

## Features

- Very low FOM  $R_{DS(on)} \times Q_G$
- Very high commutation ruggedness

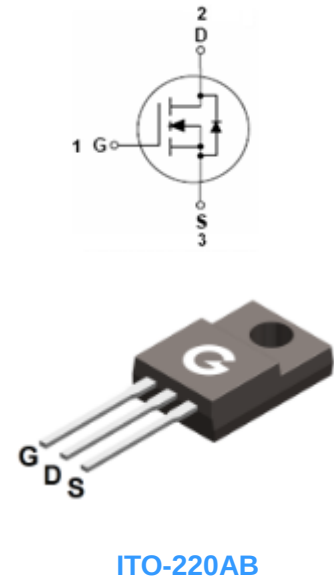
HF

## APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Power Factor Correction (PFC)
- Uninterruptible Power Supply (UPS)

## Mechanical Data

- Case: ITO-220AB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



## Ordering Information

| Part Number | Package   | Shipping Quantity | Marking Code |
|-------------|-----------|-------------------|--------------|
| SJ80R650F   | ITO-220AB | 50 pcs / Tube     | SJ80R650F    |

## Maximum Ratings (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                                              | Symbol   | Value    | Unit |
|--------------------------------------------------------|----------|----------|------|
| Drain-Source Voltage                                   | $V_{DS}$ | 800      | V    |
| Gate-Source Voltage                                    | $V_{GS}$ | $\pm 30$ | V    |
| Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )  | $I_D$    | 8        | A    |
| Continuous Drain Current ( $T_C = 125^\circ\text{C}$ ) |          | 5        | A    |
| Pulsed Drain Current ( $T_C = 25^\circ\text{C}$ )      | $I_{DM}$ | 15       | A    |
| Single Pulse Avalanche Energy <sup>*1</sup>            | $E_{AS}$ | 300      | mJ   |

