

1. General Description

G3617CF is a high performance and highly integrated secondary side synchronous rectification controller used for secondary side rectification in switch mode power supply system. it can replace Schottky diode for high efficiency by connecting with an lower voltage drop N-channel MOSFET, and meet the requirement of DOE VI & COC energy efficiency.

It is suitable for multiple mode applications including discontinuous conduction mode (DCM), quasi-resonant mode (QR) and continuous conduction mode (CCM). The Drain-to-source voltage (V_{SW}) of SR MOSFET is sensed to control the turn on and off of the SR MOSFET. G3617CF can generate its own supply voltage for battery charging applications with potential low output voltage, and at short circuit output condition, or for high-side SR configuration.

G3617CF is offered in SOP8 package.

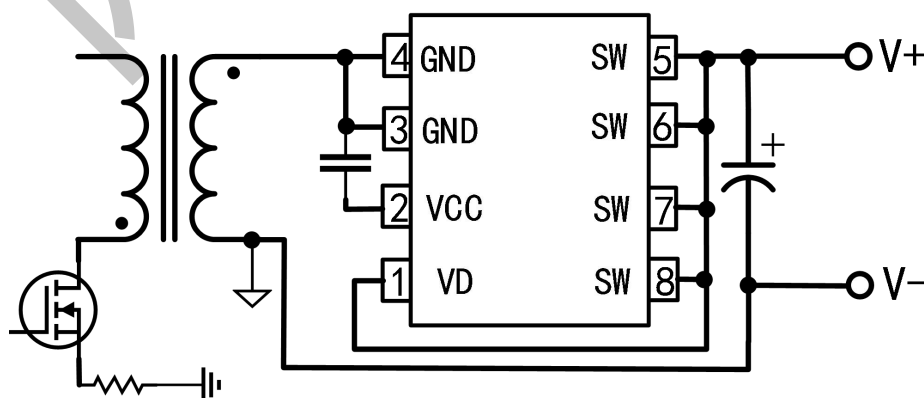
Features

- ◆ Integrated 100V Power MOSFET
- ◆ Suitable for DCM, QR and CCM
- ◆ Supports both High-side and Low-side Rectification
- ◆ Wide Output Range down to 3V
- ◆ Supports USB PD + PPS
- ◆ No need for Auxiliary Winding or external power supply
- ◆ Ringing Detection Prevents False Turn-on during DCM and Quasi-Resonant Operations
- ◆ 10nS Fast Turn-off delay and 30nS Turn-on delay
- ◆ Accurate secondary side built-in MOSFET V_{SW} sensing
- ◆ Anti-interference with digital isolation
- ◆ SOP8 Package Available

Applications

- USB PD Quick Chargers
- Power adapter
- Flyback Power Supplies with Very Low and/or Variable Output Voltage

Typical Applications



G3617CF

Fast Turn-Off Intelligent Synchronous Rectifier

2. Products Information

2.1 Pin configuration

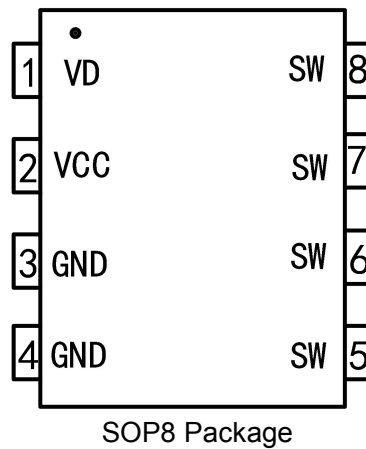
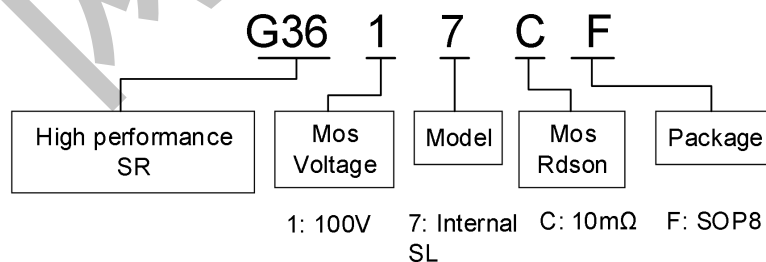


