TELEFUNKEN electronic
Creative Technologies

K 102 P

T-41-83

Optically Coupled Isolator

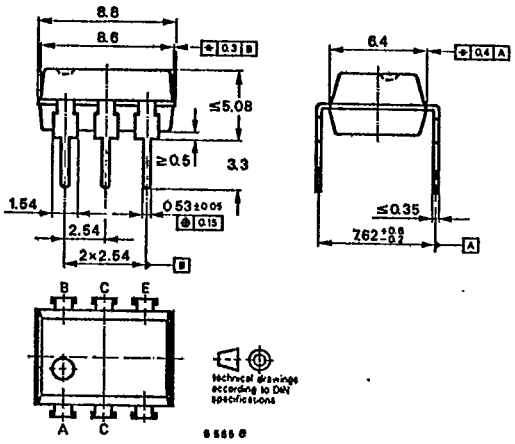
Construction: Emitter: GaAs IR Emitting Diode
Detector: Silicon NPN Epitaxial Planar Phototransistor

Applications: Galvanically separated circuits, non-interacting switches

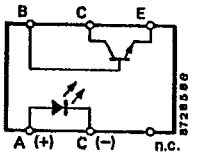
Features:

- DC isolation test voltage V_{is} 4.4 kV
- Low coupling capacity C_K typ. 0.3 pF
- Test class 25/100/21 DIN 40045
- Current transfer ratio in groups selected
- Low temperature coefficient of CTR

Dimensions in mm



Pin connections



Plastic case
DIP 6
Weight max. 0.7 g

Absolute maximum ratings

Emitter

Reverse voltage	V_R	5	V
Forward current	I_F	50	mA
Forward surge current $\frac{t_p}{T} \leq 10\ \mu s$	I_{FSM}	1.5	A
Power dissipation $T_{amb} \leq 25\ °C$	P_V	120	mW
Junction temperature	T_j	125	°C

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Detector					
Collector base voltage	V_{CBO}		50		V
Collector emitter voltage	V_{CEO}		32		V
Emitter collector voltage	V_{ECO}		7		V
Collector current	I_C		50		mA
Peak collector current $\frac{t_p}{T} = 0.5$, $t_p \leq 10$ ms	I_{CM}		100		mA
Power dissipation $T_{amb} = 25$ °C	P_V		130		mW
Junction temperature	T_j		125		°C
Coupled device					
DC isolation test voltage $t = 1$ min.	V_{is} [1]		4.4		V
Total power dissipation $T_{amb} \leq 25$ °C	P_{tot}		250		mW
Ambient temperature range	T_{amb}		−55...+100		°C
Storage temperature range	T_{stg}		−55...+125		°C
Soldering temperature 2 mm from case, $t \leq 10$ s	T_{sd}		260		°C
Electrical characteristics $T_{amb} = 25$ °C		**Min.**	**Typ.**	**Max.**	
Emitter					
Forward voltage $I_F = 50$ mA	V_F		1.25	1.6	V
Breakdown voltage $I_R = 100$ µA	$V_{(BR)}$	5			V
Junction capacitance $V_R = 0$, $f = 1$ MHz	C_j		50		pF
Detector					
Collector emitter breakdown voltage $I_C = 1$ mA	$V_{(BR)CEO}$	32			V
Collector dark current					
$V_{CE} = 20$ V, $I_F = 0$, $E = 0$	I_{CEO}			200	nA
$V_{CE} = 10$ V, $I_F = 0$, $E = 0$	I_{CEO}			50	nA
$V_{CB} = 10$ V, $I_F = 0$, $E = 0$	I_{CBO}			20	nA
Collector emitter saturation voltage $I_C = 1$ mA, $I_F = 10$ mA	V_{CEsat}			0.3	V

[1] related to standard climate 23/50 DIN 50014

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			Min.	Typ.	Max.	
Coupled device						
DC isolation test voltage $t = 1$ min		V_{is} [1]	4.4			kV
Isolation resistance $V_{IO} = 1$ kV, 40% relative humidity		R_{is} [1]		10^{12}		Ω
Collector current						
$V_{CE} = 5$ V, $I_F = 10$ mA	K 102 P1	I_C	2	6		mA
	K 102 P2	I_C	4		8	mA
	K 102 P3	I_C	6.2		12.5	mA
$I_F = 2$ mA	K 102 P2	I_C	0.4		1	mA
	K 102 P3	I_C	0.5		1.2	mA
Current transfer ratio						
$V_{CE} = 5$ V, $I_F = 10$ mA	K 102 P1	CTR	20	60		%
	K 102 P2	CTR	40		80	%
	K 102 P3	CTR	62		125	%
$I_F = 2$ mA	K 102 P2	CTR	20		50	%
	K 102 P3	CTR	25		60	%
Cut-off frequency $V_{CE} = 5$ V, $I_F = 10$ mA, $R_L = 100$ Ω		f_g		110		kHz
Coupling capacitance $f = 1$ MHz		C_k		0.3		pF
Switching characteristics						
$V_S = 5$ V, $I_C = 5$ mA, $R_L = 100$ Ω, see Fig. 1						
Delay time		t_d		4.0		µs
Rise time		t_r		7.0		µs
Turn-on time		t_{on}		11.0		µs
Storage time		t_s		0.3		µs
Fall time		t_f		6.7		µs
Turn-off time		t_{off}		7.0		µs
$V_S = 5$ V, $I_F = 10$ mA, $R_L = 1$ kΩ, see Fig. 2						
Turn-on time		t_{on}		25		µs
Turn-off time		t_{off}		42.5		µs

