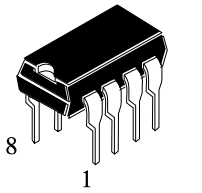
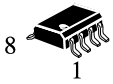
Low Power Low Offset Voltage Dual Comparators

IL2903/IL2903E



N SUFFIX
PLASTIC



D SUFFIX
SOIC

ORDERING INFORMATION

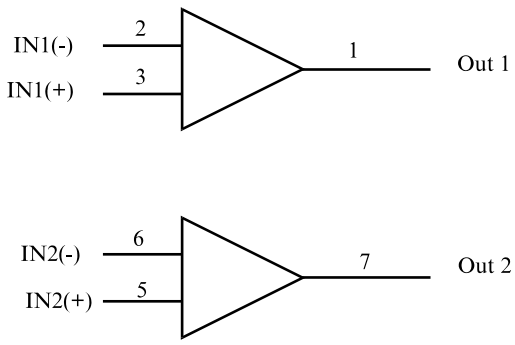
IL2903N/IL2903EN	Plastic/Tube
IL2903D/IL2903ED	SOIC/Tube
IL2903DT/IL2903EDT	SOIC/T&R

The IL2903 / IL2903E consists of two independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max for two comparators which were designed specifically to operate from a single power supply over a wide range of voltages.

Application areas include limit comparators, simple analog to digital converters; pulse, square wave and time delay generators; wide range VCO; MOS clock timers; multi-vibrators and high voltage digital logic gates.

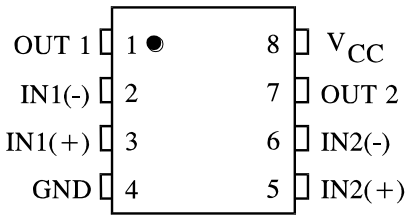
- Single or Split Supply Operation
- Low Input Bias Current
- Low Input Offset Current
- Input Common Mode Voltage Range to GND
- Low Output Saturation Voltage
- TTL and CMOS Compatible
- IL2903E AEC Q100 Qualified

LOGIC DIAGRAM



PIN 8 = V_{CC}
PIN 4 = GND

PIN ASSIGNMENT



MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	Power Supply Voltages Single Supply Split Supplies	 36 ±18	 V
V_{IDR}	Input Differential Voltage Range	36	V
V_{ICR}	Input Common Mode Voltage Range (1)	-0.3 to V_{CC}	V
I_{SC}	Output Short Circuit to Ground	Continuous	
I_{IN}	Input Current, per pin (2)	50	mA
T_J	Junction Temperature Plastic Packages	 150	 °C
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1mm from Case for 10 Seconds	260	°C
P_D	Power Dissipation @T_A=25°C Plastic Package Derate above 25°C	 570 5.7	 mW mW/°C

* Stresses beyond 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-rated conditions for extended periods may affect device reliability.

Functional operation should be restricted to the Recommended Operating Conditions.
Notes:
1. Split Power Supplies.
2. V_{IN}<-0.3V. This input current will only exist when voltage at any of the input leads is driven negative.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage		±2.5 or 5.0	±15 or 30	V
T_A	Operating Temperature, All Package Types	IL2903	-40	+105	°C
		IL2903E	-40	+125	

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.
Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS (T_A=-40 to +125°C)

