



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 overvoltage to 16.5 V. It has a $\frac{1}{4}$ " capstan envelope with a moulded cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

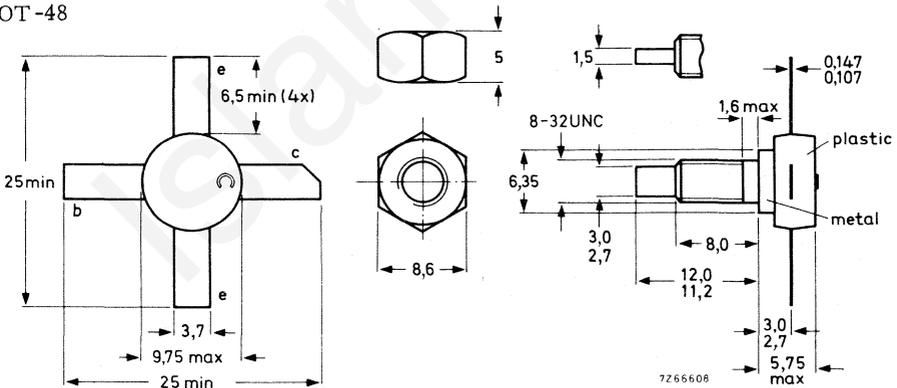
R. F. performance up to $T_{mb} = 25^{\circ}\text{C}$ in an unneutralised common-emitter class B circuit.

Mode of operation	V _{CC} (V)	f (MHz)	P _S (W)	P _L (W)	I _C (A)	G _p (dB)	η (%)	\bar{z}_i (Ω)	\bar{Y}_L (mA/V)
c. w.	13.5	175	< 1.0	8	< 0.85	> 9	> 70	2.8 + j1.2	76 - j16
c. w.	12.5	175	typ. 1.0	8	typ. 0.91	typ. 9	typ. 70	-	-

MECHANICAL DATA

Dimensions in mm

SOT-48



Torque on nut: min. 7.5 kg cm
(0.75 Newton metres)
max. 8.5 kg cm
(0.85 Newton metres)

Diameter of clearance hole in heatsink: max. 4.17 mm.

Mounting hole to have no burrs at either end. De-burring must leave surface flat; do not chamfer or countersink either end of hole.

When locking is required, an adhesive instead of a lock washer is preferred.

BLY87A

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

Voltages

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

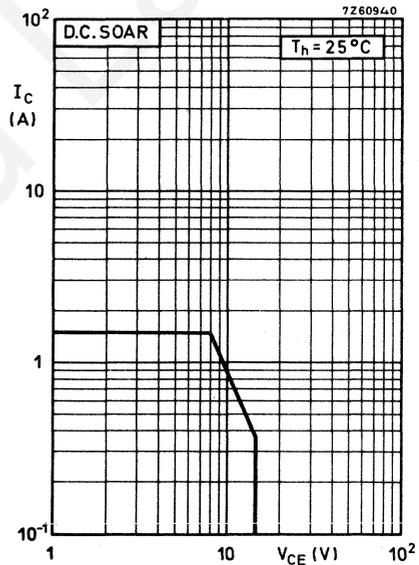
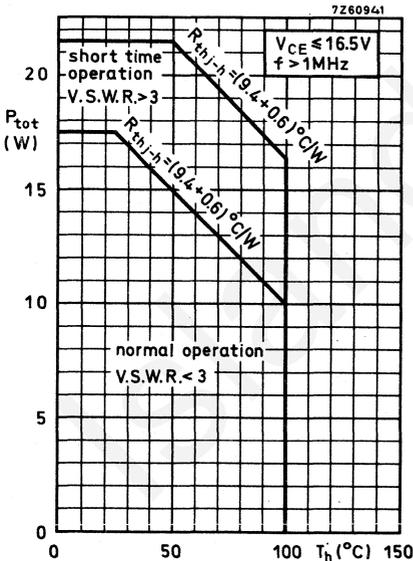
Currents

Collector current (average)	$I_{C(AV)}$	max.	1.25 A
Collector current (peak value) $f > 1$ MHz	I_{CM}	max.	3.75 A

Power dissipation

Total power dissipation up to $T_h = 25^\circ\text{C}$
 $f > 1$ MHz

P_{tot} max. 17.5 W



Temperature

Storage temperature	T_{stg}	-30 to +200 $^\circ\text{C}$
Operating junction temperature	T_j	max. 200 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j-mb}$	=	9.4 $^\circ\text{C/W}$
From mounting base to heatsink	$R_{th\ mb-h}$	=	0.6 $^\circ\text{C/W}$

