

SANYO**LC89081Q****Video Signal 3-Channel 8-Bit D/A Converter****Preliminary****Overview**

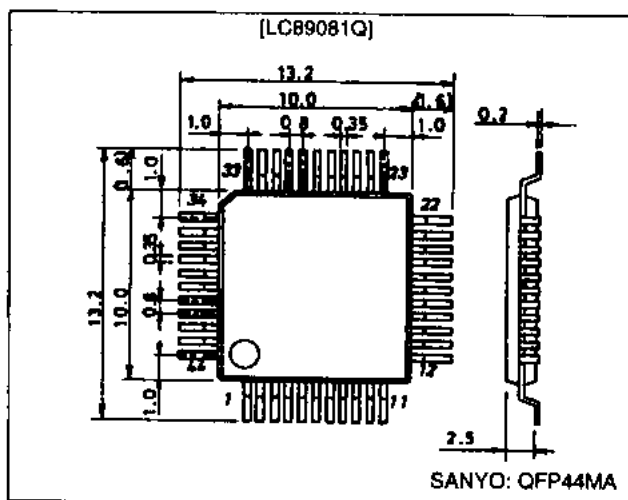
The LC89081Q are high-speed current-output D/A converters. They feature 8-bit resolution, provide 3 channels on a single chip, and can be used in demodulators for high-speed signals such as video signals.

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: 220 mW ($F_s = 15$ MHz)

Package Dimensions

unit: mm

3148A-QFP44MA**Specifications****Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$, $V_{SS} = 0$ V**

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{DD\ max}$		-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	Ratings			Unit
			min	typ	max	
Supply voltage	V_{DD}		4.5	5.0	5.5	V
Input high-level voltage	V_{IH}		2.0		$V_{DD} + 0.3$	V
Input low-level voltage	V_{IL}		-0.3		+0.8	V
Output resistance	R_O (15)	$F_s = 15$ MHz operation		200		Ω
	R_O (30)	$F_s = 30$ MHz operation		75		Ω
Reference resistance	R_{REF} (15)	$F_s = 15$ MHz operation	640	800	2000	Ω
	R_{REF} (30)	$F_s = 30$ MHz operation		600		Ω
Full-scale output voltage	V_{fult} (15)	$F_s = 15$ MHz operation	0.8	2.0	2.5	V
	V_{fult} (30)	$F_s = 30$ MHz operation		1.0		V
Output resistance	R_O			75		Ω
Phase compensation capacitance	C_{comp}		0.1			μF
Reference voltage capacitance	C_{VREF}		0.1			μF

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LC89081Q

Electrical Characteristics 1 at $T_a = 25^\circ\text{C}$, $V_{DD} = 5.0\text{ V}$, $F_s = 15\text{ MHz}$, $R_{REF} = 800\ \Omega$, $R_O = 200\ \Omega$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Resolution	RES				8	Bits
Conversion speed	F_s				15	MSPS
Power dissipation	P_d	$F_s = 15\text{ MSPS}$		220		mW
Zero-scale output voltage	V_{zero}	For each channel	-15	0	+15	mV
Full-scale output voltage	V_{full}	For each channel		2		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

Electrical Characteristics 2 at $T_a = 25^\circ\text{C}$, $V_{DD} = 5.0\text{ V}$, $F_s = 30\text{ MHz}$, $R_{REF} = 600\ \Omega$, $R_O = 75\ \Omega$

