TELEFUNKEN electronic
Creative Technologies

BPW 47

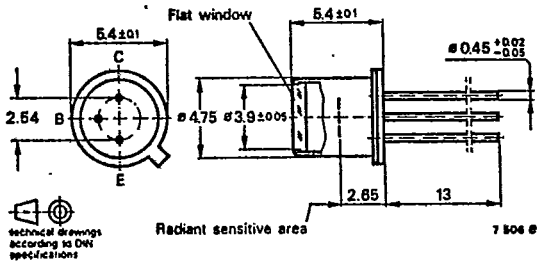
Silicon NPN Epitaxial Planar Phototransistor

Applications: Detector in electronic control and drive circuits

Features:

- Hermetically sealed case
- Suitable for visible and near infrared radiation
- Exact central chip alignment typ.: ±50 µm
- Long range light barrier with an additional optics
- Base terminal is available
- Exact focusing available

Dimensions in mm



Angle of half sensitivity
$\pm\varphi = 40°$
Collector connected with case

≈18A3 DIN 41876
≈JEDEC TO 18
Weight max. 0.5 g

Absolute maximum ratings

Collector-base voltage	V_{CBO}	80	V
Collector-emitter voltage	V_{CEO}	70	V
Emitter-base voltage	V_{EBO}	5	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
Total power dissipation $T_{amb} \leq 25$ °C	P_{tot}	250	mW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55...+125	°C

Thermal resistance		Min.	Typ.	Max.	
Junction ambient	R_{thJA}			400	K/W

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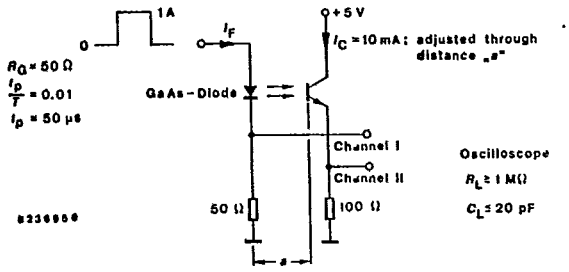
Optical and electrical characteristics $T_{amb} = 25$ °C		Min.	Typ.	Max.	
Collector dark current					
$V_{CE} = 20$ V, $E = 0$	I_{CEO}		10	100	nA
Collector light current					
$V_{CE} = 5$ V, $E_A = 1$ klx[1]	I_{ca}		1.0		mA
$V_{CE} = 5$ V, $E_e = 1$ mW/cm², $\lambda_p = 950$ nm					
Group A	I_{ca}	0.32	0.5	0.63	mA
Group B	I_{ca}	0.5	0.8	1.0	mA
Group C	I_{ca}	0.8	1.0	1.6	mA
Peak wavelength sensitivity	λ_p		800		nm
Range of spectral bandwidth (50%)	$\lambda_{0.5}$		600...1050		nm
Collector-emitter breakdown voltage					
$I_C = 1$ mA	$V_{(BR)CEO}$*)	70			V
Collector-emitter saturation voltage					
$E_e = 1$ mW/cm², $I_C = 0.1$ mA	V_{CEsat}*)		0.15	0.3	V
Cut-off frequency					
$I_C = 5$ mA, $V_S = 5$ V, $R_L = 100\ \Omega$	f_c		110		kHz
Capacitance, collector-emitter					
$V_{CE} = 5$ V, $f = 1$ MHz, $E = 0$	C_{CEO}		7.5		pF

Switching characteristics

$V_S = 5$ V, $I_C = 10$ mA, $R_L = 100\ \Omega$, see test circuit

Delay time	t_d		2.5		µs
Rise time	t_r		3.5		µs
Turn-on time	t_{on}		6.0		µs
Storage time	t_s		0.3		µs
Fall time	t_f		3.2		µs
Turn-off time	t_{off}		3.5		µs



Test circuit

*) AQL = 0.65 % 1) Standard illuminant A (DIN 5033/IEC 306-1)

