

Silicon Carbide Enhancement Mode MOSFET

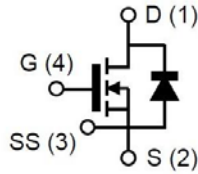
Features

- Gate charge (Typ. $Q_g=198nC$)
- Robust avalanche capability
- Fast recover time
- 100% Avalanche tested

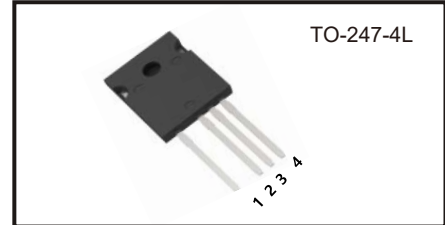
Applications

- LCD/LED/PDP TV
- EV charging station
- Telecom/server power supplies
- AC-DC Power supply
- Switch mode power supply(SMPS)

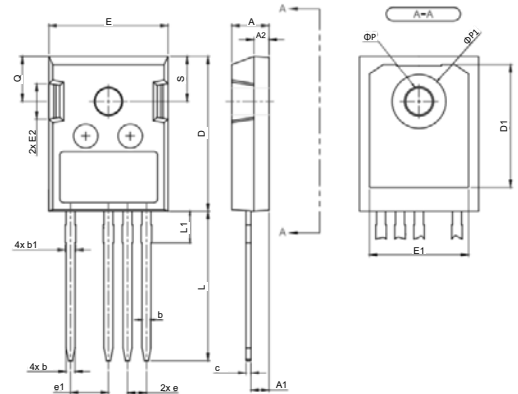
Preliminary



| | |
|---------------------|----------------|
| V_{DS} | 1200V |
| $I_D(@25^{\circ}C)$ | 100A |
| $R_{DS(ON)}$ | 20.5m Ω |



Package Dimensions



Absolute Maximum Ratings

($T_c = 25^{\circ}C$ unless otherwise specified)

| Parameter | Symbol | Rated | Unit |
|---|---------------|-------------|-------------|
| Drain-Source Voltage $V_{GS}=0V$ $I_D=100\mu A$ | V_{DS} | 1200 | V |
| Gate - Source Voltage (DC) | V_{GS} | -10/+20 | V |
| Recommended Operation Value | $V_{GS(op)}$ | -5/+18 | V |
| Drain Current-Continuous $T_c=25^{\circ}C$ $T_c=100^{\circ}C$ | I_D | 100 75 | A |
| Pulse Drain Current | $I_{D,pulse}$ | 250 | A |
| Total Power Dissipation | P_D | 469 | W |
| Storage Temperature Range | T_{STG} | -55 to +175 | $^{\circ}C$ |
| Operating Junction Temperature Range | T_J | -55 to +175 | $^{\circ}C$ |

| Symbol | Min | Nom | Max |
|----------|----------|-------|-------|
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.29 | 2.36 | 2.54 |
| A2 | 1.90 | 2.00 | 2.10 |
| b | 1.10 | 1.20 | 1.30 |
| b1 | 1.91 | 2.11 | 2.20 |
| b2 | 2.92 | 3.10 | 3.20 |
| c | 0.50 | 0.60 | 0.70 |
| D | 20.80 | 21.07 | 21.34 |
| D1 | 17.43 | 17.63 | 17.83 |
| E | 15.75 | 15.94 | 16.13 |
| E1 | 13.06 | 13.26 | 13.46 |
| E2 | 4.32 | 4.58 | 4.83 |
| e | 5.45 BSC | | |
| L | 19.85 | 20.00 | 20.25 |
| L1 | - | - | 4.49 |
| ΦP | 3.55 | 3.60 | 3.65 |
| Q | 5.59 | 5.89 | 6.19 |
| S | 6.15 BSC | | |

