

DISCRETE SEMICONDUCTORS

DATA SHEET

MX1011B700Y NPN microwave power transistor

Product specification
Supersedes data of November 1994

1997 Feb 18

NPN microwave power transistor

MX1011B700Y

FEATURES

- Suitable for short and medium pulse applications up to 100 μ s/10%
- Internal input and output 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 good stability of the characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

Intended for use in common base, class C, broadband, pulsed power amplifiers for IFF, TCAS and Mode S applications in the 1030 to 1090 MHz band. Also suitable for medium pulse, heavy duty operation within the 1030 to 1150 MHz band.

DESCRIPTION

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

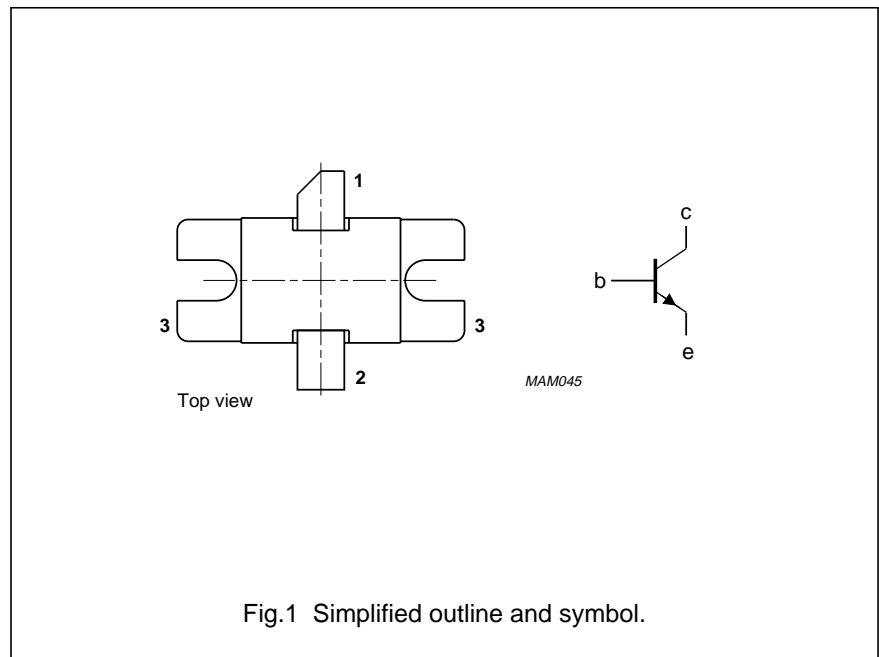
QUICK REFERENCE DATA

Microwave performance up to $T_{mb} = 25\text{ }^\circ\text{C}$ 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	$t_p = 10\ \mu\text{s};$ $\delta = 1\%$	1.09	50	650	≥ 6	≥ 48

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange



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.

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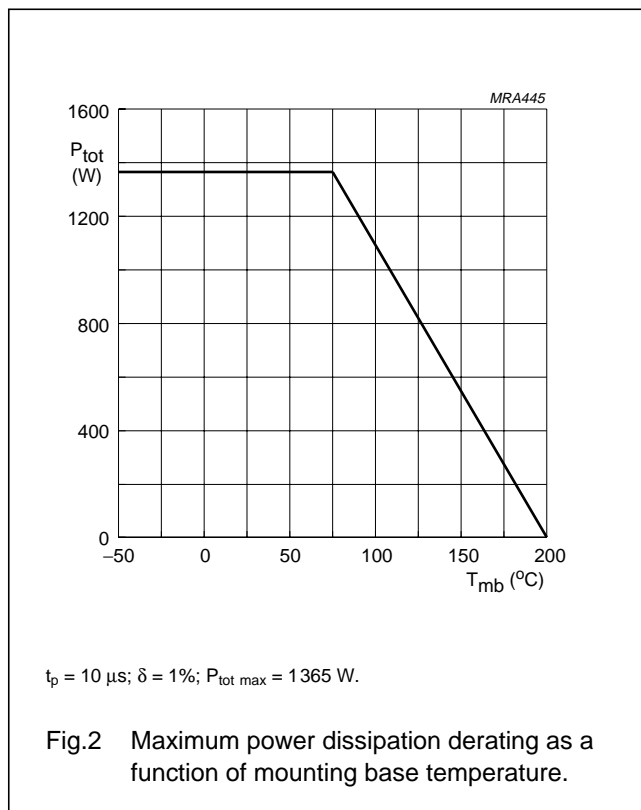
LIMITING VALUES

