

On-screen display for VCRs

BU2878FS/BU2871FS

The BU2878FS and BU2871FS are character generator ICs for pattern display use in VCRs and televisions. The IC circuit is made up of a video signal generator, analog switch, synchronization separator circuit, and synchronization signal detect circuit. The display RAM can store 10 lines X 24 characters, and the on-chip character data ROM can store either 64 or 128 different characters.

● Applications

VCRs

● Features

- 1) 10 line X 24 character display.
- 2) 64 (BU2878FS) or 128 (BU2871FS) character types.
- 3) For each line, the character size can be selected as either 1X or 2X.
- 4) Character output for composite video is white with black border.
- 5) Background color can be either white black or blue (black or white with PAL systems).
- 6) Built-in synchronous separation circuit.
- 7) Built-in clamp circuit.
- 8) Built-in synchronous decision circuit.
- 9) Compatible with NTSC, PAL, PAL-M, and PAL-N. Non-interlace mode can be selected.

● Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	-0.3~7.0	V
Power dissipation	P _d	750*	mW
Operating temperature	T _{opr}	-20~75	°C
Storage temperature	T _{stg}	-50~150	°C

* Reduced by 6.0mW for each increase in Ta of 1°C over 25°C.

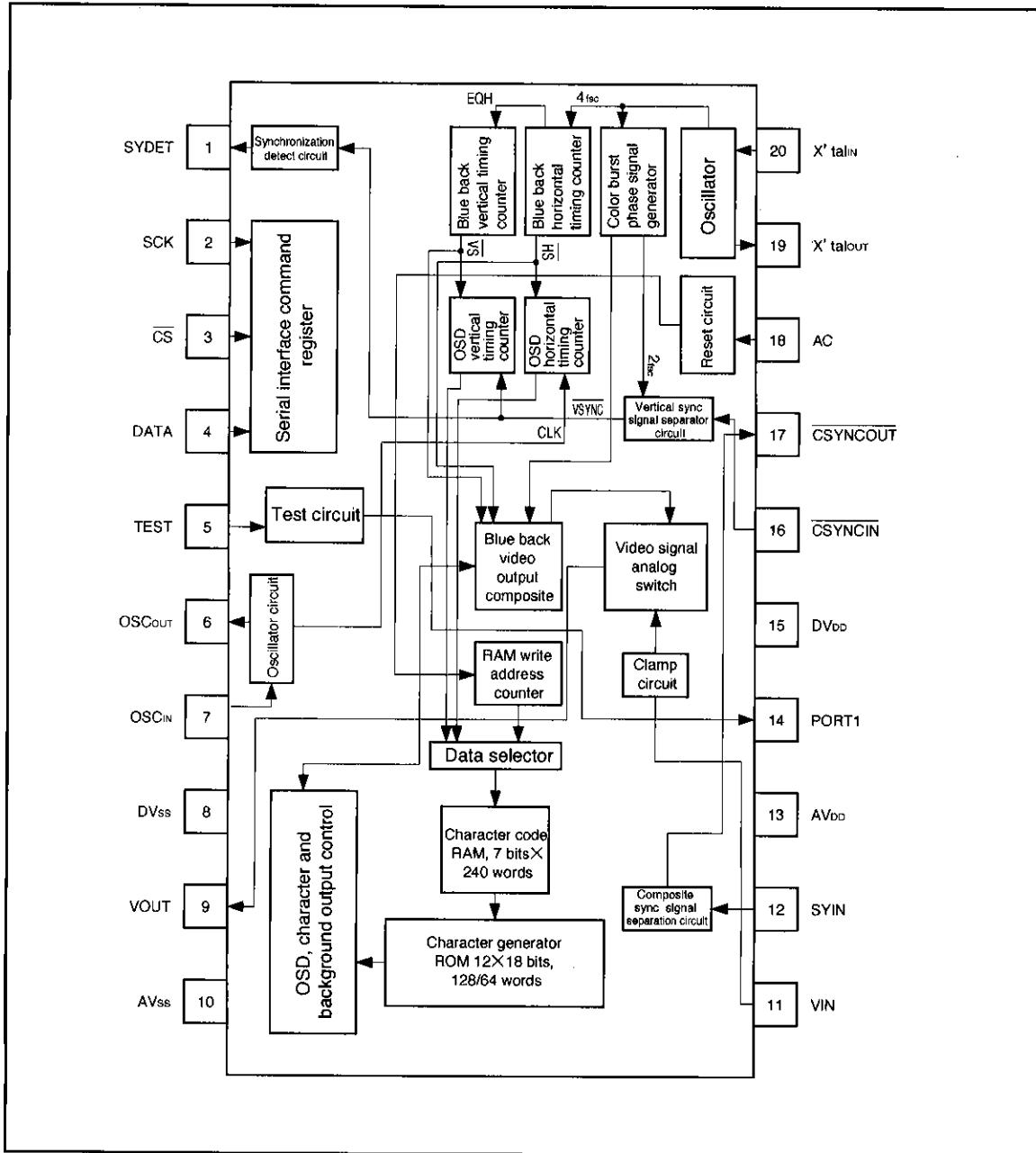
● Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V _{DD}	4.5	5.0	5.5	V
Input voltage	V _{IN}	0	—	V _{DD}	V
LC oscillator frequency	f _{osc}	5.0	—	10.0	MHz
X'tal oscillator frequency ^{*1}	X _{osc}	—	2 _{fsc}	—	Hz
X'tal oscillator frequency ^{*2}	X _{osc}	—	4 _{fsc}	—	Hz

