



# Photocoupler

## Product Data Sheet

### LTV816/ 826/ 846 (M, S, STA1) -V

Spec No.: DS-70-99-0029

Effective Date: 07/15/2010

Revision: C

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

**LITE-ON Technology Corp. / Optoelectronics**

No.90,Chien 1 Road, Chung Ho, New Taipei City 23585, Taiwan, R.O.C.

Tel: 886-2-2222-6181 Fax: 886-2-2221-1948 / 886-2-2221-0660

<http://www.liteon.com/opto>

## FEATURES

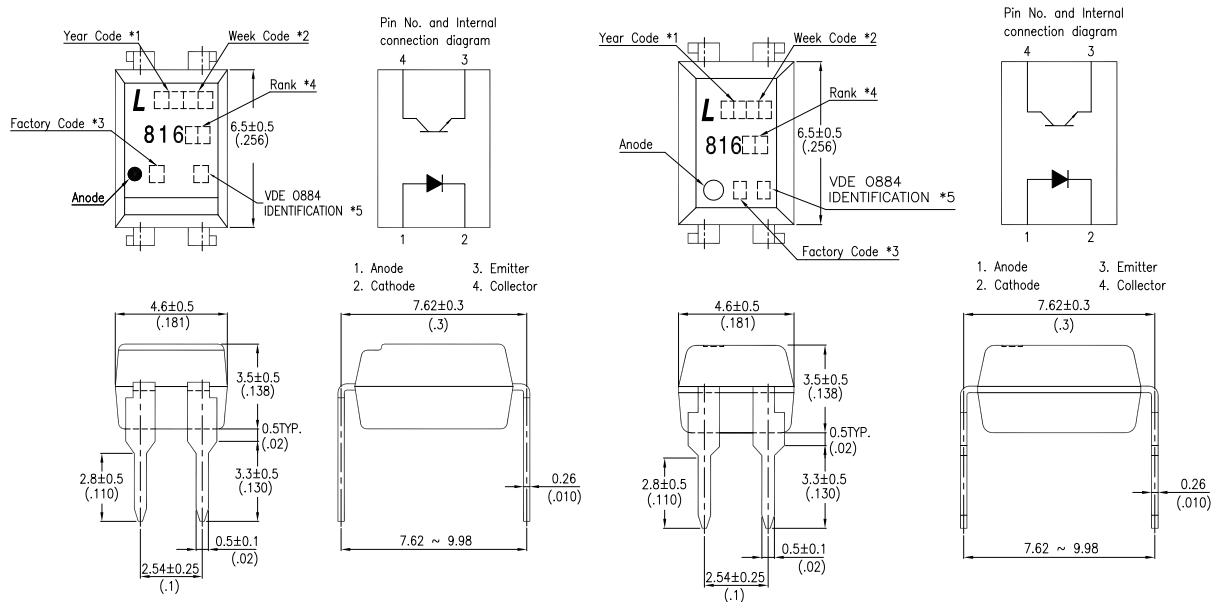


June 2010

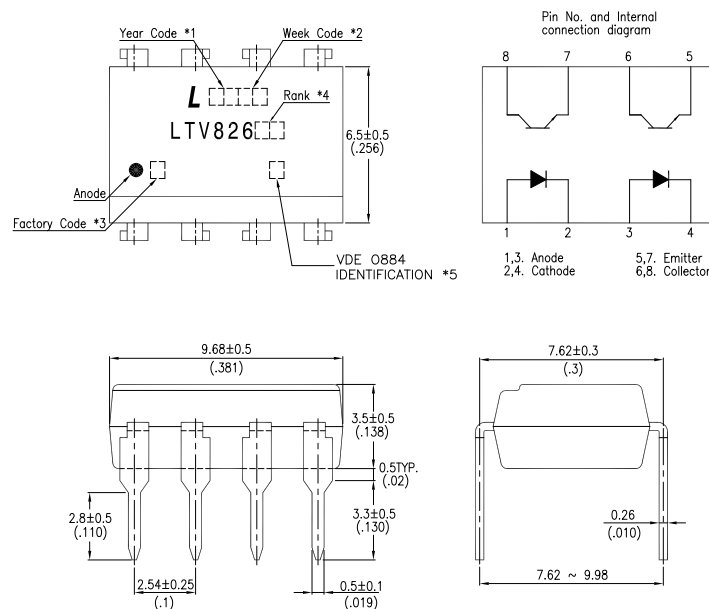
- \* Current transfer ratio  
( CTR : MIN. 50% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$  )
- \* High input-output isolation voltage  
(  $V_{ISO} = 5,000V_{rms}$  )
- \* Response time  
(  $t_r$  : TYP.  $4\mu\text{s}$  at  $V_{CE} = 2\text{V}$ ,  $I_C = 2\text{mA}$ ,  $R_L = 100\Omega$  )
- \* Dual-in-line package :
  - LTV816-V : 1-channel type
  - LTV826-V : 2-channel type
  - LTV846-V : 4-channel type
- \* Wide lead spacing package :
  - LTV816M-V : 1-channel type
  - LTV826M-V : 2-channel type
  - LTV846M-V : 4-channel type
- \* Surface mounting package :
  - LTV816S-V : 1-channel type
  - LTV826S-V : 2-channel type
  - LTV846S-V : 4-channel type
- \* Tape and reel packaging :
  - LTV816STA1-V, LTV826STA1-V
- \* Safety approval  
UL , CSA, FIMKO, NEMKO, DEMKO, SEMKO, VDE\* approved  
(\*Requires "V" ordering option)
- \* RoHS compliance

## OUTLINE DIMENSIONS

### LTV816-V :



### LTV826-V :



\*1. Year date code.

