150mA ULTRA LOW DROPOUT REGULATOR

General Description

The MC1533 is a positive voltage regulator IC fabricated by high voltage EPNP process.

The MC1533 has features of wide input voltage range, high accurcay, high ripple rejection, low dropout voltage, low noise, current limit and ultra-low quiescent current which make it ideal for use in various USB and portable devices.

The IC consists of a voltage reference, an error amplifier, a resistor network for setting output voltage, a current limit circuit for current protection, and a chip enable circuit.

The MC1533 has a fixed output voltage of 3.3V.

The MC1533 is available in space-saving SOT-23-5, SOT-89 and SOT-89V/R packages.

SOT23-5 SOT-89

Figure 1: Package Type of MC1533

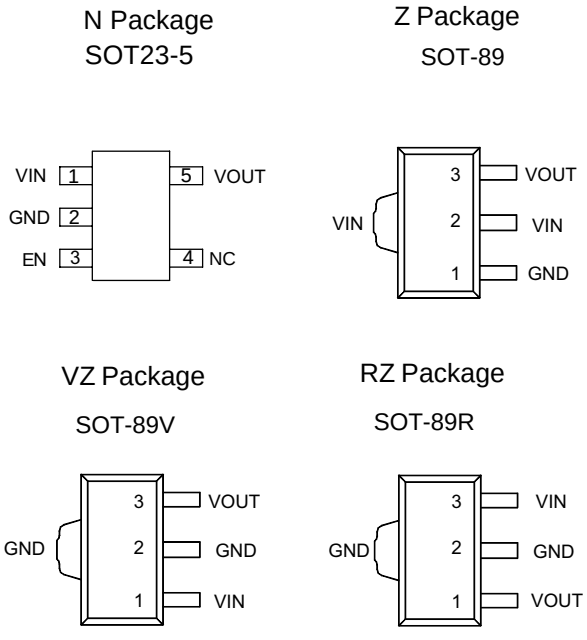


Figure 2: Pin Configuration of MC1533

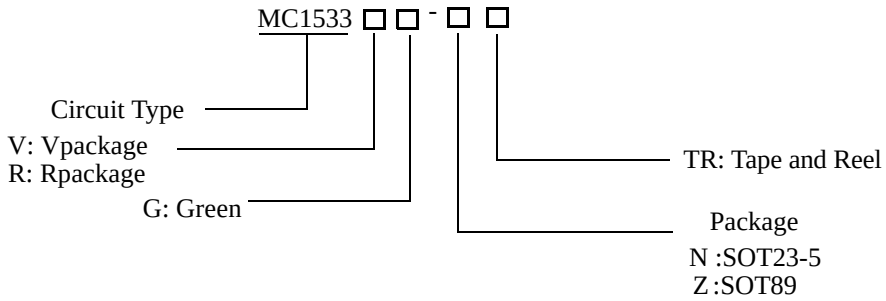
Features

- Wide Input Voltage Range: 3.4V to 32V
- Excellent Ripple Rejection: 60dB@ f=1kHz
- Low Dropout Voltage: V_{DROP}=100mV@ I_{OUT}=100μA
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function

Applications

- Battery-powered Equipment
- Laptop, Palmtops, Notebook Computers
- Portable Information Appliances

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT23-5	-40 to 85 °C	MC1533GNTR	1533G	Tape & Reel
SOT89	-40 to 85 °C	MC1533GZTR	MC1533G	Tape & Reel
SOT89 V	-40 to 85 °C	MC1533VGZTR	MG1533V	Tape & Reel
SOT89 R	-40 to 85 °C	MC1533RGZTR	MG1533R	Tape & Reel

Pin Description

Pin Number				Pin Name	Function
SOT-23-5	SOT-89				
	Z	VZ	RZ		
1	2	1	3	VIN	Input voltage
2	1	2	2	GND	Ground
3				EN	Enable input
4				NC	No connected for fixed version
5	3	3	1	VOUT	Regulated output voltage

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}	3.4	32	V
Operating Junction Temperature Range	T_J	-40	125	°C

