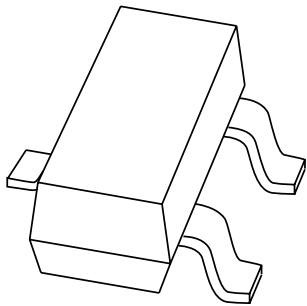


DATA SHEET



PBR941B UHF wideband transistor

Preliminary specification

2001 Jan 18

UHF wideband transistor

PBR941B

FEATURES

- Small size
- Low noise
- Low distortion
- High gain
- Gold metallization ensures excellent reliability.

APPLICATIONS

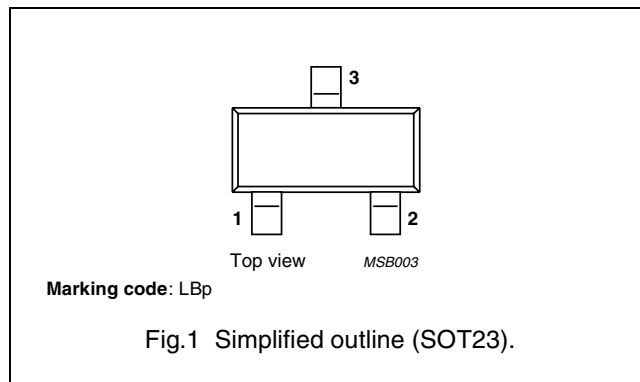
- Communication and instrumentation systems.

DESCRIPTION

Silicon NPN transistor in a surface mount 3-pin SOT23 package. The transistor is primarily intended for wideband applications in the GHz range in the RF front end of analog and digital cellular telephones, cordless phones, radar detectors, pagers and satellite TV-tuners.

PINNING SOT23

PIN	DESCRIPTION
1	base
2	emitter
3	collector



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 6$ V; $f = 1$ MHz	–	0.3	–	pF
f_T	transition frequency	$I_C = 15$ mA; $V_{CE} = 6$ V; $f_m = 1$ GHz	7	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 15$ mA; $V_{CE} = 6$ V; $T_{amb} = 25$ °C; $f = 1$ GHz	–	16	–	dB
NF	noise figure	$\Gamma_S = \Gamma_{opt}$; $I_C = 5$ mA; $V_{CE} = 6$ V; $f = 1$ GHz	–	1.5	2.5	dB
P_{tot}	total power dissipation	$T_s = 60$ °C; note 1	–	–	360	mW
$R_{th\ j-s}$	thermal resistance from junction to soldering point		–	–	320	K/W

Note

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

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

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	–	1.5	V
I_C	collector current (DC)		–	50	mA
$I_{C(AV)}$	average collector current		–	50	mA
P_{tot}	total power dissipation	$T_s = 60\text{ °C}$; note 1	–	360	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

