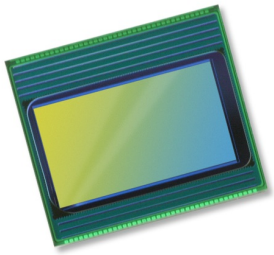


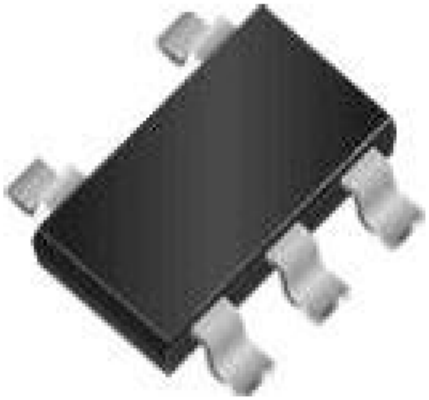
OMNIVISION WS4611 Power Distribution Switch User Guide

WS4611
80mΩ, Current Limited, Power Distribution Switch
www.ovt.com

Contents [hide

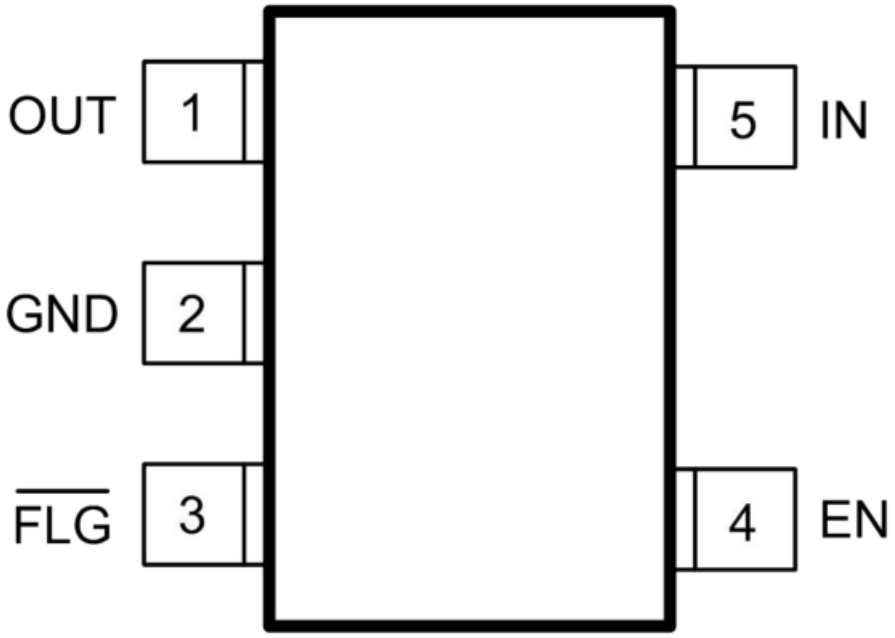
Descriptions

The WS4611 is a high-side switch with ultra-low ON resistance P-MOSFET. The integrated current-limit function can limit inrush current for heave capacitive load, over load current, and short-circuit current to protect the power source.



SOT-23-5L

The WS4611 is also an integrated reverse protection function to eliminate any reverse current flow across the switch when the device is off. The thermal shutdown function can protect the device and load. The output auto-discharge function is disabled in WS4611. The WS4611 is available in the SOT-23-5L package. The standard product is Pb-free and Halogen-free.



Pin configuration (Top view)

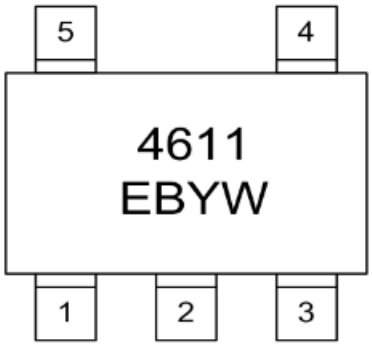
Features

- Input voltage range : 2.5~5.5V
- Main switch RON : 80mΩ @ VIN=5V
- Current limit threshold – WS4611EB: 1.0A (Typ.)
- Reverse block (No “body diode”)
- Over temperature protection

