T-73-53

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Edition 2.1

FUJITSU

DATA SHEET

MB3773
POWER SUPPLY MONITOR WITH WATCH–DOG TIMER

POWER SUPPLY MONITOR WITH WATCH-DOG TIMER

The Fujitsu MB3773 is designed to monitor the voltage level of a power supply (+5 V or an arbitrary voltage) in a microprocessor circuit, memory board in a large-size computer, for example. The MB3773 also contains a watch-dog timer function to detect uncontrol. Table status of processor and reset system/processor.

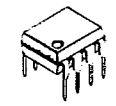
If the circuit's power supply deviates more than a specified amount, then the MB3773 generates a reset signal to the microprocessor. Thus, the computer data is protected from accidental erasure.

When the MB3773 does not receive the clock pulse from the processor in the specified period, the MB3773 generates a reset signal to the mciroprocessor.

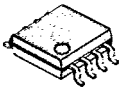
Using the MB3773 requires few external components. To monitor only a +5 volt supply, the MB3773 requires the connection of one external capacitor.

The MB3773 is available in an 8-pin Dual In-Line package space saving Flat Package, or a Single In-Line Package.

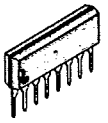
- Precision voltage detection (V_S = 4.2 V ±2.5%)
- Threshold level with hysterisis
- Low voltage output for reset signal (V_{CC} = 0.8 V typ.)
- Precision reference voltage output (V_{REF} = 1.245 V ±1.5%)
- External clock monitor and reset signal generator
- Negative-edge input watch-dog timer
- Minimal number of external components (one capacitor min.)
- Available in a variety of packages
  - 8-pin Dual In-Line Package
  - 8-pin Flat Package
  - 8-pin Single In-Line Package



PLASTIC PACKAGE
DIP-08P-M01



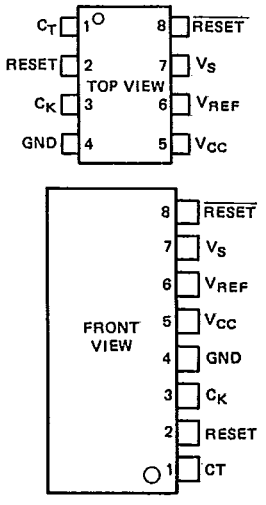
PLASTIC PACKAGE
FPT-08P-M01



PLASTIC PACKAGE
SIP-08P-M03

4

PIN ASSIGNMENT



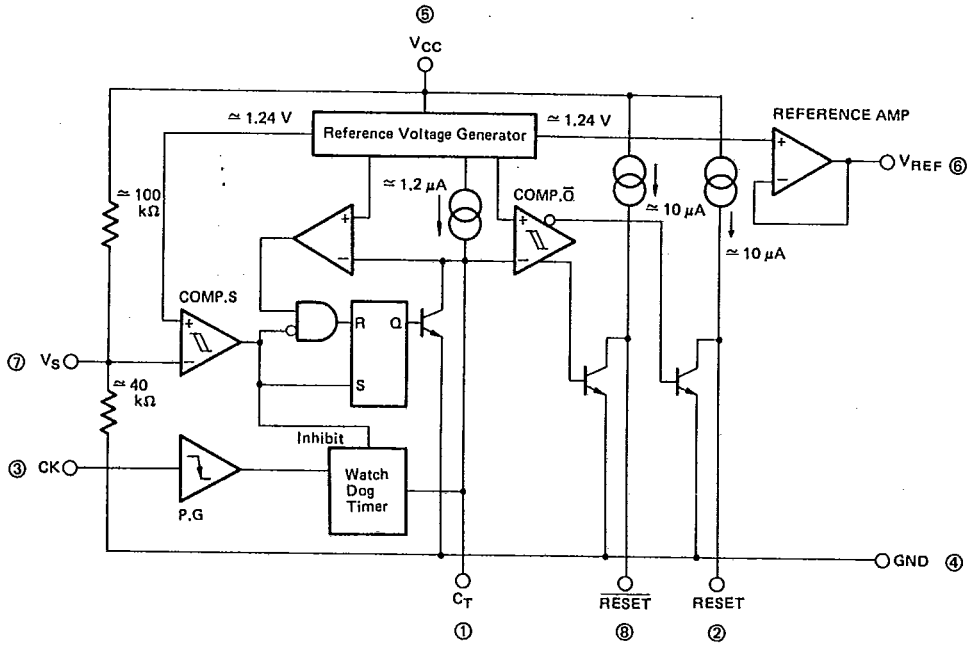
This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 to +18	V
Input Voltage	V_S	-0.3 to V_{CC} +0.3 (≦+18)	V
	V_{CK}	-0.3 to +18	V
$\overline{RESET}$, RESET Supply Voltage	V_{OH}	-0.3 to V_{CC} +0.3 (≦18)	V
Power Dissipation (T_A ≦ 85°C)	P_D	200	mW
Storage Temperature	T_{STG}	-55 to +125	°C