Electrical Characteristics @ T_c = 25°C (unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------------|-------------------|--|------|------|------|---------------|
| OFF Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=0.1mA$ | 1200 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS}=0V, V_{DS}=1200V$ | - | 1 | 100 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=22V, V_{DS}=0V$ | - | - | 100 | nA |
| ON Characteristics | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=17mA$ | 2.0 | 3.0 | 4.5 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=18V, I_D=50A$ | 18 | 20.5 | 29.4 | m Ω |
| Internal Gate Resistance | $R_{G(int.)}$ | | - | 3.34 | - | Ω |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=800V$ $V_{GS}=0V$ Freq.=250kHz | - | 3800 | - | pF |
| Output Capacitance | C_{oss} | | - | 230 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 18 | - | |
| Switching Characteristics | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}=800V$ $V_{GS}=-5/+18V$ $I_D=50A$ $R_{G(ext)}=2.0\Omega$ Inductive load | - | 30 | - | ns |
| Rise Time | t_r | | - | 28 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 65 | - | |
| Fall Time | t_f | | - | 13 | - | |
| Total Gate Charge | Q_g | $V_{DS}=800V$ $V_{GS}=-5/+18V$ $I_D=50A$ Inductive load | - | 199 | - | nC |
| Gate to Source Charge | Q_{gs} | | - | 49 | - | |
| Gate to Drain Charge | Q_{gd} | | - | 64 | - | |
| Body Diode Characteristics | | | | | | |
| Inverse Diode Forward Voltage | V_{SD} | $V_{GS}=-5V, I_{SD}=50A$ | - | 4.2 | - | V |
| Continuous Diode Forward Current | I_S | | - | - | 100 | A |
| Reverse Recovery Time | T_{rr} | $I_{SD}=50A, V_R=800V,$ $di/dt=3000A/\mu s$ Includes Q_{oss} | - | 25 | - | ns |
| Reverse Recovery Charge | Q_{rr} | | - | 480 | - | nC |
| Thermal Resistance | | | | | | |
| Thermal Resistance, Junction-to-Case | $R_{\theta_{JC}}$ | | - | - | 0.32 | $^{\circ}C/W$ |

Typical Performance

Fig 1. Transient Thermal Impedance (Junction to Case)