Note

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

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	320	K/W

UHF wideband transistor

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CHARACTERISTICS

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

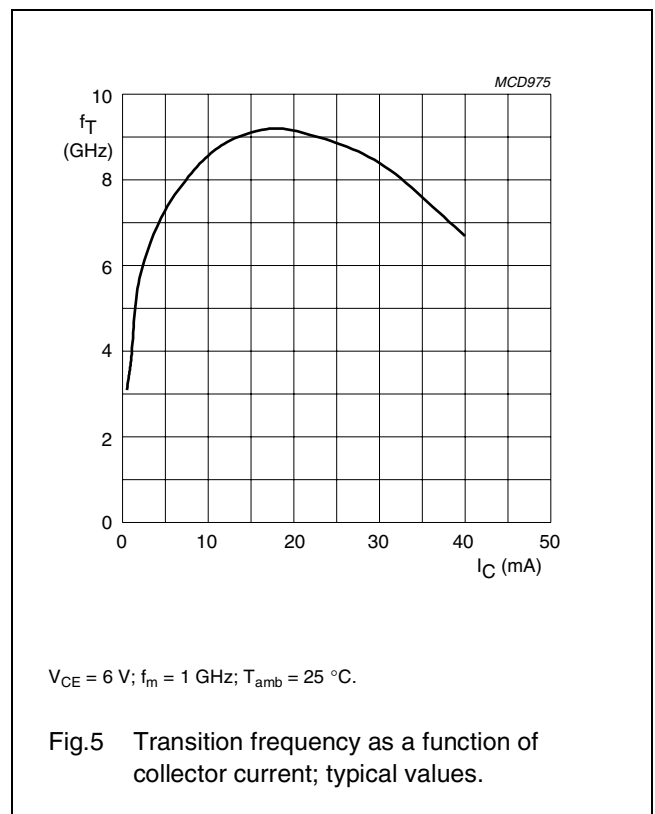
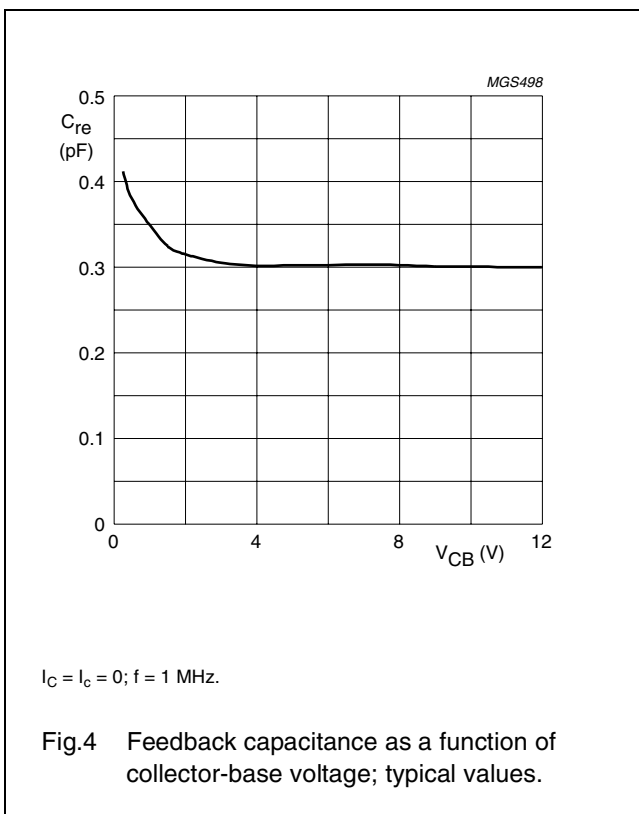
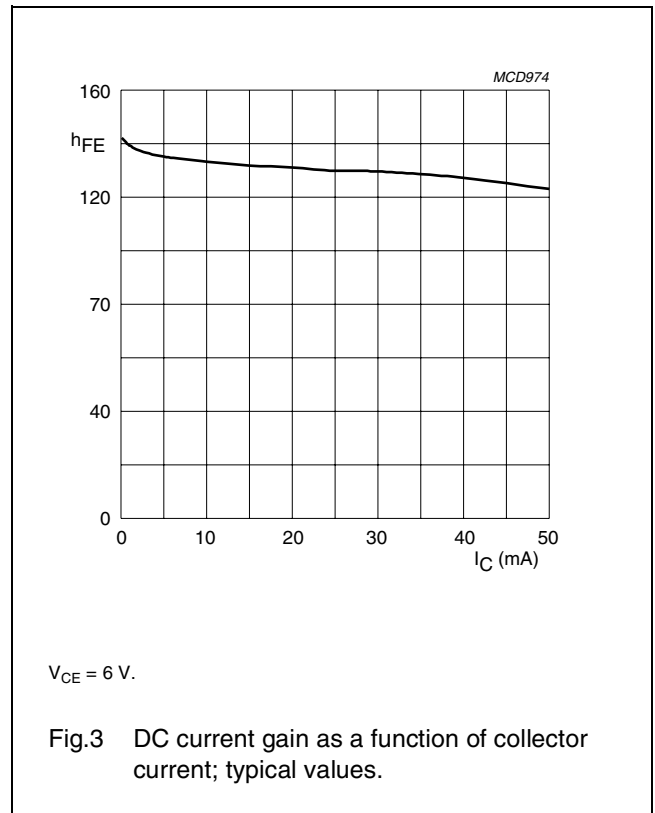
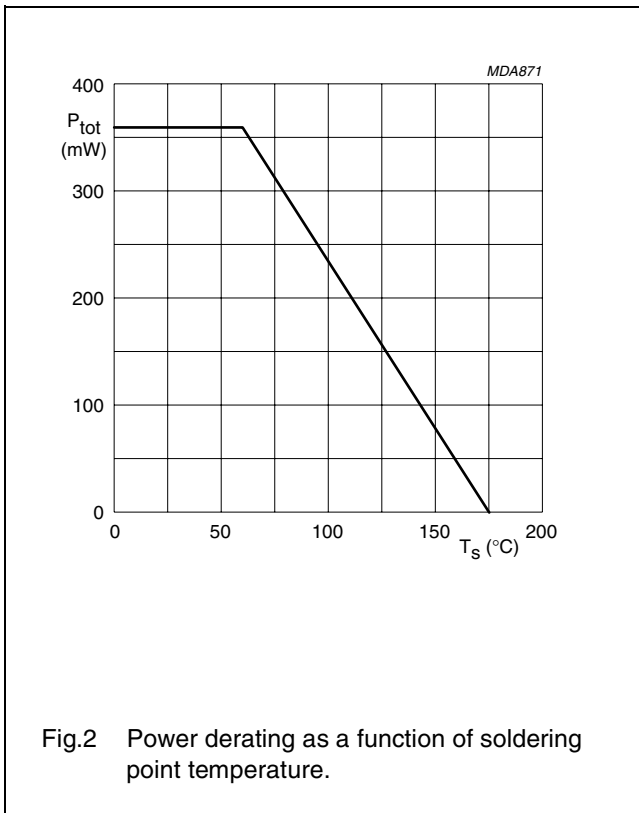
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC characteristics						
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\ \mu\text{A}; I_E = 0$	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 100\ \mu\text{A}; I_B = 0$	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 10\ \mu\text{A}; I_C = 0$	1.5	–	–	V
V_{BEF}	forward base-emitter voltage	$I_E = 25\ \text{mA}$	–	–	1.05	V
I_{CBO}	collector-base leakage current	$V_{CB} = 10\ \text{V}; I_E = 0$	–	–	100	nA
I_{EBO}	emitter-base leakage current	$V_{EB} = 1\ \text{V}; I_C = 0$	–	–	100	nA
h_{FE}	DC current gain	$I_C = 5\ \text{mA}; V_{CE} = 6\ \text{V}$	100	150	200	
		$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}$	–	150	–	
AC characteristics						
C_{re}	feedback capacitance	$I_C = 0; V_{CB} = 6\ \text{V}; f = 1\ \text{MHz}$	–	0.3	–	pF
f_T	transition frequency	$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; f_m = 1\ \text{GHz}$	7	9	–	GHz
$ S_{21} ^2$	insertion gain	$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; f = 1\ \text{GHz}$	13	15	–	dB
G_{UM}	maximum unilateral power gain; note 1	$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; T_{amb} = 25\text{ °C}; f = 1\ \text{GHz}$	–	16	–	dB
		$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; T_{amb} = 25\text{ °C}; f = 2\ \text{GHz}$	–	10	–	dB
NF	noise figure	$\Gamma_S = \Gamma_{opt}; I_C = 5\ \text{mA}; V_{CE} = 6\ \text{V}; f = 1\ \text{GHz}$	–	1.5	2.5	dB
		$\Gamma_S = \Gamma_{opt}; I_C = 5\ \text{mA}; V_{CE} = 6\ \text{V}; f = 2\ \text{GHz}$	–	2.1	–	dB

