HD74ALVC1G66

Analog Switch

HITACHI

ADE-205-625A (Z)

Rev.1
Dec. 2001

Description

The HD74ALVC1G66 has an analog switch in a 5 pin package. Switch section has its enable input control (C). High level voltage applied to C turns on the switch section. Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

Features

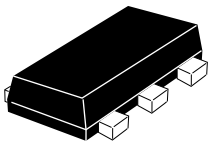
- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V
  Operating temperature range : –40 to +85°C
- Control input V_{IH} (Max.) = 3.6 V (@V_{CC} = 0 V to 3.6 V)
- Package type

Package type	Package code	Package suffix	Taping code
VSON-5 pin	TNP-5D	VS	E (3,000 pcs / Reel)

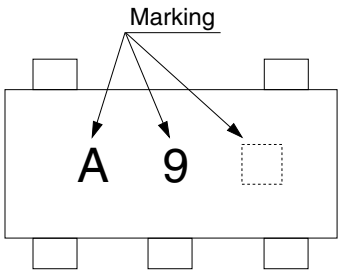
Hitachi semiconductor

Outline and Article Indication

• HD74ALVC1G66



VSON-5

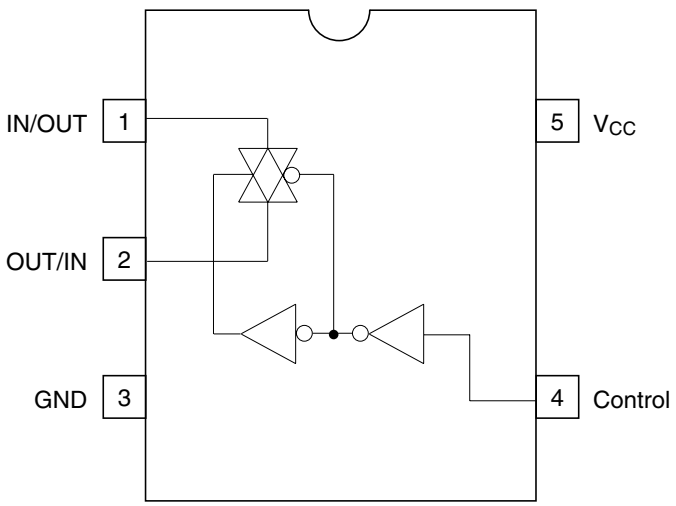


Function Table

Control	Switch
L	OFF
H	ON

H: High level
L: Low level

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	–0.5 to 4.6	V	
Input voltage range [*1]	V_I	–0.5 to 4.6	V	
Output voltage range [*1, 2]	V_O	–0.5 to V_{CC}+0.5	V	Output : H or L
Input clamp current	I_{IK}	–50	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±50	mA	V_O = 0 to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±100	mA	
Maximum power dissipation at Ta = 25°C (in still air) [*3]	P_T	200	mW	
Storage temperature	Tstg	–65 to 150	°C	

Notes: The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	1.2	3.6	V	
Input voltage range	V_I	0	3.6	V	
Input / output voltage range	$V_{I/O}$	0	V_{CC}	V	
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	V_{CC} = 1.2 to 2.7 V
		0	10		V_{CC} = 3.3±0.3 V
Operating free-air temperature	Ta	–40	85	°C	

Note: Unused or floating inputs must be held high or low.

Electrical Characteristics

Item	Symbol	V_{cc} (V)	Ta=25°C			Ta=-40 to 85°C			Unit	Test conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V_{IH}	1.2	—	—	—	V_{cc}×0.75	—	—	V	Control input only
		1.4 to 1.6	—	—	—	V_{cc}×0.7	—	—		
		1.65 to 1.95	—	—	—	V_{cc}×0.7	—	—		
		2.3 to 2.7	—	—	—	1.7	—	—		
		3.0 to 3.6	—	—	—	2.0	—	—		
	V_{IL}	1.2	—	—	—	—	—	V_{cc}×0.25		
		1.4 to 1.6	—	—	—	—	—	V_{cc}×0.3		
		1.65 to 1.95	—	—	—	—	—	V_{cc}×0.3		
		2.3 to 2.7	—	—	—	—	—	0.7		
		3.0 to 3.6	—	—	—	—	—	0.8		
On-state switch resistance	R_{ON}	1.2	—	15	—	—	—	—	Ω	V_I = 0 V, I_O = 1 mA
			—	27	—	—	—	—		V_I = 1.2 V, I_O = 1 mA
		1.4	—	11	25	—	—	30		V_I = 0 V, I_O = 2 mA
			—	20	35	—	—	40		V_I = 1.4 V, I_O = 2 mA
		1.65	—	9	17	—	—	20		V_I = 0 V, I_O = 4 mA
			—	16	27	—	—	30		V_I = 1.65 V, I_O = 4 mA
		2.3	—	7	10	—	—	12		V_I = 0 V, I_O = 8 mA
			—	12	18	—	—	20		V_I = 2.3 V, I_O = 8 mA
		3.0	—	6	8.5	—	—	9		V_I = 0 V, I_O = 24 mA
			—	10	13.5	—	—	14.5		V_I = 3.0 V, I_O = 24 mA
Peak on resistance	$R_{ON\ (p)}$	1.2	—	300	—	—	—	—	Ω	I_O = 1 mA
		1.4	—	135	250	—	—	350		I_O = 2 mA
		1.65	—	60	110	—	—	150		I_O = 4 mA
		2.3	—	19	30	—	—	35		I_O = 8 mA
		3.0	—	12	18	—	—	20		I_O = 24 mA

