

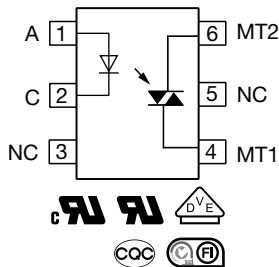
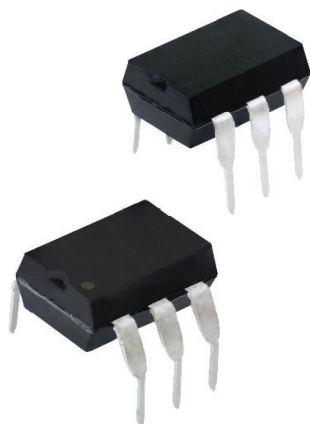


# THE DATASHEET OF K3023PG





## Optocoupler, Phototriac Output, Non-Zero Crossing, 400 V<sub>DRM</sub>



### FEATURES

- 400 V blocking voltage
- Wide range of trigger current
- 100 mA<sub>RMS</sub> on-state current
- Wide temperature range -55 °C to +100 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### APPLICATIONS

- Power TRIAC driver
- Isolated AC load switch
- Air condition
- Heaters
- White goods
- Industrial controls
- Office equipment

### DESCRIPTION

The K3020P, K3020PG series consists of a phototriac optically coupled to a gallium arsenide infrared-emitting diode in a 6-lead plastic dual in-line package.

The non-zero crossing functionality enables full wave control. Featuring galvanic and electrical noise isolation, the output is able to directly switch AC loads or drive medium to high power TRIACs.

### AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#)
- [CQC: GB4943-1-2011](#)
- [CQC: GB8898-2011](#)
- [FIMKO](#)

ORDERING INFORMATION				
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">K</div> <div style="border: 1px solid black; padding: 2px 5px;">3</div> <div style="border: 1px solid black; padding: 2px 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px;">2</div> <div style="border: 1px solid black; padding: 2px 5px;">X</div> <div style="border: 1px solid black; padding: 2px 5px;">P</div> <div style="border: 1px solid black; padding: 2px 5px;">G</div> </div> <p style="text-align: center;">PART NUMBER                      TRIGGER CURRENT BIN                      PACKAGE OPTION</p>				
AGENCY CERTIFIED / PACKAGE	TRIGGER CURRENT, I <sub>FT</sub>			
VDE, cUL, BSI	5 mA	10 mA	15 mA	30 mA
DIP-6	K3023P	K3022P	K3021P	K3020P
DIP-6, 400 mil	K3023PG	K3022PG	K3021PG	K3020PG

### Note

- Additional options may be possible, please contact sales office.



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	80	mA
Surge current	P.W. < 10 $\mu\text{s}$	$I_{FSM}$	3	A
Power dissipation		$P_{diss}$	100	mW
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>OUTPUT</b>				
Peak off-state voltage		$V_{DRM}$	400	V
On-state RMS current		$I_{D(RMS)}$	100	mA
Peak surge current	$t_p \leq 10\text{ ms}$	$I_{FSM}$	1.5	A
Power dissipation		$P_{diss}$	300	mW
Junction temperature		$T_j$	125	$^{\circ}\text{C}$
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	350	mW
Storage temperature range		$T_{stg}$	-55 to +150	$^{\circ}\text{C}$
Ambient temperature		$T_{amb}$	-55 to +100	$^{\circ}\text{C}$
Lead soldering temperature	2 mm from case, $t < 10\text{ s}$	$T_{slid}$	260	$^{\circ}\text{C}$

