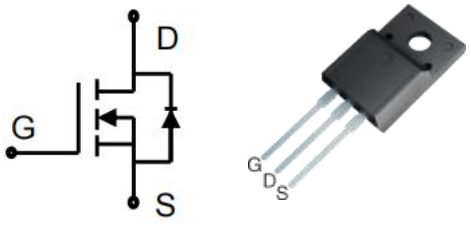
## N-Channel Super Junction MOSFET 800V/7A

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 800 | V |
| $R_{DS(on)}$ | 0.68 | Ω |
| $I_D$ | 7 | A |




TO-220F

### FEATURES

- Ultra low $R_{DS(on)}$
- Ultra low gate charge (typ. $Q_g$=17.9nC)
- 100% UIS tested

### APPLICATIONS

- Power factor correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible power supply (UPS)

### MAXIMUM RATED VALUES(at TC=25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 800 | V |
| Continuous drain current [1] ( $T_C$=25°C )<br>( $T_C$=100°C ) | $I_D$ | 7<br>4.5 | A<br>A |
| Pulsed drain current [2] | $I_{DM}$ | 21 | A |
| Gate-Source voltage | $V_{GSS}$ | ±30 | V |
| Avalanche energy, single pulse [3] | $E_{AS}$ | 120 | mJ |
| Power Dissipation | $P_D$ | 29 | W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |
| Continuous diode forward current | $I_S$ | 7 | A |
| Diode pulse current | $I_{S,pulse}$ | 21 | A |

### THERMAL CHARACTERISTICS

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 4.3 | °C/W |
| Thermal Resistance, Junction-to-Ambient, minimal Footprint [4] | $R_{\theta JA}$ | 62 | °C/W |
| Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s) | $T_{sold}$ | 260 | °C |

**ELECTRICAL CHARACTERISTICS**(Tc = 25°C unless otherwise noted)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250uA | 800 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=VGS, $I_D$=250uA | 3.0 | 4.2 | 5.0 | V |
| Drain cut-off current | $I_{DSS}$ | $V_{DS}$=800V, $V_{GS}$=0 V, $T_j$=25°C | - | - | 1 | μA |
| Gate leakage current, Forward | $I_{GSSF}$ | $V_{GS}$=30V, $V_{DS}$=0 V | - | - | 100 | nA |
| Gate leakage current, Reverse | $I_{GSSR}$ | $V_{GS}$=-30V, $V_{DS}$=0 V | - | - | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=3A<br>$T_j$=25°C<br>$T_j$=150°C | -<br>-<br>- | <br>0.68<br>1.68 | <br>0.9<br>- | Ω |
| Gate resistance | $R_G$ | f=1 MHz, open drain | - | 6.09 | - | Ω |
| **Dynamic characteristics** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$=100V, $V_{GS}$=0V, f=250kHz | - | 749.2 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 24.1 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 0.7 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=400V, $I_D$=3A<br>$R_G$=10Ω, $V_{GS}$=10V | - | 44.7 | - | ns |
| Rise time | $t_r$ | | - | 16.6 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 34.2 | - | |
| Fall time | $t_f$ | | - | 27.1 | - | |
| **Gate charge characteristics** | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=640V, $I_D$=3A, $V_{GS}$=0 to 10 V | - | 3.9 | - | nC |
| Gate to drain charge | $Q_{gd}$ | | - | 8.0 | - | |
| Gate charge total | $Q_g$ | | - | 17.9 | - | |
| Gate plateau voltage | $V_{plateau}$ | | - | 5.3 | - | V |
| **Reverse diode characteristics** | | | | | | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=3A | - | - | 1.1 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=400V, $I_F$=3A, dIF/dt=100 A/μs | - | 255.3 | - | ns |
| Reverse recovery charge | $Q_{rr}$ | | - | 1789.2 | - | nC |
| Peak reverse recovery current | $I_{rrm}$ | | - | 15.14 | - | A |

Notes:

1. Limited by maximum junction temperature and duty cycle. TO-220 equivalent.
2. Limited by maximum junction temperature, maximum duty cycle is 0.75.
3. IAS=2A, L=60mH, VDD=60V, Starting Tj= 25°C.
4. The value of $R_{thJA}$ is measured by placing the device in a still air box which is one cubic foot.

