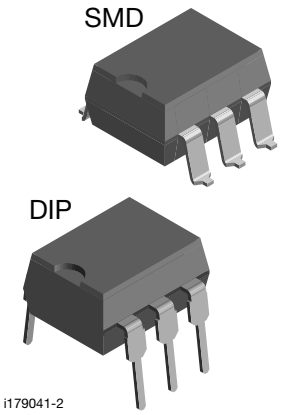
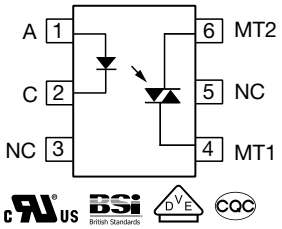
Optocoupler, Phototriac Output, Non-Zero Crossing, 250 V_{DRM}





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

Pb-free

e3

RoHS COMPLIANT

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

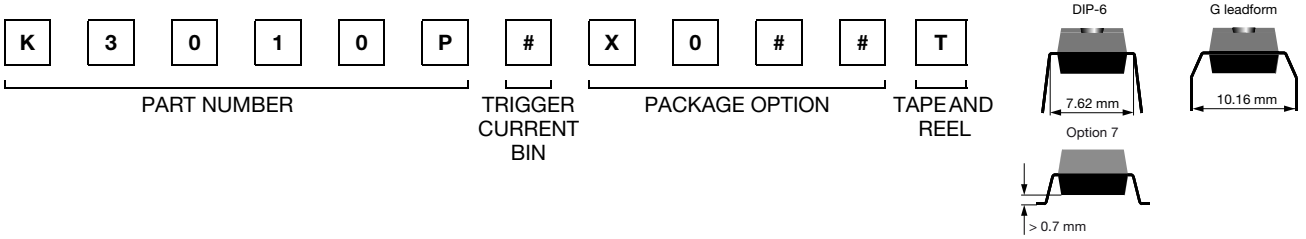
APPLICATIONS

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.

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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
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	3	A
Power dissipation		P_{diss}	100	mW
Junction temperature		T_j	100	°C
OUTPUT				
Off state output terminal voltage		V_{DRM}	250	V
On state RMS current		I_{TRM}	100	mA
Peak surge current, non-repetitive	$t_p \leq 10$ ms	I_{TMS}	1.5	A
Power dissipation		P_{diss}	300	mW
Junction temperature		T_j	100	°C
COUPLER				
Isolation test voltage (RMS)	t = 1 s	V_{ISO}	5300	V_{RMS}
Total power dissipation		P_{tot}	350	mW
Storage temperature range		T_{stg}	- 55 to + 150	°C
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Soldering temperature (1)	2 mm from case, t ≤ 10 s	T_{sld}	260	°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 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 50 mA		V_F		1.25	1.6	V
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF
OUTPUT							
Forward peak off-state voltage (repetitive)	I_{RDM} = 100 nA		V_{DRM} (1)	250			V
Peak on-state voltage	I_{TM} = 100 mA		V_{TM}		1.5	3	V
Critical rate of rise of off-state voltage	I_{FT} = 0, I_{FT} = 30 mA		dV/d_{tcr}		10		V/µs
			dV/d_{tcrq}	0.1	0.2		V/µs
COUPLER (2)							
Collector emitter trigger current	V_S = 3 V, R_L = 150 Ω	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 mA, $V_S \geq 3$ 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.

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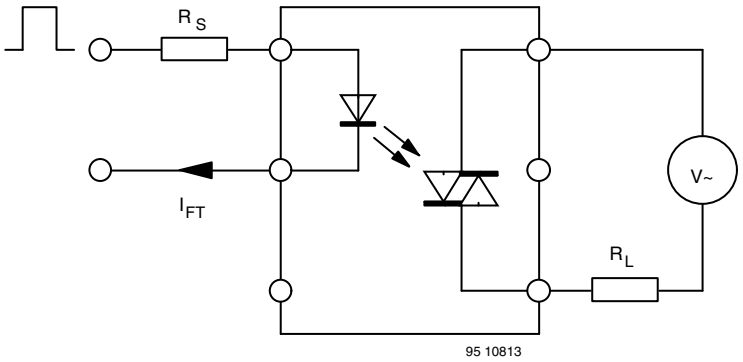
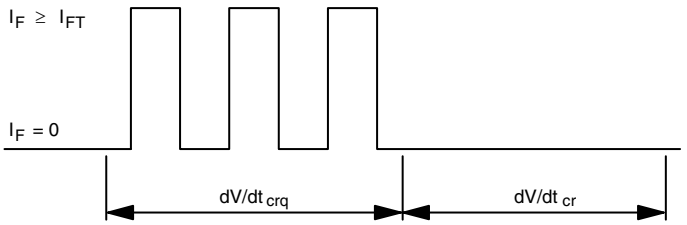


