30V 100mA Low DropOut Voltage Regulator

General Description

The MGR78L33 three terminal positive regulators is available with 3.3V fixed output voltage, making it useful in a wide range of applications. Used as a Zener-diode and resistor combination replacement, the MGR78L33 usually provides an effective output impedance improvement of two orders of magnitude and lower quiescent current. These regulators can provide local, on-card regulation, eliminating distribution problems associated with single-point regulation. The available voltages allow the MGR78L33 to be used in logic systems, instrumentation, HiFi, and other solid-state electronic equipment.

The MGR78L33 is available in the plasticSOT89-3 package, SOT23-3 package. With adequate heat sinking, the regulator can deliver 100-mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors is provided to limit internal power dissipation. If internal power dissipation is too high for the heat sinking provided, the thermal shutdown circuit prevents the IC from overheating.

Ordering Information

Part Number	Package	
MGR78L33	SOT89-3 SOT23-3	MGR78L33-GV MGR78L33-GX

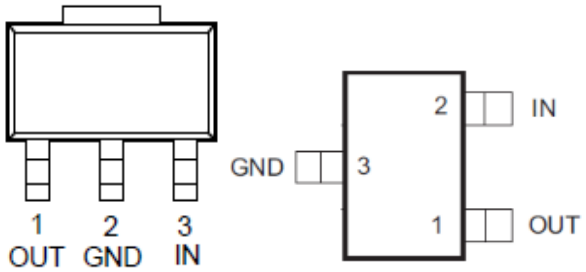
Features

- V_{IN} Range up to 30V
- Output Voltage Tolerances of ±5% Over the Temperature Range
- Output Current of 100 mA
- Output Transistor Safe Area Protection
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Available in SOT-893, SOT23-3 Low Profile Packages

Applications

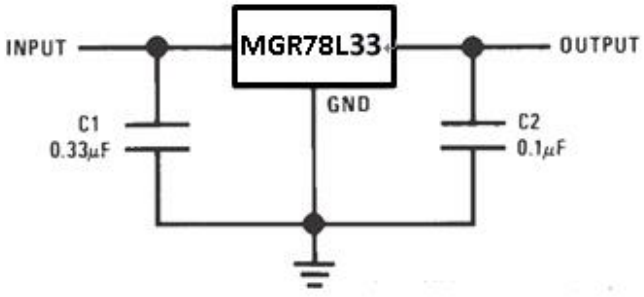
- Battery Chargers
- Portable Instrumentation
- LED Lighting
- Low Wattage Power Supplies

