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OPTOELECTRONICS

# Photocoupler
# Product Data Sheet
# LTV-1213

Spec No. :DS70-2019-0047
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LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

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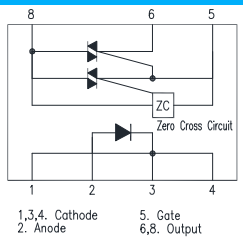
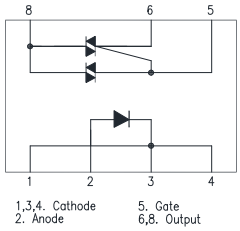
# Photocoupler
## LTV-02X3 series
## LTV-12X3 series

## 1. DESCRIPTION

Solid State Relays (SSR) are integration of an AlGaAs Light Emitting Diode, a Phototriac Detector and a main power Triac. These devices are ideally suited for controlling high voltage AC loads with solid state reliability while providing 5 KV isolation ($V_{iso}$(rms)) between input to output.

### 1.1 Features

- 8 pin DIP package
- High repetitive peak off-state voltage $V_{DRM}$ : Min. 600 V
- Isolation voltage between input and output Viso : 5,000 Vrms
- Safety approval
  VDE DIN EN 60747-5-5 / IEC 60747-5-5
  UL 1577 (E113898)
  UL 508 (E490256)
  CUL CA5A (E113898)
  CQC GB4943.1-2011/GB8898-2011 (meet Altitude up to 5000m)
  DEMKO IEC/EN62368-1; IEC/EN 60950-1; IEC/EN 60065
- RoHS Compliance
  All materials be used in device are followed EU RoHS directive (No.2002/95/EC)

| Part Number | Output Rating | | | |
|---|---|---|---|---|
| | Peak Off-state Voltage | On-state RMS Current | Type | Functional Diagram |
| LTV-0213 | 600 V | 0.3 A | Zero-Crossing |   |
| LTV-1213 | | 0.6 A | | |
| LTV-0223 | | 0.3 A | Random Phase |   |
| LTV-1223 | | 0.6 A | | |

