



General Description

The BSC050N03MSGATMA1 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

$V_{DS} = 30V$ $I_D = 60A$

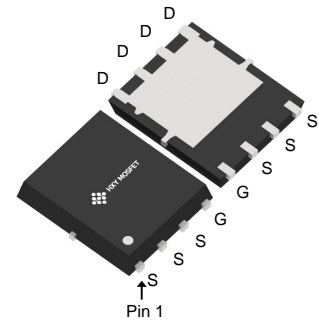
$R_{DS(ON)} < 5.8m\Omega @ V_{GS}=10V$

Applications

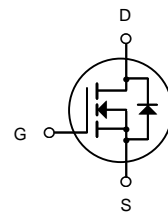
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN5X6-8L



N-Channel MOSFET

Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|-------------------|-----------|------------|----------|
| BSC050N03MSGATMA1 | DFN5X6-8L | HXY MOSFET | 5000 |

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|-------------------------|----------------------------------------------------------|------------|--------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D @ T_c=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 60 | A |
| $I_D @ T_c=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 38 | A |
| I_{DM} | Pulsed Drain Current ² | 135 | A |
| EAS | Single Pulse Avalanche Energy ³ | 29.8 | mJ |
| $P_D @ T_c=25^\circ C$ | Total Power Dissipation ⁴ | 30 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |
| $R_{\theta JC}$ | Thermal Resistance from Junction-to-Ambient ³ | 4.6 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | 50 | $^\circ C/W$ |



Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------|------------------------------------------------|------------------------------------------------------|------|------|-----------|------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=20A$ | --- | 4.4 | 5.8 | m Ω |
| | | $V_{GS}=4.5V, I_D=15A$ | --- | 6.9 | 9 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | --- | 2.5 | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=24V, V_{GS}=0V, T_J=25^{\circ}\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_J=55^{\circ}\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| g_{fs} | Forward Transconductance | $V_{DS}=5V, I_D=20A$ | --- | 67 | --- | S |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 1.7 | --- | Ω |
| Q_g | Total Gate Charge (4.5V) | $V_{DS}=15V, V_{GS}=4.5V, I_D=15A$ | --- | 8 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 2.4 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 3.2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=15A$ | --- | 7.1 | --- | ns |
| T_r | Rise Time | | --- | 40 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 15 | --- | |
| T_f | Fall Time | | --- | 6 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 814 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 498 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 41 | --- | |
| I_S | Continuous Source Current ^{1,6} | $V_G=V_D=0V$, Force Current | --- | --- | 60 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$ | --- | --- | 1 | V |
| t_{rr} | Reverse Recovery Time | $I_F=20A, di/dt=100A/\mu s$, | --- | 15 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | $T_J=25^{\circ}\text{C}$ | --- | 25 | --- | nC |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=24A$
- 4.The power dissipation is limited by 150 $^{\circ}\text{C}$ junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