Fig.1. G3617CF Pin Configuration

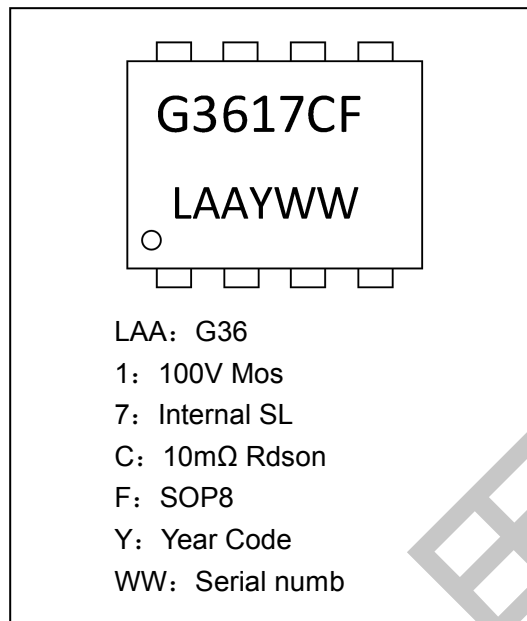
Pin Num	Pin Name	I/O	Description
1	VD	I	MOSFET drain voltage sensing. VD is also used as the linear regulator input.
2	VCC	P	Power supply, Bypass a capacitor between VCC and GND.
3,4	GND	P	Ground. GND is also used as a MOSFET source sense reference for SW.
5,6,7,8	SW	O	MOSFET Drain Pin.

2.2 Ordering Information

Part Number	Marking ID	Package	Packing
G3617CF	LAAXXX	SOP8	4000/Tape&Reel



2.3 Marking Information



Year Code

A	B	C	D	E	F	G	H	I	J	K	L	M
2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038

