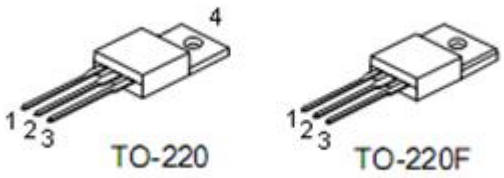
## 1. General Features

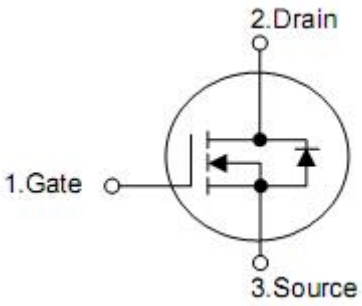
- Proprietary New Planar Technology
- $R_{DS(ON),typ.}$=0.24Ω@$V_{GS}$=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

## 2. Applications

- Adaptor Charger
- SMPS Power Supply
- LCD Panel Power

## 3. Pin configuration




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

## 4. Ordering Information

| Part Number | Package | Brand |
|---|---|---|
| KNP7150A | TO-220 | KIA |
| KNF7150A | TO-220F | KIA |

## 5. Absolute maximum ratings

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

| Symbol | Parameter | Ratings | | Unit |
|---|---|---|---|---|
| | | TO-220 | TO-220F | |
| $V_{DSS}$ | Drain-to-Source Voltage[1] | 500 | | V |
| $V_{GSS}$ | Gate-to-Source Voltage | ±30 | | |
| $I_D$ | Continuous Drain Current | 20 | | A |
| | Continuous Drain Current@ Tc=100 ºC | Figure3 | | |
| $I_{DM}$ | Pulsed Drain Current at $V_{GS}$=10V[2] | Figure6 | | |
| $E_{AS}$ | Single Pulse Avalanche Energy | 1500 | | mJ |
| dv /dt | Peak Diode Recovery dv/dt[3] | 5.0 | | V/ns |
| $P_D$ | Power Dissipation | 175 | 60 | W |
| | Derating Factor above 25 ºC | 1.40 | 0.48 | W/ ºC |
| $T_L$<br>$T_{PAK}$ | Maximum Temperature for Soldering<br>Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds | 300<br>260 | | ºC |
| $T_J$&$T_{STG}$ | Operating and Storage Temperature Range | -55 to 150 | | |

## 6. Thermal characteristics

| Symbol | Parameter | Ratings | | Unit |
|---|---|---|---|---|
| | | TO-220 | TO-220F | |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 0.71 | 2.08 | ºC /W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62 | 100 | |

## 7. Electrical characteristics

| OFF Characteristics | | | | | (TJ=25°C,unless otherwise specified) | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | VGS=0V, $I_D$=250uA | 500 | -- | -- | V |
| $I_{DSS}$ | Drain-to-Source Leakage Current | $V_{DS}$=500V, $V_{GS}$=0V | -- | -- | 1 | uA |
| | | $V_{DS}$=400V,$V_{GS}$=0V, $T_J$=125°C | -- | -- | 100 | |
| $I_{GSS}$ | Gate-to-Source Leakage Current | $V_{GS}$=+30V,$V_{DS}$=0V | -- | -- | 100 | nA |
| | | $V_{GS}$=-30V, $V_{DS}$=0V | -- | -- | -100 | |
| ON Characteristics | | | | | (TJ=25°C,unless otherwise specified) | |
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance[4] | $V_{GS}$=10V, $I_D$=10A | -- | 0.24 | 0.3 | Ω |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 2.0 | -- | 4.0 | V |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=15V,$I_D$=10A | -- | 19 | -- | S |
| Dynamic Characteristics | | Essentially independent of operating temperature | | | | |
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHZ | -- | 2650 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 255 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 34 | -- | |
| $Q_g$ | Total Gate Charge | $V_{DD}$=250V, $I_D$=20A, $V_{GS}$=0 to 10V | -- | 65 | -- | nC |
| $Q_{gs}$ | Gate-to-Source Charge | | -- | 14 | -- | |
| $Q_{gd}$ | Gate-to-Drain (Miller) Charge | | -- | 24 | -- | |
| Resistive Switching Characteristics | | Essentially independent of operating temperature | | | | |
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=250V, $I_D$=20A, $V_{GS}$= 10V $R_G$=25Ω | -- | 34 | -- | nS |
| $t_{rise}$ | Rise Time | | -- | 76 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 164 | -- | |
| $t_{fall}$ | Fall Time | | -- | 85 | -- | |
| Source-Drain Body Diode Characteristics | | | ($T_J$=25°C,unless otherwise specified) | | | |
| Symbol | Parameter | Test Conditions | Min | Typ. | Max. | Unit |
| $I_{SD}$ | Continuous Source Current[4] | Integral PN-diode in MOSFET | -- | -- | 20 | A |
| $I_{SM}$ | Pulsed Source Current[4] | | -- | -- | 80 | |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=20A, $V_{GS}$=0V | -- | -- | 1.5 | V |
| $t_{rr}$ | Reverse recovery time | $V_{GS}$=0V ,$I_F$=20A, diF/dt=100A/μs | -- | 310 | -- | ns |
| $Q_{rr}$ | Reverse recovery charge | | -- | 3.0 | -- | uC |

