



# Photocoupler Product Data Sheet

## LTV-702F

### (M, S, S-TA, S-TA1) series

Spec No. :DS-70-96-0010

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**LITE-ON DCC**

**RELEASE**

**BNS-OD-FC001/A4**

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## Photocoupler LTV-702F (M, S, S-TA, S-TA1) series

### 1. DESCRIPTION

#### 1.1 Features

- Current transfer ratio (CTR : 40% ~ 320% at  $I_F = 10\text{mA}$ ,  $V_{CE} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ )
- High input-output isolation voltage  $V_{iso} = 5,000\text{Vrms}$
- High collector-emitter voltage (  $V_{CEO} = 70\text{V}$  )
- Response time (  $t_r$  : TYP.  $2\mu\text{s}$  at  $V_{CC} = 5\text{V}$ ,  $I_F = 10\text{mA}$ ,  $R_L = 75\Omega$  )
- Dual-in-line package :  
LTV-702F
- Wide lead spacing package :  
LTV-702FM
- Surface mounting package :  
LTV-702FS
- Tape and reel packaging :  
LTV-702FS-TA, LTV-702FS-TA1
- Safety approval
  - \* UL approved
  - \* cUL approved
  - \* CSA approved
  - \* CQC GB4943.1-2011/GB8898-2011 approved
  - \* VDE approved
- RoHS Compliance  
All materials be used in device are followed EU RoHS directive (No.2002/95/EC, 2011/65/EU, and 2015/863).
- ESD pass HBM 8000V/MM2000V
- MSL class1

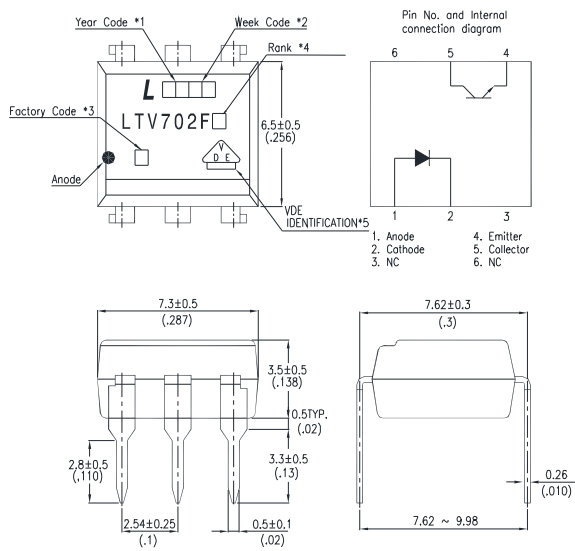
#### 1.2 Applications

- Directly connectable to TTL

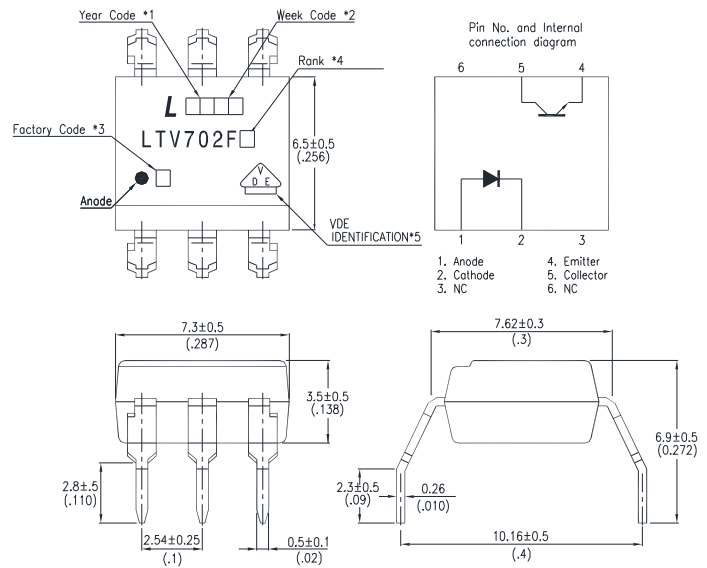
## Photocoupler LTV-702F (M, S, S-TA, S-TA1) series