Note

1. G_{UM} is the maximum unilateral power gain, assuming s_{12} is zero. $G_{UM} = 10 \log \frac{|s_{21}|^2}{(1 - |s_{11}|^2)(1 - |s_{22}|^2)}$ dB

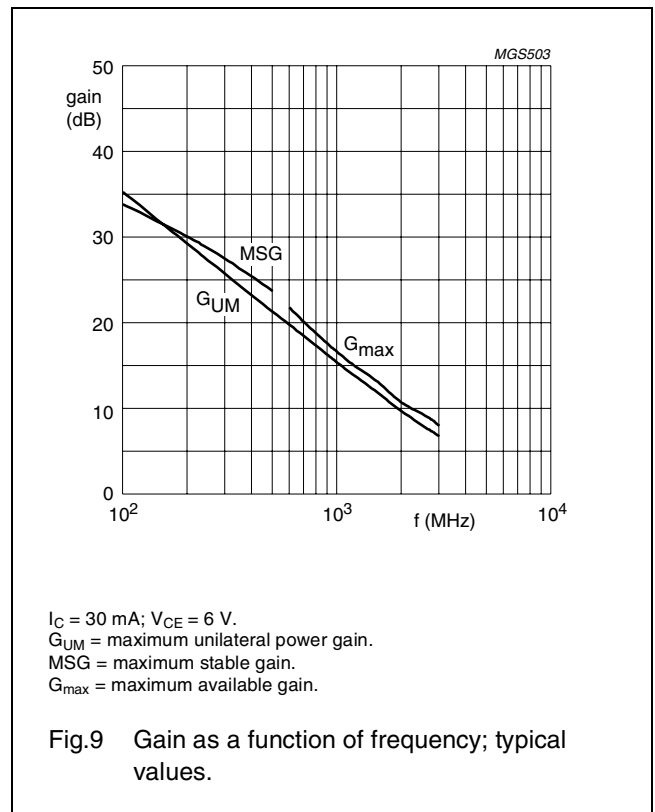
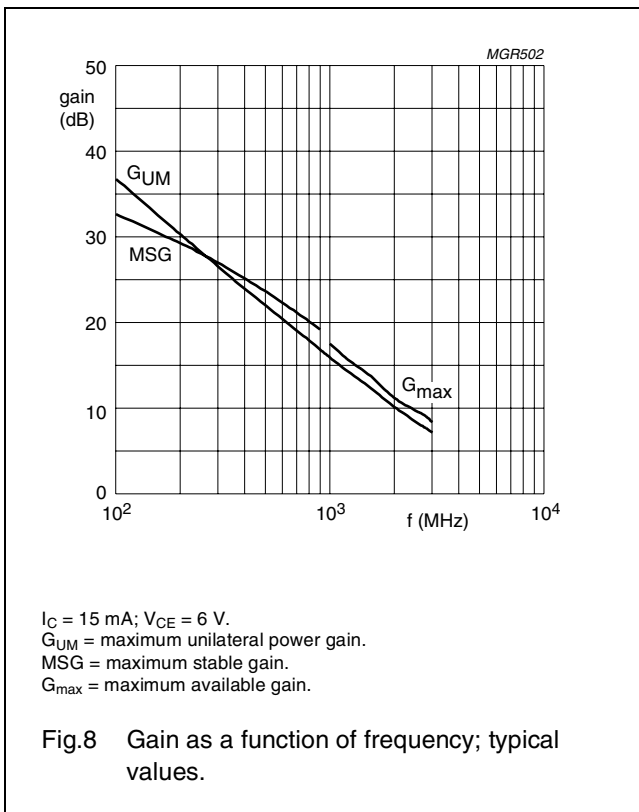
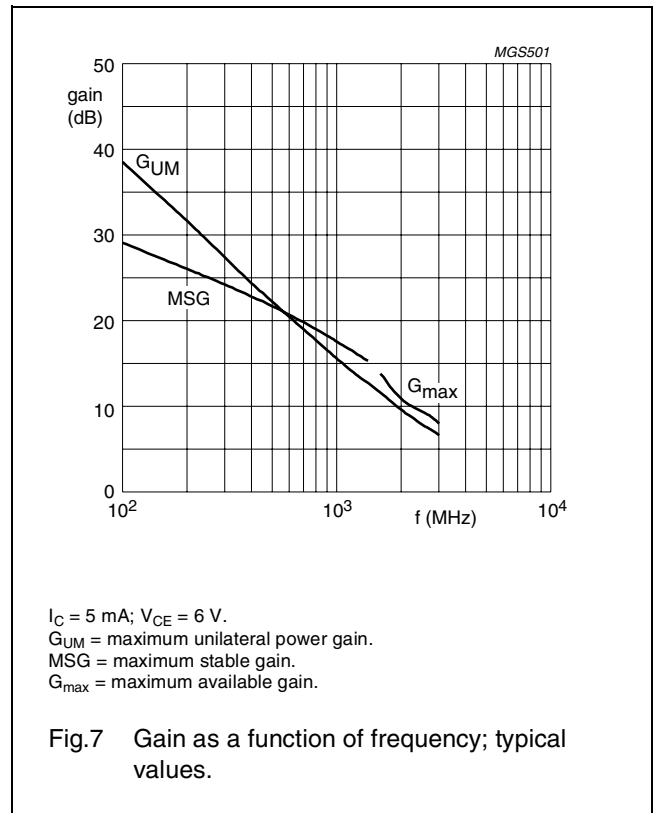
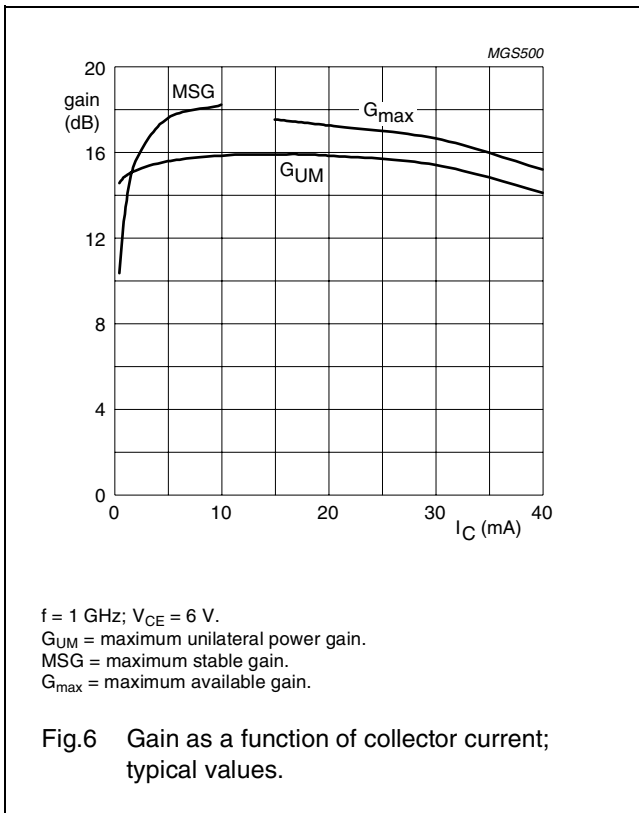
UHF wideband transistor