## CHARACTERISTICS DIAGRAMS

Fig 1: Output Characteristics

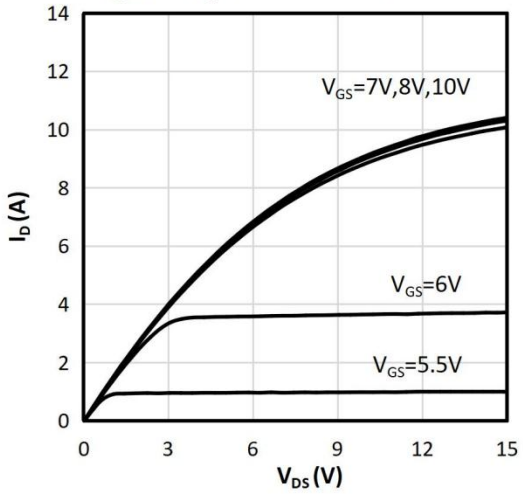



Fig 2: Transfer Characteristics

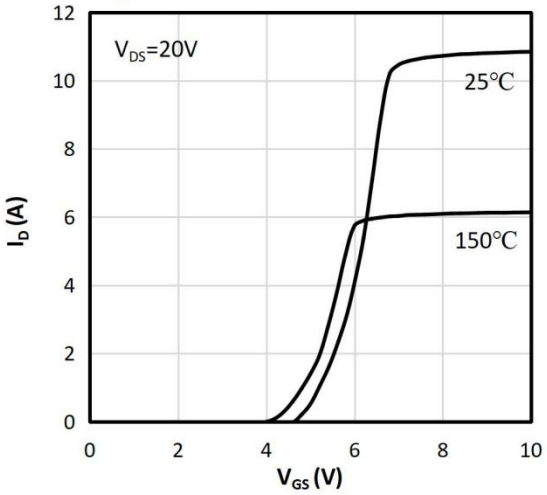



Fig 3: Rds(on) vs Drain Current

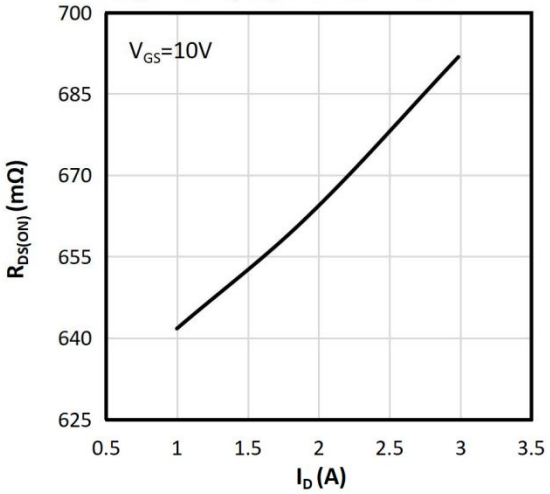



Fig 4: Rds(on) vs. Temperature

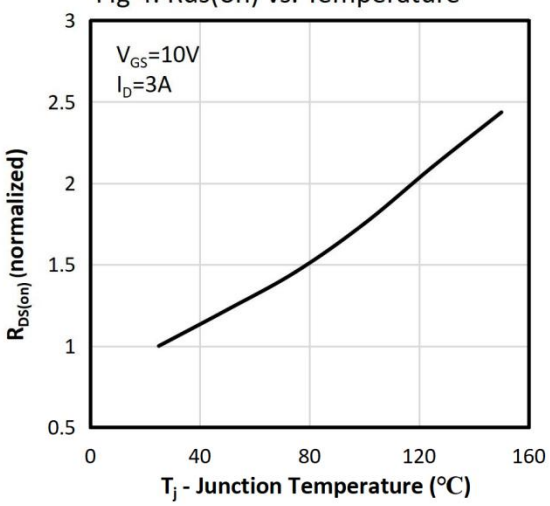



Fig 5: Breakdown Voltage vs. Temperature

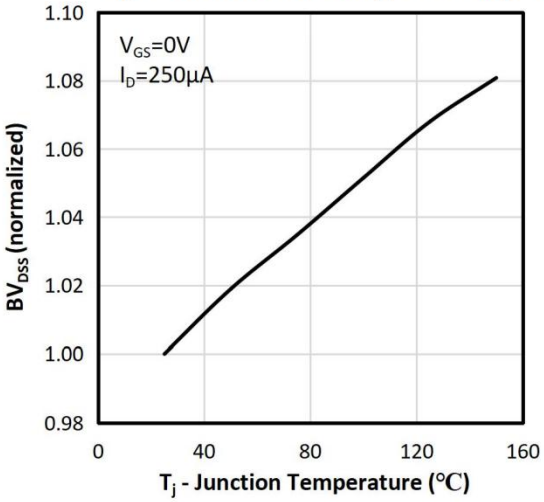



Fig 6: Threshold voltage vs. Temperature

