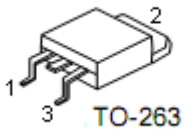
## 1. Description

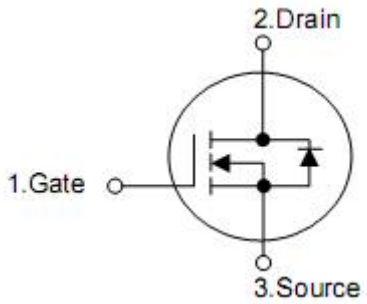
This Power MOSFET is produced using KIA`s advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

## 2. Features

- $R_{DS(on)}$=1.0Ω(typ) @ $V_{GS}$=10V
- Ultra low gate charge (typical 27nC)
- Low reverse transfer capacitance
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness

## 3. Pin configuration




| Pin | Function |
|---|---|
| 1 | Gate |
| 2 | Drain |
| 3 | Source |
| 4 | Drain |

## 4. Absolute maximum ratings

($T_C$=25ºC , unless otherwise specified)

| Parameter | | Symbol | Rating | Units |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | 600 | V |
| Gate-source voltage | | $V_{GSS}$ | ±30 | V |
| Drain current continuous | $T_C$=25ºC | $I_D$ | 7.5 | A |
| | $T_C$=100ºC | | 4.2 | A |
| Drain current pulsed (note1) | | $I_{DP}$ | 28 | A |
| Avalanche energy | Repetitive (note1) | $E_{AR}$ | 13.5 | mJ |
| | Single Pulse (note2) | $E_{AS}$ | 215 | mJ |
| Peak diode recovery dv/dt (note3) | | dv/dt | 4.5 | V/ns |
| Total power dissipation | $T_C$=25ºC | $P_D$ | 140 | W |
| | Derate above 25ºC | | 1.11 | W/ºC |
| Junction temperature | | $T_J$ | +150 | ºC |
| Storage temperature | | $T_{STG}$ | -55~+150 | ºC |

* Drain current limited by maximum junction temperature.

## 5. Thermal characteristics

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Thermal resistance junction-ambient | $R_{thJA}$ | 62.5 | ºC/W |
| Thermal resistance case-to-sink typ. | $R_{thCS}$ | 0.5 | |
| Thermal resistance junction-case | $R_{thJC}$ | 0.9 | |

## 6. Electrical characteristics

($T_J$=25°C,unless otherwise notes)

| Parameter | | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Off characteristics | | | | | | | |
| Drain-source breakdown voltage | | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 600 | - | - | V |
| Zero gate voltage drain current | | $I_{DSS}$ | $V_{DS}$=600V,$V_{GS}$=0V | - | - | 1 | μA |
| | | | $V_{DS}$=480V,$T_C$=125ºC | - | - | 10 | μA |
| Gate-body leakage current | Forward | $I_{GSS}$ | $V_{GS}$=30V,$V_{DS}$=0V | - | - | 100 | nA |
| | Reverse | | $V_{GS}$=-30V,$V_{DS}$=0V | - | - | -100 | nA |
| Breakdow voltage temperature coefficient | | $\triangle BV_{DSS}\triangle T_J$ | $I_D$=250μA | - | 0.6 | - | V/ ºC |
| On characteristics | | | | | | | |
| Gate threshold voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 2.0 | - | 4.0 | V |
| Static drain-source on-resistance | | $R_{DS(ON)}$ | $V_{DS}$=10V,$I_D$=3.5A | - | 1.0 | 1.2 | Ω |
| Dynamic characteristics | | | | | | | |
| Input capacitance | | $C_{ISS}$ | $V_{DS}$=25V,$V_{GS}$=0V, f=1MHz | - | 900 | - | pF |
| Output capacitance | | $C_{OSS}$ | | - | 100 | - | pF |
| Reverse transfer capacitance | | $C_{RSS}$ | | - | 11.5 | - | pF |
| Switching characteristics | | | | | | | |
| Turn-on delay time | | $t_{D(ON)}$ | $V_{DD}$=300V,$R_G$=25Ω, $I_D$=7.0A (note4,5) | - | 20 | - | ns |
| Rise time | | $t_R$ | | - | 45 | - | ns |
| Turn-off delay time | | $t_{D(OFF)}$ | | - | 75 | - | ns |
| Fall time | | $t_F$ | | - | 70 | - | ns |
| Total gate charge | | $Q_G$ | $V_{DS}$=480V,$V_{GS}$=10V $I_D$=7.0A (note4,5) | - | 27 | - | nC |
| Gate-source charge | | $Q_{GS}$ | | - | 4.5 | - | nC |
| Gate-drain charge | | $Q_{GD}$ | | - | 12 | - | nC |
| Drain-source diode characteristics | | | | | | | |
| Drain-source diode forward voltage | | $V_{SD}$ | $V_{GS}$=0V,$I_{SD}$=7.0A | - | - | 1.4 | V |
| Continuous drain-source current | | $I_{SD}$ | | - | - | 7.0 | A |
| Pulsed drain-source current | | $I_{SM}$ | | - | - | 28 | A |
| Reverse recovery time | | $t_{RR}$ | $V_{GS}$=0V,$I_{SD}$=7.0A, $dI_{SD}/dt$=100A/μs (note 4) | - | 320 | - | ns |
| Reverse recovery charge | | $Q_{RR}$ | | - | 3.0 | - | μC |