Test condition:
dV/dt_{cr}
V_S = 2/3 V_{DRM}
(sine wave)
R_L = 33 kΩ
dV/dt_{crq}
$V_{eff.}$ = 30 V
(sine wave)
R_L = 2 kΩ

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



95 10814

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

Fig. 2

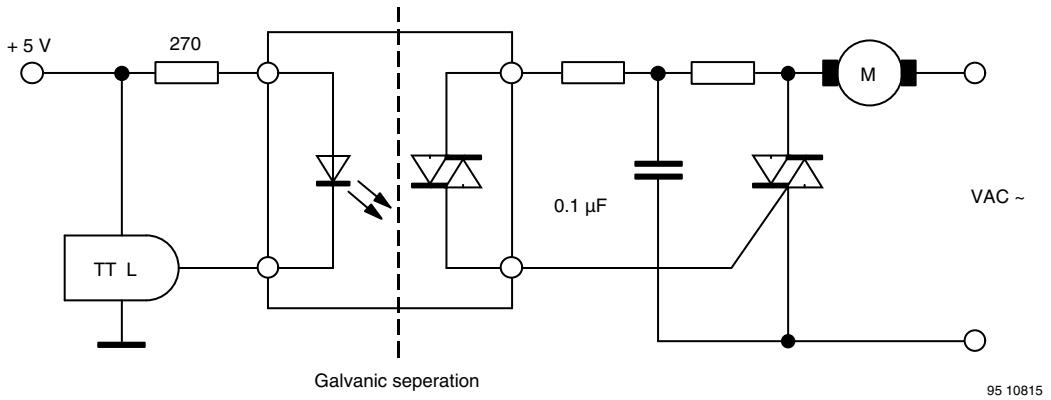


Fig. 3 - Motor Control Circuit

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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, $V_{pd} = V_{IORM} \times 1.875$)	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.

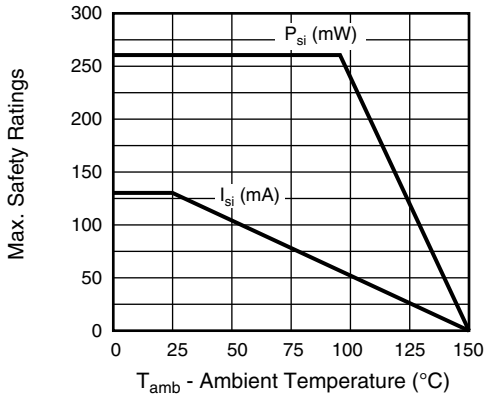

Fig. 4 - Safety Parameter Derating Diagram

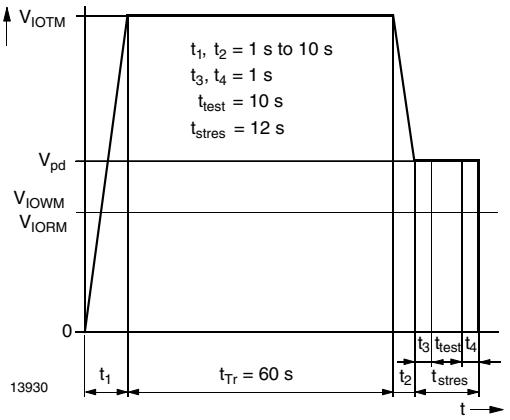

Fig. 5 - Test Pulse Diagram for Sample Test according to DIN EN60747-5-5/DIN EN60747-; IEC 60747

