

# GS391

## Low Power Low Offset Voltage Single Comparator

### Product Description

The GS391 consists of a independent precision voltage comparator which was designed specifically to operate from a single power supply over a wide range of voltages.

Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

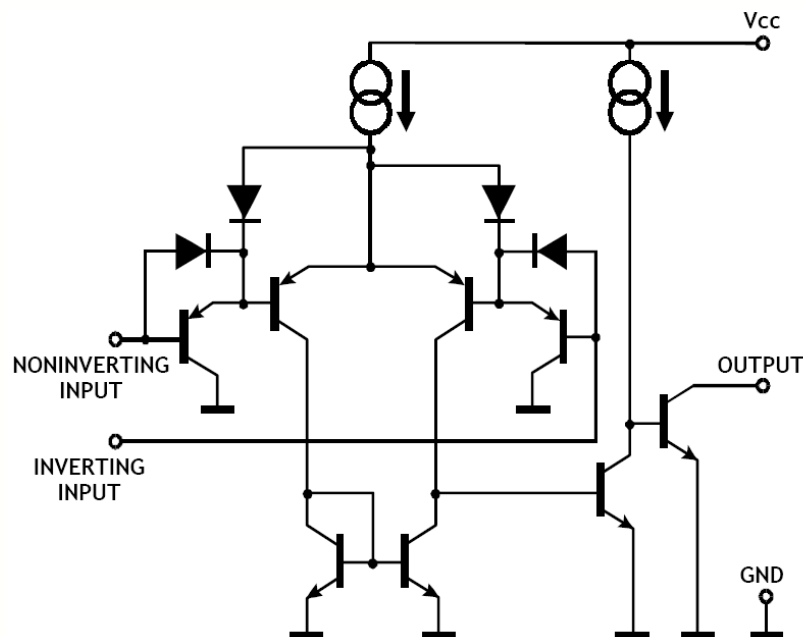
The comparator also has a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

The GS391 was designed to directly interface with TTL and CMOS. When operated from both plus and minus power supplies, the GS391 will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparator.

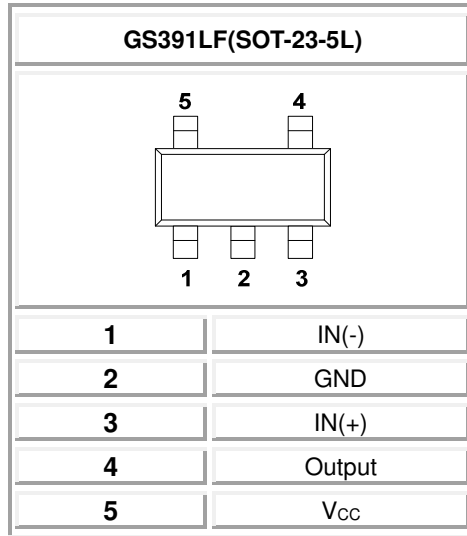
### Features

- Wide supply Voltage range: 2.0V to 32V.
- Low supply current drain independent of supply voltage.
- Low input biasing current: 25 nA typ.
- Low input offset current: 5 nA typ.
- Low input offset voltage: 2 mV typ.
- Input common-mode voltage range includes GND.
- Differential input voltage range equal to the power supply voltage
- Low output saturation voltage.
- Output voltage compatible with TTL, MOS and CMOS logic.
- RoHS Compliant and Halogen Free

