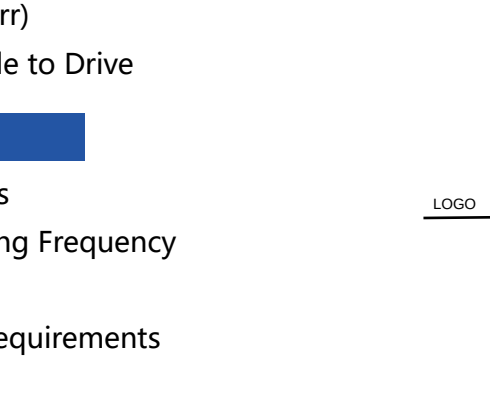
| | |
|---|---|
| $V_{DSS}$ | 800 V |
| $I_D$ | 11.8 A |
| $R_{DS(ON)}$ | 190 mΩ |

## FEATURES

- Wide Bandgap SiC MOSFET Technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery (Qrr)
- Easy to Parallel and Simple to Drive

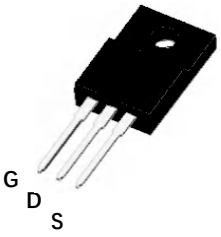
## BENEFITS

- Reduced Switching Losses
- Increased System Switching Frequency
- Increased Power Density
- Reduction of Heat Sink Requirements
- Reduced EMI

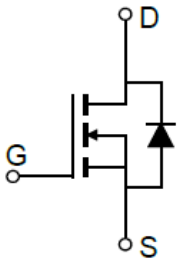



## APPLICATION

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power Applications




TO-220F-3L TopView




Schematic Diagram

## ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25°C, unless otherwise specified)

| Parameter | Symbol | Test Condition | Value | Unit |
|---|---|---|---|---|
| Drain to Source Voltage | $V_{DS}$ | $V_{GS}$ = 0V | 800 | V |
| Gate to Source Voltage | $V_{GS}$ | Absolute maximum values | -10/+22 | V |
| Recommended Operation Voltage of Gate to Source | $V_{GSop}$ | Recommended operational values | 0/+18 | V |
| Continuous Drain Current | $I_D$ | $V_{GS}$=18V, $T_C$=25℃ | 11.8 | A |
| | | $V_{GS}$=18V, $T_C$=100℃ | 8.3 | |
| Pulsed Drain Current | $I_{DM}$ | $V_{GS}$=18V, $T_C$=25℃ | 24 | A |
| Power Dissipation | $P_{tot}$ | $T_C$=25℃, $T_j$=175℃ | 38.9 | W |
| Operating and Storage Temperature | $T_j$, $T_{stg}$ | | -55 to +175 | ℃ |

# ELECTRICAL CHARACTERISTICS ($T_C$=25°C, unless otherwise specified)

## Static Characteristics

| Parameter | Symbol | Test Condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=500μA | 800 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$= $V_{DS}$, $I_D$=1.3mA | 2.6 | | 4.6 | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$=0V, $V_{DS}$=800V, $T_j$=25℃ | | | 100 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$=18V, $V_{DS}$=0V | | | 250 | nA |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}$=15V, $I_D$=6.5A | | 245 | | mΩ |
| | | $V_{GS}$=15V, $I_D$=6.5A, $T_j$=175℃ | | 201 | | |
| | | $V_{GS}$=18V, $I_D$=6.5A | | 190 | 247 | |
| | | $V_{GS}$=18V, $I_D$=6.5A, $T_j$=175℃ | | 185 | | |

## Dynamic Characteristics

| Parameter | Symbol | Test Condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=400V, $f$=100KHz, $T_j$=25℃ | | 376 | | pF |
| Output Capacitance | $C_{oss}$ | | | 30.2 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 3.0 | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=0/18V, $V_{DS}$=400V, $I_D$=6.5A, $T_j$=25℃ | | 24.5 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 9.9 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 6.5 | | |
| Gate Resistance | $R_g$ | $f$=1MHz | | 10.6 | | Ω |

## Thermal Characteristics

| Parameter | Symbol | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Thermal Resistance from Junction to Case | $R_{th(j-c)}$ | - | 3.9 | - | ℃/W |