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	$R_{BE} = 0 \Omega$	–	65	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_{CM}	peak collector current	$t_p \leq 10 \mu\text{s}; \delta \leq 1\%$	–	40	A
P_{tot}	total power dissipation	$T_{mb} < 75 \text{ }^\circ\text{C};$ $t_p \leq 10 \mu\text{s}; \delta \leq 1\%$	–	1365	W
T_{stg}	storage temperature		–65	+200	$^\circ\text{C}$
T_j	junction temperature		–	200	$^\circ\text{C}$
T_{sld}	soldering temperature	$t \leq 10 \text{ s}; \text{ note 1}$	–	235	$^\circ\text{C}$

Note

- Up to 0.2 mm from ceramic.



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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$T_j = 120\ ^\circ\text{C}$	1.12	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
$Z_{th\ j-h}$	thermal impedance from junction to heatsink	$t_p = 10\ \mu\text{s}$; $\delta = 1\%$; notes 1 and 2	0.06	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

$T_{mb} = 25\ ^\circ\text{C}$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 50\ \text{V}$; $I_E = 0$	20	mA
I_{CES}	collector cut-off current	$V_{CE} = 50\ \text{V}$; $V_{BE} = 0$	20	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\ \text{V}$; $I_C = 0$	5	mA
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 140\ \text{mA}$; $V_{BE} = 0$	65	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 140\ \text{mA}$; $V_{BE} = 0$	65	V

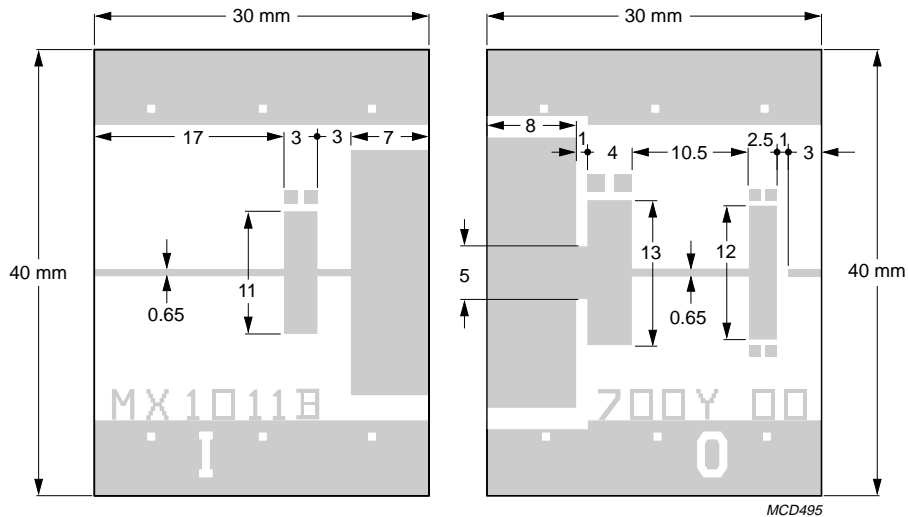
APPLICATION INFORMATION

Microwave performance up to $T_{mb} = 25\ ^\circ\text{C}$ in a broadband test circuit as shown in Fig.3.

