

Ultra-low power consumption, CMOS LDO

General Description

The WR0331 series are low dropout linear regulators and optimized to provide a high performance solution for battery power system to deliver low quiescent current. The devices offer a new level of cost effective performance in cellular phones, laptop and notebook computers, and other portable devices.

The WR0331 series are designed to make use of low cost ceramic capacitors which ensure the stability of the output current, and enhance the efficiency in order to prolong the battery life of those portable devices.

The WR0331 regulators are available in SOT23-3, SOT23-5, SOT89-3L and DFN1x1-4 packages. Standard products are Pb-free and Halogen free products.

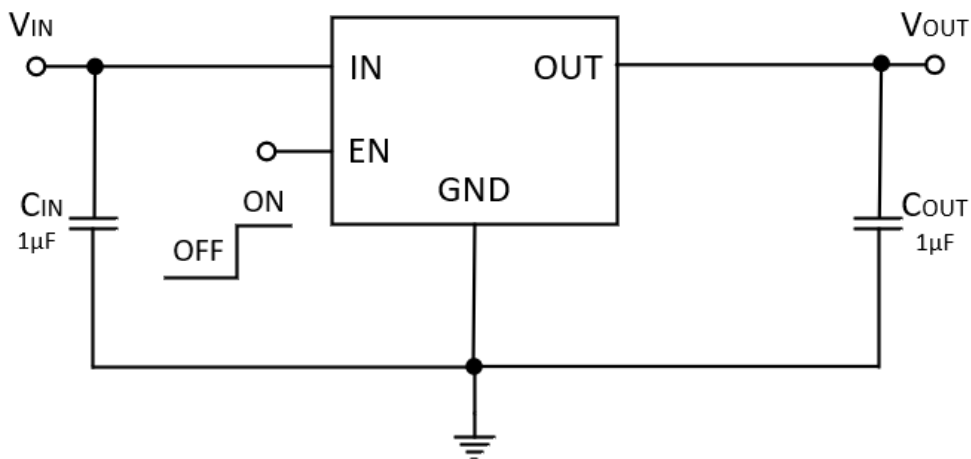
Features

- Input Voltage: 2.1V to 5.5V
- Output Voltage: 1.2V to 3.3V
- Output Current: 300mA @ $V_{OUT}=3.3V$
- Output Current: 200mA @ $V_{OUT}=2.2V$
- Output Current: 150mA @ $V_{OUT}=1.5V$
- Dropout Voltage: 240mV @ $I_{OUT}=300mA$
- Operating Temperature: -40 to +85°C
- Output short protection
- Quiescent Current: 3 μ A Typ.
- Recommend Capacitor: 1 μ F or more

Applications

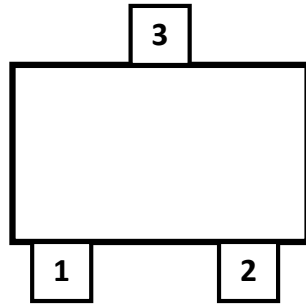
- MP3/MP4 Players
- Cellphones, radiophone, digital cameras
- Bluetooth, wireless handsets
- Others portable electronics device

Typical Application

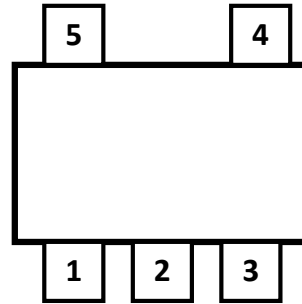


Pin Configuration

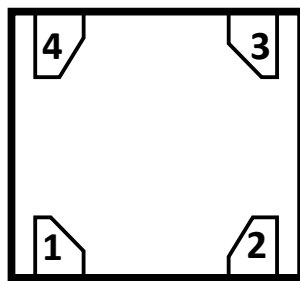
(Top View)



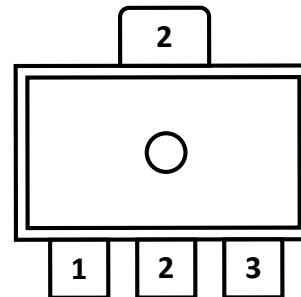
SOT23-3



SOT23-5



DFN-4



SOT 89-3L

Pin Description

Pin Number				Pin Name	Description
SOT23-3	SOT23-5	DFN-4	SOT89-3L		
3	1	4	2	IN	Input Voltage
1	2	2	1	GND	Ground
-	3	3	-	EN	Enable, Active High
-	4	-	-	NC	NC
2	5	1	3	OUT	Output Voltage

Absolute Maximum Ratings

Parameter		Rating	Unit
Input voltage range		-0.3 ~ 6.5	V
EN Input voltage range		-0.3 ~ V_{IN}	V
Output voltage range		-0.3 ~ V_{IN}	V
Power Dissipation $P_D @ T_A = 25^\circ\text{C}$	SOT23-3 & SOT23-5	500	mW
	SOT89-3L	625	mW
	DFN-4	500	mW
Thermal Resistance, θ_{JA}	SOT23-3 & SOT23-5	250	$^\circ\text{C/W}$
	SOT89-3L	200	$^\circ\text{C/W}$
	DFN-4	250	$^\circ\text{C/W}$
Operating Junction Temperature		150	$^\circ\text{C}$
Lead Temperature Range		260	$^\circ\text{C}$
Storage Temperature Range		-65 ~ 150	$^\circ\text{C}$
ESD Susceptibility	HBM	± 4000	V

Recommended Operating Conditions

Parameter	Rating	Unit
Operating Supply voltage	2.1 ~ 5.5	V
Operating Temperature Range	-40 ~ 85	$^\circ\text{C}$

