BM2596
(BM2596H) 150kHz 3A
Step-down Voltage Converter

General Description

The BM2596-H series of regulators are integrated circuits that provide all active functions for a step-down (buck) switching regulator, capable of driving a 3A load with excellent line and load regulation. These devices are avail-able in fixed output voltages of 3.3V, 5V, 12V, and an adjust-able 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 BM2596-H series operates at a switching frequency of 150 kHz thus allowing smaller sized filter components than what would be needed with lower frequency switching regulators. Available in a standard 5-lead TO-220 package with 5 pins lead in one line options, and a 5-lead TO-263 surface mount package. A standard series of inductors are available from several different manufacturers optimized for use with the BM2596-H series. This feature greatly simplifies the design of switch-mode power supplies.
Other features include a guaranteed ±2% tolerance on output voltage under specified input voltage and output load conditions, and ±10% on the oscillator frequency. External shutdown is included, featuring typically 80 μA standby current. Self-protection features include a two stage frequency reducing current limit for the output switch and an over tem perature shutdown for complete protection under fault conditions.

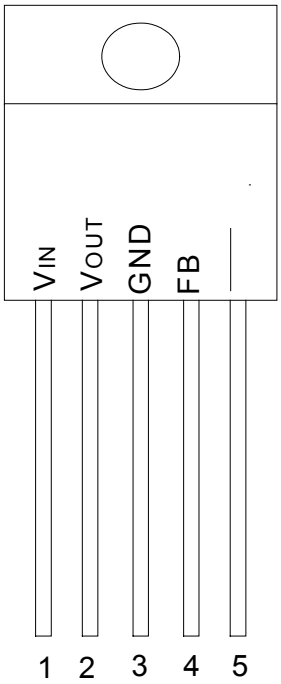
Features

- ※ 3.3V, 5V, 12V, and adjustable output versions (ADJ)
- ※ Adjustable version output voltage range, 1.25V to 37V±2% max over line and load conditions
- ※ Available in TO-220 and TO-263 packages
- ※ Guaranteed 3A output load current
- ※ Input voltage range up to 40V
- ※ Requires only 4 external components
- ※ Excellent line and load regulation specifications
- ※ 150 kHz fixed frequency internal oscillator
- ※ TTL shutdown capability
- ※ Low power standby mode, I_Q typically 80 μA
- ※ Uses readily available standard inductors
- ※ Thermal shutdown and current limit protection

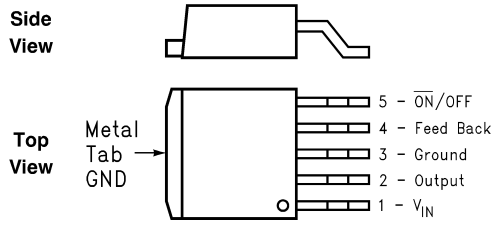
Applications

- ※ Simple high-efficiency step-down (buck) regulator , CAR DVD electronic
- ※ On-card switching regulators , LCD-TV , LCD-monitor , ADSL
- ※ Positive to negative converter

5-Lead TO-220 (T)



5-Lead TO-263 (S)



+VIN —This is the positive input supply for the IC switching regulator. A suitable input bypass capacitor must be present at this pin to minimize voltage transients and to supply the switching currents needed by the regulator**.**

Ground —Circuit ground**.**

Output —Internal switch. The voltage at this pin switches between (+VIN - VSAT) and approximately -0.5V, with a duty cycle of approximately VOUT/VIN. To minimize coupling to sensitive circuitry, the PC board copper area connected to this pin should be kept to a minimum**.**

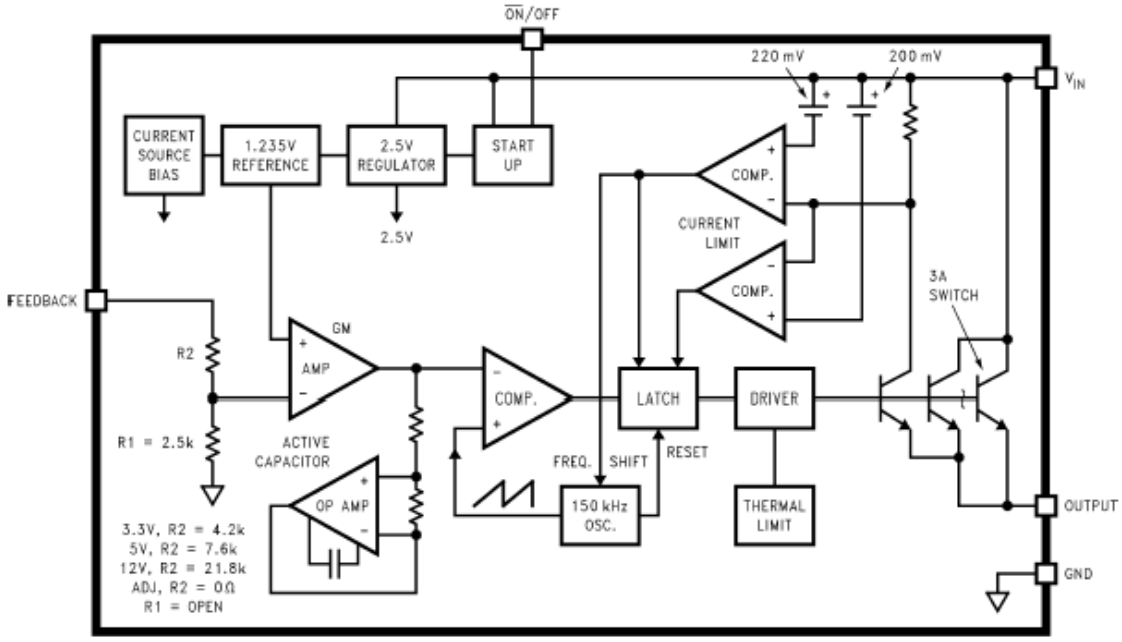
FeedBack —Senses the regulated output voltage to complete the feedback loop**.**

