FUJITSU SEMICONDUCTOR
DATA SHEET

DS04-13400-2E

LINEAR IC

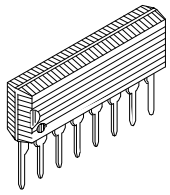
FREQUENCY-TO-VOLTAGE CONVERTER

MB4206

FREQUENCY-TO-VOLTAGE CONVERTER WITH SINGLE POWER SUPPLY COMPARATOR

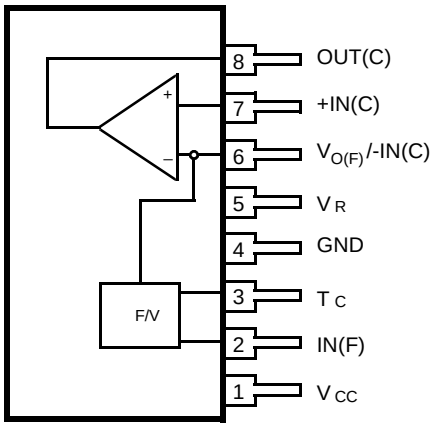
The Fujitsu MB4206 is a frequency-to-voltage converter with an on-chip comparator. The MB4206 uses a charge pump driven by a positive-edge Schmitt trigger/flip-flop input so stable operation is achieved against noise signal input. The output of the comparator is zener-clamped to a reference voltage; thus, a precise hysteresis output is obtained. The overall design makes the circuit fairly tolerant of imperfections in the input waveform.

- Conversion coefficient determined by RC pair:
  $V_{O(F)} = F_{IN} \bullet R_T \bullet C_T \bullet V_R$
- Positive edge-triggered frequency input
- Equal internal reference high-level ouput and comparator high level output
- Package
  - 8-pin plastic SIP package (Suffix: -PS)



PLASTIC PACKAGE
(SIP-08P-M03)

PIN ASSIGNMENTS



(Front View)

■ ABSOLUTE MAXIMUM RATINGS (see NOTE)

(Ta= 25°C)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	24	V
Surge Voltage at V_{CC}	$V_{CC(S)}$	40 ($t \leq 50$ms)	V
Zener Current	I_Z	20	mA
Power Dissipation	P_D	300 ($Ta \leq 85$°C)	mW
Operating Temperature	T_{OP}	-30 to +85	°C
Storage Temperature	T_{STG}	-55 to +125	°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.

