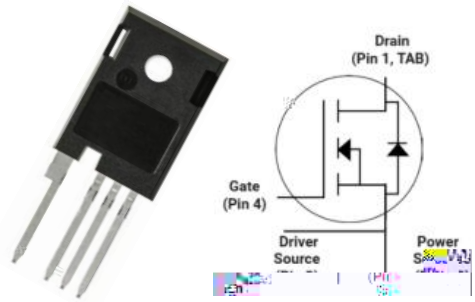
N Channel Enhancement

- High speed switching
- Very low switching losses
- Fully controllable dv/dt
- High blocking voltage with low on-resistance
- Fast intrinsic diode with low reverse recovery (Qrr)
- Temperature independent turn-off switching losses
- Halogen free, RoHS compliant




TO-247-4L

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

- On-board charger/PFC
- EV battery chargers
- Booster/DC-DC converter
- Switch mode power supplies

| | | ($T_C$ = 25 , $R_{th\ (j\text{-}c),max}$) | ($V_{GS}$ = 18V, $I_D$ = 38A, $T_J$ = 25 ) | | | |
|---|---|---|---|---|---|---|
| SG2M040170HJ | 1700V | 66A | 40mΩ | 175 | SG2M040170HJ | TO-247-4L |

(Tc = 25°C unless otherwise specified)

| | | | | | |
|---|---|---|---|---|---|
| $V_{DS,max}$ | Drain source voltage | 1700 | V | $V_{GS}$ = 0V, $I_D$ = 100μA | |
| $V_{GS,max}$ | Gate source voltage | -8 /+22 | V | Absolute maximum values | Note1 |
| $V_{GSpulse}$ | Gate-source voltage,max. transient voltage | -10 /+25 | V | $t_p \leq 0.5\mu s$, D 0.01 | |
| $V_{GSop}$ | Gate source voltage | -4 /+18 | V | Recommended operational values | |
| $I_D$ | Continuous drain current | 66<br>47 | A | $V_{GS}$ = 18V, $T_C$ = 25˚C<br>$V_{GS}$ = 18V, $T_C$ = 100˚C | Fig.19 |
| $I_D$(pulse) | Pulsed drain current | 188 | A | Pulse width $t_P$=100μs limited by $T_{J,max}$ | Fig.22 |
| $P_D$ | Power dissipation | 384 | W | $T_C$ = 25˚C,$T_J$ = 175˚C | Fig.20 |
| $T_J$ , $T_{stg}$ | Operating Junction and storage temperature | -5 i | | | |

(Tc = 25°C unless otherwise specified)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | 1700 | - | - | V | $V_{GS}$ = 0V, $I_D$ = 100μA | |
| $V_{GS(th)}$ | Gate threshold voltage | 2.5 | 3.1 | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 12mA | Fig.11 |
| | | - | 2.4 | - | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 12mA<br>$T_J$ = 175°C | |
| $I_{DSS}$ | Zero gate voltage drain current | - | - | 10 | μA | $V_{DS}$ = 1700V, $V_{GS}$ = 0V | |
| $I_{GSS}$ | Gate source leakage current | - | - | 100 | nA | $V_{GS}$ = 18V, $V_{DS}$ = 0V | |
| $R_{DS(on)}$ | Current drain-source on-state resistance | - | 47 | 65 | mΩ | $V_{GS}$ = 15V, $I_D$ = 38A | Fig.4,5,6 |
| | | - | 91 | - | | $V_{GS}$ = 15V, $I_D$ = 38A,<br>$T_J$ = 175°C | |
| | | - | 40 | 52 | | $V_{GS}$ = 18V, $I_D$ = 38A | |
| | | - | 88 | - | | $V_{GS}$ = 18V, $I_D$ = 38A,<br>$T_J$ = 175°C | |
| $g_{fs}$ | Transconductance | - | 23 | - | S | $V_{DS}$ = 20V, $I_D$ = 38A | Fig.7 |
| | | - | 22 | - | | $V_{DS}$ = 20V, $I_D$ = 38A,<br>$T_J$ = 175°C | |
| $R_{g,int}$ | Intenl gate resistance | - | 1.4 | - | Ω | $V_{AC}$ = 25mV, f = 1MHz,<br>open drain | |

