DATA SHEET

BGY203
UHF amplifier module

Product specification
Supersedes data of May 1994
File under Discrete Semiconductors, SC09

1996 May 23

Philips
Semiconductors

PHILIPS

UHF amplifier module BGY203

FEATURES

- 6 V nominal supply voltage
- 3.2 W output power
- Easy control of output power by pulsed DC voltage.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in the 880 to 915 MHz frequency range.

DESCRIPTION

The BGY203 is a four-stage UHF amplifier module in a SOT342A package. The module consists of four NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT342A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_{S1}
4	V_{S2}
5	RF output
Flange	ground

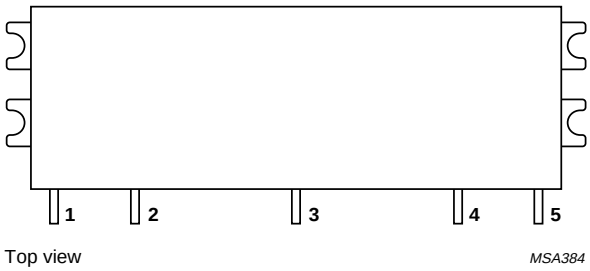


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
Pulsed; δ = 1 : 8	880 to 915	6	≤3.5	3.2	≥35	≥35	50

LIMITING VALUES

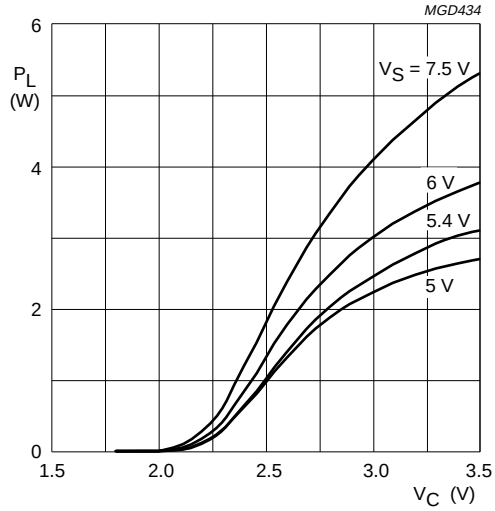
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS.	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	V_C = 3.5 V	–	8.5	V
V_{S2}	DC supply voltage	V_C = 3.5 V	–	8.5	V
V_C	DC control voltage		–	4	V
P_D	input drive power		–	2	mW
P_L	load power		–	4	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

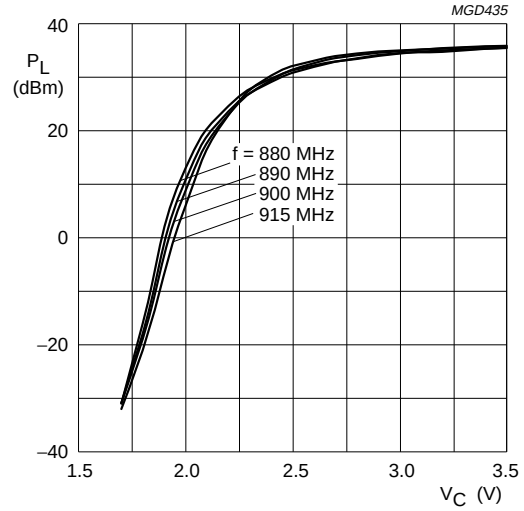
$Z_S = Z_L$ = 50 Ω; P_D = 1 mW; $V_{S1} = V_{S2}$ = 6 V; $V_C \leq$ 3.5 V; f = 880 to 915 MHz; T_{mb} = 25 °C; δ = 1 : 8; t_p = 575 µs; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{Q1} + I_{Q2}$	total leakage current	$V_C \leq$ 0.5 V	–	0.2	mA
I_C	control current	adjust V_C for P_L = 3.2 W	–	0.5	mA
P_L	load power		3.2	–	W
G_p	power gain	adjust V_C for P_L = 3.2 W	35	–	dB
η	efficiency	adjust V_C for P_L = 3.2 W	35	–	%
H_2	second harmonic	adjust V_C for P_L = 3.2 W	–	–40	dBc
H_3	third harmonic	adjust V_C for P_L = 3.2 W	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for P_L = 3.2 W	–	2 : 1	
	stability	P_D = 0.5 to 2 mW; $V_{S1} = V_{S2}$ = 5 to 8.5 V; V_C = 0 to 3.5 V; $P_L \leq$ 3.5 W; VSWR ≤ 6 : 1 through all phases	–	–60	dBc
	isolation	$V_C \leq$ 0.5 V	–	–36	dBm
	control bandwidth		1	–	MHz
P_n	noise power	P_L = 3.2 W; bandwidth = 30 kHz; 20 MHz above transmitter band	–	–85	dBm
	ruggedness	$V_{S1} = V_{S2}$ = 8.5 V; adjust V_C for P_L = 3.5 W; VSWR ≤ 10 : 1 through all phases	no degradation		



