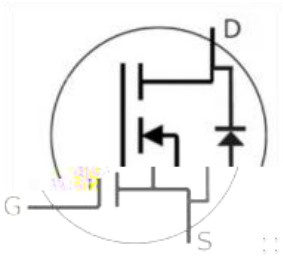
# S3M013150BK-A

**TriQSiC™1500V Silicon Carbide Power MOSFET G3** N Channel Enhancement

## Features

- High speed switching
- Very low switching losses
- High blocking voltage with low on-resistance
- Temperature independent turn-off switching losses
- Halogen free, RoHS compliant




| Part number | Die size W x L mm |
|---|---|
| S3M013150BK-A | 4.8 * 6.3 |

## Benefits

- Cooling effort reduction
- Efficiency improvement
- Reduced cooling requirements
- Increased power density
- Increased system switching frequency

## Applications

- EV motor drive
- PV string inverters
- Solar power optimizer
- Switch mode power supplies

**Table 1 Key performance and package parameters**

| Type | $V_{DS}$ | $I_{DS}$ ($T_C$=25 , $R_{th\ (j\text{-}c),max}$ ≤ 0.26 °C/W) | $R_{DS(on),\ typ}$ ($T_J$=25 ,$V_{GS}$ = 18V, $I_D$ = 86A) | $T_{J,max}$ |
|---|---|---|---|---|
| S3M013150BK-A | 1500V | 149A | 13mΩ | 175 |

**1500V S0 Ű 0 Ű 0 Ű 0 t**

# 2 Electrical characteristics

## 2.1 Static characteristics

**Table 4 Static characteristics** (Tc = 25°C unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $Q_{gs}$ | Gate source charge | - | 57 | - | nC | $V_{DS}$ = 1000V, $V_{GS}$ = -4/+18V<br>$I_D$ = 86A | Fig.12 |
| $Q_{gd}$ | Gate drain charge | - | 47 | - | | | |
| $Q_g$ | Gate charge | - | 179 | - | | | |

## 2.3 Switching characteristics

**Table 6 Dynamic characteristics**(Tc = 25°C unless otherwise specified,the data comes from TO-247-4L)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|---|
| $E_{on}$ | Turn on switching energy | - | 2407 | - | μJ | $V_{DS}$ = 1000V, $V_{GS}$ = -4/+18V<br>$I_D$ = 86A, Rg = 2.5Ω,<br>L = 16.7μH | |
| $E_{off}$ | Turn off switching energy | - | 1054 | - | | | |
| $t_{d\ on}$ | Turn on delay time | - | 69 | - | ns | | |
| $t_r$ | Rise time | - | 21 | - | | | |
| $t_{d\ off}$ | Turn off delay time | - | 93 | - | | | |
| $t_f$ | Fall time | - | 20 | - | | | |

**Table 7 Body diode characteristics**(The data comes from TO-247-4L)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|---|
| $V_{SD}$ | Diode forward voltage | - | 3.8 | - | V | $V_{GS}$ = -4V, $I_{SD}$ = 43A | Fig.8,9, 10 |
| | | - | 3.4 | - | V | $V_{GS}$ = -4V, $I_{SD}$ = 43A<br>$T_J$ = 175°C | |
| $I_S$ | Continuous diode forward current | - | 132 | - | A | $V_{GS}$ = -4V, Tc = 25°C | Note2 |
| $t_{rr}$ | Reverse recovery time | - | 69 | - | ns | $V_R$ = 1000V, $V_{GS}$ = -4V<br>$I_D$ = 86A<br>di/dt = 1683A/μs<br>$T_J$ = 175°C | |
| $Q_{rr}$ | Reverse recovery charge | - | 1028 | - | nC | | |
| $I_{rrm}$ | Peak reverse recovery current | - | 27 | - | A | | |

