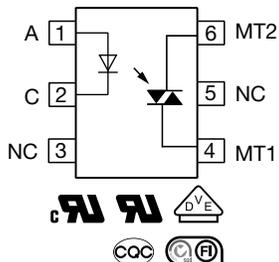




Optocoupler, Phototriac Output, Non-Zero Crossing, 400 V_{DRM}



FEATURES

- 400 V blocking voltage
- Wide range of trigger current
- 100 mA_{RMS} on-state current
- Wide temperature range -55 °C to +100 °C
- Material categorization: for definitions of compliance please see 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> <p style="text-align: center;">PART NUMBER</p>	<div style="border: 1px solid black; padding: 2px 5px;">X</div> <p style="text-align: center;">TRIGGER CURRENT BIN</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <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;">PACKAGE OPTION</p>	<p style="text-align: center;">DIP-6 7.62 mm</p>	<p style="text-align: center;">G leadform 10.16 mm</p>
AGENCY CERTIFIED / PACKAGE	TRIGGER CURRENT, I _{FT}			
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 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V _R	5	V
Forward current		I _F	80	mA
Surge current	P.W. < 10 μs	I _{FSM}	3	A
Power dissipation		P _{diss}	100	mW
Junction temperature		T _j	125	°C
OUTPUT				
Peak off-state voltage		V _{DRM}	400	V
On-state RMS current		I _{D(RMS)}	100	mA
Peak surge current	t _p ≤ 10 ms	I _{FSM}	1.5	A
Power dissipation		P _{diss}	300	mW
Junction temperature		T _j	125	°C
COUPLER				
Total power dissipation		P _{tot}	350	mW
Storage temperature range		T _{stg}	-55 to +150	°C
Ambient temperature		T _{amb}	-55 to +100	°C
Lead soldering temperature	2 mm from case, t < 10 s	T _{slid}	260	°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 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I _F = 50 mA		V _F	-	1.3	1.6	V
Reverse voltage	I _R = 10 μA		V _R	5	-	-	V
Junction capacitance	V _R = 0 V, f = 1 MHz		C _j	-	50	-	pF
OUTPUT							
Forward peak off-state voltage (repetitive)	I _{DRM} = 100 nA		V _{DRM} ⁽¹⁾	400	-	-	V
Peak on-state voltage	I _{TM} = 100 mA		V _{TM}	-	1.5	3	V
Critical rate of rise of off-state voltage	I _F = 0 A, V _D = 0.67 V _{DRM}		dV/dt _{cr}	-	10	-	V/μs
Critical rate of rise of on-state current commutation	V _D = 30 V _{RMS} , I _D = 15 mA _{RMS}		dV/dt _{crq}	0.1	0.15	-	V/μs
COUPLER⁽²⁾							
Emitting diode trigger current	V _S = 3 V, R _L = 150 Ω	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 mA, V _S ≥ 3 V		I _H	-	200	-	μA

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}	$\geq 10^{12}$	Ω
	$V_{IO} = 500\text{ V}$, $T_{amb} = 100\text{ °C}$	R_{IO}	$\geq 10^{11}$	Ω
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		≥ 7	mm
Clearance distance			≥ 7	mm
Creepage distance	DIP-6, 400 mil		≥ 8	mm
Clearance distance			≥ 8	mm
Insulation thickness		DTI	≥ 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)

