

## GS2911

### 300mA CMOS Positive LDO Voltage Regulator

#### Product Description

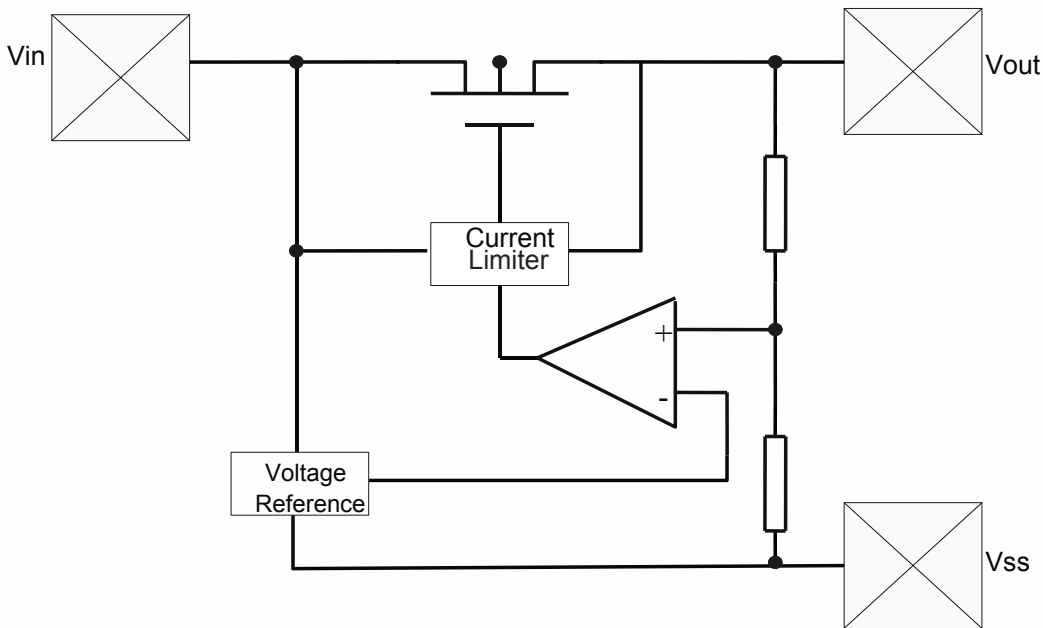
The GS2911 is a positive voltage output, three-pin regulator that provides a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and laser trimming technologies.

The GS2911 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.

TO-92 and SOT-89 packages are available.

Features	Applications
<ul style="list-style-type: none"> <li>■ Maximum output current: 250mA (within the maximum power dissipation, <math>V_{OUT}=5.0V</math>)</li> <li>■ Output voltage: 2.0V to 6.0V in 0.1V increments (1.1V to 1.9V for custom products)</li> <li>■ Highly accurate: Output voltage <math>\pm 2\%</math> (<math>\pm 1\%</math> for semi-custom products)</li> <li>■ Low power consumption: Typ. 2.0<math>\mu</math>A at <math>V_{OUT} = 5.0V</math></li> <li>■ Output voltage temperature coefficient 0.1%/V: Typ. <math>\pm 100</math>ppm/<math>^{\circ}</math>C</li> <li>■ Input stability: Typ. 2.0%/V</li> <li>■ Small input/output differential: <math>I_{OUT} = 100</math>mA at <math>V_{OUT} = 5.0V</math> with a 0.12V differential.</li> <li>■ SOT-89 and TO-92 packages are available</li> </ul>	<ul style="list-style-type: none"> <li>■ Wireless Communication Systems</li> <li>■ Battery Powered Systems</li> <li>■ Palmtops</li> <li>■ Portable Cameras and Video Recorders</li> <li>■ Voltage Regulator for Microprocessor</li> <li>■ Voltage Regulator for CD-ROM Drivers, LAN Cards, 56K Modem</li> </ul>

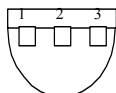
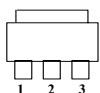
**Block Diagram**



