DATA SHEET

RX1214B300Y
NPN microwave power transistor

Product specification
Supersedes data of June 1992

1997 Feb 19

Philips
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NPN microwave power transistor RX1214B300Y

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance
- Internal input and output matching networks for an easy circuit design.

APPLICATIONS

- Common base class-C wideband amplifiers operating under pulsed conditions, recommended for L-band radar applications.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with the base connected to the flange.

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

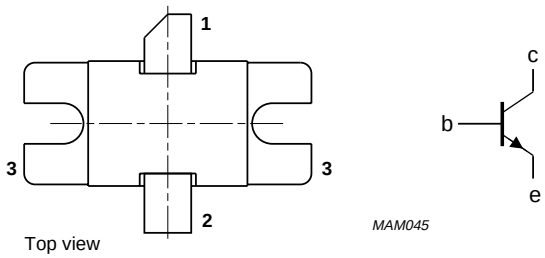


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance at $T_{mb} \leq 25$ °C in a common base class-C wideband amplifier.

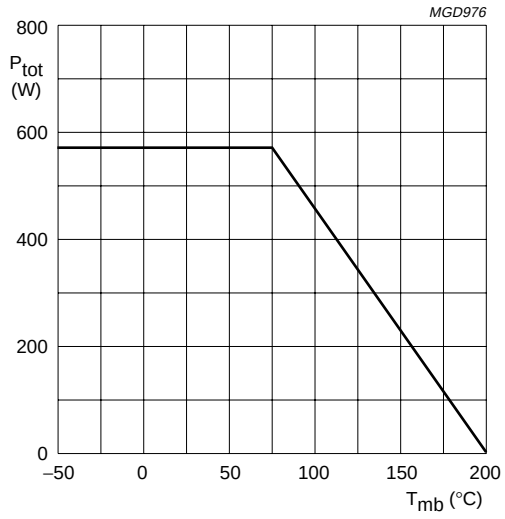
MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_P (dB)	η_C (%)	Z_i; Z_L (Ω)
Class-C t_p = 150 μs; δ = 5 %	1.2 to 1.4	50	≥250	≥7	≥35	see Fig 6

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	R_{BE} = 0 Ω	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 150$ µs; $\delta = 5$ %	–	21	A
P_{tot}	total power dissipation	$t_p \leq 150$ µs; $\delta = 5$ %; T_{mb} = 75 °C	–	570	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.2 mm from case; t ≤ 10 s	–	235	°C



t_p = 150 µs; δ = 5 %

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

T_j = 100 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base		0.8	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 150 μs; δ = 5 %; notes 1 and 2	0.22	K/W

Notes

1. See "*Mounting recommendations in the General part of handbook SC19a"*.
2. Equivalent thermal impedance under nominal pulse microwave operating conditions.

CHARACTERISTICS

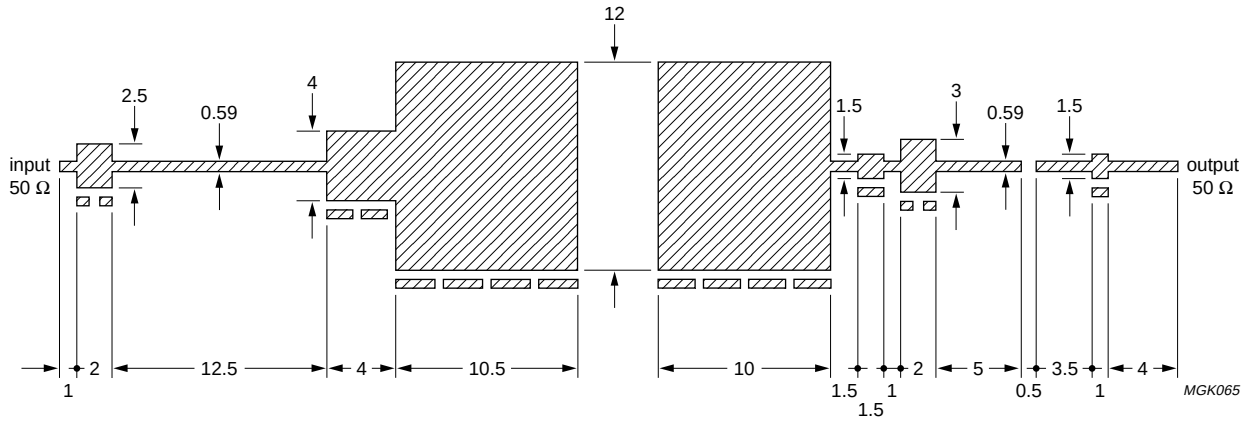
T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 140 mA; I_E = 0	65	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 140 mA; R_{BE} = 0 Ω	60	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0; I_E = 20 mA	3	–	V
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	–	14	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	1.4	mA

APPLICATION INFORMATION

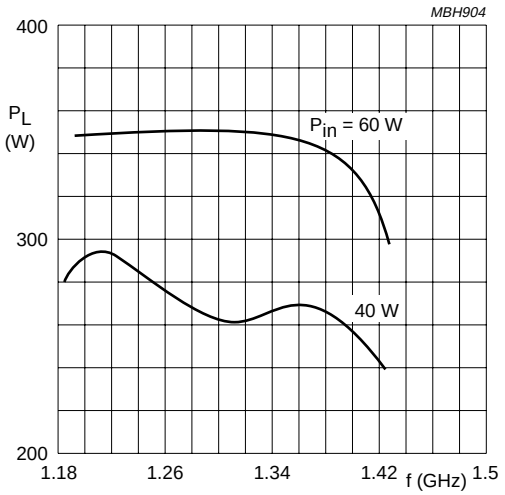
Microwave performance at $T_{mb} \leq 25$ °C in a common base class C wideband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_P (dB)	η_C (%)	Z_i; Z_L (Ω)
Pulsed t_p = 150 μs; δ = 5 %	1.2 to 1.4	50	≥250 typ. 320	≥7 typ. 8	≥35 typ. 40	see Fig 6
t_p = 300 μs; δ = 10 %	1.2 to 1.4	50	typ. 300	typ. 7.5	typ. 35	see Fig 6



