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| STRUCTURE | Silicon Monolithic Integrated Circuit |
| TYPE | BU2099FV |
| FUNCTION | 12bit Serial IN / Parallel Out Driver |
| FEATURES | 1) Nch open drain, capable of driving a maximum of 25mA 2) 25V high voltage output can be used. 3) This product can be operated on low voltage. (2.7V) |

● ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| Parameter | Symbol | Limit | Unit |
|-----------------------------|------------------|---------------------------|------|
| Power Supply Voltage | V _{DD} | 7.0 | V |
| Power Dissipation1 | Pd1 | 400 | mW |
| Power Dissipation2 | Pd2 | 650* | mW |
| Operating Temperature Range | T _{opr} | -40~+85 | °C |
| Storage Temperature Range | T _{stg} | -55~+125 | °C |
| Input Voltage | V _{IN} | -0.3~V _{DD} +0.3 | V |

* Output (Q0~Q11) are 25V (Max.)

* 70mm×70mm×1.6mm glass epoxy.

• Status of this document

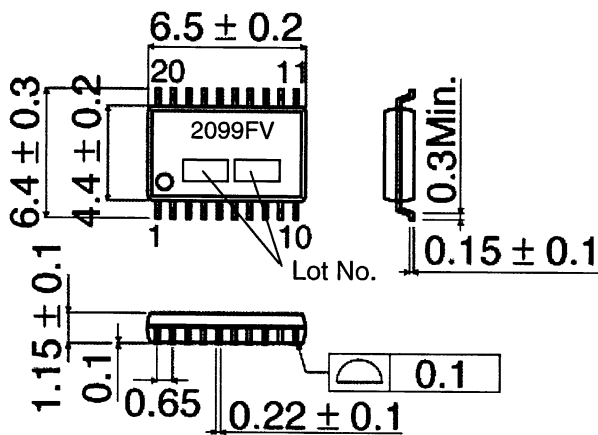
The Japanese version of this document is the formal specification. A customer may use this translation version only for a reference to help reading the formal version. If there are any difference in translation version of this document, formal version takes priority.

● ELECTRICAL CHARACTERISTICS (unless otherwise noted, Ta=25°C, VDD=5.0V)

| Parameter | Symbol | Standard Value | | | Unit | Condition |
|----------------------------|------------------|----------------|-----|------|------|---------------------------------------|
| | | MIN | TYP | MAX | | |
| Power Supply Voltage range | V _{DD} | 2.7 | - | 5.5 | V | VDD pin |
| Output Voltage range | V _o | 0 | - | 25.0 | V | |
| Supply current1 | I _{DD1} | - | - | 5.0 | μA | Vin=VSS or VDD ,Output=OPEN,VDD=5V |
| Supply current2 | I _{DD2} | - | - | 3.0 | μA | Vin=VSS or VDD ,Output=OPEN,VDD=3V |
| Input "H" voltage1 | V _{IH1} | 3.5 | - | - | V | VDD=5V |
| Input "H" voltage2 | V _{IH2} | 2.5 | - | - | V | VDD=3V |
| Input "L" voltage1 | V _{IL1} | - | - | 1.5 | V | VDD=5V |
| Input "L" voltage2 | V _{IL2} | - | - | 0.4 | V | VDD=3V |
| Output "L" voltage1 | V _{OL1} | - | - | 2.0 | V | VDD=5V,20mA |
| Output "L" voltage2 | V _{OL2} | - | - | 1.0 | V | VDD=3V,5mA |
| Output Leakage current1 | I _{IH} | - | - | 10.0 | μA | External resistance 10kΩ, Vout=25V |
| Output Leakage current2 | I _{IL} | - | - | -5.0 | μA | External resistance 10kΩ, Vout=0V |
| Data Minimum set up time1 | t _{su1} | 200 | - | - | nS | VDD=5V |
| Data Minimum set up time2 | t _{su2} | 400 | - | - | nS | VDD=3V |
| Data hold time1 | t _{h1} | 200 | - | - | nS | VDD=5V |
| Data hold time2 | t _{h2} | 400 | - | - | nS | VDD=3V |
| Minimum shift pulse width1 | t _{w1} | 500 | - | - | nS | VDD=5V |
| Minimum shift pulse width2 | t _{w2} | 1000 | - | - | nS | VDD=3V |

This product is not assessed whether to be strategic materials in foreign exchange and trade law or not, so please confirm at trading. This product is not deigned against radioactive ray.

