

## PWM DC/DC CONVERTER IC

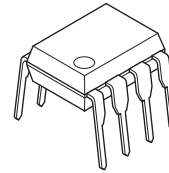
### ■GENERAL DESCRIPTION

The **NJM2374A** is a PWM DC/DC converter IC.

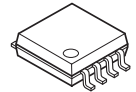
It features fixed frequency type PWM control for better noise handling and to avoid intermittent oscillation observed in a simplified controller.

It is suitable for Step-Up, Step-Down and Inverting applications for EMI sensitive application.

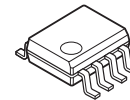
### ■PACKAGE OUTLINE



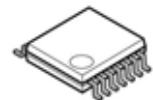
**NJM2374AD**  
( DIP8 )



**NJM2374AM**  
( DMP8 )



**NJM2374AE**  
( SOP8 )



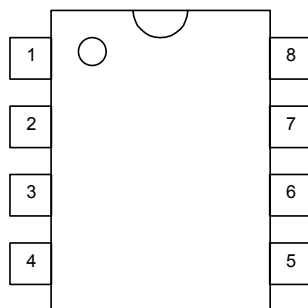
**NJM2374AV**  
( SSOP14 )

### ■FEATURES

- Operating Voltage (2.5V\* to 40V)
- NJM2374AE Operating Voltage (2.5V\* to 48V)
- Wide Oscillator Frequency (100Hz to 100kHz)
- Internal High Power Transistor 1.5A (max.)
- Internal Over Current Limit Circuit
- PWM form Switching Power Supply Control
- Bipolar Technology
- Package Outline DIP8, DMP8, SOP8 JEDEC 150mil  
SSOP14

\*Ta =25°C. At low temperature, the minimum voltage is 3.0V.

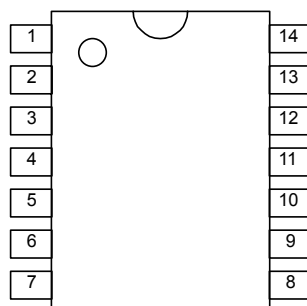
### ■PIN CONFIGURATION



**NJM2374AD**  
**NJM2374AM**  
**NJM2374AE**

#### PIN FUNCTION

- |                   |                    |
|-------------------|--------------------|
| 1. C <sub>S</sub> | 5. IN <sup>+</sup> |
| 2. E <sub>S</sub> | 6. V <sup>+</sup>  |
| 3. C <sub>T</sub> | 7. S <sub>I</sub>  |
| 4. GND            | 8. C <sub>D</sub>  |



