

### Description

The XXW4421 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

### Features

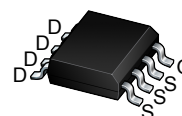
- $V_{DS} (V) = -60V$
- $I_D = -6.2 A (V_{GS} = -10V)$
- $R_{DS(ON)} < 55m\Omega (V_{GS} = -10V)$
- $R_{DS(ON)} < 72m\Omega (V_{GS} = -4.5V)$

### Application

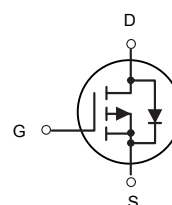
Battery protection

Load switch

Uninterruptible power supply



SOP-8



P-Channel MOSFET

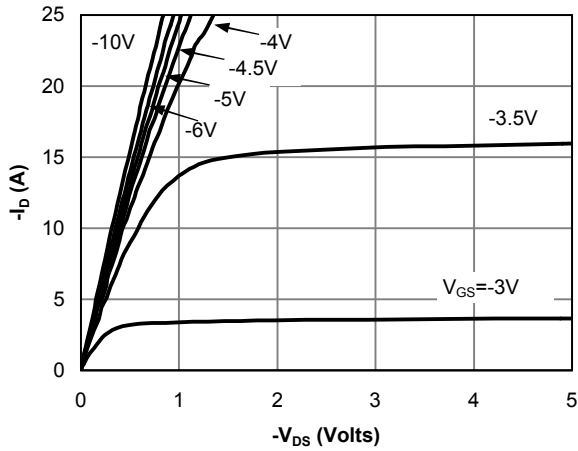
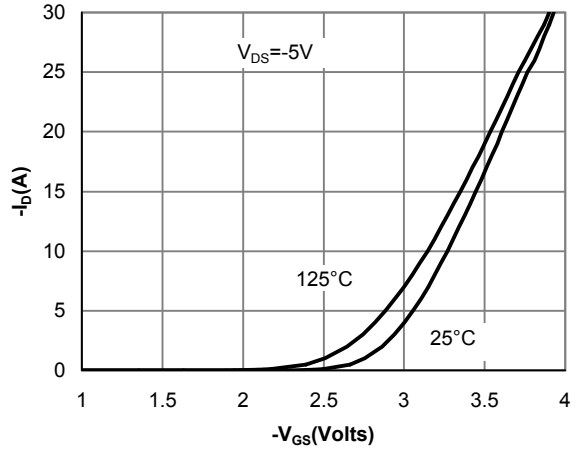
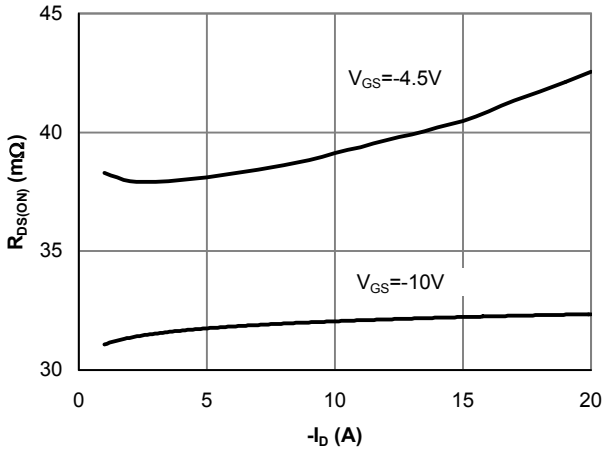
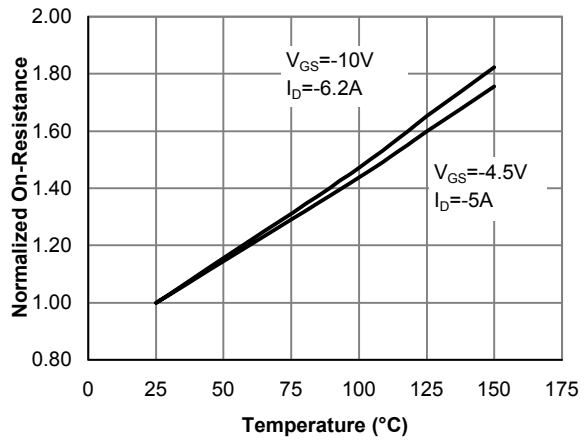
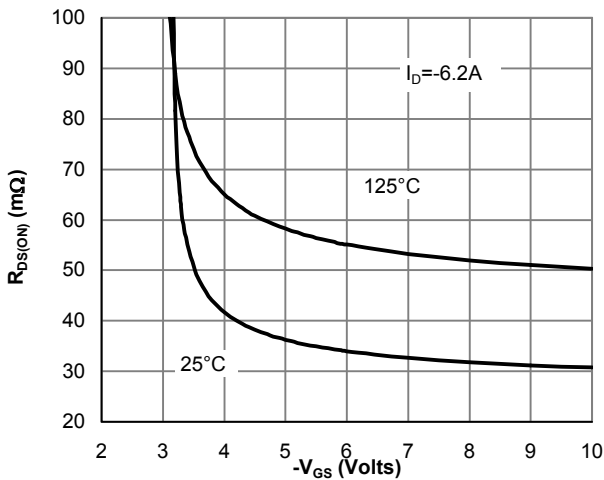
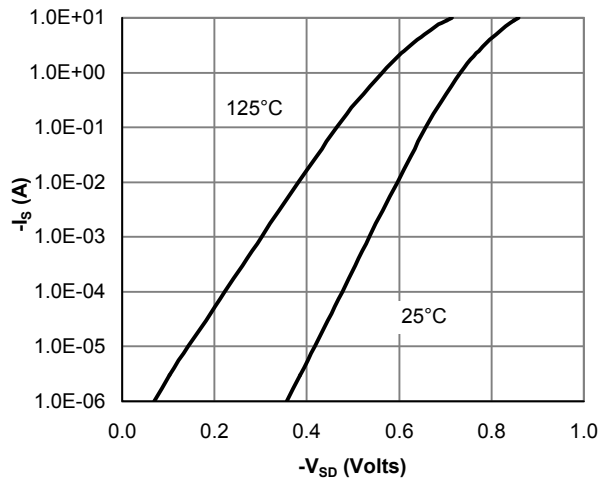
### Absolute Maximum Ratings $T_a = 25^\circ C$

