



## Description

The BSZ0994NSATMA1 use advanced SGT MOSFET technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness.

## General Features

$V_{DS} = 30V$   $I_D = 40A$

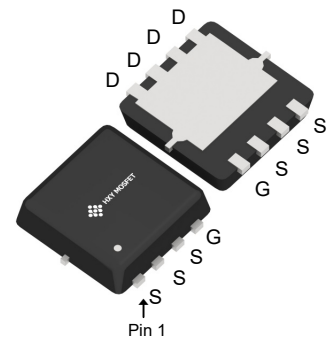
$R_{DS(ON)} < 6.3m\Omega @ V_{GS}=10V$

## Applications

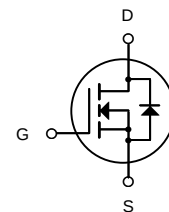
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN3X3-8L



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID     | Pack      | Brand      | Qty(PCS) |
|----------------|-----------|------------|----------|
| BSZ0994NSATMA1 | DFN3X3-8L | HXY MOSFET | 5000     |

## Absolute Maximum Ratings ( $T_C=25^\circ C$ unless otherwise specified)

| Symbol                  | Parameter                                        | Rating     | Units        |
|-------------------------|--------------------------------------------------|------------|--------------|
| $V_{DS}$                | Drain-Source Voltage                             | 30         | V            |
| $V_{GS}$                | Gate-Source Voltage                              | $\pm 20$   | V            |
| $I_D @ T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$       | 40         | A            |
| $I_D @ T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$       | 28         | A            |
| $I_D @ T_A=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$       | 27         | A            |
| $I_D @ T_A=70^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$       | 24         | A            |
| $I_{DM}$                | Pulsed Drain Current <sup>2</sup>                | 135        | A            |
| EAS                     | Single Pulse Avalanche Energy <sup>3</sup>       | 29.8       | mJ           |
| $I_{AS}$                | Avalanche Current                                | 27         | A            |
| $P_D @ T_C=25^\circ C$  | Total Power Dissipation <sup>4</sup>             | 30         | W            |
| $T_{STG}$               | Storage Temperature Range                        | -55 to 150 | $^\circ C$   |
| $T_J$                   | Operating Junction Temperature Range             | -55 to 150 | $^\circ C$   |
| $R_{\theta JA}$         | Thermal Resistance Junction-ambient <sup>1</sup> | 50         | $^\circ C/W$ |
| $R_{\theta JC}$         | Thermal Resistance Junction-Case <sup>1</sup>    | 4.6        | $^\circ C/W$ |



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

| Symbol              | Parameter                                      | Conditions                                                                                | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------------------------|-------------------------------------------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA                                               | 30   | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V , I <sub>D</sub> =20A                                                | ---  | 5    | 6.3  | mΩ   |
|                     |                                                | V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A                                               | ---  | 6.9  | 9    |      |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                                  | 1.2  | ---  | 2.5  | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =24V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C                         | ---  | ---  | 1    | uA   |
|                     |                                                | V <sub>DS</sub> =24V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C                         | ---  | ---  | 5    |      |
| I <sub>GSS</sub>    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V                                               | ---  | ---  | ±100 | nA   |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =5V , I <sub>D</sub> =20A                                                 | ---  | 67   | ---  | S    |
| R <sub>g</sub>      | Gate Resistance                                | V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz                                        | ---  | 1.7  | ---  | Ω    |
| Q <sub>g</sub>      | Total Gate Charge (4.5V)                       | V <sub>DS</sub> =15V , V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A                        | ---  | 8    | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                             |                                                                                           | ---  | 2.4  | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                              |                                                                                           | ---  | 3.2  | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                             | V <sub>DD</sub> =15V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3Ω<br>I <sub>D</sub> =15A | ---  | 7.1  | ---  | ns   |
| T <sub>r</sub>      | Rise Time                                      |                                                                                           | ---  | 40   | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time                            |                                                                                           | ---  | 15   | ---  |      |
| T <sub>f</sub>      | Fall Time                                      |                                                                                           | ---  | 6    | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz                                       | ---  | 814  | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                             |                                                                                           | ---  | 498  | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   |                                                                                           | ---  | 41   | ---  |      |
| I <sub>S</sub>      | Continuous Source Current <sup>1,6</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                                        | ---  | ---  | 40   | A    |
| V <sub>SD</sub>     | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C                           | ---  | ---  | 1    | V    |
| t <sub>rr</sub>     | Reverse Recovery Time                          | I <sub>F</sub> =20A , di/dt=100A/μs ,<br>T <sub>J</sub> =25°C                             | ---  | 15   | ---  | nS   |
| Q <sub>rr</sub>     | Reverse Recovery Charge                        |                                                                                           | ---  | 25   | ---  | nC   |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=24A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



