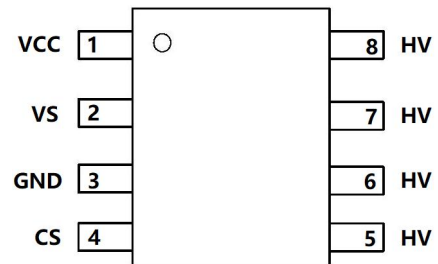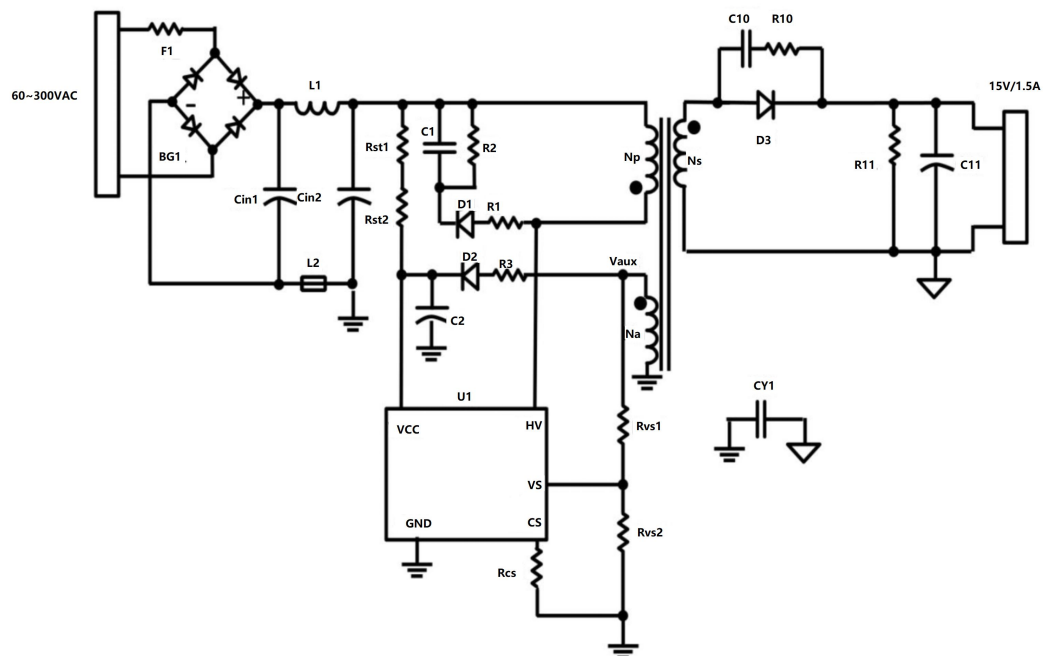# Features

- Wide input AC range: 60Vac~300Vac
- Output power: 15~18W
- Built-in 720V/4A power MOS
- LM to 75KHz operating frequency
- Adjustable cable compensation (3%~8%)
- Quasi-resonant turn on
- Control loop open protection
- Output short circuit protection
- 150mW standby power @230Vac
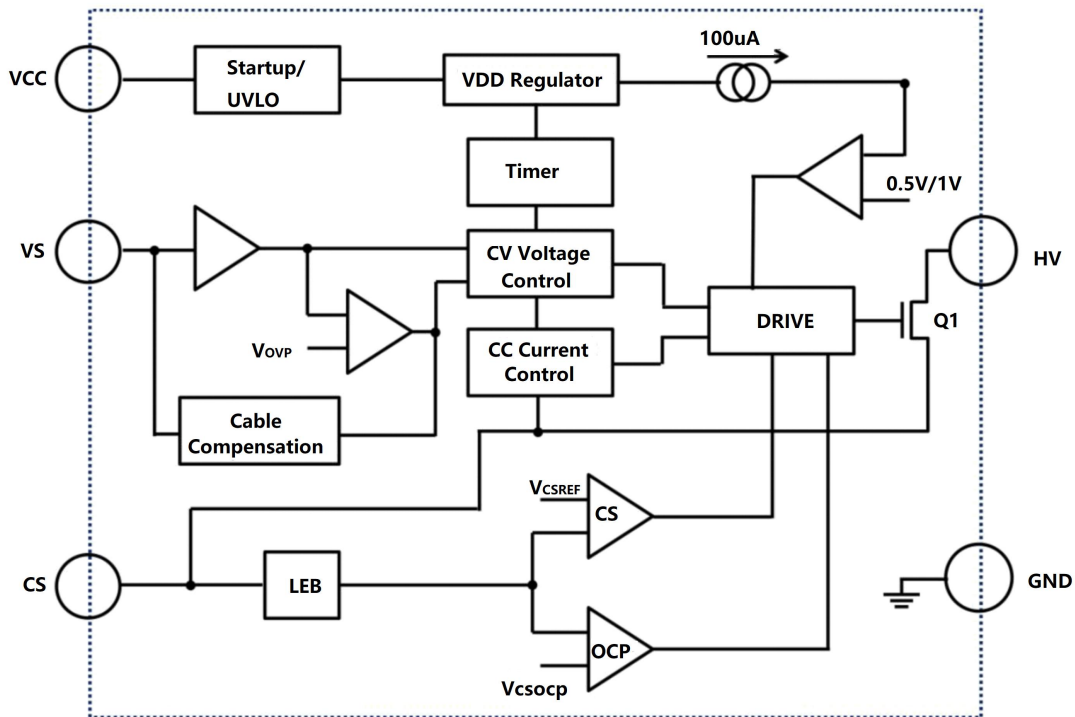- DoE(VI)/CoC tier2 compliant efficiency

