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LITEON®
OPTOELECTRONICS

# Photocoupler

## Product Data Sheet

## MOC3020 THRU MOC3023 SERIES

**Spec No.: DS-70-99-0019**

Effective Date: 06/23/2016

Revision: H

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

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# Photocoupler
# MOC302X series

## 1. DESCRIPTION

### 1.1 Features

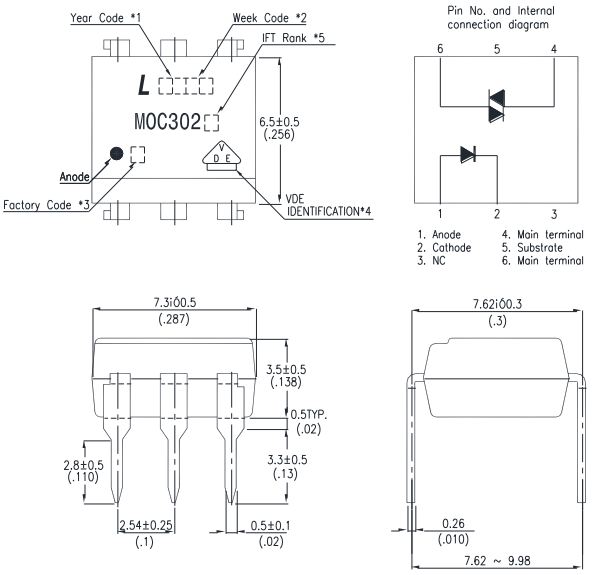
- Isolation voltage between input and output $V_{iso}$ : 5,000$V_{rms}$
- 6pin DIP photocoupler, triac driver output
- High repetitive peak off-state voltage $V_{DRM}$ : Min. 400V
- High critical rate of rise of off-state voltage( dV/dt : MIN. 1000V / μs )
- Dual-in-line package : MOC3020, MOC3021, MOC3022, 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

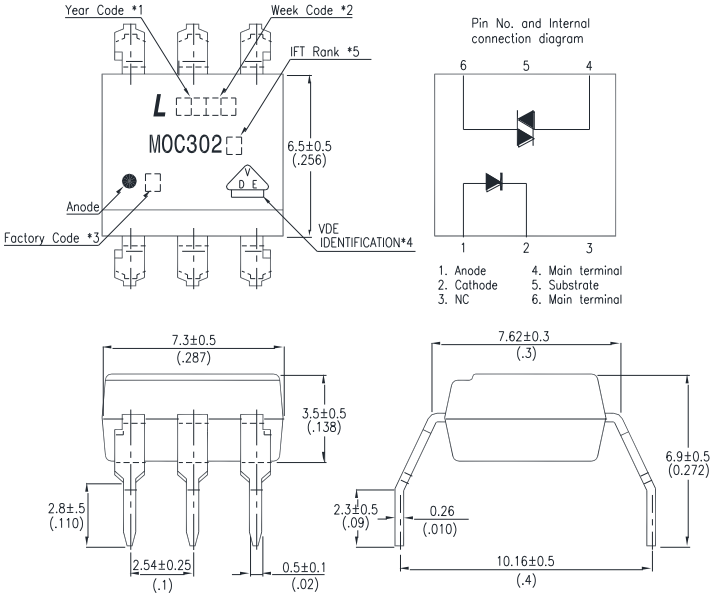
- AC Motor Drives
- AC Motor Starters
- E.M. Contactors
- Lighting Controls
- Solenoid/Valve Controls
- Solid State Relays
- Static Power Switches
- Temperature Controls

