



# Photocoupler

## Product Data Sheet

### LTV-100X-G series datasheet

Spec No.: DS70-2013-0012

Effective Date: 11/03/2016

Revision: G

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

## Photocoupler LTV-10XX-G series

### 1. DESCRIPTION

#### 1.1 Features

- Current transfer ratio ( CTR : MIN. 50% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$ ,  $T_a = 25^\circ\text{C}$  )
- High input-output isolation voltage (  $V_{iso} = 5,000\text{Vrms}$  )
- High collector-emitter voltage (  $V_{CEO} = 70\text{V}$  )
- Temperature range  $-55^\circ\text{C}$  to  $110^\circ\text{C}$
- Creepage distance > 8mm
- Employs double transfer mold technology
- Long Mini-flat package : 2.3mm profile : LTV-10XX series
- Halogen Free
- 8P-Free
- Safety approval
  - UL 1577
  - Cul CA5A
  - VDE DIN EN60747-5-5 (VDE 0884-5)
  - CQC GB4943.1-2011/ GB8898-2011 (meet Altitude up to 5000m)
  - Nordic Safety ( FIMKO/NEMKO/SEMKO/DEMKO)
- RoHS Compliance
  - All materials be used in device are followed EU RoHS directive (No.2002/95/EC).

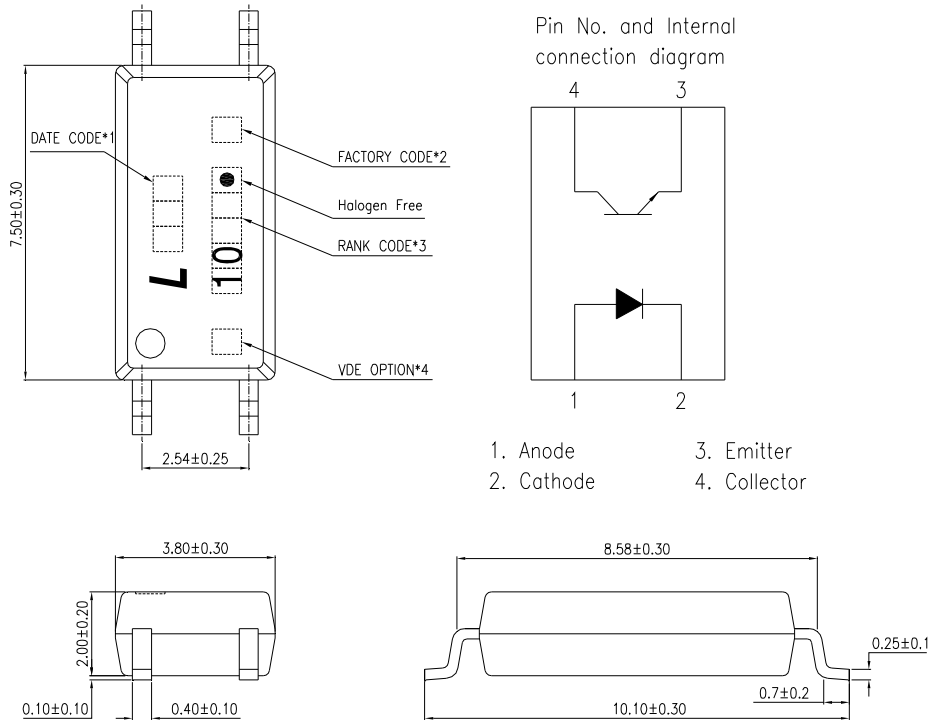
#### 1.2 Applications

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