Pin Configuration



SOT89-3 SOT23-3

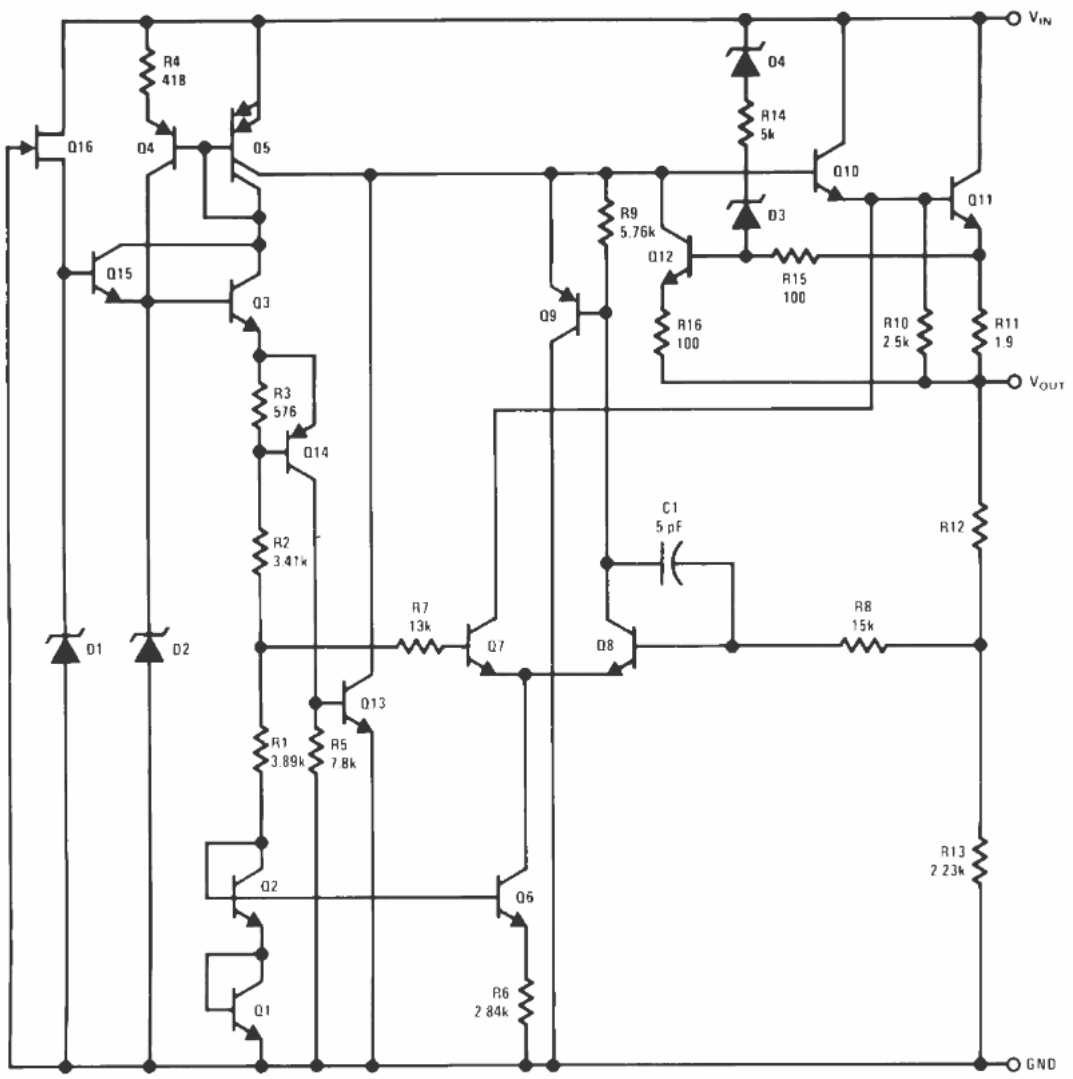
Typical Application Circuit



Pin Assignment

Pin Name	Pin No. SOT89	Pin No. SOT23	Pin Function
VOUT	1	1	Output Voltage Pin
GND	2	3	Ground
VIN	3	2	Input Voltage pin.

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ---------- -0.3V to +35V
- 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} ---------- +7V to +30V
- Junction Temperature ---------- -40°C to 125°C

Electrical Characteristics

V_{IN}=10V, I_{OUT}=40mA, C_{IN}=0.33uF, C_{OUT}=0.1uF, T_J=25℃, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage (MGR78L33)	V_{OUT}	T_J = 25℃	3.168	3.3	3.432	V
		V_{IN} = 7 to 20V, I_{OUT} = 1mA to 40mA T_J = 0℃ to 125℃	3.135		3.465	
		I_{OUT} = 1mA to 70mA T_J = 0℃ to 125℃	3.135		3.465	
Line Regulation	$\triangle V_{LINE}$	V_{IN} = 7 to 20V,		12	30	mV
		V_{IN} = 8 to 20V,		10	25	
Load Regulation	$\triangle V_{LOAD}$	I_{OUT} = 1mA to 100mA		20	50	mV
		I_{OUT} = 1mA to 40mA		10	25	
Quiescent Current	I_Q	T_J = 25℃		0.3		mA
		T_J = 125℃			1	
Quiescent Current Change	$\triangle I_Q$	V_{IN} = 8 to 20V, T_J = 0℃ to 125℃			0.2	mA
		I_{OUT} = 1mA to 40mA T_J = 0℃ to 125℃			0.1	
Ripple Rejection	PSRR	f = 120Hz, V_{IN} = 8V to 20V, T_J = 25°C	75	84		dB
Output Noise Voltage	V_N	f = 10Hz to 100KHz		32		uV
Dropout Voltage	V_{DROP}			0.8		V
V_{OUT} Temp. Coefficient	$\triangle V_{OUT}/\triangle T$	I_{OUT} = 5mA		0.2	0.5	mV/℃
Peak Output Current	I_{PK}			170		mA

Typical Characteristics

V_{IN}=10V, I_{OUT}=40mA, C_{IN}=0.33uF, C_{OUT}=0.1uF, T_J=25℃, unless otherwise specified

