

# DATA SHEET

# NEC

# GaAs INTEGRATED CIRCUIT $\mu$ PG2045TQ

## L-BAND SP3T SWITCH

### DESCRIPTION

The  $\mu$ PG2045TQ is an L-band SP3T GaAs FET switch which was developed for CDMA/PCS/GPS triple mode digital cellular telephone application. The device can operate from 500 MHz to 2.0 GHz, having the low insertion loss and high linearity by 2.4 V low control voltage.

### FEATURES

- Low insertion loss :  $L_{INS} = 0.28$  dB TYP. @ ANT-RF2,  $V_{cont} = +2.4$  V/0 V,  $f = 1.0$  GHz  
:  $L_{INS} = 0.38$  dB TYP. @ ANT-RF2,  $V_{cont} = +2.4$  V/0 V,  $f = 2.0$  GHz
- High power :  $P_{in(0.1\text{ dB})} = 32.0$  dBm TYP. @  $V_{cont} = +2.4$  V/0 V,  $f = 1.0$  GHz
- High-density surface mounting : 10-pin plastic TSON package ( $2.30 \times 2.55 \times 0.60$  mm)

### APPLICATION

- CDMA/PCS/GPS triple mode digital cellular telephone etc.

### ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
$\mu$ PG2045TQ-E1	10-pin plastic TSON	2045	<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>

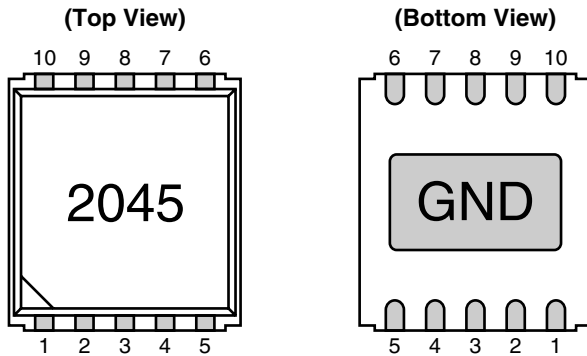
**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order:  $\mu$ PG2045TQ

**Caution** Observe precautions when handling because these devices are sensitive to electrostatic discharge.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.  
Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

**PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM**



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>

**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 to +6.0	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

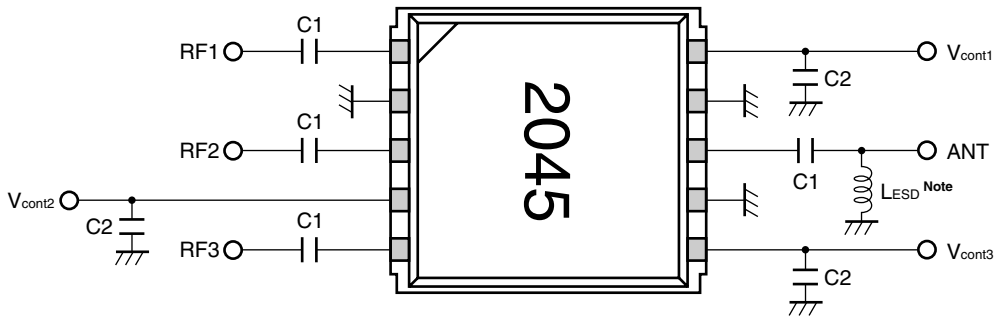
**RECOMMENDED OPERATING RANGE (T<sub>A</sub> = +25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Switch Control Voltage (High)	V <sub>cont (H)</sub>	+2.4	+2.6	+5.0	V
Switch Control Voltage (Low)	V <sub>cont (L)</sub>	-0.2	0	+0.2	V

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, V<sub>cont</sub> = 2.4 V/0 V, Z<sub>o</sub> = 50 Ω, off chip DC blocking capacitors value: 56 pF, unless otherwise specified)**

Parameter	Symbol	Pass	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	L <sub>INS</sub>	ANT-RF2	f = 0.5 to 1.0 GHz	–	0.28	0.45	dB
			f = 1.0 to 2.0 GHz	–	0.38	0.55	dB
		ANT-RF1 ANT-RF3	f = 0.5 to 1.0 GHz	–	0.50	0.65	dB
			f = 1.0 to 2.0 GHz	–	0.65	0.80	dB
Isolation	ISL	ANT-RF1 ANT-RF3	f = 0.5 to 1.0 GHz	24	27	–	dB
			f = 1.0 to 2.0 GHz	18	21	–	dB
		ANT-RF2	f = 0.5 to 1.0 GHz	18	21	–	dB
			f = 1.0 to 2.0 GHz	13	15	–	dB
Input Return Loss	RL <sub>in</sub>	ANT-RF1/2/3	f = 0.5 to 2.0 GHz	15	20	–	dB
Output Return Loss	RL <sub>out</sub>	ANT-RF1/2/3	f = 0.5 to 2.0 GHz	15	20	–	dB
0.1 dB Gain Compression Input Power	P <sub>in (0.1 dB)</sub>	ANT-RF1/2/3	f = 1.0 GHz	30.0	32.0	–	dBm
2nd Harmonics	2f <sub>0</sub>	ANT-RF1/2/3	f = 1.0 GHz, P <sub>in</sub> = +27 dBm	–	75	–	dBc
3rd Harmonics	3f <sub>0</sub>	ANT-RF1/2/3	f = 1.0 GHz, P <sub>in</sub> = +27 dBm	–	75	–	dBc
Input 3rd Order Intercept Point	IIP <sub>3</sub>	ANT-RF2	f = 882 MHz/883 MHz @ 1 MHz spacing, P <sub>in</sub> = +24 dBm each @ 2 Tone	–	66	–	dBm
		ANT-RF1 ANT-RF3		–	64	–	dBm
		ANT-RF2	f = 1 960 MHz/1 961 MHz @ 1 MHz spacing, P <sub>in</sub> = +16 dBm each @ 2 Tone	–	60	–	dBm
		ANT-RF1 ANT-RF3		–	58	–	dBm
Switch Control Speed	t <sub>sw</sub>			–	150	–	ns
Switch Control Current	I <sub>cont</sub>		RF Non	–	1	20	μA

