

- ◇Structure Silicon Monolithic Integrated Circuit
- ◇Product Name 10bit 10channels · D/A converter (with output buffer)
- ◇Model Name BU2505FV
- ◇Application Adjustment/control of industrial or home-use electric equipment, such as DVD, CD-R, CD-R/W, and DVC.
- ◇Features # The BU2505FV is an integrated semiconductor of CMOS structure with 10 channels of built – in high quality 10 bit D/A converters with output buffer operational amplifiers of Rail to Rail output type
 # Digital input corresponds to TTL level input.
 #Data is inputted by 14 bit 3-wire serial data + reset signal.
 [Address 4 bit + Data 10 bit]
 # It is able to cascading serial use with “Do” terminal.
 # Highly stable output buffer operational amplifier allow operation in the all voltage range from power supply to ground.
 # Adopting compact package of 0.65mm pitch 20 pin.

◇Absolute Maximum Rating : (Ta=25°C)

Parameter	Symbol	Ratings	Unit
Supply voltage	VCC	-0.3~6.0	V
Upper reference voltage of D/A converter	VDD	-0.3~6.0	V
Input voltage	VIN	-0.3~6.0	V
Output voltage	VOUT	-0.3~6.0	V
Storage temperature	Tstg	-55~125	°C
Power dissipation	Pd	400 #	mW

- # Operating at higher than Ta=25°C, 4mW shall be reduced per 1°C.
- * 70mm×70mm, thickness 1.6mm, less than 3% share of copper foil when implementing glass epoxy board.
- * This product is not designed for protection against radioactive rays.

◇Power supply operating voltage range : (Ta=25°C)

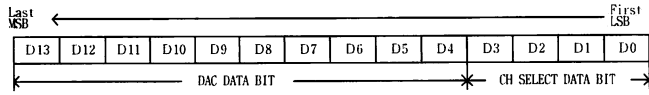
Parameter	Symbol	Ratings	Unit
Supply voltage	VCC	4.5~5.5	V
Operating temperature	Topr	-30~85	°C

◇Directions

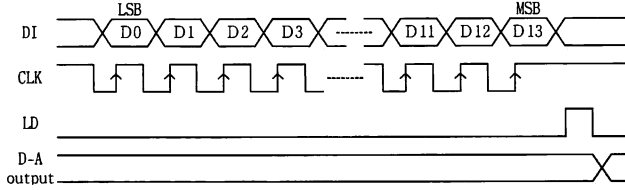
- Described values and data are typical values on design, therefore the values are not guaranteed.
- The application circuit example is supposed to be recommended, however, verify properties sufficiently if this IC is used. When using it by changing external part constant, take enough margin in consideration of dispersion in external part and our LSI including DC and AC characteristic.
- Absolute maximum rating
 We are careful enough for quality control about this IC. So, there is no problem under normal operation, excluding that it exceeds the absolute maximum ratings. However, this IC might be destroyed when the absolute maximum rating such as impressed voltages (Vcc, VM) or the operating temperature range (Topr) is exceeded, and whether the destruction is short circuit mode or open circuit mode cannot be specified. Please take into consideration the physical countermeasures for safety, such as fusing, if a particular mode that exceeds the absolute maximum rating is assumed.
- GND line
 The ground line is where the lowest potential and transient voltage are connected to the IC.
- Thermal design
 Take enough margins taking power dissipation under actual usage into account.
- Short circuit mode between terminals and wrong mounting
 Do not mount the IC in the wrong direction and be careful about the reverse connection of the power connector. Moreover, this IC might be destroyed when the dust short the terminals between them or GND.
- Radiation
 Strong electromagnetic radiation can cause operation failures.
- Added some ripple and noise to power supply terminals, this IC can't keep the accuracy of the D/A converter.
 Therefore, it is recommended that external bypass capacitor should set as close as possible to the terminals between VDD and GND in order to stabilize the D/A converter.
- The capacitor between output and GND recommend to set under 100pF including parasitic capacitor in order to reduce jitter and noise from layout of the output line.
- LSB-first or MSB-first decoding are selected by REVERSE terminal. Therefore, REVERSE terminal should be set as “open” or “VDD short” at LSB-first mode, “GND short” at MSB-first mode.

