4N32/ 4N33

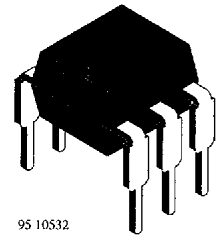
TEMIC
Semiconductors

Optocoupler with Photodarlington Output

Description

The 4N32 and 4N33 consist of a photodarlington optically coupled to a gallium arsenide infrared emitting diode in a 6 lead plastic dual inline package.

The elements are mounted on one leadframe using a coplanar technique, providing a fixed distance between input and output for highest safety requirements.



Applications

Galvanically separated circuits, non-interacting switches

Features

- High isolation resistance
- High Current Transfer Ratio
- Low coupling capacity typical 0.3 pF
- Low temperature coefficient of CTR
- UL recognized; file No. E 76222

Order Schematic

Part Numbers	CTR-Ranking
4N32/ 4N32S/ 4N33/ 4N33S	> 500%

Suffix: S = Waterproofed device

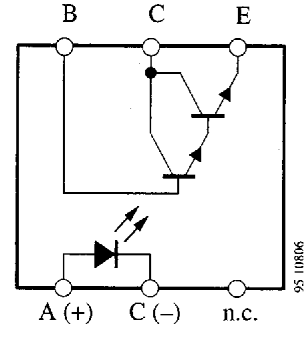
Remarks

A waterproof construction is recommended for couplers where a pure water cleaning process is used instead of a standard-soldering/ cleaning process. In this case please order the part numbers with the suffix "S".
The waterproof construction corresponds with the coupling system "S", and does not belong to the part number itself.

Standard parts are marked with the letter "A".

This coupling system indicator "A" or "S" is in a separate (second) line of the marking.

Pin Connections



Absolute Maximum Ratings

Input (Emitter)

Parameters	Test Conditions	Symbol	Value	Unit
Reverse voltage		V_R	5	V
Forward current		I_F	80	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	3	A
Power dissipation	$T_{amb} \leq 25°C$	P_V	100	mW
Junction temperature		T_j	125	°C

Output (Detector)

Parameters	Test Conditions	Symbol	Value	Unit
Collector base voltage		V_{CBO}	50	V
Collector emitter voltage		V_{CEO}	30	V
Emitter collector voltage		V_{ECO}	5	V
Collector current		I_C	150	mA
Peak collector current	$t_p/T = 0.5$, $t_p \leq 10$ ms	I_{CM}	200	mA
Power dissipation	$T_{amb} \leq 25°C$	P_V	150	mW
Junction temperature		T_j	125	°C

Coupler

Parameters	Test Conditions	Symbol	Value	Unit
Isolation test voltage (RMS)		V_{IO} [1]	3.75	kV
Total power dissipation	$T_{amb} \leq 25°C$	P_{tot}	250	mW
Ambient temperature range		T_{amb}	–55 to +100	°C
Storage temperature range		T_{stg}	–55 to +125	°C
Soldering temperature	2 mm from case, $t \leq 10$ s	T_{sd}	260	°C

1) Related to standard climate 23/50 DIN 50014

Electrical Characteristics

T_{amb} = 25°C

Input (Emitter)

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	I_F = 50 mA	V_F		1.25	1.5	V
Breakdown voltage	I_R = 100 µA	$V_{(BR)}$	5			mW
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Output (Detector)

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector base breakdown voltage	I_C = 100 µA	$V_{(BR)CBO}$	50			V
Collector emitter breakdown voltage	I_C = 1 mA	$V_{(BR)CEO}$	30			V
Emitter collector breakdown voltage	I_C = 100 µA	$V_{(BR)ECO}$	5			V
Collector dark current	V_{CE} = 10 V, I_F = 0, E = 0	I_{CEO}			100	nA