T-41-61

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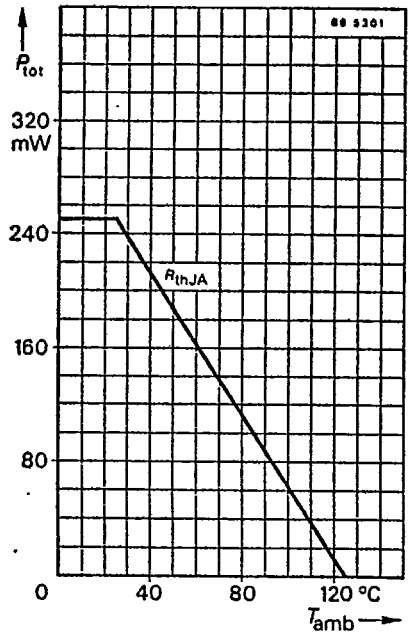
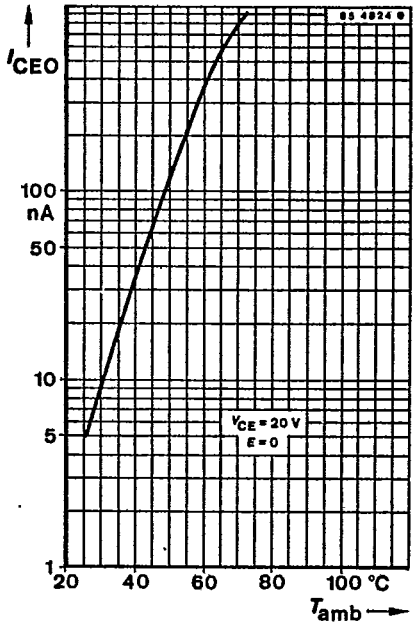
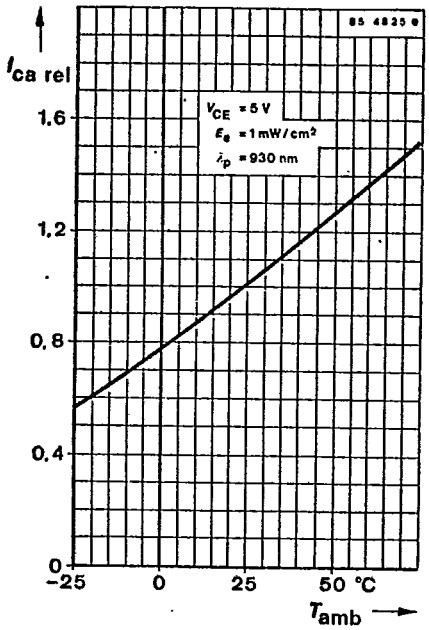
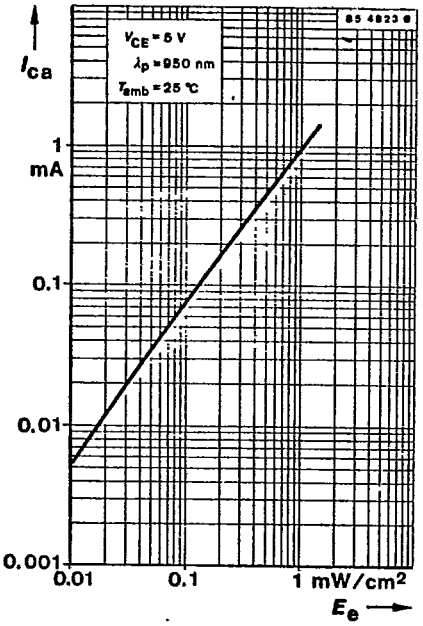

P_{tot}
320 mW
240
160
80
0
40
80
120 °C
T_{amb}
R_{thJA}


I_{CEO}
100 nA
50
10
5
1
20
40
60
80
100 °C
T_{amb}
V_{CE} = 20 V
E = 0


$I_{ca\ rel}$
1.6
1.2
0.8
0.4
0
−25
0
25
50 °C
T_{amb}
V_{CE} = 5 V
E_e = 1 mW/cm²
λ_p = 930 nm