Note2 : When using SiC Body Diode the maximum recommended $V_{GS}$ = -4 V

## 3 Electrical characteristic diagrams

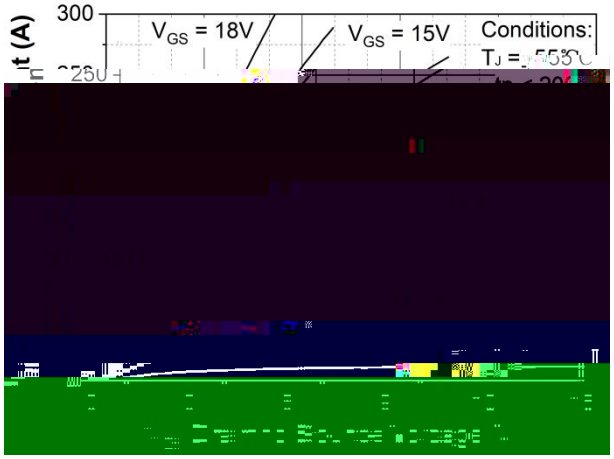



Figure 1. Output characteristics $T_J$ = -55 ºC

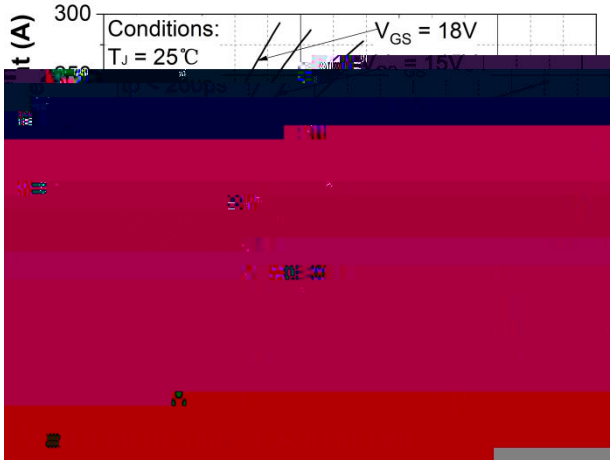



Figure 2. Output characteristics $T_J$ = 25 ºC

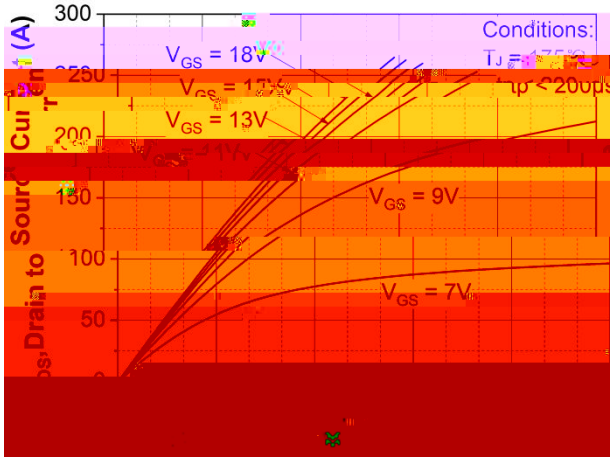



Figure 3. Output characteristics $T_J$ = 175 ºC

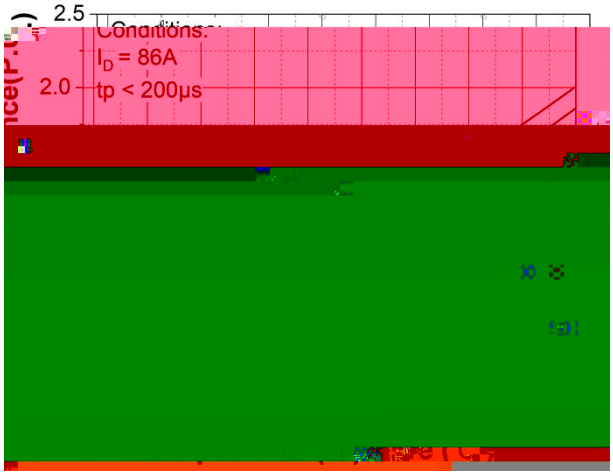



Figure 4. Normalized on-resistance vs. temperature

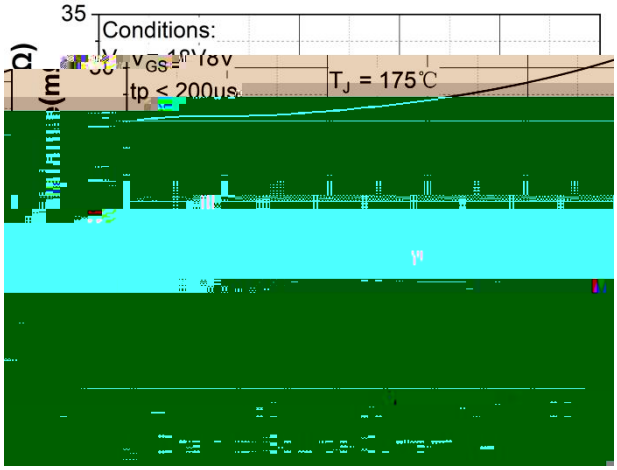



Figure 5. On-resistance vs. drain current for various temperatures

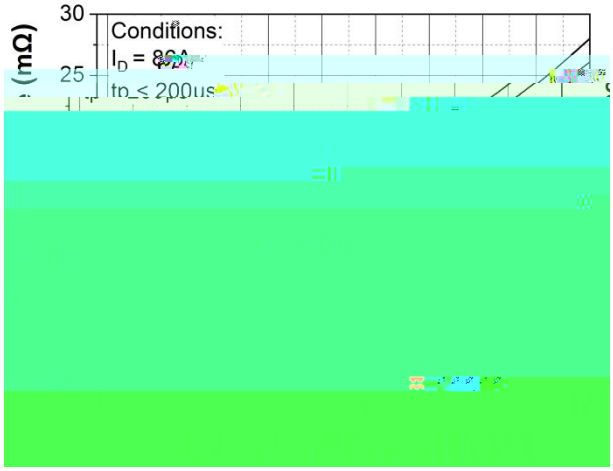



Figure 6. On-resistance vs. temperature for various gate voltages

Figure 7. Transfer characteristic for various junction temperatures

Figure 8. Body diode characteristic at $T_J$ = -55 ºC

Figure 9. Body d

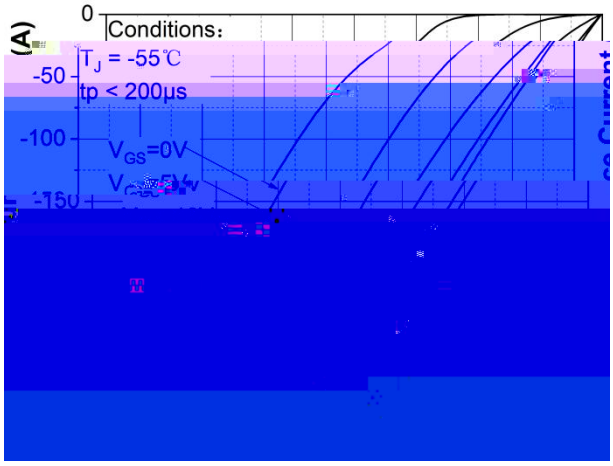



Figure 13. 3rd quadrant characteristic at $T_J$ = -55 ºC

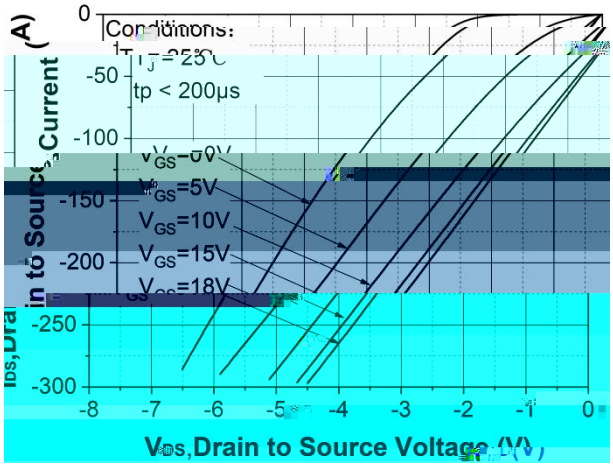



Figure 14. 3rd quadrant characteristic at $T_J$ = 25 ºC

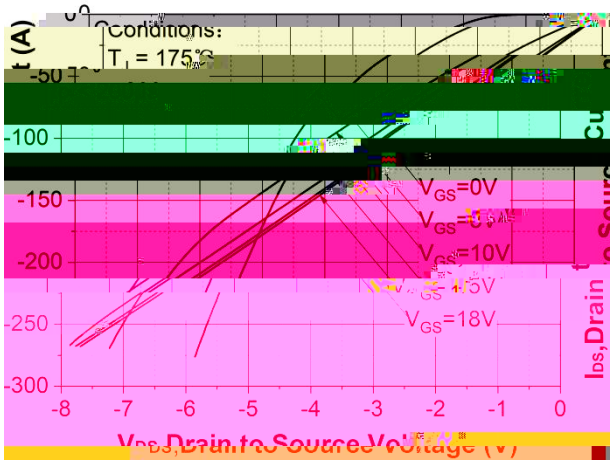