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	-60	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current	$I_D$	$T_A = 25^\circ C$	-6.2	A
		$T_A = 70^\circ C$	-5	
Pulsed Drain Current	$I_{DM}$	-40		
Power Dissipation	$P_D$	$T_A = 25^\circ C$	3.1	W
		$T_A = 70^\circ C$	2	
Thermal Resistance.Junction- to-Ambient	$R_{thJA}$	$t \leq 10s$	40	$^\circ C/W$
		Steady-State	75	
Thermal Resistance.Junction- to-Lead	$R_{thJL}$	30		
Junction Temperature	$T_J$	150	$^\circ C$	
Junction Storage Temperature Range	$T_{stg}$	-55 to 150		

## Electrical Characteristics Ta = 25°C

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Drain-Source Breakdown Voltage	V <sub>DSS</sub>	I <sub>D</sub> =-250 μA, V <sub>GS</sub> =0V	-60			V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V			-1	μA	
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C			-5		
Gate-Body leakage current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250 μA	-1		-3	V	
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6.2A			55	mΩ	
		V <sub>GS</sub> =-10V, I <sub>D</sub> =-6.2A T <sub>J</sub> =125°C			80		
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A			72		
On state drain current	I <sub>D(ON)</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-40			A	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6.2A		18		S	
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-30V, f=1MHz		2417	2900	pF	
Output Capacitance	C <sub>oss</sub>			179			
Reverse Transfer Capacitance	C <sub>rss</sub>			120			
Gate resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.9	2.3	Ω	
Total Gate Charge (10V)	Q <sub>g</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-6.2A		46.5	55	nC	
Total Gate Charge (4.5V)				22.7			
Gate Source Charge			Q <sub>gs</sub>		9.1		
Gate Drain Charge			Q <sub>gd</sub>		9.2		
Turn-On DelayTime	t <sub>d(on)</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, R <sub>L</sub> =4.7Ω, R <sub>GEN</sub> =3Ω		9.8		ns	
Turn-On Rise Time	t <sub>r</sub>			6.1			
Turn-Off DelayTime	t <sub>d(off)</sub>			44			
Turn-Off Fall Time	t <sub>f</sub>			12.7			
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =-6.2A, di/dt=100A/us		34	42	nC	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			47			
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-4.2	A	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V			-1	V	

