

Features

- SiC MOSFET technology
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 0.67°C/W Junction to Case

Applications

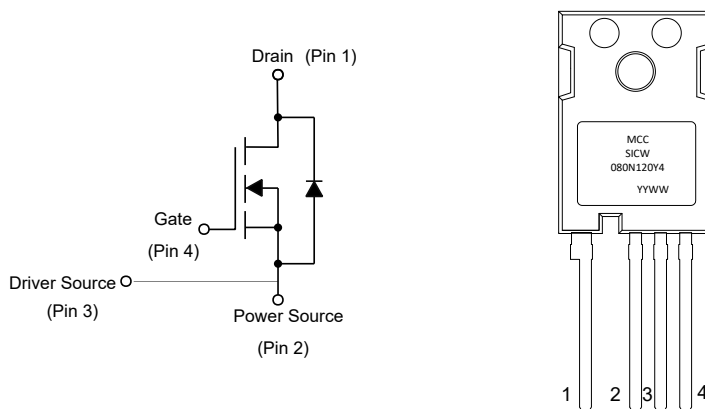
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives

| Parameter | Symbol | Rating | Unit |
|--|-------------|--------|------|
| Drain-Source Voltage | V_{DS} | 1200 | V |
| Gate-Source Voltage | V_{GSmax} | -8/+22 | V |
| Gate-Source Voltage | V_{GSop} | -4/+18 | V |
| Continuous Drain Current | I_D | 39 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | 80 | A |
| Total Power Dissipation, $T_c=25^\circ\text{C}$ | P_D | 223 | W |
| Total Power Dissipation, $T_c=110^\circ\text{C}$ | P_D | 97 | W |

Note:

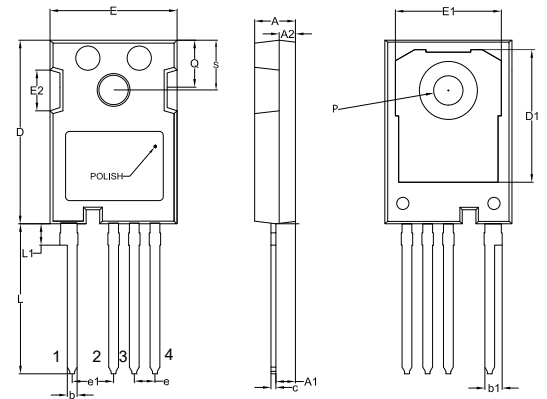
1. Pulse Test: Pulse Width $\leq 10\mu\text{s}$, Duty Cycle $\leq 1\%$.

Internal Structure



N-CHANNEL MOSFET

TO-247-4



| DIM | INCHES | | MM | | NOTE |
|-----|--------|-------|-------|-------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.190 | 0.205 | 4.80 | 5.20 | |
| A1 | 0.090 | 0.100 | 2.29 | 2.50 | |
| A2 | 0.075 | 0.08G | 1.88 | 2.08 | |
| b | 0.042 | 0.052 | 1.10 | 1.30 | |
| b1 | 0.09H | 0.11I | 2.35 | 2.75 | |
| b2 | 0.094 | 0.112 | 2.39 | 2.84 | |
| c | 0.022 | 0.027 | 0.55 | 0.68 | |
| D | 0.917 | 0.929 | 23.30 | 23.60 | |
| D1 | 0.640 | 0.61H | 16.25 | 15.6I | |
| E | 0.620 | 0.63G | 15.75 | 16.1I | |
| E1 | 0.51H | 0.55J | 13.00 | 14.0I | |
| E2 | 0.11H | 0.201 | 2.79 | 5.10 | |
| e | 0.100 | | 2.54 | | |
| L | 0.68H | 0.11J | 17.31 | 17.1I | |
| L1 | 0.15I | 0.11J | 3.81 | 4.3 | |
| P | 0.138 | 0.144 | 3.51 | 3.65 | Φ |
| Q | 0.20I | 0.236 | 5.08 | 6.00 | |
| S | 0.238 | 0.248 | 6.04 | 6.30 | |

