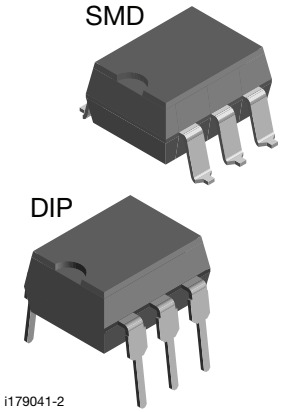
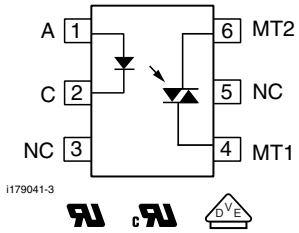
Optocoupler, Non Zero Crossing Phototriac, 1.5 kV/µs dV/dt, 600 V





FEATURES

- 1500 V/µs dV/dt minimum 2000 V/µs typical
- 600 V blocking voltage
- 100 mA on-state current
- Low input trigger current
- 6 pin DIP package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

APPLICATIONS

- Household appliances
- Triac drive/AC motor drives
- Solenoid/valve controls
- Office automation equipment/machine
- Temperature (HVAC)/lighting controls
- Switching power supply

AGENCY APPROVALS

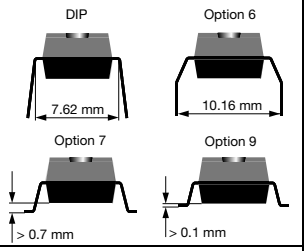
- UL-file E52744 system code H or J
- cUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 (VDE 0884) available with option 1

DESCRIPTION

The VO3052 and VO3053 triac driver family consists of a GaAs infrared LED optically coupled to a monolithic photosensitive non zero crossing triac detector chip.
The 600 V blocking voltage permits control of off-line voltages up to 240 V_{AC}, with a safety factor or more than two, and is sufficient for as much as 380 V.

ORDERING INFORMATION

V	O	3	0	5	#	-	X	0	#	#	T
PART NUMBER							PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	TRIGGER, CURRENT I_{FT} (mA)	
UL, cUL, BSI	**5**	**10**
DIP-6	VO3053	VO3052
DIP-6, 400 mil, option 6	VO3053-X006	VO3052-X006
SMD-6, option 7	VO3053-X007T	VO3052-X007T
SMD-6, option 9	VO3053-X009T	-
VDE, UL, cUL, BSI	**5**	**10**
DIP-6, 400 mil, option 6	-	VO3052-X016

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
INPUT					
Reverse voltage			V_R	6	V
Forward current - continuous			I_F	60	mA
Power dissipation			P_{diss}	100	mW
OUTPUT					
Off state output terminal voltage		VO3052, VO3053	V_{DRM}	600	V
Peak repetitive surge current	PW = 100 ms, 120 pps		I_{TSM}	1	A
Power dissipation			P_{diss}	200	mW
On-state RMS current			$I_{T(RMS)}$	100	mA
COUPLER					
Isolation test voltage	t = 1 s		V_{ISO}	5300	V_{RMS}
Total power dissipation			P_{tot}	300	mW
Operating temperature			T_{amb}	- 40 to + 100	°C
Storage temperature			T_{stg}	- 55 to + 150	°C
Soldering temperature (2)	10 s		T_{sld}	260	°C

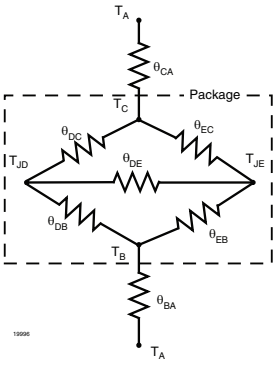
Notes

(1) T_{amb} = 25 °C, unless otherwise specified.
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.