**Package and Pin Assignments**

**GS2911YXX (SOT-89)**

**GS2911NXX (TO-92)**



Pin1 = GND  
 Pin2 =  $V_{IN}$   
 Pin3 =  $V_{OUT}$

Pin1 = GND  
 Pin2 =  $V_{IN}$   
 Pin3 =  $V_{OUT}$

**Ordering Information**

SOT-89	TO-92	Output
GS2911Y15	GS2911N15	1.5V
GS2911Y18	GS2911N18	1.8V
GS2911Y20	GS2911N20	2.0V
GS2911Y25	GS2911N25	2.5V
GS2911Y33	GS2911N33	3.3V
GS2911Y50	GS2911N50	5.0V

\*For additional available fixed voltages contact factory.

\*Add "F" means lead free part.

**Absolute Maximum Ratings**

Parameter	Symbol	Ratings
Input Voltage	$V_{IN}$	12V
Output Current	$I_{OUT}$	500 mA
Output Voltage	$V_{OUT}$	$V_{SS}-0.3$ to $V_{IN}+0.3$
Continuous Total Power Dissipation TO-92 SOT-89	$P_D$	500 mW 550 mW
Operating Ambient Temperature	$T_{opr}$	0°C to 80°C
Storage temperature Range	$T_{stg}$	-40°C to 125°C
Lead Temperature (10 sec)	$T_{LEAD}$	260°C

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

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Output voltages	$V_{OUT}$ (E) (Note 2)	$I_{OUT} = 40mA$ $V_{IN} = 3.0V$	1.960	2.000	2.040	V
Maximum output current	$I_{OUT}$ max	$V_{IN} = 3.0V$ $V_{OUT}(E) \geq 1.8V$	100			mA
Load stability	$\Delta V_{OUT}$	$V_{IN} = 3.0V$ $1mA \leq I_{OUT} \leq 60mA$		45	90	mV
Input-Output Voltage differential (Note 3)	$V_{dif}$	$I_{OUT} = 60mA$		180	360	mV
		$I_{OUT} = 120mA$		400	700	mV
Supply current	$I_{SS}$	$V_{IN} = 3.0V$		1.0	100	$\mu A$
Line regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $3.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
Input voltage	$V_{IN}$				10	V
Output voltage Temperature characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $-40^\circ C \leq T_{opr} \leq 85^\circ C$		$\pm 100$		ppm/°C

**Electrical Characteristics**  $V_{OUT(T)} = 2.5V$  (Note 1)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Output voltages	$V_{OUT}$ (E) (Note 2)	$I_{OUT} = 40mA$ $V_{IN} = 3.5V$	2.450	2.500	2.550	V
Maximum output current	$I_{OUT}$ max	$V_{IN} = 3.5V$ $V_{OUT(E)} \geq 2.25V$	150			mA
Load stability	$\Delta V_{OUT}$	$V_{IN} = 3.5V$ $1mA \leq I_{OUT} \leq 80mA$		45	90	mV
Input-Output Voltage differential (Note 3)	Vdif	$I_{OUT} = 80mA$		180	360	mV
		$I_{OUT} = 160mA$		400	700	mV
Supply current	I <sub>ss</sub>	$V_{IN} = 3.5V$		1.0	100	$\mu A$
Line regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $3.5V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
Input voltage	$V_{IN}$				10	V
Output voltage Temperature characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $-40^{\circ}C \leq T_{opr} \leq 85^{\circ}C$		$\pm 100$		ppm/ $^{\circ}C$