## Thermal Characteristics

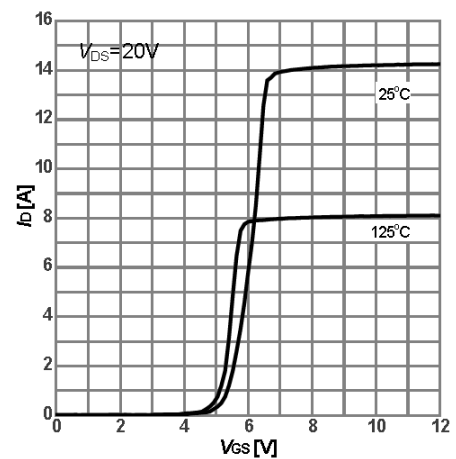
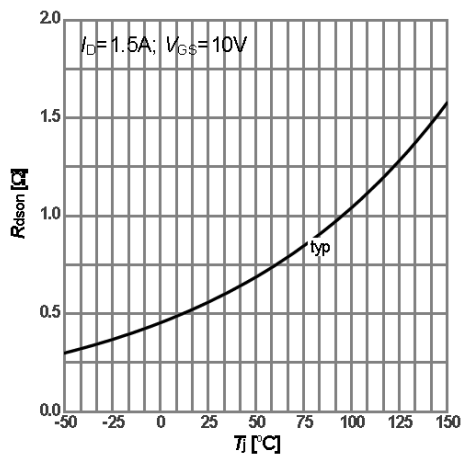
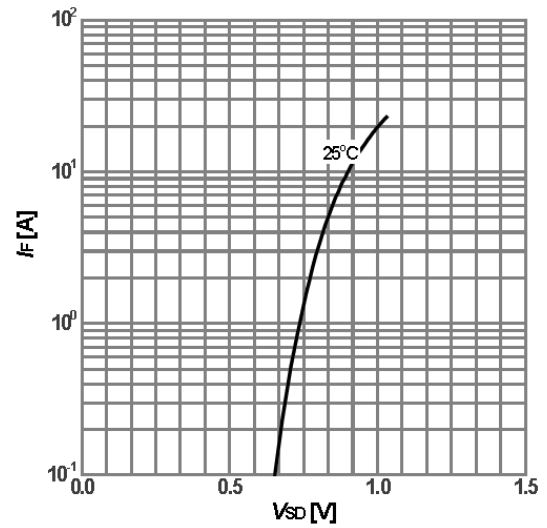
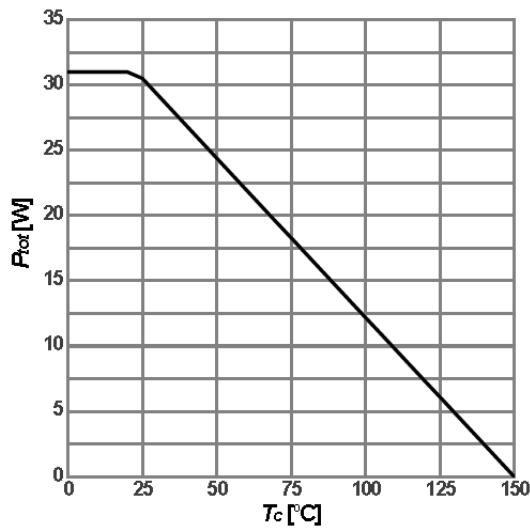
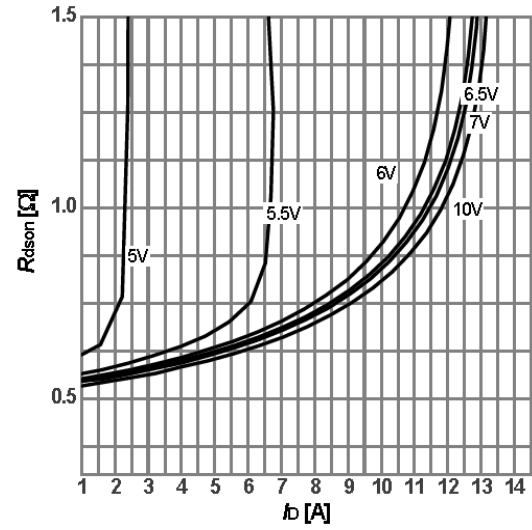
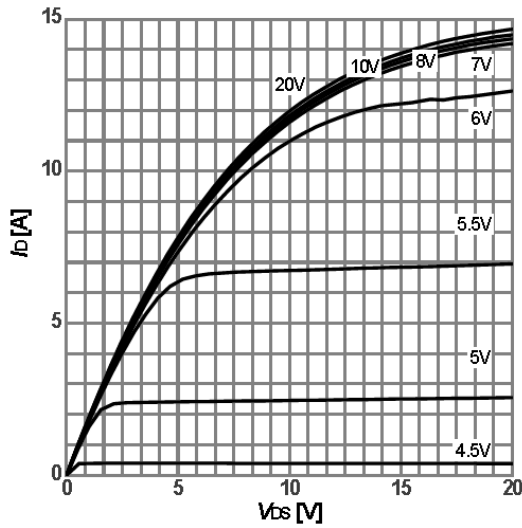
| Parameter                                                        | Symbol          | Value           | Unit               |
|------------------------------------------------------------------|-----------------|-----------------|--------------------|
| Power Dissipation ( $T_C = 25^\circ\text{C}$ )                   | $P_D$           | 31              | W                  |
| Thermal Resistance Junction-to-Air ( $T_C = 25^\circ\text{C}$ )  | $R_{\theta JA}$ | 62.5            | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Case ( $T_C = 25^\circ\text{C}$ ) | $R_{\theta JC}$ | 4               | $^\circ\text{C/W}$ |
| Operating Junction Temperature Range                             | $T_J$           | $-55 \sim +150$ | $^\circ\text{C}$   |
| Storage Temperature Range                                        | $T_{STG}$       | $-55 \sim +150$ | $^\circ\text{C}$   |

