



## FEATURES

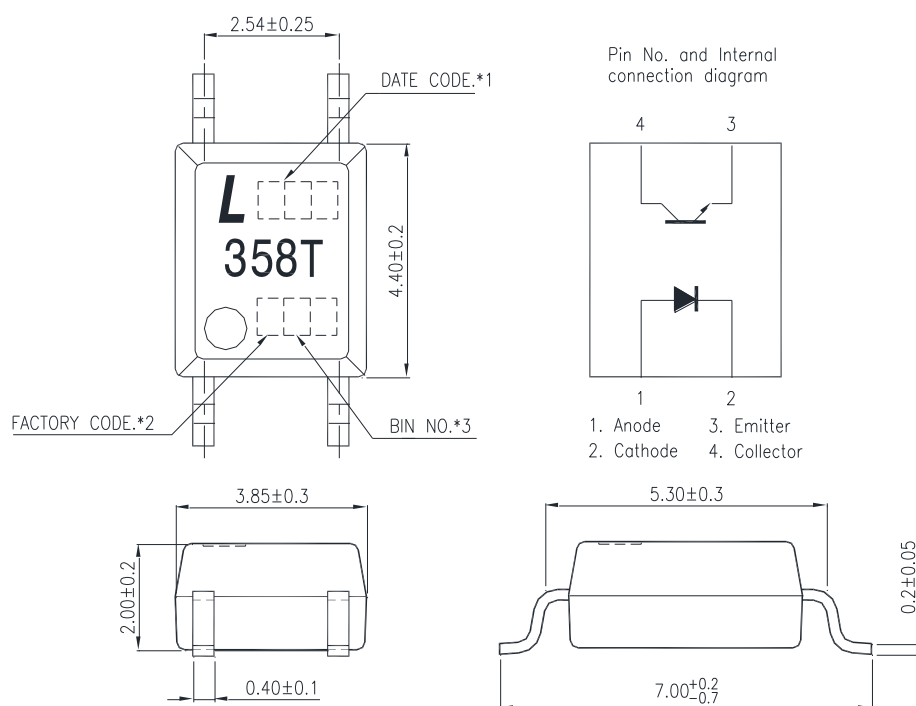
- \* Current transfer ratio  
( CTR : MIN. 80% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$  )
- \* Isolation voltage between input and output LTV-358T  
(  $V_{iso} = 3,750\text{V}_{rms}$  )
- \* High collector-emitter voltage  
(  $V_{CEO} = 120\text{V}$  )
- \* Employs double transfer mold technology
- \* Subminiature type  
( The volume is smaller than that of conventional DIP type by as far as 30% )
- \* Mini-flat package :  
2.0mm profile : LTV-358T
- \* Safety approval  
UL, CSA, FIMKO NEMKO, DEMKO, SEMKO, VDE\* approved  
(\*Requires “V” ordering option)
- \* RoHS compliance

## APPLICATIONS

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

## OUTLINE DIMENSIONS

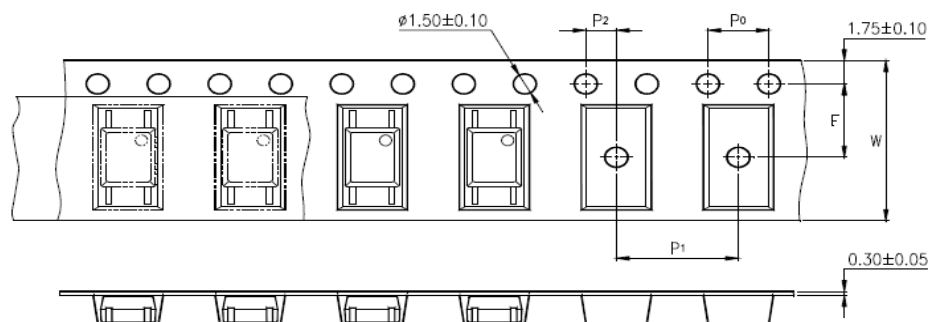
### LTV-358T :



