

MN6570F, MN6570TF, and MN6570EF

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

Overview

The MN6570F, MN6570TF, and MN6570EF are high-speed 8-bit, 3-channel CMOS digital-to-analog converters with maximum conversion rates of 35 MSPS, 40 MSPS, and 40 MSPS, respectively.

They use both a matrix cell and weighted current technology.

The three channels use separate clock signals, so they may be used as totally independent D/A converters.

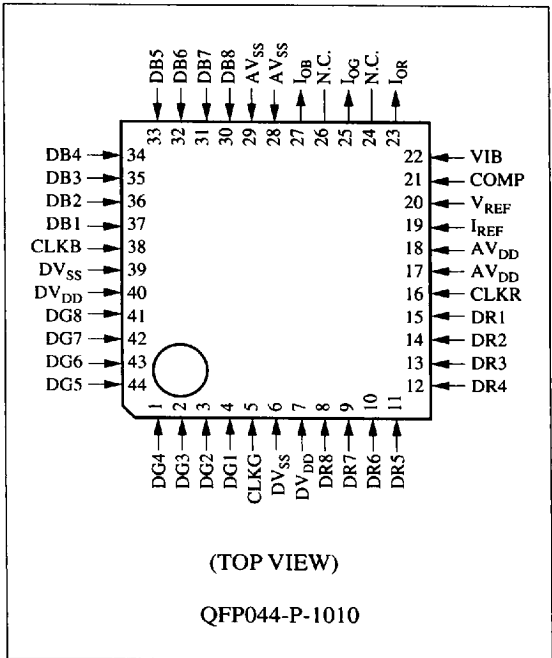
Features

- Maximum conversion rate:
MN6570F: 35MSPS (min.)
MN6570TF and MN6570EF: 40 MSPS (min.)
- Linearity error: ± 0.2 LSB (typ.)
- Differential linearity error: ± 0.2 LSB (typ.)
- Power supply voltage: $V_{CC} = 5.0 \pm 0.5$ V
- Power consumption:
MN6570F: 340 mW (typ.)
MN6570TF and MN6570EF: 190 mW (typ.)
- Full scale current:
MN6570F: 13 mA (typ.)
MN6570TF and MN6570EF: 5 mA (typ.)

Applications

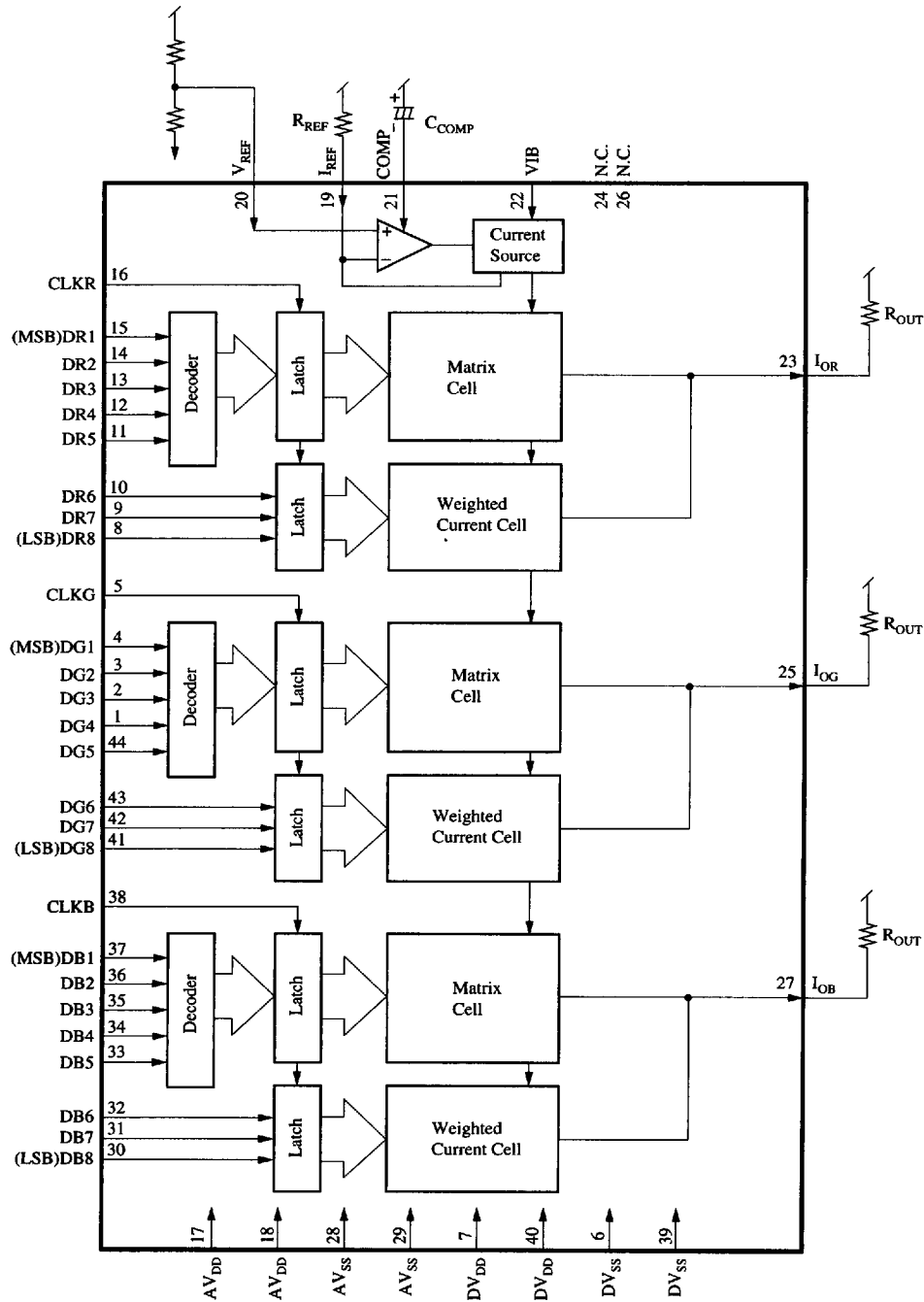
- Digital television
- Digital video equipment
- Digital image processing equipment

