

Ultra-Low I_Q 50mA CMOS LDO Regulator

General Description

The WR0112 series of CMOS low dropout regulators are designed specifically for portable battery-powered applications which require ultra-low quiescent current. The ultra-low consumption of typ 800nA ensures long battery life and dynamic transient boost feature improves device transient response for wireless communication applications.

The device is available in SOT23-3, SOT23-5 and DFN1x1-4 packages.

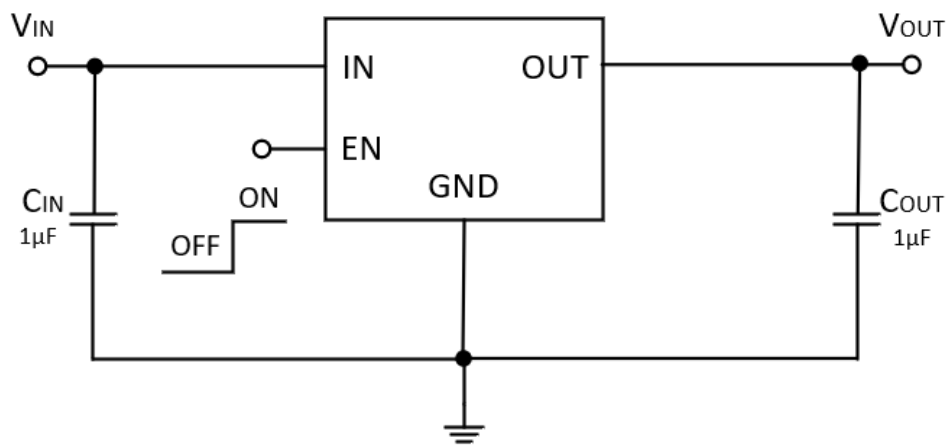
Features

- Operating Input Voltage Range: 2.2 V to 5.5 V
- Output Voltage Range: 1.2 V to 3.0 V (0.1 V Steps)
- Ultra-Low Quiescent Current Typ 0.8 μ A
- Low Dropout: 60mV Typ at 50mA @ $V_{OUT}=3.0V$
- High Output Voltage Accuracy $\pm 1\%$
- Stable with Ceramic Capacitors 1 μ F
- Over-Current Protection
- Thermal Shutdown Protection
- Active Discharge Feature
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

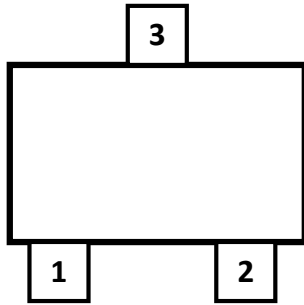
- Cameras, Image Sensors and Camcorders
- Portable Communication Equipment
- Battery Powered Equipment

Typical Application

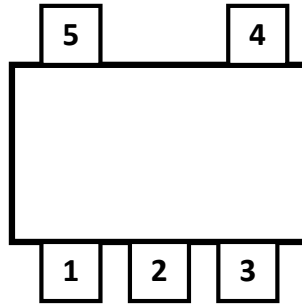


Pin Configuration

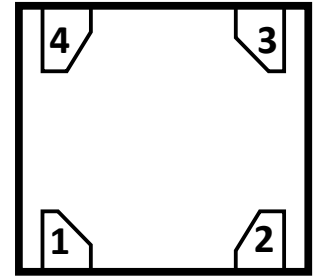
(Top View)



SOT23-3



SOT23-5



DFN-4

Pin Description

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

Absolute Maximum Ratings

Parameter		Rating	Unit
Input voltage range		-0.3 ~ 6.0	V
EN Input voltage range		-0.3 ~ 6.0	V
Output voltage range		-0.3 to $V_{IN} + 0.3$	V
Power Dissipation P_D @ $T_A = 25^\circ\text{C}$		500	mW
Thermal Resistance, θ_{JA}		250	$^\circ\text{C/W}$
Operating Junction Temperature		150	$^\circ\text{C}$
Lead Temperature Range		260	$^\circ\text{C}$
Storage Temperature Range		-55 ~ 150	$^\circ\text{C}$
ESD Susceptibility	HBM	± 4000	V