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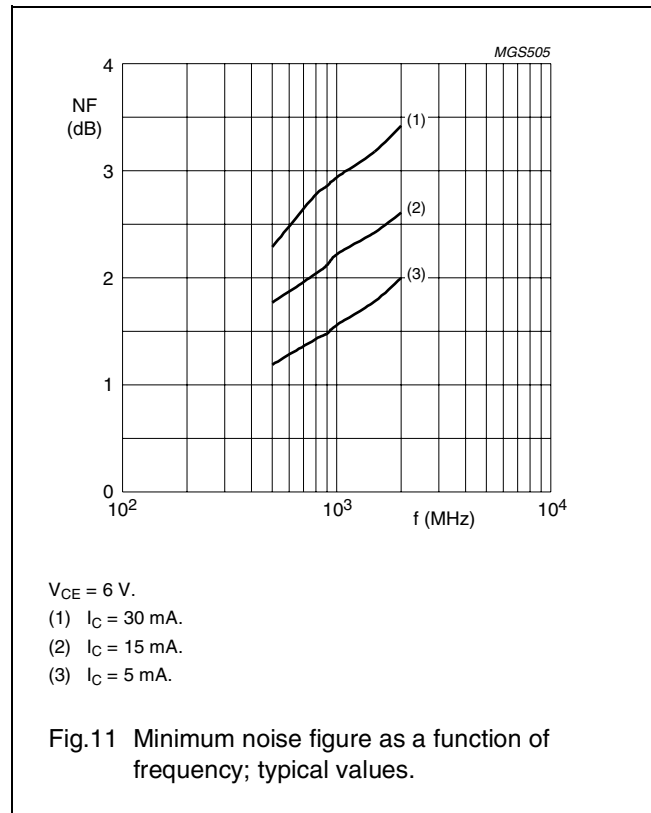
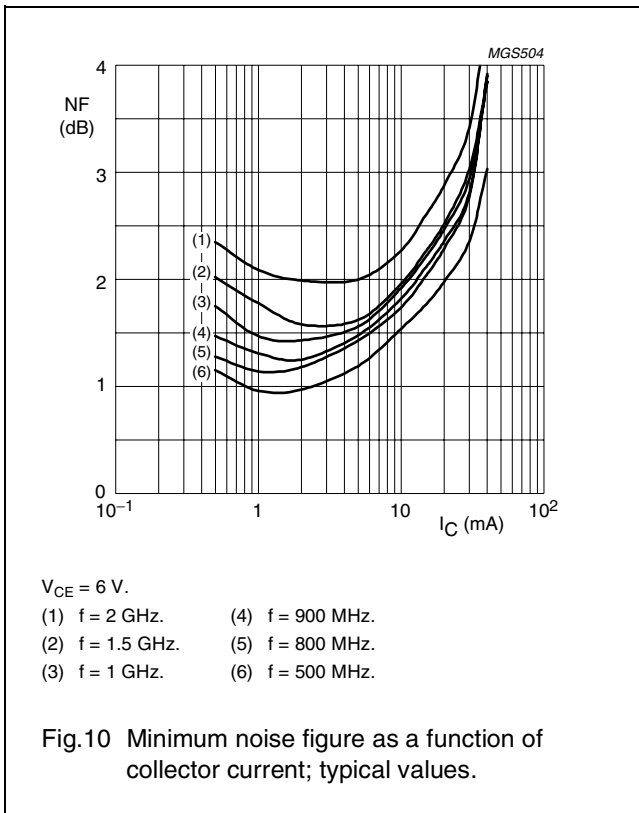
UHF wideband transistor

