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AP2008

PWM BUCK CONTROLLER

Features

- PWM Buck Control Circuitry
- Operating voltage can be up to 20V
- Under voltage Lockout (UVLO) Protection
- Short Circuit Protection (SCP)
- Soft-start circuit
- Variable Oscillator Frequency -- 300Khz Max
- 0.77V voltage reference Output
- 8-pin SOP package
- SOP-8L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

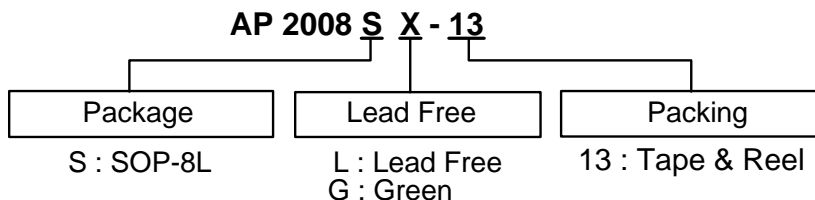
General Description

The AP2008 integrates Pulse-Width-Modulation (PWM) control circuit into a single chip, mainly designs for power-supply regulator. All the functions include an on-chip 0.77V reference output, an error amplifier, an adjustable oscillator, a soft-start, UVLO, SCP circuitry, and a push-pull output circuit. Switching frequency is adjustable by trimming CT. During low VCC situation, the UVLO makes sure that the outputs are off until the internal circuit is operational normally.

Applications

- Backlight inverter
- LCD Monitor
- XDROM, XDSDL Product
- DC/DC converters in computers, etc.

Ordering Information

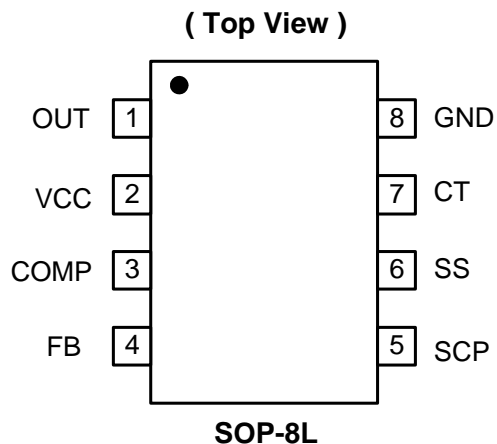


Device	Package Code	Packaging (Note 2)	13" Tape and Reel	
			Quantity	Part Number Suffix
AP2008SL-13	S	SOP-8L	2500/Tape & Reel	-13
AP2008SG-13	S	SOP-8L	2500/Tape & Reel	-13



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>.

Pin Assignments



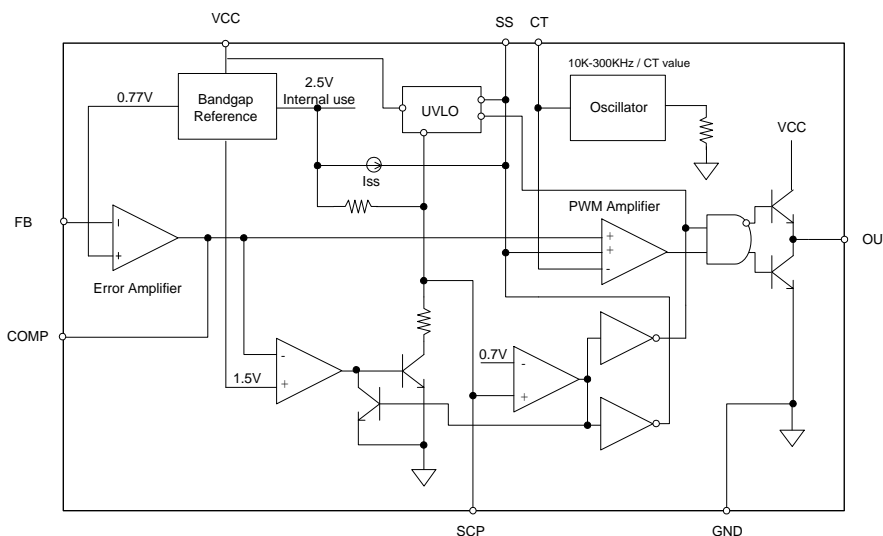
Pin Descriptions

Pin Name	Description
OUT	PWM Output
VCC	Supply Voltage
COMP	Feedback Loop Compensation
FB	Voltage Feedback
SCP	Short Circuit Protection
SS	Soft-Start.
CT	Timing Capacitor
GND	Ground



