

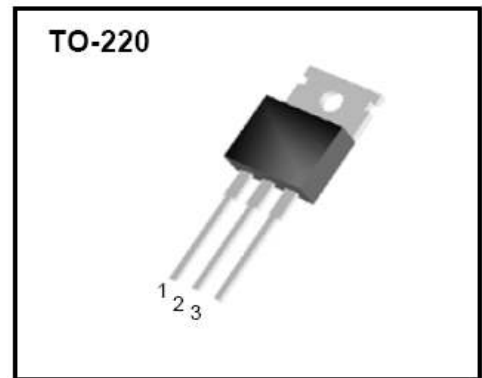
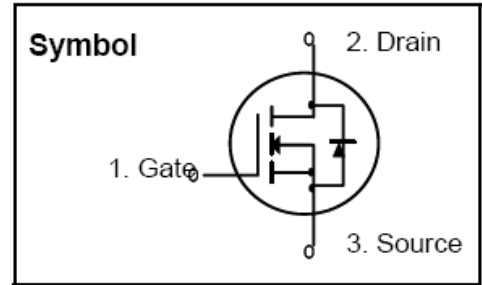
***N-Channel MOSFET***

**Features**

- ◆  $R_{DS(ON)}$  Max 1.0 ohm at  $V_{GS} = 10V$
- ◆ Gate Charge ( Typical 18nC)
- ◆ Improve dv/dt capability, Fast switching
- ◆ 100% avalanche Tested

**General Description**

This MOSFET is produced using advanced planar strip DMOS technology. This latest technology has been especially designed to minimize on-state resistance have a high rugged avalanche characteristics. These device are well suited for high efficiency switch mode power supply active power factor correction. Electronic lamp based on half bridge topology



Absolute Maximum Ratings ( $T_J = 25^\circ C$  unless otherwise specified)

| Symbol         | Parameter   | Ratings   | Units      |
|----------------|---|-----------|------------|
| $V_{DSS}$      | Drain-Source Voltage                                | 400       | V          |
| $I_D$          | Drain Current $T_C=25^\circ C$<br>$T_C=100^\circ C$ | 6<br>3.6  | A          |
| $V_{GSS}$      | Gate-Source Voltage                                 | $\pm 30$  | V          |
| $I_{DM}$       | Drain Current pulse (Note 1)                        | 24        | A          |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 2)              | 350       | mJ         |
| $E_{AR}$       | Repetitive Avalanche Energy (Note 1)                | 7.6       | mJ         |
| dv/dt          | Peak diode Recovery dv/dt (Note 3)                  | 4.5       | V/ns       |
| $P_D$          | Power Dissipation $T_C=25^\circ C$                  | 76        | W          |
| $T_J, T_{STG}$ | Operation and Storage Temperature range             | -45 ~ 150 | $^\circ C$ |

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## Thermal Characteristics

| Symbol          | Parameter                              | Ratings | Unit          |
|-----------------|--|---------|---------------|
| $R_{\theta JC}$ | Thermal Resistance Junction to Case    | 1.65    | $^{\circ}C/W$ |
| $R_{\theta CS}$ | Thermal Resistance Case to Sink Typ.   | 0.5     | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | 62.5    | $^{\circ}C/W$ |

## Electrical Characteristics ( TC = 25 $^{\circ}C$ Unless otherwise noted)

| Symbol                         | Items                                     | Conditions  | Ratings |      |         | Unit           |
|--------------------------------|---|---|---------|------|---------|----------------|
|                                |   |   | Min     | Typ. | Max     |                |
| $BV_{DSS}$                     | Drain-Source Breakdown Voltage            | $V_{GS} = 0V, I_D = 250\mu A$                                       | 400     |      |         | V              |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature coefficient | $I_D = 250\mu A$ , Reference to 25 $^{\circ}C$                      |         | 0.6  |         | V/ $^{\circ}C$ |
| $I_{DSS}$                      | Zero gate voltage Drain Current           | $V_{DS} = 400V, V_{GS} = 0V$<br>$V_{DS} = 320V, T_S = 125^{\circ}C$ |         |      | 1<br>10 | $\mu A$        |
| $I_{GSSF}$                     | Gate body leakage current Forward         | $V_{GS} = 30V, V_{DS} = 0V$   |         |      | 100     | nA             |
| $I_{GSSR}$                     | Gate body leakage current Reverse         | $V_{GS} = -30V, V_{DS} = 0V$  |         |      | -100    | nA             |

