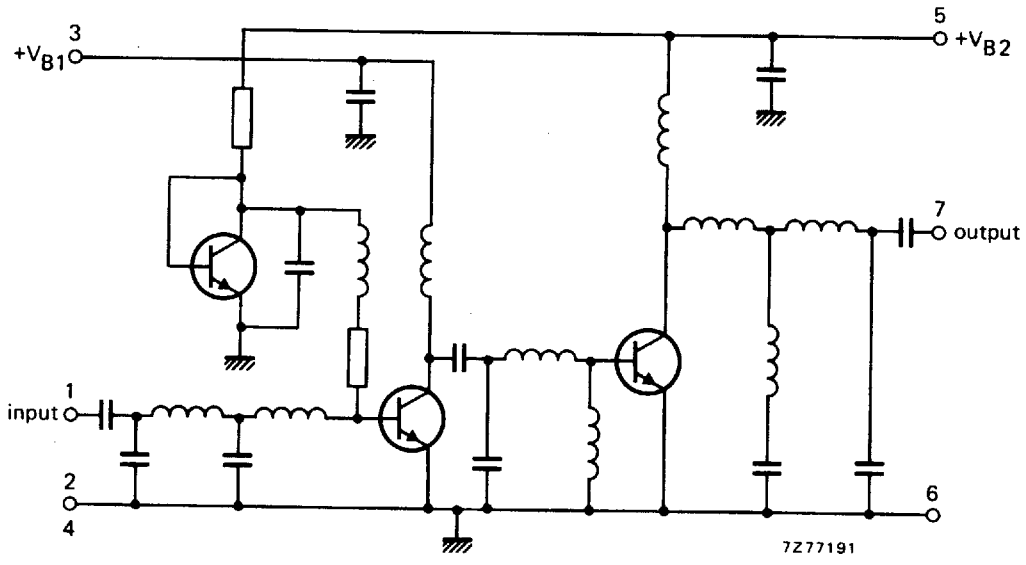
VHF POWER AMPLIFIER MODULES

A range of broadband amplifier modules designed for mobile communications equipments, operating directly from 12 V vehicle electrical systems. The devices will produce 18 W output into a 50 Ω load. The modules consist of a two stage RF amplifier using npn transistor chips, together with lumped-element matching components.

QUICK REFERENCE DATA

type number	mode of operation	frequency range f (MHz)	nominal supply voltages $V_{B1} = V_{B2}$ (V)	drive power P_D (mW)	load power P_L (W)	nominal input impedance z_i (Ω)	nominal load impedance Z_L (Ω)
BGY32	cw	68 to 88	12.5	100	> 18 typ 23	50	50
BGY33	cw	80 to 108	12.5	100	> 18 typ 22	50	50
BGY35	cw	132 to 156	12.5	150	> 18 typ 22	50	50
BGY36	cw	148 to 174	12.5	150	> 18 typ 21	50	50

CIRCUIT DIAGRAM

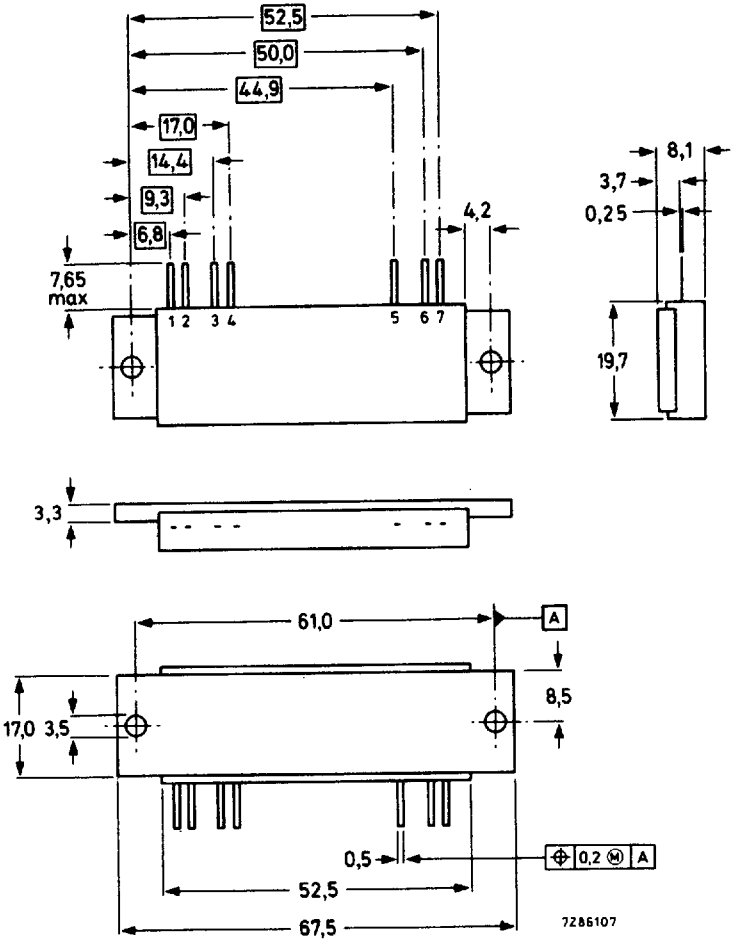


PRODUCT SAFETY This device incorporates beryllium oxide, the dust of wich is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT132B.



