



GP2T080A120H

1200V SiC MOSFET

| | |
|-----------------|---------------|
| V_{DS} | 1200 V |
| $R_{DS,on}$ | 77 m Ω |
| I_D (TC=25°C) | 35 A |
| $T_{J,max}$ | 175°C |

Features

- High speed switching
- Reliable body diode
- All parts tested to above 1400V
- Avalanche tested to 200mJ
- Driver source pin for gate driving
- Increased creepage due to notched design

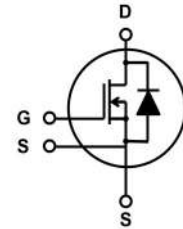
Benefits

- Lower capacitance
- Higher system efficiency
- Easy to parallel
- Lower Qg

Applications

- Solar Inverters
- Switch mode power supplies, UPS
- Induction Heating and Welding
- EV charging stations
- High Voltage DC/DC Converters
- Motor Drives

Package



- (1) D (Drain)
- (2) S (Source)
- (3) S (Driver Source)
- (4) G (Gate)

| Part # | Package | Marking |
|--------------|-----------|-----------|
| GP2T080A120H | TO-247-4L | 2T080A120 |



Maximum Ratings, at $T_J=25^\circ\text{C}$, unless otherwise specified

| Characteristics | Symbol | Conditions | Values | Unit |
|---------------------------------|--------------------|-------------------------------------|-----------|------------------|
| Drain-Source Voltage | V_{rated} | $V_{GS}=0V, I_D=1\mu A$ | 1200 | V |
| Continuous Drain Current | I_D | $T_C=25^\circ\text{C}, V_{GS}=20V$ | 35 | A |
| | | $T_C=100^\circ\text{C}, V_{GS}=20V$ | 26 | |
| Pulsed Drain Current | $I_{D,pulse}$ | $T_C=25^\circ\text{C}$ | 80 | |
| Gate Source Voltage | V_{GSmax} | | -10/25 | V |
| | V_{GSop} | Recommended operational | -5/20 | |
| Power Dissipation | P_{tot} | $T_C=25^\circ\text{C}$ | 188 | W |
| Operating & Storage Temperature | $T_J, T_{storage}$ | Continuous | -55...175 | $^\circ\text{C}$ |
| Single Pulse Avalanche Energy | E_{AS} | $L=1mH, I_{AS}=20.0A, V=50V$ | 200 | mJ |

Thermal Characteristics

| Characteristics | Symbol | Conditions | Values | | | Unit |
|---|------------|------------|--------|------|------|--------------------|
| | | | min. | typ. | max. | |
| Thermal Resistance, Junction to Case | R_{thJC} | | - | 0.65 | 0.80 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Ambient | R_{thJA} | | - | - | 40.0 | |

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Static Electrical Characteristics, at $T_J=25^\circ\text{C}$, unless otherwise specified

| Characteristics | Symbol | Conditions | Values | | | Unit |
|---------------------------------|--------------|--|--------|------|------|------------|
| | | | min. | typ. | max. | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=1mA$ | 1200 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=1200V, V_{GS}=0V$ | - | 0.1 | 1.0 | μA |
| | | $V_{DS}=1200V, V_{GS}=0V, T_J=175^\circ\text{C}$ | - | 1 | - | |
| Gate-Source Leakage Current | I_{GSS+} | $V_{GS}=20V, V_{DS}=0V$ | - | <+10 | 100 | nA |
| | I_{GSS-} | $V_{GS}=-5V, V_{DS}=0V$ | - | >-10 | -100 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=10mA$ | 2 | 2.8 | 4 | V |
| | | $V_{GS}=V_{DS}, I_D=10mA, T_J=125^\circ\text{C}$ | - | 2.1 | - | |
| | | $V_{GS}=V_{DS}, I_D=10mA, T_J=175^\circ\text{C}$ | - | 1.9 | - | |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=20V, I_D=20A$ | - | 77 | 100 | m Ω |
| | | $V_{GS}=20V, I_D=10A$ | - | 71 | 90 | |
| | | $V_{GS}=20V, I_D=20A, T_J=125^\circ\text{C}$ | - | 106 | - | |
| | | $V_{GS}=20V, I_D=20A, T_J=175^\circ\text{C}$ | - | 134 | - | |
| Gate Input Resistance | R_G | $f=1MHz, V_{AC}=25mV, D-S$ Short | - | 3.0 | - | Ω |

AC Electrical Characteristics, at $T_J=25^\circ\text{C}$, unless otherwise specified

| Characteristics | Symbol | Conditions | Values | | | Unit |
|------------------------------|--------------|--|--------------------|------|------|---------|
| | | | min. | typ. | max. | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V$ $V_{DS}=1000V$ $f=200kHz, V_{ac}=25mV$ | - | 1377 | - | pF |
| Output Capacitance | C_{OSS} | | - | 62 | - | |
| Reverse Transfer Capacitance | C_{RSS} | | - | 4 | - | |
| Coss Stored Energy | E_{OSS} | | - | 38 | - | |
| Turn-On Switching Energy | E_{ON} | $V_{DD}=800V, I_{DS}=20A,$ $R_{G(ext)}=2.5\Omega,$ $V_{GS}=-5/+20V, L=975\mu H,$ | - | 208 | - | μJ |
| Turn-Off Switching Energy | E_{OFF} | | - | 25 | - | |
| Total Switching Energy | E_{TOT} | | FWD = GP2T080A120H | - | 233 | |
| Turn-On Switching Energy | E_{ON} | $V_{DD}=800V, I_{DS}=20A,$ $R_{G(ext)}=2.5\Omega,$ $V_{GS}=-5/+20V, L=975\mu H,$ | - | 167 | - | μJ |
| Turn-Off Switching Energy | E_{OFF} | | - | 27 | - | |
| Total Switching Energy | E_{TOT} | | FWD = GP3D010A120A | - | 194 | |
| Turn-On Delay Time | $t_{D(on)}$ | $V_{DD}=800V, I_{DS}=20A,$ $R_{G(ext)}=2.5\Omega, V_{GS}=-5V/20V,$ $L=975\mu H,$ | - | 9 | - | ns |
| Rise Time | t_R | | - | 4 | - | |
| Turn-Off Delay Time | $t_{D(off)}$ | | - | 15 | - | |
| Fall Time | t_F | | FWD = GP2T080A120H | - | 10 | |
| Total Gate Charge | Q_G | $V_{DD}=800V, I_{DS}=20A$ $V_{GS}=-5/20V$ | - | 61 | - | nC |
| Gate to Source Charge | Q_{GS} | | - | 24 | - | |
| Gate to Drain Charge | Q_{GD} | | - | 14 | - | |

