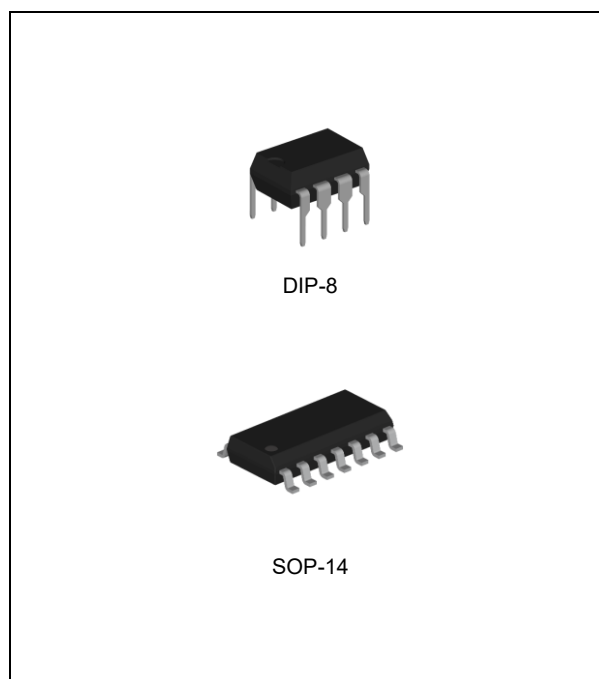


**FEATURES**

- 3.3V, 5.0V, 12V and Adjustable Output Versions
- Adjustable Version Output Voltage Range
- Wide Input Voltage Range
- Guaranteed 0.5A Output Current
- 52kHz Fixed Frequency Internal Oscillator
- Voltage mode non-synchronous PWM control
- On/Off shutdown control input
- Thermal Shutdown and Current Limit Protection
- Moisture Sensitivity Level 3 for SMD packages

**APPLICATION**

- Simple High-Efficiency Step-Down(Buck) Regulator
- Efficient Pre-Regulator for Linear Regulators
- On-Card Switching Regulators
- Positive to Negative Converter(Buck-Boost)

**ORDERING INFORMATION**

| Device      | Package |
|-------------|---------|
| LM2574N-X.X | DIP-8   |
| LM2574D-X.X | SOP-14  |

X.X = Output Voltage = 3.3, 5.0, 12, ADJ

**DESCRIPTION**

The LM2574 series are monolithic ICs designed for a step-down DC/DC converter, capable of driving 0.5A load without an additional transistor. It saves a board space. The external shutdown function is controlled by a logic level and then the circuit comes into the standby mode. The internal compensation makes the feedback control with good line and load regulation characteristics without an external design. Regarding the protection functions – the thermal shutdown prevents circuit damage during the over temperature operation and the current limit is against overcurrent operation of the output switch. Other features include a guaranteed  $\pm 4\%$  tolerance on output voltage within specified input voltages and output load conditions, and  $\pm 10\%$  on the oscillator frequency. External shutdown is included, featuring 50 $\mu$ A (typical) standby current.

The fixed output voltage version includes 3.3V, 5V, 12V devices, while the adjustable version voltages range from 1.23V to 37V. The LM2574 is available in DIP-8 and SOP-14 package.

