

# IR9161/IR9161N Low Power Quad Comparator

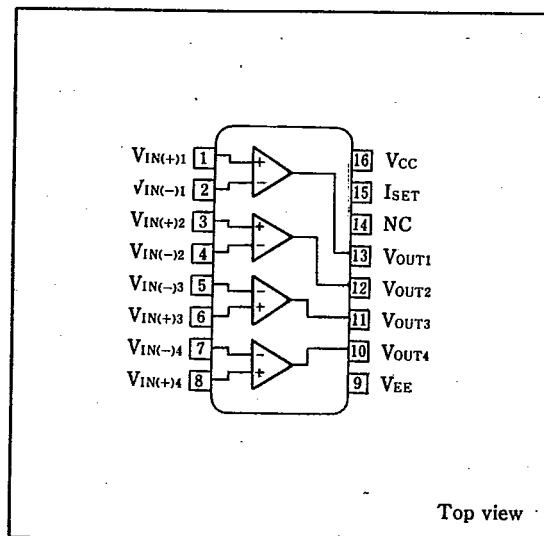
## ■ Description

The IR9161/IR9161N is a low power quad comparator capable of controlling a supply current, input bias current and output current by an external single resistor.

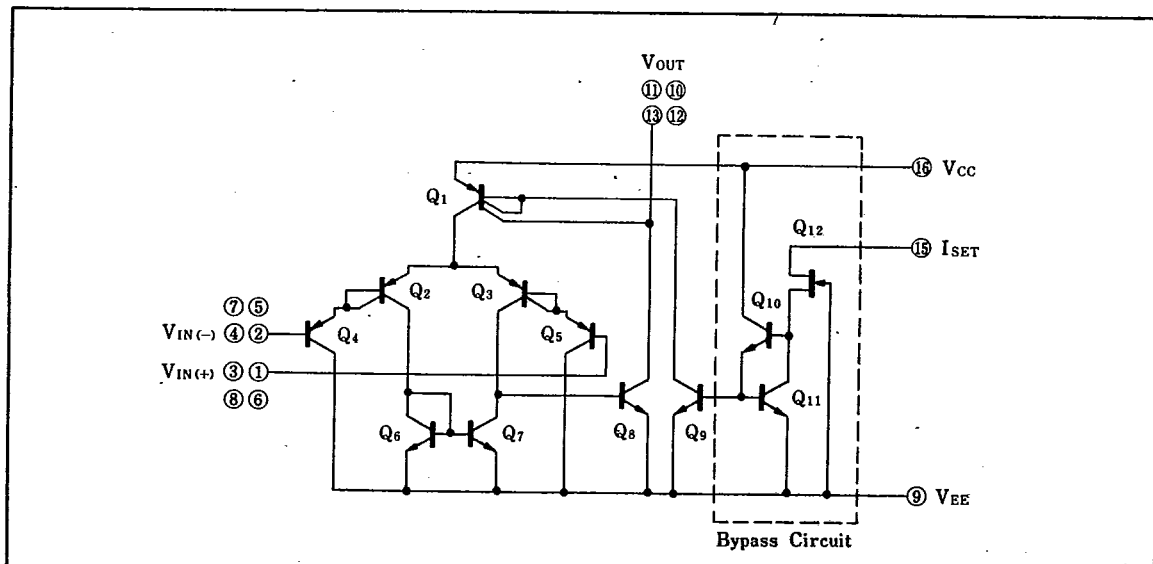
## ■ Features

1. Low power dissipation
2. Wide power supply range  $\pm 1.5V \sim \pm 18V$
3. External control of electrical characteristics (supply current, input bias current etc.)
4. 16-pin dual-in-line package (IR9161)  
16-pin small-outline package (IR9161N)

