

## 5A 650V N Channel MOSFET

### Features

- $V_{DS} = 650V$
- $I_D = 5A @ V_{GS} = 10V$
- $R_{DS(ON)} (Typ) = 2.0\Omega @ V_{GS} = 10V$

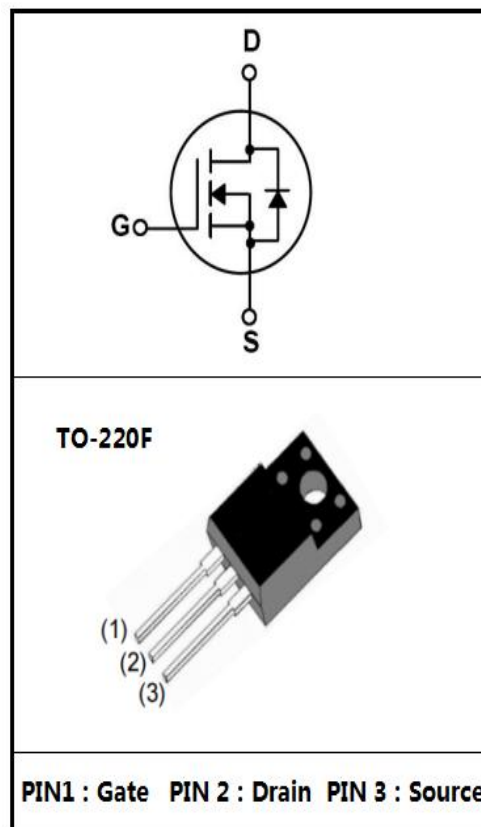
### Applications

- Power Supply
- PFC
- High Current, High Speed Switching

### Descriptions

These N-channel MOSFET are produced using advanced plane MOSFET Technology, which provides Low on-state resistance, high switching performance and excellent quality.

These devices are suitable device for SMPS, high Speed switching and general purpose applications.



**Absolute Maximum Ratings(Ta=25℃)**

| Parameter                               | Symbol                         | Rating     | Unit |
|-----------------------------------------|--------------------------------|------------|------|
| Drain-Source Voltage                    | $V_{DS}$                       | 650        | V    |
| Drain Current                           | $I_D(T_C=25^{\circ}\text{C})$  | 5.0        | A    |
| Drain Current                           | $I_D(T_C=100^{\circ}\text{C})$ | 2.6        | A    |
| Drain Current - Pulsed                  | $I_{DM}$                       | 20         | A    |
| Gate-Source Voltage                     | $V_{GS}$                       | $\pm 30$   | V    |
| Single Pulsed Avalanche Energy          | $E_{AS}$                       | 210        | mJ   |
| Repetitive Avalanche Energy             | $E_{AR}$                       | 10         | mJ   |
| Avalanche Current                       | $I_{AR}$                       | 4.5        | A    |
| Power Dissipation                       | $P_D(T_C=25^{\circ}\text{C})$  | 36         | W    |
| Operating and Storage Temperature Range | $T_J, T_{STG}$                 | -55 to 150 | ℃    |
| Junction to Ambient                     | $R_{\theta JA}$                | 62.5       | ℃/W  |
| Junction to Case                        | $R_{\theta JC}$                | 3.47       | ℃/W  |