**Note**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 50\text{ mA}$		$V_F$	-	1.3	1.6	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	5	-	-	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	50	-	pF
<b>OUTPUT</b>							
Forward peak off-state voltage (repetitive)	$I_{DRM} = 100\text{ nA}$		$V_{DRM}^{(1)}$	400	-	-	V
Peak on-state voltage	$I_{TM} = 100\text{ mA}$		$V_{TM}$	-	1.5	3	V
Critical rate of rise of off-state voltage	$I_F = 0\text{ A}$ , $V_D = 0.67\text{ }V_{DRM}$		$dV/dt_{cr}$	-	10	-	V/ $\mu\text{s}$
Critical rate of rise of on-state current commutation	$V_D = 30\text{ }V_{RMS}$ , $I_D = 15\text{ mA}_{RMS}$		$dV/dt_{crq}$	0.1	0.15	-	V/ $\mu\text{s}$
<b>COUPLER <sup>(2)</sup></b>							
Emitting diode trigger current	$V_S = 3\text{ V}$ , $R_L = 150\text{ }\Omega$	K3020P	$I_{FT}$	-	15	30	mA
		K3020PG	$I_{FT}$	-	15	30	mA
		K3021P	$I_{FT}$	-	8	15	mA
		K3021PG	$I_{FT}$	-	8	15	mA
		K3022P	$I_{FT}$	-	5	10	mA
		K3022PG	$I_{FT}$	-	5	10	mA
		K3023P	$I_{FT}$	-	3	5	mA
		K3023PG	$I_{FT}$	-	3	5	mA
Holding current	$I_F = 10\text{ mA}$ , $V_S \geq 3\text{ V}$		$I_H$	-	200	-	$\mu\text{A}$

**Notes**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

(1) Test voltage must be applied within  $dV/dt$  ratings.

(2)  $I_{FT}$  is defined as a minimum trigger current.



SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	$V_{ISO}$	4420	$V_{RMS}$
Tested withstanding isolation voltage	According to UL1577, t = 1 s	$V_{ISO}$	5300	$V_{RMS}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	$V_{IOTM}$	8000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$V_{IO} = 500\text{ V}$ , $T_{amb} = 25\text{ °C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}$ , $T_{amb} = 100\text{ °C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	265	mW
Input safety current		$I_{SI}$	130	mA
Input safety temperature		$T_S$	150	$^{\circ}\text{C}$
Creepage distance	DIP-6		$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Creepage distance	DIP-6, 400 mil		$\geq 8$	mm
Clearance distance			$\geq 8$	mm
Insulation thickness		DTI	$\geq 0.4$	mm
Input to output test voltage, method A	$V_{IORM} \times 1.6 = V_{PR}$ , 100 % sample test with $t_M = 10\text{ s}$ , partial discharge $< 5\text{ pC}$	$V_{PR}$	1424	$V_{peak}$

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

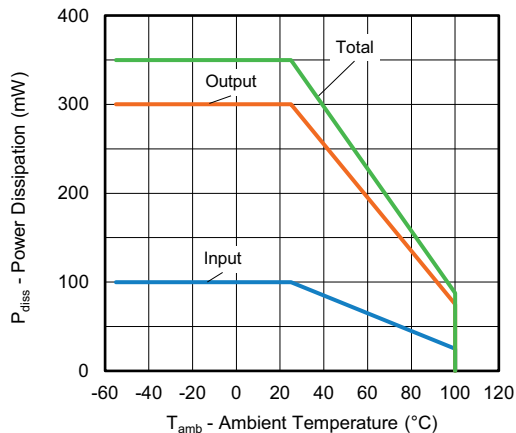
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

