

#### **Features**

- Low current consumption: In operation: 100µA max. Power off: 2µA max.
- Input voltage: 2.5V to 7V Adjustable version (±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. Sh)
- 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

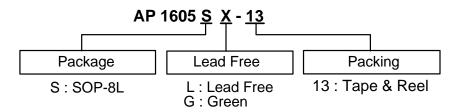
AP1605 provides low-ripple power, high efficiency, and excellent transient characteristics. The PWM/PFM control circuit is able to vary the duty ratio linearly 0%~0.25% (PFM) and 25%~100% (PWM).

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**



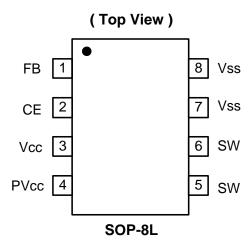
	Device	Package	Packaging	13" Tape and Reel		
		Code	(Note 2)	Quantity	Part Number Suffix	
Pb	AP1605SL-13	S	SOP-8L	2500/Tape & Reel	-13	
	AP1605SG-13	S	SOP-8L	2500/Tape & Reel	-13	

Notes:

- EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead\_free.html.
- 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.



## **Pin Assignments**

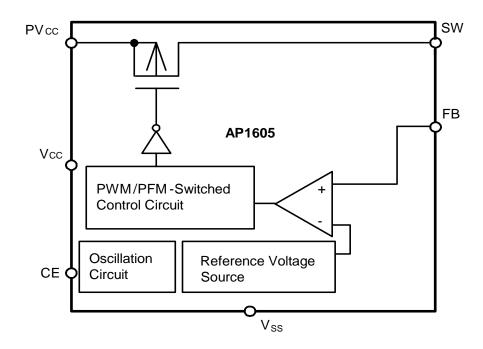


## **Pin Descriptions**

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 $10\Omega$ resistor to PVcc and a $0.1\mu F$ 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



## **Block Diagram**



### **Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
$V_{CC}$	V <sub>CC</sub> Pin Voltage	$V_{SS}$ - 0.3 to $V_{SS}$ + 8	V
$PV_{CC}$	PV <sub>CC</sub> Pin Voltage	$V_{SS}$ - 0.3 to $V_{SS}$ + 8	٧
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	٧
$V_{SW}$	Switch Pin Voltage	$V_{SS}$ - 0.3 to $V_{IN}$ + 0.3	٧
P <sub>D</sub>	Power Dissipation	1200	mW
T <sub>OPR</sub> Operating Temperature Range		-20 to +85	°C
T <sub>STG</sub>	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.



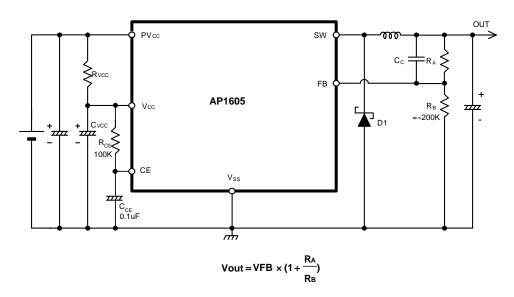
## **Electrical Characteristics** (V<sub>IN</sub> = 5V, T<sub>A</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
V <sub>IN</sub>	Input Voltage	AP1605 Series	2.5		7	V
$V_{REF}$	Internal Reference Voltage		1.1625	1.2	1.2375	٧
$V_{\text{UVLO}}$	UVLO Voltage	Voltage required to maintain V <sub>OUT</sub>	1	1	2.2	V
MAXDTY	Maximum Duty Ratio		100	1		%
PFMDTY	PFM Duty Ratio		15	25	35	%
I <sub>SW</sub>	Switch Current	Duty = 50%	3			Α
I <sub>SS</sub>	Current Consumption POWER <sub>ON</sub>	V <sub>OUT</sub> = 2.5V		35	100	μΑ
I <sub>SSS</sub>	Current Consumption During Power Off	V <sub>ON/OFF</sub> = 0V			2	μΑ
$\Delta V_{OUT1}$	Line Regulation	2.5V~7V @ I <sub>OUT</sub> = 0.1A		0.2	0.5	%
$\Delta V_{OUT2}$	Load Regulation	0.1A~3A		1	1.5	%
Fosc	Oscillation Frequency		220	300	380	KHz
$V_{CEH}$	CE Pin "High" Voltage	Evaluate oscillation at SW pin	0.65			
V <sub>CEL</sub>	CE Pin "Low" Voltage	Evaluate oscillation stop at SW pin			0.2	*Vcc
I <sub>SH</sub>	Power-Off Pin Input		-0.1		0.1	μA
I <sub>SL</sub>	Leakage Current		-0.1		0.1	μΑ
EFFI	Efficiency	$V_{IN} = 5V, V_{OUT} = 2.5V I_{OUT} = 1A$		93		%

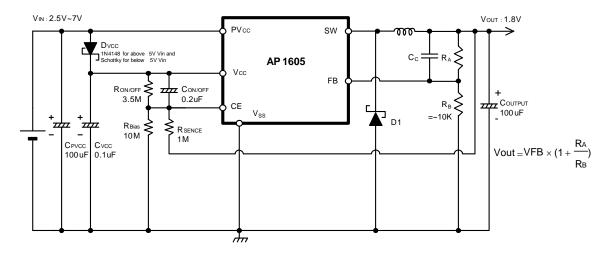


## **Typical Application Circuit**

#### (1) Normal Application

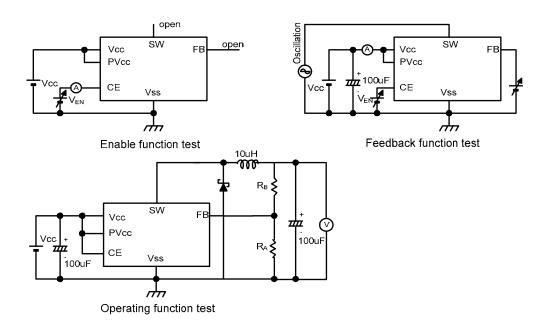


#### (2) Application with Short Circuit Protection





#### **Test Circuit**



### **Functional Description**

#### PWM/PFM Control (AP1605 Series)

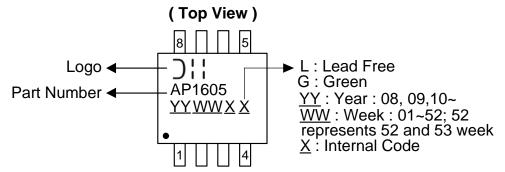
The AP1605 consists of DC/DC converters that employ a PWM/PFM auto-switch system.

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.



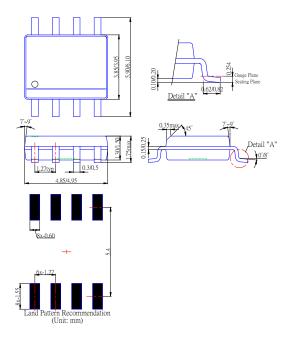
### **Marking Information**

#### (1) SOP-8L



### Package Information (All Dimensions in mm)

#### (1) Package Type: SOP-8L





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