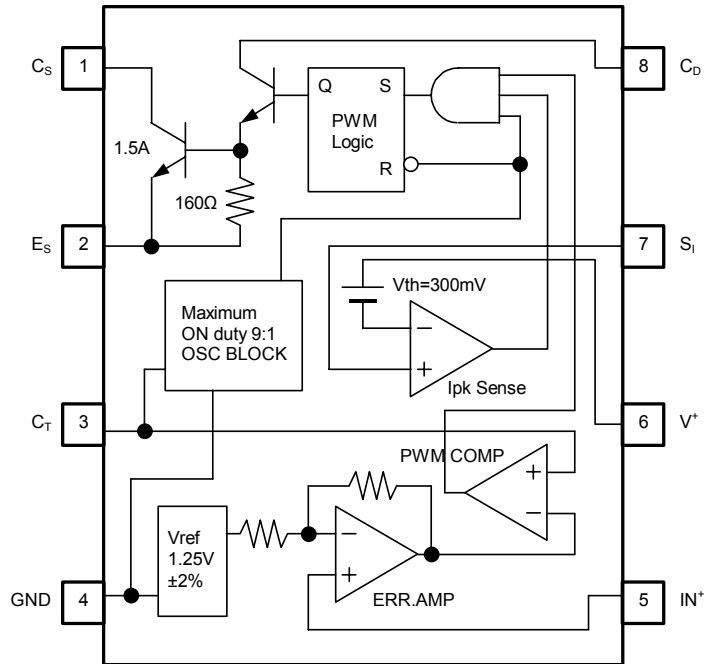
**NJM2374AV**

#### PIN FUNCTION

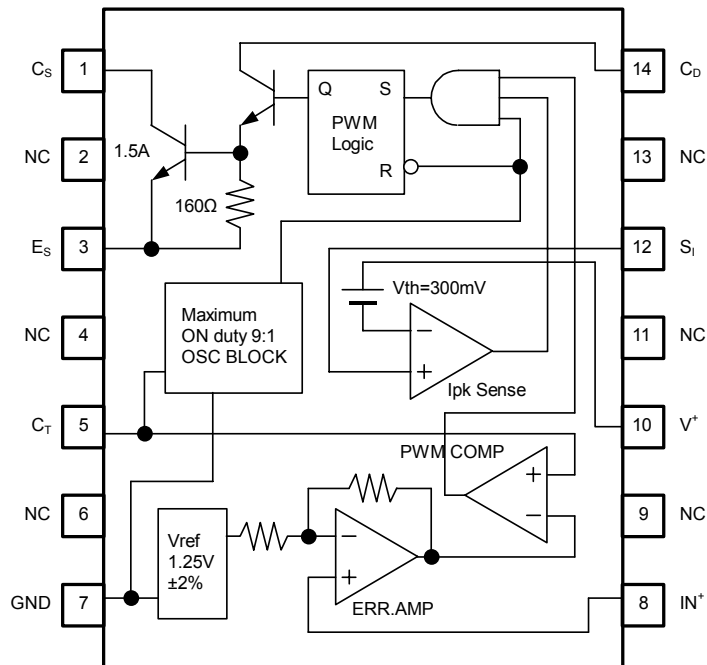
- |                   |                    |
|-------------------|--------------------|
| 1. C <sub>S</sub> | 8. IN <sup>+</sup> |
| 2. NC             | 9. NC              |
| 3. E <sub>S</sub> | 10. V <sup>+</sup> |
| 4. NC             | 11. NC             |
| 5. C <sub>T</sub> | 12. S <sub>I</sub> |
| 6. NC             | 13. NC             |
| 7. GND            | 14. C <sub>D</sub> |

# NJM2374A

## ■BLOCK DIAGRAM



(DIP8, DMP8, SOP8: PACKAGE)



(SSOP14: PACKAGE)

## ■ABSOLUTE MAXIMUM RATINGS

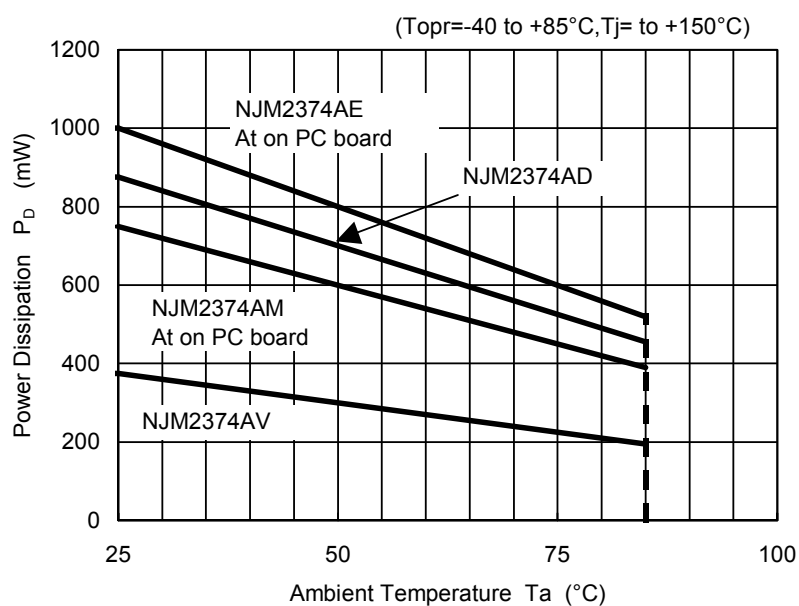
(Ta=25°C)

