Description

The OB2269 is a highly integrated current mode PWM controller IC for those high output power of off line flyback convertor. The output power is up to 120W.

OB2269 is integrated start-up circuit that realizes low quiescent dissipation and overload compensation.

OB2269 has comprehenisve protecit onf eature to ensure reliability of application system.

The packaging of OB2269 has SOP8 and DIP8.

Features

- Digit frequency shuffling technology to improve EMI performance.
- External programmable PWM switching frequency.
- Leading edge Blanking on current sense input.
- Internal synchronized slope compensation .
- Burst mode control to improve efficiency and optimize standby power consumption.

- Low start-up current and low operating current.
- Comprehensive protection functions
  1、 Under voltage locked with hysteresis (UVLO) on VDD
  2、Over voltage protection (OVP) on VDD.
  3、Cycle-by-Cycle current limitation
  4、 Over load protection (OLP)
  5、 Over temperature protection (OTP)
- Current limitation compensation to obtain the same output current in universal AC line input.
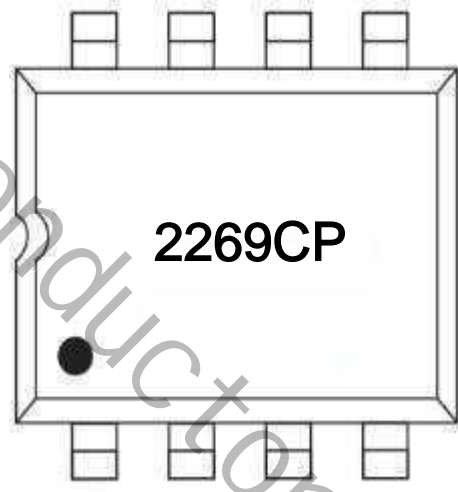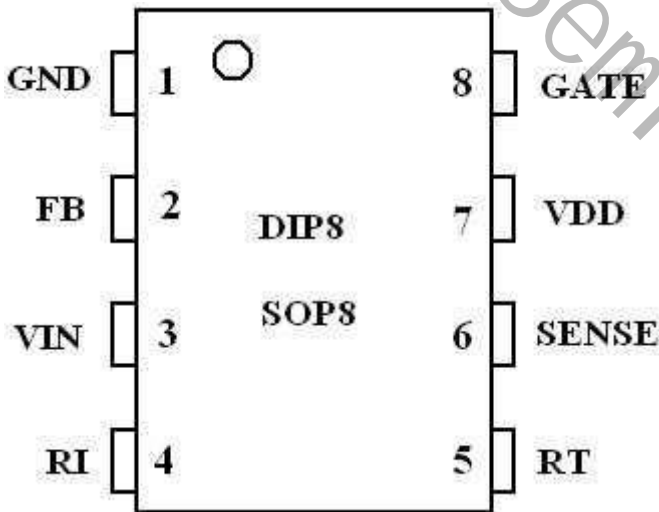- 800mA Drive Capability

