



# SP6878

## Quasi-Resonant PWM Controller

### DESCRIPTION

The SP6878 is a low cost, quasi-resonant flyback controller where the maximum frequency is below 100KHz. The internal valley detector ensures the converter operates at quasi-resonant operation over wide range of line voltage. The build-in advanced energy saving function would provide the users a superior AC/DC power application of higher efficiency, low external component counts, and lower cost solution for applications.

The SP6878 features more protections or functions for the following characteristics: over voltage protection (OVP); over temperature protection (OTP); over load protection (OLP).

SP6878 is available by SOP-8/ DIP-8P packages.

### APPLICATIONS

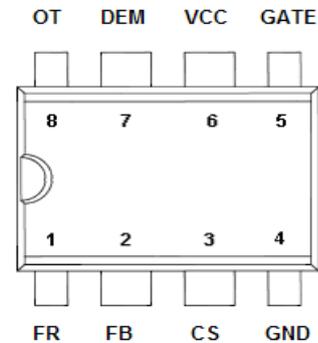
- AC/DC Switching Power Adaptor
- Set-top Box Power Supply
- Open-Frame Switching Power Supply

### FEATURES

- High-Voltage BCD Process
- Under Voltage Lockout (UVLO )
- Quasi-Resonant Control
- Internal 4ms Soft Start
- Over Temperature Latch Shutdown
- OLP (Over Load Protection)
- OVP (Over Voltage Protection) on Vcc Pin
- 100KHz Maximum Frequency
- 800mA Driving Capability

