

MN65703T

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

■ Overview

The MN65703T 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.

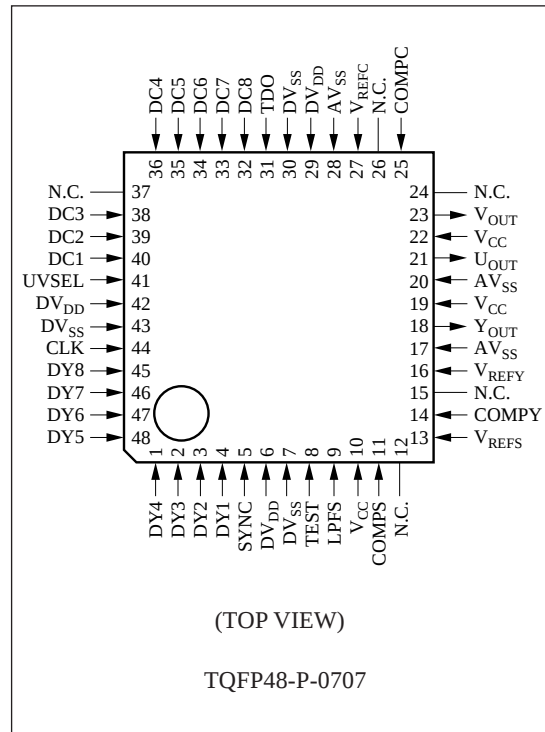
■ Features

- Maximum conversion rate: 20 MSPS (min.)
- Linearity error: ± 0.3 LSB (typ.)
- Differential linearity error: ± 0.2 LSB (typ.)
- Power supply voltage: $V_{DD} = 2.85$ to 3.7 V, $V_{CC} = 5.0 \pm 0.5$ V
- Full scale current: 2.33 mA (typ.)
- Power consumption: 90 mW (typ.) ($f_{CLK} = 15$ MHz)
- Built-in LPF and synchronization function