Applications

- Digital Cameras Charger
- Power adaptor
- Battery charger

Application Circuit
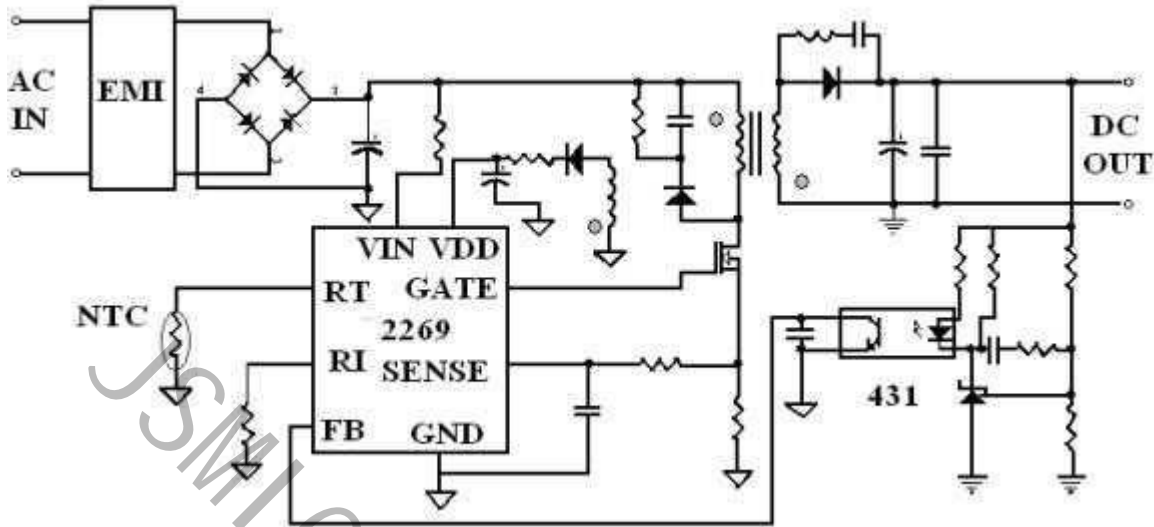
Pin Assignment & Marking Information

Ordering Information

Part number	Package
OB2269	SOP-8
OB2269	DIP-8

Pin Description

Pin Number	Symbol	Type	Description
1	GND	P	Ground.
2	FB	I	Feedback input pin.
3	VIN	I	Start-up and overload compensation current input pin
4	RI	I/O	Internal oscillator frequency setting pin.
5	RT	I/O	Temperature sensing input pin,connected through a NTC resistor to GND.
6	SENSE	I	Current sense input pin.
7	VDD	P	Chip DC power supply pin.
8	GATE	O	Totem-pole gate diver.

