LITEON®
OPTOELECTRONICS

# Photocoupler
# Product Data Sheet
# LTV-2X7-G
# (Half pitch series)

**Spec No. :DS70-2017-0023**
**Effective Date: 04/13/2017**
**Revision: -**

**LITE-ON DCC**

**RELEASE**

**BNS-OD-FC001/A4**

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# Photocoupler
# LTV-2X7 series

## 1. DESCRIPTION

### 1.1 Features

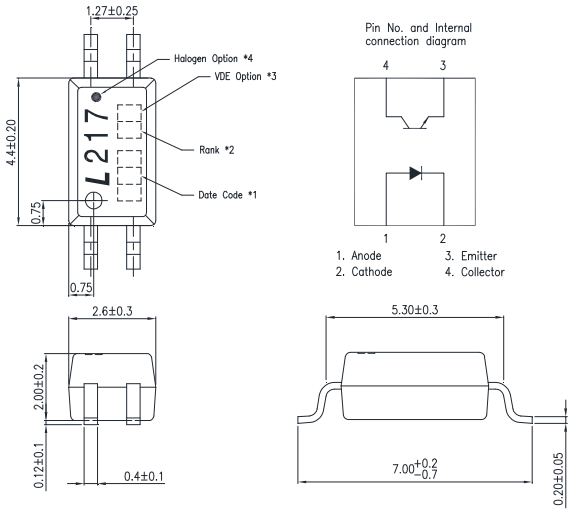
- Current transfer ratio (CTR) : MIN. 50% at $I_F$ = 5mA, $V_{CE}$ = 5V
- High input-output isolation voltage. (Viso=3,750Vrms)
- Employs double transfer mold technology
- Safety approval:
  UL 1577
  VDE DIN EN60747-5-5 (VDE 0884-5) ,
  CSA CA5A
  FIMKO
- RoHS Compliance: All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 8000V/MM2000V
- MSL class1
- Halogen Free

### 1.2 Applications

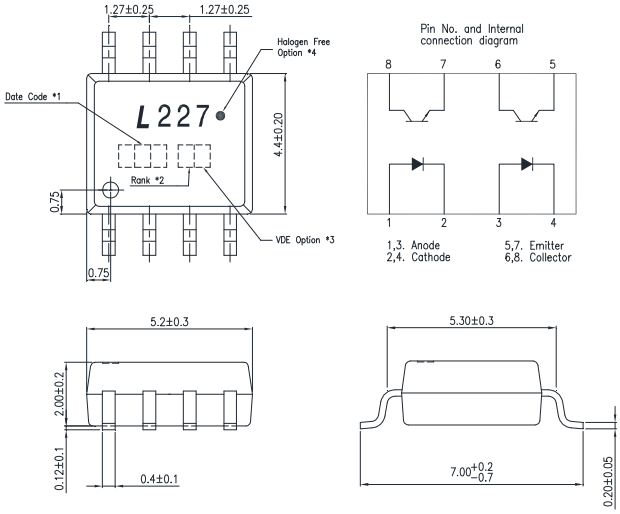
- Hybrid substrates that require high density mounting.
- Programmable controllers
- System appliances, measuring instruments

