

MB40978

3-CHANNEL 8-BIT RGB D/A CONVERTER

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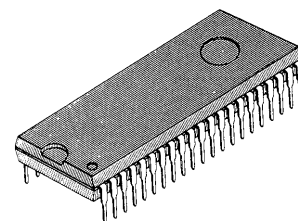
The Fujitsu MB40978 is an 8-bit ultra high speed digital-to-analog converter for video frequency band fabricated by Fujitsu Advanced Bipolar Technology. Owing to adoption of RGB 3-channel input/output, it is suitable for applications such as digital TV and graphic displays.

- Resolution: 8 bits
- Linearity: $\pm 0.2\%$ maximum
- Maximum conversion rate: 60 MSPS minimum
- Analog output voltage range: V_{CC} to $V_{CC} - 1(V)$
- Digital input voltage: TTL compatible
- Single power supply voltage: +5.0V
- Power dissipation: 350 mW typical
- Package: Plastic DIP (Suffix: -P)
Plastic flat package: (Suffix: -PFQ)

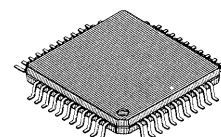
ABSOLUTE MAXIMUM RATINGS (see Note)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CCA} V_{CCD}	-0.5 to +7.0	V
Digital Input Voltage	V_{ID}	-0.5 to +7.0	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.

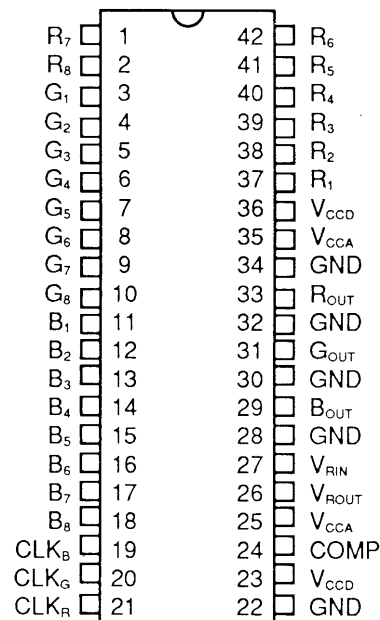


PLASTIC PACKAGE
DIP-42P-M02



PLASTIC PACKAGE
FPT-44P-M01

PIN ASSIGNMENT TOP VIEW: DIP



TOP VIEW: FPT
See Page 10 for Flat Package

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.

