1.General Description

WP3118 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 is available in an advanced WLCSP12 package with 0.4mm ball pitch.

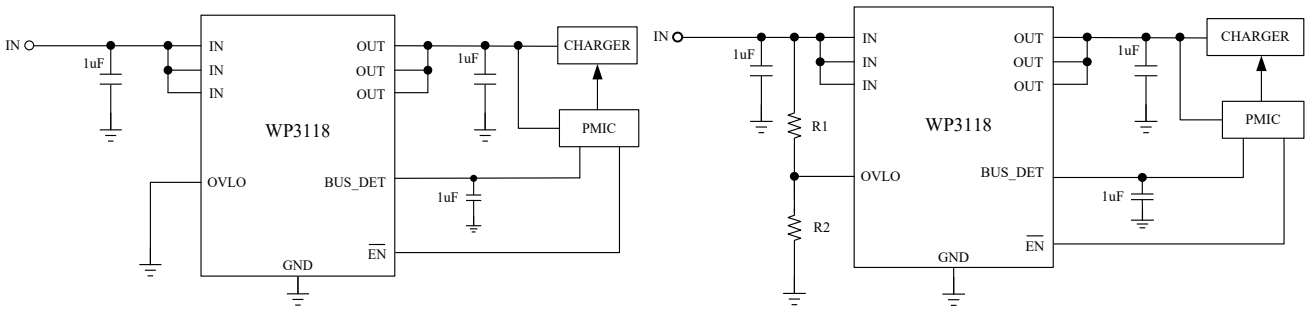
2. Features

- 4.8A Continuous Current Capability
- Overvoltage Lockout: OVLO=5.95V、6.8V、10V、14V
- OVLO Threshold Range: +4V to +20V
- Ball pitch=0.4mm
- $R_{DS(ON)}$:27mΩ(Typ.)
- Surge protection to ±100V
- OVP Response Time:50ns
- Under-Voltage Lockout
- Thermal Shutdown
- ESD:4KV
- Package: WLCSP12

3. Applications

- Smart Phones
- Tablet PC
- Charging Ports

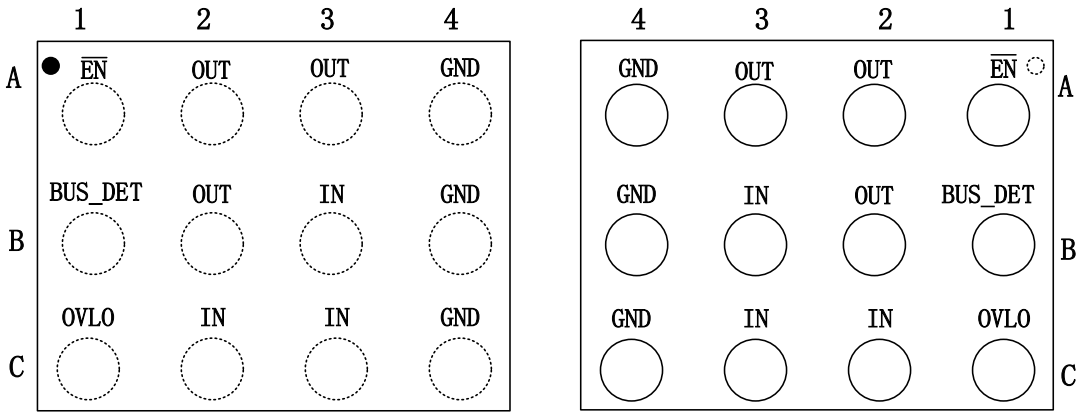
4. Typical Application



Note1：$V_{IN\_OVLO}=\frac{R_1+R_2}{R_2}V_{OVLO\_TH}$

Note2：Recommend 30 kΩ ≤ R_2 ≤ 51kΩ

5. Pin Configuration



WLCSP12

6.Pin Description

PIN NUMBER	PIN NAME	I/O	PIN FUNCTIONS
A1	$\overline{EN}$	I	Device Enable Active low.
A2 A3 B2	OUT	O	Output Voltage.
A4 B4 C4	GND		Ground.
B1	BUS_DET	O	Regulation output of VBUS
B3 C2 C3	IN	I	Input Voltage.
C1	OVLO	I	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.

7. Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)(1)

PARAMETER		RATING	UNIT
Input Voltage Range		-0.3 to 35	V
Output Voltage Range		-0.3 to 29	V
EN Voltage Range		-0.3 to 7	V
OVLO Voltage Range		-0.3 to 7	V
FLAG Voltage Range		-0.3 to 7	V
Maximum Continuous Current IN to OUT		4.8	A
Maximum Peak Current IN to OUT		8	A
Power Dissipation @T_A = 25°C		800	mW
Junction Temperature		150	°C
Lead Temperature Range		260	°C
Storage Temperature Range		-55 ~ 150	°C
ESD Susceptibility	HBM	±4000	V
Surge	IEC61000-4-5	-100~100	V

Note: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

8. Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{IN}	Operating Supply voltage	2.5	28	V
	Operating Ambient Temperature	-40	85	°C

9. Electrical Characteristics

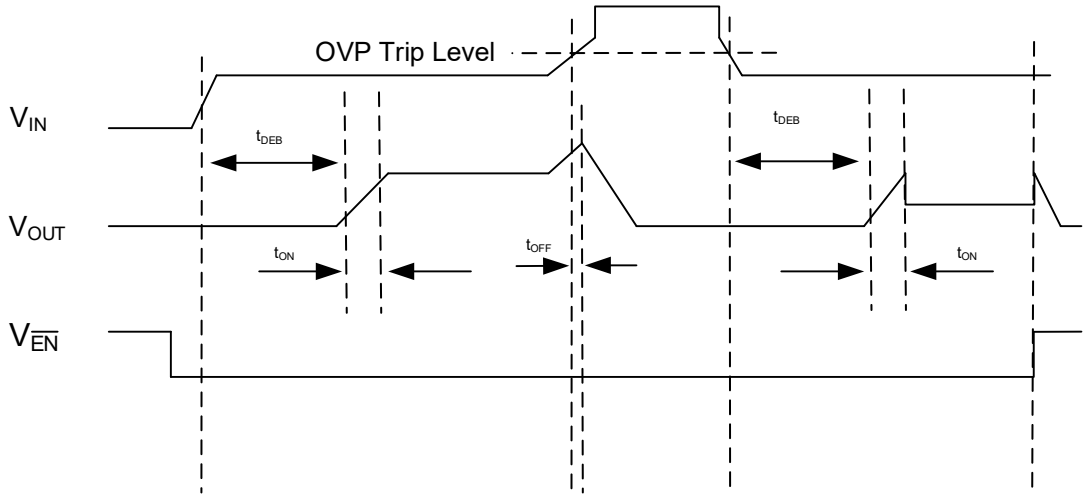
(T_A=25ºC, V_{IN}=5V, C_{IN}=1μF, unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS		MIN	TYP.	MAX	UNIT
TVS Characteristics							
V_{BR}	Reverse Breakdown Voltage	I_T=10mA, T_A=25ºC			32		V
I_{PP}[1]	Peak Pulse Current	t_p=8/20μs(+100V), T_A=25ºC			37.5		A
V_C[1]	Clamping Voltage	I_{PP}=37.5A, t_p=8/20μs, T_A=25ºC			35		V
I_{PP_NEG}[1]	Reverse Peak Pulse Current	t_p=8/20μs (-100V surge), T_A=25ºC			-48.5		A
V_{C_NEG}[1]	Reverse Peak Pulse Voltage	I_{PP}=-48.5A, t_p=8/20μs, T_A=25ºC			-3		V
V_F	Forward Voltage	I_F=10mA, T_A=25ºC			0.6		V
Basic Operation							
V_{IN}	Input Voltage			2.5		28	V
I_{IN}	VIN Quiescent Current	V_{IN}=5V, OUT Floating			120		uA
I_{IN_OVLO}	OVLO Supply Current	V_{IN}=12V, OUT Floating			150		uA
$R_{DS(ON)}$	On-Resistance of Switch IN-OUT	V_{IN}=5.0V, I_{OUT}=1A, T_A=25 ºC			27		mΩ
V_{IN_OVLO}	Overvoltage Protect Of V_{IN}	A	V_{IN} Rising		5.95		V
			Hysteresis		0.13		
		B	V_{IN} Rising		6.80		
			Hysteresis		0.14		
		C	V_{IN} Rising		10.50		
			Hysteresis		0.21		
		D	V_{IN} Rising		14.0		
			Hysteresis		0.28		
	Adjustable OVLO Threshold Range	V_{IN} =2.5V to V_{IN_OVLO}		4		20	V
V_{OVLO_TH}	OVLO Set Threshold	V_{IN} =2.5V to V_{IN_OVLO}		1.18	1.2	1.22	V
V_{OVLO_SELECT}	External OVLO Select Threshold			0.2		0.3	V