(Tc = 25°C unless otherwise specified)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $C_{iss}$ | Input capacitance | - | 2594 | - | pF | $V_{DS}$ = 1400V, $V_{GS}$ = 0V<br>$T_J$ = 25°C, $V_{AC}$ = 25mV<br>f = 100kHz | Fig.17, 18 |
| $C_{oss}$ | Output capacitance | - | 102 | - | | | |
| $C_{rss}$ | Reverse capacitance | - | 5 | - | | | |
| $E_{oss}$ | Coss stored energy | - | 106 | - | μJ | | Fig.16 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $Q_{gs}$ | Gate source charge | - | 26 | - | nC | $V_{DS}$ = 1200V, $V_{GS}$ = -4/+18V<br>$I_D$ = 38A | Fig.12 |
| $Q_{gd}$ | Gate drain charge | - | 24 | - | | | |
| $Q_g$ | Gate charge | - | 78 | - | | | |

(Tc = 25°C unless otherwise specified)

| | | | | | | |
|---|---|---|---|---|---|---|
| $E_{on}$ | Turn on switching energy | - | 722 | - | μJ | $V_{DS}$ = 1200V, $V_{GS}$ = -4/+1-אp |



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

Figure 2. Output characteristics $T_J$ = 25 ºC

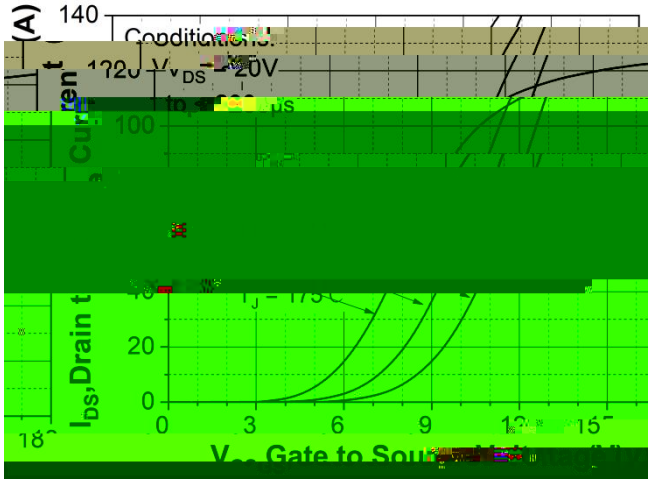


Figure 7. Transfer characteristic for various junction temperatures

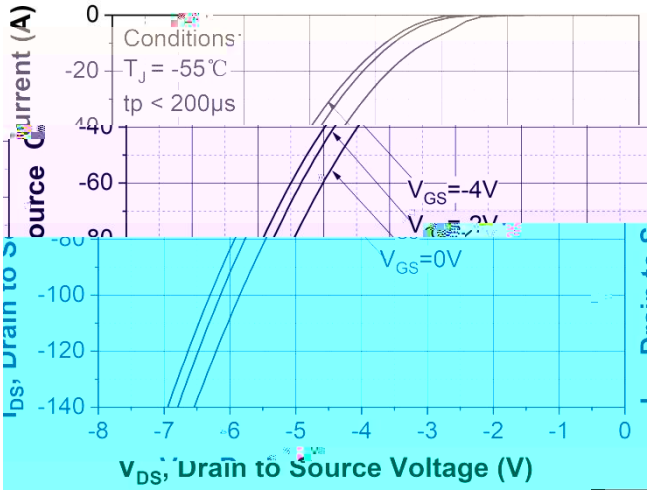



Figure 8. Body diode characteristic at $T_J$ = -55 ºC

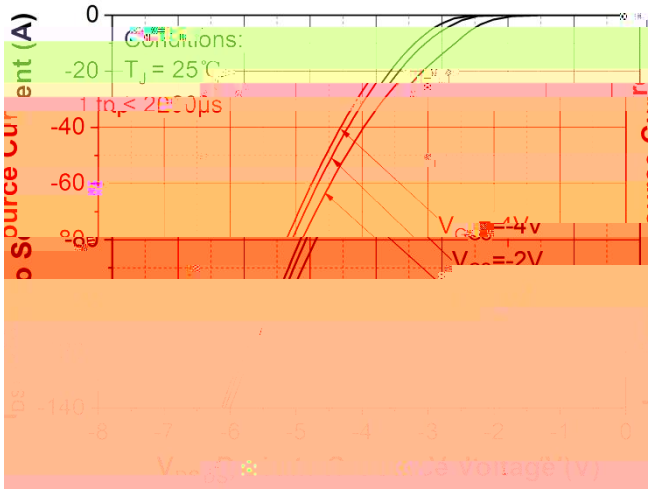


Figure 9. Body diode characteristic at $T_J$ = 25 ºC

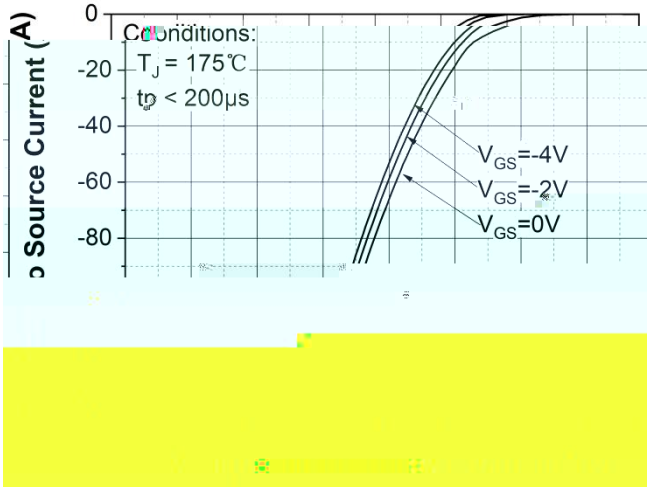



Figure 10. Body diode characteristic at $T_J$ = 175ºC

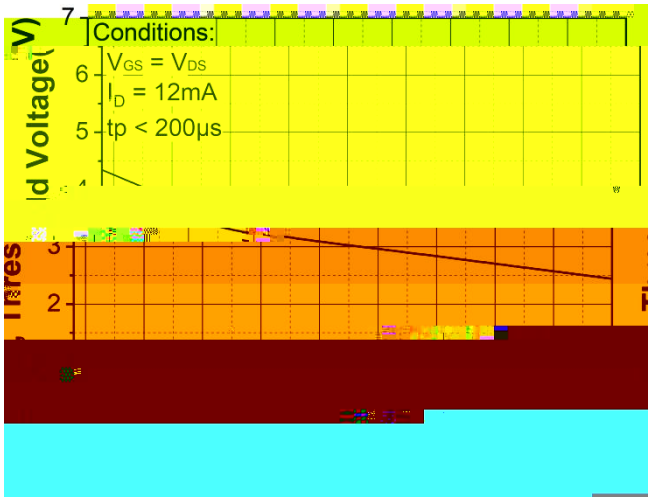