(2) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

THERMAL CHARACTERISTICS (1)

PARAMETER	SYMBOL	VALUE	UNIT
Maximum LED junction temperature	$T_{jmax.}$	125	°C
Maximum output die junction temperature	$T_{jmax.}$	125	°C
Thermal resistance, junction emitter to board	θ_{JEB}	150	°C/W
Thermal resistance, junction emitter to case	θ_{JEC}	139	°C/W
Thermal resistance, junction detector to board	θ_{JDB}	78	°C/W
Thermal resistance, junction detector to case	θ_{JDC}	103	°C/W
Thermal resistance, junction emitter to junction detector	θ_{JED}	496	°C/W
Thermal resistance, case to ambient	θ_{CA}	3563	°C/W



Note

(1) The thermal model is represented in the thermal network below. Each resistance value given in this model can be used to calculate the temperatures at each node for a given operating condition. The thermal resistance from board to ambient will be dependent on the type of PCB, layout and thickness of copper traces. For a detailed explanation of the thermal model, please reference Vishay's Thermal Characteristics of Optocouplers application note.

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Reverse current	V_R = 6 V		I_R			10	µA
Forward voltage	I_F = 30 mA		V_F		1.2	1.5	V
OUTPUT							
Leakage with LED off, either direction	V_{DRM} = 600 V		I_{DRM}		10	500	nA
Critical rate of rise off-state voltage	V_D = 400 V		dV/dt_{cr}	1500	2000		V/µs
COUPLER							
LED trigger current, current required to latch output		VO3053	I_{FT}			5	mA
		VO3052	I_{FT}			10	mA
Peak on-state voltage, either direction	I_{TM} = 100 mA peak, I_F = rated I_{FT}		V_{TM}		1.7	3	V
Holding current, either direction			I_H		200		µA
Coupling capitance	10 KHz		C_{IO}		0.4		pF

Note

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

SAFETY AND INSULATION RATINGS (1)							
PARAMETER		**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification		IEC68 part 1			40/100/21		
Pollution degree		DIN VDE 0109			2		
Tracking resistance (comparative tracking index)		Insulation group IIIa	CTI	175			
Highest allowable overvoltage		Transient overvoltage	V_{IOTM}	8000			V_{peak}
Maximum working insulation voltage		Recurring peak voltage	V_{IORM}	890			V_{peak}
Insulation resistance at 25 °C		V_{IO} = 500 V	R_{IS}			$\geq 10^{12}$	Ω
Insulation resistance at T_S		V_{IO} = 500 V	R_{IS}			$\geq 10^{12}$	Ω
Insulation resistance at 100 °C		V_{IO} = 500 V	R_{IS}			$\geq 10^{12}$	Ω
Partial discharge test voltage		Method a, $V_{pd} = V_{IORM}$ x 1.875	V_{pd}			1669	V_{peak}
Safety limiting values - maximum values allowed in the event of a failure	Output power		P_{SO}			500	mW
	Input current		I_{SI}			250	mA
	Case temperature		T_{SI}			175	°C
Minimum external air gap (clearance)		Measured from input terminals to output terminals, shortest distance through air		≥ 7			mm
Minimum external tracking (creepage)		Measured from input terminals to output terminals, shortest distance path along body		≥ 7			mm
Minimum external air gap (clearance)		Measured from input terminals to output terminals, shortest distance through air		≥ 8			mm
Minimum external tracking (creepage)		Measured from input terminals to output terminals, shortest distance path along body		≥ 8			mm

Note

(1) As per IEC60747-5-5, 7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of prodective circuits.