Body Diode Characteristics, at $T_J=25^\circ\text{C}$, unless otherwise specified

| Characteristics | Symbol | Conditions | Values | | | Unit |
|----------------------------------|-----------|--|--------|------|------|------|
| | | | min. | typ. | max. | |
| Max Continuous Diode Fwd Current | I_S | $V_{GS}=-5V, T_C=25^\circ\text{C}$ | - | - | 43 | A |
| Diode Forward Voltage | V_{SD} | $V_{GS}=-5V, I_S=10A$ | - | 3.8 | - | V |
| Reverse Recovery Time | t_{RR} | $I_S=20A, V_R=800V, V_{GS}=-5V$ $di_F/dt=8.0A/ns$ | - | 8 | - | ns |
| Reverse Recovery Charge | Q_{RR} | | - | 130 | - | nC |
| Peak Reverse Recovery Current | I_{RRM} | | - | 29 | - | A |

Typical Performance

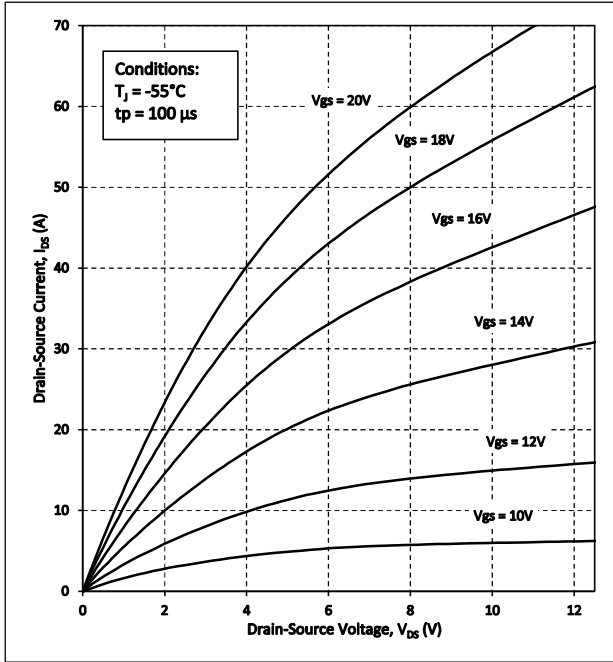


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

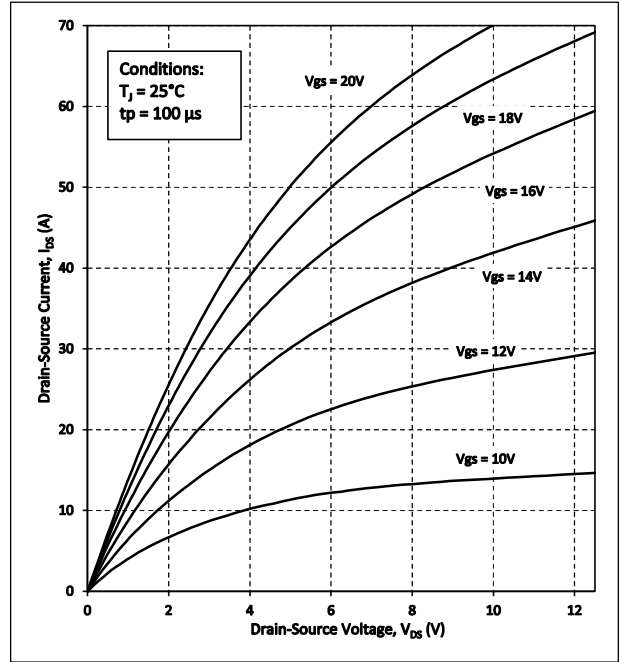


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

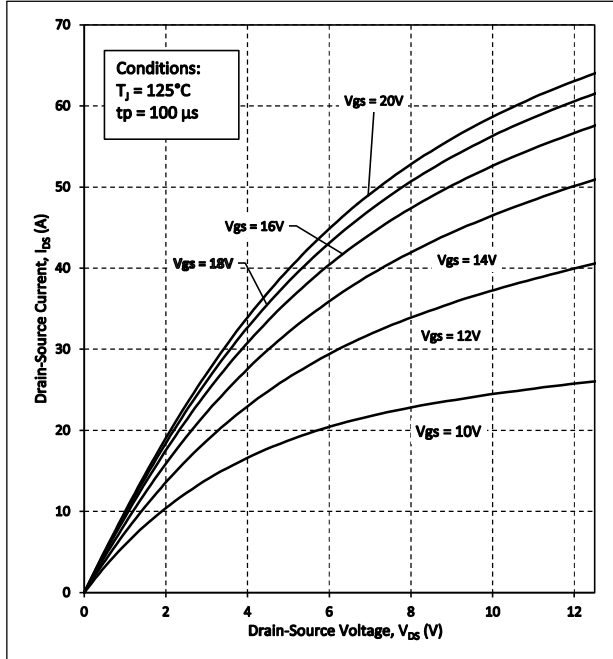


Figure 3. Output Characteristics $T_j = 125^\circ\text{C}$

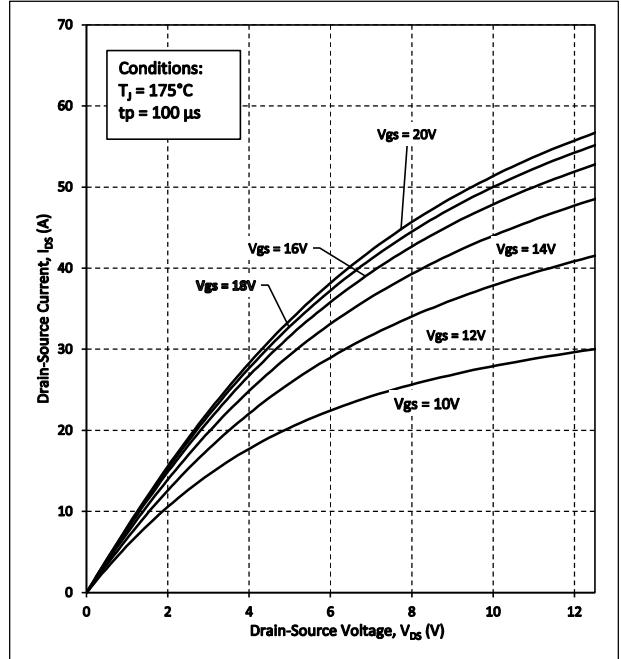


Figure 4. Output Characteristics $T_j = 175^\circ\text{C}$

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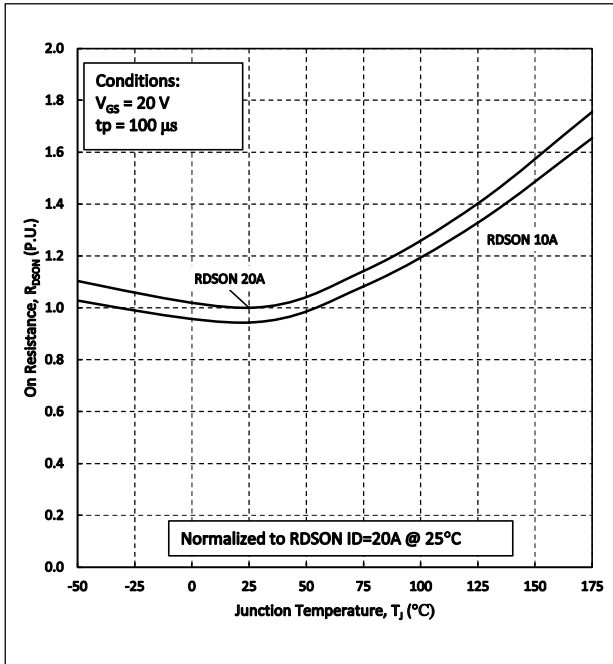


