## FEATURES

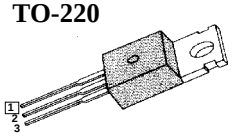
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current: 10μA (Max.) @ $V_{DS}$ = 100V
- Lower $R_{DS(ON)}$: 0.046Ω (Typ.)

$BV_{DSS}$ = 100 V

$R_{DS(on)}$ = 0.058Ω

$I_D$ = 28 A

TO-220




1.Gate 2. Drain 3. Source

## Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 100 | V |
| $I_D$ | Continuous Drain Current ($T_C$=25°C) | 28 | A |
| | Continuous Drain Current ($T_C$=100°C) | 19.8 | |
| $I_{DM}$ | Drain Current-Pulsed (1) | 98 | A |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $E_{AS}$ | Single Pulsed Avalanche Energy (2) | 522 | mJ |
| $I_{AR}$ | Avalanche Current (1) | 28 | A |
| $E_{AR}$ | Repetitive Avalanche Energy (1) | 12.1 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (3) | 6.5 | V/ns |
| $P_D$ | Total Power Dissipation ($T_C$=25°C)<br>Linear Derating Factor | 121<br>0.81 | W<br>W/°C |
| $T_J$ , $T_{STG}$ | Operating Junction and Storage Temperature Range | - 55 to +175 | °C |
| $T_L$ | Maximum Lead Temp. for Soldering Purposes, 1/8. from case for 5-seconds | 300 | |

## Thermal Resistance

| Symbol | Characteristic | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | -- | 1.24 | °C/W |
| $R_{\theta CS}$ | Case-to-Sink | 0.5 | -- | |
| $R_{\theta JA}$ | Junction-to-Ambient | -- | 62.5 | |

## Electrical Characteristics ($T_C$=25°C unless otherwise specified)

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | 100 | -- | -- | V | $V_{GS}$=0V,$I_D$=250μA |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff. | -- | 0.1 | -- | V/°C | $I_D$=250μA ***See Fig 7*** |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | -- | 2.0 | V | $V_{DS}$=5V,$I_D$=250μA |
| $I_{GSS}$ | Gate-Source Leakage , Forward | -- | -- | 100 | nA | $V_{GS}$=20V |
| | Gate-Source Leakage , Reverse | -- | -- | -100 | | $V_{GS}$=-20V |
| $I_{DSS}$ | Drain-to-Source Leakage Current | -- | -- | 10 | μA | $V_{DS}$=100V |
| | | -- | -- | 100 | | $V_{DS}$=80V,$T_C$=150°C |
| $R_{DS(on)}$ | Static Drain-Source On-State Resistance | -- | -- | 0.058 | Ω | $V_{GS}$=5V,$I_D$=14A (4) |
| $g_{fs}$ | Forward Transconductance | -- | 22 | -- | ℧ | $V_{DS}$=40V,$I_D$=14A (4) |
| $C_{iss}$ | Input Capacitance | -- | 1215 | 1580 | pF | $V_{GS}$=0V,$V_{DS}$=25V,f =1MHz ***See Fig 5*** |
| $C_{oss}$ | Output Capacitance | -- | 310 | 390 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | -- | 145 | 180 | | |
| $t_{d(on)}$ | Turn-On Delay Time | -- | 7 | 25 | ns | $V_{DD}$=50V,$I_D$=28A, $R_G$=4.6Ω ***See Fig 13*** (4) (5) |
| $t_r$ | Rise Time | -- | 12 | 35 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | -- | 38 | 85 | | |
| $t_f$ | Fall Time | -- | 24 | 60 | | |
| $Q_g$ | Total Gate Charge | -- | 38.4 | 54 | nC | $V_{DS}$=80V,$V_{GS}$=5V, $I_D$=28A ***See Fig 6 & Fig 12*** (4) (5) |
| $Q_{gs}$ | Gate-Source Charge | -- | 6.2 | -- | | |
| $Q_{gd}$ | Gate-Drain (. Miller. ) Charge | -- | 23.3 | -- | | |

## Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | -- | -- | 28 | A | Integral reverse pn-diode in the MOSFET |
| $I_{SM}$ | Pulsed-Source Current (1) | -- | -- | 98 | | |
| $V_{SD}$ | Diode Forward Voltage (4) | -- | -- | 1.5 | V | $T_J$=25°C,$I_S$=28A,$V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | -- | 132 | -- | ns | $T_J$=25°C,$I_F$=28A $di_F/dt$=100A/μs (4) |
| $Q_{rr}$ | Reverse Recovery Charge | -- | 0.63 | -- | μC | |

