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Contents, alpha-numeric

○ Can be delivered as "Qualified semiconductor device"

Classification according to applications

○ Can be delivered as "Qualified semiconductor device"

Symbols

A	Anode
A	Radiant sensitive area
AQL	Acceptable quality level
B	Base
C	Collector
C_D	Diode capacitance
$C_{ürb}$	Feedback capacitance, common base configuration
$C_{üre}$	Feedback capacitance, common emitter configuration
D	Drain
E	Emitter
E_A	Illumination at standard illuminant A (IEC 306-1)
F	Noise figure
f	Frequency
Δf	Frequency range
F_c	Noise figure of mixer stages
f_g	Cut-off frequency
f_T	Gain bandwidth product
G	Gate
G	Power gain
h_{FE}	DC forward current transfer ratio in common emitter configuration
h_{fe}	Short circuit forward current transfer ratio in common emitter configuration (small signal value)
I_{B1}	Control current
I_{B2}	Reverse control current
$I_{(BR)}$	Breakdown current (peak value)
I_C	Collector current
I_{ca}	Collector light current
I_{CAV}	Average collector current
I_{CBO}	Collector cut-off current, with open emitter
I_{CES}	Collector cut-off current, with short circuit between base and emitter
I_{CM}	Collector peak current
I_{DD}	Drain supply current
I_E	Emitter current
I_{EB20}	Emitter cut-off current of the Diode emitter – base 2
i_F	Forward current, instantaneous total value
I_F	Forward continuous current
I_{FAV}	Average forward current
I_{FM}	Forward peak current
I_k	Short circuit current
I_P	Peak point current
I_{ph}	Photo current
i_R	Reverse current, instantaneous total value
I_R	Reverse current
I_{ra}	Reverse light current
I_V	Valley point current
I_v	Luminous intensity
I_Z	Z-current (Zener current)
K	Cathode
k	Coupling factor, current transfer ratio
P_i	Input power
P_q	Output power
P_{RSM}	Peak reverse surge power dissipation
P_{tot}	Total power dissipation
P_V	Power dissipation, general
r_{BB}	Interbase resistance
r_f	Differential forward resistance
R_L	Load resistance
r_s	Series resistance
R_{thJA}	Thermal resistance between junction and ambient
R_{thJC}	Thermal resistance between junction and case
r_{zj}	Z-resistance at constant junction temperature
S	Source
T	Period
t_{amb}	Ambient temperature
t_{case}	Case temperature
t_f	Fall time
t_j	Junction temperature
TK_{UF}	Temperature coefficient of forward voltage
TK_{UZ}	Temperature coefficient of Z-voltage
t_{off}	Turn-off time
t_{on}	Turn-on time
t_p	Pulse duration
$\frac{t_p}{T}$	Duty cycle
t_r	Rise time
t_{rr}	Reverse recovery time
U_{B2B1}	Interbase voltage

Symbols

$U_{(BR)}$	Breakdown voltage
$U_{(BR)\,CEO}$	Breakdown voltage, collector-emitter with open base
U_{CB}	Collector-base voltage
U_{CE}	Collector-emitter voltage
U_{CEO}	Collector-emitter voltage with open base
U_{CER}	Collector-emitter voltage with a resistance connecting base to emitter
U_{CERM}	Collector-emitter peak voltage with a resistance connecting base to emitter
U_{CEsat}	Collector-emitter saturation voltage
U_{DD}	Drain supply voltage
U_{EB2}	Emitter-base 2 voltage
U_F	Forward voltage
U_{is}	DC isolation voltage
U_O	Open circuit voltage
U_o	Open circuit voltage (at radiation/irradiation)
U_R	Reverse voltage
U_{RWM}	Crest working reverse voltage
U_S	Supply voltage
U_{SS}	Source supply voltage
U_Z	Z-operation voltage (range)
$\lvert\gamma_{fb}\rvert$	Short circuit forward transfer admittance in common base configuration (small single value)
$\lvert\gamma_{fe}\rvert$	Short circuit forward transfer admittance in common emitter configuration (small signal value)
α	Angle of half sensitivity (at detectors) /
α	Angle of half intensity (at emitters)
λ	Wave length
η_i	Intrinsic stand-off ratio
Φ_e	Radiant power (Radiant flux)
τ	Response time
φ	Phase angle
▼	New type
○	Available as qualified semiconductor device

All values are valid at t_{amb} = 25 °C, unless otherwise specified

Color code for diodes with JEDEC designation

The JEDEC type designation for "1 N" with a four digit number is given by four colour coded rings.

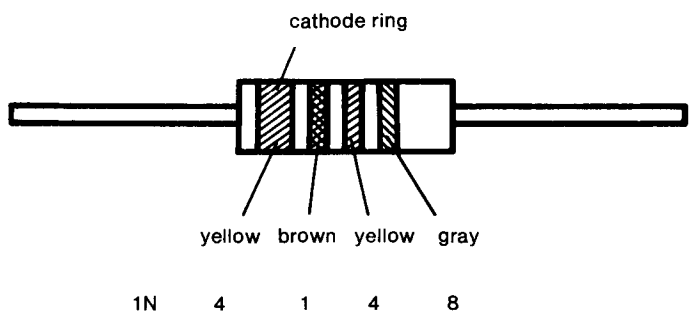
The colour code begins at the cathode side.

The first of the colour rings has double width.

The colour coding is corresponding with the following table:

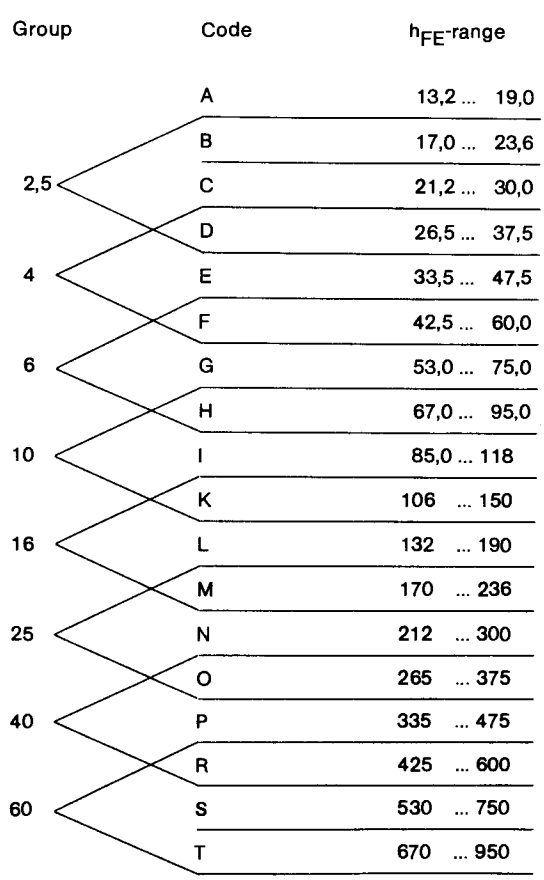
Colour	Number	Colour	Number
black	0	green	5
brown	1	blue	6
red	2	violet	7
orange	3	gray	8
yellow	4	white	9

Example:



Pair conditions of silicon AF transistors

The silicon AF transistors are measured according to the following pair conditions:



The transistors can be supplied only in the above shown groups.

The values of the h_{FE}-range limits are taken from the DIN progression R 40.

Diodes

General purpose diodes

Type	Fig. Nr.	Maximum ratings			Characteristics						
		P_V at t_{amb} = 45 °C	I_F	U_R	R_{thJA}	U_F at	I_F	I_R at	U_R and	t_j	t_{rr}
		mW	mA	V	°C/W	V	mA	µA	V	°C	µs
AA 117 [1])	1		50 [2])	90	≤ 400	1,20 (<1,85)	10	40	75	25	
AA 132 [1])	1		50 [2])	100	≤ 400	1,35 (<1,8)	10	38 (<120)	60	25	
AA 133 [1])	1		50 [2])	130	≤ 400	1,35 (<1,8)	10	55 (<160)	100	25	
AA 134 [1])	1		50 [2])	55	≤ 400	1,35 (<1,8)	10	70 (<200)	50	25	
BA 147/25	1		150	25	≤ 500	≤ 1	50	≤ 15	10	100	
BA 147/50	1		150	50	≤ 500	≤ 1	50	≤ 15	10	100	
BA 147/100	1		150	100	≤ 500	≤ 1	50	≤ 30	50	100	
BA 147/150	1		150	150	≤ 500	≤ 1	50	≤ 50	100	100	
BA 147/230	1		150	230	≤ 500	≤ 1	50	≤ 75	150	100	
BA 147/300	1		150	300	≤ 500	≤ 1	50	≤ 100	200	100	
BA 204	2		150	50	≤ 350	≤ 1	100	≤ 0,1	30	25	≤ 0,01 [4])
BAV 17	2		250	25	≤ 350	≤ 1	100	≤ 15	20	100	≤ 0,05 [3])
BAV 18	2		250	60	≤ 350	≤ 1	100	≤ 15	50	100	≤ 0,05 [3])
BAV 19	2		250	120	≤ 350	≤ 1	100	≤ 15	100	100	≤ 0,05 [3])
BAV 20	2		250	200	≤ 350	≤ 1	100	≤ 15	150	100	≤ 0,05 [3])
BAV 21	2		250	250	≤ 350	≤ 1	100	≤ 15	200	100	≤ 0,05 [3])
BAY 86	1	250	250	50	≤ 420	≤ 1	100	≤ 10	50	100	≤ 3 [4])
BAY 87	1	250	250	100	≤ 420	≤ 1	100	≤ 15	100	100	≤ 3 [4])
BAY 88	1	250	250	300	≤ 420	≤ 1	100	≤ 20	300	100	≤ 3 [4])
BAY 89	1	190	250	500	≤ 420	≤ 1	100	≤ 30	500	100	≤ 10 [4])
1N 484 A	1	250	200	130		≤ 1	100	≤ 15	125	150	

Remarks: [1]) Germanium diodes; [2]) I_{FAV} at $U_R = 0$; [3]) $I_F = I_R = 30$ mA, $R_L = 100\ \Omega$, $i_R = 3$ mA; [4]) $I_F = I_R = 10$ mA, $R_L = 100\ \Omega$, $i_R = 1$ mA

Data book reference: B 2 B

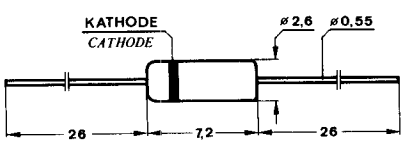


Fig. 1: 51 A 2 DIN 41880
JEDEC DO 7

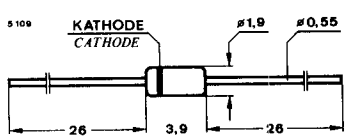


Fig. 2: 54 A 2 DIN 41880
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Diodes

Switching diodes

Type	Fig. Nr.	Maximum ratings			Characteristics								Notes
		P_V at t_{amb} = 45 °C	I_F	U_R	R_{thJA}	U_F at	I_F	C_D at	U_R	r_f at	I_F	t_{rr}	
		mW	mA	V	°C/W	V	mA	pF	V	Ω	mA	µs	
BA 173	1		300	300	≤ 450	≤ 1	100	≤ 2	150			0,35[1])	Clamping diode
BA 176	1					≤ 1,5	400						Aerial protection diode[2])
BA 178	3		100	35	≤ 400	≤ 1,2	100	≤ 1,3	30	≤ 1,3	5		RF switching diode
BA 182	3		100	35	≤ 400	≤ 1,2	100	≤ 1	20	≤ 0,7	5		RF switching diode
BA 243	2		100	20	≤ 350	≤ 1	100	≤ 2	15	≤ 1	10		RF switching diode
BA 244	2		100	20	≤ 350	≤ 1	100	≤ 2	15	≤ 0,5	10		RF switching diode
BAW 24	2	440	600	40	≤ 350	≤ 1,2	200	≤ 4	0			0,006[3])	
BAW 25	2	440	600	40	≤ 350	≤ 1	200	≤ 4	0			0,006[3])	
BAW 26	2	440	600	60	≤ 350	≤ 1,2	200	≤ 4	0			0,006[3])	
BAW 27	2	440	600	60	≤ 350	≤ 1,25	400	≤ 4	0			0,006[3])	
BAY 68	2	440	115	25	≤ 350	≤ 1	100	≤ 5	0			0,01[1])	
BAY 69	2	440	115	50	≤ 350	≤ 1	100	≤ 5	0			0,01[1])	
BAY 92	1	230[4])	100	600	≤ 450	≤ 1	100	≤ 4	10			0,35[1])	
BAY 93	2	440	115	20	≤ 350	≤ 1	10	≤ 5	0			0,015[1])	
1N 4148 ○	2	440	200	75	≤ 350	≤ 1	10	≤ 4	0			0,008[1])	
1N 4149	2	440	200	75	≤ 350	≤ 1	10	≤ 2	0			0,008[1])	
1N 4151 ○	2	440	200	50	≤ 350	≤ 1	50	≤ 2	0			0,004[1])	
1N 4154	2	440	200	25	≤ 350	≤ 1	30	≤ 4	0			0,004[1])	
1N 4446 ○	2	440	200	75	≤ 350	≤ 1	20	≤ 4	0			0,008[1])	
1N 4447	2	440	200	75	≤ 350	≤ 1	20	≤ 2	0			0,008[1])	
1N 4448 ○	2	440	200	75	≤ 350	≤ 1	100	≤ 4	0			0,008[1])	
1N 4449	2	440	200	75	≤ 350	≤ 1	30	≤ 2	0			0,008[1])	

Remarks: [1]) $I_F = I_R$ = 10 mA, i_R = 1 mA; [2]) I_R = 1 µA, $U_{(BR)}$ = 100 V, $\frac{t_p}{T}$ = 0,01, t_p = 0,3 ms; [3]) $I_F = I_R$ = 10...100 mA, i_R = 0,1 I_R; [4]) at t_{amb} = 25 °C

Data book reference: B 2 B ○ Can be delivered as "Qualified semiconductor device"

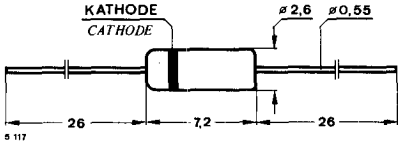


Fig. 1: 51 A 2 DIN 41880
JEDEC DO 7

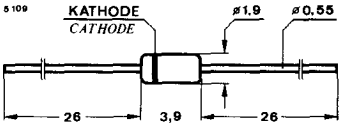


Fig. 2: 54 A 2 DIN 41880
JEDEC DO 35

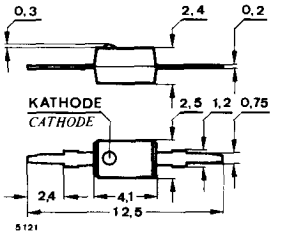


Fig. 3: Plastic case
SOD 23

Diodes

Rectifier and Avalanche diodes

Type	Group	Fig. Nr.	Maximum ratings		Characteristics				Notes
			I_{FAV} mA	U_R V	R_{thJA} °C/W	U_F at V	I_F mA	t_{rr} [2] ns	
BA 157		5	400	400	≤ 100	≤ 1,5	1000	≤ 300	Fast rectifier diodes
BA 158		5	400	600	≤ 100	≤ 1,5	1000	≤ 300	
BA 159		5	400	1000	≤ 100	≤ 1,5	1000	≤ 300	
BY 201	2	5	1000 [1]	200	≤ 100	≤ 1,2	1000	≤ 350 [3]	Fast rectifier diodes
	3	5	1000 [1]	300	≤ 100	≤ 1,2	1000	≤ 350 [3]	
	4	5	1000 [1]	400	≤ 100	≤ 1,2	1000	≤ 350 [3]	
	5	5	1000 [1]	500	≤ 100	≤ 1,2	1000	≤ 350 [3]	
	6	5	1000 [1]	600	≤ 100	≤ 1,2	1000	≤ 350 [3]	
BY 202	2	6	1500 [1]	200	≤ 70	≤ 1,0	1000	≤ 350 [3]	Fast rectifier diodes
	3	6	1500 [1]	300	≤ 70	≤ 1,0	1000	≤ 350 [3]	
	4	6	1500 [1]	400	≤ 70	≤ 1,0	1000	≤ 350 [3]	
	5	6	1500 [1]	500	≤ 70	≤ 1,0	1000	≤ 350 [3]	
	6	6	1500 [1]	600	≤ 70	≤ 1,0	1000	≤ 350 [3]	
BY 203	12	5	250	1200	≤ 100	≤ 2,4	200	≤ 550	Fast rectifier diodes
	16	5	250	1600	≤ 100	≤ 2,4	200	≤ 550	
	20	5	250	2000	≤ 100	≤ 2,4	200	≤ 550	
BY 204	4	5	400	400	≤ 100	≤ 1,2	200	≤ 550	Fast rectifier diodes
	8	5	400	800	≤ 100	≤ 1,2	200	≤ 550	
	10	5	400	1000	≤ 100	≤ 1,2	200	≤ 550	
BYV 12		8	1500	100	≤ 100	≤ 1,5	1000	≤ 300 [8]	Fast rectifier diodes
BYV 13		8	1500	400	≤ 100	≤ 1,5	1000	≤ 300 [8]	
BYV 14		8	1500	600	≤ 100	≤ 1,5	1000	≤ 300 [8]	
BYV 15		8	1500	800	≤ 100	≤ 1,5	1000	≤ 300 [8]	
BYV 16		8	1500	1000	≤ 100	≤ 1,5	1000	≤ 300 [8]	
BYW 32		8	2000	200	≤ 100	≤ 1,2	1000	≤ 200 [9]	Fast rectifier diodes
BYW 33		8	2000	300	≤ 100	≤ 1,2	1000	≤ 200 [9]	
BYW 34		8	2000	400	≤ 100	≤ 1,2	1000	≤ 200 [9]	
BYW 35		8	2000	500	≤ 100	≤ 1,2	1000	≤ 200 [9]	
BYW 36		8	2000	600	≤ 100	≤ 1,2	1000	≤ 200 [9]	
BYW 52 ○		8	2000	200	≤ 100	≤ 1	1000	–	Äquiv. **1N 5059**
BYW 53 ○		8	2000	400	≤ 100	≤ 1	1000	–	Äquiv. **1N 5060** Controlled-Avalanche-characteristics
BYW 54 ○		8	2000	600	≤ 100	≤ 1	1000	–	Äquiv. **1N 5061**
BYW 55 ○		8	2000	800	≤ 100	≤ 1	1000	–	Äquiv. **1N 5062**
BYW 56 ○		8	2000	1000	≤ 100	≤ 1	1000	–	
BYW 72		9	3000	200	≤ 90	≤ 1,2	3000	≤ 200 [9]	Fast rectifier diodes
BYW 73		9	3000	300	≤ 90	≤ 1,2	3000	≤ 200 [9]	
BYW 74		9	3000	400	≤ 90	≤ 1,2	3000	≤ 200 [9]	
BYW 75		9	3000	500	≤ 90	≤ 1,2	3000	≤ 200 [9]	
BYW 76		9	3000	600	≤ 90	≤ 1,2	3000	≤ 200 [9]	
BYW 82 ○		9	3000	200	≤ 90	≤ 1	3000	–	Äquiv. **1N 5624**
BYW 83 ○		9	3000	400	≤ 90	≤ 1	3000	–	Äquiv. **1N 5625** Controlled-Avalanche-characteristics
BYW 84 ○		9	3000	600	≤ 90	≤ 1	3000	–	Äquiv. **1N 5626**
BYW 85 ○		9	3000	800	≤ 90	≤ 1	3000	–	Äquiv. **1N 5627**
BYW 86 ○		9	3000	1000	≤ 90	≤ 1	3000	–	
BYX 82		8	1500	200	≤ 100	≤ 1	1000	–	Rectifier diodes
BYX 83		8	1500	400	≤ 100	≤ 1	1000	–	
BYX 84		8	1500	600	≤ 100	≤ 1	1000	–	
BYX 85		8	1500	800	≤ 100	≤ 1	1000	–	
BYX 86		8	1500	1000	≤ 100	≤ 1	1000	–	
1N 4001		5	1000	50	≤ 85	≤ 1,1	1000	–	General purpose rectifier diodes
1N 4002		5	1000	100	≤ 85	≤ 1,1	1000	–	
1N 4003		5	1000	200	≤ 85	≤ 1,1	1000	–	
1N 4004		5	1000	400	≤ 85	≤ 1,1	1000	–	
1N 4005		5	1000	600	≤ 85	≤ 1,1	1000	–	
1N 4006		5	1000	800	≤ 85	≤ 1,1	1000	–	
1N 4007		5	1000	1000	≤ 85	≤ 1,1	1000	–	

Remarks: [1] I_O; [2] $I_F = I_R = 10$ mA, $i_R = 1$ mA; [3] $I_F = I_R = 1$ A, $i_R = 100$ mA; [7] $I_F = 30$ mA, $U_R = 3$ V, $R_L = 100\ \Omega$, $i_R = 3$ mA; [8] $I_F = 100$ mA, $I_R = 200$ mA, $i_R = 50$ mA; [9] $I_F = 0{,}5$ A, $I_R = 1$ A, $i_R = 0{,}25$ A

Data book reference: B 2 B ○ Can be delivered as "Qualified semiconductor device"

Diodes

Capacitance diodes

Type	Group	Fig. Nr.	Maximum rat.	Characteristics							
			U_R	$C_D(U_R = 3\,V)$ / $C_D(U_R = 25\,V)$	$C_D(U_R = 3\,V)$ / $C_D(U_R = 30\,V)$	$C_D(U_R = 2\,V)$ / $C_D(U_R = 8\,V)$	C_D at	U_R	r_S at	U_R or	C_D
			V				pF	V	Ω	V	pF
BA 111		1	20	–	–	–	45...65	2	0,5	2	–
BA 121		1	30	–	–	–	8...12	2	0,9	2	–
BA 124	50	1	30	–	–	–	44...51	2	0,5	2	–
	55	1	30	–	–	–	49...56	2	0,5	2	–
	60	1	30	–	–	–	54...61	2	0,5	2	–
	65	1	30	–	–	–	59...66	2	0,5	2	–
BA 125	35	1	30	–	–	–	29...36	2	0,5	2	–
	40	1	30	–	–	–	34...41	2	0,5	2	–
	45	1	30	–	–	–	39...46	2	0,5	2	–
	50	1	30	–	–	–	46...51	2	0,5	2	–
BB 105	A	3	28	4...5	–	–	2,3...2,8	25	≦0,8	–	9
	B	3	28	4,5...6	–	–	2,0...2,3	25	≦0,8	–	9
	G	3	28	4...6	–	–	1,8...2,8	25	≦1,2	–	9
BB 109		3	28	5...6,5	–	–	4,3...6	25	0,5	–	10
BB 204	gn	7	30	–	2,5...2,8	–	34...39	3	≦0,4	–	38
	bl	7	30	–	2,5...2,8	–	37...42	3	≦0,4	–	38
BB 205	A	3	28	4,3...5,3	–	–	2,0...2,5	25	≦0,8	–	9
	B	3	28	5,0...6	–	–	1,9...2,2	25	≦0,8	–	9
	G	3	28	4,3...6	–	–	1,8...2,6	25	≦1,2	–	9
BB 209		3	28	>6,8	–	–	2,6...3,0	25	0,85	–	12
BB 304	rt	7	30	–	–	1,65...1,75	42...43,5	2	≦0,4	–	38
	gb	7	30	–	–	1,65...1,75	43...44,5	2	≦0,4	–	38
	w	7	30	–	–	1,65...1,75	44...45,5	2	≦0,4	–	38
	gn	7	30	–	–	1,65...1,75	45...46,5	2	≦0,4	–	38
	bl	7	30	–	–	1,65...1,75	46...47,5	2	≦0,4	–	38
BB 505	B	4	28	4,5...5,8	–	–	2,0...2,3	25	≦0,8	–	9
	G	4	28	4,3...6	–	–	1,8...2,5	25	≦1,2	–	9

Data book reference: B 2 B

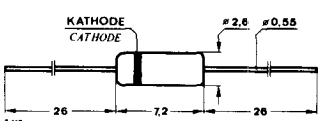


Fig. 1: 51 A 2 DIN 41880
JEDEC DO 7

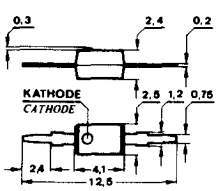


Fig. 3: Plastic case
(SOD 23)

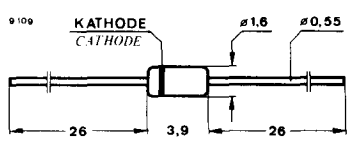


Fig. 4: 54 A 2 DIN 41880
JEDEC DO 35

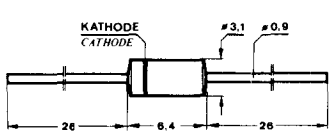
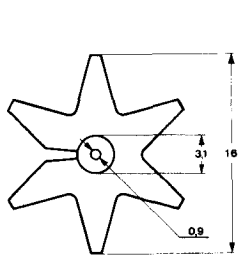


Fig. 5: Plastic case
≈ JEDEC DO 7



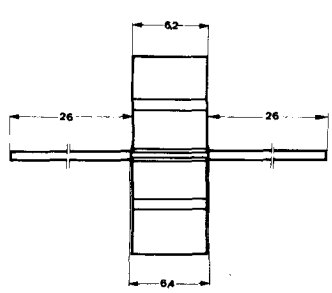


Fig. 6: Plastic case with heat sink

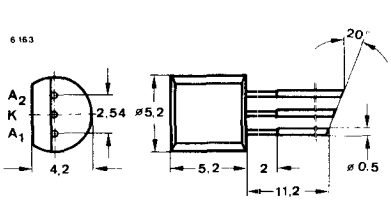


Fig. 7: 10 B 3 DIN 41868
JEDEC TO 92

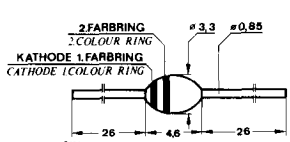


Fig. 8: Sintered glass case

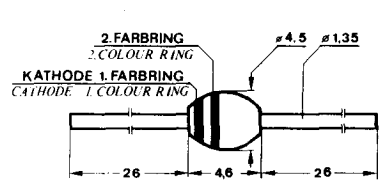


Fig. 9: Sintered glass case

Diodes

Diodes for demodulator circuits

Type	Fig. Nr.	Maximum ratings at $t_{amb} = 25°C$		Characteristics			Notes
		U_R V	I_F mA	R_{thJA} °C/W	U_F V	I_F mA	
AA 112	1	15	30	≤ 400	0,95 (<1,5)	10	For ratio detectors with low load resistance. Matched pairs are available.
AA 113	1	60	25	≤ 400	1,1 (<1,6)	10	For ratio detectors with high load resistance. Matched pairs are available.
AA 118	1	90	50[1])	≤ 400	1,05 (<1,55)	10	For phase discriminators. Matched pairs available.
AA 119	1	30	35[1])	≤ 400	1,5 (<2,2)	10	For ratio detectors with high load resistance. Matched pairs are available.
AA 137	1	30	20	≤ 400	0,9 (<1,5)	10	For ACC in TV sets.
AA 138	1	15	20	≤ 400	0,9 (<1,5)	10	For demodulators in TV sets.
Remarks:	[1]) I_{FAV}, $U_R = 0$						

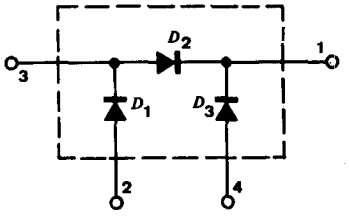
PIN-Diode

Type	Fig. Nr.	Maximum ratings		Characteristics									Notes
		U_R V	I_F mA	U_F at I_F V	mA	I_R at U_R nA	V	C_D at f pF	MHz	r_f and z_r at f Ω	kΩ	MHz	
BA 479	3	30	50	<1	50	<50	30	<0,5	0,5	<50	>9	100	For adjustable attenuators

Data book reference: B 2 B

TDA 1061 Silicon Planar PIN Diodes as a π-circuit

Applications: Attenuator two-port for AGC input signal in television tuners and antenna amplifiers.



