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

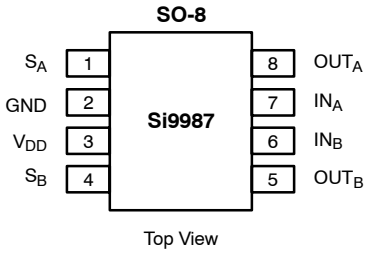
- VCM Driver
- Brushed Motor Driver
- Stepper Motor Driver
- Power Converter
- Optical Disk Drives
- Power Supplies
- High Performance Servo

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 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.

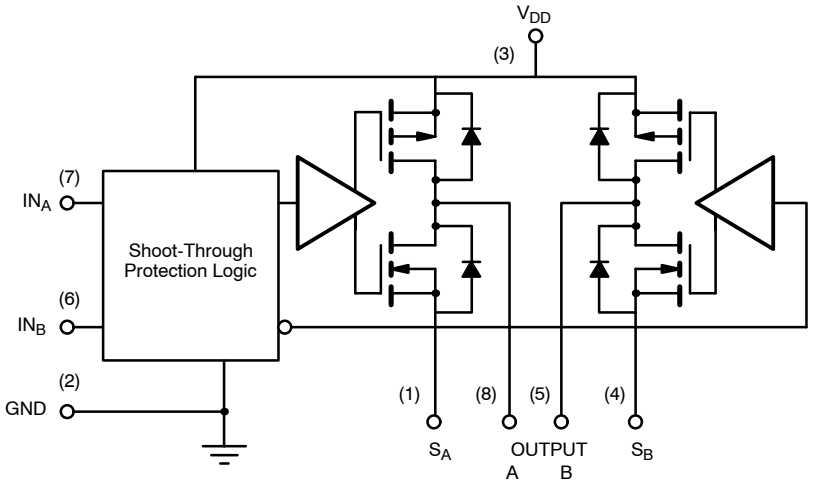
The Si9987 is available in an 8-Pin SOIC package, specified to operate over a voltage range of 3.8 V to 13.2 V, and the commercial temperature range of 0 to 70°C (C suffix) and –40 to 85°C (D suffix). The Si9987 is available in lead free.

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



ORDERING INFORMATION		
Part Number	**Temperature Range**	**Package**
Si9987CY-T1	0 to 70°C	Tape and Reel
Si9987DY-T1	–40 to 85°C	
Si9987CY-T1—E3	0 to 70°C	Lead Free Tape and Reel
Si9987DY-T1—E3	–40 to 85°C	
Si9987CY	0 to 70°C	Bulk (tubes)
Si9987DY	–40 to 85°C	

ABSOLUTE MAXIMUM RATINGS[a]

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[b] . . . . . 1 W
θ_{JA} . . . . . 100°C/W

Continuous I_{OUT} Current (T_J = 135°C)[c]
T_A = 25°C . . . . . ±1.02 A
T_A = 70°C . . . . . ±0.75 A
T_A = 85°C . . . . . ±0.65 A
Operating Temperature Range
Si9987CY . . . . . 0 to 70°C
Si9987DY . . . . . –40 to 85°C

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

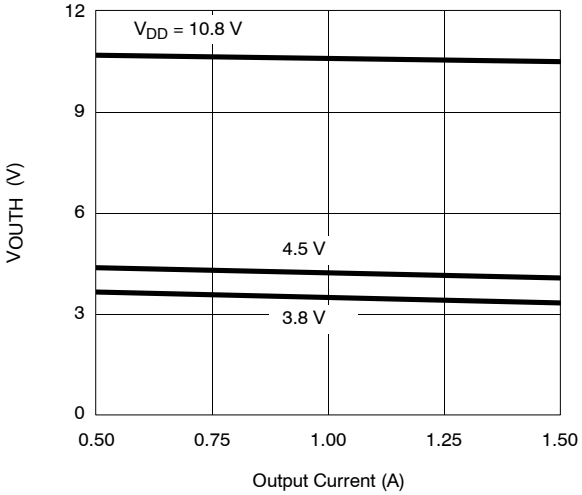
SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Specified V_{DD} = 3.8 to 13.2 V, S_A @ GND, S_B @ GND		Limits Min[a]	Limits Typ[b]	Limits 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[c]	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[c]	V_{OUTL}	I_{OUT} = 1 A	V_{DD} = 10.8 V		0.24	0.40	
			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}	$IN_A = IN_B \geq 2$ V, $V_{OUT} = V_{DD}$ = 13.2 V			0	10	µA
Output Leakage Current High	I_{OLH}	V_{OUT} = 0, V_{DD} = 13.2 V		–10	0		
Output V Clamp High	V_{CLH}	$IN_A = IN_B \geq 2$ 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		
Supply							
V_{DD} Supply Current	I_{DD}	IN = 100 kHz, V_{DD} = 5.5 V			1.8	2.5	mA
		$IN_A = IN_B$ = 4.5 V, V_{DD} = 5.5 V			75	125	µA
Dynamic							
Propogation Delay Time	T_{PLH}	V_{DD} = 5 V			300		nS
	T_{PHL}				100		

