# MY4409

## P-Ch 30V Fast Switching MOSFET

MAOYUANWEI semiconductor

## General Description

The MY4409 is the high cell density trenched P-ch MOSFETs, which provide excellent RDS(ON) and gate charge for most of the synchronous buck converter applications.

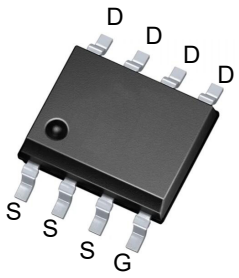
RoHS Compliant

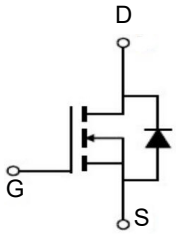
## Features

| | | |
|---|---|---|
| $V_{DSS}$ | 30 | V |
| $I_D$ | 15 | A |
| $R_{DS(ON)}$(at$V_{GS}$=10V) | 8 | mΩ |
| $R_{DS(ON)}$(at$V_{GS}$=4.5V) | 11 | mΩ |

## Application

- Battery protection
- Load switch
- PWM application




### Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|---|---|---|---|
| MY4409 | SOP-8 | 4409 | 3000 |

### Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_A$=25℃ | Continuous Drain Current, $V_{GS}$ @ -10V[1] | - 15 | A |
| $I_D$@$T_A$=70℃ | Continuous Drain Current, $V_{GS}$ @ -10V[1] | -9 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | -46 | A |
| EAS | Single Pulse Avalanche Energy[3] | 55 | mJ |
| $I_{AS}$ | Avalanche Current | -50 | A |
| $P_D$@$T_A$=25℃ | Total Power Dissipation[4] | 4.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

### Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | --- | 75 | ℃/W |
| | Thermal Resistance Junction-Ambient [1](t≦10s) | --- | 40 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 24 | ℃/W |

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

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristic** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$= -250μA | -30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$= -30V, $V_{GS}$=0V, | - | - | -1 | μA |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{DS}$=0V, $V_{GS}$= ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$= -250μA | -1.0 | -1.6 | -2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance Note3 | $V_{GS}$= -10V, $I_D$= -10A | - | 8 | 10 | mΩ |
| | | $V_{GS}$= -4.5V, $I_D$= -5A | - | 11 | 15 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$= -15V, $V_{GS}$=0V, f=1.0MHz | - | 1970 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 233 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 206 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$= -15V, $I_D$= -5A, $V_{GS}$= -10V | - | 22 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 1.0 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 1.8 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$= -15V, $I_D$= -10A, $V_{GS}$=-10V, $R_{GEN}$=2.5Ω | - | 9 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 13 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 48 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 20 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward | | - | - | -12 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | -60 | A |
| $V_{SD}$ | Drain to Source Diode Forward | $V_{GS}$=0V, $I_S$= -15A | - | -0.8 | -1.2 | V |
| trr | Reverse Recovery Time | $T_J$=25℃,$V_{DD}$= -24V,$I_F$=-2.8A,dI/dt=-100A/μs | - | 64 | - | ns |
| Qrr | Reverse Recovery Charge | | - | 25 | - | nC |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J$=25℃, $V_{GS}$=10V, $R_G$=25Ω, L=0.5mH, $I_{AS}$=-12.7A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Characteristics

