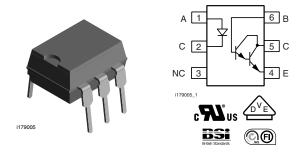


Optocoupler, Photodarlington Output, High Gain, With Base Connection



DESCRIPTION

The 4N32 and 4N33 are optically coupled isolators with a gallium arsenide infrared LED and a solicon photodarlington sensor

Switching can be achieved while maintaining a high degree of isolation between driving and load circuits.

These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

FEATURES

- Very high current transfer ratio, 500 % min.
- High isolation resistance, $10^{11} \Omega$ typical
- Standard plastic DIP package
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912





ROHS

AGENCY APPROVALS

- UL1577, file no. E52744 system code H
- DIN EN 60747-5-2 (VDE 0884) / DIN EN 60747-5-5 (pending), available with option 1
- BSI IEC 60950; IEC 60065
- FIMKO

ORDERING INFORMATION		
4 N 3 # -	PACKAGE OPTION TAPE . REE	AND 7.62 mm 10.16 mm
AGENCY CERTIFIED/PACKAGE	CTR	(%)
UL, BSI, FIMKO	≥ 500	≥ 500
DIP-6	4N32	4N33
DIP-6, 400 mil, option 6	4N32-X006	-
SMD-6, option 7	4N32-X007T ⁽¹⁾	4N33-X007T ⁽¹⁾
SMD-6, option 9	4N32-X009T ⁽¹⁾	4N33-X009T ⁽¹⁾
VDE, UL, BSI, FIMKO	≥ 500	≥ 500
DIP-6	4N32-X001	4N33-X001
SMD-6, option 7	4N32-X017T	4N33-X017T ⁽¹⁾

Notes

- · Additional options may be possible, please contact sales office
- (1) Also available in tubes, do not put T on the end



ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT			
INPUT							
Reverse voltage		V_{R}	3	V			
Forward current		l _F	60	mA			
Power dissipation		P_{diss}	100	mW			
Derate linearly	From 55 °C		1.33	mW/°C			
OUTPUT			•				
Collector emitter breakdown voltage		BV _{CEO}	30	V			
Emitter base breakdown voltage		BV _{EBO}	8	V			
Collector base breakdown voltage		BV _{CBO}	50	V			
Emitter collector breakdown voltage		BV _{ECO}	5	V			
Collector (load) current		Ic	100	mA			
Power dissipation		P _{diss}	150	mW			
Derate linearly			2	mW/°C			
COUPLER							
Total dissipation		P _{tot}	250	mW			
Derate linearly			3.3	mW/°C			
Isolation test voltage (between emitter	1 s	V _{ISO}	5300	V _{RMS}			
Leakage path			7	mm min.			
Air path			7	mm min.			
la elation vaniatama	V _{IO} = 500 V, T _{amb} = 25 °C	R _{IO}	≥ 10 ¹²	Ω			
Isolation resistance	V _{IO} = 500 V, T _{amb} = 100 °C	R _{IO}	≥ 10 ¹¹	Ω			
Storage temperature		T _{stg}	-55 to +150	°C			
Operating temperature		T _{amb}	-55 to +100	°C			
Lead soldering time (1)	at 260 °C		10	S			

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

ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
INPUT							
Forward voltage	$I_F = 50 \text{ mA}$	V_{F}	ı	1.25	1.5	V	
Reverse current	$V_R = 3 V$	I _R	ı	0.1	100	μA	
Capacitance	$V_R = 0 V$	Co	-	25		pF	
OUTPUT							
Collector emitter breakdown voltage (1)	$I_C = 100 \ \mu A, \ I_F = 0$	BV _{CEO}	30	-	-	V	
Collector base breakdown voltage (1)	$I_C = 100 \mu A, I_F = 0$	BV _{CBO}	50	_	_	V	
Emitter base breakdown voltage (1)	$I_C = 100 \ \mu A, \ I_F = 0$	BV _{EBO}	8	-	-	V	
Emitter collector breakdown voltage (1)	$I_C = 100 \mu A, I_F = 0$	BV _{ECO}	5	10	-	V	
Collector emitter leakage current	$V_{CE} = 10 \text{ V}, I_F = 0$	I _{CEO}	-	1	100	nA	
	$I_C = 0.5 \text{ mA}, V_{CE} = 5 \text{ V}$	h _{FE}	13	-	-		
COUPLER							
Collector emitter saturation voltage		V _{CEsat}	ı	1	-	V	
Coupling capacitance			ı	1.5	-	pF	

