DATA SHEET

RX1214B350Y
NPN microwave power transistor

Product specification
Superseded data of November 1994

1997 Feb 18

Philips
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NPN microwave power transistor RX1214B350Y

FEATURES

- Suitable for short and medium pulse applications up to 1 ms/10%
- Internal input prematching networks allow an easier design of circuits
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

Common base, class C, broadband, pulsed power amplifiers for L-Band radar applications in the 1.2 to 1.4 GHz band. Also suitable for medium pulse, heavy duty operation within this band.

DESCRIPTION

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

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C broadband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 130 µs; δ = 6%	1.2 to 1.4	50	280	≥7	≥40

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

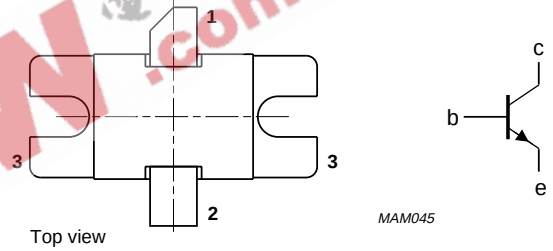


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc 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.

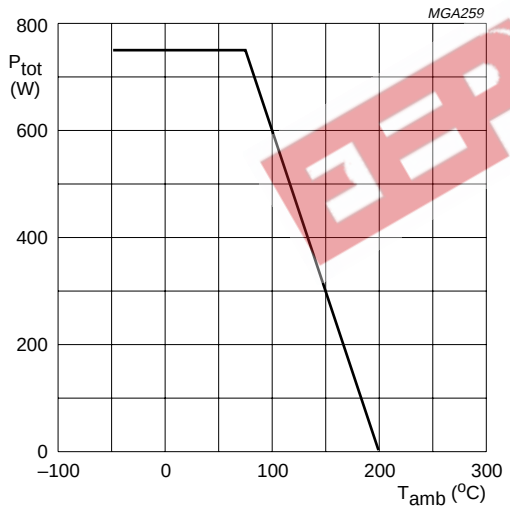
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{CES}	collector-emitter voltage	R_{BE} = 0 Ω	–	65	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 130$ µs; $\delta \leq 6\%$	–	25	A
P_{tot}	total power dissipation	$T_{mb} < 75$ °C; $t_p \leq 30$ µs; $\delta \leq 1\%$	–	750	W
T_{stg}	storage temperature		–65	200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$P_{tot\ max}$ = 750 W; $t_p \leq 30$ µs; $\delta \leq 1\%$.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 120 °C	1.2	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 = 130 µs; δ = 6%; T_j = 110 °C; notes 1 and 2	0.17	K/W

Notes

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

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	30	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	3	mA

APPLICATION INFORMATION

Microwave performance up to T_{mb} = 25 °C in a common base test circuit as shown in Fig.3.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V) note 1	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 130 µs; δ = 6%; note 2	1.2 to 1.4	50	280	≥7; typ. 8	≥40; typ. 44

Notes

1. V_{CC} during pulse.
2. Operating conditions and performances for other pulse formats can be made available on request.

