U.H.F. POWER TRANSISTOR

N-P-N silicon planar epitaxial transistor 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 and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V. Gold metallization ensures extremely high reliability.

It has a capstan envelope with a moulded cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

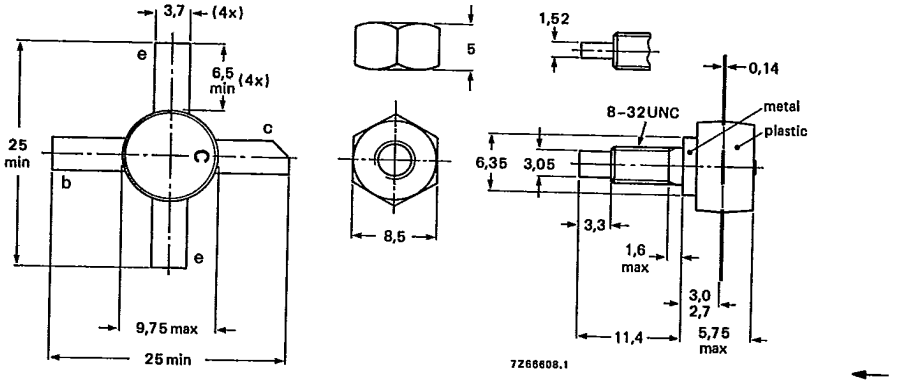
R.F. performance up to T_{mb} = 25 °C in an unneutralized common-emitter class-B circuit

mode of operation	V_{CE} V	f MHz	P_S W	P_L W	I_C A	G_P dB	η %	$\overline{z_i}$ Ω	$\overline{Y_L}$ mS
c.w.	13,5	470	< 8,0	20	< 2,28	> 4	> 65	1,2 + j4,5	163 − j35
c.w.	12,5	470	< 6,8	17	< 2,09	> 4	> 65	—	—

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-48/2.



Torque on nut: min. 0,75 Nm (7,5 kg cm)
max. 0,85 Nm (8,5 kg cm)

Diameter of clearance hole in heatsink: max. 4,2 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.

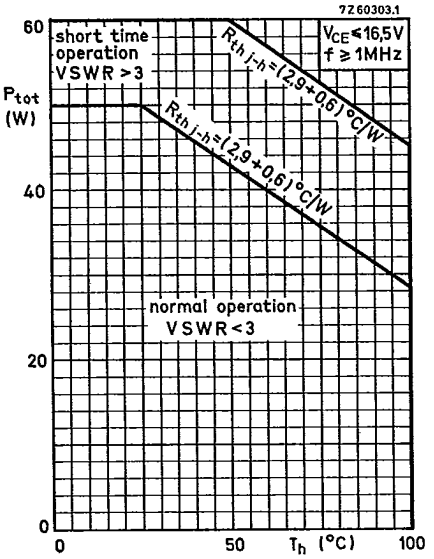
When locking is required an adhesive is preferred instead of a lock washer.

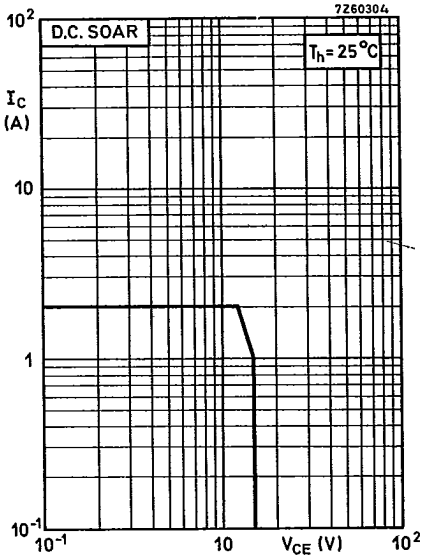
PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

BLX69A

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.	3,5	A
Collector current (peak value) f > 1 MHz	I_{CM}	max.	10	A
Power dissipation				
Total power dissipation up to T_h = 25 °C f ≥ 1 MHz	P_{tot}	max.	50	W



