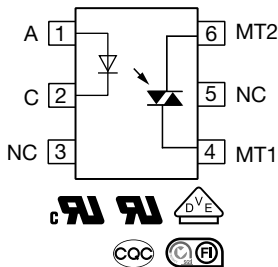
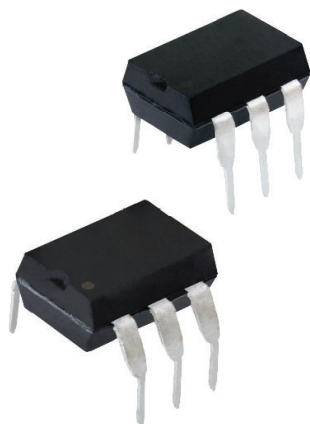




Optocoupler, Phototriac Output, Non-Zero Crossing, 400 V_{DRM}



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 inline 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 _{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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, 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 | $^{\circ}\text{C}$ |
| OUTPUT | | | | |
| 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 | $^{\circ}\text{C}$ |
| COUPLER | | | | |
| 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_{sld} | 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 |
| INPUT | | | | | | | |
| 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 |
| OUTPUT | | | | | | | |
| 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/ μs |
| 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/ μs |
| COUPLER ⁽²⁾ | | | | | | | |
| 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 | - | 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 | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{12}$ | Ω |
| | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ | 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