## 2. PACKAGE DIMENSIONS

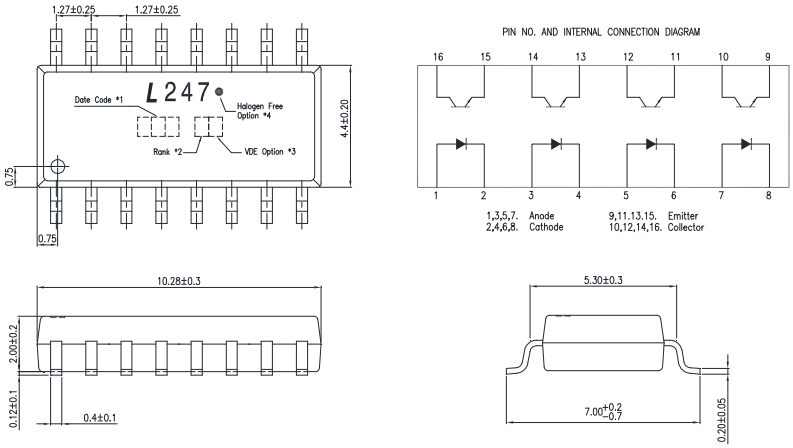
### 2.1 LTV-217




### 2.2 LTV-227




### 2.3 LTV-247



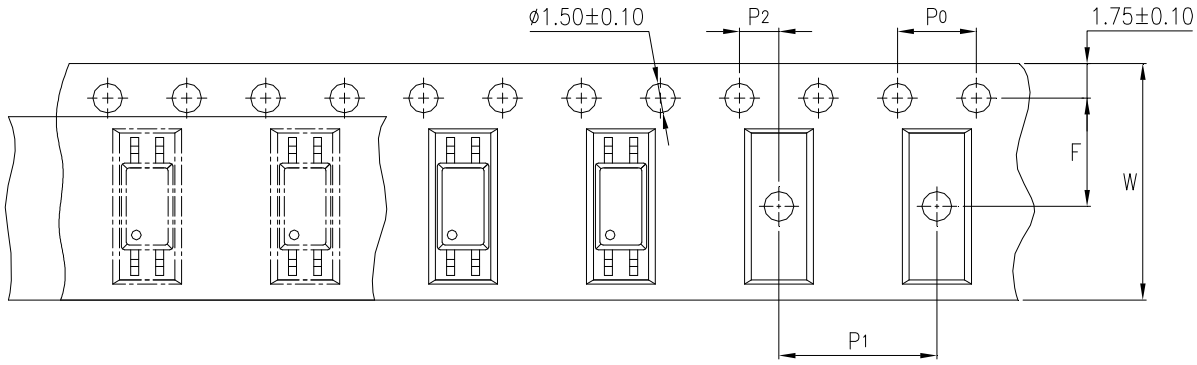

**Notes :**

1. 1-digit year code, Example : 2010 = A
   2-digit work week ranging from ‘01’ to ‘53’
2. Rank shall be or shall not be marked
3. VDE mark only appears on devices or ordered “V” option.
4. “●” indicates Halogen free option.

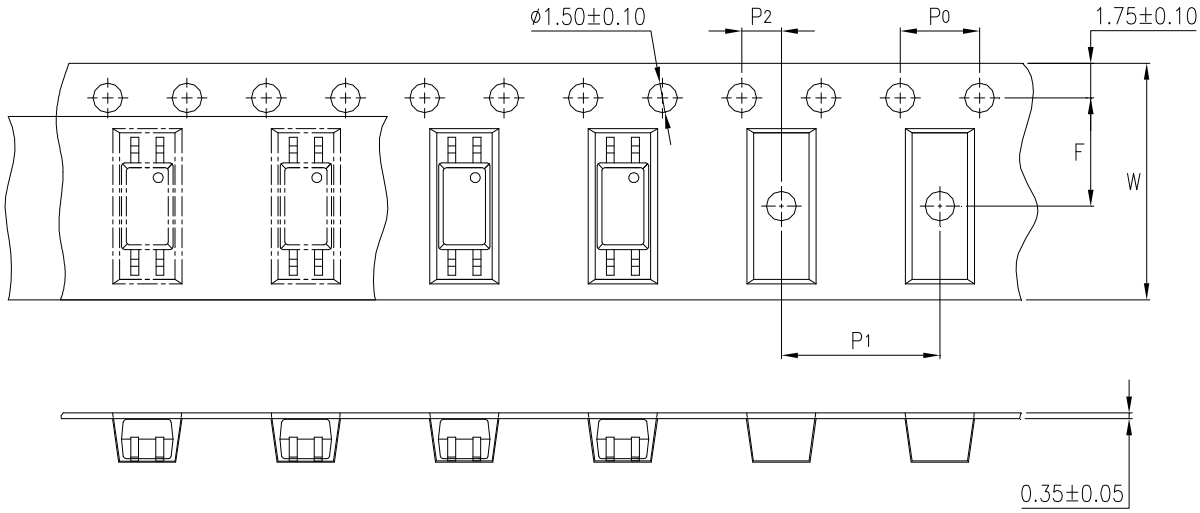
*All dimensions in millimeters.

