

## Ultra-low Dropout, 500mA, CMOS LDO

### General Description

The WR0512 series are ultra-low dropout, Low quiescent current, high PSRR CMOS LDO. The dropout voltage is 130mV (Typ.) at 500mA load current.

Using CMOS construction, the quiescent current consumed by the WR0512 is typically 60μA over the entire input voltage range, making it attractive for consumer, networking applications that demand high output current. The WR0512 series are available in wide output voltage range version from 1.2V to 3.3V with 0.1V step.

The WR0512 series offer thermal shutdown (OTP) and current limit functions, to assure the stability of chip and power system at wrong condition, and it uses trimming technique to guarantee output voltage accuracy within ±2%.

The WR0512 regulators are available in SOT-23-3、SOT-23-5、SOT-89-3/L packages. Standard products are Pb-free and Halogen-free.

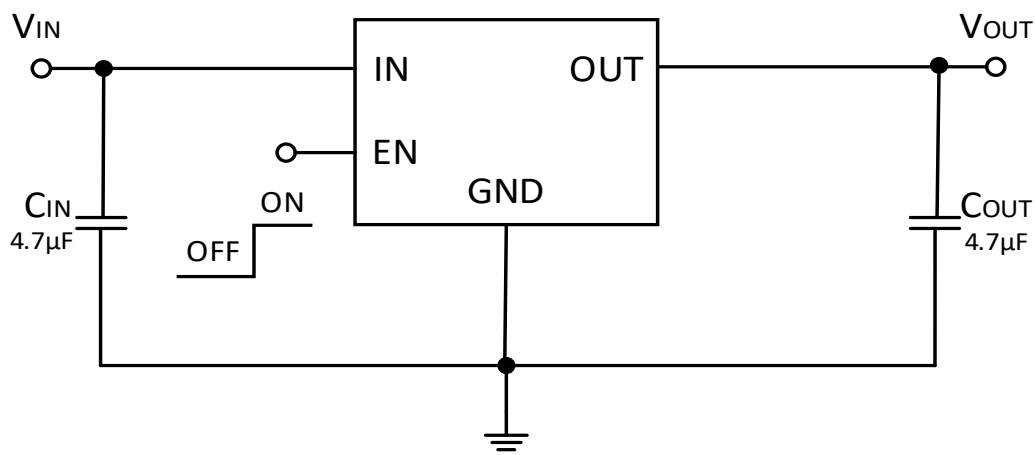
### Features

- Input Voltage: 2.5V~5.5V
- Output Voltage: 1.2V~3.3V
- Output Current: 500mA
- PSRR: 70dB @ 1KHz
- Dropout Voltage: 130mV @ I<sub>OUT</sub>=500mA
- Operating Temperature: -40~+85° C
- Output Noise: 120μVRMS
- Quiescent Current: 60μA Typ.

### Applications

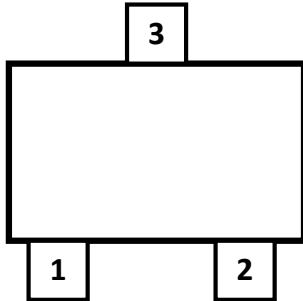
- LCD TV
- STB
- Computer, Graphic card
- Network communication equipments
- Others portable electronics devices

### Typical Application

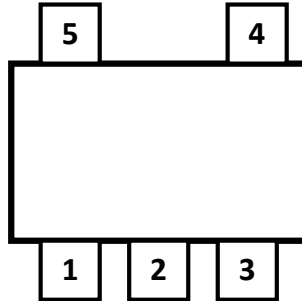


Pin Configuration

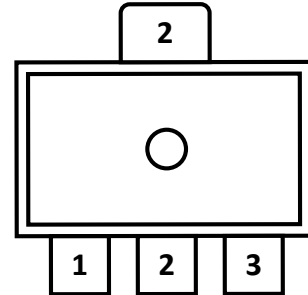
(Top View)



SOT 23-3



SOT 23-5



SOT89-3/L

Pin Description

Pin Name				Pin Number	Description
SOT23-5	SOT23-3	SOT89-3	SOT89-3L		
1	3	2	3	IN	Input
2	1	1	2	GND	Ground
3	-	-	-	EN	Enable, Active High
4	-	-	-	NC	Not connect
5	2	3	1	OUT	Output

**Absolute Maximum Ratings**

Parameter		Rating	Unit
Input voltage range		-0.3 ~ 6.5	V
EN Input voltage range		-0.3 ~ V <sub>IN</sub>	V
Output voltage range		-0.3 ~ V <sub>IN</sub>	V
Power dissipation <sup>1</sup>	SOT89-3/L	625	mW
	SOT23-5	500	mW
	SOT23-3	500	mW
Thermal resistance	SOT89-3/L	200	°C/W
	SOT23-5	250	°C/W
	SOT23-3	250	°C/W
Junction temperature		150	°C
Lead temperature(10s)		260	°C
Storage temperature		-55 ~ 150	°C
ESD Susceptibility	HBM	±4000	V

Note 1: Power dissipation is calculated by  $P_D = (V_{IN} - V_{OUT}) \times I_{OUT}$

**Recommended Operating Conditions**

Parameter	Rating	Unit
Operating Supply voltage	2.5 ~ 5.5	V
Operating Temperature Range	-40 ~ 85	°C

## Electrical Characteristics

( $T_a=25^\circ\text{C}$ ,  $V_{IN}=V_{OUT}+1\text{V}$ ,  $C_{IN}=C_{OUT}=4.7\mu\text{F}$ , unless otherwise noted)