### 2. PACKAGE DIMENSIONS

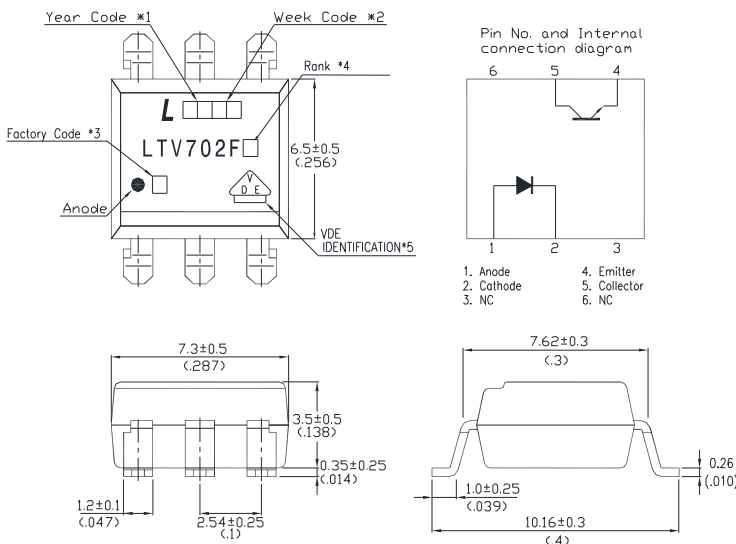
#### 2.1 LTV-702F



#### 2.2 LTV-702FM



#### 2.3 LTV-702FS



#### Notes :

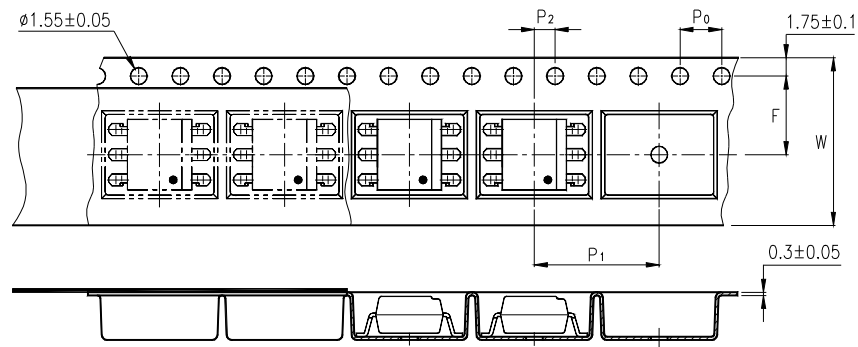
1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (Y: Thailand, W: China-CZ).
4. Rank shall be or shall not be marked.
5. For VDE option.

Dimensions in millimeters (inches).

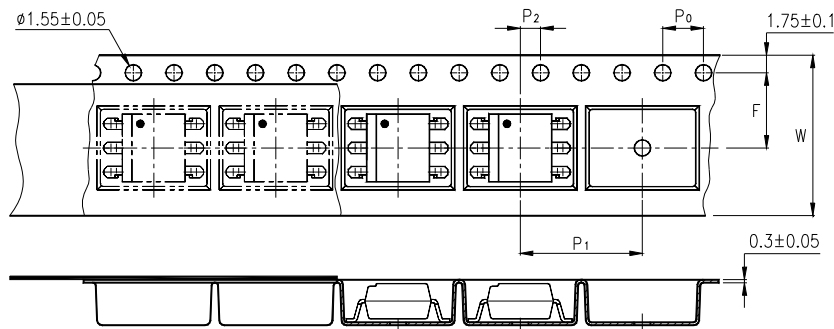
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### 3. TAPING DIMENSIONS

#### 3.1 LTV-702FS-TA



#### 3.2 LTV-702FS-TA1



| Description                            | Symbol | Dimension in mm (inch) |
|--|--------|------------------------|
| Tape wide                              | W      | 16±0.3 (0.63)          |
| Pitch of sprocket holes                | $P_0$  | 4±0.1 (0.15)           |
| Distance of compartment                | F      | 7.5±0.1 (0.295)        |
|  | $P_2$  | 2±0.1 (0.079)          |
| Distance of compartment to compartment | $P_1$  | 12±0.1 (0.472)         |

#### 3.3 Quantities Per Reel

| Package Type     | TA / TA1 |
|------------------|----------|
| Quantities (pcs) | 1000     |