PBR941B



UHF wideband transistor

PBR941B



UHF wideband transistor

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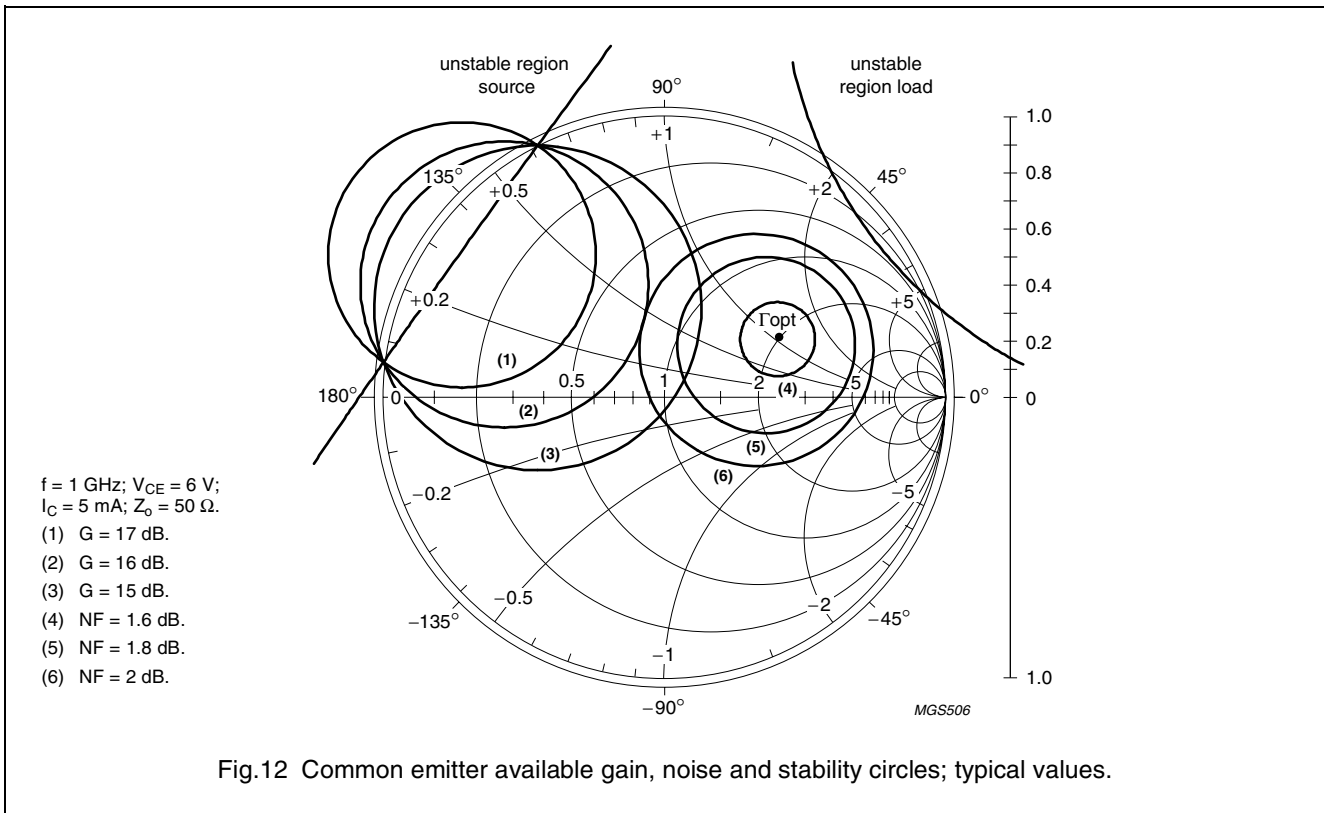


Fig.12 Common emitter available gain, noise and stability circles; typical values.