Note:
1.$T_J$=+25°C to +150°C
2.Repetitive rating; pulse width limited by maximum junction temperature
3. $I_{SD}$= 20Adi/dt < 100 A/μs, $V_{DD}$< $BV_{DSS}$, TJ=+150°C.
4.Pulse width≤380μs; duty cycle≤2%

## 8. Test circuits and waveforms

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

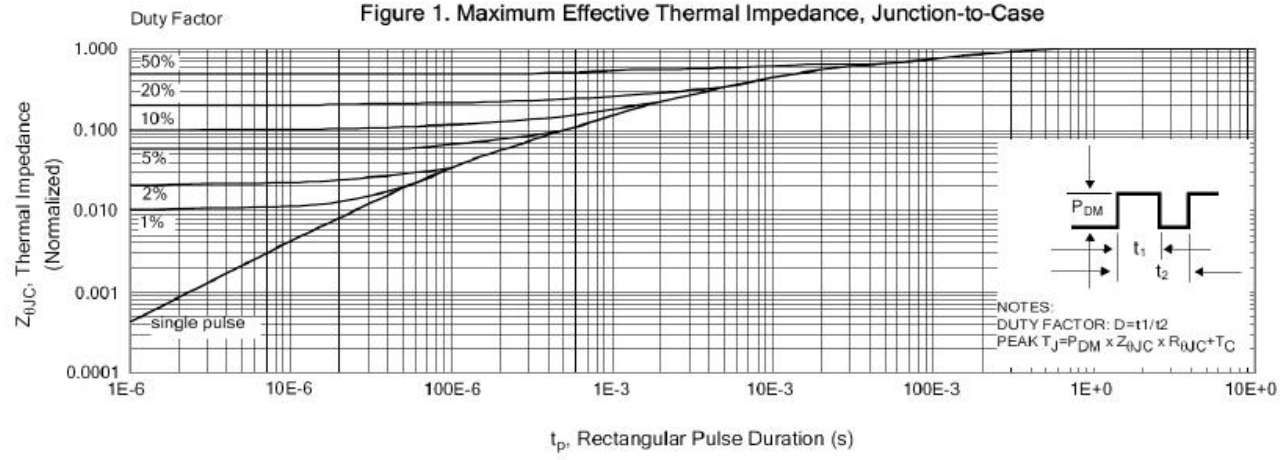



Figure 2. Maximum Power Dissipation vs Case Temperature

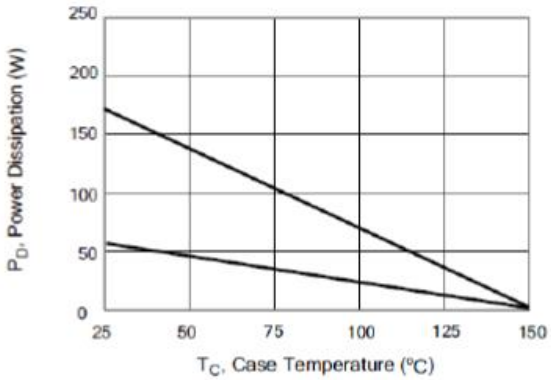



