

### FEATURES

1. This specification shall be applied to photocoupler. Model No. LTV-817 as an option.

2. Applicable Models (Business dealing name)

\* Dual-in-line package :

LTV817-V : 1-channel type / LTV827-V : 2-channel type /

LTV847-V : 4-channel type

\* Wide lead spacing package :

LTV817M-V : 1-channel type / LTV827M-V : 2-channel type /

LTV847M-V : 4-channel type

\* Surface mounting package :

LTV817S-V : 1-channel type / LTV827S-V : 2-channel type /

LTV847S-V : 4-channel type

\* Tape and reel packaging :

LTV817STA1-V, LTV827STA1-V

3. The relevant models are the models Approved by VDE

according to DIN VDE 0884:1992-06

Approved Model No.: LTV-817 / LTV-827 / LTV-847 / LTV-817M / LTV-827M /

LTV-847M / LTV-817S / LTV-827S / LTV-847S

VDE approved No.: 094722

(According to the specification DIN VDE 0884:1992-06)

\* Operating isolation voltage  $V_{IORM}$  : 850V (Peak)

\* Transient voltage  $V_{TR}$  : 6000V (Peak)

\* Pollution : 2 (According to VDE 0110-1 : 1997-04)

\* Clearances distance (Between input and output) : 7.0mm (MIN.)

\* Creepage distance (Between input and output) : 7.0mm (MIN.)

\* Isolation thickness between input and output : 0.4mm (MIN.)

\* Safety limit values Current (Isi) : 400mA (Diode side)

Power (Psi) : 700mW (Phototransistor side)

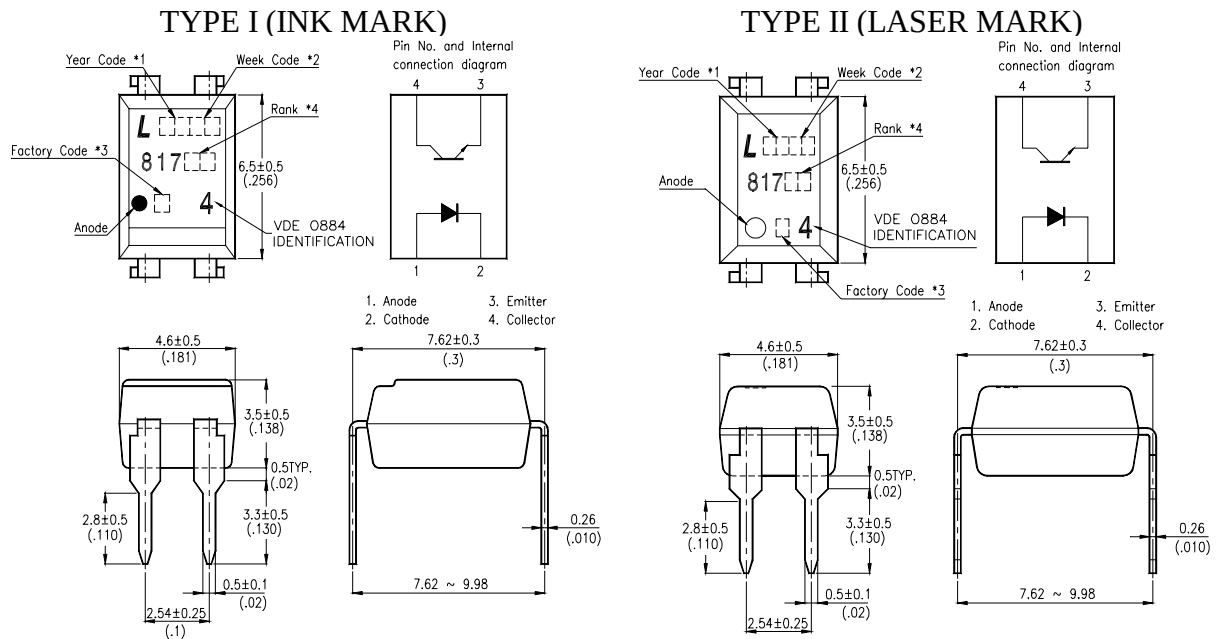
Temperature(Tsi) : 175°C

In order to keep safety electric isolation of photocoupler, please set the protective circuit to keep within safety limit values when the actual application equipment troubled.

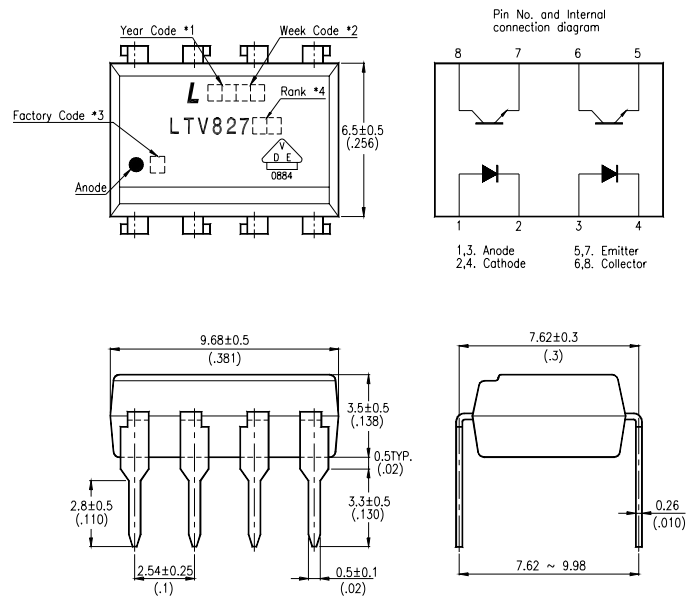
\* Indication of VDE 0884 approval prints "4" for 4-pin and " " for 8 & 16 pin on sleeve package.