## 3. TAPING DIMENSIONS

### 3.1 LTV-217

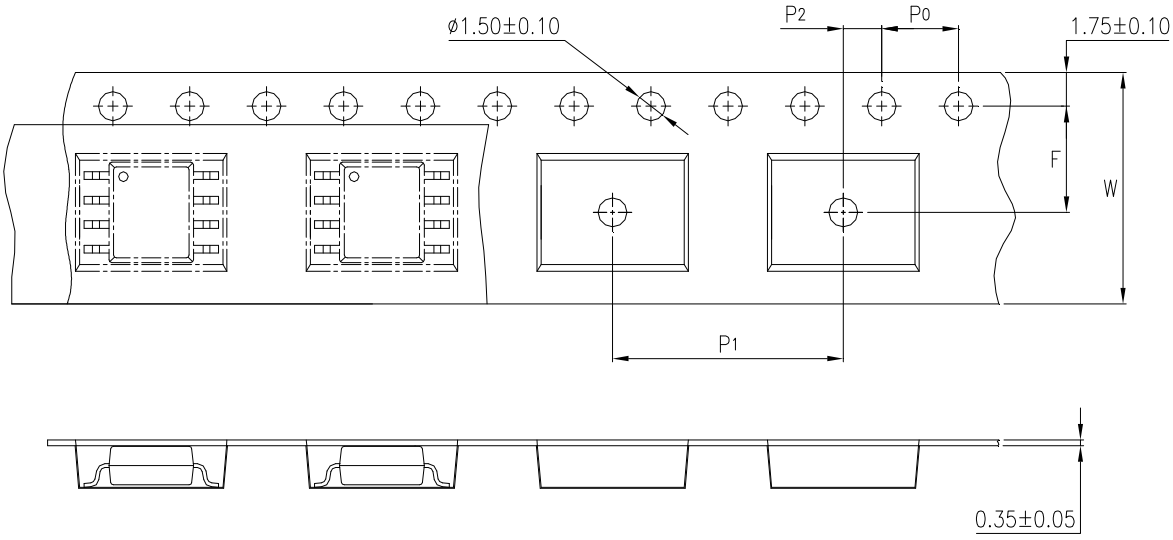



### 3.2 LTV-217-TP1



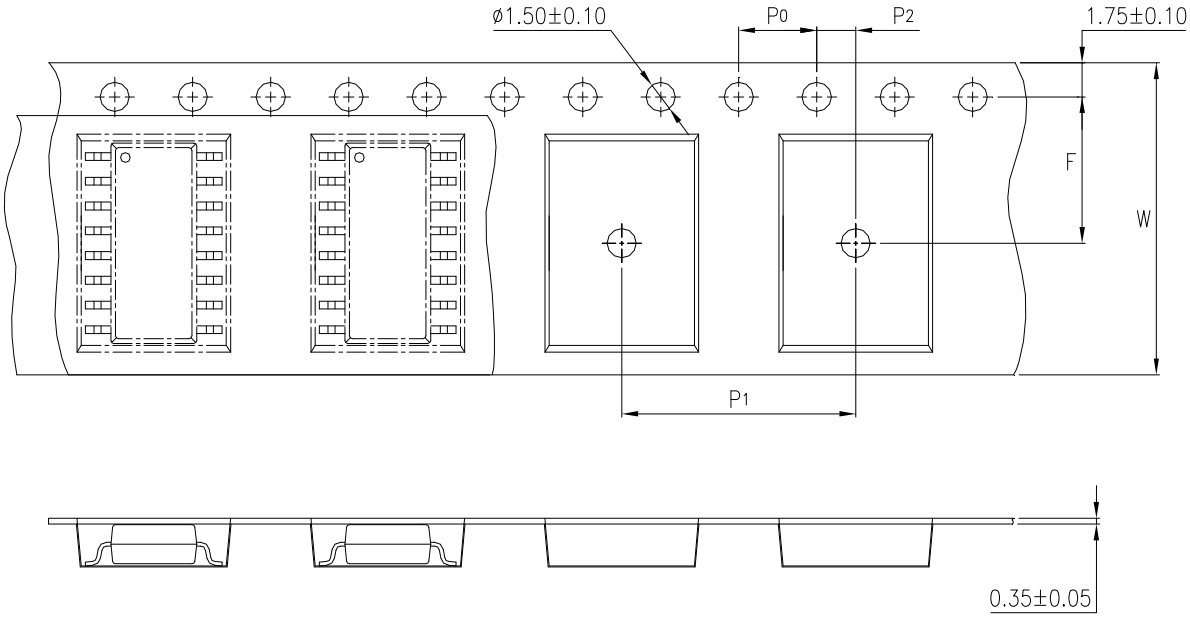

| Description | Symbol | Dimension in mm (inch) |
|---|---|---|
| Tape wide | W | 12±0.3 (0.47) |
| Pitch of sprocket holes | $P_0$ | 4±0.1 (0.15) |
| Distance of compartment | F | 5.5±0.1 (0.217) |
| | $P_2$ | 2±0.1 (0.079) |
| Distance of compartment to compartment | $P_1$ | 8±0.1 (0.315) |

### 3.3 LTV-227




| 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) |

### 3.4 LTV-247




| Description | Symbol | Dimension in mm (inch) |
|---|---|---|
| Tape wide | W | 16±0.3 (0.47) |
| Pitch of sprocket holes | $P_0$ | 4±0.1 (0.15) |
| Distance of compartment | F | 7.5±0.1 (0.217) |
| | $P_2$ | 2±0.1 (0.079) |
| Distance of compartment to compartment | $P_1$ | 12±0.1 (0.315) |

### 3.5 Quantities per Reel

| Package Type | LTV-217 | LTV-227 | LTV-247 |
|---|---|---|---|
| Quantities (pcs) | 3000 | 2000 | 2000 |

# 4. RATING AND CHARACTERISTICS

## 4.1 Absolute Maximum Ratings at Ta=25℃

| | Parameter | Symbol | Rating | | | Unit |
|---|---|---|---|---|---|---|
| | | | 217 | 227 | 247 | |
| 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 |
| | Junction Temperature | $T_J$ | 125 | | | °C |
| 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 | | 100 | mW |
| | Junction Temperature | $T_J$ | 125 | | | °C |
| | Total Power Dissipation | $P_{tot}$ | 200 | | 170 | mW |
| 1. | Isolation Voltage | $V_{iso}$ | 3750 | | | $V_{rms}$ |
| | 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

### 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 |
| | | Reverse Current | $I_R$ | — | — | 10 | μA | $V_R$=4V |
| | | Terminal Capacitance | $C_t$ | — | 30 | 250 | 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 Current | $I_C$ | 2.5 | — | 30 | mA | $I_F$=5mA $V_{CE}$=5V |
| | 1. | Current Transfer Ratio | CTR | 50 | — | 600 | % | |
| | | 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 | — | 0.6 | 1 | pF | V=0, f=1MHz |
| | | Response Time (Rise) | tr | — | 2 | 18 | μs | $V_{CE}$=10V, $I_C$=2mA $R_L$=100Ω, f=100Hz |
| | | Response Time (Fall) | tf | — | 3 | 18 | μs | |
| | | Turn-On Time | $T_{ON}$ | — | 3 | — | μs | |
| | | Turn-Off Time | $T_{OFF}$ | — | 3 | — | μs | |
| | | Turn-On Time | $t_{ON}$ | — | 2 | — | μs | $V_{CE}$=5V, $I_C$=16mA $R_L$=1.9KΩ |
| | | Storage Time | Ts | — | 25 | — | μs | |
| | | Turn-Off Time | $t_{OFF}$ | — | 40 | — | μs | |