Electrical Characteristics (cont)

Item	Symbol	V_{cc} (V)	Ta=25°C			Ta=-40 to 85°C			Unit	Test conditions
			Min	Typ	Max	Min	Typ	Max		
Off-state switch leakage current	$I_{S (OFF)}$	3.6	—	—	±0.1	—	—	±1.0	µA	$V_{IN} = V_{CC}$, V_{OUT} = GND or V_{IN} = GND, $V_O = V_{CC}$, $V_C = V_{IL}$
On-state switch leakage current	$I_{S (ON)}$	3.6	—	—	±0.1	—	—	±1.0	µA	$V_{IN} = V_{CC}$ or GND $V_C = V_{IH}$
Input current	I_{IN}	0 to 3.6	—	—	±0.1	—	—	±1.0	µA	V_{IN} = 3.6 V or GND
Quiescent supply current	I_{CC}	3.6	—	—	—	—	—	10	µA	$V_{IN} = V_{CC}$ or GND
Control input capacitance	C_{IC}	—	—	3.5	—	—	—	—	pF	
Switch terminal capacitance	$C_{IN / OUT}$	—	—	5.0	—	—	—	—	pF	
Feedthrough capacitance	C_{IN-OUT}	—	—	0.4	—	—	—	—	pF	

Switching Characteristics

(Ta = −40 to 85°C)

- V_{CC} = 1.2 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time *1	t_{PLH} t_{PHL}	—	0.4	—	ns	C_L = 15 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	—	5.0	—	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	—	4.5	—	ns	C_L = 15 pF	C	IN/OUT or OUT/IN

- V_{CC} = 1.5±0.1 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time *1	t_{PLH} t_{PHL}	—	—	0.3	ns	C_L = 15 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	2.0	—	6.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	2.0	—	6.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN

- V_{CC} = 1.8±0.15 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time *1	t_{PLH} t_{PHL}	—	—	0.48	ns	C_L = 30 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	1.5	—	5.0	ns	C_L = 30 pF	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	1.5	—	5.0	ns	C_L = 30 pF	C	IN/OUT or OUT/IN

Switching Characteristics (cont)

- V_{CC} = 2.5±0.2 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time *1	t_{PLH} t_{PHL}	—	—	0.35	ns	C_L = 30 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	1.0	—	4.0	ns	C_L = 30 pF	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	1.0	—	4.0	ns	C_L = 30 pF	C	IN/OUT or OUT/IN

- V_{CC} = 3.3±0.3 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time *1	t_{PLH} t_{PHL}	—	—	0.3	ns	C_L = 30 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	1.0	—	3.0	ns	C_L = 30 pF	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	1.0	—	3.0	ns	C_L = 30 pF	C	IN/OUT or OUT/IN

Note: 1. The propagation delay time is calculated by the RC (on-resistance and load capacitance) time constant.

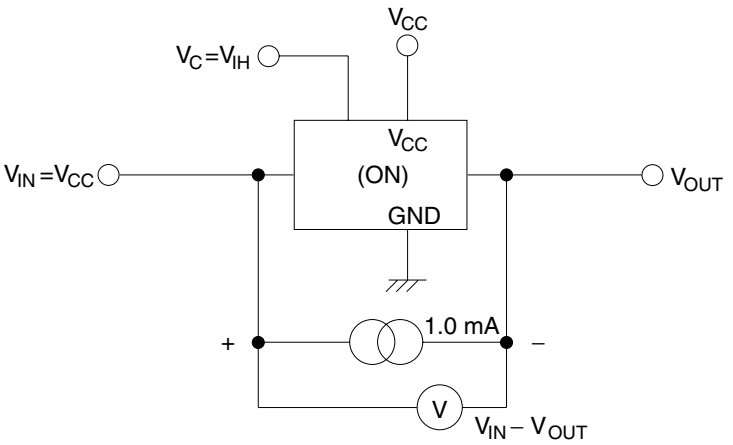
Operating Characteristics

(Ta = 25°C, C_L = 30 pF)

