

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

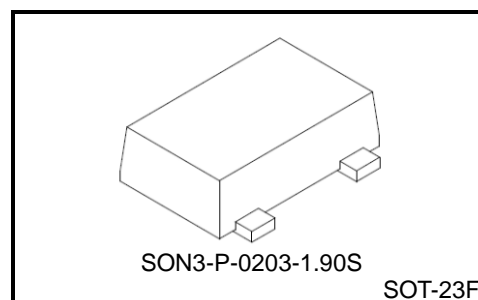
TCS40DLR

Digital Output Magnetic Sensor

Feature

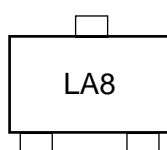
Open-Drain Output

South-Pole and North-Pole Detections

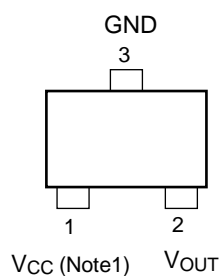


Weight: 11.0 mg (typ.)

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 μ F capacitor should be connected near the device. This condition will not guarantee successful operation. Check the performance thorough evaluation using the actual application to set the condition.

Note 2: In high impedance state.

Start of commercial production
2015-05

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	1 (Note 3)	W
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: Mounted on a FR4 board.

(25.4 mm × 25.4 mm × 1.6 mm, Cu Pad: 645 mm²)

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply Voltage	V _{CC}	2.3 to 5.5	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 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	VOL	I _{OL} = 1.0 mA	2.3	—	—	0.23	V
				2.5	—	—	0.25	
				3.3	—	—	0.33	
				3.6	—	—	0.36	
				5.0	—	—	0.50	
Output Leakage Current		I _{OFF}	V _{OUT} = 5.5 V	0	—	0.5	1	μA
Supply Current	Average Current	I _{CC}	Current at pulse driving (Note 5, Fig. A)	2.3	—	7.3	13.2	μA
				2.5	—	8.5	—	
				3.3	—	12.8	—	
				5.0	—	19.0	—	
	Operating Current	I _{CCON}	Peak current (Note 5, Fig. A)	2.3	—	0.7	1.1	mA
				2.5	—	0.8	—	
				3.3	—	1.2	—	
				5.0	—	1.6	—	
Operating Frequency		f _{opr}	(Fig. A)	2.3 to 5.0	—	25	—	Hz

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

Magnetic Characteristics (Ta = 25°C)

Characteristics		Symbol	Condition (Note 6and 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	2.3 to 3.6	—	3.4	4.4	mT*
				5.0	—	2.8	4.4	
	Releasing Point	B _{OFFS} B _{OFFN}	When output logic turns Low to High	2.3 to 3.6	0.9	2.0	—	
				5.0	0.4	1.5	—	
	Hysteresis	B _H	B _{ON} - B _{OFF}	2.3 to 5.0	—	1.4	—	

