Buffered H-Bridge

DESCRIPTION

The Si9986 is an integrated, buffered H-bridge with TTL compatible inputs and the capability of delivering a continuous 1.0 A at V_{DD} = 12 V (room temperature) at switching rates up to 200 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 Si9986 is available in both standard and lead (Pb)-free, 8-pin SOIC packages, 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 the industrial temperature range of - 40 to 85 °C (D suffix).

FEATURES

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

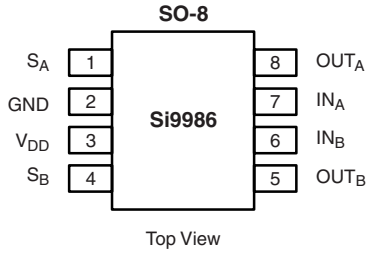
Pb-free Available

RoHS* COMPLIANT

APPLICATIONS

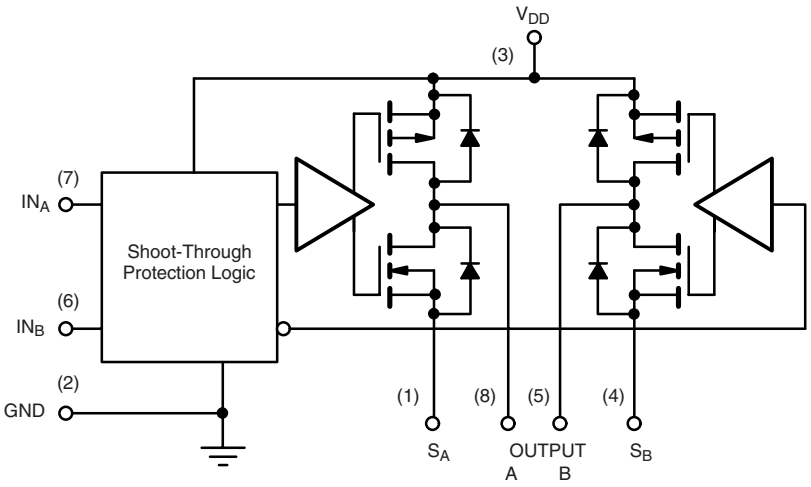
- VCM Driver
- Brushed Motor Driver
- Stepper Motor Driver
- Power Converter
- Optical Disk Drives
- Power Supplies
- High Performance Servo

FUNCTIONAL BLOCK DIAGRAM, PIN CONFIGURATION AND TRUTH TABLE



Top View

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



PIN DESCRIPTION		
Pin Number	Name	Function
1	S_A	Source of the low-side MOSFET on bridge arm A
2	GND	Ground
3	V_{DD}	IC power supply
4	S_B	Source of the low-side MOSFET on bridge arm B
5	OUT_B	Center tap of bridge arm B. Connects to one end of the load
6	IN_B	Input signal to control bridge arm B
7	IN_A	Input signal to control bridge arm A
8	OUT_A	Center tap of bridge arm A. Connects to the other end of the load

ORDERING INFORMATION		
Part Number	Temperature Range	Package
Si9986CY-T1	0 to 70 °C	Tape and Reel
Si9986DY-T1	- 40 to 85 °C	
Si9986CY-T1-E3	0 to 70 °C	Lead (Pb)-free Tape and Reel
Si9986DY-T1-E3	- 40 to 85 °C	
Si9986CY	0 to 70 °C	Bulk (tubes)
Si9986DY	- 40 to 85 °C	

* Pb containing terminations are not RoHS compliant, exemptions may apply.

ABSOLUTE MAXIMUM RATINGS[a]

Parameter		Limit	Unit
Voltage on any Pin with Respect to Ground		- 0.3 to V_{DD} + 0.3	V
Voltage on Pins 5, 8 with Respect to GND		- 1 to V_{DD} + 1	
Voltage on Pins 1, 4		- 0.3 to GND + 1	
Peak Output Current		1.5	A
Storage Temperature		- 65 to 150	°C
Maximum Junction Temperature (T_J)		150	
Maximum V_{DD}		15	V
Power Dissipation[b]		1	W
Θ_{JA}		100	°C/W
Operating Temperature Range	Si9986CY	0 to 70	°C
	Si9986DY	- 45 to 85	

Notes:
a. Device Mounted with all leads soldered or welded to PC board.
b. Derate 10 mW/°C above 25 °C.