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Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{CC}	Supply voltage	22	V
V_I	Amplifier input voltage	20	V
V_O	Collector output voltage	$V_{CC}-1.0V$	V
I_{SOURCE}	Source current	200	mA
I_{SINK}	Sink current	200	mA
T_{OP}	Operating temperature range	-20 to +85	°C
T_{ST}	Storage temperature range	-65 to +150	°C

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply voltage	3.6	20	V
V_I	Amplifier input voltage	1.05	1.45	V
V_O	Collector output voltage		$V_{CC}-1.5$	V
I_{FB}	Current into feedback terminal		45	μA
R_F	Feedback resistor	100		kΩ
C_T	Timing capacitor	100	6800	pF
F_{OSC}	Oscillator frequency	10	300	KHz



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Electrical Characteristics (T_A=25°C, V_{CC}=6V, f=200 KHz)

Reference (REF)

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V _{REF}	Comp connect to FB		0.755	0.770	0.785	V
	Output voltage change with temperature	T _A = -20°C ~ 25°C		-0.1	±1	%
		T _A = 25°C ~ 85°C			-0.2	±1

Under voltage lockout (UVLO)

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit	
V _{UT}	Upper threshold voltage (V _{CC})	I _{O(REF)} = 0.1mA T _A = 25°C		2.9		V	
V _{LWT}	Lower threshold voltage (V _{CC})				2.4		V
V _{HT}	Hysteresis (V _{CC})				500		mV

Short-circuit protection (SCP) control

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V _{IT}	Input threshold voltage	T _A = 25°C	0.60	0.67	0.75	V
V _{STB}	Standby voltage	No pull up	100	130	160	mV
V _{LT}	Latched input voltage	No pull up		50	100	mV
I _{SCP}	Input (source) current	V _I = 0.7V, T _A = 25°C	-10	-15	-20	μA
V _{CT}	Comparator threshold voltage (COMP)			1.5		V

Oscillator (OSC)

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
F _{OSC}	Frequency	C _T =270 pF		200		KHz
ΔF _{OSC}	Standard deviation of frequency	C _T =270 pF		10		%
	Frequency change with voltage	V _{CC} =3.6V ~ 20V		1		

Error-amplifier

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V _{IO}	Input offset voltage	V _O (FB)=0.77V			±6	mV
I _{IO}	Input offset current	V _O (FB)=0.77V			±100	nA
I _{IB}	Input bias current	V _O (FB)=0.77V		160	500	nA
V _{CM}	Common-mode input voltage range	V _{CC} =3.6V ~ 20V	1.05		1.45	V
AV	Open-loop voltage amplification	R _F =200 kΩ	70	80		dB
GBW	Unity-gain bandwidth			1.5		MHz
CMRR	Common-mode rejection ratio		60	80		dB
V _{OH}	Max. output voltage		V _{ref} -0.1			V
V _{OL}	Min. output voltage				1	V
I _{OI}	Output (sink) current (COMP)	V _{ID} = -0.1V, V _O = 0.77V	0.5	1.6		mA
I _{OO}	Output (source) current (COMP)	V _{ID} = 0.1V, V _O = 0.77V	-45	-70		μA

Electrical Characteristics (Continued) ($T_A=25^\circ\text{C}$, $V_{CC}=6\text{V}$, $f=200\text{KHz}$)

Output section

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
I_{LEAK}	Leakage current	$V_O = 20\text{V}$			10	μA
I_{DRV}	Sink current	$V_{IN} = 12\text{V}$		200		mA
	Source current	$V_{IN} = 12\text{V}$		200		mA
V_{SAT}	Output saturation voltage	$I_O = 10\text{mA}$		1.0	1.5	V
I_{SC}	Short-circuit output current	$V_O = 6\text{V}$		120		mA

PWM comparator

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{T0}	Input threshold voltage at $f = 10\text{KHz}$ (COMP)	$C_T = 6800\text{pF}$		0.6	0.7	V
V_{T100}		Maximum duty cycle	1.2	1.3		V

