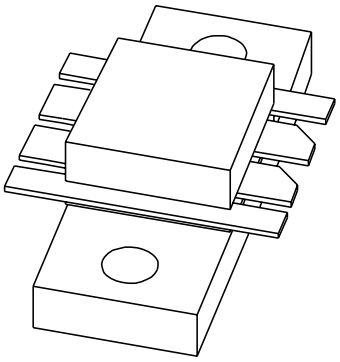
DATA SHEET



BLF246B
VHF push-pull power MOS transistor

Product specification
Supersedes data of 1999 Jan 28

2000 Feb 04

Philips
Semiconductors

PHILIPS

VHF push-pull power MOS transistor BLF246B

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

APPLICATIONS

Large signal applications in the VHF frequency range.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS push-pull transistor encapsulated in an 8-lead SOT161A balanced flange package with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT161A

PIN	DESCRIPTION
1	source
2	source
3	drain 1
4	gate 1
5	drain 2
6	gate 2
7	source
8	source

PIN CONFIGURATION

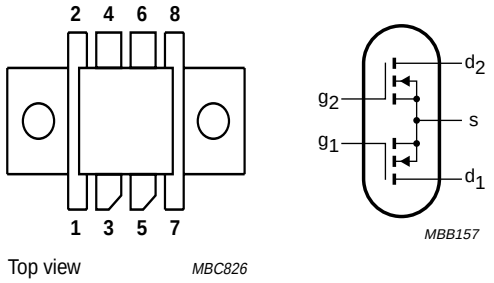


Fig.1 Simplified outline and symbol.

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A, and SNW-FQ-302B.

WARNING

Product and environmental safety - toxic materials

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

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-AB	175	28	60	>14	>55

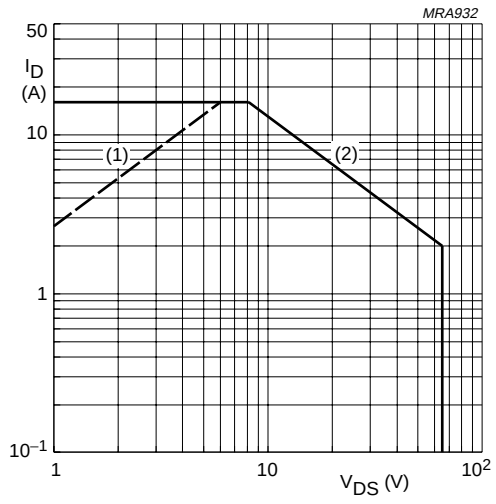
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor section unless otherwise specified					
V_{DS}	drain-source voltage		–	65	V
V_{GS}	gate-source voltage		–	±20	V
I_D	drain current (DC)		–	8	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C total device; both sections equally loaded	–	130	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C

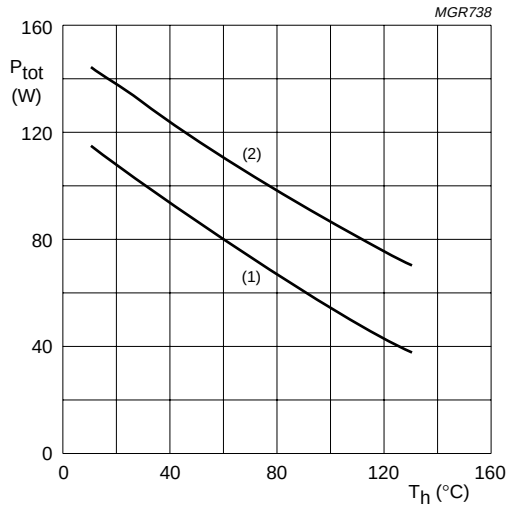
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	1.35	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.25	K/W



(1) Current in this area may be limited by R_{DSon}.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



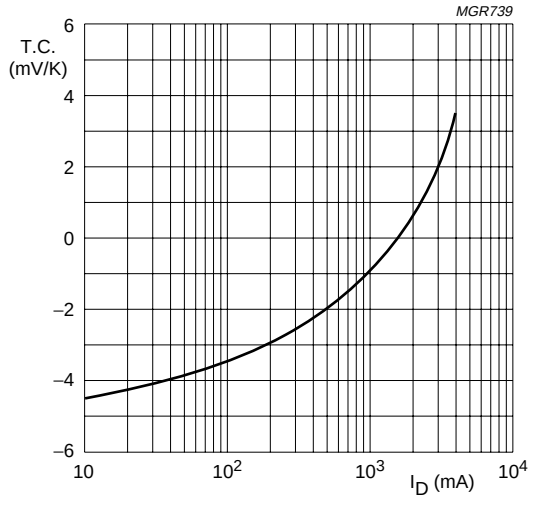
(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

