



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-LM2576

Power converter 3A step-down voltage regulator

网址 www.sztdbdt.com Q

用芯智造 · 卓越品质

semiconductor device
manufacturer

- Design
- research and development
- production
- and sales



Features

3.3V, 5V, 12V, 15V and adjustable output versions

Adjustable version output voltage range: 1.23V to 37V (57V for high voltage version), with a maximum tolerance of $\pm 4\%$ under line and load conditions

Rated output of 3A

Wide input voltage range: 40V, up to 60V for high voltage version

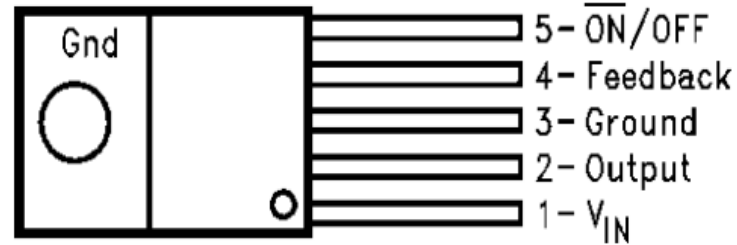
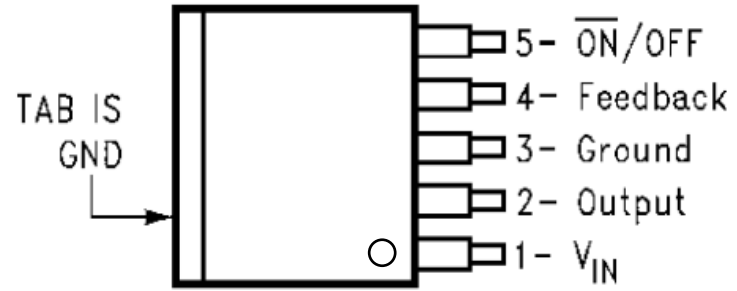
Requires only four external components

52kHz fixed-frequency internal oscillator

TTL shutdown function, low-power standby mode

High efficiency

Uses off-the-shelf standard inductor



Applications

Motor drives

Commercial networking and server PSUs

Electrical appliances

Test and measurement equipment

Description

The LM2576 series regulators are monolithic integrated circuits that provide all the essential functions for step-down switching regulators, capable of driving 3A load and featuring excellent line and load regulation performance. These devices are available in 3.3V, 5V, 12V, 15, and adjustable output versions. These regulators not only require very few external components and are simple to use, but also feature fault protection and a fixed-frequency oscillator.

The LM2576 series provides an efficient alternative to commonly used three-terminal linear regulators. It significantly reduces heat sink size, and in some cases, no heat sink is required. Several manufacturers offer standard series inductors that are optimized for use with the LM2576. This feature greatly simplifies the design of switching power supplies. Other features include an output voltage of $\pm 4\%$ and an oscillator frequency tolerance of $\pm 10\%$ under rated input voltage and output load conditions. It features an external shutdown function with a 50μ (typical) standby current. The output switch features cycle-by-cycle current limiting and a thermal shutdown function that provides comprehensive protection under fault conditions.



Pin Functions

PIN		I/O	DESCRIPTION
NO	NAME		
1	VIN	I	Supply input pin to collector pin of high-side transistor. Connect to power supply and input bypass capacitors CIN.Path from VIN pin to high frequency bypass CIN and GND must be as short as possible.
2	OUTPUT	O	Emitter pin of the power transistor. This is a switching node. Attached this pin to an inductor and the cathode of the external diode.
3	GROUND	-	Ground pin. Path to CIN must be as short as possible
4	FEEDBACK	I	Feedback sense input pin. Connect to the midpoint of feedback divider to set VOUT for ADJ version or connect this pin directly to the output capacitor for a fixed output version.
5	ON/OFF	I	Enable input to the voltage regulator. High = OFF and low = ON. Connect to GND to enable the voltage regulator. Do not leave this pin float.
-	TAB	-	Connected to GND. Attached to heatsink for thermal relief for TO-220 package or put a copper plane connected to this pin as a thermal relief for DDPACK package

