

## SI-8000JF Series

# Full-Mold, Separate Excitation Switching Type

### ■Features

- Compact full-mold package (equivalent to TO220)
- Output current: 1.5 A
- High efficiency: 79 to 91%
- Requires only 4 external components
- Phase correction and output voltage adjustment performed internally
- Choke coil size can be reduced through the employment of high frequency (125 kHz) design
- Built-in foldback overcurrent protection, thermal protection circuits
- Output ON/OFF capable (OFF state current consumption: 200  $\mu$ A max.)
- Soft start possible via ON/OFF pin



### ■Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies

### ■Lineup

| Part Number | SI-8015JF | SI-8025JF | SI-8033JF | SI-8050JF | SI-8090JF | SI-8120JF |
|-------------|-----------|-----------|-----------|-----------|-----------|-----------|
| $V_o$ (V)   | 1.59      | 2.5       | 3.3       | 5.0       | 9.0       | 12.0      |
| $I_o$ (A)   | 1.5       |           |           |           |           |           |

### ■Absolute Maximum Ratings

| Parameter                             | Symbol        | Ratings                                      | Unit |
|---------------------------------------|---------------|----------------------------------------------|------|
| DC Input Voltage                      | $V_{IN}$      | 43                                           | V    |
| Power Dissipation                     | $P_{D1}$      | 16.6 (with infinite heatsink)                | W    |
|                                       | $P_{D2}$      | 1.5 (without heatsink, standalone operation) | W    |
| Junction Temperature                  | $T_j$         | +125                                         | °C   |
| Storage Temperature                   | $T_{stg}$     | -40 to +125                                  | °C   |
| Thermal Resistance (Junction to Case) | $R_{th(j-c)}$ | 6.0                                          | °C/W |

### ■Recommended Operating Conditions

| Parameter                            | Symbol    | Ratings            |            |            |           |           |           | Unit | Conditions           |
|--------------------------------------|-----------|--------------------|------------|------------|-----------|-----------|-----------|------|----------------------|
|                                      |           | SI-8015JF*         | SI-8025JF  | SI-8033JF  | SI-8050JF | SI-8090JF | SI-8120JF |      |                      |
| DC Input Voltage Range               | $V_{IN1}$ | $V_o+2$ to $V_o+3$ | 4.5 to 5.5 | 5.3 to 6.3 | 7 to 8    | 11 to 12  | 14 to 15  | V    | $I_o=0$ to 1A        |
|                                      | $V_{IN2}$ | $V_o+3$ to 40      | 5.5 to 40  | 6.3 to 40  | 8 to 40   | 12 to 40  | 15 to 40  | V    | $I_o=0$ to 1.5A      |
| Output Current Range                 | $I_o$     | 0 to 1.5           |            |            |           |           |           | A    | $V_{IN} \geq V_o+3V$ |
| Operating Junction Temperature Range | $T_{jop}$ | -30 to +125        |            |            |           |           |           | °C   |                      |

\*SI-8015JF is a variable output voltage type. The variable output voltage range is from 2.5 V to 24 V.

## Electrical Characteristics

(Ta=25°C)