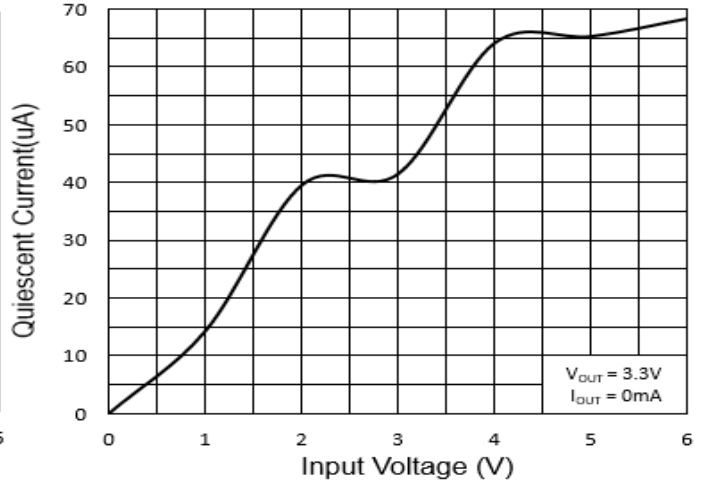
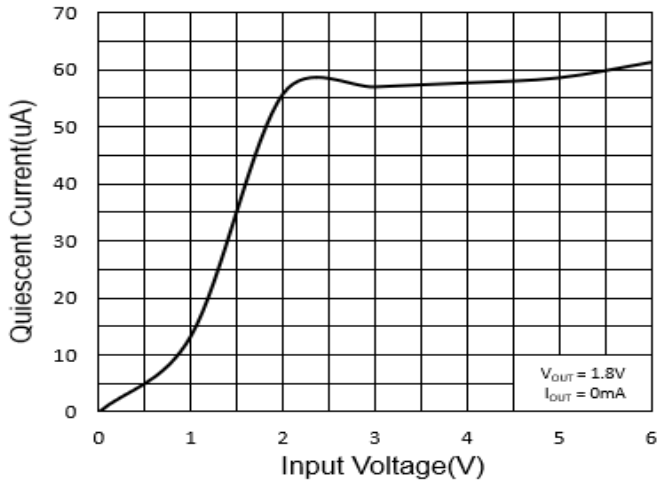
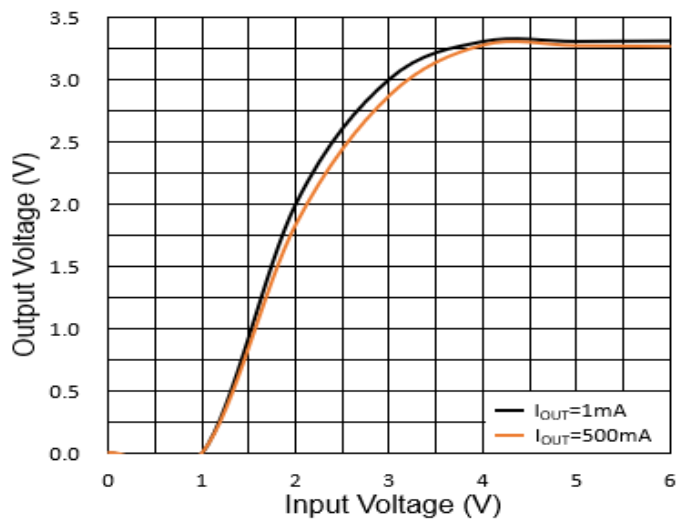
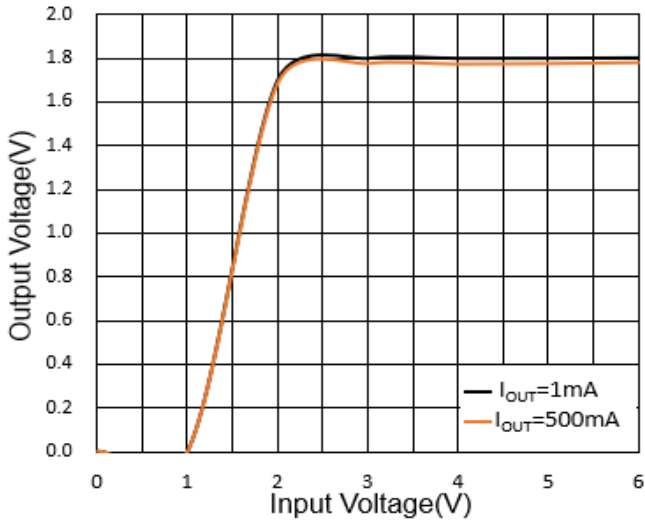
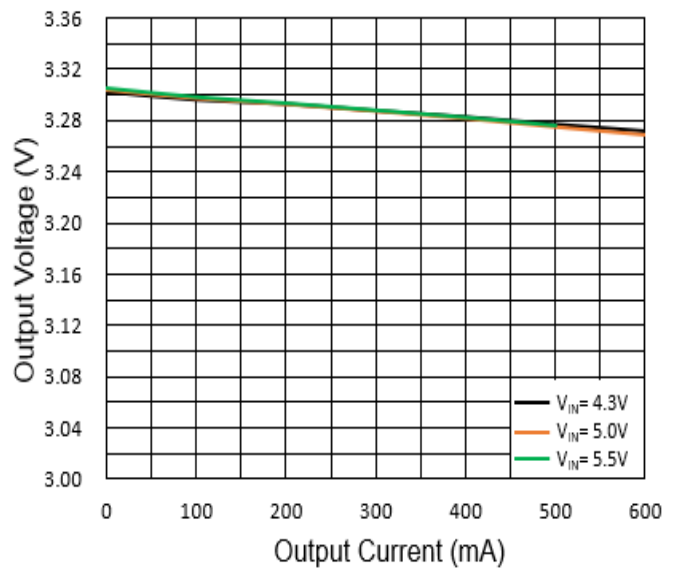
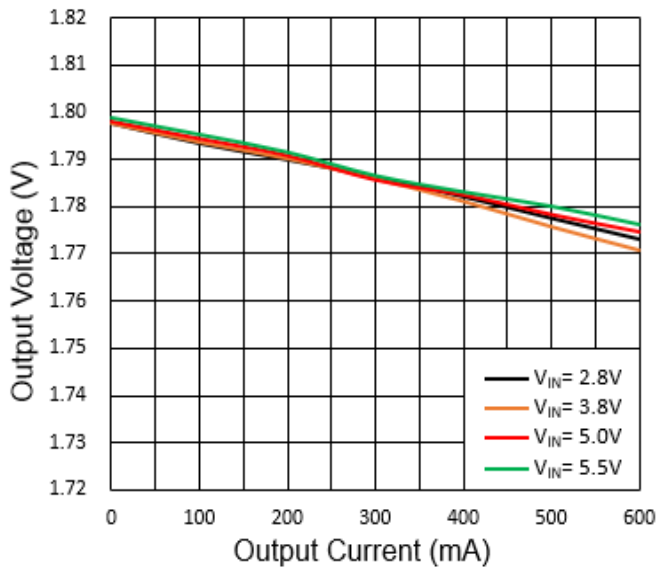
symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_{OUT}$	Output Voltage	$V_{OUT}\leq 1.5\text{V}$ , $V_{IN}=2.5\text{V}$ , $I_{OUT}=1\text{mA}$	0.97 $V_{OUT}$	$V_{OUT}$	1.03 $V_{OUT}$	V
		$V_{OUT} > 1.5\text{V}$ , $I_{OUT}=1\text{mA}$	0.98 $V_{OUT}$	$V_{OUT}$	1.02 $V_{OUT}$	
$V_{DO}$	Dropout Voltage <sup>1</sup>	$V_{OUT}=V_{OUT}\cdot 0.98$ , $I_{OUT}=500\text{mA}$		130		mV
$I_{LIMIT}$	Current Limit	$V_{IN}=5\text{V}$		0.8		A
LNR	Line Regulation	$V_{OUT}=3.3\text{V}$ , $V_{IN}=4.3\sim 5.5\text{V}$ , $I_{OUT}=1\text{mA}$		0.1		%/V
LDR	Load Regulation <sup>2</sup>	$V_{OUT}=3.3\text{V}$ , $I_{OUT}=1\sim 500\text{mA}$		15		mV
$I_Q$	Quiescent Current	$V_{OUT}=3.3\text{V}$ , $I_{OUT}=0\text{mA}$		60	90	$\mu\text{A}$
$I_{SHDN}$	Shut-down Current	$V_{EN} = 0\text{V}$		0.1	1.0	$\mu\text{A}$
PSRR	Power Supply Ripple Rejection	$V_{IN}=(V_{OUT}+1\text{V})_{DC}+0.2\text{V}_{P-P}$ $F=1\text{KHz}$ , $I_{OUT}=10\text{mA}$ @ $V_{OUT}=3.3\text{V}$		70		dB
$V_{NO}$	Output noise voltage	10Hz to 100KHz, $C_{OUT}=4.7\mu\text{F}$ $I_{OUT}=10\text{mA}$		120		$\mu\text{V}_{RMS}$
$V_{IH}$	EN logic high voltage	$V_{IN}=5.5\text{V}$ , $I_{OUT}=1\text{mA}$	1.2			V
$V_{IL}$	EN logic low voltage	$V_{IN}=5.5\text{V}$ , $I_{OUT}=1\text{mA}$			0.4	V
$T_{SD}$	Thermal shutdown threshold			165		$^\circ\text{C}$
$\Delta T_{SD}$	Thermal shutdown hysteresis			30		$^\circ\text{C}$