Recommended Operating Conditions

Parameter		Rating	Unit
Operating Supply voltage		2.2 ~ 5.5	V
Operating Temperature Range		-40 ~ 85	$^\circ\text{C}$

Electrical Characteristics

($T_A = +25^{\circ}\text{C}$, $V_{IN}=V_{OUT}+1\text{V}$, $C_{IN}=C_{OUT}=1.0\mu\text{F}$, $I_{OUT}=1\text{mA}$, unless otherwise noted)

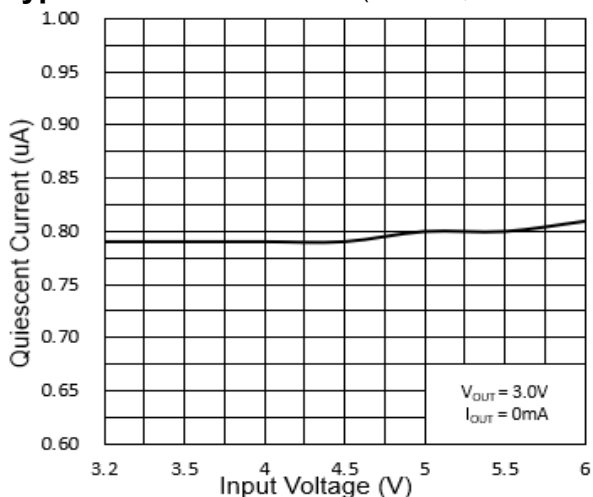
symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_{OUT}	Output Voltage		0.99 V_{OUT}	V_{OUT}	1.01 V_{OUT}	V
I_{OUT}	Maximum Output Current ¹		50	-	-	mA
I_{SHORT}	Short Current	V_{OUT} Short to GND	-	225	-	mA
V_{DO}	Dropout Voltage	$I_{OUT}=50\text{mA}@V_{OUT}=3\text{V}^2$	-	60		mV
LNR	Line Regulation	$V_{OUT}+1 < V_{IN} \leq 5.5\text{V}$, $I_{OUT}=1\text{mA}$	-	0.05	0.20	%/V
LDR	Load Regulation	$0\text{mA} < I_{OUT} \leq 50\text{mA}$, $V_{IN}=V_{OUT}+1\text{V}^3$	-	10		mV
I_Q	Quiescent Current	$I_{OUT}=0\text{mA}$	-	0.8	1	μA
I_{SHDN}	Shut-down Current	$V_{EN}=0\text{V}$	-	0.1	0.5	μA
PSRR	Power Supply Ripple Rejection	$f=1\text{KHz}$, $V_{IN}=V_{OUT}+1\text{V}$ +200mVpp Modulation, $I_{OUT}=10\text{mA}$	-	45	-	dB
V_{NO}	Output noise voltage	$V_{IN}=5.0\text{V}$, $f=10\text{Hz}$ to 1MHz, $C_{OUT}=1\mu\text{F}$, $I_{OUT}=1\text{mA}$, $V_{OUT}=1.8\text{V}$	-	95	-	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	$V_{IN}=5.5\text{V}$, $I_{OUT}=0\text{mA}$	-	-	0.4	V
I_{EN}	EN Input leakage	$V_{EN} \leq V_{IN} \leq 5.5\text{V}^4$	-	100	-	nA
R_{DIS}	Output Discharge Resistance	$V_{IN}=5.5\text{V}$, $V_{EN}=0\text{V}^4$	-	140	-	Ω
T_{SD}	Thermal Shutdown Temperature	Temperature Increasing from $T_J=+25^{\circ}\text{C}^4$	-	165	-	$^{\circ}\text{C}$
ΔT_{SD}	Thermal Shutdown Hysteresis	Temperature Falling from T_{SD}^4	-	20	-	$^{\circ}\text{C}$

Note1: Respect SOA.

