

## 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.

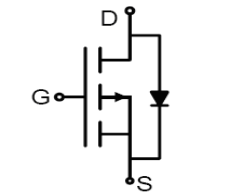
### Features

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

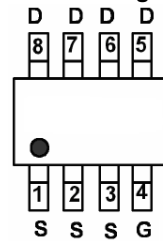
### Application

- PWM applications
- Load switch
- Power management

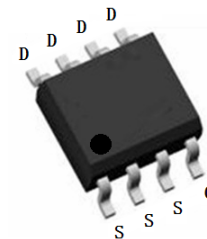
**100% UIS TESTED!**



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<sub>A</sub>=25°C)**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	-30	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	$\pm 20$	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	°C

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

**Table 2. Thermal Characteristic**

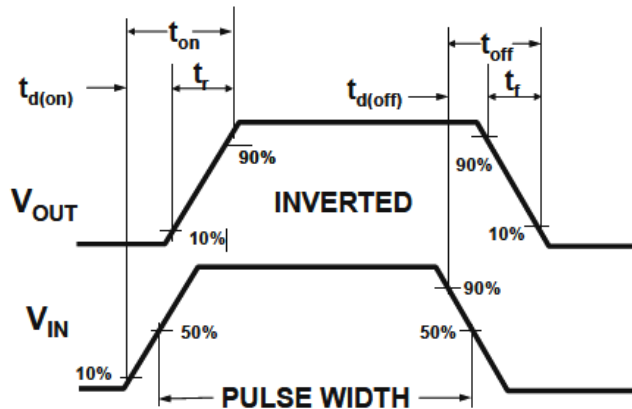
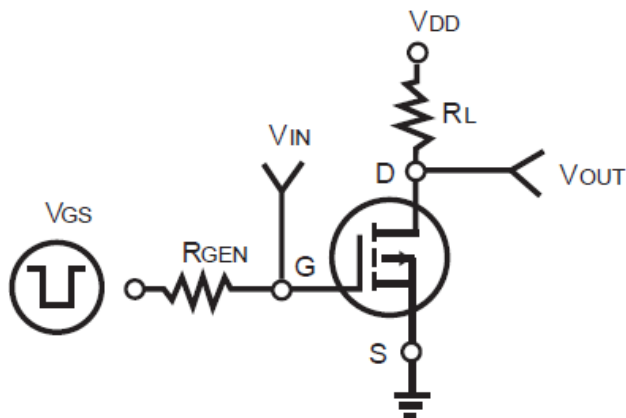
Symbol	Parameter	Typ	Value	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	39	°C/W

