



Photocoupler

Product Data Sheet

LTV-214

Spec No.: DS70-2010-0066

Effective Date: 12/27/2014

Revision: A

LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

Photocouplers LTV-2X4 series

1. DESCRIPTION

1.1 Features

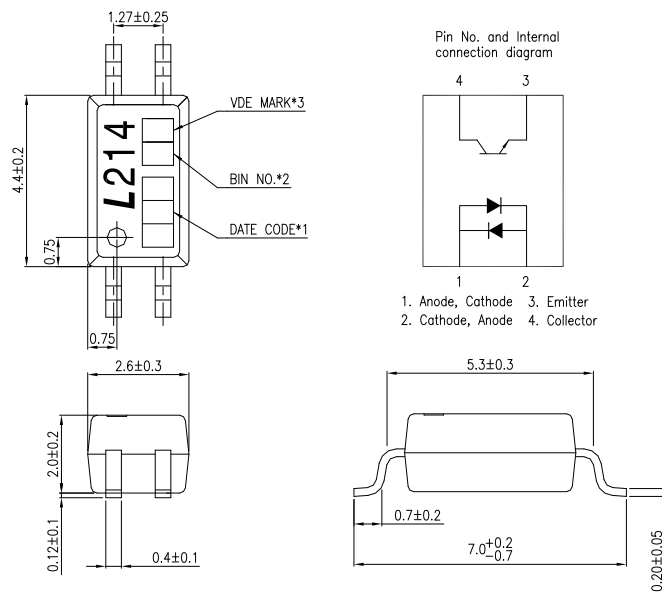
- Current transfer ratio (CTR) : MIN. 20% at $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$
- High input-output isolation voltage. ($V_{iso}=3,750\text{Vrms}$)
- Employs double transfer mold technology
 - UL 1577
 - VDE DIN EN60747-5-5 (VDE 0884-5) ,
 - CSA CA5A
 - FIMKO
- RoHS Compliance: All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 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

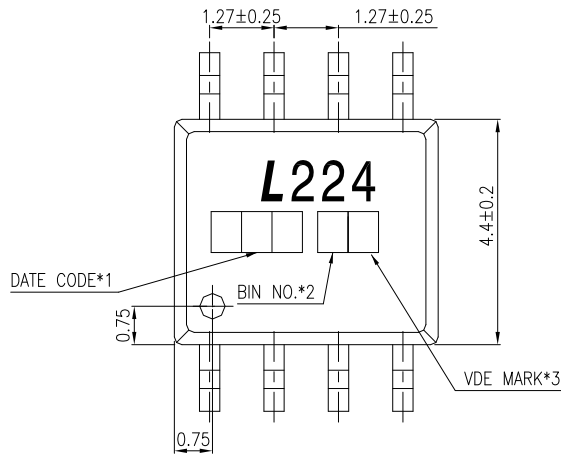


Notes :

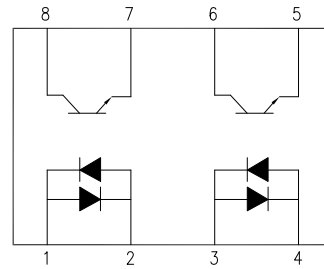
1. 3-digit date code.
2. Rank shall be or shall not be marked.
3. VDE mark only appears on devices ordered "V" option.

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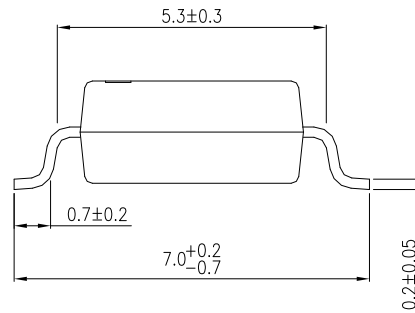
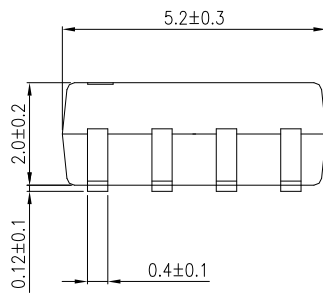
2.2 LTV-224



Pin No. and Internal connection diagram



1,3. Anode, Cathode 5,7. Emitter
2,4. Cathode, Anode 6,8. Collector

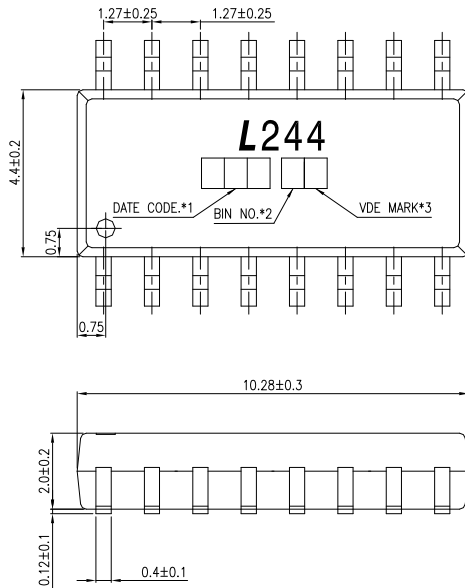


Notes :

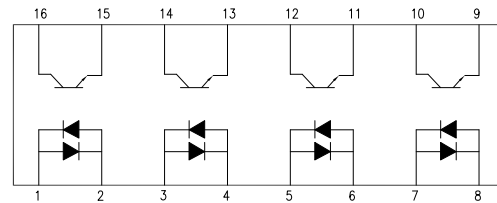
1. 3-digit date code.
2. Rank shall be or shall not be marked.
3. VDE mark only appears on devices ordered "V" option.

