

150mA, Low Noise, High PSRR Low-dropout Regulator**AUR9503****General Description**

AUR9503 is a low-noise and high-PSRR LDO linear voltage regulator which operates from 2.5V to 5.5V and provides up to 150mA output current.

AUR9503 achieves ultra low quiescent current to be ideally used with green operational portable products. Fixed output voltage options are provided with an internal built-in feedback circuit and optimized for stable operations with small 1 μ F ceramic output capacitors for excellent transient performance. EN pin enables the main chip operation and enables the output to be turned off to allow reduced power consumption in shutdown mode with a smaller than 0.1 μ A shutdown current. The low dropout voltage is 100mV at a load current of 150mA for system power efficiency. An internal current limit circuit is designed and operated as a short circuit protection for the regulator output pin.

The AUR9503 is available in tiny DFN-1.6 \times 1.6-6 package for a small footprint solution to satisfy the portable design needs.

Features

- Low Noise for RF Application
- Low Dropout Voltage: 100mV @ 150mA
- Standby Current: 55 μ A
- < 0.1 μ A Standby Current When Shutdown
- Thermal Shutdown Protection
- Current Limiting Protection
- Only 1 μ F Output Capacitor Required for Stability
- Wide Operating Voltage Range: 2.5V to 5.5V

Applications

- Battery-powered Device or Equipment
- Mobile Phone, Digital Camera and MP3 Player
- Radios, Other Hand-held Games and Instruments
- Post DC-DC Voltage Regulation
- Mini PCI & PCI-E Card
- WiFi Card

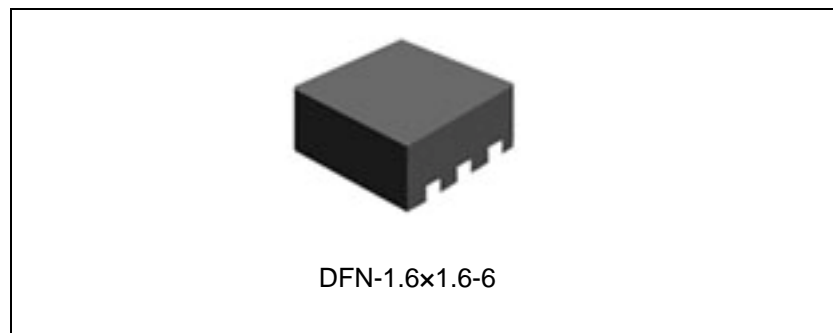


Figure 1. Package Type of AUR9503

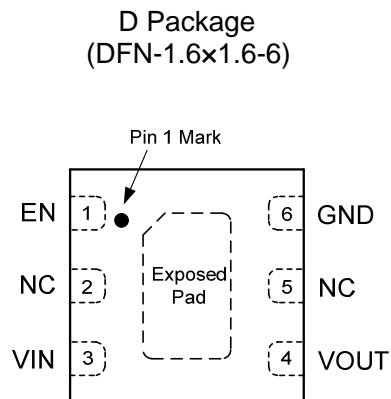
150mA, Low Noise, High PSRR Low-dropout Regulator**AUR9503****Pin Configuration**

Figure 2. Pin Configuration of AUR9503 (Top View)

Pin Description

Pin Number	Pin Name	Function
1	EN	Enable input signal, a 100k Ω pull-down resistor is needed when there is no digital signal connected
2, 5	NC	No internal connection
3	VIN	Regulator input supply voltage with 1 μ F or greater capacitor
4	VOUT	Regulator voltage output pin, 1 μ F or greater capacitor is needed
6	GND	Ground connection