**Table 3. Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

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

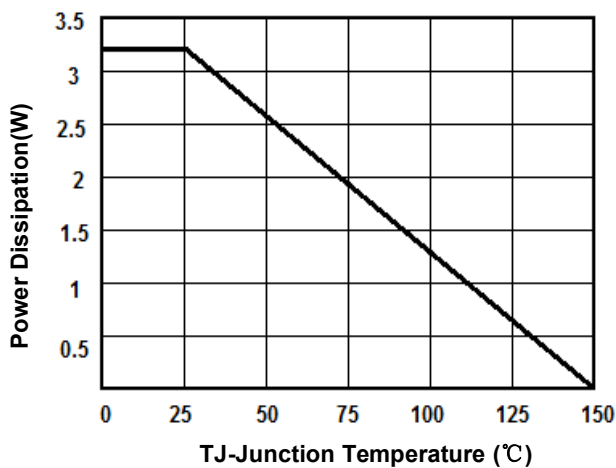


Figure2. Drain Current

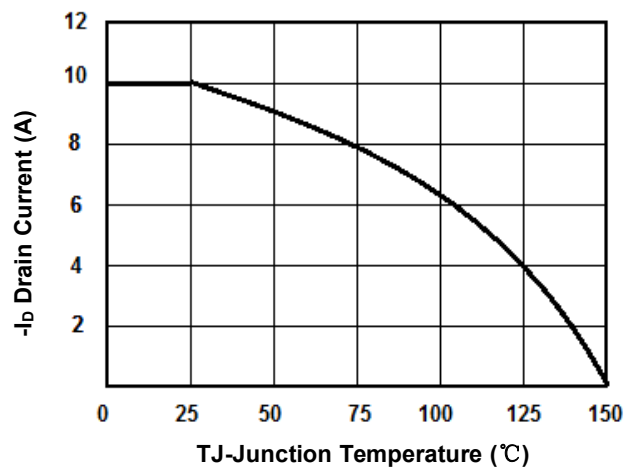


Figure3. Output Characteristics

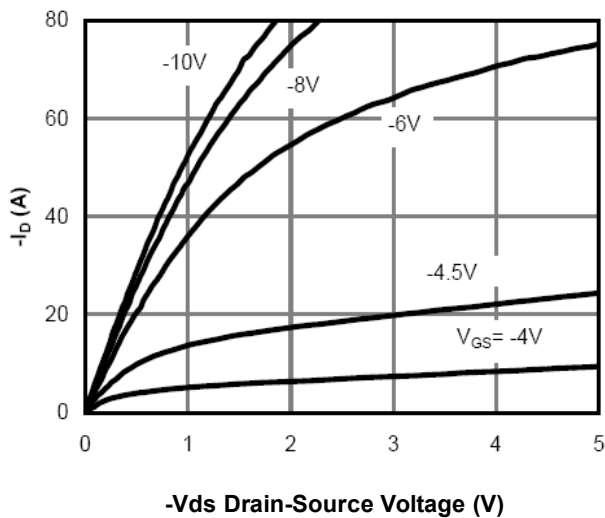


Figure4. Transfer Characteristics

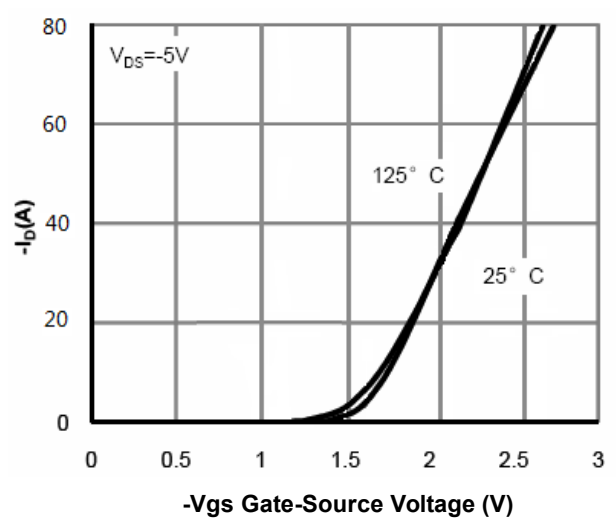


Figure5. Capacitance