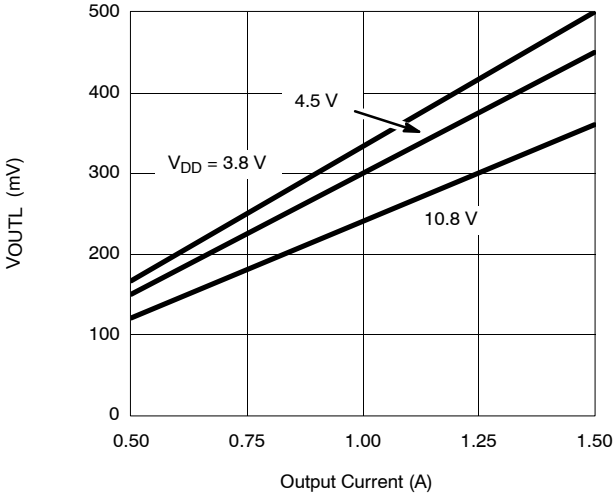
Notes
a. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
c. Maximum value measured at T_J = 135°C. Typical value measured at $T_J = T_A$ = 25°C (pulse width ≤ 300 µsec, duty cycle ≤ 2%).

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

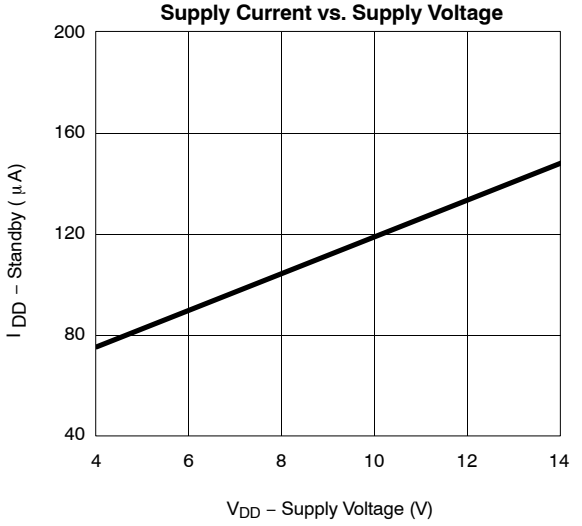
Output High Voltage vs. Output Current



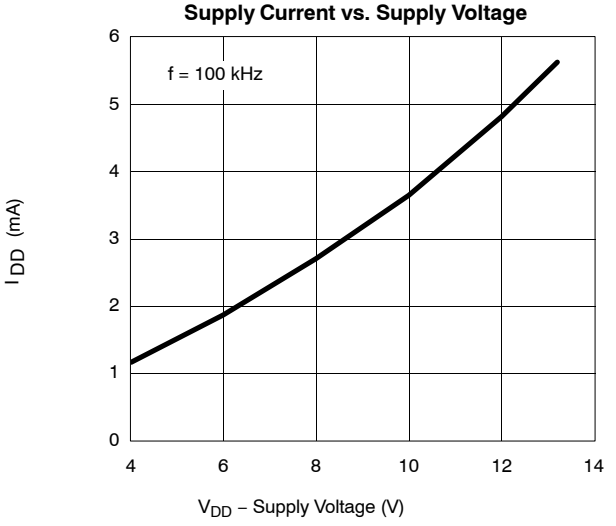
Output Low Voltage vs. Output Current



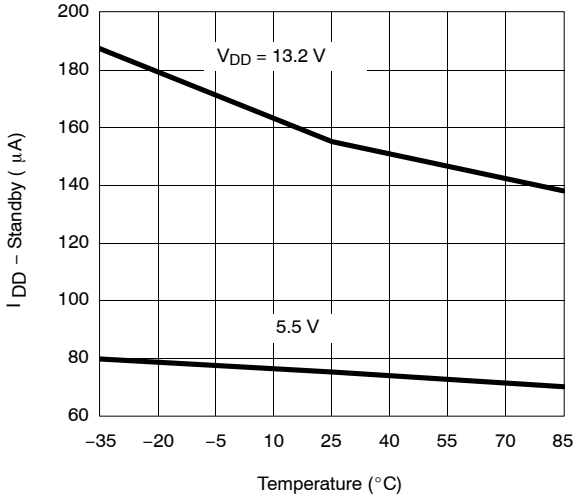
