

## C-MOS STEP-UP SWITCHING REGULATOR

### ■ GENERAL DESCRIPTION

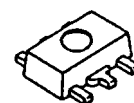
The **NJU7261 series** is a C-MOS step-up switching regulator which contains accurate voltage reference, error amplifier, CR oscillator, control circuit, switching transistor, diode and resistor.

The stand-by function is effective for low power consumption.

The regulation voltage is fixed by internal circuits and the following line-up of different output voltages version are available.

This series is suitable for portable equipment's or battery operated items because of its small packaged outline, low operating voltage and current.

### ■ PACKAGE OUTLINE

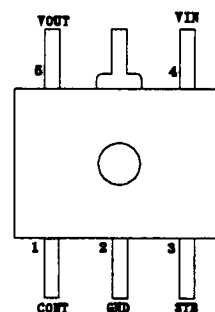


**NJU7261UX**

### ■ FEATURES

- Low Operating Voltage (1.0V min.)
- Low Operating Current (5.0 $\mu$ A typ. /  $V_{OUT} = 3.0V$ )
- Low Stand-by Current (0.2 $\mu$ A max. /  $V_{OUT} = 3.0V$ )
- High Precision Output Voltage ( $\pm 3\%$  max.)
- Wide Operating Voltage Range
- Stand-by Function
- CR Oscillator On-chip
- Diode On-chip
- Package Outline SOT89-5
- C-MOS Technology

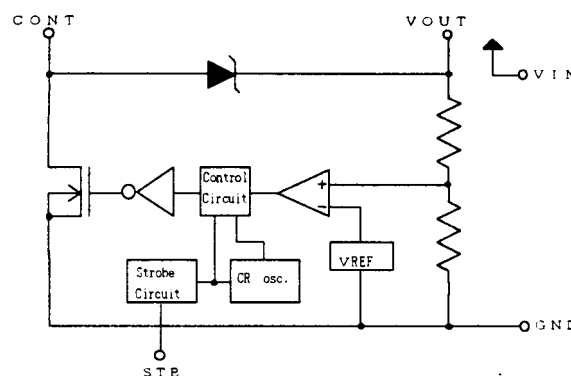
### ■ PIN CONFIGURATION



### ■ LINE-UP

| Output Voltage (V) | Line-Up    |
|--------------------|------------|
| 3.0                | NJU7261U30 |
| 3.3                | NJU7261U33 |
| 4.5                | NJU7261U45 |
| 5.0                | NJU7261U50 |

### ■ EQUIVALENT CIRCUIT



### ■ TERMINAL DESCRIPTION

| No. | Term. Name | I/O   | FUNCTION                                                                                  |
|-----|------------|-------|-------------------------------------------------------------------------------------------|
| 1   | CONT       | I     | External Inductor Connect Terminal                                                        |
| 2   | GND        | POWER | Power Source (GND)                                                                        |
| 3   | STB        | I     | Strobe Terminal : "H" or OPEN...Normal Operation (step-up)<br>" L " ...Stand-By Operation |
| 4   | $V_{IN}$   | POWER | Power Source (+)                                                                          |
| 5   | $V_{OUT}$  | O     | Step-up Output Terminal                                                                   |

# NJU7261 Series

## ■ ABSOLUTE MAXIMUM RATINGS

(T<sub>a</sub> = 25°C)

| PARAMETER                   | SYMBOL            | RATINGS                                      | UNIT |
|-----------------------------|-------------------|----------------------------------------------|------|
| Input Voltage               | V <sub>IN</sub>   | 10                                           | V    |
| CONT Input Voltage          | V <sub>CONT</sub> | GND-0.3 ≤ V <sub>CONT</sub> ≤ 10             | V    |
| Strobe Input Voltage        | V <sub>STB</sub>  | GND-0.3 ≤ V <sub>STB</sub> ≤ V <sub>IN</sub> | V    |
| Output Voltage              | V <sub>OUT</sub>  | GND-0.3 ≤ V <sub>OUT</sub> ≤ 10              | V    |
| Power Dissipation           | P <sub>D</sub>    | 300                                          | mW   |
| Operating Temperature Range | T <sub>opr</sub>  | -25 to + 75                                  | °C   |
| Storage Temperature Range   | T <sub>stg</sub>  | -40 to +125                                  | °C   |

Note1) When a coil used. This IC of V<sub>CONT</sub> possible over the absolute maximum ratings. Consequently please conduct enough to test.

