Digital servo controller for VCRs
BU2880 series

The BU2880 series are linear digital-servo controllers that allow construction of a VCR servo system using one IC. The DRUM and CAPSTAN systems have digital filters, and the IC is compatible with VISS / VASS overwriting and wide-aspect operation.

●Applications
Video cassette recorders

●Features
1) All VCR servo functions on a single chip.
2) Digital filters in the DRUM and CAPSTAN speed and phase systems.
3) Built-in CTL amplifier with serial gain setting.
4) VISS / VASS overwriting and INDEX detection functions for wide-aspect operation.
5) DRUM f_H compensation calculation function from speed detect function.
6) 6.5H discrimination.
7) Compatible with 19μm heads.

●Absolute maximum ratings (Ta = 25°C)

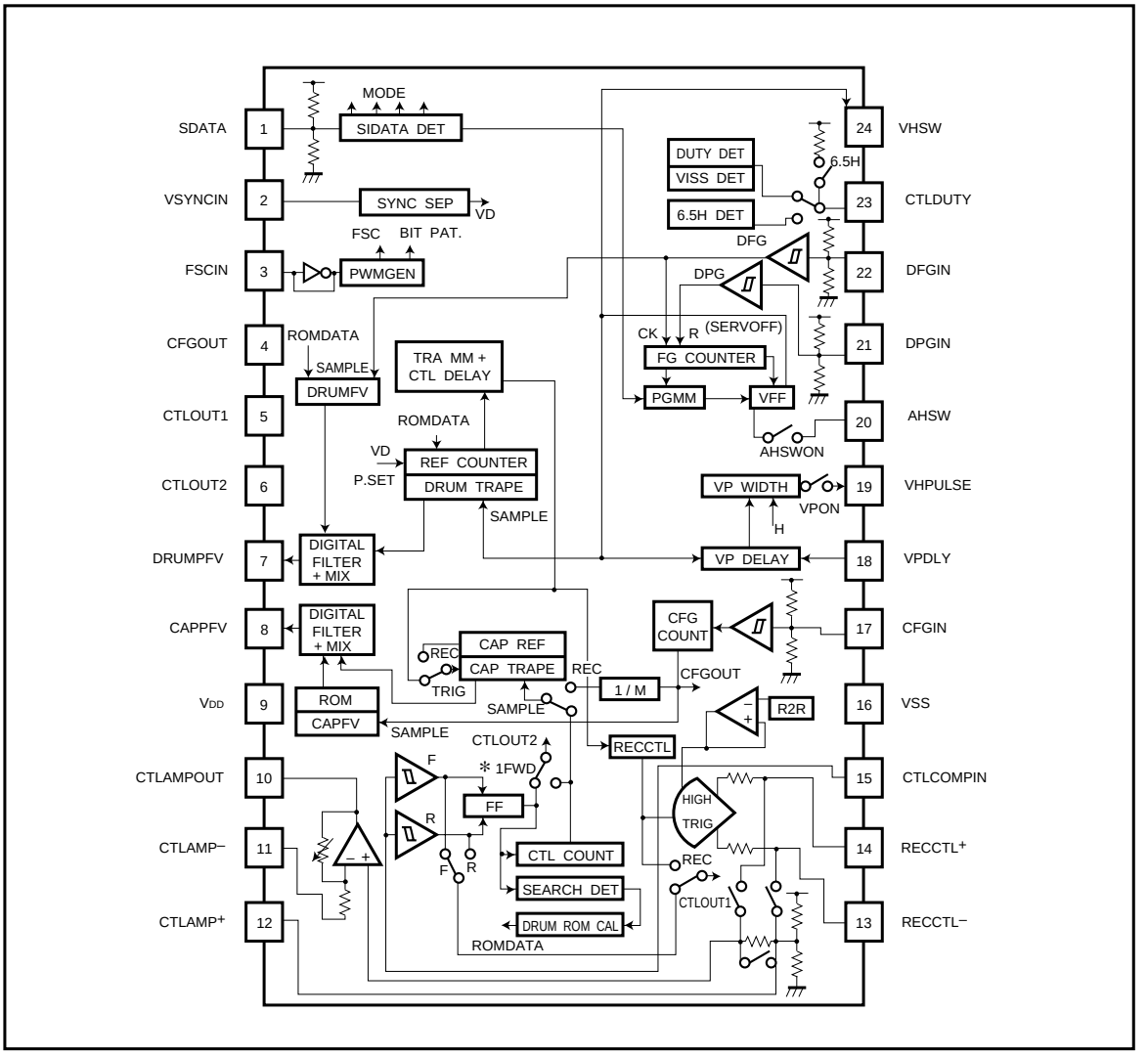
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{DD}	7.0	V
Power dissipation	Pd	500*	mW
Operating temperature	Topr	– 15 ~ + 70	°C
Storage temperature	Tstg	– 55 ~ + 125	°C

