

---

---

# **PRODUCT INFORMATION**

*Vol.98*

## **Bluetooth Switch MMIC Developed**

**The industry's highest performance and smallest package in a 2.4 GHz ISM band device.**

### **SPM3204**

#### **Overview**

Bluetooth is now seen as a standard for wireless communication with rapid growth potential in the world market. Applications for spread-spectrum communication using the 2.4 GHz ISM band (industrial, scientific, and medical frequency band) that includes Bluetooth\*<sup>1</sup> have now grown to include a wide variety areas. These include the 2.4 GHz cordless telephones introduced to the US market last year, the wireless LANs that now achieve 11 Mbps under the IEEE 802.11b standard and thus provide a significantly larger capacity than the earlier 2 Mbps LANs, wireless audio, and home RF\*<sup>2</sup>.

Sanyo has now developed the SPM3204 MMIC (Monolithic Microwave IC) that, as a communication switch for the 2.4 GHz ISM band that includes Bluetooth, achieves the industry's smallest size, highest performance, and lowest number of external components.

The SPM3204 achieves the industry's highest performance in four areas of importance to 2.4 GHz ISM band communication. (1) The SPM3204 achieves the industry's lowest insertion loss of 0.65 dB in a 2.4 GHz ISM band device. Insertion loss is the loss that occurs when the high-frequency power passes through the device. (2) It achieves linearity characteristics of 30 dBm for a  $P_{IN}$  of 1 dB. This characteristic expresses the distortion level in the output for a high-frequency input signal. (3) It achieves a VSWR\*<sup>3</sup> of 1.1. This expresses the reflections internal to the switch of the high-frequency input signal. (4) It also assures an isolation of 18 dB in the 2.4 GHz ISM band. This characteristics expresses the amount of leakage in the off side of the switch. Achieving these results required developing a variety of new technologies, and Sanyo has applied for patents in these areas.

Sanyo has a solid track record as a supplier of high-performance GaAs switching ICs in the industry's smallest packages with the smallest number of external components to the mobile equipment market such as cellular telephones, mainly for the 1 to 2 GHz band. While this new device inherits those features directly, it was designed especially for applications with frequencies over 2 GHz, and features drastic design optimizations in all of the circuit, device, process, and layout aspects. These optimizations have allowed Sanyo to establish optimal GaAs switch IC technologies for the 2.4 GHz ISM band, which is expected to show rapid growth in the near future.

\*1. Bluetooth: A communication specification that improves the mobile and business work environments by providing mutual wireless interconnection between cellular telephones, notebook personal computers, PDAs, digital cameras, and other peripheral equipment.

# PRODUCT INFORMATION

---

- \*2. Home RF: A communication specification that provides mutual wireless interconnection in the home between personal computers, cordless telephones, AV equipment, and other digital devices.
- \*3. VSWR: Voltage standing wave ratio. The ratio between the maximum and minimum levels of voltage standing waves that occur between incident wave and reflected waves that occur at discontinuities in the high-frequency transmission path. A VSWR of 1 is ideal and corresponds to zero reflection in the system.

## Features

- Achieves the industry's lowest class insertion loss of 0.65 dB in the 2.4 GHz ISM band.
- Achieves linearity characteristics of 30 dBm for a  $P_{IN}$  of 1 dB.
- Achieves a VSWR of 1.1.
- Guarantees an isolation of 18 dB in the 2.4 GHz ISM band.
- Control voltage: Uses a 0/+3 V single-voltage power supply.
- Achieves the industry's smallest number of external components: 3 components.
- Highly resistant to damage from ESD.
- Provided in the  $2.0 \times 2.1 \times 0.9 \text{ mm}^3$  MCP6 package, which is the industry's smallest package used for an RF IC switch.

## Specifications

f (GHz)	Insertion loss (dB)	Isolation (dB)	$P_{IN}$ 1 dB (dBm)	VSWR	Structure	Package
2.4 to 2.5	0.65	18	30	1.1	SPDT	MCP6

# PRODUCT INFORMATION

---

## Sample Availability

The SPM3204 will be available in sample quantities in June 2000 and in production quantities in October 2000.

MAY 17, 2000

- Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.
- SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.
- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.