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 is 10 lines ✕ 24 characters, and the on-chip character data ROM can store either 64 or 128 different characters.

● Applications
VCRs

● Features

1) 10 line ✕ 24 character display.

2) 64 (BU2878FS) or 128 (BU2871FS) character types.

3) For each line, the character size can be selected as either 1✕ or 2✕.

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℃)

| Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	$-0.3 \sim 7.0$	V
Power dissipation	P_d	750^*	mW
Operating temperature	T_{opr}	$-20 \sim 75$	℃
Storage temperature	T_{stg}	$-50 \sim 150$	℃

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

● Recommended operating conditions (Ta=25℃)

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}	—	$2f_{sc}$	—	Hz
X'tal oscillator frequency [2]	X_{OSC}	—	$4f_{sc}$	—	Hz

[1] For NTSC.
[2] For PAL, PAL-M, and PAL-N.

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● Block diagram
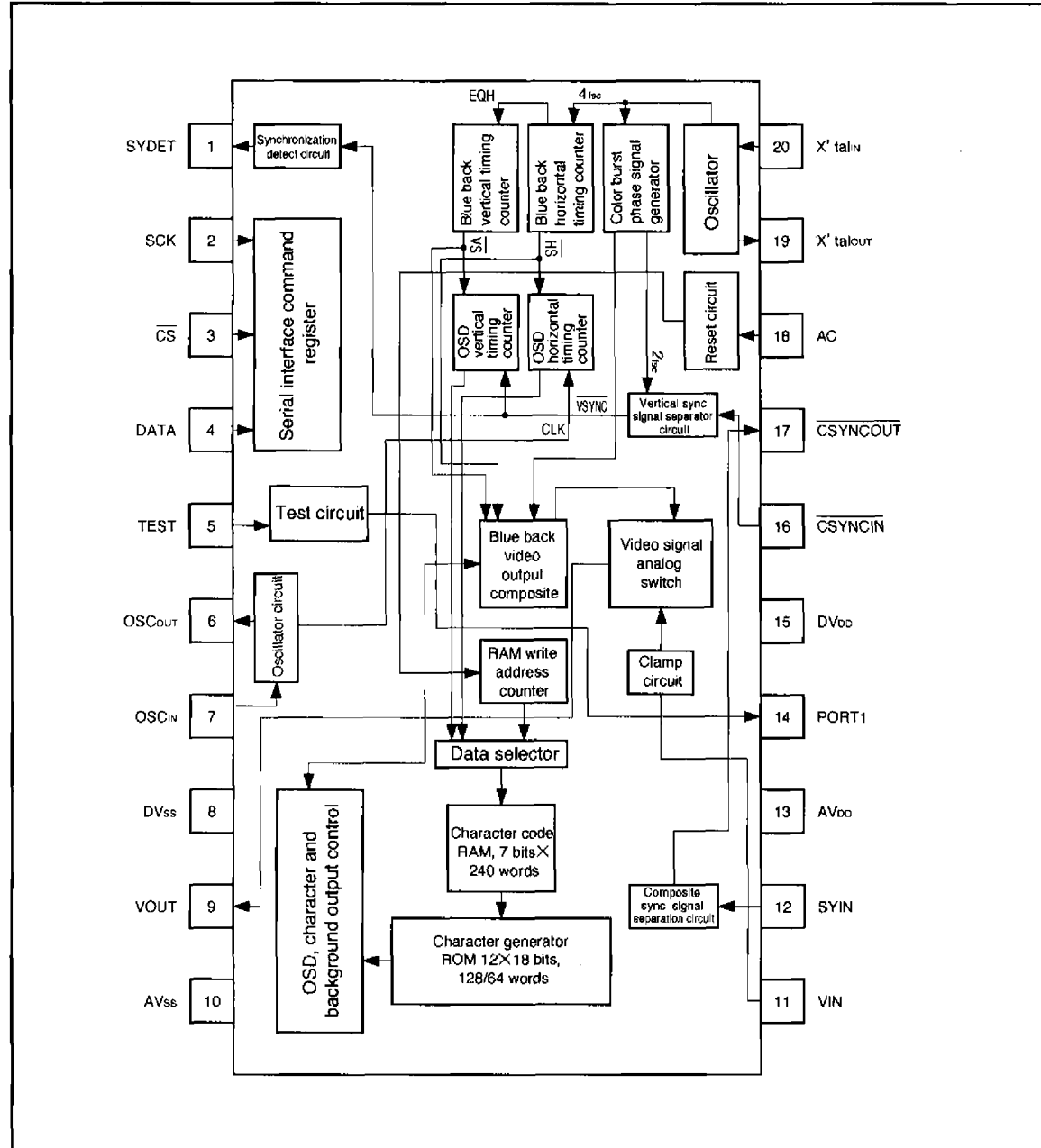
●Pin description