Pin Assignment



Other
MOS LSI

■ Block Diagram



6932852 0015865 694

■ Pin Descriptions

Pin No.	Symbol	Function Description
1	DG4	G signal digital input
2	DG3	G signal digital input
3	DG2	G signal digital input
4	DG1	G signal digital input (MSB)
5	CLKG	G signal sampling clock
6	DV _{SS}	Ground for digital circuits
7	DV _{DD}	Power supply for digital circuits
8	DR8	R signal digital input (LSB)
9	DR7	R signal digital input
10	DR6	R signal digital input
11	DR5	R signal digital input
12	DR4	R signal digital input
13	DR3	R signal digital input
14	DR2	R signal digital input
15	DR1	R signal digital input (MSB)
16	CLKR	R signal sampling clock
17	AV _{DD}	Power supply for analog circuits
18	AV _{DD}	Power supply for analog circuits
19	I _{REF}	Full scale adjustment resistor
20	V _{REF}	Reference voltage input
21	COMP	Phase compensation
22	VIB	Capacitor connection
23	I _{OR}	R signal analog current output
24	N.C.	No connection
25	I _{OG}	G signal analog current output
26	N.C.	No connection
27	I _{OB}	B signal analog current output
28	AV _{SS}	Ground for analog circuits
29	AV _{SS}	Ground for analog circuits
30	DB8	B signal digital input (LSB)
31	DB7	B signal digital input
32	DB6	B signal digital input
33	DB5	B signal digital input
34	DB4	B signal digital input
35	DB3	B signal digital input
36	DB2	B signal digital input
37	DB1	B signal digital input (MSB)
38	CLKB	B signal sampling clock
39	DV _{SS}	Ground for digital circuits
40	DV _{DD}	Power supply for digital circuits

Other
MOS LSIs

■ Pin Descriptions (continued)

Pin No.	Symbol	Function Description
41	DG8	G signal digital input (LSB)
42	DG7	G signal digital input
43	DG6	G signal digital input
44	DG5	G signal 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	AV _{DD}	- 0.3 to +7.0	V
Input voltage	V _I	DV _{SS} - 0.3 to DV _{DD} +0.3	V
Output voltage	V _O	AV _{SS} - 0.3 to AV _{DD} +0.3	V
Operating ambient temperature	T _{opr}	-20 to +70 *1/-20 to +75 *2/-30 to 85 *3	°C
Storage temperature	T _{stg}	-55 to +125	°C