*1 mT = 10 Gauss

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

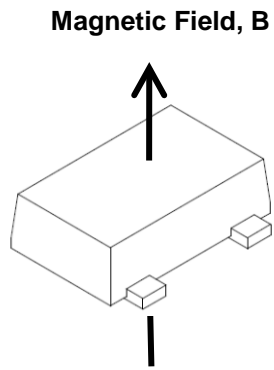


Fig. A: I_{CC} Characteristics

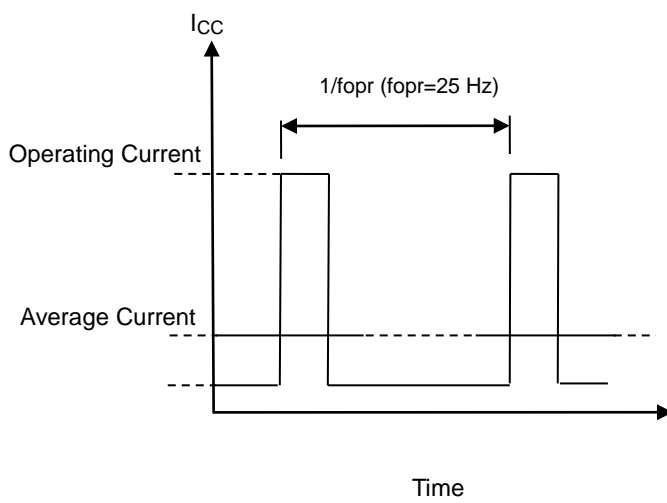
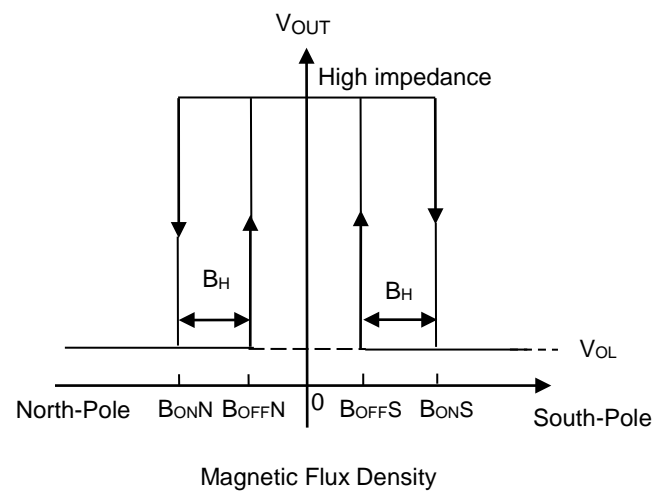


Fig. B: Operating Characteristics



SON3-P-0203-1.90S

Technical drawing of a mechanical part showing three views: front, top, and side.

Front View:

- Overall width: 2.9 ± 0.2
- Overall height: 2.4 ± 0.1
- Central vertical slot width: 1.8 ± 0.1
- Side slots: Two slots, each with a width of 0.95 .
- Bottom feature: A hole with a diameter of $0.42^{+0.08}_{-0.05}$, a tolerance of 0.1 , and a material symbol A .

Top View:

- Overall width: $0.8^{+0.08}_{-0.05}$
- Overall height: $0.17^{+0.08}_{-0.07}$
- Central vertical slot width: $0.17^{+0.08}_{-0.07}$
- Side slots: Two slots, each with a width of 0.95 .

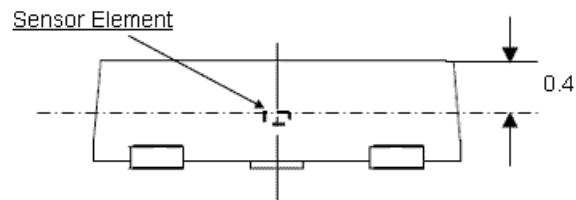
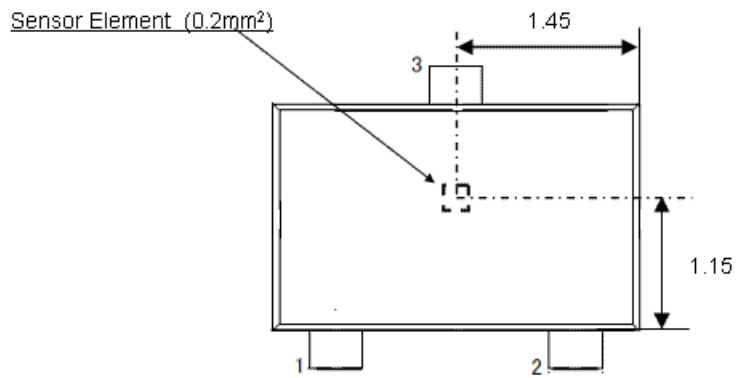
Side View:

- Overall width: $0.17^{+0.08}_{-0.07}$
- Overall height: $0.42^{+0.08}_{-0.05}$
- Central vertical slot width: $0.17^{+0.08}_{-0.07}$
- Side slots: Two slots, each with a width of 0.95 .

2015-04-03

Layout of Sensor Element

Unit: mm



Note: Dimensional tolerances are ± 0.1 mm, unless otherwise specified.

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