

High Current Over Voltage Protection IC

General Description

WP3116 features an ultra-low $R_{ds(on)}$ nFET switch with over voltage protection for input voltage. When input voltage exceeds the OVLO threshold, the switch is turned off immediately to prevent damage to the protected downstream devices.

The device features internal Thermal Shutdown Protection. The device features an open-drain output FLAG, when $V_{UVLO} < IN < V_{OVLO}$ FLAG is low and indicate a good input, otherwise it is high impedance.

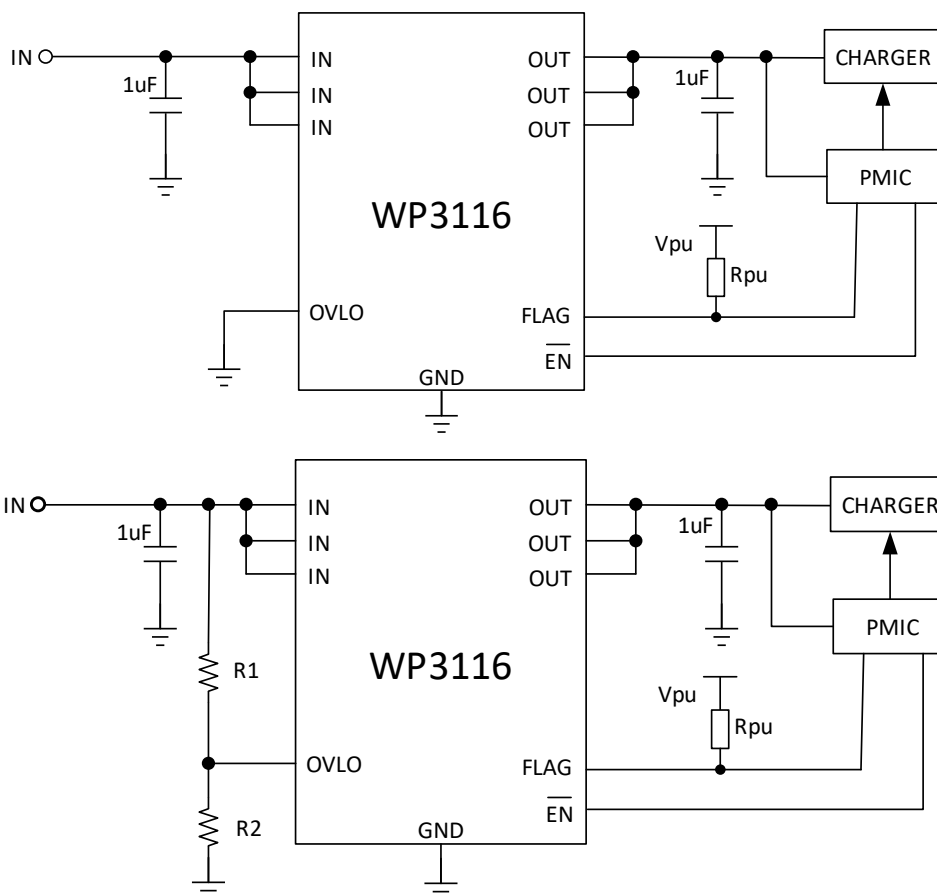
Features

- 4.8A Continuous Current Capability
- Highly reliable
- Ball pitch=0.4mm
- Typical R_{on} : 30m Ω
- Surge protection to $\pm 100V$
- OVP Response Time: 50ns

