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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FEATURES

- Constant-voltage (CV) and constant-current (CC) control without secondary-feedback circuitry
- Green-mode function: PWM frequency linearly decreasing
- Fixed PWM frequency at 42kHz with frequency hopping to solve EMI problems
- Low start-up current: 10μA (typical)
- Low operating current: 6.5mA (typical)
- Peak-current-mode control in CV mode
- Cycle-by-cycle current limiting
- V_{DD} over-voltage protection with latch (OVP)
- V_{DD} under-voltage lockout (UVLO)
- Gate output maximum voltage clamped at 18V
- Fixed over-temperature protection with latch

APPLICATIONS

- Battery chargers for cellular phones, cordless phones, PDA, digital cameras, and power tools
- Replacement for linear transformer and RCC SMPS

DESCRIPTION

This highly integrated PWM controller provides several features to enhance the performance of low-power flyback converters. The proprietary topology of SGP100 enables simplified circuit design for battery charger applications. The result is a low-cost, smaller and lighter charger than a conventional design or a linear transformer.

To minimize the standby power consumption, the proprietary green-mode function provides off-time modulation to linearly decrease PWM frequency under light-load conditions. This green-mode function allows the power supply to meet power conservation requirements. The start-up current is only 10μA, which allows large start-up resistance for further power saving.

A charger can be implemented with few external components and minimal cost. A typical output CV/CC characteristic envelope is shown in Figure 1.

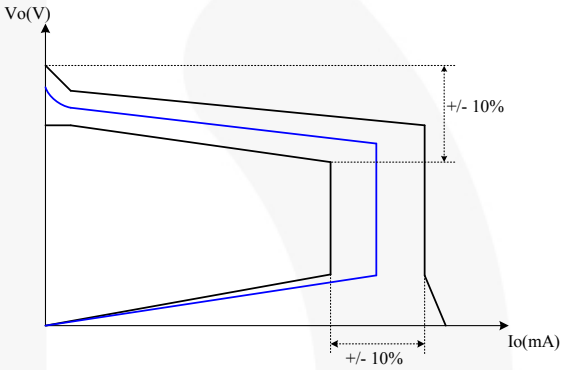
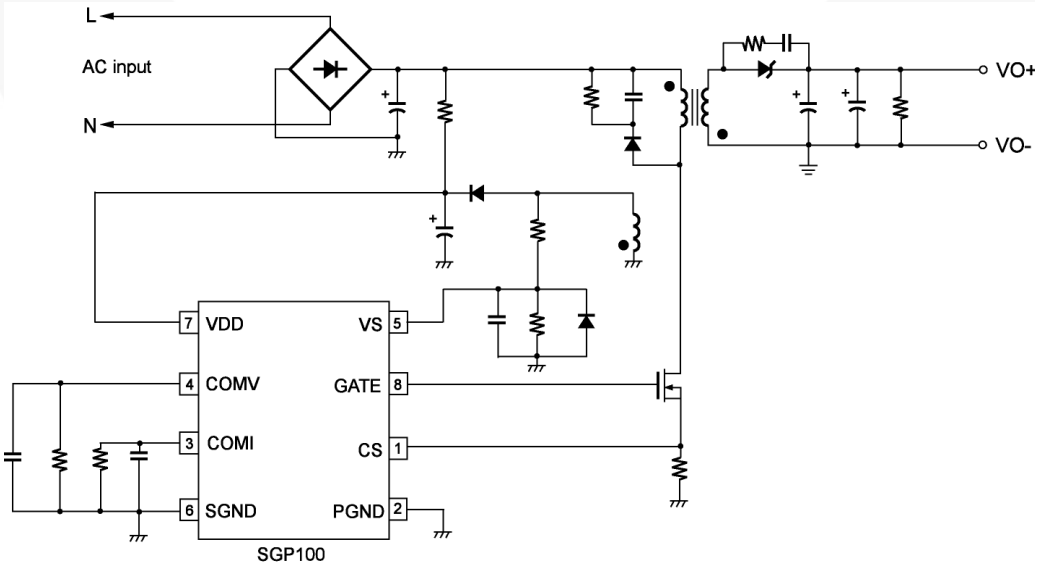
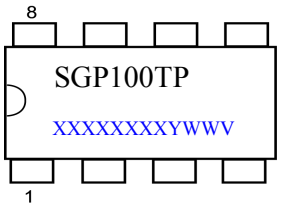