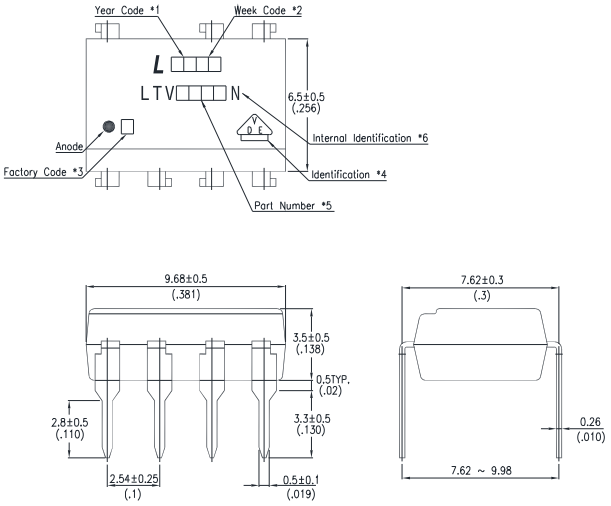
### 1.2 Applications

- Home appliances
- Industrial equipment

## 2. PACKAGE DIMENSIONS

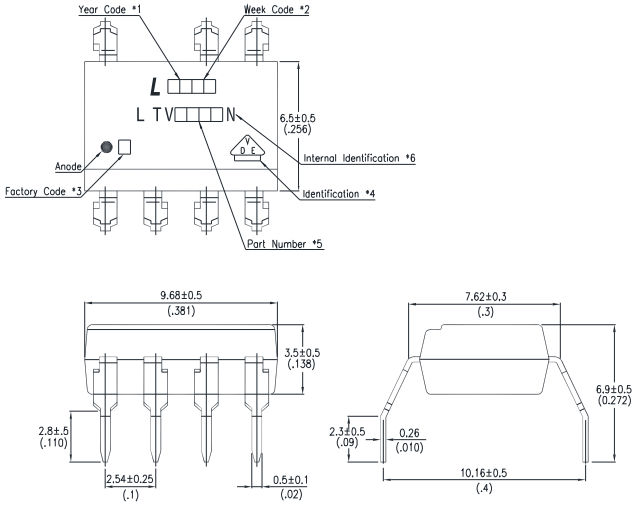
### 2.1 Through Hole

#### LTV-X2X3



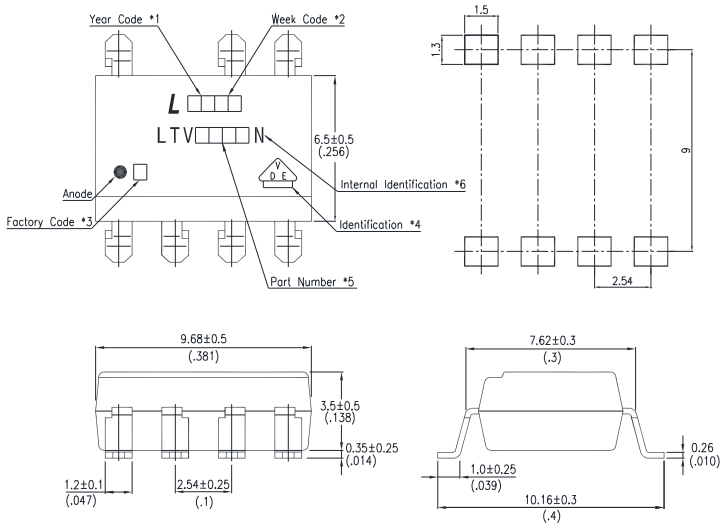

### 2.2 Wide Lead

#### LTV-X2X3M




### 2.3 SMT

#### LTV-X2X3S




**Notes:**

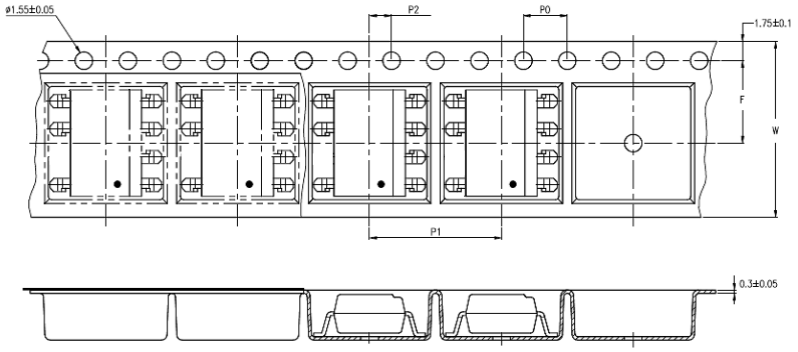
1. 2-digit year code
2. 2-digit work week code
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. VDE option
5. Part number (LTV0213, LTV0223, LTV1213, LTV1223)
6. N: Internal identification

Dimensions in millimeters (inches)

# 3. TAPING DIMENSIONS

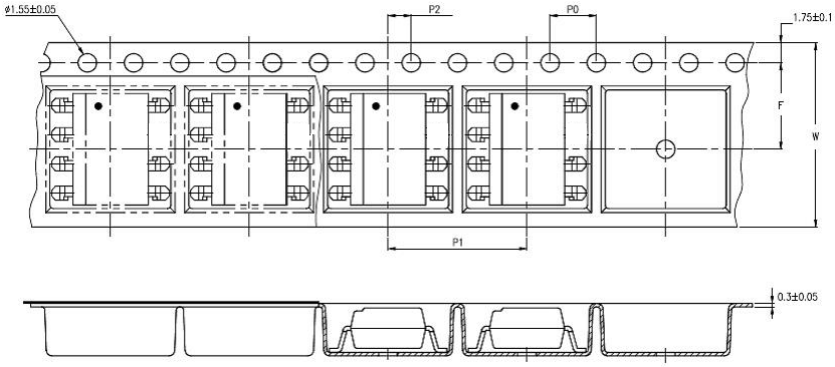
## 3.1 LTV-02X3S-TA

## LTV-12X3S-TA




## 3.2 LTV-02X3S-TA1

## LTV-12X3S-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 (0.47) |

## 3.3 Quantities Per Reel

| Package Type | LTV-02X3 series<br>LTV-12X3 series |
|---|---|
| Quantities (pcs) | 1000 |

