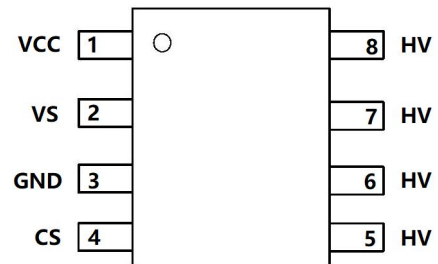


## Features

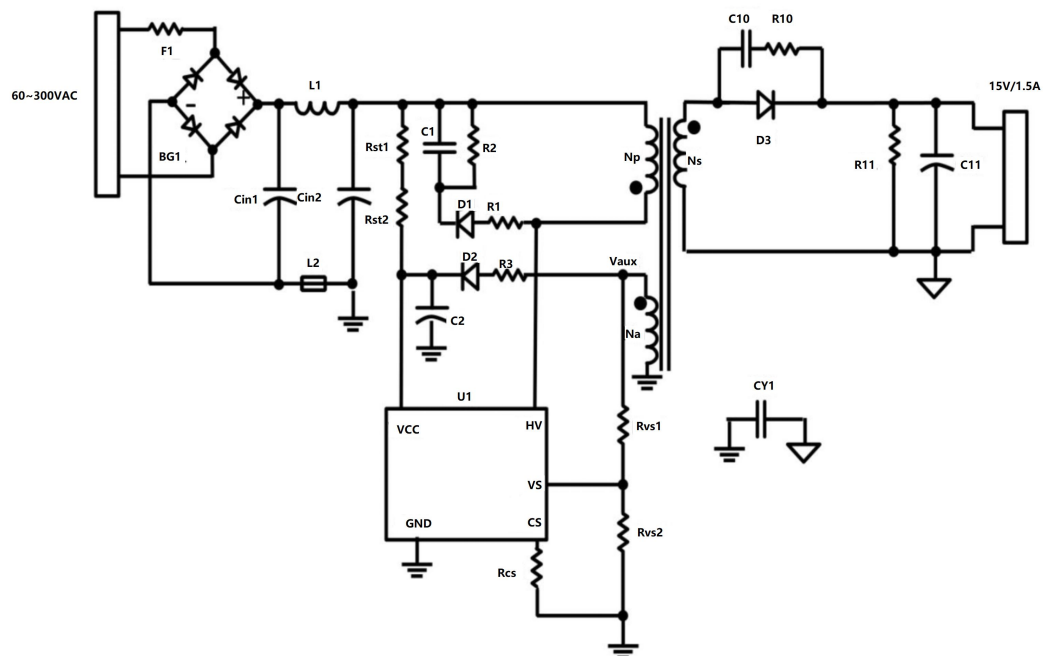
- Wide input AC range: 60Vac~300Vac
- Output power: 15~18W
- Built-in 720V/4A power MOS
- LM to 75KHz operating frequency
- Adjustable cable compensation (3%~8%)
- Quasi-resonant turn on
- Control loop open protection
- Output short circuit protection
- 150mW standby power @230Vac
- DoE(VI)/CoC tier2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



