

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:  

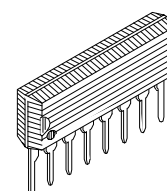
$$V_{O(F)} = F_{IN} \cdot R_T \cdot C_T \cdot V_R$$
- Positive edge-triggered frequency input
- Equal internal reference high-level output and comparator high level output
- Package  
 - 8-pin plastic SIP package (Suffix: -PS)

#### ■ ABSOLUTE MAXIMUM RATINGS (see NOTE)

(Ta= 25°C)

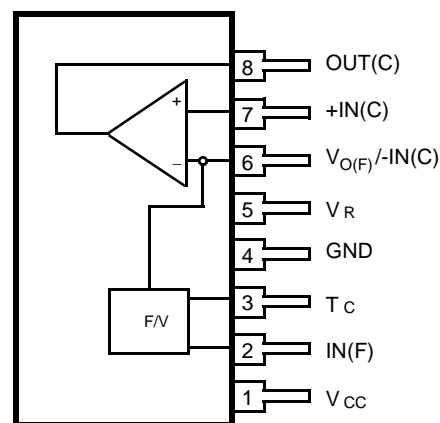
Rating	Symbol	Value	Unit
Power Supply Voltage	VCC	24	V
Surge Voltage at VCC	VCC(S)	40 (t ≤ 50ms)	V
Zener Current	Iz	20	mA
Power Dissipation	Pd	300 (Ta ≤ 85°C)	mW
Operating Temperature	TOP	-30 to +85	°C
Storage Temperature	TSTG	-55 to +125	°C

**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.



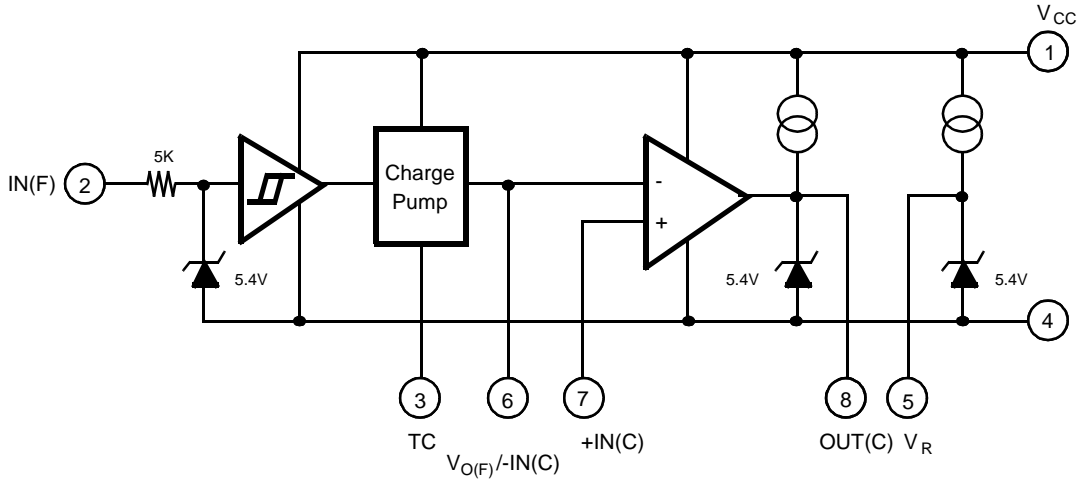
PLASTIC PACKAGE  
(SIP-08P-M03)