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	Output	OSC$_{OUT}$	For connection of capacitor and coil for the oscillator. Used as clock oscillator for
7	Input	OSC$_{IN}$	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	Output	X' tal	For connection of a capacitor for oscillation, or a crystal. Used for blue back with
20	Input		no signal. Use a crystal with a frequency of 4f$_{sc}$ for PAL, and 2f$_{sc}$ for NTSC.

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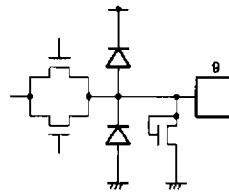
When the $\overline{AC}$ pin is set to "L", all registers are cleared, and data is written to all RAM addresses (RAM clear function). For this reason send commands until writing of data to the RAM is complete. The time requires to write the data to the RAM is 3/fosc×240 (sec.).
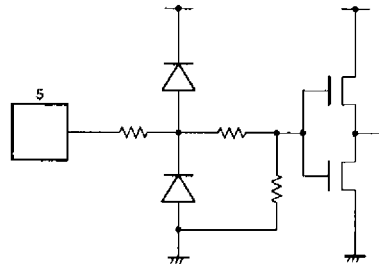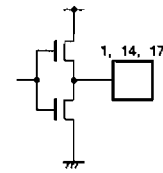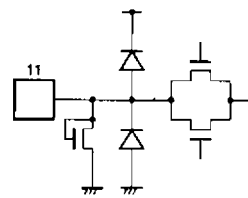
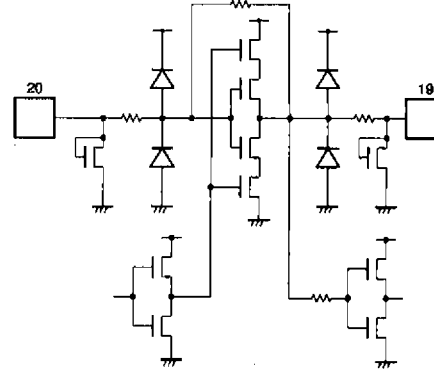●Input / output circuits

Inputs
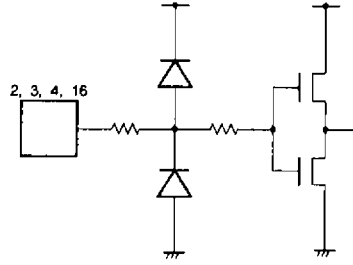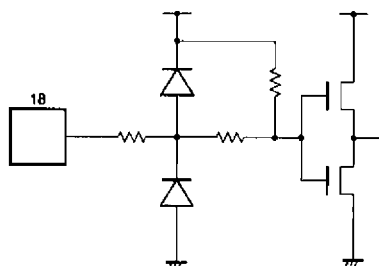
Vout