Features:

- Large frequency range, 40 MHz ... 1 GHz
- Constant input and output impedance throughout the range of regulation

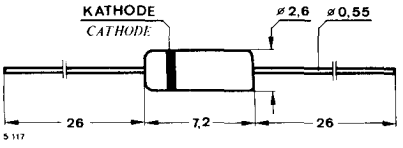


Fig. 1: 51 A 2 DIN 41880
JEDEC DO 7

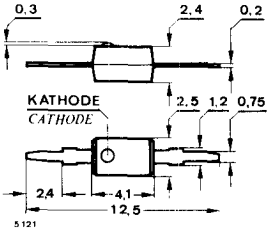


Fig. 3: Plastic case
(SOD 23)

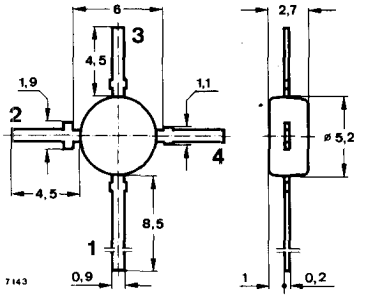


Fig. 10: 50 B 4 DIN 41867
JEDEC TO 50

Diodes

Regulator diodes

Type	Fig. Nr.	Maximum ratings	Characteristics							
		I_F mA	R_{thJA} °C/W	U_F at V	I_F mA	I_R at µA	U_R V	r_f at Ω	I_F µA	TK_{UF} at $I_F = 5$ mA 10^{-4}/°C
BZ 102/0V7	1	250	≤ 420	0,65–0,75	5	1	5	6,5	5	–26
BZ 102/1V4	1	130	≤ 420	1,3–1,5	5	1	5	13,0	5	–26
BZ 102/2V1	1	80	≤ 420	1,9–2,3	5	1	5	19,5	5	–26
BZ 102/2V8	1	60	≤ 420	2,6–3,0	5	1	5	26,0	5	–26
BZ 102/3V4	1	50	≤ 420	3,2–3,7	5	1	5	32,5	5	–26

Z diodes

BZX 55/...	$P_V = 500$ mW	Fig. No. 2						
Type	U_Z [2] V	TK_{UZ} at $I_Z = 5$ mA 10^{-4}/°C	r_{zj} Ω	r_{zj} at $I_Z = 1$ mA Ω	I_R at nA	U_R V	I_R [1] at µA	U_R V
BZX 55/C 2 V 4	2,28 ... 2,56	–9 ... –6	< 85	< 600	< 10 000	1	< 50	1
BZX 55/C 2 V 7	2,5 ... 2,9	–9 ... –6	< 85	< 600	< 10 000	1	< 50	1
BZX 55/C 3 V 0	2,8 ... 3,2	–8 ... –5	< 85	< 600	< 4 000	1	< 40	1
BZX 55/C 3 V 3	3,1 ... 3,5	–8 ... –5	< 85	< 600	< 2 000	1	< 40	1
BZX 55/C 3 V 6	3,4 ... 3,8	–8 ... –5	< 85	< 600	< 2 000	1	< 40	1
BZX 55/C 3 V 9	3,7 ... 4,1	–8 ... –5	< 85	< 600	< 2 000	1	< 40	1
BZX 55/C 4 V 3	4,0 ... 4,6	–6 ... –3	< 75	< 600	< 1 000	1	< 20	1
BZX 55/C 4 V 7	4,4 ... 5,0	–5 ... +2	< 60	< 600	< 500	1	< 10	1
BZX 55/C 5 V 1	4,8 ... 5,4	–2 ... +2	< 35	< 550	< 100	1	< 2	1
BZX 55/C 5 V 6	5,2 ... 6,0	–0,5 ... +5	< 25	< 450	< 100	1	< 2	1
BZX 55/C 6 V 2	5,8 ... 6,6	3 ... 6	< 10	< 200	< 100	2	< 2	2
BZX 55/C 6 V 8	6,4 ... 7,2	3 ... 7	< 8	< 150	< 100	3	< 2	3
BZX 55/C 7 V 5	7,0 ... 7,9	3 ... 7	< 7	< 50	< 100	5	< 2	5
BZX 55/C 8 V 2	7,7 ... 8,7	3 ... 8	< 7	< 50	< 100	6	< 2	6
BZX 55/C 9 V 1	8,5 ... 9,6	3 ... 9	< 10	< 50	< 100	7	< 2	7
BZX 55/C 10	9,4 ... 10,6	3 ... 10	< 15	< 70	< 100	7,5	< 2	7,5
BZX 55/C 11	10,4 ... 11,6	3 ... 11	< 20	< 70	< 100	8,5	< 2	8,5
BZX 55/C 12	11,4 ... 12,7	3 ... 11	< 20	< 90	< 100	9	< 2	9
BZX 55/C 13	12,4 ... 14,1	3 ... 11	< 26	< 110	< 100	10	< 2	10
BZX 55/C 15	13,8 ... 15,6	3 ... 11	< 30	< 110	< 100	11	< 2	11
BZX 55/C 16	15,3 ... 17,1	3 ... 11	< 40	< 170	< 100	12	< 2	12
BZX 55/C 18	16,8 ... 19,1	3 ... 11	< 50	< 170	< 100	14	< 2	14
BZX 55/C 20	18,8 ... 21,2	3 ... 11	< 55	< 220	< 100	15	< 2	15
BZX 55/C 22	20,8 ... 23,3	4 ... 12	< 55	< 220	< 100	17	< 2	17
BZX 55/C 24	22,8 ... 25,6	4 ... 12	< 80	< 220	< 100	18	< 2	18
BZX 55/C 27	25,1 ... 28,9	4 ... 12	< 80	< 220	< 100	20	< 2	20
BZX 55/C 30	28 ... 32	4 ... 12	< 80	< 220	< 100	22	< 2	22
BZX 55/C 33	31 ... 35	4 ... 12	< 80	< 220	< 100	24	< 2	24
BZX 55/C 36	34 ... 38	4 ... 12	< 80	< 220	< 100	27	< 2	27
BZX 55/C 39	37 ... 41	4 ... 12	< 90	< 500	< 100	28	< 2	28
BZX 55/C 43	40 ... 46 [3]	4 ... 12	< 100 [3]	< 700 [4]	< 100	32	< 2	32
BZX 55/C 47	44 ... 50 [3]	4 ... 12	< 120 [3]	< 1000 [4]	< 100	35	< 2	35
BZX 55/C 51	48 ... 54 [3]	4 ... 12	< 135 [3]	< 1000 [4]	< 100	38	< 2	38
BZX 55/C 56	52 ... 60 [3]	4 ... 12	< 150 [3]	< 1500 [4]	< 100	42	< 2	42
BZX 55/C 62	58 ... 66 [3]	4 ... 12	< 170 [3]	< 1500 [4]	< 100	47	< 2	47
BZX 55/C 68	64 ... 72 [3]	4 ... 12	< 200 [3]	< 2000 [4]	< 100	51	< 2	51
BZX 55/C 75	70 ... 79 [3]	4 ... 12	< 240 [3]	< 2000 [4]	< 100	56	< 2	56

Remarks: [1] $t_j = 150$ °C; [2] please request for tight tolerances; [3] $I_Z = 2,5$ mA; [4] $I_Z = 0,5$ mA

Data book reference: B 2 B

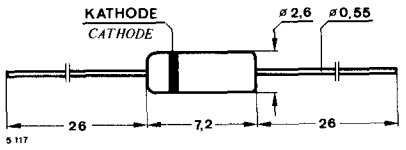


Fig. 1: 51 A 2 DIN 41 880
JEDEC DO 7

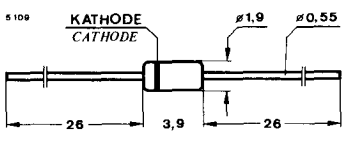


Fig. 2: 54 A 2 DIN 41 880
JEDEC DO 35

Diodes

Z diodes

BZX 85/ . . . [1])	P_V = 1,3 W		Fig. Nr. 14					
Type	U_Z	and TK_{UZ}	and r_{zj} at	I_Z	r_{zj} at	I_Z	I_R at	U_R
	V	10^{-4}/°C	Ω	mA	Ω	mA	µA	V
BZX 85/C 2 V 7	2,5...2,9	−8...−5	< 20	80	< 400	1	< 150	1
BZX 85/C 3 V 0	2,8...3,2	−8...−5	< 20	80	< 400	1	< 100	1
BZX 85/C 3 V 3	3,1...3,5	−8...−5	< 20	80	< 400	1	< 40	1
BZX 85/C 3 V 6	3,4...3,8	−8...−5	< 15	60	< 500	1	< 20	1
BZX 85/C 3 V 9	3,7...4,1	−7...−2	< 15	60	< 500	1	< 10	1
BZX 85/C 4 V 3	4,0...4,6	−7...+1	< 13	50	< 500	1	< 3	1
BZX 85/C 4 V 7	4,4...5,0	−3...+4	< 13	45	< 600	1	< 3	1,5
BZX 85/C 5 V 1	4,8...5,4	−1...+4	< 10	45	< 500	1	< 1	2
BZX 85/C 5 V 6	5,2...6,0	0...+4,5	< 7	45	< 400	1	< 1	2
BZX 85/C 6 V 2	5,8...6,6	+1...+5,5	< 4	35	< 300	1	< 1	3
BZX 85/C 6 V 8	6,4...7,2	+1,5...+6	< 3.5	35	< 300	1	< 1	4
BZX 85/C 7 V 5	7,0...7,9	+2...+6,5	< 3	35	< 200	0,5	< 1	4,5
BZX 85/C 8 V 2	7,7...8,7	+3...+7	< 5	25	< 200	0,5	< 1	5
BZX 85/C 9 V 1	8,5...9,6	+3,5...+7,5	< 5	25	< 200	0,5	< 1	6,5
BZX 85/C 10	9,4...10,6	+4...+8	< 7	25	< 200	0,5	< 0,5	7
BZX 85/C 11	10,4...11,6	+4.5...+8	< 8	20	< 300	0,5	< 0,5	7,7
BZX 85/C 12	11,4...12,7	+4,5...+8,5	< 9	20	< 350	0,5	< 0,5	8,4
BZX 85/C 13	12,4...14,1	+5...+8,5	< 10	20	< 400	0,5	< 0,5	9,1
BZX 85/C 15	13,8...15,6	+5,5...+9	< 15	15	< 500	0,5	< 0,5	10,5
BZX 85/C 16	15,3...17,1	+5,5...+9	< 15	15	< 500	0,5	< 0,5	11
BZX 85/C 18	16,8...19,1	+6...+9	< 20	15	< 500	0,5	< 0,5	12,5
BZX 85/C 20	18,8...21,2	+6...+9	< 24	10	< 600	0,5	< 0,5	14
BZX 85/C 22	20,8...23,3	+6...+9,5	< 25	10	< 600	0,5	< 0,5	15,5
BZX 85/C 24	22,8...25,6	+6...+9,5	< 25	10	< 600	0,5	< 0,5	17
BZX 85/C 27	25,1...28,9	+6...+9,5	< 30	8	< 750	0,25	< 0,5	19
BZX 85/C 30	28...32	+6...+9,5	< 30	8	< 1000	0,25	< 0,5	21
BZX 85/C 33	31...35	+6...+9,5	< 35	8	< 1000	0,25	< 0,5	23
BZX 85/C 36	34...38	+6...+9,5	< 40	8	< 1000	0,25	< 0,5	25
BZX 85/C 39	37...41	+6...+9,5	< 50	6	< 1000	0,25	< 0,5	27
BZX 85/C 43	40...46	+6...+9,5	< 50	6	< 1000	0,25	< 0,5	30
BZX 85/C 47	44...50	+6...+9,5	< 90	4	< 1500	0,25	< 0,5	33
BZX 85/C 51	48...54	+6...+9,5	< 115	4	< 1500	0,25	< 0,5	36
BZX 85/C 56	52...60	+6...+9,5	< 120	4	< 2000	0,25	< 0,5	39
BZX 85/C 62	58...66	+6...+9,5	< 125	4	< 2000	0,25	< 0,5	43
BZX 85/C 68	64...72	+6...+9,5	< 130	4	< 2000	0,25	< 0,5	48
BZX 85/C 75	70...80	+6...+9,5	< 135	4	< 2000	0,25	< 0,5	53

Remarks: [1]) please request for tight tolerances

Regulator diodes

Type	Fig. Nr.	**Maximum ratings**	**Characteristics**		
		P_V at t_{amb} = +45°C	U_F and	r_f at	I_F
		W	V	Ω	mA
BZY 87/0V7	1	0,2	0,65-0,75	≤ 8	5
BZY 87/1V4	1	0,2	1,3-1,5	≤ 20	5
BZY 87/2V1	1	0,2	1,9-2,3	≤ 30	5
BZY 87/2V8	1	0,2	2,6-3,0	≤ 40	5
BZY 87/3V4	1	0,2	3,2-3,7	≤ 50	5

Data book reference: B 2 B; Complementary transistors see page 19

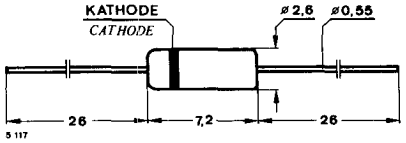


Fig. 1: 51 A 2 DIN 41880
JEDEC DO 7

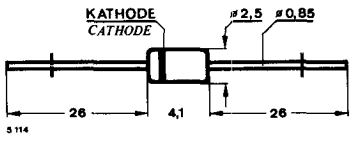


Fig. 14: 51 A 2 DIN 41880
JEDEC DO 41

AF transistors

Type	Group	Structure	Fig. Nr.	Maximum ratings			Characteristics						
				P_{tot} at t_{amb} = +45 °C W	I_C mA	U_{CEO} V	f_T at I_C MHz	mA	h_{FE} at	I_C and U_{CE} mA	V	F at f dB	kHz
BC 107	A	NPN	1	0,26	100	45	300	10	110–220	2	5	≤ 10	1 [2])
	B	NPN	1	0,26	100	45	300	10	200–450	2	5	≤ 10	1 [2])
BC 108	A	NPN	1	0,26	100	20	300	10	110–220	2	5	≤ 10	1 [2])
	B	NPN	1	0,26	100	20	300	10	200–450	2	5	≤ 10	1 [2])
	C	NPN	1	0,26	100	20	300	10	420–800	2	5	≤ 10	1 [2])
BC 109	B	NPN	1	0,26	100	20	300	10	200–450	2	5	≤ 4	0,03–15
	C	NPN	1	0,26	100	20	300	10	420–800	2	5	≤ 4	0,03–15
BC 140	6	NPN	2	0,65	1000	40	≥ 50	50	40– 95	100	1	–	–
	10	NPN	2	0,65	1000	40	≥ 50	50	67–150	100	1	–	–
	16	NPN	2	0,65	1000	40	≥ 50	50	106–236	100	1	–	–
BC 141	6	NPN	2	0,65	1000	60	≥ 50	50	40– 95	100	1	–	–
	10	NPN	2	0,65	1000	60	≥ 50	50	67–150	100	1	–	–
	16	NPN	2	0,65	1000	60	≥ 50	50	106–236	100	1	–	–
BC 160	6	PNP	2	0,65	1000	40	≥ 50	50	40– 95	100	1	–	–
	10	PNP	2	0,65	1000	40	≥ 50	50	67–150	100	1	–	–
	16	PNP	2	0,65	1000	40	≥ 50	50	106–236	100	1	–	–
BC 161	6	PNP	2	0,65	1000	60	≥ 50	50	40– 95	100	1	–	–
	10	PNP	2	0,65	1000	60	≥ 50	50	67–150	100	1	–	–
	16	PNP	2	0,65	1000	60	≥ 50	50	106–236	100	1	–	–
BC 177	VI	PNP	1	0,26	100	45	130	10	70–130	2	5	≤ 10	1 [2])
	A	PNP	1	0,26	100	45	130	10	110–220	2	5	≤ 10	1 [2])
	B	PNP	1	0,26	100	45	130	10	200–450	2	5	≤ 10	1 [2])
BC 178	VI	PNP	1	0,26	100	25	130	10	70–130	2	5	≤ 10	1 [2])
	A	PNP	1	0,26	100	25	130	10	110–220	2	5	≤ 10	1 [2])
	B	PNP	1	0,26	100	25	130	10	200–450	2	5	≤ 10	1 [2])
	C	PNP	1	0,26	100	25	130	10	420–800	2	5	≤ 10	1 [2])
BC 179	A	PNP	1	0,26	100	20	130	10	110–220	2	5	≤ 4	0,03–15
	B	PNP	1	0,26	100	20	130	10	200–450	2	5	≤ 4	0,03–15
	C	PNP	1	0,26	100	20	130	10	420–800	2	5	≤ 4	0,03–15
BC 182	A	NPN	3	0,3	200	50	≥ 150	10	125–260 [1])	2	5	≤ 10	1 [3])
	B	NPN	3	0,3	200	50	≥ 150	10	240–500 [1])	2	5	≤ 10	1 [3])
BC 212	A	PNP	3	0,3	200	50	≥ 200	10	100–300 [1])	2	5	≤ 10	1 [3])
	B	PNP	3	0,3	200	50	≥ 200	10	200–400 [1])	2	5	≤ 10	1 [3])
BC 237	A	NPN	3	0,3	100	45	300	10	110–220	2	5	≤ 10	1 [2])
	B	NPN	3	0,3	100	45	300	10	200–450	2	5	≤ 10	1 [2])
BC 238	A	NPN	3	0,3	100	20	300	10	110–220	2	5	≤ 10	1 [2])
	B	NPN	3	0,3	100	20	300	10	200–450	2	5	≤ 10	1 [2])
	C	NPN	3	0,3	100	20	300	10	420–800	2	5	≤ 10	1 [2])
BC 239	B	NPN	3	0,3	100	20	300	10	200–450	2	5	≤ 4	0,03–15
	C	NPN	3	0,3	100	20	300	10	420–800	2	5	≤ 4	0,03–15
BC 307	VI	PNP	3	0,3	100	45	130	10	70–130	2	5	≤ 10	1 [2])
	A	PNP	3	0,3	100	45	130	10	110–220	2	5	≤ 10	1 [2])
	B	PNP	3	0,3	100	45	130	10	200–450	2	5	≤ 10	1 [2])
BC 308	VI	PNP	3	0,3	100	25	130	10	70–130	2	5	≤ 10	1 [2])
	A	PNP	3	0,3	100	25	130	10	110–220	2	5	≤ 10	1 [2])
	B	PNP	3	0,3	100	25	130	10	200–450	2	5	≤ 10	1 [2])
	C	PNP	3	0,3	100	25	130	10	420–800	2	5	≤ 10	1 [2])
BC 309	A	PNP	3	0,3	100	20	130	10	110–220	2	5	≤ 4	0,03–15
	B	PNP	3	0,3	100	20	130	10	200–450	2	5	≤ 4	0,03–15
	C	PNP	3	0,3	100	20	130	10	420–800	2	5	≤ 4	0,03–15

Remarks: [1]) h_{fe}; [2]) Δf = 200 Hz; [3]) Δf = 1 Hz

Data book reference: B 2 D; Complementary transistors see page 19

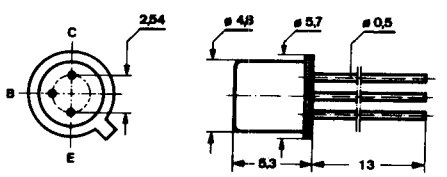


Fig. 1: 18 A 3 DIN 41876
JEDEC TO 18

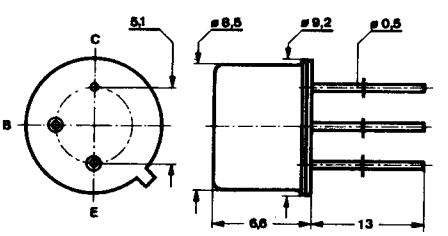


Fig. 2: 5 C 3 DIN 41873
JEDEC TO 39

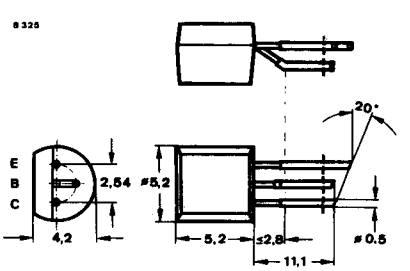


Fig. 3: 10 A 3 DIN 41868
JEDEC TO 92 Z

AF transistors

(Continued)

Type	Group	Structure	Fig. Nr.	Maximum ratings			Characteristics						
				P_{tot} at t_{amb} = +45 °C W	I_C mA	U_{CEO} V	f_T at MHz	I_C mA	h_{FE} at	I_C and mA	U_{CE} V	F at dB	f kHz
BC 327	10	PNP	3	0.625[4])	800	45	100	10	67–150	100	1	–	–
	16	PNP	3	0.625[4])	800	45	100	10	106–236	100	1	–	–
	25	PNP	3	0.625[4])	800	45	100	10	170–375	100	1	–	–
	40	PNP	3	0.625[4])	800	45	100	10	265–600	100	1	–	–
BC 328	10	PNP	3	0.625[4])	800	25	100	10	67–150	100	1	–	–
	16	PNP	3	0.625[4])	800	25	100	10	106–236	100	1	–	–
	25	PNP	3	0.625[4])	800	25	100	10	170–375	100	1	–	–
	40	PNP	3	0.625[4])	800	25	100	10	265–600	100	1	–	–
BC 337	10	NPN	3	0.625[4])	800	45	100	10	67–150	100	1	–	–
	16	NPN	3	0.625[4])	800	45	100	10	106–236	100	1	–	–
	25	NPN	3	0.625[4])	800	45	100	10	170–375	100	1	–	–
	40	NPN	3	0.625[4])	800	45	100	10	265–600	100	1	–	–
BC 338	10	NPN	3	0.625[4])	800	25	100	10	67–150	100	1	–	–
	16	NPN	3	0.625[4])	800	25	100	10	106–236	100	1	–	–
	25	NPN	3	0.625[4])	800	25	100	10	170–375	100	1	–	–
	40	NPN	3	0.625[4])	800	25	100	10	265–600	100	1	–	–
BC 368		NPN	4	0.8[6])	1000	20	65	10	85–375	500	1	–	–
BC 369		PNP	4	0.8[6])	1000	20	65	10	85–375	500	1	–	–
BC 413	B	NPN	3	0.25	100[5])	30	250	10	180–460	2	5	≤ 3	0.03–15
	C	NPN	3	0.25	100[5])	30	250	10	380–800	2	5	≤ 3	0.03–15
BC 414	B	NPN	3	0.25	100[5])	45	250	10	180–460	2	5	≤ 3	0.03–15
	C	NPN	3	0.25	100[5])	45	250	10	380–800	2	5	≤ 3	0.03–15
BC 415	A	PNP	3	0.25	100[5])	35	200	10	120–220	2	5	≤ 2	0.03–15
	B	PNP	3	0.25	100[5])	35	200	10	180–460	2	5	≤ 2	0.03–15
	C	PNP	3	0.25	100[5])	35	200	10	380–800	2	5	≤ 3	0.03–15
BC 416	A	PNP	3	0.25	100[5])	45	200	10	120–220	2	5	≤ 2	0.03–15
	B	PNP	3	0.25	100[5])	45	200	10	180–460	2	5	≤ 2	0.03–15
	C	PNP	3	0.25	100[5])	45	200	10	380–800	2	5	≤ 2	0.03–15
BC 431	10	NPN	3	0.625[4])	500	60	100	10	67–150	100	1	–	–
	16	NPN	3	0.625[4])	500	60	100	10	106–236	100	1	–	–
BC 432	10	PNP	3	0.625[4])	500	60	100	10	67–150	100	1	–	–
	16	PNP	3	0.625[4])	500	60	100	10	106–236	100	1	–	–
BC 546	A	NPN	3	0.5[6])	100	65	300	10	110–220	2	5	≤ 10	1[2])
	B	NPN	3	0.5[6])	100	65	300	10	200–450	2	5	≤ 10	1[2])
BC 547	A	NPN	3	0.5[6])	100	45	300	10	110–220	2	5	≤ 10	1[2])
	B	NPN	3	0.5[6])	100	45	300	10	200–450	2	5	≤ 10	1[2])
BC 548	A	NPN	3	0.5[6])	100	30	300	10	110–220	2	5	≤ 10	1[2])
	B	NPN	3	0.5[6])	100	30	300	10	200–450	2	5	≤ 10	1[2])
	C	NPN	3	0.5[6])	100	30	300	10	420–800	2	5	≤ 10	1[2])
BC 549	B	NPN	3	0.5[6])	100	30	300	10	200–450	2	5	≤ 4	0.03–15
	C	NPN	3	0.5[6])	100	30	300	10	420–800	2	5	≤ 4	0.03–15
BC 550	B	NPN	3	0.5[6])	100	45	300	10	200–450	2	5	≤ 3	0.03–15
	C	NPN	3	0.5[6])	100	45	300	10	420–800	2	5	≤ 3	0.03–15
BC 556	VI	PNP	3	0.5[6])	100	65	150	10	70–130	2	5	≤ 10	1[2])
	A	PNP	3	0.5[6])	100	65	150	10	110–220	2	5	≤ 10	1[2])
BC 557	VI	PNP	3	0.5[6])	100	45	150	10	70–130	2	5	≤ 10	1[2])
	A	PNP	3	0.5[6])	100	45	150	10	110–220	2	5	≤ 10	1[2])
	B	PNP	3	0.5[6])	100	45	150	10	200–450	2	5	≤ 10	1[2])
BC 558	VI	PNP	3	0.5[6])	100	30	150	10	70–130	2	5	≤ 10	1[2])
	A	PNP	3	0.5[6])	100	30	150	10	110–220	2	5	≤ 10	1[2])
	B	PNP	3	0.5[6])	100	30	150	10	200–450	2	5	≤ 10	1[2])
	C	PNP	3	0.5[6])	100	30	150	10	420–800	2	5	≤ 10	1[2])
BC 559	A	PNP	3	0.5[6])	100	30	150	10	110–220	2	5	≤ 4	0.03–15
	B	PNP	3	0.5[6])	100	30	150	10	200–450	2	5	≤ 4	0.03–15
	C	PNP	3	0.5[6])	100	30	150	10	420–800	2	5	≤ 4	0.03–15
BC 560	A	PNP	3	0.5[6])	100	45	150	10	110–220	2	5	≤ 2	0.03–15
	B	PNP	3	0.5[6])	100	45	150	10	200–450	2	5	≤ 2	0.03–15
	C	PNP	3	0.5[6])	100	45	150	10	420–800	2	5	≤ 2	0.03–15

Remarks: [2]) Δf = 200 Hz; [4]) $t_{case} \leq 45$ °C; [5]) I_{CM}; [6]) $t_{amb} \leq 25$ °C

Data book reference: B 2 D ; Complementary transistors see page 19

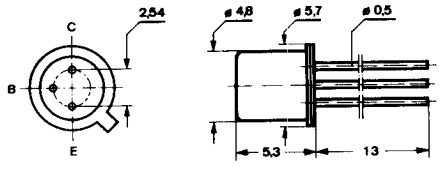


Fig. 1: 18 A 3 DIN 41 876
JEDEC TO 18

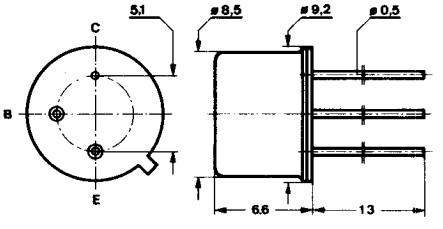


Fig. 2: 5 C 3 DIN 41 873
JEDEC TO 39

AF transistors

(Continued)

Type	Group	Structure	Fig. Nr.	Maximum ratings			Characteristics						
				P_{tot} at $t_{amb} = +45\,°C$ W	I_C mA	U_{CEO} V	f_T at MHz	I_C mA	h_{FE} at	I_C and mA	U_{CE} V	F at dB	f kHz
BC 635		NPN	4	1,0[6])	1000	45	50	50	40–250	150	2	–	–
BC 636		PNP	4	1,0[6])	1000	45	50	50	40–250	150	2	–	–
BC 637		NPN	4	1,0[6])	1000	60	50	50	40–160	150	2	–	–
BC 638		PNP	4	1,0[6])	1000	60	50	50	40–160	150	2	–	–
BC 639		NPN	4	1,0[6])	1000	80	50	50	40–160	150	2	–	–
BC 640		PNP	4	1,0[6])	1000	80	50	50	40–160	150	2	–	–
BCW 60	A	NPN	5	0,15	200	32	250	10	120–220	2	5	≤ 6	1[2])
	B	NPN	5	0,15	200	32	250	10	180–310	2	5	≤ 6	1[2])
	C	NPN	5	0,15	200	32	250	10	250–460	2	5	≤ 6	1[2])
	D	NPN	5	0,15	200	32	250	10	380–630	2	5	≤ 6	1[2])
BCW 61	A	PNP	5	0,15	200	32	150	1	120–220	2	5	≤ 6	1[2])
	B	PNP	5	0,15	200	32	150	1	180–310	2	5	≤ 6	1[2])
	C	PNP	5	0,15	200	32	150	1	250–460	2	5	≤ 6	1[2])
	D	PNP	5	0,15	200	32	150	1	380–630	2	5	≤ 6	1[2])
BCX 70	G	NPN	5	0,15	200	45	250	10	120–220	2	5	≤ 6	1[2])
	H	NPN	5	0,15	200	45	250	10	180–310	2	5	≤ 6	1[2])
	J	NPN	5	0,15	200	45	250	10	250–460	2	5	≤ 6	1[2])
	K	NPN	5	0,15	200	45	250	10	380–630	2	5	≤ 6	1[2])
BCX 71	G	PNP	5	0,15	200	45	150	1	120–220	2	5	≤ 6	1[2])
	H	PNP	5	0,15	200	45	150	1	180–310	2	5	≤ 6	1[2])
	J	PNP	5	0,15	200	45	150	1	250–460	2	5	≤ 6	1[2])
	K	PNP	5	0,15	200	45	150	1	380–630	2	5	≤ 6	1[2])
BCY 58	VII	NPN	1	0,35	200	32	250	10	120–220	2	5	≤ 6	1[2])
	VIII	NPN	1	0,35	200	32	250	10	180–310	2	5	≤ 6	1[2])
	IX	NPN	1	0,35	200	32	250	10	250–460	2	5	≤ 6	1[2])
	X	NPN	1	0,35	200	32	250	10	380–630	2	5	≤ 6	1[2])
BCY 59 ○	VII	NPN	1	0,35	200	45	250	10	120–220	2	5	≤ 6	1[2])
	VIII	NPN	1	0,35	200	45	250	10	180–310	2	5	≤ 6	1[2])
	IX	NPN	1	0,35	200	45	250	10	250–460	2	5	≤ 6	1[2])
	X	NPN	1	0,35	200	45	250	10	380–630	2	5	≤ 6	1[2])
BCY 72		PNP	1	0,31	200[5])	25	≥ 200	10	≥ 50	10	1	≤ 6	0,01–10
BCY 77	VII	PNP	1	1	100	60	200	10	120–220	2	5	≤ 6	1[2])
	VIII	PNP	1	1	100	60	200	10	180–310	2	5	≤ 6	1[2])
	IX	PNP	1	1	100	60	200	10	250–460	2	5	≤ 6	1[2])
BCY 78	VII	PNP	1	0,31	200	32	200	10	120–220	2	5	≤ 6	1[2])
	VIII	PNP	1	0,31	200	32	200	10	180–310	2	5	≤ 6	1[2])
	IX	PNP	1	0,31	200	32	200	10	250–460	2	5	≤ 6	1[2])
BCY 79 ○	VII	PNP	1	0,31	200	45	200	10	120–220	2	5	≤ 6	1[2])
	VIII	PNP	1	0,31	200	45	200	10	180–310	2	5	≤ 6	1[2])
	IX	PNP	1	0,31	200	45	200	10	250–460	2	5	≤ 6	1[2])
BFX 65		PNP	1	0,32	50	45	–	–	170	0,01	5	≤ 3	1[2])
BSX 45	6	NPN	2	5[4])	1000	40	> 50	50	40–100	100	1	3,5	1[2])
	10	NPN	2	5[4])	1000	40	> 50	50	63–160	100	1	3,5	1[2])
	16	NPN	2	5[4])	1000	40	> 50	50	100–250	100	1	3,5	1[2])
BSX 46	6	NPN	2	5[4])	1000	60	> 50	50	40–100	100	1	3,5	1[2])
	10	NPN	2	5[4])	1000	60	> 50	50	63–160	100	1	3,5	1[2])
	16	NPN	2	5[4])	1000	60	> 50	50	100–250	100	1	3,5	1[2])
2N 929		NPN	1	0,3[6])	30	45	≥ 30	0,5	40–120	0,01	5	≤ 4	0,03–15
2N 930		NPN	1	0,3[6])	30	45	≥ 30	0,5	100–300	0,01	5	≤ 3	0,03–15
2N 1711		NPN	2	0,7	800	50[7])	≥ 70	50	70–300	5	10	≤ 8	1
2N 1893		NPN	2	0,7	–	100[7])	≥ 50	50	40–120	150	10	–	–
2N 5447		PNP	3	0,25	200	25	≥ 100	50	60–300	50	5	–	–
2N 5448		PNP	3	0,25	200	30	≥ 100	50	30–150	50	5	–	–
2N 5449		NPN	3	0,3	800	30	≥ 100	50	100–300	100	2	–	–
2N 5450		NPN	3	0,3	800	30	≥ 100	50	50–150	100	2	–	–

Remarks: [2]) $\Delta f = 200$ Hz; [4]) $t_{case} \leq 45\,°C$; [5]) I_{CM}; [6]) $t_{amb} \leq 25\,°C$; [7]) U_{CER}, $R_{BE} \leq 10\,\Omega$

Data book reference: B 2 D ; Complementary transistors see page 19 ○ Can be delivered as "Qualified semiconductor device"

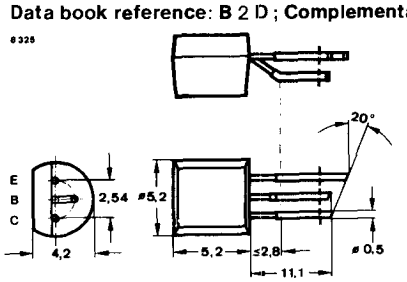


Fig. 3: 10 A 3 DIN 41 868
JEDEC TO 92 Z

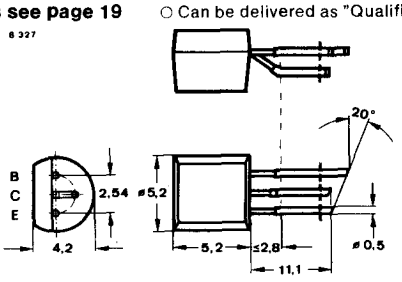


Fig. 4: 10 A 3 DIN 41 868
JEDEC TO 92 Z

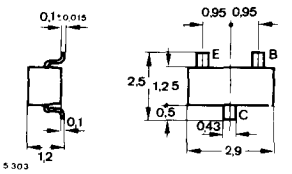


Fig. 5: 23 A 3 DIN 41 869
(SOT 23)

