

### Description

The BSS87 is the new generation trench N-channel MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) yet maintain superior switching performance, making it ideal for high efficiency power management applications

### Features

- Low Gate Charge
- Low On Resistance
- Fast switching Characteristic

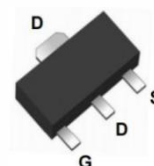
### Applications

- DC-DC converters
- Load Switch
- Power Management

|              |                           |
|--------------|---------------------------|
| $V_{DSS}$    | 250V                      |
| $I_D$        | 2.1A                      |
| $R_{DS(ON)}$ | $1.6\Omega @ V_{GS}=10V$  |
| $R_{DS(ON)}$ | $1.8\Omega @ V_{GS}=4.5V$ |

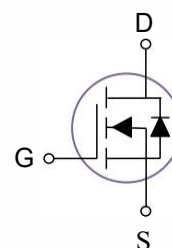
### Outline

SOT-89 Pin Configuration



### Equivalent

- (1)Gate  
(2)Source  
(3)Drain



### Packaging specifications

| Part No. | Package | Marking | Basic ordering unit.(pcs) |
|----------|---------|---------|---------------------------|
| BSS87    | SOT-89  |         | 1000                      |

### Absolute Maximum Ratings

| Parameter                                        |                   | Symbol          | Limit      | Units          |
|--------------------------------------------------|-------------------|-----------------|------------|----------------|
| Drain-Source Voltage                             |                   | $V_{DS}$        | 250        | V              |
| Gate-Source Voltage                              |                   | $V_{GS}$        | $\pm 20$   | V              |
| Drain Current-Continuous <sup>(Note2)</sup>      | $T_C=25^\circ C$  | $I_D$           | 2.1        | A              |
|                                                  | $T_C=70^\circ C$  |                 | 1.68       | A              |
| -Pulsed <sup>(Note 1· Note 2)</sup>              |                   | $I_{DM}$        | 4.4        | A              |
| Maximum Power Dissipation                        | $T_C=25^\circ C$  | $P_D$           | 23         | W              |
|                                                  | $T_C=100^\circ C$ |                 | 9.2        | W              |
| Operating Junction and Storage Temperature Range |                   | $T_J, T_{STG}$  | -55 to 150 | $^\circ C$     |
| Thermal Resistance Junction-Ambient              |                   | $R_{\theta JA}$ | 55         | $^\circ C / W$ |
| Thermal Resistance Junction-Case                 |                   | $R_{\theta JC}$ | 5.5        | $^\circ C / W$ |

