

BGS15AN16

SP5T Antenna Switch

Data Sheet

Revision 2.1, 2013-01-21

Edition 2013-01-21

**Published by
Infineon Technologies AG
81726 Munich, Germany**

**© 2013 Infineon Technologies AG
All Rights Reserved.**

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

BGS15AN16 SP5T Antenna Switch

Revision History: 2013-01-21, Revision 2.1

Previous Revision: 2011-05-08, Revision 2.0

| Page | Subjects (major changes since last revision) |
|-------------|-----------------------------------------------------|
| 8,9,10 | Updated drawings |
| | |
| | |
| | |
| | |
| | |
| | |

Trademarks of Infineon Technologies AG

BlueMoon™, COMNEON™, C166™, CROSSAVE™, CanPAK™, CIPOS™, CoolMOS™, CoolSET™, CORECONTROL™, DAVE™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPACK™, EconoPIM™, EiceDRIVER™, EUPEC™, FCOS™, HITFET™, HybridPACK™, ISOFACE™, I²RF™, IsoPACK™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OmniTune™, OptiMOS™, ORIGA™, PROFET™, PRO-SIL™, PRIMARION™, PrimePACK™, RASIC™, ReverSave™, SatRIC™, SensoNor™, SIEGET™, SINDRION™, SMARTi™, SmartLEWIS™, TEMPFET™, thinQ!™, TriCore™, TRENCHSTOP™, X-GOLD™, XMM™, X-PMU™, XPOSYS™.

Other Trademarks

Advance Design System™ (ADS) of Agilent Technologies, AMBA™, ARM™, MULTI-ICE™, PRIMECELL™, REALVIEW™, THUMB™ of ARM Limited, UK. AUTOSAR™ is licensed by AUTOSAR development partnership. Bluetooth™ of Bluetooth SIG Inc. CAT-iq™ of DECT Forum. COLOSSUS™, FirstGPS™ of Trimble Navigation Ltd. EMV™ of EMVCo, LLC (Visa Holdings Inc.). EPCOS™ of Epcos AG. FLEXGO™ of Microsoft Corporation. FlexRay™ is licensed by FlexRay Consortium. HYPERTERMINAL™ of Hilgraeve Incorporated. IEC™ of Commission Electrotechnique Internationale. IrDA™ of Infrared Data Association Corporation. ISO™ of INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. MATLAB™ of MathWorks, Inc. MAXIM™ of Maxim Integrated Products, Inc. MICROTEC™, NUCLEUS™ of Mentor Graphics Corporation. Mifare™ of NXP. MIPI™ of MIPI Alliance, Inc. MIPS™ of MIPS Technologies, Inc., USA. muRata™ of MURATA MANUFACTURING CO., MICROWAVE OFFICE™ (MWO) of Applied Wave Research Inc., OmniVision™ of OmniVision Technologies, Inc. Openwave™ Openwave Systems Inc. RED HAT™ Red Hat, Inc. RFMD™ RF Micro Devices, Inc. SIRIUS™ of Sirius Sattelite Radio Inc. SOLARIS™ of Sun Microsystems, Inc. SPANSION™ of Spansion LLC Ltd. Symbian™ of Symbian Software Limited. TAIYO YUDEN™ of Taiyo Yuden Co. TEAKLITE™ of CEVA, Inc. TEKTRONIX™ of Tektronix Inc. TOKO™ of TOKO KABUSHIKI KAISHA TA. UNIX™ of X/Open Company Limited. VERILOG™, PALLADIUM™ of Cadence Design Systems, Inc. VLYNQ™ of Texas Instruments Incorporated. VXWORKS™, WIND RIVER™ of WIND RIVER SYSTEMS, INC. ZETEX™ of Diodes Zetex Limited.

Last Trademarks Update 2010-03-22

Table of Contents

| | | |
|----------|-----------------------------------------|---|
| | Table of Contents | 1 |
| | List of Figures | 1 |
| | List of Tables | 1 |
| 1 | Features | 1 |
| 2 | Signals Description | 3 |
| 3 | Electrical Characteristics | 5 |
| 3.1 | Electrical Specification | 6 |
| 4 | Package Outline | 8 |

List of Figures

| | | |
|----------|----------------------------------------|---|
| Figure 1 | Functional Diagram. | 2 |
| Figure 2 | Pin Configuration (top view) | 3 |
| Figure 3 | Package Outline | 8 |
| Figure 4 | Pin Marking. | 8 |
| Figure 5 | Land Pattern and Stencil Mask. | 9 |
| Figure 6 | Tape Drawing for PG-TSNP-16-6. | 9 |

