

# DATA SHEET

# NEC

## GaAs INTEGRATED CIRCUIT $\mu$ PG2404T6Q

### L-BAND SP3T SWITCH

#### DESCRIPTION

The  $\mu$ PG2404T6Q is an L-band SP3T GaAs FET switch which was developed for CDMA/PCS/GPS triple mode digital cellular telephone application.

This device can operate frequency from 10 MHz to 2.0 GHz, having the low insertion loss and high isolation.

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
- High isolation :  $ISL = 21$  dB TYP. @  $f = 2.0$  GHz,  $V_{cont(H)} = 2.8$  V,  $V_{cont(L)} = 0$  V
- High power :  $P_{in(0.1\text{ dB})} = +33.0$  dBm TYP. @  $f = 1.0$  GHz,  $V_{cont(H)} = 2.8$  V,  $V_{cont(L)} = 0$  V
- High-density surface mounting : 10-pin plastic TSSON package ( $2.0 \times 1.35 \times 0.37$  mm)

#### APPLICATIONS

- CDMA/PCS/GPS triple mode digital cellular telephone etc.
- NFC (FeliCa™ etc.)

#### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PG2404T6Q-E2	$\mu$ PG2404T6Q-E2-A	10-pin plastic TSSON (Pb-Free)	G5H	<ul style="list-style-type: none"><li>• Embossed tape 8 mm wide</li><li>• Pin 5, 6 face the perforation side of the tape</li><li>• Qty 3 kpcs/reel</li></ul>

**Remark** To order evaluation samples, contact your nearby sales office.

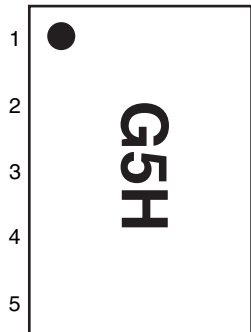
Part number for sample order:  $\mu$ PG2404T6Q

**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.

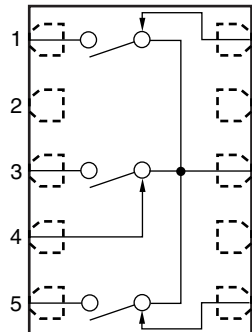
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**PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM**

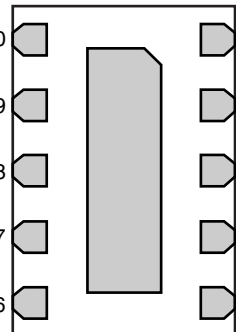
(Top View)



(Top View)



(Bottom View)



Pin No.	Pin Name
1	RF1
2	GND
3	RF2
4	V <sub>cont2</sub>
5	RF3
6	V <sub>cont3</sub>
7	GND
8	ANT
9	GND
10	V <sub>cont1</sub>

**Remark** Exposed pad : GND

**TRUTH TABLE**

V <sub>cont1</sub>	V <sub>cont2</sub>	V <sub>cont3</sub>	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<sub>A</sub> = +25°C, unless otherwise specified)**

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V <sub>cont</sub>	+6.0 <sup>Note</sup>	V
Input Power	P <sub>in</sub>	+36	dBm
Operating Ambient Temperature	T <sub>A</sub>	-45 to +85	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

**Note** |V<sub>cont (H)</sub> - V<sub>cont (L)</sub>| ≤ 6.0 V

**RECOMMENDED OPERATING RANGE (T<sub>A</sub> = +25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Switch Control Voltage (H)	V <sub>cont (H)</sub>	2.7	2.8	3.0	V
Switch Control Voltage (L)	V <sub>cont (L)</sub>	-0.2	0	0.2	V

