

**S112S01 Series**  
**S116S01 Series**

## SIP Type SSR for Medium Power Control

## ■ Features

1. Compact, high radiation resin mold package
2. RMS ON-state current

**S112S01 Series:** 12Arms at  $T_c \leq 70^\circ\text{C}$   
( With heat sink )

**S116S01 Series:** 16Arms at  $T_c \leq 60^\circ\text{C}$   
( With heat sink )

- ### 3. Built-in zero-cross circuit

(S112S02 / S212S02 / S116S02 / S216S02 )

- #### 4. High repetitive peak OFF-state voltage

**S112S01 / S112S02 / S116S01 / S116S02**

 $V_{\text{DBM}} : 400\text{V}$ 

**S212S01 / S212S02 / S216S01 / S216S02**

 $V_{\text{DRM}} : 600\text{V}$ 

5. Isolation voltage between input and output  
( $V_{iso} : 4\,000V_{rms}$ )

6. Recognized by UL, file No. E94758

S112S01 / S112S02  
S116S01 / S116S02

7. Approved by CSA, No. 63705

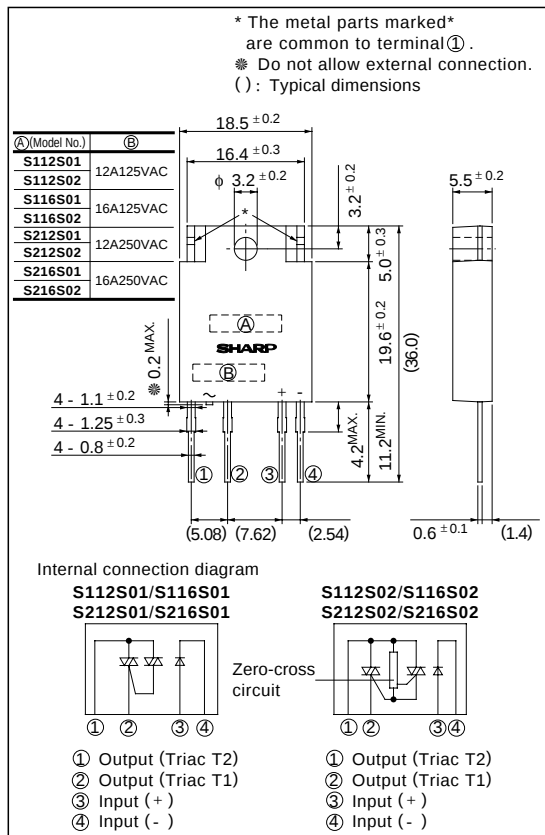
**S112S01 / S112S02**  
**S116S01 / S116S02**

## ■ Applications

1. Copiers, laser beam printers
2. Automatic vending machines
3. FA equipment

## ■ Outline Dimensions

(Unit : mm )



## ■ Model line-ups

|                                | For 100V<br>lines | For 200V<br>lines |
|--------------------------------|-------------------|-------------------|
| For phase control              | <b>S112S01</b>    | <b>S212S01</b>    |
| No built-in zero-cross circuit | <b>S116S01</b>    | <b>S216S01</b>    |
| Built-in zero-cross circuit    | <b>S112S02</b>    | <b>S212S02</b>    |
|                                | <b>S116S02</b>    | <b>S216S02</b>    |

## ■ Absolute Maximum Ratings

(Ta = 25°C)

| Parameter                           |                                            | Symbol             | Rating           | Unit             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------|--------------------------------------------|--------------------|------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input                               | Forward current                            | I <sub>F</sub>     | 50               | mA               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     | Reverse voltage                            | V <sub>R</sub>     | 6                | V                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Output                              | RMS ON-state current                       | I <sub>T</sub>     | <sup>*4</sup> 12 | A <sub>rms</sub> | <p><sup>*1</sup> AC 60Hz sine wave, T<sub>j</sub> = 25°C start</p> <p><sup>*2</sup> AC 60Hz for 1 minute, 40 to 60 % RH. Apply voltages between input and output by the dielectric withstand voltage tester with zero-cross circuit. (Input and output shall be shorted respectively) .</p> <p>(Note)</p> <p>When the isolation voltage is necessary at using external heat sink, please use the insulation sheet.</p> <p><sup>*3</sup> For 10 seconds</p> <p><sup>*4</sup> T<sub>C</sub> ≤ 70°C</p> <p><sup>*5</sup> T<sub>C</sub> ≤ 60°C</p> |
|                                     |                                            |                    | <sup>*5</sup> 16 | A <sub>rms</sub> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     | <sup>*1</sup> Peak one cycle surge current | I <sub>surge</sub> | 120              | A                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     |                                            |                    | 160              | A                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     | Repetitive peak OFF-state voltage          | V <sub>DRM</sub>   | 400              | V                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     |                                            |                    | 600              | V                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     |                                            |                    | 400              | V                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     | Non-repetitive peak OFF-state voltage      | V <sub>DSM</sub>   | 400              | V                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     |                                            |                    | 600              | V                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     | Critical rate of rise of ON-state current  | dI/dt              | 50               | A/μs             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                     | Operating frequency                        | f                  | 45 to 65         | Hz               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <sup>*2</sup> Isolation voltage     |                                            | V <sub>iso</sub>   | 4 000            | V <sub>rms</sub> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Operating temperature               |                                            | T <sub>opr</sub>   | - 25 to + 100    | °C               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Storage temperature                 |                                            | T <sub>stg</sub>   | - 30 to + 125    | °C               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <sup>*3</sup> Soldering temperature |                                            | T <sub>sol</sub>   | 260              | °C               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

