



## PRELIMINARY DATA SHEET

# CMOS INTEGRATED CIRCUIT uPD5713TK

## WIDE BAND SPDT SWITCH

### DESCRIPTION

The uPD5713TK is a CMOS MMIC for wide-band SPDT (Single Pole Double Throw) which were designed for mobile communications, wireless communications and another general-purpose RF switching application.

This device can operate frequency from 0.05GHz to 2.5GHz, having the low insertion loss and high isolation.

This device is housed in a 6-pin lead-less minimold package (1511). And this package is able to high-density surface mounting.

### FEATURES

- Supply Voltage :  $V_{DD} = 1.8V$  to  $3.3V$  (2.8V TYP.)
- Switch Control Voltage :  $V_{cont(H)} = 1.8V$  to  $3.3V$  (2.8V TYP.)  
:  $V_{cont(L)} = -0.2$  to  $+0.4V$  (0V TYP.)
- Low Insertion Loss :  $L_{INS1} = 0.6dB$  TYP. @  $f = 0.05$  to  $1.0GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$   
:  $L_{INS2} = 0.8dB$  TYP. @  $f = 1.0$  to  $2.0GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$   
:  $L_{INS3} = 0.95dB$  TYP. @  $f = 2.0$  to  $2.5GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$
- High Isolation :  $ISL1 = 32.5dB$  TYP. @  $f = 0.05$  to  $1.0GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$   
:  $ISL2 = 25dB$  TYP. @  $f = 1.0$  to  $2.0GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$   
:  $ISL3 = 22.5dB$  TYP. @  $f = 2.0$  to  $2.5GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$
- Handling Power :  $P_{in(1dB)} = +21.0dBm$  TYP. @  $f = 1.0GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$   
:  $P_{in(0.1dB)} = +17.0dBm$  TYP. @  $f = 1.0GHz$ ,  $V_{DD} = 2.8V$ ,  $V_{cont} = 2.8V/0V$
- High-density surface mounting : 6-pin lead-less minimold package ( $1.5 \times 1.1 \times 0.55$  mm)

### APPLICATION

- Mobile communications
- Wireless communications
- Another general-purpose RF switching applications

### ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
uPD5713TK-E2-A	6-pin lead-less minimold (1511)	C3Q	<ul style="list-style-type: none"><li>• Embossed tape 8mm wide</li><li>• Pin 1,6 face the perforation side of the tape</li><li>• Qty 5 kpcs / reel</li></ul>

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

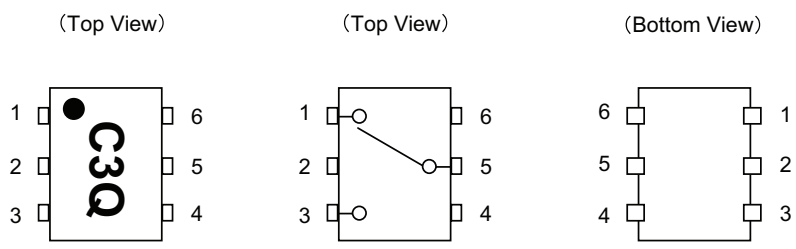
Part number for sample order : uPD5713TK-A

### 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.

**PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM**



Pin No.	Pin Name
1	OUTPUT1
2	GND
3	OUTPUT2
4	V <sub>cont</sub>
5	INPUT
6	V <sub>DD</sub>

**SW TRUTH TABLE**

V <sub>cont</sub>	INPUT-OUTPUT1	INPUT-OUTPUT2
Low	OFF	ON
High	ON	OFF

**ASOLUTE MAXIMUM RATINGS (Unless otherwise specified, T<sub>A</sub> = +25°C)**

Parameter	Symbol	Ratings	Unit
Supply Voltage	V <sub>DD</sub>	-0.5 to +4.6	V
Switch Control Voltage	V <sub>cont</sub>	-0.5 to +4.6	V
Voltage Difference	V <sub>cont</sub> - V <sub>DD</sub>	+0.5	V
Input Power	P <sub>in</sub>	+23	dBm
Power Dissipation	P <sub>D</sub>	203 <sup>Note</sup>	mW
Operating Ambient Temperature	T <sub>A</sub>	-45 to +85	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

**Note.** Mounted on double-sided copper-clad 50 × 50 × 1.6mm epoxy glass PWB

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

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V <sub>DD</sub>	+1.8	+2.8	+3.6	V
Switch Control Voltage (H)	V <sub>cont (H)</sub>	+1.8	+2.8	+3.6	V
Switch Control Voltage (L)	V <sub>cont (L)</sub>	-0.2	0	+0.4	V

