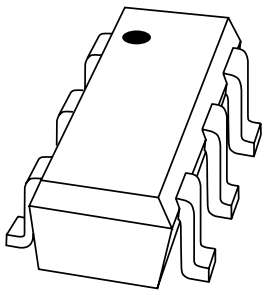
DATA SHEET



BGA2022
MMIC mixer

Product specification
Supersedes data of 2000 Jun 06

2000 Dec 04

Philips
Semiconductors

PHILIPS

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

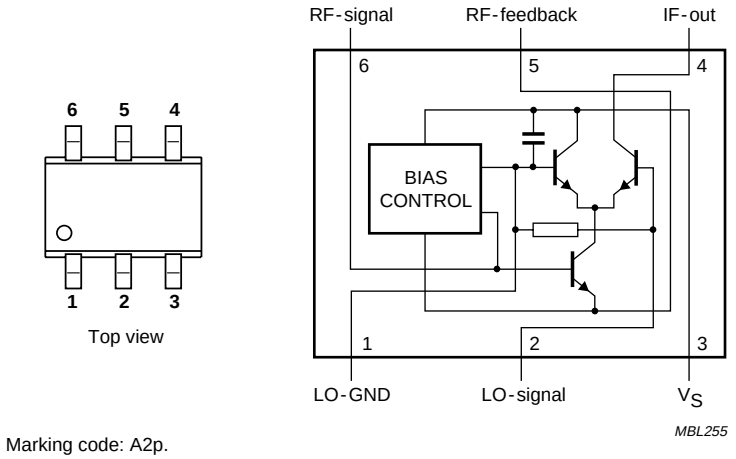
Receiver side of wireless systems that require high conversion gain and high linearity at low supply current, such as CDMA.

DESCRIPTION

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

PINNING

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



Marking code: A2p.

Fig.1 Simplified outline (SOT363) and symbol.

QUICK REFERENCE DATA

V_S = 2.8 V; I_S = 6 mA; P_{LO} = 0 dBm; f_{RF} = 1800 MHz; f_{LO} = 2080 MHz; f_{IF} = 280 MHz.

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
G_{conv}	conversion gain	4	6	8	dB
NF	noise figure (DSB)	–	12	–	dB
IP_3	output third order intercept point	–	7	–	dBm

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.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	supply voltage		–	4	V
I_S	supply current		–	10	mA
P_{LO}	oscillator power	note 1	–	10	dBm
P_{RF}	RF power	note 1	–	10	dBm
P_{tot}	total power dissipation	$T_s \leq 100$ °C; note 2	–	40	mW
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature		–	150	°C

Notes

1. LO and RF signals always AC coupled; 50 Ω source; no external DC voltage supplied to pins 1, 2 and 6.
2. T_s is the temperature at the soldering point of the ground tab.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to solder point	375	K/W

CHARACTERISTICS

V_S = 2.8 V; I_S = 6 mA; T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_S	supply current	V_S = 2.8 V	4	6	8	mA
$G_{conv(p)}$	power conversion gain	P_{RF} = −25 dBm; P_{LO} = 0 dBm				
	880 MHz		–	5	–	dB
	1800 MHz		4	6	8	dB
	1950 MHz		–	5	–	dB
	2450 MHz		–	6	–	dB
NF	noise figure	DSB				
	880 MHz		–	9	–	dB
	1800 MHz		–	12	–	dB
	1950 MHz		–	9	–	dB
	2450 MHz		–	9	–	dB
IP_3	intercept point third order input	output referred				
	880 MHz		–	4	–	dBm
	1800 MHz		–	7	–	dBm
	1950 MHz		–	7	–	dBm
	2450 MHz		–	10	–	dBm
$VSWR_{LO}$	return losses at LO port	P_{LO} = 0 dBm; f = 0 to 3 GHz	–	–	2:1	

APPLICATION INFORMATION

See application note number AN00059.

