

## PWM DC/DC CONVERTER IC

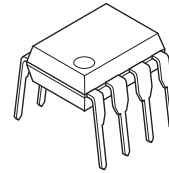
### ■GENERAL DESCRIPTION

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

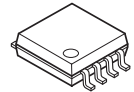
It features fixed frequency type PWM control for better noise handling and to avoid intermittent oscillation observed in a simplified controller.

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

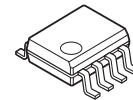
### ■PACKAGE OUTLINE



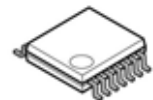
**NJM2374AD**  
(DIP8)



**NJM2374AM**  
(DMP8)



**NJM2374AE**  
(SOP8)



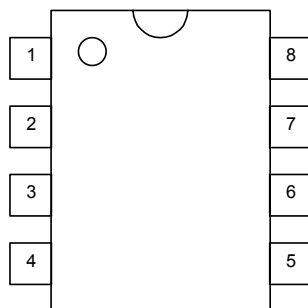
**NJM2374AV**  
(SSOP14)

### ■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.

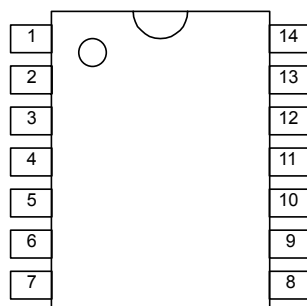
### ■PIN CONFIGURATION



**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>  |



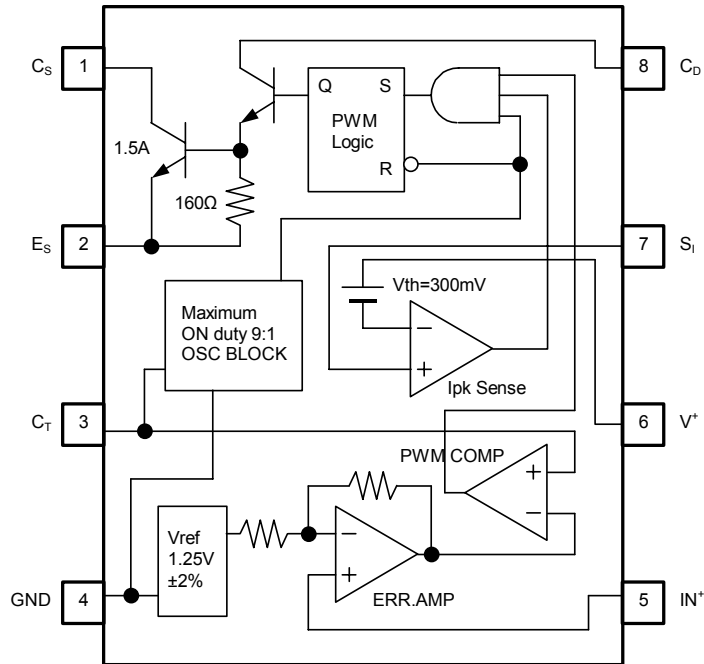
**NJM2374AV**

#### PIN FUNCTION

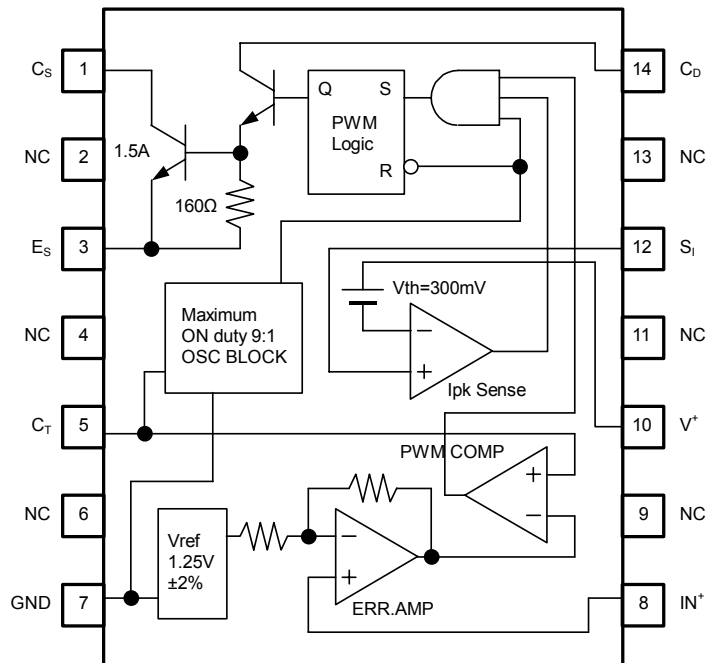
- |                   |                    |
|-------------------|--------------------|
| 1. C <sub>S</sub> | 8. IN <sup>+</sup> |
| 2. NC             | 9. NC              |
| 3. E <sub>S</sub> | 10. V <sup>+</sup> |
| 4. NC             | 11. NC             |
| 5. C <sub>T</sub> | 12. S <sub>I</sub>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