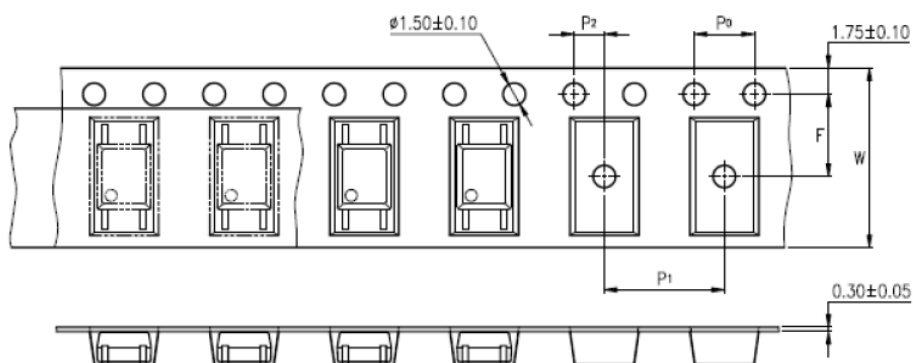
- \*1. 3-digit date code.
- \*2. Factory identification mark shall be marked (W: China-CZ, X: China-TJ, Y: Thailand).
- \*3. Rank shall be or shall not be marked.

## TAPING DIMENSIONS

### TP1 MINI FLAT (3000pcs/reel) : Suffix "-TP1"



### TP MINI FLAT (3000pcs/reel) : Suffix "-TP"



### Content Quantity

| Model      | Reel volume<br>(pcs/Reel) | Inner Box volume<br>(Reel/Box) | Outer carton volume<br>(Box/Carton) | Total volume<br>(pcs/outer carton) |
|------------|---------------------------|--------------------------------|-------------------------------------|------------------------------------|
| MFP TP/TP1 | 3000                      | 2                              | 10                                  | 60000                              |

| 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 sprocket holes to sprocket holes | $P_2$  | $8 \pm 0.1$ ( .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> | 120        | 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 ~ +100 | °C               |
| Storage Temperature     |                             | T <sub>stg</sub> | -55 ~ +150 | °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> =40V, I <sub>F</sub> =0                          |
|                          | Collector-Emitter Breakdown Voltage  | BV <sub>CEO</sub>    | 120                | —                  | —    | 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>       | 4                  | —                  | 20   | mA   | I <sub>F</sub> =5mA<br>V <sub>CE</sub> =5V                       |
|                          | *1 Current Transfer Ratio            | CTR                  | 80                 | —                  | 400  | %    |                                                                  |
|                          | Collector Current                    | I <sub>C</sub>       | 0.2                | —                  | —    | mA   | I <sub>F</sub> =1mA<br>V <sub>CE</sub> =5V                       |
|                          | *1 Current Transfer Ratio            | CTR                  | 20                 | —                  | —    | %    |                                                                  |
|                          | Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | —                  | —                  | 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 ( % ) | CTR ( % ) |
|-----------|------------------------|-----------|-----------|
| LTV-358T  | A                      | 80 ~ 160  | >20       |
|           | B                      | 130 ~ 260 | >45       |
|           | C                      | 200 ~ 400 | >70       |
|           | A or B or C or No Rank | 80 ~ 400  | >20       |

|            |                                                                                     |                                                                                     |
|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| CONDITIONS | $I_F = 5 \text{ mA}$<br>$V_{CE} = 5 \text{ V}$<br>$T_a = 25 \text{ }^\circ\text{C}$ | $I_F = 1 \text{ mA}$<br>$V_{CE} = 5 \text{ V}$<br>$T_a = 25 \text{ }^\circ\text{C}$ |
|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|

