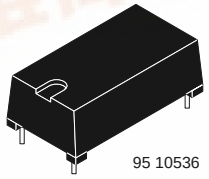
CNY65Exi

Vishay Telefunken

Optocoupler with Phototransistor Output

Description

The CNY65Exi consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4-lead plastic package.
The single components are mounted in opposite one-another, providing a distance between input and output for highest safety requirements of > 3 mm.

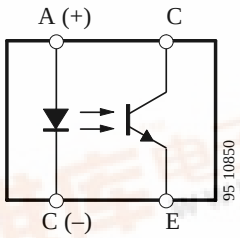


Applications

Galvanically separated circuits, suitable for intrinsic safety circuits
Electrical apparatus used in a potentially explosive atmosphere:
EN 50014-1977/VDE 0171 Part 1/5.78
General instructions
EN 50020-1977/VDE 0171 Part 7/5.78
Intrinsic safety 'i' section: 5.5, 5.5.4, 5.7

Features

- Suitable for intrinsic safety circuits according to test certificate No. Ex-81/2158 of PTB
- Isolation material according to UL94 – VO – flammability class
- Low temperature coefficient of CTR
- Creepage current resistance of isolation material according to VDE 0303/DIN 53480: KC ≥ 475
- Isolation test voltage 11.6 kV
- Test class 25/100/21 DIN 40045
- Very low coupling capacity of typical 0.3 pF therefore high noise voltage resistant
- **C**urrent **T**ransfer **R**atio (CTR) = 50 to 300%
- Coupling System J



Order Instruction

Ordering Code	CTR Ranking	Remarks
CNY65Exi	50 to 300%	Exi = Intrinsic safety

Absolute Maximum Ratings

Input (Emitter)

Parameter	Test Conditions	Symbol	Value	Unit
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	$T_{amb} \leq 25$˚C	P_V	120	mW
Junction temperature		T_j	100	˚C

Output (Detector)

Parameter	Test Conditions	Symbol	Value	Unit
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	$T_{amb} \leq 25$˚C	P_V	130	mW
Junction temperature		T_j	100	˚C

Coupler

Parameter	Test Conditions	Symbol	Value	Unit
DC isolation test voltage	t = 1 min	V_{IO}	11.6	kV
Total power dissipation	$T_{amb} \leq 25$˚C	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 ≤ 10 s	T_{sd}	260	˚C

Electrical Characteristics (T_{amb} = 25°C)

Input (Emitter)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	I_F = 50 mA	V_F		1.25	1.6	V

Output (Detector)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
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

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
DC isolation test voltage	t = 1 min	V_{IO}[1)]	11.6			kV
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
[1)] Related to standard climate 23/50 DIN 50014						

Current Transfer Ratio (CTR)

Parameter	Test Conditions	Type	Symbol	Min.	Typ.	Max.	Unit
I_C/I_F	V_{CE} = 5 V, I_F = 10 mA	CNY65Exi	CTR	0.5	1	3	

Switching Characteristics

Parameter	Test Conditions	Symbol	Typ.	Unit
Delay time	V_S = 5 V, I_C = 5 mA, R_L = 100 Ω (see figure 1)	t_d	2.6	µs
Rise time		t_r	2.4	µs
Fall time		t_f	2.4	µs
Storage time		t_s	0.3	µs
Turn-on time		t_{on}	5.0	µs
Turn-off time		t_{off}	3.0	µs
Turn-on time	V_S = 5 V, I_F = 10 mA, R_L = 1 kΩ (see figure 2)	t_{on}	25.0	µs
Turn-off time		t_{off}	42.5	µs