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AUR9503

Functional Block Diagram

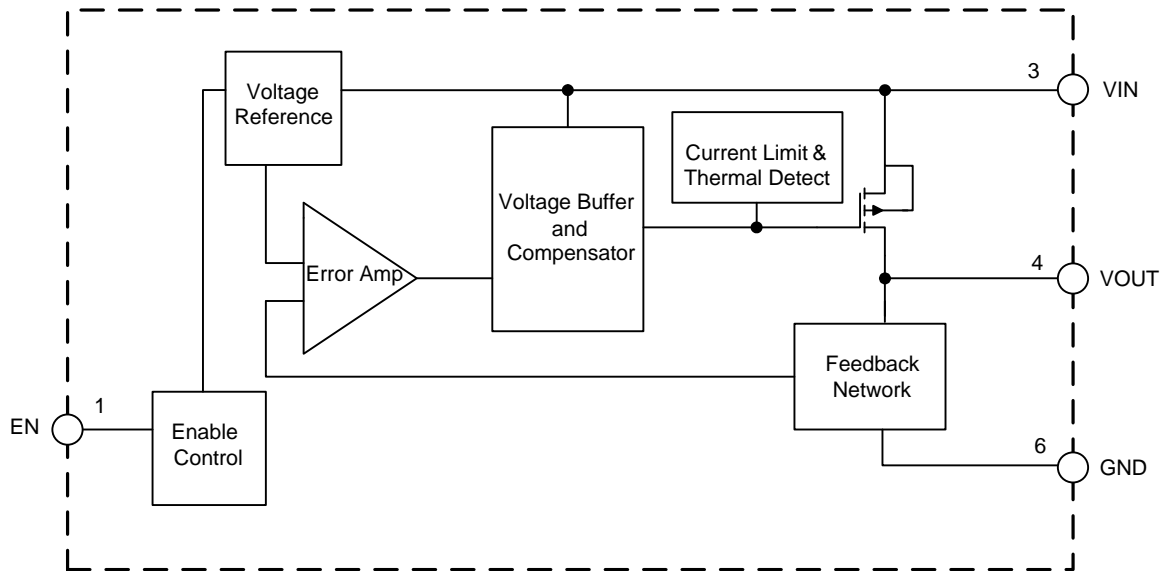
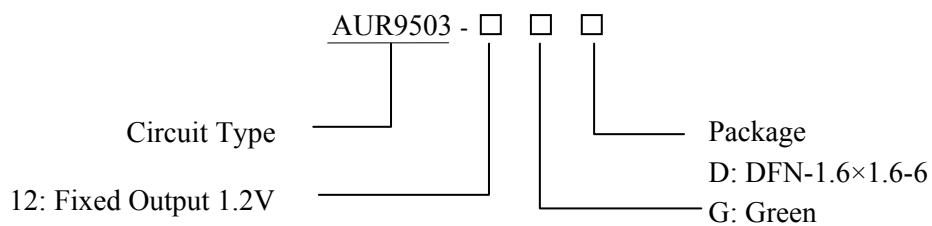


Figure 3. Functional Block Diagram of AUR9503

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
DFN-1.6×1.6-6	-40 to 80°C	AUR9503-12GD	503	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "G" in the part number, are RoHS compliant and green.

**150mA, Low Noise, High PSRR Low-dropout Regulator****AUR9503****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Supply Input Voltage	V_{IN}	0 to 6.0	V
Enable Input Voltage	V_{EN}	-0.3 to $V_{IN}+0.3$	V
Output Voltage	V_{OUT}	0 to $V_{IN}+0.3$	V
Power Dissipation (On PCB, $T_A=25^{\circ}\text{C}$)	P_D	0.55	W
Empirical Thermal Resistance (On PCB, $T_A=25^{\circ}\text{C}$)	θ_{JA}	180	$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature	T_J	160	$^{\circ}\text{C}$
Operating Temperature	T_{OP}	-40 to 85	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^{\circ}\text{C}$
ESD (Human Body Model)	V_{HBM}	2000	V
ESD (Machine Model)	V_{MM}	200	V

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Input Voltage	V_{IN}	2.5	5.5	V
Junction Temperature Range	T_J	-40	125	$^{\circ}\text{C}$
Ambient Temperature Range	T_A	-40	80	$^{\circ}\text{C}$

**150mA, Low Noise, High PSRR Low-dropout Regulator****AUR9503****Electrical Characteristics (Note 2)** $V_{IN}=V_{OUT}+0.5V$, $C_{IN}=C_{OUT}=1\mu F$ (Ceramic), $T_A=25^\circ C$, unless otherwise specified.

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage		V _{IN}		2.5		5.5	V
Output Voltage Accuracy		ΔV _{OUT} /V _{OUT}	I _{OUT} =1mA	-2		2	%
Shutdown Current		I _{SD}	EN=Low, I _{OUT} =0mA		0.1	1	μA
Quiescent Current		I _Q	EN=High, No Load		55		μA
Maximum Output Current		I _{MAX}	R _{LOAD} =1Ω	180	300	410	mA
Enable Input Voltage	“H” Level	V _{IH}		1.6		5.5	V
	“L” Level	V _{IL}		0		0.3	
Dropout Voltage (Note 3)		V _{DO}	I _{OUT} = 150mA	50		200	mV
Load Regulation		ΔV _{LOAD}	1mA< I _{OUT} <150mA, 2.5V<V _{IN} <5.5V			1.0	%
Line Regulation		ΔV _{LINE}	V _{IN} =(V _{OUT} +0.5V) to 5.5V, I _{OUT} =1mA to 150mA		0.01	0.2	%
Power Supply Rejection Ratio		PSRR	C _{IN} =C _{OUT} =1μF, I _{OUT} =10mA	f=1kHz	70		dB
				f=10kHz	60		
				f=100kHz	40		
Output Voltage Noise		V _{NO}	C _{OUT} =1μF, I _{OUT} =0mA, f=10Hz to 100kHz		30		μV _{RMS}
Junction Temperature Shutdown Threshold		T _{SD}			160		°C
Thermal Shutdown Temperature Hysteresis		T _{SDH}			30		°C

Note 2: Exceeding the absolute maximum rating may cause damage to the device.

