

Over Voltage and Over Current Protector

General Description

ET9528 can disconnect the systems from its output pin(OUT) in case wrong input operating conditions are detected. The system is positive overvoltage protected up to 36V. The internal overvoltage thresholds(OVLO) is 6.1V and internal overcurrent thresholds(OCP) is 2.5A. ET9528 also has internal over temperature protect(OTP) function and it can monitor chip temperature to protect the device.

The device is packaged in advanced full-Green Packaging (SOT23-6L).

Features

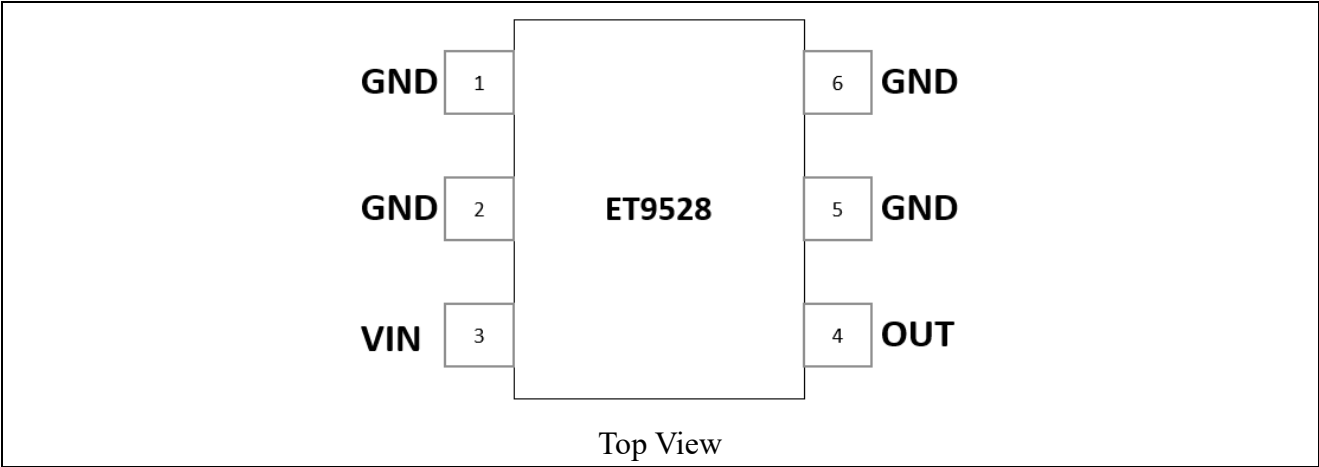
- Typical R_{ON} : 110m Ω N-Channel MOSFET @5V/1A
- V_{IN} Operating Range: 2.5V to 36V
- Internal Overvoltage Lockout : 6.1V
- Internal Overcurrent Lockout : 2.5A(MIN)
- Overvoltage-Protection Response Time: <500ns
- Startup Debounce Time:16ms(TYP).
- **Typical Output Power on Time: 16.3ms(TYP).**
- Internal Thermal-Shutdown Protection
- ESD Protected: Human Body Model: JESD22-A114(All pins) $\pm$ 2KV
- SOT23-6L package

Application

- Smartphones, Tablet PC
- HDD, Storage and Solid State Memory Devices
- Portable Media Devices, Laptop & MID
- SLR Digital Cameras
- GPS and Navigation Equipment
- Industrial Handheld and Enterprise Equipment

