Descriptions

KP3612 is a constant power controller suitable for secondary side control fly-back application, which integrates IGBT.
In the constant voltage working state, the peak current control mode is adopted, and the frequency is reduced below the medium load to improve the average efficiency. In the light load or no load, the system works in the hiccup mode.

In the constant current working state, the patented demagnetization detection and algorithm and the fixed current limiting reference value are adopted to realize the constant current function, and the constant current is reduced at high temperature.

In order to realize the ultimate simplification of system cost, the KP3612 has a built-in starting circuit without starting resistor; Fixed maximum peak current without sampling resistor; Self- power supply is adopted to cancel the power supply of auxiliary winding VCC.

KP3612 has the functions of VCC under-voltage protection, VCC over-voltage clamping, output short-circuit protection, inductance magnetic Saturation limitation and over-temperature protection.

KP3612 is packaged in SOP8L.

Features

- *Built-in power 800V MOSFET*
- *Patented demagnetization detection technology realizes constant power function.*
- *Built-in starting circuit, without starting resistor.*
- *Fixed maximum peak current without sampling resistor.*
- *Self-power supply technology, cancel the auxiliary winding VCC power supply.*
- *High temperature drop current.*
- *Unique slope compensation technology.*
- *Multiple protection functions*
  - ✓ *VCC undervoltage protection*
  - ✓ *VCC overvoltage clamp*
  - ✓ *Output short circuit protection*
  - ✓ *Inductive magnetic saturation limitation*
  - ✓ *Over temperature protection*

Applications

- *PD adapter*
- *Wide output rang adapter*

Typical Application:-

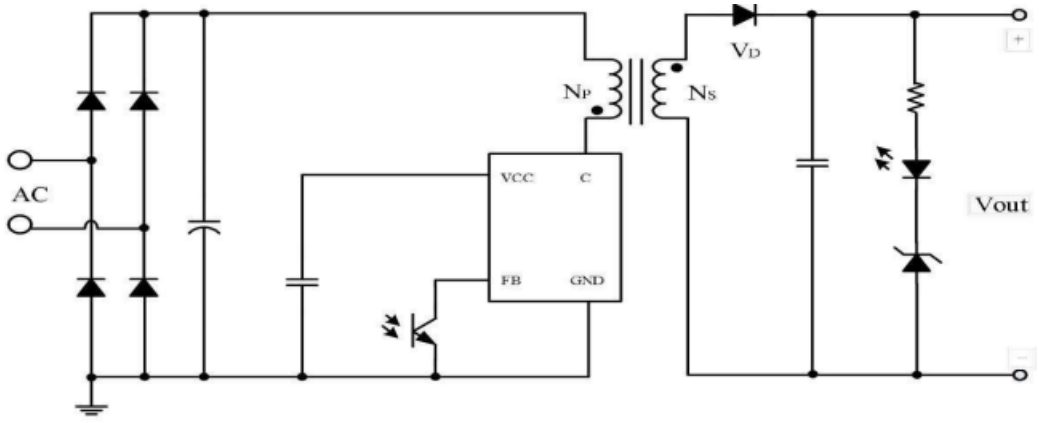


figure 1 KP3612 Typical application

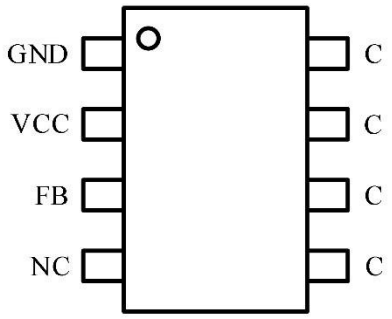
ORDERING INFORMATION:-

Model No.	Package Type	Package Form	Device Marking
KP3612A	SOP-8L	Reels Size – 4k	KP3612A – ZZZZZ
KP3612B	SOP-8L	Reels Size – 4k	KP3612B – ZZZZZ
KP3612C	SOP-8L	Reels Size – 4k	KP3612B – ZZZZZ
KP3612D	SOP-8L	Reels Size – 4k	KP3612D – ZZZZZ

VERSION INFORMATION:-

Model	MOS VDD/RDSON	Peak Current	Frequency Dithering	Recommended Application	
				85Vac-240Vac	185Vac-240Vac
KP3612A	**650V/2.5Ohm**	**3.5A**	**65Khz**	**15W**	**18W**
KP3612B	**650V/1.9Ohm**	**4.2A**	**65Khz**	**18W**	**20W**
KP3612C	**650V/1.25Ohm**	**4.8A**	**65Khz**	**22W**	**24W**
KP3612D	**650V/.95Ohm**	**5.5A**	**65Khz**	**28W**	**32W**

PIN DEFINITION:-



SOP8L

PIN DESCRIPTION:-

Pin No.	Pin Name	Description
1	GND	The reference Ground of the chip.
2	VCC	Power Supply
3	FB	Feedback Input Pin.
4	NC	Not Connected
5,6,7,8	C	HV BJT / MOS Collector.

