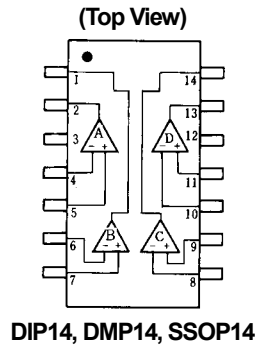# SINGLE-SUPPLY QUAD COMPARATOR

■ GENERAL DESCRIPTION

These devices offer higher frequency operation and faster switching than can be had from internally compensated quad op amps. Indeed for single-supply applications, the Darlington PNP input stage allows them to compare voltages that include ground. The two-stage common-emitter output circuit provides gain and output sink capacity of 6mA at an output level of 400mV. The output collector is left open, permitting the designer to drive devices in the range of 2V to 36V.
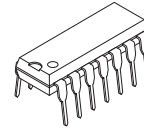
■ FEATURES

● Operating Voltage　　　　(+2V~+36V)
● Single Supply Operation
● Open Collector Output
● Package Outline　　　　DIP14, DMP14, SSOP14
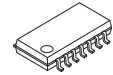● Bipolar Technology

■ PIN CONFIGURATION

■ PACKAGE OUTLINE

NJM2901N
(DIP14)

NJM2901M
(DMP14)

NJM2901V
(SSOP14)

(Top View)

DIP14, DMP14, SSOP14

PIN FUNCTION	
1.	B OUTPUT
2.	A OUTPUT
3.	V$^+$
4.	A -INPUT
5.	A +INPUT
6.	B -INPUT
7.	B +INPUT
8.	C -INPUT
9.	C +INPUT
10.	D -INPUT
11.	D +INPUT
12.	GND
13.	D OUTPUT
14.	C OUTPUT

■ EQUIVALENT CIRCUIT　(1/4 Shown)
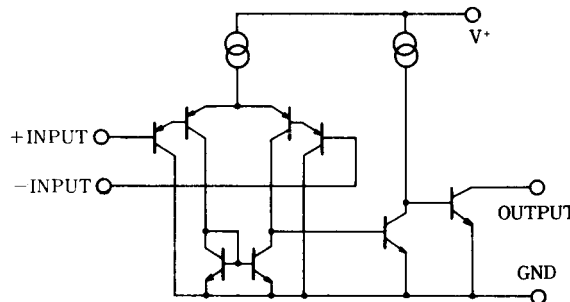
NJM2901

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	36 (± 18)	V
Differential Input Voltage	V_{ID}	36	V
Input Voltage	V_{IN}	-0.3~+36	V
Power Dissipation	P_D	(DIP14) 570 (DMP14) 300 (SSOP14) 300	mW
Operating Temperature Range	T_{opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-50~+125	°C

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V^+=5V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	R_S=0Ω,V_O=1.4V	-	2	7	mV
Input Offset Current	I_{IO}	I_{IN}=I_{IN}^+-I_{IN}^-	-	5	50	nA
Input Bias Current	I_B		-	25	250	nA
Input Common Mode Voltage Range	V_{ICM}		0~3.5	-	-	V
Large Signal Voltage Gain	A_V	R_L=15kΩ	-	106	-	dB
Response Time	t_R	R_L=5.1kΩ	-	1.3	-	µs
Output Sink Current	I_{SINK}	V_{IN}^-=1V,V_{IN}^+=0V,V_O=1.5V	6	16	-	mA
Output Saturation Voltage	V_{SAT}	V_{IN}^-=1V,V_{IN}^+=0V,I_{SINK}=3mA	-	200	400	mV
Output Leakage Current	I_{LEAK}	V_{IN}^-=0V,V_{IN}^+=1V,V_O=5V	-	0.1	1.0	µA
Operating Current	I_{CC}	R_L=∞	-	0.8	2	mA

