

## V.H.F. POWER TRANSISTOR

N-P-N epitaxial planar transistor intended for use in class-A, B and C operated mobile, industrial and military transmitters with a supply voltage of 13,5 V. The transistor is resistance stabilized. Every transistor is tested under severe load mismatch conditions with a supply over-voltage to 16,5 V.

It has a TO-39 metal envelope with the collector connected to the case.

### QUICK REFERENCE DATA

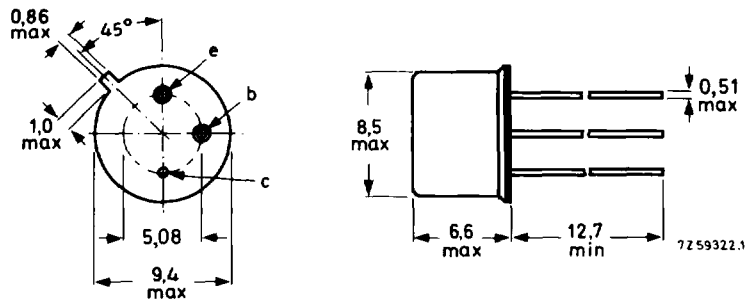
R.F. performance up to  $T_{mb} = 25\text{ }^{\circ}\text{C}$  in an unneutralized common-emitter class-B circuit

mode of operation	$V_{CE}$ V	f MHz	$P_L$ W	$G_p$ dB	$\eta$ %	$\bar{z}_i$ $\Omega$	$\bar{Y}_L$ mS
c.w.	13,5	175	4	> 8	> 60	$3,9 + j2,2$	$37 - j22$
c.w.	12,5	175	4	typ. 8	typ. 60	—	—

### MECHANICAL DATA

Dimensions in mm

Fig.1 TO-39/1; collector connected to case.

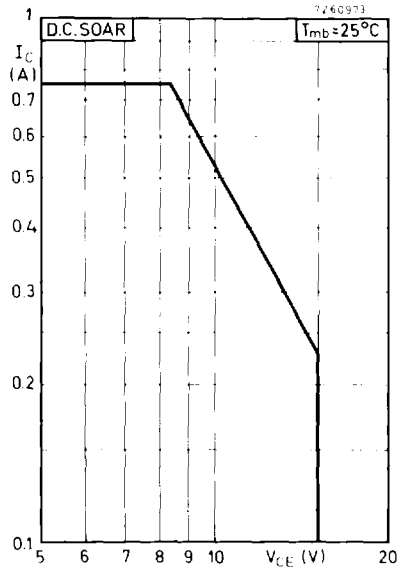
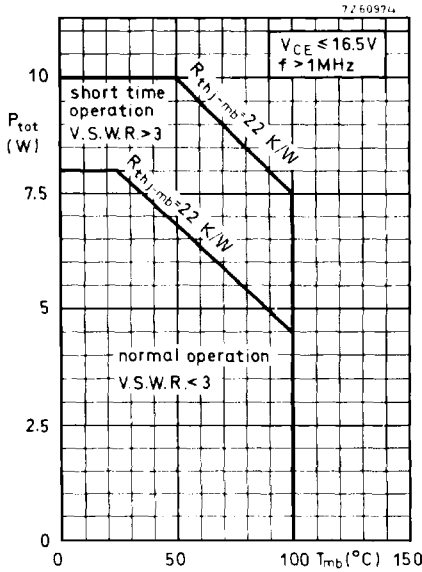


Maximum lead diameter is guaranteed only for 12,7 mm.

Accessories: 56245 (distance disc).

**RATINGS** Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter) peak value	$V_{CBOM}$	max.	36	V
Collector-emitter voltage (open base)	$V_{CEO}$	max.	18	V
Emitter-base voltage (open collector)	$V_{EBO}$	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	0.75	A
Collector current (peak value) $f > 1$ MHz	$I_{CM}$	max.	2.25	A
Total power dissipation up to $T_{mb} = 25^{\circ}C$ $f < 1$ MHz	$P_{tot}$	max.	8	W



Storage temperature	$T_{stg}$	-65 to +200	$^{\circ}C$
Operating junction temperature	$T_j$	max. 200	$^{\circ}C$

**THERMAL RESISTANCE**

From junction to mounting base	$R_{th(j-mb)}$	=	22	K/W
From mounting base to heatsink with a boron nitride washer for electrical insulation	$R_{th(mb-h)}$	=	2.5	K/W