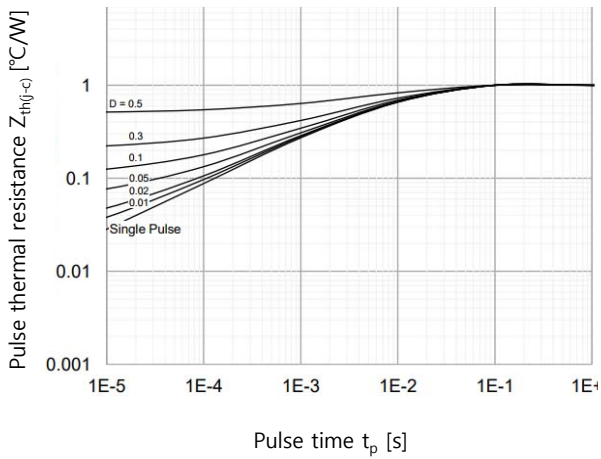


Fig 2. SOA Characteristics

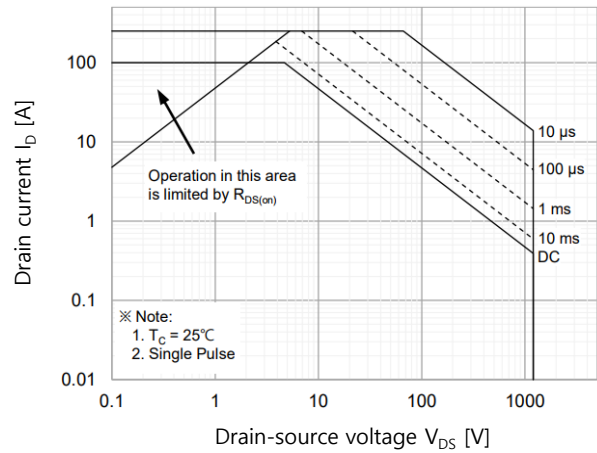


Fig 3. Output Characteristics at $T_J = 25^\circ\text{C}$

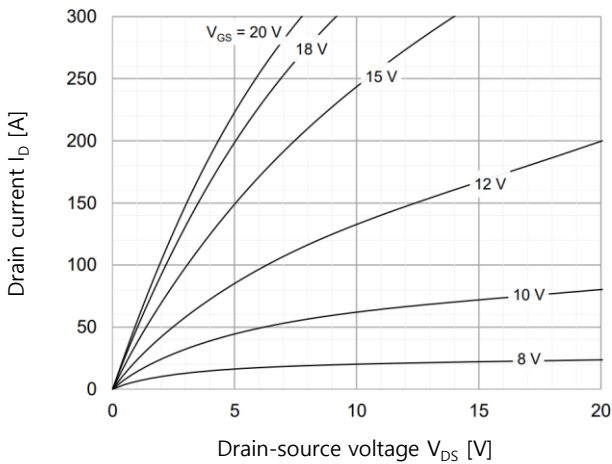


Fig 4. Output Characteristics at $T_J = 175^\circ\text{C}$

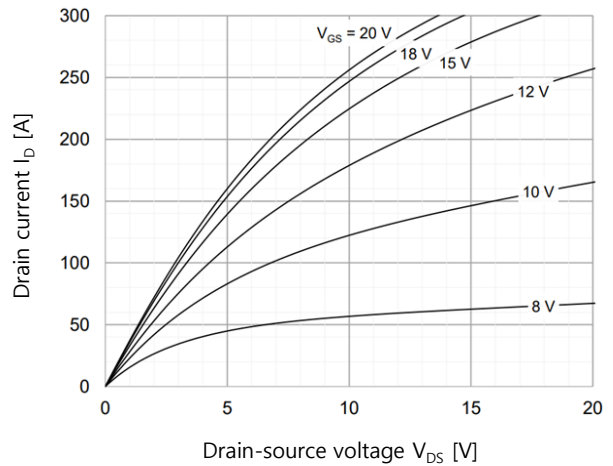


Fig 5. Normalized On-Resistance vs. Temperature

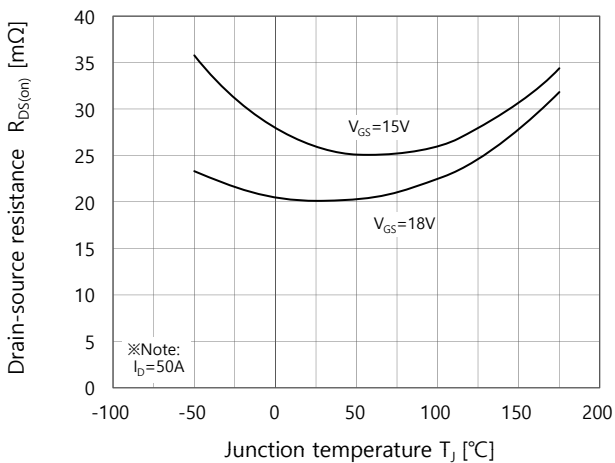
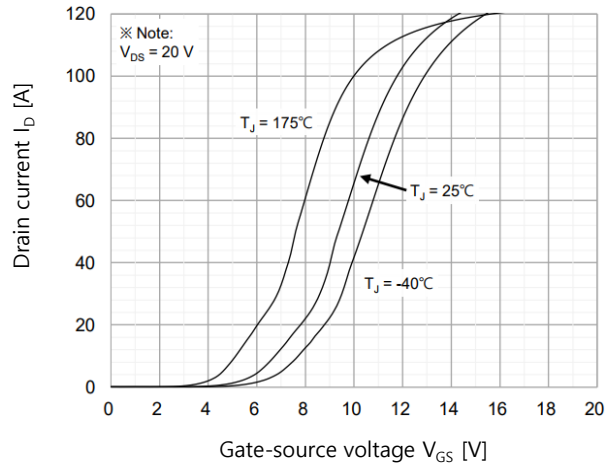