(1) I = INPUT, O = OUTPUT

Specifications

ESD Ratings

		VALUE	UNIT
V(ESD) Electrostatic discharge	Human-body model(HBM),per ANSI/ESDAJEDEC JS-001(1)	±2000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process



Absolute Maximum Ratings

over the recommended operating junction temperature range of -40 ° C to 125 ° C (unless otherwise noted)

		MIN	MAX	UNIT
Maximum supply voltage	LM2576		45	V
	LM2576HV		63	
ON /OFF pin input voltage		-0.3V	V +VIN	V
Output voltage to ground	(Steady-state)	-1		V
Power dissipation		Internally Limited		
Maximum junction temperature,TJ			150	
Storage temperature,Tstg		-65	150	

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) If Military/Aerospace specified devices are required, please contact the TI Sales Office/ Distributors for availability and specifications.

Recommended Operating Conditions

over the recommended operating junction temperature range of -40 ° C to 125 ° C (unless otherwise noted)

		MIN	MAX	UNIT
Temperature	LM2576,LM2576HV	-40	125	
Supply voltage	LM2576		40	V
	LM2576HV		60	



Thermal Information

THERMAL METRIC		LM2576,LM2576HV		UNIT
		KTT (TO-263)	KC (TO-220)	
		5 PINS	5 PINS	
ReJA	Junction-to-ambient thermal resistance	42.6	32.4	M
Re JC (top)	Junction-to-case(top)thermal resistance	43.3	41.2	W
ReJB	Junction-to-board thermal resistance	22.4	17.6	M
JT	Junction-to-top characterization parameter	10.7	7.8	M
JB	Junction-to-board characterization parameter	21.3	17	N
ReJC (bot)	Junction-to-case(bottom)thermal resistance	0.4	0.4	W

(1) The package thermal impedance is calculated in accordance with JESD 51-7

(2) Thermal Resistances were simulated on a 4-layer, JEDEC board.

Electrical Characteristics: 3.3 V

Specifications are for $T_J = 25^\circ\text{C}$ (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT	
SYSTEM PARAMETERS TEST CIRCUIT图1 and图2							
V _{OUT}	Output Voltage	V _{IN} =12V,I _{LOAD} =0.5 ACircuit of图1 and图2	3.234	3.3	3.366	V	
	Output Voltage: LM2576	6V V _{IN} 40 V,0.5A LOAD 3ACircuit of图1 and图2	T _J =25	3.168	3.3	3.432	V
			Applies over fulloperating temperaturerange	3.135		3.465	
	Output Voltage: LM2576HV	6V V _{IN} 60 V,0.5A LOAD 3ACircuit of图1 and图2	T _J =25	3.168	3.3	3.45	V
			Applies over fulloperating temperaturerange	3.135		3.482	
	Efficiency	V _{IN} =12V,LOAD=3A			75%		

(1) External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2576/LM2576HV is used as shown in 图 1 and 图 2.



Electrical Characteristics: Adjustable Output Voltage

over operating free-air temperature range (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN\	TYP	MAX	UNIT	
SYSTEM PARAMETERS TEST CIRCUIT 图1 and图2							
VOU T	Feedback voltage	VIn=12V,LOAD=0.5 A,VouT=5V,Circuit of图1 and图2	1.217	1.23	1.243	V	
VOU T	Feedback Voltage LM2576	0.5A LOAD 3A, 8V VIN 40 VVOUT=5V,Circuit of图1 and图2	TJ=25	1.193	1.23	1.267	V
			Applies over fulloperating temperaturerange	1.18		1.28	
VOU T	Feedback Voltage LM2576HV	0.5A LOAD 3A, 8V VIN 60V VOUT=5V,Circuit of 图1 and图2	TJ=25	1.193	1.23	1.273	V
			Applies over fulloperating temperaturerange	1.18		1.286	
	Efficiency	VIn=12V,ILOAD=3 A,VOUT=5V	77%				

(1) External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2576/LM2576HV is used as shown in 图 1 and 图 2.

