STRUCTURE SILICON MONOLITHIC INTEGRATED CIRCUIT

FUNCTION GROUND SENSE DUAL VOLTAGE COMPARATORS

PRODUCT SERIES **BA2903F**
BA2903FV
BA2903FVM

FEATURES
- Wide operating temperature range.(-40～+125[℃])
- Open collector output

○ABSOLUTE MAXIMUM RATINGS(Ta=25[℃])

Parameter	Symbol		Rating	Unit
Supply Voltage	VCC-VEE		+36	V
Power dissipation	Pd	BA2903F	780(*1)(*4)	mW
		BA2903FV	690(*2)(*4)	mW
		BA2903FVM	590(*3)(*4)	mW
Differential Input Voltage (*5)	Vid		±36	V
Input Common-mode Voltage Range	Vicm		(VEE-0.3)～VEE+36	V
Operating Temperature	Topr		-40～+125	℃
Storage Temperature Range	Tstg		-55～+150	℃
Maximum junction Temperature	Tjmax		150	℃

- This IC is not designed for protection against radioactive rays.

(*1) To use at temperature above Ta=25[℃] reduce 6.3[mW]/[℃].
(*2) To use at temperature above Ta=25[℃] reduce 5.6[mW]/[℃].
(*3) To use at temperature above Ta=25[℃] reduce 4.8[mW]/[℃].
(*4) Mounted on a glass epoxy PCB(70[mm]×70[mm]×1.6[mm]).
(*5) The voltage difference between inverting input and non-inverting input is the differential input voltage. Then input terminal voltage is set to more than VEE.

○OPERATING CONDITION(Ta=-40～+125[℃])

Parameter	Symbol	Rating	Unit
Supply Voltage	VCC	+2.0～+36.0 (Single Supply)	V
		±1.0～±18.0 (Split Supply)	

Status of this document
The Japanese version of this document is the formal specification.
A customer may use this translation version only for a reference to help reading the formal version.
If there are any differences in translation version of this document formal version takes priority.

Application example
- ROHM cannot provide adequate confirmation of patents.
- The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys).
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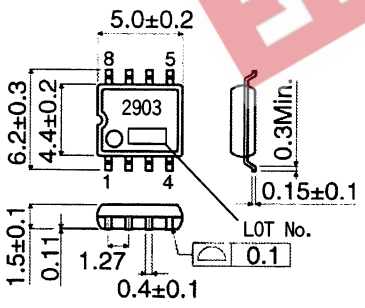
○ELECTRICAL CHARACTERISTICS (unless otherwise specified VCC=+5[V]、VEE=0[V])

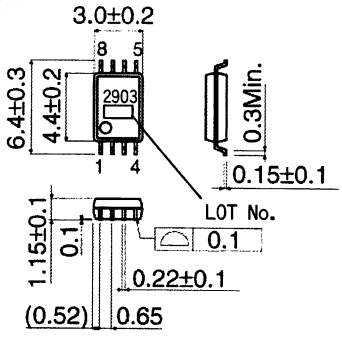
Parameter	Symbol	Temperature Range	Guaranteed Limit			Unit	Condition
			Min.	Typ.	Max.		
Input Offset Voltage (*6)	Vio	25℃	-	2	7	mV	VOUT=1.4[V]
		full range	-	-	15		VCC=5～36[V], VOUT=1.4[V]
Input Offset Current (*6)	Iio	25℃	-	5	50	nA	VOUT=1.4[V]
		full range	-	-	200		
Input Bias Current (*6)	Ib	25℃	-	50	250	nA	VOUT=1.4[V]
		full range	-	-	500		
Input Common-mode Voltage Range	Vicm	25℃	0	-	VCC-1.5	V	-
Large Signal Voltage Gain	AV	25℃	88	100	-	dB	VCC=15[V], VOUT=1.4～11.4[V], RL=15[kΩ], VRL=15[V]
Supply Current	ICC	25℃	-	0.6	1	mA	VOUT=open
		full range	-	-	2.5		VOUT=open, VCC=36[V]
Output Sink Current	IOL	25℃	6	16	-	mA	VIN+=0[V], VIN-=1[V], VOL=1.5[V]
Output Saturation Voltage (Low level Output Voltage)	VOL	25℃	-	150	400	mV	VIN+=0[V], VIN-=1[V], IOL=4[mA]
		full range	-	-	700		
Output Leakage Current (High Level Output Current)	Ileak	25℃	-	0.1	-	nA	VIN+=1[V], VIN-=0[V], VOH=5[V]
		full range	-	-	1	μA	VIN+=1[V], VIN-=0[V], VOH=36[V]
Response Time	Tre	25℃	-	1.3	-	μs	RL=5.1[kΩ], VRL=5[V], VIN=100[mVp-p], overdrive=5[mV]
			-	0.4	-		RL=5.1[kΩ], VRL=5[V], VIN=TTL Logic Swing, VREF=1.4[V]

(*6) Absolute value.

