



SP6876

Multi-Mode PWM Controller

DESCRIPTION

SP6876 is a high performance flyback multi-mode PWM controller, optimized to achieve high efficiency and low standby power with effective system cost.

At full load IC operates in CCM mode with fixed frequency at low line input range and in QR mode at high line input range. At normal load conditions it operates in QR mode with internally limited frequency to 75kHz typ. to minimize switching loss. Controller gradually reduces frequency with loading at light load conditions to keep high efficiency and switches to extended burst mode at no-load conditions to minimize stand-by power loss. As a result, high conversion efficiency can be achieved with universal input range and within whole loading range.

The rich set of protection features such as VCC Under Voltage Lockout (UVLO), VCC Over Voltage Protection (VCC OVP) and clamp, load Over Voltage Protection (OVP), Over Load Protection (OLP) and on-chip Over Temperature Protection (OTP) helps to build low component counts and high performance power supply.

The tone energy at below 23KHz is minimized in the design and audio noise is eliminated during operation.

SP6876 is offered in space saving SOT23-6 pack

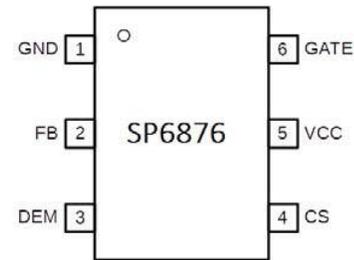
FEATURES

- Internal soft start reducing MOS FET VDS stress
- Multi-mode operation for better efficiency
- Frequency shuffling for better EMI
- Extended burst mode for lower standby power loss
- The rich set of protection features:
 - VCC Under Voltage Lockout (UVLO) with hysteresis
 - VCC Over Voltage Protection (VCC OVP) and clamp
 - Cycle-by-cycle current limiting with line voltage compensation
 - Over Load Protection (OLP) with auto-recovery
 - Adjustable load Over Voltage Protection (OVP)
 - Fixed on-chip and adjustable external over temperature protection (OTP) with auto-recovery

APPLICATIONS

- AC/DC switching power adaptor
- Set-top box power supply
- Open-frame switching power supply
- NB Adaptor
- TV/Monitor Standby Power
- PC Peripherals

PIN CONFIGURATION (SOT-23-6L)



PART MARKING

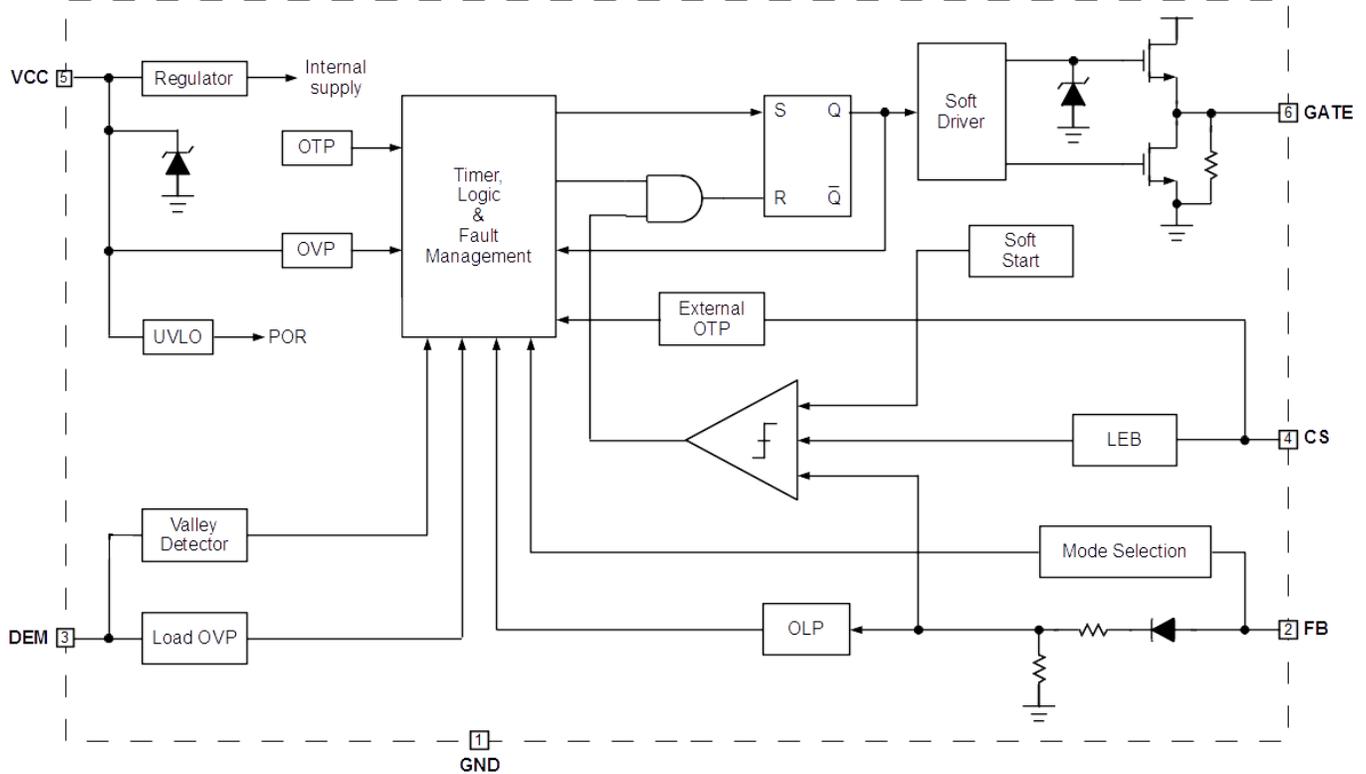




SP6876

Multi-Mode PWM Controller

BLOCK DIAGRAM



PROTECTION MODE

Part number	VCC_OVP	OSCP	DEM_OVP	OLP	OTP
SP6876	Latch off	Auto-Restart	Latch off	Auto-Restart	Auto-Restart

ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{CC}	Zener clamp voltage (@ 10mA)	31	V
V _{FB} , V _{CS} , V _{DEM}	FB, CS, DEM pin voltage	-0.3 ~ 7.0	V
T _{OP}	Operating ambient temperature	-40 ~ 85	°C
T _J	Operating junction temperature	-40 ~ 150	°C
T _{STG}	Storage temperature	-40 ~ 150	°C
T _{LEAD}	Lead soldering temperature for 5 sec	260	°C

THERMAL RESISTANCE

R _{θJC}	Thermal Resistance Junction – Case (*)	110	°C/W
------------------	--	-----	------



SP6876

Multi-Mode PWM Controller

ELECTRICAL CHARACTERISTICS

($T_A=25^{\circ}\text{C}$, $V_{CC}=16\text{V}$, unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Supply Voltage Section (VCC pin)						
I _{st_{up}}	Start-up current	$V_{CC}=\text{UVLO}(\text{OFF})-1.5\text{V}$		5	15	uA
I _{cc(op)}	Operating current	$V_{FB}=3\text{V}$		2	4	mA
		$V_{FB}=3\text{V}$, $C_L=1\text{nF}$		3	5	mA
I _{cc(burst)}	Burst mode operating current	$V_{FB}=0.5\text{V}$, $V_{CS}=0\text{V}$		0.6	0.8	mA
UVLO(ON)	VCC under voltage lockout enter			8		V
UVLO(OFF)	VCC under voltage lockout exit (recovery)			18.5		V
OVP	VCC over voltage protection			28		V
V _{cc_clamp}	Clamping voltage	$I_{CC}=10\text{mA}$		31		V
Feedback Section (FB pin)						
I _{FB(SC)}	Short circuit current			250		uA
V _{FB_Open}	Open loop voltage			5.3		V
V _{TH_BM_off}	Burst mode exit threshold			0.8		V
V _{TH_BM_on}	Burst mode enter threshold			0.7		V
V _{FB(OLP)}	Over load protection threshold			4.4		V
T _{DEL(OLP)}	Over load protection delay			80		ms
Demagnetization Detection Section (DEM pin)						
V _{DEM(TH)}	Demagnetization threshold			75		mV
V _{DEM(H)}	Upper clamp voltage			6		V
V _{DEM(L)}	Lower clamp voltage			-0.7		V
T _{DEL(DEM)}	Demagnetization propagation delay			250		ns
V _{DEM(OVP)}	Load over voltage protection threshold			3.75		V
T _{DEL(OVP)}	Number of subsequent cycles to trigger OVP			4		Cycle
Current Sense Section (CS pin)						
V _{CS(L)}	CS threshold at zero duty cycle	$V_{FB}=3\text{V}$	0.415	0.45	0.485	V
V _{CS(H)}	CS threshold at max duty cycle	$V_{FB}=3\text{V}$		0.8		V
V _{CS(BM)}	CS threshold at burst mode	$V_{FB}=1\text{V}$		0.3		V
T _{LEB}	Leading edge blanking time			300		Ns
T _{DEL(CS)}	Over current detection and control delay			80		ns
V _{TH(OTP)}	External OTP threshold			0.25		V
T _{DEL(OTP)}	External OTP debounce time			50		ms
Soft Start Section						
T _{SS}	Soft start time			4		ms
Internal OTP						
T _{SD}	Thermal shutdown threshold			150		°C
T _{SD_HYS}	Thermal shutdown hysteresis			30		°C



SP6876

Multi-Mode PWM Controller

ELECTRICAL CHARACTERISTICS (continued)

(T_A=25°C, V_{CC}=16V, unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Oscillator						
F _{BURST}	Burst mode switching frequency			22		kHz
F _{QR(L)}	Frequency low clamp in QR mode		47	52	57	kHz
F _{QR(H)}	Frequency high clamp in QR mode			75		kHz
G_PFM	Frequency reduction ratio			60		kHz/V
ΔF _{(shuffle)/F}	Frequency shuffling range		-4		+4	%
T _{ON}	Maximum ON time		10	12.5	15	us
T _{OFF}	Maximum OFF time		40	55	75	us
Gate Driver Section (GATE pin)						
V _{O(L)}	Output low voltage	I _O =10mA			1	V
V _{O(H)}	Output high voltage		11.5			V
V _{O(CLAMP)}	Output clamp voltage	V _{CC} =20V		16.5		V
t _r	Voltage rise time	C _L =1nF		100		ns
t _f	Voltage fall time	C _L =1nF		50		ns



SP6876

Multi-Mode PWM Controller

Information provided is alleged to be exact and consistent. SYNC Power Corporation presumes no responsibility for the penalties of use of such information or for any violation of patents or other rights of third parties which may result from its use. No license is granted by allegation or otherwise under any patent or patent rights of SYNC Power Corporation. Conditions mentioned in this publication are subject to change without notice. This publication surpasses and replaces all information previously supplied. SYNC Power Corporation products are not authorized for use as critical components in life support devices or systems without express written approval of SYNC Power Corporation.

© The SYNC Power logo is a registered trademark of SYNC Power Corporation
© 2020 SYNC Power Corporation – Printed in Taiwan – All Rights Reserved
Reserved SYNC Power Corporation
7F-2, No.3-1, Park Street
NanKang District (NKSP), Taipei, Taiwan, 115,
R.O.C Phone: 886-2-2655-8178
Fax: 886-2-2655-8468
<http://www.syncpower.com>