

## Buffered H-Bridge

### FEATURES

- 1.0-A H-Bridge
- 500-kHz Switching Rate
- Shoot-Through Limited
- TTL Compatible Inputs
- 3.8- to 13.2-V Operating Range
- Surface Mount Packaging

### APPLICATIONS

- VCM Driver
- Brushed Motor Driver
- Stepper Motor Driver
- Power Converter
- Optical Disk Drives
- Power Supplies
- High Performance Servo

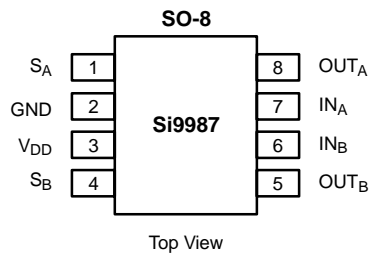
### DESCRIPTION

The Si9987 is an integrated, buffered H-bridge with TTL compatible inputs and the capability of delivering a continuous 1.0 A @  $V_{DD} = 5.0\text{ V}$  (room temperature) at switching rates up to 500 kHz. Internal logic prevents the upper and lower outputs of either half-bridge from being turned on simultaneously. Unique input codes allow both outputs to be forced low (for braking) or

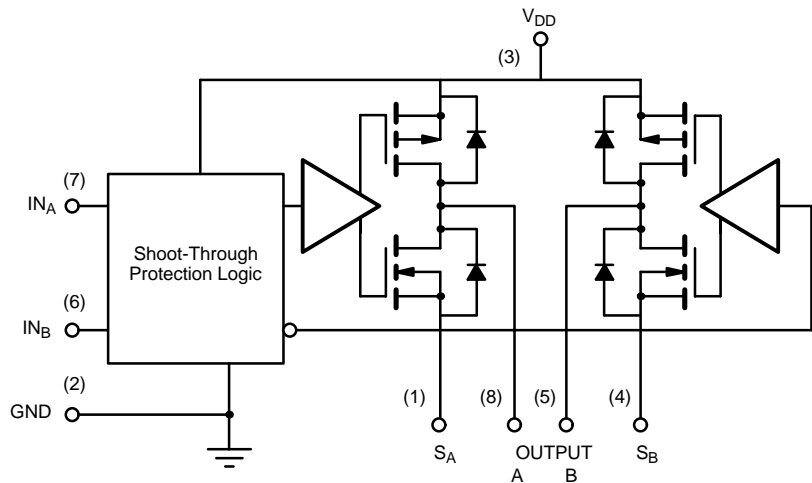
forced to a high impedance level.

The Si9987 is available in an 8-Pin SOIC package, specified to operate over a voltage range of 3.8 V to 13.2 V, and the commercial temperature range of 0 to 70°C (C suffix) and -40 to 85°C (D suffix).

### FUNCTIONAL BLOCK DIAGRAM, PIN CONFIGURATION AND TRUTH TABLE



TRUTH TABLE			
IN <sub>A</sub>	IN <sub>B</sub>	OUT <sub>A</sub>	OUT <sub>B</sub>
1	0	1	0
0	1	0	1
0	0	0	0
1	1	HiZ	HiZ



ORDERING INFORMATION		
Part Number	Temperature Range	Package
Si9987CY-T1	0 to 70°C	Tape and Reel
Si9987DY-T1	-40 to 85°C	
Si9987CY	0 to 70°C	Bulk (tubes)
Si9987DY	-40 to 85°C	



### ABSOLUTE MAXIMUM RATINGS<sup>a</sup>

Voltage on any pin with respect to ground	−0.3 V to $V_{DD} + 0.3$ V
Voltage on pins 5, 8 with respect to GND	−1 V to $V_{DD} + 1$ V
Voltage on pins 1, 4	−0.3 V to GND +1 V
Maximum $V_{DD}$	15 V
Peak Output Current	1.5 A
Storage Temperature	−65 to 150°C
Maximum Junction Temperature ( $T_J$ )	150°C
Power Dissipation <sup>b</sup>	1 W
$\theta_{JA}$	100°C/W

Continuous $I_{OUT}$ Current ( $T_J = 135^\circ\text{C}$ ) <sup>c</sup>	
$T_A = 25^\circ\text{C}$	± 1.02 A
$T_A = 70^\circ\text{C}$	± 0.75 A
$T_A = 85^\circ\text{C}$	± 0.65 A
Operating Temperature Range	
Si9987CY	0 to 70°C
Si9987DY	−40 to 85°C

#### Notes

- Device mounted with all leads soldered or welded to PC board.
- Derate 10 mW/°C above 25°C.
- $T_J = T_A + (P_D \times \theta_{JA})$ ,  $P_D$  = Power Dissipation.

