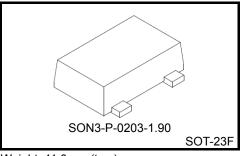
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TCS20DLR

Digital Output Magnetic Sensor

#### Feature

Open-Drain Output South-Pole and North-Pole Detections

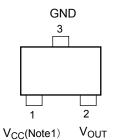


Weight: 11.0 mg (typ.)

#### Marking



## Pin Assignment (Top View)



**Function Table** 

Magnetic Flux Density	Output		
$\geq B_{ON}$	L		
≤ B <sub>OFF</sub>	Z(Note 2)		

Note 1 : A 0.47µF 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.

# 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	IOK	-10	mA
Output Current	IOUT	5	mA
Vcc/GND Current	ICC	±10	mA
Power Dissipation	PD	1 (Note 3)	W
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).

Note 3: Mounted on a FR4 board.

(25.4 mm  $\times$  25.4 mm  $\times$  1.6 mm, Cu Pad: 645 mm²)

#### **Operating Ranges**

Characteristics	Symbol	Rating	Unit
Supply Voltage	V <sub>CC</sub>	2.3 to 5.5	V
Output Voltage	V <sub>OUT</sub>	0 to 5.5 (Note 4)	V
Output Current	I <sub>OL</sub>	1.0	mA
Operating Temperature	T <sub>opr</sub>	-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 <sub>CC</sub> (V)	Min	Тур.	Max	Unit
Output Voltage	Low Level	V <sub>OL</sub>	I <sub>OL</sub> = 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	Output Leakage Current		V <sub>OUT</sub> = 5.5V	0		0.5	1	μA
Supply Current	Average Current	lcc	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 <sub>CC</sub> ON	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 <sub>opr</sub>	(Fig. A)	2.3 to 5.0	_	25	_	Hz

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

# Magnetic Characteristics (Ta = 25°C)

Cha	aracteristics	Symbol	Condition (Note 6and 7, Fig. B)	V <sub>CC</sub> (V)	Min	Тур.	Max	Unit
Magnetic Flux Density	Operating Point	B <sub>ON</sub> S	When output logic turns High to Low	2.3 to 3.6	_	3.4	4.4	
		B <sub>ON</sub> N		5.0	_	2.8	4.4	
	Releasing Point	B <sub>OFF</sub> S	When output logic turns Low to High	2.3 to 3.6	0.9	2.0	_	mT*
		B <sub>OFF</sub> N		5.0	0.4	1.5	_	
	Hysteresis	B <sub>H</sub>	B <sub>ON</sub> - B <sub>OFF</sub>	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.

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Note : Direction of Magnetic field

Magnetic Field, B

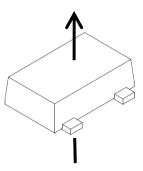
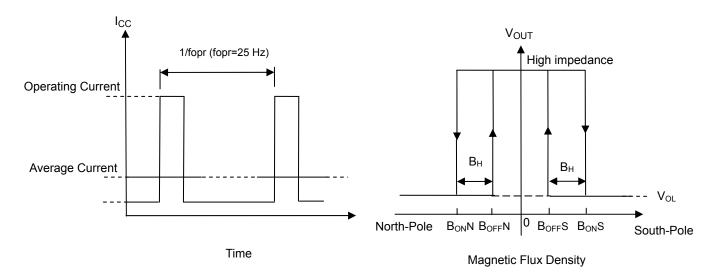


Fig. A : I<sub>CC</sub> Characteristics

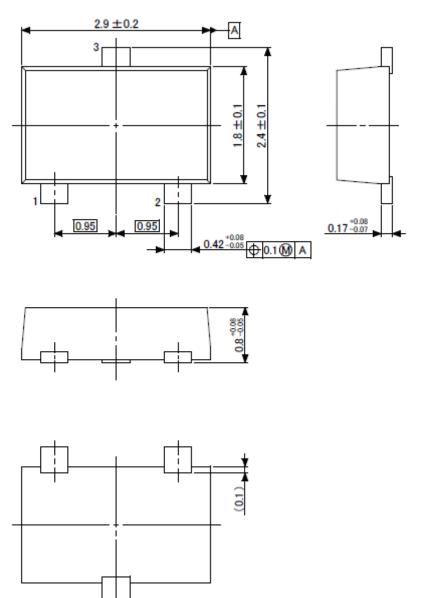




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# Package Dimension

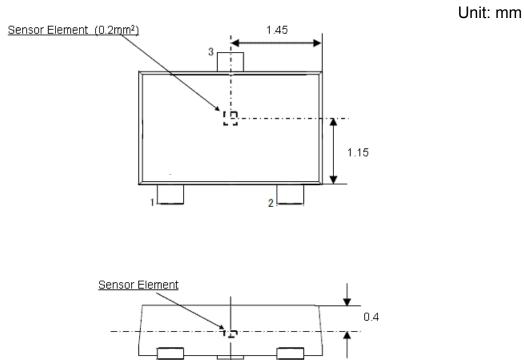
Unit: mm



Weight: 11.0 mg (Typ.)

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#### Layout of Sensor Element



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

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