DISCRETE SEMICONDUCTORS

DATA SHEET

BLY87CVHF power transistor

Product specification File under Discrete Semiconductors, SC08a August 1986





VHF power transistor

BLY87C

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, h.f. and v.h.f. transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage 16,5 V.

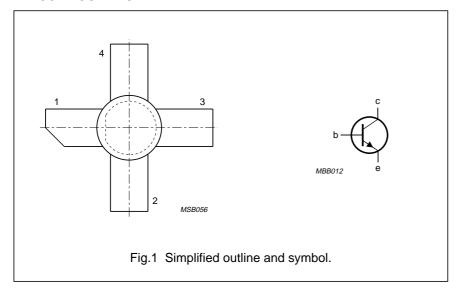
It has a 3/8" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V _{CE}	f MHz	P _L W		G _p dB		η %	$\overline{\mathbf{z}}_{\mathbf{i}}$ Ω	γ̄ _L mS
C.W.	13,5	175	8	>	12,0	>	60	2,2 + j0,4	96 – j28
C.W.	12,5	175	8	typ.	11,5	typ.	65	_	_

PIN CONFIGURATION



PINNING - SOT120

PIN	DESCRIPTION					
1	collector					
2	emitter					
3	base					
4	emitter					

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

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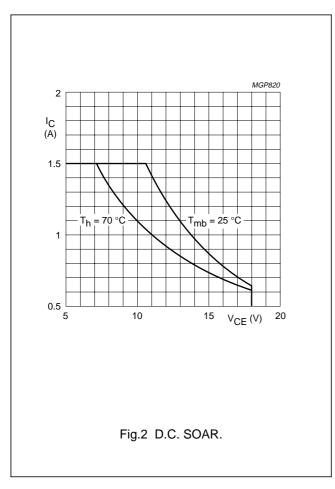
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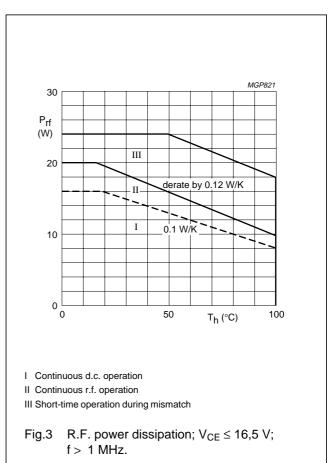
RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage $(V_{BE} = 0)$

peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	1,5	Α
Collector current (peak value); f > 1 MHz	I _{CM}	max.	4,0	Α
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	20	W
Storage temperature	T_{stg}	-65 to +	150	°С
Operating junction temperature	T_j	max.	200	°С





THERMAL RESISTANCE

(dissipation = 8 W; T_{mb} = 73,5 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation) From junction to mounting base (r.f. dissipation)

From mounting base to heatsink

 $R_{th j-mb(dc)} = 10.7 \text{ K/W}$ $R_{th j-mb(rf)} = 8.6 \text{ K/W}$ $R_{th mb-h} = 0.45 \text{ K/W}$

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CHARACTERISTICS				
$T_j = 25 ^{\circ}C$				
Collector-emitter breakdown voltage				
$V_{BE} = 0; I_{C} = 5 \text{ mA}$	V _{(BR) CES}	>	36	V
Collector-emitter breakdown voltage				
open base; I _C = 25 mA	$V_{(BR)CEO}$	>	18	V
Emitter-base breakdown voltage				
open collector; I _E = 1 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0; V_{CE} = 18 \text{ V}$	I _{CES}	<	2	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E _{SBO}	>	0,5	mJ
$R_{BE} = 10 \Omega$	E _{SBR}	>	0,5	mJ
D.C. current gain (1)		4.00	40	
$I_C = 0.75 \text{ A}; V_{CE} = 5 \text{ V}$	h _{FE}	typ. 10 to		
Collector-emitter saturation voltage (1)				
	V _{CEsat}	typ.	0,85	V
Transition frequency at f = 100 MHz (1)				
$-I_E = 0.75 \text{ A}; V_{CB} = 13.5 \text{ V}$	f _T	typ.	950	MHz
	f _T	typ.	850	MHz
Collector capacitance at f = 1 MHz				
$I_{E} = I_{e} = 0; V_{CB} = 13,5 \text{ V}$	C _c	typ.	16,5	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100 \text{ mA}; V_{CE} = 13,5 \text{ V}$	C_{re}	typ.	12	pF
Collector-stud capacitance	C_{cs}	typ.	2	pF

