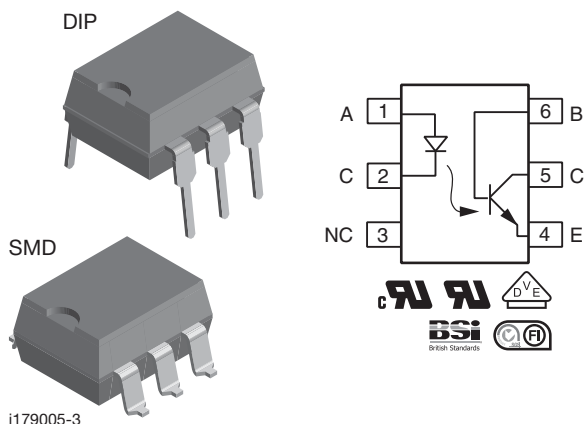


## Optocoupler, Phototransistor Output, Low Input Current, with Base Connection



### FEATURES

- Guaranteed at  $I_F = 1.0 \text{ mA}$
- High collector emitter voltage,  $BV_{CEO} = 70 \text{ V}$
- Long term stability
- Industry standard DIP package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



**RoHS**  
COMPLIANT

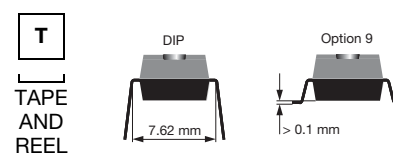
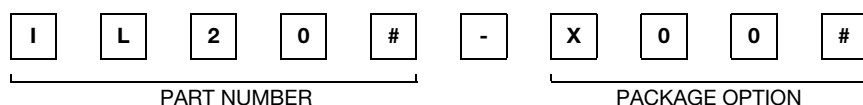
### AGENCY APPROVALS

- UL file no. E52744 system code H, double protection
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending), available with option 1
- BSI: EN 60065:2002, EN 60950-1:2006
- FIMKO

### DESCRIPTION

The IL202, IL203 is optically coupled pairs employing a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. The IL202, IL203 can be used to replace relays and transformers in many digital interface applications, as well as analog applications such as CRT modulation.

### ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)	
<b>UL, cUL, BSI, FIMKO</b>	<b>125 to 250</b>	<b>225 to 450</b>
DIP-6	-	IL203
SMD-6, option 9	-	IL203-X009T
<b>VDE, UL, cUL, BSI, FIMKO</b>	<b>125 to 250</b>	<b>225 to 450</b>
DIP-6	IL202-X001	-

# Vishay Semiconductors Optocoupler, Phototransistor Output, Low Input Current, with Base Connection

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Peak reverse voltage		$V_R$	6.0	V
Forward continuous current		$I_F$	60	mA
Power dissipation		$P_{diss}$	100	mW
Derate linearly from $25\text{ }^{\circ}\text{C}$			1.33	mW/ $^{\circ}\text{C}$
<b>OUTPUT</b>				
Collector emitter breakdown voltage		$BV_{CEO}$	70	V
Emitter collector breakdown voltage		$BV_{ECO}$	7.0	V
Collector base breakdown voltage		$BV_{CBO}$	70	V
Power dissipation		$P_{diss}$	200	mW
Derate linearly from $25\text{ }^{\circ}\text{C}$			2.6	mW/ $^{\circ}\text{C}$
<b>COUPLER</b>				
Isolation test voltage	$t = 1.0\text{ s}$	$V_{ISO}$	5300	$V_{RMS}$
Total package dissipation (LED and detector)		$P_{tot}$	250	mW
Derate linearly from $25\text{ }^{\circ}\text{C}$			3.3	mW/ $^{\circ}\text{C}$
Creepage distance			$\geq 7.0$	mm
Clearance distance			$\geq 7.0$	mm
Storage temperature		$T_{stg}$	- 55 to + 150	$^{\circ}\text{C}$
Operating temperature		$T_{amb}$	- 55 to + 100	$^{\circ}\text{C}$
Lead soldering time	$\leq 260\text{ }^{\circ}\text{C}$		10	s