| Parameter                                   |                             | Symbol     | Rating                  |      |         |                         |      |         |                         |      |         |                         |      |         |                         |      |         |                         |       |       | Unit  |    |
|---------------------------------------------|-----------------------------|------------|-------------------------|------|---------|-------------------------|------|---------|-------------------------|------|---------|-------------------------|------|---------|-------------------------|------|---------|-------------------------|-------|-------|-------|----|
|                                             |                             |            | SI-8015JF               |      |         | SI-8025JF               |      |         | SI-8033JF               |      |         | SI-8050JF               |      |         | SI-8090JF               |      |         | SI-8120JF               |       |       |       |    |
|                                             |                             |            | min.                    | typ. | max.    | min.                    | typ. | max.    | min.                    | typ. | max.    | min.                    | typ. | max.    | min.                    | typ. | max.    | min.                    | typ.  | max.  |       |    |
| Output Voltage*1                            |                             | Vo*2       | 1.558                   | 1.59 | 1.622   | 2.45                    | 2.50 | 2.55    | 3.234                   | 3.30 | 3.366   | 4.90                    | 5.00 | 5.10    | 8.82                    | 9.00 | 9.18    | 11.76                   | 12.00 | 12.24 | V     |    |
|                                             |                             | Conditions | VIN=12V, Io=0.5A        |      |         | VIN=12V, Io=0.5A        |      |         | VIN=15V, Io=0.5A        |      |         | VIN=20V, Io=0.5A        |      |         | VIN=21V, Io=0.5A        |      |         | VIN=24V, Io=0.5A        |       |       |       |    |
| Efficiency                                  |                             | η          |                         | 67   |         |                         | 74   |         |                         | 77   |         |                         | 82   |         |                         | 86   |         |                         | 88    |       | %     |    |
|                                             |                             | Conditions | VIN=12V, Io=0.5A        |      |         | VIN=12V, Io=0.5A        |      |         | VIN=15V, Io=0.5A        |      |         | VIN=20V, Io=0.5A        |      |         | VIN=21V, Io=0.5A        |      |         | VIN=24V, Io=0.5A        |       |       |       |    |
| Switching Frequency                         |                             | f          |                         | 125  |         |                         | 125  |         |                         | 125  |         |                         | 125  |         |                         | 125  |         |                         | 125   |       | kHz   |    |
|                                             |                             | Conditions | VIN=12V, Io=0.5A        |      |         | VIN=12V, Io=0.5A        |      |         | VIN=15V, Io=0.5A        |      |         | VIN=20V, Io=0.5A        |      |         | VIN=21V, Io=0.5A        |      |         | VIN=24V, Io=0.5A        |       |       |       |    |
| Line Regulation                             |                             | ΔVOLINE    |                         | 25   | 80      |                         | 25   | 80      |                         | 25   | 80      |                         | 40   | 100     |                         | 50   | 120     |                         | 60    | 130   | mV    |    |
|                                             |                             | Conditions | VIN=8 to 30V, Io=0.5A   |      |         | VIN=7 to 30V, Io=0.5A   |      |         | VIN=8 to 30V, Io=1.0A   |      |         | VIN=10 to 30V, Io=1.0A  |      |         | VIN=15 to 30V, Io=1.0A  |      |         | VIN=18 to 30V, Io=1.0A  |       |       |       |    |
| Load Regulation                             |                             | ΔVOLOAD    |                         | 10   | 30      |                         | 10   | 30      |                         | 10   | 30      |                         | 10   | 40      |                         | 10   | 40      |                         | 10    | 40    | mV    |    |
|                                             |                             | Conditions | VIN=12V, Io=0.2 to 0.8A |      |         | VIN=12V, Io=0.2 to 0.8A |      |         | VIN=15V, Io=0.5 to 1.5A |      |         | VIN=20V, Io=0.5 to 1.5A |      |         | VIN=21V, Io=0.5 to 1.5A |      |         | VIN=24V, Io=0.5 to 1.5A |       |       |       |    |
| Temperature Coefficient of Output Voltage*3 |                             | ΔVo/ΔTa*4  |                         | ±0.5 |         |                         | ±0.5 |         |                         | ±1.0 |         |                         | ±1.0 |         |                         |      |         |                         |       |       | mV/°C |    |
| Overcurrent Protection Starting Current     |                             | Is1        | 1.6                     |      |         | 1.6                     |      |         | 1.6                     |      |         | 1.6                     |      |         | 1.6                     |      |         | 1.6                     |       |       | A     |    |
|                                             |                             | Conditions | VIN=12V                 |      |         | VIN=12V                 |      |         | VIN=15V                 |      |         | VIN=20V                 |      |         | VIN=21V                 |      |         | VIN=24V                 |       |       |       |    |
| ON/OFF*5 Terminal                           | Low Level Voltage           | VSSL       |                         |      | 0.5     |                         |      | 0.5     |                         |      | 0.5     |                         |      | 0.5     |                         |      | 0.5     |                         |       | 0.5   | V     |    |
|                                             | Leak Current at Low Voltage | ISSL       |                         |      | 100     |                         |      | 100     |                         |      | 100     |                         |      | 100     |                         |      | 100     |                         |       | 100   | μA    |    |
|                                             | Conditions                  | VSSL=0V    |                         |      | VSSL=0V |                         |      | VSSL=0V |                         |      | VSSL=0V |                         |      | VSSL=0V |                         |      | VSSL=0V |                         |       |       |       |    |
| Quiescent Circuit Current                   |                             | Iq         |                         | 7    |         |                         | 7    |         |                         | 7    |         |                         | 7    |         |                         | 7    |         |                         | 7     |       | mA    |    |
|                                             |                             | Conditions | VIN=12V, Io=0A          |      |         | VIN=12V, Io=0A          |      |         | VIN=15V, Io=0A          |      |         | VIN=20V, Io=0A          |      |         | VIN=21V, Io=0A          |      |         | VIN=24V, Io=0A          |       |       |       |    |
|                                             |                             | Iq(off)    |                         |      | 200     |                         |      | 200     |                         |      | 200     |                         |      | 200     |                         |      | 200     |                         |       | 200   |       | μA |
|                                             |                             | Conditions | VIN=12V, VON/OFF=0.3V   |      |         | VIN=12V, VON/OFF=0.3V   |      |         | VIN=15V, VON/OFF=0.3V   |      |         | VIN=20V, VON/OFF=0.3V   |      |         | VIN=21V, VON/OFF=0.3V   |      |         | VIN=24V, VON/OFF=0.3V   |       |       |       |    |