# NJM2374A

## ■BLOCK DIAGRAM



(DIP8, DMP8, SOP8: PACKAGE)



(SSOP14: PACKAGE)

## ■ABSOLUTE MAXIMUM RATINGS

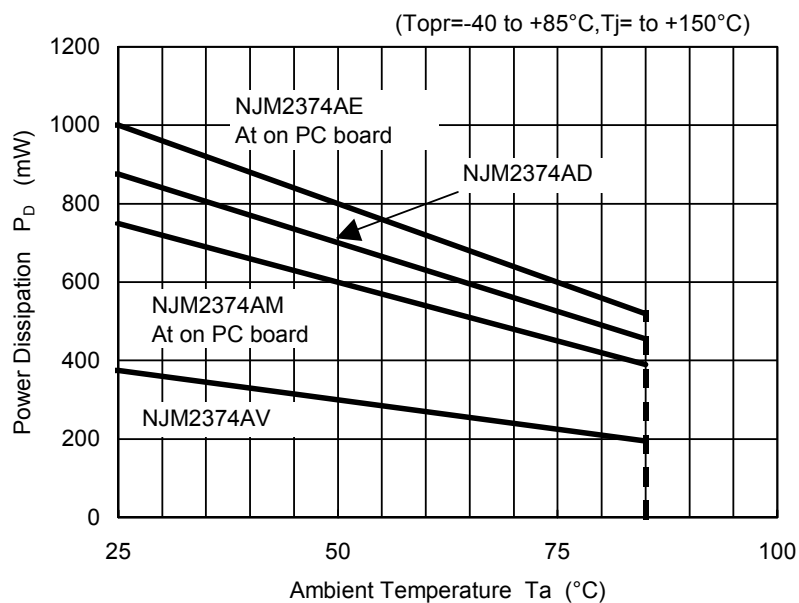
(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	V <sup>+</sup>	40 (NJM2374AE: 48V)	V
Output Switch Current	I <sub>SW</sub>	1.5	A
Output Switch Voltage	V <sub>SW</sub>	40 (NJM2374AE: 48V)	V
Comparator Input Voltage	V <sub>IR</sub>	-0.3 ~ 40 (NJM2374AE: 48V)	V
Power Dissipation	P <sub>D</sub>	(DIP8) 875 (DMP8) 750 (note1) (SOP8) 1,000 (note1) (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