* Reduced by 5mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{DD}	4.5	5.0	5.5	V

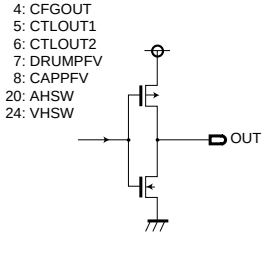
●Block diagram



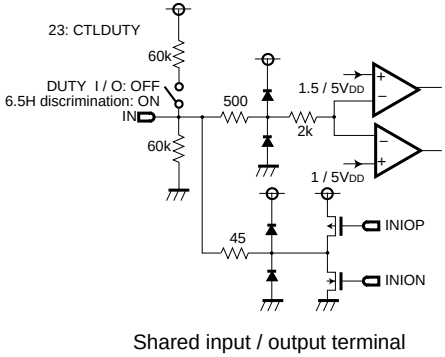
●Pin descriptions

Pin No.	Pin name	Function
1	SDATA	Serial data input (tri-state)
2	VSYNCIN	Composite sync input
3	FSCIN	System clock input
4	CFGOUT	CFG divider output
5	CTLOUT1	CTL comparator output
6	CTLOUT2	CTL divider output
7	DRUMPFV	DRUM control output (digital filter output)
8	CAPPFV	CAPSTAN control output (digital filter output)
9	V_{DD}	Power supply
10	CTLAMPOUT	CTLAMP output
11	CTLAMP$^-$	CTLAMP – input
12	CTLAMP$^+$	CTLAMP + input
13	RECCTL$^-$	Recording CTL – output
14	RECCTL$^+$	Recording CTL + output
15	CTLCOMPIN	CTL comparator input
16	VSS	GND
17	CFGIN	CFG input
18	VPDLY	Quasi-VH pulse delay amount control input
19	VHPULSE	Quasi-VH pulse output
20	AHSW	Head switch audio output
21	DPGIN	DRUM PG input
22	DFGIN	DRUM FG input
23	CTLDUTY	Duty discrimination, VISS discrimination, 6.5H discrimination output / VASS duty control input
24	VHSW	HEAD SW video output