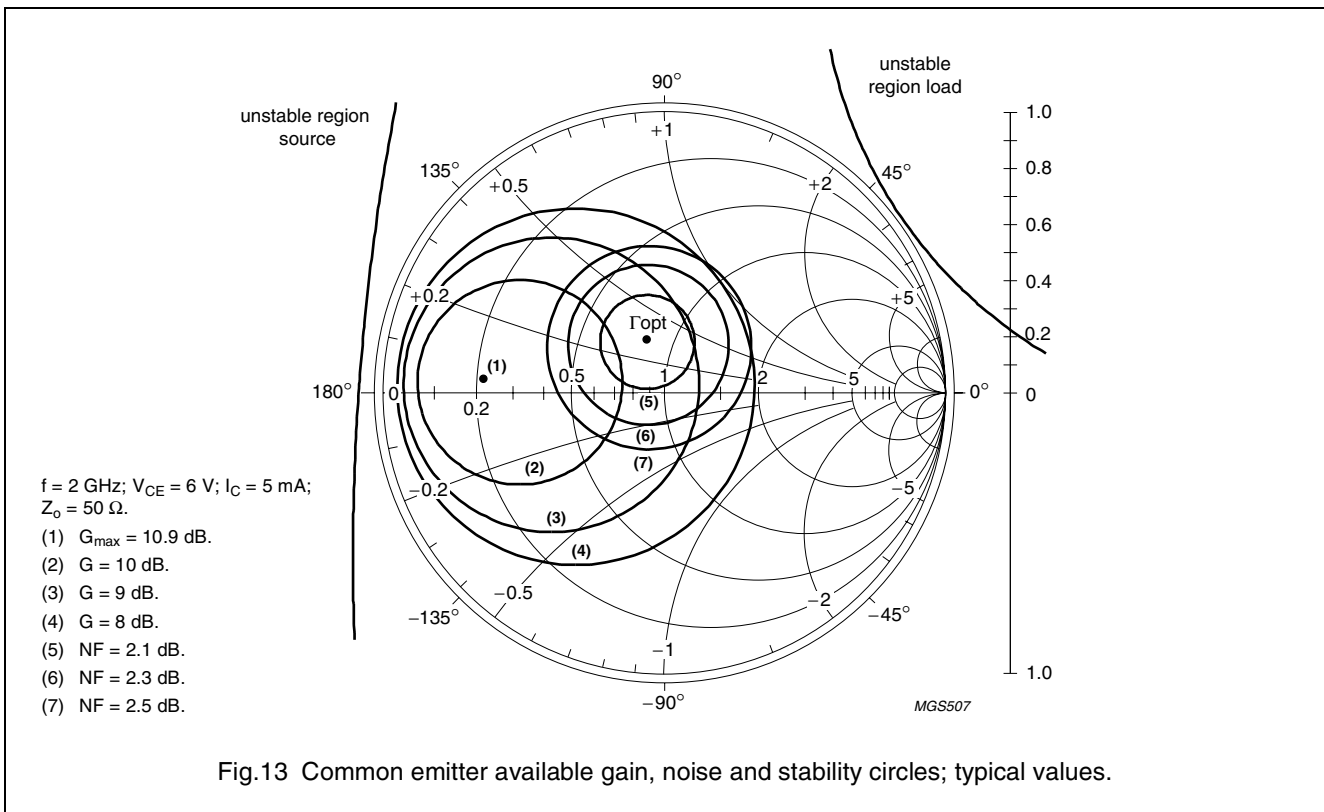
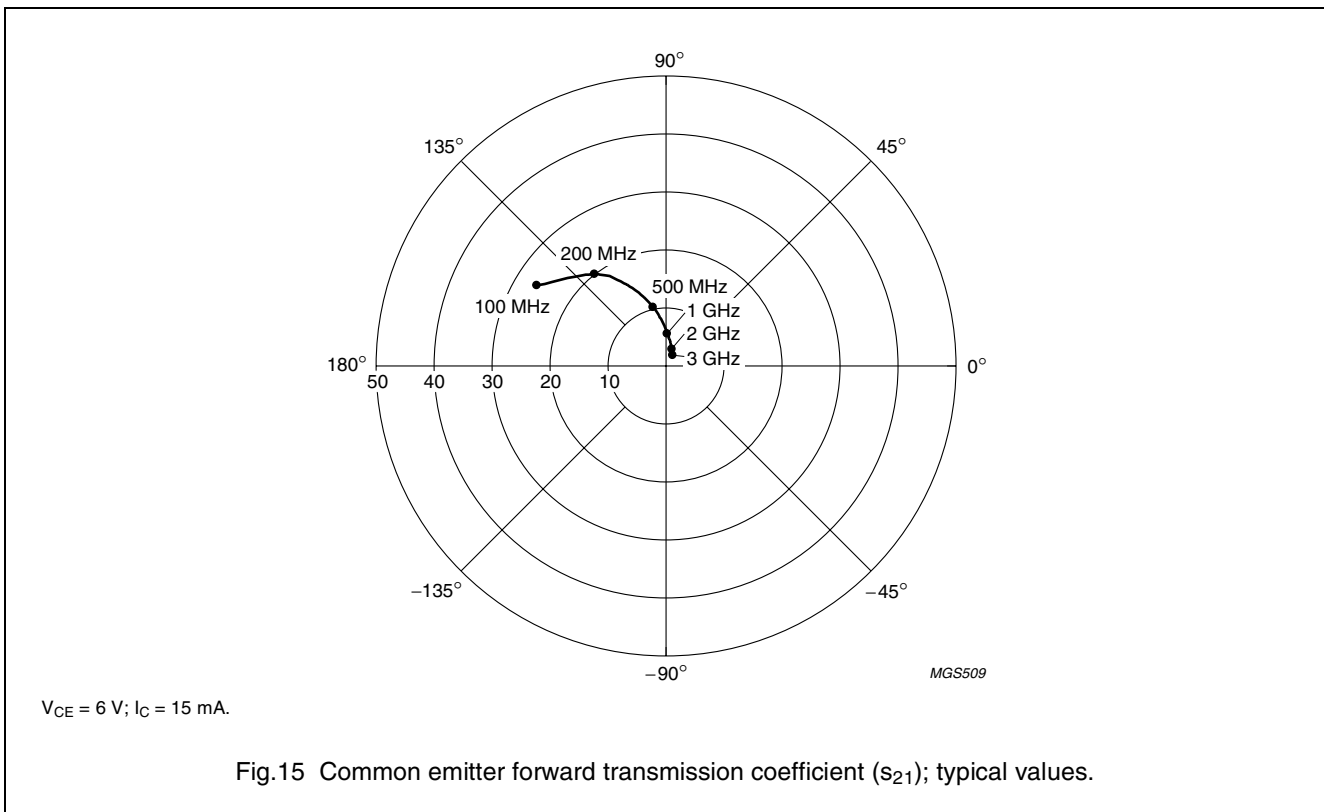
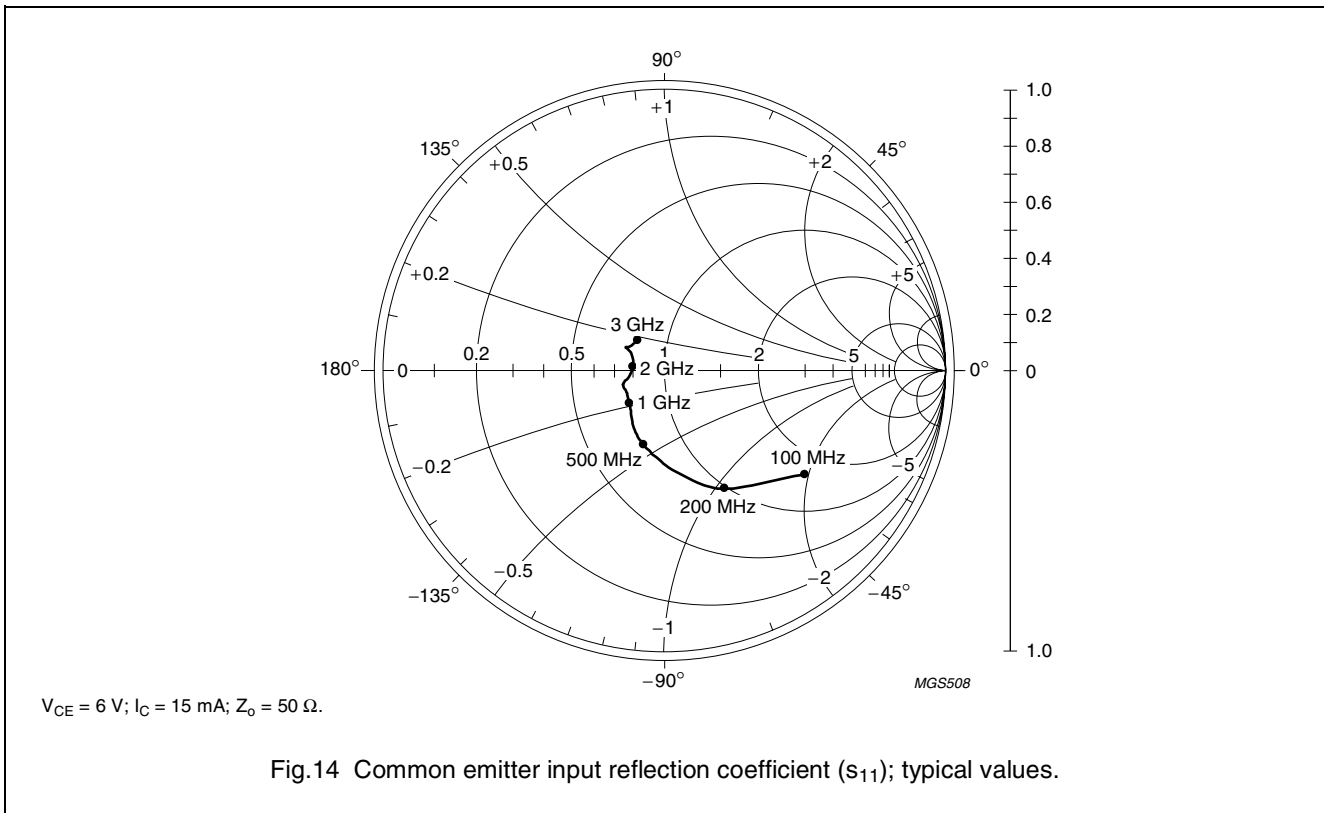