**Figure1:** Output Characteristics

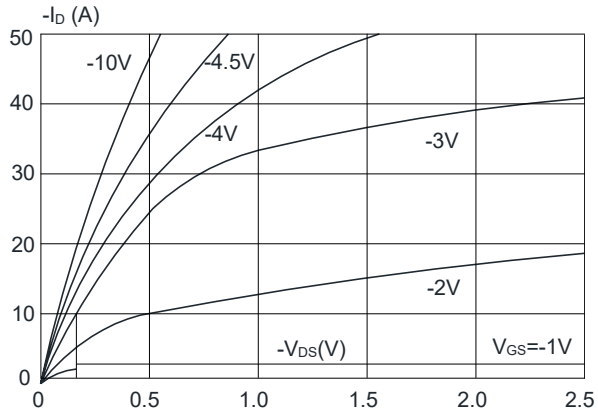



**Figure 2:** Typical Transfer Characteristics

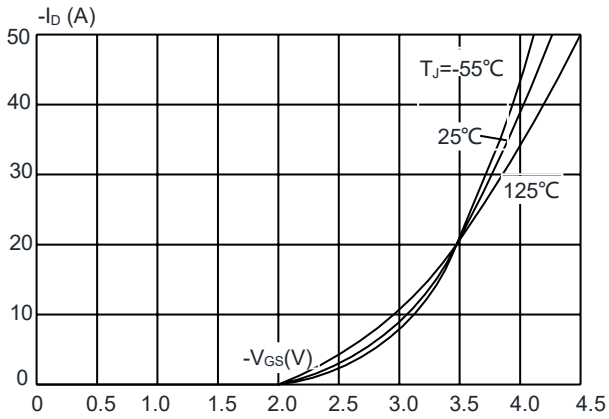



**Figure 3:**On-resistance vs. Drain Current

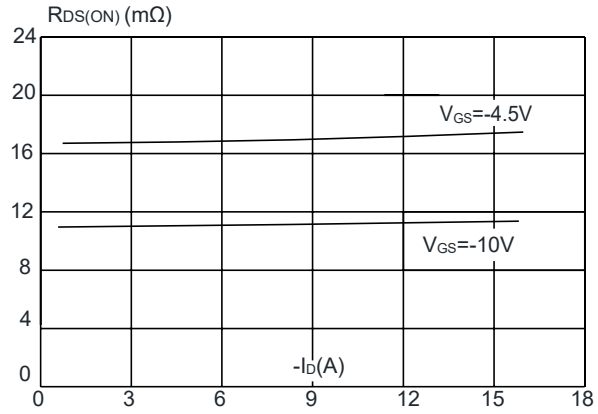



**Figure 4**: Body Diode Characteristics

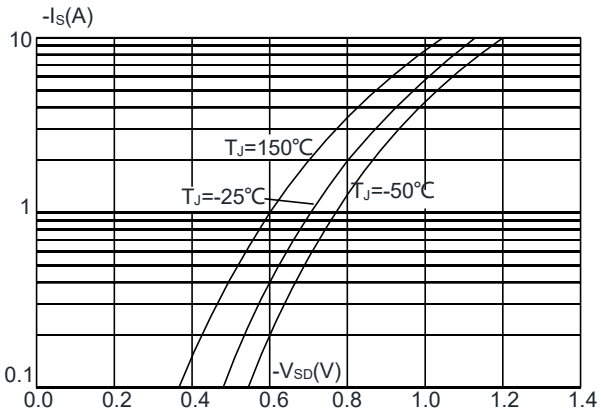



