

P-Channel Trench Power MOSFET

 Lead Free Package and Finish

General Description

The RS4435 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as $-4.5V$. This device is suitable for use as a load switch or in PWM applications.

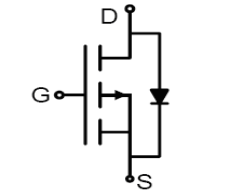
Features

- $V_{DS} = -30V, I_D = -10A$
 $R_{DS(ON)} < 20m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 34m\Omega @ V_{GS} = -4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

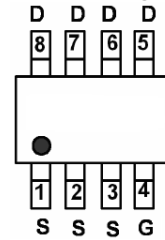
Application

- PWM applications
- Load switch
- Power management

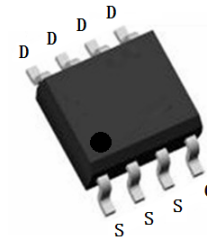
100% UIS TESTED!



Schematic Diagram



Marking and pin Assignment



SOP-8 top view

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|--------|----------------|-----------|------------|----------|
| RS4435 | RS4435 | SOP-8 | -- | -- | -- |

Table 1. Absolute Maximum Ratings ($T_A=25^\circ C$)

| Symbol | Parameter | Value | Unit |
|------------------|---|------------|------------|
| V_{DS} | Drain-Source Voltage ($V_{GS}=0V$) | -30 | V |
| V_{GS} | Gate-Source Voltage ($V_{DS}=0V$) | ± 20 | V |
| I_D | Drain Current-Continuous($T_c=25^\circ C$) | -10 | A |
| | Drain Current-Continuous($T_c=100^\circ C$) | -6.3 | A |
| $I_{DM (pluse)}$ | Drain Current-Continuous@ Current-Pulsed (Note 1) | -40 | A |
| P_D | Maximum Power Dissipation | 3.2 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 To 150 | $^\circ C$ |

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

Table 2. Thermal Characteristic

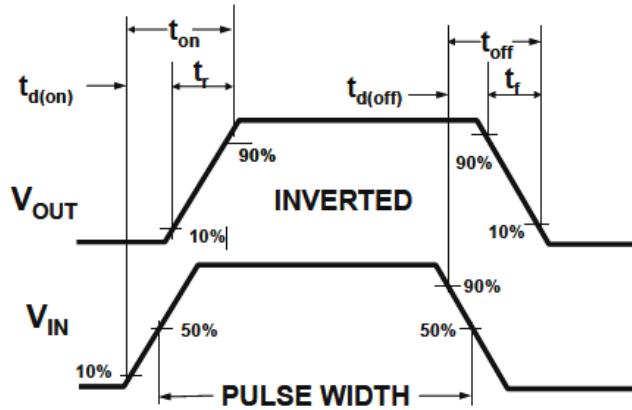
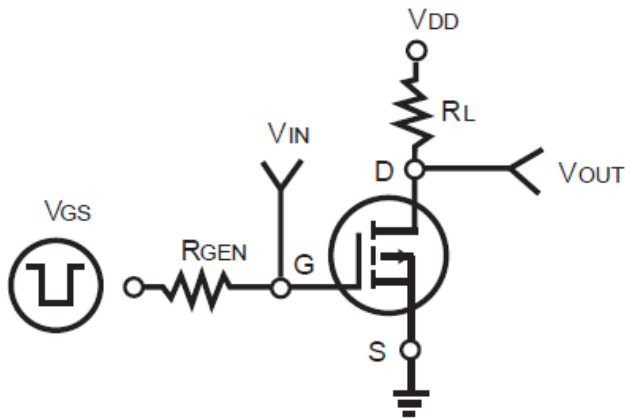
| Symbol | Parameter | Typ | Value | Unit |
|-----------------|---|-----|-------|--------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | - | 39 | $^\circ C/W$ |