Note2) The CONT input voltage (V<sub>CONT</sub>) should be inspected at the real application circuit, as some kinds of coils make the CONT input voltage exceed the Absolute Maximum Rating of the V<sub>CONT</sub>.

## ■ ELECTRICAL CHARACTERISTICS

+3.0V Version

(T<sub>a</sub> = 25°C)

| PARAMETER                     | SYMBOL             |                    | CONDITION                                                 | NORM |      |      | UNIT | MEASUREMENT<br>CIRCUIT |
|-------------------------------|--------------------|--------------------|-----------------------------------------------------------|------|------|------|------|------------------------|
|                               |                    |                    |                                                           | MIN. | TYP. | MAX. |      |                        |
| Input Voltage                 | V <sub>IN</sub>    |                    |                                                           | -    | -    | 5.0  | V    | 1                      |
| Start Voltage                 | V <sub>START</sub> |                    | NO LOAD                                                   | -    | -    | 1.0  | V    | 1                      |
| Oscillator Freq.              | f <sub>OSC</sub>   |                    | V <sub>IN</sub> = 1.5V                                    | 20   | 30   | 50   | kHz  | 2                      |
| Output Voltage                | V <sub>OUT</sub>   |                    | V <sub>IN</sub> = 1.5V, I <sub>OUT</sub> = 20mA           | 2.91 | 3.0  | 3.09 | V    | 1                      |
| Input Stability               | ΔV <sub>OUT1</sub> |                    | V <sub>IN</sub> = 1.5V to 2.0V<br>I <sub>OUT</sub> = 20mA | -    | 30   | 100  | mV   | 1                      |
| Load Stability                | ΔV <sub>OUT2</sub> |                    | V <sub>IN</sub> = 1.5V<br>I <sub>OUT</sub> = 10μA to 25mA | -    | 30   | 100  | mV   | 1                      |
| Operating Current             | I <sub>SS</sub>    |                    | V <sub>IN</sub> = V <sub>STB</sub> = 1.5V, NO LOAD        | -    | 5.0  | 10   | μA   | 3                      |
| Stand-by Current              | I <sub>Q</sub>     |                    | V <sub>IN</sub> = 1.5V<br>V <sub>STB</sub> = 0V, NO LOAD  | -    | -    | 0.2  | μA   | 4                      |
| Switching Current             | I <sub>SI</sub>    |                    | V <sub>DS</sub> = 0.2V                                    | -    | 250  | -    | mA   | -                      |
| STB Terminal<br>Input Voltage | H level            | V <sub>STBH</sub>  | V <sub>IN</sub> = 1.5V                                    | 1.0  | -    | -    | V    | 5                      |
|                               | L level            | V <sub>STBL</sub>  | V <sub>IN</sub> = 1.5V                                    | -    | -    | 0.4  | V    | 5                      |
| STB Terminal<br>Input Current | H level            | I <sub>STBH1</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 1.0V           | -    | 15   | 30   | μA   | 6                      |
|                               |                    | I <sub>STBH2</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 1.5V           | -    | 0.1  | -    | μA   | 6                      |
|                               | L level            | I <sub>STBL1</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 0.4V           | -    | 15   | 30   | μA   | 6                      |
|                               |                    | I <sub>STBL2</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 0V             | -    | 0.1  | -    | μA   | 6                      |

# NJU7261 Series

+3.3V Version

(T<sub>a</sub> = 25°C)

