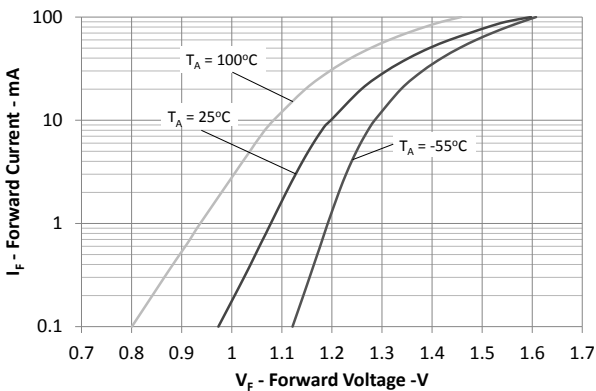


Figure 4. Collector Current vs. Non-Saturated Collector to Emitter Voltage

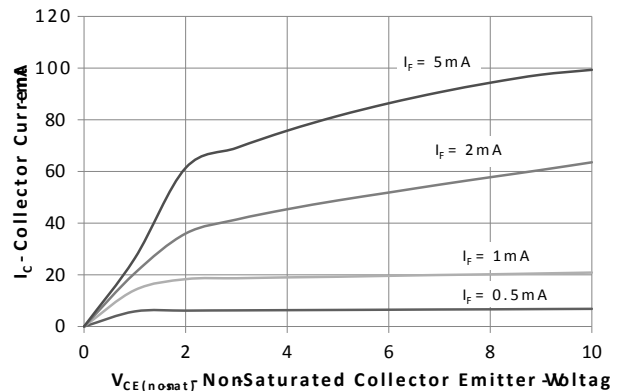


Figure 5. Collector to Emitter Dark Current vs. Ambient Temperature

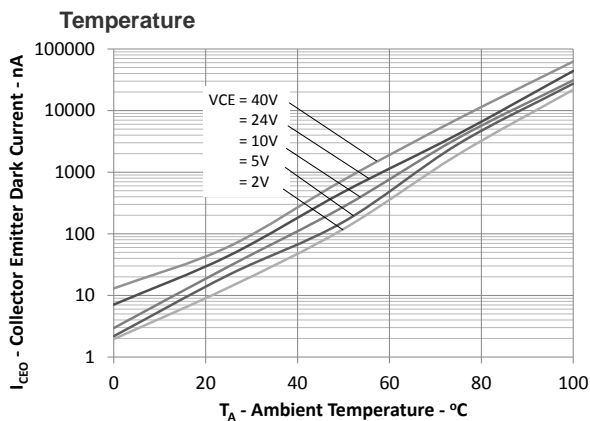
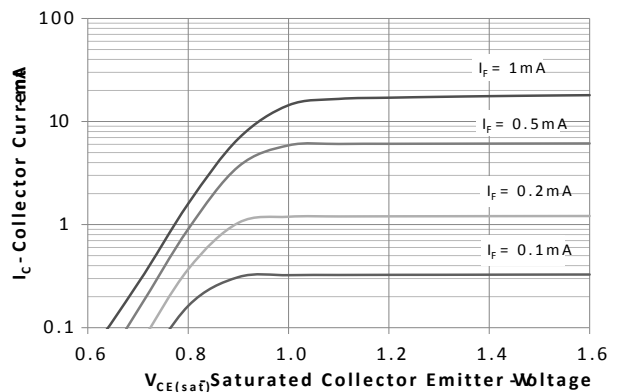


Figure 6. Collector Current vs. Saturated Collector to Emitter Voltage



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Figure 7. Normalized Current Transfer Ratio vs. Ambient Temperature