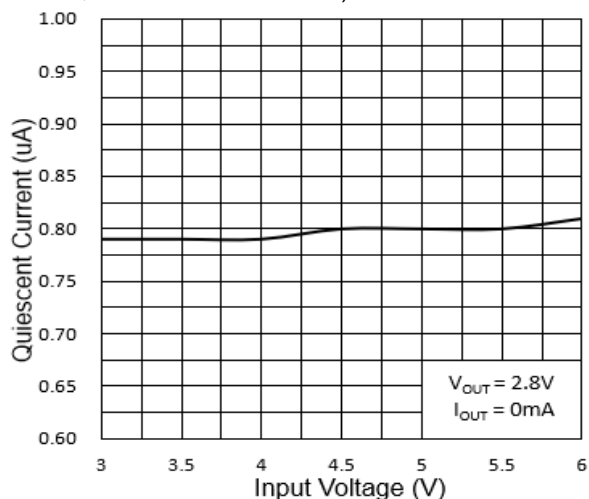
Note 2: Characterized when V_{OUT} falls $V_{OUT} \cdot 3\%$ below the regulated voltage.

Note 3: The Load regulation is measured by using pulse techniques with the duty cycle < 5%.

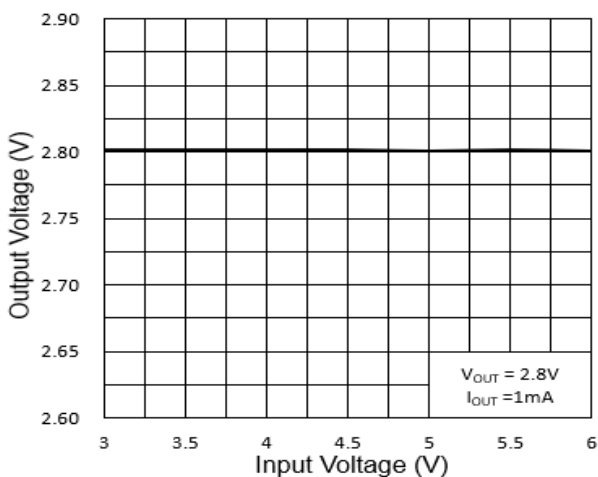
Note 4: Guaranteed by design and characterization.

