



Photocoupler

Product Data Sheet

4N27/ 4N28

(M, S, S-TA1)

Spec No.: DS-70-99-0011

Effective Date: 12/11/2015

Revision: C

LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

Photocoupler 4N2X Series

1. DESCRIPTION

1.1 Features

- High Current transfer ratio (CTR : MIN. 10% at IF = 10mA, VCE = 10V)
- Response time(ton : TYP. 3μs at VCC = 10V, IC = 2mA, RL = 100Ω)
- Input-output isolation voltage
4N25 series : Viso = 2,500Vrms
4N26 series : Viso = 1,500Vrms
4N27 series : Viso = 1,500Vrms
4N28 series : Viso = 500Vrms
- Dual-in-line package :
4N25, 4N26, 4N27, 4N28
- Wide lead spacing package :
4N25M, 4N26M, 4N27M, 4N28M
- Surface mounting package :
4N25S, 4N26S, 4N27S, 4N28S
- Tape and reel packaging :
4N25S-TA1, 4N26S-TA1, 4N27S-TA1, 4N28S-TA1
- Safety approval
UL approval (NO. E113898)
TUV approval (NO. R9653630)
DEMKO approval (NO. 303985)
CSA & cUL, VDE, FIMKO, CQC approved
- RoHS Compliance
All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 8000V/MM2000V
- MSL class 1

1.2 Applications

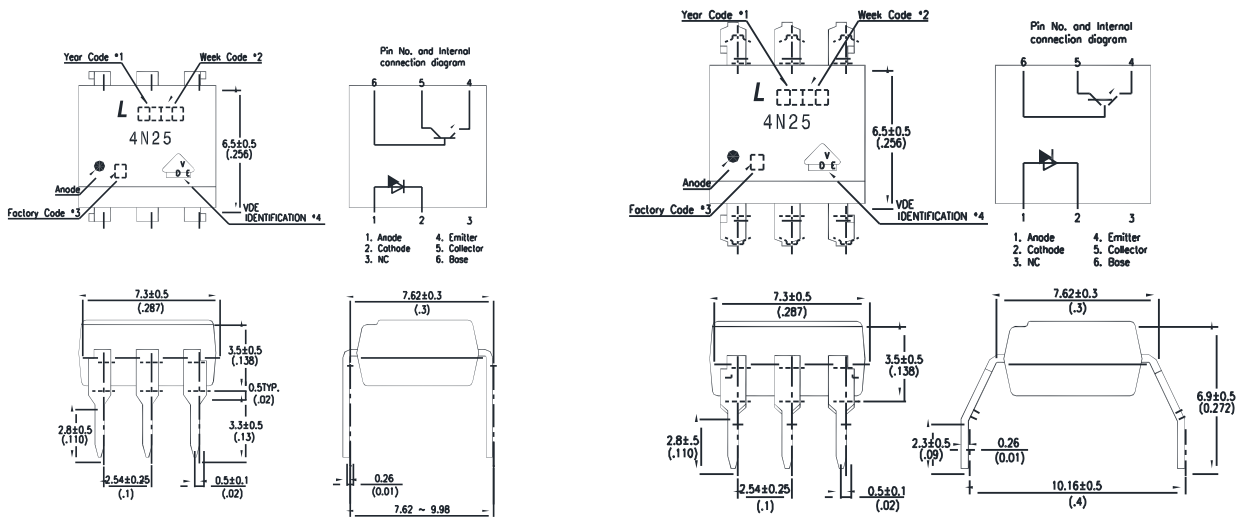
- Hybrid substrates that require high density mounting.
- Programmable controllers

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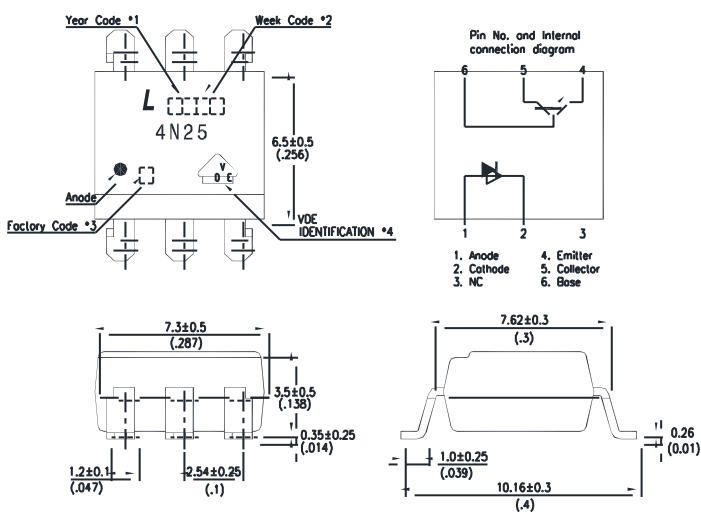
2. PACKAGE DIMENSIONS