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

## 5. RANK TABLE OF CURRENT TRANSFER RATIO CTR

| MODEL NO. | CTR Rank | Min | Max | Condition |
|---|---|---|---|---|
| LTV-217 | A | 80 | 160 | $I_F$=5mA, $V_{CE}$=5V, Ta=25°C |
| | A1 | 100 | 160 | |
| | B | 130 | 260 | |
| | C | 200 | 400 | |
| | D | 300 | 600 | |
| | A or B or C or D or No mark | 50 | 600 | |
| LTV-227 | B | 130 | 260 | |
| | C | 200 | 400 | |
| | B or C or No mark | 50 | 600 | |
| LTV-247 | No mark | 100 | 600 | |

## 6. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Figure 1. Collector Power Dissipation vs. Ambient Temperature

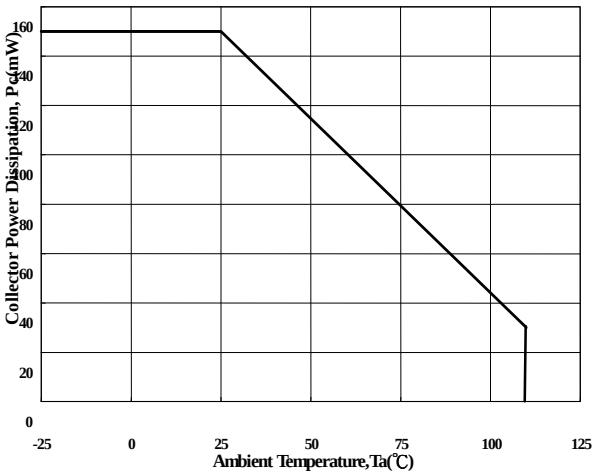