Electrical Characteristics: 12 V

Specifications are for Tj = 25 ° C (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT	
SYSTEM PARAMETERS TEST CIRCUIT图1 and图2							
VOUT	Output Voltage	VIn=25V,ILOAD=0.5ACircuit of图1 and图2	11.76	12	12.24	V	
VOUT	Output Voltage LM2576	0.5A ILOAD 3A, 15V VIN 40VCircuit of图1 and图2	TJ=25	11.52	12	12.48	V
			Applies over fulloperating temperaturerange	11.4		12.6	
VOUT	Output Voltage LM2576HV	0.5A LOAD 3A, 15V VIn 60VCircuit of图1 and图2	Tj=25	11.52		12.54	V
			Applies over fulloperating temperaturerange	11.4		12.66	



PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Efficiency	V _{IN} =15V,LOAD=3A	88%			

Specifications are for T_J = 25 ° C (unless otherwise noted).

(1) External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2576/LM2576HV is used as shown in 图1 and 图2

Electrical Characteristics: 15 V

over operating free-air temperature range (unless otherwise noted).

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
SYSTEM PARAMETERS TEST CIRCUIT图1 and图2							
V _{OUT}	Output Voltage	V _{IN} =25V,I _{LOAD} =0.5 ACircuit of图1 and图2		14.7	15	15.3	V
V _{OUT}	Output Voltage LM2576	0.5A LOAD 3A, 18V V _{IN} 40VCircuit of图1 and图2	T _J =25	14.4	15	15.6	V
			Applies over full operating temperature range	14.25		15.75	
V _{OUT}	Output Voltage V _{OUT} LM2576HV	0.5A LOAD 3A, 18V V _{IN} 60VCircuit of图1 and图2	T _J =25	14.4	15	14.25	V
			Applies over full operating temperature range	15.68		15.83	
	Efficiency	V _{IN} =18V,LOAD=3A		88%			

(1) External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2576/LM2576HV is used as shown in 图1 and 图2.



Electrical Characteristics: Adjustable Output Voltage

over operating free-air temperature range (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT	
SYSTEM PARAMETERS TEST CIRCUIT 图1and图2							
VOUT Feedback voltage		VIN=12V,ILOAD=0.5 A,VouT=5V,Circuit of 图1and图2	1.217	1.23	1.243	V	
VOUT	Feedback Voltage LM2576	0.5A LOAD 3A,8V VIN 40V VOUT=5V, Circuit of图1and图2	Tj=25	1.193	1.23	1.267	V
			Applies over full operating temperature range	1.18		1.28	
VOUT	Feedback Voltage LM2576HV	0.5A LOAD 3A,8V VIN 60 V VOUT=5V, Circuit of图1and图2	Tj=25	1.193	1.23	1.273	V
			Applies over full operating temperature range			1.286	
Efficiency		VIN=12V,ILOAD=3 A,VOUT=5V		77%			

(1) External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2576/LM2576HV is used as shown in 图 1 and 图 2.

Electrical Characteristics: All Output Voltage Versions

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MAX	TYP(1)	MAX	UNIT	
ON IOFF CONTROL TEST CIRCUIT图1 and图2							
VIH	ON /OFF Pin Logic Input Level	VouT=0V	Tj=25	2.2	1.4	V	
			Applies over full operating temperature range	2.4			
VL	ON /OFF Pin Logic Input Level	VoUT =Nominal Output Voltage	TJ=25		1.2	1	V
			Applies over full operating temperature range			0.8	
IH	ON/OFF Pin Input Current	ON/OFF Pin=5V(OFF)		12	30	μA	
IIL	ON/OFF Pin Input Current	ON/OFF Pin=0V(ON)		0	10	μA	



