

## 60V P-Channel MOSFET

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
-60V	200mΩ@-10V	-2A

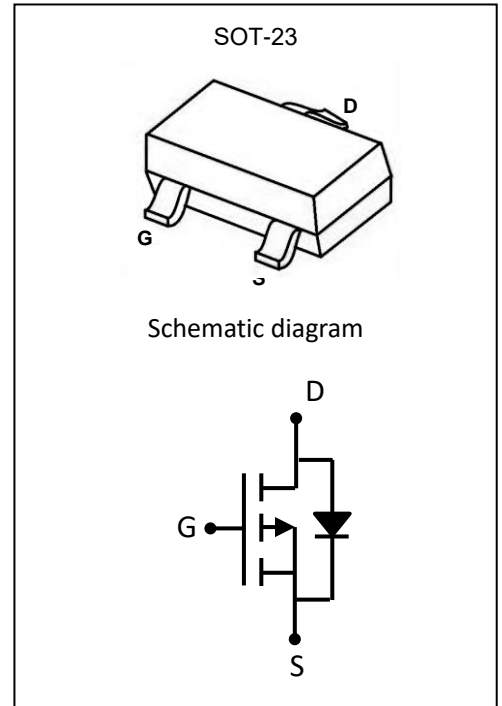
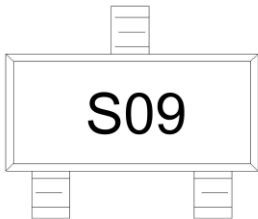
### Feature

- TrenchFET Power MOSFET
- Excellent  $R_{DS(on)}$  and Low Gate Charge
- AEC-Q101 qualified (Automotive grade with suffix "Q.")
- Expsemi electronics

### Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch

### MARKING:



### Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous	$-I_D$	2	A
Drain Current-Pulsed <sup>Note1</sup>	$-I_{DM}$	8	A
Maximum Power Dissipation	$P_D$	0.9	W
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

### Thermal Characteristics

Thermal Resistance, Junction-to-Ambient <sup>Note2</sup>	$R_{\theta JA}$	139	°C/W
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**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