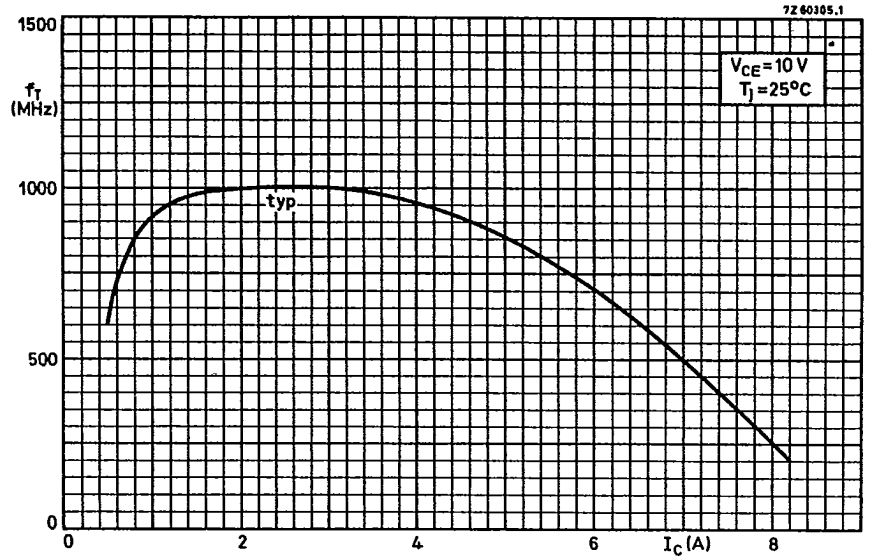


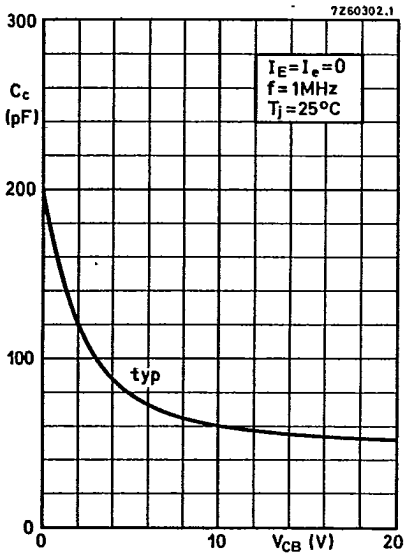
Temperatures				
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C
THERMAL RESISTANCE				
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	2,9	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Breakdown voltages				
Collector-base voltage open emitter ; I_C = 25 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter voltage open base ; I_C = 25 mA	$V_{(BR)CEO}$	>	18	V
Emitter-base voltage open collector ; I_E = 10 mA	$V_{(BR)EBO}$	>	4	V
Transient energy				
L = 25 mH; f = 50 Hz				
open base	E	>	3,1	mWs
$-V_{BE}$ = 1,5 V; R_{BE} = 33 Ω	E	>	3,1	mWs
D.C. current gain				
I_C = 1 A; V_{CE} = 5 V	h_{FE}	> typ.	10 30	
Transition frequency				
I_C = 2 A; V_{CE} = 10 V	f_T	typ.	1,0	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 15 V	C_c	typ. <	55 70	pF pF
Feedback capacitance				
I_C = 100 mA; V_{CE} = 15 V	C_{re}	typ.	32	pF
Collector-stud capacitance	C_{cs}	typ.	2	pF





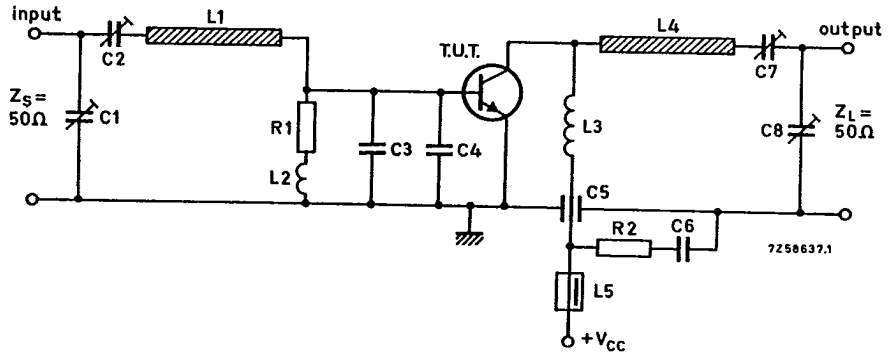
APPLICATION INFORMATION

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

T_{mb} up to 25 °C

f (MHz)	V_{CE} (V)	P_S (W)	P_L (W)	I_C (A)	G_p (dB)	η (%)	$\overline{z_i}$ (Ω)	$\overline{Y_L}$ (mS)
470	13,5	< 8,00	20	< 2,28	> 4	> 65	1,2 + j4,5	163 – j35
470	12,5	< 6,80	17	< 2,09	> 4	> 65	–	–
175	12,5	typ. 1,35	17	typ. 2,30	typ. 11	typ. 60	–	–

Test circuit: 470 MHz; c.w. class-B.



