

# LM311

# Single Comparator

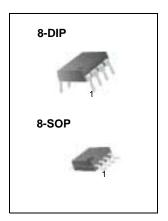
### **Features**

Low input bias current: 250nA (Max)
Low input offset current: 50nA (Max)
Differential Input Voltage: ±30V

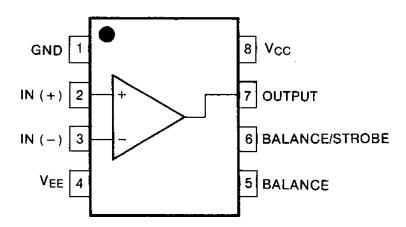
- Power supply voltage : single 5.0V supply to  $\pm 15$ V.
- Offset voltage null capability.
- · Strobe capability.

## **Description**

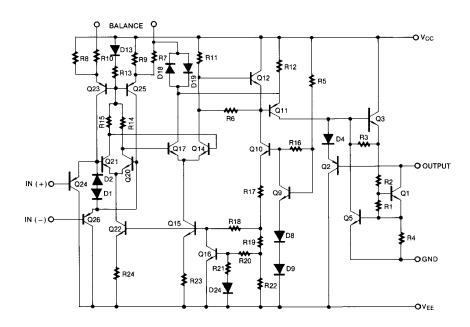
The LM311 series is a monolithic, low input current voltage comparator. The device is also designed to operate from dual or single supply voltage.



## **Internal Block Diagram**



# **Schematic Diagram**



# **Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Total Supply Voltage	Vcc	36	V
Output to Negative Supply Voltage LM311	Vo - VEE	40	V
Ground to Negative voltage	VEE	-30	V
Differential Input Voltage	VI(DIFF)	30	V
Input Voltage	VI	±15	V
Output Short Circuit Duration	-	10	sec
Power Dissipation	PD	500	mW
Operating Temperature Range	TOPR	0 ~ +70	°C
Storage Temperature Range	TSTG	- 65 ~ +150	°C

## **Electrical Characteristics**

(VCC = 15V,  $T_A = 25$ °C, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Тур.	Max.	Unit
Input Offset Voltage	Vio	$R_S \le 50 K\Omega$		-	1.0	7.5	mV
			Note 1	-	-	10	IIIV
Input Offset Current	lio			-	6	50	nA
			Note 1	-	·	70	TIA
Input Bias Current	IBIAS			-	100	250	nA
			Note 1	-	ı	300	IIA
Voltage Gain	GV	-		40	200	-	V/mV
Response Time	T <sub>RES</sub>		Note 2	-	200	ı	ns
Saturation Voltage	VSAT	IO =50mA, V <sub>I</sub> ≤ -10mV		-	0.75	1.5	
		$V_{CC} \ge 4.5V$ , $V_{EE} = 0V$ $I_{O} = 8mA$ , $V_{I} \le -10mV$ ,	Note 1	-	0.23	0.4	V
Strobe "ON" Current	ISTR(ON)	-		-	3	-	mA
Output Leakage Current	ISINK	ISTR =3mA, V <sub>I</sub> ≥ 10mV VO =15V, VCC=±15V		-	0.2	50	nA
Input Voltage Range	VI(R)	Note 1		-14.5 to 13.0	-14.7 to 13.8	-	V
Positive Supply Current	Icc	-		-	3.0	7.5	mA
Negative Supply Current	IEE	-		-	-2.2	-5.0	mA
Strobe Current	ISTR	-		-	3	-	mA

#### Notes:

- 1.  $0 \le T_A \le +70^{\circ}C$
- 2. The response time specified is for a 100mV input step with 5mV over drive.