\*2. 2-digit work week.

\*3. Factory identification mark shall be marked

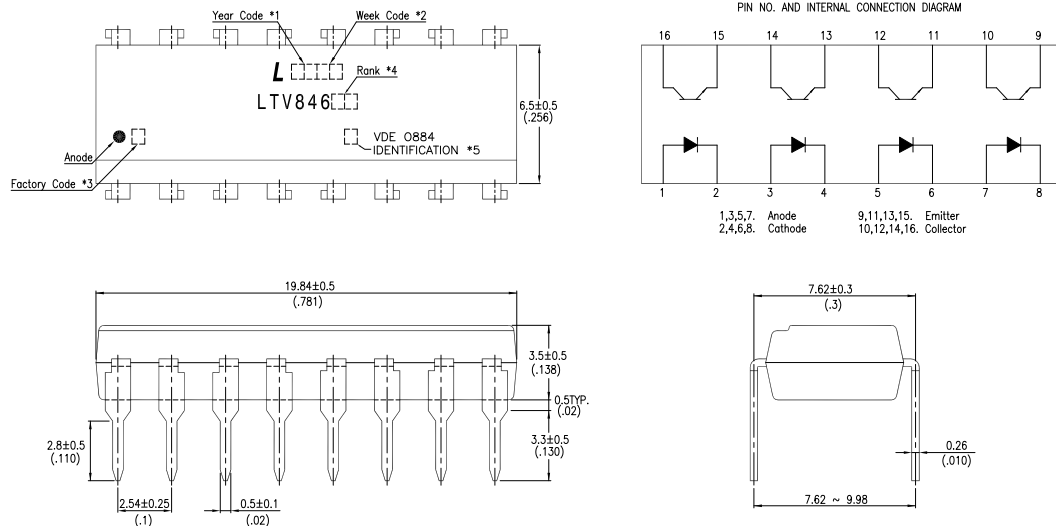
(W: China-CZ, X: China-TJ, Y: Thailand, Z: Taiwan)

\*4. Rank shall be or shall not be marked.

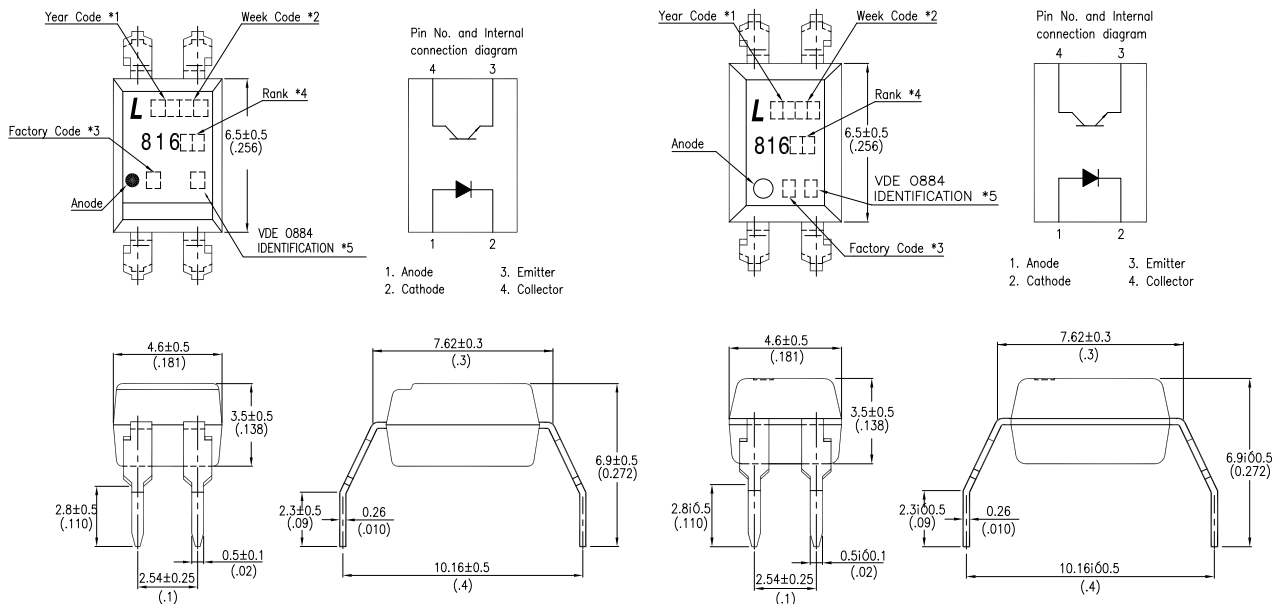
\*5. "4" or "V" for 4 pin VDE option;  for 8 & 16 pin devices.

