# KST3139AL

## -20V P-Channel MOSFET

## General Description

The KST3139AL 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 | 480 at $V_{GS}$ = 4.5 V | -0.70 |
| | 670 at $V_{GS}$ = 2.5 V | -0.63 |

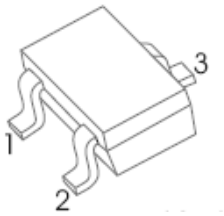
## Features

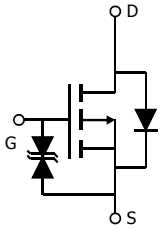
- High-Side Switching
- Low On-Resistance
- Low Threshold
- Fast Switching Speed

## Applications

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

**SOT-323 Plastic-Encapsulate**




1. GATE
2. SOURCE
3. DRAIN

## 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℃) | -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 | --- | |

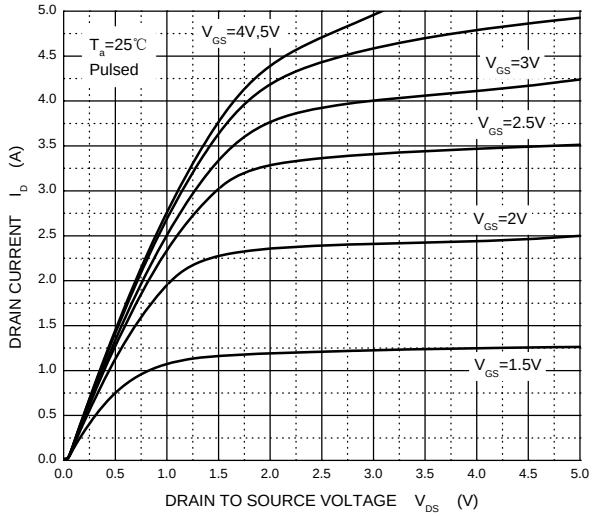
### Drain-Source Diode Characteristics and Maximum Ratings

| 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 |

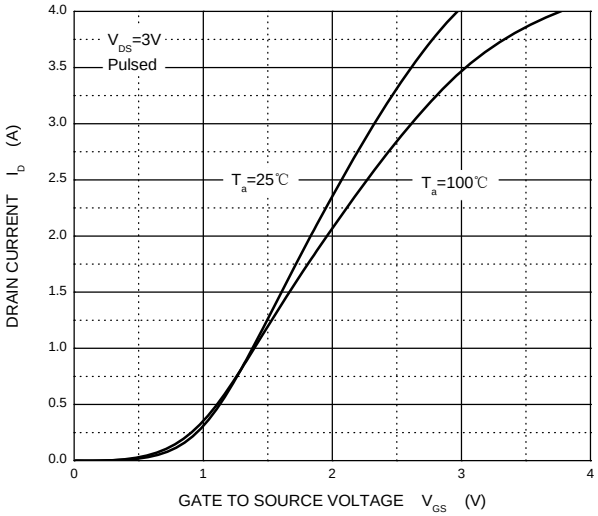
Note :

**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

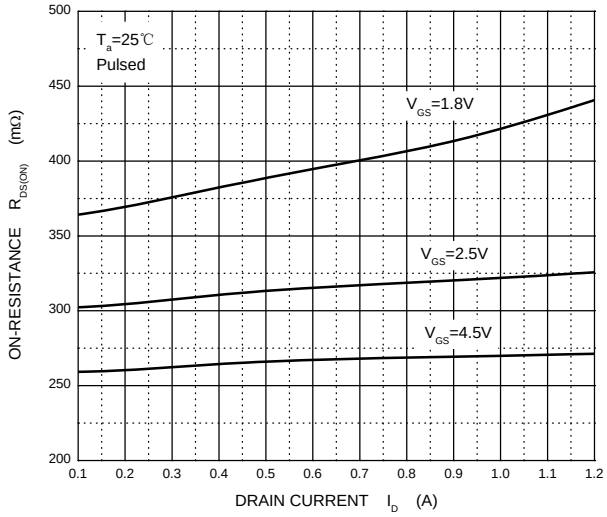
**Output Characteristics**



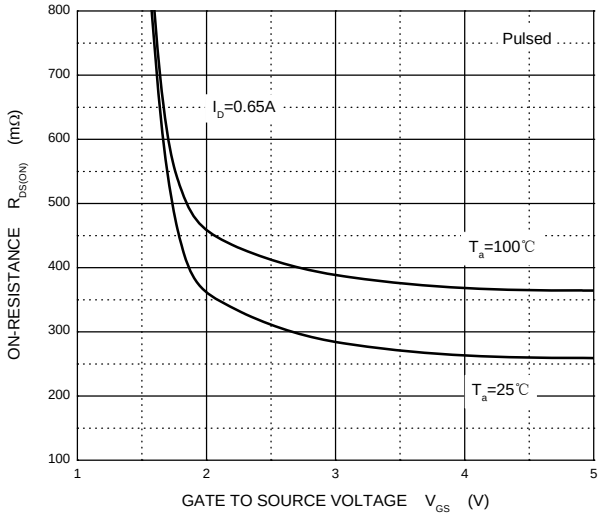

**Transfer Characteristics**



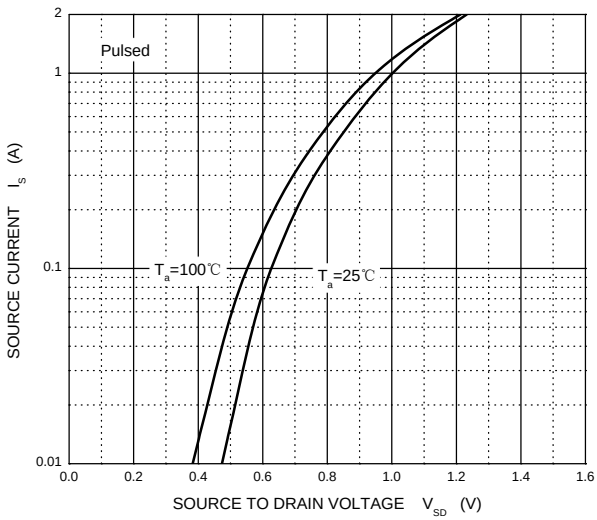

**$R_{DS(ON)}$ —— $I_D$**



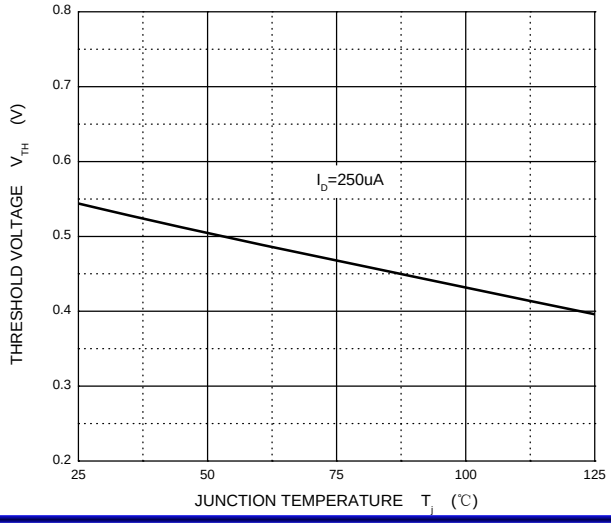

**$R_{DS(ON)}$ —— $V_{GS}$**




**$I_S$ —— $V_{SD}$**




**Threshold Voltage**



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