Figure 11. Threshold voltage vs. temperature

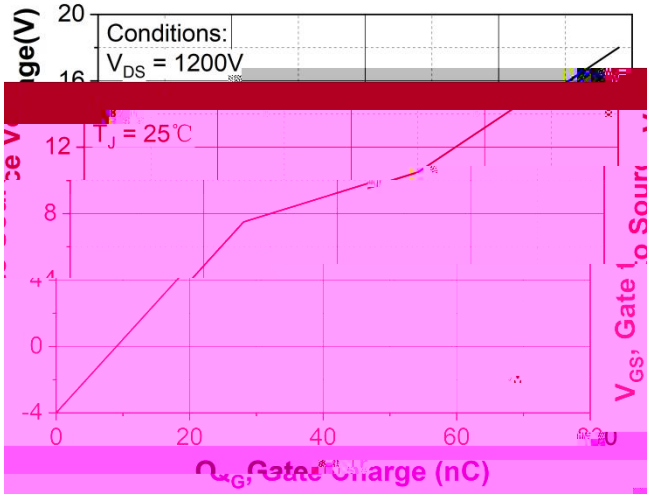



Figure 12. Gate charge characteristic

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

Figure 14. 3rd quadrant characteristic at $T_J$

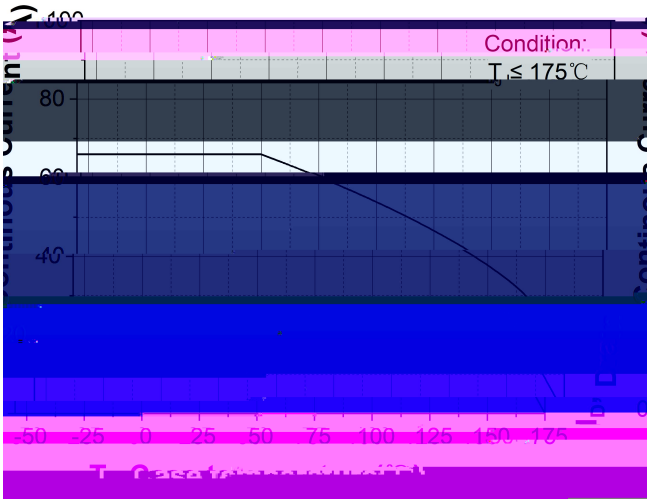



Figure 19. Continuous drain current derating vs. case temperature




Figure 20. Maximum power dissipation derating vs. case temperature

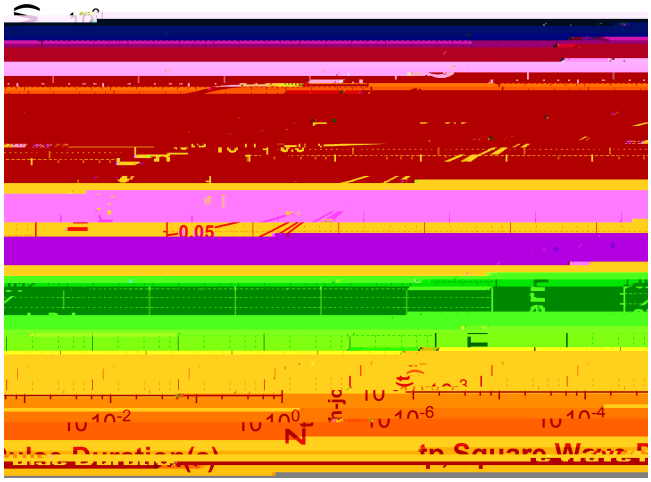


Figure 21. Transient thermal impedance (junction - case)

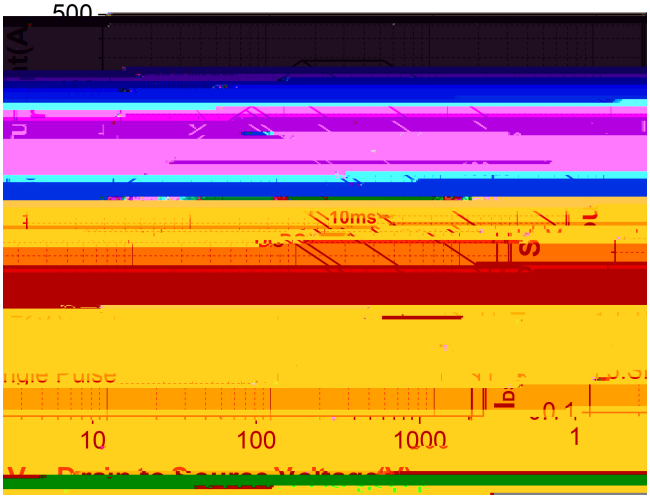



Figure 22. Safe operating area

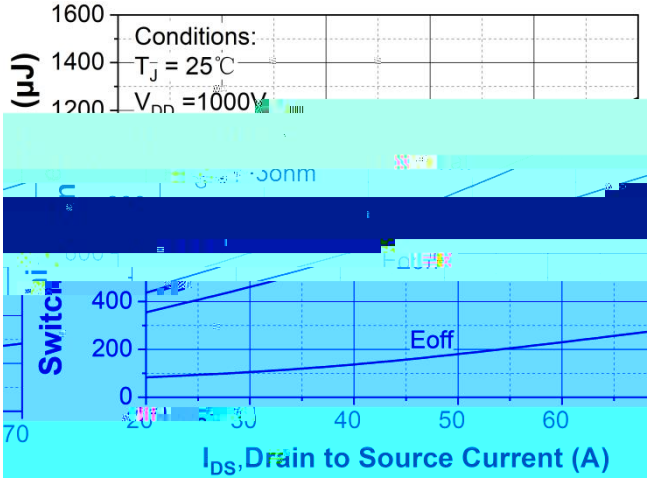



Figure 23. Clamped Inductive switching energy vs. drain current ($V_{DD}$ = 1000V)