I_{ca}
1 mA
0.1
0.01
0.001
0.01
0.1
1 mW/cm²
E_e
V_{CE} = 5 V
λ_p = 950 nm
T_{amb} = 25 °C

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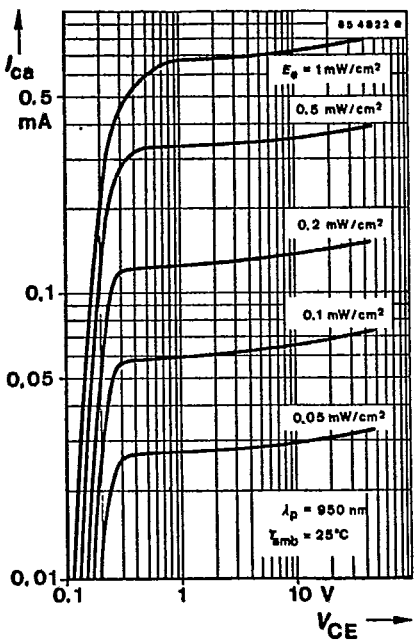
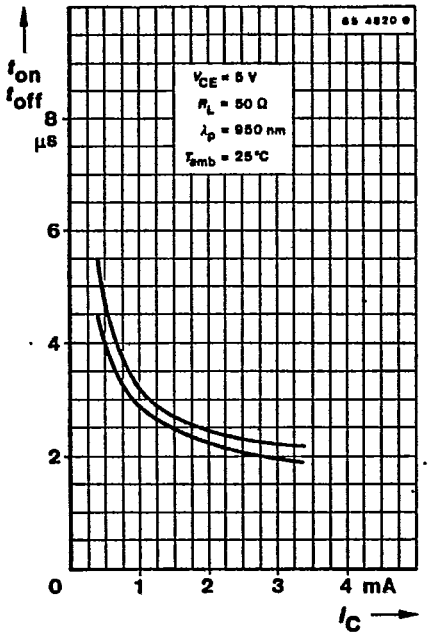
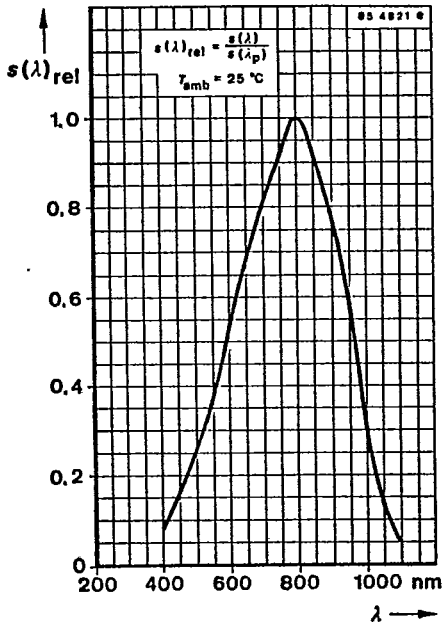

85 4822 e
I_{CE}
0.5 mA
0.1
0.05
0.01
E_e = 1 mW/cm²
0.5 mW/cm²
0.2 mW/cm²
0.1 mW/cm²
0.05 mW/cm²
λ_p = 950 nm
T_{amb} = 25°C
0.1
1
10 V
V_{CE}


85 4820 e
t_{on}
t_{off}
8 µs
6
4
2
0
V_{CE} = 5 V
R_L = 50 Ω
λ_p = 950 nm
T_{amb} = 25°C
1
2
3
4 mA
I_C


85 4821 e
$s(\lambda)_{rel}$
$s(\lambda)_{rel} = \frac{s(\lambda)}{s(\lambda_p)}$
T_{amb} = 25 °C
1.0
0.8
0.6
0.4
0.2
0
200
400
600
800
1000 nm
λ