

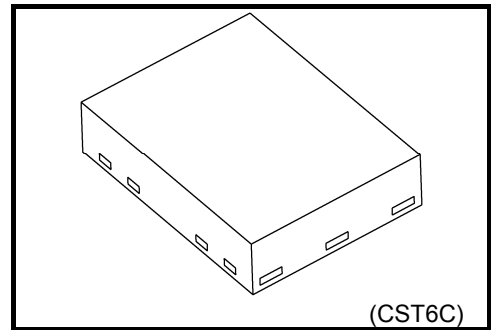
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TCS30DLC

Digital Output Magnetic Sensor

TCS30DLC is a CMOS Digital Output Magnetic Sensor with Open-Drain output, featuring low voltage operation and low current consumption. The detection type is South-Pole and North-Pole (Double detection)

TCS30DLC is offered in ultra thin and compact CST6C (1.15 mm × 1.50 mm × 0.38 mm). Thus, this device is ideal for portable applications that require high-density board assembly such as cellular phones.

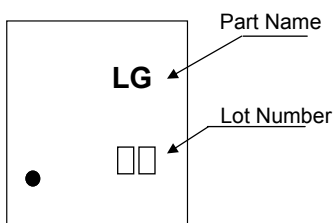


Weight: 2.0 mg (Typ.)

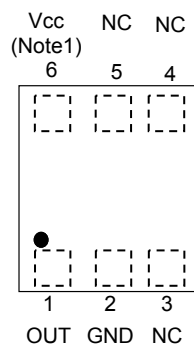
Features

- Low voltage operation : $V_{CC} = 1.6$ to 3.6 V
- Low current consumption : $I_{CC} = 4.6 \mu\text{A}$ (Typ.) at $V_{CC} = 1.6$ V
- South-Pole and North-Pole Detections (Double detection)
- Open-Drain output structure
- Ultra thin and small package CST6C (1.15 mm × 1.50 mm × 0.38 mm)

Marking



Pin Assignment (top view)



Function Table

Magnetic Flux Density	Output
$\geq B_{ON}$	L
$\leq B_{OFF}$	Z(Note 2)

Note 1: A $0.47\mu\text{F}$ 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: In high impedance condition.

Absolute Maximum Ratings (Ta = 25°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}	-10	mA
Output Current	I _{OUT}	5	mA
V _{CC} /GND Current	I _{CC}	± 10	mA
Power Dissipation	P _D	100 (Note 3)	mW
Storage Temperature Range	T _{stg}	-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).

Note 3: FR4 in board implementation (25.4mm x 25.4mm x 1.6mm, Cu Pad: 0.4mm²)

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply Voltage	V _{CC}	1.6 to 3.6	V
Output Voltage	V _{OUT}	0 to 5.5 (Note 4)	V
Output Current	I _{OL}	1.0	mA
Operating Temperature	T _{opr}	-40 to 85	°C

Note 4: V_{CC} = 0.0 V or when output impedance is high.

DC Characteristics (Ta = 25°C)

Characteristics		Symbol	Condition	V _{CC} (V)	Min.	Typ.	Max.	Unit
Output Voltage	Low-Level	V _{OL}	I _{OL} = 0.5 mA	1.6	—	—	0.16	V
			I _{OL} = 1.0mA	2.5	—	—	0.25	
				3.3	—	—	0.33	
				3.6	—	—	0.36	
Output Leakage Current		I _{OFF}	V _{out} = 5.5V	0	—	0.5	1	μA
Supply Current	Average Current	I _{CC}	Current at pulse driving (Note 5, Fig. A)	1.6	—	4.6	9.0	μA
				2.5	—	8.4	—	
				3.3	—	12	—	
	Operating Current	I _{CCON}	Peak current (Note 5, Fig. A)	1.6	—	0.4	0.9	mA
				2.5	—	0.7	—	
				3.3	—	0.9	—	
Operating Frequency		f _{opr}	(Fig. A)	1.6 to 3.6	—	25	—	Hz

Note 5: Supply current is pulsed periodically by internal circuit.

Magnetic Characteristics (Ta = 25°C)

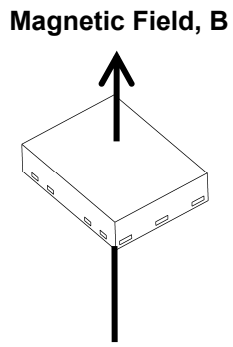
Characteristics		Symbol	Condition (Note 6 and 7, Fig. B)	V _{CC} (V)	Min.	Typ.	Max.	Unit
Magnetic Flux Density	Operating Point	B _{ONS} B _{ONN}	When output logic turns High to Low	1.6 to 3.6	—	3.2	4.4	mT*
	Releasing Point	B _{OFFS} B _{OFFN}	When output logic turns Low to High	1.6 to 3.6	0.5	1.5	—	
	Hysteresis	B _H	B _{ON} - B _{OFF}	1.6 to 3.6	—	1.7	—	

*1mT = 10Gauss

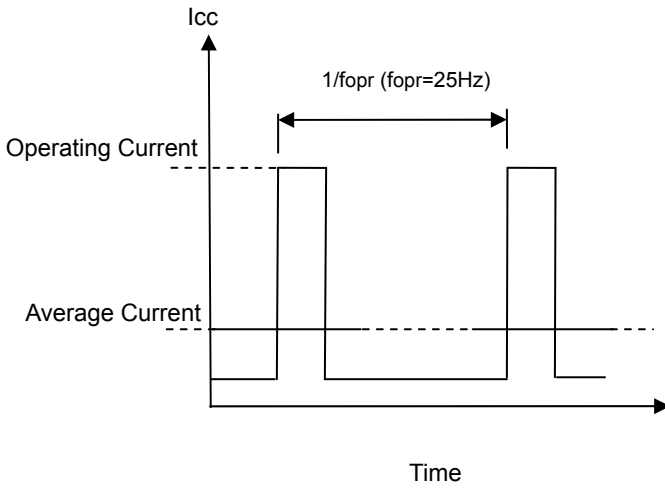
Note 6: Uniform magnetic field perpendicularly to the magnetic sensor.

