

MB40776H/40776

1 CHANNEL 6-BIT D/A CONVERTER

1-CHANNEL 6-BIT D/A CONVERTER MB40776H (60 MSPS), MB40776 (20 MSPS)

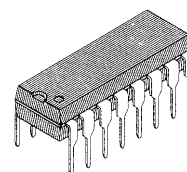
The Fujitsu MB40776H and MB40776 are 6-bit low power ultra-high speed video D/A converters fabricated with Fujitsu Advanced Bipolar Technology. The MB40776H and MB40776 can convert 6-bit digital signals into analog signals at a rate of DC to 60 mega-samples/sec (MSPS) for MB40776H and 20 MSPS for MB40776. Because of such high speed operation, both converters are suitable for applications such as digital color TV, video computer processing, and radar signal processing.

- Resolution: ± 6 -bits
- Linearity: $\pm 0.8\%$
- Conversion rate: 60 MSPS minimum for MB40776H
20 MSPS minimum for MB40776
- Analog output voltage range: V_{CC-} to $V_{CC} - 1$ [V]
- Digital I/O level: TTL Compatible
- Single power supply: +5V
- Power dissipation: 220 mW typical
- Packaging: Plastic DIP—Suffix: -P
Plastic FPT—Suffix: -PF

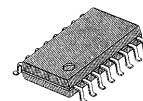
ABSOLUTE MAXIMUM RATINGS (see Note)

Rating	Symbol	Value	Unit
Power supply voltage	V_{CCA} V_{CCD}	-0.5 to +7.0	V
Digital input voltage	V_{IHD}	-0.5 to +7.0	V
Analog reference voltage	V_{REF}	3.70 to $V_{CC} + 0.5$	V
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 data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

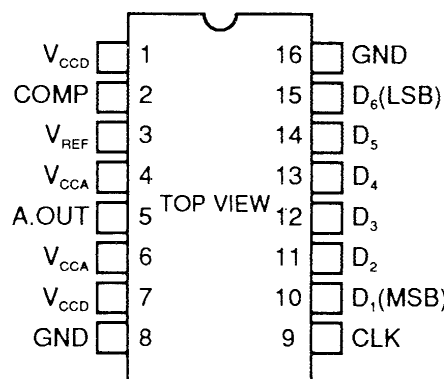


**PLASTIC PACKAGE
DIP-16P-M04**



**PLASTIC PACKAGE
FPT-16P-M06**

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.