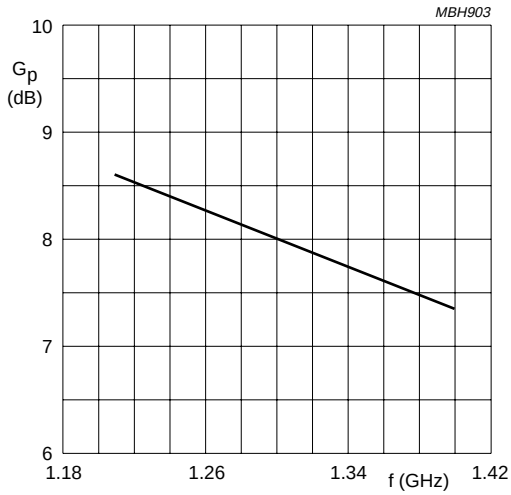
Dimensions in mm.
Substrate: Epsilam printed-circuit board.
Thickness: 0.635 mm.
Permittivity: $\varepsilon_r = 10$.

Fig.3 Wideband test circuit board for 1.2 to1.4 GHz application.



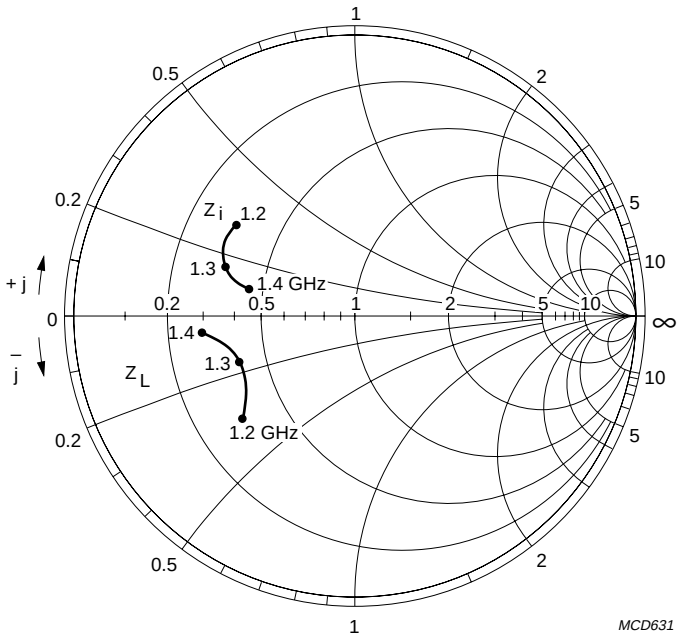
t_p = 150 µs; δ = 5 %.

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



t_p = 150 µs; δ = 5 %.

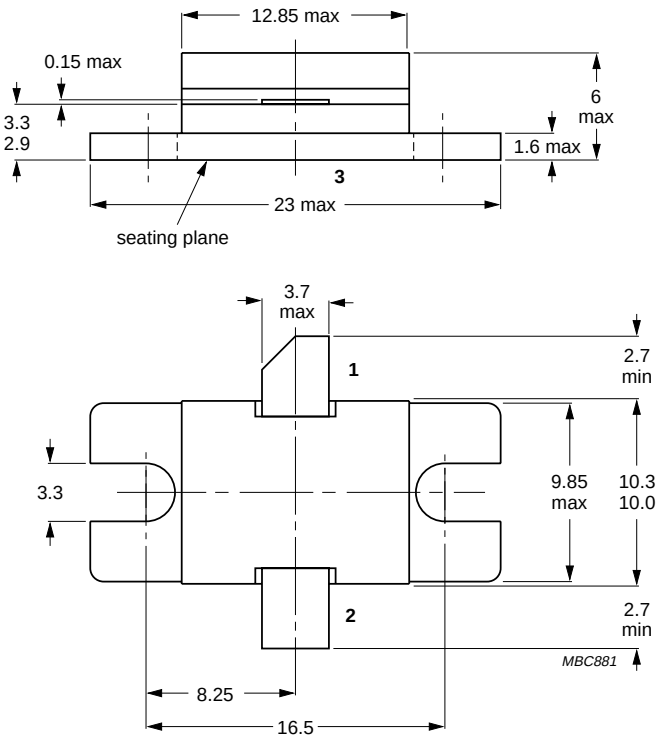
Fig.5 Power gain as a function of frequency; typical values.



Z_o = 5 Ω; V_{CC} = 50 V; P_L = 250 W; T_{mb} = 25 °C; t_p = 150 µs; δ = 5 %; class C operation.

Fig.6 Input and optimum load impedances as functions of frequency; typical values.

PACKAGE OUTLINE



Dimensions in mm.
Torque on nut: Max. 0.4 Nm
Recommended screw: M3
Recommended pitch for mounting screw: 19 mm.

Fig.7 SOT439A.

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

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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Printed in The Netherlands 127147/00/02/pp12 Date of release: 1997 Feb 19 Document order number: 9397 750 01704

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