Fig. 1 — MB4206 BLOCK DIAGRAM

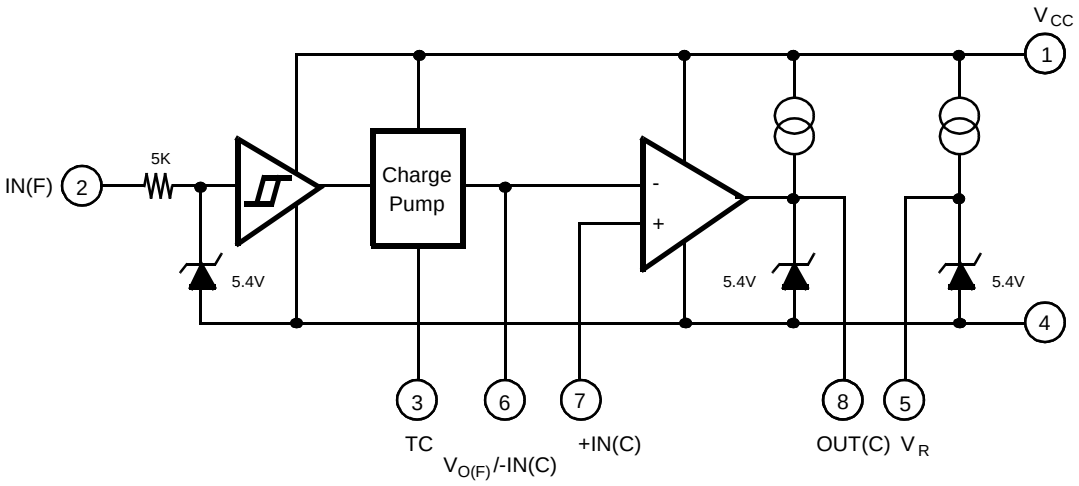
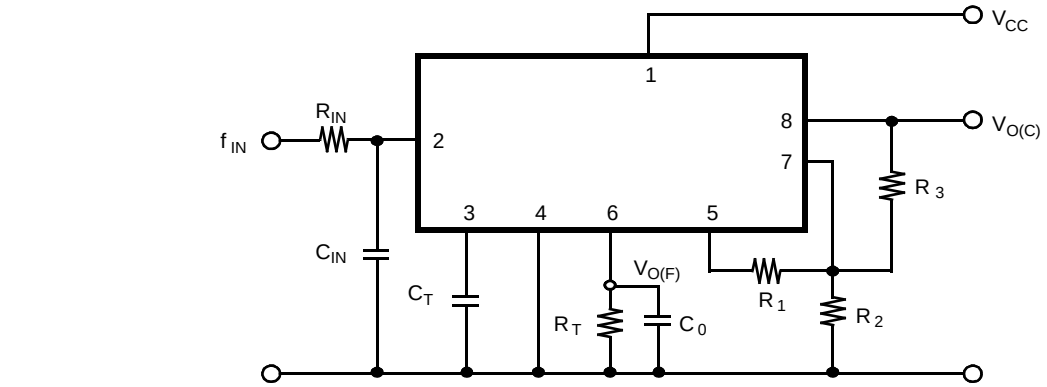
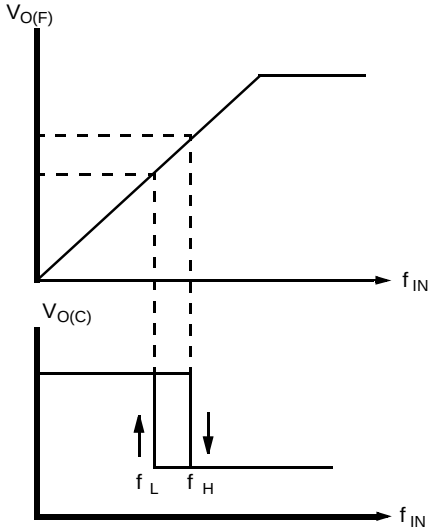


FIG. 2 — TYPICAL HOOKUP AND OPERATING PARAMETERS





The following equations define the operating frequency of the comparator.

$$f_H \doteq \frac{1}{C_T R_T} \cdot \frac{R_2}{R_2 + \frac{R_1 R_3}{R_1 + R_3}}$$

$$f_L \doteq \frac{1}{C_T R_T} \cdot \frac{R_2 R_3}{R_1 R_2 + R_1 R_3 + R_2 R_3}$$

R_{IN} and C_{IN} are needed when input noise is excessive.

■ ELECTRICAL CHARACTERISTICS

(Ta = 25°C, V_{CC} = 12V)

Parameter		Symbol	Condition	Value			Unit
				Min	Typ	Max	
Power Supplies	Power Supply Current	I_{CC}		-	7.0	10.0	mA
	Power Supply Voltage	V_{CC}		6.5	-	24	V
	Reference Voltage	V_R	$I_{L(R)}$=1mA	5.0	5.4	5.8	V
	Reference Voltage Temperature Coefficient		$I_{L(R)}$=1mA	-	+1.4	-	mV/°C
F/V Converter	Input High Voltage	V_{IH}		2.4	-	24	V
	Input Low Voltage	V_{IL}		0	-	1.2	V
	Positive-edge			1	-	-	V/ms
	Negative-edge			0.1	-	-	V/ms
	Input Current	I_I	$V_{IH(F)}$=24V	-	4	8	mA
			$V_{IL(F)}$=1.2V	-	-	0.1	mA
	Output Current	I_O	V_{TC}=2.5V	0.26	0.4	0.58	mA
	F/V Coefficient*1	K	C_T=0.1µF, R_T=47kΩ, f=100Hz	0.9	1.0	1.1	-
	Linearity*2		C_T=0.1µF, R_T=47kΩ	-	±0.3	-	%
Comparator	Input Offset Voltage	V_{IO}		-	2.0	10	mV
	Input Bias Current*3	I_I		-	0.5	3.0	µA
	Common Mode Input Voltage*4	V_{ICM}		0	-	V_R	V
	Voltage Gain	A_V	R_L=10kΩ	-	100	-	dB
	Output Voltage	V_{OL}	I_{SINK}=3mA	-	0.1	0.2	V
		V_{OH}	I_L=0.5mA	5.0	5.4	5.8	V
	Sink Current	I_{SINK}	V_{OL} ≤ 1V	8	22	-	mA

