DATA SHEET

RX1214B80W; RX1214B130Y
NPN microwave power transistors

Product specification
Supersedes data of November 1994

1997 Feb 14

Philips
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NPN microwave power transistors RX1214B80W; RX1214B130Y

FEATURES

- Suitable for short and medium pulse applications up to 1 ms pulse width, 10% duty factor
- 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
- Internal input and output prematching networks allow an easier design of circuits.

APPLICATIONS

Common-base class C broadband pulsed power amplifiers for radar applications in the 1.2 to 1.4 GHz band. Also suitable for long 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 narrowband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C RX1214B80W	t_p = 500 μs; δ = 10%	1.2 to 1.4	40	≥80	≥7	≥35
Class C RX1214B130Y	t_p = 150 μs; δ = 5%	1.2 to 1.4	50	≥130	≥7	≥35

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

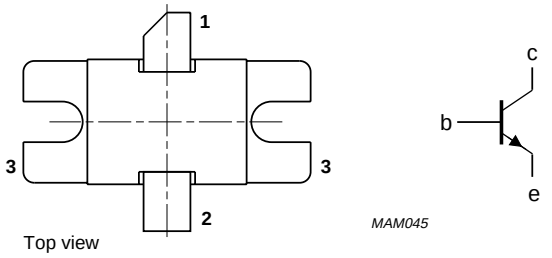


Fig.1 Simplified outline and symbol.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO 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.

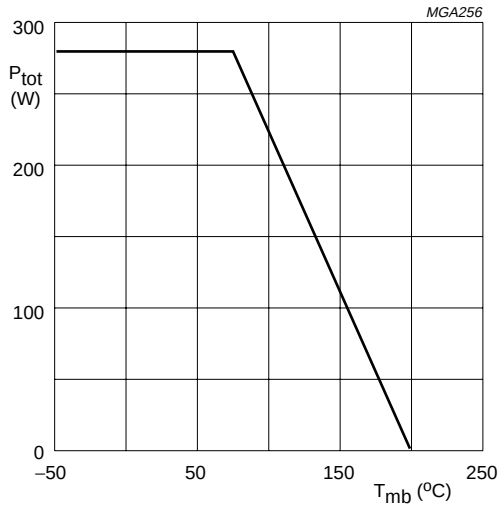
LIMITING VALUES

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_{CEO}	collector-emitter voltage	open base	–	15	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; $\delta \leq 5\%$	–	9	A
P_{tot}	total power dissipation	$T_{mb} < 75$ °C; $t_p \leq 150$ μs; $\delta \leq 5\%$	–	280	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.



t_p = 150 μs; δ = 5%; $P_{tot\ max}$ = 280 W.

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	1.75	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	0.4	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	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 50 V	–	6	mA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 1.5 V	–	0.6	mA
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 60 mA; V_{BE} = 0	60	–	V