Pin		Pin
VCC 1		8 HV
VS 2		7 HV
GND 3		6 HV
CS 4		5 HV

Applications

- USB Type-C chargers
- Adapters

Typical applications

Functional block diagram

Pin definitions

Pin Name	Pin Type	Pinout	Pin Functions
VCC	Power	1	SLMply of operating current of the switcher
VS	Input	2	Voltage sense of secondary winding
GND	Ground	3	Ground of the chip
CS	Input	4	Current sense of primary winding
HV	Power	5~8	Drain of power MOSFET

Absolute maximum ratings (Note 1)

Parameter	Name	Range	Unit
Drain voltage of Power MOSFET	HV	-0.5 to 720	V
Voltage at VCC to Ground	VCC	-0.5 to 40	V
VS input voltage	VS	-30 to 6	V
Voltage at CS to Ground	CS	-0.5 to 6	V
Voltage at NTC to Ground	NTC	-0.5 to 6	V
Maximum junction temperature	T_{JMAX}	150	℃
Lead temperature	T_{LEAD}	260	℃
Storage temperature	T_{STG}	-55 to 150	℃
ESD rating per ANSI/STM5.1-2001	HBM	2000	V
ESD rating per JEDEC EIA/JESD22-C101F	CDM	1000	V
LatchLM test per JEDEC 78D		+/-200	mA

Note1: Stresses over those listed under "Absolute maximum ratings" may cause permanent damages to the device. These are stress ratings only. Functional operation beyond those

under "Recommended operating conditions" is not implied.

Thermal parameter

Junction to ambient thermal resistance	θ_{JA}(SOP 8)	100	℃/W
Over temperature protection	T_{OTP}*	160	℃

*Typical, guarantee by design

Recommended operating con

Symbol	Parameter	Range	Unit
HV	Power MOSFET Drain voltage	0~720	V
VCC	SLMply Voltage	8~36	V

Electrical parameter (T_A=25℃,unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	MAX	Unit
Power sLMply(VCC pin)						
VCC over voltage protection	VCC_{OVP}		33	36	39	V
Quiescent current @ no load	Icc	VCC=Vst-1V	240	300	360	µA
StartLM voltage	V_{ST}		10.8	12.8	14.8	V
Minimum operating voltage	V_{UVLO}		6.8	7.5	8.2	V
StartLM current	I_{ST}	VCC=Vst-0.5V		0.1	0.6	µA
Constant voltage control(VS pin)						
VS regulation voltage	V_{FB}		1.81	1.84	1.87	V
Cable compensation current	I_{CAB}	At no load		54		µA
Minimum discontinuous time	D_{MIN}			1.5		ms
Constant current control (CS pin)						
Shutdown voltage @full load	V_{CSMAX}		580	600	620	mV
Shutdown voltage @light load	V_{CSMIN}			200		mV
Leading edge blanking	T_{LEB}			600		ns
Maximum duty of secondary winding conduction	D_{SMAX}		0.47	0.50	0.53	
Protection functions						
Over temperature protection	T_{OTP}		130	160	190	℃
NTC shutdown (falling)				0.5		V
NTC recovery (rising)				1.0		V
NTC pull LM current				100		µA
Output over voltage	V_{FBOVP}		2.2	2.5	2.8	V
Short circuit voltage	$V_{FBHICCLM}$		0.7	0.85	1	V
Power MOSFET (HV pin)						
MOSFET breakdown voltage	BV_{DSS}	I_{DSS}=250µA	720			V
MOSFET turn on resistance	R_{DSON}	V_G=10V,I_D=2A		2	2.5	Ω