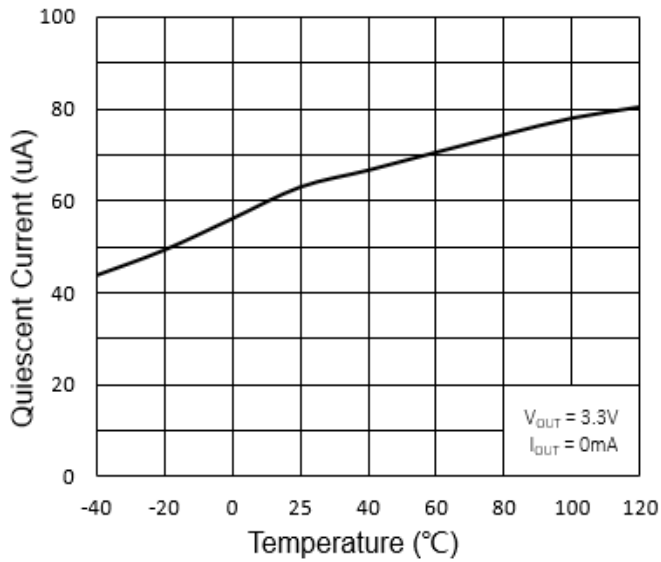
Note1: The dropout voltage is defined as ( $V_{IN}-V_{OUT}$ ) when  $V_{OUT}$  is 100mV below the target value of  $V_{OUT}$ .

Note2: The Load regulation is measured using pulse techniques with duty cycle < 5%.

