

500nA I_Q , 300mA Low-Dropout Linear Regulator

General Description

The MGR2503 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 500nA quiescent current at no load, the MGR2503 is ideally suited for standby micro-control-unit systems, especially for always-on applications like portable, and other battery-operated systems. The MGR2503 retains all the features that are common to low dropout regulators including a low dropout PMOS pass device, short circuit protection, and thermal shutdown.

The MGR2503 has a 6V maximum operating voltage limit, a -40°C to 125°C operating temperature range, and $\pm 2\%$ output voltage tolerance. The MGR2503 is available in SOT89-3, SOT23-5, SOT23-3 surface mount packages.

Ordering Information

Part Number	Voltage	Package	
MGR2503-33	$V_{OUT}=3.3\text{V}$	SOT233	MGR2503-33GV
		SOT235	MGR2503-33GB
		SOT893	MGR2503-33GX
MGR2503-50	$V_{OUT}=5.0\text{V}$	SOT233	MGR2503-50GV
		SOT235	MGR2503-50GB
		SOT893	MGR2503-50GX

Features

- V_{IN} Range up to 6V
- Output Voltage Tolerances of $\pm 2\%$
- Output Current of 300mA
- Ultra Low Quiescent Current ($I_Q = 500\text{nA}$)

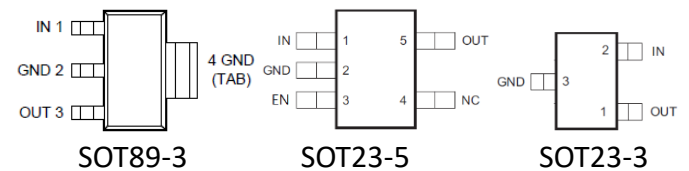
- Dropout Voltage Typically 400mV at $I_{OUT} = 300\text{mA}$
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

Applications

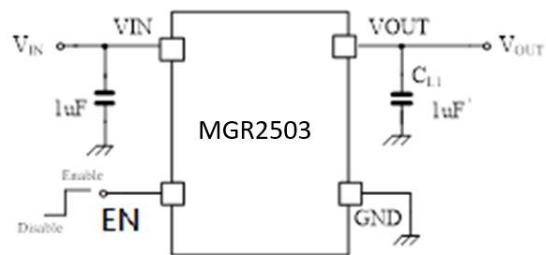
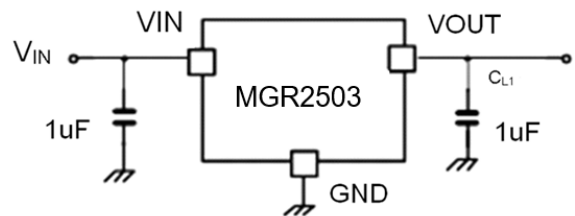


- Portable, Battery Powered Equipment
- Ultra Low Power Microcontroller
- Notebook computers

Pin Configuration



Typical Application Circuit

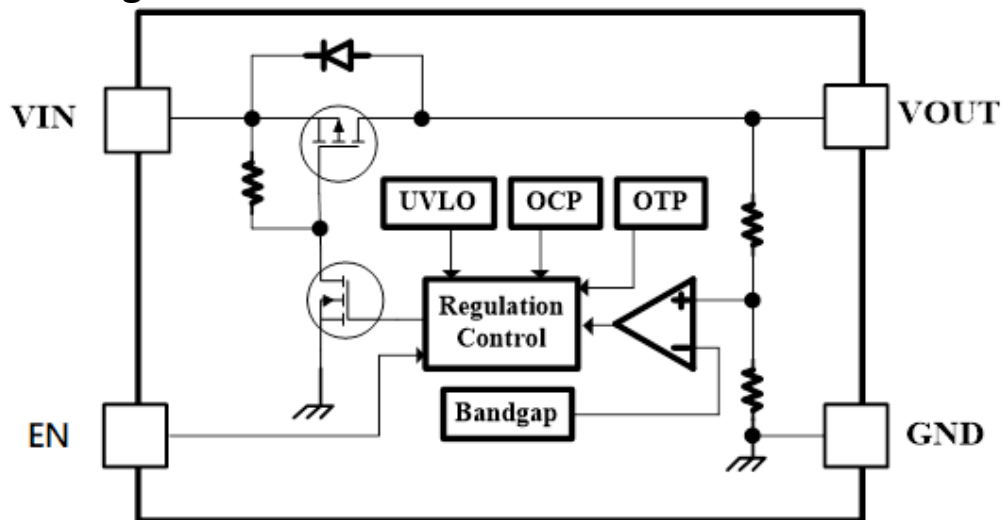


Ceramic Capacitor Stable

Pin Assignment

Pin Name	Pin No. SOT89-3	Pin No. SOT23-5	Pin Function
VOUT	3	5	Output Voltage Pin
GND	2,4	2	Ground
VIN	1	1	Input Voltage pin.
EN	--	3	Enable

