



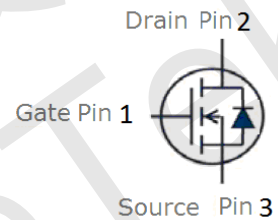
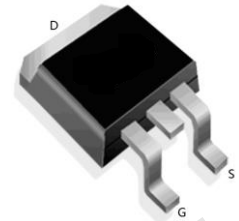
Features

- N-Channel, 5V Logic Level Control
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5V$
- 100% Avalanche test
- Pb-free lead plating; RoHS compliant

| | | |
|--------------------------------|-----|------------|
| V_{DS} | 40 | V |
| $R_{DS(on),TYP} @ V_{GS}=10V$ | 2.3 | m Ω |
| $R_{DS(on),TYP} @ V_{GS}=4.5V$ | 3.3 | m Ω |
| I_D | 200 | A |



TO-263



| Part ID | Package Type | Marking | Tape and reel information |
|------------|--------------|----------|---------------------------|
| VS40200ATD | TO-263 | 40200ATD | 1000pcs/Reel |

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

| Symbol | Parameter | Rating | Unit |
|--------------------------------|--|--------------------------------|--------------------|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage | 40 | V |
| I_S | Diode continuous forward current | $T_C=25^\circ\text{C}$ 200 | A |
| I_D | Continuous drain current @ $V_{GS}=-10V$ | $T_C=25^\circ\text{C}$ 200 | A |
| | | $T_C=100^\circ\text{C}$ 142 | A |
| I_{DM} | Pulse drain current tested ① | $T_C=25^\circ\text{C}$ 800 | A |
| EAS | Avalanche energy, single pulsed ② | 390 | mJ |
| P_D | Maximum power dissipation | $T_C=25^\circ\text{C}$ 150 | W |
| V_{GS} | Gate-Source voltage | ± 20 | V |
| $T_{STG} T_J$ | Storage and operating temperature range | -55 to 175 | $^\circ\text{C}$ |
| Thermal Characteristics | | | |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 1.0 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | 62.5 | $^\circ\text{C/W}$ |



40V/200A N-Channel Advanced Power MOSFET

VS40200ATD

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|--|--|---|------|------|-----------|------------|
| Static Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated) | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 40 | -- | -- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=40V, V_{GS}=0V$ | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current($T_j=125^\circ\text{C}$) | $V_{DS}=40V, V_{GS}=0V$ | -- | -- | 100 | μA |
| I_{GSS} | Gate-Body Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | -- | -- | ± 100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | 1.8 | 2.4 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance ^③ | $V_{GS}=10V, I_D=60A$ | -- | 2.3 | 4 | m Ω |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance ^③ | $V_{GS}=4.5V, I_D=30A$ | -- | 3.3 | 6 | m Ω |
| Dynamic Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated) | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$ | 5600 | 6605 | 7600 | pF |
| C_{oss} | Output Capacitance | | 400 | 550 | 700 | pF |
| C_{rss} | Reverse Transfer Capacitance | | 320 | 440 | 560 | pF |
| R_g | Gate Resistance | $f=1\text{MHz}$ | -- | 1.9 | -- | Ω |
| Q_g | Total Gate Charge | $V_{DS}=20V, I_D=30A, V_{GS}=10V$ | -- | 109 | -- | nC |
| Q_{gs} | Gate-Source Charge | | -- | 30.5 | -- | nC |
| Q_{gd} | Gate-Drain Charge | | -- | 42 | -- | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}=20V, I_D=30A, R_G=3\Omega, V_{GS}=10V$ | -- | 30 | -- | nS |
| t_r | Turn-on Rise Time | | -- | 24 | -- | nS |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 45.5 | -- | nS |
| t_f | Turn-Off Fall Time | | -- | 16.5 | -- | nS |
| Source- Drain Diode Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated) | | | | | | |
| V_{SD} | Forward on voltage | $I_{SD}=30A, V_{GS}=0V$ | -- | 0.9 | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $T_j=25^\circ\text{C}, I_{sd}=30A, V_{GS}=0V, di/dt=500A/\mu s$ | -- | 29 | -- | nS |
| Q_{rr} | Reverse Recovery Charge | | 179 | -- | -- | nC |

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{jmax} , starting $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}, R_G = 25\Omega, I_{AS} = 29A, V_{GS} = 10V$. Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.