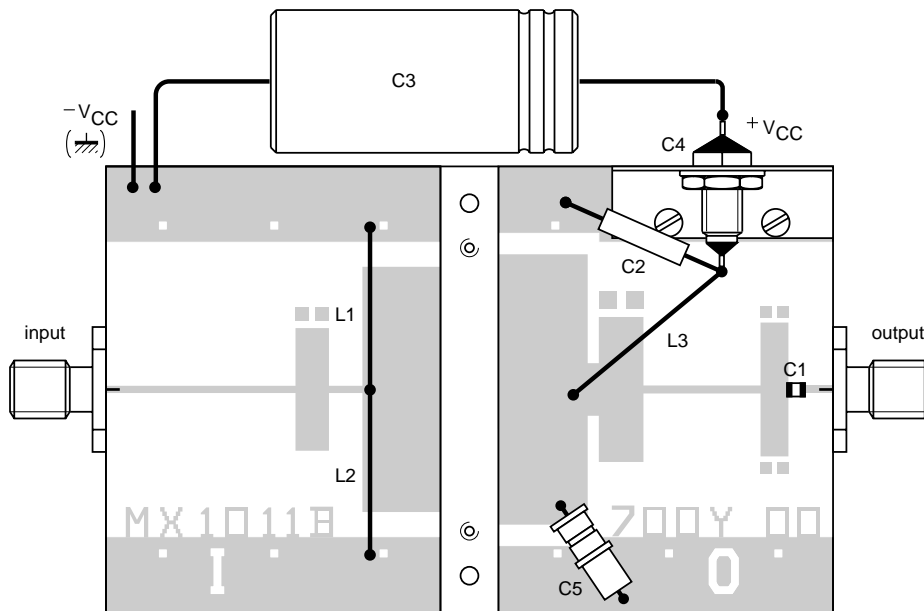
MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_P (dB)	η_c (%)
Class C	$t_p = 10\ \mu\text{s}$; $\delta = 1\%$	1.09	50	650; typ. 740	≥ 6.0 ; typ. 7	≥ 48 ; typ. 55
	$t_p = 0.5\ \mu\text{s}$; $\delta = 50\%$; $t_p = 112\ \mu\text{s}$; $\delta = 1\%$	1.03 to 1.09	50	typ. 650	typ. 6.4	typ. 45
	$t_p = 6.6\ \mu\text{s}$; $\delta = 51\%$; $t_p = 3.3\ \text{ms}$; $\delta = 43\%$	1.03 to 1.15	50	typ. 300	typ. 7	typ. 45
	$t_p = 32\ \mu\text{s}$; $\delta = 1\%$	1.09	50	typ. 700	typ. 6.7	typ. 55

