

CMOS LOGIC IC ELM7S02B 2-input NOR gate

■General description

ELM7S02B is CMOS 2-input NOR gate IC. It realizes high speed operation similar to LS-TTL with lower power consumption by CMOS features. The inner circuit structure of 3-stage logic gate obtains wider noise immunity and constant output.

■Features

- Same electrical characteristic as 74HC series (output current is around 1/2 of 74HC series)
- Low consumption current : Idd=1.0 μ A(Max.)(Top=25°C)
- Wide power voltage range : 2.0V to 6.0V
- High speed : Tpd=5ns(Typ.)(Vdd=5.0V)
- Symmetrical output impedance : |Ioh|=Iol=2mA(Min.)(Vdd=4.5V)
- Small package : SOT-25

■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

■Selection guide

ELM7S02B-EL

| Symbol | Function | 02: 2-input NOR gate |
|--------|------------------|-----------------------|
| a | Product version | B |
| c | Taping direction | EL: Refer to PKG file |

ELM7S 0 2 B - EL
↑ ↑ ↑
a b c

■Maximum absolute ratings

| Parameter | Symbol | Limit | Unit |
|--------------------------------|-----------|-----------------|------|
| Power supply voltage | Vdd | -0.5 to +7.0 | V |
| Input voltage | Vin | -0.5 to Vdd+0.5 | 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 | ± 25 | mA |
| Power dissipation | Pd | 200 | mW |
| Storage temperature | Tstg | -65 to +150 | °C |



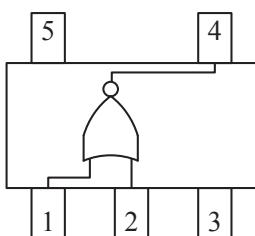
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■Suggested operating condition

| Parameter | Symbol | Limit | | Unit |
|-----------------------|--------|------------|-----------|------|
| Power voltage | Vdd | 2.0 to 6.0 | | V |
| Input voltage | Vin | 0 to Vdd | | V |
| Output voltage | Vout | 0 to Vdd | | V |
| Operating temperature | Top | -40 to +85 | | °C |
| High-input down-time | tr, tf | Vdd=2.0V | 0 to 1000 | ns |
| | | Vdd=4.5V | 0 to 500 | |
| | | Vdd=6.0V | 0 to 400 | |

■Pin configuration

SOT-25(TOP VIEW)



| Pin No. | Pin name |
|---------|----------|
| 1 | INB |
| 2 | INA |
| 3 | GND |
| 4 | OUTX |
| 5 | VDD |

| Input | Output |
|-------|--------|
| INA | INB |
| Low | Low |
| Low | High |
| High | Low |
| High | High |

■AC electrical characteristics

CL=15pF, tr=tf=6ns, Vdd=5V

| Parameter | Sym. | Vdd | Top=25°C | | | Unit | Condition |
|------------------------|------|-----|----------|------|------|------|-----------------------|
| | | | Min. | Typ. | Max. | | |
| Output transition time | tTLH | | 4 | 10 | | ns | Refer to test circuit |
| | tTHL | | 3 | 10 | | | |
| Propagation delay-time | tPLH | | 5 | 15 | | ns | Refer to test circuit |
| | tPHL | | 5 | 15 | | | |

CL=50pF, tr=tf=6ns

| Parameter | Sym. | Vdd | Top=25°C | | | Top=-40 to +85°C | | Unit | Condition |
|---------------------------|------|-----|----------|------|------|------------------|------|------|-----------------------|
| | | | Min. | Typ. | Max. | Min. | Max. | | |
| Output transition time | tTLH | 2.0 | | 21 | 125 | | 155 | ns | Refer to test circuit |
| | | 4.5 | | 8 | 25 | | 31 | | |
| | | 6.0 | | 7 | 21 | | 26 | | |
| | tTHL | 2.0 | | 16 | 125 | | 155 | ns | Refer to test circuit |
| | | 4.5 | | 7 | 25 | | 31 | | |
| | | 6.0 | | 6 | 21 | | 26 | | |
| Propagation delay-time | tPLH | 2.0 | | 19 | 100 | | 125 | ns | Refer to test circuit |
| | | 4.5 | | 8 | 20 | | 25 | | |
| | | 6.0 | | 7 | 17 | | 21 | | |
| | tPHL | 2.0 | | 17 | 100 | | 125 | ns | Refer to test circuit |
| | | 4.5 | | 7 | 20 | | 25 | | |
| | | 6.0 | | 6 | 17 | | 21 | | |
| Input capacity | Cin | | | 5 | 10 | | 10 | pF | |
| Equivalent inner capacity | Cpd | | | 10 | | | | pF | |

