SL1605

Hall switch sensor

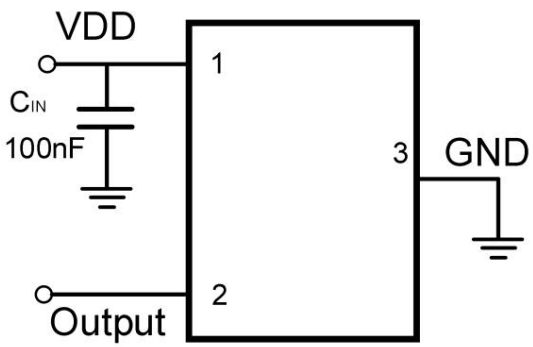
1 Product Features ÿ

Low power consumption - 5Hz version: 1.6uA@1.8V - 20Hz version: 3.3uA@1.8V ÿ Wide operating voltage range: 1.6V~5.5V ÿ Magnetic field threshold optional (Bop) - 33Gs low threshold - 46Gs high threshold ÿ Omni-polar magnetic field detection ÿ CMOS push-pull output ÿ Package: SOT-553 ÿ Operating temperature range: -40ÿ~85ÿ ÿ Excellent ESD performance: HBM 8KV ÿ RoHS compliant

2 Typical applications ÿ

Laptop and tablet switch detection ÿ TWS headsets, mobile phones ÿ Electronic locks, valve position detection ÿ Water meters, gas meters, flow meters ÿ Non-contact detection

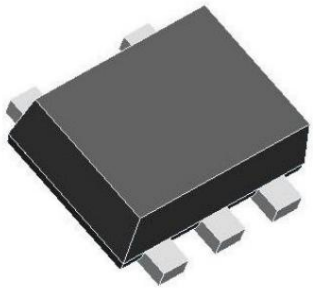
3 Application circuit schematic diagram



Note: In order to filter the noise at the power supply end of the chip, a 100nF capacitor needs to be connected between the power supply and ground, and the capacitor should be as close to the VDD pin as possible.

4 Overview

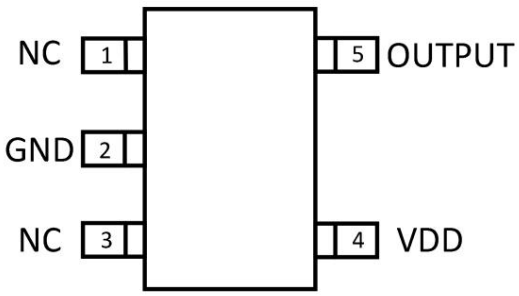
It is a low-power Hall switch sensor designed for space-constrained systems and battery-sensitive systems. The chip is available in a variety of magnetic field thresholds, switching operating frequencies and packaging styles to suit various applications. When the applied S-pole or N-pole magnetic induction intensity exceeds the operating point BOP, the chip outputs a low level and remains low. Until the S pole or N pole magnetic induction intensity is lower than the release point BRP, the chip outputs a high level. The chip has built-in temperature compensation circuit and clock logic circuit to ensure the stable operating point and switching frequency of the chip. The chip can provide omnipolar magnetic response with extremely low current consumption. The SL1605 package can operate within a supply voltage range of 1.6V to 5.5V and uses the standard SOT-553