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---------------------------------|---------------|--|------|-------|-----|------------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=100\mu A$ | 1200 | | | V |
| Gate-Source Leakage Current | I_{GSS} | $V_{DS}=0V, V_{GS}=18V$ | | | 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=1200V, V_{GS}=0V$ | | 1 | 10 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=5mA$ | 2.3 | 2.9 | 3.6 | V |
| | | $V_{DS}=V_{GS}, I_D=5mA, T_j=175^\circ C$ | | 2.2 | | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=18V, I_D=20A$ | | 77 | 85 | m Ω |
| | | $V_{GS}=18V, I_D=20A, T_j=175^\circ C$ | | 122 | | m Ω |
| Internal Gate Resistance | R_g | f=1MHz | | 3.1 | | Ω |
| Transconductance | g_{FS} | $V_{DS}=16V, I_D=20A$ | | 10 | | S |
| | | $V_{GS}=16V, I_D=20A, T_j=175^\circ C$ | | 9.2 | | |
| Diode Characteristics | | | | | | |
| Continuous Body Diode Current | I_S | | | 39 | | A |
| Diode Forward Voltage | V_{SD} | $V_{GS}=-4V, I_S=10A$ | | 3.9 | | V |
| | | $V_{DS}=0V, I_{SD}=10A, T_j=175^\circ C$ | | 3.2 | | V |
| Reverse Recovery Time | t_{rr} | | | 28.24 | | ns |
| Reverse Recovery Charge | Q_{rr} | $V_{GS}=-4V, I_{SD}=20A, dl_f/dt=2095A/\mu s$ | | 190 | | nC |
| Peak Reverse Recovery Current | I_{rrm} | | | 30.08 | | A |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=1000V, V_{GS}=0V, f=1MHz$ | | 890 | | pF |
| Output Capacitance | C_{oss} | | | 58 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 4 | | |
| Coss Stored Energy | E_{oss} | | | 34 | | μJ |
| Total Gate Charge | Q_g | $V_{DS}=800V, V_{GS}=-4/+18V, I_D=20A$ | | 41 | | nC |
| Gate-Source Charge | Q_{gs} | | | 12 | | |
| Gate-Drain Charge | Q_{gd} | | | 11 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}=800V, V_{GS}=-4/+15V, R_G=0\Omega, I_{DS}=20A$ | | 21 | | ns |
| Turn-On Rise Time | t_r | | | 17 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 14 | | |
| Turn-Off Fall Time | t_f | | | 8 | | |
| Turn-On switching energy | E_{on} | | | 377 | | μJ |
| Turn-Off switching energy | E_{off} | | | 14 | | |

