

N-Channel 100V MOSFET

FEATURES

- Trench Process Technology
- Ultra Low On-resistance Design

Application

- BMS Application
- Consumer Electronics

Mechanical

- Case:TOLL Package

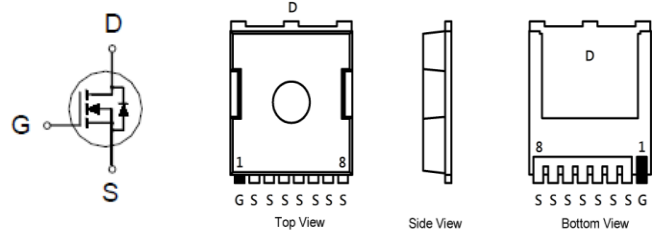
Packing Information

| Package | Packing |
|---------|-------------|
| TOLL | 2K/13" Reel |

PRODUCTY SUMMARY

| V_{DS} (V) | I_D (A) | $R_{DS(on)}$ m(Ω) Max | |
|--------------|-----------|--------------------------------|----------------|
| 100 | 360 | 1.25 | @ $V_{GS}=10V$ |
| | | 2.2 | @ $V_{GS}=6V$ |

TOLL



Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise specified)

| Parameter | | Symbol | Limit | Unit |
|--|----------------------------|-----------------------------------|-----------------|------|
| Drain-Source Voltage | | V _{DS} | 100 | V |
| Gate-Source Voltage | | V _{GS} | ±20 | V |
| Continuous Drain Current ²⁾ | T _C =25°C | I _D | 401 | A |
| | T _C =100°C | | 254 | A |
| Pulsed Drain Current ¹⁾ | T _C =25°C | I _{DM,pulesd} | 1440 | A |
| Avalanche Energy ⁶⁾ | | E _{AS} | 1806 | mJ |
| Power Dissipation | T _C =25°C | P _D | 500 | W |
| | Derating Factor above 25°C | | 4 | W/°C |
| Operating Junction and Storage Temperature Range | | T _J , T _{STG} | 150, -55 to 150 | °C |
| Maximum Temperature for Soldering | | T _L | 260 | °C |

Typical Thermal Resistance

| Parameter | Symbol | Limit | Unit |
|--|-----------------|-------|---------------|
| Junction-to-Ambient Thermal Resistance ⁵⁾ | $R_{\theta JA}$ | 62.5 | $^{\circ}C/W$ |
| Junction-to-Case Thermal Resistance | $R_{\theta JC}$ | 0.25 | $^{\circ}C/W$ |

Note:

1. Pulse width limited by maximum junction temperature. Pulse width<300us, Duty cycle<2%.
2. Fused current that based on wire numbers and diameter.
3. Guaranteed by design, not subject to production testing.
4. The maximum current rating is package limited.
5. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^{\circ}C$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^{\circ}C$.
6. $L=0.5mH$, $I_{AS}=85A$, Start $T_J=25^{\circ}C$

Electrical Characteristics (T_A = 25°C UNLESS OTHERWISE NOTED)

| Characteristics | Symbol | Test Condition | Limits | | | Unit |
|--|---------------------|--|--------|-------|-------|------|
| | | | Min | Typ | Max | |
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | B _{VDSS} | V _{GS} =0V, I _D =250uA | 100 | - | - | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250uA | 2.0 | 3.0 | 4.0 | V |
| Drain-Source On-State Resistance ¹⁾ | R _{DS(on)} | V _{GS} =10.0V, I _D =50A | - | 1.1 | 1.25 | mΩ |
| | | V _{GS} =6.0V, I _D =20A | - | 1.7 | 2.2 | mΩ |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =100V, V _{GS} =0V | - | - | 1 | μA |
| GateSource Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ± 100 | nA |
| | | | | | | |
| Dynamic Characteristics ³⁾ | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V, V _{GS} =0V, f=1MHz | - | 14200 | - | pF |
| Output Capacitance | C _{oss} | | - | 4000 | - | |
| Reverse Transfer Capacitance | C _{rss} | | - | 935 | - | |
| Total Gate Charge ²⁾ | Q _g | V _{DS} =50V, V _{GS} =10V, I _D =50A | - | 240 | - | nC |
| Gate-Source Charge ²⁾ | Q _{gs} | | - | 64 | - | |
| Gate-Drain Charge ²⁾ | Q _{gd} | | - | 64 | - | |
| | | | | | | |
| Switching | | | | | | |
| Turn-On Delay Time ²⁾ | t _{d(on)} | V _{DD} =50V, V _{GS} =10V, R _G =1.6Ω | - | 45 | - | ns |
| Turn-On Rise Time ²⁾ | t _r | | - | 51 | - | |
| Turn-Off Delay Time ²⁾ | t _{d(off)} | | - | 123 | - | |
| Turn-Off Fall Time ²⁾ | t _f | | - | 52 | - | |
| | | | | | | |
| Drain-Source Diode | | | | | | |
| Maximum Continuous Body Diode Forward Current | I _S | - | - | - | 360 | A |
| Maximum Pulsed Current | I _{SM} | - | - | - | 1440 | A |
| Diode Forward Voltage ¹⁾ | V _{SD} | I _S =50A, V _{GS} =0V | - | - | 1.2 | V |
| Reverse Recovery Time | t _{rr} | I _F =50A, d _I F/d _t =100A/μS | - | 87 | - | nS |
| Reverse Recovery Charge | Q _{rr} | | - | 220 | - | nC |