Applications

- USB peripherals
- USB Dongle

- USB 3G data card
- 3.3V or 5V Power Switch
- 3.3V or 5V Power Distribution

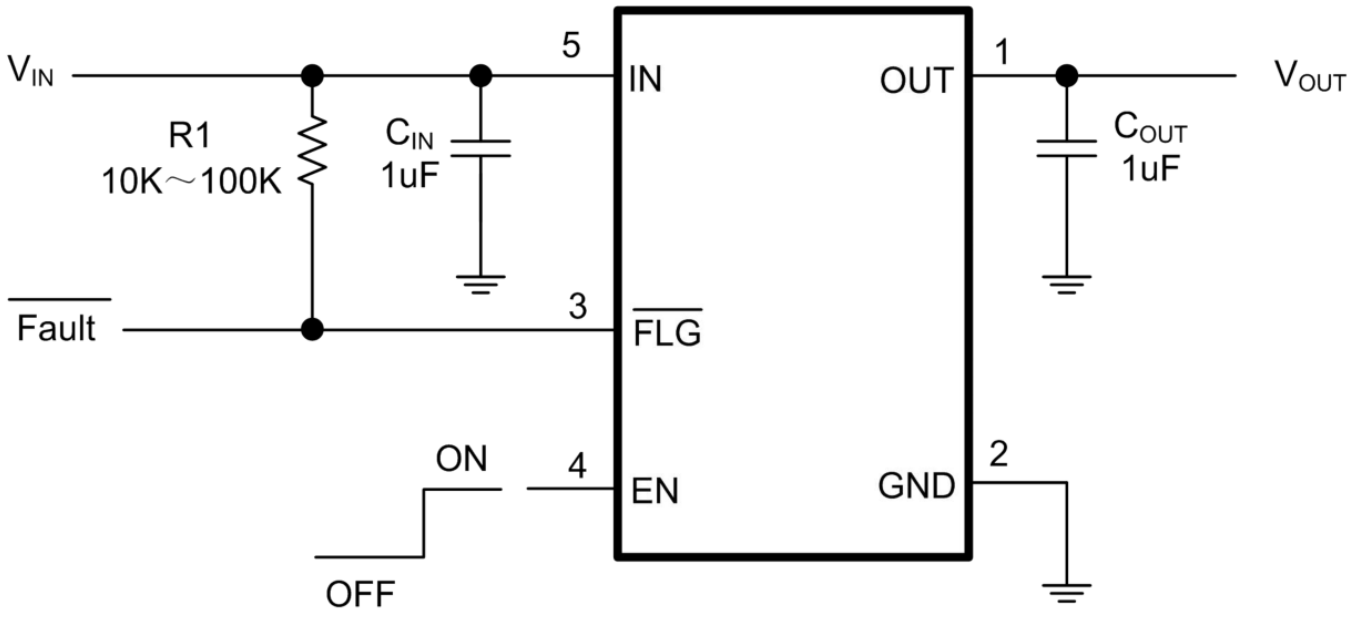


4611 = Device code
EB = Special code
Y = Year code
W = Week code

Marking
Order information

Device	Package	Shipping
WS4611EB-5/TR	SOT-23-5L	3000/Reel&Tape

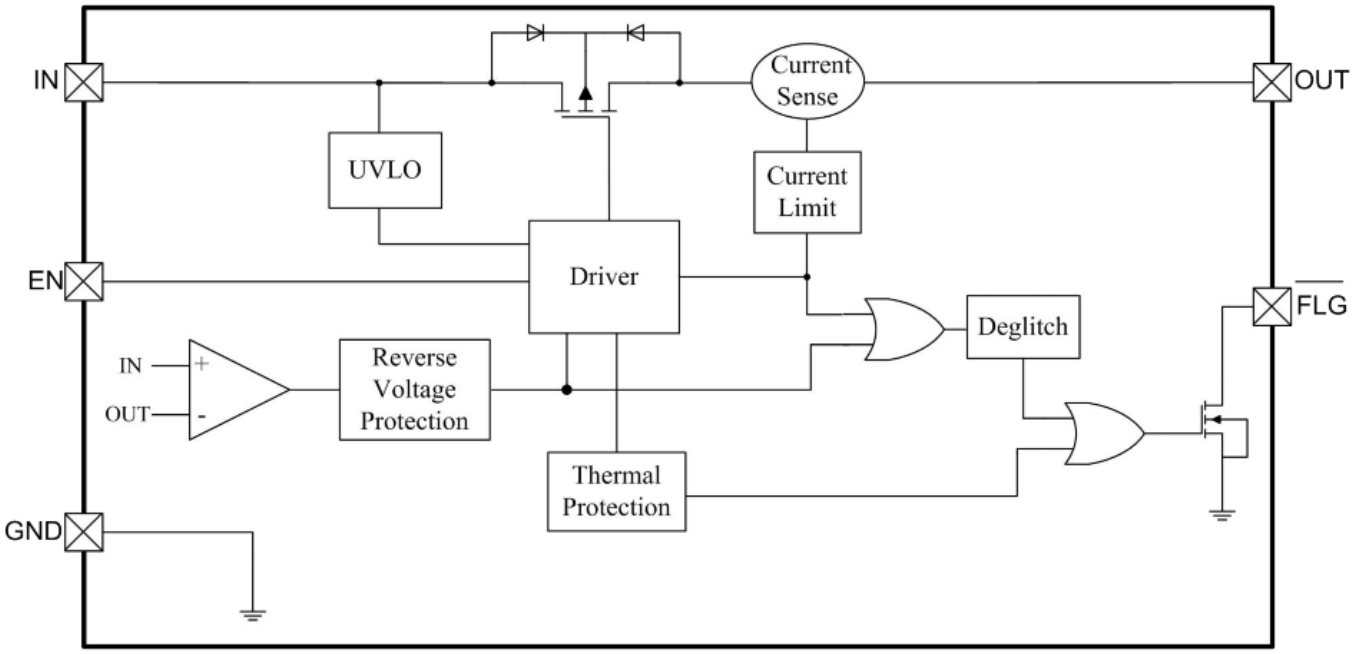
Typical Applications



Pin Descriptions

Pin Number	Symbol	Descriptions
1	OUT	Output Pin
2	GND	Ground
3	FLG	Fault Flag Pin, Open-Drain, Active Low
4	EN	Enable Pin, Active High
5	IN	Input Pin

Block Diagram



Absolute maximum ratings

Parameter	Symbol	Value	Unit
IN pin voltage range	VIN	-0.3 6.5	V
OUT pin voltage range	VOUT	-0.3~6.5	V
FLG pin voltage range	VFLG	-0.3~6.5	V
EN pin voltage range	VEN	-0.3~6.5	V
Junction temperature	TJ	-40~150	oC
Lead temperature(Soldering, 10s)	TL	260	oC
Storage temperature	Tstg	-55 ~ 150	oC
IN, OUT Pin ESD Ratings	HBM	8000	V
	MM	400	V
FLG, EN Pin ESD Ratings	HBM	4000	V
	MM	400	V

These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Recommend Operating Conditions

Parameter	Symbol	Value	Unit