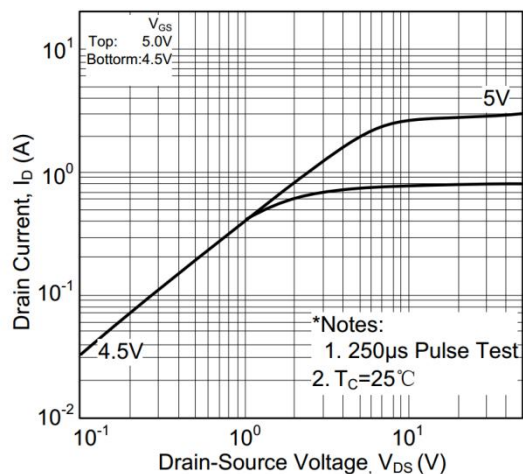
**Electrical Characteristics(Ta=25℃)**

| Parameter                          | Symbol       | Test Conditions                               | Min | Typ | Max       | Unit     |
|------------------------------------|--------------|-----------------------------------------------|-----|-----|-----------|----------|
| Drain-Source Breakdown Voltage     | $BV_{DS}$    | $V_{GS}=0V$ $I_D=250\mu A$                    | 650 |     |           | V        |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=650V$ $V_{GS}=0V$                     |     |     | 1.0       | $\mu A$  |
|                                    |              | $V_{DS}=480V$ $T_C=125^{\circ}\text{C}$       |     |     | 10        | $\mu A$  |
| Gate-Body Leakage Current, Forward | $I_{GSS}$    | $V_{GS}=\pm 30V$ $V_{DS}=0V$                  |     |     | $\pm 0.1$ | $\mu A$  |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ $I_D=250\mu A$                | 2.0 |     | 4.0       | V        |
| Static Drain-Source On-Resistance  | $R_{DS(on)}$ | $V_{GS}=10V$ $I_D=2.25A$                      |     | 2.0 | 2.5       | $\Omega$ |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=25V$ $V_{GS}=0V$<br>$f=1.0\text{MHz}$ |     | 600 |           | pF       |
| Output Capacitance                 | $C_{oss}$    |                                               |     | 60  |           |          |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                               |     | 10  |           |          |
| Total Gate Charge                  | $Q_G$        | $V_{DS}=520V$ , $I_D=5.0A$ ,<br>$V_{GS}=10V$  |     | 20  |           | nC       |
| Gate-Source Charge                 | $Q_{GS}$     |                                               |     | 2.7 |           |          |
| Gate-Drain Charge                  | $Q_{GD}$     |                                               |     | 6.8 |           |          |

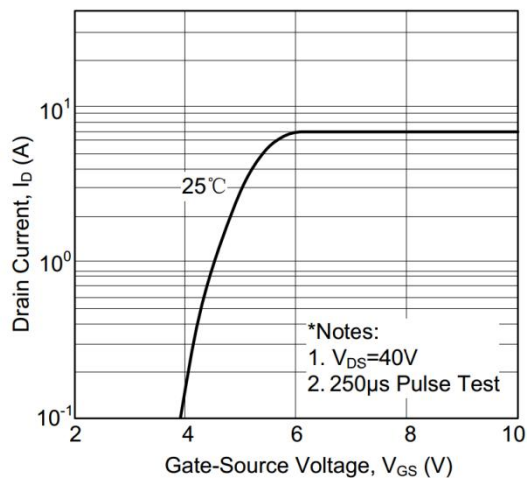
**Electrical Characteristics(Ta=25℃)**

| Parameter                                             | Symbol       | Test Conditions                                          | Min | Typ  | Max | Unit |
|-------------------------------------------------------|--------------|----------------------------------------------------------|-----|------|-----|------|
| Turn-On Delay Time                                    | $t_{d(on)}$  | $V_{DD}=325V$ $I_D=5.0A$<br>$R_G=25\Omega$               |     | 12   |     | ns   |
| Turn-On Rise Time                                     | $t_r$        |                                                          |     | 45   |     |      |
| Turn-Off Delay Time                                   | $t_{d(off)}$ |                                                          |     | 35   |     |      |
| Turn-Off Fall Time                                    | $t_f$        |                                                          |     | 49   |     |      |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$        |                                                          |     |      | 5   | A    |
| Maximum Pulsed Drain-Source Diode Forward Current     | $I_{SM}$     |                                                          |     |      | 20  | A    |
| Drain-Source Diode Forward Voltage                    | $V_{SD}$     | $V_{GS} = 0V$ , $I_S = 5.0A$                             |     |      | 1.4 | V    |
| Reverse Recovery Time                                 | $t_{rr}$     | $V_{GS} = 0V$ , $I_S = 5.0A$ ,<br>$dI_F/dt = 100A/\mu s$ |     | 320  |     | nS   |
| Reverse Recovery Charge                               | $Q_{rr}$     |                                                          |     | 2200 |     | nC   |

