



# SP6879

## Multi Mode PWM Controller

### DESCRIPTION

The SP6879 is a low cost, multi mode PWM controller intended for flyback topologies. The internal valley detector ensures the converter operates at quasi-resonant operation at high line voltage. IC operates in fixed frequency mode when the line voltage is low. Under certain conditions, SP6879 can be operated in PFM or burst mode. The build-in advanced energy saving function would provide the users a superior AC/DC power application of higher efficiency, and lower standby power.

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), on-chip Over Temperature Protection (OTP), line OVP and programmable Brownout Protection, to realize low component counts and high performance power supply.

SP6879 is available in SOP-8/ DIP-8P packages.

### FEATURES

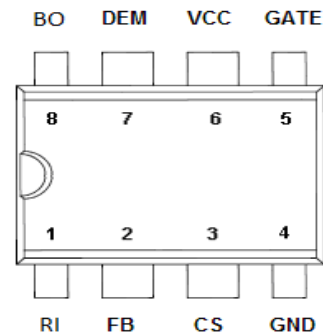
- High-Voltage BCD Process
- Under Voltage Lockout (UVLO )
- Quasi-Resonant Control
- Internal 4ms Soft Start
- Brownout Protection
- Line OVP protection
- OLP (Over Load Protection)
- OVP (Over Voltage Protection) on Vcc Pin
- 100KHz Maximum Frequency
- 800mA Driving Capability
- Low standby power <100mW solution

