PRELIMINARY PRODUCT INFORMATION

CEL

NEC's COMPACT ½W L, S-BAND SPDT SWITCH

UPG2151T5K

FEATURES

- **SWITCH CONTROL VOLTAGE:**
  $V_{cont\ (H)}$ = 1.8 to 5.3 V (3.0 V TYP.)
  $V_{cont\ (L)}$ = –0.2 to +0.2 V (0 V TYP.)
- **LOW INSERTION LOSS:**
  0.30 dB TYP. @ 0.5 to 1.0 GHz
  0.35 dB TYP. @ 1.0 to 2.0 GHz
  0.40 dB TYP. @ 2.0 to 2.5 GHz
  0.50 dB TYP. @ 2.5 to 3.0 GHz
- **HIGH ISOLATION:**
  25 dB TYP. @ 0.5 to 1.0 GHz
  18 dB TYP. @ 1.0 to 2.0 GHz
  17 dB TYP. @ 2.0 to 2.5 GHz
  13 dB TYP. @ 2.5 to 3.0 GHz
- **POWER HANDLING:**
  $P_{in\ (1\ dB)}$ = +27.0 dBm TYP. @ 0.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V/0 V
- **HIGH-DENSITY SURFACE MOUNTING:**
  6-pin TSON package (1.0 × 1.0 × 0.4 mm)
- **Pb FREE**

DESCRIPTION

NEC's UPG2151T5K is a GaAs MMIC L, S-band SPDT switch for mobile phones and other L, S-band size restricted applications.

This device can operate from 0.5 to 3 GHz with low insertion loss and high isolation.

The UPG2151T5K is housed in a 6-pin Pb Free low profile package suitable for high-density surface mounting, and is a packaged alternative to die for usage in modules.

APPLICATIONS

- **Cellular and cordless telephones**
- **Bluetooth™ , ZigBee**
- **Short Range Wireless**
- **Alternative to die usage**

ORDERING INFORMATION

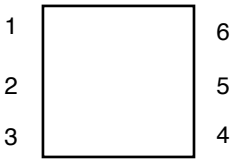
PART NUMBER	PACKAGE	MARKING	SUPPLYING FORM
UPG2151T5K-E2-A	6-pin TSON	G1	• Embossed tape 8 mm wide • Pins 1, 6 face the perforation side of the tape • Qty 5 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: UPG2151T5K-A

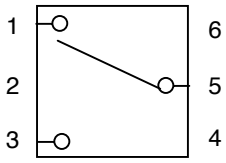
Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

PIN CONNECTIONS

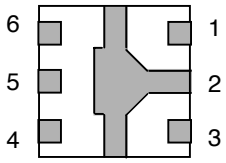
(Top View)



(Top View)



(Bottom View)



PIN NO.	PIN NAME
1	OUTPUT1
2	GND
3	OUTPUT2
4	V_{cont2}
5	INPUT
6	V_{cont1}

TRUTH TABLE

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

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}	+30	dBm
Operating Ambient Temperature	T_A	–45 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C

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

RECOMMENDED OPERATING RANGE (T_A = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Switch Control Voltage (H)	$V_{cont(H)}$	1.8	3.0	5.3	V
Switch Control Voltage (L)	$V_{cont(L)}$	–0.2	0	0.2	V