#### PIN ASSIGNMENTS

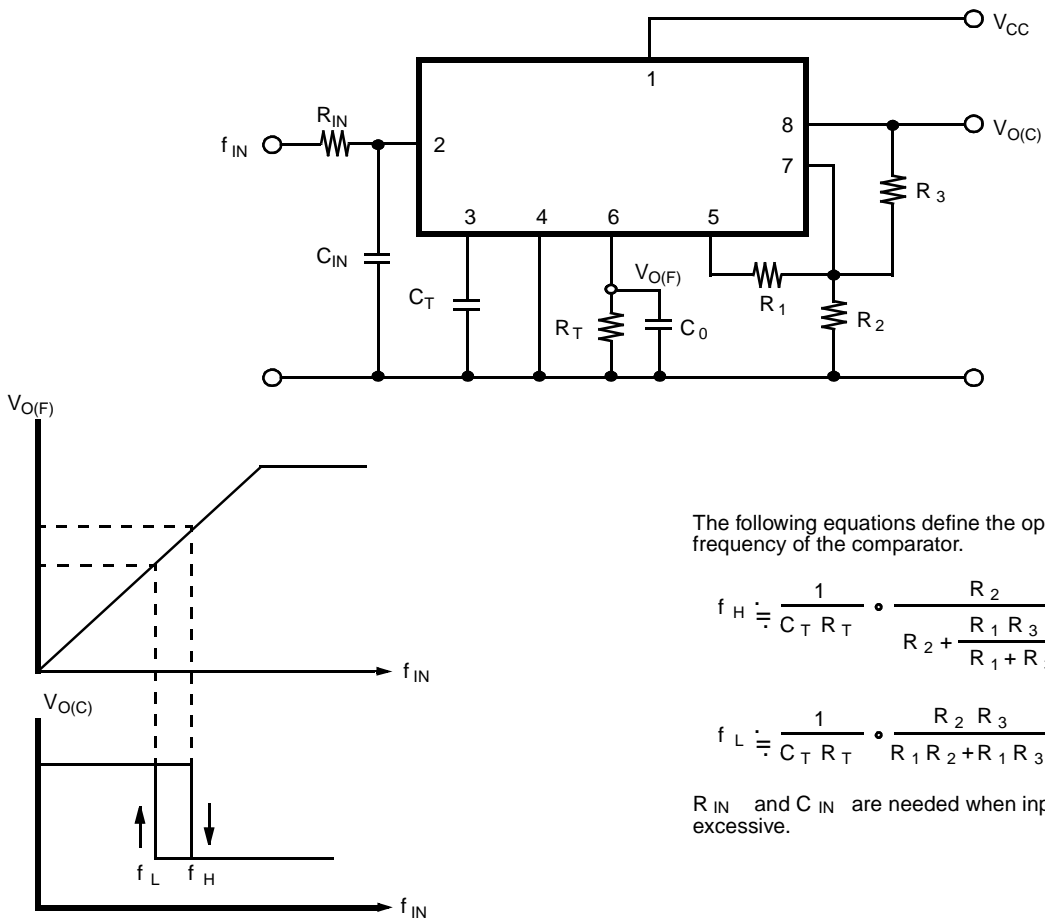


(Front View)

**Fig. 1 — MB4206 BLOCK DIAGRAM**



**FIG. 2 — TYPICAL HOOKUP AND OPERATING PARAMETERS**



## ■ ELECTRICAL CHARACTERISTICS

(Ta = 25°C, Vcc = 12V)

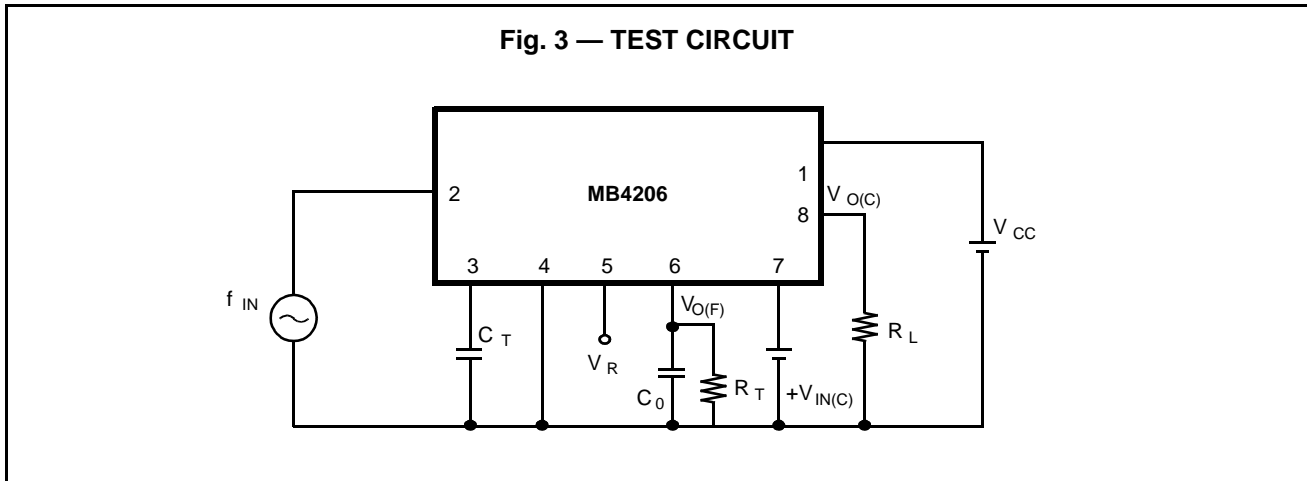
Parameter	Symbol	Condition	Value			Unit	
			Min	Typ	Max		
<b>Power Supplies</b>	Power Supply Current	I <sub>CC</sub>	-	7.0	10.0	mA	
	Power Supply Voltage	V <sub>CC</sub>	6.5	-	24	V	
	Reference Voltage	V <sub>R</sub>	I <sub>L(R)</sub> =1mA	5.0	5.4	5.8	V
	Reference Voltage Temperature Coefficient		I <sub>L(R)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