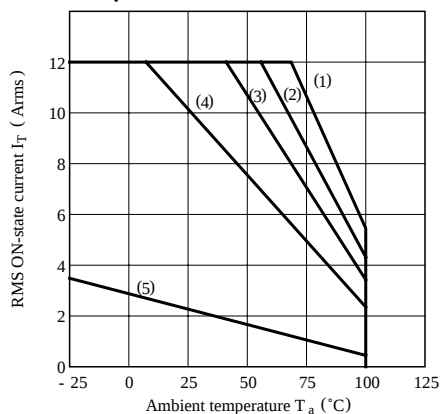
## ■ Electrical Characteristics

(Ta = 25°C)

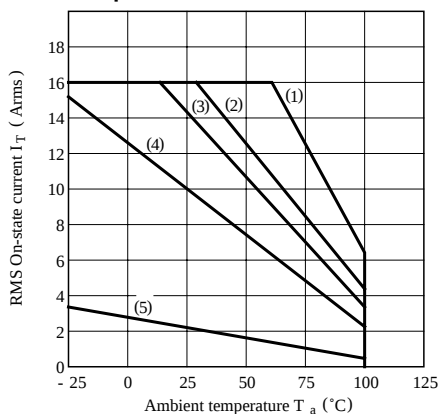
| Parameter                                           |                                                           |                                                      | Symbol                 | Conditions                                                        | MIN.                    | TYP.             | MAX.              | Unit             |
|-----------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------|------------------------|-------------------------------------------------------------------|-------------------------|------------------|-------------------|------------------|
| Input                                               | Forward voltage                                           |                                                      | V <sub>F</sub>         | I <sub>F</sub> = 20mA                                             | -                       | 1.2              | 1.4               | V                |
|                                                     | Reverse current                                           |                                                      | I <sub>R</sub>         | V <sub>R</sub> = 3V                                               | -                       | -                | 10 <sup>- 4</sup> | A                |
| Output                                              | Repetitive peak OFF-state current                         |                                                      | I <sub>DRM</sub>       | V <sub>D</sub> = V <sub>DRM</sub>                                 | -                       | -                | 10 <sup>- 4</sup> | A                |
|                                                     | ON-state voltage                                          | <b>S112S01 Series</b>                                | V <sub>T</sub>         | Resistance load<br>I <sub>F</sub> = 20mA, I <sub>T</sub> = 12Arms | -                       | -                | 1.5               | V <sub>rms</sub> |
|                                                     |                                                           | <b>S116S01 Series</b>                                |                        | Resistance load<br>I <sub>F</sub> = 20mA, I <sub>T</sub> = 16Arms | -                       | -                | 1.5               | V <sub>rms</sub> |
|                                                     | Holding current                                           |                                                      | I <sub>H</sub>         | -                                                                 | -                       | -                | 50                | mA               |
|                                                     | Critical rate of rise of OFF-state voltage                |                                                      | dV/dt                  | V <sub>D</sub> = 2/3 • V <sub>DRM</sub>                           | 30                      | -                | -                 | V/μ s            |
|                                                     | Critical rate of rise of commutating<br>OFF-state voltage |                                                      | (dV/dt) <sub>C</sub>   | T <sub>j</sub> = 125°C, V <sub>D</sub> = 400V, *6                 | 5                       | -                | -                 | V/μ s            |
|                                                     | Zero-cross voltage                                        | <b>S112S02 / S212S02</b><br><b>S116S02 / S216S02</b> | V <sub>OX</sub>        | I <sub>F</sub> = 8mA                                              | -                       | -                | 35                | V                |
| Transfer<br>charac-<br>teristics                    | Minimum trigger<br>current                                | <b>S112S01 / S212S01</b><br><b>S116S01 / S216S01</b> | I <sub>FT</sub>        | V <sub>D</sub> = 12V, R <sub>L</sub> = 30 Ω                       | -                       | -                | 8                 | mA               |
|                                                     |                                                           | <b>S112S02 / S212S02</b><br><b>S116S02 / S216S02</b> |                        | V <sub>D</sub> = 6V, R <sub>L</sub> = 30 Ω                        | -                       | -                | 8                 | mA               |
|                                                     |                                                           | Isolation resistance                                 |                        | R <sub>ISO</sub>                                                  | DC500V, RH = 40 to 60 % | 10 <sup>10</sup> | -                 | -                |
|                                                     | Turn-on time                                              | <b>S112S01 / S212S01</b><br><b>S116S01 / S216S01</b> | t <sub>on</sub>        | AC 50Hz                                                           | -                       | -                | 1                 | ms               |
|                                                     |                                                           | <b>S112S02 / S212S02</b><br><b>S116S02 / S216S02</b> |                        |                                                                   | -                       | -                | 10                | ms               |
| Turn-off time                                       |                                                           | t <sub>off</sub>                                     | AC 50Hz                | -                                                                 | -                       | 10               | ms                |                  |
| Thermal resistance<br>(Between junction and case)   |                                                           | <b>S112S01 series</b><br><b>S116S01 series</b>       | R <sub>th(j - c)</sub> | -                                                                 | -                       | 3.8              | -                 | °C/W             |
|                                                     |                                                           |                                                      |                        | -                                                                 | -                       | 3.3              | -                 | °C/W             |
| Thermal resistance (Between junction and ambience ) |                                                           |                                                      | R <sub>th(j - a)</sub> | -                                                                 | -                       | 40               | -                 | °C/W             |

