

# TCS30NPU

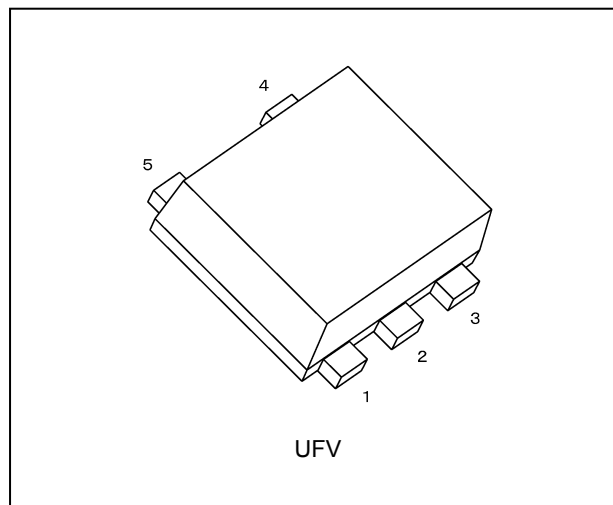
## 1. Functional Description

- Digital-Output Magnetic Sensor

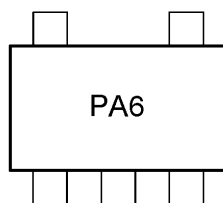
## 2. Features

- (1) Output configuration: Push-pull
- (2) Pole detected: North pole

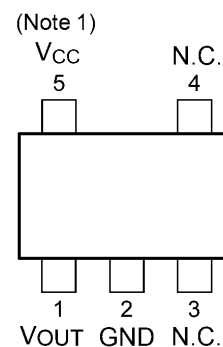
## 3. Packaging



## 4. Marking and Pin Assignment



Marking



Pin Assignment (top view)

Note 1: A 0.47  $\mu$ F capacitor should be connected near the device.

However, this does not guarantee proper operation.

Evaluate the performance of an actual application to determine circuit conditions.

## 5. Function Table

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

Start of commercial production

2017-06

### 6. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	-0.5 to 6.0	V
Output voltage	$V_{OUT}$	-0.5 to 6.0	V
Output diode current	$I_{OK}$	$\pm 10$	mA
Output current	$I_{OUT}$	$\pm 5$	mA
$V_{CC}/GND$ current	$I_{CC}$	$\pm 10$	mA
Power dissipation	$P_D$	200	mW
Storage temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$

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.

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).

### 7. Operating Range

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	2.3 to 3.6	V
Output voltage	$V_{OUT}$	0 to $V_{CC}$	V
Output current	$I_{OH}, I_{OL}$	$\pm 1.0$	mA
Operating temperature	$T_{opr}$	-40 to 85	$^\circ\text{C}$

### 8. Electrical Characteristics

#### 8.1. DC Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Note	Test Condition	$V_{CC}$ (V)	Min	Typ.	Max	Unit
High-level output voltage	$V_{OH}$		$I_{OH} = -1.0\text{ mA}$	2.3 to 3.6	$V_{CC} \times 90\%$	—	—	V
Low-level output voltage	$V_{OL}$		$I_{OL} = 1.0\text{ mA}$	2.3 to 3.6	—	—	$V_{CC} \times 10\%$	V
Average current (intermittent)	$I_{CC(AVE)}$	(Note 1)	See Fig. 8.1.1.	2.3 to 2.7	—	5.5	9.5	$\mu\text{A}$
				3.0 to 3.6	—	8.7	13.2	
Operating current (intermittent)	$I_{CC(ON)}$	(Note 1)	See Fig. 8.1.1.	2.3 to 3.6	—	0.7	1.3	mA
Operating frequency	$f_{opr}$		See Fig. 8.1.1.	2.3 to 3.6	—	25	—	Hz

Note 1: The supply current is pulsed periodically by internal circuitry.