## OUTLINE DIMENSIONS

### LTV846-V :



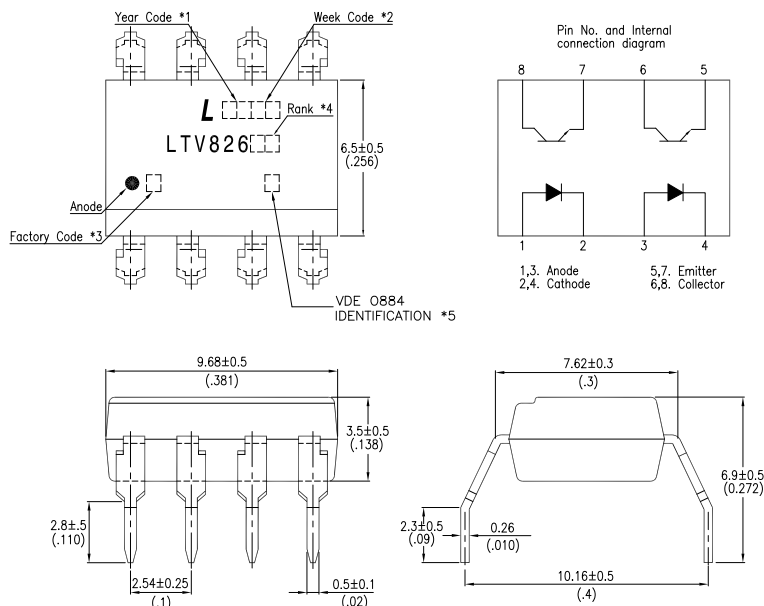
### LTV816M-V :



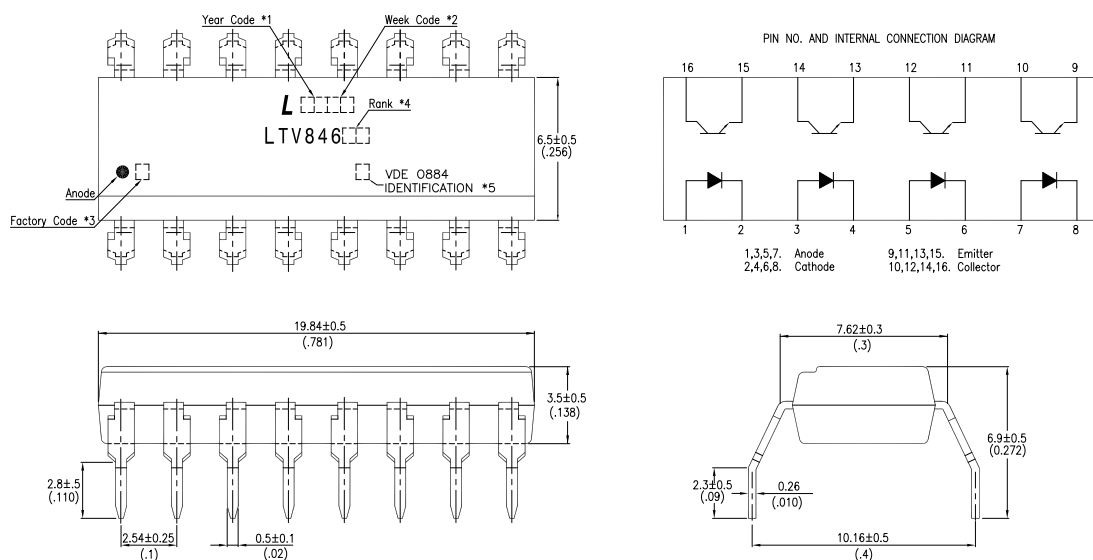
- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked  
(W: China-CZ, X: China-TJ, Y: Thailand, Z: Taiwan)
- \*4. Rank shall be or shall not be marked.
- \*5. "4" or "V" for 4 pin VDE option;  for 8 & 16 pin devices.

## OUTLINE DIMENSIONS

### LTV826M-V :



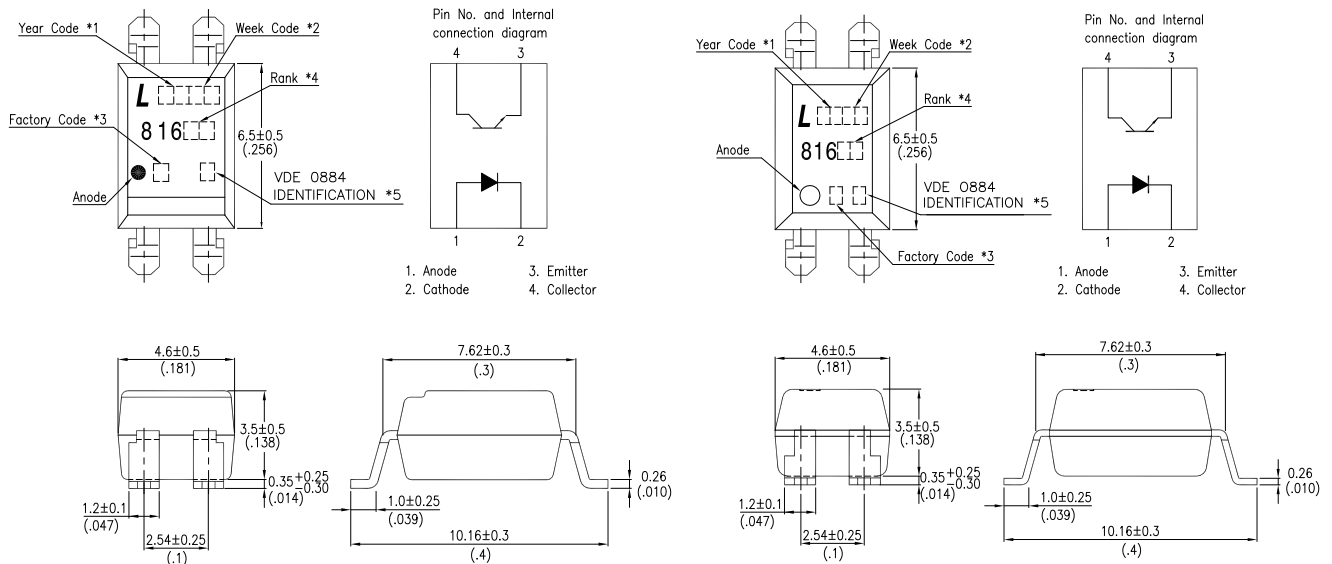
### LTV846M-V :