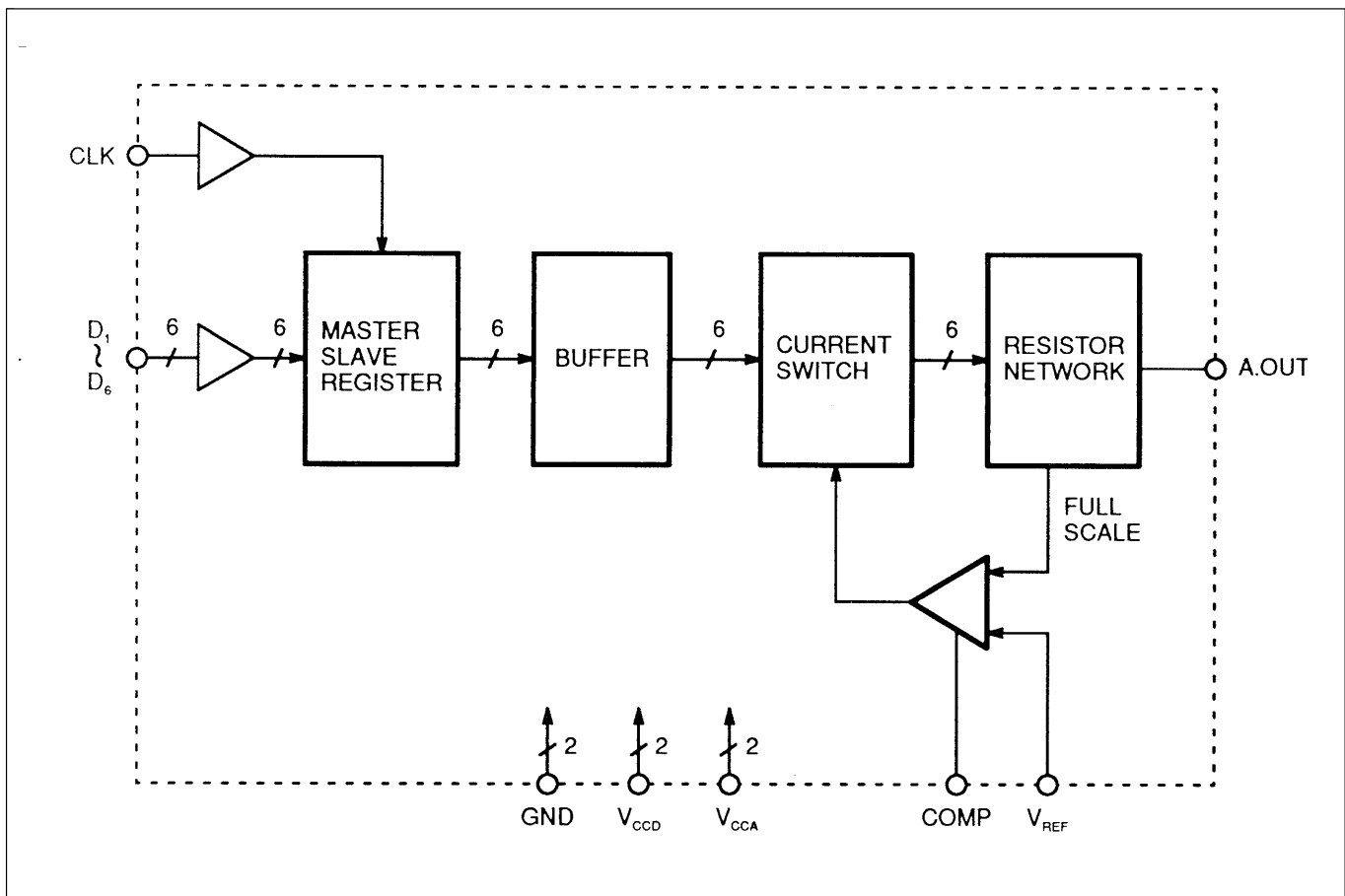


Figure 1. MB40776H, MB40776 Block Diagram

RECOMMENDED OPERATING CONDITIONS

Parameter		Symbol	Value			Unit
			Min	Typ	Max	
Power supply voltage		V_{CC} V_{CCD}	4.75	5.00	5.25	V
Analog reference voltage ¹		V_{REF}	3.70	4.00	4.30	V
Clock pulse width at high level	MB40776H	t_{W^+}	8.3			ns
	MB40776		25			
Clock pulse width at low level	MB40776H	t_{W^-}	8.3			ns
	MB40776		25			
Data setup time	MB40776H	t_S	10.0			ns
	MB40776		12.5			
Data hold time	MB40776H	t_H	4.0			ns
	MB40776		12.5			
Operating temperature		T_A	0		70	°C
Phase compensation capacitance ²		C_{COMP}	1			μF

Notes: ¹ $V_{CC} - V_{REF} \leq 1.2V$

² The capacitance should be connected between COMP and GND

ELECTRICAL CHARACTERISTICS

ANALOG DC CHARACTERISTICS

($V_{CC}=4.75$ to $5.25V$, $T_A=0$ to $70^{\circ}C$)

Parameter	Symbol	Condition	Value			Unit
			Min	Typ	Max	
Resolution					6	bits
Linearity error*	LE	DC			± 0.8	%
Full-scale analog output voltage	V_{OFS}	$V_{CC} = 5.000V$ $V_{REF} = 3.976V$	$V_{CCA}-0.015$	V_{CCA}	$V_{CCA}-0.015$	V
Zero-scale analog output voltage	V_{OZS}	$V_{CC} = 5.000V$ $V_{REF} = 3.976V$	3.932	3.992	4.052	V
Reference input current	I_{REF}	$V_{REF} = 4.00V$			10	μA
Output impedance	Z_{OUT}	$T_A = 25^{\circ}C$	70	80	90	Ω

DIGITAL DC CHARACTERISTICS

($V_{CC}=4.75$ to $5.25V$, $T_A=0$ to $70^{\circ}C$)