## OUTLINE DIMENSIONS

### LTV817-V :



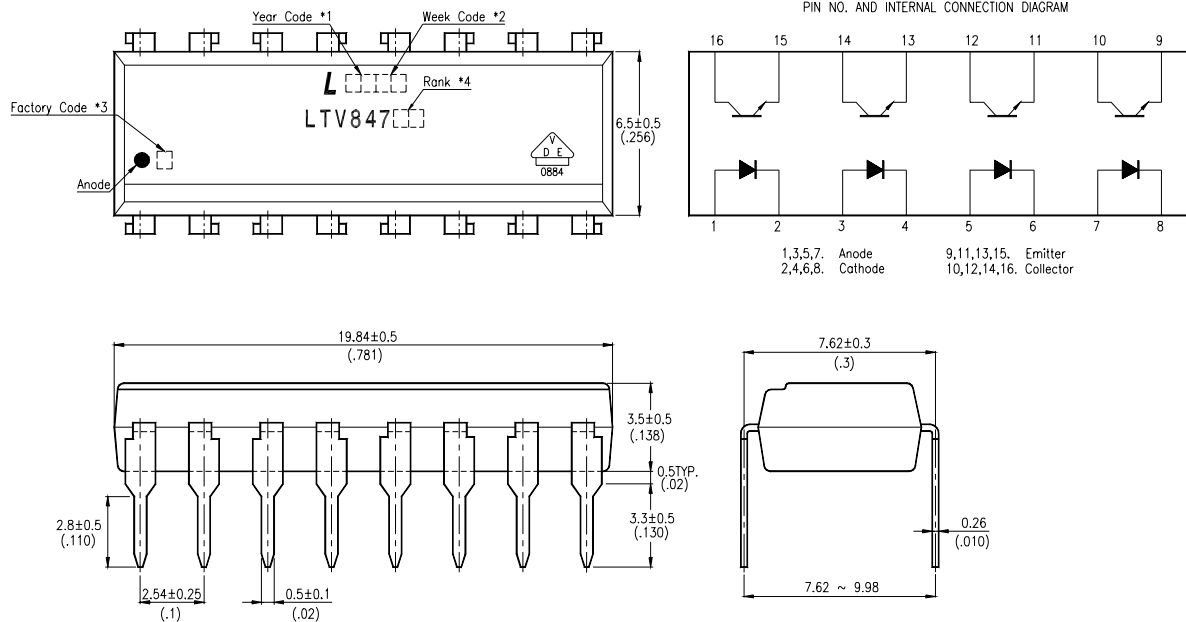
### LTV827-V :



- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand, X : China).
- \*4. Rank shall be or shall not be marked.