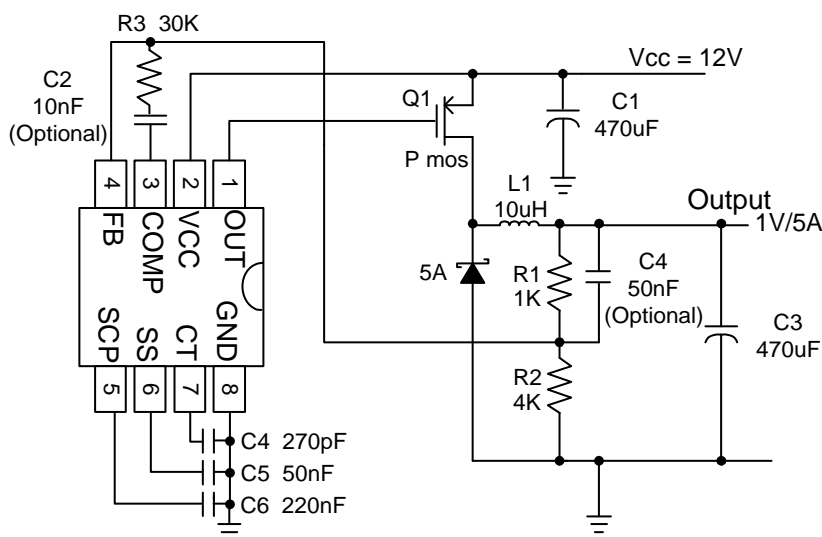
Total device

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
I_{CCA}	Average supply current	$C_T = 270\text{pF}$		6	10	mA

Soft Start

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{SS}	Soft-start Voltage			2.3		V
I_{SS}	Constant Charge Current			20		μA

Typical Application Circuit

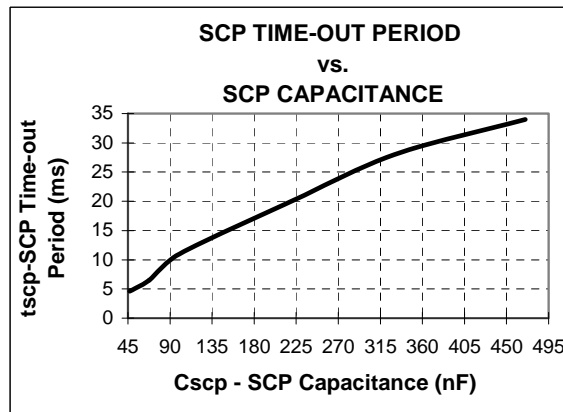
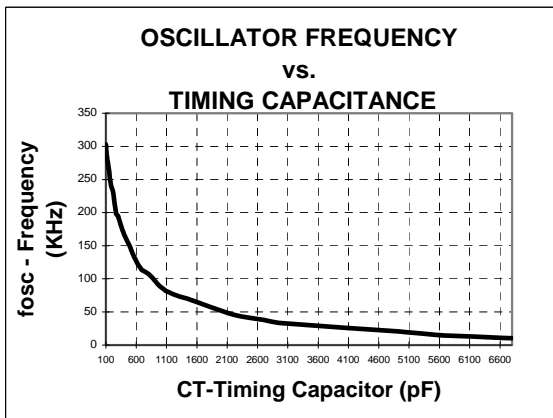
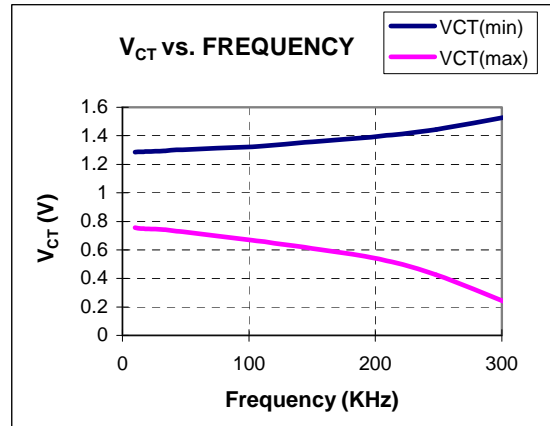
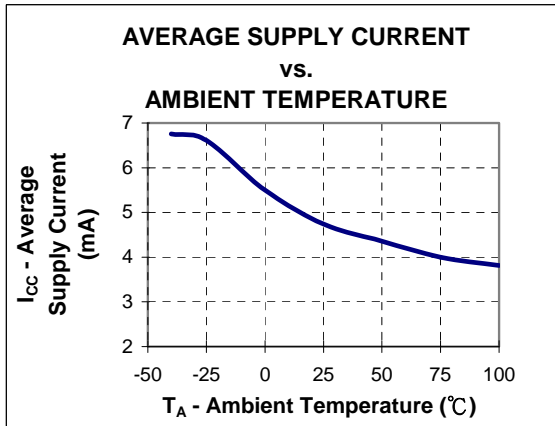
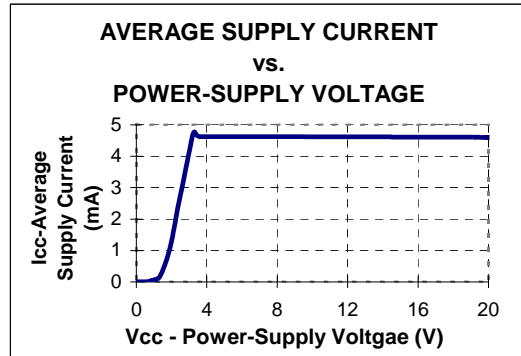
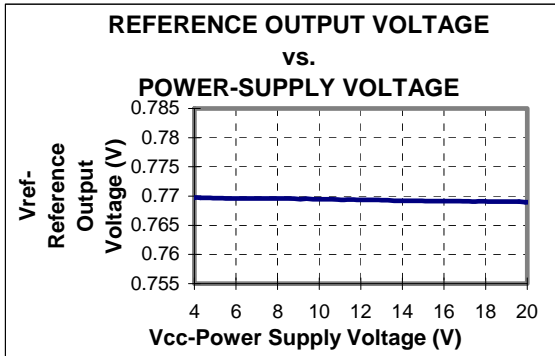


