# KST3415A

## -15V P-Channel MOSFET

## General Description

The KST3415A uses advanced trench technology to provide excellent $R_{DS}$(ON), low gate charge and operation with gate voltages as low as1.8V. This device is suitable for use as a load switch or in PWM applications

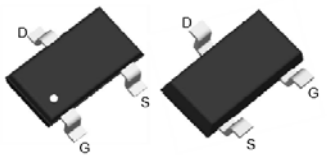
## Product Summary

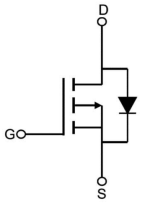
| $V_{DS}$ (V) | $R_{DS(on)}$ (mΩ) | $I_D$ (A) |
|---|---|---|
| -15 | 32 at $V_{GS}$ = 4.5 V | -5.8 |
| | 43 at $V_{GS}$ = 2.5 V | -4.3 |

## Features

- High power and current handing capability
- Lead free product is acquired
- Surface mount package

## SOT-23-3L Pin Configuration




## Applications

- Battery protection
- Load switch
- Power management

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -15 | V |
| $V_{GS}$ | Gate-Source Voltage | ±10 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25℃) | -5.8 | A |
| | Drain Current – Continuous ($T_C$=100℃) | -3.0 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | -22 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 0.8 | W |
| | Power Dissipation ($T_C$=100℃) | 0.01 | 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 | --- | 67 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 19 | ℃/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 | -12 | -15 | -18 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-12V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=-12V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±10V , $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=-4.5V , $I_D$=-4.5A | --- | 32 | 41 | mΩ |
| | | $V_{GS}$=-2.5V , $I_D$=-3A | --- | 43 | 57 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | -0.38 | -0.57 | -1.0 | V |
| gfs | Forward Transconductance | $V_{DS}$=-5V , $I_S$=-5A | --- | 12 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | $V_{DS}$=-10V , $V_{GS}$=-4.5V , $I_D$=-4A | --- | 12 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 1.7 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 2.5 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=-10V,$I_D$=-4A<br>$V_{GS}$=-4.5V,$R_G$=3.3Ω | --- | 14 | --- | ns |
| $T_r$ | Rise Time | | --- | 9 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 11 | --- | |
| $T_f$ | Fall Time | | --- | 26 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-10V , $V_{GS}$=0V , F=1MHz | --- | 906 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 213 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 146 | --- | |

### 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 | --- | --- | -5 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | -13 | 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

