

Silicon NPN Transistor

BLT70

UHF Power Transistor

16V / 250mA

DATASHEET

OEM – Philips

Source: Philips Data Handbook SC09

RF Power Modules and Transistors for Mobile Phones 1996

UHF power transistor**BLT70****FEATURES**

- Very high efficiency
- Low supply voltage.

APPLICATIONS

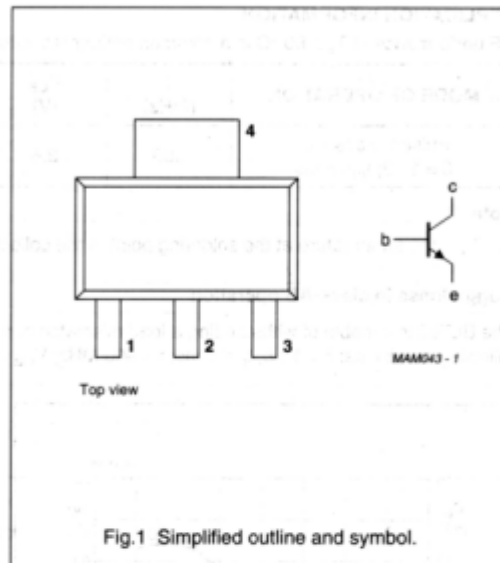
- Hand-held radio equipment in common emitter class-AB operation in the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic SOT223H SMD package.

PINNING - SOT223H

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	b	base
3	e	emitter
4	c	collector

**QUICK REFERENCE DATA**

RF performance at $T_s \leq 60^\circ\text{C}$ in a common emitter test circuit (see Fig.7).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_c (%)
CW, class-AB	900	4.8	600	≥ 6	≥ 60

UHF power transistor

BLT70

LIMITING VALUES

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

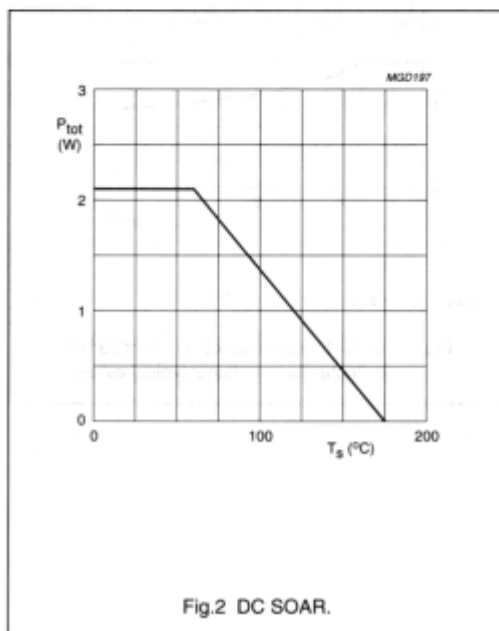
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	16	V
V_{CEO}	collector-emitter voltage	open base	–	8	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	250	mA
P_{tot}	total power dissipation	$T_s = 60\text{ °C}$; note 1	–	2.1	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	$P_{tot} = 2.1\text{ W}$; $T_s = 60\text{ °C}$; note 1	55	K/W

Note to the “Limiting values” and “Thermal characteristics”

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



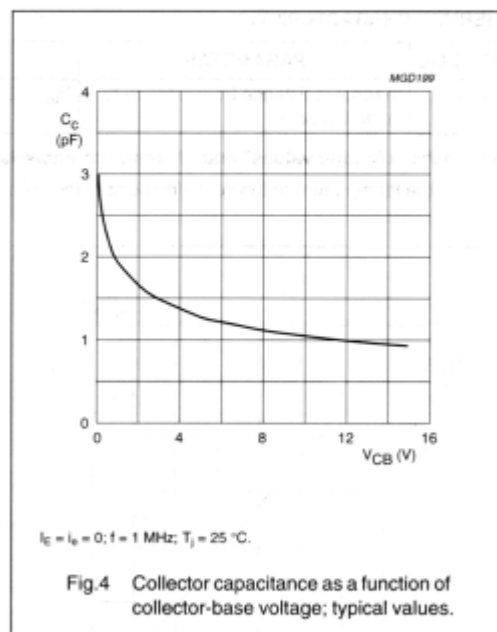
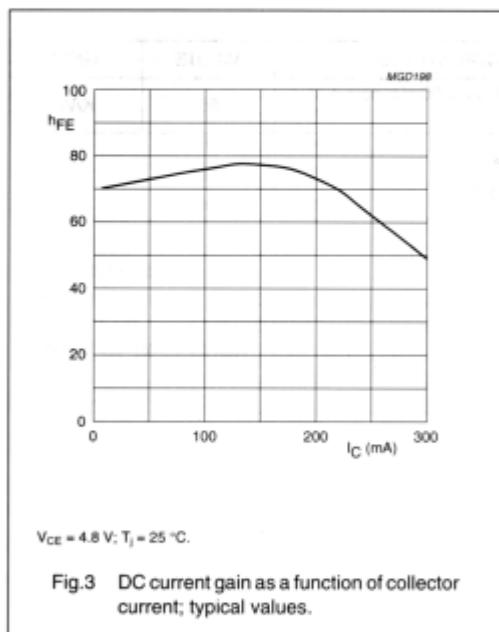
UHF power transistor