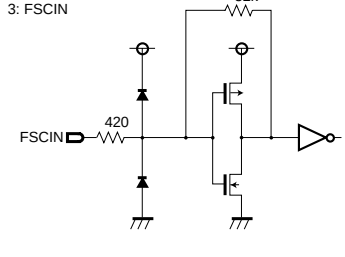
●Input / output circuits



Logic output

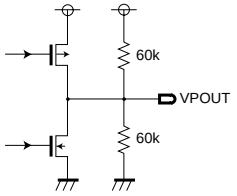


Shared input / output terminal



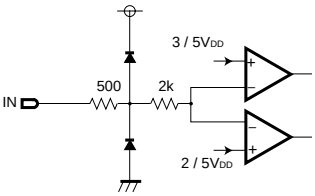
FSC input

19: VHPULSE



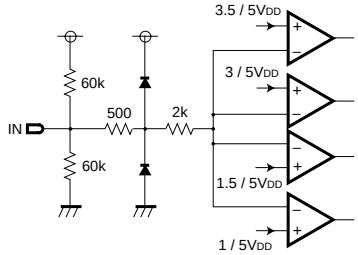
Tri-state output

2: VSYNCIN
18: VPDLY



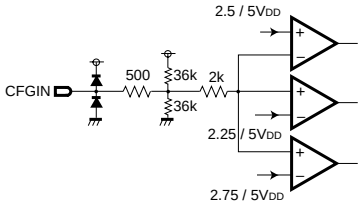
Two-value input

1: SDATA



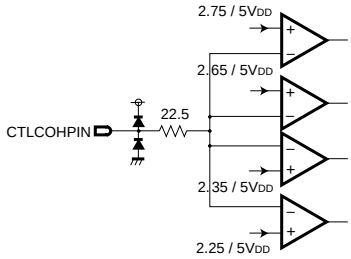
Three-value input

17: CFGIN



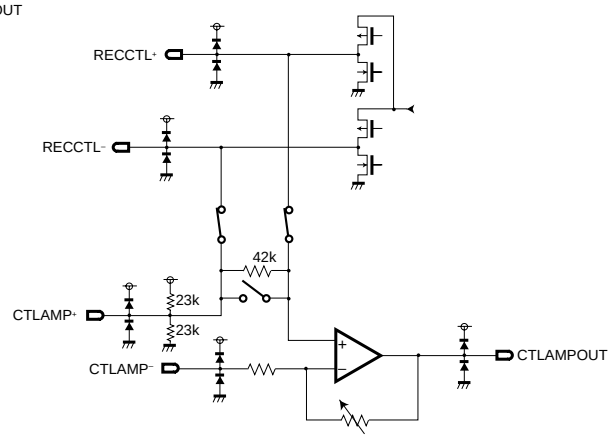
CFG input (zero cross comparator)

15: CTLCOMP IN



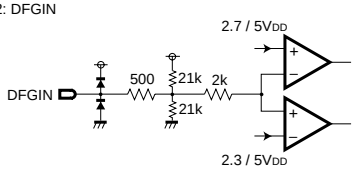
CTL comparator input

10: CTLAMPOUT
11: CTLAMP⁻
12: CTLAMP⁺
13: RECCTL⁻
14: RECCTL⁺



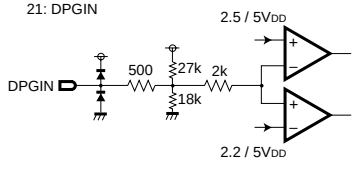
CTLAMP

22: DFGIN



DFG input

21: DPGIN



DPG input

●Electrical characteristics (unless otherwise noted, Ta = 25°C and V_{DD} = 5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply current	I_{DD}	—	27	38	mA	
Power on reset threshold	V_{PON}	1.0	1.5	2.0	V	
Two-value output high level voltage	V_H	4.0	4.5	—	V	I_{LOAD} = 1.5mA
Two-value output low level voltage	V_L	—	0.4	1.0	V	I_{LOAD} = 1.5mA
Two-value input threshold	V_{TH}	2.5	3.0	3.5	V	Schmitt level + 0V, – 1.0V
Two-value input current	I_{LIN}	—	0	1	µA	V_{IN} = V_{DD}, GND
Pullup input current	I_{PU}	59	83	116	µA	V_N = GND
CFG input current	I_{CFG}	100	140	196	µA	V_N = V_{DD}, GND
Three-value output high voltage	V_{H3}	4.0	4.5	—	V	I_{LOAD} = 1.5mA
Three-value output low voltage	V_{L3}	—	0.4	1.0	V	I_{LOAD} = 1.5mA
Three-value output mid voltage	V_{M3}	2.0	2.5	3.0	V	
Three-value input "H" threshold	V_{TINH}	3.10	3.50	4.00	V	Schmitt level + 0V, – 0.5V
Three-value input "L" threshold	V_{TINL}	1.00	1.50	1.90	V	Schmitt level + 0V, – 0.5V
Three-value input current (±)	I_{TIN}	59	83	116	µA	V_{IN} = V_{DD}, GND
FSC operating input level	V_{RCK}	0.2	—	4.0	V_{P-P}	AC coupled, duty: 40 to 60%, C = 1000pF
FSC input current (±)	I_{FSCIN}	61	85	119	µA	V_{IN} = V_{DD}, GND
RECCTL output high level voltage	V_{RCTH}	4.00	4.56	—	V	I_{LOAD} = 2.0mA
RECCTL output low level voltage	V_{RCTL}	—	0.16	0.60	V	I_{LOAD} = 2.0mA
〈CTLAMP〉						
Output high level voltage	V_{OH}	3.8	4.3	—	V	I_{LOAD} = 1.0mA
Output low level voltage	V_{OL}	—	0.2	0.5	V	I_{LOAD} = 1.0mA
CTLAMP comparator level	V_{CTLI}	200	250	300	mV	With respect to bias
CTLAMP comparator width	V_{CO}	75	100	125	mV	—
CTLAMP bias level	V_{BI}	2.4	2.5	2.6	V	—