Figure 5. Normalized On-Resistance vs. Temperature

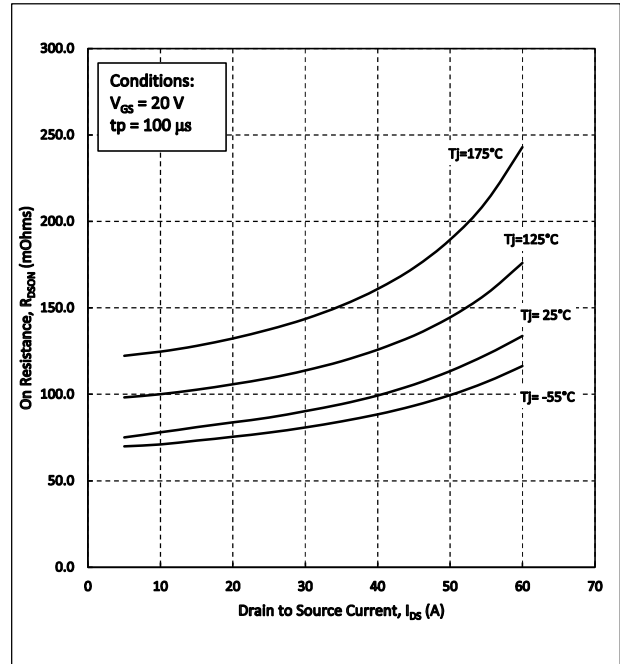


Figure 6. On-Resistance vs. Drain Current For Various Temperature

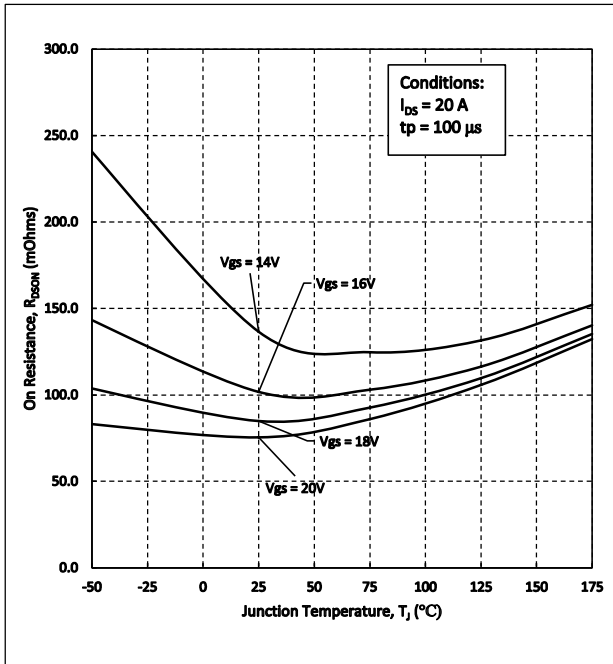


Figure 7. On-Resistance vs. Temperature For Various Gate Voltages

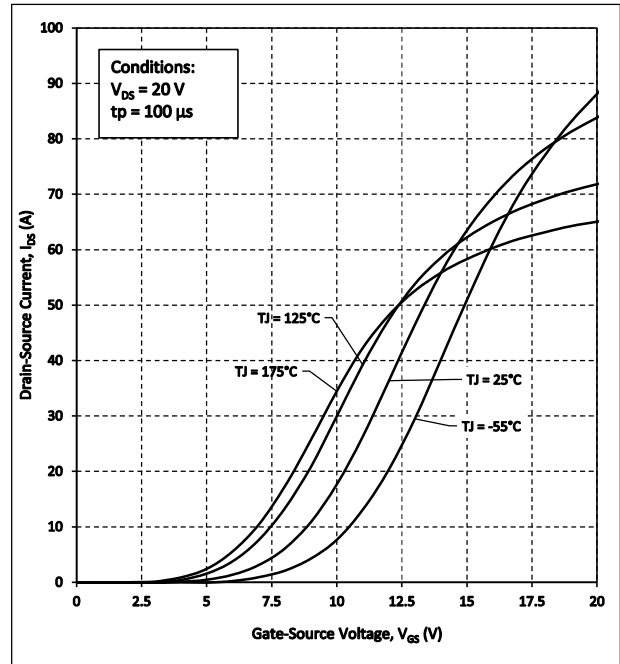


Figure 8. Transfer Characteristic for Various Junction Temperatures

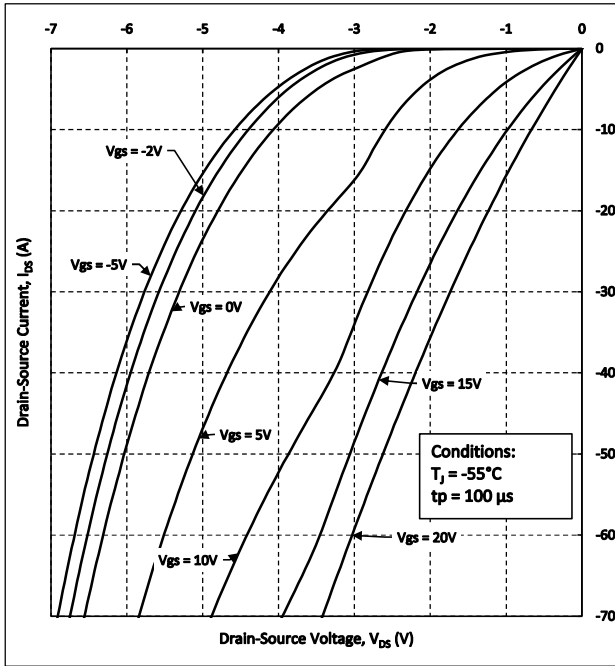


