

MICROWAVE POWER TRANSISTOR

NPN silicon planar epitaxial microwave power transistor, intended for use in a common-base class-C broadband pulse power amplifier, operating in the 1.2 to 1.4 GHz frequency range.

It is recommended for radar applications.

Features

- Interdigitated structure; giving a high emitter efficiency
- Diffused emitter ballasting resistors; capable of withstanding a high VSWR and providing excellent current sharing
- Gold metallization; ensuring excellent stability of the characteristics and giving a prolonged working life
- Multicell geometry; giving good balance of dissipated power and low thermal resistance
- Internal input and output matching cells; simplifying circuit design

The transistor is housed in a metal ceramic flange envelope (FO-91).

QUICK REFERENCE DATA

Microwave performance up to $T_{mb} = 25\text{ }^{\circ}\text{C}$ in an unneutralized common-base class-C broadband amplifier; typical values.

mode of operation	f GHz	V_{CC} V	P_L W	G_p dB	η_C %	$\bar{z}_i; \bar{Z}_L$ Ω
$t_p = 1\text{ ms};$ $\delta = 10\%$	1.2 to 1.4	40	150	7	42	see Fig. 6
$t_p = 150\text{ }\mu\text{s}$ $\delta = 5\%$	1.2 to 1.4	50	240	9	45	see Fig. 6

MECHANICAL DATA

Dimensions in mm

FO-91 (see Fig. 1).

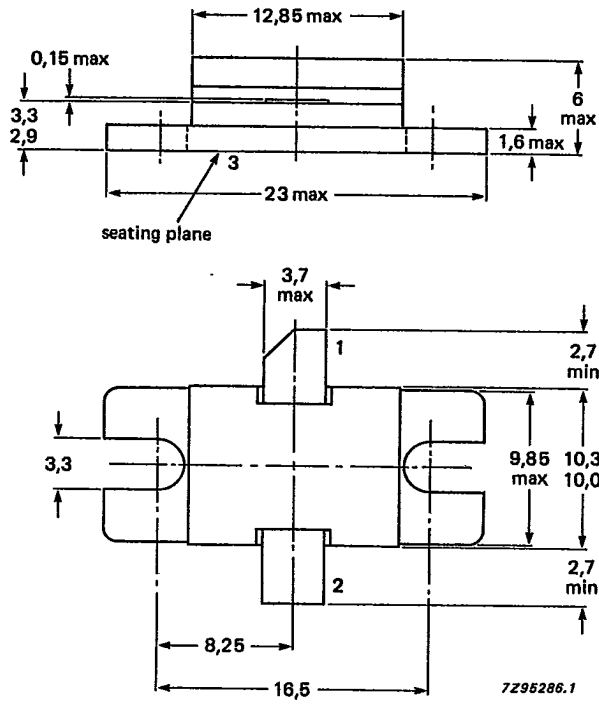
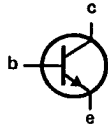
MECHANICAL DATA

Fig. 1 FO-91.

Dimensions in mm

Pinning:
1 = collector
2 = emitter
3 = base

Base is connected to the seating plane.



RATINGS

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

Collector-base voltage; open emitter	V_{CB0}	max.	60 V
Collector-emitter voltage; $R_{BE} = 10 \Omega$	V_{CER}	max.	60 V
Collector-emitter voltage; open base	V_{CEO}	max.	20 V
Emitter-base voltage; open collector	V_{EBO}	max.	3 V
Collector current (peak)*	I_C	max.	15 A
Total power dissipation at $T_{mb} \leq 75 \text{ }^\circ\text{C}$ *	P_{tot}	max.	300 W
Storage temperature range	T_{stg}		-65 to +200 $^\circ\text{C}$
Operating junction temperature	T_j	max.	200 $^\circ\text{C}$
Soldering temperature at 0.3 mm from the case; $t_{sld} \leq 10 \text{ s}$	T_{sld}	max.	235 $^\circ\text{C}$

THERMAL RESISTANCE (at $T_j = 75 \text{ }^\circ\text{C}$)

From junction to mounting base (CW)	$R_{th j-mb}$	max.	1 K/W
From junction to mounting base**	$Z_{th j-mb}$	typ.	0.3 K/W
From mounting base to heatsink (CW)	$R_{th mb-h}$	typ.	0.2 K/W

* Maximum values under nominal pulsed microwave operating conditions.

** Equivalent thermal impedance under nominal pulsed microwave operating conditions ($t_{on} = 1 \text{ ms}$; $\delta = 10\%$).

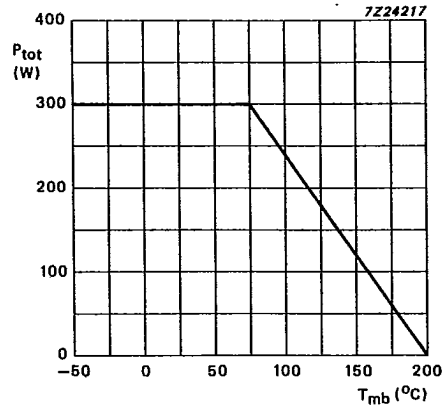


Fig. 2 Power derating curve $t_p = 1 \text{ ms}$; $\delta = 10\%$.