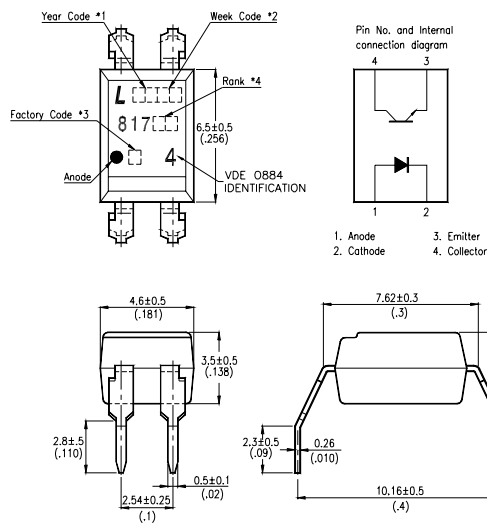
## OUTLINE DIMENSIONS

### LTV847-V :

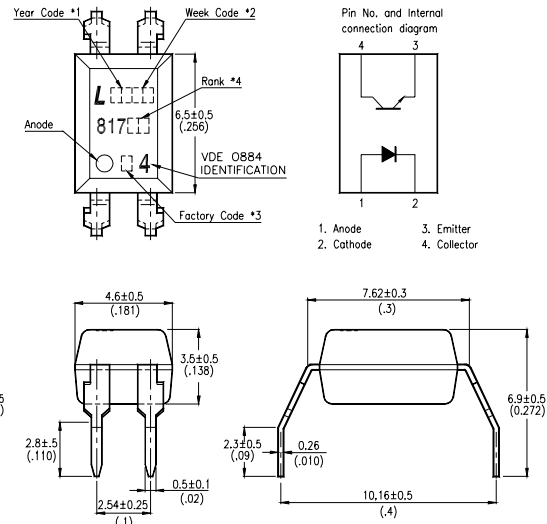


### LTV817M-V :

#### TYPE I (INK MARK)



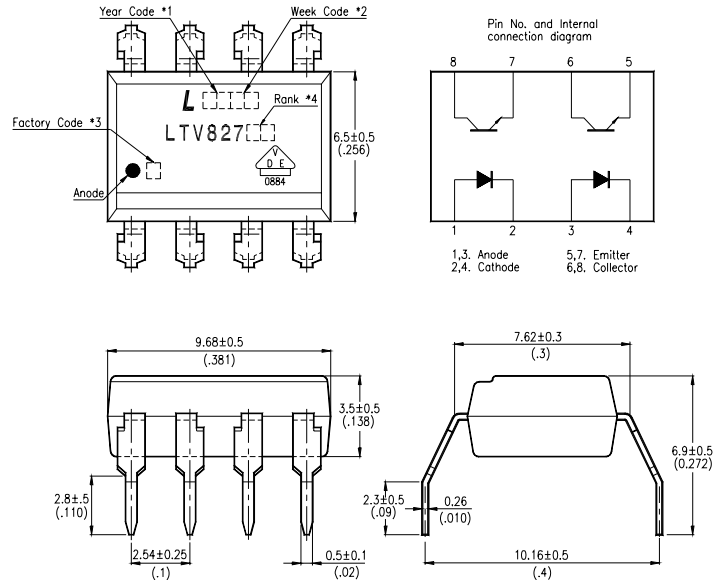
#### TYPE II (LASER MARK)



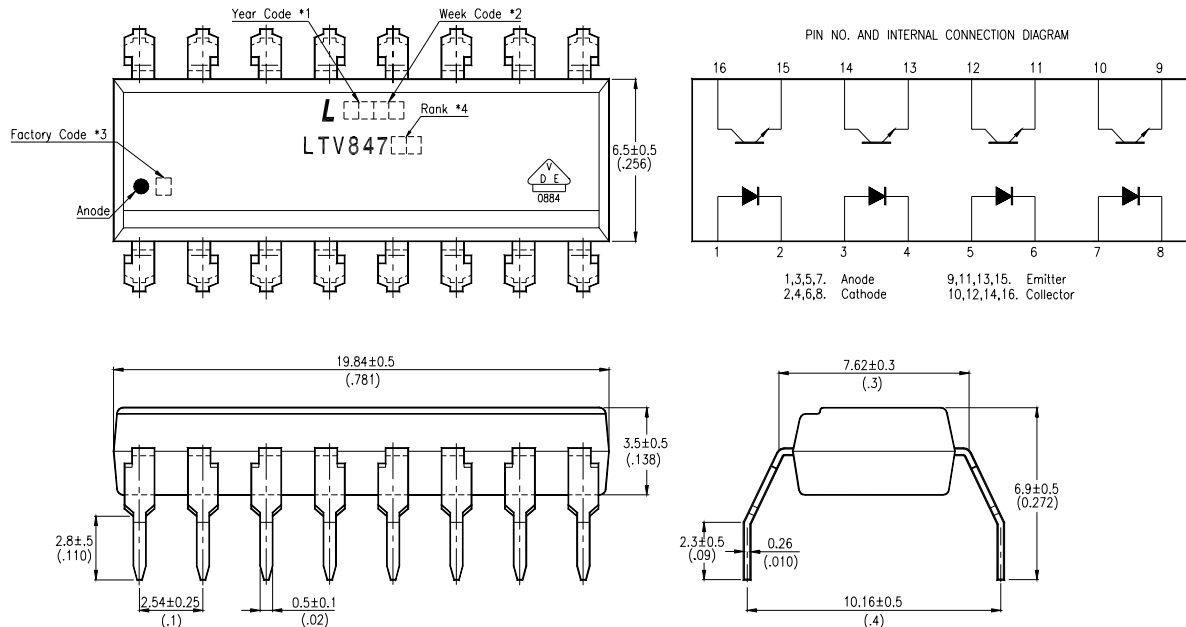
- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand, X : China).
- \*4. Rank shall be or shall not be marked.

## OUTLINE DIMENSIONS

### LTV827M-V :



### LTV847M-V :

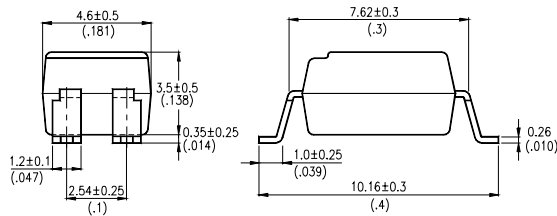
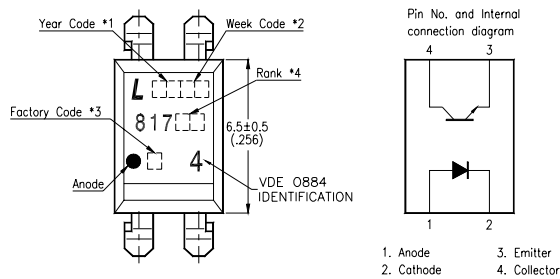


- \*1. Year date code.
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- \*4. Rank shall be or shall not be marked.