Recommended Out Power

Product	Input:230VAC±15%	Input:85-264VAC
	Adapter	Adapter
OB2269	120W	90W

Block Diagram
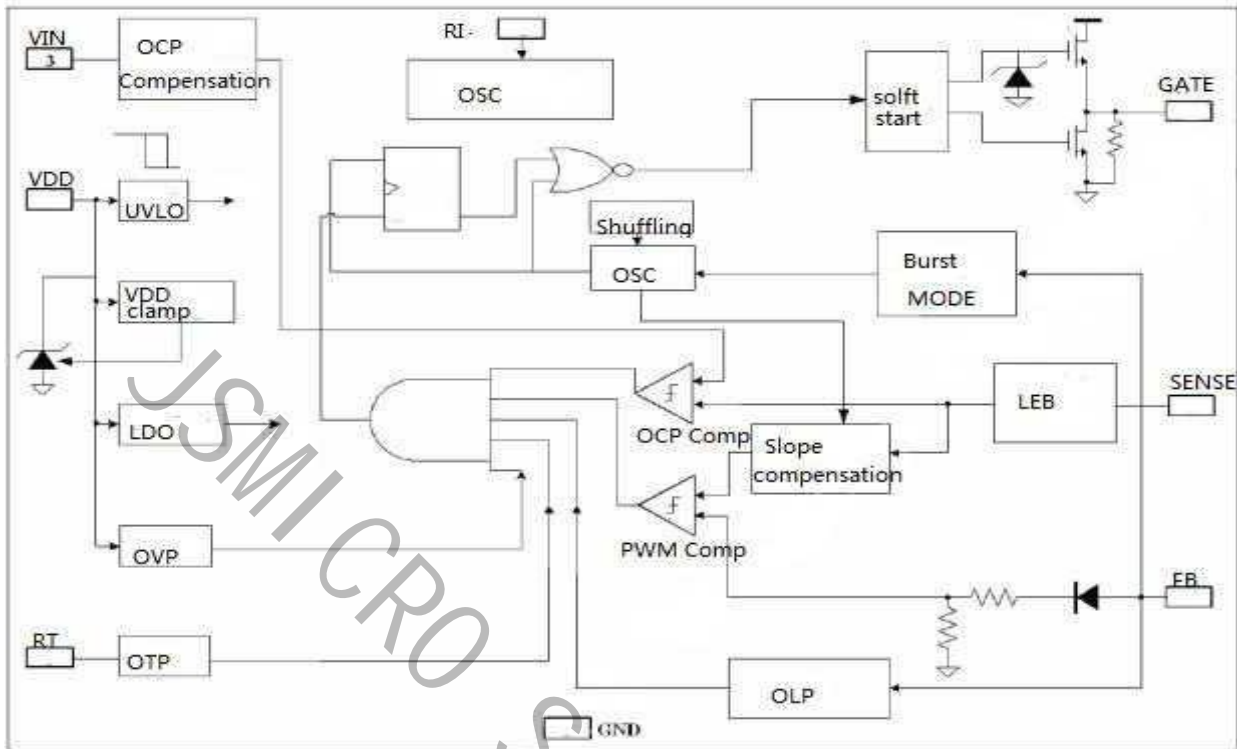
Absolute Maximum Rating

Parameter	Value	Unit
VDD/VIN Input voltage	30	V
VDD clamp voltage	32	V
VDD clamp continuous current	10	mA
FB input voltage	-0.3 to 7	V
SENSE input voltage	-0.3 to 7	V
RT input voltage	-0.3 to 7	V
RI input voltage	-0.3 to 7	V
Operating ambient temperature	-20 to 85	℃
Min/Max operating junction temperature	-55 to 150	℃
Thermal resistance,Junction to ambient SOP8	150	℃/W
Thermal resistance,Junction to ambient DIP8	100	℃/W

Note: Stresses above absolute maximum ratings may cause permanents damage to the device. Exposure to absolutely maximum-rated conditions for extended periods may affects device reliability

Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
VDD	Supply Voltage	8	25	V
T$_A$	Operating Ambient Temperature	−20	85	℃

ESD Information

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
HBM	Human body model on all pins	JEDEC-STD		3		KV
MM	Machine model on all pins	JEDEC-STD		250		V

Electrical Characteristics (T$_A$ = 25 ℃ without special notation)

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max	
Supply Voltage (VDD Pin)						
Idd_start-up	VDD start-up current	VDD=12.5V, RI=24K		6	10	uA
Idd	VDD operating current	VDD=18V, RI=24K , FB=3.6V		2.3		mA
UVLO (enter)	VDD under voltage lockout enter		8.5	9	10	V
UVLO(exit)	VDD under voltage lockout exit		14.5	15	16	V
OVP(enter)	VDD over voltage protection enter		25.5	26.5	27.5	V
VDD_clamp	VDD clamp voltage	Idd = 10mA	29	30	31	V
Voltage Feedback (FB Pin)						
AVCS	PWM input gain	ΔVFB / ΔVSENSE		2.8		V/V
VFB_open	open loop voltage			5.8		V
VFB_burst	Burst mode voltage			1.1		V
IFB_short	FB pin short current	Short FB pin to GND and measure current		780		uA
VTH_PL	Power limiting FB threshold voltage	Iout =−10mA		3.7		V
TD_PL	Power limiting delay time			80		mS
Current Sense(CS Pin)						
T_blanking	Leading-edge blanking time			250		nS
ZSENSE_IN	Input impedance			30		K
VTH	Current limitation threshold voltage	I(VIN)= 0 uA		0.85		V
Oscillator(RI Pin)						

