HA17901G, HA17901P
Quadruple Comparators

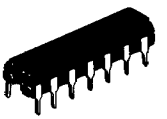
AUTOMOTIVE VERSION

HA17901 and HA17339 are comparators designed for car use and control system use.
They provide wide operating voltage with single power source, and the supply current is small because it is independent of the supply voltage.
They can be widely applied, such as limit comparator, simple analog/digital converter, pulse/square wave/time delay generator, wide range VCO, MOS clock timer, multivibrator, high voltage logic gate, etc.
Automotive Use HA17901G, HA17901P

HA17901G

(DG-14)

HA17901P
HA17339

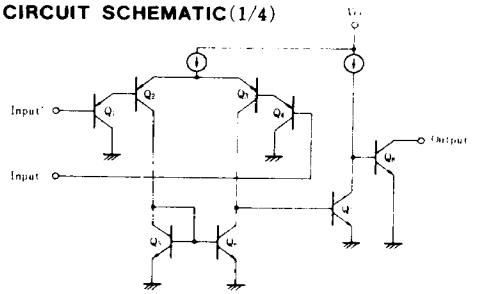


(DP-14)

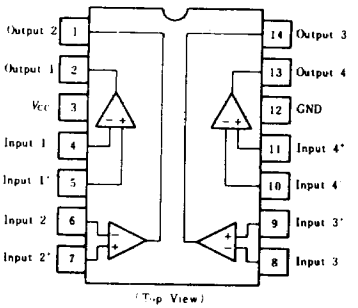
■ FEATURES

- Wide Range of Supply Voltage . . . . . 2 to 36V
- Very Small Supply Current 0.8mA
- Small Input Bias Current 25nA
- Small Input Offset Current 3nA
- Small Input Offset Voltage 2mV
- Common Mode Input Voltage Range Including Ground
- Differential Input Voltage Range Equal to Supply Voltage.
- Small Output Saturation Voltage . . . . . 1mV(5μA) 70mV(1mA)
- The output voltage is compatible with that of CMOS Logic System

■ CIRCUIT SCHEMATIC (1/4)



■ PIN ARRANGEMENT



(Top View)

■ ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Item	Symbol	1: HA17901G	2: HA17901P	Unit
Supply Voltage	V_{CC}	36	36	V
Differential Input Voltage	$V_{in\ diff}$	$\pm V_{CC}$	$\pm V_{CC}$	V
Input Voltage	V_{in}	−0.3 to +36	−0.3 to +36	V
Power Dissipation	P_d*	625	625	mW
Output Current	I_{out}**	20	20	mA
Operating Temperature	T_{opr}	−40 to +85	−40 to +85	°C
Storage Temperature	T_{stg}	−65 to +150	−55 to +125	°C
Output Voltage	V_{out}	36	36	V

Note * 1 : Value at Ta = 70°C. In case of more than it, 7.6mW/°C derating shall be performed.
2 : Value at Ta = 50°C. In case of more than it, 8.3mW/°C derating shall be performed.
** : Short-circuit between the output and V_{CC} will be a cause to destroy the circuit.
The maximum output current is the permissable value for continuous operation.

Data Sheets contain information for automotive operation only. Refer to **Reference Guide** (Section 9) for a listing of supplementary publications which provide complete specifications.

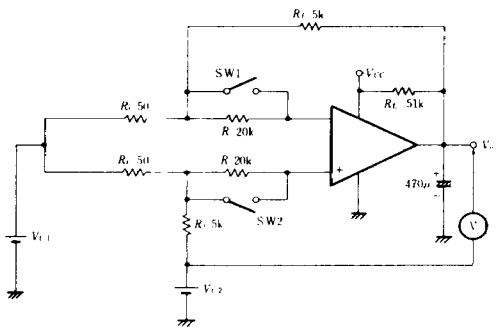
■ELECTRICAL CHARACTERISTICS (V_{CC}=5V, Ta=25°C)

