# On-screen display for VCRs
## BU2875/BU2875F/BU2857/BU2857F

The BU2875, BU2875F, BU2857 and BU2857F are character generator ICs for VCRs and televisions. The display RAM can store is 12 lines × 24 characters, and the on-chip character data ROM can store either 127 or 255 different characters. The characters are displayed in a 12×18 bit matrix, with no space between characters, so two or more characters can be joined to form icons or patterns.

●Applications

VCRs

●Features

1) Compatible with NTSC, PAL, PAL-M, and PAL-N. A non-interlace mode is also provided.
2) Compatible with composite and S-VHS.
3) 127 character types (BU2875 and BU2875F) or 255 character types (BU2857 and BU2857F).

4) Color can be specified for each character. Reverse video display, blinking display, and "aluminum option" can be selected.
5) Built-in sync-tip clamp circuit.
6) Built-in synchronization decision circuit.

●Absolute maximum ratings (Ta=25°C)

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Power supply voltage | | Vcc | −0.3~7.0 | V |
| Power dissipation | BU2875/BU2857 | Pd | 700 (DIP28)[*1] | mW |
| | BU2875F/BU2857F | | 550 (SOP28)[*2] | |
| Operating temperature | | Topr | −20~75 | °C |
| Storage temperature | | Tstg | −50~150 | °C |
| Pin voltages | | − | −0.3~Vcc+0.3 | V |

*1 Reduced by 7mW for each increase in Ta of 1°C over 25°C.
*2 Reduced by 5.5mW 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 | Vcc | 4.5 | 5.0 | 5.5 | V |
| Input voltage | Vin | 0 | − | Vcc | V |

