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 μs; δ = 0.01	I_{FRM}	max.	3 A
Total power dissipation up to T_{amb} = 25 °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 °C	P_{tot}	max.	200 mW
Optocoupler			
Output/input DC current transfer ratio (CTR) I_F = 10 mA; V_{CE} = 0.4 V	I_C/I_F	min.	0.4
Collector cut-off current (dark) V_{CC} = 10 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 mA; I_C = 4 mA	V_{CEsat}	max.	0.4 V
Isolation voltage DC	V_{IORM}	min.	5.3 kV
AC (RMS value)		min.	3.75 kV

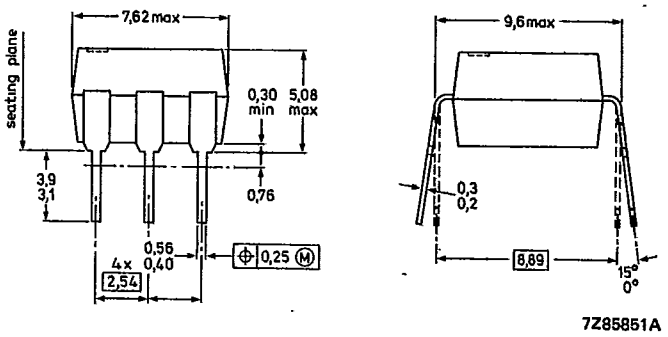
MECHANICAL DATA

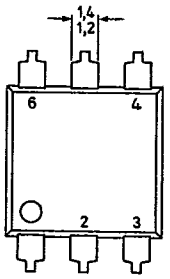
SOT174 (see Fig.1).

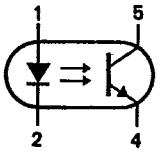
MECHANICAL DATA

Dimensions in mm

Fig.1 SOT174.







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 μs; δ = 0.01	I_{FRM}	max.	3 A
Total power dissipation up to T_{amb} = 25 °C (when mounted on a printed circuit board: T_{amb} = 45 °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 °C (when mounted on a printed circuit board: T_{amb} = 45 °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	$R_{th\ j\text{-}a}$	= 500	K/W
transistor	$R_{th\ j\text{-}a}$	= 500	K/W
From junction to ambient when mounted on PCB			
diode	$R_{th\ j\text{-}a}$	= 400	K/W
transistor	$R_{th\ j\text{-}a}$	= 400	K/W
ISOLATION RELATED VALUES			
External air gap (clearance)			
input terminals to output terminals	L(IO1)	min. 8.4	mm
External tracking path (creepage distance)			
input terminals to output terminals	L(IO2)	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		typ. 1.15	V
I_F = 10 mA	V_F	max. 1.50	V
Reverse current			
V_R = 5 V	I_R	max. 10	μA
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	V
Collector 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	μA
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	μA
$T_{amb} \leq 70$ °C; I_F = 2 mA; V_{CE} = 0.4 V	$I_{CE(L)}$	min. 150	μA

Optocoupler (continued)

Collector-emitter saturation voltage I_F = 10 mA; I_C = 4 mA	V_{CEsat}	typ. max.	0.19 V 0.40 V
Collector cut-off current (dark) at working voltage 2.5 kV DC; V_{CC} = 10 V; T_j = 25 °C (see Fig.4 and notes 1 and 2) V_{CC} = 10 V; T_j = 70 °C (see Fig.4 and notes 1 and 2)	I_{CEW}	max. max.	200 nA 100 μA
Isolation voltage; t = 1 min (see note 3) DC AC (RMS value)	V_{IORM}	min. min.	5.3 kV 3.75 kV
Capacitance between input and output V = 0; f = 1 MHz	C_{io}	typ.	0.6 pF
Insulation resistance between input and output V_{IO} = ± 1000 V	R_{IO}	min. typ.	10 GΩ 1 TΩ
Switching times (see Figs 2 and 3)			
Turn-on time I_C = 2 mA; V_{CC} = 5 V; R_L = 100 Ω I_C = 2 mA; V_{CC} = 5 V; R_L = 1 kΩ	t_{on}	typ. typ.	3 μs 12 μs
Turn-off time I_C = 2 mA; V_{CC} = 5 V; R_L = 100 Ω I_C = 2 mA; V_{CC} = 5 V; R_L = 1 kΩ	t_{off}	typ. typ.	3 μs 12 μs

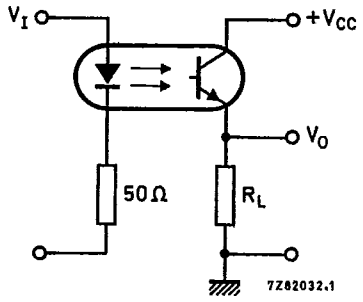


Fig.2 Switching circuit.