**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.

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 20\text{ mA}$	$V_F$		1.2	1.5	V
	$I_F = 1.0\text{ mA}$	$V_F$		1.0	1.2	V
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$	$V_F$	6.0	20		V
Reverse current	$V_R = 6.0\text{ V}$	$I_R$		0.1	10	$\mu\text{A}$
<b>OUTPUT</b>						
DC forward current gain	$V_{CE} = 5.0\text{ V}$ , $I_C = 100\text{ }\mu\text{A}$	$h_{FE}$	100	200		
Collector emitter breakdown voltage	$I_C = 100\text{ }\mu\text{A}$	$BV_{CEO}$	70			V
Emitter collector breakdown voltage	$I_E = 100\text{ }\mu\text{A}$	$BV_{ECO}$	7.0	10		V
Collector base breakdown voltage	$I_C = 10\text{ }\mu\text{A}$	$BV_{CBO}$	70	90		V
Leakage current collector emitter	$V_{CE} = 10\text{ V}$ , $T_A = 25\text{ }^{\circ}\text{C}$	$I_{CEO}$		5.0	50	nA

**Note**

- 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.

<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio (collector to base)	$I_F = 10\text{ mA}$ , $V_{CB} = 10\text{ V}$		$CTR_{CB}$	15			%
Collector emitter saturation voltage	$I_F = 10\text{ mA}$ , $I_C = 2.0\text{ mA}$		$V_{CEsat}$			0.4	V
DC current transfer ratio	$I_F = 10\text{ mA}$ , $V_{CE} = 10\text{ V}$	IL202	$CTR_{DC}$	125	200	250	%
		IL203	$CTR_{DC}$	225	300	450	%
	$I_F = 1.0\text{ mA}$ , $V_{CE} = 10\text{ V}$	IL202	$CTR_{DC}$	30			%
		IL203	$CTR_{DC}$	50			%

