



# PJM2309PSA

## P-Channel Power MOSFET

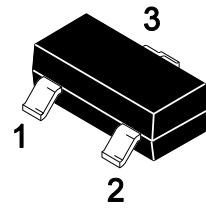
### Features

- $V_{DS} = -60V$   $I_D = -2.0A$
- $R_{DS(ON)} = 200m\Omega(max)$  @-10V
- Halogen and Antimony Free

### Applications

- Load Switch and in PWM Applications
- Power Management

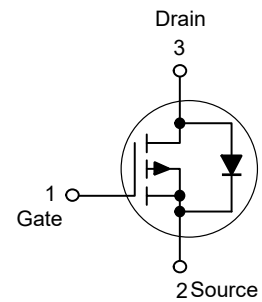
SOT-23



1. Gate 2. Source 3. Drain

Marking: S9

### Schematic Diagram



### Absolute Maximum Ratings

Ratings at  $T_A = 25^\circ C$  unless otherwise specified.

Parameter	Symbol	Value	Units
Drain-Source Voltage	$-V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$-I_D$	2	A
Power Dissipation	$P_D$	1.4	W
Junction and Storage Temperature Range	$T_J, T_{STG}$	150, -55 to 150	$^\circ C$
Thermal Characteristics			
Parameter	Symbol	Typ.	Units
Maximum Junction-to-Ambient	$R_{\theta JA}$	89	$^\circ C/W$



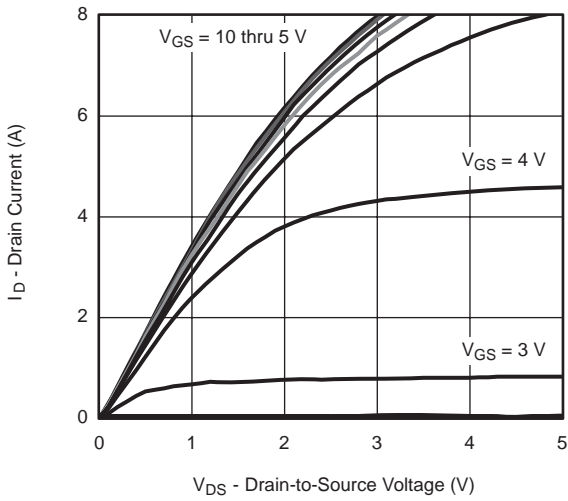
**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$-V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	60	--	--	V
Drain to Source Leakage Current	$-I_{DSS}$	$V_{DS} = -60V, V_{GS} = 0V$	--	--	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	--	--	$\pm 100$	nA
Gate threshold voltage <sup>Note1</sup>	$-V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	1.5	--	3	V
Drain-source on-resistance <sup>Note1</sup>	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -2A$	--	--	200	$m\Omega$
		$V_{GS} = -4.5V, I_D = -1A$	--	--	400	$m\Omega$
Forward transconductance <sup>Note1</sup>	$g_{FS}$	$V_{DS} = -5V, I_D = -2A$	--	6	--	S
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -30V, V_{GS} = 0V, f = 1MHz$	--	850	--	pF
Output Capacitance	$C_{oss}$		--	65	--	
Reverse Transfer Capacitance	$C_{rss}$		--	28	--	
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$I_D = -1A, V_{DD} = -30V,$ $V_{GS} = -10V, R_{GEN} = 3\Omega,$ $R_L = 7.5\Omega,$	--	7	--	ns
Turn-on rise time	$t_r$		--	3	--	
Turn-off delay time	$t_{d(off)}$		--	28	--	
Turn-off fall time	$t_f$		--	5.5	--	
Total gate charge	$Q_g$	$V_{DD} = -30V, V_{GS} = -10V, I_D = -2A$	--	22	--	nC
Gate-source charge	$Q_{gs}$		--	2.5	--	
Gate-drain charge	$Q_{gd}$		--	6	--	
<b>Source-Drain Diode characteristics</b>						
Continuous Source-Drain Diode Current	$-I_S$		--	--	1.4	A
Diode Forward voltage	$-V_{DS}$	$V_{GS} = 0V, I_S = -2A$	--	--	1.2	V