◇Command transmission

○ DIGITAL DATA FORMAT [Reverse=open or VCC short setting. (data : LSBfirst)]



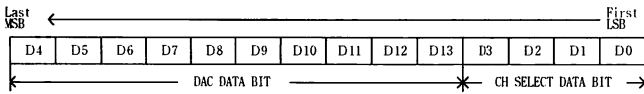
○ TIMING CHART(MODEL)



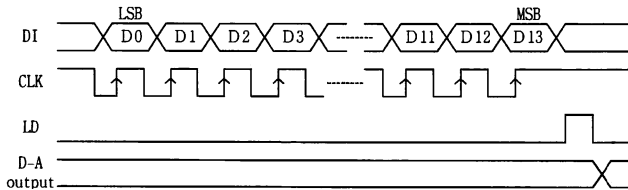
D3	D2	D1	D0	DAC selection
0	0	0	0	Don't Care
0	0	0	1	AO1 selection
0	0	1	0	AO2 selection
0	0	1	1	AO3 selection
0	1	0	0	AO4 selection
0	1	0	1	AO5 selection
0	1	1	0	AO6 selection
0	1	1	1	AO7 selection
1	0	0	0	AO8 selection
1	0	0	1	AO9 selection
1	0	1	0	AO10 selection
1	0	1	1	Don't Care
1	1	0	0	Don't Care
1	1	0	1	Don't Care
1	1	1	0	Don't Care
1	1	1	1	Don't Care

D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D/A output (VrefH=VDD, VrefL=VSS)
0	0	0	0	0	0	0	0	0	0	VrefL
0	0	0	0	0	0	0	0	0	1	$(VrefH-VrefL)/1024 \times 1 + VrefL$
0	0	0	0	0	0	0	0	1	0	$(VrefH-VrefL)/1024 \times 2 + VrefL$
0	0	0	0	0	0	0	0	1	1	$(VrefH-VrefL)/1024 \times 3 + VrefL$
:	:	:	:	:	:	:	:	:	:	:
1	1	1	1	1	1	1	1	1	0	$(VrefH-VrefL)/1024 \times 1022 + VrefL$
1	1	1	1	1	1	1	1	1	1	$(VrefH-VrefL)/1024 \times 1023 + VrefL$

○ DIGITAL DATA FORMAT [Reverse=L setting. (data : MSBfirst)]



○ TIMING CHART(MODEL)



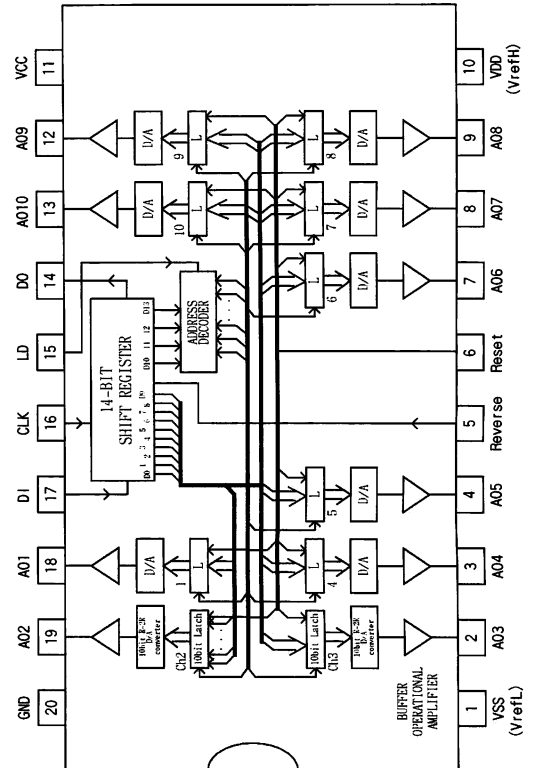
D3	D2	D1	D0	DAC selection
0	0	0	0	Don't Care
0	0	0	1	AO1 selection
0	0	1	0	AO2 selection
0	0	1	1	AO3 selection
0	1	0	0	AO4 selection
0	1	0	1	AO5 selection
0	1	1	0	AO6 selection
0	1	1	1	AO7 selection
1	0	0	0	AO8 selection
1	0	0	1	AO9 selection
1	0	1	0	AO10 selection
1	0	1	1	Don't Care
1	1	0	0	Don't Care
1	1	0	1	Don't Care
1	1	1	0	Don't Care
1	1	1	1	Don't Care