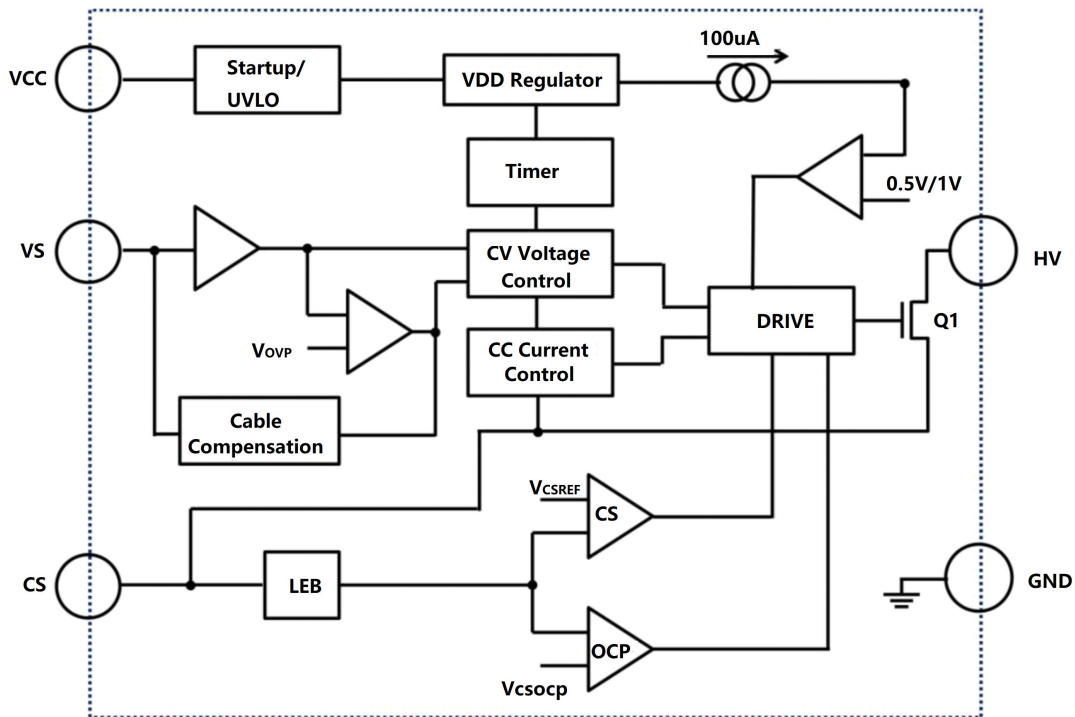
## Applications

- 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 <sub>JMAX</sub>	150	°C
Lead temperature	T <sub>LEAD</sub>	260	°C
Storage temperature	T <sub>STG</sub>	-55 to 150	°C
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	$\theta_{JA}(SOP\ 8)$	100	$^{\circ}C/W$
Over temperature protection	$T_{OTP}^*$	160	$^{\circ}C$

\*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

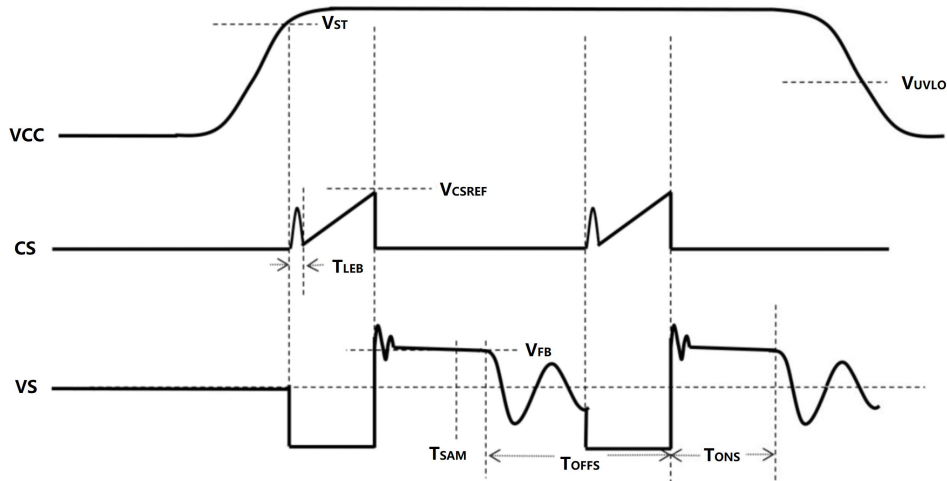
## Electrical parameter ( $T_A=25^{\circ}C$ , unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	MAX	Unit
<b>Power sLMply(VCC pin)</b>						
VCC over voltage protection	$V_{CCOVp}$		33	36	39	V
Quiescent current @ no load	$I_{CC}$	$V_{CC}=V_{st}-1V$	240	300	360	$\mu A$
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	$I_{ST}$	$V_{CC}=V_{st}-0.5V$		0.1	0.6	$\mu A$
<b>Constant voltage control(VS pin)</b>						
VS regulation voltage	$V_{FB}$		1.81	1.84	1.87	V
Cable compensation current	$I_{CAB}$	At no load		54		$\mu A$
Minimum discontinuous time	$D_{MIN}$			1.5		ms
<b>Constant current control (CS pin)</b>						
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	
<b>Protection functions</b>						
Over temperature protection	$T_{OTP}$		130	160	190	$^{\circ}C$
NTC shutdown (falling)				0.5		V
NTC recovery (rising)				1.0		V
NTC pull LM current				100		$\mu A$
Output over voltage	$V_{FBOVP}$		2.2	2.5	2.8	V
Short circuit voltage	$V_{FBHICCLM}$		0.7	0.85	1	V
<b>Power MOSFET (HV pin)</b>						
MOSFET breakdown voltage	$BV_{DSS}$	$I_{DSS}=250\mu A$	720			V
MOSFET turn on resistance	$R_{DSON}$	$V_G=10V, I_D=2A$		2	2.5	$\Omega$

