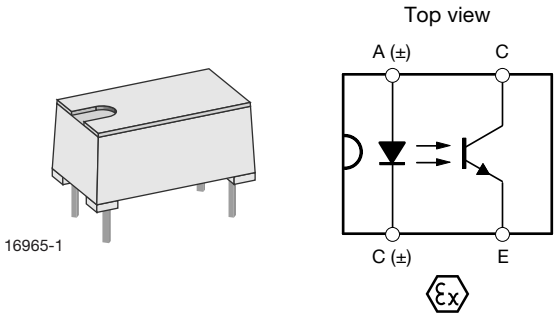
Optocoupler, Phototransistor Output, ATEX Certified



DESCRIPTION

The CNY65Exi consists of a phototransistor optically coupled to an infrared-emitting diode in a 4 pin plastic package. The components are mounted opposite one another, with a distance between input and output of > 3.0 mm; meeting the highest of safety requirements.

The CNY65Exi is ATEX certificated for explosive atmospheres according to the Directive 2014/34/EU

AGENCY APPROVALS

- ATEX :PTB 03 ATEX 2033 U
  EN 60079-0 : 2012 + A11 : 2013
  EN 60079-11 : 2012
  EN 60079-26 : 2015

FEATURES

- ATEX certificate: PTB 03 ATEX 2033 U www.vishay.com/doc?85361
- Suitable for intrinsic safe circuits for gas and dust
- Gas safety provision: II (1) G [Ex ia] IIC
- Dust safety provision: II (1) D [Ex ia] IIIC
- Conforms to EN 60079-0: 2012 + A11: 2013
- Qualified for continuously, longterm, or frequently dangerous explosive environments, zone 0
- Isolation voltage (V_{ISO}) of 11 600 V_{peak} for 1 minute
- Distance from emitter to detector through insulation ≥ 3 mm
- CTR from 50 % to 300 %
- Very low coupling capacity (C_K)
  - 0.3 pF superior noise immunity between input and output pins
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e4

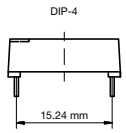
RoHS COMPLIANT

APPLICATIONS

- Electronics used in potentially explosive gas and dust environments
  - Safety related process automation and instrumentation
  - Natural gas metering and flow measurement
  - Power and motor switching
  - Power supplies, metering, and data acquisition
  - Lighting and signaling
  - Petrol and grain transport and storage

ORDERING INFORMATION

C	N	Y	6	5	X	E	x	i
PART NUMBER					CTR BIN	PACKAGE OPTION		



AGENCY CERTIFIED/PACKAGE	CTR (%)	
ATEX	**50 to 300**	**100 to 200**
DIP-4, HV, high isolation distance	CNY65Exi	CNY65BExi

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	5	V
Forward current		I_F	75	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	1.5	A
Power dissipation		P_{diss}	120	mW
Junction temperature		T_j	100	°C
OUTPUT				
Collector emitter voltage		V_{CEO}	32	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Collector peak current	$t_p/T = 0.5$, $t_p \leq 10$ ms	I_{CM}	100	mA
Power dissipation		P_{diss}	130	mW
Junction temperature		T_j	100	°C
COUPLER				
Total power dissipation		P_{tot}	250	mW
Ambient temperature range		T_{amb}	-55 to +85	°C
Storage temperature range		T_{stg}	-55 to +100	°C
Soldering temperature	2 mm from case, $t \leq 10$ s	T_{sld}	260	°C

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 Rating for extended periods of the time can adversely affect reliability

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 50 mA	V_F	-	1.25	1.6	V
OUTPUT						
Collector emitter voltage	I_C = 1 mA	V_{CEO}	32	-	-	V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7	-	-	V
Collector dark current	V_{CE} = 20 V, I_f = 0, E = 0	I_{CEO}	-	-	200	nA
COUPLER						
Isolation resistance	V_{IO} = 1 kV, 40 % relative humidity	R_{IO} (1)	-	10^{12}	-	Ω
Collector saturation voltage	I_F = 10 mA, I_C = 1 mA	V_{CEsat}	-	-	0.3	V
Cut-off frequency	V_{CE} = 5 V, I_F = 10 mA, R_L = 100 Ω	f_c	110	-	-	kHz
Coupling capacitance	f = 1 MHz	C_k	-	0.3	-	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) Related to standard climate 23/50 DIN 50014

