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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# Photocoupler

## Product Data Sheet

### LTV-356T

Spec No.: DS70-2001-010

Effective Date: 10/27/2016

Revision: N

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

## Photocoupler LTV-356T series

### 1. DESCRIPTION

#### 1.1 Features

- 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 (  $V_{CEO} = 80\text{V}$  )
- Mini-flat package : 2.0mm profile : LTV-356T
- Safety approval
  - UL 1577
  - VDE DIN EN60747-5-5 (VDE 0884-5) ,
  - CSA CA5A
  - CQC GB4943.1-2011/ GB8898-2011
  - FIMKO/DEMKO/SEMKO/NEMKO
- RoHS Compliance
  - All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 8000V/ MM2000V/ CDM2000V
- MSL class1

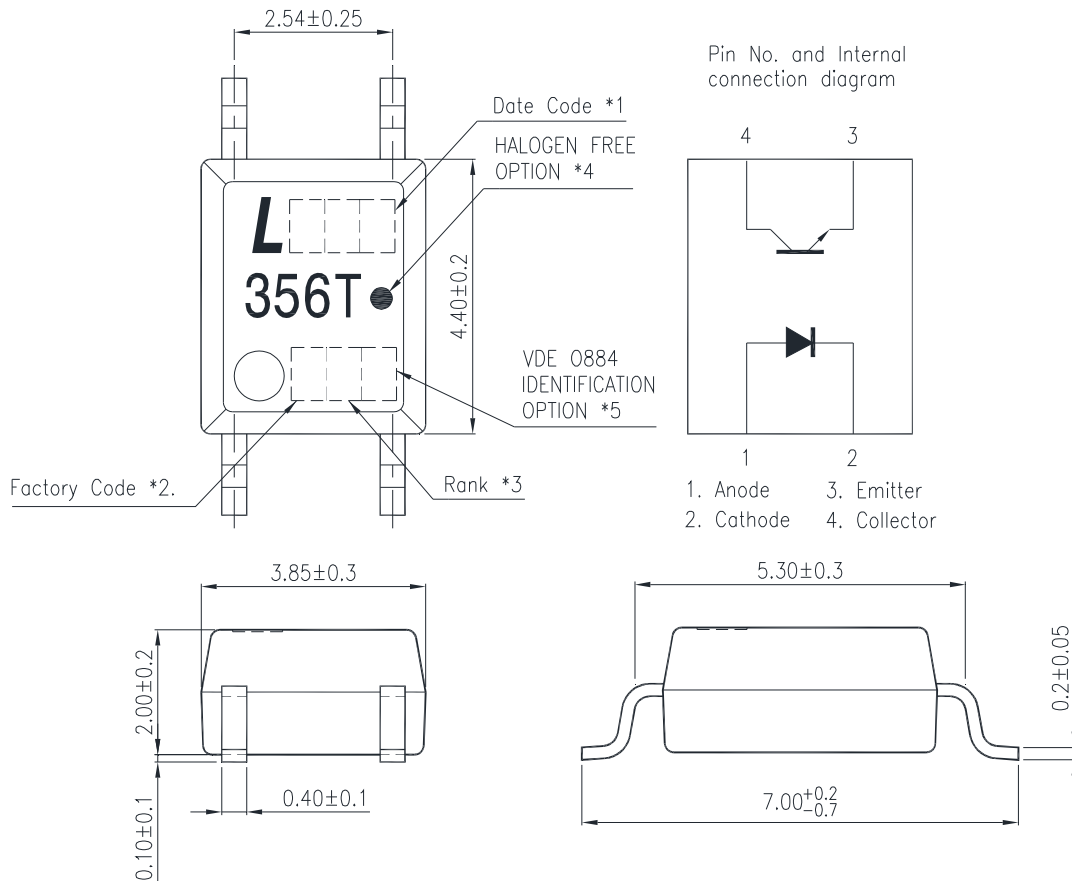
#### 1.2 Applications

- Hybrid substrates that require high density mounting.
- Programmable controllers
- System appliance, measuring instruments

## Photocoupler LTV-356T series

### 2. PACKAGE DIMENSIONS

#### 2.1 LTV-356T series



#### Notes :

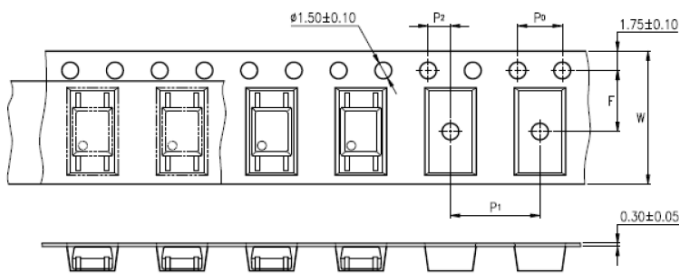
- 1-digit year code, Example : 2010 = A  
2-digit work week ranging from '01' to '53'
- Factory identification mark shall be marked (W: China -CZ, X: China -TJ)
- Rank shall be or shall not be marked.
- “●” indicates halogen free option.
- “4” or “V” for VDE option.