Functional Block Diagram

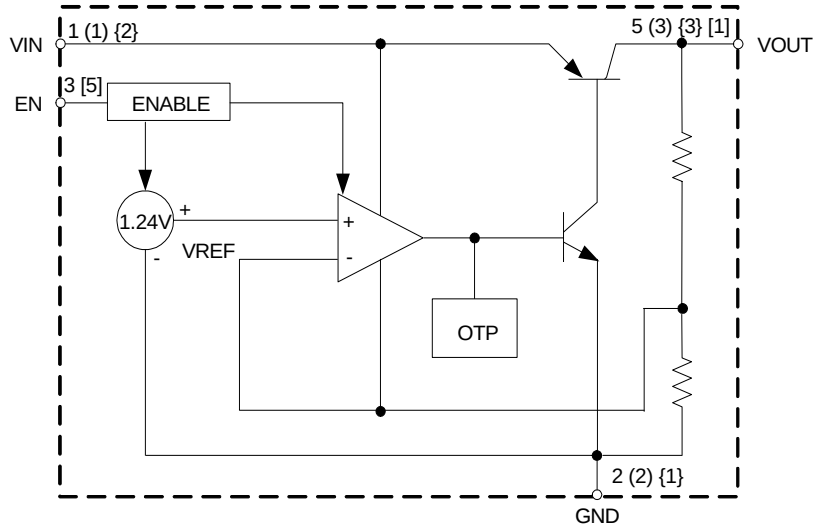


Figure 3. Functional Block Diagram of MC1533

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value		Unit
Supply Input Voltage	V_{IN}	38		V
Enable Input Voltage	V_{CE}	38		V
Output Current	I_{OUT}	250		mA
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260		^oC
Operating Junction Temperature	T_J	150		^oC
Thermal Resistance	θ_{JA}	SOT-23-5	250	$^oC/W$
		SOT-89	165	
Storage Temperature Range	T_{STG}	-65 to 150		^oC
ESD (Machine Model)		275		V
ESD (Human Body Model)		2000		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.

Electrical Characteristics

V_{IN}=V_{OUT}+1V, T_J=25°C, I_{OUT}=100μA, C_{IN}=1.0μF, C_{OUT}=2.2μF, **Bold** typeface applies over -40°C≤T_J≤125°C, unless otherwise specified.

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Output Voltage	V_{OUT}	Variation from Specified V_{OUT}		3.2		3.4	V
Reference Voltage	V_{REF}			1.215	1.24	1.265	V
Input Voltage	V_{IN}					32	V
Maximum Output Current	$I_{OUT(max)}$	V_{IN}-V_{OUT}=1V V_{OUT}=98% ×V_{OUT}		150	200		mA
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	V_{OUT}+1V≤V_{IN}≤24V			0.05		%
Load Regulation	$\Delta V_{OUT}/V_{OUT}$	1mA≤I_{OUT}≤150mA			0.5		%
Dropout Voltage	V_{DROP}	I_{OUT}=100μA			100	150	mV
		I_{OUT}=50mA			270	350	
		I_{OUT}=100mA			320	460	
		I_{OUT}=150mA			360	500	
Ground Current	I_{GND}	I_{OUT}=100μA			50		μA
		I_{OUT}=50mA			0.5		mA
		I_{OUT}=100mA			1.3		
		I_{OUT}=150mA			2.5		
Standby Current	I_{STD}	V_{IN}=V_{OUT}+1V V_{EN} in OFF Mode			0.01	1.0	μA
Power Supply Rejection Ration	PSRR	Ripple 0.5V_{P-P} V_{IN}=V_{OUT}+1V	f=100Hz		60		dB
			f=1kHz		60		
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/(V_{OUT} \times \Delta T)$	I_{OUT}=100μA, -40 °C≤T_J≤125°C			**±100**		ppm/°C
RMS Output Noise	V_{NOI}	T_J=25°C, 10Hz≤f≤100kHz			30		μV_{rms}
EN Pin Current	I_{EN}	V_{EN}=V_{OUT}+1V			1		μA
EN “High” Voltage		EN Input Voltage “High”		2.0			V
EN “Low” Voltage		EN Input Voltage “Low”				0.4	V
Thermal Resistance (Junction to Case)	θ_{JC}	SOT-23-5			43		°C/W
		SOT-89			27		