Item	Symbol	V_{cc} (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C_{PD}	1.5	—	4.5	—	pF	f = 10 MHz
		1.8	—	4.5	—		
		2.5	—	5.0	—		
		3.3	—	6.0	—		

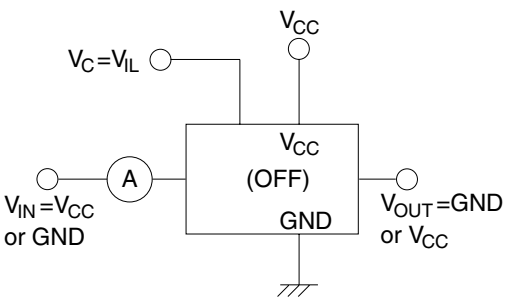
Test Circuit

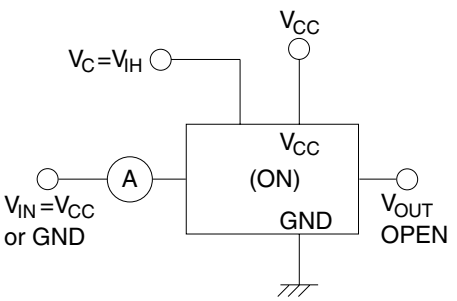
• R_{ON}



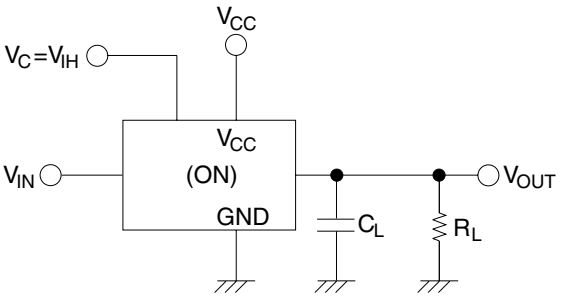
$$R_{ON} = \frac{V_{IN-OUT}}{10^{-3}} \ (\Omega)$$

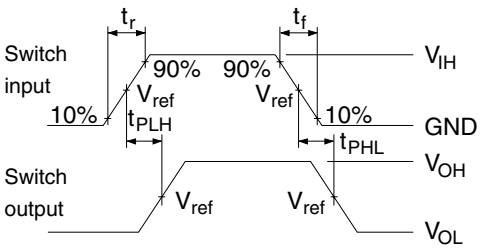
• I_S (off), I_S (on)





• t_{PLH}, t_{PHL}



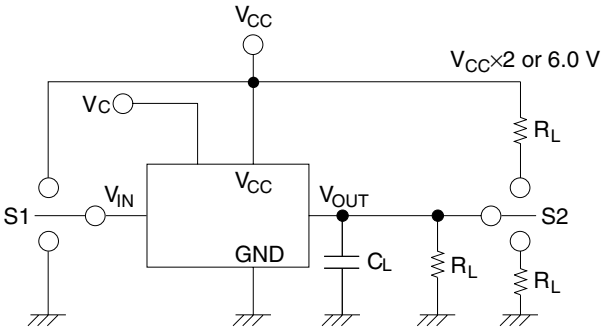


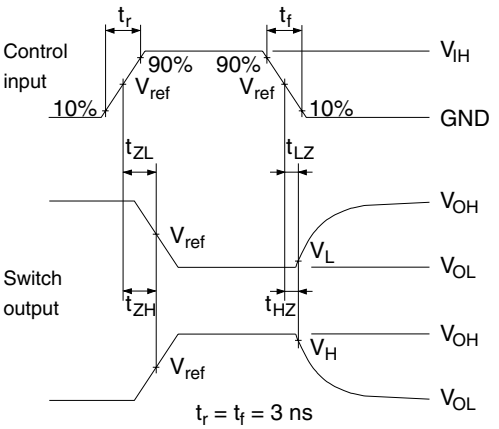
$t_r = t_f = 3$ ns

Symbol	V_{CC} = 1.2 V, 1.5±0.1 V	V_{CC} = 1.8±0.15 V	V_{CC} = 2.5±0.2 V, 3.3±0.3 V
R_L	2.0 kΩ	1.0 kΩ	500 Ω
C_L	15 pF	30 pF	30 pF

Symbol	V_{CC} = 1.2 V, 1.5±0.1 V, 1.8±0.15 V	V_{CC} = 2.5±0.2 V	V_{CC} = 3.3±0.3 V
t_r / t_f	2.0 ns	2.5 ns	2.5 ns
V_{IH}	V_{CC}	V_{CC}	2.7 V
V_{ref}	50%	50%	1.5 V