Lead reference

1 = Input
2 = Earth
3 = Supply $+V_{B1}$
4 = Earth
5 = Supply $+V_{B2}$
6 = Earth
7 = Output

Mounting and soldering recommendations

To ensure good thermal transfer the module should be mounted using heatsink compound onto a heatsink with a flat surface; if an isolation washer is used heatsink compound should be used on both sides of the insulator. Burrs and thickening of the holes in the heatsink should be removed and 3 mm bolts tightened to torques of 0,5 Nm minimum.

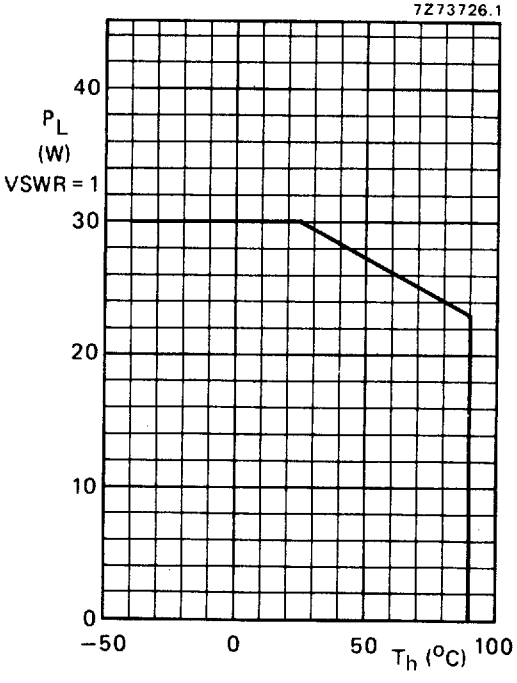
Devices may be soldered directly into a circuit with a soldering iron at maximum iron temperature of 245 °C for 10 seconds at least 1 mm from the plastic.

RATINGS

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

DC voltages (with respect to flange)

DC supply terminals	V_{B1} and V_{B2}	max	15 V
RF input terminal	$\pm V_I$	max	25 V
RF output terminal	$\pm V_O$	max	25 V
Input drive power BGY32 and BGY33	P_D	max	200 mW
Input drive power BGY35 and BGY36	P_D	max	300 mW
Load power	P_L	max	30 W



Storage temperature range	T_{stg}	−40 to 100	°C
Operating heatsink temperature	T_h	max 90	°C

CHARACTERISTICS

T_h = 25 °C

			BGY32	BGY33	BGY35	BGY36	
Quiescent current							
$V_{B1} = V_{B2}$ = 12,5 V; P_D = 0; $R_S = R_L$ = 50 Ω	I_{BQ1}	typ	6	6	6	6	mA
	I_{BQ2}	typ	13	13	13	13	mA
Frequency range	f	>	68	80	132	148	MHz
		<	88	108	156	174	MHz
Load power							
$V_{B1} = V_{B2}$ = 12.5 V; $R_S = R_L$ = 50 Ω	P_L	>	18	18			W
BGY32 and **BGY33**; P_D = 100 mW		typ	23	22	–	–	W
	η	>	40	40			%
		typ	50	50	–	–	%
	P_L	>	–	–	18	18	W
BGY35 and **BGY36**; P_D = 150 mW		typ			22	21	W
	η	>	–	–	40	40	%
		typ			50	50	%
Harmonic output	Any single harmonic will be at least 25 dB down relative to carrier						
Input VSWR with respect to 50 Ω		typ	1,5				

Stability

The module is stable with a load VSWR up to 3 : 1 (all phases) when operated within the following conditions: V_{S1} = 6 to 15 V; V_{S2} = 10 to 15 V; $V_{S1} \leqslant V_{S2}$; P_D = 50 to 200 mW; frequency within operating frequency range, provided the maximum ratings of the module are not exceeded.

Ruggedness

The modules are capable of withstanding load mismatch of up to 50 VSWR for short period overload conditions, with P_D, V_{B1} and V_{B2} at maximum values providing the combination does not result in the matched RF output power rating being exceeded.

