

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[Diodes Incorporated](#)
[AP1605SL-13](#)

For any questions, you can email us directly:

sales@integrated-circuit.com



AP1605

PWM/PFM DUAL-MODE STEP-DOWN SWITCHING REGULATOR

Features

- Low current consumption:
In operation: 100 μ A max.
Power off: 2 μ A max.
- Input voltage: 2.5V to 7V
Adjustable version ($\pm 2.5\%$)
- PWM/PFM dual Mode
- Oscillation frequency: 300KHz (Typ.)
- With a power-off function.
- Built-in internal SW P-channel MOS
- Lead Free package: SOP-8L
- SOP-8L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

General Description

AP1605 consists of CMOS step-down switching regulator with PWM/PFM dual mode control. These devices include a reference voltage source, oscillation circuit, error amplifier, internal PMOS and etc.

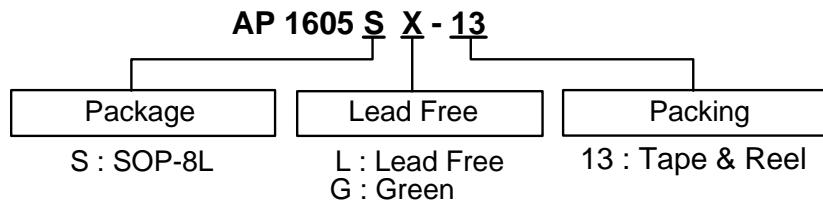
AP1605 provides low-ripple power, high efficiency, and excellent transient characteristics. The PWM/PFM control circuit is able to vary the duty ratio linearly 0%~0.25% (PFM) and 25%~100% (PWM).

With the addition of an internal P-channel Power MOS, a coil, capacitors, and a diode connected externally, these ICs can function as step-down switching regulators. They serve as ideal power supply units for portable devices when coupled with the SOP-8L mini-package, providing such outstanding features as low current consumption. Since this converter can accommodate an input voltage of up to 7V, it is also ideal when operating via an AC adapter.

Applications

- On-board power supply of battery devices for portable telephones, electronic notebooks, PDA, and other hand-held sets
- Power supplies for audio equipment, including portable CD players and headphone stereo equipment
- Fixed voltage power supply for cameras, video equipment and communications equipment
- Power supplies for microcomputers.
- Conversion from four Ni-H or Ni-Cd cells or two lithium-ion cells to 3.3V/3V
- Conversion of AC adapter input to 5V/3V

Ordering Information



Device	Package Code	Packaging (Note 2)	13" Tape and Reel	
			Quantity	Part Number Suffix
AP1605SL-13	S	SOP-8L	2500/Tape & Reel	-13
AP1605SG-13	S	SOP-8L	2500/Tape & Reel	-13

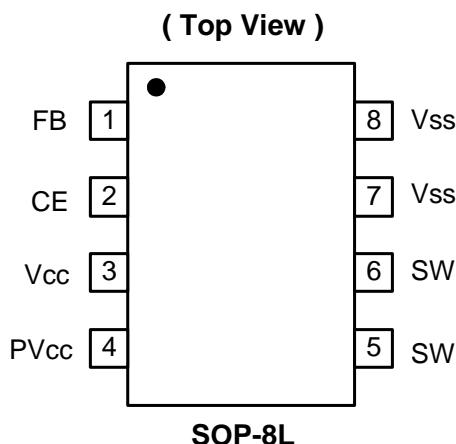
Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.