Note:

1. Pulse width<300us, Duty cycle<2%.

2. Essentially independent of operating temperature typical characteristics.

3. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.

4. The maximum current rating is package limited.

5. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. Mounted on a 1 inch2 with 2oz.square pad of copper.

6. Guaranteed by design, not subject to production testing.

Typical Characteristic Curves

Figure 1. Safe Operating Area

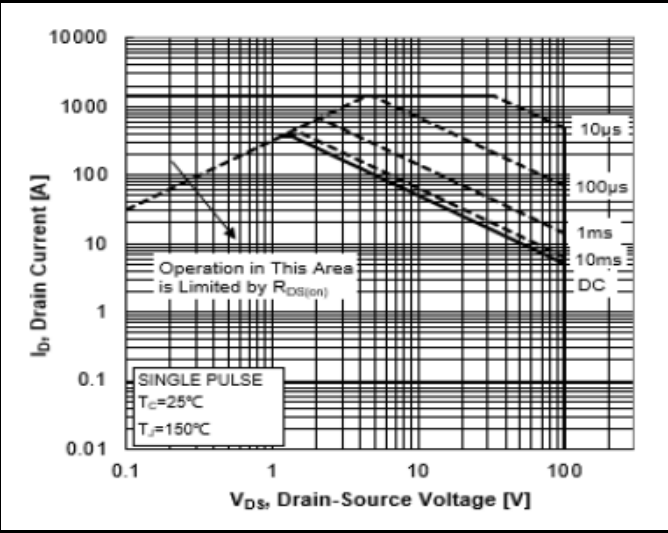


Figure 2. Maximum Power Dissipation vs Case Temperature

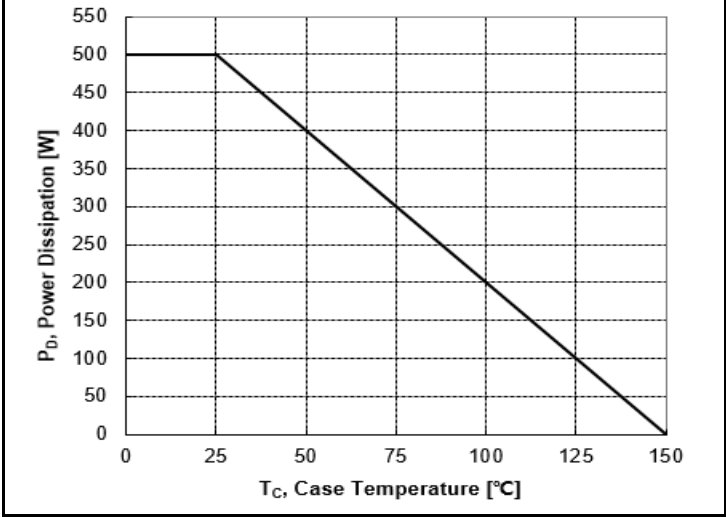


Figure 3. Maximum Continuous Drain Current vs Case Temperature

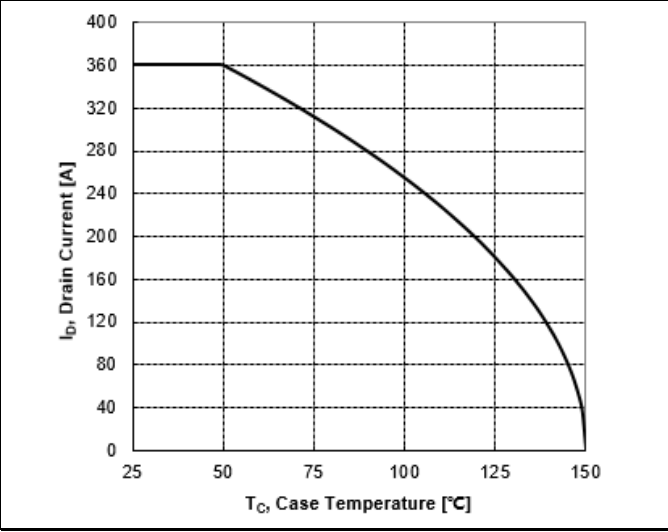


Figure 4. Typical Transfer Characteristics

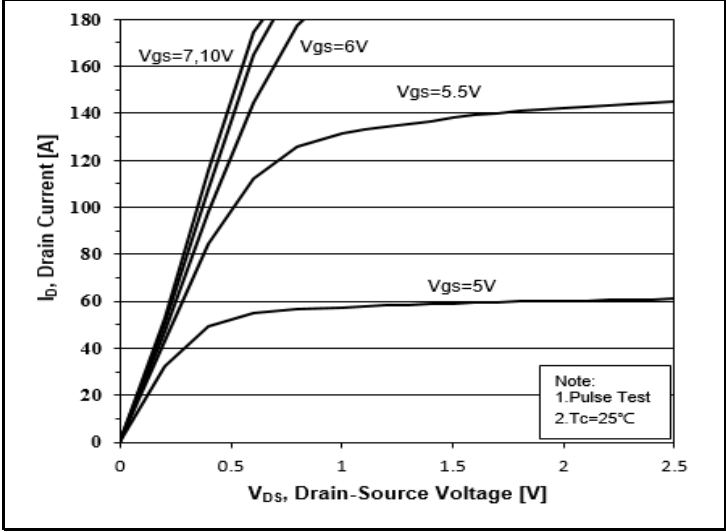


