

## 5 V, 1 A H-Bridge Motor Driver

### DESCRIPTION

The SiP2100 is an integrated, buffered H-bridge with TTL and CMOS compatible inputs with the capability of delivering up to 1 A continuous current at 5 V  $V_{DD}$  supply.

The SiP2100 has two independent logic inputs that can set four different motor operation modes: normal rotation, reverse rotation, stop (idling) and braking. The internal shoot-through protection logic also prevents upper and lower outputs from being turned on simultaneously.

The SiP2100 offers high efficiency with an extremely low operating current. The device also benefits from over temperature protection with a shut down hysteresis of 20 °C.

The SiP2100 is available in SOIC8 package.

### FEATURES

- 1 A drive capability
- Optimized for 5 V  $V_{DD}$  bias
- Extremely low idle current
- Shoot-through protection scheme
- Thermal shutdown
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- High performance servo
- Optical/tape disk drives
- Brush/stepper motor driver

### PACKAGE OUTLINE

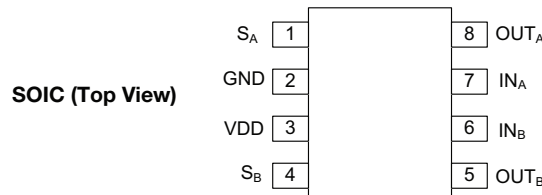


Fig. 1 - Package and Pinout

### FUNCTIONAL BLOCK DIAGRAM AND TRUTH TABLE

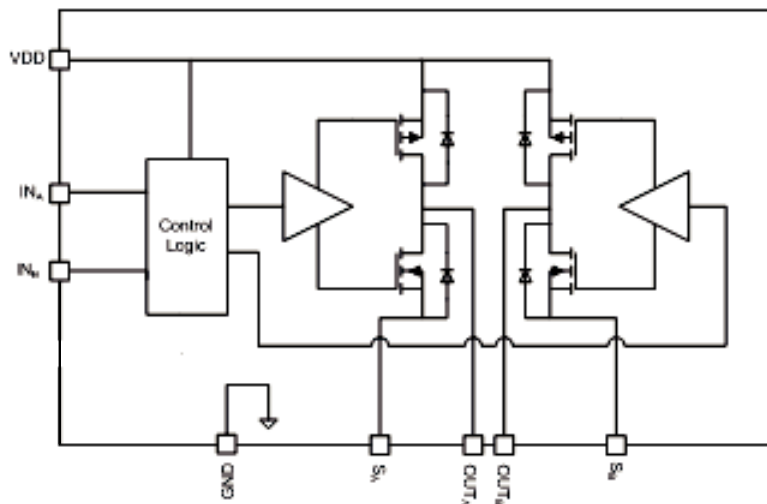


Fig. 2 - Functional Block Diagram

| TRUTH TABLE |        |         |         |
|-------------|--------|---------|---------|
| $IN_A$      | $IN_B$ | $OUT_A$ | $Out_B$ |
| 1           | 0      | 1       | 0       |
| 0           | 1      | 0       | 1       |
| 0           | 0      | 0       | 0       |
| 1           | 1      | HiZ     | HiZ     |

## SiP2100

Vishay Siliconix



| ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted) |                  |                          |      |
|---------------------------------------------------------------------------|------------------|--------------------------|------|
| Electrical Parameter                                                      | Conditions       | Limits                   | Unit |
| V <sub>DD</sub>                                                           | Reference to GND | - 0.3 to 6               | V    |
| OUT <sub>A</sub> , OUT <sub>B</sub>                                       | Reference to GND | - 0.3 to 6               |      |
| S <sub>A</sub> , S <sub>B</sub>                                           | Reference to GND | - 0.3 to 1               |      |
| IN <sub>A</sub> , IN <sub>B</sub>                                         | Reference to GND | - 0.3 to V <sub>DD</sub> |      |
| Temperature                                                               |                  |                          |      |
| Operating Temperature                                                     |                  | - 40 to 85               | °C   |
| Max. Operating Junction Temperature                                       |                  | 150                      |      |