List of Tables

| | | |
|---------|------------------------------------------|---|
| Table 1 | Pin Description (top view)..... | 3 |
| Table 2 | Truth Table..... | 4 |
| Table 3 | Absolute Maximum Ratings..... | 5 |
| Table 4 | Operating Ranges..... | 5 |
| Table 5 | ESD Ratings..... | 5 |
| Table 6 | Electrical Characteristics..... | 6 |
| Table 7 | Electrical Characteristics (cont'd)..... | 7 |

1 Features

Main Features

- 5 high-linearity Rx ports with power handling capability of up to 30 dBm
- All ports fully symmetrical
- No external decoupling components required
- High ESD robustness
- Low harmonic generation
- Low insertion loss
- High port-to-port-isolation
- 0.1 to 3.0 GHz coverage
- Direct connection to battery
- Power down mode
- On-chip control logic supporting logic levels from 1.5 V to Vdd
- Lead and halogen free package (RoHS and WEEE compliant)
- Small leadless package TSNP16 with the size of 2.3 x 2.3 mm² and a maximum height of 0.73 mm.



Applications

- WCDMA diversity
- CDMA diversity
- Analog and Digital Tuner
- Band Switching
- LTE

Description

The BGS15AN16 RF MOS switch is specifically designed for WCDMA diversity applications. Any of the 5 ports can be used as termination of the diversity antenna handling up to 30 dBm.

This SP5T offers low insertion loss and high robustness against interferer signals at the antenna port and low harmonic generation in termination mode.

An integrated LDO allows to connect V_{dd} directly to battery, hence no regulated supply voltage is required. A power down mode is implemented to avoid current drain when the device is not in use.

The on-chip controller integrates CMOS logic and level shifters, driven by control inputs from 1.5 V to Vdd. Unlike GaAs technology, external DC blocking capacitors at the RF Ports are only required if DC voltage is applied externally.

The BGS15AN16 RF Switch is manufactured in Infineon's patented MOS technology, offering the performance of GaAs with the economy and integration of conventional CMOS including the inherent higher ESD robustness.

The device has a very small size of only 2.3 x 2.3 mm² and a maximum height of 0.73 mm

| Product Name | Product Type | Package |
|----------------|--------------|--------------|
| SP5T RF Switch | BGS15AN16 | PG-TSNP-16-6 |