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

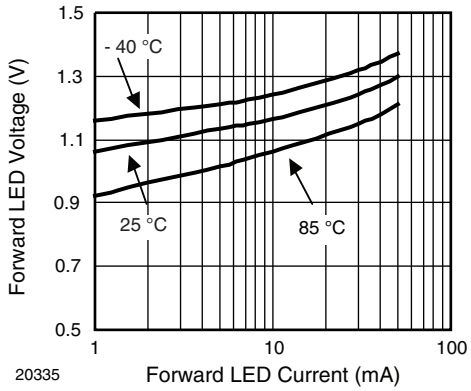


Fig. 1 - Forward Voltage vs. Forward Current

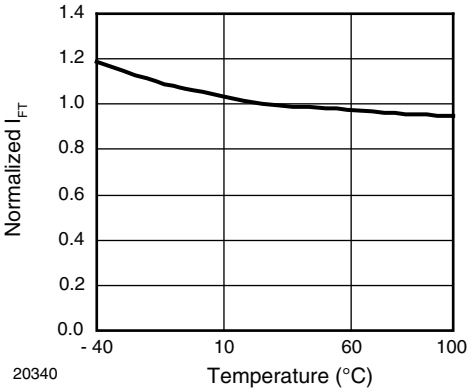


Fig. 4 - Normalized Trigger Current vs. Temperature

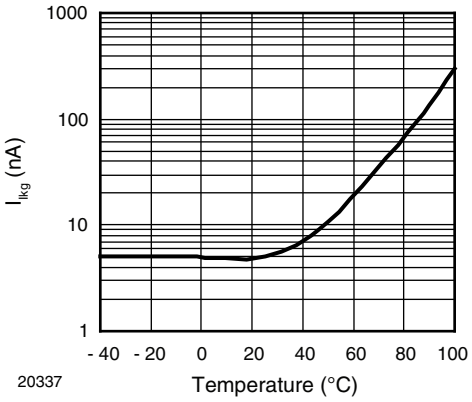


Fig. 2 - Off-State Leakage Current vs. Temperature

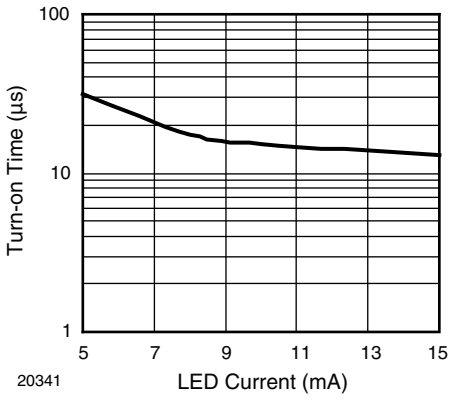


Fig. 5 - Turn-on Time vs. LED Current

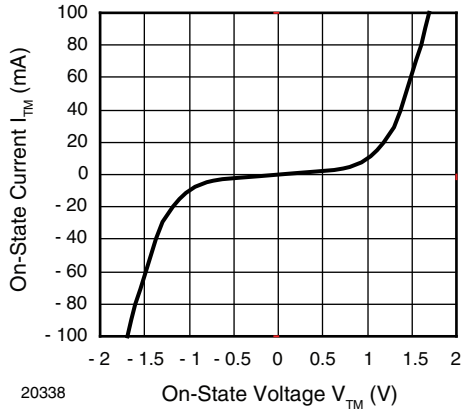