Table 3. Electrical Characteristics (T_A=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--|--|-----|------|------|------|
| On/Off States | | | | | | |
| B _V DSS | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250μA | -30 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =-24V, V _{GS} =0V | | | 1 | μA |
| I _{GSS} | Gate-Body Leakage Current | V _{GS} =±20V, V _{DS} =0V | | | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =-250μA | -1 | -1.6 | -3 | V |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-5A | | 18 | | S |
| R _{DS(ON)} | Drain-Source On-State Resistance | V _{GS} =-10V, I _D =-10A | | 15 | 20 | mΩ |
| | | V _{GS} =-4.5V, I _D =-5A | | 21 | 34 | mΩ |
| Dynamic Characteristics | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1.0MHz | | 1800 | | pF |
| C _{oss} | Output Capacitance | | | 305 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 216 | | pF |
| Switching Times | | | | | | |
| t _{d(on)} | Turn-on Delay Time | V _{DD} =-15V, I _D =-1A, R _L =15Ω V _{GS} =-10V, R _G =2.5Ω | | 10 | | nS |
| t _r | Turn-on Rise Time | | | 26 | | nS |
| t _{d(off)} | Turn-Off Delay Time | | | 35 | | nS |
| t _f | Turn-Off Fall Time | | | 8 | | nS |
| Q _g | Total Gate Charge | V _{DS} =-15V, I _D =-10A, V _{GS} =-10V | | 30 | | nC |
| Q _{gs} | Gate-Source Charge | | | 6 | | nC |
| Q _{gd} | Gate-Drain Charge | | | 9 | | nC |
| Source-Drain Diode Characteristics | | | | | | |
| I _{SD} | Source-Drain Current(Body Diode) | | | | -10 | A |
| V _{SD} | Forward on Voltage ^(Note 1) | V _{GS} =0V, I _S =-10A | | | -1.2 | V |

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Switch Time Test Circuit and Switching Waveforms:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Power Dissipation

