

## 24V 150mA Ultralow-Quiescent-Current LDO

### General Description

The MGR2202 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 1.5µA quiescent current at no load, the MGR2202 is ideally suited for standby micro-control-unit systems, especially for always-on applications like E-meters, fire alarms, smoke detectors and other battery operated systems. The MGR2202 retains all of the features that are common to low dropout regulators including a low dropout PMOS pass device, short circuit protection, and thermal shutdown.

The MGR2202 has a 24-V maximum operating voltage limit, a -40°C to 125°C operating temperature range, and ±2% output voltage tolerance. The MGR2202 is available in SOT235, SOT233, SOT893, surface mount packages.

### Ordering Information

Part Number	Voltage	Package	
MGR2202-33	V <sub>OUT</sub> =3.3V	SOT233	MGR2202-33GV
		SOT235	MGR2202-33GB
		SOT893	MGR2202-33GX
MGR2202-50	V <sub>OUT</sub> =5.0V	SOT233	MGR2202-50GV
		SOT235	MGR2202-50GB
		SOT893	MGR2202-50GX

### Features

- V<sub>IN</sub> Range up to 24V
- Output Voltage Tolerances of ±2%
- Output Current of 150 mA
- Ultra Low Quiescent Current (I<sub>Q</sub> = 1.5 µA)
- Dropout Voltage Typically 650 mV at I<sub>OUT</sub> = 100 mA
- Internal Thermal Overload Protection

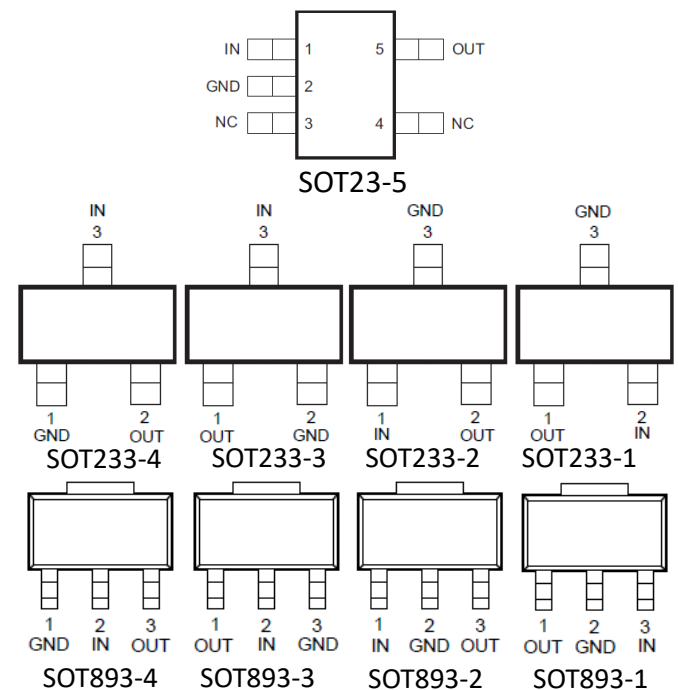
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

### Applications

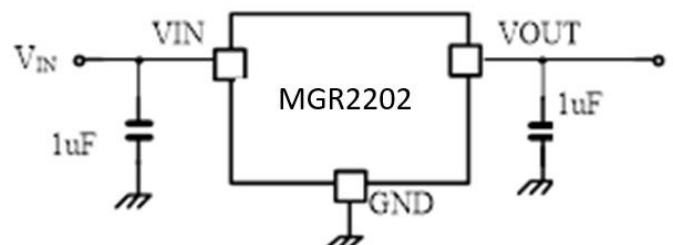


- E-meters, Water Meters and Gas Meters
- Fire Alarm, Smoke Detector
- Appliances and White Goods