## Electrical Characteristics (T<sub>c</sub>=25 °C, unless otherwise noted)

| Parameter                                              | Symbol              | Test Conditions                                                                                   | Min | Typ | Max  | Units |
|--------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------|-----|-----|------|-------|
| OFF CHARACTERISTICS                                    |                     |                                                                                                   |     |     |      |       |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA                                                       | 250 |     |      | V     |
| Zero Gate Voltage Drain Current                        | I <sub>DSS</sub>    | V <sub>DS</sub> =200V , V <sub>GS</sub> =0V                                                       |     |     | 1    | uA    |
| Gate-Body Leakage Current                              | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V                                                      |     |     | ±100 | nA    |
| ON CHARACTERISTICS                                     |                     |                                                                                                   |     |     |      |       |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250uA                                         | 1   | 1.5 | 2.5  | V     |
| Drain-Source On-State Resistance                       | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V , I <sub>D</sub> =0.5A                                                       |     | 1.6 | 1.9  | Ω     |
|                                                        |                     | V <sub>GS</sub> =4.5V , I <sub>D</sub> =0.3A                                                      |     | 1.8 | 2.1  | Ω     |
| DYNAMIC CHARACTERISTICS <small>Note4</small>           |                     |                                                                                                   |     |     |      |       |
| Input Capacitance                                      | C <sub>ISS</sub>    | V <sub>DS</sub> =120V ,<br>V <sub>GS</sub> =0 V ,<br>f =1.0MHz                                    |     | 450 |      | pF    |
| Output Capacitance                                     | C <sub>OSS</sub>    |                                                                                                   |     | 22  |      | pF    |
| Reverse Transfer Capacitance                           | C <sub>RSS</sub>    |                                                                                                   |     | 14  |      | pF    |
| Total Gate Charge                                      | Q <sub>g</sub>      | V <sub>DS</sub> =120V ,<br>I <sub>D</sub> =0.5A , V <sub>GS</sub> =10V                            |     | 6.8 |      | nC    |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | V <sub>DS</sub> =120V , I <sub>D</sub> =0.5A ,<br>V <sub>GS</sub> =10V                            |     | 1.2 |      | nC    |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     |                                                                                                   |     | 2.4 |      | nC    |
| SWITCHING CHARACTERISTICS <small>Note4</small>         |                     |                                                                                                   |     |     |      |       |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | V <sub>DD</sub> =120V ,<br>I <sub>D</sub> =0.5A ,<br>V <sub>GS</sub> =10V ,<br>R <sub>G</sub> =6Ω |     | 11  |      | ns    |
| Rise Time                                              | t <sub>r</sub>      |                                                                                                   |     | 26  |      | ns    |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> |                                                                                                   |     | 48  |      | ns    |
| Fall Time                                              | t <sub>f</sub>      |                                                                                                   |     | 35  |      | ns    |
| DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS |                     |                                                                                                   |     |     |      |       |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | V <sub>GS</sub> =0V , I <sub>S</sub> =0.5A                                                        |     |     | 1.2  | V     |

### Notes:

- 1、Pulse Test Width < 300us,Duty Cycle< 2%
- 2、Drain current limited by maximum junction temperature.
- 3、Guaranteed by design,not subject to production testing.