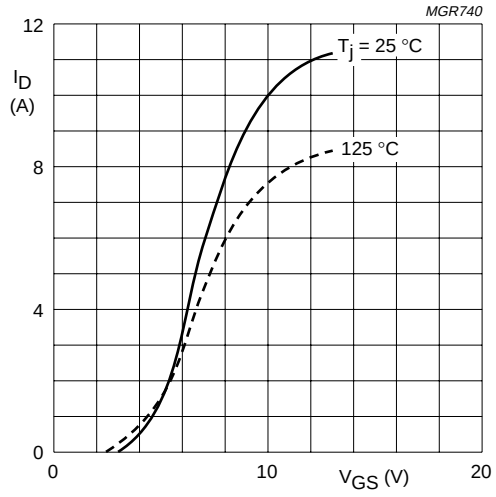
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor section						
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 10 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2	mA
I_{GSS}	gate-source leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	µA
V_{GSth}	gate-source threshold voltage	I_D = 10 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 1.5 A; V_{DS} = 10 V	1.2	1.8	–	S
R_{DSon}	drain-source on-state resistance	I_D = 1.5 A; V_{GS} = 10 V	–	0.4	0.75	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	10	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	125	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	75	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	11	–	pF



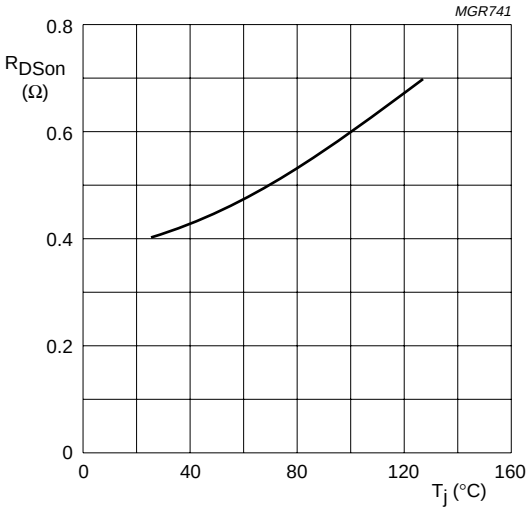
V_{DS} = 10 V.

Fig.4 Temperature coefficient of gate-source voltage as a function of drain current; typical values per section.



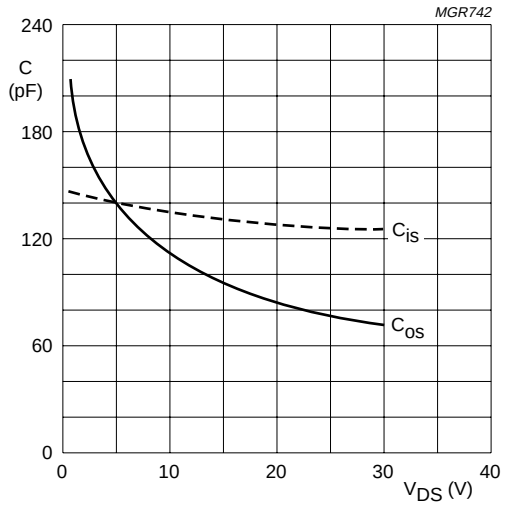
V_{DS} = 10 V.

Fig.5 Drain current as a function of gate-source voltage; typical values per section.



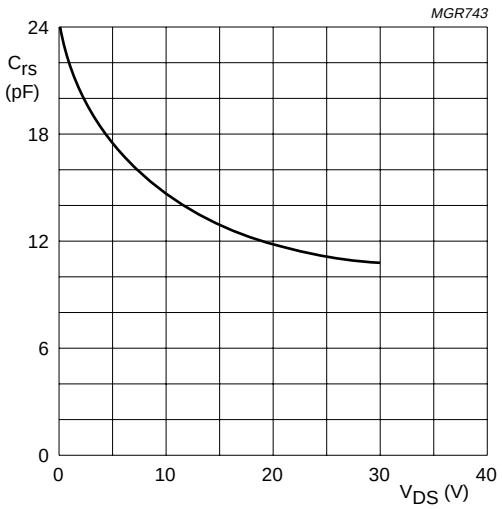
V_{GS} = 10 V; I_D = 1.5 A.

Fig.6 Drain-source on-state resistance as a function of junction temperature; typical values per section.



V_{GS} = 0; f = 1 MHz.

Fig.7 Input and output capacitance as functions of drain-source voltage; typical values per section.



V_{GS} = 0; f = 1 MHz.

Fig.8 Feedback capacitance as a function of drain-source voltage; typical values per section.