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### 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         | 105        | mW        |
|                          | Junction Temperature        | $T_J$     | 125        | °C        |
| Output                   | Collector - Emitter Voltage | $V_{CEO}$ | 70         | V         |
|                          | Emitter - Collector Voltage | $V_{ECO}$ | 6          | V         |
|                          | Collector Current           | $I_C$     | 50         | mA        |
|                          | Collector Power Dissipation | $P_C$     | 160        | mW        |
| Total Power Dissipation  |                             | $P_{tot}$ | 200        | mW        |
| *1 Isolation Voltage     |                             | $V_{iso}$ | 5000       | $V_{rms}$ |
| 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          | CONDITIONS   |
|--------------------------|--------------------------------------|----------------------|--------------------|--------------------|------|---------------|--|
| INPUT                    | Forward Voltage                      | $V_F$                | —                  | 1.4                | 1.7  | V             | $I_F=60\text{mA}$  |
|                          | Reverse Current                      | $I_R$                | —                  | —                  | 10   | $\mu\text{A}$ | $V_R=6\text{V}$  |
|                          | Terminal Capacitance                 | $C_t$                | —                  | 30                 | 250  | pF            | $V=0, f=1\text{KHz}$   |
| OUTPUT                   | Collector Dark Current               | $I_{CEO}$            | —                  | —                  | 50   | nA            | $V_{CE}=10\text{V}, I_F=0$   |
|                          | Collector-Emitter Breakdown Voltage  | $BV_{CEO}$           | 70                 | —                  | —    | V             | $I_C=0.1\text{mA}$<br>$I_F=0$                                      |
|                          | Emitter-Collector Breakdown Voltage  | $BV_{ECO}$           | 6                  | —                  | —    | V             | $I_E=10\mu\text{A}$<br>$I_F=0$                                     |
| TRANSFER CHARACTERISTICS | Collector Current                    | $I_C$                | 4                  | —                  | 32   | mA            | $I_F=10\text{mA}, V_{CE}=5\text{V}$                                |
|                          | *Current Transfer Ratio              | CTR                  | 40                 | —                  | 320  | %             |  |
|                          | Collector-Emitter Saturation Voltage | $V_{CE}(\text{sat})$ | —                  | 0.25               | 0.4  | V             | $I_F=10\text{mA}$<br>$I_C=2.5\text{mA}$                            |
|                          | 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            | $V=0, f=1\text{MHz}$   |
|                          | Cut-Off Frequency                    | $f_c$                | —                  | 150                | —    | kHz           | $V_{CC}=5\text{V}, I_F=10\text{mA}$<br>$R_L=75\Omega, -3\text{dB}$ |
|                          | Response Time (Rise)                 | $t_R$                | —                  | 2                  | 7    | $\mu\text{s}$ | $V_{CC}=5\text{V}, I_F=10\text{mA}$<br>$R_L=75\Omega$              |
|                          | Response Time (Fall)                 | $t_f$                | —                  | 2                  | 8    | $\mu\text{s}$ |  |

$$*CTR = \frac{I_C}{I_F} \times 100\%$$

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

| CTR Rank | Min | Max | Condition   |
|----------|-----|-----|---|
| A        | 40  | 80  | I <sub>F</sub> =10mA, V <sub>CE</sub> =5V, T <sub>A</sub> =25°C |
| B        | 63  | 125 |   |
| C        | 100 | 200 |   |
| D        | 160 | 320 |   |
| No mark  | 40  | 320 |   |

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### 6. CHARACTERISTICS CURVES