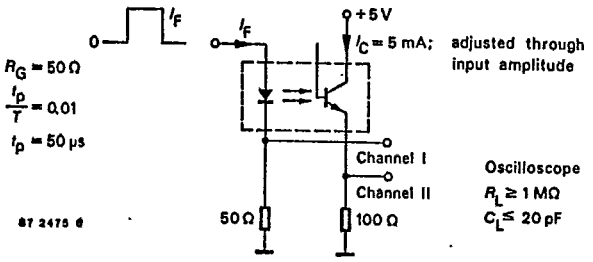

Fig. 1 Test circuit, non saturated operation

[1] related to standard climate 23/50 DIN 50014

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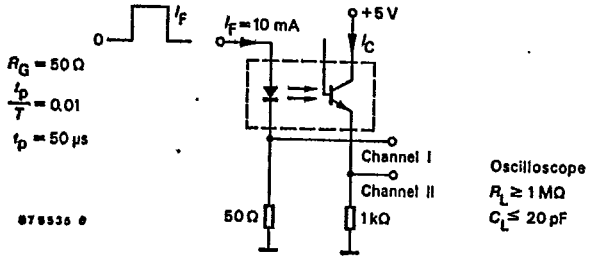
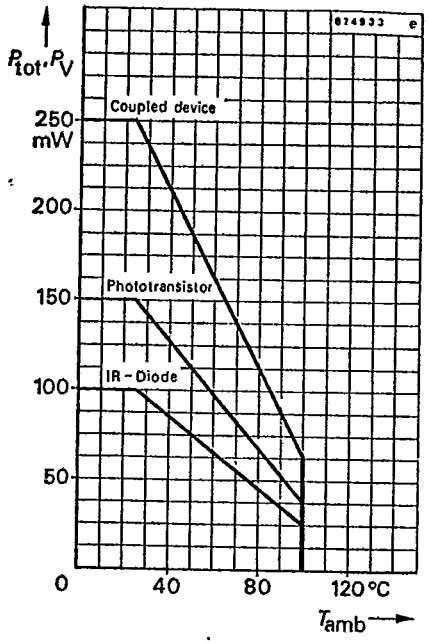
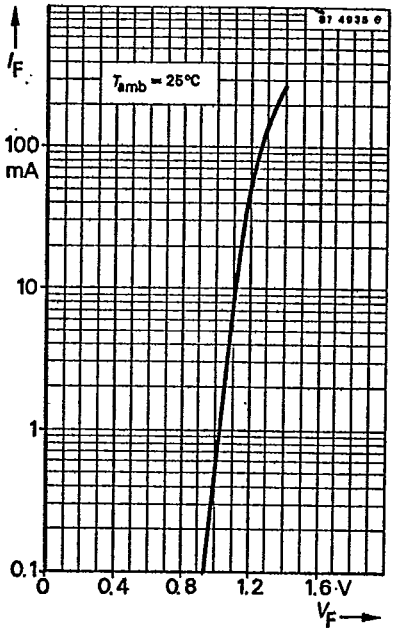


Fig. 2 Test circuit, saturated operation





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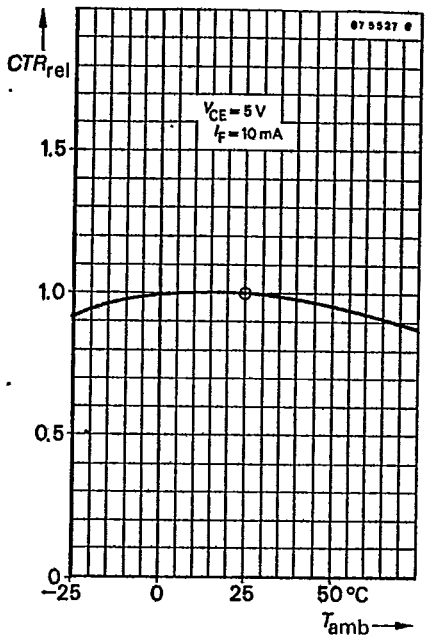