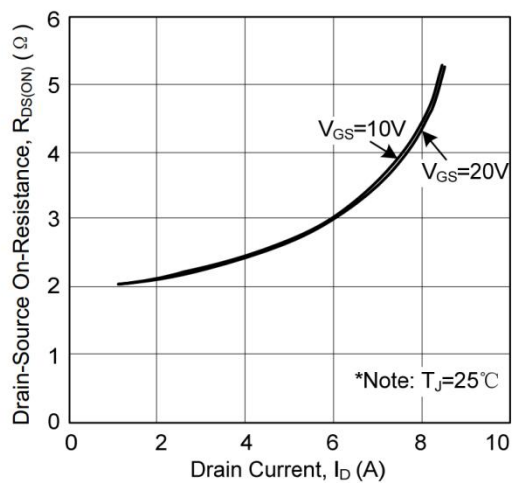
## Electrical Characteristic Curve



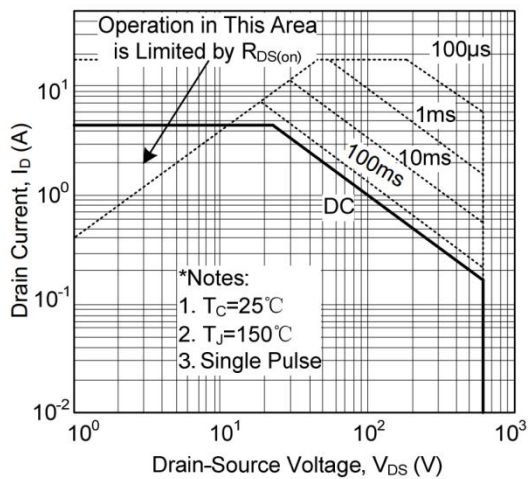
1. On-Region Characteristics



2. Transfer Characteristics

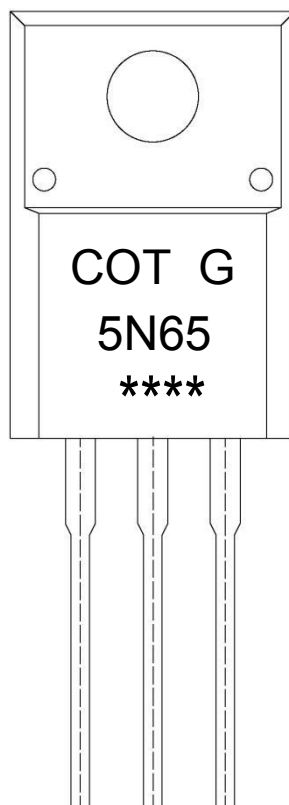


3. On-Resistance Variation vs. Drain Current and Gate Voltage



4. Maximum Safe Operating Area

## Marking Instructions



Note:

COT: Company Logo

G: Halogen Free

5N65: Product Type.

\*\*\*\*: Lot No. Code, code change with Lot No.

## Packaging SPEC.

### BULK INFORMATION

| Package Type | Units     |                |                 |                       |                 | Dimension (unit: mm <sup>3</sup> ) |             |             |
|--------------|-----------|----------------|-----------------|-----------------------|-----------------|------------------------------------|-------------|-------------|
|              | Units/Bag | Bags/Inner Box | Units/Inner Box | Inner Boxes/Outer Box | Units/Outer Box | Bag                                | Inner Box   | Outer Box   |
| TO-220F      | 200       | 10             | 2,000           | 5                     | 10,000          | 135×190                            | 237×172×102 | 560×245×195 |