Supply input voltage range	VIN	2.5 5.5	V
Operating ambient temperature	TA	-40 85	oC
Thermal Resistance	RθJA	250	oC/W

Electronics Characteristics (Ta=25o C, VIN=5V, CIN=COUT=1μF, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Quiescent supply current	IQ	IOUT=0, VIN=VEN=5V		48	60	μA
Shutdown current	ISD	VEN=0V			1	μA
Reverse current	IREV	VIN=VEN=0V, VOUT=5V, C urrent flow to VIN			1	μA
Main-FET ON resistance(1)	RON	VIN=VEN=5V, IOUT=500mA		80		mΩ
Auto-discharge FET ON resistance	RDCHG	VEN=0V, VIN =VOUT=5V		65		Ω
Over-current trip threshold	IOC	Current ramp (≤100A/s) on OUT	0.7	1	1.4	A
Short-circuit output current	IOS	OUT shorted to GND		0.45		A
Short circuit current limiting respon se time	tSHORT	OUT connected to GND CL= 1μF		2		μs
EN input low voltage	VIL	VIN=5V			0.4	V
EN input high voltage	VIH	VIN=5V	1.6			V
OUT pin turn-on time after EN ON	tON	CL=1μF, RL=5ohm		20		μs
Fault flag output blanking time	blank			9		ms
Over-temperature shutdown thresh old	TSD			160		oC
Over-temperature threshold hyster esis	THYS			35		oC
Under voltage lock-out threshold	VOLVO			2.2		V
Under voltage lockout hysteresis	VOLVO-H YS			200		mV