Figure 5. Transient Thermal Impedance

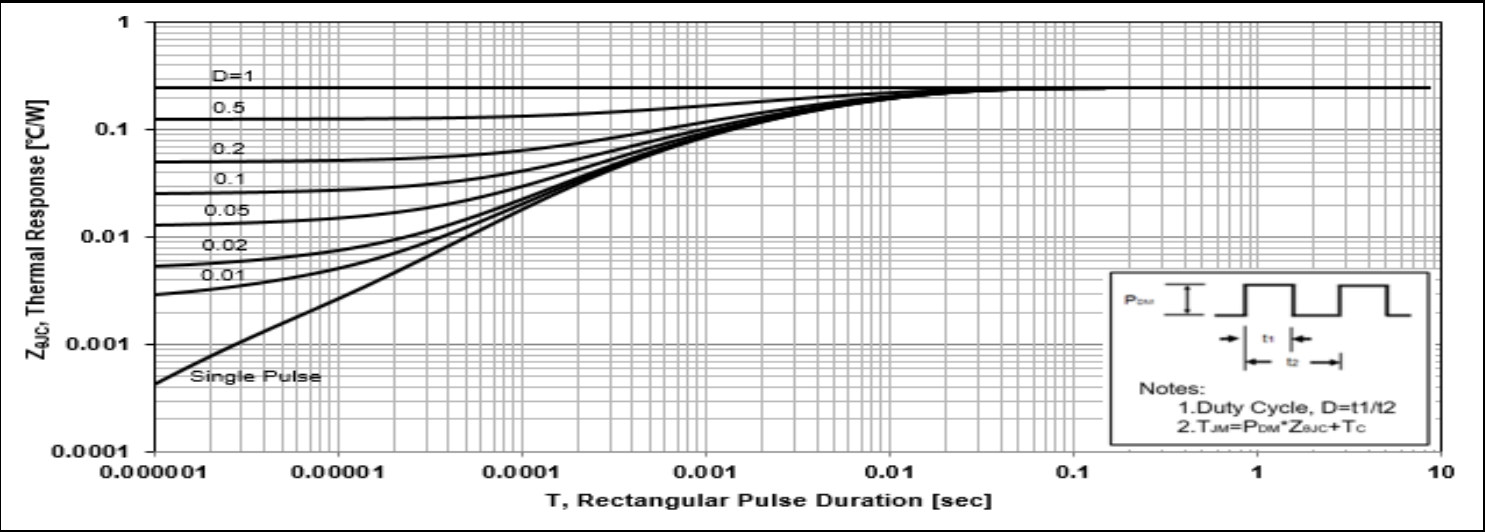


Figure 6. Typical Transfer Characteristics

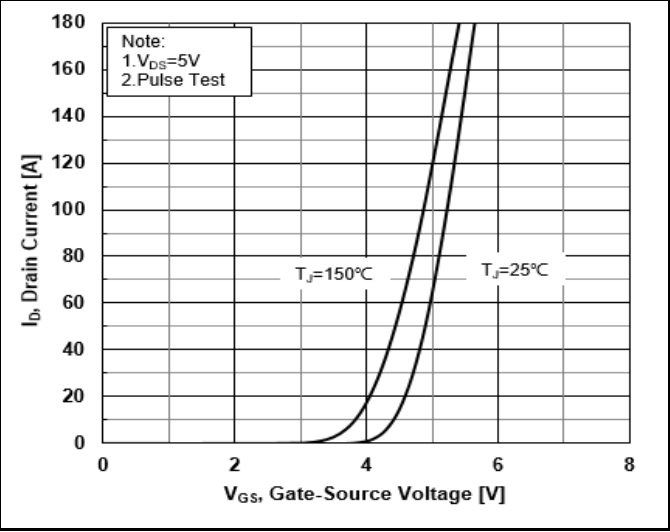


Figure 7. Source-Drain Diode Forward Characteristics

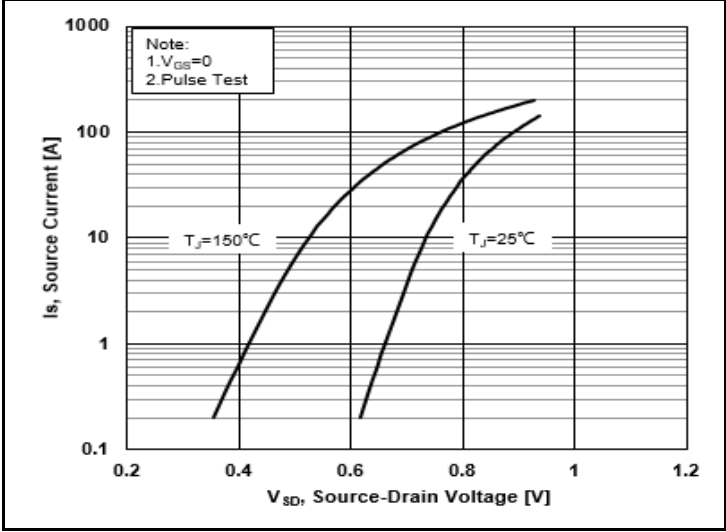


Figure 8. Drain-Source On-Resistance vs Drain Current

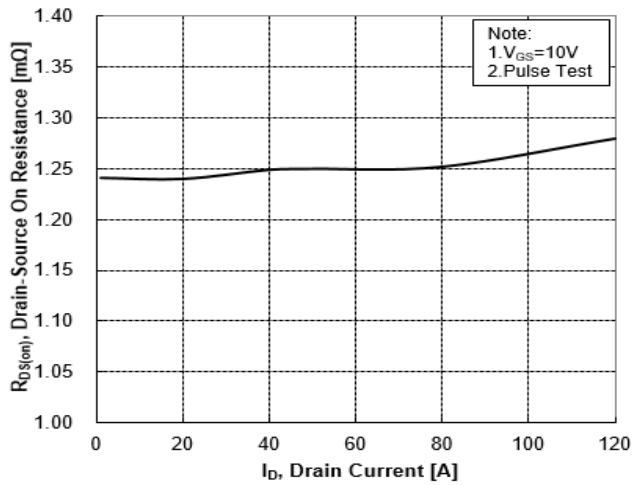


Figure 9. Normalized On-Resistance vs Junction Temperature