PARAMETER		TEST CONDITIONS	MAX	TYP(1)	MAX	UNIT
SYSTEM PARAMETERS TEST CIRCUIT图1 and图2(2)						
I _b Feedback Bias Current	Vo _{UT} =5V (AdjustableVersion Only)	T _J =25	100	50		nA
		Applies over full operating temperature range	500			
f _o Oscillator Frequency (7)	T _J =25		47	52	58	kHz
	Applies over full operating temperature range		42		63	
V _{SAT} Saturation Voltage	I _{oUT} =3A(3)	T _J =25		1.4	1.8	V
		Applies over full operating temperature range			2	
DC 1 Max Duty Cycle(ON)(4)			93%	98%		
'CL Current Limit(3)(7)	T _J =25		4.2	5.8	6.9	A
	Applies over full operating temperature range		3.5		7.5	
L Output Leakage Current	Output=0V Output =-1V Output=-1V (5)(6)		2	7.5	30	mA
I _a Quiescent Current(5)				5	10	mA
I _{STBY} Standby Quiescent Current	ON/OFF	Pin=5V(OFF)		50	200	μA

(1) All limits specified at room temperature (25 ° C) unless otherwise noted. All room temperature limits are 100% production tested. All limits at temperature extremes are specified through correlation using standard Statistical Quality Control (SQC) methods.

(2) External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2576/LM2576HV is used as shown in 图 1 and 图 2

(3) Output pin sourcing current. No diode, inductor or capacitor connected to output.

(4) Feedback pin removed from output and connected to 0V.

(5) Feedback pin removed from output and connected to +12 V for the Adjustable, 3.3-V, and 5-V versions, and +25 V for the 12-V and 15- V versions, to force the output transistor OFF.

(6) V_{IN} = 40 V (60 V for high voltage version).

(7) The oscillator frequency reduces to approximately 11 kHz in the event of an output short or an overload which causes the regulated output voltage to drop approximately 40% from the nominal output voltage. This self protection feature lowers the average power dissipation of the IC by lowering the minimum duty cycle from 5% down to approximately 2%.



Fixed Output Voltage Version

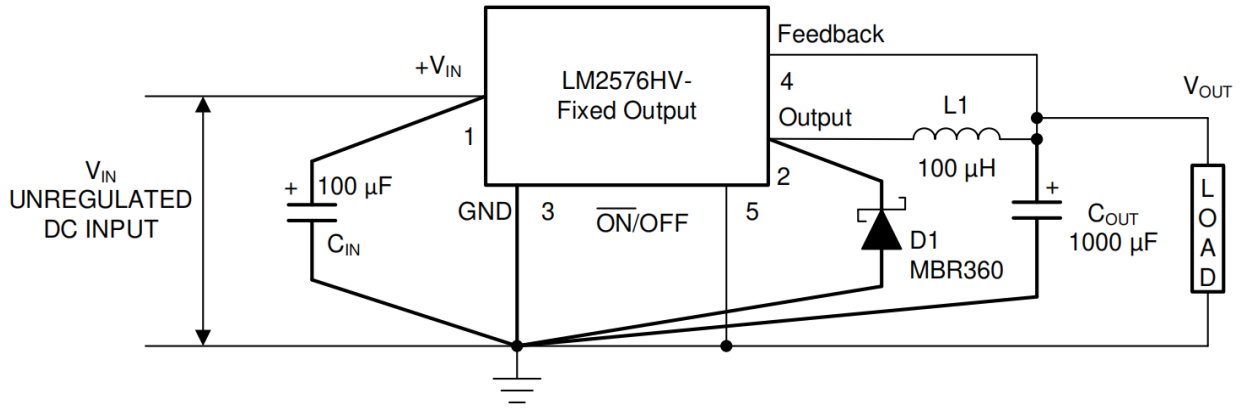


图1

- C_{IN} — 100- μ F, 75-V, Aluminum Electrolytic
- C_{OUT} — 1000- μ F, 25-V, Aluminum Electrolytic
- D₁ — Schottky, MBR360
- L₁ — 100 μ H, Pulse Eng. PE-92108
- R₁ — 2 k, 0.1%
- R₂ — 6.12 k, 0.1%

