

## Photocouplers MOC3020 THRU MOC3023 SERIES

### 1. DESCRIPTION

#### 1.1 Features

- 6 Pin DIP photocoupler, Triac driver output
- High input-output isolation voltage  
Viso = 5,000Vrms
- High repetitive peak off-state voltage  
V<sub>DRM</sub>: Min. 400 V.
- 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 approved (No. E113898)
  - \* TUV approved (No. R9653630)
  - \* CSA approved (No. CA91533-1)
  - \* VDE approved ( No. 40015248)
  - \* CQC approved (No.CQC11001061921-2)
- RoHS Compliance  
All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 8000V/MM2000V
- MSL class1

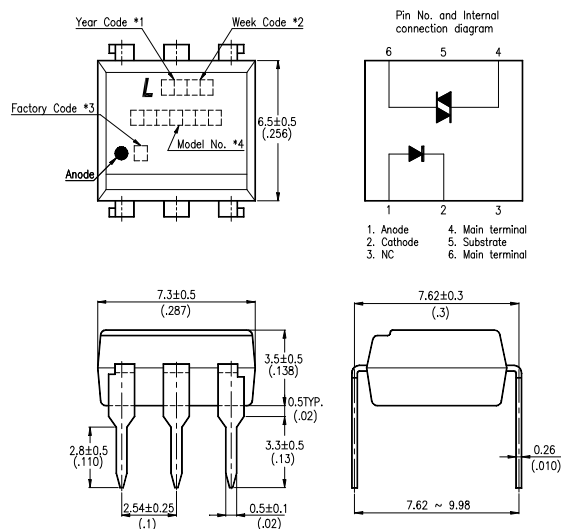
#### 1.2 Applications

- Motor Controls.
- Solid state relays
- For triggering high power thyristor and triac
- Household use equipment

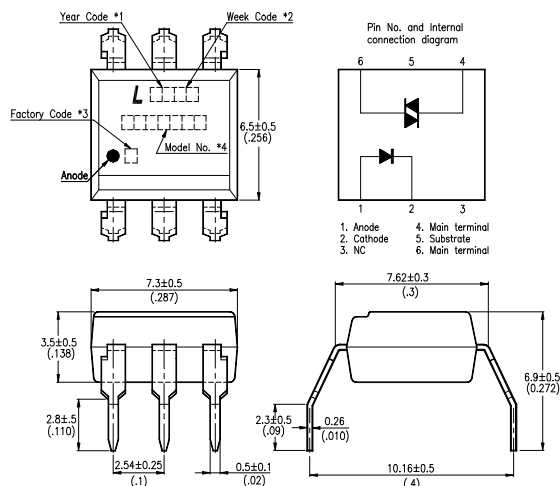
## Photocouplers MOC3020 THRU MOC3023 SERIES

### 2. PACKAGE DIMENSIONS

#### 2.1 MOC3020, MOC3021, MOC3022, MOC3023 :



#### 2.2 MOC3020M, MOC3021M, MOC3022M, MOC3023M :

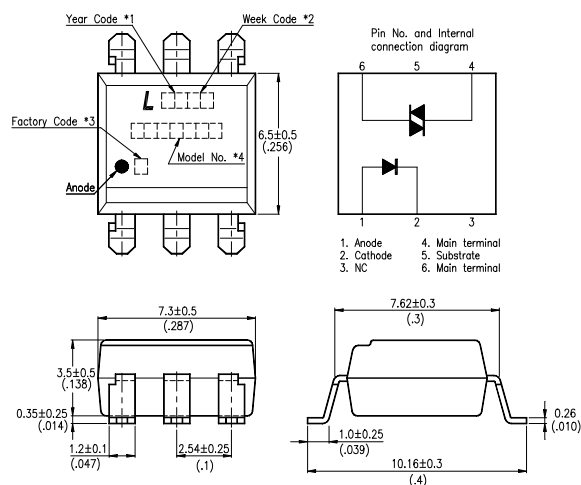


#### Notes :

1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (Y: Thailand, W: China-CZ, X: China-TJ).
4. Model No. MOC3020, MOC3021, MOC3022, MOC3023