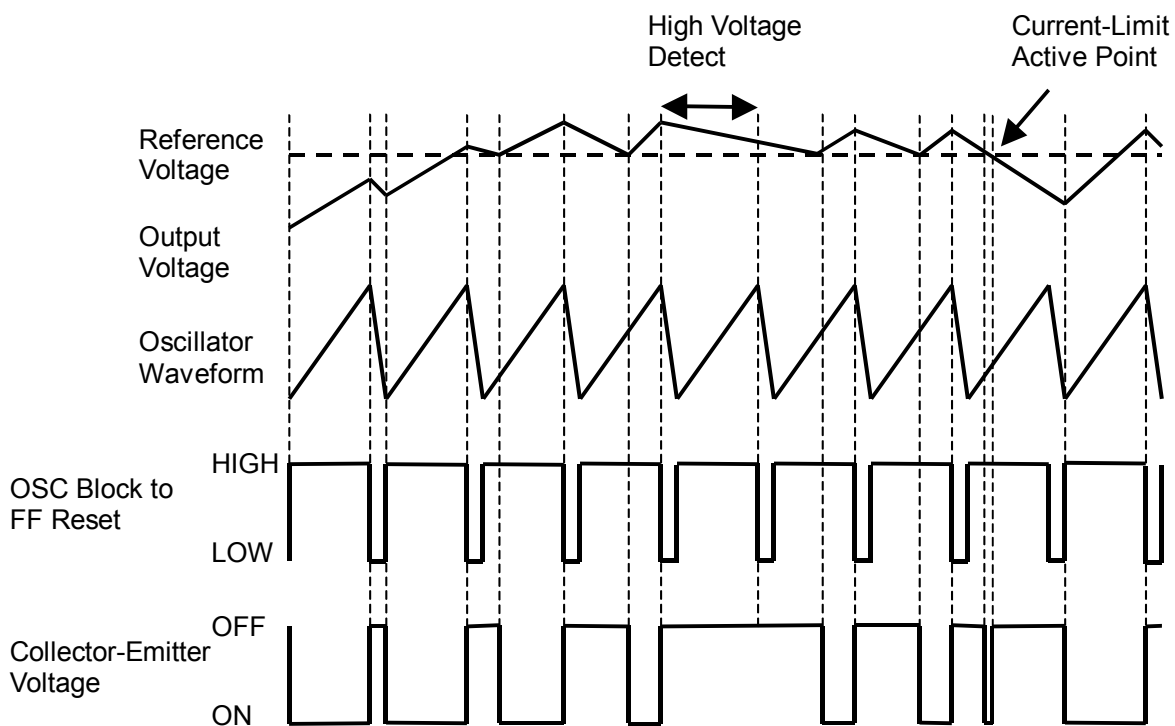
## ■ELECTRICAL CHARACTERISTICS

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

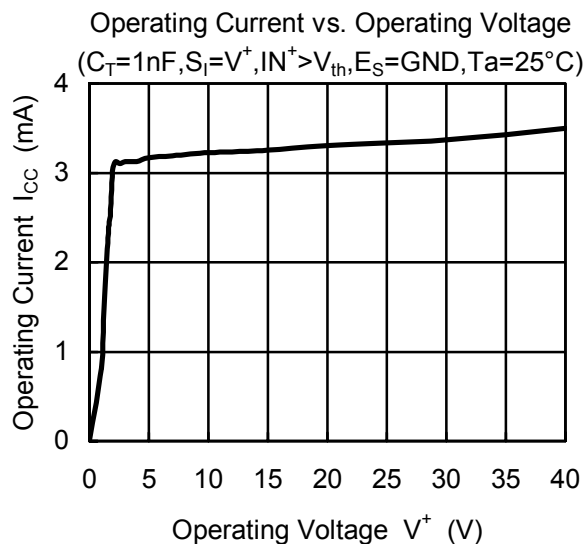
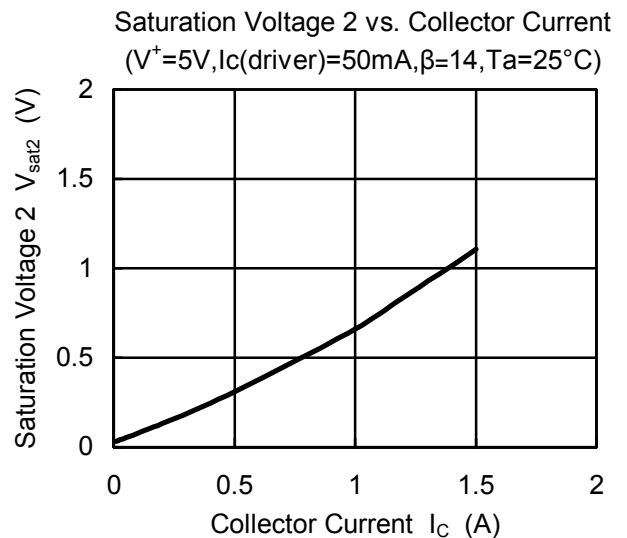
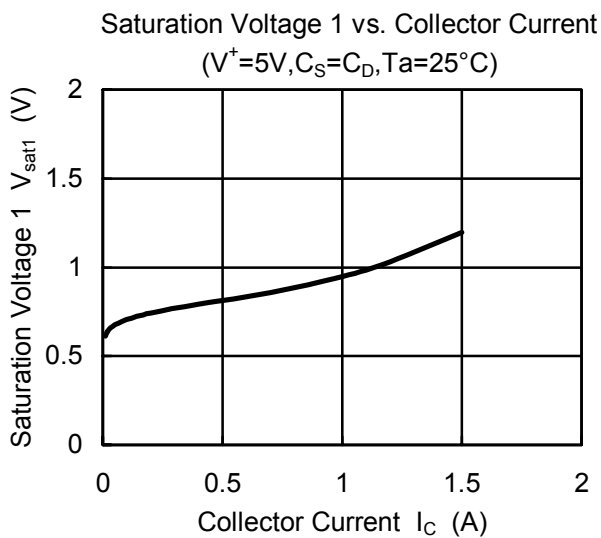
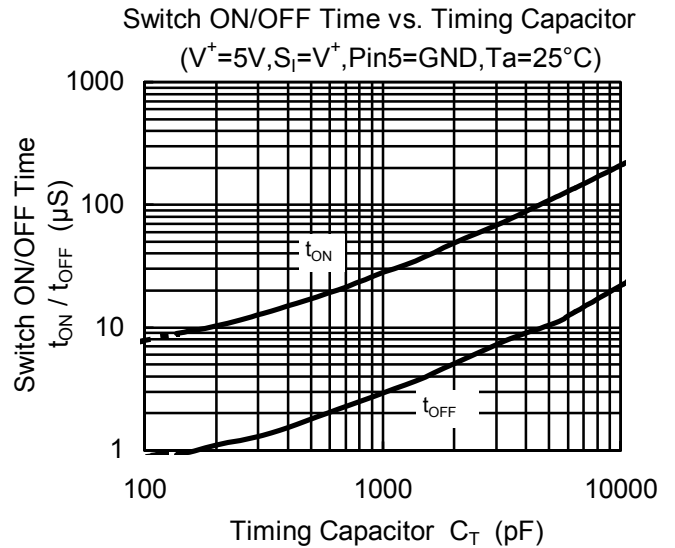
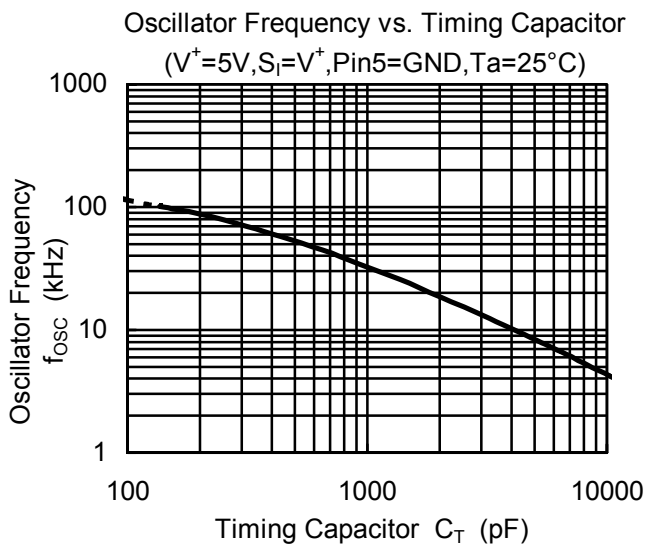
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Operating Current 1	$I_{CC1}$	$C_T=1nF$ , $S_I=V^+$ , $IN^+ > V_{th}$ , $E_S=GND$	–	2.8	4.0	mA
Operating Current 2 (NJM2374AE Only)	$I_{CC2}$	$V^+=48V$ , $C_T=1nF$ , $S_I=V^+$ , $IN^+ > V_{th}$ , $E_S=GND$	–	3.4	4.5	mA
Charge Current	$I_{chg}$		12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