*1 MN6570F
*2 MN6570TF
*3 MN6570EF

■ Recommended Operating Conditions V_{DD}=AV_{DD}=DV_{DD}=5.0V, V_{SS}=AV_{SS}=DV_{SS}=0V, Ta=25°C

Parameter		Symbol	min	typ	max	Unit
Power supply voltage		V _{DD}	4.5	5.0	5.5	V
Reference voltage	MN6570F	V _{REF}	2.0	2.3	3.5	V
	MN6570TF/EF		2.0	2.42	3.7	
Reference resistance	MN6570F	R _{REF}	390	430	1500	Ω
	MN6570TF/EF		820	1100	1400	
External compensation capacitor		C _{COMP}	0.33	1.0	3.3	μF
Output load resistance	MN6570F	R _{OUT}	50	75	330	Ω
	MN6570TF/EF		300	400	500	
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}	10	—	—	ns
	"L" level pulse width	t _{WL}	10	—	—	ns

■ Electrical Characteristics $DV_{DD}=AV_{DD}=5.0V$, $DV_{SS}=AV_{SS}=0V$, $T_a=25^{\circ}C$

●MN6570F

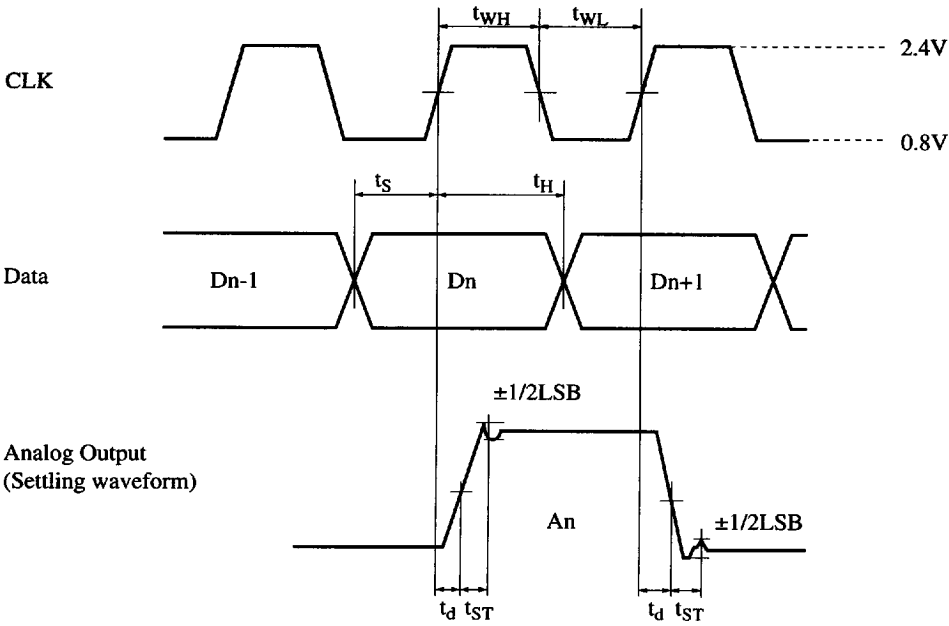
Parameter	Symbol	Conditions	min	typ	max	Unit
Power supply current	I_{DD}	$V_{DD}=5.0V$, $t_{CLK}=35MHz$, $R_{OUT}=75\Omega$, Output amplitude =1 V, $T=25^{\circ}C$		68	85	mA
Resolution	RES			8		bit
Linearity error	E_L	$V_{DD}=5.0V$, $R_{OUT}=75\Omega$ $R_{REF}=430\Omega$ $V_{REF}=2.3V$		± 0.2	± 0.5	LSB
Differential linearity error	E_D			± 0.2	± 0.5	LSB
Full scale current	I_{FS}			13		mA
Setup time	t_s		8			ns
Hold time	t_H		8			ns
Settling time	t_{ST}	$V_{DD}=5.0V$, $R_{OUT}=75\Omega$ $R_{REF}=430\Omega$ $V_{REF}=2.3V$		20	28	ns
Maximum conversion speed	$F_{C(max.)}$		35	50		MSPS
Analog output delay	t_d			5		ns