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

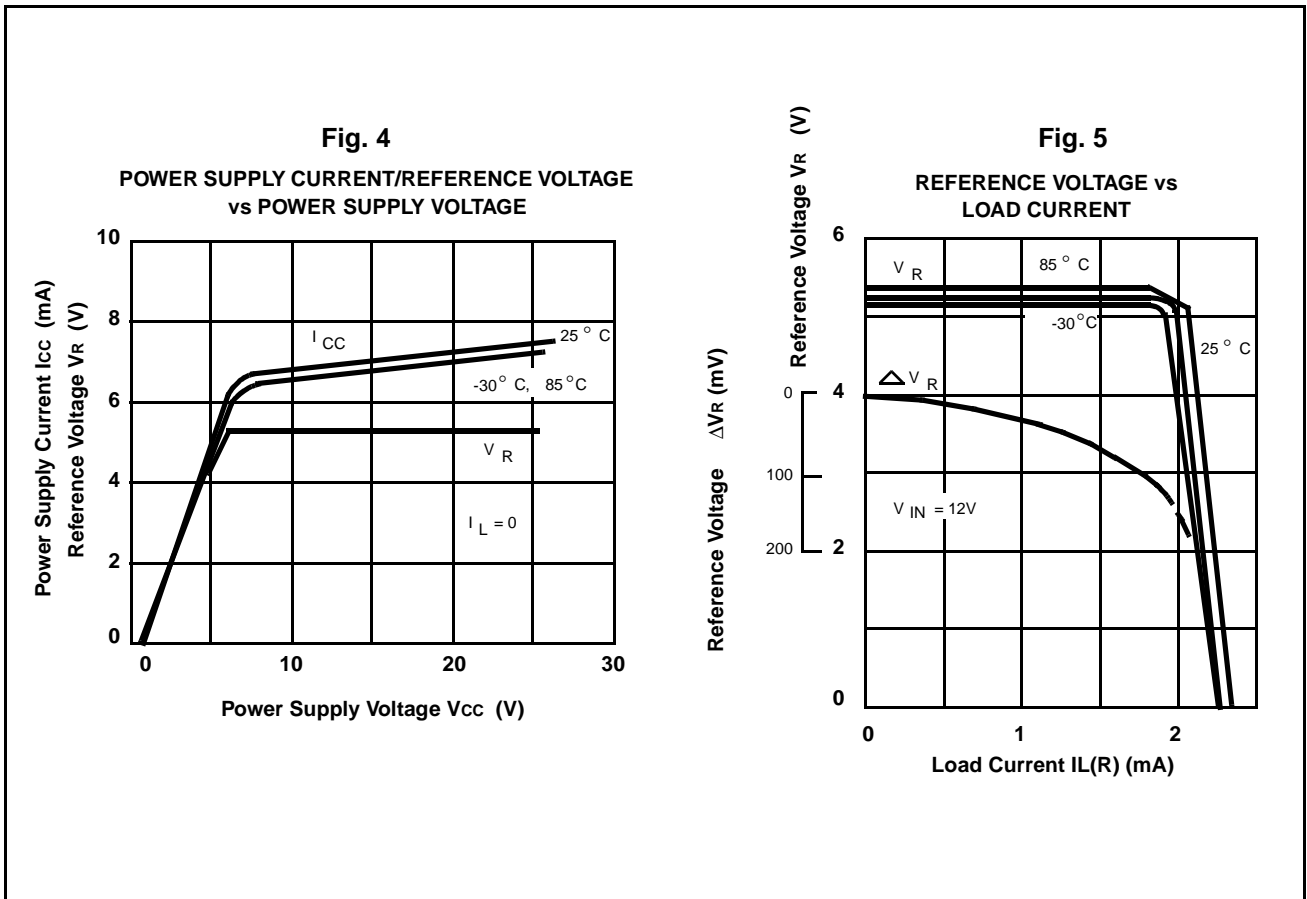
\*2 With  $f_{IN} = 100\text{Hz}$  as a reference, linearity is defined as the straight-line deviation over an input frequency range of 50- to - 150 Hz — see TYPICAL PERFORMANCE CHARACTERISTICS.