AP1605
PWM/PFM DUAL-MODE STEP-DOWN SWITCHING
REGULATOR

Pin Assignments



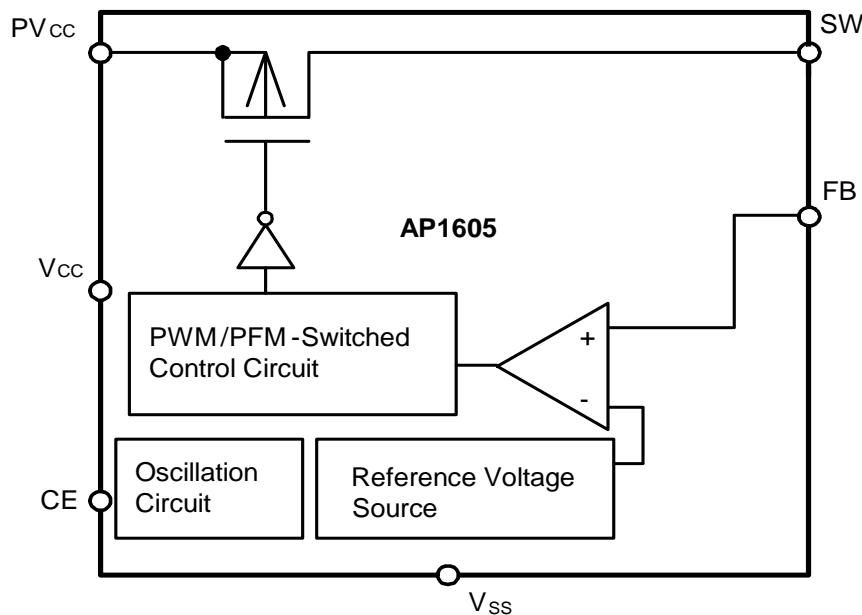
Pin Descriptions

Pin Name	Pin No.	Description
FB	1	Feedback pin
CE	2	Chip Enable: H: Enable L: Disable
Vcc	3	IC signal power supply pin, add a 10Ω resistor to PVcc and a 0.1μF capacitor to GND.
PVcc	4	IC power supply pin
SW	5, 6	Switch Pin. Connect external inductor/diode here. Minimize trace area at this pin to reduce EMI.
Vss	7, 8	GND Pin



AP1605
PWM/PFM DUAL-MODE STEP-DOWN SWITCHING
REGULATOR

Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{CC}	V_{CC} Pin Voltage	$V_{SS} - 0.3$ to $V_{SS} + 8$	V
PV_{CC}	PV_{CC} Pin Voltage	$V_{SS} - 0.3$ to $V_{SS} + 8$	V
FB	FB Pin Voltage	$V_{SS} - 0.3$ to $V_{SS} + 8$	V
V_{CE}	ON/OFF Pin Voltage	$V_{SS} - 0.3$ to $V_{SS} + 8$	V
V_{SW}	Switch Pin Voltage	$V_{SS} - 0.3$ to $V_{IN} + 0.3$	V
P_D	Power Dissipation	1200	mW
T_{OPR}	Operating Temperature Range	-20 to +85	°C
T_{STG}	Storage Temperature Range	-20 to +125	°C

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.



AP1605

**PWM/PFM DUAL-MODE STEP-DOWN SWITCHING
REGULATOR**

Electrical Characteristics (V_{IN} = 5V, T_A = 25°C, unless otherwise specified)

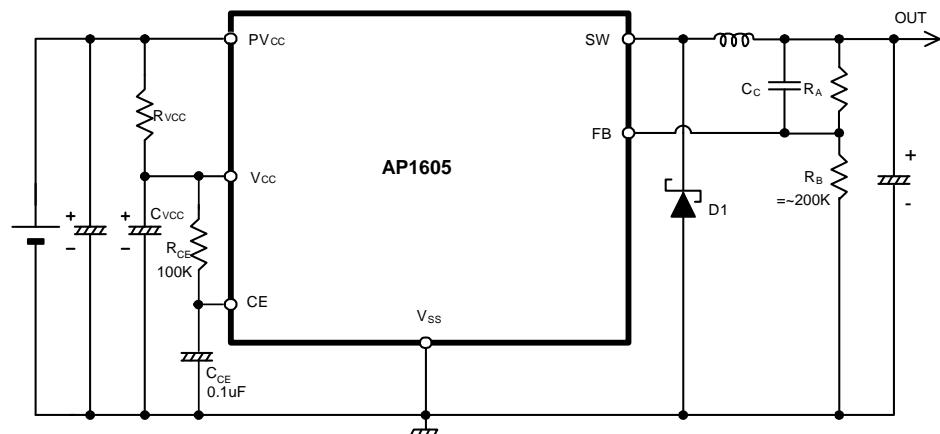
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{IN}	Input Voltage	AP1605 Series	2.5	--	7	V
V _{REF}	Internal Reference Voltage		1.1625	1.2	1.2375	V
V _{UVLO}	UVLO Voltage	Voltage required to maintain V _{OUT}	--	--	2.2	V
MAXDTY	Maximum Duty Ratio		100	--	--	%
PFMDTY	PFM Duty Ratio		15	25	35	%
I _{SW}	Switch Current	Duty = 50%	3	--	--	A
I _{SS}	Current Consumption POWER _{ON}	V _{OUT} = 2.5V	--	35	100	µA
I _{SSS}	Current Consumption During Power Off	V _{ON/OFF} = 0V	--	--	2	µA
ΔV _{OUT1}	Line Regulation	2.5V~7V @ I _{OUT} = 0.1A	--	0.2	0.5	%
ΔV _{OUT2}	Load Regulation	0.1A~3A	--	1	1.5	%
F _{OSC}	Oscillation Frequency		220	300	380	KHz
V _{CEH}	CE Pin "High" Voltage	Evaluate oscillation at SW pin	0.65	--	--	*V _{CC}
V _{CEL}	CE Pin "Low" Voltage	Evaluate oscillation stop at SW pin	--	--	0.2	
I _{SH}	Power-Off Pin Input	--	-0.1	--	0.1	µA
I _{SL}	Leakage Current	--	-0.1	--	0.1	µA
EFFI	Efficiency	V _{IN} = 5V, V _{OUT} = 2.5V I _{OUT} = 1A	--	93	--	%



