April 1990
Edition 1.0

FUJITSU

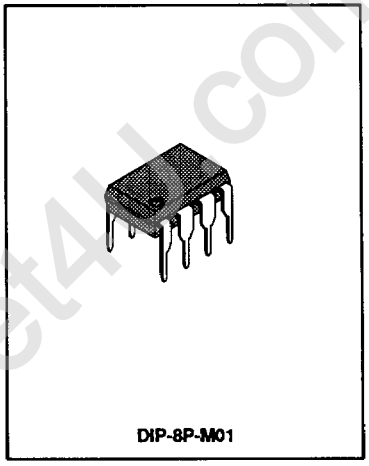
PRODUCT PROFILE

MB4207
Frequency-to-Voltage Converter

DESCRIPTION

The Fujitsu MB4207 is a single power supply frequency-to-voltage converter with a comparator. The MB4207 can stabilize a noisy signal using the charge pump driven by a Schmitt trigger and flip-flop circuit.

The comparator provides precise hysteresis output due to clamping at the reference voltage with Zener diode.



DIP-8P-M01

FEATURES

- An RC pair provides the coefficient of conversion:

$$V_O = \frac{2}{3} \cdot V_Z \cdot C_T \cdot R_T \cdot f_{IN}$$

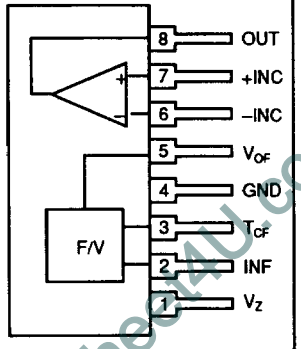
- Output is clamped at the built-in reference voltage (High-level).
- Positive-edge trigger frequency input.

ABSOLUTE MAXIMUM RATING (T_A = 25°C)

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	24[1]	V
Surge Voltage at V_{CC}	V_{CCS}	100[2]	V
Zener Current	I_Z	30	mA
Power Dissipation	P_D	300[3]	mW
Operating Temperature	T_{OP}	−30 to +85	°C
Storage Temperature	T_{STG}	−55 to +125	°C

Notes: [1] R_s = 680 Ω
[2] t < 50 msec, R_s = 680 Ω
[3] T_A<85°C

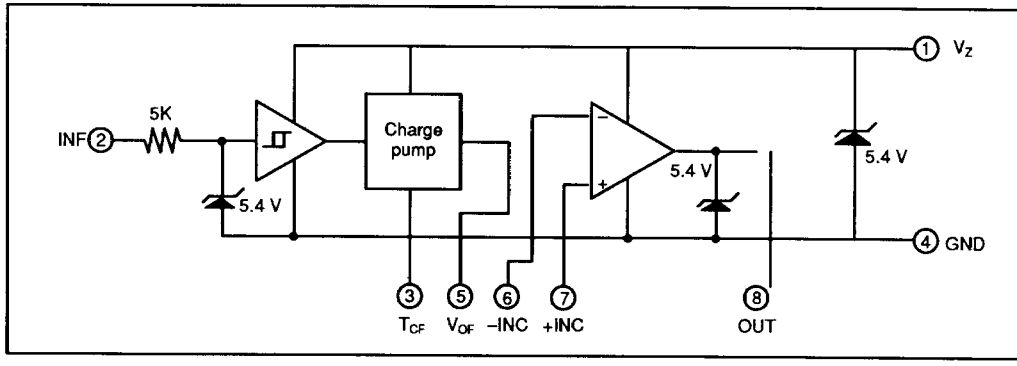
Pin Assignment (Front View)



Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operation 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.