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

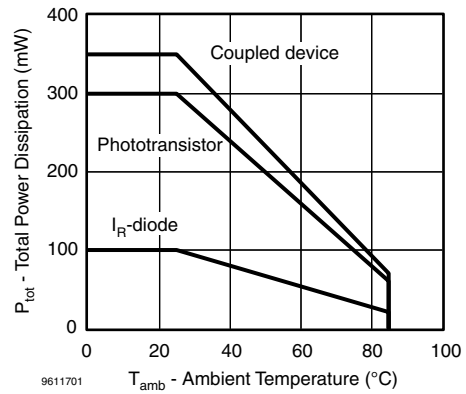

Fig. 6 - Total Power Dissipation vs. Ambient Temperature

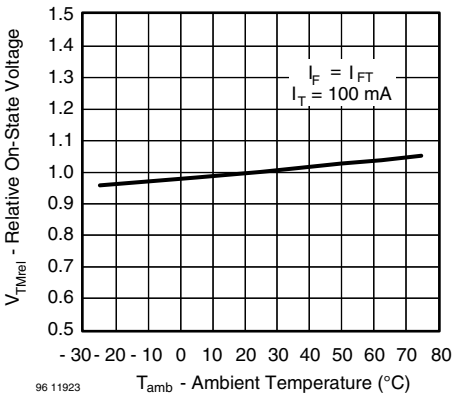

Fig. 9 - Relative On-State vs. Ambient Temperature

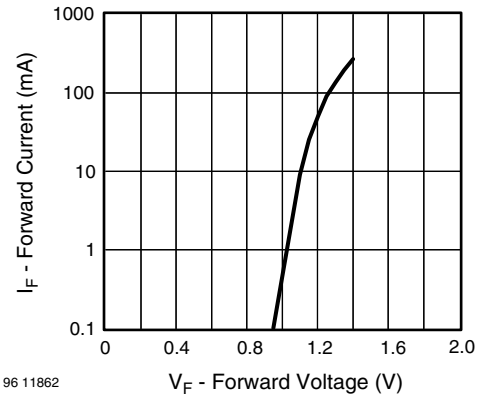

Fig. 7 - Forward Current vs. Forward Voltage

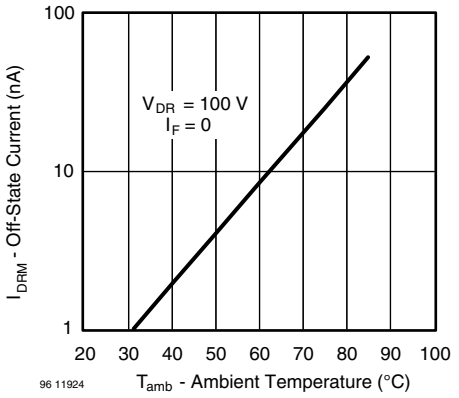

Fig. 10 - Off-State Current vs. Ambient Temperature

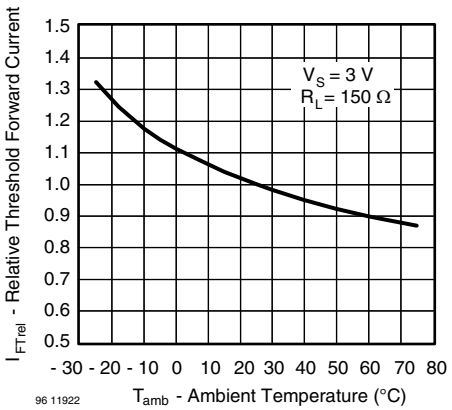

Fig. 8 - Relative Threshold Forward Current vs. Ambient Temperature

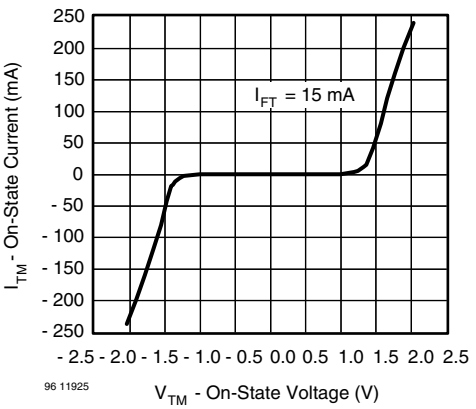

Fig. 11 - Collector Current vs. Forward Current

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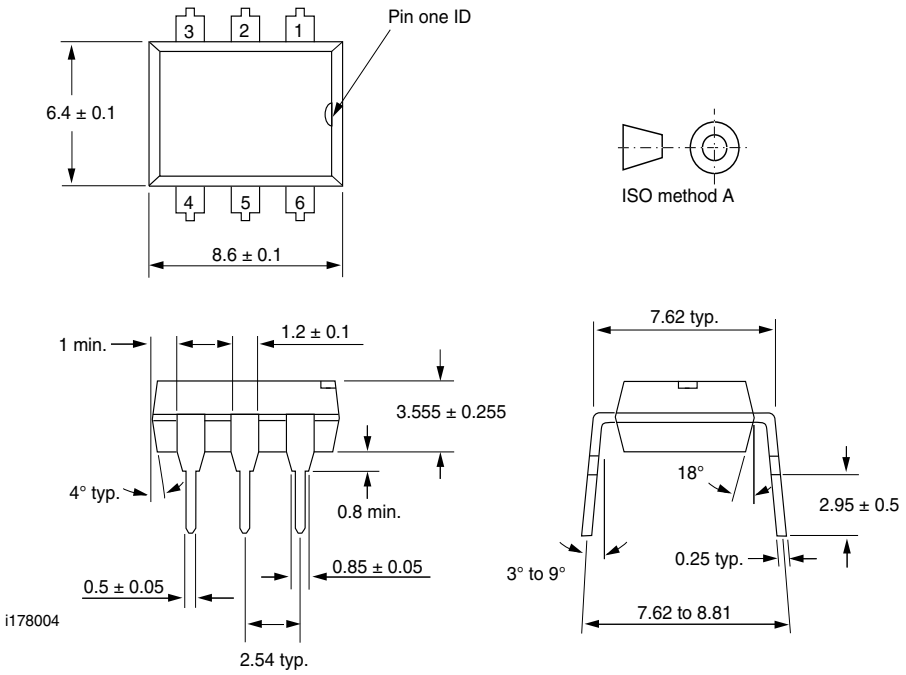
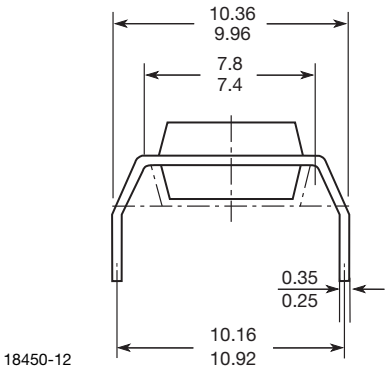
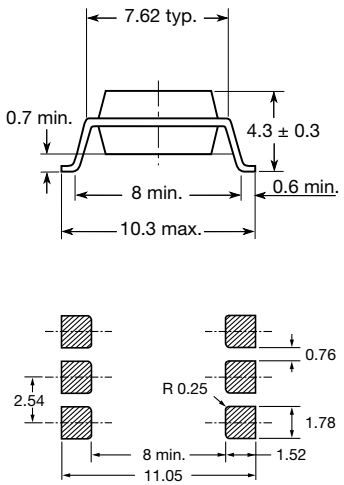
PACKAGE DIMENSIONS millimeters



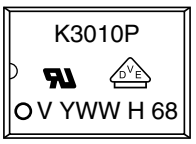