Electrical Characteristics

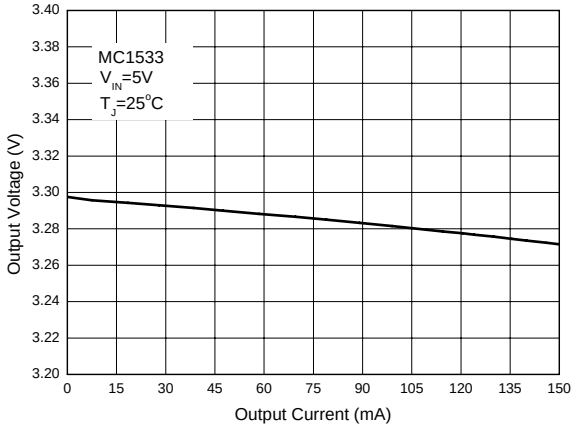


Figure 4. Output Voltage vs. Output Current

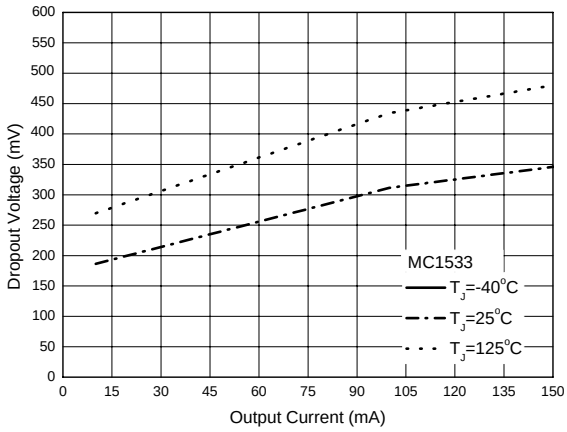


Figure 5. Dropout Voltage vs. Output Current

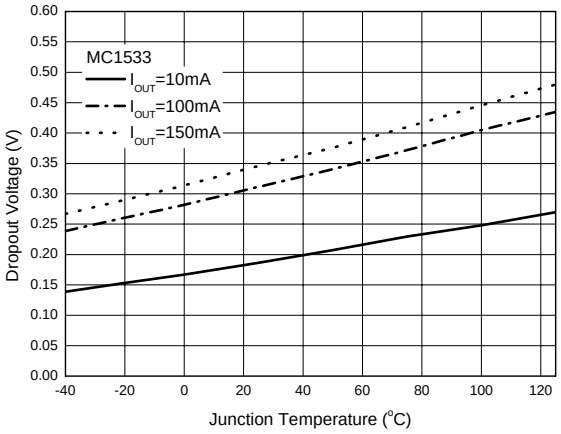


Figure 6. Dropout Voltage vs. Junction Temperature

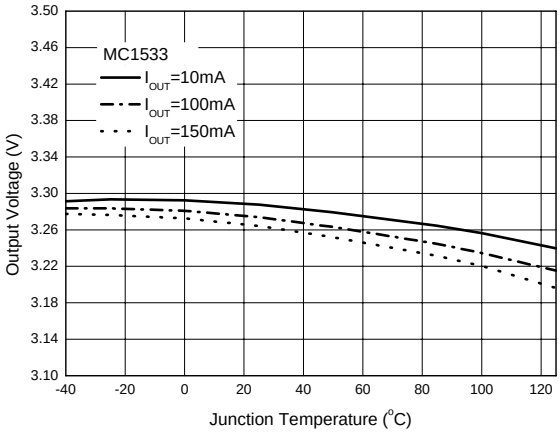


Figure 7. Output Voltage vs. Junction Temperature

Electrical Characteristics (Continued)

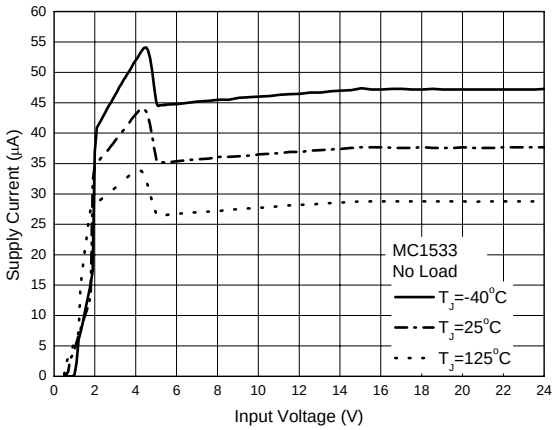
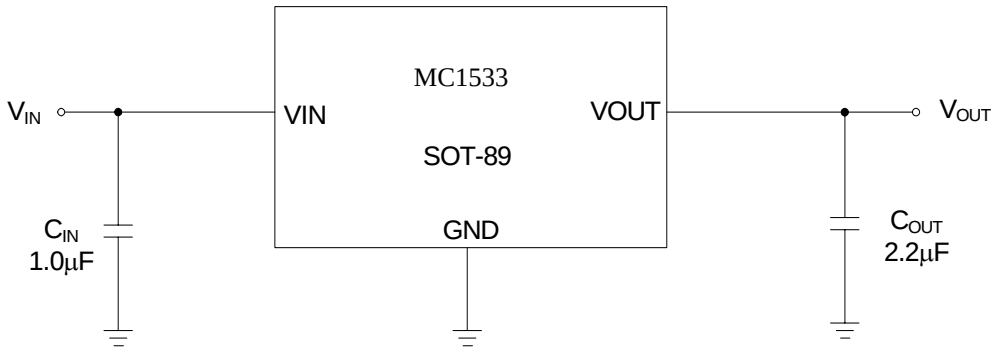
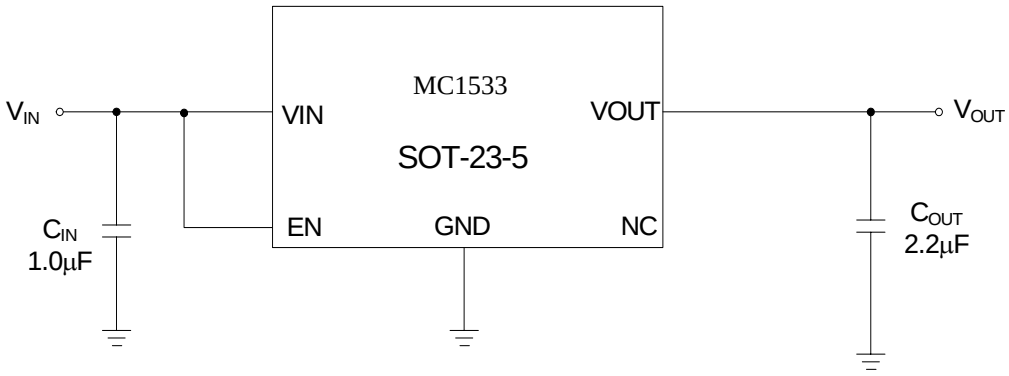