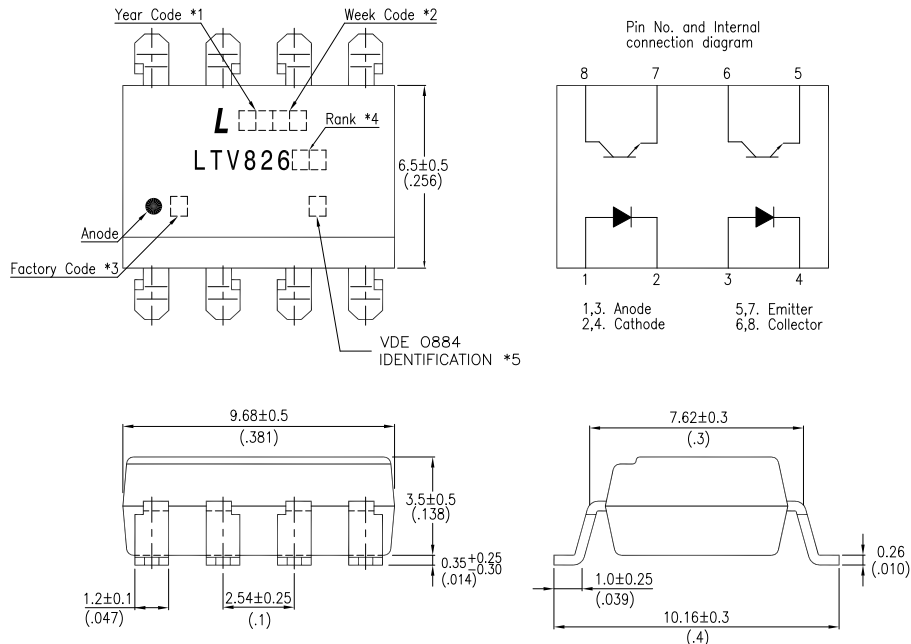
- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked  
(Z : Taiwan, Y : Thailand, X : China-TJ, W: China-CZ)
- \*4. Rank shall be or shall not be marked.
- \*5. "4" or "V" for 4 pin VDE option;  for 8 & 16 pin devices.

## OUTLINE DIMENSIONS

### LTV816S-V :



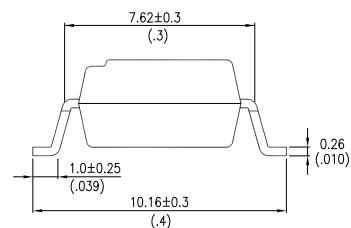
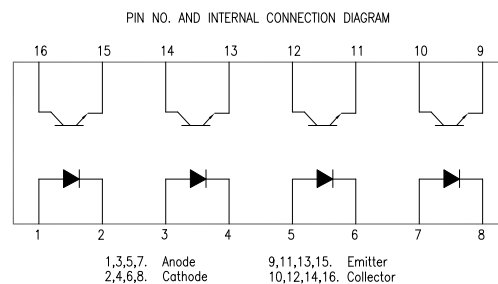
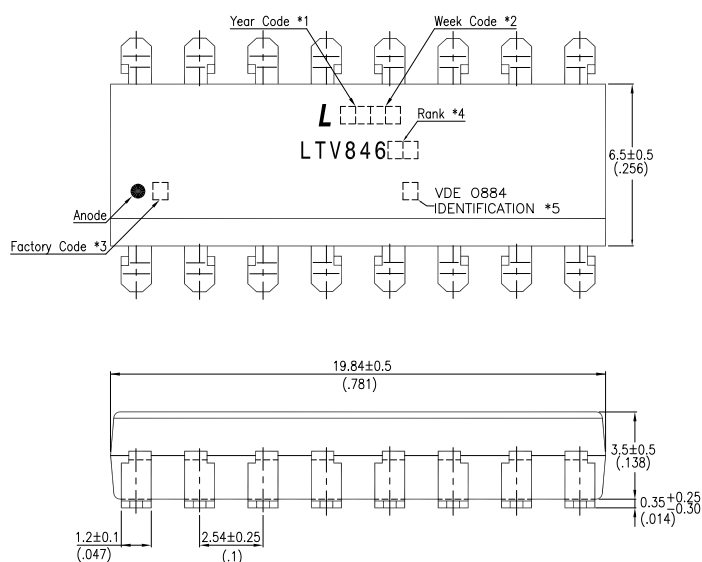
### LTV826S-V :



- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked  
(Z : Taiwan, Y : Thailand, X : China-TJ, W: China-CZ)
- \*4. Rank shall be or shall not be marked.
- \*5. "4" or "V" for 4 pin VDE option;  for 8 & 16 pin devices.