*1 For NTSC.

*2 For PAL, PAL-M, and PAL-N.

● Block diagram



● Pin description

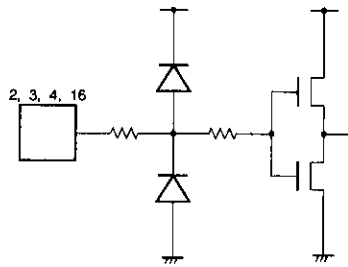
Pin No.	Input/Output	Pin Name	Function
1	Output	SYDET	The synchronizing signal is used to determine the presence or absence of a video signal, and the result is output on this pin (sync detect). Pin5 is "L" when a signal is detected, and "H" when no signal is detected.
2	Input	CLK	Clock input for reading data. Data on the DATA pin is read on the rising edge of the clock.
3	Input	\overline{CS}	When the bit data is character data, the data address is incremented by 1 when the writing to video RAM is completed.
4	Input	DATA	Control data input. Data is read synchronously with the rising edge of the signal on the CLK pin.
5	Input	TEST	IC test pin. Normally connected to GND.
6 7	Output Input	OSC _{OUT} OSC _{IN}	For connection of capacitor and coil for the oscillator. Used as clock oscillator for the OSD function.
8	—	DV _{SS}	Connect to system GND (digital circuit).
9	Output	VOUT	Video signal output
10	—	AV _{SS}	Connect to system GND (analog circuit).
11	Input	VIN	Input for external video signal. Input a signal of 2V _{P-P} .
12	Input	SYIN	Video signal input for synchronous separation circuit.
13	—	AV _{DD}	Power supply(+5V) pin (analog circuit).
14	Output	PORT1	Use as a port. When pin 5 is "H" the crystal oscillator clock is output.
15	—	DV _{DD}	Power supply (+5V) pin (digital circuit).
16	Input	$\overline{CSYNCIN}$	Composite sync signal input. Active low input.
17	Output	CSYNCOUT	Composite sync signal output.
18	Input	\overline{AC}	"L" resets all registers and clears the RAM.
19 20	Output Input	X' tal	For connection of a capacitor for oscillation, or a crystal. Used for blue back with no signal. Use a crystal with a frequency of 4f _{sc} for PAL, and 2f _{sc} for NTSC.

* Function of the \overline{AC} pin

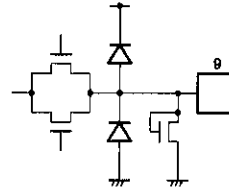
When the \overline{AC} pin is set to "L", all registers are cleared, and data is written to all RAM addresses (RAM clear function). For this reason send commands until writing of data to the RAM is complete. The time requires to write the data to the RAM is $3/f_{osc} \times 240$ (sec.).