TODAY-553

5 pin definition and labeling information

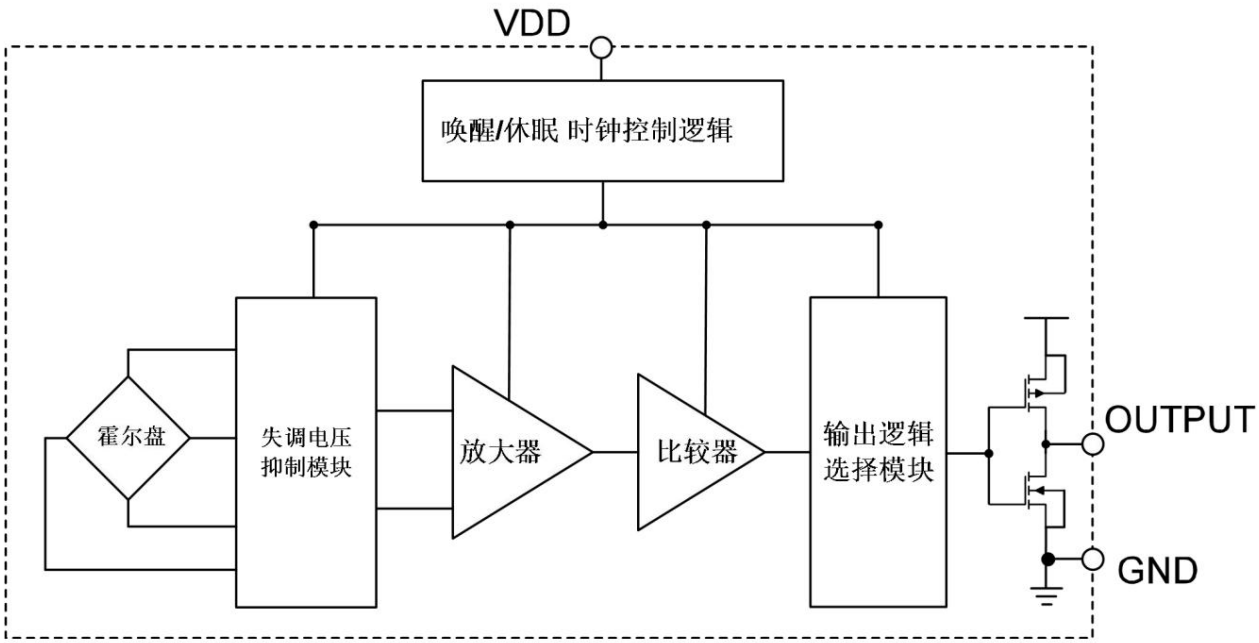
TODAY-553



Pin structure (top view)

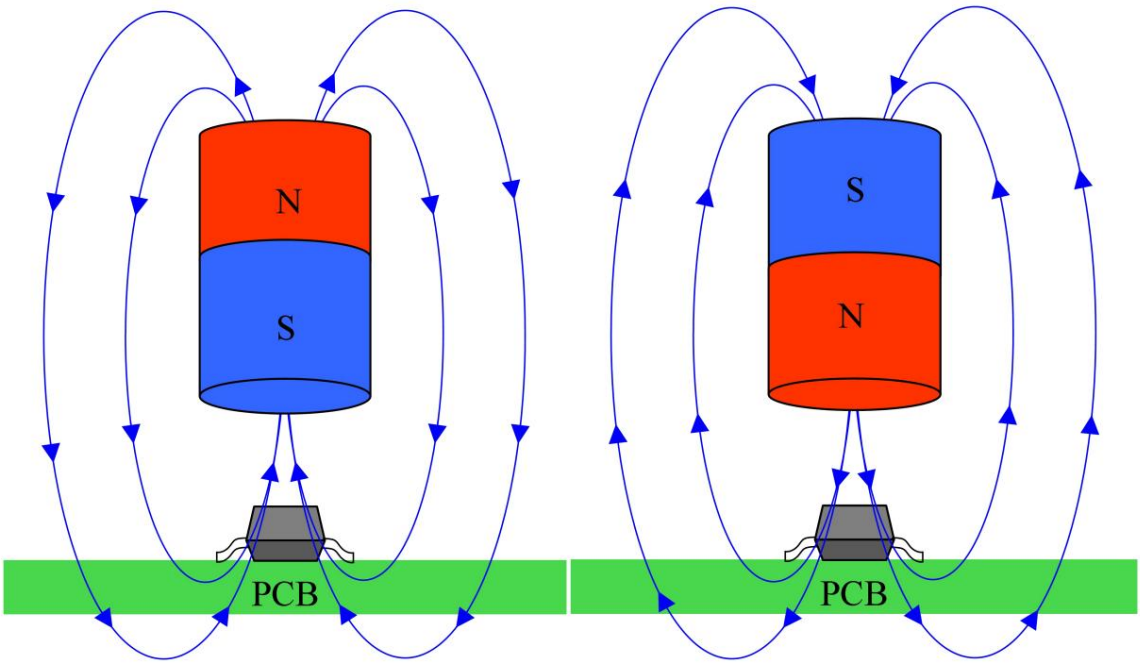
Pin name	Pin number	Function description
VDD	4	Power input terminal
OUTPUT	5	Output
GND	2	Ground terminal
NC	1ÿ3	vacant end

