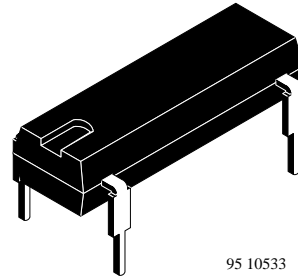


### Optocoupler with Phototransistor Output

#### Description

The CNY21Exi consists of a phototransistor optically coupled to a gallium arsenide infrared emitting diode in a 4 lead plastic dual inline packages.

The single components are mounted on one leadframe in opposite position, providing a fixed distance between input and output for highest safety requirements of  $> 3$  mm.



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#### Applications

Used for circuits with intrinsic safety Ex-i (G5).

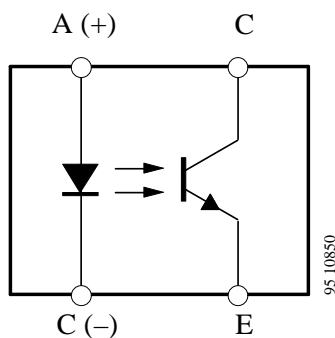
PTB-approval-file number Ex-90.C.2106 U confirms, that this coupler can be used for intrinsic circuits up to a line voltage in series  $\leq 375$  V.



#### Features

- UL-recognized-file No: E 76414
- DC isolation test voltage: 10 kV
- Creeping current resistance of isolation material according to VDE 0303/DIN 53480:  
KB  $\geq 150$ /KC  $\geq 175$
- Isolation material according to UL 94 -flammability class
- Test class 25/100/21 DIN 40045
- Very low coupling capacity, typical 0.3 pF therefore high noise voltage resistant
- Current Transfer Ratio typical 80%
- Low temperature coefficient of CTR

#### Pin Connection



## Absolute Maximum Ratings

### Input (Emitter)

Parameters	Test Conditions	Symbol	Value	Unit
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	50	mA
Forward surge current	$t_p \leq 10 \mu s$	$I_{FSM}$	1.5	A
Power dissipation	$T_{amb} \leq 25^\circ C$	$P_V$	120	mW
Junction temperature		$T_j$	100	$^\circ C$

### Output (Detector)

Parameters	Test Conditions	Symbol	Value	Unit
Collector emitter voltage		$V_{CEO}$	32	V
Emitter collector voltage		$V_{ECO}$	5	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	$T_{amb} \leq 25^\circ C$	$P_V$	130	mW
Junction temperature		$T_j$	100	$^\circ C$

### Coupler

Parameters	Test Conditions	Symbol	Value	Unit
DC isolation test voltage	$t = 1 min$	$V_{IO}^{1)}$	10	kV
Total power dissipation	$T_{amb} \leq 25^\circ C$	$P_{tot}$	250	mW
Ambient temperature range		$T_{amb}$	-55 to +85	$^\circ C$
Storage temperature range		$T_{stg}$	-55 to +100	$^\circ C$
Soldering temperature	2 mm from case, $t \leq 10 s$	$T_{sd}$	260	$^\circ C$

<sup>1)</sup> related to standard climate 23/50 DIN 50014

## Electrical Characteristics

$T_{amb} = 25^{\circ}\text{C}$

### Input (Emitter)

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	$I_F = 50 \text{ mA}$	$V_F$		1.25	1.6	V
Breakdown voltage	$I_R = 100 \mu\text{A}$	$V_{(BR)}$	5			V
Junction capacitance	$V_R = 0, f = 1 \text{ MHz}$	$C_j$		50		pF

### Output (Detector)

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter breakdown voltage	$I_C = 1 \text{ mA}$	$V_{(BR)CE0}$	32			V
Emitter collector breakdown voltage	$I_E = 100 \mu\text{A}$	$V_{(BR)EC0}$	5			V
Collector dark current	$V_{CE} = 20 \text{ V}, I_F = 0, E = 0$	$I_{CE0}$			200	nA

### Coupler

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
DC isolation test voltage	$t = 1 \text{ min}$	$V_{IO}$	10			kV
Isolation resistance	$V_{IO} = 1000 \text{ V}, 40\% \text{ relative humidity}$	$R_{IO}$		$10^{14}$		$\Omega$
$I_C/I_F$	$I_F = 10 \text{ mA}, V_{CE} = 5 \text{ V}$	CTR	0.5	0.8		
Collector emitter saturation voltage	$I_F = 10 \text{ mA}, I_C = 1 \text{ mA}$	$V_{CEsat}$			0.3	V
Cut-off frequency	$V_{CE} = 5 \text{ V}, I_F = 5 \text{ mA}, R_L = 100 \Omega$	$f_c$		170		kHz
Coupling capacitance	$f = 1 \text{ MHz}$	$C_k$		0.3		pF

