

## N Channel Super Trench Power MOSFET

### GENERAL DESCRIPTION

The product utilizes the latest super trench processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

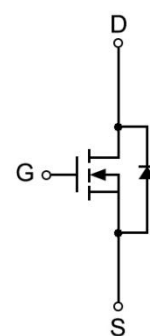
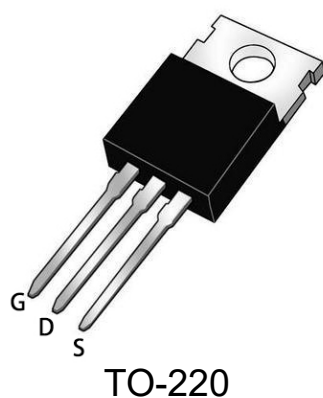
### FEATURES

- 100V/155A,  $R_{DS(ON)} = 3.5\text{m}\Omega @ V_{GS} = 10\text{V}$  (Typical)
- Fast switching and reverse body recovery
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

### APPLICATIONS

- DC/DC converters
- Hard switched and high frequency circuits
- Synchronous rectification

### PIN DESCRIPTION



N-Channel MOSFET

## N Channel Enhancement Mode Power MOSFET

Absolute Maximum Ratings( $T_c=25^{\circ}\text{C}$  Unless Otherwise Noted)

| Symbol          | Parameter                                        | Limit                     | Unit                        |
|-----------------|--------------------------------------------------|---------------------------|-----------------------------|
| $V_{DS}$        | Drain-Source Voltage                             | 100                       | V                           |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 20$                  | V                           |
| $I_D$           | Continuous Drain Current                         | $T_c=25^{\circ}\text{C}$  | A                           |
|                 |                                                  | $T_c=100^{\circ}\text{C}$ |                             |
| $I_{DM}$        | Pulsed Drain Current                             | 650                       | A                           |
| $P_D$           | Maximum Power Dissipation                        | 250                       | W                           |
| EAS(Note)       | Single Pulse Avalanche Energy                    | 1500                      | mJ                          |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | $-55$ to $+150$           | $^{\circ}\text{C}$          |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case              | 0.6                       | $^{\circ}\text{C}/\text{W}$ |

Electrical Characteristics( $T_a=25^{\circ}\text{C}$  Unless Otherwise Noted)

| Symbol                        | Parameter                        | Conditions                       | Min | Typ | Max       | Unit       |
|-------------------------------|----------------------------------|----------------------------------|-----|-----|-----------|------------|
| <b>Static Characteristics</b> |                                  |                                  |     |     |           |            |
| $BV_{DSS}$                    | Drain-Source Breakdown Voltage   | $V_{GS}=0V, I_{DS}=250\mu A$     | 100 |     |           | V          |
| $I_{DSS}$                     | Zero Gate Voltage Drain Current  | $V_{DS}=70V, V_{GS}=0V$          |     |     | 1         | $\mu A$    |
| $I_{GSS}$                     | Gate-Body Leakage Current        | $V_{GS}=\pm 20V, V_{DS}=0V$      |     |     | $\pm 100$ | nA         |
| $V_{GS(th)}$                  | Gate Threshold Voltage           | $V_{DS}=V_{GS}, I_{DS}=250\mu A$ | 2   |     | 4         | V          |
| $R_{DS(ON)}$                  | Drain-Source On-state Resistance | $V_{GS}=10V, I_{DS}=30A$         |     | 3.5 | 4.2       | m $\Omega$ |

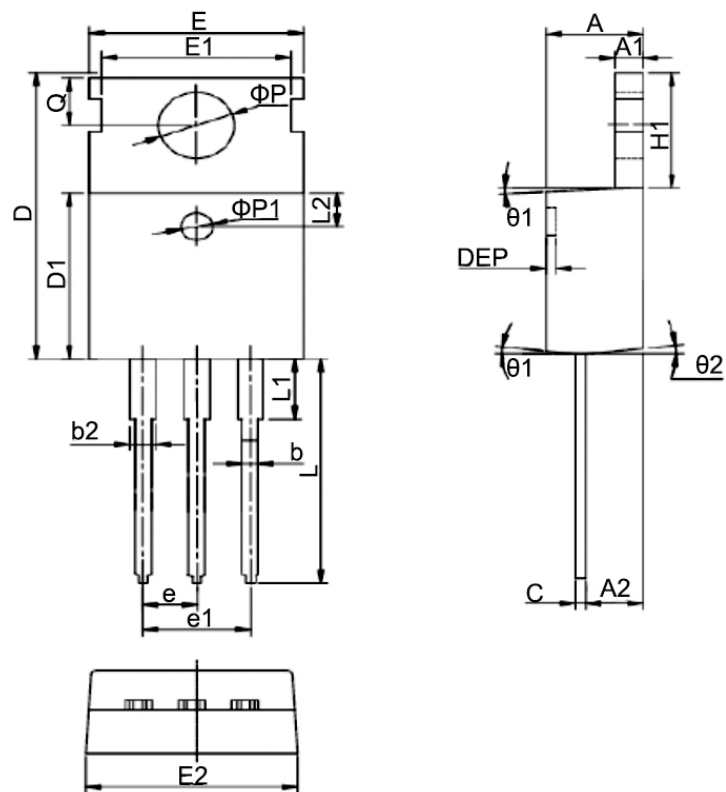
## N Channel Enhancement Mode Power MOSFET