6Functional block diagram

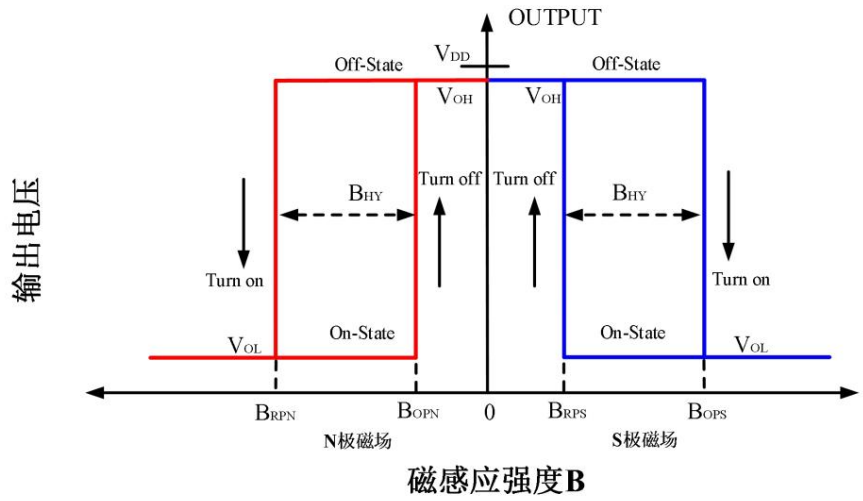


7Switch output characteristics

As shown in the figure below, when the south pole of the magnet is close to the top of the chip, the magnetic field lines pass from the bottom to the top of the chip, and the magnetic induction intensity B is considered to be positive at this time; when the north pole of the magnet is close to the top of the chip, the magnetic field lines pass from the top to the bottom of the chip. It is considered that the magnetic induction intensity B is negative at this time.



Output characteristics



8 product model composition

SL 1605 - X X

Magnetic field threshold: H: High threshold BOP=46 Gauss

L: Low threshold BOP=33 Gauss

Operating frequency: T: Typical version f = 20Hz

S: Low speed version f = 5Hz

9Absolute maximum ratings **(@TA=+25ÿ,** unless otherwise stated)

project	Parameter Description	numerical value	unit
VDD supply voltage		6	IN
VDD_REV reverse supply voltage		-0.3	IN
IOUTPUT output drive current		5	mA
B magnetic induction intensity		unlimited	Gauss
PD package		400	mW
TSTG operating temperature range		-50ÿ+150	oC
The highest temperature resistance of TJ junction		+150	oC
ESD HBM Human Body Model ESD Capability		8000	IN

NOTE: Exceeding absolute maximum ratings may cause permanent damage. Operating under absolute maximum rated conditions for a long time may affect the reliability of the chip.

Reliability.

10Reference working conditions **(@TA=+25ÿ,** unless otherwise specified)

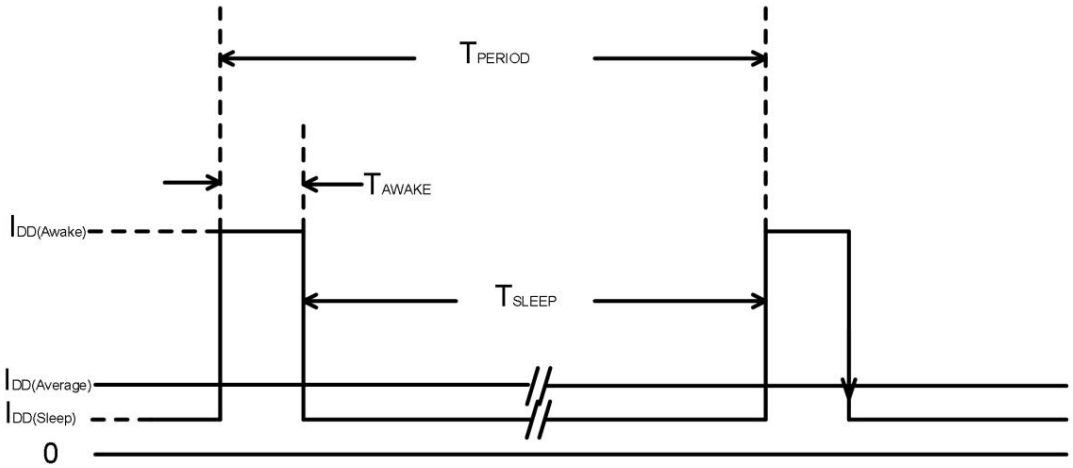
project	Parameter	working	numerical value	unit
VDD	description Supply voltage	conditions chip	1.6ÿ5.5	IN
FACING	range Operating temperature range	working chip working	-40ÿ85	oC

