

LINEAR IC

QUAD OPERATIONAL AMPLIFIER

MB3614

QUAD OPERATIONAL AMPLIFIER OPERATES FROM A SINGLE OR DUAL POWER SUPPLY

The Fujitsu MB3614 is a Quad operational amplifier having a phase compensatory circuitry and operates from a single power supply or dual power supplies.

The device has equivalent electrical characteristics of current industrial standard operational amplifier and requires low power supply current.

MB3614 can be high density mounted because it integrates 4 circuits in DIP/FPT 14-pin package.

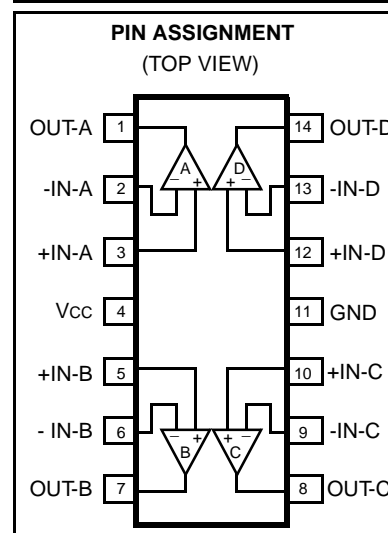
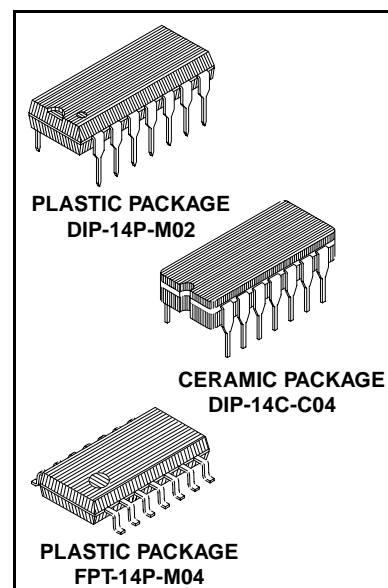
- No phase compensation required
- Wide power supply voltage
 - Single power supply: +3 to +30 V
 - Dual power supplies: ± 1.5 to ± 15 V
- Wide input common mode range: 0 to ($V_{CC} - 1.5$) V
- Low power supply current: 0.8 mA typ.
- Low input offset voltage: 2 mV typ.
- Package
 - 14-pin Plastic DIP package (Suffix: -P)
 - 14-pin Ceramic DIP package (Suffix: -Z)
 - 14-pin Plastic FPT package (Suffix: -PF)

■ ABSOLUTE MAXIMUM RATINGS (see NOTE)

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

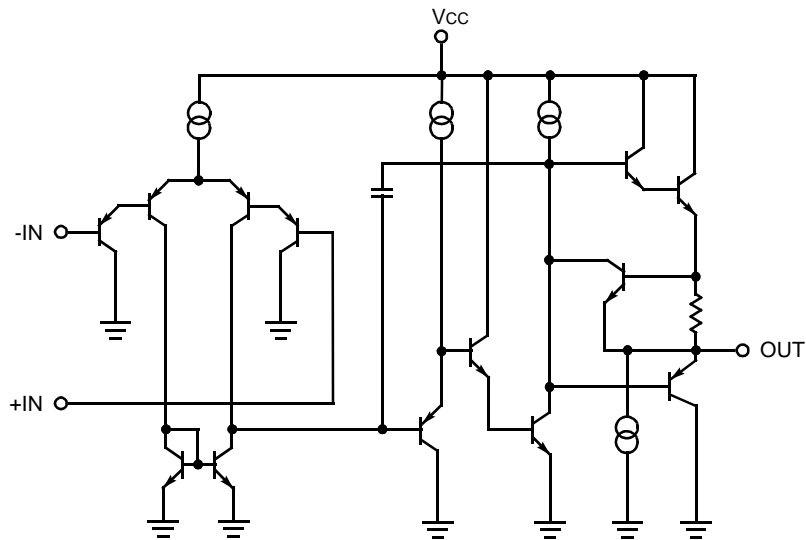
Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	36	V
Differential Input Voltage	V_{ID}	36	V
Input Common Mode Voltage	V_I	-0.3 to +36	V
Power Dissipation	P_D	570	mW
Operating Temperature	T_A	-20 to +75	$^\circ\text{C}$
Storage Temperature	Plastic	T_{STG}	-55 to +125 $^\circ\text{C}$
	Ceramic	T_{STG}	-65 to +150 $^\circ\text{C}$

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.