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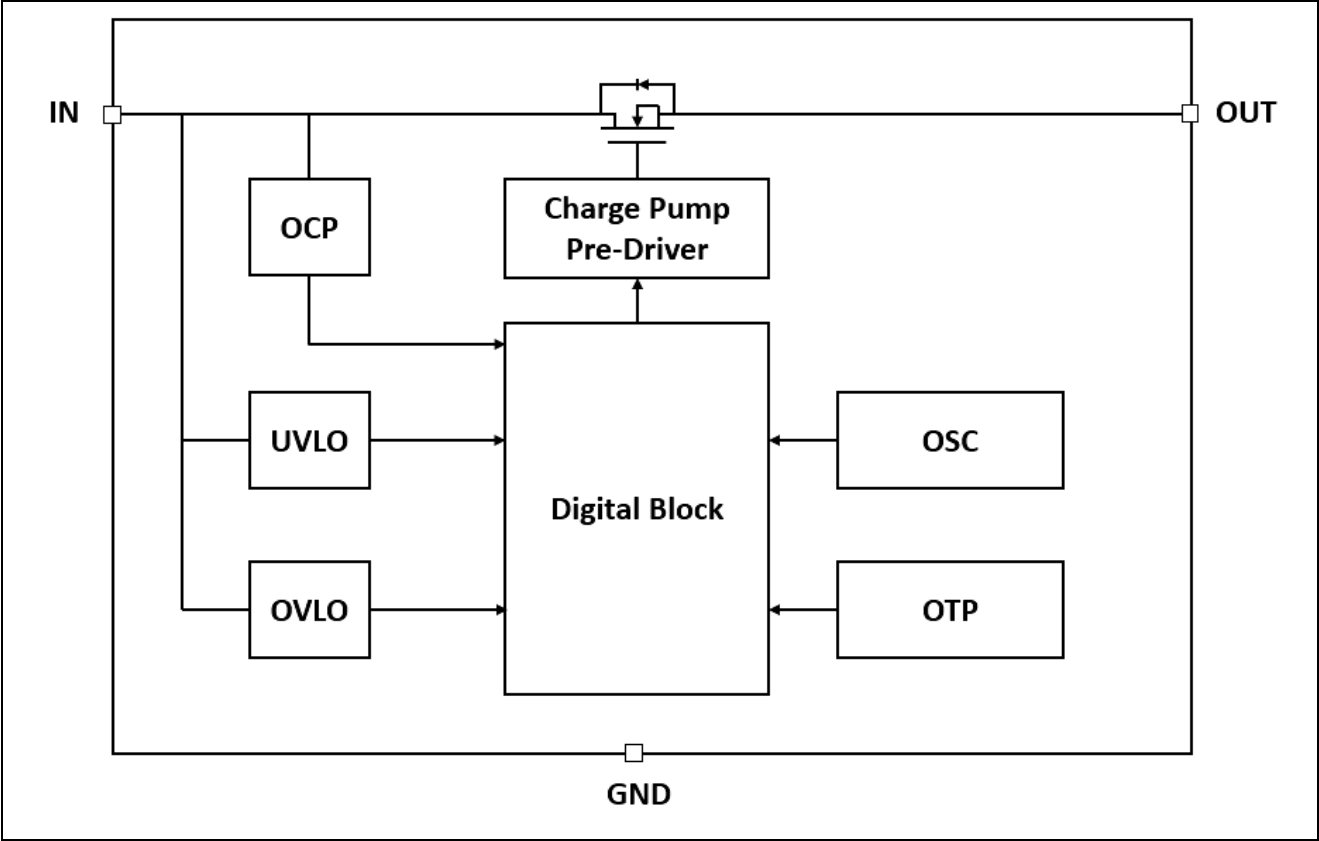
Pin Configuration



Pin Function

PIN	NAME	DESCRIPTION
1,2,5,6	GND	Ground. Connect GND pins together for proper operation.
3	IN	Voltage Input.
4	OUT	Voltage Output.

Block Diagram



Functional Description

The OVP switch with overvoltage protection feature a low 110m Ω (typical) on-resistance(R_{ON}) internal FET and protect low-voltage systems against voltage faults up to 36V_{DC}. If the input voltage(V_{IN}) exceeds 6.1V, or input current exceeds 2.5A, the internal FET is quickly turned off to prevent damage to the protected downstream components.

The internal FET turns off when the junction temperature exceeds +155°C (TYP.). The device exits thermal shutdown after the junction temperature cools by 20°C (TYP.).