Item	Symbol	Test Condition	min	typ	max	Unit
Input Offset Voltage	V_{IO}	V_{REF}=1.4V & R_S=0Ω when V_O≅1.4V at the output switching point	—	2	7	mV
Input Bias Current (Note 1)	I_{IB}	$I_{IN(+)}$ or $I_{IN(-)}$	—	25	250	nA
Input Offset Current	I_{IO}	$I_{IN(+)} - I_{IN(-)}$	—	5	50	nA
Common Mode Input Voltage (Note 2)	V_{CM}		0	—	V_{CC}−1.5	V
Supply Current	I_{CC}	R_L=∞	—	0.8	2	mA
Voltage Gain	A_V	R_L=15kΩ	—	200	—	V/mV
Response Time (Note 3)	t_R	V_{RL}=5V, R_L=5.1kΩ	—	1.3	—	μs
Output Sink Current	I_{sink}	$V_{IN(+)}$=1V, $V_{IN(-)}$=0, V_O≥1.5V	6	16	—	mA
Output Saturation Voltage	V_{osat}	$V_{IN(+)}$=1V, $V_{IN(-)}$=0, I_{sink}=3mA	—	200	400	mV
Output Leak Current	I_{LO}	$V_{IN(+)}$=1V, $V_{IN(-)}$=0, V_O=5V	—	0.1	—	nA

Note: 1. The input bias current is constant, because there is a reference line or input line without any change of load.
2. Common mode input voltage or either of the input signal voltages should not be less than −0.3V.
3. This is a value to 100mV input step voltage with 5mV overdrive.

■TEST CIRCUIT

1. Input Offset Voltage (V_{IO}), Input Offset Current (I_{IO}) Input Bias Current (I_{IB})



SW 1	SW 2	V_{out}
ON	ON	V_{O1}
OFF	OFF	V_{O2}
ON	OFF	V_{O3}
OFF	ON	V_{O4}

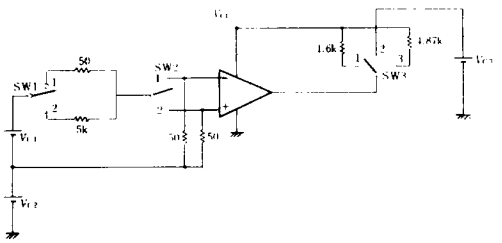
V_{C1}=1/2 V_{CC}
V_{C2}=1.4V

(1) $V_{IO} = \dfrac{|V_{O3}|}{1+\dfrac{R_f}{R_S}}$ 〔V〕

(2) $I_{IO} = \dfrac{|V_{O2}-V_{O1}|}{R\left(1+\dfrac{R_f}{R_S}\right)}$ 〔A〕

(3) $I_{IB} = \dfrac{|V_{O4}-V_{O3}|}{2\cdot R\left(1+\dfrac{R_f}{R_S}\right)}$ 〔A〕

2. Output Saturation Voltage (V_O sat), Output Sink Current (Isink), Common Mode Input Voltage (V_{CM})



Item	V_{i1}	V_{i2}	V_{i3}	SW 1	SW 2	SW 3	Unit
V_O sat	2V	0V	—	1	1	1 at V_{CC}=5V 3 at V_{CC}=15V	V
I_{sink}	2V	0V	1.5V	1	1	2	mA
V_{CM}	2V	−1~V_{CC}	—	2	1.2切換	3	V

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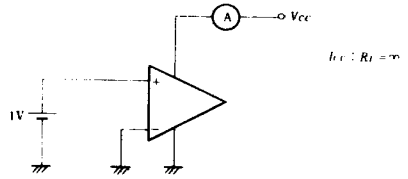
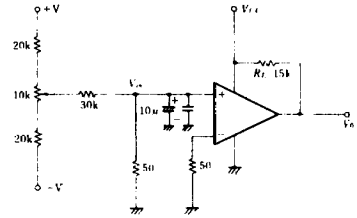
3. Supply Current (I_{CC})

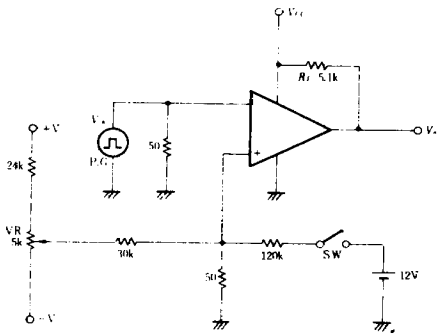


4. Voltage Gain (A_V) (R_L = 15kΩ)

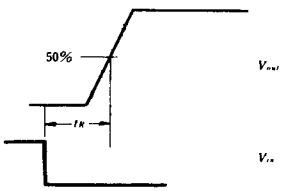


$$A_V = 20 \log \frac{V_{O1} - V_{O2}}{V_{IN1} - V_{IN2}} \quad [dB]$$

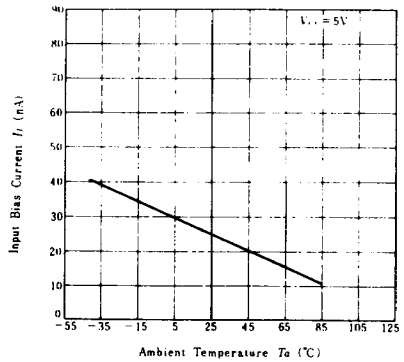
5. Response Time (t_R)