## Typical Characteristics

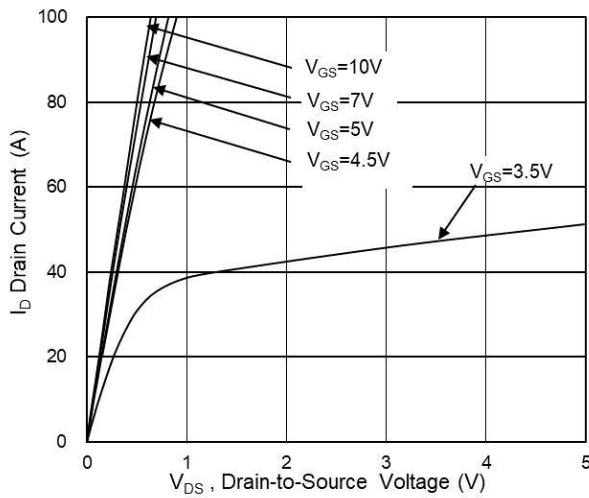


Fig.1 Typical Output Characteristics

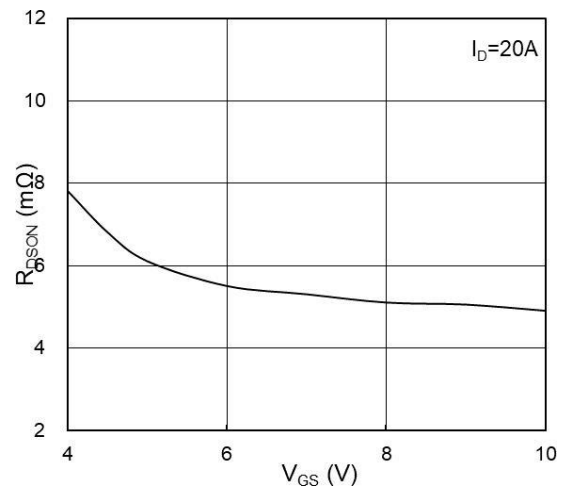


Fig.2 On-Resistance vs G-S Voltage

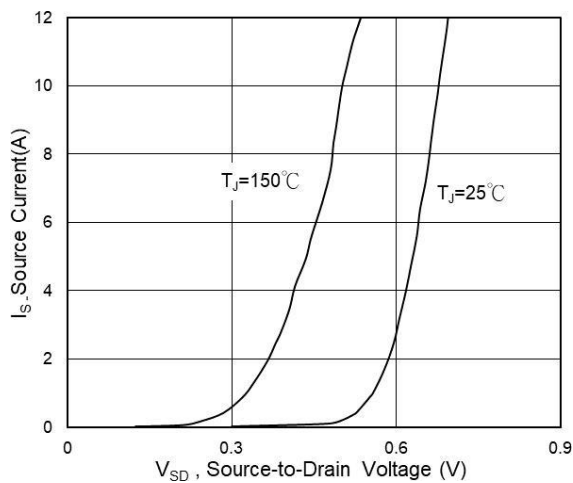


Fig.3 Source Drain Forward Characteristics

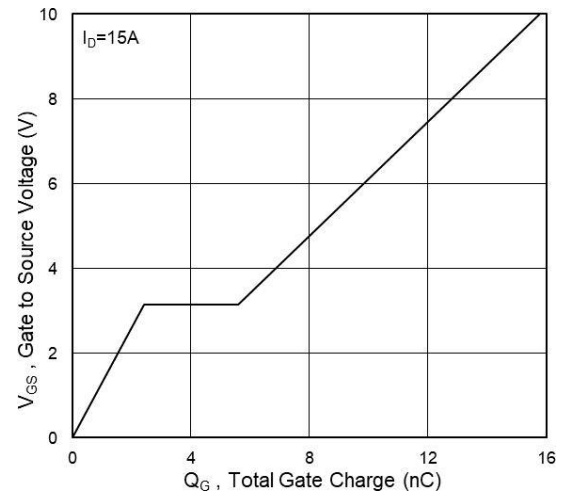


Fig.4 Gate-Charge Characteristics

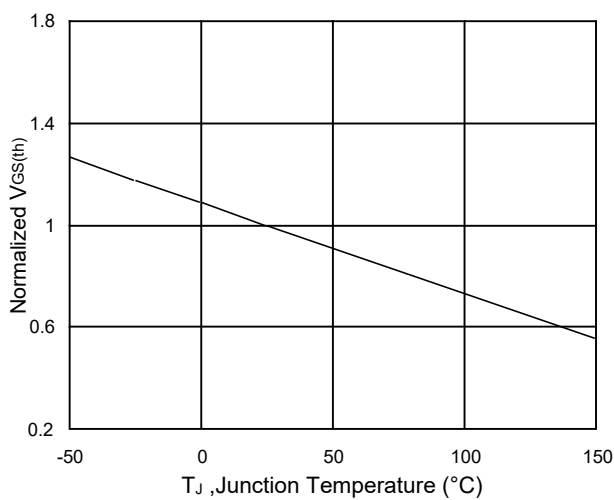


Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$

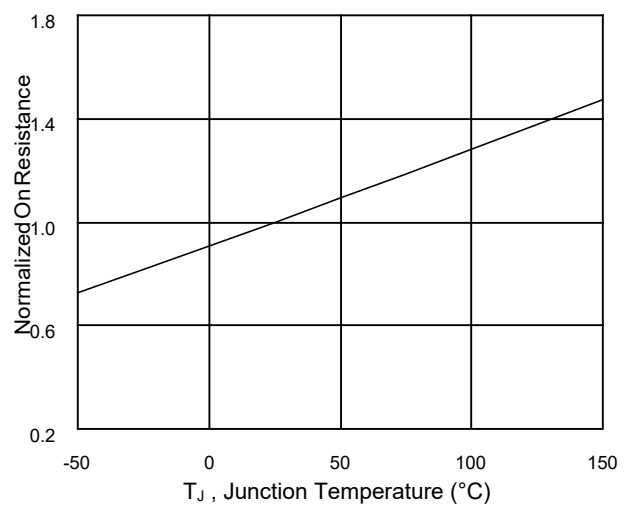


Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$

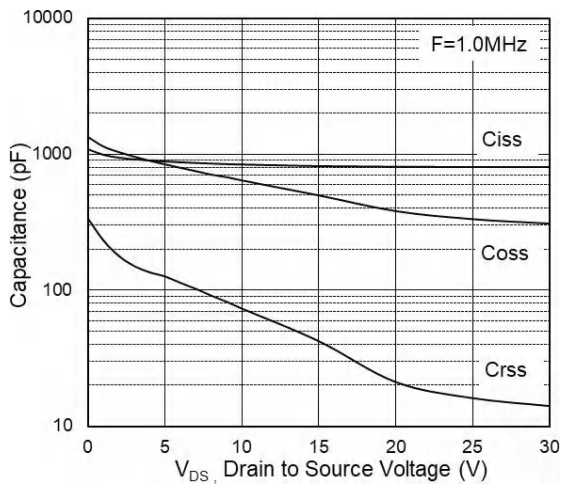


Fig.7 Capacitance

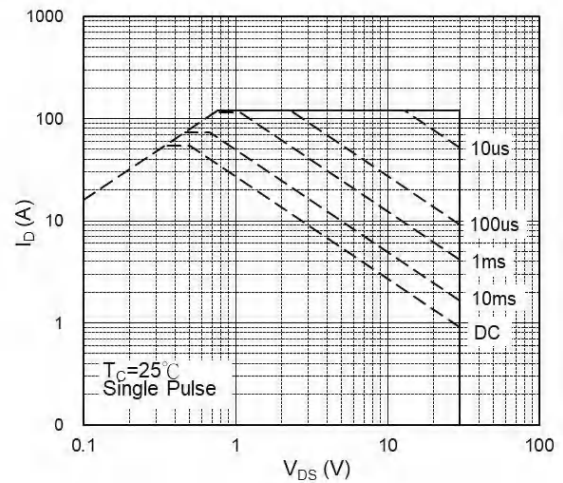


