

Features

- SiC MOSFET Technology
- High Speed Switching
- Reduction Of Heat Sink Requirements
- Essentially No Switching Losses
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant("P" Suffix Designates RoHS Compliant. See Ordering Information) (Note2)

Maximum Ratings

- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance Junction to Ambient,Max(Note 3): 62°C/W
- Thermal Resistance Junction to Case,Typ : 0.90°C/W

Applications

- Solar Inverters
- Uninterruptible Power Supply
- Photovoltaic Inverter
- Battery Chargers
- Motor Drives

| Parameter | | Symbol | Rating | Unit | |
|--|-------------------|-----------------------|----------|------|----|
| Drain-Source Voltage | | V_{DS} | 1200 | V | |
| Gate-Source Voltage(Note 4) | | V_{GSmax} | -10/+25 | V | |
| Gate-Source Voltage | | V_{GSop} | -5/+20 | V | |
| Continuous Drain Current $V_{GS}=20V$ | $T_C=25^\circ C$ | I_D | 24 | A | |
| | $T_C=110^\circ C$ | | 16.5 | | |
| Pulsed Drain Current (Note 5) | | I_{DM} | 65 | A | |
| Total Power Dissipation | $T_C=25^\circ C$ | P_D | 166 | W | |
| | $T_C=110^\circ C$ | | 71 | | |
| Avalanche Energy, Single Pulse | | $V_{DD}=100V, I_D=7A$ | E_{AS} | 625 | mJ |

Note1: Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

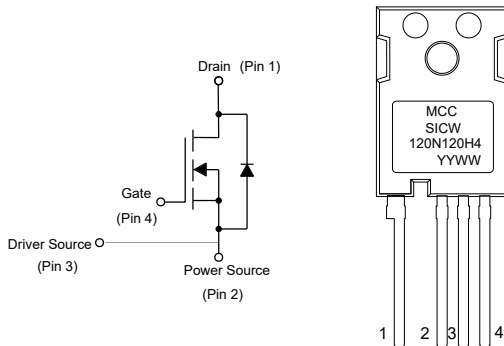
Note2: High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.

Note3: Device in a still air environment with $T_A=25^\circ C$.

Note4: AC f > 1Hz, duty cycle < 1%

Note5: Pulse Test: Pulse Width Limited by T_{jmax} .

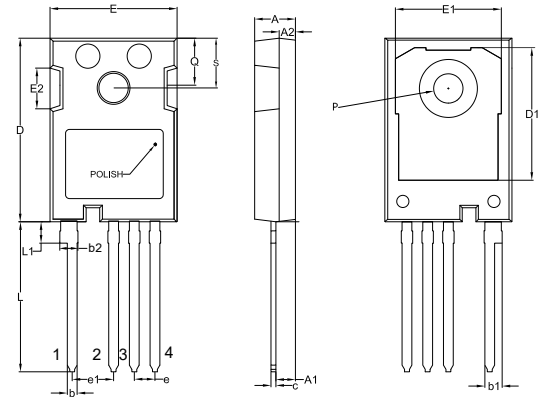
Internal Structure and Marking Code



Device Code: SICW120N120H4
Date Code: YYWW (Year & Week)

SiC N-CHANNEL MOSFET

TO-247-4



| DIM | INCHES | | MM | | NOTE |
|-----|--------|-------|-------|-------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.189 | 0.205 | 4.80 | 5.20 | |
| A1 | 0.090 | 0.098 | 2.29 | 2.50 | |
| A2 | 0.074 | 0.082 | 1.88 | 2.08 | |
| b | 0.043 | 0.054 | 1.10 | 1.36 | |
| b1 | 0.093 | 0.108 | 2.35 | 2.75 | |
| b2 | 0.094 | 0.112 | 2.39 | 2.84 | |
| c | 0.022 | 0.028 | 0.55 | 0.70 | |
| D | 0.917 | 0.929 | 23.30 | 23.60 | |
| D1 | 0.640 | 0.663 | 16.25 | 16.85 | |
| E | 0.620 | 0.632 | 15.75 | 16.05 | |
| E1 | 0.543 | 0.559 | 13.80 | 14.20 | |
| E2 | 0.173 | 0.201 | 4.4 | 5.10 | |
| e | 0.100 | | 2.54 | | |
| e1 | 0.199 | | 5.06 | | |
| L | 0.683 | 0.694 | 17.34 | 17.64 | |
| L1 | 0.157 | 0.169 | 4.00 | 4.30 | |
| P | 0.138 | 0.148 | 3.51 | 3.75 | Φ |
| Q | 0.220 | 0.236 | 5.60 | 6.00 | |
| S | 0.220 | 0.248 | 5.60 | 6.30 | |