● Input / output circuits

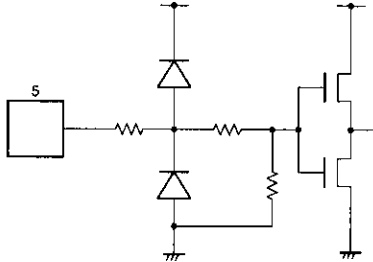
Inputs



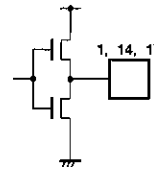
Vout



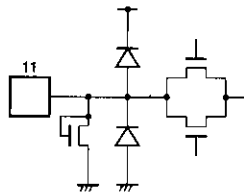
Input with pullup resistors



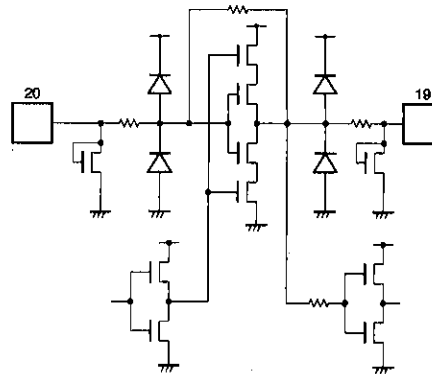
Output cell



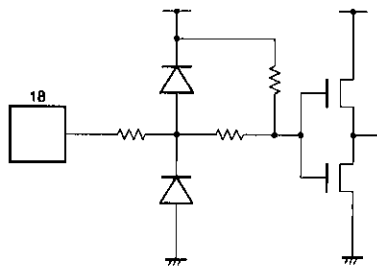
Input



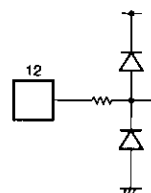
Crystal oscillator cell



Input with pullup resistors



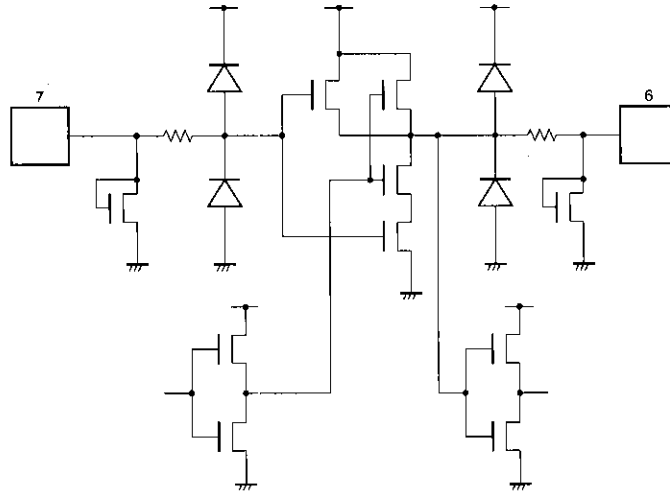
SYIN



On-screen displays

Multimedia video

Oscillator cell



●Electrical characteristics (Ta=-20°C to +75°C and V_{DD}=4.5V to 5.5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Test Circuit
"L" input voltage	V _{IL2}	0	—	0.3V _{DD}	V	For CMOS input	Fig.3
"H" input voltage	V _{IH2}	0.7V _{DD}	—	V _{DD}	V	For CMOS input	Fig.3
"L" output voltage	V _{OL1}	—	—	0.1V _{DD}	V	For OSC *1	Fig.1
"H" output voltage	V _{OH1}	0.9V _{DD}	—	—	V	For OSC *1	Fig.2
"L" output voltage	V _{OL2}	—	—	0.1V _{DD}	V	I _{OL} ≤ 2mA *2	Fig.1
"H" output voltage	V _{OH2}	0.9V _{DD}	—	—	V	I _{OH} ≤ 1mA *2	Fig.2
Input pullup resistor	I _{IR}	15	30	75	kΩ	Pullup input	Fig.3
Operating current	I _{DD}	—	10	—	mA	*3	Fig.4

*1 When an external clock is connected to the oscillator pin (50% duty cycle).

*2 Only for CMOS output pins (1, 14, and 17).

*3 All characters displayed with f_{osc} = 7MHz.

