DATA SHEET

BFG10W/X
UHF power transistor

Product specification

1995 Sep 22

UHF power transistor BFG10W/X

FEATURES

- High efficiency
- Small size discrete power amplifier
- 900 MHz and 1.9 GHz operating areas
- Gold metallization ensures excellent reliability.

APPLICATIONS

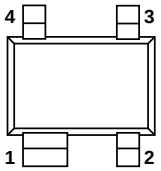
- Common emitter class-AB operation in hand-held radio equipment up to 1.9 GHz.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic, 4-pin dual-emitter SOT343N package.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



Top view MBK523

Marking code: T5.

Fig.1 SOT343N.

QUICK REFERENCE DATA

RF performance at T_{amb} = 25 °C in a common-emitter test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_c (%)
Pulsed, class-AB, duty cycle: < 1 : 2; t_p = 10 ms	1.9	3.6	200	≥5	≥50
Pulsed, class-AB, duty cycle: < 1 : 8; t_p = 4.6 ms	0.9	6	650	≥10	≥50
	0.9	6	360	≥12.5	≥50

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	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	250	mA
$I_{C(AV)}$	average collector current		–	250	mA
P_{tot}	total power dissipation	up to T_s = 102 °C; note 1	–	400	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 102 °C; note 1; P_{tot} = 400 mW	180	K/W

Note to the Limiting values and Thermal characteristics

1. T_s is the temperature at the soldering point of the collector pin.

CHARACTERISTICS

T_j = 25 °C (unless otherwise specified).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 0.1 mA	20	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 5 mA	10	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.1 mA	2.5	–	V
I_{CES}	collector cut-off current	V_{CE} = 6 V; V_{BE} = 0	–	100	μA
h_{FE}	DC current gain	I_C = 50 mA; V_{CE} = 5 V	25	–	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 6 V; f = 1 MHz	–	3	pF
C_{re}	feedback capacitance	I_C = 0; V_{CE} = 6 V; f = 1 MHz	–	2	pF

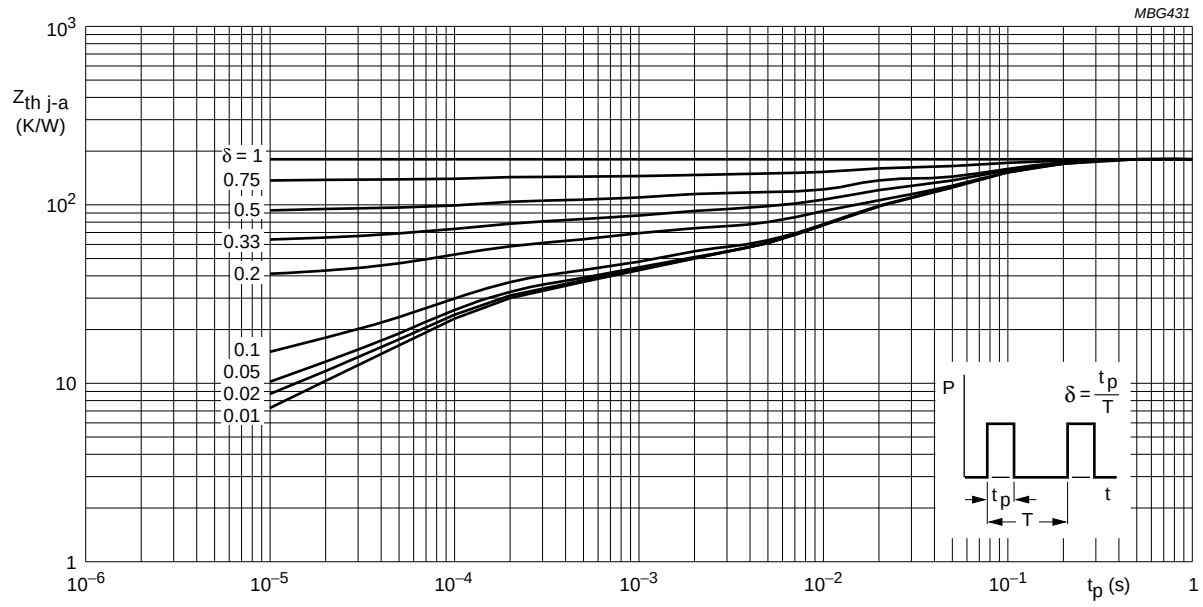


Fig.2 Transient thermal impedance from junction to soldering point as a function of pulse time; typical values.