### APPLICATIONS

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

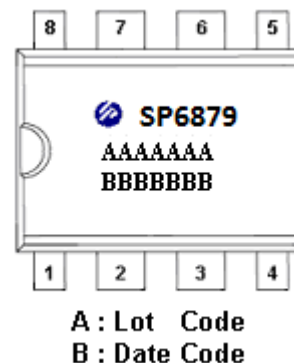
### PIN CONFIGURATION

#### SOP-8



### PART MARKING

#### SOP-8

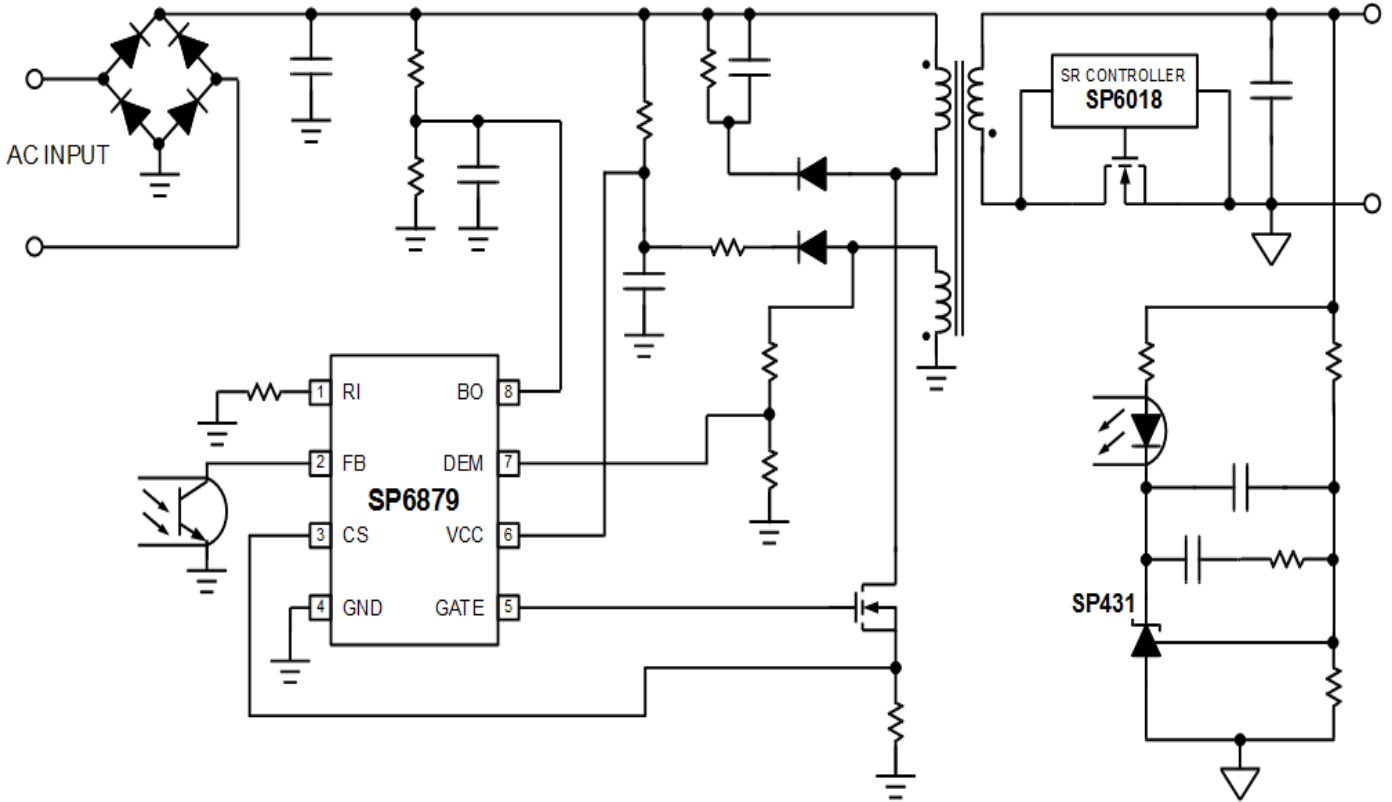




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### TYPICAL APPLICATION CIRCUIT FOR HIGH EFFICIENCY SMPS



### PIN DESCRIPTION

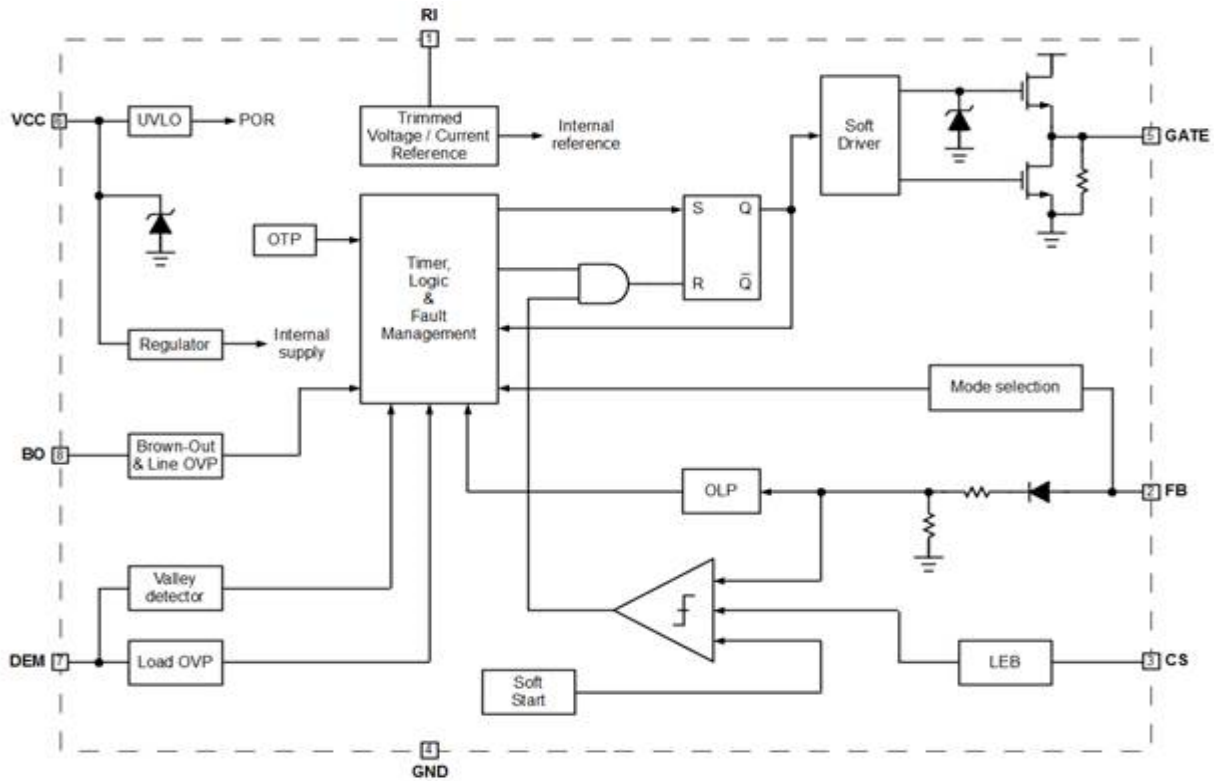
Pin	Symbol	Description
1	RI	Set the internal frequency and timer.
2	FB	Voltage feedback. It provides feedback to the internal PWM comparator to control the duty cycle.
3	CS	Current sense.
4	GND	Ground
5	GATE	Gate driver output to drive the external MOSFET.
6	Vcc	Supply voltage for the IC
7	DEM	Core reset detection and OVP.
8	BO	Brown Out and Line OVP .