## OUTLINE DIMENSIONS

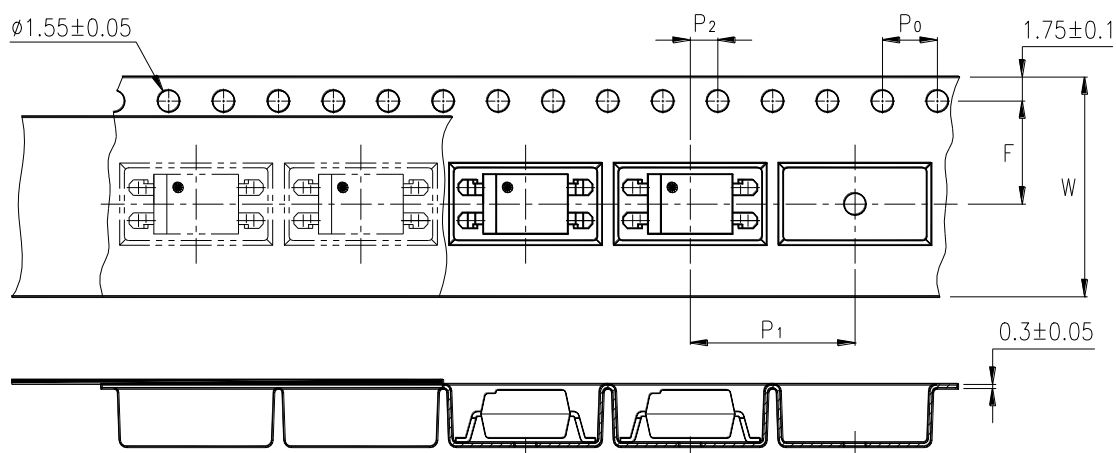
### LTV846S-V :



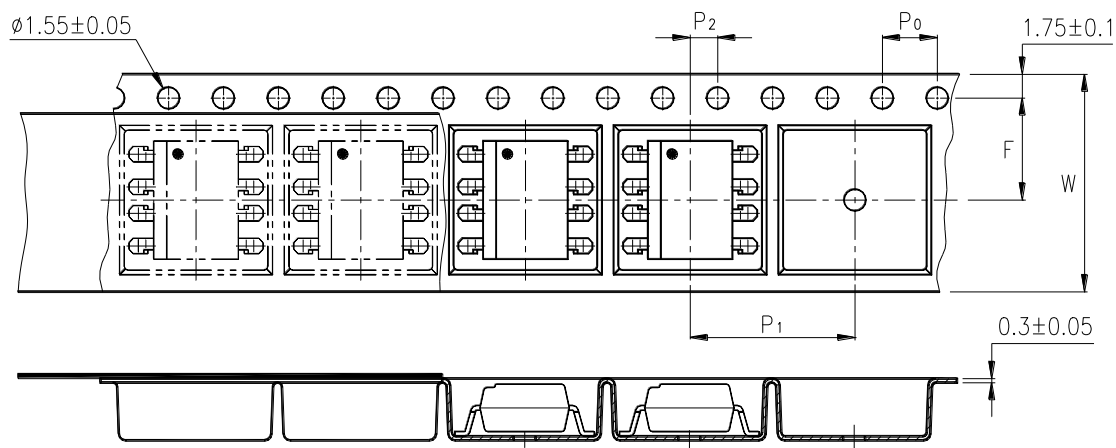
- \*1. Year date code.
- \*2. 2-digit work week.
- \*3. Factory identification mark shall be marked  
(W: China-CZ, X : China-TJ, Y : Thailand, Z : Taiwan)
- \*4. Rank shall be or shall not be marked.
- \*5. "4" or "V" for 4 pin VDE option;  for 8 & 16 pin devices.

## TAPING DIMENSIONS

### LTV816STA1-V :



### LTV826STA1-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 )      |
|                                        | $P_2$  | $2 \pm 0.1$ ( .079 )        |
| Distance of compartment to compartment | $P_1$  | $12 \pm 0.1$ ( .472 )       |

## ABSOLUTE MAXIMUM RATING

( Ta = 25°C )

