# Photocouplers
# LTV-214-TP1-AK-G series

## 1. DESCRIPTION

### 1.1 Features

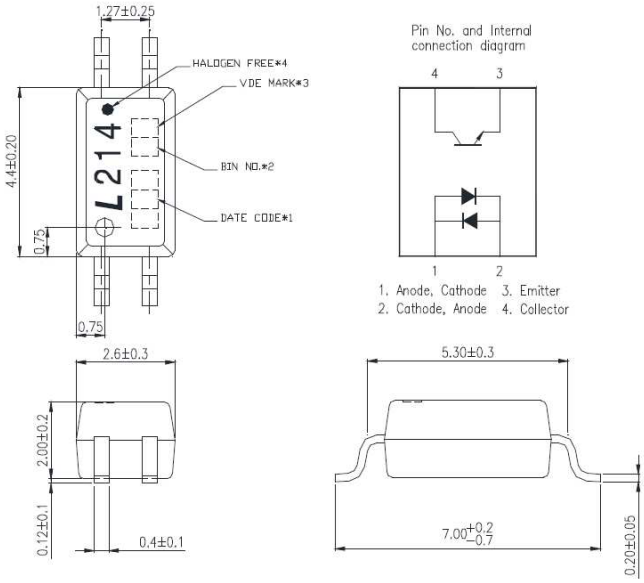
- Current transfer ratio (CTR) : MIN. 100% at $I_F$ = ±1mA, $V_{CE}$ = 5V
- High input-output isolation voltage. ($V_{iso}$=3,750Vrms)
- Employs double transfer mold technology
- Safety approval: UL 1577, Cert. No.E113898; CSA CA5A, Cert. No.1243207 (CA 91533); FIMKO EN/IEC 60950-1, EN/IEC 60065; Cert. No. FI 24472 M1
- RoHS Compliance: All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 6000V/MM2000V
- MSL class1

### 1.2 Applications

- Hybrid substrates that require high density mounting.
- Programmable controllers
- System appliances, measuring instruments

## 2. PACKAGE DIMENSIONS

### 2.1 LTV-214-TP1-AK-G

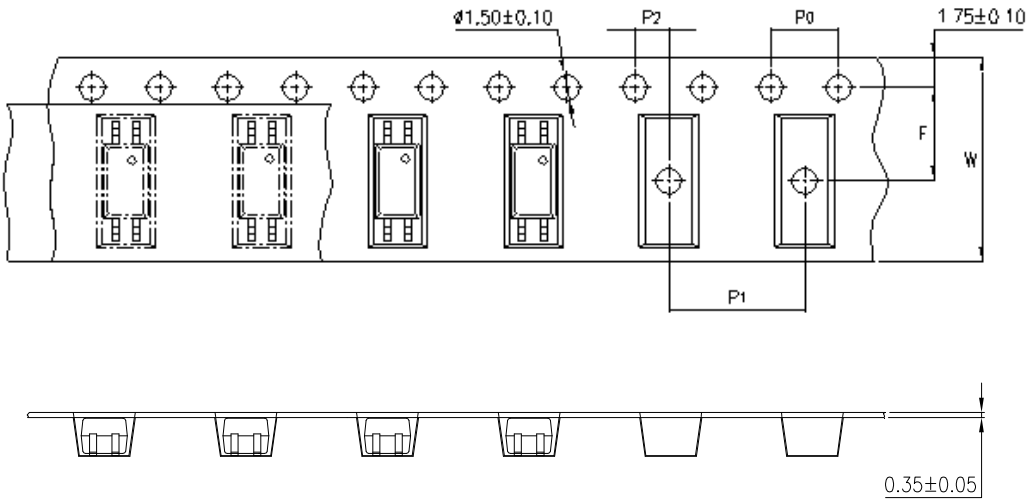



**Notes :**

1. 3-digit date code.
2. Rank mark “AK”.
3. ● Mark Halogen free.