Note:1. Repetitive rating: pulse width limited by maximum junction temperature

2. L=8.5mH ,$I_{AS}$=7.0A,$V_{DD}$=50V,$R_G$=25Ω,starting $T_J$=25ºC

3. $I_{SD}$≤7.0A,di/dt≤200A/μs, $V_{DD}$≤$BV_{DSS}$, starting $T_J$=25ºC

4. Pulse test: pulse width ≤300μs, duty cycle≤2%

5. Essentially independent of operating temperature

## 7. Test circuits and waveforms

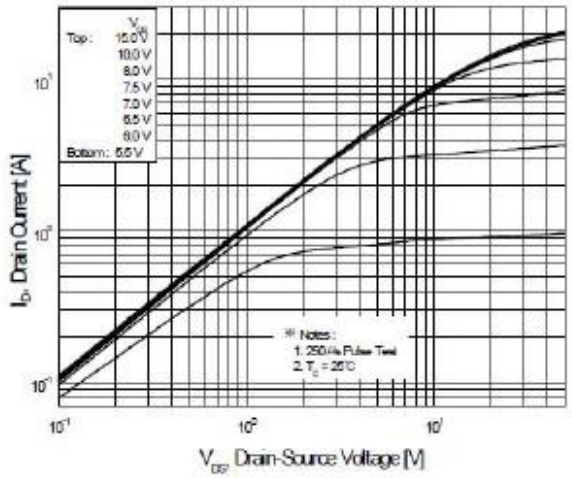



Figure 1. On-Region Characteristics

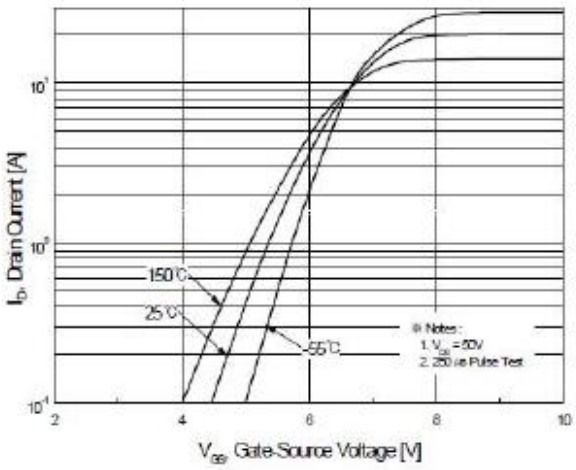



