

## GS2905

# 500mA CMOS LDO Voltage Regulator

### Product Description

The GS2905 series is a group of positive voltage output, three-pin regulators, that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and programmable fuse technologies. Output voltage: 1.5V to 6.0V.

The GS2905 consists of a high-precision voltage reference, an error correction circuit, and a current limited output driver. Transient response to load variations has improved in comparison to the existing series.

The GS2905 incorporates both over-temperature and over-current protection. SOT-89 and SOT-223 packages are available.

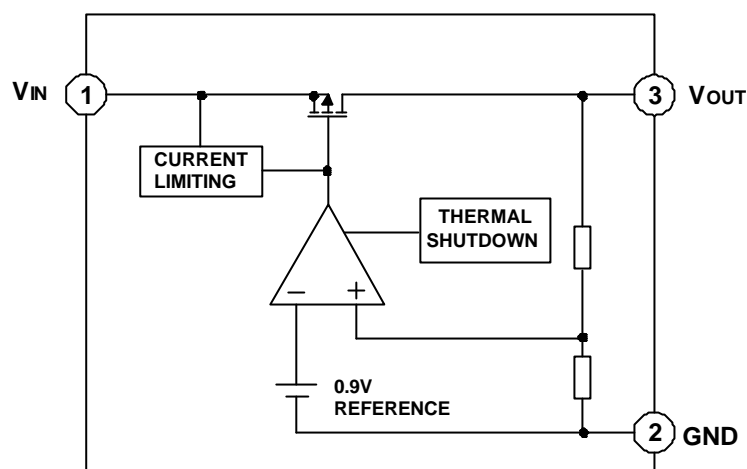
### Features

- Maximum output current: 500mA
- Highly accurate: Output voltage  $\pm 1.4\%$  ( $\pm 1\%$  for semi-custom products)
- Low power consumption
- Over-Current and Over-temperature Protection
- Small input/output differential: 0.3V at 300mA


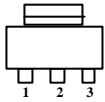
### Applications

- Wireless Communication Systems
- Battery-Operated Systems
- Portable Computer
- Portable Cameras and Video Recorders
- Voltage Regulator for Microprocessor
- Reference Voltage Sources
- Voltage Regulator for CD-ROM Drivers, LAN Cards and DVD.
- Instrumentation
- Pagers

## Block Diagram



## Packages & Pin Assignments

GS2905Y (SOT-89)	GS2905X (SOT-223)
 <p>Pin1 = GND Pin2 = <math>V_{IN}</math> Pin3 = <math>V_{OUT}</math></p>	 <p>Pin1 = GND Pin2 = <math>V_{IN}</math> Pin3 = <math>V_{OUT}</math></p>

## Ordering Information

SOT-89	SOT-223	Output
GS2905Y15	GS2905X15	1.5V
GS2905Y18	GS2905X18	1.8V
GS2905Y25	GS2905X25	2.5V
GS2905Y33	GS2905X33	3.3V
GS2905Y36	GS2905X36	3.6V
GS2905Y50	GS2905X50	5.0V

\*GS2905XF, X means package type and F means Lead Free part.

\*For other output voltages, please contact factory.

## Absolute Maximum Ratings

Symbol	Parameter	Maximum	Unit
$\theta_{JA}$	Thermal Resistance	SOT-89	120
		SOT223	100
$V_{IN}$	Input Voltage	6.5	V
$I_{OUT}$	Output Current	500	mA
$V_{OUT}$	Output Voltage	$V_{SS}-0.3$ to $V_{IN}+0.3$	V
$T_J$	Operating Junction Temperature	0 to 70	°C
$T_{STG}$	Storage temperature Range	-65 to 150	°C
$T_{LEAD}$	Lead Temperature (Soldering, 10 sec)	300	°C

**Note:** Stresses above 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 above those indicated in the operation sections of the specifications is not implied.

Exposure to Absolute Maximum Ratings conditions for extended periods may affect device reliability.