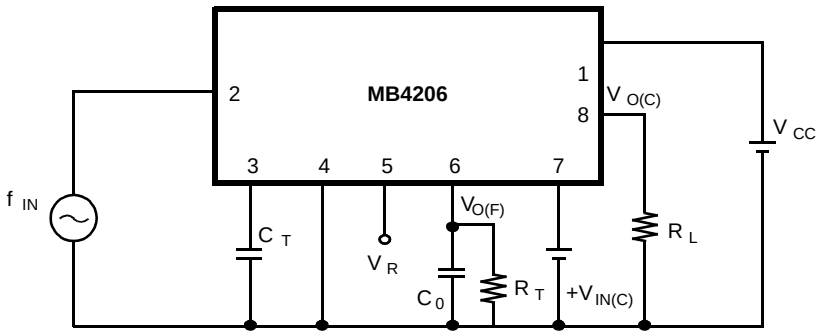
Note: *1 $V_{O(F)}=K \bullet V_R \bullet CT \bullet R_T \bullet f$

*2 With f_{IN} = 100Hz as a reference, linearity is defined as the straight-line deviation over an input frequency range of 50- to - 150 Hz — see TYPICAL PERFORMANCE CHARACTERISTICS.

*3 The current flows from IC.

*4 If V_{CC} is lower than V_R, use (V_{CC}-2).

Fig. 3 — TEST CIRCUIT



■ TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 4

POWER SUPPLY CURRENT/REFERENCE VOLTAGE vs POWER SUPPLY VOLTAGE

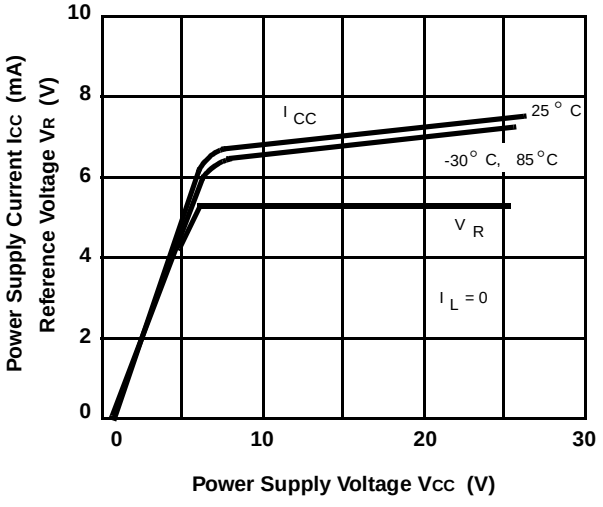
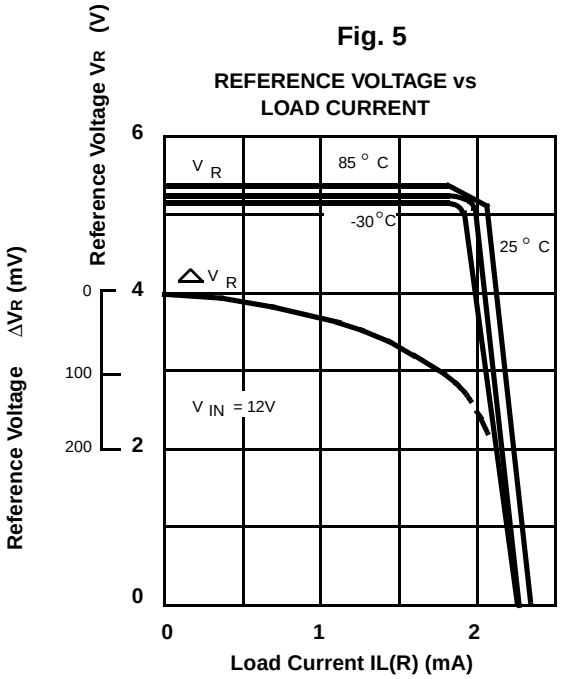


