



VIPer22ADIP VIPer22AS

LOW POWER OFF LINE SMPS PRIMARY SWITCHER

TYPICAL POWER CAPABILITY

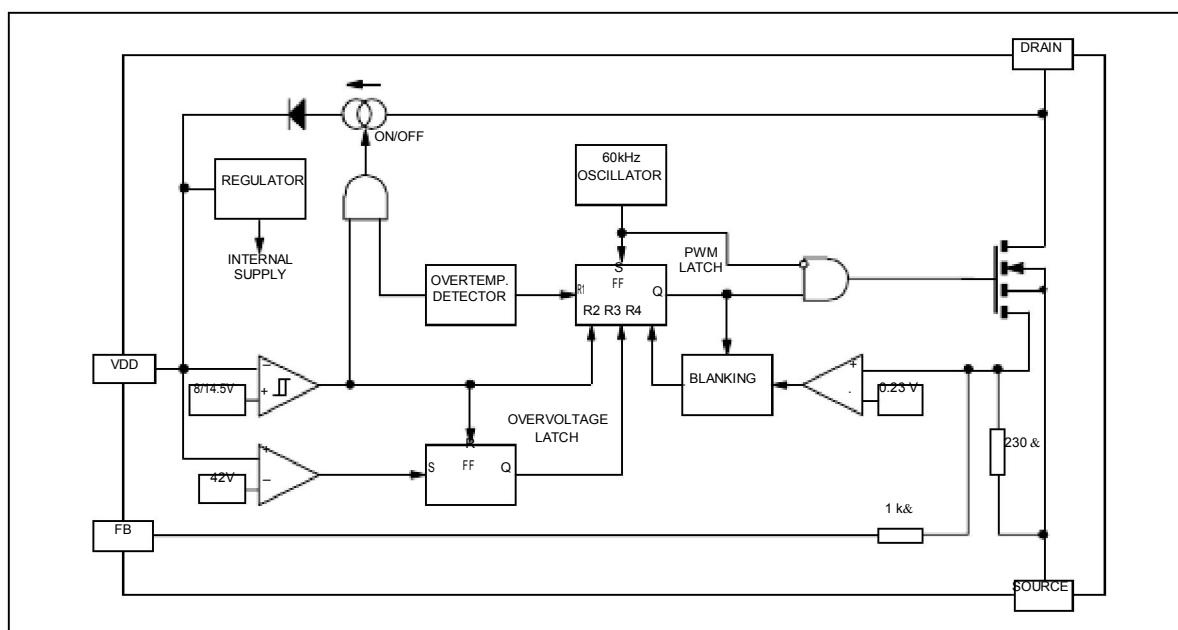
Mains type	SO-8	DIP-8
European (195 - 265 Vac)	12 W	20 W
US / Wide range (85 - 265 Vac)	7W	12 W

- FIXED 60 KHZ SWITCHING FREQUENCY
- 9V TO 38V WIDE RANGE VDD VOLTAGE
- CURRENT MODE CONTROL
- AUXILIARY UNDERVOLTAGE LOCKOUT WITH HYSTERESIS
- HIGH VOLTAGE START UP CURRENT SOURCE
- OVERTEMPERATURE, OVERCURRENT AND OVERVOLTAGE PROTECTION WITH AUTORESTART

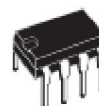
DESCRIPTION

The VIPer22A combines a dedicated current mode PWM controller with a high voltage Power

BLOCK DIAGRAM



SO-8



DIP-8

ORDER CODES

PACKAGE	TUBE	T&R
SO-8	VIPer22AS	VIPer22AS13TR
DIP-8	VIPer22ADIP	-

MOSFET on the same silicon chip. Typical applications cover off line power supplies for battery charger adapters, standby power supplies for TV or monitors, auxiliary supplies for motor control, etc. The internal control circuit offers the following benefits:

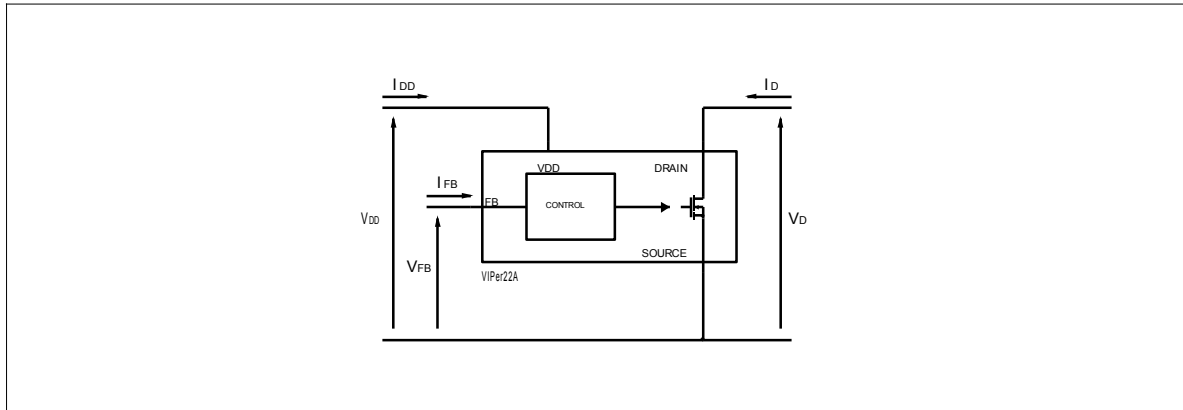
- Large input voltage range on the VDD pin accommodates changes in auxiliary supply voltage. This feature is well adapted to battery charger adapter configurations.
- Automatic burst mode in low load condition.
- Overvoltage protection in hiccup mode.

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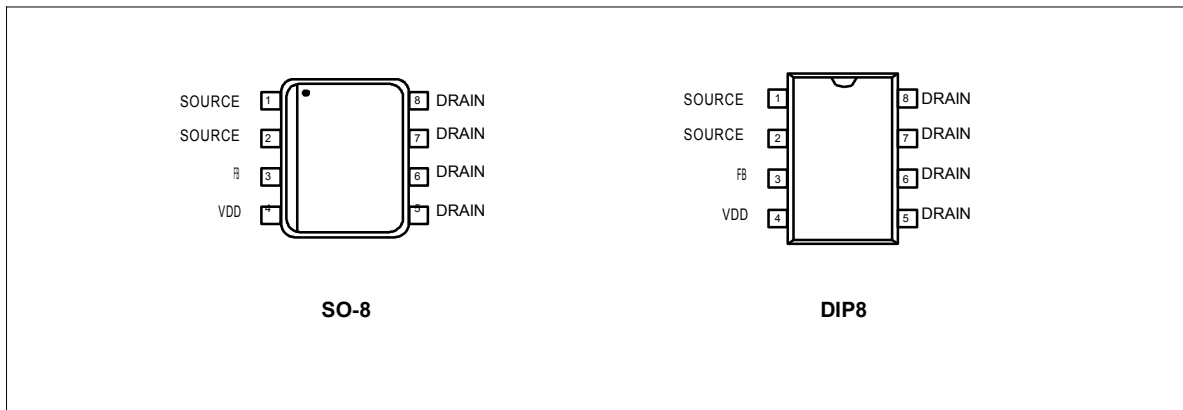
PIN FUNCTION

Name	Function
V _{DD}	Power supply of the control circuits. Also provides a charging current during start up thanks to a high voltage current source connected to the drain. For this purpose, an hysteresis comparator monitors the V _{DD} voltage and provides two thresholds: - V _{DDon} : Voltage value (typically 14.5V) at which the device starts switching and turns off the start up current source. - V _{DDoff} : Voltage value (typically 8V) at which the device stops switching and turns on the start up current source.
SOURCE	Power MOSFET source and circuit ground reference.
DRAIN	Power MOSFET drain. Also used by the internal high voltage current source during start up phase for charging the external V _{DD} capacitor.
FB	Feedback input. The useful voltage range extends from 0V to 1V, and defines the peak drain MOSFET current. The current limitation, which corresponds to the maximum drain current, is obtained for a FB pin shorted to the SOURCE pin.