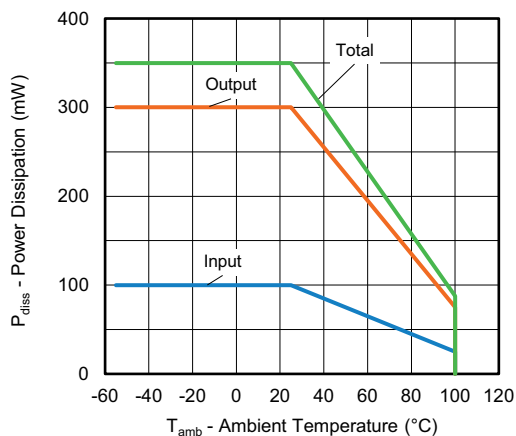


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

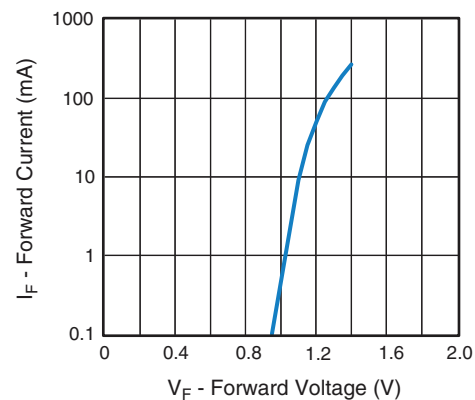


Fig. 2 - Forward Current vs. Forward Voltage

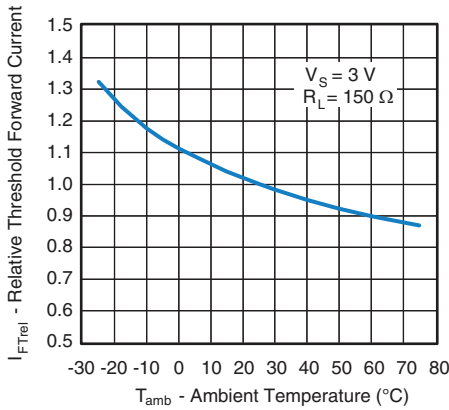


Fig. 3 - Relative Threshold Forward Current vs. Ambient Temperature

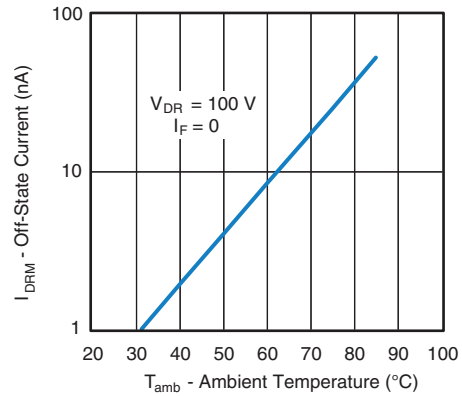


Fig. 5 - Off-State Current vs. Ambient Temperature

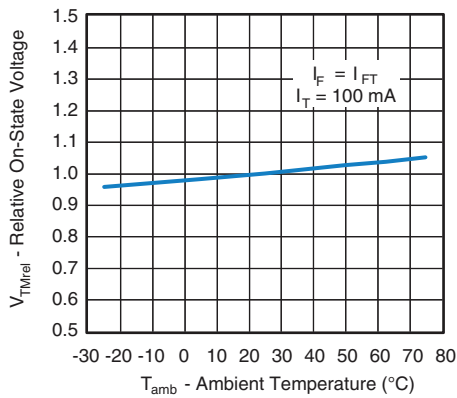


Fig. 4 - Relative On-State vs. Ambient Temperature

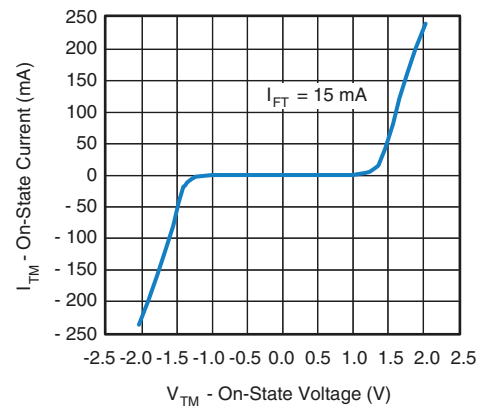
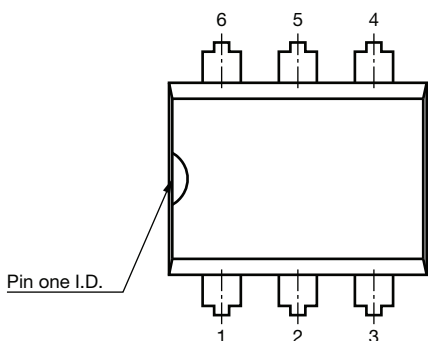
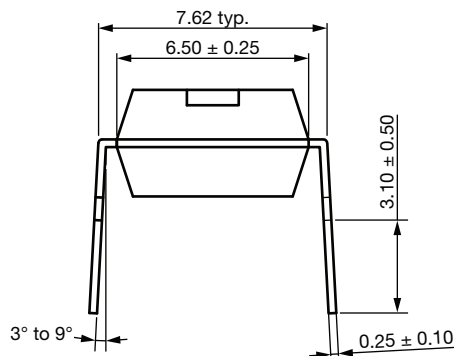
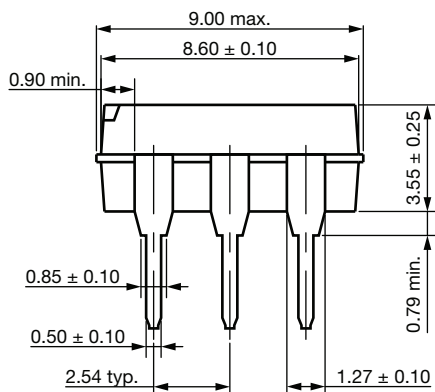


Fig. 6 - On-State Current vs. On-State Voltage

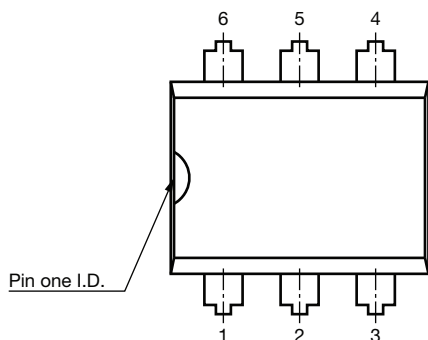
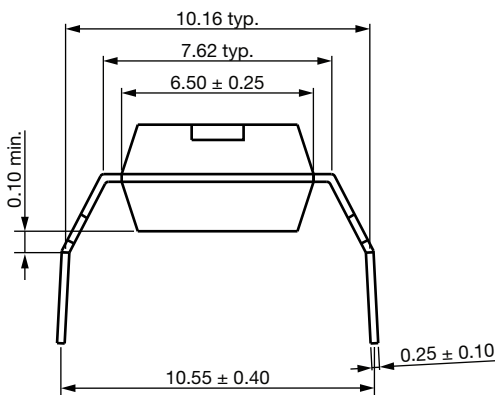
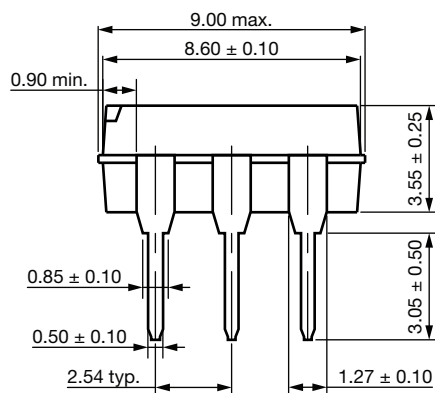


PACKAGE DIMENSIONS (in millimeters)

