

HIGH POWER COMPARATOR

MB4205

 March 1988
Edition 1.0

HIGH POWER COMPARATOR

The Fujitsu MB4205 is a comparator which is designed to operate from a single power supply voltage. It is capable of driving a load up to 0.5 A and have the current limiting circuitry. It enables a direct drive warning lamps.

As it is packaged in 8-pin plastic SIP package with heat sink, it enables easy mounting.

It is equipped with the function which turns the output "ON" by force, when the surge is inflicted in the application of automobile, and so on.

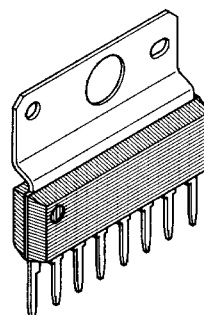
- PNP transistor input enables input control voltage from 0 V and a single power supply voltage operation
- High output drive capability : 0.5 A
- Resistance comparison is achieved due to on-chip switchable constant-current supply source (Several hundred Ω to several kilo Ω)
- Hysteresis is set easily because V_{OH} level and V_R level is almost same
- On-chip current limiting circuitry
- Common pin for input control voltage pin V_{CS} and reference voltage output pin V_R

ABSOLUTE MAXIMUM RATINGS (see NOTE)

 $(T_A = 25^\circ\text{C})$

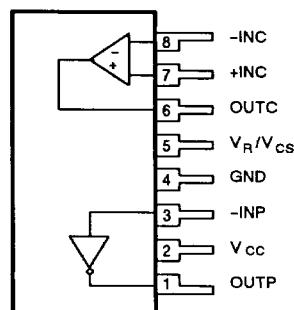
Rating	Symbol	Condition	Value	Unit
Power Supply Voltage	V_{CC}		18	V
Power Supply Current (Surge)	I_{CCS}	$t \leq 50\text{ms}$	100	mA
Load Current	I_{OL}		500	mA
Output Voltage	V_{OH}		40	V
Power Dissipation	P_D	$T_A \leq 85^\circ\text{C}$	1	W
		$T_C \leq 85^\circ\text{C}$	4	W
Operating Temperature	T_A		-30 to +85	$^\circ\text{C}$
Storage Temperature	T_{STG}		-55 to +125	$^\circ\text{C}$

NOTE: Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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PLASTIC PACKAGE
SIP-08P-M01

PIN ASSIGNMENT

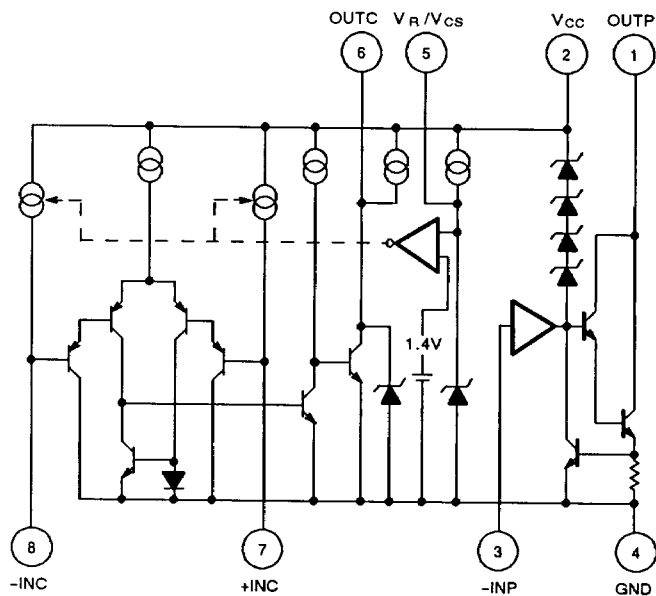


This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.