Parameter	Symbol	Condition	Value			Unit
			Min	Typ	Max	
High-level input voltage	V_{IHD}		2.0			V
Low-level input voltage	V_{ILD}				0.8	V
Maximum input current	I_{ID}	$V_{CC} = 5.25$ $V_{ID} = 7.00V$		0	100	μA
High-level input current	I_{IHD}	$V_{CC} = 5.25$ $V_{IHD} = 2.7V$		0	20	μA
Low-level input current	I_{ILD}	$V_{CC} = 5.25$ $V_{ILD} = 0.4V$	-400	-40		μA
Power supply current	I_{CC}	$V_{REF} = 4.05V$		43*	65	mA

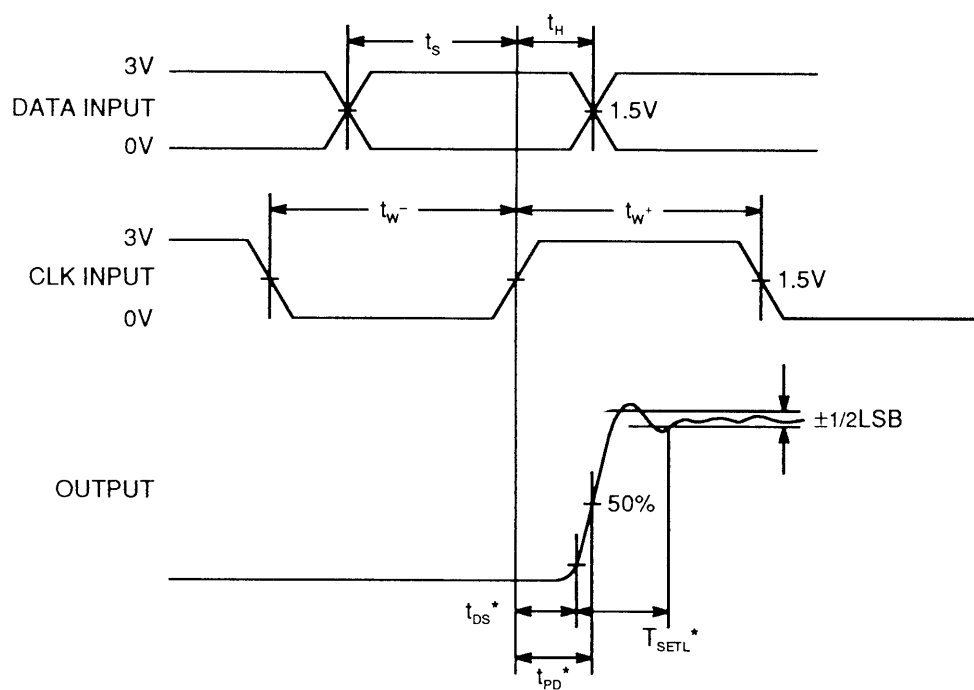
* $V_{CC}=5.00V$, $V_{REF} = 4.00V$

ELECTRICAL CHARACTERISTICS, continued

SWITCHING CHARACTERISTICS

($V_{CC}=4.75$ to $5.25V$, $T_A=0$ to $70^{\circ}C$)

Parameter		Symbol	Value			Unit
			Min	Typ	Max	
Maximum Conversion Rate	MB40776H	FS	60			MSPS
	MB40776		20	30		



NOTE: *These values are not specified because they depend on application circuit.