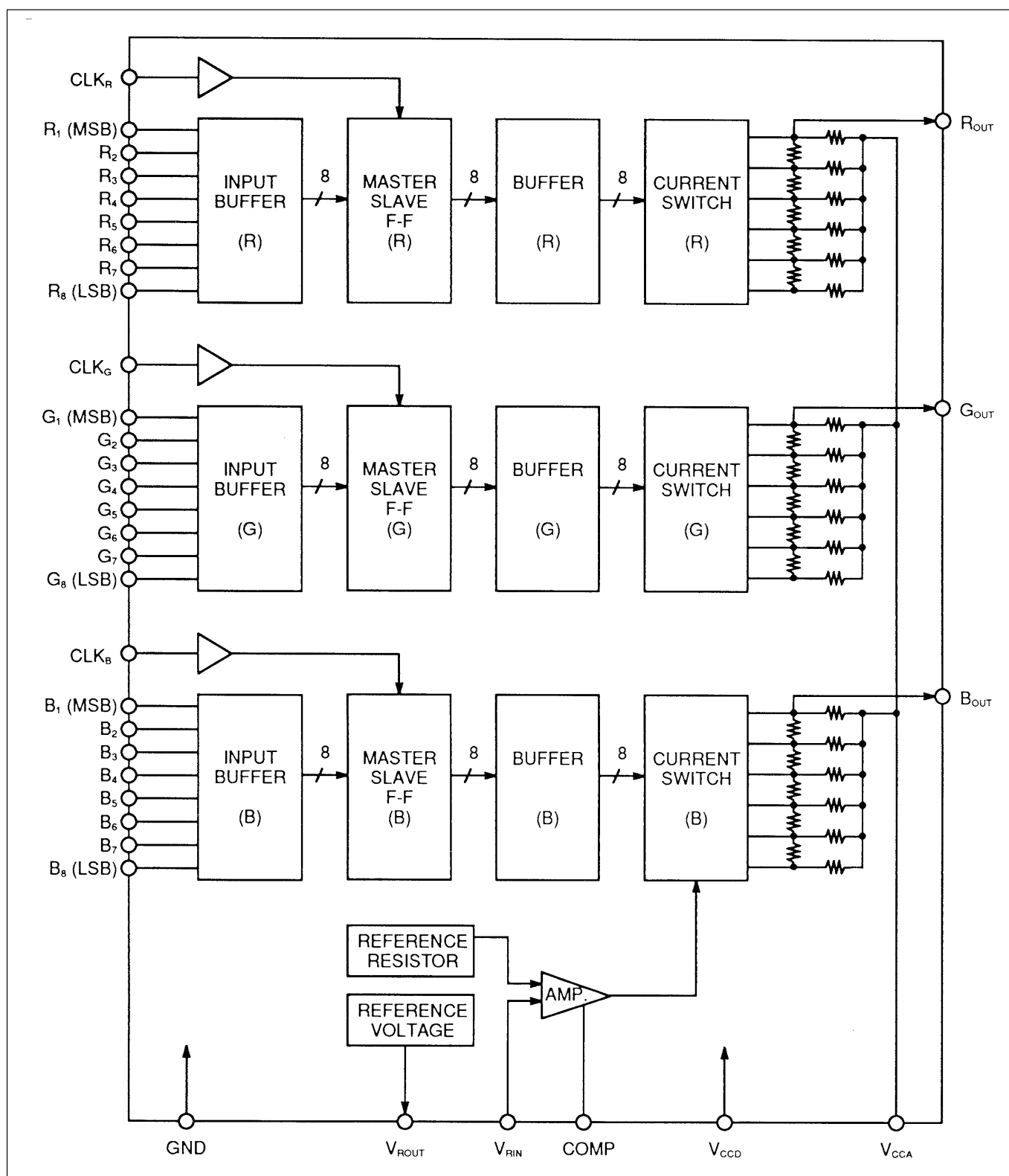


Figure 1. MB40978 Block Diagram

PIN DESCRIPTION

Pin No.	Symbol (DIP Pin Assignment)	Description
RI to R8	1,2,37 to 42	R-channel digital signal inputs: $V_{IH} = 2.0V$ minimum, $V_{IL} = 0.8V$ maximum
G1 to G8	3 to 10	G-channel digital signal inputs
B1 to B8	11 to 18	B-channel digital signal inputs
R _{OUT}	33	R-channel analog signal output
G _{OUT}	31	G-channel analog signal output
B _{OUT}	29	B-channel analog signal output
CLK _R	21	R-channel clock input: $V_{IH} = 2.0V$ minimum, $V_{IL} = 0.8V$ maximum
CLK _G	20	G-channel clock input
CLK _B	19	B-channel clock input
V _{RIN}	27	Reference voltage input: $V_{CC} = -1.2V$ minimum
V _{ROUT}	26	Reference voltage output
COMP	24	This pin is provided to connect a phase compensation capacitance. 1-mF minimum capacitor is connected between GND.
V _{CCA}	25,35	Power supply for analog circuit $5V \pm 5\%$
V _{CCD}	23,36	Power supply for digital circuit $5V \pm 5\%$
GND	22,28,30,32,34	Ground

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Power supply voltage	V_{CCA}, V_{CCD} $V_{CCA}, -V_{CCD}$	4.75 (-0.2)	5.00	5.25 (0.2)	V
Analog reference voltage	V_{RIN}	3.70	4.00	4.30	V
Digital high-level input voltage	V_{IHD}	2.0			V
Digital low-level input voltage	V_{ILD}			0.8	V
Clock frequency	f_{CLK}			60	MHz
Setup time	t_S	10			ns
Hold time	t_H	4.0			ns
Minimum high pulse width	t_{W+}	7.5			ns
Minimum low pulse width	t_{W-}	7.5			ns
Phase compensation capacitance	C_{COMP}	1.0			μF
Operating temperature	T_A	0		70	$^{\circ}C$