Electrical Characteristics @ T_j=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 =100μA | 1200 | | | V | |
| Gate-Source Leakage Current | I _{GSS} | V _{DS} =0V, V _{GS} =20V | | | 250 | nA | |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =1200V, V _{GS} =0V | | | 50 | μA | |
| Gate-Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =10mA | 2 | 2.95 | 4.5 | V | |
| Drain-Source On-Resistance | R _{DS(on)} | V _{GS} =20V, I _D =10A | | 120 | 160 | mΩ | |
| | | V _{GS} =20V, I _D =10A, T _j =175°C | | 200 | | mΩ | |
| Internal Gate Resistance | R _g | f=1MHz, V _{AC} =25mV | | 1.8 | | Ω | |
| Transconductance | g _{FS} | V _{DS} =12.5V, I _D =60A | | 6.2 | | S | |
| Dynamic Characteristics | | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =800V, V _{GS} =0V, f=1MHz, V _{AC} =25mV | | 1083 | | pF | |
| Output Capacitance | C _{oss} | | | 56 | | | |
| Reverse Transfer Capacitance | C _{rss} | | | 8 | | | |
| Coss Stored Energy | E _{oss} | | | 23 | | μJ | |
| Total Gate Charge | Q _g | V _{DS} =800V, V _{GS} =-5/+20V, I _D =10A | | 67 | | nC | |
| Gate-Source Charge | Q _{gs} | | | 14.5 | | | |
| Gate-Drain Charge | Q _{gd} | | | 29 | | | |
| Turn-On Delay Time | t _{d(on)} | V _{DD} =800V, V _{GS} =0/+20V, R _G =10Ω, I _D =8A, R _L =100Ω | | 24 | | ns | |
| Rise Time | t _r | | | 24 | | | |
| Turn-Off Delay Time | t _{d(off)} | | | 34 | | | |
| Fall Time | t _f | | | 33 | | | |
| Turn-On switching energy | E _{on} | V _{DD} =800V, V _{GS} =0/+20V, R _G =2.7Ω, I _D =10A | | 13 | | μJ | |
| Turn-Off switching energy | E _{off} | | | 19 | | | |
| Diode Characteristics | | | | | | | |
| Continuous Body Diode Current | I _S | V _{GS} =0V, T _C =25°C | | 25 | | A | |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _{SD} =2.5A | | 3.4 | | V | |
| Reverse Recovery Time | t _{rr} | V _{GS} =0V, I _{SD} =10A, V _{DS} =400V, dI _F /dt=300A/μs | | 53 | | ns | |
| Reverse Recovery Charge | Q _{rr} | | | | 63 | | nC |
| Peak Reverse Recovery Current | I _{rrm} | | | | 2.25 | | A |

Curve Characteristics ($T_j=25^\circ\text{C}$ unless otherwise specified)

Fig. 1 - Typical Output Characteristic ($T_j=25^\circ\text{C}$)

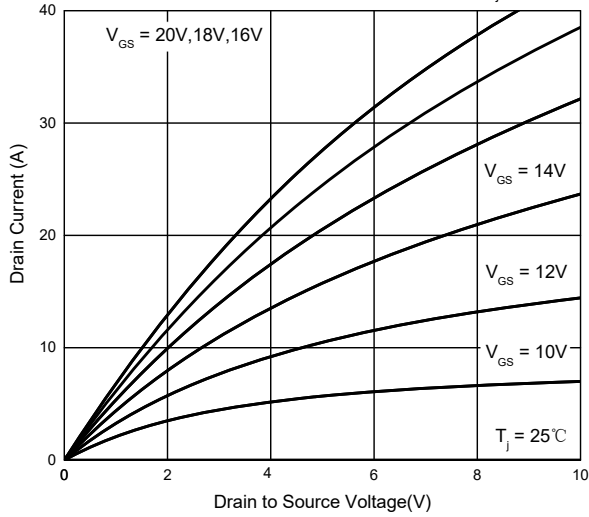


Fig. 2 - Typical Output Characteristic ($T_j=175^\circ\text{C}$)