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ----- -0.3V to +6.5V
- Junction Temperature----- 125°C
- Lead Temperature (Soldering, 10 sec.)----- 300°C
- Storage Temperature ----- -65°C to 150°C

Recommended Operating Conditions

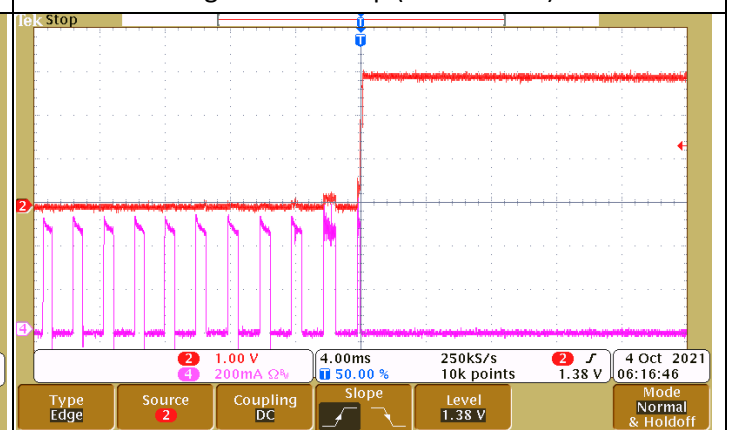
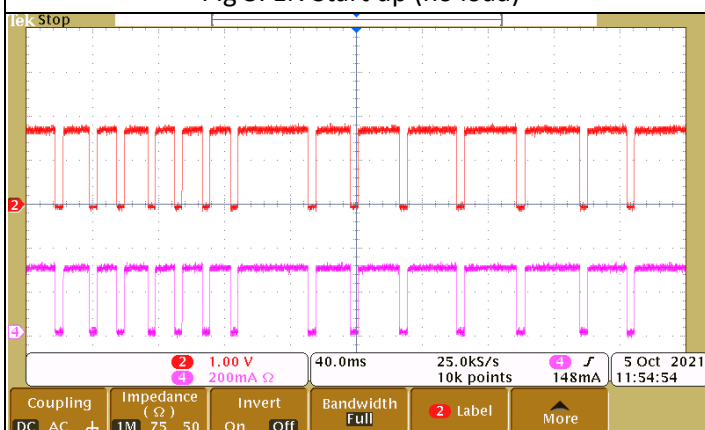
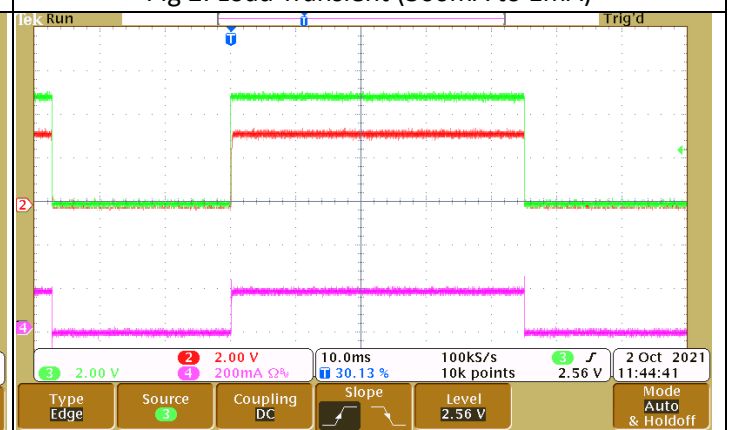
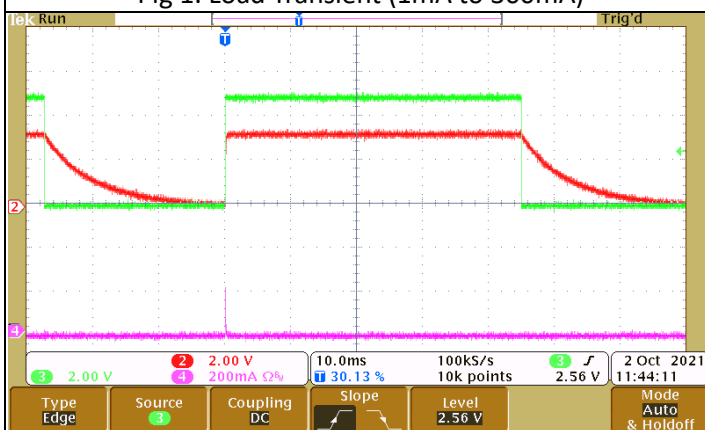
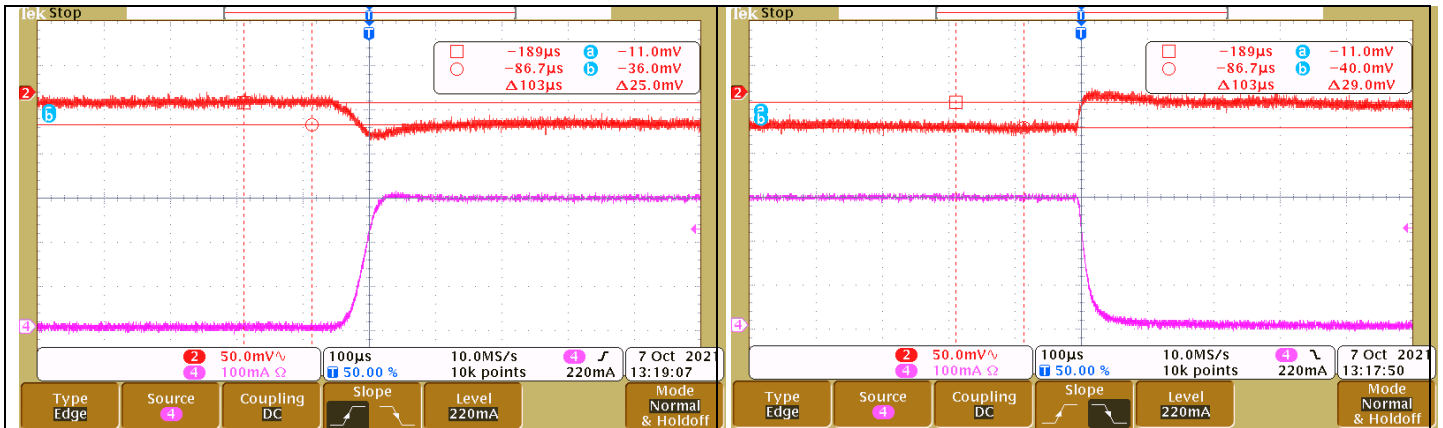
- Input Voltage, V_{IN} ----- +2.5V to +5.5V
- Junction Temperature ----- -40°C to 125°C

