



**WANSEMI**  
万芯半导体

**WP2309**

# **Enhancement Mode P-Channel Power MOSFET**

**SOT23/PMOS/-60V/ $\pm$ 20V/-1.5V/-3A/137m $\Omega$**

**Rev1.3**

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## P Channel Advanced Power MOSFET

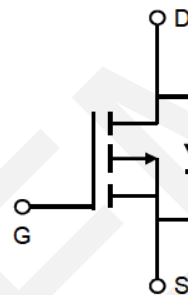
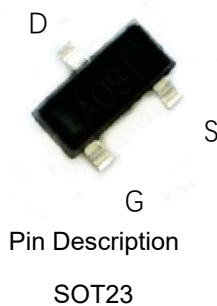
### 1.Features

- ◆ Fast Switching
- ◆ Improved dv/dt Capability

$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$ Max.
-60V	137m $\Omega$ @ -10V	-3A

### 2.Applications

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power management



Schematic Diagram

### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP2309	2309	SOT23	3,000	180,000

### 4.Absolute Max Ratings at Ta=25°C (Note1)

Parameter	Symbol	Value	Units
Drain to Source Voltage	$V_{DS}$	-60	V
Gate to Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current (DC)	$I_D$	-3	A
Drain Current (Pulse), $PW \leq 300\mu s$	$I_{DP}$	-8	A
Total Dissipation	$P_D$	1	W
Junction Temperature	$T_j$	150	$^{\circ}C$
Storage Temperature	$T_{stg}$	-55 to +150	$^{\circ}C$

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### 5. Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction to ambient	$R_{\theta JA}$	125	$^{\circ}C/W$

Note 2: When mounted on 1 inch square copper board  $t \leq 10$ sec The value in any given application depends on the user's specific board design.

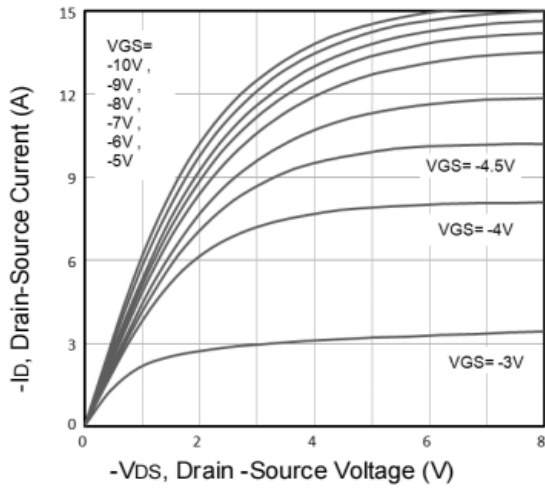
### 6. Electrical Characteristics at $T_a=25^{\circ}C$ (Note 3)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	-60	-	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -60V, V_{GS} = 0V$	-	-	-1	$\mu A$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	-1.1	-1.5	-2.0	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = -1.25A, V_{GS}=-10V$	-	137	182	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$ $V_{DS}=-30V,$ Frequency=1.0MHz	-	310	-	pF
Output Capacitance	$C_{oss}$		-	22	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	15	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$I_D = -2A,$ $V_{DS} = -30V,$ $R_{GEN} = 3.3\Omega,$ $V_{GS} = -10V,$	-	41	-	ns
Rise Time	$t_r$		-	22	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	25	-	ns
Fall Time	$t_f$		-	32	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = -30V,$	-	5.4	-	nC
	$Q_{gs}$	$V_{GS} = -10V,$	-	1.1	-	nC
	$Q_{gd}$	$I_D = -2A$	-	1.6	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_{SD} = -2A, V_{GS} = 0V$	-	-0.84	-1.2	V

