HIGH SPEED CMOS LOGIC IC ELM7SH14xB Schmitt Inverter

■General description

ELM7SH14xB is CMOS schmitt inverter which is suitable for battery-operated devices because of its low voltage and ultra high speed operation. The low power consumption contributes to longer battery life, which allows long time operation of devices. The internal circuit which provides high noise immunity and stable output is composed of 3 stages, including buffered output. All input pins have an input tolerant circuit configuration. In other words, there is no diode on the positive side (forward from input to Vdd), so it ensures that 0 to 5.5 V can be applied to the input pins without regard to the supply voltage.

■Features

- Same electrical characteristic and high speed operation as 74VHC series
- Low consumption current : Idd=1.0μA(Max.)(Top=25°C)
- Wide power voltage range : 1.65V to 5.5V
- Wide input voltage range : Vih=5.5V(Max.)(Vdd=0 to 5.5V)
- High speed : Tpd=2.5ns(Typ.)(Vdd=5.0V)
- Small package : SOT-25, SC-70-5(SOT-353)
- Same function and pin configuration as ELM7SxxB

■Application

- Cell phones
- Digital cameras
- Portable electrical appliances like PDA, etc.
- Computers and peripherals
- Digital electrical appliances like LCD TV sets, DVD recorders/players, STB, etc.
- Modification inside print board, adjustment of timing, solution to noise
- Power voltage change from 5V to 3V (Input tolerant)

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Power supply voltage	Vdd	-0.5 to +6.0	V
Input voltage	Vin	-0.5 to +6.0	V
Output voltage	Vout	-0.5 to Vdd+0.5	V
Input protection diode current	Iik	-20	mA
Output parasitic diode current	Iok	±20	mA
Output current	Iout	±25	mA
VDD/GND current	Idd, Ignd	±50	mA
Power dissipation	Pd	150	mW
Storage temperature	Tstg	-65 to +150	°C

■Selection guide

ELM7SH14xBEL

Symbol		
a	Function	14: Schmitt inverter
b	Package	M: SOT-25 T : SC-70-5(SOT-353)
c	Product version	B
d	Taping direction	EL: Refer to PKG file

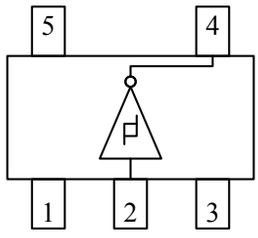
ELM7SH 14 x B EL
↑ ↑ ↑ ↑
a b c d

■Suggested operating condition

Parameter	Symbol	Limit	Unit
Power voltage	Vdd	1.65 to 5.5	V
Input voltage	Vin	0 to 5.5	V
Output voltage	Vout	0 to Vdd	V
Operating temperature	Top	-40 to +85	°C

■Pin configuration

TOP VIEW

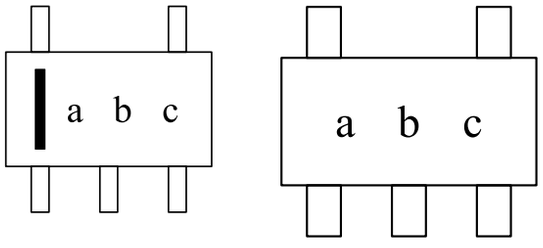


Pin No.	Pin name
1	NC
2	INY
3	GND
4	OUTX
5	VDD

Input	Output
INY	OUTX
Low	High
High	Low

■Marking

SC-70-5 SOT-25



Sym.	Mark	Content
a	F	ELM7SH series
b	A	ELM7SH14xB
c	A to Z (except I, O, X)	Lot No.