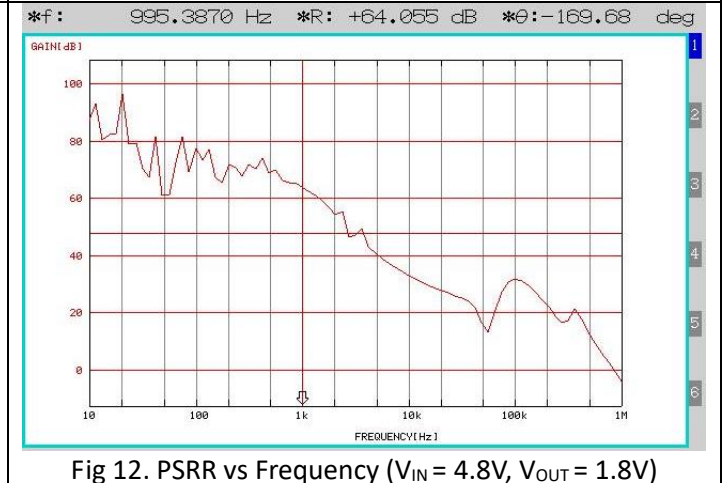
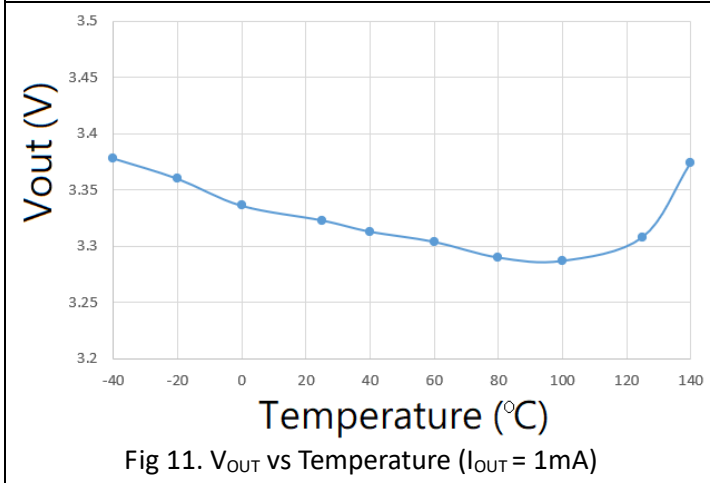
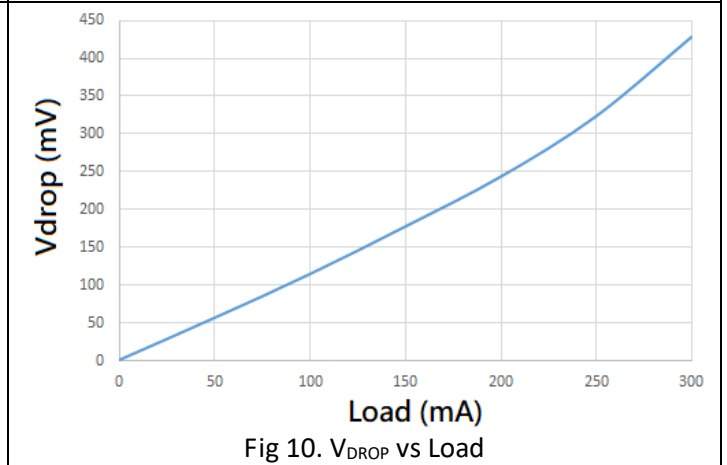
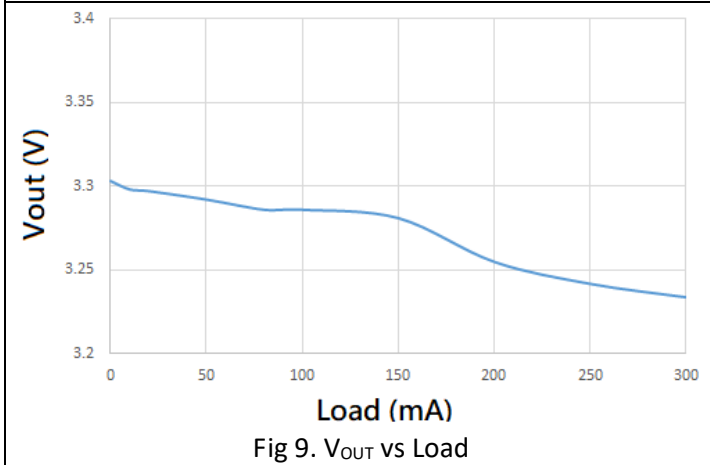
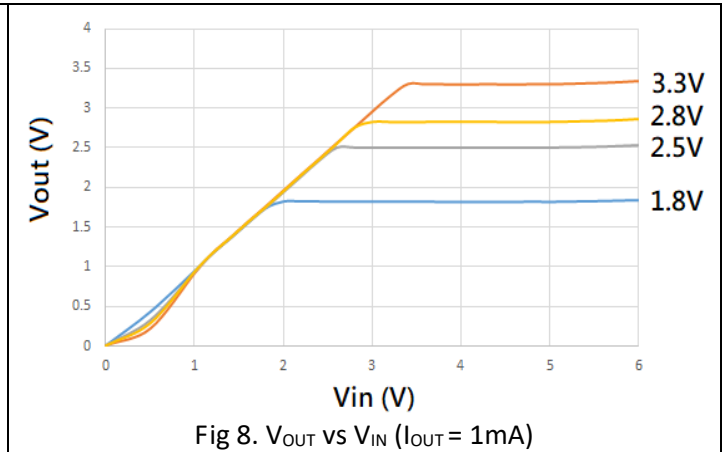
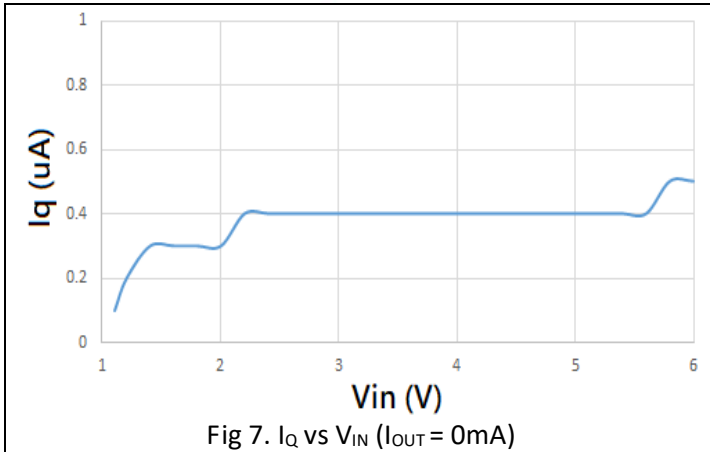
Electrical Characteristics
 $V_{IN} = V_{OUT} + 1V$, $I_{OUT} = 1mA$, $C_{IN} = C_{OUT} = 1\mu F$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy	ΔV_{OUT}		-2%		2%	V
Line Regulation	ΔV_{LINE}	$V_{IN} = V_{OUT} + 1V$ to 5.5V		0.6	1.5	%
Load Regulation	ΔV_{LOAD}	$I_{OUT} = 1mA$ to 150mA			1	%
		$I_{OUT} = 1mA$ to 300mA			1.5	
Dropout Voltage	V_{DROP}	$I_{OUT} = 100mA$, $V_{OUT} = 3.3V$		130		mV
		$I_{OUT} = 300mA$, $V_{OUT} = 3.3V$		400		mV
Quiescent Current	I_Q	$T_J = 25^\circ C$		0.5	1	μA
Current Limit	I_{CL}		360	560		mA
Enable high level	V_{ENHI}		0.6			V
Enable low level	V_{ENLO}				0.2	V
Power-supply rejection ratio	PSRR	$f = 1kHz$		60		dB
Thermal Shutdown	T_{SD}			150		$^\circ C$
Thermal Shutdown Hy	T_{SDHY}			20		$^\circ C$