# 4. RATING AND CHARACTERISTICS

## 4.1 Absolute Maximum Ratings at Ta=25℃

| | Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|---|
| Input | Forward Current | | $I_F$ | 50 | mA |
| | Reverse Voltage | | $V_R$ | 6 | V |
| | Peak Forward Current | | $I_{FP}$ | 1 | A |
| | Junction Temperature | | $T_J$ | 125 | °C |
| | Power Dissipation | | $P_{in}$ | 140 | mW |
| Output | Repetitive peak OFF-state voltage | | $V_{DRM}$ | 600 | V |
| | ON-state RMS current | LTV-0213, LTV-0223 | $I_{T(RMS)}$ | 0.3 | A |
| | | LTV-1213, LTV-1223 | | 0.6 | |
| | Non-repetitive Surge current *3 | LTV-0213, LTV-0223 | $I_{TSM}$ | 3 | A |
| | | LTV-1213, LTV-1223 | | 6 | |
| | Power Dissipation | | $P_{out}$ | 1100 | mW |
| *1. | Isolation Voltage | | $V_{iso}$ | 5000 | $V_{rms}$ |
| | Operating Temperature | | $T_{opr}$ | -30 ~ +85 | °C |
| | Storage Temperature | | $T_{stg}$ | -40 ~ +125 | °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
3. Sine wave; f=60Hz, 1 cycle

## 4.2 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25℃

| | | Symbol | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Input | Forward Voltage | $V_F$ | — | 1.2 | 1.3 | V | $I_F$=20mA |
| | Reverse Current | $I_R$ | — | — | 10 | μA | $V_R$=6V |
| Output | Peak Blocking Current, Either Direction | $I_{DRM}$ | — | — | 100 | μA | $I_F$=0mA<br>$V_{DRM}$ = 600V |
| | Peak On-State Voltage, Either Direction | $V_{TM}$ | — | — | 2.5 | V | $I_F$ = 10mA<br>$I_{TM}$ = Max. |
| | Critical rate of Rise of Off-State Voltage | dv/dt | 200 | — | — | V/μs | $V_{DRM}$ = 600 V ·1/√2 |
| Transfer characteristics | Led Trigger Current, Current Required to Latch Output, Either Direction | $I_{FT}$ | — | — | 10 | mA | $V_D$ = 6V<br>$R_L$ = 100 Ω |
| | Holding Current, Either Direction | $I_H$ | — | — | 25 | mA | |
| | Zero Crossing Voltage (LTV-X213 Series) | $V_{ZC}$ | — | — | 50 | V | $I_F$ = 10mA |
| | Turn on time | $T_{ON}$ | — | — | 100 | μs | $I_F$ = 20mA<br>$V_D$ = 6V<br>$R_L$ = 100Ω |
| | I/O isolation resistance | $R_{ISO}$ | $5X10^{10}$ | $10^{11}$ | — | Ω | 500V DC |