Figure 9. Body Diode Characteristics at $T_J = -55^\circ\text{C}$

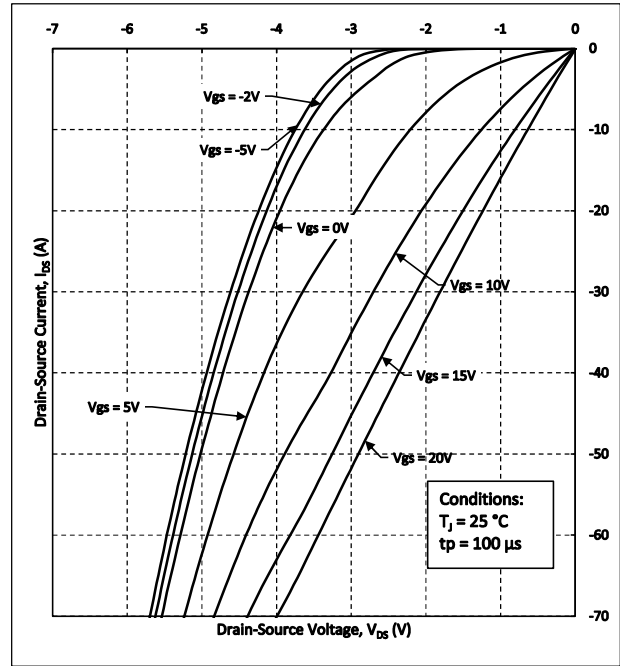


Figure 10. Body Diode Characteristics at $T_J = 25^\circ\text{C}$

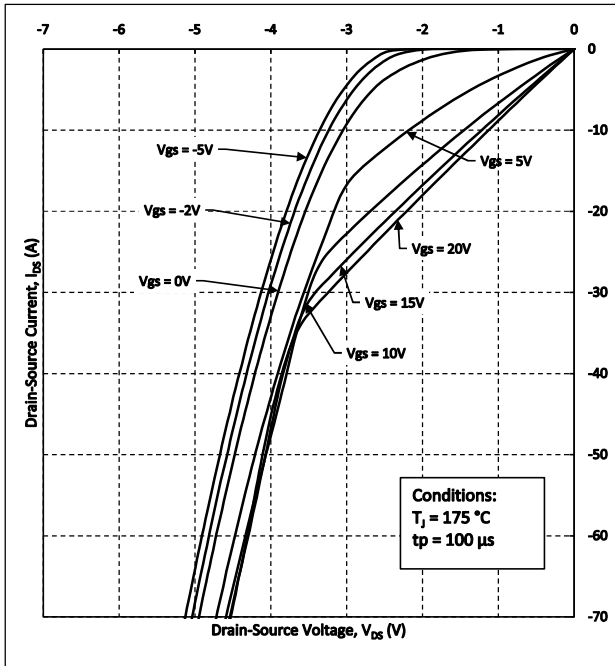


Figure 11. Body Diode Characteristics at $T_J = 175^\circ\text{C}$

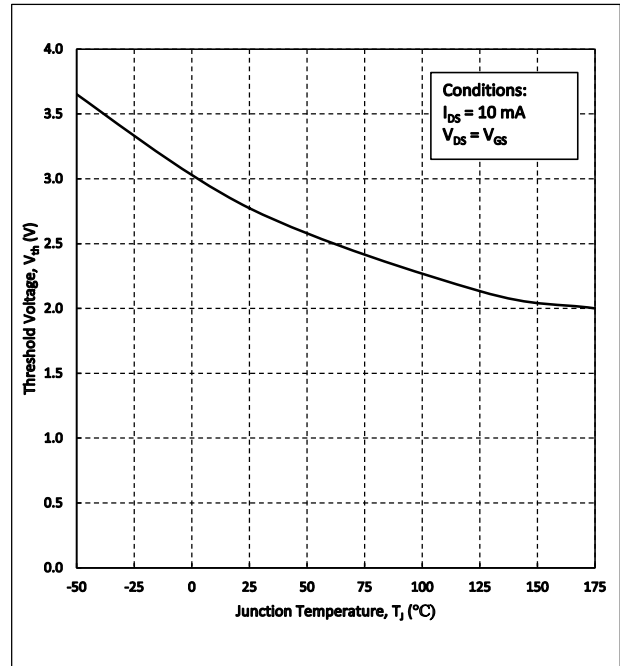


Figure 12. Threshold Voltage vs. Temperature

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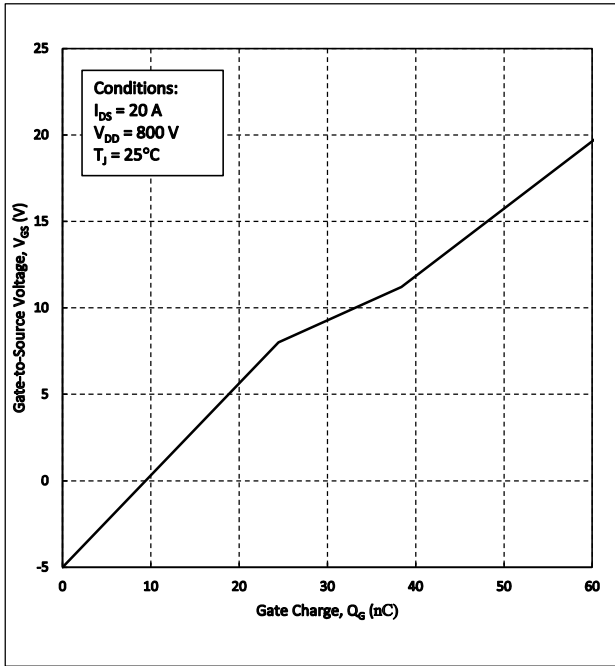