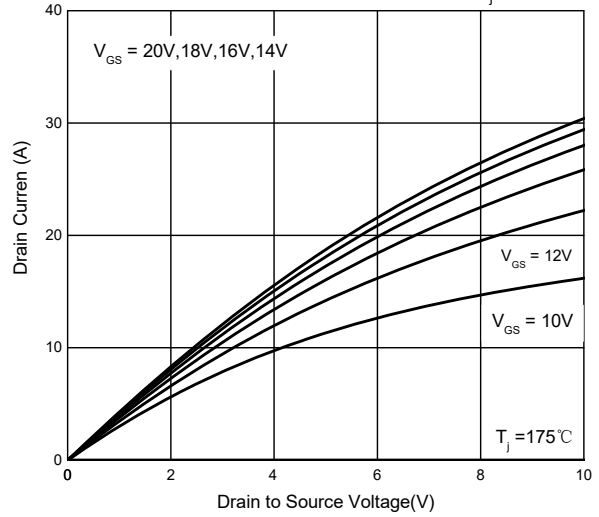


Fig. 3 - On-Resistance vs. Drain Current

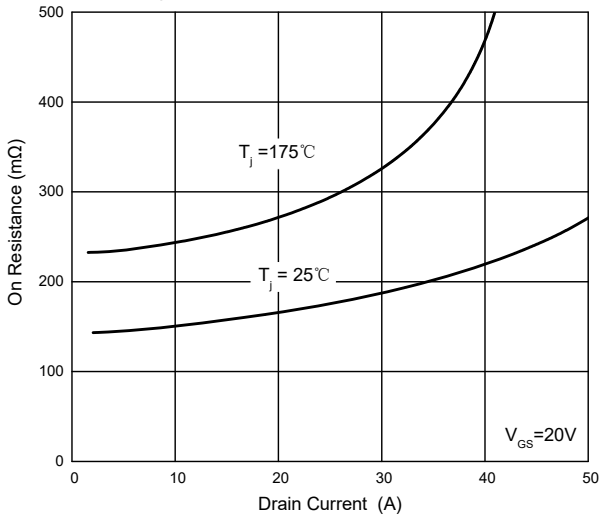


Fig. 4 - Typical Transfer Characteristic

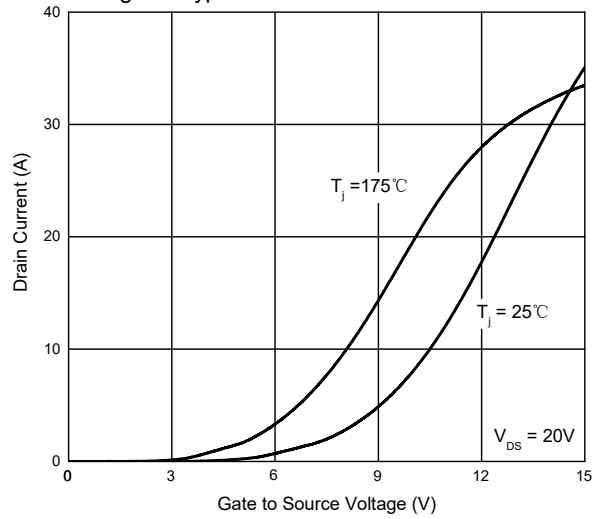


Fig. 5 - On-Resistance vs. Gate Voltage

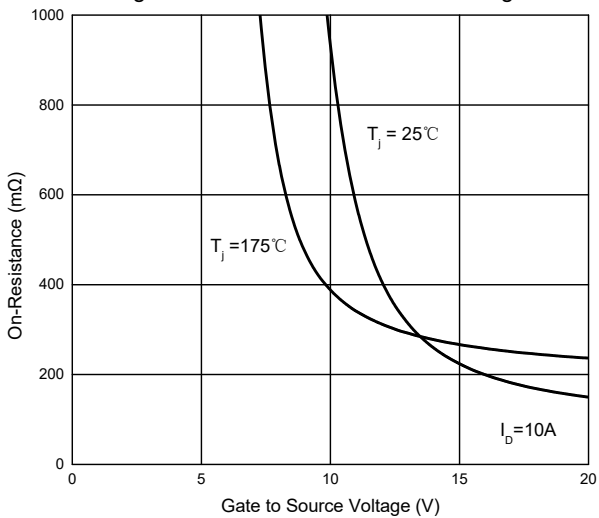
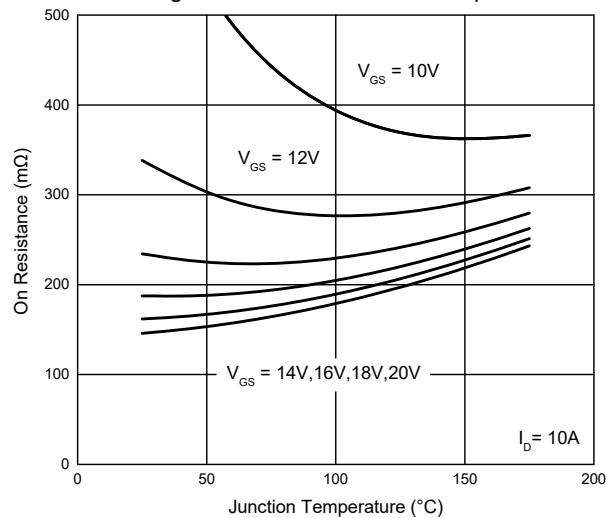


Fig. 6 - On-Resistance vs. Temperature



Curve Characteristics ($T_J=25\text{ }^\circ\text{C}$ unless otherwise specified)