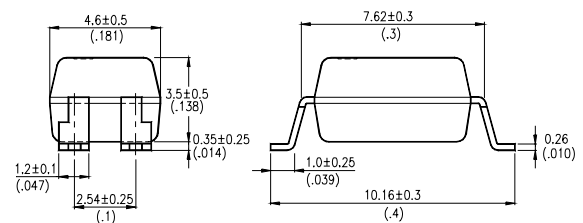
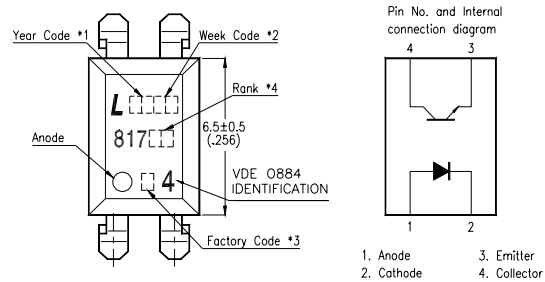
## OUTLINE DIMENSIONS

### LTV817S-V :

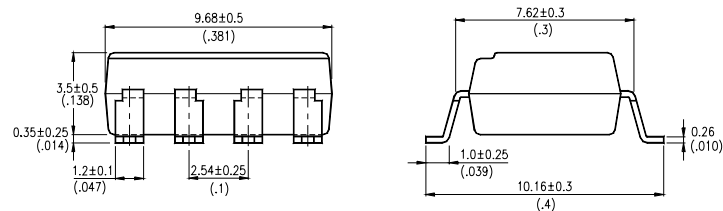
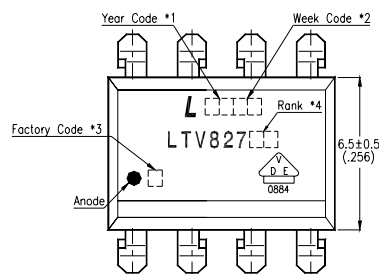
#### TYPE I (INK MARK)



#### TYPE II (LASER MARK)



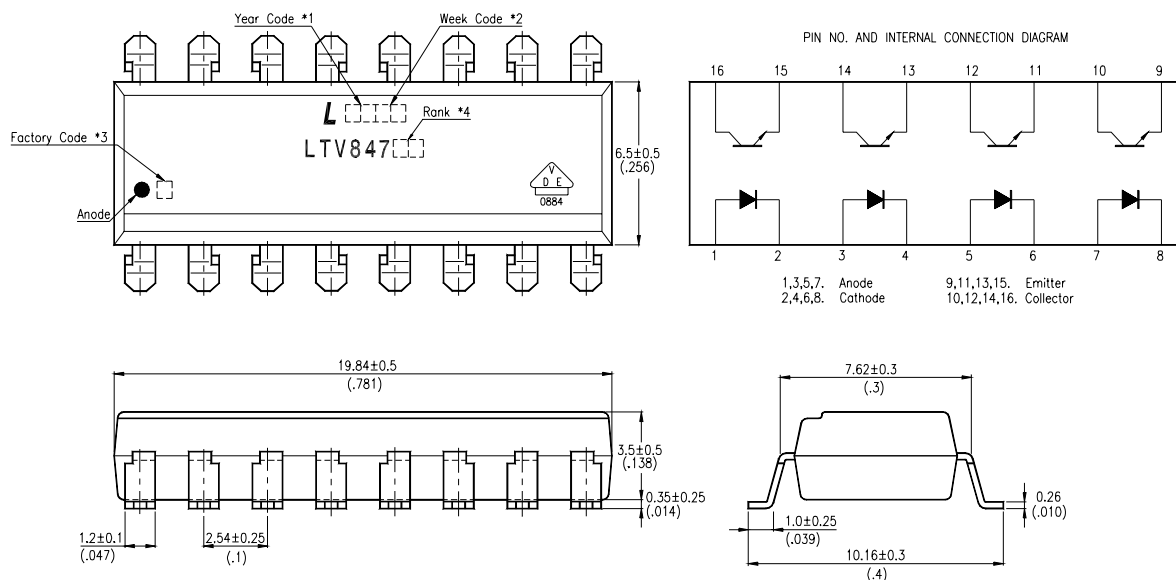
### LTV827S-V :



- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand, X : China).
- \*4. Rank shall be or shall not be marked.

