

## FEATURES

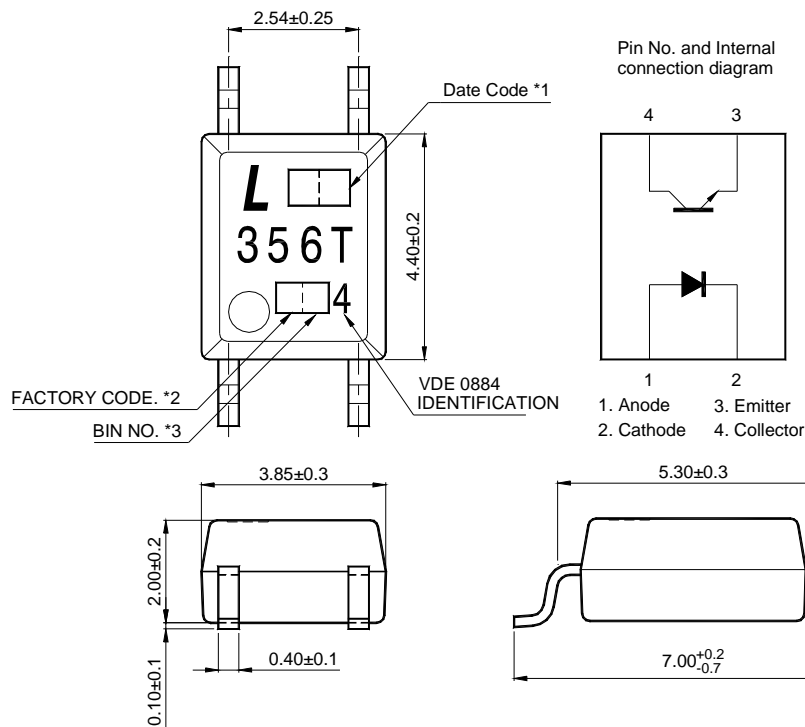
- \* This specification shall be applied to photocoupler. Model No. LTV-356T as an option.
- \* Current transfer ratio ( CTR : MIN. 50% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$  )
- \* High input-output isolation voltage (  $V_{iso} = 3,750\text{Vrms}$  )
- \* High collector-emitter voltage (  $V_{CEO} = 80\text{V}$  )
- \* Employs double transfer mold technology
- \* Subminiature type
  - ( The volume is smaller than that of conventional DIP type by as far as 30% )
- \* Mini-flat package :
  - 2.0mm profile : LTV-356T-V
- \* UL approved ( No. E113898 )
- \* CUL approved ( No. E113898 , 01SC19287 )
- \* CSA approved ( No. 1243207 )
- \* FIMKO approved ( No. FI-16420 )
- \* NEMKO approved ( No. P01100403 )
- \* DEMKO approved ( No. 310475-01 )
- \* SEMKO approved ( No. 0109173 / 01-08 )
- \* VDE approved ( No. 094722 )
- \* RoHS compliance