Principle of operation

● **Power LM and power down sequences**

switching wave forms of typical application

● **Constant Voltage (CV) operation**

■ The cable compensation voltage at full load is:

$$V_{CAB} = I_{CAB}*R_{VS1}*(N_S/N_A)$$

■ The output voltage at cable end is：

$$V_O = |V_{FB}|*(1+R_{VS1}/R_{VS2})*(N_S/N_A)$$

■ The output voltage at PCB end is：

$$V_{OPCB} = V_O - V_{CAB}$$

■ The cable compensation percentage：

$$V_{CAB}/V_O = I_{CAB}*R_{VS1}/[|V_{FB}|*(1+R_{VS1}/R_{VS2})]-0.02$$

The term 0.02 is for load regulation compensation.

● **Constant Current (CC) operation**

Output current is limited by the maximum ratio of secondary winding conduction time (TONS) to the switching period (TSW). So
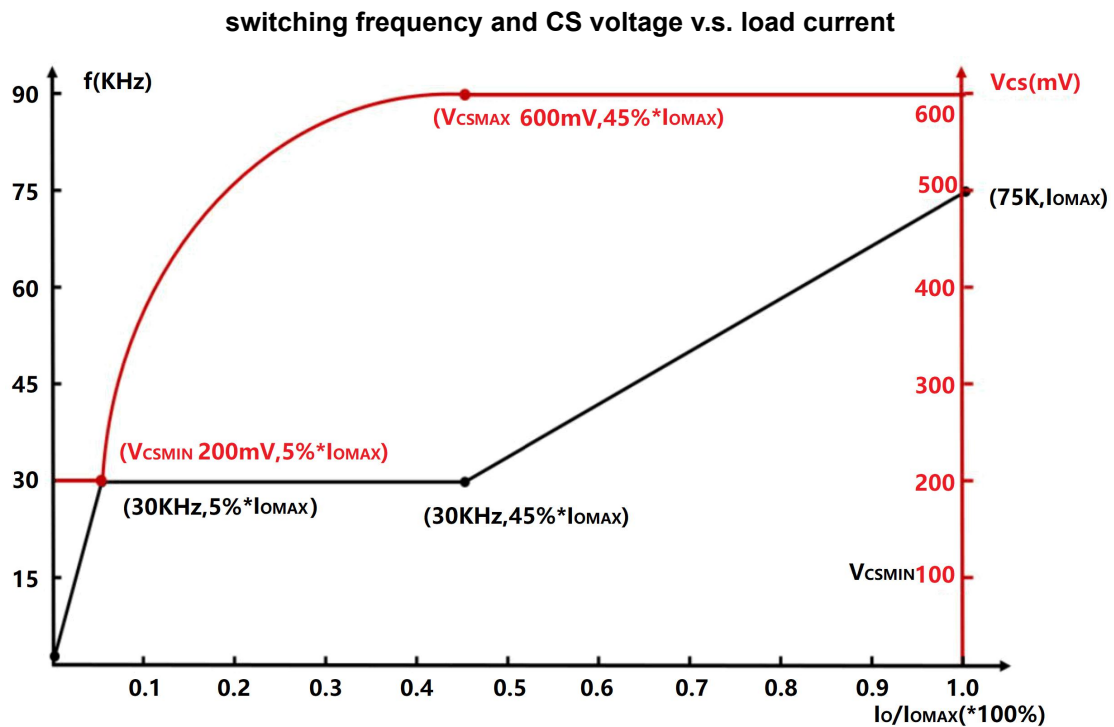
$$I_{OMAX} = 0.5*(V_{CSMAX}/R_{CS})*(N_P/N_S)*D_{SMAX}$$
$$\text{Where } D_{SMAX} = T_{ONSMAX}/T_{SW} = 0.5.$$

During the constant current operation, if the output voltage is lower than a specified voltage VSC for 64mS(typical), the output is regarded as shorted to ground, the switcher will go into hiccLM mode (startLM then shutdown repeatedly) until the output voltage is higher than

VSC again.