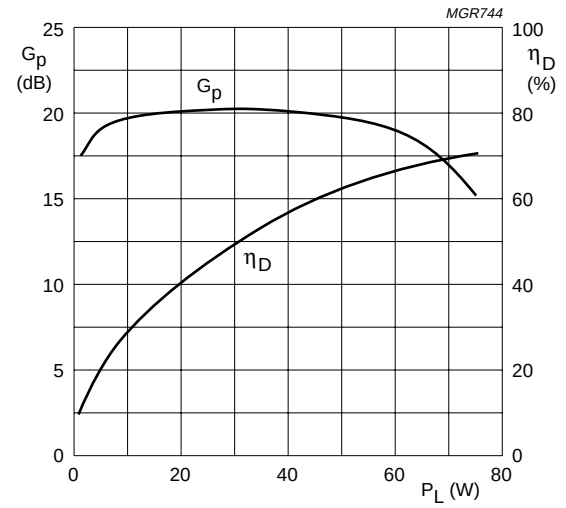
APPLICATION INFORMATION

RF performance in CW operation in a push-pull, common source, class-B circuit. T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.25 K/W; unless otherwise specified.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	28	2×50	60	>14 typ. 19	>55 typ. 65

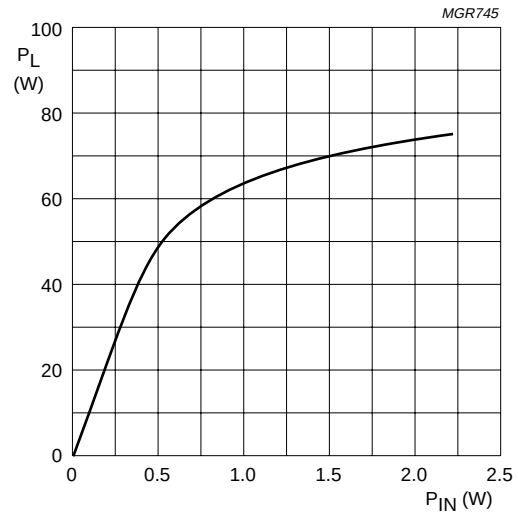
Ruggedness in class-B operation

The BLF246B is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the following conditions: V_{DS} = 28 V; f = 175 MHz at rated output power.



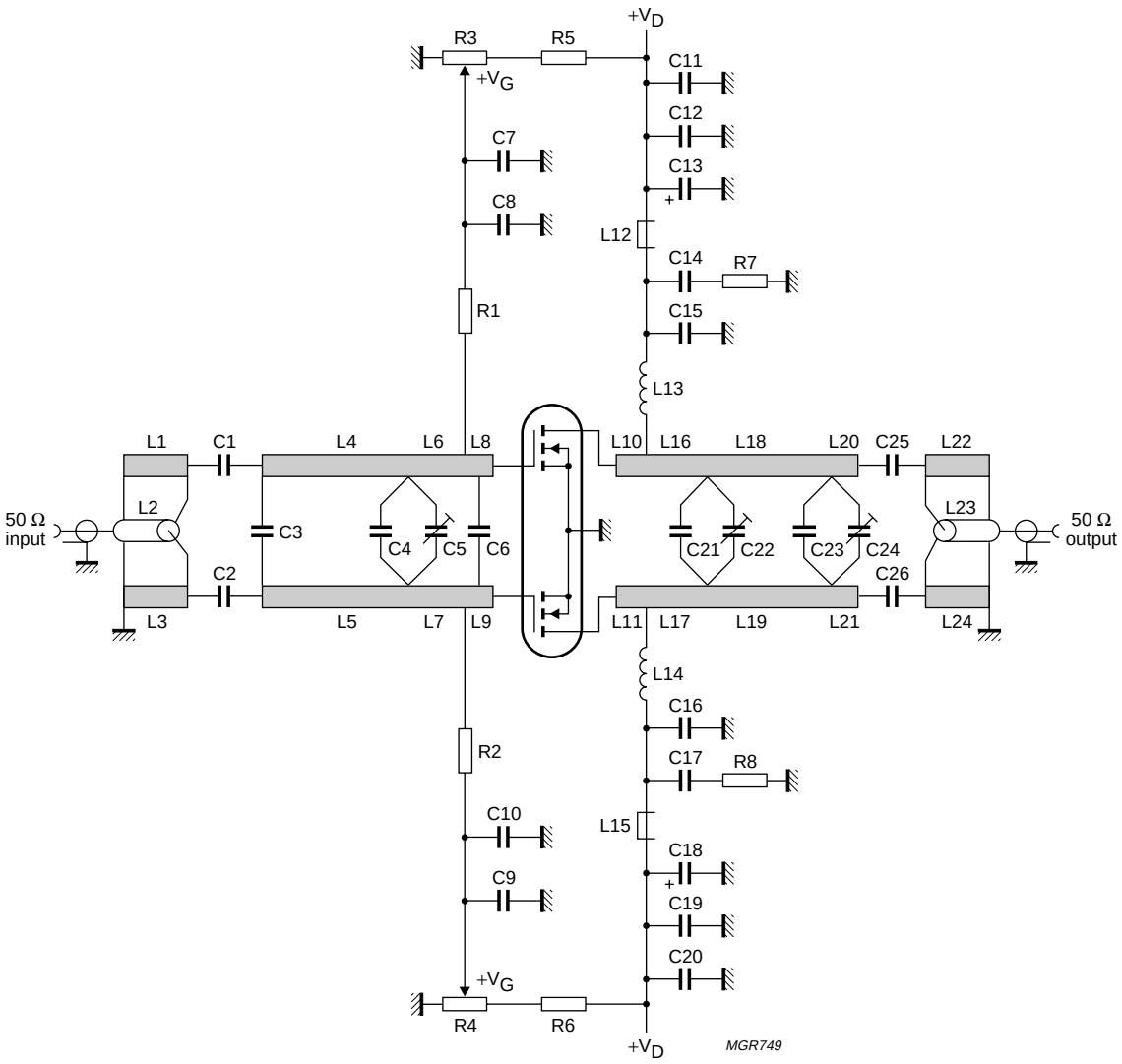
Class-B operation; V_{DS} = 28 V; $I_{DQ} = 2 \times 50$ mA; $Z_L = 4.6 + j5\ \Omega$; f = 175 MHz.

