



# Photocoupler Product Data Sheet MOC3020 THRU MOC3023 SERIES

Spec No. :DS-70-99-0019  
Effective Date: 04/13/2018  
Revision 1

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

## Photocoupler MOC302X series

### 1. DESCRIPTION

#### 1.1 Features

- Isolation voltage between input and output  $V_{ISO}$  : 5,000V<sub>rms</sub>
- 6pin DIP photocoupler, triac driver output
- High repetitive peak off-state voltage  $V_{DRM}$  : Min. 400V
- High critical rate of rise of off-state voltage(  $dV/dt$  : MIN. 1000V /  $\mu s$  )
- Dual-in-line package : MOC3020, MOC3021, MOC3022, MOC3023
- Wide lead spacing package : MOC3020M, MOC3021M, MOC3022M, MOC3023M
- Surface mounting package : MOC3020S, MOC3021S, MOC3022S, MOC3023S
- Tape and reel packaging : MOC3020S-TA, MOC3021S-TA, MOC3022S-TA, MOC3023S-TA  
MOC3020S-TA1, MOC3021S-TA1, MOC3022S-TA1, MOC3023S-TA1
- Safety approval  
UL 1577, Cert. No.E113898  
CSA CA5A, Cert. No. 1020087 (CA 91533-1)  
FIMKO EN/IEC 60950-1, EN/IEC 60065; Cert. No.NCS/FI 24426 M3  
VDE DIN EN60747-5-2, Cert. No. 40015248  
CQC GB4943.1-2011/ GB8898-2011
- RoHS Compliance  
All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- MSL class1

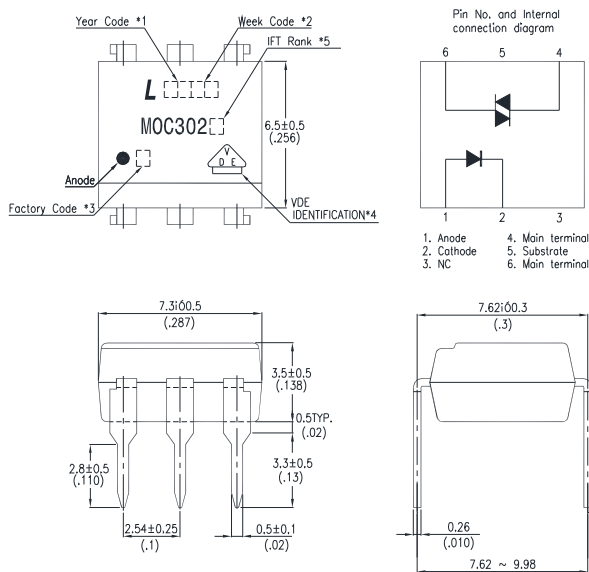
#### 1.2 Applications

- AC Motor Drives
- AC Motor Starters
- E.M. Contactors
- Lighting Controls
- Solenoid/Valve Controls
- Solid State Relays
- Static Power Switches
- Temperature Controls