## 5. CHARACTERISTICS CURVES (TYPICAL PERFORMACNE) AND TESTING DIAGRAM

Fig 1. ON-state RMS current vs. Ambient Temperature

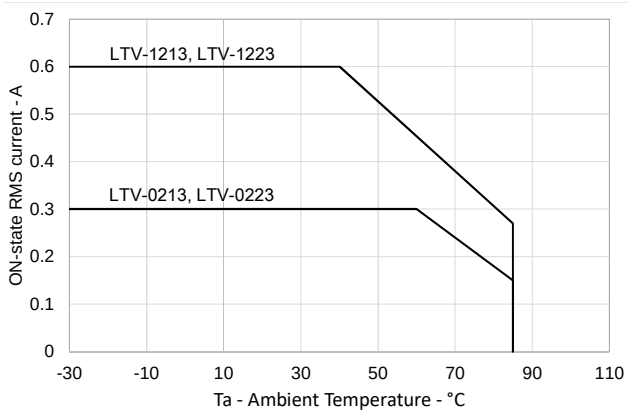



Fig 2. Peak ON-state voltage vs. Ambient Temperature

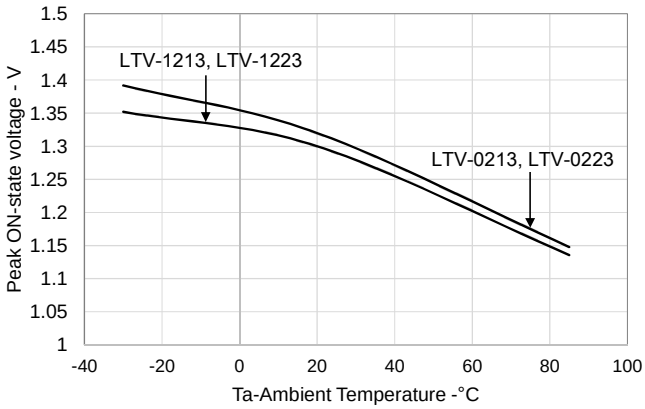



Fig 3. Trigger LED current vs. Ambient Temperature

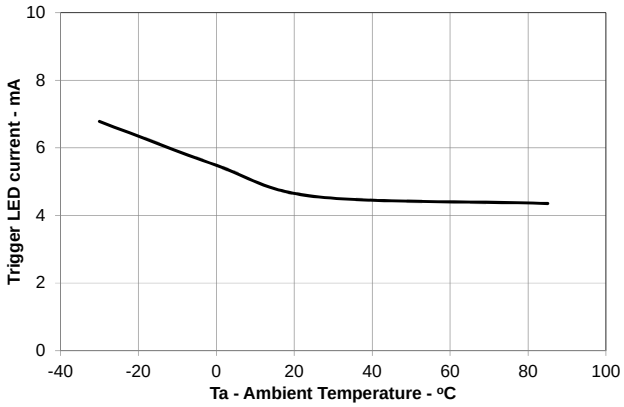



Fig 4. LED dropout voltage vs. Ambient Temperature