Curve Characteristics

Fig. 1 - Typical Output Characteristics

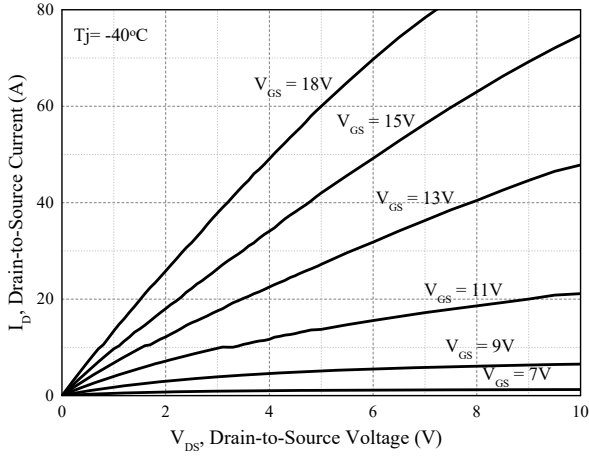


Fig. 2 - Typical Output Characteristics

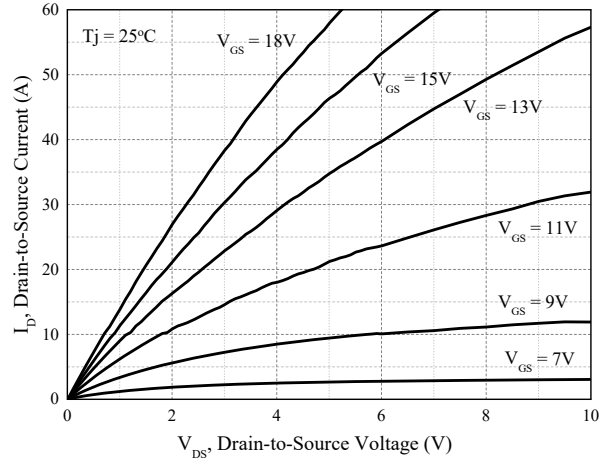


Fig. 3 - Typical Output Characteristics

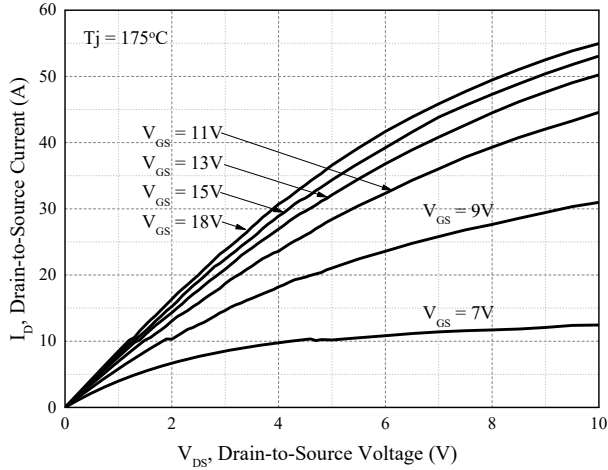


Fig. 4 - Transfer Characteristics for various junction temperature

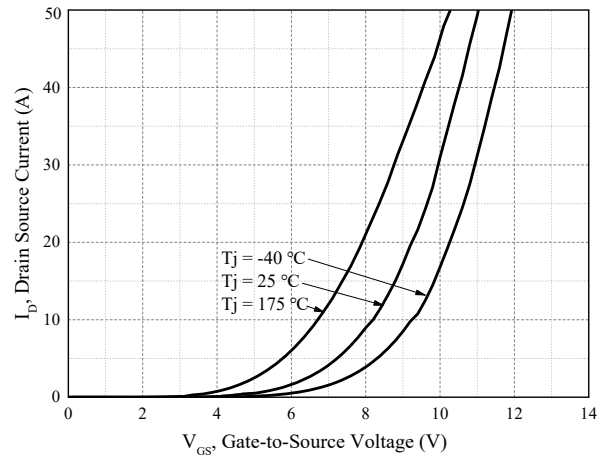


Fig. 5 - On-resistance vs. temperature for various gate voltage

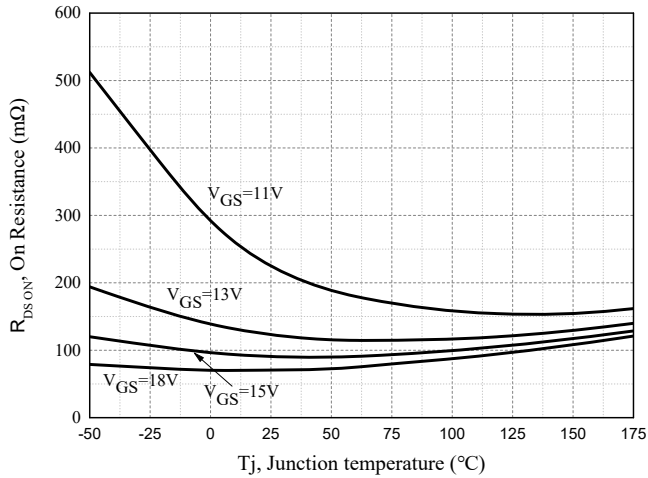
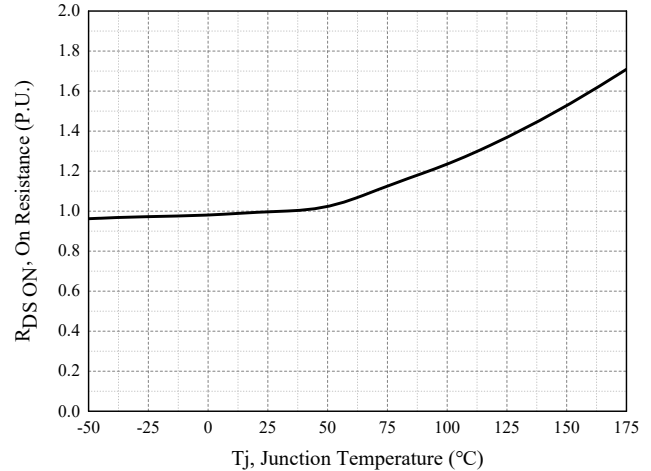


