

# CMOS LOGIC IC ELM7S08B 2-input AND gate

<https://www.elm-tech.com>

## ■General description

ELM7S08B is CMOS 2-input AND 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 :  $I_{dd}=1.0\mu A(\text{Max.})(T_{op}=25^{\circ}C)$
- Wide power voltage range : 2.0V to 6.0V
- High speed :  $T_{pd}=5ns(\text{Typ.})(V_{dd}=5.0V)$
- Symmetrical output impedance :  $|I_{oh}|=|I_{ol}|=2mA(\text{Min.})(V_{dd}=4.5V)$
- 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

ELM7S08BEL

| Symbol |                  |                       |
|--------|------------------|-----------------------|
| a      | Function         | 08: 2-input AND gate  |
| b      | Product version  | B                     |
| c      | Taping direction | EL: Refer to PKG file |

ELM7S 08 B EL  
          ↑    ↑    ↑  
          a   b   c

## ■Maximum absolute ratings

| Parameter                      | Symbol                             | Limit                        | Unit |
|--------------------------------|------------------------------------|------------------------------|------|
| Power supply voltage           | V <sub>dd</sub>                    | -0.5 to +7.0                 | V    |
| Input voltage                  | V <sub>in</sub>                    | -0.5 to V <sub>dd</sub> +0.5 | V    |
| Output voltage                 | V <sub>out</sub>                   | -0.5 to V <sub>dd</sub> +0.5 | V    |
| Input protection diode current | I <sub>ik</sub>                    | ±20                          | mA   |
| Output parasitic diode current | I <sub>ok</sub>                    | ±20                          | mA   |
| Output current                 | I <sub>out</sub>                   | ±25                          | mA   |
| VDD/GND current                | I <sub>dd</sub> , I <sub>gnd</sub> | ±25                          | mA   |
| Power dissipation              | P <sub>d</sub>                     | 200                          | mW   |
| Storage temperature            | T <sub>stg</sub>                   | -65 to +150                  | °C   |

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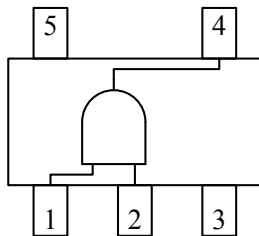
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## ■Suggested operating condition

| 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  | OUTX   |
| Low   | Low  | Low    |
| Low   | High | Low    |
| High  | Low  | Low    |
| High  | High | High   |

## ■AC electrical characteristics

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

| Parameter              | Sym. | 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 |          | 4    | 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 |          | 7    | 25   |                  | 31   |      |                       |
|                           |      | 6.0 |          | 6    | 21   |                  | 26   |      |                       |
|                           | tTHL | 2.0 |          | 18   | 125  |                  | 155  | ns   |                       |
|                           |      | 4.5 |          | 6    | 25   |                  | 31   |      |                       |
|                           |      | 6.0 |          | 6    | 21   |                  | 26   |      |                       |
| Propagation delay-time    | tPLH | 2.0 |          | 16   | 100  |                  | 125  | ns   | Refer to test circuit |
|                           |      | 4.5 |          | 6    | 20   |                  | 25   |      |                       |
|                           |      | 6.0 |          | 5    | 17   |                  | 21   |      |                       |
|                           | tPHL | 2.0 |          | 17   | 100  |                  | 125  | ns   |                       |
|                           |      | 4.5 |          | 8    | 20   |                  | 25   |      |                       |
|                           |      | 6.0 |          | 7    | 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:  $I_{dd}(opr) = Cpd \cdot Vdd \cdot f_{in} + I_{dd}$

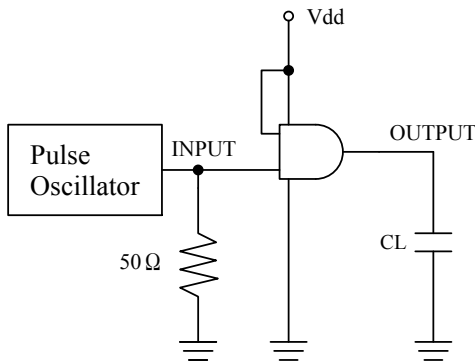
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## DC electrical characteristics

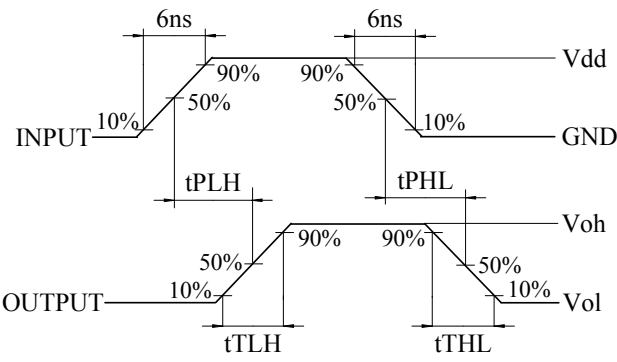
| Parameter      | Sym. | Vdd | Top=25°C |      |      | Top=-40 to +85°C |      | Unit | Condition      |            |
|----------------|------|-----|----------|------|------|------------------|------|------|----------------|------------|
|                |      |     | Min.     | Typ. | Max. | Min.             | 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=Vih        | 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     | 4.36 |      | 4.13             |      |      |                |            |
|                |      | 6.0 | 5.68     | 5.83 |      | 5.63             |      |      |                |            |
|                |      |     |          |      |      |                  |      |      |                |            |
|                | Vol  | 2.0 |          | 0.00 | 0.10 |                  | 0.10 | V    | Vin=Vih or Vil | Iol=20μA   |
|                |      | 4.5 |          | 0.00 | 0.10 |                  | 0.10 |      |                | Iol=2mA    |
|                |      | 6.0 |          | 0.00 | 0.10 |                  | 0.10 |      |                | Iol=2.6mA  |
|                |      | 4.5 |          | 0.12 | 0.26 |                  | 0.33 |      |                |            |
|                |      | 6.0 |          | 0.13 | 0.26 |                  | 0.33 |      |                |            |
|                |      |     |          |      |      |                  |      |      |                |            |
| 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



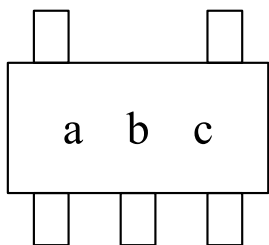
\* Output should be opened when measuring current consumption.

## Measured wave pattern



## Marking

SOT-25



| Sym. | Mark                       | Content      |
|------|----------------------------|--------------|
| a    | E                          | ELM7S series |
| b    | 2                          | ELM7S08B     |
| c    | A to Z<br>(except I, O, X) | Lot No.      |