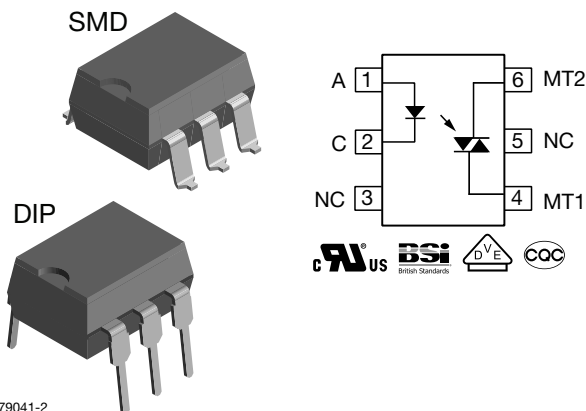


Optocoupler, Phototriac Output, Non-Zero Crossing, 250 V_{DRM}



i179041-2

DESCRIPTION

The K3010P, K3010PG series consists of a photo-transistor optically coupled to a gallium arsenide infrared-emitting diode in a 6-pin plastic dual inline package

AGENCY APPROVALS

- UL1577, file no. E52744 system code H, double protection
- BSI: BS EN60065:2002 and IEC 60065:2001, certificate number 7955. An BS EN60950-1:2006 certificate number 7956
- DIN EN 60747-5-5
- CQC: GB8898-2001

FEATURES

- Isolation materials according to UL 94 V-0
- Special construction: therefore, extra low coupling capacity of typical 0.2 pF, high common mode rejection
- I_{FT} of 5 mA, 10 mA, and 15 mA
- Rated impulse voltage (transient overvoltage) V_{IOTM} = 8 kV_{peak}
- Isolation test voltage, 5300 V_{RMS}, t = 1 s
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

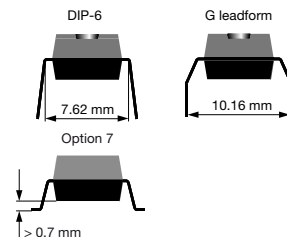
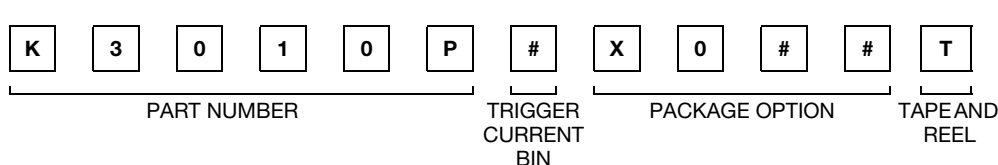

RoHS
COMPLIANT

APPLICATIONS

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):

- for appl. class I to IV at mains voltage ≤ 300 V
- for appl. class I to IV at mains voltage ≤ 600 V according to DIN EN60747-5-5 (VDE0884), suitable for:
 - Monitors
 - Air conditioners
 - Line switches
 - Solid state relay
 - Microwave

ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	TRIGGER CURRENT, I _{FT}		
VDE, cUL, BSI	5 mA	10 mA	15 mA
DIP-6	K3012P	K3011P	K3010P
DIP-6, 400 mil	K3012PG	K3011PG	K3010PG
SMD-6, option 7	K3012P-X007T	-	K3010P-X007T

Note

- G = leadform 10.16 mm; G is not marked on the body.

**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
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	I_{FSM}	3	A
Power dissipation		P_{diss}	100	mW
Junction temperature		T_j	100	$^{\circ}\text{C}$
OUTPUT				
Off state output terminal voltage		V_{DRM}	250	V
On state RMS current		I_{TRM}	100	mA
Peak surge current, non-repetitive	$t_p \leq 10\text{ ms}$	I_{TMS}	1.5	A
Power dissipation		P_{diss}	300	mW
Junction temperature		T_j	100	$^{\circ}\text{C}$
COUPLER				
Isolation test voltage (RMS)	$t = 1\text{ s}$	V_{ISO}	5300	V_{RMS}
Total power dissipation		P_{tot}	350	mW
Storage temperature range		T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	- 55 to + 100	$^{\circ}\text{C}$
Soldering temperature ⁽¹⁾	2 mm from case, $t \leq 10\text{ s}$	T_{sld}	260	$^{\circ}\text{C}$

Notes

- 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.

