FEATURES

- Extended Burst Mode Operation
- Level 6 compliance with <75mW standby power at universal AC input
- Audio noise free operation
- Fixed 65KHz(typical) switching frequency
- Power on soft start reducing MOSFET Vds stress
- Frequency shuffling for EMI
- Leading edge blanking on current sense input
- Over voltage protection(OVP)
- RM proprietary line
- Over temperature protection (OTP) with auto-recovery
- VDD under voltage lockout with hysteresis(UVLO)
- Accurate Overload protection(OLP)
- Cycle-by-Cycle over-current threshold setting for constant output power limiting over universal input voltage range
- Secondary Rectifier Short Protection

GENERAL DESCRIPTION

RM6314D combines a dedicated current mode PWM controller with a high voltage power MOSFET,.It is optimized for high voltage power standby power. And cost effective off-line fly-back converter applications in sub 18W range.

RM6314D offers complete protection coverage with automatic self-recovery feature including Cycle-by-Cycle current limiting (OCP), over load protection (OLP), over voltage protection and VDD under voltage lockout (UVLO). Excellent EMI performance is achieved with Reactor-micro proprietary frequency shuffling technique together with soft switching control at the totem pole gate driver output.

The tone energy at below 20KHz is minimized in the design and audio noise is eliminated during operation.

RM6314D is offered in DIP8 package.

APPLICATIONS

- AC/DC adapter
- Open-frame SMPS
- VCR,SVR,STB,DVD&DVCD Player SMPS
- Auxiliary Power Supply for PC and Server
- Set-Top Box Power
- Digital Cameras and Camcorder Adapter

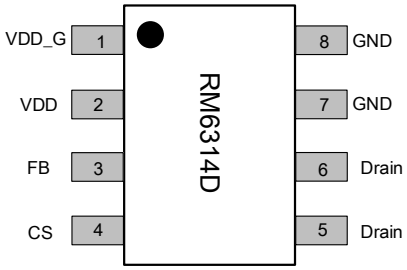
ORDERING INFORMATION

Product Name	Package	Silk Screen	Description	Package
RM6314D	DIP-8	RM6314D	Halogen-Free	Tube

OUTPUT POWER TABLE

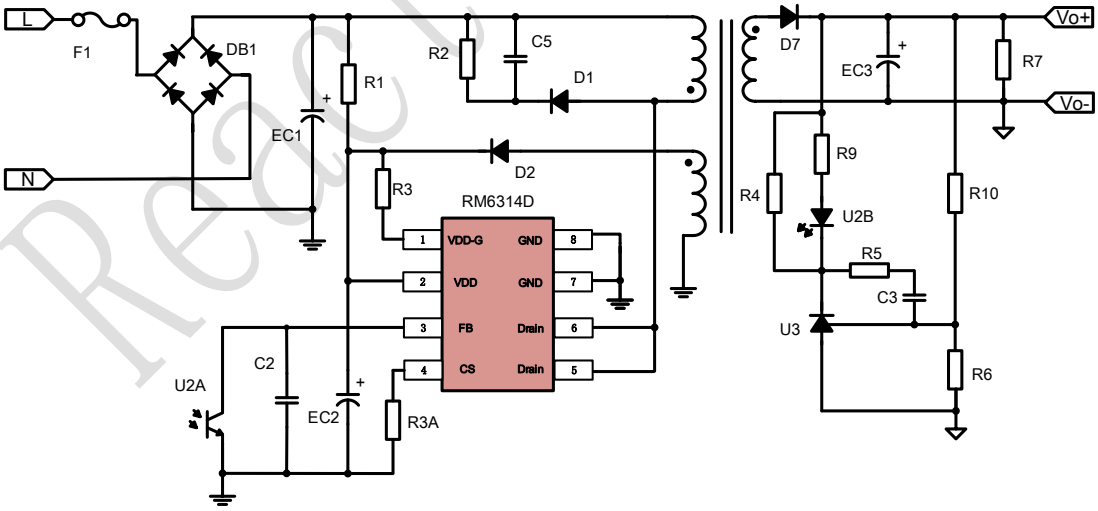
Product Name	185V----264V		90V----264V	
	Adapter	Open Frame	Adapter	Open Frame
RM6314D	20W	24W	18W	24W

