

**LC89080, ~~89080Q~~****Video Signal 3-Channel 8-Bit D/A Converter****Preliminary****Overview**

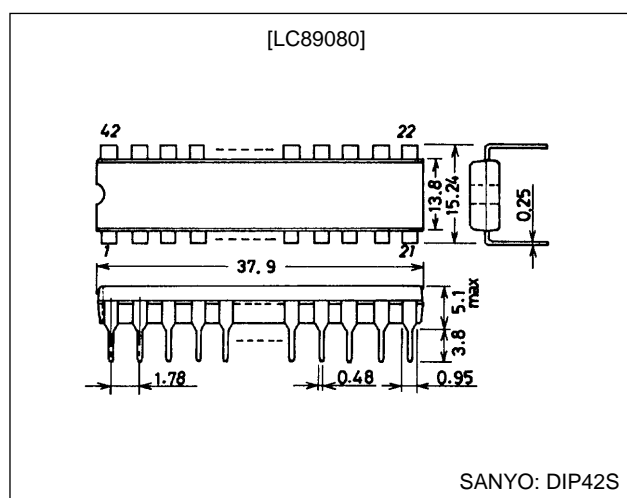
The LC89080 and LC89080Q are high-speed current-output D/A converters. They feature 8-bit resolution, provide 3 channels on a single chip, and can be used in demodulators for high-speed signals such as video signals.

Features

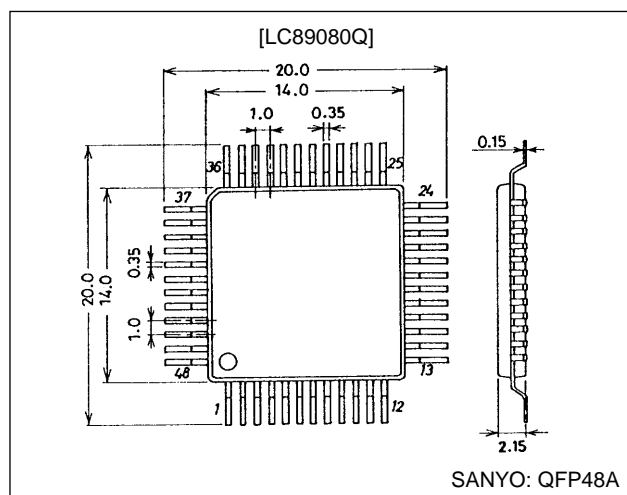
- Resolution: 8 bits
- D/A converters: Three current-output D/A converter channels on a single chip
- Maximum conversion speed: 30 MSPS
- Error: ± 1.0 LSB (maximum)
- Power supply: +5 V single-voltage power supply
- Power dissipation: 330 mW
- Inputs: TTL compatible

Package Dimensions

unit: mm

3025B-DIP42S

unit: mm

3052A-QFP48A

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$, $V_{SS} = 0\text{ V}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{DD\text{ max}}$		-0.3 to +7.0	V
Input voltage	V_{IN}		-0.3 to $V_{DD} + 0.3$	V
Operating temperature	T_{opr}		-30 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

Allowable Operating Ranges

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	V_{DD}		4.5	5.0	5.5	V
Reference voltage input	V_{REFIN}			1.0	2.0	V
Output resistance	R_O			75		Ω
Input high-level voltage	V_{IH}		2.2		$V_{DD} + 0.3$	V
Input low-level voltage	V_{IL}		-0.3		+0.8	V
Phase compensation capacitance	C_{comp}		1			μF

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{DD} = 5.0\text{ V}$, $V_{REFIN} = 1.0\text{ V}$, $R_{REF} = 300\ \Omega$, $R_O = 75\ \Omega$