Typical Characteristics



Fig.1 Typical Output Characteristics

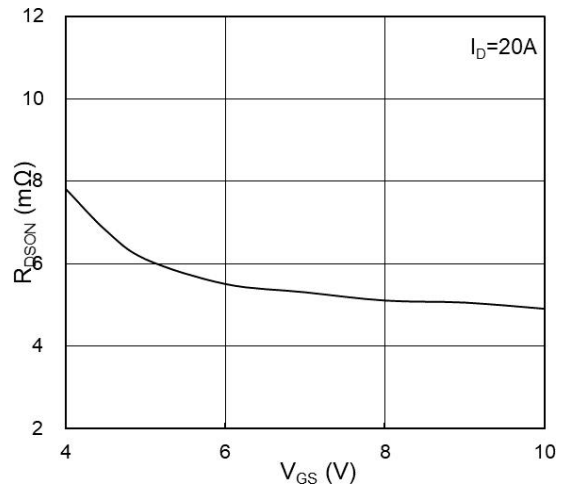


Fig.2 On-Resistance vs G-S Voltage

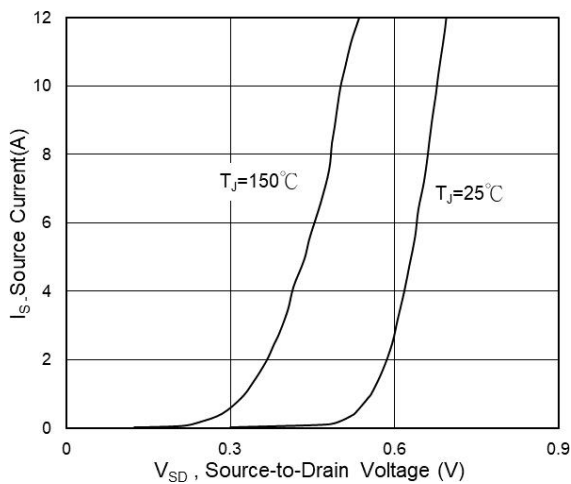


Fig.3 Source Drain Forward Characteristics

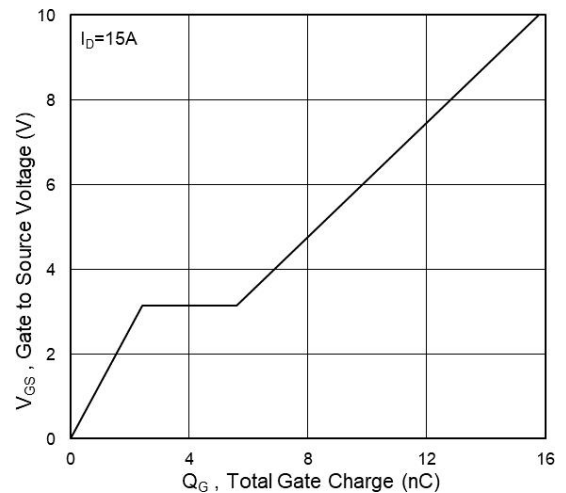


Fig.4 Gate-Charge Characteristics

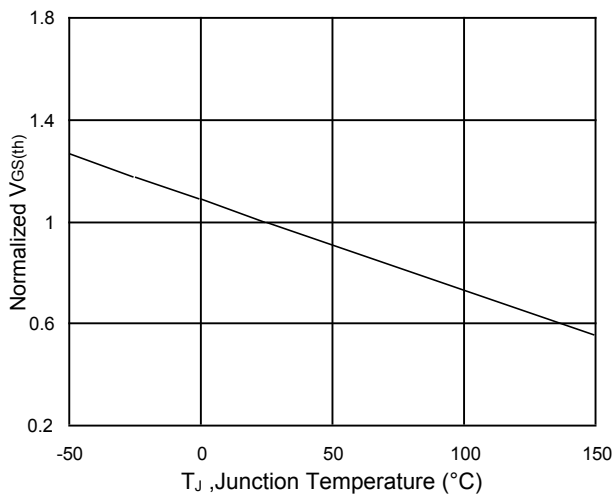


Fig.5 Normalized $V_{GS(th)}$ vs T_J

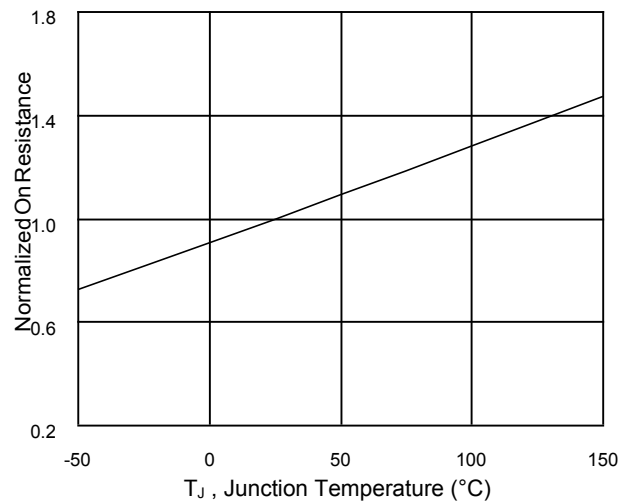


Fig.6 Normalized $R_{DS(on)}$ vs T_J

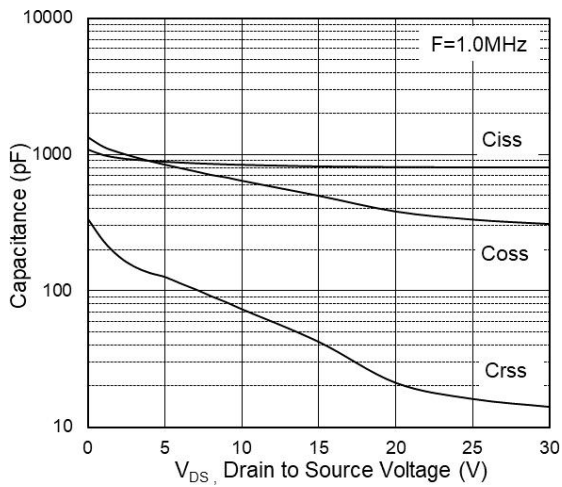


Fig.7 Capacitance

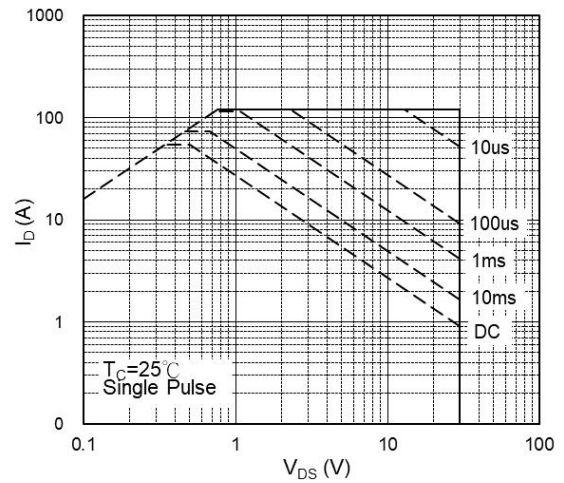