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) Indicates JEDEC® registered values



CURRENT TRANSFER RATIO						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$V_{CE} = 10 \text{ V}, I_F = 10 \text{ mA}$	CTR	500	=	-	%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$V_{CC} = 10 \text{ V}, I_{C} = 50 \text{ mA}$	t _{on}	-	-	5	μs
Turn-off time	I_F = 200 mA, R_L = 180 Ω	t _{off}	-	-	100	μs

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)			=	55 / 100 / 21	-	
Comparative tracking index		CTI	175	-	399	
V _{IOTM}			8000	-	=	V
V _{IORM}			890	-	=	V
P _{SO}			-	-	700	mW
I _{SI}			-	-	400	mA
T _{SI}			-	-	175	°C
Creepage distance	Standard DIP-6		7	-	=	mm
Clearance distance	Standard DIP-6		7	-	=	mm
Creepage distance	400 mil DIP-6		8	-	-	mm
Clearance distance	400 mil DIP-6		8	-	=	mm
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4	-	-	mm

Note

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

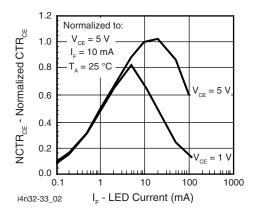


Fig. 1 - Normalized Non-Saturated and Saturated CTR_{CE} vs. LED Current

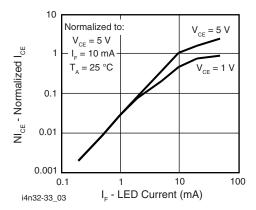


Fig. 2 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

As per IEC 60747-5-2, § 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 protective circuits



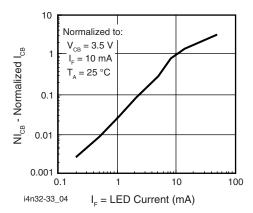


Fig. 3 - Normalized Collector Base Photocurrent vs. LED Current

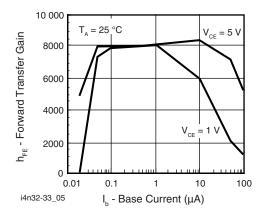


Fig. 4 - Non-Saturated and Saturated h_{FE} vs. Base Current

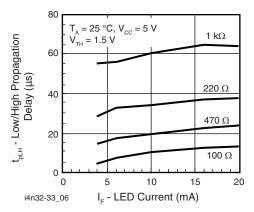


Fig. 5 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

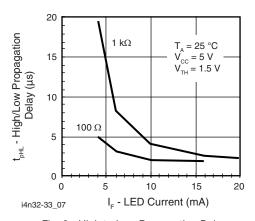


Fig. 6 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current

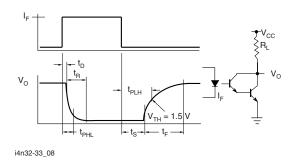
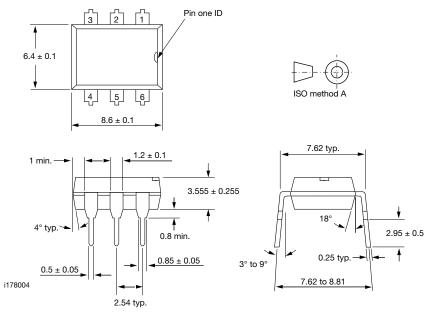
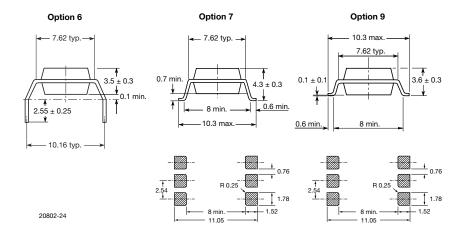


Fig. 7 - Switching Waveform and Switching Schematic

PACKAGE DIMENSIONS in millimeters

DIP-6 Package Dimensions





PACKAGE MARKING



Notes

- Example marking for 4N32-X017T
- Only options 1, and 7 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



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Vishay

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