



DIGITAL PWM IC

1. General Description

The G5177 is a high performance AC/DC power supply controller which uses digital control technology to build peak current mode PWM flyback power supplies. The device directly drives a power BJT and operates in quasi-resonant mode to provide high efficiency along with a number of key built-in protection features while minimizing the external component count, simplifying EMI design and lowering the total bill of material cost. The device together with an external active device (depletion mode NFET or NPN BJT) provides a fast start-up without compromising no-load power loss.

Global Semiconductor's innovative proprietary technology ensures that power supplies built with the G5177 can achieve both highest average efficiency and less than 20mW no-load power consumption, and have fast dynamic load response in a compact form factor. The active start-up scheme enables shortest possible start-up time without sacrificing no-load power loss.

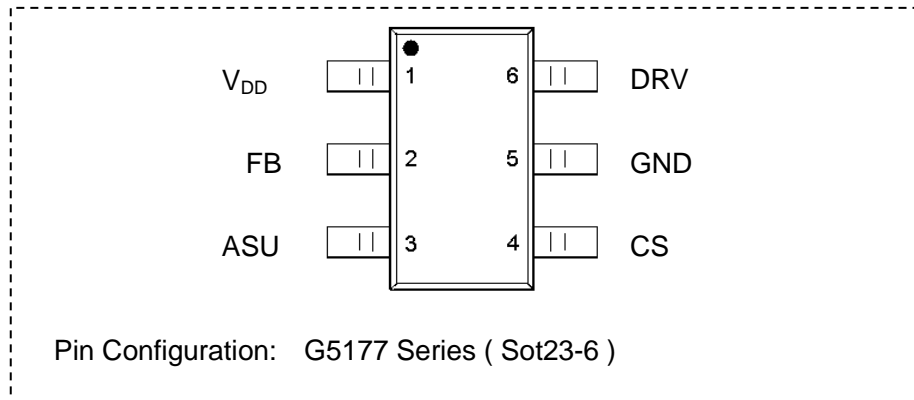
The G5177 removes the need for secondary feedback circuitry while achieving excellent line and load regulation. It also eliminates the need for loop compensation components while maintaining stability over all operating conditions. Pulse-by-pulse waveform analysis allows for a loop response that is much faster than traditional solutions, resulting in improved dynamic load response for both one-time and repetitive load transients.

Features

- ◆ Very tight constant voltage and constant current regulation over entire operating range
- ◆ No-load power consumption < 20mW at 230Vac with typical application circuit
- ◆ Fast dynamic load response for both one-time and repetitive load transients
- ◆ Optimized 72 kHz maximum PWM switching frequency achieves best size and efficiency
- ◆ Primary-side feedback eliminates opto-isolators and simplifies design
- ◆ Low supply current during normal operation (typically 0.4mA without load)
- ◆ Good EMI design.
- ◆ Complies with EPA 2.0 energy-efficiency specifications with ample margin
- ◆ Intrinsically low common mode noise
- ◆ Active start-up scheme enables fastest possible start-up
- ◆ Adaptive multi-mode PWM/PFM control improves efficiency
- ◆ Quasi-resonant operation for highest overall efficiency
- ◆ Direct drive of low-cost BJT switch
- ◆ Dynamic base current control
- ◆ No external compensation components required
- ◆ Built-in soft start, SCP, OVP

Applications

- Cell Phone Charger
- Digital Still Cameras Charger
- Smaller Power Adaptor
- Linear Regulator/RCC Replacement

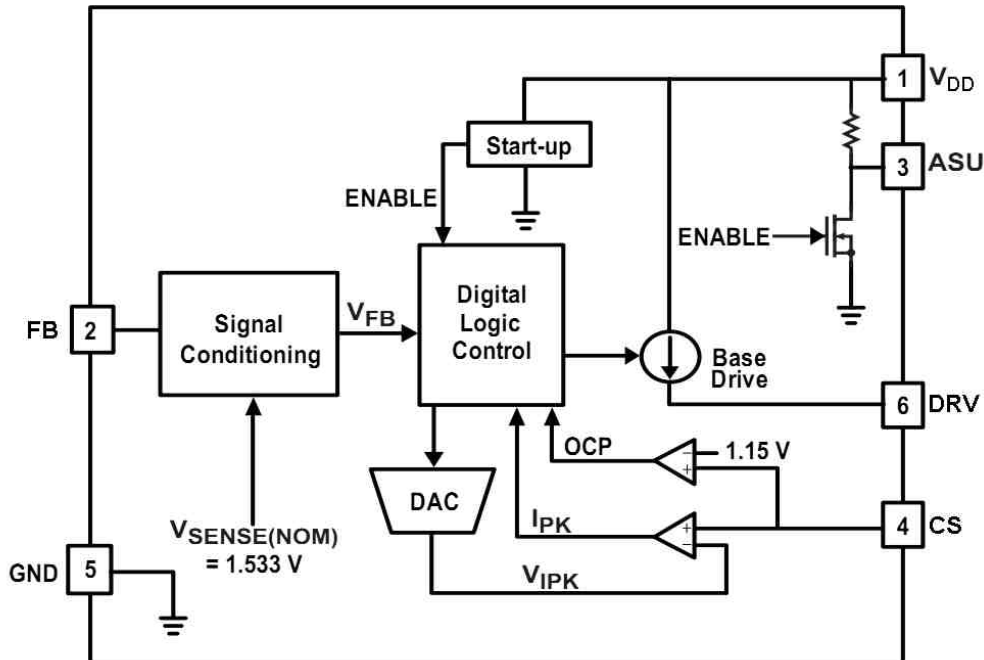
2. Products Information**2.1 Pin configuration**