\*6 **S112S01 Series**: dI<sub>T</sub>/dt = - 6A/ms**S116S01 Series**: dI<sub>T</sub>/dt = - 8A/ms

**Fig. 1 RMS ON-state Current vs. Ambient Temperature (S112S01Series)**



**Fig. 2 RMS ON-state Current vs. Ambient Temperature (S116S01Series)**

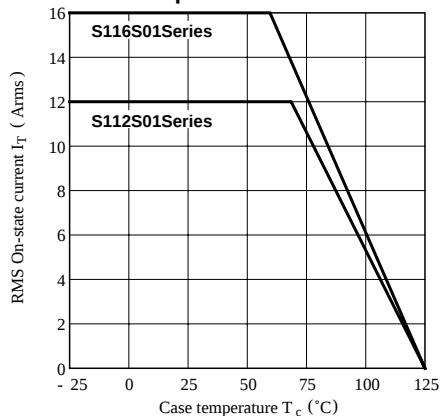


- (1) With infinite heat sink
- (2) With heat sink (280 x 280 x 2 mm Al plate)
- (3) With heat sink (200 x 200 x 2 mm Al plate)
- (4) With heat sink (100 x 100 x 2 mm Al plate)
- (5) Without heat sink

- (1) With infinite heat sink
- (2) With heat sink (280 x 280 x 2 mm Al plate)
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- (4) With heat sink (100 x 100 x 2 mm Al plate)
- (5) Without heat sink

(Note) With the Al heat sink set up vertically, tighten the device at the center of the Al heat sink with a torque of  $0.4\text{N} \cdot \text{m}$  and apply thermal conductive silicone grease on the heat sink mounting plate. Forcible cooling shall not be carried out.

**Fig. 3 RMS ON-state Current vs. Case Temperature**



**Fig. 4 Forward Current vs. Ambient Temperature**

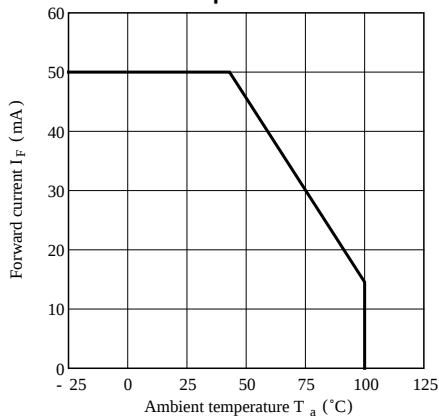


Fig. 5 Forward Current vs. Forward Voltage

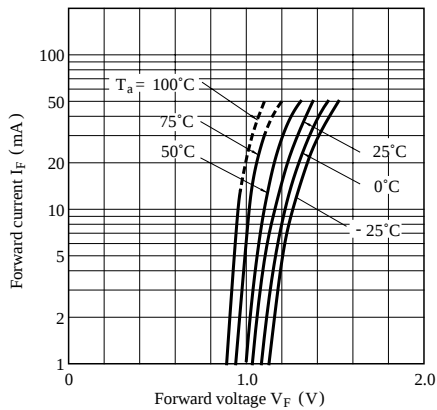


Fig. 7 Maximum ON-state Power Dissipation vs. RMS ON-state Current (S112S01Series)