### Electrical Characteristics (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

| Symbol                             | Parameter                         | Test Condition                                                                  | Min. | Typ.  | Max. | Unit |
|------------------------------------|-----------------------------------|---------------------------------------------------------------------------------|------|-------|------|------|
| Off Characteristics                |                                   |                                                                                 |      |       |      |      |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                    | 800  | -     | -    | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current   | V <sub>DS</sub> = 800V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C             | -    | -     | 1    | μA   |
|                                    |                                   | V <sub>DS</sub> = 800V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C            | -    | -     | 10   | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current         | V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V                                    | -    | -     | ±100 | nA   |
| On Characteristics                 |                                   |                                                                                 |      |       |      |      |
| R <sub>DS(ON)</sub>                | Static Drain-Source On-resistance | V <sub>GS</sub> = 10V, I <sub>D</sub> = 4A                                      | -    | -     | 0.65 | Ω    |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage            | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                      | 2.5  | -     | 4.5  | V    |
| Dynamic Characteristics            |                                   |                                                                                 |      |       |      |      |
| C <sub>ISS</sub>                   | Input Capacitance                 | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 50V<br>f = 1.0MHz                     | -    | 766   | -    | pF   |
| C <sub>OSS</sub>                   | Output Capacitance                |                                                                                 | -    | 43.2  | -    |      |
| C <sub>RSS</sub>                   | Reverse Transfer Capacitance      |                                                                                 | -    | 1.37  | -    |      |
| Switching Characteristics          |                                   |                                                                                 |      |       |      |      |
| t <sub>d(ON)</sub>                 | Turn-on Delay Time                | V <sub>DS</sub> = 400V<br>V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 2.2A        | -    | 8.6   | -    | ns   |
| t <sub>r</sub>                     | Turn-on Rise Time                 |                                                                                 | -    | 20.9  | -    |      |
| t <sub>d(OFF)</sub>                | Turn-Off Delay Time               |                                                                                 | -    | 33.2  | -    |      |
| t <sub>f</sub>                     | Turn-Off Fall Time                |                                                                                 | -    | 26.7  | -    |      |
| Q <sub>G</sub>                     | Total Gate-Charge                 | V <sub>DS</sub> = 400V<br>V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 4A          | -    | 14    | -    | nC   |
| Q <sub>GS</sub>                    | Gate to Source Charge             |                                                                                 | -    | 3.25  | -    |      |
| Q <sub>GD</sub>                    | Gate to Drain (Miller) Charge     |                                                                                 | -    | 4.84  | -    |      |
| Source-Drain Diode Characteristics |                                   |                                                                                 |      |       |      |      |
| V <sub>SD</sub>                    | Diode Forward Voltage             | I <sub>S</sub> = 8A, V <sub>GS</sub> = 0V                                       | -    | -     | 1.3  | V    |
| I <sub>S</sub>                     | Diode Continuous Forward Current  | T <sub>C</sub> = 25°C                                                           | -    | -     | 8    | A    |
| I <sub>SM</sub>                    | Pulsed Source-Drain Current       |                                                                                 | -    | -     | 15   | A    |
| t <sub>rr</sub>                    | Reverse Recovery Time             | I <sub>F</sub> = 1.7A, V <sub>R</sub> = 400 V<br>di <sub>F</sub> /dt = 100 A/μs | -    | 222.6 | -    | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge           |                                                                                 | -    | 1.15  | -    | μC   |
| I <sub>rm</sub>                    | Peak Reverse Recovery Current     |                                                                                 | -    | 11    | -    | A    |

Note 1:  $I_D = 3.5A, V_{DD} = 50V, R_G = 25\Omega, L = 50mH$ , Starting  $T_J = 25^\circ\text{C}$

Ratings and Characteristics Curves (@  $T_J = 25^\circ\text{C}$  unless otherwise specified)



