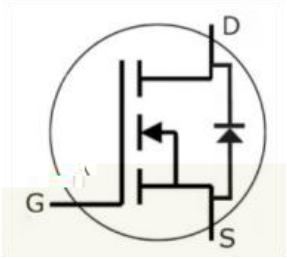
# S3M008120NK-A

**TriQSiC™1200V 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




## Benefits

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

| Part number | Die size W x L mm |
|---|---|
| S3M008120NK-A | 5.3 * 6.6 |

## 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 , $R_{th\ (j\text{-}c),max}$ ≤ 0.21 °C/W) | $R_{DS(on),\ typ}$ ($V_{GS}$ = 18V, $I_D$ = 106A, $T_J$=25 ) | $T_{J,max}$ |
|---|---|---|---|---|
| S3M008120NK-A | 1200V | 218A | 8.4mΩ | 175 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $Q_{gs}$ | Gate source charge | - | 79 | - | nC | $V_{DS}$ = 800V, $V_{GS}$ = -4/+18V<br>$I_D$ = 106A | Fig.12 |
| [illegible] | Gate drain charge | - | 64 | - | | | |
| $Q_g$ | Gate charge | - | 257 | - | | | |

## 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 | - | 3956 | - | μJ | $V_{DS}$ = 800V, $V_{GS}$ = -4/+18V<br>$I_D$ = 106A, Rg = 2.5Ω,<br>L = 16.7μH | |
| $E_{off}$ | Turn off switching energy | - | 2290 | - | | | |
| $t_{d\ on}$ | Turn on delay time | - | 117 | - | ns | | |
| $t_r$ | Rise time | - | 30 | - | | | |
| $t_{d\ off}$ | Turn off delay time | - | 174 | - | | | |
| $t_f$ | Fall time | - | 31 | - | | | |

**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 | - | 3.7 | - | V | $V_{GS}$ = -4V, $I_{SD}$ = 53A | Fig.8,9, 10 |
| | | - | 3.4 | - | V | $V_{GS}$ = -4V, $I_{SD}$ = 53A<br>$T_J$ = 175°C | |
| $I_S$ | Continuous diode forward current | - | 162 | - | A | $V_{GS}$ = -4V, Tc = 25°C | Note2 |
| $t_{rr}$ | Reverse recovery time | - | 71 | - | ns | $V_R$ = 800V, $V_{GS}$ = -4V<br>$I_D$ = 106A<br>di/dt = 1532A/μs<br>$T_J$ = 175°C | |
| $Q_{rr}$ | Reverse recovery charge | - | 990 | - | nC | | |
| $I_{rrm}$ | Peak reverse recovery current | - | 30 | - | A | | |

