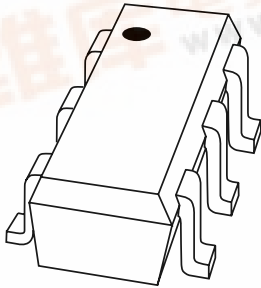


DISCRETE SEMICONDUCTORS

DATA SHEET



BGA2022 **MMIC mixer**

Objective specification
Supersedes data of 1999 Feb 25

1999 Jul 23

MMIC mixer

BGA2022

FEATURES

- Large frequency range:
 - Cellular band (900 MHz)
 - PCS band (1900 MHz)
 - WLAN band (2.4 GHz).
- High isolation
- High linearity
- High conversion gain.

APPLICATIONS

Receiver side of wireless systems that require high conversion gain and high linearity at low supply current, such as CDMA. Trade-off between gain and intermodulation is determined by one external inductor.

DESCRIPTION

Silicon double poly MMIC mixer in a 6-lead plastic SOT363 package.

PINNING

| PIN | DESCRIPTION |
|-----|----------------|
| 1 | LO - GND |
| 2 | LO - signal |
| 3 | V _S |
| 4 | IF - out |
| 5 | RF - feedback |
| 6 | RF - signal |

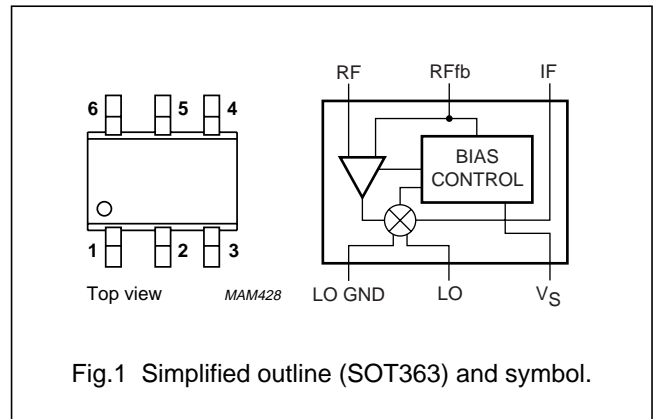


Fig.1 Simplified outline (SOT363) and symbol.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------------|-----------------------------------|---------------------------|------|------|------|------|
| V _S | supply voltage | | 2.7 | 2.8 | 2.85 | V |
| I _S | supply current | | – | 6 | – | mA |
| G _{conv} | conversion gain | f _{RF} = 900 MHz | – | 6 | – | dB |
| NF | noise figure | f _{RF} = 900 MHz | – | 9 | – | dB |
| IP ₃ | input third order intercept point | f _{RF} = 900 MHz | – | 6 | – | dBm |
| | LO – RF isolation | f _{RF} = 900 MHz | – | 30 | – | dB |

MMIC mixer

BGA2022

LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|-------------------------|---------------------------|------|------|------|
| V_S | supply voltage | | – | 4 | V |
| I_S | supply current | | – | 20 | mA |
| P_{LO} | oscillator power | note 1 | – | tbf | dBm |
| P_{RF} | RF power | note 1 | – | tbf | dBm |
| P_{tot} | total power dissipation | $T_s \leq$ tbf °C; note 2 | – | 60 | mW |
| T_{stg} | storage temperature | | –65 | +150 | °C |
| T_j | junction temperature | | – | 150 | °C |

Notes

- LO and RF signals always AC coupled; no external DC voltage supplied to pin 1, 2 and 6.
- T_s is the temperature at the soldering point of the ground tab.

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|--|--|-------|------|
| $R_{th\ j-s}$ | thermal resistance from junction to solder point | $T_s \leq$ tbf °C; $P_{tot} = 17$ mW; note 1 | tbf | K/W |

Note

- T_s is the temperature at the soldering point of the ground tab.

MMIC mixer

BGA2022

CHARACTERISTICS

$f_{RF} = 900 \text{ MHz}$; $f_{LO} = 983 \text{ MHz}$; $f_{IF} = 83 \text{ MHz}$; $V_S = 2.8 \text{ V}$; $P_{LO} = 0 \text{ dBm}$; $T_j = 25 \text{ }^\circ\text{C}$; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|--------------------|---|---|------|------|------|------------|
| f_{LO} | local oscillator frequency | | 0.5 | – | 2.5 | GHz |
| f_{RF} | signal frequency | external matching | 0.5 | – | 2.5 | GHz |
| f_{IF} | intermediate frequency | | 10 | – | 400 | MHz |
| V_S | supply voltage | | 2.7 | 2.8 | 2.85 | V |
| I_S | supply current | | – | 6 | – | mA |
| $G_{conv(p)}$ | power conversion gain | 900 MHz | – | 6 | – | dB |
| | | 1900 MHz | – | 6 | – | dB |
| | | 2.4 GHz | – | 6 | – | dB |
| NF | noise figure | DSB; 900 MHz | – | 9 | – | dB |
| | | DSB; 1900 MHz | – | 9 | – | dB |
| | | DSB; 2.4 GHz | – | 9 | – | dB |
| IP ₃ | intercept point third order intermodulation | 900 MHz; $\Delta f_{RF} = 100 \text{ kHz}$ | – | 6 | – | dBm |
| | | 1900 MHz; $\Delta f_{RF} = 100 \text{ kHz}$ | – | 6 | – | dBm |
| | | 2.4 GHz; $\Delta f_{RF} = 100 \text{ kHz}$ | – | 6 | – | dBm |
| | RF – LO isolation | | – | –26 | – | dB |
| | LO – RF isolation | | – | –30 | – | dB |
| | LO – IF isolation | | – | –20 | – | dB |
| | RF – IF isolation | | – | –29 | – | dB |
| VSWR _{LO} | voltage standing wave ratio on LO input | | – | 1.5 | 2 | |
| Z _{IF} | IF output impedance | open collector | – | tbf | – | k Ω |