## 3. TAPING DIMENSIONS

### 3.1 P/N : LTV-214-TP1-AK-G




| 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) |

| Package Type | LTV-214 |
|---|---|
| Quantities (pcs) | 3000 |

# 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 |
| | Power Dissipation | P | 70 | mW |
| | Pulse Forward Current | $I_{FSM}$ | 1 | A |
| Output | Collector - Emitter Voltage | $V_{CEO}$ | 80 | V |
| | Emitter - Collector Voltage | $V_{ECO}$ | 7 | V |
| | Collector Current | $I_C$ | 50 | mA |
| | Collector Power Dissipation | $P_C$ | 150 | mW |
| | Total Power Dissipation | $P_{tot}$ | 200 | mW |
| 1. | Isolation Voltage | $V_{iso}$ | 3750 | $V_{rms}$ |
| | Operating Temperature | $T_{opr}$ | -55 ~ +110 | °C |
| | Storage Temperature | $T_{stg}$ | -55 ~ +150 | °C |
| | Soldering Temperature | $T_{sol}$ | 260(10s) | °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.

### 4.2 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25℃

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Input | Forward Voltage | $V_F$ | — | 1.2 | 1.4 | V | $I_F$=±20mA |
| | Terminal Capacitance | $C_t$ | — | 60 | — | pF | V=0, f=1KHz |
| Output | Collector Dark Current | $I_{CEO}$ | — | — | 100 | nA | $V_{CE}$=20V, $I_F$=0 |
| | Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | 80 | — | — | V | $I_C$=0.1mA, $I_F$=0 |
| | Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | 7 | — | — | V | $I_E$=10μA, $I_F$=0 |
| TRANSFER CHARACTERISTICS | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | 0.4 | V | $I_F$±8mA, $I_C$=2.4mA |
| | Isolation Resistance | $R_{iso}$ | $5\times10^{10}$ | $1\times10^{11}$ | — | Ω | DC500V, 40 ~ 60% R.H. |
| | Floating Capacitance | Cf | — | 0.8 | 1 | pF | V=0, f=1MHz |
| | Response Time (Rise) | tr | — | 3 | 18 | μs | $V_{CE}$=10V, $I_C$=±2mA $R_L$=100Ω, f=100Hz |
| | Response Time (Fall) | tf | — | 4 | 18 | μs | |

## 5. RANK TABLE OF CURRENT TRANSFER RATIO CTR

| CTR Rank | Min | Max | Condition |
|---|---|---|---|
| AK | 100 | 200 | $I_F$=±1mA, $V_{CE}$=5V, Ta=25°C |