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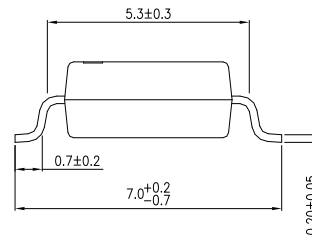
2.3 LTV-244



PIN NO. AND INTERNAL CONNECTION DIAGRAM



1,3,5,7. Anode,Cathode 9,11.13.15. Emitter
2,4,6,8. Cathode,Anode 10,12,14,16. Collector



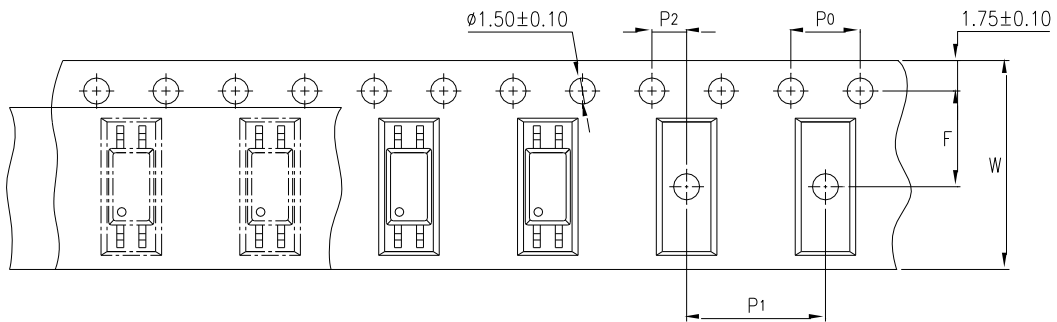
Notes :

1. 3-digit date code.
2. Rank shall be or shall not be marked.
3. VDE mark only appears on devices ordered "V" option.

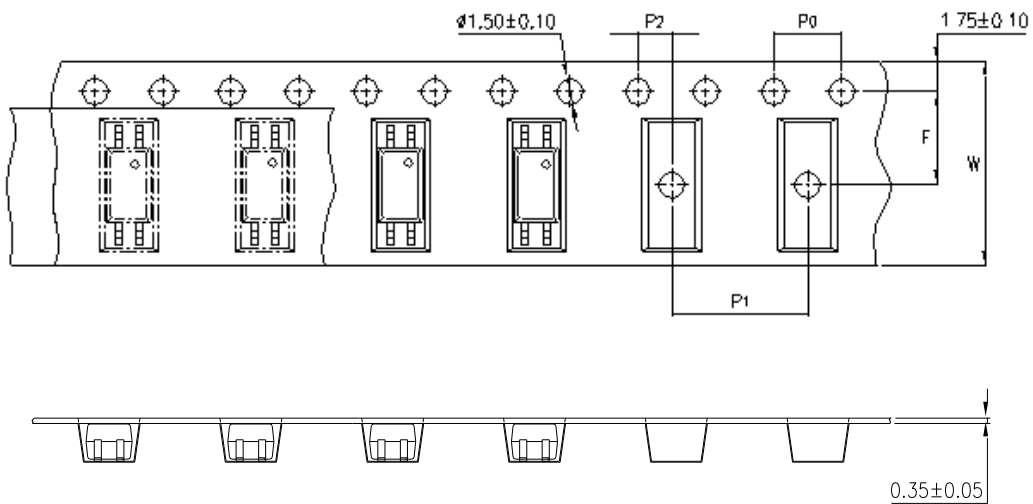
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3. TAPING DIMENSIONS