### Pin Configuration



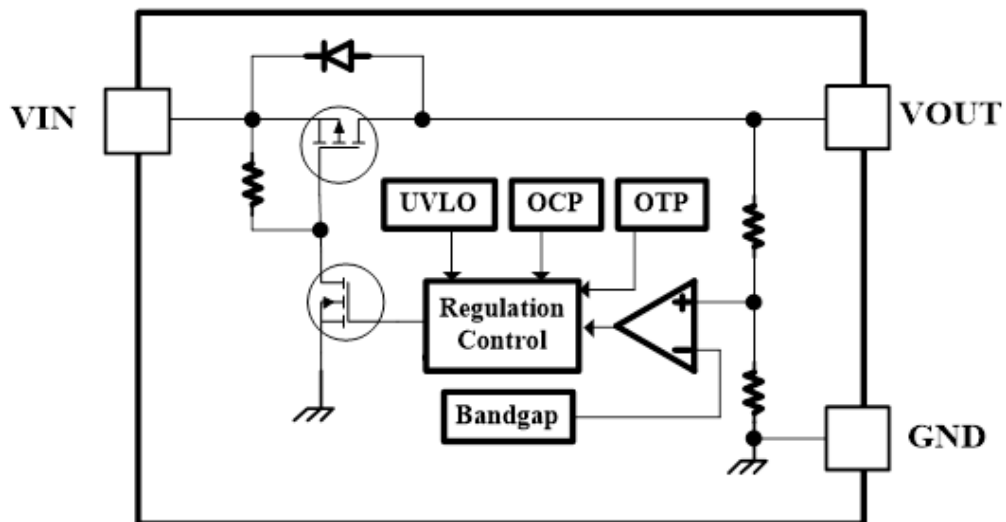
### Typical Application Circuit



**Ceramic Capacitor Stable**

**Pin Assignment**

Pin Name	Pin No. SOT893	Pin No. SOT893	Pin No. SOT893	Pin No. SOT893	Pin No. SOT235	Pin Function
VOUT	3	1	1	3	5	Output Voltage Pin
GND	1	3	2	2	2	Ground
VIN	2	2	3	1	1	Input Voltage pin.
NC	-	-	-	-	3,4	Non-Connection

**Function Block Diagram**


**Absolute Maximum Ratings (Note1)**

- $V_{IN}$  ----- -0.3V to +28V
- Junction Temperature----- 125°C
- Lead Temperature (Soldering, 10 sec.)----- 300°C
- Storage Temperature ----- -65°C to 150°C