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
V_{UVLO_R}	Under Voltage Lockout Threshold	V_{IN} Rising		2.1		V
V_{UVLO_F}		V_{IN} Falling		1.9		V
V_{DET1}	Regulation Output of BUS_DET	V_{IN}=5V, $V_{\overline{EN}}$=0V, I_{DET}=1mA and C_{BUS_DET}=1μF	4.8			V
V_{DET2}	Regulation Output of BUS_DET	V_{IN}=9V, $V_{\overline{EN}}$=0V, I_{DET}=10mA and C_{BUS_DET}=1μF		6.7		V
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}=2.5V			0.3	V
T_{SD}	Thermal Shutdown	V_{IN} = 5V		150		ºC
ΔT_{SD}	Thermal-shutdown Hysteresis	V_{IN} = 5V		20		ºC
t_{DEB}	Debounce Time	From V_{IN}>V_{UVLO} to 10% V_{OUT}		25		ms
t_{SS}	Start-up time	From V_{UVLO}<V_{IN} to 90% V_{OUT}		26		ms
t_{OFF}[1]	Switch turn-off time	V_{IN}>V_{OVLO} to V_{OUT} stop rising		50		ns

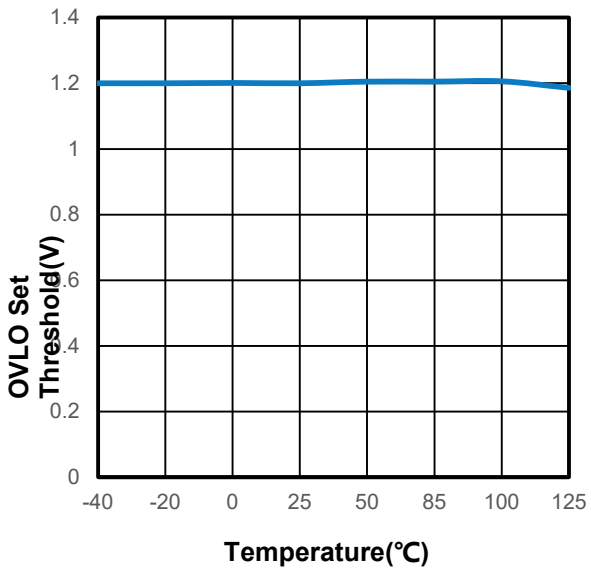
Note 1: Guaranteed by design.

10.Timing Diagram

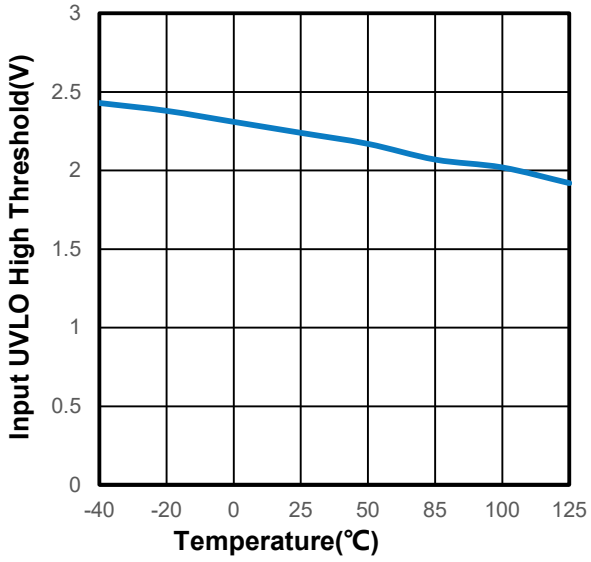


11. Typical Performance Characteristics

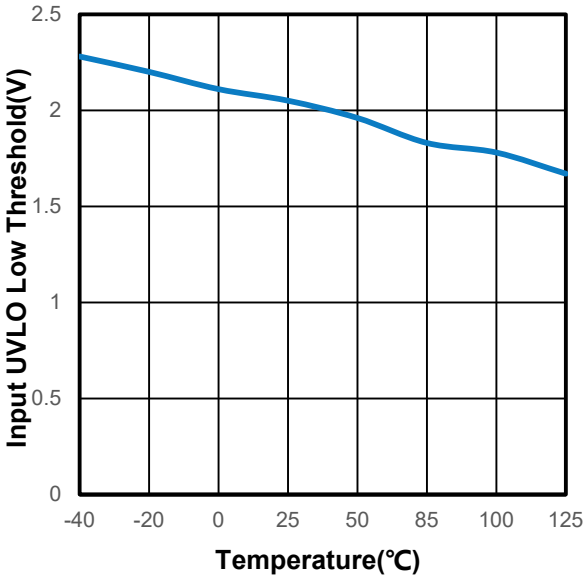
(V_{IN} = 5V, C_{IN}=1μF, C_{OUT}=1μF, T_A=25°C, unless otherwise noted)