Fig.8 Safe Operating Area

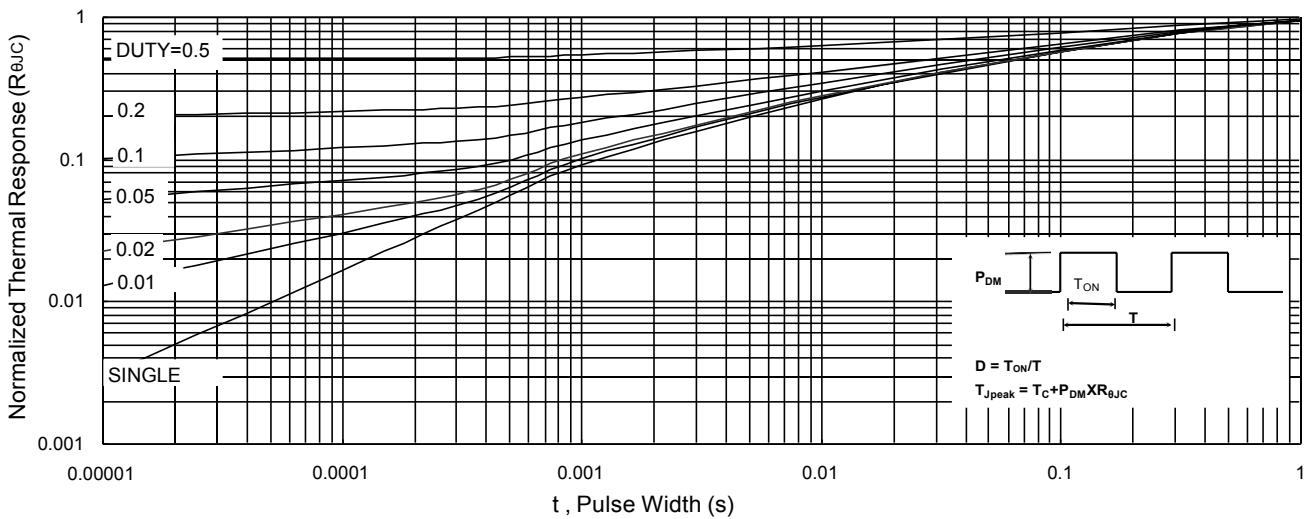


Fig.9 Normalized Maximum Transient Thermal Impedance



Fig.10 Switching Time Waveform

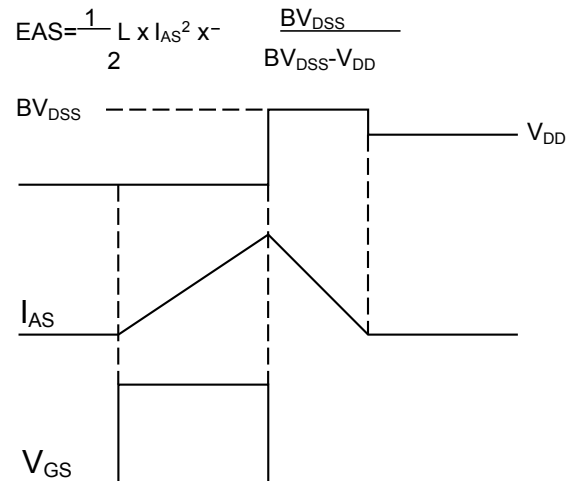
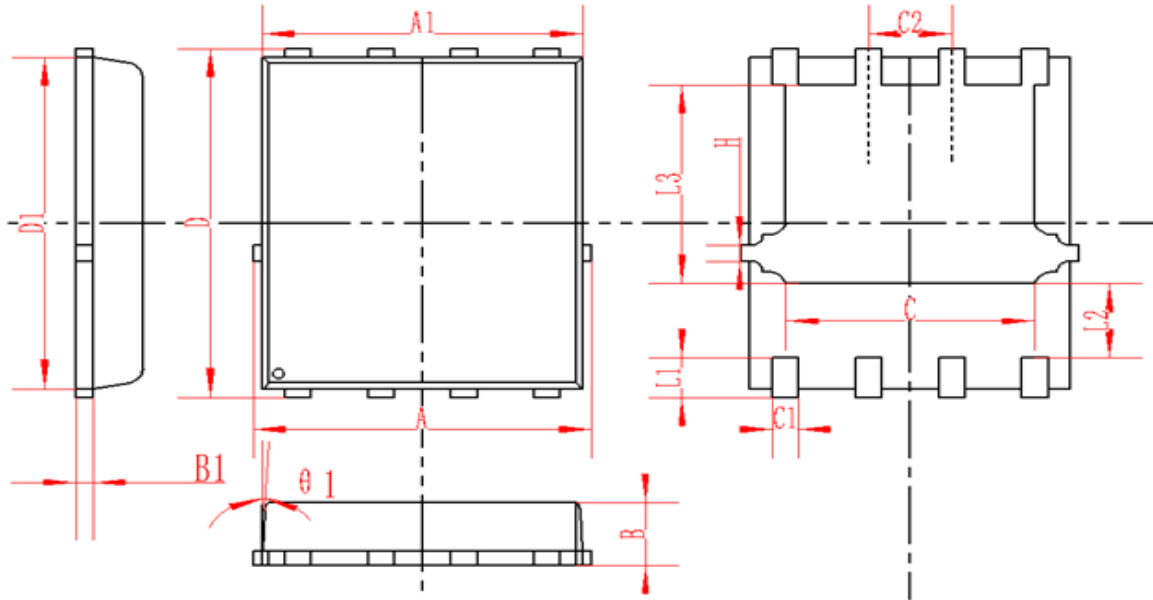


Fig.11 Unclamped Inductive Switching Waveform



DFN5X6-8L Package Information



| SYMBOL | MM | | | INCH | | |
|------------|----------|------|-------|----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.95 | 5 | 5.05 | 0.195 | 0.197 | 0.199 |
| A1 | 4.82 | 4.9 | 4.98 | 0.190 | 0.193 | 0.196 |
| D | 5.98 | 6 | 6.02 | 0.235 | 0.236 | 0.237 |
| D1 | 5.67 | 5.75 | 5.83 | 0.223 | 0.226 | 0.230 |
| B | 0.9 | 0.95 | 1 | 0.035 | 0.037 | 0.039 |
| B1 | 0.254REF | | | 0.010REF | | |
| C | 3.95 | 4 | 4.05 | 0.156 | 0.157 | 0.159 |
| C1 | 0.35 | 0.4 | 0.45 | 0.014 | 0.016 | 0.018 |
| C2 | 1.27TYP | | | 0.5TYP | | |
| $\theta 1$ | 8° | 10° | 12° | 8° | 10° | 12° |
| L1 | 0.63 | 0.64 | 0.65 | 0.025 | 0.025 | 0.026 |
| L2 | 1.2 | 1.3 | 1.4 | 0.047 | 0.051 | 0.055 |
| L3 | 3.415 | 3.42 | 3.425 | 0.134 | 0.135 | 0.135 |
| H | 0.24 | 0.25 | 0.26 | 0.009 | 0.010 | 0.010 |



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