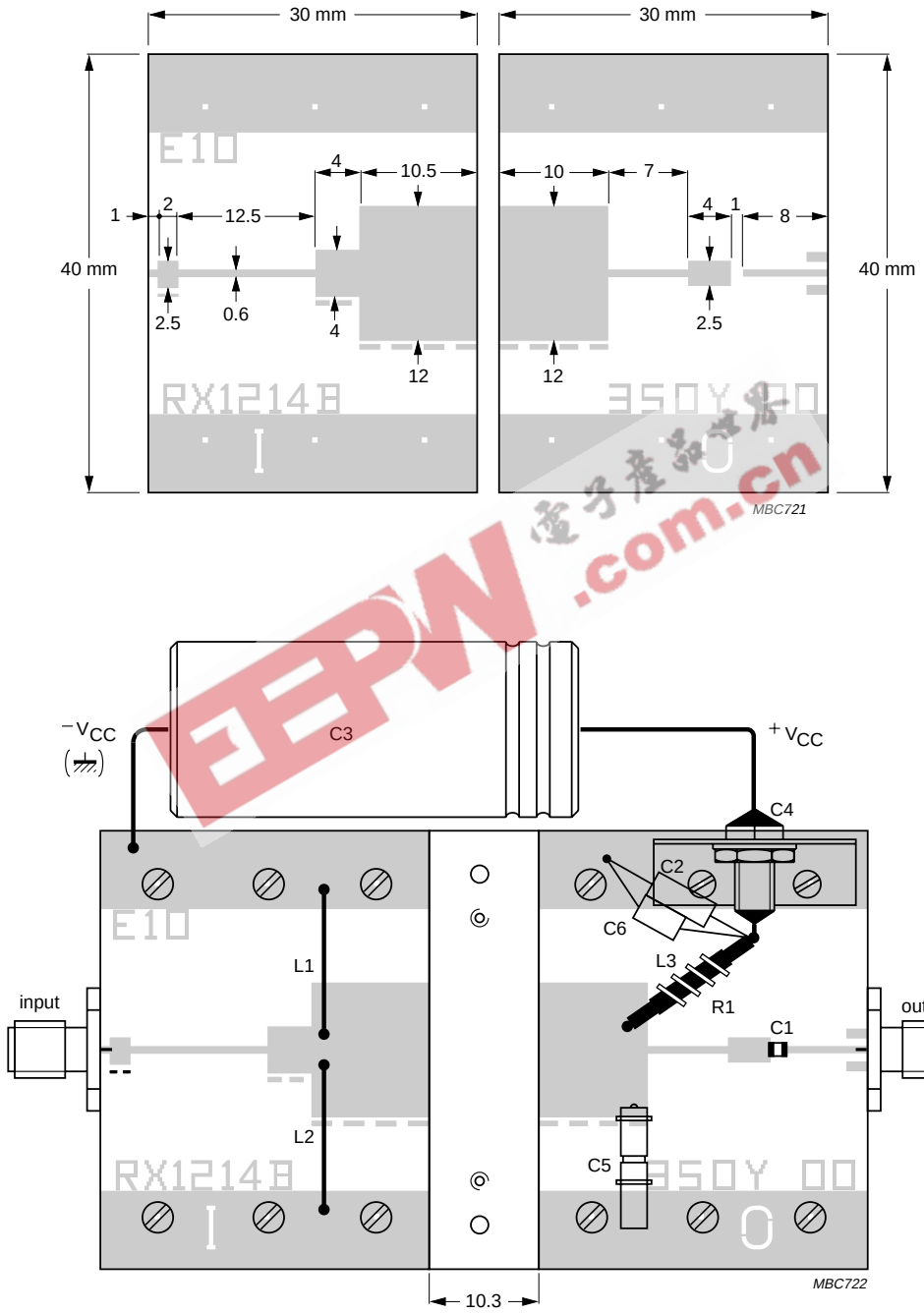
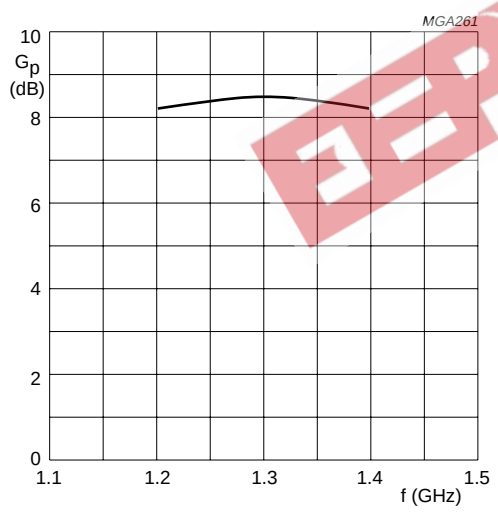


Fig.3 Broadband test circuit.