Coupler

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Isolation test voltage (RMS)	f = 50 Hz, t = 2 s	V_{IO} [1)]	3.75			kV
Isolation resistance	V_{IO} = 1000 V, 40% relative humidity	R_{IO}[1)]		10^{12}		Ω
I_C/I_F	I_F = 10 mA, V_{CE} = 10 V, t_p/T = 0.01, t_p = 0.3 ms	CTR	5			
Collector emitter saturation voltage	I_F = 8 mA, I_C = 2 mA	V_{CEsat}			1	V
Cut-off frequency	I_F = 2 mA, V_{CE} = 10 V, R_L = 100 Ω	f_c		30		kHz
Coupling capacitance	f = 1 MHz	C_k		0.3		pF

1) Related to standard climate 23/50 DIN 50014

Switching Characteristics

V_S = 10 V

Type	R_L = 100 Ω (see figure 1)							R_L = 1 kΩ		
	t_d[µs]	t_r[µs]	t_{on}[µs]	t_s[µs]	t_f[µs]	t_{off}[µs]	I_C[mA]	t_{on}[µs]	t_{off}[µs]	I_F[mA]
4N32/ 4N32S			50			40	50			
4N33/ 4N33S			50			40	50			

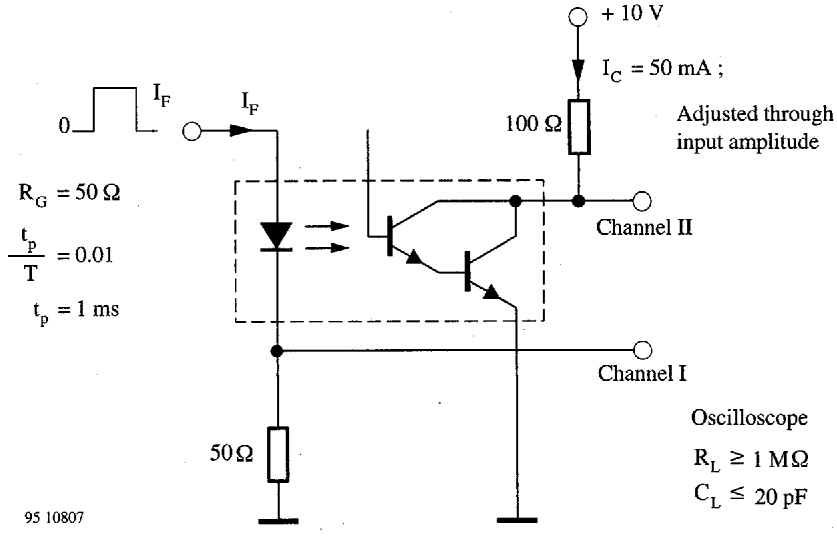


Figure 1. Test circuit

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

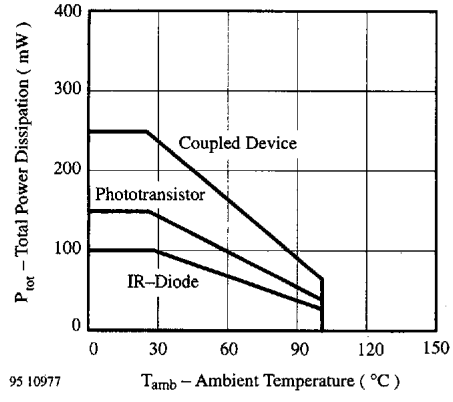


Figure 2. Total Power Dissipation vs. Ambient Temperature

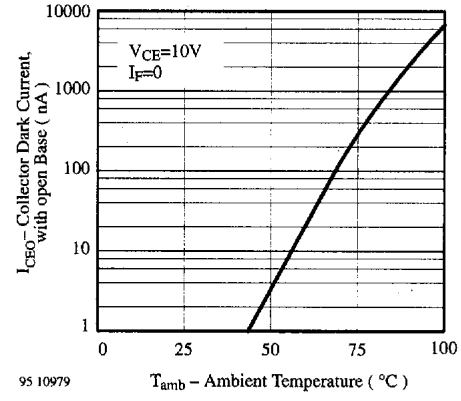


Figure 5. Collector Dark Current vs. Ambient Temperature

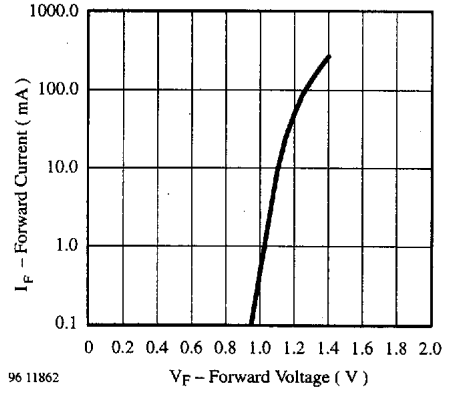


Figure 3. Forward Current vs. Forward Voltage

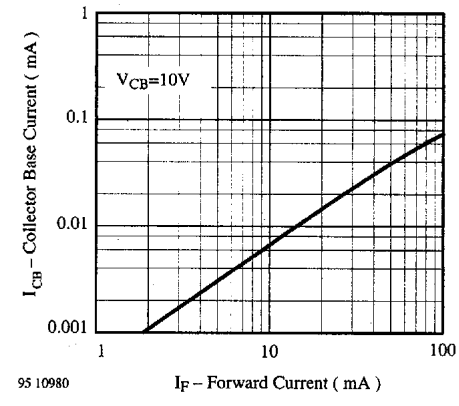


Figure 6. Collector Base Current vs. Forward Current

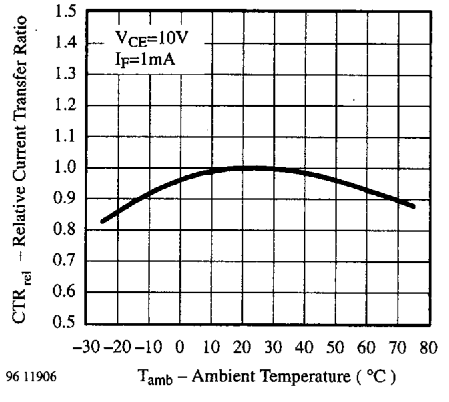