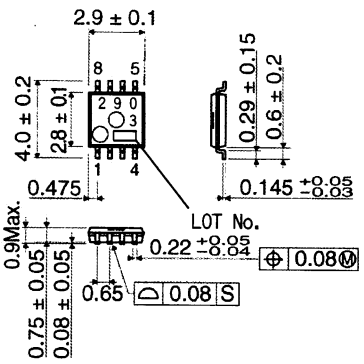
○Physical Dimensions



BA2903F(SOP8) (Unit:[mm])

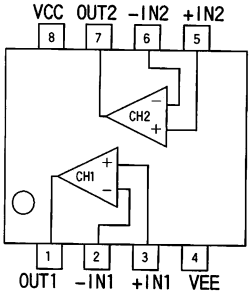


BA2903FV(SSOP-B8) (Unit:[mm])



BA2903FVM(MSOP8) (Unit:[mm])

○Block diagram



F:SOP8 FV:SSOP-B8 FVM:MSOP8

○Pin No. • Pin Name

Pin No.	Pin Name
1	OUT1
2	-IN1
3	+IN1
4	VEE
5	+IN2
6	-IN2
7	OUT2
8	VCC

○Application example

(1) Absolute maximum ratings

Absolute maximum ratings are the values which indicate the limits, within which the given voltage range can be safely charged to the terminal. However, it does not guarantee the circuit operation.

(2) The example of disabled circuit application

When there is a circuit not in use, it is recommended to make the non-inverting input terminal be the potential in the common-mode input voltage range like in Fig.1.

(3) Applied voltage to the input terminal

Regardless of power supply voltage, VEE+36 [V] can be applied to input terminals without deterioration or destruction of its characteristics. However, this does not guarantee a circuit operation. Note that circuits do not operate normally with input voltage not within input common mode voltage in terms of the electrical characteristics.

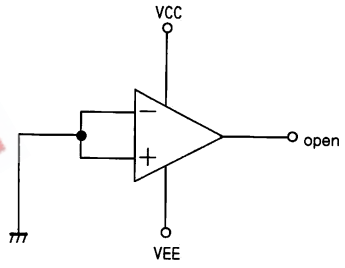


Fig.1 The example of disabled circuit

(4) Operating power supply (split power supply/single power supply)

The Comparator operates if a given level of voltage is applied between VCC and VEE. Therefore, the Comparator can be operated under single power supply or split power supply.

(5) Power dissipation(Pd)

If the IC is used under excessive power dissipation. An increase in the chip temperature will cause deterioration of the radical characteristics of IC.
For example, reduction of current capability. Take consideration of the effective power dissipation and thermal design with a sufficient margin. Pd is reference to the provided power dissipation curve.

(6) Short circuits between pins and incorrect mounting

Short circuits between pins and incorrect mounting when mounting the IC on a printed circuits board, take notice of the direction and positioning of the IC.
If IC is mounted erroneously, It may be damaged. Also, when a foreign object is inserted between output, between output and VCC terminal or VEE terminal which causes short circuit, the IC may be damaged.

(7) Output short circuit

If short circuit occurs between the output terminal and VCC terminal, excessive in output current may flow and generate heat, causing destruction of the IC. Take due care.

(8) Using under strong electromagnetic field

Be careful when using the IC under strong electromagnetic field because it may malfunction.

(9) Usage of IC

When stress is applied to the IC through warp of the printed circuit board, The characteristics may fluctuate due to the piezo effect.
Be careful of the warp of the printed circuit board.

(10) Testing IC on the set board

When testing IC on the set board, in cases where the capacitor is connected to the low impedance, make sure to discharge per fabrication because there is a possibility that IC may be damaged by stress. When removing IC from the set board, it is essential to cut supply voltage.
As a countermeasure against the static electricity, observe proper grounding during fabrication process and take due care when carrying and storage it.

(11) Output terminal capacitor

Tr in circuits may be damaged when VCC terminal and VEE terminal is shorted with the charged output terminal capacitor.
When IC is used as a comparator or as an application circuit, where oscillation is not activated by an output capacitor, the output capacitor must be kept below 10[μF] in order to prevent the damage mentioned above.

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