⁽¹⁾ Refer to wave profile for soldering conditions for through hole devices (DIP) "Assembly Instructions" (www.vishay.com/doc?80054)

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

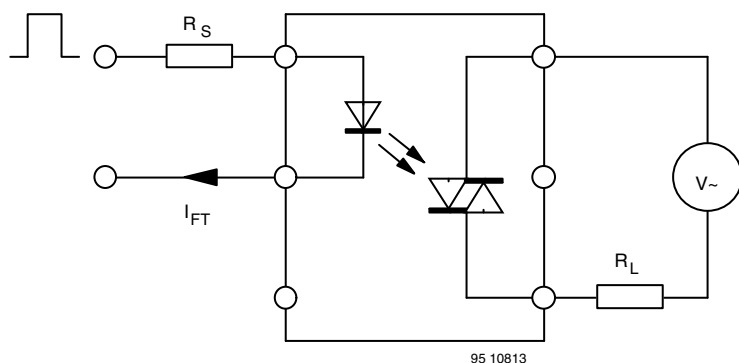
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	$I_F = 50\text{ mA}$		V_F		1.25	1.6	V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$		C_j		50		pF
OUTPUT							
Forward peak off-state voltage (repetitive)	$I_{RDM} = 100\text{ nA}$		$V_{DRM}^{(1)}$	250			V
Peak on-state voltage	$I_{TM} = 100\text{ mA}$		V_{TM}		1.5	3	V
Critical rate of rise of off-state voltage	$I_{FT} = 0, I_{FT} = 30\text{ mA}$		dV/dt_{cr}		10		V/ μs
			dV/dt_{crq}	0.1	0.2		V/ μs
COUPLER ⁽²⁾							
Collector emitter trigger current	$V_S = 3\text{ V}, R_L = 150\text{ }\Omega$	K3010P	I_{FT}		8	15	mA
		K3010PG	I_{FT}		8	15	mA
		K3011P	I_{FT}		5	10	mA
		K3011PG	I_{FT}		5	10	mA
		K3012P	I_{FT}		2	5	mA
		K3012PG	I_{FT}		2	5	mA
Holding current	$I_F = 10\text{ mA}, V_S \geq 3\text{ V}$		I_H		100		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.

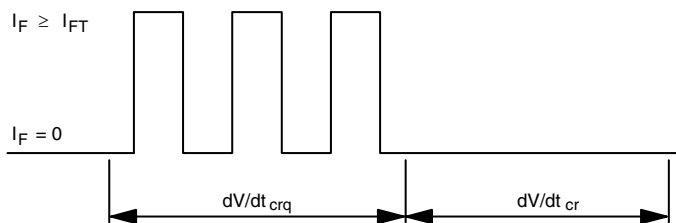
⁽¹⁾ Test voltage must be applied within dV/dt ratings.

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



Test condition:
 dV/dt_{cr}
 $V_S = 2/3 V_{DRM}$
 (sine wave)
 $R_L = 33 \text{ k}\Omega$
 dV/dt_{crq}
 $V_{eff.} = 30 \text{ V}$
 (sine wave)
 $R_L = 2 \text{ k}\Omega$

Fig. 1 - Test Circuit for dV/dt_{cr} and dV/dt_{crq}



dV/dt_{cr} Highest value of the "rate of rise of off-state voltage" which does not cause any switching from the off state to the on state
 dV/dt_{crq} Highest value of the "rate of rise of communicating voltage" which does not switch on the device again, after the voltage has decreased to zero and the trigger current is switched from I_{FT} to zero

