SONY

CXD1171M

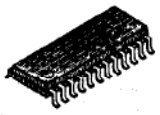
8-bit 40 MSPS High Speed D/A Converter

Description

The CXD1171M is an 8-bit 40MHz high speed D/A converter. The adoption of a current output system reduces power consumption to 80mW (200Ω load at 2Vp-p output).

This IC is suitable for digital TV and graphic display applications.

24pin SOP (Plastic)



Features

- Resolution 8-bit
- Max. conversion speed 40MSPS
- Non linearity error within ±0.25LSB
- Low glitch noise
- TTL CMOS compatible input
- +5V single power supply
- Low power consumption 80mW (200Ω load at 2Vp-p output)

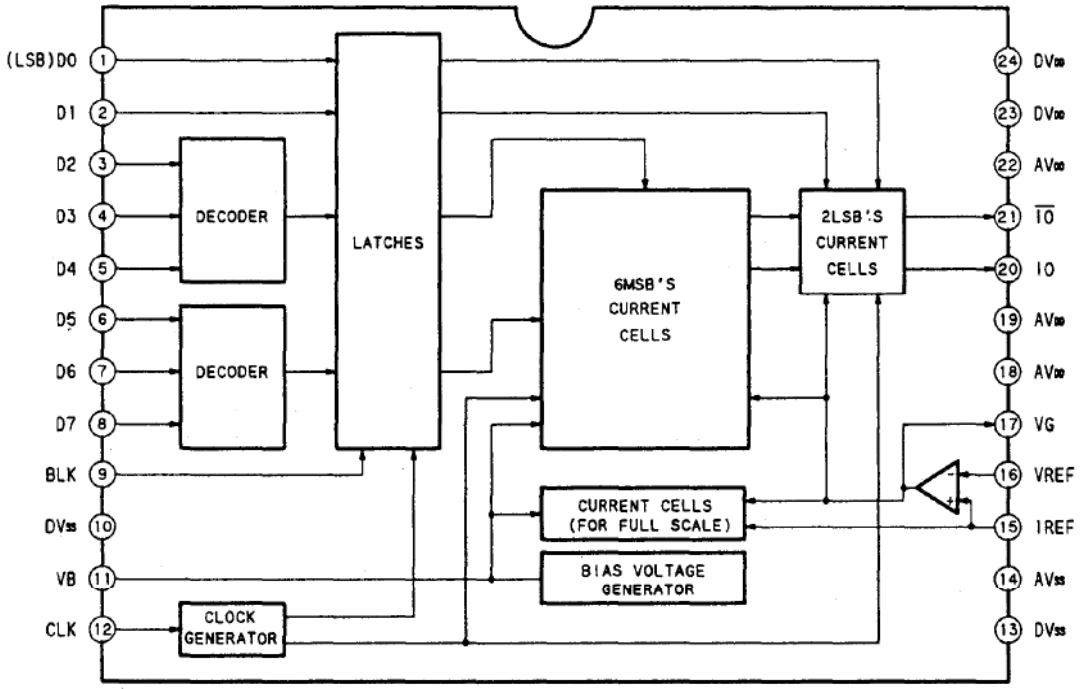
Structure

Silicon gate CMOS IC

Function

8-bit 40MHz D/A converter

Block Diagram and Pin Configuration



E89X38-HP

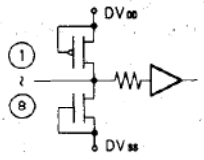
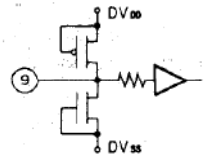
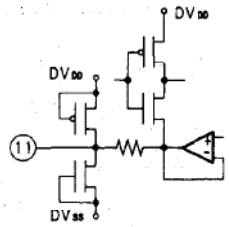
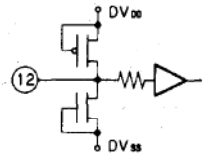
Absolute Maximum Ratings (Ta=25°C)

• Supply voltage	V_{DD}	7	V
• Input voltage	V_{IN}	V_{DD} to V_{SS}	V
• Output voltage	I_{OUT}	0 to 15	mA
• Storage temperature	T_{stg}	−55 to +150	°C

