Multimedia ICs

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}	−0.3~7.0	V
Power dissipation	Pd	750*	mW
Operating temperature	Topr	−20~75	℃
Storage temperature	Tstg	−50~150	℃

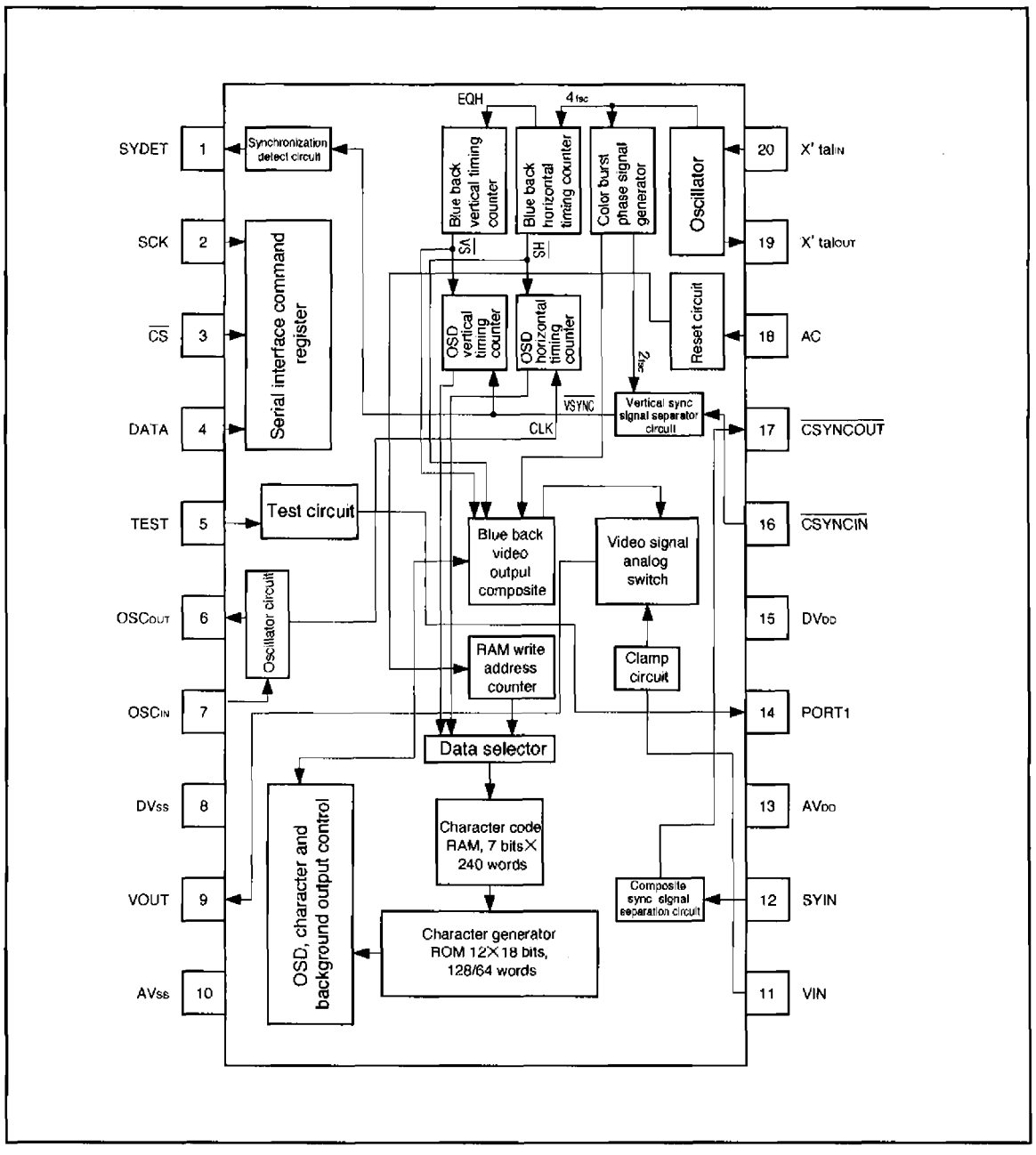
* Reduced by 6.0mW for each increase in Ta of 1°C over 25°C.

●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	fosc	5.0	—	10.0	MHz
X'tal oscillator frequency *1	Xosc	—	$2f_{sc}$	—	Hz
X'tal oscillator frequency *2	Xosc	—	$4f_{sc}$	—	Hz

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

●Block diagram



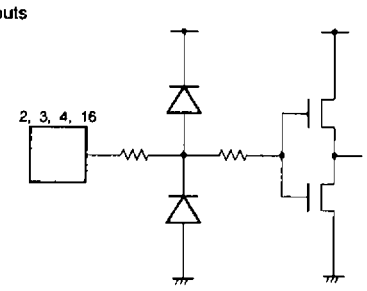
●Pin description

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	$\overline{CSYNCOUT}$	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.