### PIN CONFIGURATION

#### SOP-8



### PART MARKING

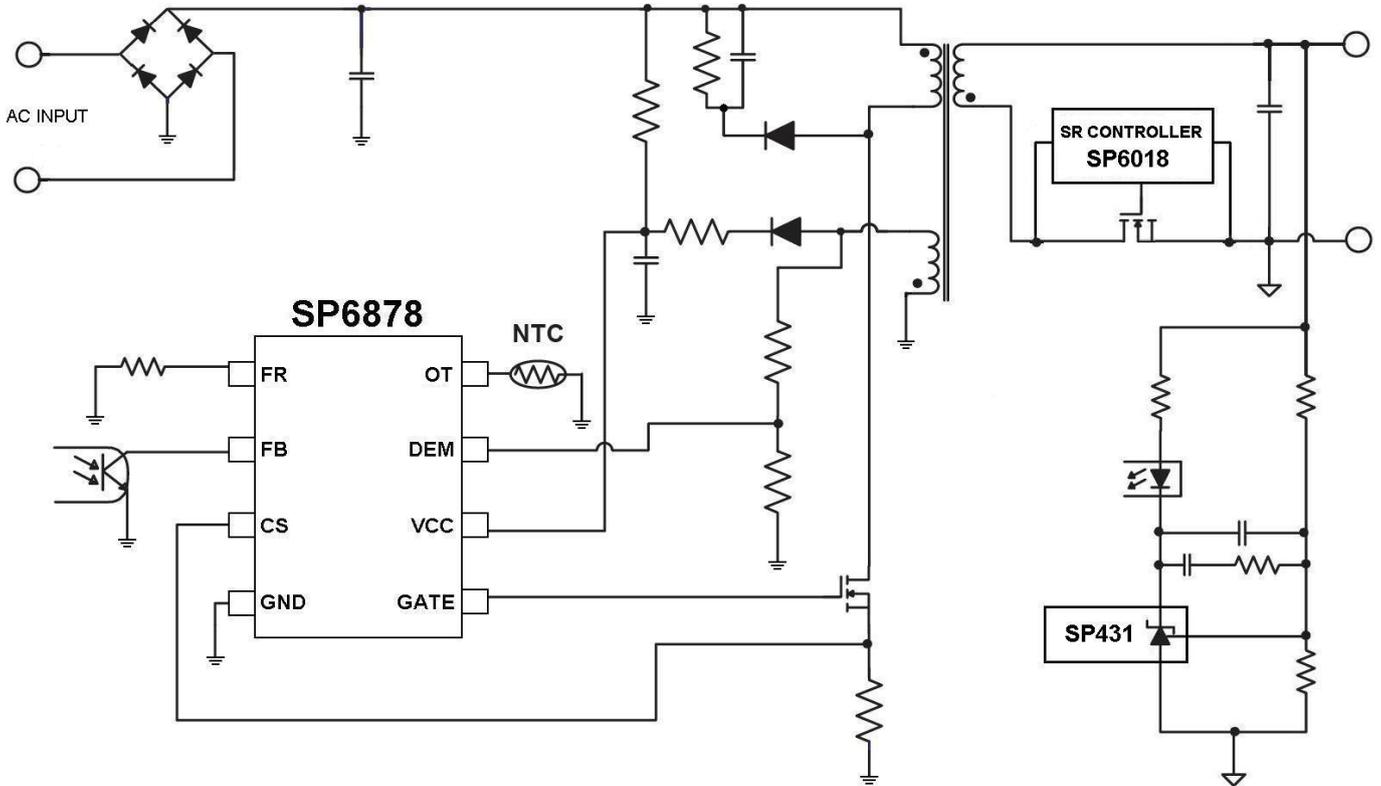
#### SOP-8





# SP6878 Quasi-Resonant PWM Controller

## TYPICAL APPLICATION CIRCUIT FOR HIGH EFFICIENCY SMPS



### PIN DESCRIPTION

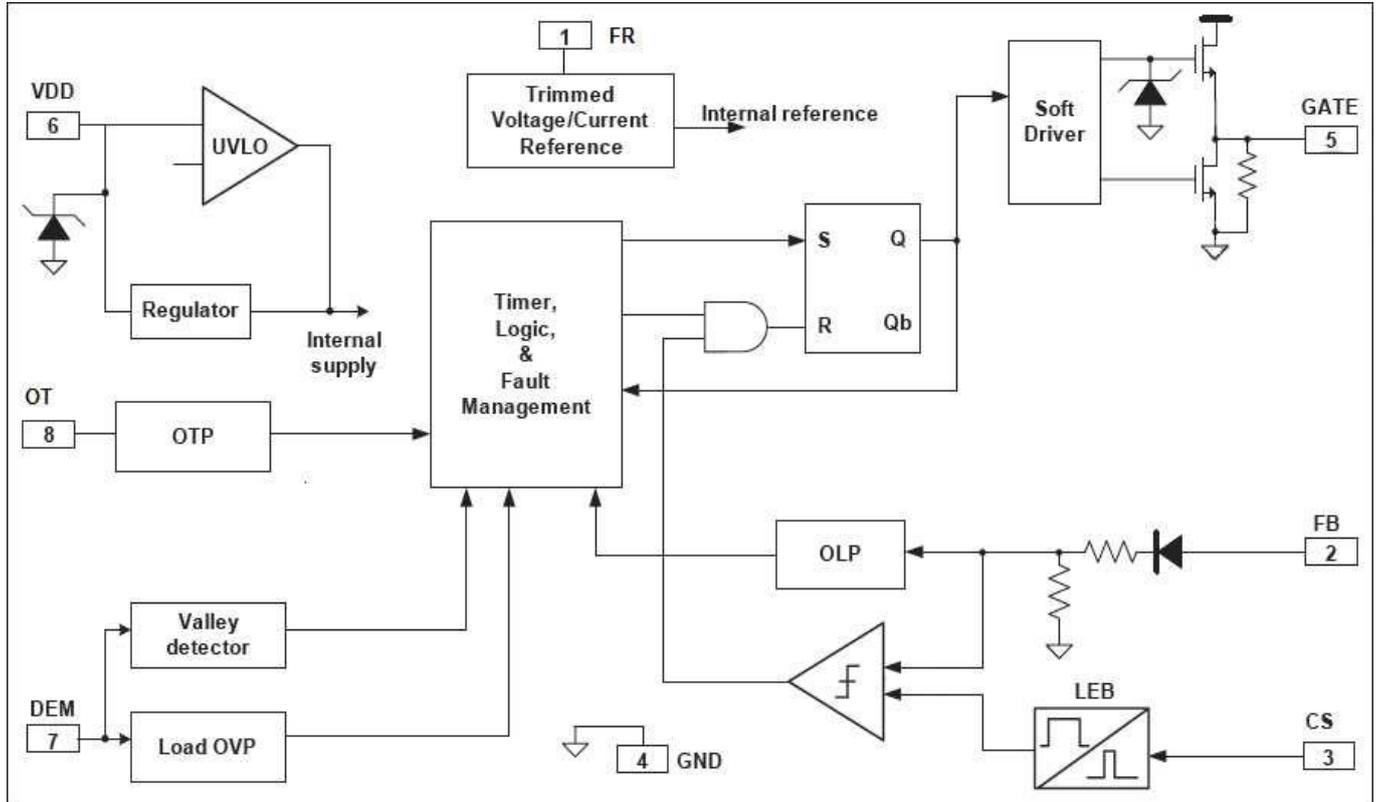
Pin	Symbol	Description
1	FR	Set the internal frequency and timer.
2	FB	Voltage feedback. It provides feedback to the internal PWM comparator to control the duty cycle.
3	CS	Current sense.
4	GND	Ground
5	GATE	Gate driver output to drive the external MOSFET.
6	Vcc	Supply voltage for the IC
7	DEM	Core reset detection and OVP.
8	OT	Over Temperature Protection by connection through a NTC resistor to GND.