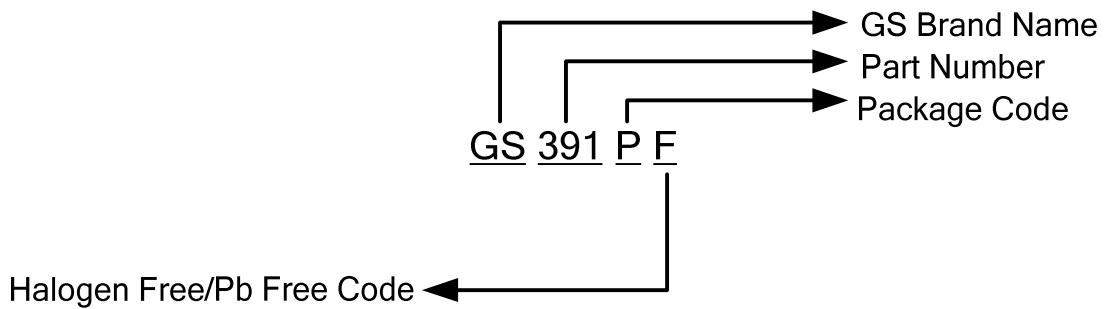
### Block Diagram



## Packages & Pin Assignments

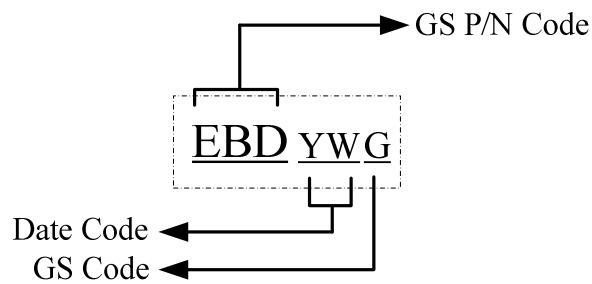


## Ordering Information



GS Complete P/N	Package	Marking	Q'ty / Reel
GS391LF	SOT-23-5L	EBD <sub>YWG</sub>	3K

## Marking Information



## Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	32	V
V <sub>IDR</sub>	Differential Input Voltage	32	V
V <sub>IN</sub>	Input Voltage	-0.3 to +32	V
I <sub>IN</sub>	Input Current	20	mA
P <sub>D</sub>	Power Dissipation (Note 1)	500	mW
I <sub>OS</sub>	Output Short-Circuit to GND	Continuous	
T <sub>PR</sub>	Operating Temperature Range	0 to 70	°C
T <sub>STG</sub>	Storage temperature Range	-65 to 150	°C
θ <sub>JA</sub>	Junction to Ambient Thermal Resistance	250	°C/W

**Note 1:** For operating at high temperatures, the GS391 must be derated based on a 125°C maximum junction temperature and a thermal resistance of 170°C /W which applies for the device soldered in a PCB, operating in a still air ambient. The low bias dissipation and the “ON-OFF” characteristic of the outputs keeps the chip dissipation very small ( $P_{D} \leq 100\text{mW}$ ), provided the output transistors are allowed to saturate.

## Electrical Characteristics

at specified free-air temperature, V<sub>CC</sub>=5V (Unless Otherwise Noted)

Symbol	Parameter	*Test conditions	Min	Typ	Max	Unit	
V <sub>IO</sub>	Input offset voltage	V <sub>CC</sub> = 5 V to 30V, V <sub>IC</sub> = V <sub>ICR</sub> min, V <sub>O</sub> =1.4 V	25 °C	2	5	mV	
			Full range		9		
I <sub>IO</sub>	Input offset current	V <sub>O</sub> =1.4 V	25 °C	5	50	nA	
			Full range		150		
I <sub>IB</sub>	Input bias current	V <sub>O</sub> =1.4 V	25 °C	25	250	nA	
			Full range		400		
V <sub>ICR</sub>	**Common-mode input voltage range		25 °C	0 to V <sub>CC</sub> - 1.5		V	
			Full range	0 to V <sub>CC</sub> - 2.0			
A <sub>VD</sub>	Large-signal differential voltage amplification	V <sub>CC</sub> = 15 V, V <sub>O</sub> =1.4V to 11.4 V, R <sub>L</sub> ≥ 15 kΩ to V <sub>CC</sub>	25 °C	50	200	V/mV	
I <sub>OH</sub>	High-level output current	V <sub>OH</sub> =5V, V <sub>ID</sub> =1V,	25 °C	0.1	50	nA	
		V <sub>OH</sub> = 30V, V <sub>ID</sub> =1V	Full range		1	μA	
V <sub>OL</sub>	Low-level output voltage	I <sub>OL</sub> = 4mA, V <sub>ID</sub> =-1V	25 °C		150	400	mV
			Full range			700	
I <sub>OL</sub>	Low-level output current	V <sub>OL</sub> = 1.5V, V <sub>ID</sub> =-1V	25 °C	6		mA	
I <sub>CC</sub>	Supply current	R <sub>L</sub> = ∞	V <sub>CC</sub> = 5V	25 °C	0.8	1	mA
			V <sub>CC</sub> = 30V	Full range			