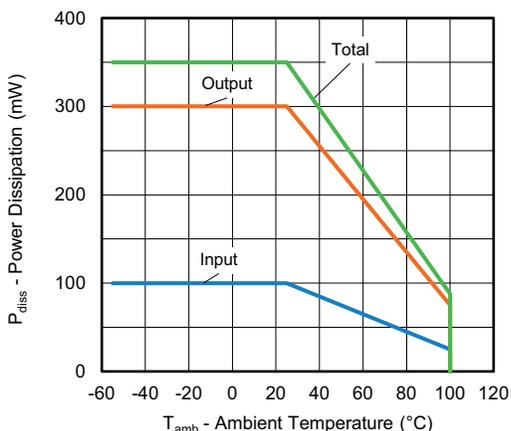


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

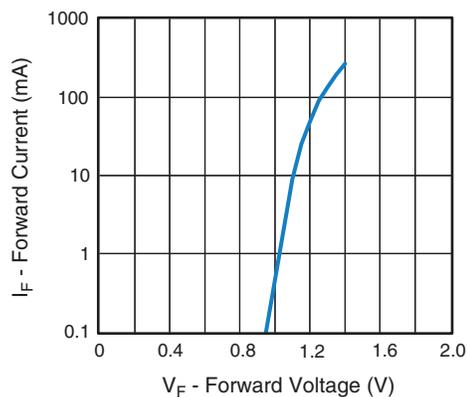


Fig. 2 - Forward Current vs. Forward Voltage

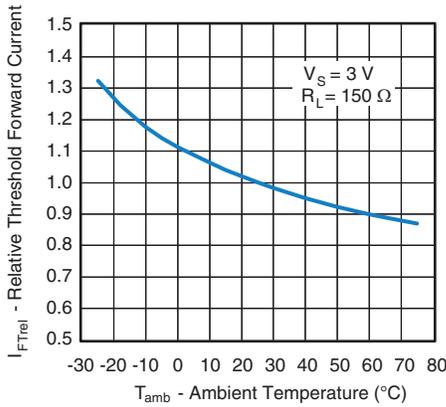


Fig. 3 - Relative Threshold Forward Current vs. Ambient Temperature

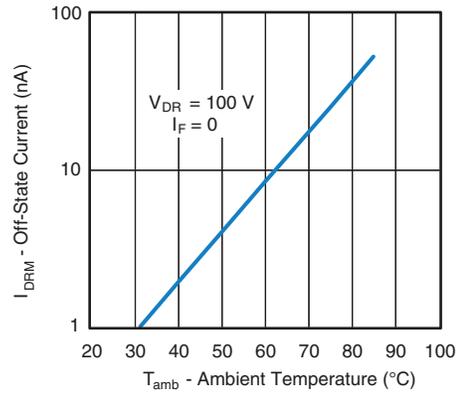


Fig. 5 - Off-State Current vs. Ambient Temperature

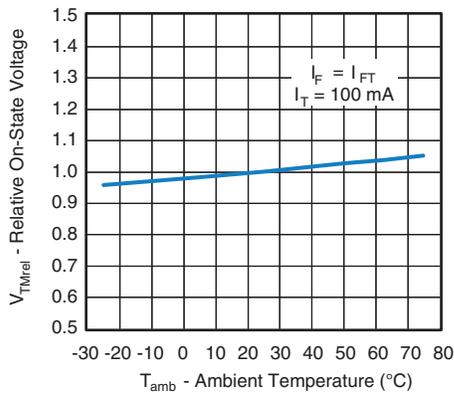


Fig. 4 - Relative On-State vs. Ambient Temperature

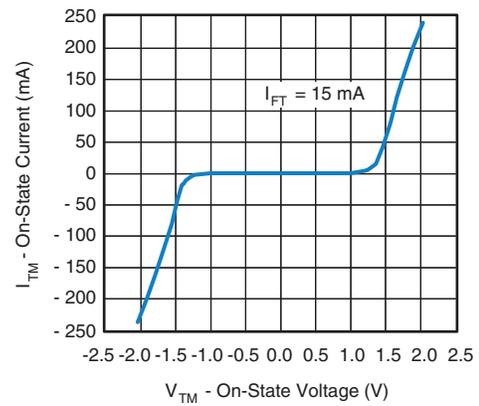
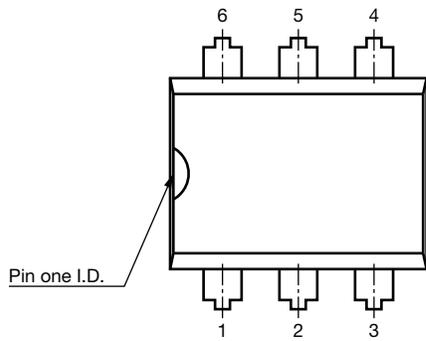
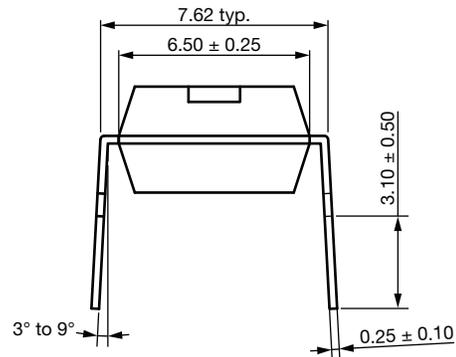
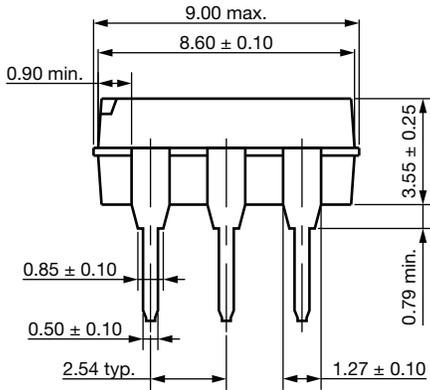