APPLICATION INFORMATION

Supply

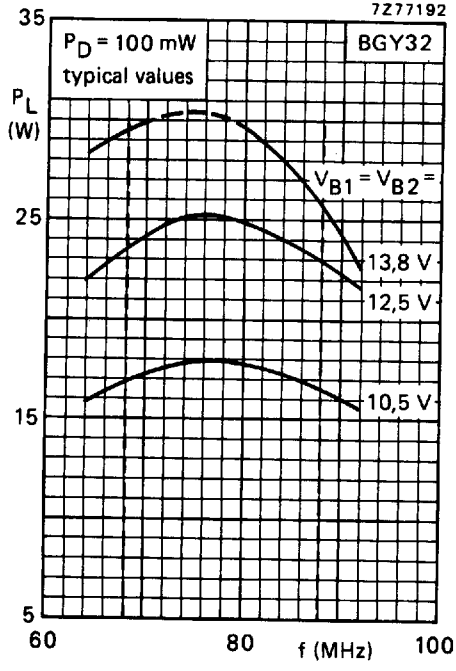
An electrolytic capacitor of 10 μF (25 V), in parallel with a polyester capacitor of 100 nF to earth, is recommended as decoupling arrangement for each power supply pin.

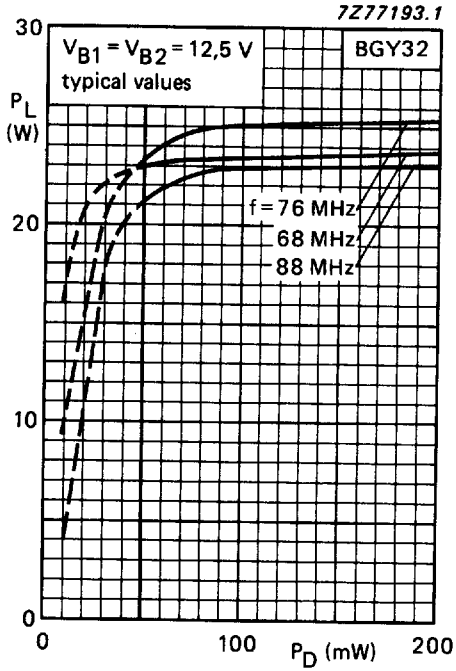
Power rating

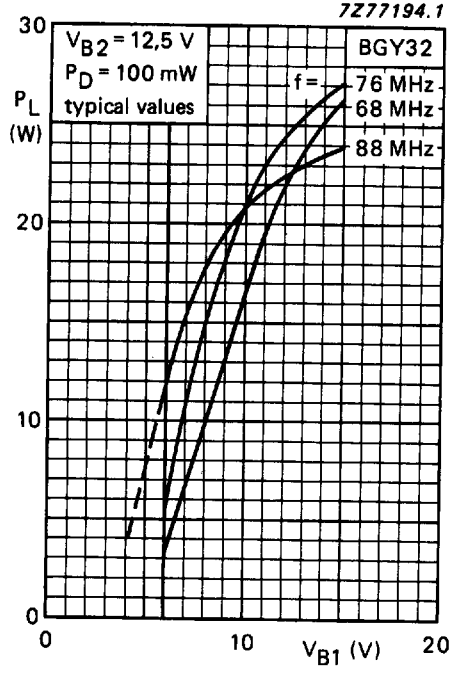
In general it is recommended that the output power from the module under nominal design conditions should not exceed 23 W in order to provide adequate safety margin under fault conditions.

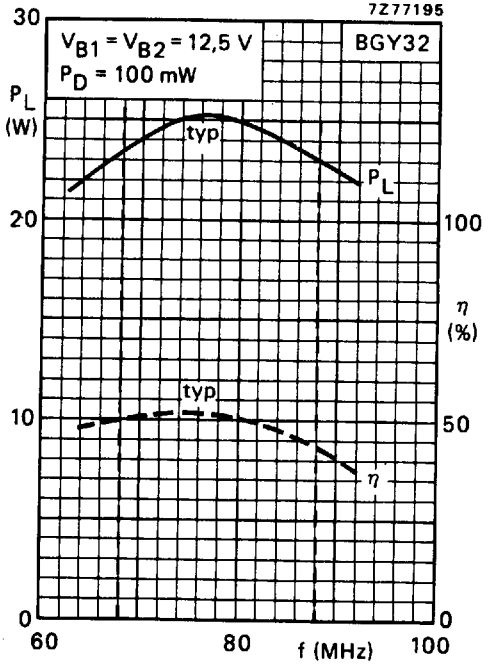
Output power control

The module is not designed to be operated over a large range of output power levels. The purpose of the output power control is to set the nominal output power level. The preferred method of output power control is by varying the drive power between 50 and 200 mW. The next option is by varying V_{S1} between 6 and 12.5 V.