Electrical Characteristics

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

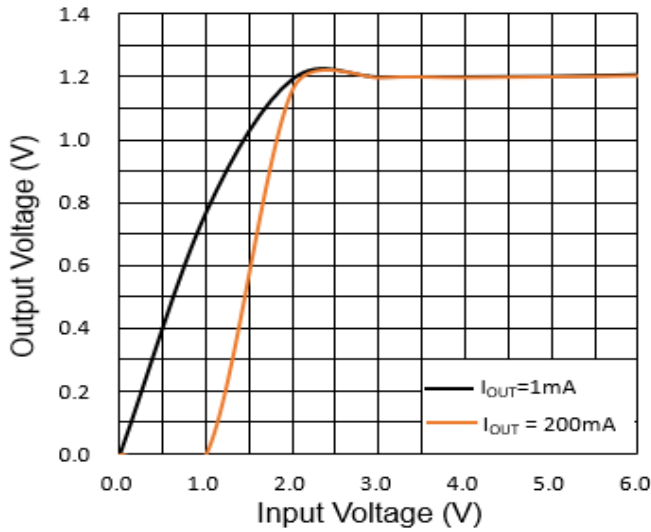
symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$V_{OUT}<2\text{V}$, $I_{OUT}=1\text{mA}$	0.97 V_{OUT}	V_{OUT}	1.03 V_{OUT}	V
		$V_{OUT}\geq 2\text{V}$, $I_{OUT}=1\text{mA}$	0.98 V_{OUT}	V_{OUT}	1.02 V_{OUT}	
I_{OUT}	Maximum Output Current	$V_{OUT}=3.3\text{V}$	300			mA
		$V_{OUT}=2.2\text{V}$	200			
		$V_{OUT}=1.5\text{V}$	150			
I_{SHORT}	Short Current	$V_{EN}=V_{IN}$, $V_{OUT}=0\text{V}$		150		mA
V_{DO}	Dropout Voltage ¹	$V_{OUT}=3.3\text{V}$, $I_{OUT}=300\text{mA}$		240		mV
		$V_{OUT}=3.0\text{V}$, $I_{OUT}=300\text{mA}$		270		
		$V_{OUT}=2.8\text{V}$, $I_{OUT}=300\text{mA}$		290		
		$V_{OUT}=2.5\text{V}$, $I_{OUT}=300\text{mA}$		320		
		$V_{OUT}=2.2\text{V}$, $I_{OUT}=200\text{mA}$		260		
		$V_{OUT}=2.0\text{V}$, $I_{OUT}=200\text{mA}$		280		
		$V_{OUT}=1.8\text{V}$, $I_{OUT}=200\text{mA}$		300		
		$V_{OUT}=1.5\text{V}$, $I_{OUT}=150\text{mA}$		400		
LNR	Line Regulation	$V_{IN}=V_{OUT}+1\text{V}\sim 5.5\text{V}$, $I_{OUT}=40\text{mA}$		0.1		%V
LDR	Load Regulation ²	$I_{OUT}=1\sim 300\text{mA}$		20		mV
I_Q	Quiescent Current	$V_{IN}=V_{OUT}+1\text{V}$, $I_{OUT}=0\text{mA}$		3	6	μA
I_{SHDN}	Shut-down Current	$V_{EN}=0\text{V}$		0.1	1.0	μA
$PSRR$	Power Supply Ripple Rejection	$V_{IN}=(V_{OUT}+1\text{V})_{DC}+0.5\text{V}_{P-P}$ $F=100\text{Hz}$, $I_{OUT}=10\text{mA}$		65		dB
		$V_{IN}=(V_{OUT}+1\text{V})_{DC}+0.5\text{V}_{P-P}$ $F=1\text{KHz}$, $I_{OUT}=10\text{mA}$		47		
V_{NO}	Output noise voltage	$BW=10\text{Hz to }100\text{KHz}$, $C_{OUT}=1\mu\text{F}$, $I_{OUT}=10\text{mA}$		40		μV_{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
I_{EN}	EN Input leakage	$V_{EN}=0\text{V or }5.5\text{V}$	-1		1	μA

symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R_{DIS}	Output Discharge resistance	$V_{IN}=4.0V, V_{EN}=0V$		140		Ω
T_C	Output Voltage Temperature Coefficient	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$		100		ppm/ $^{\circ}C$

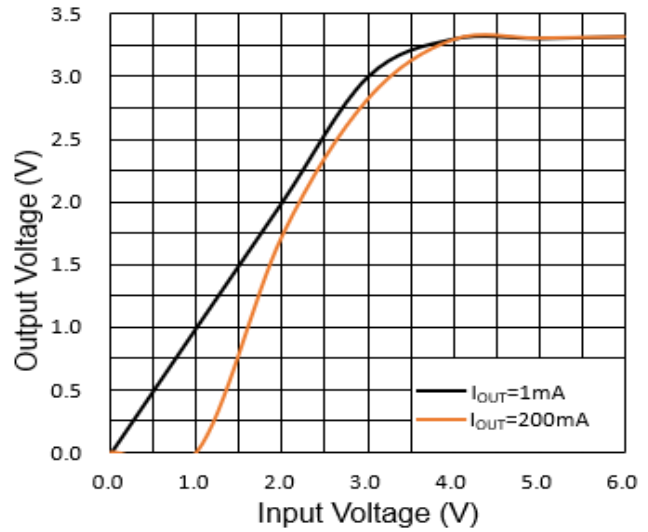
Note1: The dropout voltage is defined as $(V_{IN}-V_{OUT})$ when V_{OUT} is 100mV below the target value of V_{OUT} .