Parameter	Symbol	Conditions	min	typ	max	Unit
Resolution	RES				8	Bits
Maximum conversion speed	$F_s\text{ max}$		30			MSPS
Power dissipation	P_d	$F_s = 30\text{ MSPS}$		330	400	mW
Zero-scale output voltage	V_{zero}	For each channel	-15	0	+15	mV
Full-scale output voltage	V_{full}	For each channel	0.92	1.00	1.08	V
Full-scale voltage ratio	FSR		0	4	8	%
Linearity error	I.L.	DC precision			± 1.0	LSB
Differential linearity error	D.L.	DC precision			± 0.5	LSB
Reference voltage output	V_{REFOUT}		0.99	1.00	1.01	V

Pin Assignment LC89080 (DIP42S)

Pin No.	Symbol	Description
1	DV _{DD}	Digital system power supply (+5 V)
2	DA1	Channel A digital input (MSB)
3 to 8	DA2 to DA7	Channel A digital input
9	DA8	Channel A digital input (LSB)
10	DB1	Channel B digital input (MSB)
11 to 16	DB2 to DB7	Channel B digital input
17	DB8	Channel B digital input (LSB)
18	DC1	Channel C digital input (MSB)
19 to 24	DC2 to DC7	Channel C digital input
25	DC8	Channel C digital input (LSB)
26	CLK	Clock input
27	DV _{DD}	Digital system power supply (+5 V)
28	DGND	Digital system ground (0 V)
29	ICOB	Channel C negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
30	ICO	Channel C positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
31	AV _{DD}	Analog system power supply (+5 V)
32	IBOB	Channel B negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
33	IBO	Channel B positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
34	AGND	Analog system ground (0 V)
35	IAOB	Channel A negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
36	IAO	Channel A positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
37	AV _{DD}	Analog system power supply (+5 V)
38	COMP	Phase compensation capacitor. Connect a 1 μF capacitor between this pin and ground.
39	I _{REF}	Reference current output. Connect a resistor that is 4 times the output resistance R _O to this pin.
40	V _{REFIN}	Reference voltage input. This input pin sets the analog output dynamic range.
41	V _{REFOUT}	Reference voltage output. The output voltage is set to 0.2 times V _{DD} by a resistor divider. When V _{DD} is 5.0 V, a 1.0 V reference voltage can be acquired from pin 40.
42	DGND	Digital system ground (0 V)

Pin Assignment LC89080Q (QFP48A)

Pin No.	Symbol	Description
1 to 3	DA5 to 7	Channel A digital input
4	DA8	Channel A digital input (LSB)
5	DB1	Channel B digital input (MSB)
6	NC	Unused (no connection)
7 to 12	DB2 to DB7	Channel B digital input
13	DB8	Channel B digital input (LSB)
14	DC1	Channel C digital input (MSB)
15 to 18	DC2 to DC5	Channel C digital input
19	DV _{DD}	Digital system power supply (+5 V)
20	DC6	Channel C digital input
21	DC7	Channel C digital input
22	DC8	Channel C digital input (LSB)
23	CLK	Clock input
24	NC	Unused (no connection)
25	DV _{DD}	Digital system power supply (+5 V)
26	DGND	Digital system ground (0 V)
27	ICOB	Channel C negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
28	ICO	Channel C positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
29	AV _{DD}	Analog system power supply (+5 V)
30	AV _{DD}	Analog system power supply (+5 V)
31	IBOB	Channel B negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
32	IBO	Channel B positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
33	AGND	Analog system ground (0 V)
34	IAOB	Channel A negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
35	IAO	Channel A positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
36	AV _{DD}	Analog system power supply (+5 V)
37	COMP	Phase compensation capacitor. Connect a 1 μF capacitor between this pin and ground.
38	NC	Unused (no connection)
39	I _{REF}	Reference current output. Connect a resistor that is 4 times the output resistance R _O to this pin.
40	V _{REFIN}	Reference voltage input. This input pin sets the analog output dynamic range.
41	V _{REFOUT}	Reference voltage output. The output voltage is set to 0.2 times V _{DD} by a resistor divider. When V _{DD} is 5.0 V, a 1.0 V reference voltage can be acquired from pin 40.
42	DGND	Digital system ground (0 V)
43	DV _{DD}	Digital system power supply (+5 V)
44	DV _{DD}	Digital system power supply (+5 V)
45	DA1	Channel A digital input (MSB)
46 to 48	DA2 to DA4	Channel A digital input