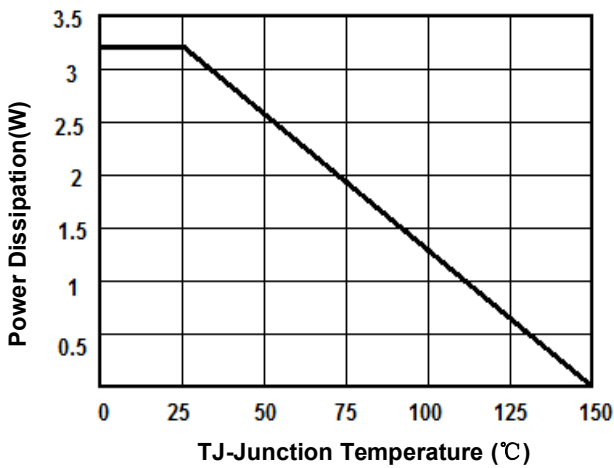


Figure2. Drain Current

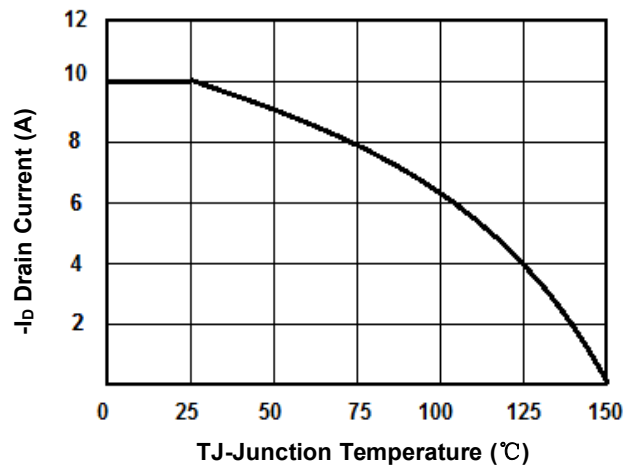


Figure3. Output Characteristics

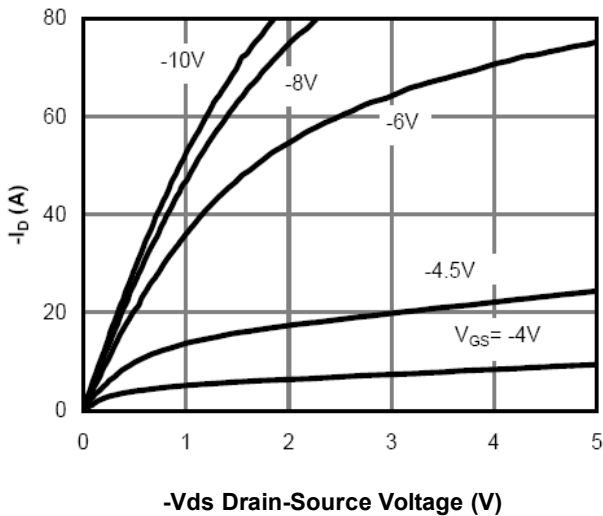


Figure4. Transfer Characteristics

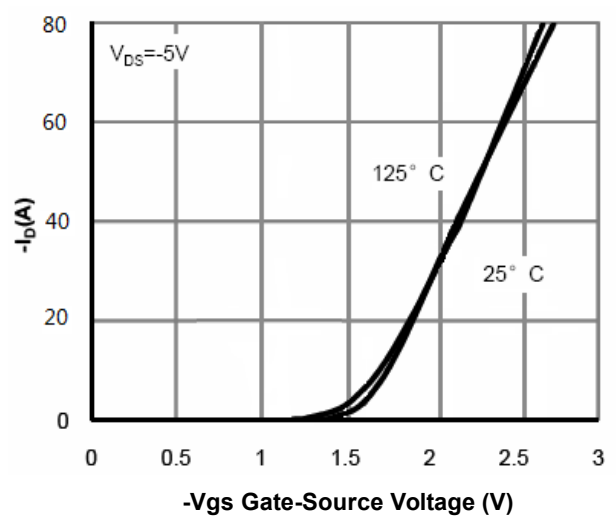


Figure5. Capacitance

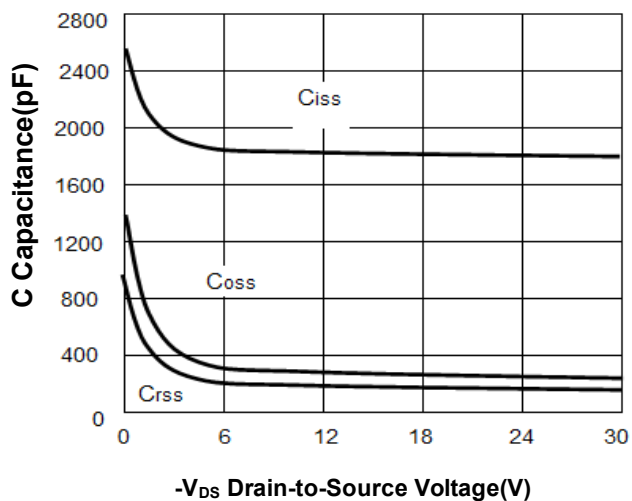


Figure6. $R_{DS(ON)}$ vs Junction Temperature

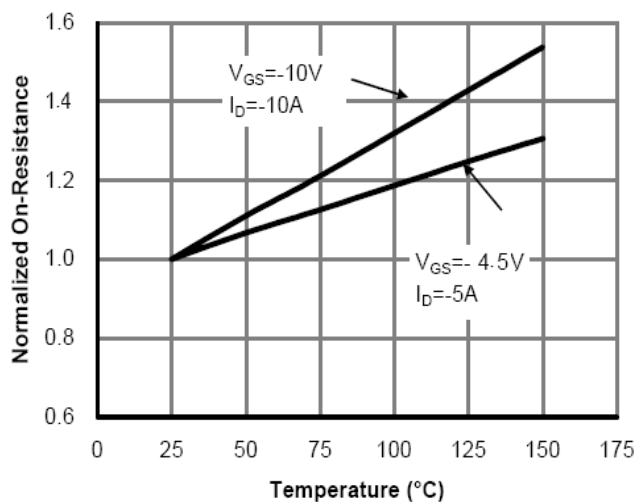


Figure7. Max BV_{DSS} vs Junction Temperature