NOTE: Permanent device damage may occur if 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 – MB3773 BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	+3.5 to +16	V
Reset, Reset Sink Current	I_{OL}	0 to 20	mA
V_{REF} Output Current	I_{OUT}	−200 to +5	mA
Watch Clock Setting Time	t_{WD}	0.1 to 1000	ms
Rising/Falling Time	t_{FC}, t_{RC}	<100	μs
Terminal Capacitance	C_T	0.001 to 10	μF
Operating Ambient Temperature	T_A	−40 to +85	°C

ELECTORICAL CHARACTERISTICS

(1) DC CHARACTERISTICS

Parameter	Condition	Symbol	Value			Unit
			Min	Typ	Max	
Supply Current	Watch dog timer operating	I_{CC}		600	900	μA
Detection Voltage	V_{CC} ↘	V_{SL}	4.10	4.20	4.30	V
	T_A = −40°C to +85°C		4.05	4.20	4.35	
	V_{CC} ↗	V_{SH}	4.20	4.30	4.40	
	T_A = −40°C to +85°C		4.15	4.30	4.45	
Hysterisis Width	V_{CC} ↗↘	V_{HYS}	50	100	150	mV
Reference Voltage		V_{REF}	1.227	1.245	1.263	V
	T_A = −40°C to +85°C		1.215	1.245	1.275	
Reference Voltage Change Rate	V_{CC} = 3.5V to 16V	ΔV_{REF1}		3	10	mV
Reference Voltage Output Loading Change Rate	I_{OUT} = −200μA to +5μA	ΔV_{REF2}	−5		+5	mV
CK Threshold Voltage	T_A = −40°C to +85°C	V_{TH}	0.8	1.25	2.0	V
CK Input Current	V_{CK} = 5.0V	I_{IH}		0	1.0	μA
	V_{CK} = 0.0V	I_{IL}	−1.0	−0.1		
C_T Open Current	Watch Dog Timer Operating V_{CT} = 1.0V	I_{CTD}	7	10	14	μA
High Level Output Voltage	V_S open, I_{RESET} = −5μA	V_{OH1}	4.5	4.9		V
	V_S = 0V, I_{RESET} = −5μA	V_{OH2}	4.5	4.9		
Output Saturation Voltage	V_S = 0V, $I_{\overline{RESET}}$ = 3mA	V_{OL1}		0.2	0.4	V
	V_S = 0V, $I_{\overline{RESET}}$ = 10mA	V_{OL2}		0.3	0.5	
	V_S open, I_{RESET} = 3mA	V_{OL3}		0.2	0.4	
	V_S open, I_{RESET} = 10mA	V_{OL4}		0.3	0.5	
Output Sink Current	V_S = 0V, $V_{\overline{RESET}}$ = 1.0V	I_{OL1}	20	60		mA
	V_S open, V_{RESET} = 1.0V	I_{OL2}	20	60		

4

(1) DC CHARACTERISTICS (Continued)