**Figure 5:** Gate Charge Characteristics

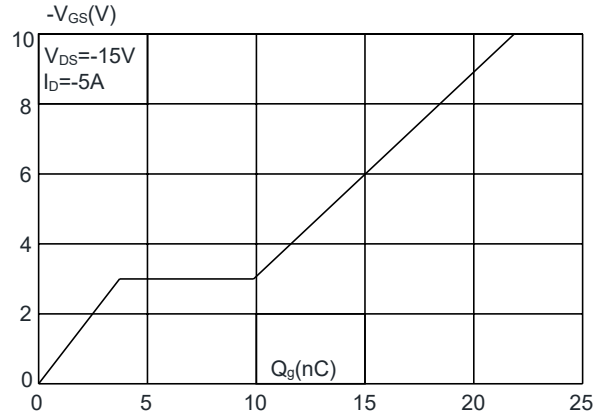



**Figure 6:** Capacitance Characteristics

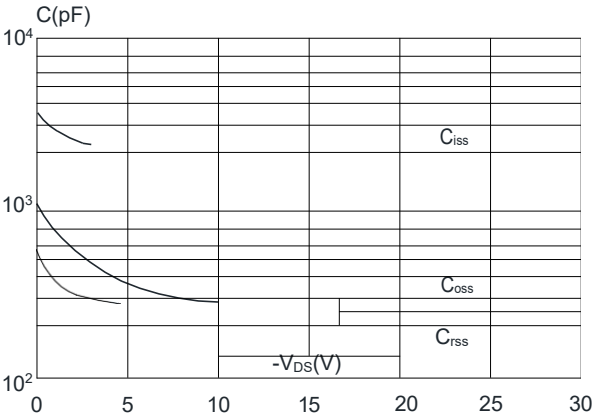


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

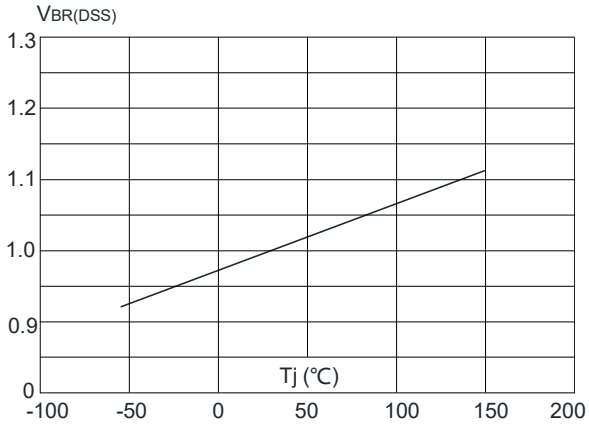



