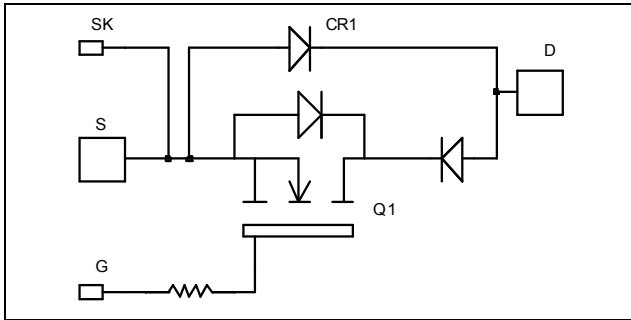


*Single switch
Series & parallel diodes
MOSFET Power Module*

**$V_{DSS} = 200V$
 $R_{DSon} = 9m\Omega$ max @ $T_j = 25^\circ C$
 $I_D = 195A$ @ $T_c = 25^\circ C$**

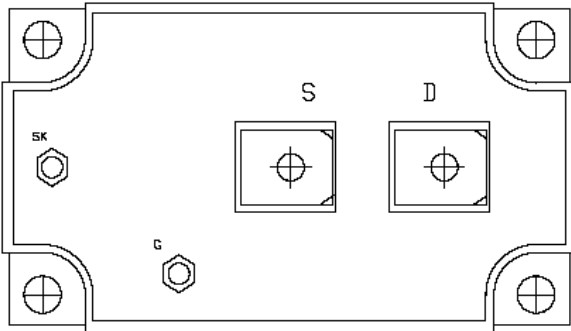


Application

- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Low stray inductance
 - M6 power connectors
 - M4 signal connectors
- High level of integration



Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|------------|---|--------------------|-----------|
| V_{DSS} | Drain - Source Breakdown Voltage | 200 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 195 |
| | | $T_c = 80^\circ C$ | 145 |
| I_{DM} | Pulsed Drain current | 780 | A |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 9 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 780 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 65 | A |
| E_{AR} | Repetitive Avalanche Energy | 30 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 1300 | |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|----------------------------------|--|-----|-----|-----------|------------------|
| BV_{DSS} | Drain - Source Breakdown Voltage | $V_{GS} = 0V, I_D = 1mA$ | 200 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{GS} = 0V, V_{DS} = 200V$ $T_j = 25^\circ\text{C}$ | | | 400 | μA |
| | | $V_{GS} = 0V, V_{DS} = 160V$ $T_j = 125^\circ\text{C}$ | | | 2000 | |
| $R_{DS(on)}$ | Drain - Source on Resistance | $V_{GS} = 10V, I_D = 74.5A$ | | | 9 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 4mA$ | 3 | | 5 | V |
| I_{GSS} | Gate - Source Leakage Current | $V_{GS} = \pm 30V, V_{DS} = 0V$ | | | ± 400 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|-----|------|-----|---------------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$ | | 12.3 | | nF |
| C_{oss} | Output Capacitance | | | 4 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 0.39 | | |
| Q_g | Total gate Charge | $V_{GS} = 10V$ $V_{Bus} = 100V$ $I_D = 195A$ | | 217 | | nC |
| Q_{gs} | Gate - Source Charge | | | 143 | | |
| Q_{gd} | Gate - Drain Charge | | | 157 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 133V$ $I_D = 195A$ $R_G = 1.2\Omega$ | | 28 | | ns |
| T_r | Rise Time | | | 56 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 81 | | |
| T_f | Fall Time | | | 99 | | |
| E_{on} | Turn-on Switching Energy ① | Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 195A, R_G = 1.2\Omega$ | | 1029 | | μJ |
| E_{off} | Turn-off Switching Energy ② | | | 1011 | | |
| E_{on} | Turn-on Switching Energy ① | Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 195A, R_G = 1.2\Omega$ | | 1351 | | μJ |
| E_{off} | Turn-off Switching Energy ② | | | 1180 | | |