95 10814

Fig. 2

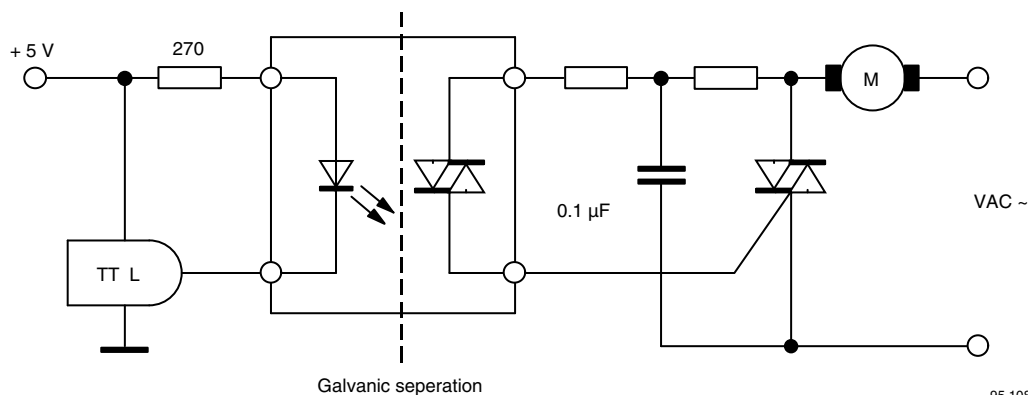


Fig. 3 - Motor Control Circuit

95 10815

SAFETY AND INSULATION RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)			55/100/21		
Pollution degree (DIN VDE 0109)			2		
Comparative tracking index	CTI	175			
Peak transient overvoltage	V _{IOTM}			8000	V _{peak}
Peak working insulation voltage	V _{IORM}			890	V _{peak}
Partial discharge test voltage (method a, V _{pd} = V _{IORM} x 1.875)	V _{pd}			1669	V _{peak}
Isolation resistance at T _{amb} = 100 °C, V _{DC} = 500 V	R _{IO}	10 ¹¹			Ω
Isolation resistance at T _{amb} = 25 °C, V _{DC} = 500 V	R _{IO}	10 ¹²			Ω
Safety rating - power	P _{SO}			265	mW
Safety rating - input current	I _{SI}			130	mA
Safety rating - temperature	T _{SI}			150	°C
Clearance distance (Standard DIP-6)		7			mm
Creepage distance (Standard DIP-6)		7			mm
Clearance distance (400 mil DIP-6)		8			mm
Creepage distance (400 mil DIP-6)		8			mm

Note

- According to DIN EN60747-5-5 (see figure 4). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

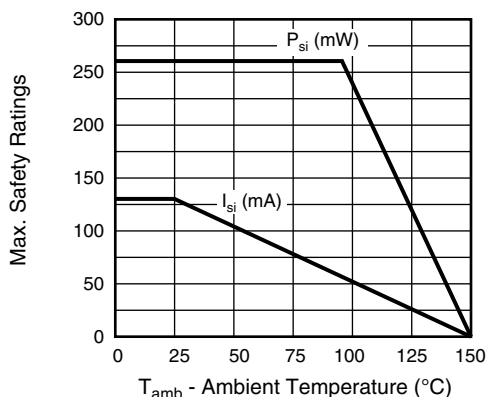


Fig. 4 - Safety Parameter Derating Diagram

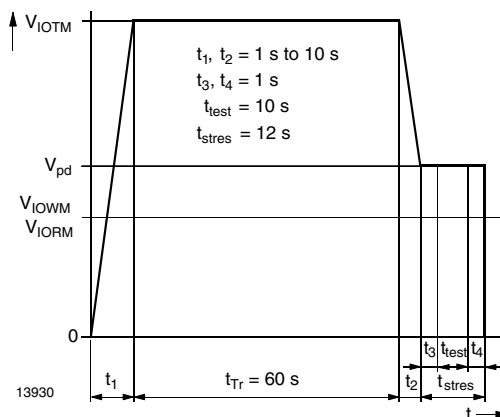


Fig. 5 - Test Pulse Diagram for Sample Test according to DIN EN60747-5-5/DIN EN60747-; IEC 60747