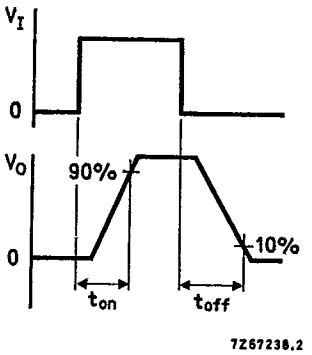


Fig.3 Waveforms.

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.

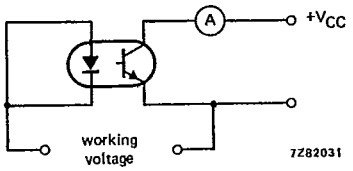


Fig. 4.

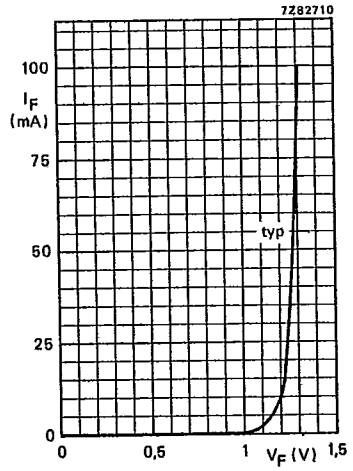


Fig. 5 T_{amb} = 25 °C.

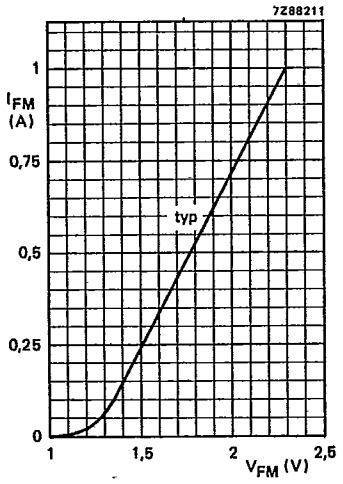


Fig. 6 T_{amb} = 25 °C; t_p = 10 μs; δ = 0.01.

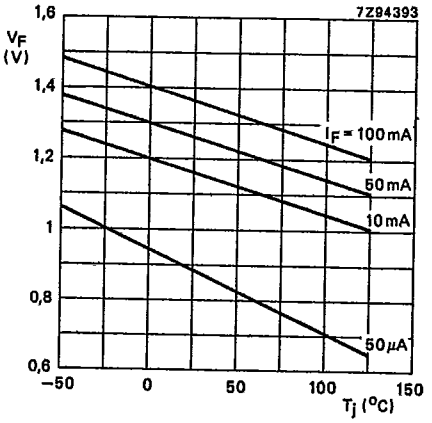


Fig.7 Typical values.

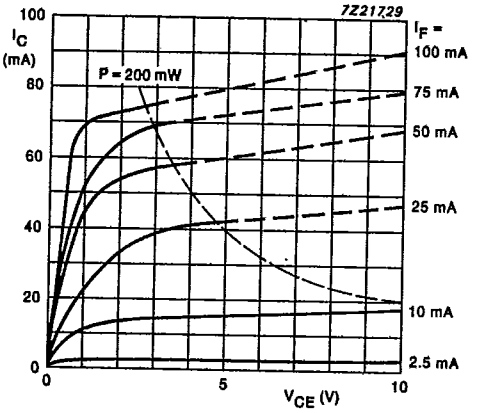


Fig.8 Typical values; T_{amb} = 25 °C.

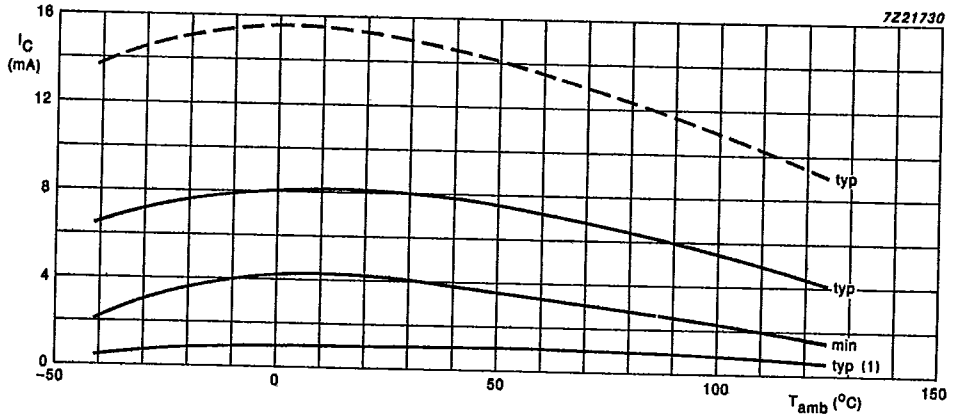


Fig.9 I_F = 10 mA; ——— V_{CE} = 0.4 V; – – – – V_{CE} = 5 V.