11 Electrical parameters **(@TA=+25ÿ, VDD=1.8V** unless otherwise specified)

SL1605-TX series						
project	Parameter Description	working conditions	Minimum value.	Typical value	Maximum value	unit
VDD	Supply voltage	working status	1.6	-	5.5	IN
VOL	Output low level	IOUT=1mA	-	0.02	0.1	IN
VOH	Output high level	IOUT=1mA	VDD-0.1	VDD-0.02 — V		
IDD(AVG)	average current	TA=+25ÿÿVDD=1.8V	-	3.30	— uA	
IDD (awake)	Wake-up state current	TA=+25ÿÿVDD=1.8V	-	2.0	— mA	
IDD(Sleep)	Sleep state current	TA=+25ÿÿVDD=1.8V	-	1.00		uA
DRUGS	wake time	working status	-	5	— ÿs	
TPERIOD	cycle	working status	-	80	— ms	

SL1605-SX series						
project	Parameter Description	working conditions	Minimum value.	Typical value	Maximum value	unit
VDD	Supply voltage	working status	1.6	-	5.5	IN
VOL	Output low level	IOUT=1mA	-	0.02	0.1	IN
VOH	Output high level	IOUT=1mA	VDD-0.1	VDD-0.02 — V		
IDD(AVG)	average current	TA=+25ÿÿVDD=1.8V	-	1.6	— uA	
IDD (awake)	Wake-up state current	TA=+25ÿÿVDD=1.8V	-	2.0	— mA	
IDD(Sleep)	Sleep state current	TA=+25ÿÿVDD=1.8V	-	1.0		uA
DRUGS	wake time	working status	-	5	— ÿs	
TPERIOD	cycle	working status	-	200	— ms	

Note: After the chip is powered on (VDD is 1.6V~5.5V), the output starts sampling, and the output status is valid after the second working cycle.



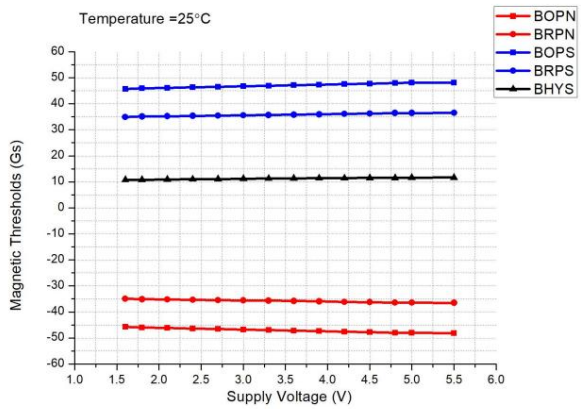
12 Magnetic parameters **(@TA=+25ÿ, VDD=1.8V** unless otherwise specified)

project	Parameter Description	working conditions	Minimum value.	Typical value	Maximum value	unit
SL1605-XH series						
BOPS	Magnetic field operating point	TA=+25ÿ, VDD=1.8V	40	46	52	Gauss
BRPS	Magnetic field release point	TA=+25ÿ, VDD=1.8V	26	34	38	
BOPN	Magnetic field operating point	TA=+25ÿ, VDD=1.8V	-52	-46	-40	
BRPN	Magnetic field release point	TA=+25ÿ, VDD=1.8V	-38	-34	-26	
BHY (|BOPX|-|BRPX|)	Hysteresis		-	12	-	