●Block diagram

ROHM
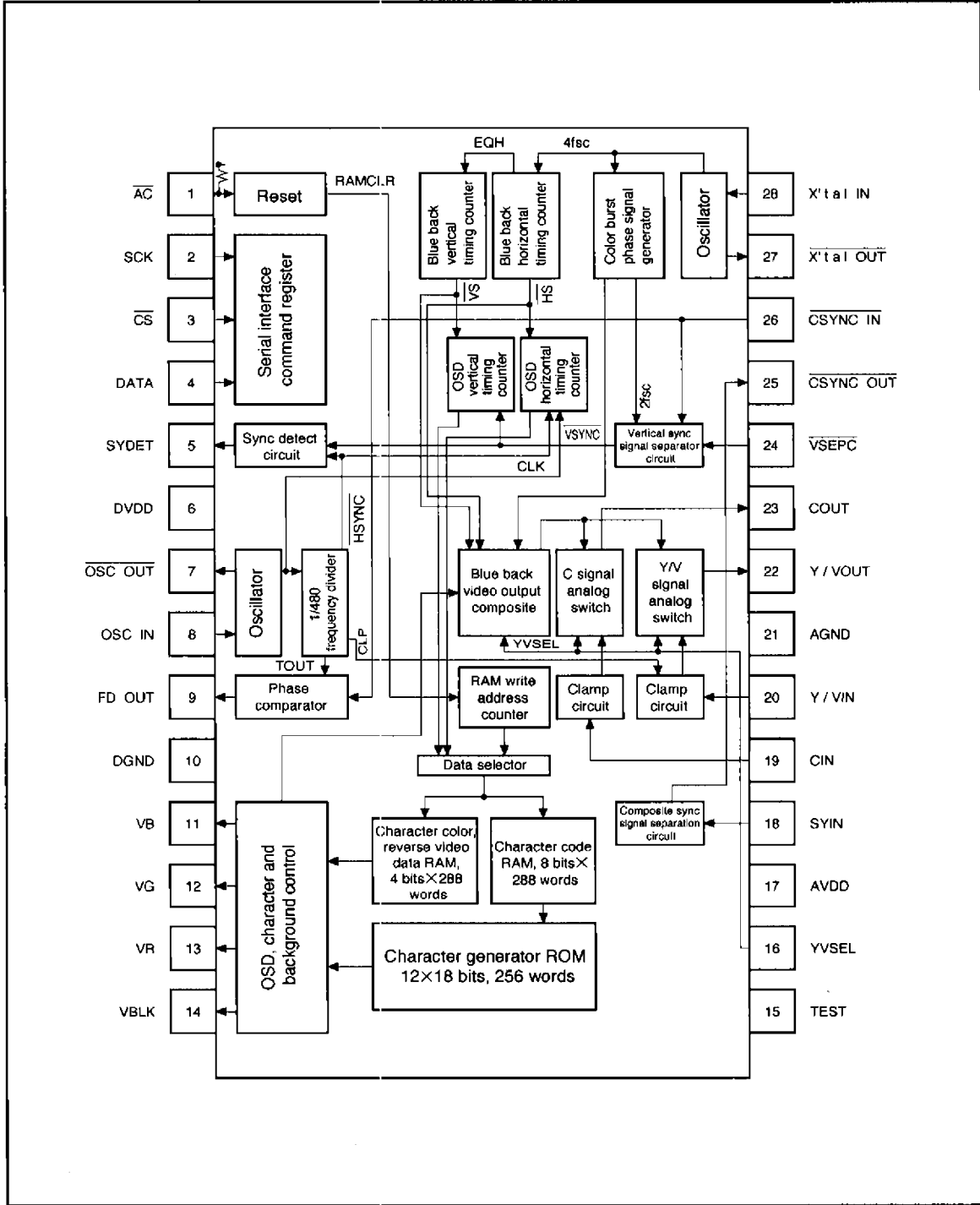
●Pin description

| Pin No. | Input/output | Pin Name | Function |
|---|---|---|---|
| 1 | Input | $\overline{AC}$ | "L" input resets all registers and clears the RAM. Pullup resistor on input. |
| 2 | Input | SCK | Clock input for reading data. Data on the DATA pin is read on the rising edge of the clock. Each block of 8 bits is loaded into the register as a command. |
| 3 | Input | $\overline{CS}$ | Serial interface chip select. Data effective when "L". |
| 4 | Input | DATA | Control data input. Data is read synchronously with the rising edge of the signal on the CLK pin. |
| 5 | 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). Normally "L", the output goes "H" when no signal is detected. |
| 6 | — | DVDD | +5V power supply pin (digital circuit). |
| 7<br>8 | Output<br>Input | OSC OUT<br>OSC IN | For connection of capacitor and coil for the VCO. Also used as the OSD character output dot clock.<br>The oscillator frequency is 480f$_H$ (f$_H$: horizontal synchronization frequency). |
| 9 | Output | FDOUT | AFC circuit phase comparator output. |
| 10 | — | DGND | Connect to system ground (digital GND). |
| 11 | Output | VB* | B character data output of digital RGB output. |
| 12 | Output | VG* | G character data output of digital RGB output. |
| 13 | Output | VR* | R character data output of digital RGB output. |
| 14 | Output | VBLK | Background data digital output. |
| 15 | Input | TEST | Open during normal operation. When "H", the LC oscillator clock is output on pin 11, and the X'tal oscillator clock is output on pin 12. This is used to for checking the oscillation frequencies. |
| 16 | Input | YVSEL | For setting the mode of the video signal input/output pins. Set to "L" for separated Y/C, and "H" for composite video. |
| 17 | — | AVDD | +5V power supply pin (analog circuit). |
| 18 | Input | SYIN | Input for the video signal for the synchronous separation circuit. |
| 19 | Input | CIN | C signal input pin for Y/C separation input/output.<br>Leave open when not used (select the mode using pin 16). |
| 20 | Input | YIN /<br>VIN | Y signal pin for Y/C separation input/output or composite video signal input (select the mode using pin 16). Use an input level of 2V$_{P-P}$. |
| 21 | — | AGND | Connect to system ground (analog GND). |
| 22 | Output | YOUT /<br>VOUT | Y signal pin for Y/C separation input/output or composite video signal output (select the mode using pin 16). |
| 23 | Output | COUT | C signal output pin for Y/C separation input/output.<br>Leave open when not used (select the mode using pin 16). |
| 24 | Input | $\overline{VSEPC}$ | Input for external vertical synchronization signal. (open when not used). Logical sum of this and the internally separated vertical synchronization signal is taken. |
| 25 | Output | $\overline{CSYNCOUT}$ | Output for composite synchronization signal (slicer output). |
| 26 | Input | $\overline{CSYNCIN}$ | Input for composite synchronization signal. This is input to the AFC phase comparator and vertical synchronization signal separation circuit. Normally connected to pin 25. |
| 27<br>28 | Output<br>Input | X'tal OUT<br>X'tal IN | For connection of a capacitor for oscillation, or a crystal. For generation of internal video signal. Use a crystal oscillator with a frequency of 4fsc. |