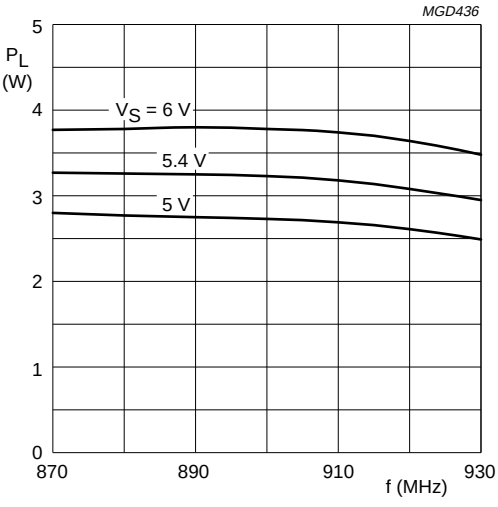
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; f = 902 MHz;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu$s.

Fig.2 Load power as a function of control voltage; typical values.



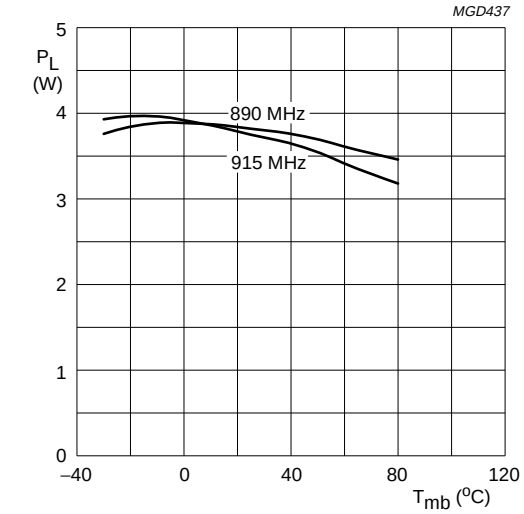
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu$s.

Fig.3 Load power as a function of control voltage; typical values.



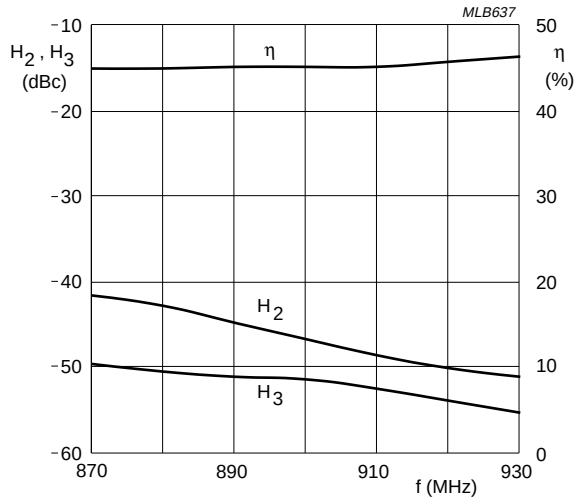
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 3.5$ V;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu$s.

