

## QUAD EXCLUSIVE OR GATE

The TC74LVQ86 is a high speed CMOS EXCLUSIVE OR GATE fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

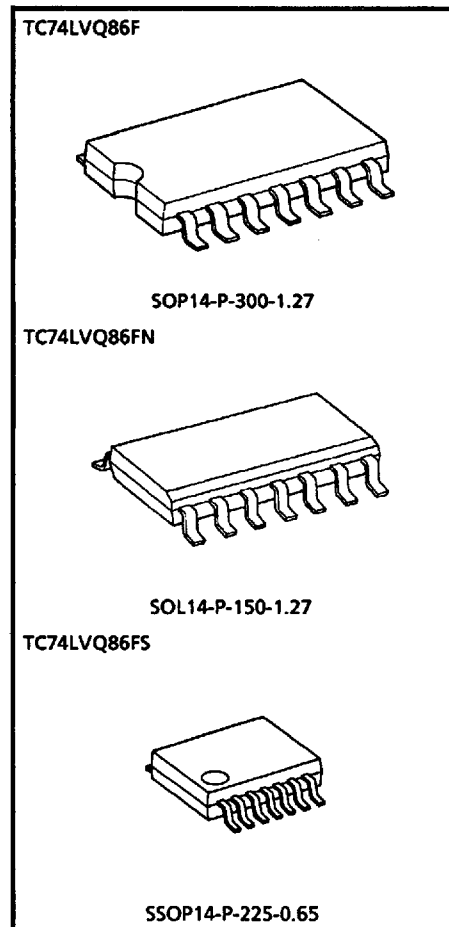
Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

The internal circuit includes an output buffer, which provides high noise immunity and stable output.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

### FEATURES

- High speed :  $t_{pd} = 5.6\text{ns}$  (Typ.) ( $V_{CC} = 3.3\text{V}$ )
- Low power dissipation :  $I_{CC} = 2.5\mu\text{A}$  (Max.) ( $T_a = 25^\circ\text{C}$ )
- Input voltage level :  $V_{IL} = 0.8\text{V}$  (Max.) ( $V_{CC} = 3\text{V}$ )  
 $V_{IH} = 2.0\text{V}$  (Min.) ( $V_{CC} = 3\text{V}$ )
- Symmetrical output impedance :  $|I_{OH}| = I_{OL} = 12\text{mA}$  (Min.)
- Balanced propagation delays :  $t_{pLH} \approx t_{pHL}$
- Pin and function compatible with 74HC86



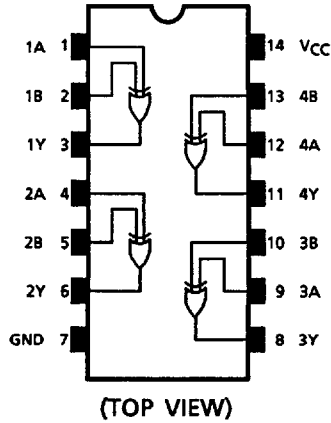
Weight  
 SOP14-P-300-1.27 : 0.18g (Typ.)  
 SOL14-P-150-1.27 : 0.12g (Typ.)  
 SSOP14-P-225-0.65 : 0.07g (Typ.)

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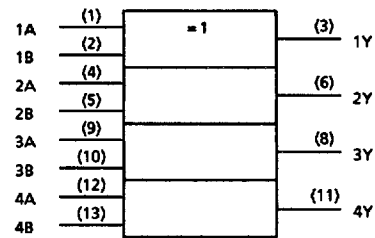
**PIN ASSIGNMENT**



**TRUTH TABLE**

| INPUTS |   | OUTPUTS |
|--------|---|---------|
| A      | B | Y       |
| L      | L | L       |
| L      | H | H       |
| H      | L | H       |
| H      | H | L       |

**IEC LOGIC SYMBOL**



**MAXIMUM RATINGS**

| PARAMETER                    | SYMBOL    | RATING             | UNIT |
|------------------------------|-----------|--------------------|------|
| Supply Voltage Range         | $V_{CC}$  | -0.5~7.0           | V    |
| DC Input Voltage             | $V_{IN}$  | -0.5~ $V_{CC}+0.5$ | V    |
| DC Output Voltage            | $V_{OUT}$ | -0.5~ $V_{CC}+0.5$ | V    |
| Input Diode Current          | $I_{IK}$  | ± 20               | mA   |
| Output Diode Current         | $I_{OK}$  | ± 50               | mA   |
| DC Output Current            | $I_{OUT}$ | ± 50               | mA   |
| DC $V_{CC}$ / Ground Current | $I_{CC}$  | ± 100              | mA   |
| Power Dissipation            | $P_D$     | 180                | mW   |
| Storage Temperature          | $T_{stg}$ | -65~150            | °C   |