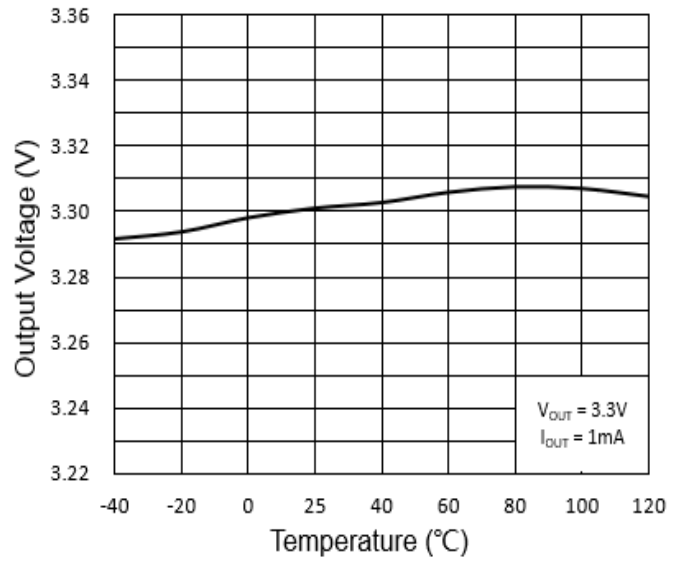
**Typical Characteristics**

( $T_a=25^\circ\text{C}$ ,  $V_{IN}=V_{OUT}+1\text{V}$ ,  $C_{IN}=C_{OUT}=4.7\mu\text{F}$ , unless otherwise noted)