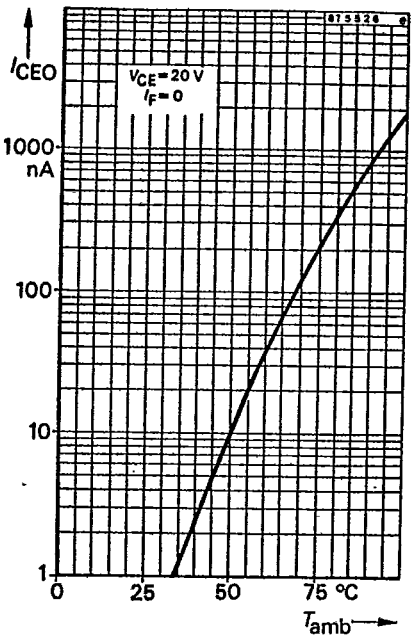

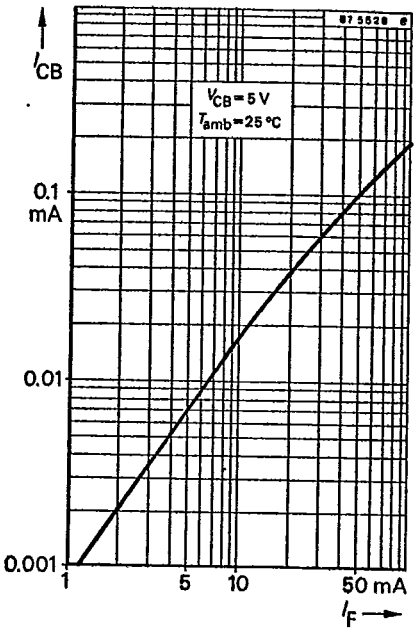

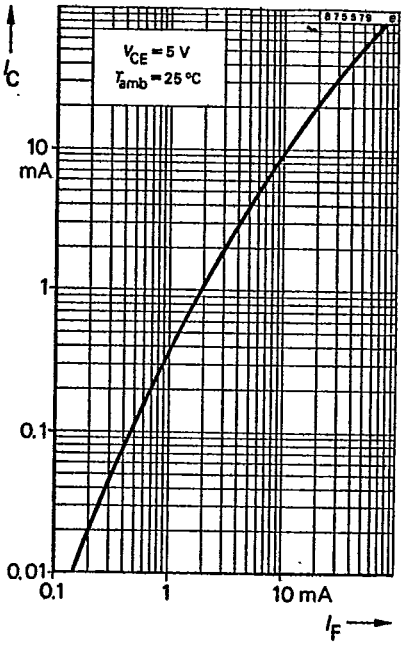

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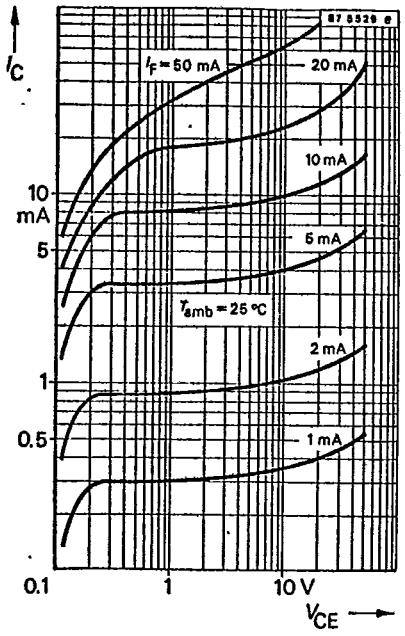
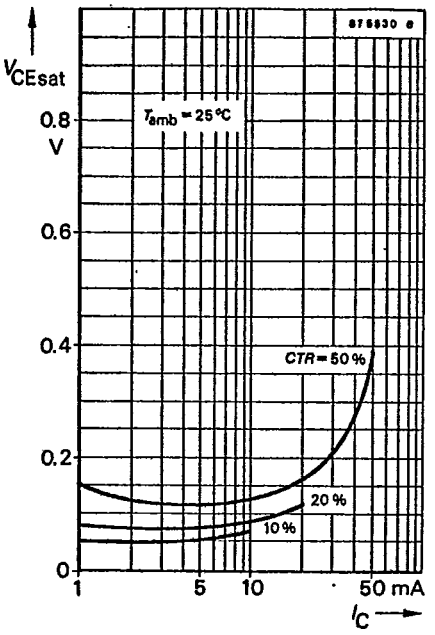
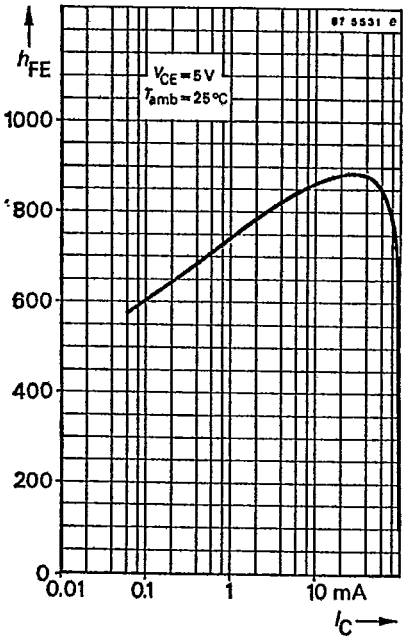
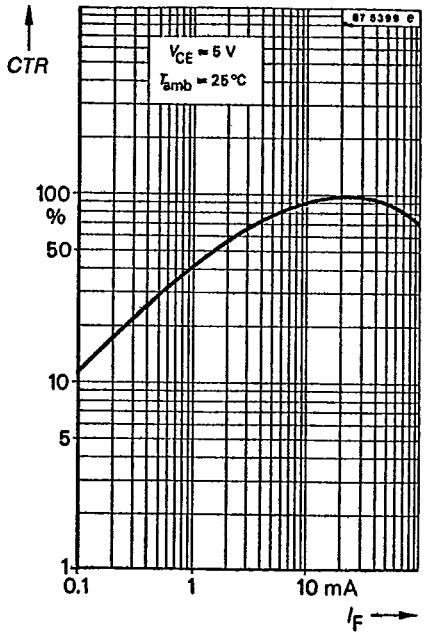