| PARAMETER                                |                             | SYMBOL           | RATING     | UNIT             |
|------------------------------------------|-----------------------------|------------------|------------|------------------|
| INPUT                                    | Forward Current             | I <sub>F</sub>   | 50         | mA               |
|                                          | Reverse Voltage             | V <sub>R</sub>   | 6          | V                |
|                                          | Power Dissipation           | P                | 70         | mW               |
| OUTPUT                                   | Collector - Emitter Voltage | V <sub>CEO</sub> | 80         | V                |
|                                          | Emitter - Collector Voltage | V <sub>ECO</sub> | 6          | V                |
|                                          | Collector Current           | I <sub>C</sub>   | 50         | mA               |
|                                          | Collector Power Dissipation | P <sub>C</sub>   | 150        | mW               |
| Total Power Dissipation                  |                             | P <sub>tot</sub> | 200        | mW               |
| *1 Isolation Voltage                     |                             | V <sub>iso</sub> | 5,000      | V <sub>rms</sub> |
| Operating Temperature ( LTV- 826 / 846 ) |                             | T <sub>opr</sub> | -30 ~ +100 | °C               |
| Operating Temperature ( LTV-816 )        |                             | T <sub>opr</sub> | -30 ~ +110 | °C               |
| Storage Temperature                      |                             | T <sub>stg</sub> | -55 ~ +125 | °C               |
| *2 Soldering Temperature                 |                             | T <sub>sol</sub> | 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 <sub>F</sub>       | —                  | 1.2                | 1.4  | V    | I <sub>F</sub> =20mA                                             |
|                          | Reverse Current                      | I <sub>R</sub>       | —                  | —                  | 10   | μA   | V <sub>R</sub> =4V                                               |
|                          | Terminal Capacitance                 | C <sub>t</sub>       | —                  | 30                 | 250  | pF   | V=0, f=1KHz                                                      |
| OUTPUT                   | Collector Dark Current               | I <sub>CEO</sub>     | —                  | —                  | 100  | nA   | V <sub>CE</sub> =20V, I <sub>F</sub> =0                          |
|                          | Collector-Emitter Breakdown Voltage  | BV <sub>CEO</sub>    | 80                 | —                  | —    | V    | I <sub>C</sub> =0.1mA<br>I <sub>F</sub> =0                       |
|                          | Emitter-Collector Breakdown Voltage  | BV <sub>ECO</sub>    | 6                  | —                  | —    | V    | I <sub>E</sub> =10μA<br>I <sub>F</sub> =0                        |
| TRANSFER CHARACTERISTICS | Collector Current                    | I <sub>C</sub>       | 2.5                | —                  | 30   | mA   | I <sub>F</sub> =5mA<br>V <sub>CE</sub> =5V                       |
|                          | *1 Current Transfer Ratio            | CTR                  | 50                 | —                  | 600  | %    |                                                                  |
|                          | Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | —                  | 0.1                | 0.2  | V    | I <sub>F</sub> =20mA<br>I <sub>C</sub> =1mA                      |
|                          | Isolation Resistance                 | R <sub>iso</sub>     | 5×10 <sup>10</sup> | 1×10 <sup>11</sup> | —    | Ω    | DC500V<br>40 ~ 60% R.H.                                          |
|                          | Floating Capacitance                 | C <sub>f</sub>       | —                  | 0.6                | 1    | pF   | V=0, f=1MHz                                                      |
|                          | Response Time (Rise)                 | t <sub>r</sub>       | —                  | 4                  | 18   | μs   | V <sub>CE</sub> =2V, I <sub>C</sub> =2mA<br>R <sub>L</sub> =100Ω |
|                          | Response Time (Fall)                 | t <sub>f</sub>       | —                  | 3                  | 18   | μs   |                                                                  |

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

**RANK TABLE OF CURRENT TRANSFER RATIO CTR**

| MODEL NO. | RANK MARK                  | CTR ( % ) |
|-----------|----------------------------|-----------|
| LTV816-V  | L                          | 50 ~ 100  |
| LTV816-V  | A                          | 80 ~ 160  |
| LTV816-V  | B                          | 130 ~ 260 |
| LTV816-V  | C                          | 200 ~ 400 |
| LTV816-V  | D                          | 300 ~ 600 |
| LTV816-V  | L or A or B or C or D      | 50 ~ 600  |
| LTV8※6-V  | B                          | 130 ~ 260 |
| LTV8※6-V  | B or C or BC               | 130 ~ 400 |
| LTV8※6-V  | C                          | 200 ~ 400 |
| LTV8※6-V  | C or D or CD               | 200 ~ 600 |
| LTV8※6-V  | B 、 BC 、 C 、 CD or No mark | 50 ~ 600  |

