

TRANSISTORI AL SILICIO
 PER BASSA FREQUENZA
 E IMPIEGHI GENERALI

A.F. SILICON PLANAR EPITAXIAL TRANSISTORS

N-P-N transistors in a TO-18 metal envelope with the collector connected to the case; the same transistors are available in lock-fit encapsulation under the type numbers BC147 to BC149.

The BC107 is primarily intended for use in driver stages of audio amplifiers and in signal processing circuits of television receivers.

The BC108 is suitable for a multitude of low voltage applications e.g. driver stages or audio pre-amplifiers and in signal processing circuits of television receivers.

The BC109 is primarily intended for low noise input stages in tape recorders, hi-fi amplifiers and other audio frequency equipment.

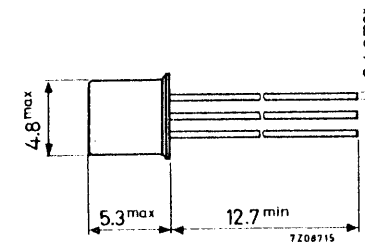
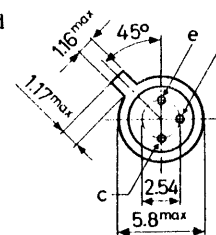
QUICK REFERENCE DATA

		BC107	BC108	BC109
Collector-emitter voltage ($V_{BE} = 0$)	V_{CES} max.	50	30	30 V
Collector-emitter voltage (open base)	V_{CEO} max.	45	20	20 V
Collector current (peak value)	I_{CM} max.	200	200	200 mA
Total power dissipation up to $T_{amb} = 25^{\circ}C$	P_{tot} max.	300	300	300 mW
Junction temperature	T_j max.	175	175	175 $^{\circ}C$
Small signal current gain at $T_j = 25^{\circ}C$ $I_C = 2$ mA; $V_{CE} = 5$ V; $f = 1$ kHz	h_{fe}	> 125 < 500	125 900	240 900
Transition frequency $I_C = 10$ mA; $V_{CE} = 5$ V	f_T typ.	300	300	300 MHz
Noise figure at $R_S = 2$ k Ω $I_C = 200$ μ A; $V_{CE} = 5$ V $f = 30$ Hz to 15 kHz	F	typ. <		1.8 dB 4 dB
$f = 1$ kHz; $B = 200$ Hz	F	typ.	2	2
				dB

MECHANICAL DATA

Dimensions in mm

Connector connected to case TO-18



Accessories available: 56246; 56263

A.F. SILICON PLANAR EPITAXIAL TRANSISTORS

N-P-N transistors in a plastic envelope with stiff, self-locking pins suitable for use with standard printed boards.

The BC147 is primarily intended for use in driver stages of audio amplifiers and in signal processing circuits of television receivers.

The BC148 is suitable for a multitude of low voltage applications e.g. driver stages or audio pre-amplifiers and in signal processing circuits of television receivers.

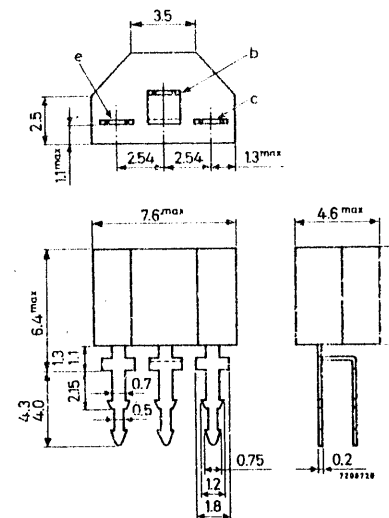
The BC149 is primarily intended for low noise input stages in tape recorders, hi-fi amplifiers and other audio frequency equipment.

QUICK REFERENCE DATA

		BC147	BC148	BC149
Collector-emitter voltage ($V_{BE} = 0$)	V_{CES}	max. 50	30	30 V
Collector-emitter voltage (open base)	V_{CEO}	max. 45	20	20 V
Collector current (peak value)	I_{CM}	max. 200	200	200 mA
Total power dissipation up to $T_{amb} = 25^{\circ}C$	P_{tot}	max. 220	220	220 mW
Junction temperature	T_J	max. 125	125	125 $^{\circ}C$
Small signal current gain at $T_J = 25^{\circ}C$ $I_C = 2 \text{ mA}$; $V_{CE} = 5 \text{ V}$; $f = 1 \text{ kHz}$	h_{fe}	> 125 < 500	125 900	240 900
Transition frequency $I_C = 10 \text{ mA}$; $V_{CE} = 5 \text{ V}$	f_T	typ. 300	300	300 MHz
Noise figure at $R_S = 2 \text{ k}\Omega$ $I_C = 200 \mu\text{A}$; $V_{CE} = 5 \text{ V}$ $f = 30 \text{ Hz}$ to 1.5 kHz	F	typ. $<$		1.8 dB 4 dB
$f = 1 \text{ kHz}$; $B = 200 \text{ Hz}$	F	typ. 2	2	dB

MECHANICAL DATA

Dimensions in mm



A.F. SILICON PLANAR EPITAXIAL TRANSISTORS

P-N-P transistors in a plastic envelope with stiff self-locking pins suitable for use with standard printed boards.

