

T-41-83

HIGH-VOLTAGE OPTOCOUPLER

The CNX62 is an optocoupler consisting of an infrared emitting GaAs diode and a silicon npn phototransistor in a dual-in-line (DIL) plastic envelope. The base is not connected.

Features

- High current transfer ratio and a low saturation voltage suitable for use with TTL integrated circuits
- High degree of AC and DC insulation (3750 V RMS and 5300 V DC)
- Working voltage of 2.5 kV (DC)

UL — Covered under UL component recognition FILE E90700

VDE — Approved according to VDE 0883/6.80

Reference voltage (VDE 0110b Tab 4): AC 500 V/DC 600 V —

isolation group C

Complied for reinforced isolation at 250 V AC with:

DIN 57 804/VDE 0804/1.83 (isolation group C)

DIN VDE 0860/8.86/HD 195 S4

BSI — Certification according to BS415:1979 (Home appliance)

QUICK REFERENCE DATA

Diode

Continuous reverse voltage

V_R max. 5 V

DC forward current

I_F max. 100 mA

peak value; $t_{on} = 10 \mu s$; $\delta = 0.01$

I_{FRM} max. 3 A

Total power dissipation up to $T_{amb} = 25^\circ C$

P_{tot} max. 200 mW

Transistor

Collector-emitter voltage (open base)

V_{CEO} max. 50 V

Total power dissipation up to $T_{amb} = 25^\circ C$

P_{tot} max. 200 mW

Optocoupler

Output/input DC current transfer ratio (CTR)

$I_F = 10 \text{ mA}$; $V_{CE} = 0.4 \text{ V}$

I_C/I_F min. 0.4

Collector cut-off current (dark)

$V_{CC} = 10 \text{ V}$; working voltage = 2.5 kV DC

I_F (diode) = 0 (see Fig.4)

I_{CEW} max. 200 nA

Collector-emitter saturation voltage

$I_F = 10 \text{ mA}$; $I_C = 4 \text{ mA}$

V_{CEsat} max. 0.4 V

Isolation voltage DC

V_{IORM} min. 5.3 kV

AC (RMS value)

min. 3.75 kV

MECHANICAL DATA

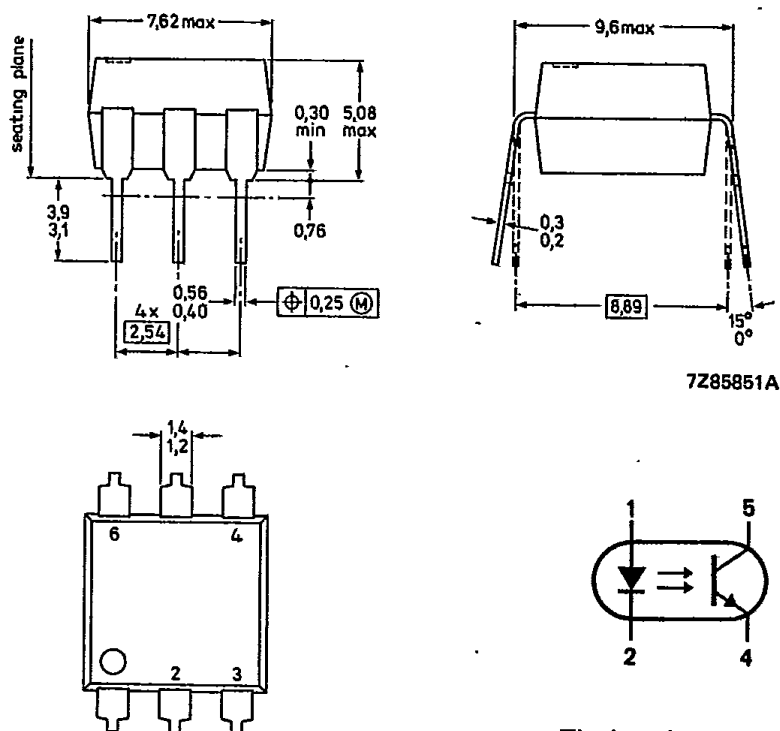
SOT174 (see Fig.1).

