AN8146FBQ

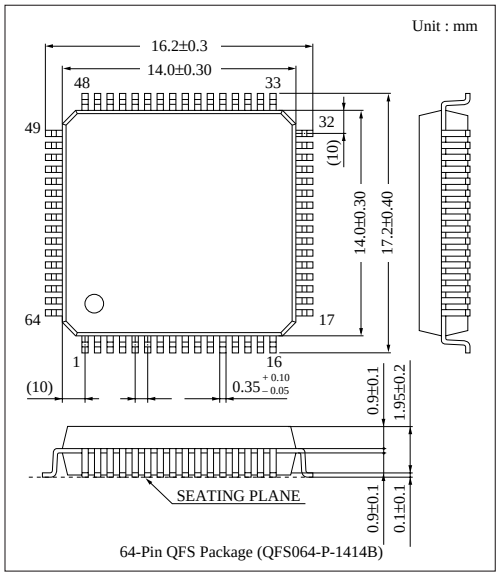
10-Bit 3-channel D/A Converter IC

■ Overview

The AN8146FBQ is a 10-bit D/A converter IC for TV image processing. It is a Bi-CMOS IC featuring low power consumption. It includes 3 channels of I/O. It is suitable for high-definition TV and computer monitor.

■ Features

- High-speed conversion : 50MSPS
- Low power consumption : 450mW
- 3 channels of I/O
- Input level : TTL level
- Single power supply : 5V
- Reference voltage source built-in