3.1 P/N : LTV-214



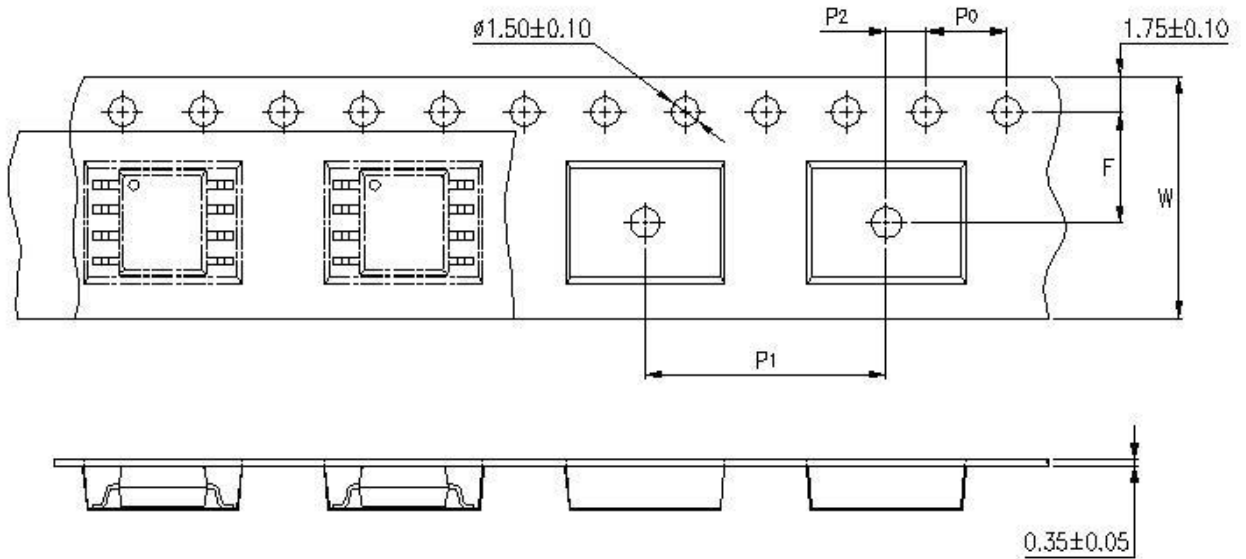
3.2 P/N : LTV-214-TP1



| 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) |

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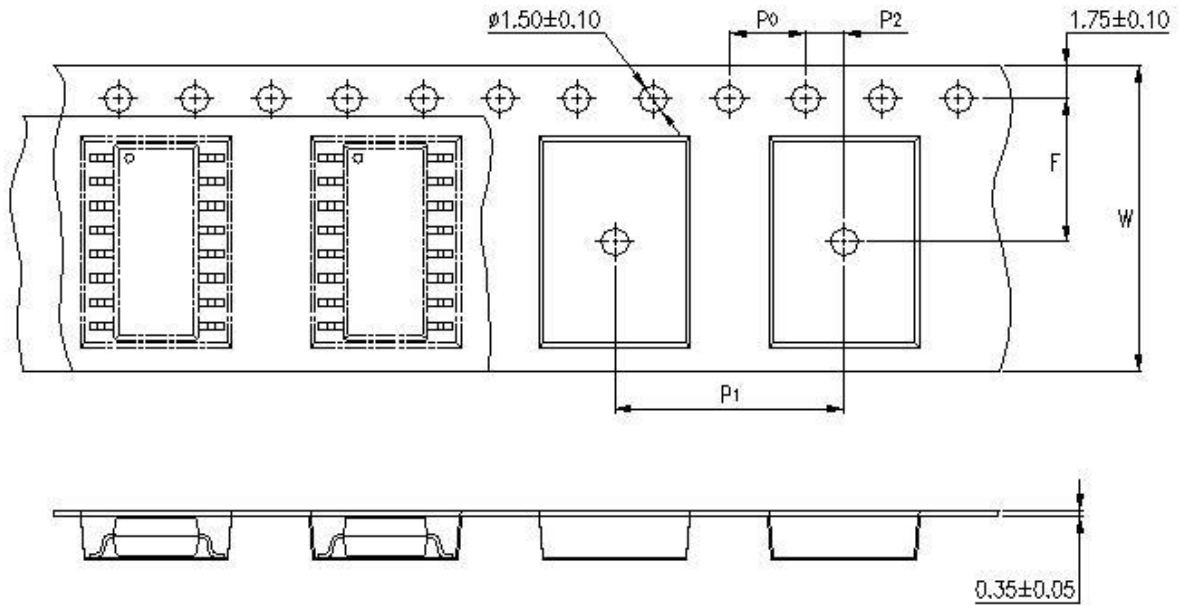
3.3 P/N :LTV-224



| 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) |

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3.4 P/N : LTV-244



| 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-214 | LTV-224 | LTV-244 |
|------------------|---------|---------|---------|
| Quantities (pcs) | 3000 | 2000 | 2000 |

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4. RATING AND CHARACTERISTICS

4.1 Absolute Maximum Ratings at Ta=25°C

| | Parameter | Symbol | Rating | | | Unit |
|--------|-----------------------------|-----------|------------|-----|-----|-----------|
| | | | 214 | 224 | 244 | |
| Input | Forward Current | I_F | 50 | | | mA |
| | Reverse Voltage | V_R | 6 | | | V |
| | Power Dissipation | P | 65 | | | 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 | 100 | | mW |
| | 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 |
| | 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.