Typical Characteristics

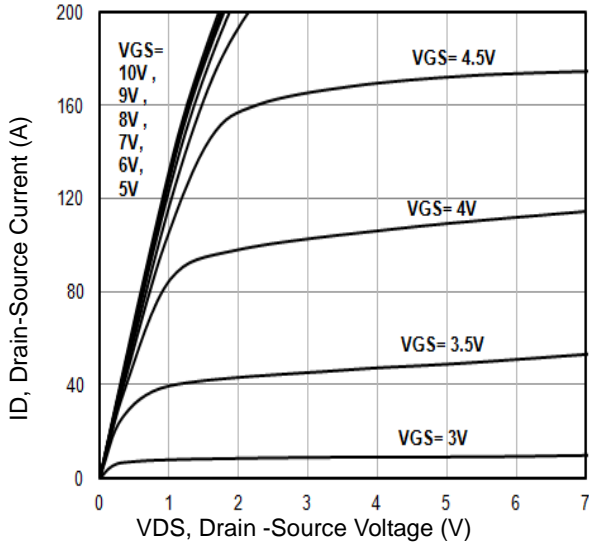


Fig1. Typical Output Characteristics

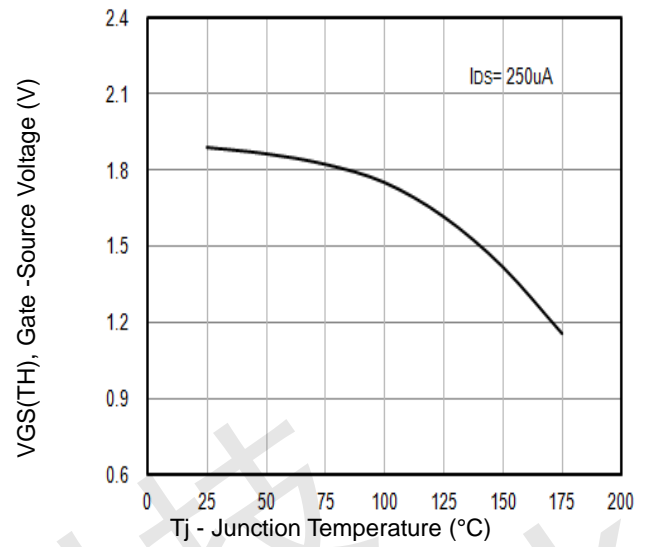


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

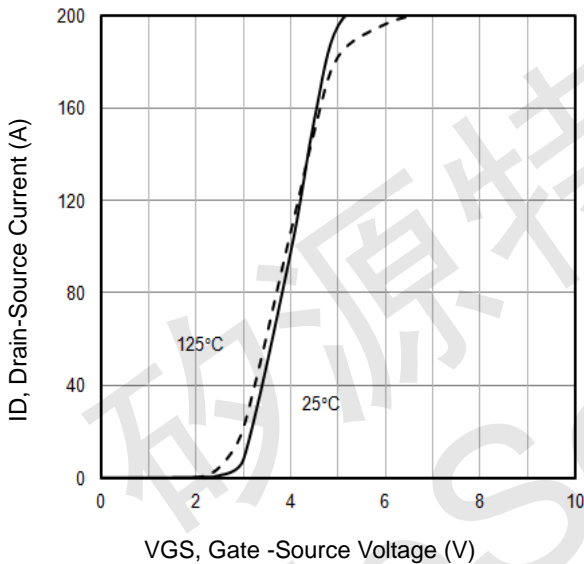


Fig3. Typical Transfer Characteristics

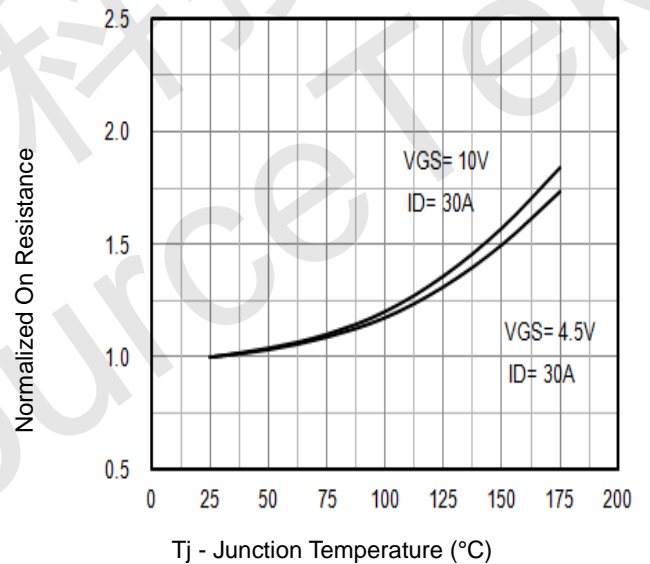


Fig4. Normalized On-Resistance Vs. T_j

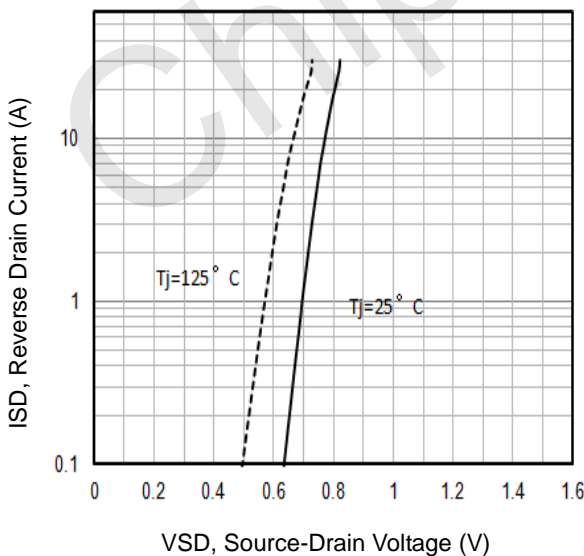


Fig5. Typical Source-Drain Diode Forward Voltage