\*All dimensions in millimeters.

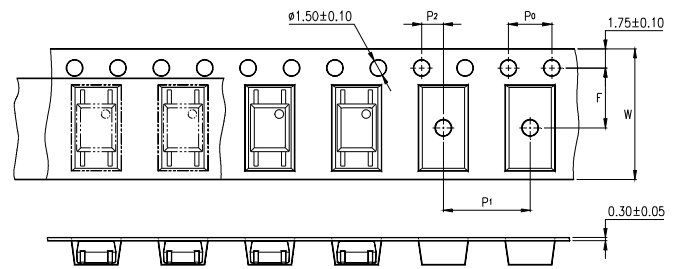
## Photocoupler LTV-356T series

### 3. TAPING DIMENSIONS

#### 3.1 LTV-356T-TP



#### 3.2 LTV-356T-TP1



Description	Symbol	Dimension in mm (inch)
Tape wide	W	12±0.3 (0.472)
Pitch of sprocket holes	P <sub>0</sub>	4±0.1 (0.157)
Distance of compartment	F	5.5±0.1 (0.217)
	P <sub>2</sub>	2±0.1 (0.079)
Distance of compartment to compartment	P <sub>1</sub>	8±0.1 (0.315)

#### 3.3 Quantities Per Reel

Package Type	LTV-356T series
Quantities (pcs)	3000



## Photocoupler LTV-356T series

### 4. RATING AND CHARACTERISTICS

#### 4.1 Absolute Maximum Ratings at 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
	Junction Temperature	$T_J$	125	°C
Output	Collector - Emitter Voltage	$V_{CEO}$	80	V
	Emitter - Collector Voltage	$V_{ECO}$	6	V
	Collector Current	$I_C$	50	mA
	Collector Power Dissipation	$P_C$	150	mW
	Junction Temperature	$T_J$	125	°C
	Total Power Dissipation	$P_{tot}$	170	mW
1.	Isolation Voltage	$V_{iso}$	3750	$V_{rms}$
	Operating Temperature	$T_{opr}$	-55 ~ +110	°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	1.4	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	$BV_{CEO}$	80	—	—	V	$I_C=0.1\text{mA}, I_F=0$
	Emitter-Collector Breakdown Voltage	$BV_{ECO}$	6	—	—	V	$I_E=10\mu\text{A}, I_F=0$
TRANSFER CHARACTERISTICS	Collector Current	$I_C$	2.5	—	30	mA	$I_F=5\text{mA}$
	1. Current Transfer Ratio	CTR	50	—	600	%	$V_{CE}=5\text{V}$
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.2	V	$I_F=20\text{mA}$ $I_C=1\text{mA}$
	Isolation Resistance	$R_{iso}$	$5 \times 10^{10}$	$1 \times 10^{11}$	—	$\Omega$	DC500V, 40 ~ 60% R.H.
	Floating Capacitance	$C_f$	—	0.6	1	pF	$V=0, f=1\text{MHz}$
	Response Time (Rise)	$t_r$	—	4	18	$\mu\text{s}$	$V_{CE}=2\text{V},$ $I_C=2\text{mA}$
	Response Time (Fall)	$t_f$	—	3	18	$\mu\text{s}$	$R_L=100\Omega,$

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

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**5. RANK TABLE OF CURRENT TRANSFER RATIO (CTR)**

Parameter	CTR Rank	Min	Max	Condition
DC Current Transfer Ratio	A	80	160	$I_F=5\text{mA}$ , $V_{CE}=5\text{V}$ , $T_a=25^\circ\text{C}$
	B	130	260	
	C	200	400	
	D	300	600	
	A or B or C or D or No mark	50	600	



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## 6. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Fig.1 Forward Current vs. Ambient Temperature