Recommended Operating Conditions

• Supply voltage	AV_{DD}, AV_{SS}	4.75 to 5.25	V
	DV_{DD}, DV_{SS}	4.75 to 5.25	V
• Reference input voltage	V_{REF}	0.5 to 2.0	V
• Clock pulse width	T_{PW1}	12.5 (Min)	ns
	T_{PW0}	12.5 (Min)	ns
• Operating temperature	T_{opr}	−20 to +75	°C

Pin Description and I/O Pins Equivalent Circuit

No.	Symbol	Equivalent circuit	Description
1 to 8	D0 to D7		Digital input
9	BLK		Blanking pin No signal at "H" (Output 0V) Output condition at "L"
11	VB		Connect a capacitor of about 0.1μF
12	CLK		Clock pin Moreover all input pins are TTL-CMOS compatible
10, 13	DV_{SS}		Digital GND
14	AV_{SS}		Analog GND

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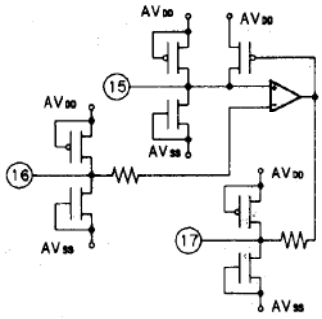
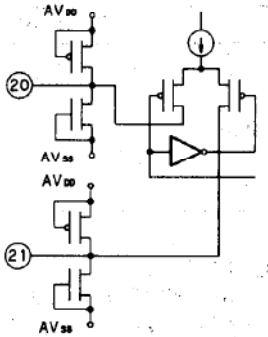
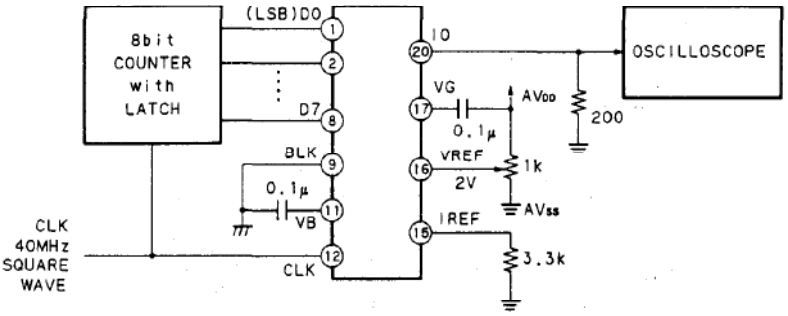
No.	Symbol	Equivalent circuit	Description
15	I_{REF}		Connect a resistance 16 times "16R" that of output resistance value "R"
16	V_{REF}		Set full scale output value
17	VG		Connect a capacitor of about 0.1μF
18, 19, 22	AV_{DD}		Analog V_{DD}
20	IO		Current output pin Voltage output can be obtained by connecting a resistance
21	$\overline{IO}$		Inverted current output pin Normally dropped to analog GND
23, 24	DV_{DD}		Digital V_{DD}

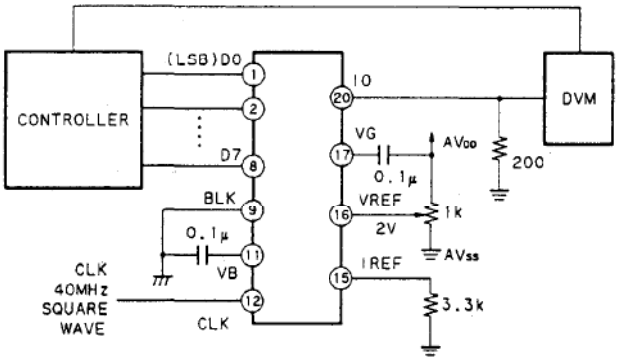
Electrical Characteristics (f_{CLK}=40MHz, V_{DD}=5V, R_{OUT}=200Ω, V_{ref}=2.0V, Ta=25°C)

