

### GENERAL DESCRIPTION

The LM2576HVS series of regulators monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving 3A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3V, 5.0V, 12V, 15V and adjustable output versions. Requiring a minimum number of external components, these regulators are simple to use and include internal frequency compensation and a fixed-frequency oscillator. The LM2576HVS series offers a high-efficiency replacement for popular three-terminal linear regulators. It substantially reduces the size of the heat sink, and in some cases no heat sink is required. A standard series of inductors optimized for use with the LM2576HVS are available from several different manufacturers. This feature greatly simplifies the design of switch-mode power supplies. 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 50uA (typical) standby current. The output switch includes cycle-by-cycle current limiting, as well as thermal shutdown for full protection under fault conditions.

### Features

- Step-down Switching Regulator
- Adjustable Version Output Voltage Range, 1.23V to 52V  
 $\pm 4\%$  Max over Line and Load conditions
- Guaranteed Output Current of 3A
- Fixed Output Voltages : 3.3V, 5.0V, 12V and 15V
- Wide Input Voltage Range 60V
- 52 kHz Fixed Frequency Oscillator
- TTL Shutdown Capability, Low Power Standby Mode
- Requires only 4 External Components
- High Efficiency
- Use Readily Available Standard Inductors
- Available in TO-263 Packages
- Thermal Shutdown and Current Limit Protection
- Moisture Sensitivity Level 3

### 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


OUTPUT VOLTAGE	PART NO.	PACKAGE	PACKING
3.3V	LM2576HVS-3.3	TO-263-5L(D <sup>2</sup> PAK)	800pcs / 13" Reel
5.0V	LM2576HVS-5.0	TO-263-5L(D <sup>2</sup> PAK)	800pcs / 13" Reel
ADJ	LM2576HVS-ADJ	TO-263-5L(D <sup>2</sup> PAK)	800pcs / 13" Reel
12V	LM2576HVS-12	TO-263-5L(D <sup>2</sup> PAK)	800pcs / 13" Reel
15V	LM2576HVS-15	TO-263-5L(D <sup>2</sup> PAK)	800pcs / 13" Reel

### Marking:


LM2576HVS-3.3

	TECH PUBLIC
	LM2576HVS
-3.3	P+


LM2576HVS-5.0

	TECH PUBLIC
	LM2576HVS
-5.0	P+


LM2576HVS-ADJ

	TECH PUBLIC
	LM2576HVS
-ADJ	P+

LM2576HVS-12

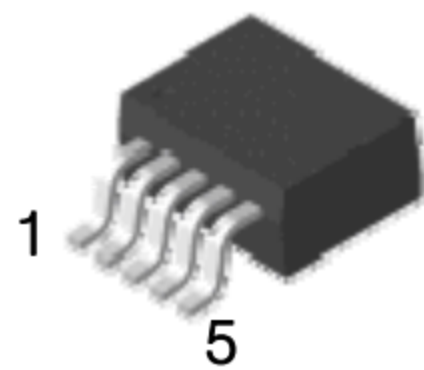
	TECH PUBLIC
	LM2576HVS
-12	P+

LM2576HVS-15

	TECH PUBLIC
	LM2576HVS
-15	P+

## PIN CONFIGURATION

TO-263-5L (D<sup>2</sup>PAK)



**Pin Definition:**

1. Input
2. SW Output
3. Ground
4. Feedback
5. Enable

## ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage	$V_{IN}$	-	63	V
ON/OFF Pin Input Voltage		-0.3	+ $V_{IN}$	V
Output Voltage to Ground (Steady State)		-0.75		V
Lead Temperature (Soldering, 5 sec)	$T_{SOL}$		260	°C
Storage Temperature Range	$T_{STG}$	-65	150	°C
Maximum Junction Temperature Range	$T_{JOPR}$	-	150	°C

## Operating Ratings

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	$V_{IN}$	-	60	V
Temperature Range	$T_J$	-40	125	°C