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MECHANICAL DATA

Dimensions in mm

Fig.1 SOT174.



7Z85851A

The base is not connected.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Diode

Continuous reverse voltage

V_R max. 5 V

DC forward current

I_F max. 100 mA

peak value; $t_{on} = 10 \mu s$; $\delta = 0.01$

I_{FRM} max. 3 A

Total power dissipation up to $T_{amb} = 25^\circ C$

(when mounted on a printed circuit board: $T_{amb} = 45^\circ C$)

P_{tot} max. 200 mW

Transistor

Collector-emitter voltage (open base)

V_{CEO} max. 50 V

Emitter-collector voltage

V_{ECO} max. 7 V

DC collector current

I_C max. 100 mA

Total power dissipation up to $T_{amb} = 25^\circ C$

(when mounted on a printed circuit board: $T_{amb} = 45^\circ C$)

P_{tot} max. 200 mW

Optocoupler

Storage temperature range

 T_{stg} -55 to + 150 °C

Junction temperature

 T_j max. 125 °C

Soldering temperature

up to the seating plane; $t_{sld} < 10$ s T_{sld} max. 260 °C**THERMAL RESISTANCE**

From junction to ambient in free air

diode

 $R_{th\ j-a}$ = 500 K/W

transistor

 $R_{th\ j-a}$ = 500 K/W

From junction to ambient when mounted on PCB

diode

 $R_{th\ j-a}$ = 400 K/W

transistor

 $R_{th\ j-a}$ = 400 K/W**ISOLATION RELATED VALUES**

External air gap (clearance)

input terminals to output terminals

 $L(1O1)$ min. 8.4 mm

External tracking path (creepage distance)

input terminals to output terminals

 $L(1O2)$ min. 7.0 mm

Tracking resistance (KB-value)

KB-100/A

Internal plastic gap (clearance)

isolation thickness between emitter and receiver

min. 1 mm ←

CHARACTERISTICS $T_j = 25$ °C unless otherwise specified**Diode**

Forward voltage

 $I_F = 10$ mA V_F typ. 1.15 V
max. 1.50 V

Reverse current

 $V_R = 5$ V I_R max. 10 μ A**Transistor**

Collector-emitter breakdown voltage

 $I_C = 1$ mA $V_{(BR)CEO}$ min. 50 V

Emitter-collector breakdown voltage

 $I_E = 0.1$ mA $V_{(BR)ECO}$ min. 7 VCollector cut-off current (dark); diode $I_F = 0$ $V_{CE} = 10$ V I_{CEO} typ. 2 nA
max. 50 nA $V_{CE} = 10$ V; $T_{amb} = 70$ °C I_{CEO} max. 10 μ A**Optocoupler**

Output/input DC current transfer ratio (CTR)

 $I_F = 10$ mA; $V_{CE} = 0.4$ V I_C/I_F min. 0.4
typ. 0.8 $I_F = 10$ mA; $V_{CE} = 5$ V I_C/I_F typ. 1.5

Collector cut-off current (light)

 $T_{amb} \leq 70$ °C; $V_F = 0.8$ V; $V_{CE} = 15$ V $I_{CE(L)}$ max. 15 μ A $T_{amb} \leq 70$ °C; $I_F = 2$ mA; $V_{CE} = 0.4$ V $I_{CE(L)}$ min. 150 μ A

Optocoupler (continued)

Collector-emitter saturation voltage

$$I_F = 10 \text{ mA}; I_C = 4 \text{ mA}$$

V_{CEsat}	typ.	0.19 V
	max.	0.40 V

Collector cut-off current (dark) at
working voltage 2.5 kV DC;

$$V_{CC} = 10 \text{ V}; T_j = 25^\circ \text{C} \text{ (see Fig.4 and notes 1 and 2)}$$

$$V_{CC} = 10 \text{ V}; T_j = 70^\circ \text{C} \text{ (see Fig.4 and notes 1 and 2)}$$