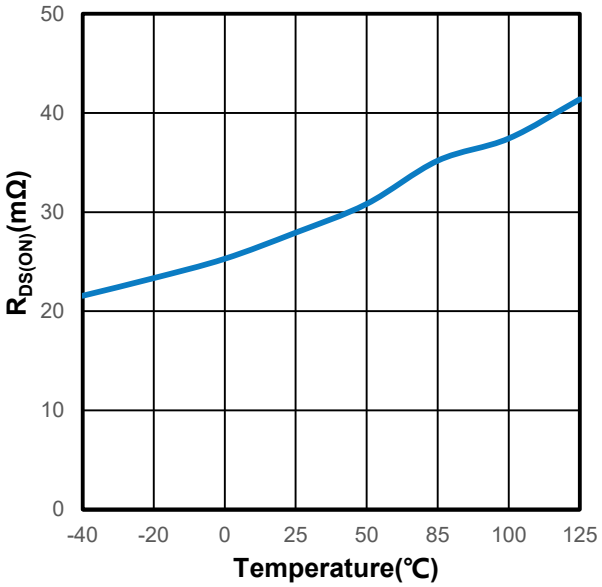
OVLO Set Threshold vs. Ambient Temperature



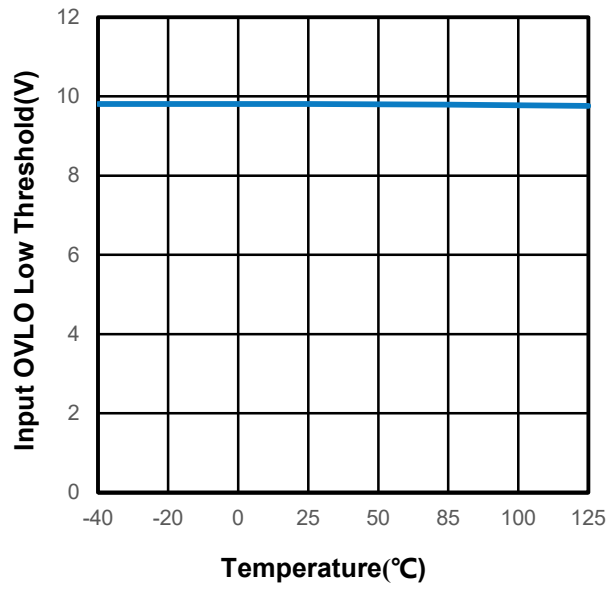
Input UVLO High Threshold vs. Ambient Temperature



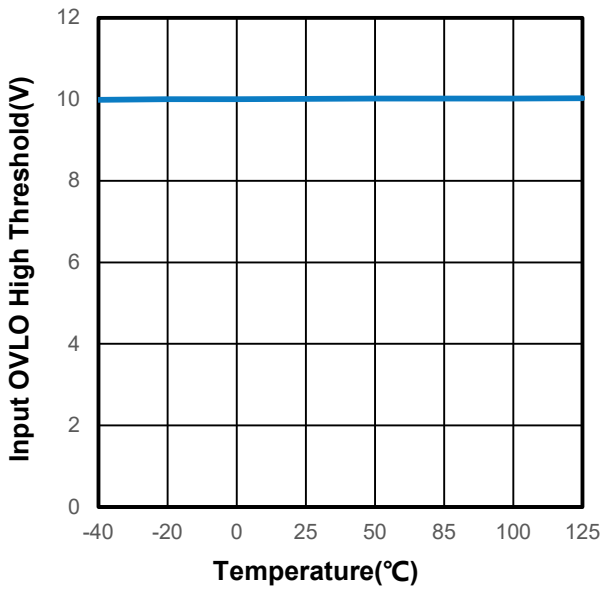
Input UVLO Low Threshold vs. Ambient Temperature