**Electrical Characteristics**  $V_{OUT(T)} = 3.3$  (Note 1)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Output voltages	$V_{OUT}$ (E) (Note 2)	$I_{OUT} = 40mA$ $V_{IN} = 4.3V$	3.234	3.3	3.366	V
Maximum output current	$I_{OUT}$ max	$V_{IN} = 4.3V$ $V_{OUT(E)} \geq 2.97V$	165			mA
Load stability	$\Delta V_{OUT}$	$V_{IN} = 4.3V$ $1mA \leq I_{OUT} \leq 80mA$		45	90	mV
Input-Output Voltage differential (Note 3)	Vdif	$V_{IN} = 4.3V$				
		$I_{OUT} = 160mA$		400	700	mV
Supply current	I <sub>ss</sub>	$V_{IN} = 4.3V$		1.0	100	$\mu A$
Line regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $4.3V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
Input voltage	$V_{IN}$				10	V
Output voltage	$\Delta V_{OUT}$	$I_{OUT} = 40mA$		$\pm 100$		ppm/ $^{\circ}C$

Temperature characteristics	$\Delta T_{opr} * \Delta V_{OUT}$	$-40^{\circ}C \leq T_{opr} \leq 125^{\circ}C$				
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**Electrical Characteristics**  $V_{OUT(T)} = 5.0$  (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltages	$V_{OUT(E)}$ (Note 2)	$I_{OUT} = 40mA$ $V_{IN} = 6.0V$	4.900	5.000	5.100	V
Maximum output current	$I_{OUT max}$	$V_{IN} = 6.0V$ $V_{OUT(E)} \geq 5.0V$	165			mA
Load stability	$\Delta V_{OUT}$	$V_{IN} = 6.0V$ $1mA \leq I_{OUT} \leq 80mA$		45	90	mV
Input-Output Voltage differential (Note 3)	$V_{dif}$	$V_{IN} = 6.0V$ $I_{OUT} = 200mA$		380	600	mV
Supply current	$I_{SS}$	$V_{IN} = 6.0V$		1.0	100	$\mu A$
Line regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $4.3V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V
Input voltage	$V_{IN}$				10	V
Output voltage Temperature characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} * \Delta V_{OUT}}$	$I_{OUT} = 40mA$ $-40^{\circ}C \leq T_{opr} \leq 125^{\circ}C$		$\pm 100$		ppm/ $^{\circ}C$

Note1.  $V_{OUT(T)}$  = Specified output voltage.

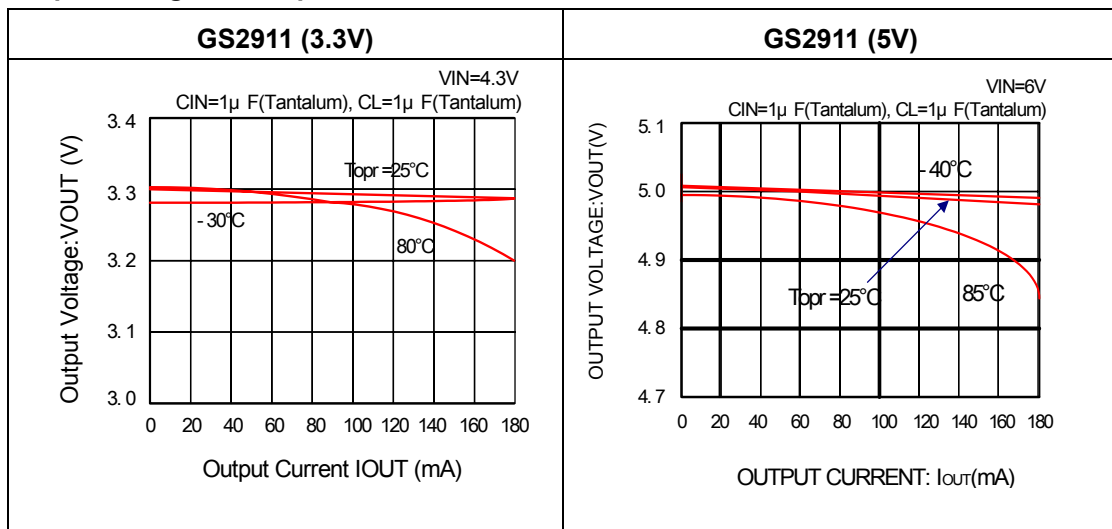
Note2.  $V_{OUT(E)}$  = Effective output voltage (i.e. the output voltage when “  $V_{OUT(T)}+1.0V$ ” is provided at the  $V_{IN}$  pin while maintaining a certain  $I_{OUT}$  value.)