The BC157 is a high voltage type and primarily intended for use in driver stages of audio amplifiers and in signal processing circuits of television receivers.

The BC158 is suitable for a multitude of low voltage applications e.g. driver stages or audio pre-amplifiers and in signal processing circuits of television receivers.

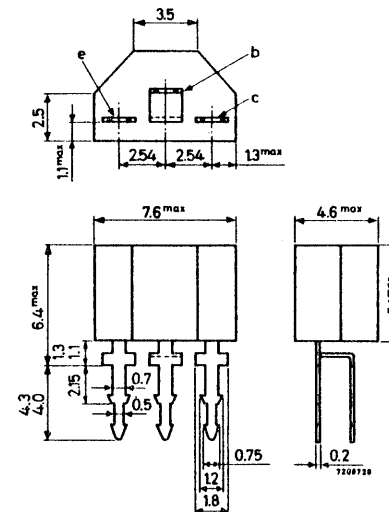
The BC159 is primarily intended for low noise input stages in tape recorders, hi-fi amplifiers and other audio frequency equipment.

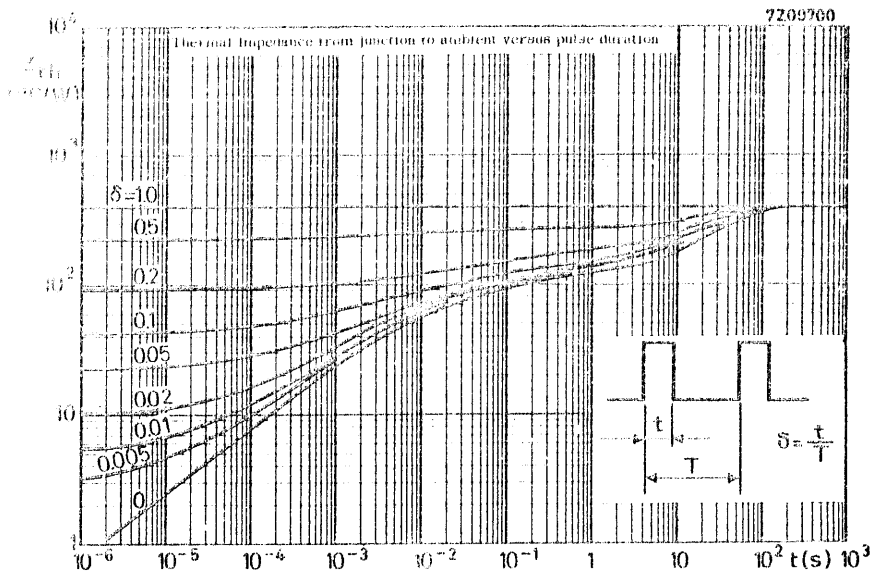
QUICK REFERENCE DATA

		BC157	BC158	BC159	
Collector-emitter voltage (+V _{BE} = 1 V)	-V _{CEX}	max. 50	30	25	V
Collector-emitter voltage (open base)	-V _{CEO}	max. 45	25	20	V
Collector current (peak value)	-I _{CM}	max. 200	200	200	mA
Total power dissipation up to T _{amb} = 25 °C	P _{tot}	max. 250	250	250	mW
Junction temperature	T _j	max. 125	125	125	°C
Small signal current gain at T _j = 25 °C					
-I _C = 2 mA; -V _{CE} = 5 V; f = 1 kHz	h _{fe}	>	75	75	125
		<	260	500	500
Transition frequency at f = 35 MHz	f _T	typ. 150	150	150	MHz
Noise figure at R _S = 2 kΩ					
-I _C = 200 μA; -V _{CE} = 5 V	F	typ.			1.2 dB
		<			4 dB
f = 30 Hz to 15 kHz	F	<			4 dB
f = 1 kHz; B = 200 Hz	F	<	10	10	4 dB