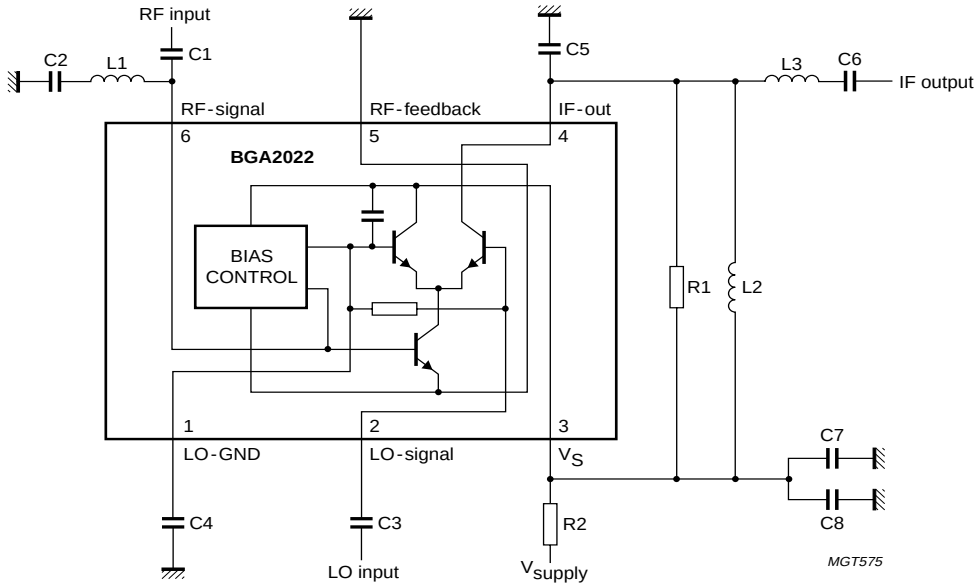
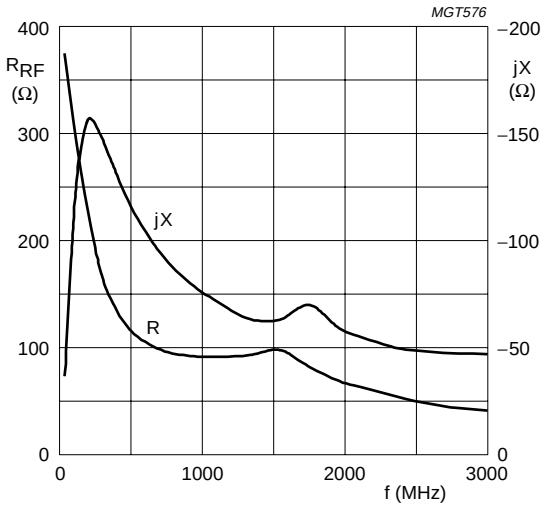


Fig.2 Application diagram.

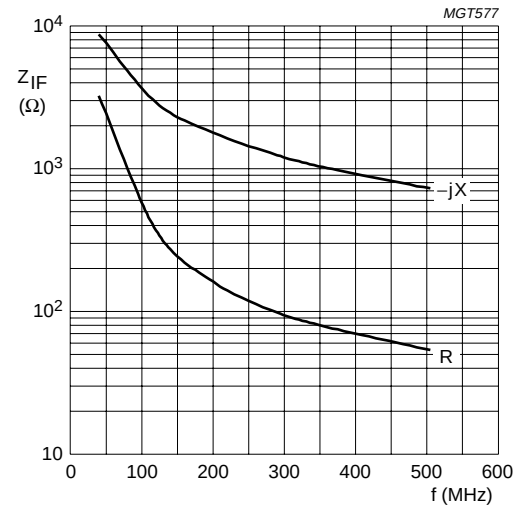
List of components (see Fig.2)

COMPONENT	APPLICATION BOARD			
	880 MHz (IF = 80 MHz)	**1800 MHz (IF = 280 MHz)**	**1950 MHz (IF = 80 MHz)**	**2450 MHz (IF = 280 MHz)**
R1	1.2 kΩ	2.7 kΩ	2.2 kΩ	3.3 kΩ
R2	22 Ω	22 Ω	22 Ω	18 Ω
C1	12 pF	1.2 pF	1.5 pF	1.0 pF
C2	390 pF	5.6 pF	1.5 nF	82 pF
C3, C4	39 pF	6.8 pF	6.8 pF	2.7 pF
C5	27 pF	2 pF	15 pF	2.2 pF
C6	100 pF	100 pF	10 pF	100 pF
C7	22 nF	22 nF	22 nF	22 nF
C8	56 pF	8.2 pF	10 pF	6.8 pF
L1	10 nH	2.7 nH	2.7 nH	1.8 nH
L2	220 nH	110 nH	150 nH	220 nH
L3	470 nH	120 nH	–	120 nH



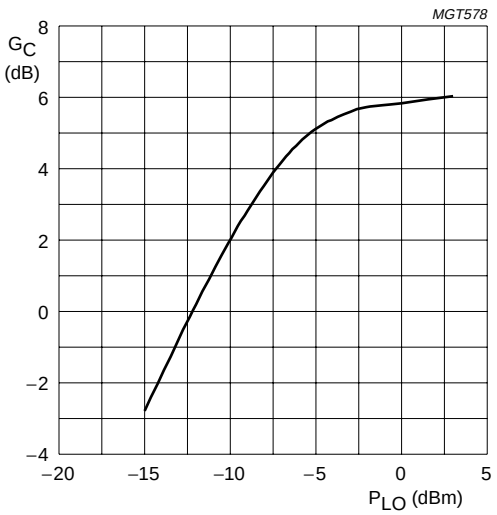
$Z_S = Z_L = 50\ \Omega$; $V_S = 2.8$ V; $P_{RF} = 25$ dBm; $T_{amb} = 25$ °C.

