LM1575/LM2575/LM2575HV
SIMPLE SWITCHER® 1A Step-Down Voltage Regulator

General Description
The LM2575 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving a 1A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3V, 5V, 12V, 15V, and an adjustable output version.

Requiring a minimum number of external components, these regulators are simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The LM2575 series offers a high-efficiency replacement for popular three-terminal linear regulators. It substantially reduces the size of the heat sink, and in many cases no heat sink is required.

A standard series of inductors optimized for use with the LM2575 are available from several different manufacturers. This feature greatly simplifies the design of switch-mode power supplies.

Other features include a guaranteed ±4% tolerance on output voltage within specified input voltages and output load conditions, and ±10% on the oscillator frequency. External shutdown is included, featuring 50 µA (typical) standby current. The output switch includes cycle-by-cycle current limiting, as well as thermal shutdown for full protection under fault conditions.

Features
- 3.3V, 5V, 12V, 15V, and adjustable output versions
- Adjustable version output voltage range, 1.23V to 37V (57V for HV version) ±4% max over line and load conditions
- Guaranteed 1A output current
- Wide input voltage range, 40V up to 60V for HV version
- Requires only 4 external components
- 52 kHz fixed frequency internal oscillator
- TTL shutdown capability, low power standby mode
- High efficiency
- Uses readily available standard inductors
- Thermal shutdown and current limit protection
- P+ Product Enhancement tested

Applications
- Simple high-efficiency step-down (buck) regulator
- Efficient pre-regulator for linear regulators
- On-card switching regulators
- Positive to negative converter (Buck-Boost)

Typical Application (Fixed Output Voltage Versions)

Note: Pin numbers are for the TO-220 package.
3.3V, R2 = 1.7k  
5V, R2 = 3.1k  
12V, R2 = 8.84k  
15V, R2 = 11.3k  
For ADJ. Version  
R1 = Open, R2 = 0Ω  

**Note:** Pin numbers are for the TO-220 package.

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**FIGURE 1.**

**Connection Diagrams** (XX indicates output voltage option. See Ordering Information table for complete part number.)

### Straight Leads  
5-Lead TO-220 (T)

- **Top View**  
  LM2575T-XX or LM2575HVT-XX  
  See NS Package Number T05A

### Bent, Staggered Leads  
5-Lead TO-220 (T)

- **Top View**  
  LM2575T-XX Flow LB03 or  
  LM2575HVT-XX Flow LB03  
  See NS Package Number T05D
**Connection Diagrams** (XX indicates output voltage option. See Ordering Information table for complete part number.) (Continued)

16–Lead DIP (N or J)

```
1       2       3       4       5       6       7       8
OUT1    TB1    16    15    14    13    12    11    10
         9

ON/OFF
```

*No Internal Connection

Top View
LM2575N-XX or LM2575HVN-XX
See NS Package Number N16A
LM1575J-XX-QML
See NS Package Number J16A

24-Lead Surface Mount (M)

```
1       2       3       4       5       6       7       8
PWR GND 23    22    21    20    19    18    17    16
         15    14    13

FB
```

*No Internal Connection

TO-263(S)
5-Lead Surface-Mount Package

```
1       2       3       4       5
ON/OFF  Feedback  Ground  Output  VIN
```

Top View
LM2575S-XX or LM2575HVS-XX
See NS Package Number TS5B

Ordering Information

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<th>Package Type</th>
<th>NSC Package Number</th>
<th>Standard Voltage Rating (40V)</th>
<th>High Voltage Rating (60V)</th>
<th>Temperature Range</th>
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Absolute Maximum Ratings (Note 1)
If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Maximum Supply Voltage
- LM1575/LM2575 45V
- LM2575HV 63V

ON/OFF Pin Input Voltage
- \(-0.3V \leq V \leq +V_{IN}\)

Output Voltage to Ground (Steady State)
- \(-1V\)

Power Dissipation
- Internally Limited

Storage Temperature Range
- \(-65\degree C\) to \(+150\degree C\)

Maximum Junction Temperature
- \(150\degree C\)

Minimum ESD Rating
(C = 100 pF, R = 1.5 k\(\Omega\)) 2 kV

Lead Temperature (Soldering, 10 sec.) 260\degree C

Operating Ratings

Temperature Range
- LM1575 \(-55\degree C \leq T_J \leq +150\degree C\)
- LM2575/LM2575HV \(-40\degree C \leq T_J \leq +125\degree C\)

Supply Voltage
- LM1575/LM2575 40V
- LM2575HV 60V

Electrical Characteristics
Specifications with standard type face are for \(T_J = 25\degree C\), and those with **boldface type** apply over full Operating Temperature Range.

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**SYSTEM PARAMETERS** (Note 4) Test Circuit Figure 2

\(V_{OUT}\) Output Voltage
- \(V_{IN} = 12V, I_{LOAD} = 0.2A\) Circuit of Figure 2
  - 3.3 3.267 3.234 V
  - 3.333 3.366 V

\(V_{OUT}\) Output Voltage
- \(4.75V \leq V_{IN} \leq 40V, 0.2A \leq I_{LOAD} \leq 1A\) Circuit of Figure 2
  - 3.3 3.200/3.168 3.168/3.135 V
  - 3.400/3.432 3.432/3.465 V

\(V_{OUT}\) Output Voltage
- \(4.75V \leq V_{IN} \leq 60V, 0.2A \leq I_{LOAD} \leq 1A\) Circuit of Figure 2
  - 3.3 3.200/3.168 3.168/3.135 V
  - 3.416/3.450 3.450/3.482 V

\(\eta\) Efficiency
- \(V_{IN} = 12V, I_{LOAD} = 1A\)
  - 75 %

LM1575-5.0, LM2575-5.0, LM2575HV-5.0
Electrical Characteristics
Specifications with standard type face are for \(T_J = 25\degree C\), and those with **boldface type** apply over full Operating Temperature Range.

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**SYSTEM PARAMETERS** (Note 4) Test Circuit Figure 2

\(V_{OUT}\) Output Voltage
- \(V_{IN} = 12V, I_{LOAD} = 0.2A\) Circuit of Figure 2
  - 5.0 4.950 4.900 V
  - 5.050 5.100 V

\(V_{OUT}\) Output Voltage
- \(0.2A \leq I_{LOAD} \leq 1A, 8V \leq V_{IN} \leq 40V\) Circuit of Figure 2
  - 5.0 4.850/4.800 4.800/4.750 V
  - 5.150/5.200 5.200/5.250 V

\(V_{OUT}\) Output Voltage
- \(0.2A \leq I_{LOAD} \leq 1A, 8V \leq V_{IN} \leq 60V\) Circuit of Figure 2
  - 5.0 4.850/4.800 4.800/4.750 V
  - 5.175/5.225 5.225/5.275 V