Fig. 7 - Normalized On-Resistance vs. Temperature

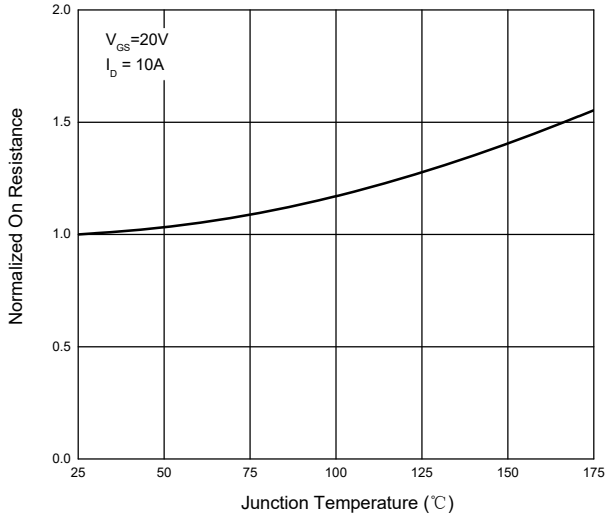


Fig. 8 - Reverse Output Voltage

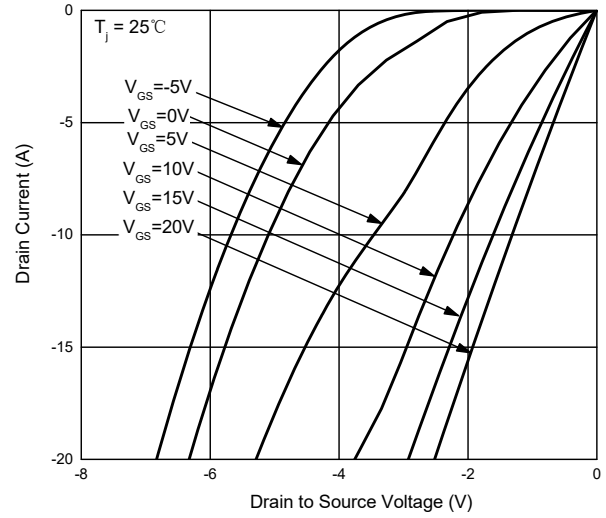


Fig. 9 - Reverse Output Voltage

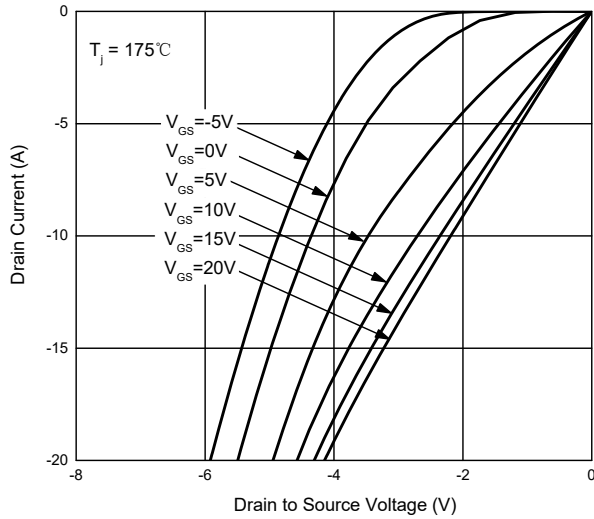


