



# Photocoupler Product Data Sheet MOC3020 THRU MOC3023 SERIES

Spec No. :DS-70-99-0019  
Effective Date: 05/03/2019  
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
- Halogen free option

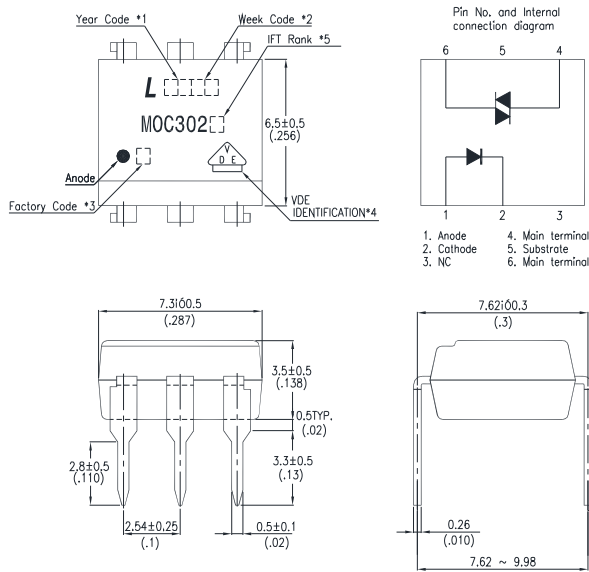
#### 1.2 Applications

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

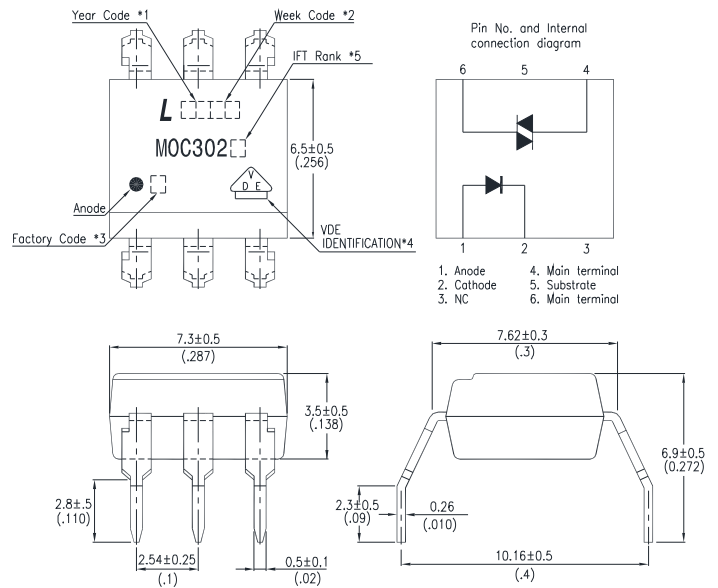
## Photocoupler MOC302X series

### 2. PACKAGE DIMENSIONS

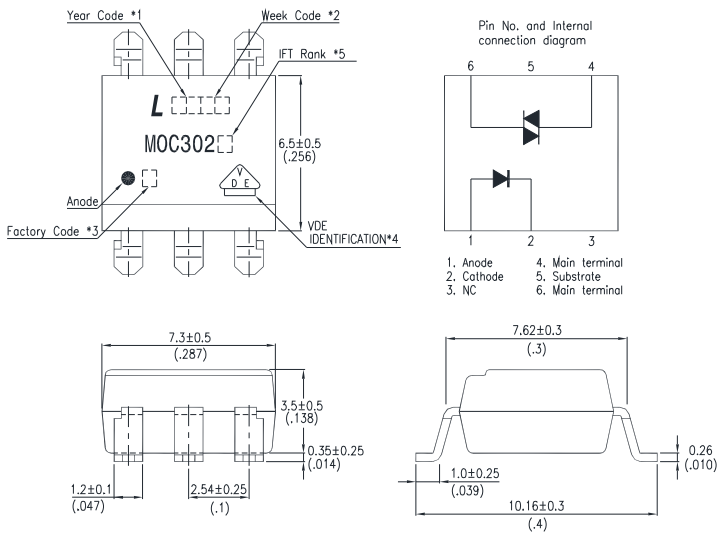
#### 2.1 MOC302X



#### 2.2 MOC302XM



#### 2.3 MOC302XS



#### Notes :

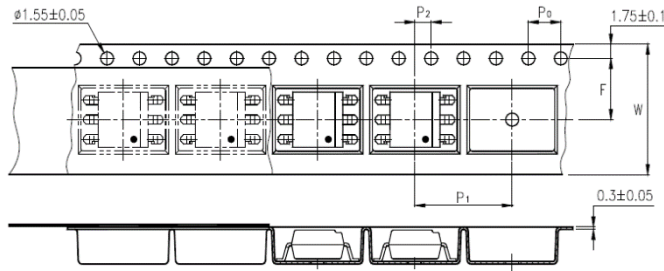
1. 2-digit year code, example : 2016 = 16
2. 2-digit work week ranging from '01' to '53'
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. VDE option
5. I<sub>FT</sub> rank

\* Dimensions are in Millimeters and (Inches).

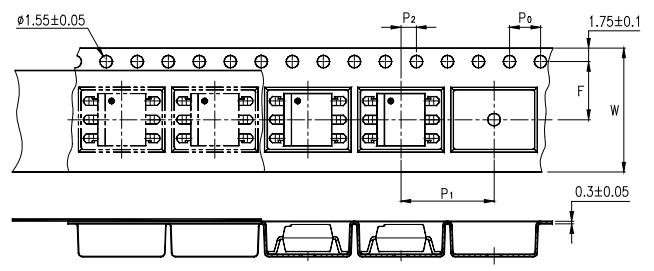
## Photocoupler MOC302X series

### 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 ( 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 ~ +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 Recommended Operating Conditions (Note)

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	$V_{AC}$	-	-	120	Vac
Forward Current	MOC3021	22.5	25	30	mA
	MOC3022	15	20	30	mA
	MOC3023	7.5	10	30	mA
Operating Temperature	$T_{opr}$	-25	-	85	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

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### 4.3 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	$I_{DRM}$	—	10	100	nA	$V_{DRM} = 400\text{V}$
	Peak On-State Voltage, Either Direction	$V_{TM}$	—	—	3.0	V	$I_{TM}=100\text{ mA Peak}$
	2 Critical rate of Rise of Off-State Voltage	$dv/dt$	1000	—	—	V/ $\mu\text{s}$	$V_{in}=240\text{Vrms}$
Couple	Led Trigger Current, Current Required to Latch Output, Either Direction	MOC3021	—	—	15	mA	Main Terminal Voltage = 3V
		MOC3022	—	—	10		
		MOC3023	—	—	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.

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### 5. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Fig.1 Forward Current vs. Ambient Temperature