BLOCK DIAGRAM



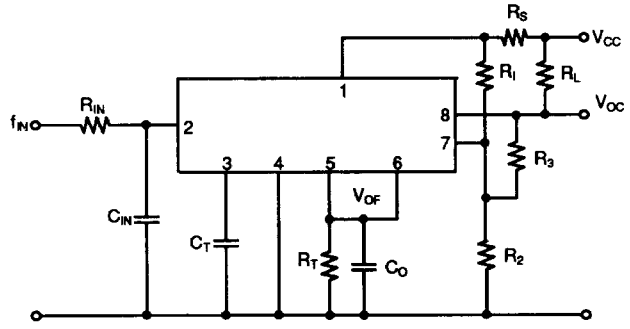
ELECTRICAL CHARACTERISTICS

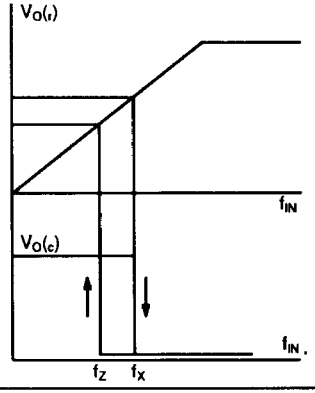
(T_A = 25 °C, V_{CC} = 12V, R_S = 680Ω)

Parameter		Conditions	Symbol	Value			Unit
				Min.	Typ.	Max.	
Supply Current		R_S=0Ω, V_{CC}=4.8V	I_{CC}	–	3.0	5.0	mA
Reference Voltage		See Figure 1	V_Z	5.0	5.4	5.8	V
		V_{CC} = 10 to 16 V	ΔV_Z	—	0.05	0.1	V
V/F CONVERTER	Input High Level		V_{IH}	2.4	–	24	V
	Input Low Level		V_{IL}	0	–	1.2	V
	Positive-edge			1	–	–	V/ms
	Negative-edge			0.1	–	–	V/ms
	Input Current	V_{IHF} = 24 V V_{ILF} = 1.2 V	I_{INF}	— —	4 —	8 0.1	mA mA
	Output Current	V_{TCF} = 2.5 V	I_{OF}	0.26	0.4	0.58	mA
	F/V Coefficient	C_T = 0.1 µF, R_T = 47k Ω f = 100 Hz	K[1]	0.9	1.0	1.1	
	Linearity Error	V_T = 0.1 µF, R_T = 47k Ω[2]		–	±0.3	–	%
COMPARATOR	Input Offset Voltage		V_{IOC}	–	2	10	mA
	Input Bias Current	(See Note[3])	I_{IBC}	–	0.5	3	µA
	Common Mode Input Voltage		V_{CM}	0	–	3	V
	Voltage Gain	R_L = 10k Ω	A_V	–	100	–	dB
	Output Voltage	I_{SINK} = 3 mA	V_{OLC}	–	0.1	0.2	V
		I_L = 0.5 mA	V_{OLC}	5.0	5.4	5.8	V
	Sink Current	V_{OLC}<1 V	I_{SINK}	8	20	–	mA

Notes: [1]$V_O = (2/3) \cdot K \cdot V_Z \cdot C_T \cdot R_T \cdot f_{IN}$
[2]At 50/100 Hz on the basis at 100 Hz.
[3]The current flows outward from the IC.

APPLICATION EXAMPLE





Operating frequency of the comparator is provided by the following equations.

$$f_X \approx \frac{3}{2C_TR_T} \cdot \frac{R_Z}{R_2 + R_I /\!/ R_3}$$

$$f_Z \approx \frac{3}{2C_TR_T} \cdot \frac{R_2 /\!/ R_3}{R_I + R_2 /\!/ R_3}$$

R_{IN} and C_{IN} are needed when the input has chattering noise.

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TYPICAL CHARACTERISTIC CURVES