AP1605
PWM/PFM DUAL-MODE STEP-DOWN SWITCHING
REGULATOR

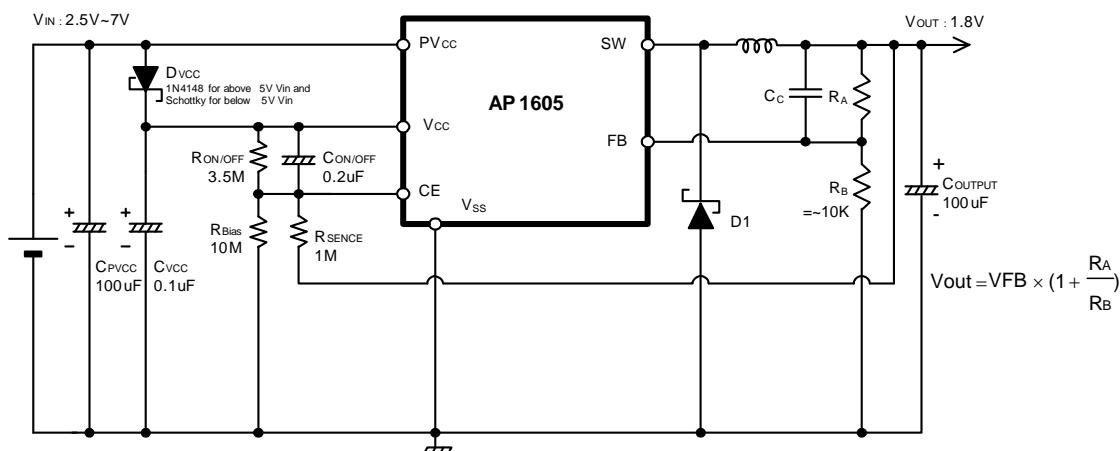
Typical Application Circuit

(1) Normal Application



$$V_{out} = V_{FB} \times \left(1 + \frac{R_A}{R_B}\right)$$

(2) Application with Short Circuit Protection

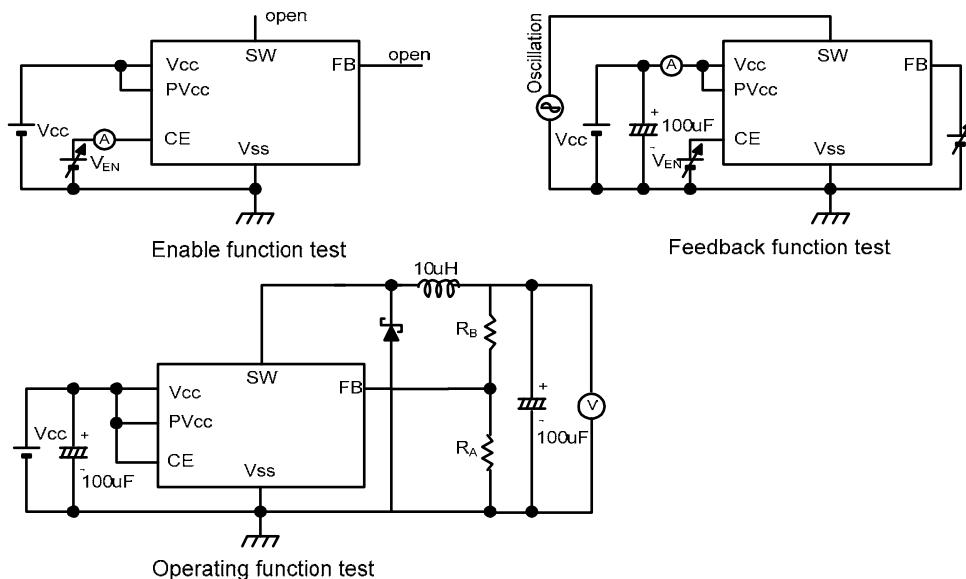




AP1605

PWM/PFM DUAL-MODE STEP-DOWN SWITCHING REGULATOR

Test Circuit



Functional Description

PWM/PFM Control (AP1605 Series)

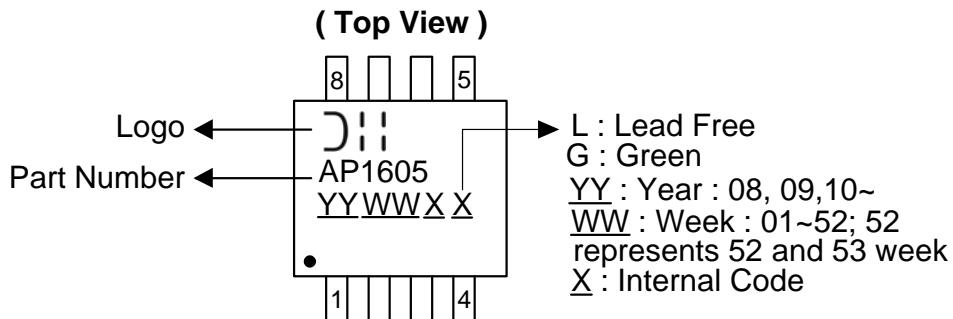
The AP1605 consists of DC/DC converters that employ a PWM/PFM auto-switch system. In converters of the AP1605, the PFM mode varies in a range of duty cycle from 0% to 25%, and the PWM mode varies in a range of duty cycle from 25% to 100% according to the load current, and yet ripple voltage produced by the switching can easily be removed through a filter because the switching frequency remains constant. Therefore, these converters provide a low-ripple power over broad ranges of input voltage and load current.