List of components (see Fig.3)

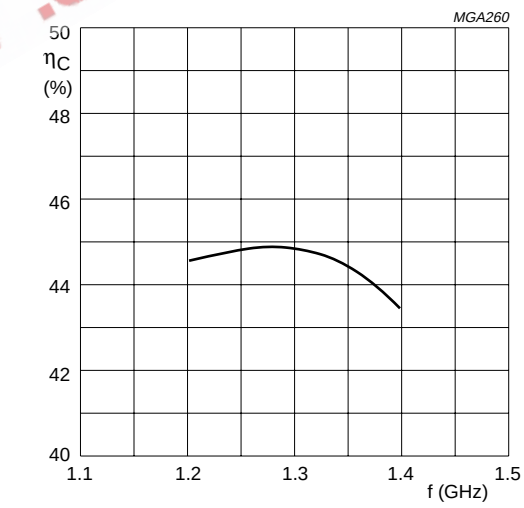
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L1, L2, L3	3 turns 0.65 mm diameter copper wire		int dia. = 4 mm; length of turn = 3 mm	
C1	capacitor	100 pF		ATC, ref. 100B101KP50X
C2	tantalum capacitor	10 µF, 50 V		
C3	electrolytic capacitor	470 µF, 63 V		
C4	feedthrough bypass capacitor			Erie, ref.1250-003
C5	variable gigatrim capacitor	0.8 - 8 pF		Tekelec, ref.729.1
C6	capacitor	4.7 nF		
R1	resistor	4.7 Ω		

The test jig consists of two circuits (input and output), each being 30 mm x 40 mm in size. The two circuits are mounted on a 10 mm thick hard aluminium alloy block. A recess should be machined in the aluminium block in which the transistor can be mounted. The mounting surface must be lapped to a surface roughness of Ra <0.5 µm and the sum of the depth of the recess and the thickness of the circuits should not exceed the specified minimum dimension between mounting face and the leads of the transistor. Tolerances on this dimension may be absorbed by placing a gold plated metal shim under the leads, close to the body of the transistor.



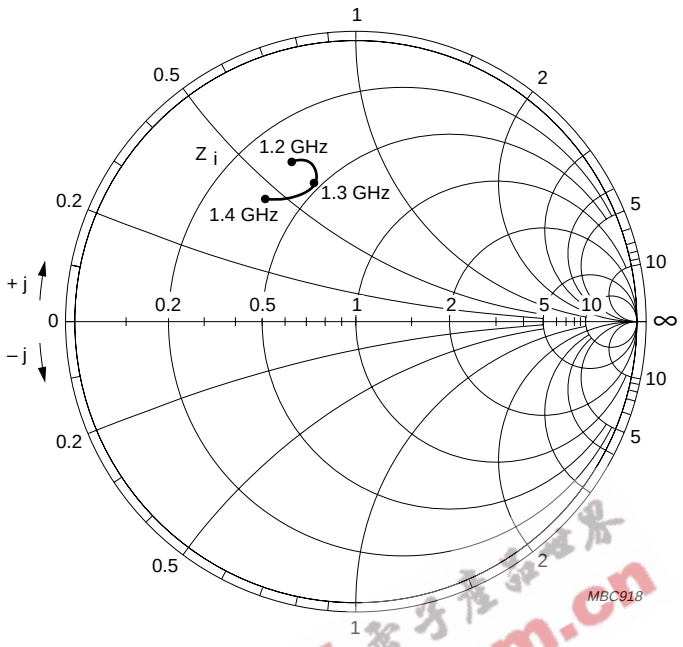
Class C pulse operation; t_p = 130 µs; δ = 6%.
V_{CC} = 50 V; P_O = 280 W.
Broadband test circuit as shown in Fig.3.

Fig.4 Power gain as a function of frequency.