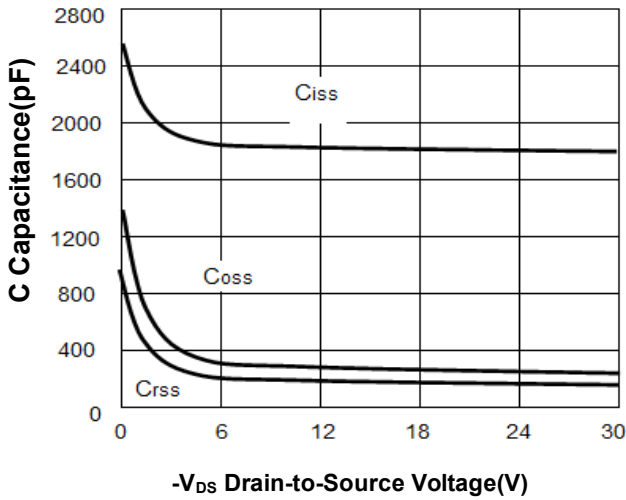


Figure6.  $R_{DS(ON)}$  vs Junction Temperature

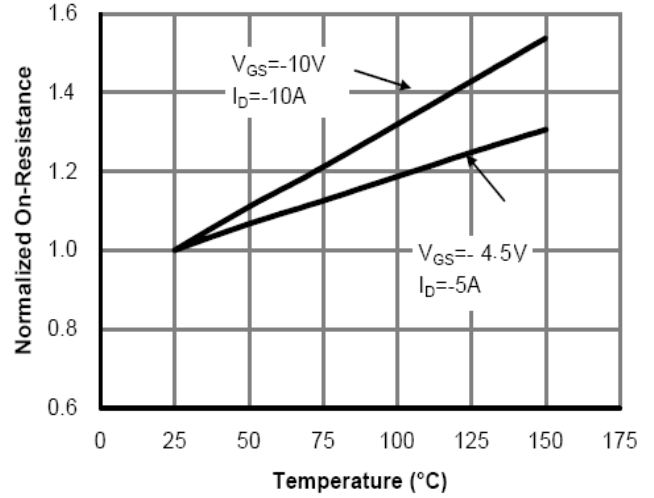


Figure7. Max  $BV_{DSS}$  vs Junction Temperature

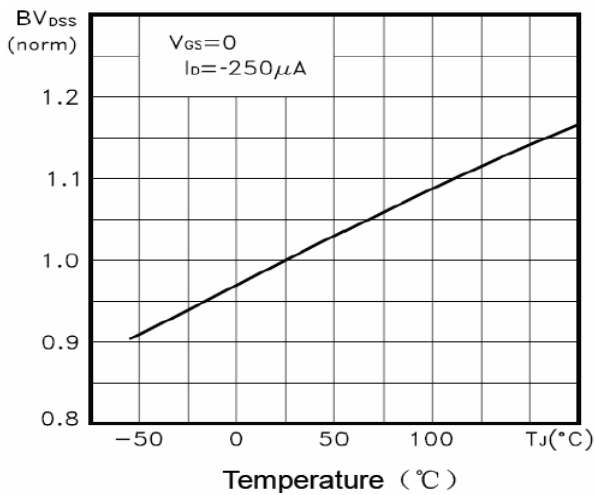


Figure8.  $V_{GS(th)}$  vs Junction Temperature

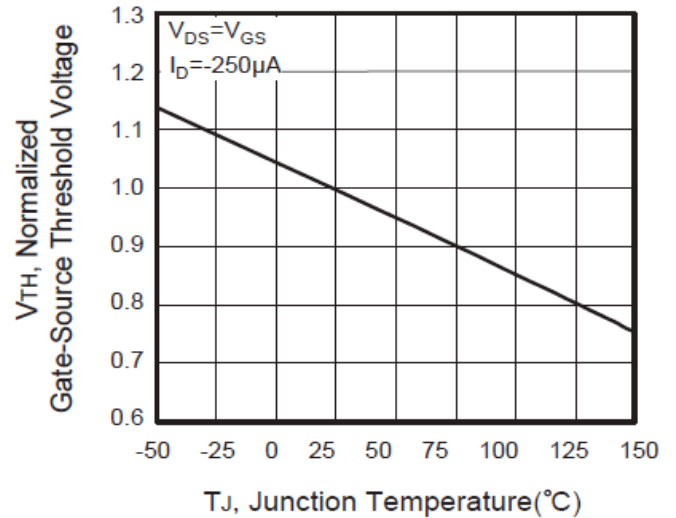


Figure9. Gate Charge Waveforms

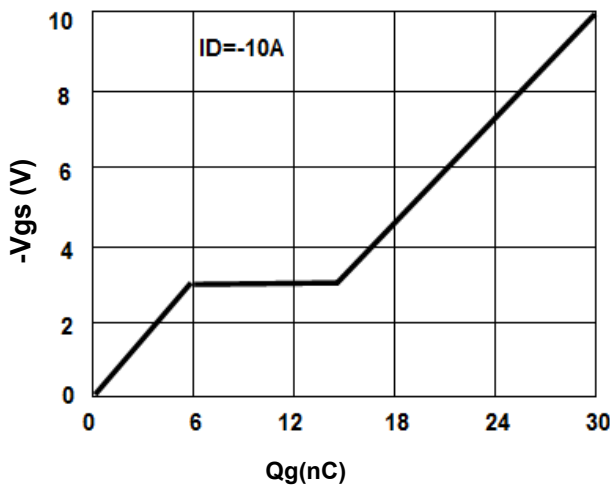