Figure 2. Forward Current vs. Ambient Temperature

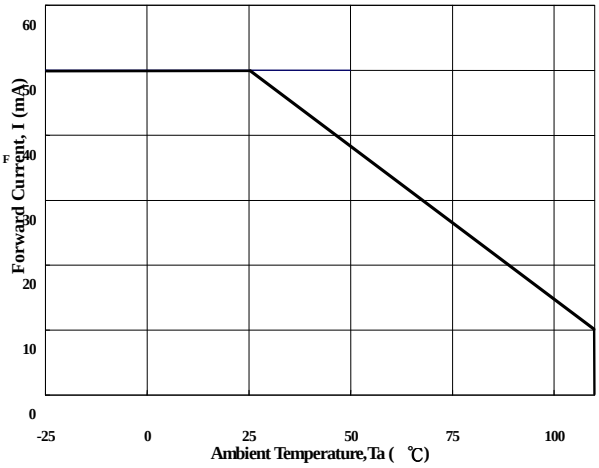



Figure 3. Forward Current vs. Forward Voltage

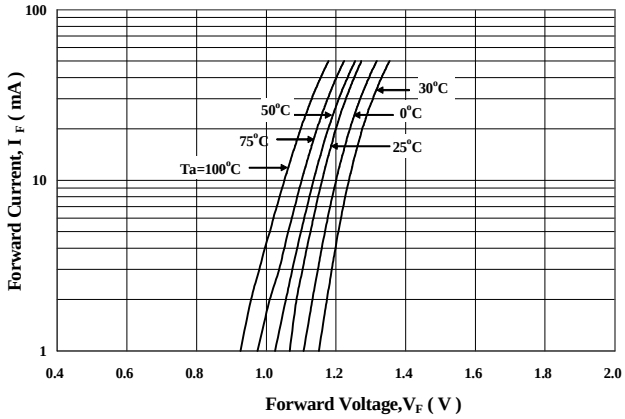



Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current

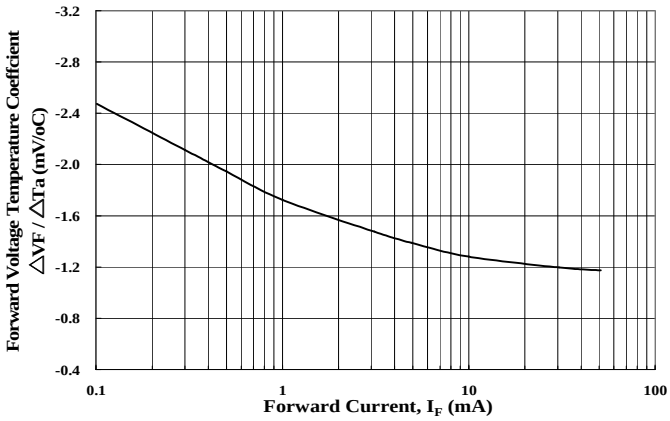



Figure 5. Pulse Forward Current vs. Duty Cycle Ratio




Figure 6. Pulse Forward Current vs. Pulse Forward

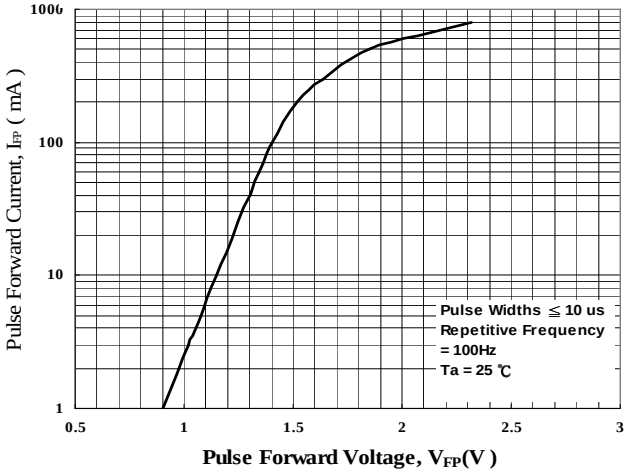


Figure 7. Collector-Emitter Saturation Voltage vs. Forward Current

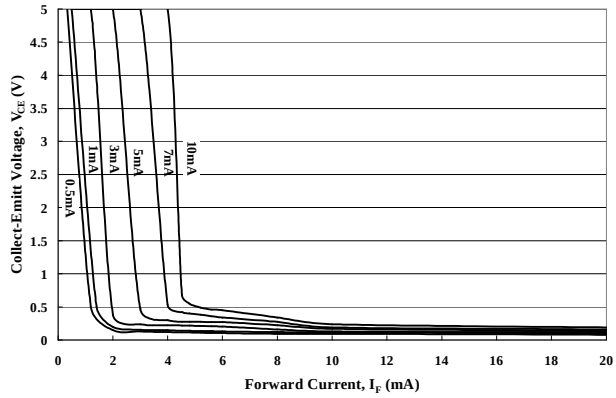



Figure 8. Collector Current vs. Collector-Emitter

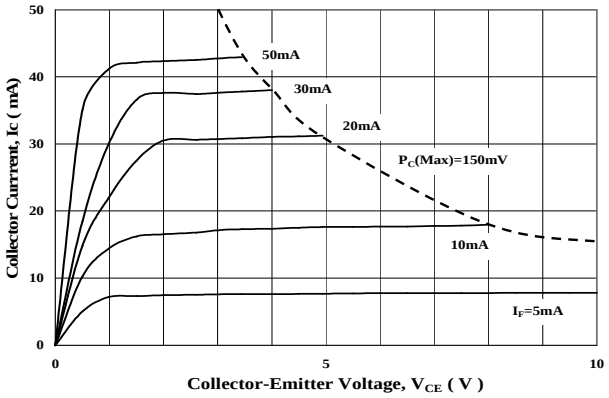



Figure 9. Collector Current vs. Small Collector-Emitter Voltage