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

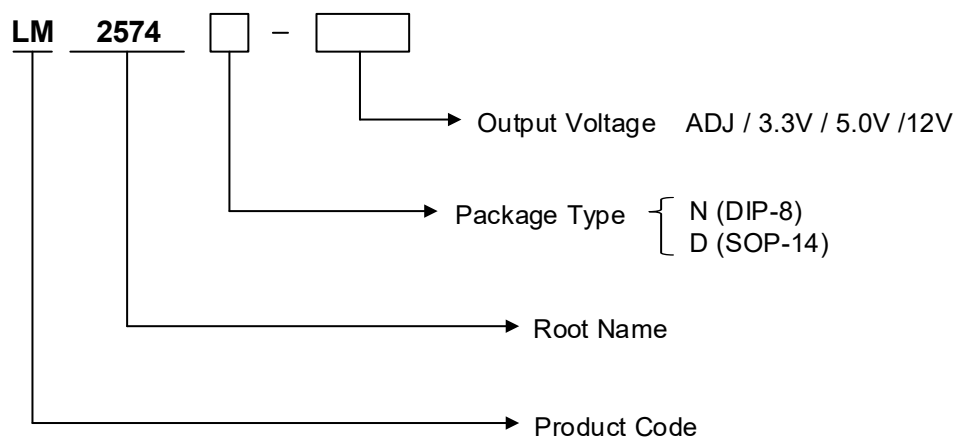
| Characteristic               | Symbol       | MIN. | MAX. | UNIT         |
|------------------------------|--------------|------|------|--------------|
| Maximum Input Supply Voltage | $V_{IN}$     | -    | 45   | V            |
| ON/OFF Pin Input Voltage     | $V_{ON/OFF}$ | -0.3 | 25   | V            |
| Output Voltage to Ground     | $V_{OUT}$    | -1.0 | -    | V            |
| Storage Temperature Range    | $T_{STG}$    | -60  | 150  | $^{\circ}$ C |
| Junction Temperature Range   | $T_J$        | -    | 150  | $^{\circ}$ C |

## RECOMMENDED OPERATING CONDITIONS

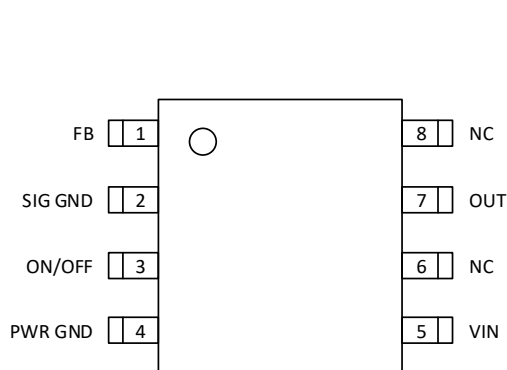
| CHARACTERISTIC       | SYMBOL     | MIN. | MAX. | UNIT |
|----------------------|------------|------|------|------|
| Supply Voltage       | $V_{IN}$   | -    | 40   | V    |
| Load Current         | $I_{LOAD}$ | -    | 0.5  | A    |
| Junction Temperature | $T_J$      | -40  | 125  | °C   |

## ORDERING INFORMATION

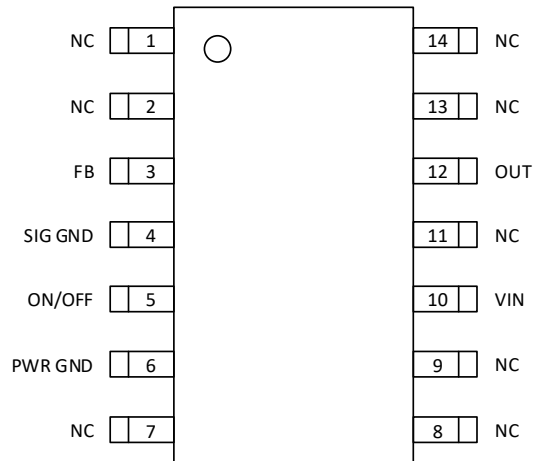
| VOUT | Package | Order No.   | Description                     | Status     |
|------|---------|-------------|---------------------------------|------------|
| ADJ  | DIP-8   | LM2574N-ADJ | 0.5A, Adjustable, 52kHz, On/Off | Active     |
|      | SOP-14  | LM2574D-ADJ | 0.5A, Adjustable, 52kHz, On/Off | Contact Us |
| 3.3V | DIP-8   | LM2574N-3.3 | 0.5A, Fixed, 52kHz, On/Off      | Contact Us |
|      | SOP-14  | LM2574D-3.3 | 0.5A, Fixed, 52kHz, On/Off      | Contact Us |
| 5.0V | DIP-8   | LM2574N-5.0 | 0.5A, Fixed, 52kHz, On/Off      | Contact Us |
|      | SOP-14  | LM2574D-5.0 | 0.5A, Fixed, 52kHz, On/Off      | Contact Us |
| 12V  | DIP-8   | LM2574N-12  | 0.5A, Fixed, 52kHz, On/Off      | Contact Us |
|      | SOP-14  | LM2574D-12  | 0.5A, Fixed, 52kHz, On/Off      | Contact Us |