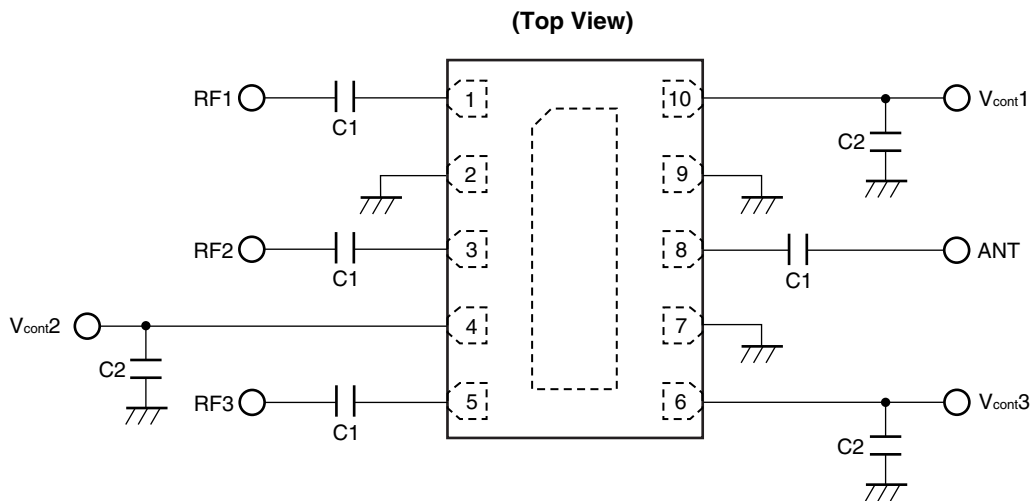
**ELECTRICAL CHARACTERISTICS**

( $T_A = +25^\circ\text{C}$ ,  $V_{\text{cont (H)}} = 2.8 \text{ V}$ ,  $V_{\text{cont (L)}} = 0 \text{ V}$ ,  $Z_o = 50 \ \Omega$ , DC blocking capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Pass	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	$L_{\text{ins}}$	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
Isolation	ISL	ANT to RF1, 2, 3 (OFF)	f = 0.5 to 1.0 GHz	22	26	–	dB
			f = 1.0 to 2.0 GHz	17	21	–	dB
Input Return Loss	$RL_{\text{in}}$	ANT to RF1, 2, 3	f = 0.5 to 2.0 GHz	15	20	–	dB
Output Return Loss	$RL_{\text{out}}$	ANT to RF1, 2, 3	f = 0.5 to 2.0 GHz	15	20	–	dB
0.1 dB Loss Compression Input Power <sup>Note</sup>	$P_{\text{in (0.1 dB)}}$	ANT to RF1, 2, 3	f = 1.0 GHz	+31.0	+33.0	–	dBm
2nd Harmonics	$2f_o$	ANT to RF1, 2, 3	f = 1.0 GHz, $P_{\text{in}} = 27 \text{ dBm}$	65	75	–	dBc
3rd Harmonics	$3f_o$	ANT to RF1, 2, 3	f = 1.0 GHz, $P_{\text{in}} = 27 \text{ dBm}$	65	75	–	dBc
Switch Control Current	$I_{\text{cont}}$		RF None	–	1	50	$\mu\text{A}$
Switch Control Speed	$t_{\text{sw}}$			–	150	–	ns

