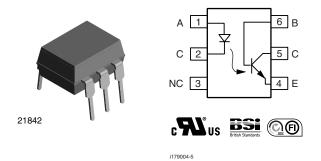


Vishay Semiconductors

Optocoupler, Phototransistor Output, with Base Connection



DESCRIPTION

Each optocoupler consists of gallium arsenide infrared LED and a silicon NPN phototransistor.

AGENCY APPROVALS

- Underwriters laboratory file no. E52744
- BSI: EN 60065:2002, EN 60950:2000
- FIMKO; EN 60065, EN 60335, EN 60950 certificate no. 25156

FEATURES

- Isolation test voltage 5000 V_{RMS}
- Interfaces with common logic families
- Input-output coupling capacitance < 0.5 pF
- Industry standard dual-in-line 6 pin package
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC





ROHS COMPLIANT

APPLICATIONS

- AC mains detection
- · Reed relay driving
- Switch mode power supply feedback
- Telephone ring detection
- Logic ground isolation
- Logic coupling with high frequency noise rejection

ORDER INFORMATION	
PART	REMARKS
4N35	CTR > 100 %, DIP-6
4N36	CTR > 100 %, DIP-6
4N37	CTR > 100 %, DIP-6

ABSOLUTE MAXIMUM RATINGS (1)							
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT			
INPUT							
Reverse voltage		V_{R}	6	V			
Forward current		I _F	50	mA			
Surge current	t ≤ 10 µs	I _{FSM}	1	А			
Power dissipation		P _{diss}	70	mW			
OUTPUT							
Collector emitter breakdown voltage		V _{CEO}	70	V			
Emitter base breakdown voltage		V _{EBO}	7	V			
Collector current		I _C	50	mA			
Collector current	$t \leq 1 \ ms$	Ic	100	mA			
Power dissipation		P _{diss}	70	mW			
COUPLER							
Isolation test voltage		V _{ISO}	5000	V_{RMS}			
Creepage			≥ 7	mm			
Clearance			≥ 7	mm			
Isolation thickness between emitter and detector			≥ 0.4	mm			

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ABSOLUTE MAXIMUM RATINGS (1)							
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT			
COUPLER							
Comparative tracking index	DIN IEC 112/VDE 0303, part 1		175				
Isolation resistance	V _{IO} = 500 V, T _{amb} = 25 °C	R _{IO}	10 ¹²	Ω			
	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			
Junction temperature		T _j	100	°C			
Soldering temperature (2)	max.10 s dip soldering: distance to seating plane ≥ 1.5 mm	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.

(2) Refer to wave profile for soldering condditions for through hole devices (DIP).

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT					•	•	
Junction capacitance	V _R = 0 V, f = 1 MHz		C _j		50		pF
Forward voltage (2)	I _F = 10 mA		V_{F}		1.3	1.5	V
Forward voitage (=)	$I_F = 10 \text{ mA}, T_{amb} = -55 ^{\circ}\text{C}$		V_{F}	0.9	1.3	1.7	V
Reverse current (2)	V _R = 6 V		I _R		0.1	10	μΑ
Capacitance	V _R = 0 V, f = 1 MHz		Co		25		pF
OUTPUT							
		4N35	BV _{CEO}	30			V
Collector emitter breakdown voltage ⁽²⁾	I _C = 1 mA	4N36	BV _{CEO}	30			V
vollage		4N37	BV _{CEO}	30			V
Emitter collector breakdown voltage ⁽²⁾	I _E = 100 μA		BV _{ECO}	7			V
OUTPUT							
	I _C = 100 μA, I _B = 1 μA	4N35	BV _{CBO}	70			V
Collector base breakdown voltage ⁽²⁾		4N36	BV _{CBO}	70			V
Vollage		4N37	BV _{CBO}	70			V
Collector emitter leakage current (2)	V _{CE} = 10 V, I _F = 0	4N35	I _{CEO}		5	50	nA
		4N36	I _{CEO}		5	50	nA
	$V_{CE} = 10 \text{ V}, I_F = 0$	4N37	I _{CEO}		5	50	nA
		4N35	I _{CEO}			500	μΑ
	$V_{CE} = 30 \text{ V, } I_{F} = 0,$ $T_{amb} = 100 \text{ °C}$	4N36	I _{CEO}			500	μΑ
	1 amb - 100 0	4N37	I _{CEO}			500	μΑ
Collector emitter capacitance	$V_{CE} = 0$		C _{CE}		6		pF
COUPLER							
Resistance, input output (2)	V _{IO} = 500 V		R _{IO}	10 ¹¹			Ω
Capacitance, input output	f = 1 MHz		C _{IO}		0.6		pF

Notes

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

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

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.