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


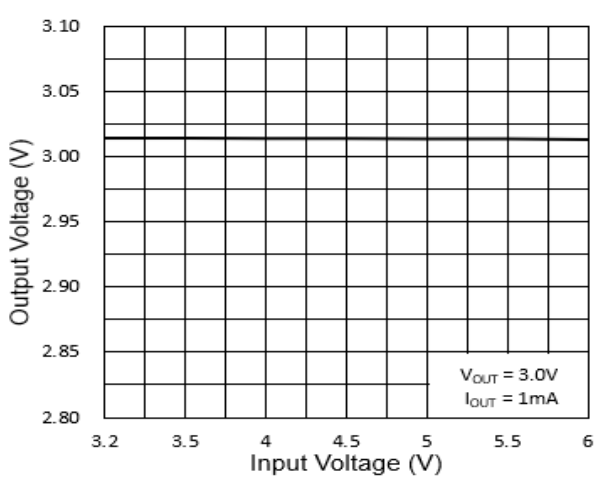
Quiescent Current vs. Supply Voltage



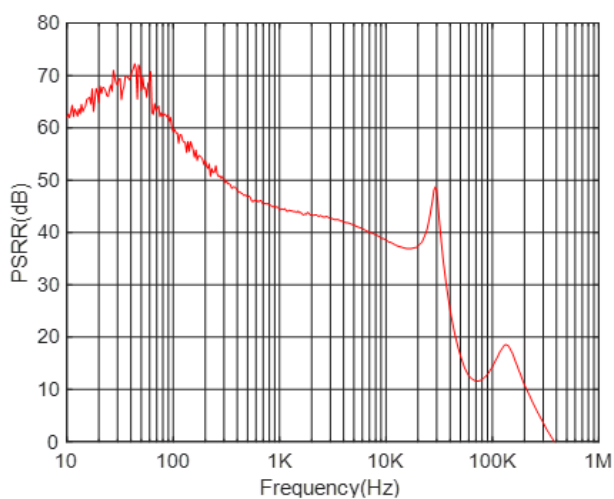
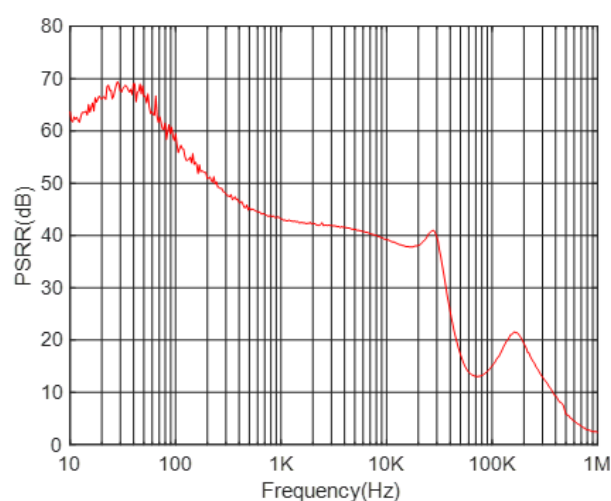
Quiescent Current vs. Supply Voltage