## Photocouplers MOC3020 THRU MOC3023 SERIES

### 2.3 MOC3020S, MOC3021S, MOC3022S, MOC3023S :



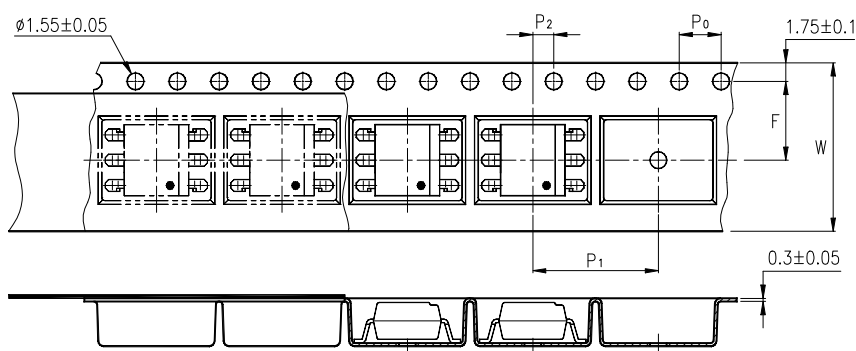
#### Notes :

1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (Y: Thailand, W: China-CZ, X: China-TJ).
4. Model No.MOC3020, MOC3021, MOC3022, MOC3023

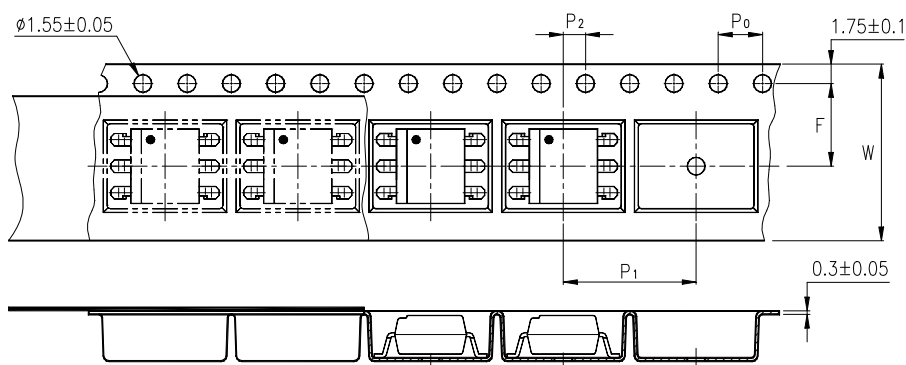
## Photocouplers MOC3020 THRU MOC3023 SERIES

### 3. TAPING DIMENSIONS

#### 3.1 MOC3020S-TA, MOC3021S-TA, MOC3022S-TA, MOC3023S-TA :



#### 3.2 MOC3020S-TA1, MOC3021S-TA1, MOC3022S-TA1, MOC3023S-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)         |

## Photocouplers MOC3020 THRU MOC3023 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                                   | $P_D$     | 70         | mW               |
| Output                              | Off-State Output Terminal Voltage                   | $V_{DRM}$ | 400        | V                |
|                                     | Peak Repetitive Surge Current<br>(PW=100μs, 120pps) | $I_{TSM}$ | 1          | A                |
|                                     | Collector Power Dissipation                         | $P_C$     | 300        | mW               |
| Total Power Dissipation             |                                                     | $P_{tot}$ | 330        | mW               |
| *1 Isolation Voltage                |                                                     | $V_{iso}$ | 5,000      | V <sub>rms</sub> |
| Ambient Operating Temperature Range |                                                     | $T_A$     | -40 ~ +100 | °C               |
| Storage Temperature Range           |                                                     | $T_{stg}$ | -55 ~ +150 | °C               |
| *2 Soldering Temperature            |                                                     | $T_L$     | 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