## Typical Electrical and Thermal Characteristics (Curves)

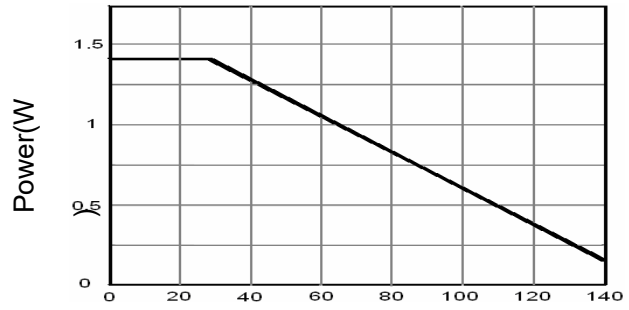



Figure 1 Power Dissipation

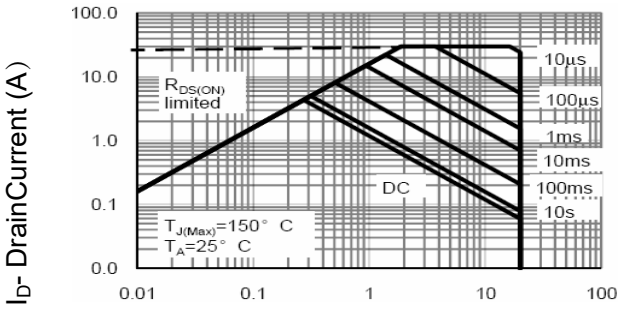



Figure 2 Safe Operation Area

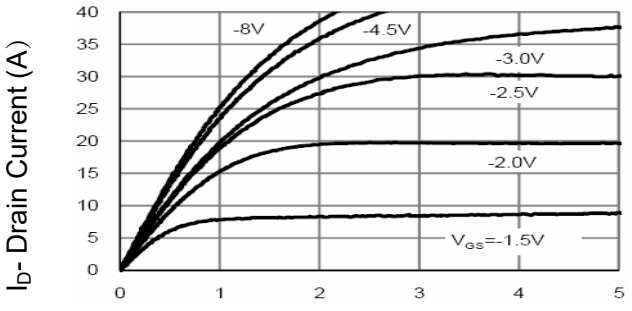



Figure 3 Output Characteristics

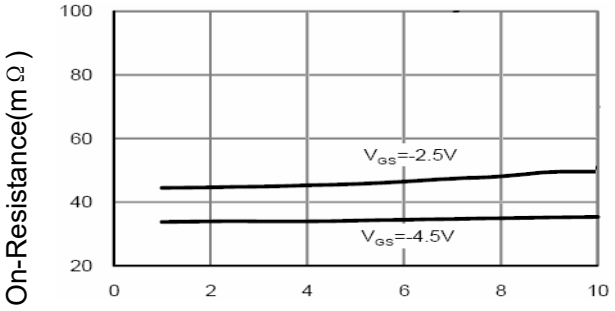



Figure 4 Drain-Source On-Resistance

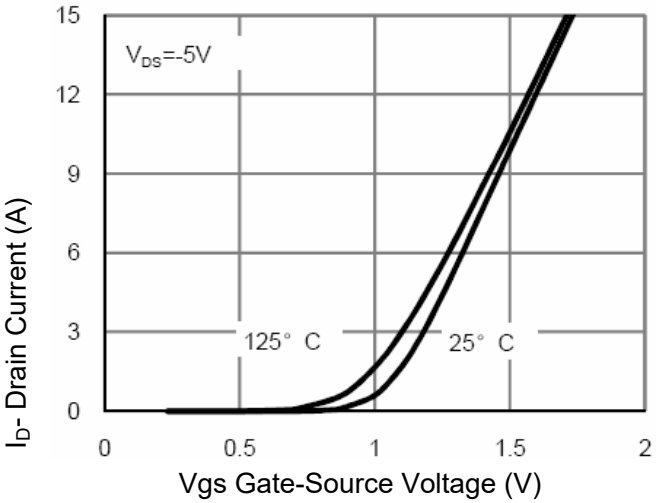



Figure 5 Transfer Characteristics

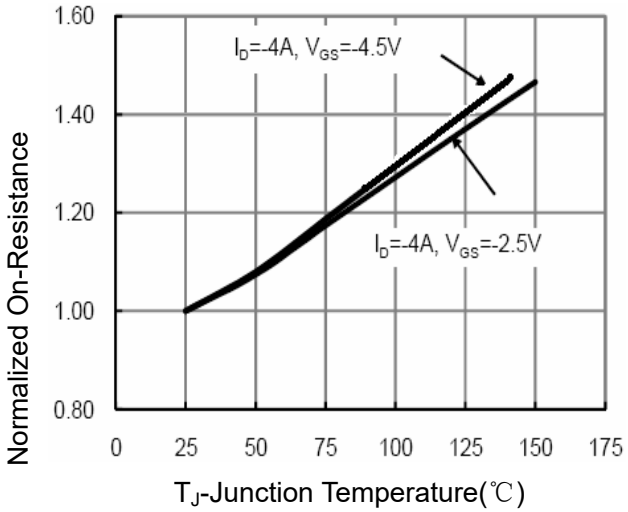