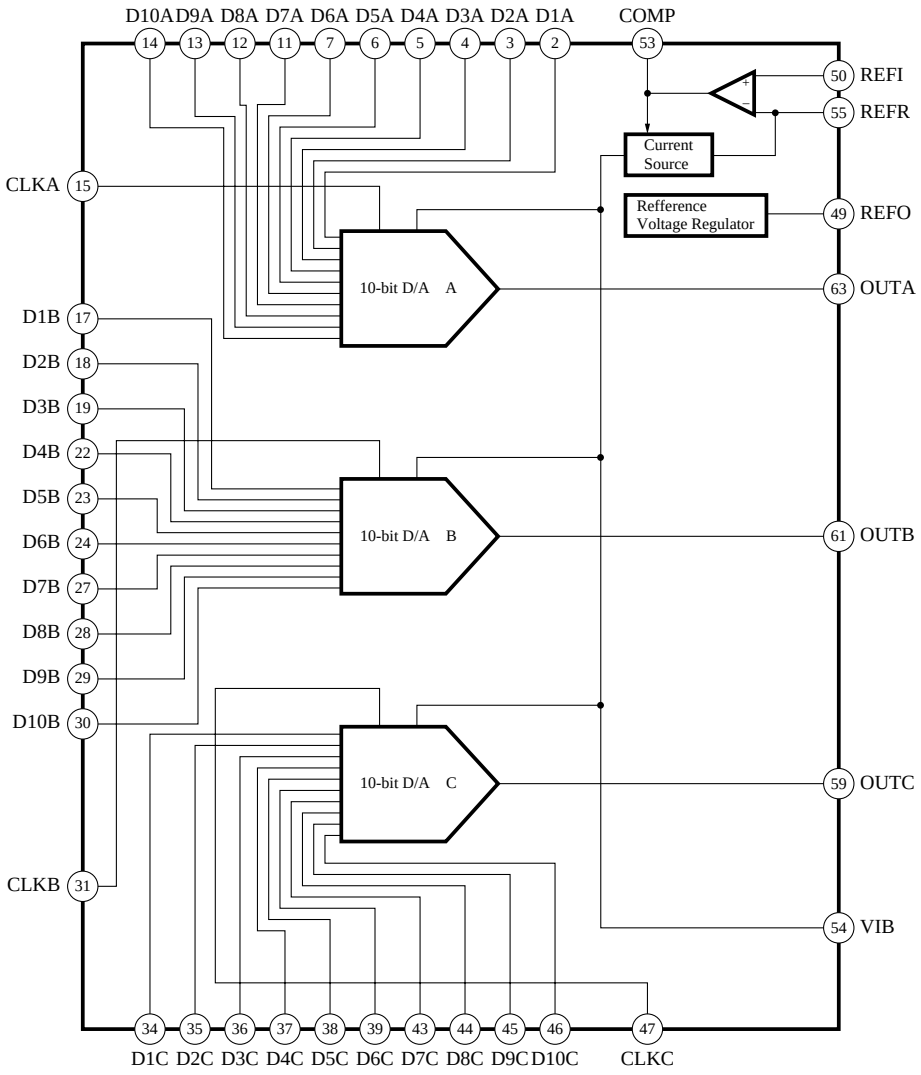


64-Pin QFS Package (QFS064-P-1414B)

■ Pin Descriptions

Pin No.	Pin name	Pin No.	Pin name	Pin No.	Pin name	Pin No.	Pin name
1	Analog GND	17	Digital input 1 bit (MSB) B	33	Analog GND	49	Reference voltage output
2	Digital input 1 bit (MSB) A	18	Digital input 2 bit B	34	Digital input 1 bit (MSB) C	50	Reference voltage input
3	Digital input 2 bit A	19	Digital input 3 bit B	35	Digital input 2 bit C	51	Analog GND
4	Digital input 3 bit A	20	Analog GND	36	Digital input 3 bit C	52	Analog GND
5	Digital input 4 bit A	21	Analog GND	37	Digital input 4 bit C	53	To a compensation capacitor
6	Digital input 5 bit A	22	Digital input 4 bit B	38	Digital input 5 bit C	54	Stabilizing
7	Digital input 6 bit A	23	Digital input 5 bit B	39	Digital input 6 bit C	55	Reference resistance
8	Analog GND	24	Digital input 6 bit B	40	Analog GND	56	Analog GND
9	Analog GND	25	Analog GND	41	Analog GND	57	Analog GND
10	Analog GND	26	Analog GND	42	Analog GND	58	Analog GND
11	Digital input 7 bit A	27	Digital input 7 bit B	43	Digital input 7 bit C	59	Analog output C
12	Digital input 8 bit A	28	Digital input 8 bit B	44	Digital input 8 bit C	60	Analog power supply
13	Digital input 9 bit A	29	Digital input 9 bit B	45	Digital input 9 bit C	61	Analog output B
14	Digital input 10 bit (LSB) A	30	Digital input 10 bit B	46	Digital input 10 bit C	62	Analog power supply
15	Clock input A	31	Clock input B	47	Clock input C	63	Analog output B
16	Digital GND	32	Digital power supply	48	Analog GND	64	Analog GND

■ Block Diagram



■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	– 0.3 to + 7.0	V
Supply current	I_{CC}	210	mA
Power dissipation Note 2)	P_D	585	mW
Operating ambient temperature Note 1)	T_{opr}	– 20 to + 70	˚C
Storage temperature Note 1)	T_{stg}	– 55 to + 125	˚C

Note 1) Ta =25˚C except operating ambient temperature and storage temperature.
Note 2) Allowable power dissipation of the package at Ta =70˚C.

■ Recommended Operating Range (Ta = 25˚C)

Parameter	Symbol	Range
Operating supply voltage range	V_{CC}	4.75V to 5.25V

■ Electrical Characteristics (AV_{CC}= DV_{CC}= 5.0V, Ta= 25±2˚C)