Fig. 6 - On-State Current vs. On-State Voltage

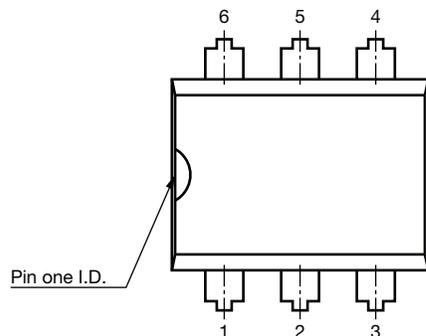
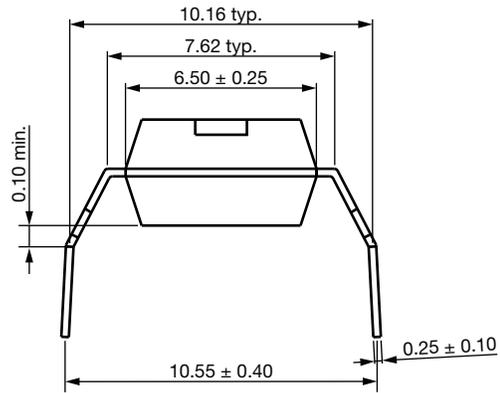
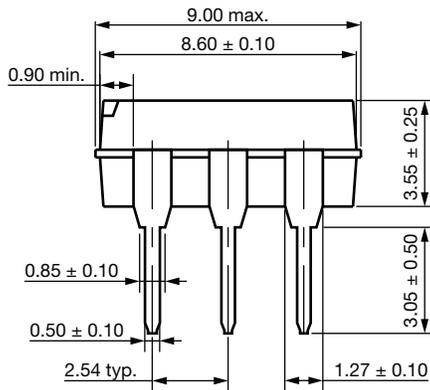


PACKAGE DIMENSIONS (in millimeters)