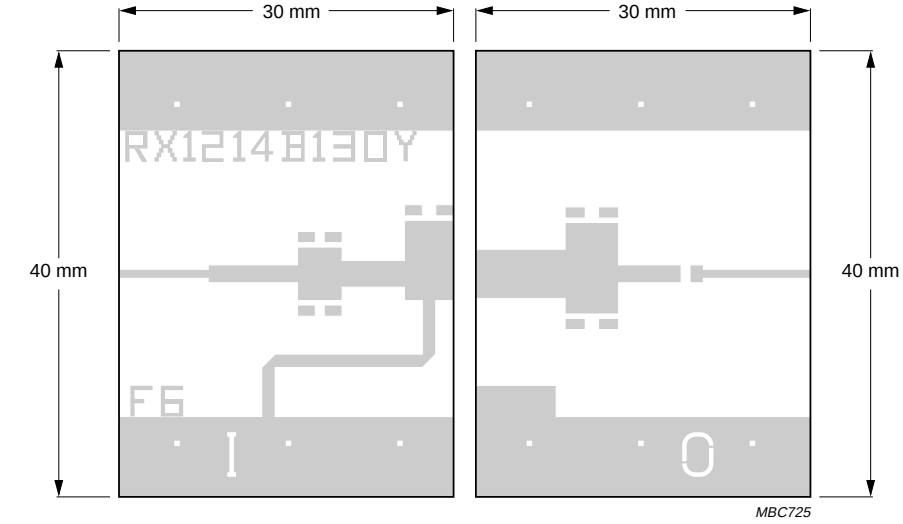
APPLICATION INFORMATION

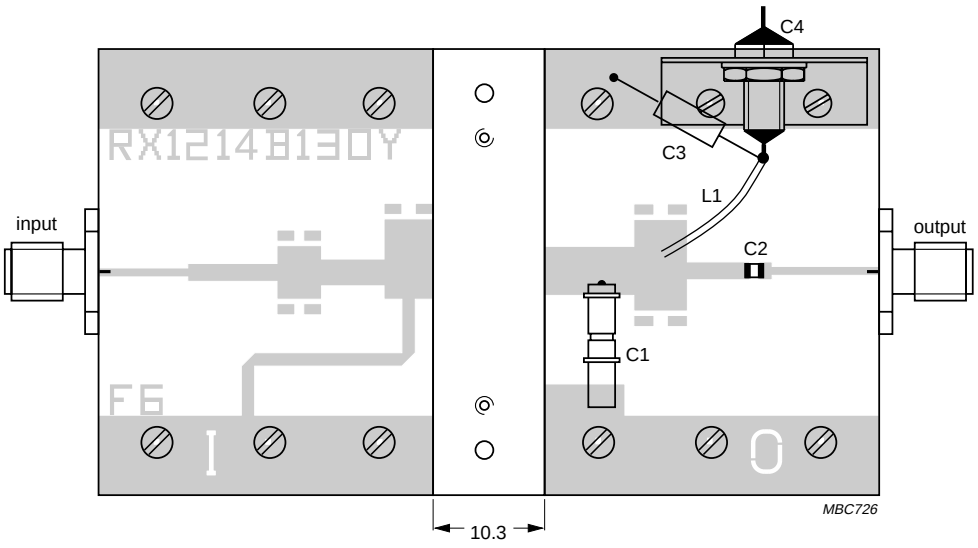
Microwave performance up to T_{mb} = 25 °C in a common-base test circuit as shown in Fig.3.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 150 μs; δ = 5%	1.2 to 1.4	50	≥130; typ. 140	≥7; typ. 7.5	≥35; typ. 39
	t_p = 500 μs; δ = 10%	1.2 to 1.4	40	typ. 80	typ. 8.5	typ. 40

List of components (see Fig.3)

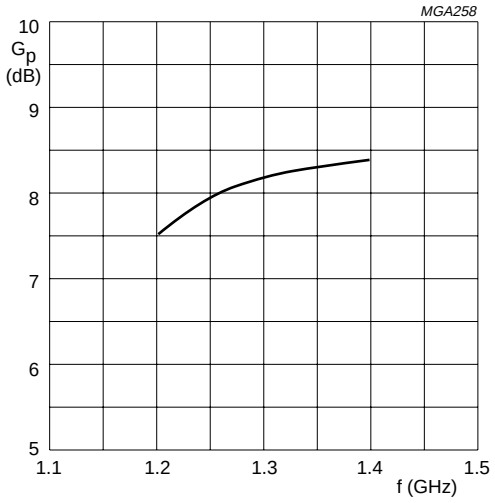
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L1	0.5 mm copper wire		total length = 15 mm	
C1	trimmer capacitor	0.6 – 5 pF		Tekelec, ref AT3-7271SL
C2	chip capacitor			
C3	tantalum capacitor	10 μF, 50 V		
C4	feedthrough bypass capacitor			Erie, ref.1250-003





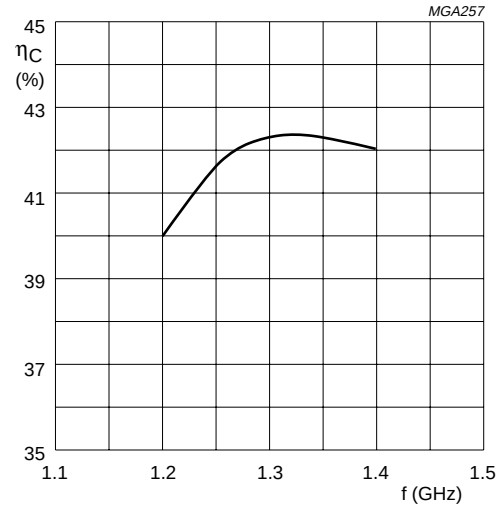
Substrate: Epsilam 10.
Thickness: 0.635 mm.
Permittivity: $\varepsilon_r = 10$.

Fig.3 Broadband test circuit.