■ TYPICAL CHARACTERISTICS

Input Offset Voltage vs. Temperature
(V⁺ = 5 V)
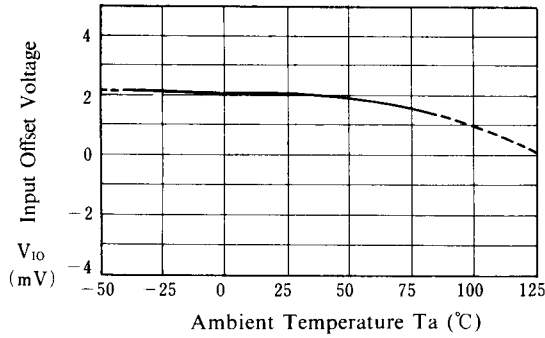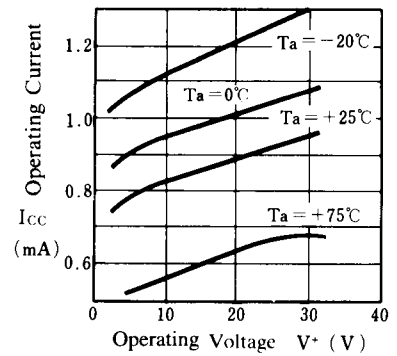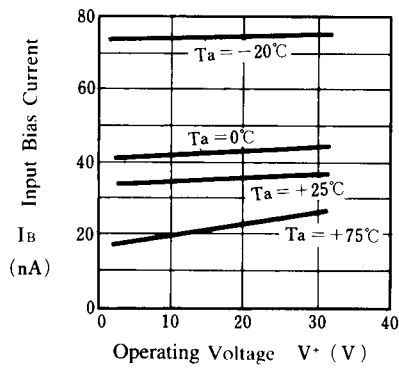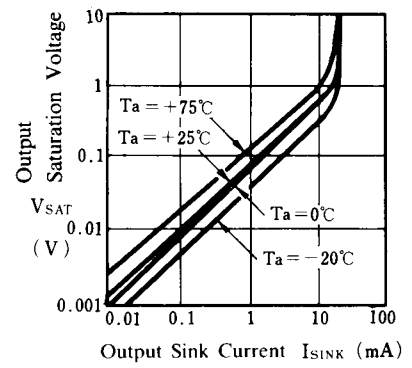
Input Offset Voltage
V_{IO} (mV)

Ambient Temperature Ta (℃)

Operating Current
($R_L = \infty$)

Operating Current
I_{CC} (mA)

Ta = −20℃
Ta = 0℃
Ta = +25℃
Ta = +75℃

Operating Voltage V⁺ (V)

Input Bias Current

Input Bias Current
I_B (nA)

Ta = −20℃
Ta = 0℃
Ta = +25℃
Ta = +75℃

Operating Voltage V⁺ (V)

Output Saturation Voltage
(V⁺ = 5V)

Output Saturation Voltage
V_{SAT} (V)

Ta = +75℃
Ta = +25℃
Ta = 0℃
Ta = −20℃

Output Sink Current I_{SINK} (mA)

Response Time for Various Input Over Drives
(V⁺ = 5V, R_L = 5.1kΩ, Ta = 25℃)

Output Voltage
V_O (V)

Input Voltage
V_{IN} (mV)

100mV 20mV 5mV Input Over Drive

Time t (μs)

5 V
V_{IN}
5.1k
V_O

Response Time for Various Input Over Drives
(V⁺ = 5V, R_L = 5.1kΩ, Ta = 25℃)

Output Voltage
V_O (V)

Input Voltage
V_{IN} (mV)

100mV 20mV 5 mV Input Over Drive

Time t (μs)
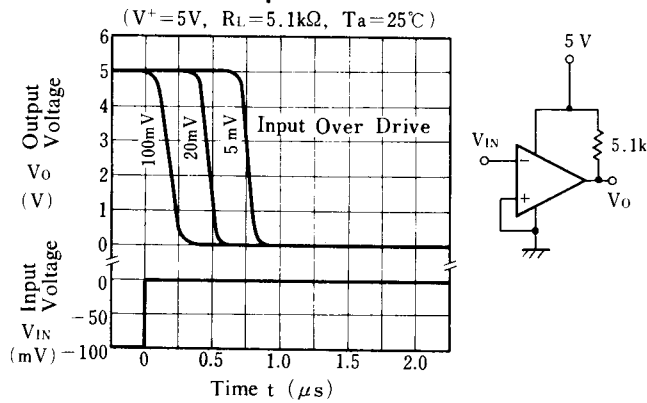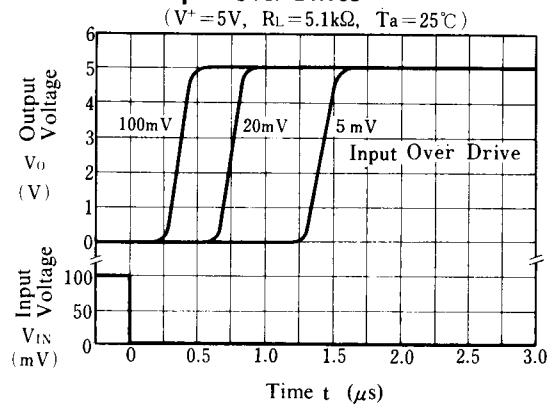
NJM2901