Fig.3 RF input impedance as a function of frequency; typical values.



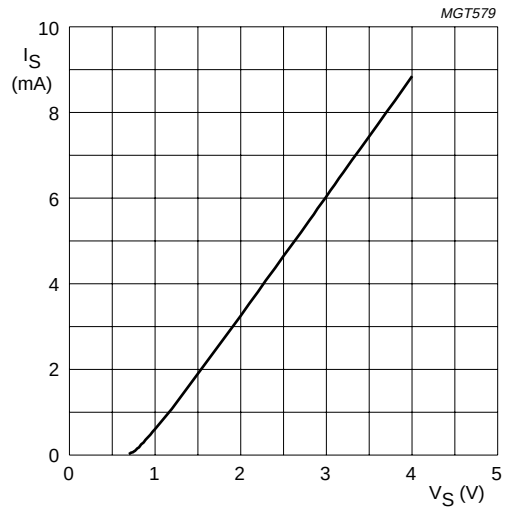
$Z_S = Z_L = 50\ \Omega$; AC coupled; no signal; $T_{amb} = 25$ °C.

Fig.4 IF output impedance as a function frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 2.8$ V; $P_{RF} = 0$ dBm; f = 1800 MHz; $T_{amb} = 25$ °C.

Fig.5 Conversion gain as a function of oscillator power; typical values.

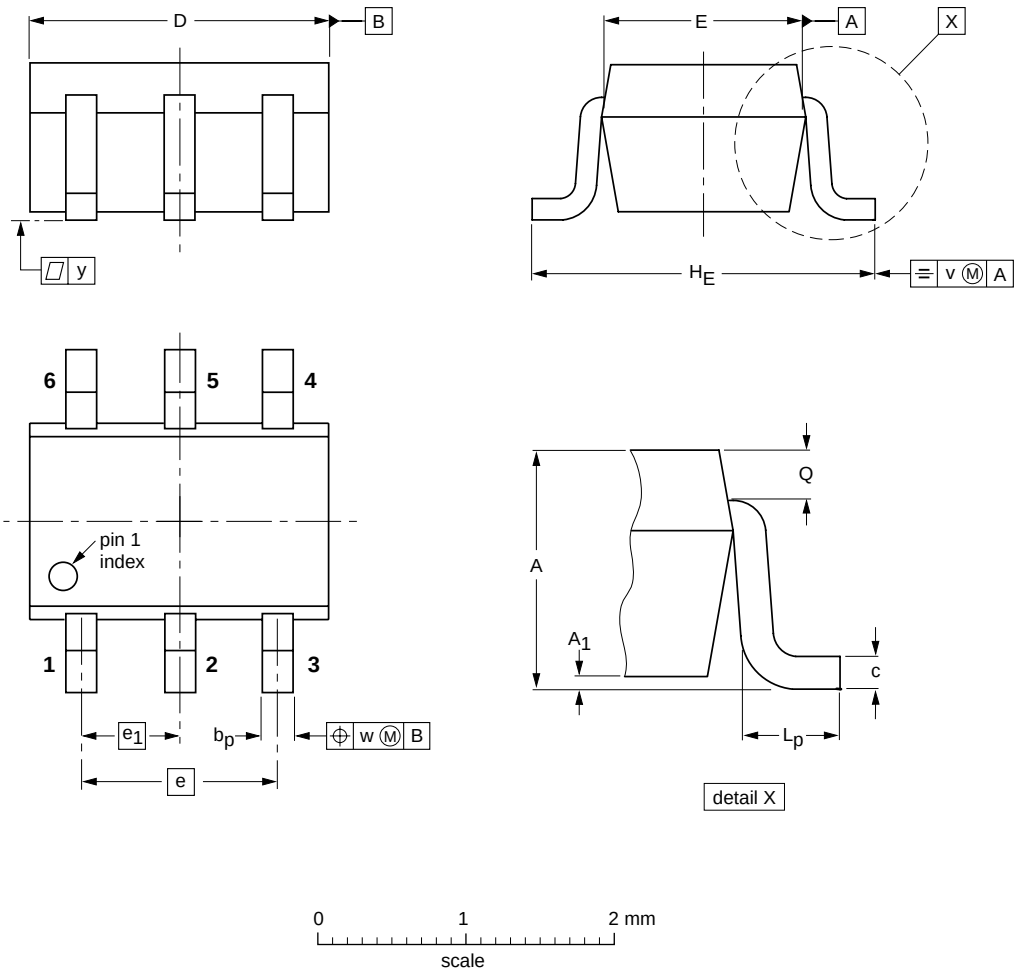


$Z_S = Z_L = 50\ \Omega$; AC coupled; no signal; $T_{amb} = 25$ °C.

Fig.6 Supply current as a function of the supply voltage; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads **SOT363**



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	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

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.

Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

DEFINITIONS

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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