

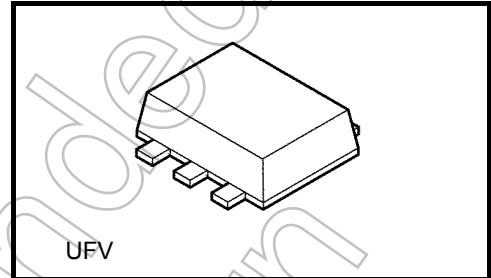
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TCS10SPU

Digital-Output Magnetic Sensor

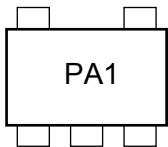
**Feature**

- Push-Pull Output
- South-pole Detection

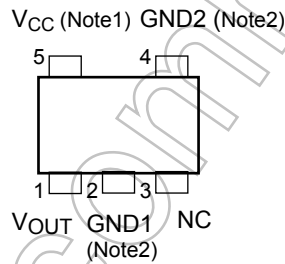


Weight: 7.0 mg (typ.)

**Marking**



**Pin Assignment (Top View)**



**Function Table**

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

Note 1: A 0.47 $\mu$ F capacitor should be connected near the device. This condition will not guarantee successful operation. Check the performance through evaluation using the actual application to set the condition.

Note 2: The GND1 and GND2 pins should be tied to ground. The GND2 pin is used as a test pin during production.

Start of commercial production  
2007-12

**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 3.0 to 3.6	—	5.5 8.7	9.5 13.2	μA
	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.

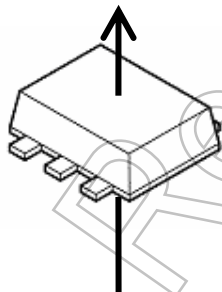
**Magnetic Characteristics (Ta = 25°C)**

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	—	1.8	2.5	mT
	Releasing Point	B <sub>OFF</sub>	V <sub>OUT</sub> = V <sub>OH</sub>	2.3 to 3.6	0.3	0.8	—	
	Hysteresis	B <sub>H</sub>	B <sub>ON</sub> - B <sub>OFF</sub>	2.3 to 3.6	—	1.0	—	

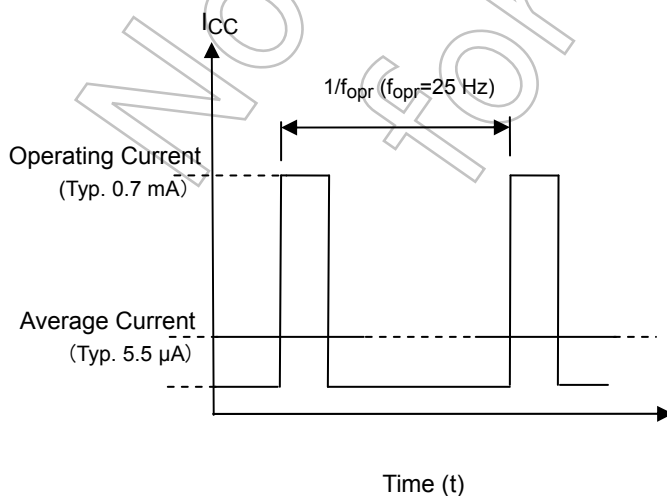
Note 4: Uniform magnetic field perpendicularly to the magnetic sensor.

Note: Direction of the Magnetic field

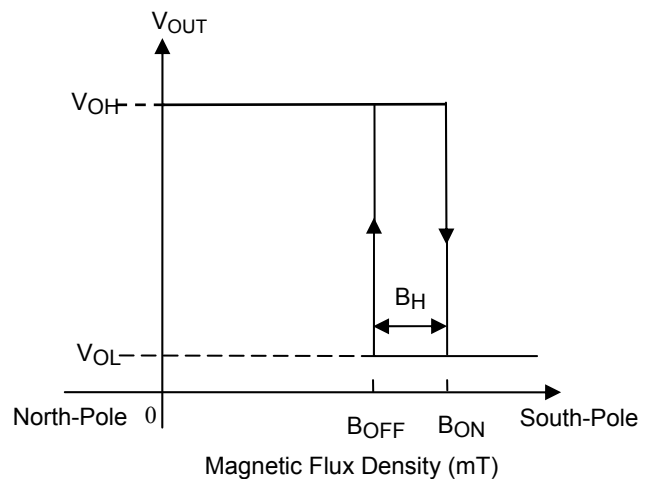
**Magnetic Field, B**



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

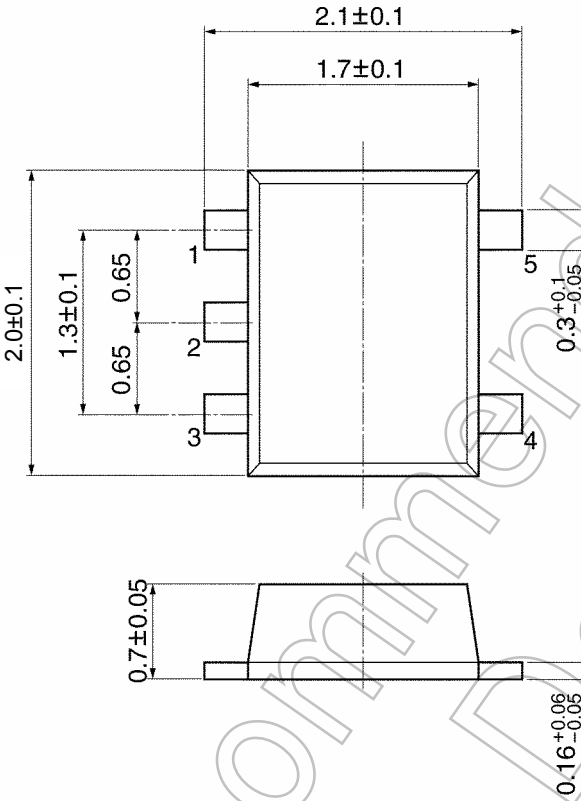


(Fig. B) : Operating Characteristics



Package Dimensions

Unit: mm

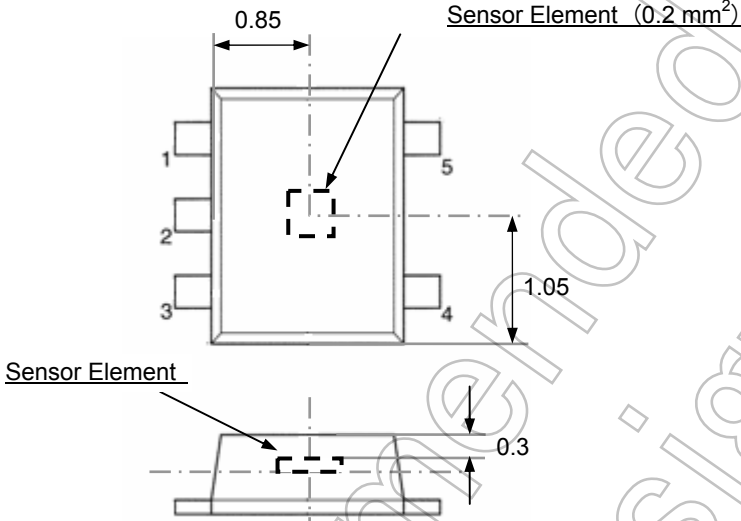


Weight: 7.0 mg (typ.)

Not Recommended for New Design

Layout of Sensor Element

Unit: mm



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

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