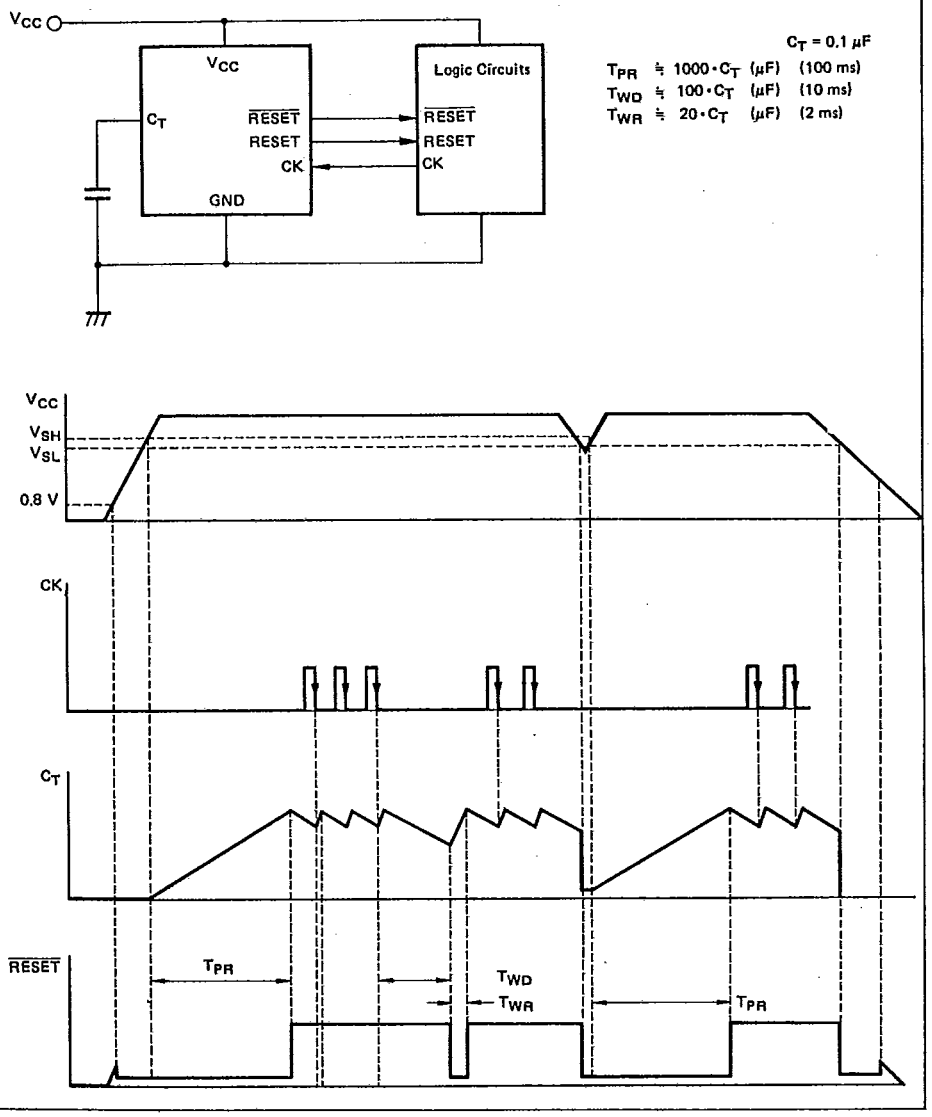
Parameter	Condition	Symbol	Value			Unit
			Min	Typ	Max	
C_T Charge Current	Power on reset operating V_{CT} = 1.0V	I_{CTU}	0.5	1.2	2.5	μA
Min. Supply Voltage for $\overline{RESET}$	$V_{\overline{RESET}}$ = 0.4V $I_{\overline{RESET}}$ = 0.2mA	V_{CCL1}		0.8	1.2	V
Min. Supply Voltage for RESET	$V_{RESET} = V_{CC} - 0.1V$ R_L (2 pin – GND) = 1MΩ	V_{CCL2}		0.8	1.2	V

(2) AC CHARACTERISTICS

Parameter	Condition	Symbol	Value			Unit
			Min	Typ	Max	
V_{CC} Input Pulse Width	V_{CC} 5V / 4V	T_{PI}	8.0			μs
CK Input Pulse Width	CK or	T_{CKW}	3.0			μs
CK Input Frequency		T_{CK}	20			μs
Watch Dog Timer Watching Time	C_T = 0.1μF	T_{WD}	5	10	15	ms
Watch Dog Timer Reset Time	C_T = 0.1μF	T_{WR}	1	2	3	ms
Rising Reset Hold Time	C_T = 0.1μF, V_{CC}	T_{PR}	50	100	150	ms
Output Propagation Delay Time from V_{CC}	$\overline{RESET}$, R_L = 2.2kΩ, C_L = 100pF	T_{PD1}		2	10	μs
	RESET, R_L = 2.2kΩ, C_L = 100pF	T_{PD2}		3	10	
Output Rising Time*	R_L = 2.2kΩ C_L = 100pF	t_R		1.0	1.5	μs
Output Falling Time*	R_L = 2.2kΩ C_L = 100pF	t_F		0.1	0.5	

* Output Rising/Falling time are measured at 10% to 90% of Voltage.