I_{CEW}	max.	200 nA
	max.	100 μ A

Isolation voltage; $t = 1 \text{ min}$
(see note 3)

DC
AC (RMS value)

V_{IORM}	min.	5.3 kV
	min.	3.75 kV

Capacitance between input and output

$$V = 0; f = 1 \text{ MHz}$$

C_{io}	typ.	0.6 pF
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Insulation resistance between input and output

$$V_{IO} = \pm 1000 \text{ V}$$

R_{IO}	min.	10 G Ω
	typ.	1 T Ω

Switching times (see Figs 2 and 3)

Turn-on time

$$I_C = 2 \text{ mA}; V_{CC} = 5 \text{ V}; R_L = 100 \Omega$$

$$I_C = 2 \text{ mA}; V_{CC} = 5 \text{ V}; R_L = 1 \text{ k}\Omega$$

t_{on}	typ.	3 μ s
	typ.	12 μ s

Turn-off time

$$I_C = 2 \text{ mA}; V_{CC} = 5 \text{ V}; R_L = 100 \Omega$$

$$I_C = 2 \text{ mA}; V_{CC} = 5 \text{ V}; R_L = 1 \text{ k}\Omega$$

t_{off}	typ.	3 μ s
	typ.	12 μ s

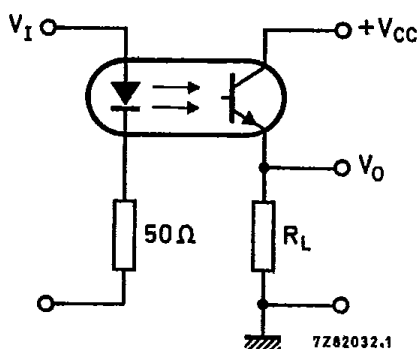


Fig.2 Switching circuit.

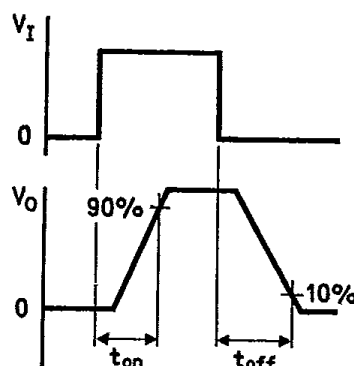


Fig.3 Waveforms.

Notes

1. The two parameters are tested on a sample basis for 1000 h.
2. This parameter is the maximum collector-emitter leakage current measured when a high voltage is applied between the shorted diode leads and the transistor emitter.
3. Every single product is tested by applying an isolation test voltage of 4500 V (RMS) for 2 seconds between the shorted input (diode) leads and the shorted output (phototransistor) leads.

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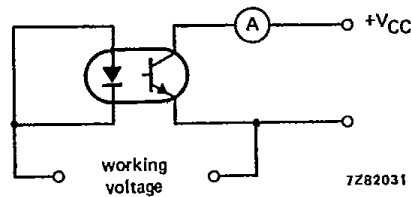


Fig. 4.

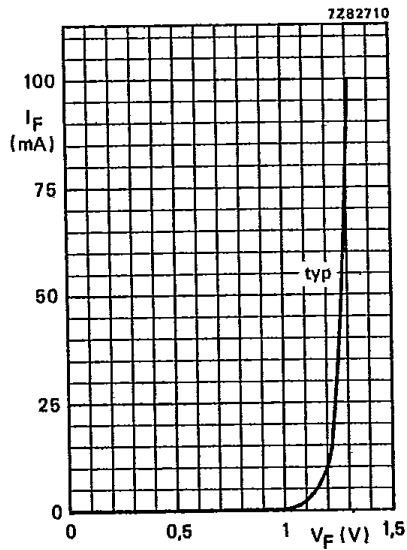


Fig. 5 $T_{amb} = 25^{\circ}C$.