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 RANGE

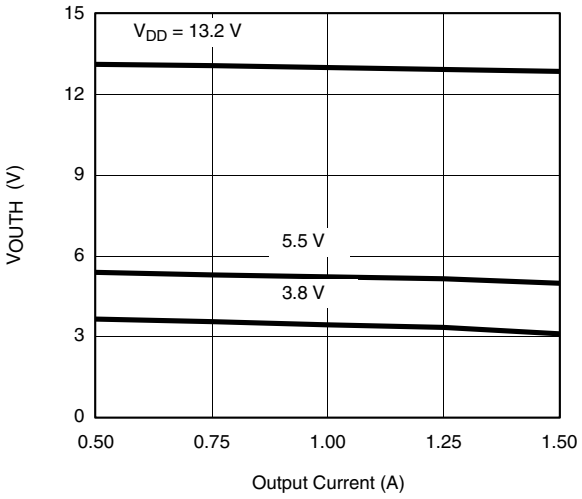
Parameter	Limit	Unit
V_{DD}	3.8 to 13.2	V
Maximum Junction Temperature (T_J)	125	°C

SPECIFICATIONS

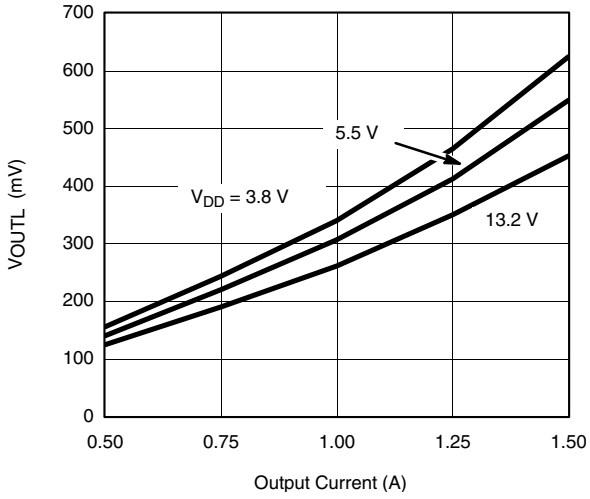
Parameter	Symbol	Test Conditions Unless Otherwise Specified V_{DD} = 3.8 to 13.2 V, S_A at GND, S_B at GND		Limits C Suffix, 0 to 70 °C D Suffix, - 40 to 85 °C Min[a]	Typ[b]	Max[a]	Unit
Input							
Input Voltage High	V_{INH}			2			V
Input Voltage Low	V_{INL}					1	
Input Current with Input Voltage High	I_{INH}	V_{IN} = 2 V				1	µA
Input Current with Input Voltage Low	I_{INL}	V_{IN} = 0 V		- 1			
Output							
Output Voltage High	V_{OUTH}	I_{OUT} = - 500 mA	V_{DD} = 10.8 V	10.5	10.7		V
			V_{DD} = 4.5 V	4.1	4.3		
		I_{OUT} = - 300 mA, V_{DD} = 3.8 V		3.4	3.7		
Output Voltage Low	V_{OUTL}	I_{OUT} = 500 mA	V_{DD} = 10.8 V		0.2	0.3	
			V_{DD} = 4.5 V		0.2	0.4	
		I_{OUT} = 300 mA, V_{DD} = 3.8 V			0.1	0.4	
Output Leakage Current High	I_{OLH}	$IN_A = IN_B \geq 2$ V, $V_{OUT} = V_{DD}$ = 13.2 V		- 10	0		µA
Output Leakage Current Low	I_{OLL}	V_{OUT} = 0, V_{DD} = 13.2 V			0	10	
Output V Clamp High	V_{CLH}	$IN_A = IN_B \geq 2$ V	I_{OUT} = 100 mA		V_{DD} + 0.7		V
Output V Clamp Low	V_{CLL}		I_{OUT} = - 100 mA		- 0.7		
Supply							
V_{DD} Supply Current	I_{DD}	IN = 100 kHz, V_{DD} = 5 V			2		mA
		$IN_A = IN_B$ = 4.5 V, V_{DD} = 5.5 V				300	µA
Dynamic							
Propogation Delay Time	T_{PLH}	V_{DD} = 5 V			300		nS
	T_{PHL}				100		