Note: (1) Pulse test, TP=380us
Typical Characteristics (Ta=25 o C, unless otherwise noted)

Operation Information

Power Switch

The power switch is a P-channel MOSFET with low RDS(ON) for power management or USB power distribution applications. The WS4611 has reverse voltage protection to prevent current flow from OUT to IN and IN to OUT when the device is off.

Current-Limit Protection

The WS4611 provides a current limit protection function to protect the power source when the over-current condition occurs.

Short-Circuit Protection

The WS4611 provides a short circuit protection function. The output current will be limited to safe level. Short-circuit protection is used to reduce the power dissipation of the device and protect the power sources during short-circuit conditions.

Fault indicate

The FLG open drain output is asserted (active low) with 8ms(Typ.) delay when an over-current or over-temperature condition is encountered. The FLG signal will remain asserted until the over-current or over-temperature condition is removed.

UVLO Protection

To avoid malfunction of the WS4611 at low input voltages, an under-voltage lockout is included that disables the device, until the input voltage exceeds 2.2V (Typ.).

Shutdown Mode Drive EN to GND to place the WS4611 in shutdown mode. In shutdown mode, input current falls to smaller than 1uA.

Thermal Shutdown

As soon as the junction temperature (TJ) exceeds 160 C (Typ.), the WS4611 goes into thermal shutdown. In this mode, the device is turned off and will turn on again until the Junction temperature falls below 125o oC (Typ.).

Application Information

Input Capacitor

A 1uF input bypass ceramic capacitor(CIN) from IN to GND, located near the WS4611 is strongly recommended to suppress the voltage overshooting during short circuit fault event. Without the bypass capacitor, the output short may cause sufficient ringing on the input (from supply lead inductance) to damage the device.

Output Capacitor

A low ESR, 150uF aluminum electrolytic or tantalum between OUT and GND is strongly recommended to reduce the voltage droop during hot-plug of downstream peripheral. Higher value output capacitor is better when the output load is heavy. Additionally, bypassing the output with a 1uF ceramic capacitor improves the immunity of the device to short-circuit transients.

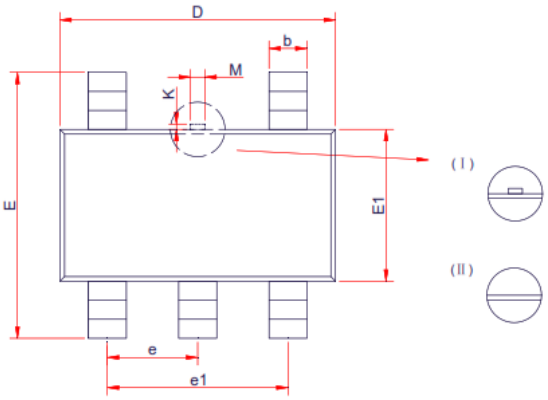
PCB Layout consideration

The PCB layout should be carefully performed to maximize thermal dissipation and to minimize voltage drop. The following guidelines must be considered:

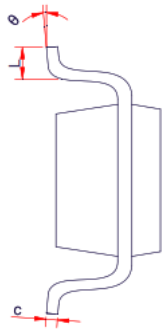
1. Please place the input capacitors near the IN pin as close as possible.
2. Output decoupling capacitors for load must be placed near the load as close as possible for decoupling high-frequency ripples.
3. Locate WS4611 and output capacitors near the load to reduce parasitic resistance and inductance for excellent load transient performance.
4. The negative pins of the input and output capacitors and the GND pin must be connected to the ground plane of the load.
5. Keep IN and OUT traces as wide and short as possible.