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

D. C. current gain

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

Transition frequency

$I_C = 500 \text{ mA}; V_{CE} = 10 \text{ V}$ $f_T \text{ typ. } 700 \text{ MHz}$

Collector capacitance at $f = 1 \text{ MHz}$

$I_E = I_e = 0; V_{CB} = 15 \text{ V}$ $C_c \text{ typ. } 15 \text{ pF}$
 $< 20 \text{ pF}$

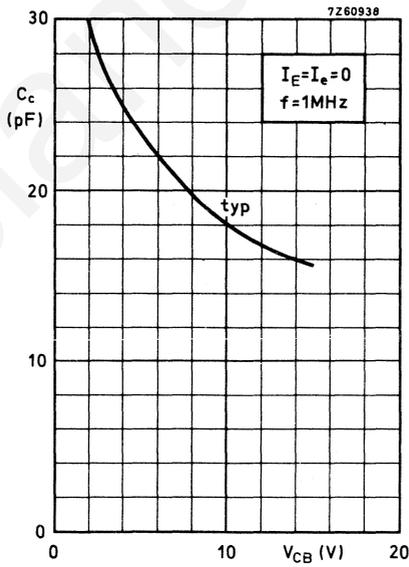
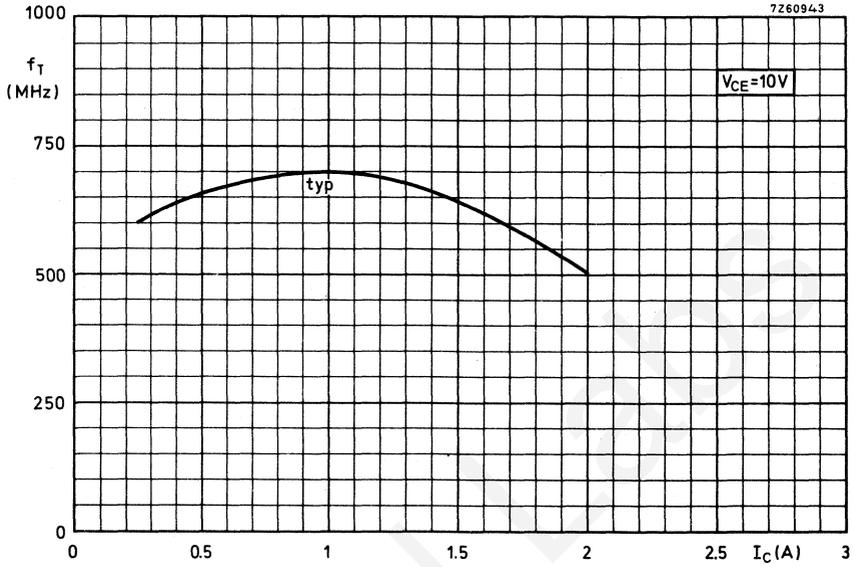
Feedback capacitance at $f = 1 \text{ MHz}$

$I_C = 100 \text{ mA}; V_{CE} = 15 \text{ V}$ $C_{re} \text{ typ. } 11 \text{ pF}$

Collector-stud capacitance

$C_{cs} \text{ typ. } 2 \text{ pF}$





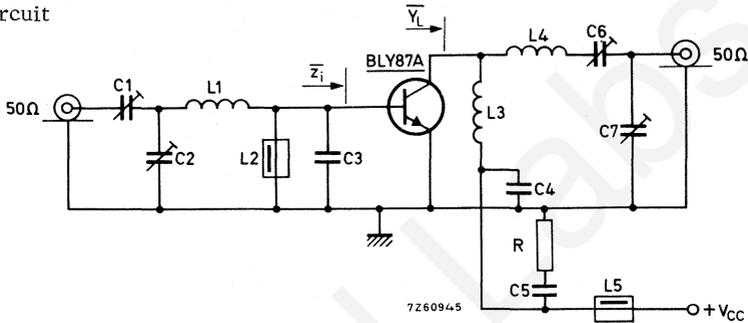
APPLICATION INFORMATION

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

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

$V_{CC}(V)$	$P_S(W)$	$P_L(W)$	$I_C(A)$	$G_p(dB)$	$\eta(\%)$	$\bar{Z}_1(\Omega)$	$\bar{Y}_L(mA/V)$
13.5	< 1.0	8	< 0,85	> 9	> 70	$2.8 + j1.2$	$76 - j16$
12.5	typ. 1.0	8	typ. 0.91	typ. 9	typ. 70	—	—