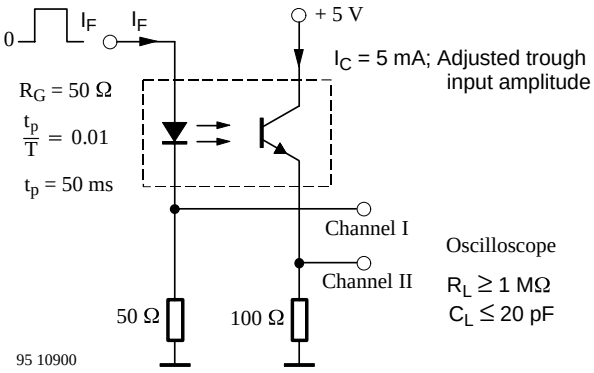


Figure 1. Test circuit, non-saturated operation

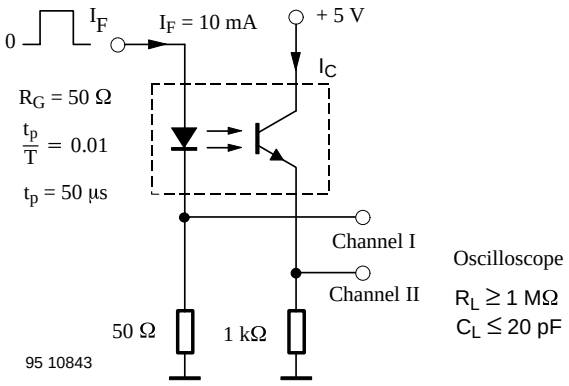
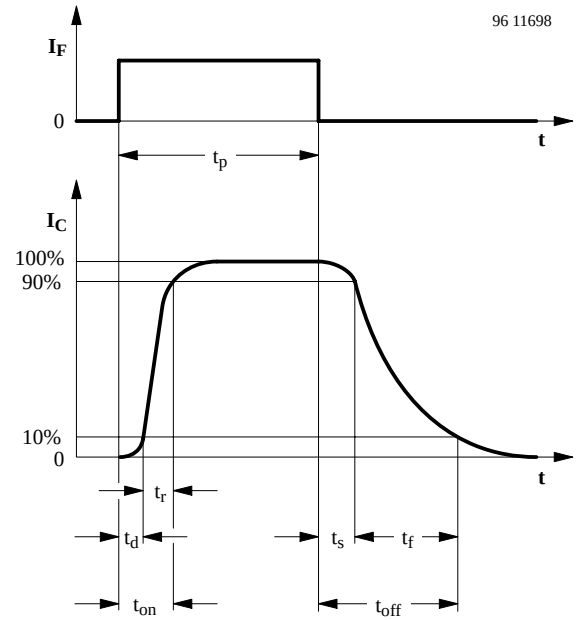


Figure 2. Test circuit, saturated operation



t_p pulse duration
t_d delay time
t_r rise time
t_{on} ($= t_d + t_r$) turn-on time
t_s storage time
t_f fall time
t_{off} ($= t_s + t_f$) turn-off time

Figure 3. Switching times

Typical Characteristics (T_{amb} = 25°C, unless otherwise specified)