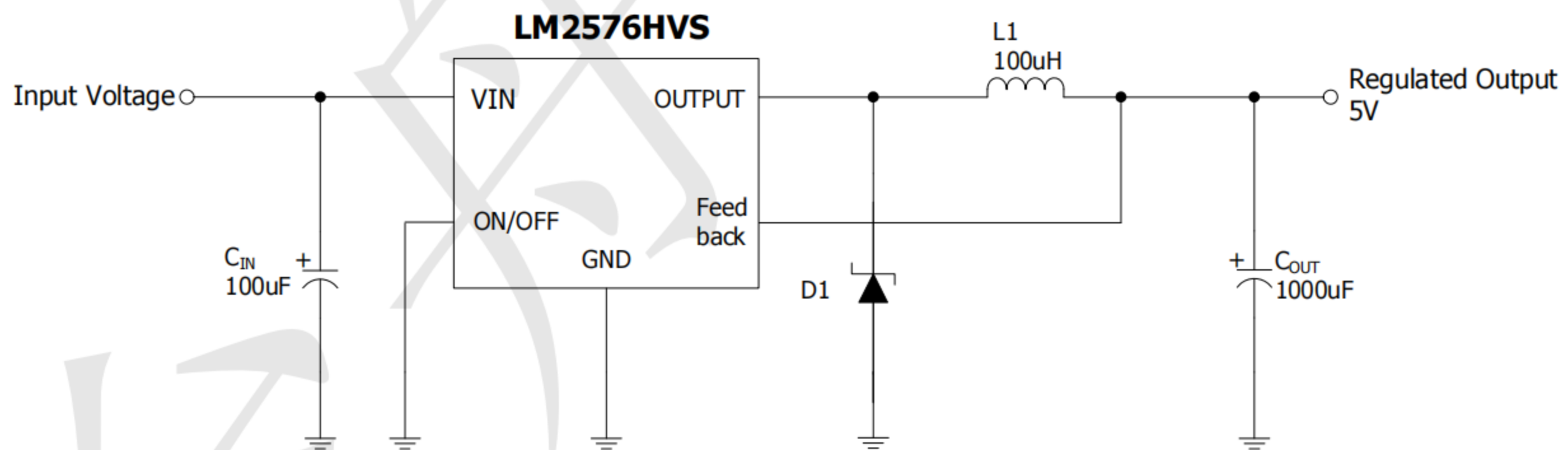
### Electrical Characteristics (T<sub>A</sub>=25 C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 2)</sup>	MIN.	TYP.	MAX.	UNIT			
<b>SYSTEM PARAMETERS</b> <sup>(Note 3)</sup>									
Feedback Voltage	V <sub>FB</sub>	LM2576HVS-ADJ	V <sub>IN</sub> = 12V, I <sub>LOAD</sub> = 0.5A	1.217	1.230	1.243	V		
			0.5A ≤ I <sub>LOAD</sub> ≤ 3A , 8V ≤ V <sub>IN</sub> ≤ 55V	1.193 <b>1.180</b>	1.230	1.273 <b>1.286</b>	V		
Output Voltage	V <sub>O</sub>	LM2576HVS-3.3	V <sub>IN</sub> = 12V, I <sub>LOAD</sub> = 0.5A	3.234	3.300	3.366	V		
			0.5A ≤ I <sub>LOAD</sub> ≤ 3A , 6V ≤ V <sub>IN</sub> ≤ 55V	3.168 <b>3.135</b>	3.300	3.450 <b>3.482</b>	V		
		LM2576HVS-5.0	V <sub>IN</sub> = 12V, I <sub>LOAD</sub> = 0.5A	4.900	5.000	5.100	V		
			0.5A ≤ I <sub>LOAD</sub> ≤ 3A , 8V ≤ V <sub>IN</sub> ≤ 55V	4.800 <b>4.750</b>	5.000	5.225 <b>5.275</b>	V		
		LM2576HVS-12	V <sub>IN</sub> = 25V, I <sub>LOAD</sub> = 0.5A	11.76	12.00	12.24	V		
			0.5A ≤ I <sub>LOAD</sub> ≤ 3A , 15V ≤ V <sub>IN</sub> ≤ 55V	11.52 <b>11.40</b>	12.00	12.54 <b>12.66</b>	V		
			V <sub>IN</sub> = 25V, I <sub>LOAD</sub> = 0.5A	14.70	15.00	15.30	V		
			0.5A ≤ I <sub>LOAD</sub> ≤ 3A , 18V ≤ V <sub>IN</sub> ≤ 55V	14.40 <b>14.25</b>	15.00	15.68 <b>15.83</b>	V		
		Efficiency		LM2576HVS-ADJ	V <sub>IN</sub> = 12V, I <sub>LOAD</sub> = 3A, V <sub>O</sub> = 5V		77		%
				LM2576HVS-3.3	V <sub>IN</sub> = 12V, I <sub>LOAD</sub> = 3A		75		%
				LM2576HVS-5.0	V <sub>IN</sub> = 12V, I <sub>LOAD</sub> = 3A		77		%
				LM2576HVS-12	V <sub>IN</sub> = 15V, I <sub>LOAD</sub> = 3A		88		%
LM2576HVS-15	V <sub>IN</sub> = 18V, I <sub>LOAD</sub> = 3A				88		%		
<b>DEVICE PARAMETERS</b>									
Feedback Bias Current	I <sub>b</sub>	V <sub>O</sub> = 5V (Adjustable Version Only)		50	100 <b>500</b>	nA			
Oscillator Frequency	f <sub>O</sub>	(Note 8)	47 <b>42</b>	52	58 <b>63</b>	KHZ			
Saturation Voltage	V <sub>SAT</sub>	I <sub>O</sub> = 3A (Note 4)		1.4	1.55 <b>1.70</b>	V			
Max Duty Cycle(ON)	DC	(Note 5)	93	98		%			
Current Limit	I <sub>CL</sub>	(Note 4, 8)	4.2 <b>3.5</b>	5.8	6.9 <b>7.5</b>	A			