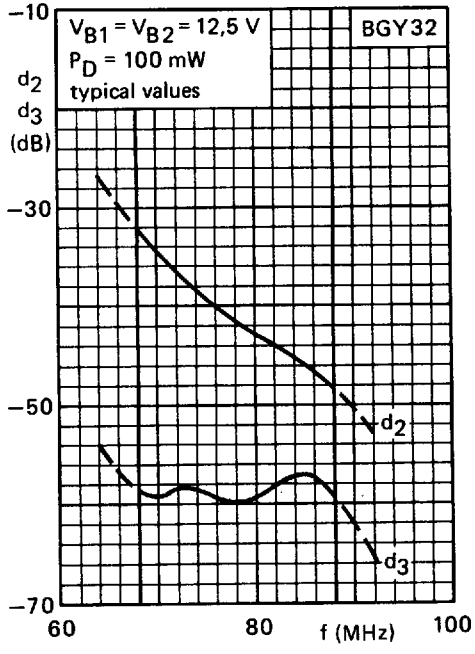

7Z77192
P_D = 100 mW
typical values
BGY32
P_L (W)
$V_{B1} = V_{B2}$ =
13,8 V
12,5 V
10,5 V
35
25
15
5
60
80
f (MHz)
100


7Z77193.1
$V_{B1} = V_{B2}$ = 12,5 V
typical values
BGY32
P_L (W)
f = 76 MHz
68 MHz
88 MHz
30
20
10
0
0
100
P_D (mW)
200

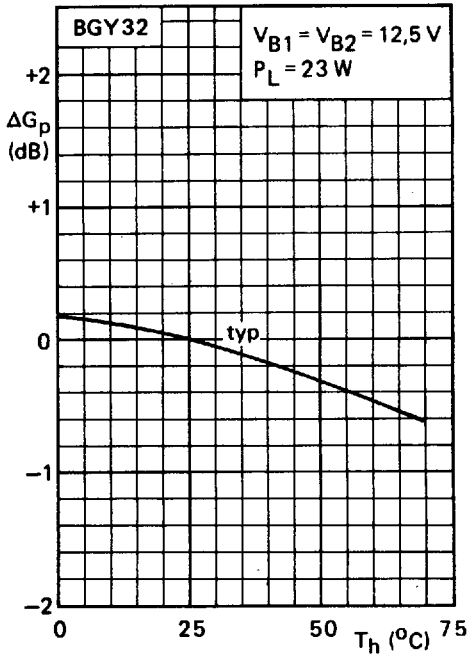

7Z77194.1
V_{B2} = 12,5 V
P_D = 100 mW
typical values
BGY32
f = 76 MHz
68 MHz
88 MHz
P_L (W)
30
20
10
0
0
10
V_{B1} (V)
20


7Z77195
$V_{B1} = V_{B2}$ = 12,5 V
P_D = 100 mW
BGY32
P_L (W)
typ
P_L
typ
η
η (%)
30
20
10
0
100
50
0
60
80
f (MHz)
100