\* Full range (MIN to MAX), for the GS391 is 0°C to 70°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

\*\* The voltage at either input or common-mode should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V<sub>CC</sub> -1.5V, but either or both inputs can go to 30V without damage

## Switching Characteristics $V_{CC}=5V, T_A=25^\circ C$

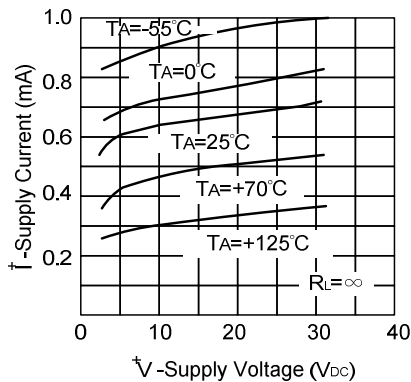
Parameter	Test conditions	Typ	Unit
Response time	$R_L$ connected to 5V through 5.1 k $\Omega$ , $C_L=15pF^*$ (See Note 1)	100-mV input step with 5-mV overdrive	1.3
		TTL-level input step	0.3

\* $C_L$  includes probe and jig capacitance.

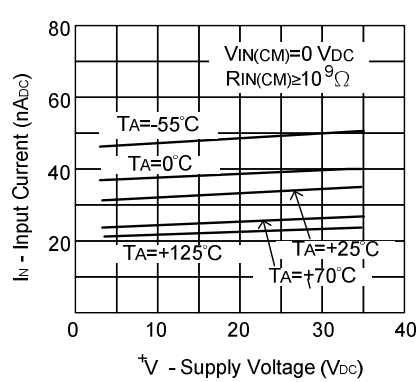
**Note 1:** The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

## Typical Performance Characteristics

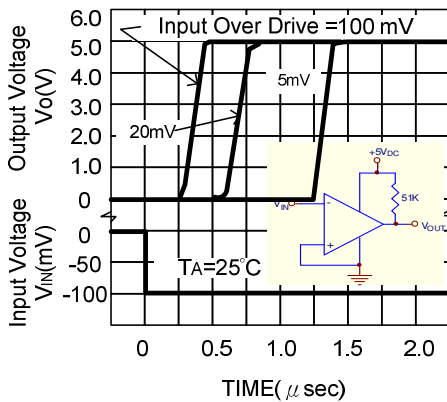
### Supply Current



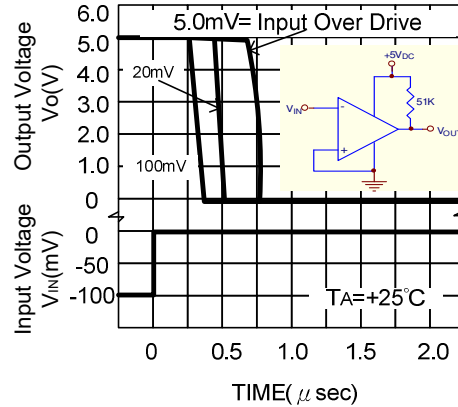
### Input Current



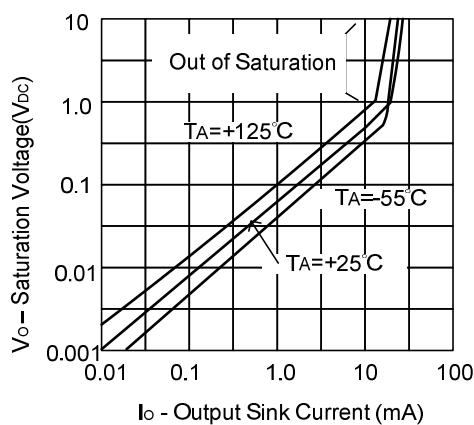
### Response Time for Various Input Overdrives—Positive Transition