Fig. 6 - Normalized on-resistance vs. temperature



Curve Characteristics

Fig. 7 - On-resistance vs. drain current

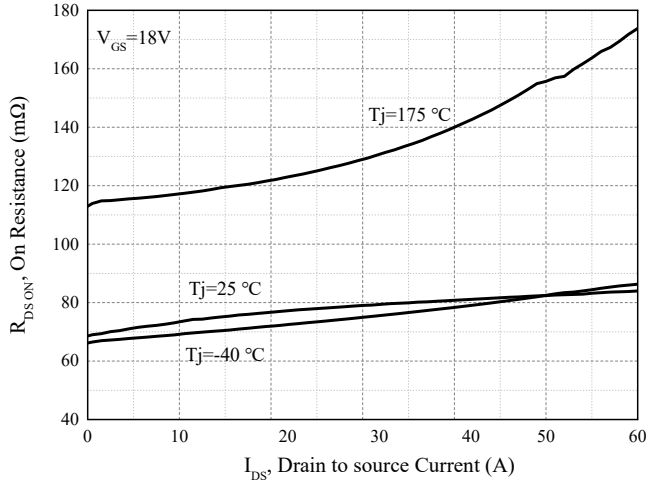


Fig. 8 - Body diode characteristic

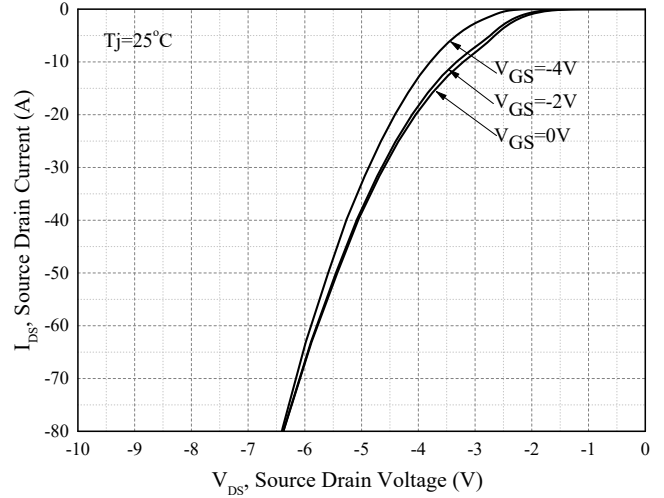


Fig. 9 - Body diode characteristic