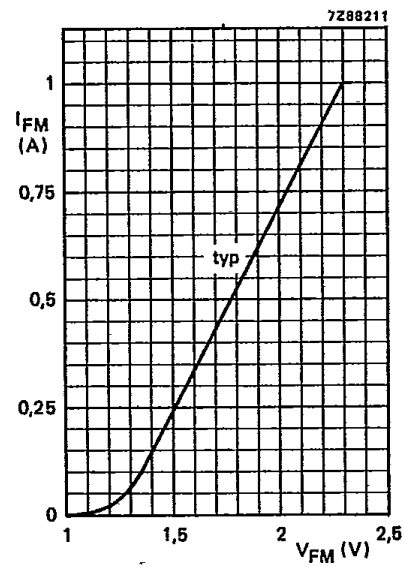


Fig. 6 $T_{amb} = 25^{\circ}C$; $t_p = 10 \mu s$; $\delta = 0.01$.

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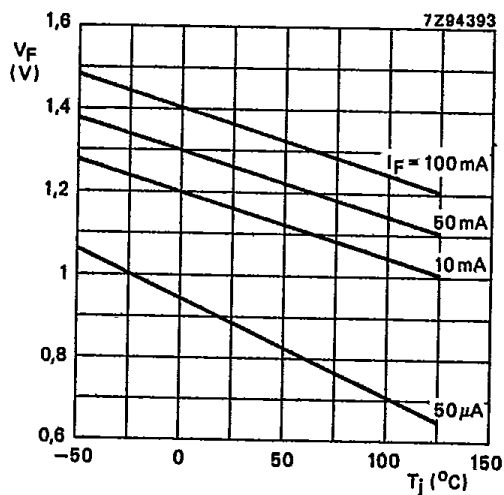


Fig.7 Typical values.

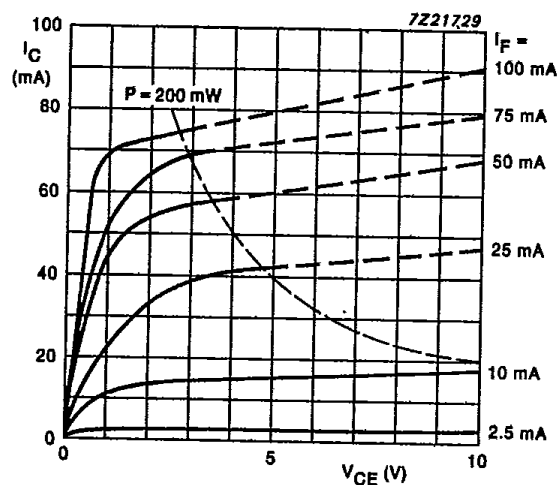


Fig.8 Typical values; $T_{amb} = 25$ °C.