| PARAMETER                   | SYMBOL           | RATINGS  | UNIT |
|-----------------------------|------------------|--|------|
| Maximum Supply Voltage      | V <sup>+</sup>   | 40<br>(NJM2374AE: 48V)   | V    |
| Output Switch Current       | I <sub>SW</sub>  | 1.5  | A    |
| Output Switch Voltage       | V <sub>SW</sub>  | 40<br>(NJM2374AE: 48V)   | V    |
| Comparator Input Voltage    | V <sub>IR</sub>  | -0.3 ~ 40<br>(NJM2374AE: 48V)  | V    |
| Power Dissipation           | P <sub>D</sub>   | (DIP8) 875<br>(DMP8) 750 (note1)<br>(SOP8) 1,000 (note1)<br>(SSOP14) 375 | mW   |
| Operating Temperature Range | T <sub>opr</sub> | -40 ~ +85  | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -50 ~ +150   | °C   |

(note1) At on PC board.

In the case of Step-Down and Inverting Conversion with the internal power transistor, the Output Voltage must be set lower than 6V(-6V).

## ■POWER DISSIPATION vs. AMBIENT TEMPERATURE



In the case of SSOP packaging, the power dissipation should carefully be considered when designing this parts.

# NJM2374A

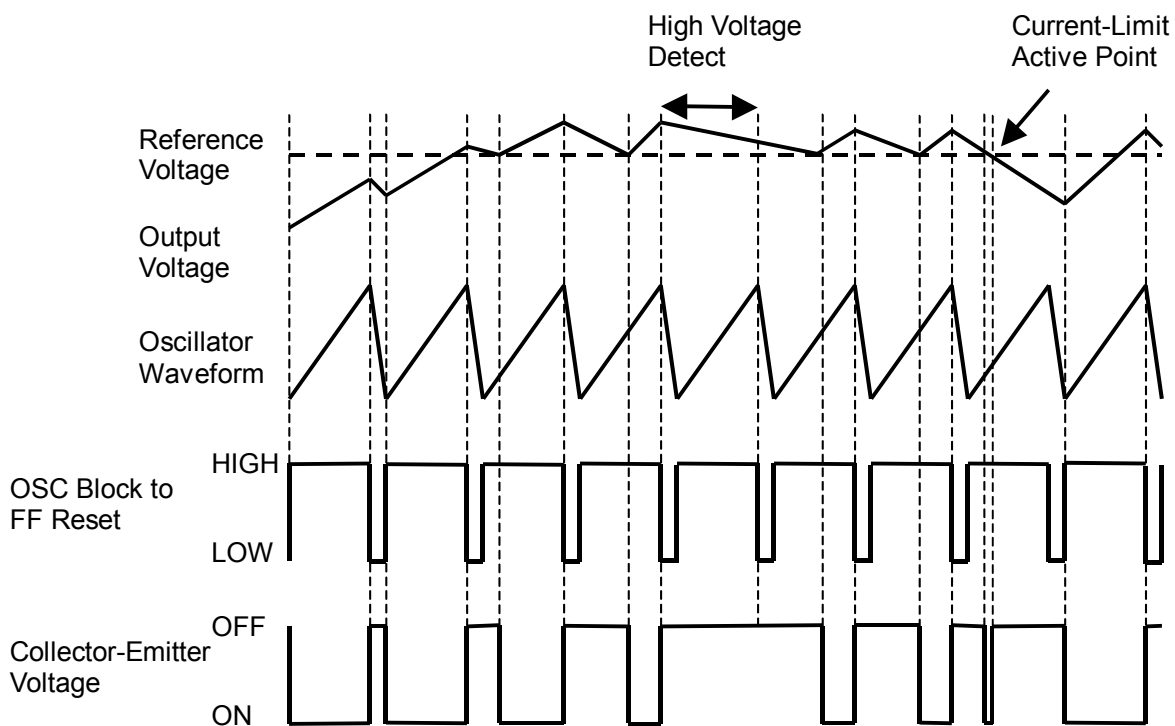
## ■ELECTRICAL CHARACTERISTICS

DC Characteristics ( $V^+=5V$ ,  $T_a=25^\circ C$ )