Fig. 2 – MB 3773 BASIC OPERATION



4

TYPICAL CHARACTERISTICS CURVES

Fig. 3 – SUPPLY CURRENT vs. SUPPLY VOLTAGE

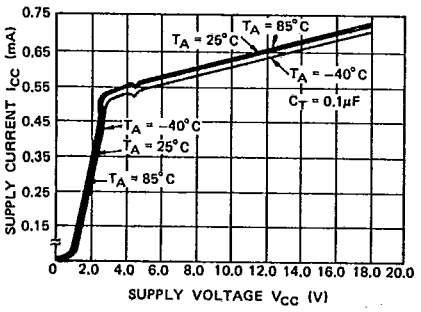


Fig. 4 – OUTPUT VOLTAG vs. SUPPLY VOLTAGE

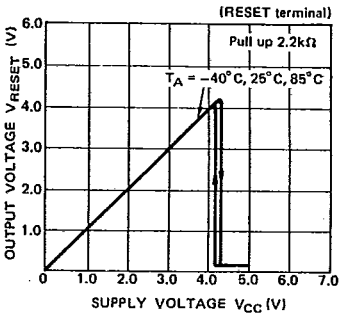


Fig. 5 – OUTPUT VOLTAGE vs. SUPPLY VOLTAGE

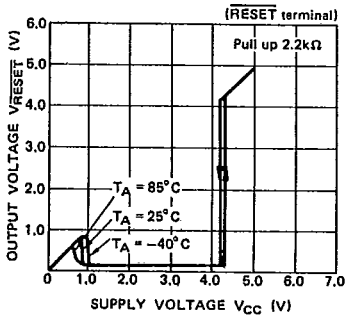


Fig. 6 – DETECTION VOLTAGE (V_{SH}, V_{SL}) vs. TEMPERATURE

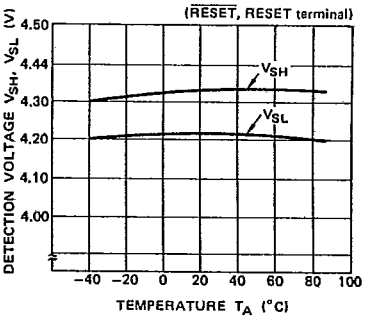


Fig. 7 – OUTPUT SATURATION VOLTAGE vs. OUTPUT SINK CURRENT

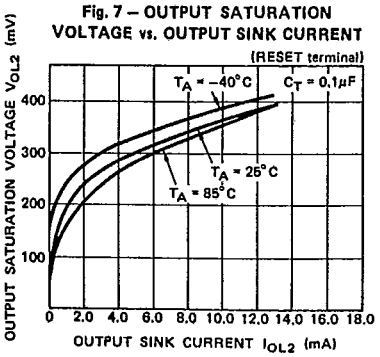
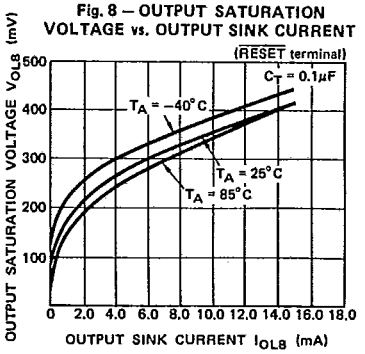


Fig. 8 – OUTPUT SATURATION VOLTAGE vs. OUTPUT SINK CURRENT



TYPICAL CHARACTERISTICS CURVES (continued)