## 2. PACKAGE DIMENSIONS

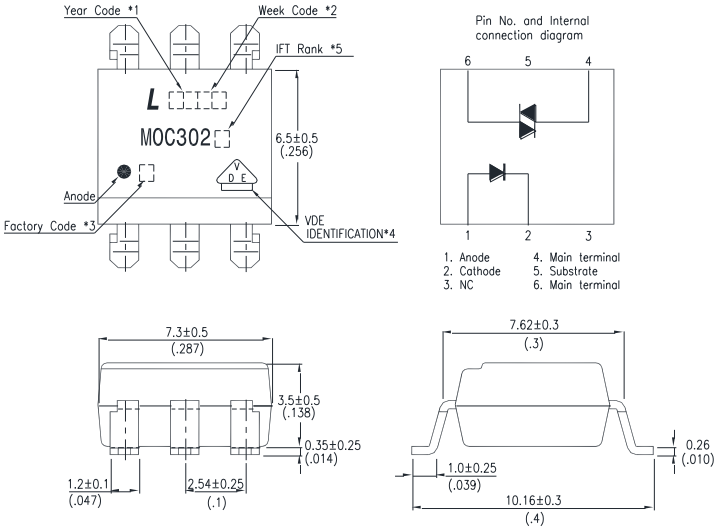
### 2.1 MOC302X




### 2.2 MOC302XM




### 2.3 MOC302XS



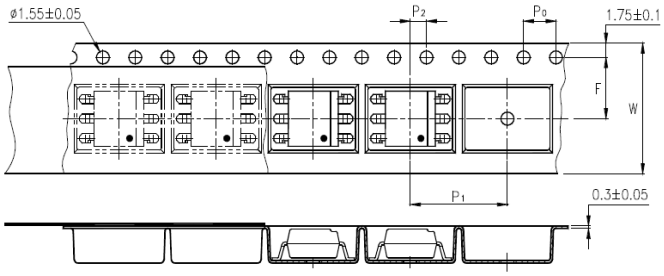

**Notes :**

1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. VDE option
5. $I_{FT}$ rank

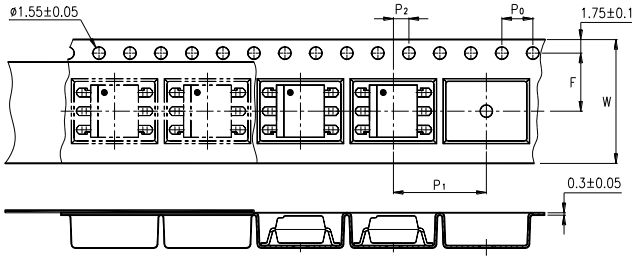
* Dimensions are in Millimeters and (Inches).

# 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 | $P_0$ | 4±0.1 (0.15) |
| Distance of compartment | F | 7.5±0.1 (0.295) |
| | $P_2$ | 2±0.1 (0.079) |
| Distance of compartment to compartment | $P_1$ | 12±0.1 (0.472) |

## 3.3 Quantities Per Reel

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

# 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 ( 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 | $T_{opr}$ | -40 ~ +100 | °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

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

| Parameter | | | Symbol | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|---|---|
| Input | | Forward Voltage | $V_F$ | — | 1.15 | 1.5 | V | $I_F$=20mA |
| | | Reverse Current | $I_R$ | — | 0.05 | 10 | μA | $V_R$=6V |
| Output | 1 | Peak Blocking Current, Either Direction | $I_{DRM}$ | — | 10 | 100 | nA | $V_{DRM}$ = 400V |
| | | Peak On-State Voltage, Either Direction | $V_{TM}$ | — | 1.7 | 3.0 | V | $I_{TM}$=100 mA Peak |
| | 2 | Critical rate of Rise of Off-State Voltage | dv/dt | 1000 | — | — | V/μs | Vin=240Vrms |
| Couple | 3 | Led Trigger Current, Current Required to Latch Output, MOC3020 | $I_{FT}$ | — | — | 30 | mA | Main Terminal Voltage = 3V |
| | | MOC3021 | | — | — | 15 | | |
| | | MOC3022 | | — | — | 10 | | |
| | | MOC3023 | | — | — | 5 | | |
| | | Holding Current, Either Direction | $I_H$ | — | 200 | — | 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 $I_F$ value less than or equal to max $I_{FT}$. Therefore, recommended operating $I_F$ lies between max $I_{FT}$, 30 mA for MOC3020, 15 mA for MOC3021, 10 mA for MOC3022, 5 mA for MOC3023, and absolute max $I_F$ (50mA)