## Photocoupler LTV-10XX-G series

### 2. PACKAGE DIMENSIONS

#### 2.1 LTV-10XX-G series



#### Notes :

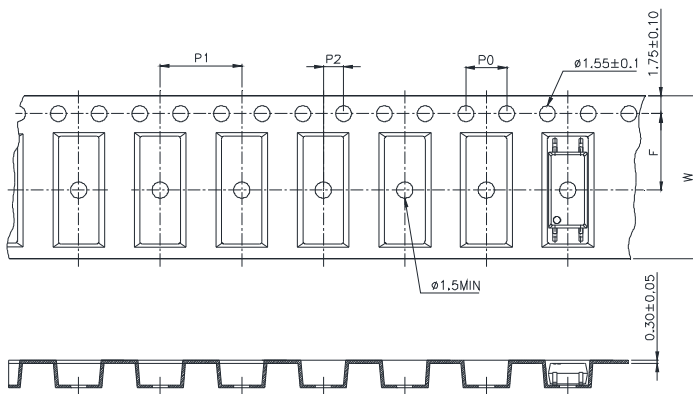
1. 1-digit year code, Example : 2010 = A  
2-digit work week ranging from '01' to '53'
2. Factory identification mark shall be marked. (W : China-CZ, X: China -TJ)
3. CTR rank.
4. "4" or "V" for VDE option.

\*All dimensions in millimeters.

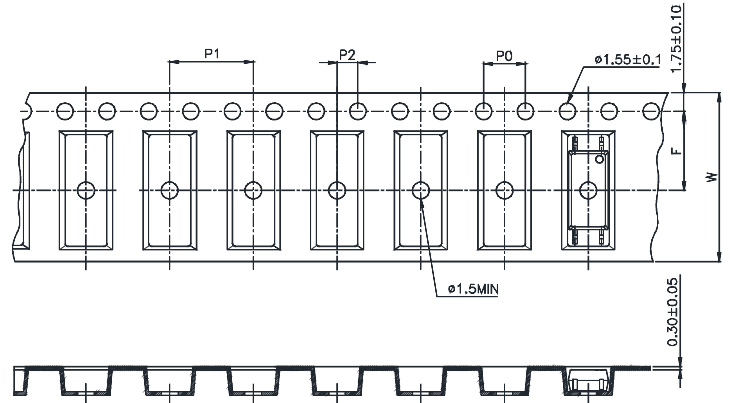
## Photocoupler LTV-10XX-G series

### 3. TAPING DIMENSIONS

#### 3.1 LTV-10XX-TP



#### 3.2 LTV-10XX-TP1



| Description                            | Symbol         | Dimension in mm (inch) |
|----------------------------------------|----------------|------------------------|
| Tape wide                              | W              | 16±0.3 (.63)           |
| Pitch of sprocket holes                | P <sub>0</sub> | 4±0.1 (.15)            |
| Distance of compartment                | F              | 7.5±0.1 (.295)         |
|                                        | P <sub>2</sub> | 2±0.1 (.079)           |
| Distance of compartment to compartment | P <sub>1</sub> | 8±0.1 (.315)           |

#### 3.3 Quantities Per Reel

| Package Type     | LTV-10XX series |
|------------------|-----------------|
| Quantities (pcs) | 3000            |

