

MN65702H

Low Power 8-Bit, 3-Channel CMOS D/A Converter for Image Processing

■ Overview

The MN65702H is a high-speed 8-bit, 3-channel CMOS digital-to-analog converter. (Two channels use serial input.)

It uses both a matrix cell and weighted current technology to achieve both low power consumption and high speed.

It features built-in output resistor, reference resistor, and low pass filter, and provides independent output amplitude adjustment for the Y (luminance) and C (chroma) synchronization signals. The Y (luminance signal) can be superimposed with an external SYNC signal.

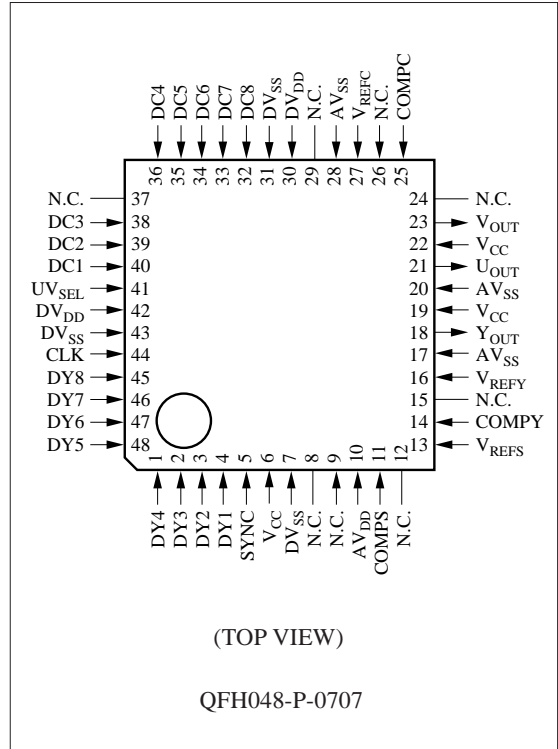
■ Features

- Maximum conversion rate: 20 MSPS (min.)
- Linearity error: ± 0.2 LSB (typ.)
- Differential linearity error: ± 0.2 LSB (typ.)
- Power supply voltage: $V_{DD} = 3.3 \pm 0.3$ V, $V_{CC} = 4.8 \pm 0.3$ V
- Full scale current: 2.33 mA (typ.)
- Power consumption: 100 mW (typ.) ($f_{CLK} = 15$ MHz)
- Built-in LPF and synchronization function.