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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 | — | 1.2 | 1.4 | V | $I_F=\pm 20\text{mA}$ |
| | Terminal Capacitance | C_t | — | 60 | — | pF | $V=0, f=1\text{KHz}$ |
| Output | Collector Dark Current | I_{CEO} | — | — | 100 | nA | $V_{CE}=20\text{V}, I_F=0$ |
| | Collector-Emitter Breakdown Voltage | BV_{CEO} | 80 | — | — | V | $I_C=0.1\text{mA}, I_F=0$ |
| | Emitter-Collector Breakdown Voltage | BV_{ECO} | 7 | — | — | V | $I_E=10\mu\text{A}, I_F=0$ |
| TRANSFER CHARACTERISTICS | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | 0.4 | V | $I_F\pm 8\text{mA}, I_C=2.4\text{mA}$ |
| | Isolation Resistance | R_{iso} | 5×10^{10} | 1×10^{11} | — | Ω | DC500V, 40 ~ 60% R.H. |
| | Floating Capacitance | C_f | — | 0.8 | 1 | pF | $V=0, f=1\text{MHz}$ |
| | Response Time (Rise) | t_r | — | 3 | 18 | μs | $V_{CE}=10\text{V}, I_C=\pm 2\text{mA}$ |
| | Response Time (Fall) | t_f | — | 4 | 18 | μs | $R_L=100\Omega, f=100\text{Hz}$ |

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5. RANK TABLE OF CURRENT TRANSFER RATIO CTR

| Model No. | CTR Rank | Min | Max | Condition |
|--------------------|----------|-----|-----|--|
| LTV-214 | 0 | 20 | 400 | $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$ |
| | A | 50 | 250 | |
| | AK | 100 | 200 | |
| | B | 100 | 400 | |
| | GR | 100 | 300 | $I_F = \pm 5\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$ |
| LTV-224 LTV-244 | 0 | 20 | 400 | $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$ |
| | A5 | 100 | 300 | |
| | GB | 100 | 400 | $I_F = \pm 5\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$ |