CURRENT AND VOLTAGE CONVENTIONS



CONNECTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{DS(sw)}$	Switching Drain Source Voltage ($T_j = 25 \dots 125^\circ\text{C}$) (See note 1)	-0.3 ... 730	V
$V_{DS(st)}$	Start Up Drain Source Voltage ($T_j = 25 \dots 125^\circ\text{C}$) (See note 2)	-0.3 ... 400	V
I_D	Continuous Drain Current	Internally limited	A
V_{DD}	Supply Voltage	0 ... 50	V
I_{FB}	Feedback Current	3	mA
V_{ESD}	Electrostatic Discharge:		
	Machine Model ($R=0\Omega$; $C=200\text{pF}$) Charged Device Model	200 1.5	V kV
T_j	Junction Operating Temperature	Internally limited	$^\circ\text{C}$
T_c	Case Operating Temperature	-40 to 150	$^\circ\text{C}$
T_{stg}	Storage Temperature	-55 to 150	$^\circ\text{C}$

Note: 1. This parameter applies when the start up current source is off. This is the case when the V_{DD} voltage has reached V_{DDon} and remains above V_{DDoff} .

2. This parameter applies when the start up current source is on. This is the case when the V_{DD} voltage has not yet reached V_{DDon} or has fallen below V_{DDoff} .

THERMAL DATA

Symbol	Parameter	Max Value	Unit
Rthj-case	Thermal Resistance Junction-Pins for :		
	SO-8 DIP-8	25 15	$^\circ\text{C}/\text{W}$
Rthj-amb	Thermal Resistance Junction-Ambient for :		
	SO-8 DIP-8	55 45	$^\circ\text{C}/\text{W}$

Note: 1. When mounted on a standard single-sided FR4 board with 200 mm² of Cu (at least 35 μm thick) connected to all DRAIN pins.

ELECTRICAL CHARACTERISTICS ($T_j=25^\circ\text{C}$, $V_{DD}=18\text{V}$, unless otherwise specified)**POWER SECTION**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Voltage	$I_D=1\text{mA}$; $V_{FB}=2\text{V}$	730			V
I_{DSS}	Off State Drain Current	$V_{DS}=500\text{V}$; $V_{FB}=2\text{V}$; $T_j=125^\circ\text{C}$			0.1	mA
R_{DSon}	Static Drain-Source	$I_D=0.4\text{A}$		15	17	&
	On State Resistance	$I_D=0.4\text{A}$; $T_j=100^\circ\text{C}$			31	
t_f	Fall Time	$I_D=0.2\text{A}$; $V_N=300\text{V}$ (See fig.1) (See note 1)		100		ns
t_r	Rise Time	$I_D=0.4\text{A}$; $V_N=300\text{V}$ (See fig.1) (See note 1)		50		ns
C_{oss}	Drain Capacitance	$V_{DS}=25\text{V}$		40		pF

Note: 1. On clamped inductive load

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ELECTRICAL CHARACTERISTICS (T_j=25°C, V_{DD}=18V, unless otherwise specified)

SUPPLY SECTION

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{DDch}	Start Up Charging Current	V _{DS} =100V; V _{DD} =0V ... V _{DDon} (See fig. 2)		-1		mA
I _{DDoff}	Start Up Charging Current in Thermal Shutdown	V _{DD} =5V; V _{DS} =100V T _j > T _{SD} - T _{HYST}	0			mA
I _{DD0}	Operating Supply Current Not Switching	I _{FB} =2mA		3	5	mA
I _{DD1}	Operating Supply Current Switching	I _{FB} =0.5mA; I _D =50mA (Note 1)		4.5		mA
D _{RST}	Restart Duty Cycle	(See fig. 3)		16		%
V _{DDoff}	V _{DD} Undervoltage Shutdown Threshold	(See fig. 2 & 3)	7	8	9	V
V _{DDon}	V _{DD} Start Up Threshold	(See fig. 2 & 3)	13	14.5	16	V
V _{DDhyst}	V _{DD} Threshold Hysteresis	(See fig. 2)	5.8	6.5	7.2	V
V _{DDovp}	V _{DD} Overvoltage Threshold		38	42	46	V

Note: 1. These test conditions obtained with a resistive load are leading to the maximum conduction time of the device.