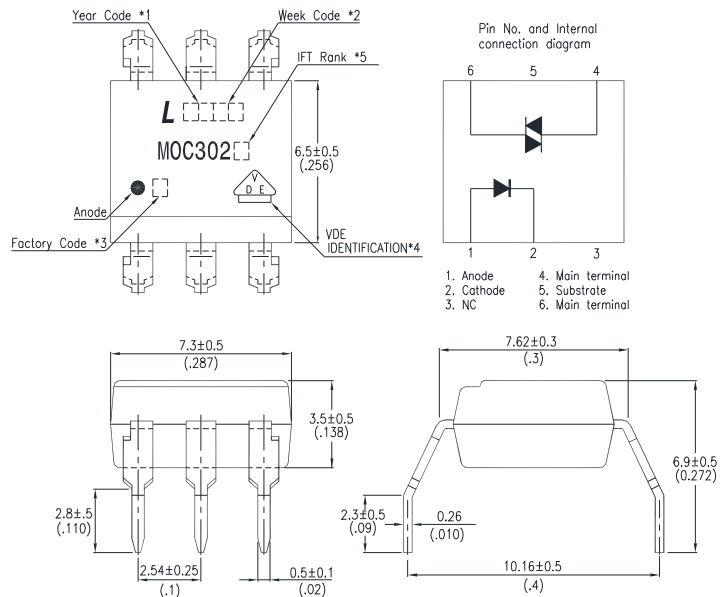
## Photocoupler MOC302X series

### 2. PACKAGE DIMENSIONS

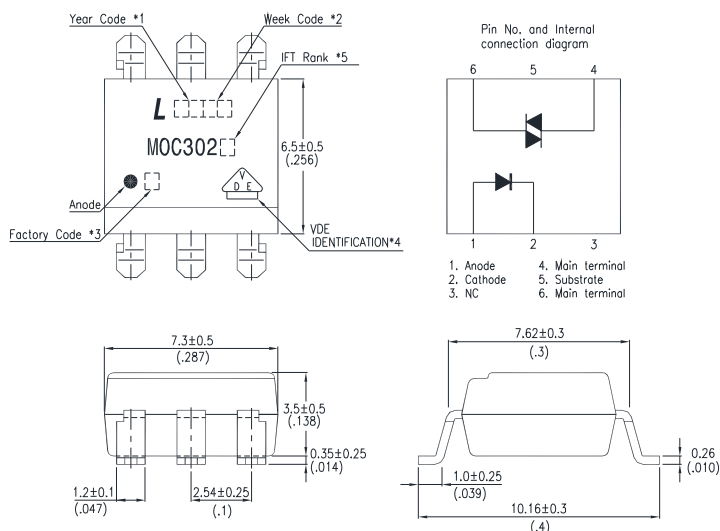
#### 2.1 MOC302X



#### 2.2 MOC302XM



#### 2.3 MOC302XS



#### Notes :

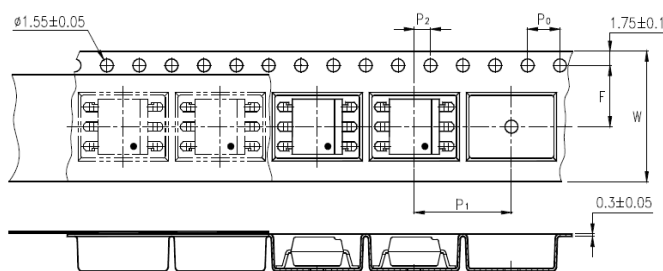
- 2-digit year code, example : 2016 = 16
- 2-digit work week ranging from '01' to '53'
- Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
- VDE option
- IFT rank

\* Dimensions are in Millimeters and (Inches).

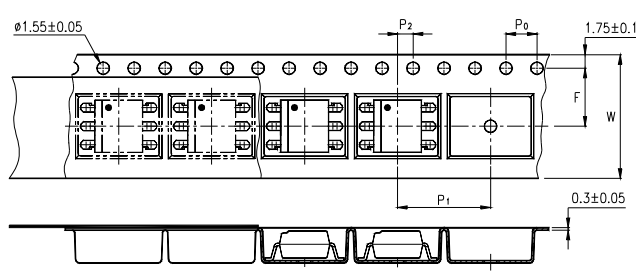
## Photocoupler MOC302X series

### 3. TAPING DIMENSIONS

#### 3.1 MOC302XS-TA



#### 3.2 MOC302XS-TA1



| Description                            | Symbol         | Dimension in mm (inch) |
|----------------------------------------|----------------|------------------------|
| Tape wide                              | W              | 16±0.3 (0.63)          |
| Pitch of sprocket holes                | P <sub>0</sub> | 4±0.1 (0.15)           |
| Distance of compartment                | F              | 7.5±0.1 (0.295)        |
|                                        | P <sub>2</sub> | 2±0.1 (0.079)          |
| Distance of compartment to compartment | P <sub>1</sub> | 12±0.1 (0.472)         |

#### 3.3 Quantities Per Reel

| Package Type     | MOC302XS series |
|------------------|-----------------|
| Quantities (pcs) | 1000            |