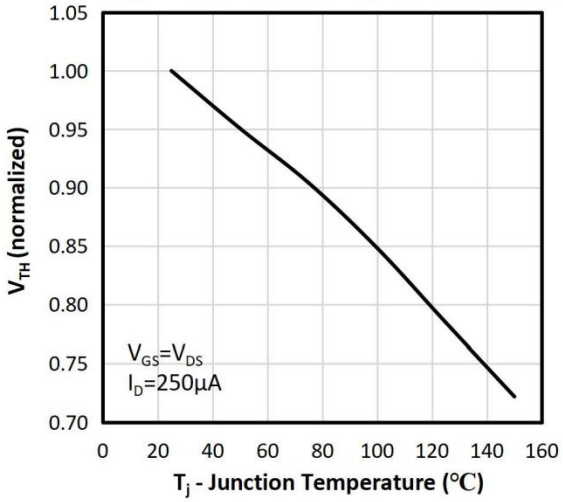


Fig 7: Body-Diode Characteristics

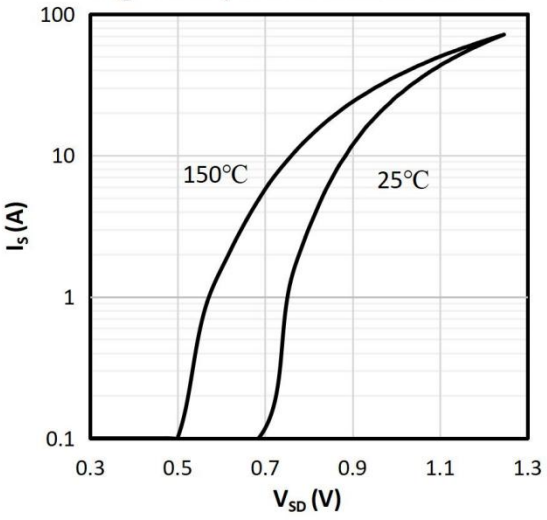



Fig 8: Capatitance Characteristics

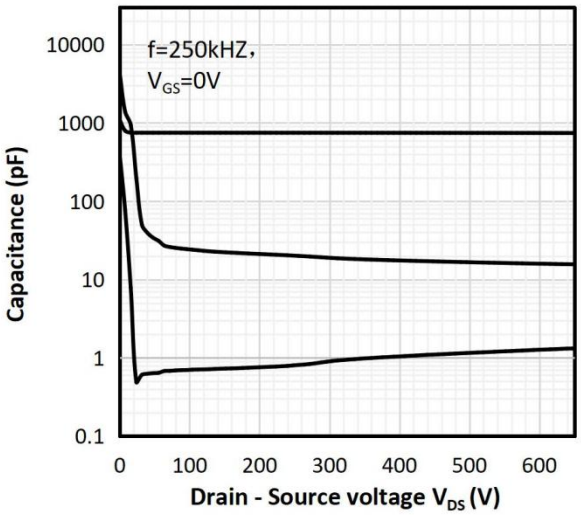



Fig 9: Gate charger Characteristics

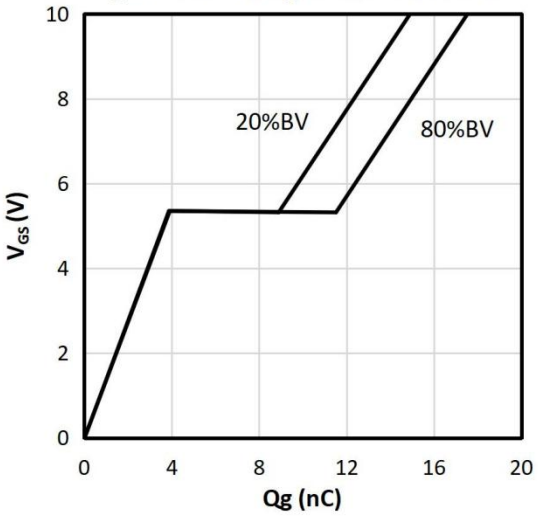



Fig 10: Drain Current Derating

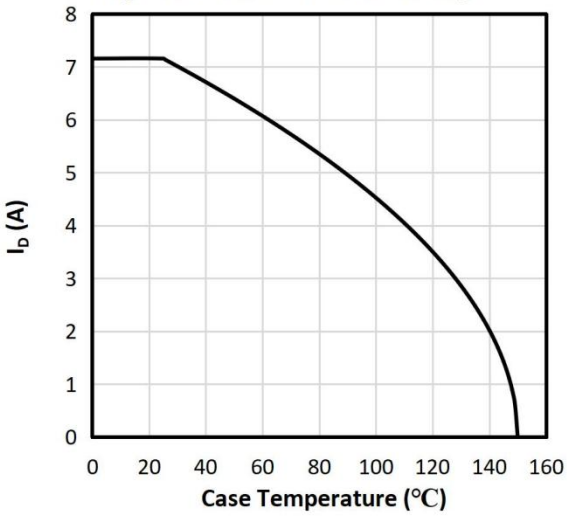



Fig 11: Power Dissipation vs.Temperature

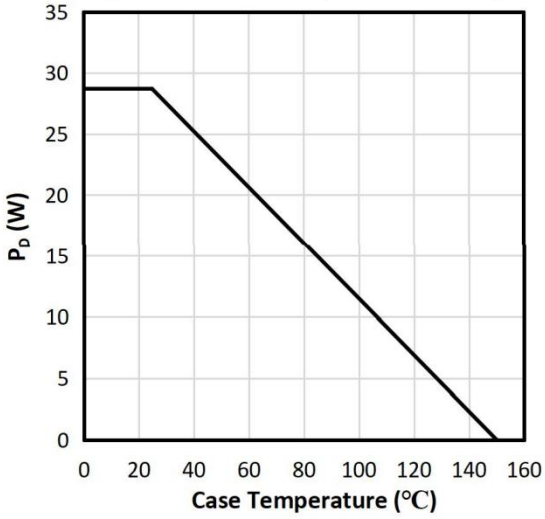