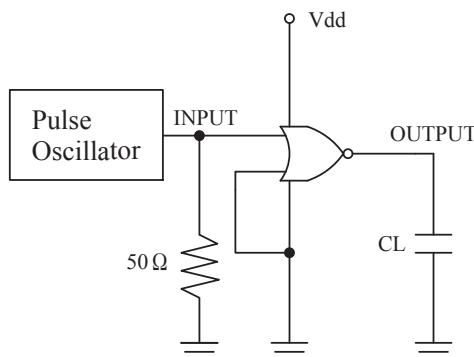
* Cpd is IC's inner equivalent capacity which is calculated from non-loaded operating current consumption referred to test circuit. Averaged operating current consumption at non load is calculated as following formula: $Idd(\text{opr}) = Cpd \cdot Vdd \cdot f_{in} + Idd$

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■DC electrical characteristics

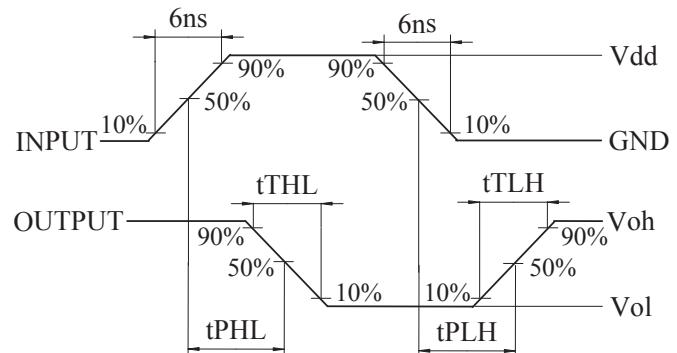
| Parameter | Sym. | Vdd | Top=25°C | | | Top=-40 to +85°C | | Unit | Condition | |
|----------------|------|-----|----------|------|------|------------------|------|------|----------------|------------|
| | | | Min. | Typ. | Max. | Min. | Max. | | | |
| Input voltage | Vih | 2.0 | 1.50 | | | 1.50 | | V | | |
| | | 4.5 | 3.15 | | | 3.15 | | | | |
| | | 6.0 | 4.20 | | | 4.20 | | | | |
| | Vil | 2.0 | | | 0.50 | | 0.50 | V | | |
| | | 4.5 | | | 1.35 | | 1.35 | | | |
| | | 6.0 | | | 1.80 | | 1.80 | | | |
| Output voltage | Voh | 2.0 | 1.90 | 2.00 | | 1.90 | | V | Vin=Vil | Ioh=-20μA |
| | | 4.5 | 4.40 | 4.50 | | 4.40 | | | | Ioh=-2mA |
| | | 6.0 | 5.90 | 6.00 | | 5.90 | | | | Ioh=-2.6mA |
| | | 4.5 | 4.18 | 4.35 | | 4.13 | | | Vin=Vih or Vil | Iol=20μA |
| | | 6.0 | 5.68 | 5.83 | | 5.63 | | | | Iol=2mA |
| | Vol | 2.0 | | 0.00 | 0.10 | | 0.10 | V | Vin=Vih or Vil | Iol=2.6mA |
| | | 4.5 | | 0.00 | 0.10 | | 0.10 | | | Iol=20μA |
| | | 6.0 | | 0.00 | 0.10 | | 0.10 | | Vin=Vih or Vil | Iol=2mA |
| | | 4.5 | | 0.12 | 0.26 | | 0.33 | | | Iol=2.6mA |
| | | 6.0 | | 0.13 | 0.26 | | 0.33 | | | Iol=20μA |
| Input current | Iin | 6.0 | -0.1 | | 0.1 | -1.0 | 1.0 | μA | Vin=Vdd or GND | |
| Static current | Idd | 6.0 | | | 1.0 | | 10.0 | μA | Vin=Vdd or GND | |

■Test circuit



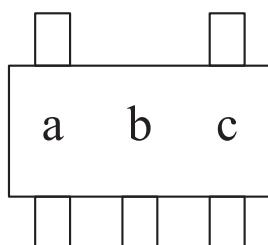
* Output should be opened when measuring current consumption.

■Measured wave pattern



■Marking

SOT-25



| Sym. | Mark | Content |
|------|----------------------------|--------------|
| a | E | ELM7S series |
| b | 3 | ELM7S02B |
| c | A to Z (except I, O, X) | Lot No. |