AF-Power transistors

Type	Structure	Fig. Nr.	Maximum ratings			Characteristics							
			P_{tot} at t_{case} = +25 °C W	I_C A	U_{CEO} V	f_T at MHz	I_C mA	h_{FE} at	I_C and A	U_{CE} V	U_{CEsat} at V	I_C and A	h_{FE}
BD 127	NPN	6	17,5[1])	0,5	250	–	–	50	1	15	–	–	–
BD 128	NPN	6	17,5[1])	0,5	300	–	–	50	1	15	–	–	–
BD 129	NPN	6	17,5[1])	0,5	350	–	–	50	1	15	–	–	–
BD 135	NPN	6	8[2])	1	45	≥ 50	50	40–250	0,15	2	≤ 0,5	0,5	10
BD 136	PNP	6	8[2])	1	45	≥ 50	50	40–250	0,15	2	≤ 0,5	0,5	10
BD 137	NPN	6	8[2])	1	60	≥ 50	50	40–160	0,15	2	≤ 0,5	0,5	10
BD 138	PNP	6	8[2])	1	60	≥ 50	50	40–160	0,15	2	≤ 0,5	0,5	10
BD 139	NPN	6	8[2])	1	80	≥ 50	50	40–160	0,15	2	≤ 0,5	0,5	10
BD 140	PNP	6	8[2])	1	80	≥ 50	50	40–160	0,15	2	≤ 0,5	0,5	10
BD 165	NPN	6	20	1,5	45	≥ 3	500	≥ 15	0,5	2	≤ 0,5	0,5	10
BD 166	PNP	6	20	1,5	45	≥ 3	500	≥ 15	0,5	2	≤ 0,5	0,5	10
BD 167	NPN	6	20	1,5	60	≥ 3	500	≥ 15	0,5	2	≤ 0,5	0,5	10
BD 168	PNP	6	20	1,5	60	≥ 3	500	≥ 15	0,5	2	≤ 0,5	0,5	10
BD 169	NPN	6	20	1,5	80	≥ 3	500	≥ 15	0,5	2	≤ 0,5	0,5	10
BD 170	PNP	6	20	1,5	80	≥ 3	500	≥ 15	0,5	2	≤ 0,5	0,5	10
BD 175	NPN	6	30	3	45	≥ 3	250	≥ 15	1	2	≤ 0,8	1	10
BD 176	PNP	6	30	3	45	≥ 3	250	≥ 15	1	2	≤ 0,8	1	10
BD 177	NPN	6	30	3	60	≥ 3	250	≥ 15	1	2	≤ 0,8	1	10
BD 178	PNP	6	30	3	60	≥ 3	250	≥ 15	1	2	≤ 0,8	1	10
BD 179	NPN	6	30	3	80	≥ 3	250	≥ 15	1	2	≤ 0,8	1	10
BD 180	PNP	6	30	3	80	≥ 3	250	≥ 15	1	2	≤ 0,8	1	10
BD 185	NPN	6	40	4	30	≥ 2	1000	≥ 15	2	2	≤ 1	2	10
BD 186	PNP	6	40	4	30	≥ 2	1000	≥ 15	2	2	≤ 1	2	10
BD 187	NPN	6	40	4	45	≥ 2	1000	≥ 15	2	2	≤ 1	2	10
BD 188	PNP	6	40	4	45	≥ 2	1000	≥ 15	2	2	≤ 1	2	10
BD 189	NPN	6	40	4	60	≥ 2	1000	≥ 15	2	2	≤ 1	2	10
BD 190	PNP	6	40	4	60	≥ 2	1000	≥ 15	2	2	≤ 1	2	10
BD 201	NPN	7	60	8	45	≥ 3	300	≥ 30	3	2	≤ 1	3	10
BD 202	PNP	7	60	8	45	≥ 3	300	≥ 30	3	2	≤ 1	3	10
BD 203	NPN	7	60	8	60	≥ 3	300	≥ 30	2	2	≤ 1	3	10
BD 204	PNP	7	60	8	60	≥ 3	300	≥ 30	2	2	≤ 1	3	10
BD 233	NPN	6	25	2	45	≥ 3	250	≥ 25	1	2	≤ 0,6	1	10
BD 234	PNP	6	25	2	45	≥ 3	250	≥ 25	1	2	≤ 0,6	1	10
BD 235	NPN	6	25	2	60	≥ 3	250	≥ 25	1	2	≤ 0,6	1	10
BD 236	PNP	6	25	2	60	≥ 3	250	≥ 25	1	2	≤ 0,6	1	10
BD 237	NPN	6	25	2	80	≥ 3	250	≥ 25	1	2	≤ 0,6	1	10
BD 238	PNP	6	25	2	80	≥ 3	250	≥ 25	1	2	≤ 0,6	1	10
BD 433	NPN	6	36	4	22	≥ 3	250	≥ 50	2	1	≤ 0,5	2	10
BD 434	PNP	6	36	4	22	≥ 3	250	≥ 50	2	1	≤ 0,5	2	10
BD 435	NPN	6	36	4	32	≥ 3	250	≥ 50	2	1	≤ 0,5	2	10
BD 436	PNP	6	36	4	32	≥ 3	250	≥ 50	2	1	≤ 0,5	2	10
BD 437	NPN	6	36	4	45	≥ 3	250	≥ 40	2	1	≤ 0,6	2	10
BD 438	PNP	6	36	4	45	≥ 3	250	≥ 40	2	1	≤ 0,6	2	10
BD 439	NPN	6	36	4	60	≥ 3	250	≥ 40	2	1	≤ 0,8	2	10
BD 440	PNP	6	36	4	60	≥ 3	250	≥ 40	2	1	≤ 0,8	2	10
BD 441	NPN	6	36	4	80	≥ 3	250	≥ 40	2	1	≤ 0,8	2	10
BD 442	PNP	6	36	4	80	≥ 3	250	≥ 40	2	1	≤ 0,8	2	10

Remarks: [1]) $t_{case} \leq 45$ °C; [2]) $t_{case} \leq 70$ °C

AF-Power darlington transistors

Type	Structure	Fig. Nr.	Maximum ratings			Characteristics							
			P_{tot} at t_{case} = +25 °C W	I_C A	U_{CEO} V	f_T at MHz	I_C mA	h_{FE} at	I_C and A	U_{CE} V	U_{CEsat} at V	I_C and A	h_{FE}
BD 643	NPN	7	62,5	8	45	7	3000	≥ 750	4	3	≤ 2	4	250
BD 644	PNP	7	62,5	8	45	7	3000	≥ 750	4	3	≤ 2	4	250
BD 645	NPN	7	62,5	8	60	7	3000	≥ 750	3	3	≤ 2	3	250
BD 646	PNP	7	62,5	8	60	7	3000	≥ 750	3	3	≤ 2	3	250
BD 647	NPN	7	62,5	8	80	7	3000	≥ 750	3	3	≤ 2	3	250
BD 648	PNP	7	62,5	8	80	7	3000	≥ 750	3	3	≤ 2	3	250
BD 649	NPN	7	62,5	8	100	7	3000	≥ 750	3	3	≤ 2	3	250
BD 650	PNP	7	62,5	8	100	7	3000	≥ 750	3	3	≤ 2	3	250
BD 675	NPN	6	40	4	45	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 676	PNP	6	40	4	45	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 677	NPN	6	40	4	60	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 678	PNP	6	40	4	60	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 679	NPN	6	40	4	80	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 680	PNP	6	40	4	80	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 681	NPN	6	40	4	100	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50
BD 682	PNP	6	40	4	100	≥ 1	1500	≥ 750	1,5	3	≤ 2,5	1,5	50

Power transistors for horizontal deflection output circuits

Type	Structure	Fig. Nr.	Maximum ratings			Characteristics					Notes
			P_{tot} at $t_{case} = +90\,°C$ W	I_{CAV} A	U_{CESM} V	f_T at MHz	I_C mA	U_{CEsat} at V	I_C and A	h_{FE}	
BU 204	NPN	8	10,0	2,5	1300	7,5	100	≤ 5	2,0	2,0	For black and white TV receivers
BU 205	NPN	8	10,0	2,5	1500	7,5	100	≤ 5	2,0	2,0	
BU 206	NPN	8	10,0	2,5	1700	7,5	100	≤ 5	2,0	1,8	
BU 207	NPN	8	12,5	5,0	1300	7,0	100	≤ 5	4,5	2,3	For colour TV receivers
BU 208	NPN	8	12,5	5,0	1500	7,0	100	≤ 5	4,5	2,3	
BU 209	NPN	8	12,5	5,0	1700	7,0	100	≤ 5	3,0	2,3	
BU 226	NPN	8	32 [1])	1,5	2000	–	–	≤ 10	1,5	1,5	For black and white TV receivers
BU 208 A	NPN	8	12,5	5,0	1500	7,0	100	≦1	4,5	2,3	For colour TV receivers
BU 208 D [2])	NPN	8	12,5	5,0	1500	7,0	100	–	–	–	

Remarks: [1]) $t_{case} \geqq 25\,°C$, [2]) with integrated invers diode

Data book reference: B 2 C

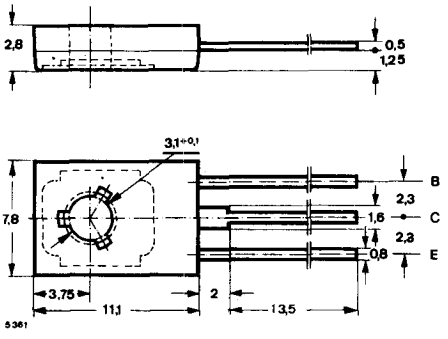


Fig. 6: 12 A 3 DIN 41869
JEDEC TO 125 (SOT 32)

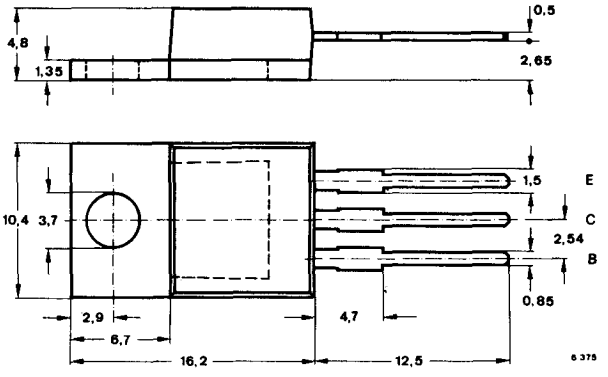


Fig. 7: 14 A 3 DIN 41869
JEDEC TO 220

Unijunction transistor

Type	Group	Fig. Nr.	Maximum ratings			Characteristics							
			P_{tot} at $t_{amb} = +45\,°C$ W	U_{B2B1} V	$-U_{EB2}$ V	r_{BB} at kΩ	U_{B2B1} V	$-I_{EB20}$ at nA	U_{EB1} V	I_P at µA	U_{B2B1} V	η_i	I_V mA
BSV 57	B	15	0,24	35	35	4,7–9,1	3	≤20	-35	≤ 6	25	0,68–0,82	≥ 4

Data book reference: B 2 D

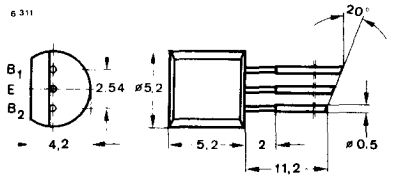


Fig. 15: 10 B 3 DIN 41868
JEDEC TO 92

Complementary transistors

BC 107 with BC 177	**BC 546 with BC 556**	**BD 139 and BD 140** [1])	**BD 439 and BD 440** [1])
BC 108 with BC 178	**BC 547 with BC 557**	**BD 175 and BD 176** [1])	**BD 441 and BD 442** [1])
BC 109 with BC 179	**BC 548 with BC 558**	**BD 177 and BD 178** [1])	**BD 643 with BD 644**
BC 140 and BC 160 [1])	**BC 635 and BC 636** [1])	**BD 179 and BD 180** [1])	**BD 645 with BD 646**
BC 141 and BC 161 [1])	**BC 637 and BC 638** [1])	**BD 201 with BD 202**	**BD 647 with BD 648**
BC 237 with BC 307	**BC 639 and BC 640** [1])	**BD 203 with BD 204**	**BD 649 with BD 650**
BC 238 with BC 308	**BCW 60 with BCW 61**	**BD 233 and BD 234** [1])	**BD 675 with BD 676**
BC 239 with BC 309	**BCX 70 with BCX 71**	**BD 235 and BD 236** [1])	**BD 677 with BD 678**
BC 327 and BC 337 [1])	**BCY 58 with BCY 78**	**BD 237 and BD 238** [1])	**BD 679 with BD 680**
BC 328 with BC 338 [1])	**BCY 59 with BCY 79**	**BD 433 and BD 434** [1])	**BD 681 with BD 682**
BC 368 and BC 369 [1])	**BD 135 and BD 136** [1])	**BD 435 and BD 436** [1])	
BC 431 and BC 432 [1])	**BD 137 and BD 138** [1])	**BD 437 and BD 438** [1])	

Remarks: [1]) matched pairs available. Pair conditions see page 7

Switching transistors

Type	Group	Structure	Fig. Nr.	Maximum ratings			Characteristics								
				P_{tot} at t_{amb} = +45 °C W	I_C A	U_{CEO} V	U_{CEsat} at I_C V	A	h_{FE} at	I_C and U_{CE} mA	V	t_{on} ns	t_{off} at I_C and I_{B1}; I_{B2} ns	mA	mA mA
BC 140	6	NPN	2	0,65	1	40	0,6	1	40- 95	100	1	≤ 250	≤ 850	100	5; 5
	10	NPN	2	0,65	1	40	0,6	1	67-150	100	1	≤ 250	≤ 850	100	5; 5
	16	NPN	2	0,65	1	40	0,6	1	106-236	100	1	≤ 250	≤ 850	100	5; 5
BC 141	6	NPN	2	0,65	1	60	0,6	1	40- 95	100	1	≤ 250	≤ 850	100	5; 5
	10	NPN	2	0,65	1	60	0,6	1	67-150	100	1	≤ 250	≤ 850	100	5; 5
	16	NPN	2	0,65	1	60	0,6	1	106-236	100	1	≤ 250	≤ 850	100	5; 5
BCY 58	VII	NPN	1	0,35	0,2	32	≤ 0,35	0,01	120-220	2	5	≤ 150	≤ 800	10	1; 1
	VIII	NPN	1	0,35	0,2	32	≤ 0,35	0,01	180-310	2	5	≤ 150	≤ 800	10	1; 1
	IX	NPN	1	0,35	0,2	32	≤ 0,35	0,01	250-460	2	5	≤ 150	≤ 800	10	1; 1
	X	NPN	1	0,35	0,2	32	≤ 0,35	0,01	380-630	2	5	≤ 150	≤ 800	10	1; 1
BCY 59 ○	VII	NPN	1	0,35	0,2	45	≤ 0,35	0,01	120-220	2	5	≤ 150	≤ 800	10	1; 1
	VIII	NPN	1	0,35	0,2	45	≤ 0,35	0,01	180-310	2	5	≤ 150	< 800	10	1; 1
	IX	NPN	1	0,35	0,2	45	≤ 0,35	0,01	250-460	2	5	≤ 150	≤ 800	10	1; 1
	X	NPN	1	0,35	0,2	45	≤ 0,35	0,01	380-630	2	5	≤ 150	≤ 800	10	1; 1
BCY 72		PNP	1	0,35	0,2[5])	25	≤ 0,5	0,05	≥ 50	10	1	≤ 65	≤ 420	10	1; 1
BCY 77	VII	PNP	1	0,35	100	60	≤ 0,25	0,01	120-220	2	5	≤ 150	≤ 800	10	1; 1
	VIII	PNP	1	0,35	100	60	≤ 0,25	0,01	180-310	2	5	≤ 150	≤ 800	10	1; 1
	IX	PNP	1	0,35	100	60	≤ 0,25	0,01	250-460	2	5	≤ 150	≤ 800	10	1; 1
BCY 78	VII	PNP	1	0,35	0,2	32	≤ 0,25	0,01	120-220	2	5	≤ 150	≤ 800	10	1; 1
	VIII	PNP	1	0,35	0,2	32	≤ 0,25	0,01	180-310	2	5	≤ 150	≤ 800	10	1; 1
	IX	PNP	1	0,35	0,2	32	≤ 0,25	0,01	250-460	2	5	≤ 150	≤ 800	10	1; 1
BCY 79 ○	VII	PNP	1	0,35	0,2	45	≤ 0,25	0,01	120-220	2	5	≤ 150	≤ 800	10	1; 1
	VIII	PNP	1	0,35	0,2	45	≤ 0,25	0,01	180-310	2	5	≤ 150	≤ 800	10	1; 1
	IX	PNP	1	0,35	0,2	45	≤ 0,25	0,01	250-460	2	5	≤ 150	≤ 800	10	1; 1
BFX 34 ○		NPN	2	0,77	5	60	≤ 1	5	40-150	2000	2	≤ 600	≤ 1200	5000	500; 500
BFY 56 A		NPN	2	0,71	1	55	≤ 0,25	0,15	40-150	150	1	≤ 225	≤ 800	150	7.5; 7.5
BSS 44		PNP	2	0,77	5	60	≤ 1	5	≥ 40	2000	2	80	450	500	50; 50
BSS 45 ○		NPN	2	0,77	5	80	≤ 1,4	5	≥ 30	2000	2	≤ 300	≤ 1000	≤ 1000	50; 50
BSS 46 ○		PNP	2	0,77	5	80	≤ 1,4	5	≥ 30	2000	2	≤ 300	≤ 1000	≤ 1000	50; 50
BSV 15	6	PNP	2	3,2[4])	1	40	≤ 1	0,5	40-100	100	1	≤ 500	≤ 650	100	5; 5
	10	PNP	2	3,2[4])	1	40	≤ 1	0,5	63-160	100	1	≤ 500	≤ 650	100	5; 5
	16	PNP	2	3,2[4])	1	40	≤ 1	0,5	100-250	100	1	≤ 500	≤ 650	100	5; 5
BSV 16	6	PNP	2	3,2[4])	1	60	≤ 1	0,5	40-100	100	1	≤ 500	≤ 650	100	5; 5
	10	PNP	2	3,2[4])	1	60	≤ 1	0,5	63-160	100	1	≤ 500	≤ 650	100	5; 5
	16	PNP	2	3,2[4])	1	60	≤ 1	0,5	100-250	100	1	≤ 500	≤ 650	100	5; 5
BSV 60		NPN	2	6,2[4])	3	40	≤ 0,9	2	50-150	2000	2	≤ 500	≤ 1000	1000	50; 50
BSW 39	6	NPN	2	0,70	1	80	≤ 0,75	1	40-100	100	1	50	300	500	50; 50
	10	NPN	2	0,70	1	80	≤ 0,75	1	63-160	100	1	50	300	500	50; 50
	16	NPN	2	0,70	1	80	≤ 0,75	1	100-250	100	1	50	300	500	50; 50
BSW 40	6	PNP	2	0,70	1	80	≤ 0,75	1	40-100	100	1	50	300	500	50; 50
	10	PNP	2	0,70	1	80	≤ 0,75	1	63-160	100	1	50	300	500	50; 50
	16	PNP	2	0,70	1	80	≤ 0,75	1	100-250	100	1	50	300	500	50; 50
	25	PNP	2	0,70	1	80	≤ 0,75	1	160-400	100	1	50	300	500	50; 50
BSX 45	6	NPN	2	4,4[4])	1	40	≤ 1	1	40-100	100	1	≤ 200	≤ 850	100	5; 5
	10	NPN	2	4,4[4])	1	40	≤ 1	1	63-160	100	1	≤ 200	≤ 850	100	5; 5
	16	NPN	2	4,4[4])	1	40	≤ 1	1	100-250	100	1	≤ 200	≤ 850	100	5; 5
BSX 46	6	NPN	2	4,4[4])	1	60	≤ 1	1	40-100	100	1	≤ 200	≤ 850	100	5; 5
	10	NPN	2	4,4[4])	1	60	≤ 1	1	63-160	100	1	≤ 200	≤ 850	100	5; 5
	16	NPN	2	4,4[4])	1	60	≤ 1	1	100-250	100	1	≤ 200	≤ 850	100	5; 5
BSY 55		NPN	2	0,80	0,5	80	≤ 0,6	0,15	40-120	150	10	< 200	< 750	150	15; 15
BSY 56		NPN	2	0,80	0,5	80	≤ 0,6	0,15	100-300	150	10	< 200	< 750	150	15; 15
2 N 2218		NPN	2	0,70	0,8	30	≤ 1,6	0,5	40-120	150	10	25	150	150	15; 15
2 N 2218 A		NPN	2	0,70	0,8	40	≤ 1	0,5	40-120	150	10	25	150	150	15; 15
2 N 2219		NPN	2	0,70	0,8	30	≤ 1,6	0,5	100-300	150	10	25	150	150	15; 15
2 N 2219 A ○		NPN	2	0,70	0,8	40	≤ 1	0,5	100-300	150	10	25	150	150	15; 15
2 N 2221		NPN	1	0,43	0,8	30	≤ 1,6	0,5	40-120	150	10	25	150	150	15; 15
2 N 2221 A		NPN	1	0,43	0,8	40	≤ 1	0,5	40-120	150	10	25	150	150	15; 15
2 N 2222		NPN	1	0,43	0,8	30	≤ 1,6	0,5	100-300	150	10	25	150	150	15; 15
2 N 2222 A		NPN	1	0,43	0,8	40	≤ 1	0,5	100-300	150	10	25	150	150	15; 15
2 N 2904		PNP	2	0,53	0,6	40	≤ 1,6	0,5	40-120	150	10	< 45	< 100	150	15; 15
2 N 2904 A		PNP	2	0,53	0,6	60	≤ 1,6	0,5	40-120	150	10	< 45	< 100	150	15; 15
2 N 2905 ○		PNP	2	0,53	0,6	40	≤ 1,6	0,5	100-300	150	10	< 45	< 100	150	15; 15
2 N 2905 A ○		PNP	2	0,53	0,6	60	≤ 1,6	0,5	100-300	150	10	< 45	< 100	150	15; 15
2 N 2906		PNP	1	0,35	0,6	40	≤ 1,6	0,5	40-120	150	10	< 45	< 100	150	15; 15
2 N 2906 A		PNP	1	0,35	0,6	60	≤ 1,6	0,5	40-120	150	10	< 45	< 100	150	15; 15
2 N 2907 ○		PNP	1	0,35	0,6	40	≤ 1,6	0,5	100-300	150	10	< 45	< 100	150	15; 15
2 N 2907 A ○		PNP	1	0,35	0,6	60	≤ 1,6	0,5	100-300	150	10	< 45	< 100	150	15; 15

Remarks: [4]) t_{case} = 45 °C; [5]) I_{CM}; [7]) t_{case} ≤ 25 °C

Data book reference: B 2 D; Complementary transistors see page 19 ○ Can be delivered as "Qualified semiconductor device"

Switching transistors

(Continued)

Type	Group	Structure	Fig. Nr.	Maximum ratings			Characteristics								
				P_{tot} at $t_{amb} = +45\,°C$ W	I_C A	U_{CEO} V	U_{CEsat} at I_C V	A	h_{FE} at I_C and U_{CE} mA	V	t_{on} ns	t_{off} at I_C and I_{B1}; I_{B2} ns	mA	mA mA
2 N 3019		NPN	2	0,71	1	80	≤ 0,5	0,5	100–300	150	10	–	–	–	–
2 N 3053		NPN	2	0,89	1	40	≤ 1,4	0,15	50–250	150	10	–	–	–	–
2 N 3700 ○		NPN	1	0,44	1	80	≤ 0,5	0,5	100–300	150	10	–	–	–	–
2 N 4033		NPN	2	0,71	1	80	≤ 0,5	0,5	100–300	100	5	< 100	< 400	500	50; 50
2 N 4036		PNP	2	0,88	1	65	≤ 0,65	0,15	40–140	150	10	< 110	< 700	150	15; 15

Data book reference: B 2 D ○ Can be delivered as "Qualified semiconductor device"

Power switching transistors

Type	Structure	Fig. Nr.	Maximum ratings			Characteristics							
			P_{tot} at $t_{case} = 45\,°C$ W	I_C A	U_{CEO} V	t_f at I_C µs	A	h_{FE} at I_C and U_{CE} A	V	U_{CEsat} at I_C and h_{FE} V	A	
BDY 42	NPN	8	60	5	250	≤ 1	2,5	≥ 20	1	2	≤ 1,5	5	3,3
BDY 43	NPN	8	60	5	300	≤ 1	2,5	≥ 20	1	2	≤ 1,5	5	3,3
BDY 44	NPN	8	60	5	350	≤ 1	2,5	≥ 20	1	2	≤ 1,5	5	3,3
BDY 45	NPN	8	95	15	250	≤ 1	5	≥ 20	2	2	≤ 1,5	15	3
BDY 46	NPN	8	95	15	300	≤ 1	5	≥ 20	2	2	≤ 1,5	15	3
BDY 47	NPN	8	95	15	350	≤ 1	5	≥ 20	2	2	≤ 1,5	15	3
BU 126	NPN	8	40 [1])	3	300	≤ 1	2,5	≥ 15	1	5	≤ 10	2,5	10
BU 526	NPN	8	86 [1])	8	400	≤ 1	4	≥ 6	4	5	≤ 5	8	2,6
BUX 30 [2])	NPN	8	90 [1])	10	400	≤ 2	5	≥ 150	5	3	≤ 3	10	25
BUY 50	NPN	8	95	15	250 [3])	≤ 1	5	≥ 20	2	2	≤ 1,5	15	3

Remarks: [1]) $t_{case} = 25\,°C$; [2]) Darlington transistor; [3]) Avalanche energy $E_R \leq 150$ mWs, $R_{BE} = 2$ kΩ, $I_C = 5$ A

Data book reference: B 2 C

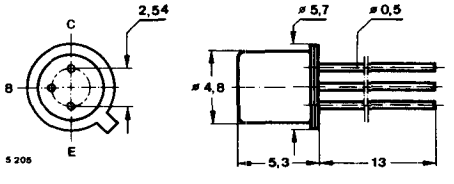


Fig. 1: 18 A 3 DIN 41 876
JEDEC TO 18

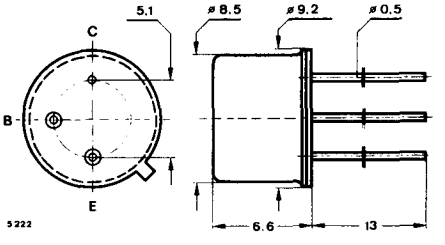


Fig. 2: 5 C 3 DIN 41 873
JEDEC TO 39

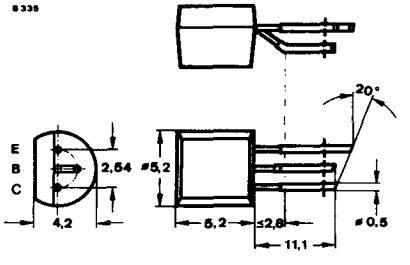


Fig. 3: 10 A 3 DIN 41 868
JEDEC TO 92; Z

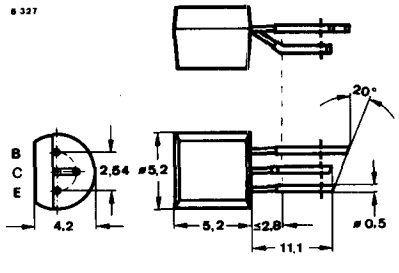


Fig. 4: 10 A 3 DIN 41 868
JEDEC TO 92 Z

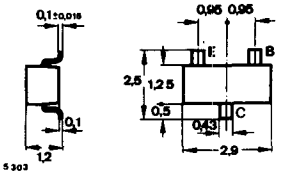


Fig. 5: 23 A 3 DIN 41 869
(SOT 23)

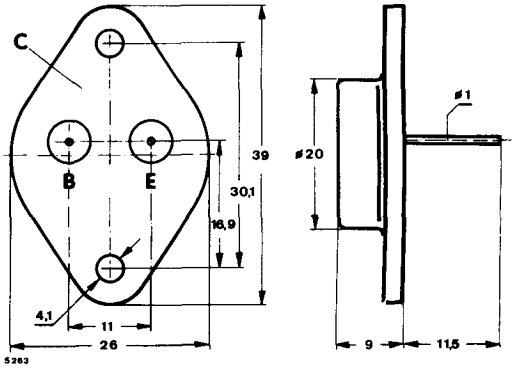


Fig. 8: 3 B 2 DIN 41 872
JEDEC TO 3

RF transistors

Single transistors

Type	Structure	Fig. Nr.	Maximum ratings			Characteristics											
			P_{tot} at $t_{amb} = +45\,°C$ W	I_C mA	U_{CEO} V	h_{FE} at	I_C mA	U_{CE} V	f_T at	I_C mA	$C_{üre}$ at	U_{CB} V	y_{fe} at	I_C mA	f MHz	F at dB	f MHz
BF 115	NPN	9	0,145	30	30	48-167	1	10	230	1	0,65	10	35	1	0,45	1,2	1
BF 167 [1]	NPN	9	0,13	25	30	≥ 27	4	10	350	4	0,15	10	105	4	35	3	35
BF 173	NPN	9	0,2	25	25	≥ 38	7	10	550	5	0,23	10	145	7	35	–	–
BF 184 [1]	NPN	9	0,145	30	20	67-220	1	10	260	1	0,65	10	35	1	10,7	3,5	1
BF 185	NPN	9	0,145	30	20	36-125	1	10	200	1	0,65	10	35	1	10,7	3,5	1
BF 198 [1]	NPN	10	0,3	25	30	≥ 27	4	10	400	4	0,22	10	105	4	35	3	35
BF 199	NPN	10	0,3	25	25	≥ 38	7	10	550	5	0,32	10	175	7	35	3	–
BF 240 [1]	NPN	10	0,3	25	40	67-220	1	10	430	1	0,27	10	–	–	–	1,6	100
BF 241	NPN	10	0,3	25	40	36-125	1	10	400	1	0,27	10	–	–	–	1,6	100
BF 254 [1]	NPN	10	0,3	30	20	67-220	1	10	260	1	0,85	10	35	1	10,7	2 [2]	1
BF 255	NPN	10	0,3	30	20	36-125	1	10	200	1	0,85	10	35	1	10,7	2,5 [2]	1
BF 257	NPN	2 [10]	5 [6]	100	160	≥ 25	30	10	90	10	4,2	30	–	–	–	–	–
BF 258	NPN	2 [10]	5 [6]	100	250	≥ 25	30	10	90	10	4,2	30	–	–	–	–	–
BF 259	NPN	2 [10]	5 [6]	100	300	≥ 25	30	10	90	10	4,2	30	–	–	–	–	–
BF 310	NPN	10	0,3	25	30	≥ 29	4	10	≤ 580	1	≤0,13 [3]	10	≥ 80 [4]	4	36	–	–
BF 311	NPN	10	0,3	40	25	≥ 40	15	10	750	5	0,35	10	370	15	36	–	–
BF 314	NPN	3 [10]	0,3	25	30	≥ 29	4	10	450	1	0,1 [3]	10	36 [4]	1	100	3	100
BF 414	PNP	3 [10]	0,3	25	30	≥ 30	1	10	400	1	0,09 [3]	10	–	–	–	2	100
BF 422	NPN	4	0,83 [6]	20	250	≥ 50	25	20	≥ 60	10	–	–	–	–	–	–	–
BF 423	PNP	4	0,83 [3]	20	250	≥ 50	25	20	≥ 60	10	–	–	–	–	–	–	–
BF 440 [1]	PNP	10	0,3	25	40	60-220	1	10	250	1	0,4	10	≥ 80	4	36	–	–
BF 441	PNP	10	0,3	25	40	30-125	1	10	250	1	0,4	10	≥ 80	4	36	–	–
BF 469	NPN	6 [11]	1,8 [8]	20	250	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 470	PNP	6 [11]	1,8 [8]	20	250	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 471	NPN	6 [11]	2 [10]	30	300 [7]	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 472	PNP	6 [11]	2 [10]	30	300 [7]	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 869	NPN	16/17	5 [5]	50	250	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 870	PNP	16/17	5 [5]	50	250	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 871	NPN	16/17	5 [5]	50	300 [7]	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BF 872	PNP	16/17	5 [5]	50	300 [7]	≥ 50	25	20	≥ 60	10	≤ 1,8	30	–	–	–	–	–
BFR 90	NPN	13	0,18 [12]	25	15	50	14	10	5000	14	0,4	10	–	–	–	2,4	500
BFR 91	NPN	13	0,18 [12]	35	12	50	30	5	5000	14	0,8	5	–	–	–	1,9	500
BFR 96	NPN	13	0,5 [12]	75	15	≥ 25	50	10	5000	14	< 1,4	10	–	–	–	3,8	800
BFS 17	NPN	5	0,2 [6]	25	15	20-150	2	1	1000	2	0,65	5	–	–	–	4,5	500
BFS 19	NPN	5	0,2 [6]	30	20	65-225	1	10	260	1	0,85	10	–	–	–	4	100
BFS 20	NPN	5	0,11 [6]	25	20	≥ 40	7	10	450	5	0,3	10	–	–	–	–	–
BFS 62	NPN	11	0,2	25	25	≥ 35	7	10	≥ 580	5	≤ 0,33	10	≥ 74	5	200	4	200
BFT 95	PNP	13	0,2 [6]	25	15	60	10	5	5000	10	0,5	10	–	–	–	2	1000
BFT 95 A	PNP	13	0,2 [12]	25	15	60	10	5	3600	15	0,5	10	–	–	–	2,5	1000
BFT 96	PNP	13	0,5 [12]	75	15	80	50	5	5000	50	–	–	–	–	–	4	1000
BFT 96 A	PNP	13	0,5	75	15	80	50	5	3600	50	–	–	–	–	–	4,5	1000
BFW 92	NPN	13	0,13 [9]	25	15	≥ 20	25	1	1600	25	0,6	5	–	–	–	4	500
BFX 89	NPN	11	0,175	25	15	≥ 20	2	1	≥ 800	4	–	–	–	–	–	≤ 6,5	500
BFY 88 ○	NPN	9	0,175	25	25	≥ 40	5	1	850	5	0,2	10	≥ 160	7	36	3,5	200
BFY 90 ○	NPN	11	0,2 [6]	25	15	≥ 25	2	1	≥ 1300	20	0,6	5	45	2	500	≤ 5	500
2 N 918	NPN	11	0,2 [6]	–	15	≥ 20	3	1	≥ 600	4	–	–	–	–	–	≤ 6	60
2 N 1613	NPN	2 [10]	0,7	800	50 [7]	≥ 20	0,1	10	≥ 60	50	–	–	–	–	–	≤ 12	10^{-3}