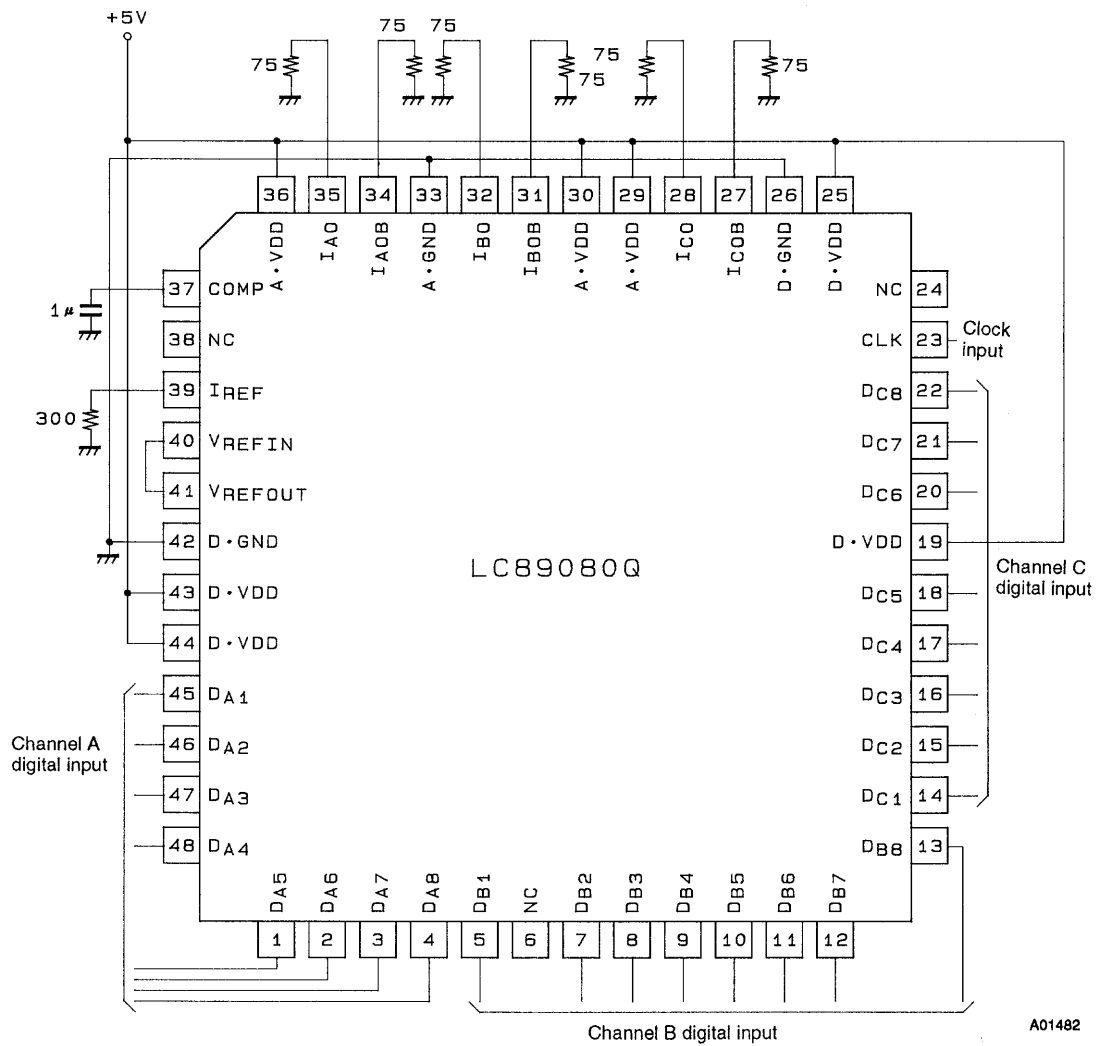
LC89080, 89080Q

Pin Assignment LC89080Q (QFP48A)

