

## Silicon N-Channel Power MOSFET

### Description

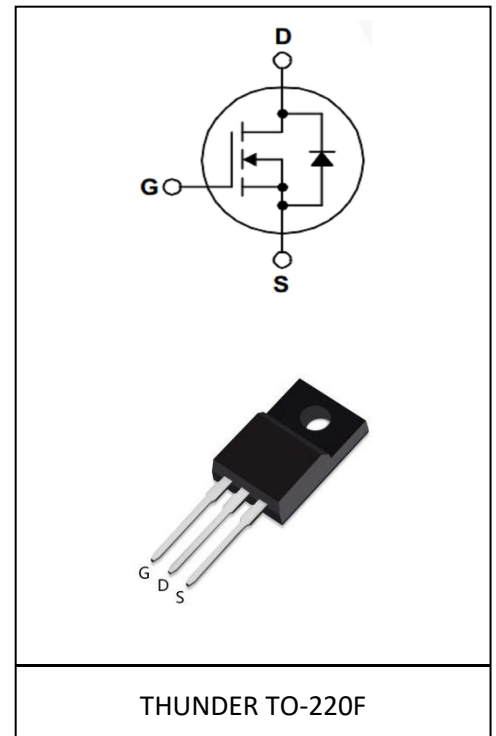
The TH12N65PF uses advanced technology and design to provide excellent  $R_{DS(ON)}$ . It can be used in a wide variety of applications.

### General Features

- $V_{DS}=650V, I_D=12A$
- Low ON Resistance
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

### Application

- Power switching application
- Adapter and charger



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

#### a) Absolute Maximum Ratings:

| Symbol    | Parameter                                            | Value | Units            |
|-----------|------------------------------------------------------|-------|------------------|
| $V_{DS}$  | Drain-to-Source Breakdown Voltage                    | 650   | V                |
| $I_D$     | Drain Current (continuous) at $T_c=25^\circ\text{C}$ | 12    | A                |
| $I_{DM}$  | Drain Current (pulsed)                               | 48    | A                |
| $V_{GS}$  | Gate to Source Voltage                               | +/-30 | V                |
| $P_{tot}$ | Total Dissipation at $T_c=25^\circ\text{C}$          | 75    | W                |
| $T_j$     | Max. Operating Junction Temperature                  | 150   | $^\circ\text{C}$ |
| $E_{AS}$  | Single Pulse Avalanche Energy                        | 722   | mJ               |

**b) Electrical Parameters:**

| Symbol       | Parameter                            | Test Conditions                             | Min | Typ  | Max  | Unit     |
|--------------|--------------------------------------|---------------------------------------------|-----|------|------|----------|
| $V_{DS}$     | Drain-source Voltage                 | $V_{GS}=0V, I_D=250\mu A$                   | 650 |      |      | V        |
| $R_{DS(on)}$ | Static Drain-to-Source on-Resistance | $V_{GS}=10V, I_D=6A$                        |     | 0.46 | 0.7  | $\Omega$ |
| $V_{GS(th)}$ | Gated Threshold Voltage              | $V_{DS}=V_{GS}, I_D=250\mu A$               | 2.0 | 3.0  | 4.0  | V        |
| $I_{DSS}$    | Drain to Source leakage Current      | $V_{DS}=650V, V_{GS}=0V$                    |     |      | 1.0  | $\mu A$  |
| $I_{GSS(F)}$ | Gated to Source Foward Leakage       | $V_{GS}=+30V$                               |     |      | 100  | nA       |
| $I_{GSS(R)}$ | Gated to Source Reverse Leakage      | $V_{GS}=-30V$                               |     |      | -100 | nA       |
| $C_{iss}$    | Input Capacitance                    | $V_{GS}=0V,$<br>$V_{DS}=25V,$<br>$f=1.0MHZ$ |     | 2060 |      | pF       |
| $C_{oss}$    | Output Capacitance                   |                                             |     | 184  |      | pF       |
| $C_{rss}$    | Reverse Transfer Capacitance         |                                             |     | 16   |      | pF       |