○Not designed for radiation resistance.

●Measurement circuit

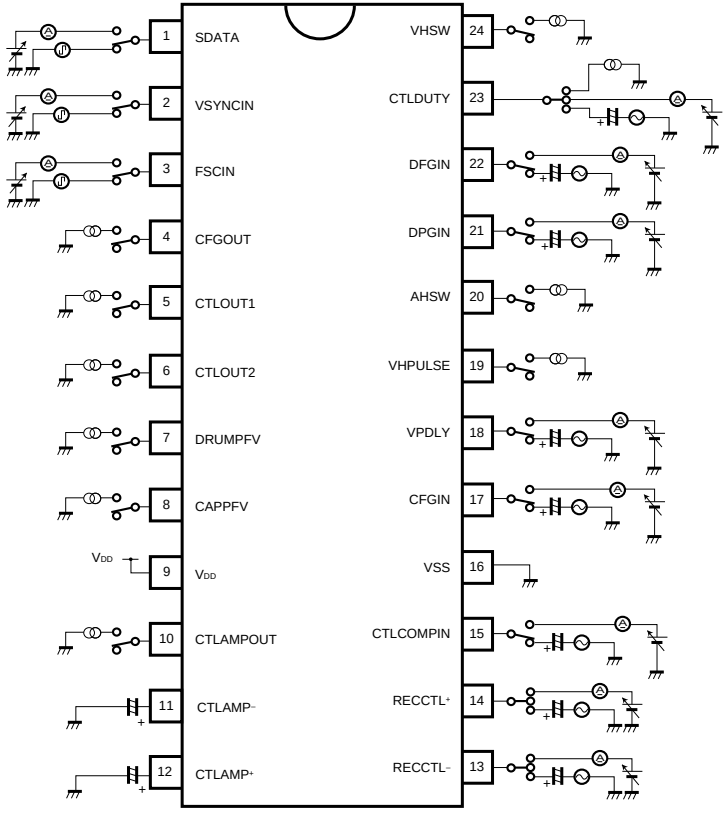


Fig.1

●Electrical characteristic curves

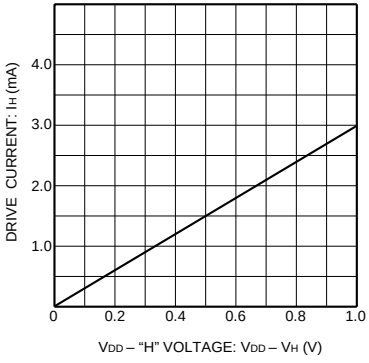


Fig. 2 Two-value output high level voltage vs. drive current characteristics

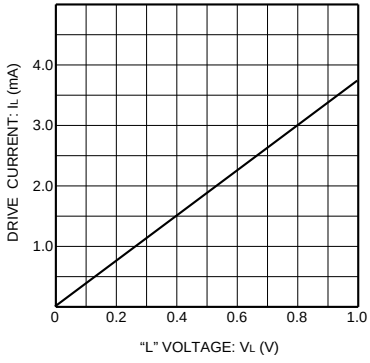


Fig. 3 Two-value output low level voltage vs. drive current characteristics

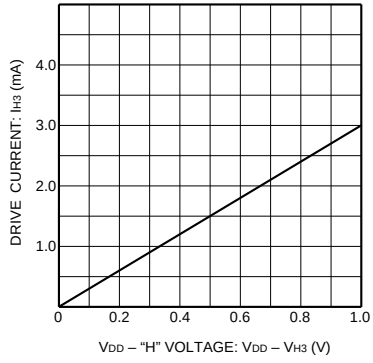


Fig. 4 Three-value output high level voltage vs. drive current characteristics

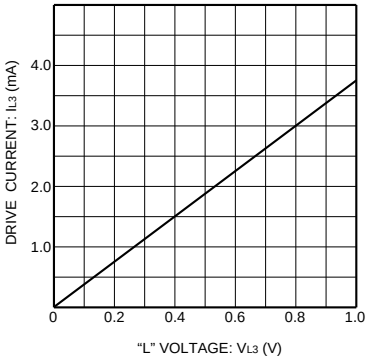


Fig. 5 Three-value output low level voltage vs. drive current characteristics