## On Characteristics

|              |                                   |                                   |     |      |     |          |
|--------------|-----------------------------------|-----------------------------------|-----|------|-----|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{GS} = V_{DS}, I_D = 250\mu A$ | 2.0 |      | 4.0 | V        |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 3.0A$        |     | 0.75 | 1.0 | $\Omega$ |

## Dynamic Characteristics

|           |                              |   |  |     |  |    |
|-----------|------------------------------|---|--|-----|--|----|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 25V, V_{GS} = 0V$<br>$f = 1.0MHz$ |  | 520 |  | pF |
| $C_{oss}$ | output Capacitance           |   |  | 80  |  | pF |
| $C_{rss}$ | Reverse Transfer Capacitance |   |  | 15  |  | pF |

## Switching Characteristics

| Symbol       | Items               | Conditions   | Min | Typ. | Max | Units |
|--------------|---------------------|--|-----|------|-----|-------|
| $t_{d(on)}$  | Turn-on Delay Time  | $V_{DD} = 200V, I_D = 6.0A$<br>$R_G = 25 \Omega$<br>(note 4,5) |     | 15   |     | ns    |
| $t_r$        | Turn-on Rise Time   |  |     | 65   |     | ns    |
| $t_{d(off)}$ | Turn-off Delay Time |  |     | 20   |     | ns    |
| $t_f$        | Turn-off Fall Time  |  |     | 40   |     | ns    |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 320V, I_D = 6.0A$<br>$V_{GS} = 10V$<br>(note 4,5)    |     | 18   |     | nC    |
| $Q_{gs}$     | Gate-Source Charge  |  |     | 2.5  |     | nC    |
| $Q_{gd}$     | Gate-Drain Charge   |  |     | 8.5  |     | nC    |

## Drain-Source Diode Characteristics

|          |   |  |  |      |         |
|----------|---|--|--|------|---------|
| $I_S$    | Maximum Continuous Drain-Source diode Forward Current |  |  | 6.0  | A       |
| $I_{SM}$ | Maximum Pulse Drain-Source diode Forward Current      |  |  | 24.0 | A       |
| $V_{SD}$ | Drain-Source diode Forward voltage                    | $V_{GS} = 0V, I_S = 6.0A$                                  |  | 1.4  | V       |
| $t_{rr}$ | Reverse Recovery Time                                 | $V_{GS} = 0V, I_S = 6.0A$<br>$di_F/dt = 100 A/us$ (note 4) |  | 230  | nS      |
| $Q_{rr}$ | Reverse Recovery Charge                               |  |  | 1.8  | $\mu C$ |

## Notes

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L = 17mH, I_{AS} = 6.0A, V_{DD} = 50V, R_G = 25 \Omega$ , starting  $T_J = 25^\circ C$
3.  $I_{SD} \leq 6.0A, di/dt \leq 200A/us, V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ C$
4. Pulse Test : Pulse width  $\leq 300us$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operation temperature

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Fig. 1 On-State Characteristics