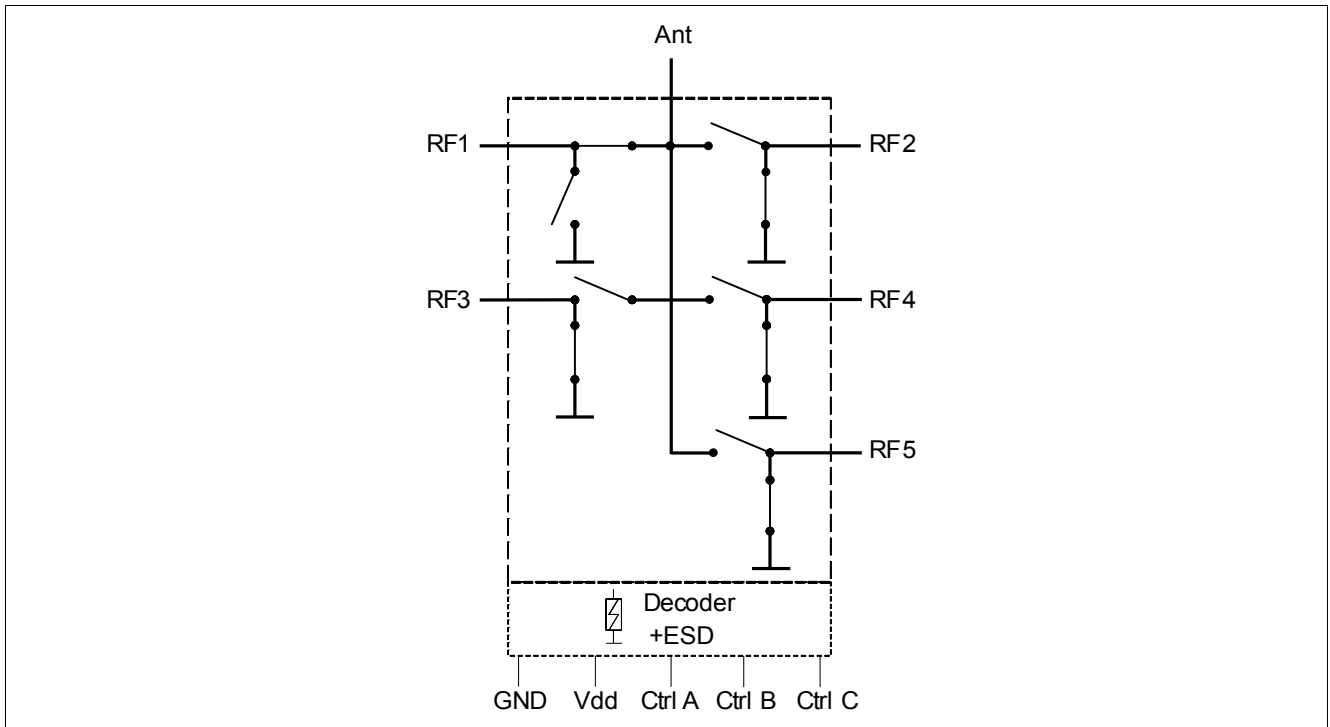


Figure 1 Functional Diagram

2 Signals Description

Table 1 Pin Description (top view)

| Pin No. | Name | Pin Type | Buffer Type | Function |
|---------|------|----------|-------------|---------------|
| 1 | RX5 | RX5 | | Rx RF port 5 |
| 2 | RX4 | I/O | | Rx RF port 4 |
| 3 | GND | GND | | Ground |
| 4 | RX3 | I/O | | Rx RF port 3 |
| 5 | GND | GND | | Ground |
| 6 | RX2 | I/O | | Rx RF port 2 |
| 7 | GND | GND | | Ground |
| 8 | RX1 | I/O | | Rx RF port 1 |
| 9 | GND | GND | | Ground |
| 10 | ANT | I/O | | Antenna port |
| 11 | DGND | GND | | Ground |
| 12 | VDD | PWR | | Vdd supply |
| 13 | V3 | I | | Control pin 3 |
| 14 | V2 | I | | Control pin 2 |
| 15 | V1 | I | | Control pin 1 |
| 16 | GND | GND | | Ground |