## Photocoupler LTV-10XX-G series

### 4. RATING AND CHARACTERISTICS

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

|        | Parameter                              | Symbol      | Rating     | Unit      |
|--------|----------------------------------------|-------------|------------|-----------|
| Input  | Forward Current                        | $I_F$       | 60         | mA        |
|        | Reverse Voltage                        | $V_R$       | 6          | V         |
|        | Power Dissipation                      | $P$         | 100        | mW        |
|        | Junction Temperature                   | $T_J$       | 125        | °C        |
|        | Thermal Resistance Junction to Ambient | $R_{thJ-A}$ | 250        | °C/W      |
|        | Thermal Resistance Junction to Case    | $R_{thJ-C}$ | 180        | °C/W      |
| Output | Collector - Emitter Voltage            | $V_{CEO}$   | 70         | V         |
|        | Emitter - Collector Voltage            | $V_{ECO}$   | 7          | V         |
|        | Collector Current                      | $I_C$       | 50         | mA        |
|        | Collector Power Dissipation            | $P_C$       | 150        | mW        |
|        | Junction Temperature                   | $T_J$       | 125        | °C        |
|        | Total Power Dissipation                | $P_{tot}$   | 250        | mW        |
| 1.     | Isolation Voltage                      | $V_{iso}$   | 5000       | $V_{rms}$ |
|        | Operating Temperature                  | $T_{opr}$   | -55 ~ +110 | °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                         | $V_F$         | —         | 1.25 | 1.6  | V             | $I_F=50\text{mA}$                       |
|                             | Reverse Current                         | $I_R$         | —         | —    | 10   | $\mu\text{A}$ | $V_R=4\text{V}$                         |
|                             | Terminal Capacitance                    | $C_t$         | —         | 50   | —    | pF            | $V=0, f=1\text{MHz}$                    |
| Output                      | Collector Dark Current                  | $I_{CEO}$     | —         | 10   | 100  | nA            | $V_{CE}=20\text{V}, I_F=0$              |
|                             | Collector- Emitter<br>Breakdown Voltage | $BV_{CEO}$    | 70        | —    | —    | V             | $I_C=1\text{mA}, I_F=0$                 |
|                             | Emitter-Collector<br>Breakdown Voltage  | $BV_{ECO}$    | 7         | —    | —    | V             | $I_E=100\mu\text{A}, I_F=0$             |
| TRANSFER<br>CHARACTERISTICS | Collector Current                       | $I_C$         | 2.5       | —    | 30   | mA            | $I_F=5\text{mA}$                        |
|                             | 1. Current Transfer Ratio               | CTR           | 50        | —    | 600  | %             | $V_{CE}=5\text{V}$                      |
|                             | Collector-Emitter<br>Saturation Voltage | $V_{CE(sat)}$ | —         | —    | 0.3  | V             | $I_F=10\text{mA}$<br>$I_C=1\text{mA}$   |
|                             | Isolation Resistance                    | $R_{iso}$     | $10^{12}$ | —    | —    | $\Omega$      | DC500V,<br>40 ~ 60% R.H.                |
|                             | Floating Capacitance                    | $C_f$         | —         | 0.3  | —    | pF            | $V=0, f=1\text{MHz}$                    |
|                             | Response Time (Rise)                    | $t_r$         | —         | 3    | 18   | $\mu\text{s}$ | $V_{CC}=5\text{V},$<br>$I_C=2\text{mA}$ |
|                             | Response Time (Fall)                    | $t_f$         | —         | 4.7  | 18   | $\mu\text{s}$ | $R_L=100\Omega,$                        |

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

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

| CTR Rank | Min. | Typ. | Max. | Unit | Condition                                                 |
|----------|------|------|------|------|-----------------------------------------------------------|
| LTV-1000 | 50   | —    | 600  | %    | $I_F=5\text{mA}, V_{CE}=5\text{V}, T_a=25^\circ\text{C}$  |
| LTV-1001 | 100  | —    | 160  |      |                                                           |
| LTV-1004 | 100  | —    | 200  |      |                                                           |
| LTV-1005 | 50   | —    | 150  |      |                                                           |
| LTV-1006 | 100  | —    | 300  |      |                                                           |
| LTV-1007 | 80   | —    | 160  |      |                                                           |
| LTV-1008 | 130  | —    | 260  |      |                                                           |
| LTV-1009 | 200  | —    | 400  |      |                                                           |
| LTV-1010 | 150  | —    | 300  |      |                                                           |
| LTV-1019 | 250  | —    | 500  |      |                                                           |
| LTV-1020 | 300  | —    | 450  |      |                                                           |
| LTV-1002 | 22   | —    | —    | %    | $I_F=1\text{mA}, V_{CE}=5\text{V}, T_a=25^\circ\text{C}$  |
| LTV-1003 | 34   | —    | —    |      |                                                           |
| LTV-1014 | 56   | —    | —    |      |                                                           |
| LTV-1015 | 63   | —    | 125  |      |                                                           |
| LTV-1018 | 100  | —    | 200  | %    | $I_F=10\text{mA}, V_{CE}=5\text{V}, T_a=25^\circ\text{C}$ |
| LTV-1002 | 63   | —    | 125  |      |                                                           |
| LTV-1003 | 100  | —    | 200  |      |                                                           |
| LTV-1014 | 160  | —    | 320  |      |                                                           |

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## 6. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