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

## 6. CHARACTERISTICS CURVES

**Figure 1. Collector Power Dissipation vs. Ambient Temperature**

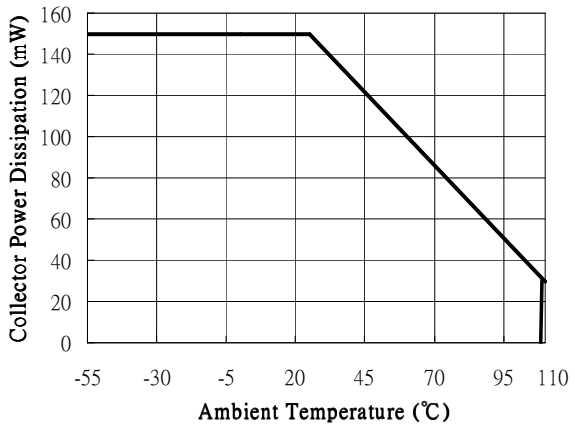



**Figure 2. Forward Current vs. Ambient Temperature**

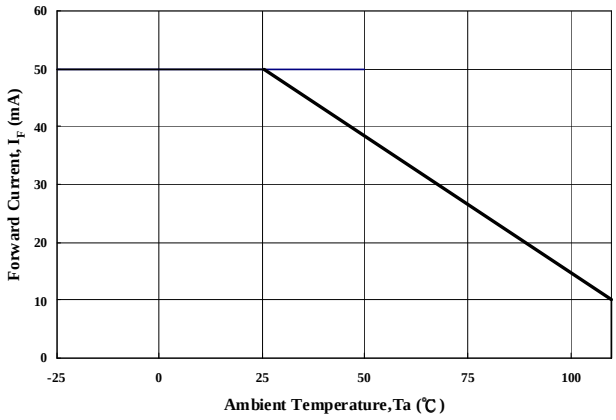



**Figure 3. Forward Current vs. Forward Voltage**

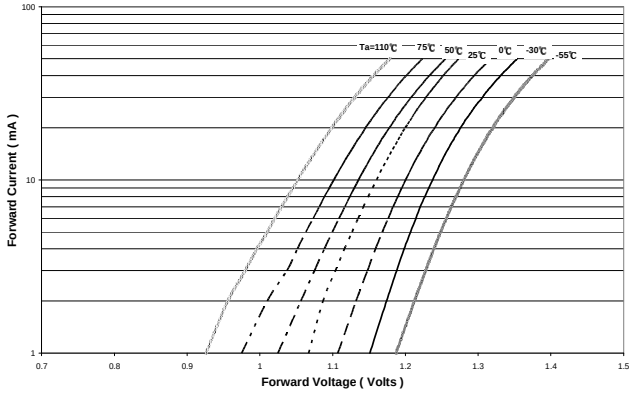



**Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current**

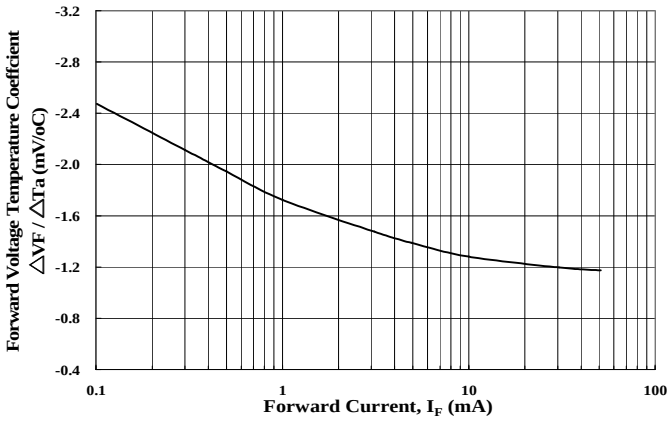



**Figure 5. Pulse Forward Current vs. Duty Cycle Ratio**


**Figure 6. Pulse Forward Current vs. Pulse Forward**

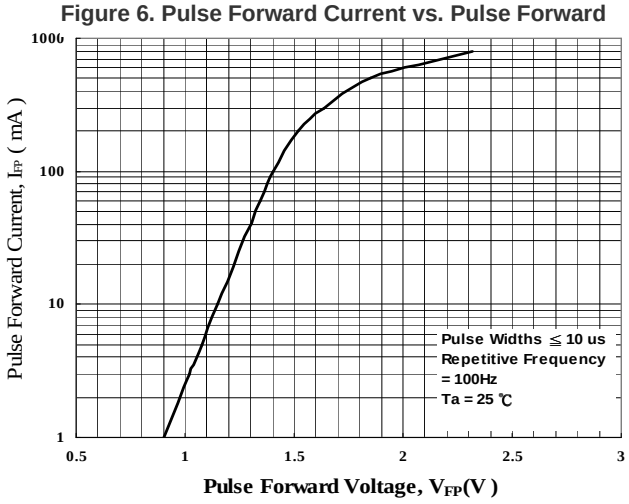


Figure 7. Collector-Emitter Saturation Voltage vs. Forward Current

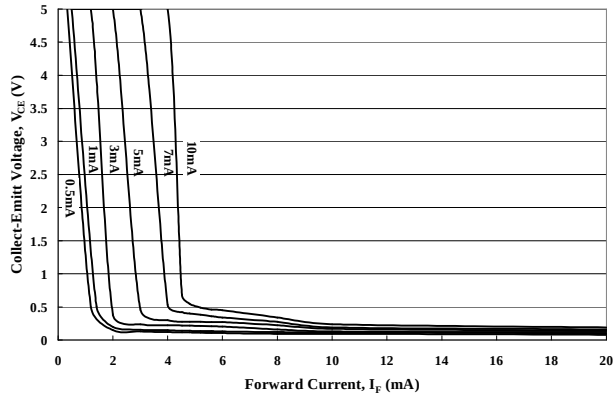



Figure 8. Collector Current vs. Collector-Emitter

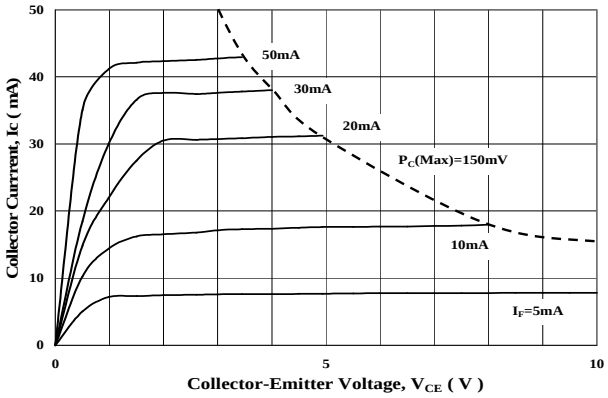