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.

Fig. 1 — EQUIVALENT CIRCUIT



■ ELECTRICAL CHARACTERISTICS

($V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$)

Parameter	Symbol	Condition	Value			Unit
			Min	Typ	Max	
Input Offset Voltage	V_{IO}	—	—	2	7	mV
Input Offset Current	I_{IO}	—	—	5	50	nA
Input Bias Current	I_I^*	—	—	45	250	nA
Power Supply Current	I_{CC}	$R_L = \infty$	—	0.8	2.0	mA
Input Common Mode Voltage	V_{CM}	—	0	—	$V_{CC} - 1.5$	V
Voltage Gain	A_V	$R_L \geq 2\text{k}\Omega$	25	100	—	V/mV
Output Voltage	V_{OH}	$V_{CC} = 30\text{V}$, $R_L = 2\text{k}\Omega$	26	28	—	V
	V_{OL}	$V_{CC} = 5\text{V}$, $R_L \leq 10\text{k}\Omega$	—	5	20	mV
Output Current	I_{SOURCE}	$V_{CC} = 15\text{V}$, $V_{IN} = +1\text{V}$	20	40	—	mA
	I_{SINK}	$V_{CC} = 15\text{V}$, $V_{IN} = -1\text{V}$	10	20	—	mA
Common Mode Rejection Ratio	CMRR	—	65	85	—	dB
Power Supply Voltage Rejection Ratio	SVRR	—	65	100	—	dB
Channel Separation	CS	—	—	120	—	dB

Note:

* A direction of the input bias current flows from IC because first input transistor consists of PNP.