## CHARACTERISTICS CURVES

Fig.1 Forward Current vs. Ambient Temperature

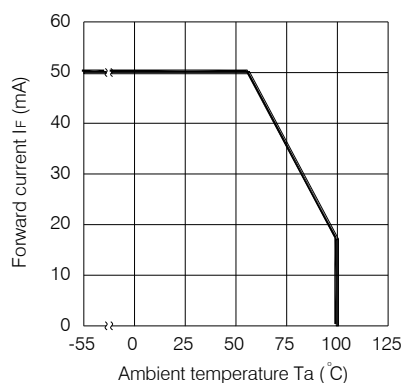


Fig.2 Collector Power Dissipation vs. Ambient Temperature

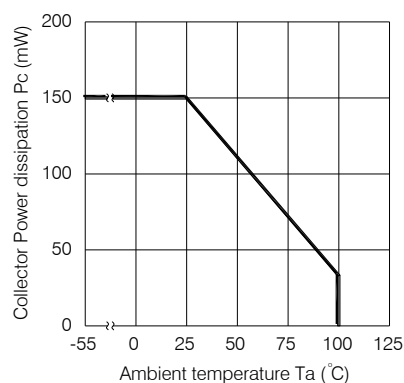


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

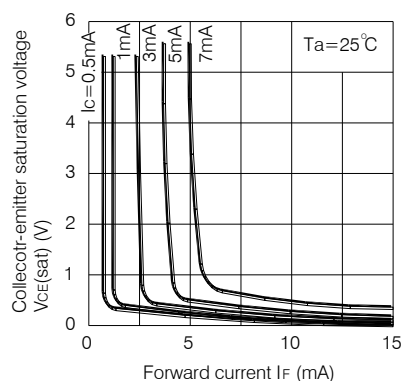


Fig.4 Forward Current vs. Forward Voltage

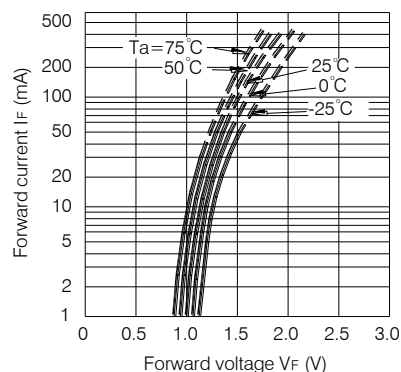


Fig.5 Current Transfer Ratio vs. Forward Current

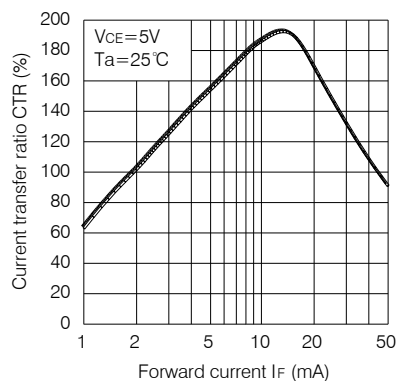
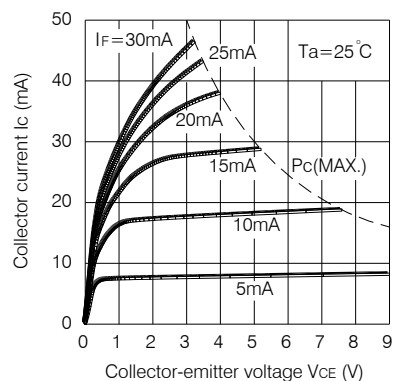