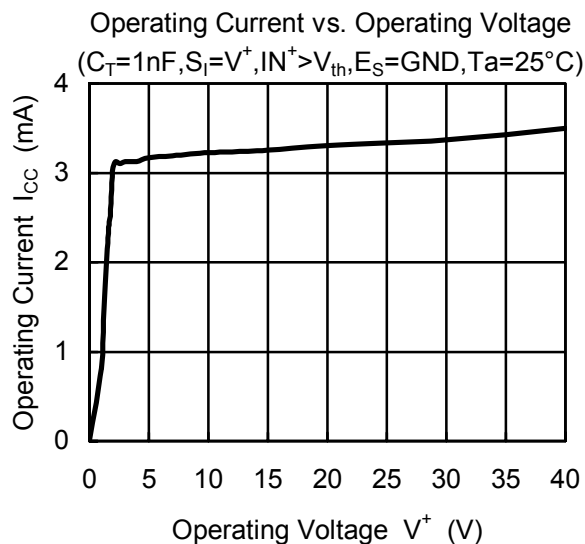
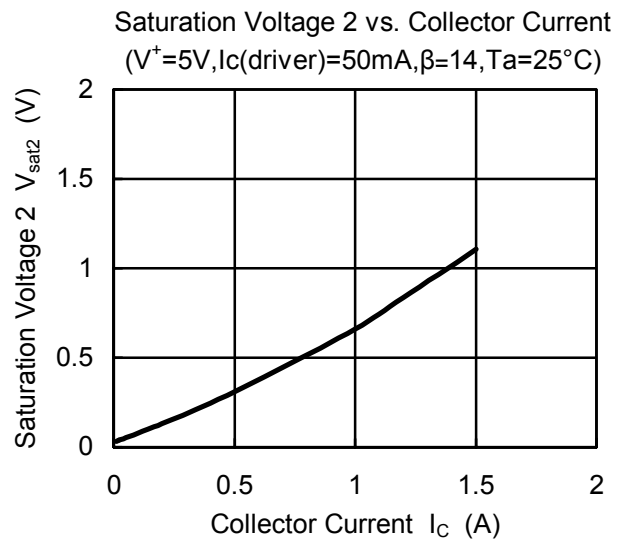
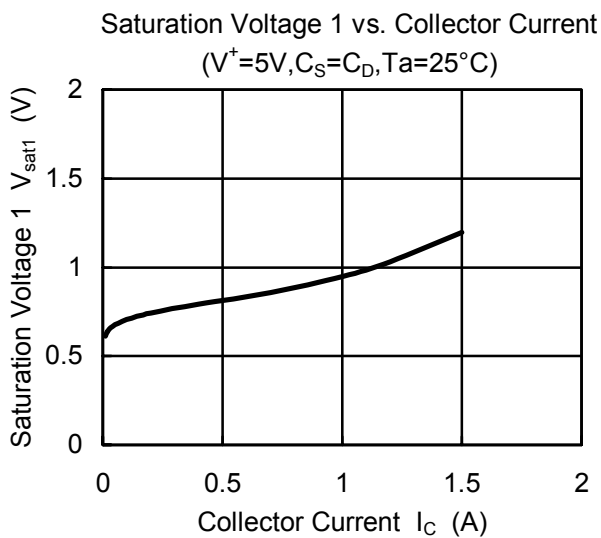
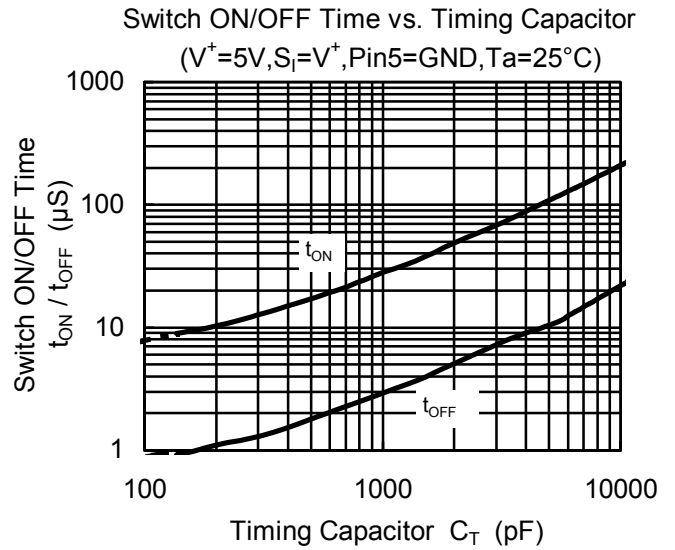
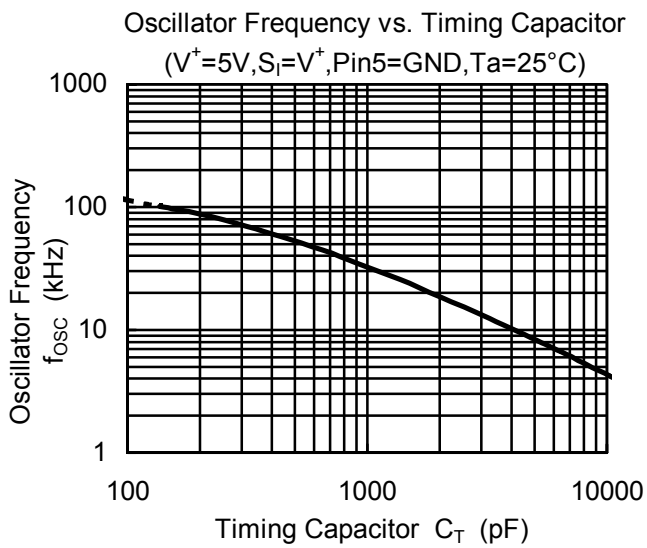
| PARAMETER                               | SYMBOL       | TEST CONDITIONS  | MIN.  | TYP.  | MAX.  | UNIT      |
|---|--------------|--|-------|-------|-------|-----------|
| Operating Current 1                     | $I_{CC1}$    | $C_T=1nF$ , $S_I=V^+$ , $IN^+ > V_{th}$ , $E_S=GND$                | –     | 2.8   | 4.0   | mA        |
| Operating Current 2<br>(NJM2374AE Only) | $I_{CC2}$    | $V^+=48V$ , $C_T=1nF$ , $S_I=V^+$ ,<br>$IN^+ > V_{th}$ , $E_S=GND$ | –     | 3.4   | 4.5   | mA        |
| Charge Current                          | $I_{chg}$    |  | 12    | 20    | 30    | $\mu A$   |
| Discharge Current                       | $I_{dis}$    |  | 110   | 180   | 300   | $\mu A$   |
| Voltage Swing                           | $V_{OSC}$    |  | –     | 0.5   | –     | $V_{P-P}$ |
| Discharge to Charge<br>Current Ratio    | $I_{ratio}$  | $S_I=V^+$  | –     | 9     | –     | –         |