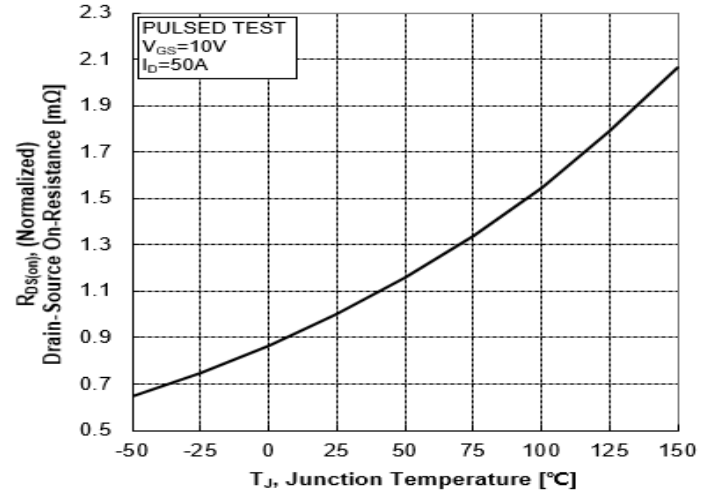


Figure 10. Normalized Threshold Voltage vs Junction Temperature

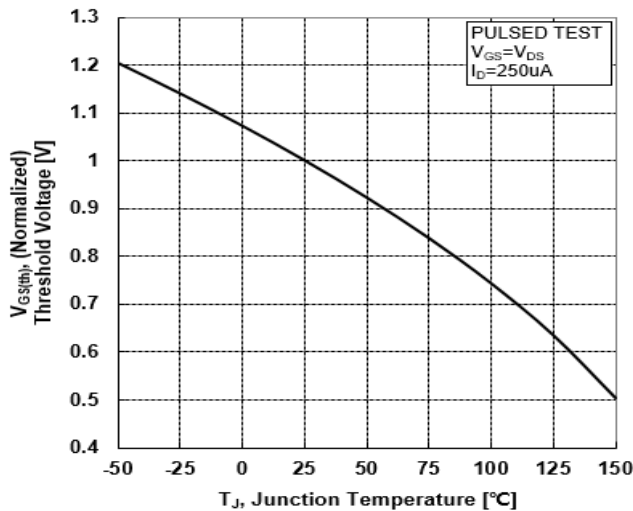


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

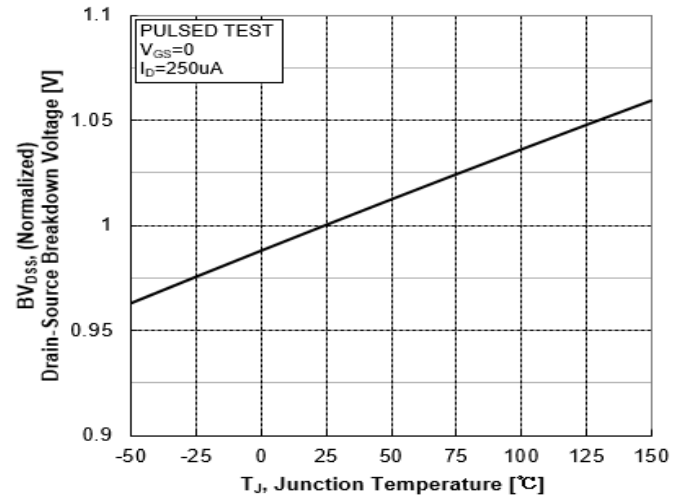


Figure 12. Capacitance Characteristics

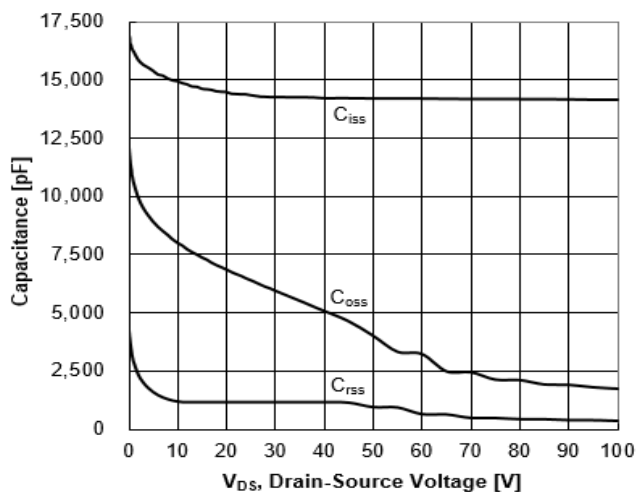
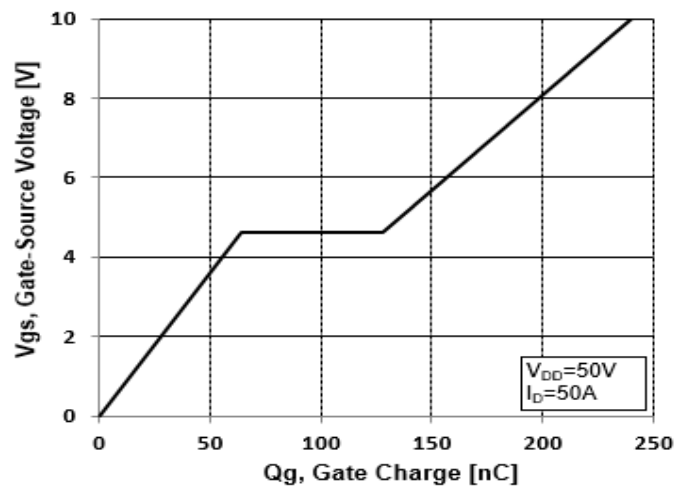