Test circuit



C1 = 2.5 to 20 pF film dielectric trimmer (code number 2222 809 07004)

C2 = C6 = C7 = 4 to 40 pF film dielectric trimmer (code number 2222 809 07008)

C3 = 47 pF ceramic

C4 = 100 pF ceramic

C5 = 150 nF polyester

L1 = 0.5 turn enamelled Cu wire (1.5 mm); int. diam. 6 mm; leads 2 x 10 mm

L2 = L5 = ferroxcube choke (code number 4312 020 36640)

L3 = 2.5 turns closely wound enamelled Cu wire (1.5 mm); int. diam. 6 mm; leads 2 x 10 mm

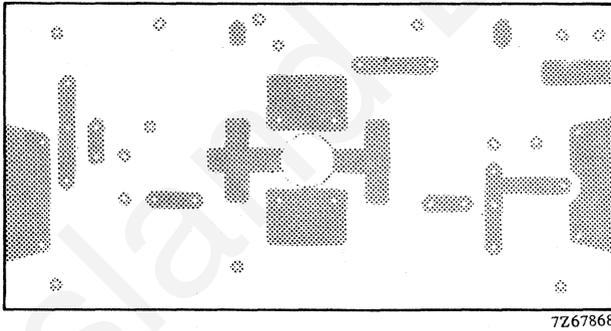
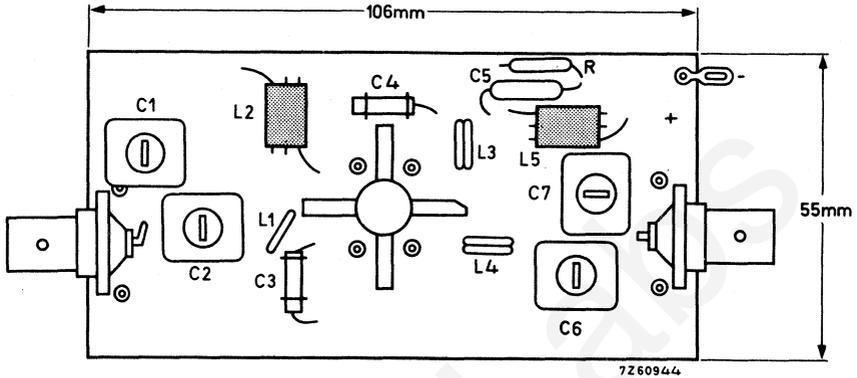
L4 = 4.5 turns enamelled Cu wire (1.5 mm); int. diam. 6 mm; leads 2 x 10 mm