## ■ Pin Connections



## ■ Equivalent Circuit



## ■ Absolute Maximum Ratings

(Ta=25°C)

| Parameter                  | Symbol                        | Condition                     |                   | Rating                           | Unit               |
|----------------------------|-------------------------------|-------------------------------|-------------------|----------------------------------|--------------------|
| Supply voltage             | $V_{CC}-V_{EE}$               |                               |                   | 36                               | V                  |
| Differential input voltage | $V_{ID}$                      |                               |                   | $\pm 30$                         | V                  |
| In-phase input voltage     | $V_{ICM}$                     |                               |                   | $V_{EE}\sim V_{CC}$              | V                  |
| Power dissipation          | $P_D$                         | $T_a\leq +25^{\circ}\text{C}$ | IR9161<br>IR9161N | 650<br>360                       | mW                 |
| $P_D$ derating ratio       | $\Delta P_D/^{\circ}\text{C}$ | $T_a> +25^{\circ}\text{C}$    | IR9161<br>IR9161N | 6.5<br>3.6                       |                    |
| Operating temperature      | $T_{opr}$                     |                               |                   | $0\sim +70$                      | $^{\circ}\text{C}$ |
| Storage temperature        | $T_{stg}$                     |                               | IR9161<br>IR9161N | $-55\sim +125$<br>$-55\sim +150$ | $^{\circ}\text{C}$ |

## ■ Electrical Characteristics 1

(V<sub>CC</sub>=3V, V<sub>EE</sub>=-3V, I<sub>SET</sub>=10 μA, Ta=25°C)

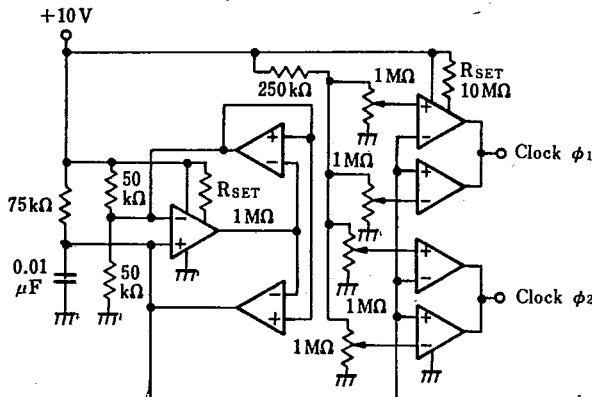
| Parameter                      | Symbol       | Condition                     | MIN. | TYP.  | MAX. | Unit |
|--------------------------------|--------------|-------------------------------|------|-------|------|------|
| Input offset voltage           | $V_{IO}$     |                               |      | 1.0   | 6.0  | mV   |
| Input offset current           | $I_{IO}$     | $V_{OUT}=0V$                  |      | 1.0   | 25   | nA   |
| Input bias current             | $I_B$        | $V_{OUT}=0V$                  |      | 25    | 150  | nA   |
| In-phase input voltage         | $V_{ICM}$    | $V_{IO} \leq 6mV$             | -3.0 |       | 1.3  | V    |
| Major amplitude voltage gain   | $A_V$        |                               | 70   | 76    |      | dB   |
| Supply current                 | $I_{CC}$     | All input pins are grounded   |      | 0.21  | 0.35 | mA   |
| Common signal rejection ratio  | CMR          |                               | 70   | 77    |      | dB   |
| Supply voltage rejection ratio | SVR          |                               | 65   | 80    |      | dB   |
| Rise time                      | $t_r$        | $R_L=10M\Omega$<br>$C_L=10pF$ |      | 5.0   |      | μs   |
| Output saturation voltage      | $V_{SAT(+)}$ |                               | 2.5  | 2.9   |      | V    |
|                                | $V_{SAT(-)}$ | $R_L=1M\Omega$                | -2.6 | -2.95 |      |      |

## ■ Electrical Characteristics 2

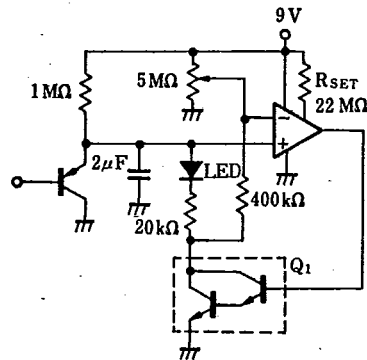
(V<sub>CC</sub>=15V, V<sub>EE</sub>=-15V, I<sub>SET</sub>=100 μA, Ta=25°C)