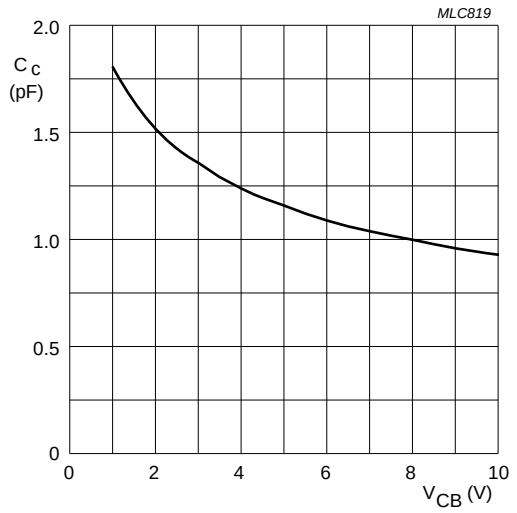


Fig.3 Collector capacitance as a function of collector-base voltage.

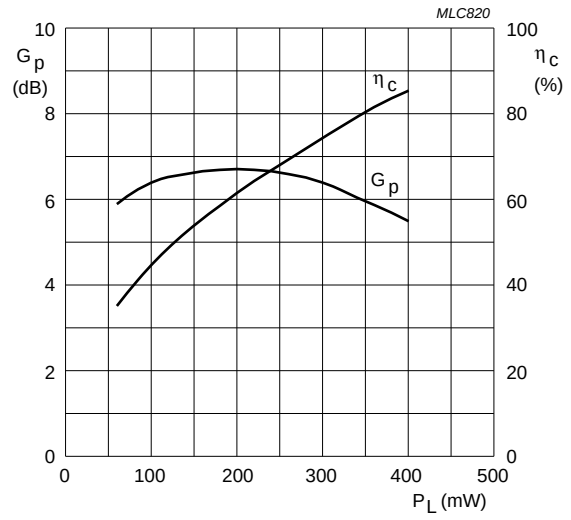
APPLICATION INFORMATION

RF performance at T_{amb} = 25 °C in a common-emitter test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_c (%)
Pulsed, class-AB, duty cycle: < 1 : 2; t_p = 10 ms	1.9	3.6	200	≥5; typ. 7	≥50; typ. 60
Pulsed, class-AB, duty cycle: < 1 : 8; t_p = 5 ms	0.9	6	650	≥10	≥50
	0.9	6	360	≥12.5	≥50

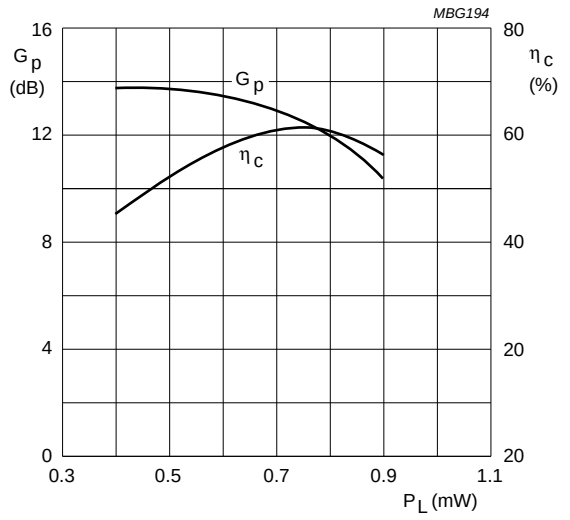
Ruggedness in class-AB operation

The BFG10W/X is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under pulsed conditions up to a supply voltage of 8.6 V under the conditions: 900 MHz; 650 mW; t_p = 4.6 ms; duty cycle of 1 : 8 and up to a supply voltage of 5.5 V under the conditions: 1.9 GHz; 200 mW; t_p = 10 ms; duty cycle of 1 : 2.