Figure 8. Supply Current vs. Input Voltage

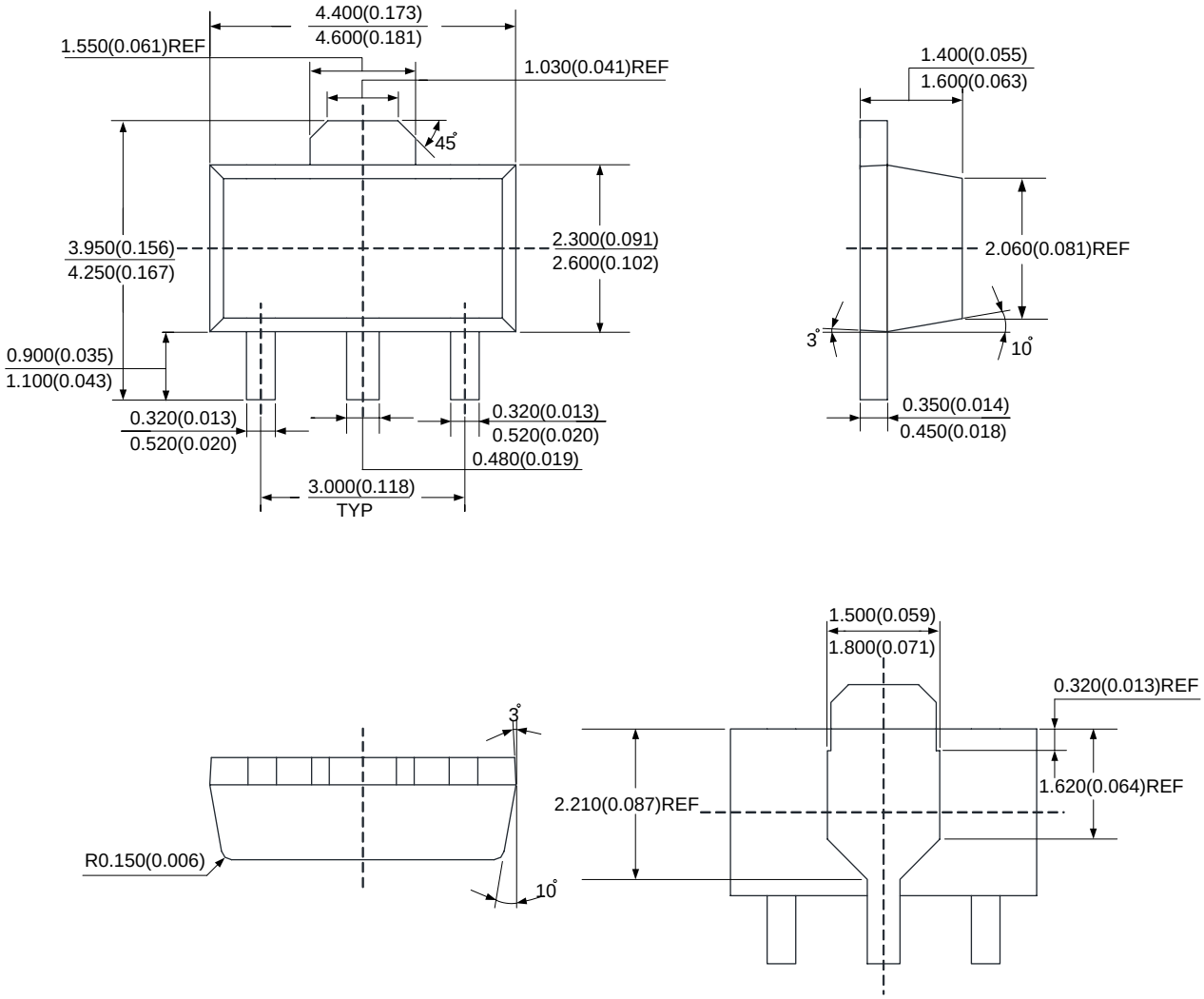
Typical Application





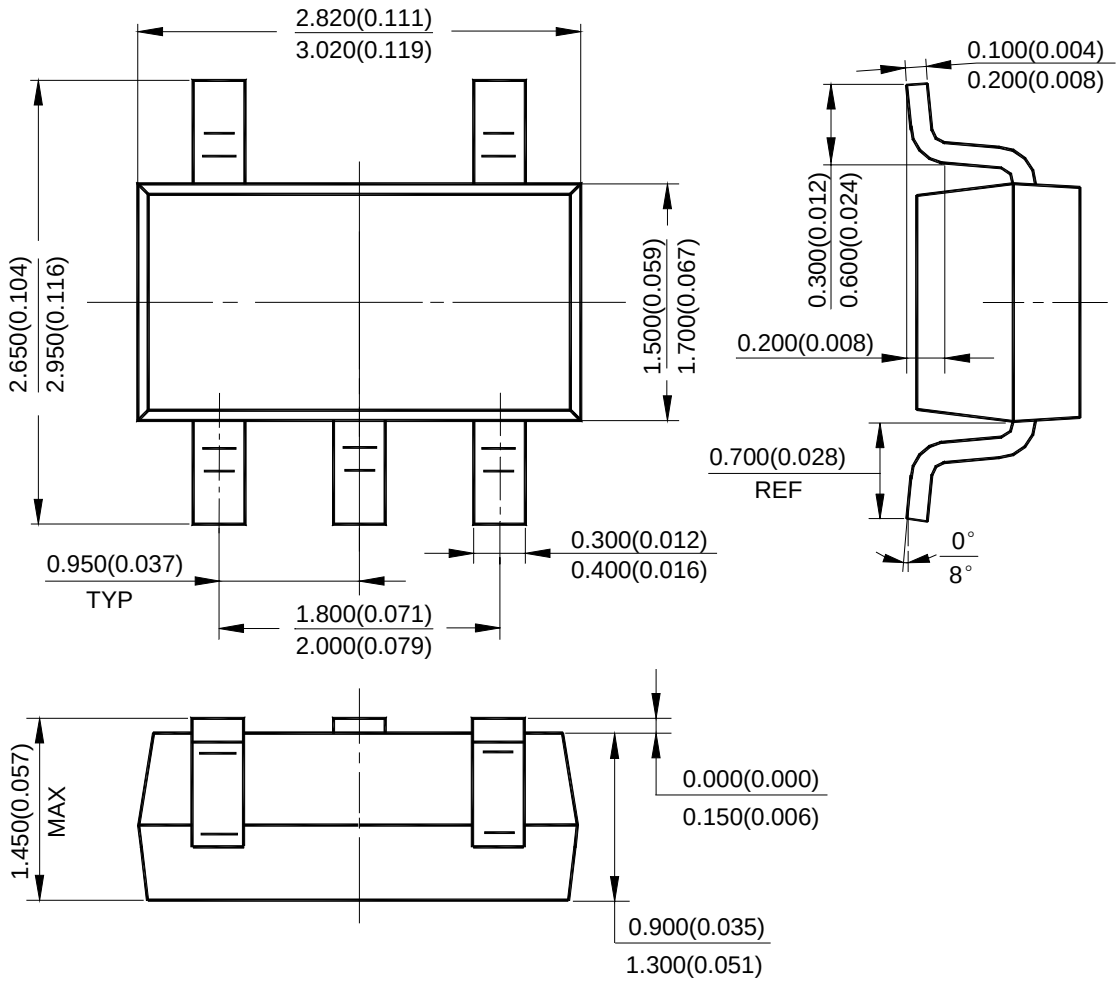
Mechanical Dimensions

SOT-89 **Unit: mm(inch)**



Mechanical Dimensions (Continued)

SOT-23-5 **Unit: mm(inch)**



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