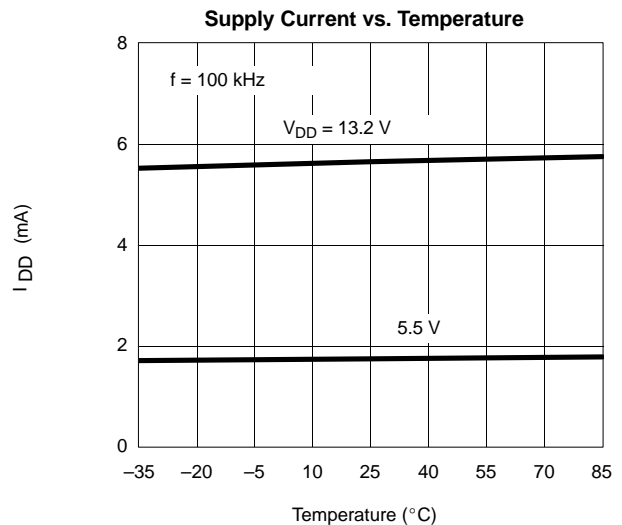
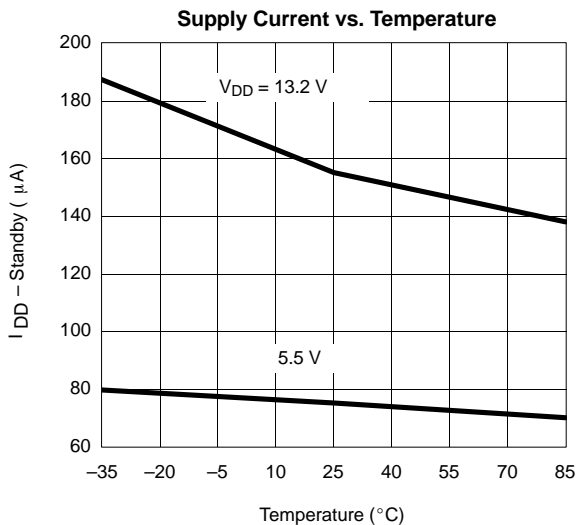
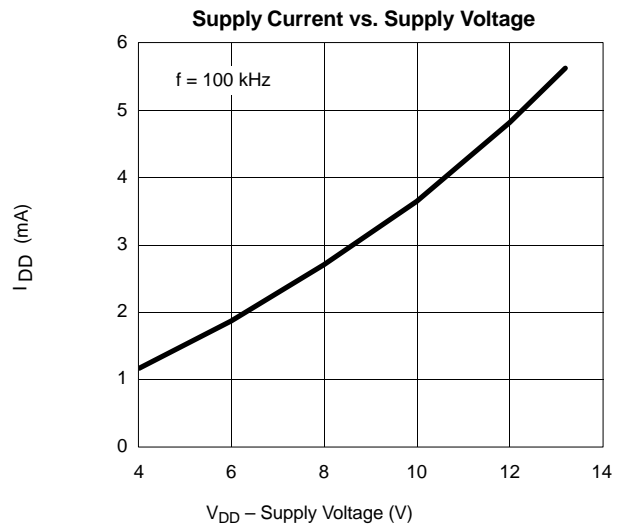
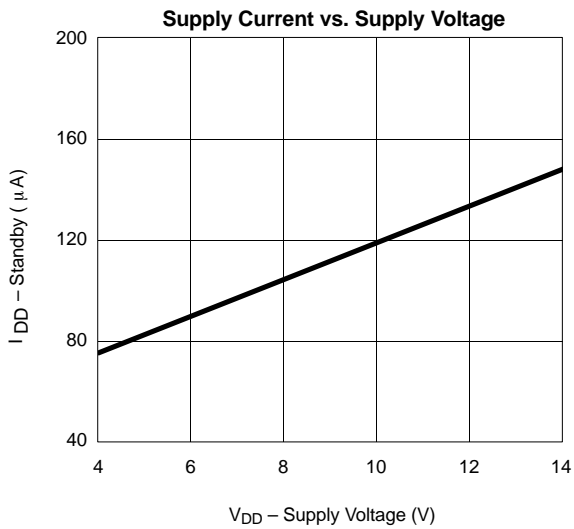
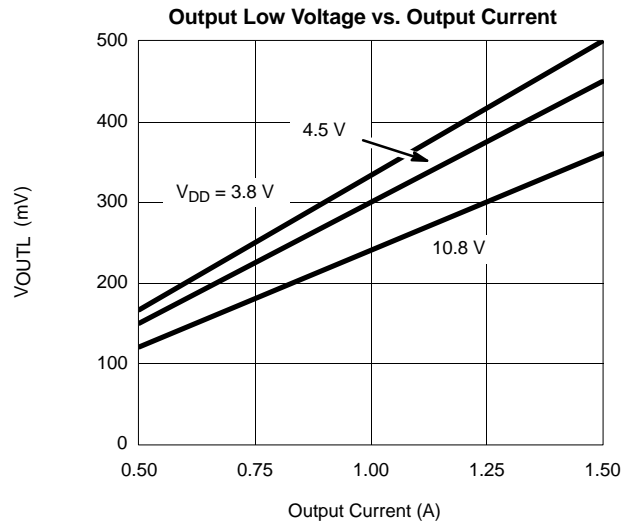
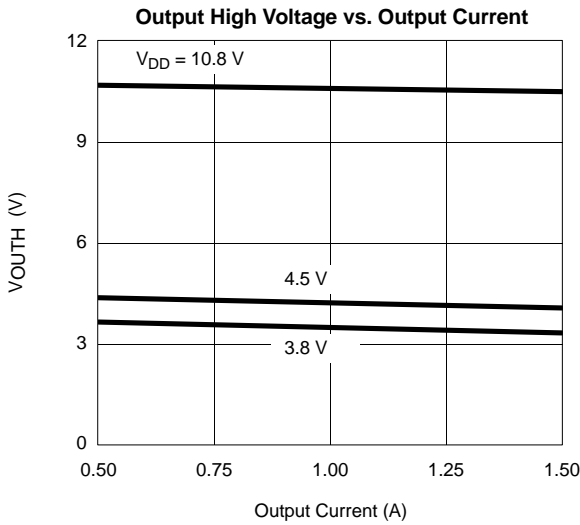
### RECOMMENDED OPERATING RANGE