## Photocouplers MOC3020 THRU MOC3023 SERIES

### 4.2 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

| PARAMETER |                                                                            |         | SYMBOL           | MIN. | TYP. | MAX. | UNIT | CONDITIONS                   |
|-----------|----------------------------------------------------------------------------|---------|------------------|------|------|------|------|------------------------------|
| INPUT     | Forward Voltage                                                            |         | V <sub>F</sub>   | —    | 1.15 | 1.5  | V    | I <sub>F</sub> =20mA         |
|           | Reverse Current                                                            |         | I <sub>R</sub>   | —    | —    | 10   | μA   | V <sub>R</sub> =6V           |
| OUTPUT    | *1 Peak Blocking Current, Either Direction                                 |         | I <sub>DRM</sub> | —    | 10   | 100  | nA   | V <sub>DRM</sub> = 400V      |
|           | Peak On-State Voltage, Either Direction                                    |         | V <sub>TM</sub>  | —    | 1.7  | 3    | V    | I <sub>TM</sub> =100 mA Peak |
|           | *2 Critical rate of Rise of Off-State Voltage                              |         | dv/dt            | 1000 | —    | —    | V/μs |                              |
| COUPLED   | *3 Led Trigger Current, Current Required to Latch Output, Either Direction | MOC3020 | I <sub>FT</sub>  | —    | 15   | 30   | mA   | Main Terminal Voltage = 3V   |
|           |                                                                            | MOC3021 |                  | —    | 8    | 15   |      |                              |
|           |                                                                            | MOC3022 |                  | —    | —    | 10   |      |                              |
|           |                                                                            | MOC3023 |                  | —    | —    | 5    |      |                              |
|           | Holding Current, Either Direction                                          |         | I <sub>H</sub>   | —    | 250  | —    | μA   |                              |

\*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<sub>F</sub> value less than or equal to max I<sub>FT</sub>. Therefore, recommended operating I<sub>F</sub> lies between max I<sub>FT</sub>, 30 mA for MOC3020, 15 mA for MOC3021, 10 mA for MOC3022, 5 mA for MOC3023, and absolute max I<sub>F</sub> (50mA)