Input Capacitor

To limit the voltage drop on the input supply caused by transient inrush current when the switch turns on into a discharged load capacitor or short-circuit, a capacitor 1 μ F or larger must be placed between the VIN and GND pins.

Output Capacitor

A 1 μ F or larger capacitor should be placed between the OUT and GND pins.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

SYMBOL	PARAMETERS	MIN	MAX	UNIT
V_{IN}	VIN to GND	-0.3	36	V
V_{OUT}	VOUT to GND	-0.3	28	V
I_{SW1}	Maximum Continuous Current of switch IN-OUT		2.5	A
I_{SW2}	Maximum Peak Current of switch IN-OUT(10ms)		4	A
P_D	Power Dissipation at $T_A = +70^{\circ}\text{C}$		500	mW
T_{STG}	Storage Junction Temperature	-65	+150	$^{\circ}\text{C}$
T_A	Operating Temperature Range	-40	+85	$^{\circ}\text{C}$
T_{Store}	Soldering Temperature (reflow).		+260	$^{\circ}\text{C}$
T_J	Junction Temperature		+150	$^{\circ}\text{C}$

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Electrical Characteristics

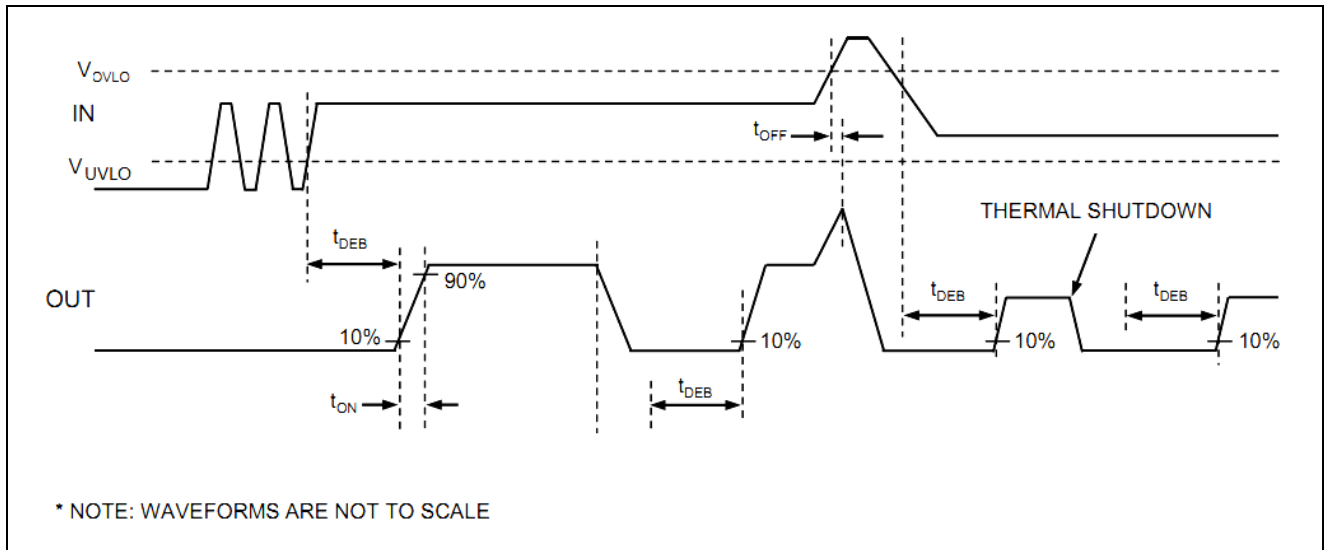
Unless otherwise noted, typical values are at $V_{IN}=5V$ and $T_A=25^{\circ}C$.