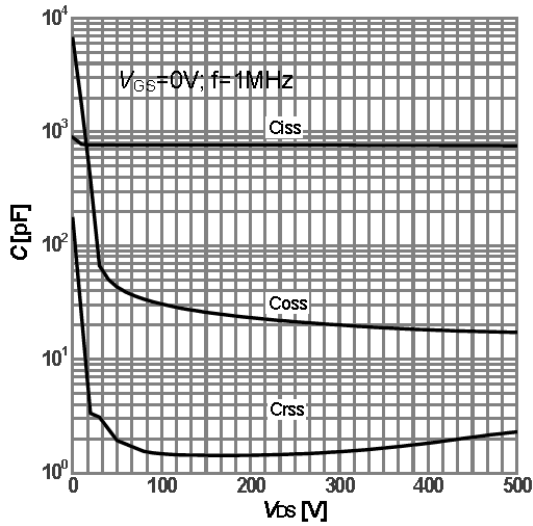


Fig 7 Capacitance Characteristics

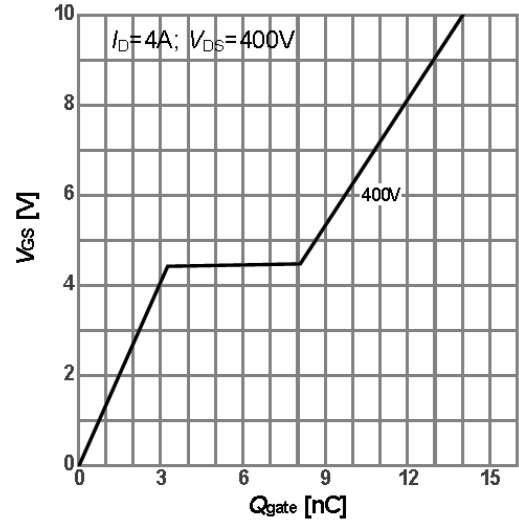


Fig 8 Gate-Charge Characteristics

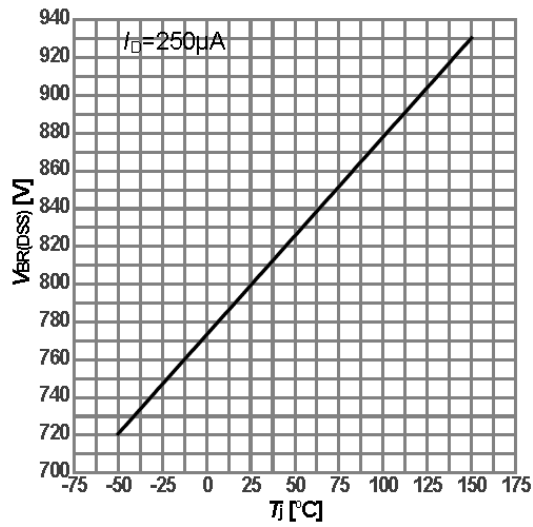


Fig 9 Normalized Breakdown Voltage  
vs. Junction Temperature

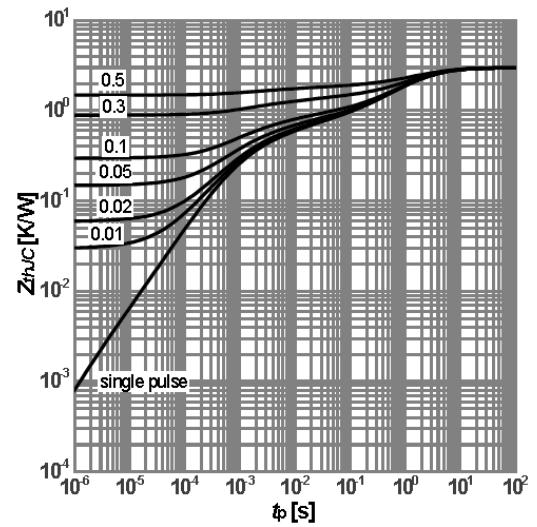


Fig 10 Transient Thermal Resistance

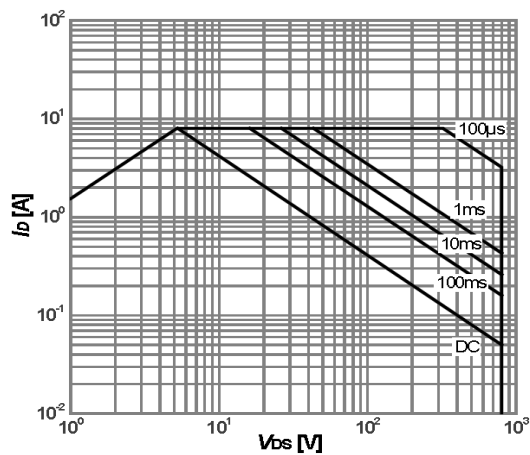
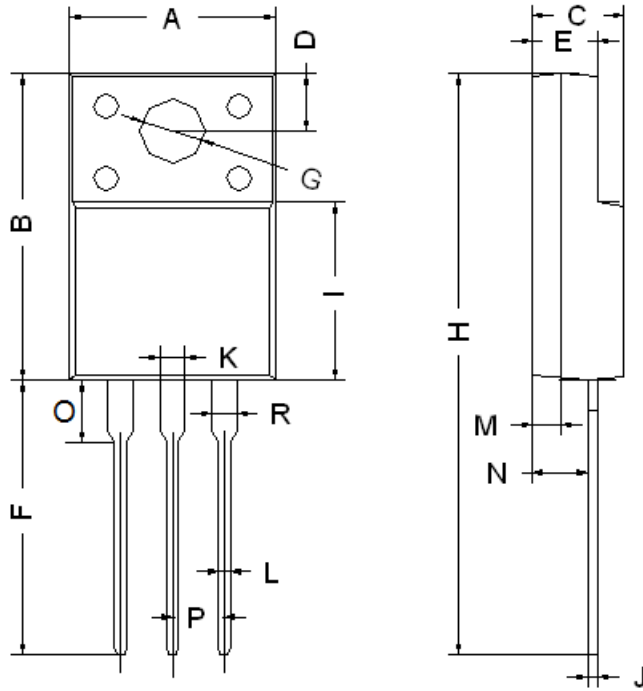


Fig 11 Safe Operation Area

**Package Outline Dimensions** (Unit: mm)



| ITO-220AB |       |       |
|-----------|-------|-------|
| Dimension | Min.  | Max.  |
| A         | 9.90  | 10.30 |
| B         | 14.80 | 15.20 |
| C         | 4.30  | 4.70  |
| D         | 2.50  | 2.90  |
| E         | 2.80  | 3.30  |
| F         | 13.00 | 13.60 |
| G         | 3.10  | 3.30  |
| H         | 28.00 | 28.60 |
| I         | 7.90  | 8.90  |
| J         | 0.40  | 0.60  |
| L         | 0.70  | 0.90  |
| M         | 1.30  | 1.50  |
| N         | 2.60  | 2.80  |
| O         | 2.60  | 3.10  |
| P         | 2.45  | 2.65  |
| K/R       | 1.10  | 1.30  |

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