MECHANICAL DATA

Dimensions in mm





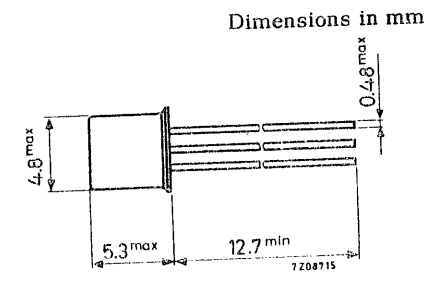
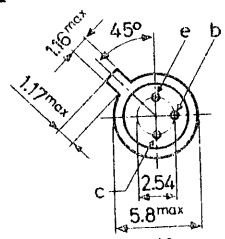
A.F. SILICON PLANAR EPITAXIAL TRANSISTORS

P-N-P transistors in a TO-18 metal envelope with the collector connected to the case. The BC177 is a high voltage type and primarily intended for use in driver stages of audio amplifiers and in signal processing circuits of television receivers. The BC178 is suitable for a multitude of low voltage applications e.g. driver stages or audio pre-amplifiers and in signal processing circuits of television receivers. The BC179 is primarily intended for low noise input stages in tape recorders, hi-fi amplifiers and other audio frequency equipment. Moreover they are intended as complementary types for the BC107, BC108 and BC109.

QUICK REFERENCE DATA		BC177	BC178	BC179
Collector-emitter voltage (+V _{BE} = 1 V)	-V _{CEX} max.	50	30	25 V
Collector-emitter voltage (open base)	-V _{CEO} max.	45	25	20 V
Collector current (peak value)	-I _{CM} max.	200	200	200 mA
Total power dissipation up to T _{amb} = 25 °C	P _{tot} max.	300	300	300 mW
Junction temperature	T _j max.	175	175	175 °C
Small signal current gain at T _j = 25 °C				
-I _C = 2 mA; -V _{CE} = 5 V; f = 1 kHz	h _{fe} >	75	75	125
	h _{fe} <	260	500	500
Transition frequency at f = 35 MHz	f _T typ.	150	150	150 MHz
-I _C = 10 mA; -V _{CE} = 5 V				
Noise figure at R _S = 2 kΩ				
-I _C = 200 μA; -V _{CE} = 5 V	F typ.			1.2 dB
f = 30 Hz to 15 kHz	F <			4 dB
f = 1 kHz; B = 200 Hz	F <	10	10	4 dB

MECHANICAL DATA

TO-18
Collector connected to case

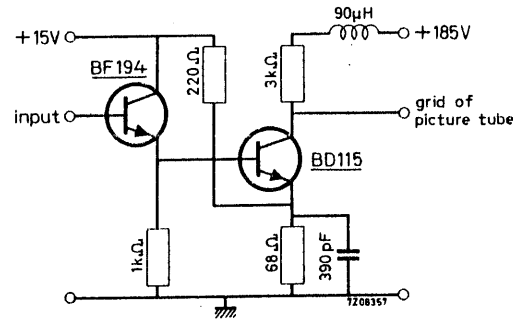


Accessories available: 56246, 56263

APPLICATION INFORMATION (continued)

Grid-driver circuit for colour picture tubes.

Three identical circuits are used for the red, green and blue signal respectively.



Performance up to $T_{amb} = 55\text{ }^{\circ}\text{C}$

Voltage gain	G_v	60
Output voltage (video information) (peak-peak)	V_o	120 V
	$V_o(p-p)$	150 V
Bandwidth (-3 dB)		> 4 MHz
Rise time	t_r	< 80 ns
Overshoot		< 5 %

Note

- The maximum dissipation of the output transistor is 3.3 W. In order not to exceed the junction temperature rating, the thermal resistance from junction to ambient should be: $R_{th\ j-a} < 45\text{ }^{\circ}\text{C/W}$. To ensure the above mentioned performance for bandwidth and transient response, the contribution of the heatsink to the total output capacitance of the device should not exceed 4 pF.
- For grid drive of the picture tube, the sync pulses must be negative going. To avoid driving the output transistor into the high frequency knee voltage, the sync pulses must be clipped before the output stage.

SILICON PLANAR EPITAXIAL POWER TRANSISTOR

N-P-N silicon power transistor in a metal envelope with the collector connected to the case. It is primarily intended for quasi-complementary output stages up to 15 W in audio applications, such as hi-fi amplifiers.