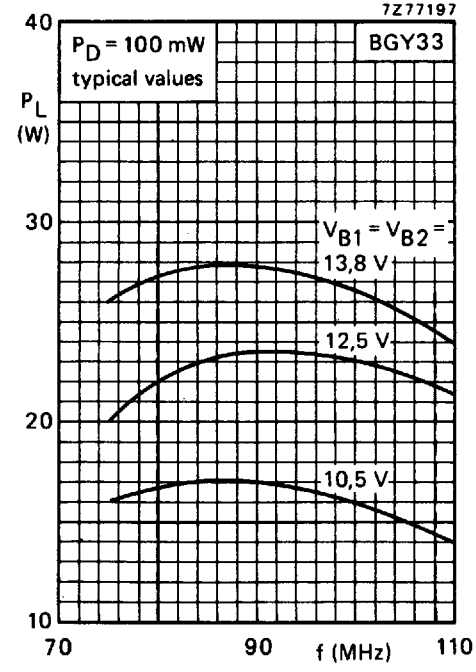
7Z77196.1



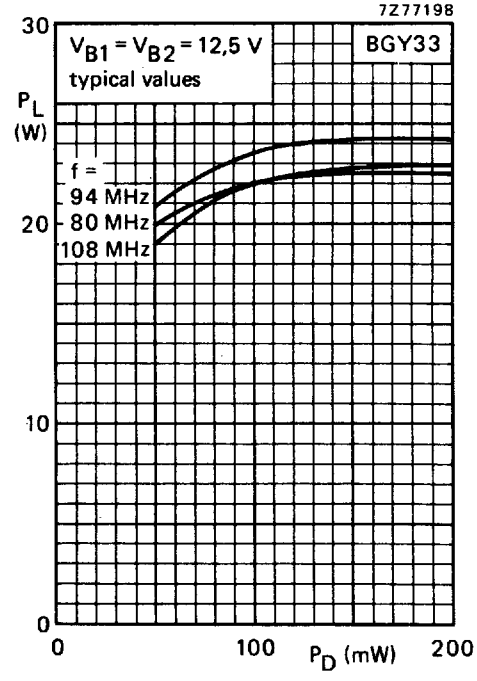
7Z77261

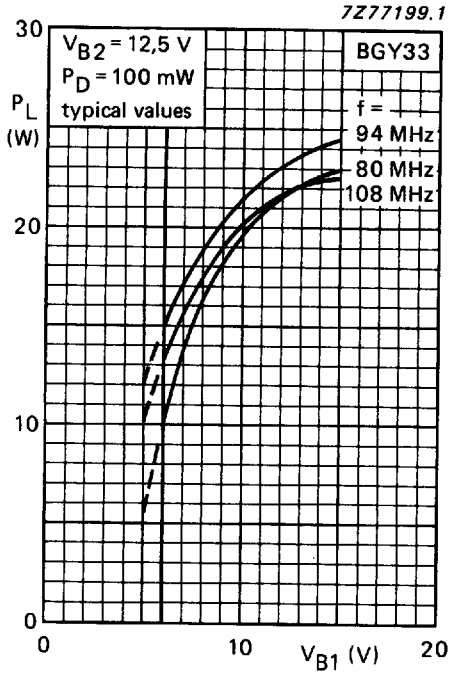


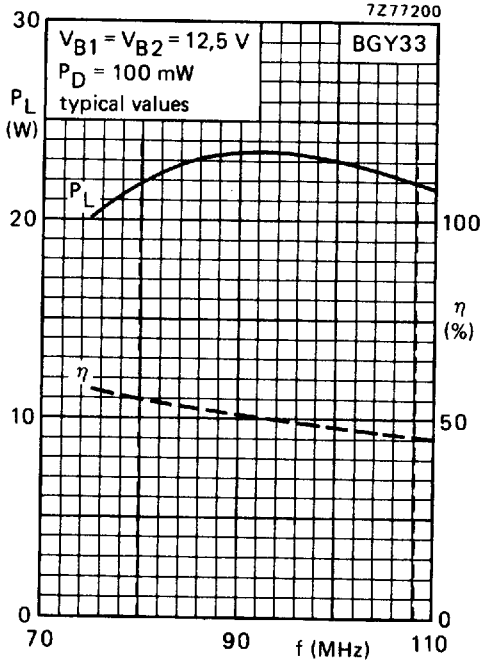
7Z77197

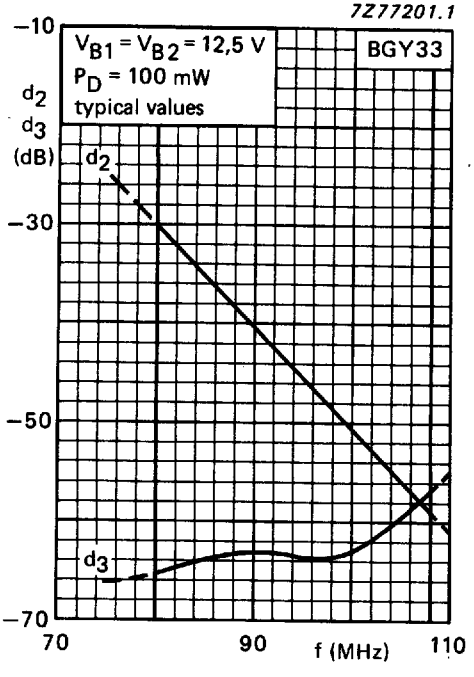


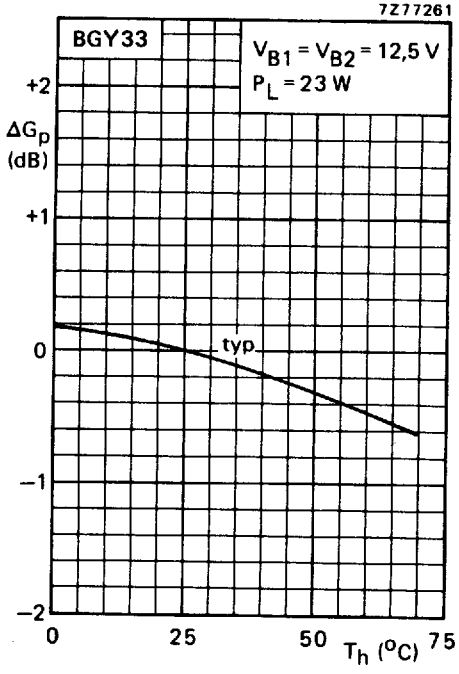
7Z77198

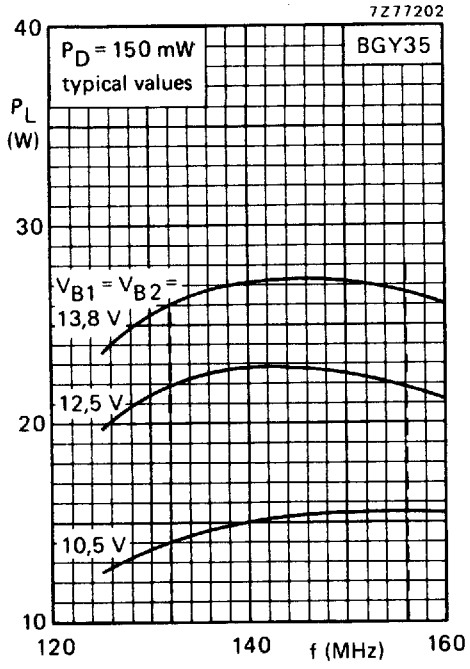