Remarks: [1]) controlled; [2]) F_C; [3]) $C_{ürb}$; [4]) y_{fb}; [5]) $t_{case} \leqq 25\,°C$; [6]) $t_{amb} \leqq 25\,°C$; [7]) U_{CER}, $R_{BE} \leqq 10\,\Omega$; [8]) $t_{case} \leqq 110\,°C$; [9]) $t_{amb} \leqq 73\,°C$; [10]) see page 21; [11]) see page 19; [12]) $t_{amb} \leqq 60\,°C$

Data book reference: B 2 D ○ Can be delivered as "Qualified semiconductor device"

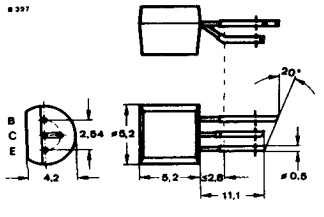


Fig. 4: 10 A 3 DIN 41 868
JEDEC TO 92 Z

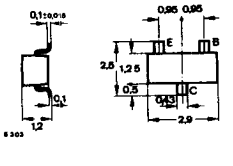


Fig. 5: 23 A 3 DIN 41 869
(SOT 23)

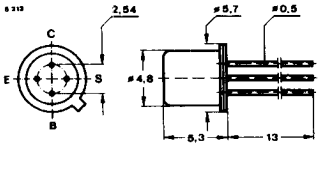


Fig. 9: 18 A 4 DIN 41 876
JEDEC TO 72

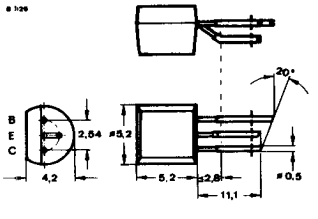


Fig. 10: 10 A 3 DIN 41 868
JEDEC TO 92 Z

VHF-, UHF-Tuner transistors

Single transistors

Type	Structure	Fig. Nr.	Maximum ratings			Characteristics								
			P_{tot} at t_{amb} = +45 °C W	I_C mA	U_{CEO} V	h_{FE} at	I_C and mA	U_{CE} V	f_T at MHz	I_C mA	$C_{üre}$ at pF	U_{CB} V	F at dB	f MHz
BF 362	NPN	12	0,12 [3])	20	20	≥ 20	3	10	800	–	–	–	4,5	800
BF 363	NPN	12	0,12 [3])	20	20	≥ 20	3	10	700	–	–	–	5	800
BF 479	PNP	12	0,16 [3])	50	25	≥ 20	10	10	1800	10	–	–	4,5	800
BF 479 T	PNP	12	0,16 [3])	50	20	≥ 20	10	10	1850	10	–	–	3,4	800
BF 506	PNP	3	0,3	30	35	≥ 25	3	10	550	2	0,12 [2])	10	3,0	200
BF 509 [1])	PNP	3	0,3	30	35	≥ 25	3	10	800	2	0,12 [2])	10	2,6	200
BF 509 S [1])	PNP	3	0,3	30	35	≥ 70	3	10	800	2	0,12 [2])	10	2,6	200
BF 679 T [1])	PNP	12	0,16 [3])	30	30	≥ 25	3	10	930	2	–	–	2,8	800
BF 680	PNP	12	0,16 [3])	30	35	≥ 25	3	10	750	2	–	–	4,8	800
BF 914	PNP	3 [10])	0,3	25	35	≥ 25	3	10	850	2	0,12 [2])	10	2,5	200

Remarks: [1]) controlled; [2]) $C_{ürb}$; [3]) $t_{amb} \leq 55$ °C [10]) see page 21

Dual transistors

Type	Structure	Fig. Nr.	Maximum ratings					Characteristics at: U_{CE} = 10 V, U_{B2E} = 6 V, I_C = 3 mA									
			P_{tot} at $t_{amb} \leq 55$ °C W	I_C mA	U_{CEO} V	U_{EB10} V	U_{EB20} V	h_{FE}	f_T at MHz	f MHz	C_{CB2} pF	C_{CB1} fF	at f MHz	F at dB	f MHz	G_u at dB	f MHz
TDA 1086	NPN	14	0,2	30	25	4	5	30	600	100	0,35	38	200	≤ 7	200	26	200
TDA 1087	NPN	14	0,280	50	20	4	5	30	500	100	0,7	10	200	≤ 5	200	49 [1])	200
TEA 1087	NPN	14	0,75	80	18	4,5	–	150 [2])	700 [2])	100 [2])	–	–	50 [2])	3,0 [2])	36 [2])	36 [2])	40 [2])

Remarks: [1]) I_C = 10 mA [2]) U_{CE} = 12 V, I_C = 20 mA

Dual Gate MOS-FET's

Type	Structure	Fig. Nr.	Maximum ratings				Characteristics at: U_{DS} = 15 V, U_{G2S} = 4 V									
			P_{tot} t_{amb} = 25 °C W	U_{DS} V	I_D mA	I_{G1M} and I_{G2M} mA	U_G = 4 V, I_D = 10 µA $U_{(BR)DS}$ V	U_{DS} = 15 V, U_{GS} = 0 V I_{DSS} mA	U_{GS} = 5 V, U_D = 0 V I_{GSS} nA	U_{DS} = 15 V, U_{GS} = 4 V, I_D = 20 µA U_{GS} V	y_{21S} mS	C_{g1S} pF	C_{dG1} fF	C_{dS} pF	f = 200 MHz, R_S = 68 Ω G_{ps} dB	F dB
BF 963	N	14	0,33	20	50	10	≥ 20	6...40	≤ 100	≤ 3,5	25	6	35	2,5	25	1,8
BF 960	N	14	0,2	20	30	10	≥ 20	2 ... 25	< 100	≤ 4	14	3,7	25	2	20	2
BF 961	N	14	0,2	20	30	10	≥ 20	2 ... 25	< 100	≤ 4	9	1,7	20	0,7	21	–

Data book reference: B 2 D

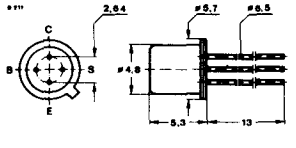


Fig. 11: 18 A 4 DIN 41 876
JEDEC TO 72

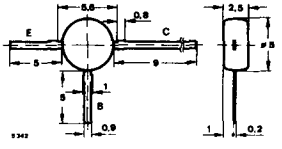


Fig. 12: ≈ 50 A 3 DIN 41 867
≈ JEDEC TO 50

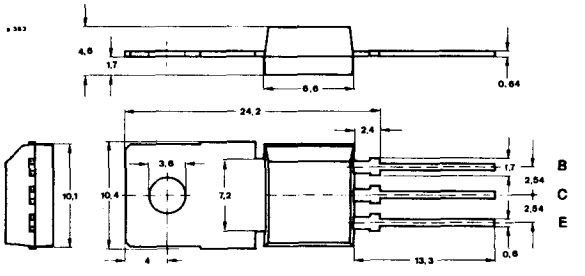


Fig. 16: 34 A 3 DIN 41 869
JEDEC TO 202

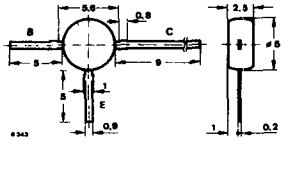


Fig. 13: ≈ 50 A 3 DIN 41 867
≈ JEDEC TO 50

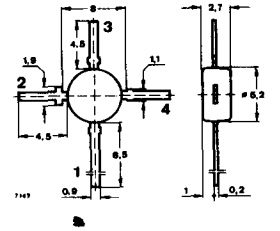


Fig. 14: 50 B 4 DIN 41 867
JEDEC TO 50

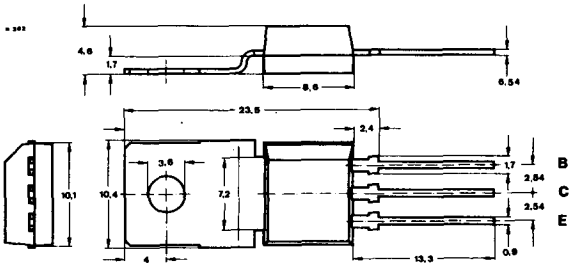


Fig. 17: 34 A 3 DIN 41 869
JEDEC TO 202

Optoelectronic devices

Red light emitting diodes

Type	Case	Fig. Nr.	Characteristics				Spectral curve see page 27
			α	I_V and mcd	U_F at	I_F mA	
CQY 40 L	ø 5 mm plastic dull red	1	60°	1,6	1,6	20	4
V 168 P	ø 5 mm plastic dull red	1	60°	3,0	1,6	20	4
CQX 35 A	ø 5 mm plastic clear white	1	25°	5,0	1,6	20	4
CQX 35 B	ø 5 mm plastic clear white	1	25°	8,0	1,6	20	4
CQX 25 N	ø 3 mm plastic clear white	2	25°	2,6	1,6	20	4
CQY 85 N A	ø 3 mm plastic dull red	2	60°	1,6	1,6	20	4
CQY85 N B	ø 3 mm plastic dull red	2	60°	3,0	1,6	20	4
CQY 41 N	ø 1,8 mm plastic dull red	3	40°	1,6	1,6	20	4
CQX 10 [1])	2,54 x 5,08 mm plastic dull red	4	50°	1,6	1,6	20	4

Remarks: [1]) Center to center spacing

Data book reference: S 8 A

Orangered light emitting diodes

Type	Case	Fig. Nr.	Characteristics				Spectral curve see page 27
			α	I_V and mcd	U_F at	I_F mA	
CQX 38 A	ø 5 mm plastic dull light red	1	60°	6,0	2,2	20	9
CQX 38 B	ø 5 mm plastic dull light red	1	60°	12	2,2	20	9
CQX 39 A	ø 5 mm plastic clear white	1	25°	15	2,2	20	9
CQX 39 B	ø 5 mm plastic clear white	1	25°	40	2,2	20	9
CQX 41 N A	ø 3 mm plastic dull light red	2	60°	6,0	2,2	20	9
CQX 41 N B	ø 3 mm plastic dull light red	2	60°	12,0	2,2	20	9
CQX 42 N A	ø 3 mm plastic clear white	2	25°	7,0	2,2	20	9
CQX 42 N B	ø 3 mm plastic clear white	2	25°	15,0	2,2	20	9
CQX 43 N	ø 1,8 mm plastic dull light red	3	40°	5,0	2,2	20	9
CQX 40 [1])	2,54 x 5,08 mm plastic dull light red	4	50°	5,0	2,2	20	9

Remarks: [1]) Center to center spacing

Data book reference: S 8 A

Green light emitting diodes

Type	Case	Fig. Nr.	Characteristics				Spectral curve see page 27
			α	I_V and mcd	U_F at	I_F mA	
CQY 72 L	ø 5 mm plastic dull green	1	60°	2,0	2,7	20	7
V 169 P	ø 5 mm plastic dull green	1	60°	4,0	2,7	20	7
CQX 36 A	ø 5 mm plastic clear white	1	25°	5,0	2,7	20	7
CQX 36 B	ø 5 mm plastic clear white	1	25°	15	2,7	20	7
CQX 96 A	ø 5 mm plastic clear white	1	24°	40	2,7	20	7
CQX 96 B	ø 5 mm plastic clear white	1	24°	70	2,7	20	7
CQX 97 A	ø 5 mm plastic clear white	1	160°	4,0	2,7	20	7
CQX 97 B	ø 5 mm plastic clear white	1	160°	7,0	2,7	20	7
CQX 26 N	ø 3 mm plastic clear white	2	25°	4,0	2,7	20	7
CQY 86 N A	ø 3 mm plastic dull green	2	60°	2,0	2,7	20	7
CQY 86 N B	ø 3 mm plastic dull green	2	60°	4,0	2,7	20	7
CQY 73 N	ø 1,8 mm plastic dull green	3	40°	2,0	2,7	20	7
CQX 11 [1])	2,54 x 5,08 mm plastic dull green	4	50°	2,6	2,7	20	7

Remarks: [1]) Center to center spacing

Data book reference: S 8 A

Optoelectronic devices

Yellow light emitting diodes

Type	Case	Fig. Nr.	Characteristics				Spectral curve see page 27
			α	I_V and mcd	U_F at	I_F mA	
CQY 74 L	ø 5 mm plastic dull yellow	1	60°	3,0	2,7	20	8
V 170 P	ø 5 mm plastic dull yellow	1	60°	5,0	2,7	20	8
CQX 37 A	ø 5 mm plastic clear white	2	25°	5,0	2,7	20	8
CQX 37 B	ø 5 mm plastic clear white	2	25°	30	2,7	20	8
CQX 27 N	ø 3 mm plastic clear white	2	25°	5,0	2,7	20	8
CQY 87 N A	ø 3 mm plastic dull yellow	2	60°	3,0	2,7	20	8
CQY 87 N B	ø 3 mm plastic dull yellow	2	60°	5,0	2,7	20	8
CQY 75 N	ø 1,8 mm plastic dull yellow	3	40°	3,0	2,7	20	8
CQX 12 [1])	2,54 x 5,08 mm plastic dull yellow	4	50°	4,2	2,7	20	8
Remarks: [1]) Center to center spacing							

Data book reference: S 8 A

Orange-red and green light emitting diode

Type	Case	Luminous colour	Fig. Nr.	Characteristics				Spectral curve (see page 27)
				α	I_V and mcd	U_F at	I_F mA	
CQX 95	ø 5 mm Plastic dull/white	orange-red	5	60°	6,0	2,2	20	9
		green	5	60°	6,0	2,4	20	7

Data book reference: S 8 A

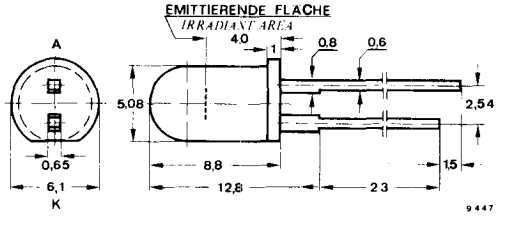


Fig. 1: Plastic case ø 5

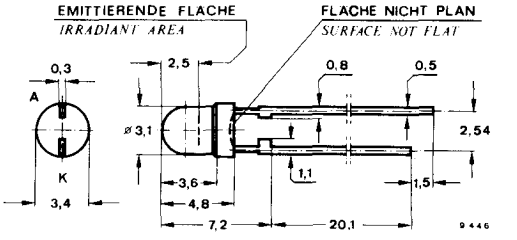


Fig. 2: Plastic case ø 3

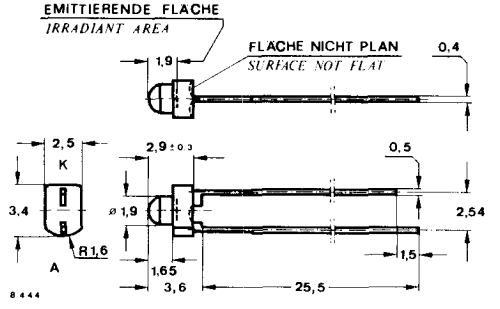


Fig. 3: Plastic case ø 1,8

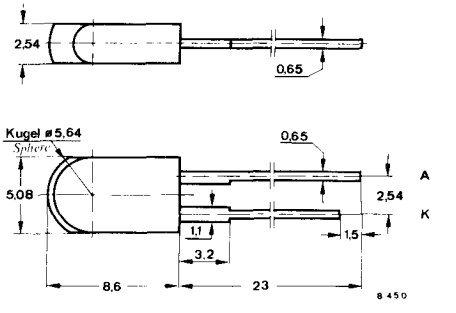


Fig. 4: Plastic case 2.5 x 5.08

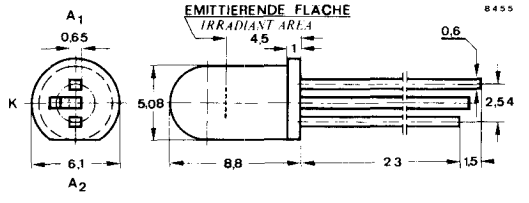


Fig. 5: Plastic case ø 5

Light emitting diodes in hermetically sealed case

Type	Case	Fig. Nr.	Luminous colour	Characteristics				Spectral curve see page 27
				α	I_V and mcd	U_F at	I_F mA	
CQX 28	≈ JEDEC TO 52 dull white	6	red	50°	2,0	1,6	20	4
CQX 29	≈ JEDEC TO 52 dull white	6	green	50°	2,6	2,7	20	7
CQX 30	≈ JEDEC TO 52 dull white	6	yellow	50°	4,2	2,7	20	8
CQX 31 [1])	≈ JEDEC TO 52 dull white	7	red	50°	2,0	1,6	20	4
			green		2,6	2,7		7
CQX 32 [1])	≈ JEDEC TO 52 dull white	7	red	50°	2,0	1,6	20	4
			yellow		4,2	2,7		8

Remarks: [1]) bi colour

Light emitting diode displays

Type	Version	Character height mm	Fig. Nr.	I_V and U_F at $I_F = 20$ mA mcd	V	Luminous colour	Spectral curve see page 27
CQX 86 A	7-Segment 1½-digit with + and − sign	13	8	0,7	1,65	red	4
CQX 86 K							
CQX 88 A		13	8	1,5	2,7	orangered	9
CQX 88 K							
CQX 90 A		13	8	0,7	2,7	green	7
CQX 90 K							
CQX 92 A		13	8	1,0	2,7	yellow	8
CQX 92 K							
CQX 87 A	7-Segment 2-digit	13	9	0,7	1,65	red	4
CQX 87 K							
CQX 89 A		13	9	1,5	2,7	orangered	9
CQX 89 K							
CQX 91 A		13	9	0,7	2,7	green	7
CQX 91 K							
CQX 93 A		13	9	1,0	2,7	yellow	8
CQX 93 K							

Data book reference: S 8 A

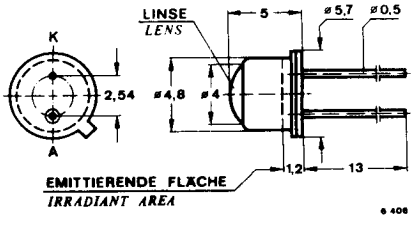


Fig. 6: ≈ 18 A 2 DIN 41 876
≈ JEDEC TO 52

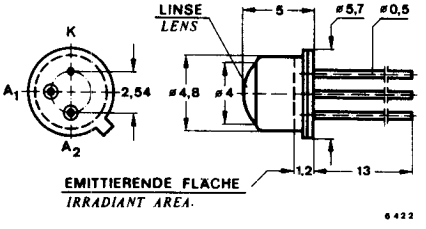
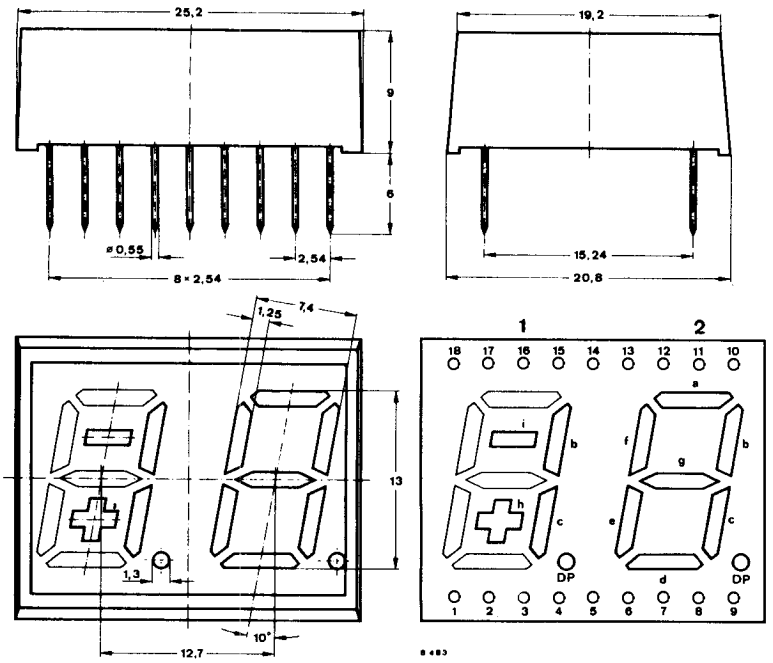


Fig. 7: ≈ 18 A 3 DIN 41 876
≈ JEDEC TO 52

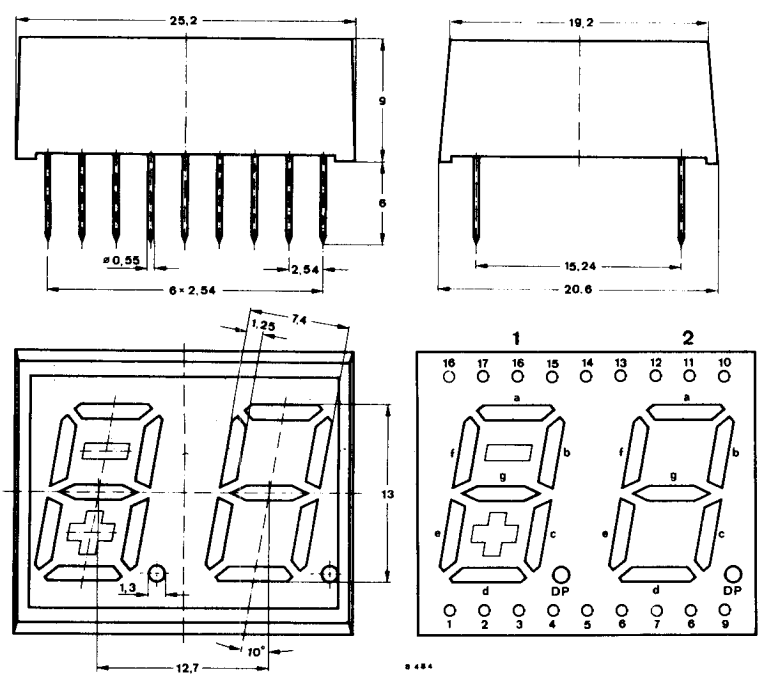


Pin connections

CQX 86, CQX 88
CQX 90, CQX 92

Pin	Segment	Digit
1	i	1
2	h	1
3	c	1
4	DP	1
5	e	2
6	d	2
7	g	2
8	c	2
9	DP	2
10	b	2
11	a	2
12	f	2
13	Anode/Cathode	2
14	Anode/Cathode	1
15	b	1

Fig. 8: Special case

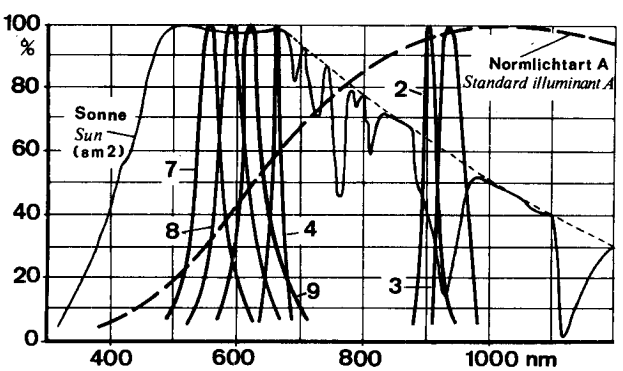


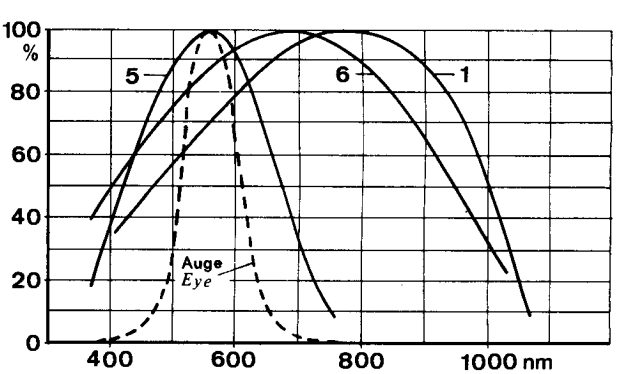
Pin connections

CQX 87, CQX 89
CQX 91, CQX 93

Pin	Segment	Digit
1	e	1
2	d	1
3	c	1
4	DP	1
5	e	2
6	d	2
7	g	2
8	c	2
9	DP	2
10	b	2
11	a	2
12	f	2
13	Anode/Cathode	2
14	Anode/Cathode	1
15	b	1
16	a	1
17	g	1
18	f	1

Fig. 9: Special case





Optoelectronic devices

GaAs diodes (infrared)

Type	Group	Fig. Nr.	Characteristics						Spectral curve (see page 27)
			α	Φ_e and mW	I_e at mW/sr	I_F mA	t_r at $I_F = 1$ A ns	t_f ns	
CQX 18	A B	12 12	150° 150°	0,7 ... 1,4 > 1,1	– –	20 20	1000 1000	1000 1000	≈ 3 ≈ 3
CQX 19		13	40°	20	40	250	700	830	≈ 3
CQY 31		14	80°	1	0,25	100	100	100	2
CQY 32		15	10°	1	4,5	100	100	100	2
CQY 33 N	A B C	14 14 14	80° 80° 80°	2 ... 4 3 ... 6 > 5	1,2 1,2 1,2	100 100 100	500 500 500	600 600 600	≈ 3 ≈ 3 ≈ 3
CQY 34 N	A B C	16 16 16	25° 25° 25°	2 ... 4 3 ... 6 > 5	13 13 13	100 100 100	500 500 500	600 600 600	≈ 3 ≈ 3 ≈ 3
CQY 35 N	A B C	15 15 15	10° 10° 10°	2 ... 4 3 ... 6 > 5	20 20 20	100 100 100	500 500 500	600 600 600	≈ 3 ≈ 3 ≈ 3
CQY 36		18a	80°	2	0,4	50	500	600	≈ 3
CQY 36 N		18	80°	2	0,4	50	500	600	≈ 3
CQY 37		19a	25°	2	2,2	50	500	600	≈ 3
CQY 37 N		19	25°	2	2,2	50	500	600	≈ 3
CQX 46		20	50°	15	10	100	400	450	3
CQY 98		21	40°	15	20	100	400	450	3
CQY 99		22	60°	15	20	100	1000	1000	3
V 194 P	A B C	17 17 17	120° 120° 120°	4 ... 8 6 ... 12 > 10	1,6 1,6 1,6	100 100 100	500 500 500	600 600 600	≈ 3 ≈ 3 ≈ 3

Data book reference: S 8 A

GaAlAs CW Laserdiode

Type	Fig. Nr.	α_2	α_1	Fig. Nr.	Φ_e at I_F		I_e at Φ_e		$I_{(TO)}$	λ_p	$\Delta\lambda$	t_r at Φ_e	
					mW	mA	$\frac{kW}{cm^2\ sr}$	mW	mA	nm	nm	ns	mW
CQX 20	11	50°	10°	10	> 5	< 300	> 200	5	200	820	2,5	1	≥ 2

Data book reference: S 8 A

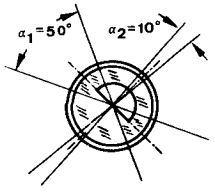


Fig. 10: Top view:
The drawn angles α_1 and α_2 are the projections of the angles of half intensity into the plane of the emitting area.

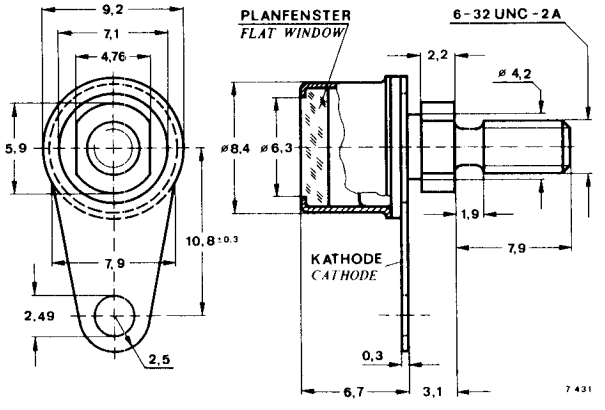


Fig. 11: Special case

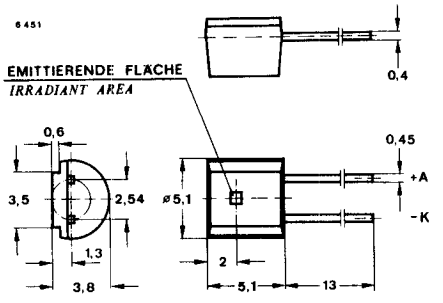


Fig. 12: Plastic case
≈ 10 B 3 DIN 41 868
≈ JEDEC TO 92

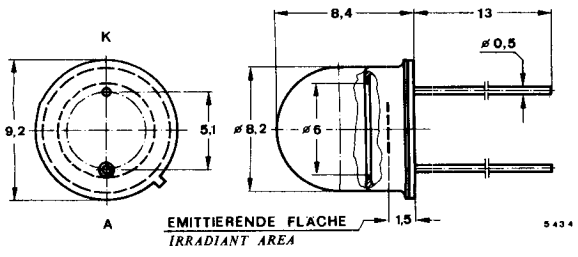


Fig. 13: Metal base with clear plastic lens covering

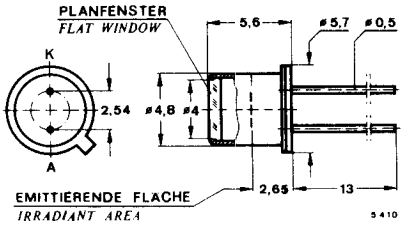


Fig. 14: ≈ 18 C 2 DIN 41 876
≈ JEDEC TO 18

Optoelectronic devices

Photo switches

Type	Fig. Nr.	Application	Characteristics			Spectral curve see page 27
			α	I_{ca} mA at	E_A klx	
BPX 99	23	Darlington	25°	30	0,1	1

Data book reference: S 8 A

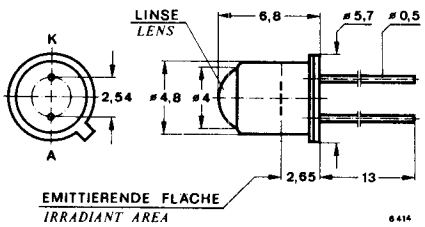


Fig. 15: 18 C 2 DIN 41 876 ≈ JEDEC TO 18

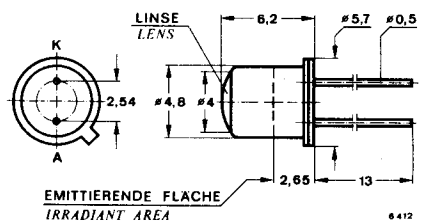


Fig. 16: 18 C 2 DIN 41 876 ≈ JEDEC TO 18

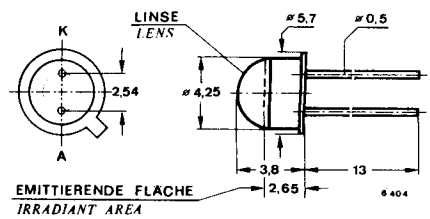


Fig. 17: 18 C 2 DIN 41 876 ≈ JEDEC TO 18

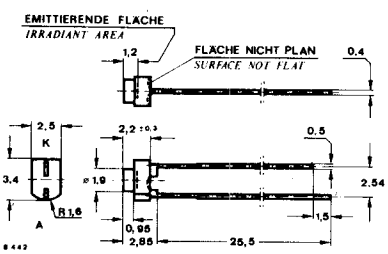


Fig. 18: Plastic case ø 1,8

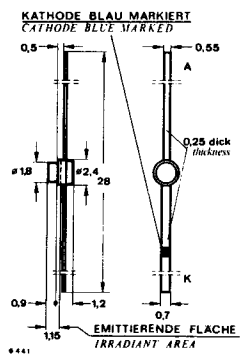


Fig. 18a: Plastic case ø 1,8

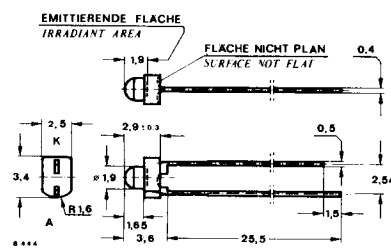


Fig. 19: Plastic case ø 1,8

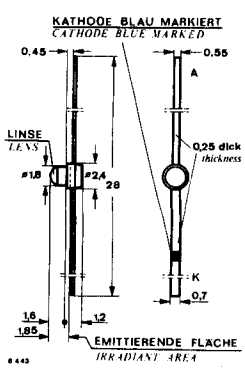


Fig. 19a: Plastic case ø 1,8

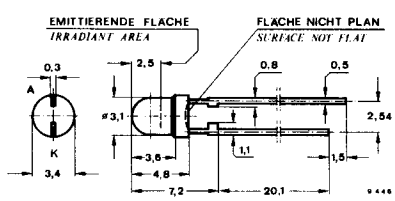


Fig. 20: Plastic case ø 3

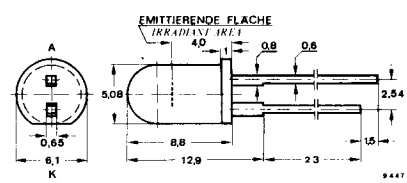


Fig. 21: Plastic case ø 5

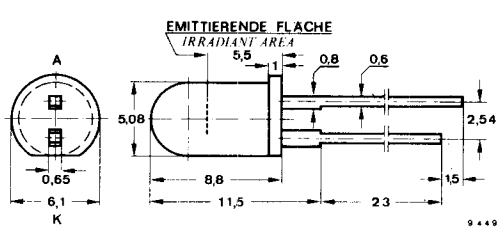


Fig. 22: Plastic case ø 1,8

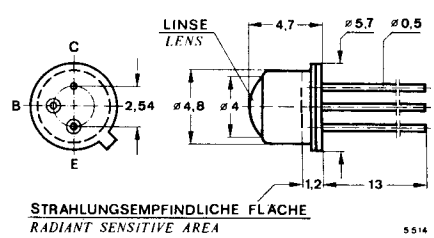


Fig. 23: 18 A 3 DIN 41 876 JEDEC TO 18

Optoelectronic devices

Photo transistors

Type	Group	Fig. Nr.	Maximum ratings		Characteristics				Spectral curve (see page 27)
			P_{tot} at t_{amb} = + 25 °C	U_{CEO}	α	I_{ca} [1])	t_r [2]) at U_S = 5 V, R_L = 100 Ω	t_f [2])	
			W	V		mA	µs	µs	
BPW 13	A	24	0,375	32	80°	0,2 ... 0,4	1,6	1,7	1
	B	24	0,375	32	80°	0,3 ... 0,6	1,6	1,7	1
	C	24	0,375	32	80°	> 0,5	1,6	1,7	1
BPW 14	A	25	0,375	32	25°	2 ... 4	1,6	1,7	1
	B	25	0,375	32	25°	3 ... 6	1,6	1,7	1
	C	25	0,375	32	25°	> 5,0	1,6	1,7	1
BPW 16		27a	0,05	32	80°	0,4	1,6	1,7	1
BPW 16 N		27	0,05	32	80°	0,4	1,6	1,7	1
BPW 17		28a	0,05	32	25°	3,0	1,6	1,7	1
BPW 17 N		28	0,05	32	25°	3,0	1,6	1,7	1
BPW 39	A	26	0,15	32	130°	0,5 ... 1,6	1,6	1,7	1
	B	26	0,15	32	130°	> 1,3	1,6	1,7	1
BPW 40		29	0,1	32	40°	> 3	1,6	1,7	1
BPW 42		30	0,1	32	80°	3	–	–	≈ 1