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

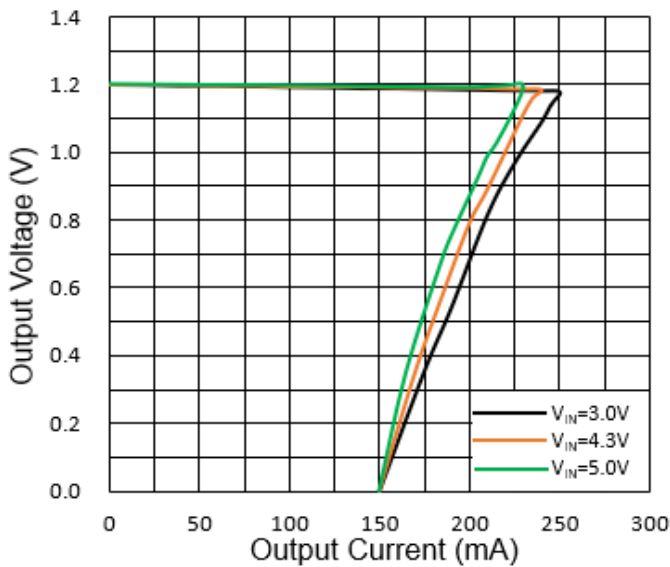
Typical Characteristics (T_A=25°C, V_{IN}=V_{OUT}+1V, C_{IN}=C_{OUT}=1μF, unless otherwise noted)