\*1: Reference voltage for SI-8015JF

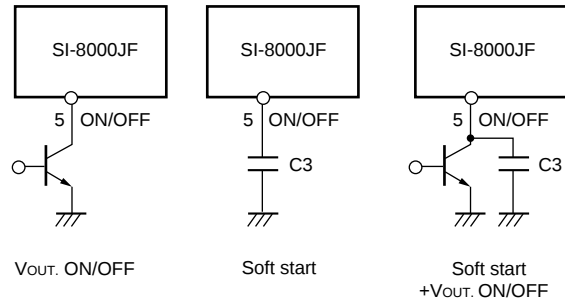
\*3: Reference voltage temperature coefficient for SI-8015JF

\*2: VREF for SI-8015JF

\*4:  $\Delta V_{REF}/\Delta T_a$  for SI-8015JF

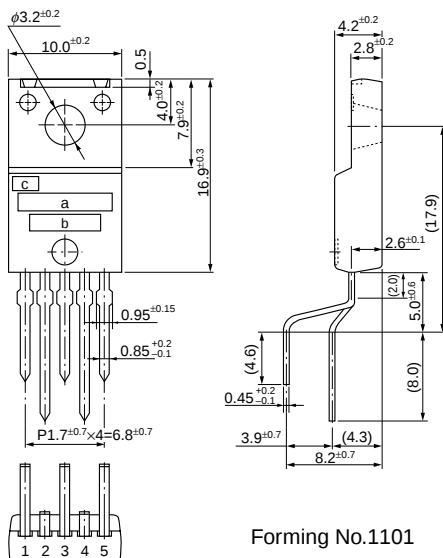
\*5: Pin 5 is the ON/OFF pin. Connecting a capacitor to this pin enables the soft start function. By using this pin, the output can also be turned on or off.

To stop output, set the ON/OFF pin voltage to VSSL or less. To switch the potential of the ON/OFF pin, drive the open collector of the transistor, etc. When SI-8000JF is started using the ON/OFF pin, take appropriate action such as limiting the current for a large-capacity C3 because a discharge current flows to the ON/OFF control transistor from C3. The ON/OFF pin is pulled up to the power supply in the IC, so no external voltage can be applied. If this pin is not used, leave it open.



## External Dimensions

(Unit : mm)



- a. Part Number
- b. Lot Number
- c. Logo Mark

### Pin Arrangement

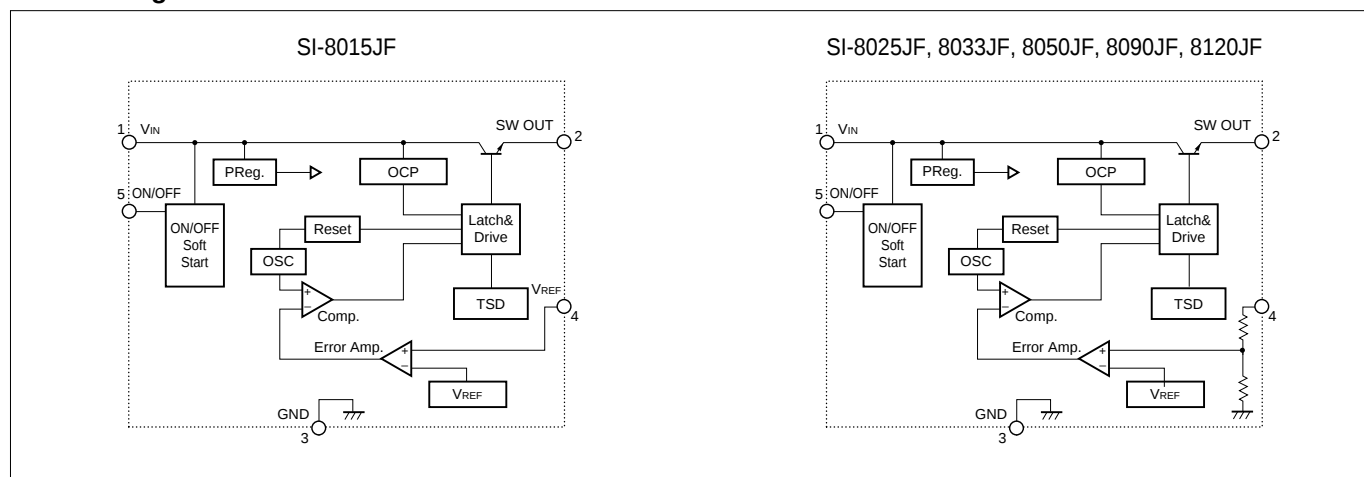
- ① VIN
- ② SWOUT
- ③ GND
- ④ Vos
- ⑤ ON/OFF