## OUTLINE DIMENSIONS

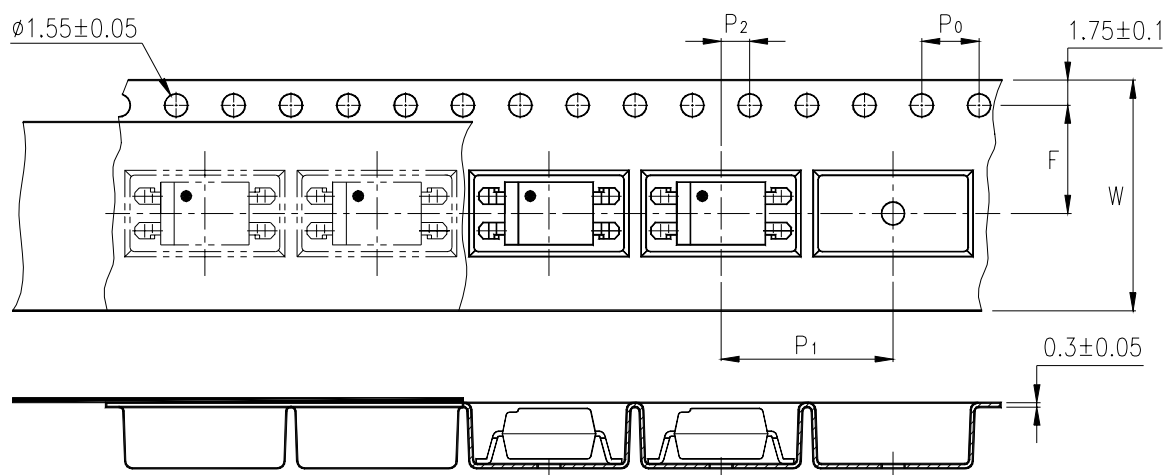
### LTV847S-V :



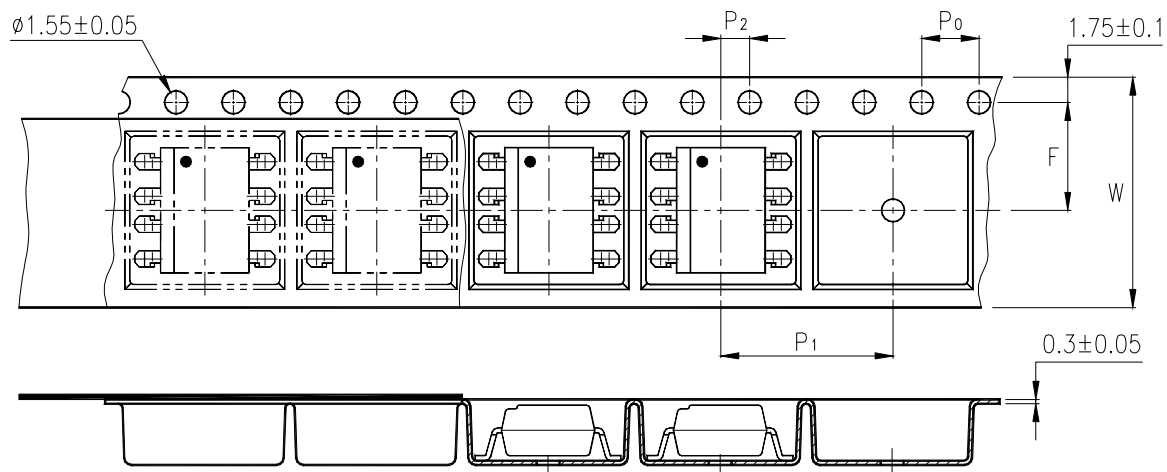
- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand, X : China).
- \*4. Rank shall be or shall not be marked.

## TAPING DIMENSIONS

### LTV817STA1-V :



### LTV827STA1-V :



| Description                            | Symbol | Dimensions in mm ( inches ) |
|----------------------------------------|--------|-----------------------------|
| Tape wide                              | W      | $16 \pm 0.3$ ( .63 )        |
| Pitch of sprocket holes                | $P_0$  | $4 \pm 0.1$ ( .15 )         |
| Distance of compartment                | F      | $7.5 \pm 0.1$ ( .295 )      |
| Distance of compartment to compartment | $P_1$  | $12 \pm 0.1$ ( .472 )       |
|                                        | $P_2$  | $2 \pm 0.1$ ( .079 )        |

**ABSOLUTE MAXIMUM RATING**

( Ta = 25°C )

| PARAMETER               |                             | SYMBOL    | RATING     | UNIT |
|-------------------------|-----------------------------|-----------|------------|------|
| INPUT                   | Forward Current             | $I_F$     | 50         | mA   |
|                         | Reverse Voltage             | $V_R$     | 6          | V    |
|                         | Power Dissipation           | P         | 70         | mW   |
| OUTPUT                  | Collector - Emitter Voltage | $V_{CEO}$ | 35         | V    |
|                         | Emitter - Collector Voltage | $V_{ECO}$ | 6          | V    |
|                         | Collector Current           | $I_C$     | 50         | mA   |
|                         | Collector Power Dissipation | $P_C$     | 150        | mW   |
| Total Power Dissipation |                             | $P_{tot}$ | 200        | mW   |
| *1                      | Isolation Voltage           | $V_{iso}$ | 5,000      | Vrms |
| Operating Temperature   |                             | $T_{opr}$ | -30 ~ +100 | °C   |
| Storage Temperature     |                             | $T_{stg}$ | -55 ~ +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