* For superimposition, the VR, VG, and VB outputs display in monochrome.

On-screen displays

Multimedia video

●Function of the $\overline{AC}$ pin

When the $\overline{AC}$ pin is set to "L", all registers are cleared, and character code FFH is written to all RAM addresses (RAM clear function). For this reason, do not send commands until writing of data to the RAM is complete. The time requires to write the data to the RAM is

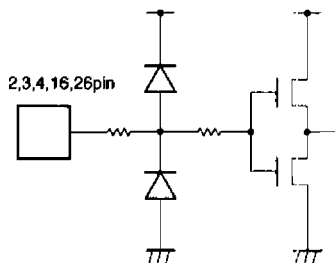$$3 / f_{osc} \times 288 \text{ [sec]}$$

($f_{osc}$ : the LC oscillator frequency.)
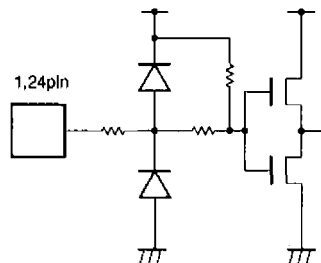
●YVSEL setting

| YVSEL | YIN / VIN YOUT / VOUT | CIN COUT |
|-------|------------------------|----------|
| L | Y signal input/output | C signal input/output |
| H | Composite video signal input/output | Unused (open) |

●Input / output circuits

Inputs



Input with pullup resistors



Input with pulldown resistors



SYIN

ROHM
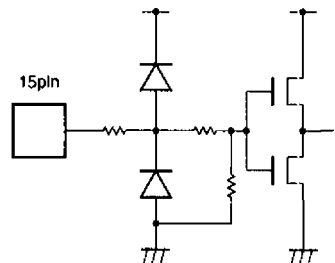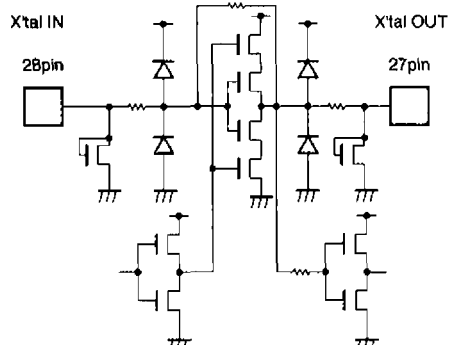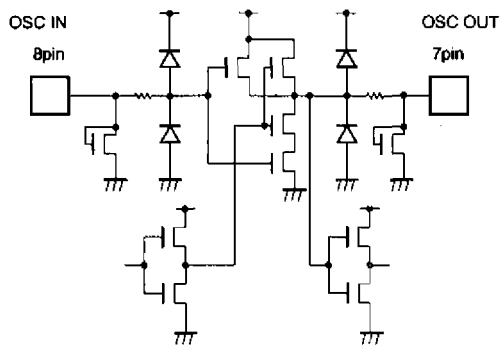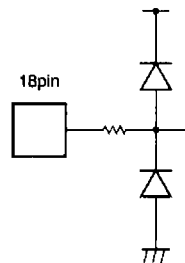
●Input / output circuits