Note3.  $V_{dif} = (V_{IN 1} \text{ (Note 4)} - V_{OUT} (E))$

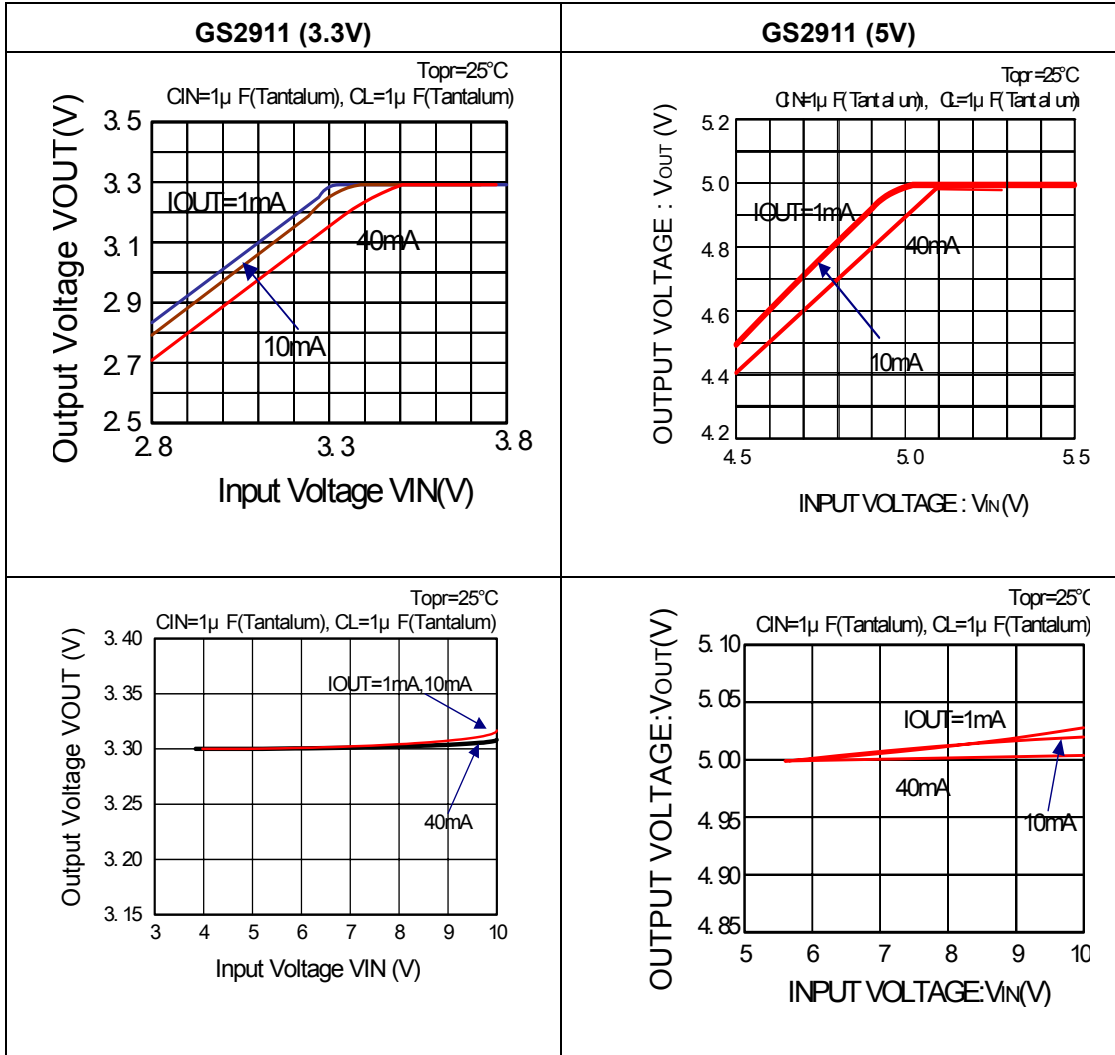
Note4.  $V_{IN 1}$  = The input voltage at the time 98% of  $V_{OUT(E)}$  is output (input voltage has been gradually reduced).