Step-Down DC/DC converter



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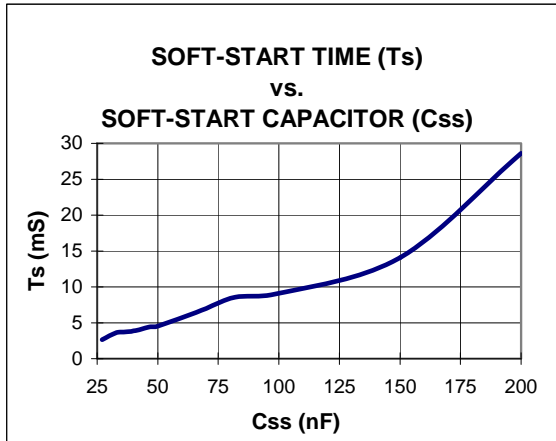
Typical Characteristics





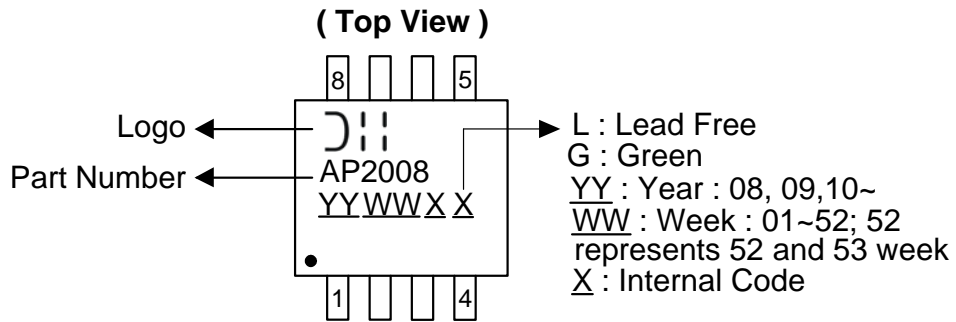
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Typical Characteristics (Continued)



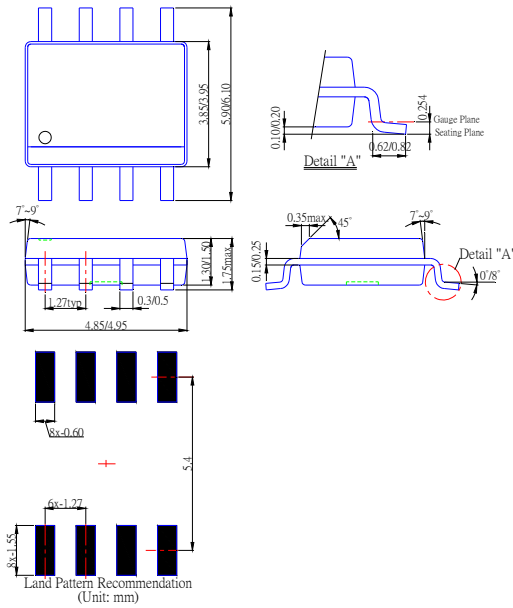
Marking Information

(1) SOP-8L



Package Information (All Dimensions in mm)

(1) Package Type: SOP- 8L



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