Figure 9. Collector Current vs. Small Collector-Emitter Voltage

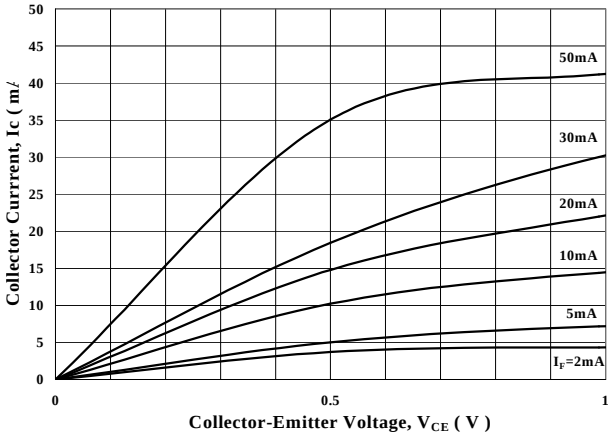



Figure 10. Collector Current vs. Forward Curent

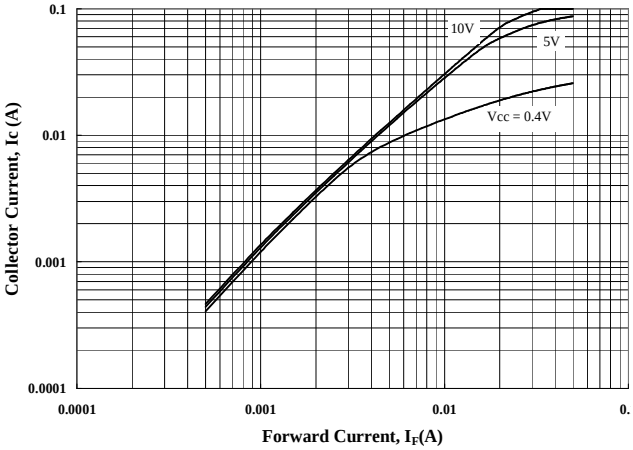



Figure 11. Collector Dark Current vs. Ambient Temperature

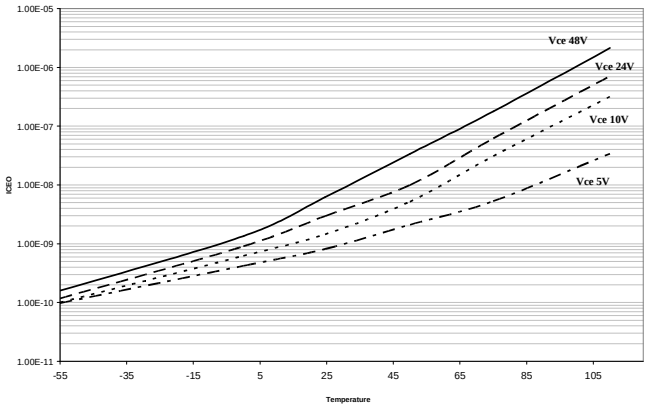



Figure 12. Current Transfer Ratio vs. Forward Current

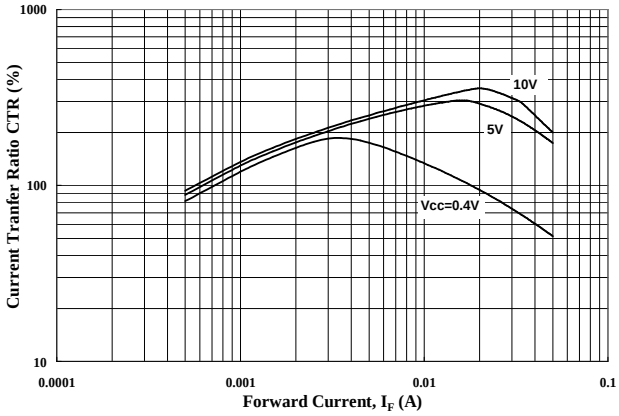


