HD74HC1G66

Analog Switch

HITACHI

ADE-205-314E (Z)

6th Edition
May 2001

Description

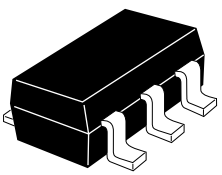
The HD74HC1G66 is high speed CMOS analog switch using silicon gate CMOS process. With CMOS low power dissipation, it provides high speed. The device has low ON resistance for good transfer characteristics and can take wide range of input voltage.

Features

- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Electrical characteristics equivalent to the HD74HC4066
  Supply voltage range : 2 to 6 V
  Operating temperature range : –40 to +85°C

Outline and Article Indication

• HD74HC1G66



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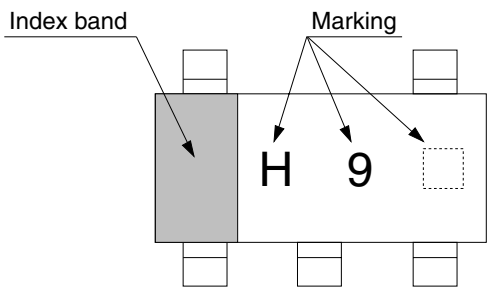


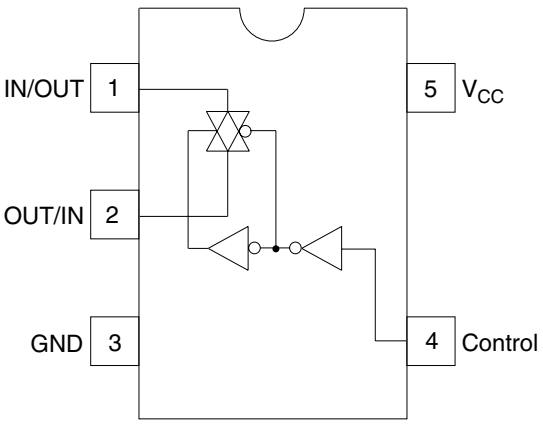
Hitachi semiconductor

Function Table

Control	Switch
L	OFF
H	ON

H : High level
L : Low level
GND ≤ V_{IN} ≤ V_{CC}
GND ≤ V_{OUT} ≤ V_{CC}

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	V_{CC}	–0.5 to 7.0	V	
Input voltage range *[1]	V_I	–0.5 to V_{CC} + 0.5	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}	±20	mA	V_I < 0 or V_I > V_{CC}
Output clamp current	I_{OK}	±20	mA	V_O < 0 or V_O > V_{CC}
Continuous output current	I_O	±25	mA	V_O = 0 to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±25	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 5.5 V maximum.
3. The maximum package power dissipation was caluculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Test Conditions
Supply voltage range	V_{CC}	2	6	V	
Input voltage range	$V_{I/O}$	0	V_{CC}	V	
Output voltage range	V_O	0	V_{CC}	V	
Input rise / fall time (Control input 10% to 90%)	t_r, t_f	0	1000	ns	V_{CC} = 2.0 V
		0	500		V_{CC} = 4.5 V
		0	400		V_{CC} = 6.0 V
Operating temperature	Ta	–40	85	°C	

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

Electrical Characteristics

Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to 85°C Min	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V	Control input only
		4.5	3.15	—	—	3.15	—		
		6.0	4.2	—	—	4.2	—		
	V_{IL}	2.0	—	—	0.5	—	0.5		
		4.5	—	—	1.35	—	1.35		
		6.0	—	—	1.8	—	1.8		
On resistance	R_{ON}	2.0	—	200	450	—	550	Ω	$V_C = V_{IH}$
		4.5	—	90	160	—	180		$V_{IN} = V_{CC}$ or GND
		6.0	—	80	130	—	140		I_T = 1 mA
Peak on resistance	R_{ON} (p)	2.0	—	600	1500	—	2000	Ω	$V_C = V_{IH}$
		4.5	—	125	200	—	250		V_{IN} = 0 to V_{CC}
		6.0	—	100	170	—	210		$I_{IN/OUT}$ = 1 mA
Leak current	I_S (off)	6.0	—	—	±0.1	—	±1.0	μA	$V_C = V_{IL}$ $V_{IN} = V_{CC}$, V_{OUT} = GND or V_{IN} = GND, $V_{OUT} = V_{CC}$
	I_S (on)	6.0	—	—	±0.1	—	±1.0	μA	$V_C = V_{IH}$ $V_{IN} = V_{CC}$ or GND
Input current	I_{IN}	6.0	—	—	±0.1	—	±1.0	μA	$V_{IN} = V_{CC}$ or GND
Operating current	I_{CC}	6.0	—	—	1.0	—	10.0	μA	$V_{IN} = V_{CC}$ or GND

