PRELIMINARY PRODUCT INFORMATION

NEC

GaAs INTEGRATED CIRCUIT

uPG2159T5K

L,S-BAND SPDT SWITCH

DESCRIPTION

The uPG2159T5K is a GaAs MMIC for L,S-band SPDT（Single Pole Double Throw） which were designed for mobile phone and the another L,S-band applications.

This device can operate frequency from 0.05GHz to 3.0GHz,, having the low insertion loss and high isolation.

This device is housed in a 6-pin TSON (Thin Small Out-line Non-Leaded) package. And this package is able to high-density surface mounting.

FEATURES

- Switch Control Voltage : $V_{cont\ (H)}$ = 1.8 to 5.3V（2.7V TYP.）
  : $V_{cont\ (L)}$ = -0.2 to 0.2V（0V TYP.）
- Low Insertion Loss : L_{ins1} = 0.30dB TYP.@ f = 0.05 to 0.5GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : L_{ins2} = 0.30dB TYP.@ f = 0.5 to 1.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : L_{ins3} = 0.35dB TYP.@ f = 1.0 to 2.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : L_{ins4} = 0.40dB TYP.@ f = 2.0 to 2.5GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : L_{ins5} = 0.40dB TYP.@ f = 2.5 to 3.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
- High Isolation : ISL1 = 27dB TYP. @ f = 0.05 to 0.5GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : ISL2 = 27dB TYP. @ f = 0.5 to 1.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : ISL3 = 25dB TYP. @ f = 1.0 to 2.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : ISL4 = 24dB TYP. @ f = 2.0 to 2.5GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : ISL5 = 22dB TYP. @ f = 2.5 to 3.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
- Handling Power : $P_{in\ (1dB)}$ = +26.0dBm TYP.@ f = 0.5 to 3.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
  : $P_{in\ (0.1dB)}$ = +23.0dBm TYP.@ f = 0.5 to 3.0GHz, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V
- High-density surface mounting : 6-pin TSON package（1.0 × 1.0 × 0.4 mm）

APPLICATION

- L,S-band digital cellular or cordless telephone
- W-LAN, WLL and Bluetooth^{TM} etc.

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
uPG2159T5K-E2	6-pin TSON (1010)	G3	TBD

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order : uPG2159T5K

Caution Electro-static sensitive devices

**The information in this document is being issued in advance of the production cycle for device.
The parameters for the device may change before final production or NEC Compound Semiconductor Devices, at its own discretion, may withdraw the device prior to its production.**

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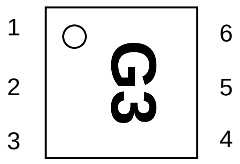
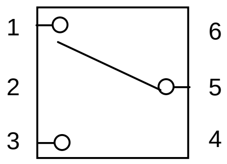
PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

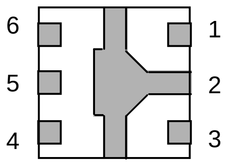
(Top View)



(Top View)



(Bottom View)



Pin No.	Pin Name
1	OUTPUT1
2	GND
3	OUTPUT2
4	V_{cont2}
5	INPUT
6	V_{cont1}

SW TRUTH TABLE

V_{cont1}	V_{cont2}	INPUT-OUTPUT1	INPUT-OUTPUT2
Low	High	OFF	ON
High	Low	ON	OFF

ASOLUTE MAXIMUM RATINGS（Unless otherwise specified, T_A = +25℃)

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V_{cont}	+6.0^{Note}	V
Input Power	P_{in}	+28	dBm
Operating Ambient Temperature	T_A	-45 to +85	℃
Storage Temperature	T_{stg}	-55 to +150	℃

Note $|V_{cont1} - V_{cont2}| \leqq 6.0$V

RECOMMENDED OPERATING RANGE（Unless otherwise specified, T_A = +25℃)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Switch Control Voltage（H)	$V_{cont\ (H)}$	1.8	2.7	5.3	V
Switch Control Voltage（L)	$V_{cont\ (L)}$	-0.2	0	0.2	V