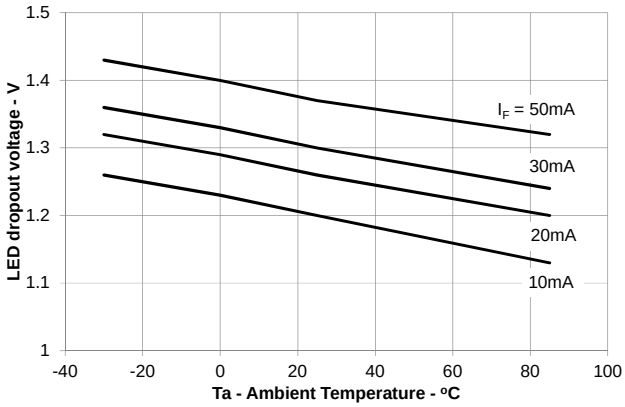


Fig 5. Turn on time vs. LED current

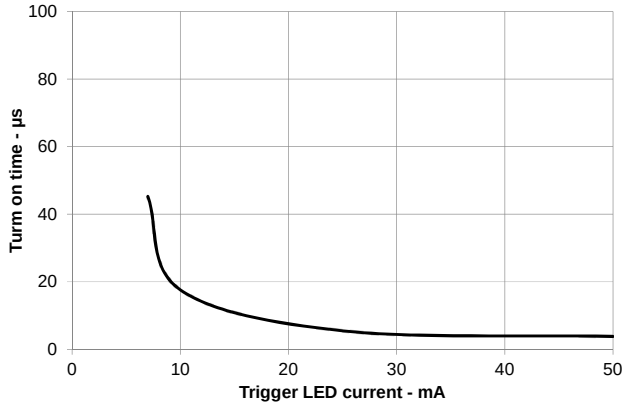



Fig 6. Repetitive peak OFF-state current vs. Load voltage

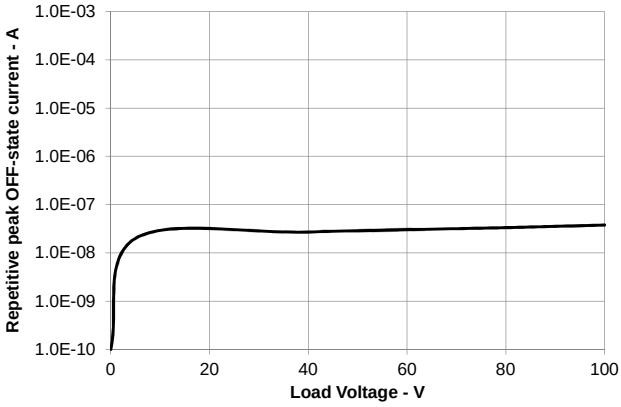



Fig 7. Hold current vs. Ambient Temperature

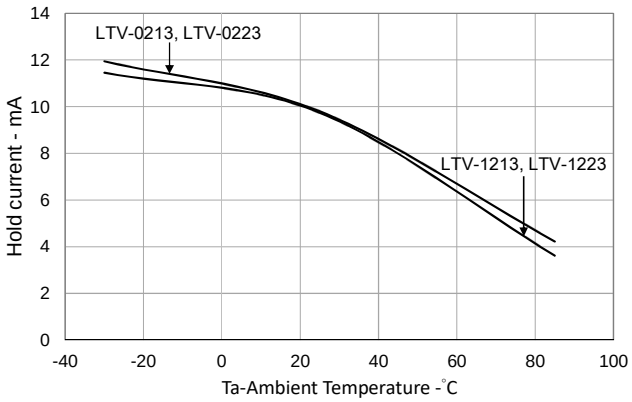



Fig.8 Testing diagram of Turn on time

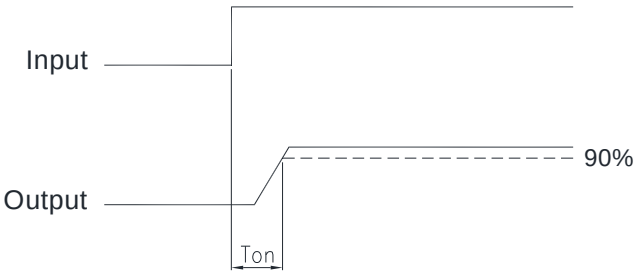
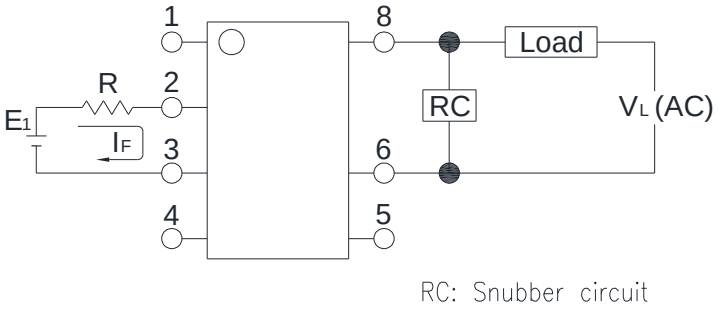