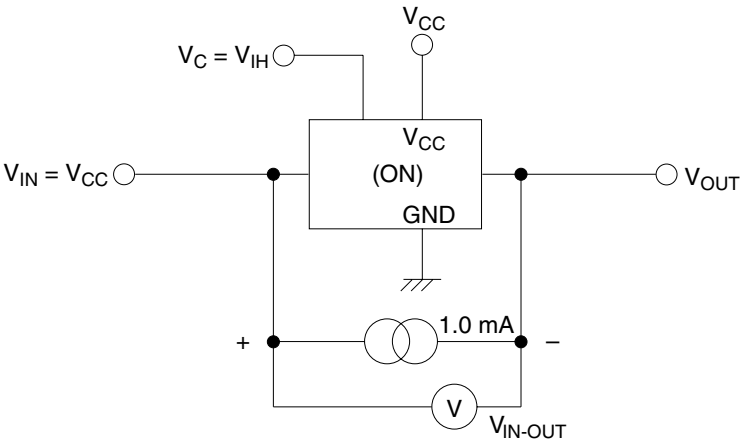
Switching Characteristics

Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to 85°C Min	Max	Unit	Test Conditions
Propagation delay time	t_{PLH}, t_{PHL}	2.0	—	—	50	—	65	ns	R_L = 10 kΩ
		4.5	—	4	10	—	13		
		6.0	—	—	9	—	11		
Output enable time	t_{ZH}, t_{ZL}	2.0	—	—	115	—	145	ns	R_L = 1 kΩ
		4.5	—	10	23	—	29		
		6.0	—	—	20	—	25		
Output disable time	t_{HZ}, t_{LZ}	2.0	—	—	115	—	145	ns	R_L = 1 kΩ
		4.5	—	14	23	—	29		
		6.0	—	—	20	—	25		
Maximum control frequency		2.0	—	20	—	—	—	MHz	
		4.5	—	30	—	—	—		
		6.0	—	30	—	—	—		
Control input capacitance	C_{IN}		—	2.5	5	—	5	pF	
Switch I/O capacitance	$C_{IN/OUT}$		—	2.5	—	—	—	pF	
Feed through capacitance	$C_{IN–OUT}$		—	0.5	—	—	—	pF	
Power dissipation capacitance	C_{PD}		—	5	—	—	—	pF	

(C_L = 50 pF, t_r = t_f = 6 ns)

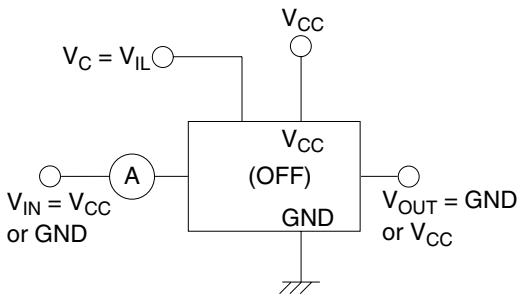
Test Circuit

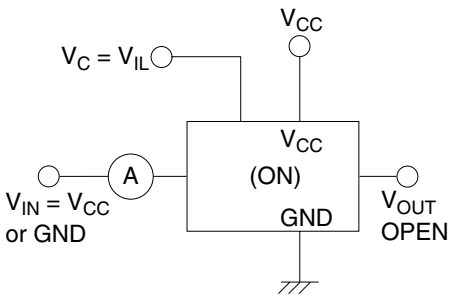
• R_{ON}



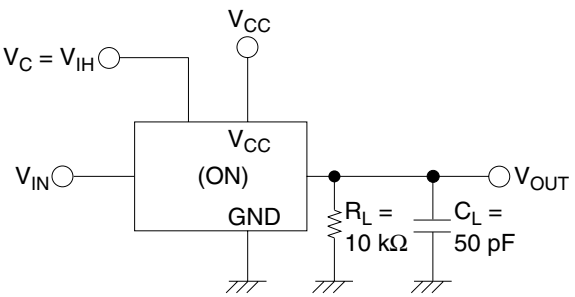
$$R_{ON} = \frac{V_{IN-OUT}}{10^{-3}} \ (\Omega)$$

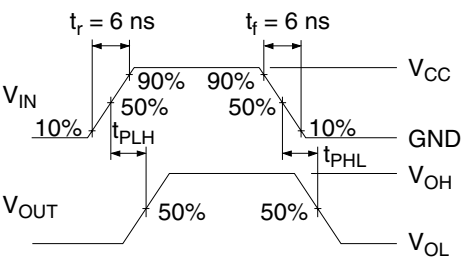
• I_S (off), I_S (on)