Figure 13. Gate Charge Characteristics

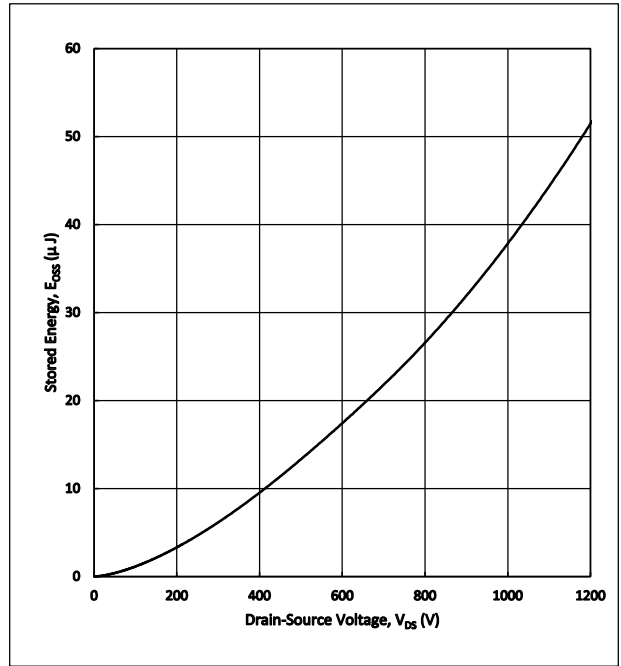


Figure 14. Output Capacitor Stored Energy

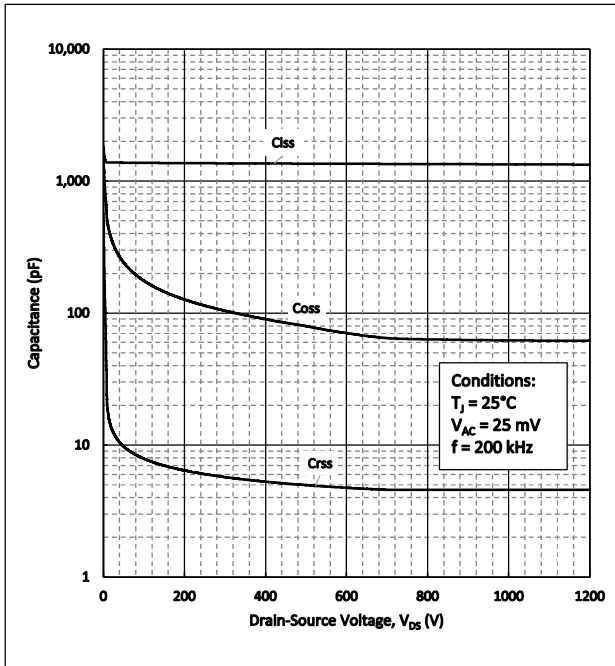


Figure 15. Capacitance vs Drain-Source Voltage

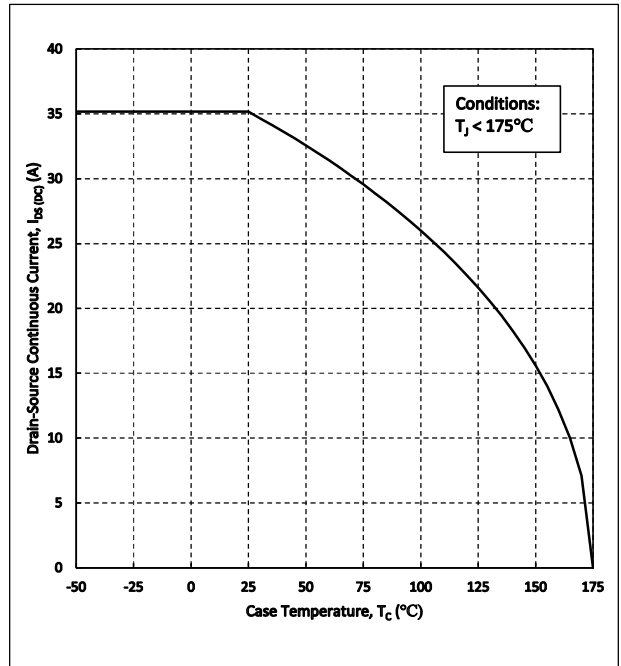


Figure 16. Continuous Drain Current Derating vs. Case Temperature

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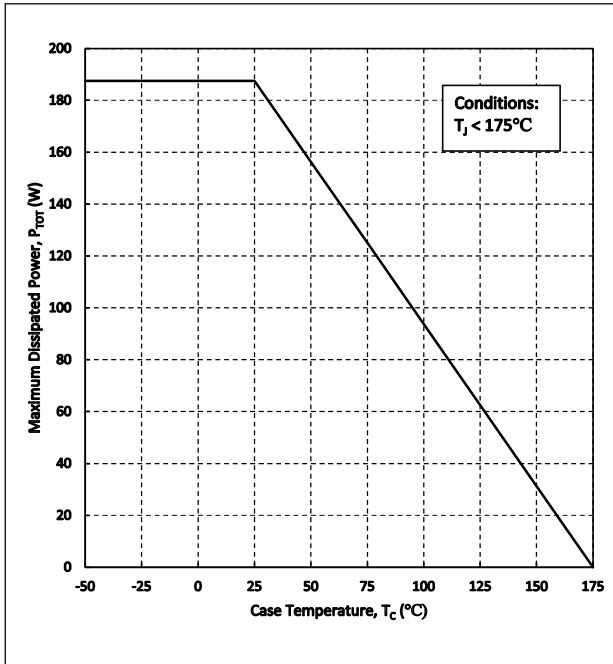


Figure 17. Maximum Power Dissipation Derating vs Case Temperature

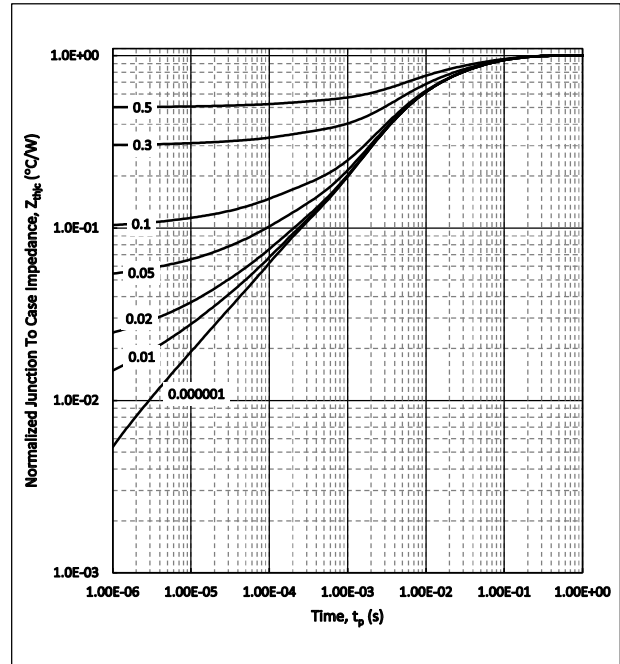


Figure 18. Transient Thermal impedance (Junction to Case)