2.1 4N25

2.2 4N25M



2.3 4N25S



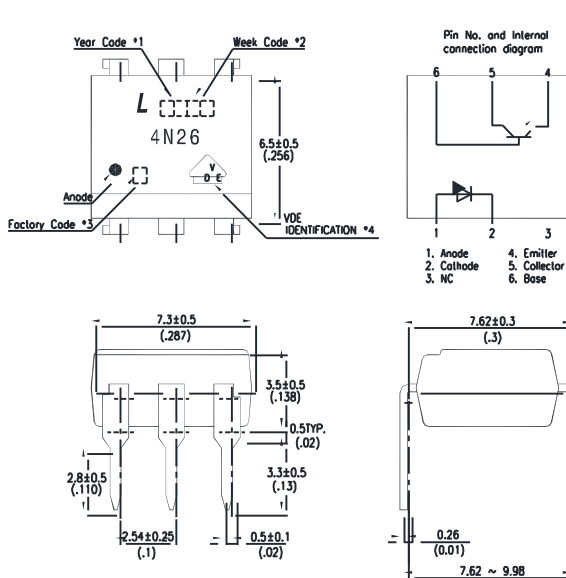
Notes :

1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. VDE option.

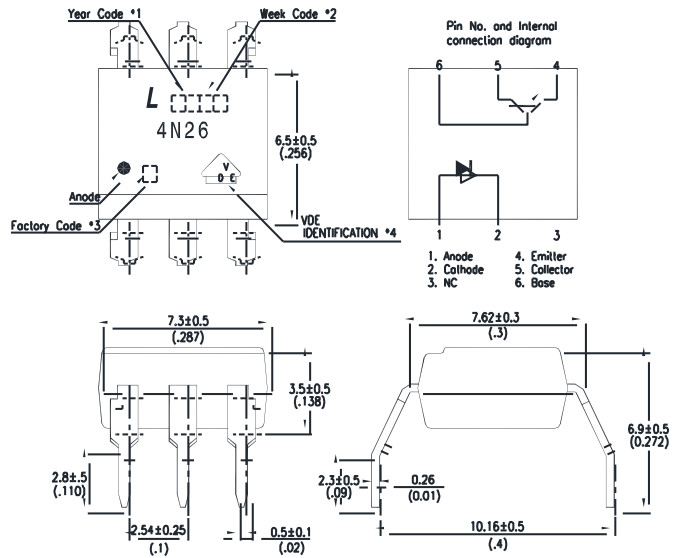
Dimensions in millimeters(inches).

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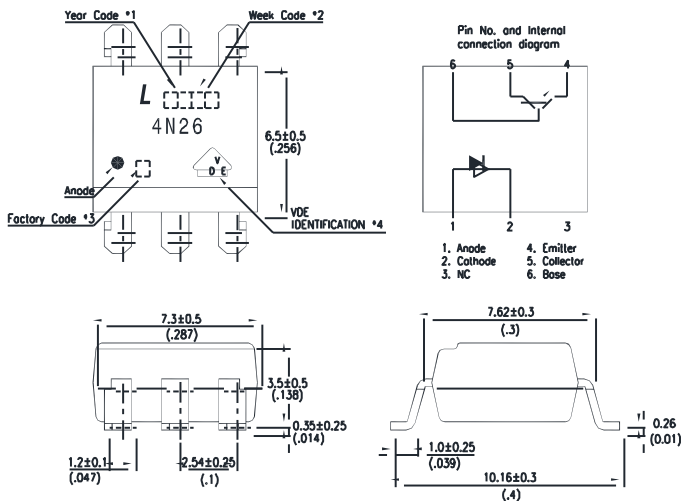
2.4 4N26