Pin Name	I/O	Description
V _{DD}	P	Power supply for control logic.
FB	I	Analog Input Auxiliary voltage sense (used for primary regulation).
ASU	O	Control signal for active start-up device (BJT or depletion NFET).
CS	I	Analog Input Primary current sense. Used for cycle-by-cycle peak current control and limit.
GND	P	Ground.
DRV	O	Base drive for BJT.

2.2 Series description

Part Number	Description
G5177-00	Cable Comp = 0mV
G5177-01	Cable Comp = 150mV
G5177-03	Cable Comp = 300mV
G5177-05	Cable Comp = 450mV

2.3 Block diagram



3. Absolute Maximum Ratings

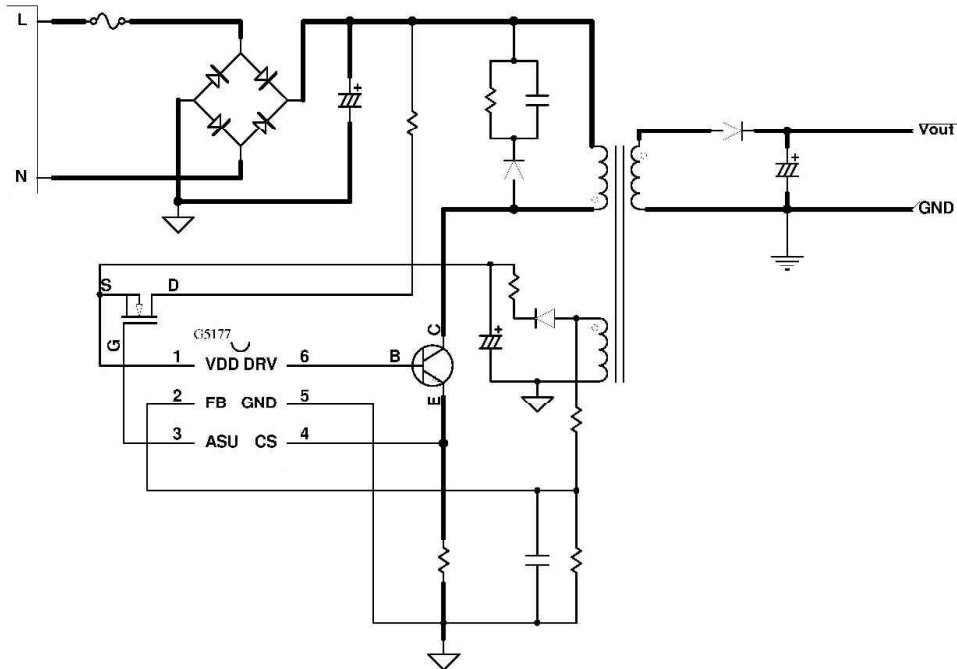
Parameter	Symbol	Value	Units
DC supply voltage range (pin 1, $I_{DD} = 20\text{mA max}$)	V_{DD}	-0.3 to 18.0	V
Continuous DC supply current at V_{DD} pin ($V_{DD} = 15\text{ V}$)	I_{DD}	20	mA
ASU output (Pin 3)		-0.3 to 18.0	V
DRV output (Pin 6)		-0.3 to 4.0	V
FB input (Pin 2, $I_{FB} \leq 10\text{mA}$)		-0.7 to 4.0	V
CS input (Pin 4)		-0.3 to 4.0	V
Maximum junction temperature		150	°C
Storage temperature		-65 to 150	°C
Lead temperature during IR reflow for ≤ 15 seconds	$T_{J\text{MAX}}$	260	°C
Thermal resistance junction-to-ambient	T_{STG}	190	°C/W
ESD rating	T_{LEAD}	2,000	V
Latch-up test per JEDEC 78	θ_{JA}	± 100	mA

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Low-Power Off-Line Digital Green-Mode PWM Controller

4. Typical Application

The G5177 contains a controller for a flyback circuit.