## Switching Characteristics

$$V_S = 5 \text{ V}$$

Type	$R_L = 100 \text{ k}\Omega$ , see figure 1							$R_L = 1 \text{ k}\Omega$ , see figure 2		
	$t_d[\mu\text{s}]$	$t_r[\mu\text{s}]$	$t_{on}[\mu\text{s}]$	$t_s[\mu\text{s}]$	$t_f[\mu\text{s}]$	$t_{off}[\mu\text{s}]$	$I_C[\text{mA}]$	$t_{on}[\mu\text{s}]$	$t_{off}[\mu\text{s}]$	$I_F[\text{mA}]$
CNY21Exi	2.6	2.4	5.0	0.3	2.7	3.0	5	11	13.5	20

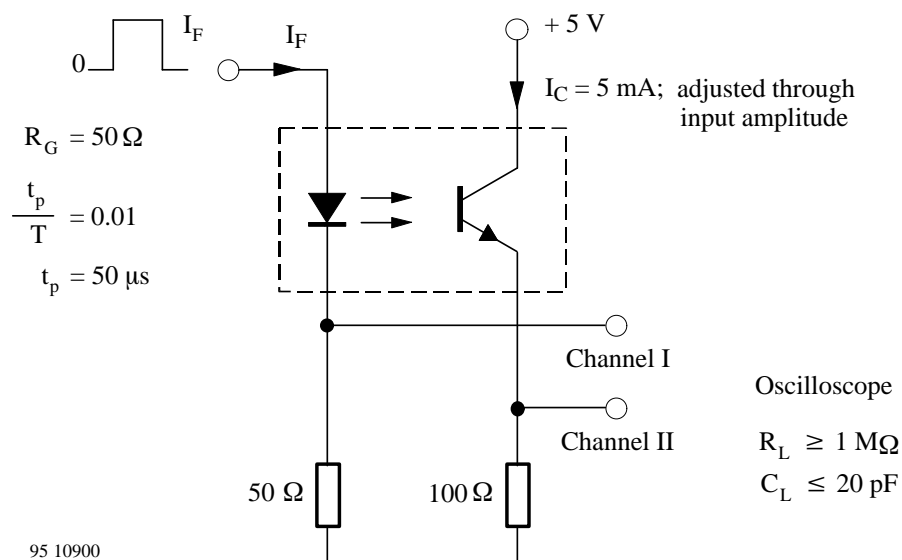


Figure 1. Test circuit, non-saturated operation

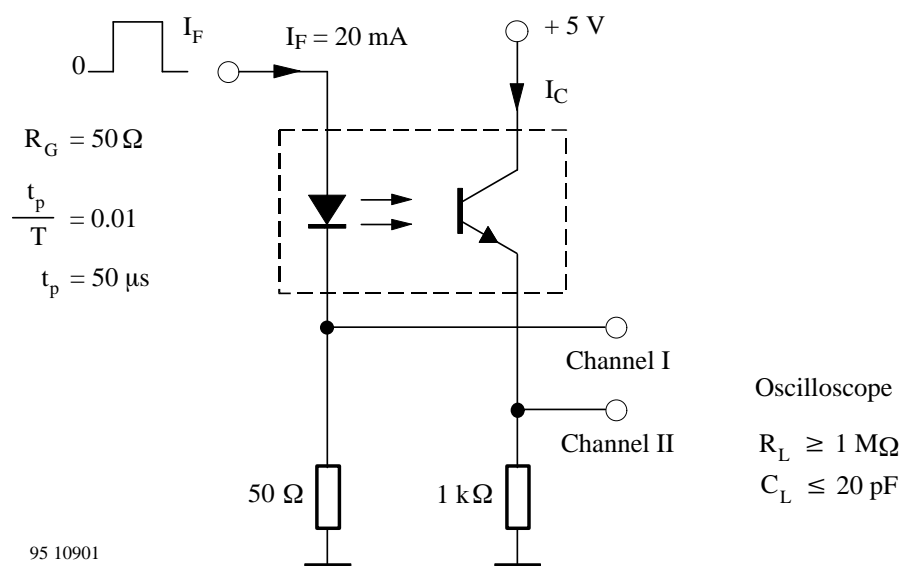


Figure 2. Test circuit, saturated operation

### Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**TEMIC TELEFUNKEN microelectronic GmbH** semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**TEMIC** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use TEMIC products for any unintended or unauthorized application, the buyer shall indemnify TEMIC against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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