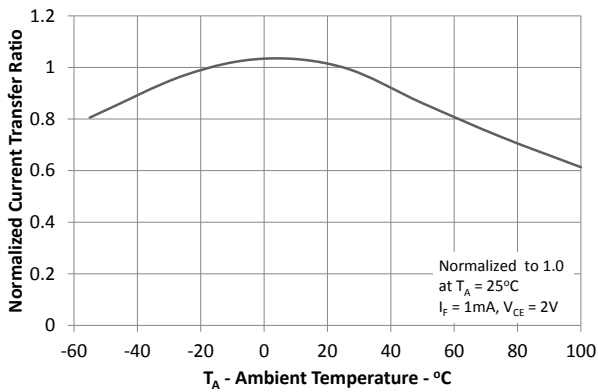


Figure 8. Current Transfer Ratio vs. Forward Current

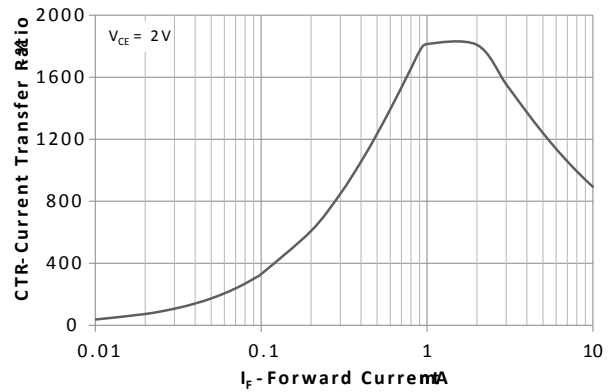


Figure 9. Switching Time vs. Load Resistance

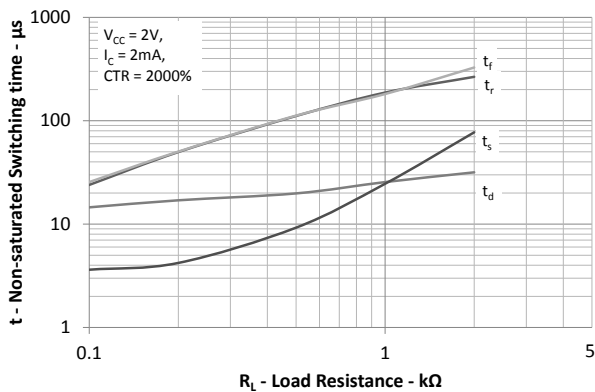
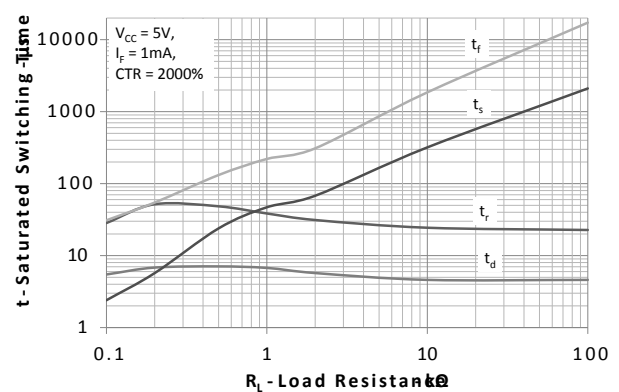
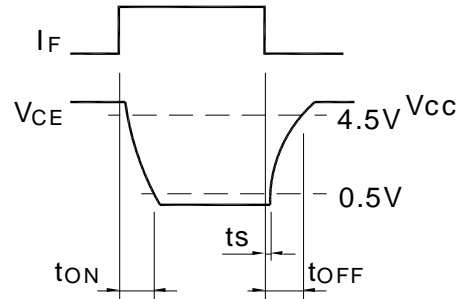
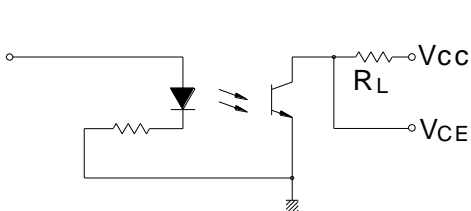


Figure 10. Switching Time vs. Load Resistance



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### 7. SWITCHING TIME TEST CIRCUIT



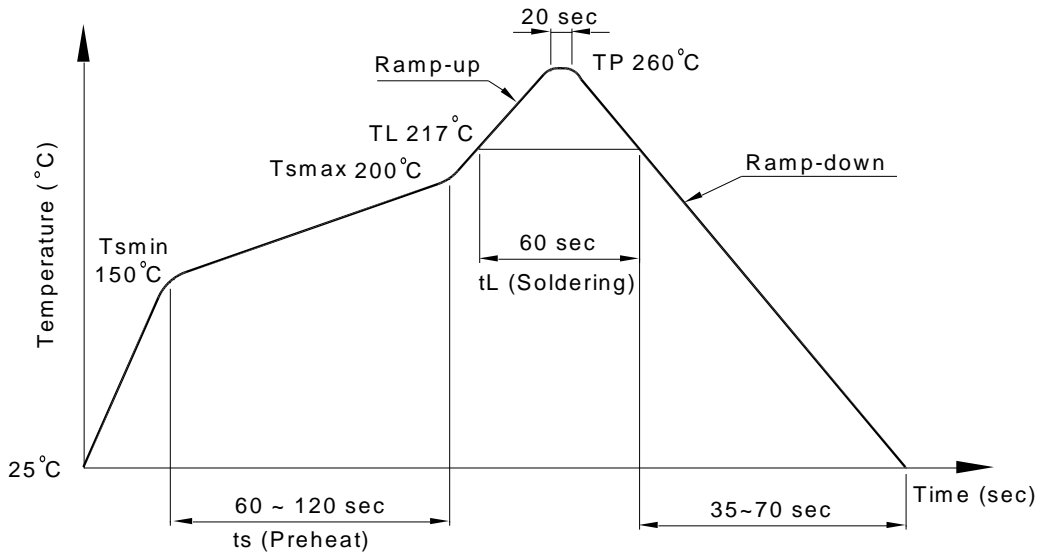
### 8. TEMPERATURE PROFILE OF SOLDERING

#### 8.1 IR Reflow soldering (JEDEC-STD-020C compliant)

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

| Profile item                     | Conditions     |
|----------------------------------|----------------|
| Preheat                          |                |
| - Temperature Min ( $T_{Smin}$ ) | 150°C          |
| - Temperature Max ( $T_{Smax}$ ) | 200°C          |
| - Time (min to max) (ts)         | 90±30 sec      |
| Soldering zone                   |                |
| - Temperature ( $T_L$ )          | 217°C          |
| - Time ( $t_L$ )                 | 60 sec         |
| Peak Temperature ( $T_P$ )       | 260°C          |
| Ramp-up rate                     | 3°C / sec max. |
| Ramp-down rate                   | 3-6°C / sec    |