Plastic Mold Package Type

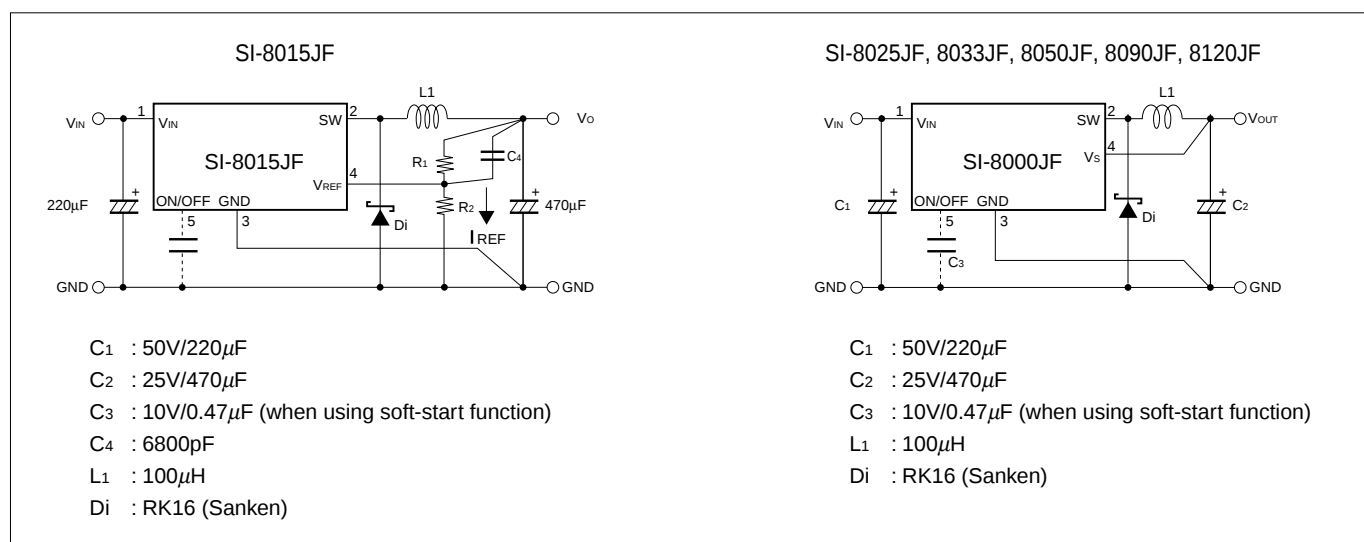
Flammability: UL94V-0

Weight: Approx. 2.3g

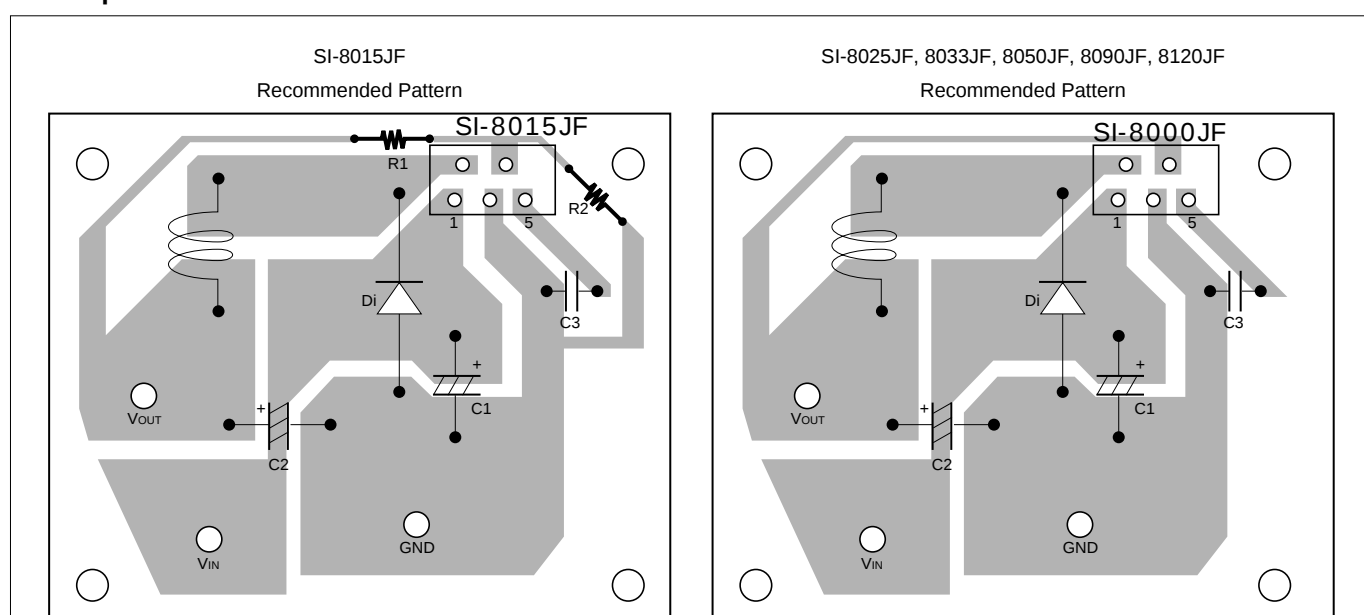
## ■Block Diagram



## ■Standard External Circuit

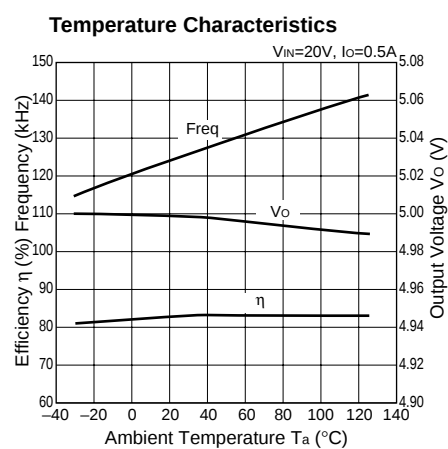