Figure 15. 3rd quadrant characteristic at $T_J$ = 175 ºC

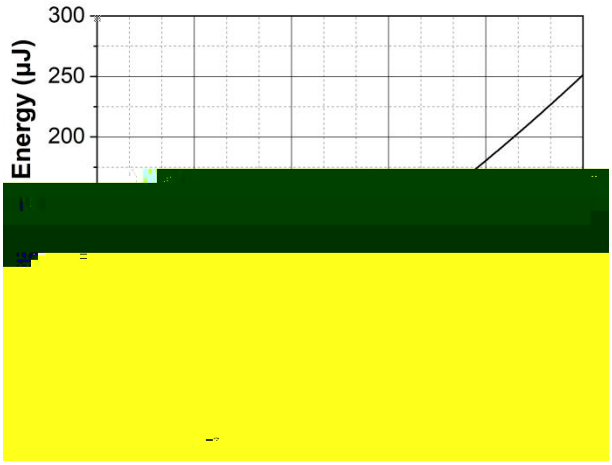



Figure 16. Output capacitor stored energy

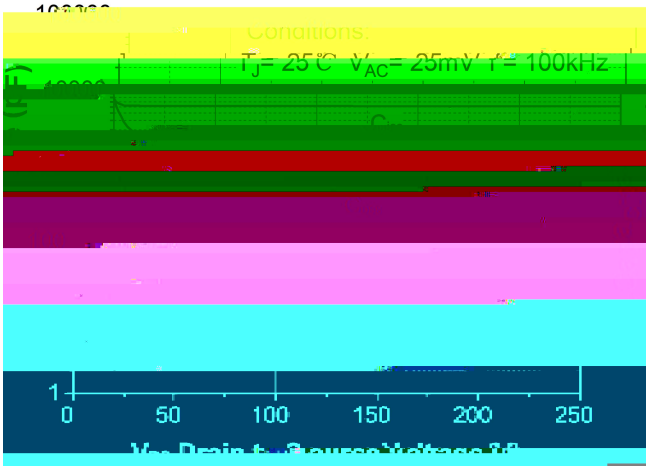



Figure 17. Capacitances vs. drain-source voltage (0 - 250V)

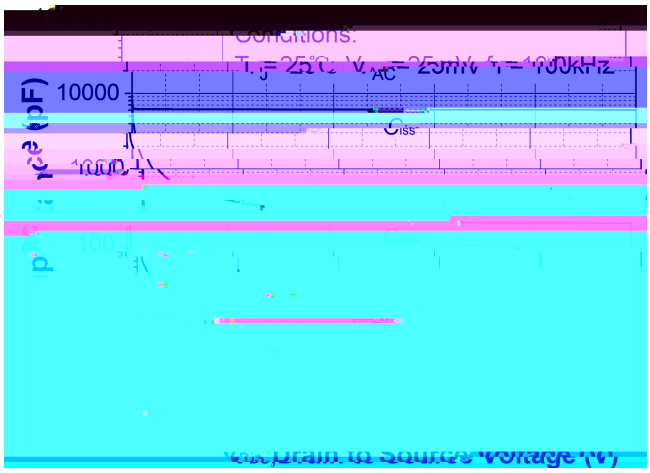



Figure 18. Capacitances vs. drain-source voltage (0 - 1500V)

# S3MC 150BK-A

**1500V Si ver MOSFET**

**4**



# 5 Test conditions

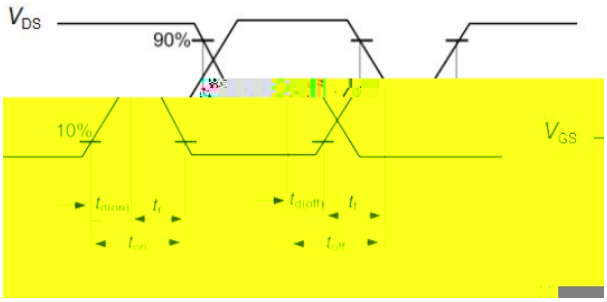



Figure A. Definition of switching times

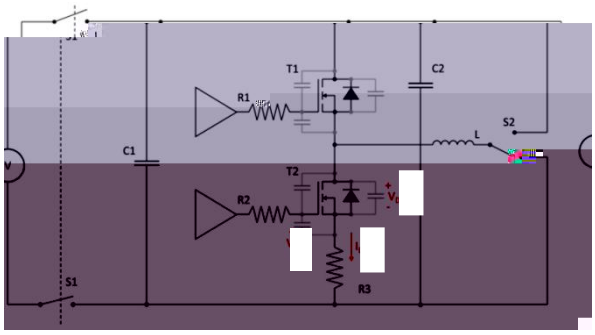



Figure B. Dynamic test circuit

## Revision history

| Document version | Date of release | Document stage | Description of changes |
|---|---|---|---|
| V01_00 | 2026-06-29 | Final | —— |
| | | | |
| | | | |
| | | | |
| | | | |

# Attention

1. **RoHS compliance**

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/ EC (RoHS2), as implemented January 2, 2013.

2. **REACH compliance**

REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Sichain representative to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

3. With respect to information regarding the application of the product, Sichain hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

4. Any information given in this documents subject to customer's compliance with its obligations and any applicable legal requirements, norms and standards concerning any use of the product of Sichain in any customer's applications.

5. Specifications of any and all products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guaranteed.

6. Due to technical requirements products may contain dangerous substances. For information on the types in question please contact Sichain office.

7. Except as otherwise explicitly approved by Sichain in a written document signed by authorized representatives of Sichain, Sichain' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

8. For use of our products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a Sichain representatives, for example but not limited to: transportation equipment,primary communication equipment,traffic lights,fire/crime prevention, safety equipment, medical systems, and power transmission systems.