**Typical Performance Characteristics**

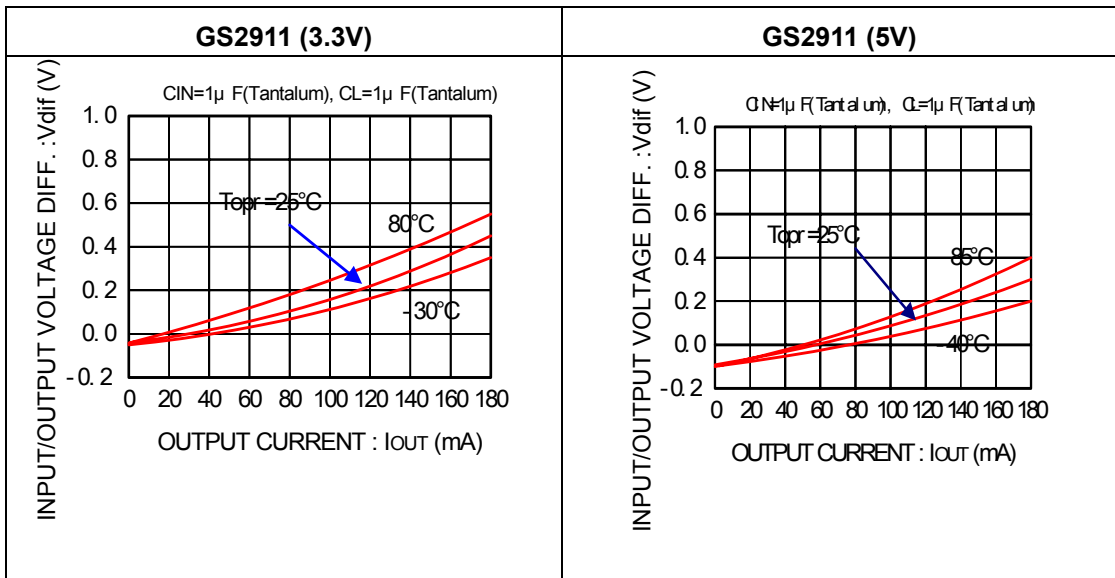
**Output Voltage vs. Output Current**



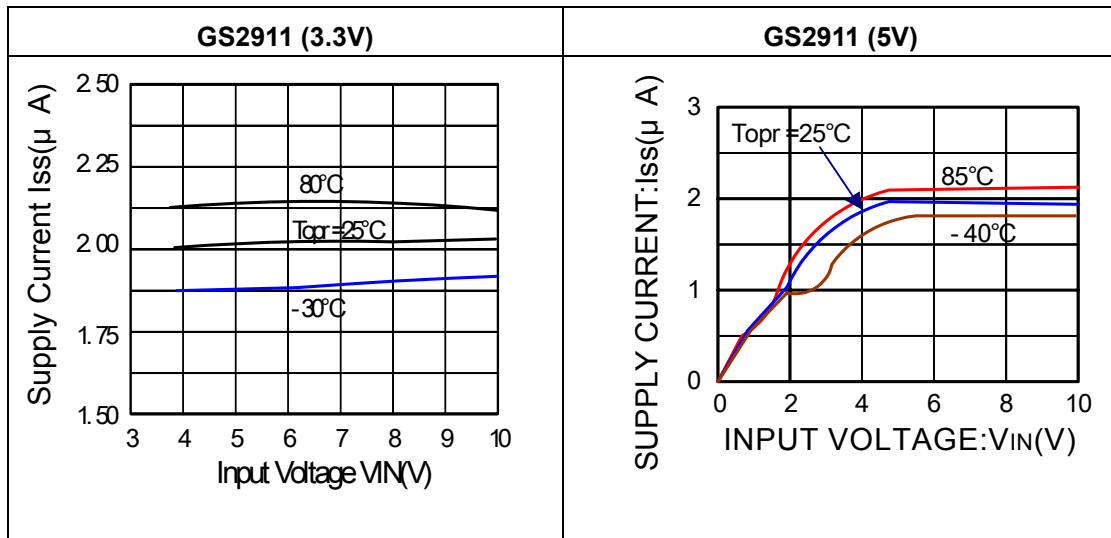