## APPLICATIONS

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

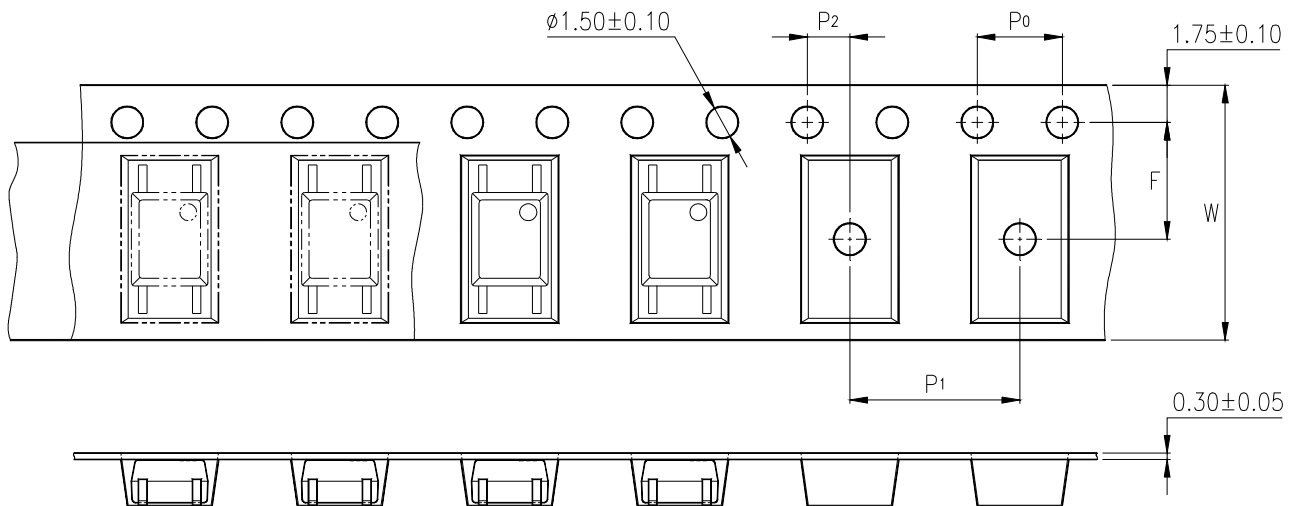
## OUTLINE DIMENSIONS

LTV-356T-V :



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

## TAPING DIMENSIONS



Description	Symbol	Dimensions in mm ( inches )
Tape wide	W	$12 \pm 0.3$ ( .47 )
Pitch of sprocket holes	$P_0$	$4 \pm 0.1$ ( .15 )
Distance of compartment	F	$5.5 \pm 0.1$ ( .217 )
Distance of compartment to compartment	$P_1$	$2 \pm 0.1$ ( .079 )
Distance of compartment to sprocket hole	$P_2$	$8 \pm 0.1$ ( .315 )

## 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>	170	mW
*1	Isolation Voltage	V <sub>iso</sub>	3,750	V <sub>rms</sub>
Operating Temperature		T <sub>opr</sub>	-55 ~ +110	°C
Storage Temperature		T <sub>stg</sub>	-55 ~ +150	°C
*2	Soldering Temperature	T <sub>sol</sub>	260	°C
Junction Temperature		T <sub>j</sub>	125	°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 I <sub>F</sub> =0
	Emitter-Collector Breakdown Voltage	BV <sub>ECO</sub>	6	—	—	V	I <sub>E</sub> =10μA I <sub>F</sub> =0
TRANSFER CHARACTERISTICS	Collector Current	I <sub>C</sub>	2.5	—	30	mA	I <sub>F</sub> =5mA
	*1 Current Transfer Ratio	CTR	50	—	600	%	V <sub>CE</sub> =5V
	Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	—	0.2	V	I <sub>F</sub> =20mA I <sub>C</sub> =1mA
	Isolation Resistance	R <sub>iso</sub>	5×10 <sup>10</sup>	1×10 <sup>11</sup>	—	Ω	DC500V 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 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 ( % )
LTV-356T-V	A	80 ~ 160
	B	130 ~ 260
	C	200 ~ 400
	D	300 ~ 600
	A or B or C or D or No mark	50 ~ 600

<b>CONDITIONS</b>	$I_F = 5 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $T_a = 25 \text{ }^\circ\text{C}$
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### ISOLATION SPECIFICATION ACCORDING TO VDE 0884