Pin No.	Symbol	Description
1 to 3	DA5 to 7	Channel A digital input
4	DA8	Channel A digital input (LSB)
5	DB1	Channel B digital input (MSB)
6	NC	Unused (no connection)
7 to 12	DB2 to DB7	Channel B digital input
13	DB8	Channel B digital input (LSB)
14	DC1	Channel C digital input (MSB)
15 to 18	DC2 to DC5	Channel C digital input
19	DV _{DD}	Digital system power supply (+5 V)
20	DC6	Channel C digital input
21	DC7	Channel C digital input
22	DC8	Channel C digital input (LSB)
23	CLK	Clock input
24	NC	Unused (no connection)
25	DV _{DD}	Digital system power supply (+5 V)
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32	IBO	Channel B positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
33	AGND	Analog system ground (0 V)
34	IAOB	Channel A negative output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
35	IAO	Channel A positive output. Connect to A.GND through an output resistor R _O (usually 75 Ω).
36	AV _{DD}	Analog system power supply (+5 V)
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42	DGND	Digital system ground (0 V)
43	DV _{DD}	Digital system power supply (+5 V)
44	DV _{DD}	Digital system power supply (+5 V)
45	DA1	Channel A digital input (MSB)
46 to 48	DA2 to DA4	Channel A digital input

Sample Application Circuit: LC89080Q

Application circuit in which the output resistance is $75\ \Omega$ and the internally generated 1-V reference voltage is used.



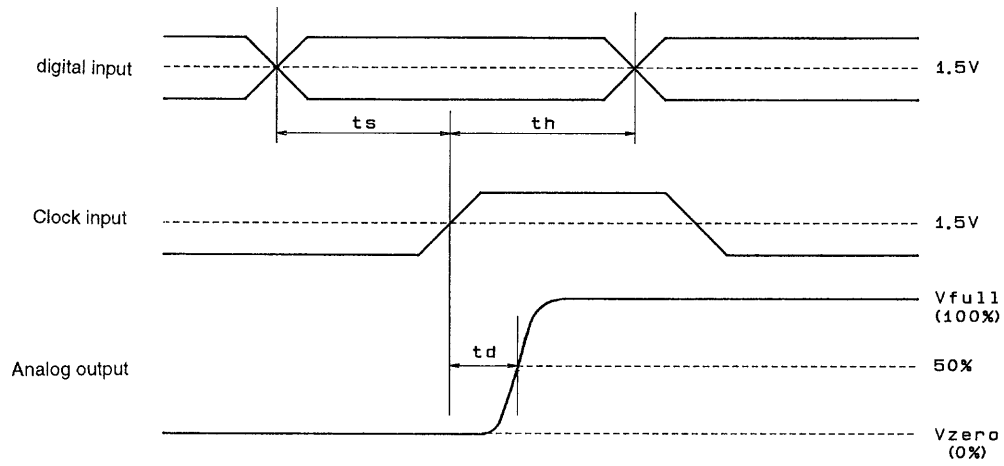
Unit (resistance: Ω , capacitance: F)

AC Characteristics at $T_a = -30$ to 70°C , $V_{DD} = 4.5$ to 5.5 V

Parameter	Symbol	Conditions	min	typ	max	Unit
Data setup time	t_s		15			ns
Data hold time	t_h		15			ns
Output delay time	t_d			10		ns