Fig 6. Transfer Characteristics



Typical Performance

Fig 7. $V_{SD} - I_{SD}$ Characteristics, $T_J = 25^\circ\text{C}$

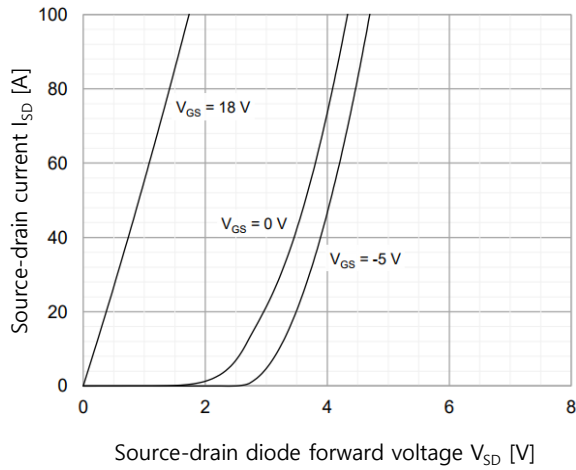


Fig 8. $V_{SD} - I_{SD}$ Characteristics, $T_J = 175^\circ\text{C}$

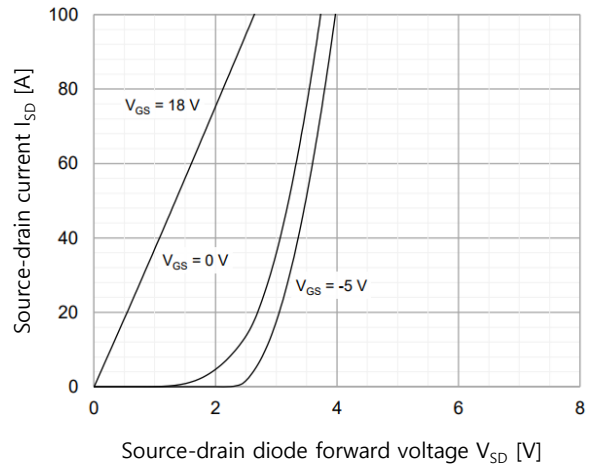


Fig 9. $T_J - V_{GS(th)}$ Characteristics

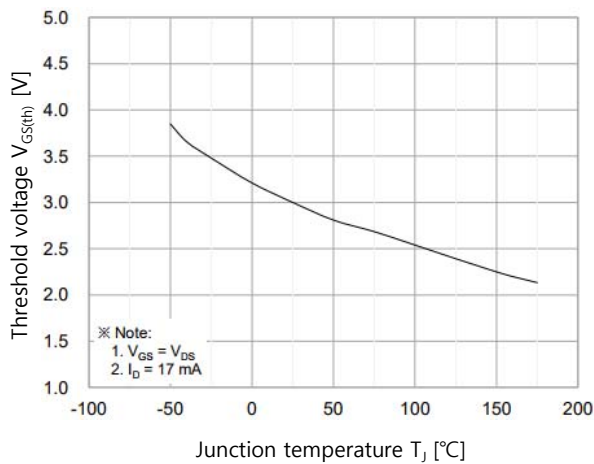


Fig 10. $Q_g - V_{GS}$ Characteristics