Fig.9 Power gain and efficiency as a function of load power; typical values per section.



Class-B operation; V_{DS} = 28 V; $I_{DQ} = 2 \times 50$ mA; $Z_L = 4.6 + j5\ \Omega$; f = 175 MHz.

Fig.10 Load power as a function of input power; typical values per section.



f = 175 MHz.

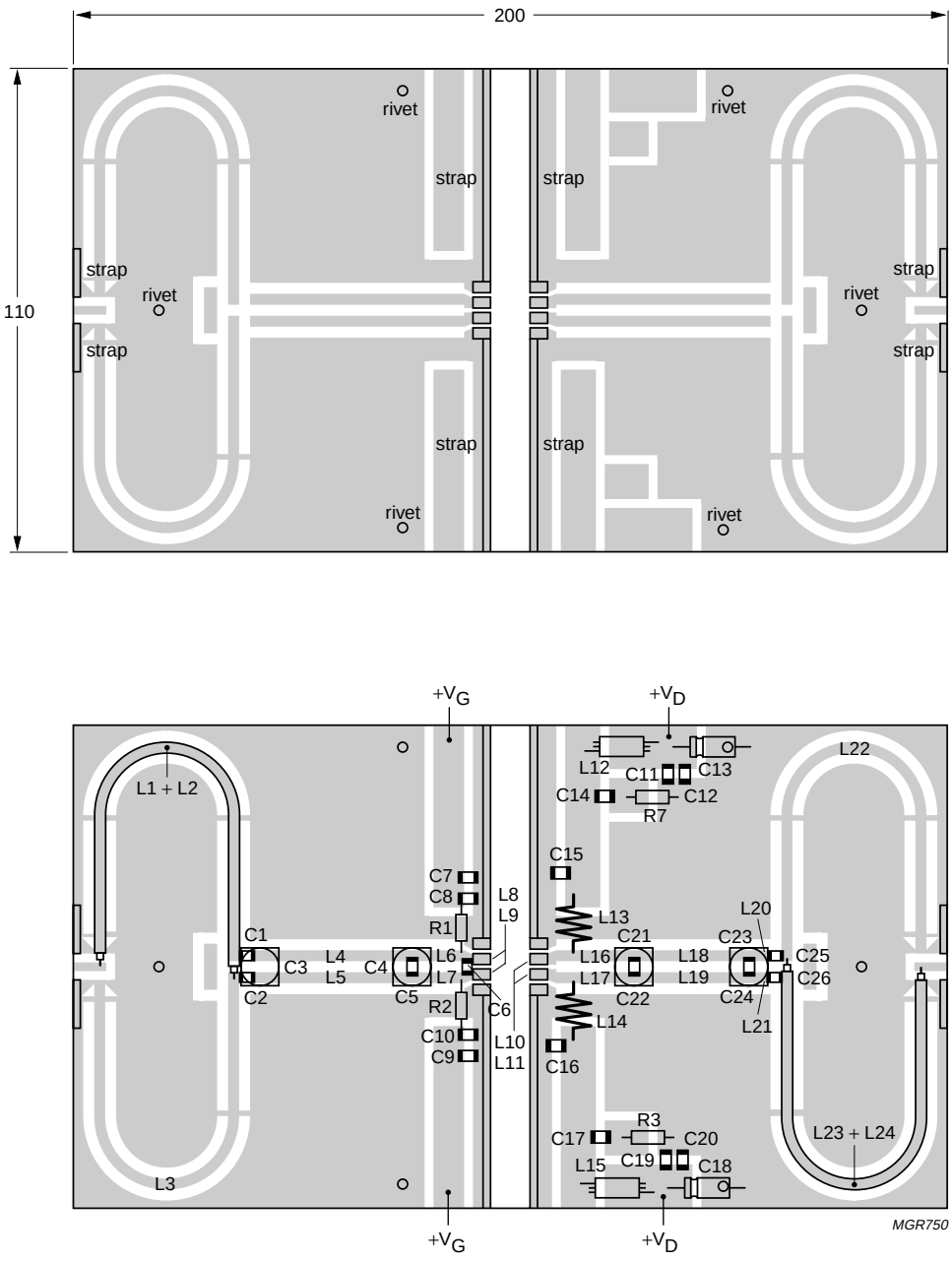
Fig.11 Test circuit for class-B operation.