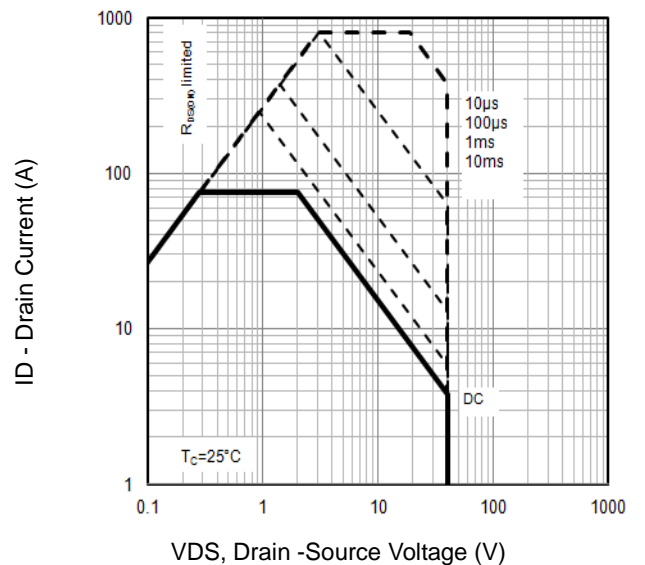


Fig6. Maximum Safe Operating Area



Typical Characteristics

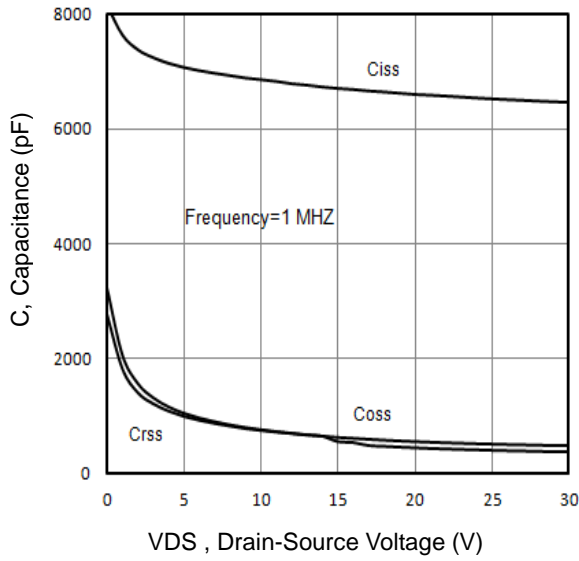


Fig7. Typical Capacitance Vs. Drain-Source Voltage

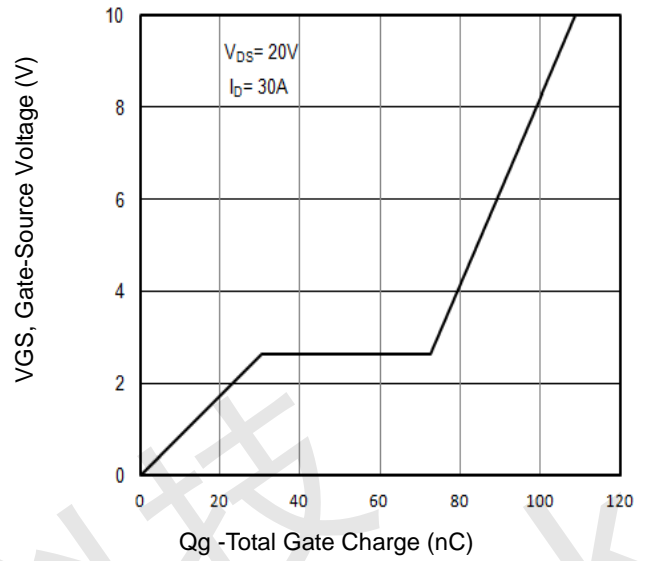


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

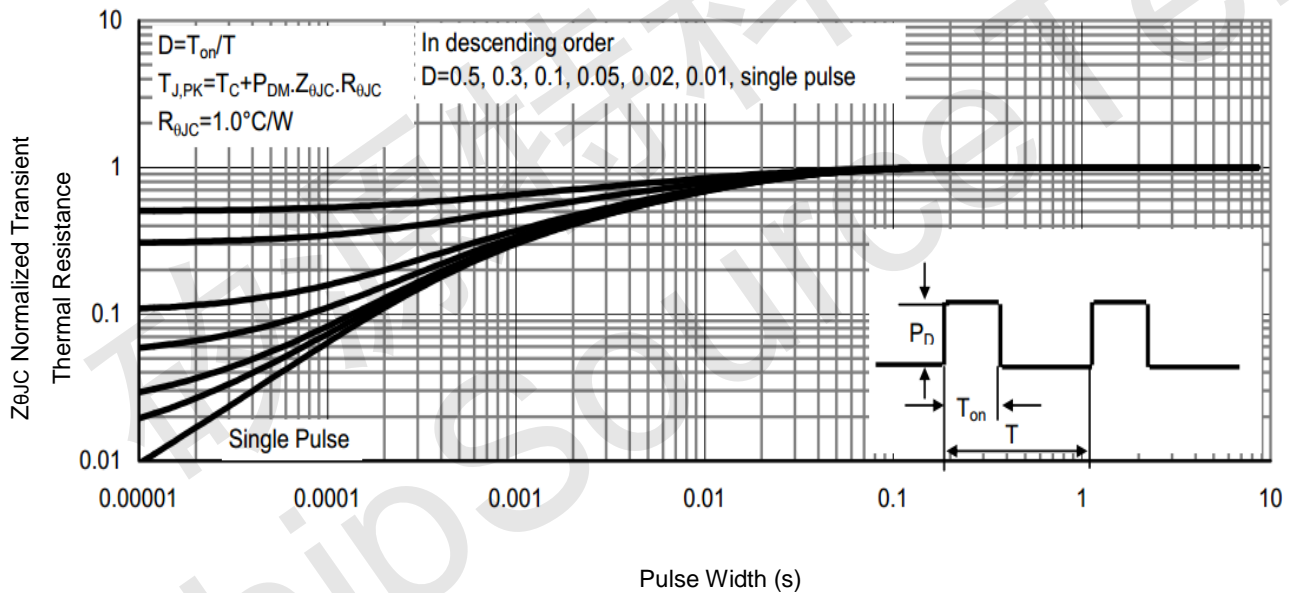


Fig9. Normalized Maximum Transient Thermal Impedance

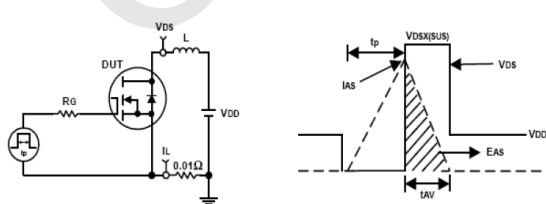


Fig10. Unclamped Inductive Test Circuit and waveforms