⁽²⁾ Indicates JEDEC registered value.



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CURRENT TRANSFER RATIO							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
DC current transfer ratio (1)	V _{CE} = 10 V, I _F = 10 mA	4N35	CTR _{DC}	100			%
		4N36	CTR _{DC}	100			%
		4N37	CTR _{DC}	100			%
	V _{CE} = 10 V, I _F = 10 mA, T _A = -55 °C to + 100 °C	4N35	CTR _{DC}	40	50		%
		4N36	CTR _{DC}	40	50		%
		4N37	CTR _{DC}	40	50		%

Note

(1) Indicates JEDEC registered values.

SWITCHING CHARACTERISTICS							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Switching time (1)	$V_{CC} = 10 \text{ V}, I_{C} = 2 \text{ mA}, R_{L} = 100 \Omega$	t _{on} , t _{off}		10		μs	

Note

(1) Indicates JEDEC registered values.

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specied

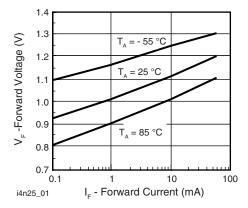


Fig. 1 - Forward Voltage vs. Forward Current

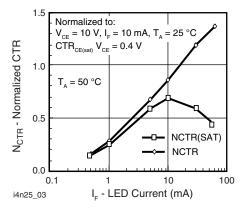


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

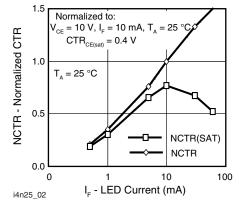


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

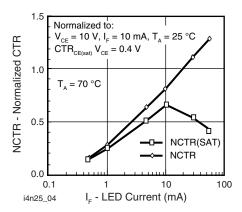


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

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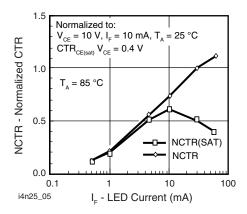


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

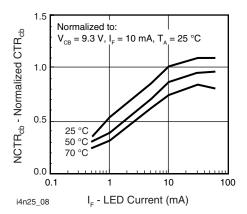


Fig. 8 - Normalized CTR_{cb} vs. LED Current and Temperature

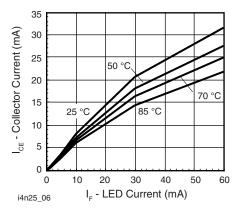


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

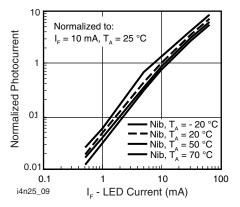


Fig. 9 - Normalized Photocurrent vs. I_F and Temperature

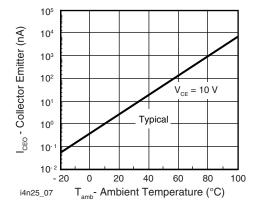


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

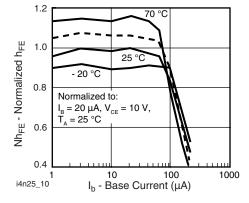


Fig. 10 - Normalized Non-Saturated h_{FE} vs. Base Current and Temperature



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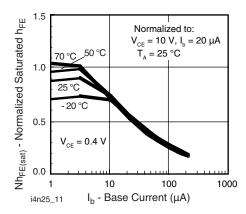


Fig. 11 - Normalized hFE vs. Base Current and Temperature

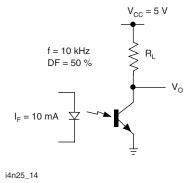


Fig. 14 - Switching Schematic

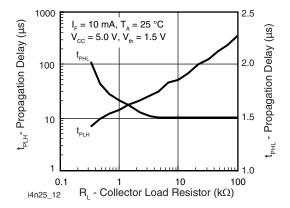


Fig. 12 - Propagation Delay vs. Collector Load Resistor

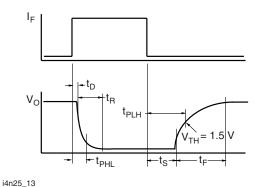
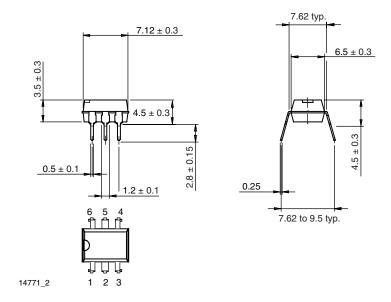


Fig. 13 - Switching Timing

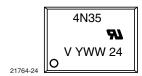
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PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING





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