## ELECTRICAL - OPTICAL CHARACTERISTICS

( Ta = 25°C )

| PARAMETER                |                                      | SYMBOL        | MIN.               | TYP.               | MAX. | UNIT          | CONDITIONS                                                      |
|--------------------------|--------------------------------------|---------------|--------------------|--------------------|------|---------------|-----------------------------------------------------------------|
| INPUT                    | Forward Voltage                      | $V_F$         | —                  | 1.2                | 1.4  | V             | $I_F=20\text{mA}$                                               |
|                          | Reverse Current                      | $I_R$         | —                  | —                  | 10   | $\mu\text{A}$ | $V_R=4\text{V}$                                                 |
|                          | Terminal Capacitance                 | $C_t$         | —                  | 30                 | 250  | 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  | $BV_{CEO}$    | 35                 | —                  | —    | V             | $I_C=0.1\text{mA}$<br>$I_F=0$                                   |
|                          | Emitter-Collector Breakdown Voltage  | $BV_{ECO}$    | 6                  | —                  | —    | V             | $I_E=10\mu\text{A}$<br>$I_F=0$                                  |
| TRANSFER CHARACTERISTICS | Collector Current                    | $I_C$         | 2.5                | —                  | 30   | mA            | $I_F=5\text{mA}$<br>$V_{CE}=5\text{V}$                          |
|                          | * Current Transfer Ratio             | CTR           | 50                 | —                  | 600  | %             |                                                                 |
|                          | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —                  | 0.1                | 0.2  | V             | $I_F=20\text{mA}$<br>$I_C=1\text{mA}$                           |
|                          | Isolation Resistance                 | Riso          | $5 \times 10^{10}$ | $1 \times 10^{11}$ | —    | $\Omega$      | DC500V<br>40 ~ 60% R.H.                                         |
|                          | Floating Capacitance                 | $C_f$         | —                  | 0.6                | 1    | pF            | $V=0$ , $f=1\text{MHz}$                                         |
|                          | Cut-Off Frequency                    | fc            | —                  | 80                 | —    | kHz           | $V_{CE}=5\text{V}$ , $I_C=2\text{mA}$<br>$R_L=100\Omega$ , -3dB |
|                          | Response Time (Rise)                 | $t_r$         | —                  | 4                  | 18   | $\mu\text{s}$ | $V_{CE}=2\text{V}$ , $I_C=2\text{mA}$<br>$R_L=100\Omega$        |
|                          | Response Time (Fall)                 | $t_f$         | —                  | 3                  | 18   | $\mu\text{s}$ |                                                                 |

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

**RANK TABLE OF CURRENT TRANSFER RATIO CTR**

| MODEL NO.            | RANK MARK                        | CTR ( % ) |
|----------------------|----------------------------------|-----------|
| LTV817-V             | L                                | 50 ~ 100  |
|                      | A                                | 80 ~ 160  |
|                      | B                                | 130 ~ 260 |
|                      | C                                | 200 ~ 400 |
|                      | D                                | 300 ~ 600 |
|                      | L or A or B or C or D or No mark | 50 ~ 600  |
| LTV827-V<br>LTV847-V | B                                | 130 ~ 260 |
|                      | B or C or BC                     | 130 ~ 400 |
|                      | C                                | 200 ~ 400 |
|                      | C or D or CD                     | 200 ~ 600 |
|                      | B、 BC、 C、 CD or No mark          | 50 ~ 600  |

|            |                                                                                     |
|------------|-------------------------------------------------------------------------------------|
| CONDITIONS | $I_F = 5 \text{ mA}$<br>$V_{CE} = 5 \text{ V}$<br>$T_a = 25 \text{ }^\circ\text{C}$ |
|------------|-------------------------------------------------------------------------------------|

#### ISOLATION SPECIFICATION ACCORDING TO VDE 0884

| Parameter                                                             |           | Symbol        | Conditions          | Rating         | Unit        | Remark                    |
|-----------------------------------------------------------------------|-----------|---------------|---------------------|----------------|-------------|---------------------------|
| Class of environmental test                                           |           | -             | DIN IEC68           | 30/100/21      | -           |                           |
| Pollution                                                             |           | -             | DIN VDE0110         | 2              | -           |                           |
| Maximum Operating Isolation Voltage                                   |           | $V_{IORM}$    | -                   | 850            | $V_{PEAK}$  | Refer to the Diagram 1, 2 |
| Partial Discharge Test Voltage (Between Input and Output)             | Diagram 1 | $V_{pr}$      | $t_p=60s, q_c<5pC$  | 1275           | $V_{PEAK}$  |                           |
|                                                                       | Diagram 2 |               | $t_p=1s, q_c<5pC$   | 1594           | $V_{PEAK}$  |                           |
| Maximum Over-voltage                                                  |           | $V_{INITIAL}$ | $t_{INI} = 10s$     | 6000           | $V_{PEAK}$  |                           |
| Safety Maximum Ratings                                                |           |               |                     |                |             | Refer to the Figure 1, 3  |
| 1) Case Temperature                                                   |           | $T_{si}$      | $I_F = 0, P_c = 0$  | 175            | $^{\circ}C$ |                           |
| 2) Input Current                                                      |           | $I_{si}$      | $P_c=0$             | 400            | mA          |                           |
| 3) Electric Power (Output or Total Power Issipation)                  |           | $P_{si}$      | -                   | 700            | mW          |                           |
| Isolation Resistance (Test Voltage Between Input and Output : DC500V) |           | $R_{ISO}$     | $T_a=T_{si}$        | MIN. $10^9$    | $\Omega$    |                           |
|                                                                       |           |               | $T_a=T_{opr}(MAX.)$ | MIN. $10^{11}$ |             |                           |
|                                                                       |           |               | $T_a=25^{\circ}C$   | MIN. $10^{12}$ |             |                           |