Note: $V_{CC} - V_{REF} \leq 1.2V$

ELECTRICAL CHARACTERISTICS

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

Parameter	Symbol	Condition	Value			Unit
			Min	Typ	Max	
Resolution					8	Bit
Linearity error	LE				± 0.2	LSB
Reference input current	I_{RIN}	V_{RIN}, V_{ROUT} short			10	μA
Reference output voltage	V_{ROUT}	$V_{CC} = 5.00V$	3.900	4.000	4.100	V
Digital high-level input current	I_{IHD}	$V_{IHD} = 2.7V$			20	μA
Digital low-level input current	I_{ILD}	$V_{ILD} = 0.4V$	-100			μA
RGB output voltage ratio	FSR		0	2	8	%
Full-scale output voltage	V_{OFS}	$V_{CC} = 5.000V$ V_{RIN}, V_{ROUT} short	$V_{CCA} - 15$	V_{CCA}		mV
Zero-scale output voltage	V_{OZS}	$V_{CC} = 5.000V$ $V_{RIN} = 4.00V$	3.944	4.004	4.064	V
		$V_{CC} = 5.000V$ V_{RIN}, V_{ROUT} short	3.884	4.004	4.124	
Output resistance	R_O			240		Ω
Power supply current	I_{CC}	$V_{CC} = 5.25V$ V_{RIN}, V_{ROUT} short		*70	102	mA

* $V_{CC} = 5.00V$

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	F_S	60			MSPS
Digital output delay time	t_{pd}		10	30	ns
Output rise time	t_r		5		ns
Output fall time	t_f		5		ns