R = 10 Ω carbon

Component lay-out for 175 MHz test circuit see page 6

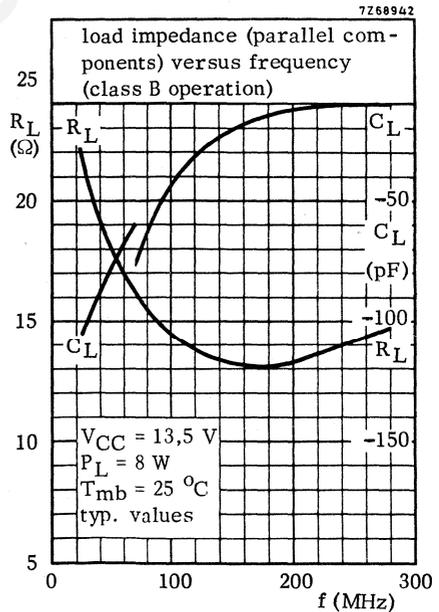
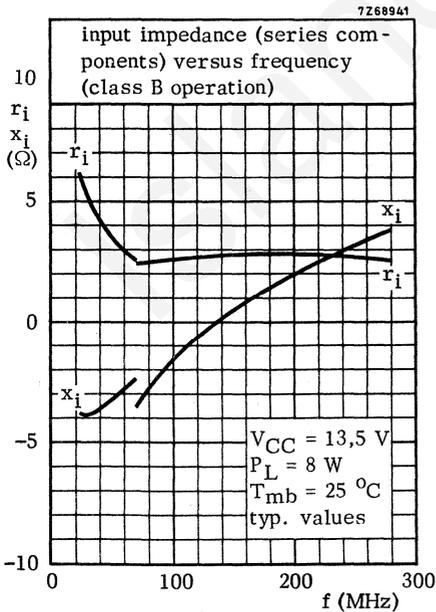
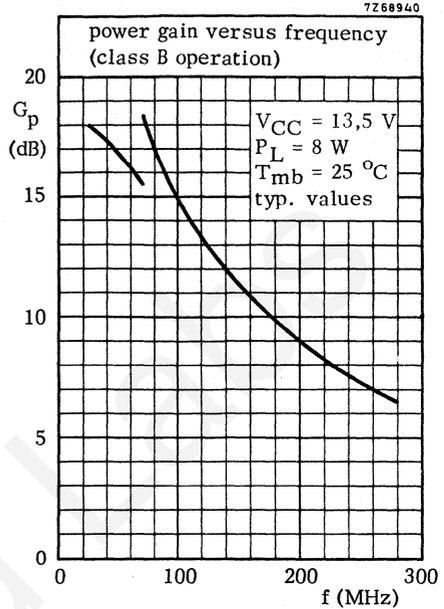
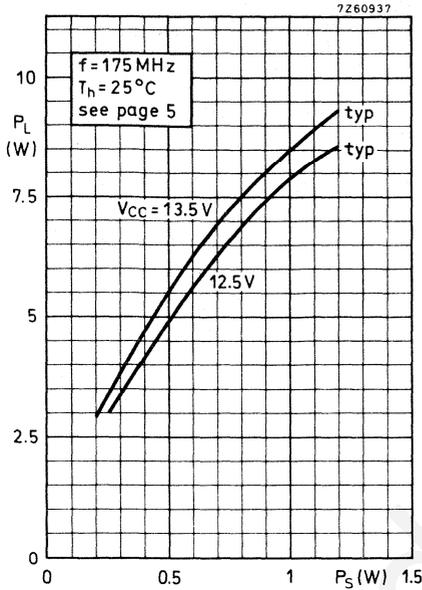
APPLICATION INFORMATION (continued)

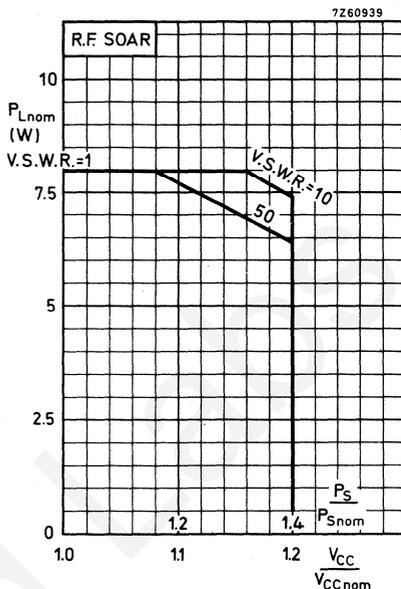
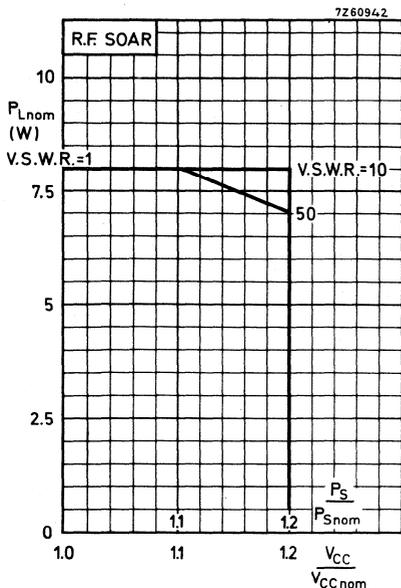
Component lay-out and printed circuit board for 175 MHz test circuit.



The circuit and the components are situated on one side of the epoxy fibre-glass board, the other side being fully metallised to serve as earth. Earth connections are made by means of hollow rivets.

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.





Conditions for R.F. SOAR:

$$\begin{aligned}
 f &= 175 \text{ MHz} & P_{Snom} &= P_S \text{ at } V_{CC} = V_{CCnom} \text{ and } V.S.W.R. = 1 \\
 T_h &= 70^\circ\text{C} & R_{th mb-h} &= 0.6 \text{ }^\circ\text{C/W} \\
 V_{CCnom} &= 12.5 \text{ or } 13.5 \text{ V} & & \text{see also page 5}
 \end{aligned}$$

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.