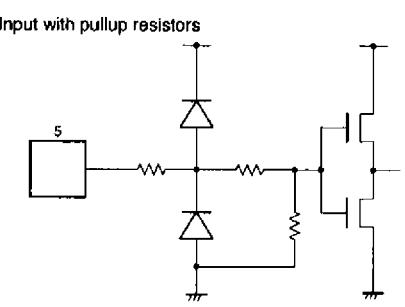
* Function of the $\overline{AC}$ pin
When the $\overline{AC}$ pin is set to "L", all registers are cleared, and data is written to all RAM addresses (RAM clear function). For this reasonsend commands until writing of data to the RAM is complete. The time requires to write the data to the RAM is $3/f_{osc}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

●Input / output circuits

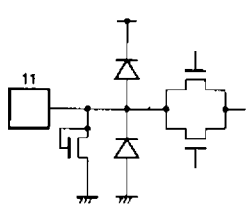
Inputs



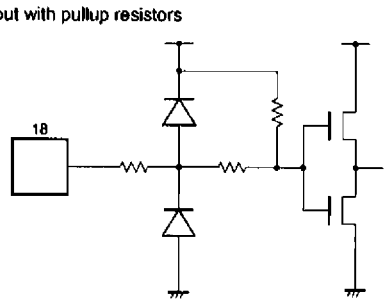
Input with pullup resistors



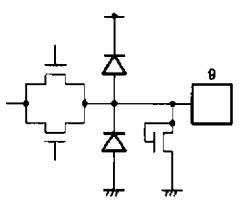
Input



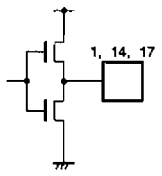
Input with pullup resistors



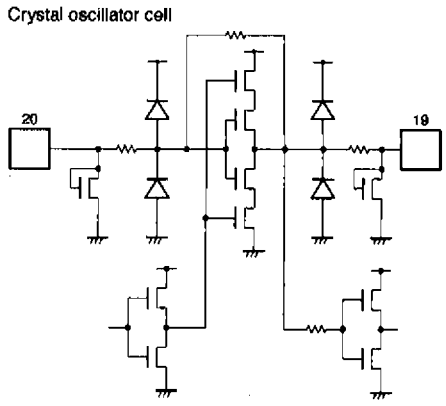
VOUT



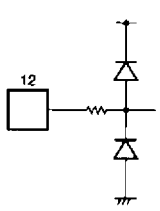
Output cell



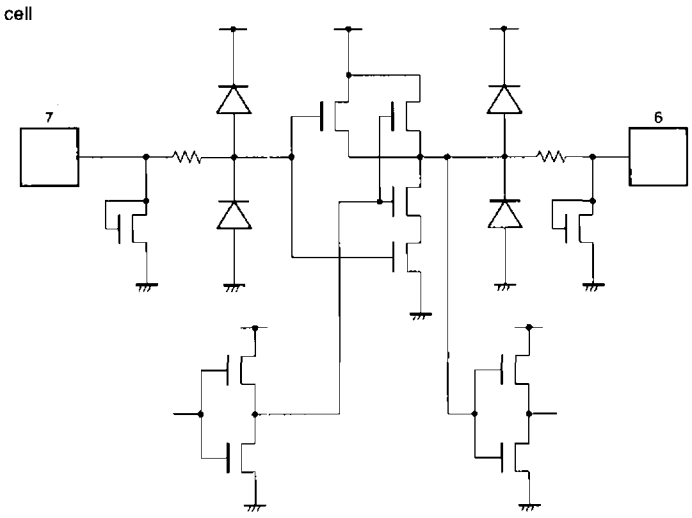
Crystal oscillator cell



SYIN



Oscillator cell



●Electrical characteristics (Ta=−20℃ to + 75℃ 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 fosc = 7MHz.
◎Not designed for radiation resistance.