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**RECOMMENDED OPERATING CONDITIONS**

| PARAMETER                | SYMBOL           | RATING            | UNIT |
|--------------------------|------------------|-------------------|------|
| Supply Voltage           | V <sub>CC</sub>  | 2.0~3.6           | V    |
| Input Voltage            | V <sub>IN</sub>  | 0~V <sub>CC</sub> | V    |
| Output Voltage           | V <sub>OUT</sub> | 0~V <sub>CC</sub> | V    |
| Operating Temperature    | T <sub>opr</sub> | -40~85            | °C   |
| Input Rise And Fall Time | dt/dv            | 0~100             | ns/V |

**ELECTRICAL CHARACTERISTICS**

DC characteristics

| PARAMETER                | SYM-BOL         | TEST CONDITION                           | V <sub>CC</sub><br>(V)                                  | Ta = 25°C               |      |      | Ta = -40~85°C |      | UNIT |   |      |
|--------------------------|-----------------|--|---|-------------------------|------|------|---------------|------|------|---|------|
|                          |                 |  |   | MIN.                    | TYP. | MAX. | MIN.          | MAX. |      |   |      |
| Input Voltage            | "H" Level       | V <sub>IH</sub>                          | 3.0   | 2.0                     | —    | —    | 2.0           | —    | V    |   |      |
|                          | "L" Level       | V <sub>IL</sub>                          | 3.0   | —                       | —    | 0.8  | —             | 0.8  |      |   |      |
| Output Voltage           | "H" Level       | V <sub>OH</sub>                          | V <sub>IN</sub> = V <sub>IH</sub><br>or V <sub>IL</sub> | I <sub>OH</sub> = -50μA | 3.0  | 2.9  | 3.0           | —    | 2.9  | V |      |
|                          |                 |  |   | I <sub>OH</sub> = -12mA | 3.0  | 2.58 | —             | —    | 2.48 |   | —    |
|                          | "L" Level       | V <sub>OL</sub>                          | V <sub>IN</sub> = V <sub>IH</sub><br>or V <sub>IL</sub> | I <sub>OL</sub> = 50μA  | 3.0  | —    | 0.0           | 0.1  | —    |   | 0.1  |
|                          |                 |  |   | I <sub>OL</sub> = 12mA  | 3.0  | —    | —             | 0.36 | —    |   | 0.44 |
| Input Leakage Current    | I <sub>IN</sub> | V <sub>IN</sub> = V <sub>CC</sub> or GND | 3.6   | —                       | —    | ±0.1 | —             | ±1.0 | μA   |   |      |
| Quiescent Supply Current | I <sub>CC</sub> | V <sub>IN</sub> = V <sub>CC</sub> or GND | 3.6   | —                       | —    | 2.5  | —             | 25.0 | μA   |   |      |

AC characteristics (Input t<sub>r</sub> = t<sub>f</sub> = 3ns, C<sub>L</sub> = 50pF, R<sub>L</sub> = 500Ω)

| PARAMETER                     | SYM-BOL           | TEST CONDITION | V <sub>CC</sub><br>(V) | Ta = 25°C |      |      | Ta = -40~85°C |      | UNIT |
|-------------------------------|-------------------|----------------|------------------------|-----------|------|------|---------------|------|------|
|                               |                   |                |                        | MIN.      | TYP. | MAX. | MIN.          | MAX. |      |
| Propagation Delay Time        | t <sub>pLH</sub>  |                | 2.7                    | —         | 7.8  | 16.2 | 1.0           | 18.0 | ns   |
|                               | t <sub>pHL</sub>  |                | 3.3 ± 0.3              | —         | 6.5  | 11.5 | 1.0           | 12.5 |      |
| Output To Output Skew         | t <sub>osLH</sub> | (Note 1)       | 2.7                    | —         | —    | 1.5  | —             | 1.5  | ns   |
|                               | t <sub>osHL</sub> |                | 3.3 ± 0.3              | —         | —    | 1.5  | —             | 1.5  |      |
| Input Capacitance             | C <sub>IN</sub>   | (Note 2)       |                        | —         | 5    | 10   | —             | 10   | pF   |
| Power Dissipation Capacitance | C <sub>PD</sub>   | (Note 3)       |                        | —         | 27   | —    | —             | —    | pF   |

(Note 1) Parameter guaranteed by design.

$$(t_{osLH} = |t_{pLHm} - t_{pLHn}|, t_{osHL} = |t_{pHLm} - t_{pHLn}|)$$

(Note 2) Parameter guaranteed by design.

(Note 3) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.

