

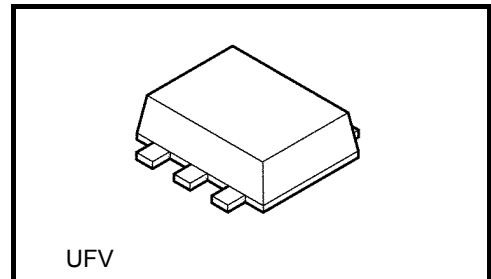
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TCS10NPU

Digital-Output Magnetic Sensor

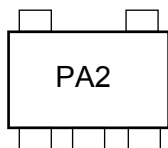
**Feature**

- Push-Pull Output
- North-Pole Detection

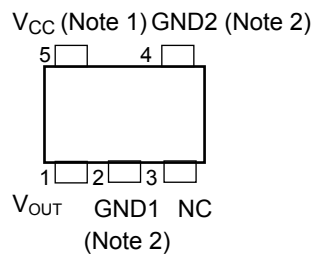


Weight: 0.007 g (typ.)

**Marking**



**Pin Assignment (top view)**



**Function Table**

Magnetic Flux Density	Output
$\geq B_{ON}$	L
$\leq B_{OFF}$	H

- Note 1: It is recommended to add a capacitor of about 0.1  $\mu$ F between  $V_{CC}$  and GND.
- Note 2: The GND1 and GND2 pins should be tied to ground. The GND2 pin is used as a test pin during production.

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply Voltage	V <sub>CC</sub>	-0.5 to 6.0	V
Output Voltage	V <sub>OUT</sub>	-0.5 to 6.0	V
Output Diode Current	I <sub>OK</sub>	±10	mA
Output Current	I <sub>OUT</sub>	±5	mA
V <sub>CC</sub> /GND Current	I <sub>CC</sub>	±10	mA
Power Dissipation	P <sub>D</sub>	200	mW
Storage Temperature Range	T <sub>stg</sub>	-65 to 150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Operating Range

Characteristics	Symbol	Rating	Unit
Supply Voltage	V <sub>CC</sub>	2.3 to 3.6	V
Output Voltage	V <sub>OUT</sub>	0 to V <sub>CC</sub>	V
Output Current	I <sub>OH</sub> / I <sub>OL</sub>	±1.0	mA
Operating Temperature	T <sub>opr</sub>	-40 to 85	°C

## DC Characteristics (Ta = 25°C)

Characteristics		Symbol	Condition	V <sub>CC</sub> (V)	Min	Typ.	Max	Unit
Output Voltage	Hi-Level	V <sub>OH</sub>	I <sub>OH</sub> = -1.0 mA	2.3 to 3.6	V <sub>CC</sub> x 90%	—	—	V
	Lo- Level	V <sub>OL</sub>	I <sub>OL</sub> = 1.0 mA	2.3 to 3.6	—	—	V <sub>CC</sub> x 10%	
Supply Current	Average Current	I <sub>CC</sub>	Current at pulse driving (Note 3, Fig. A)	2.3 to 2.7	—	5.5	9.5	μA
				3.0 to 3.6	—	8.7	13.2	
	Operating Current	I <sub>CCON</sub>	Peak current (Note 3, Fig. A)	2.3 to 3.6	—	0.7	1.3	mA
Operating Frequency		f <sub>opr</sub>	(Fig. A)	2.3 to 3.6	—	25	—	Hz

Note 3: Supply Current is pulsed periodically by internal circuit.

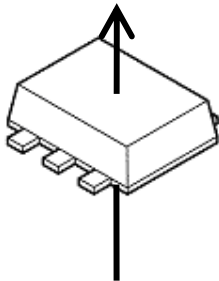
## Magnetic Characteristics (Ta = 25°C)

Characteristics		Symbol	Condition (Note 4, Fig. B)	V <sub>CC</sub> (V)	Min	Typ.	Max	Unit
Magnetic Flux Density	Operating Point	B <sub>ON</sub>	V <sub>OUT</sub> = V <sub>OL</sub>	2.3 to 3.6	-2.5	-1.8	—	mT
	Releasing Point	B <sub>OFF</sub>	V <sub>OUT</sub> = V <sub>OH</sub>	2.3 to 3.6	—	-0.8	-0.3	
	Hysteresis	B <sub>H</sub>	B <sub>ON</sub> - B <sub>OFF</sub>	2.3 to 3.6	—	1.0	—	

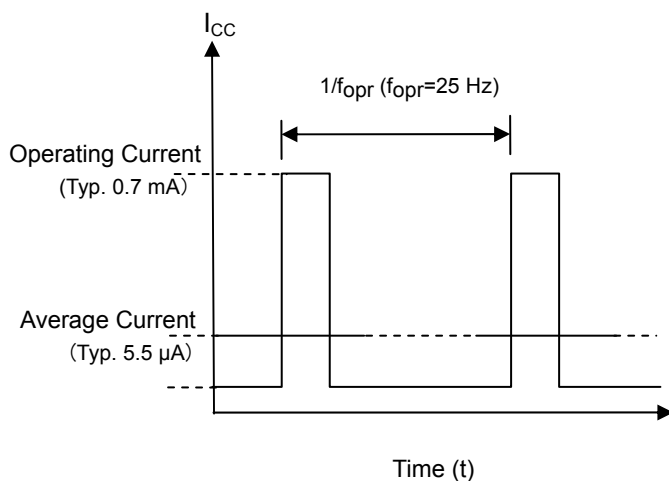
Note 4: Uniform magnetic field perpendicularly to the magnetic sensor.