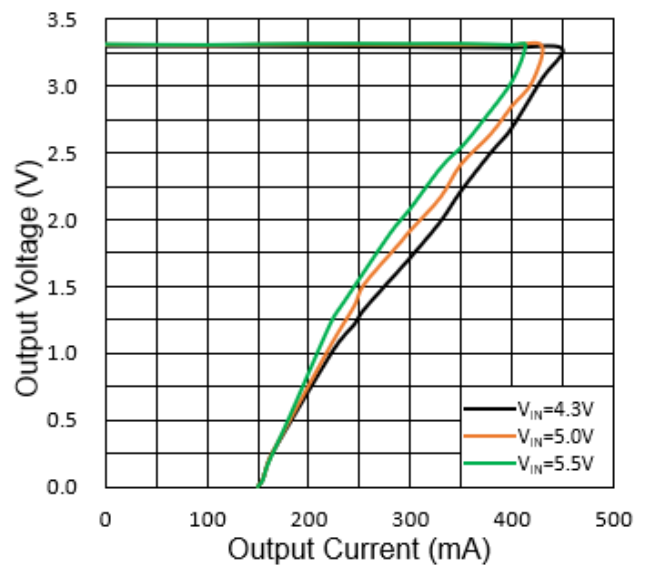
Output Voltage vs. Supply Voltage



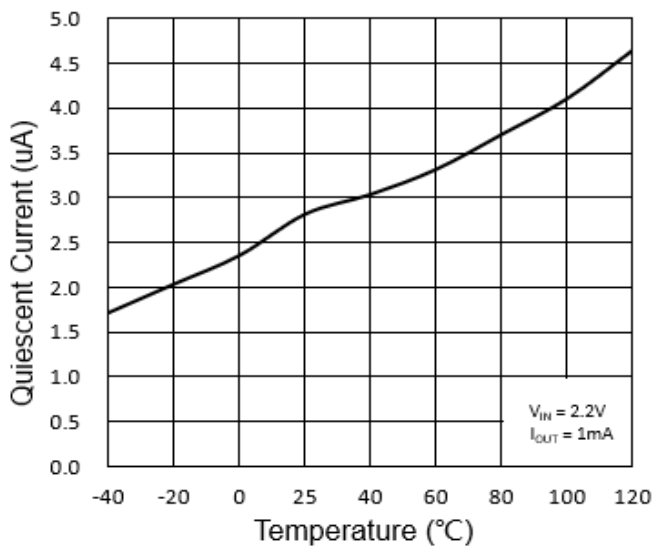
Output Voltage vs. Supply Voltage



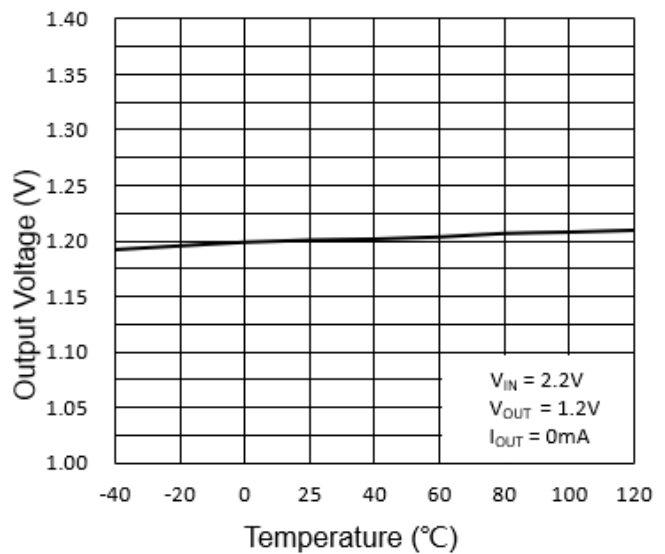
Output Voltage vs. Output Current



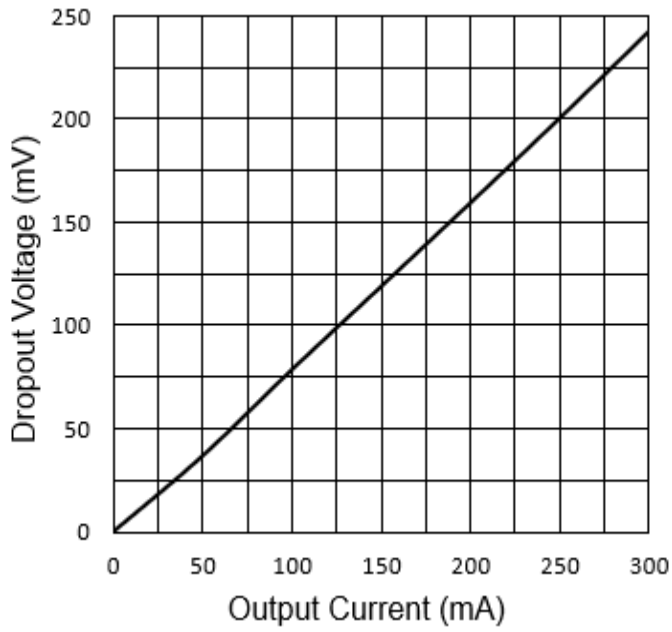
Output Voltage vs. Output Current



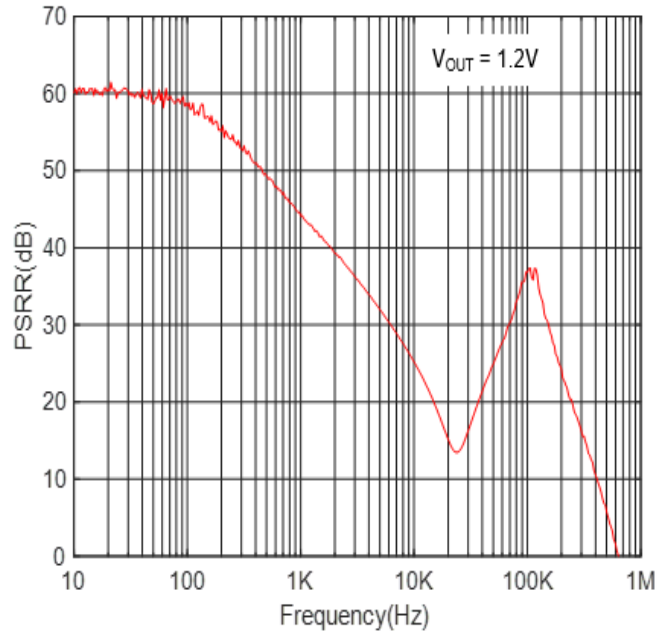
Quiescent Current vs. Temperature



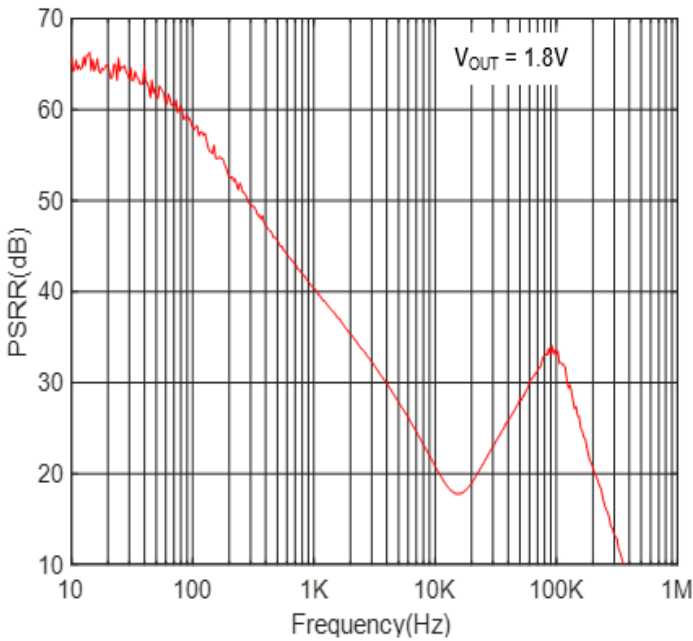
Output Voltage vs. Temperature



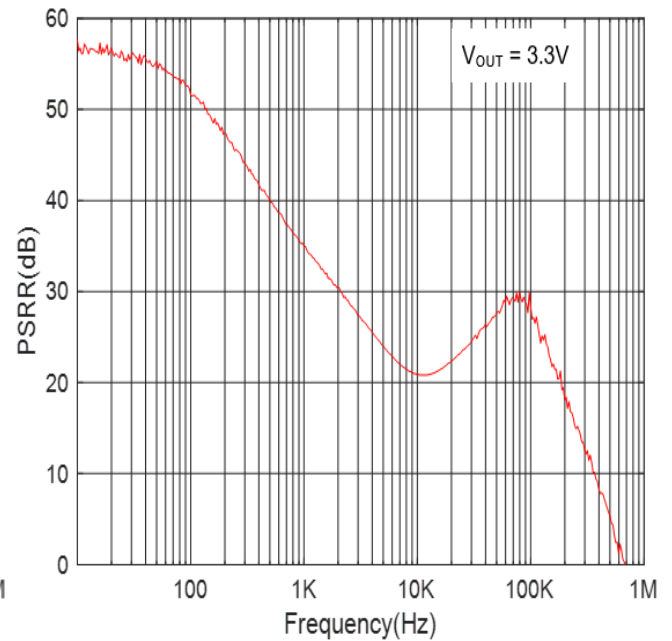
Dropout Voltage vs. Output Current



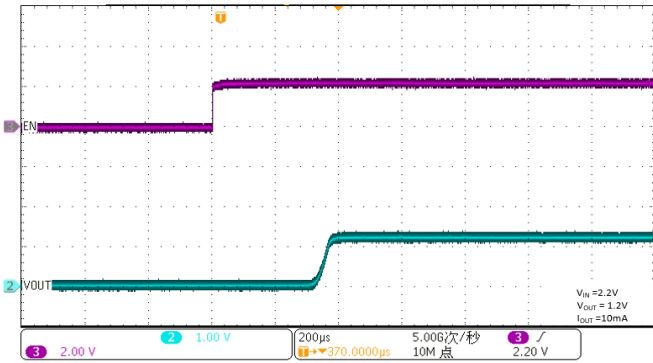
Power Supply Rejection Ratio vs. Frequency



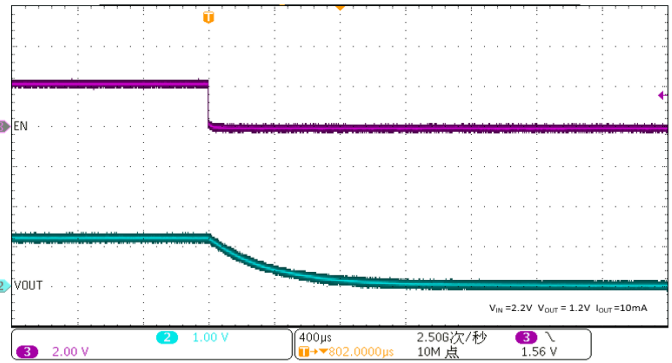
Power Supply Rejection Ratio vs. Frequency