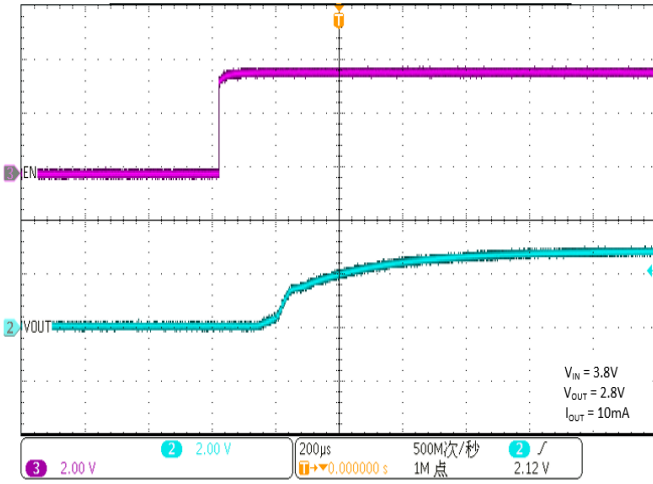


Output Voltage vs. Supply Voltage

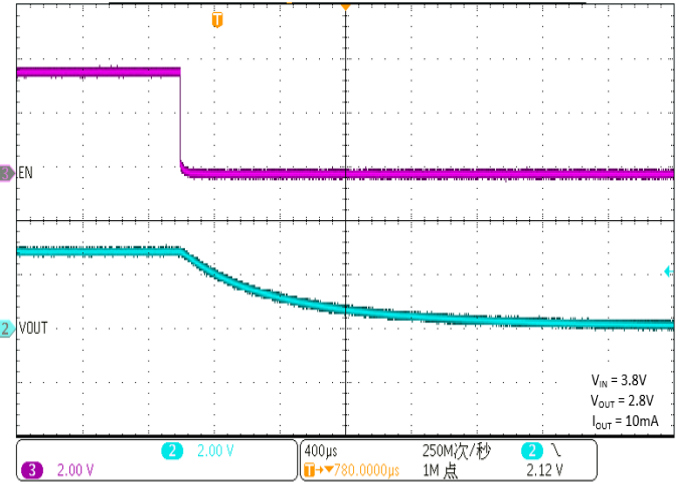


Output Voltage vs. Supply Voltage

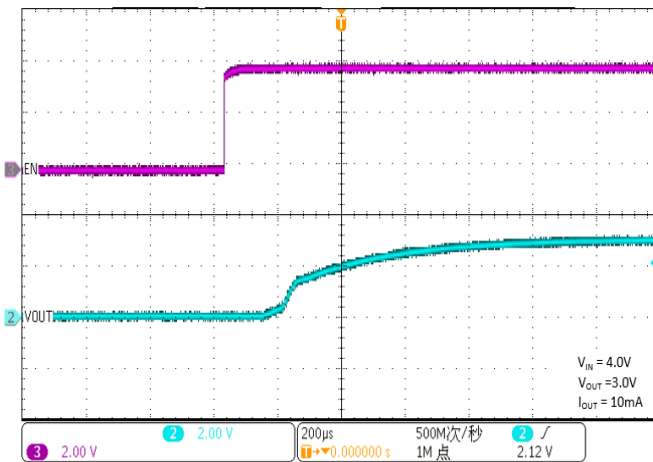

 Power Supply Rejection Ratio vs. Frequency
($V_{OUT} = 2.8\text{V}$)

 Power Supply Rejection Ratio vs. Frequency
($V_{OUT} = 3.0\text{V}$)