Figure 6 Drain-Source On-Resistance

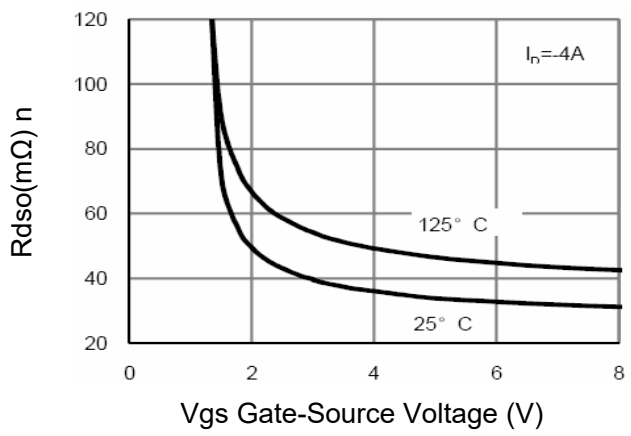



Figure 7 Rdson vs Vgs

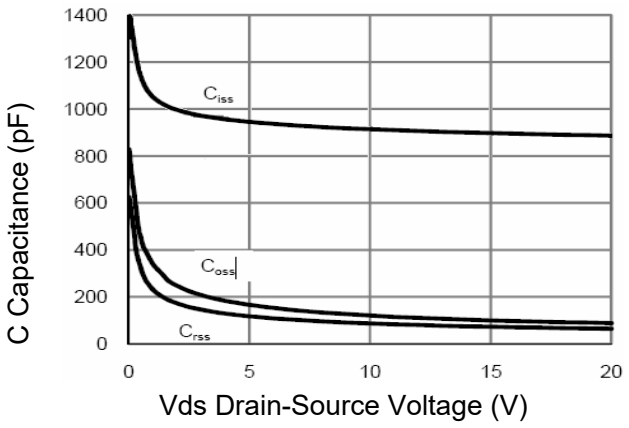



Figure 8 Capacitance vs Vds

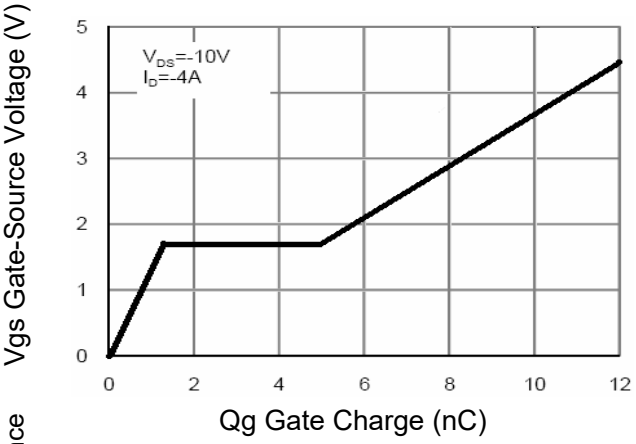



Figure 9 Gate Charge

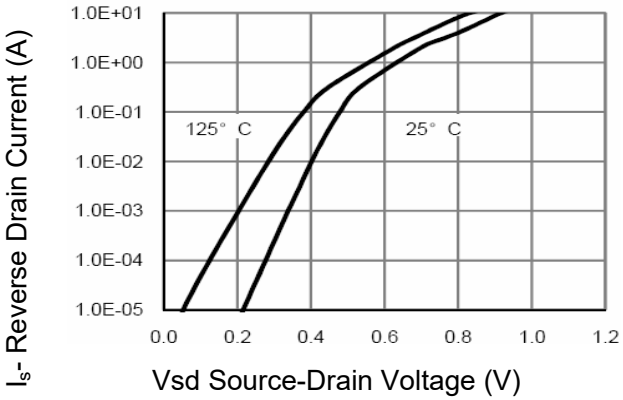



Figure 10 Source- Drain Diode Forward

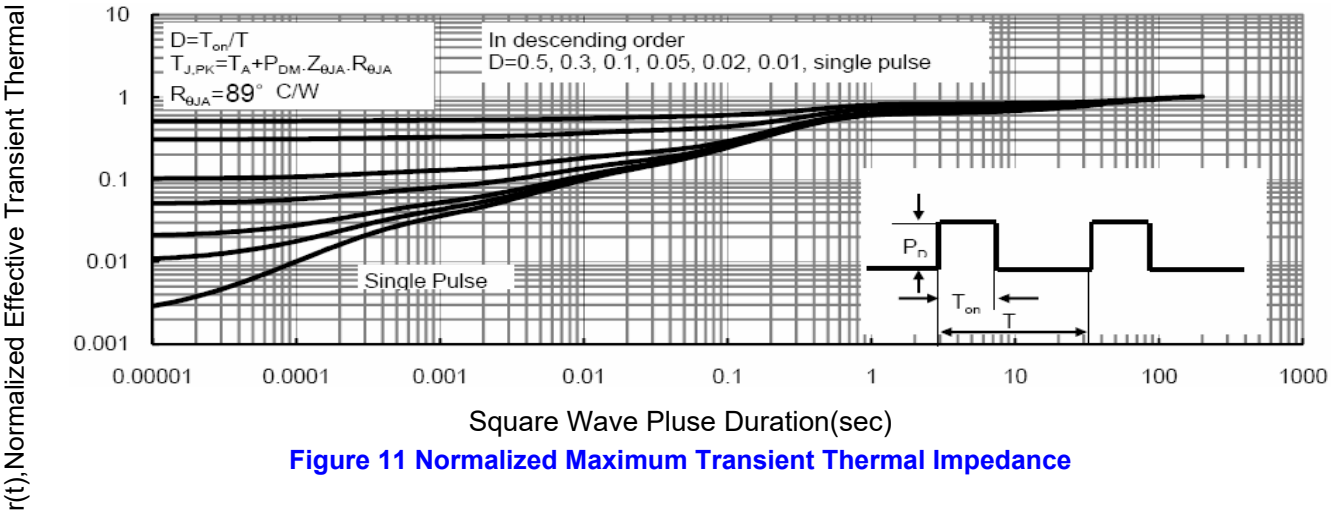



Figure 11 Normalized Maximum Transient Thermal Impedance

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