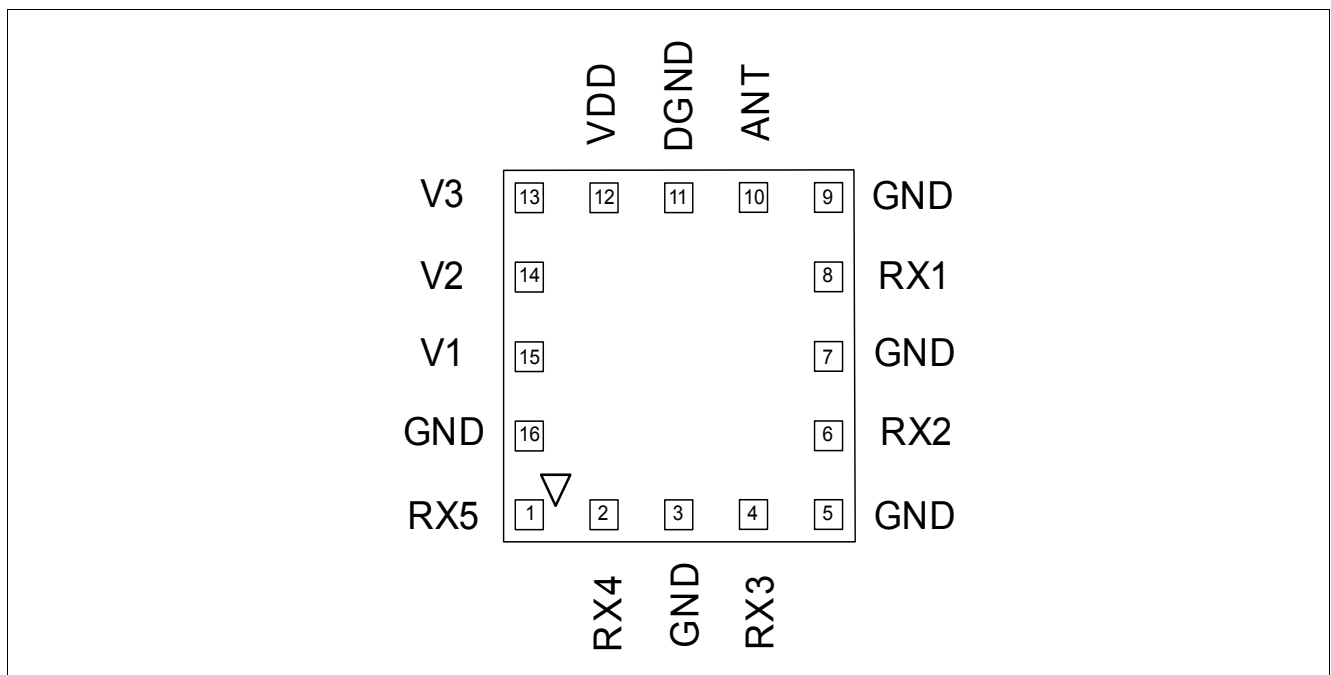


Figure 2 Pin Configuration (top view)

Table 2 Truth Table

| Function | V1 | V2 | V3 |
|-----------------|-----------|-----------|-----------|
| Ant → RF1 | 1 | 0 | 0 |
| Ant → RF2 | 0 | 1 | 0 |
| Ant → RF3 | 0 | 0 | 1 |
| Ant → RF4 | 1 | 0 | 1 |
| Ant → RF5 | 1 | 1 | 1 |
| Power down mode | 0 | 0 | 0 |
| All off | 1 | 1 | 0 |
| All off | 0 | 1 | 1 |

3 Electrical Characteristics

Table 3 Absolute Maximum Ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------------------------------|--------------------|--------|------|------|------|-------------------------------|
| | | Min. | Typ. | Max. | | |
| Storage Temperature Range | T_{stg} | -55 | – | 150 | °C | – |
| DC Voltage at V_{dd} pin to GND | V_{DC} | – | – | 5.5 | V | – |
| DC Voltage at all other pins to GND | V_{DC} | – | – | 3.6 | V | – |
| Max RF power at antenna port, any RF port on | $P_{Ant\ IN\ max}$ | – | – | 32 | dBm | 50 Ω |
| Max. Input (Reverse) Power at antenna pin | P_{in} | – | – | 30 | dBm | 50% duty cycle 50 Ω |

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

Table 4 Operating Ranges

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------|-------------|--------|------|----------|------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Ambient Temperature | T_A | -30 | – | 85 | °C | – |
| RF Frequency | f | 0.1 | – | 3 | GHz | – |
| Control Voltage low | V_{CtrlL} | -0.3 | – | 0.3 | V | – |
| Control Voltage high | V_{CtrlH} | 1.5 | – | V_{dd} | V | $V_{dd} < 3.3V$ |
| Supply Voltage | V_{dd} | 2.85 | – | 4.7 | V | – |

Table 5 ESD Ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--------------------------------------------|-----------|--------|------|------|------|-----------------------------|
| | | Min. | Typ. | Max. | | |
| ESD HBM, all ports | V_{max} | 1 | – | – | kV | all GND ports connected |
| ESD CDM, all ports | V_{max} | 2 | – | – | kV | – |
| ESD MM, all ports | V_{max} | 100 | – | – | V | – |
| ESD robustness IEC-61000-4-2, antenna port | V_{max} | 8 | – | – | kV | with external 27nH inductor |

3.1 Electrical Specification

Test Conditions:

- Termination port impedance: $Z_0 = 50 \Omega$
- Temperature range: $T_A = -30 \text{ }^\circ\text{C} \dots +85 \text{ }^\circ\text{C}$
- Supply Voltage: $V_{dd} = 2.85 \text{ V} \dots 4.7 \text{ V}$
- $P_{in} = 0 \text{ dBm}$
- Across operating range of control voltages: $V_{ctrl} = 1.5 \dots 3.5 \text{ V}$
- Measured using external circuitry according application note AN259.