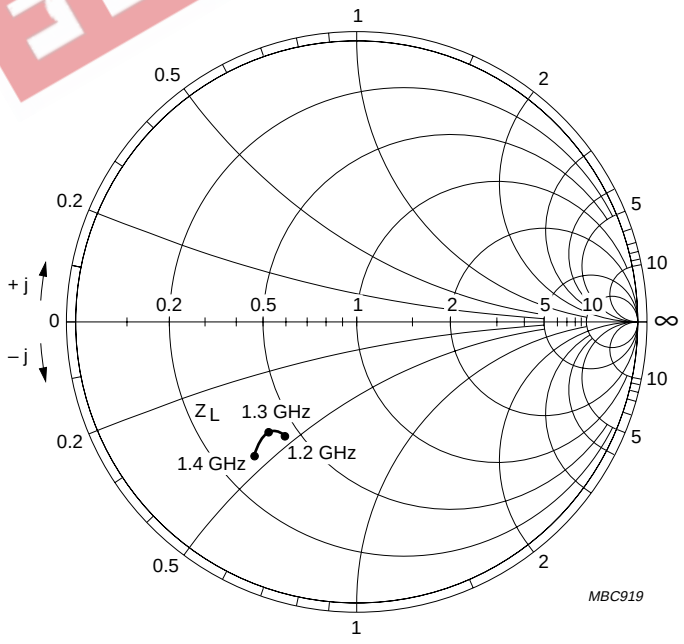
Class C pulse operation; t_p = 130 µs; δ = 6%.
V_{CC} = 50 V; P_O = 280 W.
Broadband test circuit as shown in Fig.3.

Fig.5 Collector efficiency as a function of frequency.



V_{CC} = 50 V; Z_O = 5 Ω; P_O = 280 W.

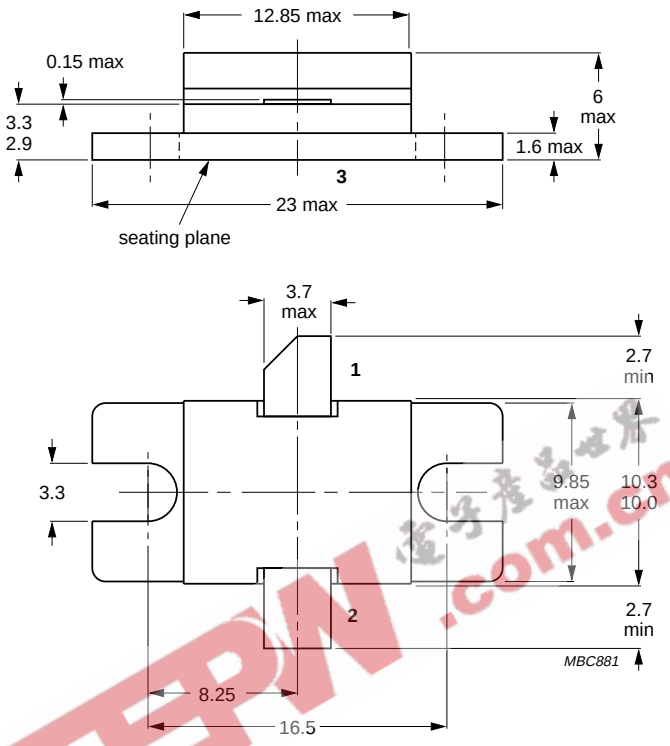
Fig.6 Input impedance as a function of frequency, associated with optimum load impedance.



V_{CC} = 50 V; Z_O = 5 Ω; P_O = 280 W.

Fig.7 Optimum load impedance as a function of frequency, associated with input impedance.

PACKAGE OUTLINE



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

Fig.8 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 this 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.	

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NOTES

NOTES

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Printed in The Netherlands 127147/00/02/pp12 Date of release: 1997 Feb 18 Document order number: 9397 750 01737

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