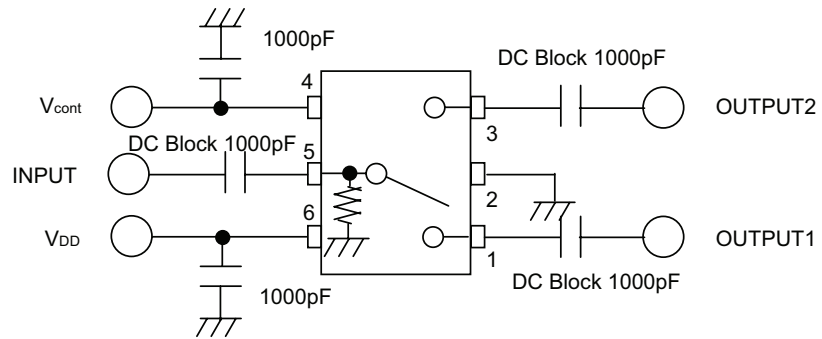
**Note.** V<sub>DD</sub>-0.4V ≤ V<sub>cont(H)</sub> ≤ V<sub>DD</sub>+0.2V

**ELECTRICAL CHARACTERISTICS**(Unless otherwise specified,  $T_A = +25^\circ\text{C}$ ,  $V_{DD} = 2.8\text{V}$ ,  $V_{\text{cont(H)}} = 2.8\text{V}$ ,  $V_{\text{cont(L)}} = 0\text{V}$ ,  $P_{\text{in}} = 0\text{dBm}$ )

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss1	LINS1	f = 0.05 to 1.0GHz	-	0.6	0.8	dB
Insertion Loss2	LINS2	f = 1.0 to 2.0GHz	-	0.8	1.0	dB
Insertion Loss3	LINS3	f = 2.0 to 2.5GHz	-	0.95	1.2	dB
Isolation1	ISL1	f = 0.05 to 1.0GHz	30	32.5	-	dB
Isolation2	ISL2	f = 1.0 to 2.0GHz	22	25	-	dB
Isolation3	ISL3	f = 2.0 to 2.5GHz	20	22.5	-	dB
Input Return Loss	RL <sub>in</sub>	f = 0.05 to 2.5GHz	13	17	-	dB
Output Return Loss	RL <sub>out</sub>	f = 0.05 to 2.5GHz	13	17	-	dB
0.1dB Loss Compression Input Power <sup>Note</sup>	P <sub>in (0.1dB)</sub>	f = 1.0GHz	+13.0	+17.0	-	dBm
1dB Loss Compression Input Power <sup>Note</sup>	P <sub>in (1dB)</sub>	f = 1.0GHz	-	+21.0	-	dBm
Supply Current	I <sub>DD</sub>	No Signal	-	0.01	1.0	uA
Switch Control Current	I <sub>cont</sub>	No Signal	-	0.01	1.0	uA
Switch Control Speed	t <sub>sw</sub>	f = 1.0GHz	-	30	100	nS

**Note.** P<sub>in (0.1dB)</sub> or P<sub>in (1dB)</sub> are measured the input power level when the insertion loss increases more 0.1dB or 1dB than that of linear range.

EVALUATION CIRCUIT

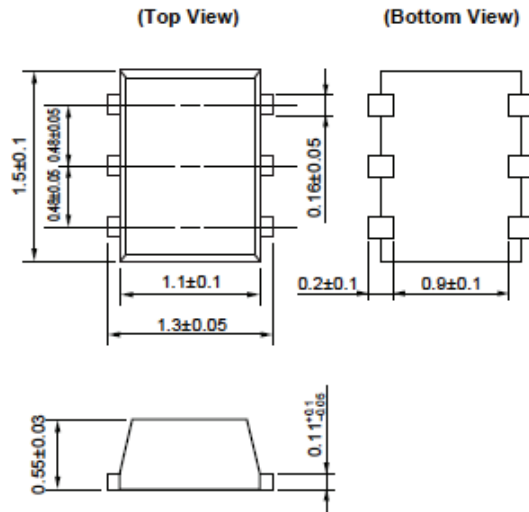


**Note1 :** This IC has pull down resistance between RF line and GND, which fixes electric potential of RF line to 0V, then the IC cannot be used for DC switching.

**Note2 :** If an external DC voltage is not present on RF lines, the DC blocking capacitors are not needed.

**PACKAGE DIMENSIONS**

**6-PIN LEAD-LESS MINIMOLD (1511) (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 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 reflow 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) .**

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	
		-A	-AZ
Lead (Pb)	< 1000 PPM	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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