2.4 Block diagram

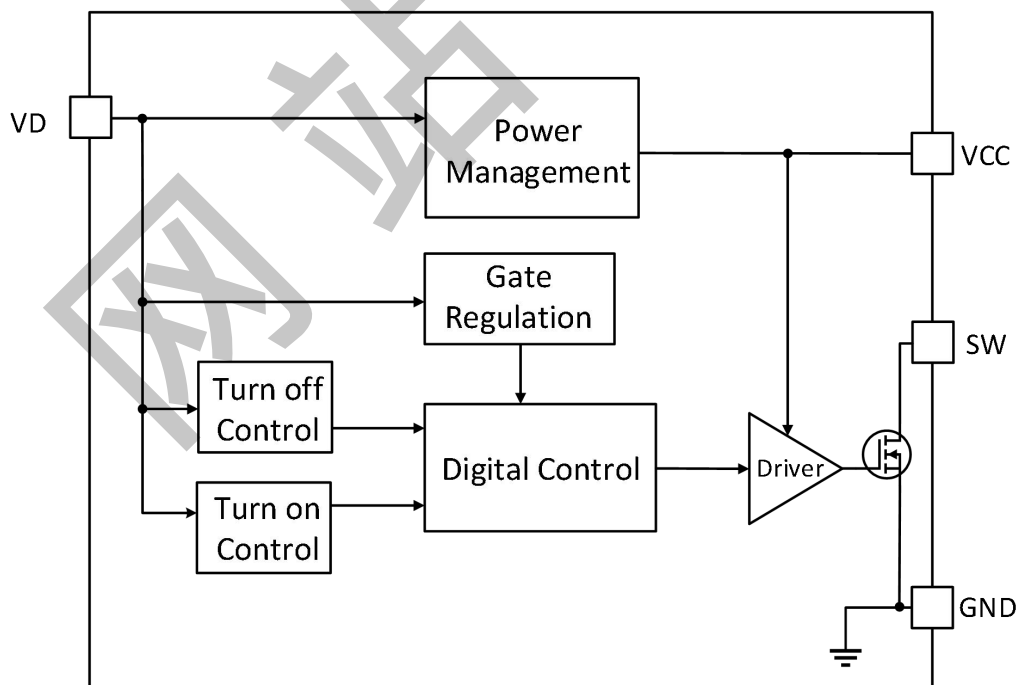


Fig.2. Block Diagram

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3. CHARACTERISTICS Ratings

Absolute Maximum Ratings

Description	Absolute Maximum Ratings
SW to GND	-0.3V to 100V
Continuous SW current(TA=+25°C)	15A
Continuous SW current(TA=+100°C)	9.5A
Pulsed SW Current	60A
VD to GND	-0.3V to 100V
VCC to GND	-0.3 to 15V
Maximum power dissipation(TA=+25°C)	1.7W
Min/Max Operating Junction Temperature T _J	-40 to 150°C
Operating Ambient Temperature T _A	-40 to 85°C
Min/Max Storage Temperature T _{stg}	-55 to 150°C
Lead Temperature (Soldering, 10secs)	260°C
Package Dissipation Rating for SOT23-6 R _{θJA}	70°C/W
Package Dissipation Rating for SOT23-6 R _{θJC}	32°C/W

Notes:

Stress beyond those listed under “absolute maximum ratings” may cause permanent damage to the device.

Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

Recommended Operation Conditions

Description	Absolute Maximum Ratings
VCC to GND	4.0 to 14V
SW to GND	20 to 90V
Operating Junction Temperature T _J	-40 to 125°C

4. Electrical Characteristics

(TA = 25°C, VCC=6V, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Management Section						
UVLO_OFF	VCC UVLO rising			4.6		V
UVLO_ON	VCC UVLO falling			4		V
UVLO_HY	VCC UVLO hysteresis			0.6		V
VCC_REG	VCC regulation voltage	V _{SW} =15V	8.5	9	9.5	V
I _{VDD_OP}	Operation Current	VCC=9V, C _{LOAD} =4.7nF , F _{SW} =100kHz		4.5		mA
I _{VDD_Q}	Quiescent current	VCC=9V		255		uA
Control Circuitry Section						
V _{ON_TH}	Turn-on threshold			-250		mV
V _{OF_TH}	Turn-off threshold			0		mV
T _{Off-min}	Turn-off minimum time			500		ns
T _{Doff}	Turn-off delay			10		ns
T _{B-ON}	Turn-on blanking time			1		us
T _{Don}	Turn-on delay			30		ns
V _{B-OFF}	Turn-off threshold in blanking time			2		V
T _{SLEW}	Turn-on slew rate detection timer			40		ns
MOSFET SECTION						
BV _{dss}	Mosfet Drain-Source Breakdown Voltage	I _D =250uA	100			V
R _{dson}	Static Drain to source on resistance			10		mΩ

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

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5. OPERATION DESCRIPTION

G3617CF is a high performance and highly integrated secondary side synchronous rectification controller in switch mode power supply system. Built-in a much lower voltage drop N-channel MOSFET, it emulates a traditional diode rectifier, which can reduce heat dissipation, increase output current capability and efficiency, and simplify the thermal design.

5.1 VCC Generation

The capacitor at VCC supplies power for the IC. Capacitance recommended 100nF. It can be charged up by SW. When V_{SW} larger than 10V, the VCC voltage is 9V.

5.2 Start-Up and Under-Voltage Lockout (UVLO)

During the startup period, when the VCC is increases to U_{VLO_OFF} , the chip starts to work. When the VCC is below U_{VLO_ON} threshold, the internal MOSFET is turned off and the current flows through body diode until the VCC exceeds the startup voltage.

5.3 Turn-On Phase

When V_{SW} drops to 2V, a turn-on timer begins to count. If V_{SW} reaches the -200mV turn-on threshold from 2V within the time (TSLEW) set by the timer, the MOSFET is turned on after a turn-on delay (around 30ns). If V_{SW} crosses -200mV after the timer ends, the gate voltage remains off. This turn-on timer prevents the G3617CF from turning on falsely due to ringing from DCM and quasi-resonant operations.