| Parameter                      | Symbol       | Conditions                   | MIN.  | TYP.  | MAX. | Unit |
|--------------------------------|--------------|------------------------------|-------|-------|------|------|
| Input offset voltage           | $V_{IO}$     |                              |       | 1.5   | 6.0  | mV   |
| Input offset current           | $I_{IO}$     | $V_{OUT}=0V$                 |       | 5.0   | 90   | nA   |
| Input bias current             | $I_B$        | $V_{OUT}=0V$                 |       | 100   | 600  | nA   |
| In-phase input voltage         | $V_{ICM}$    | $V_{IO} \leq 6mV$            | -15   |       | +13  | V    |
| Major amplitude voltage gain   | $A_V$        |                              | 80    | 90    |      | dB   |
| Supply current                 | $I_{CC}$     | All input pins are grounded  |       | 2.1   | 3.5  | mA   |
| Common signal rejection ratio  | CMR          |                              | 75    | 90    |      | dB   |
| Supply voltage rejection ratio | SVR          |                              | 65    | 80    |      | dB   |
| Rise time                      | $t_r$        | $R_L=2M\Omega$<br>$C_L=10pF$ |       | 1.5   |      | μs   |
| Output saturation voltage      | $V_{SAT(+)}$ |                              | 14.5  | 14.9  |      | V    |
|                                | $V_{SAT(-)}$ | $R_L=1M\Omega$               | -14.6 | -14.9 |      |      |

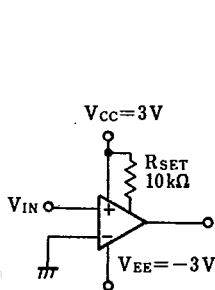
## Application Circuit Example

(1) A Versatile 2  $\phi$  pulse generator

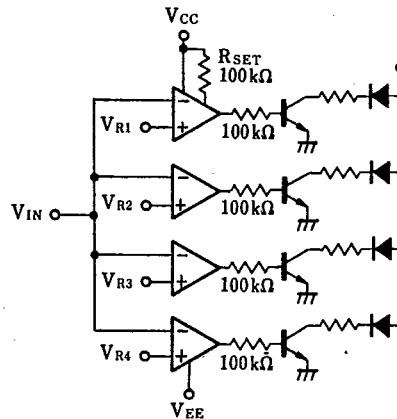
(2) Low battery indicator



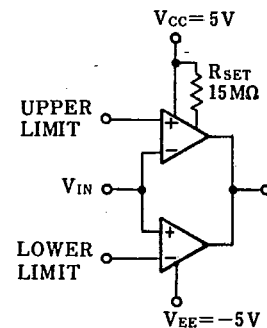
(3) Zero crossing detector



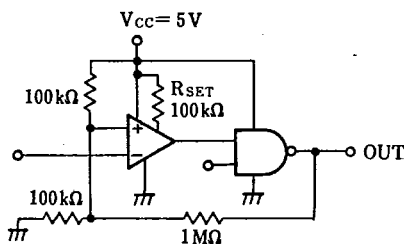
(4) Voltage level detector



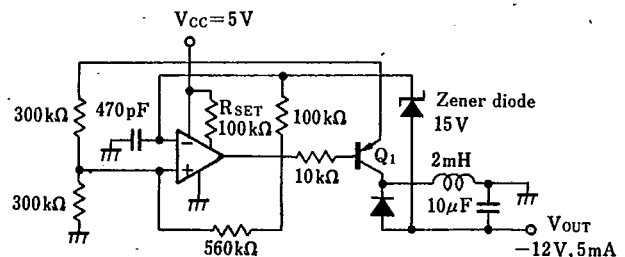
(5) Double-ended limit detector



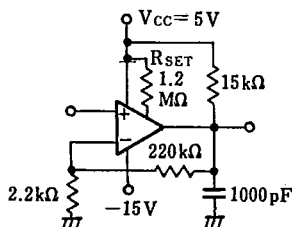
(6) CMOS line receiver



(7) Stabilizing DC/DC converter



(8) 40dB operational amplifier



(9) Sinusoidal wave oscillator