Note : The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

**Typical Characteristics**

**Fig 1: On-Region Characteristics**

**Figure 2: Transfer Characteristics**

**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**

**Figure 4: On-Resistance vs. Junction Temperature**

**Figure 5: On-Resistance vs. Gate-Source Voltage**

**Figure 6: Body-Diode Characteristics**

Typical Characteristics

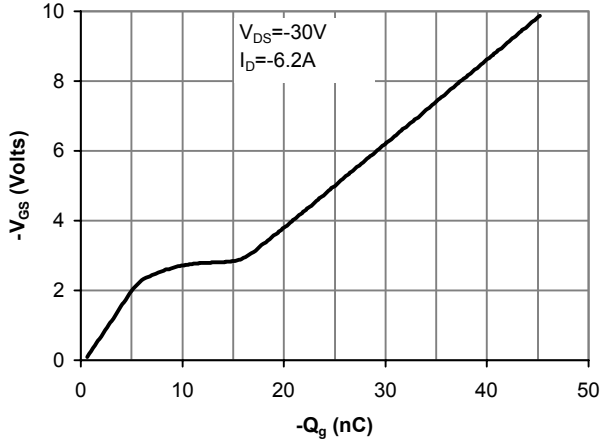


Figure 7: Gate-Charge Characteristics

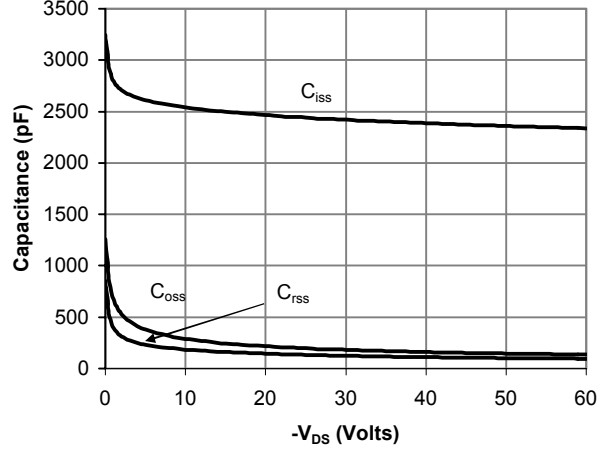


Figure 8: Capacitance Characteristics