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### 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         |
|        | Junction Temperature                                | $T_J$     | 125        | °C        |
|        | Power Dissipation                                   | P         | 100        | mW        |
| Output | Off-State Output Terminal Voltage                   | $V_{DRM}$ | 400        | V         |
|        | Peak Repetitive Surge Current<br>( PW=1ms, 120pps ) | $I_{TSM}$ | 1          | A         |
|        | Junction Temperature                                | $T_J$     | 125        | °C        |
|        | Collector Power Dissipation                         | $P_C$     | 300        | mW        |
|        | Total Power Dissipation                             | $P_{tot}$ | 330        | mW        |
| 1.     | Isolation Voltage                                   | $V_{iso}$ | 5000       | $V_{rms}$ |
|        | 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                   |                                            | $V_F$            | —    | 1.15 | 1.4  | V                | $I_F=20\text{mA}$                  |
|           | Reverse Current                   |                                            | $I_R$            | —    | 0.05 | 10   | $\mu\text{A}$    | $V_R=6\text{V}$                    |
| Output    | 1                                 | Peak Blocking Current, Either Direction    | $I_{\text{DRM}}$ | —    | 10   | 100  | nA               | $V_{\text{DRM}} = 400\text{V}$     |
|           |                                   | Peak On-State Voltage, Either Direction    | $V_{\text{TM}}$  | —    | —    | 3.0  | V                | $I_{\text{TM}}=100\text{ mA Peak}$ |
|           | 2                                 | Critical rate of Rise of Off-State Voltage | $dv/dt$          | 1000 | —    | —    | V/ $\mu\text{s}$ | $V_{\text{in}}=240\text{Vrms}$     |
| Couple    | 3                                 | Led Trigger                                | $I_{\text{FT}}$  | —    | —    | 15   | mA               | Main Terminal Voltage = 3V         |
|           |                                   | Current, Current                           |                  | —    | —    | 10   |                  |                                    |
|           |                                   | Required to                                |                  | —    | —    | 5    |                  |                                    |
|           | Holding Current, Either Direction |                                            | $I_H$            | —    | 200  | —    | $\mu\text{A}$    |                                    |

\*1. Test voltage must be applied within  $dv/dt$  rating.

\*2. This is static  $dv/dt$ . Commutating  $dv/dt$  is a function of the load-driving thyristor(s) only.

\*3. All devices are guaranteed to trigger at an  $I_F$  value less than or equal to max  $I_{\text{FT}}$ . Therefore, recommended operating  $I_F$  lies between max  $I_{\text{FT}}$ , 30 mA for MOC3020, 15 mA for MOC3021, 10 mA for MOC3022, 5 mA for MOC3023, and absolute max  $I_F$  (50mA)

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### 5. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Fig.1 Forward Current vs.  
Ambient Temperature