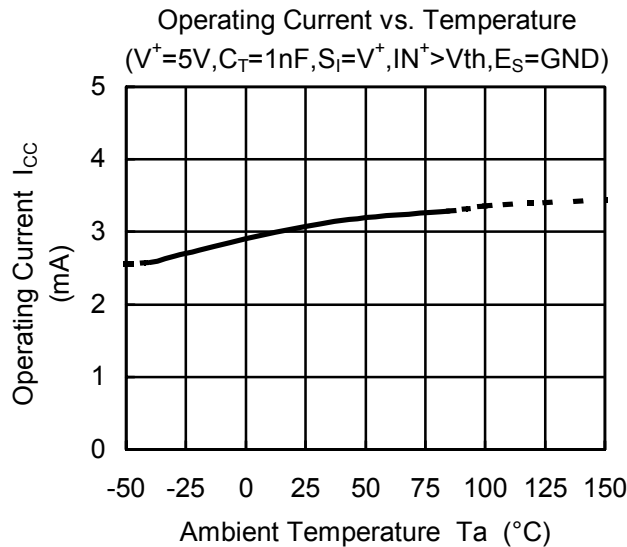
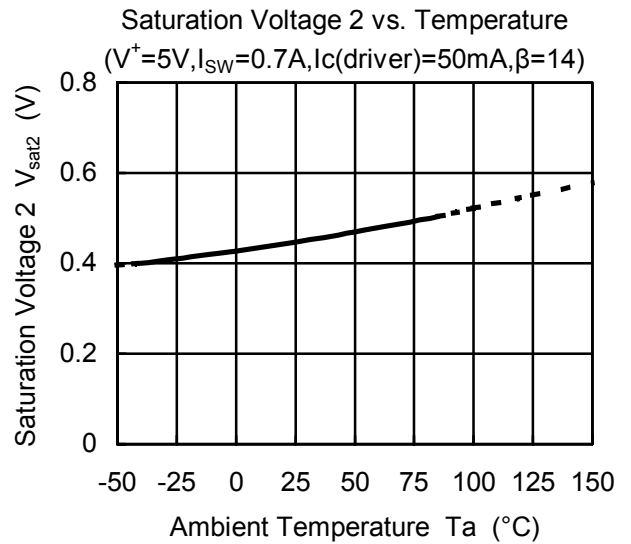
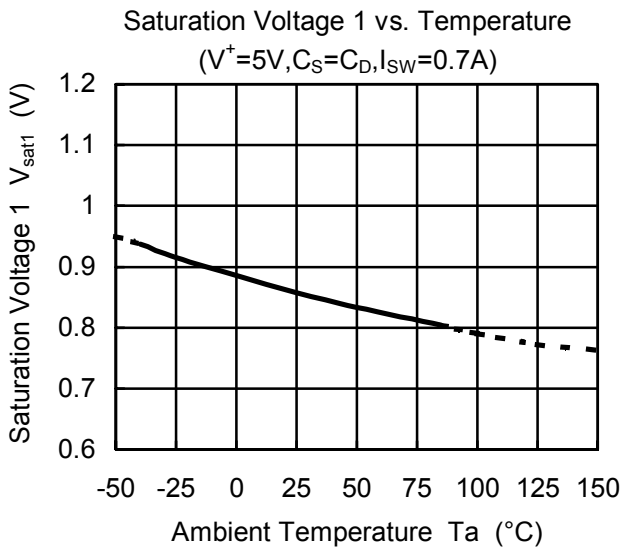
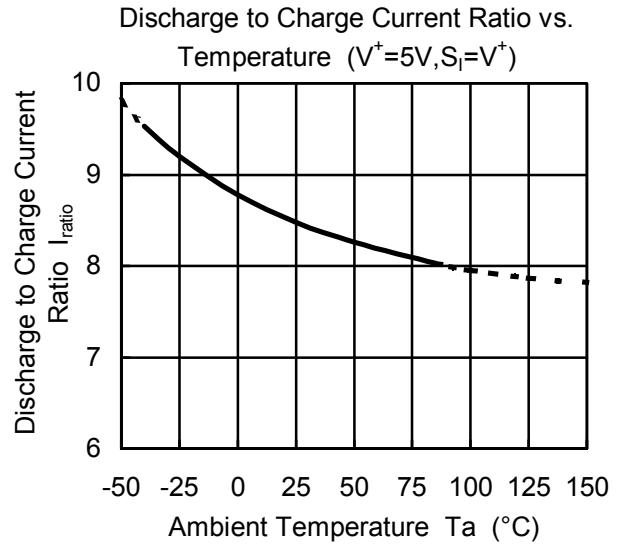
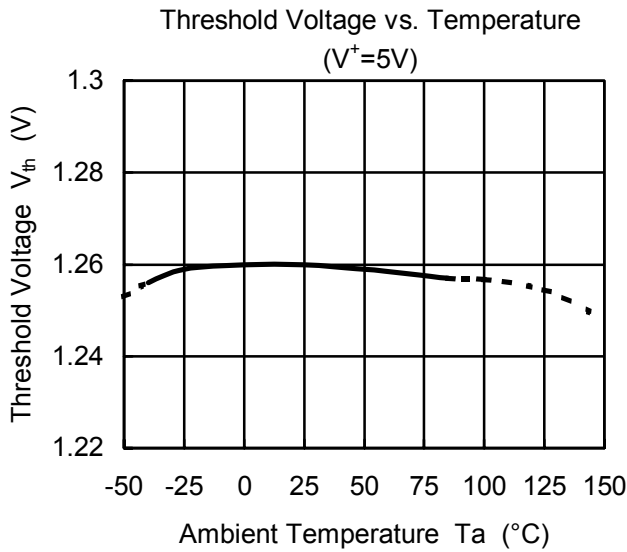
## ■TIMING CHART