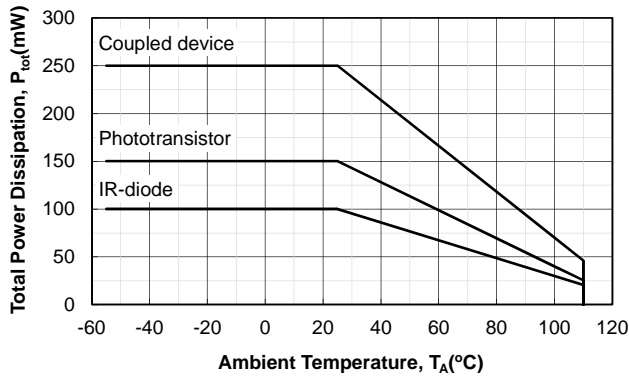


Figure 1.  $P_{tot}$  vs.  $T_A$

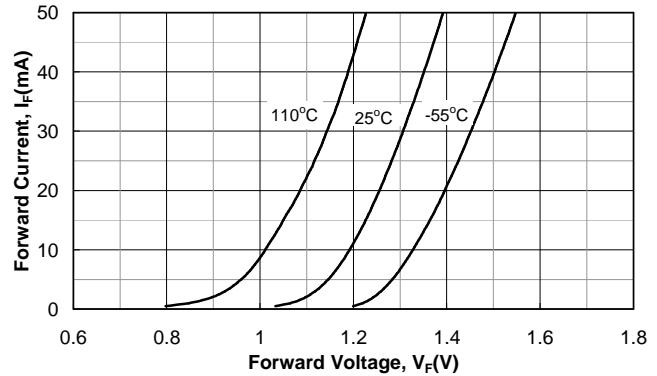


Figure 4.  $I_F$  vs.  $V_F$

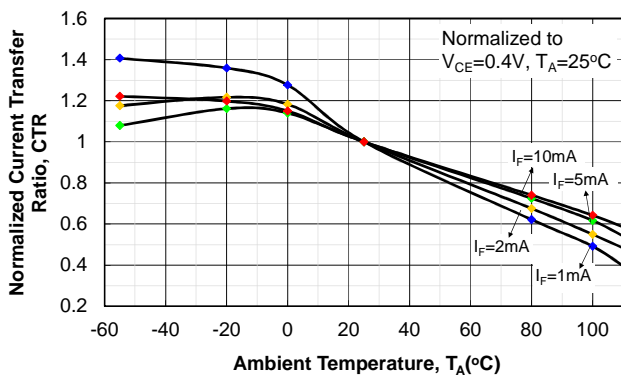


Figure 2. Saturated Normalized CTR vs.  $T_A$

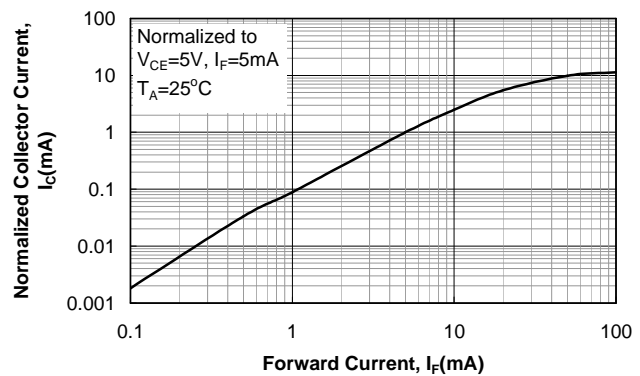


Figure 5. Normalized  $I_C$  vs.  $I_F$

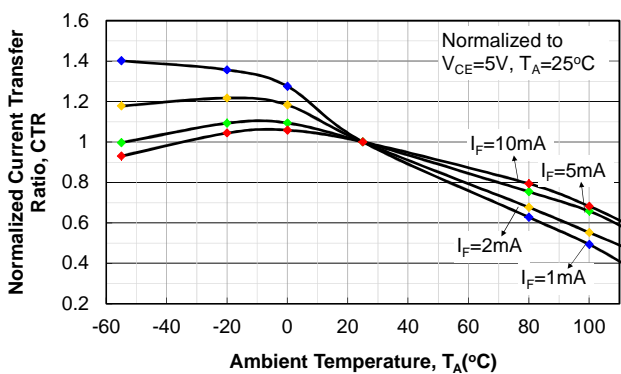


Figure 3. Non-saturated Normalized CTR vs.  $T_A$