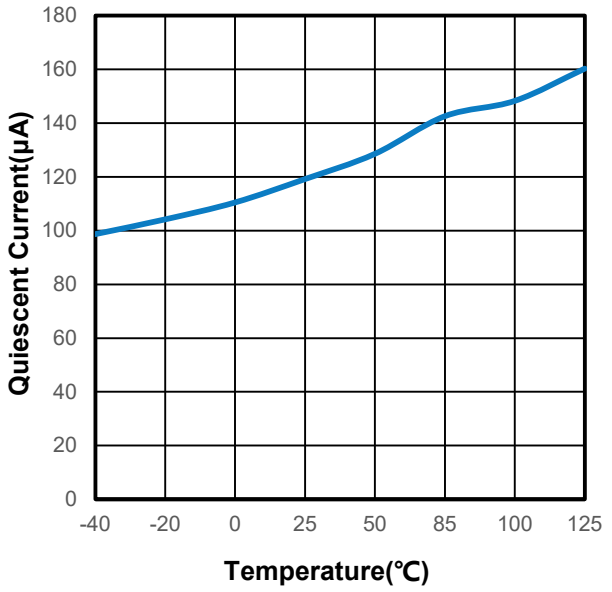
$R_{DS(ON)}$ vs. Ambient Temperature



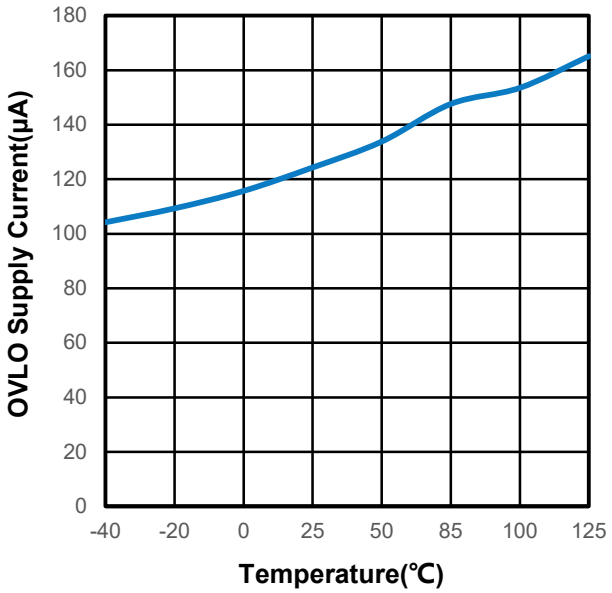
Input OVLO Low Threshold vs. Ambient Temperature



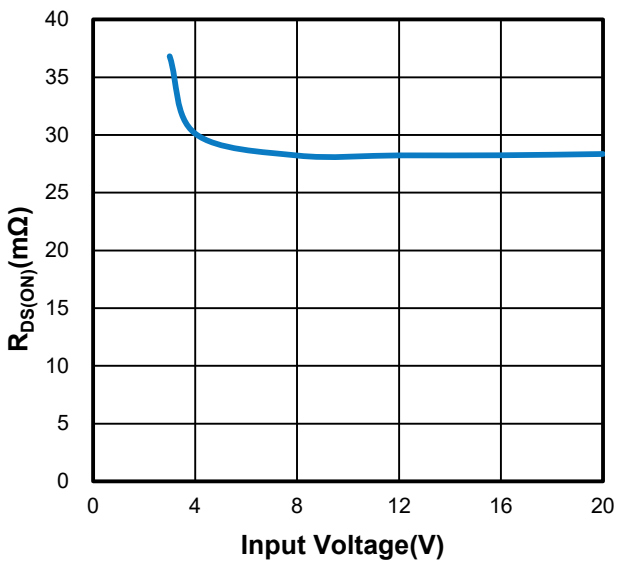
Input OVLO High Threshold vs. Ambient Temperature



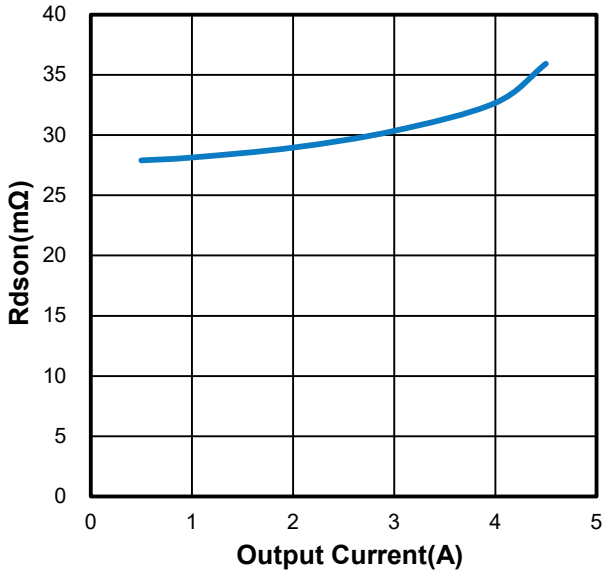
Quiescent Current vs. Ambient Temperature



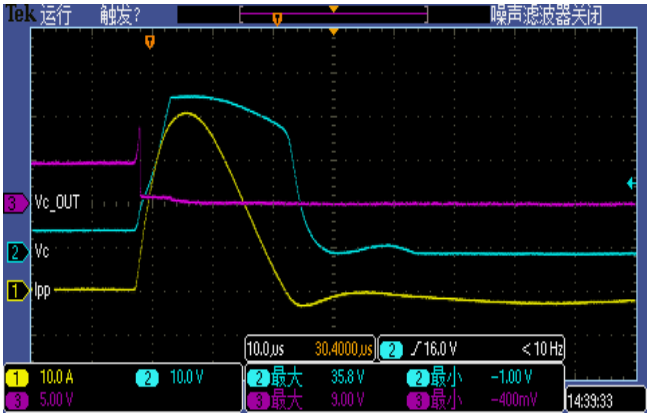
OVLO Supply Current vs. Ambient Temperature