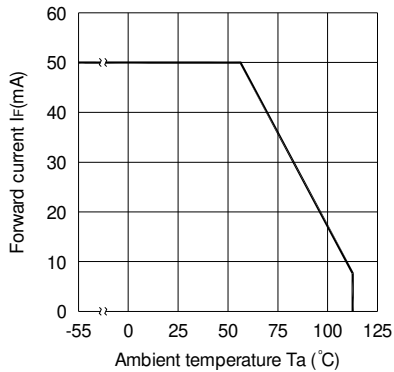


Fig.2 Collector Power Dissipation vs. Ambient Temperature

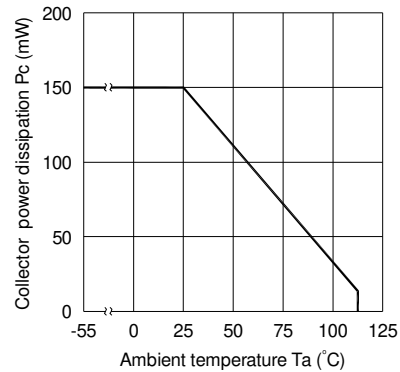


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

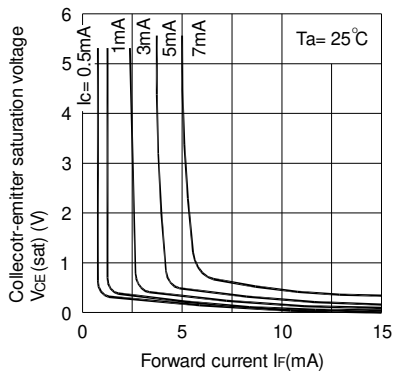


Fig.4 Forward Current vs. Forward Voltage

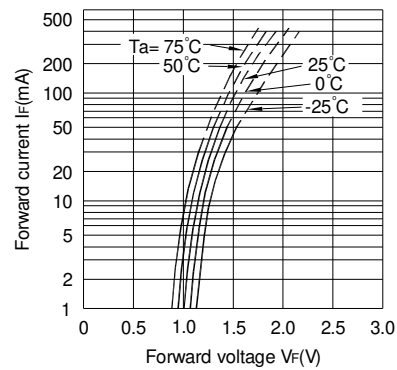


Fig.5 Current Transfer Ratio vs. Forward Current

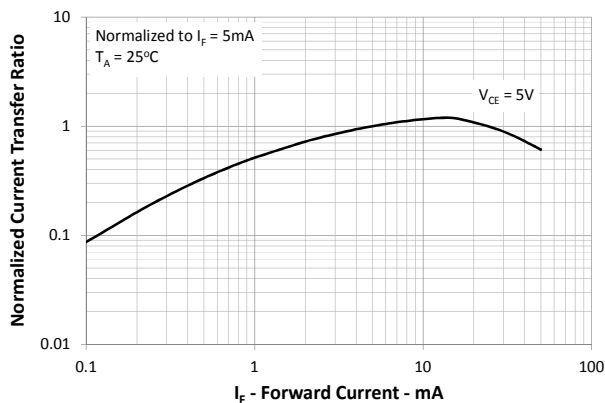
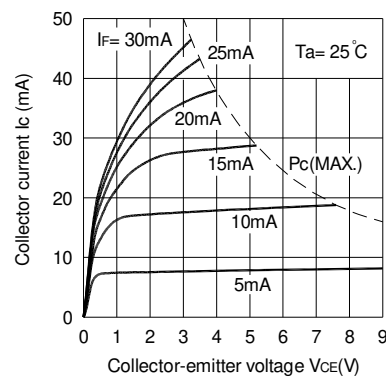


Fig.6 Collector Current vs. Collector-emitter Voltage



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Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

