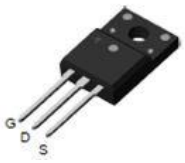
N-channel MOSFET

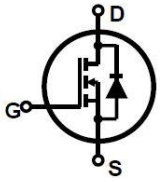
| $BV_{DSS}$ | $I_D$ | $R_{DS(on)}$ |
|---|---|---|
| 800V | 7A | <1.9Ω |

## Features

- Low gate charge
- Improved dv/dt capability
- RoHS compliant
- JEDEC Qualification

Top view TO-220F




| Ordering Part Number | Package | Marking | Remark |
|---|---|---|---|
| TMPF7N80A | TO-220F | TMPF7N80A | RoHS |

## Absolute Maximum Ratings

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 800 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | V |
| Continuous Drain Current | $T_C$ = 25 ℃ | $I_D$ | 7 | A |
| | $T_C$ = 100 ℃ | | 4 | A |
| Pulsed Drain Current (Note 1) | | $I_{DM}$ | 28 | A |
| Single Pulse Avalanche Energy (Note 2) | | $E_{AS}$ | 227 | mJ |
| Repetitive Avalanche Current (Note 1) | | $I_{AR}$ | 7 | A |
| Repetitive Avalanche Energy (Note 1) | | $E_{AR}$ | 15.6 | mJ |
| Power Dissipation | $T_C$ = 25 ℃ | $P_D$ | 50 | W |
| | Derate above 25 ℃ | | 0.4 | W/℃ |
| Peak Diode Recovery dv/dt (Note 3) | | dv/dt | 4.5 | V/ns |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55~150 | ℃ |
| Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | | $T_L$ | 300 | ℃ |

* Limited only by maximum junction temperature

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Maximum Thermal resistance, Junction-to-Case | $R_{\theta JC}$ | 2.5 | ℃/W |
| Maximum Thermal resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | ℃/W |

## Electrical Characteristics : $T_C$=25℃, unless otherwise noted

| Parameter | Symbol | Test condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 800 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 800 V, $V_{GS}$ = 0 V | -- | -- | 10 | µA |
| | | $V_{DS}$ = 640 V, $T_C$ = 125 ℃ | -- | -- | 100 | µA |
| Forward Gate-Source Leakage Current | $I_{GSSF}$ | $V_{GS}$ = 30 V, $V_{DS}$ = 0 V | -- | -- | 100 | nA |
| Reverse Gate-Source Leakage Current | $I_{GSSR}$ | $V_{GS}$ = -30 V, $V_{DS}$ = 0 V | -- | -- | -100 | nA |
| **ON** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 2 | -- | 4 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 3.5 A | -- | 1.59 | 1.9 | Ω |
| Forward Transconductance (Note 4) | $g_{FS}$ | $V_{DS}$ = 30 V, $I_D$ = 3.5 A | -- | 8 | -- | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1.0 MHz | -- | 1410 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 120 | -- | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 20 | -- | pF |
| **SWITCHING** | | | | | | |
| Turn-On Delay Time (Note 4,5) | $t_{d(on)}$ | $V_{DD}$ = 400 V, $I_D$ = 7 A, $R_G$ = 25 Ω | -- | 26 | -- | ns |
| Turn-On Rise Time (Note 4,5) | $t_r$ | | -- | 49 | -- | ns |
| Turn-Off Delay Time (Note 4,5) | $t_{d(off)}$ | | -- | 135 | -- | ns |
| Turn-Off Fall Time (Note 4,5) | $t_f$ | | -- | 60 | -- | ns |
| Total Gate Charge (Note 4,5) | $Q_g$ | $V_{DS}$ = 640 V, $I_D$ = 7 A, $V_{GS}$ = 10 V | -- | 38 | -- | nC |
| Gate-Source Charge (Note 4,5) | $Q_{gs}$ | | -- | 5.6 | -- | nC |
| Gate-Drain Charge (Note 4,5) | $Q_{gd}$ | | -- | 17 | -- | nC |
| **SOURCE DRAIN DIODE** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | ---- | -- | -- | 7 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | ---- | -- | -- | 28 | A |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 7 A | -- | -- | 1.5 | V |
| Reverse Recovery Time (Note 4) | $t_{rr}$ | $V_{GS}$ = 0 V, $I_S$ = 7 A, $dI_F$ / dt = 100 A/µs | -- | 540 | -- | ns |
| Reverse Recovery Charge (Note 4) | $Q_{rr}$ | | -- | 4.1 | -- | µC |

Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=8.7mH, $I_{AS}$ = 7A, $V_{DD}$ = 50V, $R_G$ = 25Ω, Starting $T_J$= 25 ℃, not subject to production test – verified by design/characterization
3 $I_{SD}$ ≤ 7A, di/dt ≤ 200A/µs , $V_{DD}$ ≤ $BV_{DS}$, Starting $T_J$= 25 ℃
4. Pulse Test :Pulse width ≤ 300µs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Fig. 1 Output Characteristics