| Peak Current<br>Sense Voltage           | $V_{ipk}$    | $I_{chg}=I_{dis}$  | 250   | 300   | 350   | mV        |
| Saturation Voltage 1                    | $V_{sat1}$   | Darlington Connection<br>( $C_S=C_D$ ), $I_{SW}=0.7A$              | –     | 1.0   | 1.3   | V         |
| Saturation Voltage 2                    | $V_{sat2}$   | $I_{SW}=0.7A$ , $I_c(driver)=50mA$<br>(Forced $\beta \approx 14$ ) | –     | 0.5   | 0.7   | V         |
| Output Transistor<br>Bias Resistance    | $R_{bias}$   |  | –     | 160   | –     | $\Omega$  |
| DC Voltage Gain                         | $h_{FE}$     | $I_{SW}=0.7A$ , $V_{CE}=5.0V$                                      | 35    | 120   | –     | –         |
| Collector Off-State<br>Current          | $I_{C(off)}$ | $V_{CE}=40V$<br>(NJM2374AE: $V_{CE}=48V$ )                         | –     | 10    | –     | nA        |
| Threshold Voltage                       | $V_{th}$     |  | 1.225 | 1.250 | 1.275 | V         |
| Input Bias Current                      | $I_B$        | $IN^+=0V$  | –     | 40    | 400   | nA        |