**Figure 8:** Normalized on Resistance vs. Junction Temperature

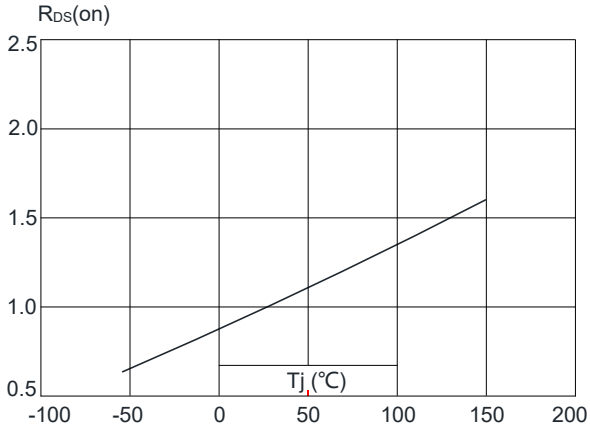



**Figure 9:** Maximum Safe Operating Area

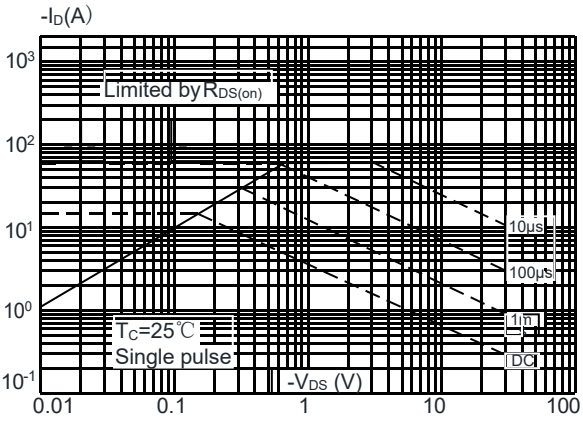



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

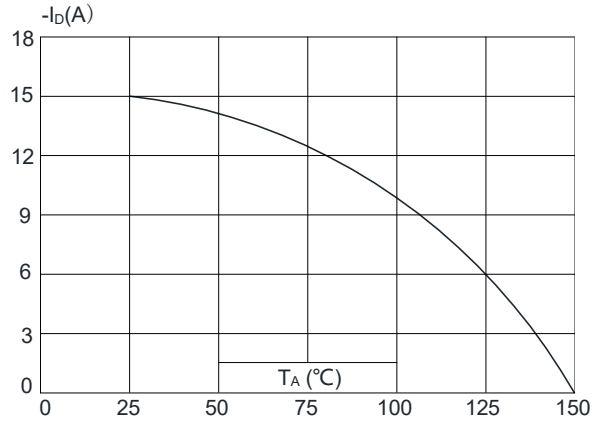
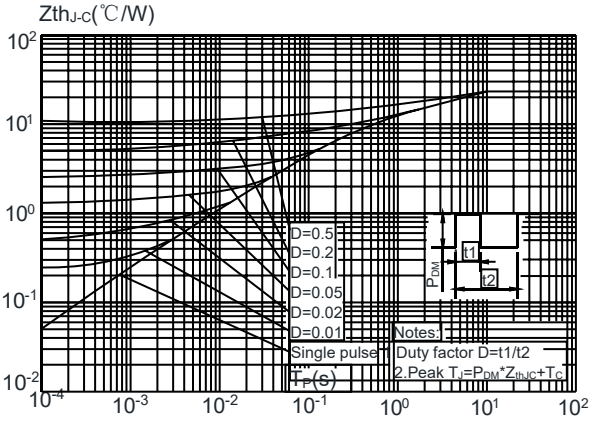
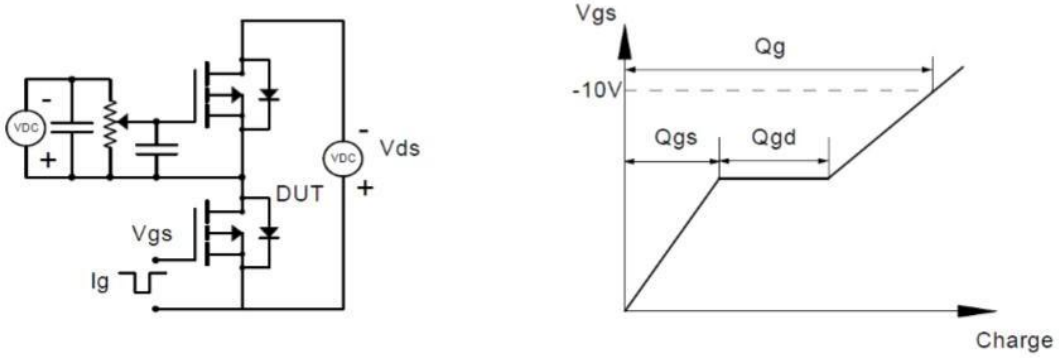