PIN CONFIGURATION



DIP-8

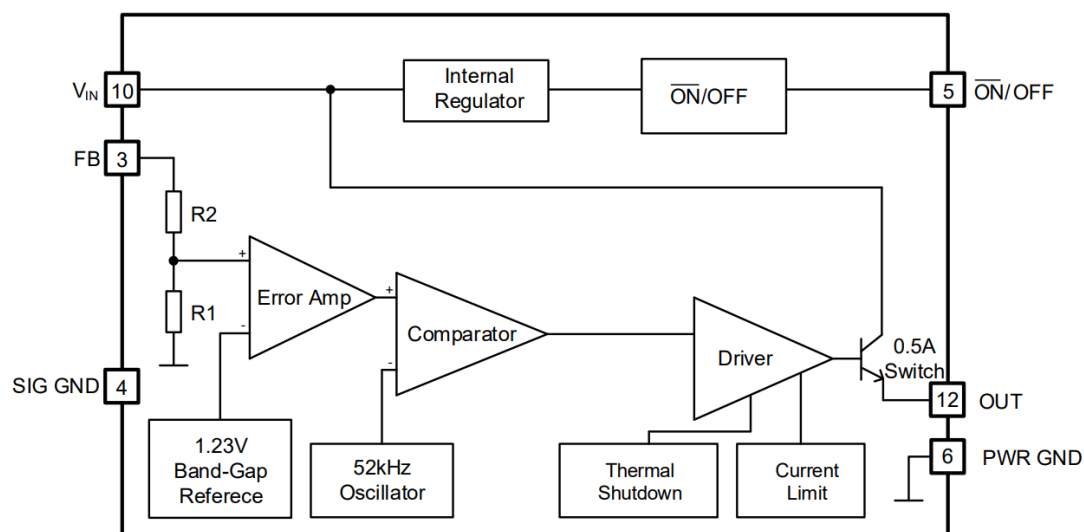


SOP-14

PIN DESCRIPTION

| Package |                           | Symbol          | Description                     |
|---------|---------------------------|-----------------|---------------------------------|
| DIP-8   | SOP-14                    |                 |                                 |
| 1       | 3                         | FB              | Output voltage feedback control |
| 2       | 4                         | SIG GND         | Signal ground                   |
| 3       | 5                         | ON/OFF          | On/Off Shutdown                 |
| 4       | 6                         | PWR GND         | Power ground                    |
| 5       | 10                        | V <sub>IN</sub> | Input Supply                    |
| 7       | 12                        | OUT             | Switching output                |
| 6, 8    | 1, 2, 7, 8, 9, 11, 13, 14 | NC              | -                               |