Fig. 3 - On-State Current vs. V_{TM}

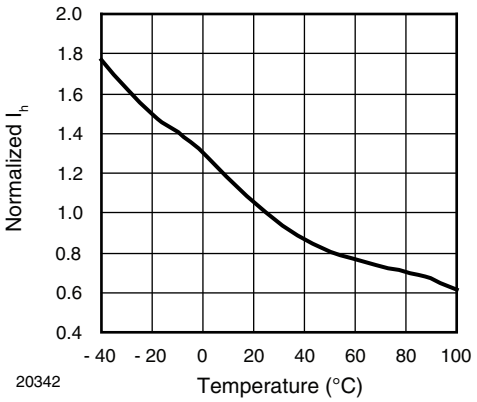


Fig. 6 - Normalized Holding Current vs. Temperature

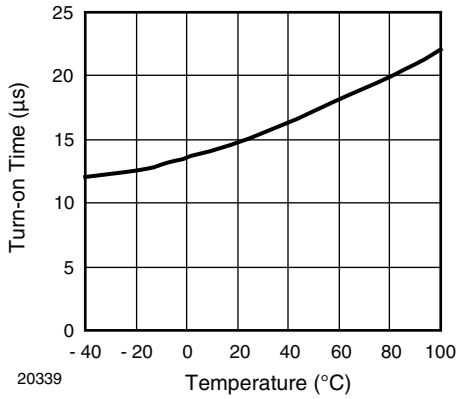


Fig. 7 - Turn-on Time vs. Temperature

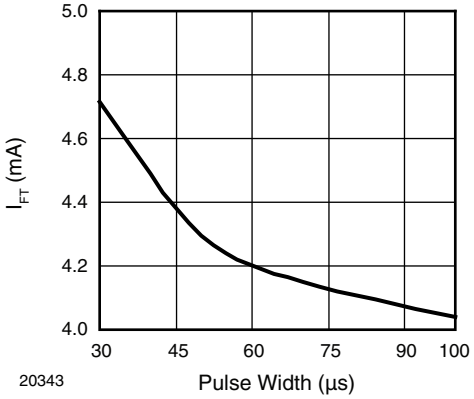
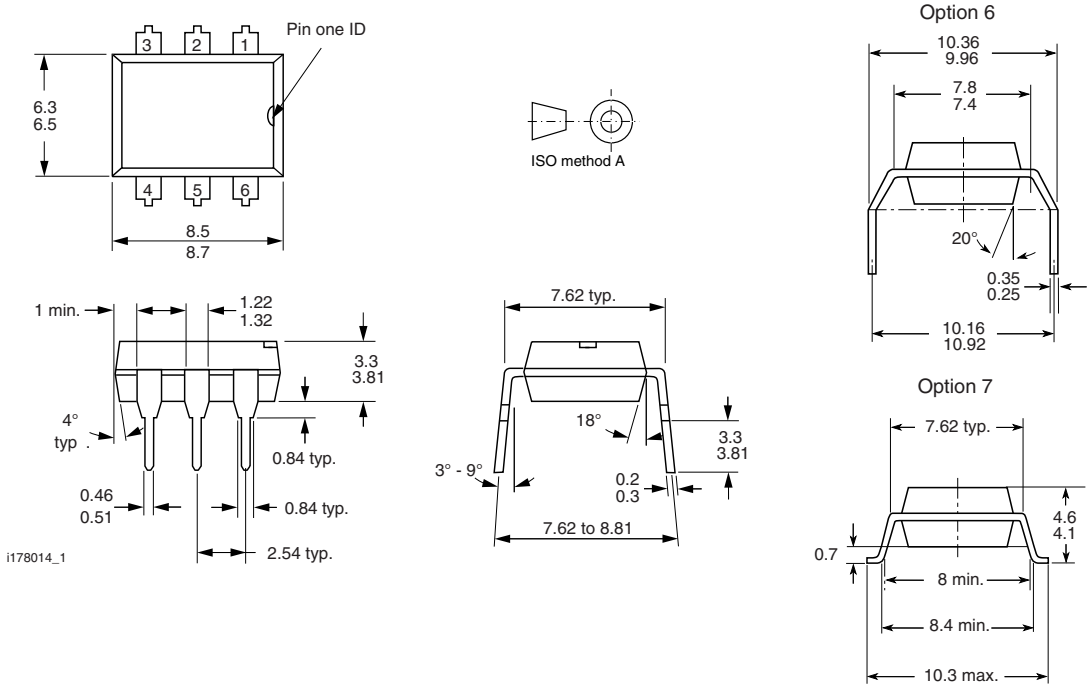
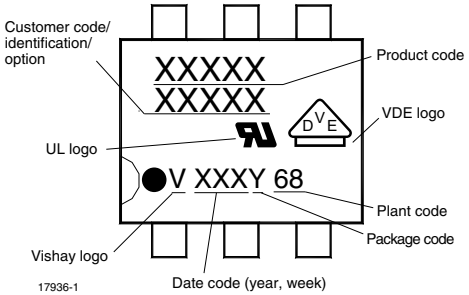


Fig. 8 - Trigger Current vs. Pulse Width

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING



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