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

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6. CHARACTERISTICS CURVES

Figure 1. Collector Power Dissipation vs. Ambient Temperature

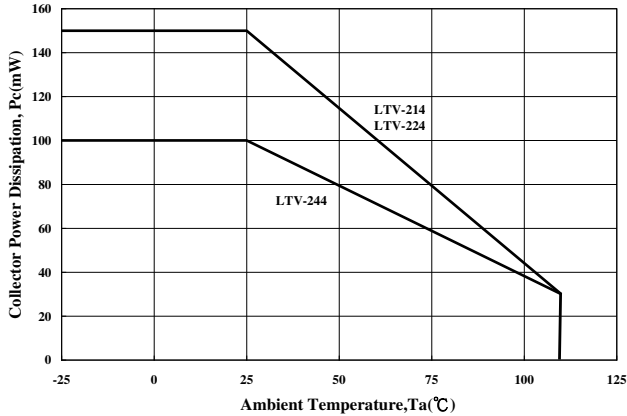


Figure 2. Forward Current vs. Ambient Temperature

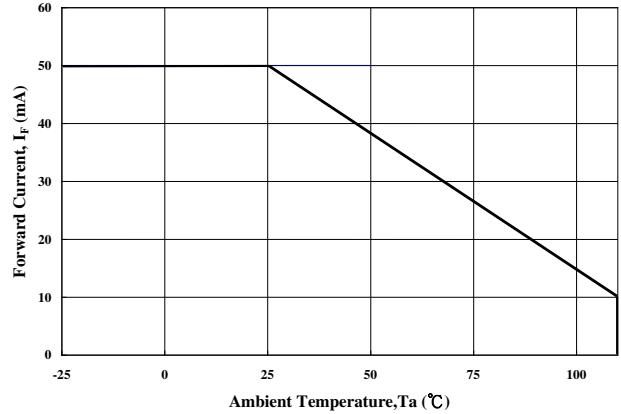


Figure 3. Forward Current vs. Forward Voltage

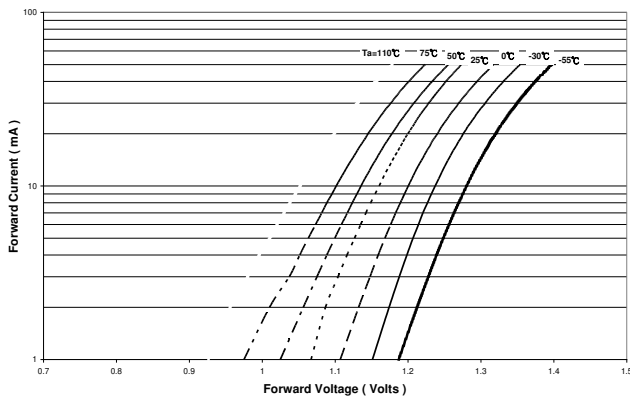


Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current

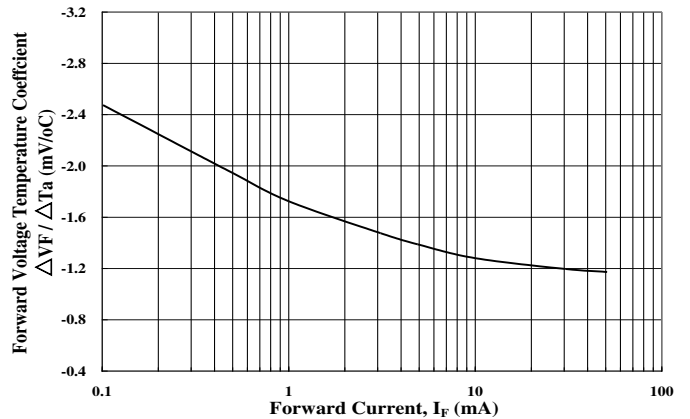


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

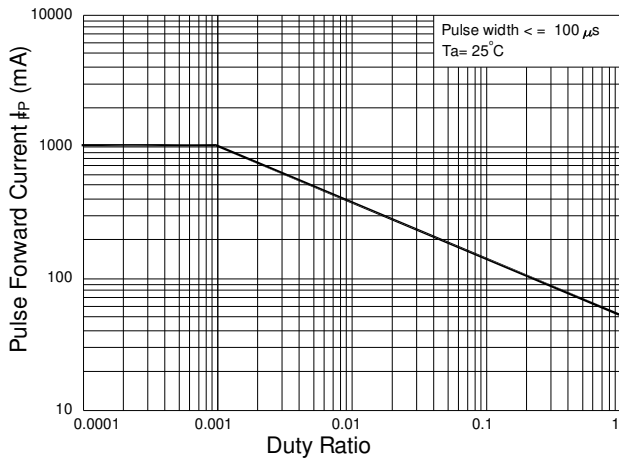
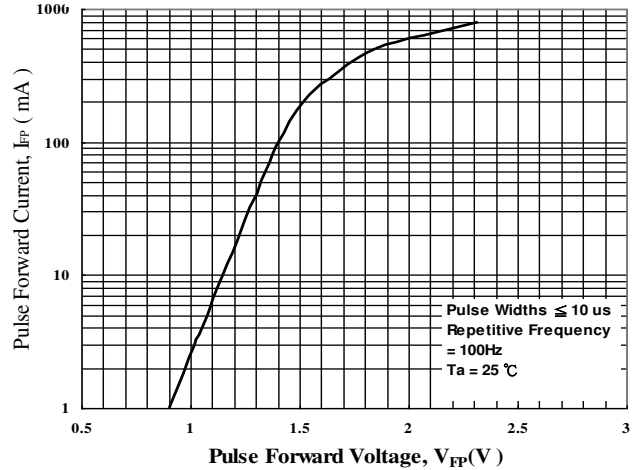