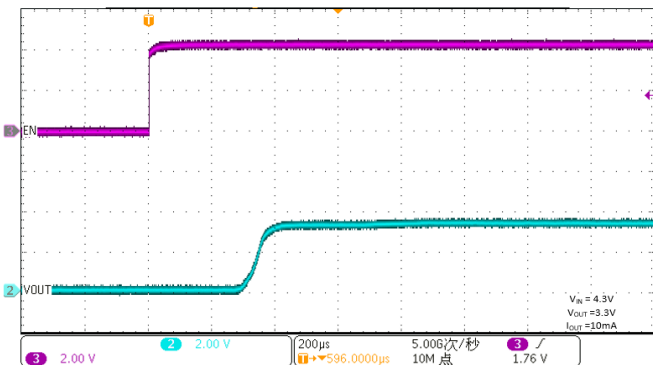
Power Supply Rejection Ratio vs. Frequency



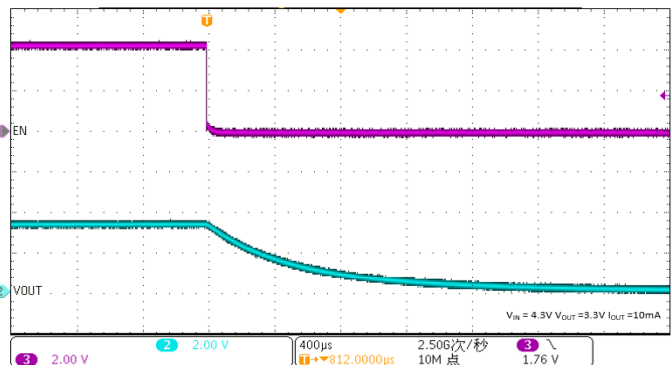
Soft Start from EN



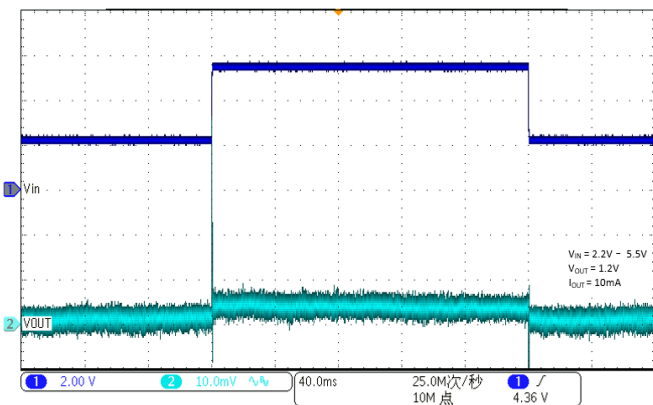
EN Shutdown



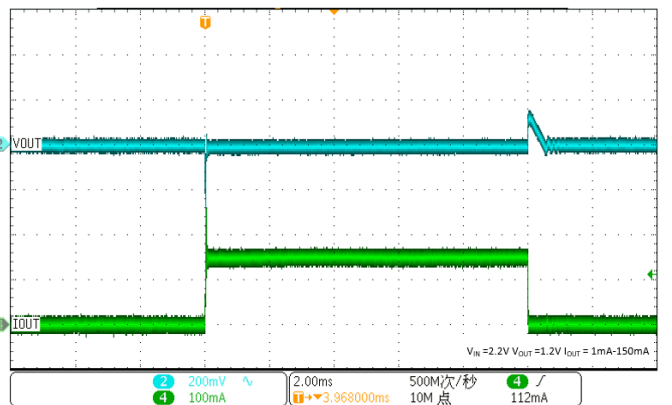
Soft Start from EN



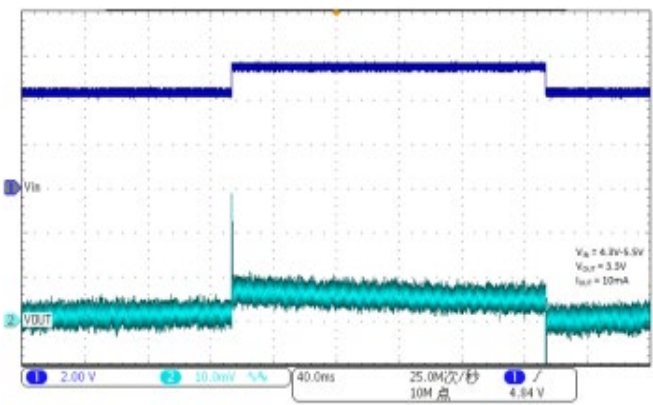
EN Shutdown



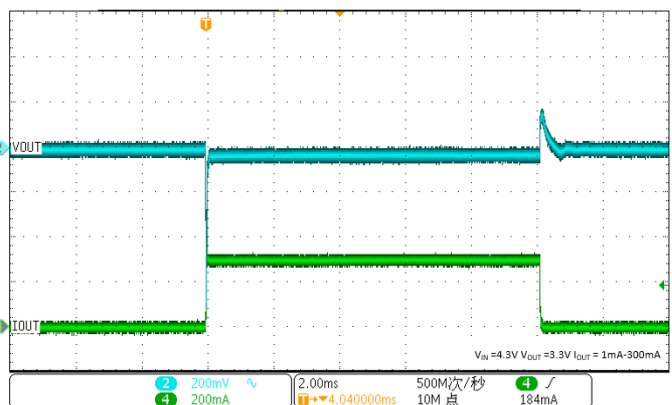
Line Transient



Load Transient

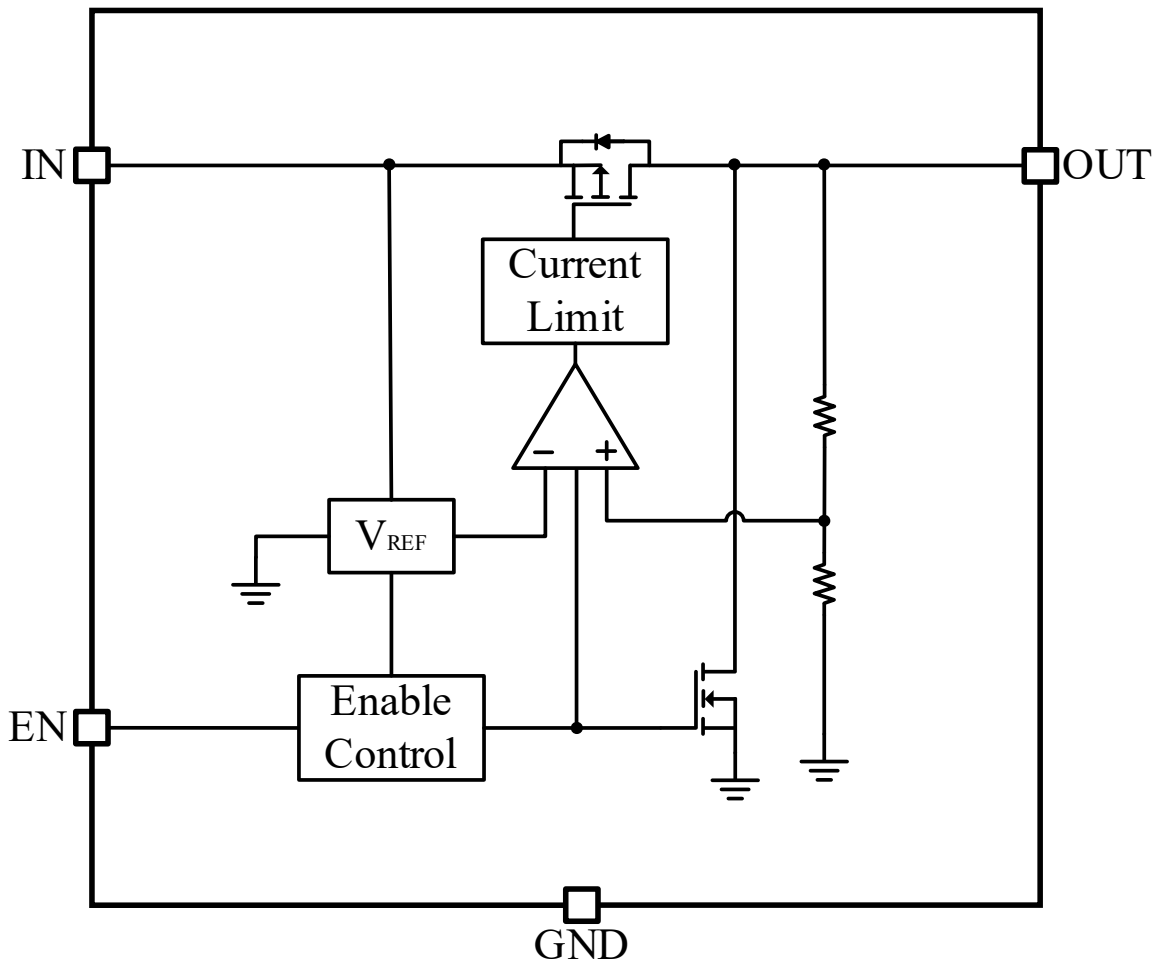


Line Transient

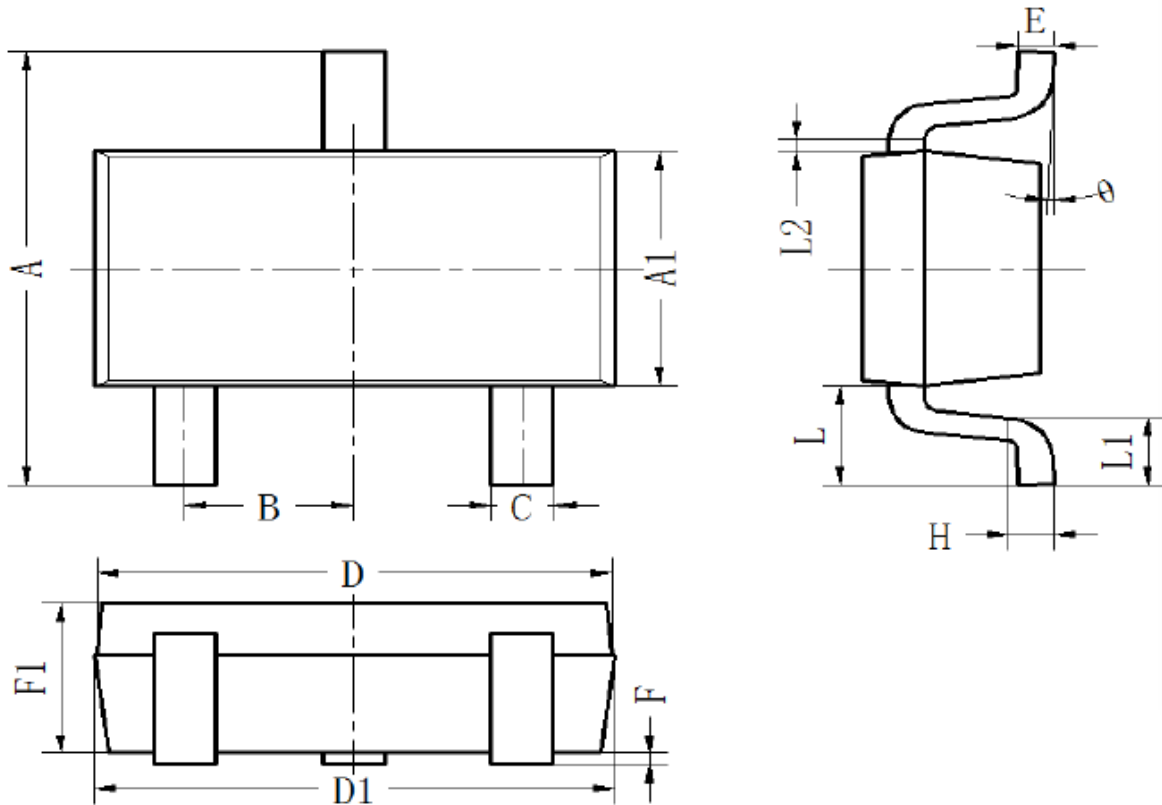


Load Transient

Block Diagram

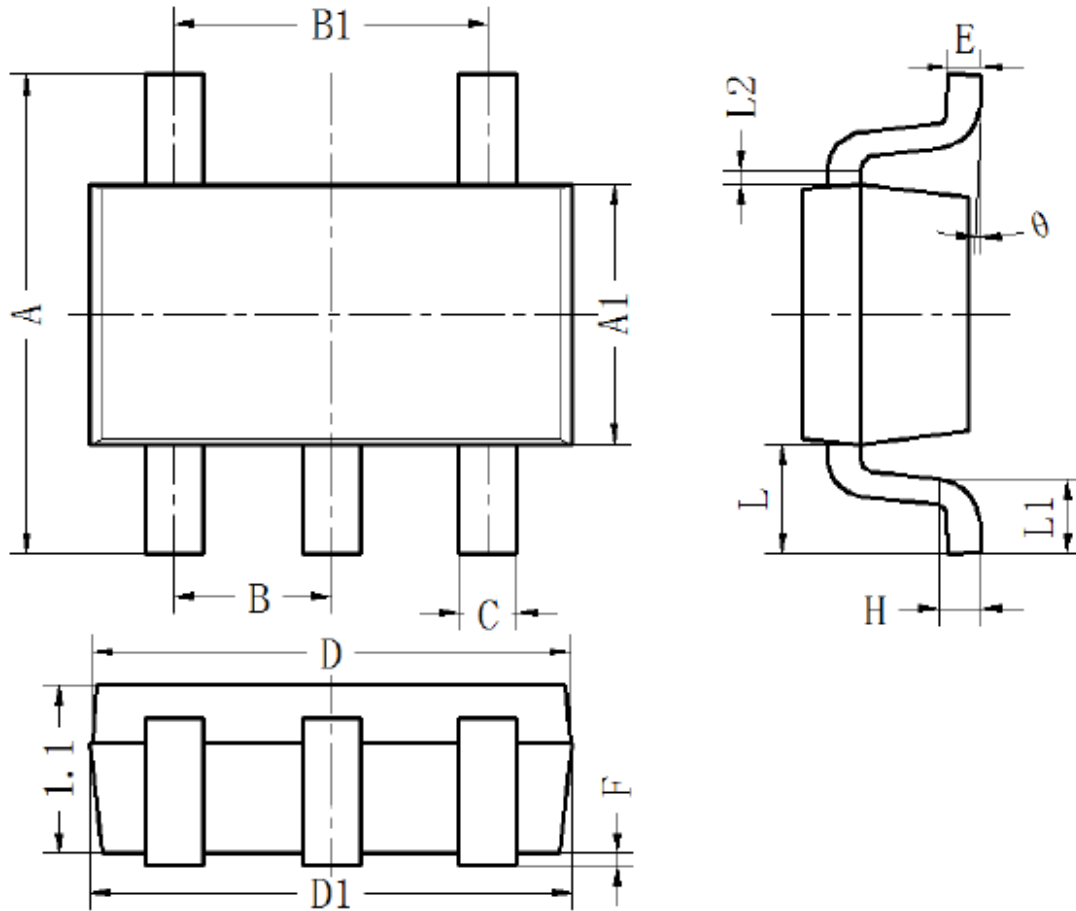


Package Information



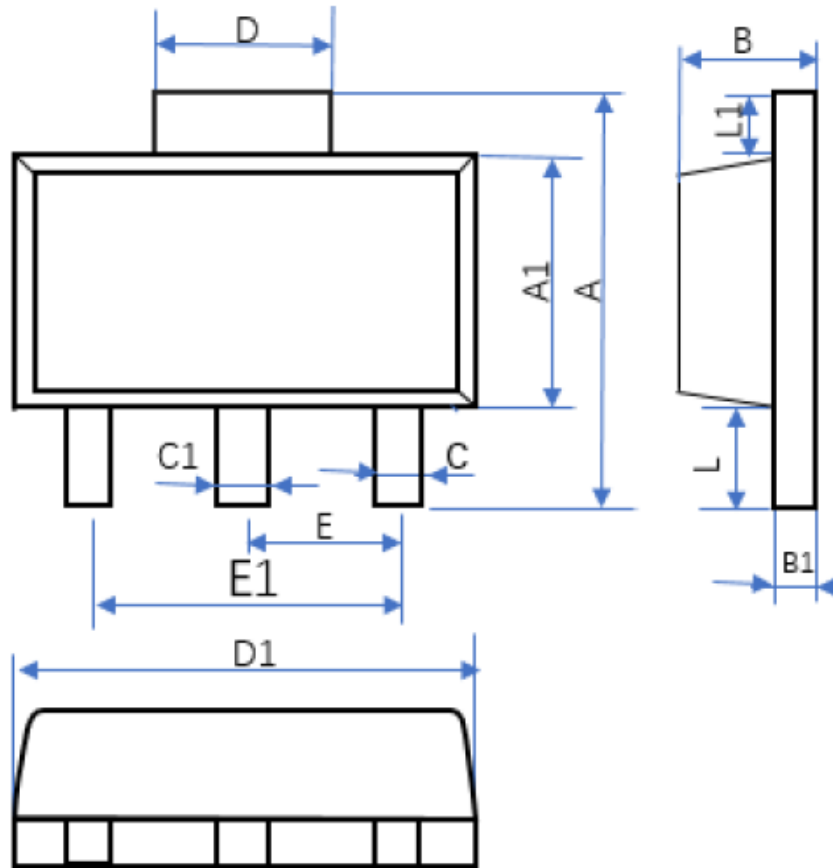
SOT 23-3

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



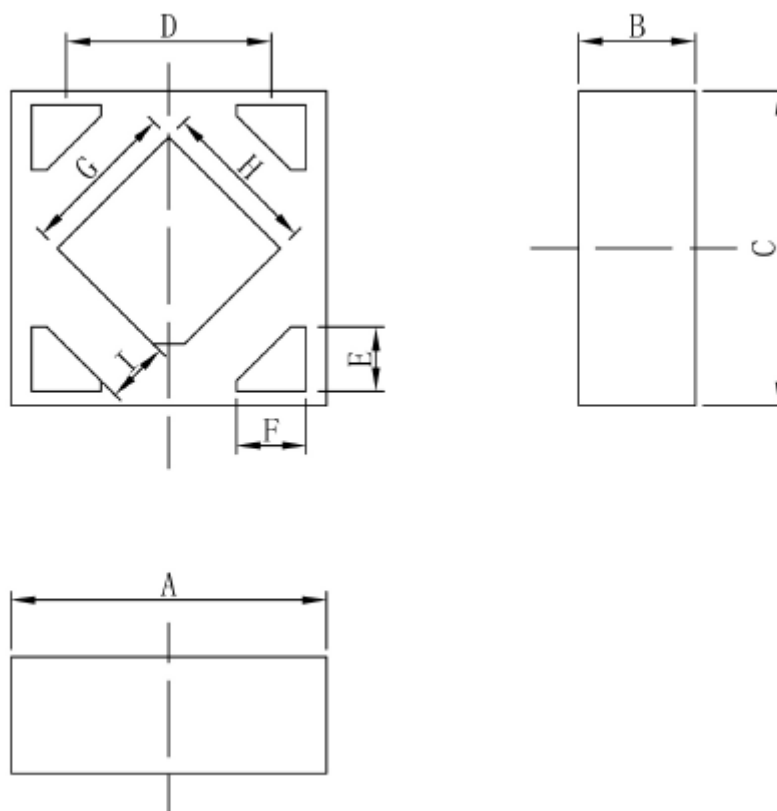