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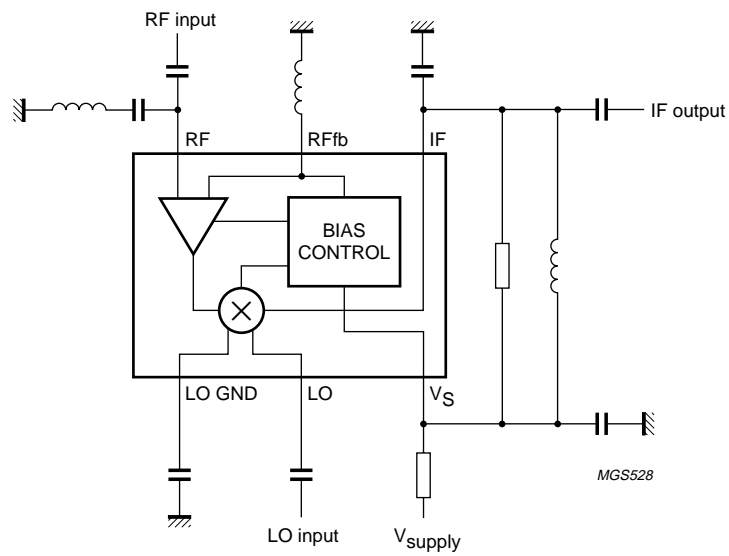


Fig.2 Application diagram (values tbf).

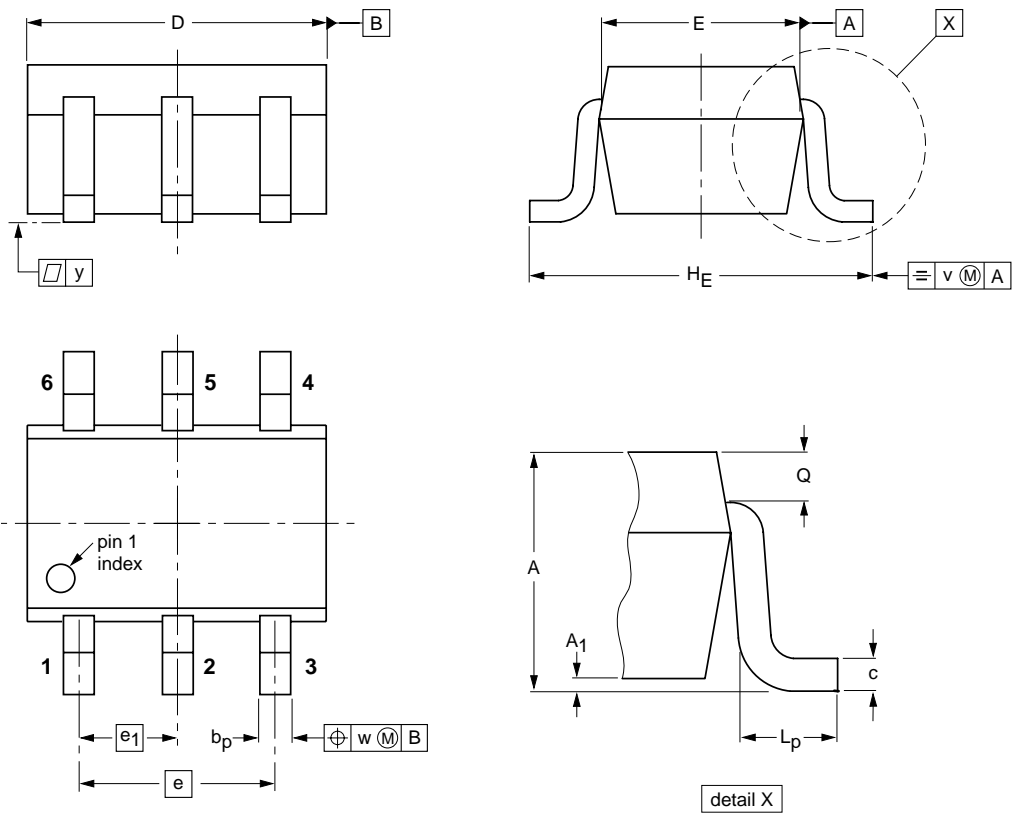
MMIC mixer

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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT363



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ max | bp | c | D | E | e | e ₁ | H _E | L _p | Q | v | w | y |
|------|------------|-----------------------|--------------|--------------|------------|--------------|-----|----------------|----------------|----------------|--------------|-----|-----|-----|
| mm | 1.1 0.8 | 0.1 | 0.30 0.20 | 0.25 0.10 | 2.2 1.8 | 1.35 1.15 | 1.3 | 0.65 | 2.2 2.0 | 0.45 0.15 | 0.25 0.15 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT363 | | | SC-88 | | | 97-02-28 |

MMIC mixer

BGA2022

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. | |

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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: Ul. Lukiska 10, PL 04-123 WARSZAWA,
Tel. +48 22 612 2831, Fax. +48 22 612 2327

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

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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

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Tel. +381 11 62 5344, Fax. +381 11 63 5777

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International Marketing & Sales Communications, Building BE-p, P.O. Box 218,
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