5. Electrical Characteristics

($T_A = 25^\circ\text{C}$, $V_{DD} = 12\text{V}$, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Voltage (Pin1)						
$V_{DD(\text{MAX})}$	Maximum operating voltage (Note 1)				16	V
$V_{DD(\text{ST})}$	Start-up threshold	V_{DD} rising	10.0	11.0	12.0	V
$V_{DD(\text{UVL})}$	Under voltage lockout threshold	V_{DD} falling	3.8	4.0	4.2	V
$I_{IN(\text{ST})}$	Start-up current	$V_{DD} = 10\text{V}$	1.0	1.7	3.0	μA
I_{DDQ}	Quiescent current	No I_B current		2.7	4.0	mA
V_{ZB}	Zener breakdown voltage	Zener current=5mA	18.5	19.5	20.5	V
Feedback (Pin2)						
I_{BVS}	Input leakage current	$V_{\text{SENSE}} = 2\text{V}$			1	μA
V_{FB}	Nominal voltage threshold	$T_A = 25^\circ\text{C}$, negative edge	1.518	1.533	1.548	V



Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{FB(MAX)}$	Output OVP threshold -00 (Note 1)	TA=25°C, negative edge		1.834		V
$V_{FB(MAX)}$	Output OVP threshold -01 (Note 1)	TA=25°C, negative edge Load=100%		1.926		V
$V_{FB(MAX)}$	Output OVP threshold -03 (Note 1)	TA=25°C, negative edge Load=100%		1.972		V
$V_{FB(MAX)}$	Output OVP threshold -05 (Note 1)	TA=25°C, negative edge Load=100%		1.880		V
ASU Section (Pin3)						
V_{ASU}	Maximum operating voltage(Note1)			16	V	
R_{VDD_ASU}	Resistance between V_{DD} and ASU		830		k Ω	
CS Section (Pin4)						
V_{OCP}	Over current threshold		1.11	1.15	1.19	V
$V_{IPK(HIGH)}$	I_{CS} regulation upper limit (Note 1)			1.0		V
$V_{IPK(LOW)}$	I_{CS} regulation lower limit (Note 1)			0.23		V
I_{LK}	Input leakage current	$V_{CS}=1.0V$			1	μA
DRV Section (Pin6)						
$R_{DS(ON)LO}$	DRV low level ON-resistance	$I_{SINK}=5mA$		1	3	Ω
F_{SW}	Switching frequency (Note 2)	> 50% load		72		kHz

Notes:

Note 1. These parameters are not 100% tested, guaranteed by design and characterization.

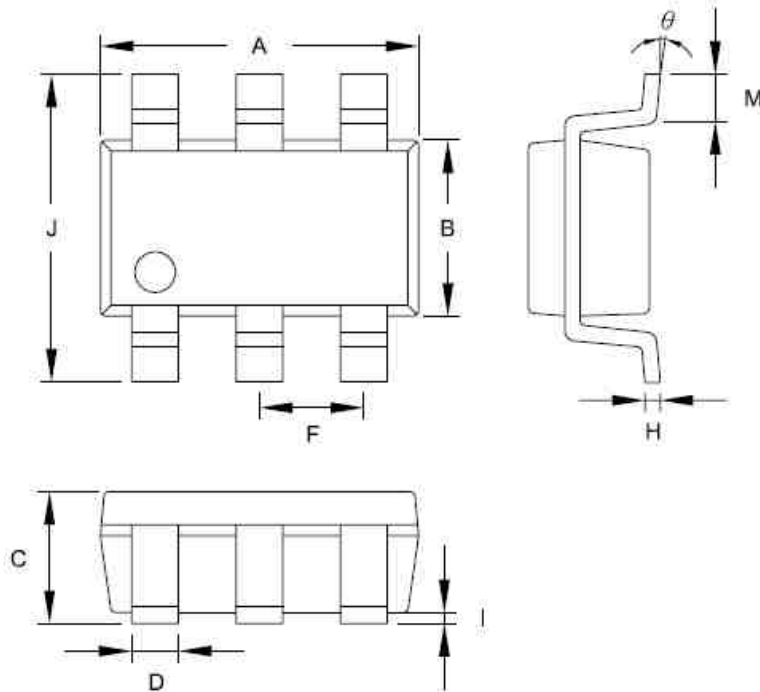
Note 2. Operating frequency varies based on the load conditions, see Section 9.6 for more details.

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6. Package Information

Sot23-6



Symbol	Dimension in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	2.692	3.099	0.106	0.122
B	1.397	1.803	0.055	0.071
C	--	1.450	--	0.057
D	0.300	0.500	0.012	0.020
F	0.95		0.037	
H	0.080	0.254	0.003	0.010
I	0.050	0.150	0.002	0.006
J	2.600	3.000	0.102	0.118
M	0.300	0.600	0.012	0.024
θ	0°	10°	0°	10°

Data and specifications subject to change without notice.

This product has been designed and qualified for Industrial Level and Lead-Free.

Qualification Standards can be found on GS's Web site.

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