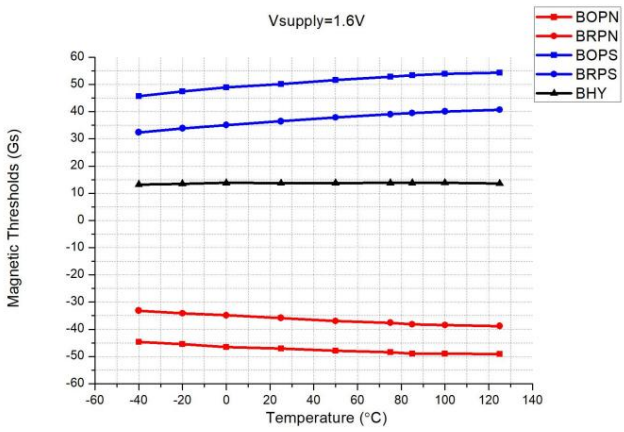
project	Parameter Description	working conditions	Minimum value.	Typical value	Maximum value	unit
SL1605-XL series						
BOPS	Magnetic field operating point	TA=+25ÿ, VDD=1.8V	26	33	38	Gauss
BRPS	Magnetic field release point	TA=+25ÿ, VDD=1.8V	16	23	28	
BOPN	Magnetic field operating point	TA=+25ÿ, VDD=1.8V	-38	-33	-28	
BRPN	Magnetic field release point	TA=+25ÿ, VDD=1.8V	-28	-23	-16	
BHY (|BOPX|-|BRPX|)	Hysteresis			10		

13Performance curve graph

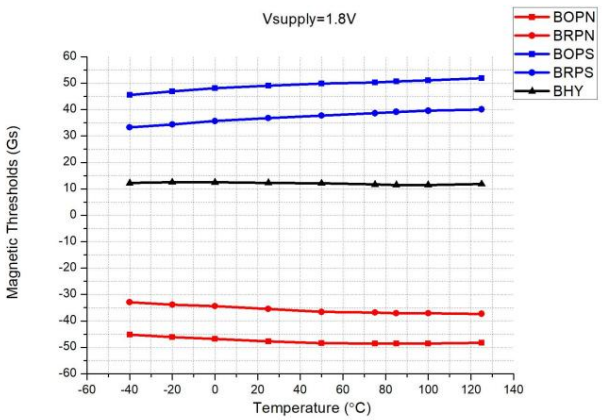
SL1605-XH series (high threshold version)



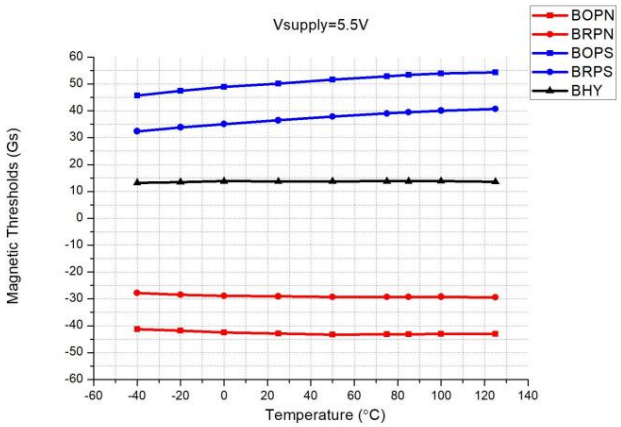
Magnetic field threshold **vs.** supply voltage **@TA=25ÿ**