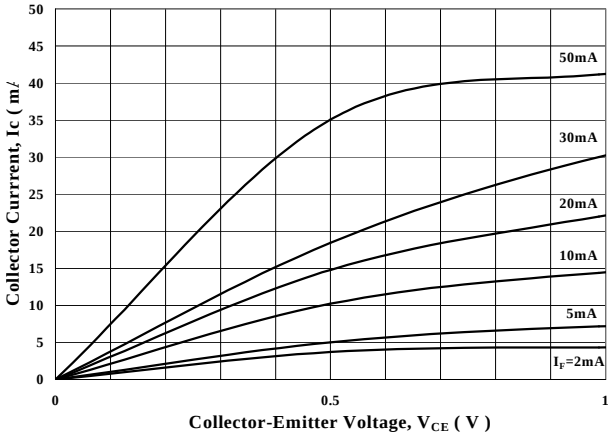



Figure 10. Normalized CTR vs. Forward Current

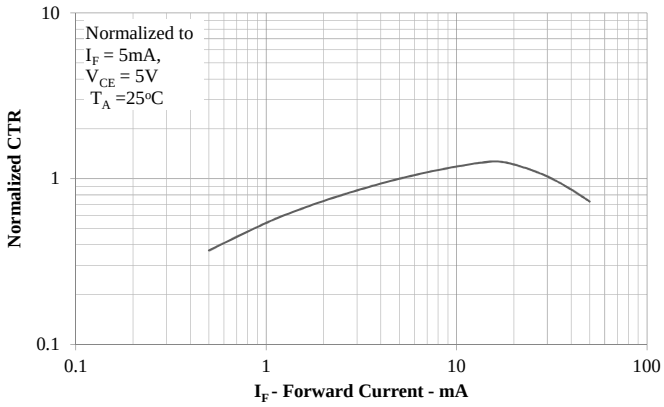



Figure 11. Collector Dark Current vs. Ambient Temperature

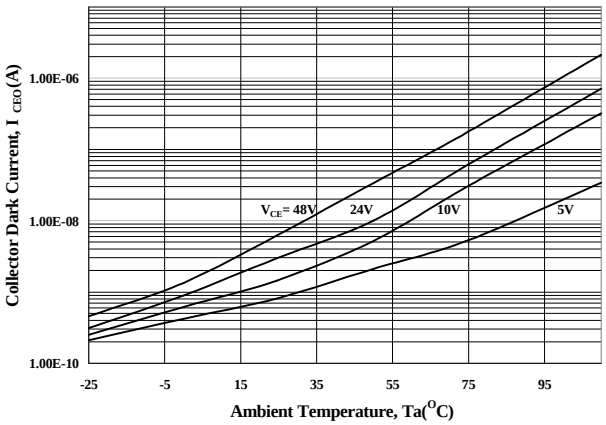



Figure 12. Current Transfer Ratio vs. Forward Current

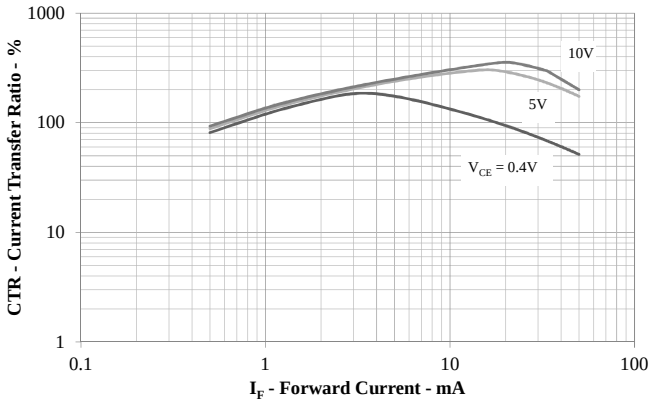


**Figure 13. Normalized CTR vs. Ambient Temperature**

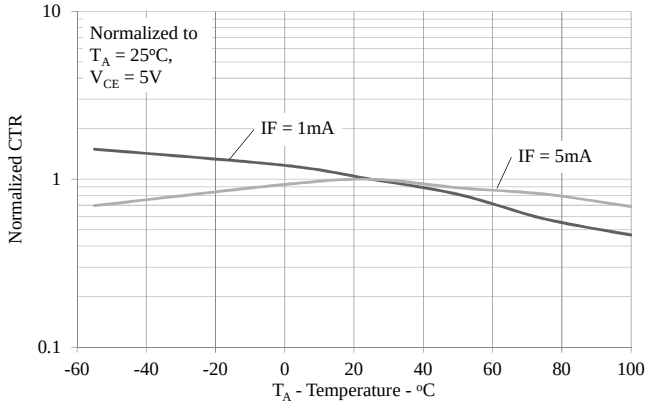



**Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature**

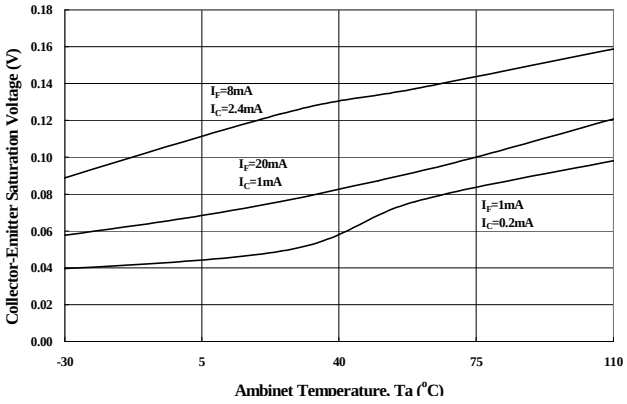



**Figure 15. Collector Current vs. Ambient Temperature**

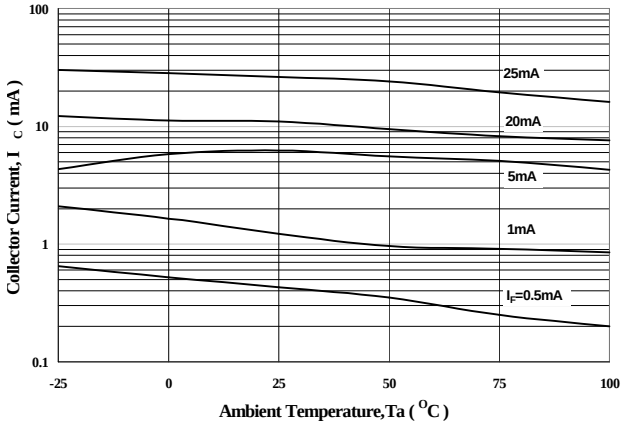