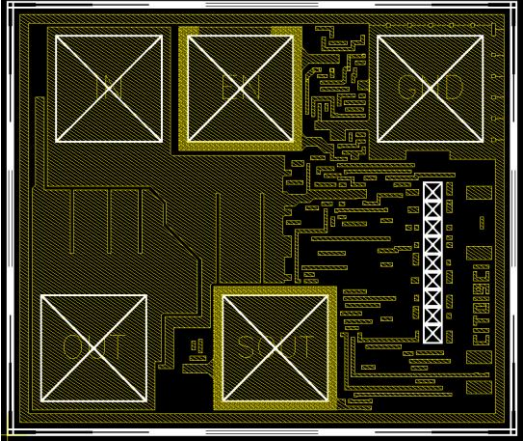
Typical Characteristics

$V_{IN} = V_{OUT} + 1V$, $I_{OUT} = 1mA$, $V_{OUT} = 3.3V$, $C_{IN} = C_{OUT} = 1\mu F$, $T_J = 25^\circ C$, unless otherwise specified





PAD Location and Coordinates

PHYSICAL CHARACTERISTICS		UNIT	CHIP DRAWING
Wafer Size	200	mm	
Die Size (with S/L)	0.360 * 0.305	mm ²	
Scribe line width	60	um	
TOP Metal thickness	3	μm	
Metal layers	3	layers	
Top Metallization	Al-Cu		
Wafer Thickness	736	μm	
CUP (circuit under PAD) or not	YES		
Bonding Wire Diameter	20	um	

PAD NAME	PAD SIZE (μm ²)	Coordinate
VOUT	60*60	(49,49)
VOUT	60*60	(162,49)
VIN	60*60	(57.8,196)
ENABLE	60*60	(132.8,196)
GND	60*60	(251,196)

Bonding Diagram Example