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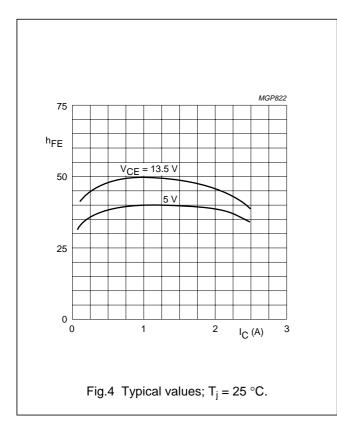
Note

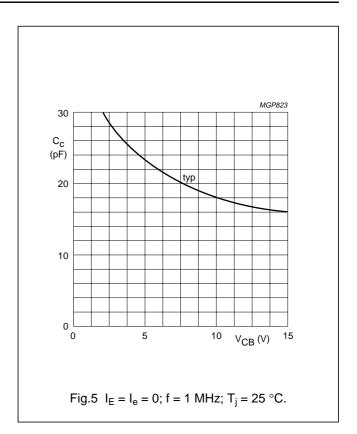
August 1986

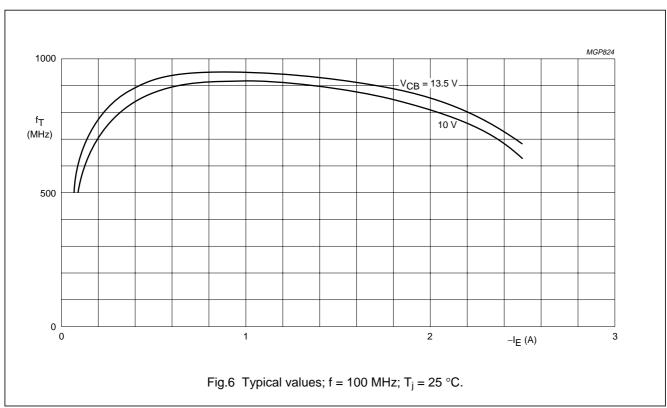
^{1.} Measured under pulse conditions: $t_p \leq 200~\mu s;~\delta~\leq 0{,}02.$

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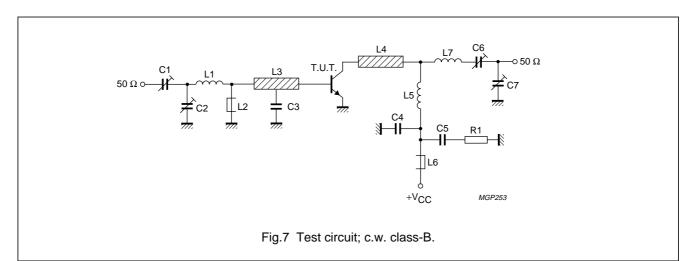
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APPLICATION INFORMATION

R.F. performance in c.w. operation (unneutralized common-emitter class-B circuit) $T_h = 25$ °C

f (MHz)	V _{CE} (V)	P _L (W)	P _S (W)	G _p (dB)	I _C (A)	η (%)	_ z _i (Ω)	√Y _L (mS)
175	13,5	8	< 0,5	> 12,0	< 0,99	> 60	2,2 + j0,4	96 – j28
175	12,5	8	_	typ. 11,5	_	typ. 65	_	_



List of components:

C1 = 2,5 to 20 pF film dielectric trimmer (cat. no. 2222 809 07004)

C2 = C6 = 4 to 40 pF film dielectric trimmer (cat. no. 2222 809 07008)

C3 = 47 pF ceramic capacitor (500 V)

C4 = 120 pF ceramic capacitor (500 V)

C5 = 100 nF polyester capacitor

C7 = 5 to 60 pF film dielectric trimmer (cat. no. 2222 809 07011)

L1 = 2 turns Cu wire (1,6 mm); int. dia. 4,5 mm; length 5,7 mm; leads 2×5 mm

L2 = L6 = Ferroxcube wide-band h.f. choke, grade 3B (cat. no. 4312 020 36640)