SOT 23-5

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
θ	2		8



SOT89-3L

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



DFN-4

SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.950	1.000	1.050
B	0.320	0.370	0.420
C	0.950	1.000	1.050
D	0.600	0.650	0.700
E	0.175	0.225	0.275
F	0.170	0.220	0.270
G	0.440	0.490	0.540
H	0.440	0.490	0.540
I	0.140	0.190	0.240

Ordering Information

Part Number	Output Voltage	Package	Packing Quantity	Marking*
WR0331-12A30R	1.2V	SOT23-3	3K/Reel	WR0331 12 XXXX
WR0331-15A30R	1.5V	SOT23-3	3K/Reel	WR0331 15 XXXX
WR0331-18A30R	1.8V	SOT23-3	3K/Reel	WR0331 18 XXXX
WR0331-20A30R	2.0V	SOT23-3	3k/Reel	WR0331 20 XXXX
WR0331-22A30R	2.2V	SOT23-3	3k/Reel	WR0331 22 XXXX
WR0331-25A30R	2.5V	SOT23-3	3k/Reel	WR0331 25 XXXX
WR0331-28A30R	2.8V	SOT23-3	3k/Reel	WR0331 28 XXXX
WR0331-30A30R	3.0V	SOT23-3	3k/Reel	WR0331 30 XXXX
WR0331-33A30R	3.3V	SOT23-3	3k/Reel	WR0331 33 XXXX
WR0331-12A50R	1.2V	SOT23-5	3k/Reel	WR0331 12 JXXXX
WR0331-15A50R	1.5V	SOT23-5	3k/Reel	WR0331 15 XXXX
WR0331-18A50R	1.8V	SOT23-5	3K/Reel	WR0331 18 XXXX
WR0331-20A50R	2.0V	SOT23-5	3k/Reel	WR0331 20 XXXX
WR0331-22A50R	2.2V	SOT23-5	3k/Reel	WR0331 22 XXXX
WR0331-25A50R	2.5V	SOT23-5	3k/Reel	WR0331 25 XXXX
WR0331-28A50R	2.8V	SOT23-5	3K/Reel	WR0331 28 XXXX
WR0331-30A50R	3.0V	SOT23-5	3k/Reel	WR0331 30 JXXXX
WR0331-33A50R	3.3V	SOT23-5	3k/Reel	WR0331 33 XXXX
WR0331-12A21R	1.2V	SOT89-3L	1k/Reel	WR0331 12 XXXX
WR0331-15A21R	1.5V	SOT89-3L	1k/Reel	WR0331 15 XXXX
WR0331-18A21R	1.8V	SOT89-3L	1k/Reel	WR0331 18 XXXX