Fig. 10 - Capacitances vs. V_{DS}

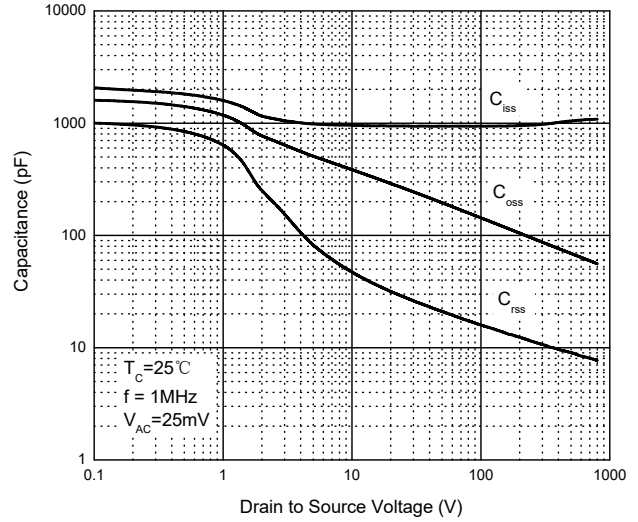


Fig. 11 - Threshold Voltage vs. Temperature

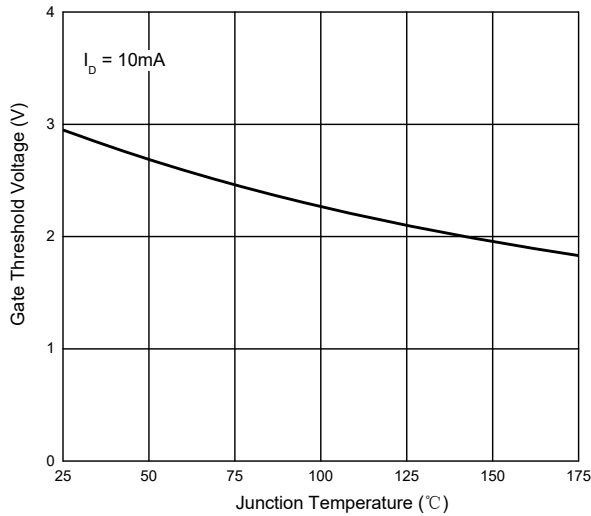
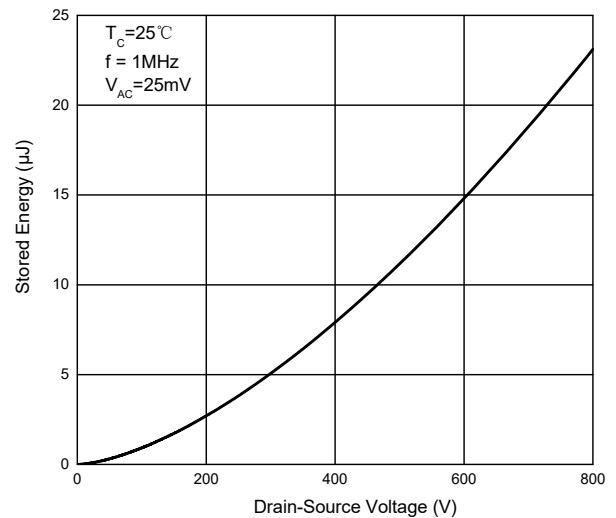