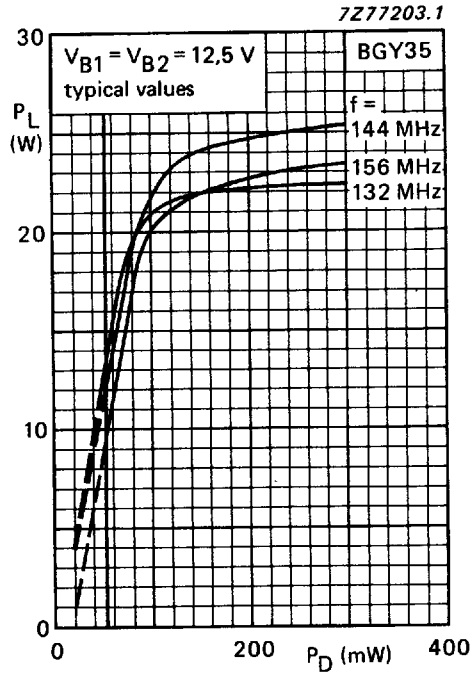

7Z77199.1
BGY33
V_{B2} = 12,5 V
P_D = 100 mW
typical values
f =
94 MHz
80 MHz
108 MHz
P_L (W)
30
20
10
0
0
10
20
V_{B1} (V)

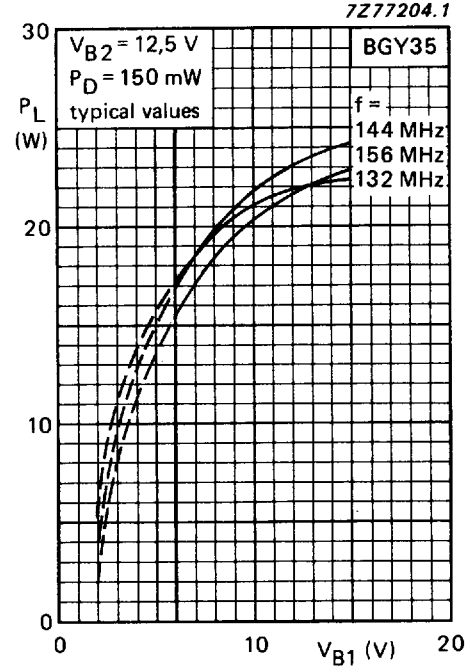

7Z77200
BGY33
V_{B1} = V_{B2} = 12,5 V
P_D = 100 mW
typical values
P_L (W)
P_L
η
η (%)
30
20
10
0
100
50
0
70
90
110
f (MHz)