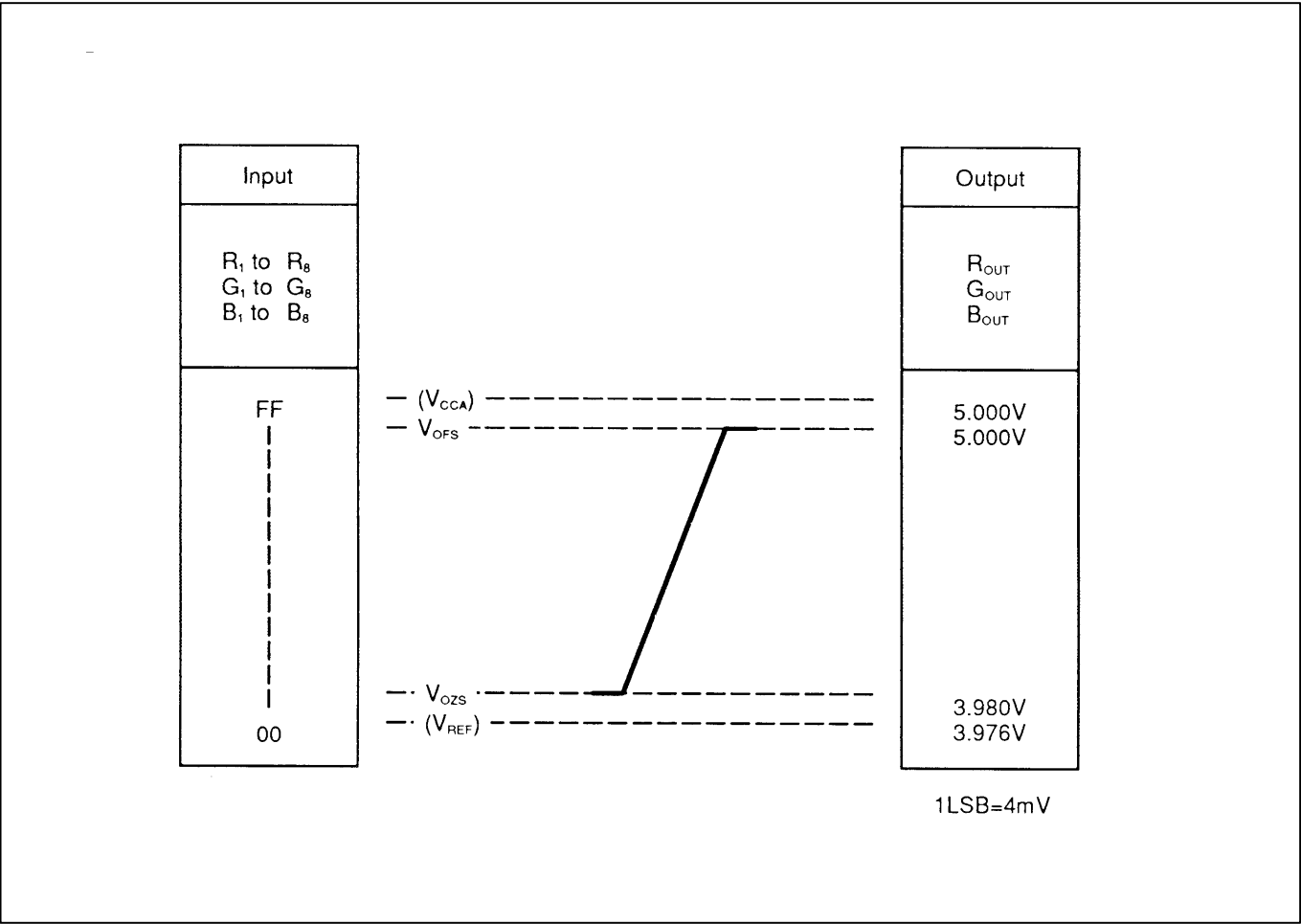


Figure 2. DAC Output Voltage

SWITCHING CHARACTERISTICS, continued