Symbol	Parameter	Test Conditions	Guaranteed Limit			Unit
			Min	Typ	Max	
V_{IO}	Input Offset Voltage	V_0=1.4V V_{CC}=5.0-30V;R_S≤100Ω V_{ICR}=0V - (V_{CC}-1.5)V	-		9.0 5.0*	mV
I_{IB}	Input Bias Current	V_0=1.4V V_{CC}=5.0-30V V_{ICR}=0V - (V_{CC}-1.5)V	-		400	nA
I_{IO}	Input Offset Current	V_0=1.4V V_{CC}=5.0-30V V_{ICR}=0V - (V_{CC}-1.5)V	-		±150 50*	nA
V_{ICR}	Input Common Mode Voltage Range	V_{CC}=5.0-30V	0		V_{CC}-2.0V	V
I_{CC}	Supply Current	R_L=∞,V_{CC}=5.0 R_L=∞,V_{CC}=30V	- -		1.0* 2.5*	mA
A_{VOL}	Voltage Gain	V_{CC}=15V, R_L=15KΩ	-	200*	-	V/mV
t_1	Large Signal Response Time	V_{IN}=TTL Logic Swing, V_{ref}=1.4V, V_{CC}=5.0V, R_L=5.1KΩ, V_{RL}=5.0V	-	300*	-	ns
t_2	Response Time (Note 6)	V_{CC}=5.0V, R_L=5.1KΩ, V_{RL}=5.0V	-	1.3*	-	μs
I_{sink}	Output Sink Current	V_I(-)=1.0V, V_I(+)=0V, V_0≤1.5V, V_{CC}=5.0V	6.0*	-	-	mA
V_{sat}	Saturation Voltage	V_I(-)=1.0V, V_I(+)=0V, I_{sink}≤4.0mA, V_{CC}=5.0V	-	-	700	mV
I_{OL}	Output Leakage Current	V_I(+)=1.0V, V_I(-)=0V, V_0=5.0V V_0=30V		0.1*	 1000	nA
V_{IDR}	Differential Input Voltage Range	All V_{IN}≥GND or V-Supply (if used)			V_{CC}	V

*=@25°C

SWITCHING CHARACTERISTICS (T_A=25°C)

V_S = 5V, V_{O_PULLUP} = 5V, V_{CM} = V_S/2, C_L = 15pF, $R_{\_PULLUP}$ = 5.1kΩ,(unless otherwise noted).

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{response}$	Propagation delay time, high-to-low; TTL input signal	TTL input with V_{ref} = 1.4V		0.3		us
$t_{response}$	Propagation delay time, high-to-low; Small scale input signal	Input overdrive = 5mV, Input step = 100mV		0.8		us

TYPICAL PERFORMANCE CHARACTERISTICS

(V_{CC}=1.5V, T_A=+25°C, (each comparator))