**Output Voltage vs. Input Voltage**



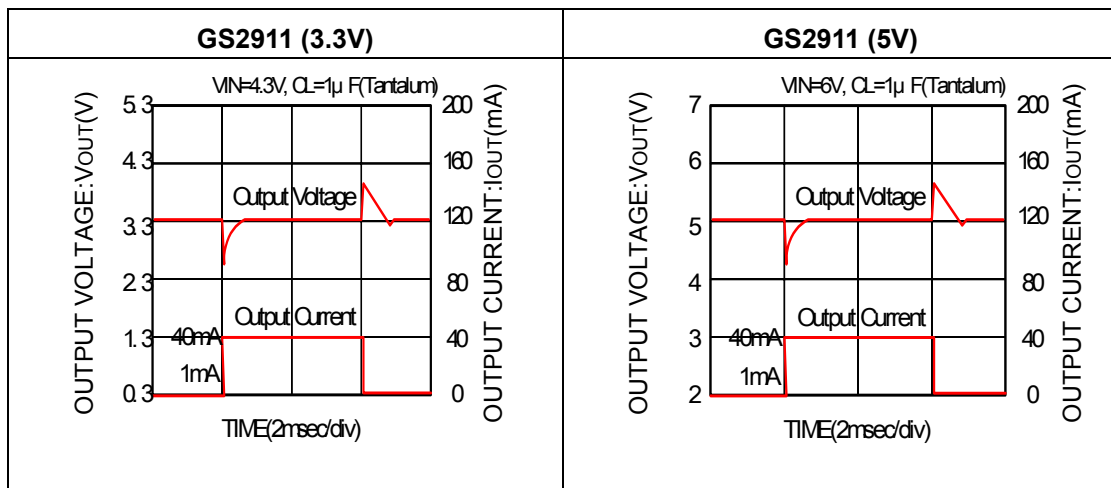
**Input/Output Voltage Differential vs. Output Current**