L3 = L4 = strip (12 mm \times 6 mm); tap for C3 at 5 mm from transistor

L5 = 3 turns Cu wire (1,6 mm); int. dia. 7,5 mm; length 7,5 mm; leads 2×5 mm

L7 = 3 turns Cu wire (1,6 mm); int. dia. 6,5 mm; length 7,4 mm; leads 2×5 mm

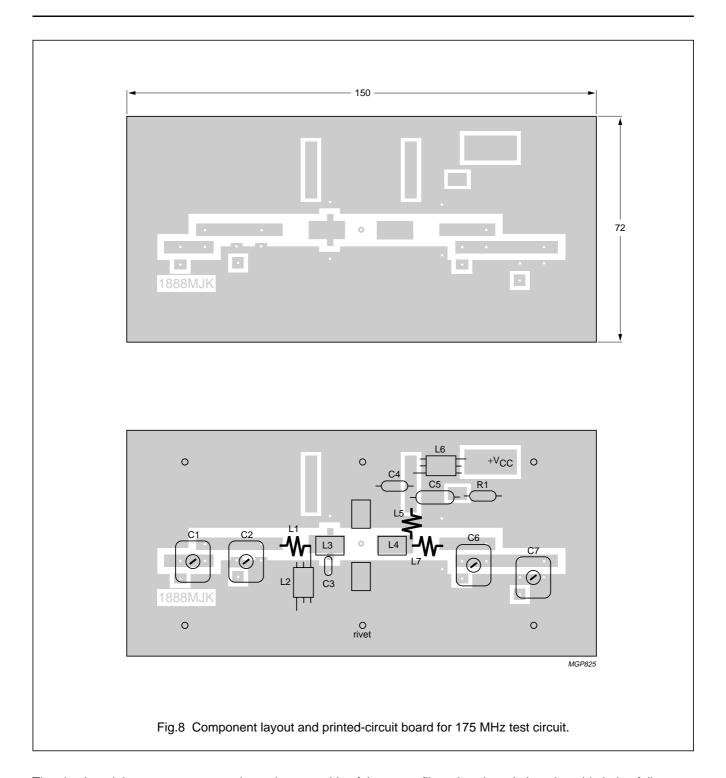
L3 and L4 are strips on a double Cu-clad printed-circuit board with epoxy fibre-glass dielectric, thickness 1/16".

R1 = 10Ω carbon resistor

Component layout and printed-circuit board for 175 MHz test circuit see Fig.8.

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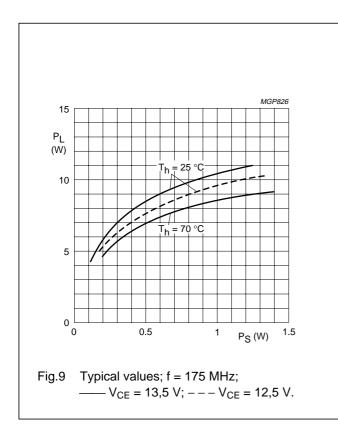
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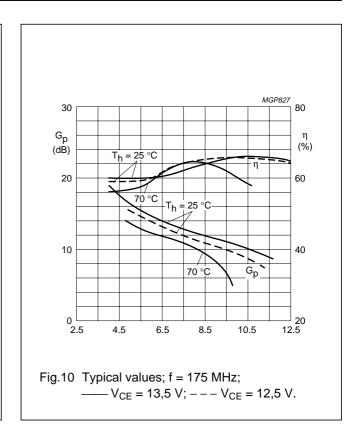


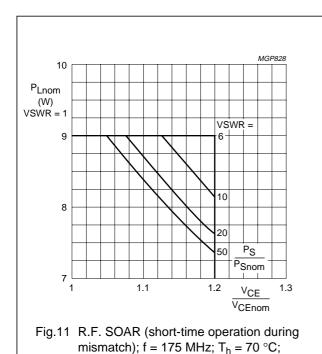
The circuit and the components are situated on one side of the epoxy fibre-glass board, the other side being fully metallized to serve as earth. Earth connections are made by means of hollow rivets, whilst under the emitter leads Cu straps are used for a direct contact between upper and lower sheets.

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 $R_{th mb-h} = 0.45 \text{ K/W};$

 V_{CEnom} and VSWR = 1.