### Response Time for Various Input Overdrives—Negative Transition

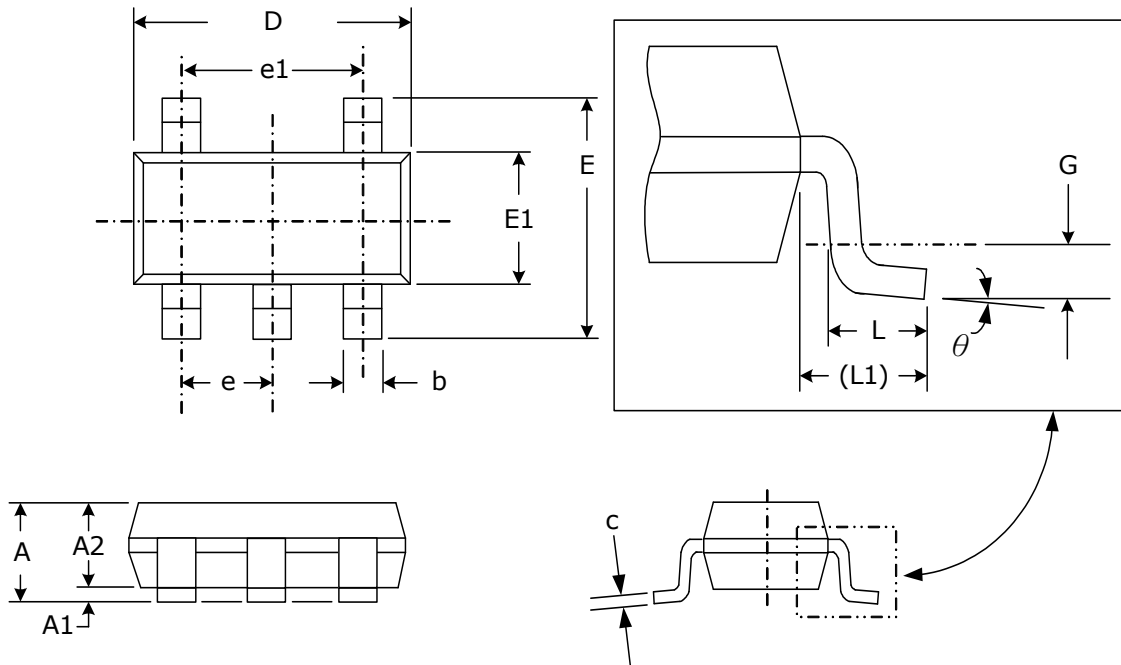


### Output Saturation Voltage



## Package Dimension

### SOT-23-5L







### Dimensions



SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	0.95	1.45	.037	.057
A1	0.05	0.15	.002	.006
A2	0.90	1.30	.035	.051
b	0.30	0.50	.012	.020
c	0.08	0.20	.003	.008
D	2.80	3.00	.110	.118
E	2.60	3.00	.102	.118
E1	1.50	1.70	.059	.067
e	0.95 (TYP)		.037 (TYP)	
e1	1.90 (TYP)		.075 (TYP)	
L	0.35	0.55	.014	.022
L1	0.60 (TYP)		.024 (TYP)	
G	0.25 (TYP)		.010 (TYP)	
Y	08	88	08	88

## NOTICE

Information furnished is believed to be accurate and reliable. However Globaltech Semiconductor assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties, which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Globaltech Semiconductor. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information without express written approval of Globaltech Semiconductor.

## CONTACT US

GS Headquarter	
	4F.,No.43-1,Lane11,Sec.6,Minquan E.Rd Neihu District Taipei City 114, Taiwan (R.O.C)
	886-2-2657-9980
	886-2-2657-3630
	sales_twn@gs-power.com

RD Division	
	824 Bolton Drive Milpitas. CA. 95035
	1-408-457-0587