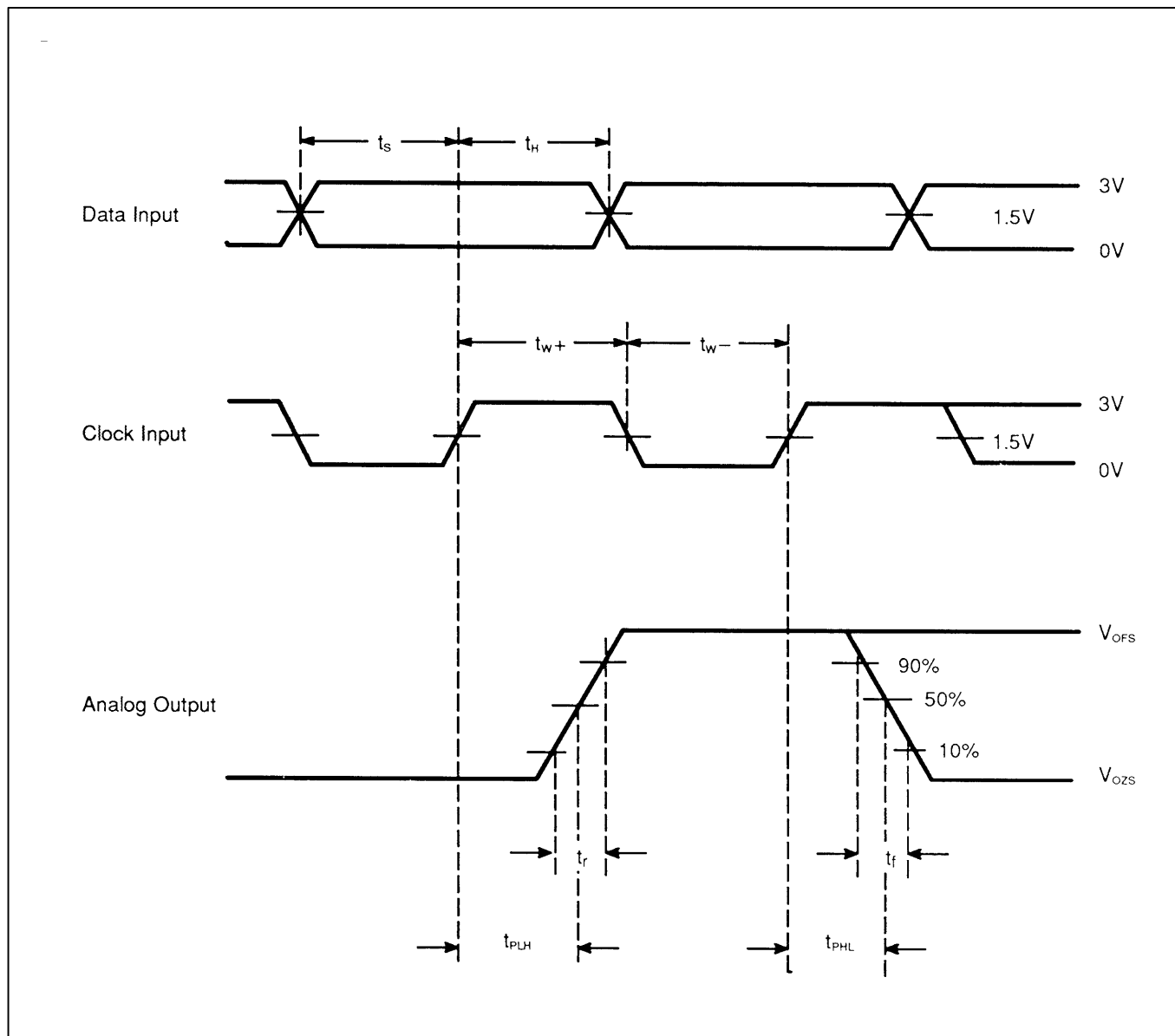


Figure 3. Timing Diagram

APPLICATION EXAMPLES