## ■ TYPICAL CHARACTERISTICS

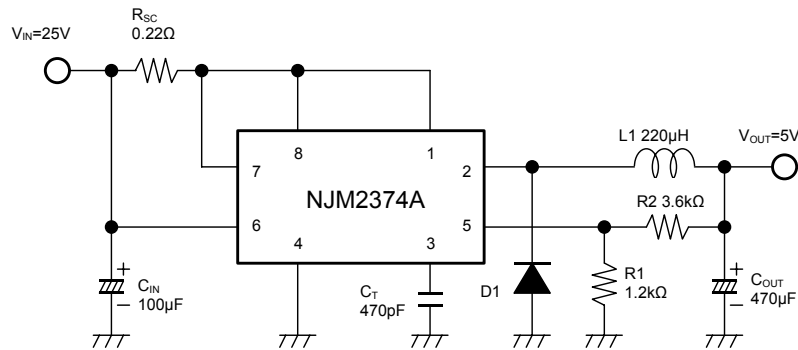


## ■ TYPICAL CHARACTERISTICS



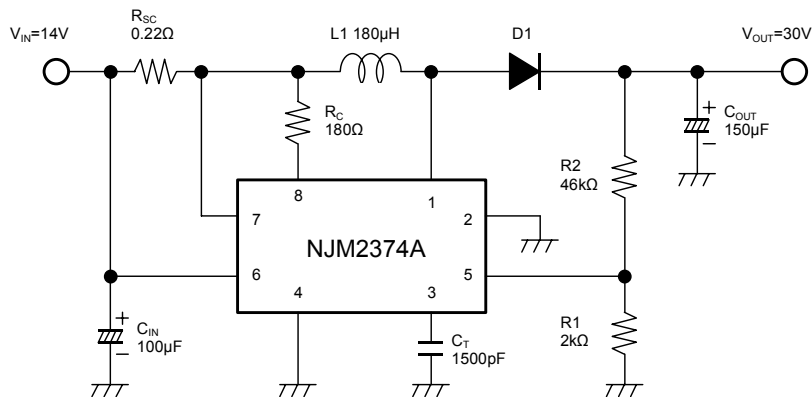
## ■ TYPICAL APPLICATIONS

### Step-Down Converter

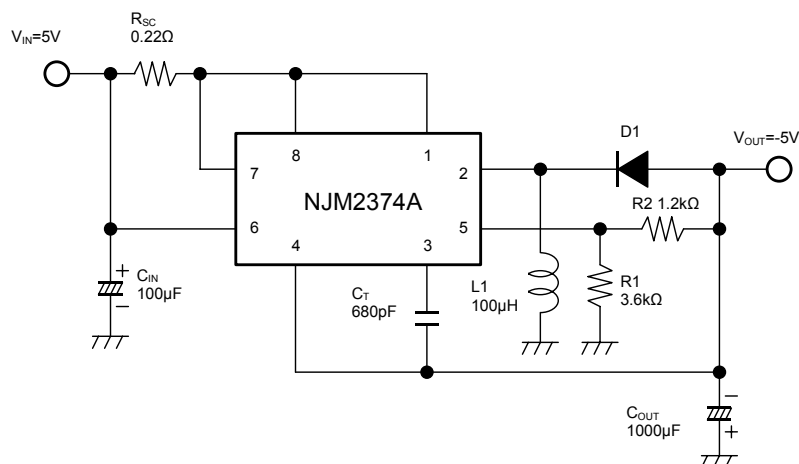


In the case of Step-Down Conversion with the internal power transistor, the Output Voltage must be set lower than 6V.

### Step-Up Converter



### Inverting Converter



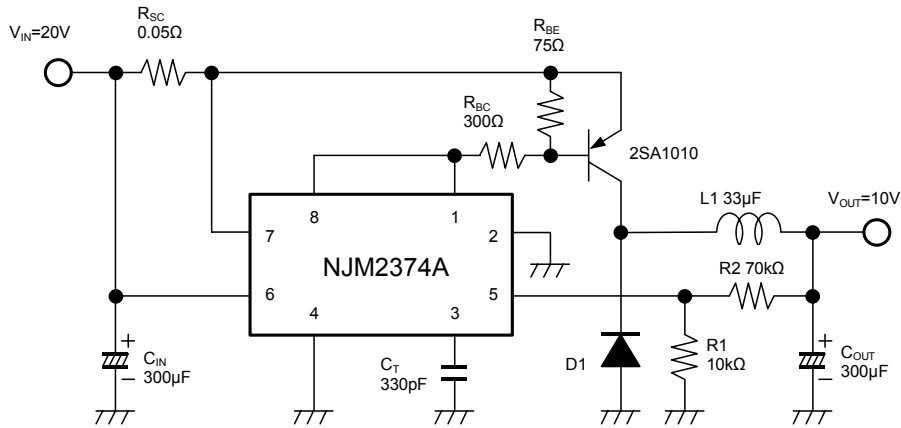