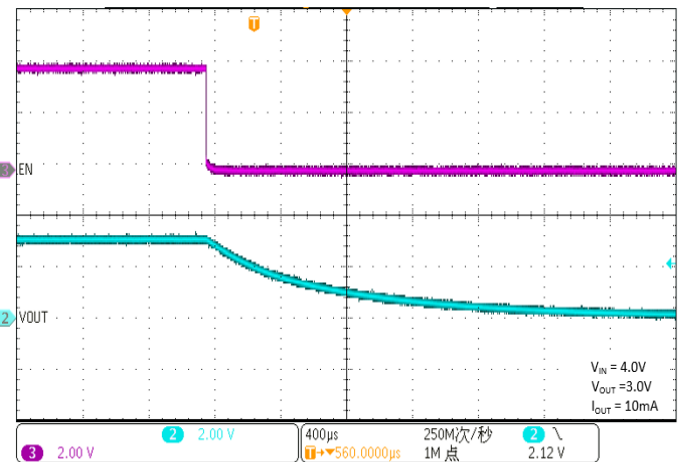
Start from EN



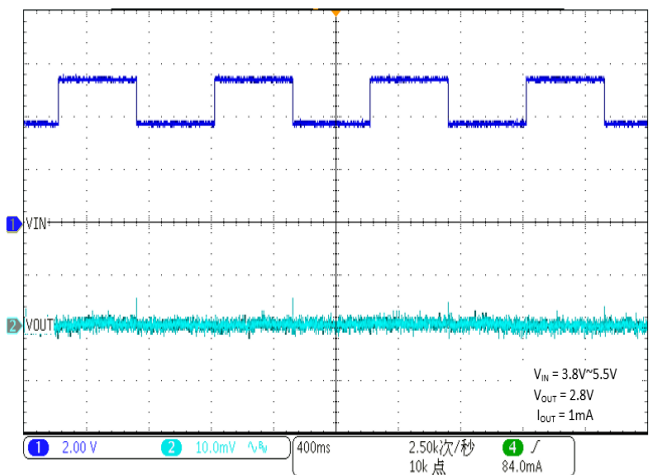
EN Shutdown



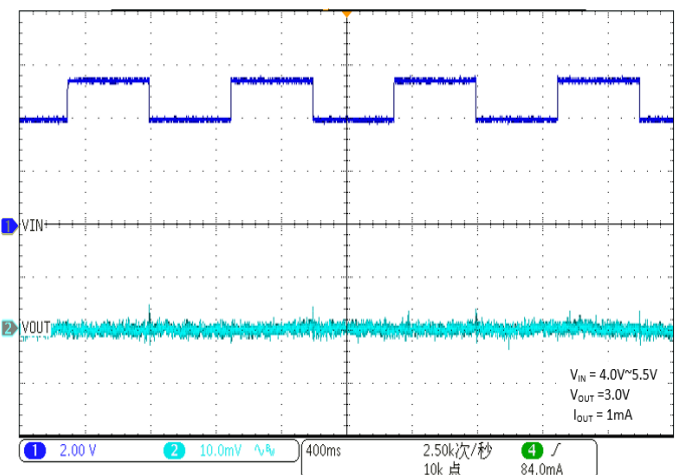
Start from EN



EN Shutdown

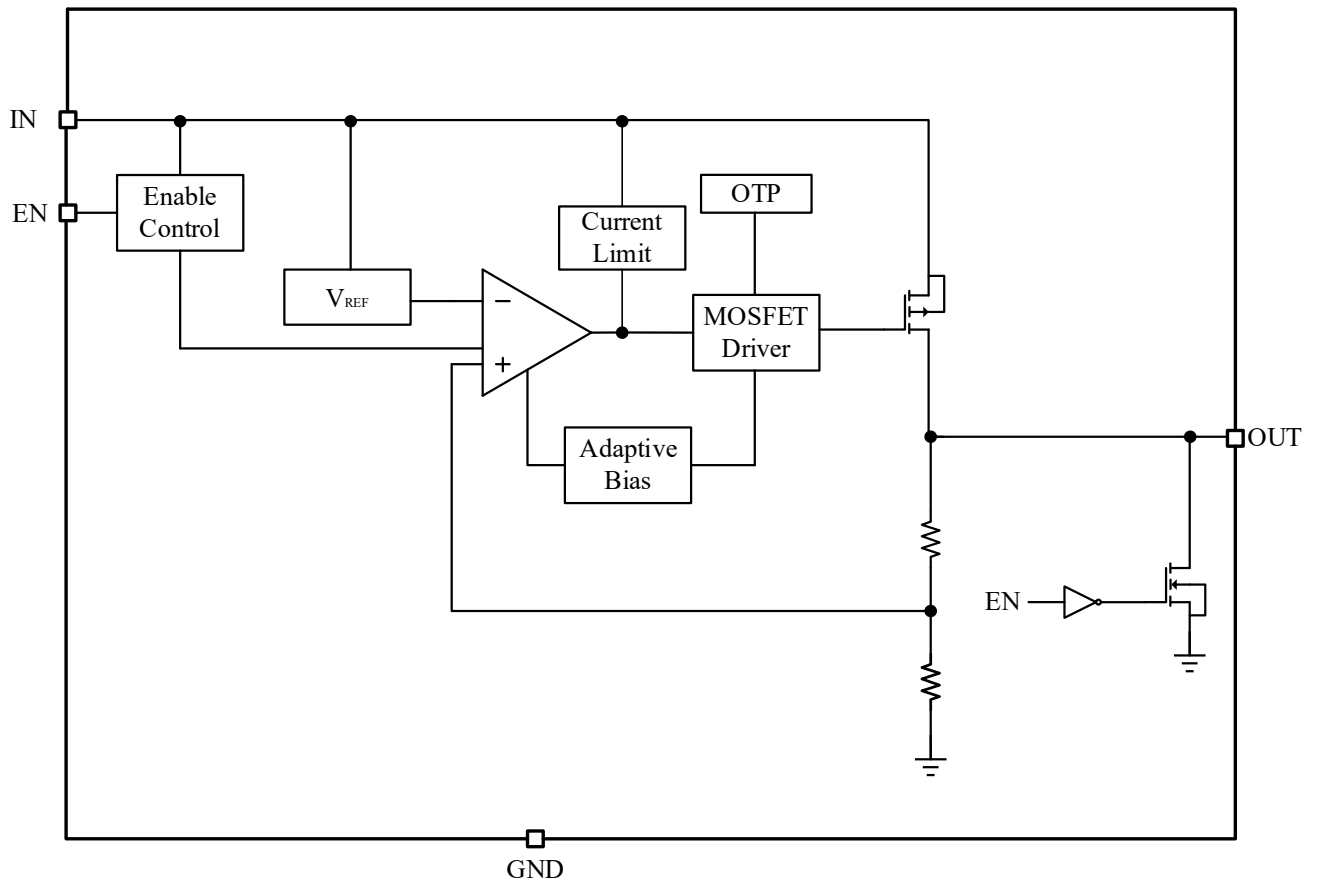


Line Transient

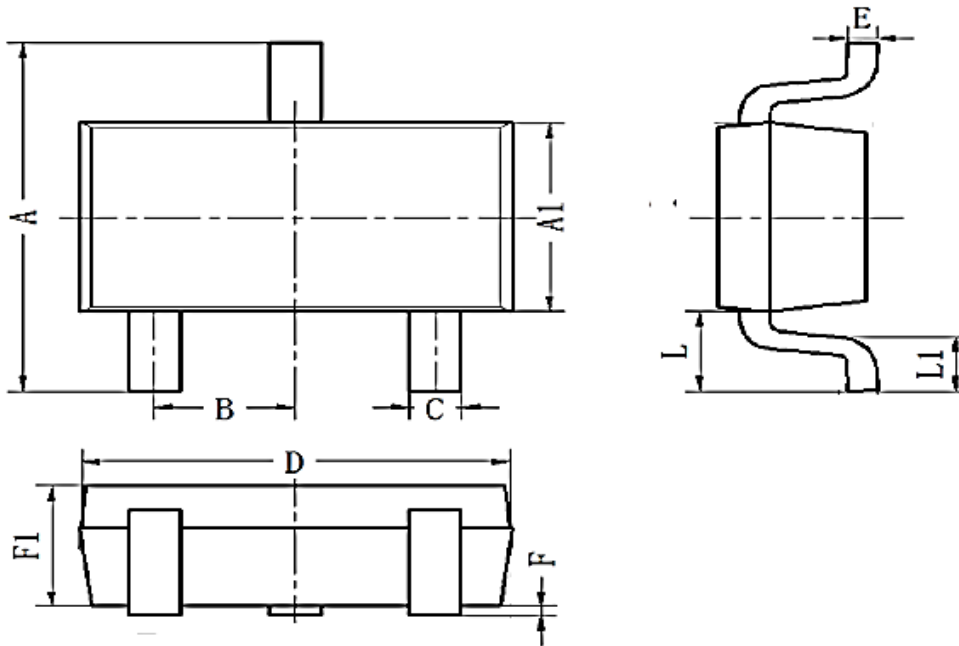


Line Transient

Block Diagram

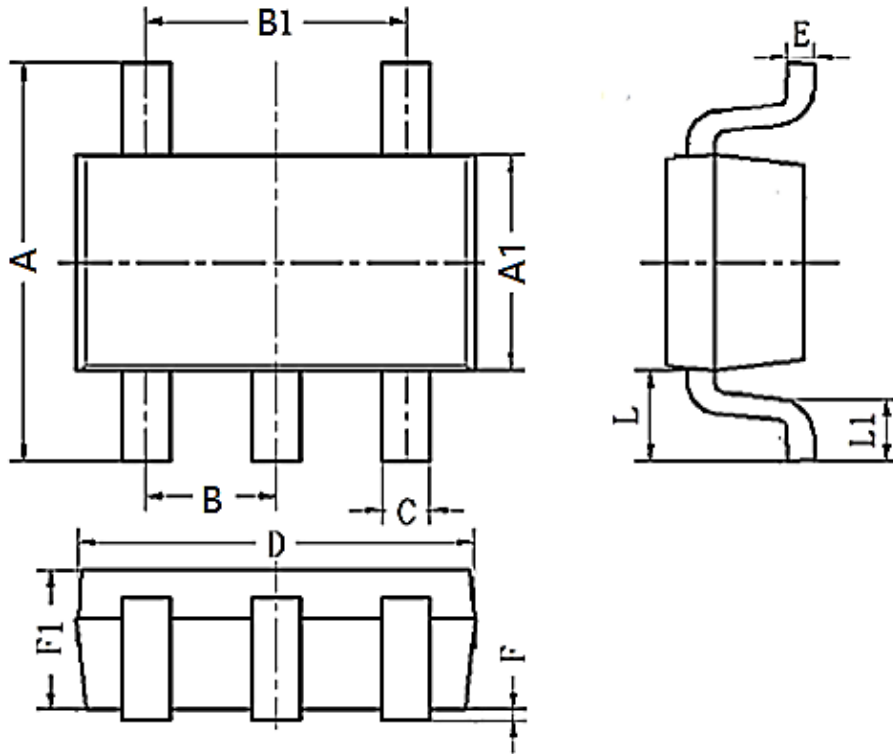


Package Information



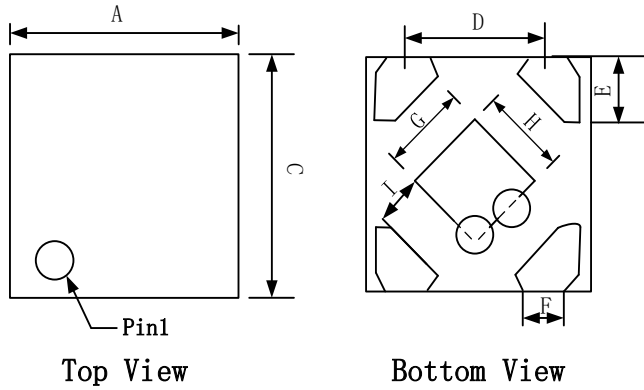
SOT 23-3

SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	2.60	2.80	3.00
A1	1.50	1.60	1.70
B	0.95BSC		
C	0.25	0.40	0.50
D	2.82	2.92	3.02
E	0.10	0.15	0.20
L	0.59REF		
L1	0.30	0.45	0.60
F1	0.90	1.10	1.30