Figure 2. Timing Diagram

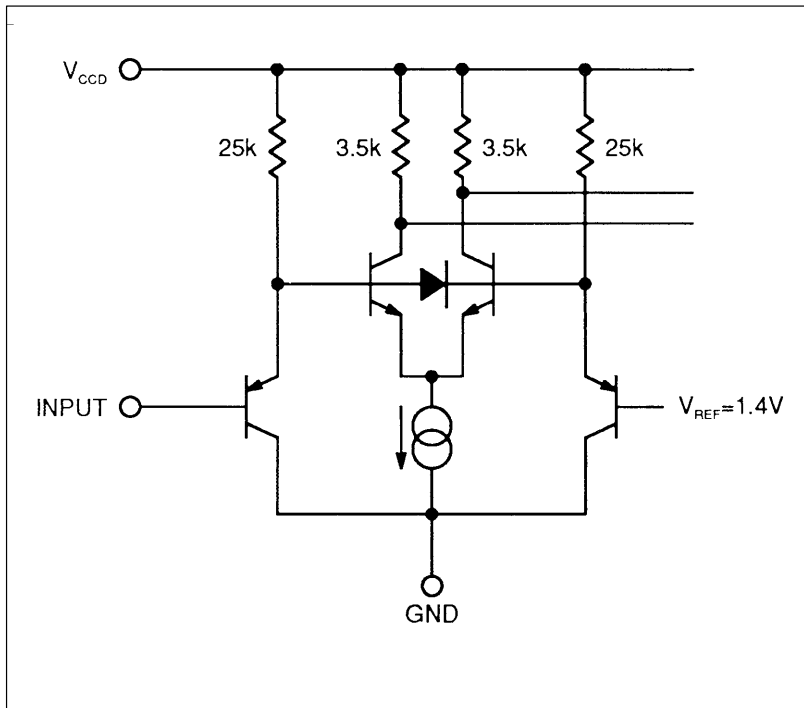


Figure 3. Digital Input Equivalent Circuit

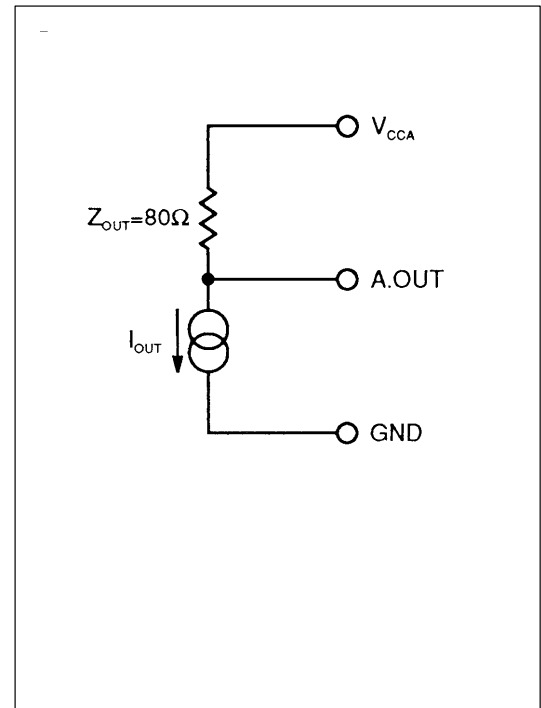


Figure 4. Output Equivalent Circuit

OUTPUT VOLTAGE

($V_{CCA}=5.000V$, $V_{REF}=3.976V$)

Step	Input Code	OUTPUT VOLTAGE (V)
0	000000	3.992
1	000001	4.008
	⋮	⋮
31	011111	4.488
32	100000	4.504
33	100001	4.520
	⋮	⋮
62	111110	4.984
63	111111	5.000