ABSOLUTE MAXIMUM RATINGS:-

Description	Symbol	Parameter	Unit
Collector Base Voltage	VCBO	-0.3 to 800	V
VCC	VCC	-0.3 to 7	V
Feedback Voltage	VFB	-0.3 to 7	V
Power Dissipation	PDMAX	1.25	W
Maximum Junction Temperature	TJ	150	ºC
Operating Temperature Range	TOP	-40 to 150	ºC
Storage Temperature Range	TST	-65 to 150	ºC
Junction to Ambient Thermal Resistor	RθJA	96	ºC/W
Junction-to-case(top) thermal resistor	RθJC	45	ºC/W
Lead Temperature	TLEAD	260	ºC
ESD Capability, HBM	ESDHBM	3000	V

OPERATING CONDITIONS:-

Description	Symbol	Parameter	Unit
Operating Temperature	TA	-40 to 125	ºC

Note1 : Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device

Note2 : The device is not guaranteed to function outside its operating conditions.

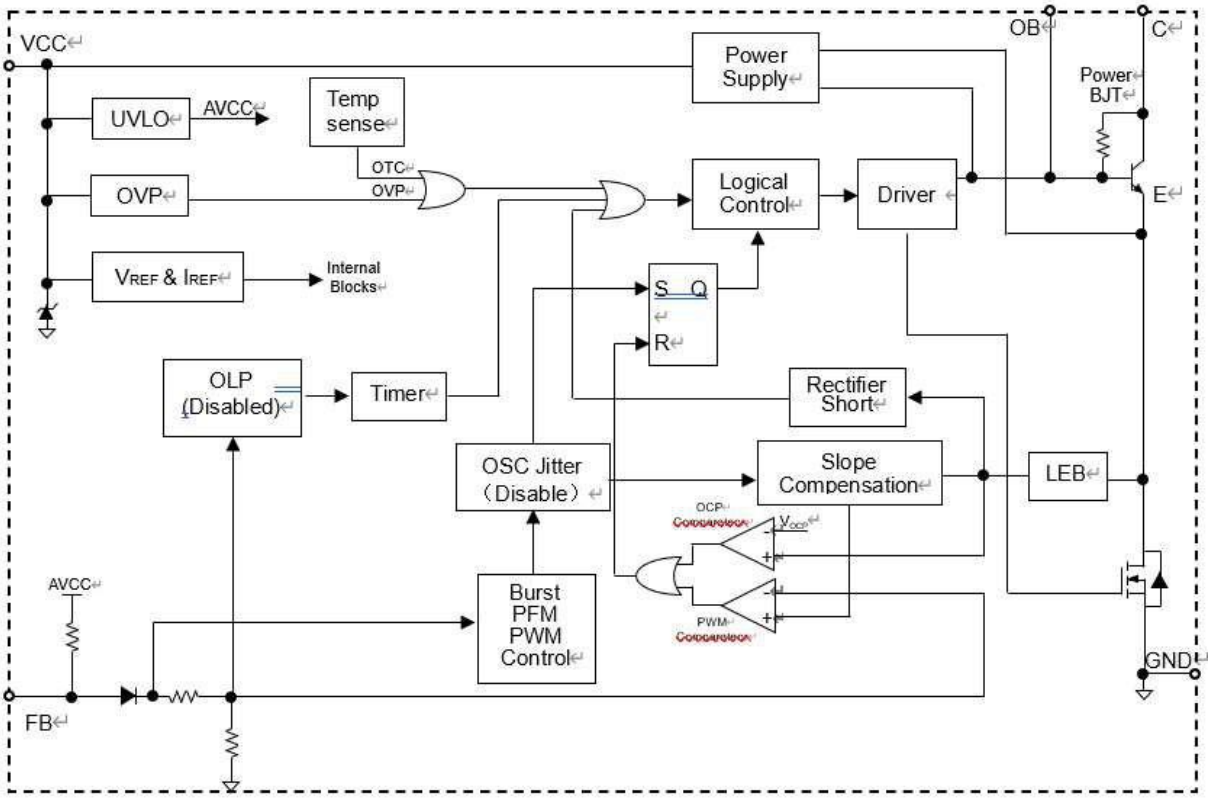
Electrical Characteristics:-

(Unless otherwise specified, TA=25 ºC)