Figure 3. Maximum Continuous Drain Current vs Case Temperature

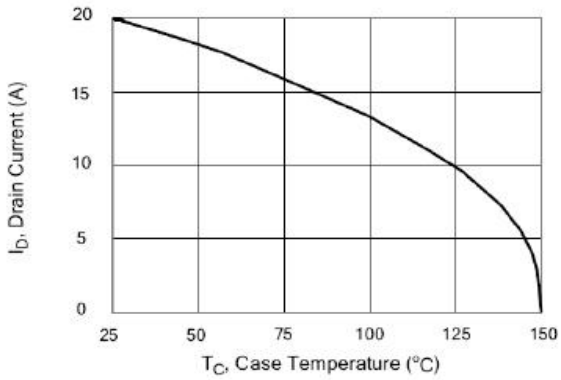



Figure 4. Typical Output Characteristics

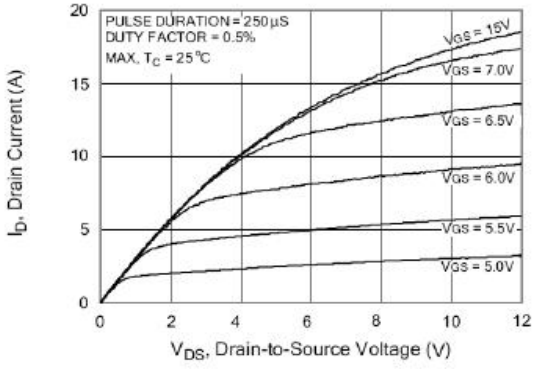



Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current

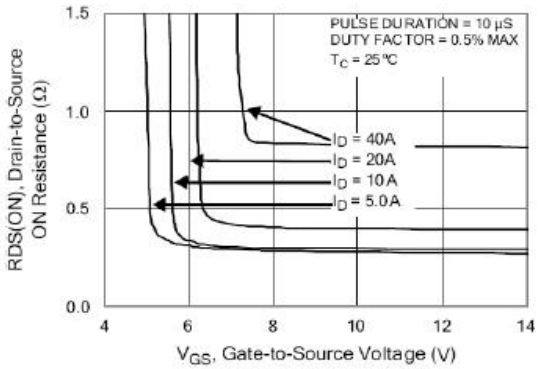


Figure 6. Maximum Peak Current Capability

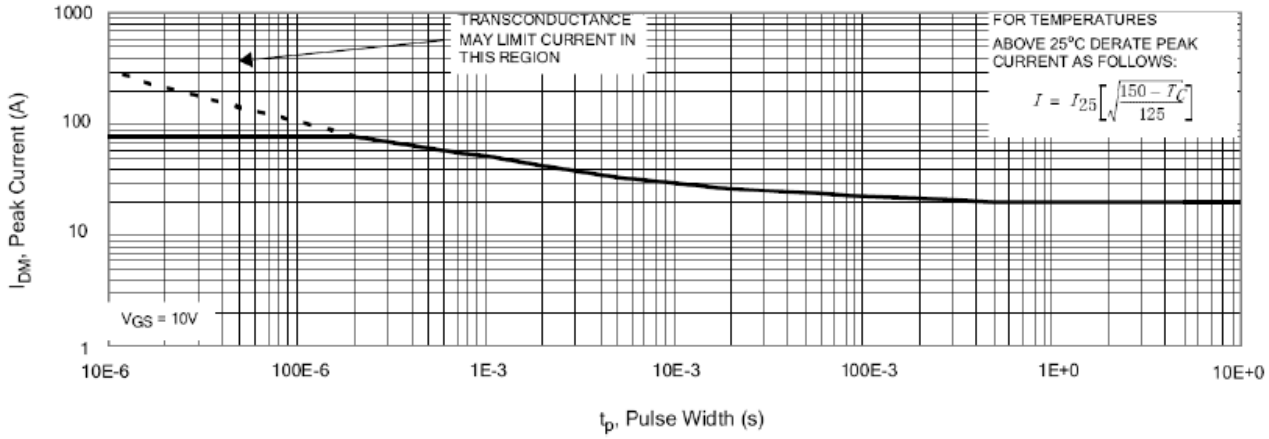



Figure 7. Typical Transfer Characteristics