Figure 4. Rel. Current Transfer Ratio vs. Ambient Temperature

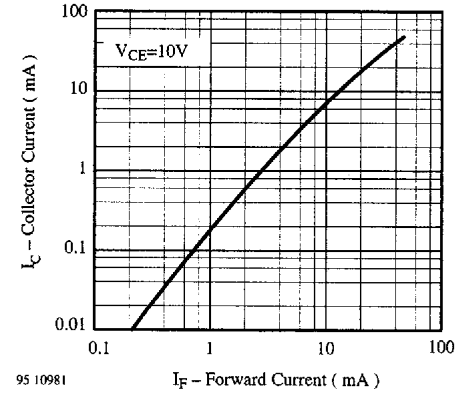


Figure 7. Collector Current vs. Forward Current

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

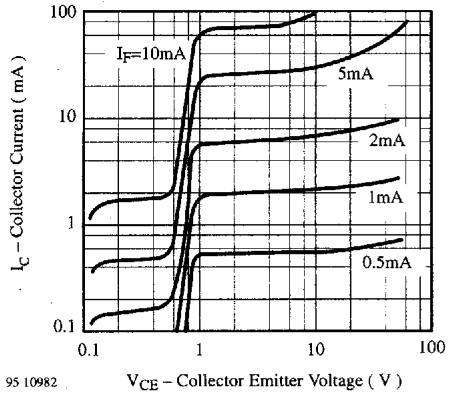


Figure 8. Collector Current vs. Collector Emitter Voltage

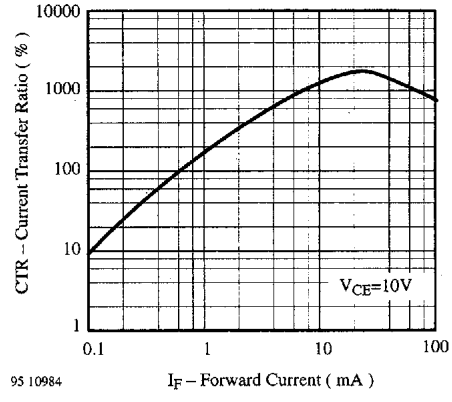


Figure 10. Current Transfer Ratio vs. Forward Current

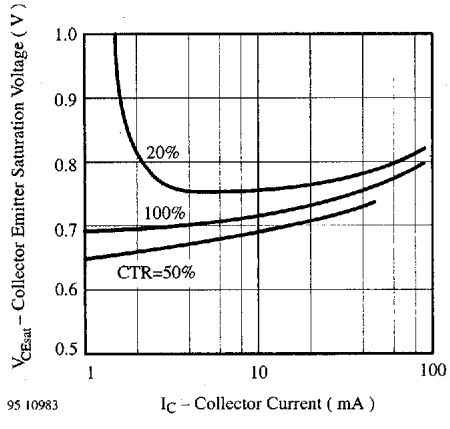
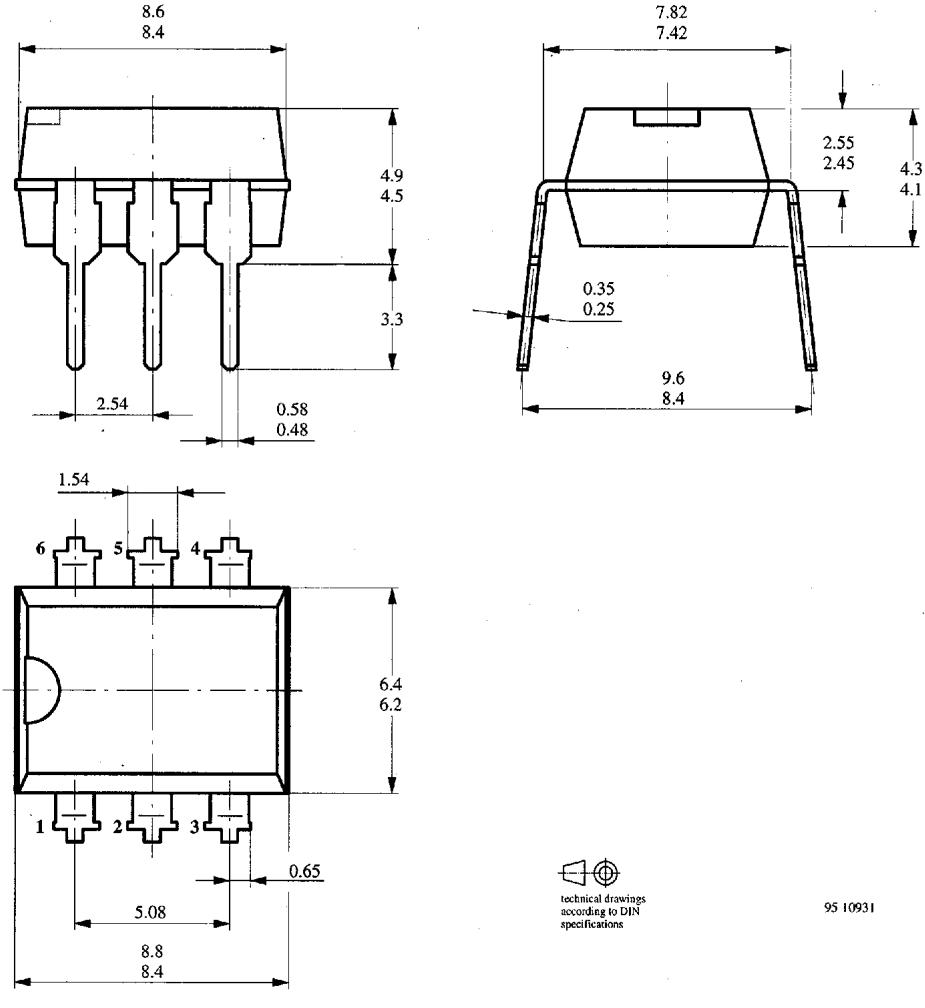


Figure 9. Collector Emitter Sat. Voltage vs. Collector Current

Dimensions in mm



technical drawings according to DIN specifications

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