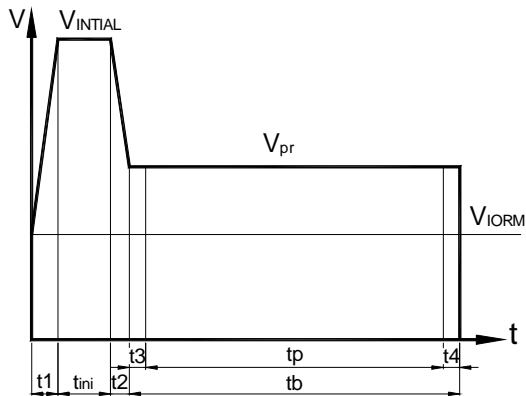
Parameter	Symbol	Conditions	Rating	Unit	Remark
Class of environmental test	-	DIN IEC68	30/100/21	-	
Pollution	-	DIN VDE0110	2	-	
Maximum Operating Isolation Voltage	$V_{IORM}$	-	565	$V_{PEAK}$	Refer to the Diagram 1, 2
Partial Discharge Test Voltage (Between Input and Output)	Diagram 1	$t_p=60s, q_c<5pC$	848	$V_{PEAK}$	
	Diagram 2	$t_p=1s, q_c<5pC$	1059	$V_{PEAK}$	
Maximum Over-voltage	$V_{INITIAL}$	$t_{INI} = 10s$	6000	$V_{PEAK}$	
Safety Maximum Ratings					
1) Case Temperature	$T_{si}$	$I_F = 0, P_c = 0$	150	$^{\circ}C$	Refer to the Figure 1, 3
2) Input Current	$I_{si}$	$P_c=0$	200	mA	
3) Electric Power (Output or Total Power Issipation)	$P_{si}$	-	300	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 ( $V_{IORM}$ )

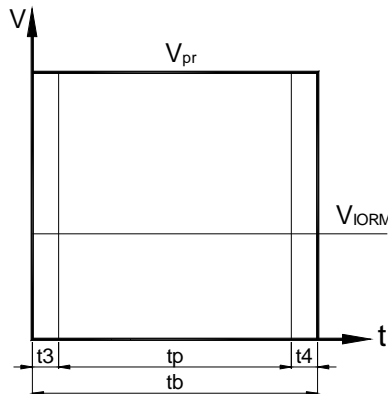
## PARTIAL DISCHARGE TEST METHOD

Method (A) for type testing and random testing.



$t_1, t_2$  = 1 to 10s  
 $t_3, t_4$  = 1s  
 $t_p$  (Partial Discharge Measuring Time) = 60s  
 $t_b$  = 62s  
 $t_{ini}$  = 10s

Method (B) for routine testing.



$t_3, t_4$  = 0.1s  
 $t_p$  (Partial Discharge Measuring Time) = 1s  
 $t_b$  = 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

