# KSD90P02

**-20V P-Channel MOSFET**

## General Description

The KSD90P02 series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible onresistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

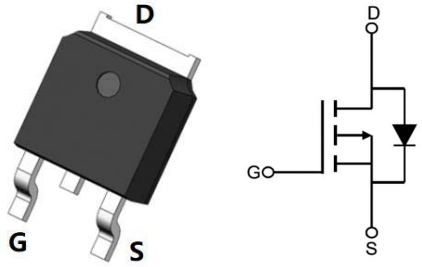
## Product Summary

| $V_{DS}$ (V) | $R_{DS(on)}$ (mΩ) | $I_D$ (A) |
|---|---|---|
| -20 | 3.6at $V_{GS}$ = 4.5 V | -90 |

## Features

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high $E_{AS}$
- Excellent package for good heat dissipation

## TO-252 Pin Configuration




## Applications

- High side switch for full bridge converter
- DC/DC converter for LCD display

## Absolute Maximum Ratings Tc=25℃ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25℃) | -90 | A |
| | Drain Current – Continuous ($T_C$=100℃) | -37 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | -250 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 55 | W |
| | Power Dissipation ($T_C$=100℃) | 1 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -50 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -50 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 61 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 1.5 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=-250uA | -20 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-20V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | -1 | uA |
| | | $V_{DS}$=-20V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | -10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±12V , $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=-4.5V , $I_D$=-10A | --- | 3.6 | 4.6 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | -1.0 | -1.3 | -2 | V |
| gfs | Forward Transconductance | $V_{DS}$=-5V , $I_S$=-10A | --- | 30 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | $V_{DS}$=-10V , $V_{GS}$=-4.5V , $I_D$=-10A | --- | 32 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 4.2 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 10 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=-10V, $R_L$=3Ω<br>$V_{GS}$=-4.5V,$R_G$=2.5Ω | --- | 9 | --- | ns |
| $T_r$ | Rise Time | | --- | 10 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 50 | --- | |
| $T_f$ | Fall Time | | --- | 20 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-10V , $V_{GS}$=0V , F=1MHz | --- | 5660 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 470 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 204 | --- | |

## Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | -40 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | -80 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=-1A , $T_J$=25℃ | --- | --- | -1.2 | V |

Note :

**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to production
**5.** $E_{AS}$ condition: Tj=25℃,$V_{DD}$=-15V,$V_G$=-10V,L=0.5mH,Rg=25Ω,$I_{AS}$=-26A