# SP6878

## Quasi-Resonant PWM Controller

### BLOCK DIAGRAM



### ORDERING INFORMATION

Part Number	Package	Part Marking
SP6878S8RGB	SOP-8	SP6878

※ SP6878S8RGB : Tape Reel ; Pb – Free ; Halogen-Free

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, unless otherwise specified.)

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

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	25	V
V <sub>FR/FB/CS/DEM/OT</sub>	FR /FB / CS/DEM/OT Voltage	-0.3 ~ 7.0	V
ESD	Human Body Model	4	KV
	Machine Model	300	V
T <sub>ope</sub>	Operating Ambient Temperature	-40 ~ 85	°C
T <sub>J</sub>	Operating Junction Temperature Range	-40 ~ 150	°C
T <sub>STG</sub>	Storage Temperature Range	-40 ~ 150	°C
T <sub>LEAD</sub>	Pb-Free Lead Soldering Temperature for 5 sec.	260	°C
R <sub>θJC</sub>	Thermal Resistance Junction – Case (*)	SOP-8	150
		DIP-8	90

(\*) The power dissipation and thermal resistance are evaluated under copper board mounted with free air conditions.



# SP6878

## Quasi-Resonant PWM Controller

### ELECTRICAL CHARACTERISTICS

(T<sub>A</sub>=25°C, V<sub>CC</sub>=16V, R<sub>FR</sub> = 20K Ohm unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Supply Voltage ( Vcc Pin )</b>						
I <sub>stt</sub>	Startup Current	V <sub>CC</sub> =UVLO-1.5V		5	15	uA
I <sub>op</sub>	Operating Current	V <sub>FB</sub> = 3V		2.0	4.0	mA
		V <sub>FB</sub> = 3V, C <sub>L</sub> = 1nf		3.0	5.0	mA
UVLO (off)	Min. Operating Voltage			7.5		V
UVLO (on)	Start Threshold Voltage			13.5		V
OVP Level	Over Voltage Protection			19		V
V <sub>CC</sub> Clamp	Clamping Voltage	I <sub>VCC</sub> = 5mA		20		V
<b>Voltage Feedback ( FB Pin )</b>						
I <sub>sc</sub>	Short Circuit Current			1.5		mA
V <sub>op</sub>	Open Loop Voltage			5.3		V
V <sub>TH_BM_on</sub>	Burst Mode on threshold			0.8		V
V <sub>TH_BM_off</sub>	Burst Mode off threshold			0.7		V
Z <sub>FB</sub>	Input Impedance			4		KΩ
TL <sub>OLP</sub>	OLP Trip Level			4.4		V
TD <sub>OLP</sub>	OLP Delay Time (note)			80		mS
<b>Demagnetization ( DEM Pin )</b>						
V <sub>TH(DEM)</sub>	Demagnetization Threshold Voltage			75		mV
V <sub>CH</sub>	Input Clamp Voltage High			6		V
V <sub>CL</sub>	Input Clamp Voltage Low			-0.7		V
T <sub>supp</sub>	Suppression of the transformer ringing at start of secondary stroke			2.5		uS
T <sub>DEM</sub>	Demag Propagation Delay			250		nS
V <sub>TH_OVP</sub>	Output OVP trigger point			3.75		V
<b>Current Sensing ( CS Pin )</b>						
V <sub>TH_Duty_zero</sub>	Internal current limiting threshold	Zero duty cycle, V <sub>FB</sub> =3V	0.415	0.45	0.485	V
V <sub>TH_Duty_max</sub>	Internal current limiting threshold	Max duty cycle, V <sub>FB</sub> =3V		0.8		V
V <sub>TH_CS_min</sub>	Burst mode CS threshold	Zero Output, V <sub>FB</sub> =1V		0.3		V
T <sub>LEB</sub>	Leading Edge Blanking Time			300		nS
<b>Gate Driver Output ( GATE Pin )</b>						
V <sub>OL</sub>	Output Low Level	V <sub>CC</sub> =15V, I <sub>o</sub> =100mA			1	V
V <sub>OH</sub>	Output High Level	V <sub>CC</sub> =15V, I <sub>o</sub> =100mA	7.5			V
V <sub>G_Clamp</sub>	Output Clamp Voltage Level	V <sub>CC</sub> =18V		16.5		
T <sub>r</sub>	Rising Time	C <sub>L</sub> = 1nf		80		nS
T <sub>f</sub>	Falling Time	C <sub>L</sub> = 1nf		30		nS
<b>Frequency Setup (FR Pin)</b>						
R <sub>FR</sub>	Resistor Range			20		KΩ
V <sub>FR_open</sub>	FR open voltage			2.0		V
F <sub>burst</sub>	Burst mode switching frequency			22		KHz
F <sub>max_QR_L</sub>	Frequency low clamp in QR mode		47	52	57	KHz
F <sub>min_QR_H</sub>	Frequency high clamp in QR mode		82	90	98	KHz
G <sub>PFM</sub>	PFM mode frequency modulation slope			90		KHz
ΔF(shuffle) /F	F <sub>min_QR_L</sub> frequency shuffling range		-4		+4	%
T <sub>ON</sub>	Maximum ON Time	R <sub>FR</sub> = 20 KΩ	10	13	15	uS



# SP6878

## Quasi-Resonant PWM Controller

$T_{OFF}$	Maximum OFF Time	$R_{FR} = 20\text{ K}\Omega$	40	55	75	$\mu\text{S}$
<b>Over Temp Protection ( OT Pin )</b>						
$V_{OT\_open}$	OT pin open voltage			3.5		V
$V_{TH(OTP)}$	OTP Threshold Voltage		1.00	1.05	1.10	V
$I_{OT}$	Output Current of OT pin	$R_{FR} = 20\text{K}\Omega$		100		$\mu\text{A}$
<b>Soft Start</b>						
$T_{soft}$	Internal soft startup			4		mS

Note: The OLP delay time is proportional to the period of switching cycle. So that, the lower FR resistor value will set the higher switching frequency and the shorter OLP delay time.



# SP6878

## Quasi-Resonant 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 that 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

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>