Applications

- Smartphones
- Tablet PC
- Charging Ports

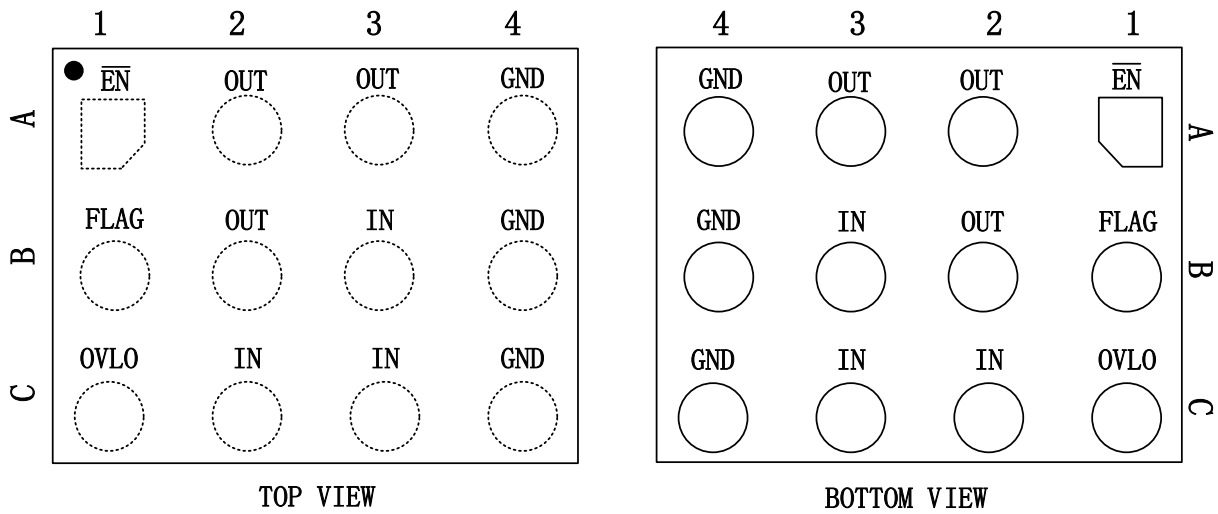
Typical Application



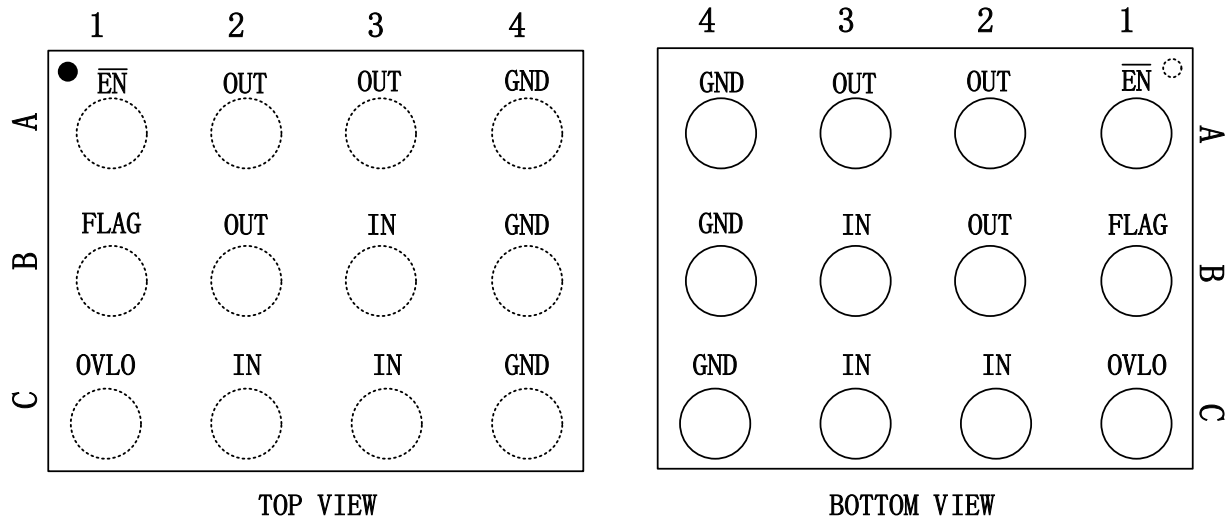
Note1: $V_{IN_OVLO} = \frac{R_1 + R_2}{R_2} V_{OVLO_TH}$

Note2: Recommend $30k \leq R_2 \leq 51k$

Pin Configuration



DFN1814-12



WLCSP12

Pin Description

Pin Number	Pin Name	Description	
A1	\overline{EN}	Device Enable Active low.	
A2,A3,B2	OUT	Output Voltage.	
A4,B4,C4	GND	Ground.	
B1	FLAG	Power status indicator	0 $V_{UVLO} < IN < V_{OVLO}$, $T_j < T_{SD}$
			1 others
B3,C2,C3	IN	Input Voltage.	
C1	OVLO	External OVLO Adjustment. Connect OVLO to GND when using the internal fix threshold. Connect a resistor-divider to OVLO to set a different OVLO threshold.	

