STRUCTURE SILICON MONOLITHIC INTEGRATED CIRCUIT

FUNCTION OUTPUT FULL SWING SINGLE CMOS OPERATIONAL AMPLIFIER

PRODUCT SERIES **BU7465HFV**
BU7465SHFV

FEATURES
- Wide operating temperature range (BU7465S : -40[℃]～105[℃])
- Low input bias current(1[pA] typ.)
- Slew Rate(1.0[V/μs] typ.)
- Low supply current(120[μA] typ.)
- Wide input and output voltage range(VSS～VDD)
- Low power supply voltage operation(1.7[V]～5.5[V])
- Small package HVSOF5

○ABSOLUTE MAXIMUM RATINGS(Ta=25[℃])

Parameter	Symbol		Rating	Unit
Supply Voltage	VDD-VSS		+7	V
Power dissipation	Pd		535(*1)(*2)	mW
Differential Input Voltage(*3)	Vid		VDD-VSS	V
Input Common-mode Voltage Range	Vicm		(VSS-0.3)～VDD+0.3	V
Operating Temperature range	Topr	BU7465	-40～+85	℃
		BU7465S	-40～+105	
Storage Temperature Range	Tstg		-55～+125	℃
Maximum junction Temperature	Tjmax		+125	℃

・This IC is not designed for protection against radioactive rays.
(*1) To use at temperature above Ta=25[℃] reduce 5.35[mW].
(*2) Mounted on a glass epoxy PCB(70[mm]×70[mm]×1.6[mm]).
(*3) The voltage difference between inverting input and non-inverting input is the differential input voltage. Then input terminal voltage is set to more than VSS.

○OPERATING CONDITION(BU7465:Ta=-40[℃]～+85[℃] BU7465S:Ta=-40[℃]～+105[℃])

Parameter	Symbol	Rating	Unit
Supply Voltage	VDD	+1.7～+5.5 (Single Supply)	V

○ELECTRICAL CHARACTERISTICS (unless otherwise specified VDD=+3[V]、VSS=0[V])

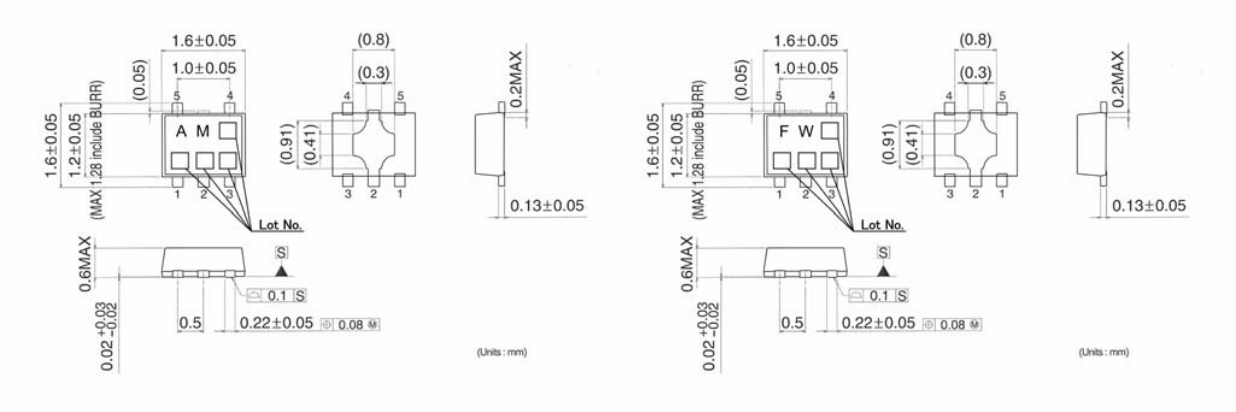
Parameter	Symbol	Temperature	Min	Typ	Max	Unit	Condition
Input offset voltage(*4)	Vio	25℃	-	1	6	mV	
Input offset current(*4)	Iio	25℃	-	1	-	pA	
Input bias current(*4)	Ib	25℃	-	1	-	pA	
Supply current(*6)	IDD	25℃	-	120	300	μA	RL=∞ All Op-Amps AV=0[dB], VIN=0.9[V]
		Full range	-	-	400		
High level output voltage	VOH	25℃	VDD-0.1	-	-	V	RL=10[kΩ]
Low level output voltage	VOL	25℃	-	-	VSS+0.1	V	RL=10[kΩ]
Large signal voltage gain	AV	25℃	60	100	-	dB	RL=10[kΩ]
Input common mode voltage	Vicm	25℃	0	-	1.8	V	VSS～VDD
Common mode rejection ratio	CMRR	25℃	45	60	-	dB	
Power supply rejection ratio	PSRR	25℃	60	80	-	dB	
Output source current(*5)	IOH	25℃	4	8	-	mA	VDD-0.4[V]
Output sink current(*5)	IOL	25℃	9	18	-	mA	VSS+0.4[V]
Slew rate	SR	25℃	-	1.0	-	V/μs	CL=25[pF]
Gain band width	FT	25℃	-	1.2	-	MHz	CL=25[pF], AV=40[dB]
Phase margin	θ	25℃	-	60°	-		CL=25[pF], AV=40[dB]
Total harmonics distortion	THD	25℃	-	0.05	-	%	VOUT=0.8[Vp-p], f=1[kHz]

(*4) Absolute value

(*5) Reference to power dissipation under the high temperature environment and decide the output current.
Continuous short circuit is occurring the degenerate of output current characteristics.

(*6) Full range BU7465:-40[℃]～+85[℃] BU7465S:-40[℃]～+105[℃]

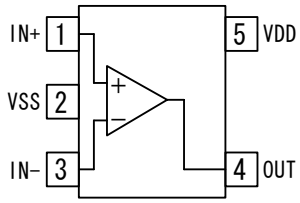
○Physical Dimensions



BU7465HFV(HVSOF5) (Unit : [mm])

BU7465SHFV(HVSOF5) (Unit : [mm])

○Block diagram



HFV:HVSOF5

○Pin No.・Pin Name

Pin No.	Pin Name
1	IN+
2	VSS
3	IN−
4	OUT
5	VDD

○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) Applied voltage to the input terminal

For normal circuit operation of operational amplifier, please input voltage for its input terminal within input common mode voltage VDD+0.3[V]. Then, regardless of power supply voltage, VSS-0.3[V] can be applied to input terminals without deterioration or destruction of its characteristics.

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

The operational amplifier operates if a given level of voltage is applied between VDD and VSS. Therefore, the operational amplifier can be operated under single power supply or split power supply.

(4) 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.

(5) 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 VDD terminal or VSS terminal which causes short circuit, the IC may be damaged.

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

(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) 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.

(10) The IC destruction caused by capacitive load
The transistors in circuits may be damaged when VDD terminal and VSS terminal is shorted with the charged output terminal capacitor.
When IC is used as a operational amplifier or as an application circuit, where oscillation is not activated by an output capacitor,the output capacitor must be kept below 0.1[μF] in order to prevent the damage mentioned above.

(11) Decupling capacitor
Insert the deculing capacitance between VDD and VSS, for stable operation of operational amplifier.

(12) Latch up
Be careful of input vltage that exceed the VDD and VSS. When CMOS device have sometimes occur latch up operation. And protect the IC from abnormaly noise

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