2.5 4N26M



2.6 4N26S



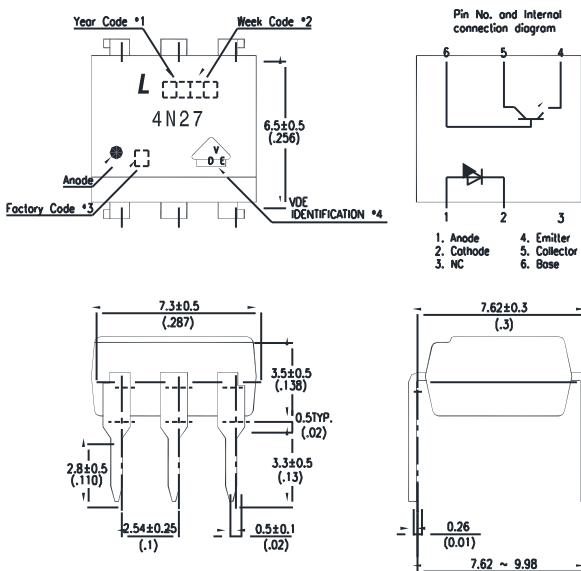
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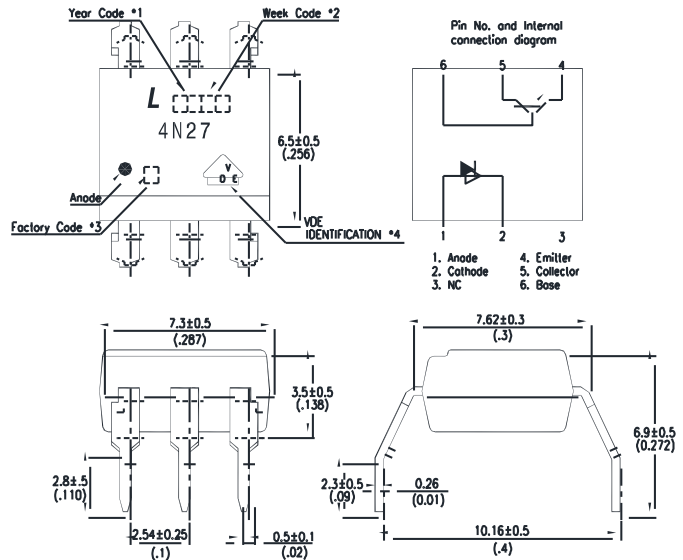
Dimensions in millimeters(inches).

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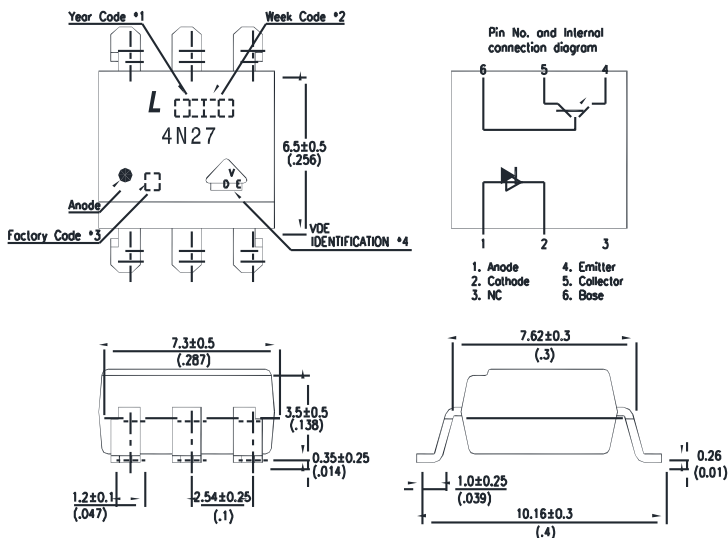
2.7 4N27