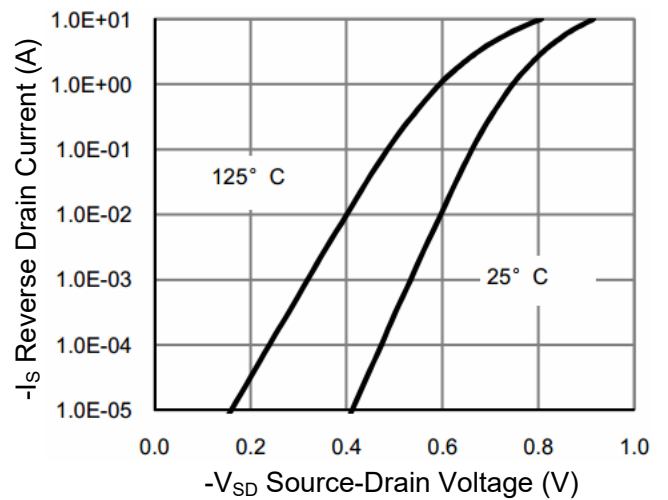
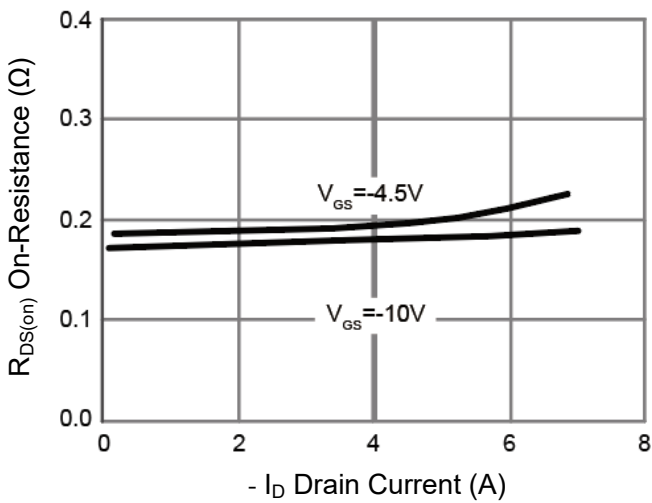
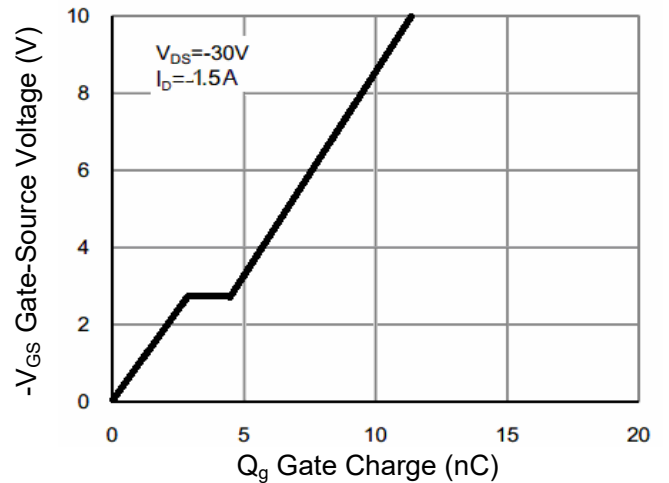
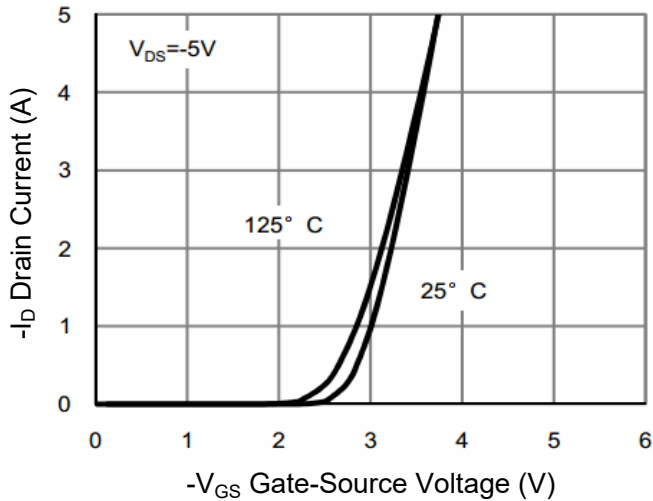
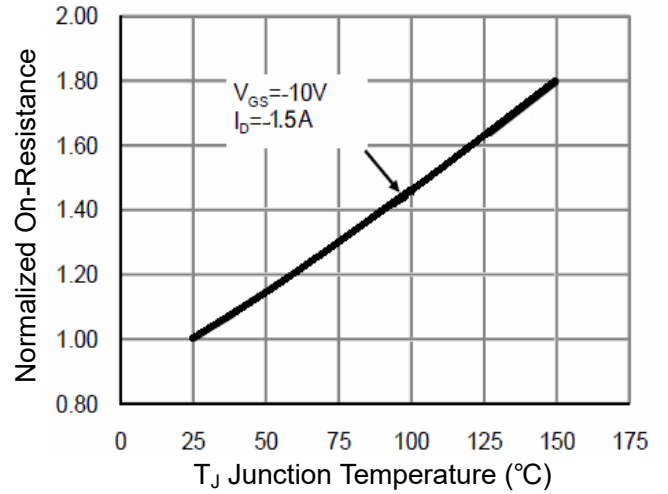
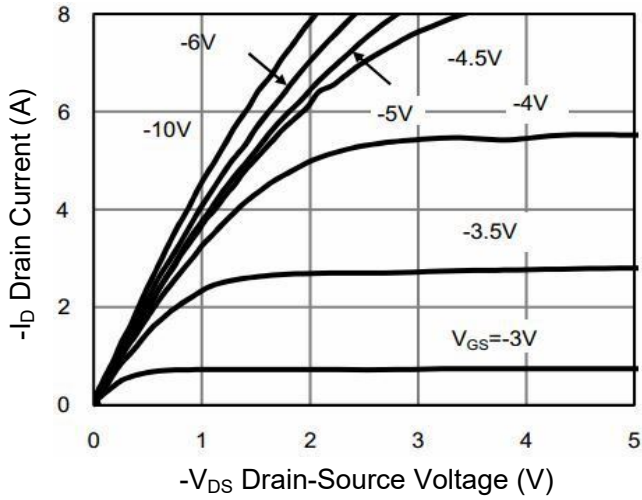
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	-V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	60	--	--	V
Zero Gate Voltage Drain Current	-I <sub>DSS</sub>	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V	--	--	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
Gate Threshold Voltage <sup>Note3</sup>	-V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	1.0	1.8	3.0	V
Drain-Source On-Resistance <sup>Note3</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-2A	--	175	200	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A	--	190	300	mΩ
Forward Transconductance <sup>Note3</sup>	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-1A	--	4	--	S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, f=1MHz	--	444.2	--	pF
Output Capacitance	C <sub>oss</sub>		--	19.6	--	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		--	17.9	--	pF
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-30V, I <sub>D</sub> =-1.5A V <sub>GS</sub> =-10V, R <sub>GEN</sub> =3Ω	--	40	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	35	--	nS
Turn-off Delay Time	t <sub>d(off)</sub>		--	15	--	nS
Turn-off Fall Time	t <sub>f</sub>		--	10	--	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-30V, I <sub>D</sub> =-1.5A, V <sub>GS</sub> =-10V	--	11.3	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	2.7	--	nC
Gate-Drain Charge	Q <sub>gd</sub>		--	1.6	--	nC
<b>Source-Drain Diode Characteristics</b>						
Diode Forward Voltage <sup>Note3</sup>	-V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-2A	--	--	1.2	V
Diode Forward Current <sup>Note2</sup>	-I <sub>S</sub>		--	--	2	A

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

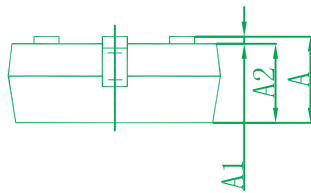
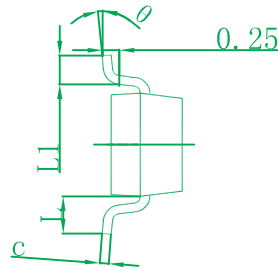
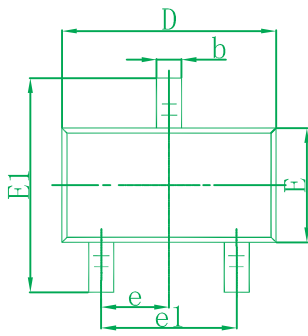
2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse width ≤ 300μs, duty cycle ≤ 2%.

### Typical Characteristic Curves

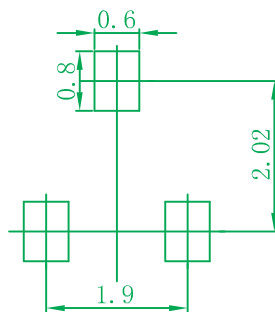


### SOT-23 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.150	0.035	0.045
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.050	0.110	0.120
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.360 REF		0.014 REF	
θ	0°	8°	0°	8°

### SOT-23 Suggested Pad Layout



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

### Ordering information

Device	Package	Shipping
EP2309	SOT-23	3000/Tape&Reel(7inches)