Fosc	Normal oscillation frequency	RI=24K	60	65	70	Khz
Δf_temp	Frequency temperature stability	TA -20℃ to 100℃ VDD=16V, RI=24K		2		%
Δf_VDD	Frequency voltage stability	VDD=12V to 25V RI=24K		2		%
RI_range	Operating resistor range		12	24	60	K
VRI	Voltage of RI to GND	RI=24K		2		V
Fosc_BM	Burst mode base frequency			25		Khz
DC_MAX	Maximum duty cycle	VDD=18V, FB=3V SENSE=0V		80		%
Δf_OSC	Frequency modulation range /Base frequency		-5		+5	%
Gate Drive Output(GATE Pin)						
VOL	Output low level	VDD=18V, IO=-20mA			0.3	V
VOH	Output high level	VDD=18V, IO=20mA	11			V
V_Clamp	output clamp voltage level			16		V
T_r	Output rising time	VDD=18V, CL=1nF		110		nS
T_f	Output falling time	VDD=18V, CL=1nF		40		nS
Over Temperature Protection (RT pin)						
I_RT	Output current of RT pin			70		uA
V_OTP	OTP threshold voltage			0.65		V
V_OTP_off	OTP recovery threshold voltage			0.8		V
T_OTP	OTP delay time			100		uS
Start up and Current limitation compensation (VIN pin)						
G_VIN	Current limitation compensation gain	$\Delta I_{VIN}/\Delta V_{CS}$		2		mS

Application Information

The OB2269 is a highly integrated current mode PWM controller IC for those high output power of off line flyback convertor. The output power is up to 120W. Its main features are optimized for OB2269 in driving capability, quiescent dissipation, current limitation compensation and low cost and reliability.

Start-up Current and Start-up Control

OB2269 has very low start-up current that is less than 10uA. Therefore, the voltage of VDD could be charged up above UVLO(exit) threshold level quickly. A large value resistor can be used in the start-up circuit to minimize quiescent dissipation. The typical resistance value of resistor is 2M Ohms in start-up circuit of OB2269 The start-up resistor can be connected with the VIN pin or the capacitor of VDD to provide start-up current.

Operating Current

The Operating current of OB2269 is less than 2.3mA. Therefore, OB2269 can have good efficiency.

Frequency shuffling for EMI improvement

The frequency Shuffling is implemented in OB2269 The oscillation frequency is modulated with a random source so that the harmonic energy is spread out. The spread spectrum minimizes the conduction EMI and therefore reduces system design challenge.

Burst Mode Operation

At zero load or light load condition, the main power dissipation in a switching mode power supply is from switching on the MOSFET, the core of transformer and the snubber circuit. The magnitude of power dissipation is proportional to the number of switching frequency within certain period. Less switching frequency can reduce the power dissipation.OB2269 adjusts the switching frequency according to the loading condition. From light load to no load, the FB voltage drops. While the FB voltage is less than 1.1V, the gate pin output is disabled and kept low, while the FB voltage is higher than 1.2V, the gate output recovers to normal working mode. To reduce audio noise, the switching frequency will be kept higher than 20KHz in burst mode.

Oscillator Operation

The oscillating frequency of OB2269 is set by the externally resistor between the RI pin and the GND pin. It is recommended that the range of oscillation frequency is in between 20KHz and

100KHz. The relationship between the resistor and the oscillation frequency follows below equation.

$$Fosc = \frac{1625}{RI(K\Omega)+1} \quad (KHz)$$

Current Sensing and Leading-Edge Blanking

Cycle-by-Cycle current limitation is offered in OB2269. The switching current is detected by a resistor into the SENSE pin. An internal leading-edge blanking circuit chops off the SENSE voltage spike at initial so that the external RC filtering on SENSE pin is no longer required. The current limiting comparator is disabled and thus cannot turn off the external MOSFET during the blanking period. PWM duty cycle is determined by the voltage in the SENSE pin and the FB pin

Internal Synchronized Slope Compensation

Built-in slope compensation circuit adds voltage ramp onto the current sense input voltage for PWM generation. This greatly improves the close loop stability at CCM and prevents the sub-harmonic oscillation and thus reduces the output ripple voltage.