※ = 2 or 4

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

## CHARACTERISTICS CURVES

Fig.1 Forward Current  
vs. Ambient Temperature

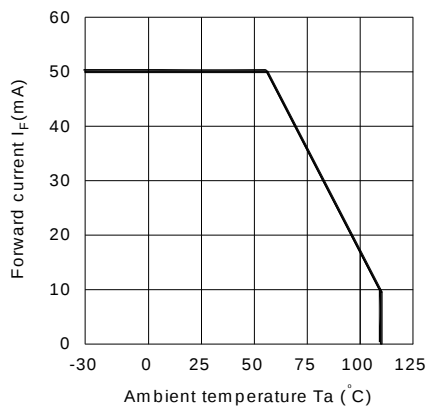


Fig.2 Collector Power Dissipation  
vs. Ambient Temperature

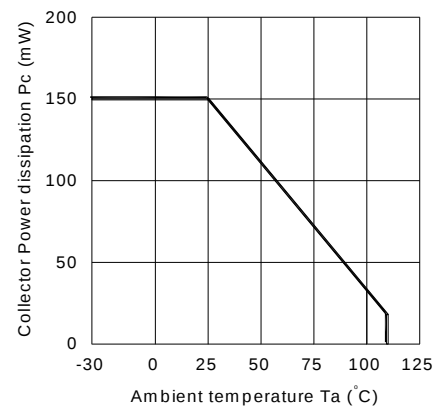


Fig.3 Collector-emitter Saturation  
Voltage vs. Forward Current

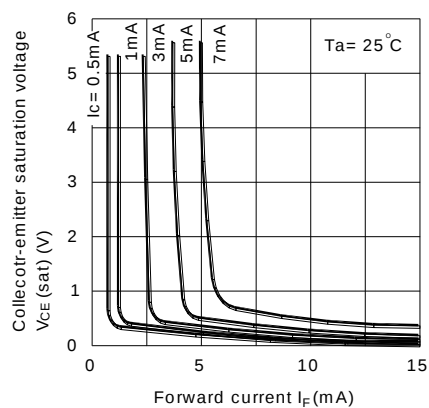


Fig.4 Forward Current vs. Forward  
Voltage

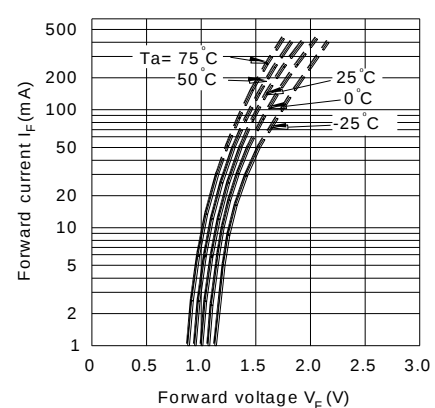


Fig.5 Current Transfer Ratio vs.  
Forward Current

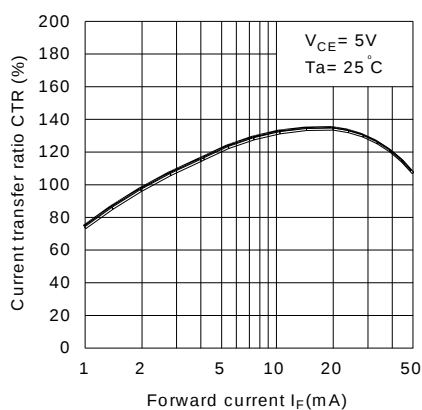
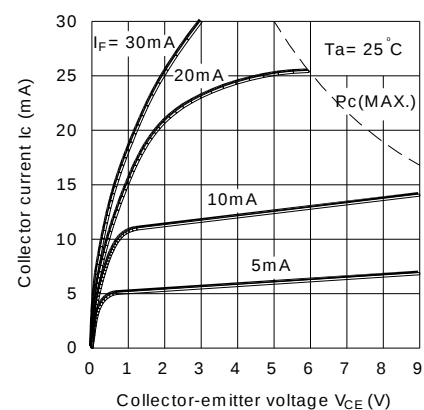


Fig.6 Collector Current vs.  
Collector-emitter Voltage



## CHARACTERISTICS CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

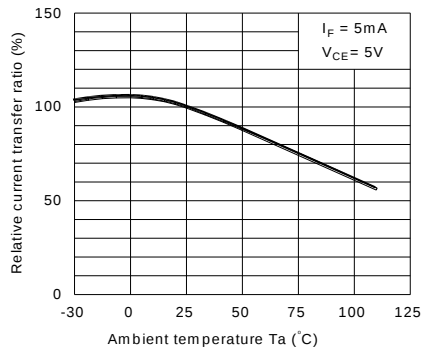


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

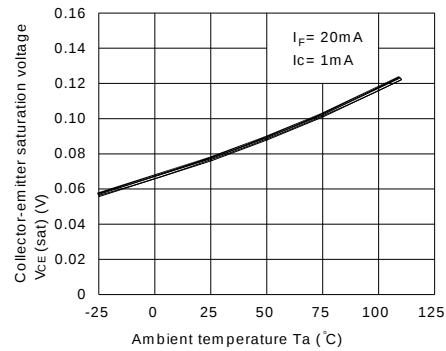


Fig.9 Collector Dark Current vs. Ambient Temperature

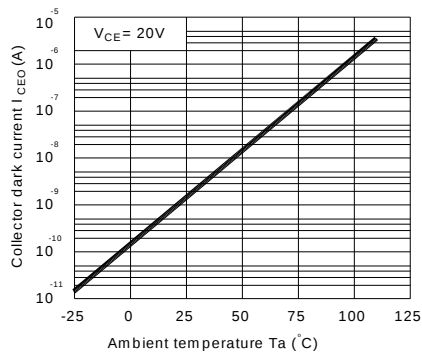


Fig.10 Response Time vs. Load Resistance

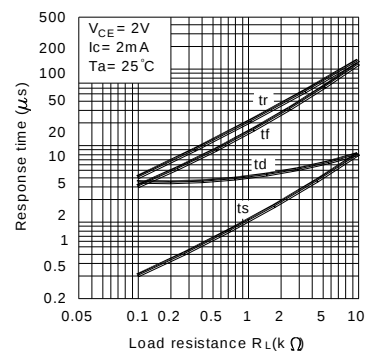
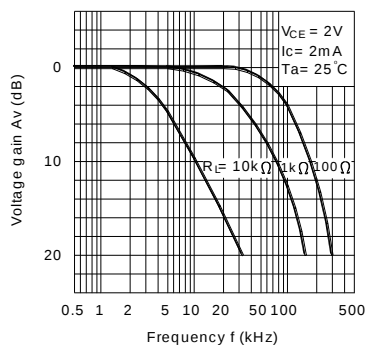
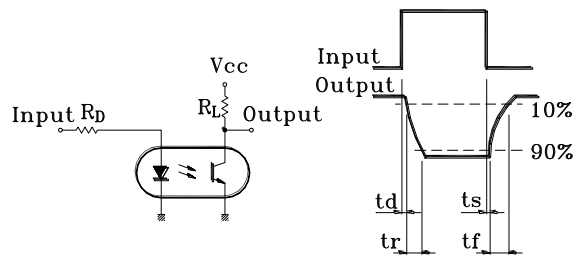