CHARACTERISTICS

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

Breakdown voltages

$I_C = 35 \text{ mA}$; $I_E = 0$

$I_C = 35 \text{ mA}$; $I_B = 0$

$I_C = 35 \text{ mA}$; $R_{BE} = 10 \text{ } \Omega$

$I_C = 0$; $I_E = 10 \text{ mA}$

$V_{(BR)CBO} \geq 60 \text{ V}$

$V_{(BR)CEO} \geq 20 \text{ V}$

$V_{(BR)CER} \geq 50 \text{ V}$

$V_{(BR)EBO} \geq 3 \text{ V}$

Collector cut-off current

$I_E = 0$; $V_{CB} = 50 \text{ V}$

$I_{CBO} \leq 7 \text{ mA}$

APPLICATION INFORMATION

Microwave performance at $T_{mb} = 25 \text{ }^\circ\text{C}$ measured in a common-base broadband test circuit as shown in Fig. 3.

mode of operation	f GHz	V _{CC} V	P _L W	G _p dB	η_C %	$\bar{z}_i; \bar{Z}_L$
class-C; $t_p = 1 \text{ ms}$; $\delta = 10\%$	1.2 to 1.4	40	≥ 135	≥ 6.5	≥ 35	see Fig. 6

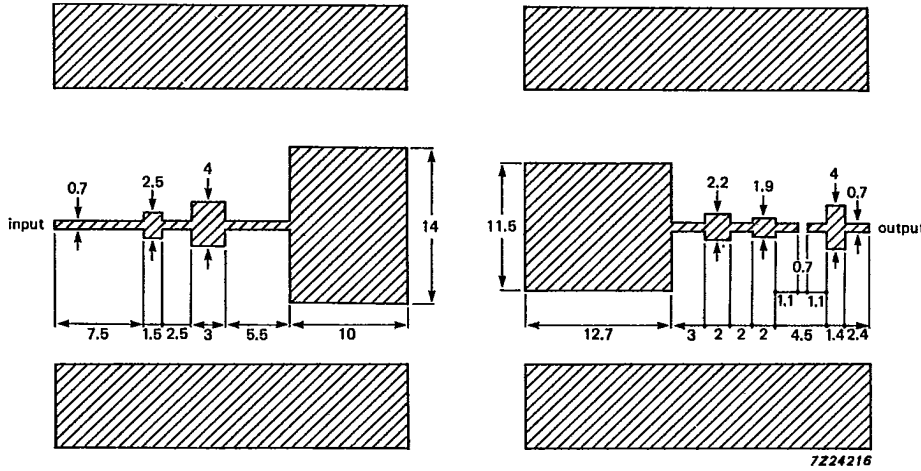


Fig. 3 Broadband test circuit for 1.2 to 1.4 GHz; class-C; pulse applications (dimensions in mm). Epsilam printed circuit board; thickness 0.635 mm; $\epsilon_r = 10$.

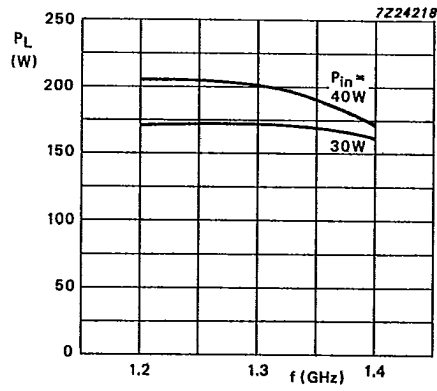


Fig. 4 Load power as a function of frequency; $V_{CC} = 40$ V; $t_p = 1$ ms; $\delta = 10\%$; typical values.

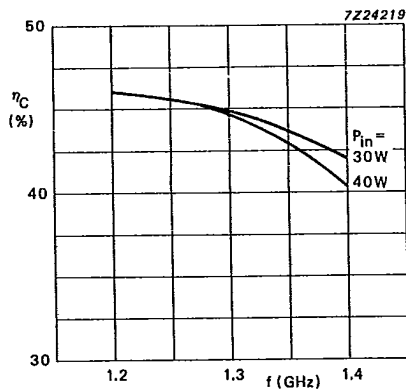


Fig. 5 Power gain as a function of frequency;
 $t_p = 1$ ms; $\delta = 10\%$; typical values.

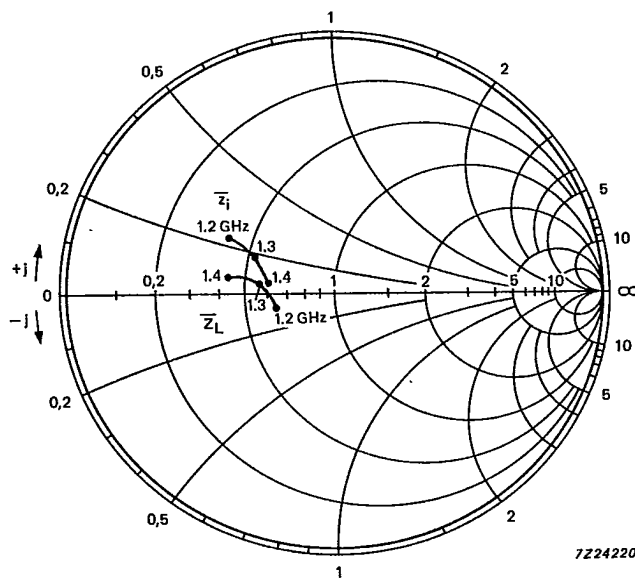


Fig. 6 Input and optimum load impedance as a function of frequency;
 $V_{CC} = 40$ V; $Z_0 = 5 \Omega$.