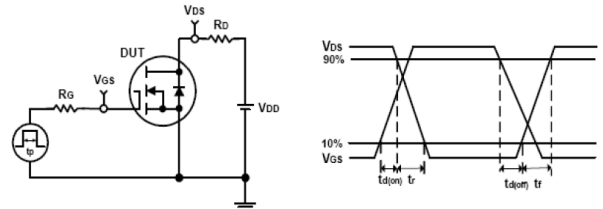
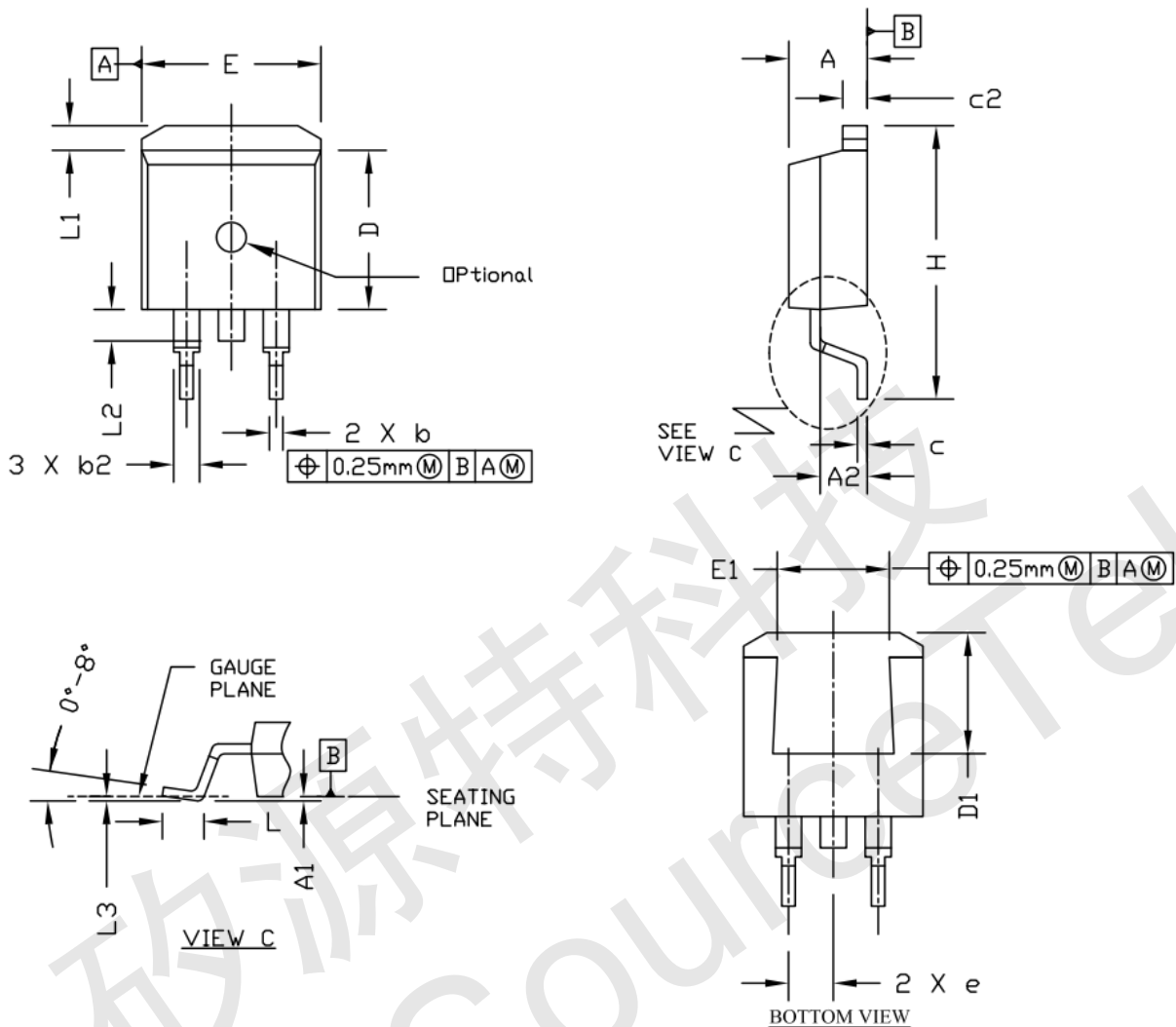


Fig11. Switching Time Test Circuit and waveforms



TO-263 Package Outline Data



| Symbol | Dimensions (unit: mm) | | |
|--------|-----------------------|--------|--------|
| | Min | Typ | Max |
| A | 4.400 | 4.570 | 4.700 |
| A1 | 0.000 | 0.100 | 0.200 |
| A2 | 2.300 | 2.400 | 2.500 |
| b | 0.700 | 0.800 | 0.900 |
| b2 | 1.200 | 1.270 | 1.360 |
| c | 0.381 | 0.500 | 0.737 |
| c2 | 1.220 | 1.300 | 1.350 |
| D | 8.600 | 9.200 | 9.300 |
| D1 | 6.860 | | |
| e | 2.540 BSC | | |
| E | 9.780 | 9.880 | 10.260 |
| E1 | 6.225 | | |
| H | 14.700 | 15.100 | 15.500 |
| L | 2.000 | 2.550 | 2.750 |
| L1 | 1.000 | 1.200 | 1.400 |
| L2 | 1.300 | 1.600 | 1.700 |
| L3 | 0.255 BSC | | |

Notes:

1. Refer to JEDEC TO-263 variation AB
2. Dimension "D" & "E" do NOT include mold flash, mold flash shall not exceed 0.127mm per side.