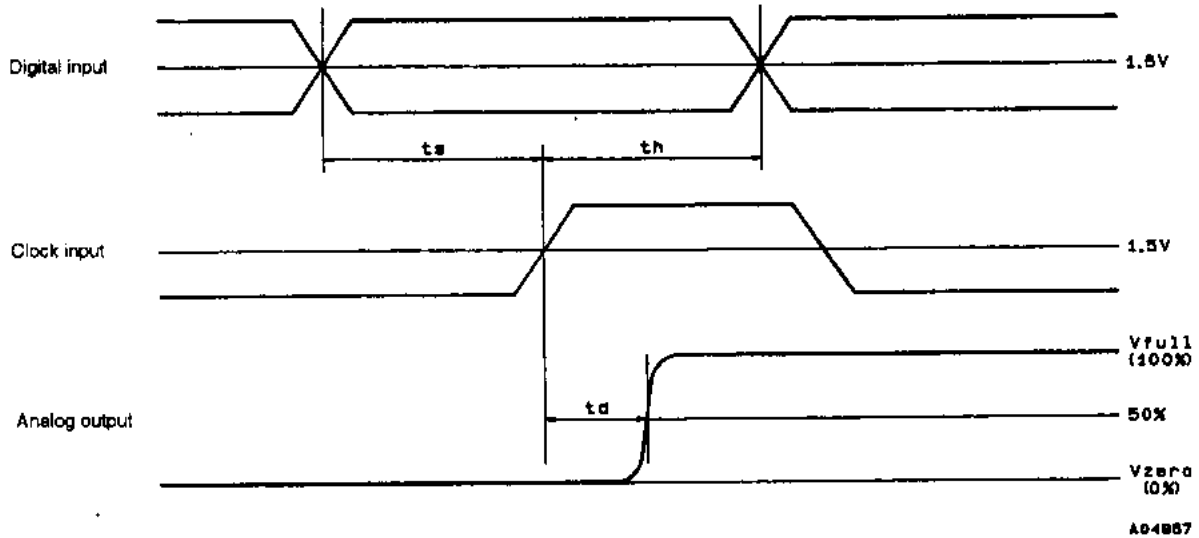
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Resolution	RES				8	Bits
Conversion speed	F_s				30	MSPS
Power dissipation	P_d			300		mW
Zero-scale output voltage	V_{zero}		-15	0	+15	mV
Full-scale output voltage	V_{full}			1		V
Full-scale voltage ratio	FSR		0	4	8	%
Linearity error	I.L.	DC precision			± 1.0	LSB
Differential linearity error	D.L.	DC precision			± 0.5	LSB

AC Characteristics at $T_a = -30\text{ to }+70^\circ\text{C}$, $V_{DD} = 4.5\text{ to }5.5\text{ V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Data setup time	t_s		7			ns
Data hold time	t_h		7			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.



Adjusting the Output Voltage

The LC89081Q full scale output voltage, V_{full} , can be changed by adjusting the output resistor, R_O , and the reference resistor, R_{REF} . The relationship between these values is given by the following equation.