| PARAMETER                     | SYMBOL             |                    | CONDITION                                                 | NORM |      |      | UNIT | MEASUREMENT<br>CIRCUIT |
|-------------------------------|--------------------|--------------------|-----------------------------------------------------------|------|------|------|------|------------------------|
|                               |                    |                    |                                                           | MIN. | TYP. | MAX. |      |                        |
| Input Voltage                 | V <sub>IN</sub>    |                    |                                                           | -    | -    | 5.0  | V    | 1                      |
| Start Voltage                 | V <sub>START</sub> |                    | NO LOAD                                                   | -    | -    | 1.0  | V    | 1                      |
| Oscillator Freq.              | f <sub>OSC</sub>   |                    | V <sub>IN</sub> = 1.5V                                    | 20   | 30   | 50   | kHz  | 2                      |
| Output Voltage                | V <sub>OUT</sub>   |                    | V <sub>IN</sub> = 1.5V, I <sub>OUT</sub> = 20mA           | 3.20 | 3.30 | 3.40 | V    | 1                      |
| Input Stability               | ΔV <sub>OUT1</sub> |                    | V <sub>IN</sub> = 1.5V to 3.0V<br>I <sub>OUT</sub> = 20mA | -    | 30   | 100  | mV   | 1                      |
| Load Stability                | ΔV <sub>OUT2</sub> |                    | V <sub>IN</sub> = 1.5V<br>I <sub>OUT</sub> = 10μA to 25mA | -    | 30   | 100  | mV   | 1                      |
| Operating Current             | I <sub>SS</sub>    |                    | V <sub>IN</sub> = V <sub>STB</sub> = 1.5V, NO LOAD        | -    | 5    | 10   | μA   | 3                      |
| Stand-by Current              | I <sub>Q</sub>     |                    | V <sub>IN</sub> = 1.5V<br>V <sub>STB</sub> = 0V, NO LOAD  | -    | -    | 0.2  | μA   | 4                      |
| Switching Current             | I <sub>SI</sub>    |                    | V <sub>DS</sub> = 0.2V                                    | -    | 250  | -    | mA   | -                      |
| STB Terminal<br>Input Voltage | H level            | V <sub>STBH</sub>  | V <sub>IN</sub> = 1.5V                                    | 1.0  | -    | -    | V    | 5                      |
|                               | L level            | V <sub>STBL</sub>  | V <sub>IN</sub> = 1.5V                                    | -    | -    | 0.4  | V    | 5                      |
| STB Terminal<br>Input Current | H level            | I <sub>STBH1</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 1.0V           | -    | 15   | 30   | μA   | 6                      |
|                               |                    | I <sub>STBH2</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 1.5V           | -    | 0.1  | -    | μA   | 6                      |
|                               | L level            | I <sub>STBL1</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 0.4V           | -    | 15   | 30   | μA   | 6                      |
|                               |                    | I <sub>STBL2</sub> | V <sub>IN</sub> = 1.5V, V <sub>STB</sub> = 0V             | -    | 0.1  | -    | μA   | 6                      |

+4.5V Version

(T<sub>a</sub> = 25°C)

| PARAMETER                     | SYMBOL             |                    | CONDITION                                                 | NORM |      |      | UNIT | MEASUREMENT<br>CIRCUIT |
|-------------------------------|--------------------|--------------------|-----------------------------------------------------------|------|------|------|------|------------------------|
|                               |                    |                    |                                                           | MIN. | TYP. | MAX. |      |                        |
| Input Voltage                 | V <sub>IN</sub>    |                    |                                                           | -    | -    | 4.5  | V    | 1                      |
| Start Voltage                 | V <sub>START</sub> |                    | NO LOAD                                                   | -    | -    | 1.0  | V    | 1                      |
| Oscillator Freq.              | f <sub>OSC</sub>   |                    | V <sub>IN</sub> = 3.0V                                    | 20   | 30   | 50   | kHz  | 2                      |
| Output Voltage                | V <sub>OUT</sub>   |                    | V <sub>IN</sub> = 3.0V, I <sub>OUT</sub> = 20mA           | 4.36 | 4.50 | 4.64 | V    | 1                      |
| Input Stability               | ΔV <sub>OUT1</sub> |                    | V <sub>IN</sub> = 2.0V to 3.0V<br>I <sub>OUT</sub> = 20mA | -    | 30   | 100  | mV   | 1                      |
| Load Stability                | ΔV <sub>OUT2</sub> |                    | V <sub>IN</sub> = 3.0V<br>I <sub>OUT</sub> = 10μA to 25mA | -    | 30   | 100  | mV   | 1                      |
| Operating Current             | I <sub>SS</sub>    |                    | V <sub>IN</sub> = V <sub>STB</sub> = 3.0V, NO LOAD        | -    | 5    | 15   | μA   | 3                      |
| Stand-by Current              | I <sub>Q</sub>     |                    | V <sub>IN</sub> = 3.0V<br>V <sub>STB</sub> = 0V, NO LOAD  | -    | -    | 0.2  | μA   | 4                      |
| Switching Current             | I <sub>SI</sub>    |                    | V <sub>DS</sub> = 0.2V                                    | -    | 250  | -    | mA   | -                      |
| STB Terminal<br>Input Voltage | H level            | V <sub>STBH</sub>  | V <sub>IN</sub> = 3.0V                                    | 2.4  | -    | -    | V    | 5                      |
|                               | L level            | V <sub>STBL</sub>  | V <sub>IN</sub> = 3.0V                                    | -    | -    | 0.4  | V    | 5                      |
| STB Terminal<br>Input Current | H level            | I <sub>STBH1</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 2.4V           | -    | 50   | 100  | μA   | 6                      |
|                               |                    | I <sub>STBH2</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 3.0V           | -    | 0.1  | -    | μA   | 6                      |
|                               | L level            | I <sub>STBL1</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 0.4V           | -    | 50   | 100  | μA   | 6                      |
|                               |                    | I <sub>STBL2</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 0V             | -    | 0.1  | -    | μA   | 6                      |