PIN CONFIGURATION

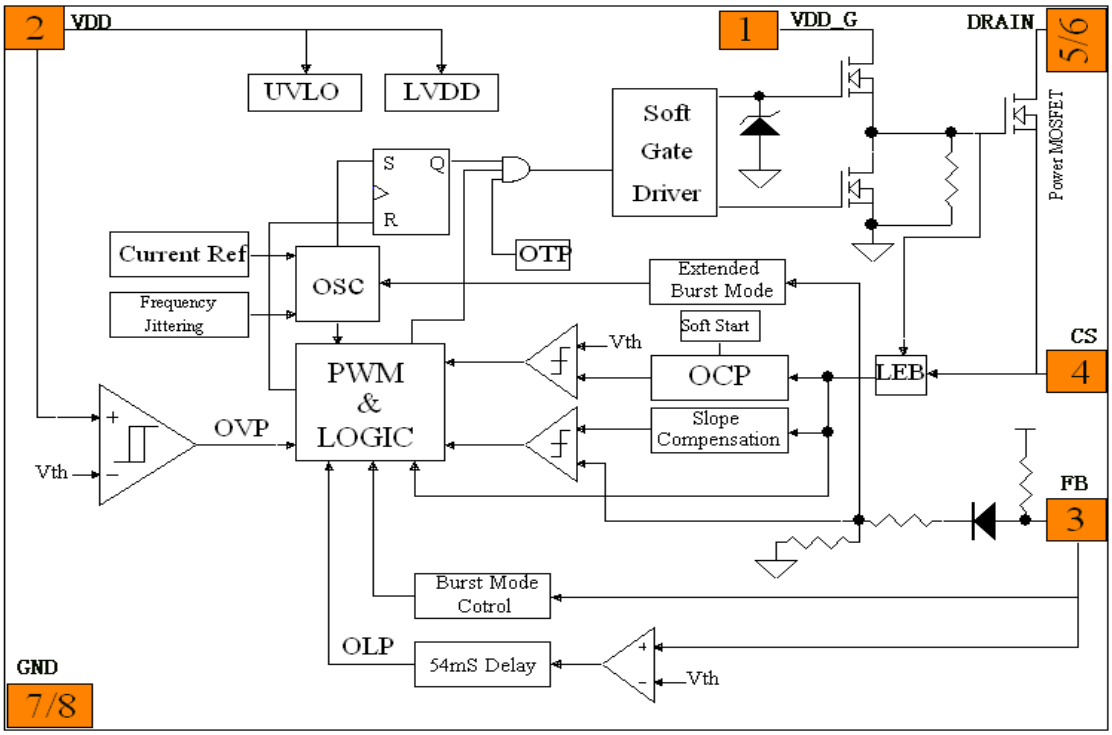


Pin Number	Pin Name	Description
1	VDD_G	Internal Gate Driver Power Supply
2	VDD	DC power supply input
3	FB	Feedback input pin
4	CS	Current sense input
5/6	Drain	HV MOSTET Drain Pin
7/8	GND	Ground

TYPICAL APPLICATION



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Paramter	Value	Unit
HV-MOSFET Voltage(V_{DGR})	650	V
VDD/VDD_G Voltage(V_{GS})	-0.3 to 40	V
CS/FB Voltage(V_{CS},V_{FB})	-0.3 to 7	V
Min/Max Operating Junction Temperature (T_J)	-40 to 150	℃
Min/Max Storage Temperature (T_{amb}=25℃)	-50 to 150	℃
Lead Temperature（10S）	260	℃

ELECTRICAL CHARACTERISTICS

(VDD=18V, TA=25℃, unless otherwise stated)