BLT70

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 0.5\text{ mA}$	16	—	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 5\text{ mA}$	8	—	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 0.2\text{ mA}$	2.5	—	V
I_{CES}	collector leakage current	$V_{CE} = 7\text{ V}$; $V_{BE} = 0$	—	0.1	mA
h_{FE}	DC current gain	$V_{CE} = 4.8\text{ V}$; $I_C = 100\text{ mA}$	25	—	
C_c	collector capacitance	$V_{CB} = 4.8\text{ V}$; $I_E = I_B = 0$; $f = 1\text{ MHz}$	—	3.5	pF
C_{re}	feedback capacitance	$V_{CE} = 4.8\text{ V}$; $I_C = 0$; $f = 1\text{ MHz}$	—	2.5	pF



UHF power transistor

BLT70

APPLICATION INFORMATION

RF performance at $T_s \leq 60^\circ\text{C}$ in a common emitter test circuit (see note 1 and Fig.7).

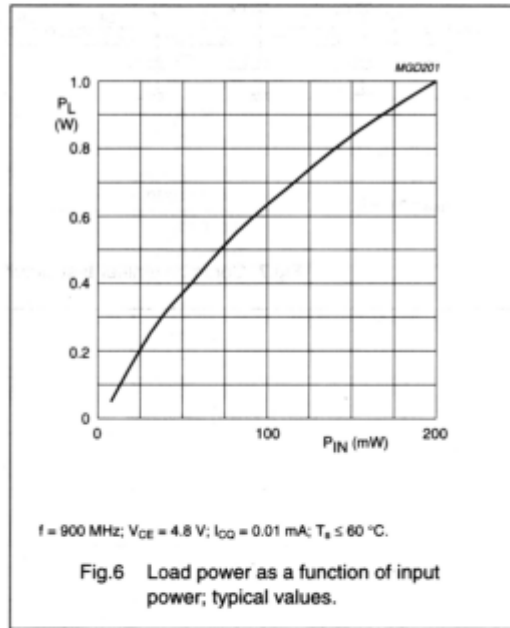
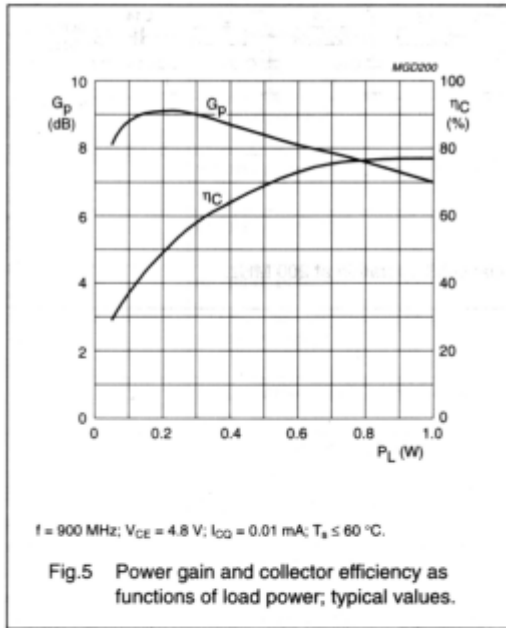
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_c (%)
CW, class-AB	900	4.8	0.01	0.6	≥ 6 typ. 8.1	≥ 60 typ. 73