NOTE: 1LSB=16mV

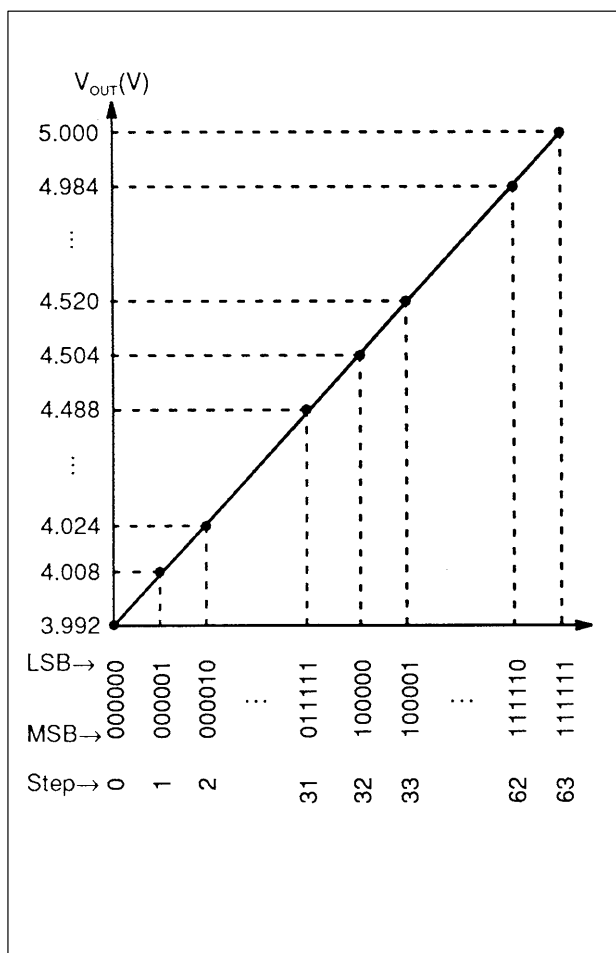


Figure 5. Ideal Output Operation

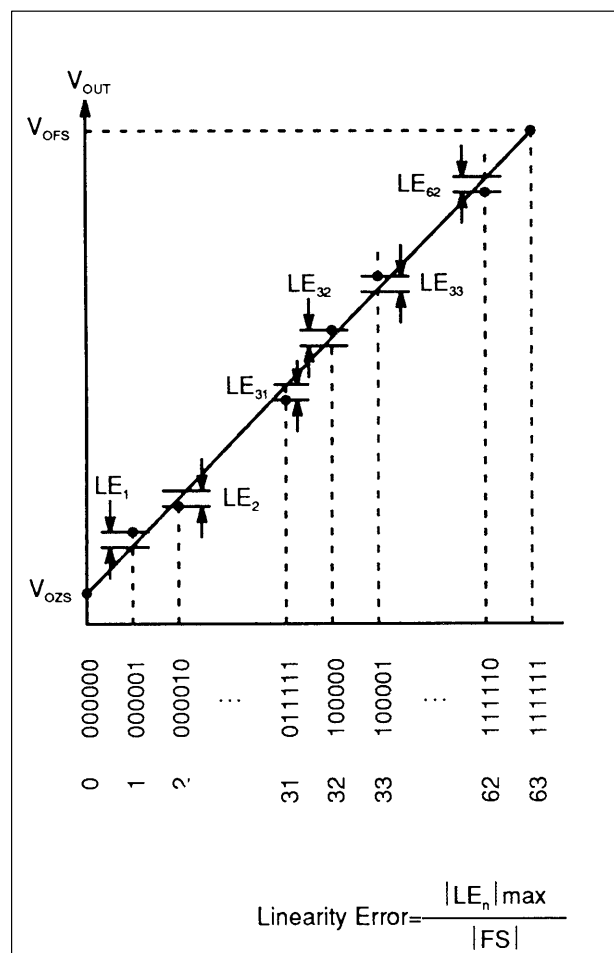


Figure 6. Practical Output Operation

TYPICAL CHARACTERISTICS CURVES

Figure 7. Power Supply Current vs. Temperature

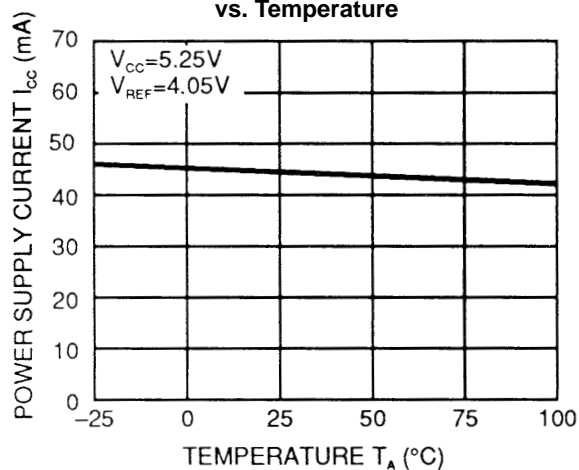


Figure 8. Linearity Error vs. Temperature