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

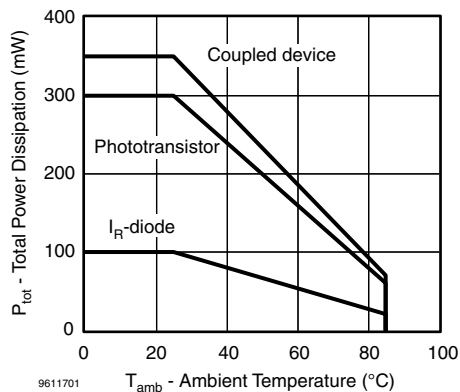


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

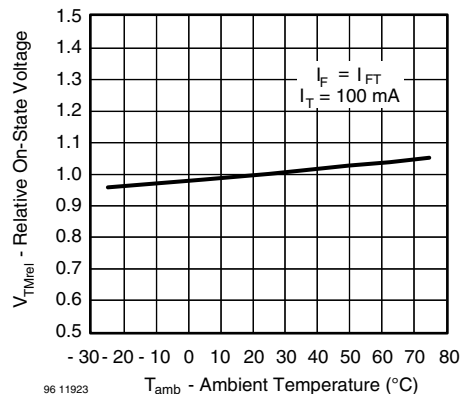


Fig. 9 - Relative On-State vs. Ambient Temperature

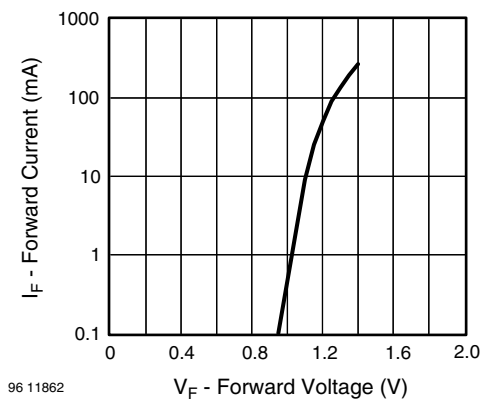


Fig. 7 - Forward Current vs. Forward Voltage

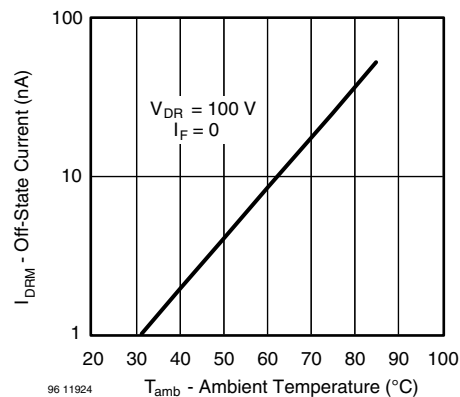


Fig. 10 - Off-State Current vs. Ambient Temperature

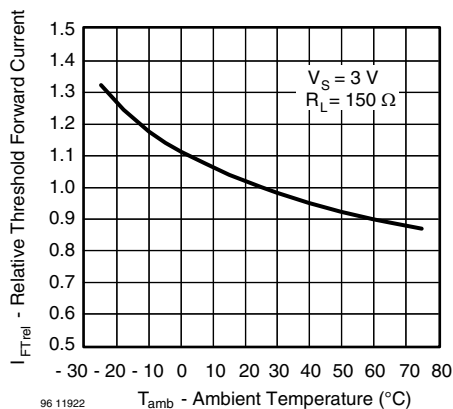