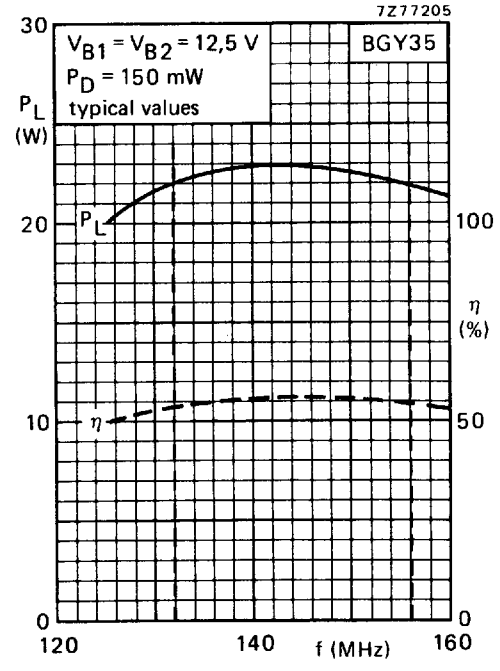

7Z77201.1
BGY33
V_{B1} = V_{B2} = 12,5 V
P_D = 100 mW
typical values
d_2
d_3 (dB)
d_2
d_3
−10
−30
−50
−70
70
90
110
f (MHz)


7Z77261
BGY33
V_{B1} = V_{B2} = 12,5 V
P_L = 23 W
ΔG_p (dB)
typ
+2
+1
0
−1
−2
0
25
50
75
T_h (°C)

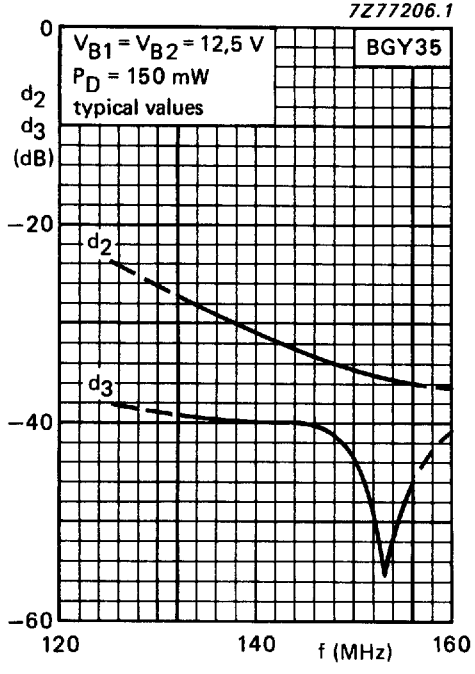

7Z77202
BGY35
P_D = 150 mW
typical values
P_L (W)
$V_{B1} = V_{B2}$ =
13,8 V
12,5 V
10,5 V
40
30
20
10
120
140
160
f (MHz)


7Z77203.1
BGY35
$V_{B1} = V_{B2}$ = 12,5 V
typical values
P_L (W)
f =
144 MHz
156 MHz
132 MHz
30
20
10
0
0
200
400
P_D (mW)


7Z77204.1
BGY35
V_{B2} = 12,5 V
P_D = 150 mW
typical values
P_L (W)
f =
144 MHz
156 MHz
132 MHz
30
20
10
0
0
10
20
V_{B1} (V)


7Z77205
BGY35
$V_{B1} = V_{B2}$ = 12,5 V
P_D = 150 mW
typical values
P_L (W)
P_L
η
η (%)
30
20
10
0
100
50
0
120
140
160
f (MHz)

7Z77206.1



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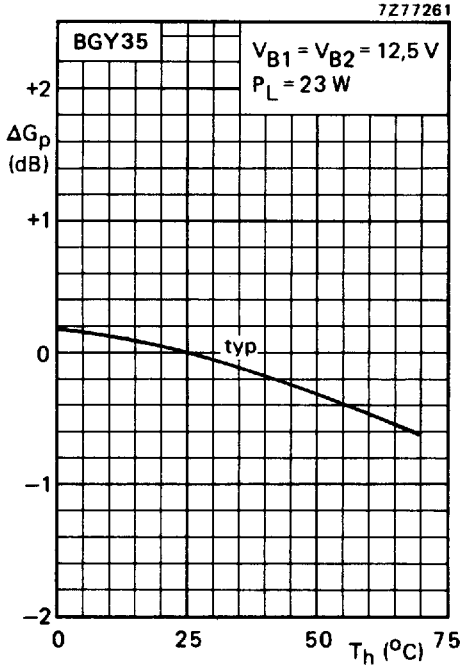

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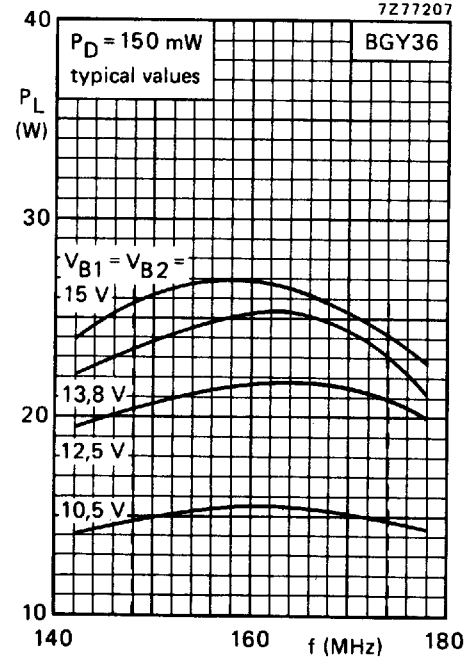