Note2 : When using SiC Body Diode the maximum rec**ɑ**

# 3 Electrical characteristic diagrams

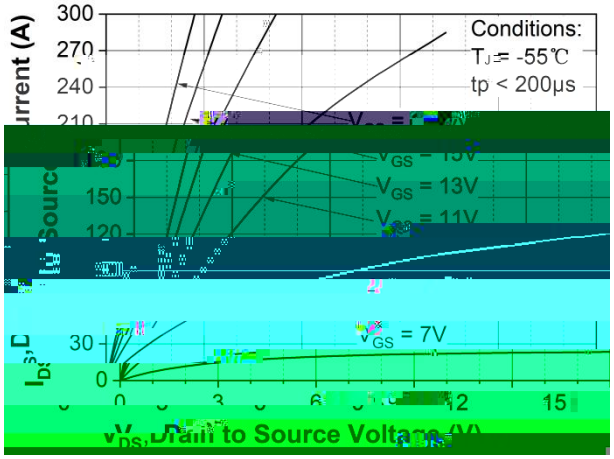



Figure 1. Output characteristics $T_J$ = -55 ºC

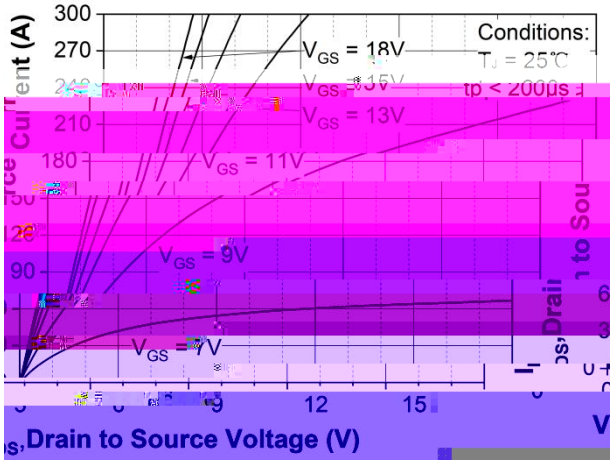



Figure 2. Output characteristics $T_J$ = 25 ºC

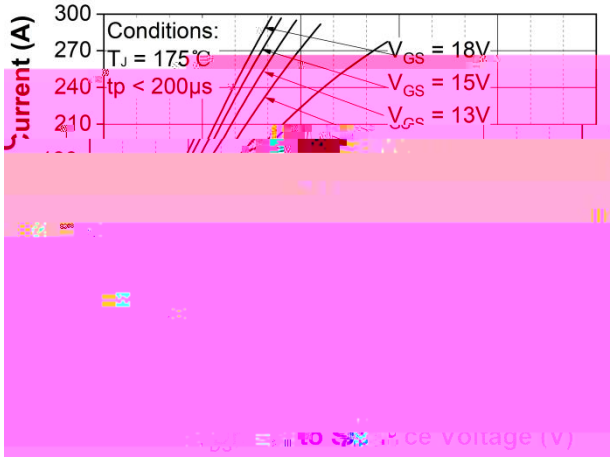



Figure 3. Output characteristics $T_J$ = 175 ºC

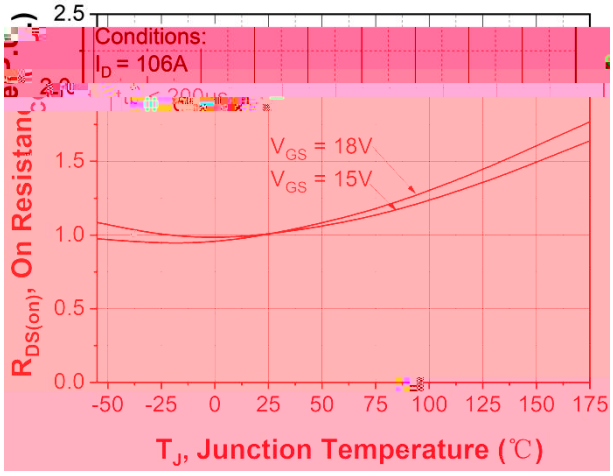



