UHF POWER AMPLIFIER MODULE

UHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 5 W into a 50 Ω load over the frequency range 430 to 470 MHz.

The module consists of a two-stage RF amplifier using npn transistor chips with lumped element matching components in a SOT182 plastic encapsulation.

QUICK REFERENCE DATA

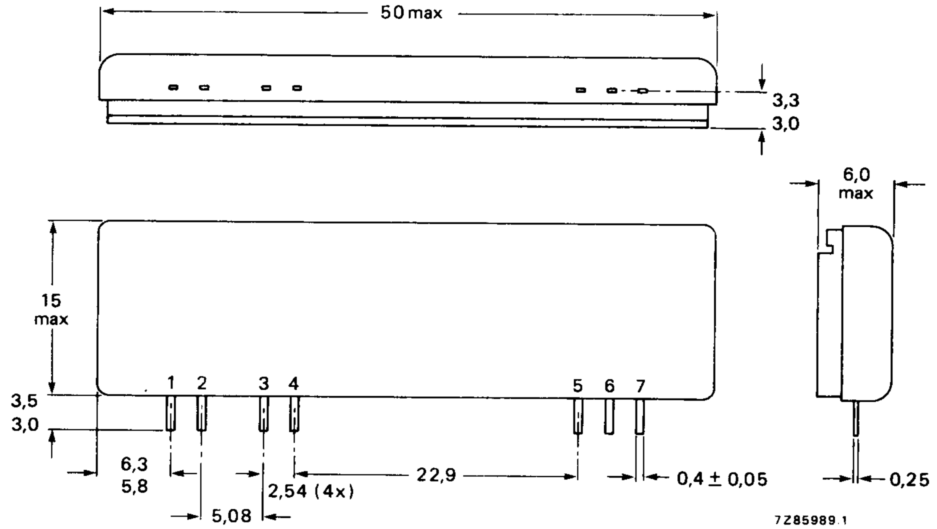
Mode of operation			continuous wave	
Frequency range			430 to 470	MHz
DC supply terminal voltages	V_{S1}; V_{S2}	nom.	9.6	V
RF drive power	P_D	max.	35	mW
RF load power	P_L	min.	5.0	W
Efficiency	n	min.	40	%
Input and output impedance	z_i; Z_l	nom.	50	Ω

MECHANICAL DATA

See Fig.1 next page.

MECHANICAL DATA

Dimensions in mm



Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output

Flange connected to earth

Fig.1 SOT182.

RATINGS

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

DC supply terminal voltages*	V_{S1}; V_{S2}	max.	13.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	9.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature	T_h	max.	90	°C

* With respect to the earth pins.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated

Conditions: $V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; f = 430 to 470 MHz

Quiescent currents			
first stage current $P_D = 0$	I_{Q1}	typ.	10 mA
second stage current with first stage open circuit	I_{Q2}	<	0.5 mA
RF drive power P_L = 5.0 W	P_D	<	35 mW
Efficiency P_L = 5.0 W	η	min.	40 %
		typ.	44 %
Harmonic output $R_S = R_L$ = 50 Ω	any harmonic	min.	−40 dB
		typ.	−50 dB
Input VSWR with respect to 50 Ω	VSWR	<	2.0 : 1

Stability

The module is stable with a load VSWR up to 5 (all phases) when operated within the following conditions:

$V_{S1} = V_{S2}$ = 4.0 V to 11.2 V; P_D = 17 to 70 mW; f = 430 to 470 MHz; P_L = < 9.0 W (matched)

Ruggedness

The module will withstand a load mismatch VSWR of 50 (all phases) for short period overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded (T_h < 90 °C).

Output power control

The module is designed to be operated at a constant output power of 5.0 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage V_{S1}. If the module is to be used over a range of output power levels below 5.0 W, the first stage supply voltage should not be reduced below 4.0 V. If further reductions in power are needed this may be achieved by varying the drive power P_D. For stable operation however, care must be taken to avoid operating the module outside the published stability conditions.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. The leads of the devices may be soldered directly into a circuit using a soldering iron with a maximum temperature of 245 °C for not more than 10 s at a distance of at least 1 mm from the plastic.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

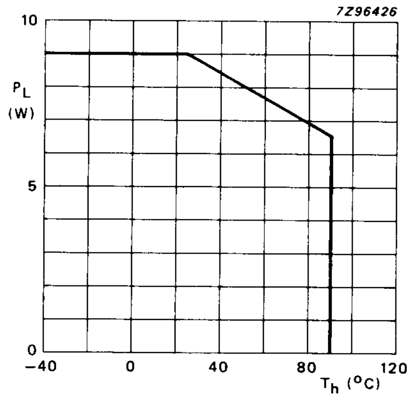


Fig.2 Load power derating; VSWR = 1 : 1.

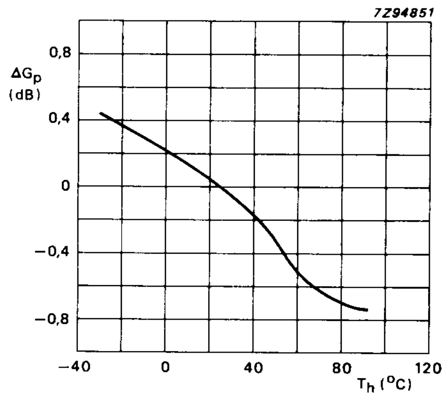


Fig.3 Change in power gain as a function of heatsink temperature; $V_{S1} = V_{S2} = 9.6$ V; typical values.