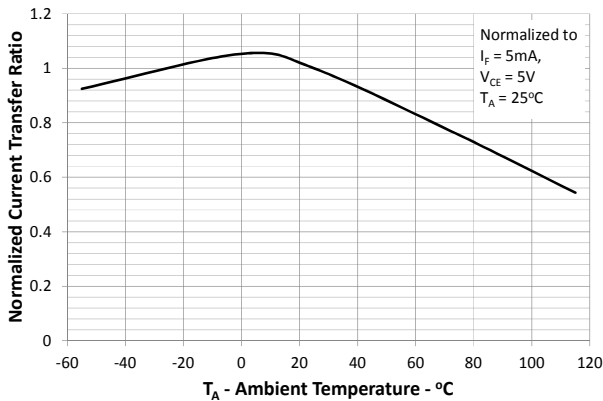


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

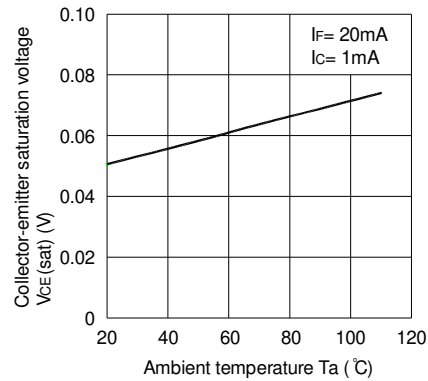


Fig.9 Collector Dark Current vs. Ambient Temperature

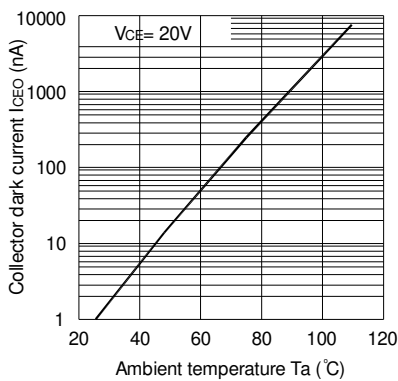


Fig.10 Response Time vs. Load Resistance

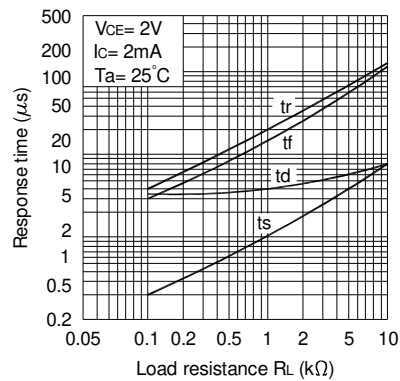
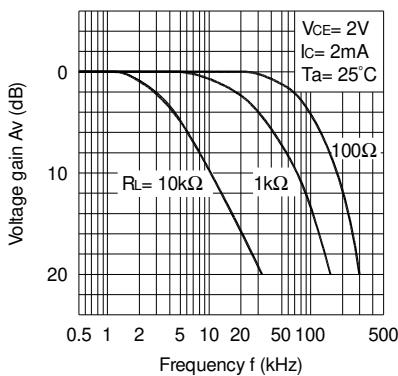
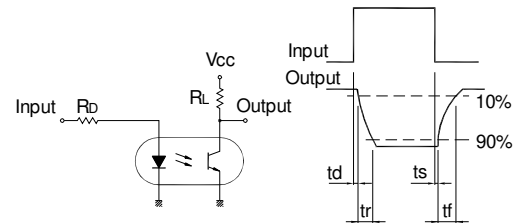


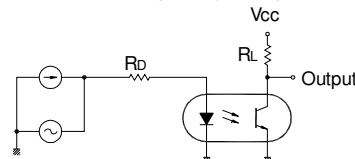
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



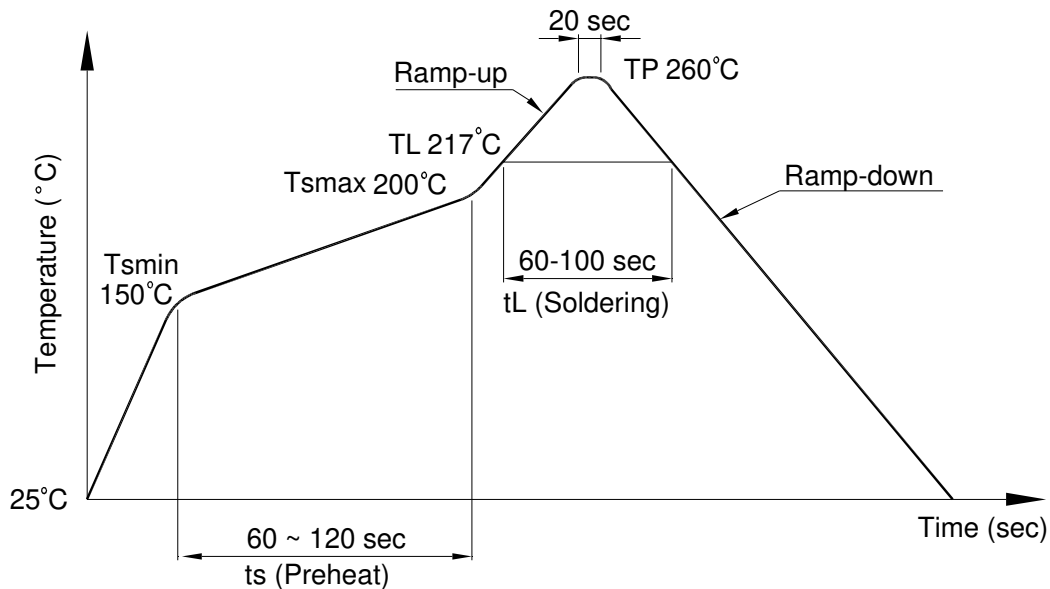
# Photocoupler LTV-356T series

## 7. TEMPERATURE PROFILE OF SOLDERING

### 7.1 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 ~ 100 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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**7.2 Wave soldering (JEDEC22A111 compliant)**