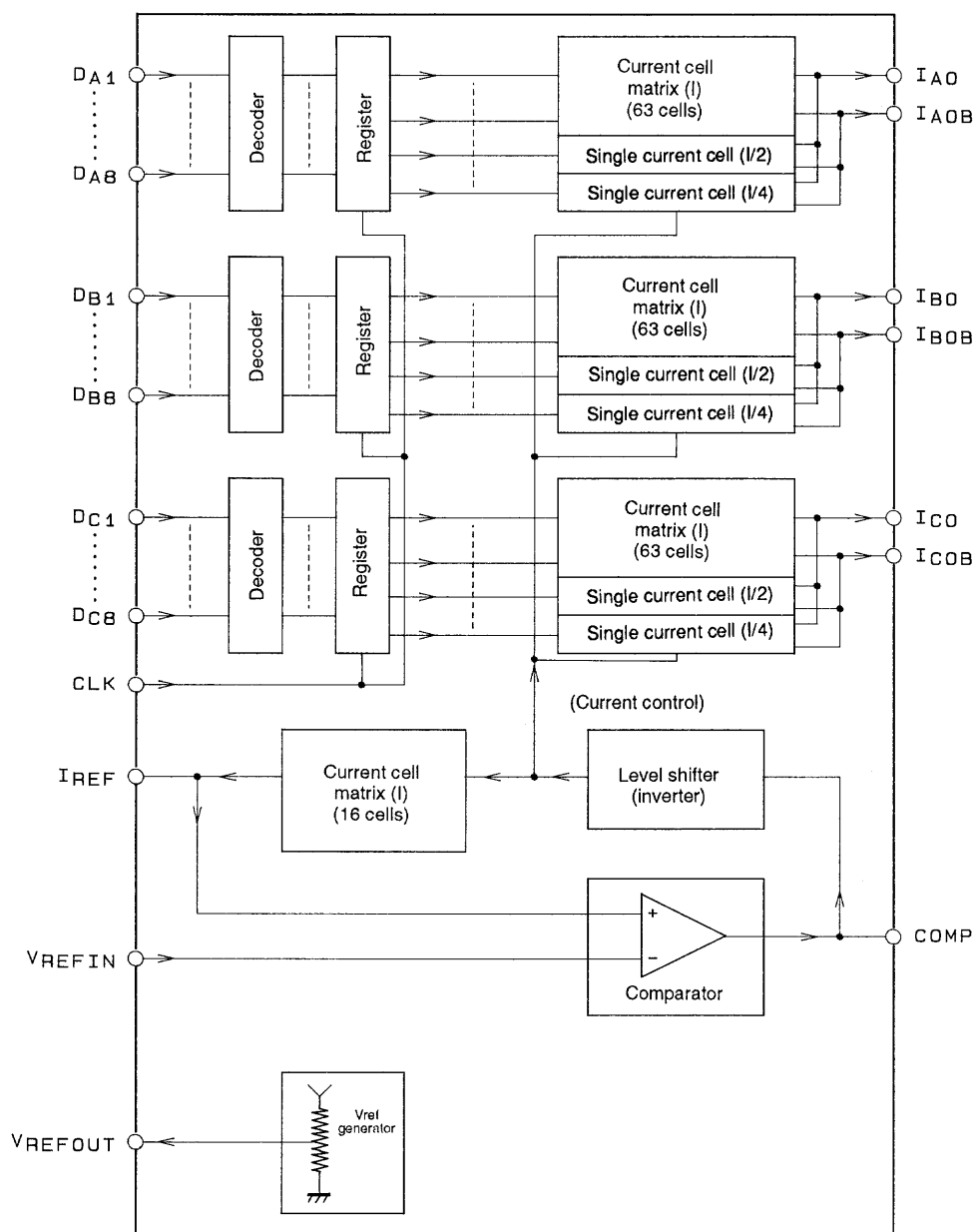
Timing Chart

The digital inputs for all 3 channels are acquired on the rising edge of the clock input, after which the corresponding analog voltages are output.



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Block Diagram



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