Fig.1 Forward Current vs. Ambient Temperature

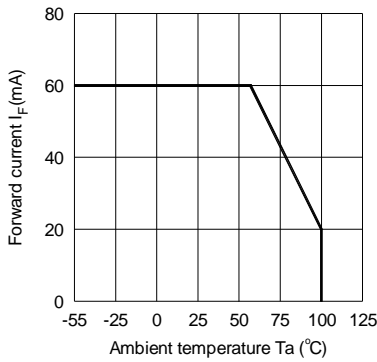


Fig.2 Collector Power Dissipation vs. Ambient Temperature

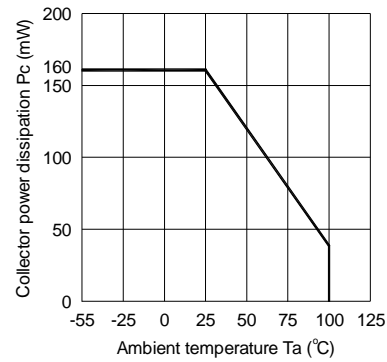


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

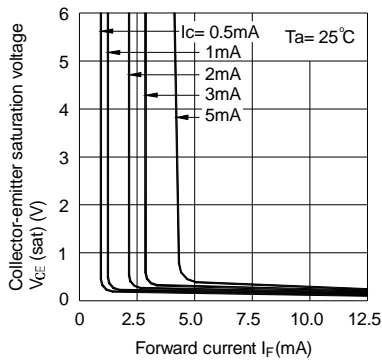


Fig.4 Forward Current vs. Forward Voltage

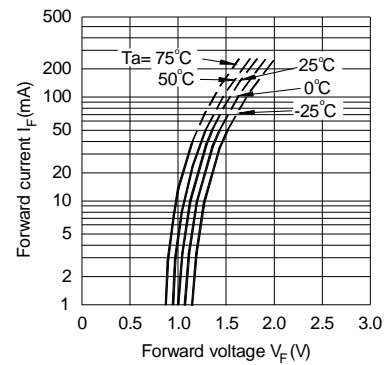


Fig.5 Current Transfer Ratio vs. Forward Current

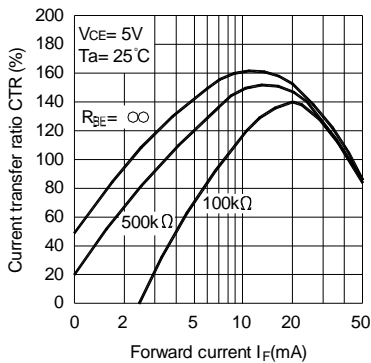
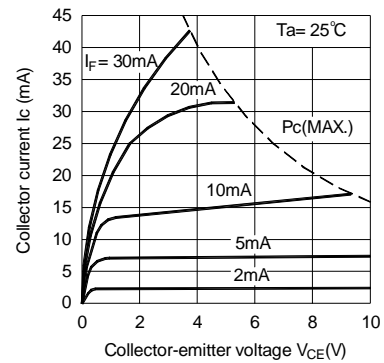


Fig.6 Collector Current vs. Collector-emitter Voltage





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Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