SYMBOL	PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNIT
Basic Operation						
V_{IN}	Input Voltage		2.5		36	V
I_{IN}	V_{IN} Quiescent Current	$V_{IN}=5V$, OUT floating		110		μA
R_{ON}	On-Resistance of Switch IN-OUT	$V_{IN}=5.0V$, $I_{OUT}=1A$		110		$m\Omega$
$R_{DISCHARGE}$	Output discharge resistance			3.9		$K\Omega$
V_{OVLO}	Overvoltage protect of V_{IN}	V_{IN} rise up	5.8	6.1	6.4	V
	Overvoltage protect hysteresis of V_{IN}			0.15		V
V_{UVLO_R}	Under Voltage Lockout Threshold	V_{IN} Rising		2.2		V
Input Over						
t_{DEB}	Debounce Time	Time from $2.1V < V_{IN} < V_{OVLO}$ to $V_{OUT}=10\%$ of V_{IN}		16		ms
t_{ON}	Switch Turn-On Time	$R_L=100\Omega$, $C_L=22\mu F$, V_{OUT} from $0.1 \times V_{IN}$ to $0.9 \times V_{IN}$		0.3		ms
t_{ON_ALL}	Output power-on Time	Time from $2.1V < V_{IN} < V_{OVLO}$ to $V_{OUT}=90\%$ of V_{IN}		16.3		ms
$t_{OFF_RES}^{(1)}$	Switch turn-off response time	$V_{IN} > V_{OVLO}$ to V_{OUT} stop rising		100	500	ns
Dynamic Characteristics: see figure						
I_{OCP}	Overcurrent protect of I		2.5	3.1		A
I_{SHORT}				120		mA
t_{OCP}	OCP debounce time			30		ms
T_{REC_OCP}	OCP recovery time			1		s
Over Temperature Protection (OTP)						
	Thermal Shutdown			155		$^{\circ}C$
	Thermal-shutdown Hysteresis			20		$^{\circ}C$

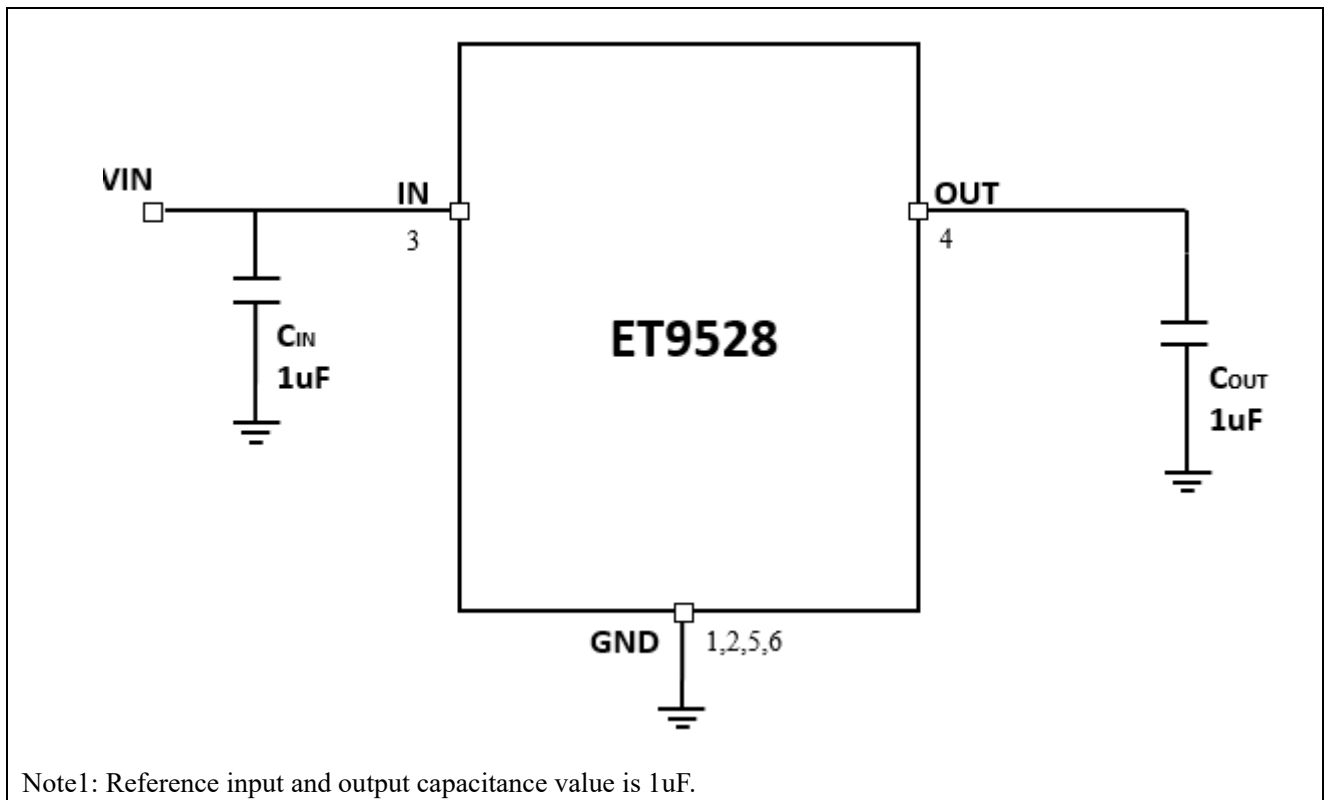
Note:

1、Guaranteed by characterization and design.

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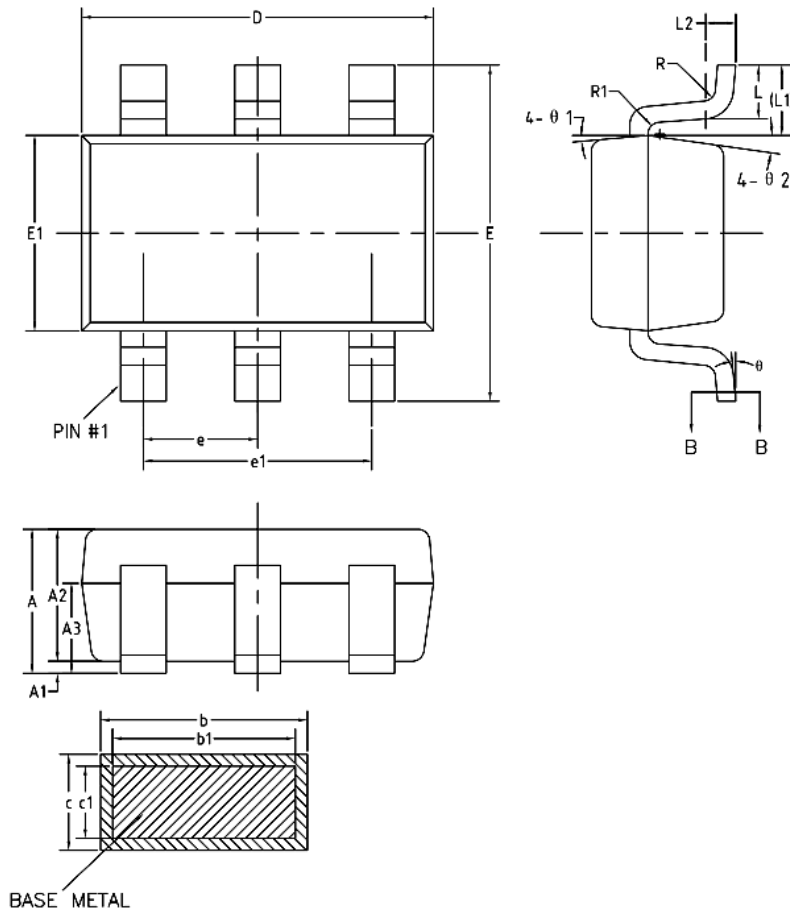
Application Circuits



*: This electric circuit only supplies for reference.

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Package Dimension



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	—	—	1.25
A1	0	—	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	—	0.50
b1	0.36	0.38	0.45
c	0.14	—	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.95BSC		
e1	1.90BSC		
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.05	—	—
R1	0.05	—	0.20
θ	0°	—	8°
$\theta 1$	3°	5°	7°
$\theta 2$	6°	8°	10°

Revision History and Checking Table

[illegible]