Fig 9. Basic diagrams

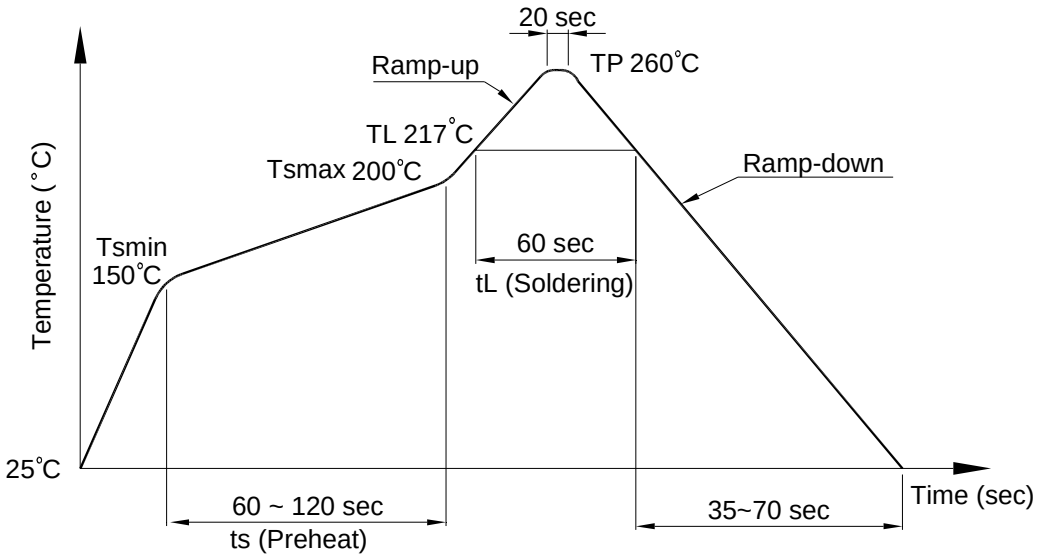


# 6. TEMPERATURE PROFILE OF SOLDERING

## 6.1 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 twice.

| 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 |



## 6.2 Wave soldering (JEDEC22A111 compliant)

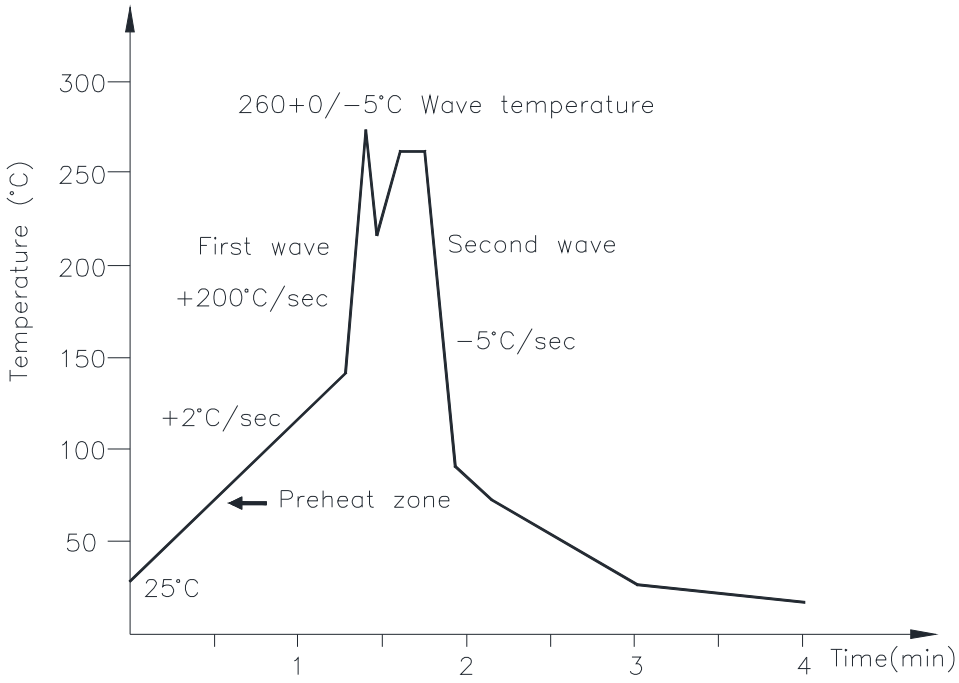
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C

Time: 10 sec.

Preheat temperature: 25 to 140˚C

Preheat time: 30 to 80 sec.




## 6.3 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.

## 7. NAMING RULE

LTV-X2X3(X)-(1)

DEVICE PART NUMBER
(1) ON-STATE CURRENT
Please refer to Page 1
(2) FUNCTIONAL TYPE
Please refer to Page 1
(3) FORM TYPE (S, M or none)
No suffix = Dual-Line package
M = Wide lead spacing package
S = Surface mounting package
Please refer to Page 2
(4) TAPING TYPE (TA, TA1)
Please refer to orientation of taping on Page 3
Example: LTV-0213S-TA, LTV-1223S-TA1

LTVX2X3(X)(1)-V

DEVICE PART NUMBER
(1) ON-STATE CURRENT
Please refer to Page 1
(2) FUNCTIONAL TYPE
Please refer to Page 1
(3) FORM TYPE (S, M or none)
No suffix = Dual-Line package
M = Wide lead spacing package
S = Surface mounting package
Please refer to Page 2
(4) TAPING TYPE (TA, TA1)
Please refer to orientation of taping on Page 3
(5) VDE option
Example: LTV0223STA-V, LTV1213STA1-V

## 8. NOTES

1. LiteOn is continually improving the quality, reliability, function or design and LiteOn reserves the right to make changes without further notices.
2. 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.
3. 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.
4. When requiring a device for any ”specific” application, please contact our sales in advice.
5. If there are any questions about the contents of this publication, please contact us at your convenience.
6. The contents described herein are subject to change without prior notice.
7. Immerge unit’s body in solder paste is not recommended.

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