Fig. 5

REFERENCE VOLTAGE vs LOAD CURRENT



■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Fig. 6

OUTPUT CURRENT vs OPERATING TEMPERATURE

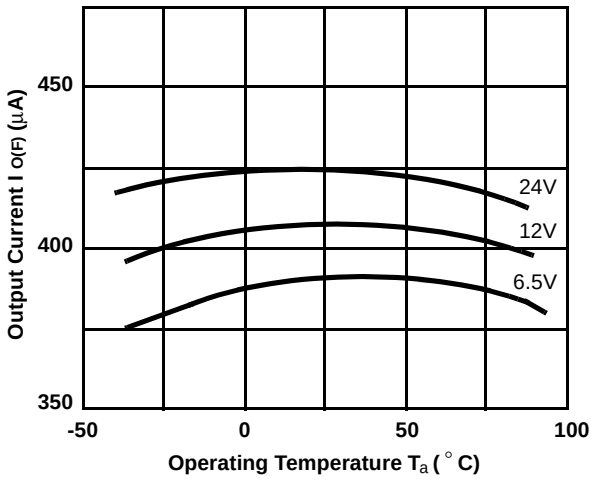


Fig. 7

OUTPUT LOW VOLTAGE vs SINK CURRENT

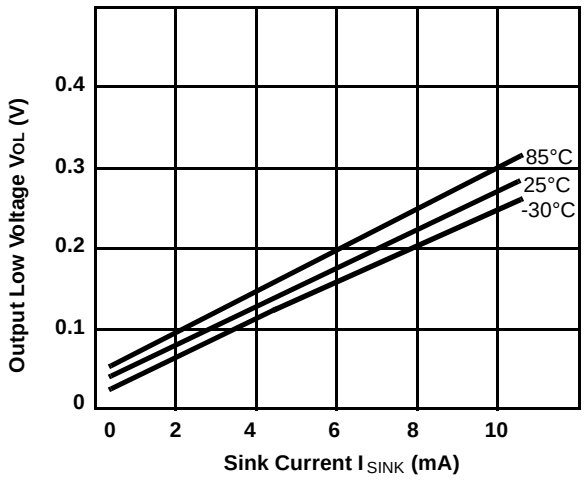


Fig. 8

F/V CONVERTER OUTPUT VOLTAGE vs INPUT FREQUENCY