Fig. 12 - Output Capacitor Stored Energy



Curve Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 13 - Power Derating

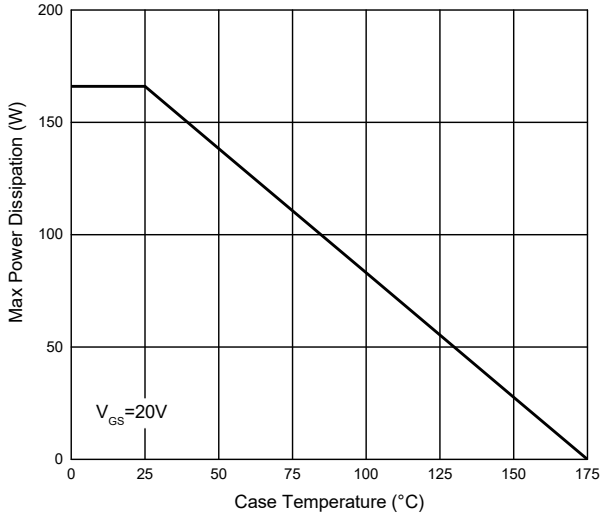


Fig. 14 - Drain Current Derating

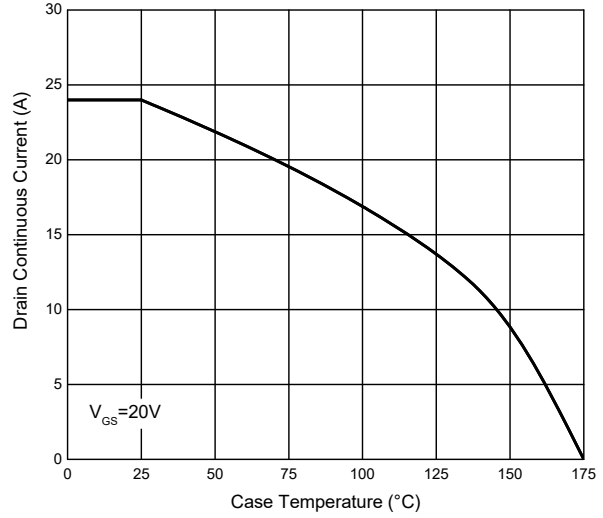


Fig. 15 - Safe Operation Area

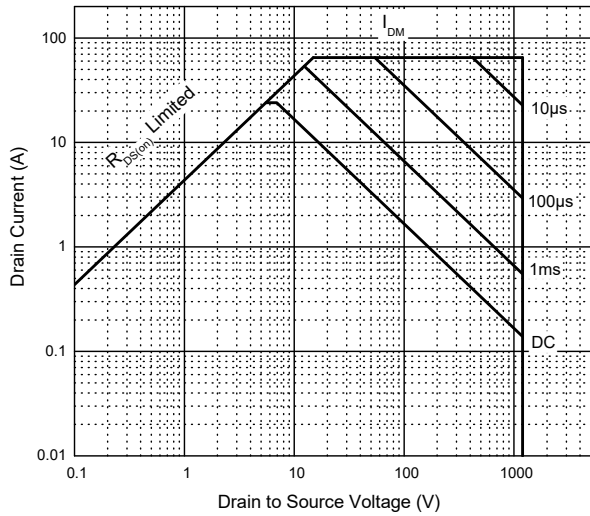


Fig. 16 - Typical Gate Charge

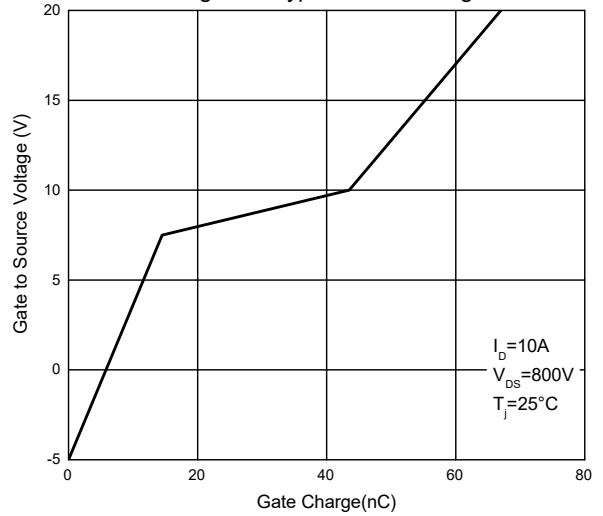


Fig. 17 - Clamped Inductive Switching Energy vs. Drain Current

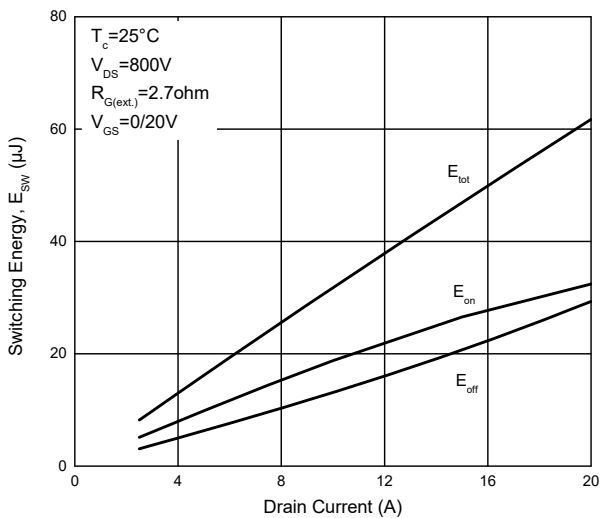