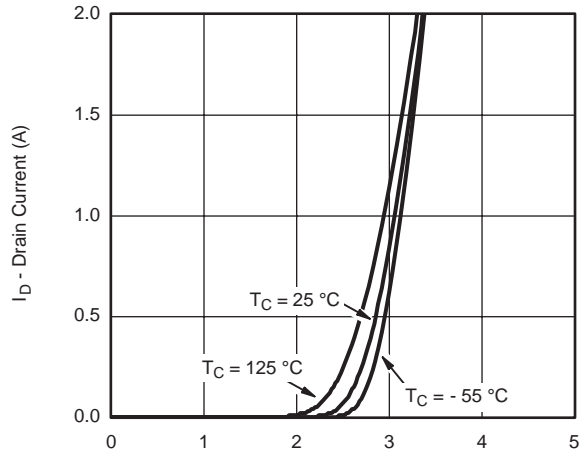
Notes: 1. Pulse test ; pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .



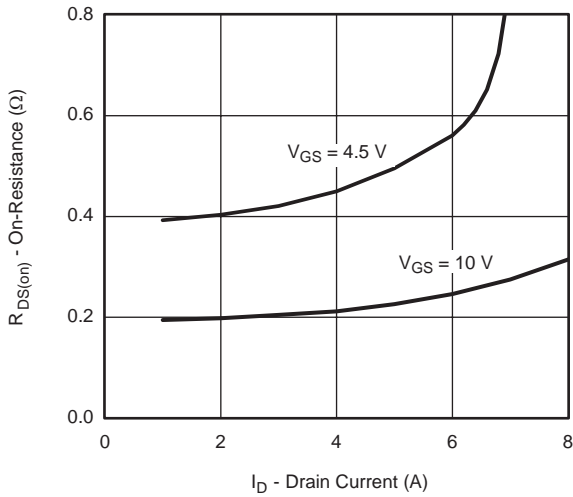
**Typical Characteristic Curves**



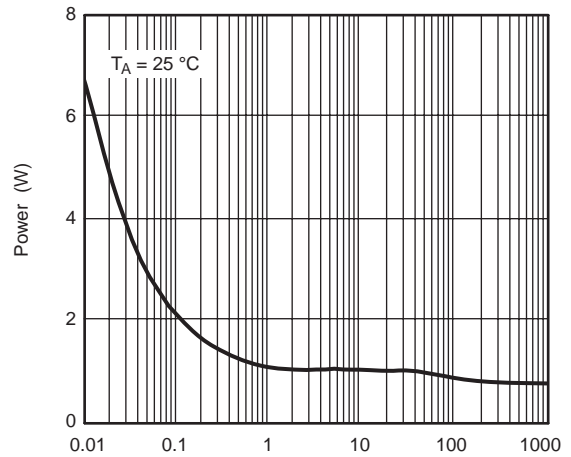