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

EVALUATION CIRCUIT

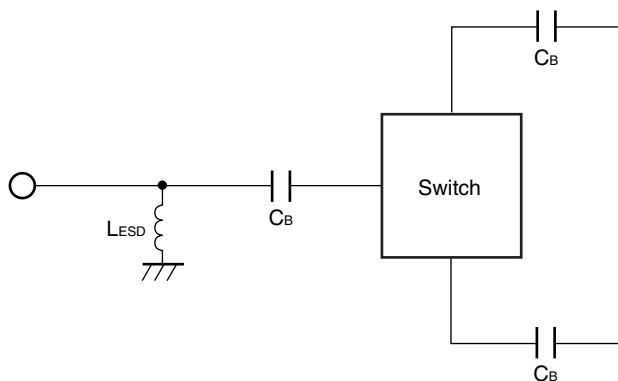


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

USING THE NEC EVALUATION BOARD

Symbol	Values
C1	56 pF
C2	1 000 pF

APPLICATION INFORMATION

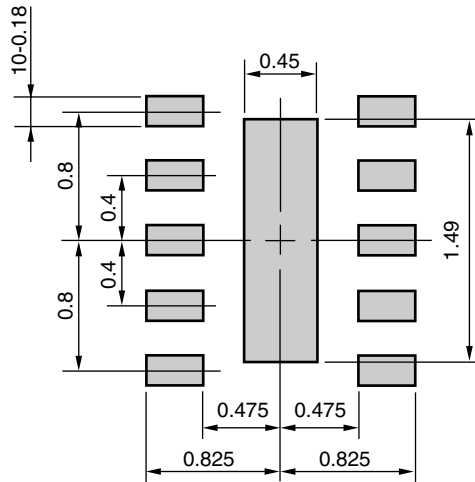


- C<sub>B</sub> are DC blocking capacitors external to the device.  
A value of 56 pF is sufficient for operation from 500 MHz to 2.5 GHz bands.  
The value may be tailored to provide specific electrical responses.
- The RF ground connections should be kept as short as possible and connected to directly to a good RF ground for best performance.
- L<sub>ESD</sub> 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)

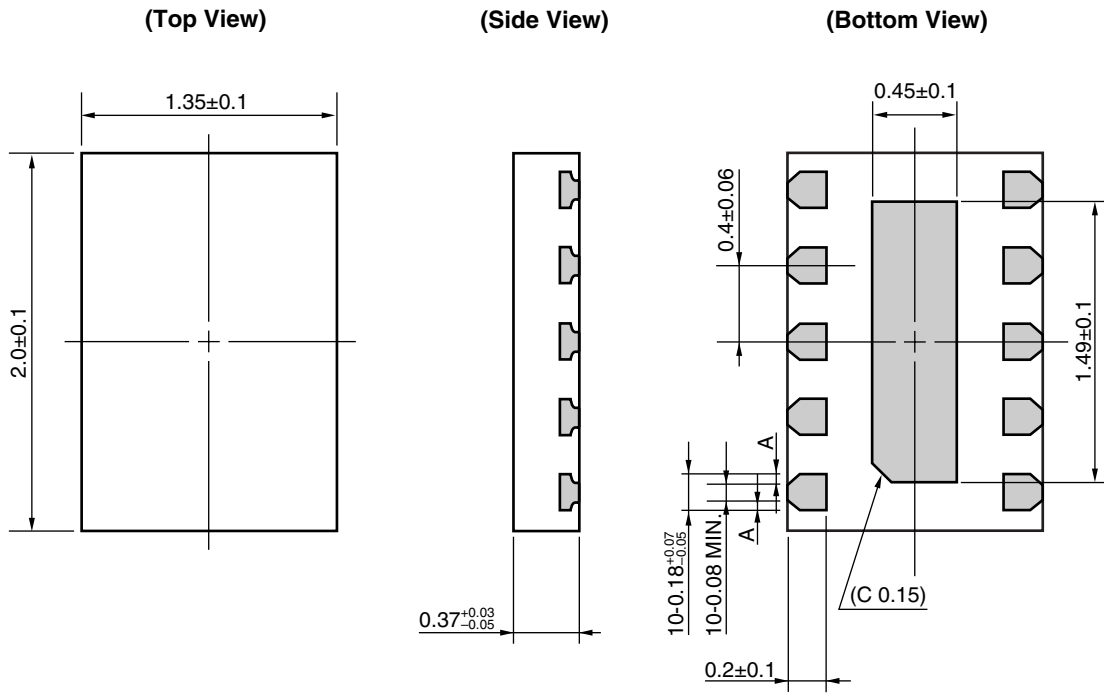
MOUNTING PAD



**Remark** The mounting pad layout in this document is for reference only.

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	IR260
Wave Soldering	Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	WS260
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	HS350

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

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

FeliCa is a trademark of Sony Corporation.

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M8E 02.11-1



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