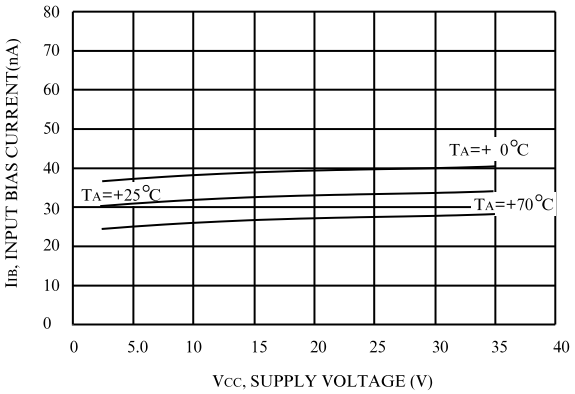


Figure 1. Input Bias Current versus Power Supply Voltage

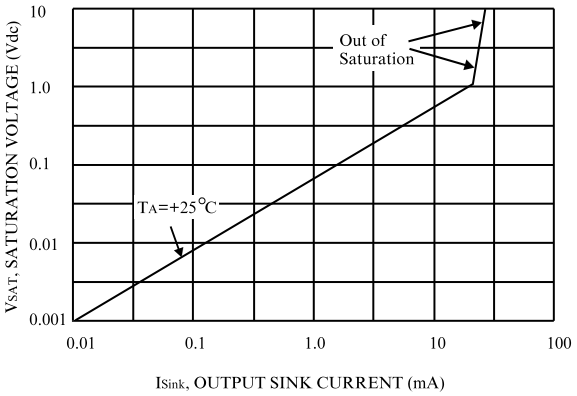


Figure 2. Output Saturation Voltage versus Output Sink Current

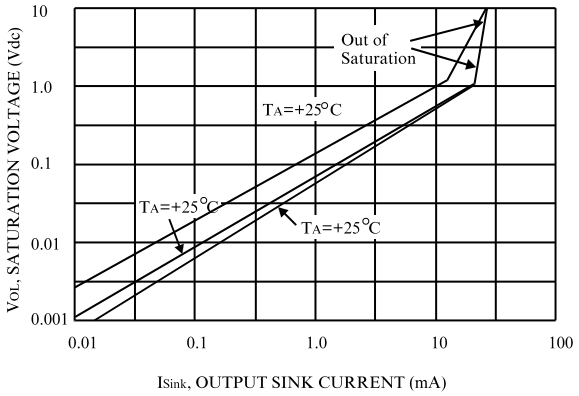


Figure 3. Output Saturation Voltage versus Output Sink Current

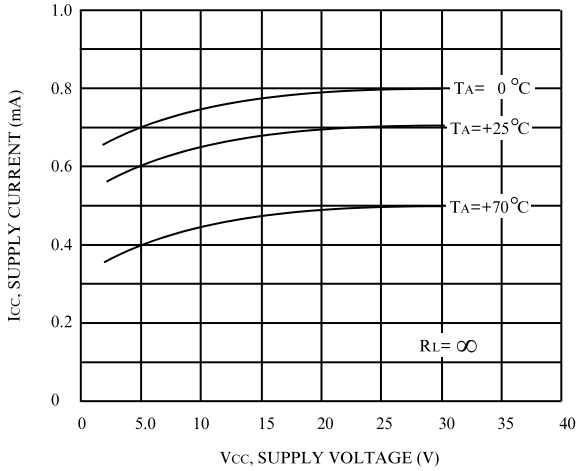


Figure 4. Power Supply Current versus Power Supply Voltage

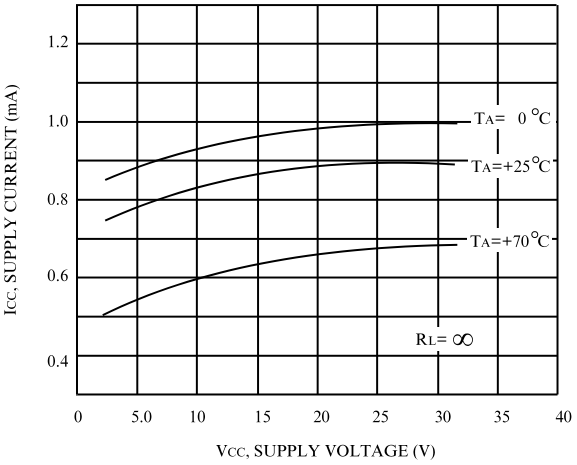


Figure 5. Power Supply Current versus Power Supply Voltage

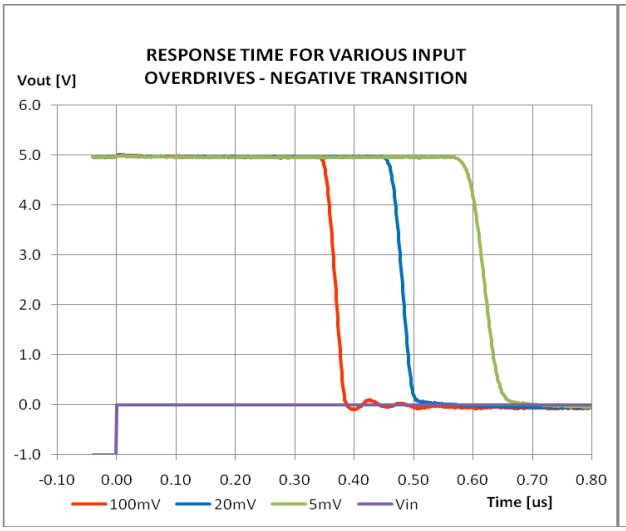


Figure 6. Response Time for Various Overdrives, High-to-Low Transition

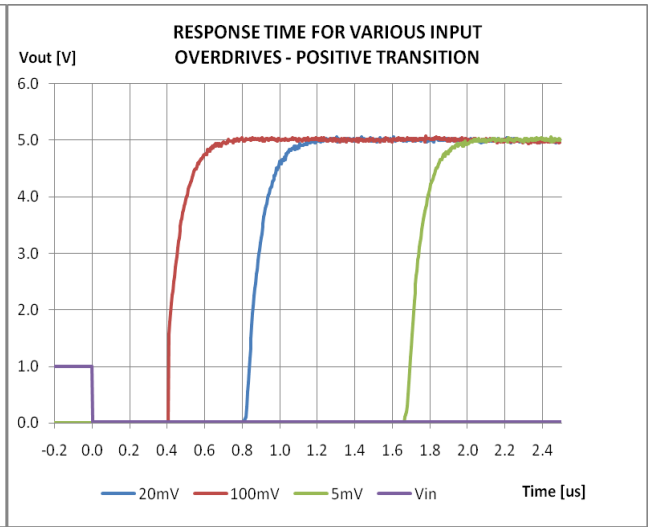
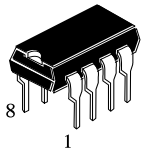