Fig.4 Load power as a function of frequency; typical values.



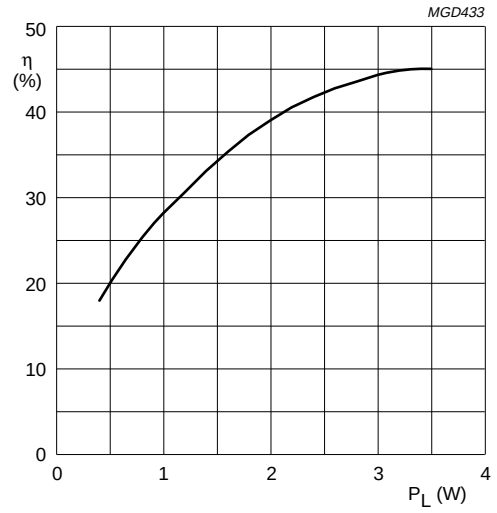
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$V_C = 3.5$ V; $\delta = 1 : 8$; $t_p = 575\ \mu$s.

Fig.5 Load power as a function of mounting base temperature; typical values.



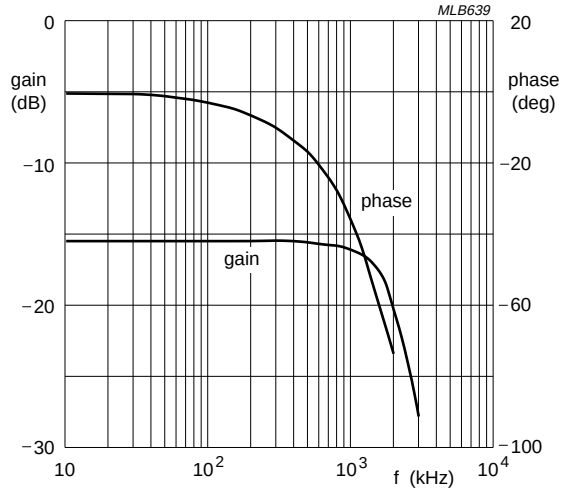
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$P_L = 3.2$ W; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.6 Harmonics and efficiency as functions of frequency; typical values.



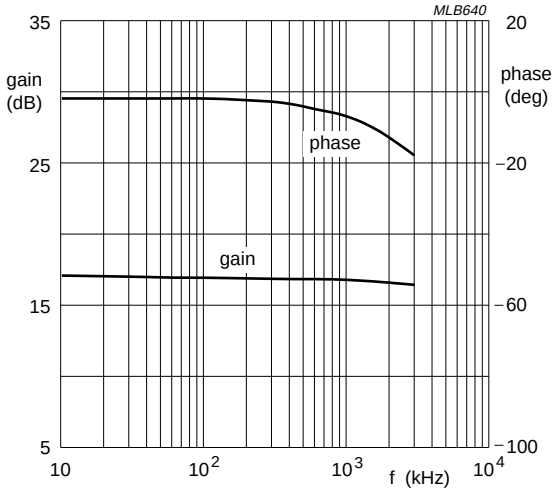
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
f = 902 MHz; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.7 Efficiency as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$P_L = 35$ dBm; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.8 Control bandwidth in terms of gain and phase shift as functions of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$P_L = 15$ dBm; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.9 Control bandwidth in terms of gain and phase shift as functions of frequency; typical values.