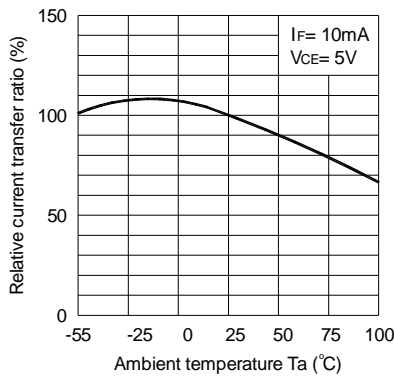


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

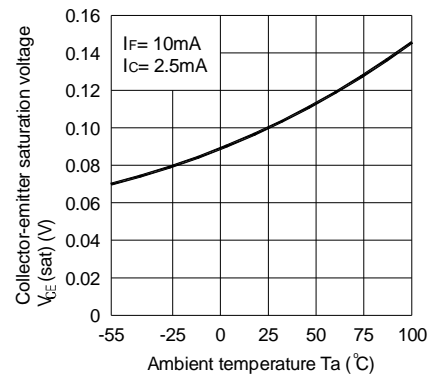


Fig.9 Collector Dark Current vs. Ambient Temperature

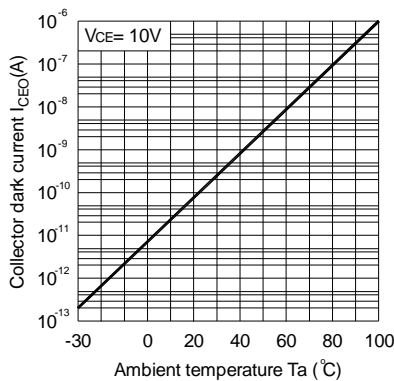


Fig.10 Response Time vs. Load Resistance

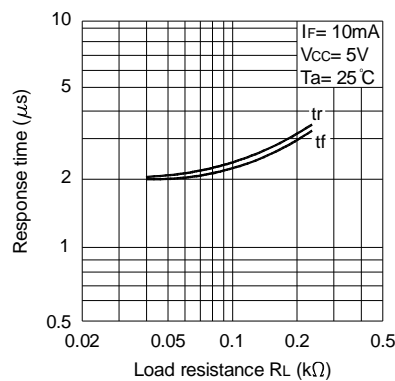
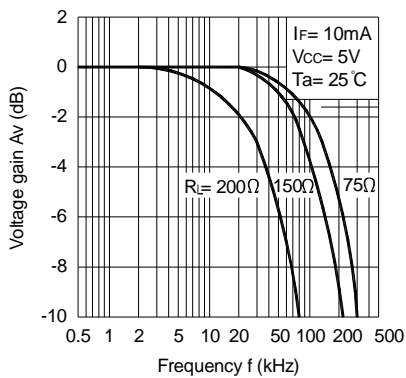
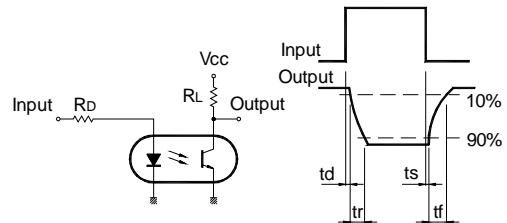


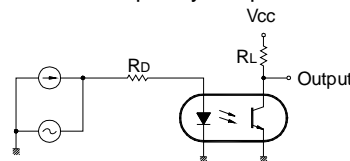
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



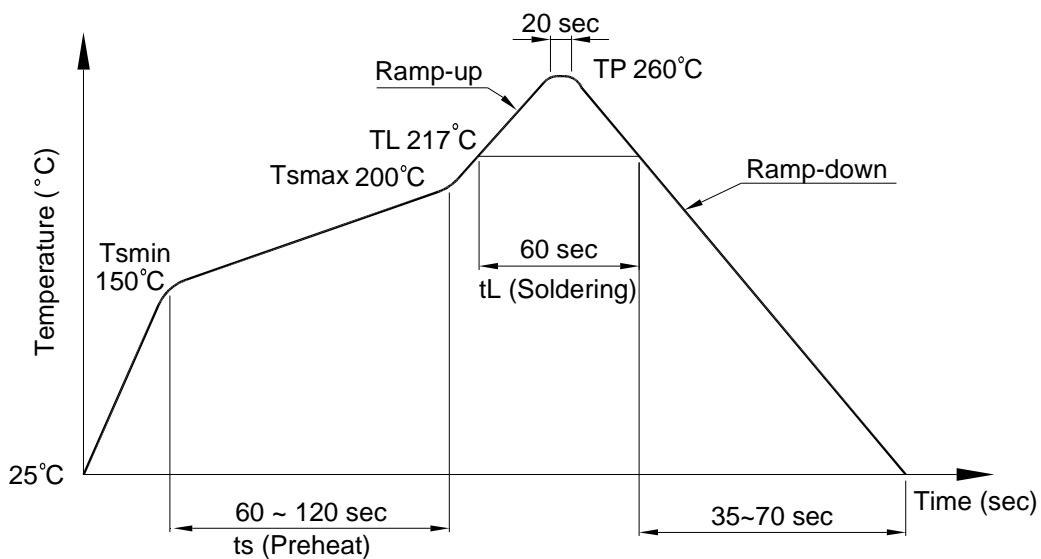
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## 7. TEMPERATURE PROFILE OF SOLDERING

### 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)

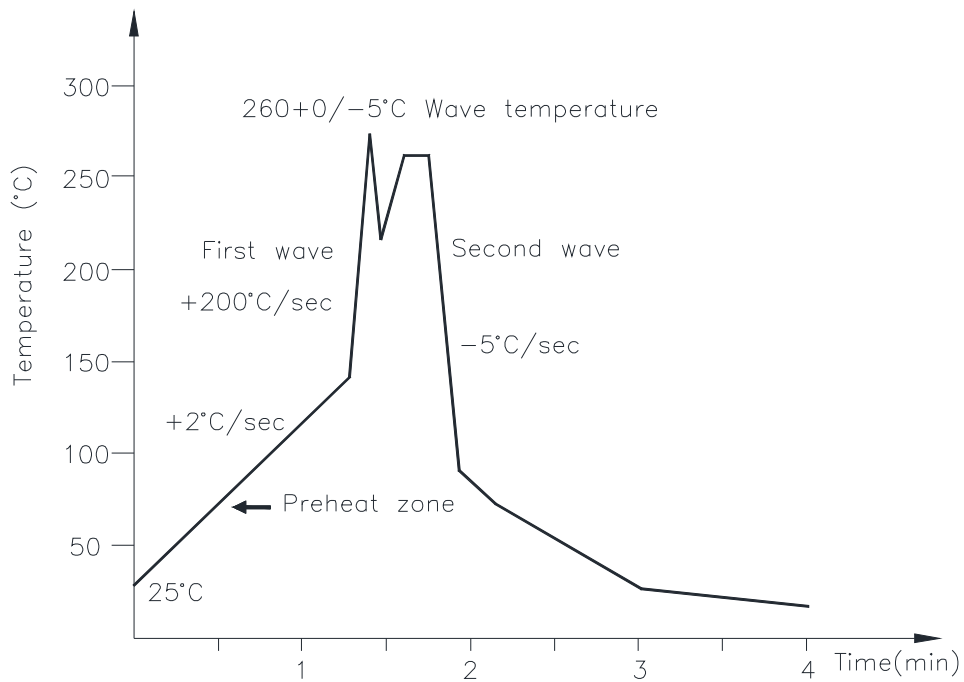
One time soldering is recommended within the condition of temperature.