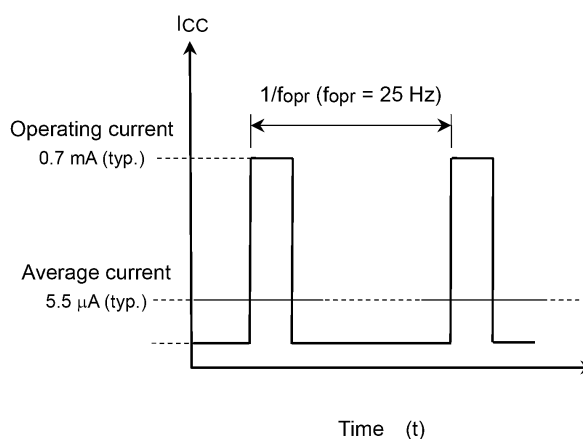


Fig. 8.1.1  $I_{CC}$  Characteristics During Intermittent Operation

#### 8.2. Magnetic Characteristics (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	$V_{CC}$ (V)	Min	Typ.	Max	Unit
North pole operating magnetic flux density	$B_{ONN}$	$V_{OUT} = V_{OL}$ See Fig. 8.2.1, 8.2.2.	2.3 to 3.6	-2.5	-1.8	—	mT
North pole operating magnetic flux density	$B_{OFFN}$	$V_{OUT} = V_{OH}$ See Fig. 8.2.1, 8.2.2.	2.3 to 3.6	—	-0.8	-0.3	mT
Hysteresis magnetic flux density	$B_H$	$ B_{ON} - B_{OFF} $ See Fig. 8.2.1, 8.2.2.	2.3 to 3.6	—	1.0	—	mT

Note: Uniform magnetic field perpendicular to the magnetic sensor.

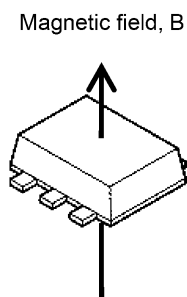


Fig. 8.2.1 Magnetic Field Direction

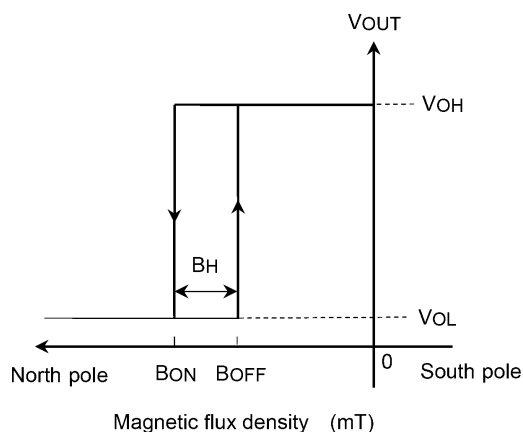
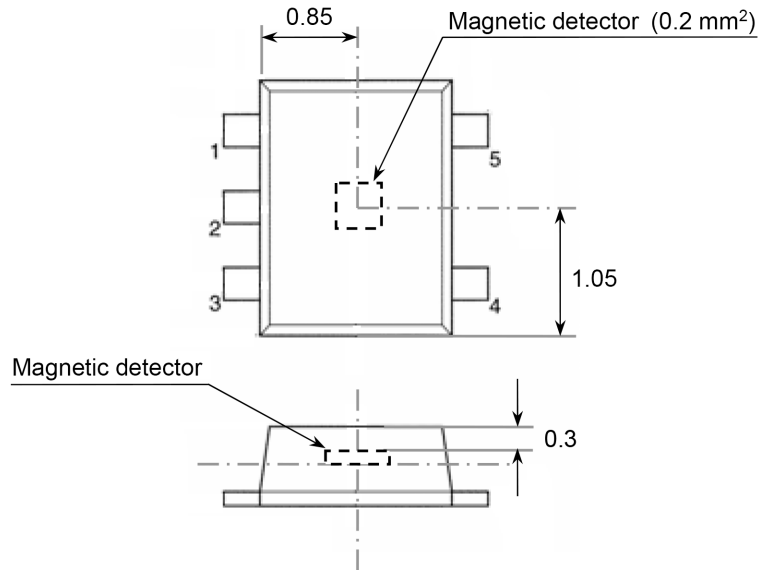