2.8 4N27M



2.9 4N27S



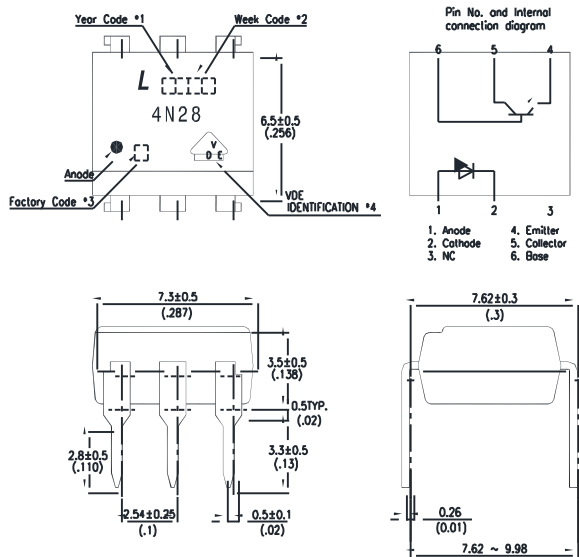
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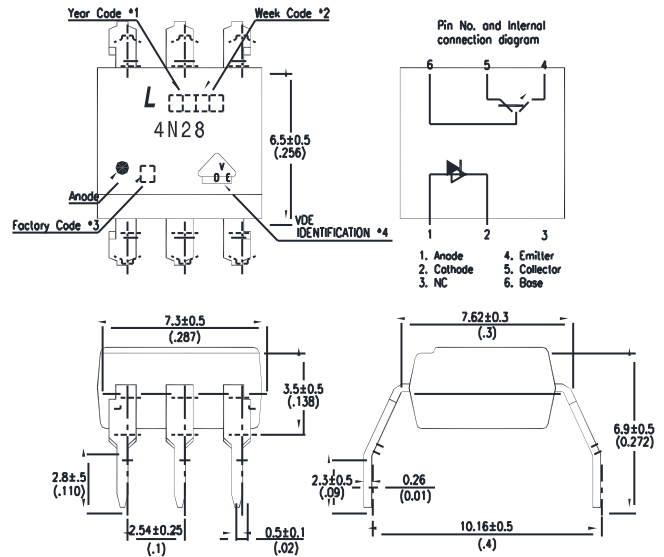
Dimensions in millimeters(inches).

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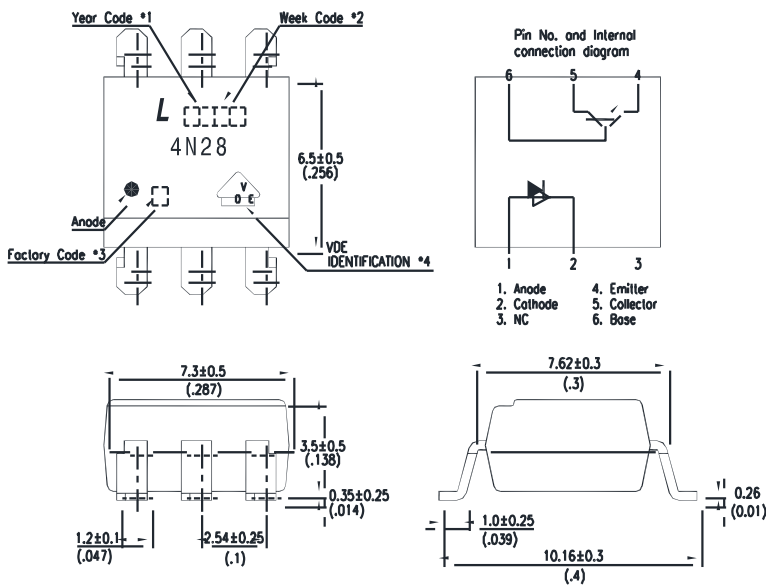
2.10 4N28



2.11 4N28M



2.12 4N28S



Notes :

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3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. VDE option.

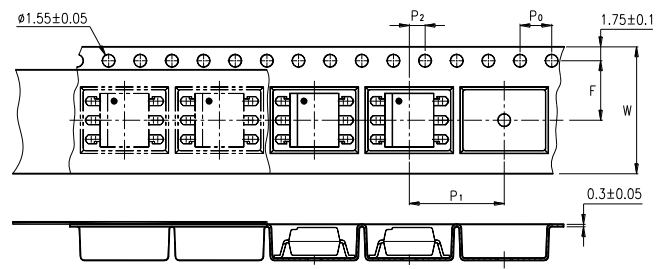
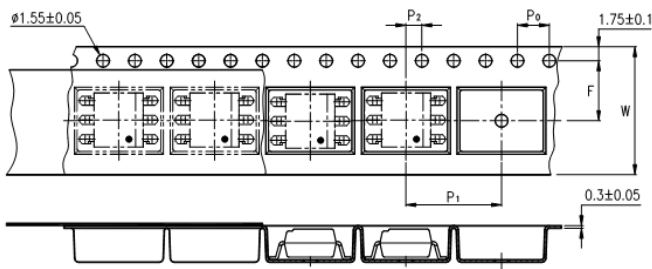
Dimensions in millimeters(inches).