Parameters	Symbol	Condition	Min	Typ	Max	Unit
SUPPLY						
VCC Operation Voltage	VOP		4.2	-	5.5	V
VCC under Voltage Lockout Exit	VST	VCC Rising	4.8	5.1	5.4	V
VCC Under Voltage Lockout	VUVLO	VCC Falling	3.4	3.6	3.8	V
VCC Start up Current	IST			200		uA
Operation Current	ICC	VCC=5V, VFB=2.8V	5	-	40	mA
VCC Clamp Voltage	VCLAMP	ICC=50mA	6.0	6.3	6.5	mA
VCC OVP Threshold Voltage	VCC-OVP		6.6	7.1	7.6	V
Built-In – Start up resistor	R START			3-	8	MΩ
CURRENT SENSE						
Maximum peak current limiting	IPEAK_MAX	KP3612A		3000		mA
		KP3612B		4000		mA
		KP3612C		4400		mA
		KP3612D		5000		mA
Minimum peak current limiting	IPEAK_MIN	KP3612A		3500		mA
		KP3612B		4200		mA
		KP3612C		4900		mA
		KP3612D		5500		mA
CS Input Leading Edge Blanking Time	TLEB		-	500	-	**ns**
Soft start time	TSS		-	3.5	-	**ms**
OSCILLATOR						
Oscillation Frequency	FOSC		61	65	69	KHZ
Burst mode Base Frequency	FOSC_BM		19	23	27	KHZ
Maximum duty cycle	Dmax			75		%
FEEDBACK						
FB Open Voltage	VFB_OPEN		4.1	4.7	5.3	V
FB Short Circuit Current	IFB_SHORT	Short FB to GND		0.16		mA
Burst mode Threshold Voltage	VBURST			1.15		V
Burst mode hysteretic voltage	VBURST_HY S			150		mV
TEMPERATURE CONTROL						
Over Temperature Control	TOTC			120		℃

Note3:- Typical parameter values are parameter standards measured at 25 ° C

INTERNAL BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

The KP3612 is a highly integrated power converter that integrates a current mode PWM controller, Mosfet and BJT. KP3612 has over temperature power control function, especially suitable for PD chargers.

Start up

The KP3612 Injects current into the VCC capacitor through the built-in start resistor, and KP3612 starts to work after reaching the VST.During soft startup, operating frequency from 65kHz to 85kHz gradually increase the operating frequency to the maximum. And limit the peak current in the starting process. When the chip is powered on, the overcurrent protection threshold increases gradually from 0 in 8 steps, which effectively inhibits the current peak at startup, reduces the stress of the component, and improves system reliability.

Self-supply

The KP3612 is Self-supply and does not require an auxiliary power supply winding. By controlling the current flow direction of the primary side and the charging time of a single cycle, the self-power functions realized. The VCC capacitor is placed as close as possible to the VCC and GND pins of the chip.

Burst Mode

The KP3612 has the Burst Mode function, which can automatically adjust the switching mode according to the load situation. When the system is under no-load or light or medium load, the input voltage at the FB end will be below the threshold voltage of Burst Mode. Based on this judgment, the device enters pulse mode control. The base drive output has an output only if the FB input is activated. In other cases, the base drive output is kept long off to reduce power consumption, thereby minimizing standby power consumption.

Oscillator Operation

The switching frequency of KP3612 is internally fixed at 65 KHz.

Current Sensing and Leading Edge Blanking

Cycle-by-Cycle current limiting is offered in KP3612 current mode PWM control. The switch current is detected by the built-in sense resistor. An internal leading edge blanking circuit chops off the sensed voltage spike at initial internal power BJT on state due to snubber diode reverse recovery and surge gate current of internal power BJT so that the external RC filtering on sense input is no longer needed. The current limiting comparator is disabled and cannot turn off the internal power BJT 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 into 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.

Build-in line voltage Compensation

Due to the existence of fixed turn-off delay, the higher the line voltage, the greater the overload power. KP3612 has built-in line voltage compensation. The lower the line voltage, the higher the OCP threshold of overcurrent protection cycle by cycle, so that the constant power is basically unchanged in the whole voltage range.