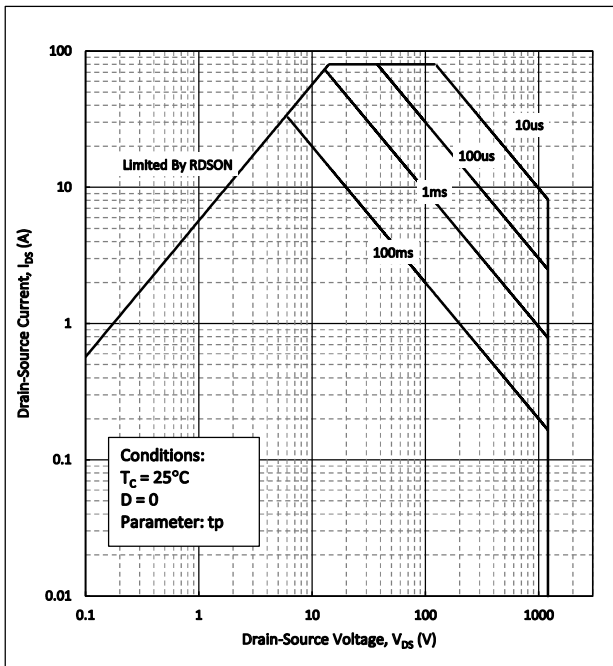


Figure 19. Safe Operating Area

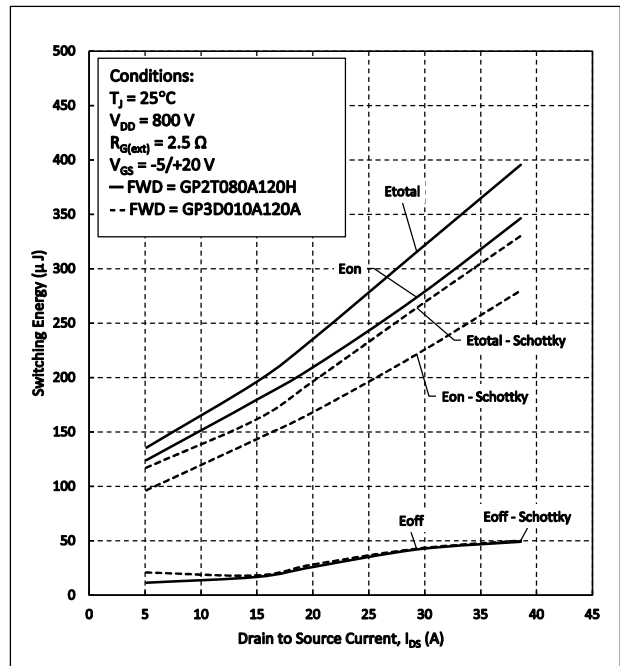


Figure 20. Clamped Inductive Switching Energy vs. Drain Current

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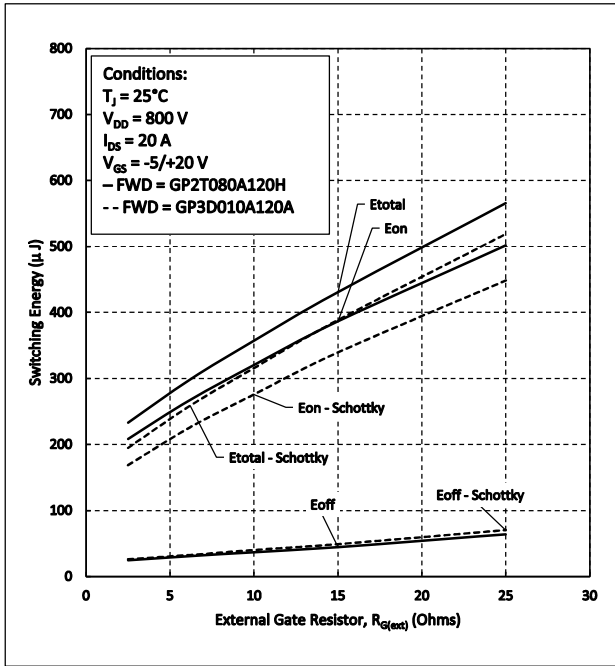