## 5. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Fig.1 Forward Current vs. Ambient Temperature

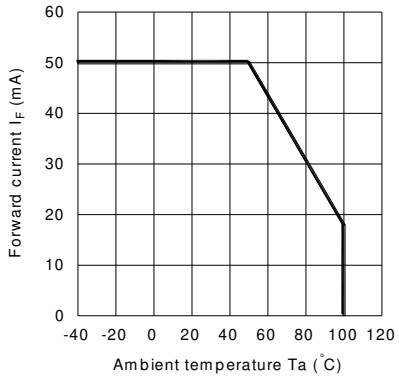



Fig.2 On-state Current vs. Ambient Temperature

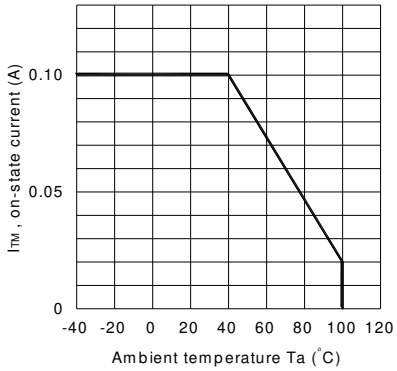



Fig.3 Minimum Trigger Current vs. Ambient Temperature

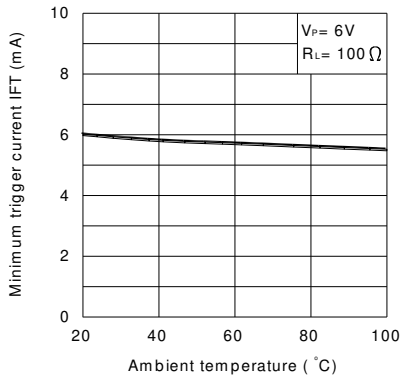



Fig.4 Forward Current vs. Forward Voltage

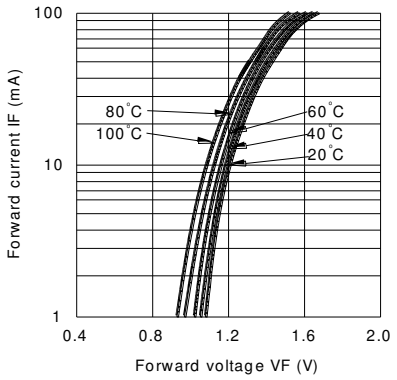



Fig.5 On-state Voltage vs. Ambient Temperature

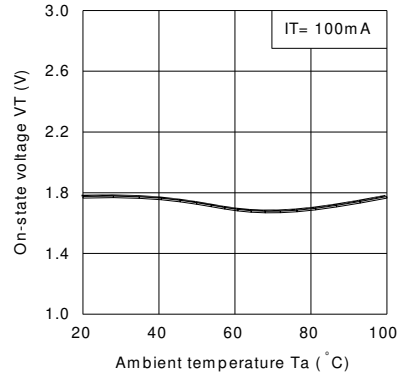



Fig.6 Holding Current vs. Ambient Temperature

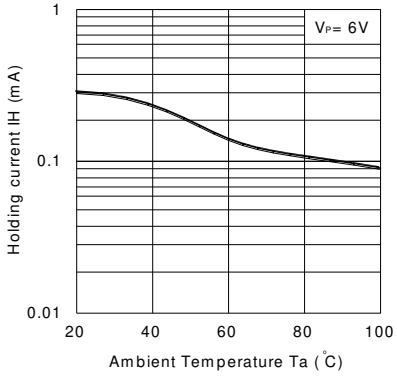


Fig.7 Repetitive Peak Off-state Current vs. Temperature

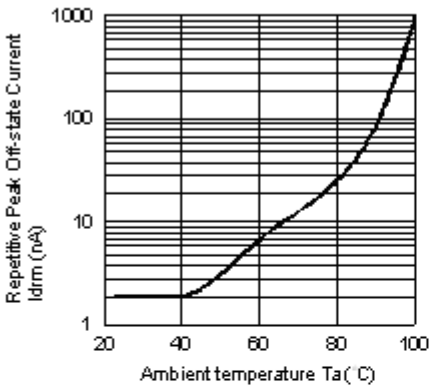
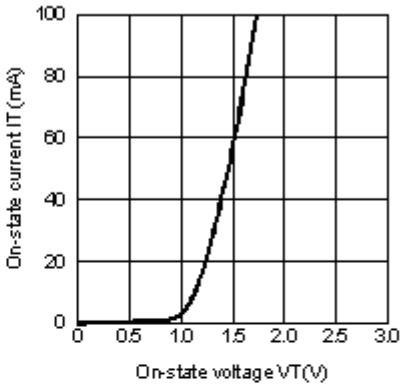
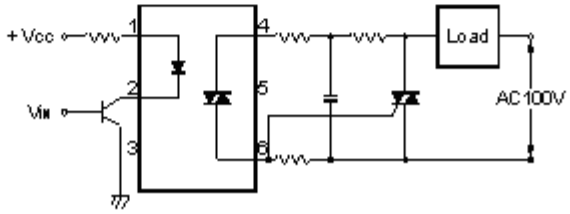