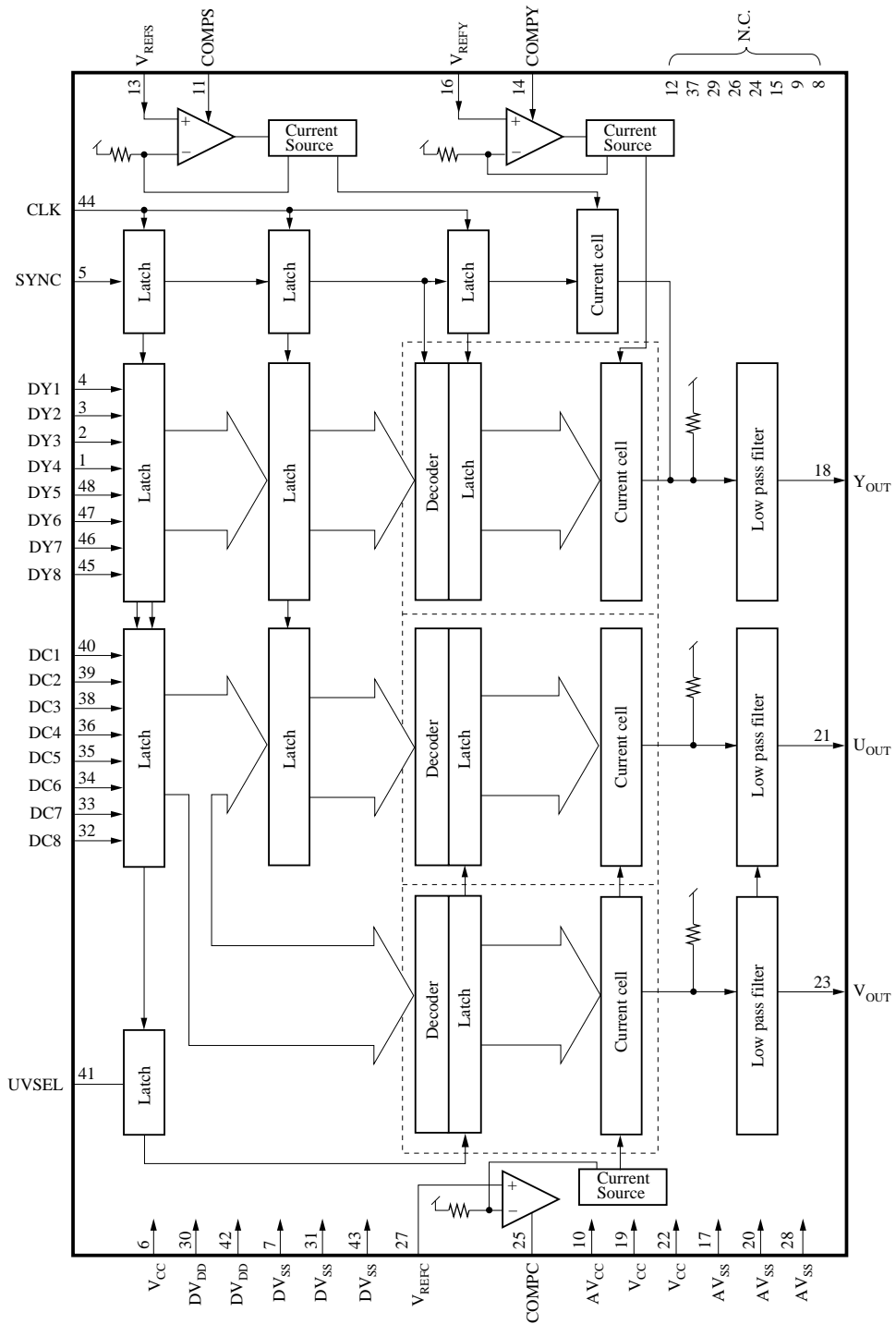
■ Applications

- Digital television
- Digital video equipment
- Digital image processing equipment

■ Pin Assignment



■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Function Description
1	DY4	Y (luminance) digital input
2	DY3	Y (luminance) digital input
3	DY2	Y (luminance) digital input
4	DY1	Y (luminance) digital input (MSB)
5	SYNC	SYNC signal judgment signal
6	V _{CC}	Filter power supply for analog circuits
7	DV _{SS}	Ground for digital circuits
8	N.C.	No connection
9	N.C.	No connection
10	AV _{DD}	Power supply for analog circuits
11	COMPS	Phase compensation
12	N.C.	No connection
13	V _{REFS}	SYNC reference voltage input
14	COMPY	Phase compensation
15	N.C.	No connection
16	V _{REFY}	Luminance reference voltage input
17	AV _{SS}	Ground for analog circuits
18	Y _{OUT}	Y signal analog current output
19	V _{CC}	Filter power supply for analog circuits
20	AV _{SS}	Ground for analog circuits
21	U _{OUT}	U signal analog current output
22	V _{CC}	Filter power supply for analog circuits
23	V _{OUT}	V signal analog current output
24	N.C.	No connection
25	COMPC	Phase compensation
26	N.C.	No connection
27	V _{REFC}	Chroma reference voltage input
28	AV _{SS}	Ground for analog circuits
29	N.C.	No connection
30	DV _{DD}	Power supply voltage for digital circuits
31	DV _{SS}	Ground for digital circuits
32	DC8	C (chroma) digital input (LSB)
33	DC7	C (chroma) digital input
34	DC6	C (chroma) digital input
35	DC5	C (chroma) digital input
36	DC4	C (chroma) digital input
37	N.C.	No connection
38	DC3	C (chroma) digital input
39	DC2	C (chroma) digital input
40	DC1	C (chroma) digital input (MSB)
41	UVSEL	U/V signal discrimination for C (chroma) signal
42	DV _{DD}	Power supply voltage for digital circuits