Fig. 9 – HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT

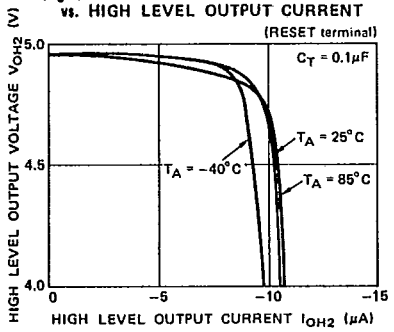


Fig. 10 – HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT

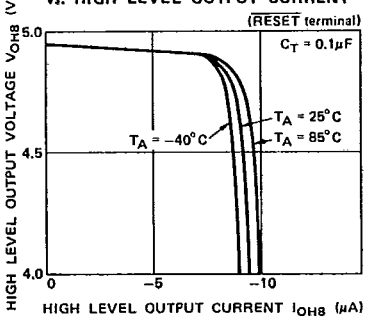


Fig. 11 – REFERENCE VOLTAGE vs. SUPPLY VOLTAGE

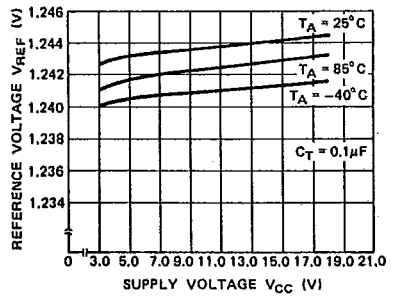


Fig. 12 – REFERENCE VOLTAGE vs. REFERENCE CURRENT

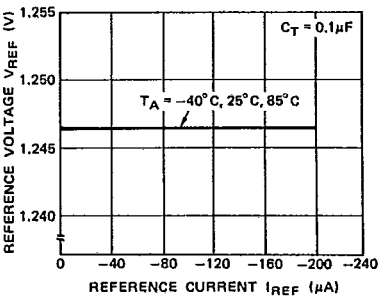


Fig. 13 – REFERENCE VOLTAGE vs. TEMPERATURE

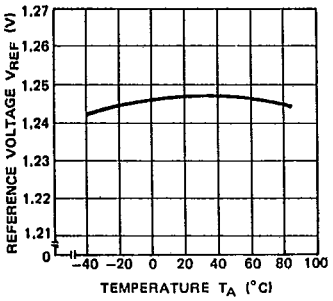
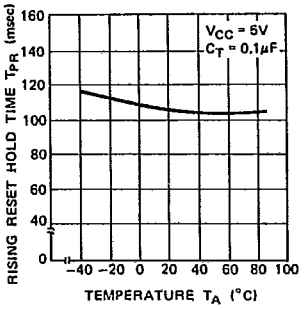


Fig. 14 – RISING RESET HOLD TIME vs. TEMPERATURE



TYPICAL CHARACTERISTICS CURVES (continued)