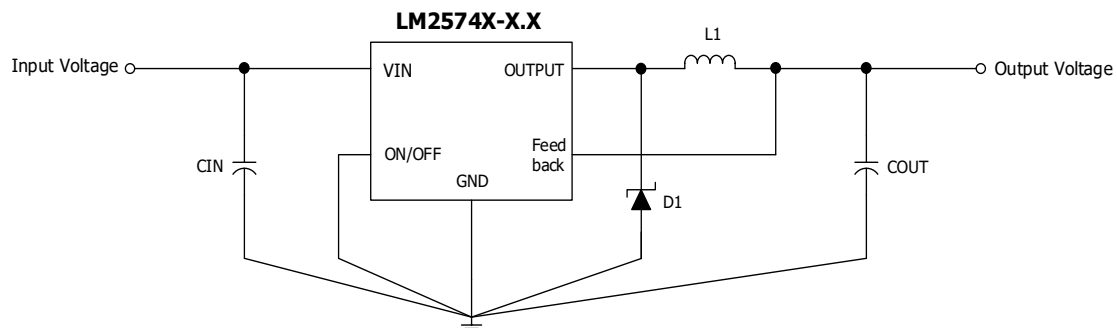
## BLOCK DIAGRAM



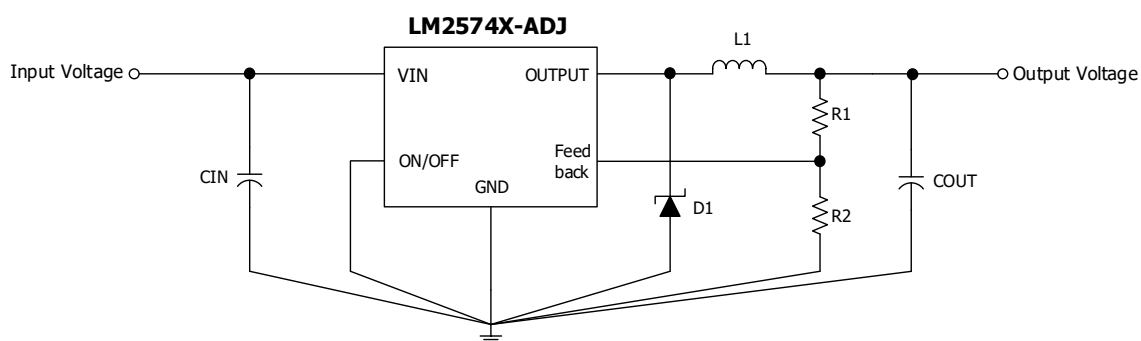
- \* For fixed 3.3V Version,  
R1 = 1.2k $\Omega$  / R2 = 2.02k $\Omega$
- \* For fixed 5V Version,  
R1 = 1.2k $\Omega$  / R2 = 3.69k $\Omega$
- \* For fixed 12V Version,  
R1 = 1.2k $\Omega$  / R2 = 10.56k $\Omega$
- \* For adjustable version  
R1 = Open / R2 = 0 $\Omega$

## TYPICAL APPLICATION

### - Fixed Output Voltage Version



### - Adjustable Output Voltage Version



# 0.5A, 52KHz, Step-Down Switching Regulator

LM2574

## ELECTRICAL CHARACTERISTICS

Specification with standard type face are for  $T_J=25^{\circ}\text{C}$ , and those with **boldface type** apply over **full Operating Temperature Range**. Unless specified otherwise,  $V_{IN}=12\text{V}$  for the 3.3V, 5V, and Adjustable versions and  $V_{IN}=25\text{V}$  for the 12V version.  $I_{LOAD}=0.2\text{A}$