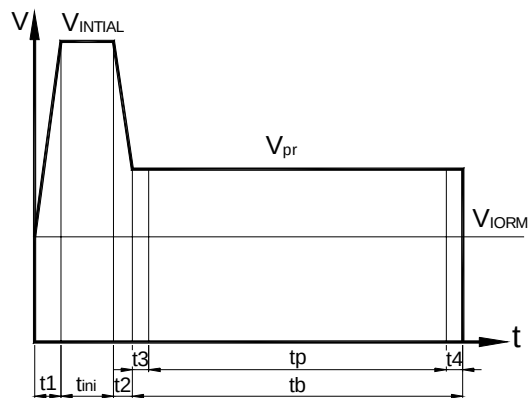
#### Precautions in performing isolation test

\* Partial discharge test methods shall be the ones according to the specifications of VDE 0884:1992-06

\* Please don't carry out isolation test ( $V_{iso}$ ) over  $V_{INITIAL}$ , This product deteriorates isolation characteristics by partial discharge due to applying high voltage (ex.  $V_{INITIAL}$ ). And there is possibility that this product occurs partial discharge in operating isolation voltage ( $V_{IORM}$ )

PARTIAL DISCHARGE TEST METHOD

Method (A) for type testing and random testing.



t1, t2

= 1 to 10s

t3, t4

= 1s

t<sub>p</sub> (Partial Discharge Measuring Time)

= 60s

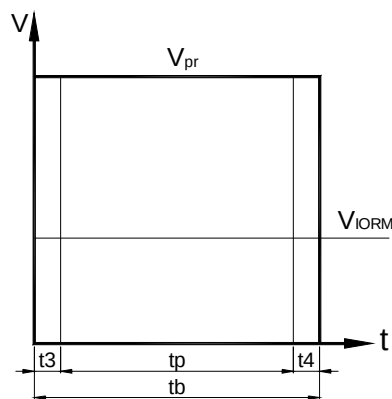
t<sub>b</sub>

= 62s

t<sub>ini</sub>

= 10s

Method (B) for routine testing.



t3, t4

= 0.1s

t<sub>p</sub> (Partial Discharge Measuring Time)

= 1s

t<sub>b</sub>

= 1.2s

The partial discharge level shall not exceed 5 pC during the partial discharge measuring time interval  $t_p$  under the test conditions shown above.