**Recommended Operating Conditions**

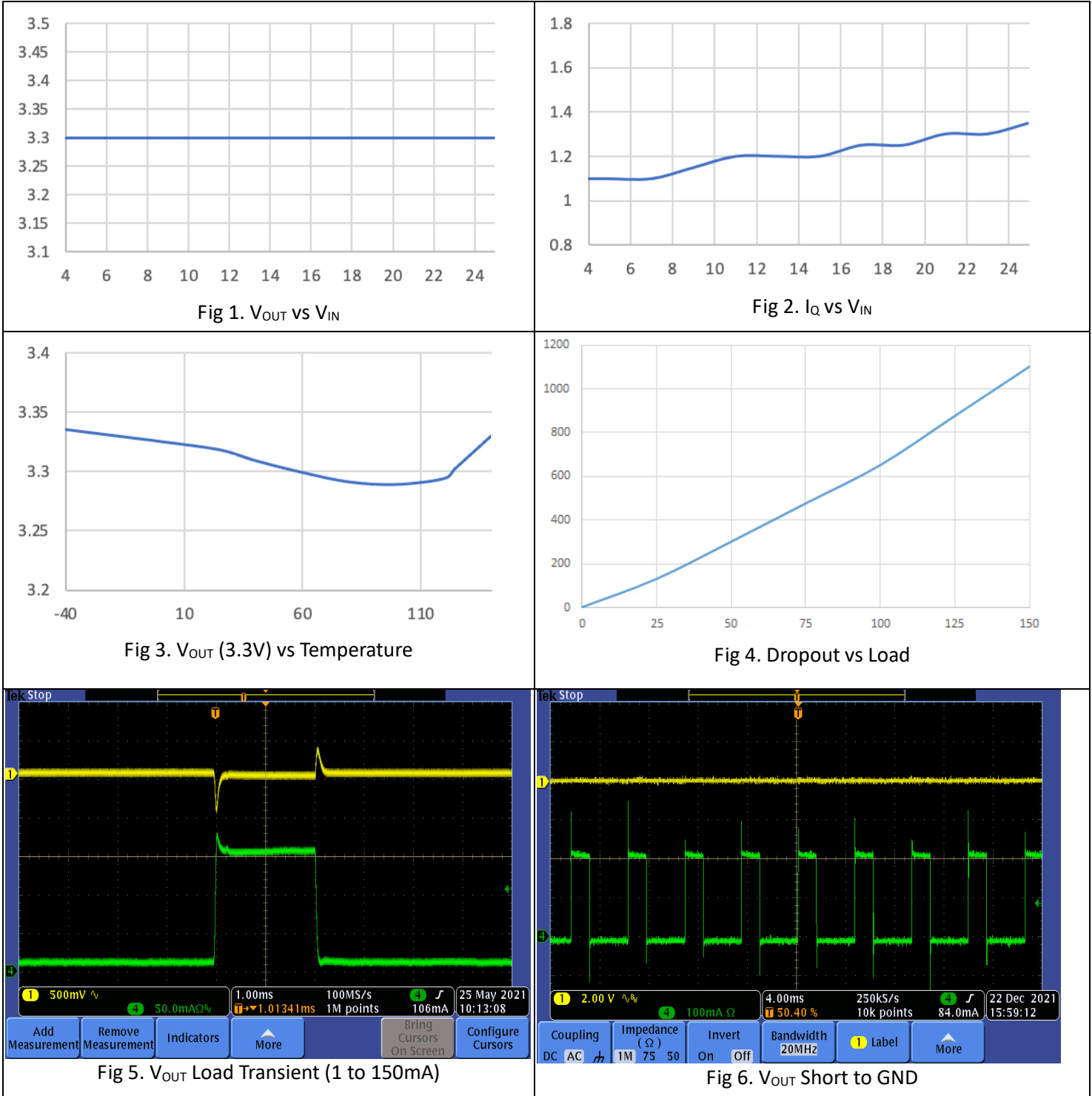
- Input Voltage,  $V_{IN}$  ----- +2.7V to +24V
- Junction Temperature ----- -40°C to 125°C

**Electrical Characteristics**
 $V_{IN} = V_{OUT} + 2V$ ,  $I_{OUT} = 1mA$ ,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage	$V_{OUT}$		-2%		2%	V
Line Regulation	$\Delta V_{LINE}$	$V_{IN} = V_{OUT} + 2V$ to 24V, or $V_{IN} = 5V$ to 24V, if $V_{OUT} < 3V$		2	50	mV
Load Regulation	$\Delta V_{LOAD}$	$I_{OUT} = 1mA$ to 150mA		0.15	1.5	%
Dropout Voltage	$V_{DROP}$	$I_{OUT} = 100mA$		650		mV
		$I_{OUT} = 150mA$		1100		mV
Quiescent Current	$I_Q$	$I_{OUT} = 0mA$		1.5	4.0	$\mu A$
Current Limit	$I_{CL}$		170	200		mA
Thermal Shutdown	$T_{SD}$			160		$^\circ C$
Thermal Shutdown Hysteresis	$T_{HY}$			30		$^\circ C$

## Typical Characteristics

$V_{IN} = V_{OUT} + 1.5V$ ,  $I_{OUT} = 1mA$ ,  $V_{OUT} = 3.3V$ ,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified



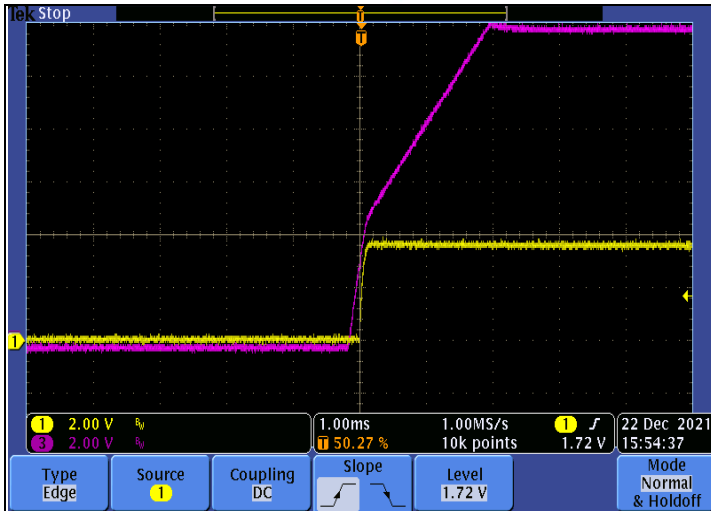


Fig 7.  $V_{IN}$  Start up

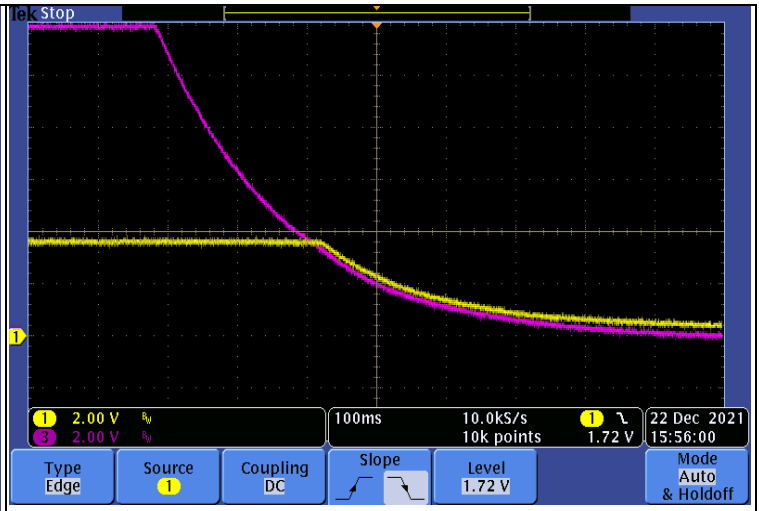
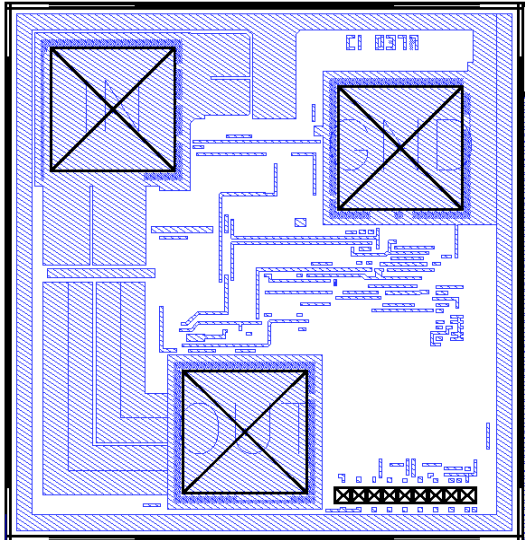


Fig 8.  $V_{IN}$  Shut down

**PAD Location and Coordinates**

PHYSICAL CHARACTERISTICS		UNIT	CHIP DRAWING
Wafer Size	200	mm	
Die Size (with S/L)	0.394 * 0.410	mm <sup>2</sup>	
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		

PAD NAME	PAD SIZE (μm <sup>2</sup> )	Coordinate
VOUT	80*80	(155,71)
GND	80*80	(255,256)
VIN	80*80	(69,281)

**Bonding Diagram Example**