Pulsed, class-AB operation.
V_{CE} = 3.6 V; f = 1.9 GHz; duty cycle < 1 : 2.
Circuit optimized for P_L = 200 mW.

Fig.4 Power gain and efficiency as functions of load power; typical values.



Pulsed, class-AB operation.
V_{CE} = 6 V; f = 900 MHz; duty cycle < 1 : 8.
Circuit optimized for P_L = 600 mW.

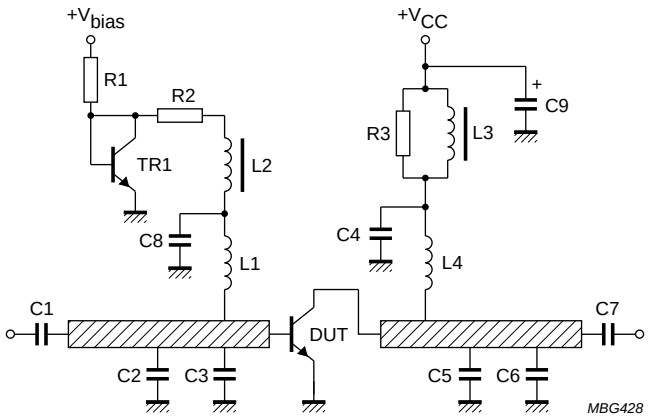
Fig.5 Power gain and efficiency as functions of load power; typical values.

List of components (see Fig.6)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
TR1	bias transistor, BC548 or equivalent	note 1		
C1, C4, C7	capacitor; notes 2 and 3	120 pF		
C2	capacitor; note 2	6.8 pF		
C3	capacitor; note 2	0.5 pF		
C5	capacitor; note 2	1.2 pF		
C6	capacitor; note 2	1.9 pF		
C8	Philips multilayer capacitor	1 nF, 10 V		
C9	Philips capacitor	1500 μF, 10 V		2222 032 14152
L1	6 turns enamelled 0.7 mm copper wire		length 3.5 mm	
L4	2 turns enamelled 0.7 mm copper wire		length 3 mm	
L2, L3	RF choke, Philips			4312 020 36690
R1	metal film resistor	275 Ω		
R2	metal film resistor	100 Ω		
R3	metal film resistor	10 Ω		

Notes

1. V_{BE} at 1 mA must be 0.65 V.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. Resonant at 1900 MHz.



PCB RT5880, thickness 0.79 mm.

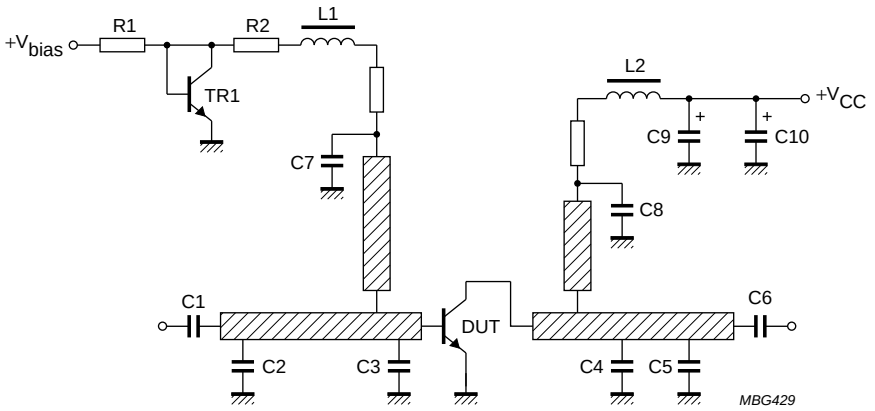
Fig.6 Class-AB test circuit at f = 900 MHz.