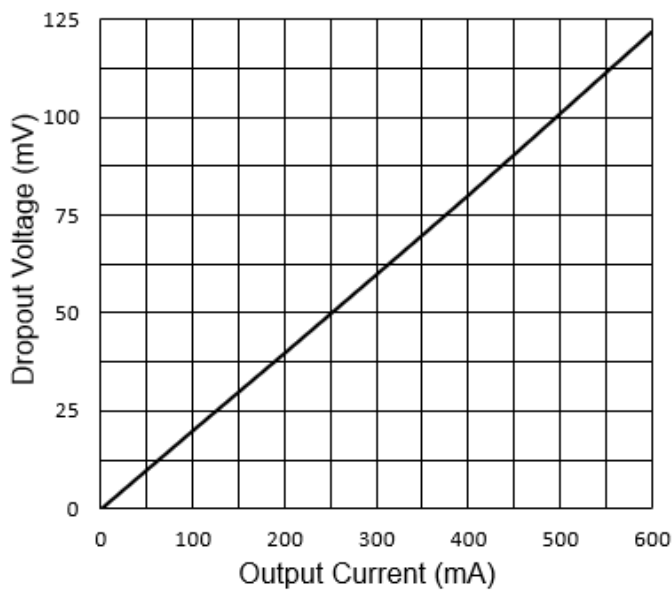

**Quiescent Current vs. Supply Voltage**
**Quiescent Current vs. Supply Voltage**

**Output Voltage vs. Supply Voltage**
**Output Voltage vs. Supply Voltage**

**Output Voltage vs. Output Current**
**Output Voltage vs. Output Current**



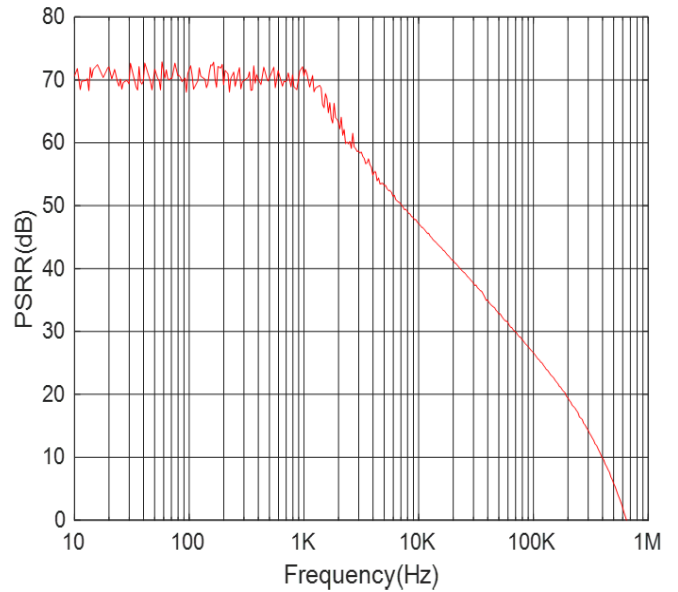
Quiescent Current vs. Temperature



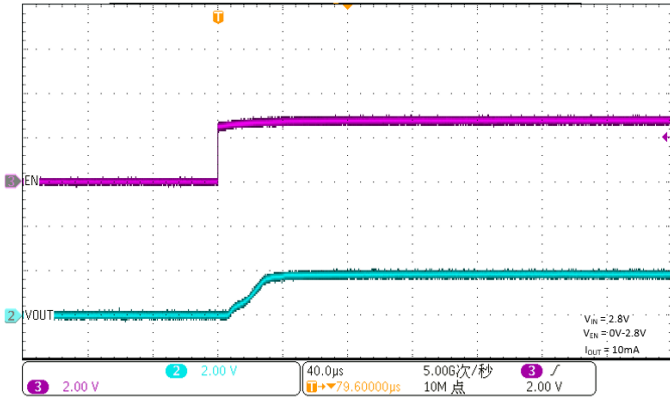
Output Voltage vs. Temperature



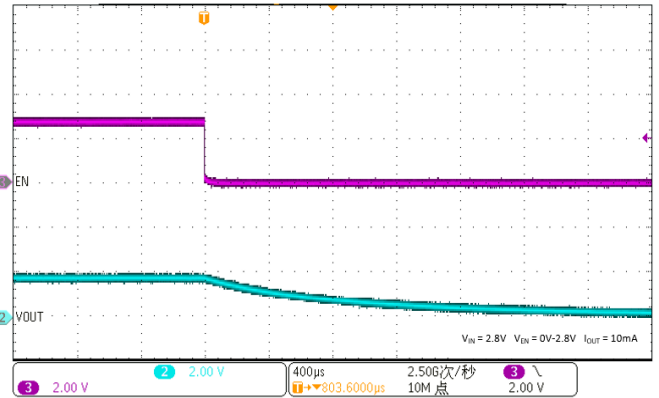
Dropout Voltage vs. Output Current



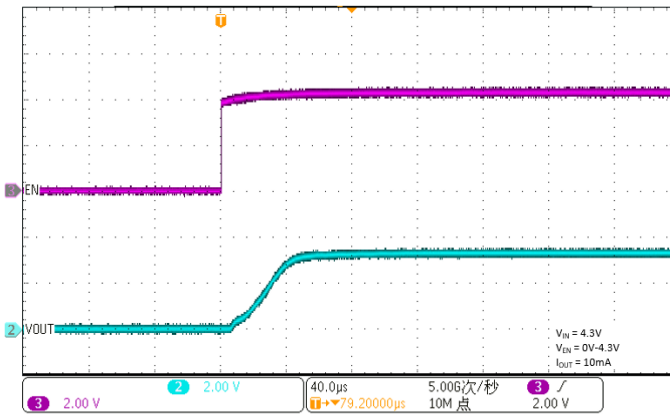
Power Supply Rejection Ratio vs. Frequency