List of components:

C1 = C2 = C7 = C8 = 2,0 to 9,0 pF film dielectric trimmer (cat. no. 2222 809 09002)
C3 = C4 = 15 pF chip capacitor
C5 = 100 pF feed-through capacitor
C6 = 33 nF polyester capacitor

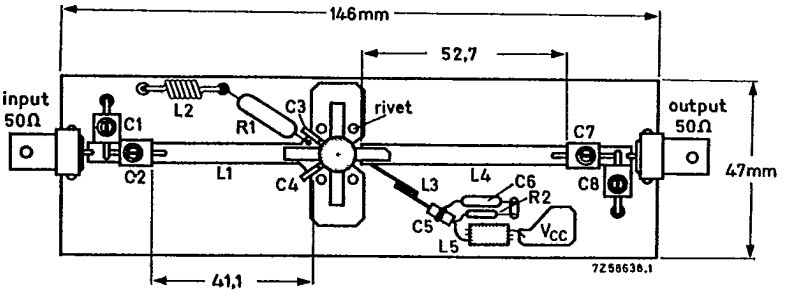
R1 = 1 Ω carbon resistor
R2 = 10 Ω carbon resistor

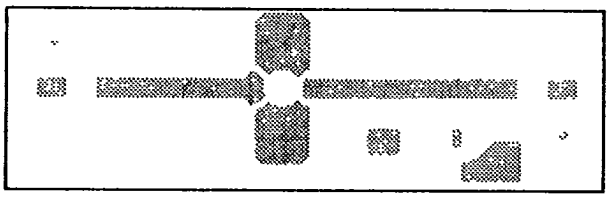
L1 = stripline (41,1 mm x 5,0 mm)
L2 = 13 turns closely wound enamelled Cu wire (0,5 mm); int. dia. 4,0 mm (0,32 μH)
L3 = 2 turns Cu wire (1 mm); winding pitch 1,5 mm; int. dia. 4 mm; leads 2 x 5 mm
L4 = stripline (52,7 mm x 5,0 mm)
L5 = Ferroxcube choke coil. Z (at f = 50 MHz) = 750 Ω ± 20% (cat. no. 4312 020 36640)

L1 and L4 are striplines on a double Cu-clad print plate with PTFE fibre-glass dielectric. (ϵ_r = 2,74); thickness 1,45 mm.

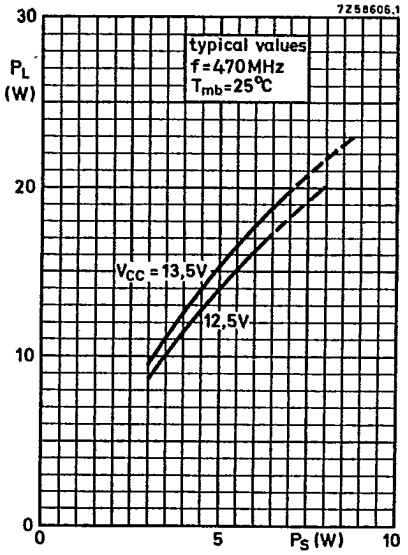
APPLICATION INFORMATION (continued)

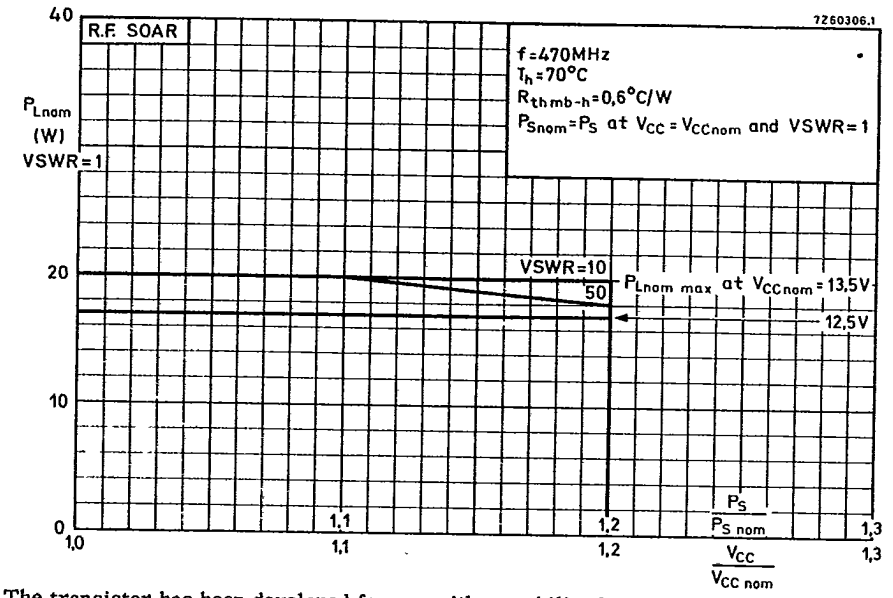
Component layout and printed-circuit board for 470 MHz test circuit.





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





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 graph above for safe operation at supply voltages other than the nominal. The graph shows the allowable output power, under nominal conditions, as a function of the supply overvoltage ratio, with VSWR as parameter.
The graph applies to the situation in which the drive (P_S/P_{Snom}) increases linearly with the supply overvoltage ratio.

The horizontal line at 20 W applies at V_{CCnom} = 13,5 V.
For V_{CCnom} = 12,5 V, P_L should be derated to 17 W.