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	V_{CE} = 5 V, I_F = 10 mA	CNY65Exi	CTR	50	100	300	%
		CNY65BExi	CTR	100	-	200	%

SAFETY AND INSULATION RATINGS				
PARAMETER		**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		40 / 85 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	475	
Maximum rated withstanding isolation voltage	t = 1 min	V_{ISO}	8200	V_{RMS}
Maximum transient isolation voltage		V_{IOTM}	12 000	V_{peak}
Maximum repetitive peak isolation voltage		V_{IORM}	1450	V_{peak}
Isolation resistance	T_{amb} = 25 °C, V_{IO} = 500 V	R_{IO}	$\geq 10^{12}$	Ω
	T_{amb} = 100 °C, V_{IO} = 500 V	R_{IO}	$\geq 10^{11}$	Ω
	$T_{amb} = T_S$, V_{IO} = 500 V	R_{IO}	$\geq 10^{9}$	Ω
Output safety power		P_{SO}	250	mW
Input safety current		I_{si}	120	mA
Input safety temperature		T_S	150	°C
Creepage distance			≥ 14	mm
Clearance distance			≥ 14	mm
Insulation thickness		DTI	≥ 3	mm

Note

- According to DIN EN 60747-5-5 (see Fig. 2). 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

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Delay time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see Fig. 1)	t_d	-	2.6	-	µs
Rise time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see Fig. 1)	t_r	-	2.4	-	µs
Fall time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see Fig. 1)	t_f	-	2.4	-	µs
Storage time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see Fig. 1)	t_s	-	0.3	-	µs
Turn-on time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see Fig. 1)	t_{on}	-	5	-	µs
Turn-off time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω, (see Fig. 1)	t_{off}	-	3	-	µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see Fig. 2)	t_{on}	-	25	-	µs
Turn-off time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ, (see Fig. 2)	t_{off}	-	42.5	-	µs