OSCILLATOR SECTION

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
F _{OSC}	Oscillator Frequency Total Variation	V _{DD} =V _{DDoff} +0.35V; T _j =0 ... 100°C	54	60	66	kHz

PWM COMPARATOR SECTION

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
G _{ID}	I _{FB} to I _D Current Gain	(See fig. 4)		560		
I _{Dlim}	Peak Current Limitation	V _{FB} =0V (See fig. 4)	0.56	0.7	0.84	A
I _{FBsd}	I _{FB} Shutdown Current	(See fig. 4)		0.9		mA
R _{FB}	FB Pin Input Impedance	I _D =0mA (See fig. 4)		1.2		kΩ
t _d	Current Sense Delay to Turn-Off	I _D =0.4A		200		ns
t _b	Blanking Time			500		ns
t _{ONmin}	Minimum Turn On Time			700		ns

OVERTEMPERATURE SECTION

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
T _{SD}	Thermal Shutdown Temperature	(See fig. 5)	140	170		°C
T _{HYST}	Thermal Shutdown Hysteresis	(See fig. 5)		40		°C

Figure 1 : Rise and Fall Time

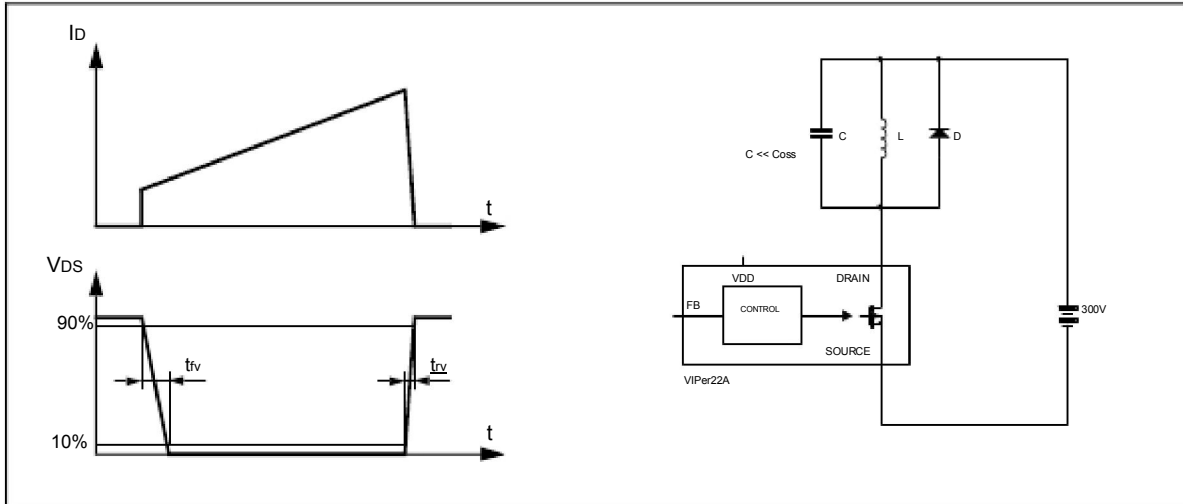


Figure 2 : Start Up VDD Current

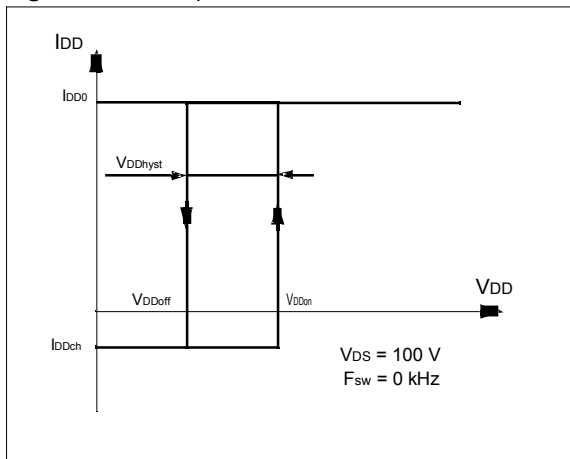


Figure 3 : Restart Duty Cycle