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● Measurement circuits

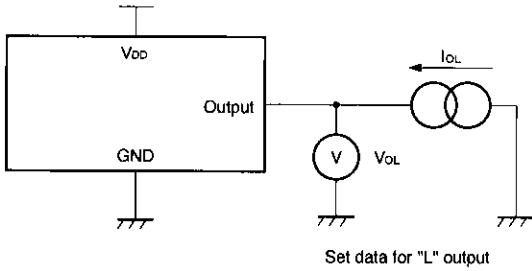


Fig. 1 "L" output voltage measurement circuit

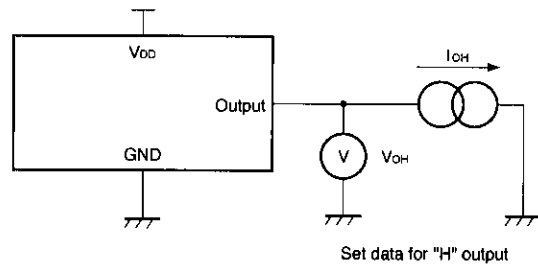


Fig. 2 "H" output voltage measurement circuit

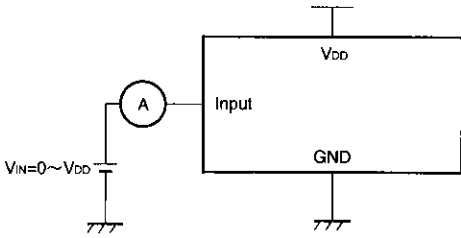


Fig. 3 Input voltage measurement circuit

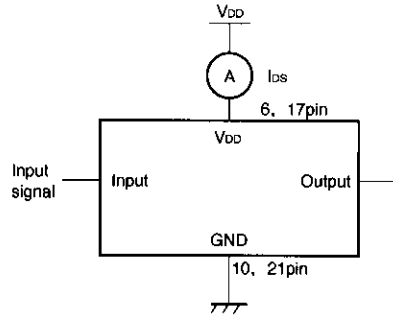
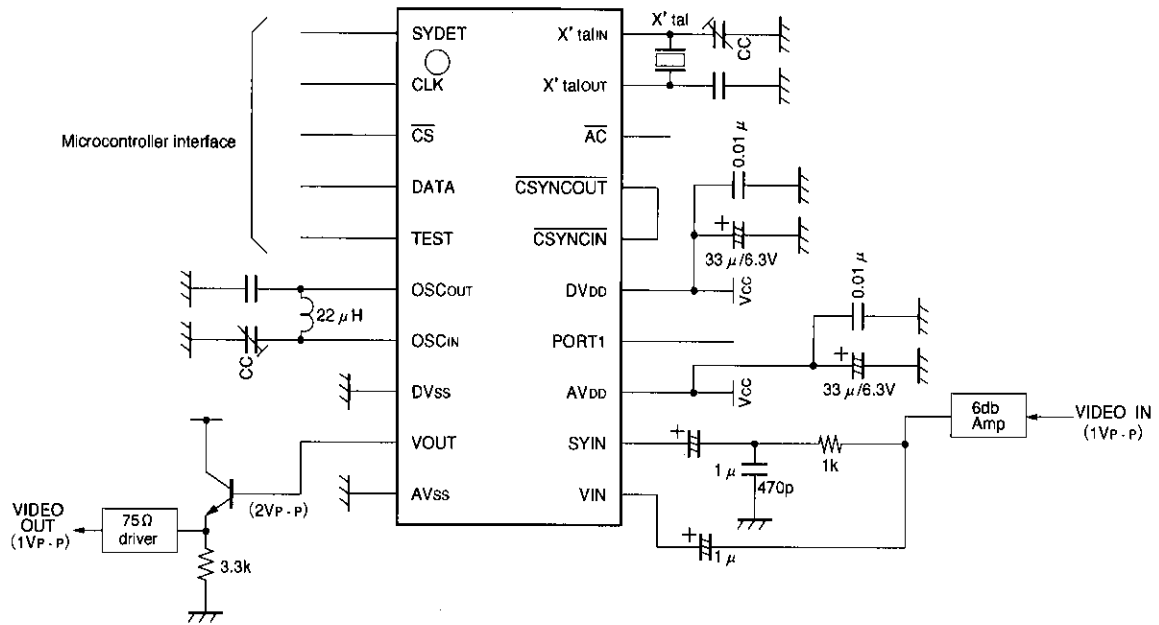


Fig. 4 Operating current measurement circuit

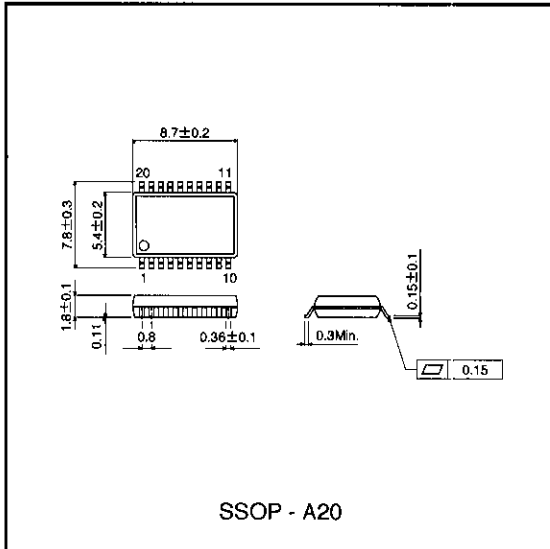
● Application example



On-screen displays

Multimedia video

● External dimensions (Units: mm)



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