■ TYPICAL CHARACTERISTICS CURVES

Fig. 2 - Power Supply Current vs. Power Supply Voltage

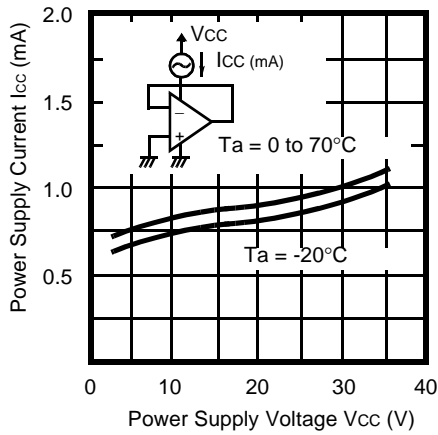


Fig. 3 - Input Bias Current vs. Temperature

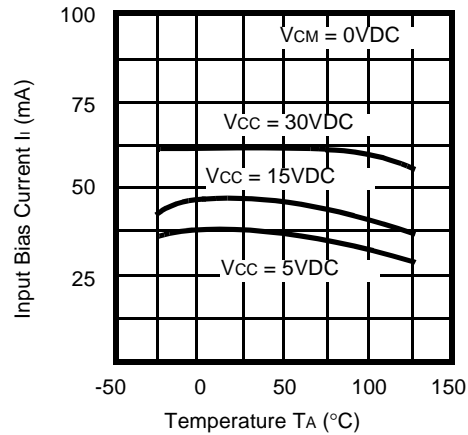


Fig. 4 - Voltage Gain vs. Power Supply Voltage

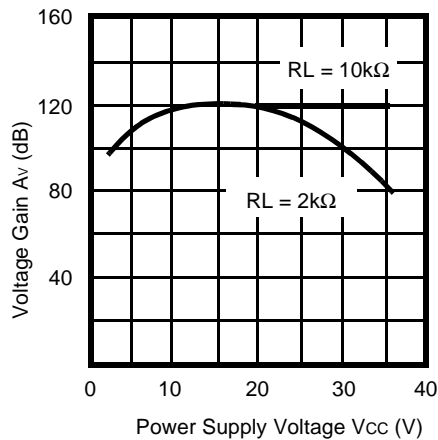


Fig. 5 - Voltage Gain vs. Frequency

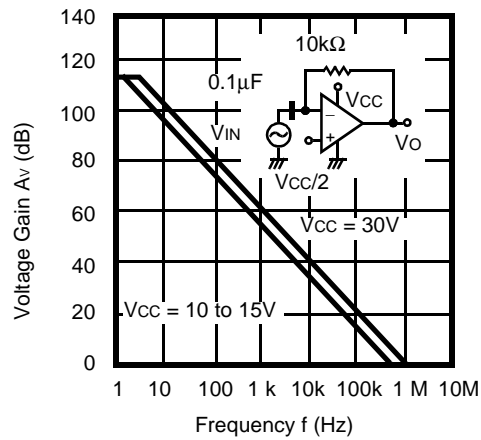


Fig. 6 - Output Voltage vs. Frequency

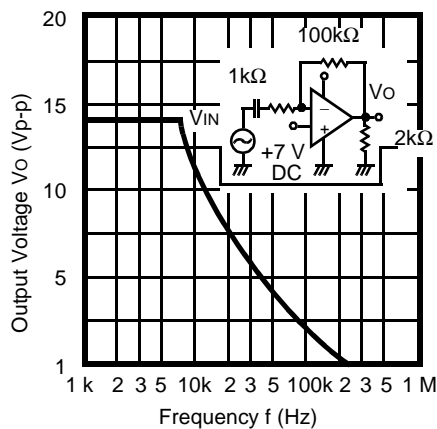
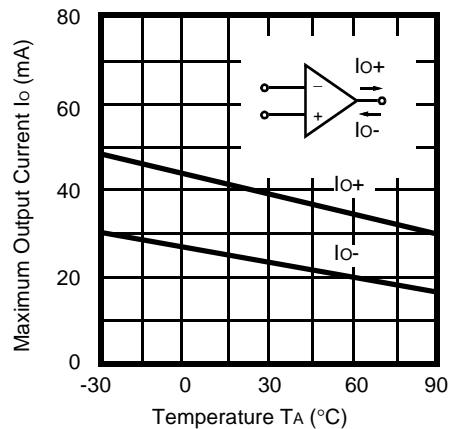


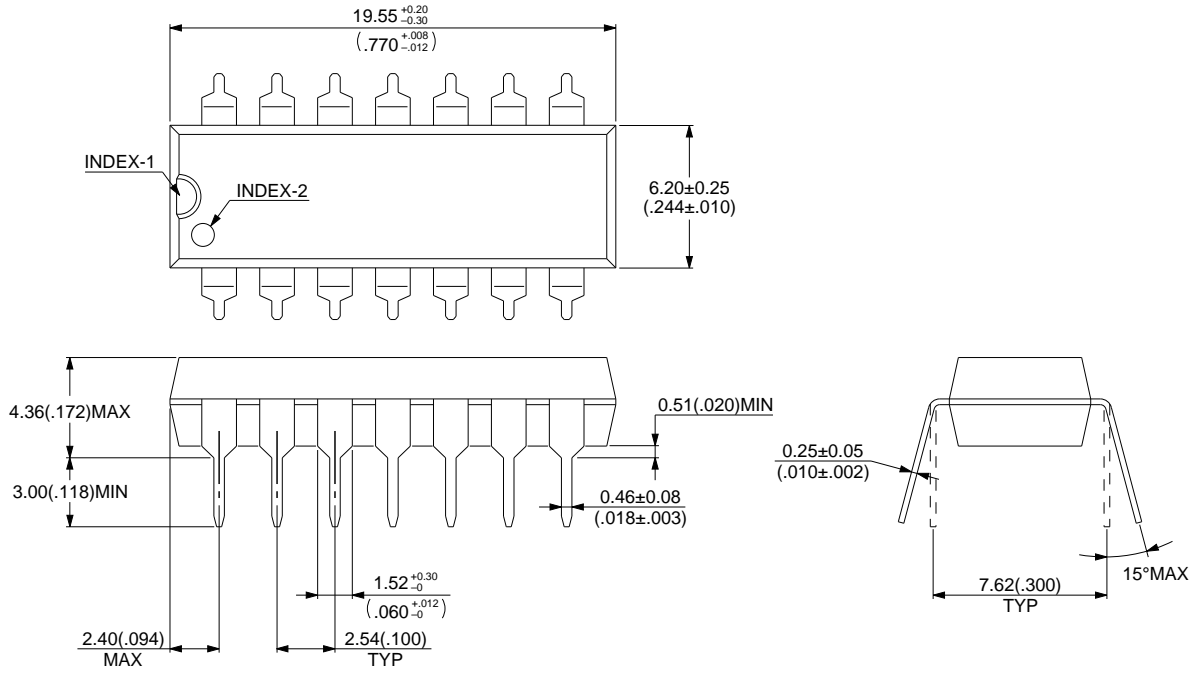
Fig. 7 - Maximum Output Voltage vs. Temperature