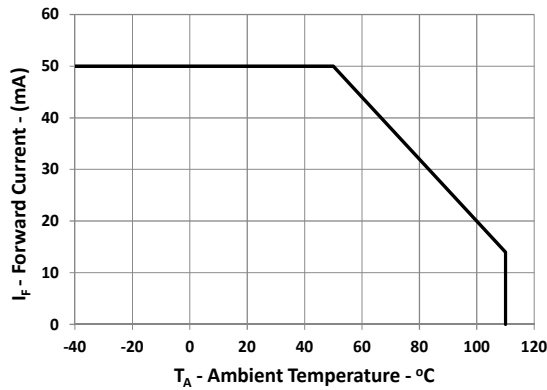


Fig.2 On-state Current vs. Ambient Temperature

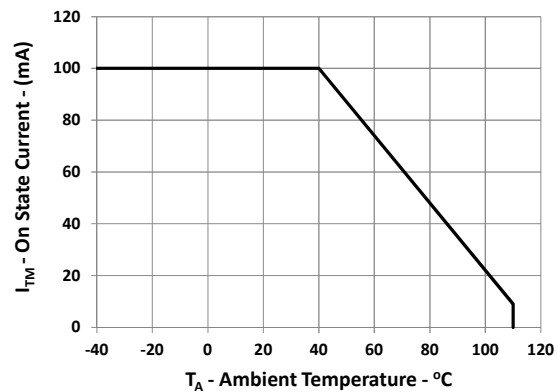


Fig.3 Normalized Trigger Current vs Ambient Temperature

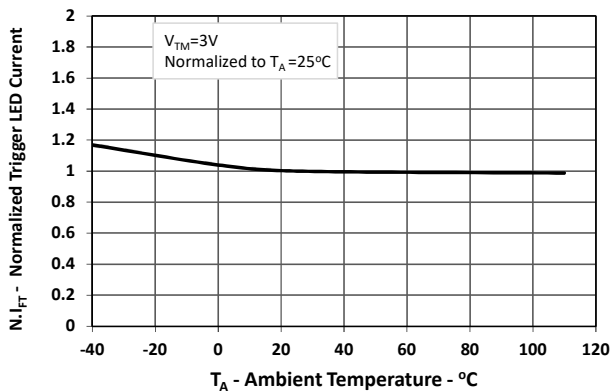


Fig.4 Forward Current vs. Forward Voltage

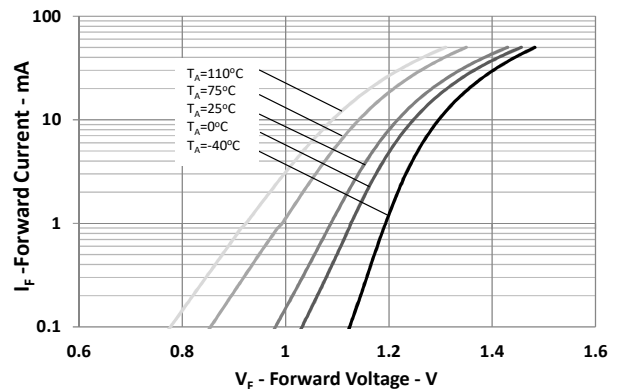


Fig.5 Normalized On-state Voltage vs Ambient Temperature

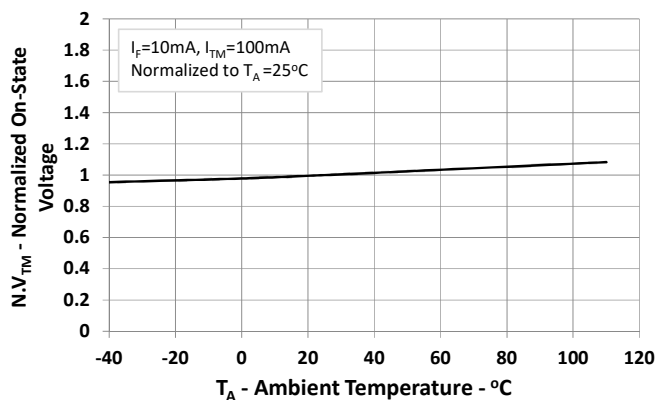
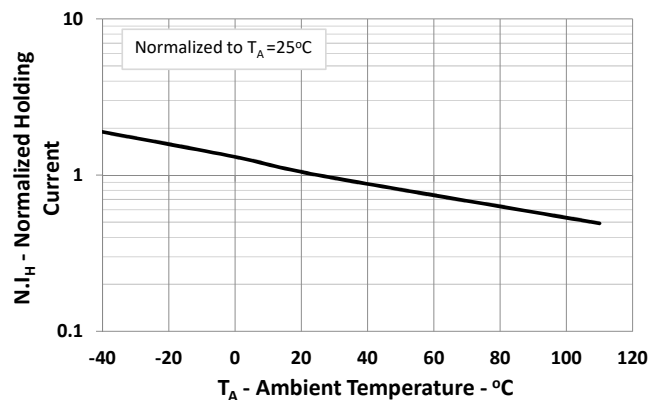


Fig.6 Normalized Holding Current vs Ambient Temperature





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Fig.7 Off-state Current vs Ambient Temperature