## 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

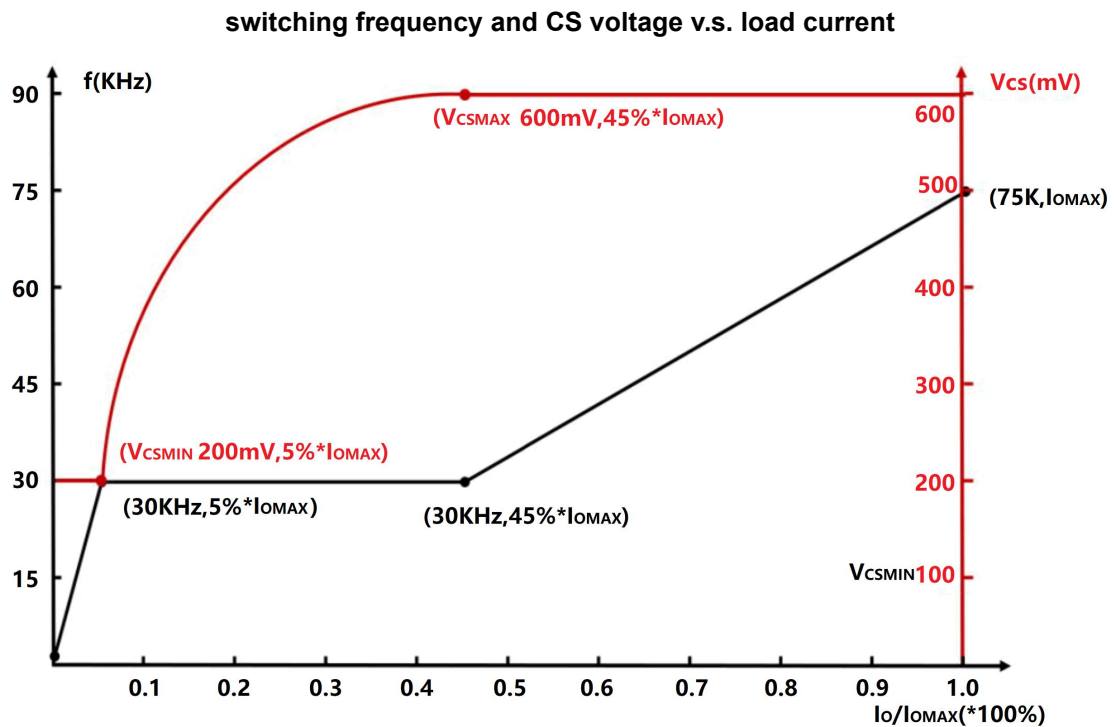
$$I_{OMAX} = 0.5 * (V_{CSMAX} / R_{CS}) * (N_P / N_S) * D_{SMAX}$$

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.