Item		Symbol	Test conditions	Min.	Typ.	Max.	Unit
Resolution		n			8		bit
Maximum conversion speed		f_{MAX}		40			MSPS
Linearity error		E_L		−0.5		1.3	LSB
Differential linear error		E_D		−0.25		0.25	LSB
Full scale output voltage		V_{FS}		1.9	2.0	2.1	V
Full scale output current		I_{FS}			10	15	mA
Offset output voltage		V_{OS}				1	mV
Power supply current		I_{DD}	14.3MHz, at COLOR BAR DATA input	13	14.5	16	mA
Digital input current	H level	I_{IH}				5	μA
	L level	I_{IL}		−5			μA
Accuracy guaranteed range of output voltage		V_{OC}		0.5	2.0	2.1	V
Set up time		t_S		5			ns
Hold time		t_H		10			ns
Propagation delay time		t_{PD}			10		ns
Glitch energy		GE	R_{OUT}=75Ω		30		pV-s

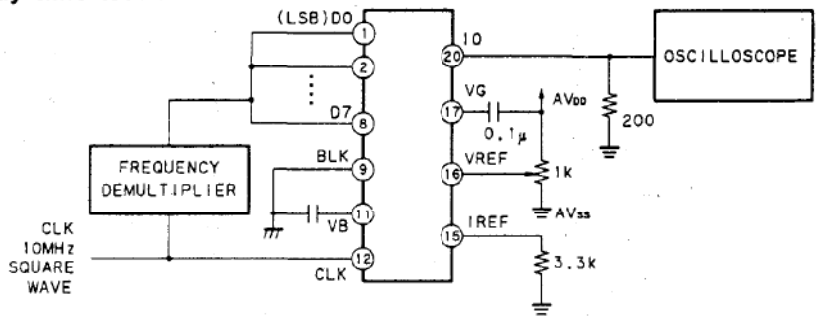
Maximum conversion speed test circuit



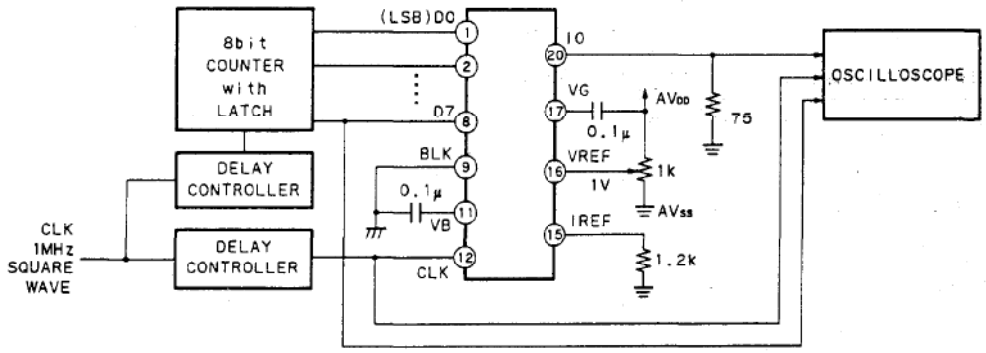
DC characteristics test circuit



Propagation delay time test circuit



Set up hold time and glitch energy test circuit



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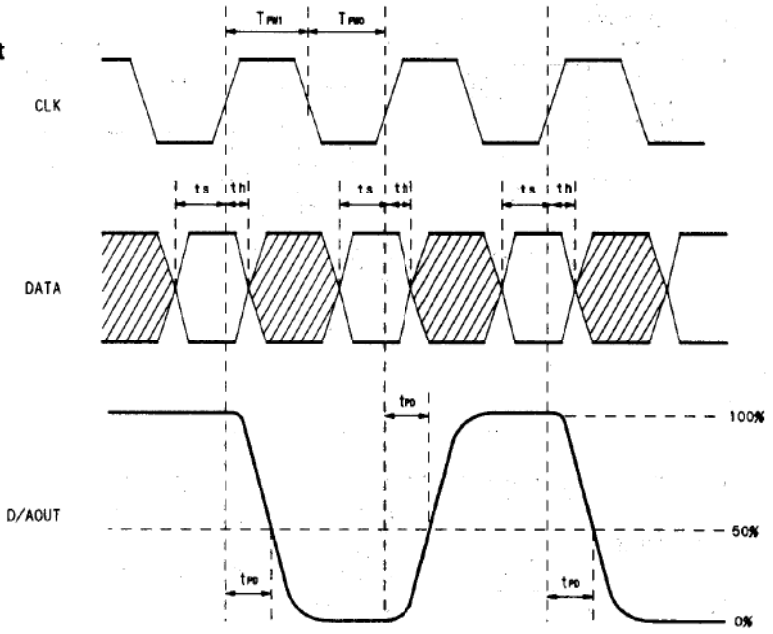
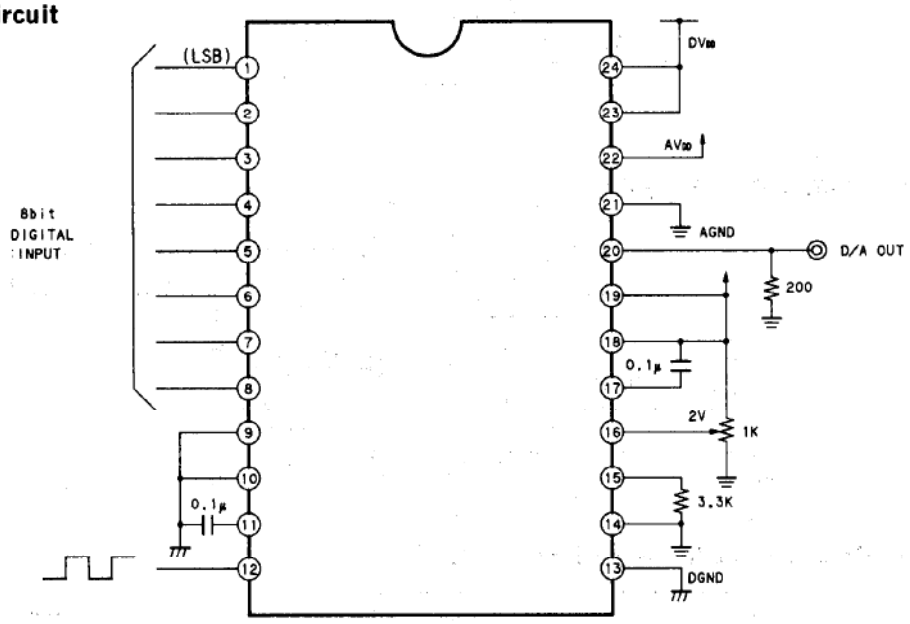
Operation Timing Chart



Application Circuit



I/O Chart (when full scale output voltage at 2.00V)

Input code	Output voltage
MSB LSB	
1 1 1 1 1 1 1 1	2.0V
⋮	
1 0 0 0 0 0 0 0	1.0V
⋮	
0 0 0 0 0 0 0 0	0V

Notes on Operation

- How to select the output resistance

The CXD1171M is a D/A converter of the current output type. To obtain the output voltage connect the resistance to IO pin. For specifications we have ;

Output full scale voltage V_{FS}=0.5 to 2.0 [V]

Output full scale current I_{FS}=0 to 15 [mA]

Calculate the output resistance value from the relation of $V_{FS}=I_{FS} \times R$. Also, 16 times resistance of the output resistance is connected to reference current pin I_{REF}. In some cases, however, this turns out to be a value that does not actually exist. In such a case a value close to it can be used as a substitute. Here please note that V_{FS} becomes $V_{FS}=V_{REF} \times 16R/R'$. R is the resistance connected to IO while R' is connected to I_{REF}. Increasing the resistance value can curb power consumption. On the other hand glitch energy and data settling time will inversely increase. Set the most suitable value according to the desired application.

- Phase relation between data and clock

To obtain the expected performance as a D/A converter, it is necessary to set properly the phase relation between data and clock applied from the exterior. Be sure to satisfy the provisions of the set up time (ts) and hold time (th) as stipulated in the Electrical Characteristics.

- V_{DD}, V_{SS}

To reduce noise effects separate analog and digital systems in the device periphery. For V_{DD} pins, both digital and analog, bypass respective GNDs by using a ceramic capacitor of about 0.1μF, as close as possible to the pin.