Figure 1. Typical Output V-I Characteristic

TYPICAL APPLICATION

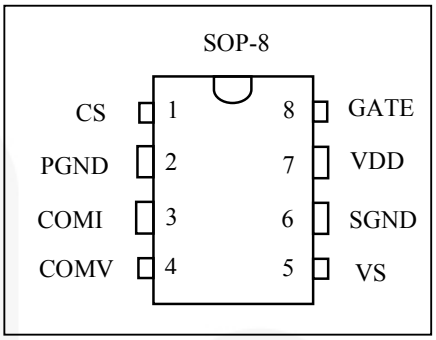


MARKING INFORMATION



T: S=SOP
P : Z=Lead Free + ROHS Compatible
Null=regular package
XXXXXXXX: Wafer Lot
Y: Year; WW: Week
V: Assembly Location

PIN CONFIGURATION



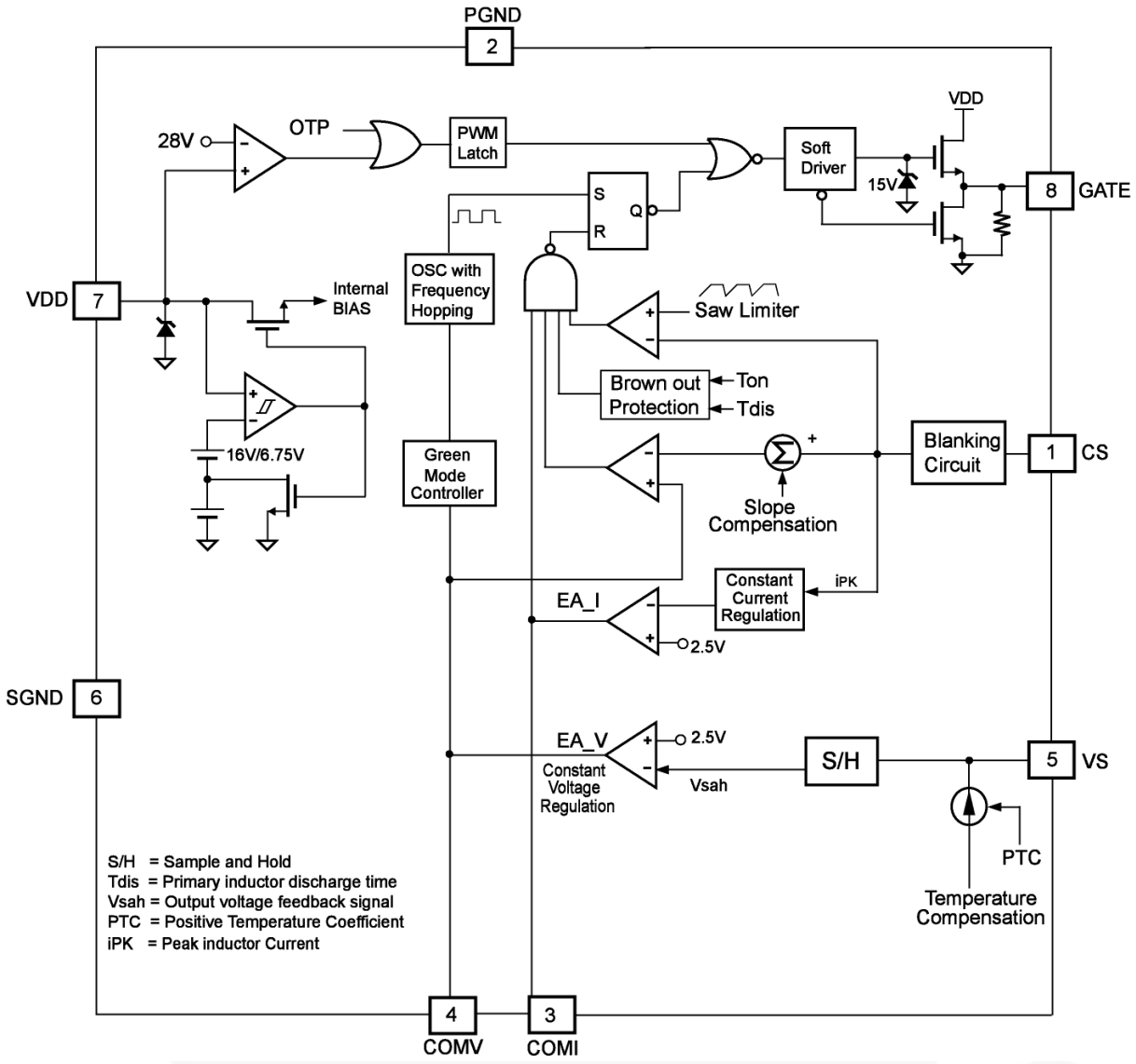
ORDERING INFORMATION

Part Number	Pb-Free	Package
SGP100SZ		8-pin SOP-8

PIN DESCRIPTIONS

Name	Pin No.	Type	Function
CS	1	Analog Input	Current sense. Connected to a current-sense resistor for peak-current-mode control in CV mode. The current-sense signal is also provided for output-current regulation in CC mode.
PGND	2	Ground	Power ground.
COMI	3	Analog Output	Current compensation. Output of the current error amplifier. Connect a capacitor between the COMI pin and SGND for frequency compensation.
COMV	4	Analog Output	Voltage compensation. Output of the voltage error amplifier. Connect a capacitor between the COMV pin and SGND for frequency compensation.
VS	5	Analog Input	Voltage sense. Output-voltage-sense input for output-voltage regulation.
SGND	6	Ground	Signal ground.
VDD	7	Supply	Power supply.
GATE	8	Driver Output	The totem-pole output driver to drive the power MOSFET.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	DC Supply Voltage*	30	V
V_L	Input Voltage to CS, COMV, COMI, VS Pins	-0.3 to 7.0	V
P_D	Power Dissipation	400	mW
$R_{\theta JC}$	Thermal Resistance (Junction-to-Case)	68.3	°C/W
T_J	Operating Junction Temperature	-40 to +125	°C
T_{STG}	Storage Temperature Range	-55 to +150	°C
T_L	Lead Temperature (Wave Soldering or Infrared, 10 Seconds)	260	°C
ESD	Electrostatic Discharge Capability, Human Body Model	4.5	kV
	Electrostatic Discharge Capability, Machine Model	200	V

*All voltage values, except differential voltages, are given with respect to the GND pin.

*Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Max.	Unit
T_A	Operating Ambient Temperature	-20 to +85	°C