**Notes;**

(1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
(2) L=1mH, $I_{AS}$=28A, $V_{DD}$=25V, $R_G$=27Ω, Starting $T_J$=25°C
(3) $I_{SD} \leq$ 28A, di/dt ≤ 400A/μs, $V_{DD} \leq BV_{DSS}$ , Starting $T_J$=25°C
(4) Pulse Test: Pulse Width = 250μs, Duty Cycle ≤ 2%
(5) Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

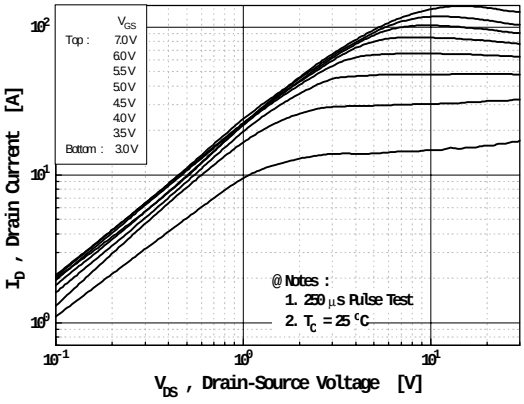



Fig 2. Transfer Characteristics

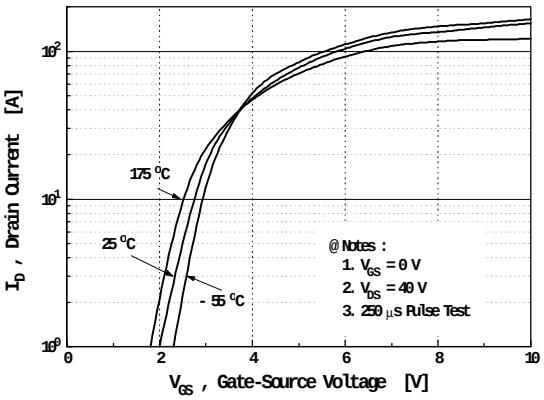



Fig 3. On-Resistance vs. Drain Current

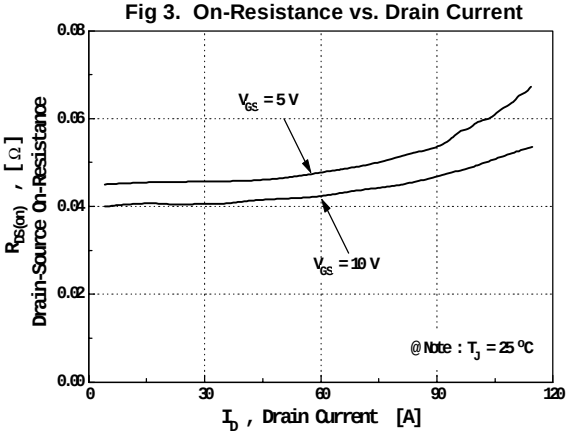



Fig 4. Source-Drain Diode Forward Voltage

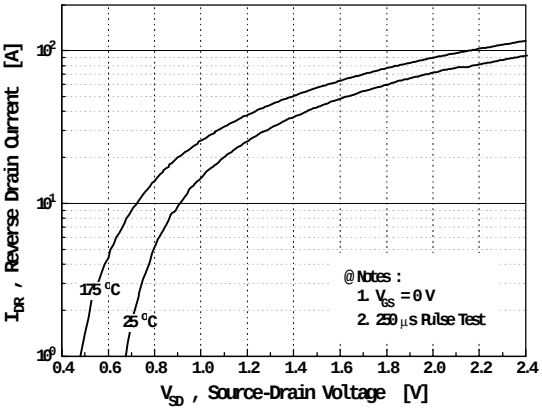



Fig 5. Capacitance vs. Drain-Source Voltage

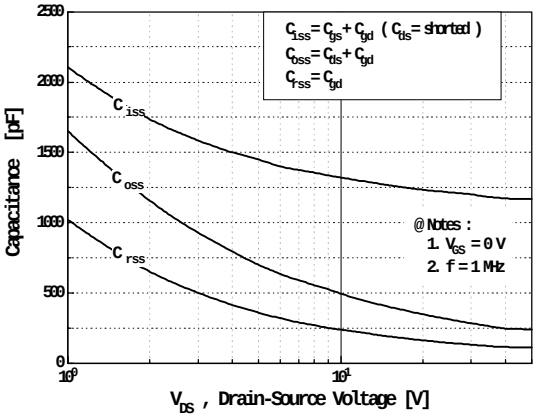



Fig 6. Gate Charge vs. Gate-Source Voltage