## Typical Electrical and Thermal Characteristics (Curves)

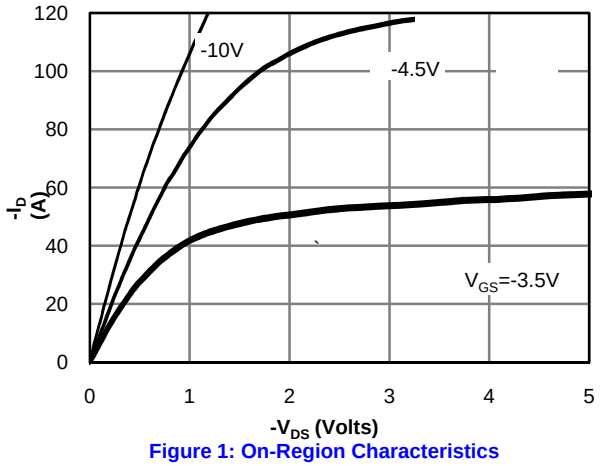



Figure 1: On-Region Characteristics

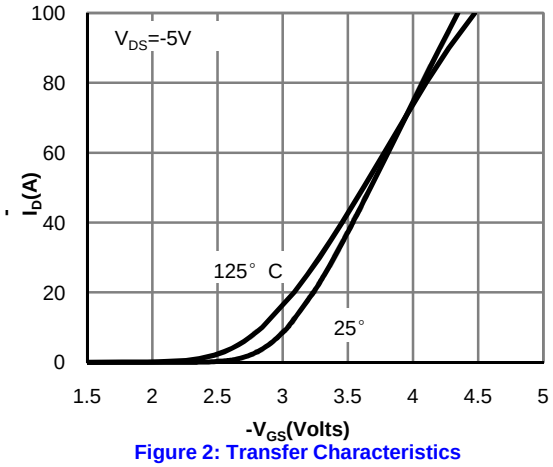



Figure 2: Transfer Characteristics

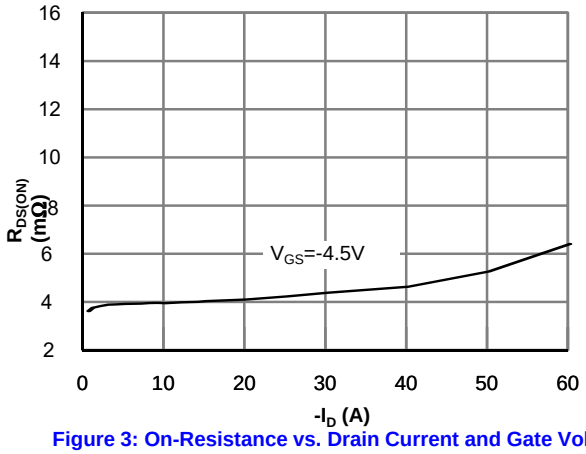



Figure 3: On-Resistance vs. Drain Current and Gate Voltage

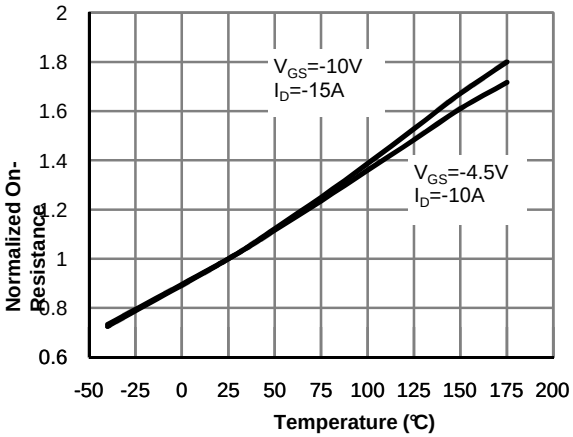



Figure 4: On-Resistance vs. Junction Temperature

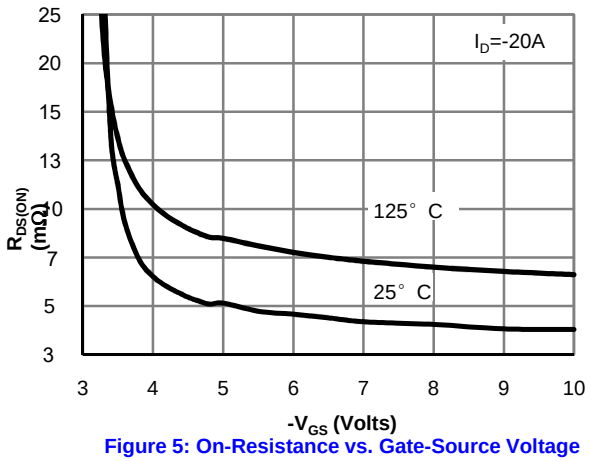



Figure 5: On-Resistance vs. Gate-Source Voltage

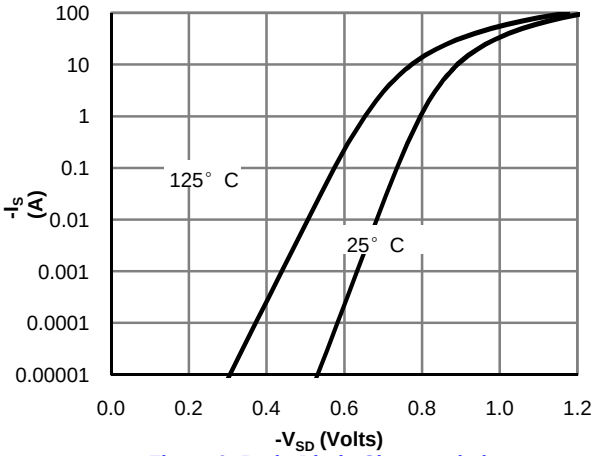