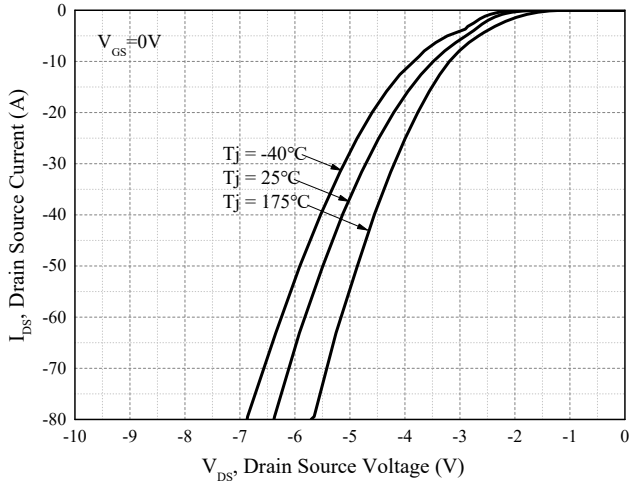


Fig. 10 - 3rd quadrant characteristic at $T_j = 25^\circ C$

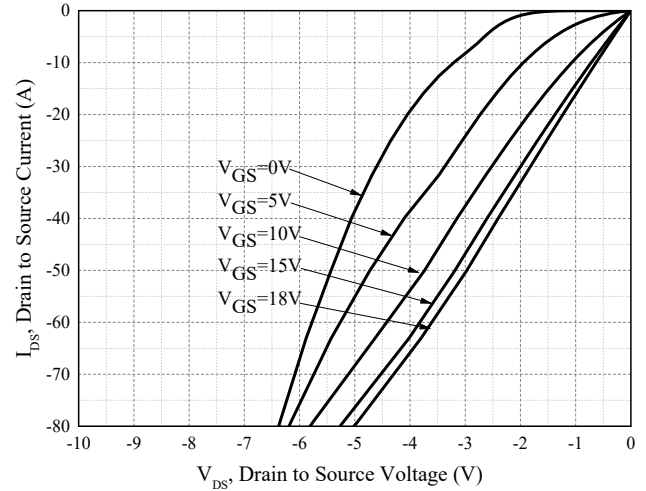


Fig. 11 - Threshold voltage vs. temperature

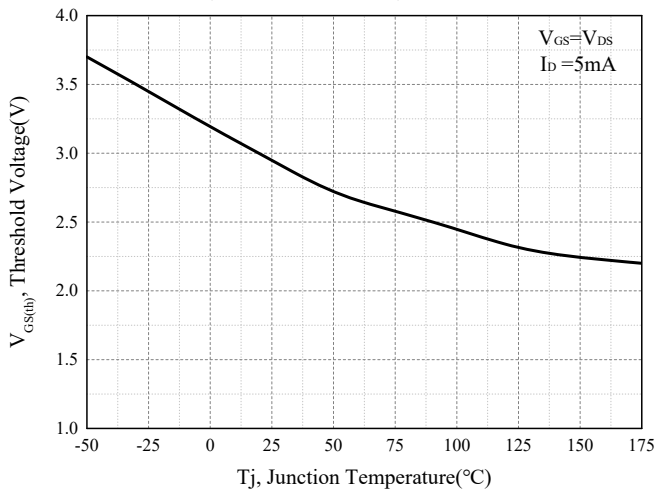
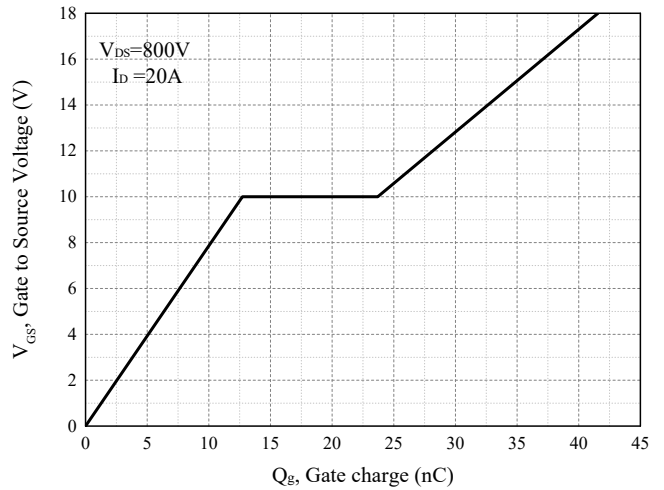