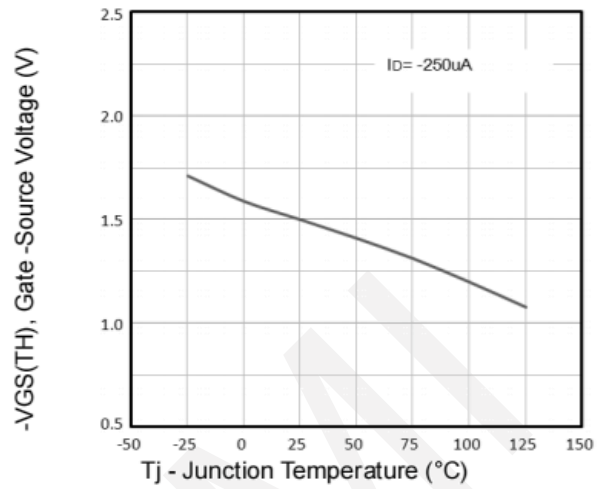
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



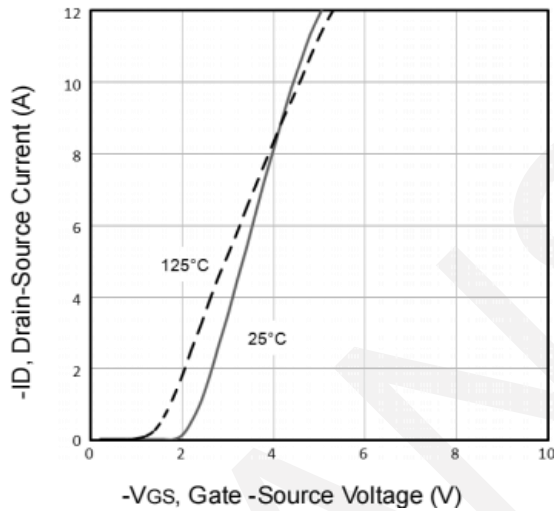
### 7. Typical electrical and thermal characteristics



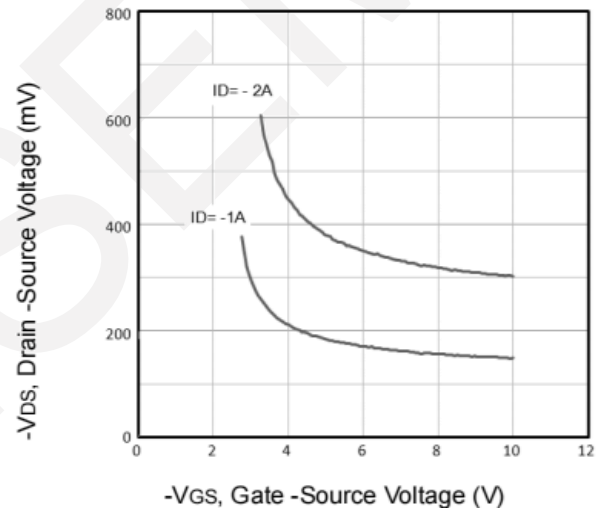
Output Characteristics



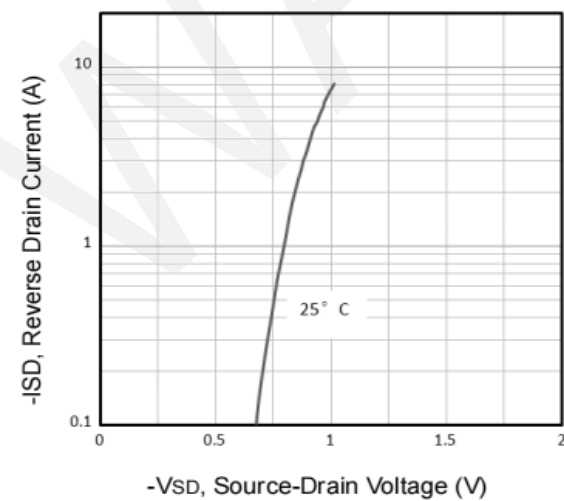
Normalized Threshold Voltage Vs. Temperature