Figure 6: Body-Diode Characteristics

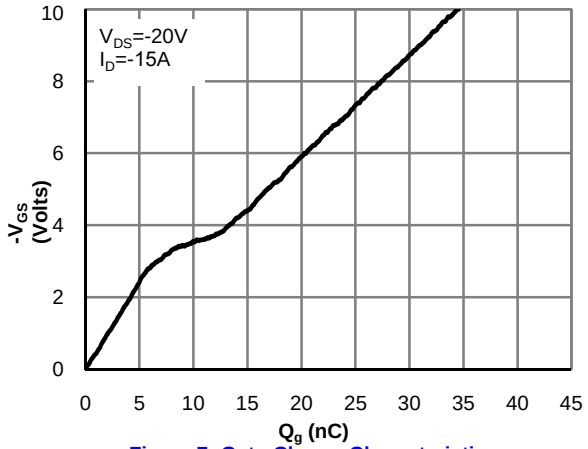



Figure 7: Gate-Charge Characteristics

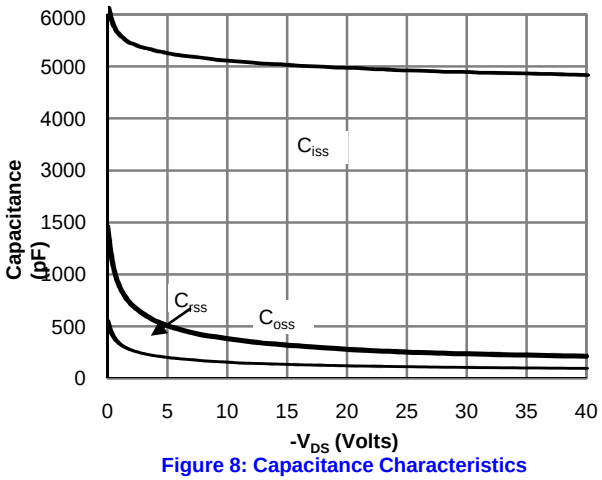



Figure 8: Capacitance Characteristics

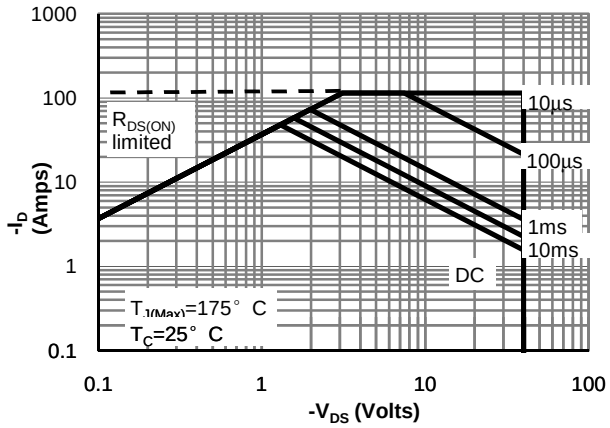



Figure 9: Maximum Forward Biased Safe Operating Area

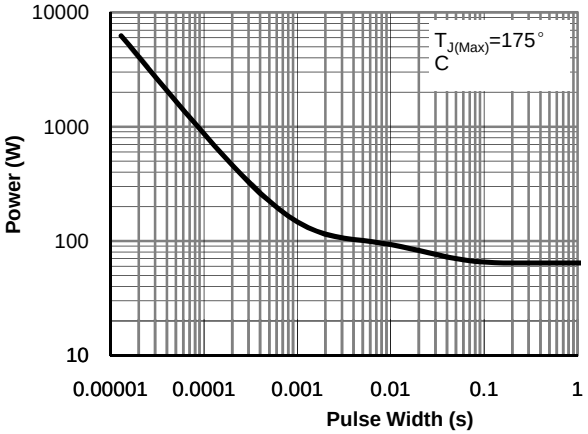



Figure 10: Single Pulse Power Rating Junction-to-Case

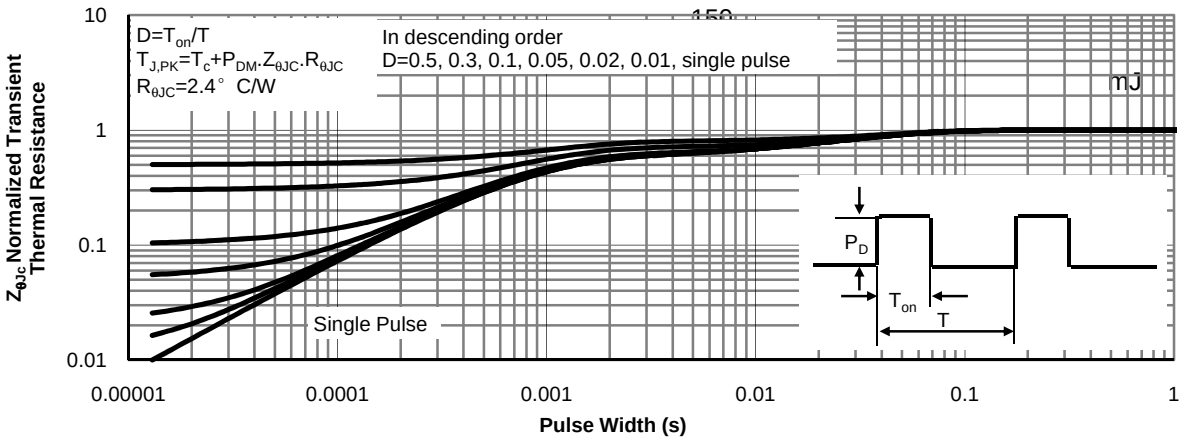



Figure 11: Normalized Maximum Transient Thermal Impedance

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