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3. TAPING DIMENSIONS

3.1 4N25S-TA , 4N26S-TA , 4N27S-TA , 4N28S-TA

3.2 4N25S-TA1 , 4N26S-TA1 , 4N27S-TA1 , 4N28S-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 | 80 | mA |
| | Reverse Voltage | V_R | 6 | V |
| | Power Dissipation | P | 150 | mW |
| Output | Collector - Emitter Voltage | V_{CEO} | 30 | V |
| | Emitter - Collector Voltage | V_{ECO} | 7 | V |
| | Collector - Base Voltage | V_{CBO} | 70 | V |
| | Collector Current | I_C | 100 | mA |
| | Collector Power Dissipation | P_C | 150 | mW |
| Total Power Dissipation | | P_{tot} | 250 | mW |
| *1 Isolation Voltage | 4N25 series | V_{iso} | 2,500 | V_{rms} |
| | 4N26 series | | 1,500 | |
| | 4N27 series | | 1,500 | |
| | 4N28 series | | 500 | |
| 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 | Test Condition |
|--------------------------|--------------------------------------|---------------|--------------------|--------------------|------|---------------|--------------------------------------|
| Input | Forward Voltage | V_F | — | 1.2 | 1.5 | V | $I_F=10\text{mA}$ |
| | Reverse Current | I_R | — | — | 10 | μA | $V_R=4\text{V}$ |
| | Terminal Capacitance | C_t | — | 50 | — | 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} | 30 | — | — | V | $I_C=0.1\text{mA}, I_F=0$ |
| | Emitter-Collector Breakdown Voltage | BV_{ECO} | 7 | — | — | V | $I_E=10\mu\text{A}, I_F=0$ |
| | Collector-Base Breakdown Voltage | BV_{CBO} | 70 | — | — | V | $I_C=0.1\text{mA}, I_F=0$ |
| TRANSFER CHARACTERISTICS | Collector Current (4N25/4N26) | I_C | 2 | — | — | mA | $I_F=10\text{mA}, V_{CE}=10\text{V}$ |
| | * Current Transfer Ratio (4N25/4N26) | CTR | 20 | — | — | % | |
| | Collector Current (4N27/4N28) | I_C | 1 | — | — | mA | |
| | * Current Transfer Ratio (4N27/4N28) | CTR | 10 | — | — | % | |
| | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | 0.1 | 0.5 | V | $I_F=50\text{mA}, I_C=2\text{mA}$ |
| | Isolation Resistance | R_{iso} | 5×10^{10} | 1×10^{11} | — | Ω | DC500V, 40 ~ 60% R.H. |
| | Floating Capacitance | C_f | — | 1 | — | pF | $V=0, f=1\text{MHz}$ |
| | Response Time (Rise) | t_r | — | 3 | — | μs | $V_{CE}=2\text{V}, I_C=2\text{mA}$ |
| | Response Time (Fall) | t_f | — | 3 | — | μs | $R_L=100\Omega,$ |