 V_{CEnom} = 13,5 V or 12,5 V; P_S = P_{Snom} at

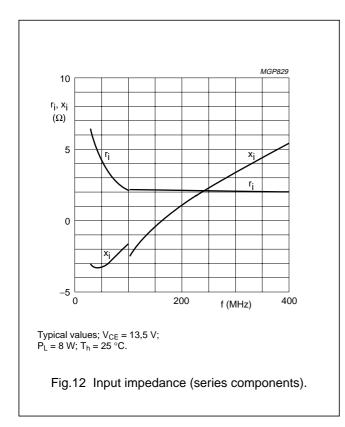
Note to Fig.11:

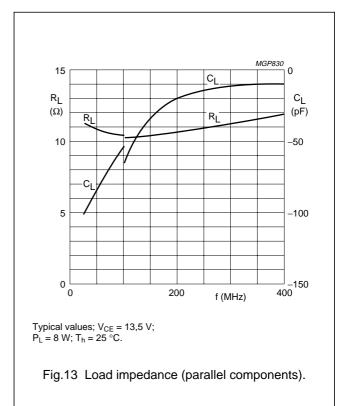
The transistor has been developed for use with unstabilized supply voltages. As the output power and drive power increase with the supply voltage, the nominal output power must be derated in accordance with the graph for safe operation at supply voltages other than the nominal. The graph shows the permissible output power under nominal conditions (VSWR = 1), as a function of the expected supply over-voltage ratio with VSWR as parameter.

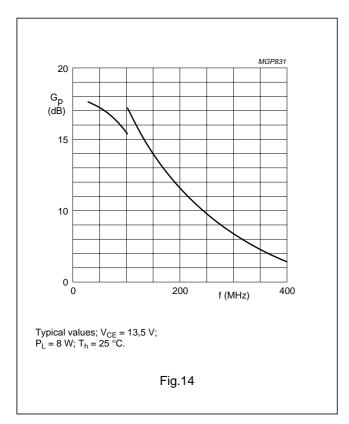
The graph applies to the situation in which the drive (P_S/P_{Snom}) increases linearly with supply over-voltage ratio

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OPERATING NOTE

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Below 100 MHz a base-emitter resistor of 10 Ω is recommended to avoid oscillation. This resistor must be effective for r.f. only.

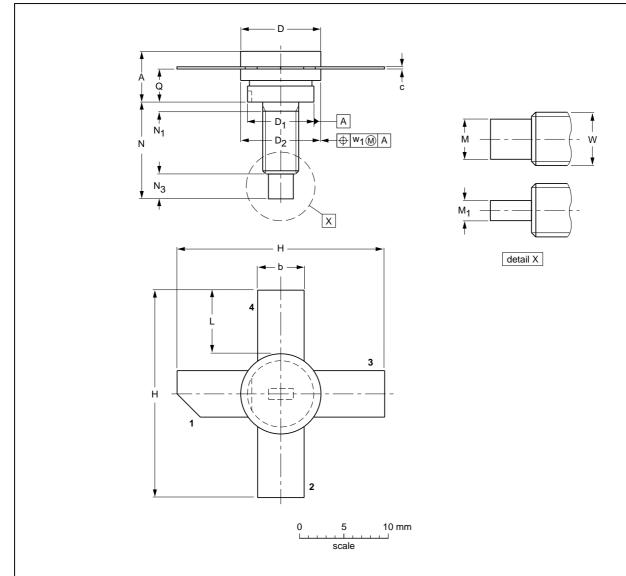
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PACKAGE OUTLINE

Studded ceramic package; 4 leads

SOT120A



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UI	VIT	A	b	С	D	D ₁	D ₂	н	L	М	М1	N	N ₁	N ₃	Q	w	w ₁
m	ım	5.97 4.74	5.90 5.48	0.18 0.14	9.73 9.47	8.39 8.12	9.66 9.39	27.44 25.78	9.00 8.00	3.41 2.92	1.66 1.39	12.83 11.17	1.60 0.00	3.31 2.54	4.35 3.98	8-32	0.38
inc	hes	0.283 0.248	0.232 0.216			0.330 0.320	0.380 0.370		0.354 0.315	0.134 0.115	0.065 0.055	0.505 0.440		0.130 0.100		UNC	0.015

OUTLINE		EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	EIAJ		PROJECTION	1330E DATE
SOT120A						97-06-28

Product specification Philips Semiconductors

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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 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.

LIFE SUPPORT APPLICATIONS

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11 August 1986