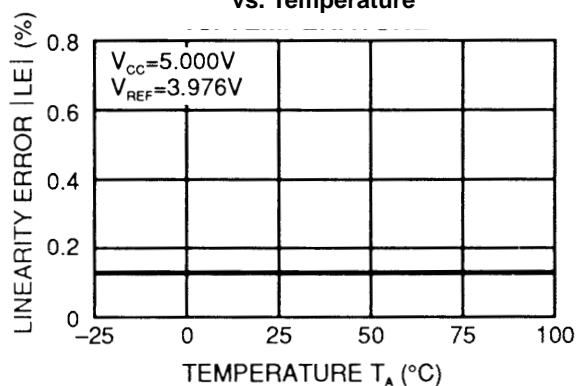


Figure 9. Output Impedance vs. Temperature

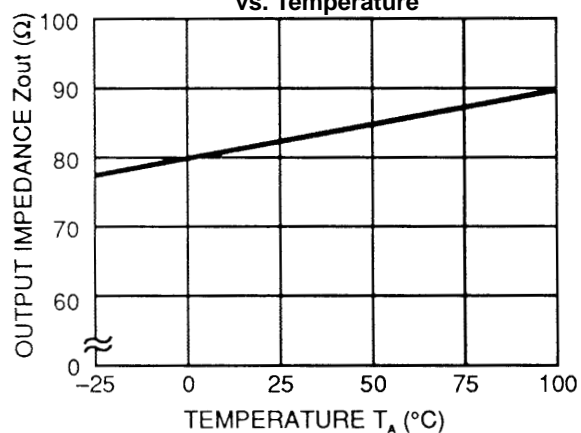


Figure 10. Zero-Scale Analog Output Voltage vs. Temperature

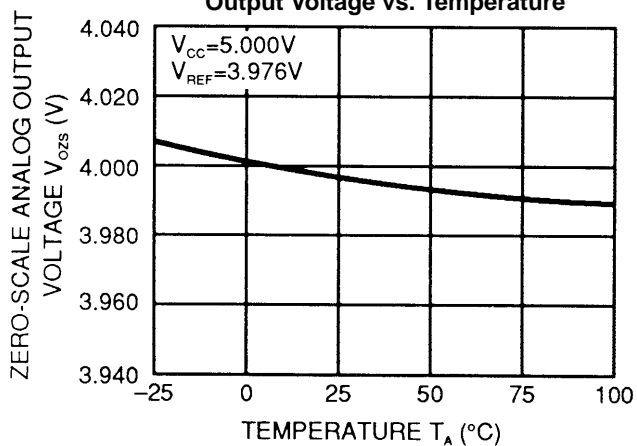


Figure 11. Full-Scale Analog Output Voltage vs. Temperature

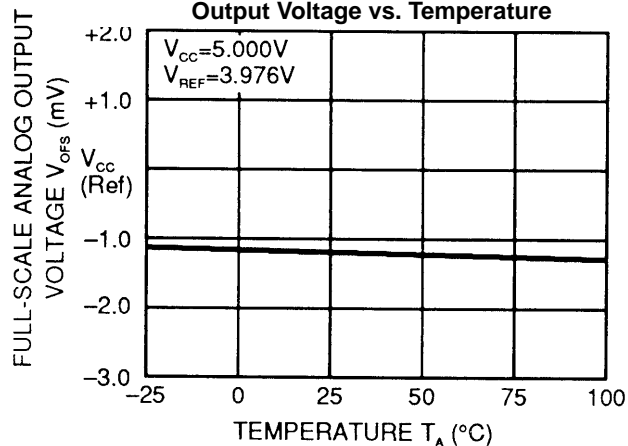


Figure 12. Delay Time vs. Temperature