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating/conditions for extended periods may affect device reliability.

| RECOMMENDED OPERATING CONDITIONS |      |      |      |                    |
|----------------------------------|------|------|------|--------------------|
| Parameter                        | Min. | Typ. | Max. | Unit               |
| $V_{DD}$                         | 3.8  | 5    | 5.5  | V                  |
| Temperature                      |      |      |      |                    |
| Operating Junction Temperature   | 0    |      | 125  | $^{\circ}\text{C}$ |
| Recommended Ambient Temperature  | 0    |      | 70   |                    |

| THERMAL RESISTANCE RATINGS               |                                                   |             |                             |
|------------------------------------------|---------------------------------------------------|-------------|-----------------------------|
| Parameter                                |                                                   | Max.        | Unit                        |
| Thermal Resistance (Junction to Ambient) | SO-8, $R_{thJA}$                                  | 153         | $^{\circ}\text{C}/\text{W}$ |
|                                          | SO-8 PowerPAD, $R_{thJC}$                         | 40          |                             |
| Power Dissipation                        | SO-8, $T_A = 70\text{ }^{\circ}\text{C}$          | 522         | mW                          |
|                                          | SO-8 PowerPAD, $T_A = 70\text{ }^{\circ}\text{C}$ | 2           | W                           |
| Junction Temperature                     |                                                   | - 65 to 150 | $^{\circ}\text{C}$          |
| Storage Temperature                      |                                                   | - 55 to 150 |                             |

**SPECIFICATIONS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| Parameter                           | Symbol               | Test Conditions<br>V <sub>DD</sub> = 5 V | Limits                   |                   |                   | Unit |      |
|-------------------------------------|----------------------|------------------------------------------|--------------------------|-------------------|-------------------|------|------|
|                                     |                      |                                          | Min. <sup>a</sup>        | Typ. <sup>b</sup> | Max. <sup>a</sup> |      |      |
| Driver Power Supply                 |                      |                                          |                          |                   |                   |      |      |
| V <sub>DD</sub> Bias Supply Current | I <sub>DD</sub>      | IN = 100 kHz                             |                          | 250               | 300               | μA   |      |
|                                     |                      | IN = 20 kHz                              |                          | 150               | 180               |      |      |
|                                     |                      | Quiescent state                          |                          | 50                |                   |      |      |
| V <sub>DD</sub> Rising Threshold    | V <sub>DD TH_R</sub> | V <sub>DD</sub> rising                   |                          | 2.8               | 3                 | V    |      |
| V <sub>DD</sub> Falling Threshold   | V <sub>DD TH_F</sub> | V <sub>DD</sub> falling                  | 2                        | 2.5               |                   |      |      |
| V <sub>DD</sub> UVLO Hysteresis     | V <sub>DD UVLO</sub> |                                          |                          | 300               |                   | mV   |      |
| Input Logic                         |                      |                                          |                          |                   |                   |      |      |
| Input Voltage High                  | V <sub>IN_H</sub>    |                                          | 2                        |                   |                   | V    |      |
| Input Voltage Low                   | V <sub>IN_L</sub>    |                                          |                          |                   | 0.7               |      |      |
| Input Sourcing Current              | I <sub>INH</sub>     |                                          |                          |                   | 1                 | μA   |      |
| Input Sinking Current               | I <sub>INL</sub>     |                                          | - 1                      |                   |                   |      |      |
| Output Stage                        |                      |                                          |                          |                   |                   |      |      |
| Output Voltage High                 | V <sub>OUTH</sub>    | I <sub>OUT</sub> = - 500 mA              | V <sub>DD</sub> = 4.75 V | 4.4               |                   | V    |      |
|                                     |                      | I <sub>OUT</sub> = - 1000 mA             |                          | 4.25              |                   |      |      |
| Output Voltage Low                  | V <sub>OUTL</sub>    | I <sub>OUT</sub> = + 500 mA              |                          |                   |                   |      | 0.25 |
|                                     |                      | I <sub>OUT</sub> = + 1000 mA             |                          |                   |                   |      | 0.5  |
| Output High Propagation Delay       | TP <sub>LH</sub>     |                                          |                          | 20                | 25                | nS   |      |
| Output Low Propagation Delay        | TP <sub>HL</sub>     |                                          |                          | 20                | 25                |      |      |
| Thermal Protection                  |                      |                                          |                          |                   |                   |      |      |
| Thermal Shutdown Threshold          |                      |                                          |                          | 150               |                   | °C   |      |
| Thermal Shutdown Hysteresis         |                      |                                          |                          | 20                |                   |      |      |