PACKAGE OUTLINE DIMENSIONS

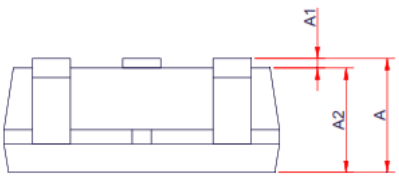
SOT-23-5L



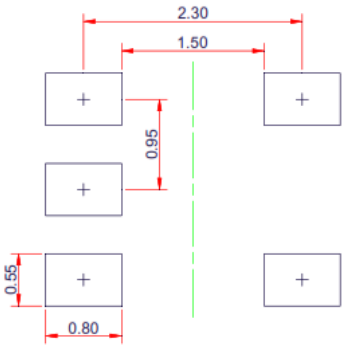
TOP VIEW



SIDE VIEW



SIDE VIEW

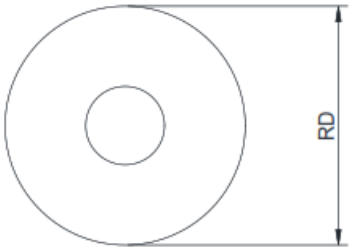


RECOMMENDED LAND PATTERN (unit: mm)

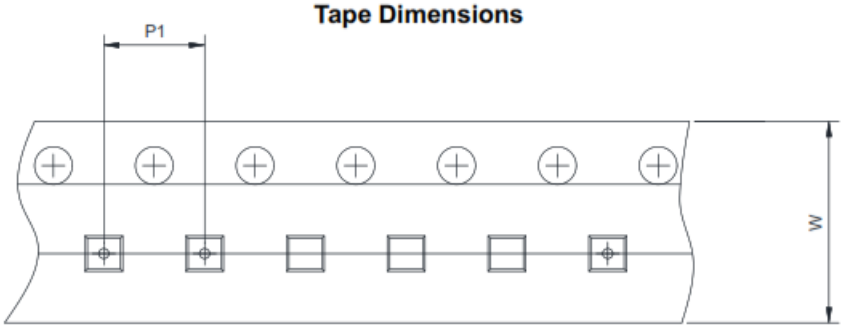
Symbol	Dimensions in Millimeters		
	Min.	**Typ.**	**Max.**
A	–	–	1.45
A1	0.00	–	0.15
A2	0.90	1.10	1.30
b	0.30	0.40	0.50
c	0.10	–	0.21
D	2.72	2.92	3.12
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95 BSC		
e1	1.90 BSC		
L	0.30	0.45	0.60
M	0.10	0.15	0.25
K	0.00	–	0.25
θ	0°	–	8°

TAPE AND REEL INFORMATION

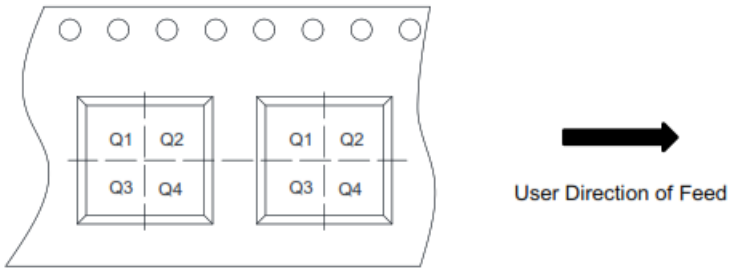
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☑ 7inch	☐ 13inch		
W	Overall width of the carrier tape	☑ 8mm	☐ 12mm	☐ 16mm	
P1	Pitch between successive cavity centers	☐ 2mm	☑ 4mm	☐ 8mm	
Pin1	Pin1 Quadrant	☐ Q1	☐ Q2	☑ Q3	☐ Q4

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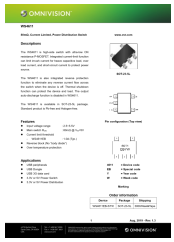
Documents / Resources

	OMNIVISION WS4611 Power Distribution Switch [pdf] User Guide WS4611, Power Distribution Switch, WS4611 Power Distribution Switch