Series diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-------------|---------------------------------|---|-----|-----|------|------|
| $I_{F(AV)}$ | Maximum Average Forward Current | 50% duty cycle $T_c = 85^\circ\text{C}$ | | 120 | | A |
| V_F | Diode Forward Voltage | $I_F = 120A$ | | 1.1 | 1.15 | V |
| | | $I_F = 240A$ | | 1.4 | | |
| | | $I_F = 120A$ $T_j = 125^\circ\text{C}$ | | 0.9 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu\text{s}$ $T_j = 25^\circ\text{C}$ | | 31 | | ns |
| | | $T_j = 125^\circ\text{C}$ | | 60 | | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu\text{s}$ $T_j = 25^\circ\text{C}$ | | 120 | | nC |
| | | $T_j = 125^\circ\text{C}$ | | 500 | | |

① E_{on} includes diode reverse recovery.

② In accordance with JEDEC standard JESD24-1.

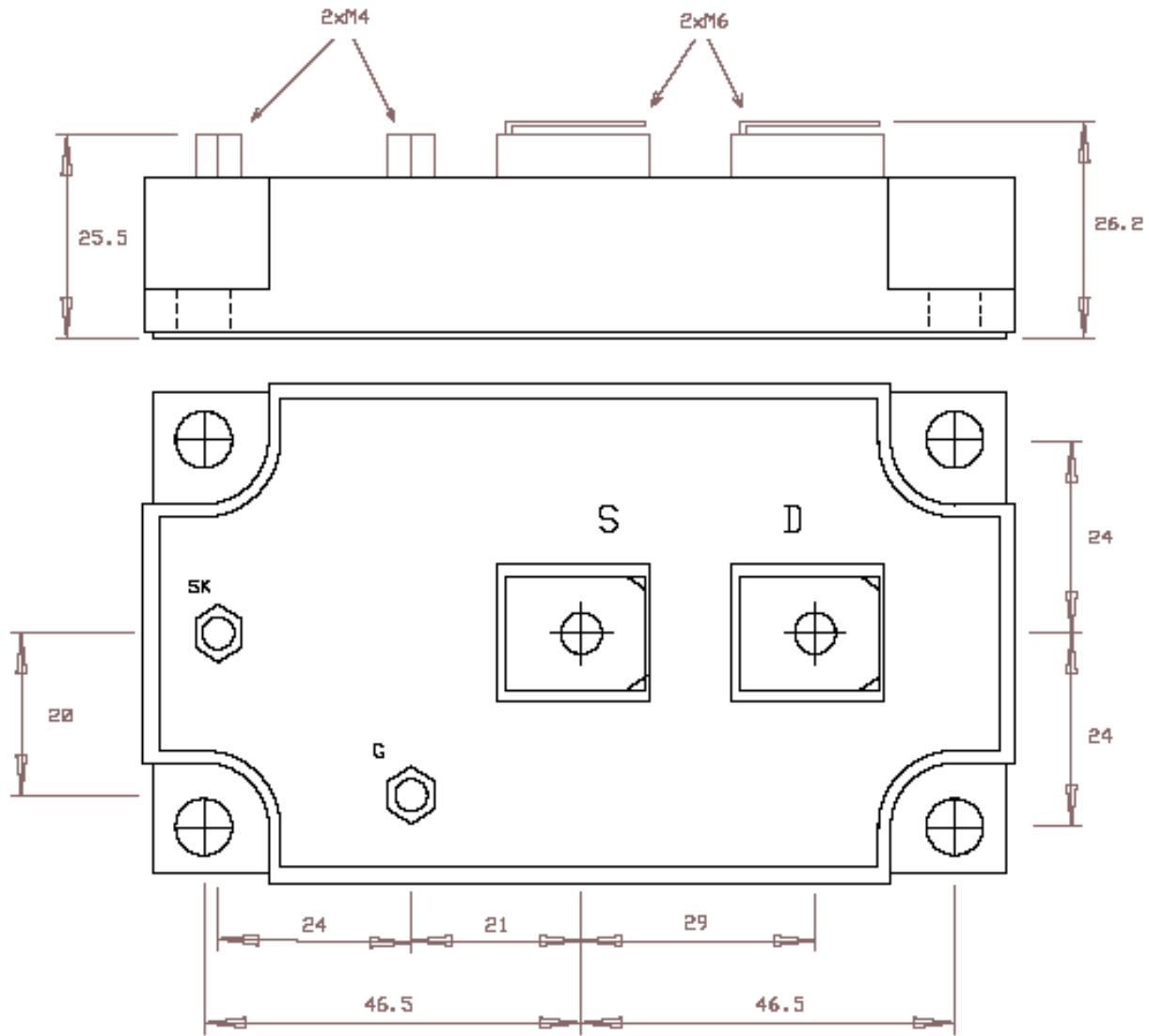
Parallel diode ratings and characteristics

| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|---------------------------------|---|---------------------------|------------|------------|------------|-------------|
| $I_{F(AV)}$ | Maximum Average Forward Current | 50% duty cycle | $T_c = 90^\circ\text{C}$ | | 100 | | A |
| V_F | Diode Forward Voltage | $I_F = 100\text{A}$ | | | 1 | 1.1 | V |
| | | $I_F = 200\text{A}$ | | | 1.4 | | |
| | | $I_F = 100\text{A}$ | $T_j = 125^\circ\text{C}$ | | 0.9 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 100\text{A}$ $V_R = 133\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 60 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | | 110 | | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 100\text{A}$ $V_R = 133\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 200 | | nC |
| | | | $T_j = 125^\circ\text{C}$ | | 840 | | |

Thermal and package characteristics

| <i>Symbol</i> | <i>Characteristic</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|--|----------------|------------|------------|------------|---------------------------|
| R_{thJC} | Junction to Case | Transistor | | | 0.16 | $^\circ\text{C}/\text{W}$ |
| | | Series diode | | | 0.46 | |
| | | Parallel diode | | | 0.6 | |
| V_{ISOL} | RMS Isolation Voltage, any terminal to case $t = 1\text{ min}$, $I_{isol} < 1\text{mA}$, 50/60Hz | | 2500 | | | V |
| T_J | Operating junction temperature range | | -40 | | 150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | | -40 | | 125 | |
| T_C | Operating Case Temperature | | -40 | | 100 | |
| Torque | Mounting torque | M4 | | | 1.2 | |
| | | M6 | 3 | | 5 | |
| Wt | Package Weight | | | | 400 | g |