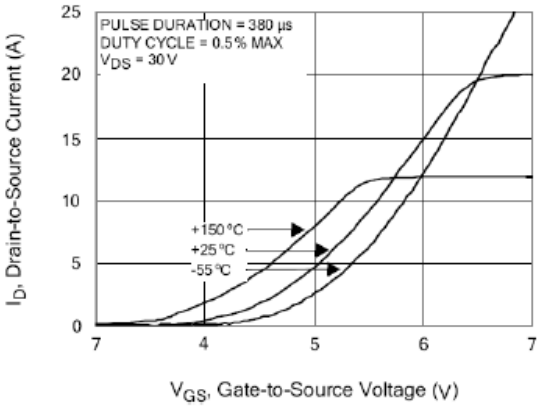



Figure 8. Unclamped Inductive Switching Capability

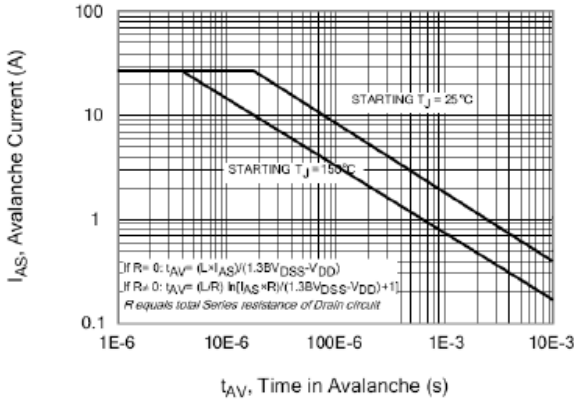



Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

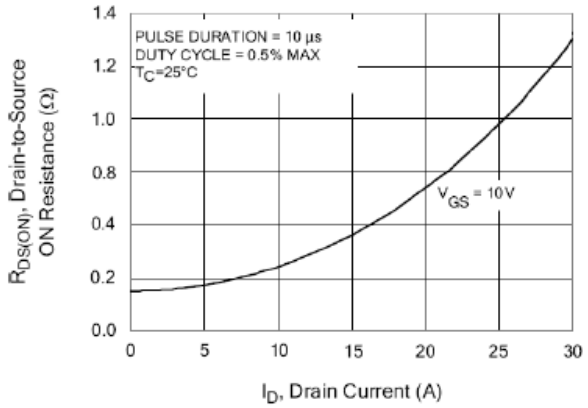



Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

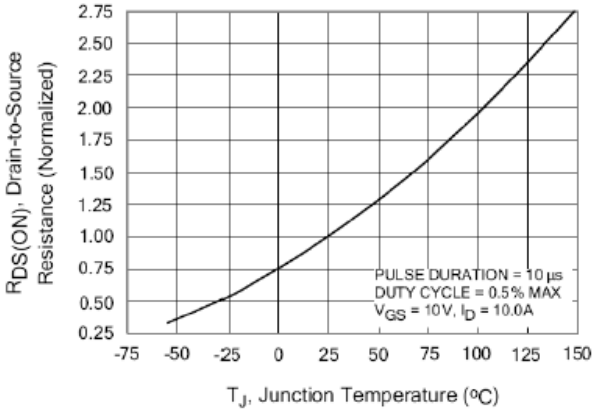


Figure 11. Typical Breakdown Voltage vs Junction Temperature

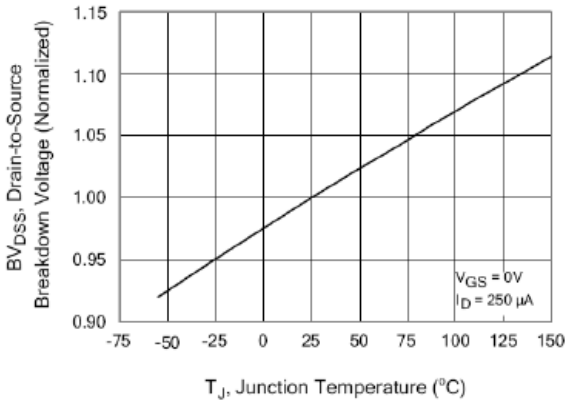