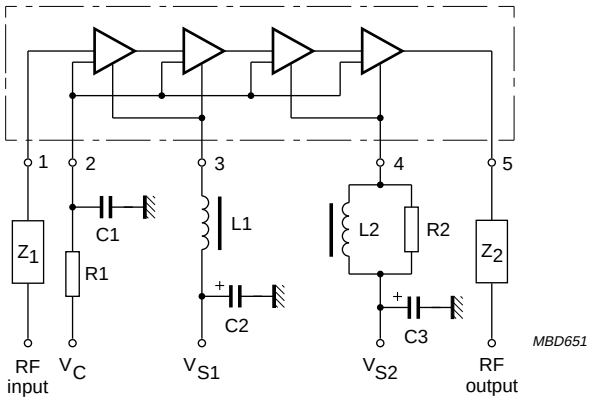
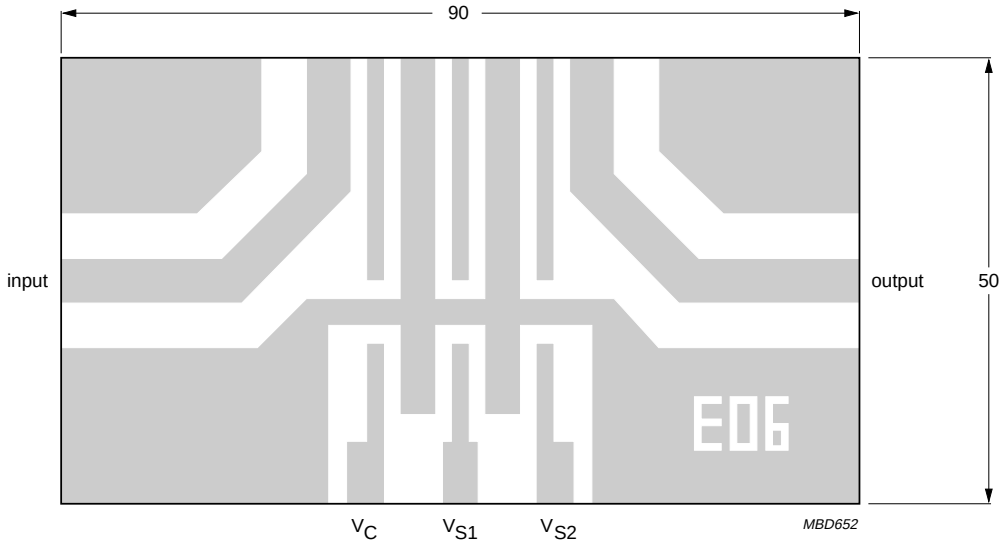


Fig.10 Test circuit.



Dimensions in mm.

Fig.11 Printed-circuit board layout.

List of components (see Fig.10)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1	multilayer ceramic chip capacitor	470 pF	–
C2	tantalum capacitor	2.2 μF	–
C3	electrolytic capacitor	68 μF	–
L1, L2	1 turn 0.4 mm copper wire on grade 3B core	0.9 μH	4330 030 32221
Z_1, Z_2	stripline; note 1	50 Ω	–
R1	metal film resistor	80 Ω; 0.4 W	–
R2	metal film resistor	5 Ω; 0.4 W	–

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric ($\varepsilon_r = 2.2$); thickness $^1/_{16}$ inch.

SOLDERING

The indicated temperatures are those at the solder interfaces.

Advised solder types are types with a liquidus less than or equal to 210 °C.

Solder dots or solder prints must be large enough to wet the contact areas.

Footprints for soldering should cover the module contact area +0.1 mm on all sides.

Soldering can be carried out using a conveyor oven, a hot air oven, an infrared oven or a combination of these ovens.

Hand soldering must be avoided because the soldering iron tip can exceed the maximum permitted temperature of 250 °C and damage the module.

The maximum temperature profile and soldering time is indicated as follows (see Fig.12):

t = 350 s at 100 °C

t = 300 s at 125 °C

t = 200 s at 150 °C

t = 100 s at 175 °C

t = 50 s at 200 °C

t = 5 s at 250 °C (maximum temperature).