Remarks: [1]) E_A = 1 klx; [2]) I_C = 1 mA, GaAs diode as emitter; [3]) E_A = 100 lx

Data book reference: S 8 A

Photo voltaic cells (Solar cells)

Type	Fig. Nr.	A	Characteristics					Spectral curve (see page 27)
			α	U_O and I_k at E_A = 1 klx		t_r at U_S = 5 V, R_L = 100 Ω	t_f	
		mm²		mV	mA	µs	µs	
BPW 35	34	94	120°	380	0,3	–	–	≈ 6
BPY 70	34a	360	120°	400	3,0	14	7	≈ 1

Data book reference: S 8 A

Photo diodes and photo voltaic cells

Type	Fig. Nr.	A	Characteristics							Spectral curve (see page 27)
			α	U_O and I_k at E_A = 1 klx		I_{ra} at U_R at E_A = 1 klx		t_r at I_{ph} = 100 µA, R_L = 1 kΩ	t_f	
		mm²		mV	µA	µA	V	µs	µs	
BPW 20	31	7,5	100°	430	33	33	5	3,5	3,5	6
BPW 21 ○	31	7,5	100°	380	7	7	5	3,5	3,5	5
BPW 24 [1])	32	0,64	40°	380	35	45	20	[2])	[2])	≈ 1
BPW 34 [1])	36	7,5	120°	400	80	85	5	–	–	≈ 1
BPW 41 [1])	35	7,5	130°	320	70	75	5	0,05 [3])	0,05 [4])	≈ 1
BPW 43 [1])	37	0,25	50°	400	12	15	5	4	4	≈ 1

Remarks: [1]) Photo PIN diode; [2]) Response time τ = 2 ns at HeNe-Laser, λ = 630 mm; [3]) t_{on}; t_{off}

Data book reference: S 8 A ○ Can be delivered as "Qualified semiconductor device"

Photo avalanche diode

Type	Fig. Nr.	⌀	α	P_V	$U_{(BR)}$		G_B	I_{ro}	$\lambda_{0,5}$
		mm²		mW	V	%	GHz	nA	nm
BPW 28	33	0,2	70°	100	170	≧ 20	≧ 200	1	450...950

Data book reference: S 8 A

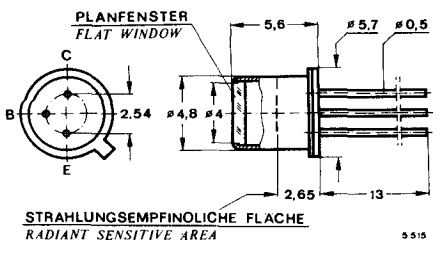


Fig. 24: 18 A 3 DIN 41 876
JEDEC TO 18

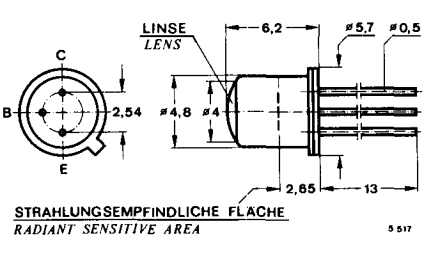


Fig. 25: 18 C 3 DIN 41 876
≈ JEDEC TO 18

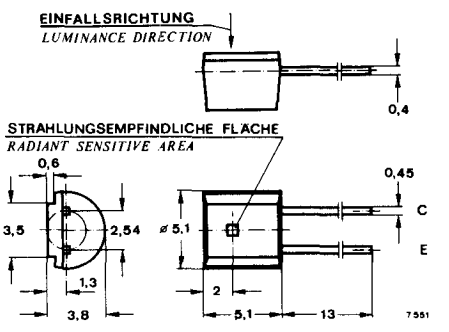


Fig. 26: Plastic case
≈ 10 B 3 DIN 41 868
≈ JEDEC TO 92

Optoelectronic devices

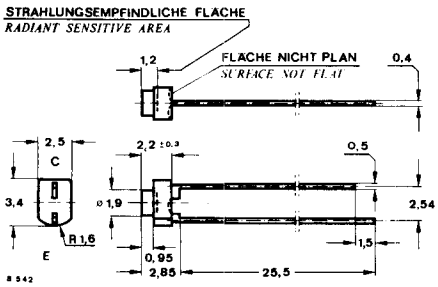


Fig. 27: Plastic case ø 1,8

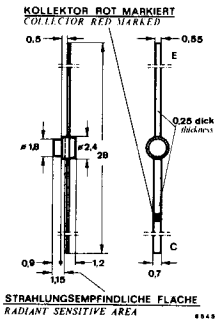


Fig. 27a: Plastic case ø 1,8

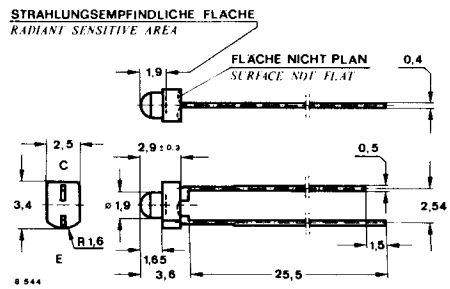


Fig. 28: Plastic case ø 1,8

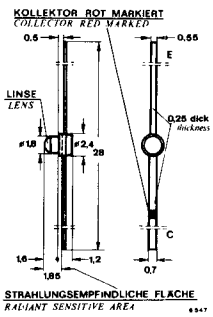


Fig. 28a: Plastic case ø 1,8

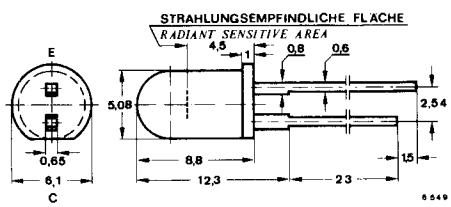


Fig. 29: Plastic case ø 5

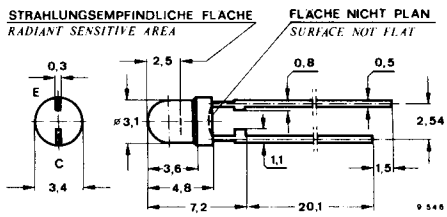


Fig. 30: Plastic case ø 3

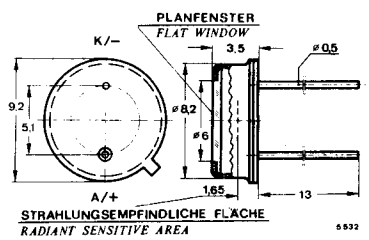


Fig. 31: ≈ 5 G 2 DIN 41 873
≈ JEDEC TO 39

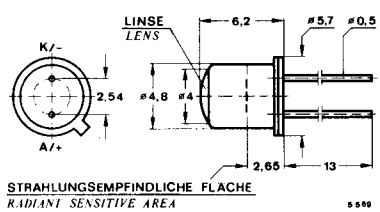


Fig. 32: ≈ 18 C 2 DIN 41 876
≈ JEDEC TO 18

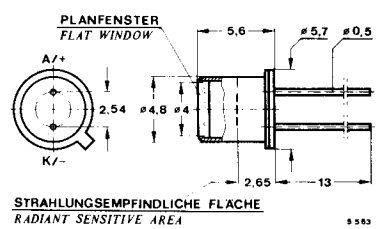


Fig. 33: ≈ 18 C 2 DIN 41 876
≈ JEDEC TO 18

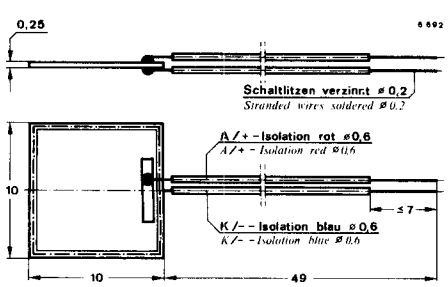


Fig. 34: without case

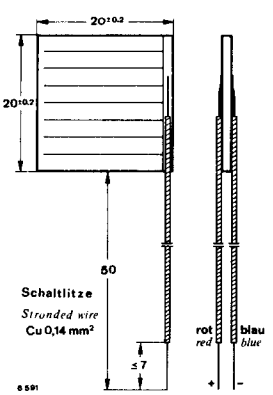


Fig. 34a: without case

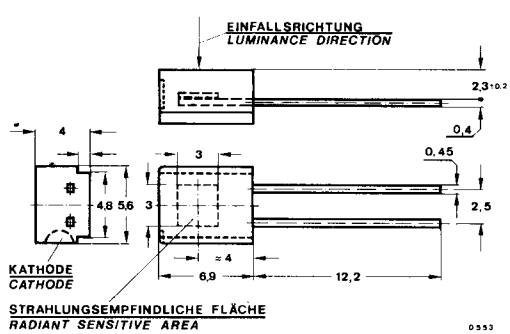


Fig. 35: Plastic case

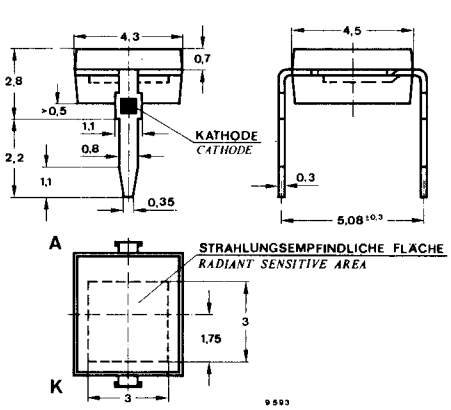


Fig. 36: Plastic case ø 5

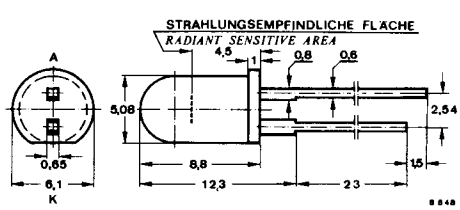


Fig. 37: Plastic case ø 5

Optoelectronic devices

Coupling devices

Type	Fig. Nr.	Maximum ratings						Characteristics			
		Emitter		Receiver						t_r	t_f
		I_F mA	P_V [1] mW	I_C mA	U_{CEO} V	P_V [1] mW	U_{is} V	k at I_F	mA	at I_F = 10 mA µs	µs
CNY 18	38	60	100	150	32	150	500	> 0,25	10	1,6	1,7
CNY 21	39	50	120	50	32	130	10.000	0,5	10	1,6	1,7
CNY 24	40	50	120	50	32	130	10.000	1,0	30	1,6	1,7
CNY 36 [2]	42	60	100	100	32	150	–	0,04	20	2,5	3,3
CNY 37 [2]	43	60	100	100	32	150	–	0,04	20	2,5	3,3
CQY 80	41	60	100	50	32	150	4400	0,6	10	1,6	1,7

Remarks: [1] t_{amb} = 25 °C; [2] Interrupter modules

Data book reference: S 8 A ○ Can be delivered as "Qualified semiconductor device"

Photo-threshold switch (see also Integrated circuits)

Type	Case	Fig. Nr.	Maximum ratings		Characteristics			
			P_{tot} mW	I_C mA	λ_p nm	$E_{A(TO)}$ lx	t_r ns	t_f ns
U 102 P	MO 002	44	400	70	660	5	100	100

Photo pulse amplifier (see also Integrated circuits)

Type	Case	Fig. Nr.	Maximum ratings		Characteristics			
			P_{tot} mW	I_Q mA	λ_p nm	λ 0,5 nm	A_{uo} dB	U_q / U_{nq} dB
U 123 P	DIP 6-lead	45	210	10	840	620 ... 970	94	15

Data book reference: S 8 A

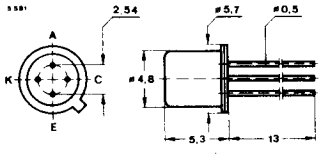


Fig. 38: 18 A 4 DIN 41 876
JEDEC TO 72

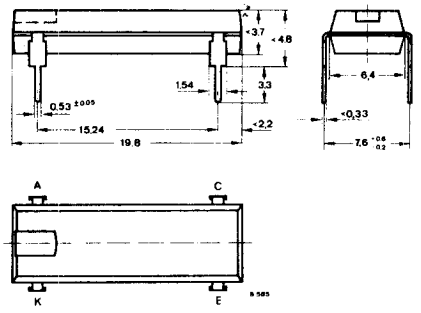


Fig. 39: ≈ 20 A 14 DIN 41 866
≈ JEDEC TO 116

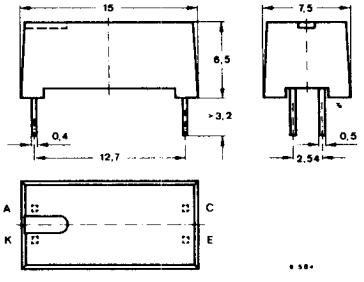


Fig. 40: Plastic case

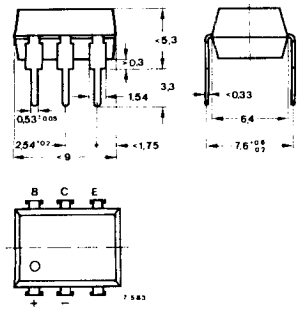


Fig. 41: DIP 6-lead

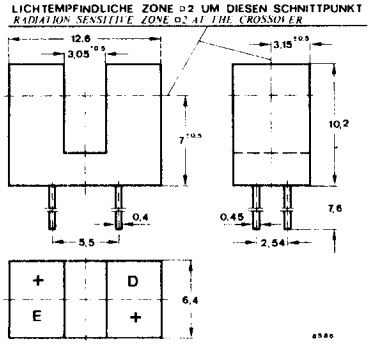


Fig. 42: Plastic case

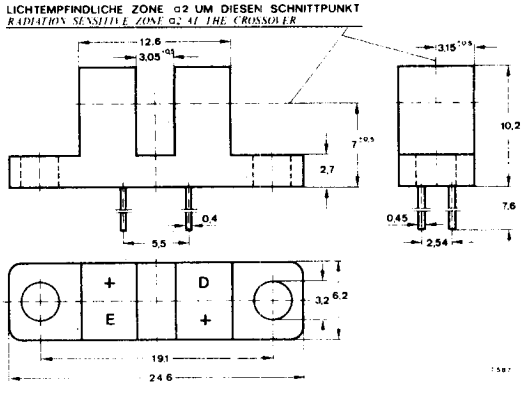


Fig. 43: Plastic case

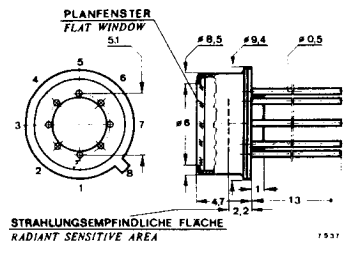


Fig. 44: 5 G 8 DIN 41 873
JEDEC MO 002 AG

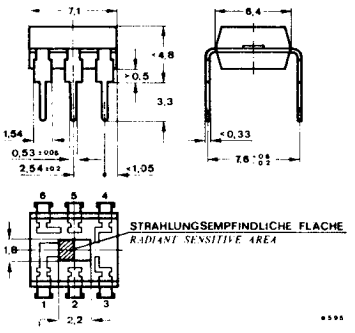


Fig. 45: Plastic case

Integrated circuits for AF applications

TBA 800

Audio power amplifier, especially for TV-receivers

Supply voltage	Pin 1, Pin 3	U_S	5...30	V
Output power U_S = 24 V, R_L = 16 Ω, f = 1 kHz, k = 10%		P_q	(>4.4) 5	W
Input voltage U_S = 24 V, P_q = 5 W, f = 1 kHz, R_L = 16 Ω, R_f = 56 Ω	Pin 8	U_i	80	mV
Voltage amplification with closed loop U_S = 24 V, R_L = 16 Ω, f = 1 kHz, R_f = 56 Ω		A_{uof}	42 (< 45)	dB
Input noise voltage U_S = 24 V, B = 40...20 000 Hz R_f = 56 Ω	Pin 8	U_{ni}	5	μV

Features:

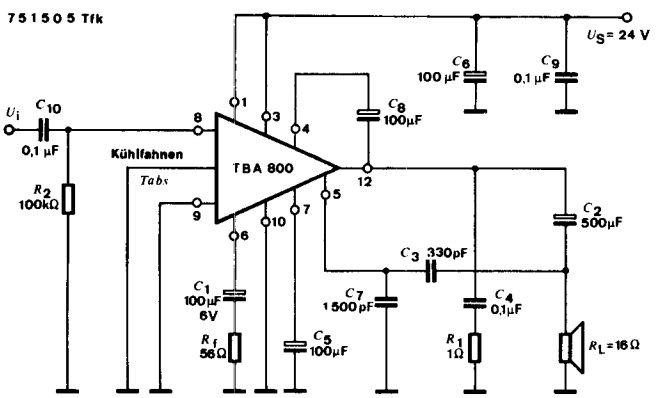
- High output current, up to 1.5 A
- Wide range of supply voltage
- High output power
without heat sink 2,5 W
with heat sink 5,0 W
- Very high efficiency 70%

Case:

QIP special

Dimensions see page 60

Number 1



TBA 810 S · TBA 810 AS

Audio power amplifier

Supply voltage	Pin 1		U_S	4...20	V
Output power R_L = 4 Ω, f = 1 kHz, k = 10%	U_S = 16 V		P_q	7	W
	U_S = 6 V		P_q	1	W
Input voltage	Pin 8				
U_S = 14,4 V, P_q = 6 W,	R_f = 56 Ω		U_i	80	mV
f = 1 kHz. R_L = 4 Ω,	R_f = 22 Ω		U_i	35	mV
Voltage amplification with closed loop U_S = 14,4 V, R_L = 4 Ω, f = 1 kHz, R_f = 56 Ω			A_{uof}	37 (< 40)	dB
Input noise voltage U_S = 14,4 V, B = 20...20000 Hz	Pin 8		U_{ni}	2	μV

Features:

- High output current, up to 2 A
- High output power 7 W
- Low harmonic distortion

Case:

TBA 810 S: QIP special

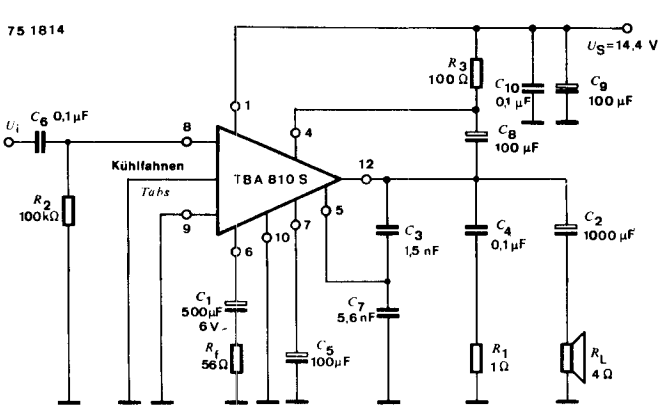
Dimensions see page 60

Number 1

TBA 810 AS: QIP special

Dimensions see page 60

Number 2



Integrated circuits for AF applications

TBA 810 T · TBA 810 AT

Audio power amplifier

Supply voltage range	Pin 1	U_S	4 ... 25	V
Output power $R_L = 4\ \Omega$, $f = 1$ kHz, $k = 10\ \%$, $U_S = 20$ V $U_S = 14{,}4$ V $U_S = 6$ V		 P_q P_q P_p	 10 6 1	 W W W
Band width (−3) $U_S = 14{,}4$ V, $R_L = 4\ \Omega$, $C_3 = 420$ pF		B	40 ... 20000	Hz
Distortion $U_S = 14{,}4$ V, $R_L = 4\ \Omega$, $P_q = 0{,}05$ ... 3 W		k	0,3	%

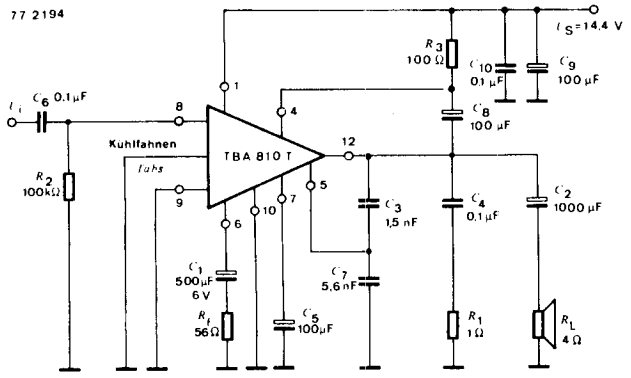
Features:

- Thermal shut-down
- High output current, up to 3 A
- Wide range of supply voltage, 4 to 25 V
- High output power 7 W
- Low cross-over distortion
- Low harmonic distortion
- Very high efficiency 70%

Case:

TBA 810 T: QIP special
Dimensions see page 60
Number 1

TBA 810 AT: QIP special
Dimensions see page 60
Number 2



TCA 830 · TCA 830 A

Audio power amplifier

Supply voltage range	Pin 1	U_S	3,5...20	V
Input voltage $U_S = 12$ V, $P_q = 50$ mW $f = 1$ kHz, $R_L = 4\ \Omega$, $R_f = 56\ \Omega$	Pin 8	U_i	6,5	mV
Voltage amplification $R_L = 4\ \Omega$, $f = 1$ kHz, $R_f = 56\ \Omega$ *with* closed loop		A_{uof}	37 (< 40)	dB
Output noise voltage $U_S = 12$ V, $B = 30...15\,000$ Hz, $R_G = 10$ kΩ, $U_i = 0$		U_{na}	500	µV

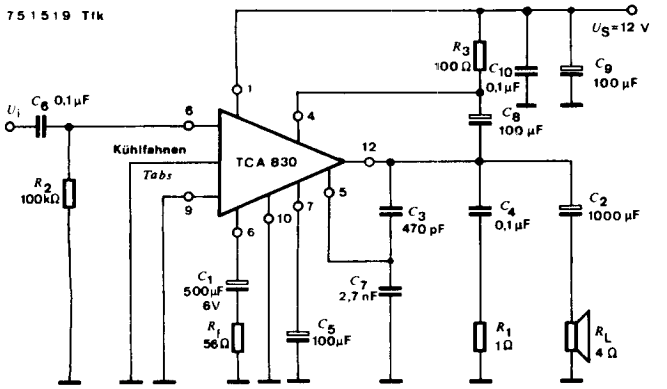
Features:

- High output current, up to 1.5 A
- High output power, up to 4 W
- Low harmonic distortion

Case:

TCA 830: QIP special
Dimensions see page 60
Number 1

TCA 830 A: QIP special
Dimensions see page 60
Number 2



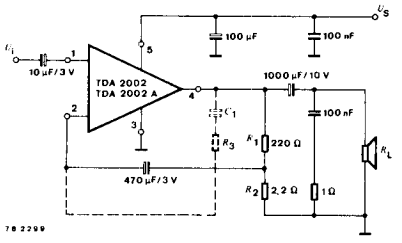
Data book reference: S 8 E

Integrated circuits for AF applications

TDA 2002 · TDA 2002 A

Audio power amplifier especially for car radios

Supply voltage range	Pin 5	U_S	8 ... 18	V
Output power				
U_S = 14,4 V, f = 1 kHz, k = 10%, R_L = 4 Ω		P_q	5,2	W
R_L = 2 Ω		P_q	8	W
Peak supply voltage				
$t_p \leq$ 50 ms	**TDA 2002**	U_{SP}	40	V



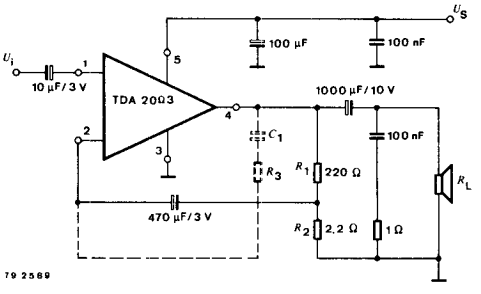
Features:
- Very low number of external components
- Designed for low impedance load 4 Ω as well as 2 Ω
- High output power

Case:
Plastic case 5-lead
≈ JEDEC TO 220
Dimensions see page 60
Number 3 or 6

TDA 2003

Audio power amplifier especially for car radios

Supply voltage range	Pin 5	U_S	8 ... 18	V
Output power				
U_S = 14,4 V, f = 1 kHz, k = 10 %				
A_u = 40 dB R_L = 4 Ω		P_q	6	W
R_L = 2 Ω		P_q	10	W
Input noise voltage	Pin 1	U_{ni}	1	µV



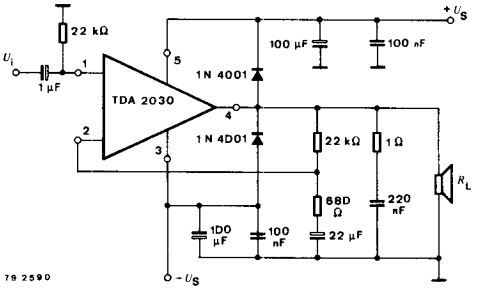
Features:
- Very low number of external components
- Designed for low impedance load 4 Ω as well as 2 Ω
- High output power
- Low noise

Case:
Plastic case 5-lead
≈ JEDEC TO 220
Dimensions see page 60
Number 3 or 6

TDA 2030

Audio amplifier for radios and TV receivers

Supply voltage range	Pin 5	U_S	±6 ... ±18	V
Output power				
U_S = ±14 V, f = 1 kHz, A_u = 30 dB, R_L = 4 Ω,				
k = 10 %		P_q	18	W
k = 0,5 %		P_q	14	W
Input noise voltage	Pin 1	U_{ni}	3	µV



Features:
- Very low number of external components
- Designed for low impedance load 4 Ω as well as 8 Ω
- High output power

Case:
Plastic case 5-lead
≈ JEDEC TO 220
Dimensions see page 60
Number 3 or 6

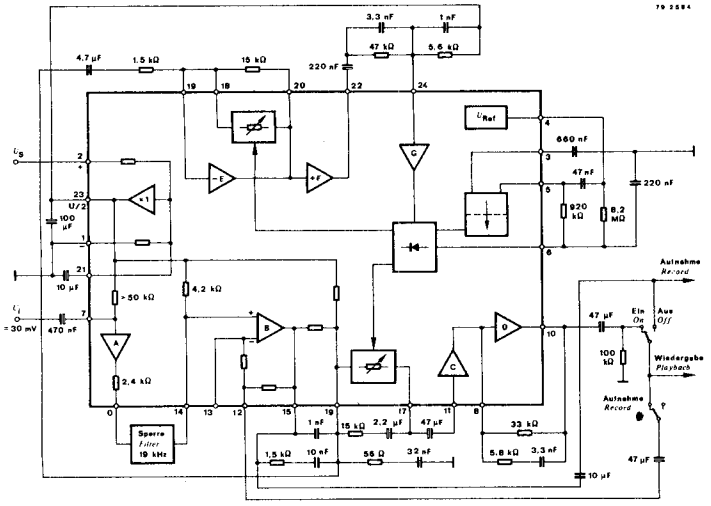
Data book reference: S 8 E

Integrated circuits for AF applications

U 401 B HIGH{}COM

Broadband compander circuit to reduce noise during recording and playback in cassette recorders just as for radio systems

Supply voltage range	Pin 2	U_S	12...20	V
Supply quiescent current	Pin 2	I_{SB}	7	mA
Amplification f = 1 kHz, position playback	Pin 7 and Pin 15	A_u	26	dB
Signal to noise ratio Pin 7, R_G = 10 kΩ	Pin 8	$\frac{U_q}{U_{qn}}$	80	dB
Compander gain in signal to noise ratio		A_u	20	dB



Features:

- Wide supply voltage range, usabled in bipolar or unipolar circuits
- Extreme high noise suppression even at low frequencies
- No frequency change response with level shifting between recording and playback
- No additional distortion due to faults in the transmission equipment
- Short circuit protected
- Low harmonic distortion
- Low internal noise

Case:

20 B 24 DIN 41 866

DIP 24-lead

Dimensions see page 60

Number 13

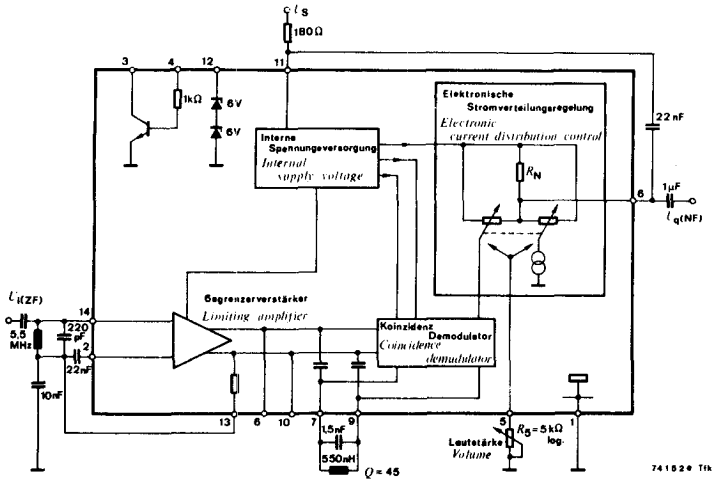
This circuit is intended for HIGH{}COM noise reduction. It is available only to the licenses of AEG-TELEFUNKEN 6000 Frankfurt, for the production of equipment with HIGH{}COM noise reduction.

