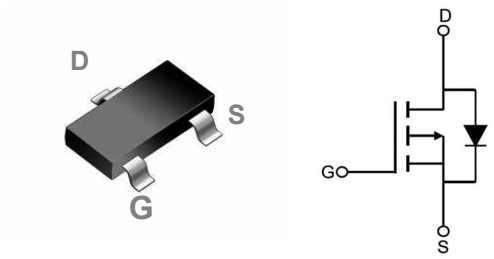
# KST3139N

## -20V P-Channel MOSFET

## General Description

These P-Channel enhancement mode power field effect transistors are using trench 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 fast switching applications

**SOT-523 Plastic-Encapsulate**




## Product Summary

| $V_{DS}$ (V) | $R_{DS(on)}$ (mΩ) | $I_D$ (A) |
|---|---|---|
| -20 | 480 at $V_{GS}$ = 4.5 V | -0.70 |
| | 670 at $V_{GS}$ = 2.5 V | -0.63 |

## Features

- High-Side Switching
- Low On-Resistance
- Low Threshold
- Fast Switching Speed

## Applications

- Drivers:Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers

## Absolute Maximum Ratings $T_C$=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℃) | -0.70 | A |
| | Drain Current – Continuous ($T_C$=100℃) | -0.40 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | -2.3 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 0.26 | W |
| | Power Dissipation ($T_C$=100℃) | 0.003 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 460 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 154 | ℃/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 | $V_{GS}$=±10V , $V_{DS}$=0V | --- | --- | ±20 | uA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=-4.5V , $I_D$=-1A | --- | 480 | --- | mΩ |
| | | $V_{GS}$=-2.5V , $I_D$=-1A | --- | 670 | --- | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | -0.35 | -0.6 | -1.1 | V |
| gfs | Forward Transconductance | $V_{DS}$=-5V , $I_S$=-0.5A | --- | 1 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | $V_{DS}$=-10V , $V_{GS}$=-5V , $I_D$=-0.3A | --- | 2.3 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 0.7 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 0.9 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=-10V,$I_D$=200mA, $V_{GS}$=4.5V,$R_G$=10Ω | --- | 7.5 | --- | ns |
| $T_r$ | Rise Time | | --- | 5.0 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 16 | --- | |
| $T_f$ | Fall Time | | --- | 8.4 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-10V , $V_{GS}$=0V , F=1MHz | --- | 160 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 28 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 16 | --- | |

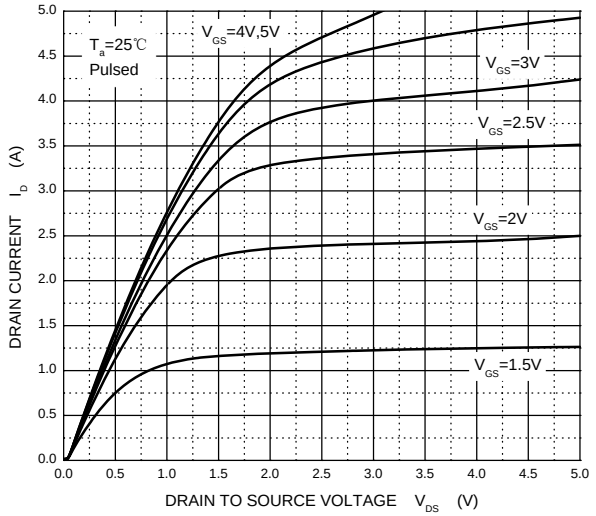
### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | -0.70 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | -1.0 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=-0.5A , $T_J$=25℃ | --- | --- | -1.0 | V |

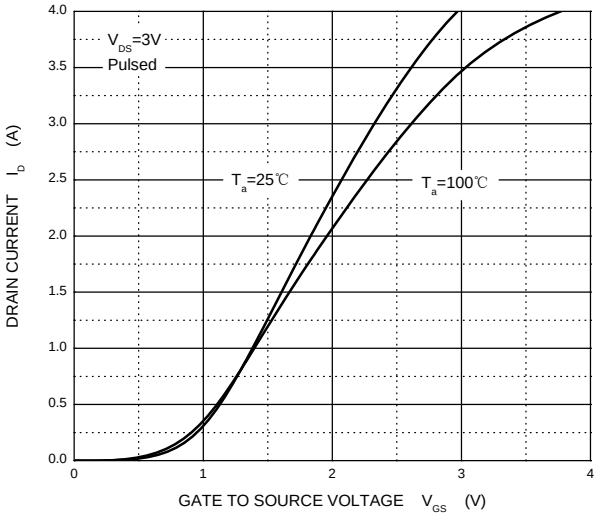
Note :