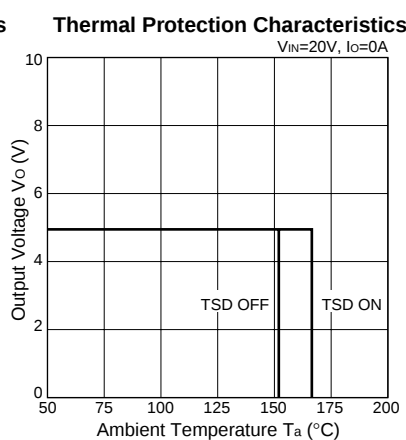
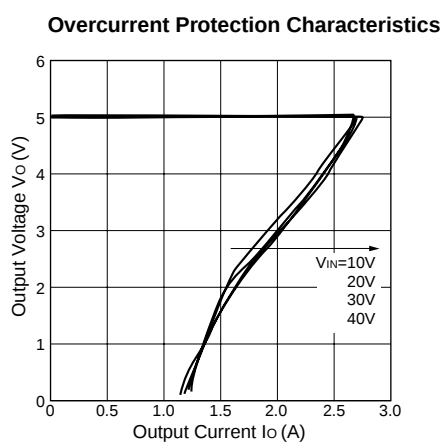
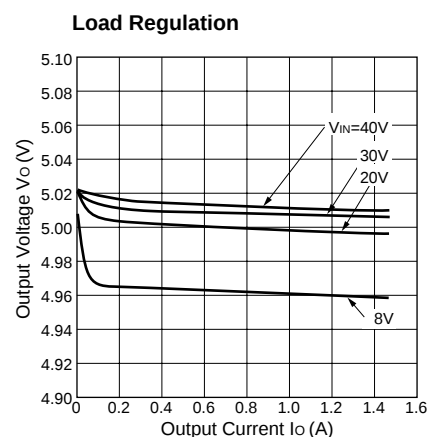
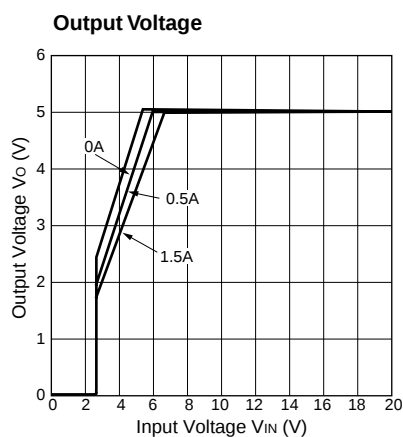
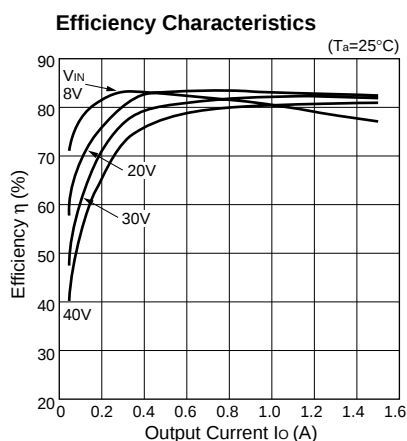