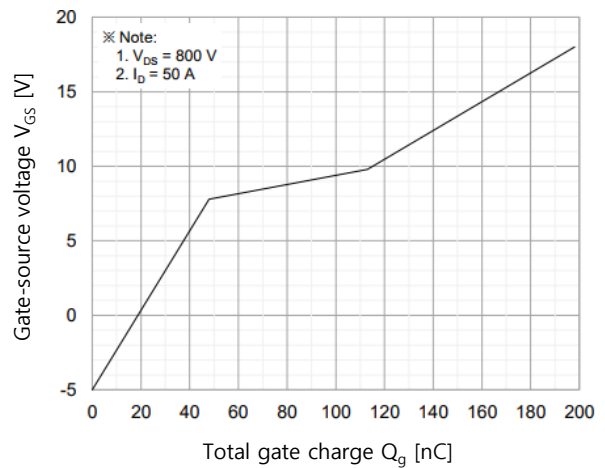


Fig 11. $V_{DS} - E_{OSS}$ Characteristics

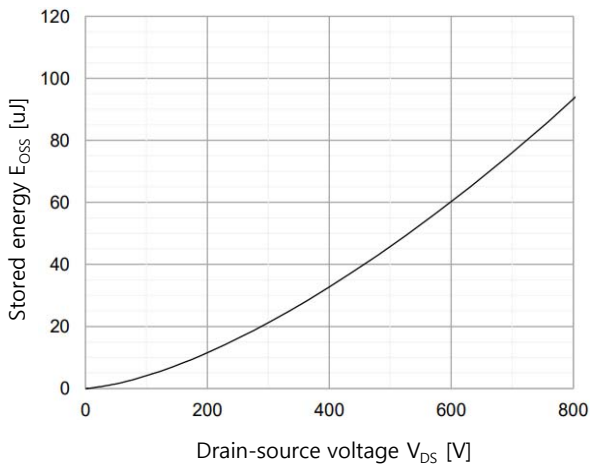
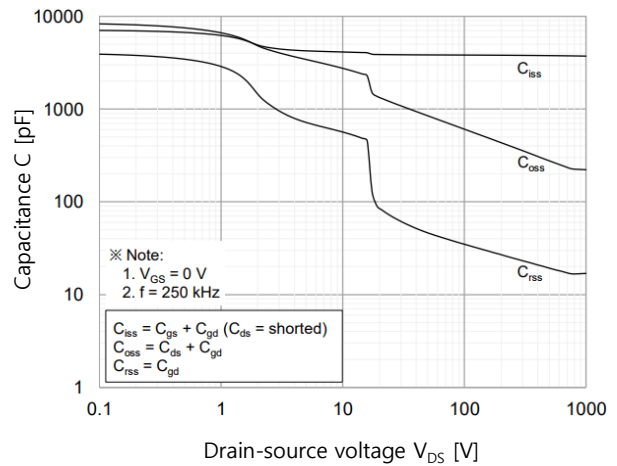


Fig 12. $V_{DS} - C$ Characteristics



Typical Performance

Fig 13. $T_C - I_D$ Characteristics

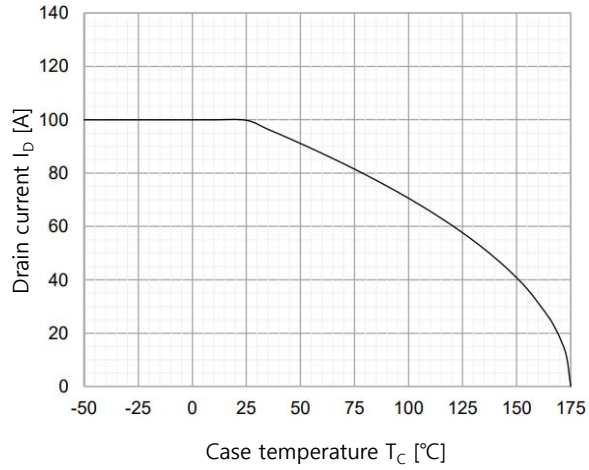
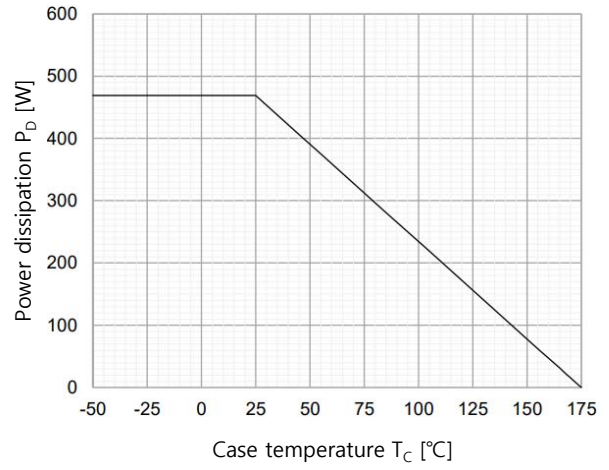


Fig 14. $T_C - P_D$ Characteristics



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