Absolute Maximum Ratings

Parameter		Rating	Unit
Input voltage range		-0.3~35	V
Output voltage range		-0.3~29	V
EN voltage range		-0.3~7	V
OVLO voltage range		-0.3~7	V
FLAG voltage range		-0.3~7	V
Maximum Continuous Current IN to OUT		4.8	A
Maximum Peak Current IN to OUT		8	A
Power Dissipation @ $T_A = 25^\circ\text{C}$		800	mW
Junction Temperature		150	$^\circ\text{C}$
Lead Temperature Range		260	$^\circ\text{C}$
Storage Temperature Range		-55 ~ 150	$^\circ\text{C}$
ESD Susceptibility	HBM	± 4000	V
Surge	IEC61000-4-5	-100~100	V

Recommended Operating Conditions

Parameter		Rating	Unit
Operating Supply voltage		2.5 ~ 28	V
Operating Temperature Range		-40 ~ 85	$^\circ\text{C}$

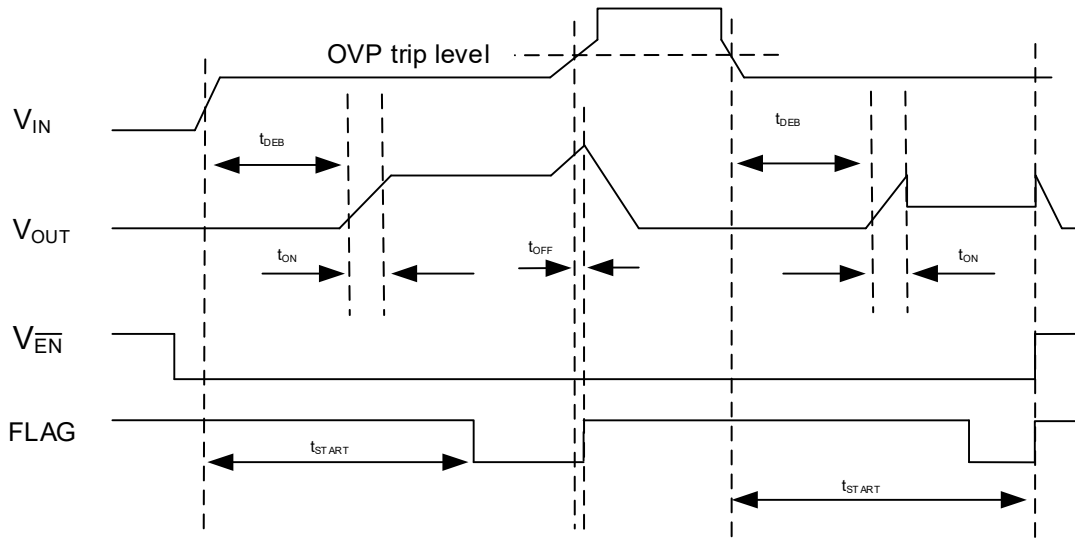
Electrical Characteristics

($T_A=25^{\circ}\text{C}$, $V_{IN}=5\text{V}$, $I_{IN}\leq 2\text{A}$, $C_{IN}=1\mu\text{F}$, unless otherwise noted)