# Optocoupler, Phototransistor Output, Vishay Semiconductors Low Input Current, with Base Connection

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

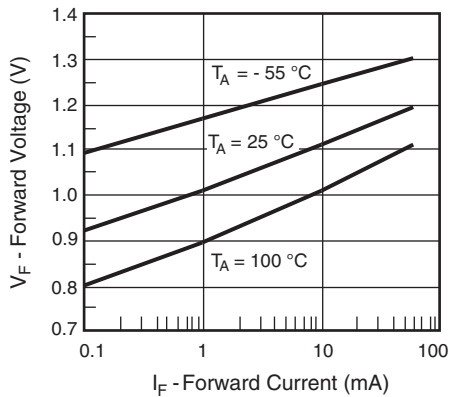


Fig. 1 - Forward Voltage vs. Forward Current

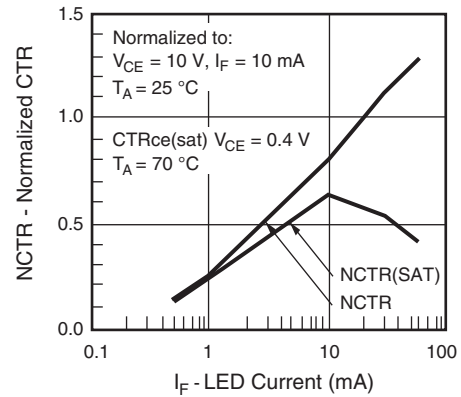


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

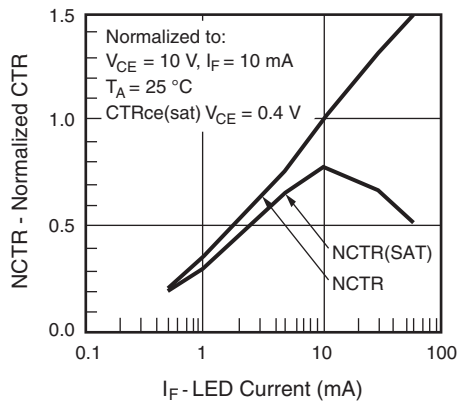


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

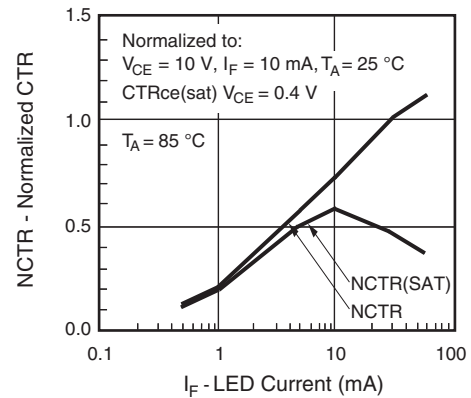


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

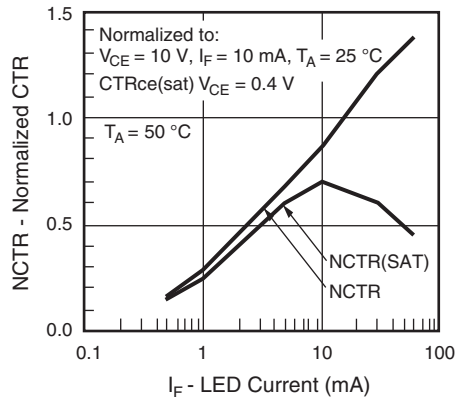


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

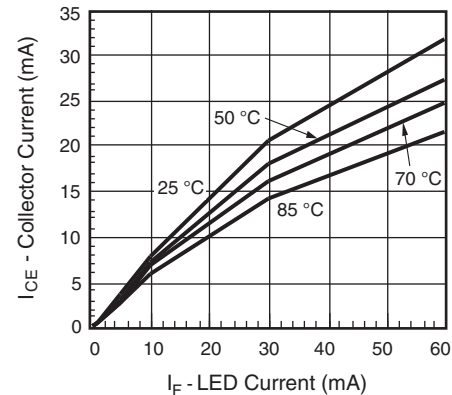


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

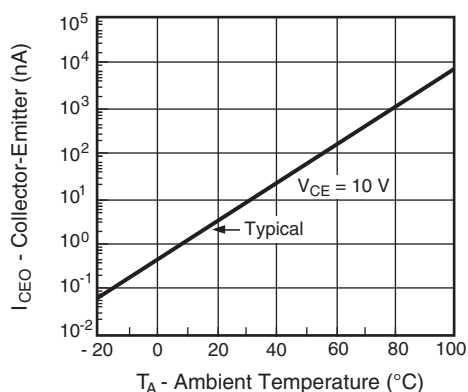


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

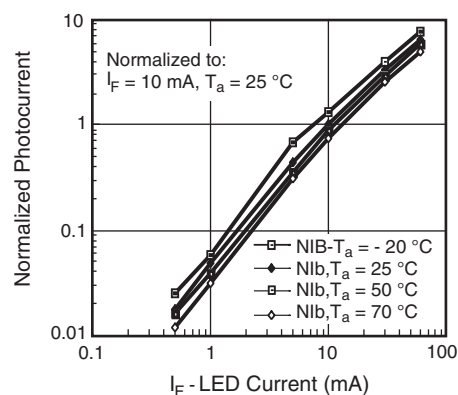


Fig. 10 - Normalized Photocurrent vs.  $I_F$  and Temperature

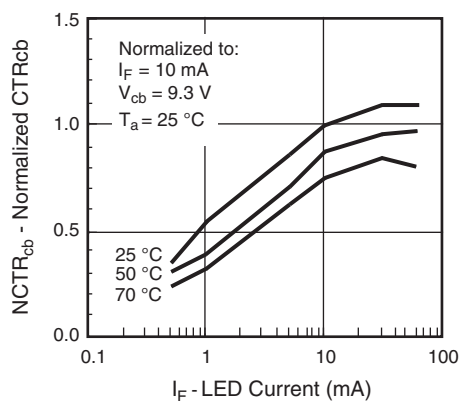


Fig. 8 - Normalized  $CTR_{cb}$  vs. LED Current and Temperature

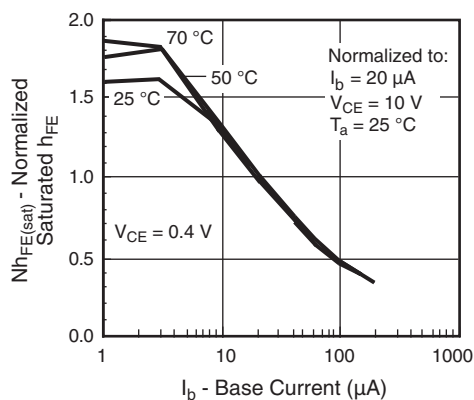