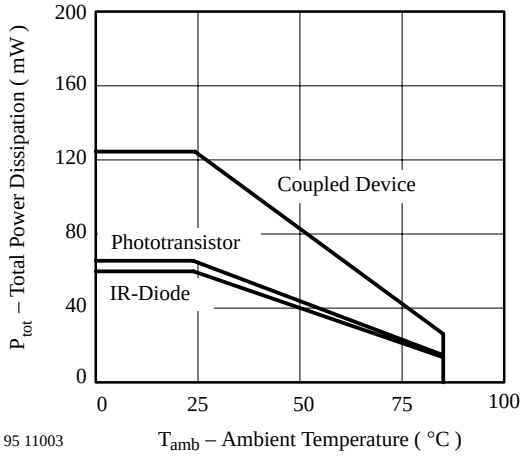


Figure 4. Total Power Dissipation vs. Ambient Temperature

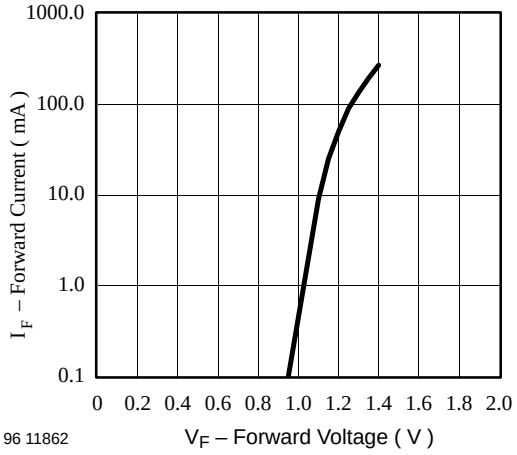


Figure 5. Forward Current vs. Forward Voltage

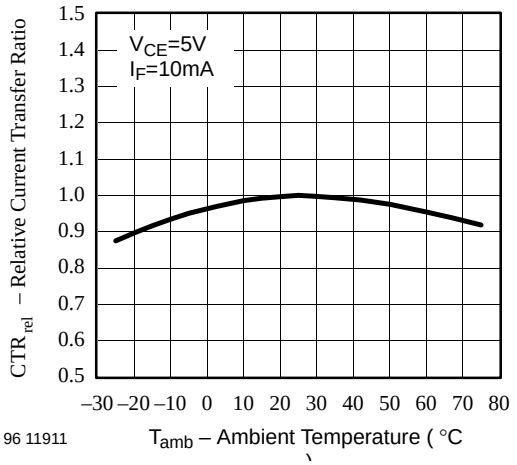


Figure 6. Relative Current Transfer Ratio vs. Ambient Temperature

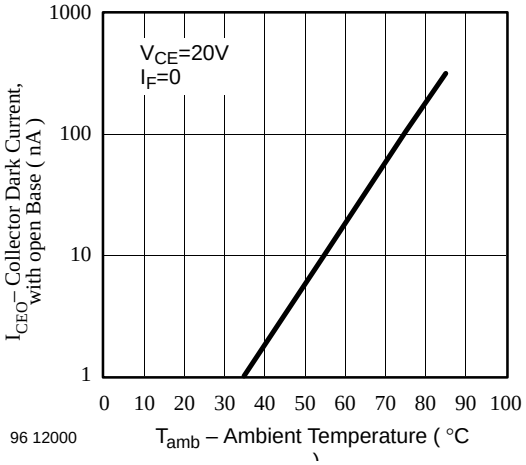


Figure 7. Collector Dark Current vs. Ambient Temperature

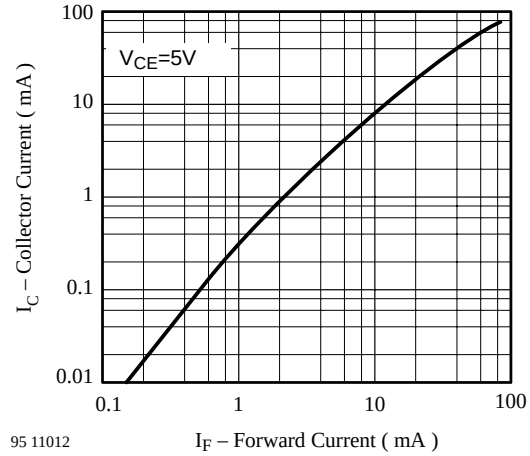


Figure 8. Collector Current vs. Forward Current

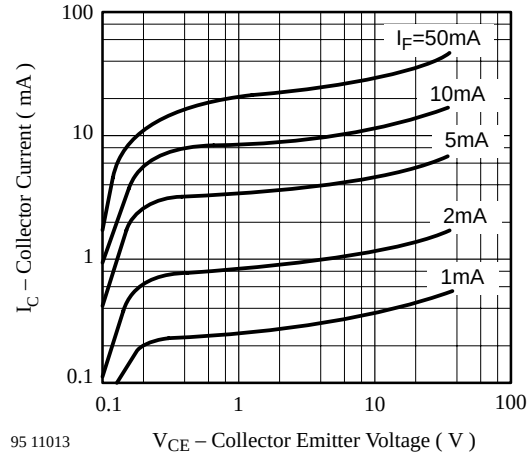


Figure 9. Collector Current vs. Collector Emitter Voltage

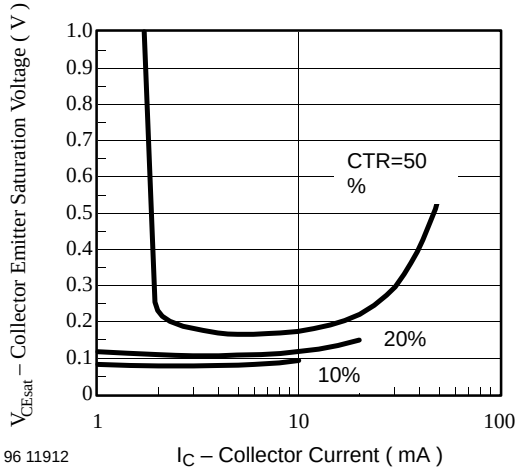


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