●Measurement circuits

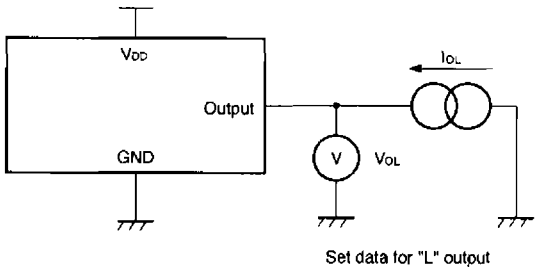


Fig. 1 "L" output voltage measurement circuit

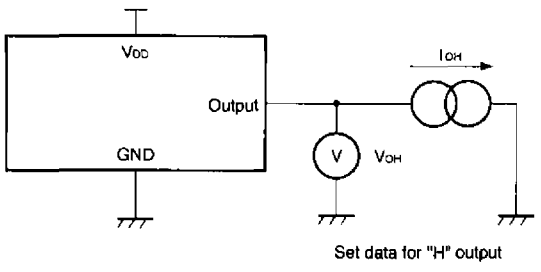


Fig. 2 "H" output voltage measurement circuit

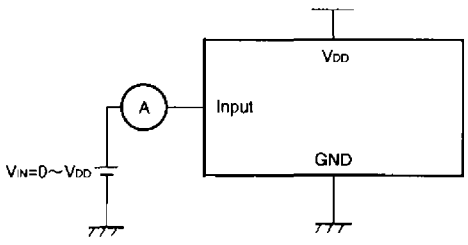


Fig. 3 Input voltage measurement circuit

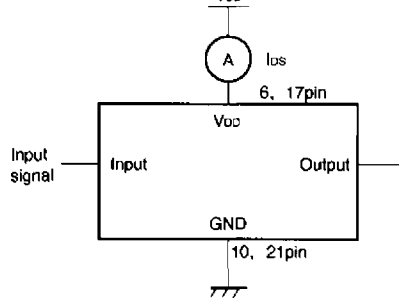
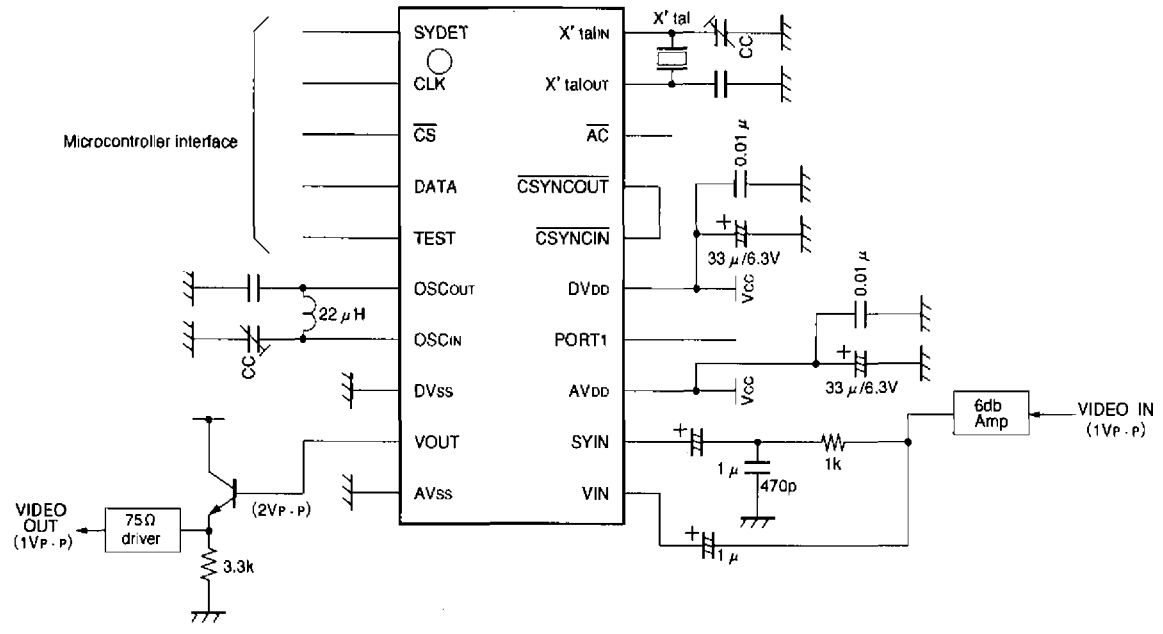
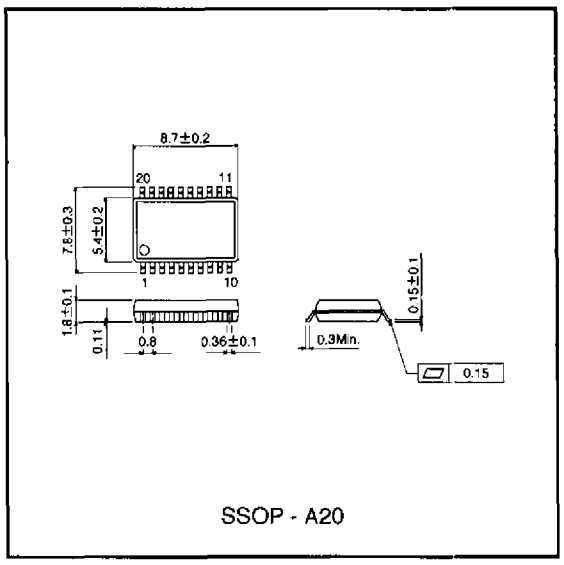


Fig. 4 Operating current measurement circuit

●Application example



●External dimensions (Units: mm)



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