Figure 2. Transfer Characteristics

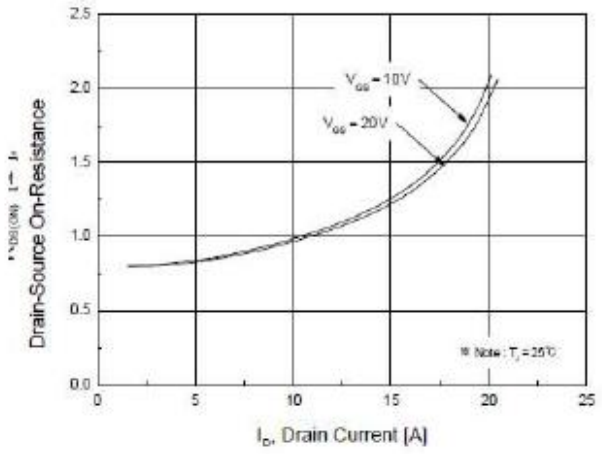



Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

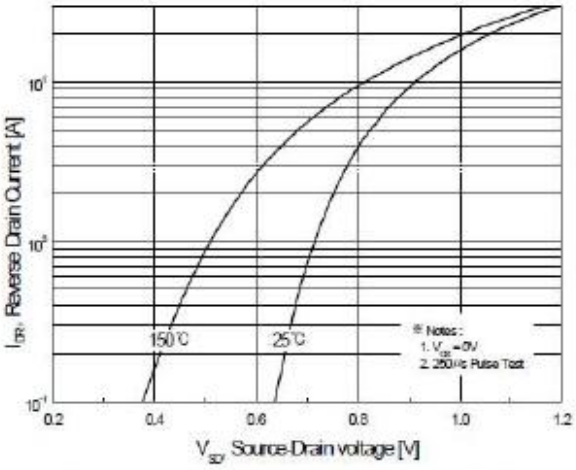



Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

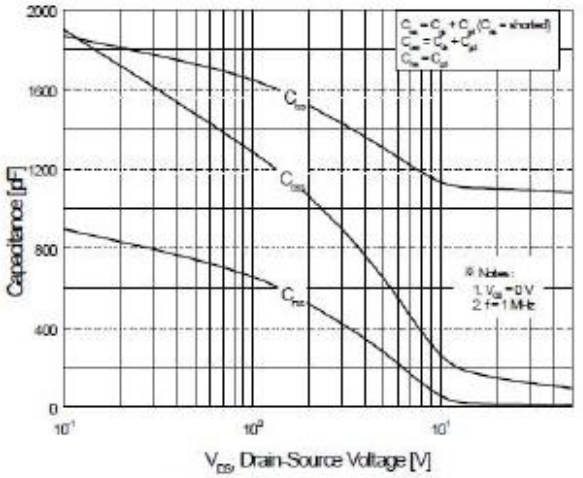



Figure 5. Capacitance Characteristics

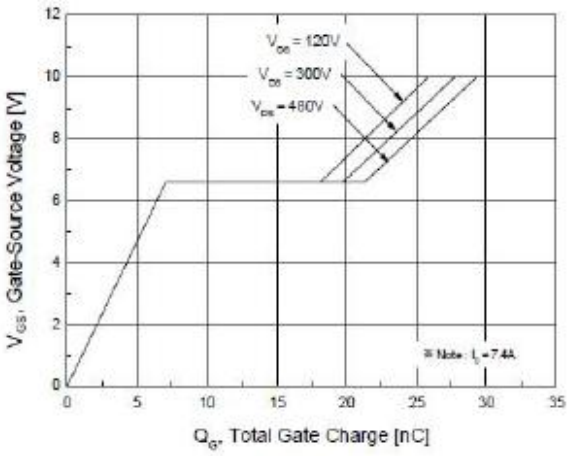



Figure 6. Gate Charge Characteristics

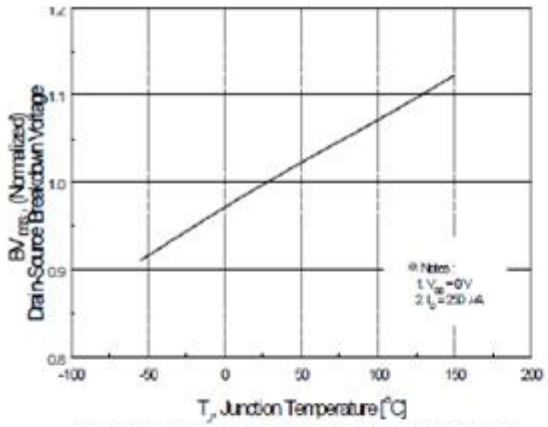



Figure 7. Breakdown Voltage Variation vs. Temperature