D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D/A output (VrefH=VDD, VrefL=VSS)
0	0	0	0	0	0	0	0	0	0	VrefL
1	0	0	0	0	0	0	0	0	0	$(VrefH-VrefL)/1024 \times 1 + VrefL$
0	1	0	0	0	0	0	0	0	0	$(VrefH-VrefL)/1024 \times 2 + VrefL$
1	1	0	0	0	0	0	0	0	0	$(VrefH-VrefL)/1024 \times 3 + VrefL$
:	:	:	:	:	:	:	:	:	:	:
0	1	1	1	1	1	1	1	1	1	$(VrefH-VrefL)/1024 \times 1022 + VrefL$
1	1	1	1	1	1	1	1	1	1	$(VrefH-VrefL)/1024 \times 1023 + VrefL$

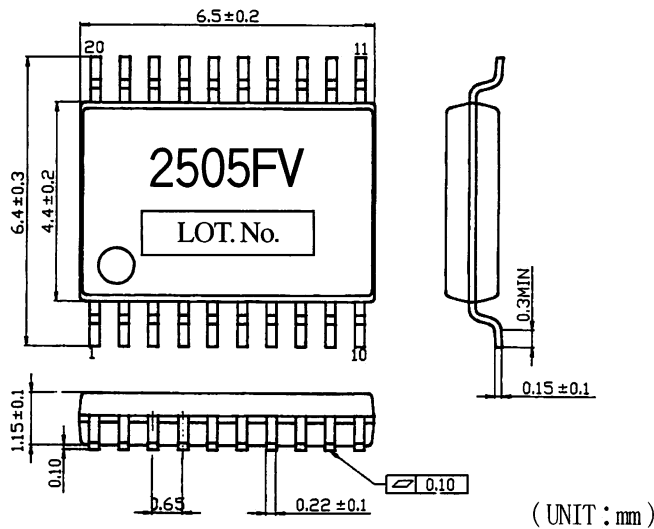
◇Explanation Of Terminals / Block Diagram

Pin No.	Symbol	Function
1	VSS	D/A converter lower reference voltage input terminal
2	AO3	10bit D/A converter output terminal (CH3)
3	AO4	10bit D/A converter output terminal (CH4)
4	AO5	10bit D/A converter output terminal (CH5)
5	Reverse	It is inverted about the data designation 10bit LSB and MSB.
6	Reset	The analog output of all channels is fixed for "L".
7	AO6	10bit D/A converter output terminal (CH6)
8	AO7	10bit D/A converter output terminal (CH7)
9	AO8	10bit D/A converter output terminal (CH8)
10	VDD	D/A converter upper reference voltage input terminal
11	VCC	Power supply terminal
12	AO9	10bit D/A converter output terminal (CH9)
13	AO10	10bit D/A converter output terminal (CH10)
14	DO	Terminal to output LSB data of 14-bit shift register
15	LD	When H-level signal is input to this terminal, the value stored in 14-bit shift register is loaded in decoder and D/A converter output register
16	CLK	Shift clock input terminal. Input signal at DI pin is input to 14-bit shift register at rise of shift clock pulse
17	DI	Serial data input terminal to input 14-bit long serial data
18	AO1	10bit D/A converter output terminal (CH1)
19	AO2	10bit D/A converter output terminal (CH2)
20	GND	GND terminal

Please refer to directions also when using it.



◇External Dimensions



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