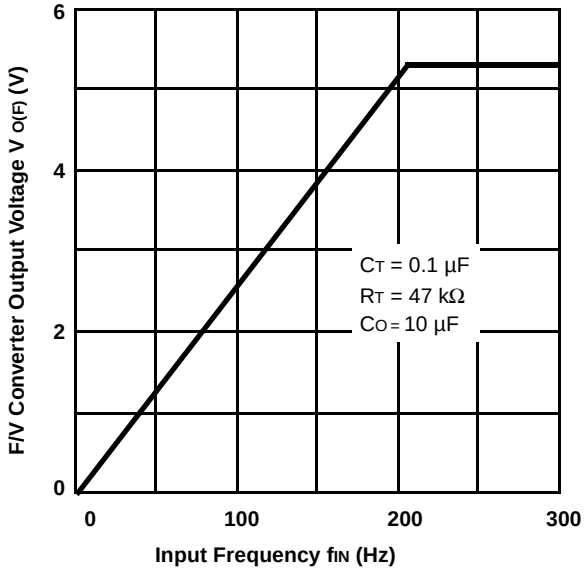
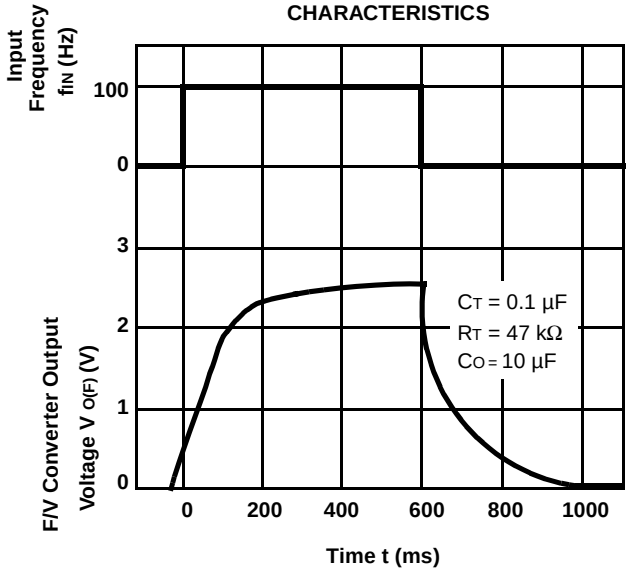


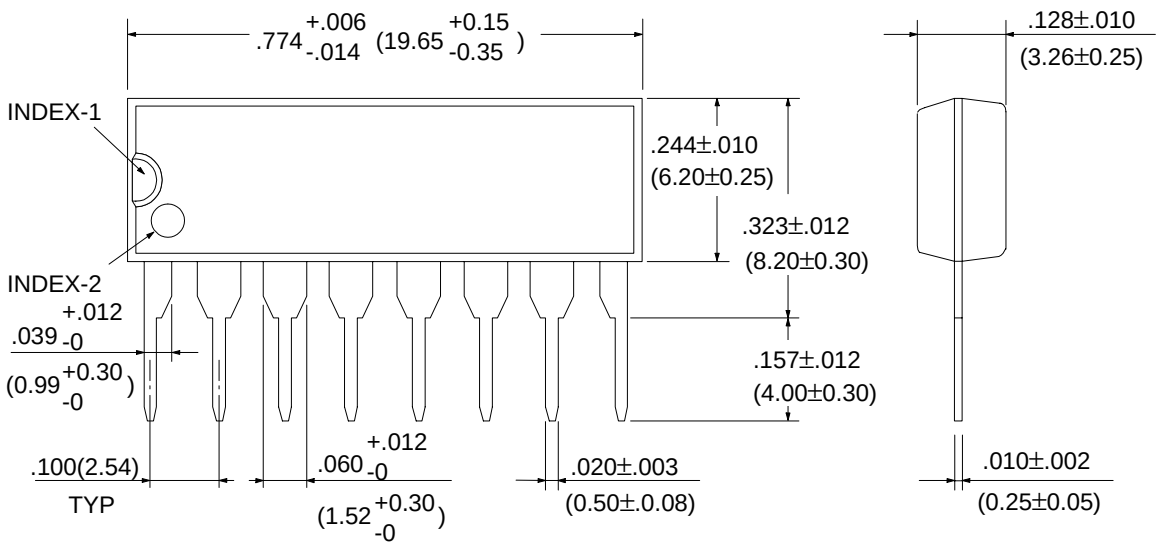
Fig. 9

F/V CONVERTER TRANSMISSION CHARACTERISTICS



■ PACKAGE DIMENSIONS

8-LEAD PLASTIC SINGLE IN-LINE PACKAGE
(CASE No.: SIP-8P-M03)



Dimensions in
inches (millimeters)

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