Figure 1. Supply Current/Reference Voltage vs. Supply Voltage

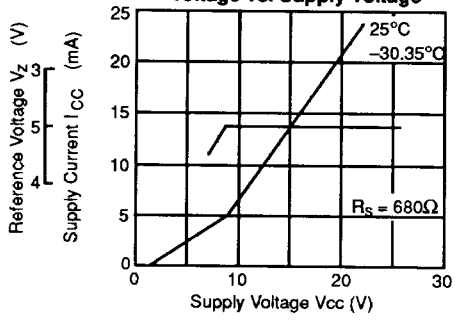


Figure 2. Output Current vs. Ambient Temperature

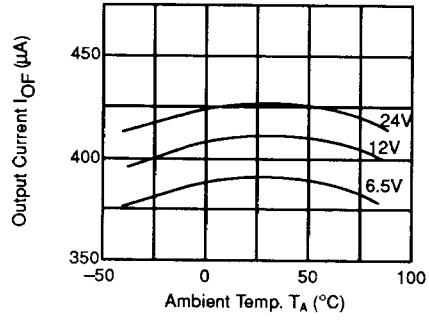
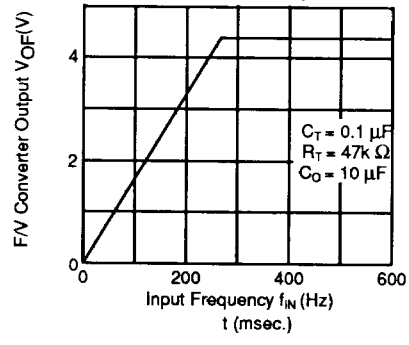


Figure 3. F/V Converter Output Voltage vs. Input Frequency



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TYPICAL CHARACTERISTIC CURVES (Continued)

Figure 4. Zener Current vs. Reference Voltage

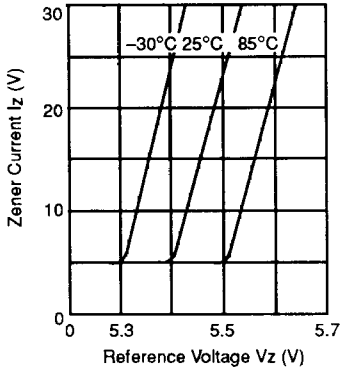


Figure 5. Low-Level Output Voltage vs. Sink Current

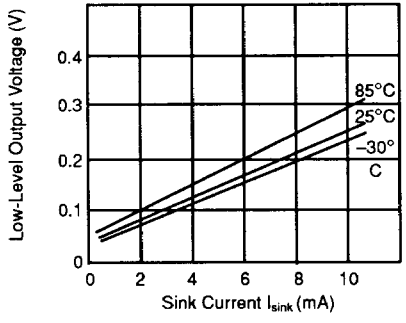
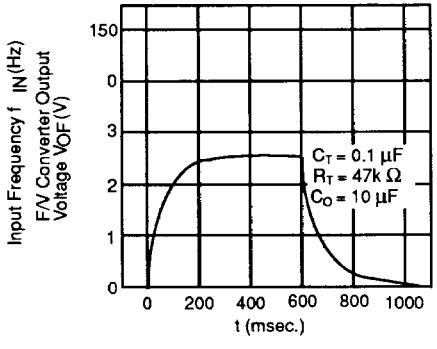


Figure 6. F/V Converter Transition Characteristics



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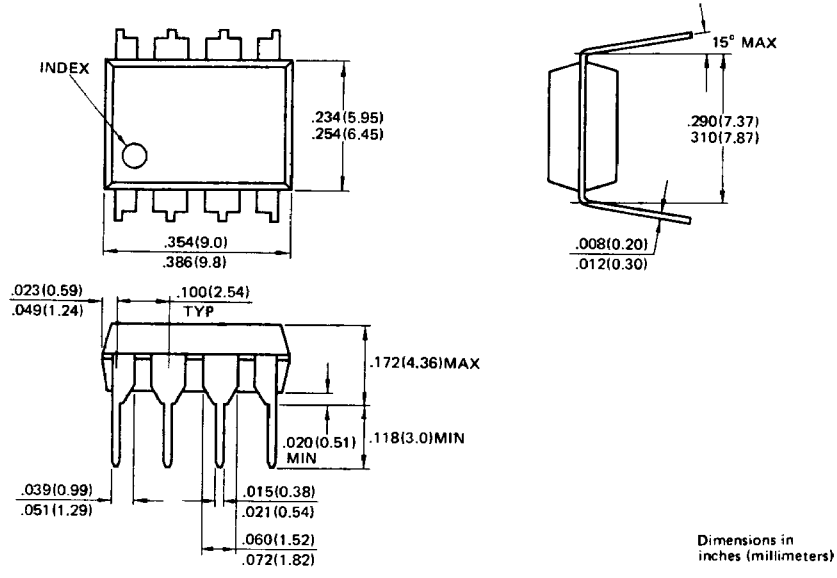
PACKAGE DIMENSIONS

8-LEAD PLASTIC DUAL IN-LINE PACKAGE
(Case No.: DIP-08-M01)



Dimensions in inches (millimeters)

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