Fig.6 Collector Current vs. Collector-emitter Voltage



## CHARACTERISTICS CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

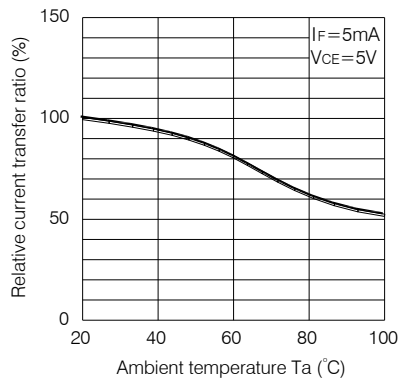


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

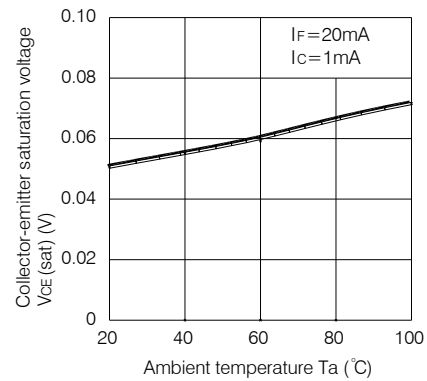


Fig.9 Collector Dark Current vs. Ambient Temperature

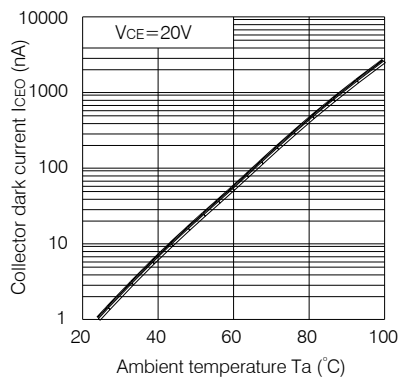


Fig.10 Response Time vs. Load Resistance

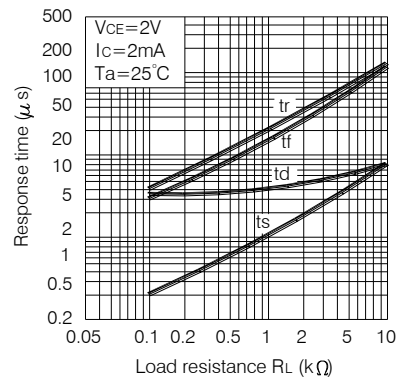
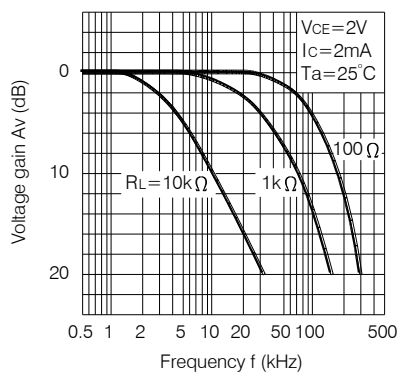
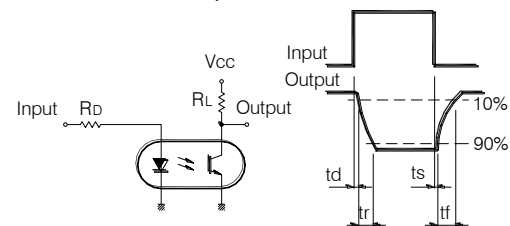


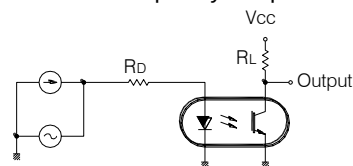
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