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Fig. 1 — MB4205 EQUIVALENT CIRCUIT



ELECTRICAL CHARACTERISTICS (TA=25°C, VCC=13.2V, RS=220Ω, RL=54Ω)

Parameter	Symbol	Condition	Value			Unit
			Min	Typ	Max	
Power Supply Voltage	VCC	RS=0	6.5		18	V
Power Supply Current	ICC	VCC=10V, RS=0		9	13	mA
Zener Voltage	VCCZ	ICC=50mA	26	30	36	V
Comparator section						
Input Offset Voltage	VIO	VCS=2.0V		2	10	mV
		VCS=0.8V		5	20	mV
Input Bias Current *	I _I	VCS=2.0V		0.5	3	μA
	I _{IB}	VCS=0.8V	0.6	1.0	1.5	mA
Input Bias Current Ratio	I _{I+} /I _{I-}	VCS=0.8V	0.95	1.0	1.05	
Common-mode Input Voltage Range	VCM		0		VCC-2	V
Output Voltage	VOL	ISINK=3mA		0.1	0.2	V
	VOH	I _R =0.5mA	5.0	5.4	5.8	V
Sink Current	ISINK	VOL≤1V	8	20		mA
Output section						
Reference Voltage	VR	RL=100kΩ	5.0	5.4	5.8	V
Input Control Current	ICS	VCS=0.8V	0.5	1.0	1.8	mA
Input Bias Current	I _I	V _I =0		3	20	μA
		V _I =5.0V			1	μA
Output Voltage	VOL	V _{IH} =2.0V, I _{OL} =0.2A		0.85	1.0	V
Output Current	IOH	V _{IL} =0.8V, V _{IH} =40V		2	5	mA

Note: Input bias current flows from the IC.



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ELECTRICAL CHARACTERISTICS CURVES

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FIG. 2 — POWER SUPPLY CURRENT VS. POWER SUPPLY VOLTAGE

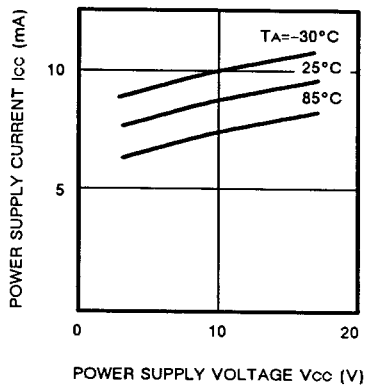


FIG. 3 — INPUT BIAS CURRENT VS. POWER SUPPLY VOLTAGE

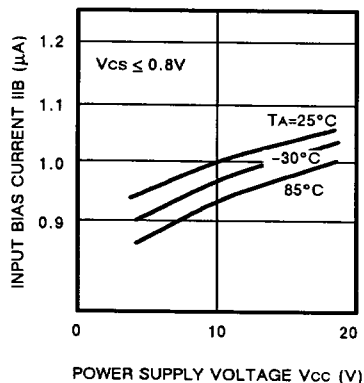


FIG. 4 — REFERENCE VOLTAGE/OUTPUT VOLTAGE VS. TEMPERATURE

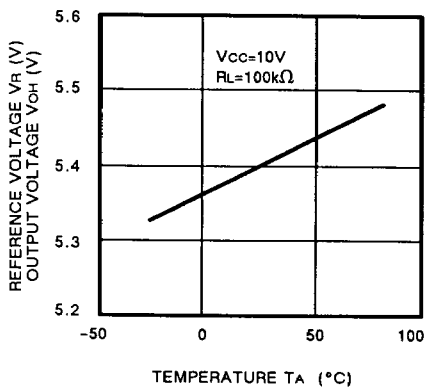
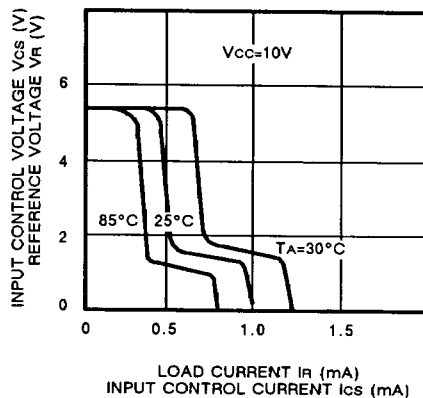


FIG. 5 — REFERENCE VOLTAGE VS. LOAD CURRENT
INPUT CONTROL VOLTAGE VS. INPUT CONTROL CURRENT



ELECTRICAL CHARACTERISTICS CURVES (Continued)