● PHYSICAL DIMENSIONS

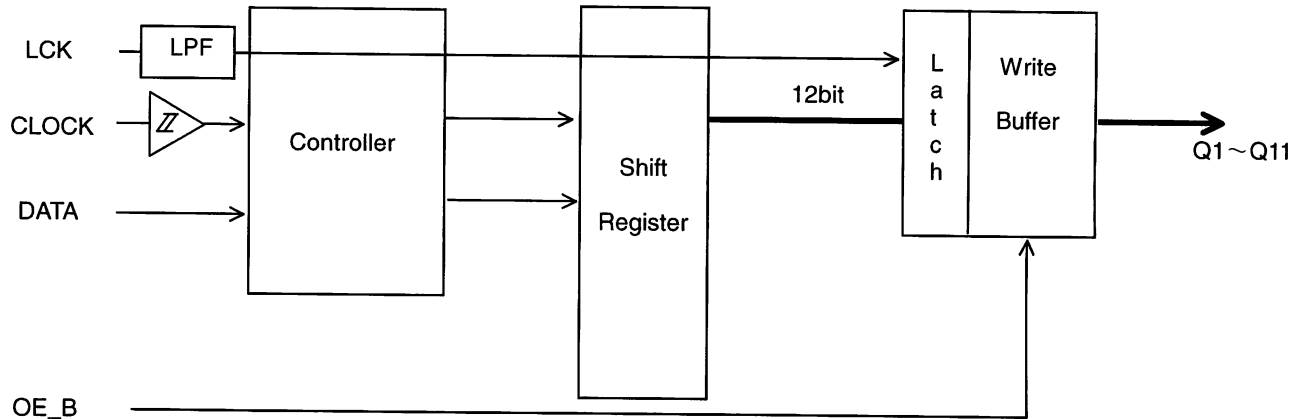


SSOP-B20 (UNIT : mm)

● Pin Description

| Pin. No | Terminal | Symbol | Function |
|---------|----------|-----------------|---|
| 4 | CLOCK | C | Shift pulse for shift register |
| 3 | DATA | S _I | Data input for shift register, data is set at rising edge of shift pulse |
| 5 | LCK | L _{CK} | Strobe signal input, output is renewable at "1" and reserved at "0". |
| 19 | OE_B | O _{EB} | Enable signal input, output is enabled at "0". |
| 18 | SO | S _O | Data output for shift register, which is outputted at the rising edge of shift pulse. |
| 6 | Q0 | O ₀ | 1st bit output, it becomes "1" when data in register is "1" |
| 7 | Q1 | O ₁ | 2nd bit output, it becomes "1" when data in register is "1" |
| 8 | Q2 | O ₂ | 3rd bit output, it becomes "1" when data in register is "1" |
| 9 | Q3 | O ₃ | 4th bit output, it becomes "1" when data in register is "1" |
| 10 | Q4 | O ₄ | 5th bit output, it becomes "1" when data in register is "1" |
| 11 | Q5 | O ₅ | 6th bit output, it becomes "1" when data in register is "1" |
| 12 | Q6 | O ₆ | 7th bit output, it becomes "1" when data in register is "1" |
| 13 | Q7 | O ₇ | 8th bit output, it becomes "1" when data in register is "1" |
| 14 | Q8 | O ₈ | 9th bit output, it becomes "1" when data in register is "1" |
| 15 | Q9 | O ₉ | 10th bit output, it becomes "1" when data in register is "1" |
| 16 | Q10 | O ₁₀ | 11th bit output, it becomes "1" when data in register is "1" |
| 17 | Q11 | O ₁₁ | 12th bit output, it becomes "1" when data in register is "1" |
| 1 | VSS | GND | GND |
| 2 | NC | NC | NC pin |
| 20 | VDD | VDD | Power supply |

● BLOCK DIAGRAM



● NOTES FOR USE

- (1) Absolute maximum ratings
Exceeding the absolute maximum ratings, including applied voltage and operating temperature range, may damage or destroy the IC. Since the cause of the damage cannot be conclusively identified (as, for example, a short or open mode), be sure to take appropriate physical safety measures, such as incorporating fuses, whenever a special mode anticipated to exceed absolute maximum ratings is employed.
- (2) Ground Potential
Make sure the potential for the GND pin is always kept lower than the potentials of all other pins, regardless of the operating mode.
- (3) Thermal design
Provide sufficient margin in the thermal design to account for the allowable power dissipation (Pd) expected in actual use.
- (4) Electromagnetic fields
Use in strong electromagnetic fields may cause malfunctions. Be careful operating in electromagnetic fields.
- (5) Ground wiring pattern
When both a small-signal GND and high current GND are present, single-point grounding (at the set standard point) is recommended, in order to separate the small-signal and high current patterns, and to be sure the voltage change stemming from the wiring resistance and high current does not cause any voltage change in the small-signal GND. In the same way, care must be taken to avoid wiring pattern fluctuations in any connected external component GND.

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| | | |
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