■ TYPICAL APPLICATIONS

Basic Comparator

INPUT

V+
3k

V_{REF}

OUTPUT
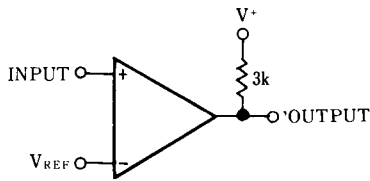
Comparator With Hysteresis
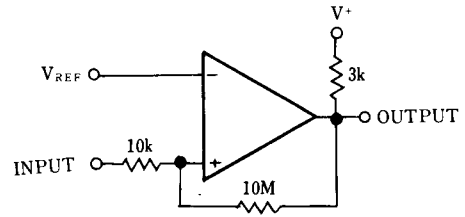
V_{REF}

V+
3k

INPUT
10k

10M

OUTPUT

Zero Crossing Detector

V+

INPUT

100k 100k 5k

5k 5k

OUTPUT

10k 20M

Low Frequency Op Amp.

V+

INPUT

15k

OUTPUT

100k

1.0k

$0.5\mu F$

$A_V = 100$

Pulse Generator

V+

4.3k

100k

75pF

V+
0

$f = 100kHz$

OUTPUT

100k 100k

INPUT

100k

Limit Comparator

V+

$V_{REF(HI)}$

INPUT
V_{IN}

$V_{REF(LO)}$
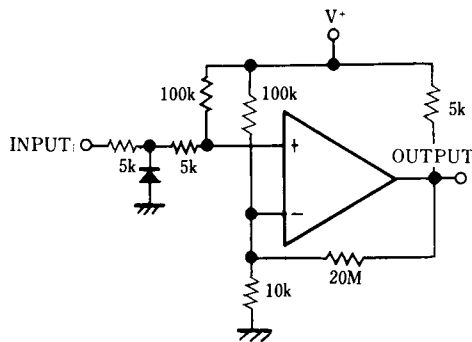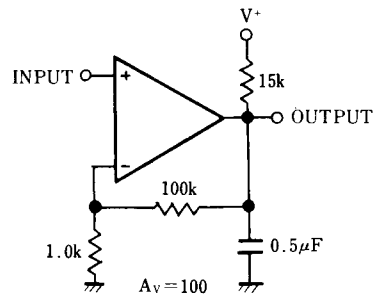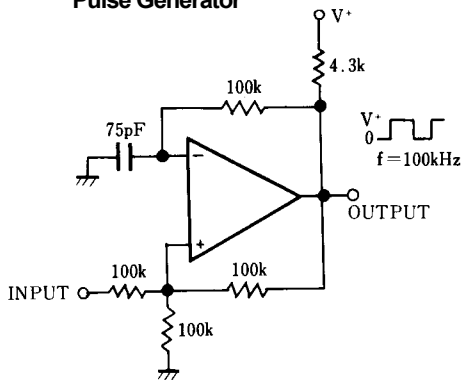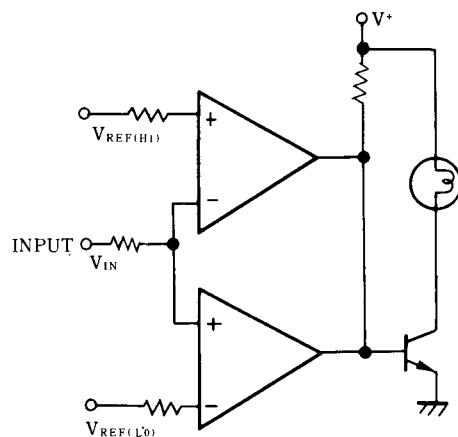
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