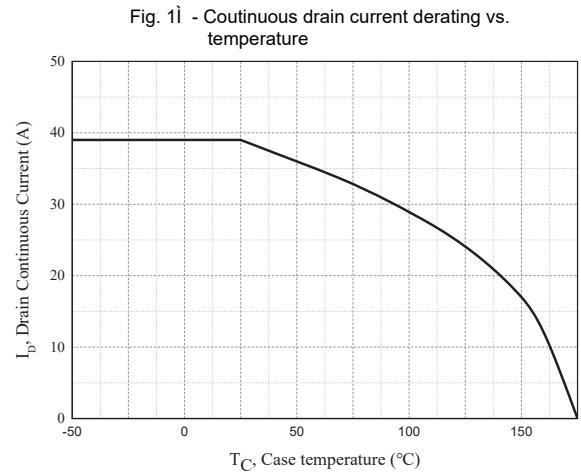
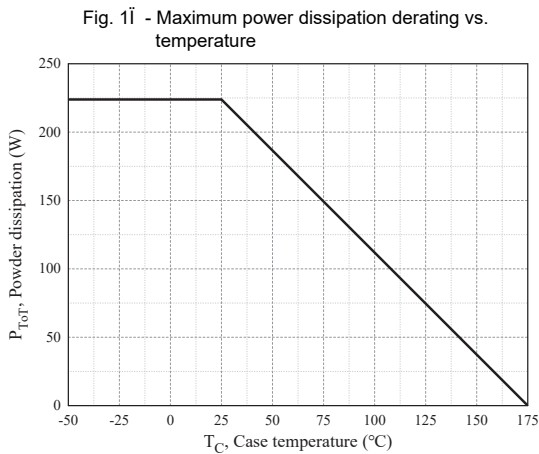
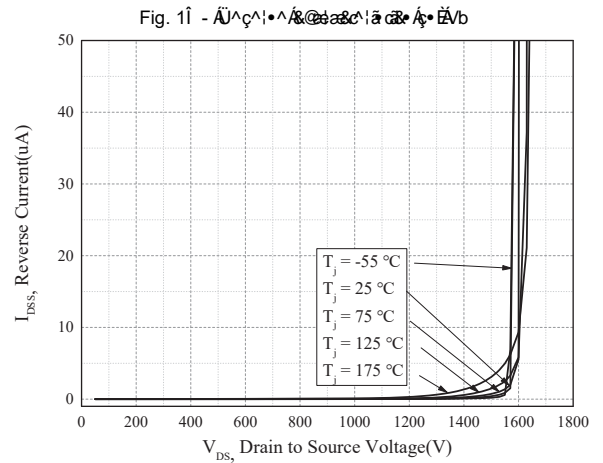
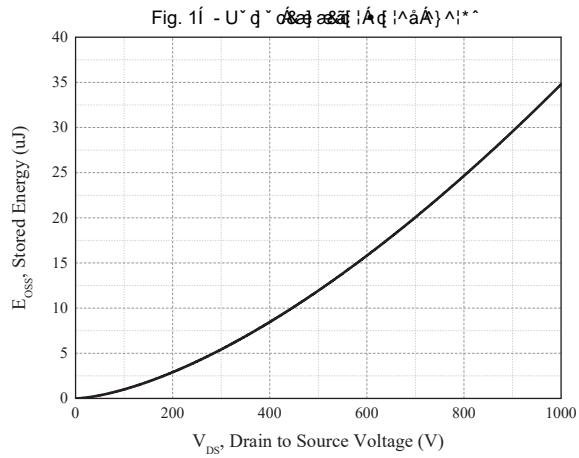
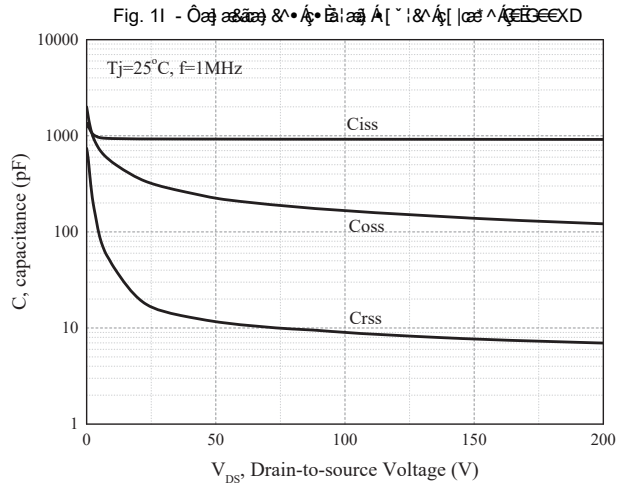
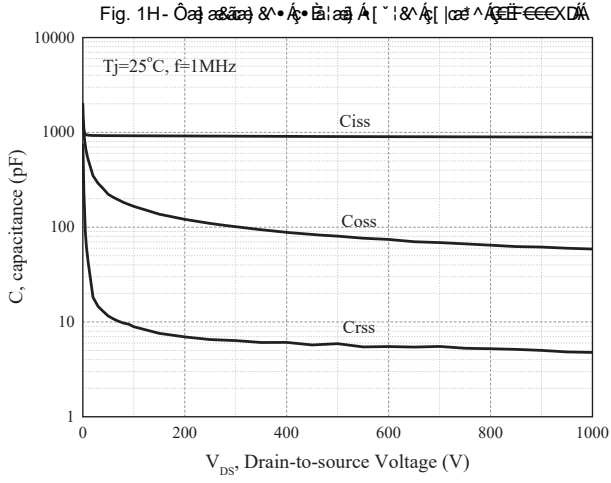