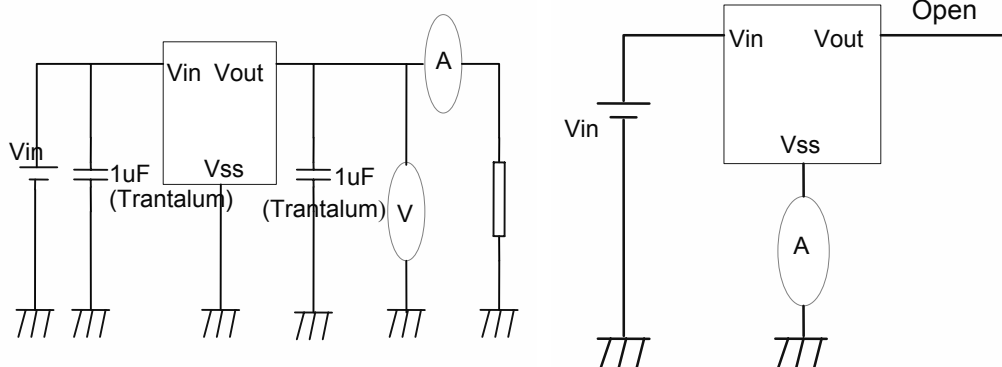
**Supply Current vs. Input Voltage**



**Load Transient Response**



## Typical Application Circuits



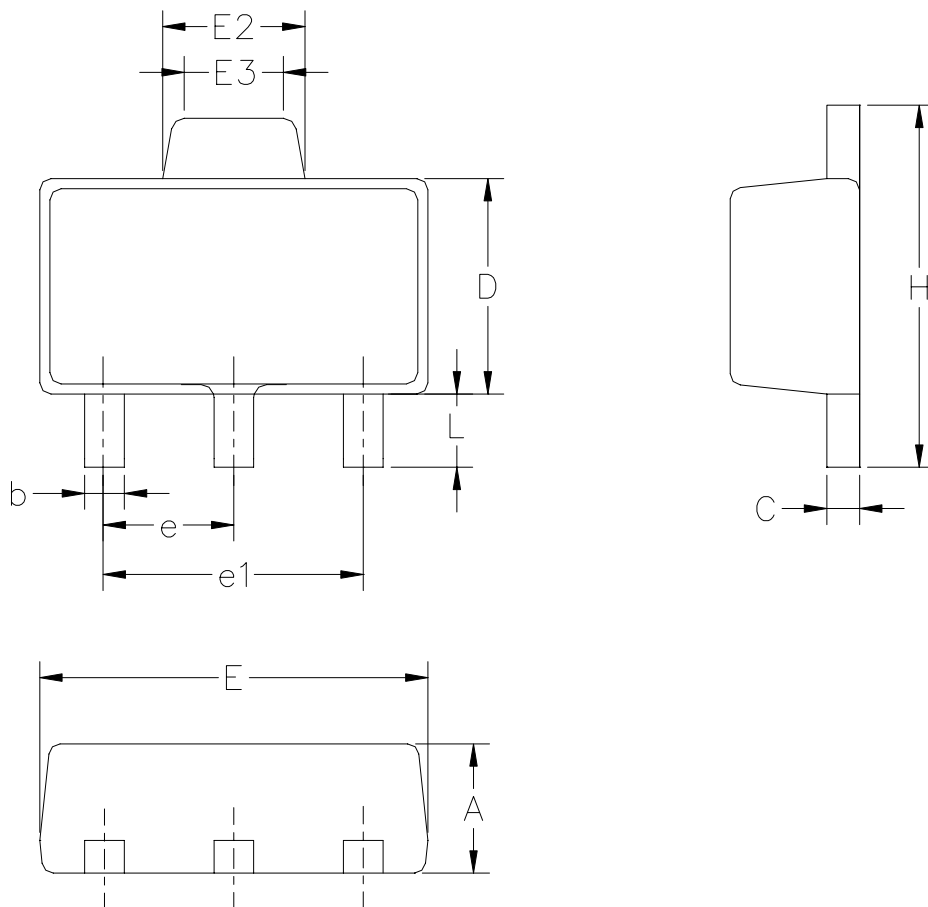
## Notes on Use

1. There is a possibility that oscillation may occur as a result of the impedance present between the power supply and the IC's input. Where impedance is  $10\Omega$  or more, please use a capacitor ( $C_{IN}$ ) of at least  $1\mu F$ . With a large output current, operations can be stabilised by increasing capacitor size ( $C_{IN}$ ). If  $C_{IN}$  is small and capacitor size ( $CL$ ) is increased, there is a possibility of oscillation due to input impedance. In such cases, either increasing the size of  $C_{IN}$  or decreasing the size of  $CL$  can stabilize operations.
2. Please ensure that output current ( $I_{OUT}$ ) is less than  $P_D + (V_{IN} - V_{OUT})$  and does not exceed the stipulated Continuous Total Power Dissipation value ( $P_D$ ).
3. Should you wish to increase output current ( $I_{OUT}$ ) and/or have the capability to exceed the stipulated  $P_D$  value, using a current boost circuit (similar to the one shown below) is likely to lead to oscillation. With such applications, we recommend use of a boost type voltage regulator, such as the GS2911 series.