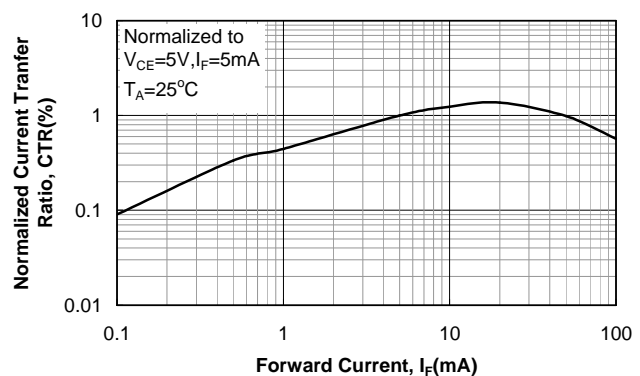


Figure 6. Normalized CTR vs.  $I_F$



## Photocoupler LTV-10XX-G series

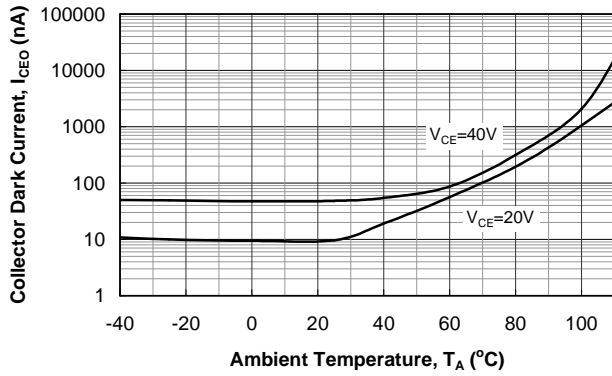


Figure 7.  $I_{CEO}$  vs.  $T_A$

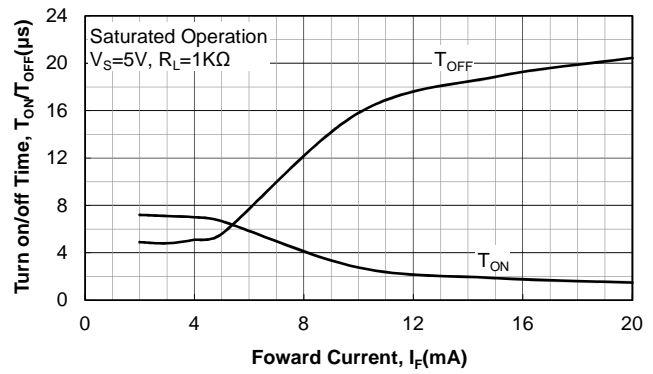


Figure 10.  $T_{ON} / T_{OFF}$  vs.  $I_F$

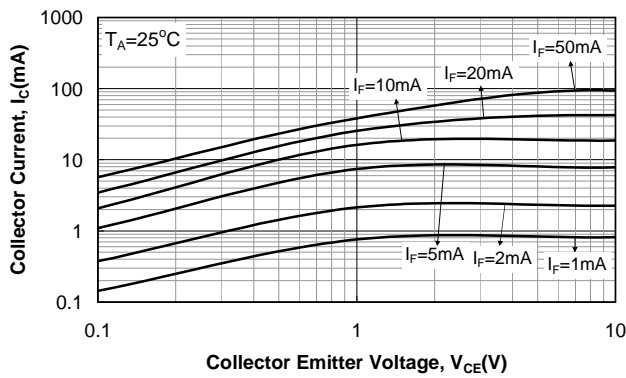


Figure 8.  $I_C$  vs.  $V_{CE}$

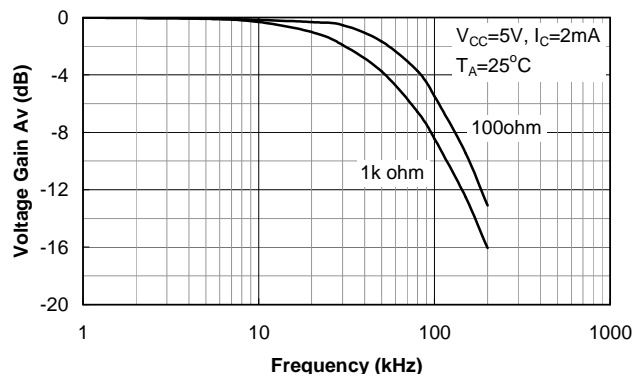