G Series



Option 7



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.

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Footprint and Schematic Information for K3010, K3011, K3012

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

PART NUMBER	FOOTPRINT / SCHEMATIC
K3010P	www.snapeda.com/parts/K3010P/Vishay/view-part
K3010P-X007T	www.snapeda.com/parts/K3010P-X007T/Vishay/view-part
K3010PG	www.snapeda.com/parts/K3010PG/Vishay/view-part
K3011P	www.snapeda.com/parts/K3011P/Vishay/view-part
K3011PG	www.snapeda.com/parts/K3011PG/Vishay/view-part
K3012P	www.snapeda.com/parts/K3012P/Vishay/view-part
K3012P-X007T	www.snapeda.com/parts/K3012P-X007T/Vishay/view-part
K3012PG	www.snapeda.com/parts/K3012PG/Vishay/view-part

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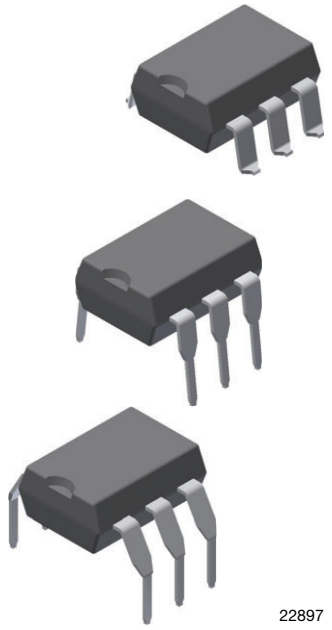

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