Fig 12: Safe Operating Area

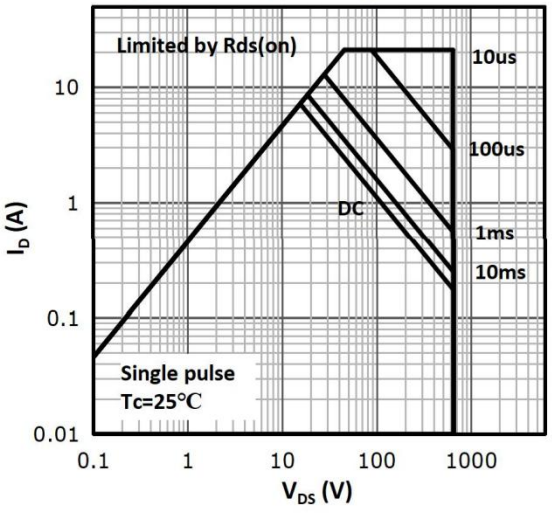
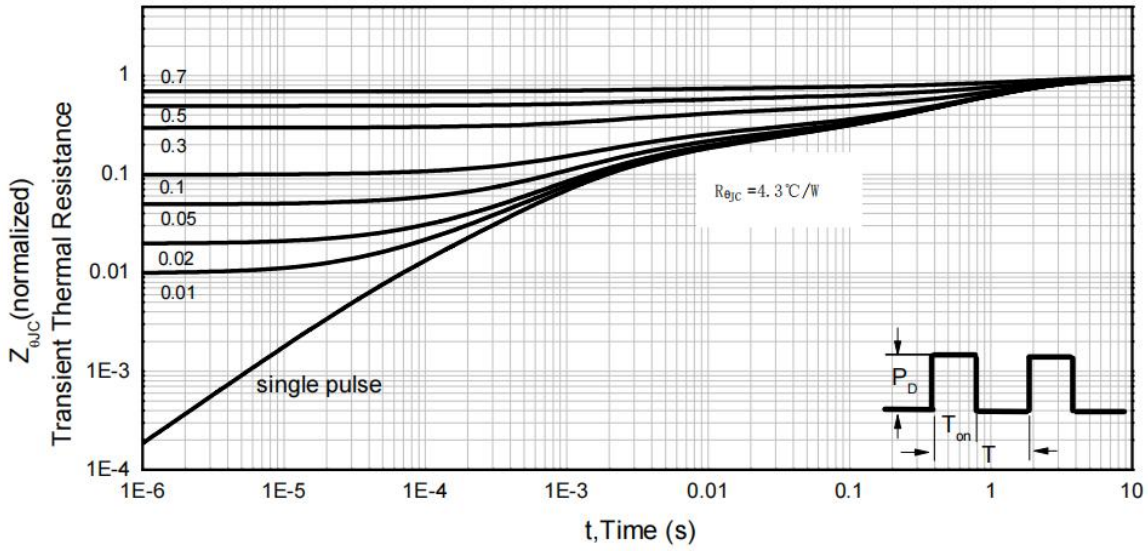
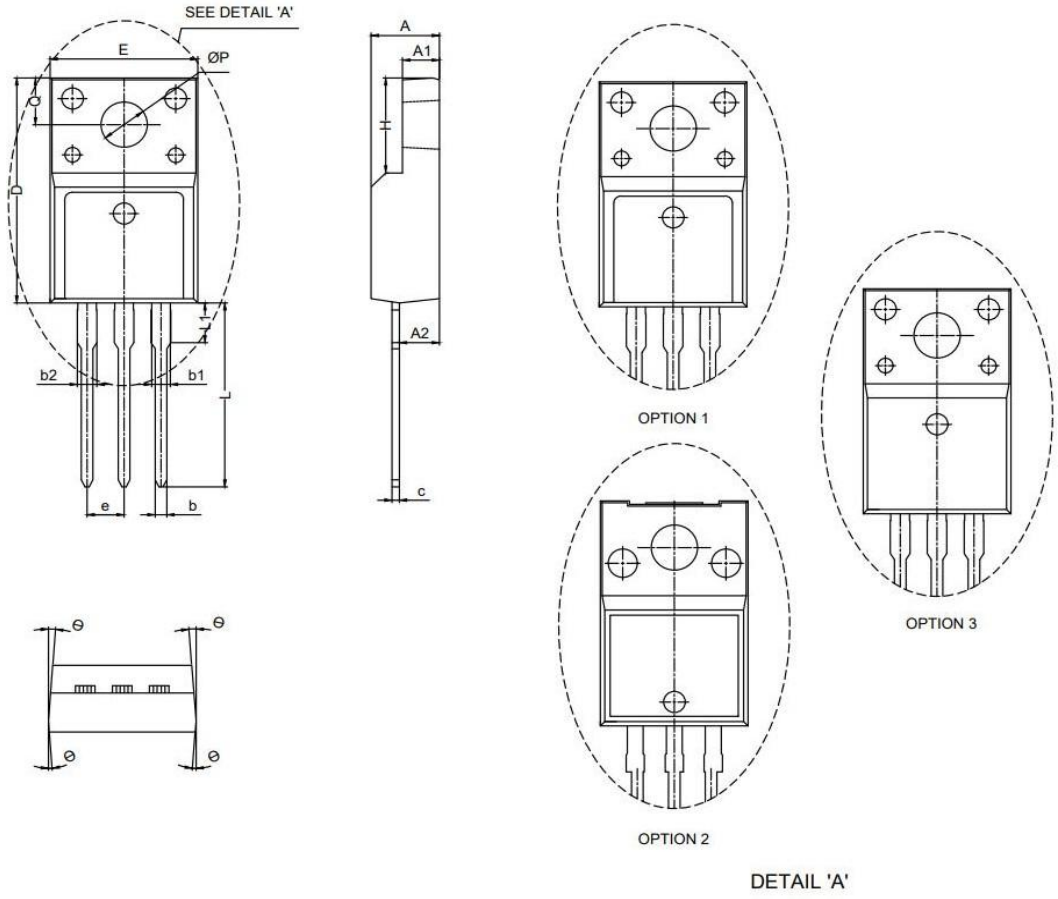


Fig 13: Normalized Maximum Transient Thermal Impedance ($R_{thJC}$)




## PACKAGE OUTLINE



| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 4.40 | 4.90 | 0.173 | 0.193 |
| A1 | 2.34 | 2.74 | 0.092 | 0.108 |
| A2 | 2.50 | 2.96 | 0.098 | 0.117 |
| b | 0.70 | 1.00 | 0.028 | 0.039 |
| b1 | 1.18 | 1.43 | 0.046 | 0.056 |
| b2 | 1.15 | 1.58 | 0.045 | 0.062 |
| c | 0.40 | 0.70 | 0.016 | 0.028 |
| D | 15.57 | 16.40 | 0.613 | 0.646 |
| E | 9.96 | 10.40 | 0.392 | 0.409 |
| e | 2.54 BSC | | 0.100 BSC | |
| H | 6.48 | 7.25 | 0.255 | 0.285 |
| L | 12.64 | 14.20 | 0.498 | 0.559 |
| L1 | 2.90 | 3.60 | 0.114 | 0.142 |
| ∅P | 3.00 | 3.38 | 0.118 | 0.133 |
| Q | 3.10 | 3.50 | 0.122 | 0.138 |
| Θ | 1° | 5° | 1° | 5° |

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