**Output Characteristics**



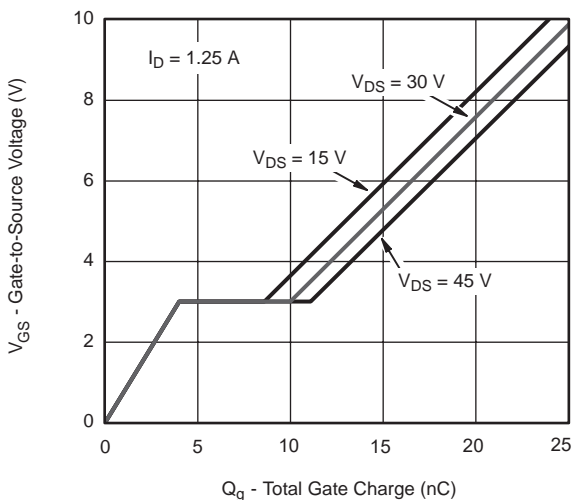
**Transfer Characteristics**



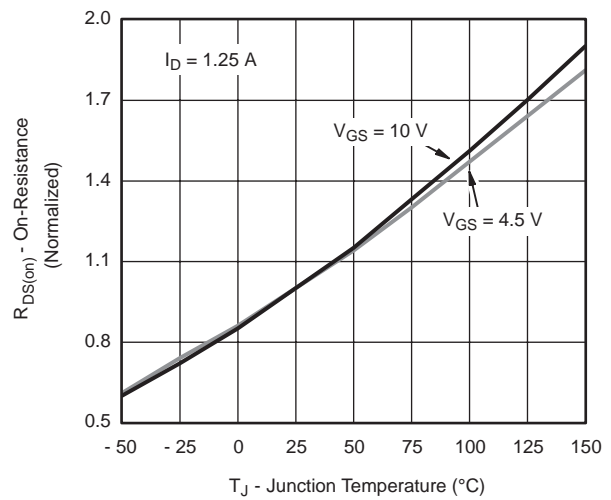
**On-Resistance vs. Drain Current and Gate Voltage**



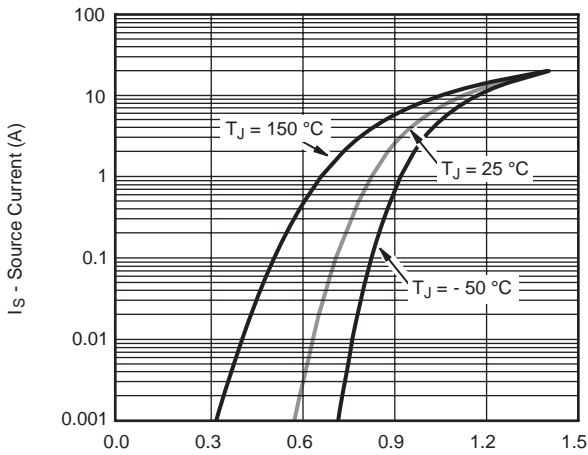
**Single Pulse Power, Junction-to-Ambient**