## Photocouplers MOC3020 THRU MOC3023 SERIES

### 5. CHARACTERISTICS CURVES

Fig.1 Forward Current vs. Ambient Temperature

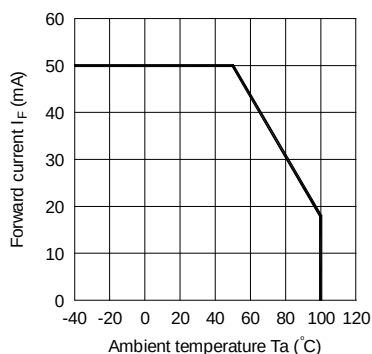


Fig.2 On-state Current vs. Ambient Temperature

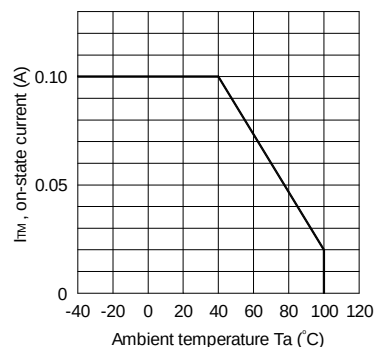


Fig.3 Minimum Trigger Current vs. Ambient Temperature

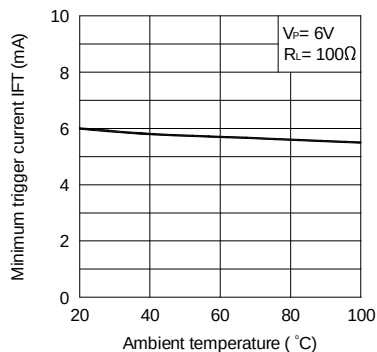


Fig.4 Forward Current vs. Forward Voltage

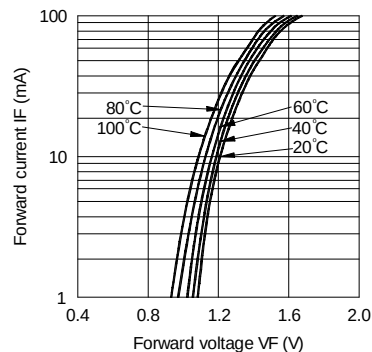


Fig.5 On-state Voltage vs. Ambient Temperature

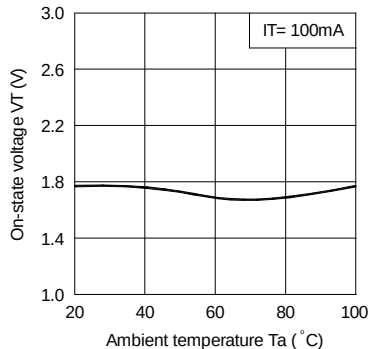
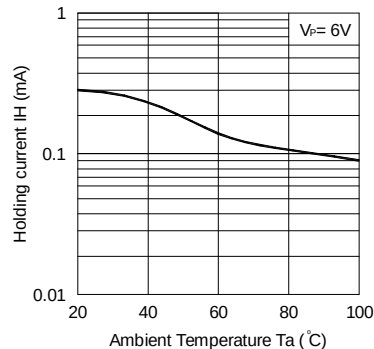


Fig.6 Holding Current vs. Ambient Temperature



# Photocouplers MOC3020 THRU MOC3023 SERIES

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

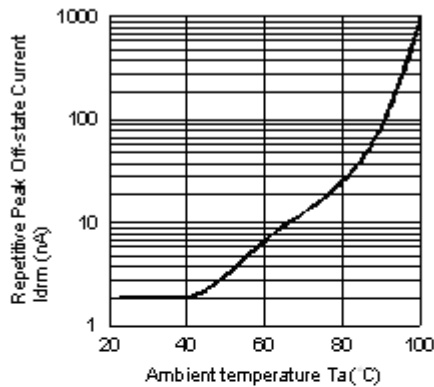
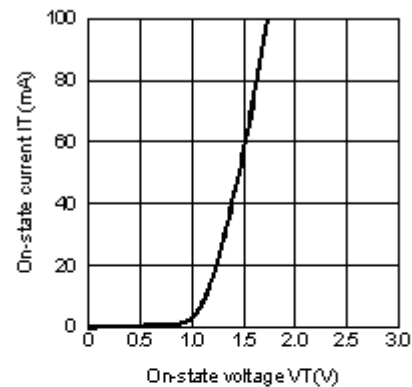
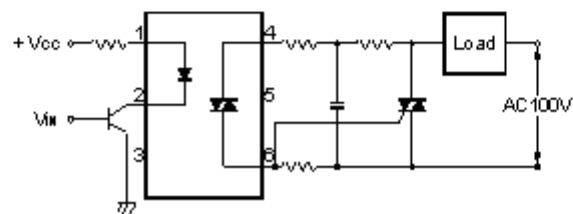


Fig.8 On-state Current vs.  
On-state Voltage



Basic Operation Circuit

Medium/High Power Triac Drive Circuit





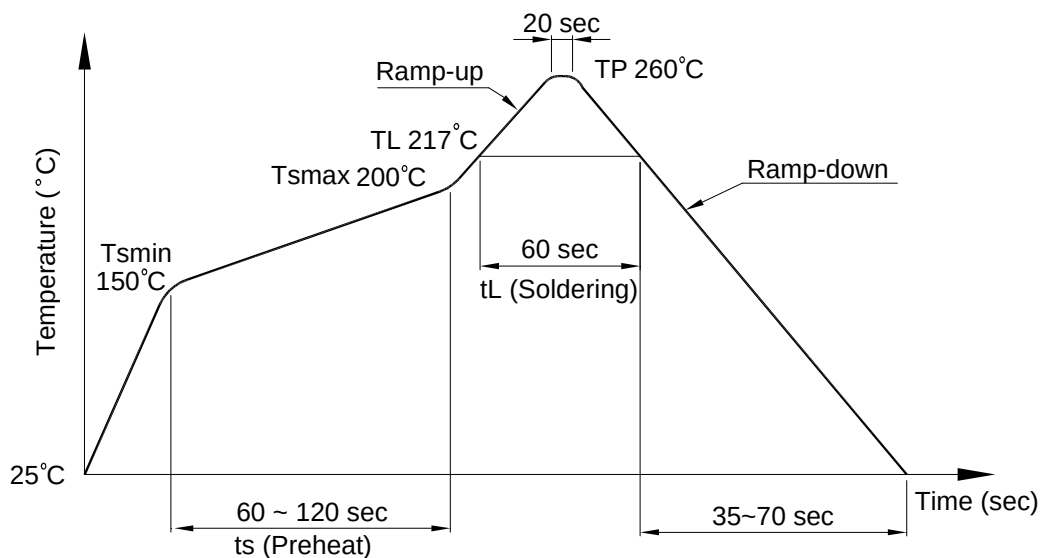
## Photocouplers MOC3020 THRU MOC3023 SERIES