Fig. 1 - Total Power Dissipation vs. Ambient Temperature

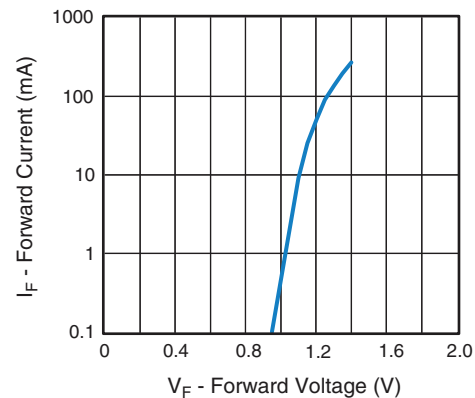


Fig. 2 - Forward Current vs. Forward Voltage

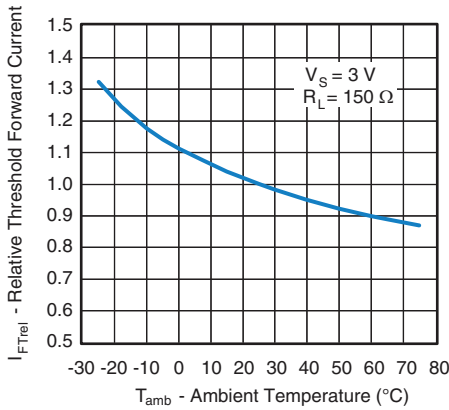


Fig. 3 - Relative Threshold Forward Current vs. Ambient Temperature

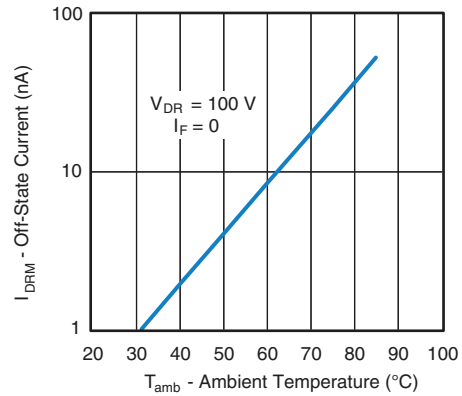


Fig. 5 - Off-State Current vs. Ambient Temperature

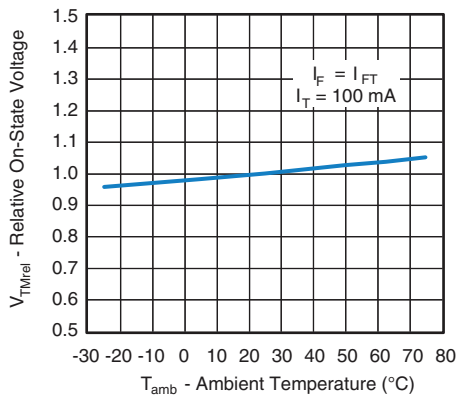


Fig. 4 - Relative On-State vs. Ambient Temperature

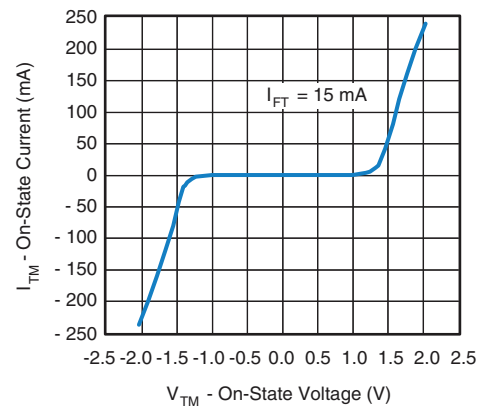
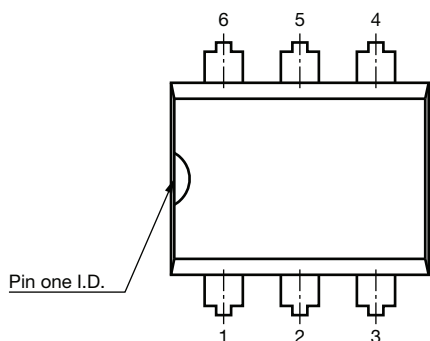
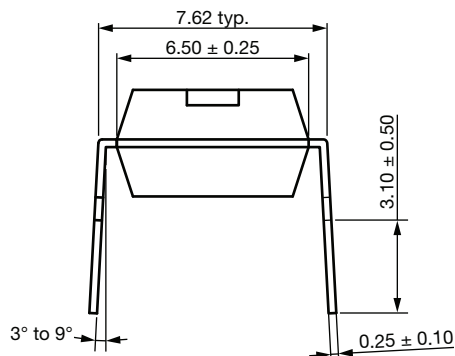
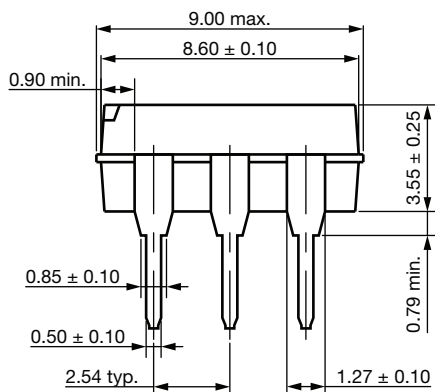