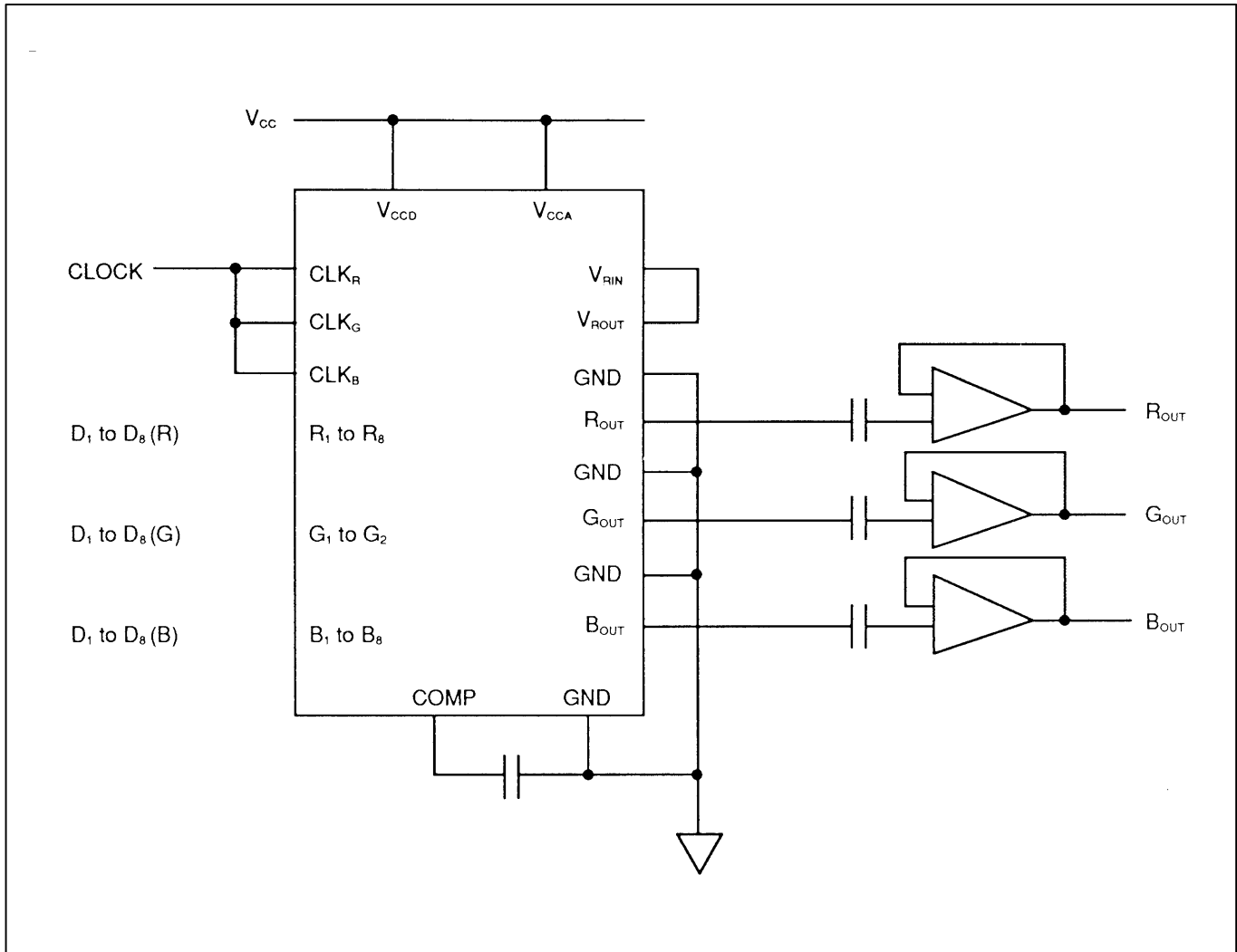


Figure 4. RGB Signal Process

APPLICATION EXAMPLES, continued