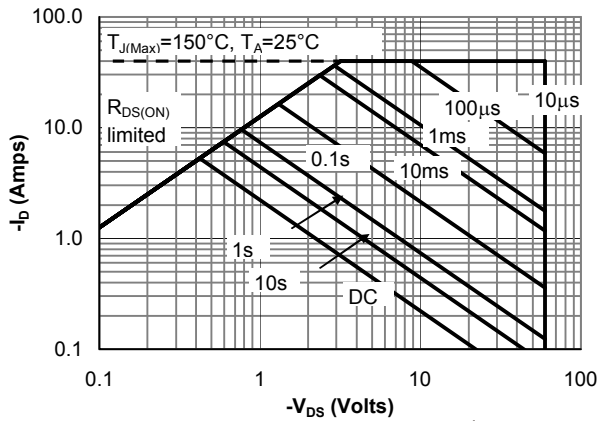


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

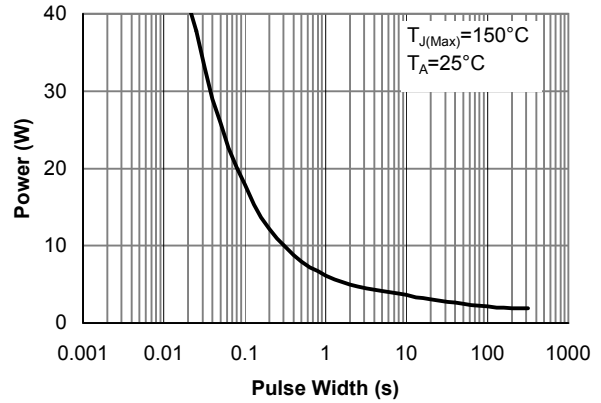


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

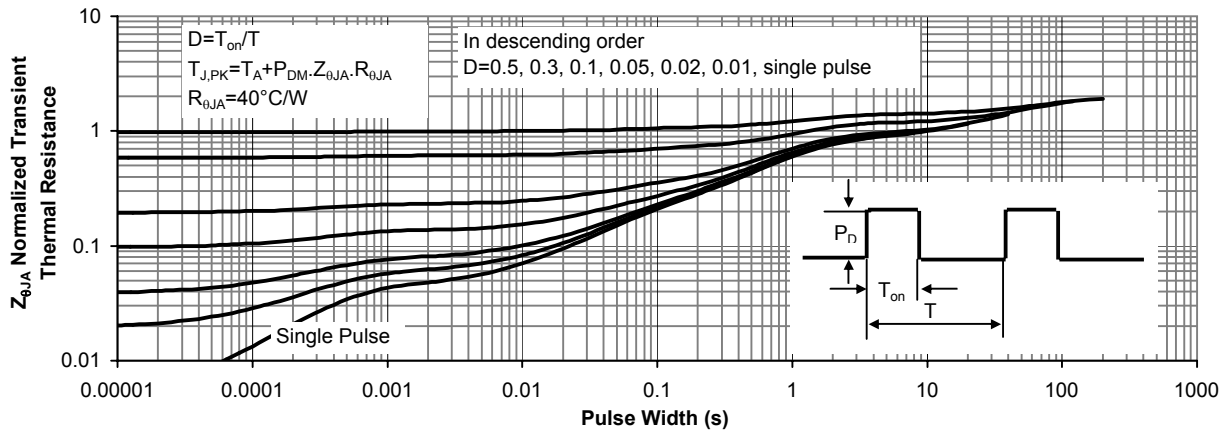
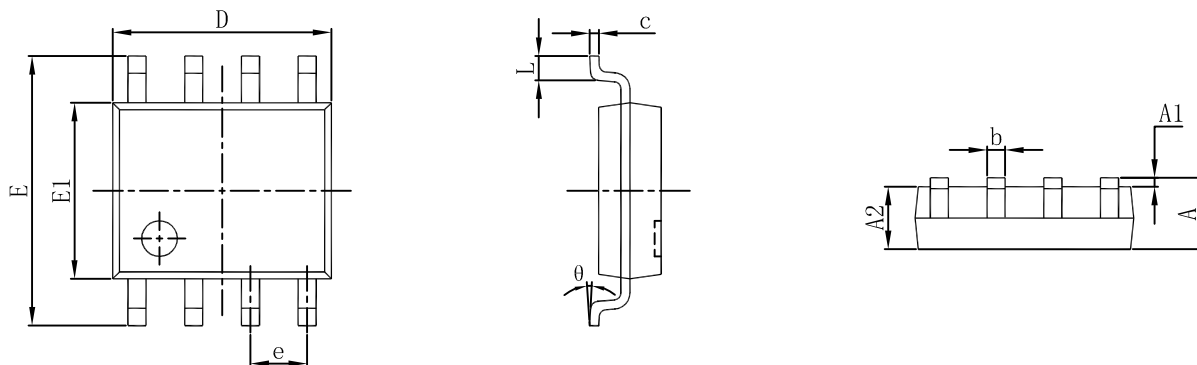
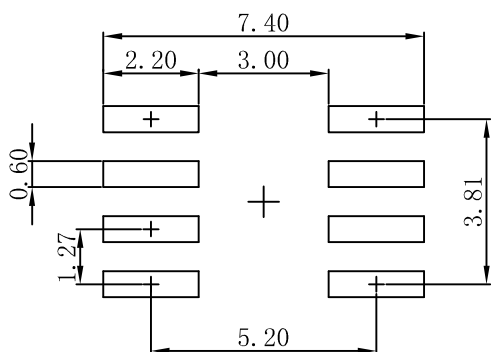


Figure 11: Normalized Maximum Transient Thermal Impedance

**SOP-8 Package Outline Dimensions**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance:  $\pm 0.05\text{mm}$ .  
 3. The pad layout is for reference purposes only.