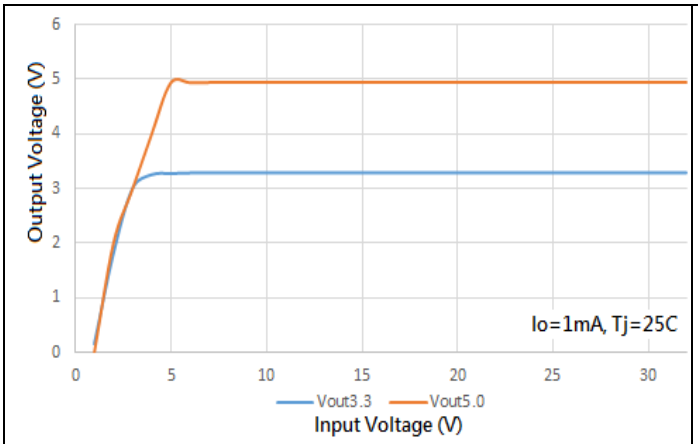


Fig 1. Output Voltage vs Input Voltage

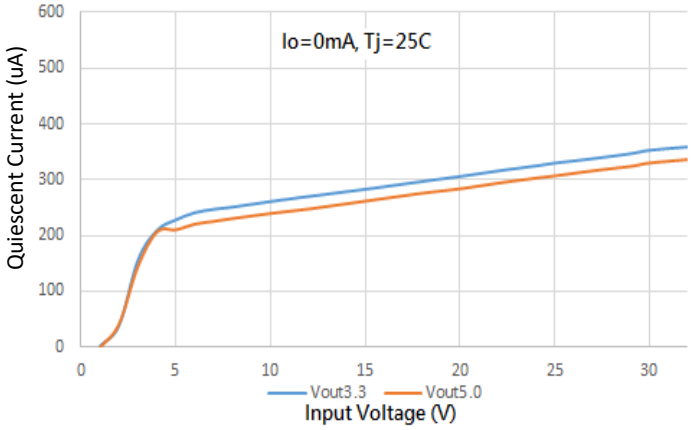


Fig 2. Quiescent Current vs Input Voltage

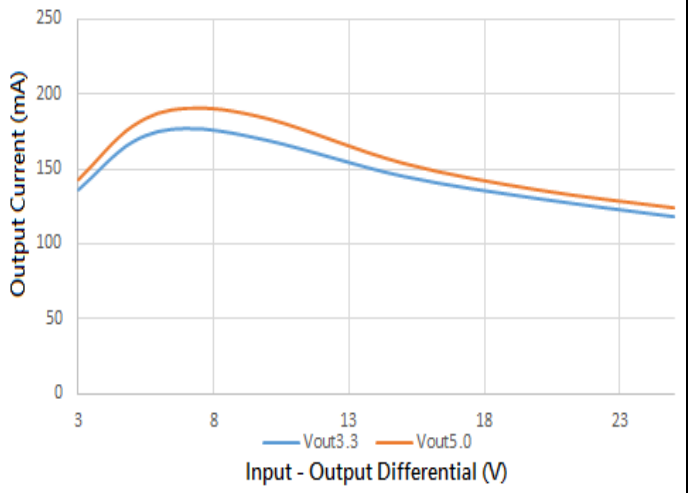


Fig 3. Peak Output Current vs Input-Output Differential

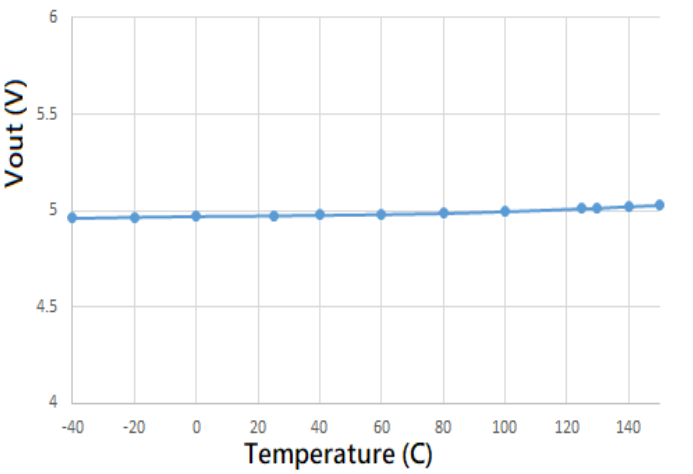


Fig 4. V_{OUT} vs Temp

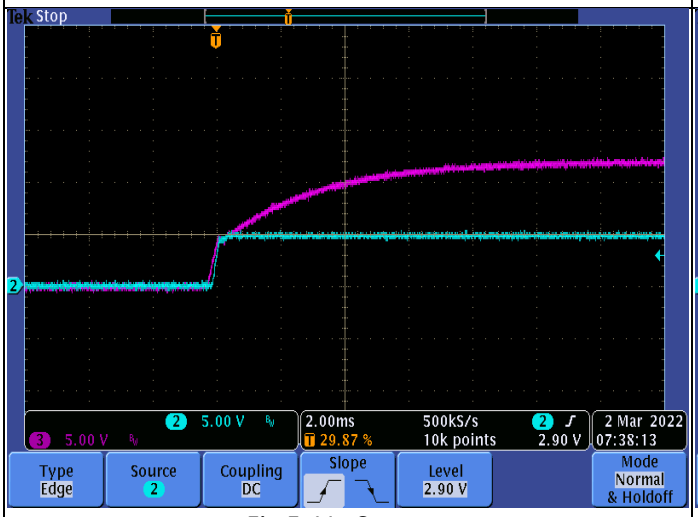


Fig 5. V_{IN} Start up