## Typical Performance Characteristics

Fig.1 Continuous Drain Current vs. TC

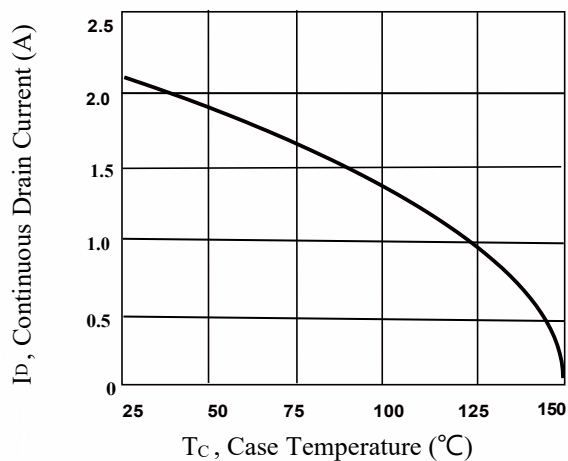


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

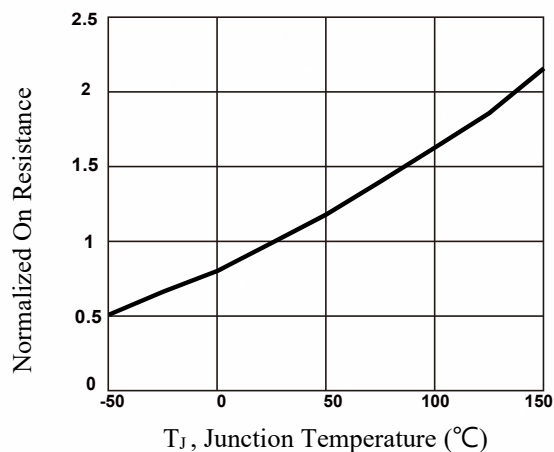


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

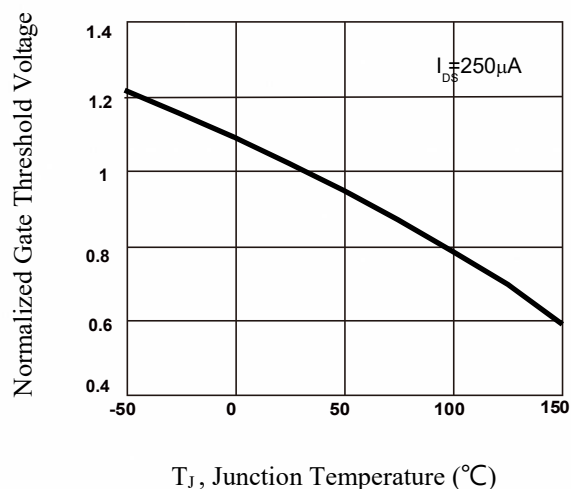


Fig.4 Gate Charge Waveform

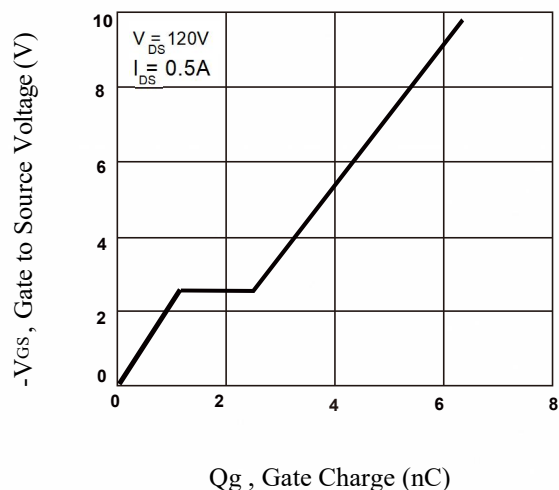


Fig.5 Typical Output Characteristics

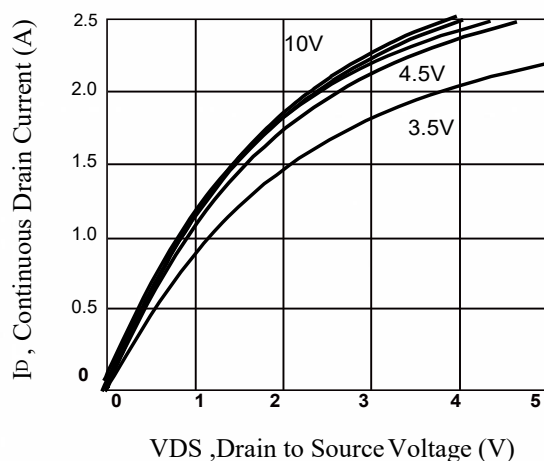
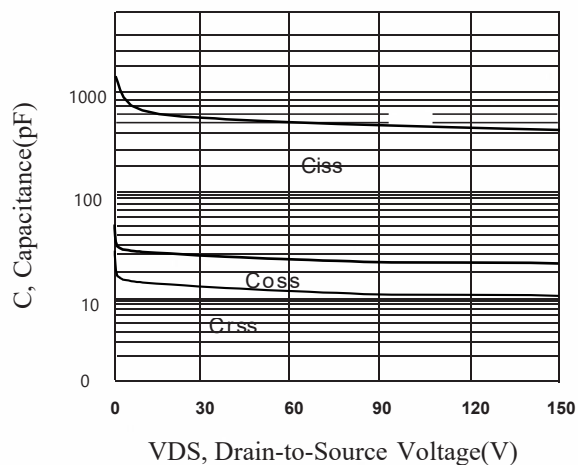
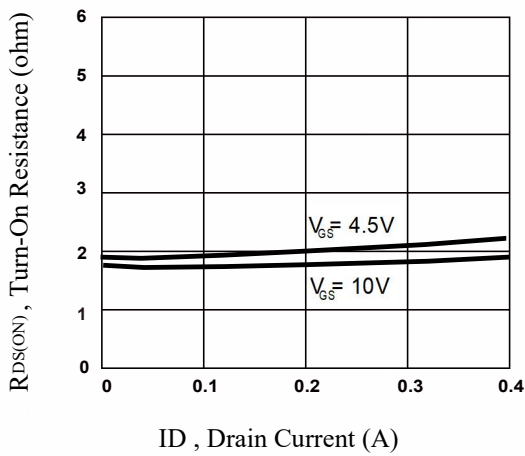