Data book refrence: S 8 E

TBA 120 S

FM IF amplifier and detector for television and radio receivers

Supply voltage range		U_S	6...18 V	V
Input limiting voltage f = 5.5 MHz, Δf = ±50 kHz, f_{mod} = 1 kHz, $Q \approx 45$,	Pin 14	U_i	30 (< 60)	µV
Attenuation $20 \lg \left(\frac{U_{qmax(NF)}}{U_{qmin(NF)}} \right)$			(> 70) 75	dB



Features:

- Exceptional limiting sensitivity
- Minimum number of external components
- Large power supply range

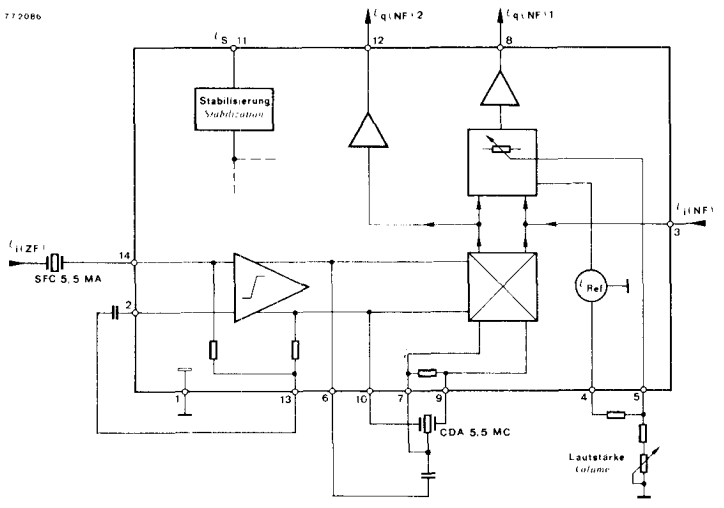
Case:

20 A 14 DIN 41866
JEDEC MO 001 AA (TO 116) or
QIP 14-lead
Dimensions see page 60
Number 4 or 5

TBA 120 T

FM IF amplifier and detector

Supply voltage range		U_S	10...18	V
Input limiting voltage f = 5,5 MHz, Δf = ±50 kHz, f_{FM} = 1 kHz, Pin 14		U_i	30 (< 60)	µV
Volume setting range $\frac{U_{qmax}}{U_{qmin}}$	Pin 8		(> 70) 85	dB
AF-voltage amplification R_5 = 20 kΩ	Pin 8/3	A_u	7,5	



Features:

- Input and demodulator provided for operating with ceramic-resonators
- No selection of volume-input characteristics
- Independent sound output for VCR and headphone
- Additional sound input for video playback unit
- Insensitive against ripple and inconstant supply voltage (10 V ... 18 V)
- High residual carrier suppression prevents harmonic distortion

Case:

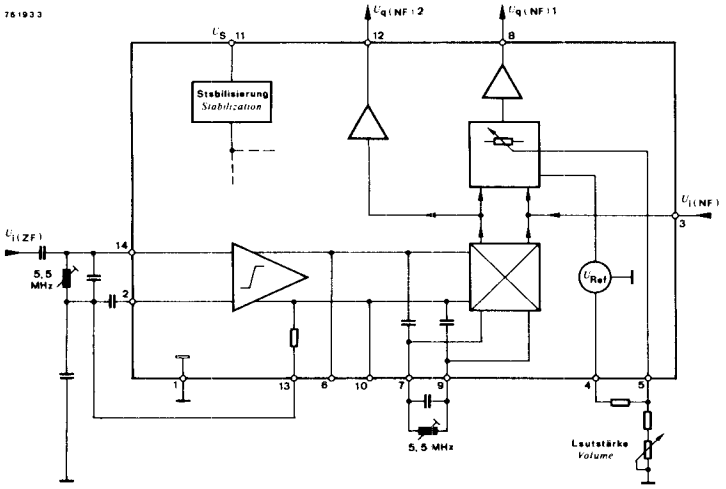
20 A 14 DIN 41866
JEDEC MO 001 AC
Dimensions see page 60
Number 4 or 5

Integrated circuits for RF applications

TBA 120 U

FM IF amplifier and demodulator for television receivers

Supply voltage range		U_S	10...18	V
Input limiting voltage f = 5.5 MHz, Δf = ±50 kHz, f_{FM} = 1 kHz, Q = 45,	Pin 14	U_i	30 (< 60)	µV
Attenuation	Pin 8	$\frac{U_{qmax}}{U_{qmin}}$	(> 70) 85	dB
AF amplification R_5 = 20 kΩ	Pin 8/3	A_u	7.5	



Features:

- No grouping of volume control tuning characteristics
- Independent AF-output for VCR and headphone
- Additional AF-input for video play back
- Rugged against noise and fluctuation of the supply voltage
- High residual carrier attenuation prevents the harmonic

Case:

20 A 14 DIN 41866
JEDEC MO 001 AA (TO 116) or
QIP 14-lead or DIP 14-lead
Dimensions see page 60
Number 4 or 5

TBA 520

Synchronous demodulator for PAL colour television receivers

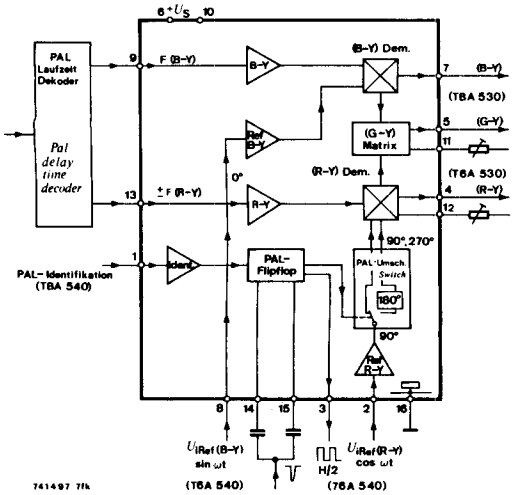
Supply voltage			U_S	12	V
Chroma signal amplification $U_{i(R-Y)}$ = 50 mV, f = 4.4 MHz			$A_{u(R-Y)}$	6	
Ratio of blue to red demodulator gains			$\frac{A_{u(B-Y)}}{A_{u(R-Y)}}$	1.78	
Colour difference output signal for colour bar standard signal					
$U_{i(B-Y)}$ = 166.5 mVss	R-Y	Pin 4	U_q	1.4	Vss
$U_{i(R-Y)}$ = 233.0 mVss	G-Y	Pin 5	U_q	0.82	Vss
f = 4.4 MHz	B-Y	Pin 7	U_q	1.78	Vss

Features:

- High demodulating linearity
- Low output rest carrier

Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
or QIP 16-lead
Dimensions see page 60
Number 4 or 5



Data book reference: S 8 E

Integrated circuits for RF applications

TBA 530

RGB matrix and pre-amplifier for PAL colour television receivers

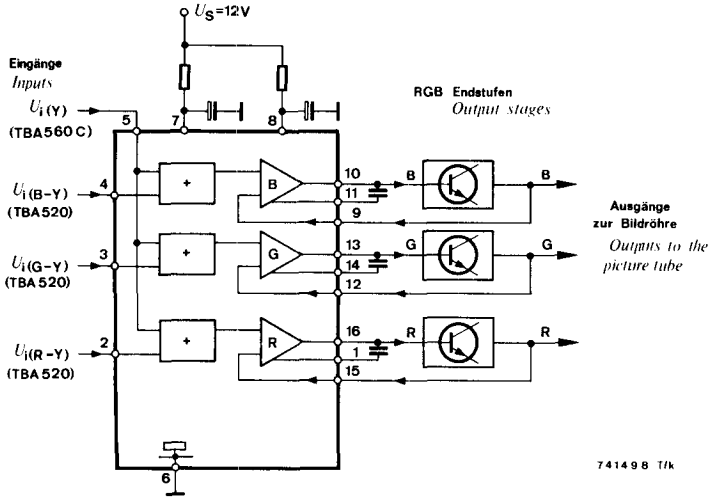
Supply voltage			U_S	12	V
Input d.c. voltage					
	R-Y	Pin 2	U_i	1.4	Vss
	G-Y	Pin 3	U_i	0.82	Vss
	B-Y	Pin 4	U_i	1.78	Vss
	Y	Pin 5	U_i	1	Vss
Voltage amplification (including RGB output stages)					
f = 0.5 MHz			A_u	100	
3-dB Bandwidth			f	>6	MHz

Features:

- Associated with TBA 520 direct drive of RGB-output transistors possible
- RGB drive circuit with or without clamping possible

Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
or QIP 16-lead or DIP 16-lead
Dimensions see page 60
Number 7 or 8



TBA 540

Reference circuit for PAL-colour TV receivers for generating colour carrier, colour killer, PAL-identification signals and control voltage for chroma amplifier

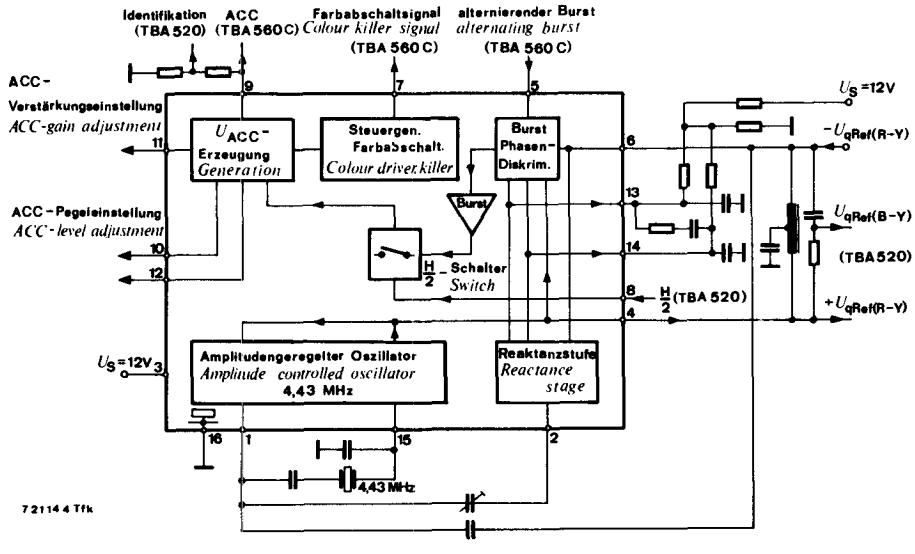
Supply voltage	Pin 3	U_S	12	V
Drive voltage for colour killer				
Switching position 1 "ON"	Pin 7	U_{Q1}	11	V
0 "OFF"	Pin 7	U_{Q0}	<0.27	V
Lock-in-range of subcarrier oscillator		Δf_{Fang}	±300	Hz
Phase difference between reference and burst signal at a frequency difference of 200 Hz	Pin 4, Pin 5	$\Delta\varphi$	±5°	

Features:

- Wide lock-in and holding range of reference oscillator
- Controlled oscillator amplitude

Case:

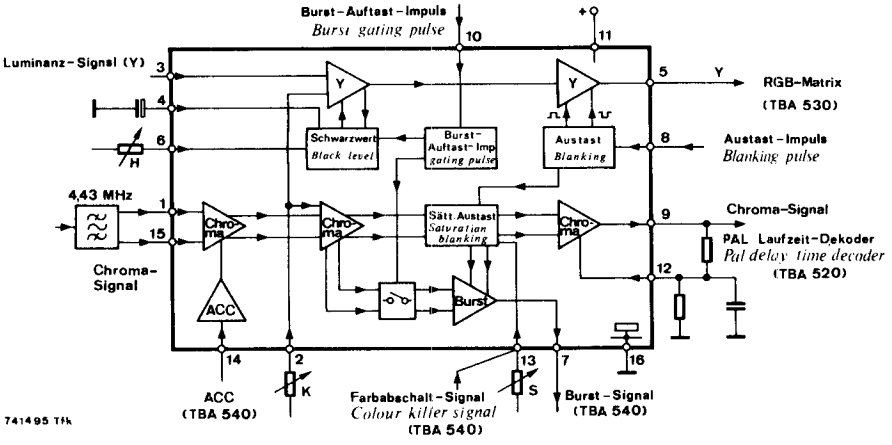
20 A 16 DIN 41866
JEDEC MO 001 AC
or QIP 16-lead
Dimensions see page 60
Number 7 or 8



TBA 560 C

Luminance and chroma-combination for PAL colour television receivers

Supply voltage	Pin 11	U_S		12	V
Control range of chroma amplification	Pin 1–15/Pin 9–16	$20 \log \left(\frac{A_{umax}}{A_{umin}} \right)$		26	dB
Maximum chroma output voltage max. contrast $U_{I(2)} = 5.5$ V max. saturation $U_{I(13)} = 6.0$ V $k \leq 5\%$	Pin 9	U_q		> 2.5	Vss
Temperature drift of black level (Y) at nominal brightness $U_{I(6)} = 1.25$ V	Pin 5	U_Q	50 °C 20 °C	< 60	mV



Features:

- Electronic adjustment for brightness, contrast and chroma saturation
- Minimum temperature dependance of the black level
- Luminance output signal suitable for direct use in the integrated RGB-matrix circuit TBA 530

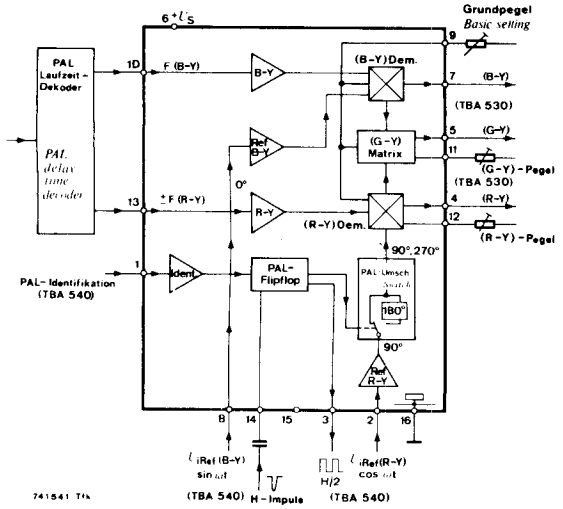
Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
or QIP 16-lead or DIP 16-lead
Dimensions see page 60
Number 7 or 8

TBA 990

Synchronous demodulator for PAL colour television receivers

Supply voltage	Pin 6	U_S		12	V
Chroma signal amplification $U_{i(R-Y)} = 50$ mV, $f = 4.4$ MHz		$A_{u(R-Y)}$		3.8	
Ratio of blue to red demodulator gains		$\frac{A_{u(B-Y)}}{A_{u(R-Y)}}$		1.78	
Colour difference output signal $m = 0.7$					
R-Y	Pin 4	U_q		> 1.6	Vss
G-Y	Pin 5	U_q		> 0.9	Vss
B-Y	Pin 6	U_q		> 2.0	Vss



Features:

- High demodulating linearity
- Low output rest carrier

Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
or QIP 16-lead or DIP 16-lead
Dimensions see page 60
Number 7 or 8

Data book reference: S 8 E

Integrated circuits for RF applications

TDA 440

Video IF amplifier for colour and monochrome television receivers

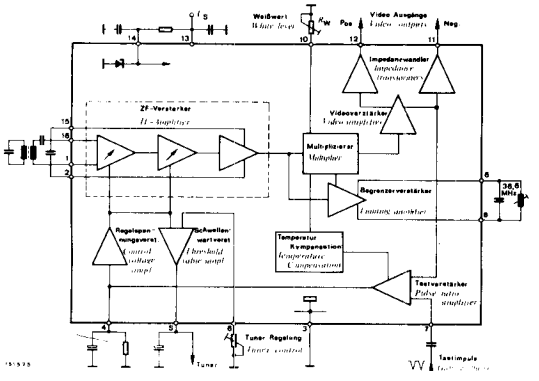
Supply voltage range	Pin 13	U_S	10...15	V
Negative video DC output voltage With white level adjustable Pin 10 $R_W = \infty$	Pin 11	U_Q	< 4.8	V
$R_W = 0$		U_Q	> 6.5	V
Composite video output level U_Q = 5.5 V (Pin 11)	Pin 11	$-u_q$	3.3	Vss
U_Q = 6.4 V (Pin 11)	Pin 11	$-u_q$	4.2	Vss
AGC range		ΔA(ZF)	(> 50) 56	dB
Symmetrical input voltage $-u_q$ = 3.3 Vss (Pin 11)	Pin 1–16	u_i	150 (< 220)	µV
Maximum IF voltage level present at video outputs over the full AGC range f = 38.9 MHz	Pin 11, 12	u_{HF}	< 30	mV
f = 77.8 MHz	Pin 11, 12	u_{HF}	< 50	mV
Suppression of vision carrier/colour subcarrier IP (1.07 MHz) with respect to colour subcarrier level		a_{IM}	> 40	dB

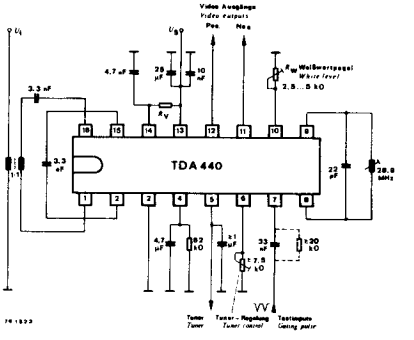
Features:

- High gain – high stability
- Negative video signal hardly affected by supply voltage variations
- Minimum differential error
- DC output component adjustable (peak white)

Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7 or 8





TDA 440 T

Video IF amplifier for quasi-parallel sound in television receivers

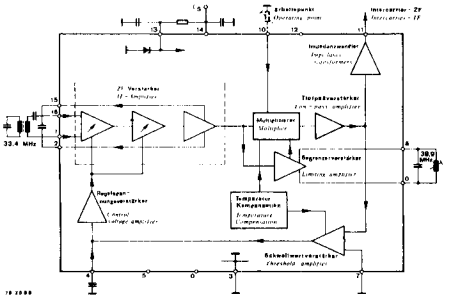
Supply voltage range	Pin 13	U_S	10...15	V
Supply current	Pin 13	I_S	19	mA
Supply voltage I_S = 40 mA	Pin 14	U_S	5,8	V
Negative video DC output voltage With white level adjustable Pin 10 $R_W = \infty$	Pin 11	U_Q	3,6	V
$R_W = 0$		U_Q	≥ 6,5	V
Intercarrier output voltage	Pin 11	u_q	900	mV
Symmetrical sound carrier input voltage for control action, picture carrier 8 dB below sound carrier	Pin 1–16	u_i	100	µV

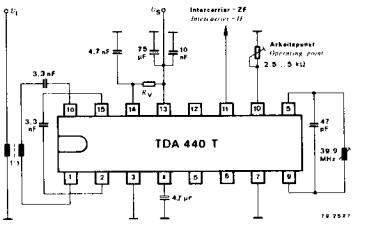
Features:

- Reduced noise influence against intercarrier IF
- Possibility to reduce 1.1 MHz noise by lowering sound carrier in the video IF section
- Large detuning width of the input signal
- Very few external components

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7





Integrated circuits for AF applications

TDA 1062

FM-Tuner for AC-line and car-radios, mixer, modulator and phasesensive detectors up to 200 MHz.

Supply voltage		U_S	9 ... 15	V
Power amplification $U_S = 10$ V, $f = 95$ MHz, $R_G = R_L = 50\ \Omega$		G_P	typ. 30	dB
Oscillator pulling $P_i = 0$ dBm	without AFC	A_{fo}	typ. 10	kHz
	with AFC	A_{fo}	typ. 22	kHz
Noise figure		F	typ. 5,5	dB

Features:

- Excellent large signal behavior
- High oscillator frequency stability, even by large input signals
- Low noise figure
- Adaptable to capacitance diode, variometer or variable capacitor tuning
- Low radiation

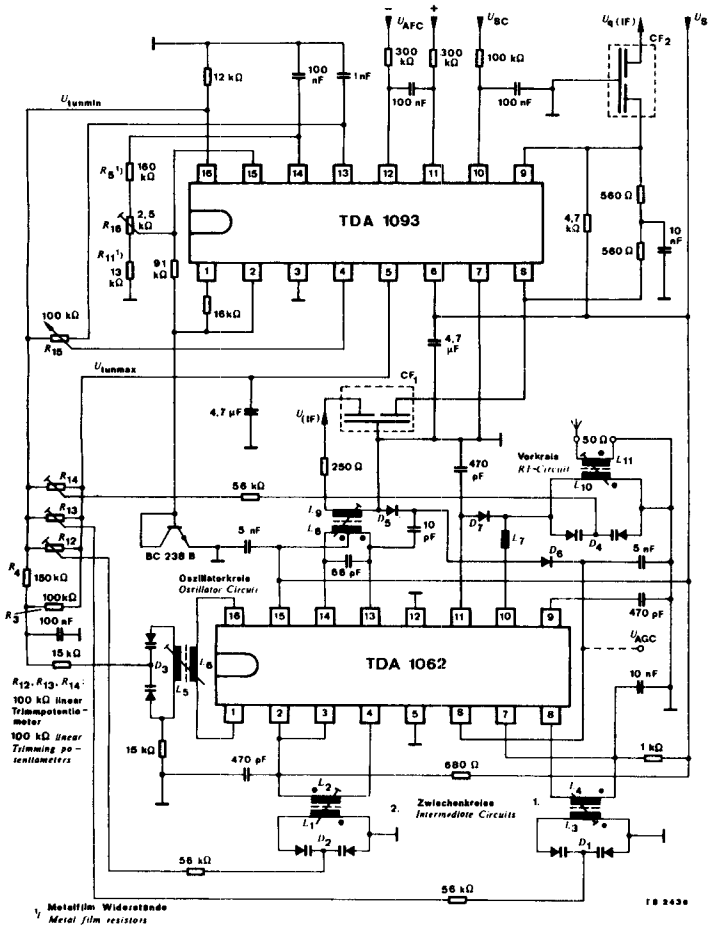
Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

TDA 1093

FM-Interface for TDA 1062

Supply voltage range		U_S	7,5...18	V
Quiescent drain current		I_{SB}	3	mA
Minimum tuning voltage		U_{tunmin}	1,8	V
Maximum tuning voltage		U_{tunmax}	U_S–1 V	V



Features:

- Regulation of the tuning voltage against supply voltages variations
- Adjustable programmable tuning voltage
- Adjustable programmable thermal compensation of the tuned circuits
- Programmable AFC
- Buffer stage for tuning voltage source
- Transistor stage for FM IF amplification or other functions

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

Data book reference: S 8 E

Integrated circuits for RF applications

TDA 1083

AM/FM- and Audio-Amplifier (One chip radio)

Supply voltage range		U_S	3 ... 12	V
Quiescent drain current				
U_S = 6 V		I_{SB}	14	mA
U_S = 9 V		I_{SB}	17	mA
U_S = 12 V		I_{SB}	20	mA
Limiting threshold (−3 dB)	Pin 2			
FM-mode f = 10.7 MHz		U_i	50	µV
RF amplification				
f = 460 kHz		A_u	70	dB
AF output power				
k = 10%, U_S = 7,5 V, R_L = 8 Ω		P_q	700	mW
U_S = 12 V, R_L = 25 Ω		P_q	700	mW
AF voltage amplification				
f = 1 kHz		A_u	40	dB

Features:

- Large supply voltage range
- High AM-Sensitivity
- Limiting threshold voltage
- Audio output power P_q = 0.7 W
- AFC-connection for VHF-Tuner
- AM-FM switching without high frequency voltages

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

U 417 B (Pin-compatible with TDA 1083)

AM-/FM-and Audio-Amplifier (One chip radio)

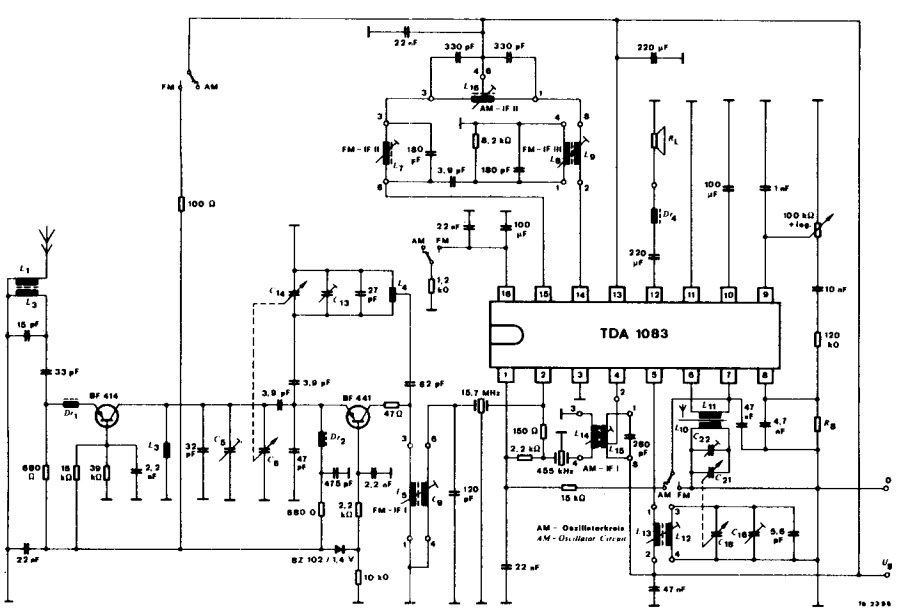
Supply voltage range		U_S	3 ... 15	V
Quiescent drain current				
U_S = 9 V		I_{SB}	12	mA
Limiting threshold (−3 dB)	Pin 2			
FM-mode f = 10,7 MHz		U_i	50	µV
RF amplification				
f = 460 kHz		A_u	70	dB
AF output power				
U_S = 9 V, R_L = 8 Ω		P_q	1	W
AF voltage amplification				
f = 1 kHz		A_u	40	dB

Features:

- Large supply voltage range
- High AM-Sensitivity
- Limiting threshold voltage
- Audio output power P_q = 1 W
- AFC-connection for VHF-Tuner
- AM-FM switching without high frequency voltages

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7



Integrated circuits for RF applications

TDA 1086

Monolithic integrated NPN double transistors
Cascade amplifier stage especially for mixer stages up to 300 MHz

Total power dissipation $t_{amb} \leq 55$ °C	P_{tot}	200	mW
DC forward current transfer ratio $I_C = 3$ mA	h_{FE}	>40	
Gain bandwidth product $I_C = 3$ mA	f_T	600	MHz
Noise figure $I_C = 3$ mA	F	<7	dB
Unilateral gain $I_C = 3$ mA, $f = 200$ MHz	G_u	26	dB

Features:

- High usable amplification
- No reconvertion problems
- Low oscillator power
- High convertion transconductance with
- With emitter negative feedback $R_e \approx 15\ \Omega$:
  Excellent large signal behaviour and low input conductance

Case:
50 B 4 DIN 41 867
JEDEC TO 50
Dimensions see page 22
Number 14

TDA 1087

Monolithic integrated NPN double transistors
High current cascade amplifier stage up to 300 MHz

Total power dissipation $t_{amb} \leq 55$ °C	P_{tot}	280	mW
DC forward current transfer ratio $I_C = 20$ mA	h_{FE}	>40	
Gain bandwidth product $I_C = 10$ mA	f_T	680	MHz
Noise figure $I_C = 10$ mA	F	<7	dB
Unilateral gain $I_C = 10$ mA, $f = 200$ MHz	G_u	49	dB

Features:

- Low feedback
- High input signal opportunity
- High internal resistance
- High dynamic stability

Case:
50 B 4 DIN 41 867
JEDEC TO 50
Dimensions see page 22
Number 14

TDA 1170 S

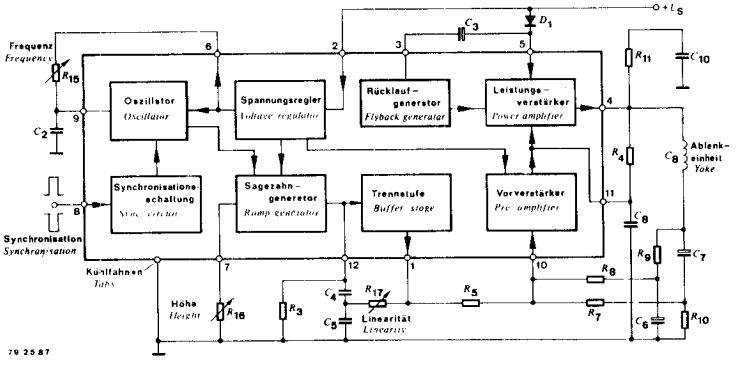
Monolithic integrated vertical deflection circuit in TV receivers

Supply voltage	Pin 2	U_S	35	V
Total power dissipation $t_{case} = 90°$		P_{tot}	5	W
Flyback voltage	Pin 4–5	U_q	58	V
Peak output current $f = 50$ Hz, $t \leq 10$ µs	Pin 4	I_q	2,5	A

Features:

- Wide supply voltage range
- Flyback generator
- Low saturation voltage of the output stages
- Wide pull-in range

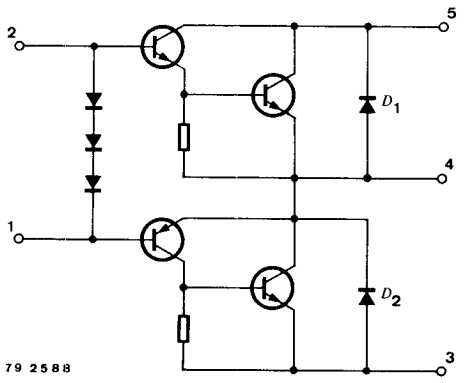
Case:
Qip special
Dimensions see page 60
Number 1



TDA 1410

Monolithic integrated Quasi-complementary Darlington power stage for output stage in colour television receivers, power stage for operational amplifiers and audio power stages

Collector-base voltage		U_{CBO}	50	V
Collector-emitter voltage		U_{CEO}	36	V
Output current	Pin 4	I_Q	3	A
Total power dissipation $t_{case} = 60°$		P_{tot}	30	W



Features:

- Wide supply voltage range
- High output current
- Minimum number of external components

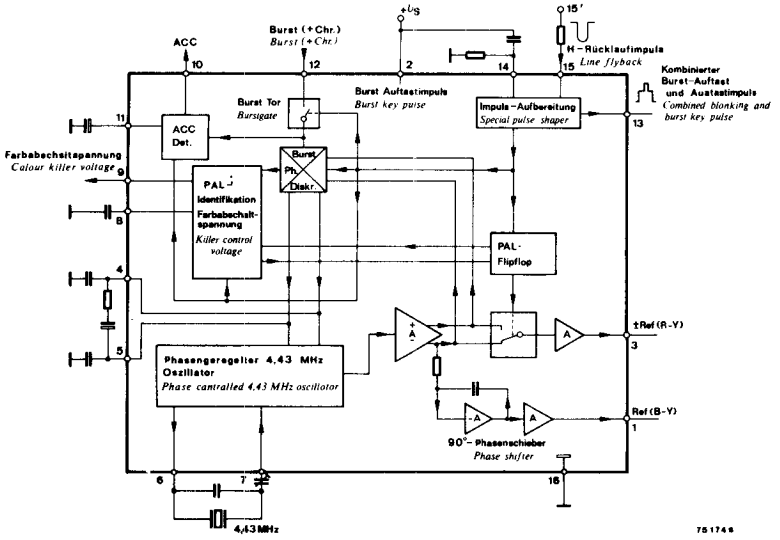
Case:

Plastic case 5-lead
JEDEC TO 220
Dimensions see page 60
Number 3 or 6

TDA 2140

PAL subcarrier reference oscillator for colour TV receivers

Supply voltage	U_S	12	V
Power dissipation	P_{tot}	0.8	W
Flyback input resistance	R_i	1	kΩ
Drive voltage for the colour killer			
correct phase of PAL flipflop	U_Q	12	V
incorrect phase of PAL flipflop	U_Q	0.2	V
Pull in range	$\pm\Delta f$	> 400	Hz



Features:

- High noise immunity in ACC and APC circuits obtained by means of detectors activated only during the burst time
- Internal generation of a combined blanking and burst key pulse by means of the flyback pulse
- When the antenna signal decreases, chroma saturation is automatically reduced before colour killer action
- No adjustments of ACC level and gain are needed
- Integrated 90° phase shifter

Case:

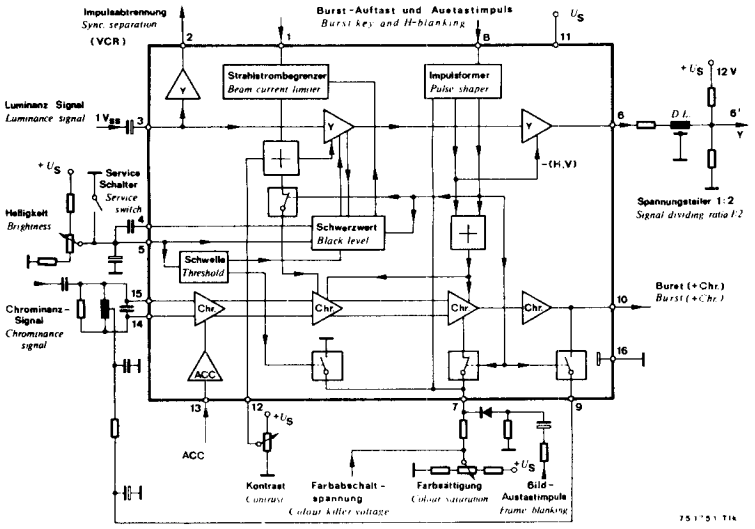
20 A 16 DIN 41866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