ELECTRICAL CHARACTERISTICS

(T_A = +25℃, $V_{cont(H)}$ = 2.7V, $V_{cont(L)}$ = 0V,DC cut capacitors = 56pF,Unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss1	L_{ins1}	f = 0.05 to 0.5GHz^{Note1}	-	0.30	0.45	dB
Insertion Loss2	L_{ins2}	f = 0.5 to 1.0GHz	-	0.30	0.45	dB
Insertion Loss3	L_{ins3}	f = 1.0 to 2.0GHz	-	0.35	0.50	dB
Insertion Loss4	L_{ins4}	f = 2.0 to 2.5GHz	-	0.40	0.55	dB
Insertion Loss5	L_{ins5}	f = 2.5 to 3.0GHz	-	0.40	0.60	dB
Isolation1	ISL1	f = 0.05 to 0.5GHz^{Note1}	24	27	-	dB
Isolation2	ISL2	f = 0.5 to 1.0GHz	24	27	-	dB
Isolation3	ISL3	f = 1.0 to 2.0GHz	22	25	-	dB
Isolation4	ISL4	f = 2.0 to 2.5GHz	21	24	-	dB
Isolation5	ISL5	f = 2.5 to 3.0GHz	19	22	-	dB
Input Return Loss1	RL_{in1}	f = 0.05 to 0.5GHz^{Note1}	15	20	-	dB
Input Return Loss2	RL_{in2}	f = 0.5 to 3.0GHz	15	20	-	dB
Output Return Loss1	RL_{out1}	f = 0.05 to 0.5GHz^{Note1}	15	20	-	dB
Output Return Loss2	RL_{out2}	f = 0.5 to 3.0GHz	15	20	-	dB
0.1dB Loss Compression Input Power^{Note2}	$P_{in\ (0.1dB)}$	f = 2.0GHz/2.5GHz	+20.0	+23.0	-	dBm
		f = 0.5 TO 3.0GHz	-	+23.0	-	dBm
1dB Loss Compression Input Power^{Note3}	$P_{in\ (1dB)}$	f = 0.5 to 3.0GHz	-	+26.0	-	dBm
2nd Harmonics	$2f_0$	f = 2.0GHz/2.5GHz, P_{in}=+20dBm	65	75	-	dBc
3rd Harmonics	$3f_0$	f = 2.0GHz/2.5GHz, P_{in}=+20dBm	65	75	-	dBc
Input Intercept Point	IIP_3	f = 0.5 to 3.0GHz, 2tone 5MHz spacing	-	+58	-	dBm
Switch Control Current	I_{cont}		-	0.2	20	uA
Switch Control Speed	t_{SW}	50% CTL to 90/10%	-	20	200	ns

Note1. DC cut capacitors = 1000pF 0.05 to 0.5GHz
Note2. $P_{in\ (0.1dB)}$ is measured the input power level when the insertion loss increases more 0.1dB than that of linear range.
Note3. $P_{in\ (1dB)}$ is measured the input power level when the insertion loss increases more 1dB than that of linear range.

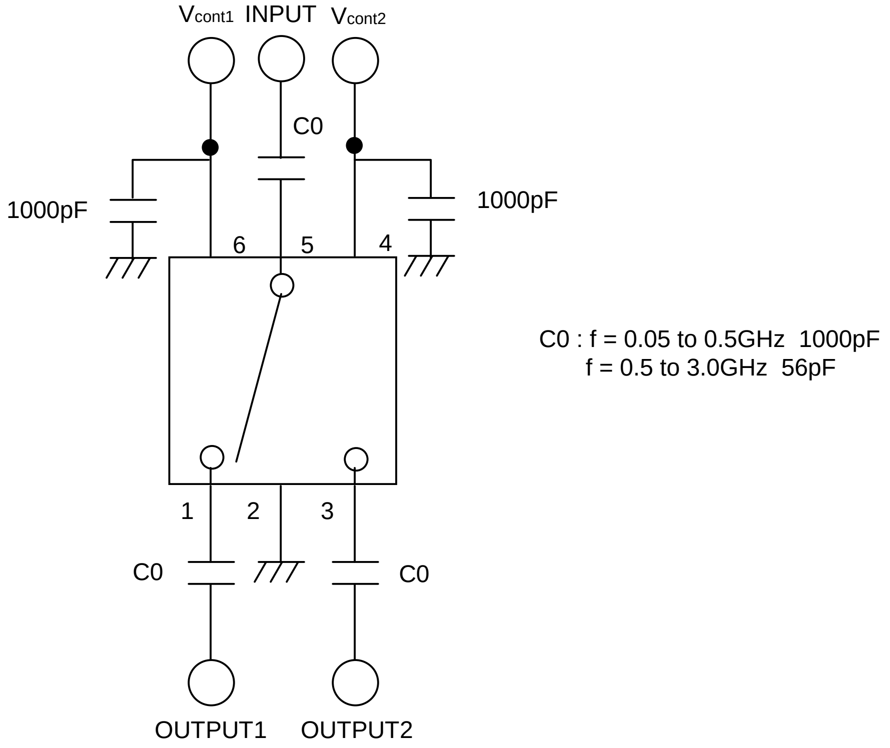
ELECTRICAL CHARACTERISTICS

（ T_A = +25℃, $V_{cont(H)}$ = 1.8V, $V_{cont(L)}$ = 0V,DC cut capacitors = 56pF,Unless otherwise specified ）

