CEL

NEC's L-BAND SP3T SWITCH | UPG2031TQ

FEATURES

- **LOW INSERTION LOSS:**
  L_{INS} = 0.45 dB TYP. @ V_{cont} = 2.8 V/0 V, f = 1.0 GHz
  L_{INS} = 0.55 dB TYP. @ V_{cont} = 2.8 V/0 V, f = 2.0 GHz
- **HIGH ISOLATION:**
  ISL = 21 dB TYP. @ V_{cont} = 2.8 V/0 V, f = 2.0 GHz
- **HIGH POWER:**
  $P_{in\ (0.1\ dB)}$ = 33.0 dBm TYP. @ V_{cont} = 2.8 V/0 V, f = 1.0 GHz
- **HIGH-DENSITY SURFACE MOUNTING:**
  10-pin plastic TSON package (2.30 × 2.55 × 0.60 mm)

DESCRIPTION

NEC's UPG2031TQ is an L-band SP3T GaAs FET switch for CDMA/PCS/GPS triple mode digital cellular telephone applications. The device can operate from 500 MHz to above 2.0 GHz, with low insertion loss and high linearity.

APPLICATIONS

- **CDMA/PCS/GPS triple mode digital cellular telephones**

ORDERING INFORMATION

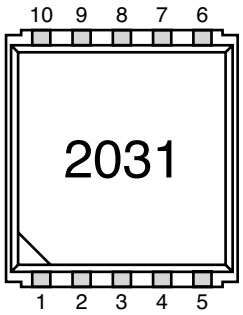
Part Number	Package	Marking	Supplying Form
UPG2031TQ-E1-A	10-pin plastic TSON	2031	• Embossed tape 8 mm wide • Pin 5, 6 face the perforation side of the tape • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: UPG2031TQ

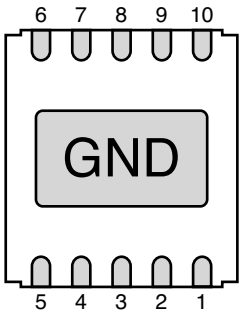
Caution Observe precautions when handling, because these devices are sensitive to electrostatic discharge.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

(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}

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

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V_{cont}	−6.0 to +6.0	V
Input Power	P_{in}	+36	dBm
Operating Ambient Temperature	T_A	−45 to +85	°C
Storage Temperature	T_{stg}	−55 to +150	°C

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

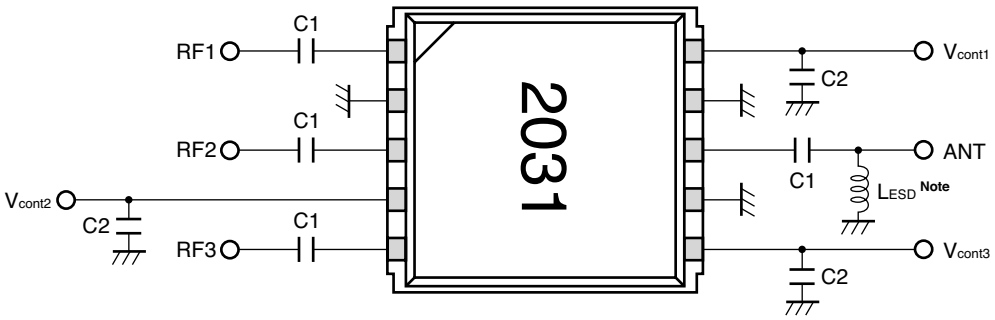
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Switch Control Voltage (High)	$V_{cont\ (H)}$	2.7	2.8	3.0	V
Switch Control Voltage (Low)	$V_{cont\ (L)}$	−0.2	0	0.2	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{cont} = 2.8 V/0 V, Z_O = 50 Ω, off chip DC blocking capacitors value: 56 pF, unless otherwise specified)