# NJU7261 Series

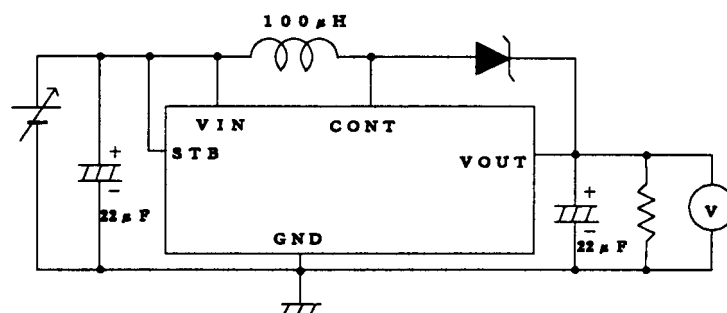
+5.0V Version

(T<sub>a</sub> = 25°C)

| PARAMETER                     | SYMBOL             |                    | CONDITION                                                 | NORM |      |      | UNIT | MEASUREMENT<br>CIRCUIT |
|-------------------------------|--------------------|--------------------|-----------------------------------------------------------|------|------|------|------|------------------------|
|                               |                    |                    |                                                           | MIN. | TYP. | MAX. |      |                        |
| Input Voltage                 | V <sub>IN</sub>    |                    |                                                           | -    | -    | 5.0  | V    | 1                      |
| Start Voltage                 | V <sub>START</sub> |                    | NO LOAD                                                   | -    | -    | 1.0  | V    | 1                      |
| Oscillator Freq.              | f <sub>OSC</sub>   |                    | V <sub>IN</sub> = 3.0V                                    | 20   | 30   | 50   | kHz  | 2                      |
| Output Voltage                | V <sub>OUT</sub>   |                    | V <sub>IN</sub> = 3.0V, I <sub>OUT</sub> = 20mA           | 4.85 | 5.0  | 5.15 | V    | 1                      |
| Input Stability               | ΔV <sub>OUT1</sub> |                    | V <sub>IN</sub> = 2.0V to 3.0V<br>I <sub>OUT</sub> = 20mA | -    | 30   | 100  | mV   | 1                      |
| Load Stability                | ΔV <sub>OUT2</sub> |                    | V <sub>IN</sub> = 3.0V<br>I <sub>OUT</sub> = 10μA to 25mA | -    | 30   | 100  | mV   | 1                      |
| Operating Current             | I <sub>SS</sub>    |                    | V <sub>IN</sub> = V <sub>STB</sub> = 3.0V, NO LOAD        | -    | 5    | 15   | μA   | 3                      |
| Stand-by Current              | I <sub>Q</sub>     |                    | V <sub>IN</sub> = 3.0V<br>V <sub>STB</sub> = 0V, NO LOAD  | -    | -    | 0.2  | μA   | 4                      |
| Switching Current             | I <sub>SI</sub>    |                    | V <sub>DS</sub> = 0.2V                                    | -    | 250  | -    | mA   | -                      |
| STB Terminal<br>Input Voltage | H level            | V <sub>STBH</sub>  | V <sub>IN</sub> = 3.0V                                    | 2.4  | -    | -    | V    | 5                      |
|                               | L level            | V <sub>STBL</sub>  | V <sub>IN</sub> = 3.0V                                    | -    | -    | 0.4  | V    | 5                      |
| STB Terminal<br>Input Current | H level            | I <sub>STBH1</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 2.4V           | -    | 50   | 100  | μA   | 6                      |
|                               |                    | I <sub>STBH2</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 3.0V           | -    | 0.1  | -    | μA   | 6                      |
|                               | L level            | I <sub>STBL1</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 0.4V           | -    | 50   | 100  | μA   | 6                      |
|                               |                    | I <sub>STBL2</sub> | V <sub>IN</sub> = 3.0V, V <sub>STB</sub> = 0V             | -    | 0.1  | -    | μA   | 6                      |