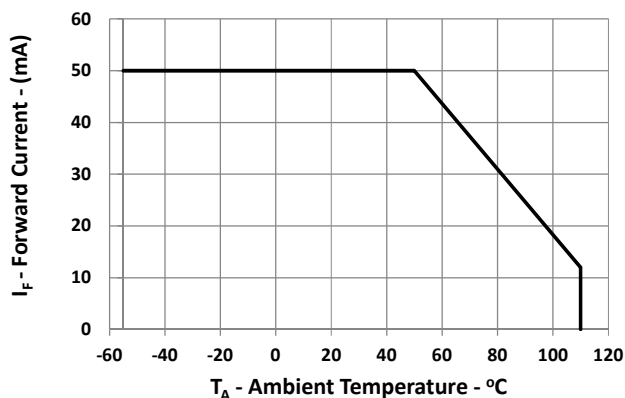


Fig.2 On-state Current vs. Ambient  
Temperature

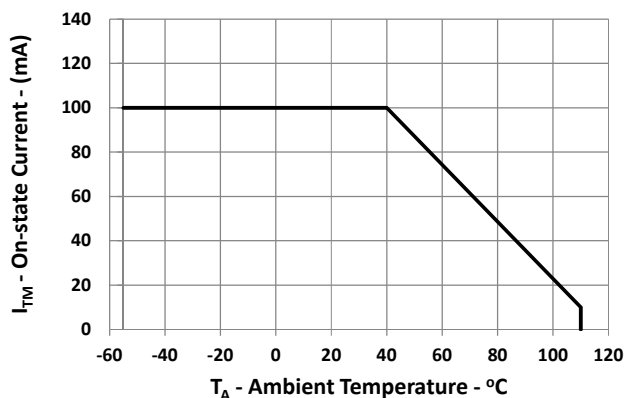


Fig.3 Minimum Trigger Current  
vs. Ambient Temperature

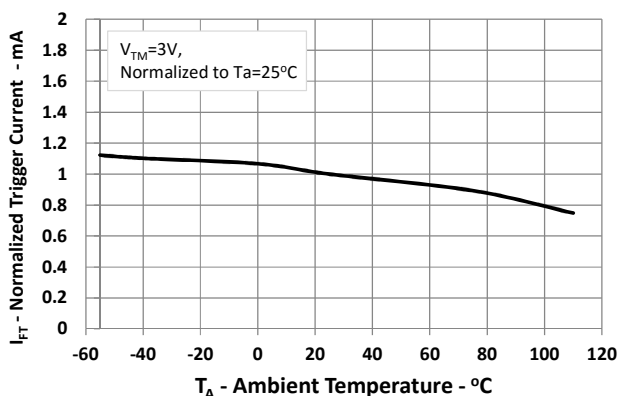


Fig.4 Forward Current vs. Forward  
Voltage

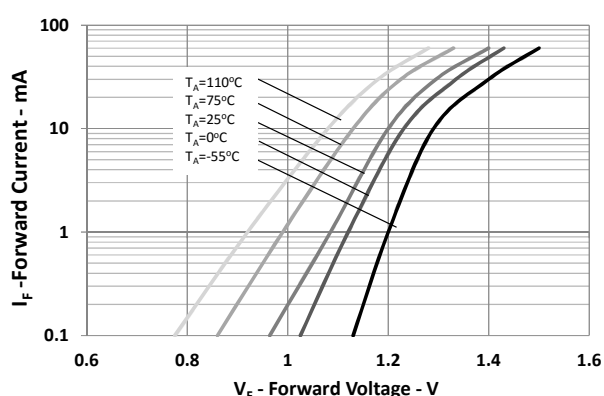


Fig.5 On-state Voltage vs. Ambient  
Temperature

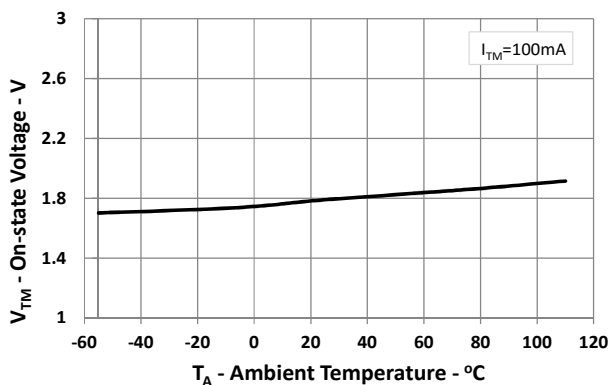
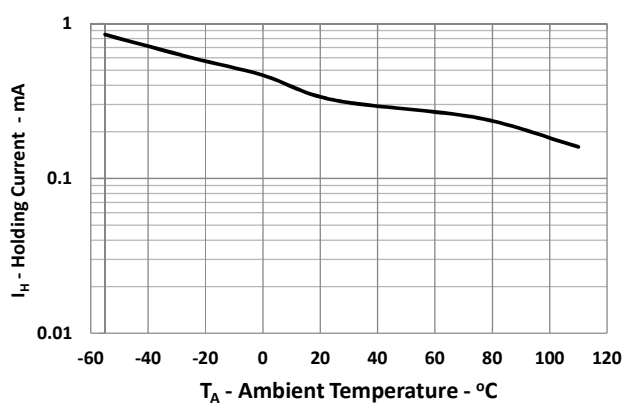


Fig.6 Holding Current vs.  
Ambient Temperature



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Fig.7 Repetitive Peak Off-state Current  
vs. Temperature