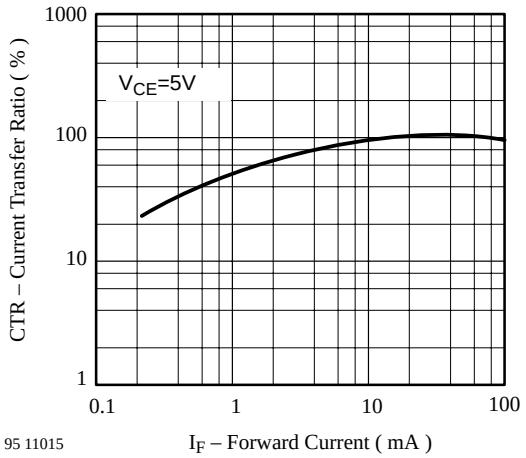


Figure 11. Current Transfer Ratio vs. Forward Current

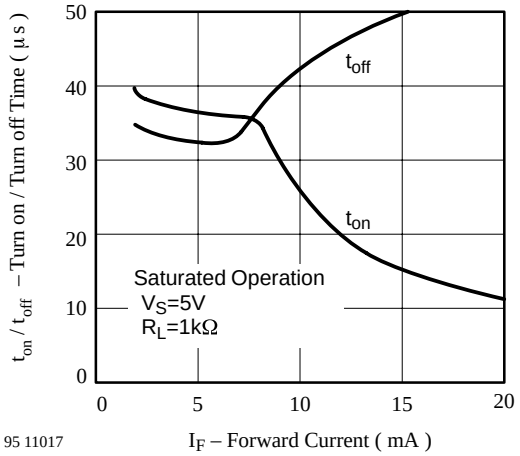


Figure 12. Turn on / off Time vs. Forward Current

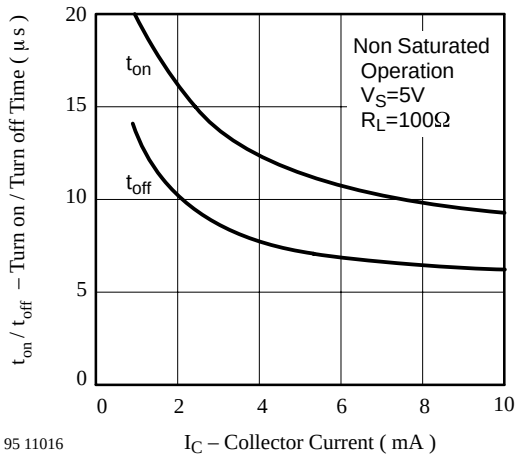


Figure 13. Turn on / off Time vs. Collector Current

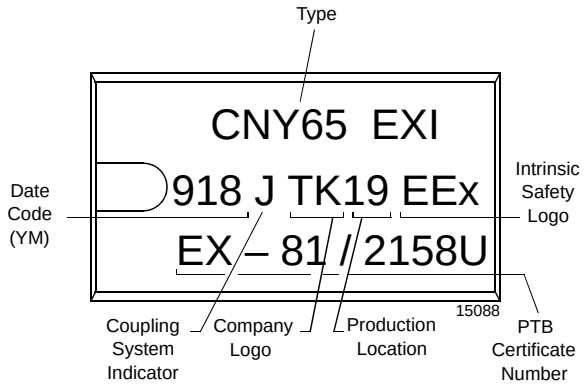
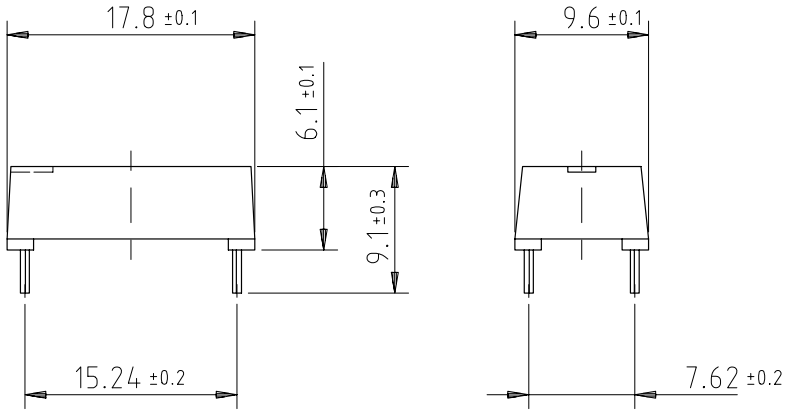
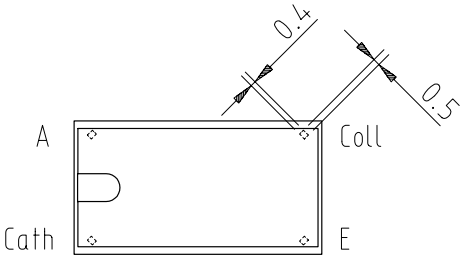


Figure 14. Marking example

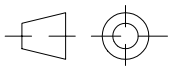
Dimensions of CNY65Exi in mm





weight: ca. 1.40 g
creepage distance: ≧ 14 mm
air path: ≧ 14 mm

after mounting on PC board



technical drawings
according to DIN
specifications

14763