Figure 6. Pulse Forward Current vs. Pulse Forward Voltage



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

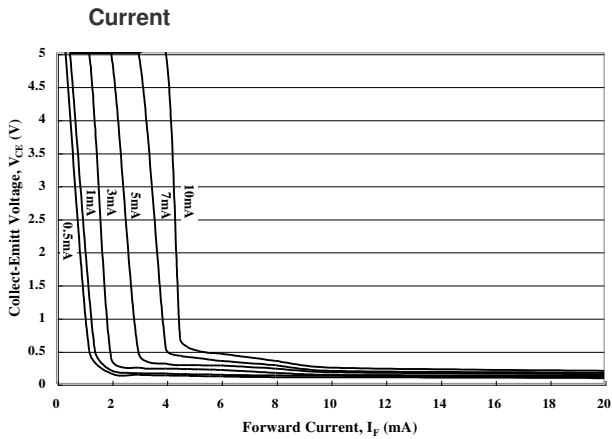


Figure 8. Collector Current vs. Collector-Emitt

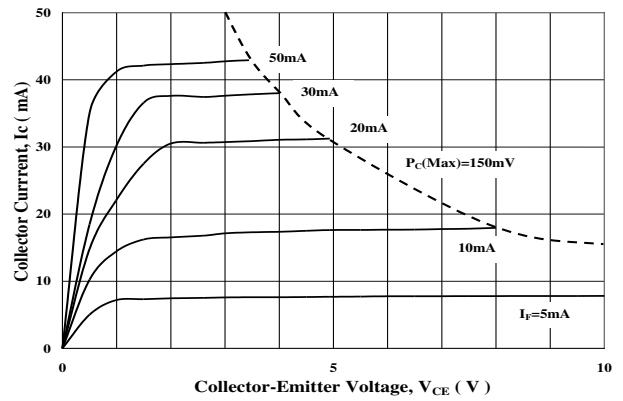


Figure 9. Collector Current vs. Small Collector-Emitt

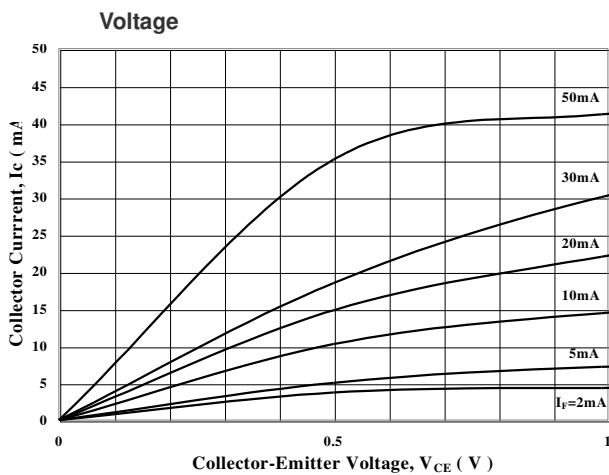


Figure 10. Normalized CTR vs. Forward Current

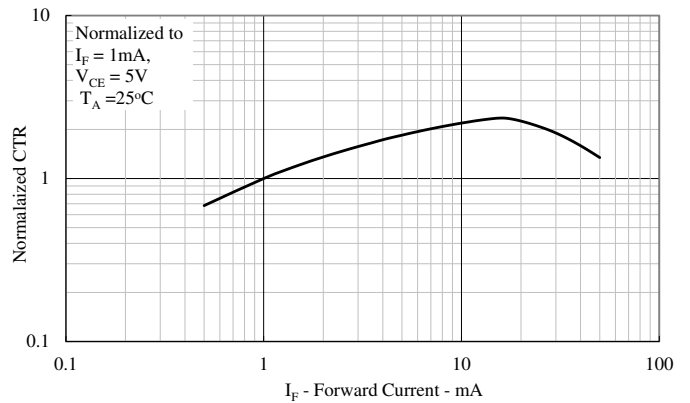


Figure 11. Collector Dark Current vs. Ambient Temperature

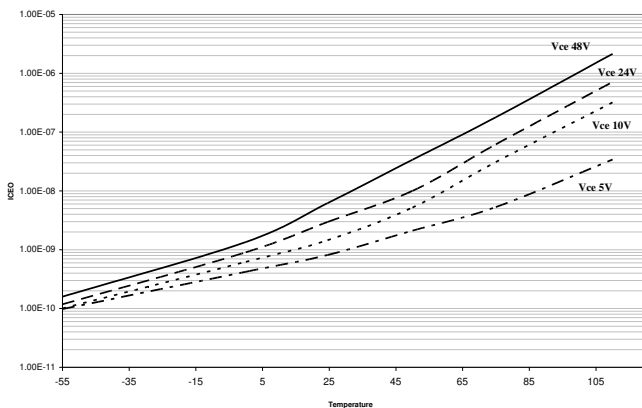
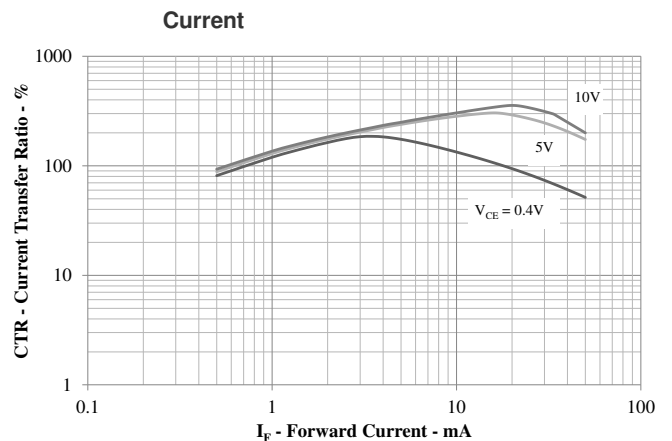