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### 8.2 Wave soldering (JEDEC22A111 compliant)

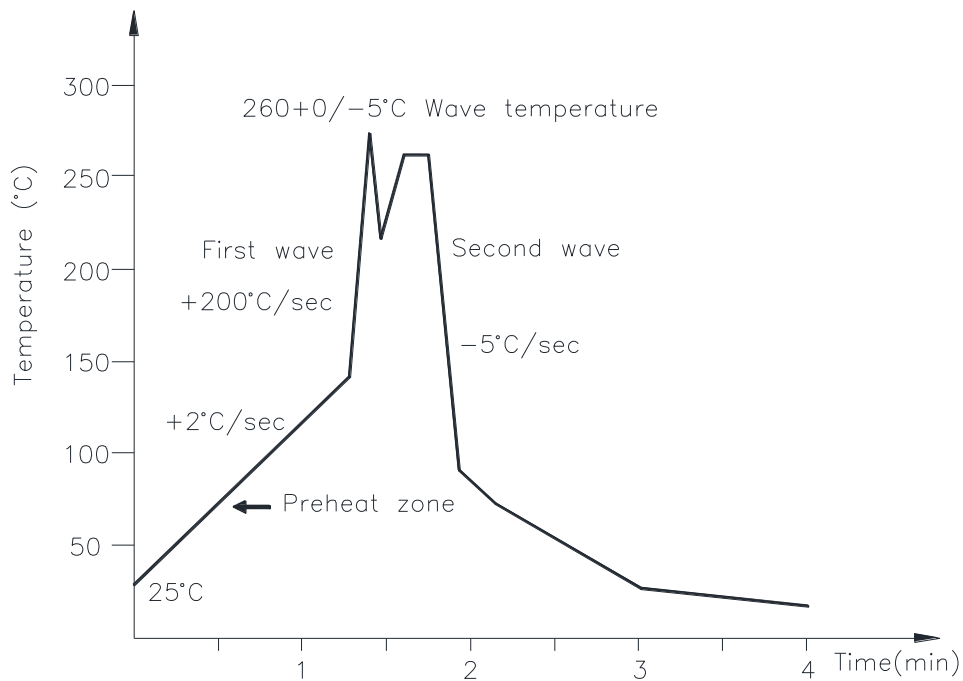
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5°C

Time: 10 sec.

Preheat temperature: 25 to 140°C

Preheat time: 30 to 80 sec.



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### 8.3 Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

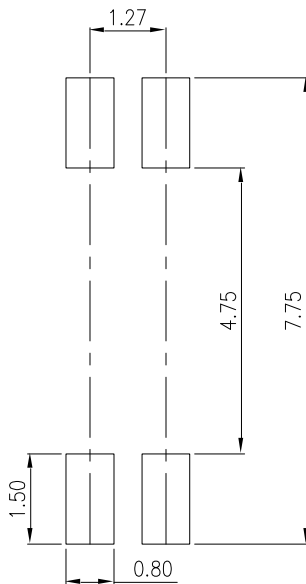
Temperature: 380+0/-5°C

Time: 3 sec max.

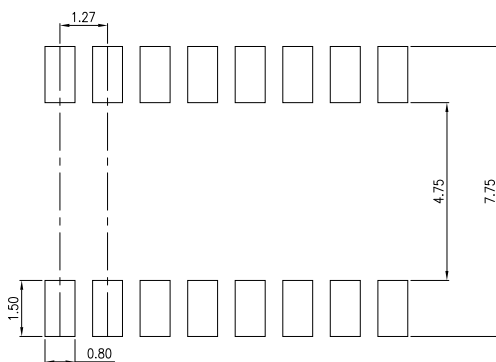
## 9. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit: mm

P/N : LTV-217



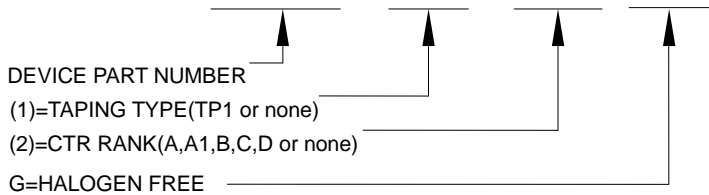
P/N : LTV-247



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10. NAMING RULE

LTV- 2x5-(1)-(2)-G



11. Notes:

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- The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.
- For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.
- When requiring a device for any "specific" application, please contact our sales in advice.
- If there are any questions about the contents of this publication, please contact us at your convenience.
- The contents described herein are subject to change without prior notice.
- Immerge unit's body in solder paste is not recommended.