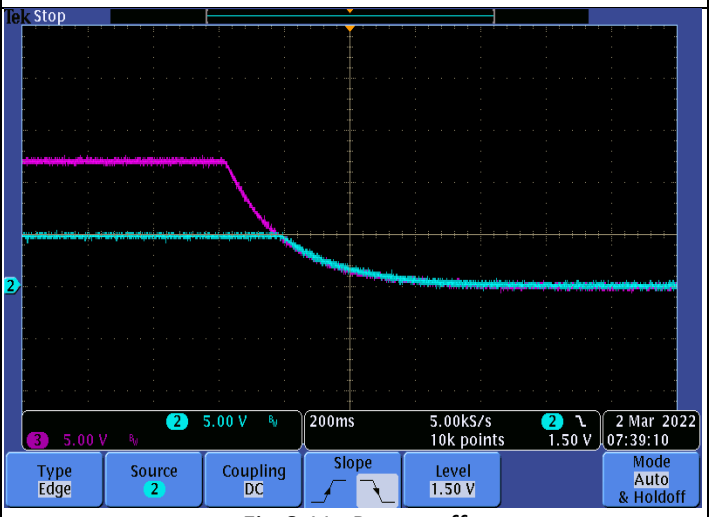


Fig 6. V_{IN} Power off

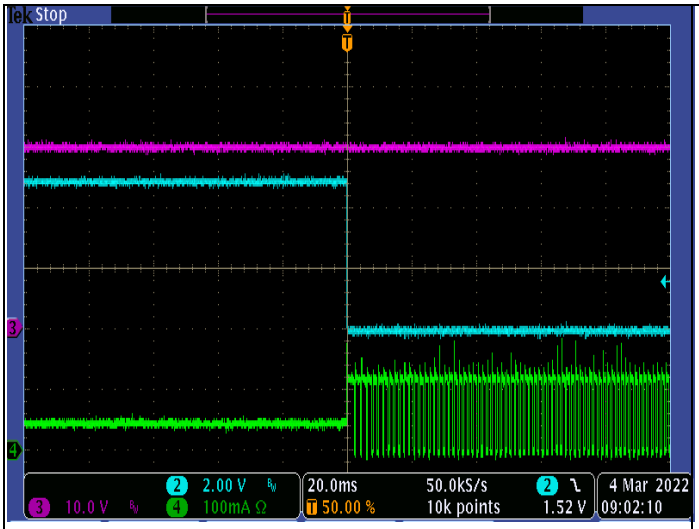


Fig 7. V_{OUT} Short to GND

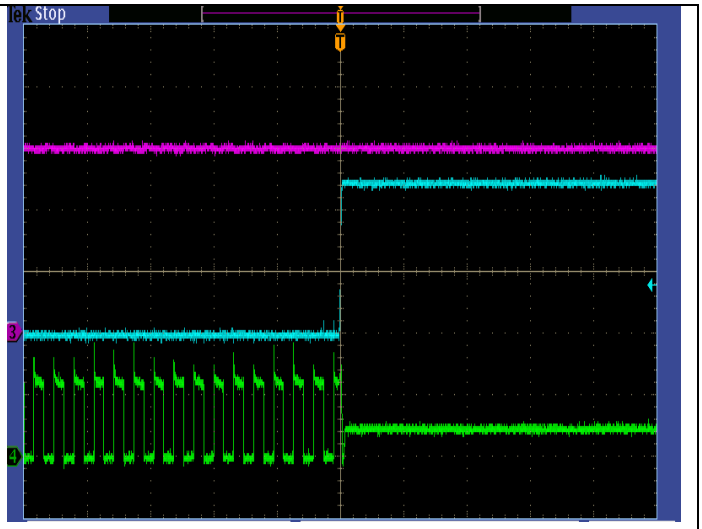


Fig 8. V_{OUT} Short and Release

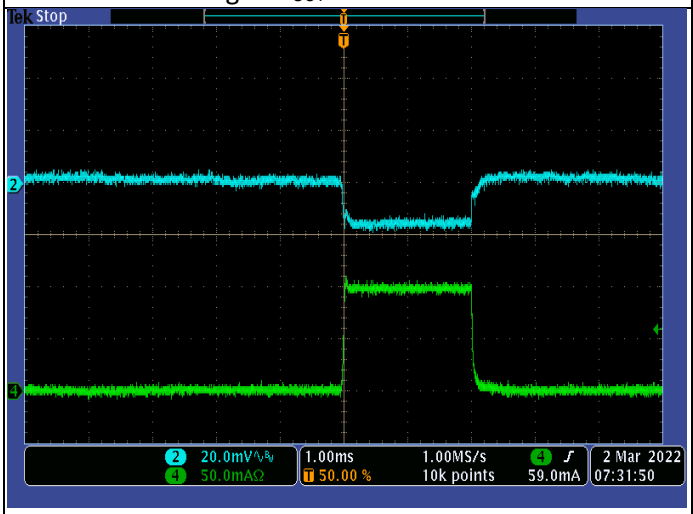


Fig 9. Load Transient

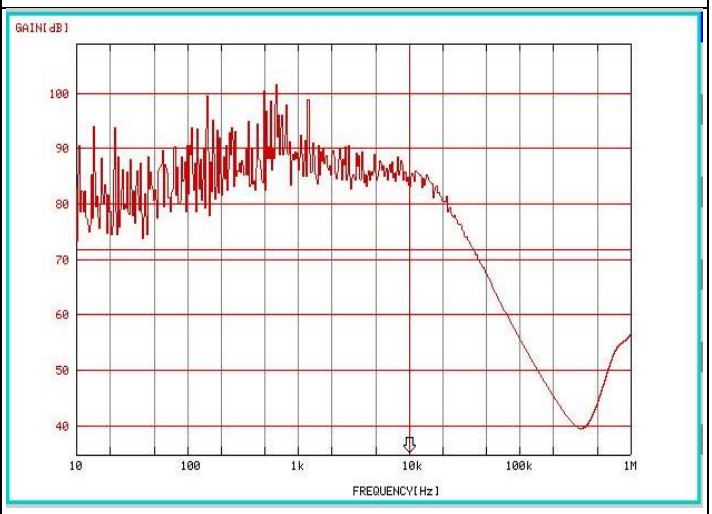
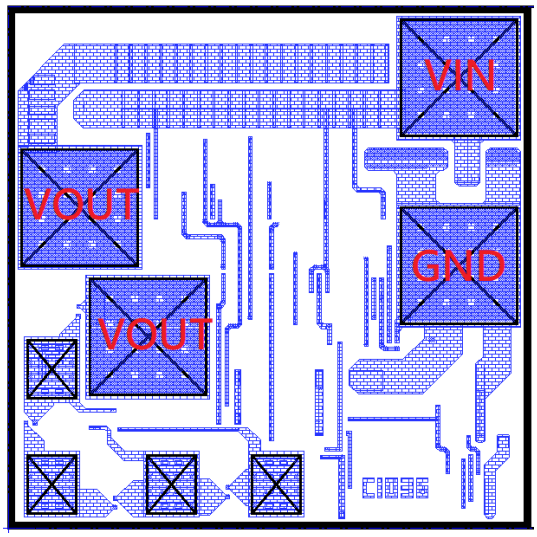


Fig 10. PSRR vs Frequency (V_{IN} = 9V, V_{OUT} = 5V)

PAD Location and Coordinates

PHYSICAL CHARACTERISTICS		UNIT	CHIP DRAWING
Wafer Size	200	mm	
Die Size (with S/L)	0.332 * 0.326	mm^2	
Scribe line width	62 (X direction) 56 (Y direction)	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^2)	Coordinate
GND	60*60	(233,136)
VIN	60*60	(233,233)
VOUT	60*60	(37,166)
VOUT	60*60	(72,99)

Bonding Diagram Example