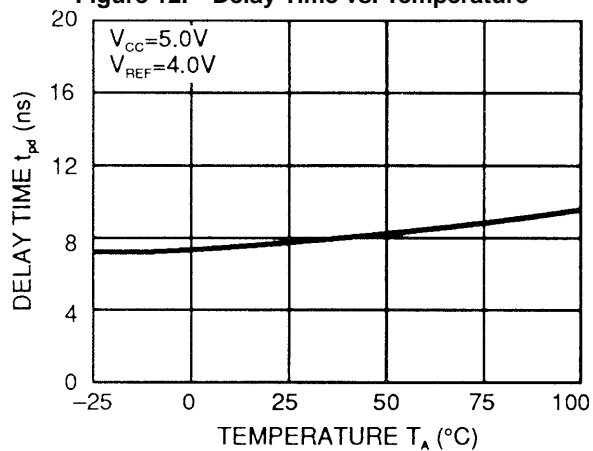


Figure 13. Delay Time vs. Poer Supply Voltage

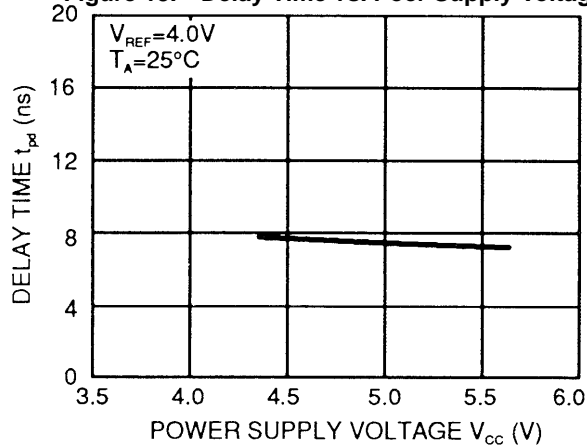


Figure 14. Clock Pulse Width vs. Temperature

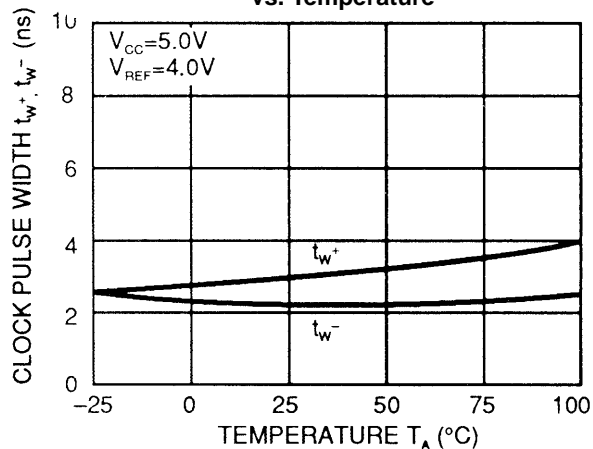


Figure 15. Clock Pulse Width vs. Power Supply Voltage

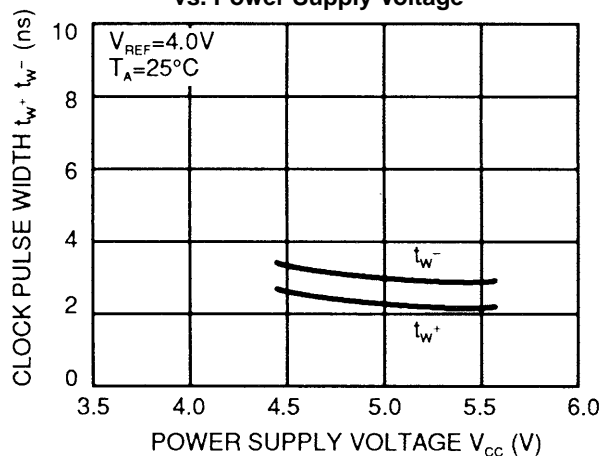
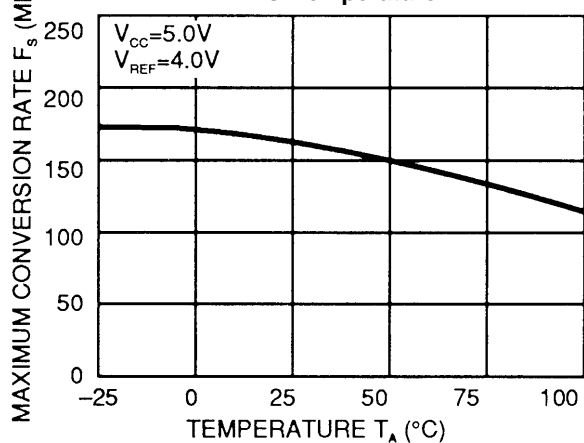