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



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

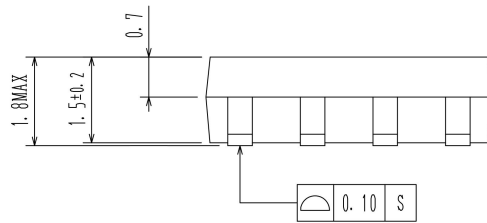
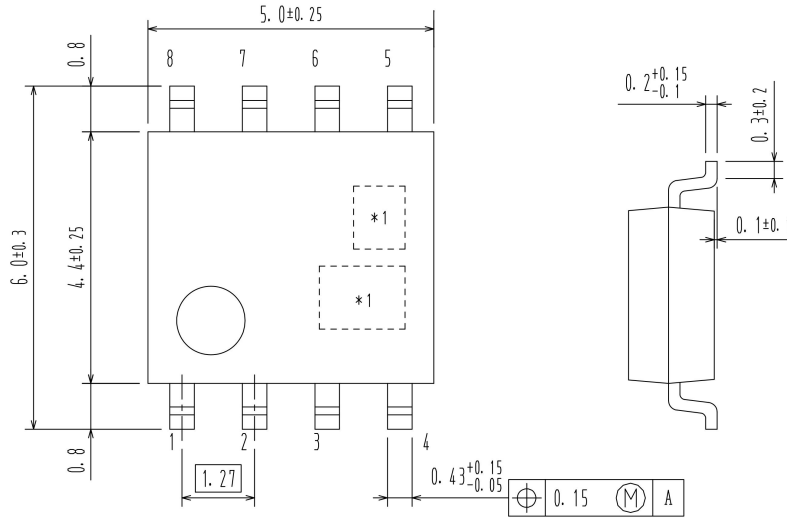
When the output voltage is over a specified value VOVP for 3 successive switching cycles, the internal output over voltage protection function will work, power transistor will be turned off until a new startLM event begins.

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

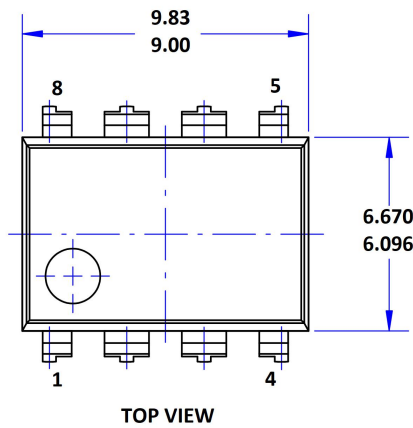
## Ordering information

Part number	Package	Marking ID
	SOP8	PWM815YDN
	DIP8	PWM815YBN

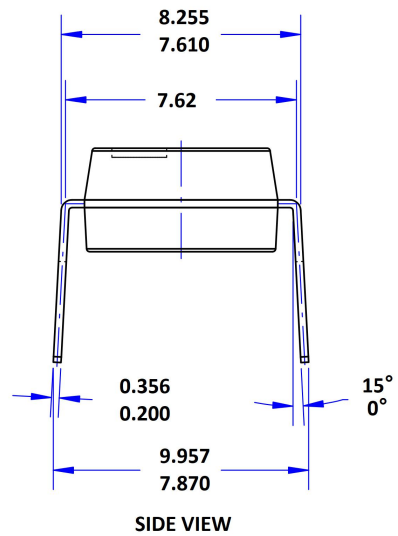
## Mechanical dimensions



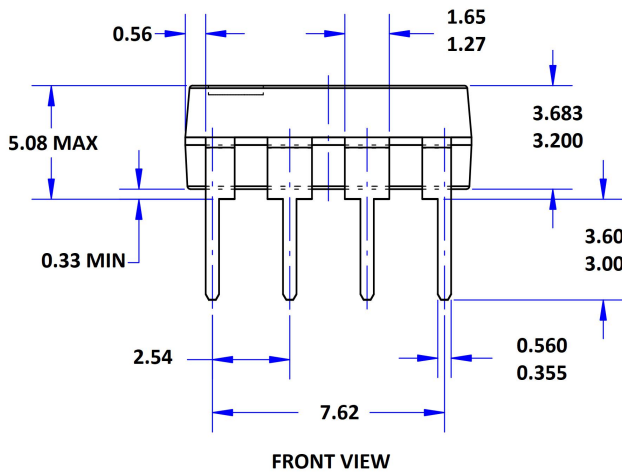
**SOP-8** Unit: mm



TOP VIEW



SIDE VIEW



FRONT VIEW

**DIP-8** Unit: mm

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