Figure 13. Typical Gate Charge vs Gate-Source Voltage



Test Circuit and Waveform

Figure 14. Resistive Switching Test Circuit

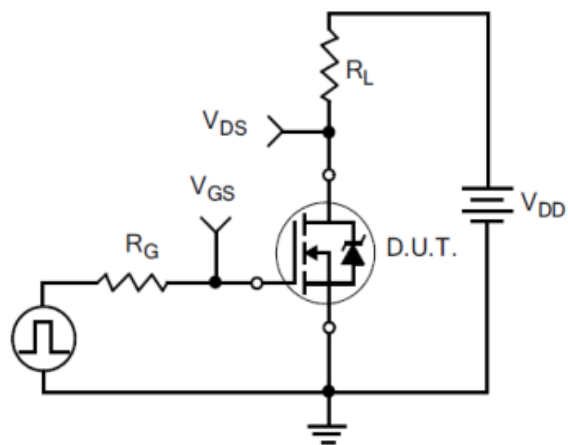


Figure 15. Resistive Switching Waveforms

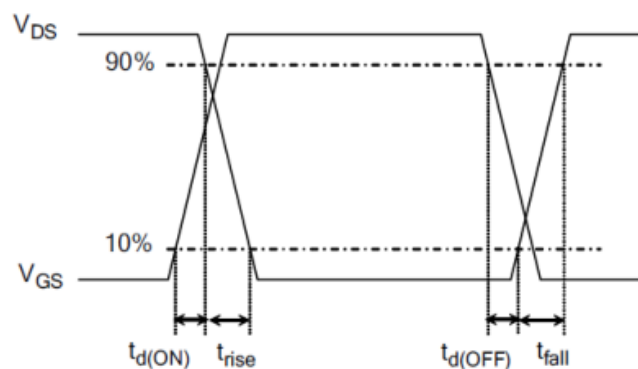


Figure 16. Gate Charge Test Circuit

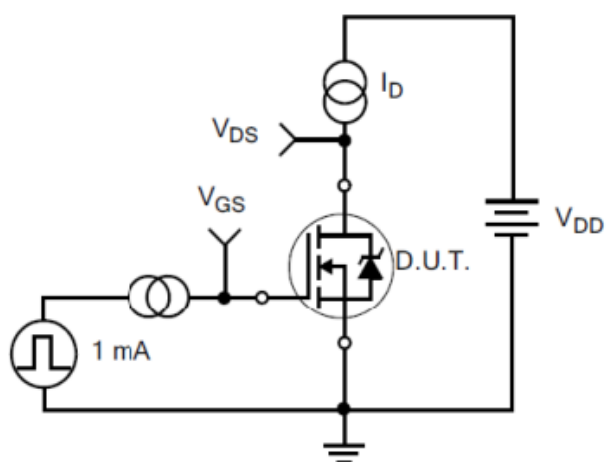


Figure 17. Gate Charge Waveforms