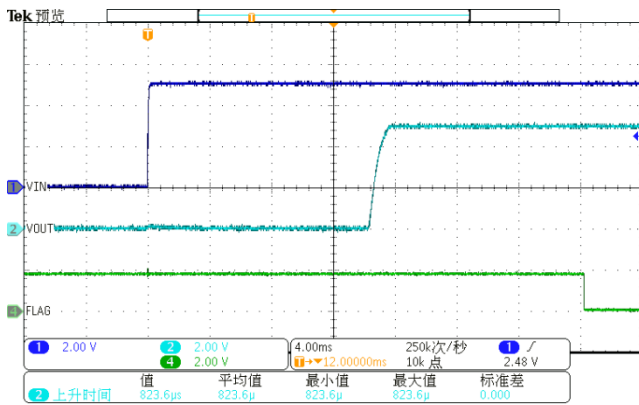
symbol	Parameter	Test Condition	Min	Typ	Max	Unit	
V_{IN}	Input Voltage		2.5		28	V	
I_{IN}	V_{IN} Quiescent Current	$V_{IN}=5\text{V}$, OUT Floating		90		μA	
I_{IN_OVLO}	OVLO Supply Current	$V_{IN}=12\text{V}$, OUT Floating		100		μA	
R_{ON}	On-Resistance of Switch IN-OUT	$V_{IN}=5.0\text{V}$, $I_{OUT}=1\text{A}$, $T_A=25^{\circ}\text{C}$		30		$\text{m}\Omega$	
V_{IN_OVLO}	Overvoltage Protect Of V_{IN}	A	V_{IN} Rising	5.90	5.95	5.99	V
			hysteresis		0.13		V
		B	V_{IN} Rising	6.66	6.80	6.94	V
			hysteresis		0.14		V
		C	V_{IN} Rising	10.29	10.50	10.71	V
			hysteresis		0.21		V
D	V_{IN} Rising	13.7	14.0	14.3	V		
	hysteresis		0.28		V		
	Adjustable OVLO Threshold Range	$V_{IN} = 2.5\text{V}$ to V_{IN_OVLO}	4		20	V	
V_{OVLO_TH}	OVLO Set Threshold	$V_{IN} = 2.5\text{V}$ to V_{IN_OVLO}	1.18	1.2	1.22	V	
V_{OVLO_SELECT}	External OVLO Select Threshold		0.2		0.3	V	
V_{UVLO_R}	Under Voltage Lockout Threshold	V_{IN} Rising		2.1		V	
V_{UVLO_F}		V_{IN} Falling		1.9		V	
V_{FLAG_OL}	FLAG Output Logic Low Voltage	$V_{PU}=1.8\text{V}$, $I_{SINK}=1\text{mA}$		0.1	0.2	V	
I_{FLAG_LEAK}	FLAG Output HIGH Leakage Current	$V_{FLAG}=5\text{V}$			0.5	μA	
I_{OVLO}	OVLO Input Leakage Current	$V_{OVLO}=V_{OVLO_TH}$	-100		100	nA	
V_{IH}	EN Input Logic High Voltage		1.4			V	
V_{IL}	EN Input Logic Low Voltage	$V_{IN}=2.5\text{V}$			0.3	V	
T_{SD}	Thermal Shutdown			150		$^{\circ}\text{C}$	
ΔT_{SD}	Thermal-shutdown Hysteresis			20		$^{\circ}\text{C}$	
t_{DEB}	Debounce Time	From $V_{IN}>V_{UVLO}$ to 10% V_{OUT}		15		ms	
t_{START}	Start-up time	From $V_{IN}>V_{UVLO}$ to FLAG turn low		30		ms	
t_{ON}	Switch turn-on time	$R_L=100\Omega$, $C_L=22\mu\text{F}$, V_{OUT} from 10% V_{IN} to 90% V_{IN}		2		ms	
t_{OFF}^1	Switch turn-off time	$V_{IN}>V_{OVLO}$ to V_{OUT} stop rising		50		ns	

NOTE1. Guaranteed by design.