Magnetic field threshold **vs** temperature **@VDD=1.6**

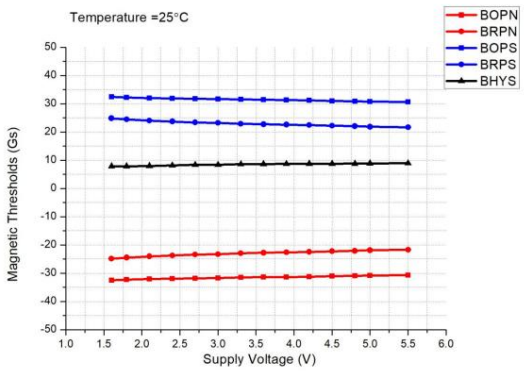


Magnetic field threshold **vs** temperature **@VDD=1.8V**

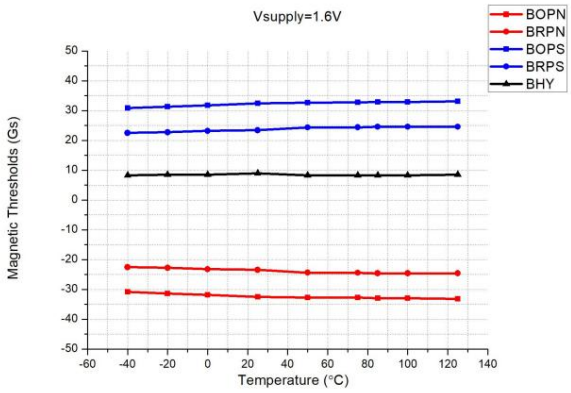


Magnetic field threshold **vs** temperature **@VDD=5.5**

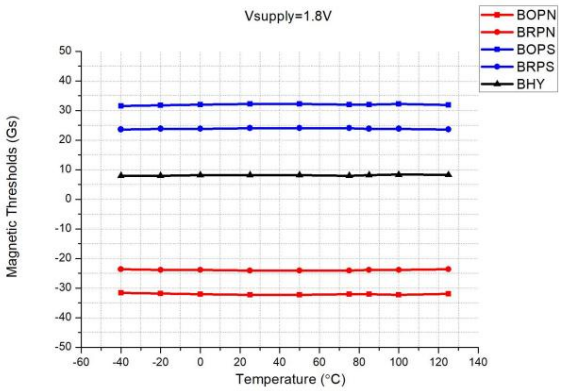
SL1605-XL series (low threshold version)



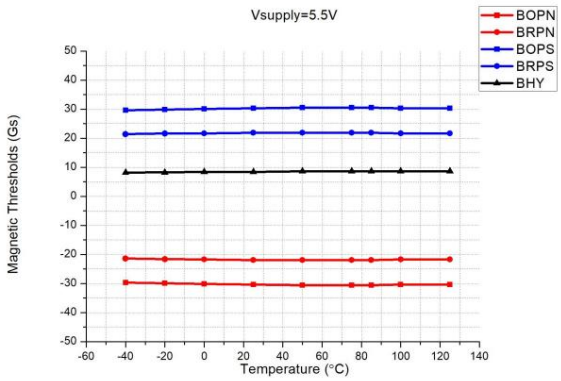
Magnetic field threshold **vs.** supply voltage **@TA=25ÿ**



Magnetic field threshold **vs** temperature **@VDD=1.6V**

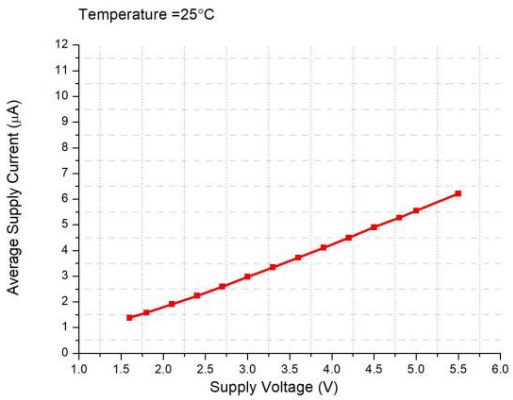


Magnetic field threshold **vs** temperature **@VDD=1.8V**



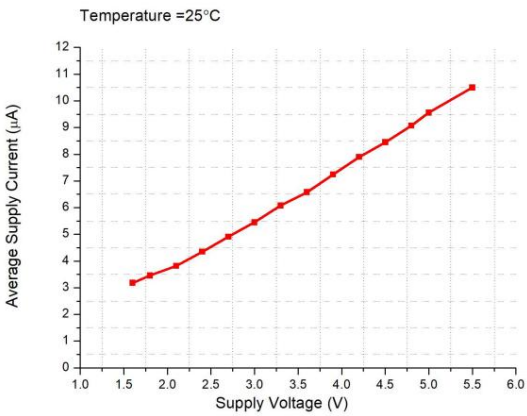
Magnetic field threshold **vs** temperature **@VDD=5.5V**