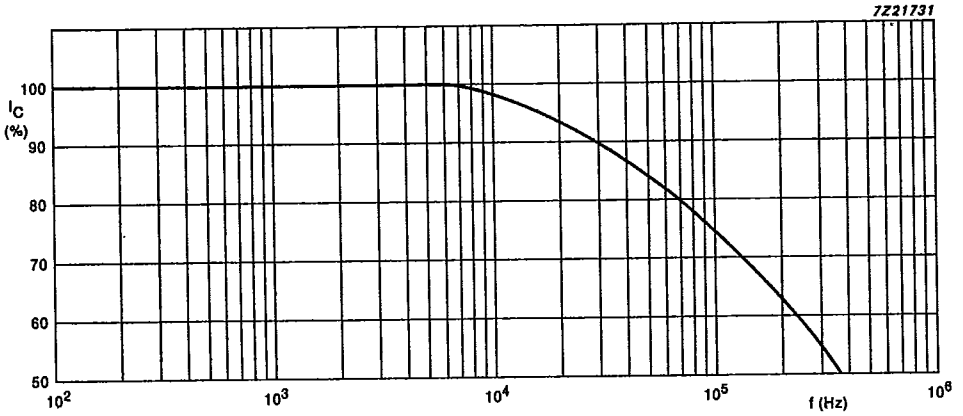


Fig.10 Typical values; R_L = 1 kΩ; I_C = 2 mA; V_{CC} = 5 V; T_{amb} = 25 °C.

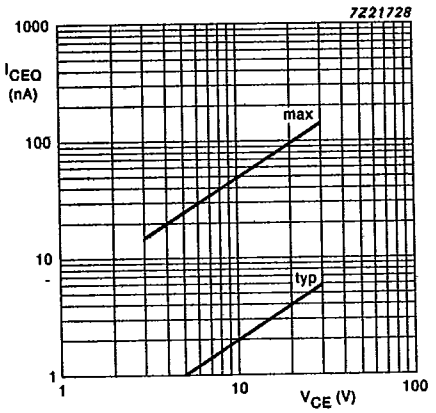


Fig.11 T_j = 25 °C.

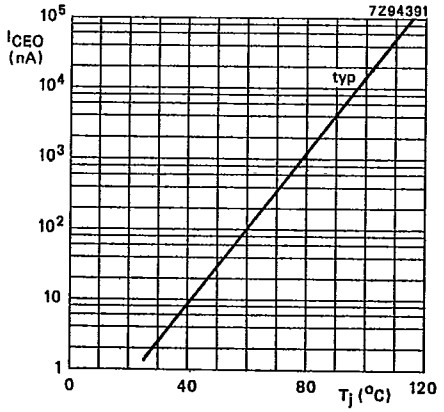


Fig. 12 V_{CE} = 10 V.

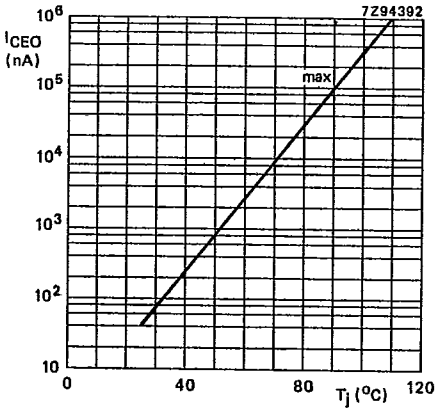


Fig. 13 V_{CE} = 10 V.

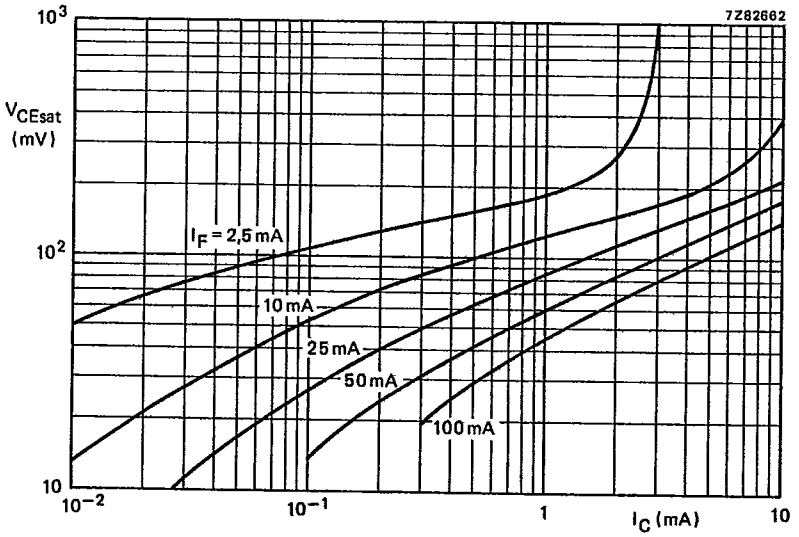


Fig. 14 T_{amb} = 25 °C; typical values.