**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

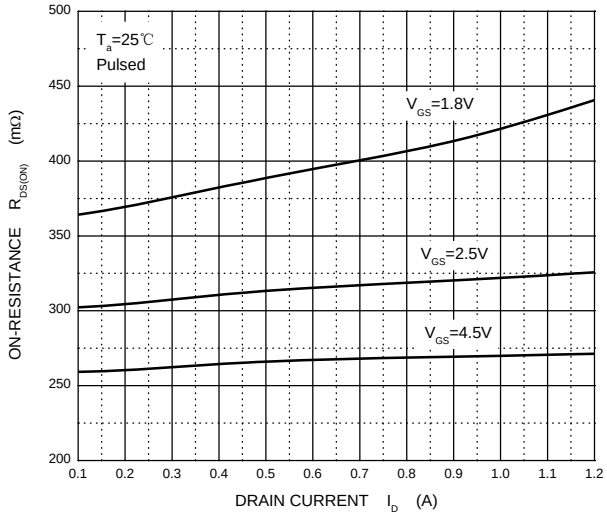
**Output Characteristics**



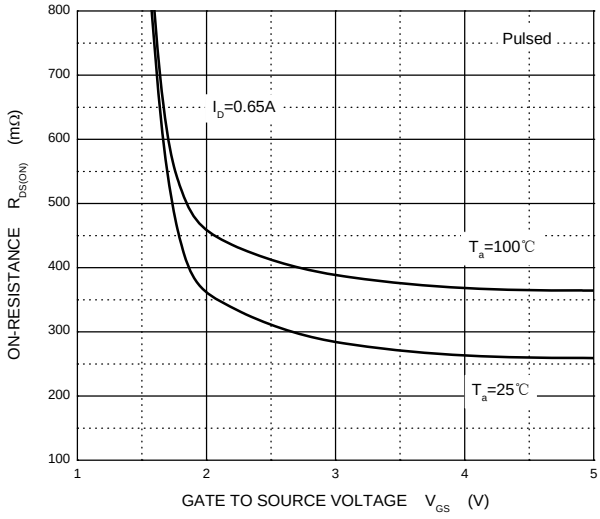

**Transfer Characteristics**



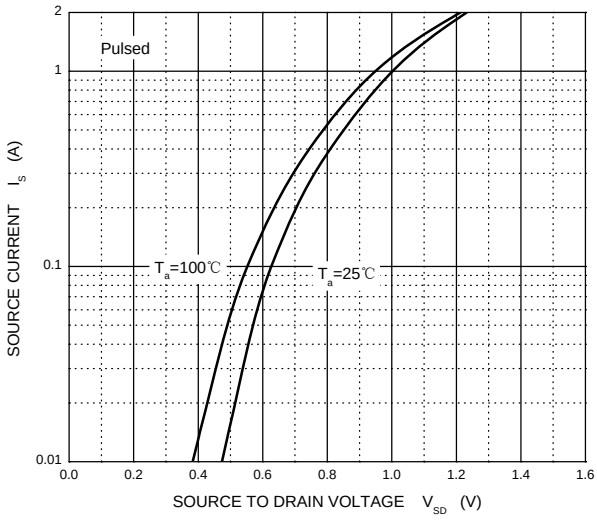

**$R_{DS(ON)}$ —— $I_D$**



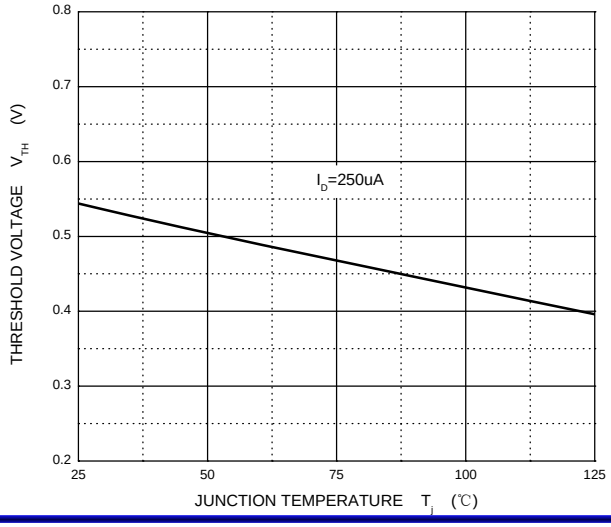

**$R_{DS(ON)}$ —— $V_{GS}$**




**$I_S$ —— $V_{SD}$**




**Threshold Voltage**



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