# ELECTRICAL CHARACTERISTICS ($T_C$=25°C, unless otherwise specified)

## Switching Characteristics

| Parameter | Symbol | Test Condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}$=0/18V, $V_{DD}$=400V, $I_D$=6.5A, $R_g$=5Ω, $L$=200uH | | 13.2 | | ns |
| Rise Time | $t_r$ | | | 35.2 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 18.8 | | |
| Fall Time | $t_f$ | | | 36.8 | | |

## Reverse Diode Characteristics

| Parameter | Symbol | Test Condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{SD}$=3.5A, $T_j$=25℃ | - | 3.4 | | V |
| Continuous Diode Forward Current | $I_S$ | $V_{GS}$=0V, $T_j$=25℃ | | 11.8 | | A |
| Reverse Recovery Time | $t_{rr}$ | $V_{GS}$ = 0V, $I_{SD}$=6.5A, $V_R$=400V, di/dt=880A/us, $T_j$=25℃ | | 11.8 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 34.5 | | nC |
| Peak Reverse Recovery Current | $I_{rrm}$ | | | 4.6 | | A |

## RATING AND CHARACTERISTIC CURVES

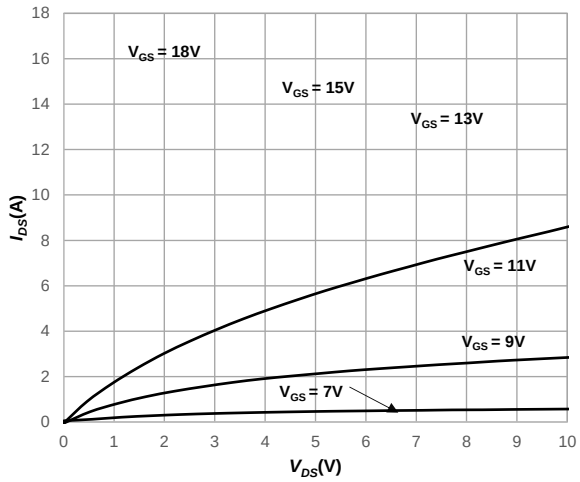



Fig1. Output Characteristics $T_j$=25℃

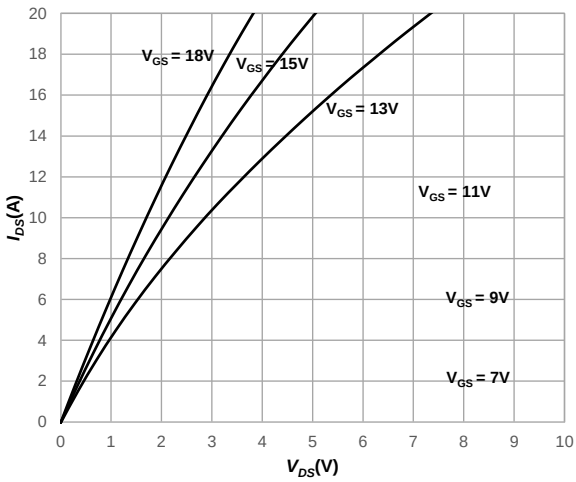



Fig2. Output Characteristics $T_j$=175℃

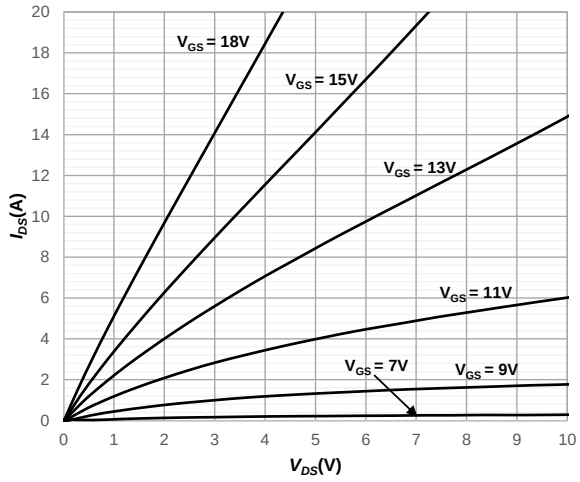



Fig3. Output Characteristics $T_j$= -40℃

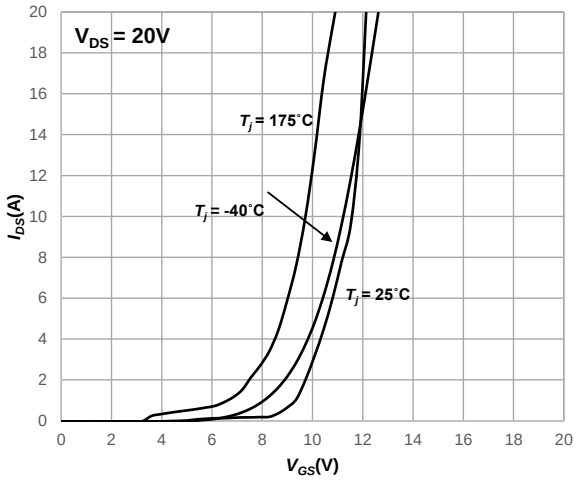



Fig4. Typical Transfer Characteristics

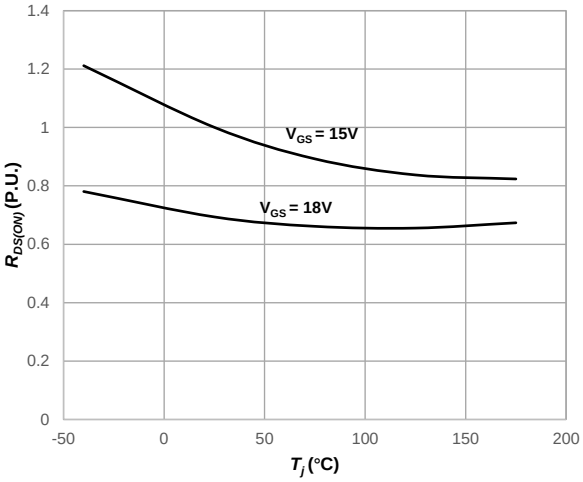



Fig5. Normalized On-Resistance vs. Temperature

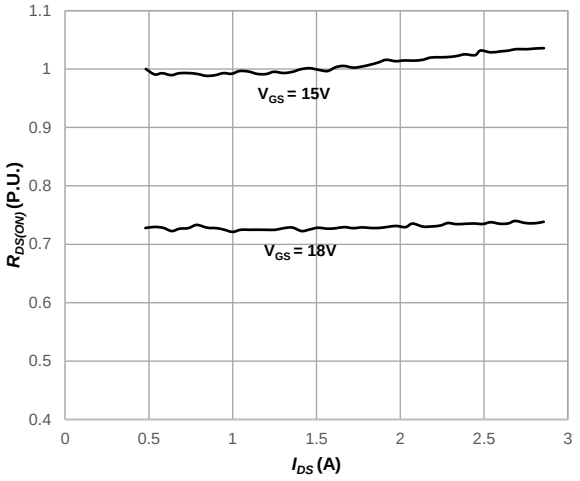



Fig6. Normalized On-Resistance vs. Drain Current For $T_j$=25℃

## RATING AND CHARACTERISTIC CURVES

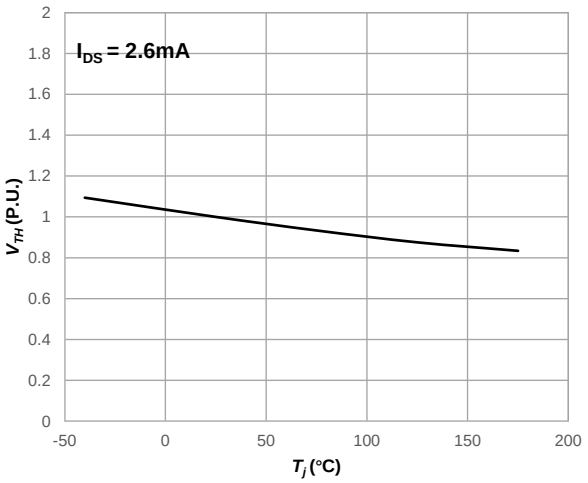



Fig7. Normalized Threshold Voltage vs. Temperature

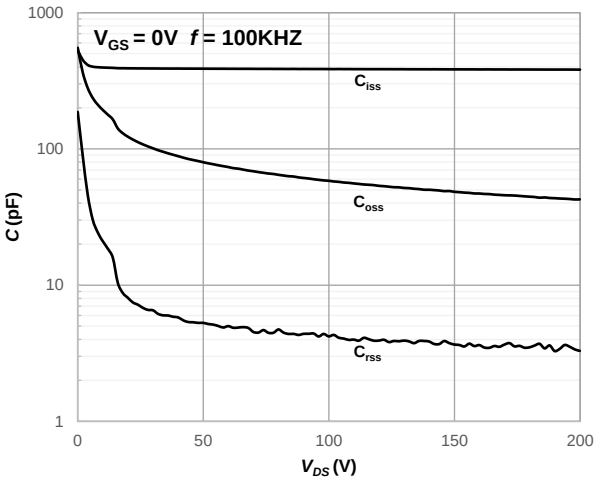



Fig8. Capacitances vs. Drain-Source Voltage (0-200V)

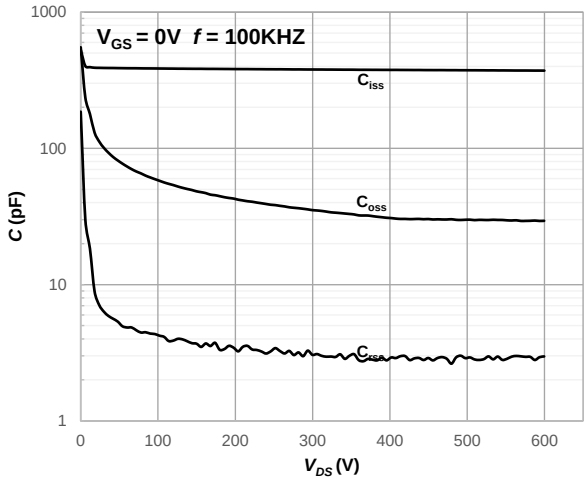



Fig9. Capacitances vs. Drain-Source Voltage (0-650V)