Average operating current can be obtained by the equation :

$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per Gate)}$$

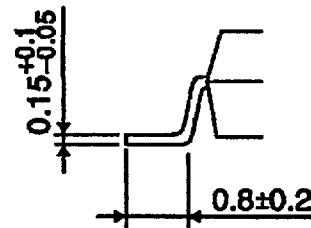
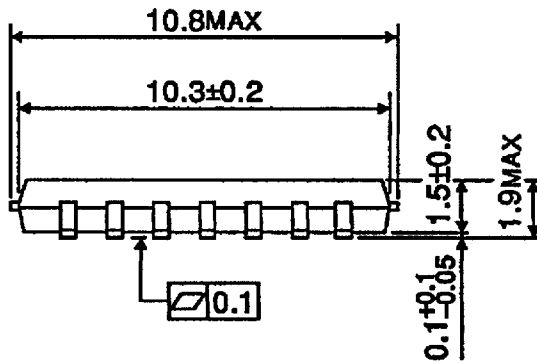
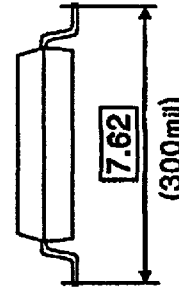
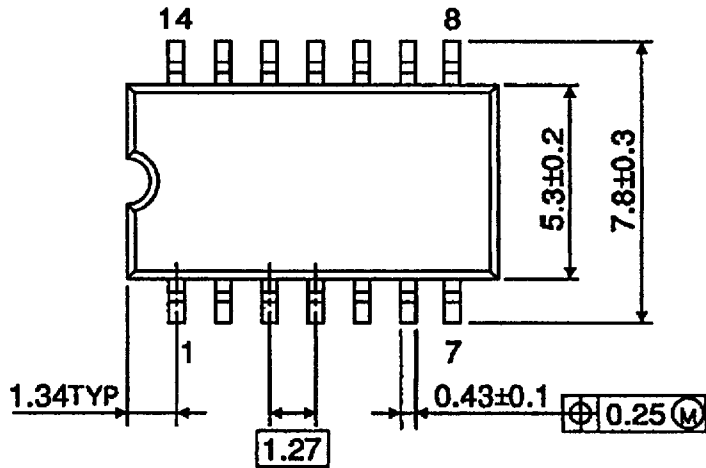
Noise characteristics ( $T_a = 25^\circ\text{C}$ , Input  $t_r = t_f = 3\text{ns}$ ,  $C_L = 50\text{pF}$ ,  $R_L = 500\Omega$ )

| PARAMETER                                | SYMBOL    | TEST CONDITION | $V_{CC}$ (V) | TYP. | LIMIT | UNIT |
|--|-----------|----------------|--------------|------|-------|------|
|  |           |                |              |      |       |      |
| Quiet Output Maximum Dynamic $V_{OL}$    | $V_{OLP}$ |                | 3.3          | 0.3  | 0.8   | V    |
| Quiet Output Minimum Dynamic $V_{OL}$    | $V_{OLV}$ |                | 3.3          | -0.3 | -0.8  | V    |
| Minimum High Level Dynamic Input Voltage | $V_{IHD}$ |                | 3.3          | —    | 2.0   | V    |
| Maximum Low Level Dynamic Input Voltage  | $V_{ILD}$ |                | 3.3          | —    | 0.8   | V    |

|                            |
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OUTLINE DRAWING  
SOP14-P-300-1.27