List of components class-B test circuit (see Figs 11 and 12)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2, C25, C26	multilayer ceramic chip capacitor; note 1	91 pF		
C3	film dielectric trimmer	4 to 40 pF		2222 809 08002
C4	multilayer ceramic chip capacitor; note 1	180 pF		
C5, C22, C24	film dielectric trimmer	5 to 60 pF		2222 809 08003
C6	multilayer ceramic chip capacitor; note 1	100 pF		
C7, C9, C12, C14, C17, C19	multilayer ceramic chip capacitor; note 1	100 nF		2222 852 47104
C8, C10, C15, C16	multilayer ceramic chip capacitor; note 1	680 pF		
C11, C20	multilayer ceramic chip capacitor; note 1	10 nF		2222 852 47103
C13, C18	electrolytic capacitor	10 μF, 63 V		
C21	multilayer ceramic chip capacitor; note 1	82 pF		
C23	multilayer ceramic chip capacitor; note 1	33 pF		
L1, L3, L22, L24	stripline; note 2	55 Ω	111 × 2.5 mm	
L2, L23	semi-rigid cable	50 Ω	length 111 mm ext. dia 2.2 mm	
L4, L5	stripline; note 2	50 Ω	6.5 × 2.8 mm	
L6, L7	stripline; note 2	50 Ω	35 × 2.8 mm	
L8, L9	stripline; note 2	50 Ω	5 × 2.8 mm	
L10, L11	stripline; note 2	50 Ω	9 × 2.8 mm	
L12, L15	grade 3B Ferroxcube wideband HF choke			4312 020 36642
L13, L14	4 turns enamelled 1 mm copper wire	50 nH	length 6.5 mm int. dia. 4 mm leads 2 × 5 mm	
L16, L17	stripline; note 2	50 Ω	17 × 2.8 mm	
L18, L19	stripline; note 2	50 Ω	26 × 2.8 mm	
L20, L21	stripline; note 2	50 Ω	4 × 2.8 mm	
R1, R2, R7, R8	metal film resistor	0.4 W, 10 Ω		
R3, R4	10 turns potentiometer	50 kΩ		
R5, R6	metal film resistor	0.4 W, 205 kΩ		

Notes

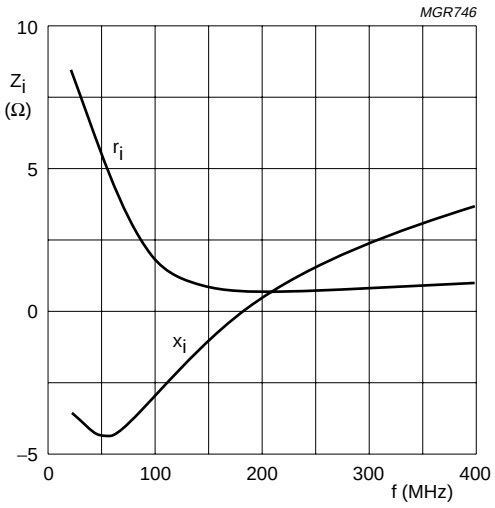
1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. The striplines are on a double copper-clad printed-circuit board with epoxy glass dielectric (ε_r = 4.5); thickness $^1/_{16}$ inch. The other side of the board is fully metallized and used as a ground plane. The ground planes on each side of the board are connected together by means of copper straps and hollow rivets.