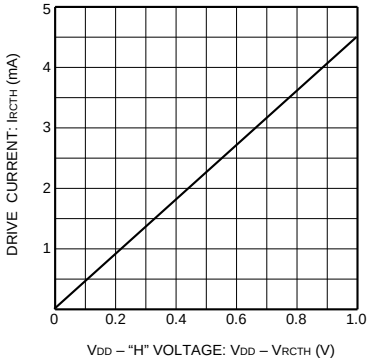


Fig. 6 RECCTL output high level voltage vs. drive current characteristics

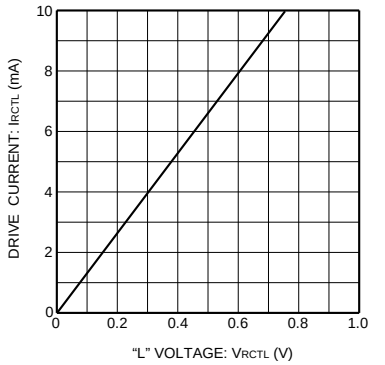


Fig. 7 RECCTL output low level voltage vs. drive current characteristics

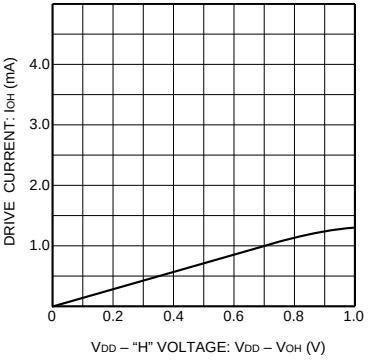


Fig. 8 CTLAMP output high level voltage vs. drive characteristics

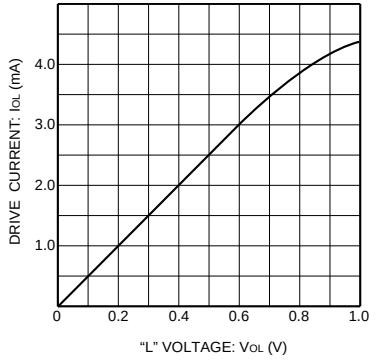
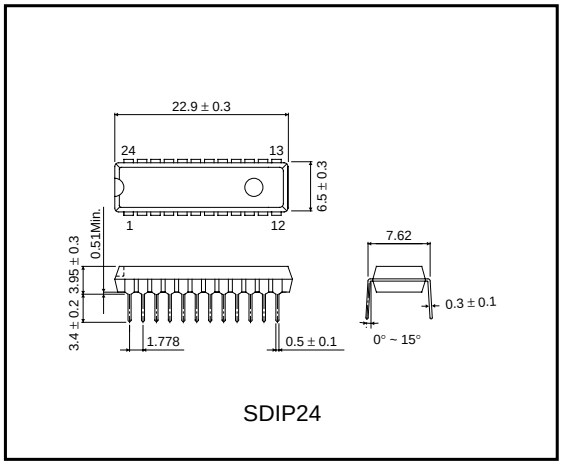


Fig. 9 CTLAMP output low level voltage vs. drive current characteristics

●External dimensions (Units: mm)



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