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

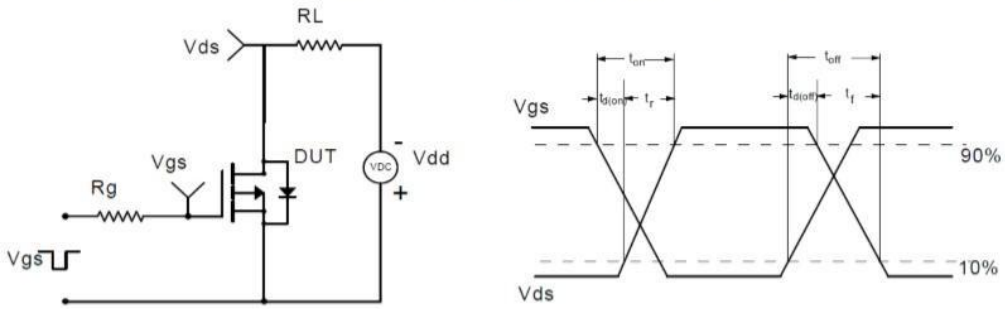


## Test Circuit

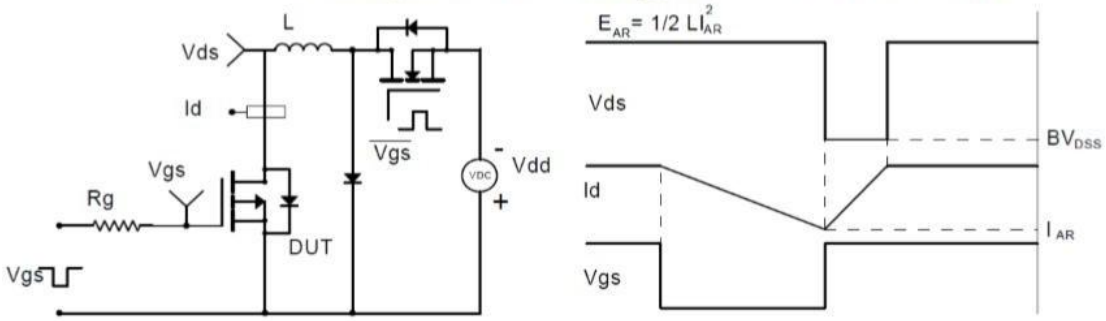
Gate Charge Test Circuit & Waveform



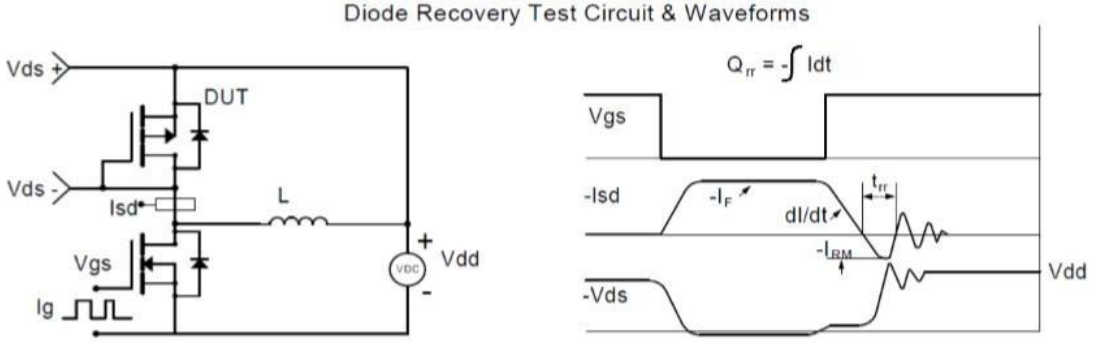

Resistive Switching Test Circuit & Waveforms



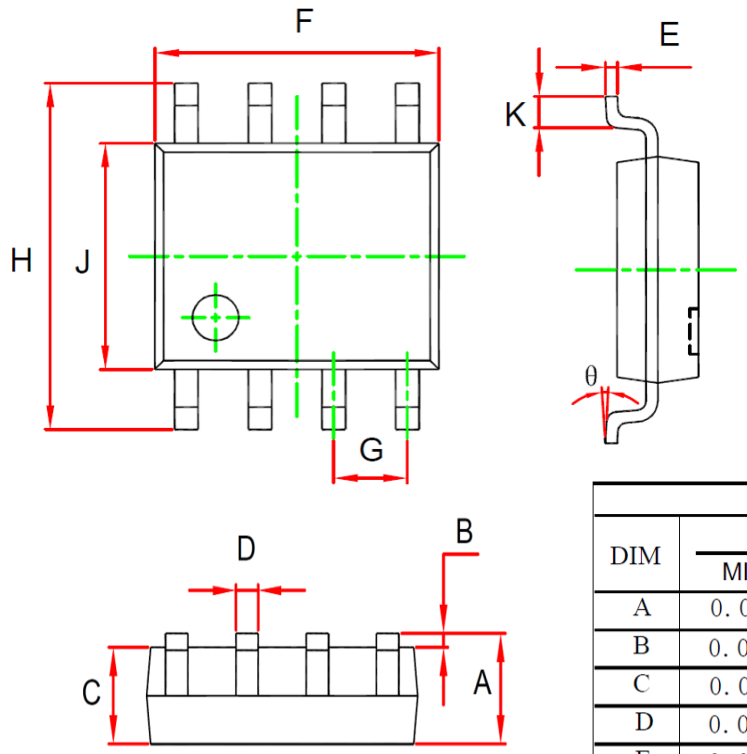

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



## Package Mechanical Data-SOP-8




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | |
| | MIN | MAX | MIN | MAX | NOTE |
| A | 0.053 | 0.069 | 1.350 | 1.750 | |
| B | 0.004 | 0.010 | 0.100 | 0.250 | |
| C | 0.053 | 0.061 | 1.350 | 1.550 | |
| D | 0.013 | 0.020 | 0.330 | 0.510 | |
| E | 0.007 | 0.010 | 0.170 | 0.250 | |
| F | 0.189 | 0.197 | 4.800 | 5.000 | |
| G | 0.050 (BSC) | | 1.270 (BSC) | | |
| H | 0.228 | 0.244 | 5.800 | 6.200 | |
| J | 0.150 | 0.157 | 3.800 | 4.000 | |
| K | 0.016 | 0.050 | 0.400 | 1.270 | |
| θ | 0° | 8° | 0° | 8° | |