$$V_{SC}=V_{FBHICCLM}*(1+R_{VS1}/R_{VS2})*(N_S/N_A)+I_{CAB}*R_{VS1}*(N_S/N_A)$$

switching frequency and CS voltage v.s. load current

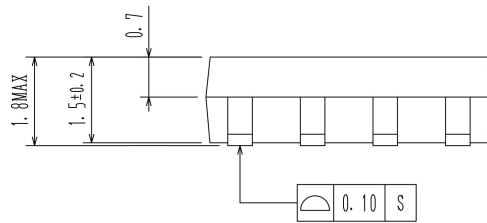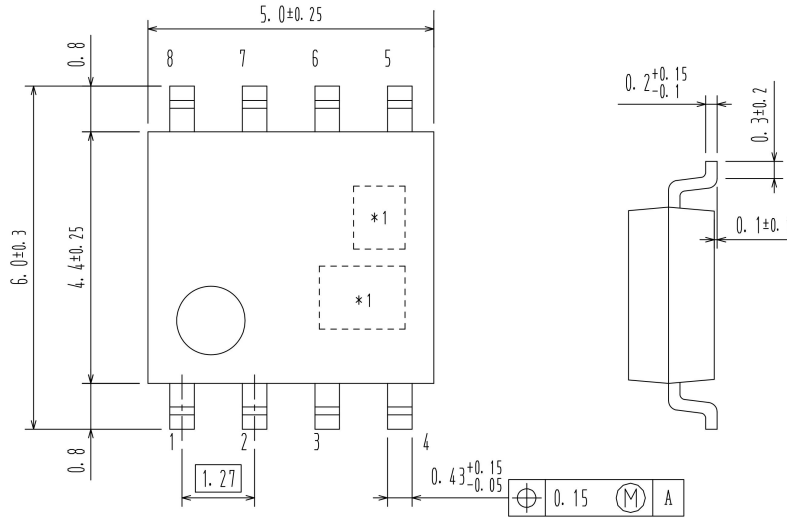- **Built-in output over voltage protection**

When the output voltage is over a specified value VOVP for 3 successive switching cycles, the internal output over voltage protection function will works, power transistor will be turned off until a new startLM event begins.

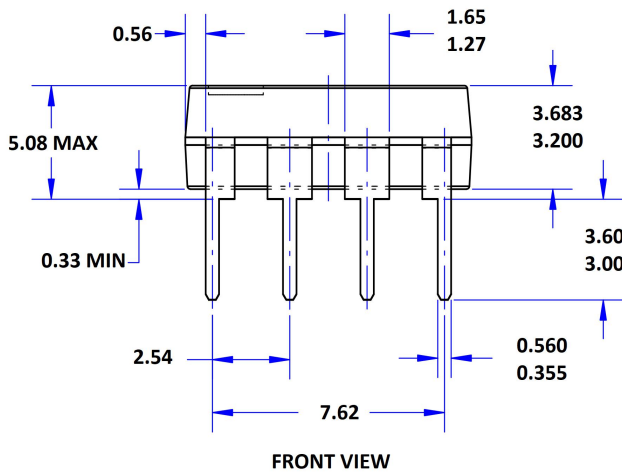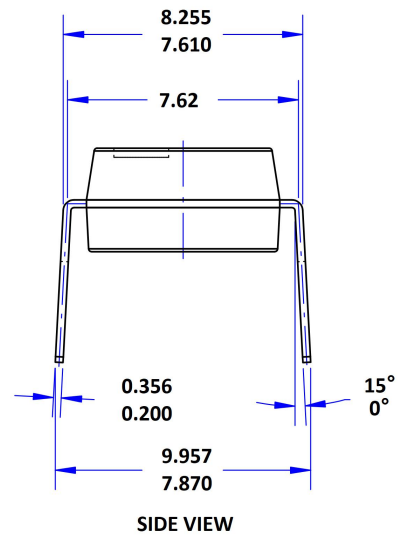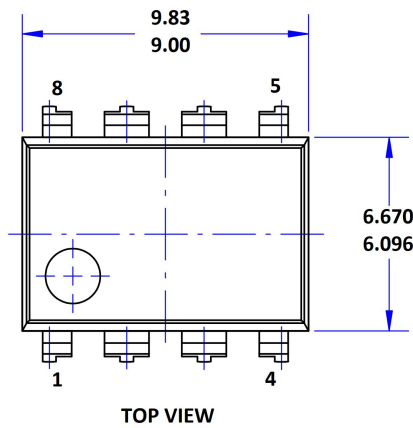$$V_{OVP}=|V_{FBOVP}|*(1+R_{VS1}/R_{VS2})*(N_S/N_A)+I_{CAB}*R_{VS1}*(N_S/N_A)$$

Ordering information

Part number	Package	Marking ID
	SOP8	PWM815YDN
	DIP8	PWM815YBN

Mechanical dimensions

SOP-8 **Unit: mm**

TOP VIEW

SIDE VIEW

FRONT VIEW

DIP-8 **Uint: mm**