Supply Current vs. Supply Voltage



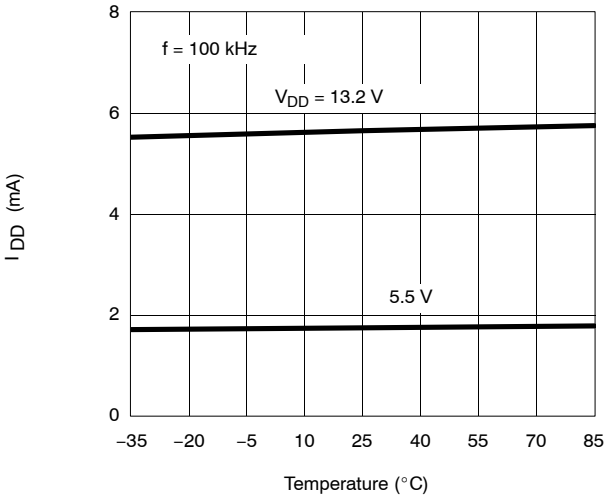
Supply Current vs. Supply Voltage



Supply Current vs. Temperature

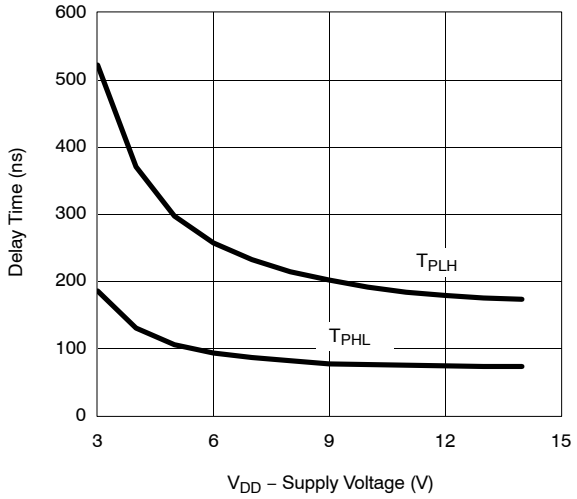


Supply Current vs. Temperature

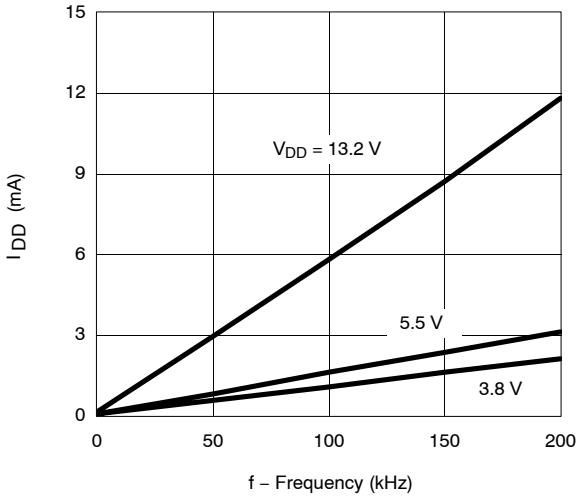


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

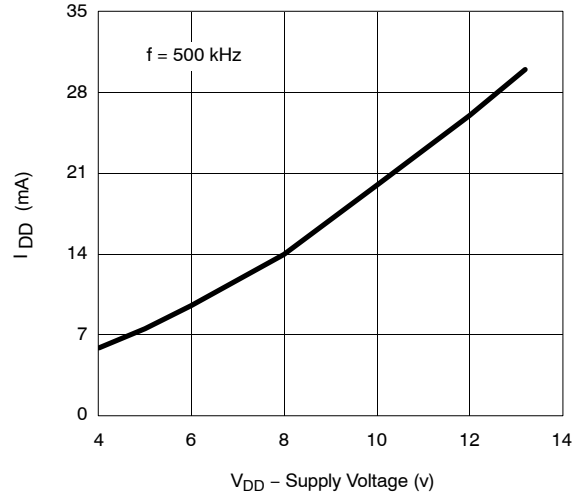
Propagation Time vs. Supply Voltage



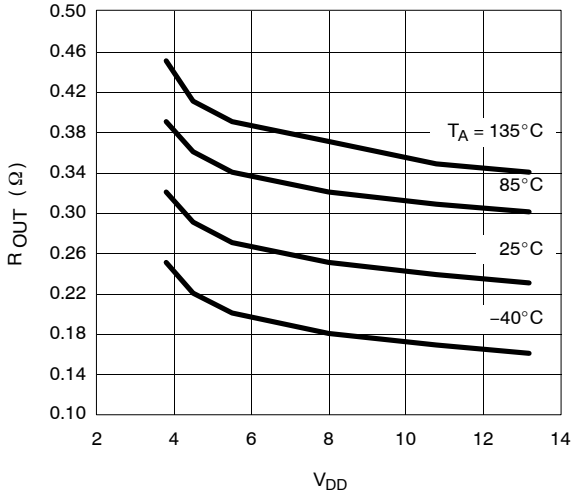
Supply Current vs. Frequency