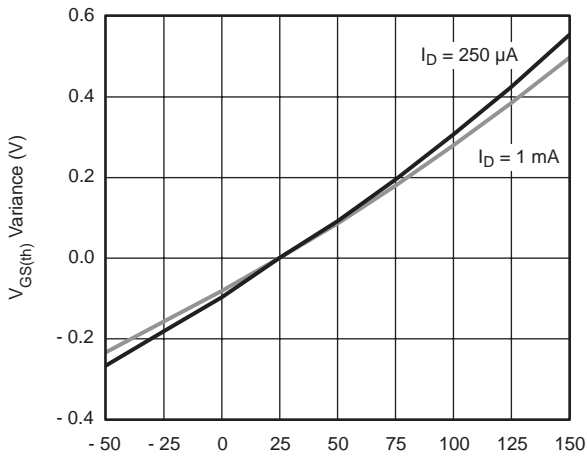
**Gate Charge**



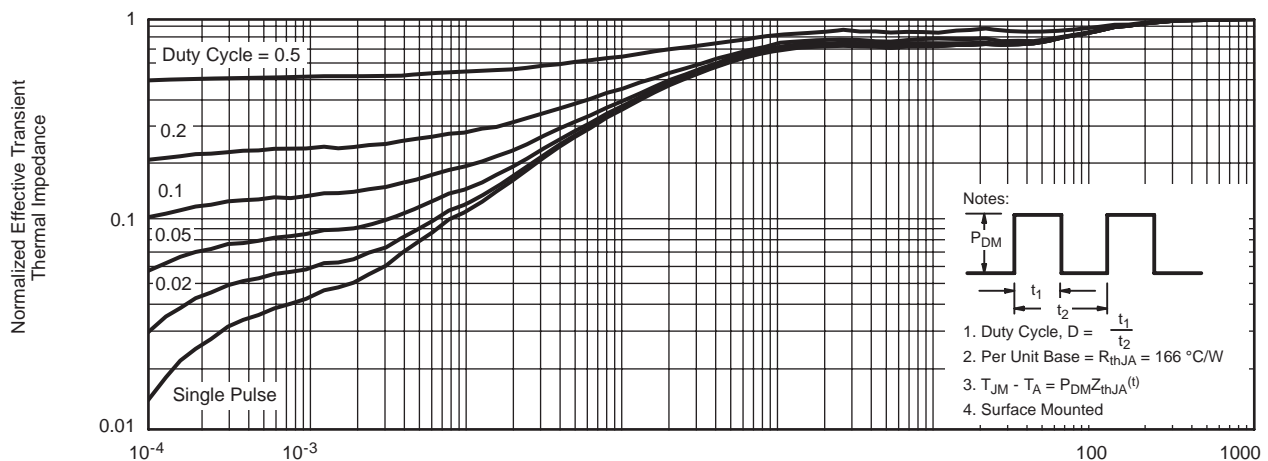
**On-Resistance vs. Junction Temperature**