## ■Example of Pattern on PC Board

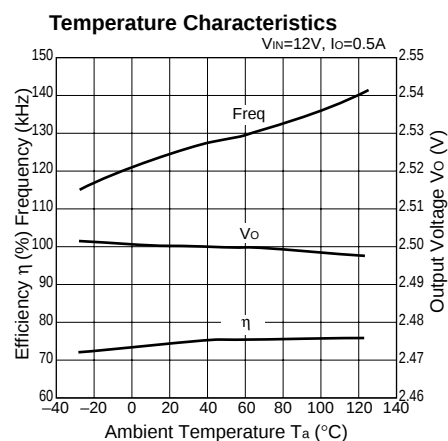
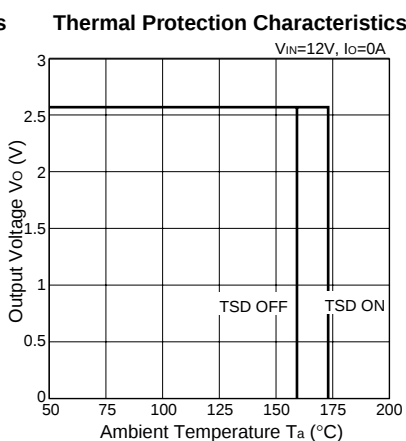
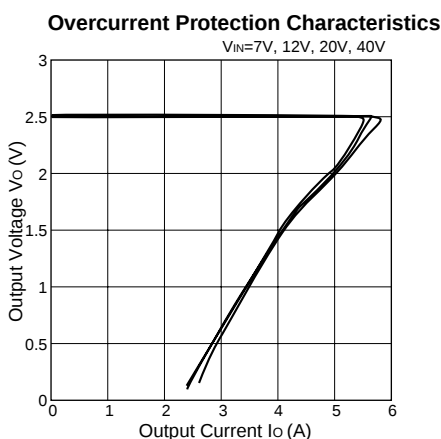
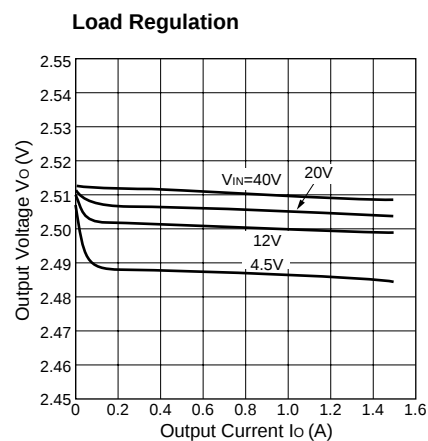
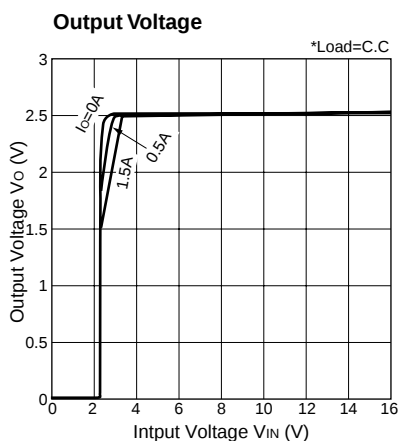
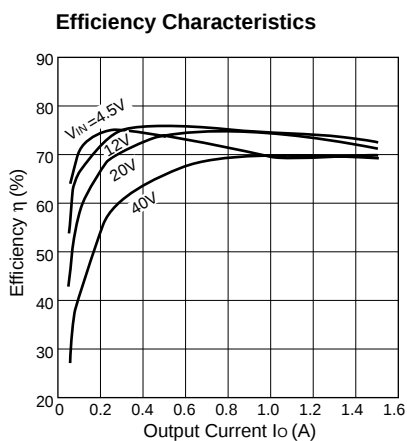