Figure 12. Typical Threshold Voltage vs Junction Temperature

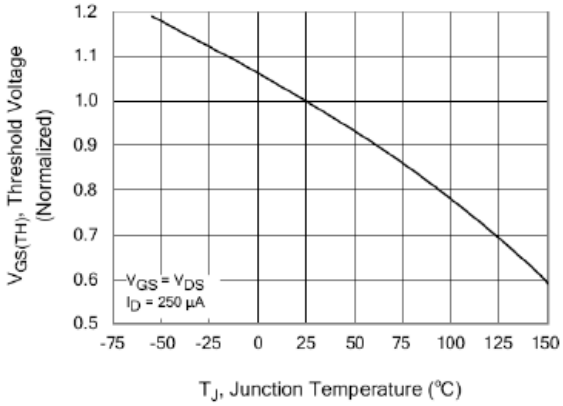



Figure 13. Maximum Forward Bias Safe Operating Area

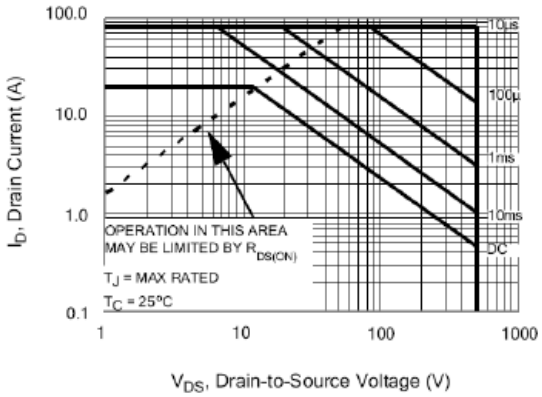



Figure 14. Typical Capacitance vs Drain-to-Source Voltage

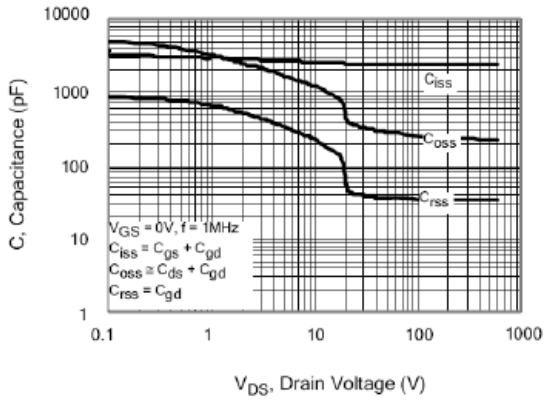



Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

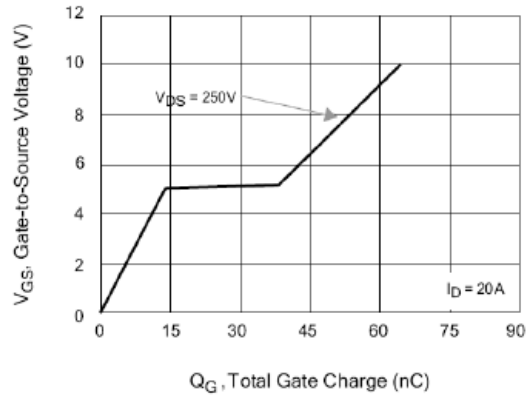



Figure 16. Typical Body Diode Transfer Characteristics