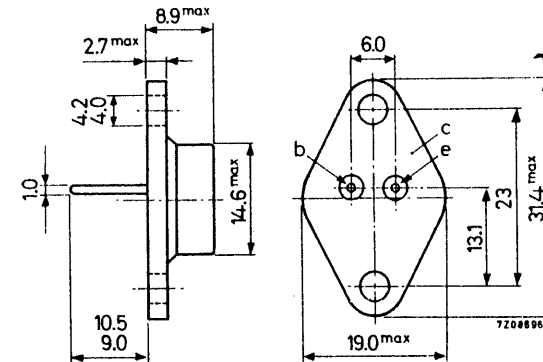
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	70 V
Collector-emitter voltage (open base)	V_{CEO}	max.	45 V
Collector current (peak value)	I_{CM}	max.	4.0 A
Total power dissipation up to $T_{mb} = 62.5\text{ }^{\circ}\text{C}$	P_{tot}	max.	15 W
D.C. current gain	h_{FE}	>	25
$I_C = 2\text{ A}; V_{CE} = 5\text{ V}$		typ.	50
Transition frequency at $f = 35\text{ MHz}$	f_T	typ.	120 MHz
$I_C = 250\text{ mA}; V_{CE} = 5\text{ V}$			

MECHANICAL DATA

Dimensions in mm

Collector connected to the case



Accessories available: 56203

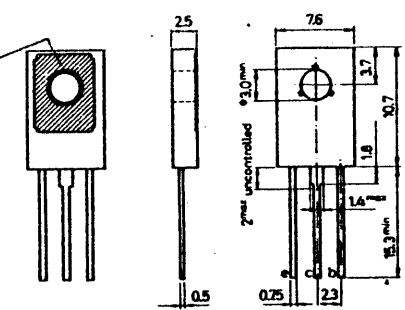
SILICON PLANAR EPITAXIAL TRANSISTORS

DEVELOPMENT SAMPLE DATA

N-P-N transistors in a plastic envelope primarily intended for use with the p-n-p BD136, BD138 and BD140 as complementary driver pairs in hi-fi amplifiers. Single transistors are recommended in driver stages where a high voltage and high dissipation are required.

MECHANICAL DATA

Mounting surface connected to the collector

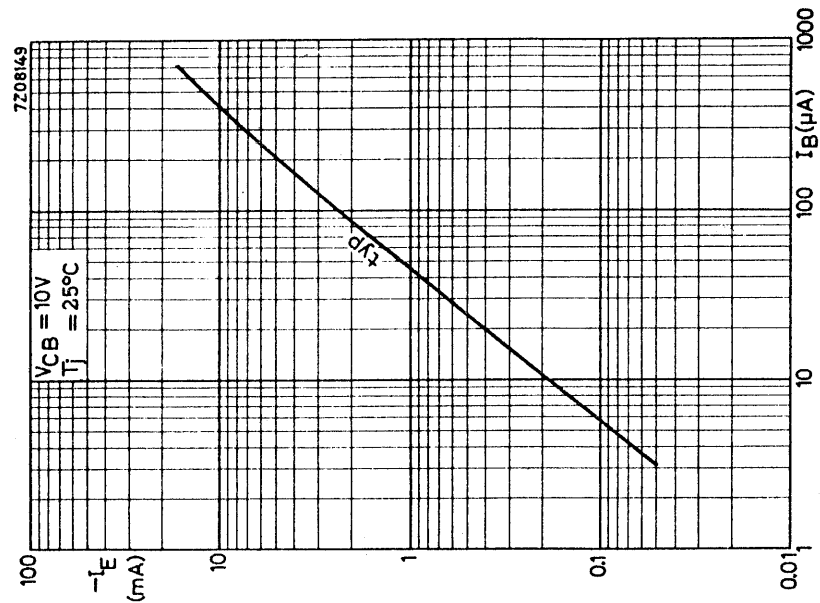
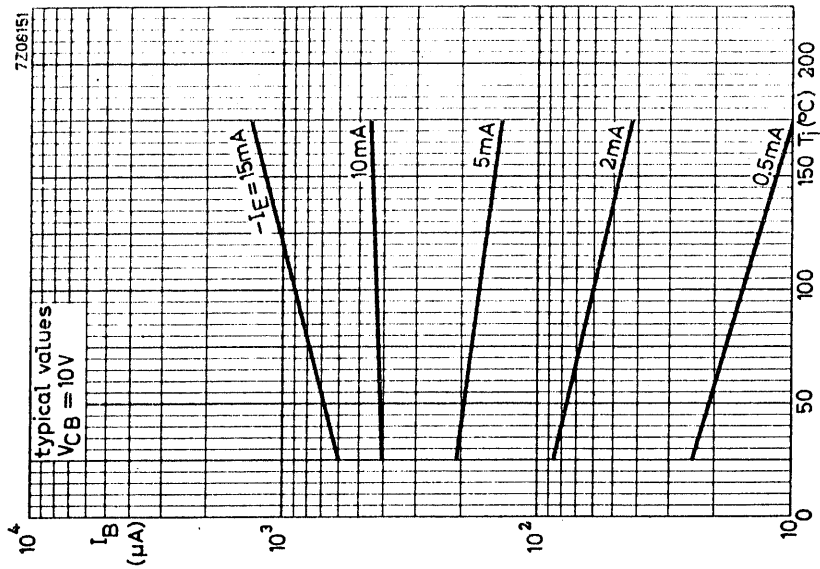