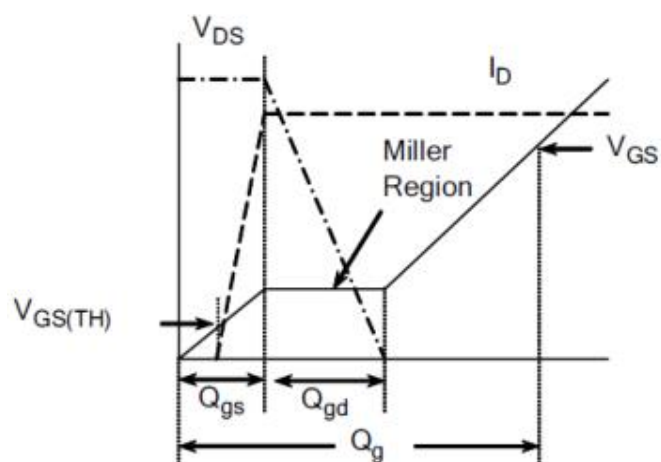


Figure 18. Diode Reverse Recovery Test Circuit

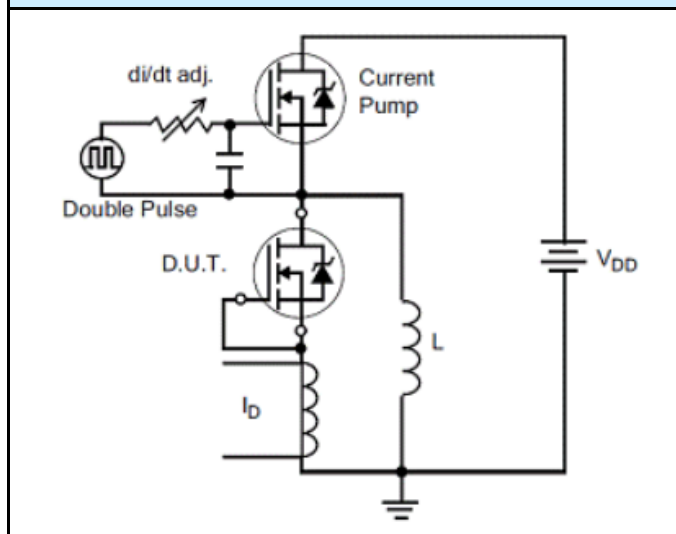


Figure 19. Diode Reverse Recovery Waveform

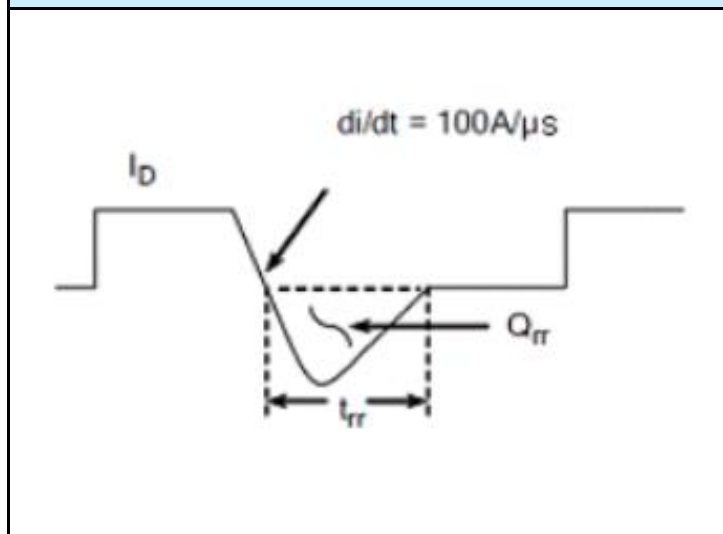


Figure 20. Unclamped Inductive Switching Test Circuit

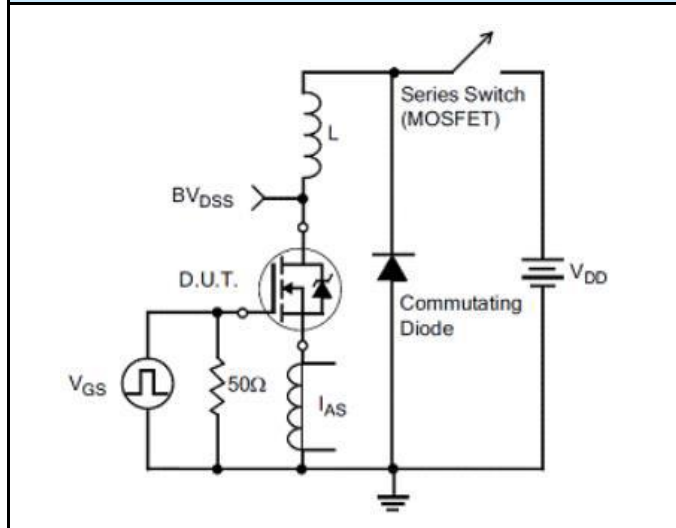
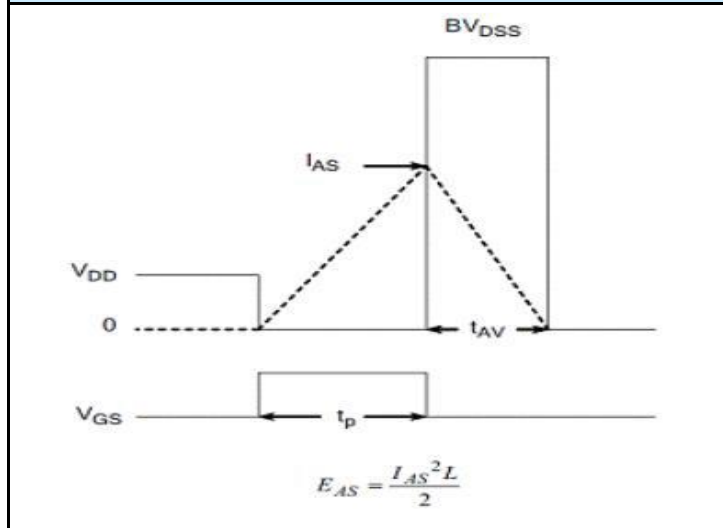
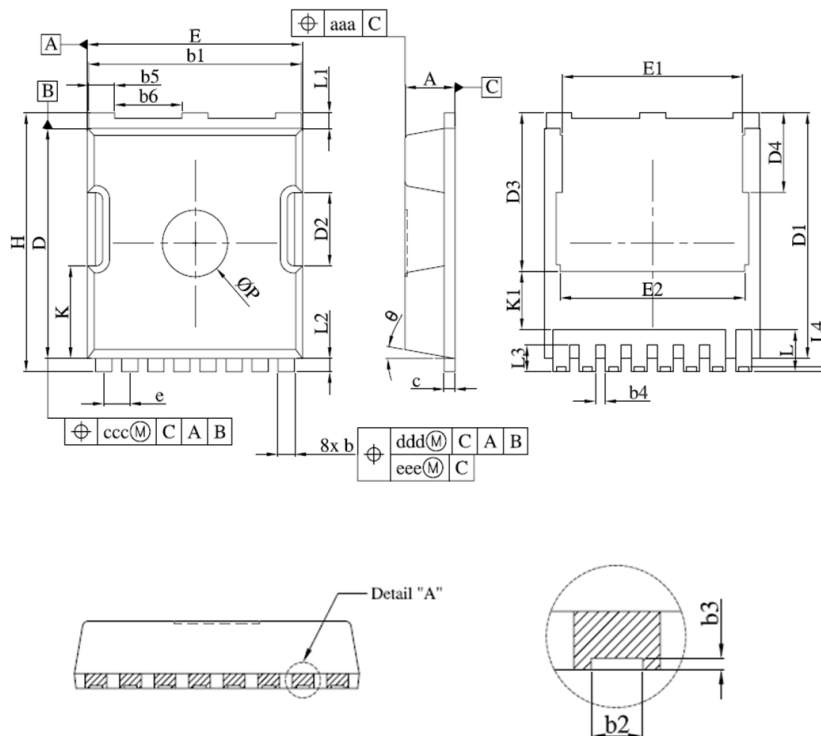