DIP-6



DIP-6, 400 mil





PACKAGE MARKING

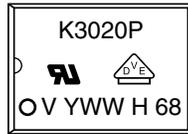


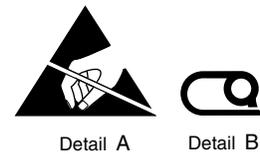
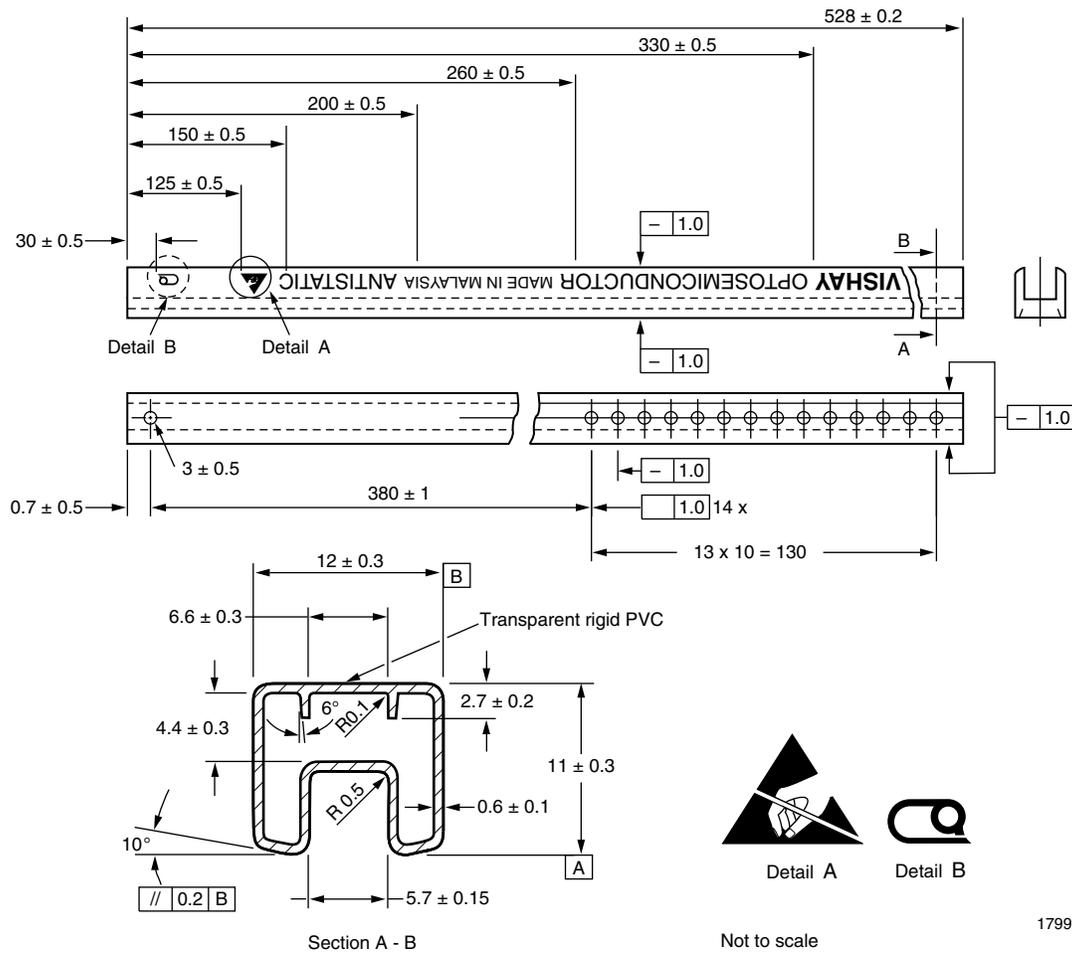
Fig. 7 - Example of K3020P

Notes

- The “G” of the G leadform type is not marked on the body.
- The VDE logo is only marked on p10n1 parts.

PACKAGING INFORMATION (in millimeters)

DIP-6

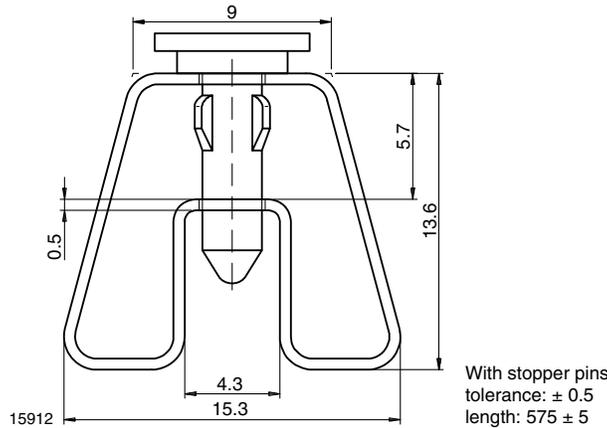


Not to scale

17996



DIP-6, 400 mil



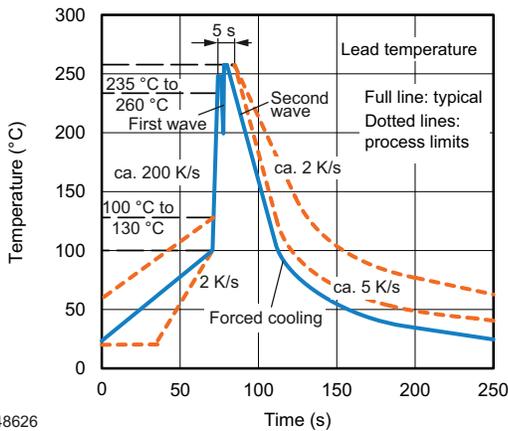
SHIPPING INFORMATION

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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