Fig. 15 – RESET TIME vs. TEMPERATURE

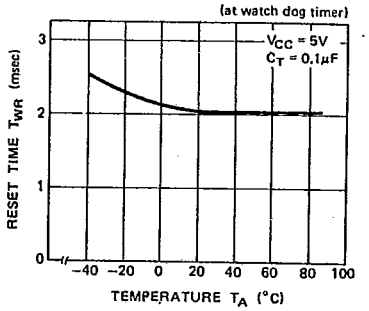


Fig. 16 – WATCH DOG TIMER WATCHING TIME vs. TEMPERATURE

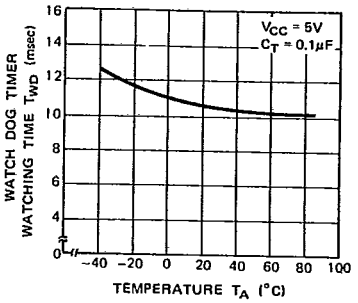


Fig. 17 – TERMINAL CPACITANCE vs. RISING RESET HOLD TIME

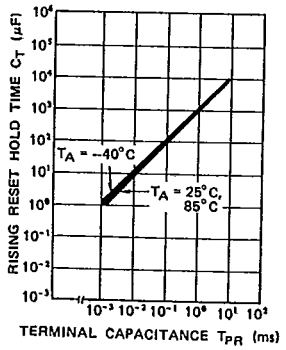


Fig. 18 – TERMINAL CAPACITANCE vs. RESET TIME

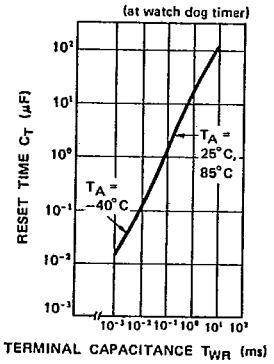


Fig. 19 – TERMINAL CAPACITANCE vs. WATCH DOG TIMER WATCHING TIME

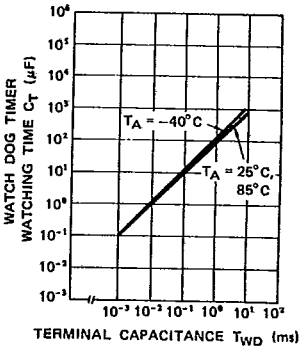
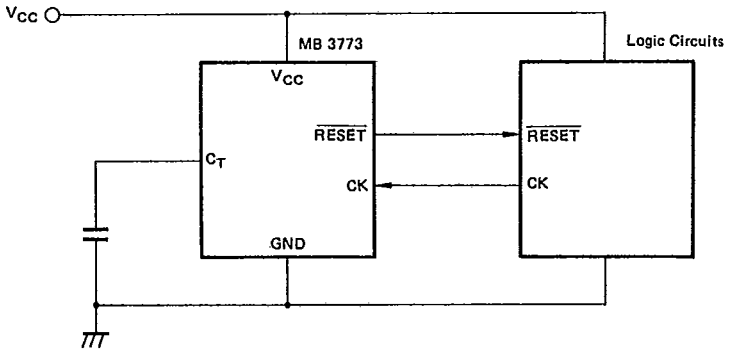
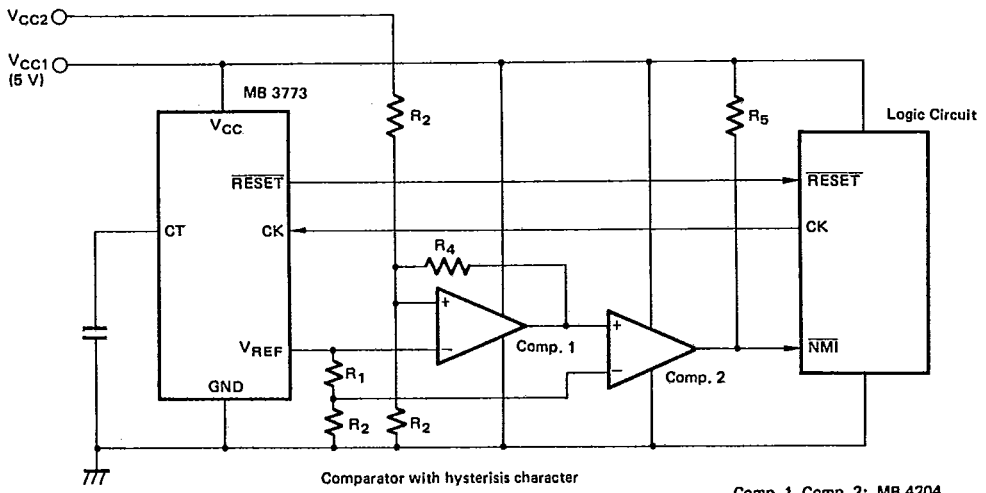