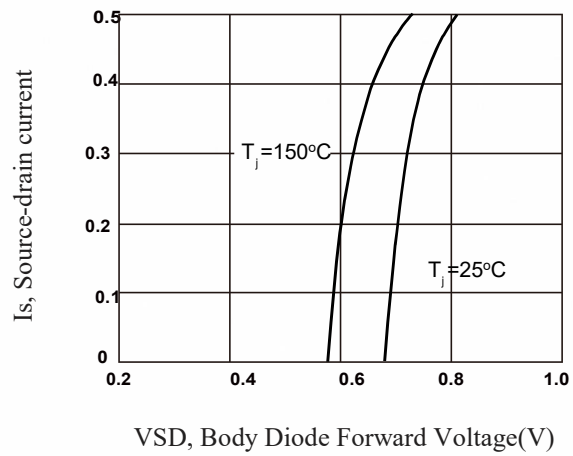
Fig.6 Capacitance



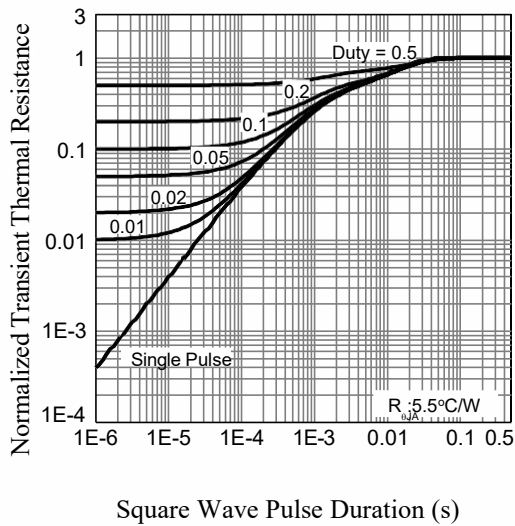
**Fig.7 Turn-On Resistance vs. ID**



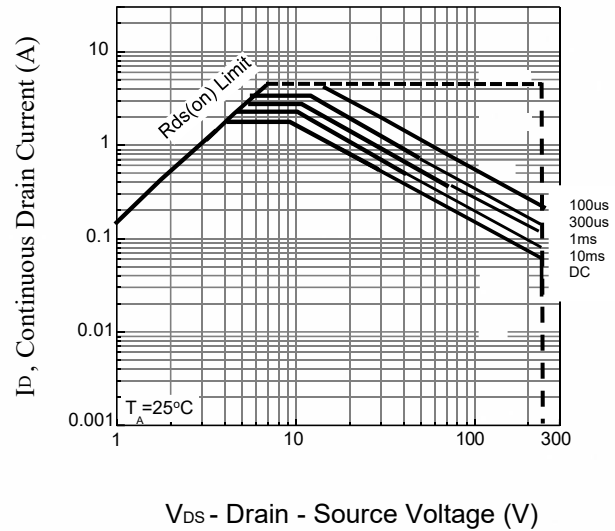
**Fig.8 Typical Source-Drain Diode Forward Voltage**



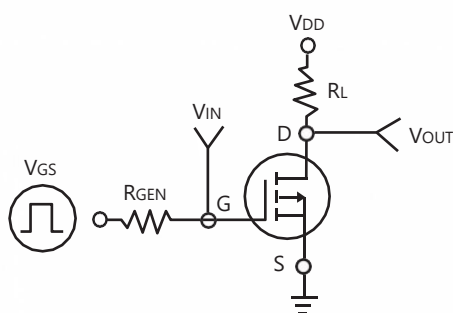
**Fig.9 Normalized Transient Impedance**