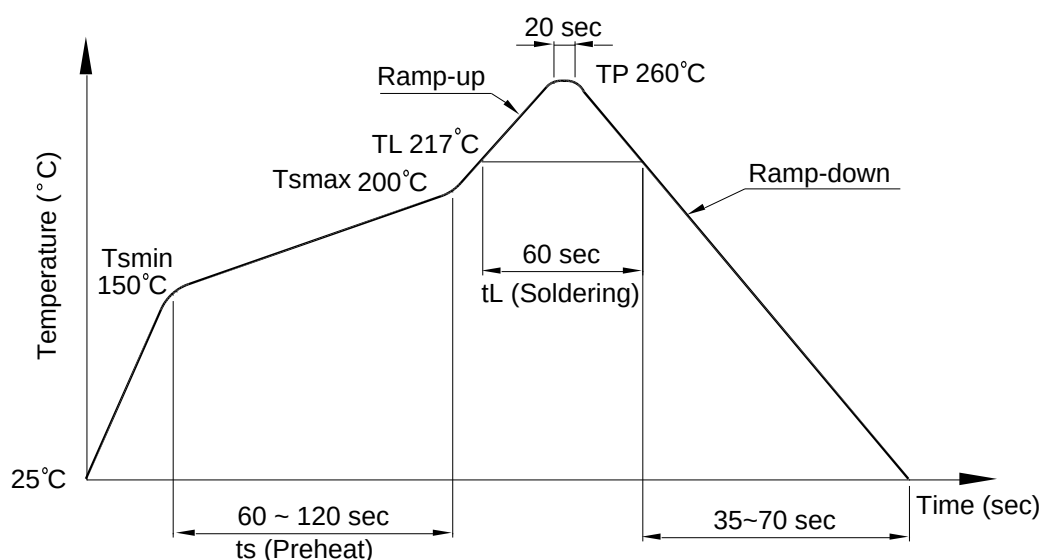


## TEMPERATURE PROFILE OF SOLDERING REFLOW

### (1) IR Reflow soldering (JEDEC-STD-020C compliant)

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

| Profile item                                                                                                | Conditions                  |
|-------------------------------------------------------------------------------------------------------------|-----------------------------|
| Preheat<br>- Temperature Min ( $T_{Smin}$ )<br>- Temperature Max ( $T_{Smax}$ )<br>- Time (min to max) (ts) | 150°C<br>200°C<br>90±30 sec |
| Soldering zone<br>- Temperature ( $T_L$ )<br>- Time ( $t_L$ )                                               | 217°C<br>60 sec             |
| Peak Temperature ( $T_P$ )                                                                                  | 260°C                       |
| Ramp-up rate                                                                                                | 3°C / sec max.              |
| Ramp-down rate                                                                                              | 3~6°C / sec                 |



## TEMPERATURE PROFILE OF SOLDERING REFLOW

### (2) Wave soldering (JEDEC22A111 compliant)

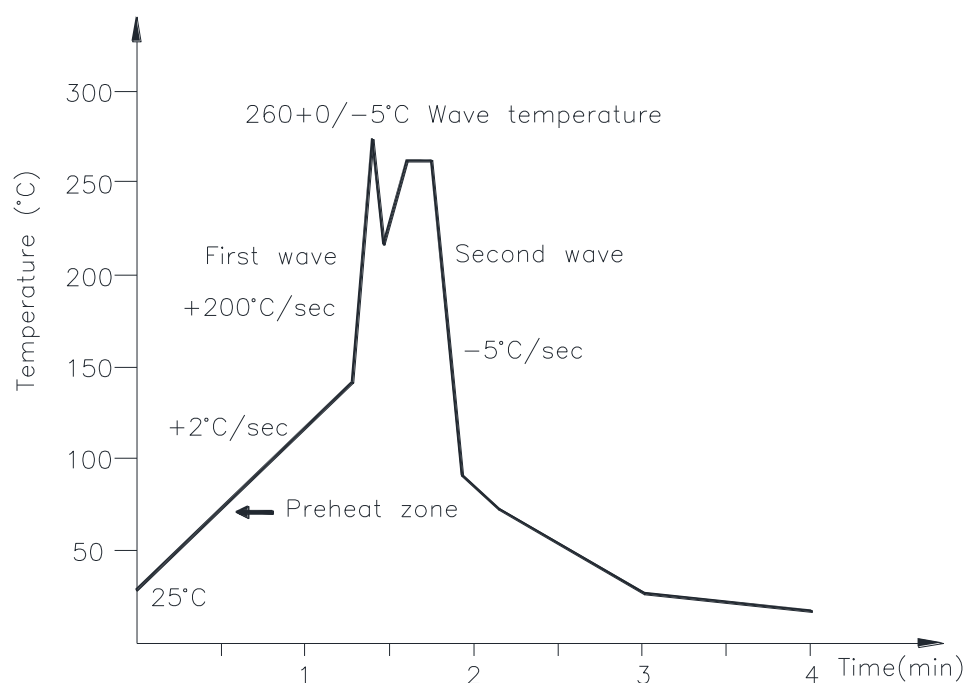
One time soldering is recommended within the condition of temperature.

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

Time: 10 sec.

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

Preheat time: 30 to 80 sec.



### (3) Hand soldering by soldering iron

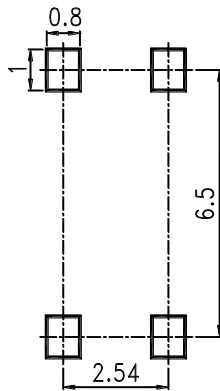
Allow single lead soldering in every single process. One time soldering is recommended.

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

Time: 3 sec max.

## RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit : mm



### **Notes:**

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- 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 body in solder paste is not recommended.

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

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