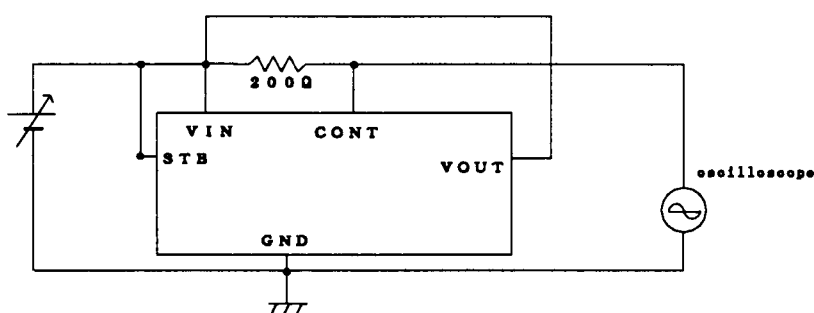
## ■ MEASUREMENT CIRCUIT 1

(1)

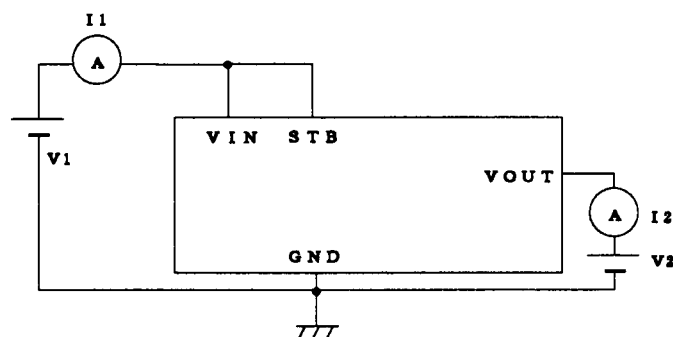


External Diode Type : "D1NS4" provided by SHINDENGEN  
( $I_F = 1A$ ,  $V_F = 0.55V$ )

(2)



(3)

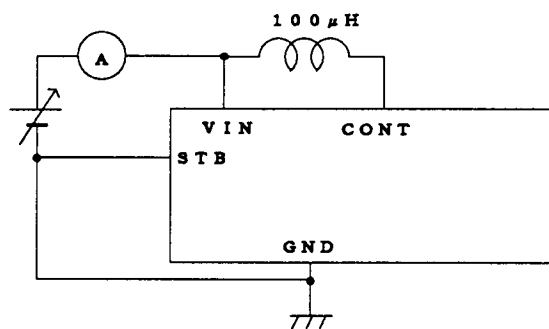


$$I_{SS} = I_1 + I_2 \times \frac{V_{OUT}}{V_2}$$

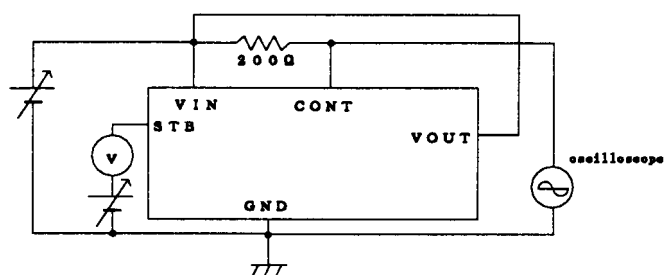
Under the condition of  $V_2 = V_{OUT} + 1.0V$

## ■ MEASUREMENT CIRCUIT 2

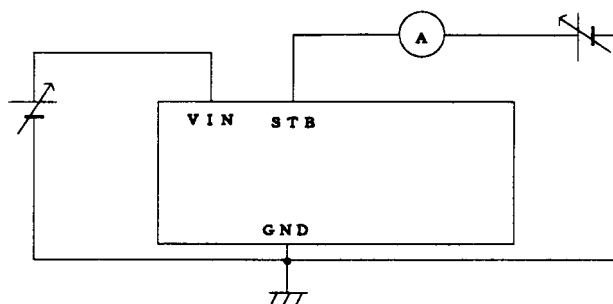
(4)