Y/V IN
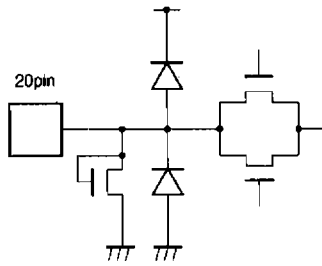


Y/V OUT, COUT



CIN
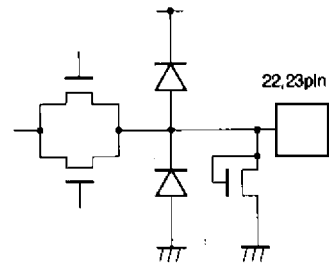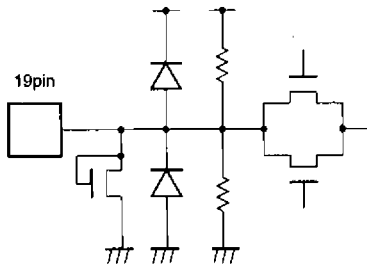


FD OUT
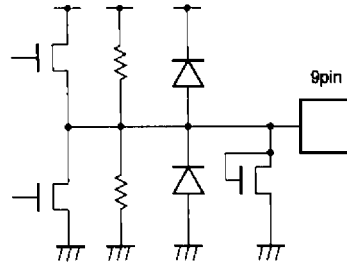


Outputs
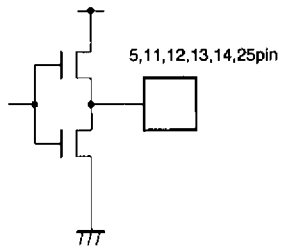
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●Electrical characteristics (Unless otherwise specified: Ta=25°C and V<sub>DD</sub>=5V)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions | Measurement Circuit |
|---|---|---|---|---|---|---|---|
| "L" input voltage | V<sub>IL2</sub> | 0 | — | 1.5 | V | For CMOS input | Fig.3 |
| "H" input voltage | V<sub>IH2</sub> | 3.5 | — | V<sub>DD</sub> | V | For CMOS input | Fig.3 |
| "L" output voltage | V<sub>OL1</sub> | — | — | 0.4 | V | For OSC *1 | Fig.1 |
| "H" output voltage | V<sub>OH1</sub> | 4.6 | — | — | V | For OSC *1 | Fig.2 |
| "L" output voltage | V<sub>OL2</sub> | — | — | 0.4 | V | I<sub>OL</sub> ≦2mA (CMOS output) | Fig.1 |
| "H" output voltage | V<sub>OH2</sub> | 4.6 | — | — | V | I<sub>OH</sub> ≦ 1mA (CMOS output) | Fig.2 |
| Video signal input level | V<sub>VI</sub> | — | 2.0 | — | V<sub>P-P</sub> | Pins 18 and 20 (when white peak) *2 | — |
| Video signal output level | V<sub>VO</sub> | — | 1.85 | — | V<sub>P-P</sub> | Pin 22 (when white peak) *3 | Fig.5 |
| C signal input level | V<sub>CI</sub> | — | 1.4 | 3.0 | V<sub>P-P</sub> | 19pin *2 | — |
| C signal output level | V<sub>CO</sub> | — | 1.4 | — | V<sub>P-P</sub> | 23pin *3 | Fig.5 |
| LC oscillator frequency | f<sub>OSC</sub> | — | 480f<sub>H</sub> | — | MHz | f<sub>H</sub>: horizontal synchronization signal frequency | — |
| Input pullup resistance | I<sub>IR</sub> | — | 28 | — | kΩ | Pullup input | Fig.3 |
| Operating current | I<sub>DS</sub> | — | — | 25 | mA | *4 | Fig.4 |

*1 When an external clock is connected to the oscillator pin (50% duty cycle).
*2 Signal level of the externally input signal in external synchronization mode (superimpose).
*3 Signal level of the internally generated signal in internal synchronization mode.
*4 All characters displayed with fosc = 7.55MHz.
◎Not designed for radiation resistance.