Figure 4. Normalized on-resistance vs. temperature

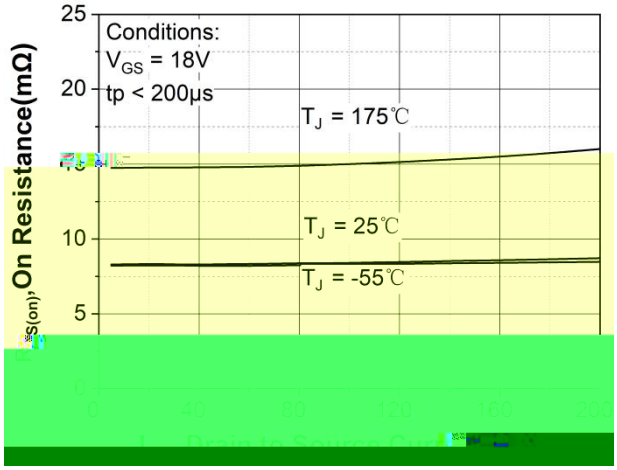



Figure 5. On-resistance vs. drain current for various temperatures

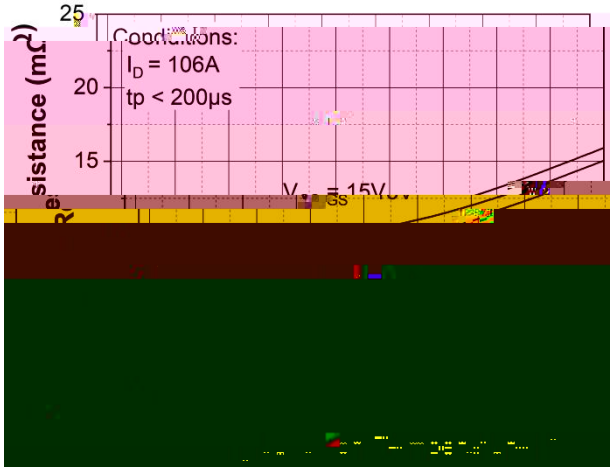



Figure 6. On-resistance vs. temperature for various gate voltages

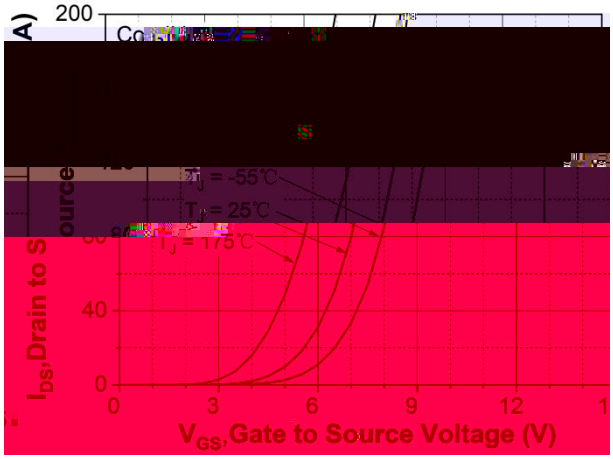



Figure 7. Transfer characteristic for various junction temperatures

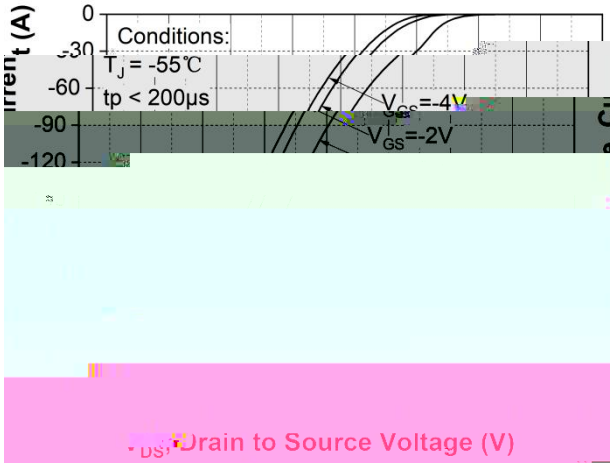



Figure 8. Body diode characteristic at $T_J$ = -55 ºC