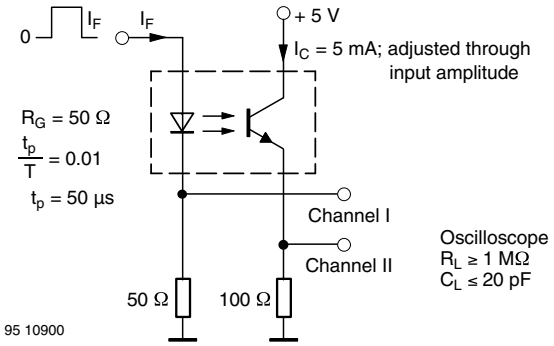


Fig. 1 - Test Circuit, Non-Saturated Operation

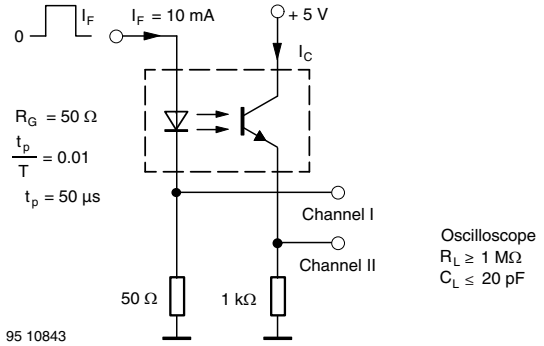


Fig. 2 - Test Circuit, Saturated Operation

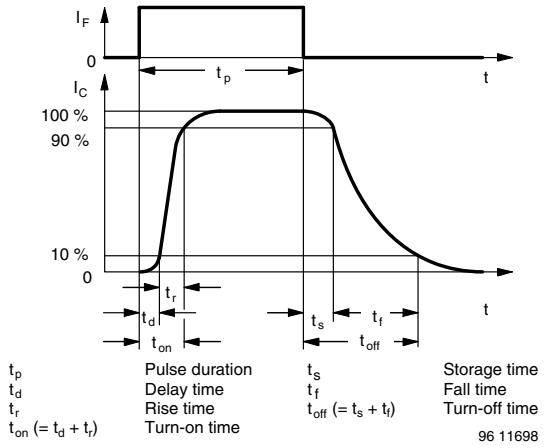


Fig. 3 - Switching Times

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

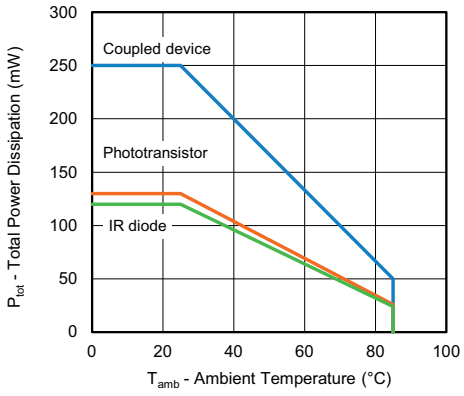


Fig. 4 - Total Power Dissipation vs. Ambient Temperature

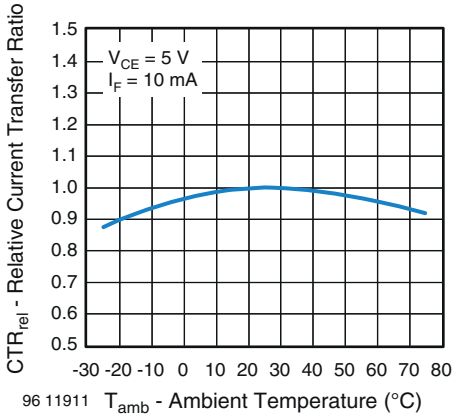


Fig. 6 - Relative Current Transfer Ratio vs. Ambient Temperature

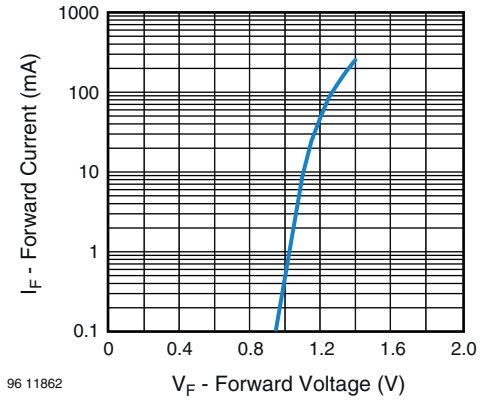


Fig. 5 - Forward Current vs. Forward Voltage

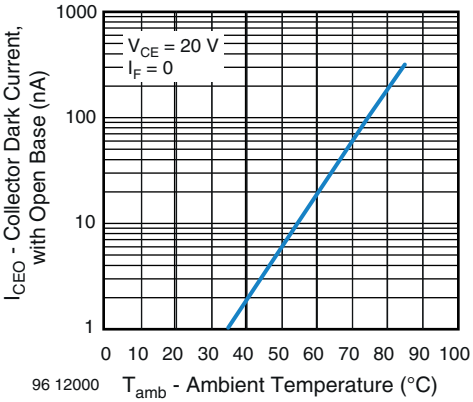