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### BLOCK DIAGRAM



### ORDERING INFORMATION

Part Number	Package	Part Marking
SP6879S8RGB	SOP-8	SP6879

※ SP6879S8RGB : 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	26	V
V <sub>RI/FB/CS/DEM/BO</sub>	RI /FB /CS/DEM/BO Voltage	-0.3 ~ 7.0	V
ESD	Human Body Model	3	KV
	Machine Model	200	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.



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### ELECTRICAL CHARACTERISTICS

( $T_A=25^{\circ}\text{C}$ ,  $V_{CC}=16\text{V}$ ,  $R_{RI} = 20\text{K Ohm}$  unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Supply Voltage ( Vcc Pin )</b>						
Ist <sub>up</sub>	Startup Current	$V_{CC}=\text{UVLO}-1.5\text{V}$		2	15	uA
I <sub>cc</sub> (op)	Operating Current	$V_{FB} = 3\text{V}$		2.0	4.0	mA
		$V_{FB} = 3\text{V}$ , $C_L = 1\text{nf}$		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			24		V
V <sub>cc</sub> Clamp	Clamping Voltage	$I_{VCC} = 10\text{mA}$		26		V
<b>Voltage Feedback ( FB Pin )</b>						
I <sub>sc</sub>	Short Circuit Current			0.3		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			17		K $\Omega$
V <sub>TLOLP</sub>	OLP Trip Level			4.4		V
T <sub>DOLP</sub>	OLP Delay Time (note)			80		mS
<b>Demagnetization ( DEM Pin )</b>						
V <sub>TH(DEM)</sub>	Demagnetization Threshold Voltage			75		mV
V <sub>DEM(H)</sub>	Input Clamp Voltage High			6		V
V <sub>DEM(L)</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>	Demagnetization Propagation Delay			250		nS
V <sub>DEM(OVP)</sub>	Load OVP trigger point		3.4	3.75	4.1	V
T <sub>DEL</sub>	Number of Cycles to trigger OVP			4		Cycle
<b>Current Sensing ( CS Pin )</b>						
V <sub>CS(L)</sub>	CS threshold at Zero Duty Cycle	Zero duty cycle, $V_{FB}=3\text{V}$	0.415	0.45	0.485	V
V <sub>CS(H)</sub>	CS threshold at max Duty Cycle	Max duty cycle, $V_{FB}=3\text{V}$		0.8		V
V <sub>CS(BM)</sub>	Burst mode CS threshold	Zero Output, $V_{FB}=1\text{V}$		0.3		V
T <sub>LEB</sub>	Leading Edge Blanking Time			100		nS
<b>Gate Driver Output ( GATE Pin )</b>						
V <sub>OL</sub>	Output Low Level	$V_{CC}=15\text{V}$ , $I_o=100\text{mA}$			1	V
V <sub>OH</sub>	Output High Level	$V_{CC}=15\text{V}$ , $I_o=100\text{mA}$	7.5			V
V <sub>OC</sub>	Output Clamp Voltage Level	$V_{CC}=18\text{V}$		16.5		V
T <sub>r</sub>	Rising Time	$C_L = 1\text{nf}$		80		nS
T <sub>f</sub>	Falling Time	$C_L = 1\text{nf}$		30		nS
<b>Frequency Setup ( RI Pin )</b>						
RI	Resistor Range			20		K $\Omega$
V <sub>RI_open</sub>	RI open voltage			2.0		V
F <sub>burst</sub>	Burst mode switching frequency			22		KHz
F <sub>QR(L)</sub>	Frequency low clamp in QR mode		47	52	57	KHz
F <sub>QR(H)</sub>	Frequency high clamp in QR mode		82	90	98	KHz
G_PFM	PFM mode frequency modulation slope			90		KHz/V
$\Delta F(\text{shuffle}) / F$	Frequency Shuffling Range		-4		+4	%
T <sub>ON</sub>	Maximum ON Time	$R_{RI} = 20\text{K}\Omega$	10	13	15	uS
T <sub>OFF</sub>	Maximum OFF Time	$R_{RI} = 20\text{K}\Omega$	40	55	75	uS