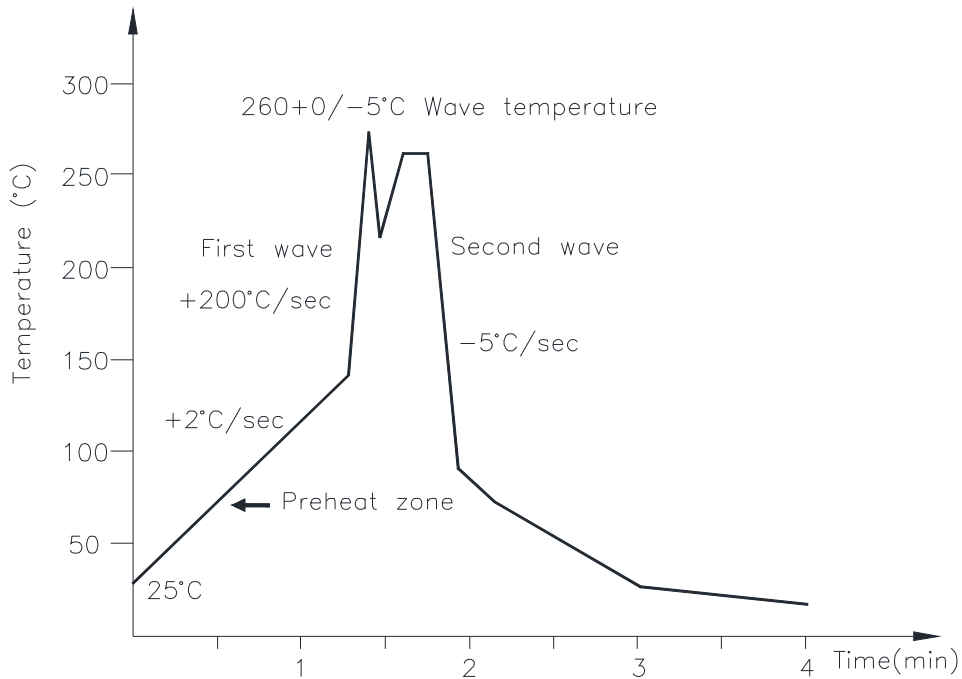
One time soldering is recommended within the condition of temperature.

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

Time: 10 sec.

Preheat temperature: 25 to  $140^{\circ}\text{C}$

Preheat time: 30 to 80 sec.



**7.3 Hand soldering by soldering iron**

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

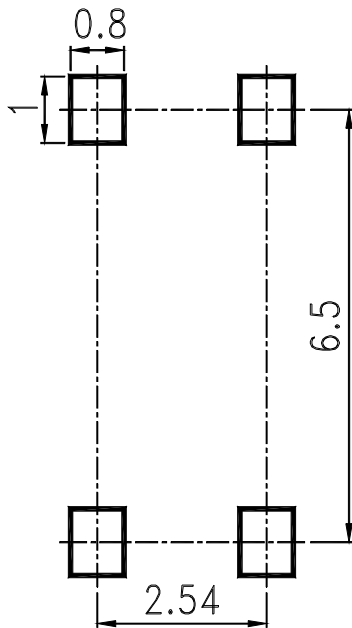
Temperature:  $380 \pm 0 / -5^{\circ}\text{C}$

Time: 3 sec max.

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**8. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)**

Unit: mm



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**9. NAMING RULE**

**LTV-356T-(1)-(2)-G**

DEVICE PART NUMBER

(1) TAPING TYPE (TP, TP1)

LTV-356T has tape and reel solution.

Please refer to orientation of taping on Page P3

(2) CTR RANK (A,B or )

Please refer to Page P6

(3) Halogen free option

Example : LTV-356T-TP-A-G

**LTV 356T (1) (2)-V-G**

DEVICE PART NUMBER

(1) TAPING TYPE (TP, TP1)

LTV-356T has tape and reel solution.

Please refer to orientation of taping on Page P3

(2) CTR RANK (A,B or )

Please refer to Page P6

(3) VDE option

(4) Halogen free option

Example : LTV356TTPA-V-G

**10. 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.
- Immerge unit's body in solder paste is not recommended.