Dimensions in mm

RATINGS (Limiting values according to the Absolute Maximum System as defined in IEC publication 134)

		BD135	BD137	BD139
<u>Voltages</u>				
Collector-base voltage (open emitter)	V_{CBO}	max. 45	60	80 V
Collector-emitter voltage (open base)	V_{CEO}	max. 45	60	80 V
Emitter-base voltage (open collector)	V_{EBO}	max. 15	5	5 V
<u>Currents</u>				
Collector current (d.c.)	I_C	max.	0.35	A
Collector current (peak value)	I_{CM}	max.	1.0	A
Base current (d.c.)	I_B	max.	0.1	A
<u>Power dissipation</u>				
Total power dissipation	P_{tot}	max.	2.0	W

These data, based on the specifications and measured performance of development samples, afford a preliminary indication of the characteristics to be expected of the described product. Distribution of development samples implies no guarantee as to the subsequent availability of the product



SILICON PLANAR EPITAXIAL TRANSISTOR

N-P-N transistor in a TO-72 metal case with insulated electrodes and a shield lead connected to the case; the same transistor is available in lock-fit encapsulation under the type number BF194.

The BF184 is intended for h.f. applications in radio and television receivers; it is especially recommended for f.m. tuners, low noise a.m. mixer-oscillators with high source impedance and i.f. amplifiers in a.m./f.m. receivers where a high current gain is of importance.

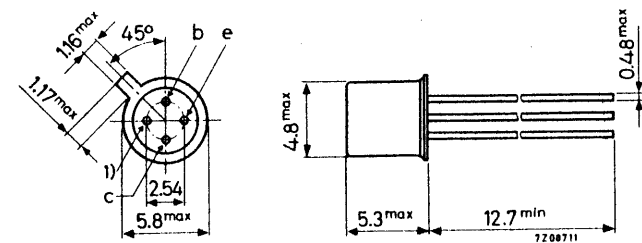
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max. 30 V
Collector-emitter voltage (open base)	V_{CEO}	max. 20 V
Collector current (d.c.)	I_C	max. 30 mA
Total power dissipation up to $T_{amb} = 45^\circ\text{C}$	P_{tot}	max. 145 mW
Junction temperature	T_j	max. 175 $^\circ\text{C}$
D.C. current gain at $T_j = 25^\circ\text{C}$	h_{FE}	typ. 115
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$		
Transition frequency	f_T	typ. 300 MHz
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$		

MECHANICAL DATA

Dimensions in mm

TO-72
Insulated electrodes



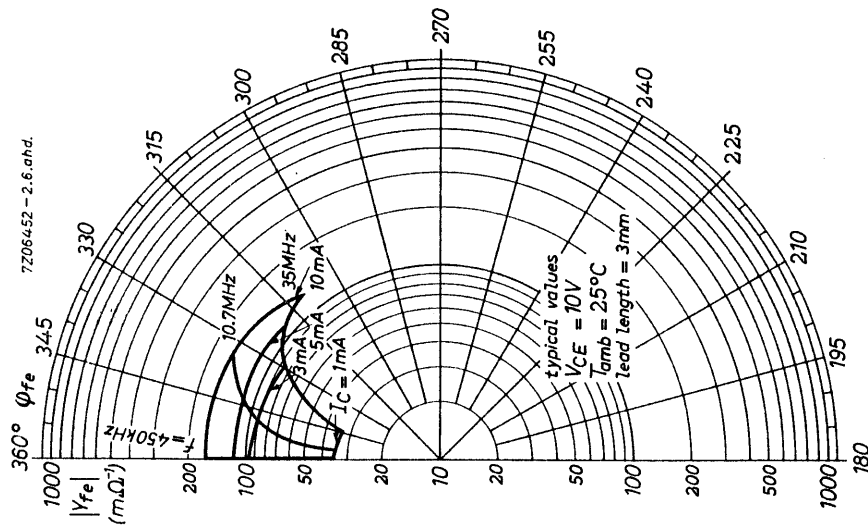
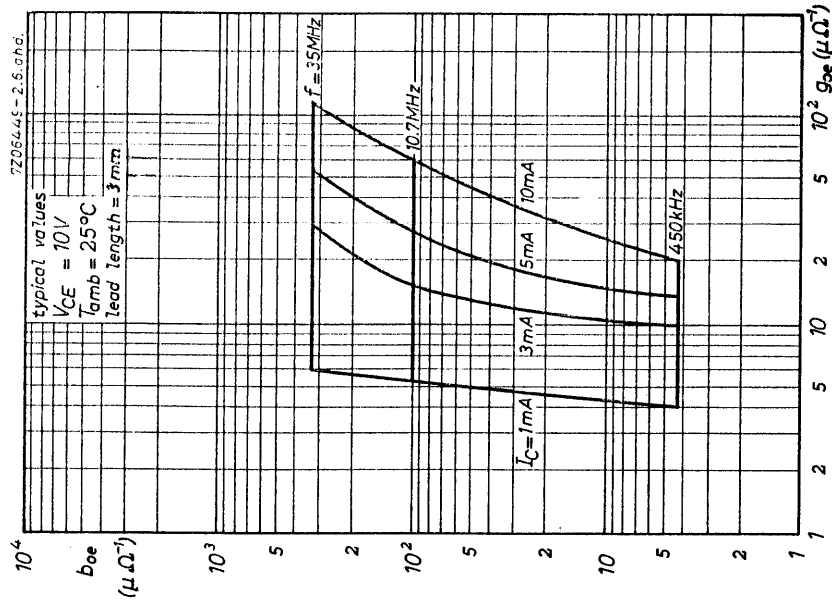
1) = shield lead (connected to case)