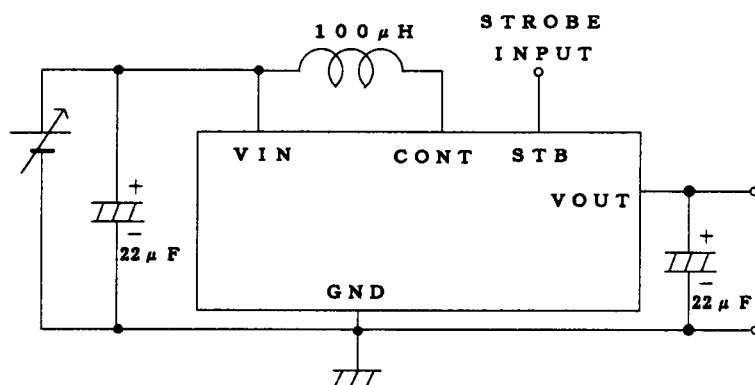
(5)



(6)

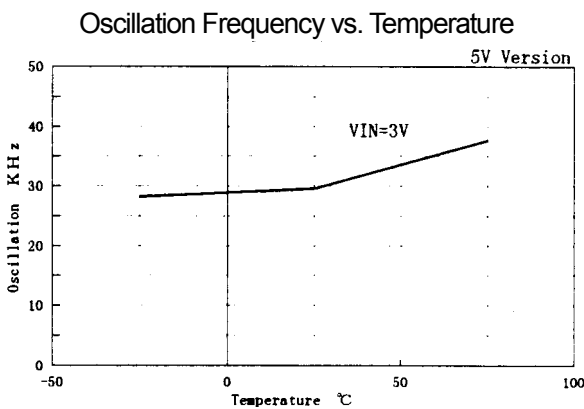
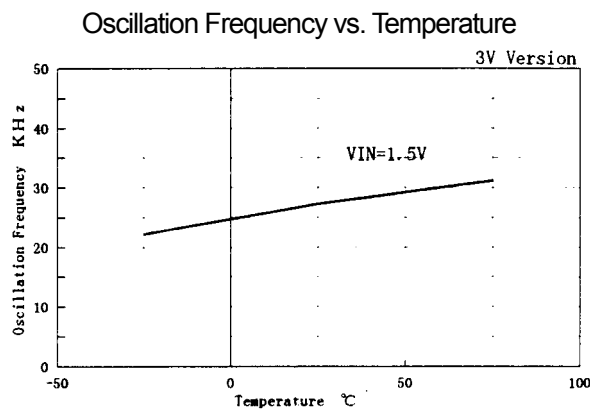
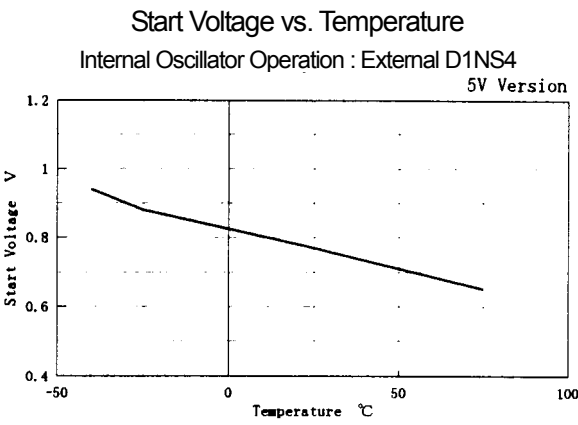
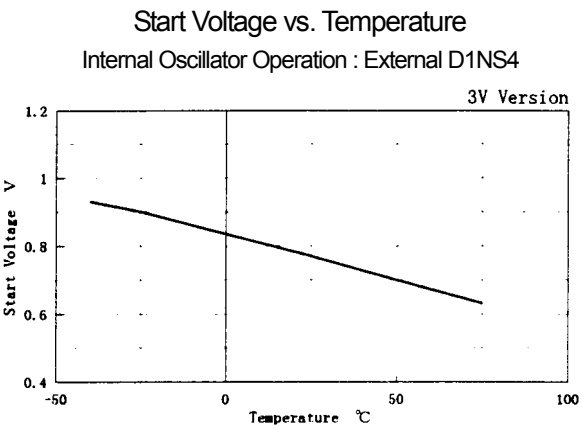


## ■ APPLICATION CIRCUIT



# NJU7261 Series

## ■ TYPICAL CHARACTERISTIC



[CAUTION]  
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