DIP-6



DIP-6, 400 mil





PACKAGE MARKING

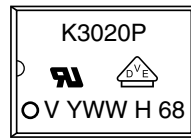


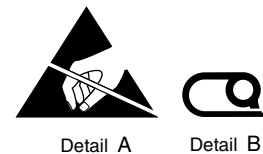
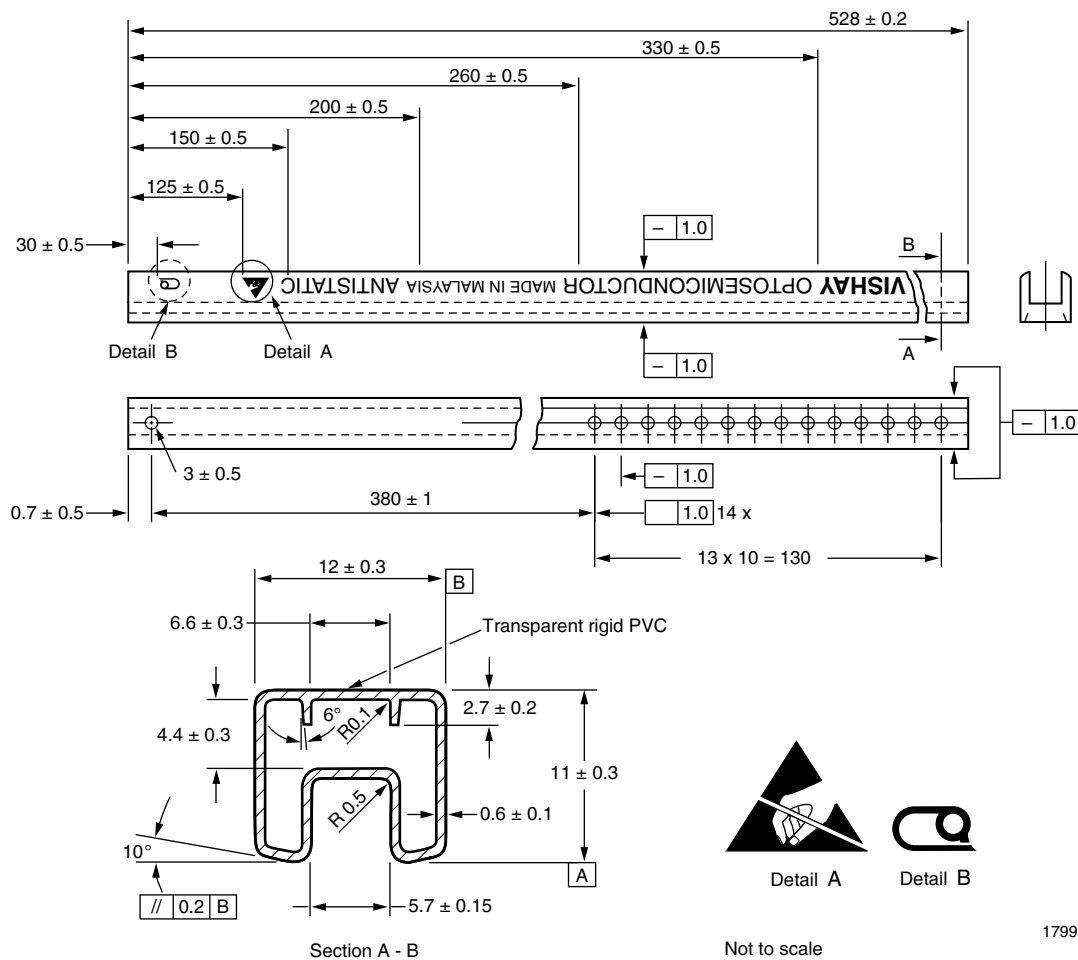
Fig. 7 - Example of K3020P

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

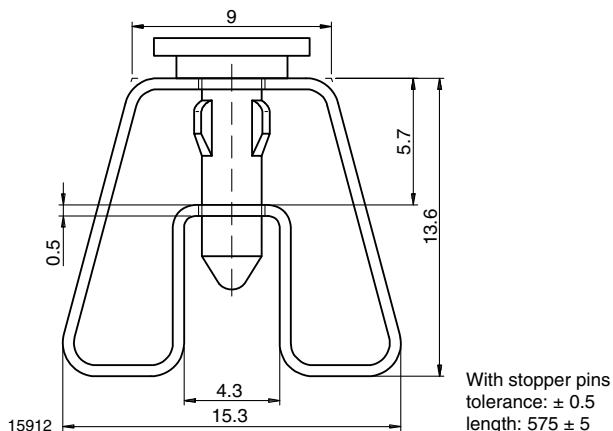


Not to scale

17996



DIP-6, 400 mil



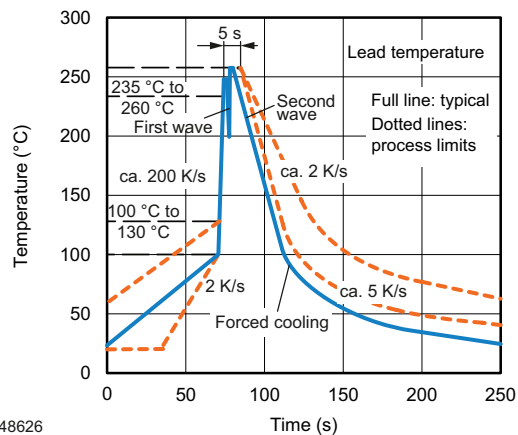
SHIPPING INFORMATION

| 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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