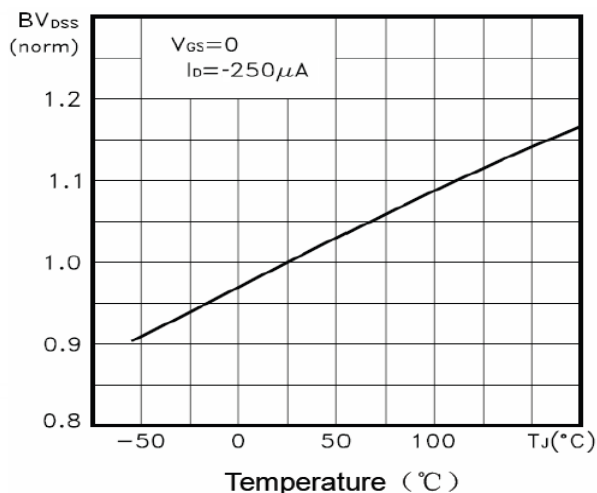


Figure8. $V_{GS(th)}$ vs Junction Temperature

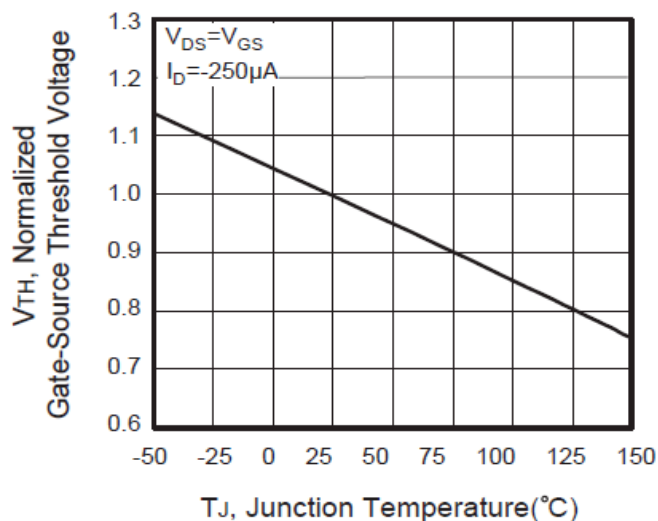


Figure9. Gate Charge Waveforms

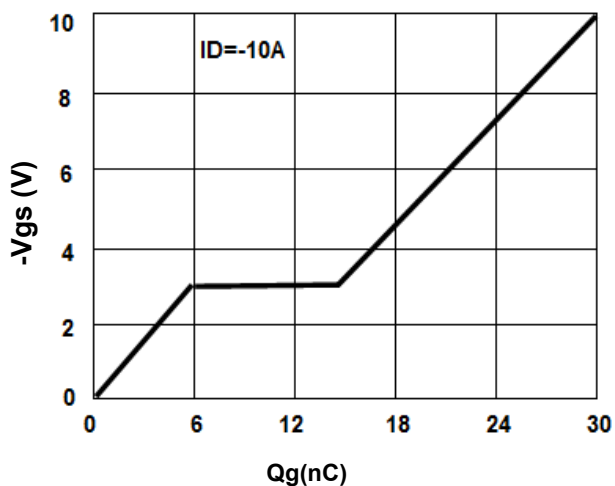


Figure10. Maximum Safe Operating Area

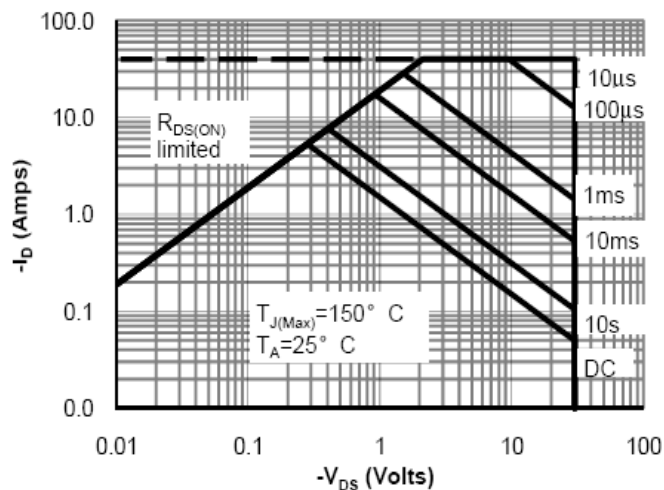
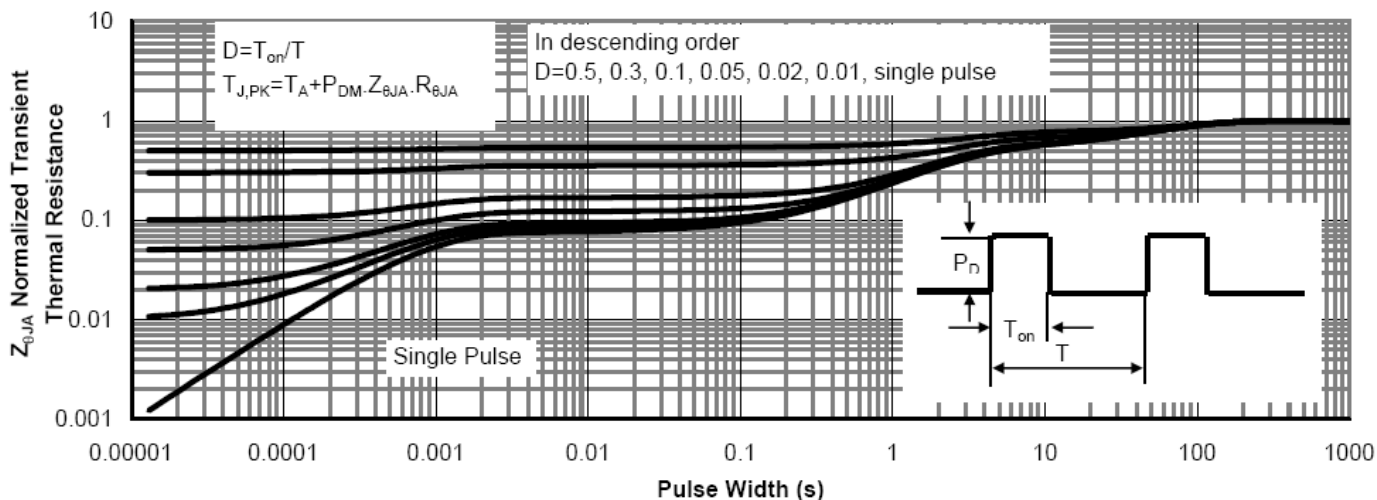
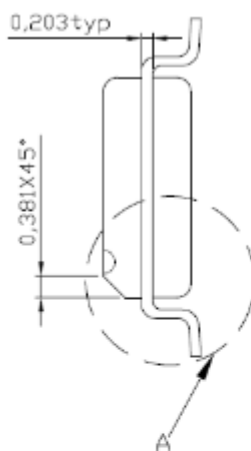
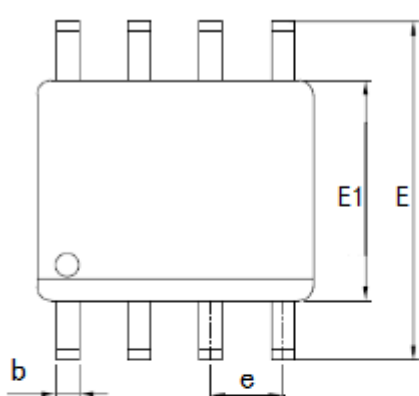


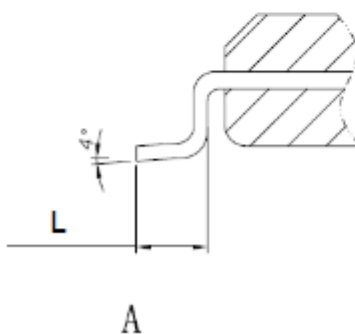
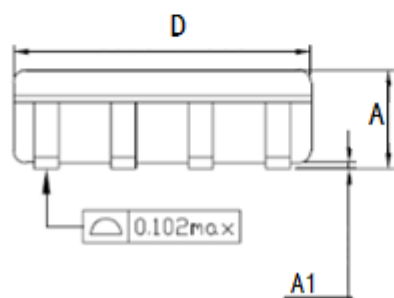
Figure11. Normalized Maximum Transient Thermal Impedance



SOP-8 Package Information



| COMMON DIMENSIONS | | | |
|-------------------|---------|-------|-------|
| SYMBOL | mm | | |
| | MIN | NOM | MAX |
| L | | | |
| A | 1.35 | 1.55 | 1.75 |
| A1 | 0.1 | 0.15 | 0.2 |
| b | 0.346 | 0.406 | 0.466 |
| D | 4.8 | 4.89 | 4.98 |
| E | 5.75 | 6.00 | 6.25 |
| E1 | 3.81 | 3.90 | 3.99 |
| e | 1.27TYP | | |
| L | 0.406 | 0.838 | 1.27 |



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