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.

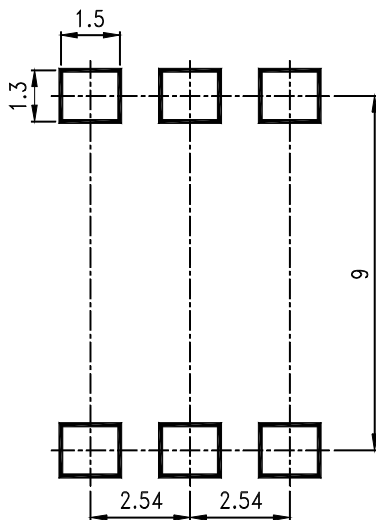
Temperature:  $380 \pm 0 / -5^\circ\text{C}$

Time: 3 sec max.

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LTV-702F (M, S, S-TA, S-TA1) series**

**8. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)**

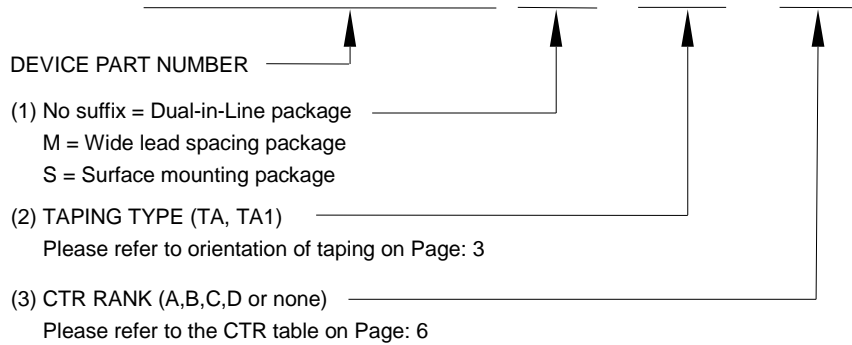
Unit: mm



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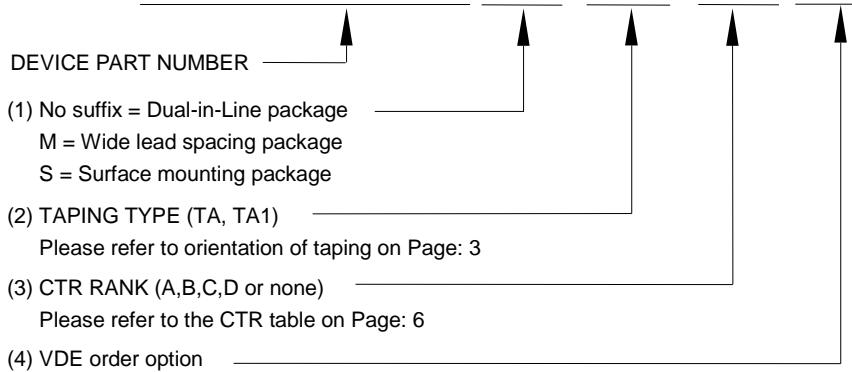
**9. NAMING RULE**

**LTV-702F(1)-(2)-(3)**



Example : LTV-702FS-TA1-A

**LTV702F(1)(2)(3)-V**



Example : LTV702FSTA1A-V

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### 10. 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.