Note

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

Ruggedness in class-AB operation

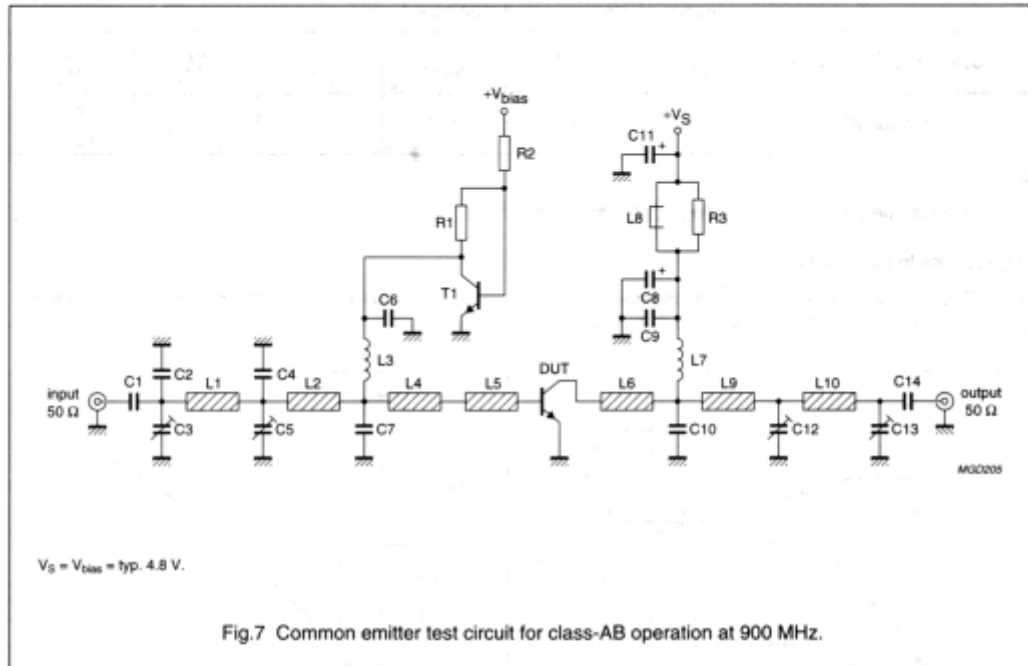
The BLT70 is capable of withstanding a load mismatch corresponding to $VSWR = 6 : 1$ through all phases under the following conditions: $f = 900\text{ MHz}$; $V_{CE} = 6.5\text{ V}$; $P_L = 0.5\text{ W}$; $T_s \leq 60^\circ\text{C}$.



UHF power transistor

BLT70

Test circuit information



UHF power transistor

BLT70

List of components used in test circuit (see Figs 7 and 8)