●Measurement circuits
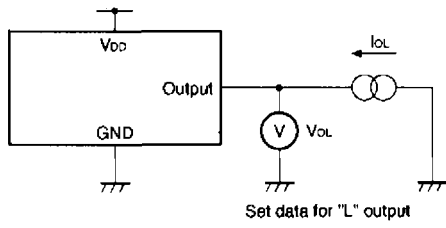


Fig. 1 "L" output voltage measurement circuit
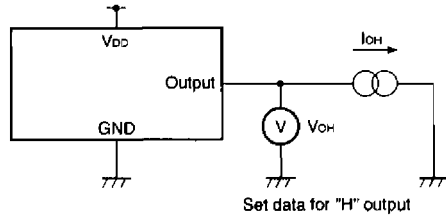


Fig. 2 "H" output voltage measurement circuit
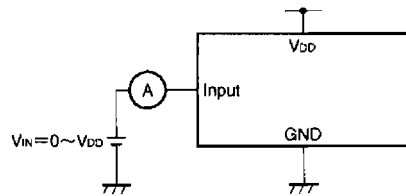


Fig. 3 Input voltage measurement circuit
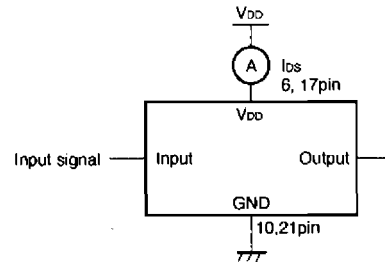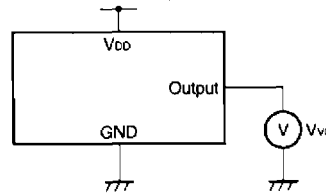