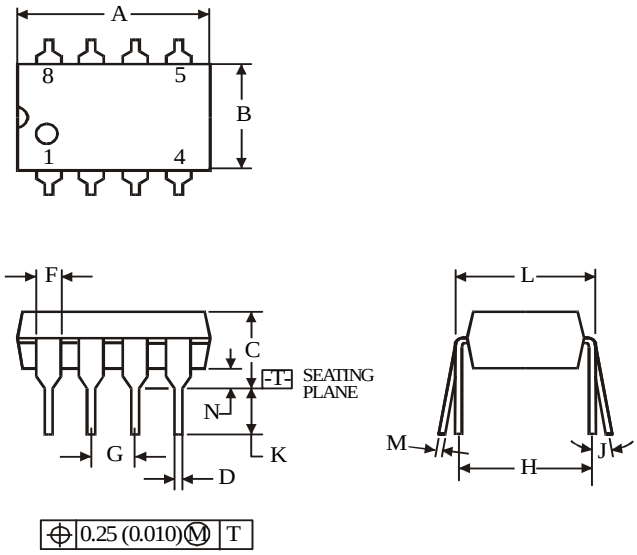


Figure 7. Response Time for Various Overdrives Low-to-High Transition

N SUFFIX PLASTIC DIP
(MS – 001BA)



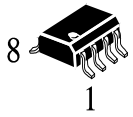


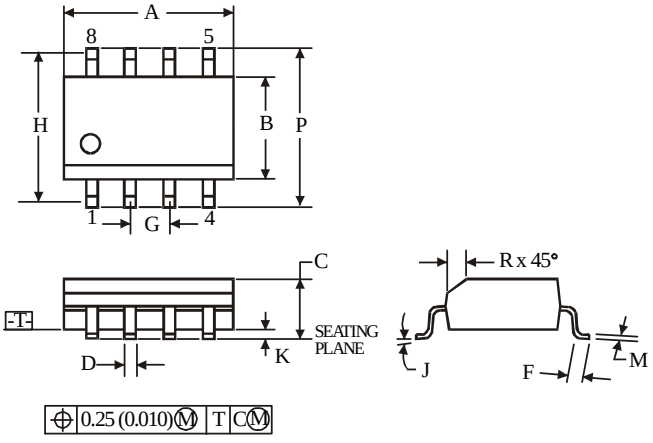
	Dimension, mm	
Symbol	**MIN**	**MAX**
A	8.51	10.16
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

NOTES:

1. Dimensions “A”, “B” do not include mold flash or protrusions.
   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

D SUFFIX SOIC
(MS - 012AA)





	Dimension, mm	
Symbol	**MIN**	**MAX**
A	4.8	5
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

NOTES:

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B – 0.25 mm (0.010) per side.