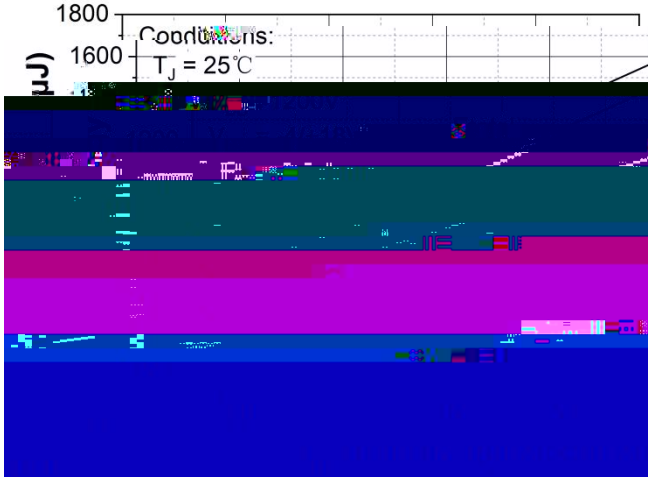



Figure 24. Clamped inductive switching energy vs. drain current ($V_{DD}$ = 1200V)

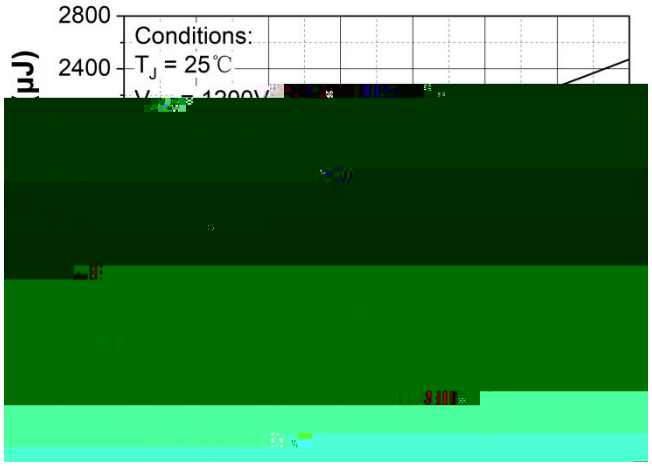



Figure 25. Clamped inductive switching energy vs. $R_G$(ext)

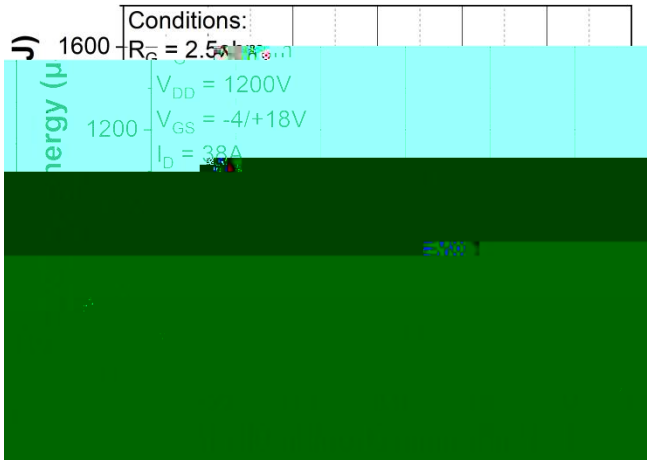



Figure 26. Clamped inductive switching energy vs. temperature

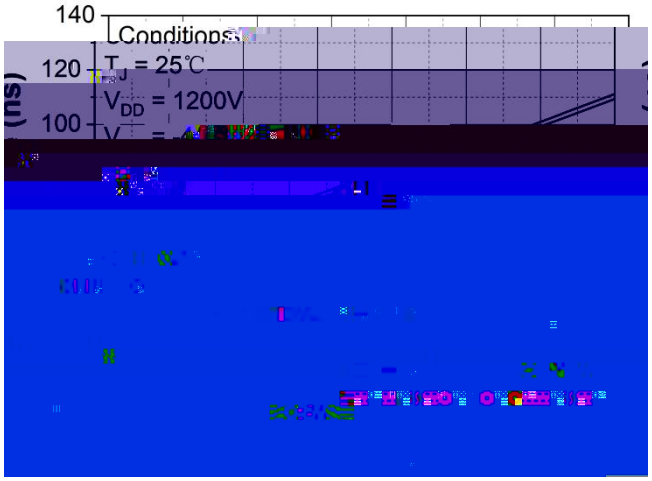



Figure 27. Switching times vs. $R_G$(ext)

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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.