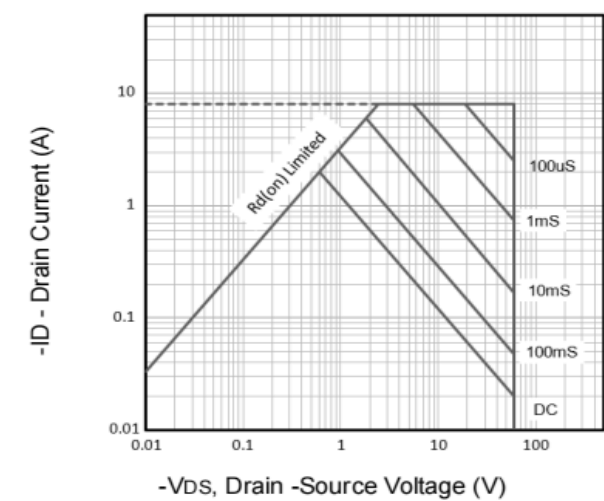
Typical Transfer Characteristics



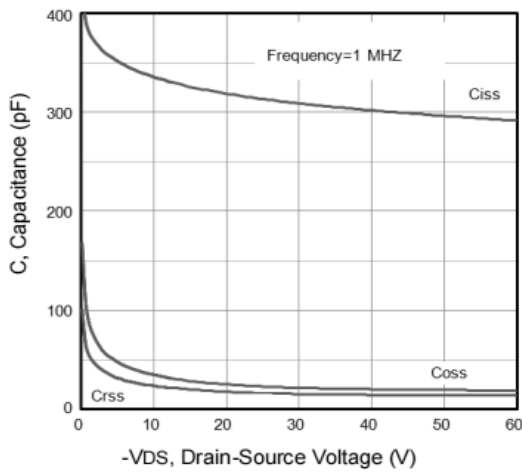
Drain-Source Voltage vs Gate-Source Voltage



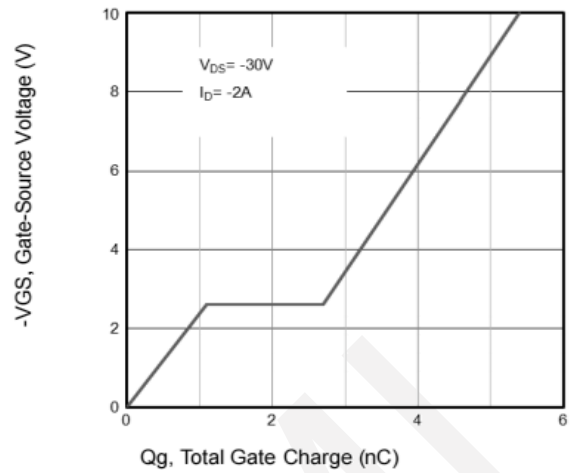
Typical Source-Drain Diode Forward Voltage