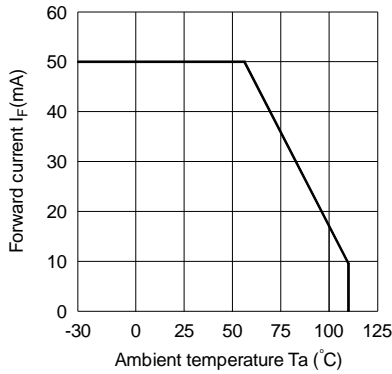


Fig.2 Collector Power Dissipation vs. Ambient Temperature

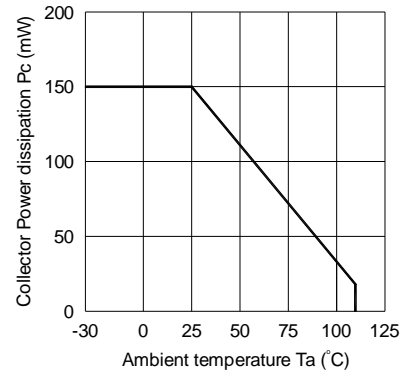


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

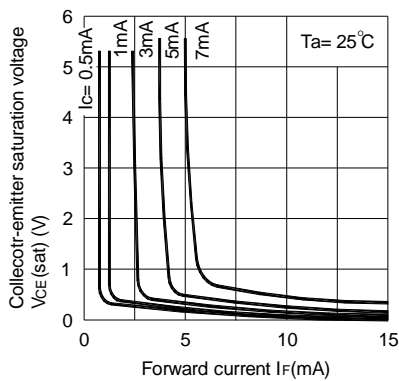


Fig.4 Forward Current vs. Forward Voltage

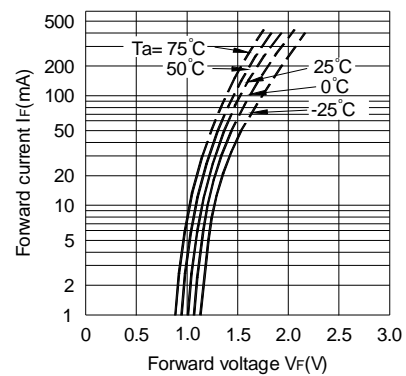


Fig.5 Current Transfer Ratio vs. Forward Current

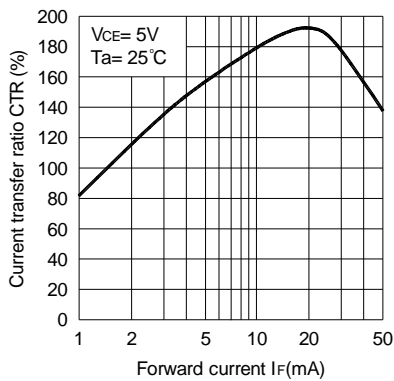
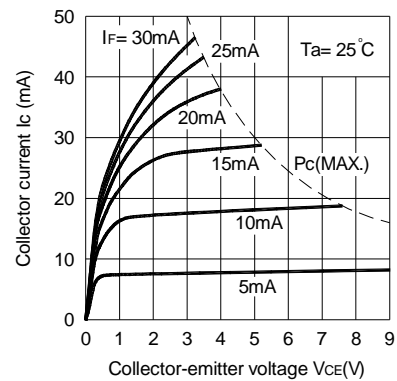