**Figure 13. Collector-Emitter Saturation Voltage vs. Ambient Temperature**

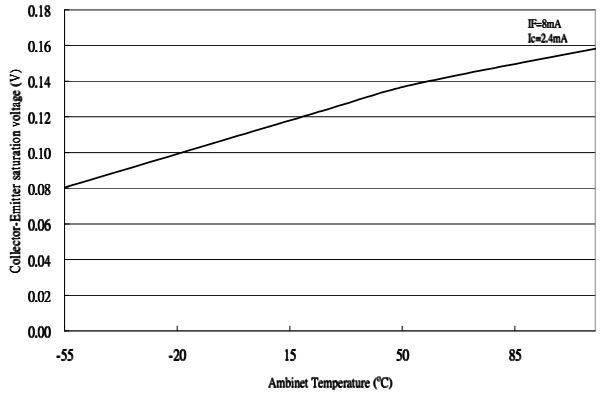



**Figure 14. Collector Current vs. Ambient Temperature**

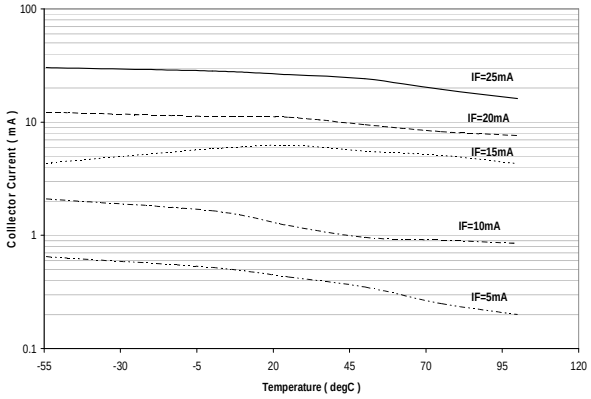



**Figure 15. Switching Time vs. Load Resistance**

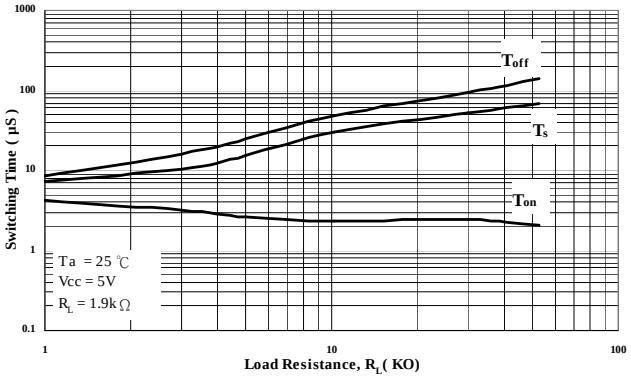



**Figure 16. Switching Time vs. Ambient Temperature**

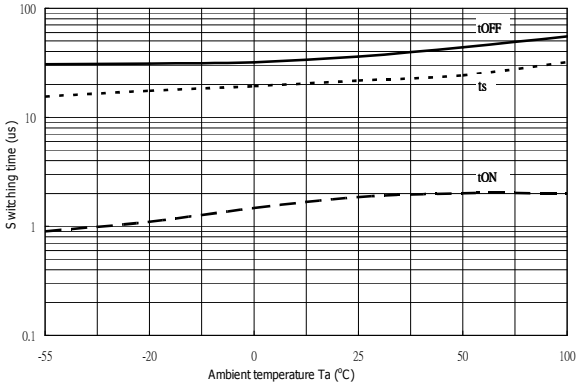
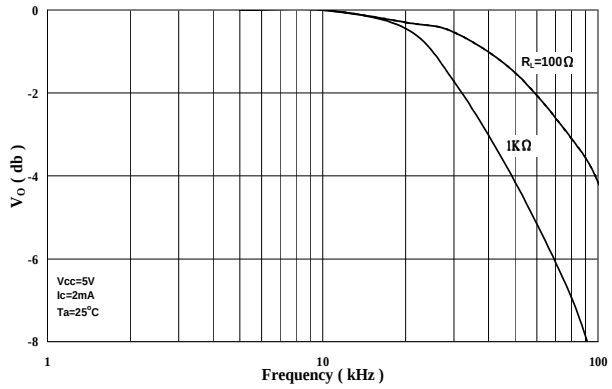
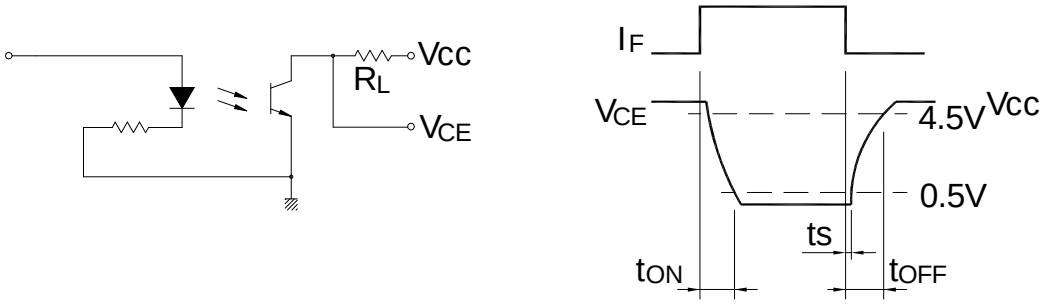