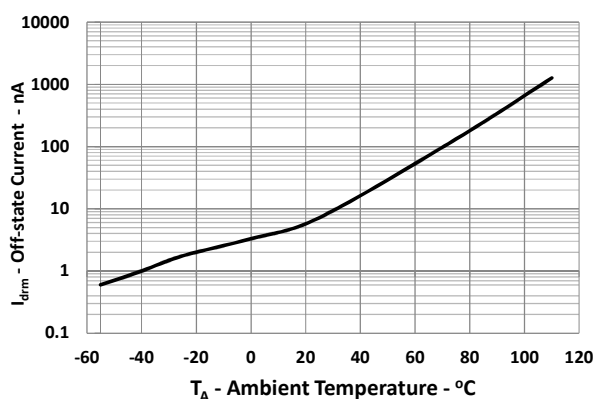
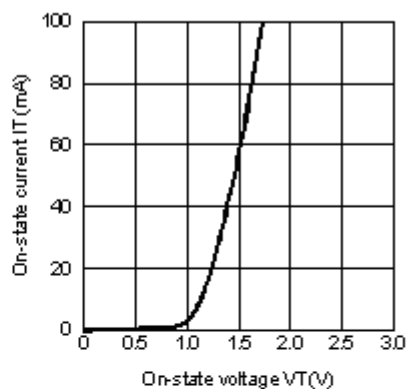
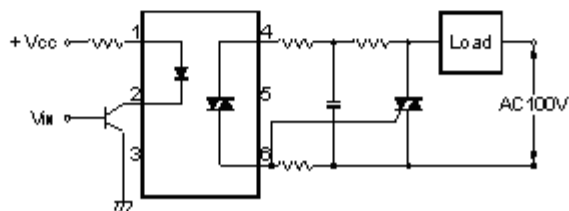


Fig.8 On-state Current vs.  
On-state Voltage



Basic Operation Circuit

Medium/High Power Triac Drive Circuit



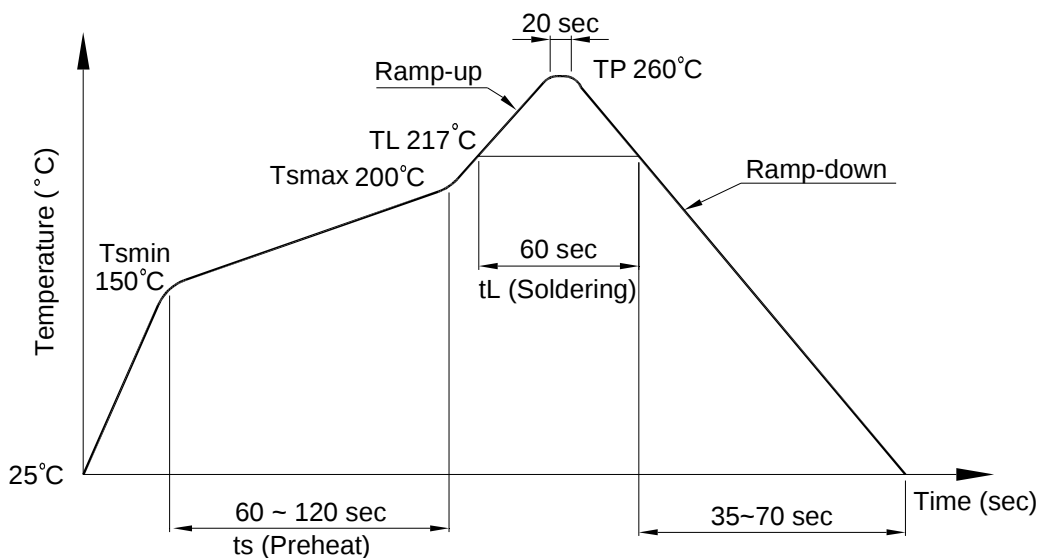
## Photocoupler MOC302X series

### 6. TEMPERATURE PROFILE OF SOLDERING

#### 6.1 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) ( $t_s$ )    | 90±30 sec      |
| Soldering zone                   |                |
| - Temperature ( $T_L$ )          | 217°C          |
| - Time ( $t_L$ )                 | 60 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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### 6.2 Wave soldering (JEDEC22A111 compliant)