*For proper operation.

ELECTRICAL CHARACTERISTICS

V_{CC}=15V, T_A=25°C, unless otherwise noted.

V_{DD} Section

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{OP}	Continuously Operating Voltage				25	V
V_{DD-ON}	Turn-on Threshold Voltage		15	16	17	V
V_{DD-OFF}	Turn-off Threshold Voltage		6.25	6.75	7.25	V
I_{DD-ST}	Start-up Current	0< V_{DD} < V_{DD-ON}-0.16V		10	20	μA
I_{DD-OP}	Operating Supply Current	V_{DD}=20V, F_S=F_{OSC}, C_L=1nF		6.5	7.5	mA
V_{DD-OVP}	V_{DD} Over-Voltage Protection Level		27	28	29	V
T_{OVP}	V_{DD} Over-Voltage Protection Debounce	Fs=F_{OSC}	90	130	180	μs
I_{DD-OVP}	V_{DD} Over-Voltage Protection Holding Current	V_{DD}=5V	10	30	50	μA

Oscillator Section

Symbol	Parameter		Test Condition	Min.	Typ.	Max.	Unit
F_{OSC}	Frequency	Center frequency		39	42	45	kHz
		Frequency Hopping Range		±2.2	±2.6	±3	
T_{FHP}	Frequency Hopping Period			2.75	3.00	3.25	ms
$F_{OSC-N-MIN}$	Minimum Frequency at No-load			350	500	650	Hz
$F_{OSC-CM-MIN}$	Minimum Frequency at CCM			20	25	35	kHz

Voltage-Sense Section

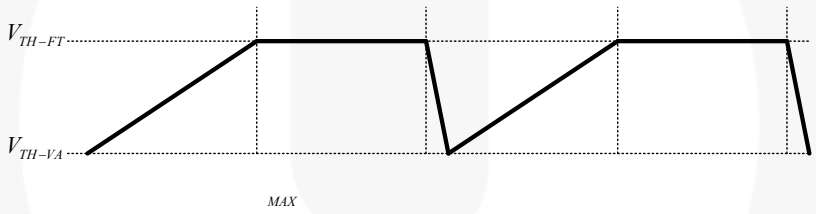
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
T_{RATIO}	Proportion of T_{ON} and T_{DIS} for Brownout Protection*	T_{ON}/T_{DIS}		1.5		
I_{TC-25}	CV Temperature Compensation Current		9	10	11	μA

* Guaranteed by design.

Current-Sense Section

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Z_{CS}	Filter Resistance			2		kΩ
T_{PD}	Propagation Delay to GATE Output			150	200	ns
T_{LEB}	Leading-Edge Blanking Time	T_{MIN-N}-T_{PD}	825	1025	1225	ns
T_{MIN-N}	Minimum On-time at No Load		1075	1200	1350	ns
V_{SLOPE}	Slope Compensation*		0.37	0.40	0.43	V
D_{SAW}	Duty Cycle of SAW Limiter*		35	40	45	%
V_{TH-VA}	Valley Threshold Voltage for Current Limit		V_{TH-FT} - 0.4	V_{TH-FT} - 0.25	V_{TH-FT} - 0.1	V
V_{TH-FT}	Flat threshold Voltage for Current Limit		1.2	1.3	1.5	V

* Guaranteed by design.



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