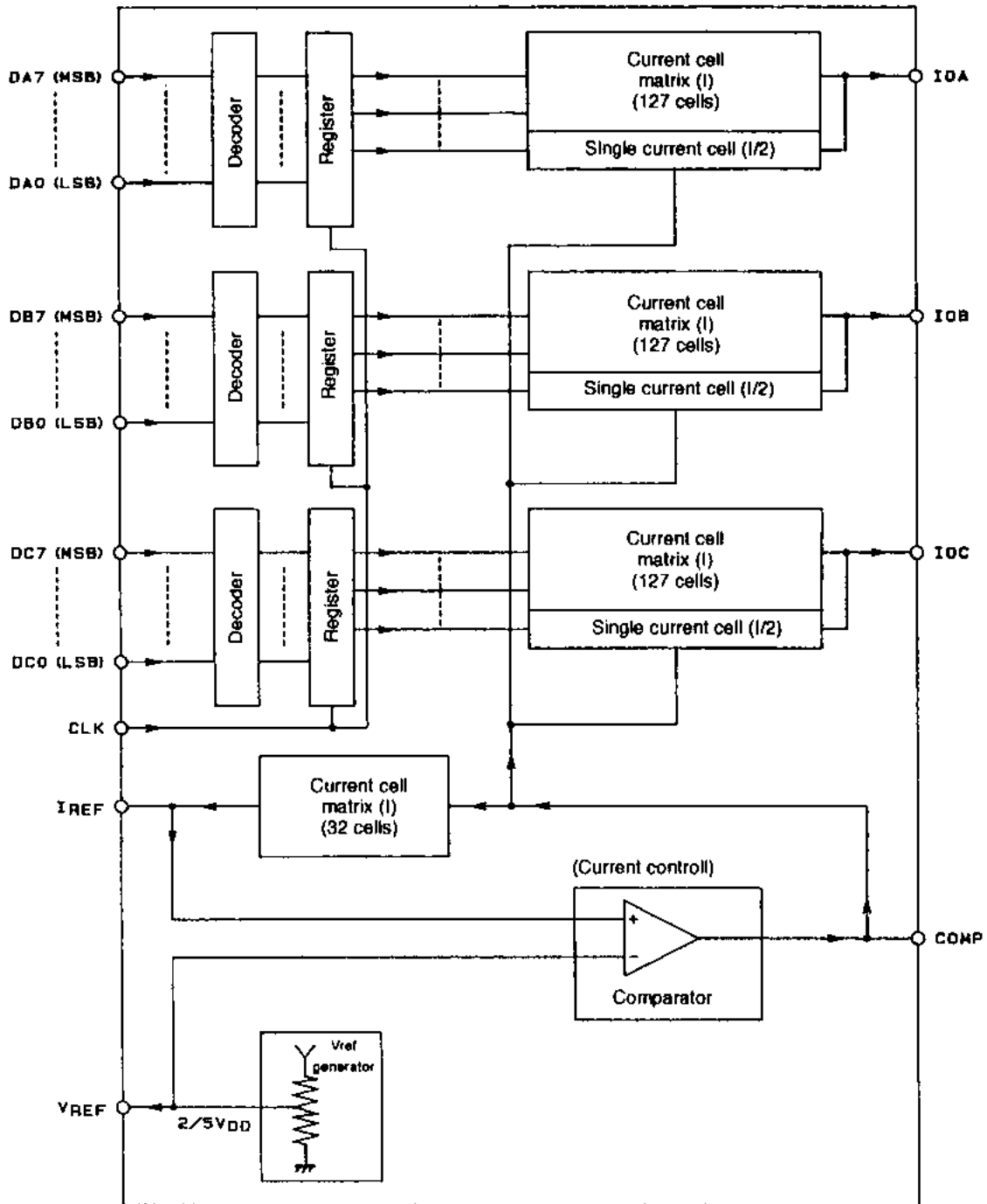
$$V_{full} = 1.6 \times V_{DD} \times R_O \div R_{REF}$$

Applications should use a full-scale voltage of 2 V with $R_O = 200\Omega$ and $R_{REF} = 800\Omega$ for conversion rates up to 15 MHz, and a full-scale voltage of 1 V with $R_O = 75\Omega$ and $R_{REF} = 600\Omega$ for conversion rates up to 30 MHz.

Pin Functions

Pin No.	Symbol	Description
1	I _{REF}	Reference current output. Connect the reference resistor to this pin.
2	AGND	Analog system ground
3	DA7	Channel A digital system input (MSB)
4 to 5	DA6 to DA5	Channel A digital system inputs
6	DGND	Digital system ground
7		Digital system power supply
8 to 11	DA4 to DA1	Channel A digital inputs
12	DA0	Channel A digital input (LSB)
13	DB7	Channel B digital input (MSB)
14 to 19	DB6 to DB1	Channel B digital inputs
20	DB0	Channel B digital input (LSB)
21	DC7	Channel C digital input (MSB)
22 to 26	DC6 to DC2	Channel C digital inputs
27	DV _{DD}	Digital system power supply
28	DGND	Digital system ground
29	DC1	Channel C digital inputs
30	DC0	Channel digital input (LSB)
31	CLK	Clock Input
32	AV _{DD}	Analog system power supply
33	V _{REF}	Reference voltage output
34	NC	Unused. Must be left open.
35	AV _{DD}	Analog system power supply
36	IOC	Channel C output. Connect the output resistor to this pin.
37	COMP	Phase compensation capacitor connection
38	NC	Unused. Must be left open.
39	AV _{DD}	Analog system power supply
40	IOB	Channel B output. Connect the output resistor to this pin.
41	NC	Unused. Must be left open.
42	AGND	Digital system ground
43	AV _{DD}	Digital system power supply
44	IOA	Channel A output. Connect the output resistor to this pin.