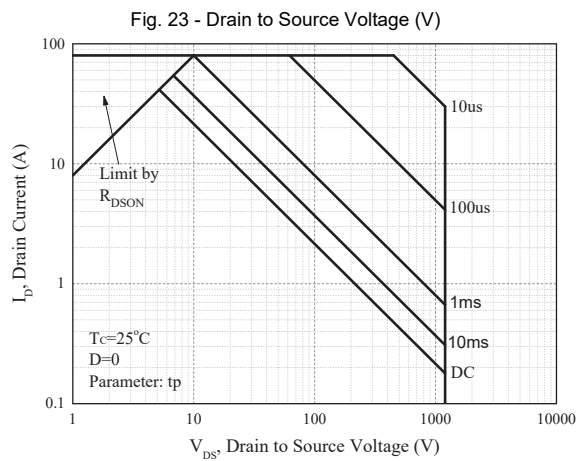
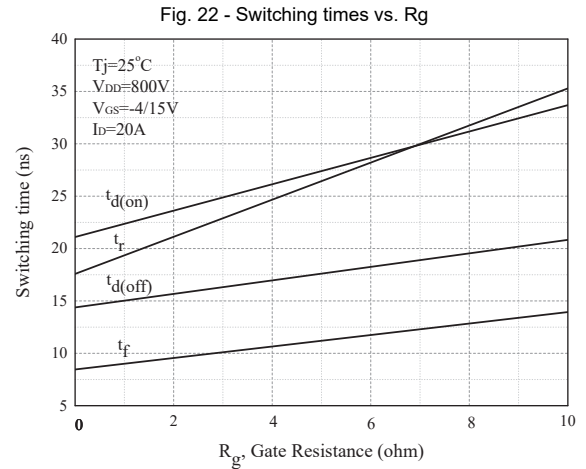
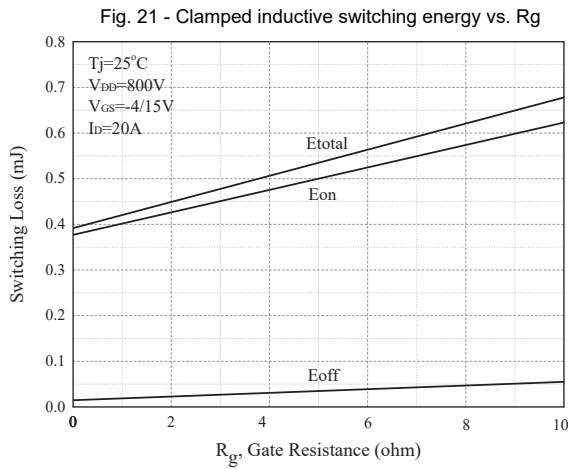
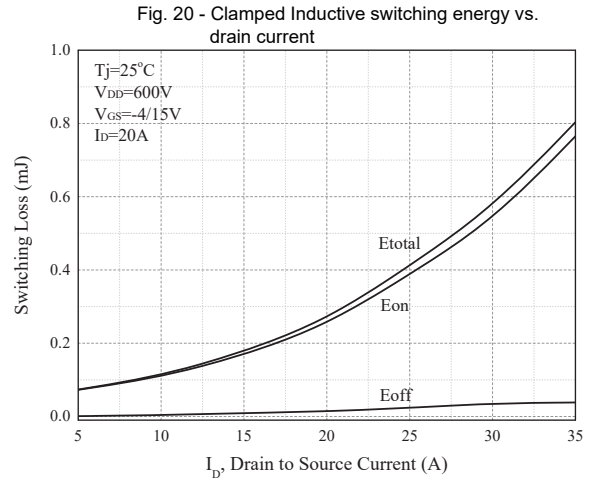
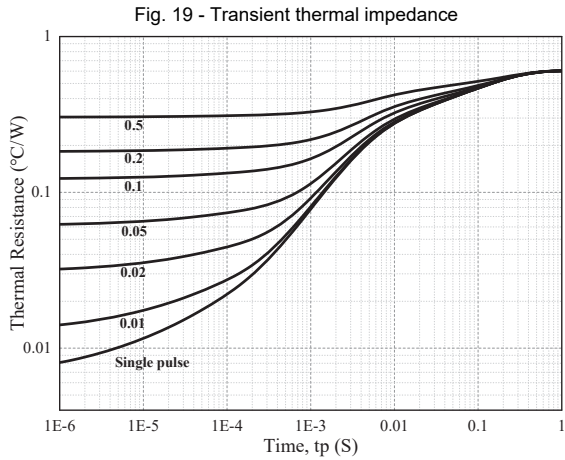
Fig. 12 - Gate charge characteristic



Curve Characteristics



Curve Characteristics



Ordering Information

| Device | Packing |
|------------------|---------------------------------------|
| SICW080N120Y4-BP | Tube:30pcs/Tube, 360pcs/Box,1.8K/Ctn; |

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