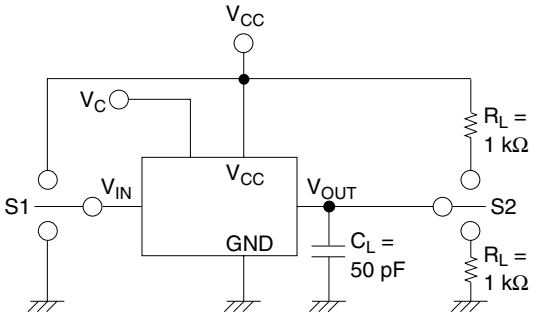


• t_{PLH}, t_{PHL}

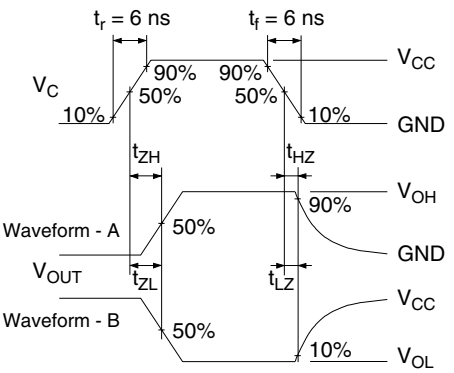




• t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}

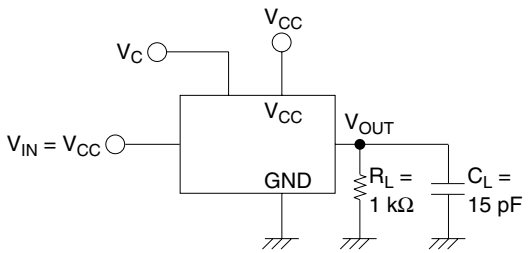


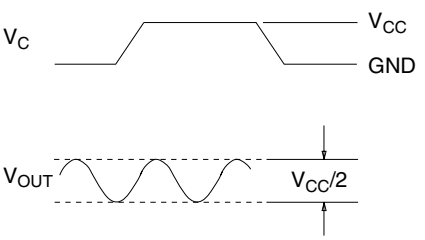
Item	S1	S2
t_{ZH}	V_{CC}	GND
t_{ZL}	GND	V_{CC}
t_{HZ}	V_{CC}	GND
t_{LZ}	GND	V_{CC}



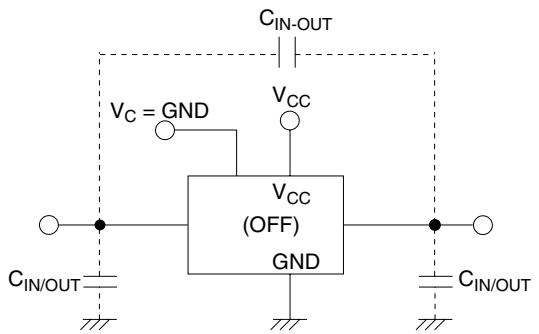
Notes: 1. Waveform - A is for an output with internal conditions such that the output is high except when disabled by the output control.
2. Waveform - B is for an output with internal conditions such that the output is low except when disabled by the output control.

• Maximum control frequency





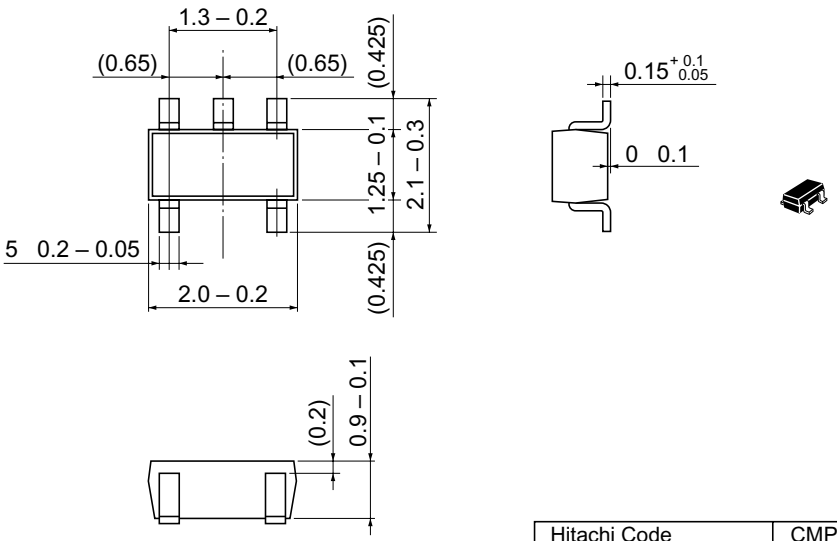
• $C_{IN/OUT}$, C_{IN-OUT}



Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	CMPAK-5
JEDEC	
EIAJ	Conforms
Mass (reference value)	0.006 g

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