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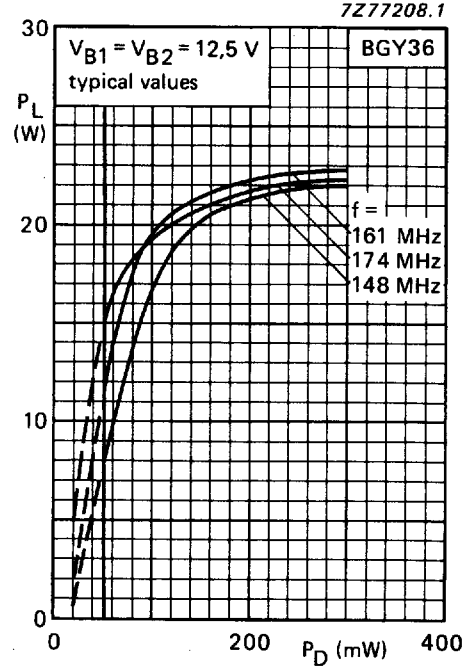

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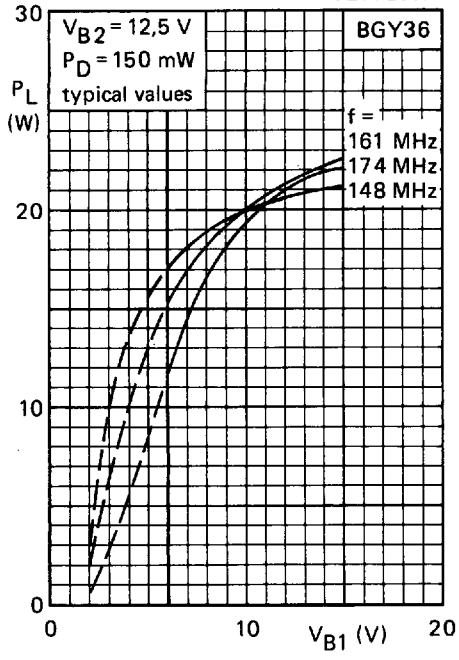

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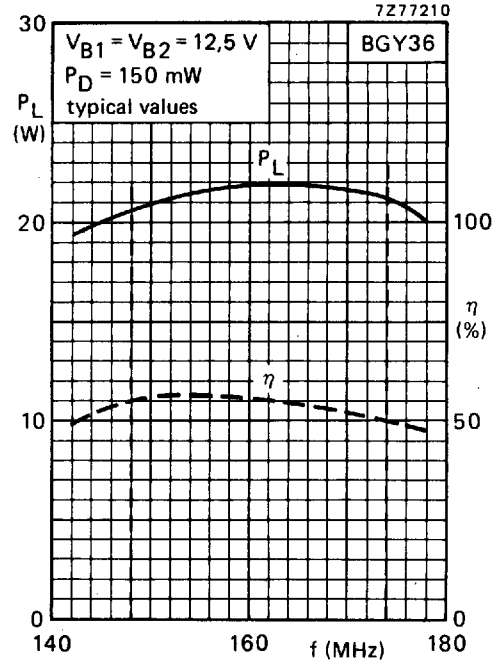

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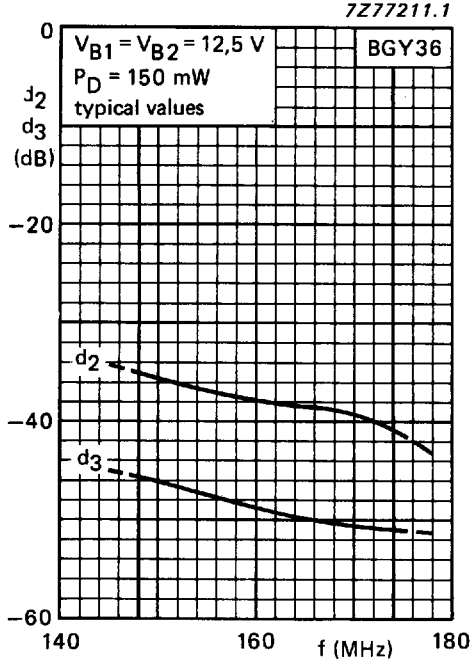

7Z77261