\*3 The current flows from I<sub>C</sub>.

\*4 If V<sub>CC</sub> is lower than V<sub>R</sub>, use (V<sub>CC</sub>-2).



## ■ TYPICAL PERFORMANCE CHARACTERISTICS



■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Fig. 6

OUTPUT CURRENT vs OPERATING TEMPERATURE

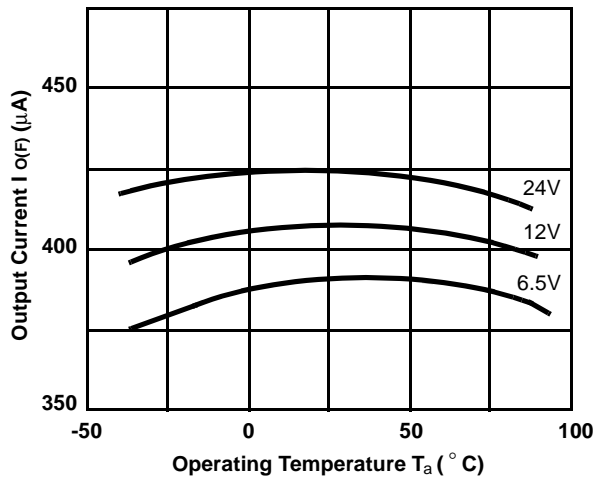


Fig. 7

OUTPUT LOW VOLTAGE vs SINK CURRENT

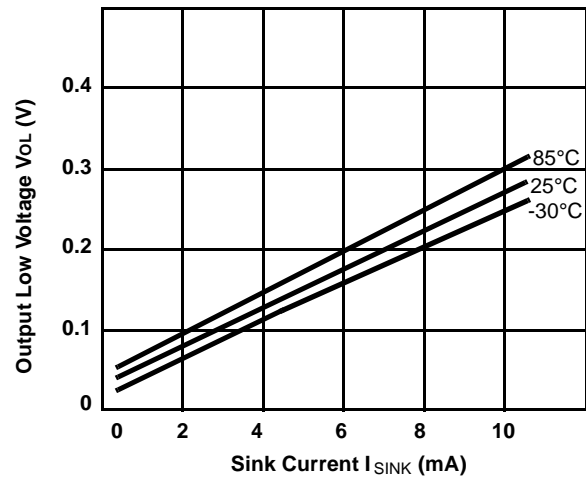


Fig. 8

F/V CONVERTER OUTPUT VOLTAGE vs INPUT FREQUENCY

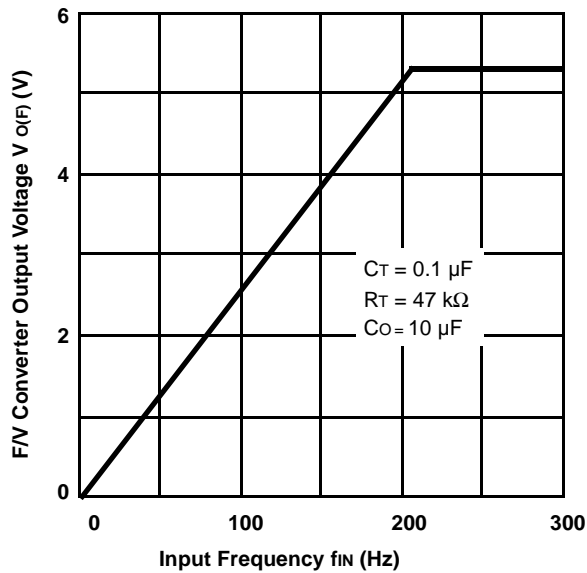
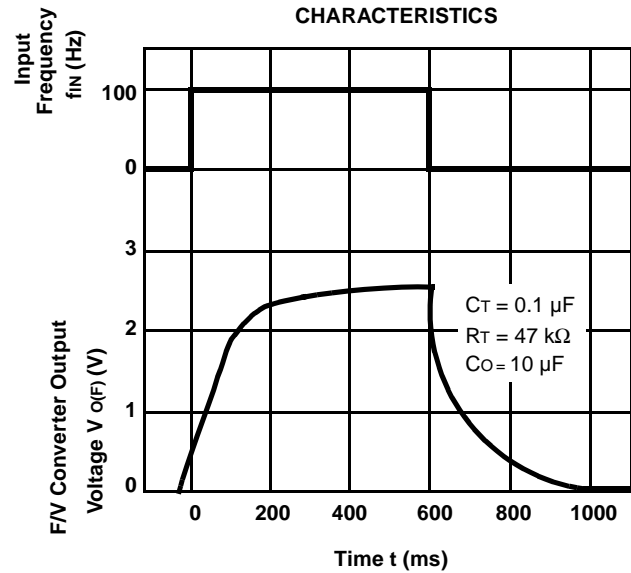