Over Temperature Protection

OB2269 is specially optimized for the high output power system. If the temperature from the environment or the component is too high, it results in the system damage.OB2269 provides the function of temperature sensing and the function of over temperature protection. The voltage on the RT pin is determined by resistor between the RT pin and the GND pin. The resistor is usually a NTC resistor. With the Fixed internal current flowing through the resistor, the voltage on the RT pin varies with the resistance value of NTC resistor. When the voltage on the RT pin is less than 0.65V, OB2269 is shut down and recovers when the voltage on the RT pin is higher than 0.8V.

Gate Drive

OB2269 Gate pin is used to drive Gate of the external MOSFET. OB2269 has 800mA of sinking and sourcing current that can minimize the switching dissipation of the MOSFET. Therefore, higher efficiency can be obtained. The internally totem pole circuit of the GATE pin can control the MOSFET to be turned on slowly and turned off faster. There is very good compromise between high efficiency and low radiation EMI.

Protection Controls

OB2269 has comprehensive protection functions, including Cycle-by- Cycle current limitation (OCP), Over Load Protection (OLP) and over voltage clamp, Under Voltage Lockout on VDD (UVLO), Over Temperature Protection (OTP).

Current limitation compensation

To obtain the same output current capability in the universal AC line voltage range, OB2269 has current limitation compensation. To obtain good current limitation compensation, the start-up resistor must be connected with the VIN pin.

Package Information：

SOP-8
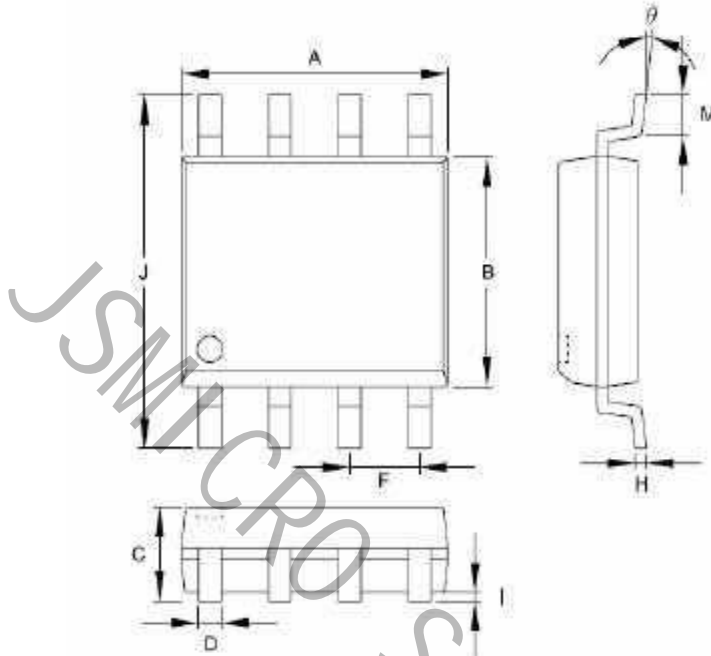
Symbols	Dimensions in Millimeters		Dimensions in Inch	
	MIN	MAX	MIN	MAX
A	4.801	5.004	0.189	0.197
B	3.810	3.988	0.150	0.157
C	1.346	1.753	0.053	0.069
D	0.330	0.508	0.013	0.020
F	1.194	1.346	0.047	0.053
H	0.178	0.229	0.007	0.009
I	0.102	0.254	0.004	0.010
J	5.791	6.198	0.228	0.244
M	0.406	1.270	0.016	0.050
θ	0°	8°	0°	8°