5.4 Turn-On Blanking

To prevent an accidental turn-off due to ringing, the control circuitry contains a blanking function. When the MOSFET turns on, the control circuit ensures that the on state lasts for a specific period of time. The turn-on blanking time is 1 μ s. However, if V_{SW} reaches 2V within the turn-on blanking time, the gate of built-in MOSFET is pulled low immediately.

5.5 Conduction Phase

Once the SR MOSFET is turned on, the gate drive voltage will remain at the high level during minimum on time. With the decrease of the switching current, the V_{SW} will rise above -40mV, then the gate voltage is pulled lower to enlarge the R_{dson} of the synchronous MOSFET, therefore V_{SW} is adjusted to remain at -40mV during the rest of demagnetization time. The low level gate voltage saves the pull-down time, resulting in high turn-off speed, which is very important in CCM mode.

5.6 Turn-Off Phase and Turn-Off Blanking

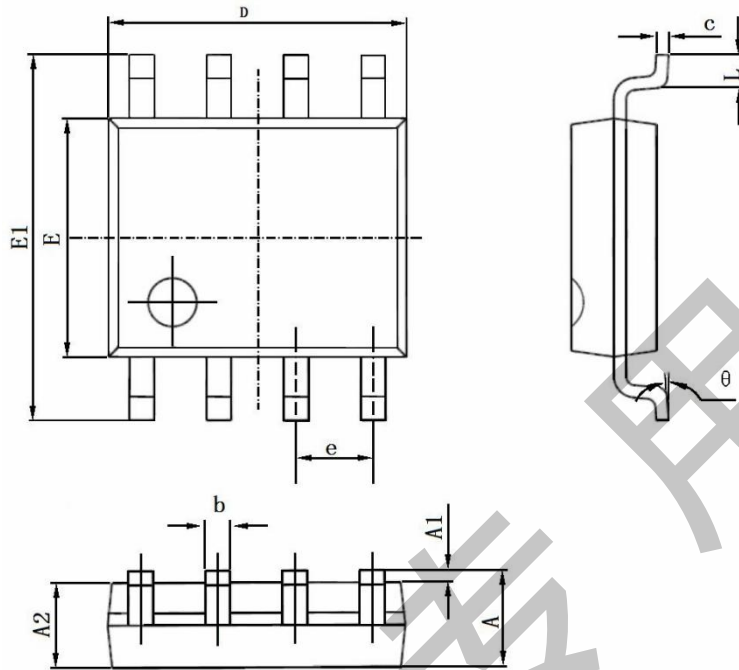
When V_{SW} rises to trigger the turn off threshold (0V), the gate voltage is pulled to zero after a very short turn-off delay of 10ns. After the gate driver is pulled to zero by V_{SW} reaching the turn-off threshold (0V), a turn-off blanking time is applied, during which the gate driver signal is latched off. The turn-off blanking is removed when V_{SW} rises above 2V.

5.7 PCB Layout Guidelines

1. Keep the IC out of the power loop to prevent the sensing loop and power loop from interrupting each other. 2. Make the sensing loop as small as possible. 3. The capacitor of VCC should be placed closest to VCC PIN and GND PIN.

6.Package Information

SOP8:



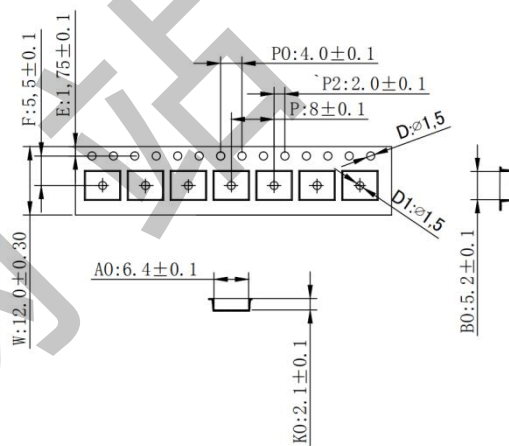
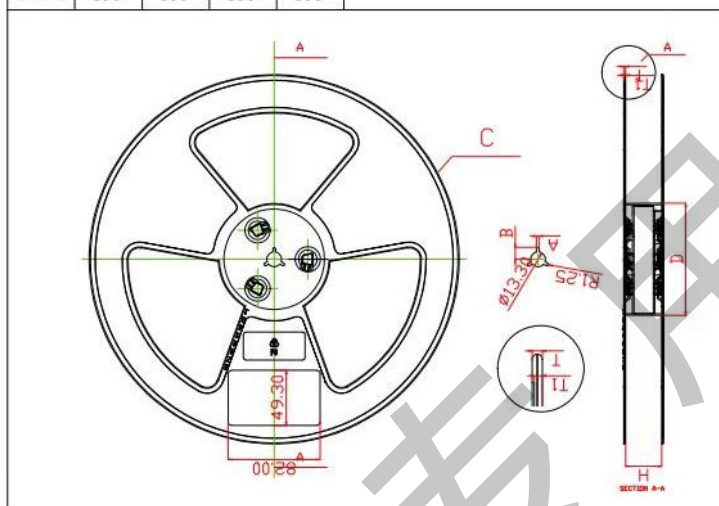
Symbol	Dimension in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	4.700	5.150	0.185	0.203
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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7. Tape and Reel Information

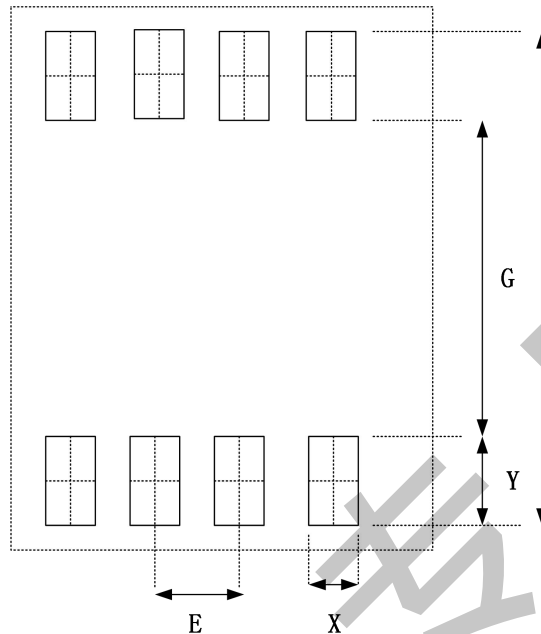
H	12	16	24	32
C±0.2	330	330	330	330
T1±0.2	1.45	1.45	1.45	1.45
B±0.2	10.7	10.7	10.7	10.7
A±0.2	2.5	2.5	2.5	2.5
T±0.2	1.85	1.85	1.85	1.85
D±0.2	100	100	100	100



8. Tape and Reel Information

SOP8:

Grid placement courtyard



尺寸	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
数值	6.900/0.272	3.900/0.154	0.650/0.026	1.500/0.059	1.270/0.050

IMPORTANT NOTICE

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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Addendum:

IR-Reflow Profile For Pb-free Leads

Pb-free Process – Package Classification Reflow Temperatures

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 +0°C*	260 +0°C*	260 +0°C*
1.6 mm – 2.5 mm	260 +0°C*	250 +0°C*	245 +0°C*
≥2.5 mm	250 +0°C*	245 +0°C*	245 +0°C*

* Tolerance: The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C. For example 260°C+0°C) at the rated MSL level.

Profile Feature	Pb-Free Assembly
Average ramp-up rate (TL to TP)	3°C/second max.
Preheat	
-Temperature Min (T _{Smin})	150°C
-Temperature Max (T _{Smax})	200°C
-Time (min to max) (t _s)	60-180 seconds
Time maintained above:	
-Temperature (TL)	217°C
-Time (t _L)	60-150 seconds
Peak/Classification Temperature (T _p)	See Pb-free Process
Time within 5°C of actual Peak Temperature (t _p)	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

Notes: All temperatures refer to topside of the package. Measured on the body surface.