Input with pullup resistors

Output cell

Input
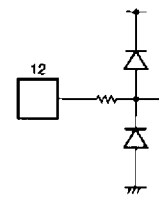
Crystal oscillator cell
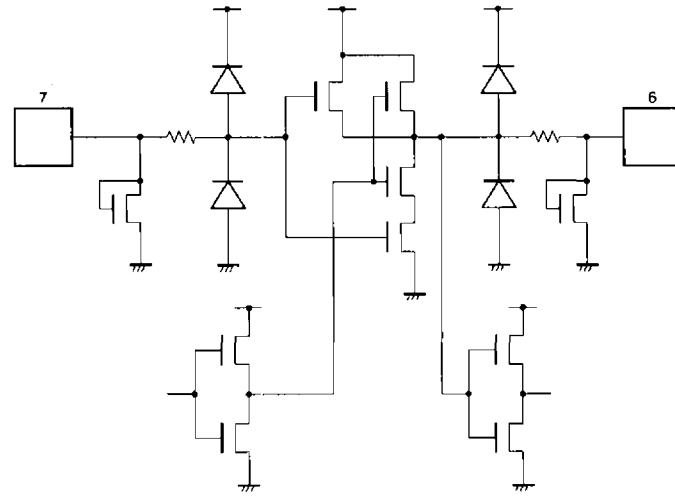
Input with pullup resistors

SYIN

On-screen displays

Multimedia video

Oscillator cell

● Electrical characteristics (Ta=−20°C to + 75°C and VDD=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	$I_{OL} \leq 2mA$ [*2]	Fig.1
"H" output voltage	V_{OH2}	$0.9V_{DD}$	—	—	V	$I_{OH} \leq 1mA$ [*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 fosc = 7MHz.
○Not designed for radiation resistance.

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● Measurement circuits
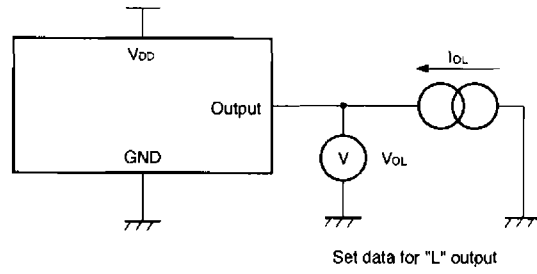
Fig. 1 "L" output voltage measurement circuit

Fig. 2 "H" output voltage measurement circuit

Fig. 3 Input voltage measurement circuit
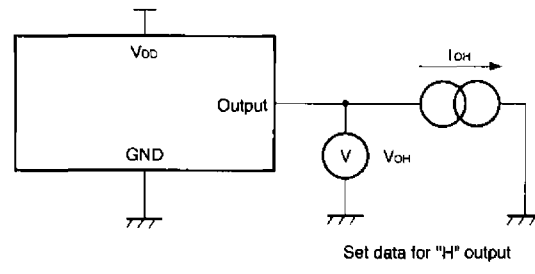
Fig. 4 Operating current measurement circuit

● Application example

Microcontroller interface

SYDET
CLK
CS
DATA
TEST
OSCout
OSCin
DVss
VOUT
AVss

X'talIN
X'talOUT
AC
CSYNCOUT
CSYNCIN
DVDD
PORT1
AVDD
SYIN
VIN

VIDEO OUT (1VP·P)
75Ω driver
3.3k
(2VP·P)