## CHARACTERISTICS CURVES

Fig.1 Forward Current  
vs. Ambient Temperature

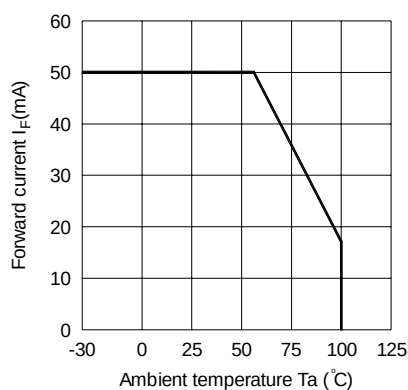


Fig.2 Collector Power Dissipation  
vs. Ambient Temperature

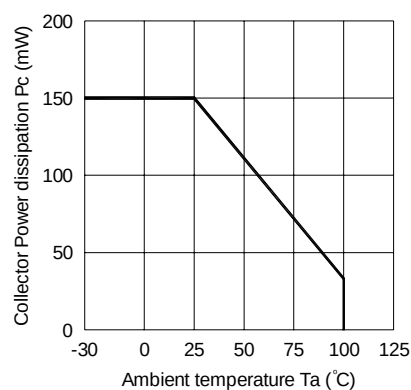


Fig.3 Collector-emitter Saturation  
Voltage vs. Forward Current

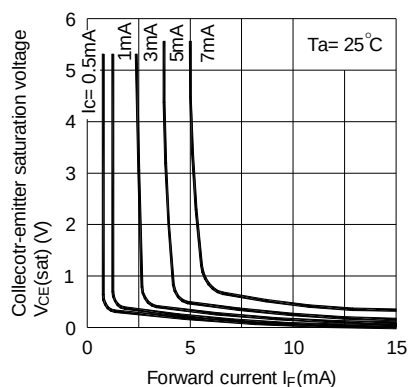


Fig.4 Forward Current vs. Forward  
Voltage

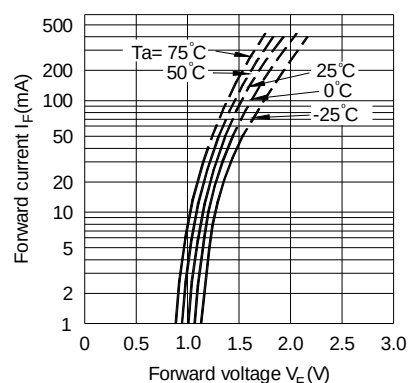


Fig.5 Current Transfer Ratio vs.  
Forward Current

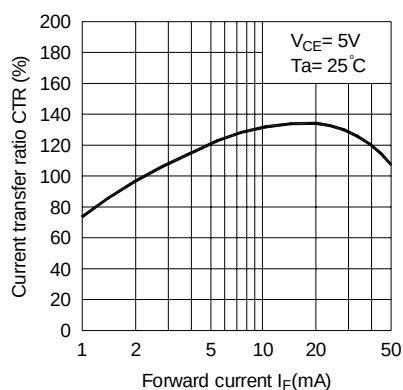
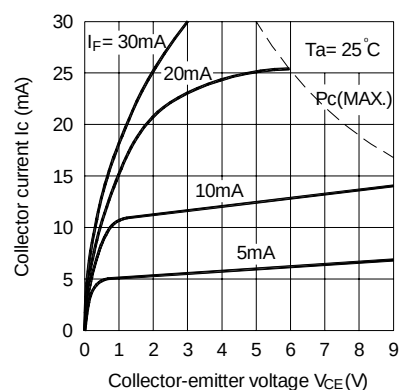


Fig.6 Collector Current vs.  
Collector-emitter Voltage



## CHARACTERISTICS CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

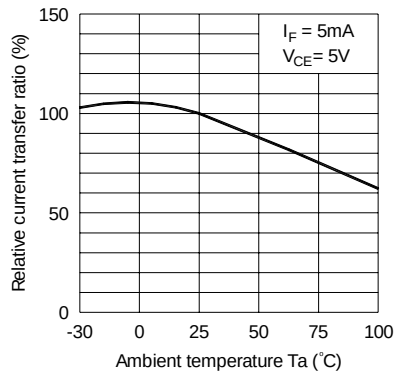


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

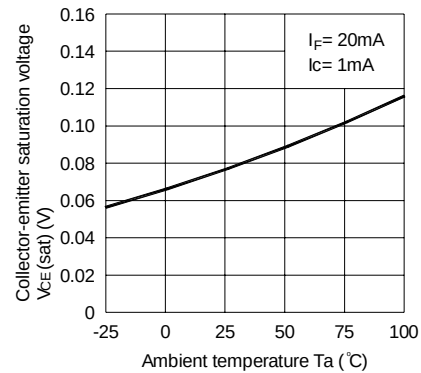


Fig.9 Collector Dark Current vs. Ambient Temperature

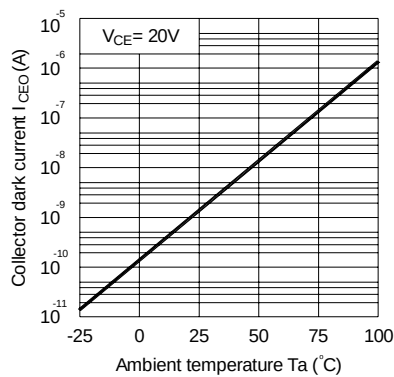


Fig.10 Response Time vs. Load Resistance

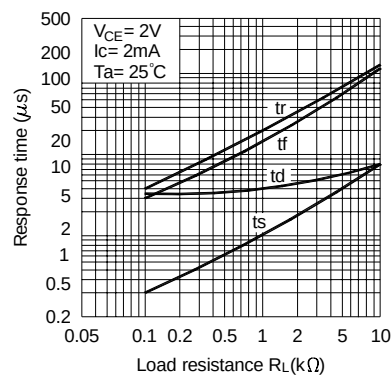
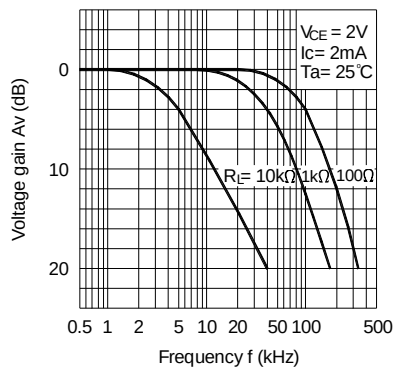
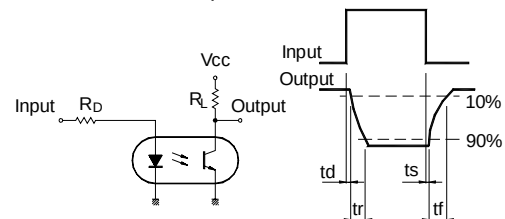


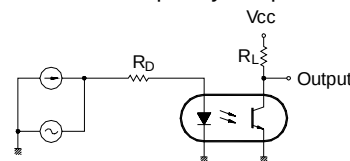
Fig.11 Frequency Response



Test Circuit for Response Time



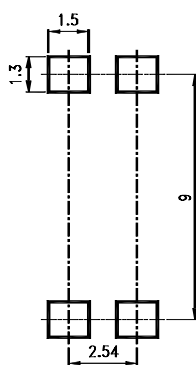
Test Circuit for Frequency Response



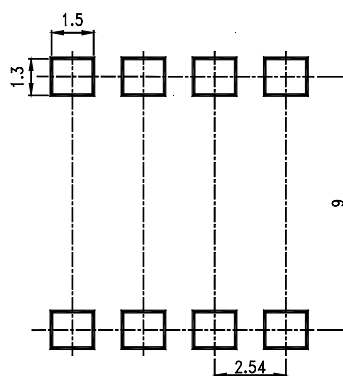
### RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit : mm

4 PIN



8 PIN



16 PIN