Adjusted Output Voltage Version

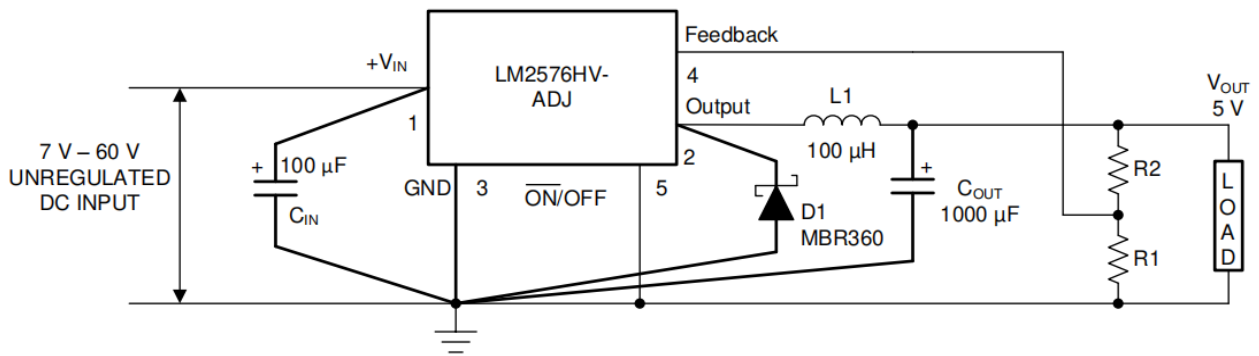


图2

$$V_{OUT} = V_{REF} \left(1 + \frac{R_2}{R_1} \right)$$

$$R_2 = R_1 \left(\frac{V_{OUT}}{V_{REF}} - 1 \right)$$

where $V_{REF} = 1.23 \text{ V}$, R_1 between 1 k and 5 k



Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
LM2576HVSX-12/NOPB-TUDI	TO263	Tape,Reel,500	LM2576HVS-12	-40°C to 125°C
LM2576HVSX-3.3/NOPB-TUDI	TO263	Tape,Reel,500	LM2576HVS-3.3	
LM2576HVSX-5.0/NOPB-TUDI	TO263	Tape,Reel,500	LM2576HVS-5.0	
LM2576HVSX-ADJ/NOPB-TUDI	TO263	Tape,Reel,500	LM2576HVS-ADJ	
LM2576HVSX-15/NOPB-TUDI	TO263	Tape,Reel,500	LM2576HVS-15	
LM2576SX-3.3/NOPB-TUDI	TO263	Tape,Reel,500	LM2576S-3.3	
LM2576SX-5.0/NOPB-TUDI	TO263	Tape,Reel,500	LM2576S-5.0	
LM2576SX-ADJ/NOPB-TUDI	TO263	Tape,Reel,500	LM2576S-ADJ	
LM2576SX-12/NOPB-TUDI	TO263	Tape,Reel,500	LM2576S-12	
LM2576SX-15/NOPB-TUDI	TO263	Tape,Reel,500	LM2576S-15	
LM2576HVT-12/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576HVT-12	
LM2576HVT-15/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576HVT-15	
LM2576HVT-5.0/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576HVT-5.0	
LM2576HVT-ADJ/NOPB-TUDI	TO220	Tube,50,A box of1000	LM2576HVT-ADJ	
LM2576HVT-3.3/NOPB-TUDI	TO220	Tube,50,A box of1000	LM2576HVT-3.3	
LM2576T-15/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576T-15	
LM2576T-3.3/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576T-3.3	
LM2576T-5.0/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576T-5.0	
LM2576T-ADJ/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576T-ADJ	
LM2576T-12/NOPB-TUDI	TO220	Tube,50,A box of 1000	LM2576T-12	



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