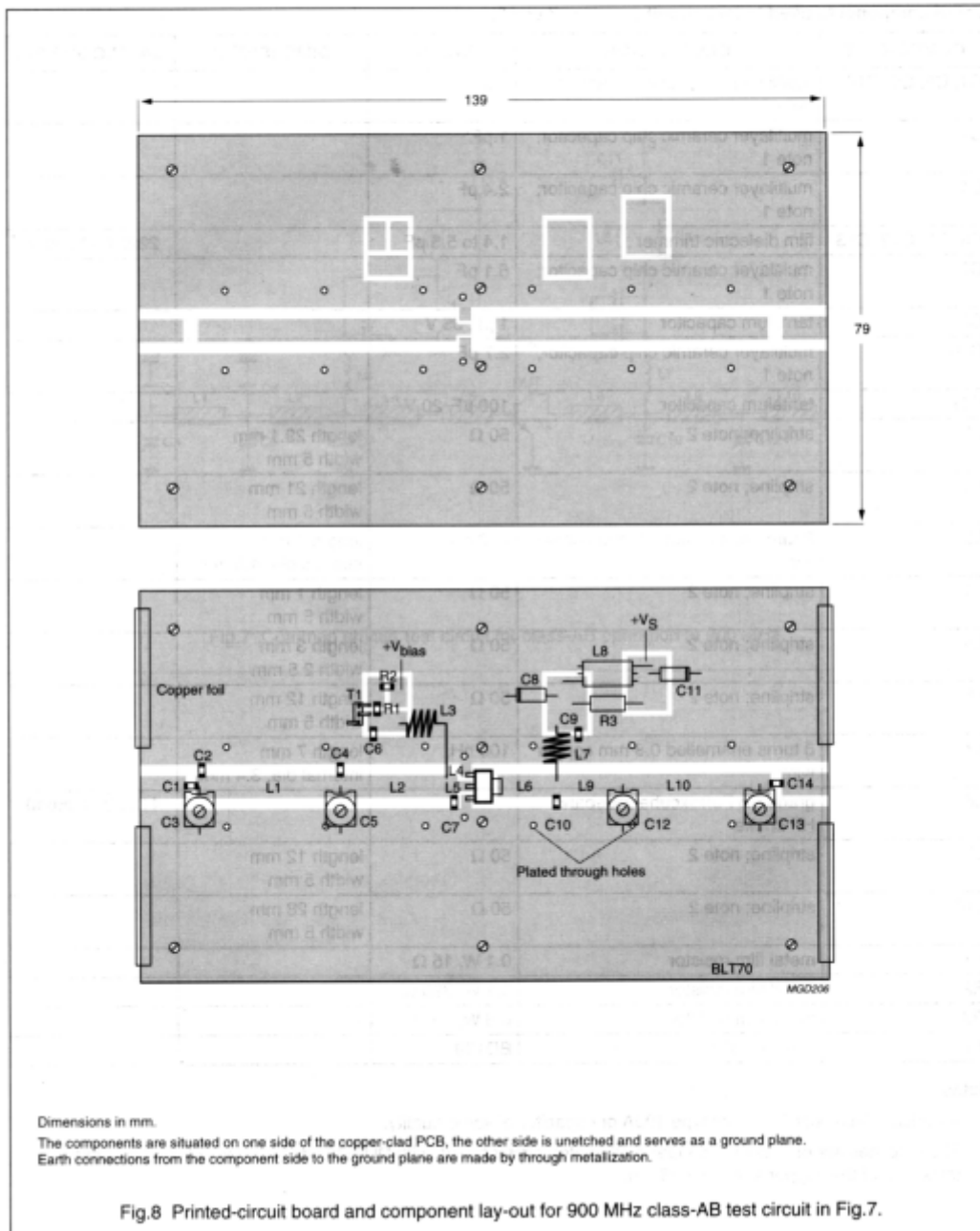
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C6, C9, C14	multilayer ceramic chip capacitor; note 1	100 pF		
C2	multilayer ceramic chip capacitor; note 1	1 pF		
C4	multilayer ceramic chip capacitor; note 1	2.4 pF		
C3, C5, C12, C13	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09004
C7	multilayer ceramic chip capacitor; note 1	5.1 pF		
C8	tantalum capacitor	1 μ F, 35 V		
C10	multilayer ceramic chip capacitor; note 1	2.7 pF		
C11	tantalum capacitor	100 μ F, 20 V		
L1	stripline; note 2	50 Ω	length 29.1 mm width 5 mm	
L2	stripline; note 2	50 Ω	length 21 mm width 5 mm	
L3	8 turns enamelled 0.8 mm copper wire	216 nH	length 7 mm internal dia. 4.5 mm	
L4	stripline; note 2	50 Ω	length 1 mm width 5 mm	
L5	stripline; note 2	50 Ω	length 3 mm width 2.5 mm	
L6	stripline; note 2	50 Ω	length 12 mm width 5 mm	
L7	8 turns enamelled 0.8 mm copper wire	105 nH	length 7 mm internal dia. 3.4 mm	
L8	grade 3B Ferroxcube wideband HF choke			4132 020 36640
L9	stripline; note 2	50 Ω	length 12 mm width 5 mm	
L10	stripline; note 2	50 Ω	length 28 mm width 5 mm	
R1	metal film resistor	0.1 W, 15 Ω		
R2	metal film resistor	0.1 W, 390 Ω		
R3	metal film resistor	0.6 W, 10 Ω		
T1	NPN transistor	BD139		

Notes

- American Technical Ceramics type 100A or capacitor of same quality.
- The striplines are on a double copper-clad printed-circuit board, with DUROID dielectric ($\epsilon_r = 2.2$); thickness $\frac{1}{16}$ " ; thickness of the copper sheet $2 \times 35 \mu\text{m}$.

UHF power transistor

BLT70



UHF power transistor

BLT70