VIDEO IN (1VP·P)
6db Amp

X'tal
22μH
0.01μ
33μ/6.3V
Vcc
0.01μ
33μ/6.3V
Vcc
1μ
470p
1k
1μ
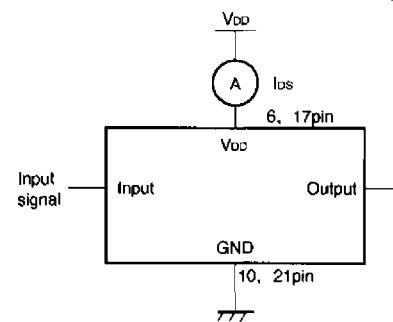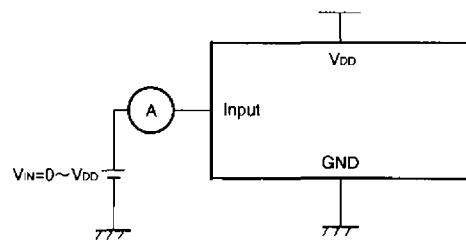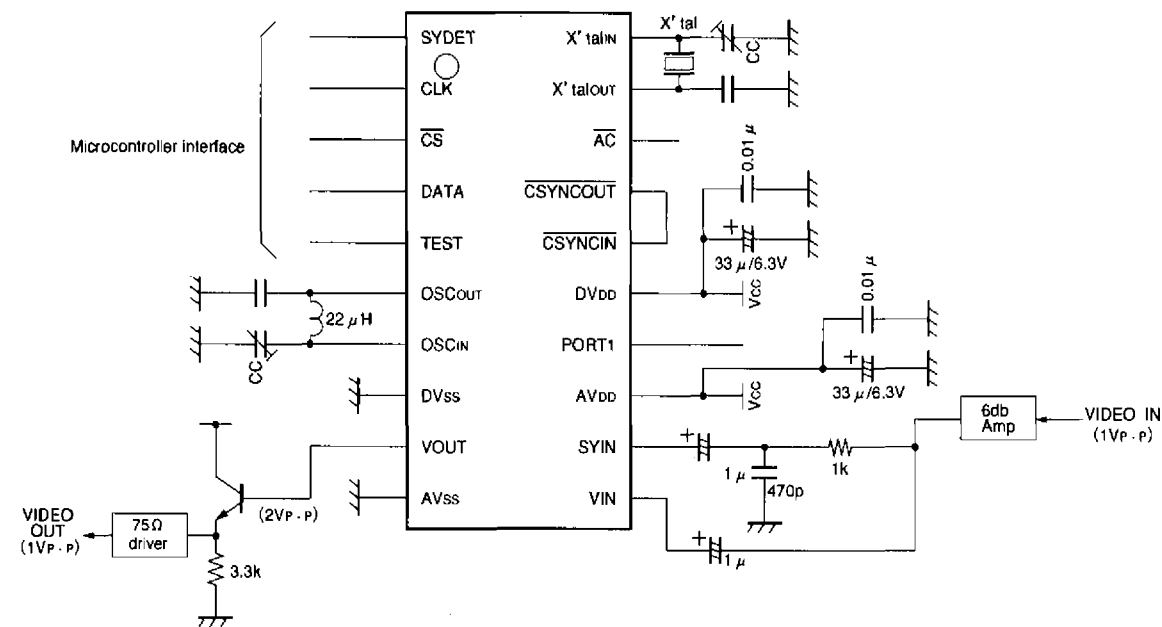
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●External dimensions (Units: mm)

SSOP - A20

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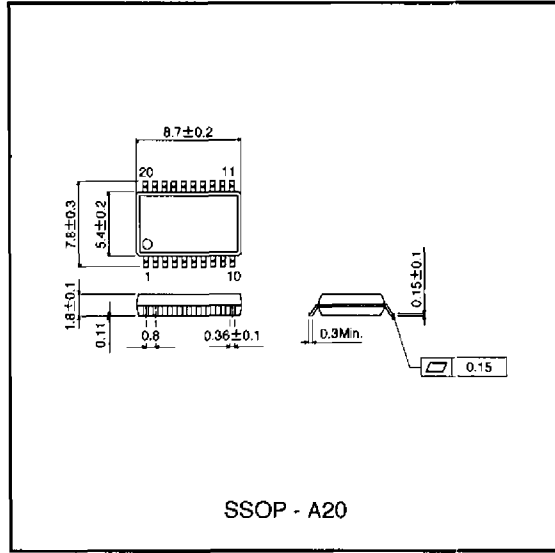
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