

STRUCTURE SILICON MONOLITHIC INTEGRATED CIRCUIT

FUNCTION HIGH SLWE RATE QUAD OPERATIONAL AMPLIFIERS

PRODUCT SERIES BA3474F BA3474FV

## FEATURES

- Operating temperature range(BA3474F:-40~+75[°C], BA3474FV:-40~+85[°C]) • High slew rate (10[V/us] typ.)
- Wide output voltage range  $(-14.7[V] \sim 14.0[V]$  with VCC/VEE=+15[V]/-15[V] typ.)
- Operable with a single power supply.  $(3[V] \sim 36[V])$

### OABSOLUTE MAXIMUM RATINGS(Ta=25[°C])

Parameter	Symbol		Rating	Unit
Supply Voltage	VCC-VEE		+36	۷
Power dissipation	D.I	BA3474F	610(*1)(*3)	
	Pd	BA3474FV	870 (*2) (*3)	– mW
Differential Input Voltage (*4)	Vid		36	٧
Input Common Voltage Range	Vicm		(VEE−0. 3) ~VEE+36	۷
Operating Temperature	т	BA3474F	-40~+75	20
	Topr	BA3474FV	-40~+85	°C
Storage Temperature		lstg	-55~+150	°C
Maximum junction Temperature	Т	jmax	150	°C

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

(\*1) To use at temperature above Ta=25[°C] reduce 4.9[mW]/[°C].

(\*2) To use at temperature above Ta=25[°C] reduce 7.0[mW]/[°C].

(\*3) Mounted on a glass epoxy  $PCB(70[mm] \times 70[mm] \times 1.6[mm])$ .

(\*4) 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.

#### OOPERATING CONDITION

Parameter	Symbol	Rating	Unit
Supply Voltage	100	+3.0~+36.0 (Single Supply)	V
	VCC	$\pm 1.5 \sim \pm 18.0$ (Split Supply)	v



# $\label{eq:observed_constraint} OELECTRICAL \ CHARACTERISTICS \ (unless \ otherwise \ specified \ VCC=+15[V], \ VEE=-15[V], \ Ta=25[^{\circ}C])$

DELECTRICAL CHARACTERISTICS			pecified V	JO-'IJ[V].	VLL- IJL	
Parameter	Symbol	Gu	aranteed Lim	it	llnit	Condition
	Symbol	Min.	Тур.	Max.	Unit	
Input Offset Voltage (*5)	Vie	-	1	10	mV	Vicm=O[V],Vout=O[V]
	Vio	-	1.5	10		VCC=5[V], VEE=0[V], Vicm=0[V], VOUT=VCC/2
Input Offset Current (*5)	lio	-	6	75	nA	Vicm=O[V],Vout=O[V]
Input Bias Current (*5)	Ib	-	100	500	nA	Vicm=O[V],Vout=O[V]
Supply Current	ICC	-	8	11	mA	RL=∞ All Op-Amps
High Level Output Voltage		3. 7	4	-		VCC=5[V], RL=2[kΩ]
	VOH	13. 7	14	-	v	RL=10[kΩ]
		13. 5	-	-		RL=2[kΩ]
Low Level Output Voltage		-	0. 1	0. 3		VCC=5[V], RL=2[kΩ]
	VOL	-	-14. 7	-14.3	v	RL=10[kΩ]
		-	-	-13.5		RL=2[kΩ]
Large Signal Voltage Gain	AV	80	100	-	dB	$RL \ge 2[k\Omega], Vout=\pm 10[V]$
Input Common-mode Voltage Range	Vicm	0	-	VCC-2. 0	v	VCC=5[V], VEE=0[V], VOUT=VCC/2
Common-mode Refection Ratio	CMRR	60	97	-	dB	Vicm=O[V],Vout=O[V]
Power Supply Rejection Ratio	PSRR	60	97	-	dB	Vicm=O[V],Vout=O[V]
Output Source Current (*6)	IOH	10	30	-	mA	VIN+=1[V],VIN-=0[V],Vout=0[V], Only 1CH is short circuit
Output Sink Current (*6)	IOL	20	30	-	mA	VIN+=O[V],VIN-=1[V],Vout=5[V], Only 1CH is short circuit
Maximum Frequency	ft	-	4	-	MHz	
Slew rate	SR	-	10	-	V/μs	Av=1,Vin=-10 to +10[V],RL=2[kΩ]
Channel Separation	CS	-	120	-	dB	

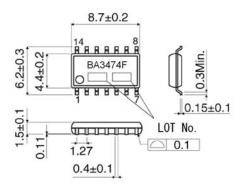
(\*5) Absolute value.

(\*6) Under the high temperature environment, consider the power dissipation of IC when select the output current.

When output terminal short circuits continuously, the output current reduce to climb temperature inside IC by flash.

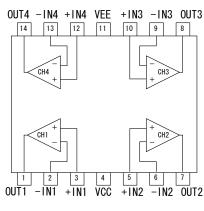


O Physical Dimensions



BA3474F(SOP14) (Unit : [mm])

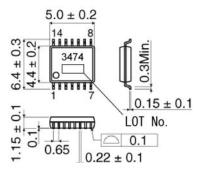
OBlock diagram



F:SOP14 FV:SSOP-B14

### OApplication example

- 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. Circuit operation is guaranteed within "Operating Conditions".
- (3) Applied voltage to the input terminal For normal circuit operation of comparator, please input voltage for its input terminal within input common mode voltage VCC-1.5[V]. Then, regardless of power supply voltage, VEE+36[V] can be applied to input terminals without deterioration or destruction of its characteristics.
- (4) Operating power supply (split power supply/single power supply) The OP-Amp operates if a given level of voltage is applied between VCC and VEE. Therefore, the OP-Amp can be operated under single power supply or split power supply.



#### BA3474FV(SSOP-B14) (Unit: [mm])

OPin No. • Pin Name

Pin No.	Pin Name
1	OUT1
2	-IN1
3	+1N1
4	VCC
5	+1N2
6	-1N2
7	OUT2
8	OUT3
9	-1N3
10	+1N3
11	VEE
12	+1N4
13	-IN4
14	OUT4

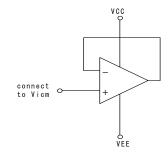


Fig.1 The example of disabled circuit



#### (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

(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.

design with a sufficient margin. Pd is reference to the provided power dissipation curve.

- (7) Using under strong electromagnetic field Be careful when using the IC under strong electromagnetic field because it may malfunction.
- (8) 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.

(9) Output operation

This IC is configured with a push-pull circuit and Class C output stage. Therefore, when load resistance is connected to the middle point potential of VCC and VEE, this configuration generates crossover distortion when switching between source and sink current. To suppress crossover distortion, connect a resistor between the output terminal and VEE then increase the bias current to enable Class A operation.

(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.

(12) The IC destruction caused by capacitive load

The transistors 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 application circuits no constructed negative feed back, where oscillation is not activated by an output capacitor, the output capacitor must be kept below  $0.1[\mu F]$  in order to prevent the damage mentioned above.

(13) The oscillation caused by capacitive load Designed negative feedback circuit using this IC, verify output oscillation caused by capacitive load.

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