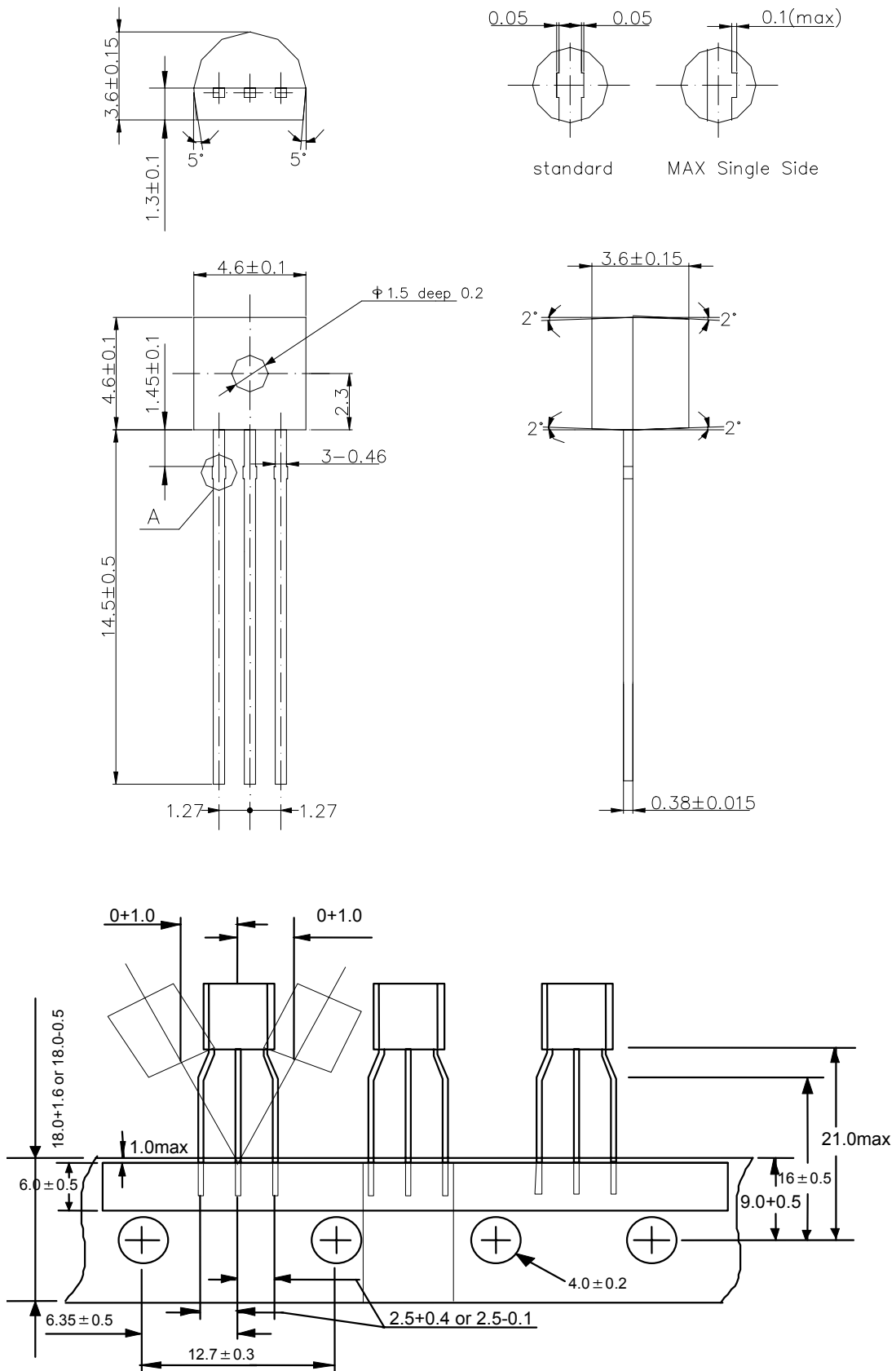
**Package Dimension**

**SOT-89 PLASTIC PACKAGE**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Min
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	1.400Ref		0.055Ref	
e	1.500BSC		0.059BSC	
e1	3.000BSC		0.118BSC	
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

**TO-92 PLASTIC PACKAGE**



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