■ Pin Descriptions (continued)

Pin No.	Symbol	Function Description
43	DV _{SS}	Power supply for digital circuits
44	CLK	Sampling clock
45	DY8	Y (luminance) digital input (LSB)
46	DY7	Y (luminance) digital input
47	DY6	Y (luminance) digital input
48	DY5	Y (luminance) digital input

■ Absolute Maximum Ratings $T_a=25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Power supply voltage	DV _{DD} /AV _{DD}	- 0.3 to +7.0	V
Power supply voltage for analog circuits	V _{CC}	- 0.3 to +7.0	V
Input voltage	V _I	- 0.3 to DV _{DD} +0.3	V
Output voltage	V _O	- 0.3 to AV _{DD} +0.3	V
Operating ambient temperature	T _{opr}	-20 to +70	°C
Storage temperature	T _{stg}	-55 to +125	°C

■ Recommended Operating Conditions $V_{DD}=AV_{DD}=DV_{DD}=3.3\text{V}$, $V_{CC}=4.8\text{V}$, $V_{SS}=AV_{SS}=DV_{SS}=0\text{V}$, $T_a=25^\circ\text{C}$

Parameter	Symbol	min	typ	max	Unit	
Power supply voltage	V _{CC}	4.5	4.8	5.1	V	
	V _{DD}	3.0	3.3	3.6	V	
Reference voltage	V _{REFS/Y/C}	—	2.15/1.96/1.93	—	V	
External compensation capacitor	C _{COMPS, Y, C}	0.33	1.0	3.3	μF	
Digital input voltage	"H" level	V _{IH}	2.4	—	V _{DD}	V
	"L" level	V _{IL}	V _{SS}	—	0.8	V
Clock	"H" level pulse width	t _{WH}	20	—	—	ns
	"L" level pulse width	t _{WL}	20	—	—	ns