Figure10. Maximum Safe Operating Area

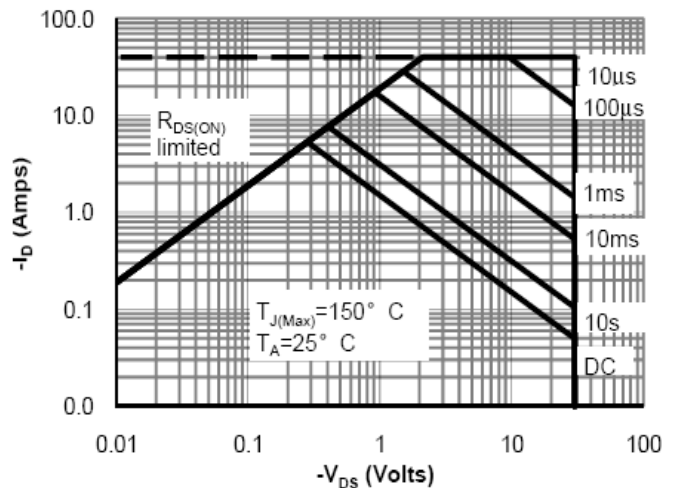
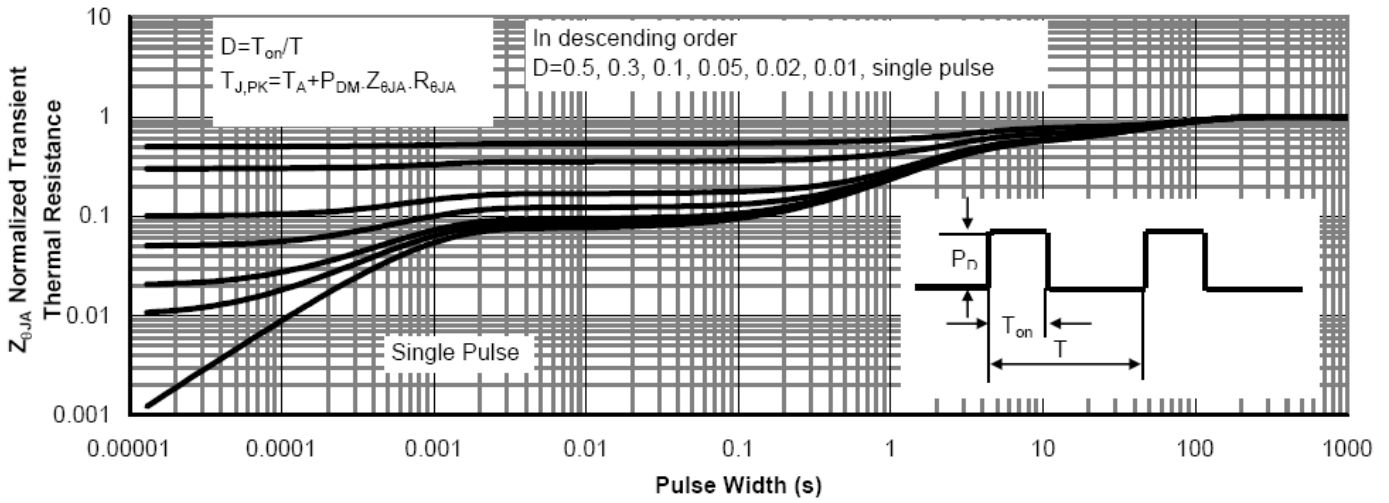
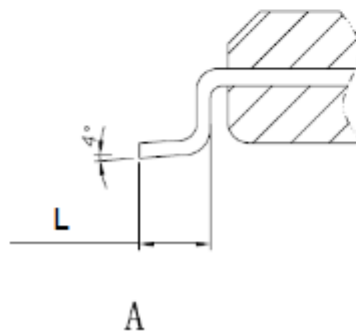
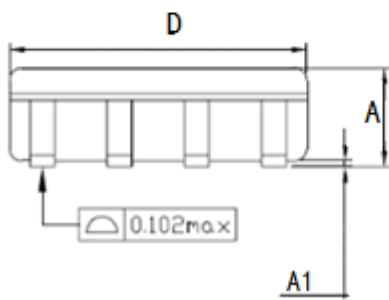
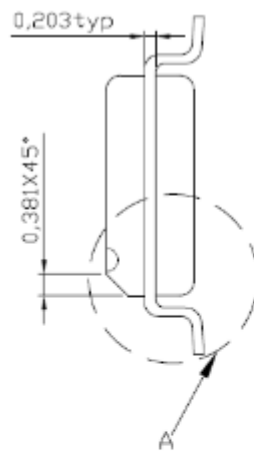
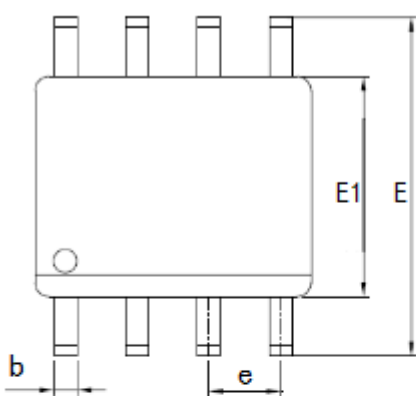


Figure11. Normalized Maximum Transient Thermal Impedance



### 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