Accessories available: 56246, 56263.

SILICON PLANAR EPITAXIAL TRANSISTOR

N-P-N transistor in a TO-72 metal case with insulated electrodes and a shield lead connected to the case; the same transistor is available in lock-fit encapsulation under the type number BF195.

The BF185 is intended for h.f. applications in radio and television receivers; it is especially recommended for f.m. tuners, i.f. amplifiers in a.m./f.m. receivers where a low transistor output conductance is of importance, a.m. input stages of carradios where a low noise figure at low source impedance is required.



QUICK REFERENCE DATA

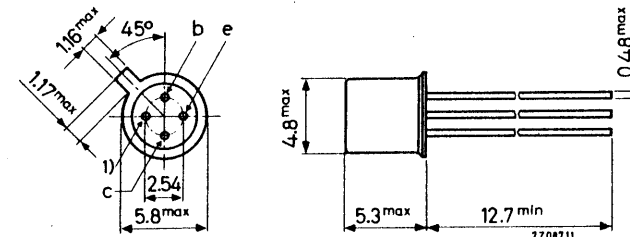
Collector-base voltage (open emitter)	V_{CBO}	max.	30 V
Collector-emitter voltage (open base)	V_{CEO}	max.	20 V
Collector current (d.c.)	I_C	max.	30 mA
Total power dissipation up to $T_{amb} = 45^\circ C$	P_{tot}	max.	145 mW
Junction temperature	T_j	max.	175 $^\circ C$
D.C. current gain at $T_j = 25^\circ C$	h_{FE}	typ.	67
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$			
Transition frequency	f_T	typ.	220 MHz
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$			
Noise figure at $f = 100\text{ MHz}$	F	typ.	4 dB
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}; G_S = 10\text{ m}\Omega^{-1}$			

