PRODUCT INFORMATION

SEPTEMBER 30, 1997

Creation of the World's Smallest Surface Mount Package

Development of the Ultrasmall Broadband Si MMIC

SMA3000 Series

Overview

Devices that use the UHF and microwave bands are continuing to surge in popularity, and are now found in popular everyday use in products such as portable telephones, BS/CS receivers, and automobile navigation systems.

The demands for higher performance, further miniaturization, and lower prices of semiconductor devices used in the high-frequency receiver components are growing ever more intense, and thus there are strong market demands for the development of "Monolithic Microwave Integrated Circuits" (MMICs).

While SANYO Electric Co., Ltd., has a history of development in high performance microwave-band silicon bipolar transistors, we have developed and will commercialize new ultracompact broadband Si MMIC amplifiers (the SMA3001, the SMA3002, and SMA3003) using a silicon bipolar process for a cutoff frequency of 16 GHz.

The Si MMIC amplifiers developed in this project feature circuitry 50% smaller than conventional circuits as a result of developments in high-accuracy circuit simulation technologies; this circuitry made it possible to create the MCP6, one of the smallest surface mount packages in the world. Moreover, these amplifiers provide both superior power gain characteristics and a low noise figure over a wide range of frequency band from 10 MHz to 2 GHz, where the noise figure at 1 GHz is approximately 1 dB less than that of conventional broadband Si MMIC amplifiers.

During the development of this product we have succeeded in developing submicron microemitter-transistor cells, shallow-junction fabrication technology, parasitic-capacitance reduction processes, and a SANYO-proprietary low-noise silicon bipolar process, and improved reliability through the use of gold metallization.

With the contributions to system miniaturization by the world's smallest packaging technology, this product will be well suited for buffer amplifiers for products such as BS/CS converters/tuners, mobile communications systems, and GPS receivers.

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In the future, we are scheduled to further increase bandwidths and decrease power dissipation to develop ICs for satellite broadcasts and for wireless LANs.

Features

- Ultraminiaturization through the use of minimold packages (MCP6: 2.0 × 1.25 mm)
- Broadband operation

  SMA3001: 10 MHz to 2.0 GHz (Gp ≥ 18 dB, V_{CC} = 3 V)
  SMA3002: 10 MHz to 1.2 GHz (Gp ≥ 19 dB, V_{CC} = 5 V)
  SMA3003: 10 MHz to 2.0 GHz (Gp ≥ 18 dB, V_{CC} = 5 V)

- Low noise figures

  SMA3001: NF = 2.9 dB (f = 1.0 GHz, V_{CC} = 3 V)
  SMA3002: NF = 3.7 dB (f = 1.0 GHz, V_{CC} = 5 V)
  SMA3003: NF = 3.2 dB (f = 1.0 GHz, V_{CC} = 5 V)

- High reliability Ti-Pt-Au metallization is used.

Applications

- These ICs are optimized for buffer amps for BS/CS converters and tuners, mobile communications systems, GPS equipment, etc.

Specifications

The SMA3001

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Standard Value	Unit
Circuit current	I_{CC}	V_{CC} = 3 V	13	mA
Power gain	G_P	V_{CC} = 3 V, I_{CC} = 13 mA, f = 1.0 GHz	23	dB
Noise figure	NF	V_{CC} = 3 V, I_{CC} = 13 mA, f = 1.0 GHz	2.9	dB
Saturation output power	$P_{O\ (sat)}$	V_{CC} = 3 V, I_{CC} = 13 mA, f = 0.8 GHz	1	dBm

The SMA3002

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Standard Value	Unit
Circuit current	I_{CC}	V_{CC} = 5 V	30	mA
Power gain	G_P	V_{CC} = 5 V, I_{CC} = 29 mA, f = 1.0 GHz	22	dB
Noise figure	NF	V_{CC} = 5 V, I_{CC} = 29 mA, f = 1.0 GHz	3.7	dB
Saturation output power	$P_{O\ (sat)}$	V_{CC} = 5 V, I_{CC} = 29 mA, f = 0.8 GHz	6	dBm

The SMA3003

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Standard Value	Unit
Circuit current	I_{CC}	V_{CC} = 5 V	22	mA
Power gain	G_P	V_{CC} = 5 V, I_{CC} = 22 mA, f = 1.0 GHz	22	dB
Noise figure	NF	V_{CC} = 5 V, I_{CC} = 22 mA, f = 1.0 GHz	3.2	dB
Saturation output power	$P_{O\ (sat)}$	V_{CC} = 5 V, I_{CC} = 22 mA, f = 0.8 GHz	1	dBm

Sample Availability

Samples of the SMA3000 Series will be available in November 1997; production quantities are anticipated in April 1998.