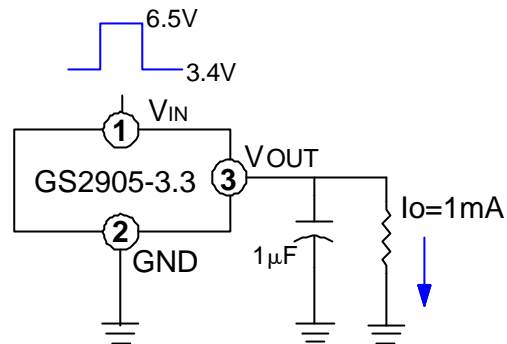
## Electrical Characteristics $V_{OUT}(T) = 2.0$ (Note 1)

Parameter	Conditions	Test Circuit	Min	Typ.	Max	Unit
Output Voltage Accuracy	$I_{OUT} = 1\text{mA}$ $I_{OUT} = 0.1\text{mA}$ to $500\text{mA}$ ( $T_A = 25^\circ\text{C}$ )		-1.4% -4.5%	- -	1.4% 2.0%	V
Line regulation $V_{OUT}/(V_{IN} \times V_{OUT})$	$I_{OUT} = 1\text{mA}$ $(V_{OUT} + 0.1\text{V}) < V_{IN} < 6.5\text{V}$	Fig. 1	-	0.1	0.3	%/V
Load Regulation (Note1)	$V_{IN} = 6\text{V}$ $0.1\text{mA} < I_{OUT} < 500\text{mA}$ , $C_{OUT} = 1\mu\text{F}$	Fig. 2	-	0.005	0.04	%/mA
Maximum output current	$V_{IN} = 5\text{V}$ $V_{OUT} > 0.96 \times V_{RATING}$		500			mA
Current Limit			500			mA
Ground Pin Current	$I_{OUT} = 0\text{mA} - 500\text{mA}$	Fig. 3	-	15	30	$\mu\text{A}$
<b>Dropout Voltage</b>						
For $V_{OUT} > 2.5\text{V}$	$I_{OUT} = 100\text{mA}$			100	180	mV
	$I_{OUT} = 500\text{mA}$			600	900	
For $2.0\text{V} < V_{OUT} < 2.5\text{V}$	$I_{OUT} = 100\text{mA}$			150	300	mV
	$I_{OUT} = 500\text{mA}$			750	900	
For $V_{OUT} < 2.0\text{V}$	$I_{OUT} = 100\text{mA}$			200	400	mV
	$I_{OUT} = 500\text{mA}$			1100	1500	

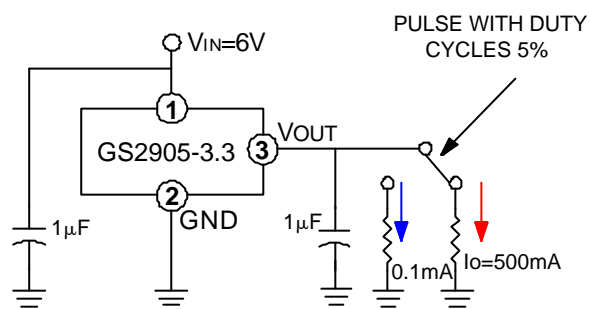
**Note1:** Load Regulation is measured using pulse techniques with duty cycle < 5%