Fig.13 Common emitter available gain, noise and stability circles; typical values.

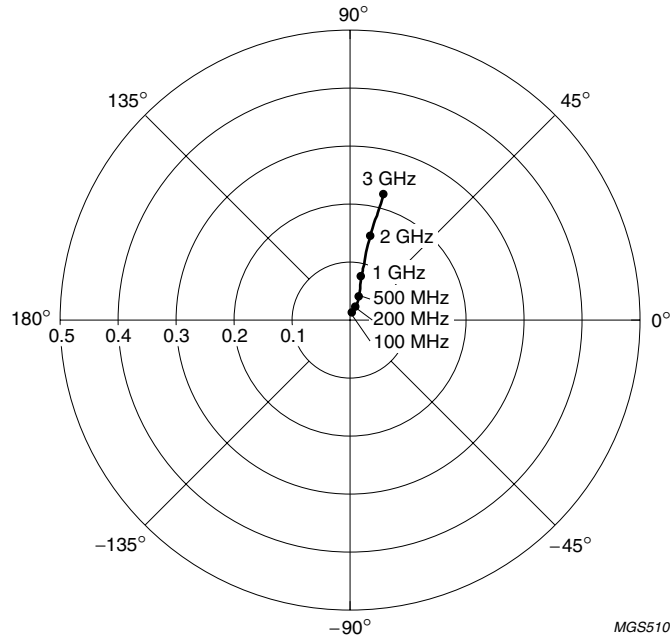
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UHF wideband transistor

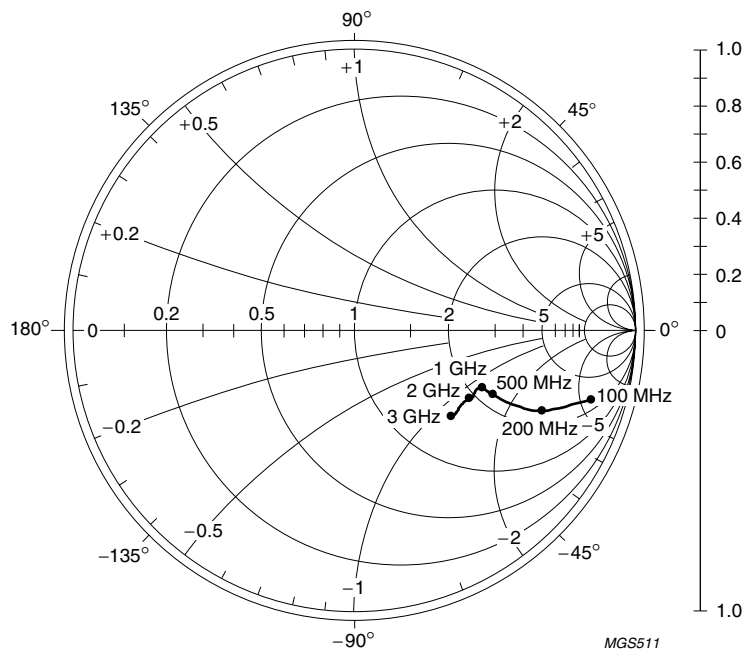
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$V_{CE} = 6\text{ V}; I_C = 15\text{ mA}$.