Fig.8 On-state Current vs. On-state Voltage




Basic Operation Circuit
Medium/High Power Triac Drive Circuit

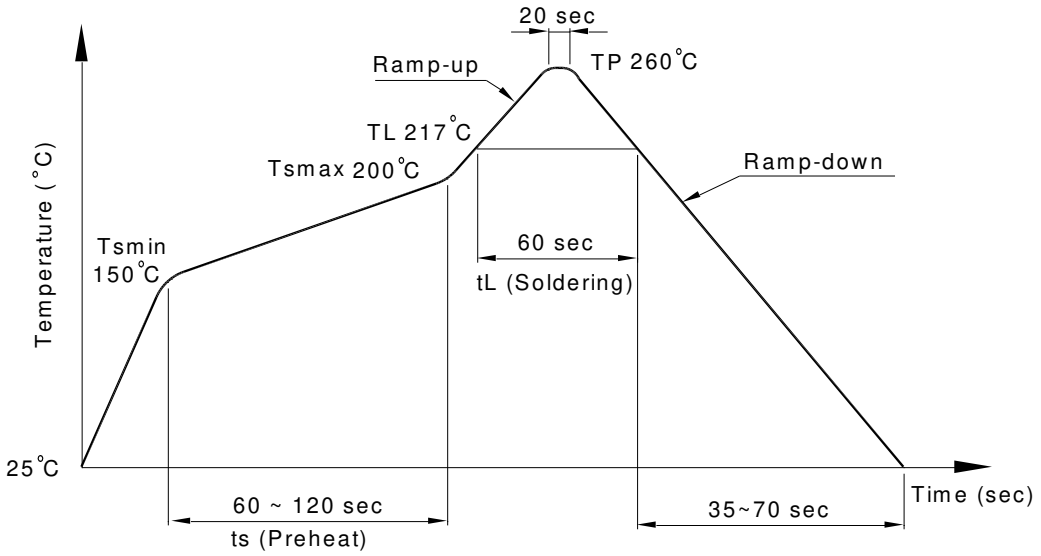


# 6. TEMPERATURE PROFILE OF SOLDERING

## 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) (ts) | 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 |



## 6.2 Wave soldering (JEDEC22A111 compliant)

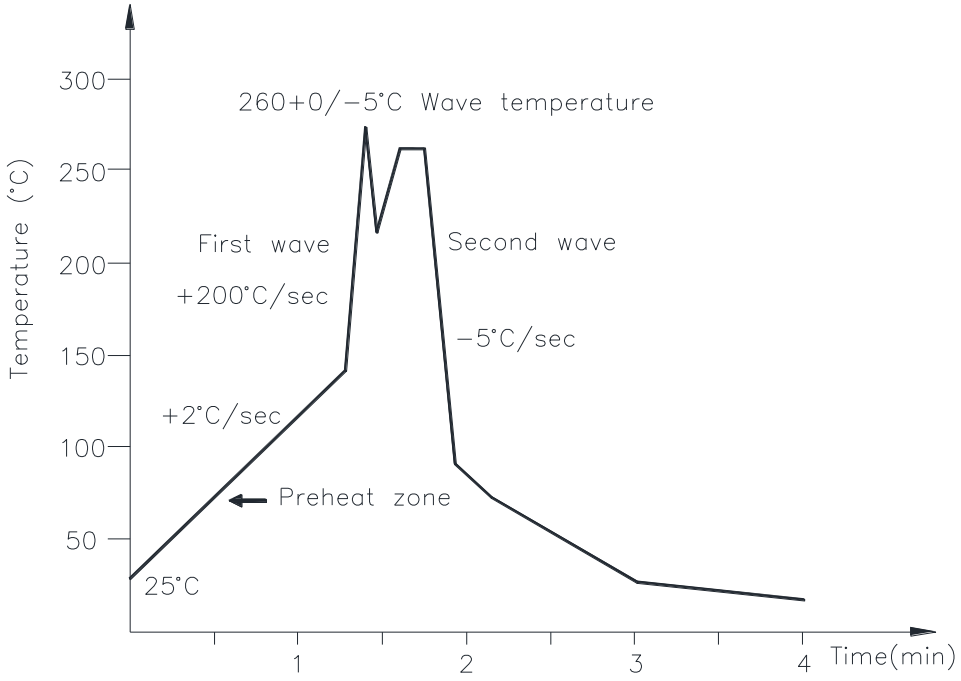
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C

Time: 10 sec.

Preheat temperature:25 to 140˚C

Preheat time: 30 to 80 sec.




## 6.3 Hand soldering by soldering iron

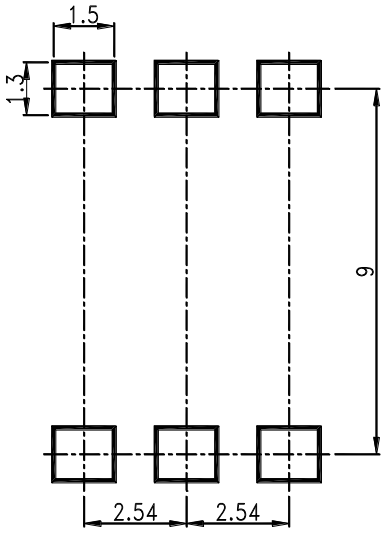
Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380+0/-5˚C

Time: 3 sec max.

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

Unit: mm



## 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.