MECHANICAL DATA

Dimensions in mm

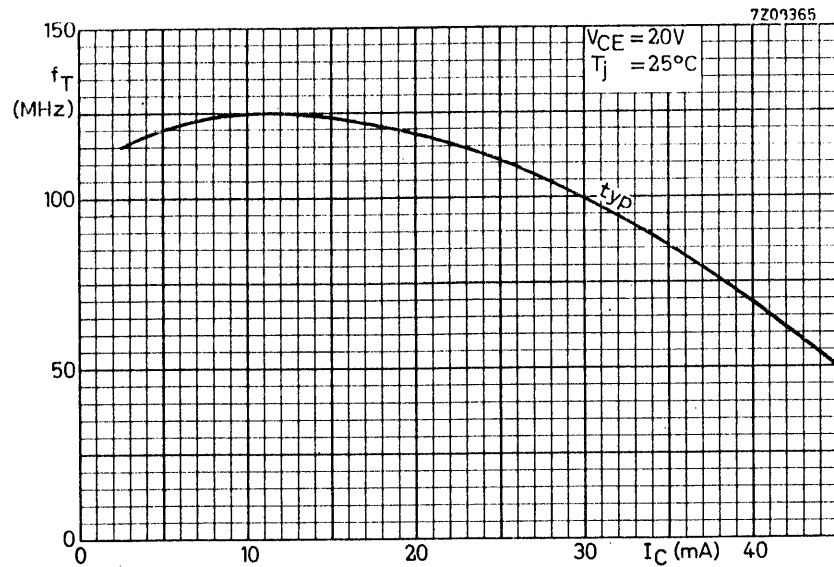
TO-72

Insulated electrodes

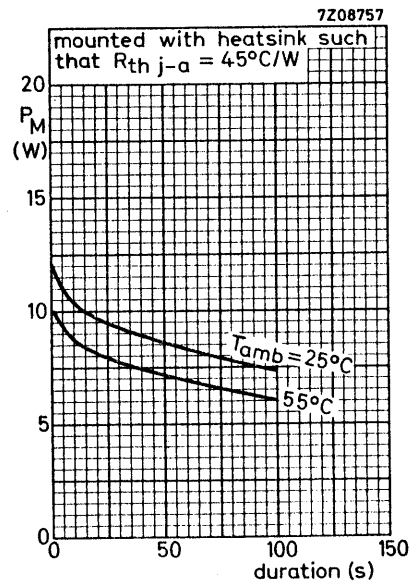
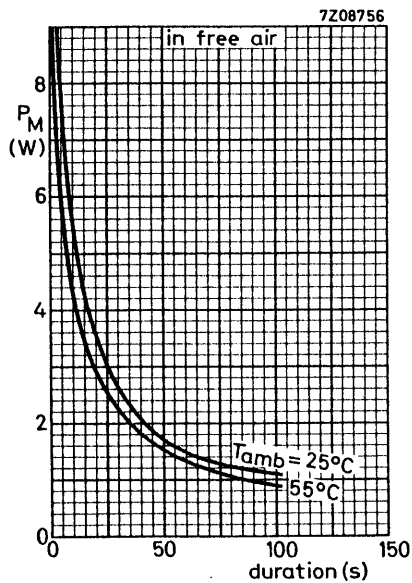


1) = shield lead (connected to case)

Accessories available: 56246, 56263.



maximum allowable peak power dissipation versus duration



SILICON PLANAR EPITAXIAL TRANSISTOR

N-P-N transistor in a plastic envelope with stiff, self-locking pins suitable for use with standard printed boards.

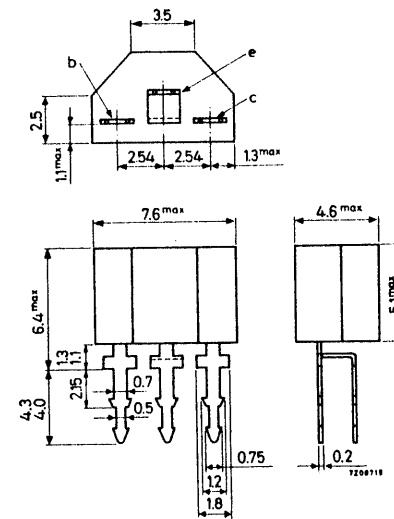
The BF194 is intended for h.f. applications in radio and television receivers; it is especially recommended for f.m. tuners, low noise a.m. mixer-oscillators with high source impedance and i.f. amplifiers in a.m./f.m. receivers where a high current gain is of importance.

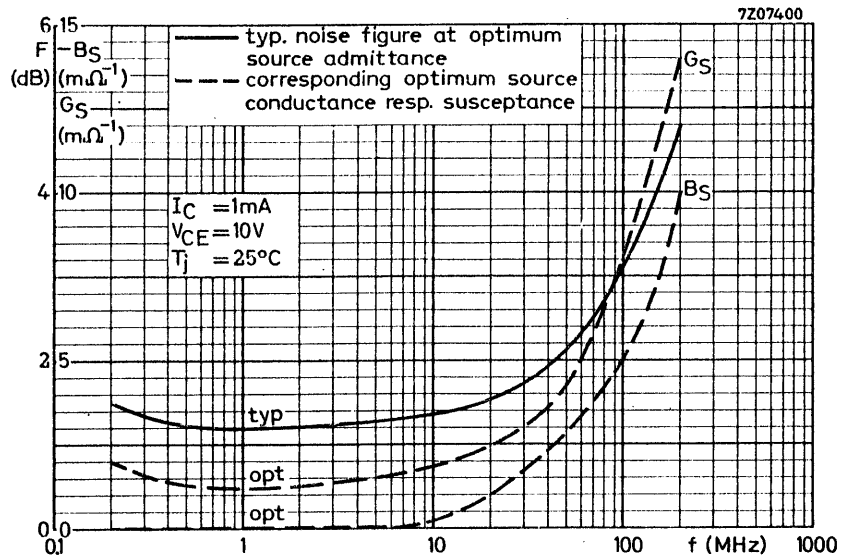
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max. 30 V
Collector-emitter voltage (open base)	V_{CEO}	max. 20 V
Collector current (d.c.)	I_C	max. 30 mA
Total power dissipation up to $T_{amb} = 25^\circ C$	P_{tot}	max. 220 mW
Junction temperature	T_j	max. 125 °C
D.C. current gain at $T_j = 25^\circ C$	h_{FE}	typ. 115
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$		
Transition frequency	f_T	typ. 260 MHz
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$		
Noise figure at $f = 100\text{ MHz}$	F	typ. 4 dB
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}; G_S = 10\text{ m}\Omega^{-1}$		
Conversion noise figure at $f = 1\text{ MHz}$	F_c	typ. 2 dB
$I_C = 1\text{ mA}; V_{CE} = 10\text{ V}; G_S = 1.2\text{ m}\Omega^{-1}$		