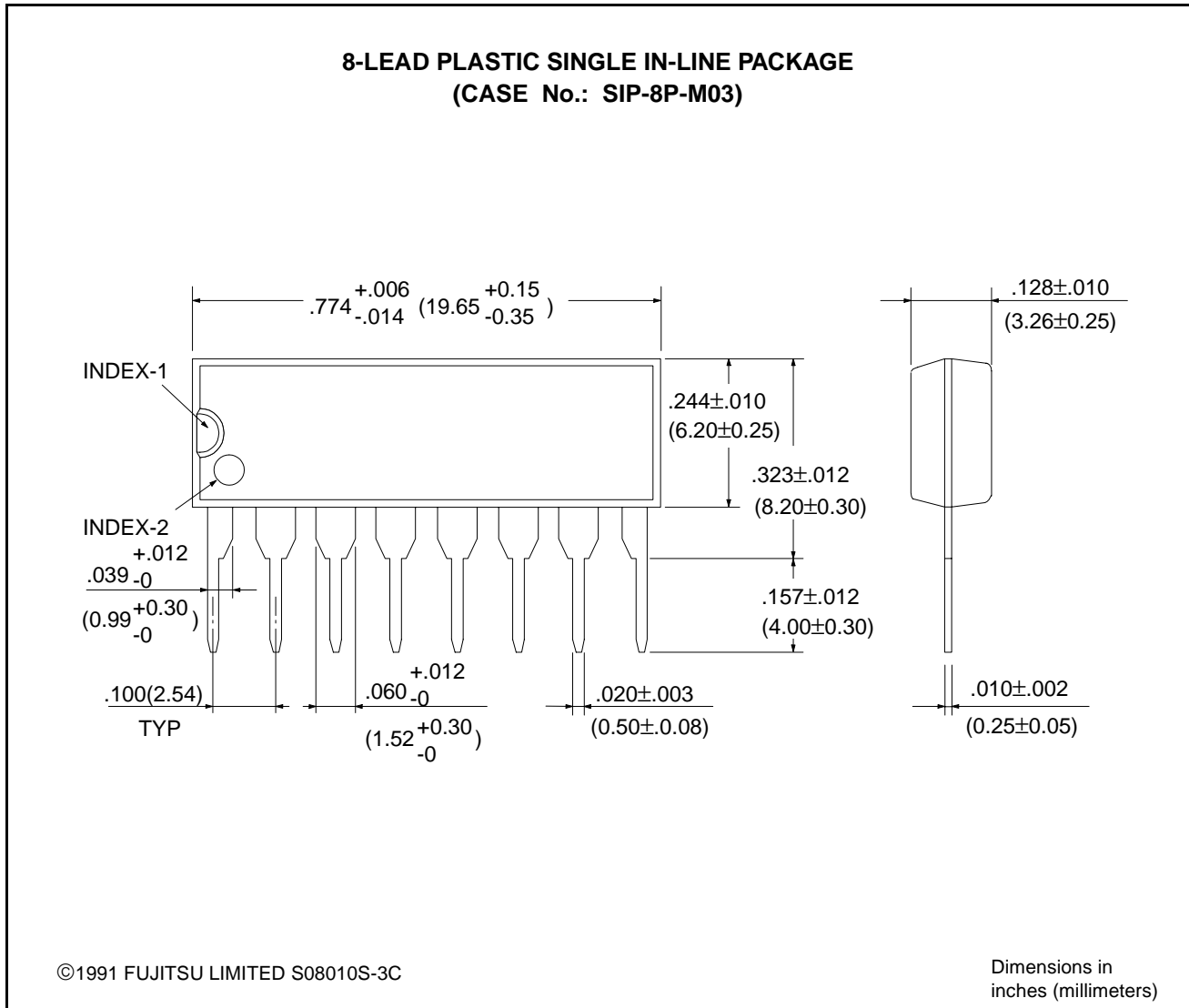
Fig. 9

F/V CONVERTER TRANSMISSION CHARACTERISTICS



# MB4206

## ■ PACKAGE DIMENSIONS



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