## Test Circuits

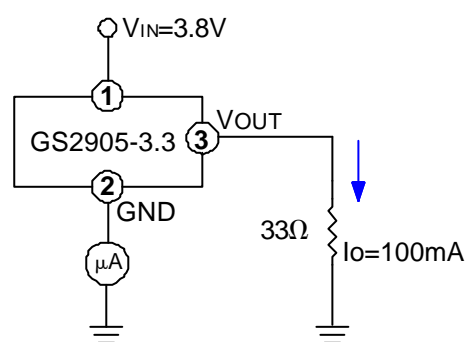
Line Regulation Figure. 1



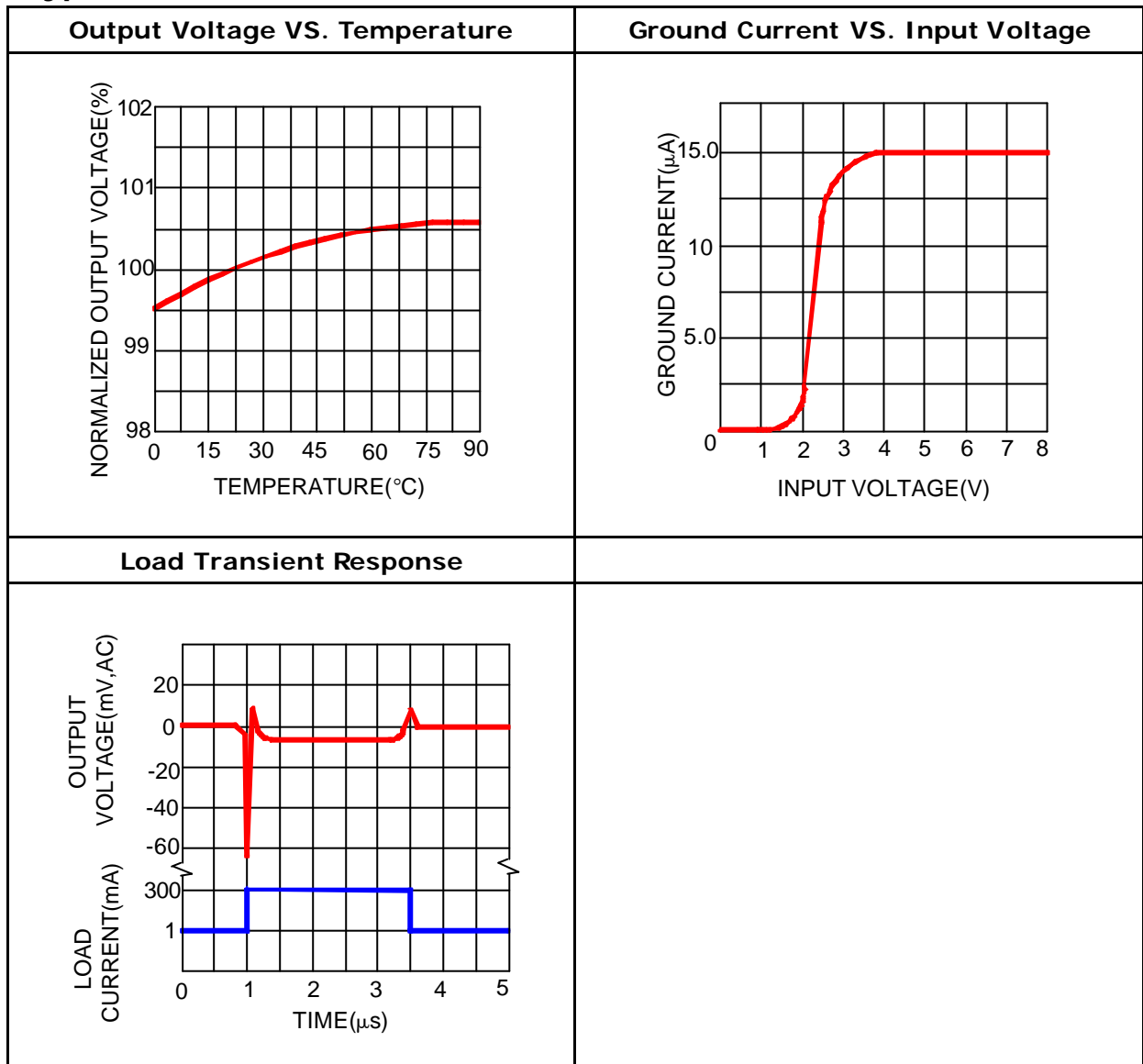
Load Regulation Figure. 2



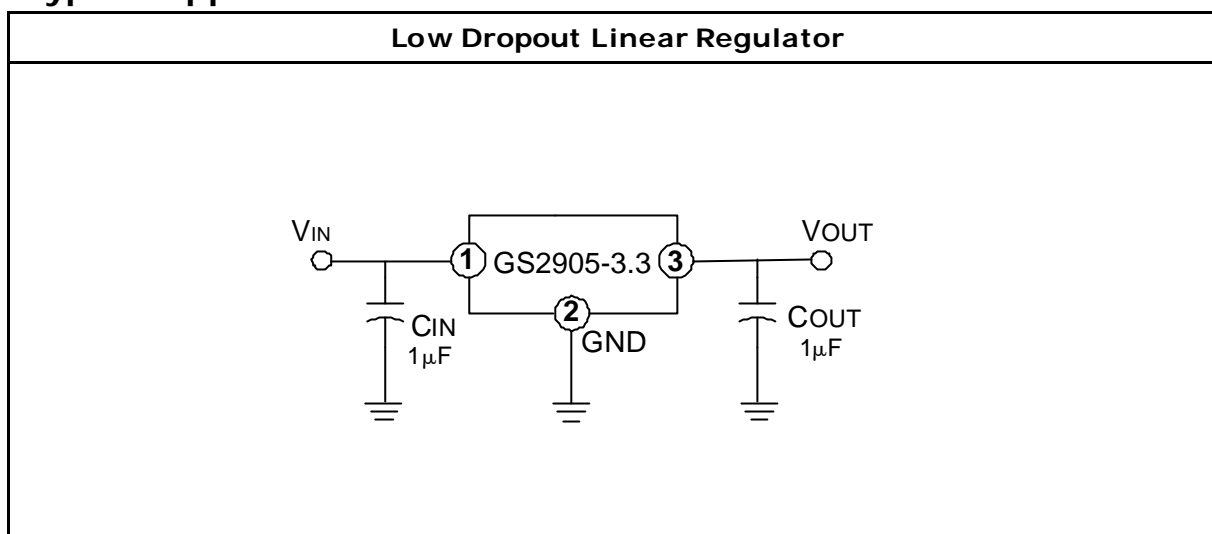
Ground Current Figure. 3



Typical Performance Characteristics



## Typical Applications

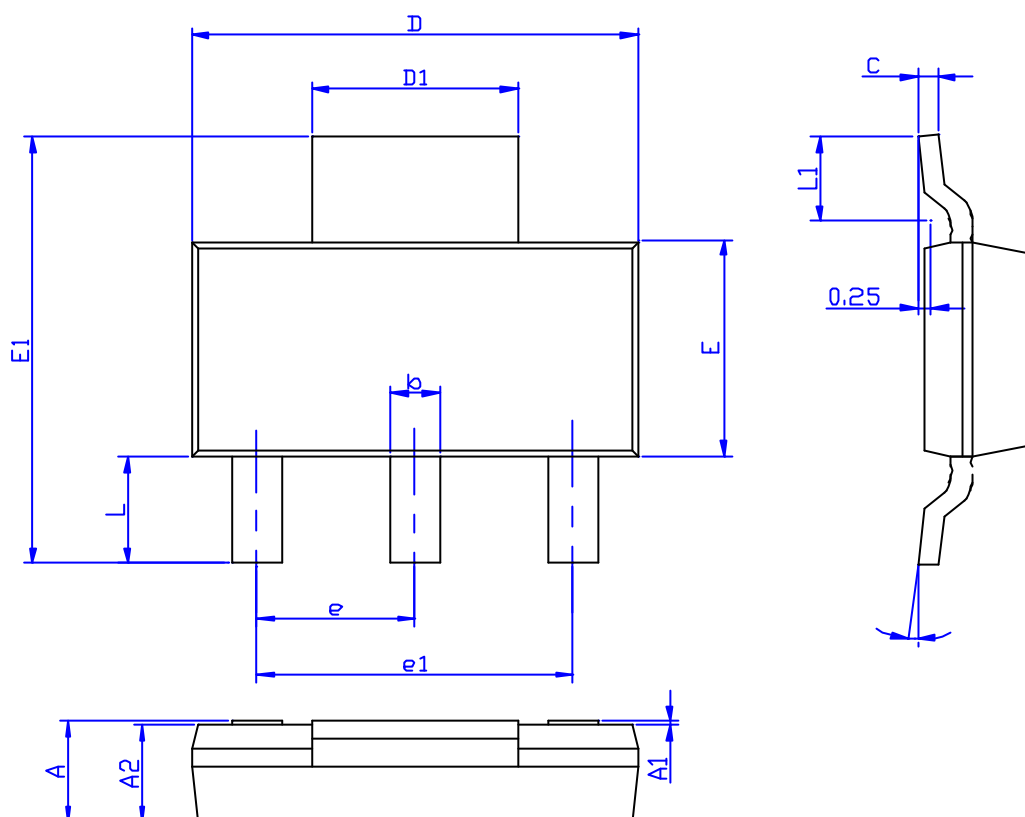


A  $1\mu F$  (or greater) capacitor is required between the GS2905 output and ground for stability. Without this capacitor the part will oscillate. Even though most types of capacitor may work, the equivalent series resistance (ESR) should be held to 5 or less if Aluminum electrolytic type is used. Many Aluminum electrolytic have electrolytes that freeze at about  $-30^{\circ}C$ , so solid tantalums are recommended for operation below  $-25^{\circ}C$ . The value of this capacitor may be increased without limit.