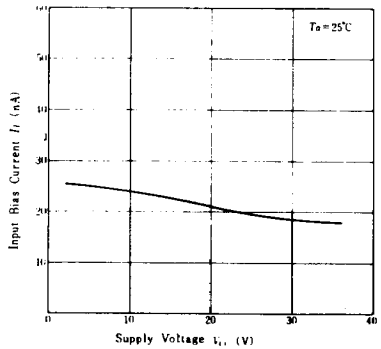
t_R: R_L = 5.1kΩ,
100mV input with 5mV overdrive
Turn the SW OFF without applying V_{IN}, and adjust the V_R to make V_O 1.4V approximately.
Apply V_{IN}, and turn the SW ON.



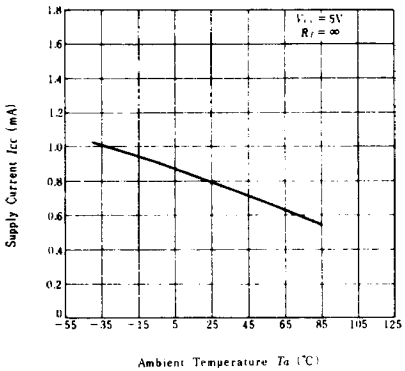
INPUT BIAS CURRENT VS: AMBIENT TEMPERATURE



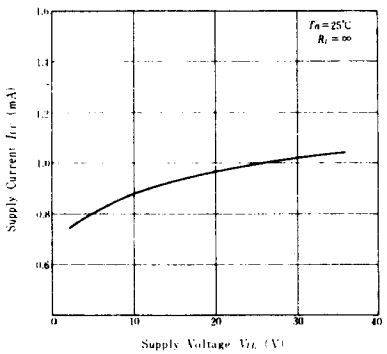
INPUT BIAS CURRENT VS. SUPPLY VOLTAGE



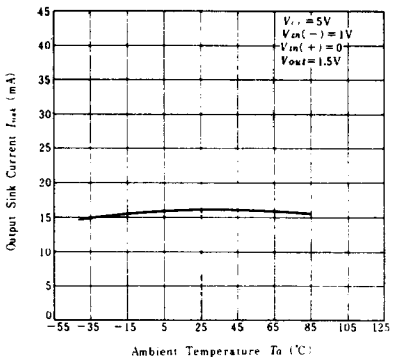
SUPPLY CURRENT VS. AMBIENT TEMPERATURE



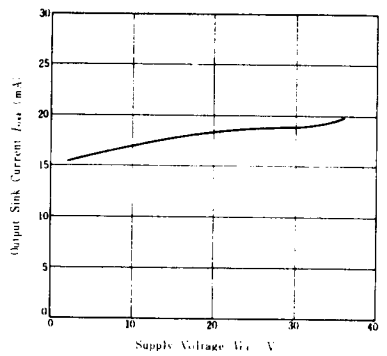
SUPPLY CURRENT VS. SUPPLY VOLTAGE



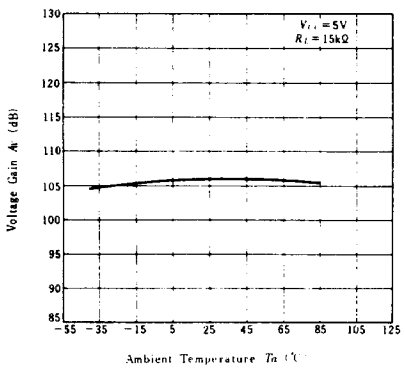
OUTPUT SINK CURRENT VS. SUPPLY VOLTAGE



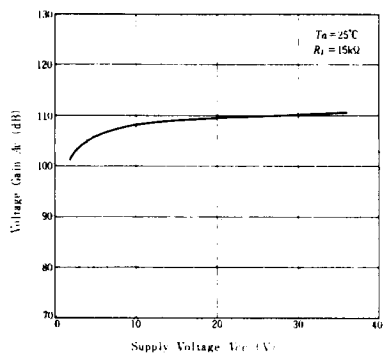
OUTPUT SINK CURRENT VS. SUPPLY VOLTAGE



VOLTAGE GAIN VS. AMBIENT TEMPERATURE



VOLTAGE GAIN VS. SUPPLY VOLTAGE



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