Dimensions in mm.

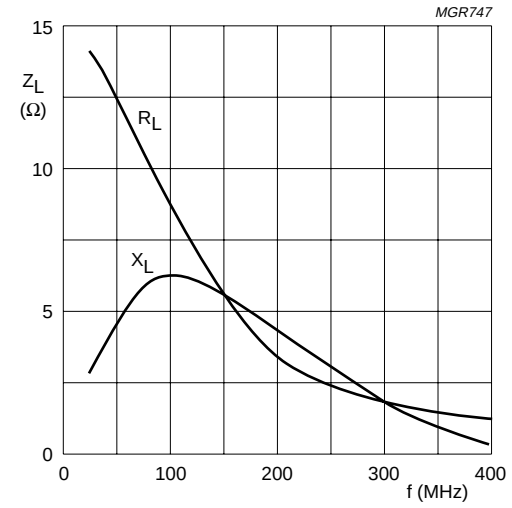
The circuit and components are situated on one side of the PTFE fibre-glass board, the other side being fully metallized, to serve as a ground plane. Earth connections are made by means of copper straps and hollow rivets for a direct contact between upper and lower sheets.

Fig.12 Component layout for 175 MHz class-B test circuit.



Class-B operation; V_{DS} = 28 V; I_{DQ} = 2 × 50 mA;
R_{GS} = 10 Ω; P_L = 60 W (total device).

Fig.13 Input impedance as a function of frequency (series components); typical values per section.



Class-B operation; V_{DS} = 28 V; I_{DQ} = 2 × 50 mA;
R_{GS} = 10 Ω; P_L = 60 W (total device).

Fig.14 Load impedance as a function of frequency (series components); typical values per section.

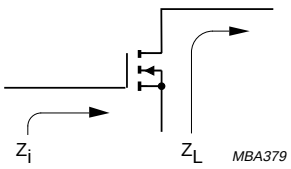
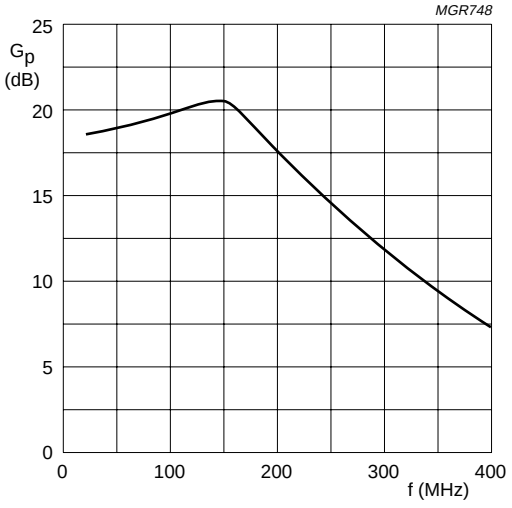


Fig.15 Definition of MOS impedance.