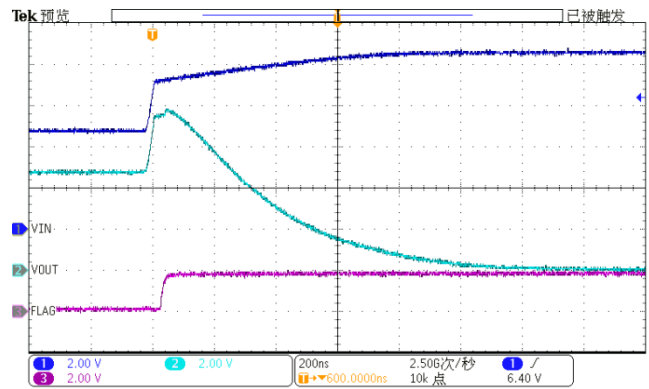
TIMING DIAGRAM



Typical Performance Characteristics

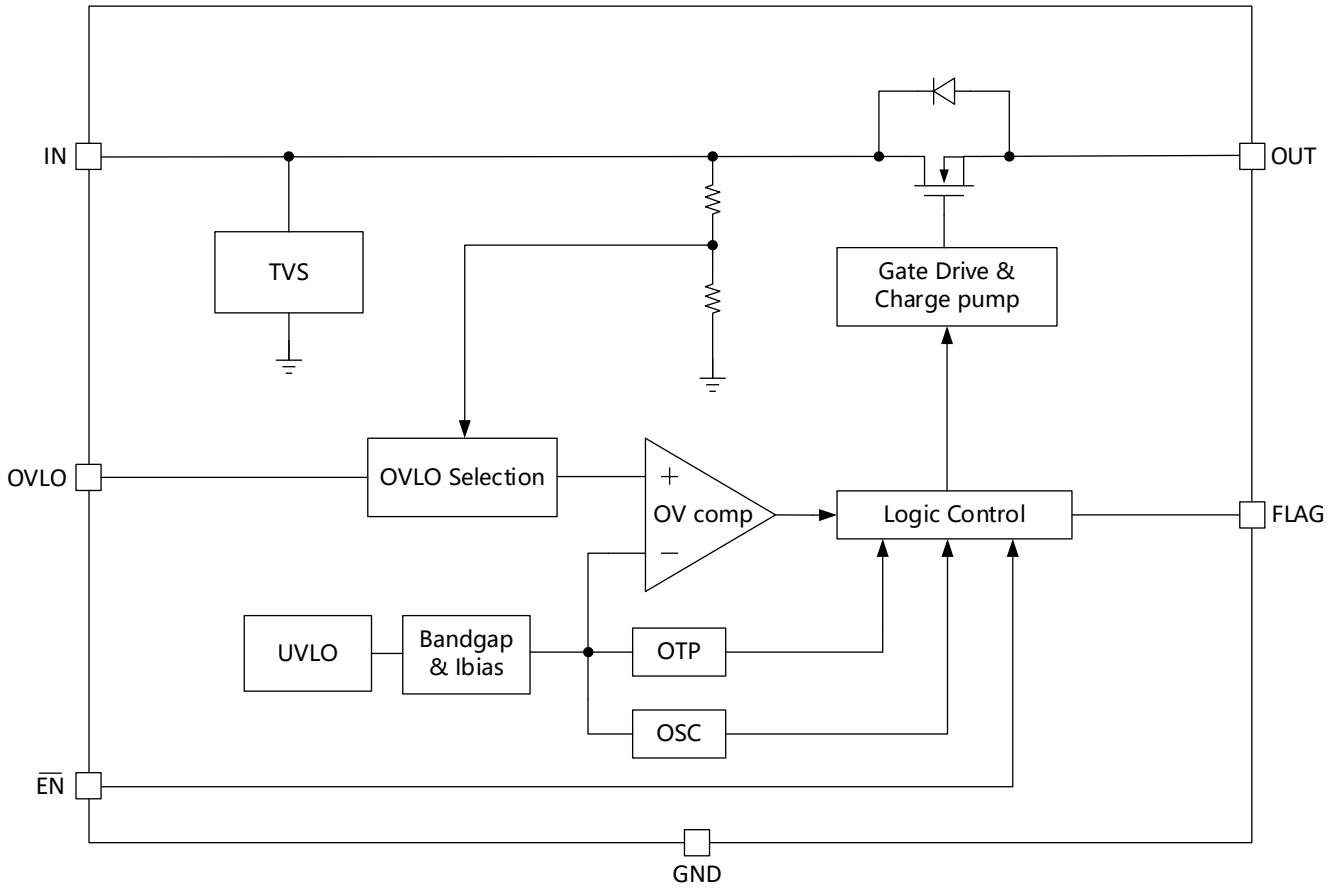


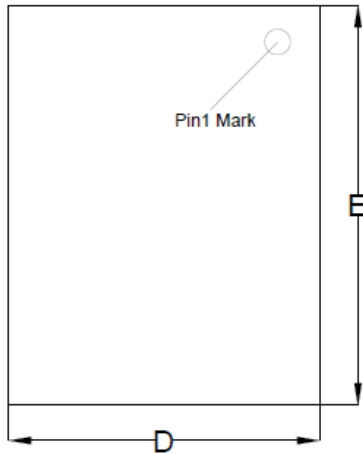
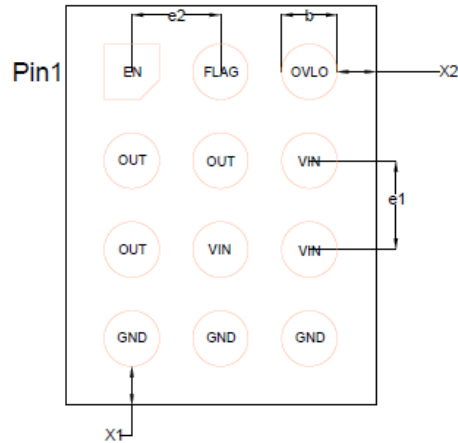
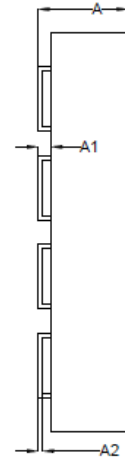
t_{DEB} & t_{START} & t_{ON}



t_{OFF}

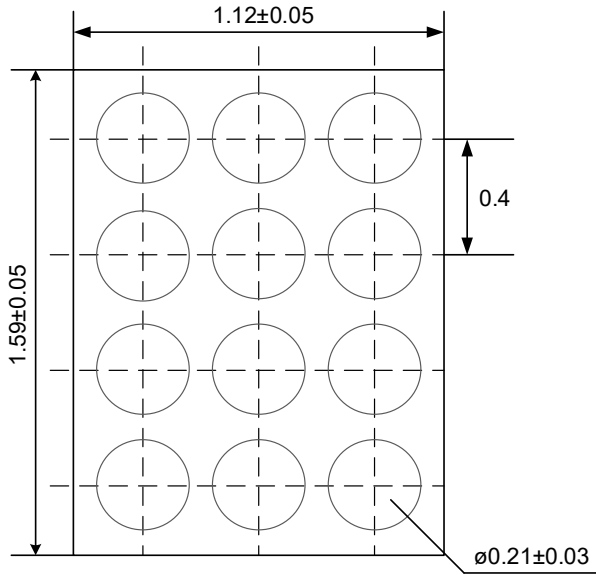
Block Diagram



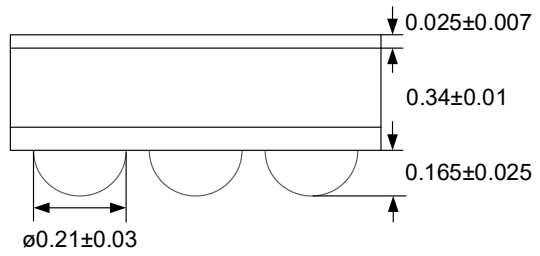
Package Information
DFN1814-12
TOP VIEW

BOTTOM VIEW

SIDE VIEW


SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.520	0.550	0.580
A1	-	0.030	0.075
A2	0.007	0.012	0.017
D	1.300	1.400	1.500
E	1.700	1.800	1.900
e1	0.350	0.400	0.450
e2	0.350	0.400	0.450
b	0.220	0.250	0.280
X1	0.125	0.175	0.225
X2	0.125	0.175	0.225

WLCSP12



Bottom View



Side View

Unit: mm

Ordering Information

Part Number	V _{OVLO}	Package	Packing Quantity	Marking*
WP3116-APB2R	5.95V	DFN1814-12	5k/Reel	316A XXXX
WP3116-BPB2R	6.8V	DFN1814-12	5k/Reel	316B XXXX
WP3116-CPB2R	10.5V	DFN1814-12	5k/Reel	316C XXXX
WP3116-DPB2R	14V	DFN1814-12	5k/Reel	316D XXXX
WP3116-AC12R	5.95V	WLCSP12	3k/Reel	316A XXXX
WP3116-BC12R	6.8V	WLCSP12	3k/Reel	316B XXXX
WP3116-CC12R	10.5V	WLCSP12	3k/Reel	316C XXXX
WP3116-DC12R	14V	WLCSP12	3k/Reel	316D XXXX

*XXXX is variable.


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Specifications are subject to change without notice. The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.

Users should verify actual device performance in their specific applications.