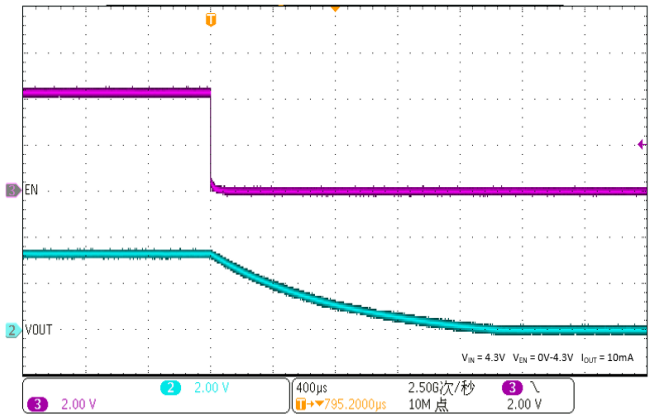
Soft Start from EN



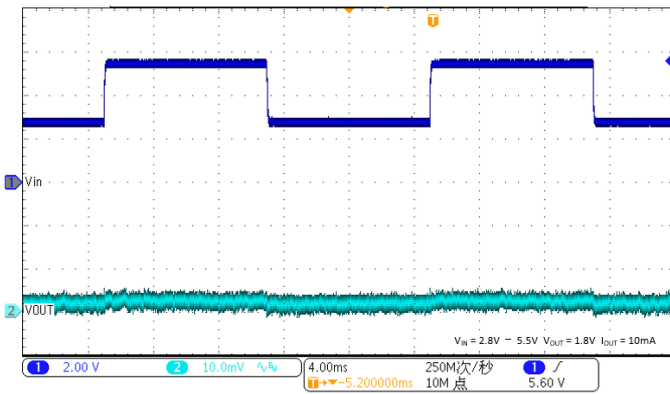
EN Shutdown



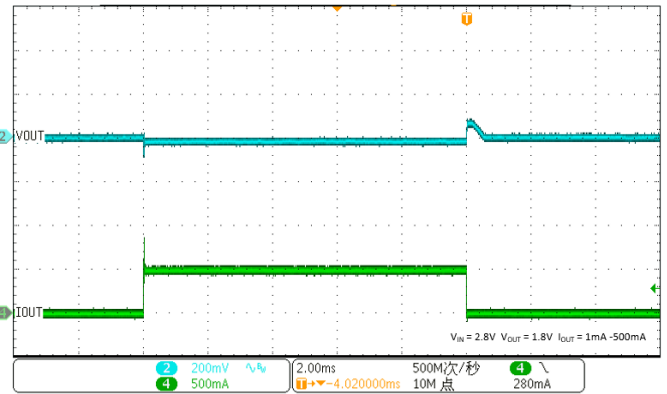
Soft Start from EN



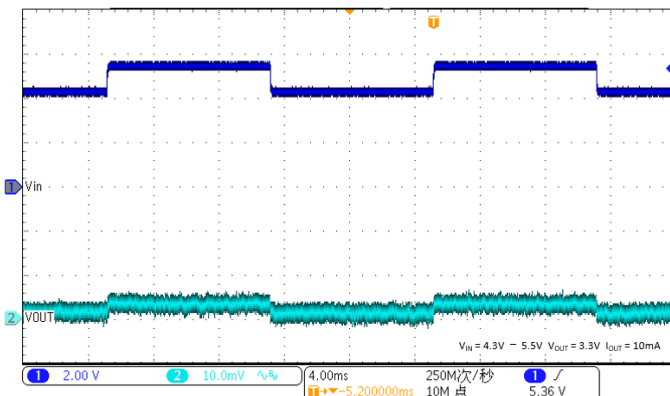
EN Shutdown



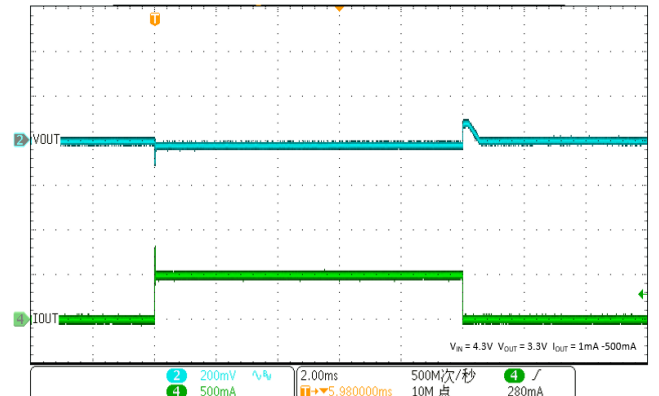
Line Transient



Load Transient

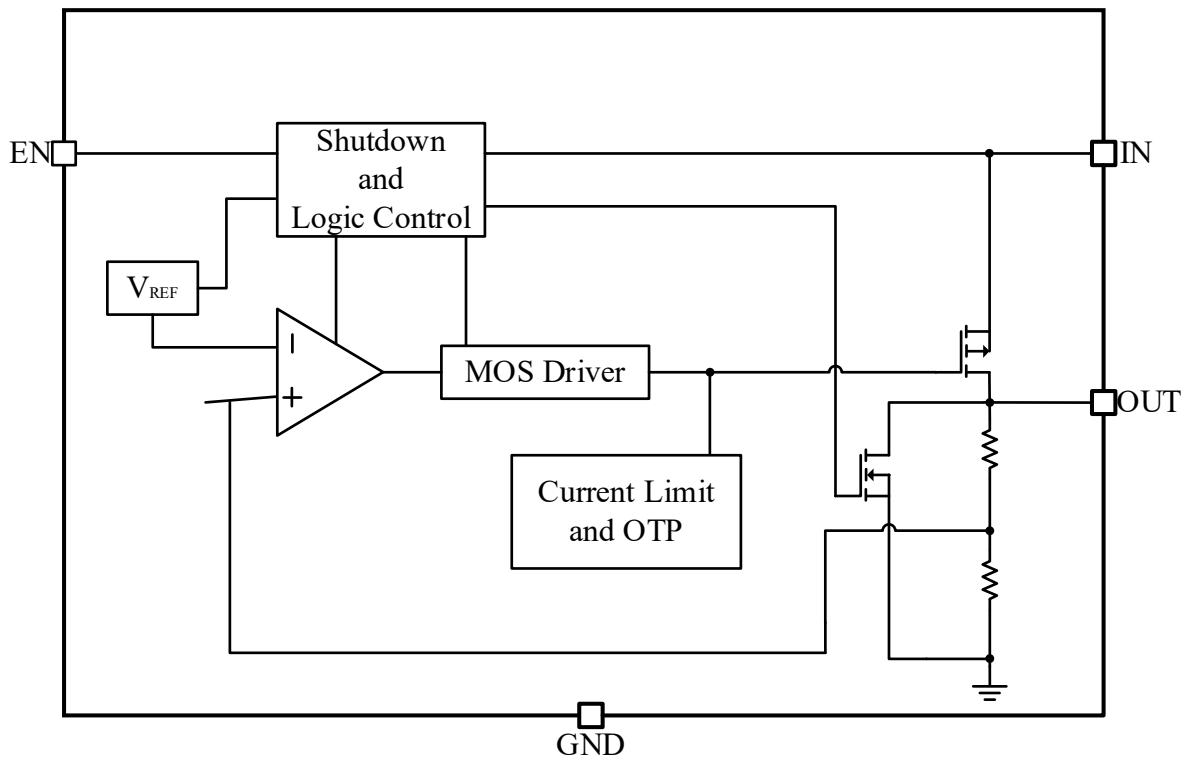


Line Transient

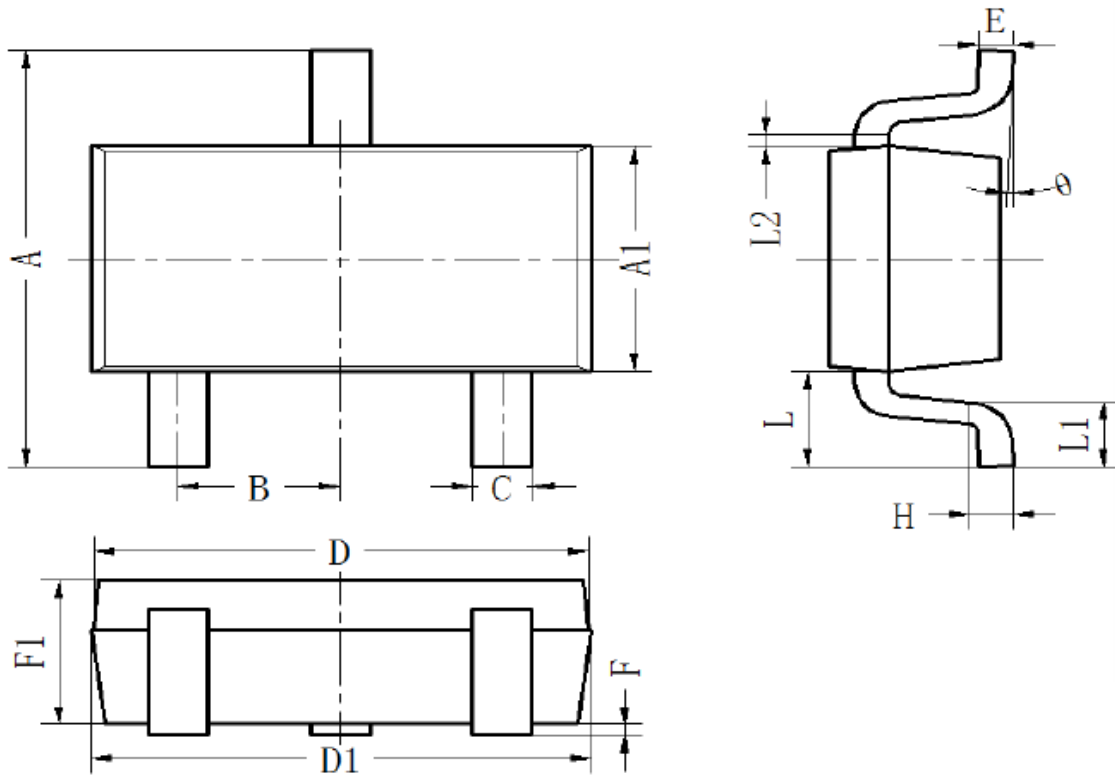


Load Transient

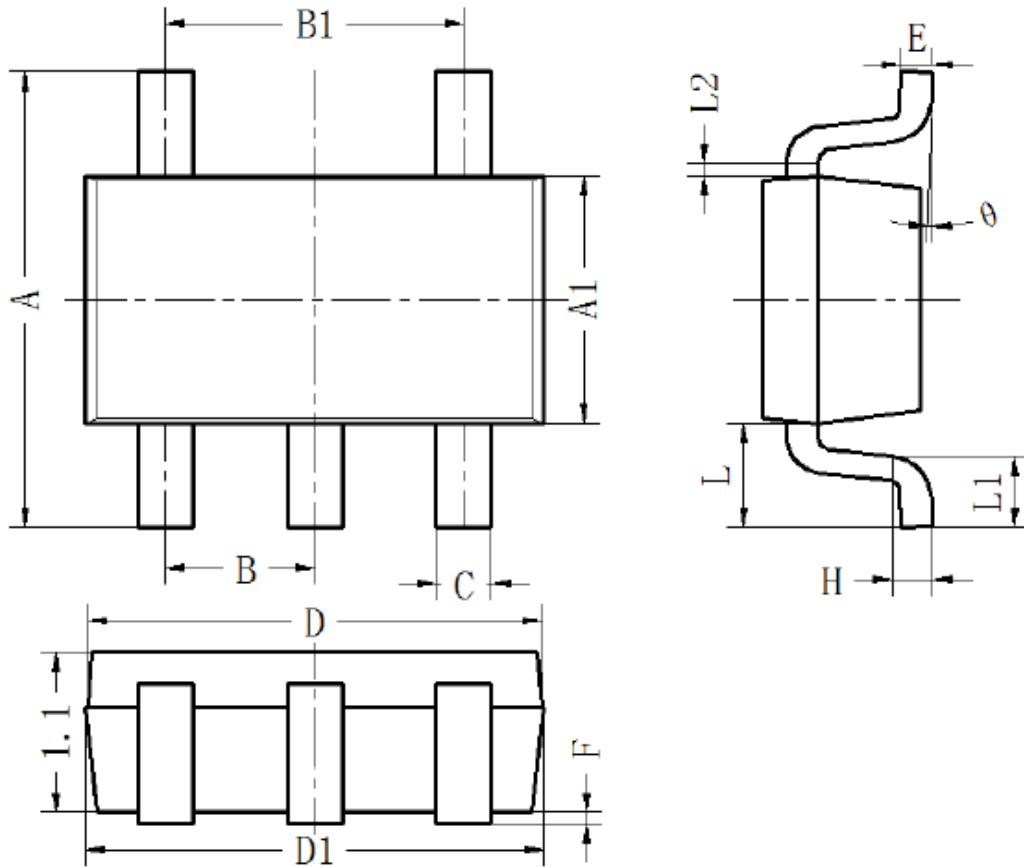