Note: Direction of the magnetic field

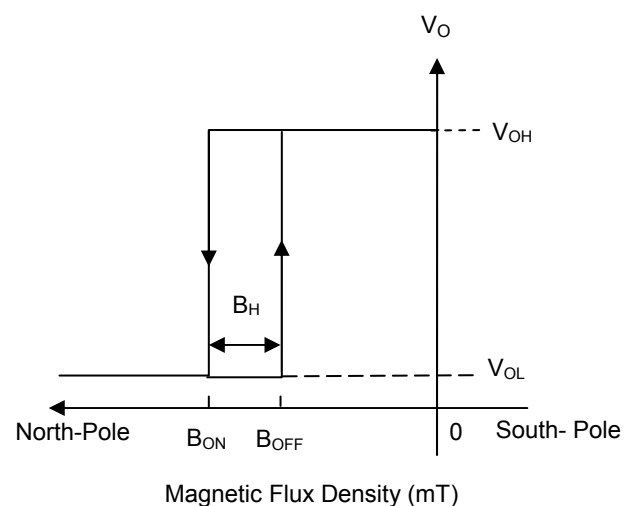
### Magnetic Field, B



(Fig. A) : I<sub>CC</sub> Characteristics

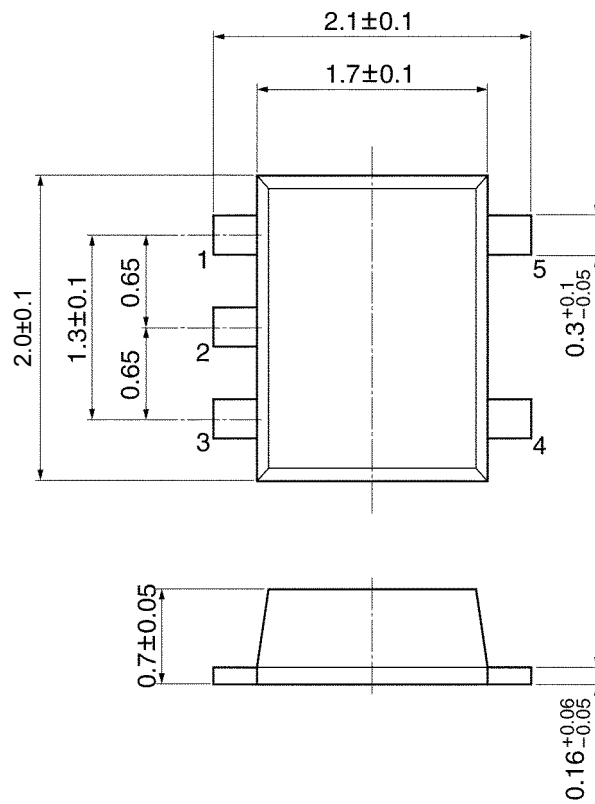


(Fig. B) : Operating Characteristics



## Package Dimensions

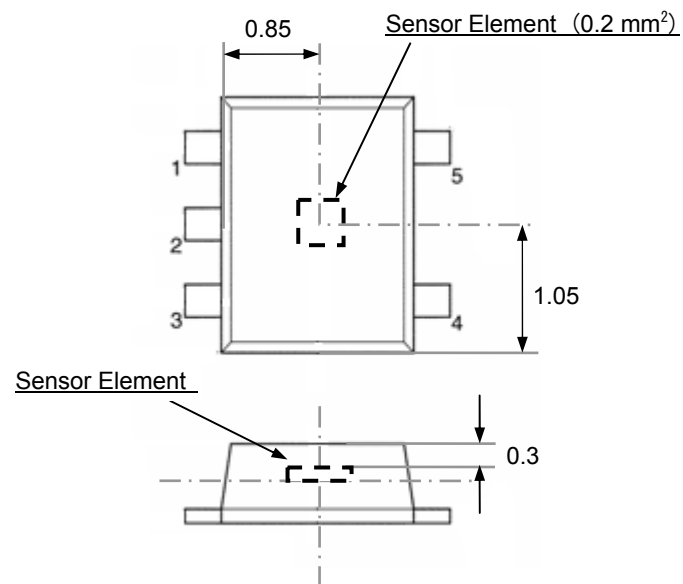
Unit: mm



Weight: 0.007 g (typ.)

## Layout of Sensor Element

Unit: mm



Note) Dimensional tolerances are  $\pm 0.1$  mm, unless otherwise specified.

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