DIP-8
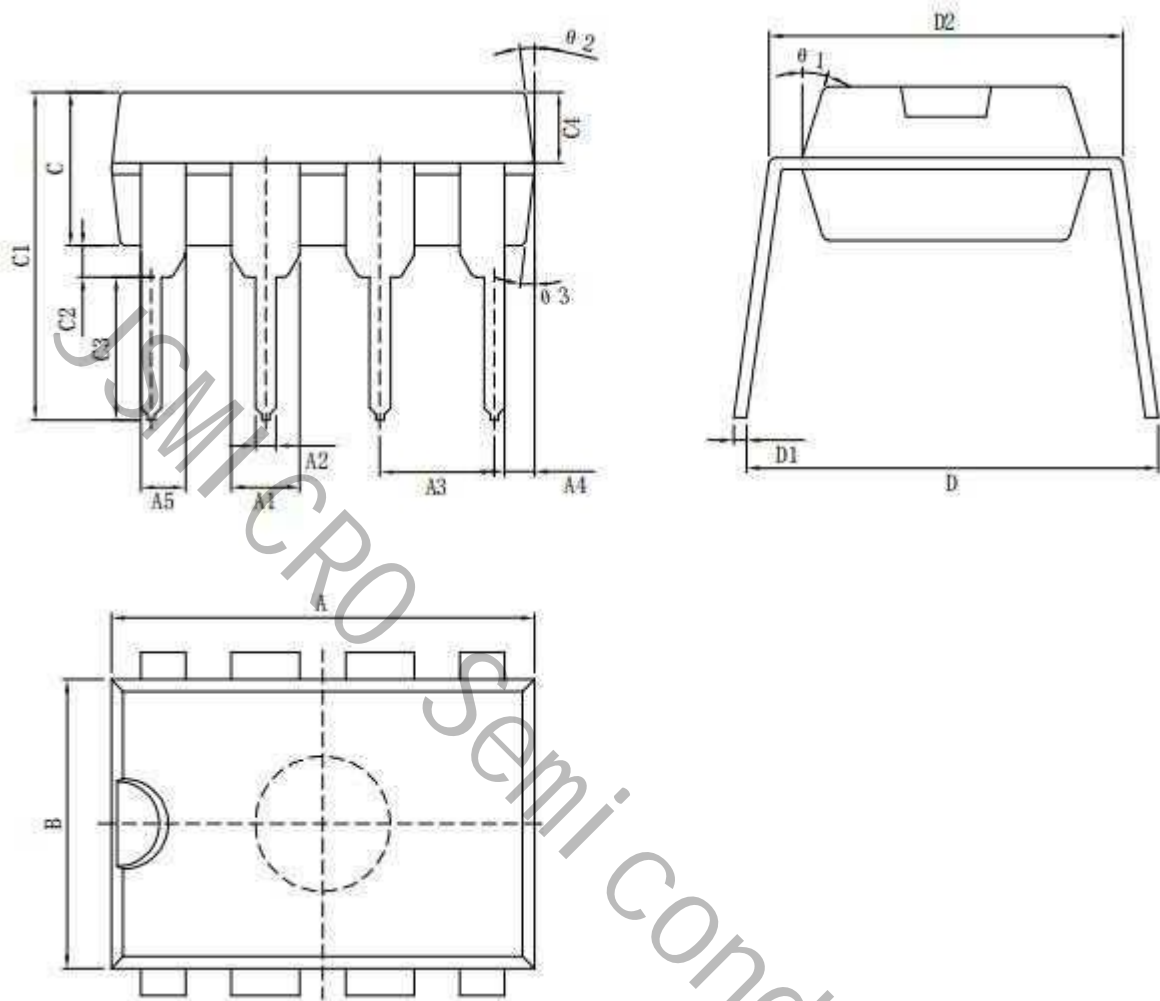
Symbol \ Size	MIN (mm)	MAX (mm)	Symbol \ Size	MIN (mm)	MAX (mm)
A	9.00	9.20	C2	0.50TYP	
A1	1.474	1.574	C3	3.20	3.40
A2	0.41	0.51	C4	1.47	1.57
A3	2.44	2.64	D	8.20	8.80
A4	0.51TYP		D1	0.244	0.264
A5	0.99TYP		D2	7.62	7.87
B	6.10	6.30	θ1	17° TYP4	
C	3.20	3.40	θ2	10° TYP4	
C1	7.10	7.30	θ3	8° TYP	