Fig. 6 - On-State Current vs. On-State Voltage

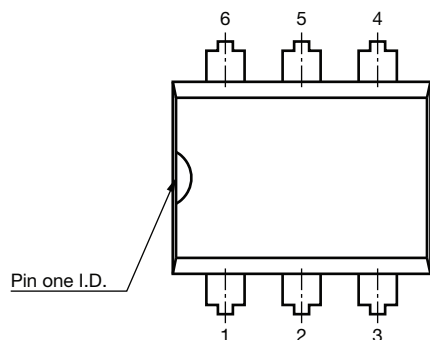
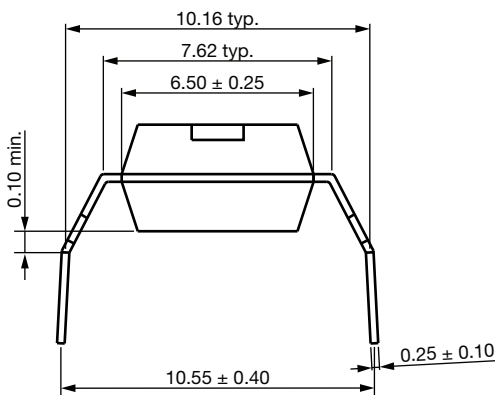
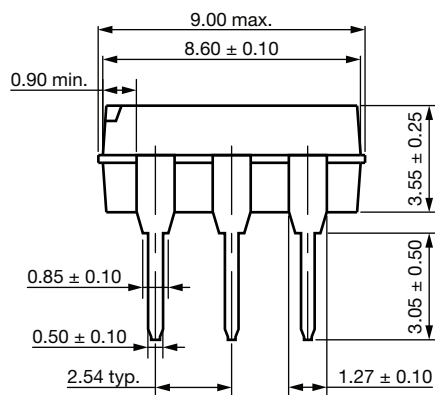