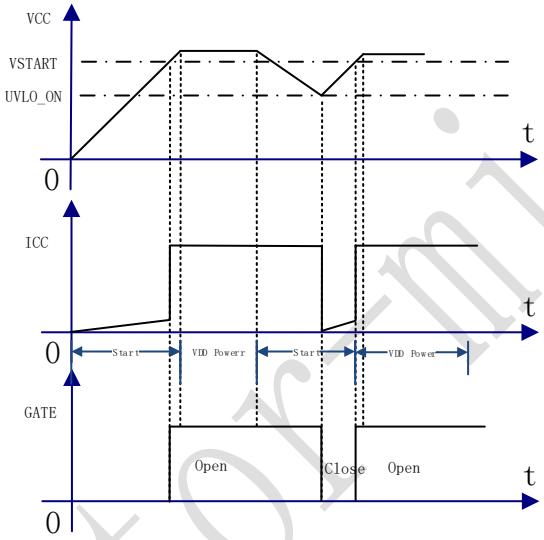
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage（VDD PIN）						
VDD Start up Current	$I_{\_Startup}$	VDD=15V		6	20	uA
Operation Current	$I_{\_VDD\_ON}$	V_{FB}=3V		1.3		mA
VDD Under Voltage Lockout Enter	$UVLO_{\_ON}$		7.0	8.0	9.0	V
VDD Under Voltage Lockout Exit(Recovery)	$V_{\_VDD\_ON}$		16	17	18	V
Over voltage protection voltage	$VDD_{\_OVP\_ON}$	CS=0V,FB=3V	27	29	32	V
Feedback Input Section（FB PIN）						
FB Open Loop Voltage	V_{FB_open}		4.5	4.9	5.5	V
FB short circuit current	I_{FB_short}			0.35		mA
Zero Duty Cycle FB Threshold Voltage	V_{TH_0D}			0.8		V
Power Limiting FB Threshold Voltage	V_{TH_PL}			3.5		V
Power Limiting Debounce Time	T_{D_PL}			54		ms
Input Impedance	Z_{FB_IN}			15.7		KΩ
Current Sense Input（CS Pin）						
Soft stat time	$T_{softstart}$			4		ms
Leading Edge Blanking time	$T_{blanking}$			600		ns
Input Impedance	Z_{CS_IN}			40		KΩ
Over Current Detection and Control Delay	T_{D_OC}			100		ns
Internal Current Limiting Threshold Voltage	V_{TH_OC}	FB=3V	0.72	0.75	0.78	V
Oscillator						
Normal Oscillation Frequency	F_{OSC}		60	65	70	kHz
Frequency Jittering Range	$\Delta f_{\_OSC}$		-4		4	%
Frequency Temperature Stability	$\Delta f_{\_Temp}$			5		%
Frequency Voltage Stability	$\Delta f_{\_VDD}$			5		%
Maximum duty cycle	$D_{\_max}$	FB=3V, CS=0V	65	75	85	%
Burst Mode Base Frequency	$F_{\_Burst}$			22		kHz
MOSFET						
Drain-Source Breakdown Voltage	BV_{dss}	V_{GS}=0V，I_{DS}=250uA	650			V
Static Drain to Source On Current	ID			4		A
Static Drain to Source On Resistance	$R_{DS(on)}$	V_{GS}=10V，I_{DS}=2A		2.0	2.4	Ω
Over Temperature protection						
Over temperature protection trip point	OTP			150	160	℃

OPERATION DESCRIPTION

The RM6314D is a low power off-line SMPS Switcher optimized for off-line fly-back converter applications in sub 18W power range. The Extended burst mode control greatly reduces the standby power consumption and helps the design easily to meet the international power conservation requirements.

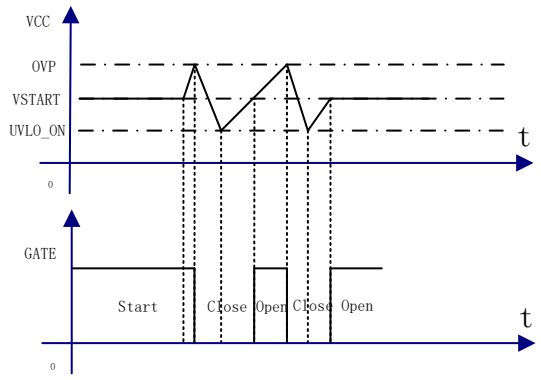
● Under Voltage Lock Out

At overload condition when FB input voltage exceeds power limit threshold value for more than TD_PL control circuit reacts to shut down the switcher. Switcher restarts when VDD voltage drops below UVLO limit. Similarly control circuit shutdowns the power MOSFET when an Over Temperature condition is detected or the sense pin is opened.