Note 7: Output logic is High level with pull-up resistance.

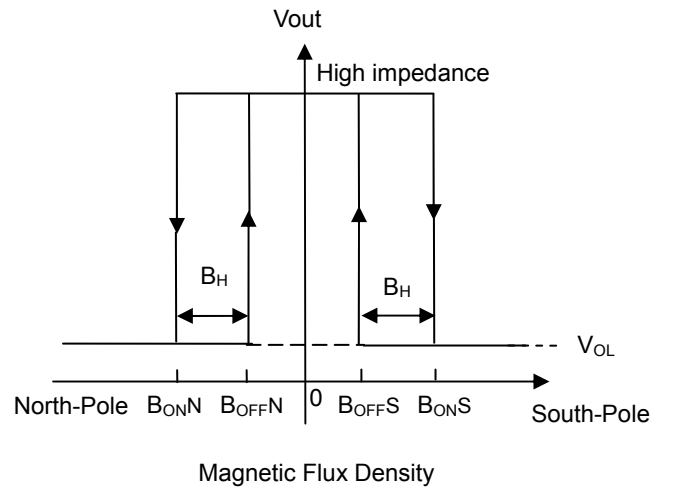
Note: Direction of Magnetic field



(Fig. A): I_{cc} Characteristics

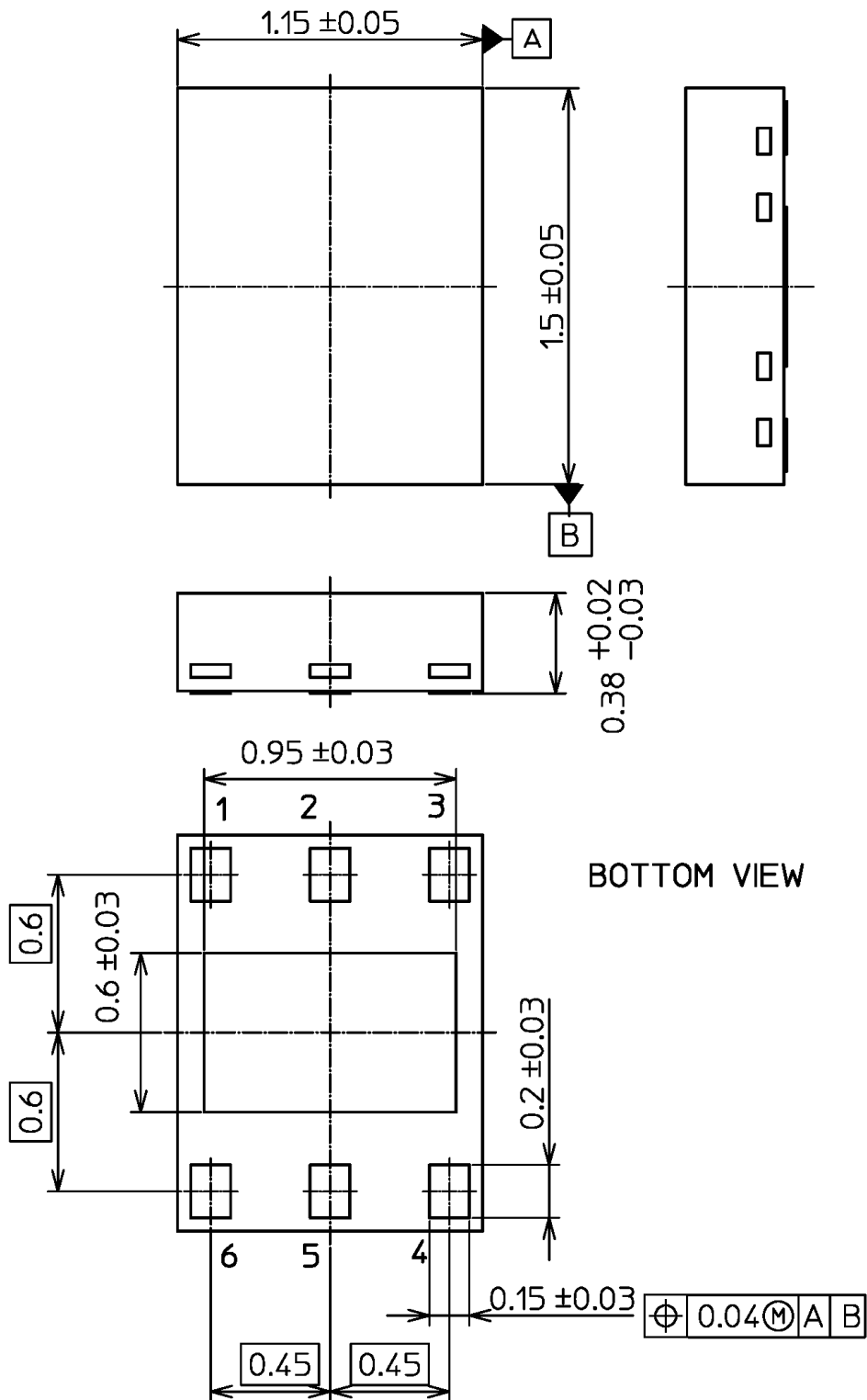


(Fig. B): Operating Characteristics



Package Dimension

Unit: mm



Weight: 2.0 mg (Typ.)

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