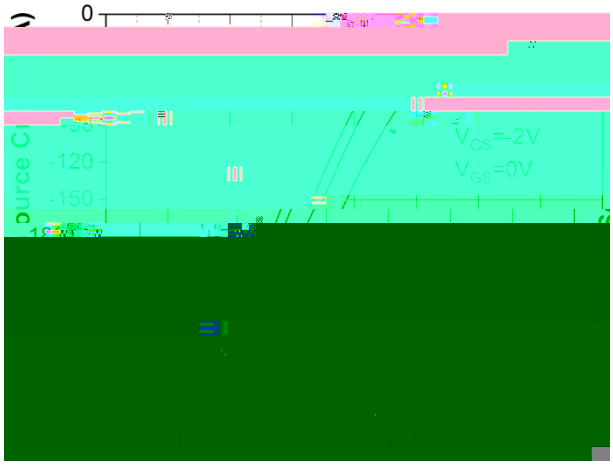



Figure 9. Body diode characteristic at $T_J$ = 25 ºC

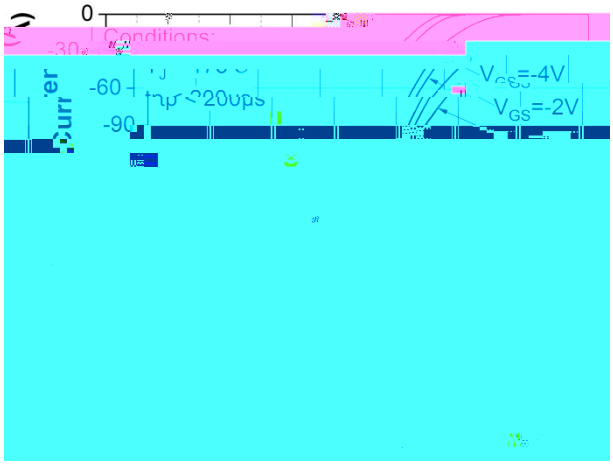



Figure 10. Body diode characteristic at $T_J$ = 175ºC

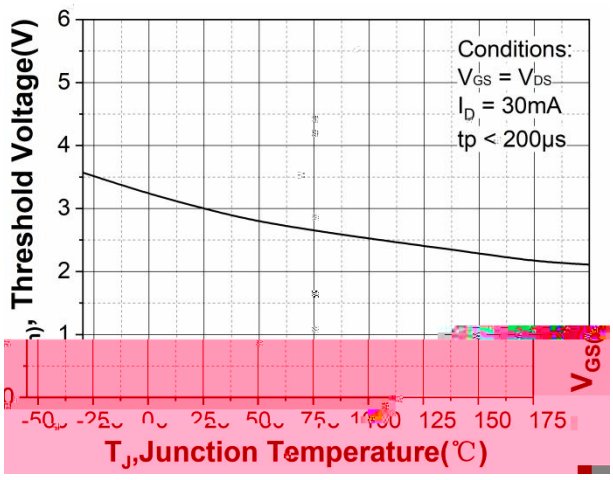



Figure 11. Threshold voltage vs. temperature

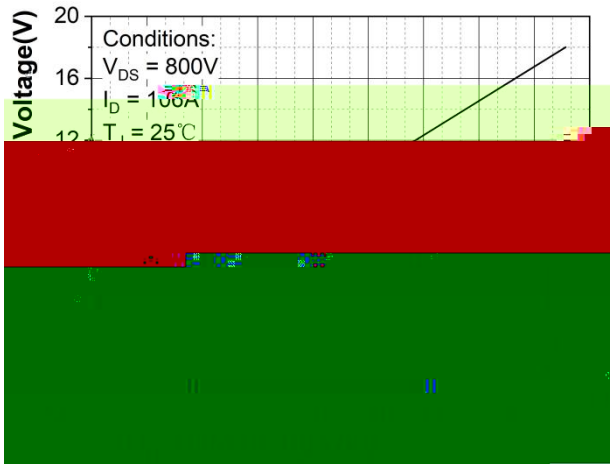



Figure 12. Gate charge characteristic

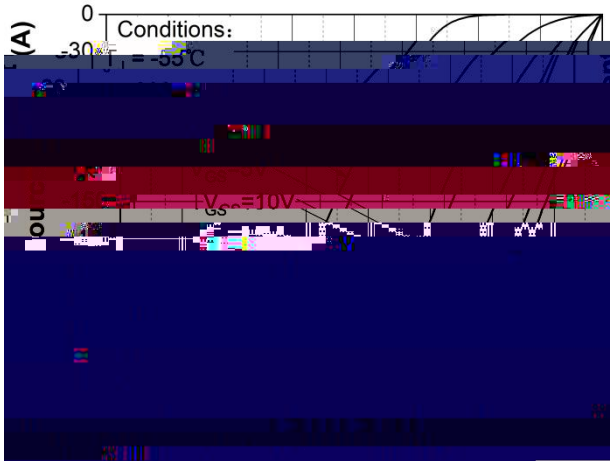