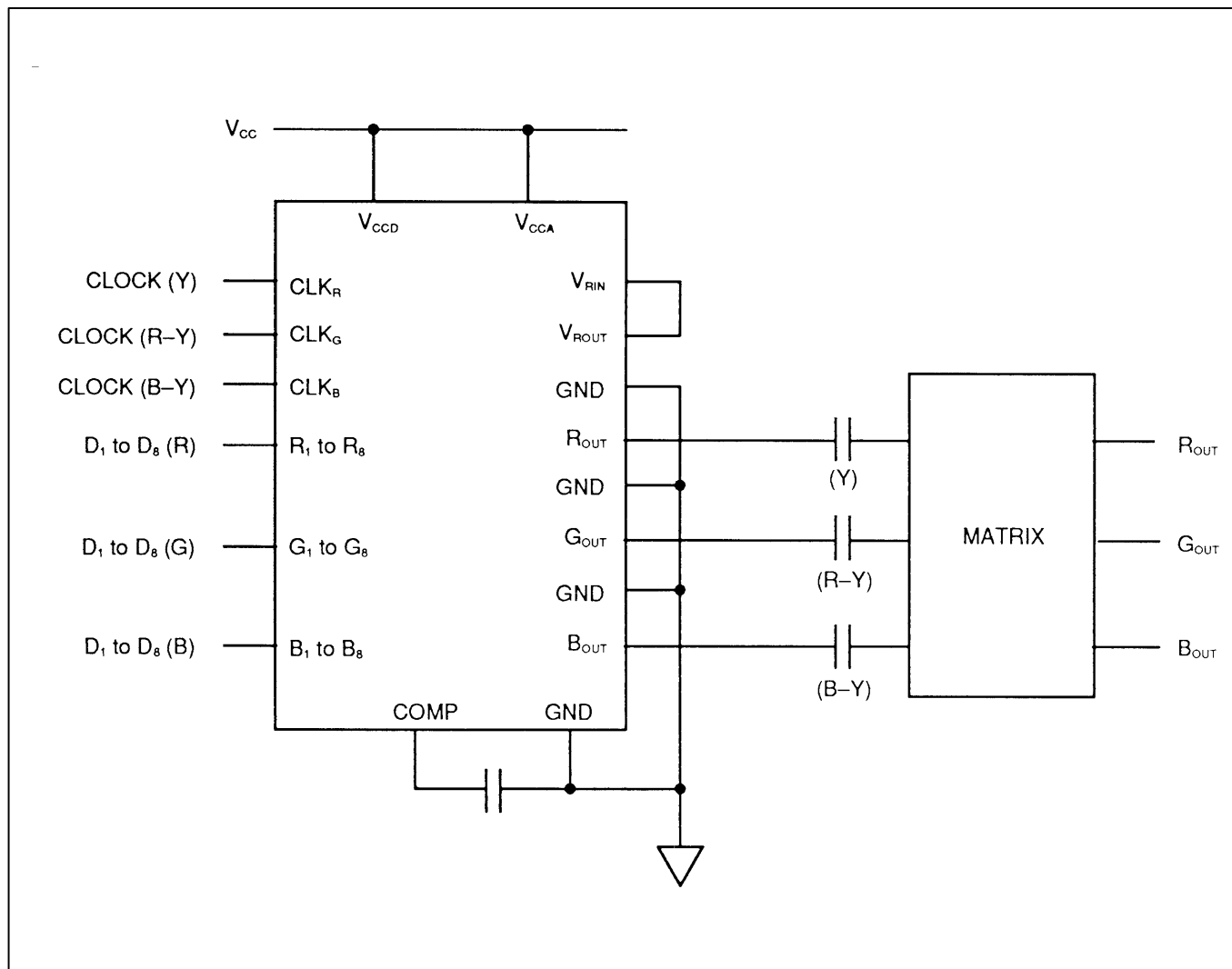
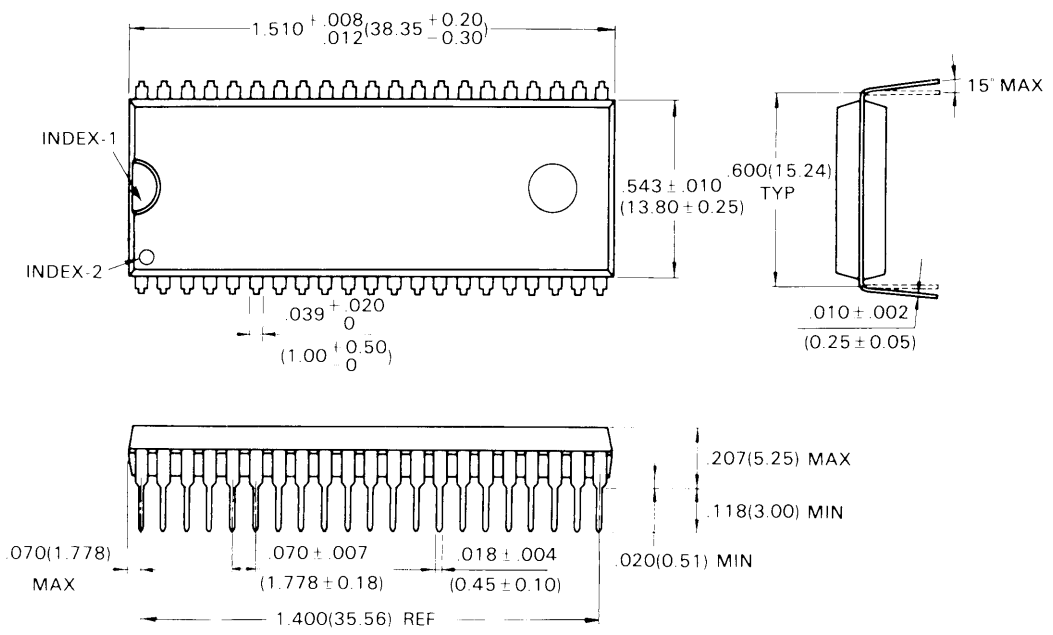