Integrated circuits for RF applications

TDA 2150

Luminance and chrominance amplifier for colour TV receivers

Supply voltage		U_S	12	V
Power dissipation		P_{tot}	0,8	W
Luminance input signal 100% white beam	Pin 3	U_i	1	Vss
Luminance output signal U_{12} = 12 V	Pin 6	U_q	2,0 ... 2,4	Vss
Chrominance input signal	Pin 14–15	U_i	< 80	mVss
Chrominance output signal $k \geq 5\%$	Pin 10	U_q	3	Vss



Features:

- Very low spread of the D.C. controls for brightness, contrast and colour saturation in order to avoid presettings completely
- Tracked D.C, contrast control in chrominance and luminance channels
- Independent video signal output for the sync. separator especially at VCR playback operation
- Generation of a luminance service signal for adjusting the CRT cathode bias

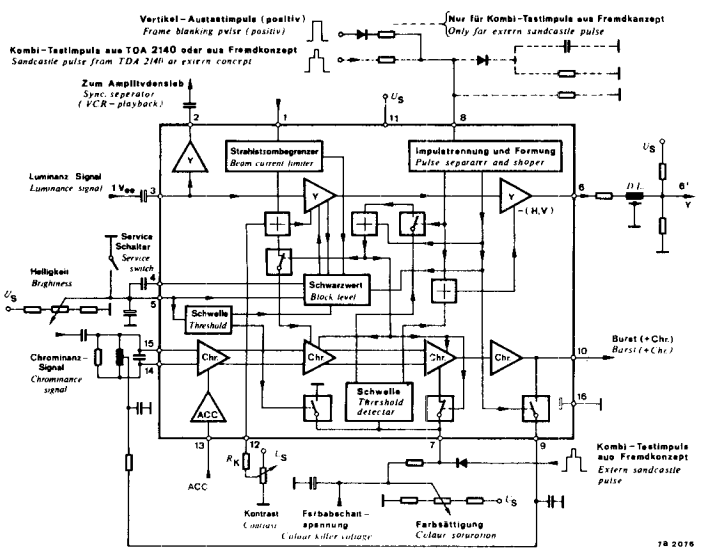
Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

TDA 2151

Luminance and chrominance amplifier for colour TV receivers

Supply voltage		U_S	12	V
Power dissipation		P_{tot}	0,8	W
Luminance input signal 100% white beam	Pin 3	U_i	1	Vss
Luminance output signal U_{12} = 12 V	Pin 6	U_q	2,0 ... 2,4	Vss
Chrominance input signal	Pin 14–15	U_i	< 80	mVss
Chrominance output signal $k \geq 5\%$	Pin 10	U_q	3	Vss
Contrast reduction at beam current limiter action			25 ... 80	%
Programming resistor	Pin 12	R_k	0 ... 7,5	kΩ



Features:

- Very low spread of the DC controls of brightness, contrast and colour saturation in order to avoid presettings completely
- Tracked DC, contrast control in chrominance and luminance channels
- Generation of a luminance service signal for adjusting the CRT cathode bias
- Compatible with every available concept in the market for combined test pulse generation

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Nummer 7

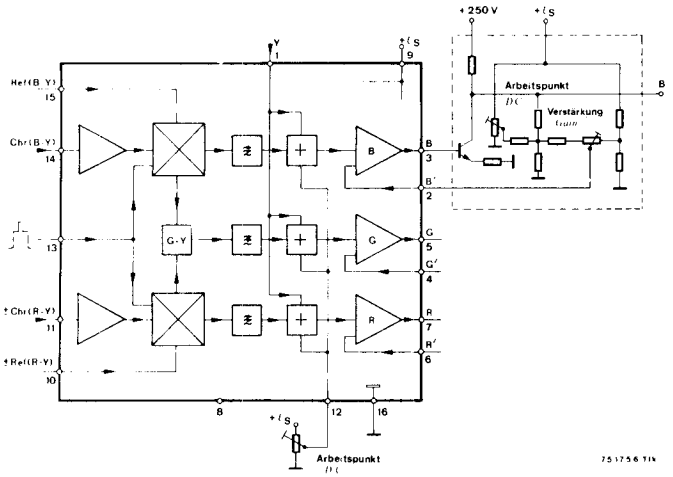
Data book reference: S 8 E

Integrated circuit for RF application

TDA 2160

Synchronous demodulator and RGB matrix for colour TV receivers

Supply voltage		U_S	< 13,2	V
Power dissipation		P_{tot}	0,8	W
Luminance input resistance	Pin 1	R_i	50	kΩ
Blanking input pulse	Pin 13	I_i	> 10	μ A
Amplification ratio		$\frac{A(B-Y)}{A(R-Y)}$	1,78	
Gain of luminance channels including video power stages		A_u	100	



Features:

- High stability of the DC output voltage ensured by applying heavy feedback from the output stages
- Large bandwidth
- Low subcarrier leakage ensured by means of integrated active filters
- Large range of the output black level adjustments
- Large dynamic swing of the output signals
- Good electrical stability of the RGB amplifiers ensured by internal frequency compensations

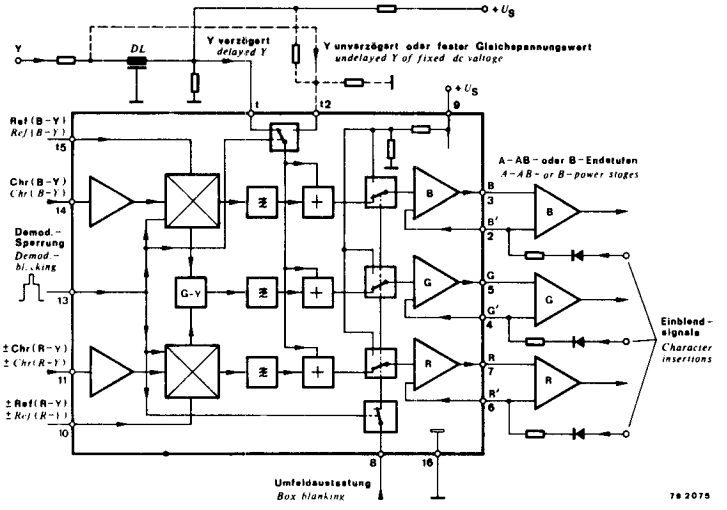
Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

TDA 2161

Synchronous and RGB matrix for colour TV receivers

Supply voltage		U_S	12	V
Power dissipation		P_{tot}	0,8	W
Luminance input resistance	Pin 1	R_i	50	kΩ
Blanking input pulse	Pin 13	I_i	> 10	μA
Gain ratio		$\frac{A(B-Y)}{A(R-Y)}$	1,78	
Gain of luminance channels including video power stages		A_u	100	
Field black out pulse	Pin 8	U_i	2.8 ... 5	V



Features:

- High stability of the DC output voltage ensured by applying heavy feedback from the output stages
- Large bandwidth
- Good electrical stability of the RGB amplifiers ensured by internal frequency compensations
- Field black out for signal fade-in

Case:

20 A 16 DIN 41866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

Data book reference: S 8 E

Integrated circuit for RF application

TDA 4400 with PNP-Tuners · TDA 4410 with NPN-Tuners

Video IF-amplifier for colour and monochrome television receivers.

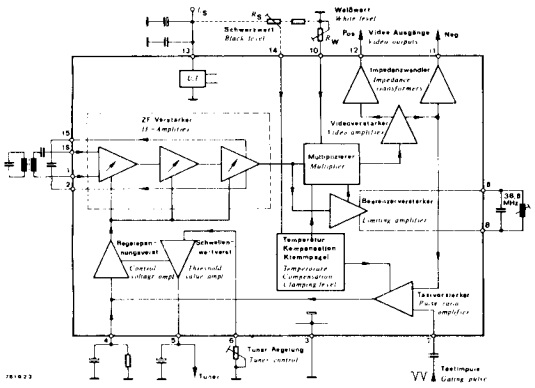
Supply voltage range	Pin 13	U_S	10 ... 15	V
Negative video DC output voltage With white level adjustable				
Pin 10 $R_W = \infty$	Pin 11	U_Q	$< 4{,}5$	V
$R_W = 0$		U_Q	$> 6{,}5$	V
Composite video output level				
$U_Q = 5{,}5$ V (Pin 11)	Pin 11	$-u_q$	3,3	Vss
$U_Q = 6{,}4$ V (Pin 11)	Pin 11	$-u_q$	4,2	Vss
AGC range		ΔA(ZF)	(> 50) 56	dB
Symmetrical input voltage $-u_q = 3{,}3$ Vss (Pin 11)	Pin 1-16	u_i	150 (< 220)	µV
Maximum IF voltage level present at video outputs over the full AGC range				
$f = 38{,}9$ MHz	Pin 11, 12	u_{HF}	< 30	mV
$f = 77{,}8$ MHz (2. Harmonische)	Pin 11, 12	u_{HF}	< 50	mV
Suppression of sound carrier/colour subcarrier IP (1.07 MHz) with respect to colour subcarrier level		a_{IM}	48	dB
Differential gain of negative comp. video output signal, for full black to white swing	Pin 13	d	3	%

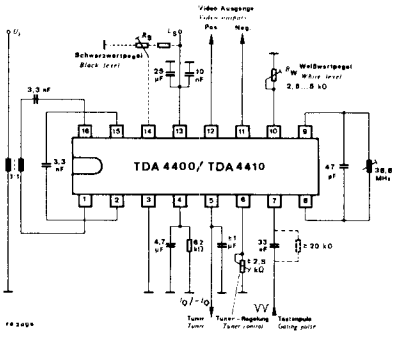
Features:

- High gain – high stability
- Negative video signal hardly affected by supply voltage variations
- Minimum differential error
- Positive as well as neg. video signal available from low-impedance outputs
- White- and black level adjustable
- Very low intermodulation products

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC or
QIP 16-lead
Dimensions see page 60
Number 7 or 8





TDA 4420 with PNP-Tuners-AGC · TDA 4421 with NPN-Tuners-AGC

Video-IF-amplifier for colour and monochrome television receivers.

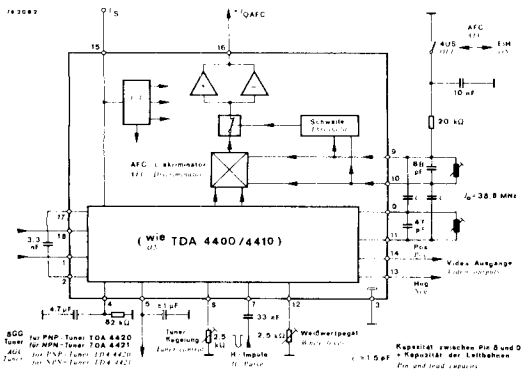
Supply voltage range	Pin 15	U_S	10 ... 15	V
Peak black clamping level at negative video output	Pin 13	u_{QSW}	1,75...1,9...2,15	V
AGC range		ΔA_{ZF}	58	dB
Differential distortion of negative comp. video output signal, for full black to white swing	Pin 13	d	3	%
IMA (1,07 MHz)		a_{IM}	48	dB
AFC voltage	Pin 16	U_{QAFC}	1...(U_S-1,5 V)	V
Max. AFC current	Pin 16	I_{QAFC}	± 5	mA
AFC-slope	Pin 16	$\frac{\Delta I_{QAFC}}{\Delta f}$	±1	$\frac{\text{mA}}{100\ \text{kHz}}$
DC control voltage for AFC switching "OFF"	Pin 9, 10	I_{OFF}	300	µA

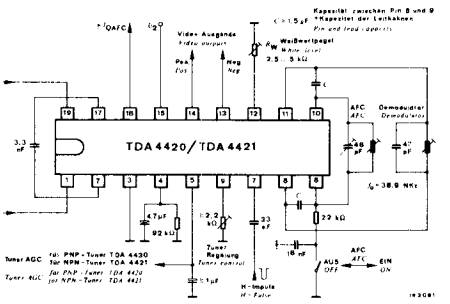
Features:

- High gain – high stability
- Negative video signal hardly affected by supply voltage variations
- Minimum differential error
- Fast AGC action – gating largely independent of pulse shape and amplitude
- Gating pulse control for transmission search system
- White level adjustable
- Large AFC output current swing (push-pull output)
- Switchable AFC

Case:

DIP 18-lead
Dimensions see page 60
Number 10





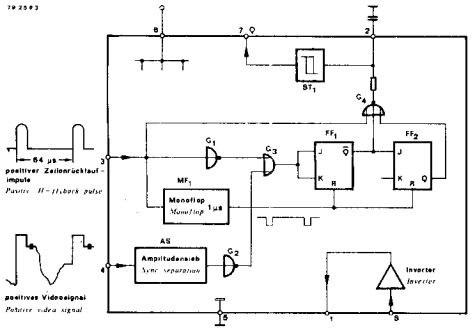
Data book reference: S 8 E

Integrated circuits for RF applications

TDA 4432

Television transmission identification circuit for generating a stop signal for automatic tuning systems, automatic muting at reception of non TV-signals

Supply voltage range	U_S	14,2...15,8	V
Supply current	I_S	10	mA



Features:

- Digital differentiation of transmitter signals with or without modulation
- Suitable for positive or negative flyback pulses
- Digital control signal output

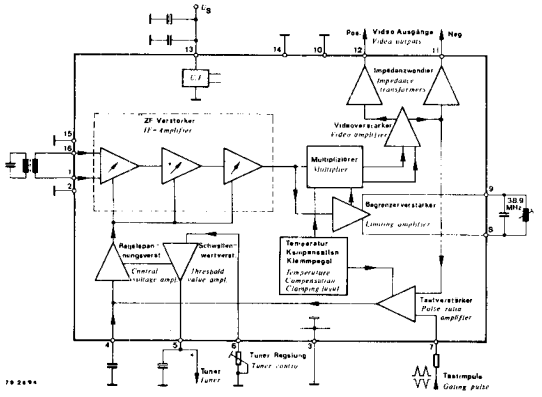
Case:

20 A 8 DIN 41 866
DIP 8-lead
Dimensions see page 60
Number 12

TDA 4440 with PNP-Tuner · TDA 4450 with NPN-Tuner

Video-IF-amplifier, Video-Demodulator

Supply voltage range	Pin 13	U_S	10...15	V
BAS-output voltage $R_L = \infty$	Pin 11	$-u_q$	3	V_{pp}
Negative video output voltage	Pin 11	U_Q	5,5	V
Positive viedeo output voltage	Pin 12	U_Q	2	V
Gating pulse R_V = 10 kΩ	Pin 7	$\pm U_i$	5	V_{pp}
AGC range		$\Delta A_{u(IF)}$	60	dB
Symmetrical input voltage $-u_q$ = 3 V_{pp} (Pin 11)	Pin 1–16	u_i	90	µV



Features:

- Very low intermodulation products
- Minimal differential error
- Constant input impedance independent of AGC
- Video signal hardly affected by supply voltage variations
- Fixed video output voltage with small tolerance range
- Positive or negative gating pulse

Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC or
QIP 16-lead
Dimensions see page 60
Number 7 or 8

TEA 1087

Monolithic integrated NPN-double transistors
High current cascade amplifier stage IF-preamplifier for surface wave filters

Total power dissipation $t_{amb} \leq 55$ °C	P_{tot}	750	mW
Gain bandwidth product I_C = 20 mA	f_T	700	MHz
Noise figure I_C = 10 mA	F	2,8	dB
Unilateral gain I_C = 20 mA, f = 40 MHz	G_u	36	dB

Features:

- High gain
- Low feedback
- High input signal opportunity
- High internal resistance
- High dynamic stability

Case:

10 A 3 DIN 41 868
JEDEC TO92 Z
Dimensions see page 21
Number 3

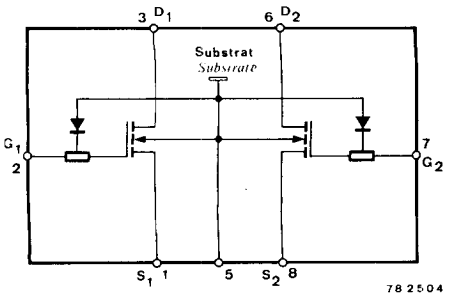
Data book reference: S 8 E

Integrated circuits for RF applications

U 353 M

Low ohmic pair of powerless controlled switches for signal sources up to 10 MHz in N-Channel-Si-Gate-Technology

Channel resistance U_{GS} = 12 V, U_{DS} = 0, f = 1 MHz, U_{pp} = 0,1 V	R_{ON}	≦5	Ω



Shield on top side of the case connected with pin 5

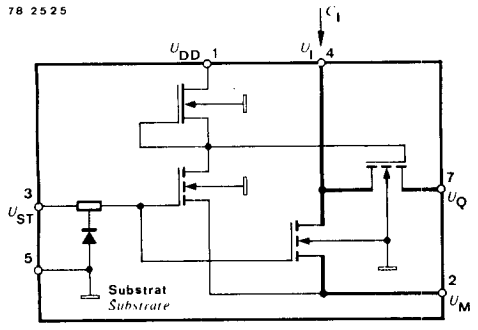
Features:
- On-state resistance ≦ 5 Ω
- Low capacitances
- Protected gates
- Wattless control

Case:
20 A 8 DIN 41 866
DIP 8-lead
Dimensions see page 60
Number 12

U 354 M

Low ohmic powerless controlled switch for signal sources up to 10 MHz in N-Channel-Si-Gate-Technology

Channel resistance			
U_{ST} = 0, U_I = 0, U_{pp} = 0,1 V, f = 1 MHz	R_{ON}	≦4	Ω
U_{ST} = 12 V, U_I = 0, U_{pp} = 0,1 V, f = 1 MHz	R_{ON}	≦4	Ω



Shield on top side of the case connected with pin 5

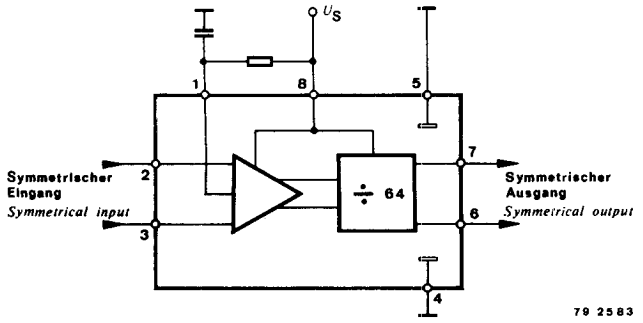
Features:
- On-state resistance ≦ 4 Ω
- Low capacitances
- Protected gates
- Wattless control

Case:
20 A 8 DIN 41 866
DIP 8-lead
Dimensions see page 60
Number 12

U 264 B

GHz frequency divider for frequency synthesizers in TV-tuners

Supply voltage range	U_S	4...6	V
Maximal input voltage	U_{imax}	500	mV
Power dissipation	P_{tot}	340	mW
Input voltage	U_i	≦10	mV
Frequency range	f	10...1000	MHz



Features:
- High input sensitivity
- Large operation frequency range
- Large signal compatibility
- High dynamic stability
- Low power dissipation
- Wide supply voltage range
- Few external components

Case:
20 A 8 DIN 41 866
DIP 8-lead
Dimensions see page 60
Number 12

Data book reference: S 8 E

Integrated circuit for RF application

EPM-System

Electronic **P**rogram **M**emory-System

Electronic system for TV receivers to tune and memorize 16 TV stations

The basic system is containing the following IC's:

TDA 4420 – Video –IF +AF amplifier (bipolar)

TDA 4430 or TDA 4431 – TV signal identification (bipolar)

U 193 M – Control functions, digital tuning voltage generator, nonvolatile memory for 16 TV programmes (N-MOS)

Additional IC's for system completion:

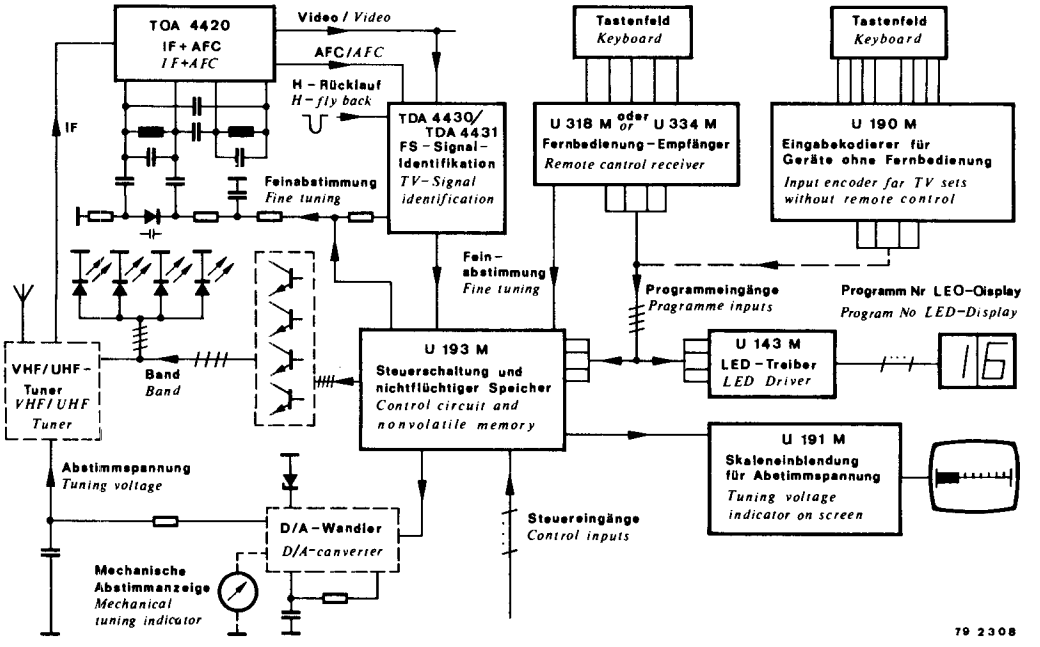
U 143 M – LED-display driver (P-MOS)

U 190 M – Keyboard encoder for 16 program keys (TV sets without remote control-N-MOS)

U 191 M – Character generator indicating a tuning voltage scale and band information on screen (N-MOS)

Features:

- Control functions and nonvolatile memory integrated on one chip
- Identification of TV stations during the automatic search
  - **TDA 4430** – Digital transmitter identification
    Tristate control output
    Constant output voltage
  - **TDA 4431** – High sensitive analogue identification
    Adjustable sensitivity
    Tristate control output
    Control output for search speed
    Constant output voltage
- Soft frequency stability requirements concerning tuner, tuning voltage generator, dc/ac-converter and tuning voltage reference by a quasi closed tuning loop and an automatic frequency offset of recalled stations from the memory into a safe AFC pull in range
- Memorable fine tuning for each of the 16 programmes
- Fast searching run, externally adjustable:
  UHF – 8 s, VHF – 4 s
- Simple manual tuning for service
- Provided for complete manual tuning with two speeds each in up and down direction



Cases:

TDA 4420, U 190 M
20 A 18 DIN 41 866
DIP 18-lead
Dimensions see page 60
Number 10

TDA 4430
DIP 18-lead
Dimensions see page 60
Number 12

TDA 4431
20 A 14 DIN 41 866
JEDEC MO 001 AA (TO 116)
Dimensions see page 60
Number 4

U 143 M, U 191 M
20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

U 193 M
20 B 28 DIN 41 866
JEDEC MO 015 AH
DIP 28-lead
Dimensions see page 60
Number 14

Data book reference: S 8 E

Integrated Trigger, Sensor and remote control circuits

SAS 660 · SAS 670

Electronic touch plate (touch driven double contact four-channel-switch) for program selection of radio and television receivers, lift controls, test equipments etc.

Tuning voltage	Pin 7	U_{SA}	29 ... 37	V
Indicator voltage	Pin 8	U_{SL}	11 ... 15	V
Indicator current of one output U_{SL} = 13,5 V	Pin 8	I_{SL}	55	mA
Switching sensitivity for sensor "ON" U_{SA} = 33 V, U_{SL} = 13,5 V, R_p = 3,9 MΩ ±10%		I_{ITA}	25	nA

Features:

- High input sensitivity
- High noise immunity
- Low saturation voltage and temperature drift of switching transistors
- The indicating outputs (e.g. lamps) provide high load current
- Minimum of external components

SAS 6600 · SAS 6700

Electronic touch plate as SAS 660/SAS 670, but with reduced sensitivity

All datas, block diagram, test circuit and case etc. are corresponding to SAS 660/SAS 670, out cludes:

Tuning voltage	Pin 7	U_{SA}	17 ... 36	V
Indicator voltage	Pin 8	U_{SL}	10 ... 25	V
Indicator current of one output U_{SL} = 13,5 V	Pin 8	I_{SL}	55	mA
Switching sensitivity for sensor "ON" U_{SA} = 33 V, U_{SL} = 13,5 V, R_p = 3,9 MΩ ±10%		I_{ITA}	20 ... 250	nA

Additional special features:

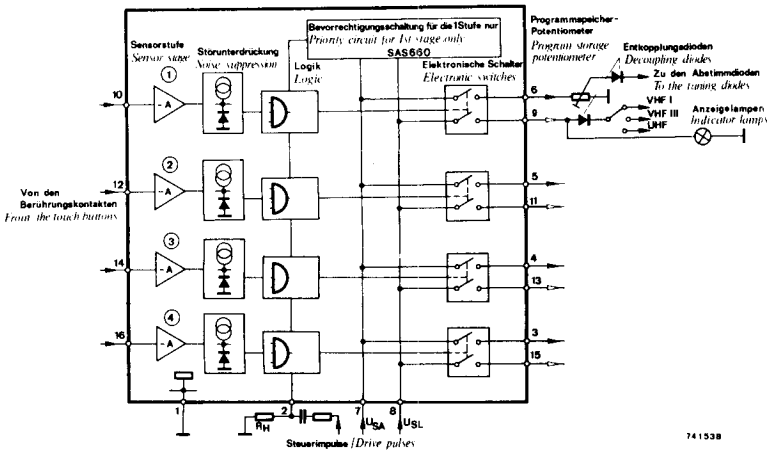
- The selected programs is maintained by switching-off the voltage U_{SL} (pin 8) when U_{SA} = 17 ... 36 V.

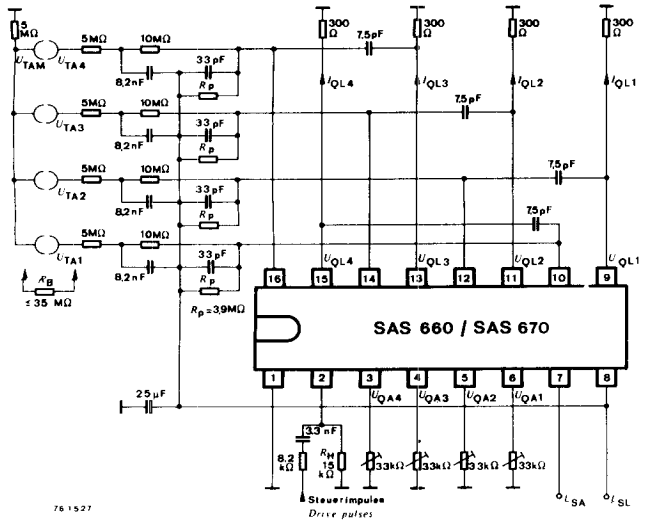
SAS 6610 · SAS 6710

Electronic touch plate as SAS 6600/SAS 6700

Additional special features:

- Sensor inputs with protecting diodes
  Provides for equipments with bridge-connected rectifier without mains decoupling.





Case:

SAS 660/SAS 670 and **SAS 660 S/SAS 670 S**

20 A 16 DIN 41 866

JEDEC MO 001 AC

or QIP 16-lead

Dimensions see page 60

Number 7 or 8

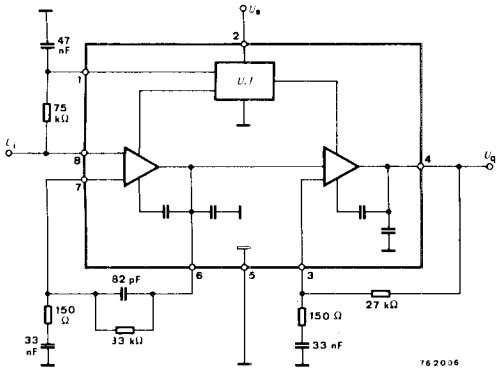
Data book reference: S 8 E

Integrated Trigger, Sensor and remote control circuits

TDA 4180 P

Front end amplifier for remote control systems
i. e.: ultrasonic or infrared transmission

Supply voltage	U_S	12 ... 17	V
Frequency range	f	30 ... 45	kHz
Voltage amplification $U_q \leq 1$ V, $f = 40$ kHz	A	≥ 83	dB
Frequency response	$\frac{A\ (40\ \text{kHz})}{A\ (15\ \text{kHz})}$	≥ 6	dB
Input voltage sensitivity $\frac{N_s + N_n}{N_n} = 2$, $f = 40$ kHz	U_i	≤ 15	µV



Features:

- High sensitivity
- High gain, externally adjustable by the values of the resistors R_{3-4} and R_{6-7}
- Band-pass response can be influenced by RC_{3-5}, RC_{7-5} and RC_{6-7}
- Overdrivable

Case:

DIP 18-lead

Dimensions see page 60

Number 12

UAA 145 · UAA 146

Phase control circuit

U_{S1} = 13...16 V, $-I_{S13}$ = 15 mA U_{S3} = 0 V (Reference point) t_{amb} = 25 °C			
Output saturation voltage $U_{S1} = U_{I2}$ = 16 V, $U_{I7} = U_{\varphi 8}$ = 0 V, I_{I11} = 50 µA I_{Q10} = 20 mA, $I_{Syn\ 9}$ = −0.3 mA I_{Q14} = 20 mA, $I_{Syn\ 9}$ = +0.3 mA	 U_{Q10} U_{Q14}	 0.3 (< 1.0) 0.3 (< 1.0)	 V V
Pulse phasing difference for two half-waves f = 50 Hz	$\Delta\varphi$	$< \pm 3°$	
Inter-IC phasing difference f = 50 Hz	$\Delta\varphi$	$< \pm 3°$	
Maximum synchronic current	$I_{Syn\ 9}$	± 20	mA
Maximum output current	$I_{Q10/14}$	20	mA

Application:

The monolithic integrated circuit UAA 145 and UAA 146 permits the number of components in thyristor drive circuits to be drastically reduced. The versatility of the device is further enhanced by the provision of a large number of pins giving access to internal circuit points.

Features:

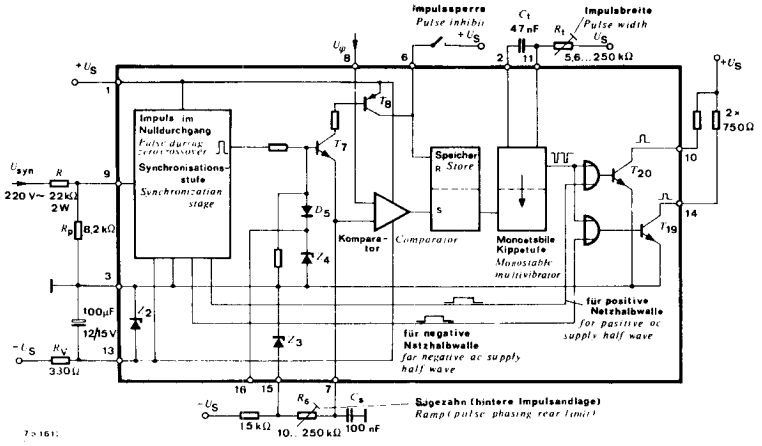
- Suitable for phase-control in high-precision regulators
- Separate pulse outputs for the positive and the negative half-cycle of the sync signal
- Output pulse-width is freely adjustable
- Phase angle variable from < 0° to < 180°
- High-impedance shift input
- Less than 3° pulse symmetry between two half-cycles or those of different UAA 145 units
- No multiple pulse generation due to noisy shift input
- Output pulse blocking feasible

Case:

DIP special

Dimensions see page 60

Number 11

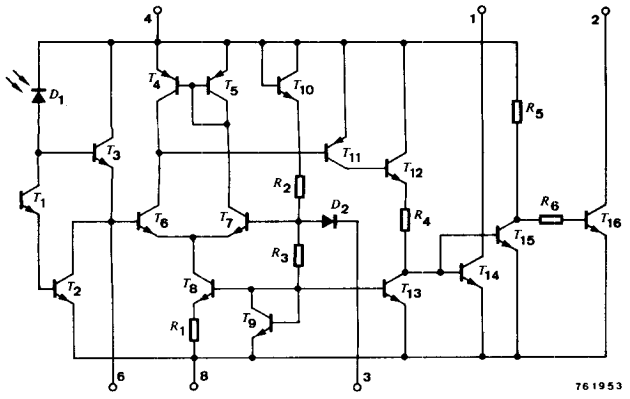


Data book reference: S 8 E

Integrated Trigger, Sensor and remote control circuits

U 102 P

Photo Threshold Switch



Applications:

Exposure and illumination control
Light barrier with direct relay control
Twilight switch

Features:

- Integrated switch and photo detector on one chip
- External controlled light sensitivity
- External controlled hysteresis
- Output stages with open collector $U_{CE} = 25$ V, $I_C = 70$ mA
- Quiescent current $I_{SB} = 2.5$ mA

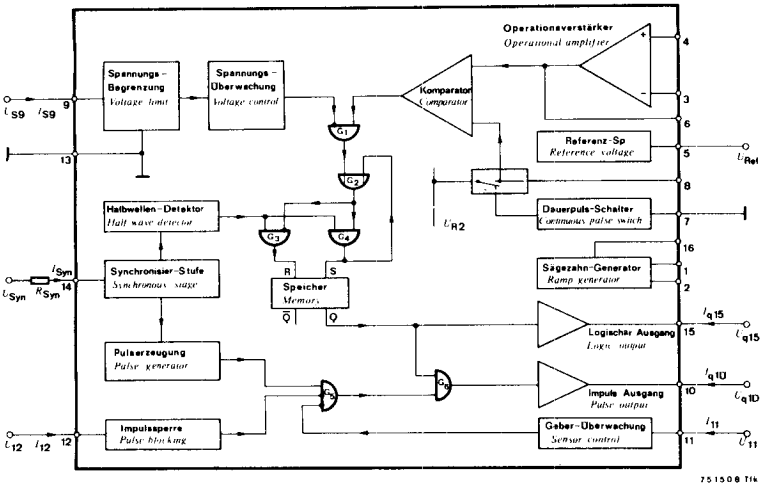
Case:

≈ 5 G 8 DIN 41 873
Dimensions see page 32
Number 44

U 106 BS

Zero voltage switch

Supply voltage	$-U_S$	8	V
Current consumption	$-I_S$	15	mA
Ignition pulse	$-i_q$	250	mA



Applications:

Thyristor- and triac control in the zero crossing mode for static switch, burst firing, two-point driver, proportional driver, power timer, etc. in one and three phase power supply.

