Photocoupler
Product Data Sheet
LTV-816/ 826/ 846
(M, S, S-TA, S-TA1, S-TP) Series
Spec No.: DS-70-97-0013
Effective Date: 04/21/2010
Revision: F
FEATURES

* Current transfer ratio
  (CTR : MIN. 50% at If = 5mA, VCE = 5V)
* High input-output isolation voltage
  (Viso = 5,000Vrms)
* Response time
  (tr : TYP. 4µs at VCE = 2V, Ic = 2mA, RL = 100Ω)
* Dual-in-line package:
  LTV-816 : 1-channel type
  LTV-826 : 2-channel type
  LTV-846 : 4-channel type
* Wide lead spacing package:
  LTV-816M : 1-channel type
  LTV-826M : 2-channel type
  LTV-846M : 4-channel type
* Surface mounting package:
  LTV-816S : 1-channel type
  LTV-826S : 2-channel type
  LTV-846S : 4-channel type
* Tape and reel packaging:
  LTV-816S-TA : 1-channel type
  LTV-816S-TA1 : 1-channel type
  LTV-816S-TP : 1-channel type
  LTV-826S-TA1 : 2-channel type
* Safety approval
  UL / CSA / FIMKO / NEMKO / DEMKO / SEMKO / VDE* approved
* Required “V” ordering option
* RoHS compliance

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OUTLINE DIMENSIONS

LTV-816:

LTV-826:

*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.

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OUTLINE DIMENSIONS

LTV-846:

LTV-816M:

*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.
OUTLINE DIMENSIONS

LTV-826M :

LTV-846M :

*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.
OUTLINE DIMENSIONS

LTV-816S:

LTV-826S:

*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.
**OUTLINE DIMENSIONS**

*LTV-846S:*

*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.*
TAPING DIMENSIONS

LTV-816S-TA1:

- 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: \(P_1\)  
  \[12 \pm 0.1 (.472)\]

LTV-826S-TA1:

- 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: \(P_1\)  
  \[12 \pm 0.1 (.472)\]
**TAPING DIMENSIONS**

**LTV-816S-TA:**

- Tape width: \( W \) = 16 ± 0.3 ( .63 )
- Pitch of sprocket holes: \( P_0 \) = 4 ± 0.1 (.15)
- Distance of compartment: \( F \) = 7.5 ± 0.1 ( .295 )
- Distance of compartment to compartment: \( P_1 \) = 12 ± 0.1 (.472 )

**LTV-816S-TP:**

- Tape width: \( W \) = 16 ± 0.3 ( .63 )
- Pitch of sprocket holes: \( P_0 \) = 4 ± 0.1 (.15)
- Distance of compartment: \( F \) = 7.5 ± 0.1 ( .295 )
- Distance of compartment to compartment: \( P_1 \) = 12 ± 0.1 (.472 )
# ABSOLUTE MAXIMUM RATING

(Ta = 25°C)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>RATING</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward Current</td>
<td>If</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Reverse Voltage</td>
<td>Vr</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>P</td>
<td>70</td>
<td>mW</td>
</tr>
<tr>
<td><strong>OUTPUT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector - Emitter Voltage</td>
<td>VCEO</td>
<td>80</td>
<td>V</td>
</tr>
<tr>
<td>Emitter - Collector Voltage</td>
<td>VECO</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Collector Current</td>
<td>Ic</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Collector Power Dissipation</td>
<td>Pc</td>
<td>150</td>
<td>mW</td>
</tr>
<tr>
<td>Total Power Dissipation</td>
<td>Ptot</td>
<td>200</td>
<td>mW</td>
</tr>
<tr>
<td><strong>Isolation Voltage</strong></td>
<td>Viso</td>
<td>5,000</td>
<td>Vrms</td>
</tr>
<tr>
<td>Operating Temperature (LTV-826/846)</td>
<td>Topr</td>
<td>-30 ~ +100</td>
<td>ºC</td>
</tr>
<tr>
<td>Operating Temperature (LTV-816)</td>
<td>Topr</td>
<td>-30 ~ +110</td>
<td>ºC</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>Tstg</td>
<td>-55 ~ +125</td>
<td>ºC</td>
</tr>
<tr>
<td><strong>Soldering Temperature</strong></td>
<td>Tsol</td>
<td>260</td>
<td>ºC</td>
</tr>
</tbody>
</table>