(note) Output switch tests are performed under pulsed conditions to minimize power dissipation.

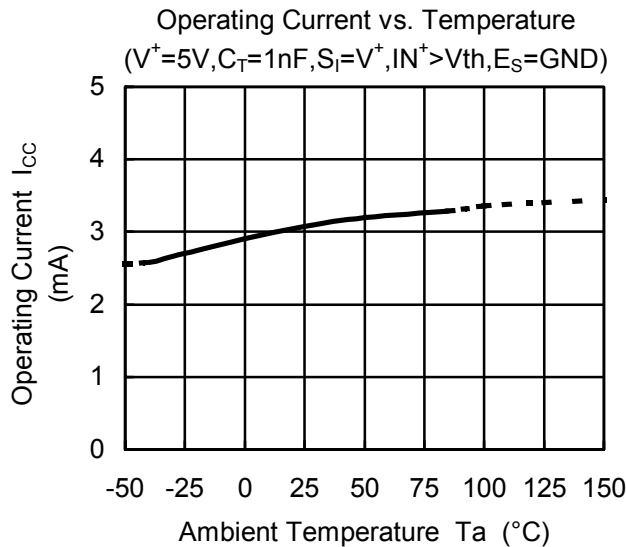
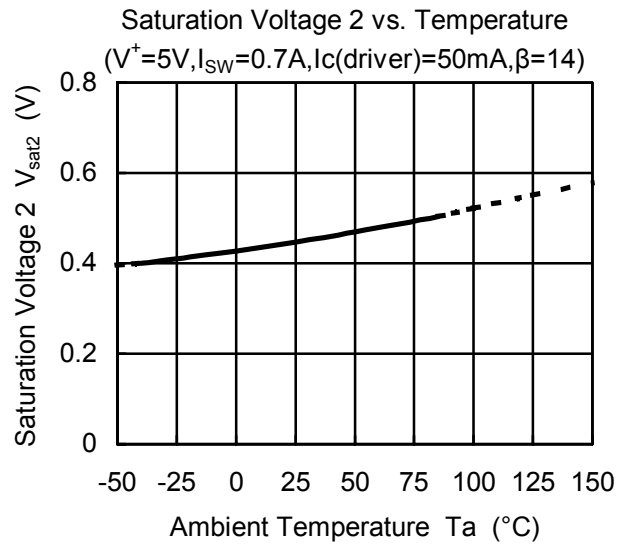
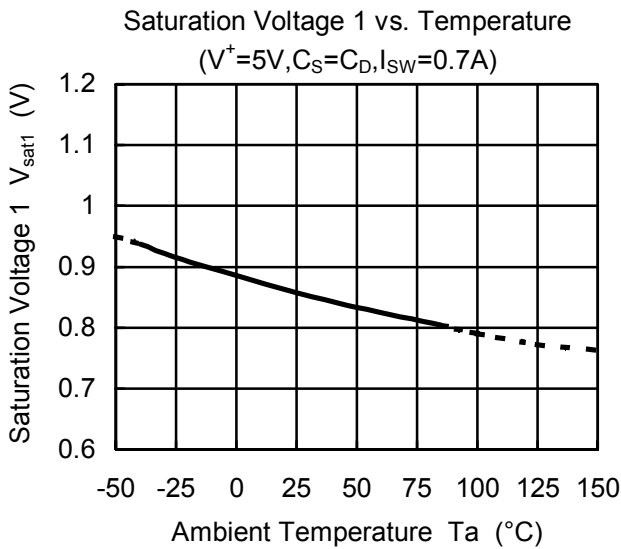
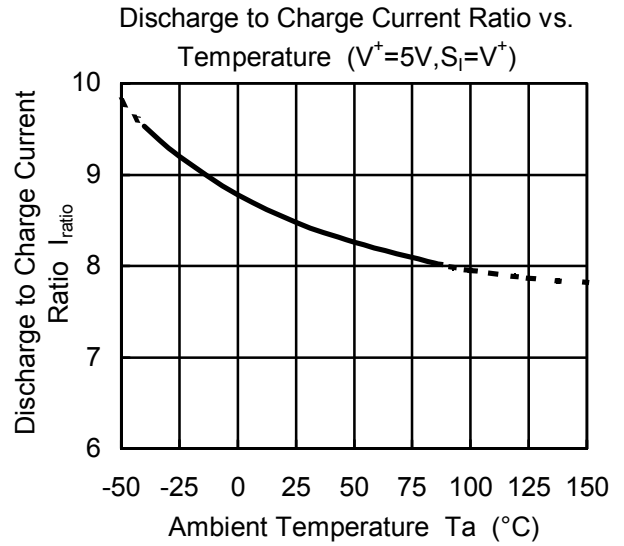
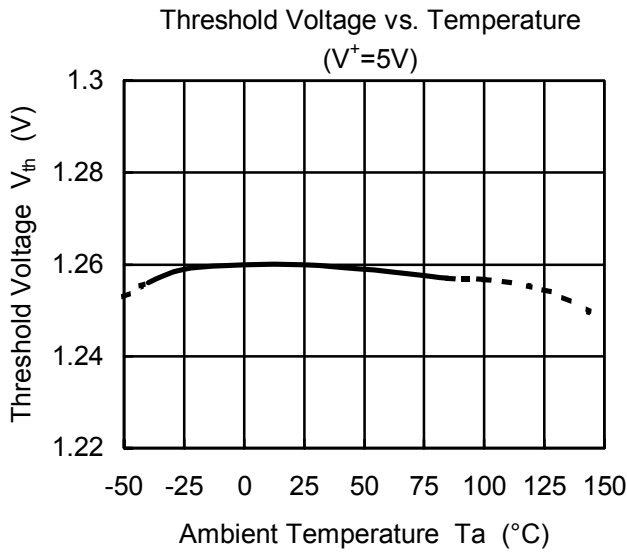
## ■TIMING CHART