| Characteristic                           | Symbol         | Test Condition                               |  | Min.<br>(Note 3) | Typ.<br>(Note 2) | Max.<br>(Note 3) | Unit |
|--|----------------|--|--|------------------|------------------|------------------|------|
| SYSTEM PARAMETERS (Note 4)               |                |  |  |                  |                  |                  |      |
| Efficiency                               | $\eta$         | LM2574X-ADJ                                  | $V_{IN}=12V, I_{LOAD}=0.5A, V_{OUT}=5V$                        |                  | 77               |                  | %    |
|  |                | LM2574X-3.3                                  | $V_{IN}=12V, I_{LOAD}=0.5A$                                    |                  | 72               |                  |      |
|  |                | LM2574X-5.0                                  | $V_{IN}=12V, I_{LOAD}=0.5A$                                    |                  | 77               |                  |      |
|  |                | LM2574X-12                                   | $V_{IN}=15V, I_{LOAD}=0.5A$                                    |                  | 88               |                  |      |
| Output Voltage                           | $V_{OUT}$      | LM2574X-3.3                                  | $4.75V \leq V_{IN} \leq 40V$<br>$0.1A \leq I_{LOAD} \leq 0.5A$ | 3.168            | 3.3              | 3.432            | V    |
|  |                |  | <b>3.135</b>   | <b>3.465</b>     |                  |                  |      |
|  |                | LM2574X-5.0                                  | $7V \leq V_{IN} \leq 40V$<br>$0.1A \leq I_{LOAD} \leq 0.5A$    | 4.800            | 5.0              | 5.200            |      |
|  |                |  | <b>4.750</b>   | <b>5.250</b>     |                  |                  |      |
|  |                | LM2574X-12                                   | $15V \leq V_{IN} \leq 40V$<br>$0.1A \leq I_{LOAD} \leq 0.5A$   | 11.520           | 12               | 12.480           |      |
|  |                |  | <b>11.400</b>  | <b>12.600</b>    |                  |                  |      |
| Feedback Voltage                         | $V_{FB}$       | LM2574X-ADJ                                  | $7V \leq V_{IN} \leq 40V$<br>$0.1A \leq I_{LOAD} \leq 0.5A$    | 1.193            | 1.23             | 1.267            | V    |
|  |                |  | <b>1.180</b>   | <b>1.280</b>     |                  |                  |      |
| DEVICE PARAMETERS                        |                |  |  |                  |                  |                  |      |
| Feedback Bias Current                    | $I_{FB}$       | Adjustable Version Only<br>$V_{FB}=1.3V$     |  |                  | 100              | nA               |      |
|  |                |  |  |                  | <b>500</b>       |                  |      |
| Oscillator Frequency                     | $F_{OSC}$      | (Note 5)                                     | 47   | 52               | 58               | kHz              |      |
|  |                |  | <b>42</b>  |                  | <b>63</b>        |                  |      |
| Saturation Voltage                       | $V_{SAT}$      | $I_{OUT}=0.5A$<br>(Note 6, 7)                |  |                  | 1.2              | V                |      |
|  |                |  |  |                  | <b>1.4</b>       |                  |      |
| Max. Duty Cycle (ON)                     | DC             | (Note 7)                                     |  | 98               |                  | %                |      |
| Current Limit                            | $I_{CL}$       | Peak Current (Note 6, 7)                     | 0.7  |                  | 1.6              | A                |      |
|  |                |  | <b>0.65</b>  |                  | <b>1.8</b>       |                  |      |
| Output Leakage Current                   | $I_L$          | $V_{OUT}=0V$ (Note 6, 8)                     |  |                  | 2                | mA               |      |
|  |                | $V_{OUT}=-1V$ (Note 9)                       |  |                  | 30               | mA               |      |
| Quiescent Current                        | $I_Q$          | (Note 8)                                     |  |                  | 10               | mA               |      |
| Shutdown Current                         | $I_{SHUTDOWN}$ | $V_{FB}=0V, V_{ON/OFF}=5V(OFF)$<br>(Note 9)  |  |                  | 200              | $\mu A$          |      |
| ON/OFF Control                           |                |  |  |                  |                  |                  |      |
| ON/OFF Pin Logic Input Threshold voltage | $V_{IH}$       | $V_{FB}=0V$ , Low (Regulator ON)             |  |                  | <b>0.8</b>       | V                |      |
|  | $V_{IL}$       | $V_{FB}=0V$ , High (Regulator OFF)           | <b>2.4</b>   |                  |                  |                  |      |
| ON/OFF Pin Logic Input current           | $I_{IH}$       | $V_{FB}=0V, V_{ON/OFF}=5.0V$ (regulator OFF) |  |                  | 30               | $\mu A$          |      |
|  | $I_{IL}$       | $V_{FB}=0V, V_{ON/OFF}=0V$ (regulator ON)    |  |                  | 10               |                  |      |

**Note 1:** Absolute Maximum Rating indicate limits beyond which damage to the device may occur. Operating Ratings indicate condition for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

**Note 2:** Typical numbers are at 25°C and represent the most likely norm.

**Note 3:** All limits guaranteed at room temperature (standard type face) and at temperature extremes (**bold type face**).

**Note 4:** External components such as the schottky diode, inductor, input and output capacitors, and voltage programming resistors can affect switching regulator system performance. When the LM2574 is used as shown in the typical circuit, system performance will be as shown in system parameters section of Electrical Characteristics.