Figure 13. 3rd quadrant characteristic at $T_J$ = -55 ºC

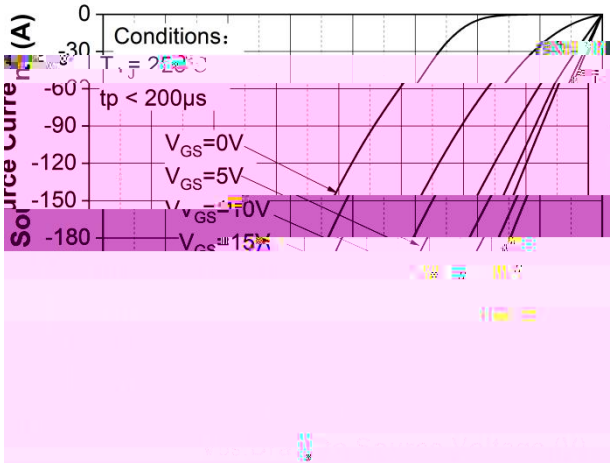



Figure 14. 3rd quadrant characteristic at $T_J$ = 25 ºC

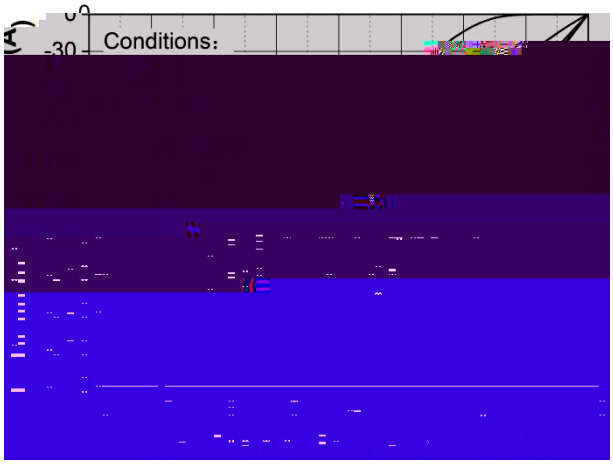



Figure 15. 3rd quadrant characteristic at $T_J$ = 175 ºC

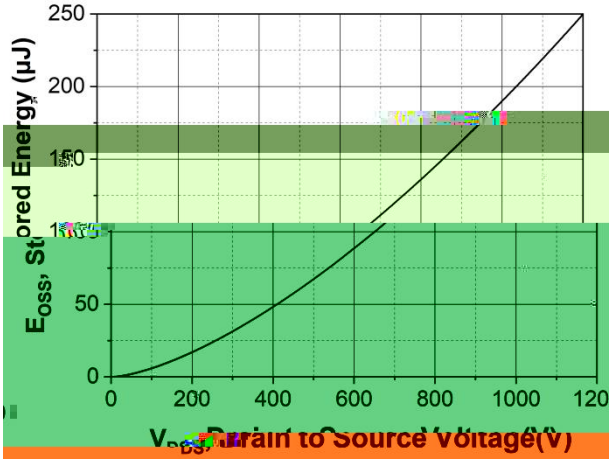



Figure 16. Output capacitor stored energy

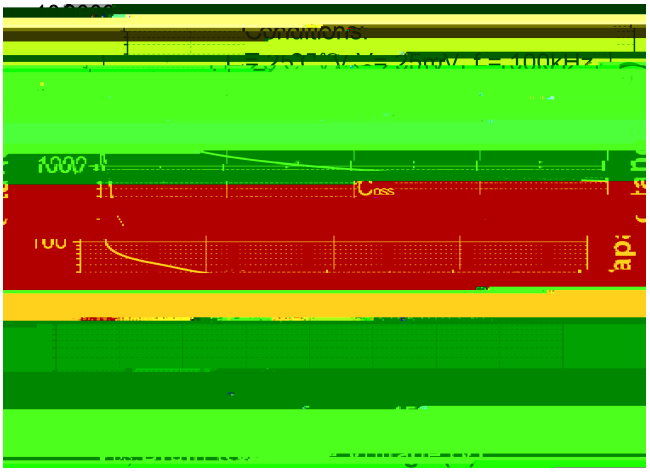



Figure 17. Capacitances vs. drain-source voltage (0 - 200V)