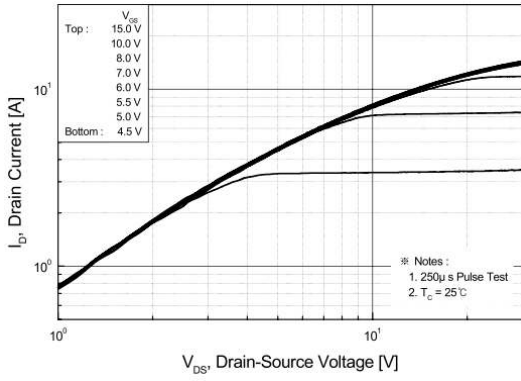


Fig. 2 On-Resistance variation vs Drain Current And gate Voltage

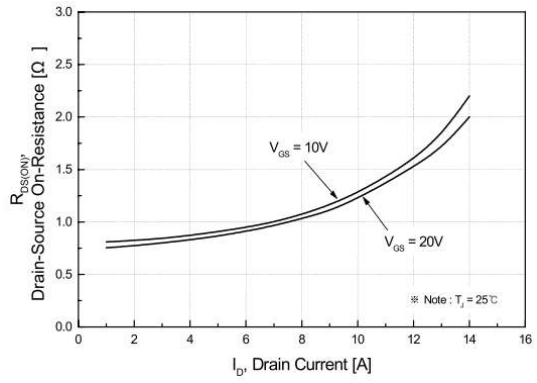


Fig. 3 Breakdown Voltage Variation vs Temperature

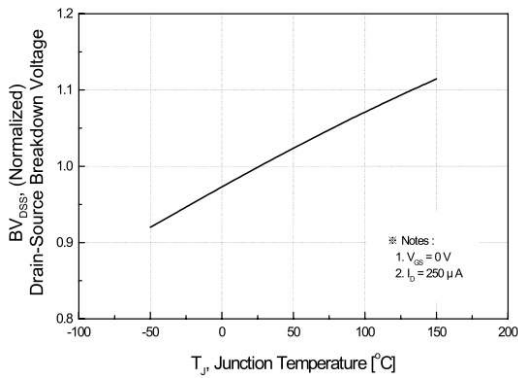


Fig. 4. On-Resistance Variation vs Temperature

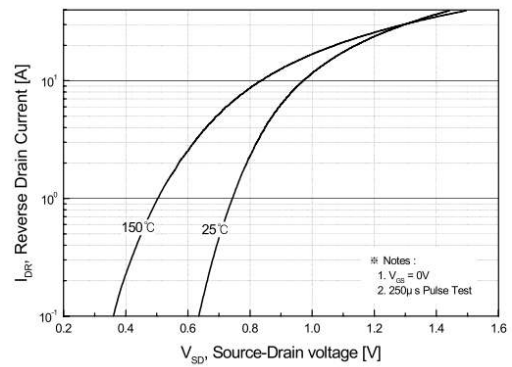
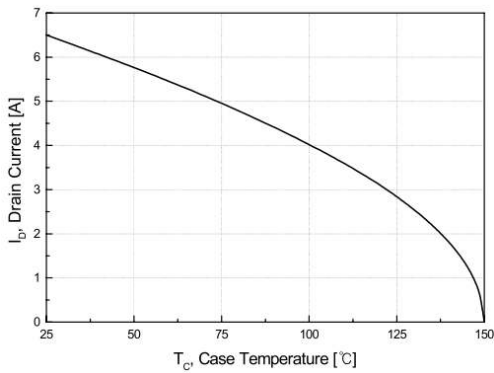


Fig. 5 Maximum Drain Current vs Case Temp.



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## TO-220 Package Dimension

| Dim.   | mm   |      |      | Inch  |       |       |
|--------|------|------|------|-------|-------|-------|
|        | Min. | Typ. | Max. | Min.  | Typ.  | Max.  |
| A      | 9.7  |      | 10.1 | 0.382 |       | 0.398 |
| B      | 6.3  |      | 6.7  | 0.248 |       | 0.264 |
| C      | 9.0  |      | 9.47 | 0.354 |       | 0.373 |
| D      | 12.8 |      | 13.3 | 0.504 |       | 0.524 |
| E      | 1.2  |      | 1.4  | 0.047 |       | 0.055 |
| F      |      | 1.7  |      |       | 0.067 |       |
| G      |      | 2.5  |      |       | 0.098 |       |
| H      | 3.0  |      | 3.4  | 0.118 |       | 0.134 |
| I      | 1.25 |      | 1.4  | 0.049 |       | 0.055 |
| J      | 2.4  |      | 2.7  | 0.094 |       | 0.106 |
| K      | 5.0  |      | 5.15 | 0.197 |       | 0.203 |
| L      | 2.2  |      | 2.6  | 0.087 |       | 0.102 |
| M      | 1.25 |      | 1.55 | 0.049 |       | 0.061 |
| N      | 0.45 |      | 0.6  | 0.018 |       | 0.024 |
| O      | 0.6  |      | 1.0  | 0.024 |       | 0.039 |
| $\phi$ |      | 3.6  |      |       | 0.142 |       |