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MCD495



MCD496

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

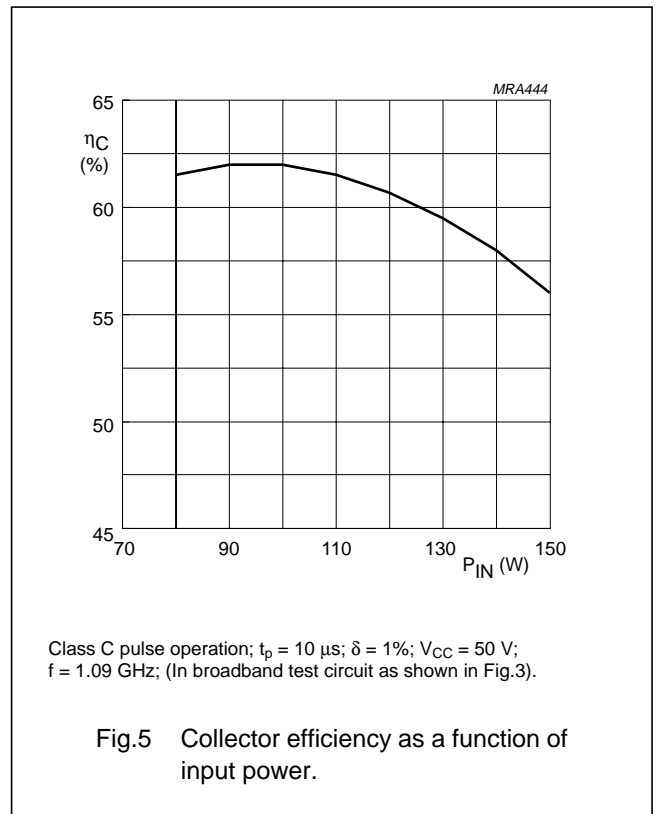
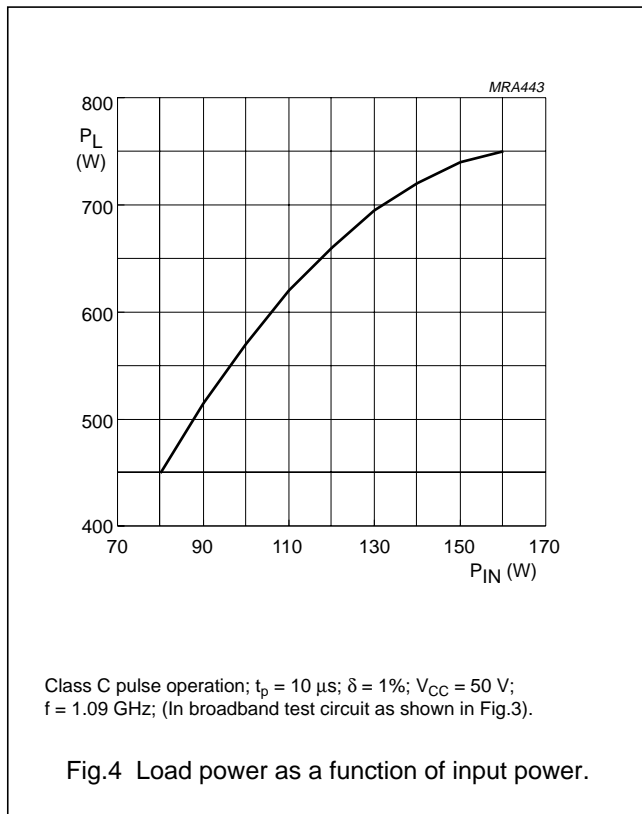
Fig.3 Broadband test circuit.

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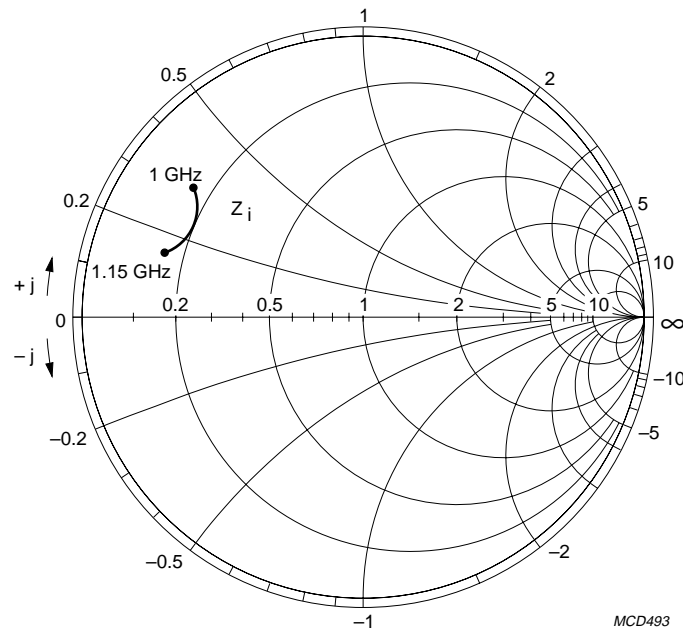
List of components (see Fig.3)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L1, L2	0.65 mm diameter copper wire	–	total length = 26 mm; height of loop = 10 mm	–
L3	0.85 mm diameter silver wire	–	total length = 30 mm; height of loop = 15 mm	–
C1	capacitor	100 pF	–	ATC, ref.100A101KP50X
C2	tantalum capacitor	10 μ F; 50 V	–	–
C3	electrolytic capacitor	1000 μ F; 63 V	–	–
C4	feedthrough bypass capacitor	–	–	Erie, ref.1250-003
C5	variable gigatrim capacitor	0.8 – 8 pF	–	Tekelec, ref.729.1