Fig.6 Collector Current vs. Collector-emitter Voltage



### CHARACTERISTICS CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

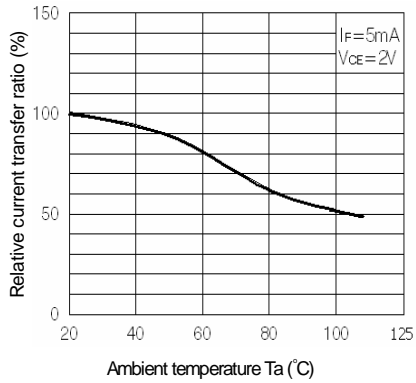


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

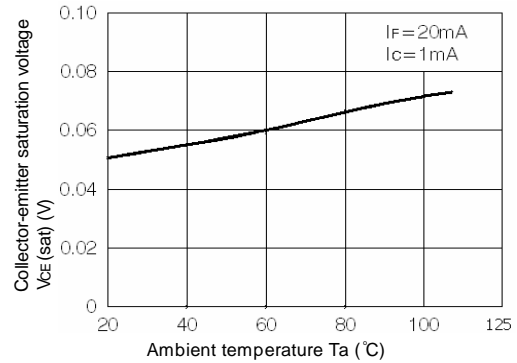


Fig.9 Collector Dark Current vs. Ambient Temperature

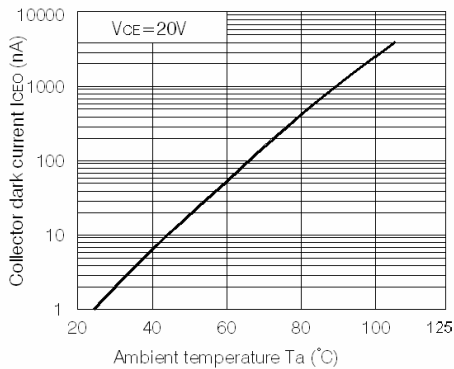


Fig.10 Response Time vs. Load Resistance

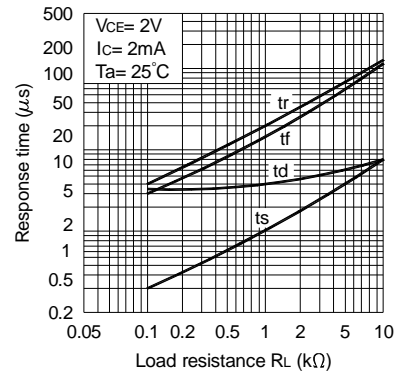
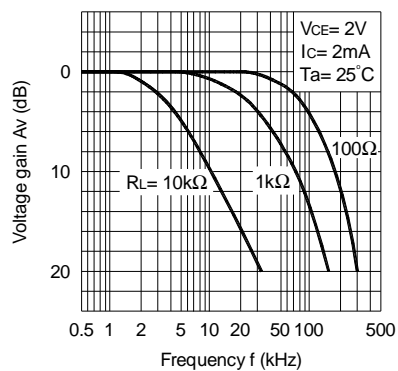
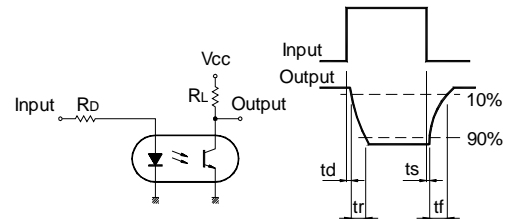


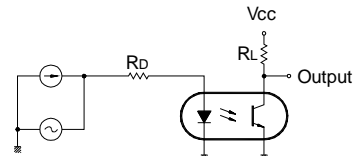
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



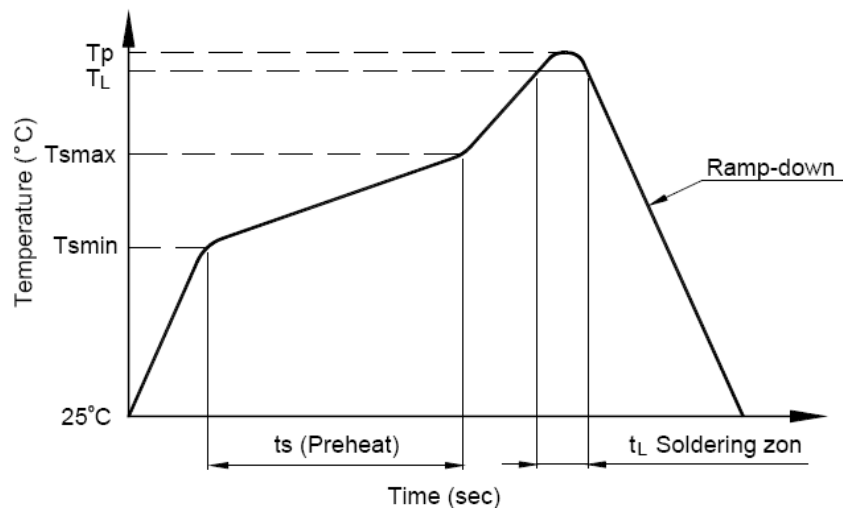
## TEMPERATURE PROFILE OF SOLDERING REFLOW

(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	Condition
Preheat	
- Temperature Min ( $T_{smin}$ )	150 °C
- Temperature Max ( $T_{smax}$ )	180 °C
- Time (min to max) ( $t_s$ )	90 ± 30 sec
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

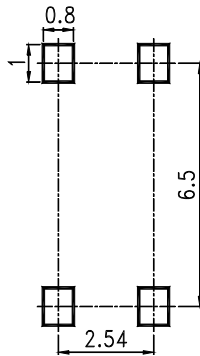


## TEMPERATURE PROFILE OF SOLDERING REFLOW

- (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)

## RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit : mm



### **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.
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  - 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.
- Do not immerse unit's body in solder paste.