## ■ TYPICAL CHARACTERISTICS

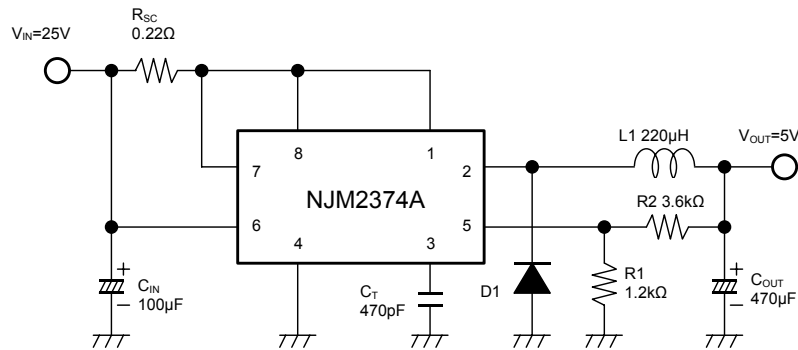


## ■ TYPICAL CHARACTERISTICS



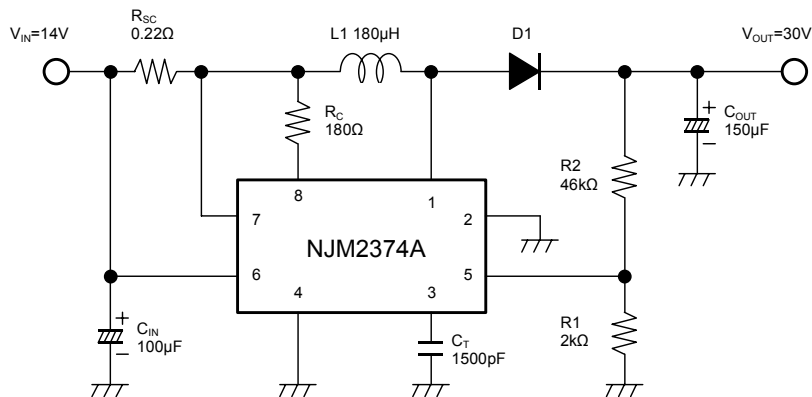
## ■ TYPICAL APPLICATIONS

### Step-Down Converter

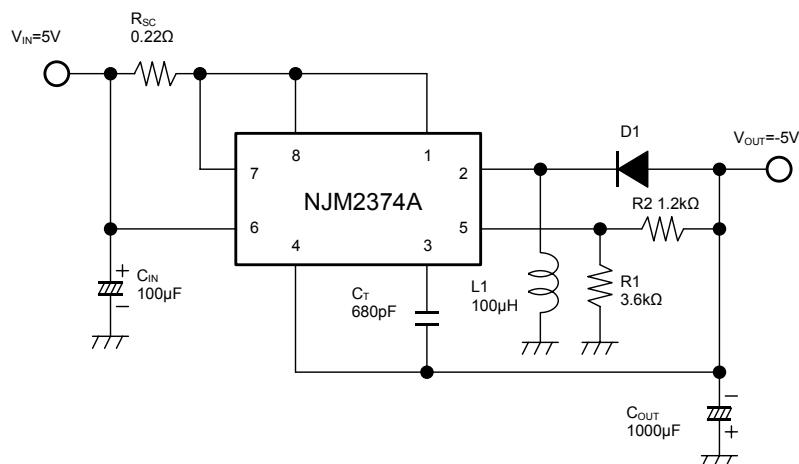


In the case of Step-Down Conversion with the internal power transistor, the Output Voltage must be set lower than 6V.

### Step-Up Converter



### Inverting Converter



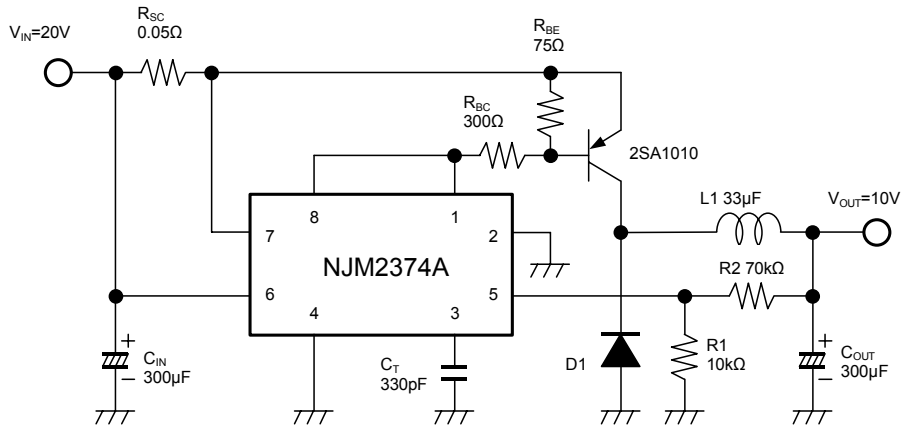