● Over Voltage Protection

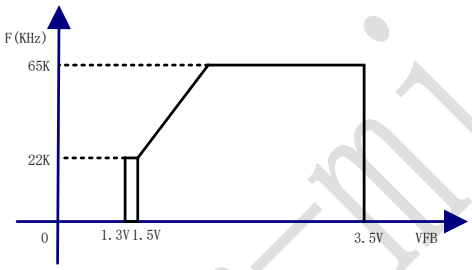
Over Voltage Protection starts at 28V of VDD Voltage. When the electrical system exception occurs or Output short circuit occurs , the VDD Voltage continues rising until Over Voltage Protection spot, VDD system stop the power supply, all the electrical system close up and go on self-inspection. If the the electrical system exception remove abnormal, VDD Voltage restarts and the electrical system goes to work.



● Extended Burst Mode Operation

At light load or zero load condition, most of the power dissipation in a switching mode power supply is from switching loss on the MOSFET, the core loss of the transformer and the loss on the snubber circuit. The magnitude of power loss on the snubber circuit. The magnitude of power loss is in proportion to the switching frequency. Lower switching frequency is internally adjusted at no load or light load condition. The switch frequency reduces at light/no load condition to improve the conversion efficiency. At light load or no load condition, the FB input drops below burst mode threshold level and device enters Burst-Mode control. The gate drive output switches only when VDD Voltage drops below a preset level and FB input is active to output an on state. Otherwise the gate drive remains at off state to minimize the switching loss and reduces the standby power consumption to the greatest extend.

The switching frequency control also eliminates the audio noise at any loading conditions.

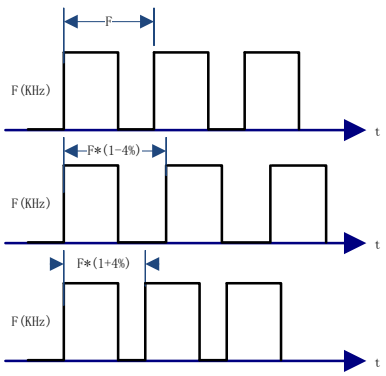


● Driver

The internal power MOSFET in RM6314D is driven by a dedicated gate driver for power switch control. Too weak the gate driver strength results in higher conduction and switch loss of MOSFET while too strong gate drive results in the compromise of EMI.

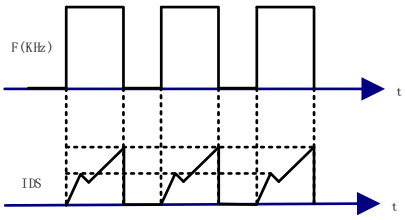
A good tradeoff is achieved through the built-in totem pole gate design with right output strength an dead time control. The low idle loss and good EMI system design is easier to achieve with this dedicated control scheme.

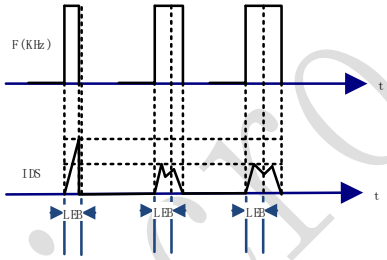
In addition to the gate drive control scheme mentioned. The gate drive strength can also be adjusted externally by a resistor connected between VDD and VDDG, the falling edge of the Drain output can be well controlled. It provides great flexibility for system EMI design.



● Current Sensing and Leading Edge Blanking

Cycle-by-Cycle current limiting is offered in RM6314D current mode PWM control, The switch current is detected by a sense resistor into the sense pin. An internal leading edge blanking circuit chops off the sensed voltage spike at initial internal reverse recovery and surge gate current of internal power MOSFET so no longer needed. The current limiting comparator is disabled and cannot turn off the internal power MOSFET during the blanking period. The PWM duty cycle is determined by the current sense input voltage and the FB input voltage.