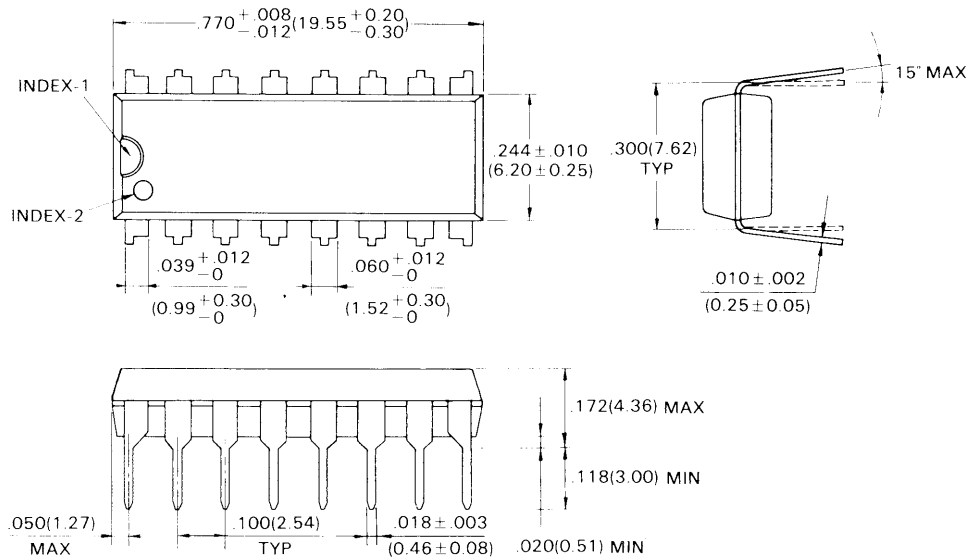
Figure 16. Maximum Conversion Rate vs. Temperature



MB40776H
MB40776

PACKAGE DIMENSIONS

16-LEAD PLASTIC DUAL IN-LINE PACKAGE (CASE No.: DIP-16P-M04)

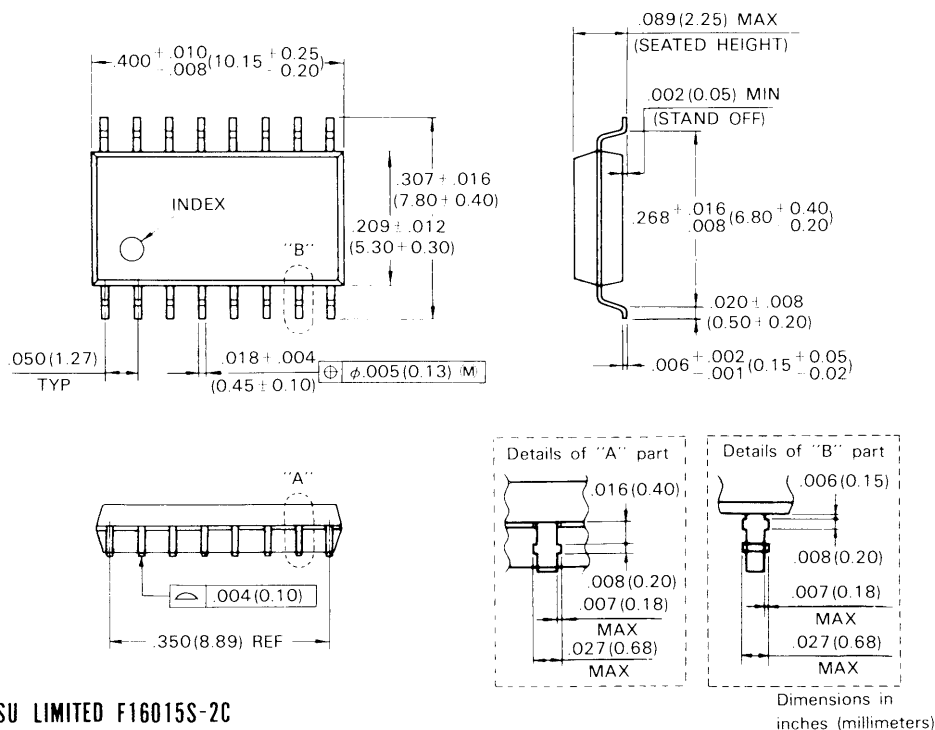


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Dimensions in
inches (millimeters)

PACKAGE DIMENSIONS, continued

16-LEAD PLASTIC FLAT PACKAGE (CASE No.: FPT-16P-M06)



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