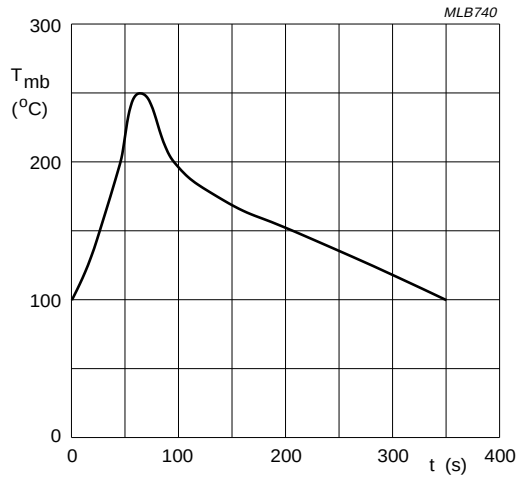


Fig.12 Maximum allowable temperature profile.

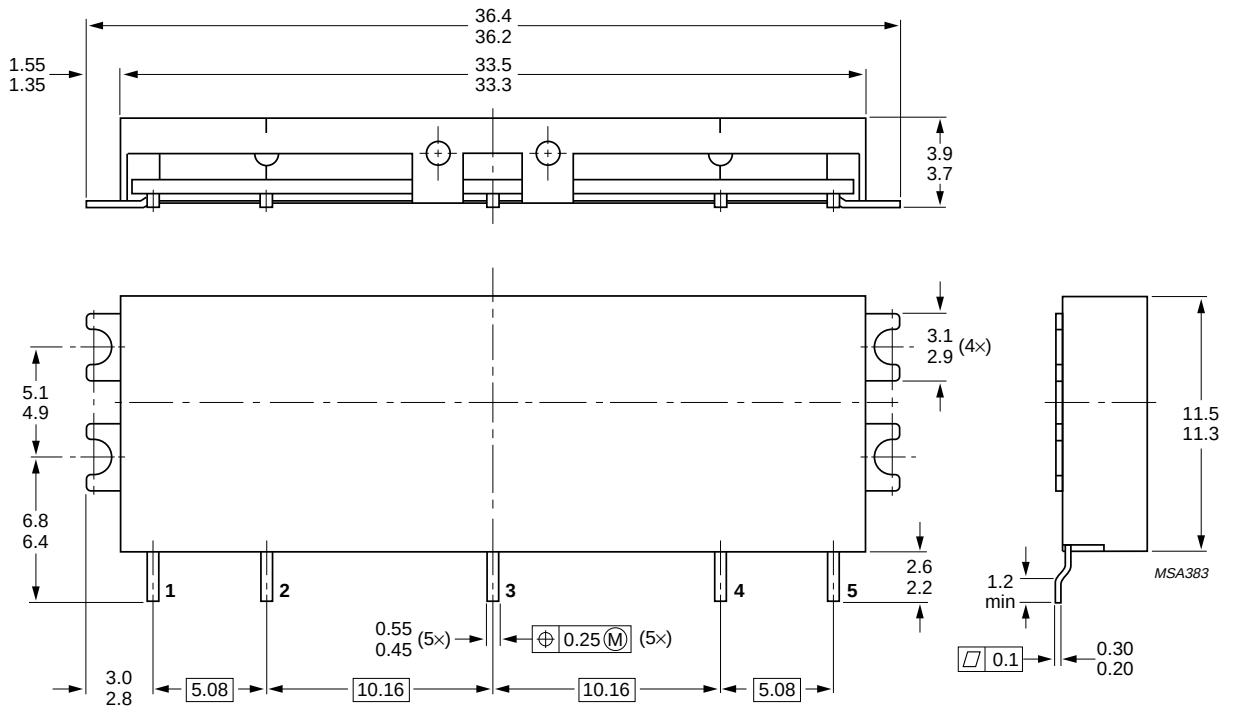
Cleaning

The following fluids may be used for cleaning:

- Alcohol
- Bio-Act (Terpene Hydrocarbon)
- Triclean B/S
- Acetone.

Ultrasonic cleaning should not be used since this can cause serious damage to the product.

PACKAGE OUTLINE



Dimensions in mm.

Fig.13 SOT342A.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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