A  $0.1\mu F$  capacitor (or greater) should be placed from the GS2905 input to ground if the lead inductance between the input and power source exceeds 500nH (approximately 10 inches of trace).

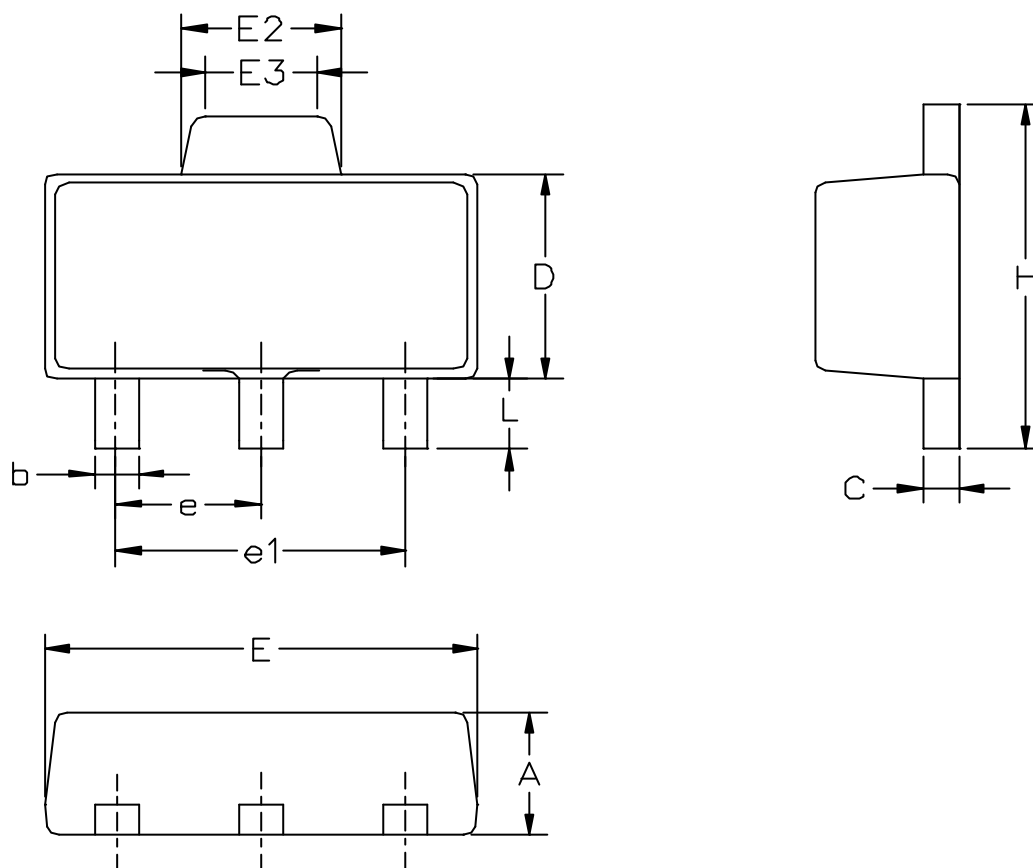
## Package Dimension

## SOT-223 PLASTIC PACKAGE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.610	0.810	0.024	0.032
c	0.250	0.350	0.010	0.014
D	6.300	6.700	0.248	0.264
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.700	7.300	0.264	0.287
e	2.300 (TYP)		0.091 (TYP)	
e1	4.500	4.700	0.177	0.185
L	1.750 (TYP)		0.069 (TYP)	
L1	0.900		0.035	

## SOT-89 PLASTIC PACKAGE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.550	0.570	0.061
b	0.440	0.480	0.017	0.019
C	0.360	0.400	0.014	0.016
E	4.450	4.550	0.175	0.179
E2	1.500	1.700	0.059	0.067
E3	1.400 (TYP)		0.055 (TYP)	
e	1.500 (TYP)		0.059 (TYP)	
e1	3.000 (TYP)		0.118 (TYP)	
H	4.150	4.250	0.163	0.167
D	2.450	2.550	0.096	0.100
L	0.900	1.100	0.035	0.043



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