

DATA SHEET

NEC

GaAs INTEGRATED CIRCUIT μ PG2405T6Q

1 W SP3T SWITCH

DESCRIPTION

The μ PG2405T6Q is an SP3T GaAs FET switch which was developed for Bluetooth™, wireless LAN and NFC. This device can operate frequency from 500 MHz to 2.5 GHz, having the low insertion loss and high linearity. This device is housed in a 10-pin plastic TSSON (Thin Shrink Small Out-line Non-leaded) package. And this package is able to high-density surface mounting.

FEATURES

- Low insertion loss : $L_{ins} = 0.45$ dB TYP. @ $f = 1.0$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
: $L_{ins} = 0.55$ dB TYP. @ $f = 2.0$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
: $L_{ins} = 0.60$ dB TYP. @ $f = 2.5$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
- High isolation : $ISL = 28$ dB TYP. @ $f = 1.0$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
: $ISL = 22$ dB TYP. @ $f = 2.0$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
: $ISL = 20$ dB TYP. @ $f = 2.5$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
- Handling power : $P_{in(0.1\text{ dB})} = +31.0$ dBm TYP. @ $f = 2.5$ GHz, $V_{cont(H)} = 2.8$ V, $V_{cont(L)} = 0$ V
- High-density surface mounting : 10-pin plastic TSSON package (2.0 × 1.35 × 0.37 mm)

APPLICATIONS

- Bluetooth and IEEE802.11b/g etc.
- NFC (FeliCa™ etc.)

ORDERING INFORMATION

| Part Number | Order Number | Package | Marking | Supplying Form |
|--------------------|----------------------|--------------------------------|---------|--|
| μ PG2405T6Q-E2 | μ PG2405T6Q-E2-A | 10-pin plastic TSSON (Pb-Free) | G5M | <ul style="list-style-type: none">• Embossed tape 8 mm wide• Pin 5, 6 face the perforation side of the tape• Qty 3 kpcs/reel |

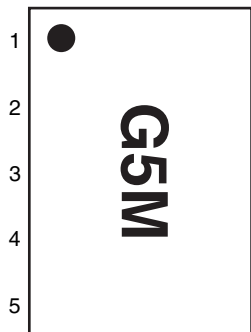
Remark To order evaluation samples, please contact your nearby sales office.
Part number for sample order: μ PG2405T6Q

Caution Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

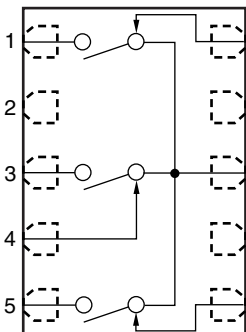
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PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

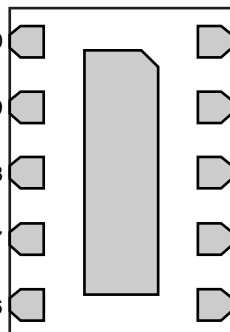
(Top View)



(Top View)



(Bottom View)



| Pin No. | Pin Name |
|---------|--------------------|
| 1 | RF1 |
| 2 | GND |
| 3 | RF2 |
| 4 | V _{cont2} |
| 5 | RF3 |
| 6 | V _{cont3} |
| 7 | GND |
| 8 | ANT |
| 9 | GND |
| 10 | V _{cont1} |

Remark Exposed pad : GND

TRUTH TABLE

| V _{cont1} | V _{cont2} | V _{cont3} | ANT-RF1 | ANT-RF2 | ANT-RF3 |
|--------------------|--------------------|--------------------|---------|---------|---------|
| High | Low | Low | ON | OFF | OFF |
| Low | High | Low | OFF | ON | OFF |
| Low | Low | High | OFF | OFF | ON |

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|-------------------|----------------------|------|
| Switch Control Voltage | V _{cont} | +6.0 ^{Note} | V |
| Input Power | P _{in} | +34 | dBm |
| Operating Ambient Temperature | T _A | -45 to +85 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

Note |V_{cont (H)} - V_{cont (L)}| ≤ 6.0 V

RECOMMENDED OPERATING RANGE (TA = +25°C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|--------------------------------|---------------------------------|------|------|------|------|
| Switch Control Voltage (H) | V _{cont (H)} | 2.7 | 2.8 | 3.0 | V |
| Switch Control Voltage (L) | V _{cont (L)} | -0.2 | 0 | 0.2 | V |
| Control Voltage Difference (H) | ΔV _{cont (H)} Note1 | -0.1 | 0 | 0.1 | V |
| Control Voltage Difference (L) | ΔV _{cont (L)} Note2 | -0.1 | 0 | 0.1 | V |

- Notes 1.** ΔV_{cont (H)} is a difference between the maximum and the minimum control voltages among V_{cont1 (H)}, V_{cont2 (H)} and V_{cont3 (H)}.
- 2.** ΔV_{cont (L)} is a difference between the maximum and the minimum control voltages among V_{cont1 (L)}, V_{cont2 (L)} and V_{cont3 (L)}.