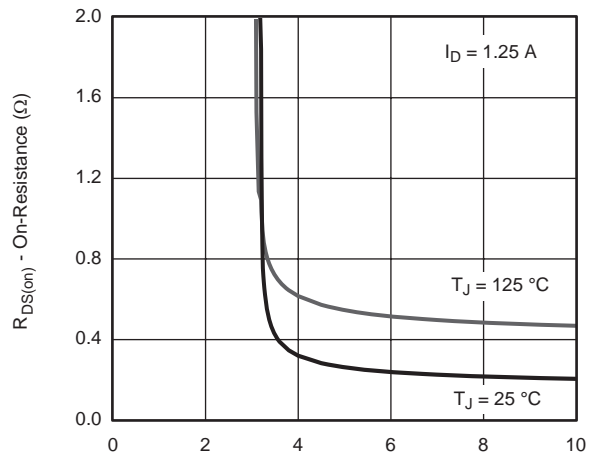
Source-Drain Diode Forward Voltage



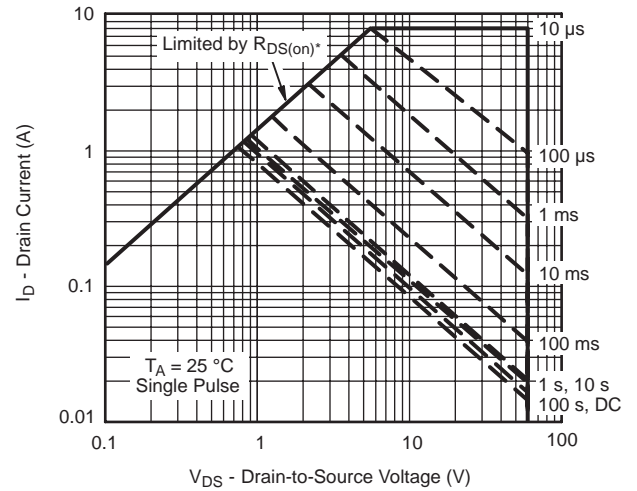
Threshold Voltage



Normalized Thermal Transient Impedance, Junction-to-Ambient



On-Resistance vs. Gate-to-Source Voltage

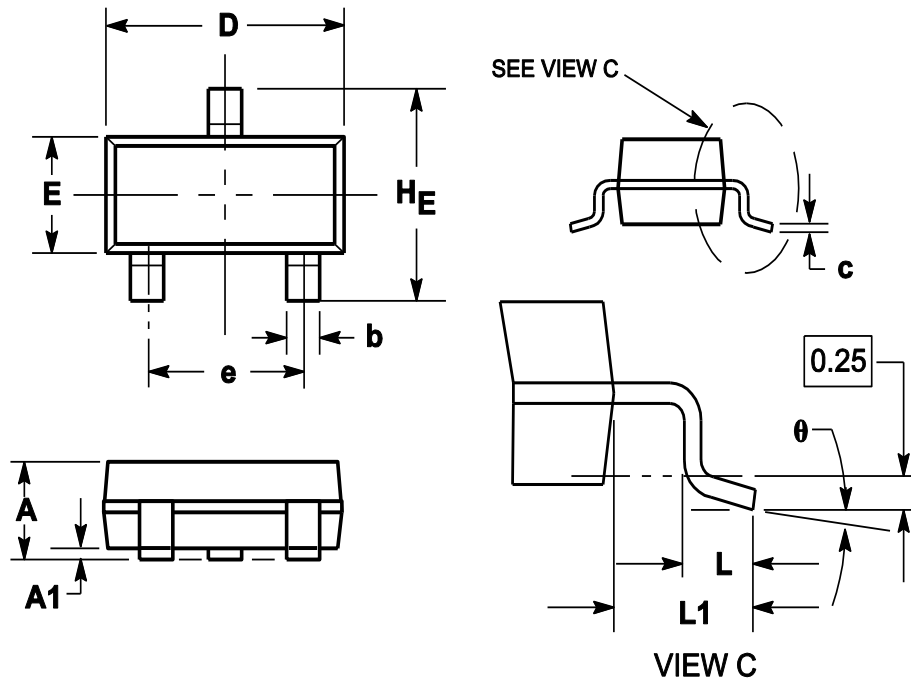


Safe Operating Area, Junction-to-Ambient

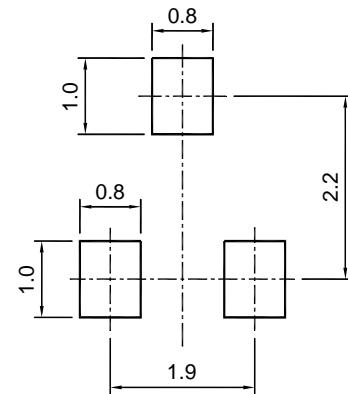


**Package Outline**

SOT-23



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.900	1.025	1.150
A1	0.000	0.050	0.100
b	0.300	0.400	0.500
c	0.080	0.115	0.150
D	2.800	2.900	3.000
E	1.200	1.300	1.400
HE	2.250	2.400	2.550
e	1.800	1.900	2.000
L1	0.550REF		
L	0.300		0.500
θ	0°		8°



SOT-23 (TO-236)