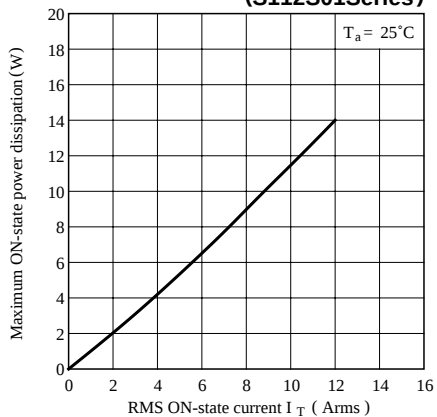


Fig. 9 Minimum Trigger Current vs. Ambient Temperature

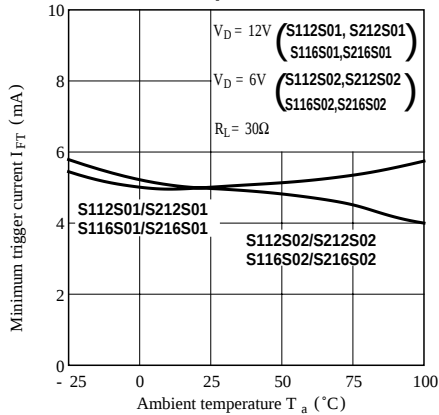


Fig. 6 Surge Current vs. Power-on Cycle

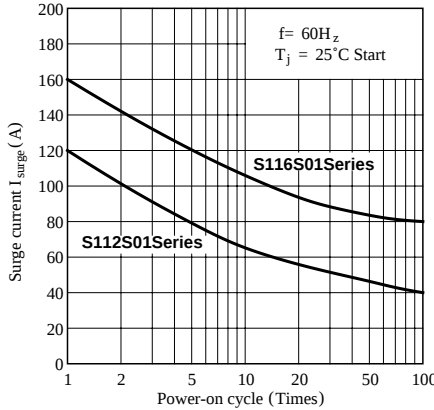


Fig. 8 Maximum ON-state Power Dissipation vs. RMS ON-state Current (S116S01Series)

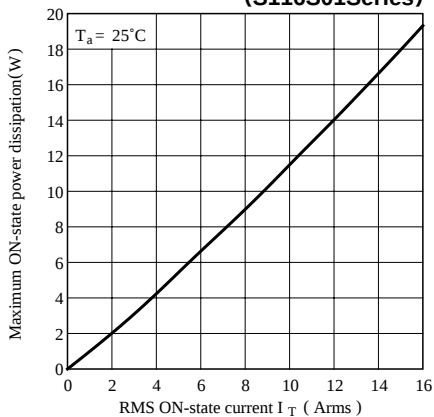


Fig.10 Repetitive Peak OFF-state Current vs. Ambient Temperature (S112S01/ S112S02/ S116S01/ S116S02)

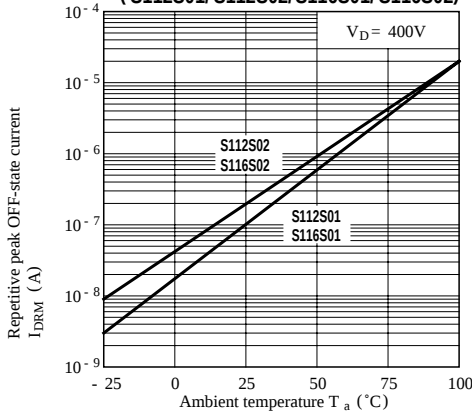
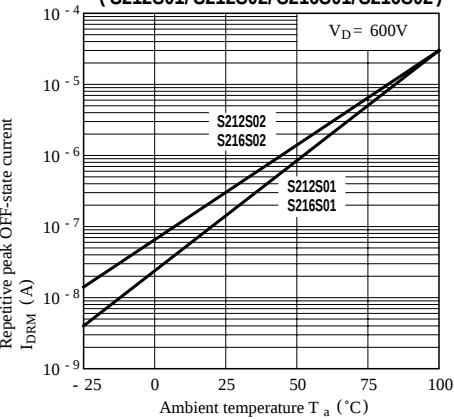


Fig.11 Repetitive Peak OFF-state Current vs. Ambient Temperature  
( S212S01/ S212S02/ S216S01/ S216S02 )



● Please refer to the chapter “Precautions for Use.”