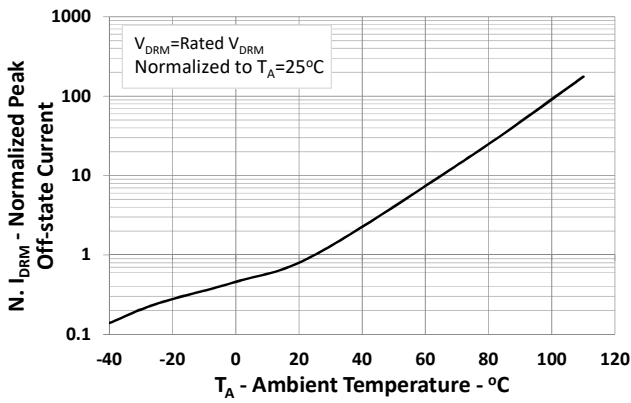
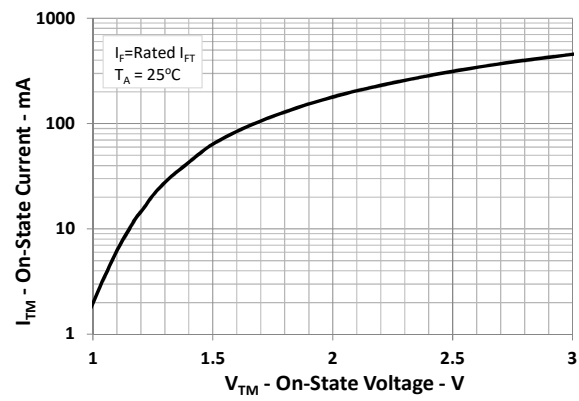
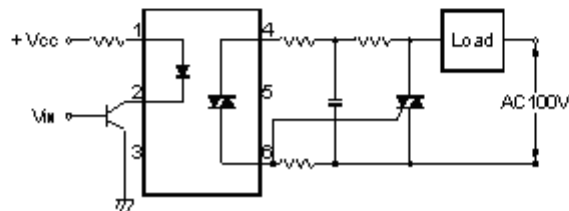


Fig.8 On-state Current vs On-state Voltage



Basic Operation Circuit  
Medium/High Power Triac Drive Circuit



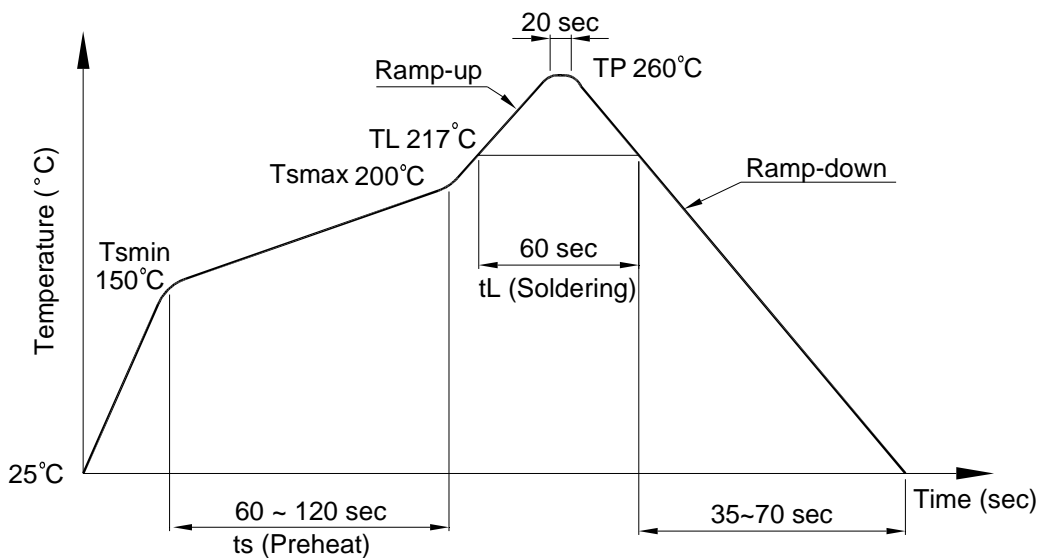
# Photocoupler MOC302X series

## 6. TEMPERATURE PROFILE OF SOLDERING

### 6.1 IR Reflow soldering (JEDEC-STD-020E 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



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**6.2 Wave soldering (JEDEC22A111 compliant)**