*. Current Transfer Ratio $CTR = \frac{I_C}{I_F} \times 100\%$

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5. CHARACTERISTICS CURVES

Fig.1 Forward Current vs. Ambient Temperature

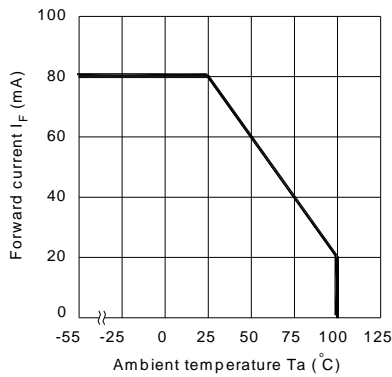


Fig.2 Collector Power Dissipation vs. Ambient Temperature

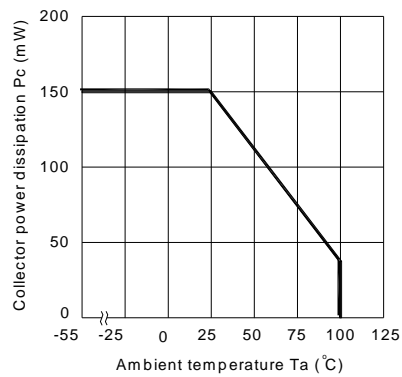


Fig.3 Forward Current vs. Forward Voltage

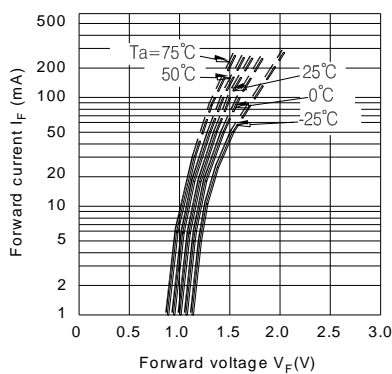


Fig.4 Current Transfer Ratio vs. Forward Current

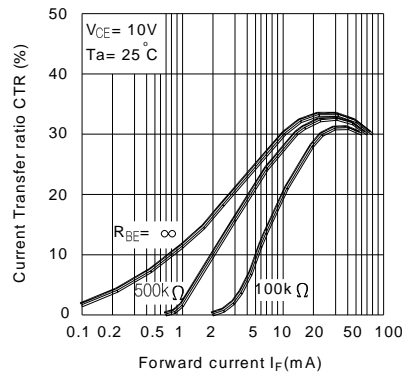


Fig.5 Collector Current vs. Collector-emitter Voltage

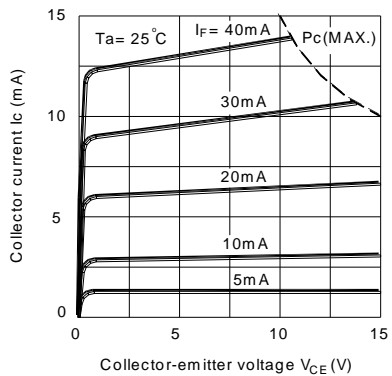
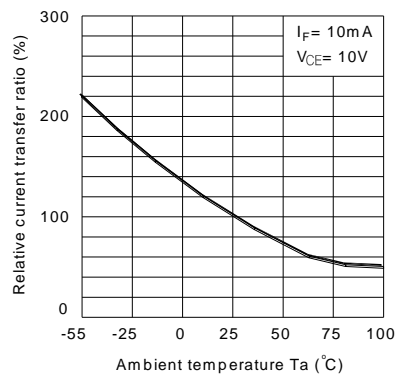


Fig.6 Relative Current Transfer Ratio vs. Ambient Temperature



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Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature

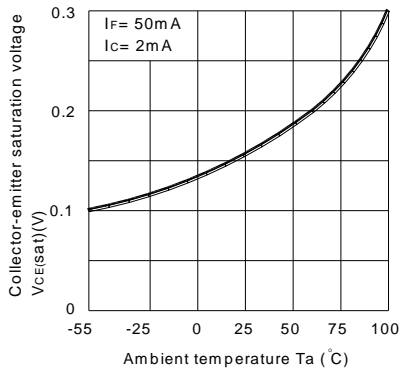


Fig.8 Collector Dark Current vs. Ambient Temperature

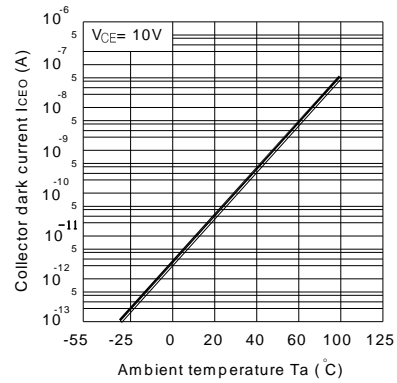


Fig.9 Response Time vs. Load Resistance

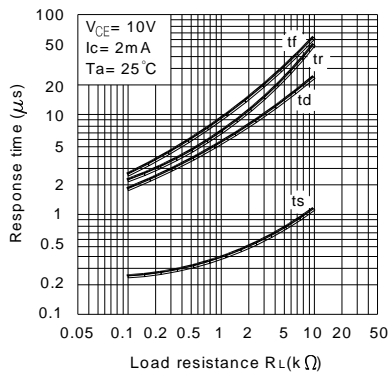


Fig.10 Frequency Response

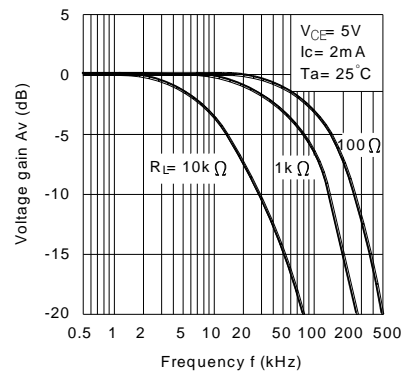
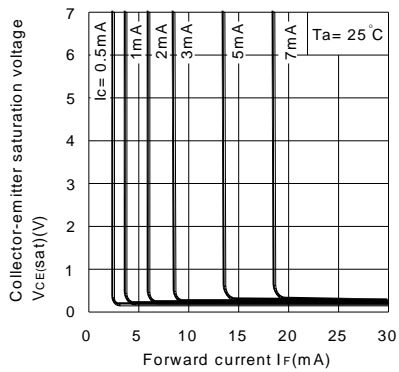
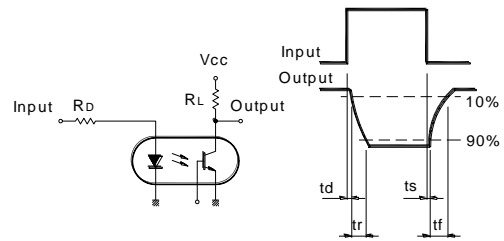


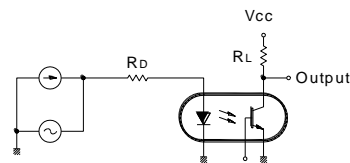
Fig.11 Collector-emitter Saturation Voltage vs. Forward Current



Test Circuit for Response Time



Test Circuit for Frequency Response



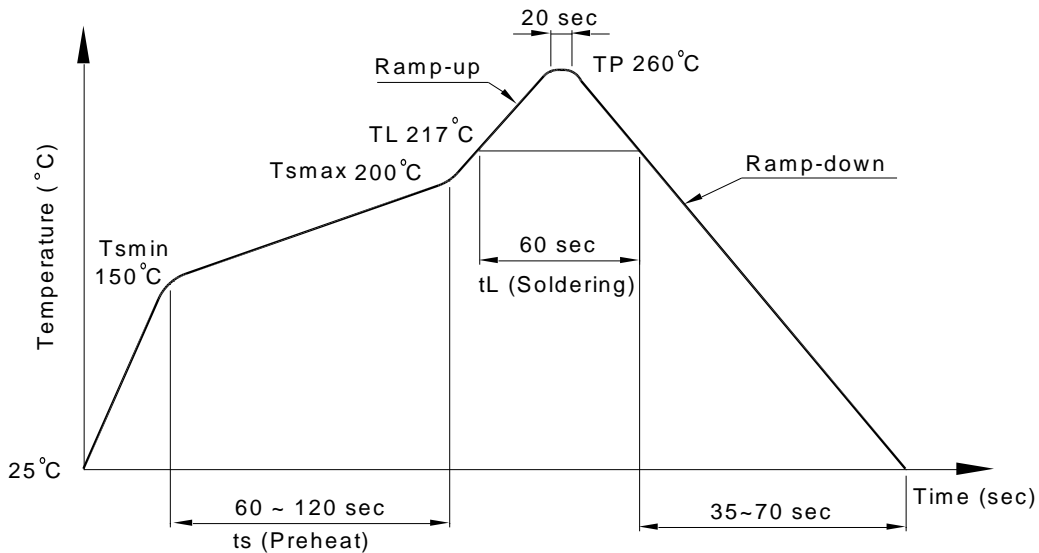
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6. TEMPERATURE PROFILE OF SOLDERING

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 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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6.2 Wave Soldering (JEDEC22A111 compliant)