Figure 11. Frequency Response

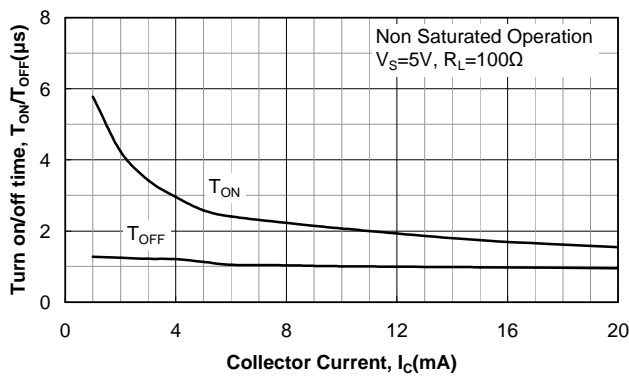


Figure 9.  $T_{ON} / T_{OFF}$  vs.  $I_C$

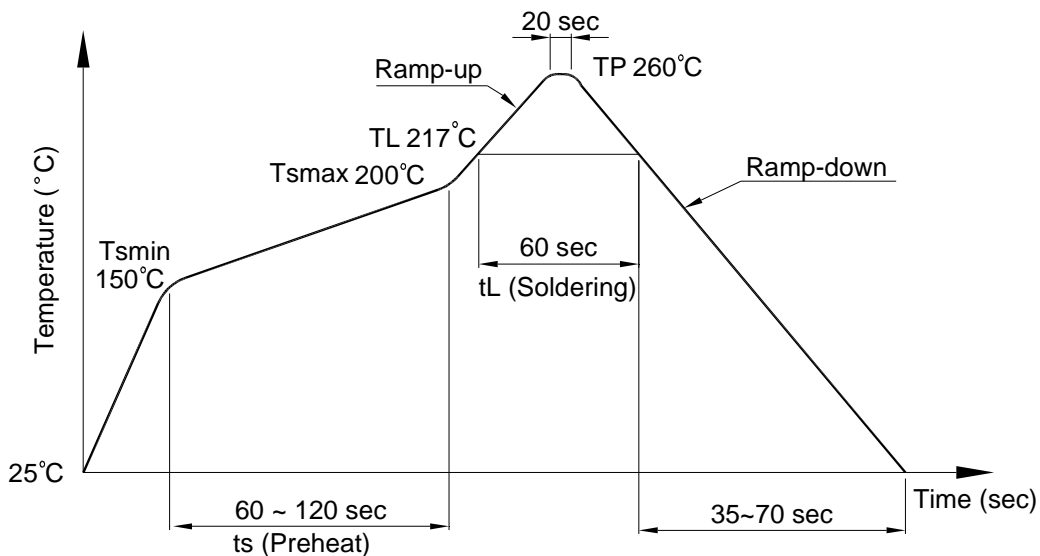
# Photocoupler LTV-10XX-G series

## 7. TEMPERATURE PROFILE OF SOLDERING

### 7.1 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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**7.2 Wave soldering (JEDEC22A111 compliant)**