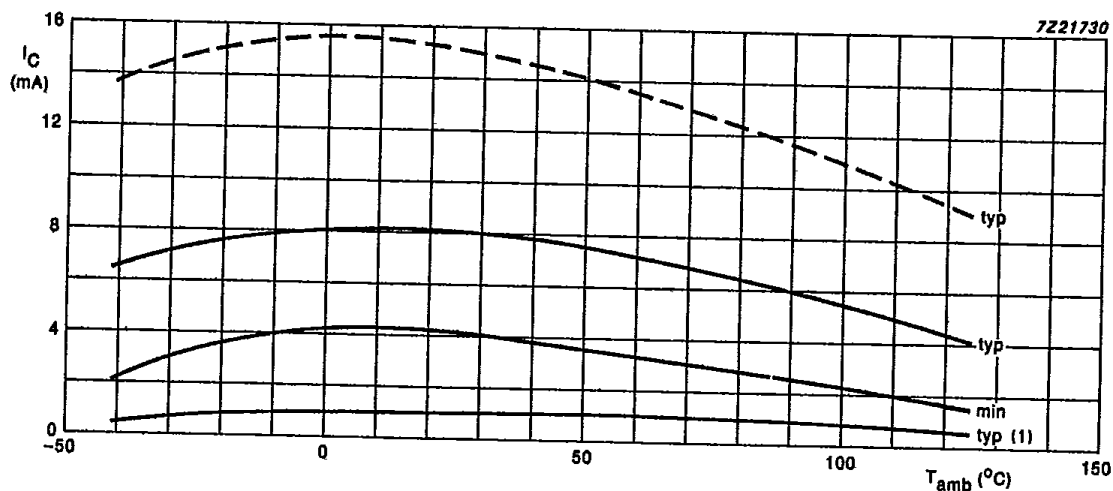


Fig.9 $I_F = 10$ mA; — $V_{CE} = 0.4$ V; ---- $V_{CE} = 5$ V.

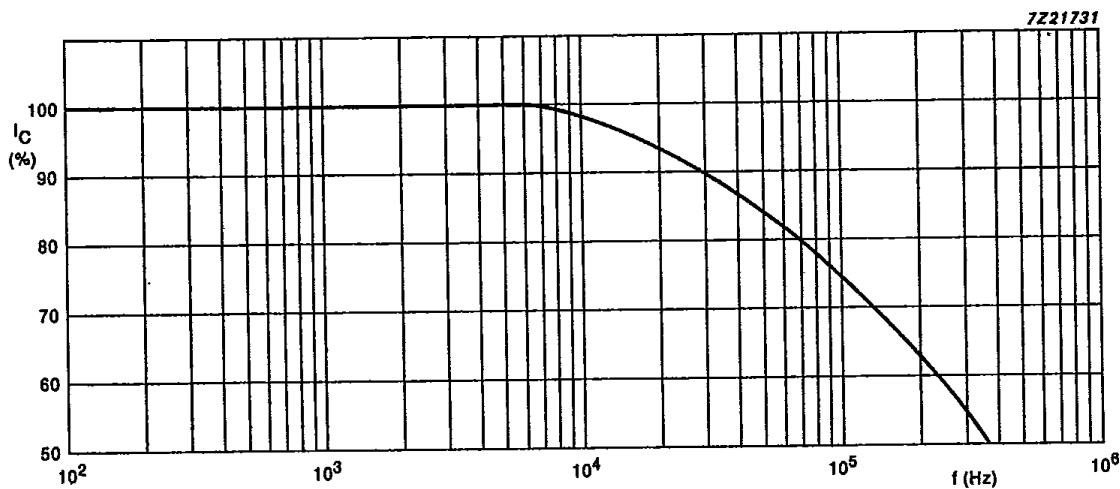


Fig.10 Typical values; $R_L = 1 \text{ k}\Omega$; $I_C = 2 \text{ mA}$; $V_{CC} = 5 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$.

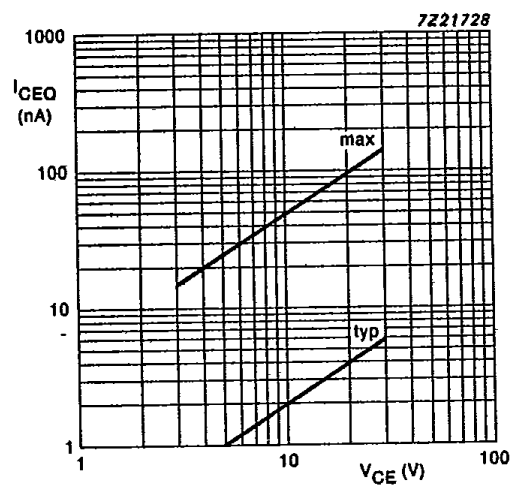


Fig.11 $T_j = 25 \text{ }^\circ\text{C}$.