EVALUATION CIRCUIT



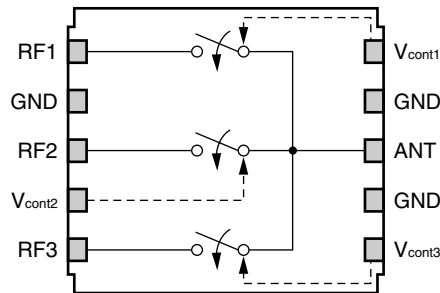
**Note** Recommend attached L<sub>ESD</sub> to antenna port for ESD protection.

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

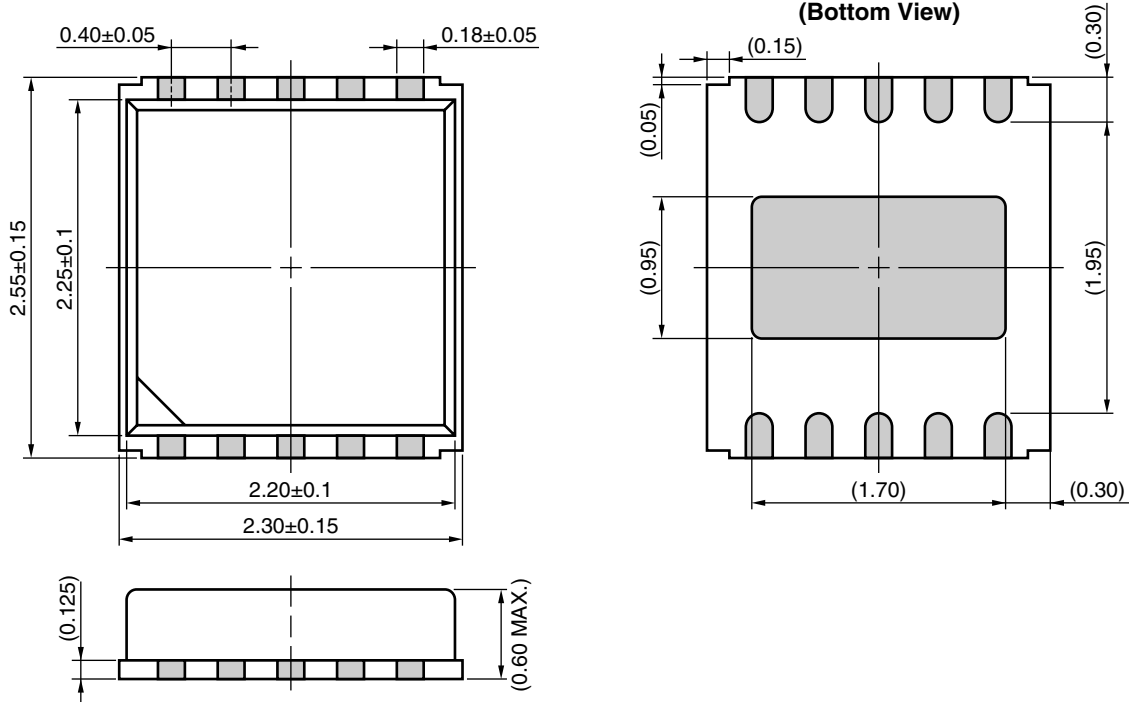
TRUTH TABLE



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

PACKAGE DIMENSIONS

10-PIN PLASTIC TSON (UNIT: mm)



Remark ( ) : 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
VPS	Peak temperature (package surface temperature) : 215°C or below Time at temperature of 200°C or higher : 25 to 40 seconds Preheating time at 120 to 150°C : 30 to 60 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	VP215
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 (pin 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).**

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M8E 00.4-0110

<p><b>Caution</b></p>	<p>GaAs Products</p>	<p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> <li>• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.               <ol style="list-style-type: none"> <li>1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.</li> <li>2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.</li> </ol> </li> <li>• Do not burn, destroy, cut, crush, or chemically dissolve the product.</li> <li>• Do not lick the product or in any way allow it to enter the mouth.</li> </ul>
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