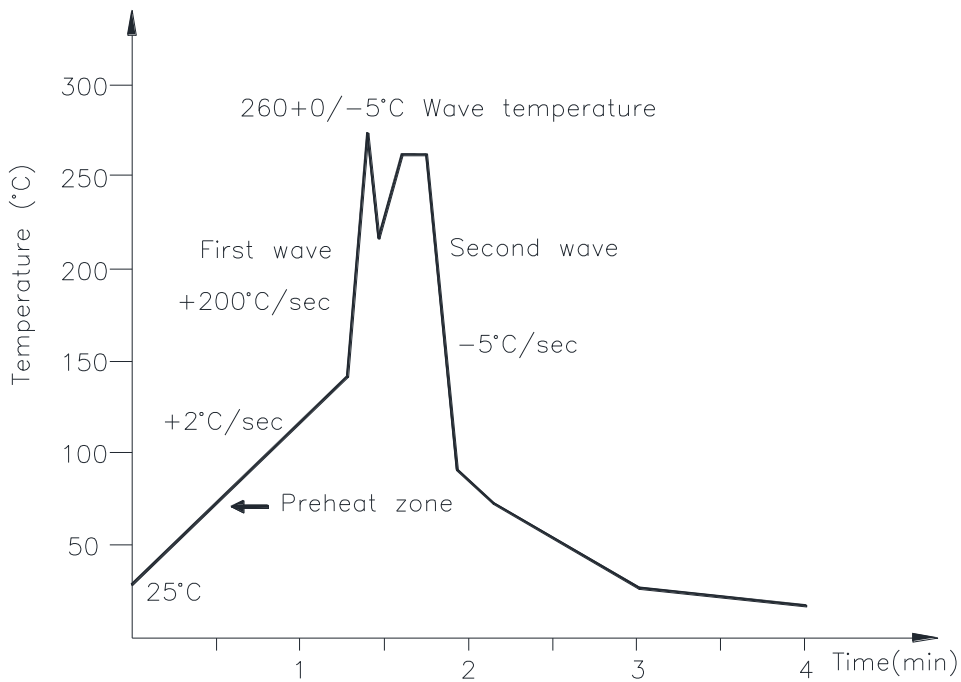
One time soldering is recommended within the condition of temperature.

Temperature: $260 \pm 0 / -5^\circ\text{C}$

Time: 10 sec.

Preheat temperature: 25 to 140°C

Preheat time: 30 to 80 sec.



6.3 Hand Soldering by Soldering Iron

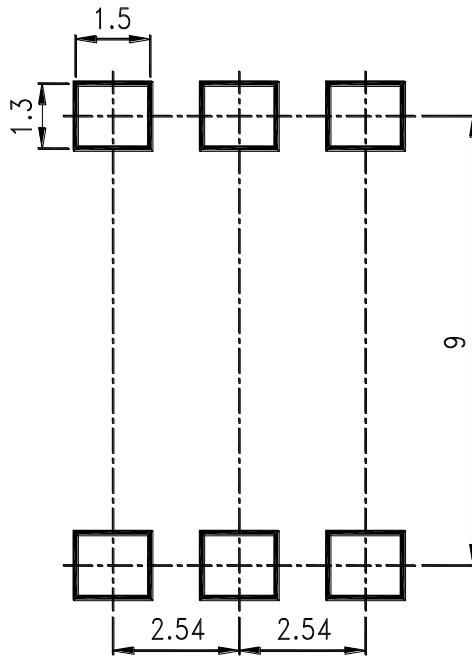
Allow single lead soldering in every single process. One time soldering is recommended.

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

Time: 3 sec max.

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7. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)



Note :

Dimensions in millimeters.

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8. Naming rule

4NXX (1)-(2)

DEVICE PART NUMBER

- (1) No suffix = Dual-in-Line package
- M = Wide lead spacing package
- S = Surface mounting package

(2) TAPING TYPE (TA,TA1 or none)

4NXX series have tape and reel solution.

Please refer to orientation of taping on Page P6

Example : 4N25S-TA1

4NXX(1)(2)-V

DEVICE PART NUMBER

- (1) No suffix = Dual-in-Line package
- M = Wide lead spacing package
- S = Surface mounting package

(2) TAPING TYPE (TA,TA1 or none)

4NXX series have tape and reel solution.

Please refer to orientation of taping on Page P6

(3) VDE order option

Example : 4N25STA1-V-G

9. 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.
- Immerring unit's body in solder paste is not recommended.