*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

\( (Ta = 25^\circ C) \)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT</td>
<td>Forward Voltage</td>
<td>( V_F )</td>
<td>1.2</td>
<td>1.4</td>
<td>V</td>
<td>( I_F = 20 \text{mA} )</td>
</tr>
<tr>
<td></td>
<td>Reverse Current</td>
<td>( I_R )</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>( \mu A )</td>
</tr>
<tr>
<td></td>
<td>Terminal Capacitance</td>
<td>( C_t )</td>
<td>—</td>
<td>30</td>
<td>250</td>
<td>( \text{pF} )</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>Collector Dark Current</td>
<td>( I_{CEO} )</td>
<td>—</td>
<td>—</td>
<td>100</td>
<td>( \text{nA} )</td>
</tr>
<tr>
<td></td>
<td>Collector-Emitter Breakdown Voltage</td>
<td>( B_{VCEO} )</td>
<td>80</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Emitter-Collector Breakdown Voltage</td>
<td>( B_{V_ECO} )</td>
<td>6</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Collector Current</td>
<td>( I_C )</td>
<td>2.5</td>
<td>—</td>
<td>30</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>*1 Current Transfer Ratio</td>
<td>CTR</td>
<td>50</td>
<td>—</td>
<td>600</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Collector-Emitter Saturation Voltage</td>
<td>( V_{CE(sat)} )</td>
<td>—</td>
<td>0.1</td>
<td>0.2</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Isolation Resistance</td>
<td>( R_{iso} )</td>
<td>( 5 \times 10^{10} )</td>
<td>( 1 \times 10^{11} )</td>
<td>—</td>
<td>( \Omega )</td>
</tr>
<tr>
<td></td>
<td>Floating Capacitance</td>
<td>( C_f )</td>
<td>—</td>
<td>0.6</td>
<td>1</td>
<td>( \text{pF} )</td>
</tr>
<tr>
<td></td>
<td>Cut-Off Frequency</td>
<td>( f_c )</td>
<td>—</td>
<td>80</td>
<td>—</td>
<td>( \text{kHz} )</td>
</tr>
<tr>
<td></td>
<td>Response Time (Rise)</td>
<td>( t_r )</td>
<td>—</td>
<td>4</td>
<td>18</td>
<td>( \mu \text{s} )</td>
</tr>
<tr>
<td></td>
<td>Response Time (Fall)</td>
<td>( t_r )</td>
<td>—</td>
<td>3</td>
<td>18</td>
<td>( \mu \text{s} )</td>
</tr>
</tbody>
</table>

\[ *1 \text{ CTR} = \frac{I_C}{I_F} \times 100\% \]
### RANK TABLE OF CURRENT TRANSFER RATIO CTR

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>RANK MARK</th>
<th>CTR ( % )</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTV-816</td>
<td>L</td>
<td>50 ~ 100</td>
</tr>
<tr>
<td>LTV-816</td>
<td>A</td>
<td>80 ~ 160</td>
</tr>
<tr>
<td>LTV-816</td>
<td>B</td>
<td>130 ~ 260</td>
</tr>
<tr>
<td>LTV-816</td>
<td>C</td>
<td>200 ~ 400</td>
</tr>
<tr>
<td>LTV-816</td>
<td>D</td>
<td>300 ~ 600</td>
</tr>
<tr>
<td>LTV-8×6</td>
<td>L or A or B or C or D</td>
<td>50 ~ 600</td>
</tr>
<tr>
<td>LTV-8×6</td>
<td>B</td>
<td>130 ~ 260</td>
</tr>
<tr>
<td>LTV-8×6</td>
<td>B or C or BC</td>
<td>130 ~ 400</td>
</tr>
<tr>
<td>LTV-8×6</td>
<td>C</td>
<td>200 ~ 400</td>
</tr>
<tr>
<td>LTV-8×6</td>
<td>C or D or CD</td>
<td>200 ~ 600</td>
</tr>
<tr>
<td>LTV-8×6</td>
<td>B 、BC 、C 、CD or No mark</td>
<td>50 ~ 600</td>
</tr>
</tbody>
</table>

※ = 2 or 4

**CONDITIONS**

- $I_F = 5$ mA
- $V_{CE} = 5$ V
- $Ta = 25$ °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

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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

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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 soldering
   – 260 °C / 10 sec

2. IR reflow

<table>
<thead>
<tr>
<th>Profile Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat</td>
<td></td>
</tr>
<tr>
<td>– Temperature Min ($T_{min}$)</td>
<td>150 °C</td>
</tr>
<tr>
<td>– Temperature Max ($T_{max}$)</td>
<td>180 °C</td>
</tr>
<tr>
<td>– Time (min to max) (ts)</td>
<td>90 ± 30 sec</td>
</tr>
<tr>
<td>Soldering zone</td>
<td></td>
</tr>
<tr>
<td>– Temperature ($T_L$)</td>
<td>250 °C</td>
</tr>
<tr>
<td>– Time ($t_L$)</td>
<td>10 ~150 sec</td>
</tr>
<tr>
<td>Peak temperature (Tp)</td>
<td>260 °C</td>
</tr>
<tr>
<td>Ramp-down rate</td>
<td>3 ~ 6 °C/sec</td>
</tr>
</tbody>
</table>

![Temperature Profile Diagram]

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