Table 6 Electrical Characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|------------------------------------------------------------------------|--------|--------|--------------------|------|------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Insertion Loss | | | | | | |
| 824<f<960 MHz | | – | 0.34 ¹⁾ | 0.49 | dB | – |
| 1710<f<1980 MHz | | – | 0.55 ¹⁾ | 0.75 | dB | RX1, RX5 |
| 1710<f<1980 MHz | | – | 0.5 ¹⁾ | 0.7 | dB | RX 2-4 |
| 1980<f<2170 MHz | | – | 0.59 ¹⁾ | 0.79 | dB | RX1, RX5 |
| 1980<f<2170 MHz | | – | 0.55 ¹⁾ | 0.75 | dB | RX2-4 |
| 2170<f<2690 MHz | | – | 0.69 ¹⁾ | 0.89 | dB | RX1, RX5 |
| 2170<f<2690 MHz | | – | 0.65 ¹⁾ | 0.85 | dB | RX2-4 |
| Inband ripple Rx ports (high bands) | | – | 0.05 | 0.1 | dB | – |
| Inband ripple Rx ports (low bands) | | – | 0.03 | 0.1 | dB | – |
| Return Loss¹⁾ | | | | | | |
| All ports @ 824 - 915 MHz | | 25 | 30 | – | dB | – |
| All ports @ 1.71 - 2.69 GHz | | 14 | 20 | – | dB | – |
| Isolation Ant – RF1,2,3,4,5 | | | | | | |
| 824 - 915 MHz | | 35 | 40 | – | dB | – |
| 1.71 - 1.98 GHz | | 26 | 30 | – | dB | – |
| 1.98 - 2.17 GHz | | 24 | 30 | – | dB | – |
| 2.17 - 2.69 GHz | | 24 | 27 | – | dB | – |
| Isolation RF1,2,3 – RF1,2,3,4,5 | | | | | | |
| 824 - 915 MHz | | 32 | 35 | – | dB | – |
| 1.71 - 1.98 GHz | | 26 | 28 | – | dB | – |
| 1.98 - 2.17 GHz | | 25 | 28 | – | dB | – |
| 2.17 - 2.69 GHz | | 21 | 25 | – | dB | – |
| Isolation RF Ports – V_{dd}, V_{ctrl} | | | | | | |
| 0.9 GHz | | 40 | 30 | – | dB | – |
| 2 GHz | | 20 | 20 | – | dB | – |

1) $T_A = 25 \text{ }^\circ\text{C}$ and $V_{dd} = 3.5 \text{ V}$

Table 7 Electrical Characteristics (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-------------------------------------------------------------------------------|--------|--------|------|------|------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Input Intercept Point Requirements - IMD2¹⁾ | | | | | | |
| Tx=15 dBm@ ant port, Int=-15 dBm @ant port (TX Freq = 824 - 915 MHz) | | – | -110 | -104 | dBm | – |
| Tx=10 dBm@ ant port, Int=-15 dBm @ant port (TX Freq=1710 - 1980 MHz) | | – | -110 | -104 | dBm | – |
| Input Intercept Point Requirements – IMD3¹⁾ | | | | | | |
| Tx=15 dBm@ ant port, Int= -15 dBm @ant port(TX Freq = 824 - 915 MHz) | | – | -110 | -104 | dBm | – |
| Tx=10 dBm@ ant port, Int=-15 dBm @ant port (TX Freq=1710 - 1980 MHz) | | – | -110 | -104 | dBm | – |
| Harmonic Generation RF ports up to 12.75 GHz¹⁾ | | | | | | |
| Pin (UMTS) = 23 dBm, Duty Cycle = 100%, unused RF pins = any load, VSWR = 4:1 | | – | – | – | – | – |
| 824 to 960 MHz | | – | – | -46 | dBm | – |
| 1920 to 1980 MHz | | – | – | -46 | dBm | – |
| Harmonic Generation RF port up to 12.75 GHz¹⁾ | | | | | | |
| Pin = 30 dBm at low band, 22 dBm at high band, Duty Cycle = 25% | | – | – | – | – | – |
| 824 to 960 MHz, Third Harmonic | | – | -50 | -42 | dBm | – |
| 824 to 960 MHz, all other Harmonics up to 12.75 GHz | | – | -50 | -44 | dBm | – |
| 1920 to 1980 MHz | | – | -50 | -44 | dBm | – |
| Switching Time and Current Consumption | | | | | | |
| On/Off Switching Time (10-90%) RF | | 0.3 | 1 | 3 | µs | – |
| Boost Converter Settling Time | | – | 10 | 25 | µs | after power down mode |
| Current Consumption at Vdd Pin | | 50 | 75 | 100 | µA | – |
| Current Consumption at Vctrl Pins | | 0.1 | 1 | 30 | µA | – |
| Current Consumption at power down mode | | – | – | 1 | µA | – |