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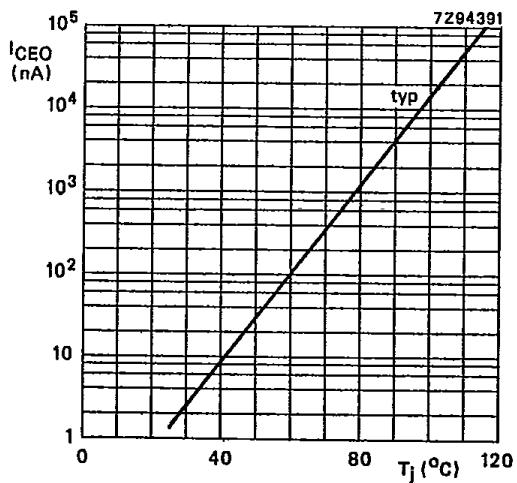


Fig. 12 $V_{CE} = 10$ V.

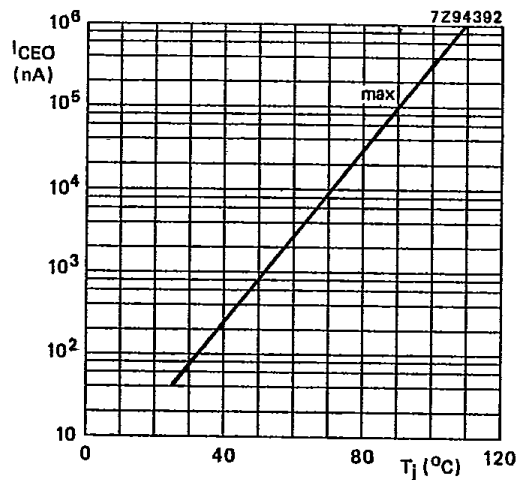


Fig. 13 $V_{CE} = 10$ V.

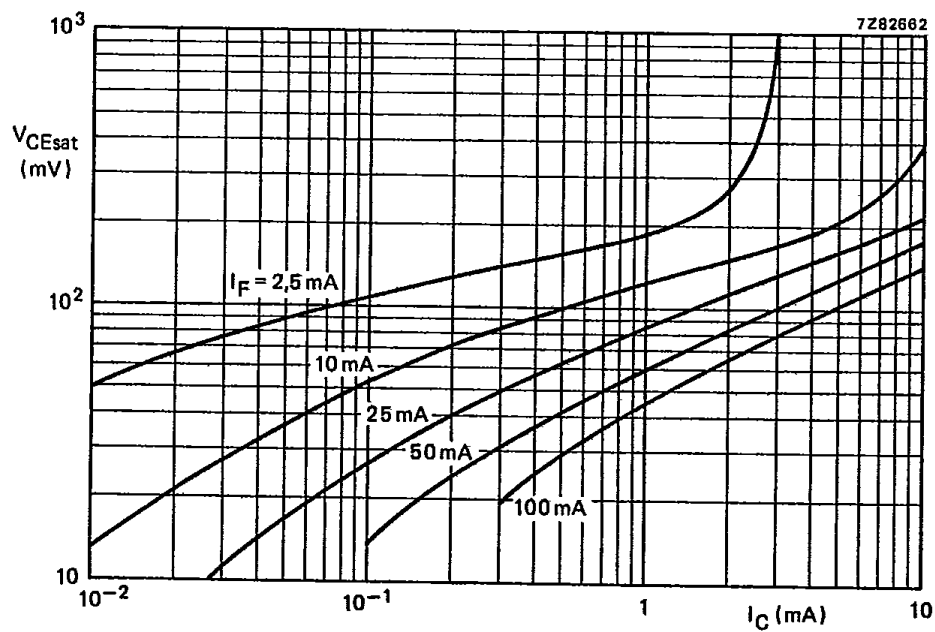


Fig. 14 $T_{amb} = 25$ °C; typical values.