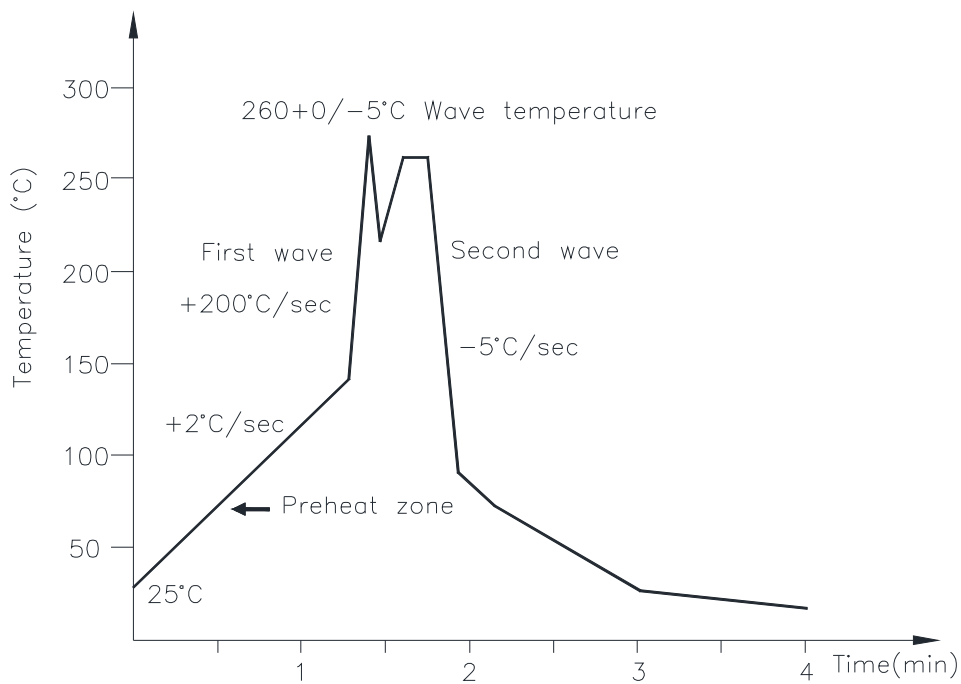
One time soldering is recommended within the condition of temperature.

Temperature:  $260 \pm 0/-5^{\circ}\text{C}$

Time: 10 sec.

Preheat temperature: 25 to  $140^{\circ}\text{C}$

Preheat time: 30 to 80 sec.



**7.3 Hand soldering by soldering iron**

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

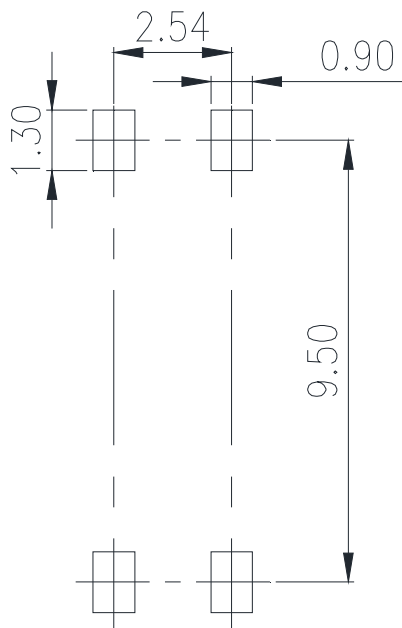
Temperature:  $380 \pm 0/-5^{\circ}\text{C}$

Time: 3 sec max.

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8. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

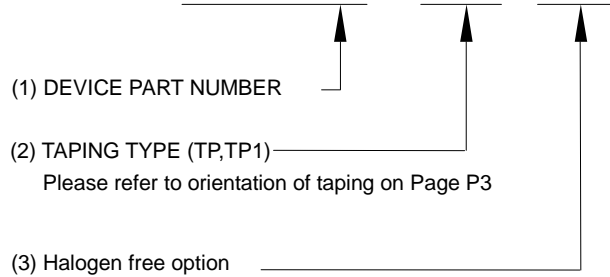
Unit: mm



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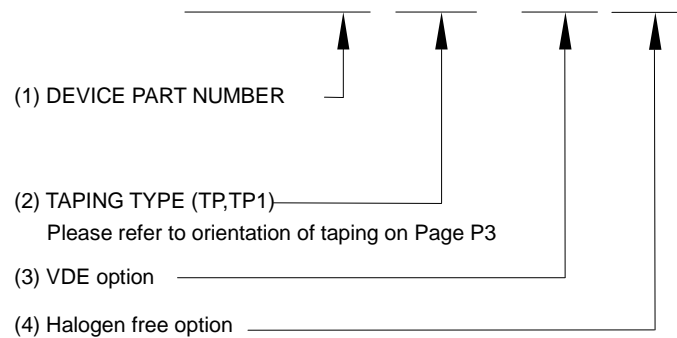
**9. NAMING RULE**

**LTV-10XX-(2)-G**



Example : LTV-1008-TP-G

**LTV 10XX (2) -V-G**



Example : LTV1008TP-V-G

**10. NOTES**

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- 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.

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