Figure 12. Current Transfer Ratio vs. Forward Current



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

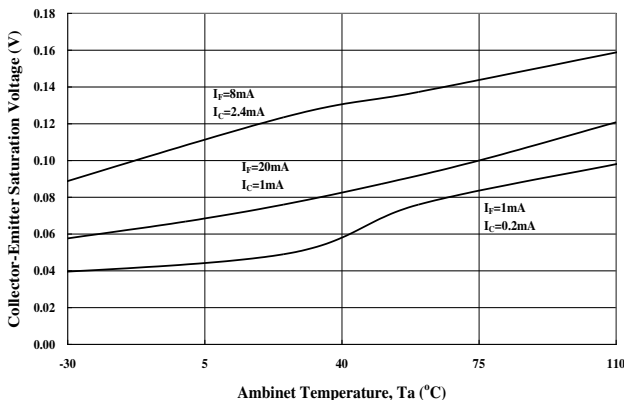


Figure 14. Collector Current vs. Ambient Temperature

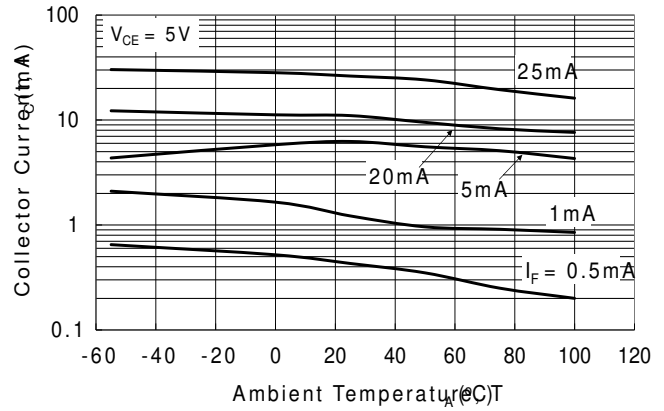


Figure 15. Switching Time vs. Load Resistance

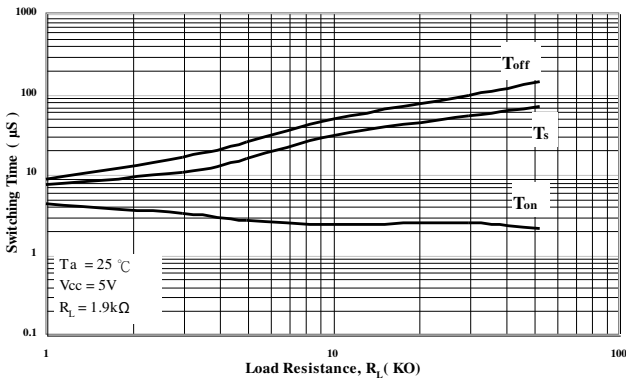


Figure 16. Switching Time vs. Ambient Temperature

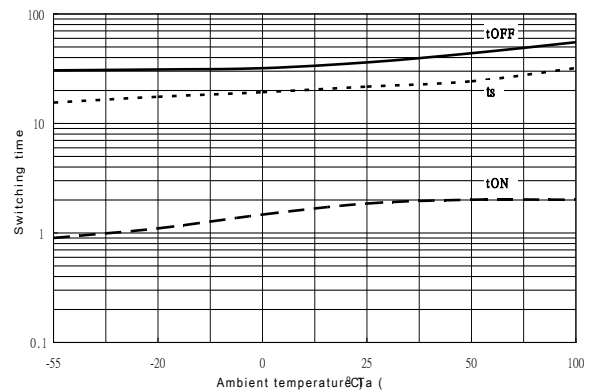
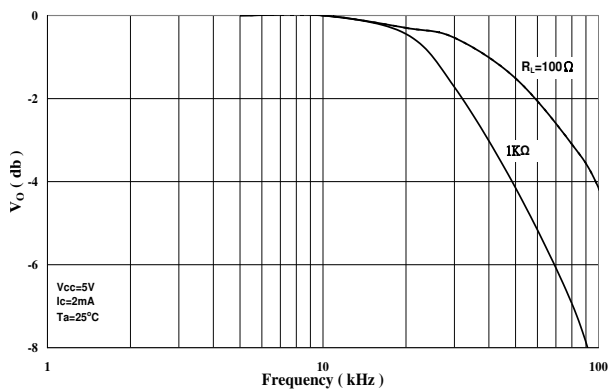
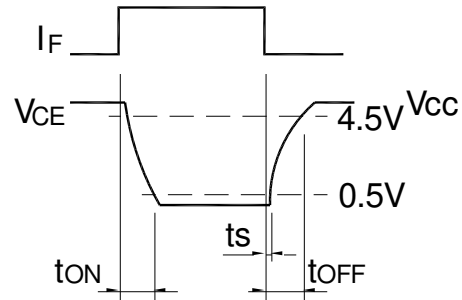
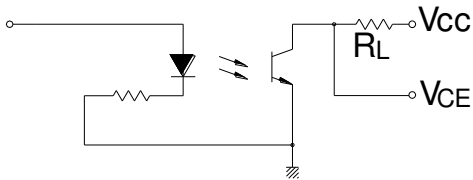


Figure 17. Frequency Response



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7. SWITCHING TIME TEST CIRCUIT



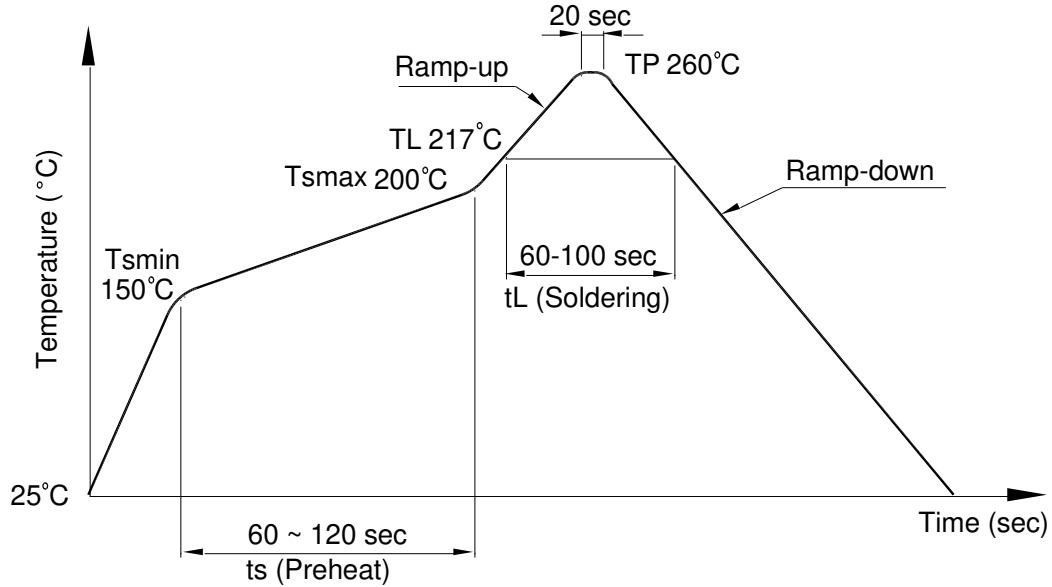
8. TEMPERATURE PROFILE OF SOLDERING

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 |

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8.2 Wave soldering (JEDEC22A111 compliant)