**c) Switching Characteristics**

| Symbol       | Parameter           | Test Conditions                            | Min | Typ | Max | Unit |
|--------------|---------------------|--------------------------------------------|-----|-----|-----|------|
| $t_{d(on)}$  | Turn-on Delay Time  | $V_{DD}=325V, I_D=12A,$<br>$R_G=25\Omega$  |     | 15  |     | nS   |
| $t_r$        | Turn-on Rise Time   |                                            |     | 18  |     | nS   |
| $t_{d(off)}$ | Turn-off Delay Time |                                            |     | 44  |     | nS   |
| $t_f$        | Turn-off Fall Time  |                                            |     | 22  |     | nS   |
| $Q_g$        | Total Gate Charge   | $V_{DS}=325V$<br>$I_D=12A$<br>$V_{GS}=10V$ |     | 44  |     | nC   |
| $Q_{gs}$     | Gate-Source Charge  |                                            |     | 6.5 |     | nC   |
| $Q_{gd}$     | Gate-Drain Charge   |                                            |     | 18  |     | nC   |

**d) Source-Drain Diode Characteristics**

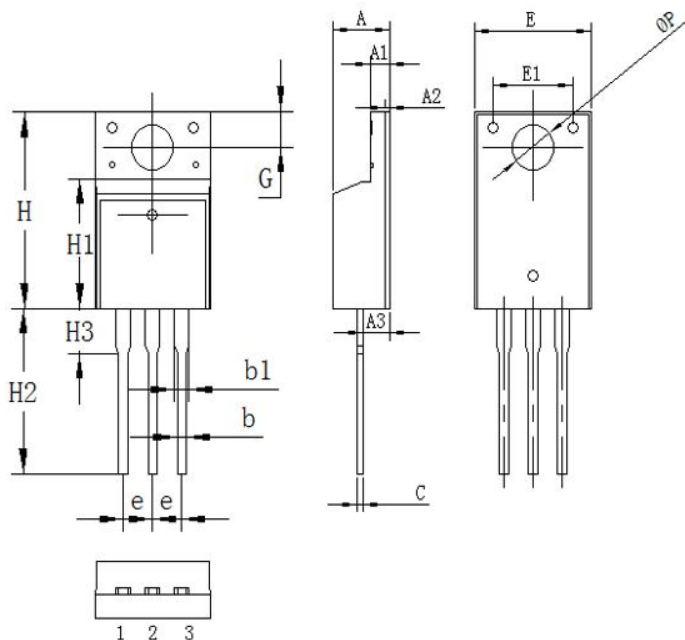
| Symbol           | Parameter                                          | Test Conditions                                             | Min | Typ | Max | Unit |
|------------------|----------------------------------------------------|-------------------------------------------------------------|-----|-----|-----|------|
| I <sub>SD</sub>  | S-D Current(Body Diode)                            |                                                             |     |     | 12  | A    |
| I <sub>SDM</sub> | Pulsed S-D Current(Body Diode)                     |                                                             |     |     | 48  | A    |
| V <sub>SD</sub>  | Diode Forward Voltage                              | V <sub>GS</sub> =0V, I <sub>DS</sub> =10A                   |     |     | 1.5 | v    |
| t <sub>rr</sub>  | Reverse Recovery Time                              | T <sub>J</sub> =25 °C, I <sub>F</sub> =10A<br>di/dt=100A/us |     | 345 |     | nS   |
| Q <sub>rr</sub>  | Reverse Recovery Charge                            |                                                             |     | 2.6 |     | μC   |
|                  | *Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2% |                                                             |     |     |     |      |

| Symbol          | Parameter        | Typ | Units        |
|-----------------|------------------|-----|--------------|
| $R_{\theta JC}$ | Junction-to-Case | 2.0 | $^\circ C/W$ |

## Package Information

### TO-220F PACKAGE

#### 基本尺寸



| Symbol | 单位 mm |      |      |
|--------|-------|------|------|
|        | Min   | Nom  | Max  |
| A      | 4.55  | 4.75 | 4.95 |
| A1     | 2.40  | 2.60 | 2.80 |
| A2     | 0.40  | 0.60 | 0.80 |
| A3     | 2.10  | 2.30 | 2.50 |
| b1     | 1.10  | 1.30 | 1.50 |
| b      | 0.60  | 0.80 | 1.00 |
| c      | 0.42  | 0.50 | 0.58 |
| e      | 2.30  | 2.50 | 2.70 |
| E      | 9.9   | 10.1 | 10.3 |
| E1     | 6.8   | 7    | 7.2  |
| H      | 15.8  | 16.0 | 16.2 |
| H1     | 9.10  | 9.30 | 9.50 |
| H2     | 12.5  | 13.0 | 13.5 |
| H3     | 3.10  | 3.30 | 3.50 |
| G      | 3.00  | 3.20 | 3.40 |
| ΦP     | 3.00  | 3.20 | 3.40 |

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