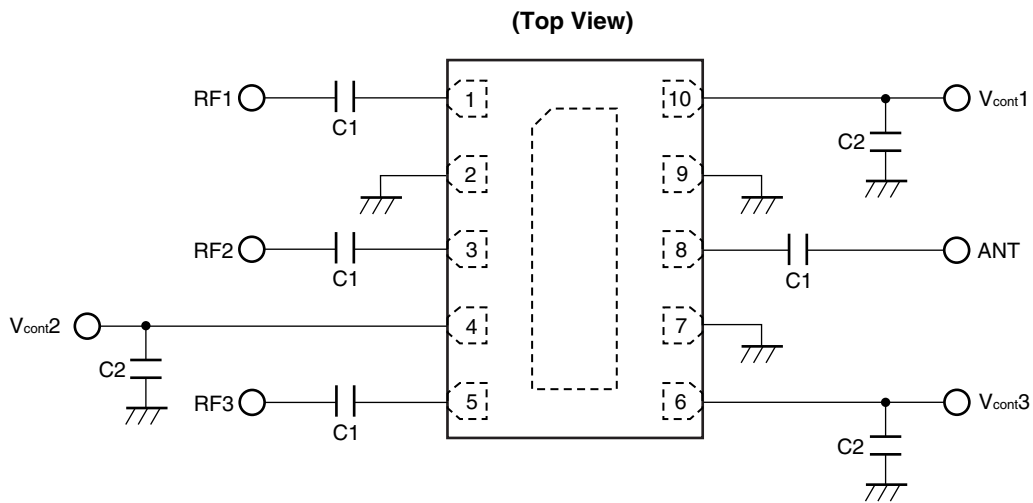
ELECTRICAL CHARACTERISTICS

(TA = +25°C, V_{cont (H)} = 2.8 V, V_{cont (L)} = 0 V, Zo = 50 Ω, DC blocking capacitors = 56 pF, unless otherwise specified)

| Parameter | Symbol | Pass | Test Conditions | MIN. | TYP. | MAX. | Unit |
|--|--------------------------|---------------------------|--|-------|-------|------|------|
| Insertion Loss | L _{ins} | ANT to RF1, 2, 3 | f = 0.5 to 1.0 GHz | - | 0.45 | 0.65 | dB |
| | | | f = 1.0 to 2.0 GHz | - | 0.55 | 0.80 | dB |
| | | | f = 2.0 to 2.5 GHz | - | 0.60 | 0.85 | dB |
| Isolation | ISL | ANT to RF1, 2, 3 (OFF) | f = 0.5 to 1.0 GHz | 24 | 28 | - | dB |
| | | | f = 1.0 to 2.0 GHz | 18 | 22 | - | dB |
| | | | f = 2.0 to 2.5 GHz | 16 | 20 | - | dB |
| Input Return Loss | RL _{in} | ANT to RF1, 2, 3 | f = 0.5 to 2.5 GHz | 15 | 20 | - | dB |
| Output Return Loss | RL _{out} | ANT to RF1, 2, 3 | f = 0.5 to 2.5 GHz | 15 | 20 | - | dB |
| 0.1 dB Loss Compression Input Power ^{Note} | P _{in (0.1 dB)} | ANT to RF1, 2, 3 | f = 2.5 GHz | +29.0 | +31.0 | - | dBm |
| 2nd Harmonics | 2f ₀ | ANT to RF1, 2, 3 | f = 2.5 GHz, P _{in} = 23 dBm | 65 | 75 | - | dBc |
| 3rd Harmonics | 3f ₀ | ANT to RF1, 2, 3 | f = 2.5 GHz, P _{in} = 23 dBm | 65 | 75 | - | dBc |
| Switch Control Current | I _{cont} | | RF None | - | 0.2 | 50 | μA |
| Switch Control Speed | t _{sw} | | | - | 700 | - | ns |

Note P_{in (0.1 dB)} is measured the input power level when the insertion loss increases more 0.1 dB than that of linear range.