Note 3: Dropout voltage is defined as the difference between the input and output voltage when the output voltage drops 0.1V below its nominal value.

150mA, Low Noise, High PSRR Low-dropout Regulator

AUR9503

Typical Performance Characteristics

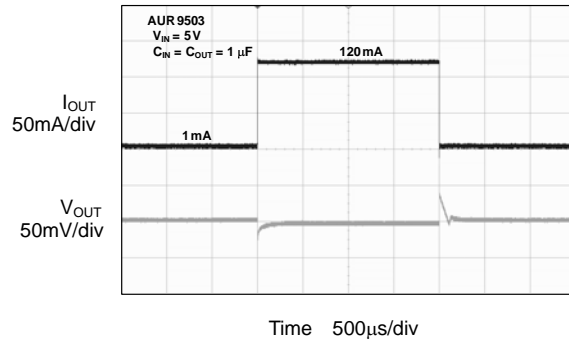


Figure 4. Load Transient Response

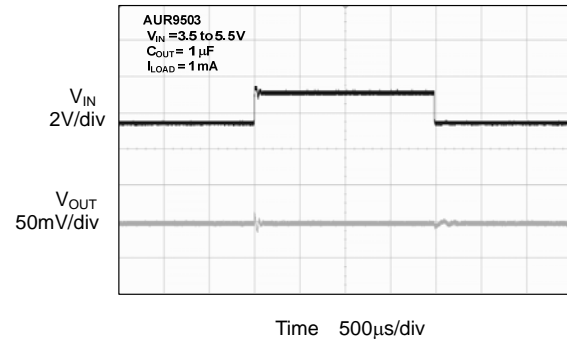


Figure 5. Line Transient Response

150mA, Low Noise, High PSRR Low-dropout Regulator**AUR9503****Application Information**

Along with the highly development of portable devices, the LDO linear regulators are applied in many modern digital products like mobile phone, digital camera and MP3 player, etc. Hence, the battery of the hand-held device is widely used and it is important to design a LDO regulator with low quiescent current to extend the battery's life-time. When applied in RF application which is easily affected by noise, low noise supply voltage is also necessary. AUR9503, a low-noise and high-PSRR product, is ideally designed for such portable applications.

The basic application circuit of AUR9503 is shown in Figure 6.

1. Thermal Protection

The efficiency of a LDO linear regulator is determined by the difference between input and output voltage. The larger difference may cause overheat problems within the integrated circuit and reduce the efficiency. AUR9503 has a built-in over-temperature and over-current protection circuit. When the junction temperature exceeds 160°C,

thermal shutdown circuit is enabled to prevent heat danger.

2. External Capacitors

The AUR9503 is stable using an output capacitor of 1μF. The ceramic capacitors can be used to attain better AC response. Moreover, low ESR can provide smaller undershoot and overshoot when loading current varies. Besides, an input capacitor of 1μF is required to stabilize VIN. All the capacitors' ground is recommended to share the IC's GND pin as direct and short as possible.

3. Enable Input

The AUR9503 can be operated or shutdown by the voltage level of EN pin. For continuous ON state, the EN pin is tied to VIN.

4. PCB Layout Consideration

The AUR9503 needs 1μF capacitors on VIN and VOUT pin. Place the capacitors as close as possible to the pin.