**Note 5:** The switching frequency is reduced when the second stage current limit is activated. The amount of reduction is determined by the severity of current over-load.

**Note 6:** No diode, inductor or capacitor connected to output pin.

**Note 7:** Feedback pin removed from output and connected to 0V to force the output transistor switch ON.

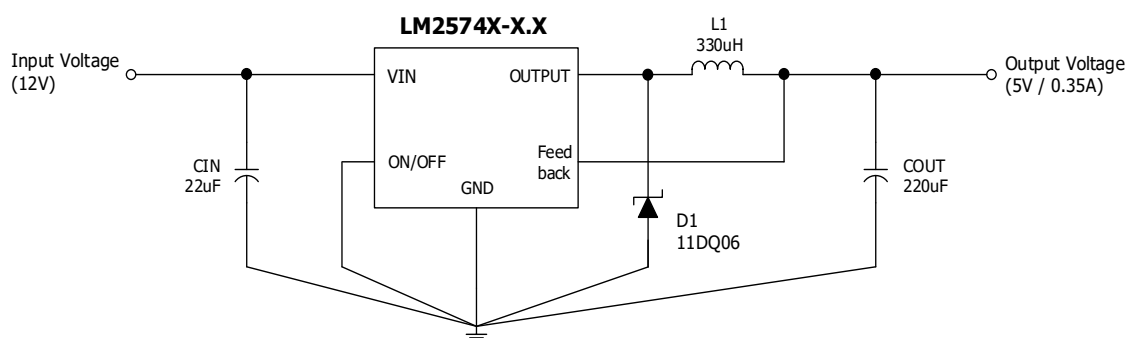
**Note 8:** Feedback pin removed from output and connected to 12V for the 3.3V, 5V, and the ADJ version, and 25V for the 12V version, to force the output transistor switch OFF.

**Note 9:** VIN=40V.

## APPLICATION INFORMATION

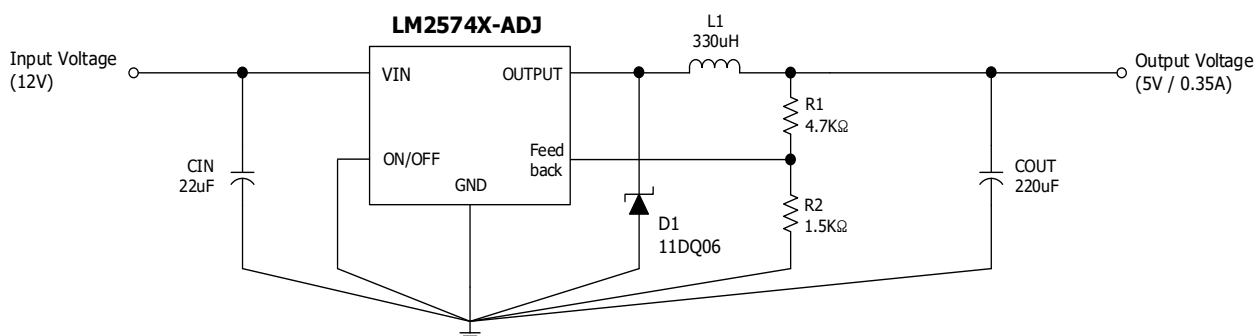
As in any switching regulator, layout is very important. Rapidly switching currents associated with wiring inductance generate voltage transients which can cause problems. For minimal inductance and ground loops, the length of the wires should be kept as short as possible. Single-point grounding or ground plane construction should be used for best results. Keep the feedback wiring away from the inductor flux.

### - Fixed Output Voltage Version (VOUT=5V)



[Figure 1]

### - Adjustable Output Voltage Version (VOUT=5V)



[Figure 2]

$$* V_{OUT} = V_{FB} \left(1 + \frac{R1}{R2}\right), \text{ Where } V_{FB}=1.23V, R2 \text{ Between } 1K \text{ and } 5K$$



**TYPICAL OPERATING CHARACTERISTIC**

T.B.D.

## REVISION NOTICE

The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.