### 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    |



## Photocouplers MOC3020 THRU MOC3023 SERIES

### 6.2 Wave soldering (JEDEC22A111 compliant)

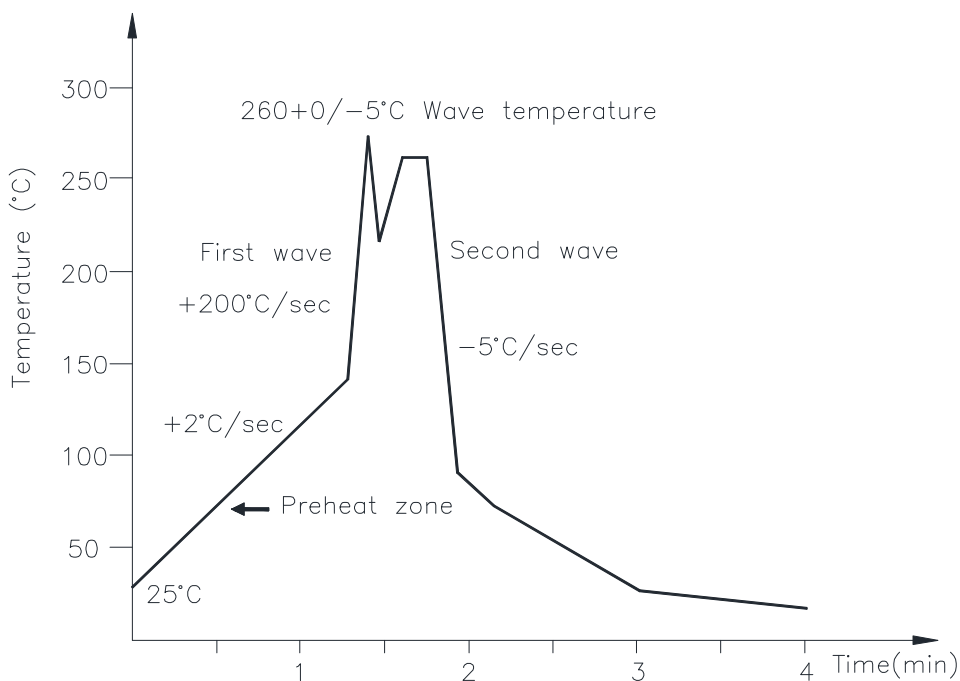
One time soldering is recommended within the condition of temperature.

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.

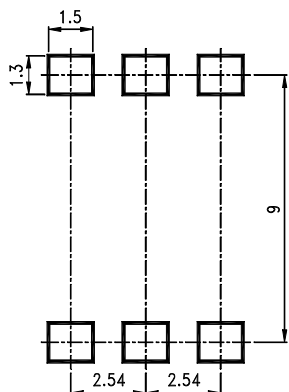
Temperature:  $380 \pm 0/-5^{\circ}\text{C}$

Time: 3 sec max.

## Photocouplers MOC3020 THRU MOC3023 SERIES

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

Unit: mm



### 8. NAMING RULE

# MOC302X(1)-(2)

DEVICE PART NUMBER

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

(2)= TAPING TYPE (TA, TA1 or none)

### 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.