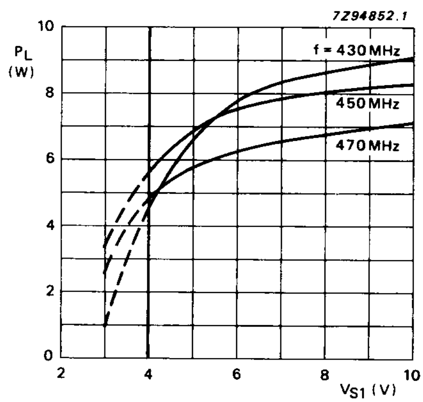


Fig.4 Load power as a function of V_{S1}; $V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

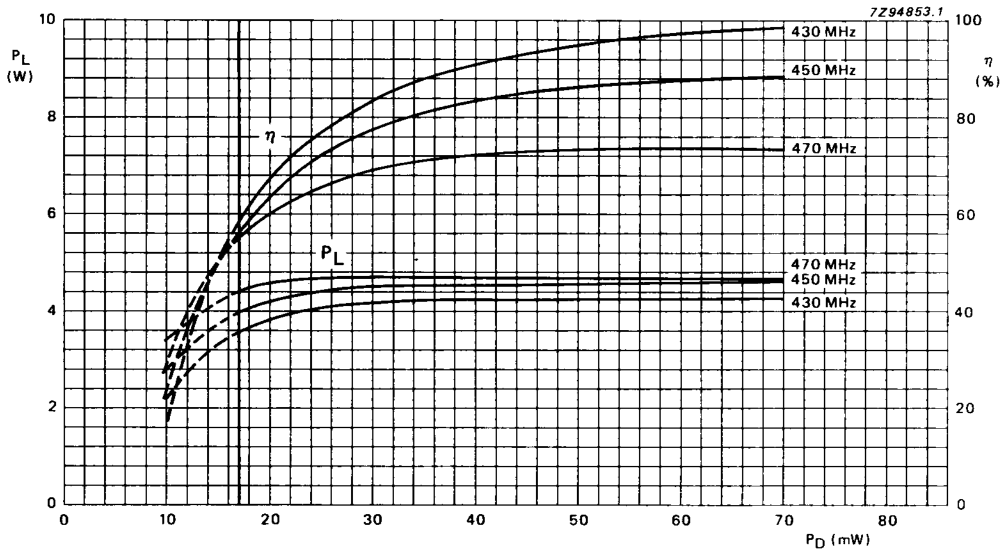


Fig.5 Load power and efficiency as functions of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

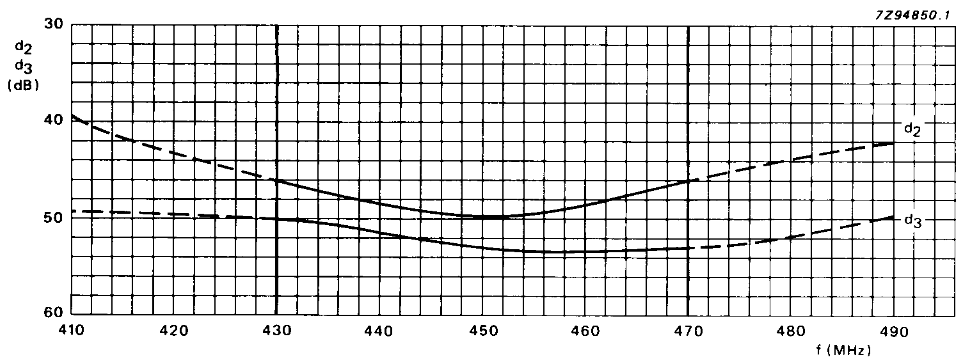


Fig.6 Second and third harmonic distortions as functions of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

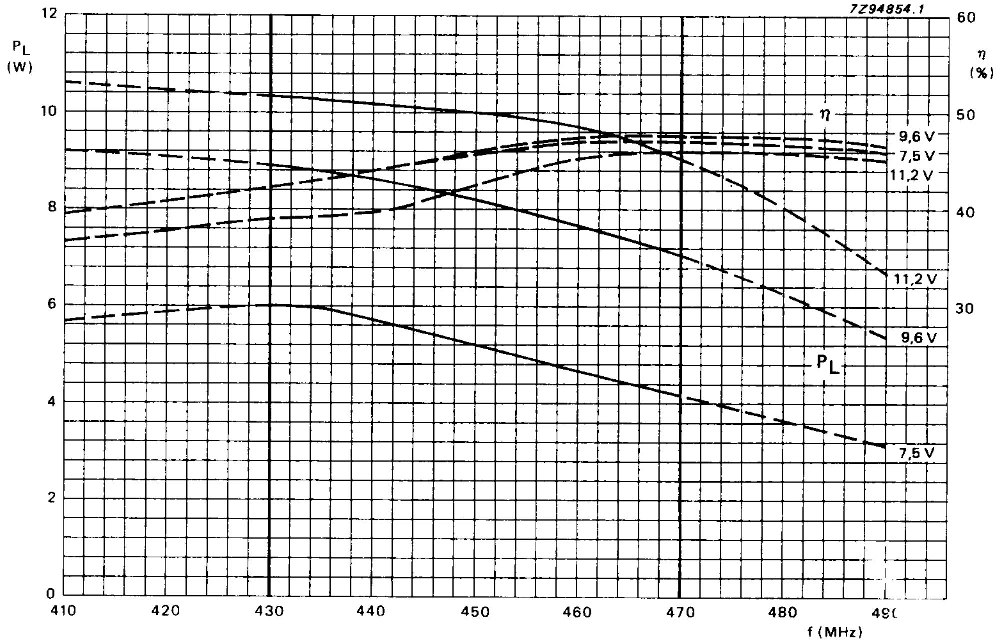


Fig.7 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2}$; P_D = 35 mW; typical values.