Unit : mm

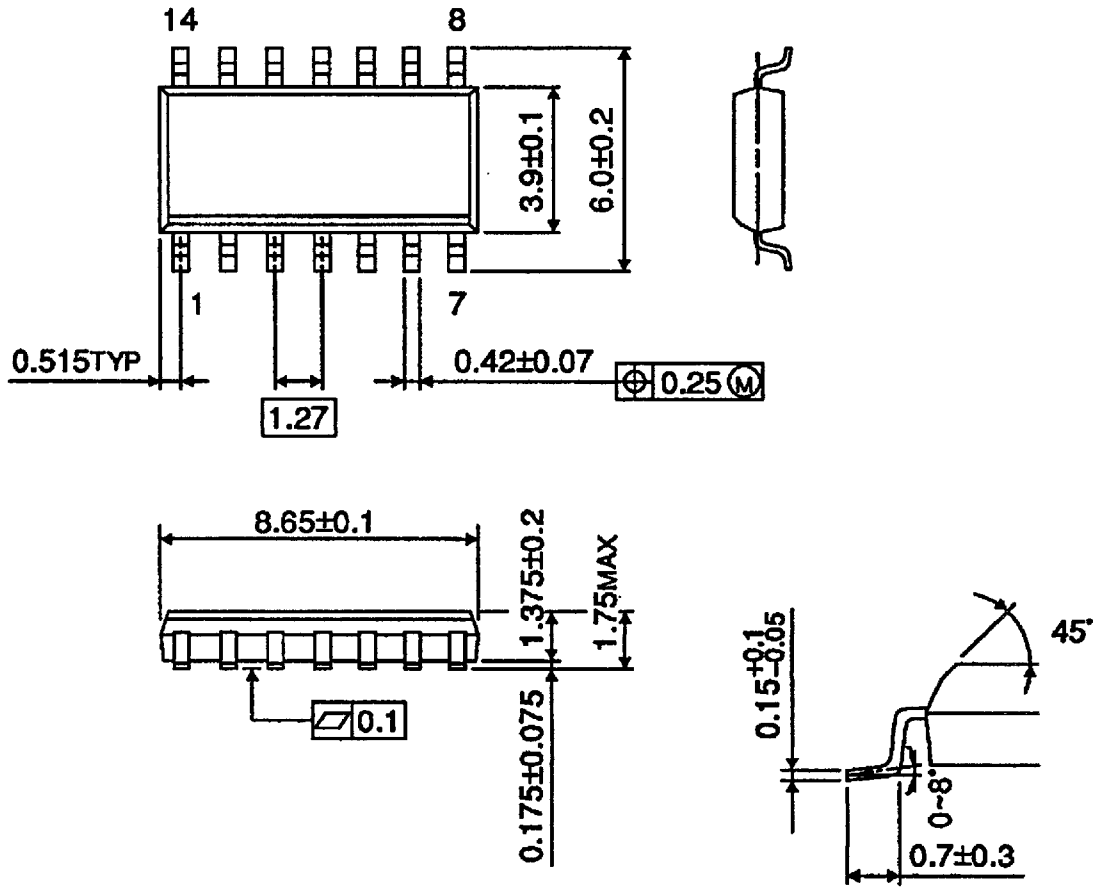


Weight : 0.18g (Typ.)

|                            |
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OUTLINE DRAWING  
SOL14-P-150-1.27

Unit : mm

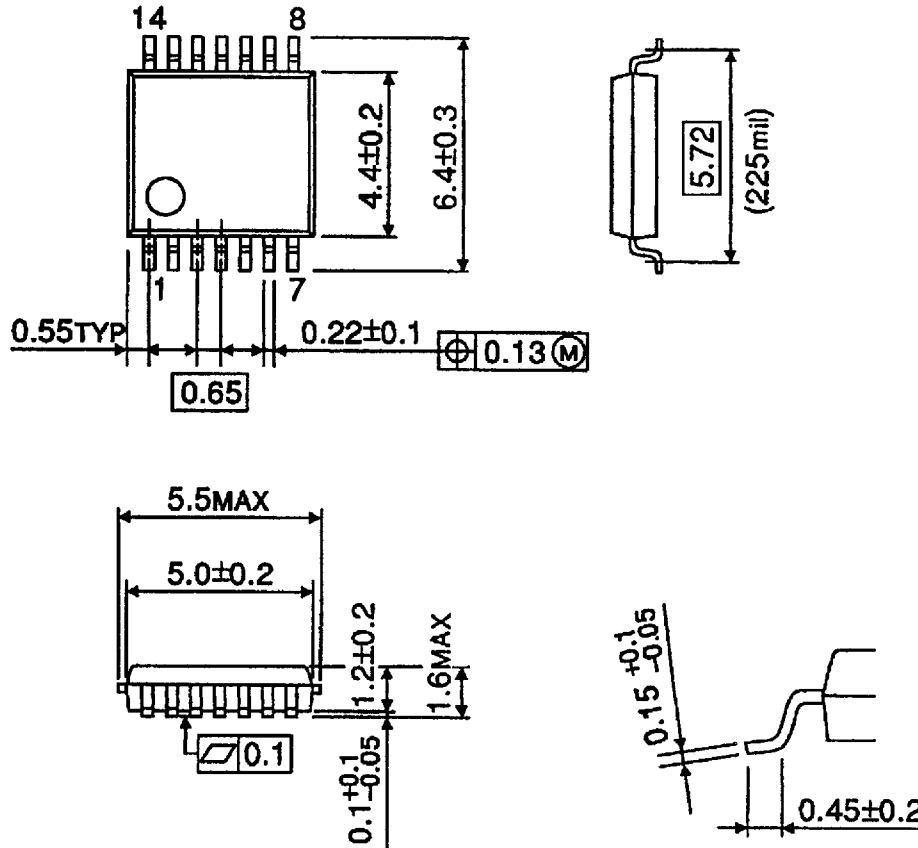


Weight : 0.12g (Typ.)

|                            |
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OUTLINE DRAWING  
SSOP14-P-225-0.65

Unit : mm



Weight : 0.07g (Typ.)

|                            |
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