●MN6570TF, MN6570EF

Parameter	Symbol	Conditions	min	typ	max	Unit
Power supply current	I_{DD}	$V_{DD}=5.0V$, $t_{CLK}=40MHz$, $R_{OUT}=400\Omega$, Output amplitude =2V, $T=25^{\circ}C$		38	55	mA
Resolution	RES			8		bit
Linearity error	E_L	$V_{DD}=5.0V$, $R_{OUT}=400\Omega$ $R_{REF}=1100\Omega$ $V_{REF}=2.42V$		± 0.2	± 0.5	LSB
Differential linearity error	E_D			± 0.2	± 0.5	LSB
Full scale current	I_{FS}			5		mA
Setup time	t_s		8			ns
Hold time	t_H		8			ns
Settling time	t_{ST}	$V_{DD}=5.0V$, $R_{OUT}=400\Omega$ $R_{REF}=1100\Omega$ $V_{REF}=2.42V$		20	25	ns
Maximum conversion speed	$F_{C(max.)}$		40	50		MSPS
Analog output delay time	t_d			5		ns

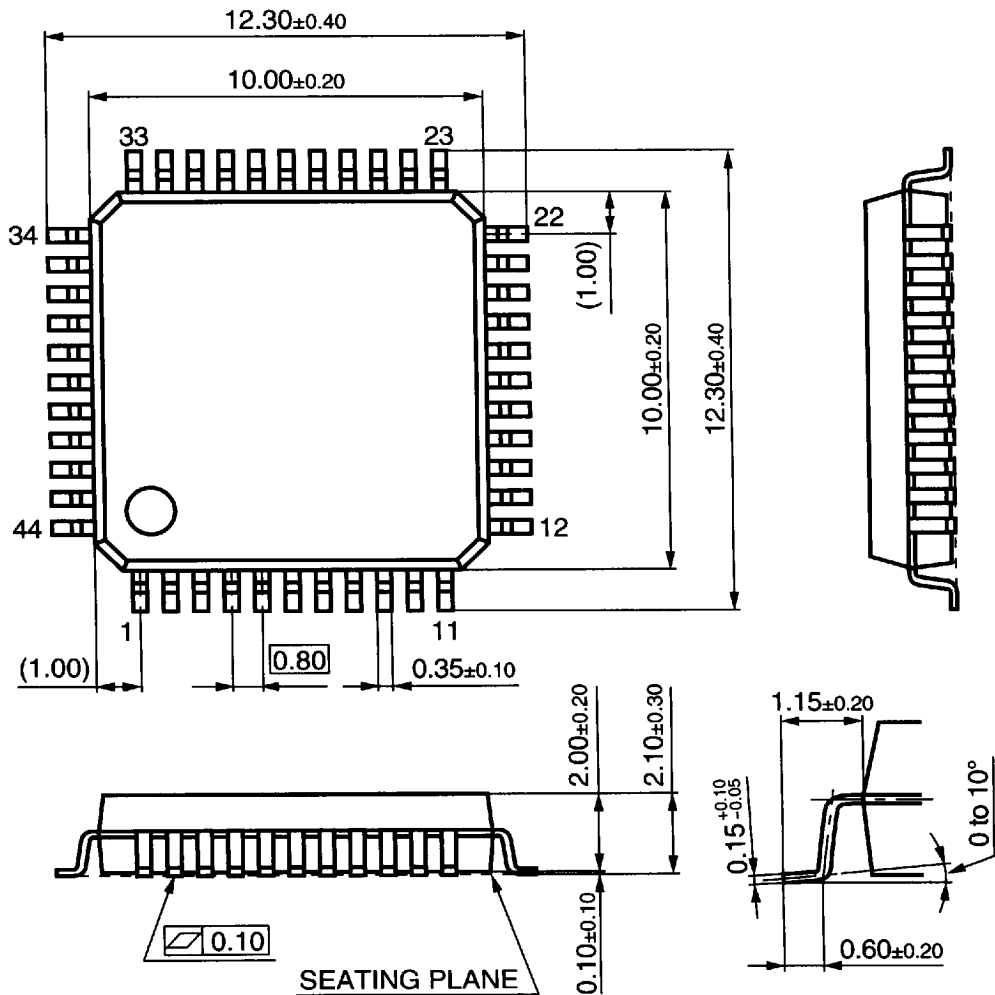
Other
MOS LSIs

■ Timing Chart



■ Package Dimensions (Unit:mm)

QFP044-P-1010



Other
MOS LSIs

■ 6932852 0015870 T51 ■

Panasonic