- Latch up

AV_{DD} and DV_{DD} have to be common at the PCB power supply source. This is to prevent latch up due to voltage difference between AV_{DD} and DV_{DD} pins when power supply is turned ON.

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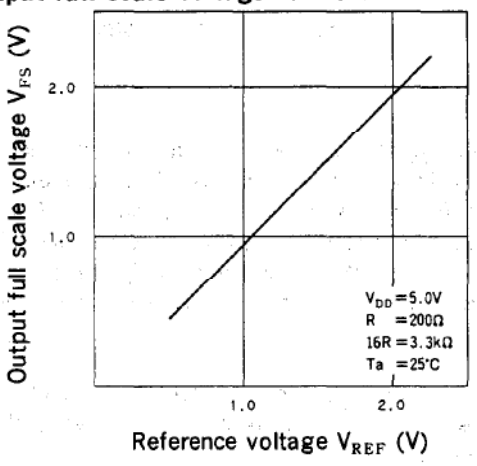
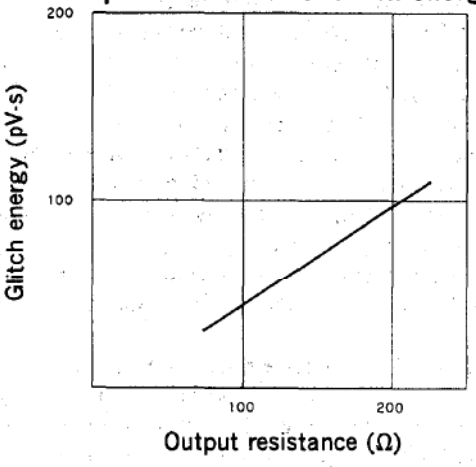
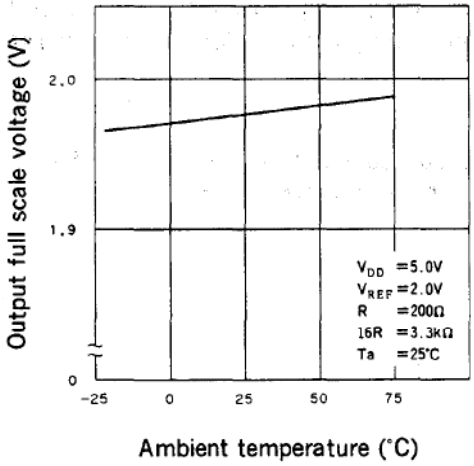
Output full scale voltage vs. Reference voltage



Output resistance vs. Glitch energy

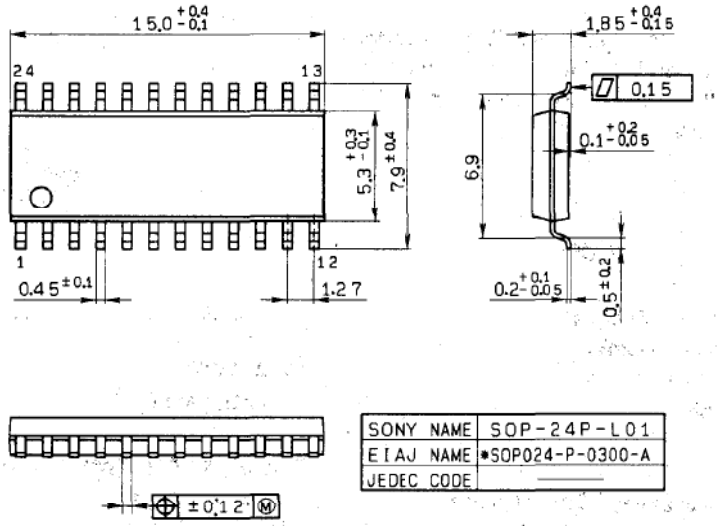


Output full scale voltage vs. Ambient temperature



Package Outline Unit : mm

24pin SOP (Plastic) 300mil 0.3g



SONY NAME	SOP-24P-L01
EIAJ NAME	*SOP024-P-0300-A
JEDEC CODE	

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