Block Diagram





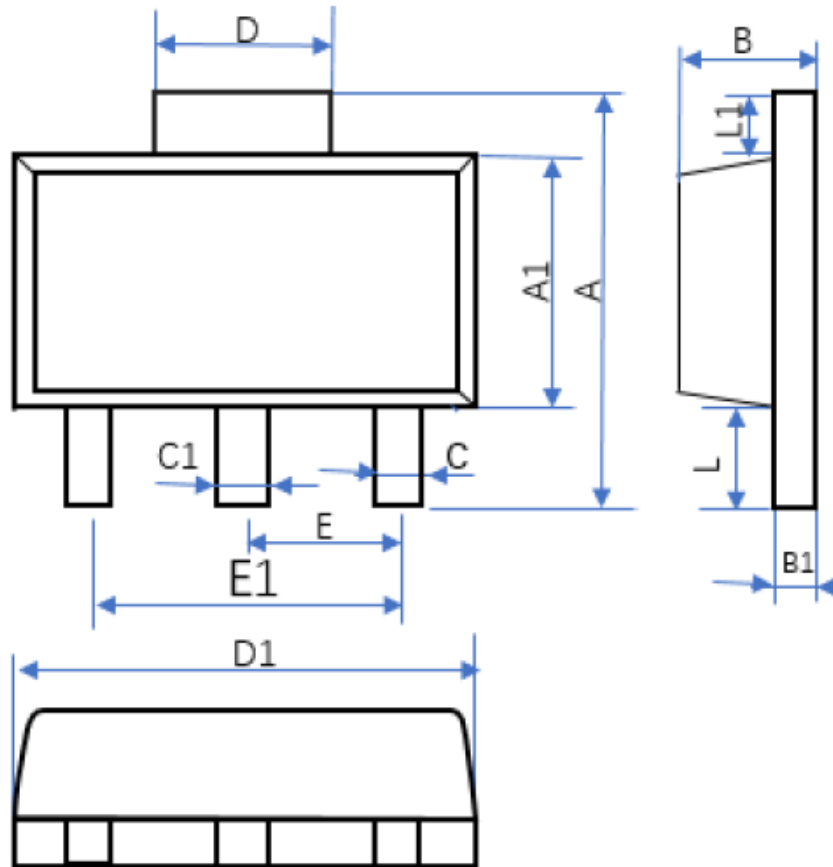
**Package Information**

**SOT 23-3**

SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
<b>A</b>	2.65	2.8	2.95
<b>A1</b>	1.5	1.6	1.7
<b>B</b>	0.90	0.95	1.00
<b>C</b>	0.3	0.4	0.5
<b>D</b>	2.82	2.92	3.02
<b>D1</b>	2.87	2.92	2.97
<b>E</b>	0.1	0.15	0.2
<b>H</b>	0.204	0.254	0.304
<b>L</b>	0.55	0.65	0.75
<b>L1</b>	0.3	0.45	0.6
<b>L2</b>	0.06	0.08	0.10
<b>F1</b>	1.05	1.1	1.15
<b>F</b>	0.02	0.08	0.15