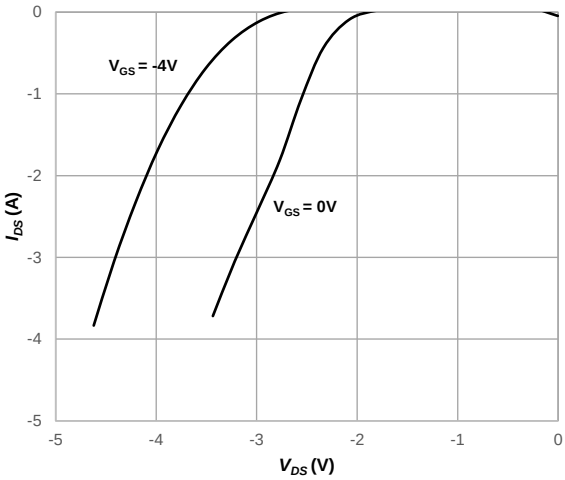



Fig10. Body Diode Characteristics

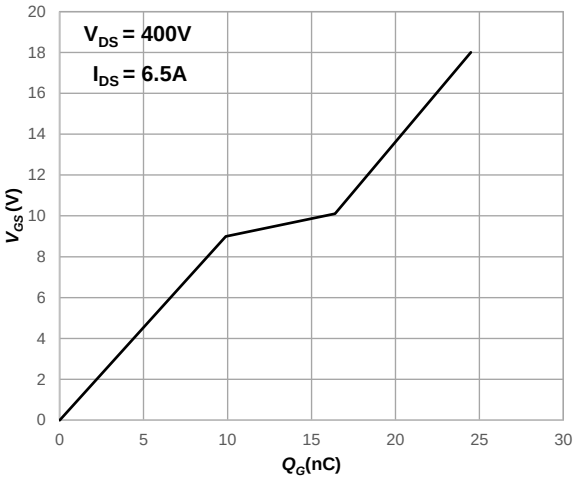



Fig11. Gate Charge Characteristic

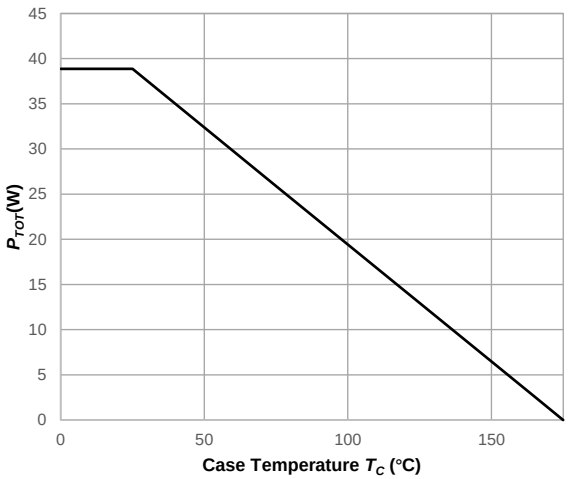



Fig12. Power Dissipation vs. Case temperature

## RATING AND CHARACTERISTIC CURVES

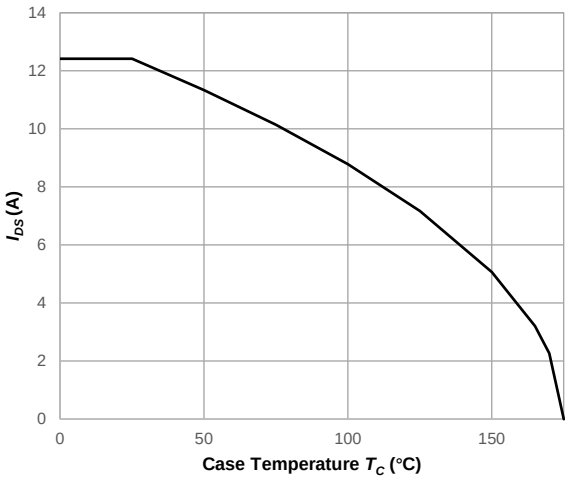
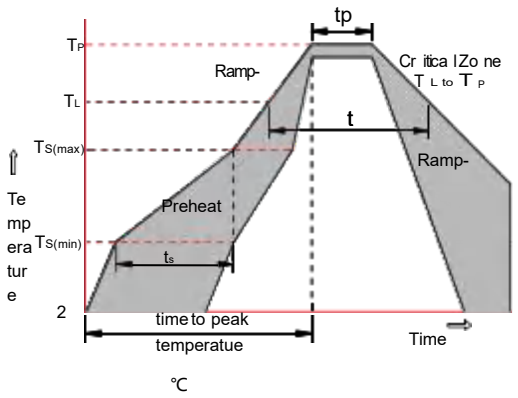



Fig13. Continuous Drain Current vs. Case Temperature

## Soldering parameters

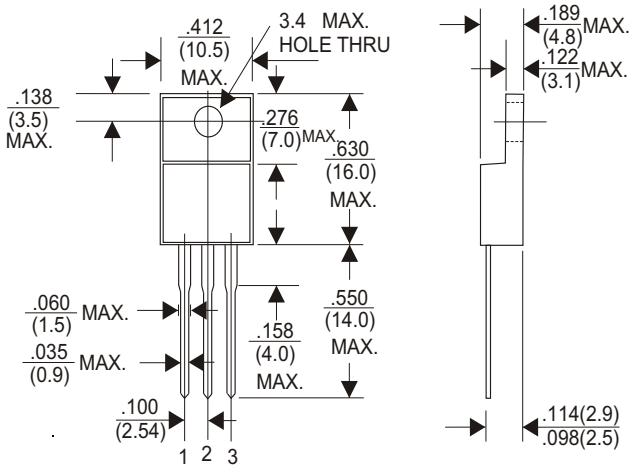
| Reflow Condition | | Pb-Free assembly (see as bellow) |
|---|---|---|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150℃ |
| | -Temperature Max($T_{s(max)}$) | +200℃ |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp ($T_L$) to peak) | | 3℃/sec. Max |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate | | 3℃/sec. Max |
| Reflow | -Temperature($T_L$)(Liquid us) | +217℃ |
| | -Temperature($t_L$) | 60-150 secs. |
| Peak Temp ($T_p$) | | +260(+0/-5)℃ |
| Time within 5℃ of actual Peak Temp ($t_p$) | | 30 secs. Max |
| Ramp-down Rate | | 6℃/sec. Max |
| Time 25℃ to Peak Temp ($T_P$) | | 8 min. Max |
| Do not exceed | | +260℃ |

**FIG5:** Reflow condition




## Package Dimensions & Suggested Pad Layout

ITO-220AB **(FULLYINSULATED)**




Dimensions in inches and (millimeters)