F	0.00	0.08	0.15



SOT23-5

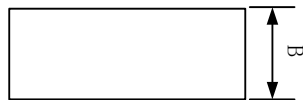
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A	2.60	2.80	3.00
A1	1.50	1.60	1.70
B	0.95BSC		
B1	1.90BSC		
C	0.25	0.40	0.50
D	2.82	2.92	3.02
E	0.10	0.15	0.20
F	0.00	0.08	0.15
L	0.59REF		
F1	0.90	1.10	1.30
L1	0.30	0.45	0.60



DETAIL A

Pin 1 ID and Tie Bar Mark Options

Note: The configuration of the Pin 1 identifier is optional, but must be located within the zone indicated.



Side View

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	0.650BSC		
E	0.170	0.270	0.370
F	0.130	0.235	0.300
G	0.430	0.485	0.540
H	0.430	0.485	0.540
I	0.200REF		

Ordering Information

Part Number	Output Voltage	Package	Packing Quantity	Marking*
WR0112-18A30R	1.8V	SOT23-3	3K/Reel	WR0112 18 XXXX
WR0112-25A30R	2.5V	SOT23-3	3k/Reel	WR0112 25 XXXX
WR0112-28A30R	2.8V	SOT23-3	3k/Reel	WR0112 28 XXXX
WR0112-18A50R	1.8V	SOT23-5	3K/Reel	WR0112 18 XXXX
WR0112-25A50R	2.5V	SOT23-5	3k/Reel	WR0112 25 XXXX
WR0112-28A50R	2.8V	SOT23-5	3K/Reel	WR0112 28 XXXX
WR0112-18FF4R	1.8V	DFN-4	10k/Reel	114 18
WR0112-25FF4R	2.5V	DFN-4	10k/Reel	114 25
WR0112-28FF4R	2.8V	DFN-4	10k/Reel	114 28

* XXXX is variable.


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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.