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

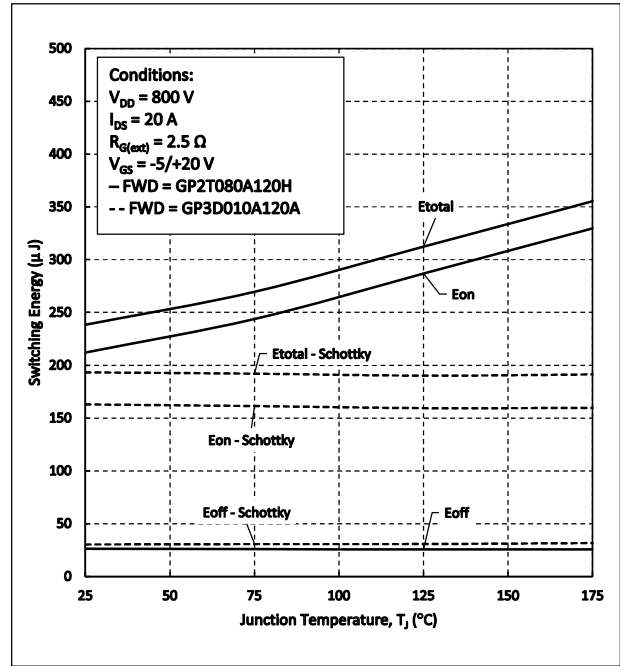


Figure 22. Clamped Inductive Switching Energy vs. Temperature

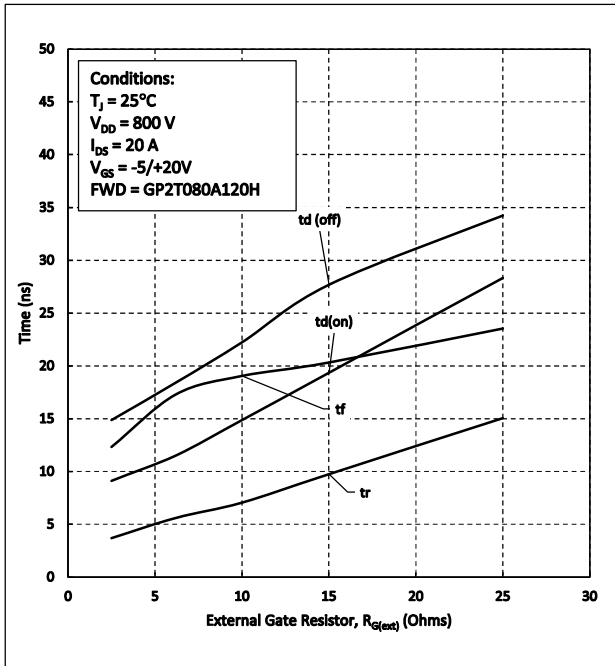


Figure 23. Switching Times vs $R_{G(ext)}$

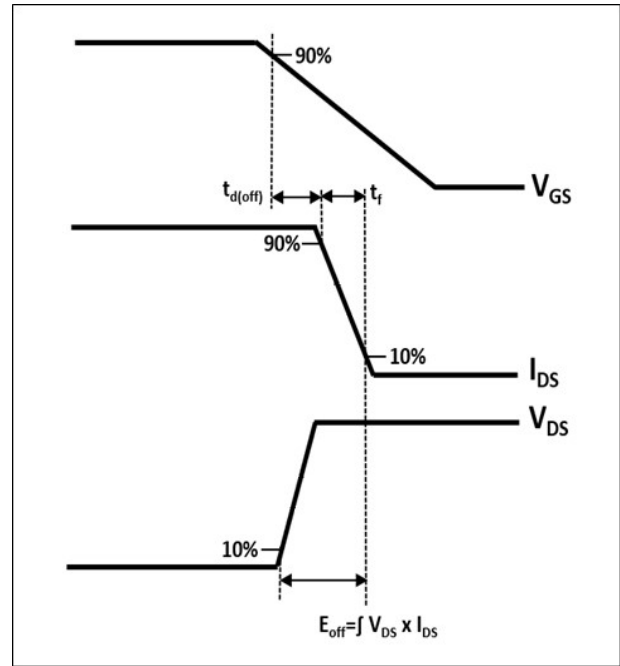


Figure 24. Turn-off Transient Definitions

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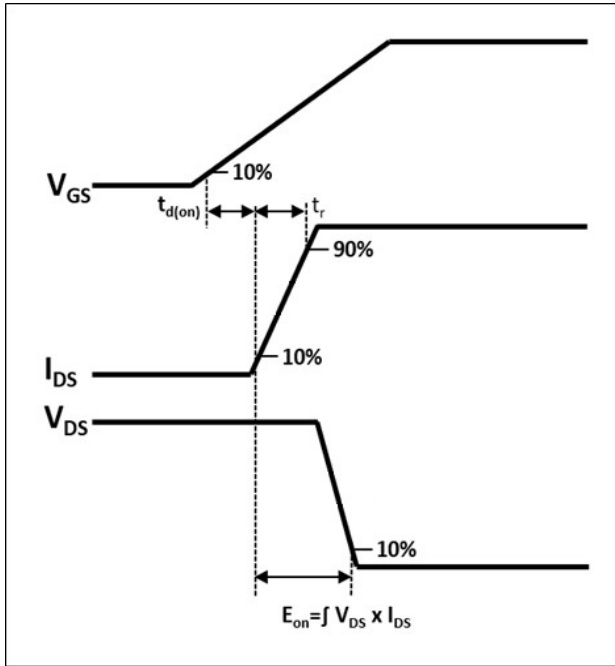


Figure 25. Turn-on Transient Definitions

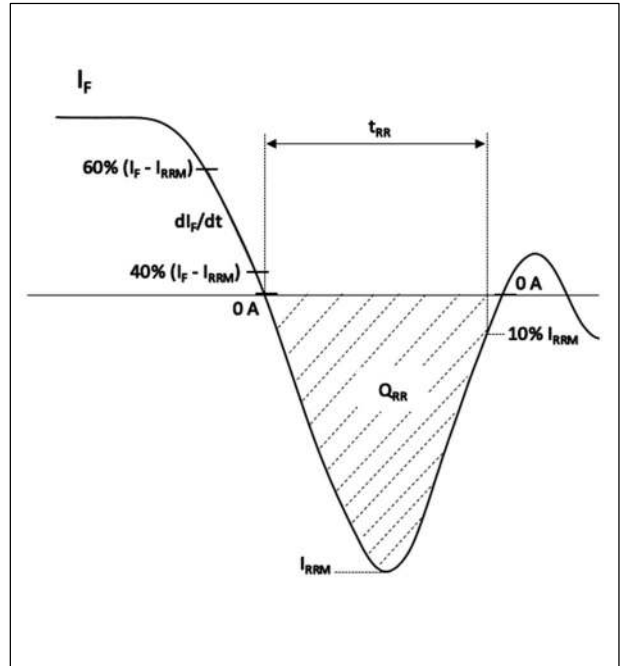
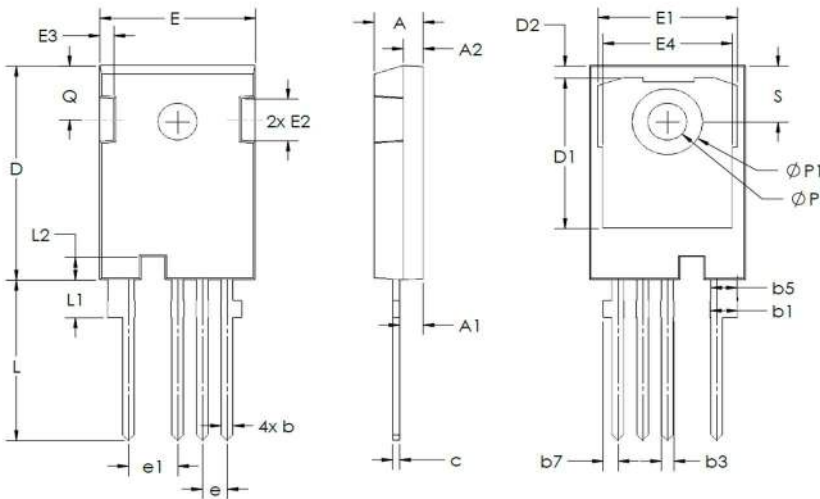


Figure 26. Reverse Recovery Definitions

Package Dimensions TO-247-4L



| Sym | Millimeters | | Inches | |
|-----|-------------|-------|-----------|-------|
| | Min | Max | Min | Max |
| A | 4.83 | 5.21 | 0.190 | 0.205 |
| A1 | 2.29 | 2.54 | 0.090 | 0.100 |
| A2 | 1.91 | 2.16 | 0.075 | 0.085 |
| b | 1.07 | 1.33 | 0.042 | 0.052 |
| b1 | 2.39 | 2.94 | 0.094 | 0.116 |
| b3 | 1.07 | 1.60 | 0.042 | 0.063 |