Fig.8 Safe Operating Area

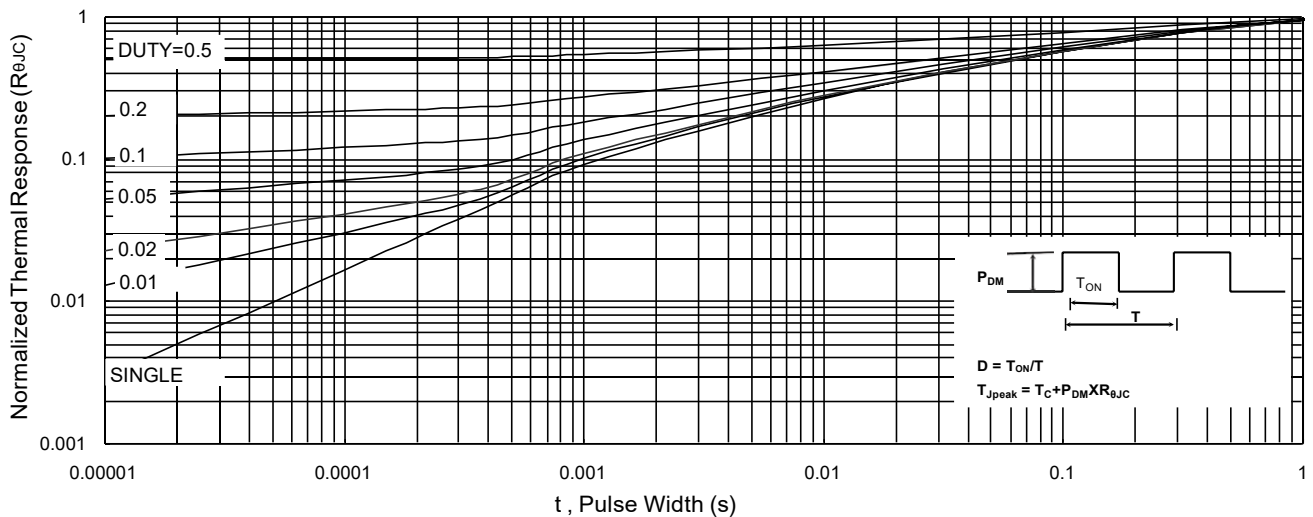


Fig.9 Normalized Maximum Transient Thermal Impedance

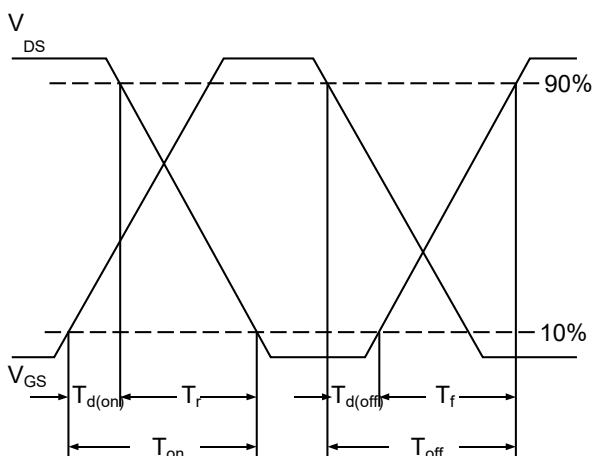


Fig.10 Switching Time Waveform

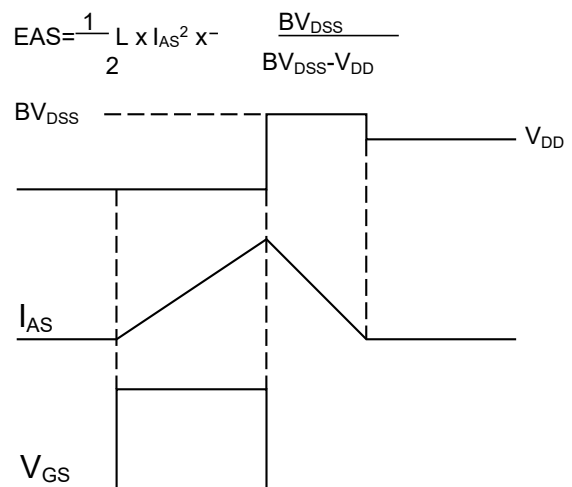


Fig.11 Unclamped Inductive Switching Waveform



## DFN3X3-8L Package Information



| Symbol | Dimensions In Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom. | Max. |
| A      | 0.70                      | 0.75 | 0.80 |
| b      | 0.25                      | 0.30 | 0.35 |
| c      | 0.10                      | 0.15 | 0.25 |
| D      | 3.25                      | 3.35 | 3.45 |
| D1     | 3.00                      | 3.10 | 3.20 |
| D2     | 1.48                      | 1.58 | 1.68 |
| D3     | -                         | 0.13 | -    |
| E      | 3.20                      | 3.30 | 3.40 |
| E1     | 3.00                      | 3.15 | 3.20 |
| E2     | 2.39                      | 2.49 | 2.59 |
| e      | 0.65BSC                   |      |      |
| H      | 0.30                      | 0.39 | 0.50 |
| L      | 0.30                      | 0.40 | 0.50 |
| L1     | -                         | 0.13 | -    |
| M      | *                         | *    | 0.15 |
| θ      |                           | 10°  | 12°  |



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