**Figure 16. Switching Time vs. Load Resistance**

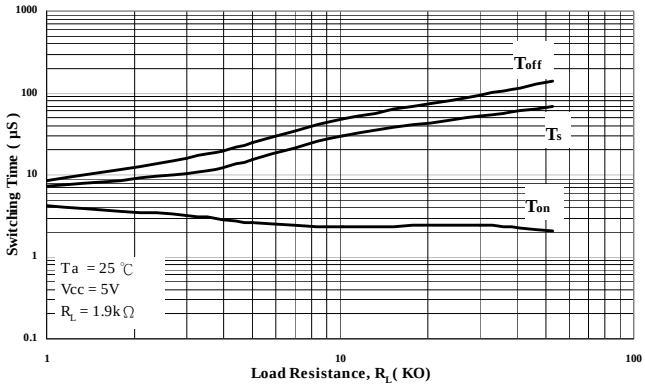



**Figure 17. Switching Time vs. Ambient Temperature**

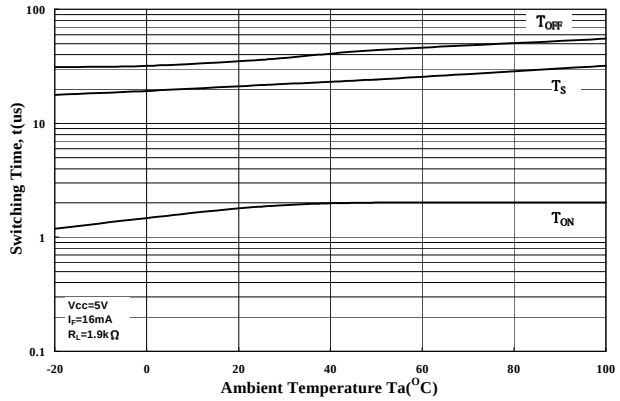
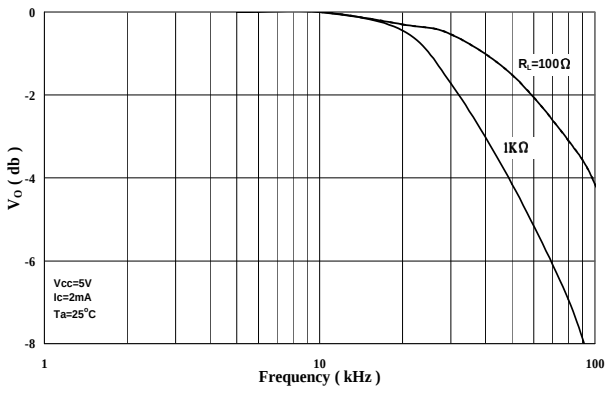
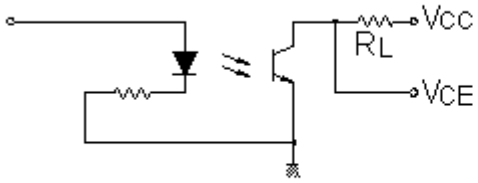
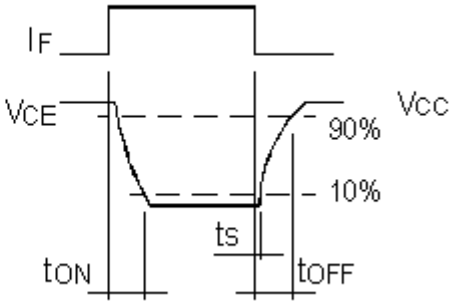



**Figure 18. Frequency Response**



## 7. SWITCHING TIME TEST CIRCUIT



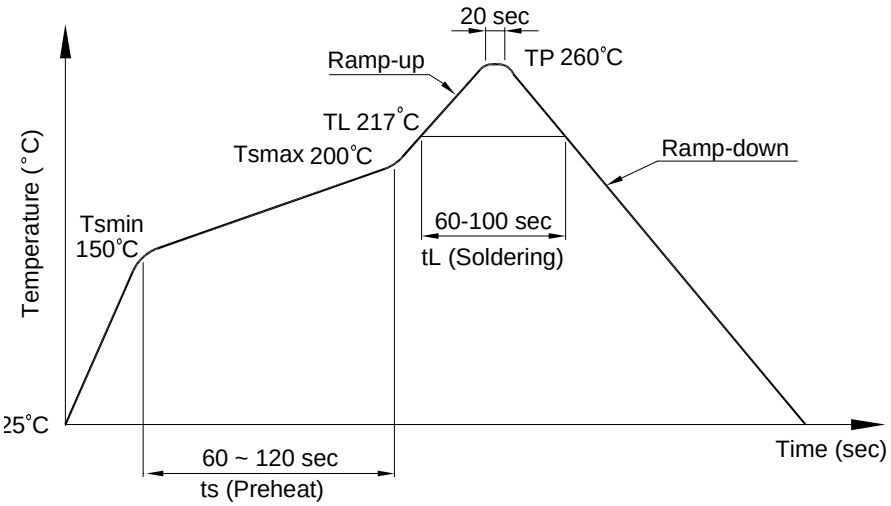




## 8. TEMPERATURE PROFILE OF SOLDERING

### 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 ~100 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)

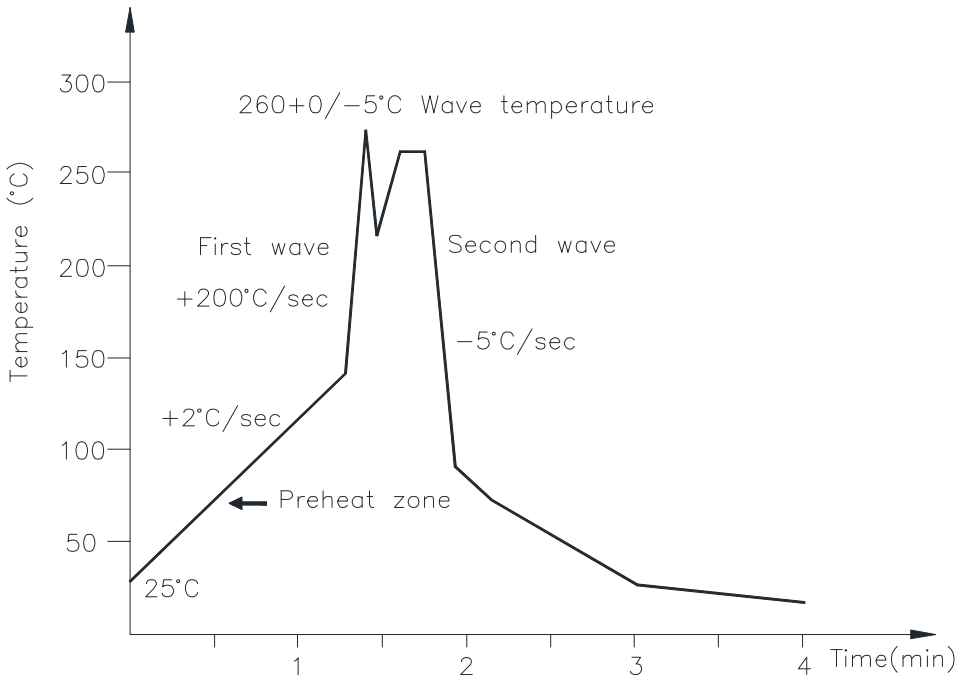
One time soldering is recommended within the condition of temperature.