MB3614

■ PACKAGE DIMENSIONS

14 pin, Plastic DIP
(DIP-14P-M02)

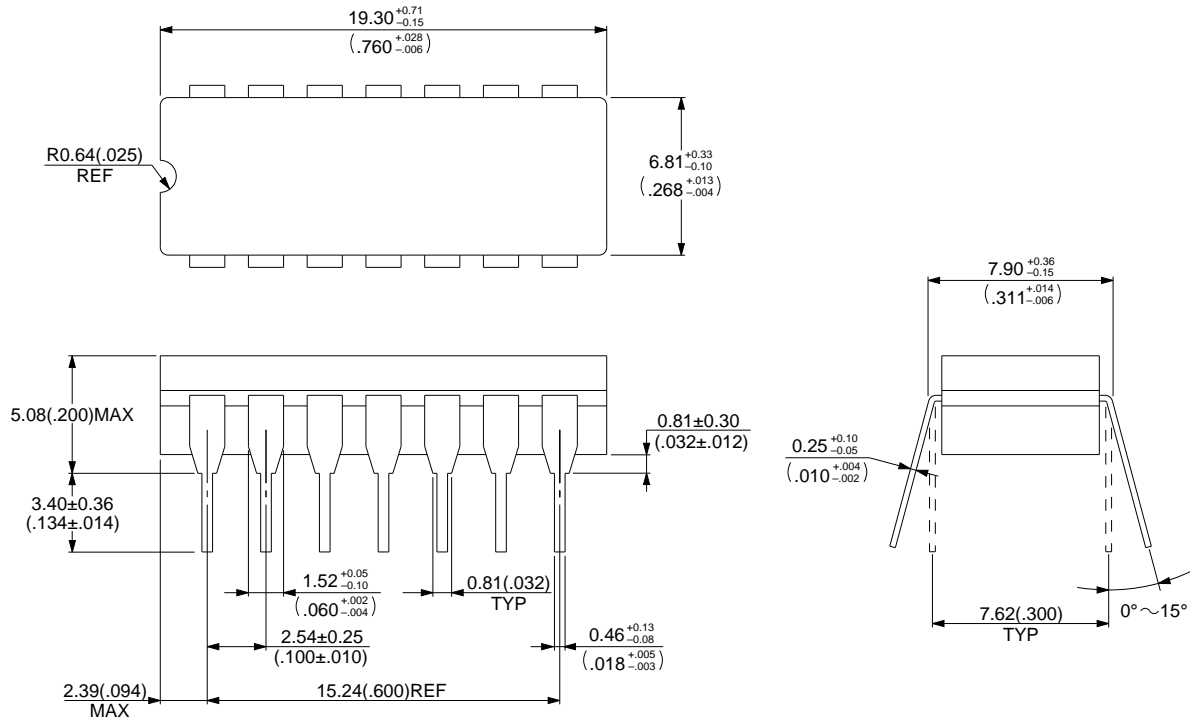


© 1994 FUJITSU LIMITED D14010S-4C-3

Dimensions in mm(inches).