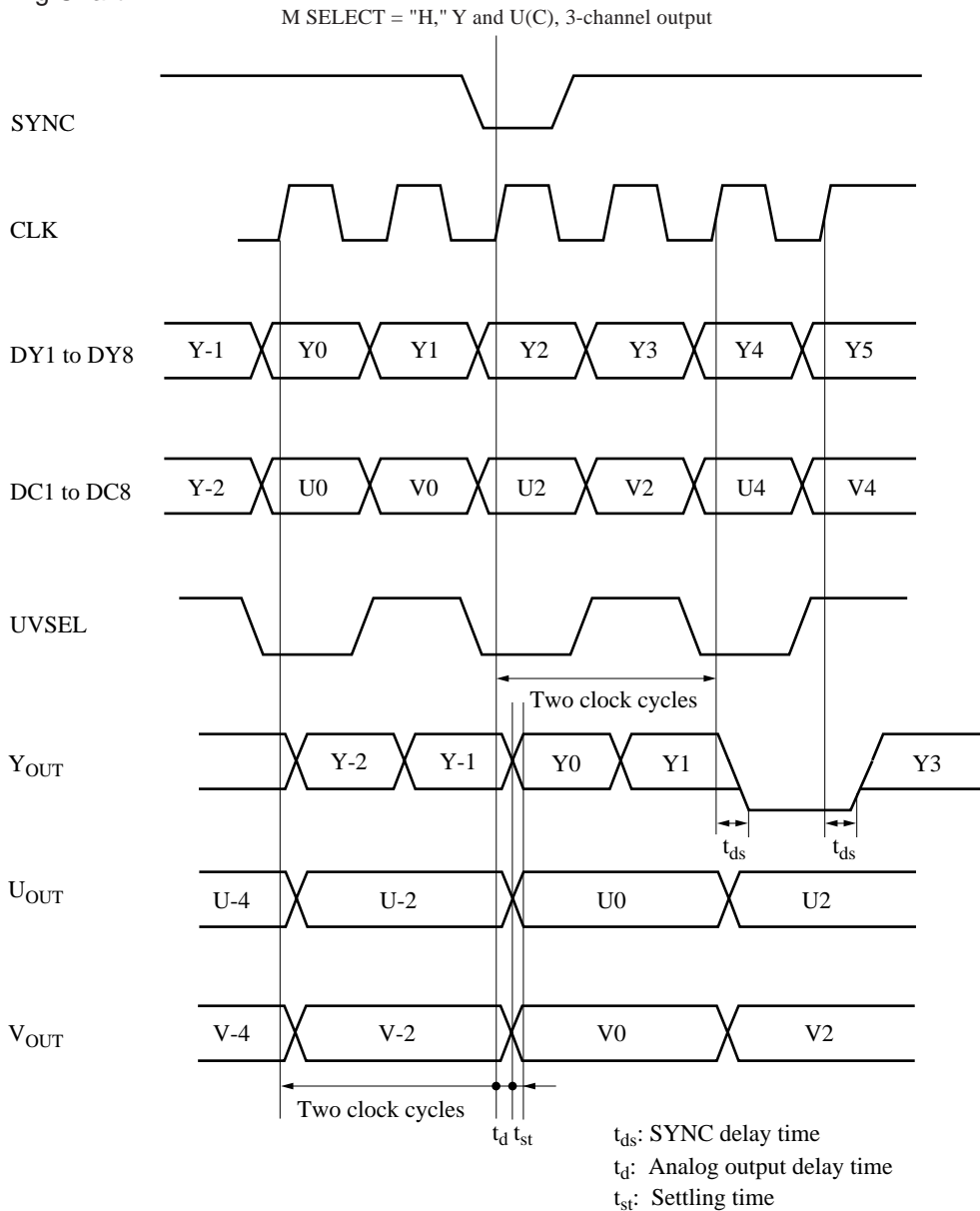
■ Electrical Characteristics $DV_{DD}=AV_{DD}=3.0\text{V}$, $V_{CC}=4.8\text{V}$, $DV_{SS}=AV_{SS}=0\text{V}$, $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Power supply current	I _{DD} /I _{CC}	f _{CLK} =15MHz, Output amplitude = 0.7 V,	—	12/12	21/21	mA
Resolution	RES		—	8	—	bit
Linearity error	E _L	V _{DD} =3.3V, V _{CC} =4.8V	—	±0.2	±0.5	LSB
Differential linearity error	E _D	Y (luminance) output amplitude =0.7V _{P-P}	—	±0.2	±0.5	LSB
Full scale current	I _{FS}	C (chroma) output amplitude =0.7V _{P-P}	—	2.33	—	mA
Setup time	t _S		15	—	—	ns
Hold time	t _H		5	—	—	ns
Settling time	t _{ST}	V _{DD} =3.3V, V _{CC} =4.8V	—	30	50	ns
Maximum conversion speed	F _{C(max.)}	Y·C output amplitude =0.7V _{P-P}	20	—	—	MSPS
Analog output delay time	t _{dY} /t _{dc}	f=100kHz	—	90/140	—	ns

■ Filter Characteristics $DV_{DD}=AV_{DD}=3.0V, V_{CC}=4.8V, DV_{SS}=AV_{SS}=0V, T_a=25^\circ C$

Parameter	Symbol	Conditions	min	typ	max	Unit
Y filter I/O gain	GYF	$f=100kHz$	-1.2	-0.2	0.8	dB
Y filter f characteristic (fck/2)	FYFCK	$f=100kHz \rightarrow 6.35MHz$	-10	-7	-4	dB
Y filter f characteristic (3MHz)	FYFCL	$f=100kHz \rightarrow 3.0MHz$	-3	-1	1.0	dB
Y filter group delay	DYF	$f=100kHz$	60	80	100	dB
UV filter I/O gain	GCF	$f=100kHz$	-1.2	-0.2	0.8	dB
UV filter f characteristic (fck/4)	FCFCK	$f=100kHz \rightarrow 3.18MHz$	-15	-10	-6	dB
UV filter f characteristic (1MHz)	FCFCL	$f=100kHz \rightarrow 1.0MHz$	-3	-1	1.0	dB
UV filter group delay	DCF	$f=100kHz$	100	130	160	ns

■ Timing Chart



■ Package Dimensions (Unit:mm)

QFH048-P-0707