Notes:
a. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

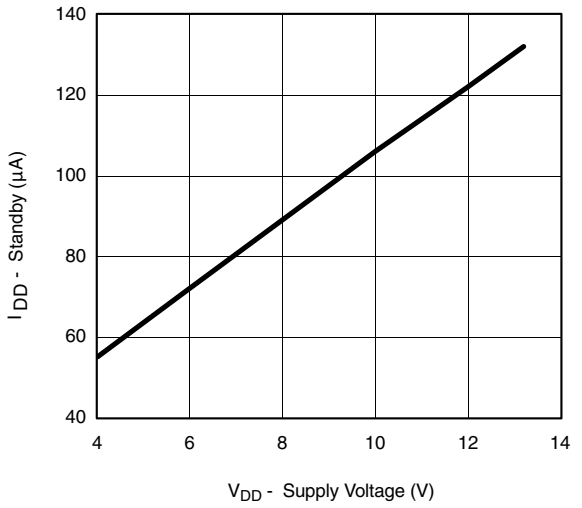
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



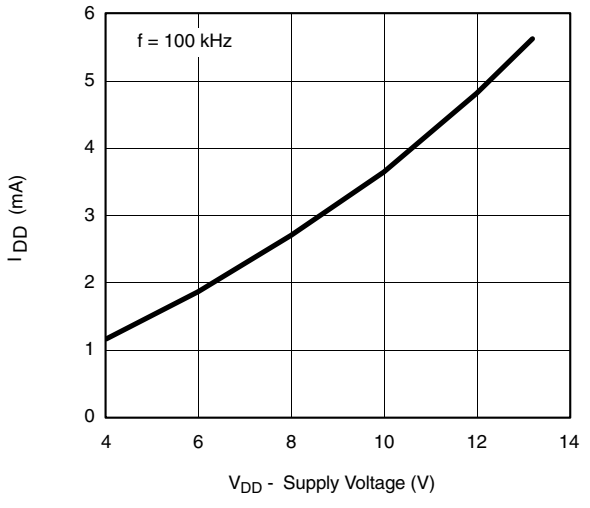
Output High Voltage vs. Output Current



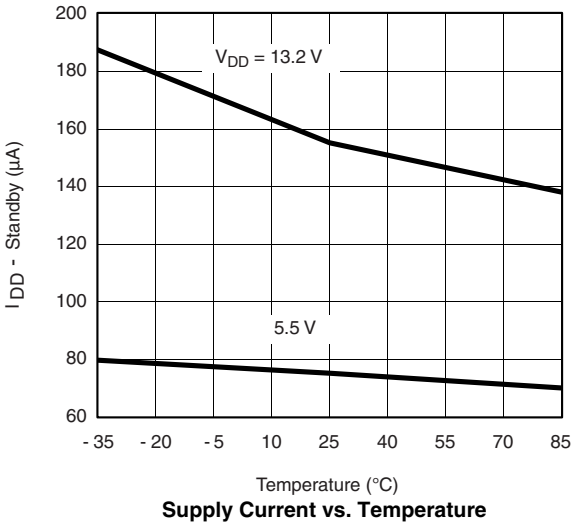
Output Low Voltage vs. Output Current



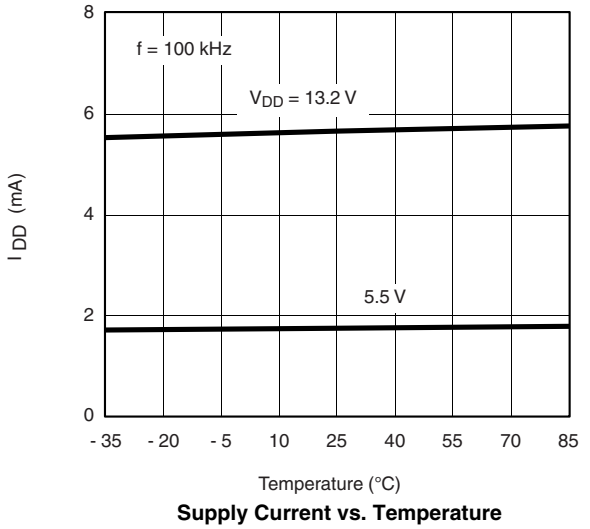
Supply Current vs. Supply Voltage



Supply Current vs. Supply Voltage

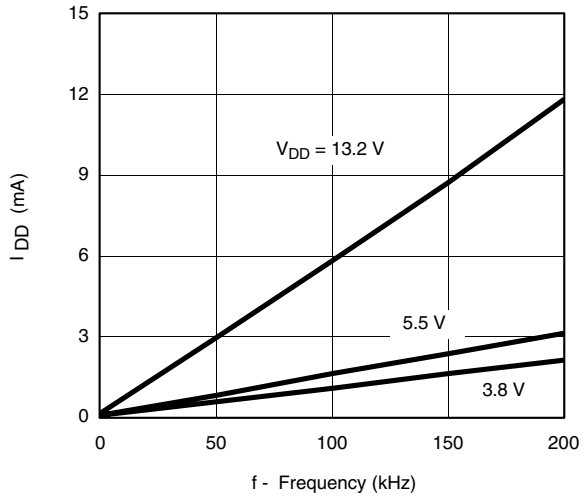