\* For the optimum operating conditions, use one-point GND wiring centering on pin 3, and place each component as closely as possible.

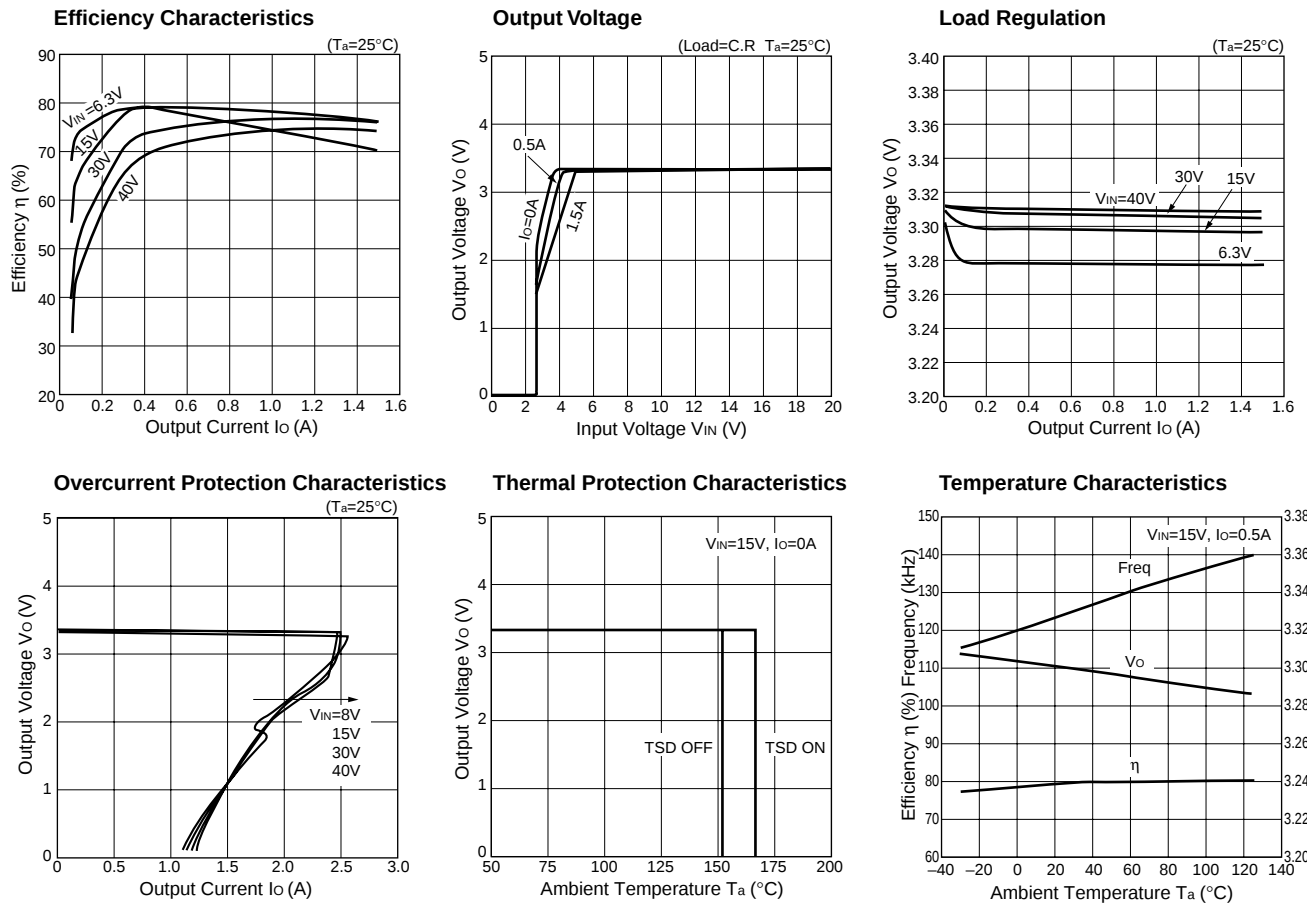
■Typical characteristics (SI-8015JF) ( $V_o=5V$ )