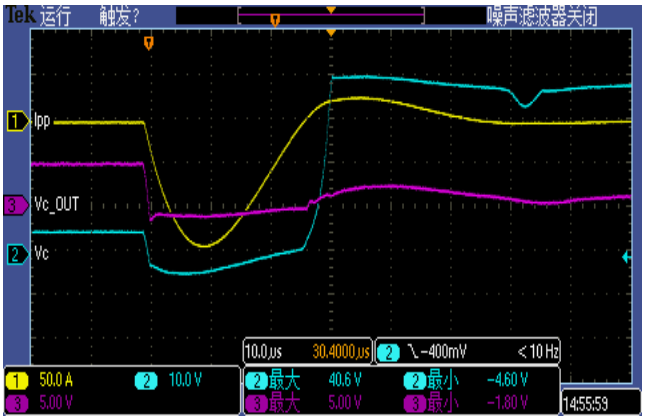
$R_{DS(ON)}$ vs. Input Voltage (I_{OUT} = 1A)



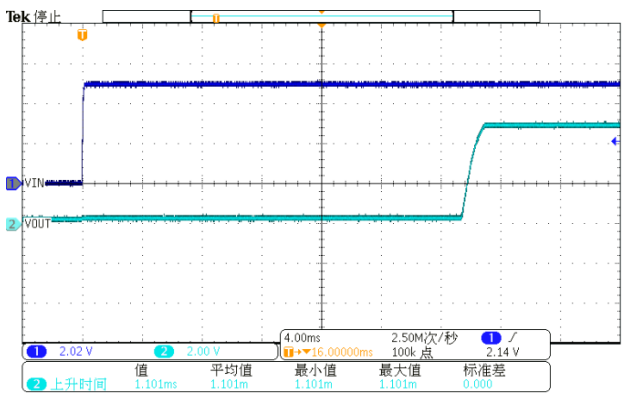
$R_{DS(ON)}$ vs. Output Current



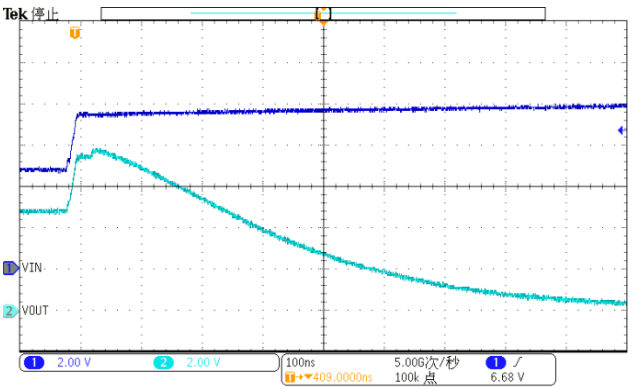
+110V Surge Response



-320V Surge Response



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



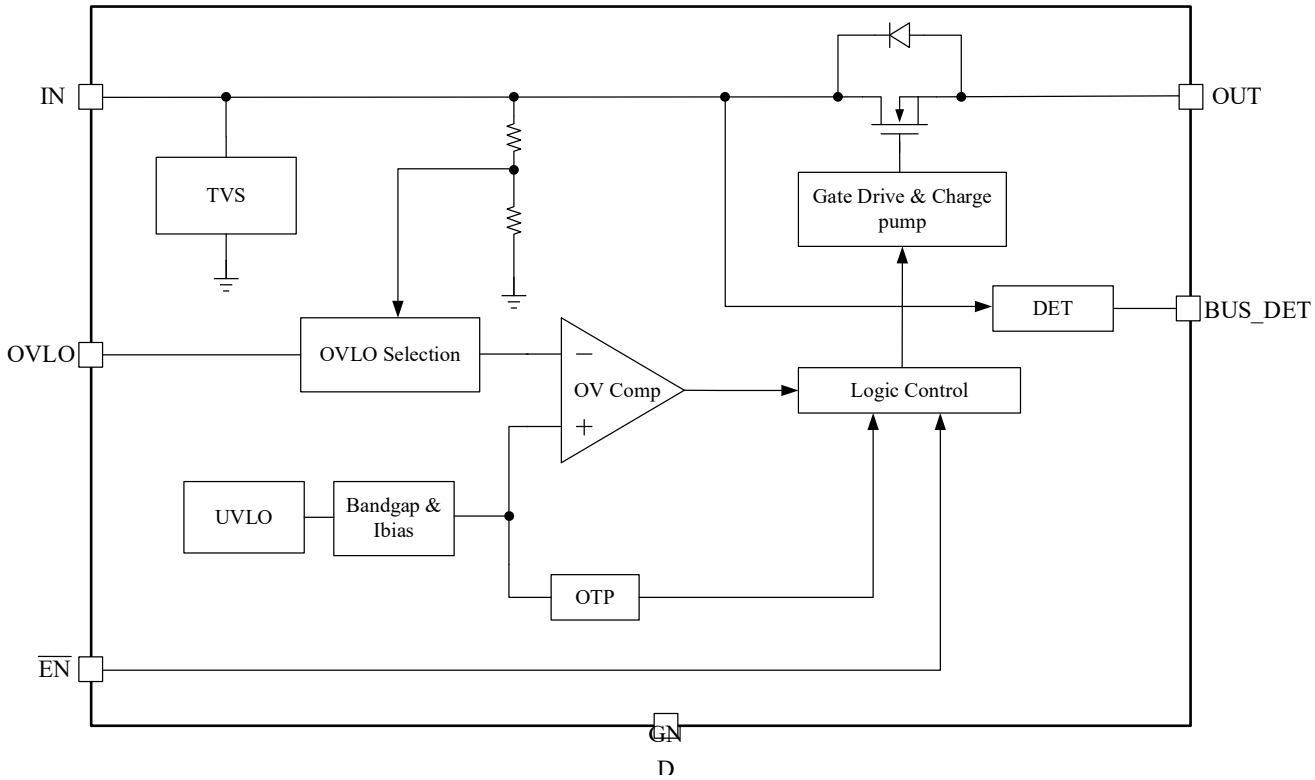
t_{OFF}

12. Function Description

12.1 Overview

If the WP3118 is enabled and the input voltage is between UVLO and OVP threshold, the internal charge pump begins to work after debounce time, the gate of the nFET switch will be slowly charged high till the switch is fully on. If the input voltage exceeds the OVP trip level, the switch will be turned off in about 50ns. If $\overline{EN}$ is pulled high, or input voltage falls below UVLO threshold, or over-temperature happens, the switch will also be turned off.

12.2 Block Diagram



12.3 Feature Description

12.3.1 Over-Voltage Protection

If the input voltage exceeds the OVP rising trip level, the switch will be turned off in about 50ns. The switch will remain off until VIN falls below the OVP falling trip level.

12.3.2 OVP Threshold Adjustment

If the default OVP threshold is used, OVLO pin must be grounded. If OVLO pin is not grounded, and by connecting external resistor divider to OVLO pin as shown in the typical application circuit, between IN and GND, the OVP threshold can be adjusted as following:

$V_{IN\_OVLO}=\frac{R_1+R_2}{R_2}V_{OVLO\_TH}$

The OVP threshold adjustment range is from 4V to 20V. When the OVLO pin voltage VOVLO exceeds V_{OVLO_SEL} (0.26V Typ.), VOVLO is compared with the reference voltage V_{OVLO_TH} (1.2V Typ.) to judge whether input supply is over-voltage.

12.3.3 Over Temperature Protection (OTP)