## CHARACTERISTICS

 $T_j = 25^\circ\text{C}$  unless otherwise specified

Collector cut-off current

 $I_B = 0; V_{CE} = 14\text{ V}$  $I_{CEO} < 5\text{ mA}$ 

Breakdown voltages

Collector-base voltage

open emitter,  $I_C = 1\text{ mA}$  $V_{(BR)CBO} > 36\text{ V}$ 

Collector-emitter voltage

open base,  $I_C = 10\text{ mA}$  $V_{(BR)CEO} > 18\text{ V}$ 

Emitter-base voltage

open collector,  $I_E = 1\text{ mA}$  $V_{(BR)EBO} > 4\text{ V}$ 

Transient energy

 $L = 25\text{ mH}; f = 50\text{ Hz}$ 

open base

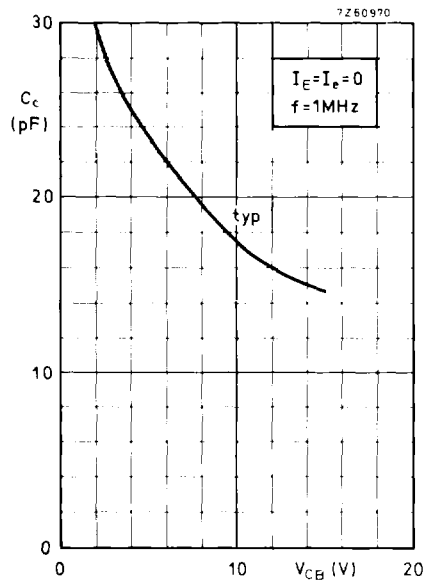
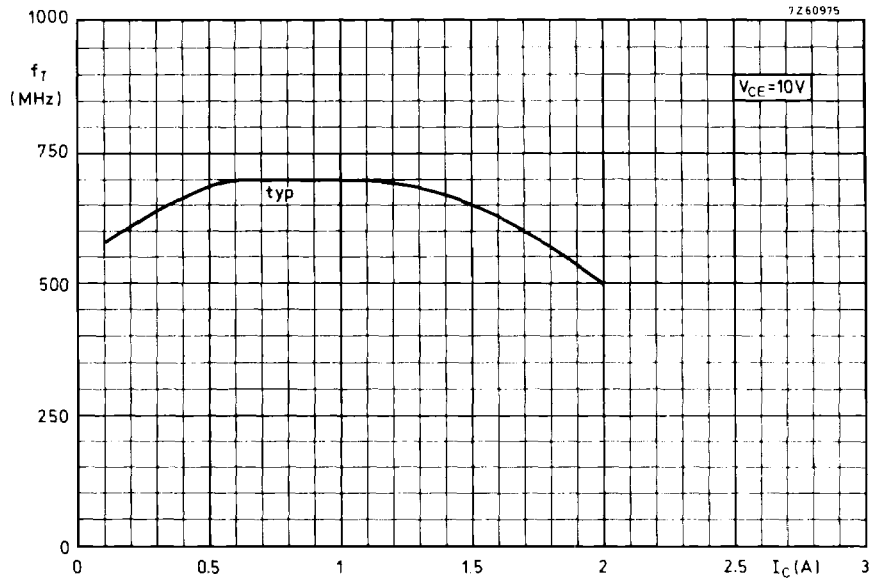
 $-V_{BE} = 1.5\text{ V}; R_{BE} = 33\ \Omega$  $E > 0.5\text{ mS}$  $E > 0.5\text{ mS}$ 

D.C. current gain

 $I_C = 500\text{ mA}; V_{CE} = 5\text{ V}$  $h_{FE} > 5$ 

Transition frequency

 $I_C = 350\text{ mA}; V_{CE} = 10\text{ V}$  $f_T$  typ. 700 MHzCollector capacitance at  $f = 1\text{ MHz}$  $I_E = I_e = 0; V_{CB} = 15\text{ V}$  $C_c$  typ. 15 pF  
< 20 pFFeedback capacitance at  $f = 1\text{ MHz}$  $I_C = 50\text{ mA}; V_{CE} = 15\text{ V}$  $-C_{re}$  typ. 11 pF



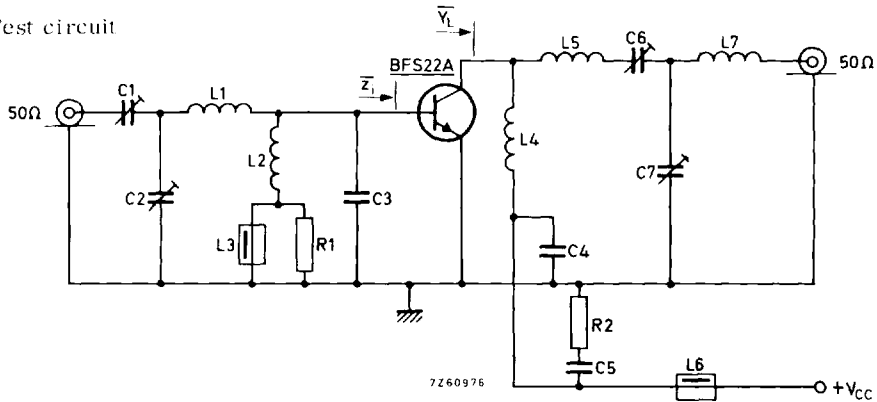
## APPLICATION INFORMATION

R. F. performance in c. w. operation (unneutralised common-emitter class B circuit)

 $f = 175 \text{ MHz}$ ;  $T_{\text{mb}}$  up to  $25^\circ\text{C}$ 

$V_{\text{CC}}(\text{V})$	$P_{\text{S}}(\text{W})$	$P_{\text{L}}(\text{W})$	$I_{\text{C}}(\text{A})$	$G_{\text{p}}(\text{dB})$	$\eta(\%)$	$\bar{z}_{\text{i}}(\Omega)$	$\bar{Y}_{\text{L}}(\text{mS})$
13.5	0.63	4	< 0.49	> 8	> 60	$3.9 + j2.2$	$37 - j22$
12.5	typ. 0.63	4	typ. 0.53	typ. 8	typ. 60	-	-