$\overline{\text{ON}}$/OFF —Allows the switching regulator circuit to be shut down using logic level signals thus dropping the total input supply current to approximately 80 μA. Pulling this pin below a threshold voltage of approximately 1.3V turns the regulator on, and pulling this pin above 1.3V (up to a maximum of 25V) shuts the regulator down. If this shutdown feature is not needed, the $\overline{\text{ON}}$/OFF pin can be wired to the ground pin or it can be left open, in either case the regulator will be in the ON condition.

Marking information: BM2596 -xx or BM2596H -xx on the chip, both two numbers are Pb-free; xx means output voltage

系列型号	输入耐压	限流点
BM2596	37V	3.5A
BM2596H	48V	3.3A

Block Diagram



Absolute Maximum Ratings (Note 1)

Parameter		Rating	Unit
Maximum Supply Voltage		45	V
$\overline{ON}/OFF$ Pin Input Voltage		-0.3～25	V
Feedback Pin Voltage		-0.3～25	V
Output Voltage to Ground (Steady State)		-1	V
Power Dissipation		Internally limited	--
Storage Temperature Range		-65～150	℃
ESD Susceptibility (Human Body Model) (Note 2)			KV
Conditions	Maximum Junction Temperature	150	℃
	Temperature Range	-40～125	℃
	Supply Voltage	4.5～40	V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions 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: The human body model is a 100 pF capacitor discharged through a 1.5k resistor into each pin.

Electrical Characteristics (Condition :T_J = 25℃)

V_O=3.3V						
Symbol	**Parameter**	**Conditions**	**BM2596H-- V_O=3.3V**			**Units**
			Min (Note 4)	**Typ** (Note 3)	**Max** (Note4)	
SYSTEM PARAMETERS (Note 5) Test Circuit Figure 1						
V_{OUT}	Output Voltage	4.75V≤V_{IN}≤40V 0.2A≤I_{LOAD}≤3A	**3.18**	3.3	**3.42**	V
η	Efficiency	V_{IN}=12V，I_{LOAD}=3A	--	75	--	%
V_O=5V						
Symbol	**Parameter**	**Conditions**	**BM2596H-- V_O=5.0V**			**Units**
			Min (Note 4)	**Typ** (Note 3)	**Max** (Note4)	
SYSTEM PARAMETERS (Note 5) Test Circuit Figure 1						
V_{OUT}	Output Voltage	7V≤V_{IN}≤40V 0.2A≤I_{LOAD}≤3A	**4.80**	5.0	**5.250**	V
η	Efficiency	V_{IN}=12V，	--	84	--	%
V_O=12V						
Symbol	**Parameter**	**Conditions**	**BM2596H-- V_O=12.0V**			**Units**
			Min (Note 4)	**Typ** (Note 3)	**Max** (Note4)	
SYSTEM PARAMETERS (Note 5) Test Circuit Figure 1						
V_{OUT}	Output Voltage	15V≤V_{IN}≤40V 0.2A≤I_{LOAD}≤3A	**11.40**	12.0	**12.60**	V
η	Efficiency	V_{IN}=25V，I_{LOAD}=3A	--	88	---	%
Vout is adjustable						
Symbol	**Parameter**	**Conditions**	**BM2596H—ADJ**			**Units**
			Min (Note 4)	**Typ** (Note 3)	**Max** (Note4)	
SYSTEM PARAMETERS (Note 5) Test Circuit Figure 1						
V_{FB}	Feedback Voltage	4.5V≤V_{IN}≤40V 0.2A≤I_{LOAD}≤3A VOUT programmed for 3V. Circuit of Figure 1	**1.21**	1.25	**1.29**	V
η	Efficiency	V_{IN}=12V， V_{OUT}=3V，I_{LOAD}=3A	--	75	--	%