Parameter	Symbol	ON-Pass	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	L_{INS}	ANT-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-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_{in}	ANT-RF1/2/3	f = 0.5 to 2.0 GHz	15	20	–	dB
Output Return Loss	RL_{out}	ANT-RF1/2/3	f = 0.5 to 2.0 GHz	15	20	–	dB
0.1 dB Gain Compression Input Power	$P_{in\ (0.1\ dB)}$	ANT-RF1/2/3	f = 1.0 GHz	31.0	33.0	–	dBm
2nd Harmonics	2f0	ANT-RF1/2/3	f = 1.0 GHz, P_{in} = 27 dBm	65	75	–	dBc
3rd Harmonics	3f0	ANT-RF1/2/3	f = 1.0 GHz, P_{in} = 27 dBm	65	75	–	dBc
Switch Control Speed	t_{sw}			–	150	–	ns
Switch Control Current	I_{cont}		RF Non	–	1	50	μA

EVALUATION CIRCUIT



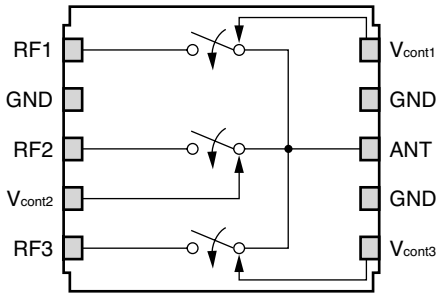
Note Recommend attached L_{ESD} to antenna port for ESD protection.

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

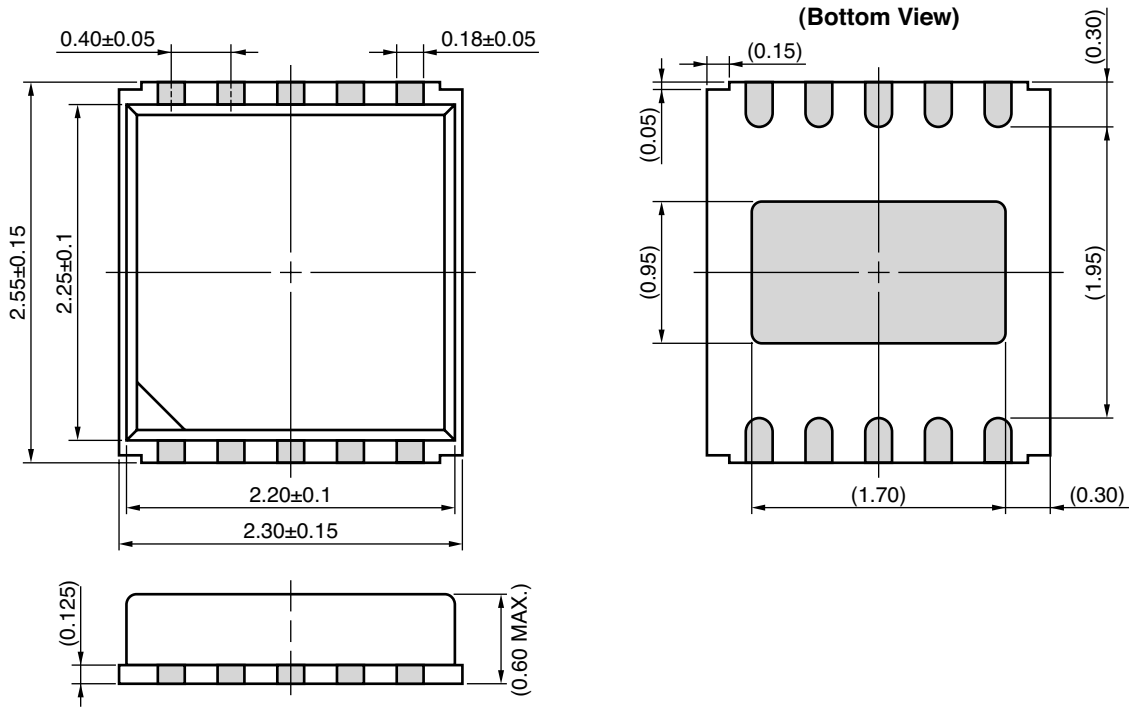
TRUTH TABLE



V_{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

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	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).

Life Support Applications
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

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.

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ООО «НИОКР СИТЕМС»
Москва, 125362, Россия, ул. Вишневая, д. 9, к. 1, Блок 104 а и 104 в

Телефон: 8 (495) 268-14-82
Email: n@nsistems.ru

ИНН: 7735154786
ОГРН: 1167746717709