■ PACKAGE DIMENSIONS (Continued)

14 pin, Ceramic DIP
(DIP-14C-C04)



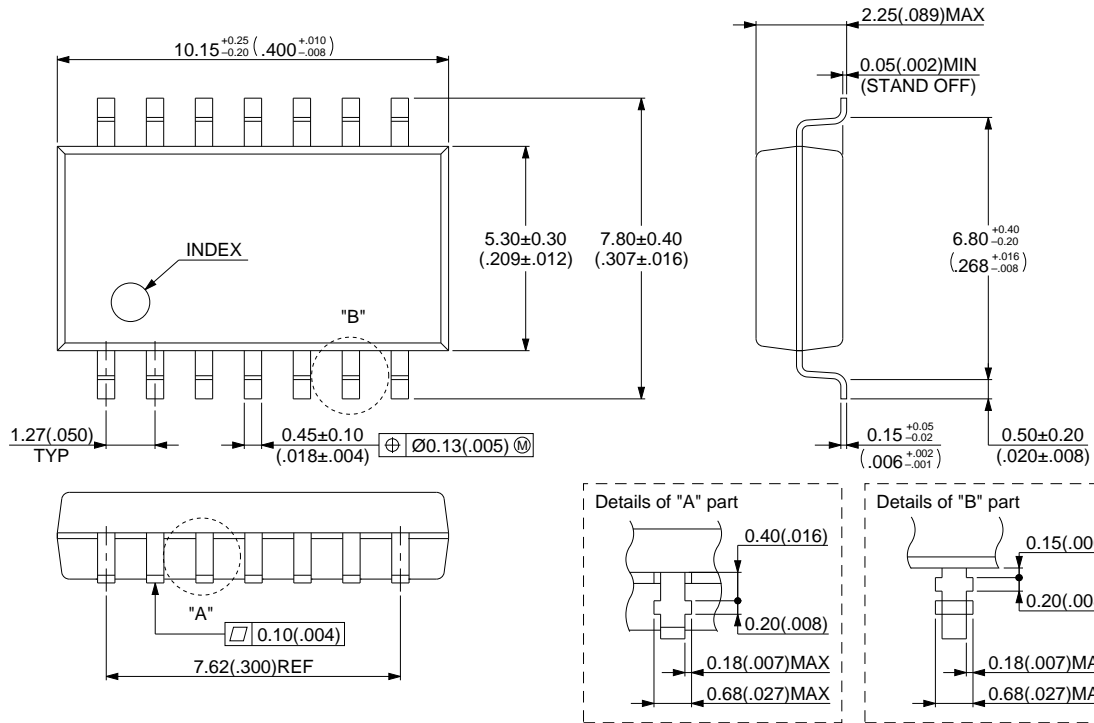
© 1994 FUJITSU LIMITED D14006SC-2-3

Dimensions in mm(inches).

MB3614

■ PACKAGE DIMENSIONS (Continued)

14 pin, Plastic SOP
(FPT-14P-M04)



© 1994 FUJITSU LIMITED F14010S-2C-4

Dimensions in mm(inches).

FUJITSU LIMITED

All Rights Reserved.

The contents of this document are subject to change without notice. Customers are advised to consult with FUJITSU sales representatives before ordering.

The information and circuit diagrams in this document are presented as examples of semiconductor device applications, and are not intended to be incorporated in devices for actual use. Also, FUJITSU is unable to assume responsibility for infringement of any patent rights or other rights of third parties arising from the use of this information or circuit diagrams.

The products described in this document are designed, developed and manufactured as contemplated for general use, including without limitation, ordinary industrial use, general office use, personal use, and household use, but are not designed, developed and manufactured as contemplated (1) for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite).

Please note that Fujitsu will not be liable against you and/or any third party for any claims or damages arising in connection with above-mentioned uses of the products.

Any semiconductor devices have an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions.

If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Law of Japan, the prior authorization by Japanese government will be required for export of those products from Japan.

F9703

© FUJITSU LIMITED Printed in Japan