**PACKAGE DIMENSIONS** (in millimeters)

**DIP-6**



**DIP-6, 400 mil**





**PACKAGE MARKING**

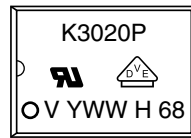


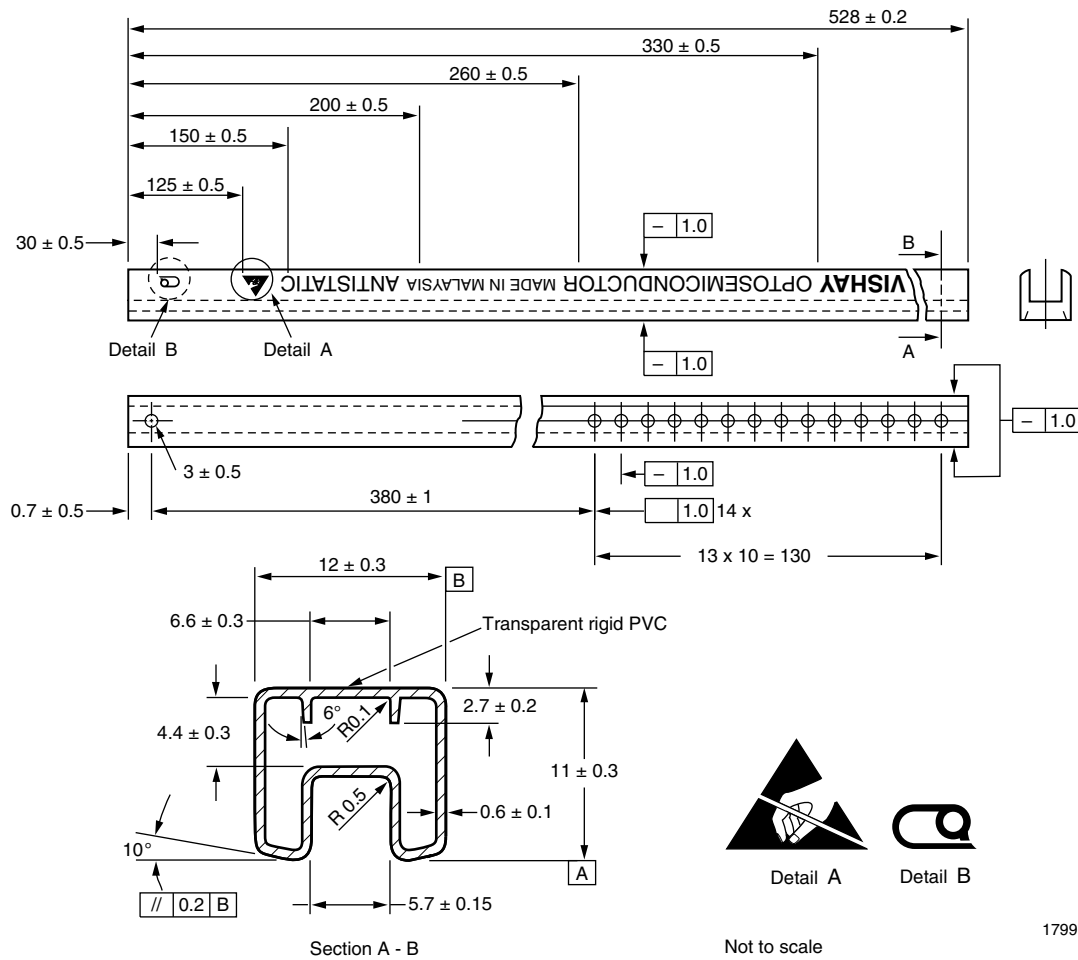
Fig. 7 - Example of K3020P

**Notes**

- The “G” of the G leadform type is not marked on the body.
- The VDE logo is only marked on ption1 parts.

**PACKAGING INFORMATION** (in millimeters)

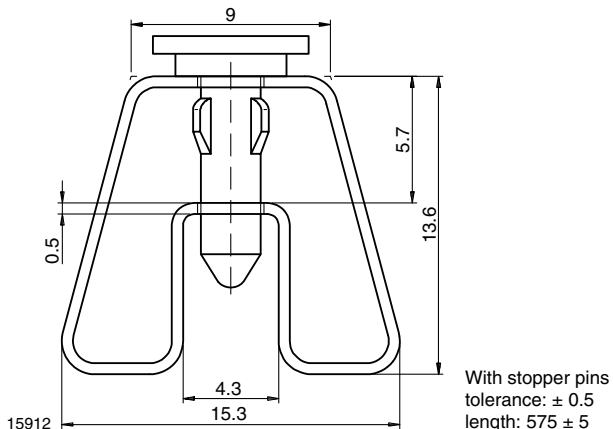
**DIP-6**



17996



DIP-6, 400 mil



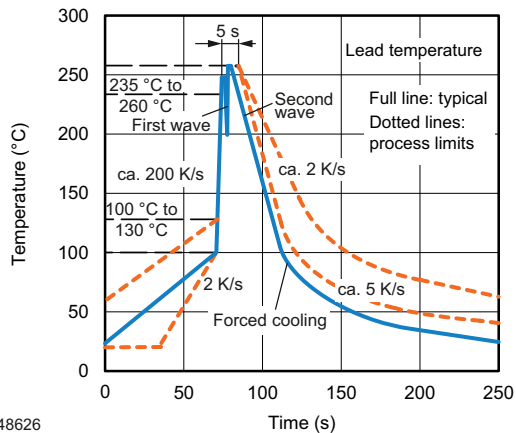
**SHIPPING INFORMATION**

DEVICES PER TUBS			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-6	50	40	2000

**HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2  
 Floor life: unlimited  
 Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ , RH < 85 %  
 Moisture sensitivity level 1, according to J-STD-020

**SOLDER PROFILES**



948626

Fig. 8 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP Devices



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