MECHANICAL DATA

Dimensions in mm





SILICON PLANAR EPITAXIAL TRANSISTOR

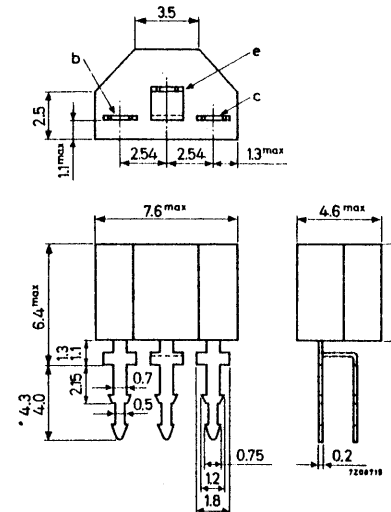
N-P-N transistor in a plastic envelope with stiff self-locking pins suitable for use with standard printed boards. The BF195 is intended for h.f. applications in radio and television receivers; it is especially recommended for f.m. tuners, i.f. amplifiers in a.m./f.m. receivers where a low transistor output conductance is of importance, a.m. input stages of car radios where a low noise figure at low source impedance is required.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	30 V
Collector-emitter voltage (open base)	V_{CEO}	max.	20 V
Collector current (d.c.)	I_C	max.	30 mA
Total power dissipation up to $T_{amb} = 25^\circ C$	P_{tot}	max.	220 mW
Junction temperature	T_j	max.	125 $^\circ C$
D. C. current gain at $T_j = 25^\circ C$	h_{FE}	typ.	67
Transition frequency	f_T	typ.	200 MHz
Noise figure	F	typ.	3.5 dB
$I_C = 1 mA; V_{CE} = 10 V$	F	typ.	4 dB
$G_S = 20 m\Omega^{-1}; f = 1 MHz$			
$G_S = 10 m\Omega^{-1}; f = 100 MHz$			

MECHANICAL DATA.

Dimensions in mm



SILICON PLANAR TRANSISTOR

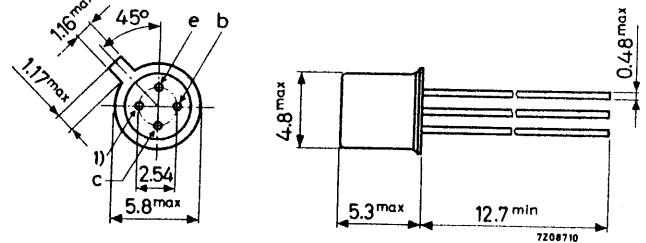
N-P-N transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. The BF200 is primarily intended for application in a forward gain controlled pre-amplifier in v.h.f. television tuners and f.m. tuners.

QUICK REFERENCE DATA			
Collector-base voltage (open emitter)	V_{CBO}	max.	30 V
Collector-emitter voltage (open base)	V_{CEO}	max.	20 V
Collector current (d.c.)	I_C	max.	20 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Junction temperature	T_j	max.	175 $^\circ\text{C}$
Transition frequency	f_T	typ.	650 MHz
$-I_E = 3\text{ mA}; V_{CB} = 10\text{ V}$			
Max. unilateralised power gain	G_{UM}	typ.	30 dB
$-I_E = 3\text{ mA}; V_{CB} = 10\text{ V}; f = 50\text{ MHz}$			
$f = 200\text{ MHz}$	G_{UM}	typ.	22 dB
Noise figure at optimum source admittance			
$-I_E = 2\text{ mA}; V_{CB} = 10\text{ V}; f = 100\text{ MHz}$	F	typ.	2 dB
$-I_E = 3\text{ mA}; V_{CB} = 10\text{ V}; f = 200\text{ MHz}$	F	typ.	2.7 dB

MECHANICAL DATA

TO-72

Dimensions in mm



1) = shield lead (connected to case)

Accessories available: 56246, 56263