EVALUATION CIRCUIT

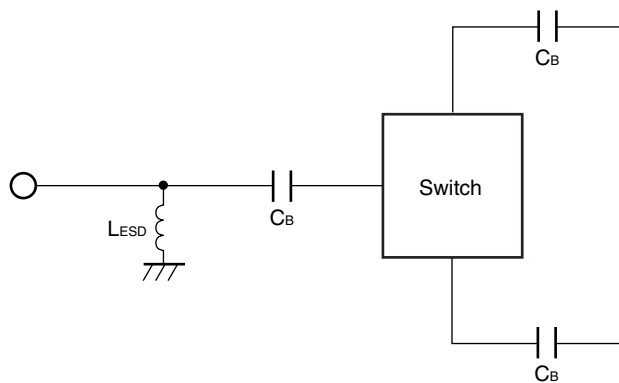


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

USING THE NEC EVALUATION BOARD

| Symbol | Values |
|--------|----------|
| C1 | 56 pF |
| C2 | 1 000 pF |

APPLICATION INFORMATION

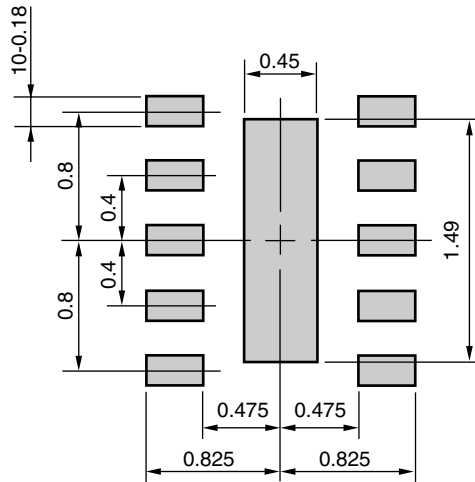


- C_B are DC blocking capacitors external to the device.
A value of 56 pF is sufficient for operation from 500 MHz to 2.5 GHz bands.
The value may be tailored to provide specific electrical responses.
- The RF ground connections should be kept as short as possible and connected to directly to a good RF ground for best performance.
- L_{ESD} provides a means to increase the ESD protection on a specific RF port, typically the port attached to the antenna.

MOUNTING PAD LAYOUT DIMENSIONS

10-PIN PLASTIC TSSOP (UNIT: mm)

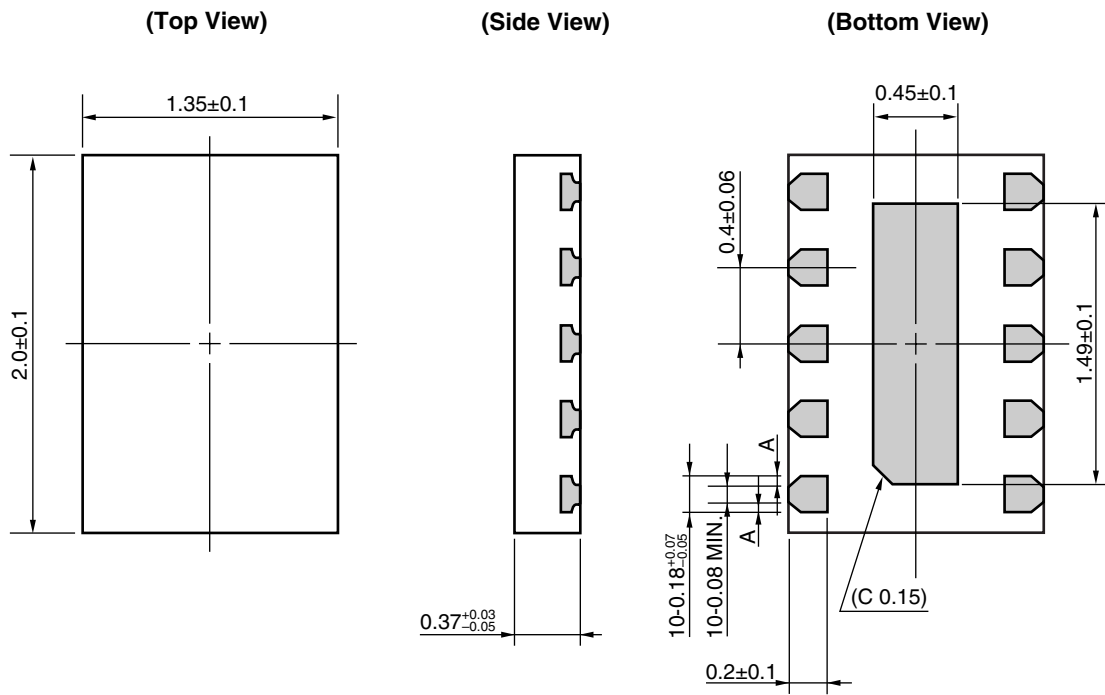
MOUNTING PAD



Remark The mounting pad layout in this document is for reference only.
 When designing PCB, please consider workability of mounting, solder joint reliability, prevention of solder bridge and so on, in order to optimize the design.

PACKAGE DIMENSIONS

10-PIN PLASTIC TSSOP (UNIT: mm)



Remark A>0
 () : Reference value

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|----------------------|
| Infrared Reflow | Peak temperature (package surface temperature) | : 260°C or below |
| | Time at peak temperature | : 10 seconds or less |
| | Time at temperature of 220°C or higher | : 60 seconds or less |
| | Preheating time at 120 to 180°C | : 120±30 seconds |
| | Maximum number of reflow processes | : 3 times |
| | Maximum chlorine content of rosin flux (% mass) | : 0.2%(Wt.) or below |
| Partial Heating | Peak temperature (terminal temperature) | : 350°C or below |
| | Soldering time (per side of device) | : 3 seconds or less |
| | Maximum chlorine content of rosin flux (% mass) | : 0.2%(Wt.) or below |

Caution Do not use different soldering methods together (except for partial heating).

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FeliCa is the contactless IC card technology developed by Sony Corporation.

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|-----------------------|----------------------|---|
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|-----------------------|----------------------|---|