ELECTRICAL CHARACTERISTICS

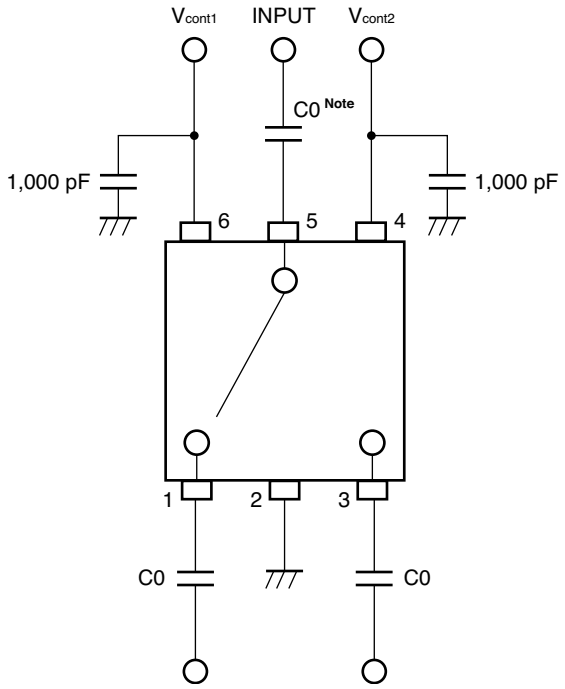
(T_A = +25°C, $V_{cont\ (H)}$ = 2.6 to 3.0 V, $V_{cont\ (L)}$ = 0 V, DC blocking capacitors value = 56 pF, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Insertion Loss 1	L_{ins1}	f = 0.5 to 1.0 GHz	−	0.30	0.45	dB
Insertion Loss 2	L_{ins2}	f = 1.0 to 2.0 GHz	−	0.35	0.50	dB
Insertion Loss 3	L_{ins3}	f = 2.0 to 2.5 GHz	−	0.40	0.55	dB
Insertion Loss 4	L_{ins4}	f = 2.5 to 3.0 GHz	−	0.50	0.65	dB
Isolation 1	ISL1	f = 0.5 to 1.0 GHz	22	25	−	dB
Isolation 2	ISL2	f = 1.0 to 2.0 GHz	15	18	−	dB
Isolation 3	ISL3	f = 2.0 to 2.5 GHz	14	17	−	dB
Isolation 4	ISL4	f = 2.5 to 3.0 GHz	10	13	−	dB
Input Return Loss	RL_{in}	f = 0.5 to 3.0 GHz	−	20	−	dB
Output Return Loss	RL_{out}	f = 0.5 to 3.0 GHz	−	20	−	dB
0.1 dB Loss Compression Input Power **Note 1**	$P_{in\ (0.1\ dB)}$	f = 2.0/2.5 GHz, 2.6 V	+18.0	+21.0	−	dBm
		f = 2.0/2.5 GHz, 3.0 V	+20.0	+23.0	−	dBm
1 dB Loss Compression Input Power **Note 2**	$P_{in\ (1\ dB)}$	f = 2.0/2.5 GHz, 2.6 V	−	+24.0	−	dBm
		f = 2.0/2.5 GHz, 3.0 V	−	+27.0	−	
2nd Harmonics	$2f_0$	f = 2.0/2.5 GHz, P_{in} = +16 dBm	65	75	−	dBc
3rd Harmonics	$3f_0$	f = 2.0/2.5 GHz, P_{in} = +16 dBm	65	75	−	dBc
Switch Control Current	I_{cont}		−	0.2	20	μA
Switch Control Speed	t_{SW}	50% CTL to 90/10% RF	−	10	200	ns

Notes 1. $P_{in\ (0.1\ dB)}$ is the measured input power level when the insertion loss increases 0.1 dB more than that of linear range.

2. $P_{in\ (1\ dB)}$ is the measured input power level when the insertion loss increases 1 dB more than that of linear range.

EVALUATION CIRCUIT

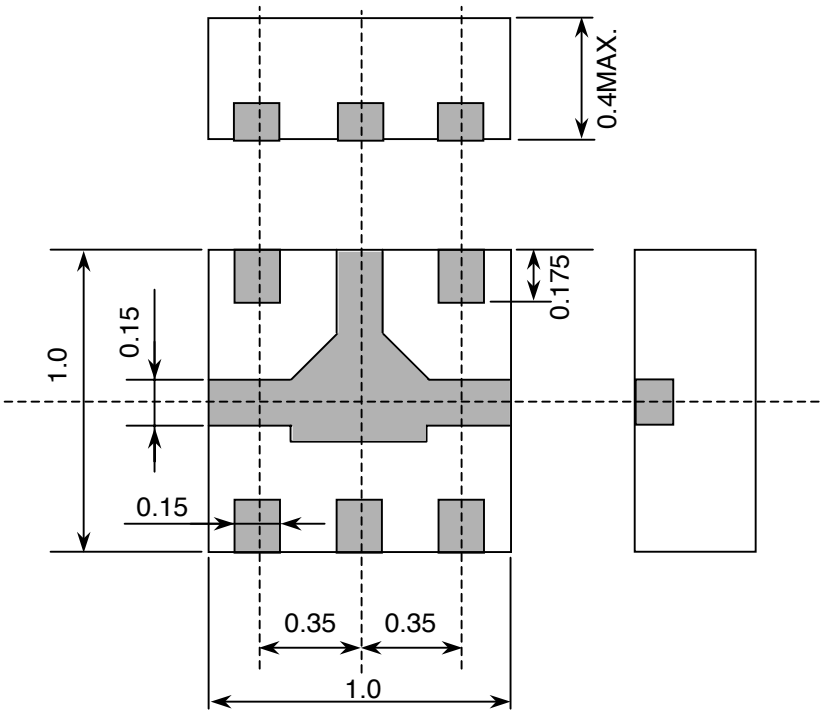


Note C0 : 56 pF

The application circuits and their parameters are for reference only and are not intended for 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°C or below	IR260
	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	
VPS	Peak temperature (package surface temperature)	: 215°C or below	VP215
	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	
Wave Soldering	Peak temperature (molten solder temperature)	: 260°C or below	WS260
	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	
Partial Heating	Peak temperature (pin temperature)	: 350°C or below	HS350
	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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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.