## Electrical Characteristics(Ta=25°C Unless Otherwise Noted)

| Symbol                                    | Parameter                    | Conditions                                                                              | Min | Typ  | Max | Unit |
|-------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------|-----|------|-----|------|
| <b>Drain-Source Diode Characteristics</b> |                              |                                                                                         |     |      |     |      |
| V <sub>SD</sub>                           | Diode Forward Voltage        | V <sub>GS</sub> =0V, I <sub>SD</sub> =30A                                               |     |      | 1.3 | V    |
| T <sub>rr</sub>                           | Reverse Recovery Time        | I <sub>SD</sub> =40A                                                                    |     | 65   |     | ns   |
| Q <sub>rr</sub>                           | Reverse Recovery Charge      | di/dt=100A/us                                                                           |     | 140  |     | nC   |
| <b>Dynamic Characteristics</b>            |                              |                                                                                         |     |      |     |      |
| T <sub>d(on)</sub>                        | Turn-on Delay Time           | V <sub>DS</sub> =50V, R <sub>G</sub> =3Ω,<br>I <sub>DS</sub> =40A, V <sub>GS</sub> =10V |     | 30   |     | ns   |
| T <sub>r</sub>                            | Turn-on Rise Time            |                                                                                         |     | 78   |     |      |
| T <sub>d(off)</sub>                       | Turn-off Delay Time          |                                                                                         |     | 55   |     |      |
| T <sub>f</sub>                            | Turn-off Fall Time           |                                                                                         |     | 19   |     |      |
| C <sub>iss</sub>                          | Input Capacitance            | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =50V,<br>f=1.0MHz                               |     | 7500 |     | pF   |
| C <sub>oss</sub>                          | Output Capacitance           |                                                                                         |     | 810  |     |      |
| C <sub>rss</sub>                          | Reverse Transfer Capacitance |                                                                                         |     | 50   |     |      |
| Q <sub>g</sub>                            | Total Gate Charge            | V <sub>DS</sub> =50V, I <sub>D</sub> =40A,<br>V <sub>GS</sub> =10V                      |     | 115  |     | nC   |
| Q <sub>gs</sub>                           | Gate-Source Charge           |                                                                                         |     | 40   |     |      |
| Q <sub>gd</sub>                           | Gate-Drain Charge            |                                                                                         |     | 25   |     |      |

**Note:****1.E<sub>AS</sub> condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω**

## N Channel Enhancement Mode Power MOSFET



| SYMBOL | MM    |       |       | INCH  |       |       | SYMBOL | MM      |      |       | INCH     |       |       |
|--------|-------|-------|-------|-------|-------|-------|--------|---------|------|-------|----------|-------|-------|
|        | MIN   | NOM   | MAX   | MIN   | NOM   | MAX   |        | MIN     | NOM  | MAX   | MIN      | NOM   | MAX   |
| A      | 4.40  | 4.57  | 4.70  | 0.173 | 0.180 | 0.185 | Φp1    | 1.40    | 1.50 | 1.60  | 0.055    | 0.059 | 0.063 |
| A1     | 1.27  | 1.30  | 1.33  | 0.050 | 0.051 | 0.052 | e      | 2.54BSC |      |       | 0.1BSC   |       |       |
| A2     | 2.35  | 2.40  | 2.50  | 0.093 | 0.094 | 0.098 | e1     | 5.08BSC |      |       | 0.2BSC   |       |       |
| b      | 0.77  | -     | 0.90  | 0.030 | -     | 0.035 | H1     | 6.40    | 6.50 | 6.60  | 0.252    | 0.256 | 0.260 |
| b2     | 1.23  | -     | 1.36  | 0.048 | -     | 0.054 | L      | 12.75   | -    | 13.17 | 0.502    | -     | 0.519 |
| C      | 0.48  | 0.50  | 0.52  | 0.019 | 0.020 | 0.021 | L1     | -       | -    | 3.95  | -        | -     | 0.156 |
| D      | 15.40 | 15.60 | 15.80 | 0.606 | 0.614 | 0.622 | L2     | 2.50REF |      |       | 0.098REF |       |       |
| D1     | 9.00  | 9.10  | 9.20  | 0.354 | 0.358 | 0.362 | Φp     | 3.57    | 3.6  | 3.63  | 0.141    | 0.142 | 0.143 |
| DEP    | 0.05  | 0.10  | 0.20  | 0.002 | 0.004 | 0.008 | Q      | 2.73    | 2.80 | 2.87  | 0.107    | 0.110 | 0.113 |
| E      | 9.70  | 9.90  | 10.10 | 0.382 | 0.389 | 0.398 | Θ1     | 5°      | 7°   | 9°    | 5°       | 7°    | 9°    |
| E1     | -     | 8.70  | -     | -     | 0.343 | -     | Θ2     | 1°      | 3°   | 5°    | 1°       | 3°    | 5°    |
| E2     | 9.80  | 10.00 | 10.20 | 0.386 | 0.394 | 0.401 |        |         |      |       |          |       |       |