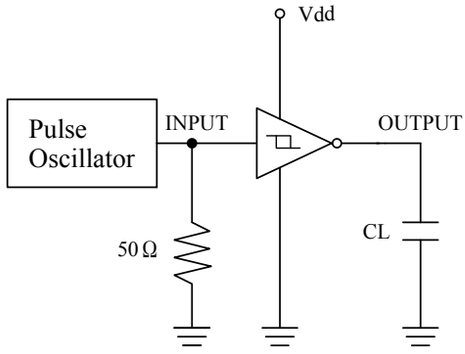
■AC electrical characteristics

tr=tf=3ns

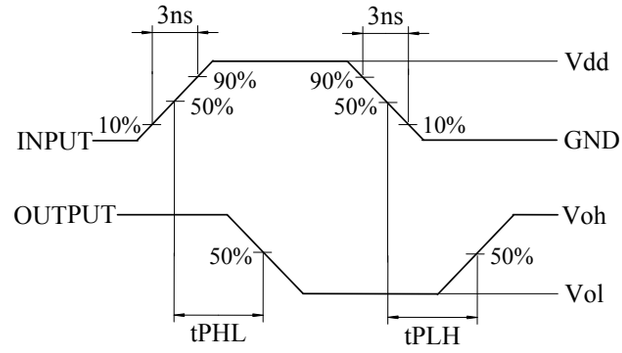
Parameter	Sym.	Vdd	CL	Top=25°C			Top=-40 to +85°C		Unit	Condition
				Min.	Typ.	Max.	Min.	Max.		
Propagation delay-time	tPLH	1.8 ± 0.15	15	-	16.8	32.0	1.0	34.0	ns	Refer to test circuit
	tPHL			-	16.8	32.0	1.0	34.0		
	tPLH	1.8 ± 0.15	50	-	23.8	43.0	1.0	46.0		
	tPHL			-	23.8	43.0	1.0	46.0		
	tPLH	2.5 ± 0.2	15	-	10.5	19.7	1.0	22.0		
	tPHL			-	10.5	19.7	1.0	22.0		
	tPLH	2.5 ± 0.2	50	-	14.0	24.0	1.0	27.0		
	tPHL			-	14.0	24.0	1.0	27.0		
	tPLH	3.3±0.3	15	-	2.8	12.8	1.0	15.0		
	tPHL			-	3.1	12.8	1.0	15.0		
	tPLH	3.3±0.3	50	-	4.3	16.3	1.0	18.5		
	tPHL			-	4.4	16.3	1.0	18.5		
	tPLH	5.0±0.5	15	-	2.1	8.6	1.0	10.0		
	tPHL			-	2.5	8.6	1.0	10.0		
	tPLH	5.0±0.5	50	-	3.1	10.6	1.0	12.0		
	tPHL			-	3.4	10.6	1.0	12.0		
Input capacity	Cin	5.0	-	-	2.0	10.0	-	10.0	pF	Vin=Vdd or GND
Equivalent inner capacity	Cpd	-	-	-	10.0	-	-	-	pF	f=1MHz

∗ Cpd is IC's inner equivalent capacity which is calculated from non-loaded operating current consumption referred to test circuit. Averaged operating current consumption at non load is calculated as following formula: Idd(opr)=Cpd • Vdd • fin+Idd

■Test circuit



■Measured wave pattern



∗ Output should be opened when measuring current consumption.

■DC electrical characteristics

Parameter	Sym.	Vdd	Top=25°C		Top=-40 to +85°C		Unit	Condition	
			Min.	Max.	Min.	Max.			
Threshold voltage	Vt^+	1.65	-	1.34	-	1.34	V		
		2.0	-	1.57	-	1.57			
		3.0	-	2.20	-	2.20			
		4.5	-	3.15	-	3.15			
		5.5	-	3.85	-	3.85			
	Vt^-	1.65	0.15	-	0.15	-	V		
		2.0	0.35	-	0.35	-			
		3.0	0.90	-	0.90	-			
		4.5	1.35	-	1.35	-			
		5.5	1.65	-	1.65	-			
Hysteresis voltage	Vh	1.65	0.25	1.20	0.25	1.20	V		
		2.0	0.25	1.20	0.25	1.20			
		3.0	0.25	1.20	0.25	1.20			
		4.5	0.25	1.20	0.25	1.20			
		5.5	0.25	1.20	0.25	1.20			
Output voltage	Voh	1.65	1.55	-	1.55	-	V	Vin=Vil	Ioh=-50μA
		2.0	1.90	-	1.90	-			
		3.0	2.90	-	2.90	-			
		4.5	4.40	-	4.40	-			
		3.0	2.58	-	2.48	-			Ioh=-4mA
		4.5	3.94	-	3.80	-			Ioh=-8mA
	Vol	1.65	-	0.10	-	0.10	V	Vin=Vih	Iol=50μA
		2.0	-	0.10	-	0.10			
		3.0	-	0.10	-	0.10			
		4.5	-	0.10	-	0.10			
		3.0	-	0.36	-	0.44			Iol=4mA
		4.5	-	0.36	-	0.44			Iol=8mA
Input current	Iin	5.5	-0.1	0.1	-1.0	1.0	μA	Vin=Vdd or GND	
Static current	Idd	5.5	-	1.0	-	10.0	μA	Vin=Vdd or GND	