| b5 | 2.39 | 2.69 | 0.094 | 0.106 |
| b7 | 1.30 | 1.70 | 0.051 | 0.067 |
| c | 0.55 | 0.68 | 0.022 | 0.027 |
| c1 | 0.55 | 0.65 | 0.022 | 0.026 |
| D | 23.30 | 23.60 | 0.917 | 0.929 |
| D1 | 16.25 | 17.65 | 0.640 | 0.695 |
| D2 | 0.95 | 1.25 | 0.037 | 0.049 |
| E | 15.75 | 16.13 | 0.620 | 0.635 |
| E1 | 13.10 | 14.15 | 0.516 | 0.557 |
| E2 | 3.68 | 5.10 | 0.145 | 0.201 |
| E3 | 1.00 | 1.90 | 0.039 | 0.075 |
| E4 | 12.38 | 13.43 | 0.487 | 0.529 |
| e | 2.54 BSC | | 0.100 BSC | |
| e1 | 5.08 BSC | | 0.200 BSC | |
| L | 17.31 | 17.82 | 0.681 | 0.702 |
| L1 | 3.97 | 4.37 | 0.156 | 0.172 |
| L2 | 2.35 | 2.65 | 0.093 | 0.104 |
| φP | 3.51 | 3.65 | 0.138 | 0.144 |
| φP1 | 7.19 REF | | 0.283 REF | |
| Q | 5.49 | 6.00 | 0.216 | 0.236 |
| S | 6.04 | 6.30 | 0.238 | 0.248 |

Notes

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 March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.SemiQ.com.

REACH Compliance

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