In the case of Inverting Conversion with the internal power transistor, the Output Voltage must be set lower than -6V.

D1 use to schottky diode.

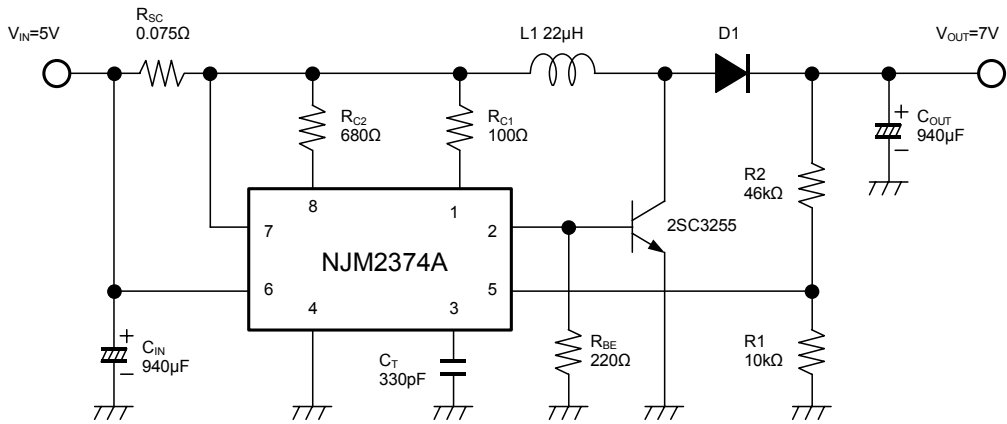
In the case of SSOP packaging, the power dissipation should carefully be considered when designing this parts.

# NJM2374A

## Step-Down Converter (High Current)



## Step-Up Converter (High Current)



D1 use to schottky diode.

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