**Figure 17. Frequency Response**



## 7. SWITCHING TIME TEST CIRCUIT

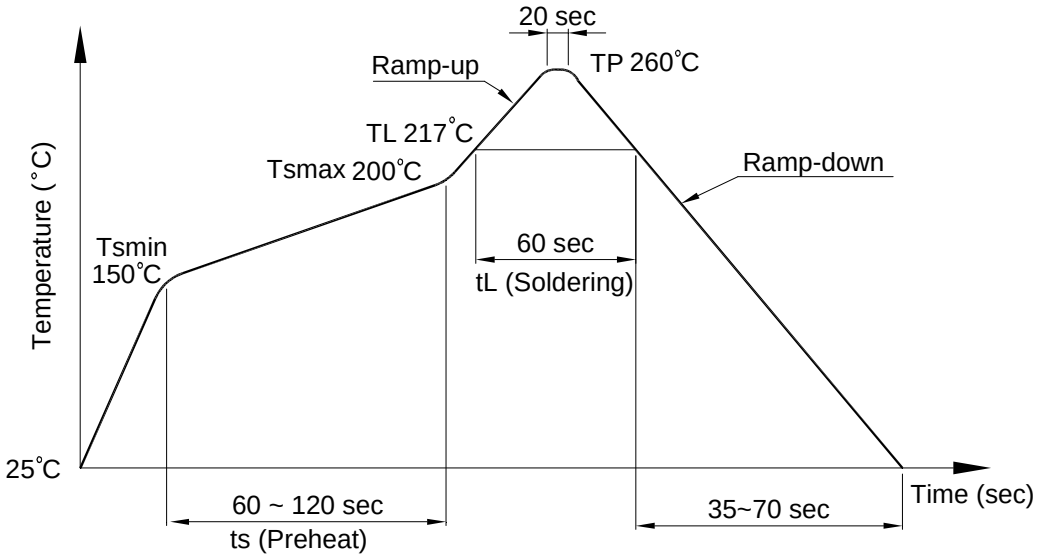



## 8. TEMPERATURE PROFILE OF SOLDERING

### 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 |




### 8.2 Wave soldering (JEDEC22A111 compliant)

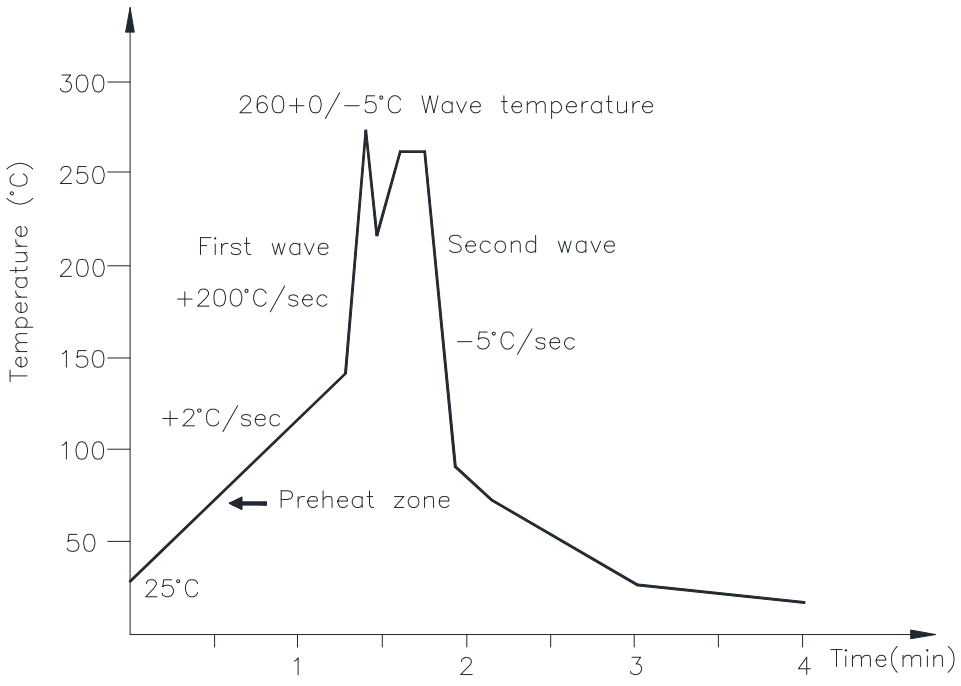
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C

Time: 10 sec.

Preheat temperature:25 to 140˚C

Preheat time: 30 to 80 sec.



### 8.3 Hand soldering by soldering iron

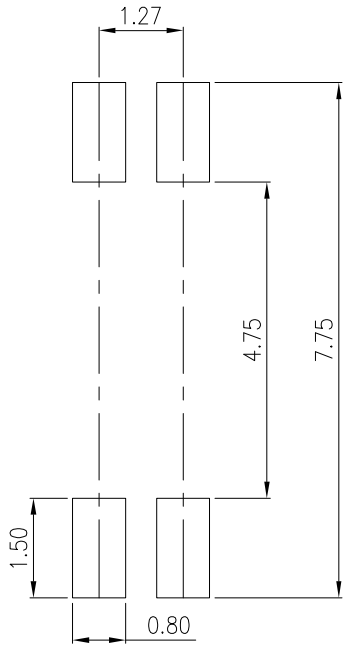
Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380+0/-5°C

Time: 3 sec max.

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

Unit: mm

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- 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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