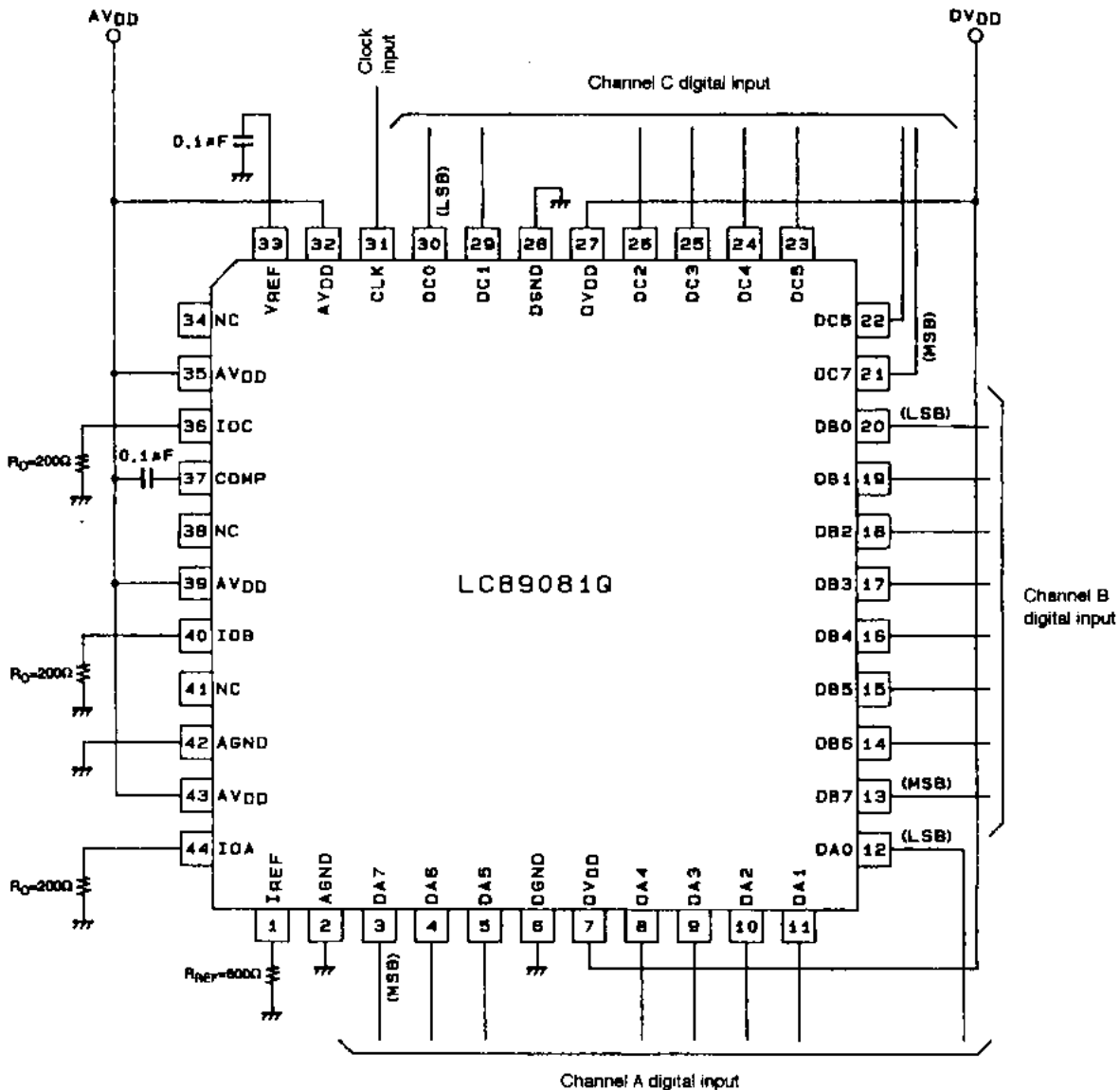
Block Diagram



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LC89081Q

Sample Application Circuit (Fs = 15MHz)



When operating at $F_s = 30 \text{ MHz}$, R_o should be 75Ω and R_{REF} should be 600Ω .

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