**Recommended soldering pad**

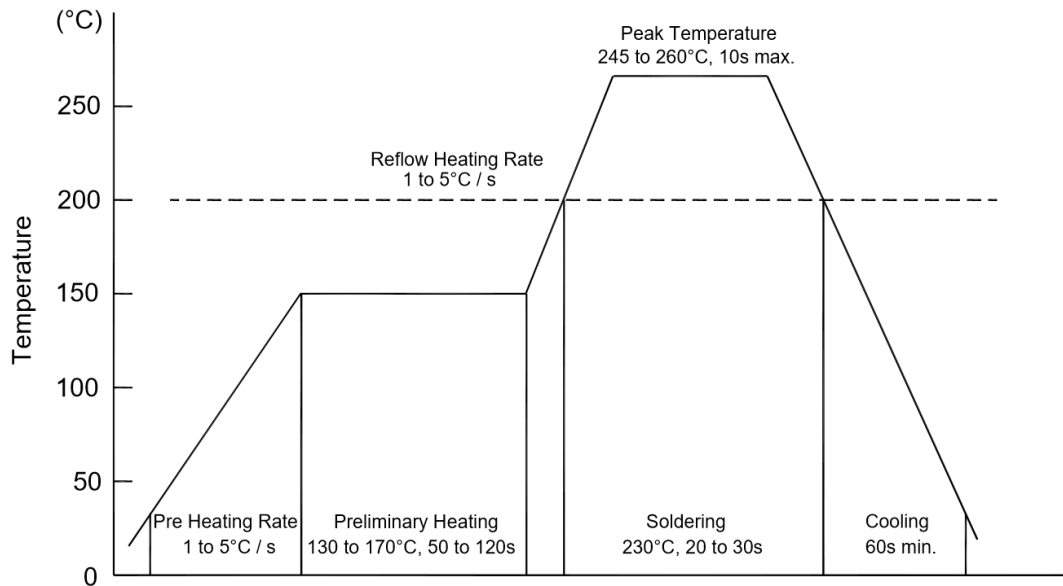
**Ordering Information**

Device	Package	Shipping
PJM2309PSA	SOT-23	3000PCS/Reel&Tape



## Conditions of Soldering And Storage

### ◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245 °C. If peak temperature is below 245 °C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

### ◆ Conditions of hand soldering

- Temperature: 370 °C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

- **Temperature**  
5 to 40 °C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing



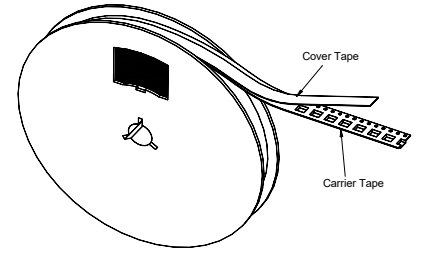
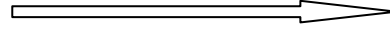
**Package Specifications**

- The method of packaging

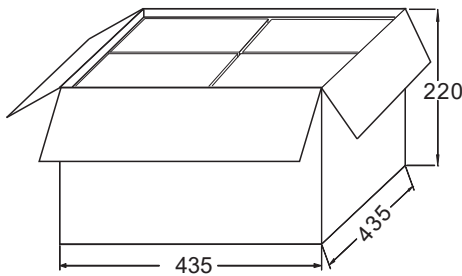
SOT-23 (TO-236)



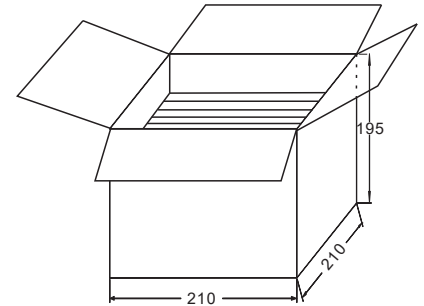
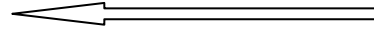
3,000 pcs per reel



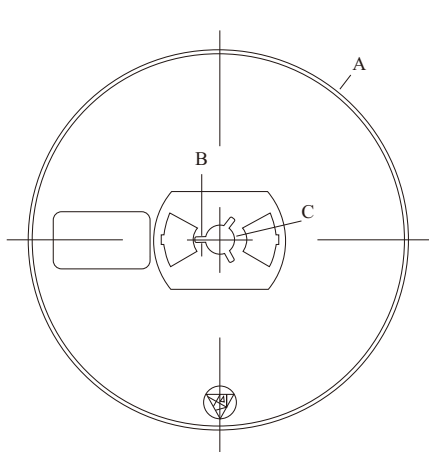
30,000 pcs per box  
10 reels per box



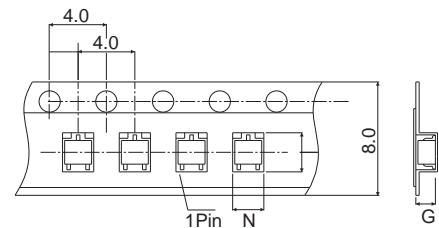
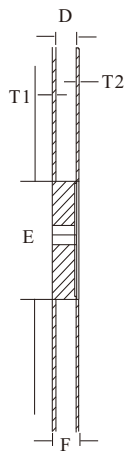
120,000 pcs per carton  
4 boxes per carton



◆ **Embossed tape and reel data**



Reel (7")



Tape (8mm)

Symbol	Value (unit: mm)
A	∅ 177.8±1
B	2.7±0.2
C	∅ 13.5±0.2
E	∅ 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2
N	3.15±0.1
G	1.25±0.1