Notes:

a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

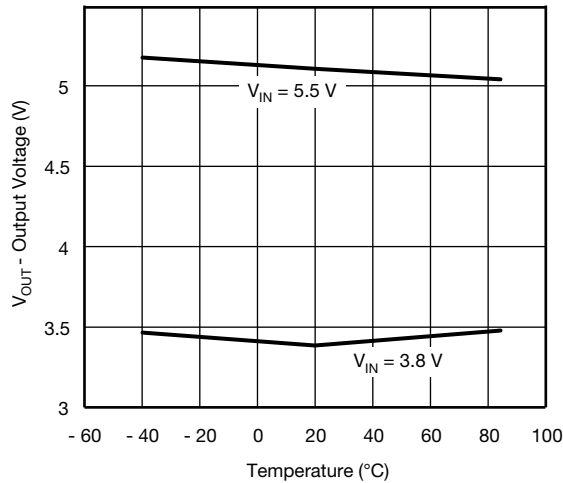
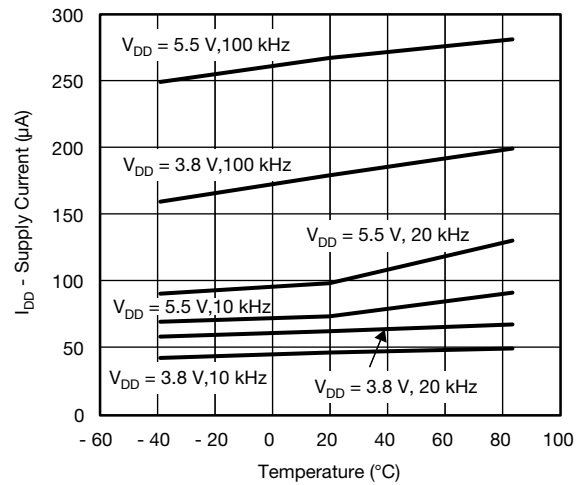
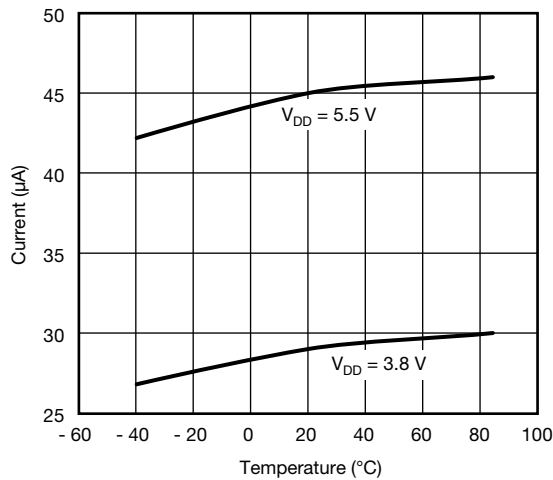
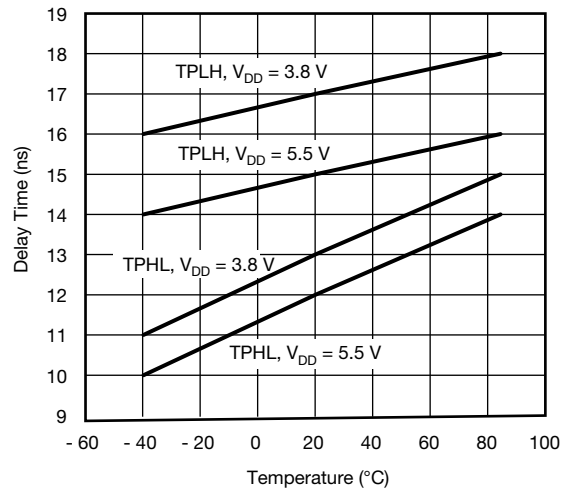
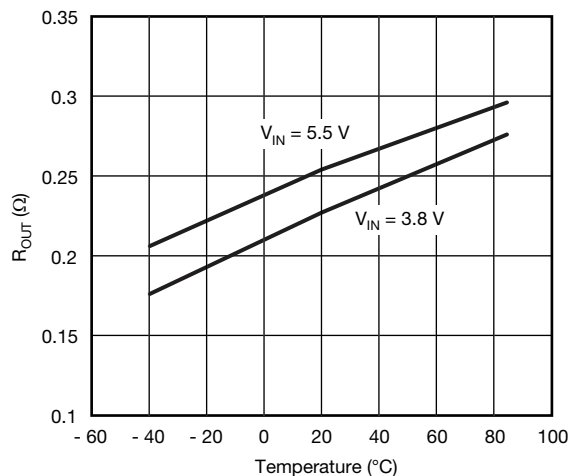
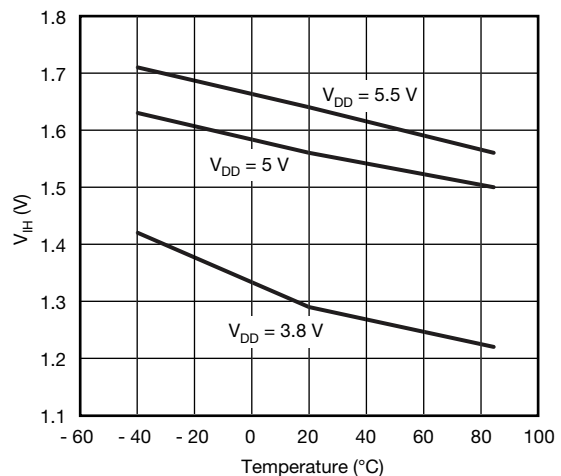
b. Guaranteed by design, not subject to production testing.