The WP3118 monitors its own internal temperature to prevent thermal failures. The chip turns off the MOSFET when the internal temperature reaches 150°C. The IC will resume after the internal temperature is cooled down 20°C.

12.3.4 Surge Protection

The WP3118 integrates a clamp circuit to suppress input surge voltage. For surge voltages between V_{IN_OVLO} and V_{IN_CLAMP}, the switch will be turned off but the clamp circuit will not work. For surge voltages greater than V_{IN_CLAMP}, the internal clamp circuit will detect surge voltage level and discharge the surge energy to ground. The device can suppress surge voltages up to 110V.

12.3.5 USB On-The-Go (OTG) Operation

If V_{IN} = 0V and OUT is supplied by OTG voltage, the body diode of the load switch conducts current from OUT to IN and the voltage drop from OUT to IN is approximately 0.7V. When V_{IN} > V_{IN_UVLO}, internal charge pump begins to open the load switch after debounce time (about 15ms). After switch is fully on, current is supplied through switch channel and the voltage drop from OUT to IN is minimum.

13.Application and Implementation

13.1 Application Information

13.1.1Power Up Enable Control

The WP3118 offers an enable ($\overline{EN}$) input. When the $\overline{EN}$ pin is pulled to logic high (>1.4V), the WP3118 will be shut down. When the $\overline{EN}$ pin is pulled to logic low (<0.4V), the WP3118 will be powered on. The $\overline{EN}$ pin has an internal pull-down resistor. Leaving the $\overline{EN}$ pin floating can enable the IC.

13.1.2 Input Capacitor

To limit the voltage drop on the input supply caused by transient in-rush currents when the switch turns on into a discharged load capacitor or a short-circuit, a capacitor needs to be placed between V_{IN} and GND. A 1-μF ceramic capacitor, C_{IN}, placed close to the pins is usually sufficient. Higher values of C_{IN} can be used to further reduce the voltage drop.