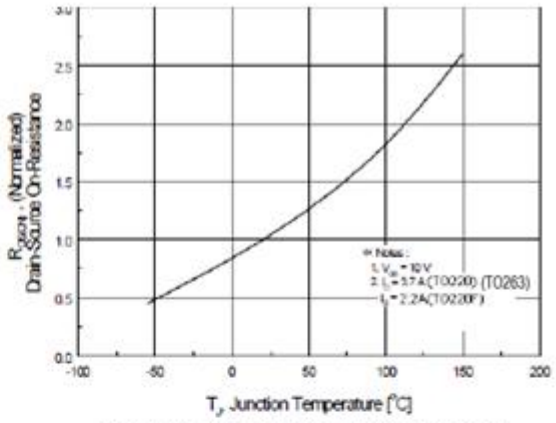



Figure8. On-Resistance Variation vs Temperature

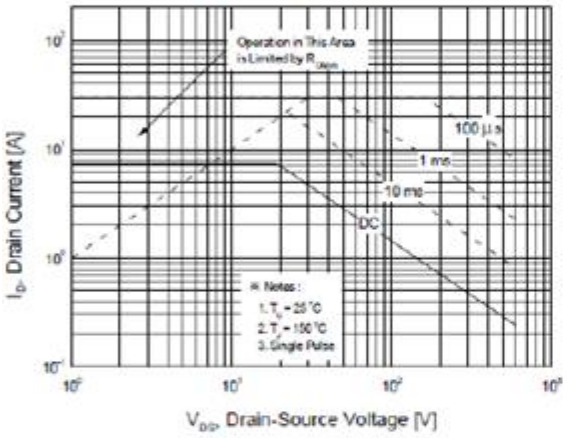



Figure 9 . Maximum Safe Operating Area

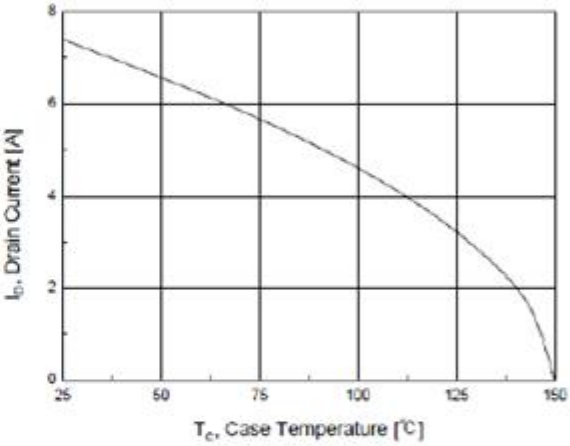



Figure 10. Maximum Drain Current vs Case Temperature

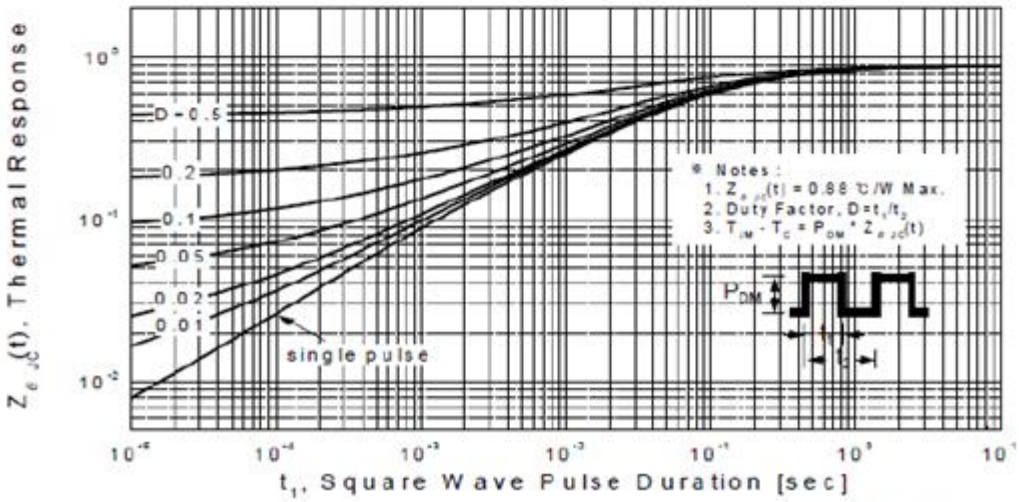



Figure 11-1. Transient Thermal Response Curve for TO220 、TO263 TO262

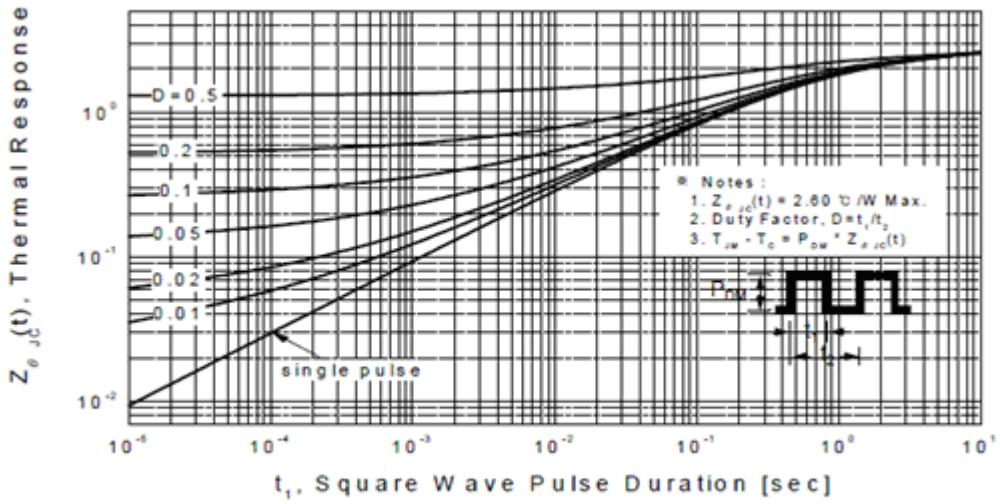



**Figure 11-2. Transient Thermal Response Curve for TO220F**