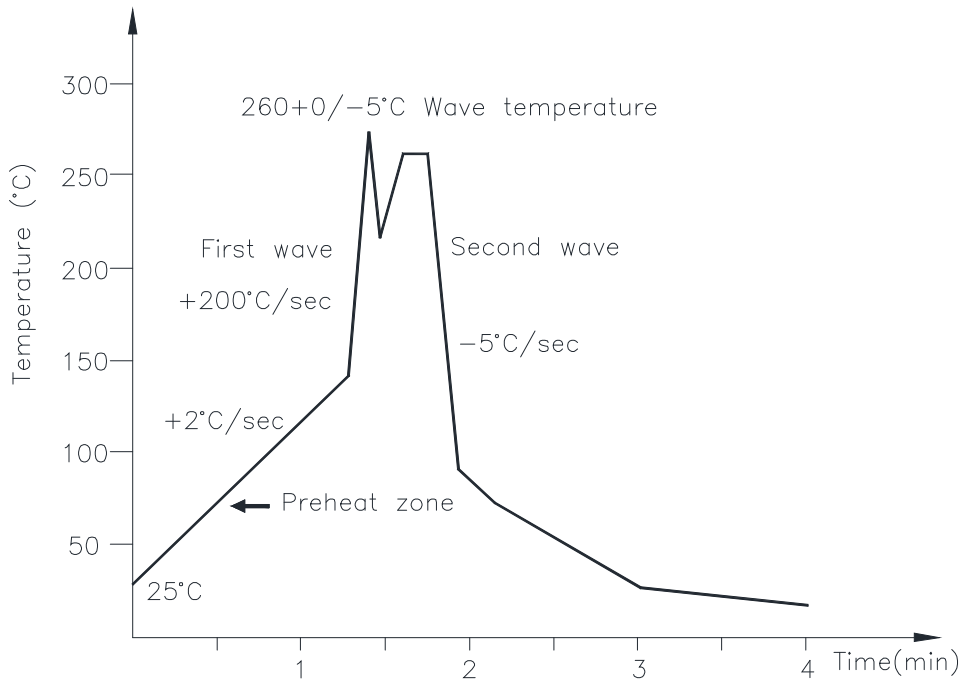
One time soldering is recommended within the condition of temperature.

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.

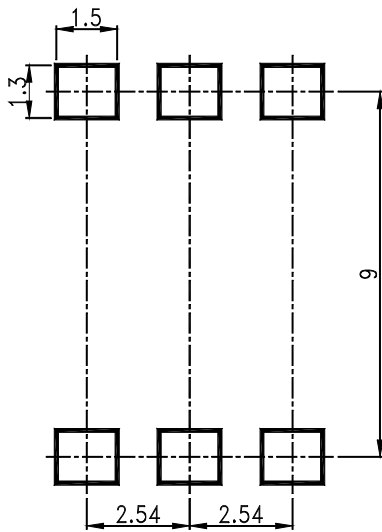
Temperature:  $380 \pm 0 / -5^\circ\text{C}$

Time: 3 sec max.

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

Unit: mm



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**8. NAMING RULE**

**MOC302(X)(1)-(2)-G**

DEVICE PART NUMBER (MOC302X)

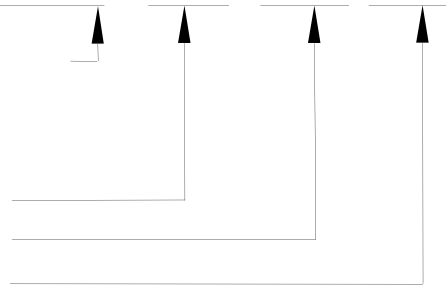
Please refer to Electrical Optical Characteristics Table on Page 6

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

(2) TAPING TYPE (TA, TA1)

(3) Halogen free

Example : MOC3021S-TA1-G



**MOC302(X)(1)(2)-V-G**

DEVICE PART NUMBER (MOC302X)

Please refer to Electrical Optical Characteristics Table on Page 6

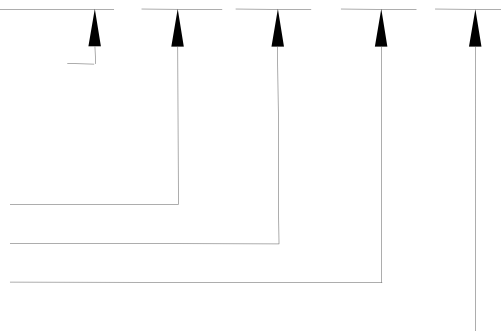
(1) FORM TYPE (S, M or none)

(2) TAPING TYPE (TA, TA1)

(3) VDE option

(4) Halogen free

Example : MOC3021STA1-V-G



**9. 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.
- 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.
- Immerse unit's body in solder paste is not recommended.