13.1.3 Output Capacitor

A 1-μF capacitor, C_{OUT}, should be placed between V_{OUT} and GND. This capacitor will prevent parasitic board inductances from forcing V_{OUT} below GND when the switch turns off.

14. Layout

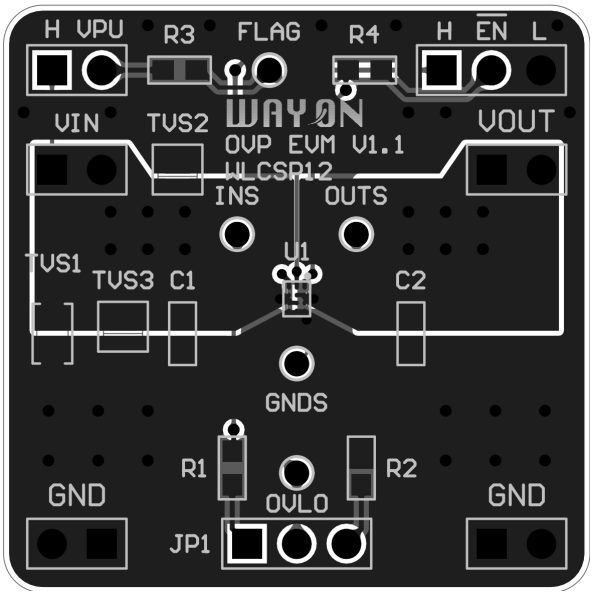
To make fully use of the performance of WP3118, the guidelines below should be followed.

1. All the peripherals should be placed as close to the device as possible. Place the input capacitor C_{IN} on the top layer (same layer as the WP3118) and close to IN pin, and place the output capacitor C_{OUT} on the top layer (same layer as the WP3118) and close to OUT pin.

2. If external TVS is used, IN pin routing passes through the external TVS firstly, and then connect WP3118.

3. If R_1 and R_2 are used, route OVLO line on PCB as short as possible to reduce parasitic capacitance.

14.1 Layout Example



15 Evaluation Modules

Evaluation Modules (EVMs) are available to help evaluate initial circuit performance. We have evaluation modules for different packages, you can contact us by phone or address at the end to get the evaluation module or schematic.

The module names are listed in the table below.

NAME	PACKAGE	EVALUATION MODULE
WP3118	WLCSP12	WAYON OVP EVM V1.1 WLCSP12

16 Naming Conventions

WP AB CC-D EEE F

WP: WAYON Protection IC;

A: Product Category –3: OVP on;

B: Whether TVS is integrated –1: Integrated;

CC: Serial number;

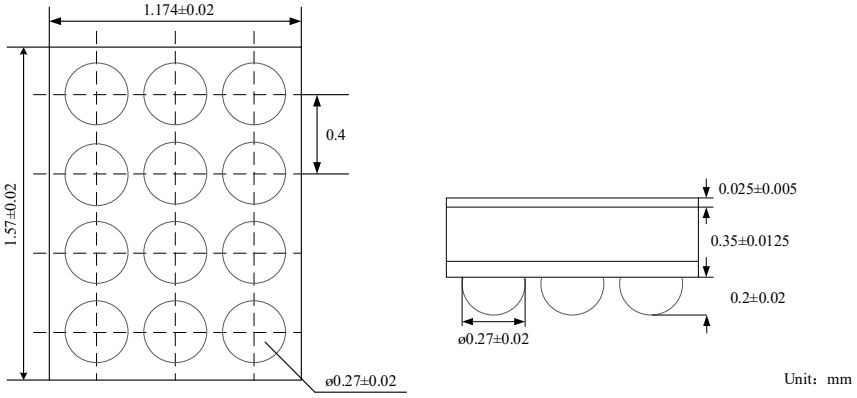
D: Overvoltage Protect of V_{IN} – A: 5.95V/ B: 6.80V / C:10.50V/ D: 14V;

EEE: Package – C12: WLCSP12;

F: R-Reel & T-tube;

17 Package Information

WLCSP12



Bottom View　　Side View

18 Ordering Information

PART NUMBER	V_{OVLO}	PACKAGE	PACKING QUANTITY	MARKING*
WP3118-AC12R	5.95V	WLCSP12	3k/Reel	318A XXXX
WP3118-BC12R	6.8V	WLCSP12	3k/Reel	318B XXXX
WP3118-CC12R	10.5V	WLCSP12	3k/Reel	318C XXXX
WP3118-DC12R	14V	WLCSP12	3k/Reel	318D XXXX

Contact Information

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WAYON website: http://www.way-on.com
For additional information, please contact your local Sales Representative.

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.

单击下面可查看定价，库存，交付和生命周期等信息

>>WAY-ON(维安)