SOT 23-5

SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	2.8	2.9	3.0
A1	1.5	1.6	1.7
B	0.90	0.95	1.0
B1	1.8	1.9	2.0
C	0.35	0.4	0.45
D	2.79	2.89	2.99
D1	2.82	2.92	3.02
E	0.1	0.15	0.2
F	0.02	0.08	0.14
H	0.254	0.254	0.254
L	0.55	0.65	0.75
L1	0.35	0.45	0.55
L2	0.08	0.08	0.08
$\theta$	2		8



**SOT89-3/L**

SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
<b>A</b>	3.95	4.10	4.25
<b>A1</b>	2.45	2.50	2.55
<b>B</b>	1.44	1.49	1.54
<b>B1</b>	0.35	0.40	0.45
<b>C</b>	0.35	0.40	0.45
<b>C1</b>	0.45	0.50	0.55
<b>D</b>	1.65	1.70	1.75
<b>D1</b>	4.45	4.50	4.55
<b>E</b>	1.45	1.50	1.55
<b>E1</b>	2.95	3.00	3.05
<b>L</b>	0.95	1.02	1.09
<b>L1</b>	0.55	0.60	0.65

## Ordering Information

Part Number	Output Voltage	Package	Packing Quantity	Marking*
WR0512-12A50R	1.2V	SOT23-5	3k/Reel	WR0512 12 XXXX
WR0512-15A50R	1.5V	SOT23-5	3k/Reel	WR0512 15 XXXX
WR0512-18A50R	1.8V	SOT23-5	3k/Reel	WR0512 18 XXXX
WR0512-20A50R	2.0V	SOT23-5	3k/Reel	WR0512 20 XXXX
WR0512-22A50R	2.2V	SOT23-5	3k/Reel	WR0512 22 XXXX
WR0512-25A50R	2.5V	SOT23-5	3k/Reel	WR0512 25 XXXX
WR0512-28A50R	2.8V	SOT23-5	3k/Reel	WR0512 28 XXXX
WR0512-30A50R	3.0V	SOT23-5	3k/Reel	WR0512 30 JXXXX
WR0512-33A50R	3.3V	SOT23-5	3k/Reel	WR0512 33 JXXXX
WR0512-12A20R	1.2V	SOT89-3	1k/Reel	WR0512 12 XXXX
WR0512-15A20R	1.5V	SOT89-3	1k/Reel	WR0512 15 JXXXX
WR0512-18A20R	1.8V	SOT89-3	1k/Reel	WR0512 18 XXXX
WR0512-20A20R	2.0V	SOT89-3	1k/Reel	WR0512 20 XXXX
WR0512-22A20R	2.2V	SOT89-3	1k/Reel	WR0512 22 XXXX
WR0512-25A20R	2.5V	SOT89-3	1k/Reel	WR0512 25 XXXX
WR0512-28A20R	2.8V	SOT89-3	1k/Reel	WR0512 28 XXXX
WR0512-30A20R	3.0V	SOT89-3	1k/Reel	WR0512 30 JXXXX
WR0512-33A20R	3.3V	SOT89-3	1k/Reel	WR0512 33 JXXXX
WR0512-12A21R	1.2V	SOT89-3L	1k/Reel	WR0512 12 XXXX
WR0512-15A21R	1.5V	SOT89-3L	1k/Reel	WR0512 15 XXXX
WR0512-18A21R	1.8V	SOT89-3L	1k/Reel	WR0512 18 XXXX
WR0512-20A21R	2.0V	SOT89-3L	1k/Reel	WR0512 20 XXXX
WR0512-22A21R	2.2V	SOT89-3L	1k/Reel	WR0512 22 XXXX
WR0512-25A21R	2.5V	SOT89-3L	1k/Reel	WR0512 25 XXXX
WR0512-28A21R	2.8V	SOT89-3L	1k/Reel	WR0512 28 XXXX
WR0512-30A21R	3.0V	SOT89-3L	1k/Reel	WR0512 30 XXXX
WR0512-33A21R	3.3V	SOT89-3L	1k/Reel	WR0512 33 XXXX
WR0512-12A30R	1.2V	SOT23-3	3k/Reel	WR0512 12 XXXX
WR0512-15A30R	1.5V	SOT23-3	3k/Reel	WR0512 15 XXXX
WR0512-18A30R	1.8V	SOT23-3	3k/Reel	WR0512 18 XXXX
WR0512-20A30R	2.0V	SOT23-3	3k/Reel	WR0512 20 XXXX
WR0512-22A30R	2.2V	SOT23-3	3k/Reel	WR0512 22 XXXX
WR0512-25A30R	2.5V	SOT23-3	3k/Reel	WR0512 25 XXXX
WR0512-28A30R	2.8V	SOT23-3	3k/Reel	WR0512 28 XXXX

Part Number	Output Voltage	Package	Packing Quantity	Marking*
WR0512-30A30R	3.0V	SOT23-3	3k/Reel	WR0512 30 JXXXX
WR0512-33A30R	3.3V	SOT23-3	3k/Reel	WR0512 33 XXXX

\* XXXX is variable.


## Contact Information

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WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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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.*