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.

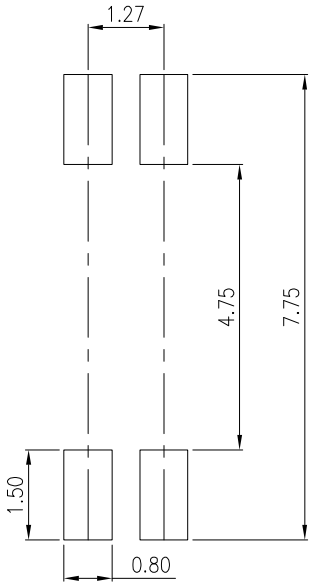
Temperature: 380+0/-5°C

Time: 3 sec max.

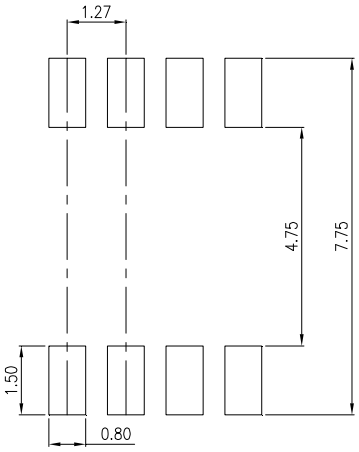
## 9. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit: mm

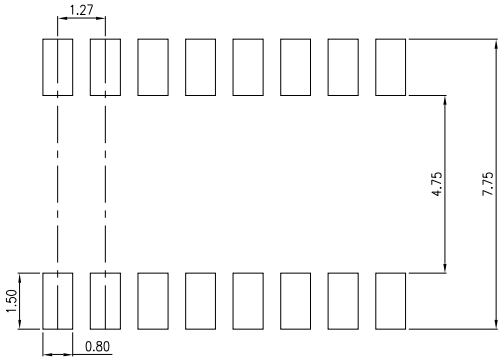
### 9.1 LTV-217



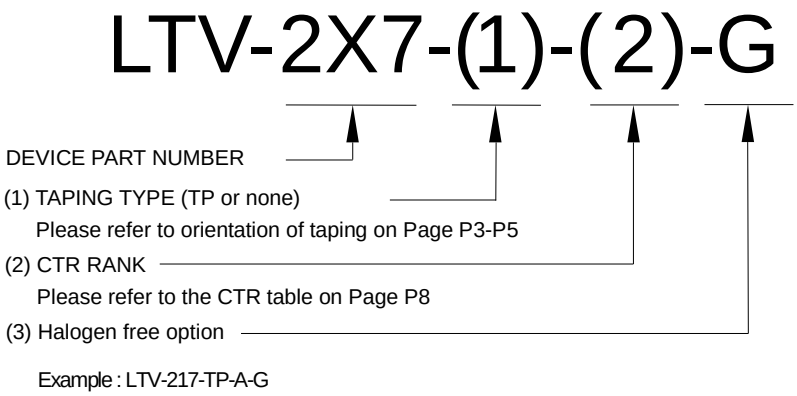

### 9.2 LTV-227



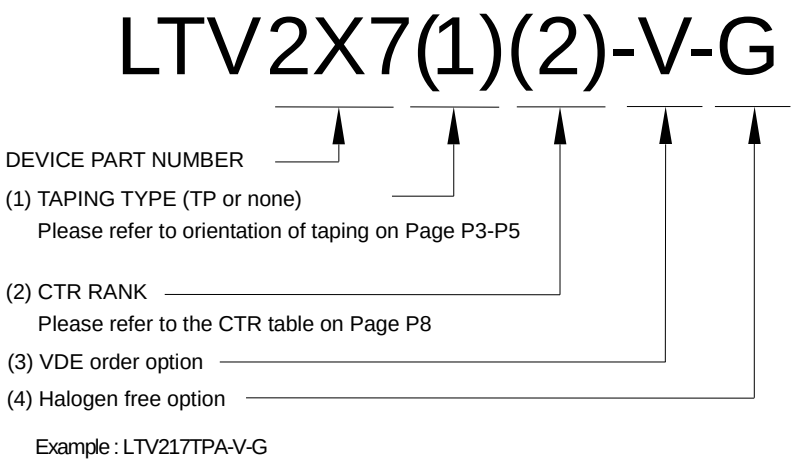

### 9.3 LTV-247



## 10. NAMING RULE




Example : LTV-217-TP-A-G




Example : LTV217TPA-V-G

## 11. NOTES

- LiteOn is continually improving the quality, reliability, function or design and LiteOn reserves the right to make changes without further notices.
- 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.