Supply Current vs. Temperature

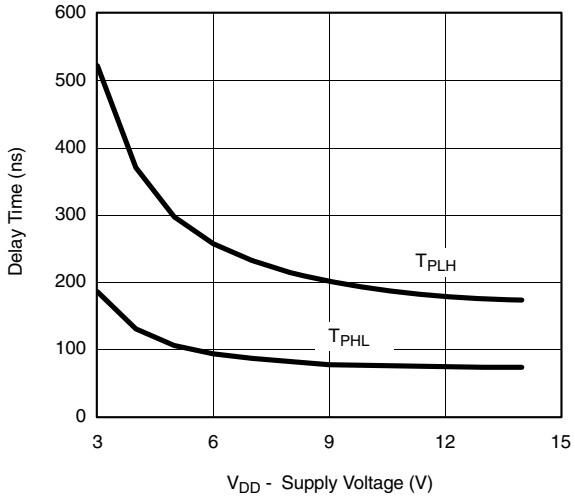


Supply Current vs. Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Supply Current vs. Frequency



Propagation Time vs. Supply Voltage

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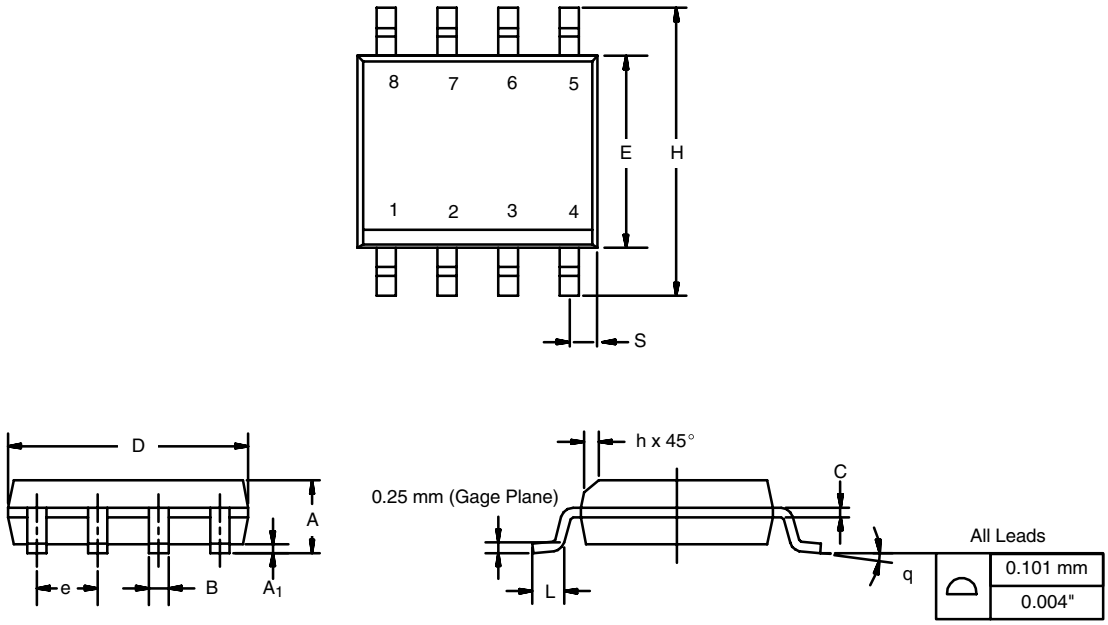
SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A_1	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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