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### ELECTRICAL CHARACTERISTICS

(TA=25°C, VCC=16V, RRI = 20K Ohm unless otherwise specified.) (continued)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Brown Out and Line OVP Section ( BO Pin )</b>						
V <sub>BO(ovp)</sub>	Line OVP Threshold Voltage			2		V
V <sub>BO(TH)</sub>	Brown Out Threshold Voltage			0.5		V
T <sub>DEL(BO)</sub>	Brown Out Debounce Time			50		mS
I <sub>BD(HYS)</sub>	Output current for hysteresis setup			2		uA
<b>Soft Start</b>						
T <sub>soft</sub>	Internal Soft Startup Time			4		mS
<b>Thermal Protection</b>						
T <sub>SD</sub>	Thermal shutdown			150		°C
T <sub>HYS</sub>	Thermal shutdown hysteresis			50		°C

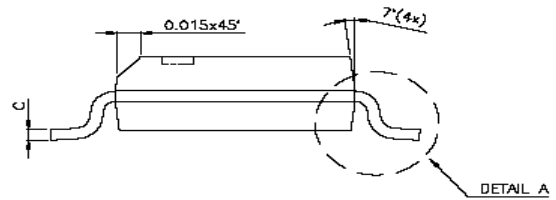
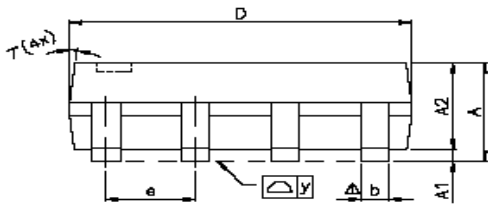
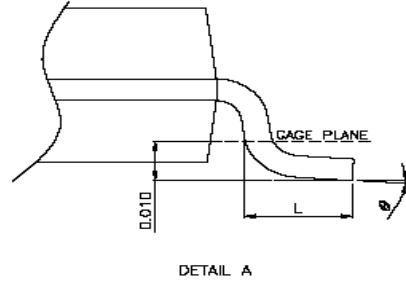
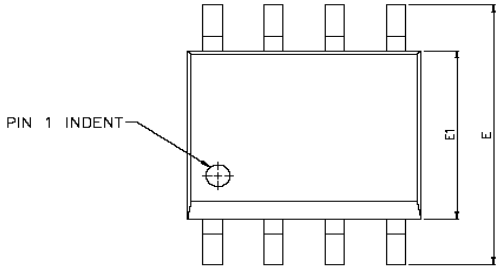
Note: The OLP delay time is proportional to the period of switching cycle. So that, the lower RI resistor value will set the higher switching frequency and the shorter OLP delay time.



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### SOP-8 PACKAGE OUTLINE



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	—	0.25	0.004	—	0.010
A2	—	1.45	—	—	0.057	—
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	—	1.27	—	—	0.050	—
L	0.38	0.71	1.27	0.015	0.028	0.050
$\Delta$ y	—	—	0.076	—	—	0.003
$\theta$	0°	—	8°	0°	—	8°



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