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss6	L_{ins6}	f = 0.05 to 0.5GHz^{Note1}	-	0.30	TBD	dB
Insertion Loss7	L_{ins7}	f = 0.5 to 1.0GHz	-	0.30	TBD	dB
Insertion Loss8	L_{ins8}	f = 1.0 to 2.0GHz	-	0.35	TBD	dB
Insertion Loss9	L_{ins9}	f = 2.0 to 2.5GHz	-	0.40	TBD	dB
Insertion Loss10	L_{ins10}	f = 2.5 to 3.0GHz	-	0.40	TBD	dB
Isolation6	ISL6	f = 0.05 to 0.5GHz^{Note1}	TBD	25	-	dB
Isolation7	ISL7	f = 0.5 to 1.0GHz	TBD	25	-	dB
Isolation8	ISL8	f = 1.0 to 2.0GHz	TBD	23	-	dB
Isolation9	ISL9	f = 2.0 to 2.5GHz	TBD	23	-	dB
Isolation10	ISL10	f = 2.5 to 3.0GHz	TBD	22	-	dB
Input Return Loss1	RL_{in1}	f = 0.05 to 0.5GHz^{Note1}	15	20	-	dB
Input Return Loss2	RL_{in2}	f = 0.5 to 3.0GHz	15	20	-	dB
Output Return Loss1	RL_{out1}	f = 0.05 to 0.5GHz^{Note1}	15	20	-	dB
Output Return Loss2	RL_{out2}	f = 0.5 to 3.0GHz	15	20	-	dB
0.1dB Loss Compression Input Power^{Note2}	$P_{in\ (0.1dB)}$	f = 2.0GHz/2.5GHz	TBD	+17.0	-	dBm
		f = 0.5 TO 3.0GHz	-	+17.0	-	dBm
1dB Loss Compression Input Power^{Note3}	$P_{in\ (1dB)}$	f = 0.5 to 3.0GHz	-	+20.0	-	dBm
Switch Control Current	I_{cont}		-	0.2	20	uA
Switch Control Speed	t_{SW}	50% CTL to 90/10%	-	20	500	ns

Note1. DC cut capacitors = 1000pF 0.05 to 0.5GHz
Note2. $P_{in\ (0.1dB)}$ is measured the input power level when the insertion loss increases more 0.1dB than that of linear range.
Note3. $P_{in\ (1dB)}$ is measured the input power level when the insertion loss increases more 1dB than that of linear range.

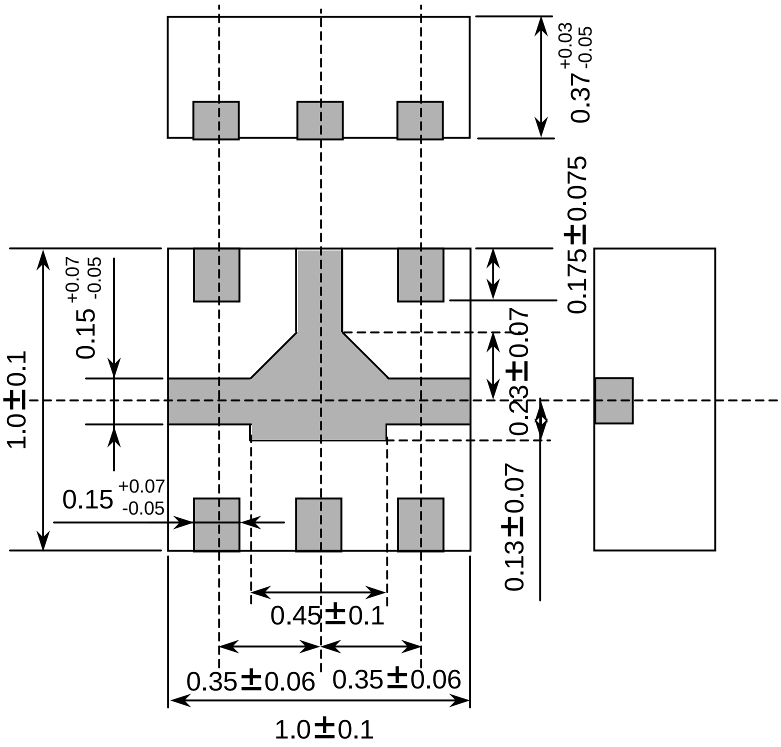
EVALUATION CIRCUIT



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

PACKAGE DIMENSIONS

6-PIN TSON（UNIT: mm）



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℃ or below Time at peak temperature : 10 seconds or less Time at temperature of 220℃ or higher : 60 seconds or less Preheating time at 120 to 180℃ : 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℃ or below Time at temperature of 200℃ or higher : 25 to 40 seconds Preheating time at 120 to 150℃ : 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℃ or below Time at peak temperature : 10 seconds or less Preheating temperature（package surface temperature） : 120℃ or below Maximum number of reflow processes : 1 time Maximum chlorine content of rosin flux（% mass） : 0.2 %（Wt.）or below	WS260
Partial Heating	Peak temperature（pin temperature） : 350℃ 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

SAFETY INFORMATION ON THIS PRODUCT

Caution GaAs products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. ・Do not destroy or burn the product. ・Do not cut or cleave off any part of the product. ・Do not crush or chemically dissolve the product. ・Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be from general industrial waste or household garbage.

▶ **Technical issue**

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