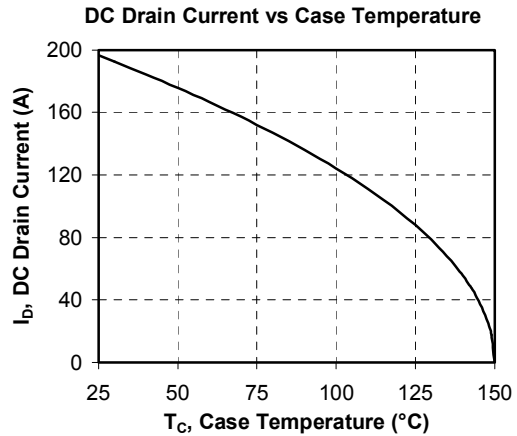
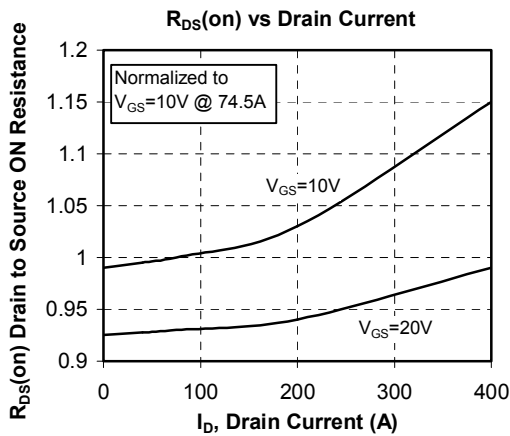
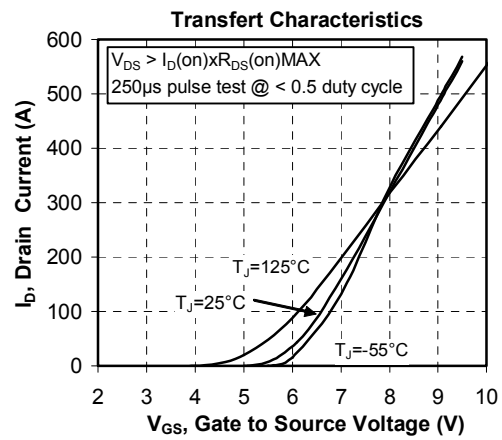
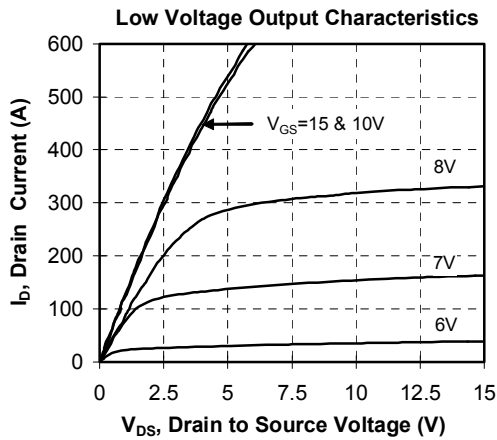
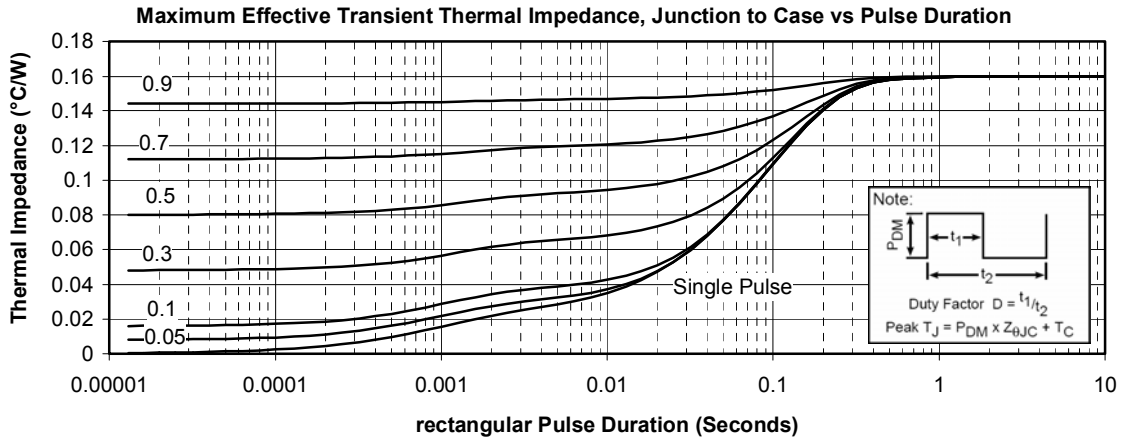
Package outline