1) $T_A = 25\text{ }^\circ\text{C}$ and $V_{dd} = 3.5\text{ V}$

4 Package Outline

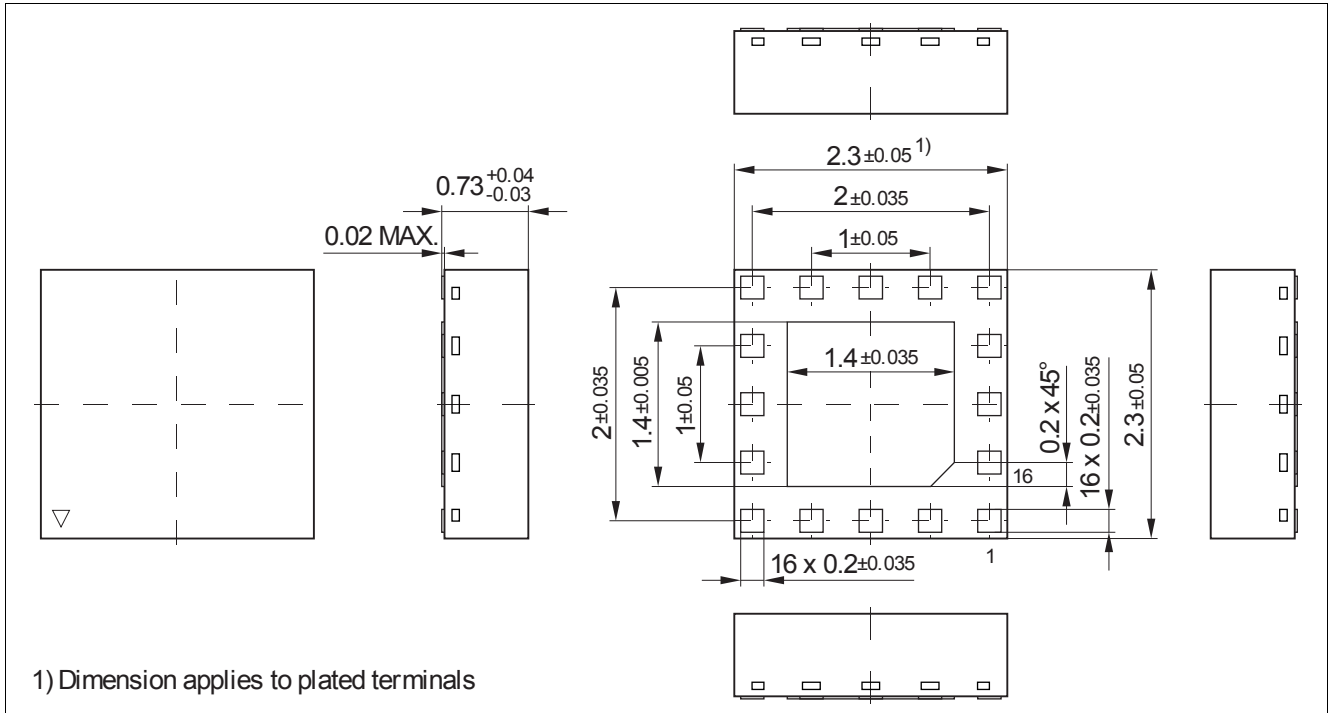


Figure 3 Package Outline

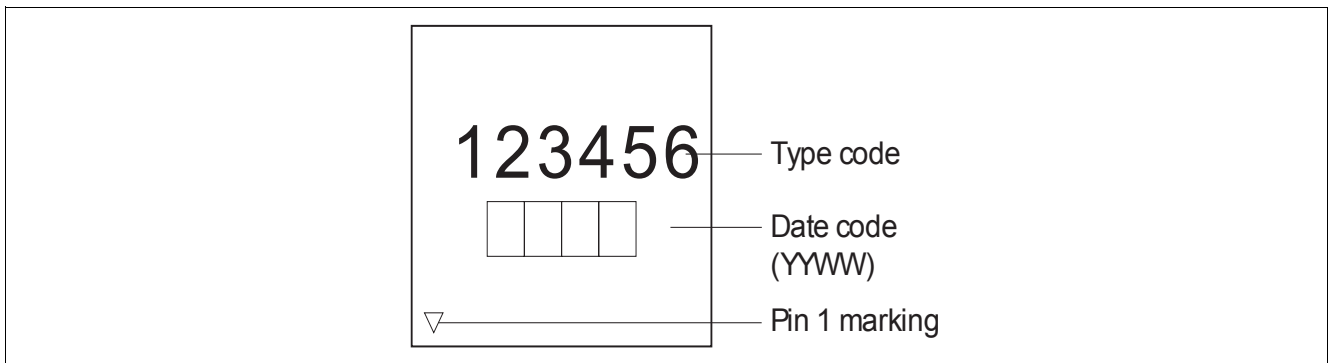


Figure 4 Pin Marking

www.infineon.com

Published by Infineon Technologies AG

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А