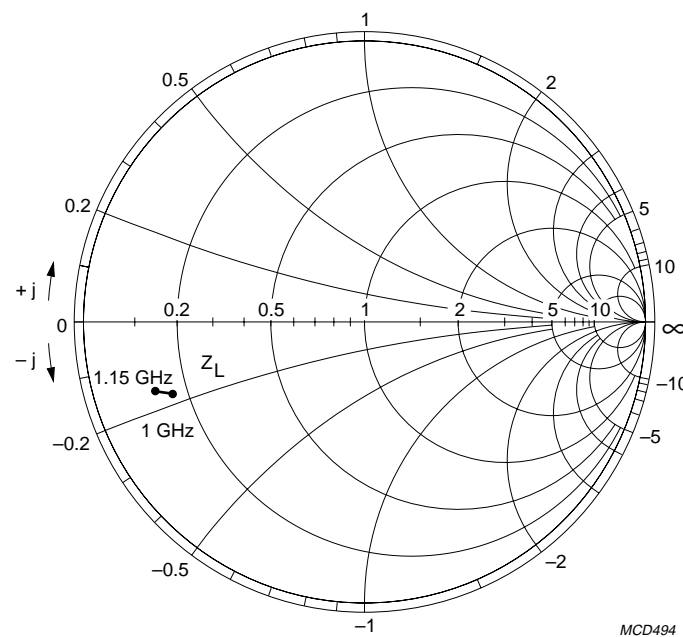
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$V_{CC} = 50 \text{ V}; Z_0 = 10 \Omega; P_o = 740 \text{ W}.$

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



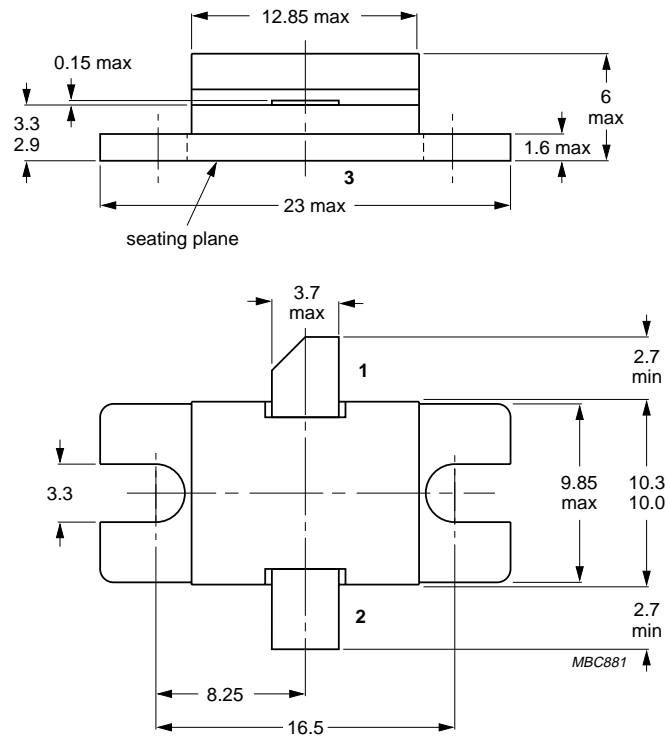
$V_{CC} = 50 \text{ V}; Z_0 = 10 \Omega; P_o = 740 \text{ W}.$

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

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PACKAGE OUTLINE



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

Fig.8 SOT439A.

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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.	

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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NOTES

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NOTES

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