In the case of Inverting Conversion with the internal power transistor, the Output Voltage must be set lower than -6V.

D1 use to schottky diode.

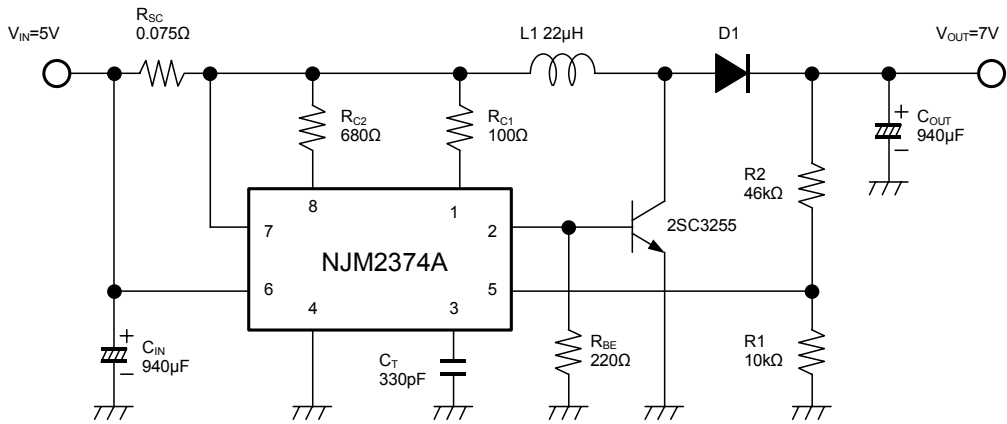
In the case of SSOP packaging, the power dissipation should carefully be considered when designing this parts.

# NJM2374A

## Step-Down Converter (High Current)



## Step-Up Converter (High Current)



D1 use to schottky diode.

**[CAUTION]**

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