Fig. 4 Operating current measurement circuit



Fig. 5 Video signal output voltage
measurement circuit
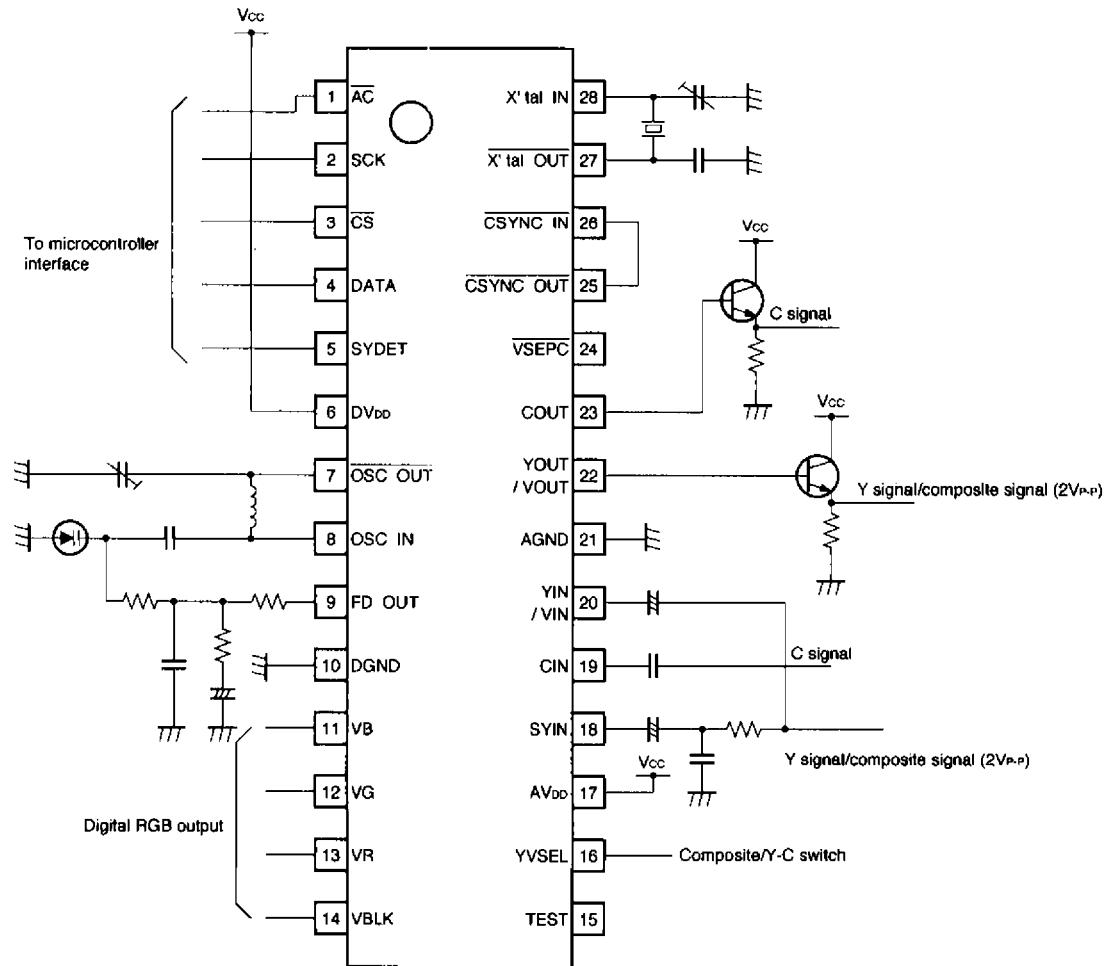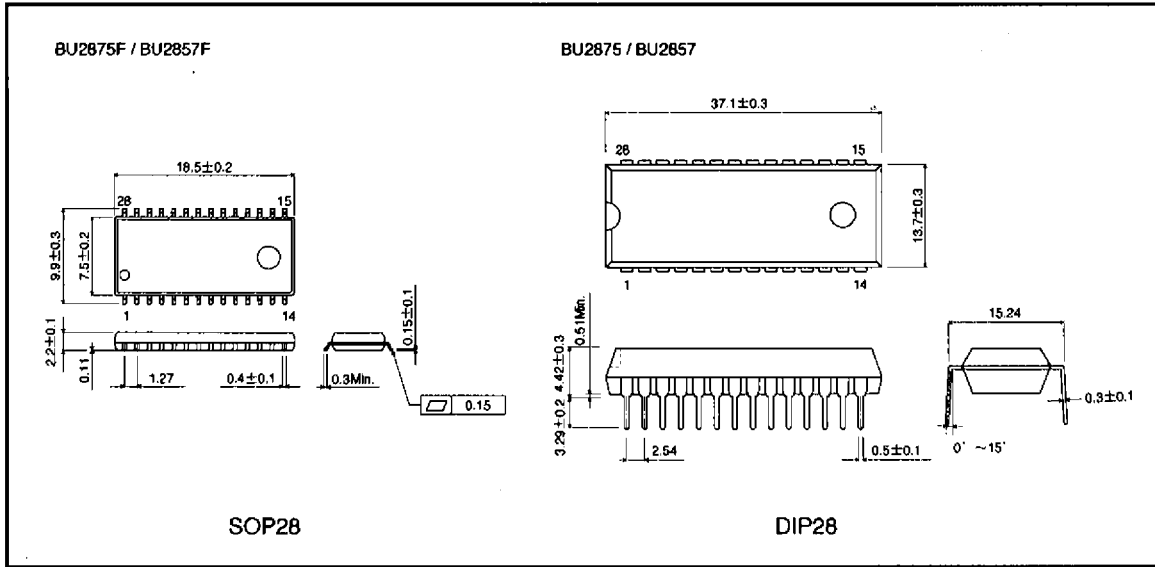
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●Application example



Fig. 6

●External dimensions (Units: mm)



BU2875F / BU2857F

SOP28

BU2875 / BU2857

DIP28

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# Notes