Parameter	Symbol	Condition	min	typ	max	Unit
Supply current	I_{CC}		—	90	150	mA
Digital input leak current	I_{DI}	V_{IN} = 5V (H_I), V_{IN} = 0V (L_O)	—	—	± 30	µA
REF leak current	I_{REFI}	V_{IN} = 5V (H_I), V_{IN} = 0V (L_O)	—	—	± 30	µA
Reference supply output voltage	V_{REFO}	I_{REFO} = 3.0mA	2.06	2.7	3.24	V
Resolution	R_{ES}		—	10	—	Bit
Linearity error	E_L		—	± 0.5	±1.0	LSB
Differential linearity error	E_D		—	± 0.5	±1.0	LSB
Full scale output voltage	V_{FS}	R_{REF} = 350Ω R_O = 75Ω V_{REFO} – V_{REFI} = 1.4V	4.9	5.0	5.1	V
Zero scale output voltage	V_{ZS}		3.8	4.0	4.2	V
Maximum conversion rate	F_{CMAX}		50	—	—	MSPS
Zero scale matching	M_Z	V_{ZS} = 4.0V	—	—	± 4	%
2nd harmonics level	D	f_{OUT} = 10MHz	—	(– 38)	—	dB
Crosstalk	CT	f_{OUT} = 10MHz	—	(– 43)	—	dB

Note) The characteristics value in parentheses is not a guaranteed value, but reference one on design.

■ Operation Descriptions

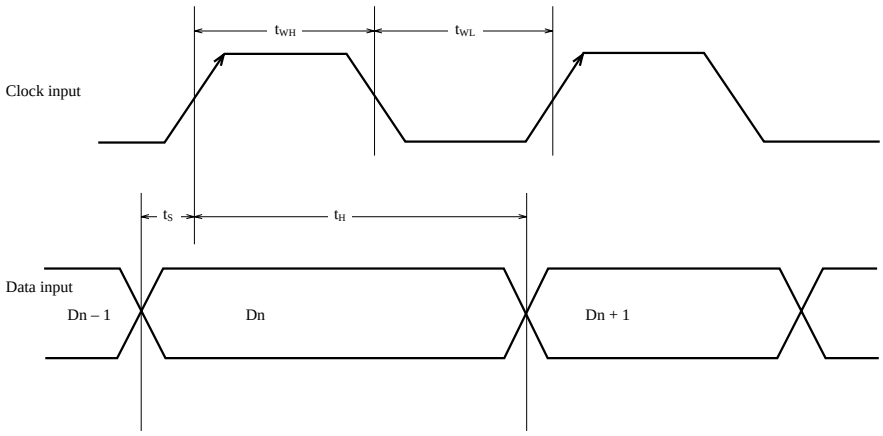
• Recommended Operating Conditions (AV_{CC}= DV_{CC}= 5.0V, Ta= 25±5˚C)

Parameter	Symbol	Conditions	min	typ	max	Unit	Note
Reference voltage	V_{REFI}		—	1.3	—	V	—
Output load resistance	R_O		—	75	—	Ω	—
Digital input voltage	V_{IH}		2.4	—	DV_{CC}	V	—
Digital input voltage	V_{IL}		0	—	0.8	V	—
Clock pulse width	t_{WH}	Refer to the timing chart.	8	—	—	ns	1
Clock pulse width	t_{WL}	Refer to the timing chart.	8	—	—	ns	1
Set-up time	t_S	Refer to the timing chart.	5	—	—	ns	—
Holding time	t_H	Refer to the timing chart.	1	—	—	ns	—
Reference voltage input voltage	V_{REF1}		– 0.3	—	AV_{CC}	V	2
Analog output current	I_{OUT}		0	—	30	mA	2
Reference power supply output current	I_{REFO}		–10	—	0	mA	2

Note 1) $t_{WH} + t_{WL} \geq 20$ns
Note 2) Use it under the condition : $AV_{CC} = DV_{CC}$, and AGND = DGND

(Cautions on surge)
Comparing with the other pins, Pin50 has a lower negative-surge resistance (Approx. –190V at 200pF).
Therefore, particular care must be taken when it is used.

• Operational Timing



■ Reference

Power Dissipation on Package
P_D – Ta