Feedback loop

KP3612 controls the operating frequency and peak Current through FB. The FB pin is pulled up to the 5V reference voltage through the internal resistor, and the external side is connected to the optocoupler. The FB pin is capacitor in parallel with GND to provide a low frequency pole, which is conducive to stabilizing the loop. The capacitor capacity is generally selected from 1nF to 10nF.

Driver

KP3612 has built-in ramp current drive circuit Specially matched for bipolar junction transistor, so that the bipolar junction transistor can work in the optimal critical saturation state.

Protection Controls:

KP3612 provides comprehensive protection features and the system can achieve the highest reliability. Protection features including Cycle-by- Cycle current limiting (OCP), Under Voltage Lockout on VCC (UVLO), over-temperature power control (OTC), VCC overvoltage protection (VCC_OVP) , VCC clamp protection (CLAMP), Output Short circuit protection (OSP), and undervoltage Shutdown (UVLO)

PCB Layout:

The following rules should be followed in KP3612 PCB layout:

The Area of Power Loop:

The area of the main current loop should be as small as possible to reduce EMI radiation, such as the primary current loop, the snubber circuit and the secondary rectifying loop.

Bypass Capacitor:

The bypass capacitor on VCC should be placed as close as possible to pin out. And the negative node of VCC capacitor should be connected directly to the IC GND pin before single point connected to the negative node of the output capacitor.

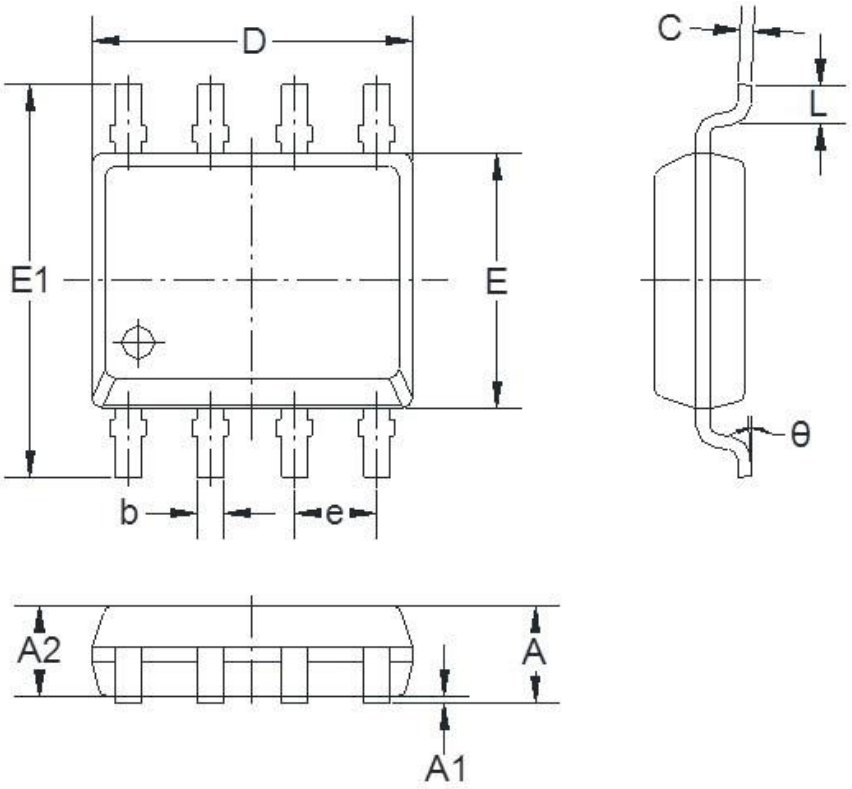
Ground Path:

The GND path of the input power loop and IC controller path should be separated and connected at the negative terminal of input capacitor by single point, such as power sense resistor, the negative of the auxiliary winding and the IC GND.

C Pin:

C pin increases the copper area of the C terminal for heat dissipation. And the PCB trace must be wide and short for thermal consideration. However too large copper area may compromise EMI performance.

MECHANICAL DATA



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065 b
	0.310	0.510	0.012	0.020 c
	0.170	0.250	0.006	0.010
D	4.700	5.150	0.185	0.203
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244 e
	1.270 (BSC)		0.05 (BSC)	
L	0.400	1.270	0.016	0.050 θ
0º	8º	0º	8º	