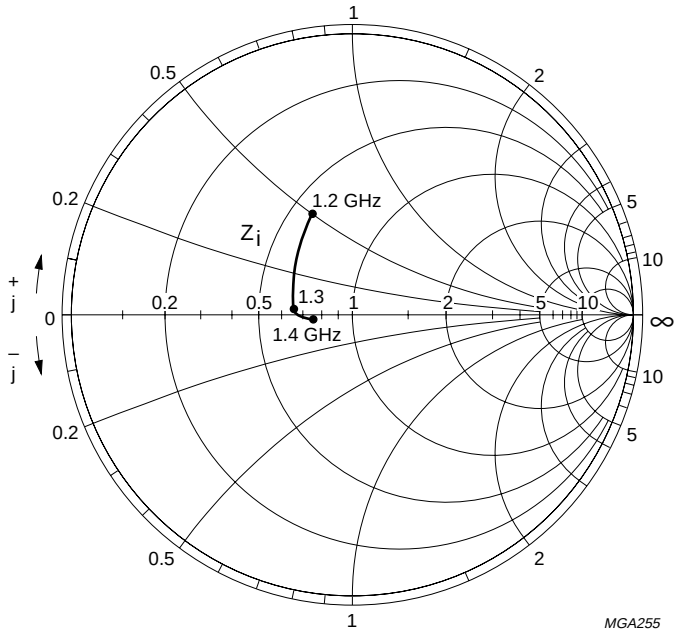
Class C pulse operation; t_p = 500 μs; δ = 5%.
V_{CC} = 50 V; P_O = 130 W.
Broadband test circuit as shown in Fig.3.

Fig.4 Power gain as a function of frequency.



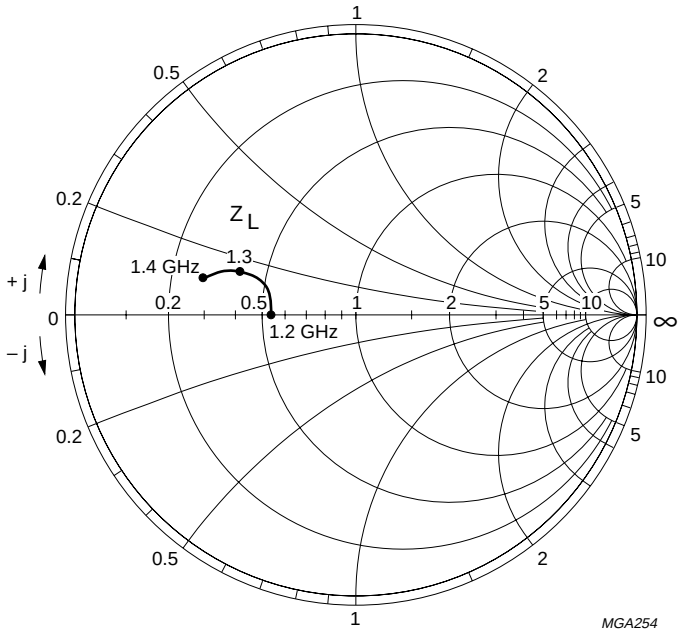
Class C pulse operation; t_p = 500 μs; δ = 5%.
V_{CC} = 50 V; P_O = 130 W.
Broadband test circuit as shown in Fig.3.

Fig.5 Collector efficiency as a function of frequency.



V_{CC} = 50 V; Z_O = 10 Ω; P_{OUT} = 130 W.

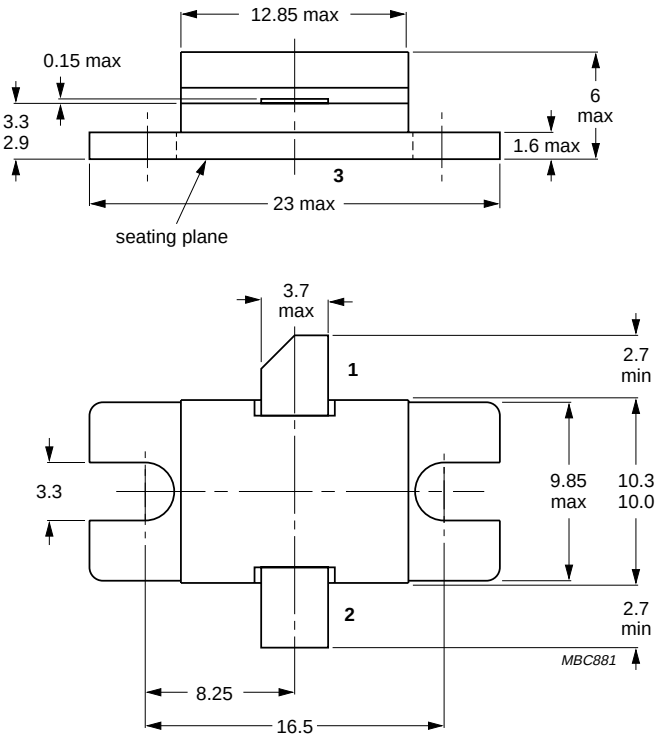
Fig.6 Input impedance as a function of frequency, associated with optimum load impedance.



V_{CC} = 50 V; Z_O = 10 Ω; P_{OUT} = 130 W.

Fig.7 Load impedance as a function of frequency, associated with optimum 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 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.	

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NOTES

NOTES

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