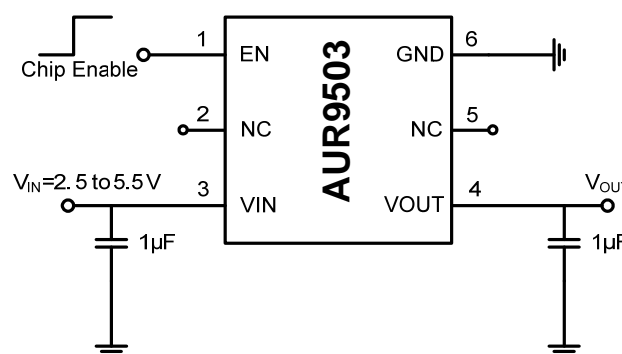
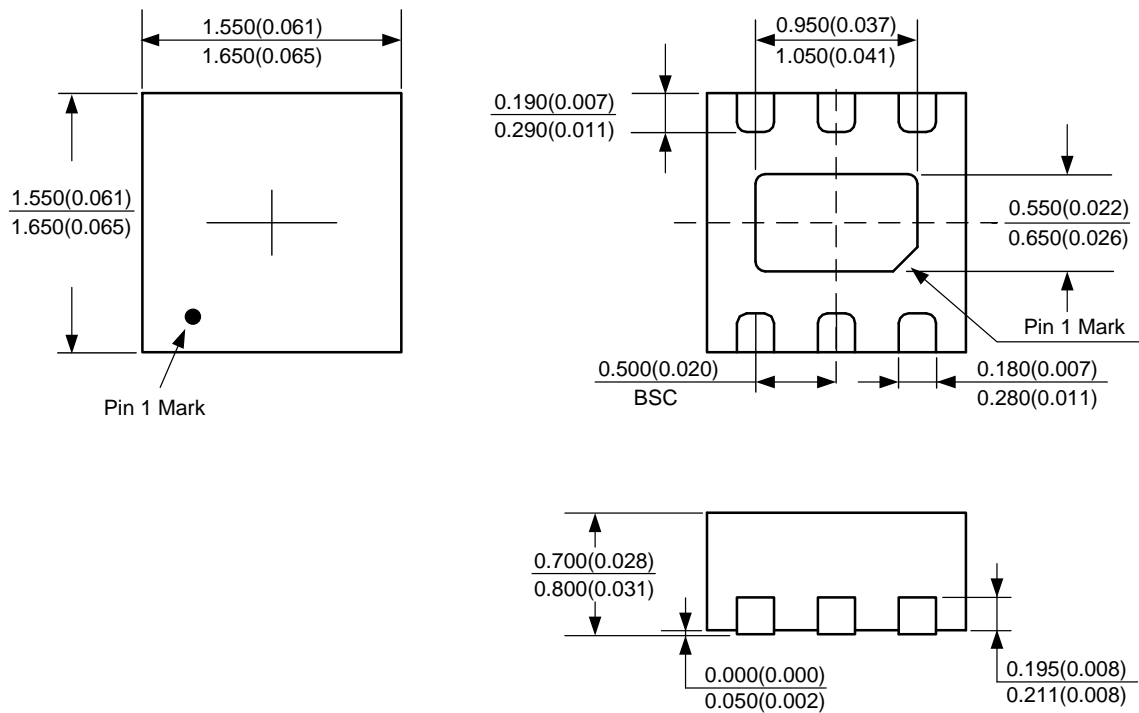
Typical Application

Figure 6. Typical Application Circuit of AUR9503

150mA, Low Noise, High PSRR Low-dropout Regulator
AUR9503
Mechanical Dimensions
DFN-1.6×1.6-6
Unit: mm(inch)




BCD Semiconductor Manufacturing Limited

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MAIN SITE

- Headquarters

BCD (Shanghai) Micro-electronics Limited

No. 1600, Zi Xing Road, Shanghai ZiZhu Science-based Industrial Park, 200241, P. R.C.
Tel: +86-021-2416-2266, Fax: +86-021-2416-2277

- Wafer Fab

Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd.

800 Yishan Road, Shanghai 200233, China
Tel: +021-6485-1491, Fax: +86-021-5450-0008

REGIONAL SALES OFFICE

Shenzhen Office

Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd., Shenzhen Office

Unit A Room 1203, Skyworth Bldg., Gaoxin Ave.1.S., Nanshan District
Shenzhen 518057, China
Tel: +86-0755-8660-4900, Fax: +86-0755-8660-4958

Taiwan Office (Taipei)

BCD Semiconductor (Taiwan) Company Limited

3F, No.17, Lane 171, Sec. 2, Jiu-Zong Rd., Nei-Hu Dist., Taipei(114), Taiwan, R.O.C
Tel: +886-2-2656 2808
Fax: +886-2-2656-2806/26562950

Taiwan Office (Hsinchu)

BCD Semiconductor (Taiwan) Company Limited

8F, No.176, Sec. 2, Gong-Dao 5th Road, East District
HsinChu City 300, Taiwan, R.O.C
Tel: +886-3-5160181, Fax: +886-3-5160181

USA Office

BCD Semiconductor Corp.

48460 Kato Road, Fremont, CA 94538, USA
Tel: +1-510-668-1950
Fax: +1-510-668-1990

Korea Office

BCD Semiconductor Limited Korea office.

Room 101-1112, Digital-Empire II, 486 Sin-dong,
Yeongtong-Gu, Suwon-city, Gyeonggi-do, Korea
Tel: +82-31-695-8430