Fig. 11 - Normalized Saturated  $h_{FE}$  vs. Base Current and Temperature

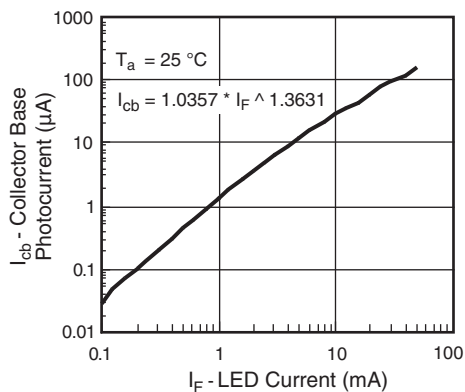


Fig. 9 - Collector Base Photocurrent vs. LED Current

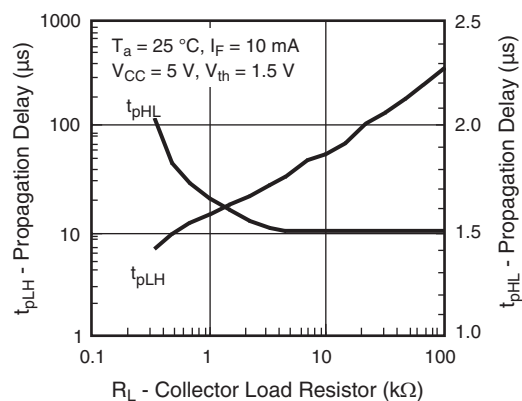


Fig. 12 - Propagation Delay vs. Collector Load Resistor

# Optocoupler, Phototransistor Output, Vishay Semiconductors Low Input Current, with Base Connection

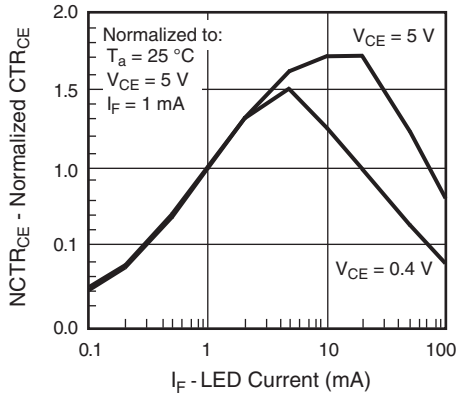


Fig. 13 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

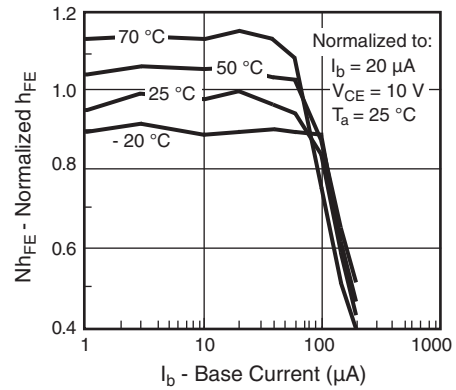
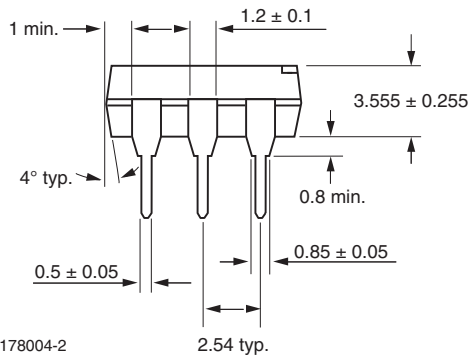
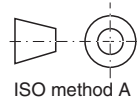
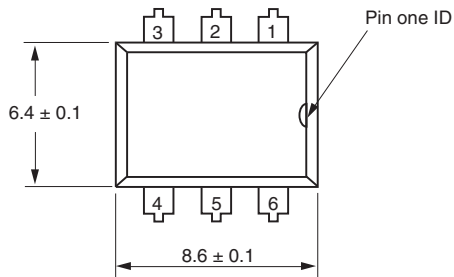
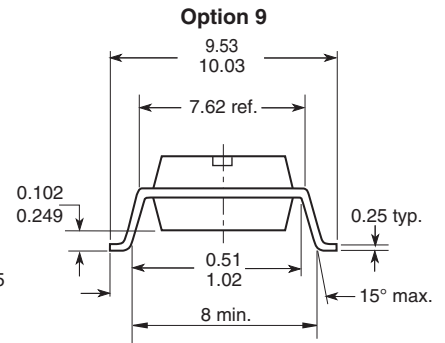
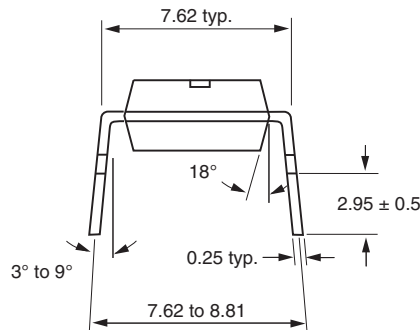


Fig. 14 - Normalized Non-Saturated  $h_{FE}$  vs. Base Current and Temperature

## PACKAGE DIMENSIONS in millimeters



i178004-2



## PACKAGE MARKING (example)



### Notes

- Only option 1 is reflected in the package marking
- The VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking



## Disclaimer

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