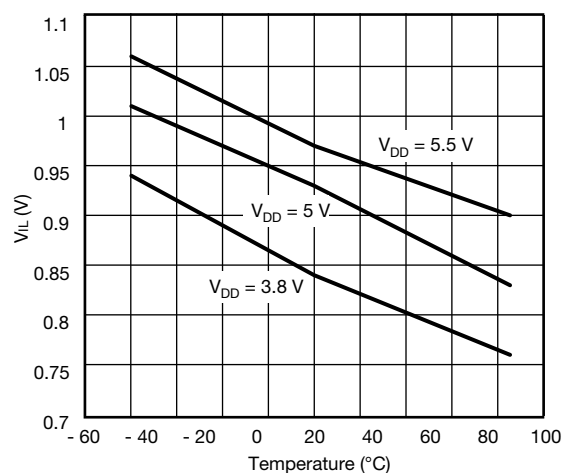
**PIN DESCRIPTION (SOIC PACKAGE)**

| Pin Number | Name     | Function                                     |
|------------|----------|----------------------------------------------|
| 1          | $S_A$    | Driver output return A                       |
| 2          | GND      | Analog ground of internal logic              |
| 3          | $V_{DD}$ | Input of internal logic bias and power stage |
| 4          | $S_B$    | Driver output return B                       |
| 5          | $OUT_B$  | Driver output B                              |
| 6          | $IN_B$   | Driver input B                               |
| 7          | $IN_A$   | Driver input A                               |
| 8          | $OUT_A$  | Driver output A                              |