Fig. 7 - Collector Dark Current vs. Ambient Temperature

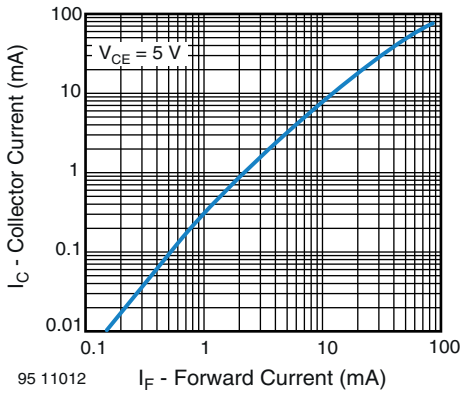


Fig. 8 - Collector Current vs. Forward Current

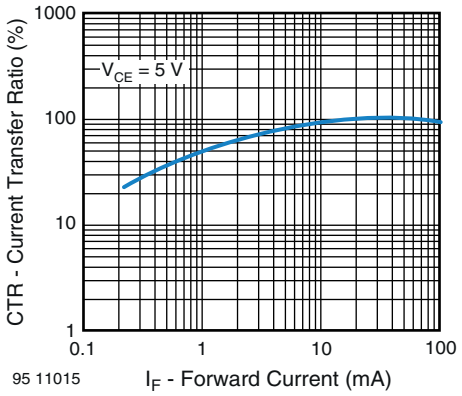


Fig. 11 - Current Transfer Ratio vs. Forward Current

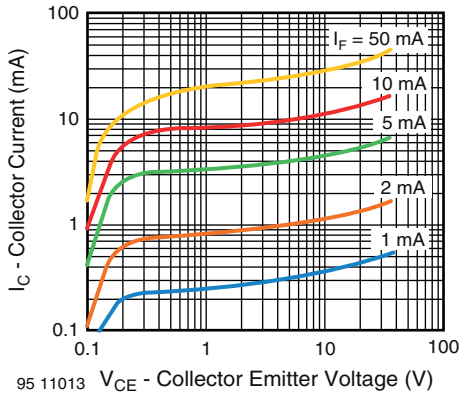


Fig. 9 - Collector Current vs. Collector Emitter Voltage

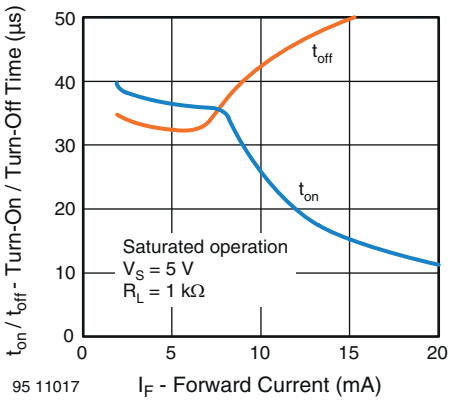


Fig. 12 - Turn-On / Turn-Off Time vs. Forward Current

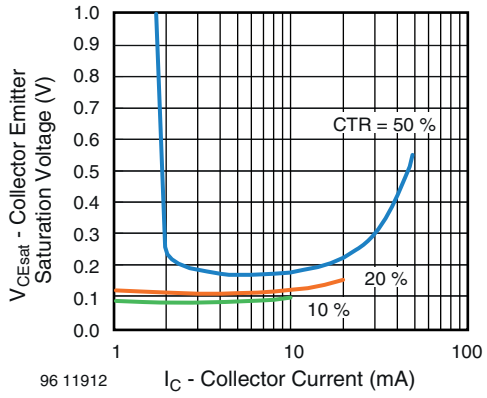


Fig. 10 - Collector Emitter Saturation Voltage vs. Collector Current

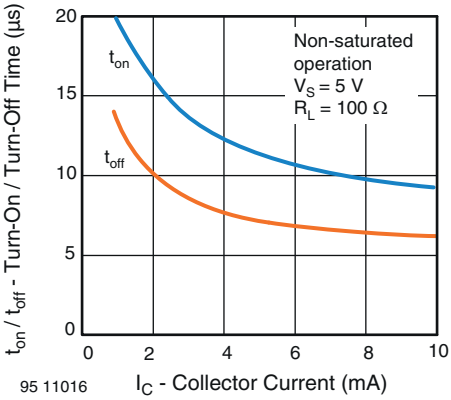
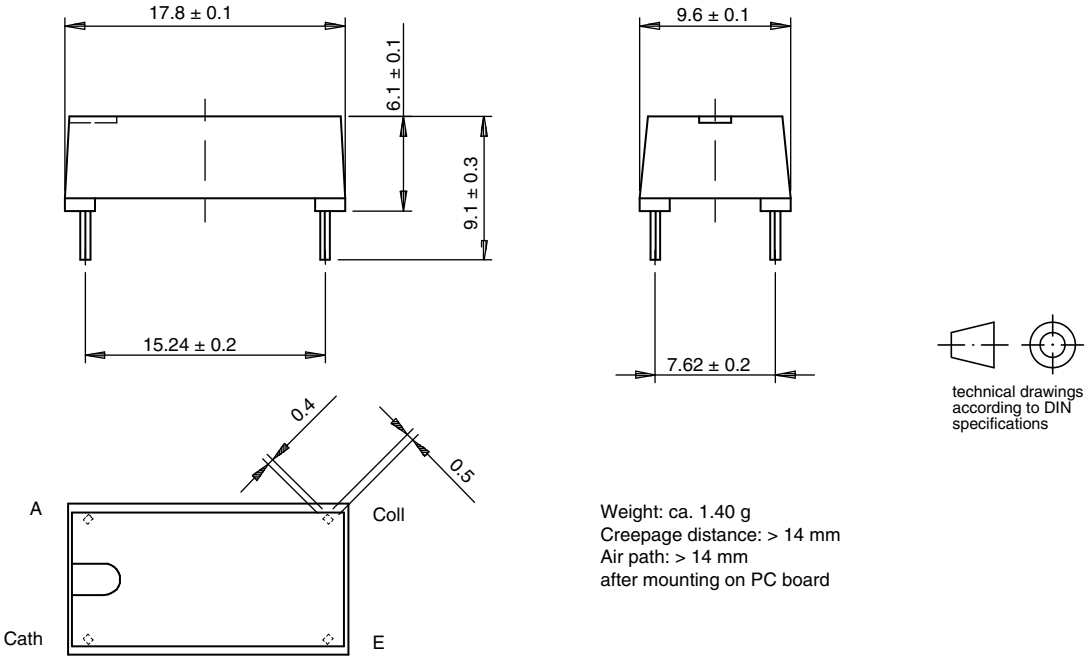