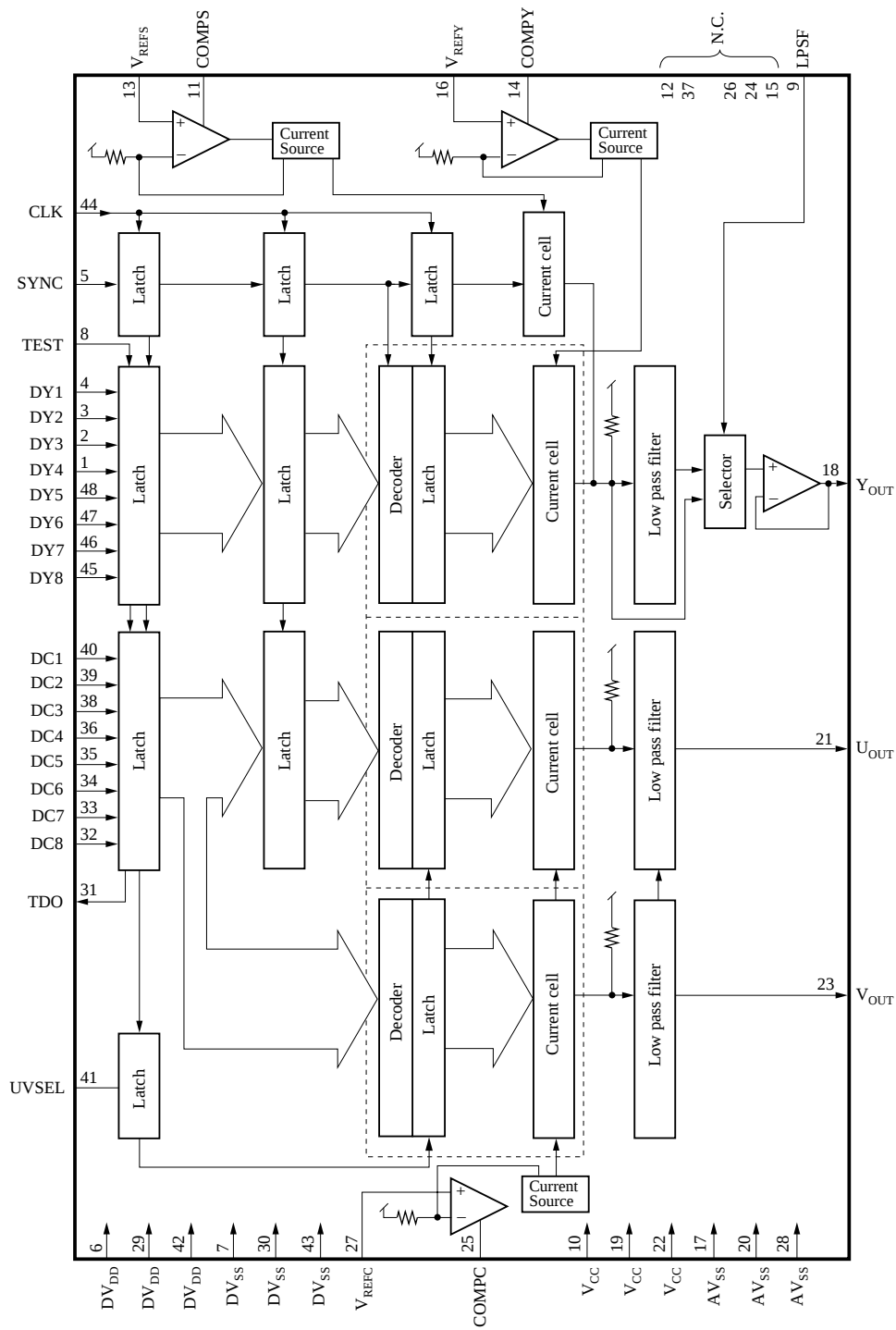
■ Applications

- 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	DV _{DD}	Power supply for digital circuits
7	DV _{SS}	Ground for digital circuits
8	TEST	Test mode judgment signal
9	LPFS	Low pass filter selection signal for Y (brightness) signal
10	V _{CC}	Filter 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	DV _{DD}	Power supply for digital circuits
30	DV _{SS}	Ground for digital circuits
31	TDO	Test data output
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 for digital circuits

■ Pin Descriptions (continued)

Pin No.	Symbol	Function Description
43	DV _{SS}	Ground 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 Ta=25°C

Parameter	Symbol	Rating	Unit
Power supply voltage for digital circuits	DV _{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}=DV_{DD}=3.3V, V_{CC}=4.8V, V_{SS}=AV_{SS}=DV_{SS}=0V, Ta=25°C

Parameter	Symbol	min	typ	max	Unit
Power supply voltage	V _{DD}	2.5	3.3	3.7	V
	V _{CC}	4.5	4.8	5.5	V
Reference voltage	V _{REFS/Y/C}	1.0	2.0/2.25/2.20	3.8	V
External compensation capacitor	C _{COMPS. Y. C}	0.33	1.0	3.3	μF
Digital input voltage	"H" level	V _{IH}	DV _{DD} × 0.7	DV _{DD}	V
	"L" level	V _{IL}	V _{SS}	DV _{DD} × 0.24	V
Clock	"H" level pulse width	t _{WH}	20		ns
	"L" level pulse width	t _{WL}	20		ns

■ Electrical Characteristics DV_{DD}=3.3V, V_{CC}=4.8V, DV_{SS}=AV_{SS}=0V, Ta=25°C

Parameter	Symbol	Conditions	min	typ	max	Unit
Power supply current	I _{DD} /I _{CC}	f _{CLK} =15MHz, Output amplitude =0.7 V		2/19	8/30	mA
Resolution	RES			8		bit
Linearity error	E _L	DV _{DD} =3.3V, V _{CC} =4.8V		±0.3	±0.6	LSB
Differential linearity error	E _D	Y output amplitude =0.7V,		±0.2	±0.5	LSB
Full scale current	I _{FS}	U output amplitude =0.7V, V output amplitude =0.7V		0.23		mA
Setup time	t _S		15			ns
Hold time	t _H		5			ns
Settling time	t _{ST}	DV _{DD} =3.3V, V _{CC} =4.8V Y output amplitude =0.7V,		30	50	ns
Maximum conversion speed	F _{C(max.)}	U, V output amplitude =0.7V f=100kHz	20			MSPS
Analog output delay time	t _{dY} /t _{dc}	DV _{DD} =3.3V, V _{CC} =4.8V LPFS="L", f=100kHz		90/100		ns

■ Filter Characteristics $DV_{DD}=3.3V$, $V_{CC}=4.8V$, $DV_{SS}=AV_{SS}=0V$, $T_a=25^{\circ}C$

Parameter	Symbol	Conditions	min	typ	max	Unit
Y filter I/O gain	GYF	$f=100kHz$, LPFS="L"	-1.2	-0.2	0.8	dB
Y filter f characteristic (fck/2)	FYFCK	$f=100kHz \rightarrow 6.35MHz$, LPFS="L"	-15	-7	-4	dB
Y filter f characteristic (3MHz)	FYFCL	$f=100kHz \rightarrow 3.0MHz$, LPFS="L"	-3	-1	1.0	dB
Y filter group delay (including D/A converter output delay)	DYF	$f=100kHz$, LPFS="L"	70	90	110	ns
UV filter I/O gain	GCF	$f=100kHz$	-1.2	-0.2	0.8	dB
UV filter f characteristic (fck/4)	FCFCK	$f=100kHz \rightarrow 3.18MHz$	-10	-6	-2	dB
UV filter f characteristic (1MHz)	FCFCL	$f=100kHz \rightarrow 1.0MHz$	-3	-1	1.0	dB
UV filter group delay (including D/A converter output delay)	DCF	$f=100kHz$	70	100	130	ns

■ Timing Chart

M SELECT = "H," Y and U(C), 3-channel output