Fig. 8.2.2 Operating Characteristics

## 9. Magnetic Detector Layout (Note)

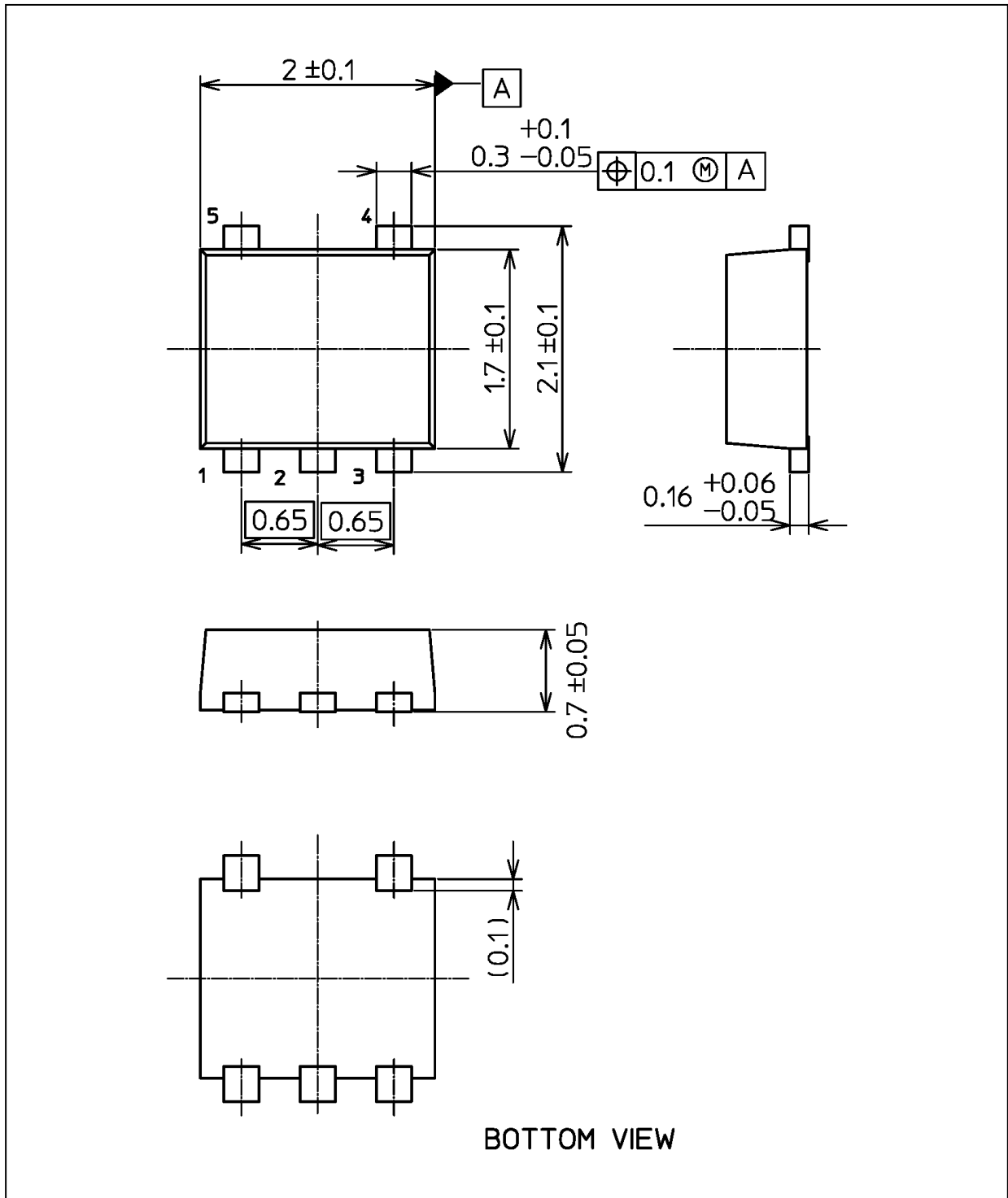
Unit: mm



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

## Package Dimensions

Unit: mm



Weight: 7.0 mg (typ.)

Package Name(s)
Nickname: UFV

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