**SiP2100**

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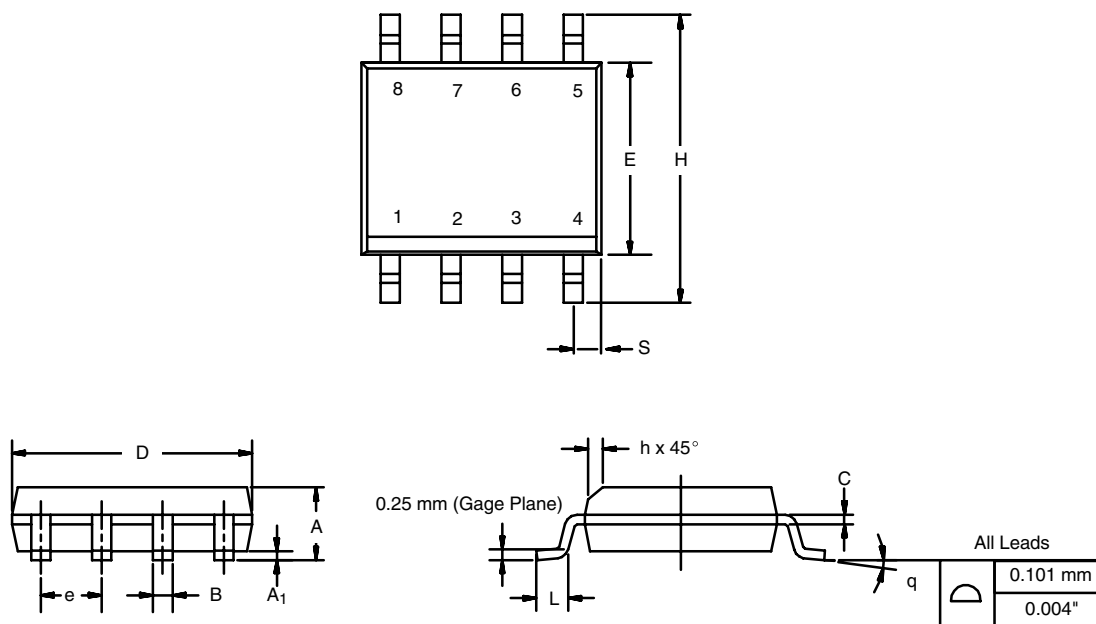
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)**Fig 1. Output Voltage vs. Temperature (at 1.5 A Load)****Fig 2. Supply Current  $I_{DD}$  vs. Temperature****Fig 3. Quiescent Current vs. Temperature****Fig 4. Propagation Delay vs. Temperature****Fig 5.  $R_{OUT}$  vs. Temperature****Fig 6. PWM Rising Threshold vs. Temperature**


**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Fig 7. PWM Falling Threshold vs. Temperature**

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## SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



| DIM                            | MILLIMETERS |      | INCHES    |       |
|--------------------------------|-------------|------|-----------|-------|
|                                | Min         | Max  | Min       | Max   |
| A                              | 1.35        | 1.75 | 0.053     | 0.069 |
| A <sub>1</sub>                 | 0.10        | 0.20 | 0.004     | 0.008 |
| B                              | 0.35        | 0.51 | 0.014     | 0.020 |
| C                              | 0.19        | 0.25 | 0.0075    | 0.010 |
| D                              | 4.80        | 5.00 | 0.189     | 0.196 |
| E                              | 3.80        | 4.00 | 0.150     | 0.157 |
| e                              | 1.27 BSC    |      | 0.050 BSC |       |
| H                              | 5.80        | 6.20 | 0.228     | 0.244 |
| h                              | 0.25        | 0.50 | 0.010     | 0.020 |
| L                              | 0.50        | 0.93 | 0.020     | 0.037 |
| q                              | 0°          | 8°   | 0°        | 8°    |
| S                              | 0.44        | 0.64 | 0.018     | 0.026 |
| ECN: C-06527-Rev. I, 11-Sep-06 |             |      |           |       |
| DWG: 5498                      |             |      |           |       |



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