SL1605- SX series (low speed version)



Average operating current **vs.** supply voltage @ **TA=25ÿ**

SL1605-TX series (typical version)

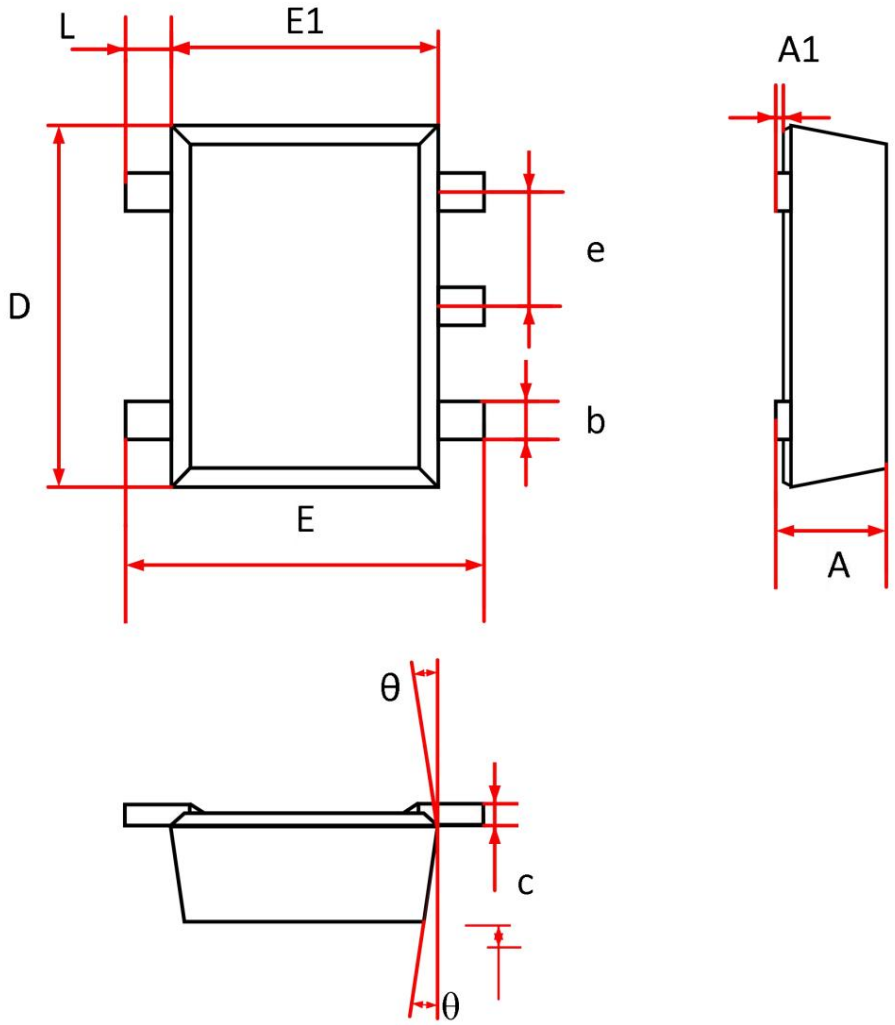


Average operating current **vs.** supply voltage @ **TA=25ÿ**

14Ordering information

model	Package Type	Number of Pins	Magnetic Field Threshold (Bop)	Switching Frequency	Temperature	
SL1605-TH	TODAY-553	3	46Gauss	20Hz	-40ÿ~85ÿ	
SL1605-TL	TODAY-553	3	33Gauss	20Hz	-40ÿ~85ÿ	
SL1605-SH	TODAY-553	3	46Gauss	5Hz	-40ÿ~85ÿ	
SL1605-SL	TODAY-553	3	33Gauss	5Hz	-40ÿ~85ÿ	

TODAY-553



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	0.45	0.60
A1	0.00	0.05
b	0.17	0.27
c	0.09	0.16
It is	0.45	0.55
D	1.50	1.70
AND	1.50	1.70
E1	1.10	1.30
L	0.10	0.30
i	7°REF	