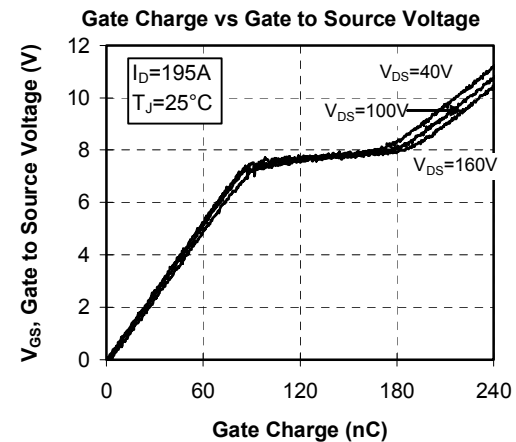
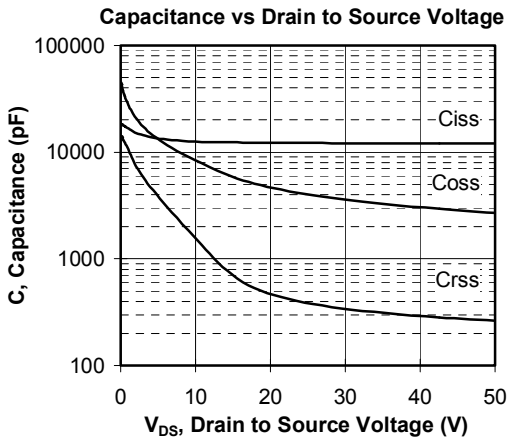
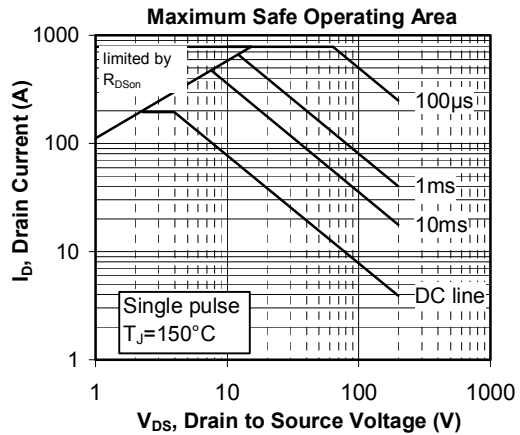
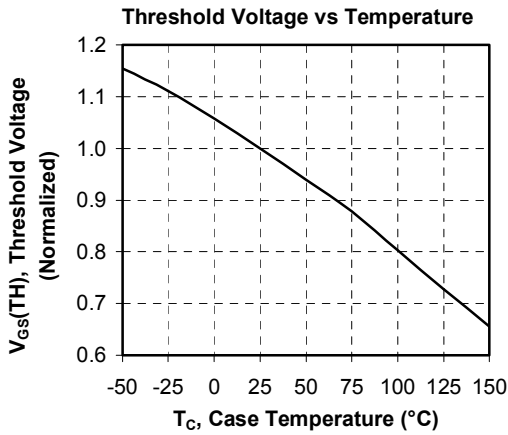
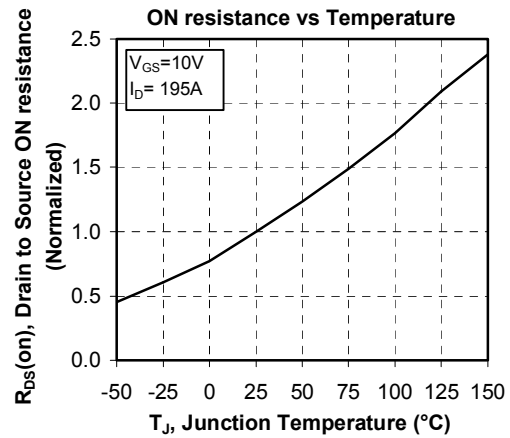
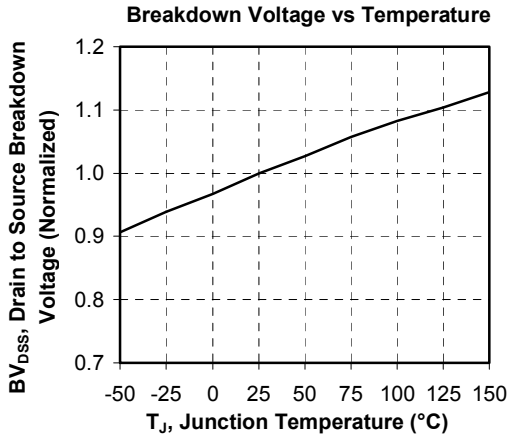