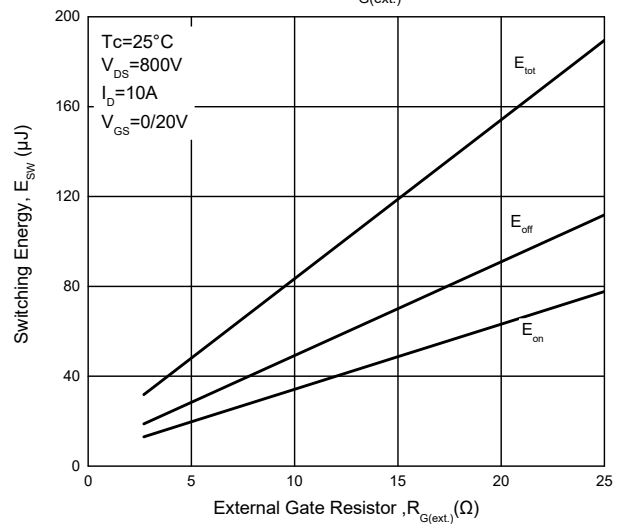
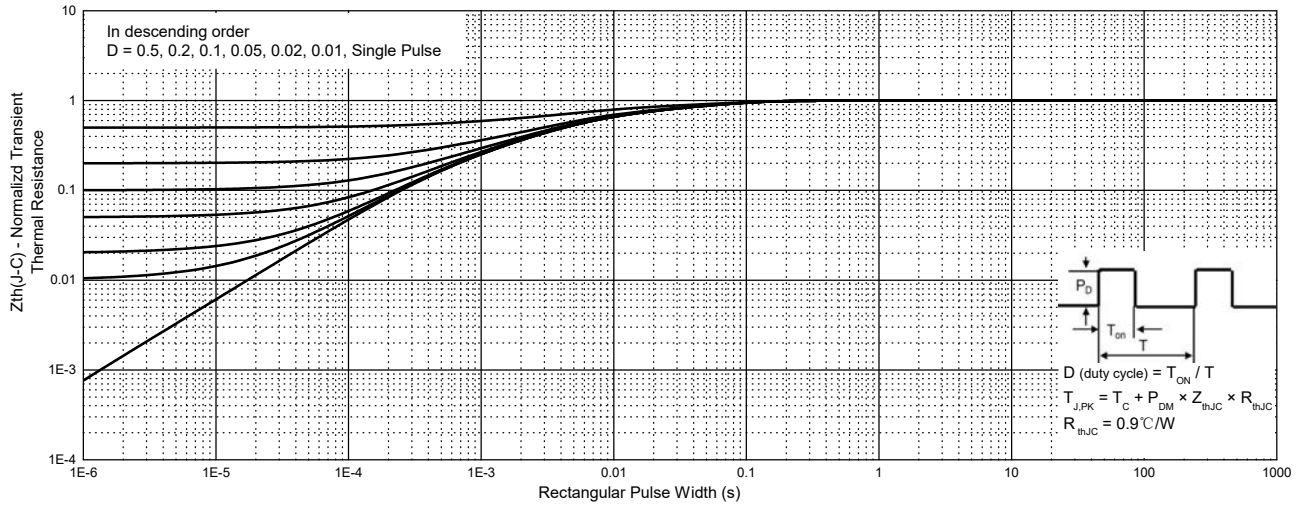


Fig. 18 - Clamped Inductive Switching Energy vs. External Gate Resistor ($R_{G(ext)}$)



Curve Characteristics ($T_J=25\text{ }^\circ\text{C}$ unless otherwise specified)

Fig.19 - Normalized Transient Thermal Impedance



Ordering Information

| Device | Packing |
|------------------|----------------------------|
| SICW120N120H4-BP | Tube:30pcs/Tube, 1.8K/Ctn; |

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