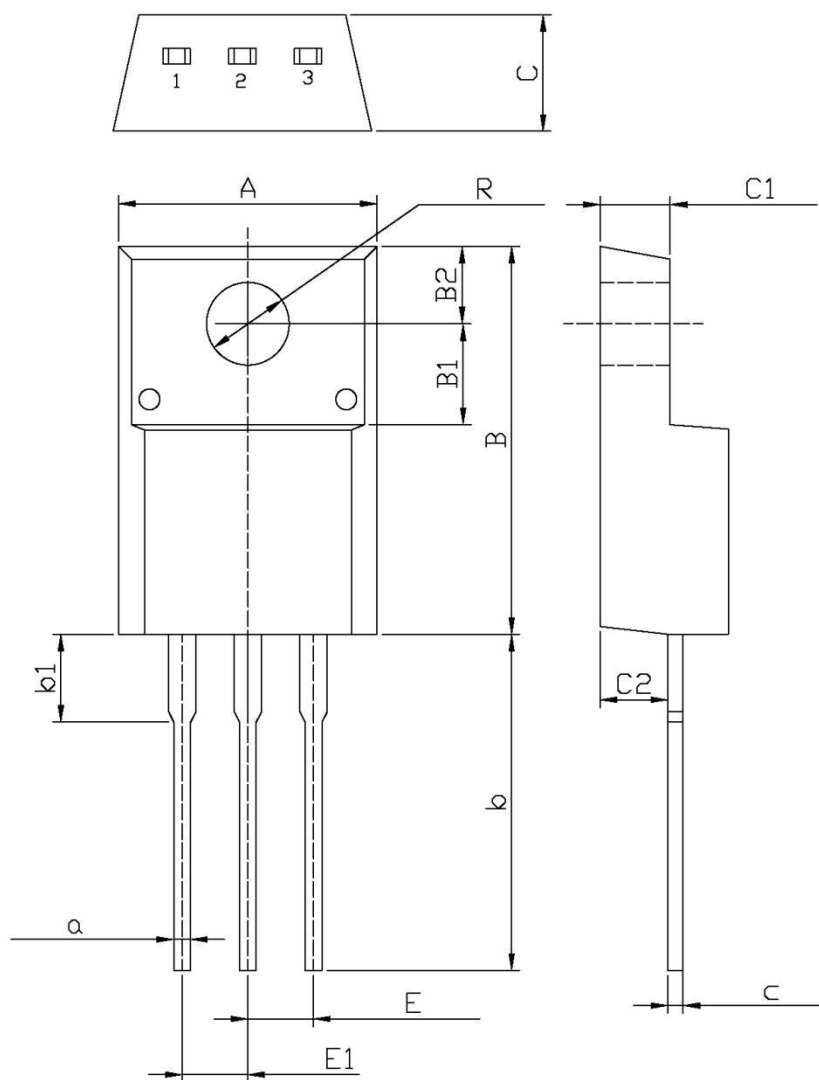
### TUBE INFORMATION

| Package Type | Units      |                 |                 |                       |                 | Dimension (unit: mm <sup>3</sup> ) |            |             |
|--------------|------------|-----------------|-----------------|-----------------------|-----------------|------------------------------------|------------|-------------|
|              | Units/Tube | Tubes/Inner Box | Units/Inner Box | Inner Boxes/Outer Box | Units/Outer Box | Tube                               | Inner Box  | Outer Box   |
| TO-220F      | 50         | 20              | 1,000           | 5                     | 5,000           | 532×31.4×5.5                       | 555×164×50 | 575×290×180 |

Package Outline Dimensions

T0-220F

单位: mm



| Symbol | Dimensions In Millimeters |      | Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|--------|---------------------------|------|
|        | Min                       | Max  |        | Min                       | Max  |
| C      | 4.3                       | 4.7  | b1     | 2.9                       | 3.9  |
| A      | 9.7                       | 10.3 | a      | 0.55                      | 0.75 |
| B      | 14.7                      | 15.3 | E      | 2.29                      | 2.79 |
| B1     | 3.8                       | 4.0  | E1     | 2.29                      | 2.79 |
| B2     | 2.9                       | 3.1  | C1     | 2.5                       | 2.9  |
| R      | 3.0                       | 3.4  | C2     | 2.5                       | 2.7  |
| b      | 12.5                      | 13.5 | c      | 0.5                       | 0.7  |