GENERAL TOLERANCES : ± 0.5 mm

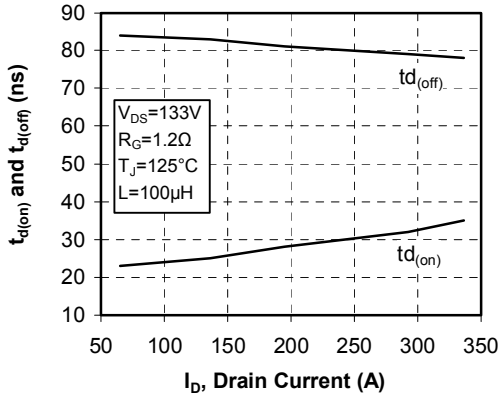
Mounting holes: 4x \varnothing 6.5 mm

Typical Performance Curve

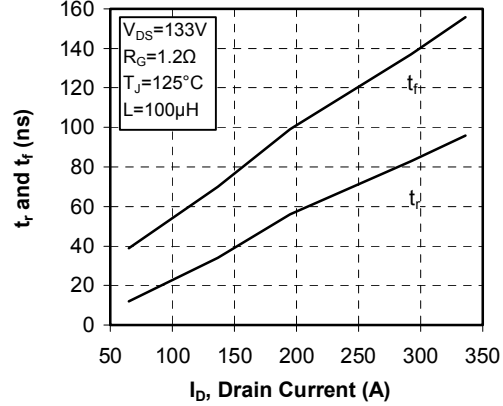




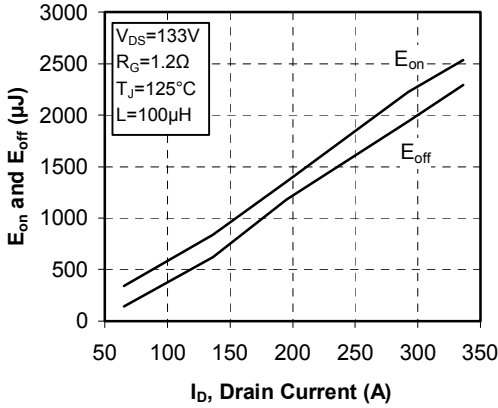
Delay Times vs Current



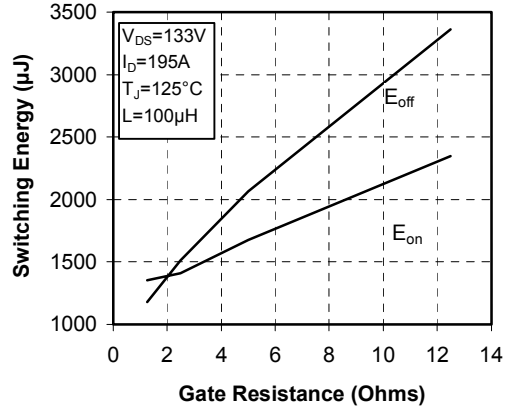
Rise and Fall times vs Current



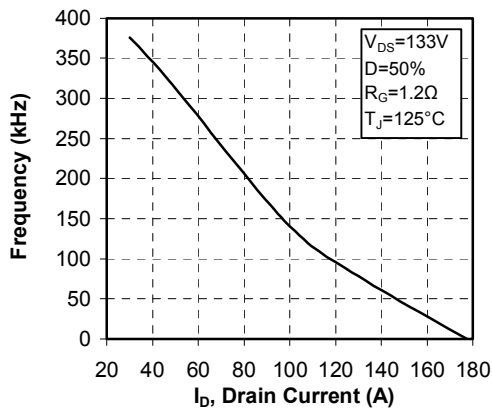
Switching Energy vs Current



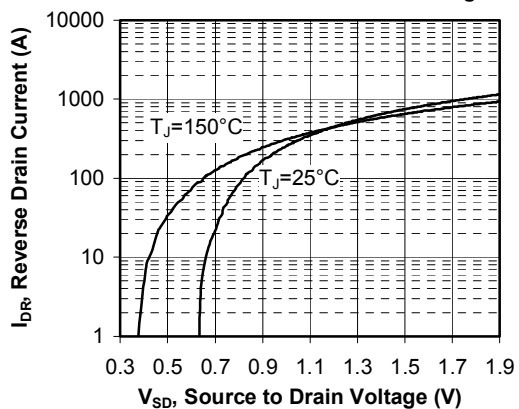
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



APT reserves the right to change, without notice, the specifications and information contained herein

APT's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.