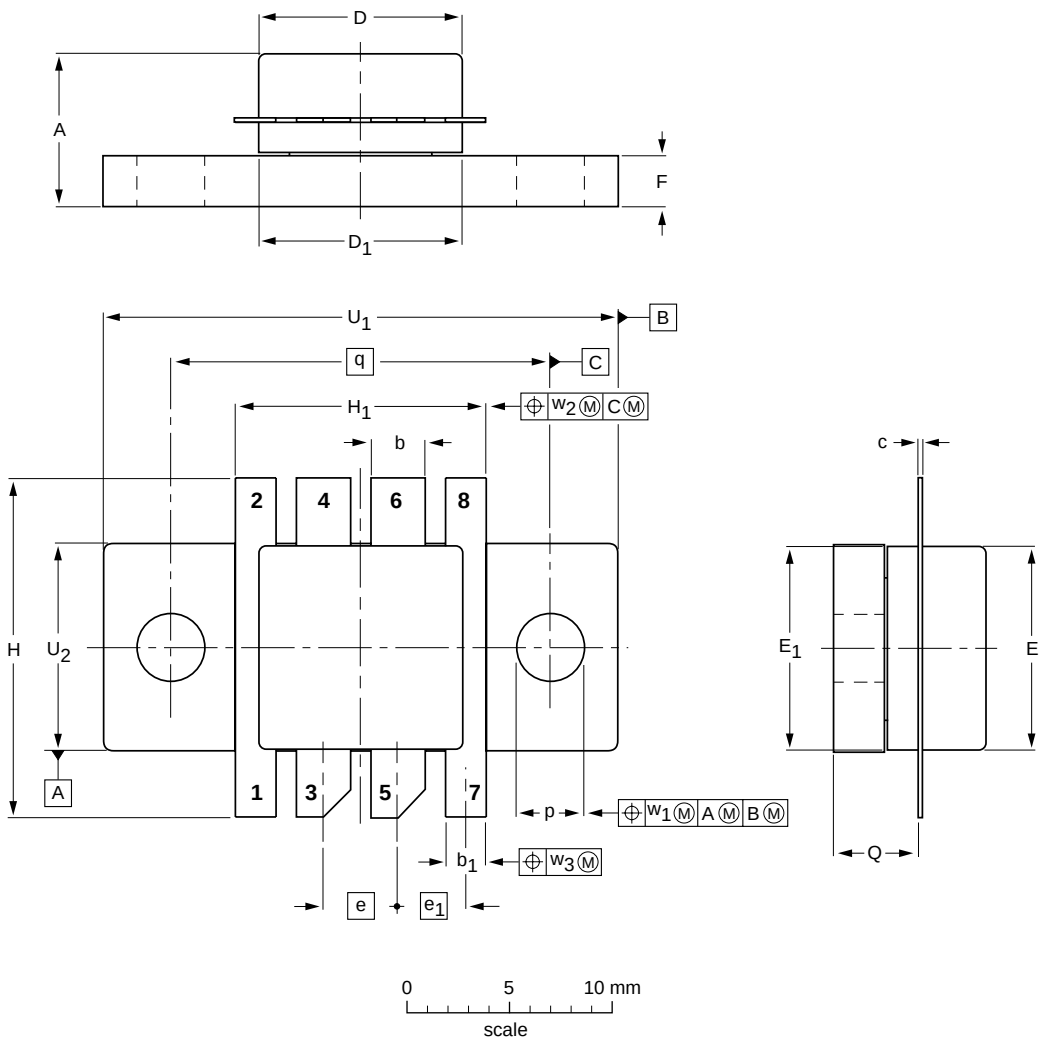


Class-B operation; V_{DS} = 28 V; I_{DQ} = 2 × 50 mA;
R_{GS} = 10 Ω; P_L = 60 W (total device).

Fig.16 Power gain as a function of frequency; typical values per section.

PACKAGE OUTLINE

Flanged ceramic package; 2 mounting holes; 8 leads **SOT161A**



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

UNIT	A	b	b_1	c	D	D_1	E	E_1	e	e_1	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	7.27 6.47	2.93 2.66	2.04 1.77	0.18 0.10	10.22 10.00	10.21 9.94	10.21 10.00	10.21 9.94	3.80	3.50	2.70 2.08	16.81 16.21	12.83 12.57	3.33 3.07	4.32 4.06	18.42	24.97 24.71	10.34 10.08	0.25	0.51	0.25
inches	0.286 0.255	0.115 0.105	0.080 0.070	0.007 0.004	0.402 0.394	0.402 0.391	0.402 0.394	0.402 0.391	0.150	0.138	0.106 0.082	0.662 0.638	0.505 0.495	0.131 0.121	0.170 0.160	0.725	0.983 0.973	0.407 0.397	0.010	0.020	0.010

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT161A						~~99-03-29~~ 99-10-04

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

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.

NOTES

NOTES

NOTES

Philips Semiconductors – a worldwide company

Argentina: see South America

Australia: 3 Figtree Drive, HOMEBUSH, NSW 2140,
Tel. +61 2 9704 8141, Fax. +61 2 9704 8139

Austria: Computerstr. 6, A-1101 WIEN, P.O. Box 213,
Tel. +43 1 60 101 1248, Fax. +43 1 60 101 1210

Belarus: Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,
220050 MINSK, Tel. +375 172 20 0733, Fax. +375 172 20 0773

Belgium: see The Netherlands

Brazil: see South America

Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor,
51 James Bourchier Blvd., 1407 SOFIA,
Tel. +359 2 68 9211, Fax. +359 2 68 9102

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS,
Tel. +1 800 234 7381, Fax. +1 800 943 0087

China/Hong Kong: 501 Hong Kong Industrial Technology Centre,
72 Tat Chee Avenue, Kowloon Tong, HONG KONG,
Tel. +852 2319 7888, Fax. +852 2319 7700

Colombia: see South America

Czech Republic: see Austria

Denmark: Sydhavnsgade 23, 1780 COPENHAGEN V,
Tel. +45 33 29 3333, Fax. +45 33 29 3905

Finland: Sinikalliontie 3, FIN-02630 ESPOO,
Tel. +358 9 615 800, Fax. +358 9 6158 0920

France: 51 Rue Carnot, BP317, 92156 SURESNES Cedex,
Tel. +33 1 4099 6161, Fax. +33 1 4099 6427