Features:

- Simple a.c. or d.c. power supply requirement and definite IC-switching characteristics
- Very few external components
- Full wave drive – no d.c. current components in the load circuit
- Negative output current pulse up to 250 mA – short circuit protection
- Frequency compensated operational amplifier
- Ramp generator
- High resistant input sensor control

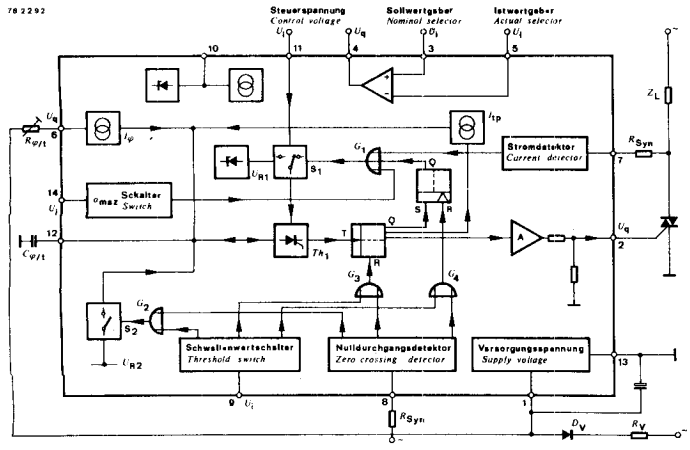
Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

U 111 B

Phase control of ac loads

Supply voltage range	Pin 1			
DC operation		$-U_S$	12 ... 14,2	V
Mains supply		$-U_S$	13,5 ... 17	V~
Current consumption	Pin 1	$-I_S$	≤ 2,4	mA
Drive current	Pin 11	I_I	≤ 0,5	µA



Features:

- One supply voltage
- Low supply current
- Mains supply possible
- Power dissipation in series resistance ≦1.5 W
- Ignition pulse typ. 150 mA
- Output short circuit protected
- Only one time controlled capacitor ramp voltage and ignition pulse width
- Voltage and current synchronisation
- α_{max}- switch
- Internal supply voltage control
- Input blocking pulse
- Free switchable operation amplifier
- Temperature stabilised reference source
- Integrated gate-protected resistance

Case:

20 A 14 DIN 41 866
JEDEC MO 001 AA (TO 116)
Dimensions see page 60
Number 4

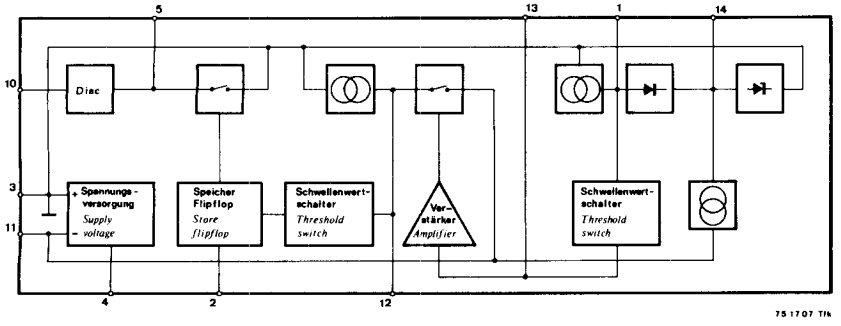
Data book reference: S 8 E

Integrated Trigger, Sensor and remote control circuits

U 112 BA

Triac Control Circuit with Touch Switch

Supply voltage	$-U_S$	21	V
Supply current	$\pm I_{SM}$	<200	mA
Ignition pulse current	$\pm I_G$	500	mA
Drive current	$\pm I_I$	<2	mA



Applications:

Two-wire touch switch with continuously adjustable phase control angle for ohmic and inductive loads.

Features:

- Operation through dropping resistor at 110/220 V mains
- Supply current ≦200 µA
- Insensitive to mains noise and short-time interruption
- Preffered position OFF by longer mains failure
- Integrated Triac trigger stage with low breakover current ≦100 µA and high breakdown voltage between on state and breakover voltage ≧10 V
- Remote control of switching function is possible by integrated touch switch U 113 B through two-wire line (phase and control line)
- Interchangeable with mechanical switches without changing the installation

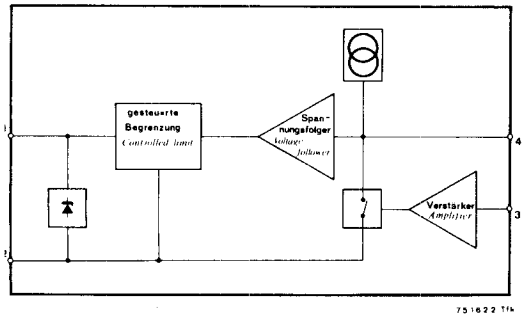
Case:

20 A 14 DIN 41866
JEDEC MO 001 AA (TO 116)
Dimensions see page 60
Number 14

U 113 B

Touch Switch

Sensor input current	$\pm I_I$	<2	mA



Applications:

Bounce-free sensor switch e.g.
Remote control for U 112 B, single ramp generator, constant current source

Features:

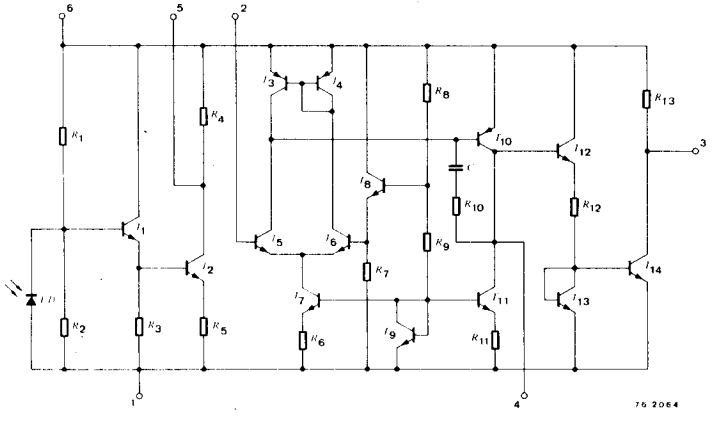
- Functions without mains supply
- The circuit functions even by induced noise pulses
- Minimum need of components

Case:

DIP 4-lead
Dimensions see page 60
Number 9

U 123 P

Photo Pulse Amplifier



Applications:

Pulse light barrier,
photo pulse amplifier

Features:

- Integrated operational amplifier and photo detector on one chip
- External controlled photo sensitivity through R_{2-3}
- Quiescent current I_{SB} = 11 mA
- For $R_{2-3} \geq 50$ kΩ internal frequency compensation
- No influence on primary illumination up to $E = 15$ klx, $f = 100$ Hz (fluorescent lamps)

Case:

Special case, clear plastic
Dimensions see page 32
Number 41

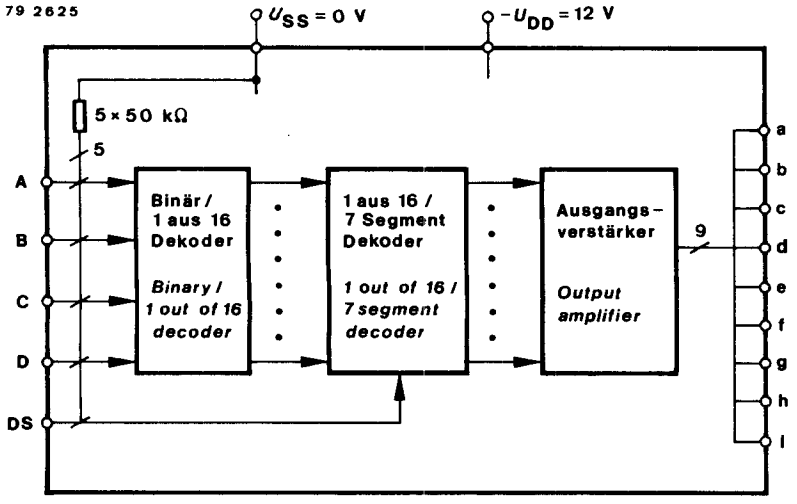
Data book reference: S 8 E

Integrated Trigger, Sensor and remote control circuits

U 143 M

Driver circuit for LED digits

Supply voltage	$-U_{DD}$	12	V
Quiescent drain current	$-I_{SSB}$	1.5	mA
Reverse output current $-U_Q$ = 13,2 V, t_{amb} = 70 °C, Q_1 ... Q_9	$-I_{QR}$	50	µA



Application:

Control the 7-segment LED digits in TV channel displays

Features:

- Display numbers from 1 to 16
- LED control with R_V
- Output currents $-I_{Q1}$ ... $-I_{Q9}$ = 10 mA
- Input code BCD+1
- Pull-up input resistors 50 kΩ
- Separate input for dark switching

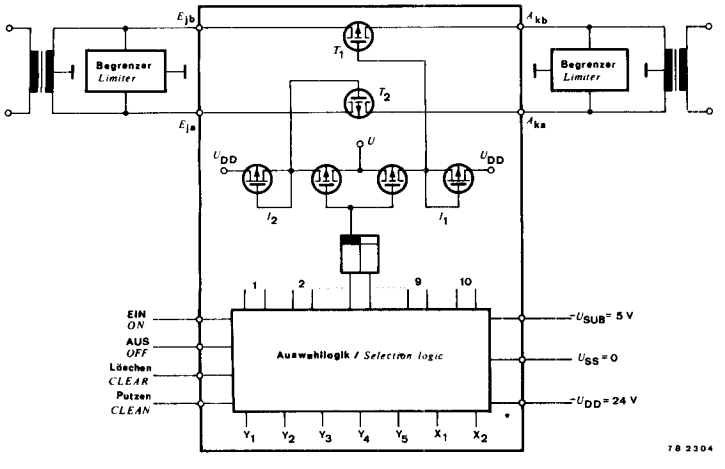
Case:

20 A 16 DIN 41 866
JEDEC MO 001 AC
DIP 16-lead
Dimensions see page 60
Number 7

U 145 M

Cross point switches for PABEX

Supply voltage ranges				
U_{GG} = 5 V	Pin . .	U_{DD}	+0,3 ... -27,5	V
$-U_{DD}$ = 24 V	Pin . .	U_{GG}	-0,3 ... + 8,5	V
Supply currents				
	Pin . .	$-I_{DD}$	≤ 12	mA
	Pin . .	I_{GG}	≤ 14,5	mA



Features:

- Integrated driver logic
- Balanced switching network
- No flow of dc current in speech path
- TTL drivable
- Internally protected inputs
- Signal inputs are galvanically separated from signal path

Case:

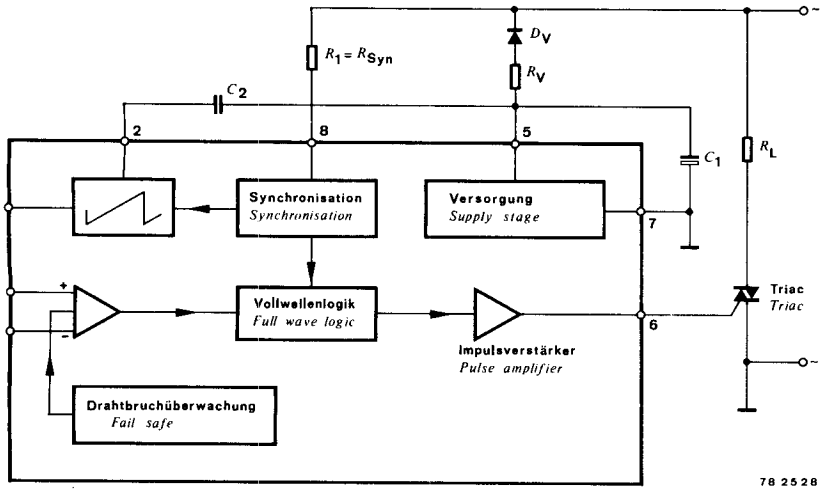
20 B 28 DIN 41 866
JEDEC MO 015 AH
DIP 28-lead
Dimensions see page 60
Number16

Integrated Trigger, Sensor and remote control circuits

U 217 B

Zero voltage switch

Supply voltage range	$-U_S$	8,6...9,9	V
Supply current	$-I_S$	30	mA
Output pulse	$-i_q$	100	mA



Applications:

Triac control in the zero crossing mode for static switch, burst firing, two-point driver proportional driver, power timer, etc. in one and three phase power supply from $16^2/_3$ up to 400 Hz

Features:

- Simple a.c. or d.c. power supply requirement and definite IC-switching characteristics
- Supply voltage control
- Very few external components
- Full wave drive – no d.c. current component in the load circuit
- Negative output current pulse typ. 100 mA – short circuit protected
- Simple power control
- Ramp generator
- Sensor fail safe

Case:

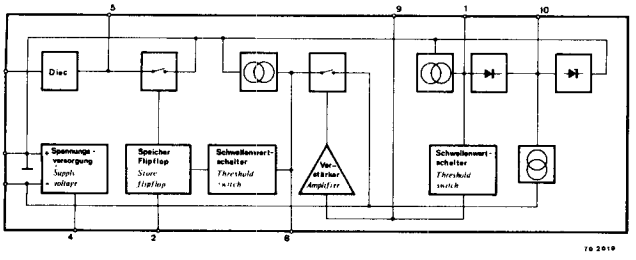
DIP 8-lead

Dimensions see page 60

Number 12

U 221 B

Monolithic Integrated Sensor Stair Case



Applications:

Sensor control stair light time switch with sensor and/or touch remote control and adjustable brightness

Features:

- Operation as two-wire-switch available
- Supply current ≤ 200 µA
- Switch current ± 25 mA
- Sensor input sensitivity ≤ 1 µA
- Trigger current up to ± 500 mA
- Integrated firing stage with $\Delta U = 10$ V
- Controllable with U 113 B and/or mechanical keys by using a two-wire-line
- Interchangeable with mechanical switches without changing the installation

Case:

DIP 10-lead

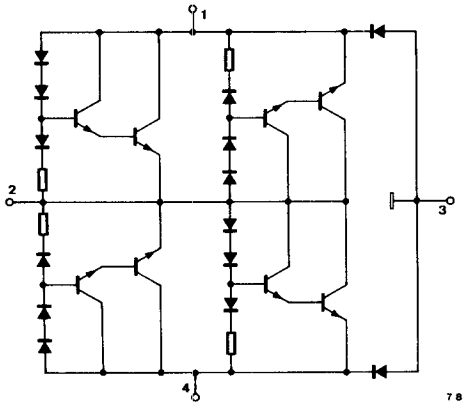
Dimensions see page 60

Number 14

U 225 B

Limiter to limit the voltage on symmetrical two wire speech branches in PABEX

Supply voltage	Pin 3	$-U_S$	5 V ± 10%	
Input voltage I_I = 1,2 A, t_p = 10 ms	Pin 1 or 4	$\pm U_I$	≤ 3,2	V
Input current $\pm U_I$ = 0,6 ... 1,4 V	Pin 1 or 4	I_I	1 ... 20	µA



Features:

- Symmetrical limitation of noise voltage to ±3.2 V
- Simultaneously effective for a- and b- branch
- Low ohmic due to active circuit
- High input current 1.2 A

Case:

20 A 4 DIN 41 866

Dimensions see page 60

Number 9

Data book reference: S 8 E

Integrated Trigger, Sensor and remote control circuits

U 250 B – U 327 M – U 334 M – U 427 B

Universal IR remote control (PCM) system for the consumer electronic field, especially for TV sets, radios and additional equipments

U 250 B – Amplifier circuit

Supply voltage range	U_S	10,8 ... 13,2	V
Voltage gain	A_u	1300	dB
Bandwidth $\Delta A_u = -3$ dB	B	8	kHz
Center frequency	f	36	kHz

Features:

- An internal signal limiter without saturation prevents overdriving
- Good ambient light compatibility by separating into a quasi static and a dynamic input
- Steep bandpath characteristic by active filters
- No external resonator circuit
- Accepts extremely steep input pulse slopes by compensating the IR diode capacity

U 327 M – Transmitter

Supply voltage range	U_S	6 ... 10	V
Quiescent supply current	I_{SB}	< 8	µA
Clock frequency – ceramic resonator	f_c	485	kHz
Output signal duty cycle	$\frac{t_p}{T}$	2,75 10^{-3}	

Features:

- 8 x 40 commands
- PCM transmission
- High noise immunity by two carrier frequencies
- Minimum number of external components by keyboard scanner
- Low quiescent current consumption by standby circuit
- Low current consumption by energy saving signal coding
- Externally programmable to 8 addresses for TV, radio etc.

U 334 M – Receiver

Supply voltage range	U_S	10,8 ... 13,2	V
Clock frequency – quartz –	f_c	4,43	MHz

Features:

- High noise immunity by two carrier frequencies and several code checks within word reception
- High speed word transmission by noise immune PCM without word comparison
- Keyboard input for 5 x 8 keys for the local set control
- External programming for acceptance of 4 address ranges

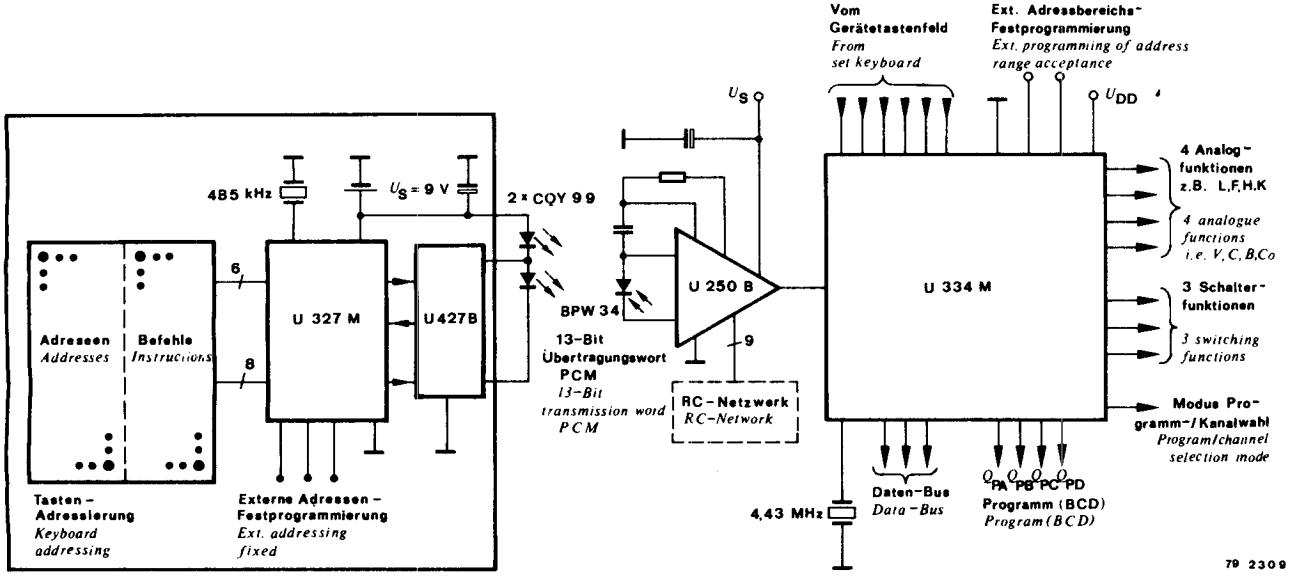
U 427 B

Driver for IR-Transmitter diodes

Supply voltage range	U_S	1...10	V
Control range	U_I	3...10	V
Control current	I_I	1	mA

Features:

- Current stabilisation starts at $U_S = 1$ V
- Constant current $I_{CM} = 1{,}5$ A
- Additional switching transistor $I_C = 20$ mA



Cases:

U 250 B
20 A 16 DIN 41866
JEDEC MO 001 AC
Dip 16-lead
Dimensions see page 60
Number 7

U 327 M
20 B 24 DIN 41866
DIP 24-lead
Dimensions see page 60
Number 15

U 334 M
20 B 28 DIN 41866
DIP 28-lead
Dimensions see page 60
Number 16

U 427 B
20 A 8 DIN 41866
DIP 8-lead
Dimensions see page 60
Number 12

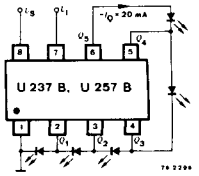
Data book reference: S 8 E

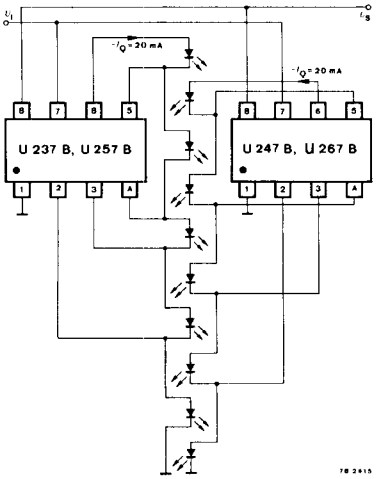
Integrated Trigger, Sensor and remote control circuits

U 237 B · U 247 B · U 257 B · U 267 B

Driver for LED displays with 5 or 10 diodes

Supply voltage range	Pin 8	U_S	12...25	V
Output current (in series)	Pin 6	I_Q	20	mA
Input threshold distance	Pin 7	ΔU_I	$\leqq \pm 30$	mV





Features:

- Wide supply voltage range
- High LED current
- Low power dissipation due to series connection of LED's
- Different colour LED's can be connected arbitrary
- No peripheral components are necessary
- High input resistance
- Eligible between:
  5 LED's line with linear scale division with U 237 B or U 247 B
  5 LED's line with logarithmic scale division with U 257 B or U 267 B
  10 LED's line with linear scale division with U 237 B and U 247 B
  10 LED's line with logarithmic scale division with U 257 B and U 267 B

Case:

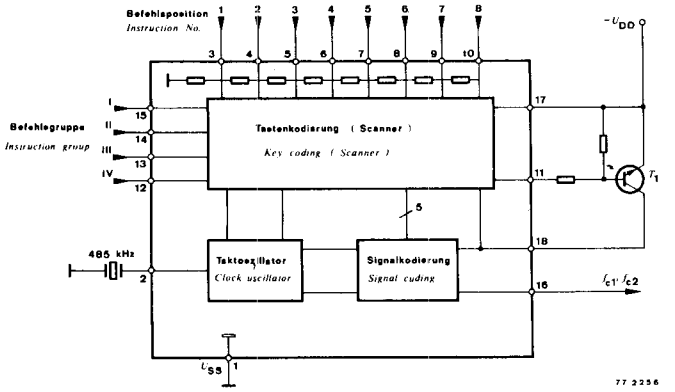
20 A 8 DIN 41 866
DIP 8-lead
Dimensions see page 60
Number 12

U 321 M, U 318 M

IR remote control for TV receivers

U 321 M – Senderschaltung

Supply voltage range		U_S	6,2...10	V
Quiescent supply current		I_{SB}	<10	µA



Features:

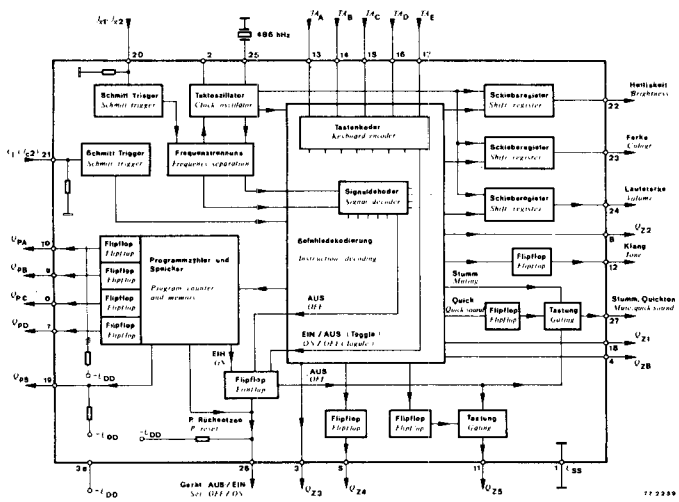
- 32 commands
- High transmission reliability by two carrier frequencies
- Minimum numbers of external components

Case:

20 A 18 DIN 41 866
DIP 18-lead
Dimensions see page 60
Number 10

U 318 M – Receiver

Supply voltage range		$-U_{DD}$	11...13	V
Supply current		I_S	20	mA



Features:

- High transmission reliability by two carrier frequencies
- Integrated separation circuit for the two carriers
- Minimum number of external components

Case:

20 B 28 DIN 41 866
DIP 28-lead
Dimensions see page 60
Number 10

Data book reference: S 8 E

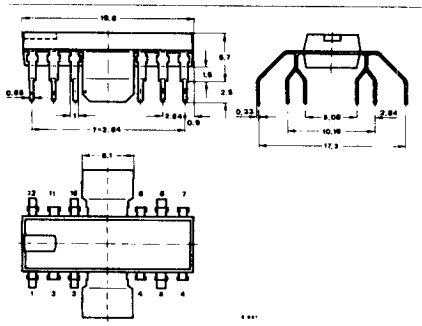


Fig. 1

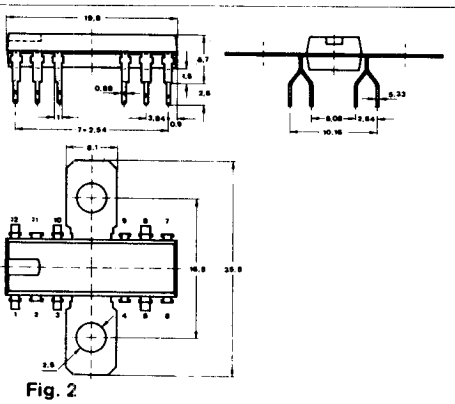


Fig. 2

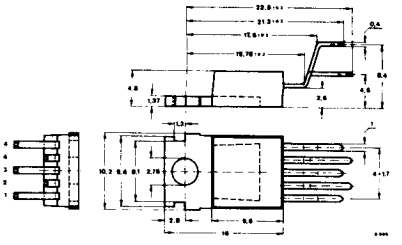


Fig. 3

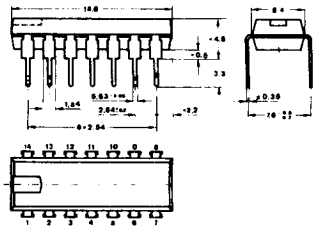


Fig. 4

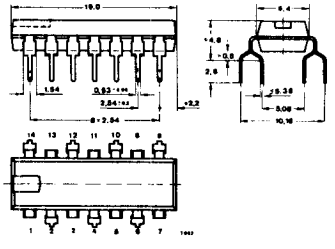


Fig. 5

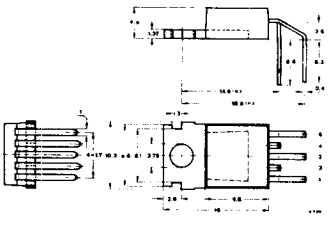


Fig. 6

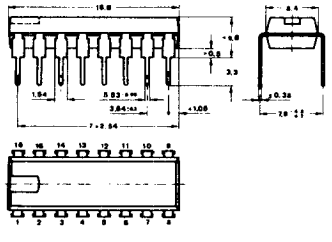


Fig. 7

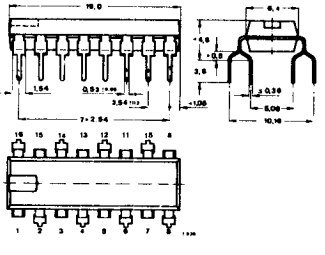


Fig. 8

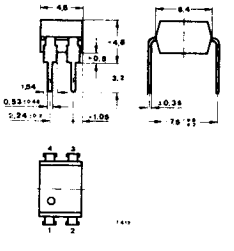


Fig. 9

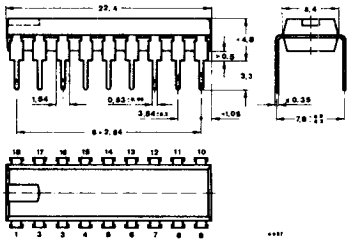


Fig. 10

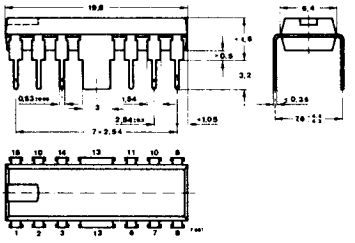


Fig. 11

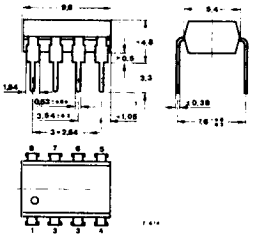


Fig. 12

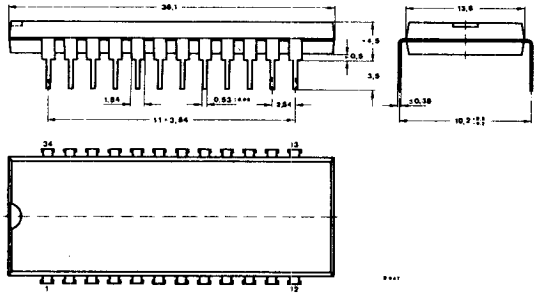


Fig. 13

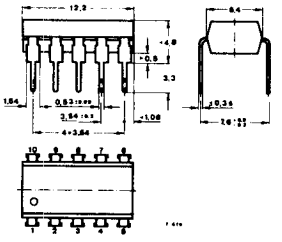


Fig. 14

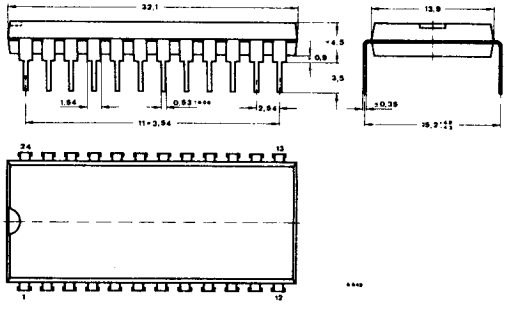


Fig. 15

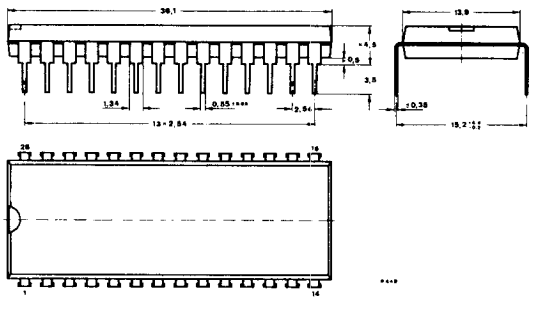


Fig. 16

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