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Leakage Current	$I_L$	(Notes 6, 7) Output=0V			7.5		mA
Quiescent Current	$I_Q$	(Note 6)			5	10	mA
Standby Quiescent Current	$I_{STBY}$	ON/OFF Pin = 5V (OFF)	$V_{IN} = 60V$		50	200	$\mu A$
<b><math>\overline{ON/OFF}</math> CONTROL</b>							
$\overline{ON/OFF}$ Pin Logic Input Level	$V_{IH}$	$V_O = 0V$		2.2 2.4	1.4		V
	$V_{IL}$	$V_O = \text{Nominal Output Voltage}$			1.2	1.0 0.8	V
$\overline{ON/OFF}$ Pin Input Current	$I_{IH}$	$\overline{ON/OFF}$ Pin = 5V (OFF)			12	30	$\mu A$
	$I_{IL}$	$\overline{ON/OFF}$ Pin = 0V (ON)			0	10	$\mu A$

## TYPICAL APPLICATION

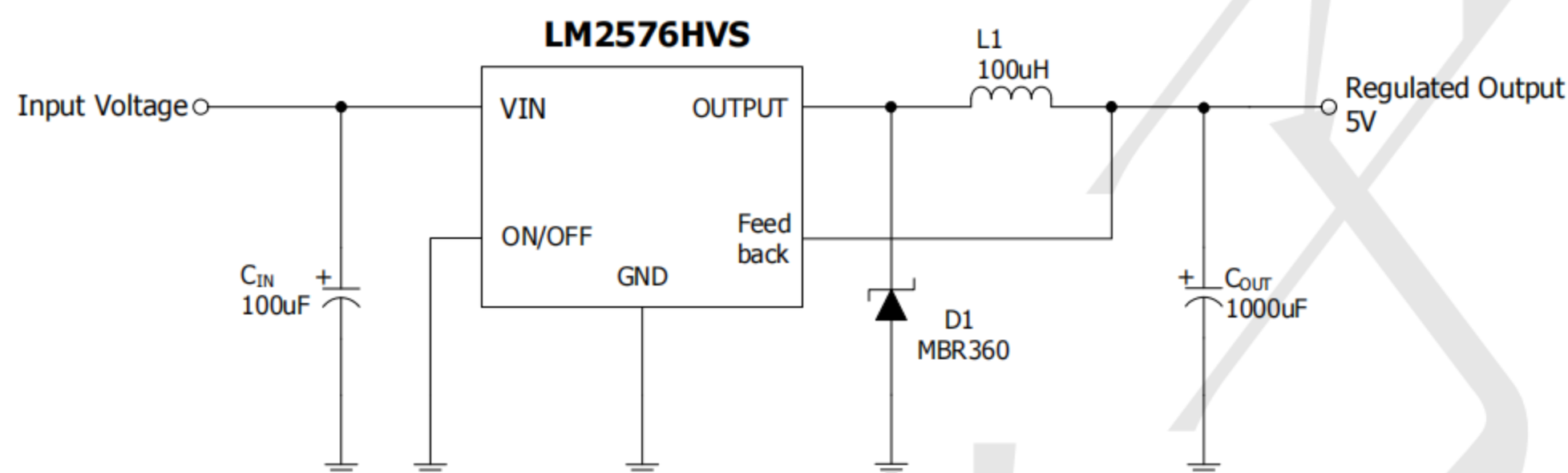
- Fixed Output Voltage Version



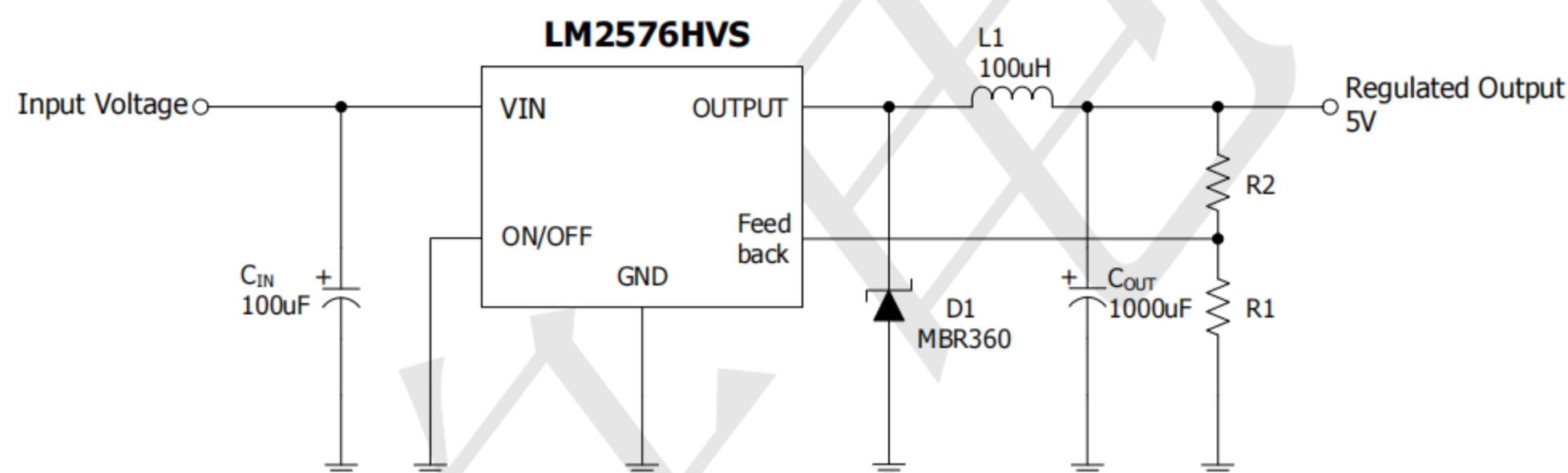
### APPLICATION INFORMATION

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 leads indicated by heavy lines should be kept as short as possible. Single-point grounding (as indicated) or ground plane construction should be used for best results. When using the Adjustable version, physically locate the programming resistors near the regulator, to keep the sensitive feedback wiring short.

#### - Fixed Output Voltage Version



#### - Adjustable Output Voltage Version



$$* V_{OUT} = V_{REF} \left(1 + \frac{R2}{R1}\right)$$

$$* R2 = R1 \left(\frac{V_{OUT}}{V_{REF}} - 1\right)$$

where  $V_{REF} = 1.23V$ ,  $R1$  between  $1K\Omega$  and  $5K\Omega$ .

- $C_{IN}$  : 100µF, 75V, Aluminum Electrolytic
- $C_{OUT}$  : 1000µF, 25V, Aluminum Electrolytic
- D1 - Schottky, MBR360
- L1 : 100µH, Pulse Eng. PE-92108
- R1 : 2K, 0.1%
- R2 : 6.12K, 0.1%

**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

**TO-263-5L (D<sup>2</sup>PAK)**