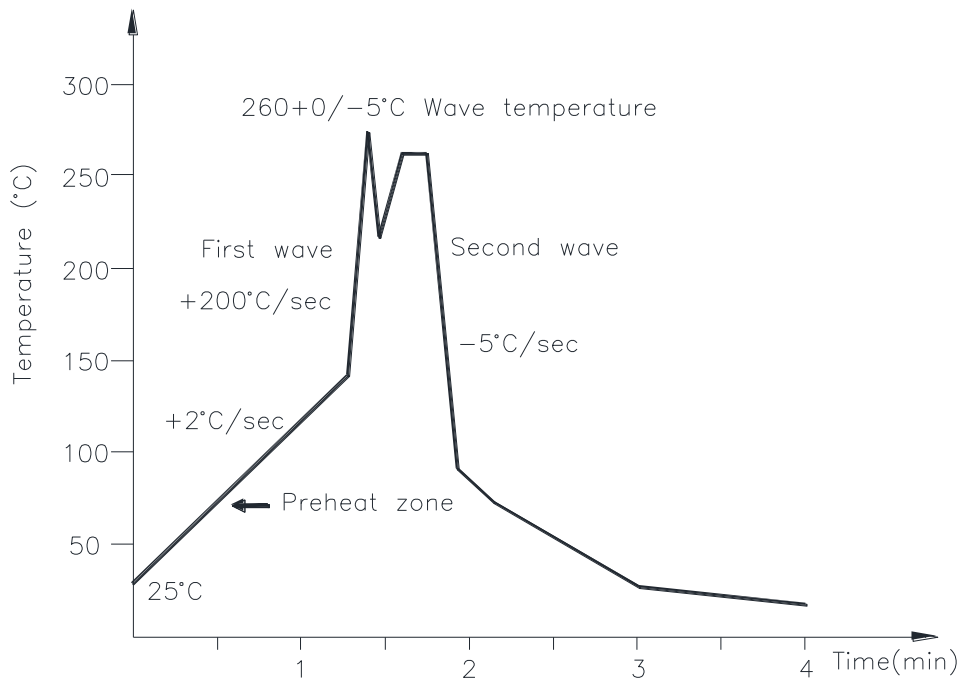
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5°C

Time: 10 sec.

Preheat temperature: 25 to 140°C

Preheat time: 30 to 80 sec.



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8.3 Hand soldering by soldering iron

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

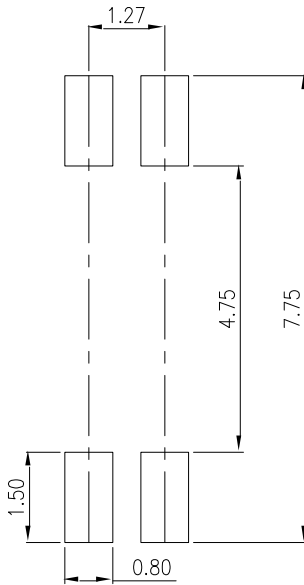
Temperature: 380+0/-5°C

Time: 3 sec max.

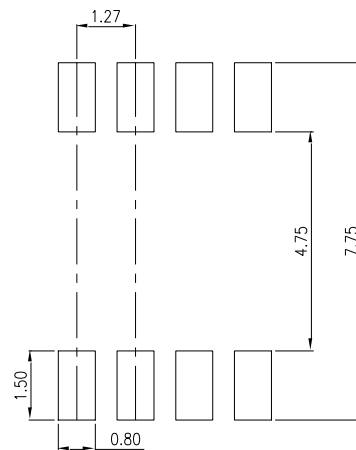
9. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit: mm

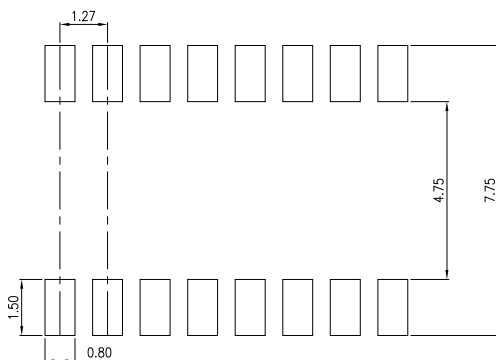
P/N : LTV-214



P/N : LTV-224



P/N : LTV-244



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10. 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 advance.
- 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.