## **Typical Performance Characteristics**

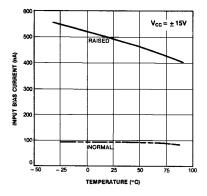


Figure 1. Input Bias Current vs Temperature

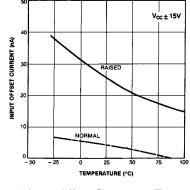


Figure 2. Input Offset Current vs Temperature

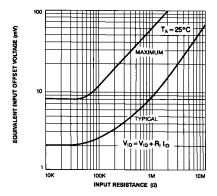


Figure 3. Offset Voltage vs Input Resistance

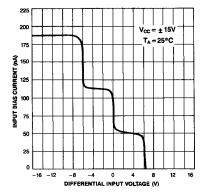


Figure 4. Input Bias Current vs Differential input voltage

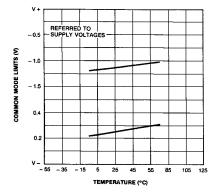


Figure 5. Common Mode Limits vs Temperature

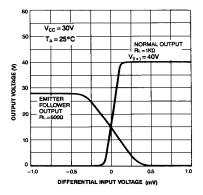


Figure 6. Output Voltage vs Differential input voltage

## **Typical Performance Characteristics (continued)**

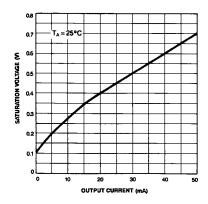


Figure 7. Saturation voltage vs Current

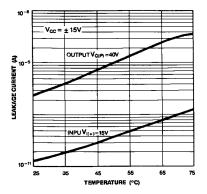


Figure 9. Leakage Current vs Temperature

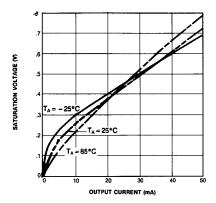


Figure 11. Current Saturation Voltage

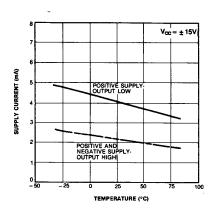


Figure 8. Supply Current vs Temperature

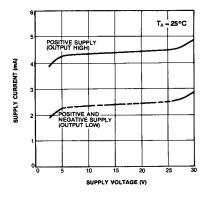


Figure 10. Supply Current vs Supply Voltage

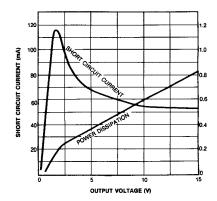
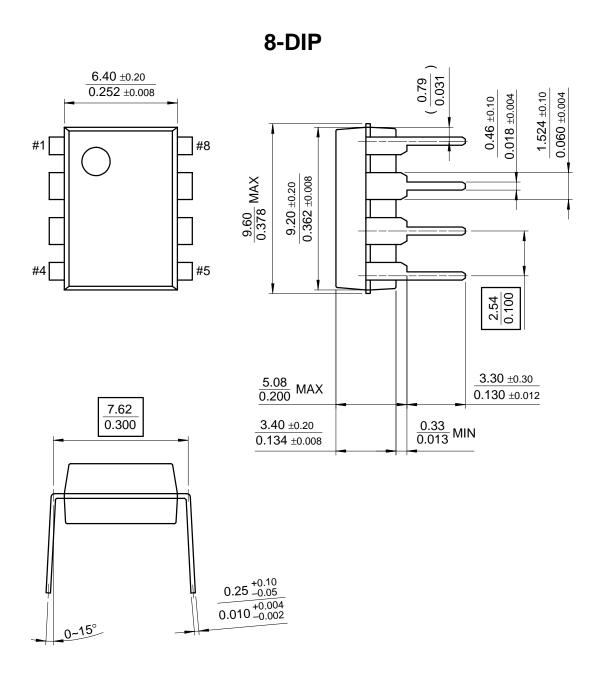


Figure 12. Output Limiting Characterstics

## **Mechanical Dimensions**

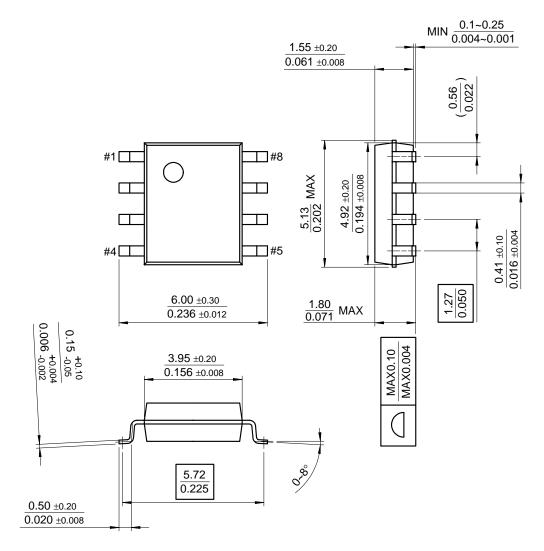
## **Package**



## **Mechanical Dimensions** (Continued)

## Package

# 8-SOP



# **Ordering Information**

Product Number	Package	Operating Temperature
LM311N	8-DIP	0 ~ +70°C
LM311M	8-SOP	0~+70 C

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