

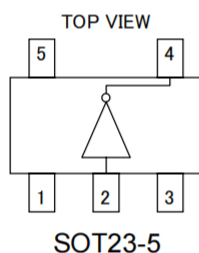
Features

- Power voltage range : 2.0 ~ 6.0V
- Operation temp. range : -40 ~ +85°C
- | IOH | = IOL = 2mA (min)
- ESD Protection Exceeds ESD 22
 - 2000-V Human-Body Model (A114-A)
 - 1000-V Charged-Device Model (C101)
- SOT23-5 Package Available

General Description

NC7S04M5X are CMOS inverter ICs. They realize a high speed operation similar to LS-TTL with a lower power consumption by CMOS features. An inner circuit structure of 3-stages logic gates obtains a wider noise immunity and a constant output.

Pin Configuration



Marking : 7S04F

Function Table

Pin No.	Pin Name
1	NC
2	INY
3	GND
4	OUTX
5	VCC

Input	Output
INA	OUTX
Low	High
High	Low

Maximum Absolute Ratings

Parameter	Symbol	Value	Units
Power Voltage	VCC	-0.5~+7.0	V
Input Voltage	VIN	-0.5~VCC+0.5	V
Output Voltage	VOUT	-0.5~VCC+0.5	V
Input Protection Diode Current	I _{IK}	±20	mA
Output Parasitic Diode Current	I _{OK}	±20	mA
Output Current	I _{OUT}	±25	mA
VCC/GND Current	I _{CC} , I _{IGND}	±25	mA
Power Dissipation	P _d	200	mW
Storage Temp.	T _{stg}	-65~+150	°C

Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks, PDAs
 - Tablet Computers, E-readers
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set-Top Box
 - Cell Phones, Personal Navigation / GPS
 - MP3 Players, Cameras, Video Recorders

Suggested Operating Condition

Parameter	Symbol	Value	Units
Power Voltage	VCC	2.0~6.0	V
Input Voltage	VIN	0~VCC	V
Output Voltage	VOU _T	0~VCC	V
Operating Temp.	Top	-40~+85	°C
High-input, Down-time	tr,tf	0~1000 (VCC=2.0V)	ns
		0~500 (VCC=4.5V)	
		0~400 (VCC=6.0V)	

DC Electrical Characteristics

Parameter	Sym.	VCC	Top = 25°C			Top = -40~+85°C		Units	Conditions	
			Min.	Typ.	Max.	Min.	Max.			
Input Voltage	VIH	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	VIL	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output Voltage	VOH	2.0	1.9	2.0	—	1.9	—	V	VIN=VIL	IOH = -20 μA
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	4.35	—	4.13	—		VIN=VIH	IOH = -2mA
		6.0	5.68	5.83	—	5.63	—			IOH = -2.6mA
	VOL	2.0	—	0.0	0.1	—	0.1	V	VIN=VIL	IOL = 20 μA
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	0.12	0.26	—	0.33		VIN=VIH	IOL = 2mA
		6.0	—	0.13	0.26	—	0.33			IOL = 2.6mA
Input Current	IIN	6.0	-0.1	—	0.1	-1.0	1.0	μA	VIN = VCC or GND	
Static Current	ICC	6.0	—	—	1.0	—	10.0	μA	VIN = VCC or GND	

AC Electrical Characteristics

(CL=15pF, tr=tf=6ns, VCC=5V)

Parameter	Sym.	Top = 25°C			Units	Conditions
		Min.	Typ.	Max.		
High Output Down-time	t _{TLH}	—	4	10	ns	Refer to following test circuit
	t _{THL}	—	3	10		
Propagation Delay-time	t _{PLH}	—	5	15	ns	Refer to following test circuit
	t _{PHL}	—	5	15		

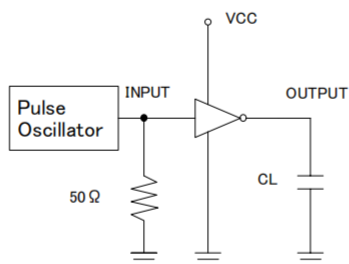
(CL=50pF, tr=tf=6ns)

Parameter	Sym.	VCC	Top = 25°C			Top = -40~+85°C		Units	Conditions
			Min.	Typ.	Max.	Min.	Max.		
High-Output Down-time	tTLH	2.0	—	22	125	—	155	ns	Refer to test circuit
		4.5	—	8	25	—	31		
		6.0	—	6	21	—	26		
	tTHL	2.0	—	16	125	—	155	ns	
		4.5	—	7	25	—	31		
		6.0	—	6	21	—	26		
Propagation Delay-time	tPLH	2.0	—	18	100	—	125	ns	Refer to test circuit
		4.5	—	8	20	—	25		
		6.0	—	7	17	—	21		
	tPHL	2.0	—	17	100	—	125	ns	
		4.5	—	7	20	—	25		
		6.0	—	6	17	—	21		
Input Capacity	CIN	—	—	5	10	—	10	pF	
Equivalent Inner Capacity	CPD	—	—	10	—	—	—	pF	

* CPD is IC's inner equivalent capacity which is calculated from non-loaded operating current consumption referred to following test circuit. Averaged operating current consumption at non-load is calculated as following formula;

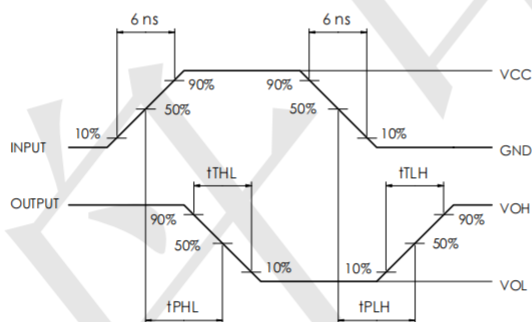
$$ICC(opr) = CPD \cdot VCC \cdot f_{IN} + ICC$$

Test Circuit And Waveforms



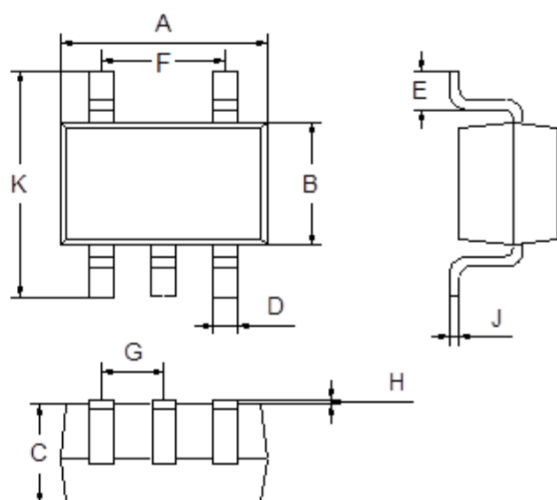
* Output should be opened when measuring current consumption.

Measured Wave Pattern



Package Outline Dimensions (Unit: mm)

SOT23-5



Dimension	Min.	Max.
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
F	1.80	2.00
G	0.90	1.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00

Mounting Pad Layout (Unit: mm)