Fig. 13 - Turn-On / Turn-Off Time vs. Collector Current

PACKAGE DIMENSIONS (in millimeters)



Weight: ca. 1.40 g
Creepage distance: > 14 mm
Air path: > 14 mm
after mounting on PC board

Drawing-No.: 6.544-5036.01-1
Issue: 2; 10.11.98
14763

PACKAGE MARKING (example of CNY65BExi)

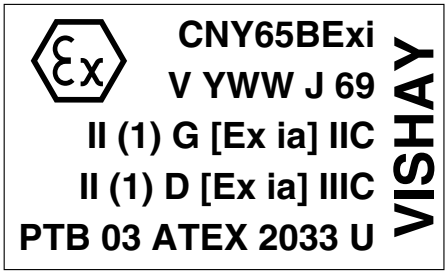


Fig. 14 - Top Marking

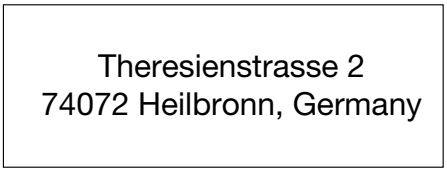
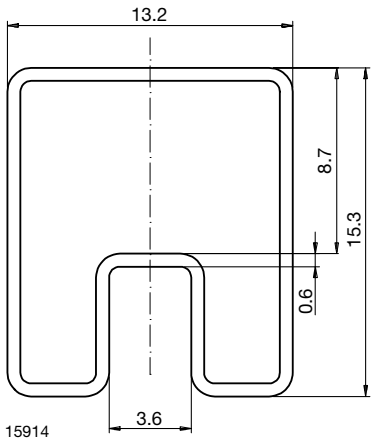


Fig. 15 - Side Marking

TUBE INFORMATION			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
CNY65Exi	30	35	1050



With foamy rubber plugs
Tolerance: ± 0.5 mm
Length: 575 mm ± 2 mm

Fig. 16 - CNY65Exi

SOLDER PROFILES

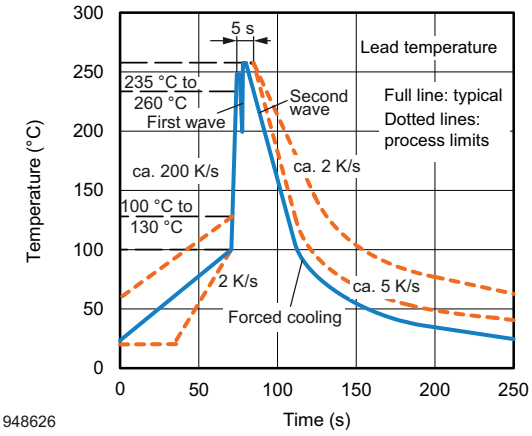


Fig. 17 - Wave Soldering Double Wave Profile According to J-STD-020 for Through-Hole Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: T_{amb} < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

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