$V_{DD}$	3.8 V to 13.2 V
Maximum Junction Temperature ( $T_J$ )	135°C

SPECIFICATIONS						
Parameter	Symbol	Test Conditions Unless Specified $V_{DD} = 3.8$ to $13.2$ V $S_A$ @ GND, $S_B$ @ GND	Limits			Unit
			Min <sup>a</sup>	Typ <sup>b</sup>	Max <sup>a</sup>	
<b>Input</b>						
Input Voltage High	$V_{INH}$		2			V
Input Voltage Low	$V_{INL}$				1	
Input Current with Input Voltage High	$I_{INH}$	$V_{IN} = 2$ V			1	$\mu\text{A}$
Input Current with Input Voltage Low	$I_{INL}$	$V_{IN} = 0$ V	−1			
<b>Output</b>						
Output Voltage High <sup>c</sup>	$V_{OUTH}$	$I_{OUT} = -1$ A	$V_{DD} = 10.8$ V	10.40	10.56	V
			$V_{DD} = 4.5$ V	4.00	4.20	
		$I_{OUT} = -500$ mA	$V_{DD} = 10.8$ V	10.60	10.68	
$V_{DD} = 4.5$ V	4.25		4.35			
		$I_{OUT} = -300$ mA, $V_{DD} = 3.8$ V	3.63	3.70		
Output Voltage Low <sup>c</sup>	$V_{OUTL}$	$I_{OUT} = 1$ A	$V_{DD} = 10.8$ V		0.24	
			$V_{DD} = 4.5$ V		0.30	0.50
		$I_{OUT} = 500$ mA	$V_{DD} = 10.8$ V		0.12	0.20
			$V_{DD} = 4.5$ V		0.15	0.25
		$I_{OUT} = 300$ mA, $V_{DD} = 3.8$ V		0.10	0.17	
Output Leakage Current Low	$I_{OLL}$	$I_{NA} = I_{NB} \geq 2$ V, $V_{OUT} = V_{DD} = 13.2$ V		0	10	$\mu\text{A}$
Output Leakage Current High	$I_{OLH}$	$V_{OUT} = 0$ , $V_{DD} = 13.2$ V	−10	0		
Output V Clamp High	$V_{CLH}$	$I_{NA} = I_{NB} \geq 2$ V	$I_{OUT} = 100$ mA	$V_{DD} + 0.7$	$V_{DD} + 0.9$	V
Output V Clamp Low	$V_{CLL}$		$I_{OUT} = -100$ mA	−0.9	−0.7	
<b>Supply</b>						
$V_{DD}$ Supply Current	$I_{DD}$	$I_N = 100$ kHz, $V_{DD} = 5.5$ V		1.8	2.5	mA
		$I_{NA} = I_{NB} = 4.5$ V, $V_{DD} = 5.5$ V		75	125	$\mu\text{A}$
<b>Dynamic</b>						
Propagation Delay Time	$T_{PLH}$	$V_{DD} = 5$ V		300		nS
	$T_{PHL}$			100		

#### Notes

- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Maximum value measured at  $T_J = 135^\circ\text{C}$ . Typical value measured at  $T_J = T_A = 25^\circ\text{C}$  (pulse width  $\leq 300$   $\mu\text{sec}$ , duty cycle  $\leq 2\%$ ).

**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**


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