Test circuit



C1 C6 4 to 29 pF air trimmer with insulated rotor

C2 C7 4 to 29 pF air trimmer with non-insulated rotor

C3 39 pF ceramic

C4 100 pF ceramic

C5 15 nF polyester

L1 1 turn enamelled Cu wire (1.0 mm); int. diam. 10 mm; leads 2 x 10 mm

L2 6 turns enamelled Cu wire (0.7 mm); int. diam. 4 mm; leads 2 x 10 mm

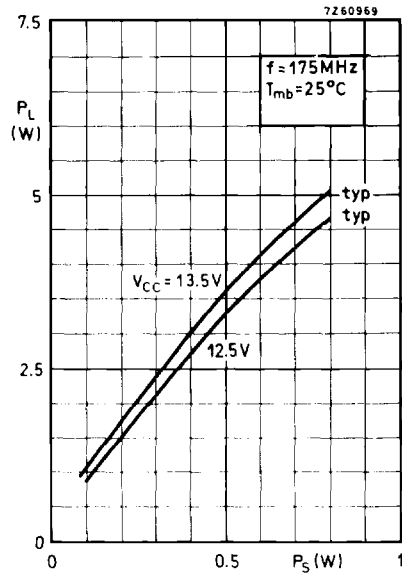
L3 L6 ferroxcube choke (code number 4312 020 36640)

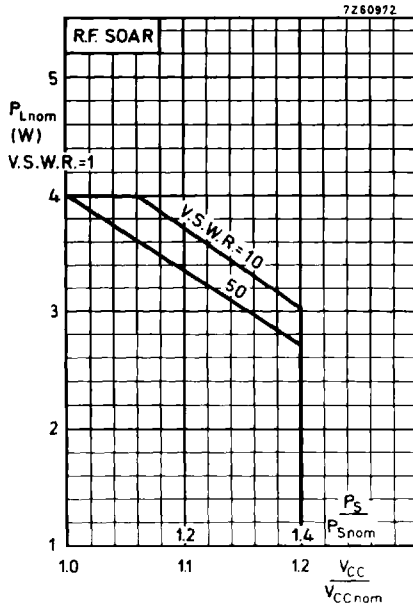
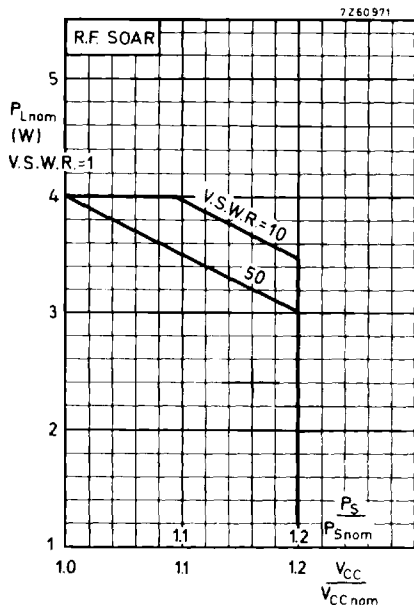
L4 8 turns enamelled Cu wire (0.7 mm); int. diam. 4 mm; leads 2 x 10 mm

L5 5 turns enamelled Cu wire (1.0 mm); winding pitch 1.0 mm; int. diam. 8 mm; leads 2 x 10 mm

L7 7 turns enamelled Cu wire (1.0 mm); winding pitch 1.0 mm; int. diam. 6 mm; leads 2 x 5 mm

R1 R2 10  $\Omega$  carbon





Conditions for R.F. SOAR:

- f = 175 MHz       $P_{Snom} = P_S$  at  $V_{CC} = V_{CCnom}$  and  $V.S.W.R. = 1$
- $T_{mb} = 70^\circ C$
- $V_{CCnom} = 12.5$  or  $13.5$  V

The transistor has been developed for use with unstabilized supply voltages. As the output power and drive power increase with the supply voltage, the nominal output power must be derated in accordance with the graphs above for safe operation at supply voltages other than the nominal. The graphs show the allowable output power under nominal conditions, as a function of the supply overvoltage ratio, with V. S. W. R. as parameter.

The left hand graph applies to the situation in which the drive ( $P_S/P_{Snom}$ ) increases linearly with supply overvoltage ratio.

The right hand graph shows the derating factor to be applied when the drive ( $P_S/P_{Snom}$ ) increases as the square of the supply overvoltage ratio ( $V_{CC}/V_{CCnom}$ ).

Depending on the operating conditions, the appropriate derating factor may lie in the region between the linear and the square-law functions.

**OPERATING NOTE** Below 70 MHz a base-emitter resistor of  $10\ \Omega$  is recommended to avoid oscillation. This resistor must be effective for both d.c. and r.f.