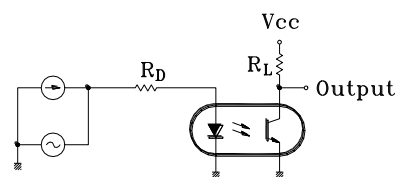
Fig.11 Frequency Response



Test Circuit for Response Time



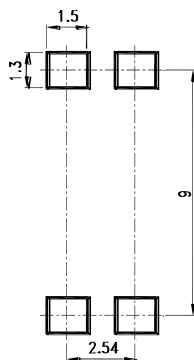
Test Circuit for Frequency Response



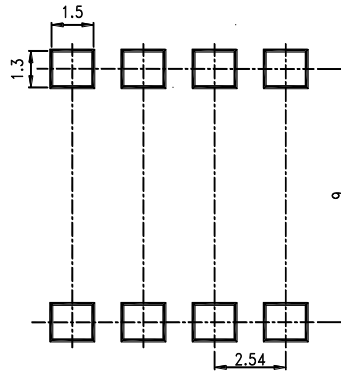
## RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit : mm

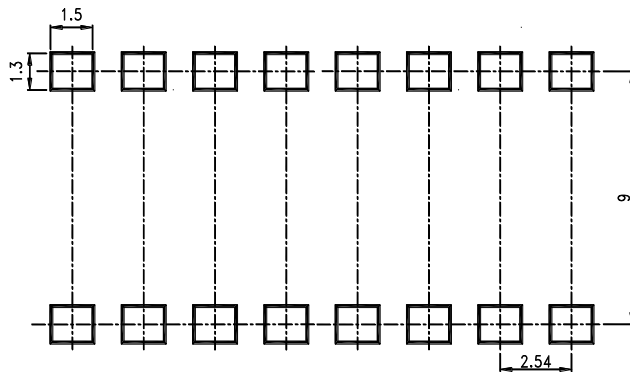
**4 PIN**



**8 PIN**



**16 PIN**



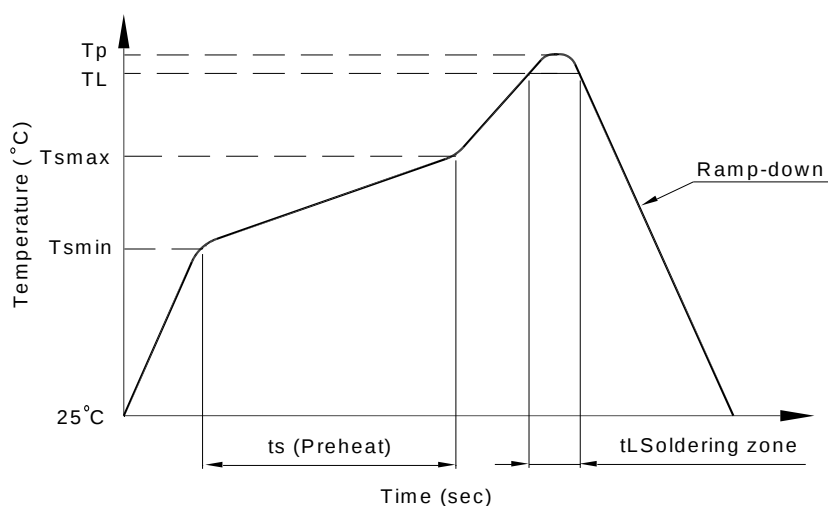
### TEMPERATURE PROFILE OF SOLDERING REFLOW

(1) One time soldering reflow is recommended within the condition of temperature and time profile shown below.

1. Wave solder  
- 260°C / 10 sec.

#### 2. IR Reflow

| Profile item                     | Conditions  |
|----------------------------------|-------------|
| Preheat                          |             |
| - Temperature Min ( $T_{Smin}$ ) | 150°C       |
| - Temperature Max ( $T_{Smax}$ ) | 180°C       |
| - Time (min to max) (ts)         | 90±30°C     |
| Soldering zone                   |             |
| - Temperature ( $T_L$ )          | 250°C       |
| - Time ( $t_L$ )                 | 10~15 sec   |
| Peak Temperature ( $T_P$ )       | 260°C       |
| Ramp-down rate                   | 3~6°C / sec |



(2) When using another soldering method such as infrared ray lamp, the temperature may rise partially in the mold of the device.

Keep the temperature on the package of the device within the condition of above (1)

### Notes:

- Lite-On is continually improving the quality, reliability, function or design and Lite-On 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.
- Immerse body in solder paste is not recommended.