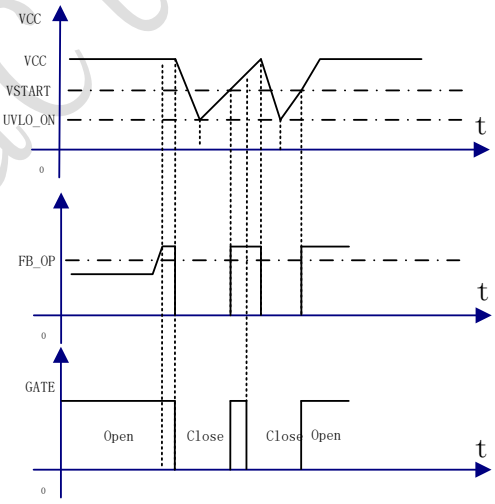


● Internal Synchronized Slope Compensation

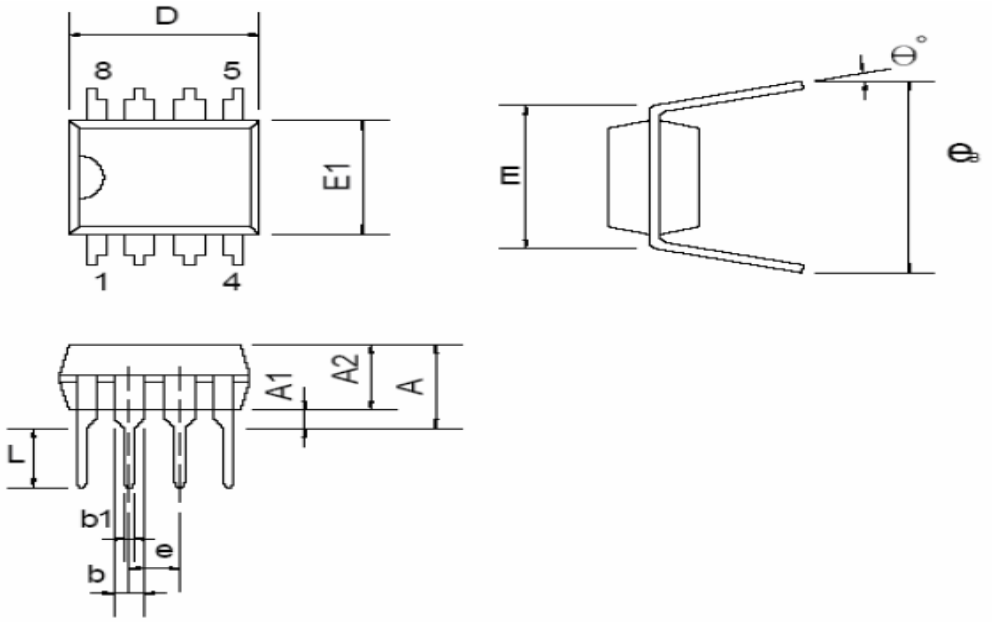
Built-in slope compensation circuit adds voltage ramp onto the current sense input voltage for PWM generation. This greatly improves the close loop stability at CCM and prevents the sub-harmonic oscillation and thus reduces the output ripple voltage.

● Over Load Protection

When the secondary rectifier is shorted, the transformer acts like a leakage inductance. Meanwhile, the current spike is extremely high. During high line input, the current in power MOSFET is too high to wait for OLP delay time. To offer reliable design, RM6314D shut down the switcher and enter into auto-recovery mode in this case.



PACKAGE MECHANICAL DATA(DIP-8)



Symbol	Millimeter			Inch		
	Min	Typ	Max	Min	Typ	Max
A			5.334			0.210
A1	0.381			0.015		
A2	3.175	3.302	3.429	0.125	0.130	0.135
b		1.524			0.060	
b1		0.457			0.018	
D	9.017	9.271	10.160	0.355	0.365	0.400
E		7.620			0.300	
E1	6.223	6.350	6.477	0.245	0.250	0.255
E		2.540			0.100	
L	2.921	3.302	3.810	0.115	0.130	0.150
e_B	8.509	9.017	9.525	0.335	0.355	0.375
θ °	0°	7°	15°	0°	7°	15°