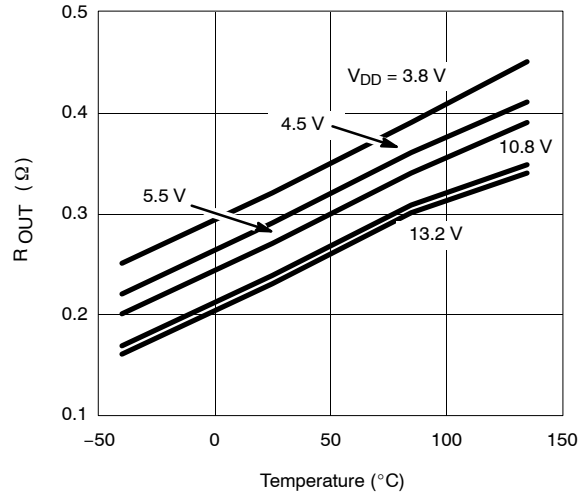
Supply Current vs. Supply Voltage



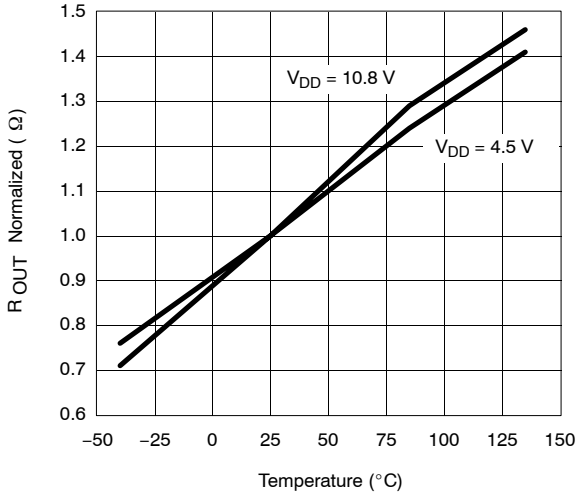
R_{OUT} vs. V_{DD}



R_{OUT} vs. Junction Temperature (T_J)



R_{OUT} Normalized vs. Junction Temperature (T_J)



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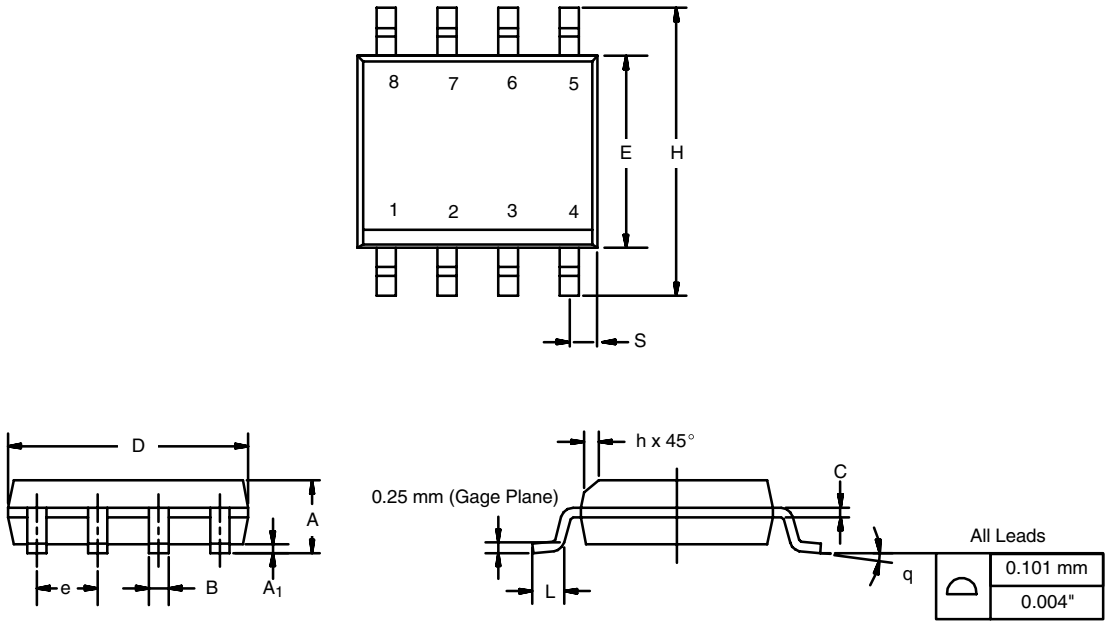
SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



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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