Germany: Hammerbrookstraße 69, D-20097 HAMBURG,
Tel. +49 40 2353 60, Fax. +49 40 2353 6300

Hungary: see Austria

India: Philips INDIA Ltd, Band Box Building, 2nd floor,
254-D, Dr. Annie Besant Road, Worli, MUMBAI 400 025,
Tel. +91 22 493 8541, Fax. +91 22 493 0966

Indonesia: PT Philips Development Corporation, Semiconductors Division,
Gedung Philips, Jl. Buncit Raya Kav.99-100, JAKARTA 12510,
Tel. +62 21 794 0040 ext. 2501, Fax. +62 21 794 0080

Ireland: Newstead, Clonskeagh, DUBLIN 14,
Tel. +353 1 7640 000, Fax. +353 1 7640 200

Israel: RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053,
TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

Italy: PHILIPS SEMICONDUCTORS, Via Casati, 23 - 20052 MONZA (MI),
Tel. +39 039 203 6838, Fax +39 039 203 6800

Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku,
TOKYO 108-8507, Tel. +81 3 3740 5130, Fax. +81 3 3740 5057

Korea: Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL,
Tel. +82 2 709 1412, Fax. +82 2 709 1415

Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,
Tel. +60 3 750 5214, Fax. +60 3 757 4880

Mexico: 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,
Tel. +9-5 800 234 7381, Fax +9-5 800 943 0087

Middle East: see Italy

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,
Tel. +31 40 27 82785, Fax. +31 40 27 88399

New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
Tel. +64 9 849 4160, Fax. +64 9 849 7811

Norway: Box 1, Manglerud 0612, OSLO,
Tel. +47 22 74 8000, Fax. +47 22 74 8341

Pakistan: see Singapore

Philippines: Philips Semiconductors Philippines Inc.,
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,
Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

Poland: Al.Jerozolimskie 195 B, 02-222 WARSAW,
Tel. +48 22 5710 000, Fax. +48 22 5710 001

Portugal: see Spain

Romania: see Italy

Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
Tel. +7 095 755 6918, Fax. +7 095 755 6919

Singapore: Lorong 1, Toa Payoh, SINGAPORE 319762,
Tel. +65 350 2538, Fax. +65 251 6500

Slovakia: see Austria

Slovenia: see Italy

South Africa: S.A. PHILIPS Pty Ltd., 195-215 Main Road Martindale,
2092 JOHANNESBURG, P.O. Box 58088 Newville 2114,
Tel. +27 11 471 5401, Fax. +27 11 471 5398

South America: Al. Vicente Pinzon, 173, 6th floor,
04547-130 SÃO PAULO, SP, Brazil,
Tel. +55 11 821 2333, Fax. +55 11 821 2382

Spain: Balmes 22, 08007 BARCELONA,
Tel. +34 93 301 6312, Fax. +34 93 301 4107

Sweden: Kottbygatan 7, Akalla, S-16485 STOCKHOLM,
Tel. +46 8 5985 2000, Fax. +46 8 5985 2745

Switzerland: Allmendstrasse 140, CH-8027 ZÜRICH,
Tel. +41 1 488 2741 Fax. +41 1 488 3263

Taiwan: Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,
TAIPEI, Taiwan Tel. +886 2 2134 2886, Fax. +886 2 2134 2874

Thailand: PHILIPS ELECTRONICS (THAILAND) Ltd.,
209/2 Sanpavuth-Bangna Road Prakanong, BANGKOK 10260,
Tel. +66 2 745 4090, Fax. +66 2 398 0793

Turkey: Yukari Dudullu, Org. San. Blg., 2.Cad. Nr. 28 81260 Umraniye,
ISTANBUL, Tel. +90 216 522 1500, Fax. +90 216 522 1813

Ukraine: PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,
252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes,
MIDDLESEX UB3 5BX, Tel. +44 208 730 5000, Fax. +44 208 754 8421

United States: 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,
Tel. +1 800 234 7381, Fax. +1 800 943 0087

Uruguay: see South America

Vietnam: see Singapore

Yugoslavia: PHILIPS, Trg N. Pasica 5/v, 11000 BEOGRAD,
Tel. +381 11 3341 299, Fax.+381 11 3342 553

For all other countries apply to: Philips Semiconductors,
International Marketing & Sales Communications, Building BE-p, P.O. Box 218,
5600 MD EINDHOVEN, The Netherlands, Fax. +31 40 27 24825

Internet: http://www.semiconductors.philips.com

Printed in The Netherlands 603516/05/pp16 Date of release: 2000 Feb 04 Document order number: 9397 750 06765

Let's make things better.

Philips Semiconductors

PHILIPS