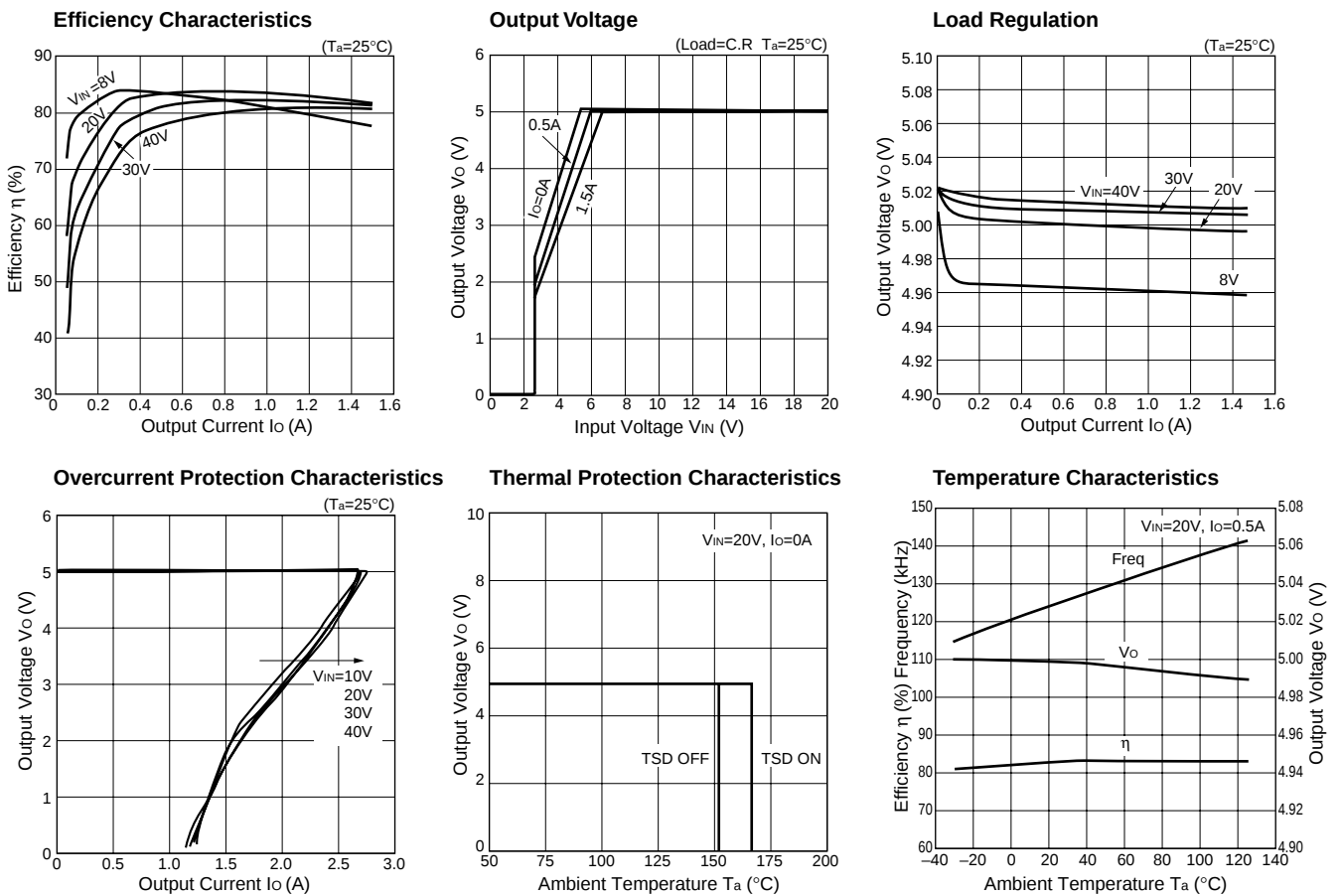
■Typical characteristics (SI-8025JF)



## ■Typical characteristics (SI-8033JF)



## ■Typical characteristics (SI-8050JF)



■Typical characteristics (SI-8090JF)