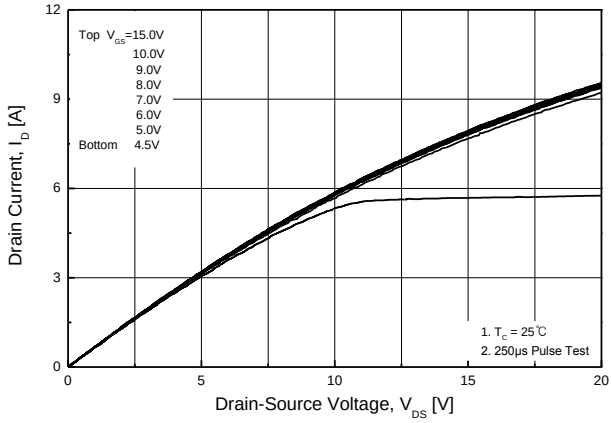



Fig. 2 Transfer Characteristics

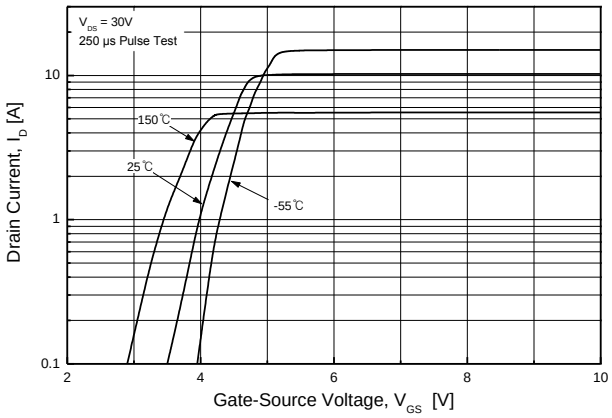



Fig. 3 On-Resistance vs.
Drain Current and Gate voltage

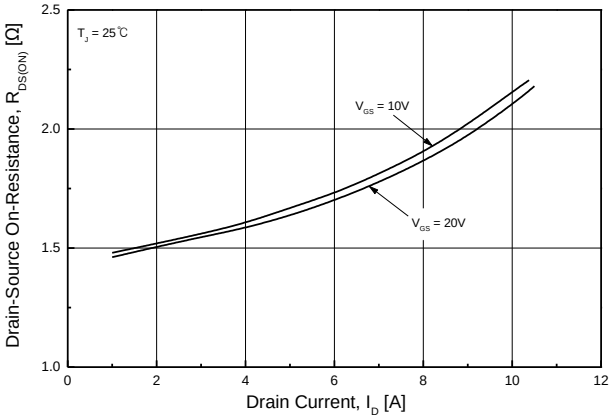



Fig. 4 Body Diode Forward Voltage vs.
Source Current and Temperature

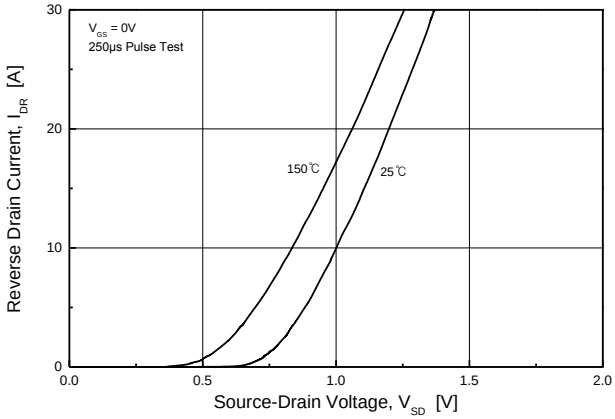



Fig. 5 Capacitance Characteristics

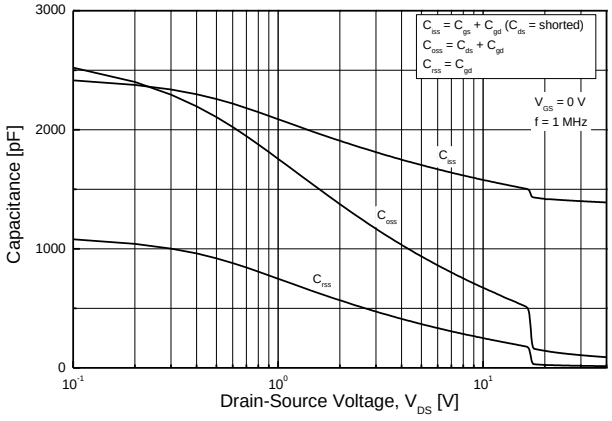



Fig. 6 Gate Charge Characteristics

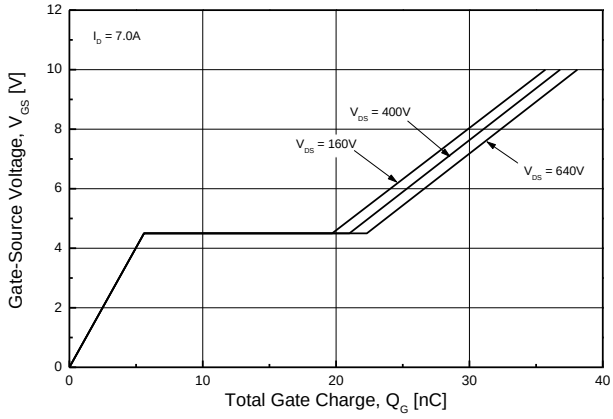


Fig. 7 Breakdown Voltage vs. Temperature

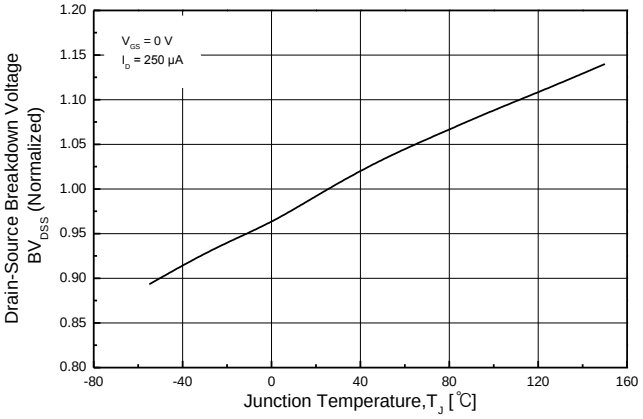