• t_{ZH} ,t_{ZL} / t_{HZ} ,t_{LZ}



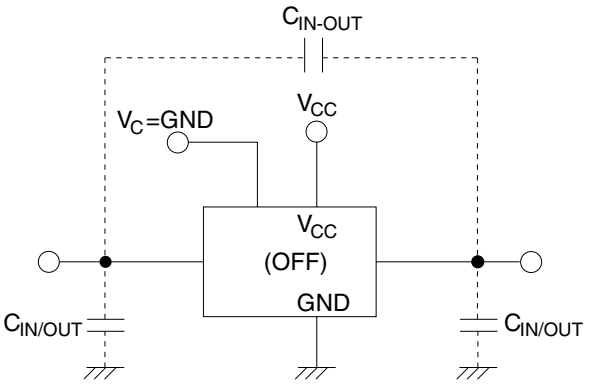


	S1		S2	
Symbol	V_{CC} = 1.2 V, 1.5±0.1 V, 1.8±0.15 V, 2.5±0.2 V	V_{CC} = 3.3±0.3 V	V_{CC} = 1.2 V, 1.5±0.1 V, 1.8±0.15 V, 2.5±0.2 V	V_{CC} = 3.3±0.3 V
t_{HZ} / t_{ZH}	V_{CC}	V_{CC}	GND	GND
t_{HZ} / t_{ZH}	GND	GND	V_{CC}×2	6.0 V

Symbol	V_{CC} = 1.2 V, 1.5±0.1 V	V_{CC} = 1.8±0.15 V	V_{CC} = 2.5±0.2 V, 3.3±0.3 V
R_L	2.0 kΩ	1.0 kΩ	500 Ω
C_L	15 pF	30 pF	30 pF

Symbol	V_{CC} = 1.2 V, 1.5±0.1 V	V_{CC} = 1.8±0.15 V	V_{CC} = 2.5±0.2 V	V_{CC} = 3.3±0.3 V
t_r / t_f	2.0 ns	2.0 ns	2.5 ns	2.5 ns
V_{IH}	V_{CC}	V_{CC}	V_{CC}	2.7 V
V_{ref}	50%	50%	50%	1.5 V
V_H / V_L	V_H = V_{OH}-0.1 V V_L = V_{OL}+0.1 V	V_H = V_{OH}-0.15 V V_L = V_{OL}+0.15 V	V_H = V_{OH}-0.15 V V_L = V_{OL}+0.15 V	V_H = V_{OH}-0.3 V V_L = V_{OL}+0.3 V

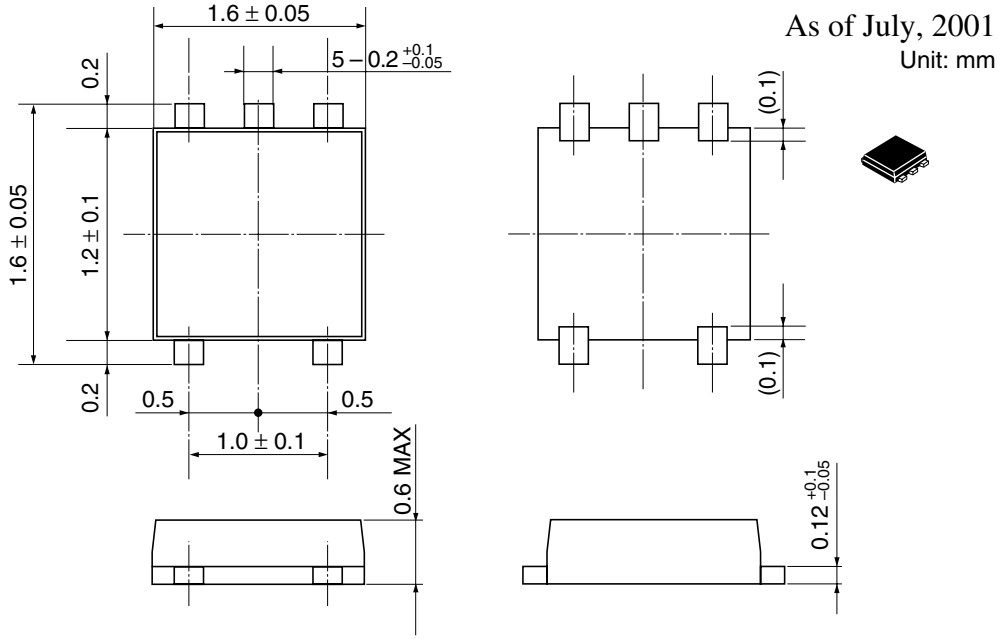
• $C_{IN/OUT}$, C_{IN-OUT}



Package Dimensions

As of July, 2001

Unit: mm



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Mass (reference value)	0.002 g

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