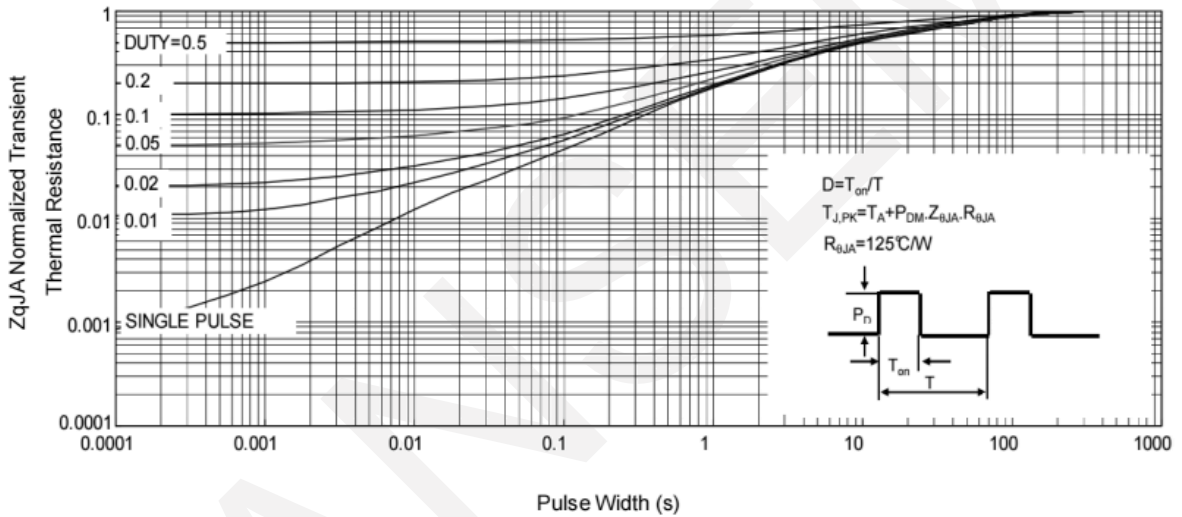
Maximum Safe Operating Area



**Typical Capacitance Vs. Drain-Source Voltage**



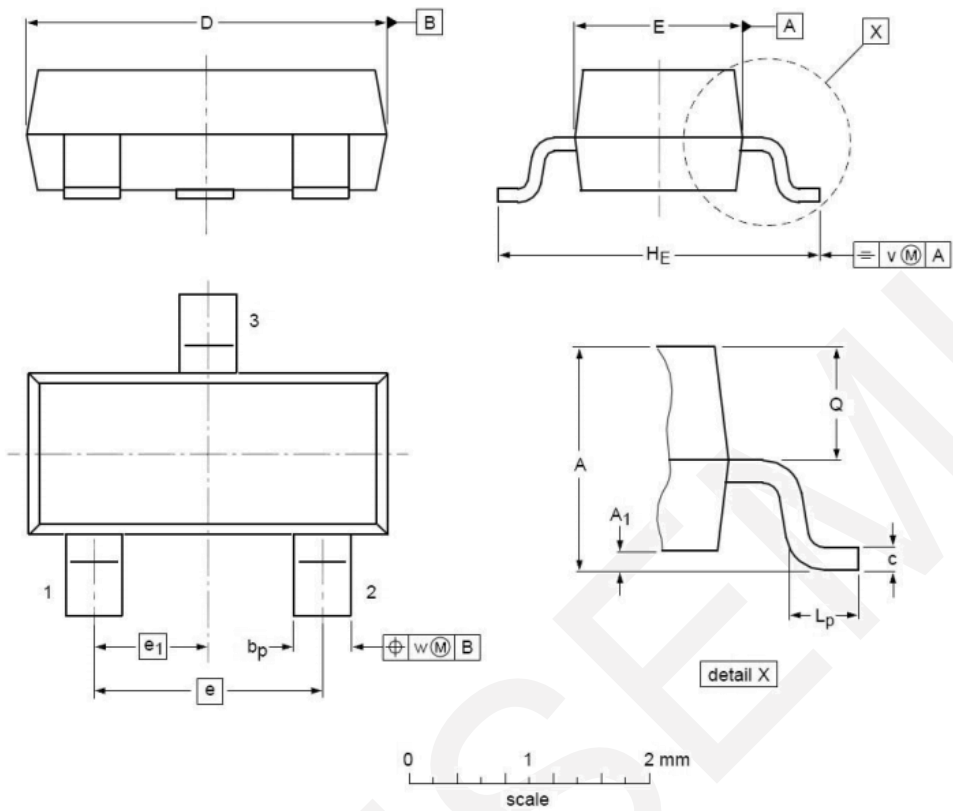
**Typical Gate Charge Vs. Gate-Source Voltage**



**Normalized Maximum Transient Thermal Impedance**



**8.Package Dimensions**



**DIMENSIONS** (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A <sub>1</sub>	0.01	0.05	0.10
b <sub>p</sub>	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e <sub>1</sub>	--	0.95	--
H <sub>E</sub>	2.25	2.40	2.55	L <sub>p</sub>	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				

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