MGS510

Fig.16 Common emitter reverse transmission coefficient (s_{12}); typical values.



$V_{CE} = 6\text{ V}; I_C = 15\text{ mA}; Z_0 = 50\ \Omega$.

MGS511

Fig.17 Common emitter output reflection coefficient (s_{22}); typical values.

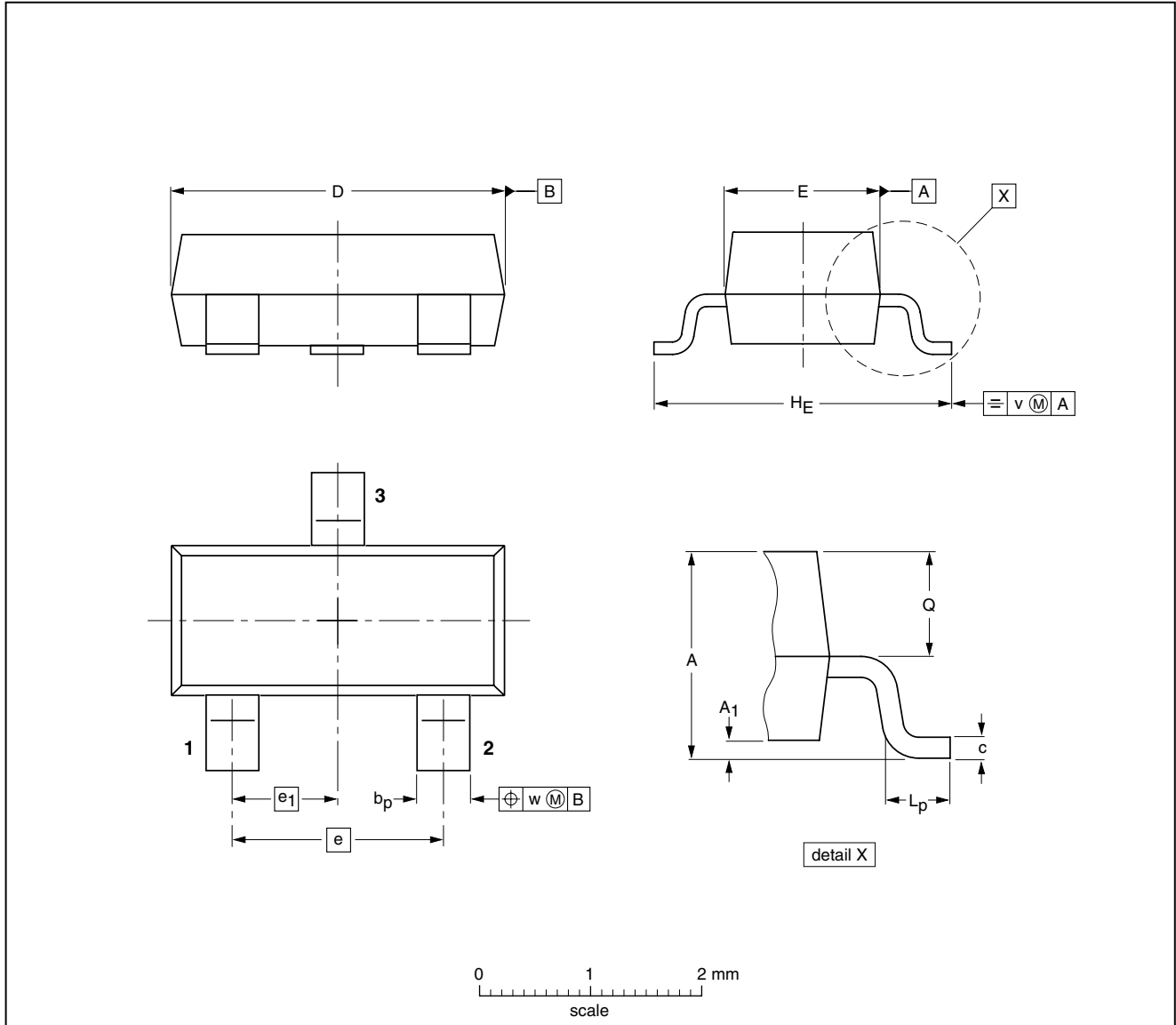
UHF wideband transistor

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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max.	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23		TO-236AB				97-02-28 99-09-13

UHF wideband transistor

PBR941B

DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS ⁽¹⁾
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

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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,
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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: Philips Hungary Ltd., H-1119 Budapest, Fehervari ut 84/A,
Tel: +36 1 382 1700, Fax: +36 1 382 1800

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),
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Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku,
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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,
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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,
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Pakistan: see Singapore

Philippines: Philips Semiconductors Philippines Inc.,
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Poland: Al.Jerozolimskie 195 B, 02-222 WARSAW,
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Portugal: see Spain

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Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
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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,
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Taiwan: Philips Semiconductors, 5F, No. 96, Chien Kuo N. Rd., Sec. 1,
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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,
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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,
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