Fig. 8 - Relative Threshold Forward Current vs. Ambient Temperature

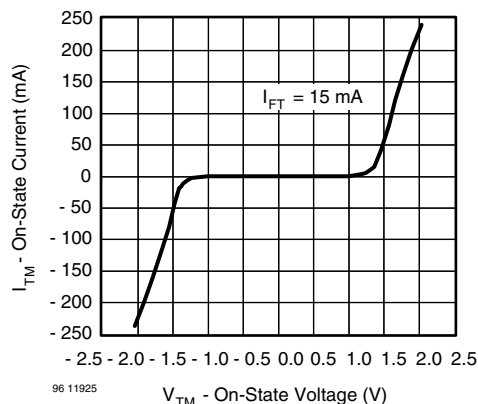
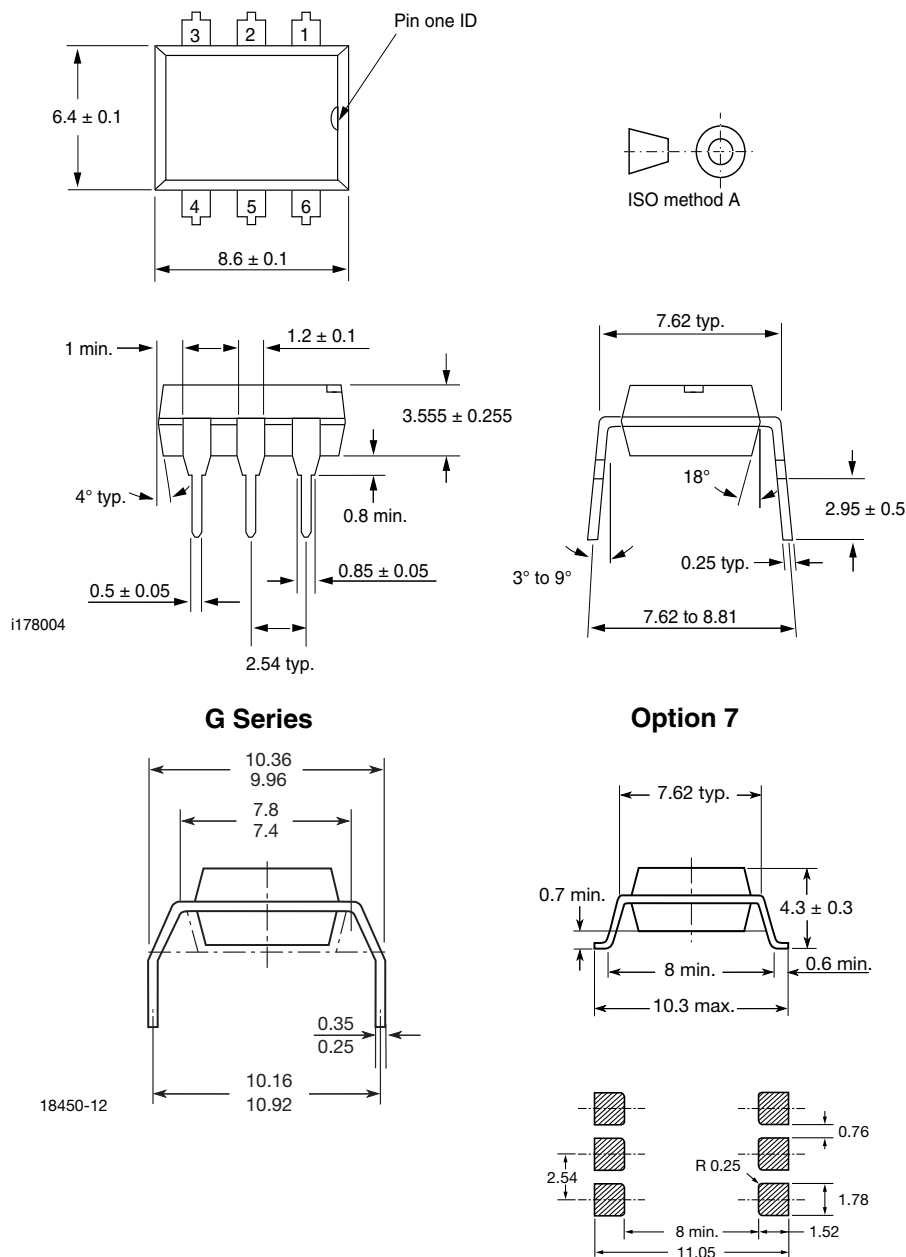


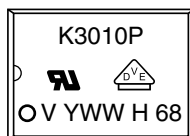
Fig. 11 - Collector Current vs. Forward Current



PACKAGE DIMENSIONS millimeters



PACKAGE MARKING (example)



Notes

- The "G" of the 400 mil G leadform type is not marked on the body.
- The VDE logo is only marked on option1 parts.



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.