Fig. 20 – MB3773 APPLICATION EXAMPLE

- Sagging Monitor and Watch-Dog Timer



- Monitor for other power system



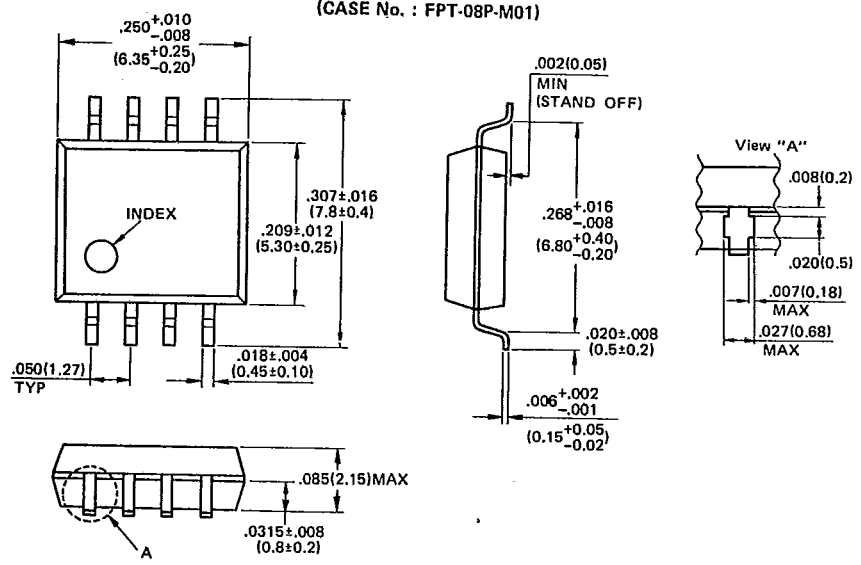
Comparator with hysterisis character

Comp. 1, Comp. 2: MB 4204
MB 47393

NOTE: When V_{CC2} in lower then the specified voltage, NMI low.
If over-voltage detection of V_{CC2}, Swap the inputs of comparator 2.

PACKAGE DIMENSIONS

8-LEAD PLASTIC FLAT PACKAGE
(CASE No. : FPT-08P-M01)



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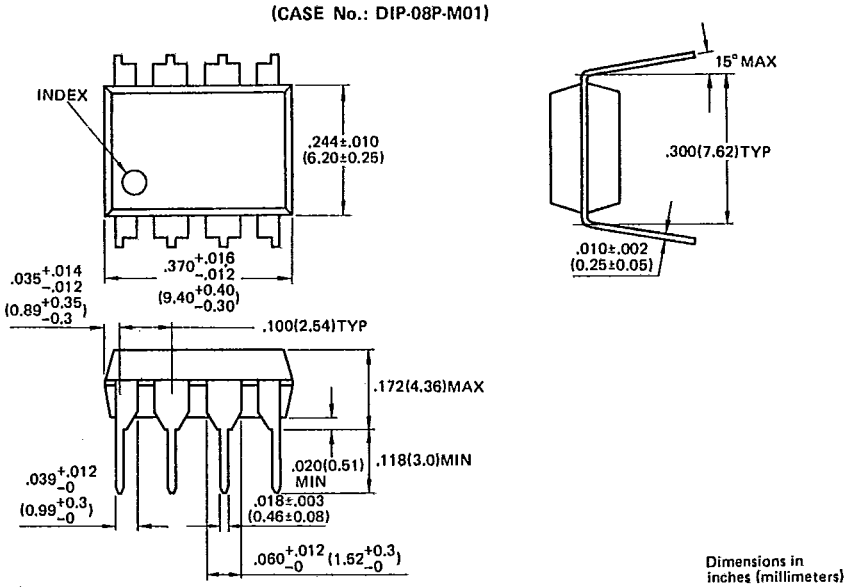
Dimensions in inches (millimeters)

PACKAGE DIMENSIONS (continued)

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



Dimensions in inches (millimeters)

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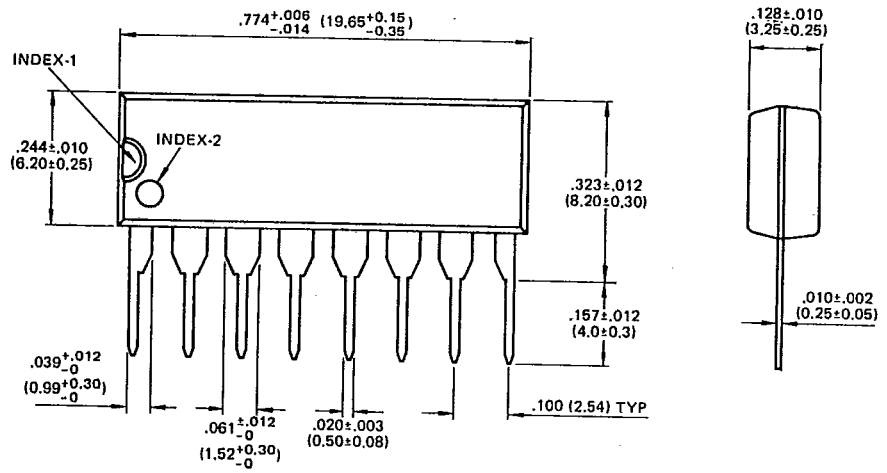
PACKAGE DIMENSIONS

8-LEAD PLASTIC SINGLE IN-LINE PACKAGE
(CASE No.: SIP-08P-M03)



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Dimensions in inches (millimeters)