WR0331-20A21R	2.0V	SOT89-3L	1k/Reel	WR0331 20 XXXX
WR0331-22A21R	2.2V	SOT89-3L	1k/Reel	WR0331 22 XXXX
WR0331-25A21R	2.5V	SOT89-3L	1k/Reel	WR0331 25 XXXX
WR0331-28A21R	2.8V	SOT89-3L	1k/Reel	WR0331 28 XXXX
WR0331-30A21R	3.0V	SOT89-3L	1k/Reel	WR0331 30 XXXX
WR0331-33A21R	3.3V	SOT89-3L	1k/Reel	WR0331 33 XXXX
WR0331-12FF4R	1.2V	DFN-4	10k/Reel	331 12
WR0331-15FF4R	1.5V	DFN-4	10k/Reel	331 15
WR0331-18FF4R	1.8V	DFN-4	10k/Reel	331 18
WR0331-20FF4R	2.0V	DFN-4	10k/Reel	331 20
WR0331-22FF4R	2.2V	DFN-4	10k/Reel	331 22
WR0331-25FF4R	2.5V	DFN-4	10k/Reel	331 25
WR0331-28FF4R	2.8V	DFN-4	10k/Reel	331 28
WR0331-30FF4R	3.0V	DFN-4	10k/Reel	331 30
WR0331-33FF4R	3.3V	DFN-4	10k/Reel	331 33

*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.