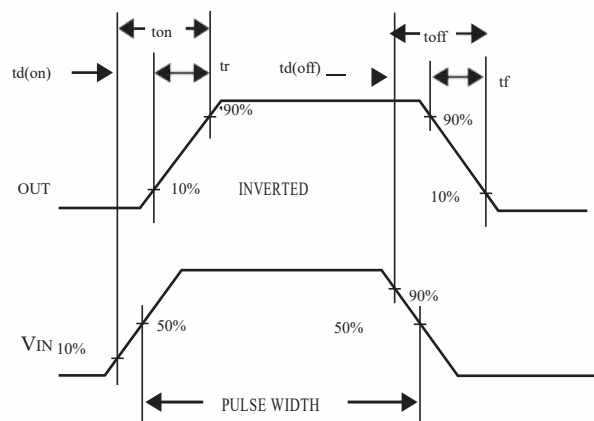
**Fig.10 Maximum Safe Operation Area**



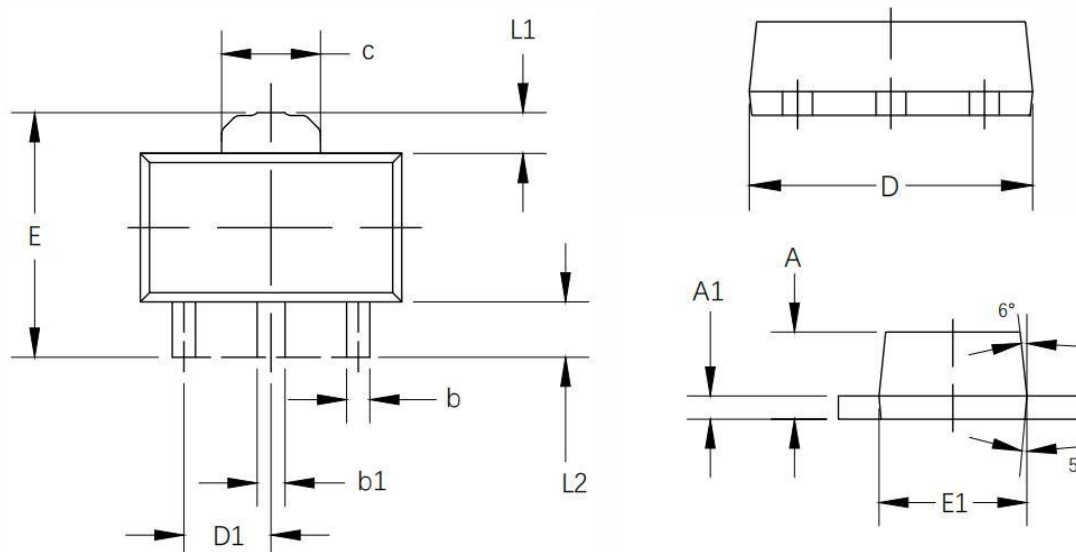
**Figure11a. Switching Test Circuit**



**Figure 11b. Switching Waveforms**



## SOT-89 Package Information



COMMON  
DIMENSION(MM)

| SYMBOL | MIN   | TYP   | MAX   |
|--------|-------|-------|-------|
| A      | 1.450 | 1.500 | 1.550 |
| A1     | 0.373 | 0.381 | 0.389 |
| b      | 0.415 | 0.440 | 0.465 |
| b1     | 0.495 | 0.520 | 0.545 |
| c      | 1.675 | 1.700 | 1.725 |
| D      | 4.445 | 4.500 | 4.550 |
| D1     | 1.470 | 1.500 | 1.550 |
| E      | 4.100 | 4.200 | 4.300 |
| E1     | 2.450 | 2.500 | 2.550 |
| L1     | 0.630 | 0.680 | 0.730 |
| L2     | 0.890 | 0.940 | 0.990 |

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