List of components (see Fig.6)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
TR1	bias transistor, BC548 or equivalent	note 1		
C1, C6, C7, C8	capacitor; notes 2 and 3	24 pF		
C2	capacitor; note 2	0.4 pF		
C3	capacitor; note 2	2.4 pF		
C4	capacitor; note 2	0.5 pF		
C5	capacitor; note 2	1.2 pF		
C9, C10	Philips capacitor	1500 μF, 10 V		2222 032 14152
L1, L2	RF choke, Philips			4330 030 36301
R1, R2	metal film resistor	75 Ω		
R3, R4	metal film resistor	10 Ω		

Notes

1. V_{BE} at 1 mA must be 0.65 V.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. Resonant at 1900 MHz.

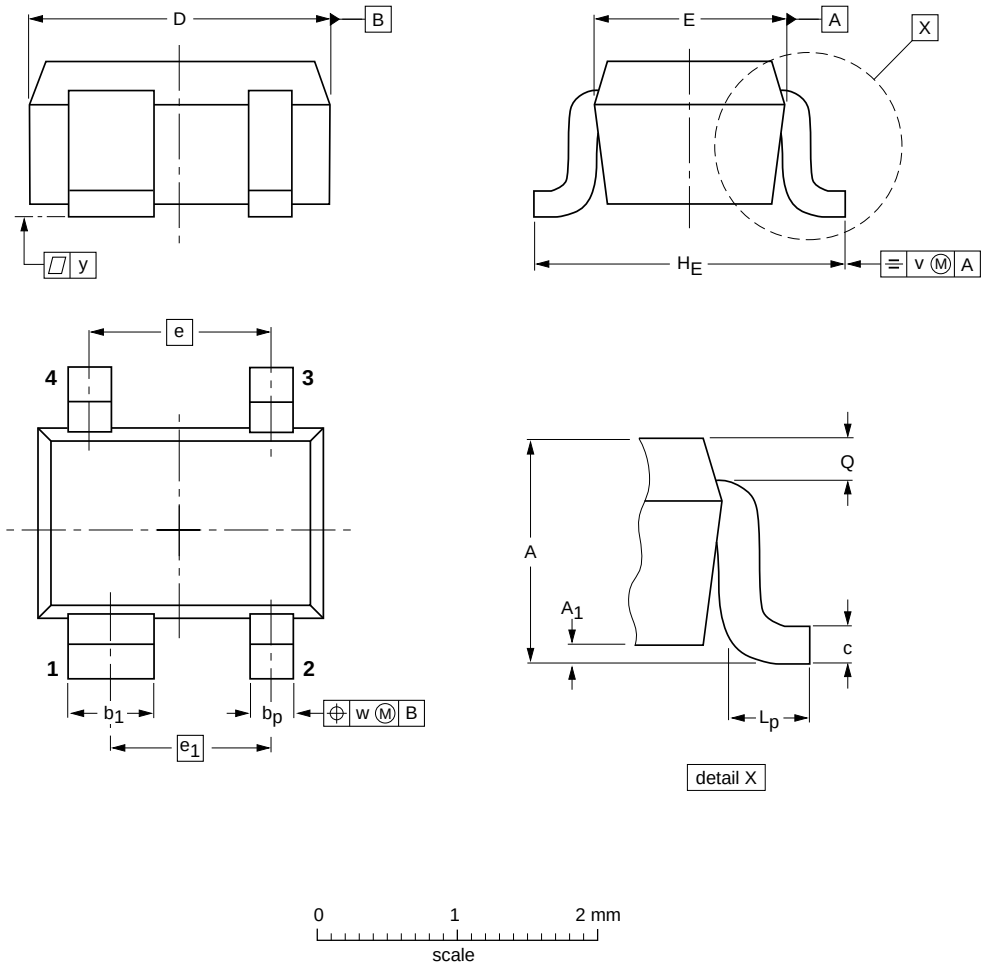


PCB RT5880, thickness 0.79 mm.

Fig.7 Class-AB test circuit at f = 1.9 GHz.

PACKAGE OUTLINE

Plastic surface-mounted package; 4 leads **SOT343N**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.4 0.3	0.7 0.5	0.25 0.10	2.2 1.8	1.35 1.15	1.3	1.15	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT343N						~~97-05-21~~ 06-03-16

DATA SHEET STATUS

DOCUMENT STATUS[1]	PRODUCT STATUS[2]	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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