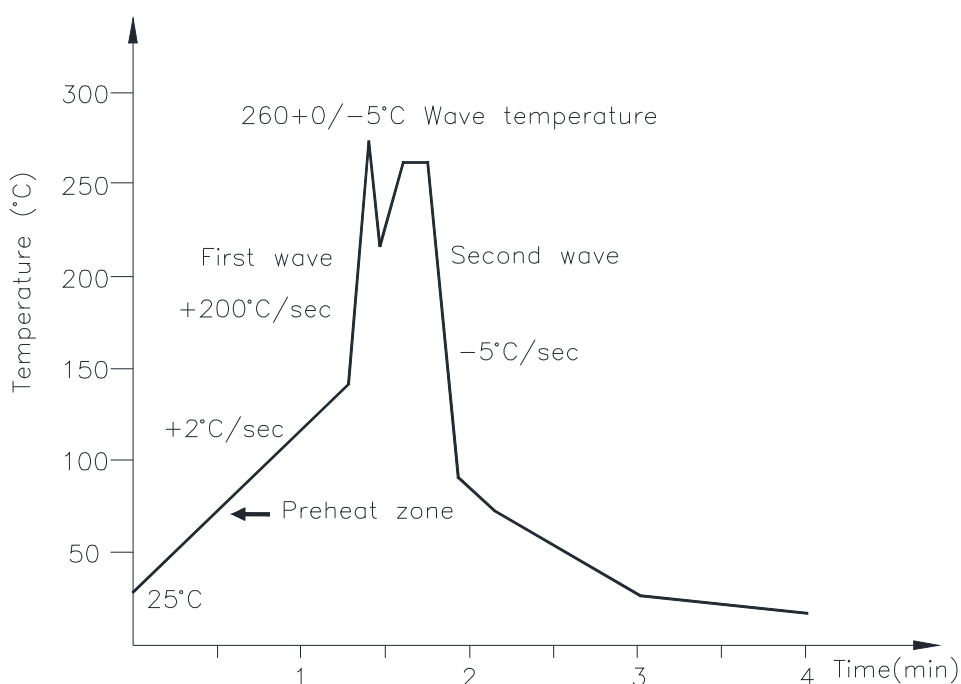
One time soldering is recommended within the condition of temperature.

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.



### 6.3 Hand soldering by soldering iron

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

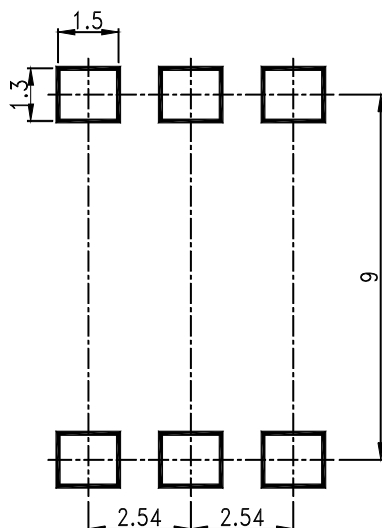
Temperature:  $380 \pm 0/-5^{\circ}\text{C}$

Time: 3 sec max.

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**7. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)**

Unit: mm



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### 8. NAMING RULE

# MOC302(X)(1)-(2)

DEVICE PART NUMBER (MOC302X)

Please refer to Electrical Optical  
Characteristics Table on Page P5

(1) FORM TYPE (S, M or none)

(2) TAPING TYPE (TA, TA1)

Example : MOC3021S-TA1

# MOC302(X)(1)(2)-V

DEVICE PART NUMBER (MOC302X)

Please refer to Electrical Optical  
Characteristics Table on Page P5

(1) FORM TYPE (S, M or none)

(2) TAPING TYPE (TA, TA1)

(3) VDE option

Example : MOC3021STA1-V

### 9. NOTES

- LiteOn is continually improving the quality, reliability, function or design and LiteOn 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.
- Immerge unit's body in solder paste is not recommended.