Figure 5. Component Signal Processing

PACKAGE DIMENSIONS

42-LEAD PLASTIC DUAL IN-LINE PACKAGE

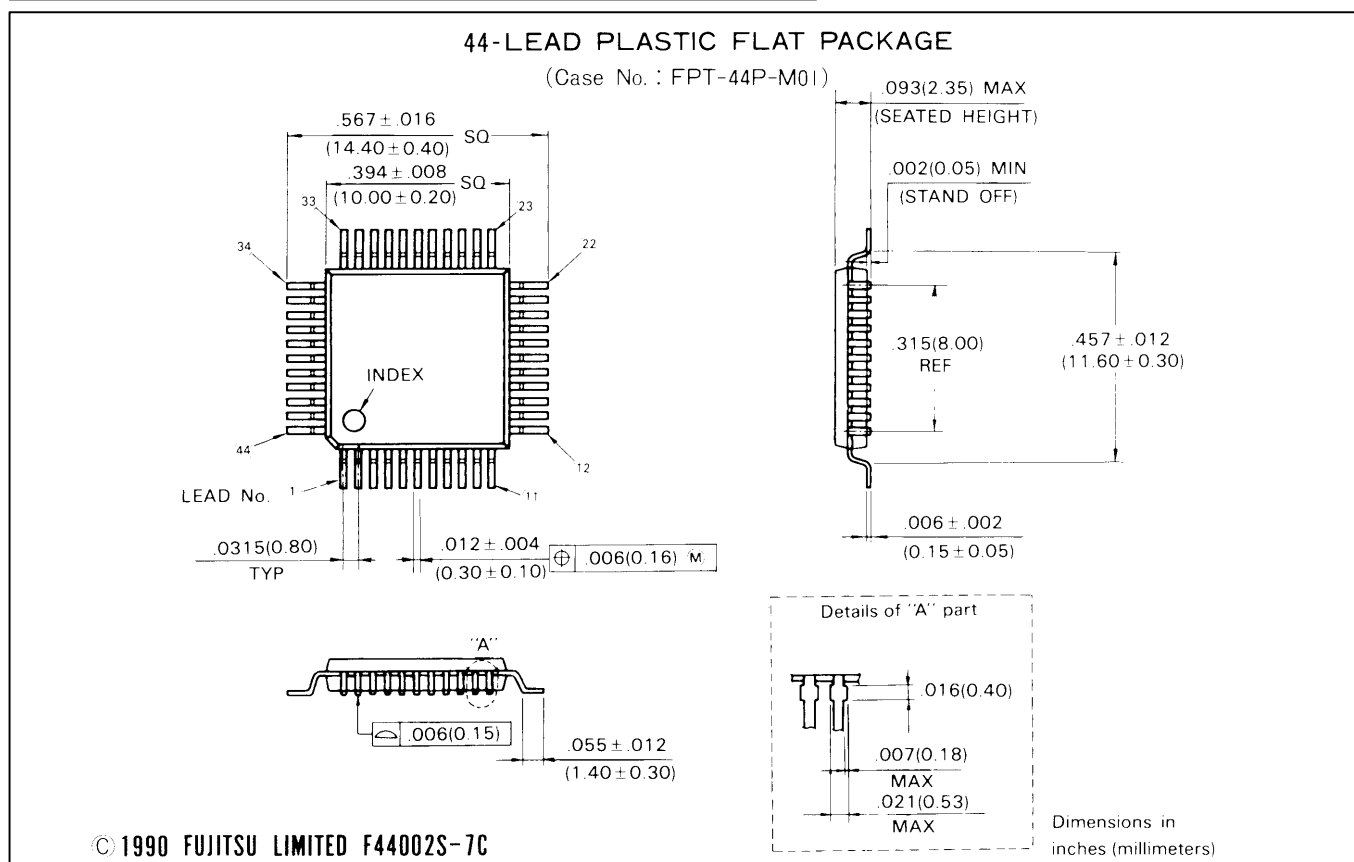
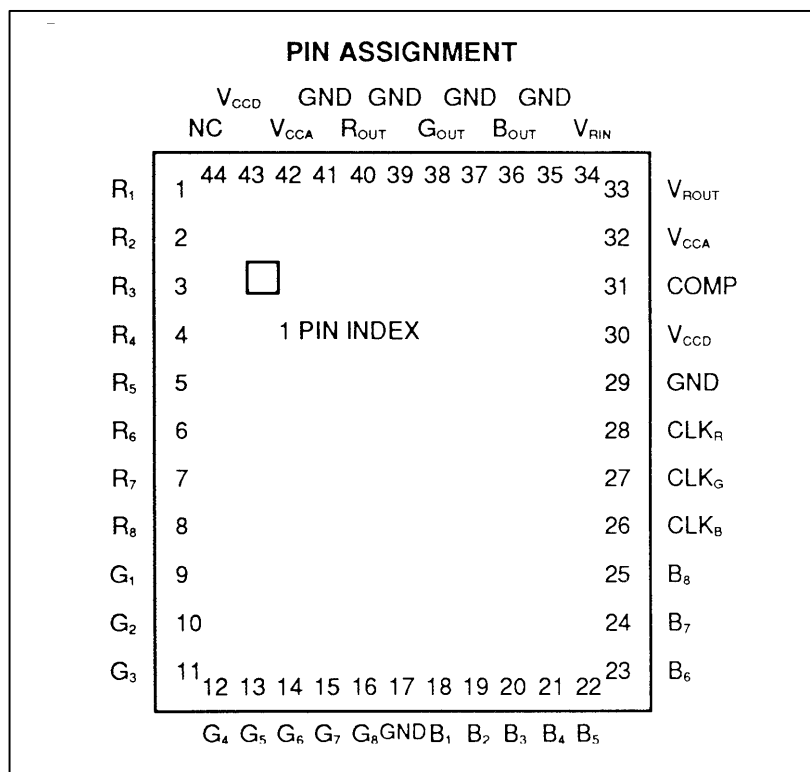
(Case No. : DIP-42P-M02)



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Dimensions in
inches (millimeters)

PACKAGE DIMENSIONS, continued



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