Figure 21. Unclamped Inductive Switching Waveform

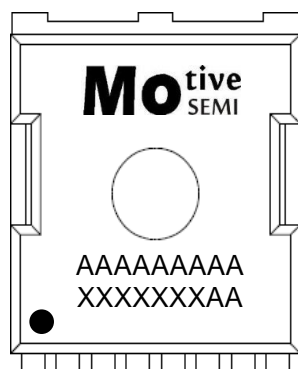


Package Outline Dimensions (inches and millimeters)

| TOLL | | | | |
|--------|-------------|-------|--------|-------|
| SYMBOL | Dimensions | | | |
| | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| A | 2.20 | 2.40 | 0.087 | 0.094 |
| b | 0.70 | 0.90 | 0.028 | 0.035 |
| b1 | 9.70 | 9.90 | 0.382 | 0.390 |
| b2 | 0.36 | 0.55 | 0.014 | 0.022 |
| b3 | 0.05 | 0.35 | 0.002 | 0.014 |
| b4 | 0.30 | 0.50 | 0.012 | 0.020 |
| b5 | 1.10 | 1.30 | 0.043 | 0.051 |
| b6 | 3.00 | 3.20 | 0.118 | 0.126 |
| c | 0.40 | 0.60 | 0.016 | 0.024 |
| D | 10.28 | 10.55 | 0.405 | 0.415 |
| D1 | 10.98 | 11.18 | 0.432 | 0.440 |
| D2 | 3.20 | 3.40 | 0.126 | 0.134 |
| D3 | 7.00 | 7.30 | 0.276 | 0.287 |
| D4 | 3.44 | 3.74 | 0.135 | 0.147 |
| e | 1.10 | 1.30 | 0.043 | 0.051 |
| E | 9.80 | 10.00 | 0.386 | 0.394 |
| E1 | 8.20 | 8.40 | 0.323 | 0.331 |
| E2 | 8.35 | 8.65 | 0.329 | 0.341 |
| H | 11.50 | 11.85 | 0.453 | 0.467 |
| K | 4.08 | 4.28 | 0.161 | 0.169 |
| K1 | 2.45 | - | 0.096 | - |
| L | 1.60 | 2.10 | 0.063 | 0.083 |
| L1 | 0.50 | 0.90 | 0.020 | 0.035 |
| L2 | 0.50 | 0.70 | 0.020 | 0.028 |
| L3 | 1.00 | 1.30 | 0.039 | 0.051 |
| L4 | 0.13 | 0.33 | 0.005 | 0.013 |
| P | 2.85 | 3.15 | 0.112 | 0.124 |
| θ | 10° REF. | | | |
| aaa | 0.20 | | 0.008 | |
| ccc | 0.20 | | 0.008 | |
| ddd | 0.25 | | 0.010 | |
| eee | 0.20 | | 0.008 | |



Marking Information



First line = Company name

AAAAA = Product number

XXXXXX = Tracking number

Fourth line = Gate pin point

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