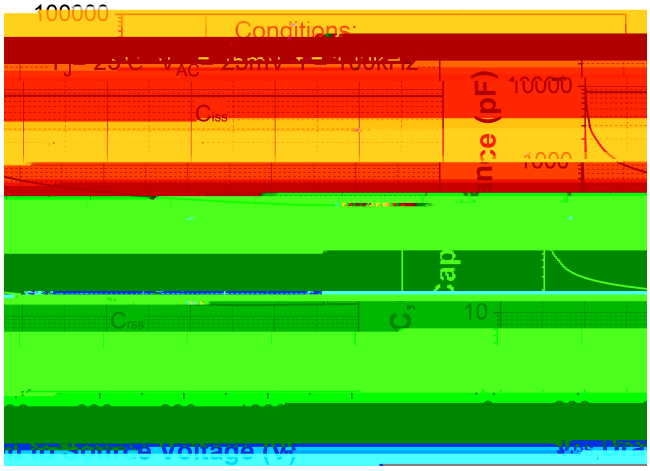



Figure 18. Capacitances vs. drain-source voltage (0 - 1200V)

# 5 Test conditions

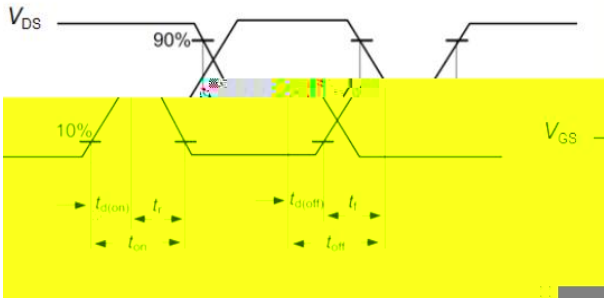



Figure A. Definition of switching times

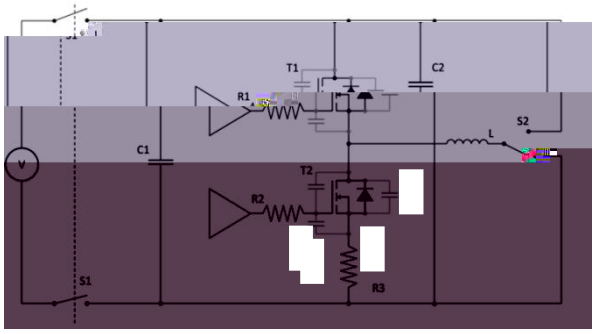



Figure B. Dynamic test circuit

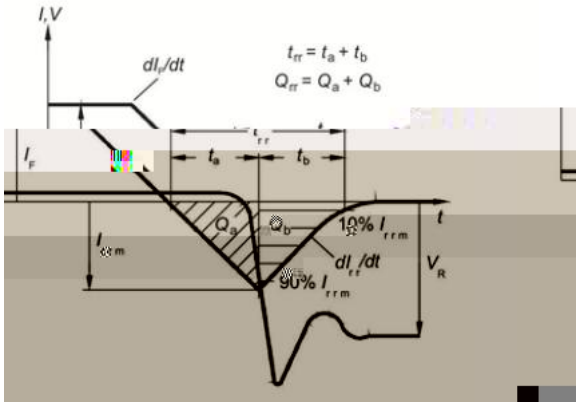



Figure C. Definition of body diode switching characteristics

# Revision history

| Document version | Date of release | Document stage | Description of changes |
|---|---|---|---|
| V01_00 | 2026-06-26 | 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.

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