Fig. 8 On-Resistance vs. Temperature

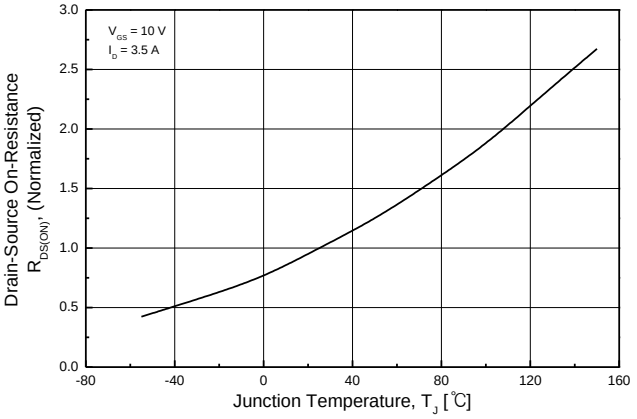



Fig. 9 Maximum Drain Current vs. Case Temperature

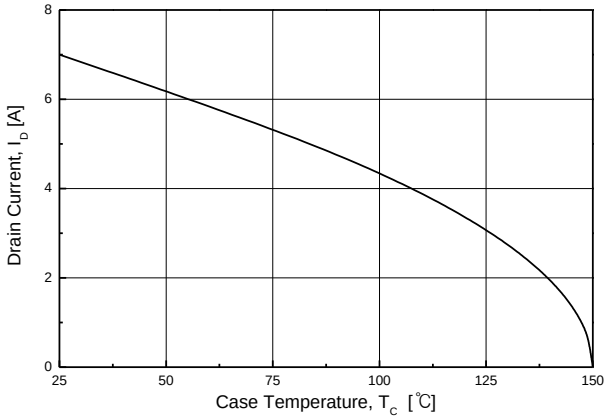



Fig. 10 Gate Threshold Voltage vs. Junction Temperature

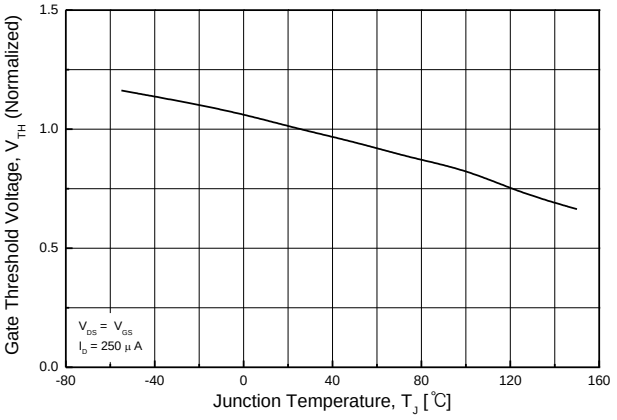



Fig. 11 Maximum Safe Operating Area

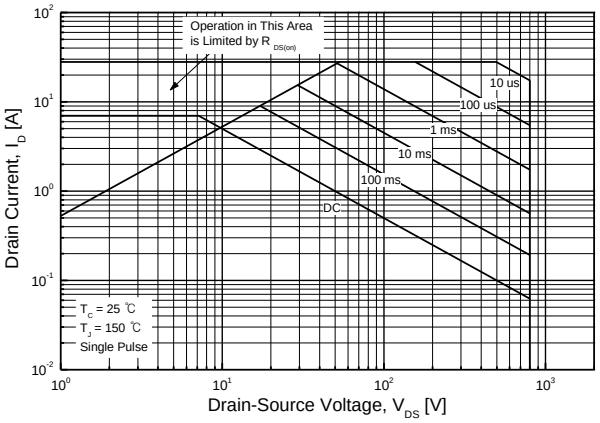
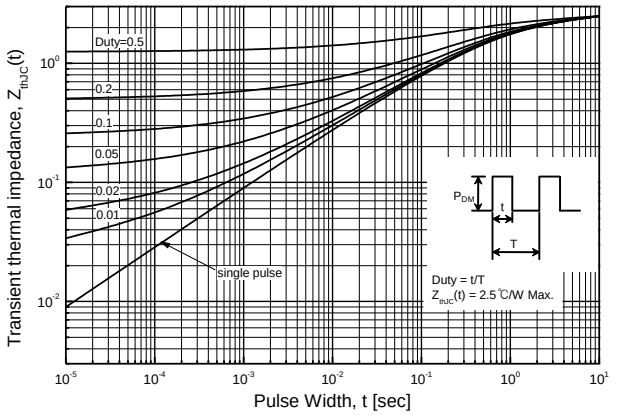
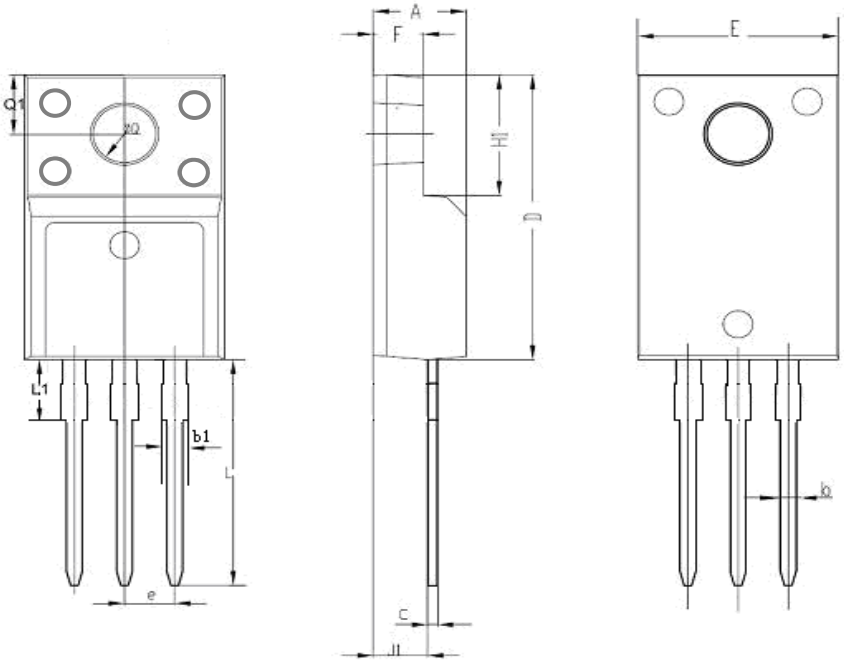



Fig. 12 Transient Thermal Response Curve



# TO-220F-3L MECHANICAL DATA




| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|---|---|---|---|---|---|
| | MIN | MAX | MIN | MAX | |
| A | 0.178 | 0.194 | 4.53 | 4.93 | |
| b | 0.028 | 0.036 | 0.71 | 0.91 | |
| C | 0.018 | 0.024 | 0.45 | 0.60 | |
| D | 0.617 | 0.633 | 15.67 | 16.07 | |
| E | 0.392 | 0.408 | 9.96 | 10.36 | |
| e | 0.100 TYP. | | 2.54TYP. | | |
| H1 | 0.256 | 0.272 | 6.50 | 6.90 | |
| J1 | 0.101 | 0.117 | 2.56 | 2.96 | |
| L | 0.503 | 0.519 | 12.78 | 13.18 | |
| φQ | 0.117 | 0.133 | 2.98 | 3.38 | |
| b1 | 0.045 | 0.055 | 1.15 | 1.39 | |
| L1 | 0.114 | 0.130 | 2.9 | 3.3 | |
| Q1 | 0.122 | 0.138 | 3.10 | 3.50 | |
| F | 0.092 | 0.108 | 2.34 | 2.74 | |