FIG. 6 — OUTPUT VOLTAGE VS. INPUT VOLTAGE

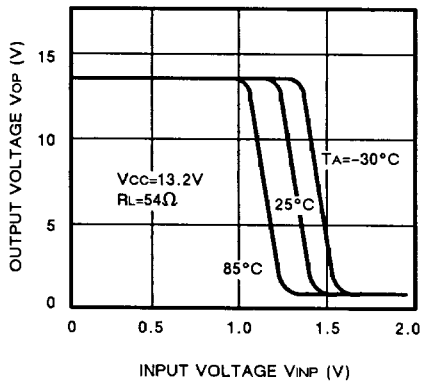
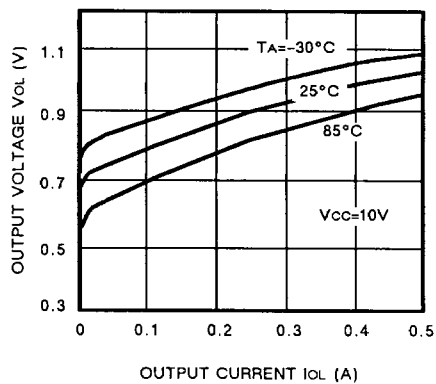


FIG. 7 — OUTPUT VOLTAGE VS. INPUT CURRENT



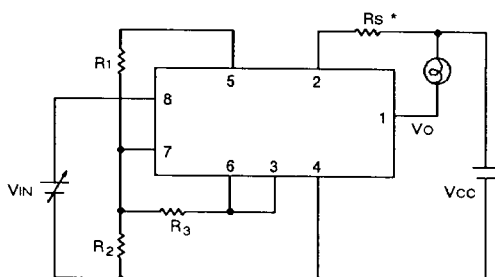


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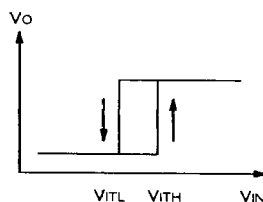
APPLICATION EXAMPLES

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Fig. 8



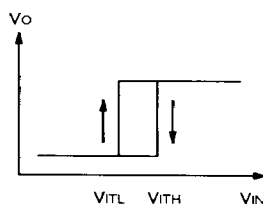
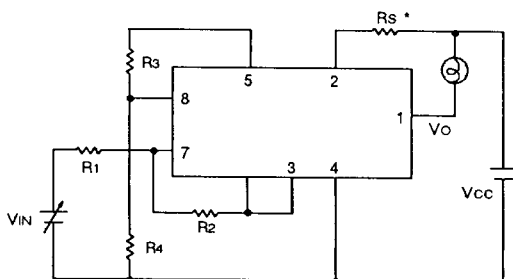
* R_s is not required if surge is not large.



$$V_{ITH} = \frac{R_2(R_1 + R_3)}{R_2(R_1 + R_3) + R_1R_3} V_R$$

$$V_{ITL} = \frac{R_2R_3}{R_2(R_1 + R_3) + R_1R_3} V_R$$

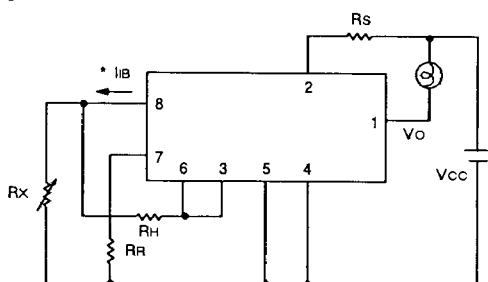
Fig. 9



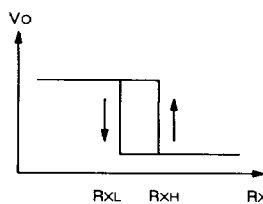
$$V_{ITH} = \left(1 + \frac{R_1}{R_2}\right) \left(\frac{R_4}{R_3 + R_4}\right) V_R$$

$$V_{ITL} = V_{ITH} - \frac{R_1}{R_2} V_R$$

Fig. 10



When 5 pin is connected to GND, constant current I_{IB} is generated internally.



$$R_{XH} = \frac{R_R}{1 - \frac{R_R}{R_H}}$$

$$R_{XL} = \frac{R_R}{1 - \frac{R_R}{R_H} + \frac{V_R}{I_{IB}R_H}}$$

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