I_C
I_F = 50 mA
20 mA
10 mA
5 mA
2 mA
1 mA
T_{amb} = 25 °C
10 mA
5
1
0.5
0.1
1
10 V
V_{CE}


V_{CEsat}
0.8 V
0.6
0.4
0.2
0
T_{amb} = 25 °C
CTR = 50 %
20 %
10 %
1
5
10
50 mA
I_C


h_{FE}
V_{CE} = 5 V
T_{amb} = 25 °C
1000
800
600
400
200
0
0.01
0.1
1
10 mA
I_C


CTR
V_{CE} = 5 V
T_{amb} = 25 °C
100 %
50
10
5
1
0.1
1
10 mA
I_F

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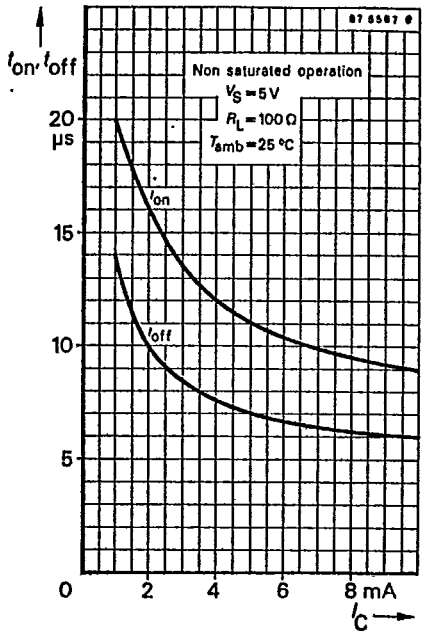
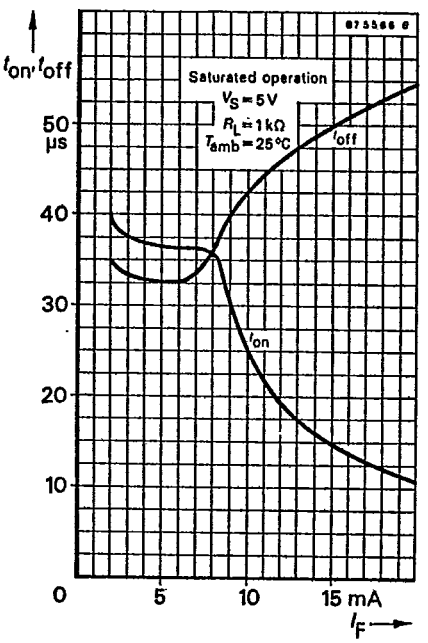

Non saturated operation
V_S = 5 V
R_L = 100 Ω
T_{amb} = 25 °C
t_{on}, t_{off}
20 µs
15
10
5
0
2
4
6
8 mA
I_C
t_{on}
t_{off}


Saturated operation
V_S = 5 V
R_L = 1 kΩ
T_{amb} = 25 °C
t_{on}, t_{off}
50 µs
40
30
20
10
0
5
10
15 mA
I_F
t_{off}
t_{on}