AP1605
PWM/PFM DUAL-MODE STEP-DOWN SWITCHING
REGULATOR

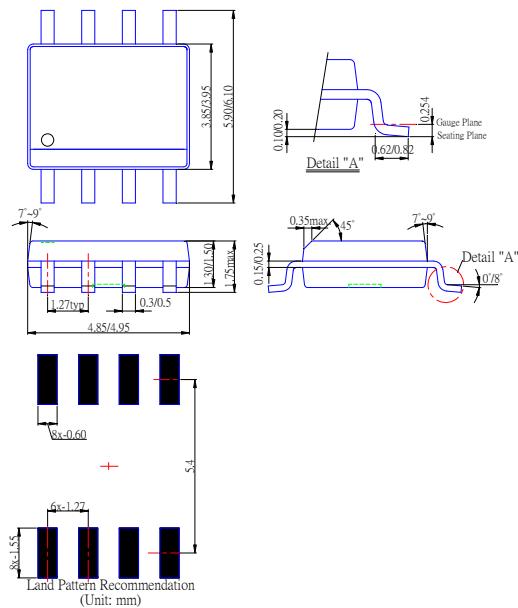
Marking Information

(1) SOP-8L



Package Information (All Dimensions in mm)

(1) Package Type: SOP-8L



**AP1605****PWM/PFM DUAL-MODE STEP-DOWN SWITCHING
REGULATOR****IMPORTANT NOTICE**

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. Diodes Incorporated does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. The user of products in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on our website, harmless against all damages.

LIFE SUPPORT

Diodes Incorporated products are not authorized for use as critical components in life support devices or systems without the expressed written approval of the President of Diodes Incorporated.